TEXAS A&M UNIVERSITY-CORPUS CHRISTI
PURCHASING DEPARTMENT
6300 OCEAN DRIVE
CORPUS CHRISTI, TX 78412

CSP Number:
CSP4-0003

Central Plant Improvements – Chaparral Bldg.

Addendum #2

In an effort to ensure that prospective vendors have the all necessary information to provide accurate proposals, the University is providing the following relevant information regarding equipment the University has purchased for the project.

1. **Please see the equipment submittals attached as Attachment A and Attachment B.**

2. **For reference, it is anticipated that the Generator System will be delivered in January of 2025, and the Chillers will be delivered in June of 2024.**

This document and attachments shall be attached to and become a part of the contract documents for this project. This addendum shall be signed for acknowledgement that you have received Addendum #2 and shall be returned with your proposal.

COMPANY NAME: _____

STREET ADDRESS: _____

CITY/STATE: _____

TELEPHONE AND FAX: _____

SIGNATURE: _____ **DATE:** _____

Attachment A

Equipment Submittal

TAMU CC

450REZXD– 450 Kilowatt Generator System

Account Manager: Jim Lambrecht
210-740-5340
jlambrecht@loftinequip.com

Loftin Equipment Company
1241 Universal City Blvd.
Universal City, TX
85008
(210) 881-1623
www.loftinequip.com

KOHLER. Power Systems

TABLE OF CONTENTS

1241 Universal City Boulevard, Universal City, TX 78148
Phone: 210-881-1623| Fax: 210-881-2143
www.LoftinEquip.com

Generator

Kohler Model: 450REZXD

This gas generator set equipped with a 5M4028 alternator operating at 120/208 volts is rated for 450 kW/562 kVA. Output amperage: 1560.

Qty	Description
	450REZXD Generator System
1	450REZXD Generator Set

Includes the following:

Literature Languages	English
Approvals and Listings	UL2200 Listing/cUL Genset List
Engine	450REZXD,24V,SINGLE FUEL,NG
Nameplate Rating	Standby 130C Rise
Voltage	60Hz, 120/208V, Wye, 3Ph, 4W
Alternator	5M4028
Cooling System	Unit Mounted Radiator, 50C
Skid and Mounting	Skid
Controller	APM603
Enclosure Type	Sound
Enclosure Material	Aluminum
Enclosure Electrical Package	Basic Electrical Pkg, 1 Ph
Enclosure Electrical Acc.	Wire Block Heater
Enclosure Electrical Acc.	Wire Battery Charger
Enclosure DC Lighting	DC Lights, LED
Starting Aids, Installed	6000W,208V,1Ph,w/Valves
Electrical Accy.,Installed	Battery, 2/12V, Wet
Electrical Accy.,Installed	Battery Charger, 10A
Electrical Accy.,Installed	Run Relay
Electrical Accy.,Installed	Failure Relay w/Harness,1Fault
Electrical Accy.,Installed	Generator Heater
Electrical Accy.,Installed	15 Relay I/O Board
Rating, LCB 1 Right	100% Rated
Amps, LCB 1 Right	1200
Trip Type, LCB 1 Right	Electronic, LSI

1241 Universal City Boulevard, Universal City, TX 78148
Phone: 210-881-1623| Fax: 210-881-2143
www.LoftinEquip.com

	LCB 1 Right Interrupt Rating	35kA at 480V
	Aux Trip, LCB 1 Right	Shunt Trip
	Rating, LCB 1 Left	100% Rated
	Amps, LCB 1 Left	1200
	Trip Type, LCB 1 Left	Electronic, LSI
	LCB 1 Left Interrupt Rating	35kA at 480V
	Aux Trip, LCB 1 Left	Shunt Trip
	LCB Accy. Installed	Shunt Trip Wiring
	LCB Accy. Installed	Ground Fault Relay Indication
	Exceeds LTL Shipping Height	Add'l Shipping Charge Accepted
	Miscellaneous Accy,Installed	Air Cleaner Restriction Ind.
	Miscellaneous Accy,Installed	Coolant in Genset
	Warranty	10 Year Extended
	Testing, Additional	Power Factor Test,0.8,3Ph Only
	Testing, Additional	Special Test requested
	Special Factory Test Options	Regulation Stability/Transient
	Special Factory Test Options	Voltage & Frequency Regulation
	Special Factory Test Options	Voltage Dip/Rise @ Rated Load
	Special Factory Test Options	Record and cc customer
	Total number of running hours	4 hours total
	Run at full load (standard)	4 hours at full load
	Run test at 75% Load	0 hour at 75% load
	Run test at 50% Load	0 hour at 50% load
	Run test at 25% Load	0 hour at 25% load
	Standard readings every 15 min	Every 15 minutes (standard)
	Witnessed Y/N or Virtual	Not witnessed
	Weeks notice to perform test	9 weeks notice
	* Disclaimer - Special Test	Pricing subject to lead times
	Total unit length in inches	251
	Total unit width in inches	89
	Total unit height in inches	107
	Total unit weight (lbs)	15,470
	Weight/Dimensions Disclaimer *	Estimates-Not for Construction
1	Weld-On Flange, 5" ANSI	
1	Battery Charger Temp. Comp. Sensor	
1	NEC Remote, E-Stop	
1	Flexible Fuel Line	
1	RSA III, Annunciator only	
1	Special Test	

Qty	Description
1	RSA III, Annunciator only

KOHLER®

Miscellaneous

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	**Warranty Coverage**
Stationary Standby 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.
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

Kohler Standby/Prime Generator Set Test Program

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

Prototype Testing

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

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

Production Testing

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

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

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

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

KOHLER®

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

G18-56 12/05b

KOHLER®

450REZXD

60 Hz. Gas Generator Set
EPA Certified for Stationary Emergency Applications
EMISSION DATA SHEET

ENGINE INFORMATION

Model:	D219TIC, 21.9L	Bore:	128mm (5.0 in.)
Nameplate kW @ 1800 RPM:	510 (NG) 352 (LPG)	Stroke:	142mm (5.6 in.)
Type:	4-Cycle,V12 Cylinder	Displacement:	21.9 L (1336 cu. in.)
Aspiration:	Turbocharged	EPA Family (LP):	RPSIB21.9NGP
Compression Ratio:	10.5:1	EPA Family (NG):	RPSIB21.9NGP
Catalyst Required:	Yes	EPA Certificate (LP):	RPSIB21.9NGP-023
		EPA Certificate (NG):	RPSIB21.9NGP-023

EXHAUST EMISSION DATA[1]:

	LPG	NG	
CO_2	590.7	881.3	g/kWh
NOx	0.03	0.08	g/kWh
VOC[2]	0.05	0.01	g/kWh
CO	0.34	0.13	g/kWh
BSFC	241	213	g/kWh

1)Emissions shown are certified third-party Zero-hour data points suitable for site permitting calculations

2)For NG, NMHC is reported in place of VOC for this report

TEST METHODS AND CONDITIONS

Standby and overload ratings based on ISO3046. Continuous ratings based on ISO 8528.
All ratings are gross flywheel horsepower corrected to 77ºF at an altitude of 328 feet with no cooling fan or alternator losses using heating value for NG of 1015 BTU/SCF.
Production tolerances in engines and installed components can account for power variations of +/- 5%. Corrections for altitude, temperature and excessive exhaust and intake restrictions should be applied to power calculations.
Electrical ratings are an estimate based on assumed fan and generator losses and may vary depending on actual equipment losses.
BSFC is based on 100% gross flywheel power rating and does not include fan or generator losses.

Data and specifications subject to change without notice.

Attachment A

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2024 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: Power Solutions International, Inc.
(U.S. Manufacturer or Importer)

Certificate Number: RPSIB21.9NGP-023

Effective Date: 05/12/2023

Expiration Date: 12/31/2024

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 05/12/2023

Revision Date: N/A

Manufacturer: Power Solutions International, Inc.
Engine Family: RPSIB21.9NGP
Mobile/Stationary Certification Type: Mobile and Stationary
Fuel : Natural Gas (CNG/LNG)
LPG/Propane
Emission Standards :
Part 60 Subpart JJJ Table 1
NOx (g/Hp-hr) : 1.0
VOC (g/Hp-hr) : 0.7
CO (g/Hp-hr) : 2.0
Mobile Part 1048
NMHC + NOx (g/kW-hr) : 2.7
HC + NOx (g/kW-hr) : 2.7
CO (g/kW-hr) : 4.4
Stationary Part 1048
CO (g/kW-hr) : 4.4
NMHC + NOx (g/kW-hr) : 2.7
HC + NOx (g/kW-hr) : 2.7
Emergency Use Only : N

Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547) and 40 CFR Part 60, 40 CFR Part 1048, 1065, 1068, and 60 (stationary only and combined stationary and mobile) 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 nonroad engines, by engine family, more fully described in the documentation required by 40 CFR Part 60, 40 CFR Part 1048 and produced in the stated model year.

This certificate of conformity covers only those new nonroad spark-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, 40 CFR Part 1048 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60, 40 CFR Part 1048. This certificate of conformity does not cover nonroad engines imported prior to the effective date of the certificate.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068.20 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, 40 CFR Part 1048. 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, 40 CFR Part 1048.

This certificate does not cover large nonroad 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.

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
Effective Date: 2021-11-07
Latest Revision Date: 2021-10-29
Expiry Date: 2024-11-06

...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

Attachment A

Generator Set/Transfer Switch Installation Checklist

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

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

Equipment Room or Weather Housing

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

Engine and Mounting

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

Lubrication

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

Cooling and Ventilation

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

Fuel

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

Exhaust

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

AC Electrical System

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

Transfer Switch, Remote Control System, Accessories

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

Batteries and DC Electrical System

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

Special Requirements

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

Attachment A
Generator Set/Transfer Switch Startup Checklist

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

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

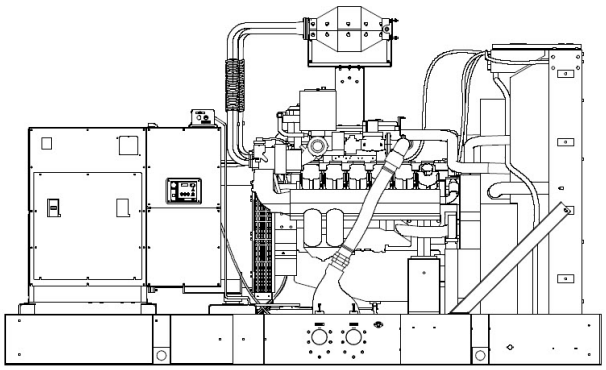
* Some models with an Engine Electronic Control Module (ECM) may limit or prohibit adjusting the engine speed or testing shutdowns. Refer to appropriate documentation available from the manufacturer.

KOHLER®

Spec Sheets

KOHLER

450REZXD
Natural Gas



Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- EPA-Certified for Stationary Emergency Applications
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a cULus listing.
- The generator set accepts rated load in one step.
- The 60 Hz emergency generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A one-year limited warranty covers all systems and components. Two-and five-year extended warranties are also available.
- Alternator Protection
- Battery Rack and Cables
- Closed Crankcase Ventilation (CCV) Filters
- Dual Fuel Reset Box (standard on dual fuel models)
- Integral Vibration Isolation
- Local Emergency Stop Switch
- Low Coolant Level Shutdown
- Oil Drain Extension
- Secondary Gas Solenoid Value
- Three-Way Exhaust Catalyst

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

- Natural gas is the primary fuel. Automatically transfers back to primary fuel when LP fuel becomes lwo or generator stops and restarts.
- The patented pending reset box on the generator provides the ability to manually transfer back to natural gas.The natural gas rating is available when running on natural gas.
- APM603 controller provides load shed for automatic derate to LP ratings to prevent an overload condition.

Generator Set Rating

Standby 130C Rise Ratings

Alternator	Voltage	Ph	Hz	kW/kVA	Amps
5M4028	120/208	3	60	450/562	1560

RATINGS: All three-phase units are rated at 0.8 power factor. All single-phase units are rated at 1.0 power factor.
Standby Ratings: The standby rating is applicable to varying loads for the duration of a power outage. There is no overload capability for this rating.

Alternator Specifications

Specifications	Alternator
Alternator manufacturer	Kohler
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, Nonhydroscopic
Insulation: Temperature Rise	130 ° C, 150 ° C Standby
Bearing: quantity, type	1, Sealed
Coupling	Flexible disc
Amortisseur windings	Full
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.
• Brushless alternator with brushless pilot exciter for excellent load response.

Engine

Engine Specification

Engine Manufacturer	Doosan
Engine Model	D219L
Engine: type	21.9 L, 4-Cycle, Turbocharged, Charge Air-Cooled
Cylinder arrangement	V-12
Displacement, L (cu. in.)	21.9 (1336)
Bore and stroke, mm (in.)	128 x 142 (5.0 x 5.6)
Compression ratio	10.5:1
Piston speed, m/min. (ft./min.)	511 (1677)
Main bearings: quantity, type	14, Precision Half-Shell
Rated rpm	1800
Max. power at rated rpm, kWm (BHP)	510 (684)
Cylinder head material	Cast Iron
Crankshaft material	Forged Steel
Governor: type, make/model	Electronic
Frequency regulation, no-load to-full load	Isochronous
Frequency regulation, steady state	± 0.5%
Frequency	Fixed
Air cleaner type, all models	Dry

Exhaust

Exhaust System

Exhaust Manifold Type	Wet
Exhaust flow at rated kW, kg/hr. (cfm)	1932 (2529)
Maximum allowable back pressure after catalyst, kPa (in. Hg)	5.1 (1.5)
Exhaust temperature at rated kW, dry exhaust, ° C (° F)	614 (1136)
Maximum allowable back pressure, kPa (in. Hg)	10.2 (3)
Exh. outlet size at eng. hookup, mm (in.)	See ADV Drawing

Engine Electrical

Engine Electrical System

Battery charging alternator: Ground (negative/positive)	Negative
Battery charging alternator: Volts (DC)	24
Battery charging alternator: Ampere rating	45
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	Natural Gas
Fuel supply line inlet	3.0 NPTF
Natural gas/LPG fuel supply pressure, kPa (in. H20). Fuel supply pressure measured at the generator set fuel inlet downstream of any fuel system equipment accessories.	1.74-2.74 (7-11)

Fuel Composition

Fuel Composition

Natural Gas: Ethane, % by volume	4.0 max.
Natural Gas: Propane, % by volume	1.0 max.
Natural Gas: Propene, % by volume	0.1 max.
Natural Gas: C4 and higher, % by volume	0.3 max.
Natural Gas: Sulfur, ppm mass	25 max.
Natural Gas: Lower heating value, kJ/m3 (Btu/ft3), min.	33.2 (890)

* Fuels with other compositions may be acceptable. If your fuel is outside the listed specifications, contact your local distributor for further analysis and advice.

Lubrication

Lubrication System

Type	Full Pressure
Oil pan capacity, L (qt.)	40 (42.3)
Oil pan capacity with filter, L (qt.)	47.1 (49.7)
Oil filter: quantity, type	2, Cartridge
Oil cooler	Water-Cooled

Cooling

Radiator System

Ambient temperature, ° C (° F)	50 (122)
Engine jacket water capacity, L (gal.)	44 (12)
Radiator system capacity, including engine, L (gal.)	190 (51)
Engine jacket water flow, Lpm (gpm)	570 (151)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	516 (29345)
Heat rejected to air charge cooler at rated kW, dry exhaust, kW (Btu/min.)	65 (3686)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	1321 (52)
Fan, kWm (HP)	31 (42)
Max. restriction of cooling air, intake and discharge side of radiator, kPA (in. H20)	0.125 (0.5)

* Weather and sound enclosures with internal silencer reduce ambient temperature capability by 5 ° C (9 ° F).

Operation Requirements

Air Requirements

Radiator-cooled cooling air, m3/min. (scfm) *	870 (30700)
Combustion air, kg/hr. (cfm)	1821 (829)
Heat rejected to ambient air: Engine, kW (Btu/min.)	25 (1437)
Heat rejected to ambient air: Alternator, kW (Btu/min.)	23 (1580)

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

Fuel Consumption

Natural Gas, m3/hr. (cfh) at % load	Rating
Standby Fuel Consumption at 100% load	149.9 m3/hr. (5293 cfh)
Standby Fuel Consumption at 75% load	117.8 m3/hr. (4161 cfh)
Standby Fuel Consumption at 50% load	86.9 m3/hr. (3068 cfh)
Standby Fuel Consumption at 25% load	55.3 m3/hr. (2410 cfh)
Natural gas, MJ/m3 (1000 Btu/ft.3)	

KOHLER®

TIB-102

TECHNICAL INFORMATION BULLETIN

Alternator Data Sheet

Alternator Model: 5M4028 14-APR-20

Kilowatt ratings at	1800 RPM	60 Hertz		10 Leads	
kW (kVA)	3 Phase	0.8 Power Factor		Dripproof or Open Enclosure	
	CONTINUOUS [1, 2]			STANDBY [1, 2]	
Voltage*	NEMA B / 80 °C	NEMA F / 105 °C	NEMA H / 125 °C	NEMA F / 130 °C	NEMA H / 150 °C
240/480	445 (556)	535 (669)	560 (700)	560 (700)	610 (763)
220/440	470 (588)	535 (669)	560 (700)	560 (700)	560 (700)
208/416	450 (563)	510 (638)	525 (656)	525 (656)	535 (669)
200/400	434 (543)	492 (615)	500 (625)	500 (625)	506 (633)
190/380	415 (519)	470 (588)	470 (588)	470 (588)	470 (588)

① Rise by resistance method, Mil-Std-705, Method 680.1b. ② Machine rated for Max Ambient of 40 °C, Max Altitude 3300 ft

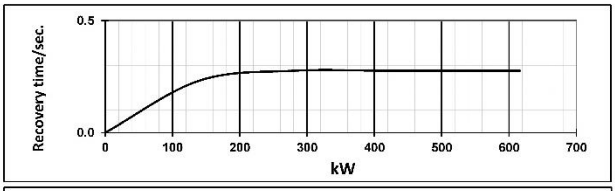
Submittal Data: 480 Volts*, 560 kW, 700 kVA, 0.8 P.F., 1800 RPM, 60 Hz, 3 Phase **High Wye CONNECTION**

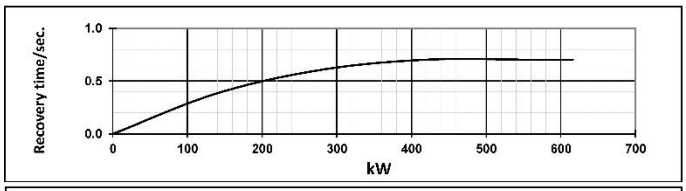
Mil-Std-705B Method	Description	Value	Units	Mil-Std-705C Method	Description	Value	Units
301.1b	Insulation Resistance	>1.5 Meg	Ohms	505.3b	Overspeed	2250	RPM
302.1a	High Potential Test			507.1c	Phase Sequence CCW-ODE	ABC	
	Main Stator	1960	Volts	508.1c	Voltage Balance, L-L or L-N	0.2%	
	Main Rotor	1500	Volts	601.4a	L-L Harmonic Max - Total (Distortion Factor)	5.0%	
	Exciter Stator	1500	Volts				
	Exciter Rotor	1500	Volts	601.4a	L-L Harmonic Max - Single	3.0%	
	PMG Stator	1500	Volts	601.1c	Deviation Factor	5.0%	
401.1a	Stator Resistance, Line to Line High Wye Connection	0.00920	Ohms	---	TIF (1960 Weightings)	<50	
				---	THF (IEC, BS & NEMA Weightings)	<2%	
	Rotor Resistance	0.423	Ohms	---	Winding Pitch	2/3	
	Exciter Stator	23	Ohms				
	Exciter Rotor	0.045	Ohms				
	PMG Stator	2.1	Ohms				
410.1a	No Load Exciter Field Amps at 480 Volts Line to Line	0.73	A DC	**Additional Prototype Mil-Std Methods are Available on Request.**			
420.1a	Short Circuit Ratio	0.653					
421.1a	Xd Synchronous Reactance	2.680	PU	--	Generator Frame	572	
		0.882	Ohms	--	Type	MagnaMax	
422.1a	X2 Negative Sequence React.	0.213	PU	--	Insulation	Class H	
		0.070	Ohms	--	Coupling - Single Bearing	Flexible	
423.1a	X0 Zero Sequence Reactance	0.051	PU	--	Amortisseur Windings	Full	
		0.017	Ohms	--	Excitation	Ext. Voltage Regulated, Brushless	
425.1a	X'd Transient Reactance	0.144	PU	--	Voltage Regulator	DVR2400	
		0.047	Ohms	--	Voltage Regulation	0.25%	
426.1a	X''d Subtransient Reactance	0.121	PU				
		0.040	Ohms				
--	Xq Quadrature Synchronous Reactance	1.080	PU	--	Cooling Air Volume	1480	CFM
		0.355	Ohms	--	Heat rejection rate	1769	Btu's/min
427.1a	T'd Transient Short Circuit Time Constant	0.12	Sec	--	Full load current	842	Amps
				--	Minimum Input hp required	792.3	HP
428.1a	T''d Subtransient Short Circuit Time Constant	0.009	Sec	--	Full load torque	2311	Lb-ft
				--	Efficiency at rated load :	94.7%	
430.1a	T'do Transient Open Circuit Time Constant	1.95	Sec				
432.1a	Ta Short Circuit Time Constant of Armature Winding	0.021	Sec	--	Weight	3050	lbs

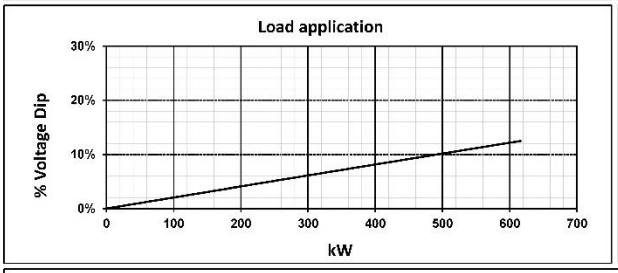
* Voltage refers to wye (star) connection, unless otherwise specified.

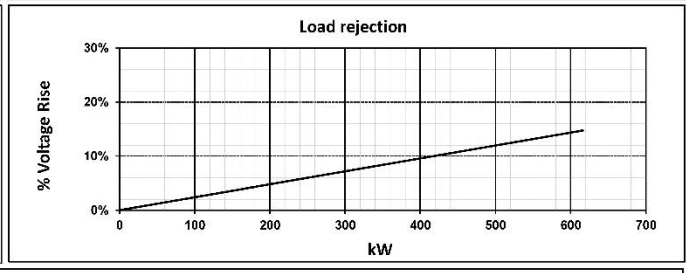
Alternator Model: 5M4028 14-APR-20

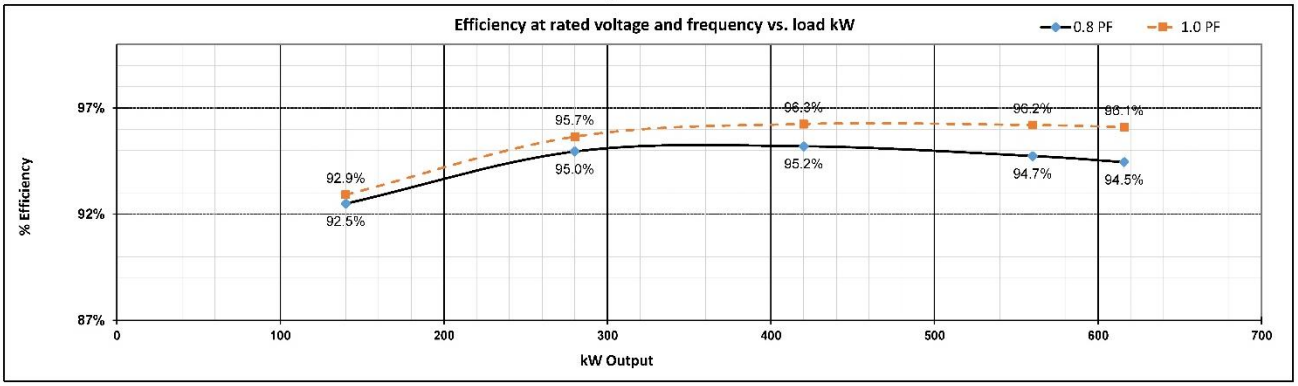
TYPICAL DYNAMIC CHARACTERISTICS

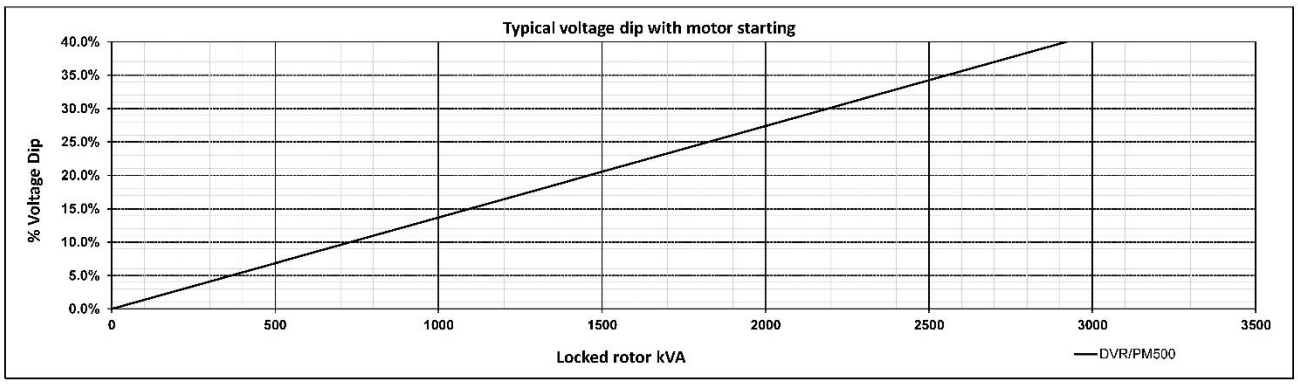










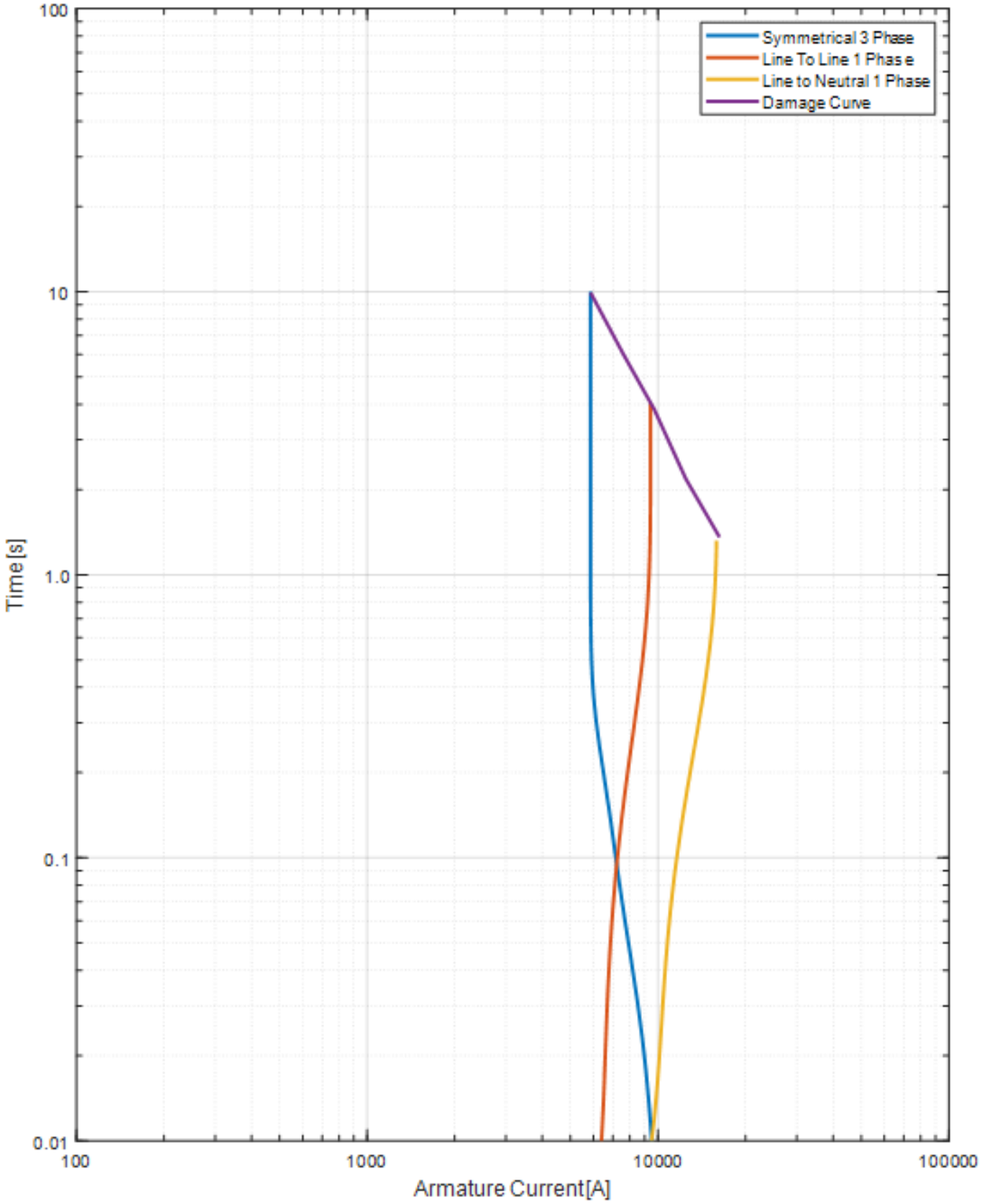


Voltage refers to wye (star) connection, unless otherwise specified..

Alternator Model: 5M4028 14-APR-20

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

Full Load Current: 1943 Amps **Steady State S.C. Current:** 5829 Amps **Max. 3 ph. Symm. S.C. Current:** 11994 Amps

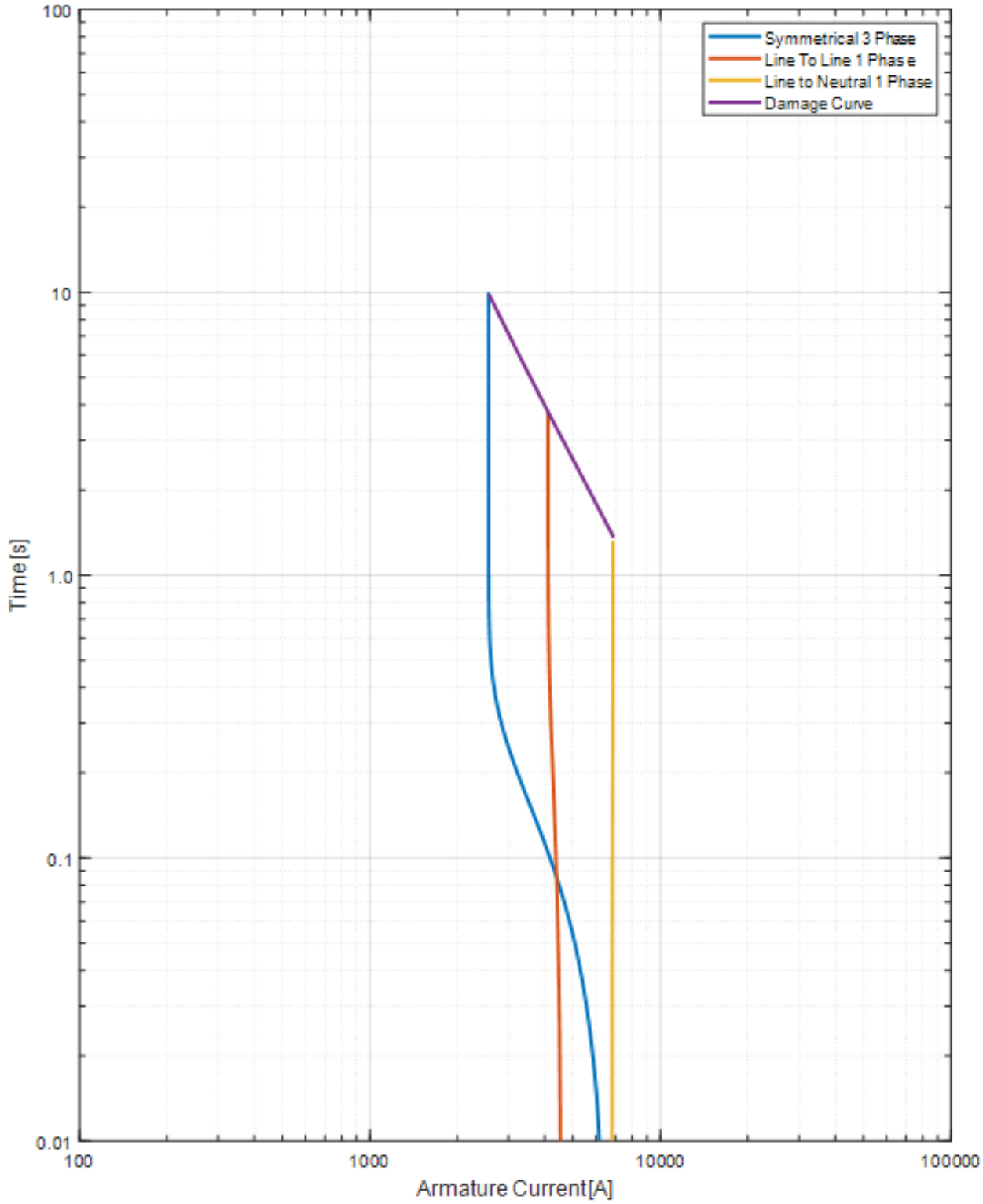


NOTE: Symmetrical component values are shown, maximum asymmetr ical values are 1.732 times the symmetrical values.

Alternator Model: 5M4028 14-APR-20

SHORT CIRCUIT DECREMENT CURVE
60 Hz, High Wye Connection

Full Load Current:842 Amps **Steady State S.C. Current:** 2526 Amps **Max. 3 ph. Symm. S.C. Current:** 6959 Amps



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

KOHLER®

Industrial Generator Set Accessories

Generator Set Controller

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

Display, Interface, and Accessibility

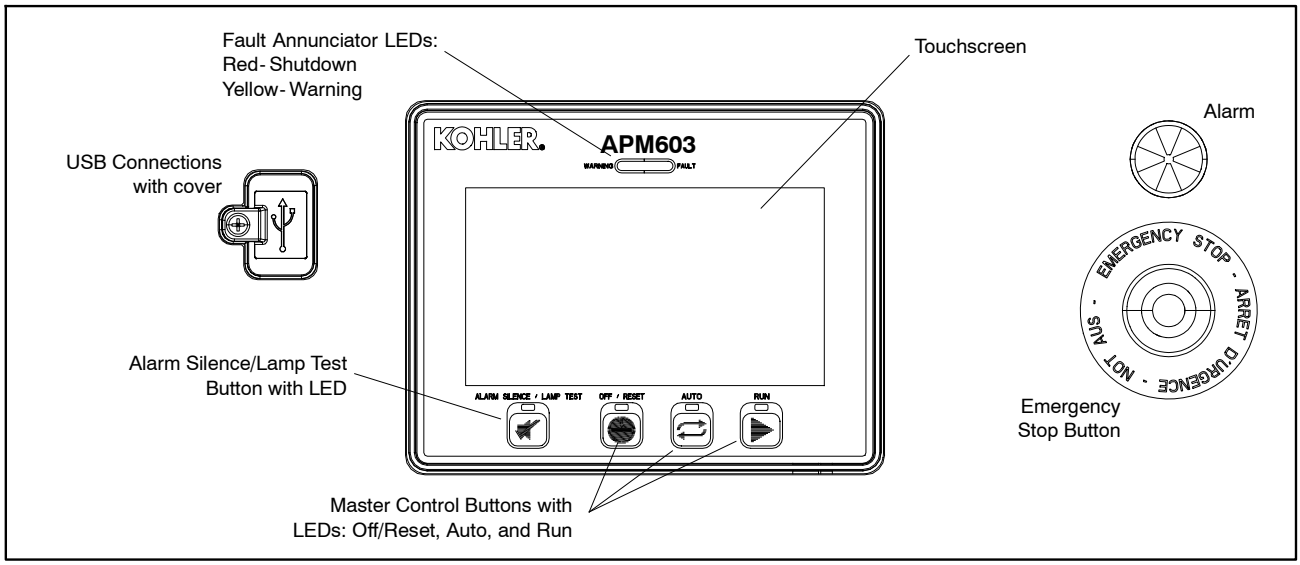
- A 7-inch color TFT touchscreen for easy local access to data.
  - Home screen can be customized to show critical data at a glance.
  - Create a custom favorites list for quick access to important data
- Measurements are selectable in metric or English units.
- Supports Modbus® protocol through serial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

Global Support

- Sales, installation, and service support from more than 800 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



Controller Features

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

Kohler KG Engine-Powered Models
Inputs and Outputs

Standard Dedicated User Inputs	Input Type
Auxiliary Fault (Shutdown)	Digital Input
Auxiliary Warning	
Battery Charger Fault	
Breaker Closed *	
Breaker Tripped/Open *	
Emergency Stop, Local	
Emergency Stop, Remote	
Excitation Over Voltage	
Ground Fault Relay	
Fuel Type	
Low Fuel Pressure	
Remote Engine Start	Two-wire input
Speed Bias	Analog Voltage Input, Scalable up to +/- 10 VDC
Voltage Bias	

Standard Dedicated User Outputs	Output Type
Close Breaker *	Relay Driver Output
Common Failure	
Common Warning	
Crank	
High Coolant Temperature	
Horn	
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	

KG Engine Data

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

Parameter
Coolant Temperature
ECU Runtime Hours
Engine Speed
Intake Manifold Pressure
Intake Manifold Temperature
Intercooler Temperature
Fuel Pressure
Oil Pressure
Oil Temperature

PSI/Doosan Engine-Powered Models
Inputs and Outputs

Standard Dedicated User Inputs	Input Type
Auxiliary Fault (Shutdown)	Digital Input
Auxiliary Warning	
Battery Charger Fault	
Breaker Closed *	
Breaker Tripped/Open *	
Emergency Stop, Local	
Emergency Stop, Remote	
Excitation Over Voltage	
Ground Fault Relay	
Fuel Type	
Low Fuel Pressure	
Remote Engine Start	Two-wire input
Speed Bias	Analog Voltage Input, Scalable up to +/- 10 VDC
Voltage Bias	

Standard Dedicated User Outputs	Output Type
Close Breaker *	Relay Driver Output
Common Failure	
Common Warning	
Crank	
High Coolant Temperature	
Horn	
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	

PSI/Doosan Engine Data

The following engine data is displayed on the APM603 controller.

Parameter
Ambient Temperature
Coolant Temperature
ECU Runtime Hours
Engine Speed
Intake Manifold Pressure
Intake Manifold Temperature
Intercooler Temperature
Fuel Pressure
Mechanical Engine Load
Oil Pressure
Oil Temperature

KOHLER

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KOHLERPower.com

APM603 Available Options

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

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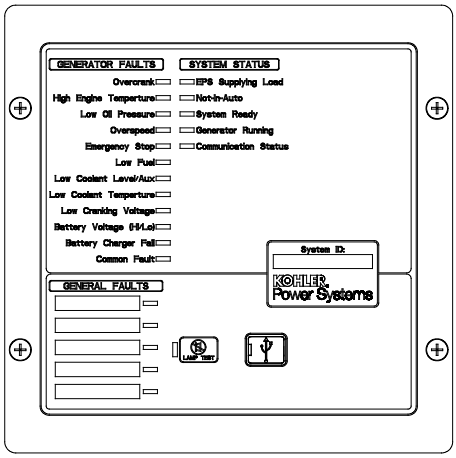
KOHLER

Industrial Generator Set Accessories

Remote Serial Annunciator III (RSA III)



RSA III

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

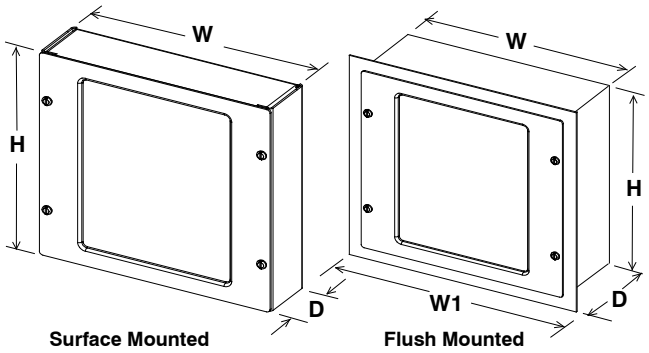
- Dimensions—W x H x D, mm (in.).

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.



Surface Mounted **Flush Mounted**

Fault and Status Conditions	Fault LEDs	Fault Horn	System Ready LED	Generator Running LED	Communication Status LED
Overcrank Shutdown	Red	On	Red	Off	Green
High Engine Temperature Warning *	Yellow	On	Red	Green	Green
High Engine Temperature Shutdown	Red	On	Red	Off	Green
Low Oil Pressure Warning *	Yellow	On	Red	Green	Green
Low Oil Pressure Shutdown	Red	On	Red	Off	Green
Overspeed Shutdown	Red	On	Red	Off	Green
Emergency Stop *	Red	On	Red	Off	Green
Low Coolant Level/Aux. Shutdown	Red	On	Red	Off	Green
Low Coolant Temperature *	Yellow	On	Red	Off	Green
Low Cranking Voltage	Yellow	On	Red	Off	Green
Low Fuel—Level or Pressure *	Yellow	On	Red	Green or Off	Green
Not-In-Auto	Red	On	Red	Green or Off	Green
Common Fault	Red	On	Green	Green or Off	Green
Battery Charger Fault (1) *	Yellow	On	Red	Green or Off	Green
Battery Charger Fault (2) *	Yellow	On	Green	Green or Off	Green
High Battery Voltage *	Yellow	Off	Green	Green or Off	Green
Low Battery Voltage *	Yellow	Off	Green	Green or Off	Green
User Input #1 (Warning)	Yellow	Off	Green	Green or Off	Green
User Input #1 (Shutdown)	Red	On	Green	Off	Green
User Input #2 (Warning)	Yellow	Off	Green	Green or Off	Green
User Input #2 (Shutdown)	Red	On	Green	Off	Green
User Input #3 (Warning) (1) †	Yellow	Off	Green	Green or Off	Green
User Input #3 (Shutdown) (1) †	Red	On	Green	Off	Green
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 with120/208 VAC, 50/60 Hz adapter (option)
- Power draw: 200 mA
- Humidity range: 0% to 95% noncondensing
- Operating temperature range: - 20°C to +70°C (- 4°F to +158°F)
- Storage temperature range: - 40°C to +85°C (- 40°F to +185°F)
- Standards:
  - NFPA 110, level 1
  - UL 508 recognized
  - CE directive
  - NFPA 99
  - ENS 61000- 4- 4
  - EN6II-4-4 fast transient immunity
- RS-485 Modbus® isolated port @ 9.6/19.2/38.4/57.6 kbps (default is 19.2 kbps)
- USB device port
- NEMA 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.
Modbus® is a registered trademark of Schneider Electric.

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.

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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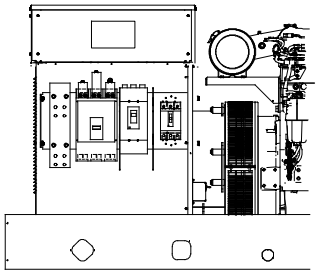
KOHLER

Industrial Generator Set Accessories

Line Circuit Breakers 15- 3250 kW



Multiple Circuit Breaker Kit with Neutral Bus Bar 180- 300 kW 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	
	250	684- 2500 A. Mag. Trip	JJ
	300- 400	Thermal Magnetic	LA
	400	500- 1000 A. Mag. Trip	
		750- 1600 A. Mag. Trip	
		1000- 2000 A. Mag. Trip	
		1125- 2250 A. Mag. Trip	
		1250- 2500 A. Mag. Trip	
		1500- 3000 A. Mag. Trip	
		1750- 3500 A. Mag. Trip	
		2000- 4000 A. Mag. Trip	
	400- 600	Electronic LI	LG
		Electronic LSI	
		Electronic LSIG	
	800	Electronic LI	MG
	1000- 1200	Thermal Magnetic	PG
	800- 1200	Electronic LSI	
		Electronic LSIG	
	1200	Thermal Magnetic	PJ
		Electronic LSI	
		Electronic LSIG	
	1600- 2500	Thermal Magnetic	RJ
		Electronic LSI	
		Electronic LSIG	

100% Rating Circuit Breaker

Alt. Model	Ampere Range	Trip Type	C. B. Frame Size
4M 5M 7M	15- 150	Thermal Magnetic	HD
	60- 150	Electronic LI	HD
		Electronic LSI	
		Electronic LSIG	
	175- 250	Thermal Magnetic	JD
	250	Electronic LI	JD
		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
		5.0 LSI	PL
	1600, 2000, 2500, 3000	Electronic LSI	NW
		Electronic LSIG	NW

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

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

No second breakers are allowed in combination with these breakers.

Load Bus Rating

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

300- 2250* kW Line Circuit Breaker Specifications

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

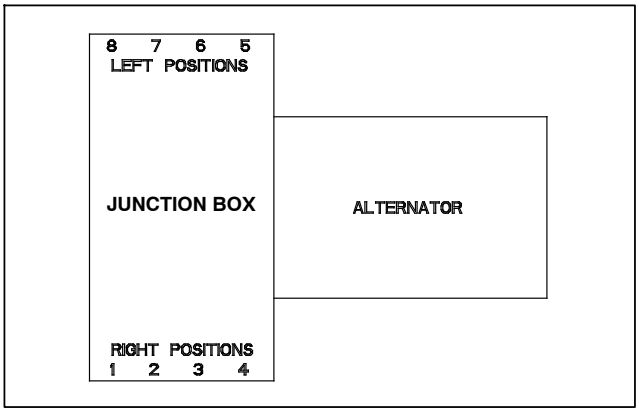
Interrupting Ratings

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

Circuit Breaker Lugs Per Phase (Al/Cu)

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

Breaker Positions



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

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

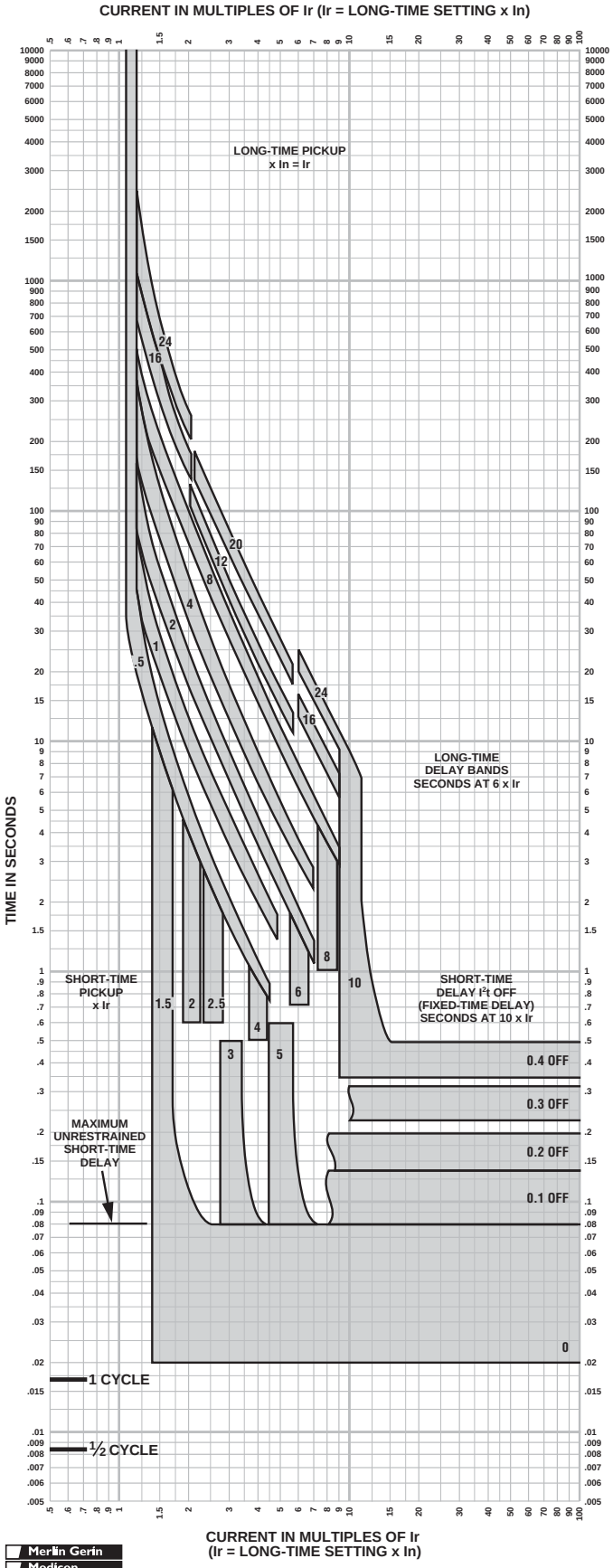
Multiple Circuit Breaker Combinations

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



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

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

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

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

Notes:

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

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

Schneider Electric

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

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

The most compact and innovative molded case circuit breakers

P-Frame 1200 A

R-Frame

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

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

Full-Featured Performance

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

Merlin Gerin
Modicon
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SQUARE D
Schneider Electric

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

Onboard Intelligence

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

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

MICROLOGIC® Trip Units

Choose the Model that Meets Your Needs

MICROLOGIC 3.0 and 5.0

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

MICROLOGIC 3.0A, 5.0A and 6.0A

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

MICROLOGIC 5.0P and 6.0P

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

MICROLOGIC 5.0H and 6.0H

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

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

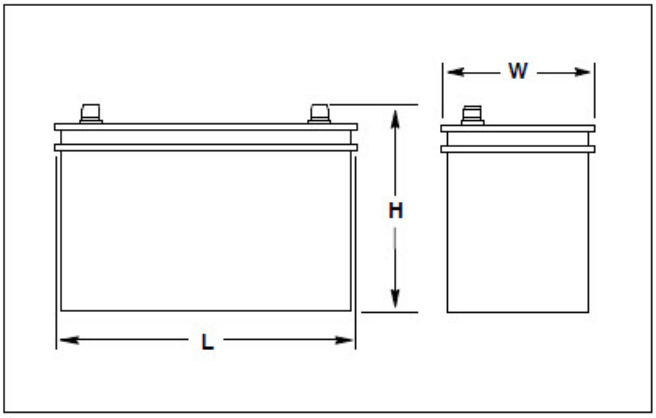
Order Number 0612HO0201

SQUARE D
Schneider Electric

KOHLER®

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED

Typical Overall Dimensions

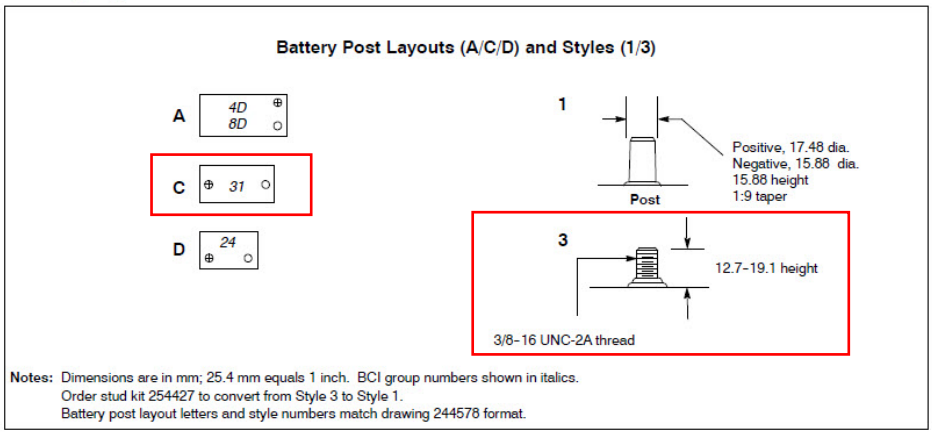


Standard Features

- 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 availabe for 24-volt systems and/or systems with redundant starters.
- Wet- and dry-charged batteries have lead-calcium or lead-antimony plates and use sulferic acide electrolyte. Removable cell covers allow checking of electrolyte specific gravity.
- Absorbant glass mat (AGM) batteries are sealed and maintenance free.
- Batteries are for applications below and above 0 ° C (32 ° F).

Charge Type*	Battery Part Number	Battery Qty. per Size	BCI Group Size	Battery SAE Dimension, mm (in.)			Cold Cranking Amps at 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

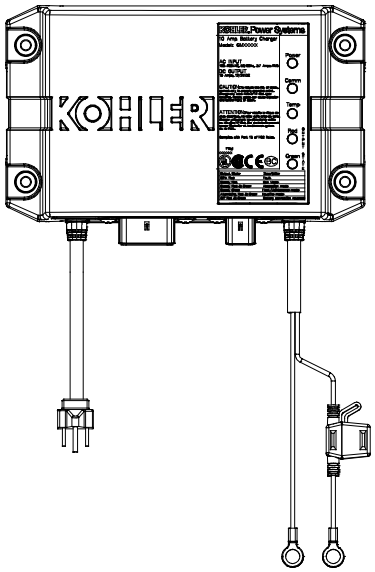
Battery Specifications



KOHLER

Industrial Generator Set Accessories

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



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

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

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

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

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

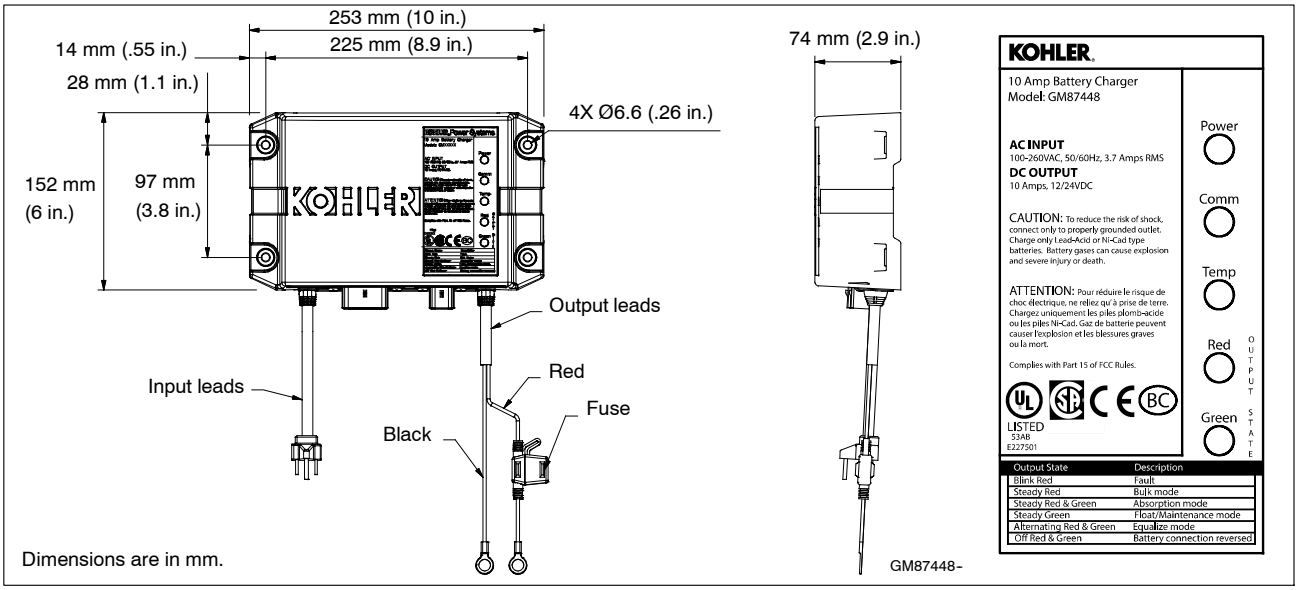
Standard Features

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

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

KOHLER

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



Specifications

AC Input	100–260 VAC
Frequency Input	50/60 Hz
DC Output	10 Amps @ 12 VDC or 10 Amps @ 24 VDC (On battery voltage regulation ±1%; current is electronically limited
Fuse Protection	15 amps ATC
Battery Types	Flooded Lead Acid (FLA) AGM Gel Cell High Performance AGM Nickel–Cadmium (NiCad)
Monitoring	
LED Indications	Power Communication Temperature compensation Output charger curve and charger status: ○ 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	

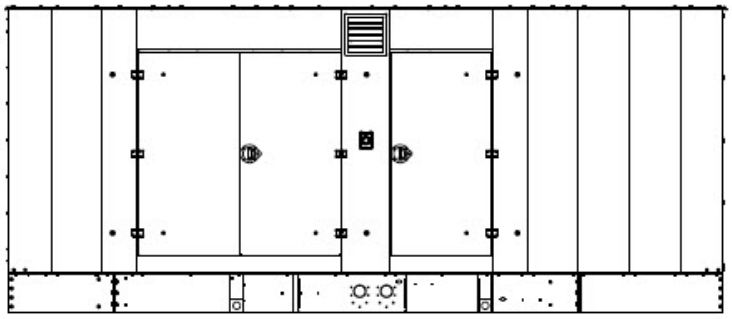
DISTRIBUTED BY:

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.

G6-146 3/19c

KOHLER®

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED



Sound Enclosure Standard Features

• Internal silencer, flexible exhaust connector and rain cap.

• Skid-mounted, aluminum construction with hinged doors.

• Fade-, scratch-, and corrosion-resistant Kohler® Power Armor automotive-grade textured finish.

• Enclosure has six large access doors which allow for easy maintenance.

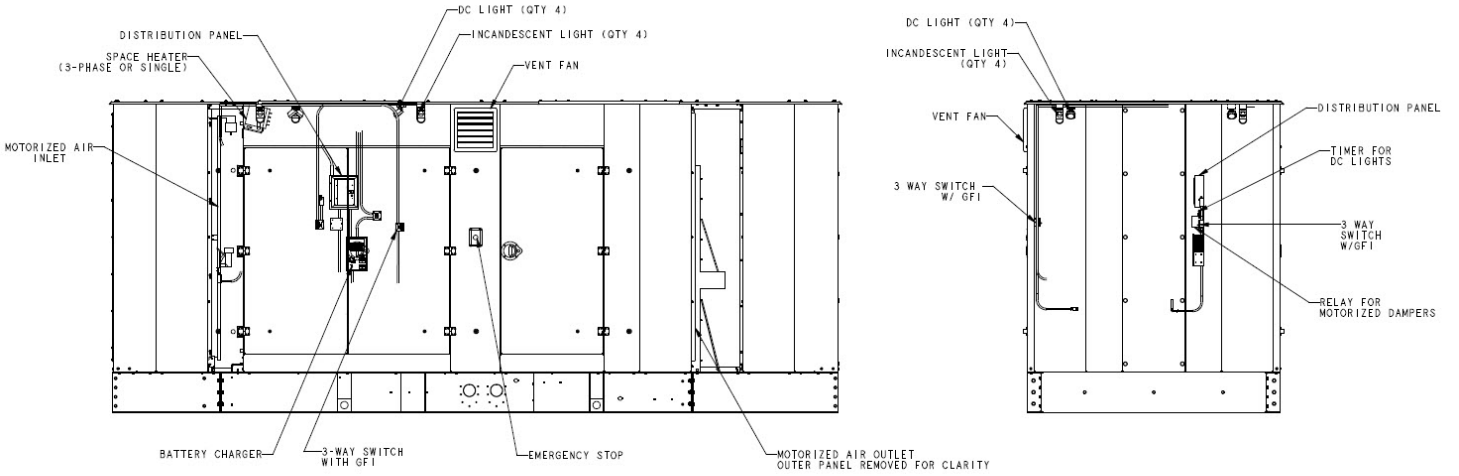
• Lockable, flush-mounted door latches.

• Louvered air inlets on alternator end and roof outlet to redirect air and reduce noise.

• Automatic door holders keep doors open during maintenance.

• Acoustic insulation that meets UL 94 HF1 flammability classification and repels moisture absorption.

Attachment A



ADV-9200-

Sound Enclosure Features

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

Accessories

Miscellaneous Enclosure Accessories
Battery Charger, Mounted. Mounting and prewiring of DC output and AC input when optional BEP is selected. Battery charger located inside the enclosure and accessible through an access door.

DC Light Package - with LED Lights:
Prewired DC light package offering an economical alternative light source within the enclosure, as a complement to the BEP or a source of light when AC power is not available.Battery drain limited with fuse protection and controlled through a 0-60 minute, spring-wound, no-hold timer.Available in either incadescent of LED.

Electrical Accessories
Block heater wiring, single-phase

Basic Electrical Package (BEP)
Distribution panel/load center. 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.The load center powered by building source power and protected by a main circuit breaker, rated for 100 amps with capacity and circuit positions for future expansion.AC power distribution installed in accordance with NEC and all wiring within EMT thin wall conduit. Four incandescent or fluorescent lights located within UL-listed fixtures designed for wet locations.

KOHLER®

TIB-114

TECHNICAL INFORMATION BULLETIN

Generator Set Sound Data Sheet

			Sound Pressure Data in dB(A)			
Generator Set Model	**Hz**	**Load**	**Raw Exhaust**	**Open Unit, Isolated Exhaust**	**Weather Enclosure**	**Level 2 Sound Enclosure**
450REZXD	**60**	100% Load	102.8	91.7	89.8	72.3
		No Load	101.9	90.8	88.9	71.4

Note: Sound pressure data is the logarithmic average of eight perimeter measurement points at a distance of 7 m (23 ft.), except Raw Exhaust data which is a single measurement point at 1 m (3.3 ft.) from the mouth of a straight pipe exhaust.

450REZXD		**60 Hz**		**Sound Pressure Levels, dB(A)**								
Load	Distance, m (ft)	Enclosure	Measurement Clock Position	Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
100% Load	7 (23)	Level 2 Sound	3:00	53.4	57.2	64.5	63.9	63.7	60.8	56.5	50.8	70.1
			1:30	49.4	56.7	65.7	68.1	65.7	63.0	56.7	49.4	72.3
			12:00-Engine	50.1	56.5	66.8	66.2	64.6	62.1	56.7	46.5	71.6
			10:30	57.2	54.3	65.9	65.7	65.7	62.6	56.6	48.4	71.6
			9:00	61.1	55.4	64.5	62.1	62.6	59.4	54.4	46.9	69.6
			7:30	56.7	59.1	68.7	63.9	63.7	64.1	55.6	50.6	72.2
			6:00-Alternator	53.7	61.1	72.1	68.6	66.3	67.8	61.2	55.0	75.7
			4:30	52.4	58.8	67.5	66.2	64.6	63.2	55.6	50.4	72.1
			8-pos. log avg.	55.9	57.9	67.7	66.1	64.8	63.6	57.2	50.6	72.3

450REZXD		**60 Hz**		**Sound Pressure Levels, dB(A)**								
Load	Distance, m (ft)	Enclosure	Measurement Clock Position	Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
No Load	7 (23)	Level 2 Sound	3:00	49.2	53.7	64.6	62.6	63.1	60.1	54.5	44.8	69.2
			1:30	48.9	54.9	65.1	67.4	66.1	62.4	55.0	45.9	71.8
			12:00-Engine	50.3	54.8	66.6	63.6	64.6	61.8	55.7	45.2	70.8
			10:30	53.2	53.3	65.2	66.8	65.0	62.2	54.0	45.2	71.3
			9:00	49.1	54.4	64.6	61.8	62.0	58.8	51.0	42.0	68.6
			7:30	50.5	57.8	68.9	62.7	63.3	63.4	53.5	46.8	71.7
			6:00-Alternator	53.2	59.7	69.5	67.6	65.9	67.1	60.5	52.5	74.2
			4:30	50.6	56.7	65.9	65.1	64.2	62.5	53.9	46.1	70.9
			8-pos. log avg.	50.9	56.2	66.7	65.2	64.5	63.0	55.6	47.2	71.4

KOHLER

Industrial Generator Set Accessories

Load Center

- Part Number - SA20461
- Model - QO124M100
- QO Load Center
- Main Breaker
- 100A, 1PH- 3W, 24SP
- NEMA1

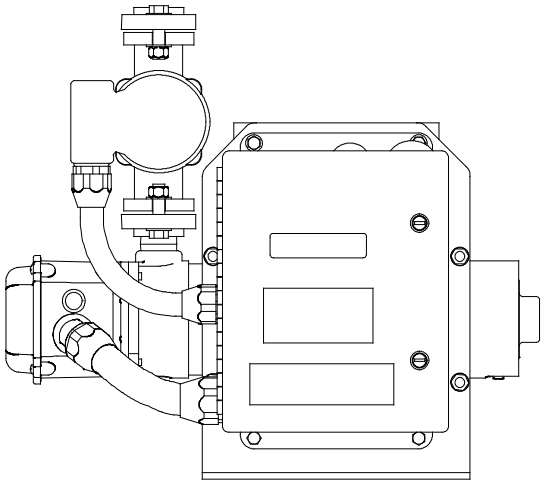
Specifications

Product	Load Center
Marketing Trade Name	QO
Load Center Type	Main Breaker
Line Rated Current	100 A
Number of Spaces	24
Short Circuit Current Rating	22 kA
Maximum Number of Single Pole Circuits	24
Maximum Number of Tandem Breakers	0
Phase	1 Phase
System Voltage	120/240 VAC
Wire Size	AWG 6...AWG 2/0 (Aluminum/Copper)
Enclosure Rating	NEMA 1 Indoor
Electrical Connection	Lugs
Grounding Bar	Grounding Bar included
Wiring Configuration	3- Wire
Busbar Material	Tin Plated Copper Busbar
Enclosure Material	Welded Sheet Steel
Cover Finish	Baked Enamel Grey
Box Number	7
Product Certifications	UL listed
Height	20.90 in (531 mm)
Width	14.25 in (362 mm)
Package Weight (Lbs)	13.2

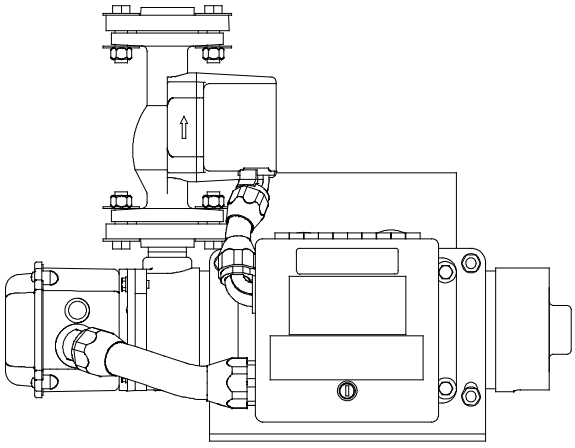
KOHLER

Industrial Generator Set Accessories

Engine Block Heater Kits



Type 1 and Type 3



Type 2

Block Heater Kits, typical

Applicable Models

- 250- 400RZXB
- 250- 450REZXB
- 300REZXC
- 300- 400RZXD
- 300- 500REZXD
- 900- 1250REOZMD
- 1250- 2000ROZMC

Standard Features

- UL- C/US listed (60 Hz Models) - E250789CE
- 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 has a thermostat, pump, and temperature control system. The pump circulates warm coolant into the engine and supplies constant heating to the engine. The engine block heater kit helps to extend element life and gives a significant reduction in electrical consumption.

The engine block heater has a fixed setting thermostat that turns ON when the engine coolant temperature reaches 38°C (100°F) and turns OFF when the engine coolant temperature reaches 49°C (120°F).

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

The engine block heater kits are available in 208 V, 240 V, 380 V, and 480 V versions.

Block Heater Specifications

Heating Fluid	Engine Coolant (50% Glycol/50% Water)
Fixed Thermostat	38°- 49°C (100°- 120°F)
Flow	10 GPM (2.2m^3/hr) @ 10 ft head (3 mWc)
Pump Power	70W (50 Hz), 97W (60 Hz)
Max. Pressure	125 psi (860 kPa)
Pressure Loss	0.2 psi (1.5 kPa)
Inlet Plumbing	1.0 in. NPT
Outlet Plumbing	1.0 in. NPT
Main Control Box Ingress Protection	NEMA 4 (IP66)
Motor Ingress Protection	IP44 (50 Hz), NEMA 2 (60 Hz)

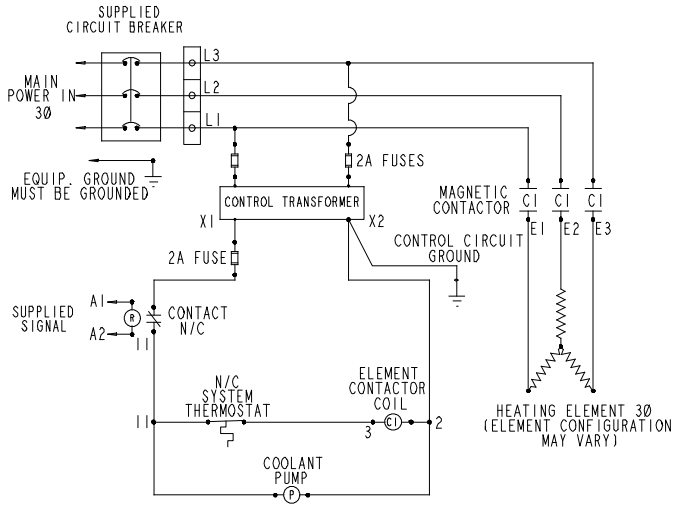
Specifications

Block Heater Kit Number	Component	Watts	Voltage	Phase	Type
GM64396- KA1	GM62499	9000	240	1	2
GM64396- KA2	GM62500	9000	480	1	3
GM64396- KA3	GM62501	9000	240	3	1
GM64396- KA4	GM62502	9000	380	3	1
GM64396- KA5	GM62498	9000	480	3	1
GM64396- KA6	GM62509	9000	208	1	2
GM64396- KP1	GM62499	9000	240	1	2
GM64396- KP2	GM62500	9000	480	1	3
GM64396- KP3	GM62501	9000	240	3	1
GM64396- KP4	GM62502	9000	380	3	1
GM64396- KP5	GM62498	9000	480	3	1
GM64396- KP6	GM62509	9000	208	1	2
GM64397- KA1	GM62499	9000	240	1	2
GM64397- KA2	GM62501	9000	240	3	2
GM64397- KA3	GM62502	9000	380	3	1
GM64397- KA4	GM62498	9000	480	3	1
GM64397- KA5	GM62500	9000	480	1	3
GM64397- KA6	GM62509	9000	208	1	2
GM64397- KP1	GM62499	9000	240	1	2
GM64397- KP2	GM62501	9000	240	3	2
GM64397- KP3	GM62502	9000	380	3	1
GM64397- KP4	GM62498	9000	480	3	1
GM64397- KP5	GM62500	9000	480	1	3
GM64397- KP6	GM62509	9000	208	1	2
GM64398- KA1	GM62499	9000	240	1	2
GM64398- KA2	GM62501	9000	240	3	1
GM64398- KA3	GM62502	9000	380	3	1
GM64398- KA4	GM62498	9000	480	3	1
GM64398- KA5	GM62500	9000	480	1	3
GM64398- KA6	GM62499	9000	240	1	2
GM64398- KA7	GM62501	9000	240	3	1
GM64398- KA8	GM62502	9000	380	3	1
GM64398- KA9	GM62498	9000	480	3	1
GM64398- KA10	GM62500	9000	480	1	3

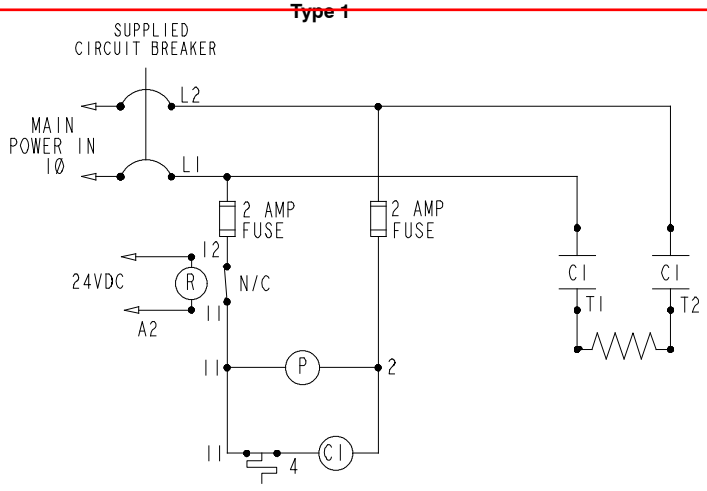
Specifications (Continued)

Block Heater Kit Number	Component	Watts	Voltage	Phase	Type
GM64398- KA11	GM62509	9000	208	1	2
GM64398- KA12	GM62509	9000	208	1	2
GM64398- KP1	GM62499	9000	240	1	2
GM64398- KP2	GM62501	9000	240	3	1
GM64398- KP3	GM62502	9000	380	3	1
GM64398- KP4	GM62498	9000	480	3	1
GM64398- KP5	GM62500	9000	480	1	3
GM64398- KP6	GM62499	9000	240	1	2
GM64398- KP7	GM62501	9000	240	3	1
GM64398- KP8	GM62502	9000	380	3	1
GM64398- KP9	GM62498	9000	480	3	1
GM64398- KP10	GM62500	9000	480	1	3
GM64398- KP11	GM62509	9000	208	1	2
GM64398- KP12	GM62509	9000	208	1	2
GM74160- KA1	GM62511	6000	240	1	2
GM74160- KA2	GM62512	6000	480	1	3
GM74160- KA3	GM62513	6000	240	3	1
GM74160- KA4	GM62514	6000	380	3	1
GM74160- KA5	GM62510	6000	480	3	1
GM74160- KA6	GM77835	6000	208	1	2
GM75287- KA1	GM62511	6000	240	1	2
GM75287- KA2	GM62512	6000	480	1	3
GM75287- KA3	GM62513	6000	240	3	1
GM75287- KA4	GM62514	6000	380	3	1
GM75287- KA5	GM62510	6000	480	3	1
GM75287- KA6	GM77835	6000	208	1	2
GM111086- KA1	GM62511	6000	240	1	2
GM111086- KA2	GM62512	6000	480	1	3
GM111086- KA3	GM62513	6000	240	3	1
GM111086- KA4	GM62510	6000	480	3	1
GM111086- KA5	GM77835	6000	208	1	2
GM111086- KA6	GM62514	6000	380	3	1

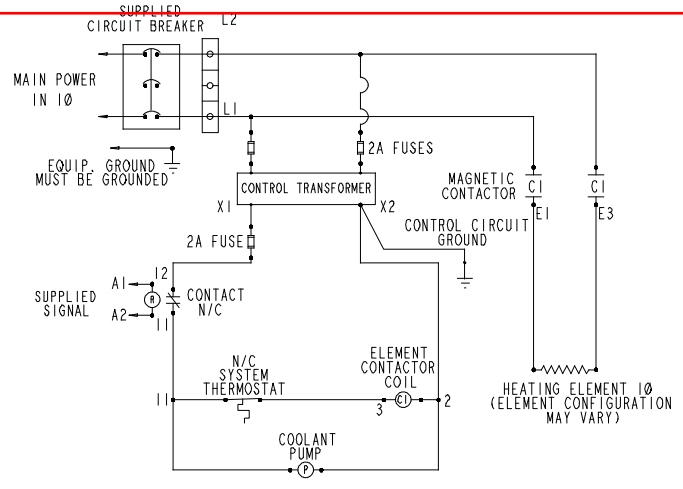
Wiring Diagram



Type 1



Type 2

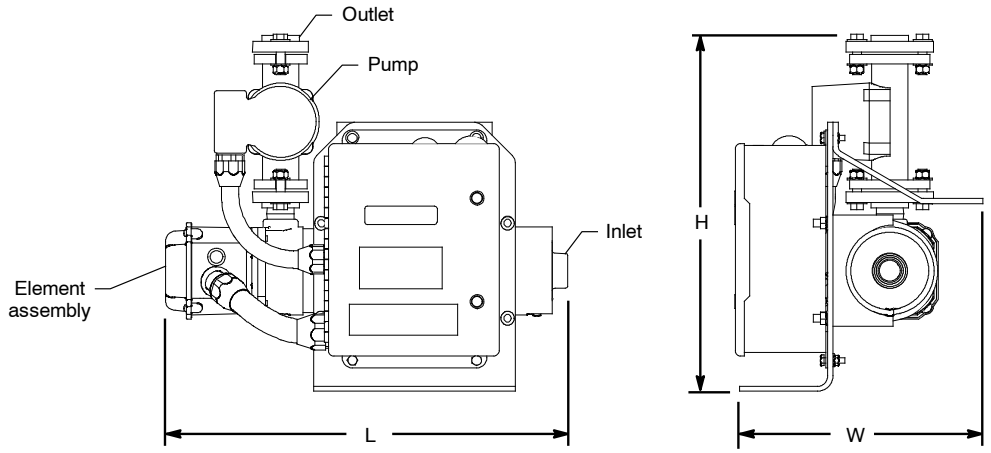


Type 3

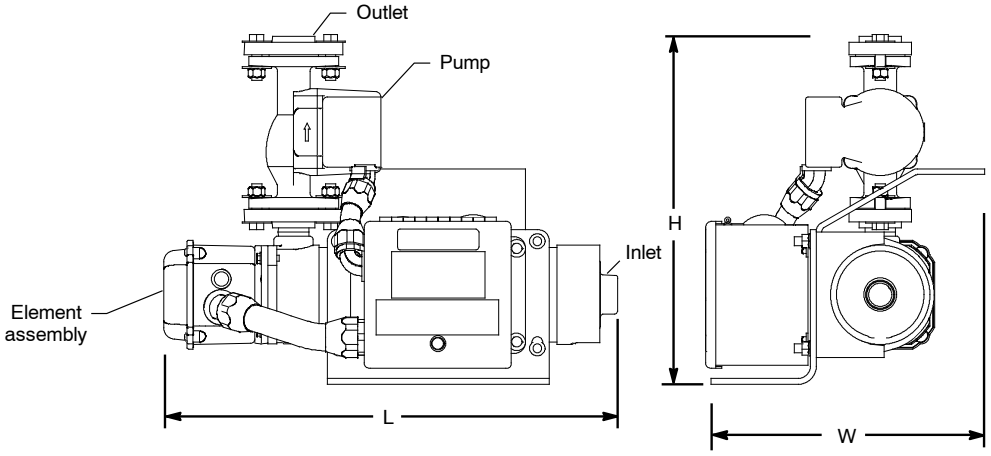
GM62498V-

Dimensions and Weights

Block heater type 1 and type 3 size, L x W x H, mm (in):	493.9 x 298.5 x 436.7 (26.53 x 10.4 x 12.9)
Block heater type 2 size, L x W x H, mm (in):	493.9 x 297.7 x 378.8 (26.53 x 11.7 x 14.9)
Block heater type 1 and 3 weight, kg (lb):	24.5 (54)
Block heater type 2 weight, kg (lb):	16.8 (37)



Type 1 and Type 3



Type 2

GM62498V- D

KOHLER®

TIB-118

TECHNICAL INFORMATION BULLETIN

Generator Set Cooling System Data Sheet

	50°C Ambient Temperature Cooling System								
450REZXD 60Hz (Standby Duty)	**Total external restriction on open unit[7]**	Pa *(in.H_2O)*	0 (0)	125 (0.5)	187 (0.75)	250 (1)	312 (1.25)	375 (1.5)	**Enclosed Units**
	Maximum allowable ambient temperature	°C *(°F)*	51 (124)	48 (118)	47 (117)	45 (113)	44 (111)	42 (108)	45 (113)
	Cooling system airflow	m^3/min *(ft^3/min)*	870 (30700)	814 (28700)	788 (27800)	761 (26900)	735 (26000)	708 (25000)	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.

KOHLER®

TIB-119

TECHNICAL INFORMATION BULLETIN

Enclosed Generator Set Exhaust System Data Sheet

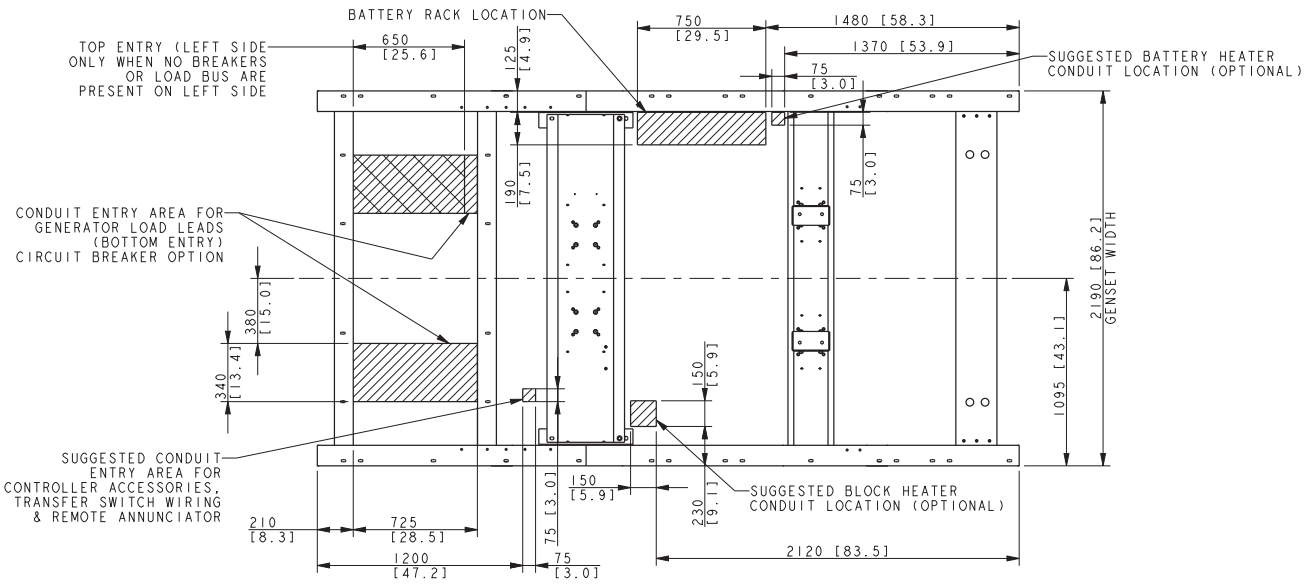
Model	Enclosure Type	Consumed Back Pressure (in H20)	Consumed Back Pressure (in Hg)	Back Pressure Limit(s) (in H20)	Back Pressure Limit(s) (in Hg)	Flex Exhaust Tube(s)	Silencer	Drawing
450REZXD	All Weather and Sound Enclosures	48.0	3.5	60.0	4.4	GM69644 FlexTube (Left Side), GM69645 FlexTube (Right Side), Doosan Supplied Dual Catalysts and GM73955 Dual Flex Tubes	GM64224 Dual Mufflers	ADV-9200

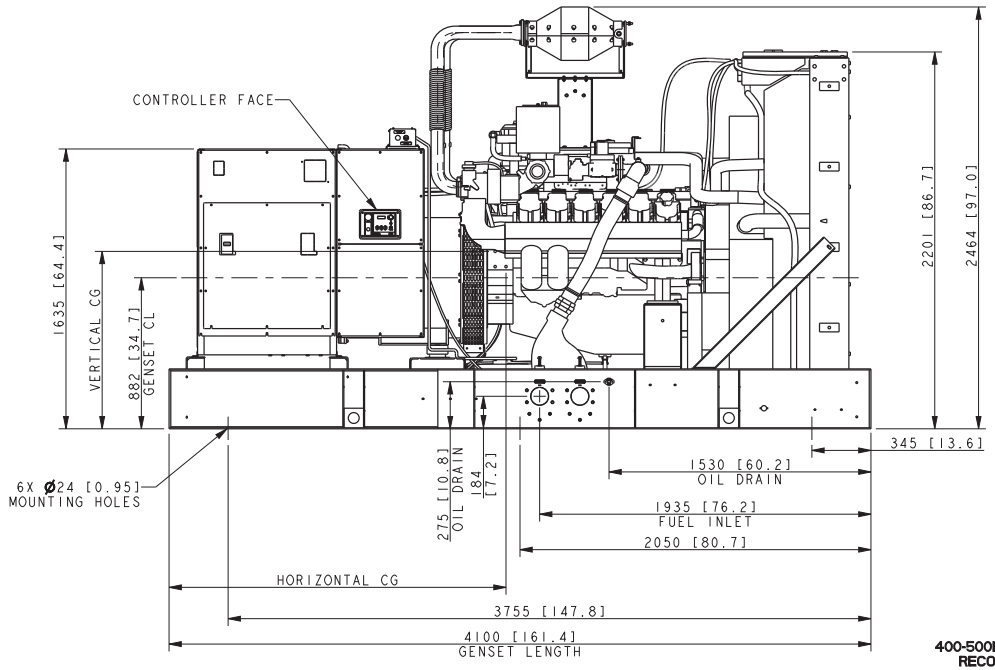
1. Total system exhaust back pressure is applicable to generator sets equipped with Kohler standard enclosure packages.
2. For generator sets with multiple exhaust outlets, total system exhaust back pressure value represents each outlet.
3. The total system back pressure should not exceed the manufacturer's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

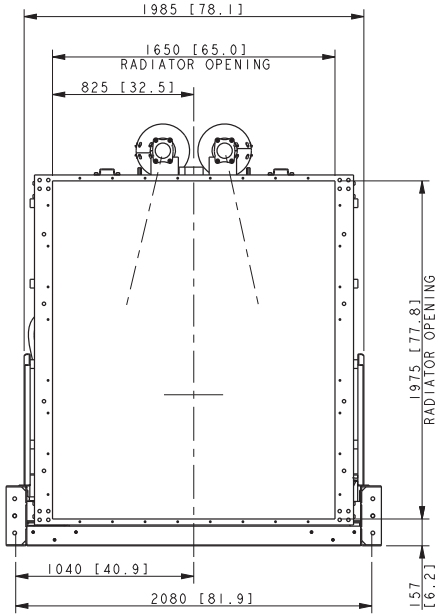
KOHLER®

Dimensional Drawings

Attachment A







MODEL	ALTERNATOR	GENSET MAX WEIGHT kg [lb]	HORIZONTAL CG mm [in]	VERTICAL CG mm [in]
400RZXD/REZXD	4M4266	5,040 [11,115]	2,220 [87.50]	940 [37.00]
400RZXD/REZXD	5M4024	5,220 [11,510]	2,200 [86.50]	940 [37.00]
400RZXD/REZXD	5M4027	5,260 [11,600]	2,180 [85.75]	940 [37.00]
450/500REZXD	5M4028	5,360 [11,820]	2,160 [85.00]	940 [37.00]
500REZXD	5M4030	5,380 [11,860]	2,160 [85.00]	940 [37.00]
400RZXD	5M4160	5,220 [11,510]	2,200 [86.50]	940 [37.00]
450/500REZXD	5M4270	5,260 [11,600]	2,180 [85.75]	940 [37.00]
500REZXD	5M4272	5,380 [11,860]	2,160 [85.00]	940 [37.00]

WOOD BASE IS AN ADDITIONAL 170 kg [375 lb]

ALL LEAD CONNECTIONS USE 10MM [3/8] HARDWARE.

NOTES:

CATALYSTS NOT SUPPLIED WITH NON-EPA GENSETS

DIMENSIONS IN [ ] ARE ENGLISH EQUIVALENTS.

THIS ASSEMBLY MUST COMPLY WITH PEP-RML-001.

SIMILAR TO: ADV-9194

400-500KW MODELS
RECONNECTABLE
22 LITER DOOSAN, EPA & NON-EPA

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	9JUL2020	NEW DRAWING [CT205102]	CEK

DO NOT SCALE, REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN MILLIMETERS GENERAL TOLERANCES: X.XX ± 0.25, X.X ± 1.0, X ± 1.5, ANGLES ± 0°30' SURFACE FINISH MAX.

THIRD-ANGLE PROJECTION

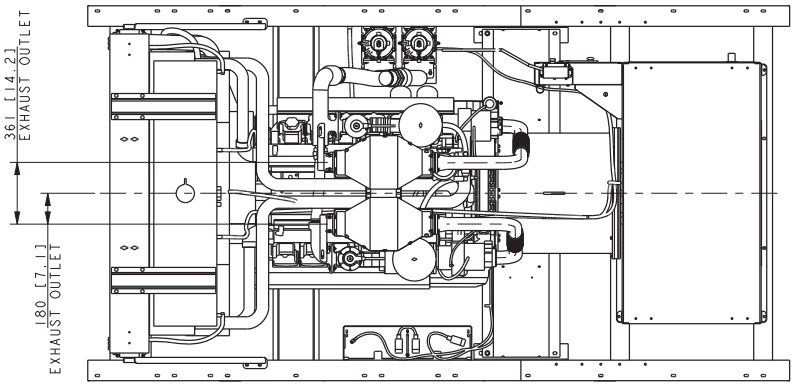
APPROVALS		DATE
DRAWN	CEK	9JUL2020
CHECKED	DJV	9JUL2020
APPROVED	LAC	9JUL2020

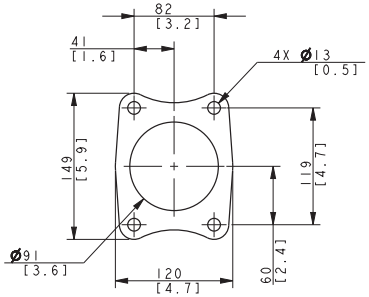
KOHLER
KOHLER, WISCONSIN 53044

TITLE: DIMENSION PRINT, 400-500 REZXD/RZXD

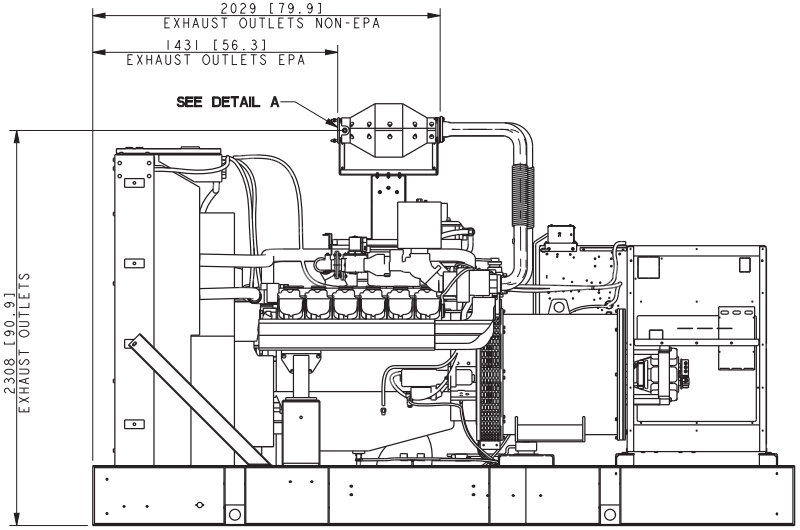
SCALE 0.07 | CAD NO. | SHEET 1 of 3

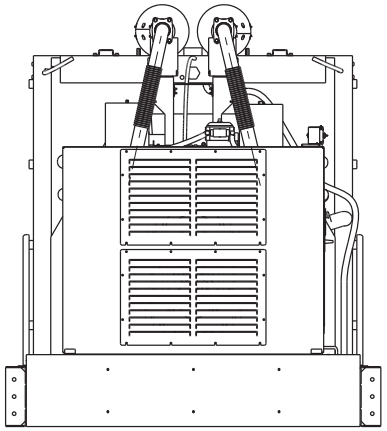
DWG NO. ADV-9195 | D





DETAIL A
EXHAUST OUTLETS
SCALE 0.50





400-500KW MODELS
RECONNECTABLE
22 LITER DOOSAN, EPA & NON-EPA

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	9JUL2020	NEW DRAWING [CT205102]	CEK

DO NOT SCALE, REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

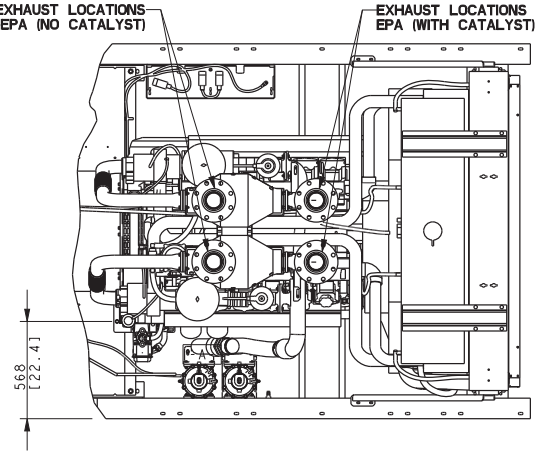
UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS IN MILLIMETERS
GENERAL TOLERANCES:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0°30'
SURFACE FINISH 125 MAX.
THIRD ANGLE PROJECTION

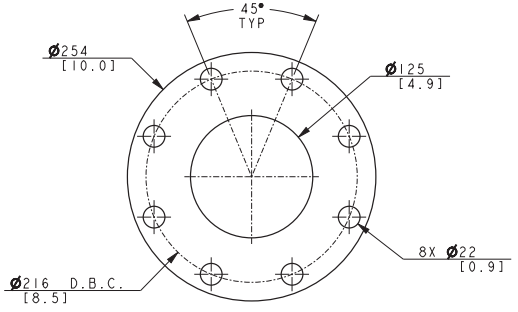
APPROVALS		DATE
DRAWN	CEK	9JUL2020
CHECKED	DJV	9JUL2020
APPROVED	LAC	9JUL2020

TITLE: **DIMENSION PRINT, 400-500 REZXD/RZXD**

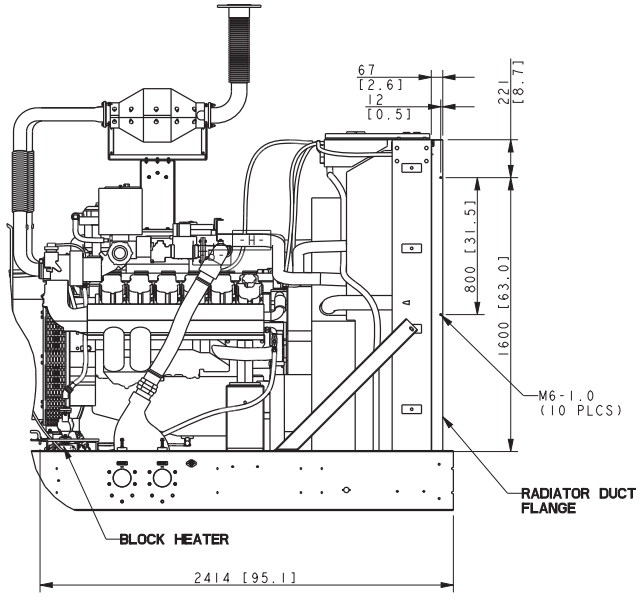
SCALE 0.07 | CAD NO. | SHEET 2 of 3

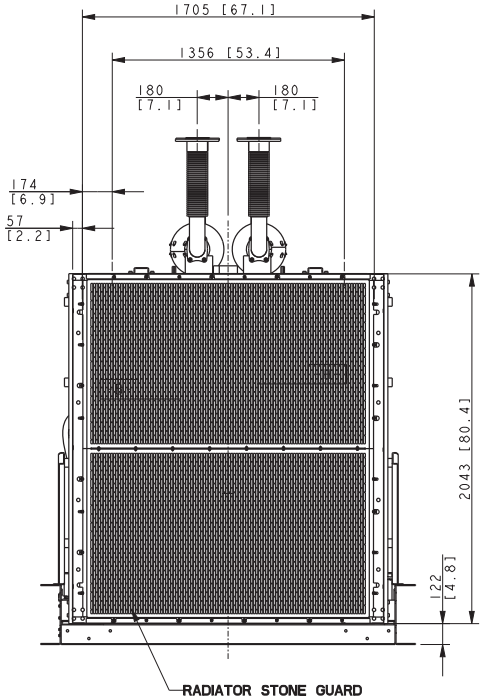
DWG NO. **ADV-9195** | **D**

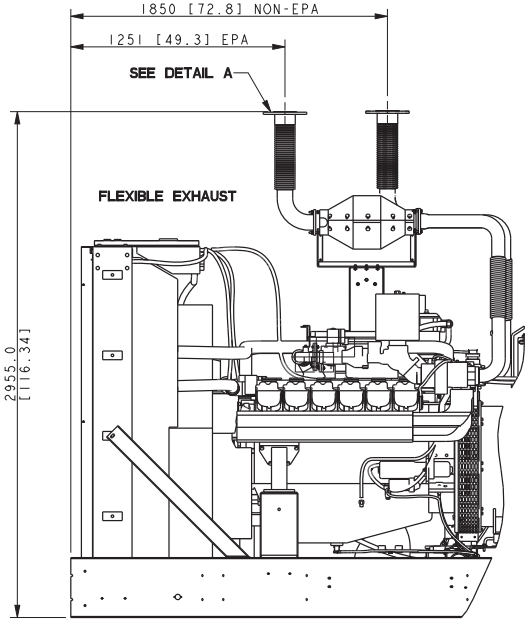




DETAIL A







CATALYSTS ARE NOT INCLUDED WITH NON-EPA GENSETS.

DIMENSIONS IN [ ] ARE ENGLISH EQUIVALENTS.

THIS ASSEMBLY MUST COMPLY WITH PEP-RML-001

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	9JUL2020	NEW DRAWING [CT205102]	CEK
A	15SEP2020	(D-8) EXHAUST LOCATION NOTE ADDED [CT206780]	CEK

DO NOT SCALE, REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS IN MILLIMETERS
GENERAL TOLERANCES:
X.XX ± 0.25
X.X ± 1.0
X ± 1.3
ANGLES ± 0°30'
SURFACE FINISH MAX.

THIRD-ANGLE PROJECTION

APPROVALS		DATE
DRAWN	CEK	9JUL2020
CHECKED	DJV	9JUL2020
APPROVED	LAC	9JUL2020

KOHLER
KOHLER, WISCONSIN 53044

TITLE: DIMENSION PRINT, ACCESSORY
400-500 REZXD

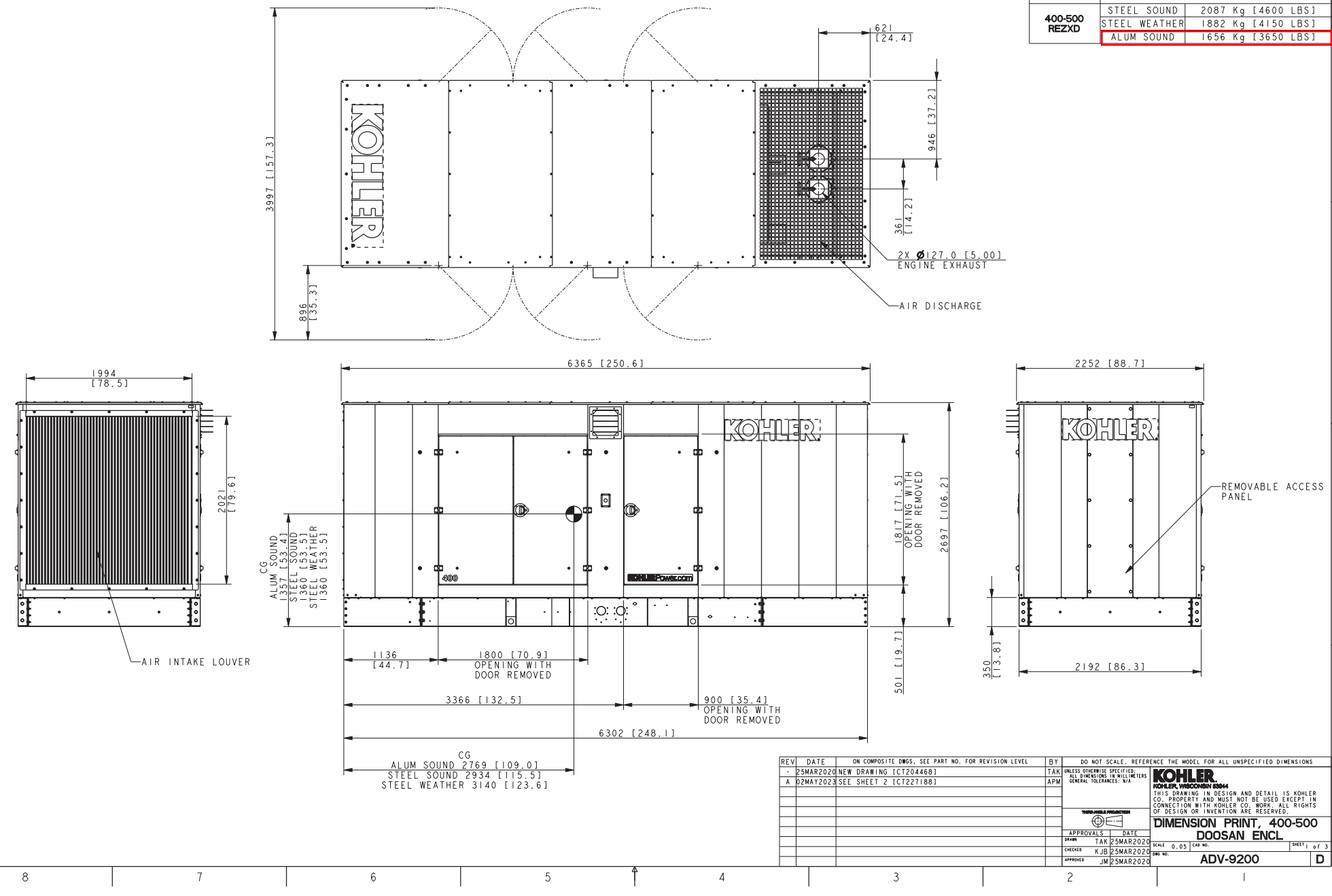
SCALE 0.07 | CAD NO. | SHEET 1 of 1

DWG NO. ADV-9196 | D

400-500KW MODELS
RECONNECTABLE
22 LITER DOOSAN,
EPA & NON-EPA

Attachment A

MODEL	ENCLOSURE WEIGHT	
400-500 REZXD	STEEL SOUND	2087 Kg [4600 LBS]
	STEEL WEATHER	1882 Kg [4150 LBS]
	ALUM SOUND	1656 Kg [3650 LBS]



REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	25MAR2020	NEW DRAWING [CT204468]	TAK
A	02MAY2023	SEE SHEET 2 [CT227188]	APM

DO NOT SCALE, REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

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

THIRD-ANGLE PROJECTION

APPROVALS		DATE
DRAWN	TAK	25MAR2020
CHECKED	KJB	25MAR2020
APPROVED	JM	25MAR2020

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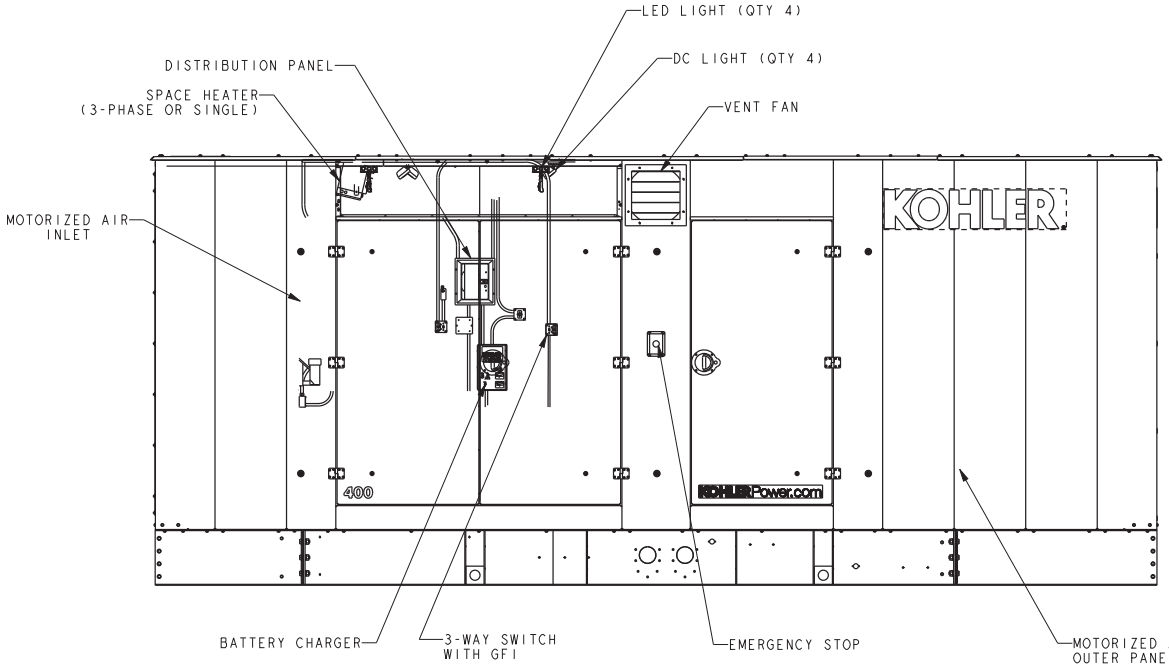
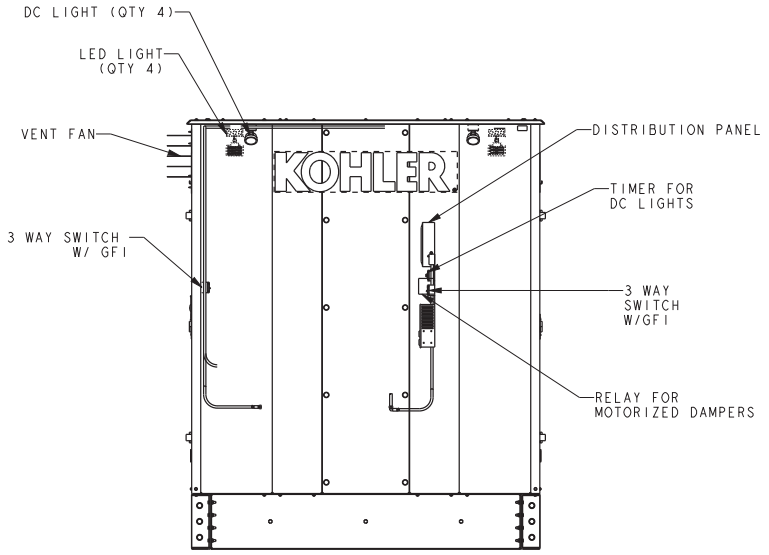
KOHLER, WISCONSIN 53044

DIMENSION PRINT, 400-500 DOOSAN ENCL

SCALE 0.05 | CAD NO. | SHEET 1 of 3

DWG NO. ADV-9200 | D





REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	25MAR2020	NEW DRAWING [CT204468]	TAK
A	02MAY2023	(C-3,6) LED LIGHT WAS INCANDESCENT LIGHT	
		[CT227188]	APM

DO NOT SCALE, REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

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

THIRD ANGLE PROJECTION

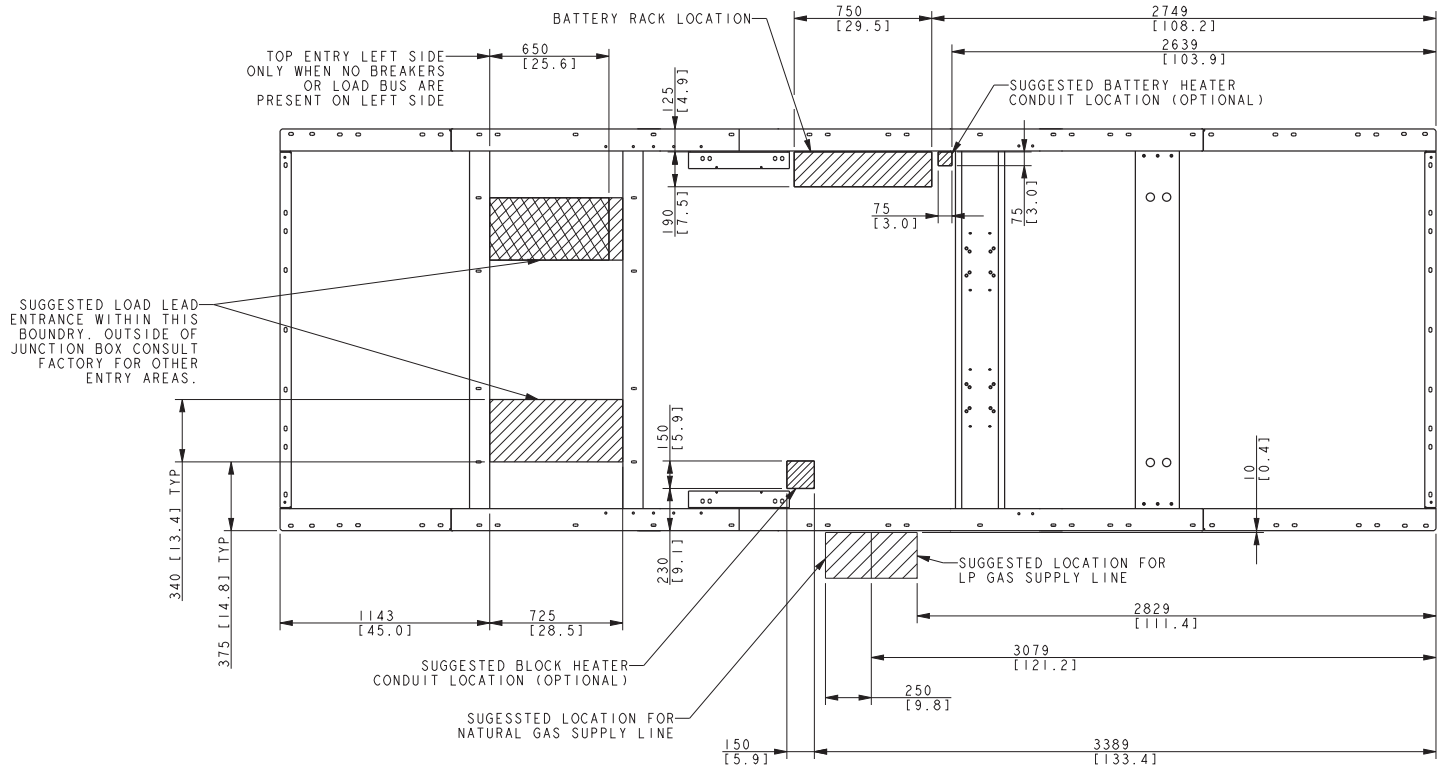
APPROVALS		DATE
DRAWN	TAK	25MAR2020
CHECKED	KJB	25MAR2020
APPROVED	JM	25MAR2020

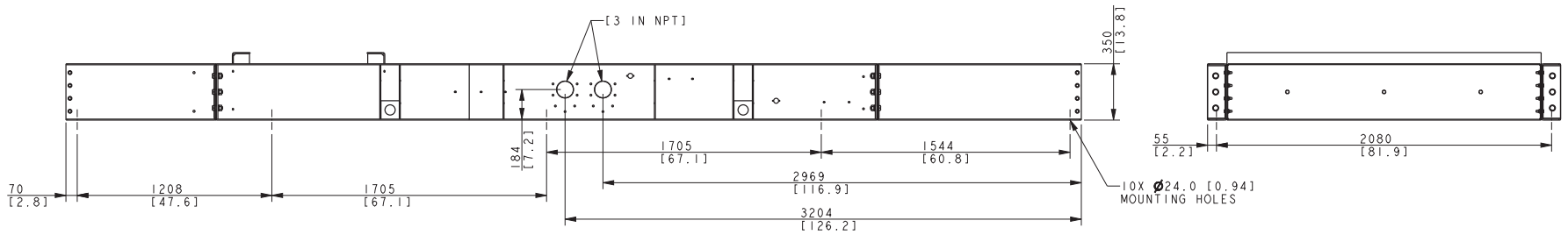
KOHLER
KOHLER, WISCONSIN 53044

DIMENSION PRINT, 400-500
DOOSAN ENCL

SCALE 0.07 | CAD NO. | SHEET 2 of 3

DWG NO. ADV-9200 | D





REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	25MAR2020	NEW DRAWING [CT204468]	TAK
A	02MAY2023	SEE SHEET 2 [CT227188]	APM

DO NOT SCALE, REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

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

THIRD ANGLE PROJECTION

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KOHLER, WISCONSIN 53044

APPROVALS		DATE
DRAWN	TAK	25MAR2020
CHECKED	KJB	25MAR2020
APPROVED	JM	25MAR2020

DIMENSION PRINT, 400-500 DOOSAN ENCL

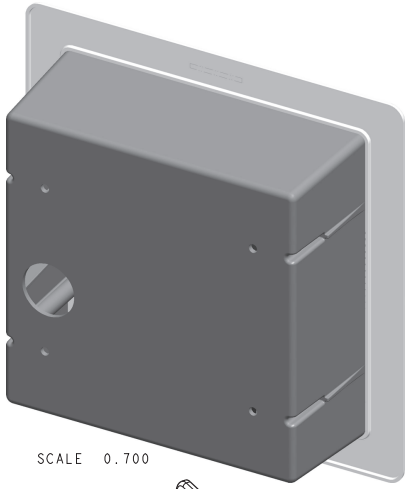
SCALE 0.08 | CAD NO. | SHEET 3 of 3

DWG NO. ADV-9200 | D

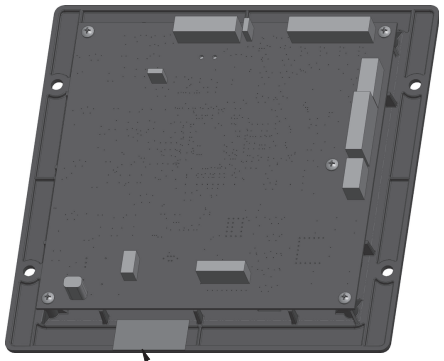
Attachment A

PART NO.	REV	ITEM 1	ITEM 2	ITEM 3	COMMENTS
GM85123-1	C	GM85127	GM85129	GM86126-1	MULTIPLE ATS
GM85123-2	C	GM85131	GM85129	GM86126-2	SINGLE ATS
GM85123-3	C	GM85132	-	GM86126-3	ANNUNCIATOR ONLY
GM85123-4	C	GM85133	-	GM86126-3	SDMO - ANNUNCIATOR ONLY

SCALE 0.700

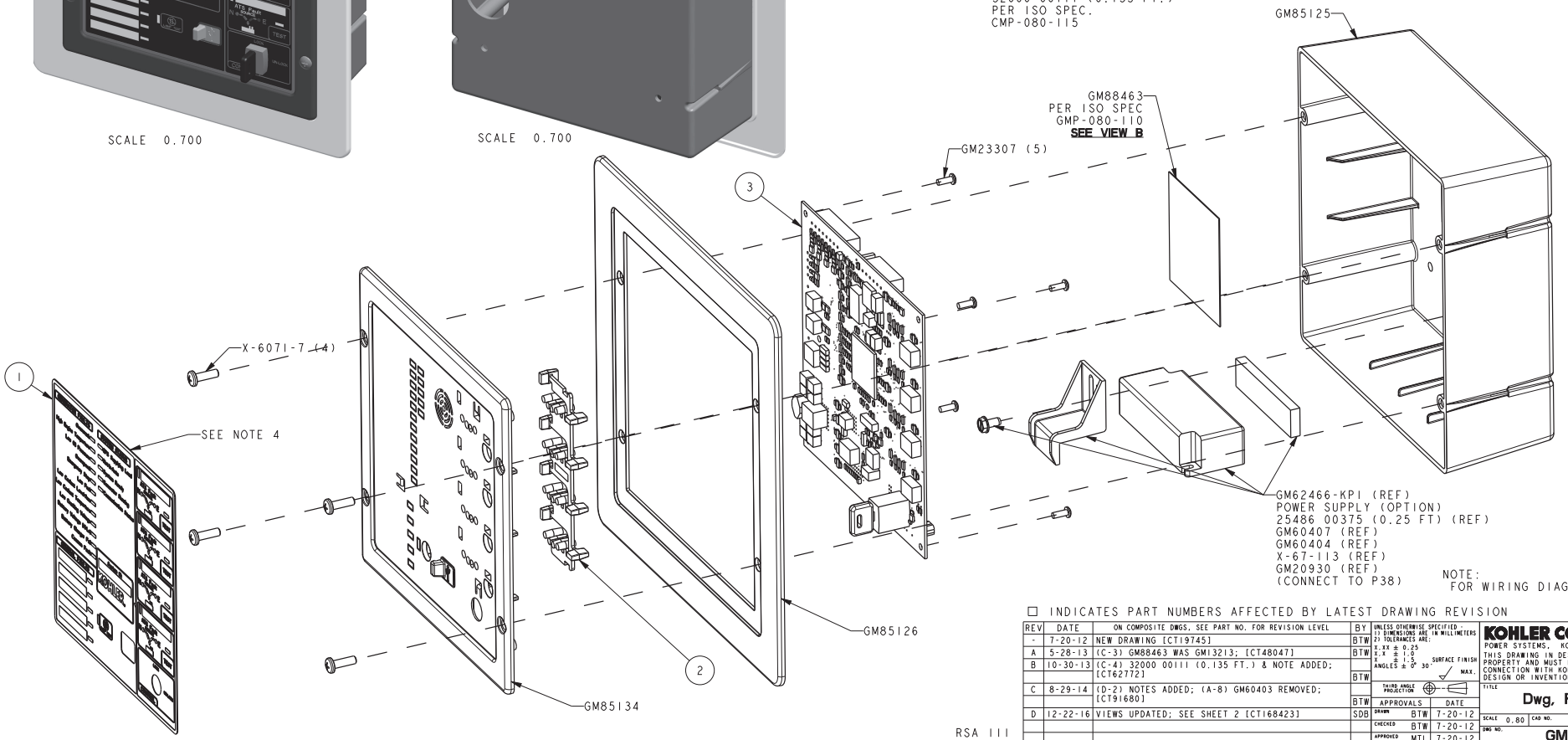


SCALE 0.700



32000 00111 (0.135 FT.)
PER ISO SPEC.
CMP-080-115

NOTES:
1. FUNCTIONALLY TEST ACCORDING TO ISO DOCUMENT ETF-WI-001, PER SPECIFICATION ETF-TD-003.
2. ASSEMBLE PCBA TO BACK OF BEZEL USING FIXTURE JT-0001.
3. TORQUE ALL SCREWS TO 7-10 in lbs.
4. PEEL BACKING OFF FACE PLATE AND APPLY TO BEZEL. APPLY EVEN PRESSURE TO ENTIRE SURFACE TO ENSURE COMPLETE ADHESION.



NOTE:
FOR WIRING DIAGRAM, SEE GM62554.

☐ INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	7-20-12	NEW DRAWING [CT19745]	BTW
A	5-28-13	(C-3) GM88463 WAS GM13213; [CT48047]	BTW
B	10-30-13	(C-4) 32000 00111 (0.135 FT.) & NOTE ADDED; [CT62772]	BTW
C	8-29-14	(D-2) NOTES ADDED; (A-8) GM60403 REMOVED; [CT91680]	BTW
D	12-22-16	VIEWS UPDATED; SEE SHEET 2 [CT168423]	SDB

UNLESS OTHERWISE SPECIFIED: (1) DIMENSIONS ARE IN MILLIMETERS (2) TOLERANCES ARE: X .XX ± 0.25, X.X ± 1.0, X ± 1.5, ANGLES ± 0° 30' — SURFACE FINISH MAX. — THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	BTW	7-20-12
CHECKED	BTW	7-20-12
APPROVED	MTL	7-20-12

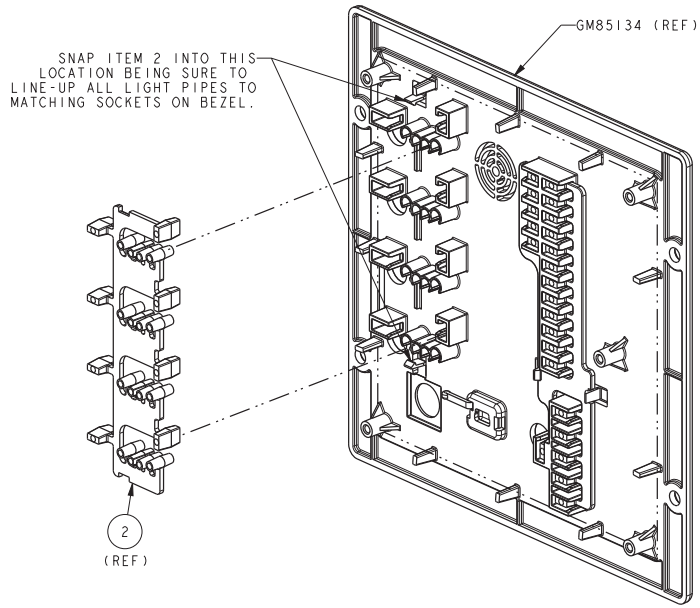
KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE: Dwg, RSA III Assy

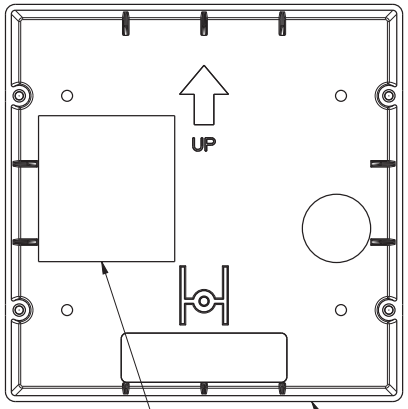
SCALE 0.80 | CAD NO. | SHEET 1 of 2

DWG NO. GM85123 | D

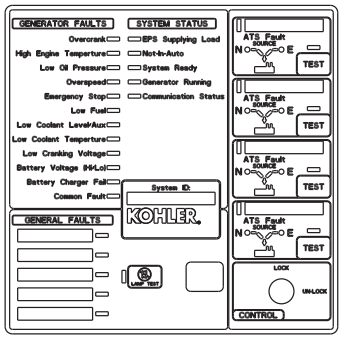
RSA III



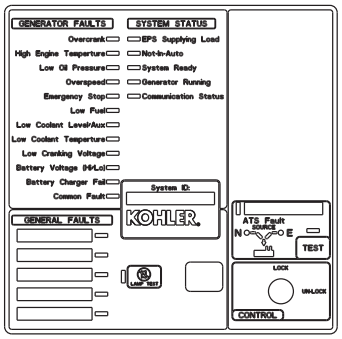
BACK VIEW OF BEZEL
SCALE 1.000



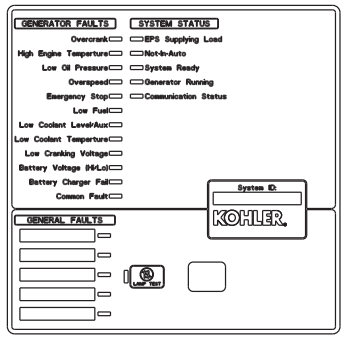
VIEW B
FRONT OF BOX



ITEM 1
(P/N: GM85127 REF)



ITEM 1
(P/N: GM85131 REF)



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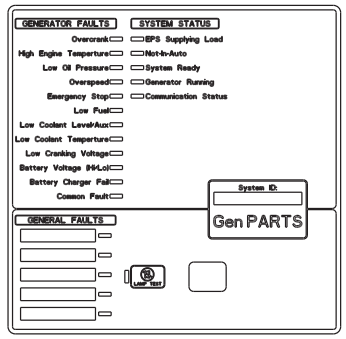
(P/N: GM85132 REF)



ITEM 1
(P/N: GM85133 REF)

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	7-30-12	NEW DRAWING [CTI9745]	BTW
A	5-28-13	(A-8) GM88463 (REF) WAS GM13213 (REF); [CT48047]	BTW
B	10-30-13	SEE SHEET 1 [CT62772]	BTW
C	8-29-14	VIEW A REMOVED; [CT91680]	BTW
D	12-22-16	VIEWS UPDATED; SEE SHEET 1 [CTI68423]	SDB

UNLESS OTHERWISE SPECIFIED: (1) DIMENSIONS ARE IN MILLIMETERS (2) TOLERANCES ARE: X.XX ± 0.25, X.X ± 1.0, X ± 1.5, ANGLES ± 0° 30' MAX. SURFACE FINISH. THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	BTW	7-30-12
CHECKED	BTW	7-30-12
APPROVED	MTL	7-30-12

TITLE: Dwg, RSA III Assy

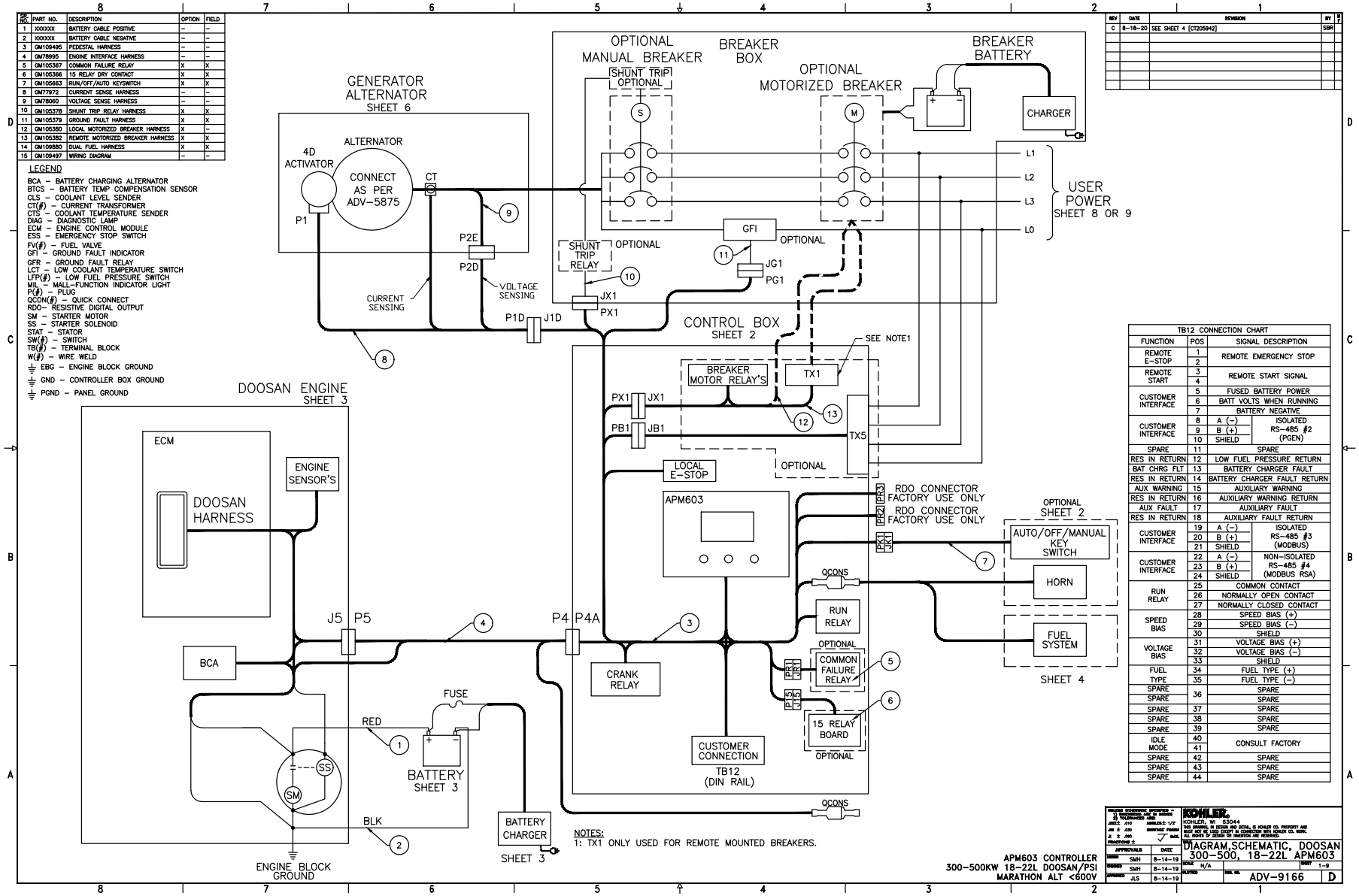
SCALE 0.80 | CAD NO. | SHEET 2 of 2

DWG NO. GM85123 | D

KOHLER®

Wiring Schematics

Attachment A



SEQ NO.	PART NO.	DESCRIPTION	OPTION	FIELD
1	XXXXXX	BATTERY CABLE POSITIVE	–	–
2	XXXXXX	BATTERY CABLE NEGATIVE	–	–
3	GM109495	PEDESTAL HARNESS	–	–
4	GM78995	ENGINE INTERFACE HARNESS	–	–
5	GM105367	COMMON FAILURE RELAY	X	X
6	GM105366	15 RELAY DRY CONTACT	X	X
7	GM105663	RUN/OFF/AUTO KEYSWITCH	X	X
8	GM77972	CURRENT SENSE HARNESS	–	–
9	GM78060	VOLTAGE SENSE HARNESS	–	–
10	GM105378	SHUNT TRIP RELAY HARNESS	X	X
11	GM105379	GROUND FAULT HARNESS	X	X
12	GM105380	LOCAL MOTORIZED BREAKER HARNESS	X	–
13	GM105382	REMOTE MOTORIZED BREAKER HARNESS	X	X
14	GM109880	DUAL FUEL HARNESS	X	X
15	GM109497	WIRING DIAGRAM	–	–

LEGEND

BCA – BATTERY CHARGING ALTERNATOR
BTCS – BATTERY TEMP COMPENSATION SENSOR
CLS – COOLANT LEVEL SENDER
CT(#) – CURRENT TRANSFORMER
CTS – COOLANT TEMPERATURE SENDER
DIAG – DIAGNOSTIC LAMP
ECM – ENGINE CONTROL MODULE
ESS – EMERGENCY STOP SWITCH
FV(#) – FUEL VALVE
GFI – GROUND FAULT INDICATOR
GFR – GROUND FAULT RELAY
LCT – LOW COOLANT TEMPERATURE SWITCH
LFP(#) – LOW FUEL PRESSURE SWITCH
MIL – MALI–FUNCTION INDICATOR LIGHT
P(#) – PLUG
QCON(#) – QUICK CONNECT
RDO– RESISTIVE DIGITAL OUTPUT
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

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
SPARE	11	SPARE
RES IN RETURN	12	LOW FUEL PRESSURE 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)
	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
FUEL TYPE	34	FUEL TYPE (+)
	35	FUEL TYPE (–)
SPARE	36	SPARE
SPARE		SPARE
SPARE	37	SPARE
SPARE	38	SPARE
SPARE	39	SPARE
IDLE MODE	40	CONSULT FACTORY
	41	
SPARE	42	SPARE
SPARE	43	SPARE
SPARE	44	SPARE

REV	DATE	REVISION	BY
C	8–18–20	SEE SHEET 4 [CT205942]	SBR

NOTES:
1: TX1 ONLY USED FOR REMOTE MOUNTED BREAKERS.

APM603 CONTROLLER
300–500KW 18–22L DOOSAN/PSI
MARATHON ALT <600V

KOHLER CO. KOHLER, WI 53044

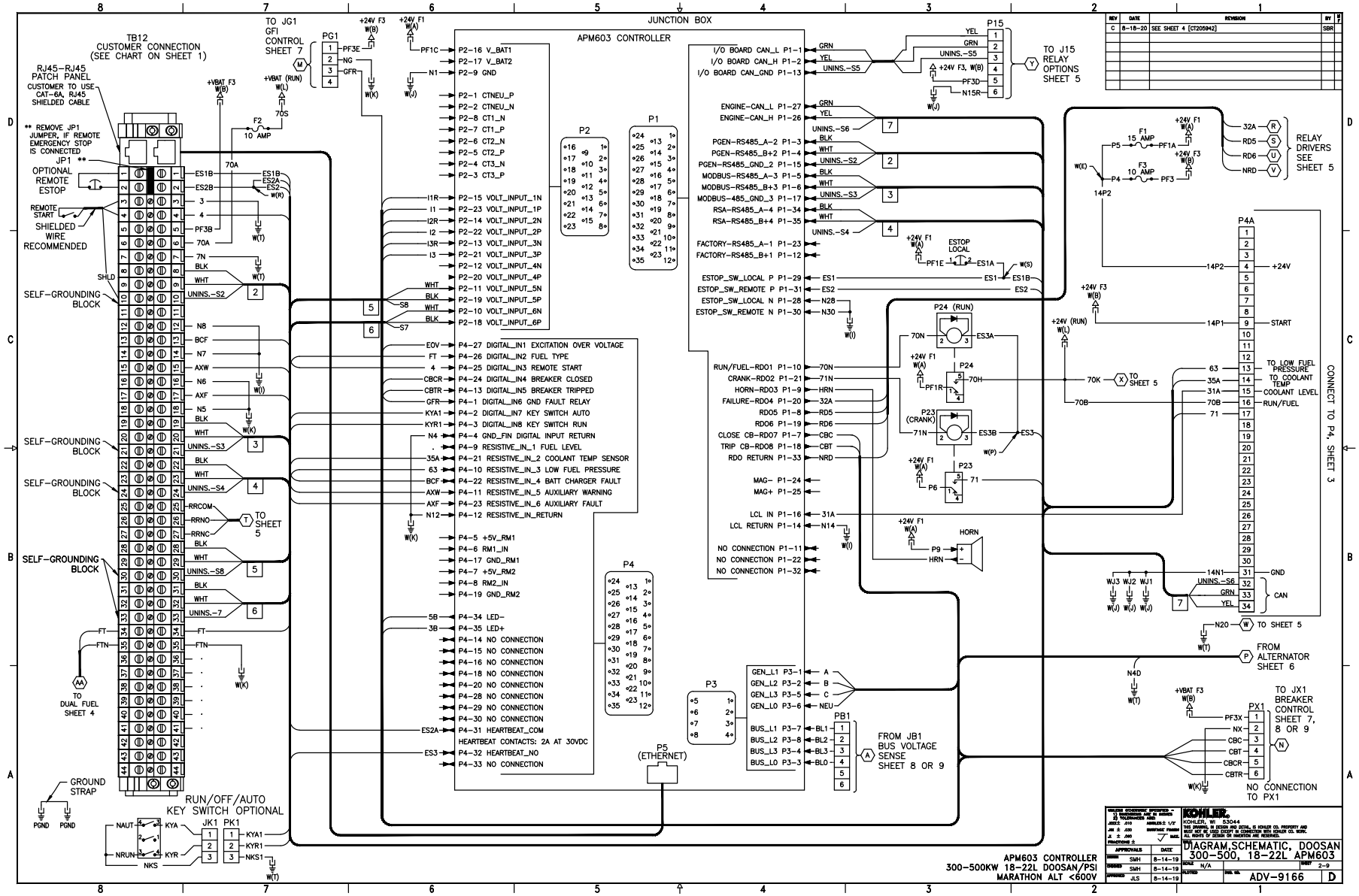
APPROVALS	DATE
SMH	8–14–19
SMH	8–14–19
JLS	8–14–19

DIAGRAM,SCHEMATIC, DOOSAN 300–500, 18–22L APM603

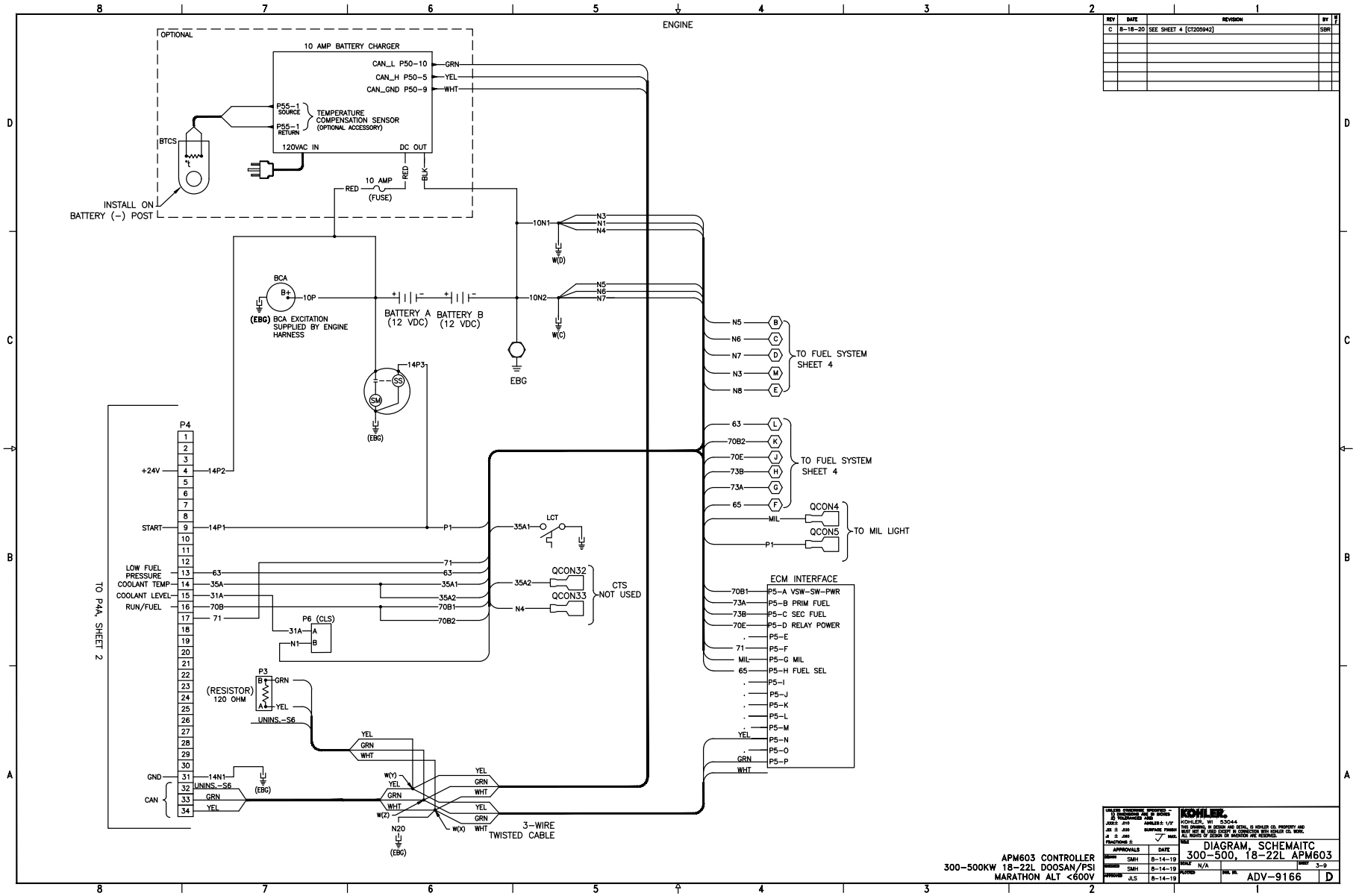
SCALE N/A SHEET 1–9

DRAWING NO. ADV–9166 D

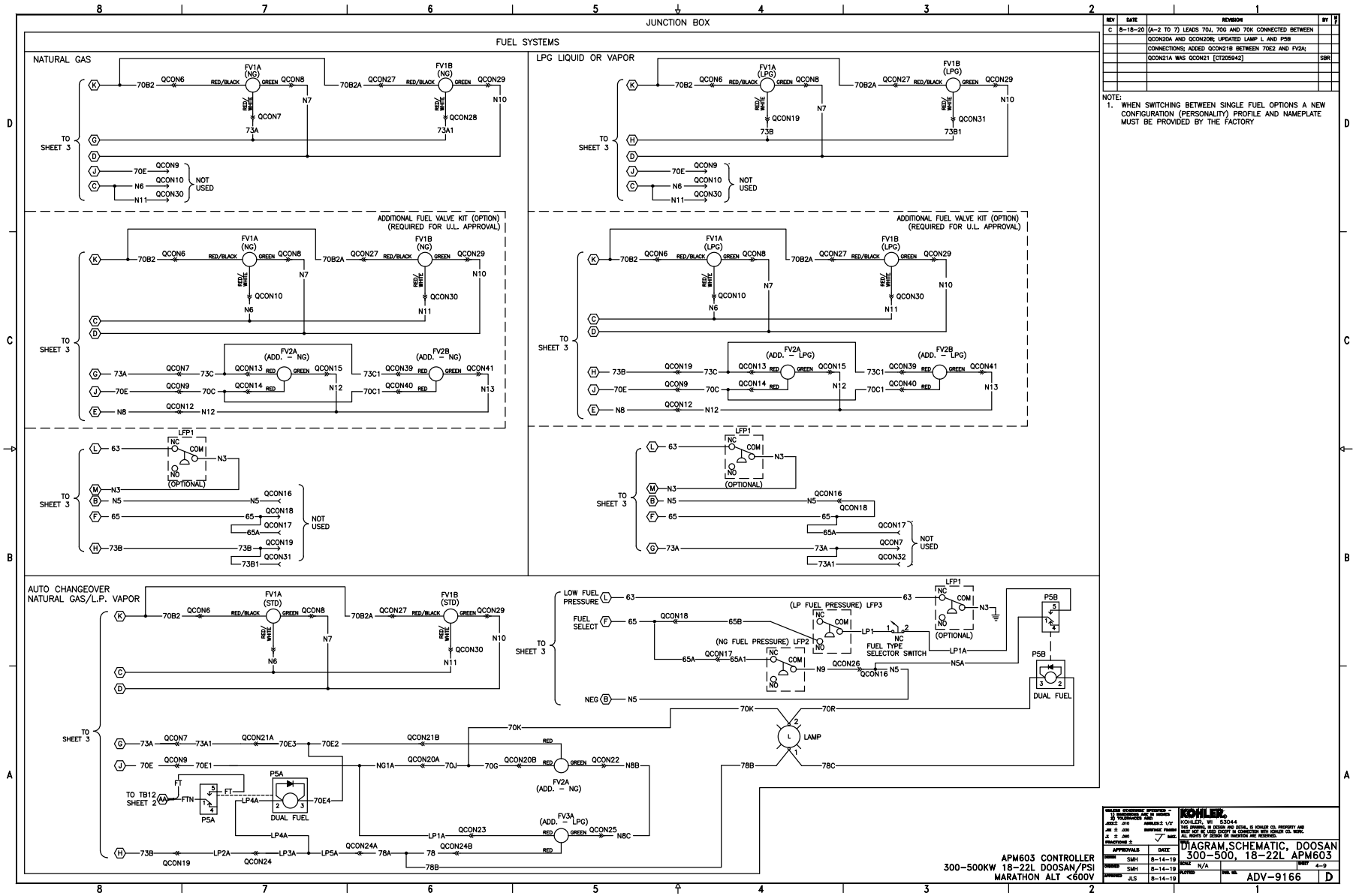
Attachment A



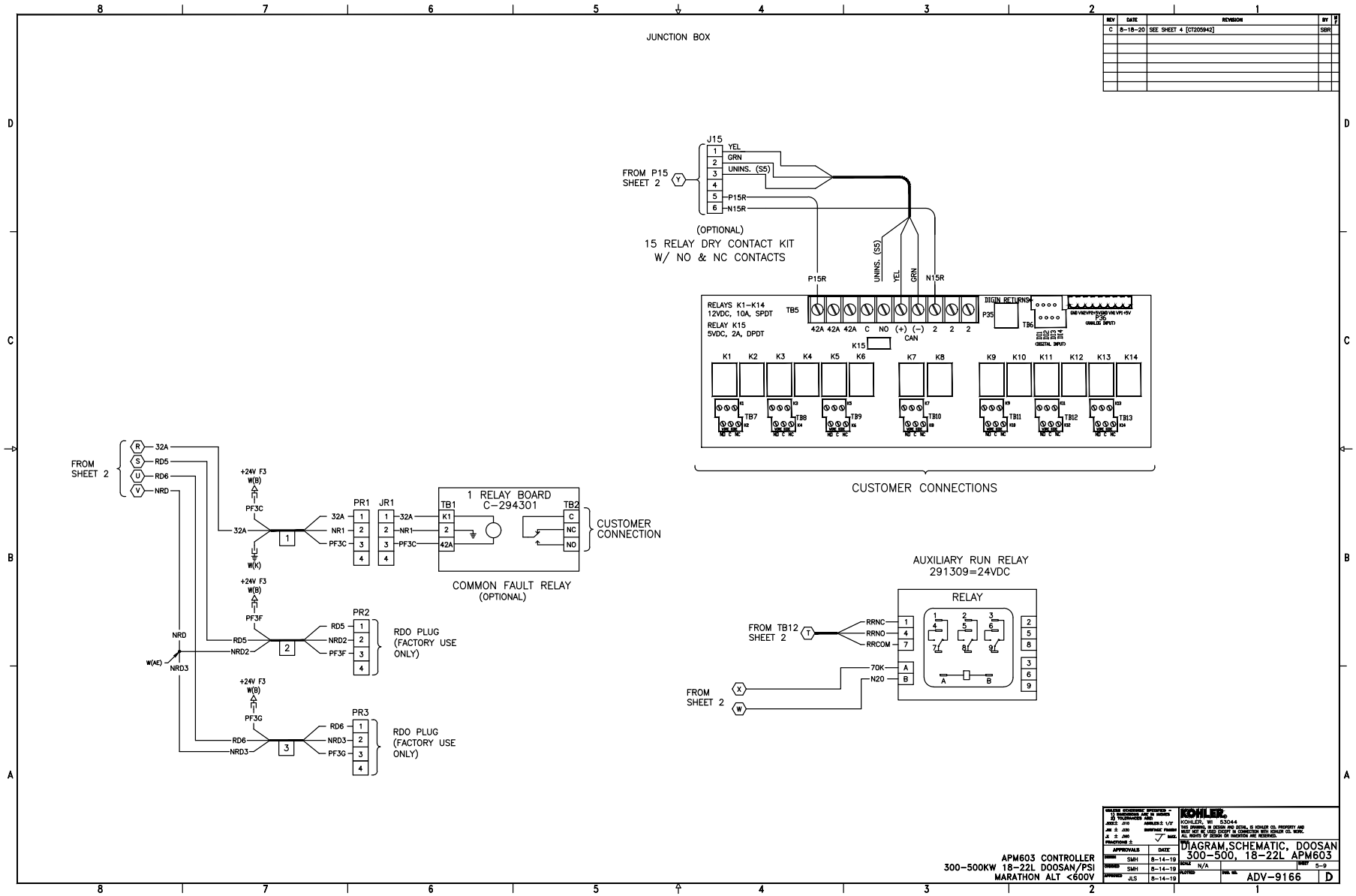
Attachment A



Attachment A



Attachment A



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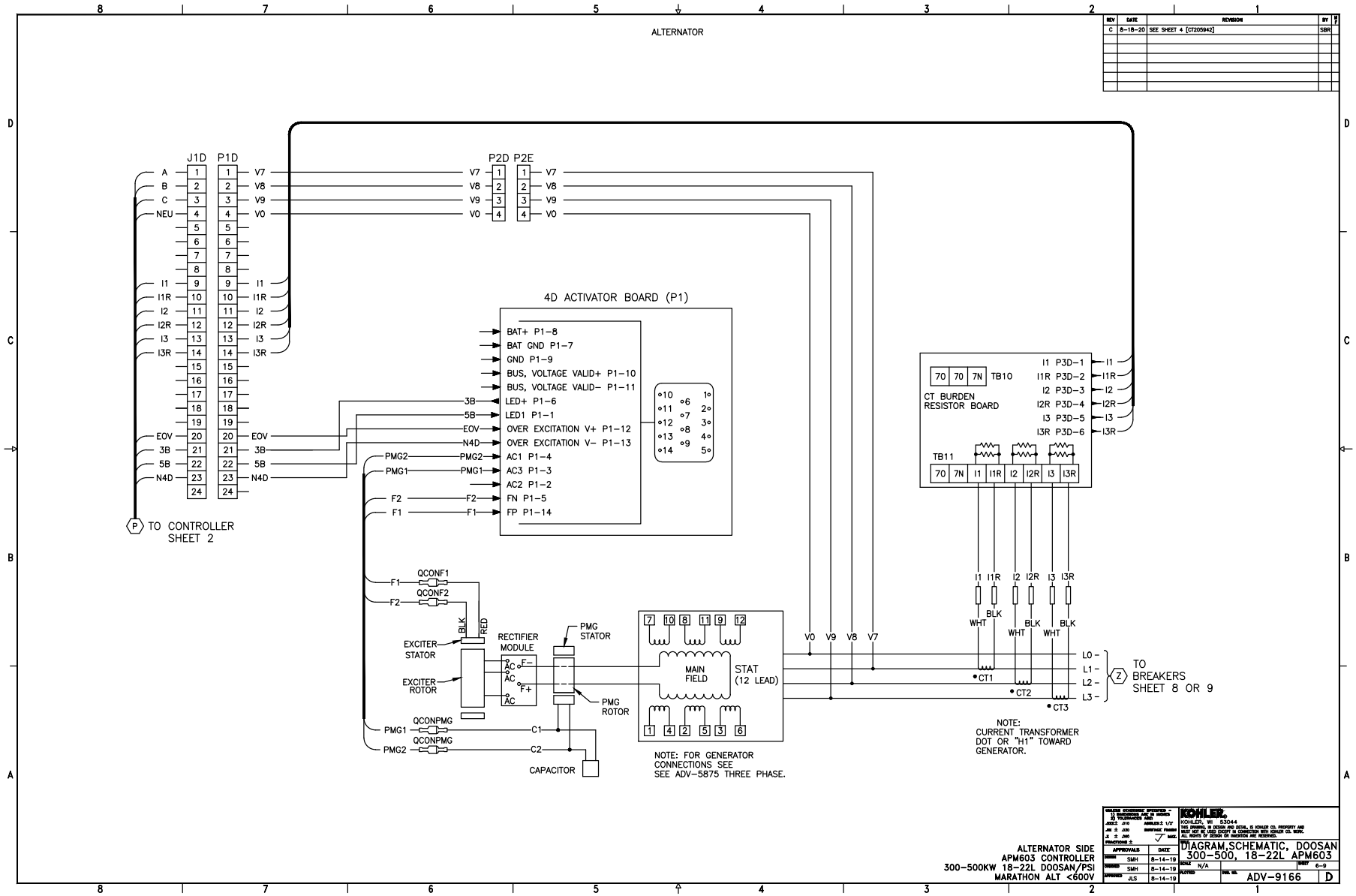

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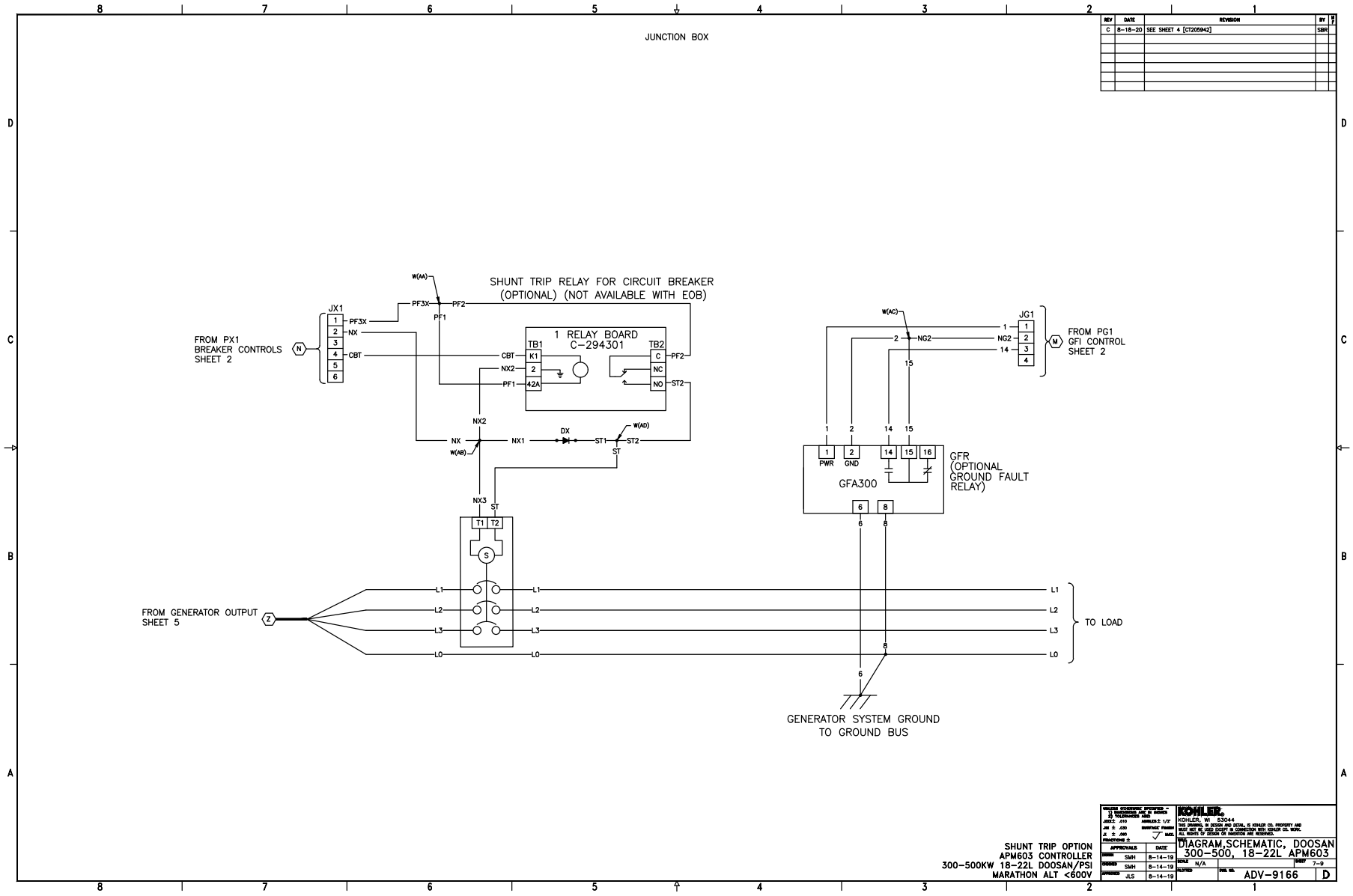


REV	DATE	REVISION	BY
C	8-18-20	SEE SHEET 4 [CT205942]	SBR

SHUNT TRIP OPTION
APM603 CONTROLLER
300-500KW 18-22L DOOSAN/PSI
MARATHON ALT <600V

KOHLER CO.
KOHLER, WI 53044

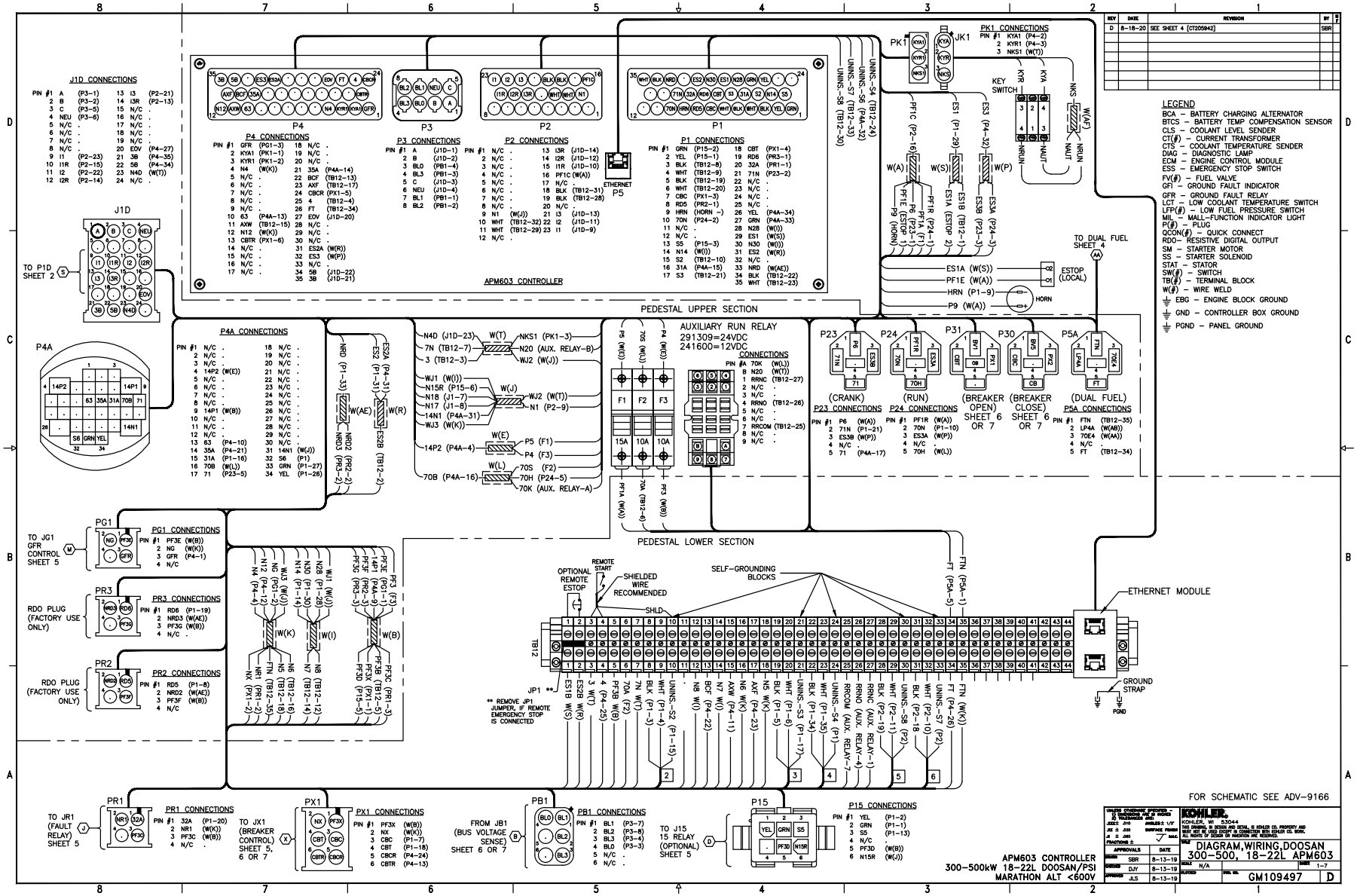
APPROVALS	DATE
SMH	8-14-19
SMH	8-14-19
JLS	8-14-19

DIAGRAM,SCHEMATIC, DOOSAN
300-500, 18-22L APM603

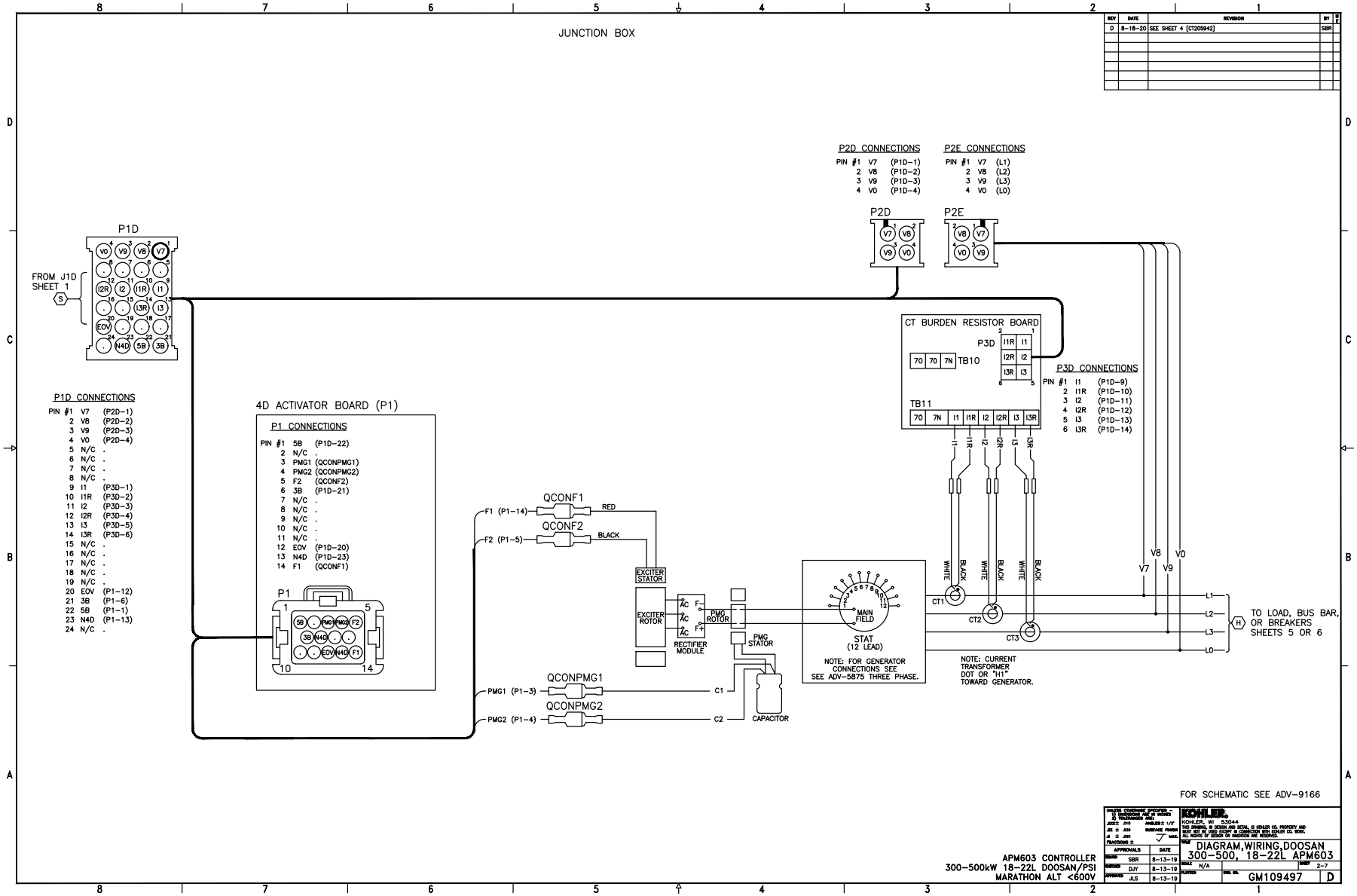
SCALE N/A SHEET 7-9

DWG NO. ADV-9166 D

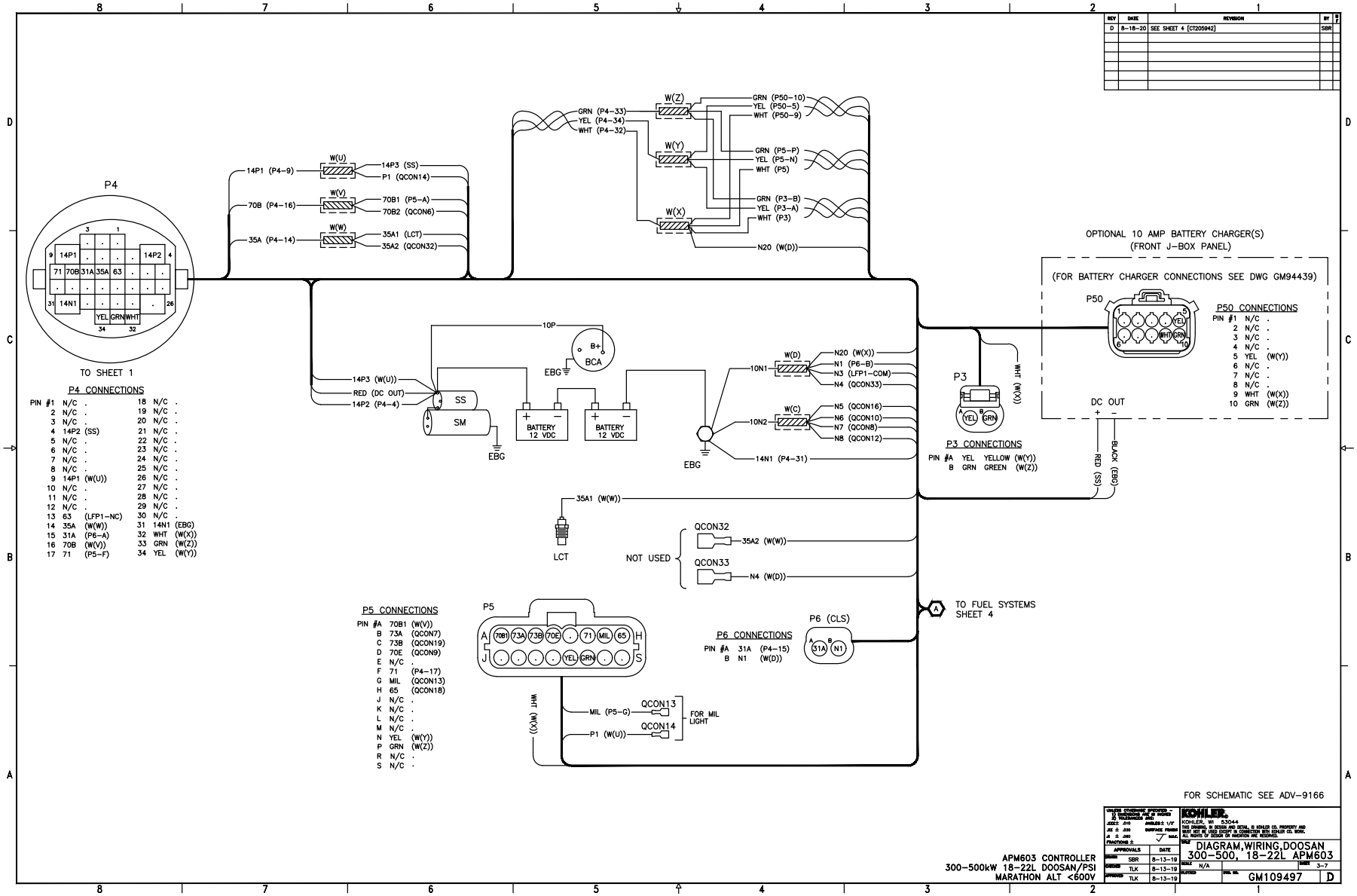
Attachment A



Attachment A



Attachment A



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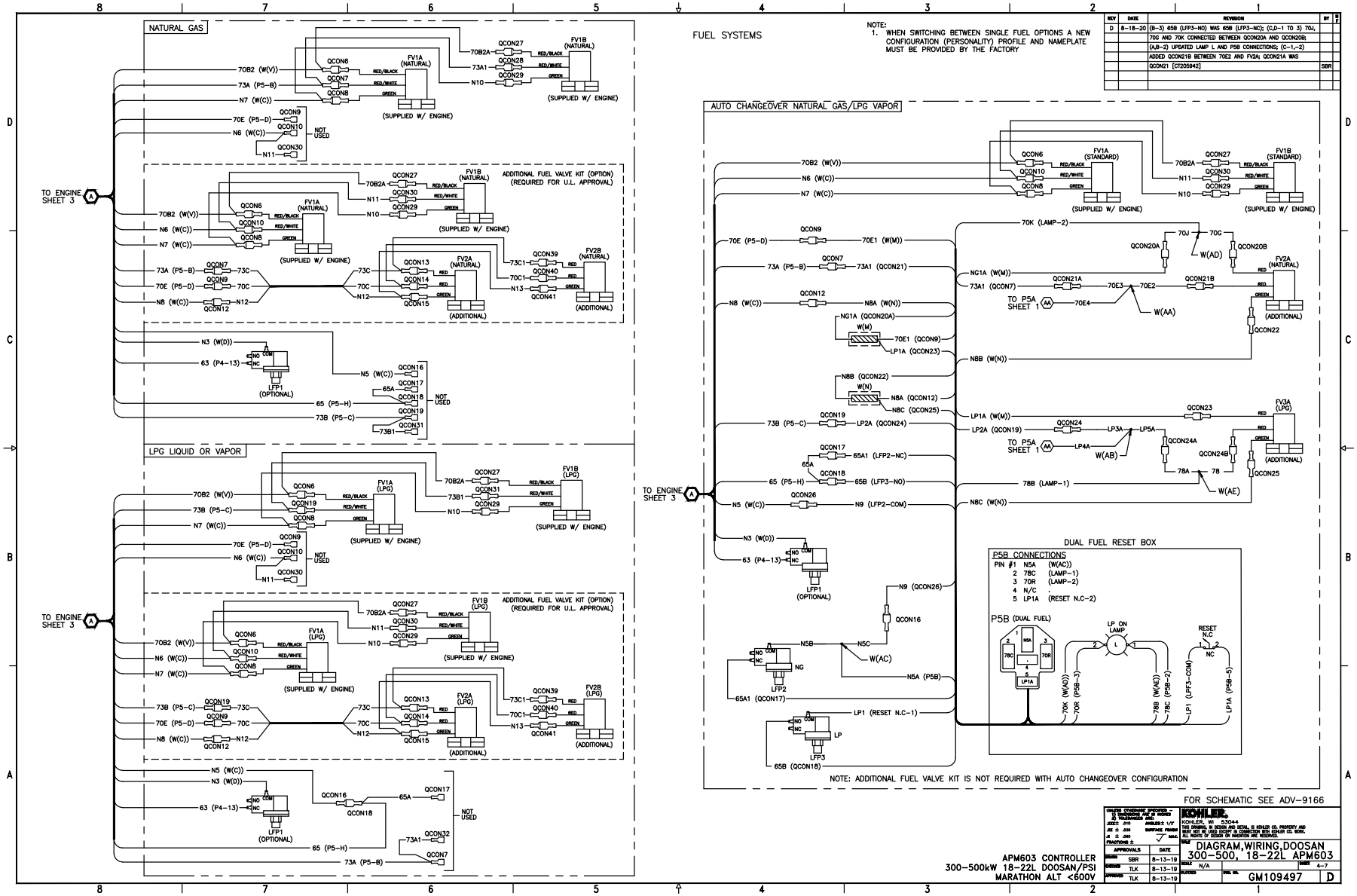
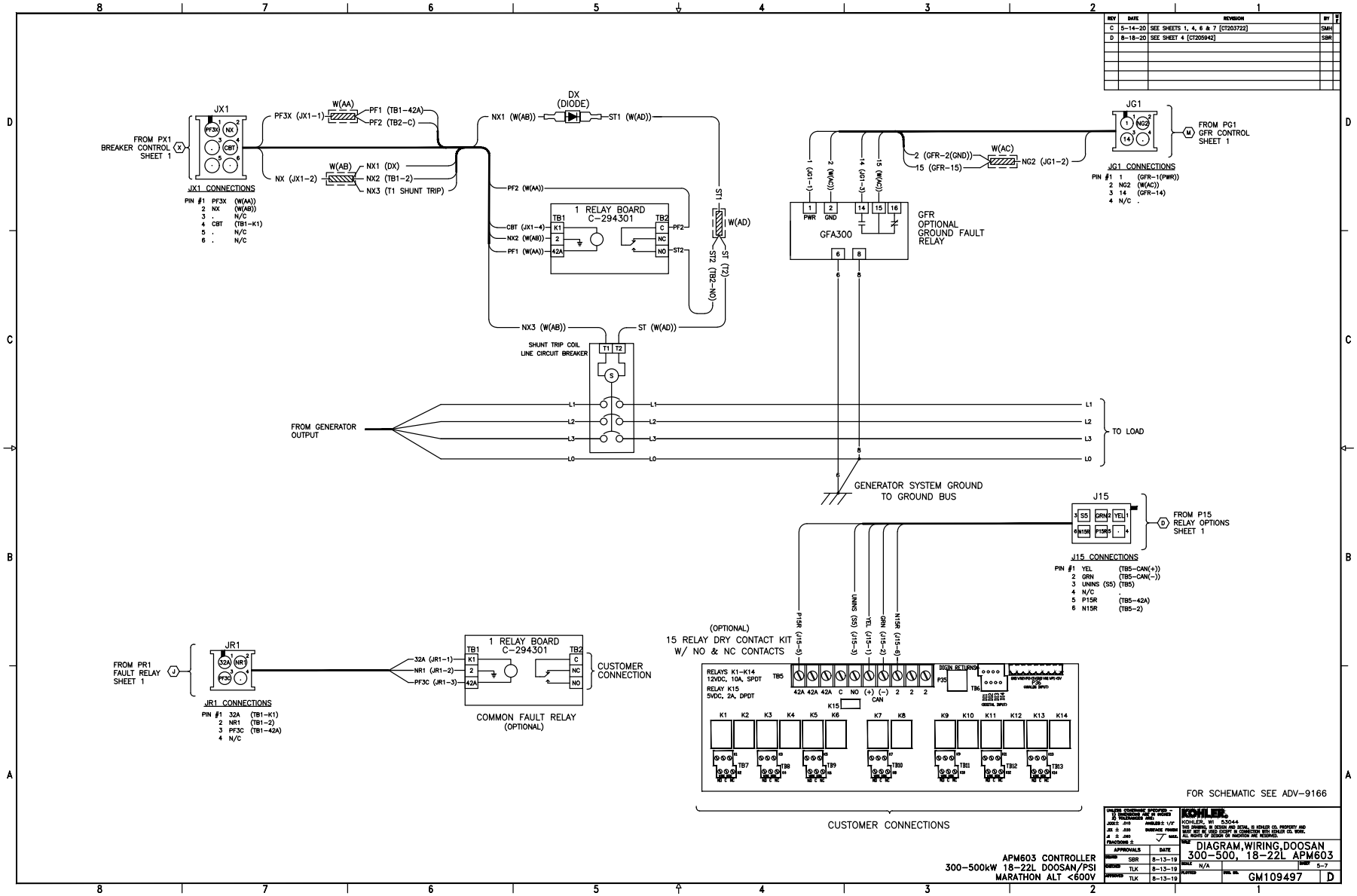
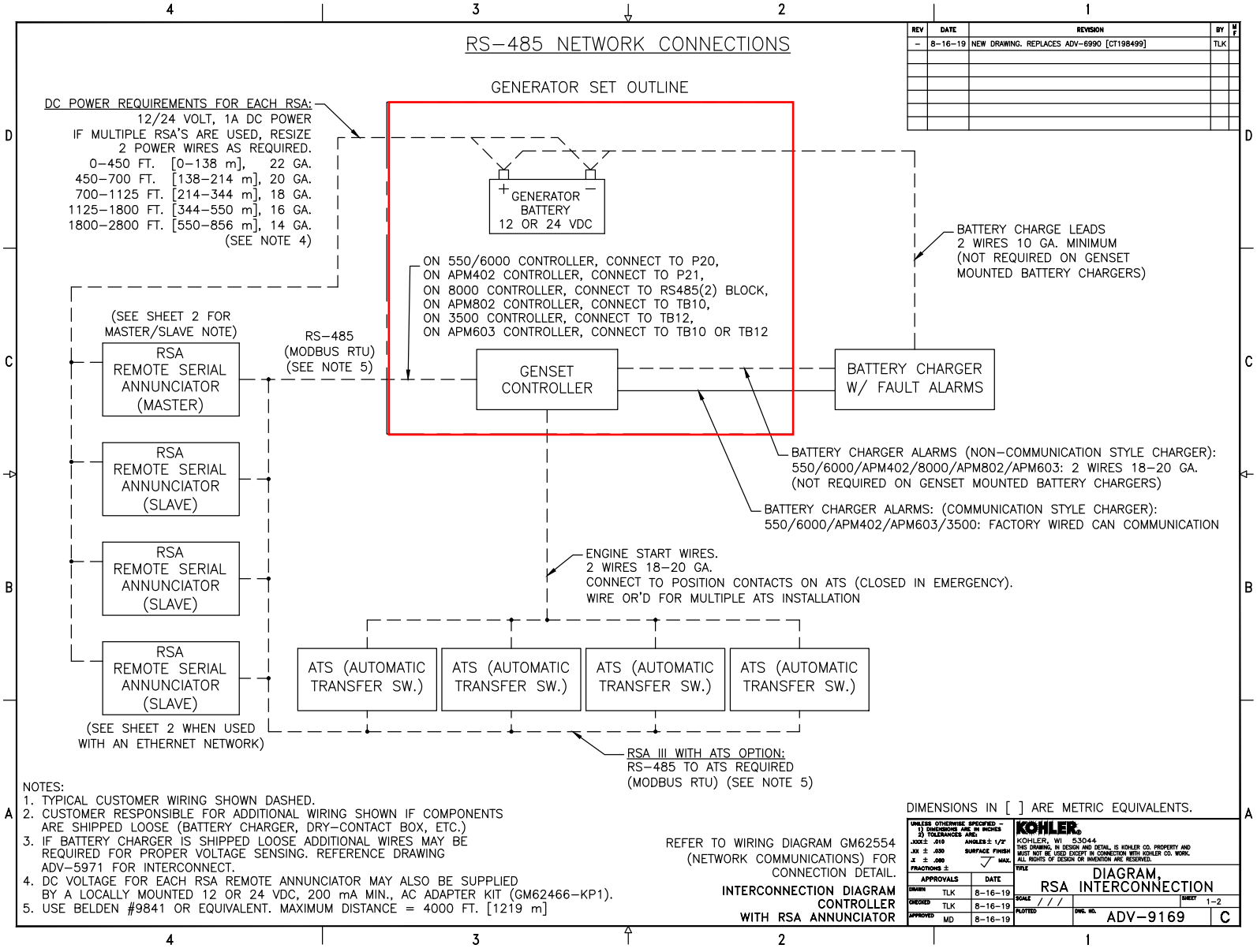
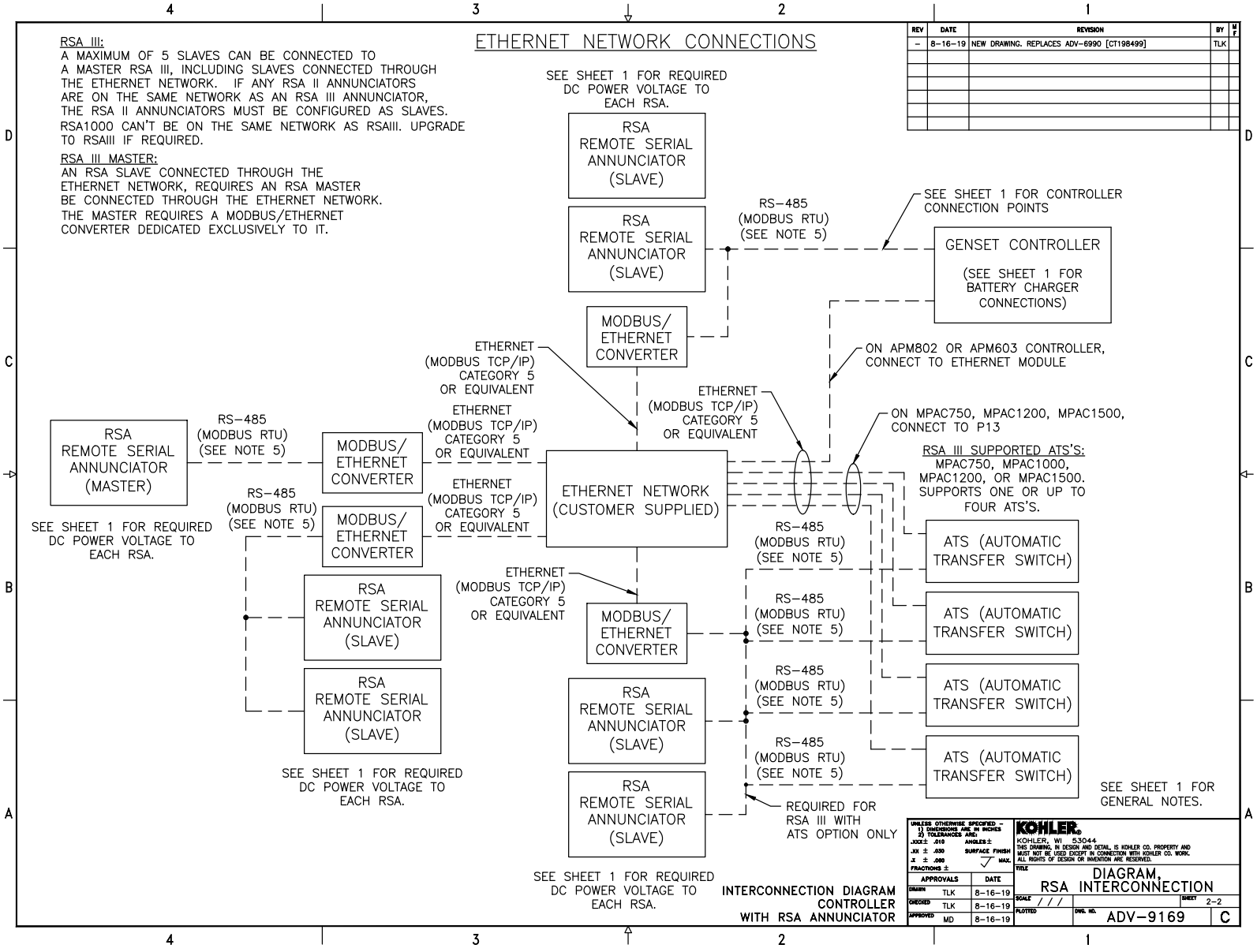


Attachment A



Attachment A




ETHERNET NETWORK CONNECTIONS
RSA III:
A MAXIMUM OF 5 SLAVES CAN BE CONNECTED TO A MASTER RSA III, INCLUDING SLAVES CONNECTED THROUGH THE ETHERNET NETWORK. IF ANY RSA II ANNUNCIATORS ARE ON THE SAME NETWORK AS AN RSA III ANNUNCIATOR, THE RSA II ANNUNCIATORS MUST BE CONFIGURED AS SLAVES. RSA1000 CAN'T BE ON THE SAME NETWORK AS RSAIII. UPGRADE TO RSAIII IF REQUIRED.
RSA III MASTER:
AN RSA SLAVE CONNECTED THROUGH THE ETHERNET NETWORK, REQUIRES AN RSA MASTER BE CONNECTED THROUGH THE ETHERNET NETWORK. THE MASTER REQUIRES A MODBUS/ETHERNET CONVERTER DEDICATED EXCLUSIVELY TO IT.
REV DATE REVISION BY
– 8-16-19 NEW DRAWING. REPLACES ADV-6990 [CT198499] TLK
SEE SHEET 1 FOR REQUIRED DC POWER VOLTAGE TO EACH RSA.
RSA REMOTE SERIAL ANNUNCIATOR (SLAVE)
RSA REMOTE SERIAL ANNUNCIATOR (SLAVE)
RS-485 (MODBUS RTU) (SEE NOTE 5)
SEE SHEET 1 FOR CONTROLLER CONNECTION POINTS
GENSET CONTROLLER
(SEE SHEET 1 FOR BATTERY CHARGER CONNECTIONS)
MODBUS/ ETHERNET CONVERTER
ETHERNET (MODBUS TCP/IP) CATEGORY 5 OR EQUIVALENT
ON APM802 OR APM603 CONTROLLER, CONNECT TO ETHERNET MODULE
ETHERNET (MODBUS TCP/IP) CATEGORY 5 OR EQUIVALENT
ON MPAC750, MPAC1200, MPAC1500, CONNECT TO P13
RSA III SUPPORTED ATS'S:
MPAC750, MPAC1000, MPAC1200, OR MPAC1500. SUPPORTS ONE OR UP TO FOUR ATS'S.
RSA REMOTE SERIAL ANNUNCIATOR (MASTER)
RS-485 (MODBUS RTU) (SEE NOTE 5)
MODBUS/ ETHERNET CONVERTER
ETHERNET (MODBUS TCP/IP) CATEGORY 5 OR EQUIVALENT
ETHERNET NETWORK (CUSTOMER SUPPLIED)
SEE SHEET 1 FOR REQUIRED DC POWER VOLTAGE TO EACH RSA.
RS-485 (MODBUS RTU) (SEE NOTE 5)
MODBUS/ ETHERNET CONVERTER
ETHERNET (MODBUS TCP/IP) CATEGORY 5 OR EQUIVALENT
RS-485 (MODBUS RTU) (SEE NOTE 5)
ATS (AUTOMATIC TRANSFER SWITCH)
ETHERNET (MODBUS TCP/IP) CATEGORY 5 OR EQUIVALENT
MODBUS/ ETHERNET CONVERTER
RS-485 (MODBUS RTU) (SEE NOTE 5)
ATS (AUTOMATIC TRANSFER SWITCH)
RSA REMOTE SERIAL ANNUNCIATOR (SLAVE)
RSA REMOTE SERIAL ANNUNCIATOR (SLAVE)
RS-485 (MODBUS RTU) (SEE NOTE 5)
ATS (AUTOMATIC TRANSFER SWITCH)
SEE SHEET 1 FOR REQUIRED DC POWER VOLTAGE TO EACH RSA.
RS-485 (MODBUS RTU) (SEE NOTE 5)
ATS (AUTOMATIC TRANSFER SWITCH)
RSA REMOTE SERIAL ANNUNCIATOR (SLAVE)
REQUIRED FOR RSA III WITH ATS OPTION ONLY
SEE SHEET 1 FOR GENERAL NOTES.
SEE SHEET 1 FOR REQUIRED DC POWER VOLTAGE TO EACH RSA.
INTERCONNECTION DIAGRAM CONTROLLER WITH RSA ANNUNCIATOR
KOHLER CO.
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.
APPROVALS DATE
DRAWN TLK 8-16-19
CHECKED TLK 8-16-19
APPROVED MD 8-16-19
TITLE DIAGRAM, RSA INTERCONNECTION
SCALE /// SHEET 2-2
PLOTTED DWG. NO. ADV-9169 C

Attachment A

Drawing Sheet Reference

Sheet	Description
1	Networked Devices, General Notes, This Sheet
2	Converters, Ethernet Network, PC, Data Interface System
3	16-Light (DEC3+), 550 (DEC550), KPC 1000 Legacy Genset Controllers
4	DEC3000 / APM402 Genset Controller
5	DEC6000 Genset Controller
6	APM603 Genset Controller for non-KD series, Standard PGEN Network
7	This Sheet Reserved for Future Features
8	APM603 Genset Controller for KD Series, Standard PGEN Network
9	This Sheet Reserved for Future Features
10	APM802 Genset Controller
11	DEC8000 Genset Controller
12	DEC3500 Genset Controller, Towable 10 Position Customer Terminal Block
13	Series 1000 (MPAC1000), 340 (M340/M340+), Power Monitor Legacy ATS (Automatic Transfer Switch Controllers)
14	MPAC1500, MPAC-DM 750/1200/1500 ATS (Automatic Transfer Switch Controllers)
15	Legacy RSAII (Remote Serial Annunciator)
16	RSAIII (Remote Serial Annunciator)

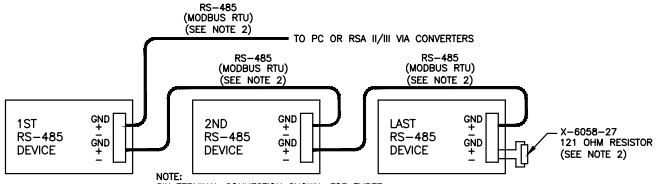
REV	DATE	REVISION	BY
N	5-30-19	THIS SHEET ADDED; COMPATIBILITY CHART, STANDARD NOTES,	
		AND NETWORKED DEVICES MOVED TO THIS SHEET; ISOLATED/	
		NON-ISOLATED RS-485 IDENTIFIED ON ALL SHEETS [CT197795]	TLK
P	6-24-20	(D-8) SHEET 6 NOTE: NON-KD SERIES WAS JOHN DEERE	
		80-500 KW, SHEET 12 NOTE: ADDED	
		TOWABLE 10 POSITION CUSTOMER TERMINAL BLOCK [CT204963]	TLK
R	28APR202	(A-8,7) "PEP-RML-001" NOTE ADDED; SEE SHEET 15 [CT212605]	CLN

Controller/Annunciator Compatibility Chart

	Monitor III	SiteTech	RSA2	RSA3
550 Genset	X	X	X	X
16-Light Genset	X		X	X
DEC 3000 / APM402 Genset	X	X	X	X
KPC 1000 Genset			X	X
6000 Genset	X	X	X	X
8000 Genset				4
APM802				X
APM603		X		X
DEC-3500 Genset		X		X
MPAC 1500	X		X	X
MPAC-DM 750, 1200, 1500		X	X	X
Series 1000 ATS	X		X	X
340 ATS	X			
340 Power Monitor	X			

"X" Designates supported devices. "4" Designates RS-485 Only.

DETAIL A (EXAMPLE OF)
NETWORKED RS-485 DEVICES



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

NOTES:

1.) MAXIMUM CABLE LENGTH FOR RS-232 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 1219 METERS (4000 FT.) FROM THE RS-485 CONVERTER TO THE LAST RS-485 DEVICE IN THE NETWORK. THE "LAST DEVICE" IS THE DEVICE FURTHEST FROM THE CONTROLLER. CONNECT "+" TO "+", "-" TO "-". CONNECT THE CABLE SHIELD TO "GND" AT ONE END OF CABLE ONLY, LEAVE OTHER END DISCONNECTED. 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 CONVERTER AND REMOTE SERIAL ANNUNCIATOR2 (RSA2) VIA P34. PLACE THE P34 JUMPER ON THE "IN" PINS IF THE MODBUS/ETHERNET CONVERTER, RSA2, OR RSA3 IS THE LAST DEVICE IN THE NETWORK. IF NOT THE LAST DEVICE, PLACE THE P34 JUMPER ON THE "OUT" PINS.

3.) THE 550 & 6000 CONTROLLER CAN BE USED AS A RS-232/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.

4.) EACH MODBUS/ETHERNET CONVERTER CAN COMMUNICATE WITH UP TO 4 ETHERNET NETWORK DEVICES SIMULTANEOUSLY. 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.

5.) ONLY ONE MASTER IS ALLOWED PER RS-485 NETWORK. ANY COMBINATION OF MASTERS IS ALLOWED IF COMMUNICATING VIA MODBUS/ETHERNET CONVERTERS.

6.) THIS ASSEMBLY OR PART MUST COMPLY WITH PEP-RML-001

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES. TOLERANCES ARE: .XXX ± .010, .XX ± .020, .X ± .040, FRACTIONS ± 1/64, ANGLES ± 1/2°, SURFACE FINISH 125

APPROVALS	DATE
DRAWN TLK	5-30-19
CHECKED TLK	5-30-19
APPROVED MD	5-30-19

KOHLER CO.
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.
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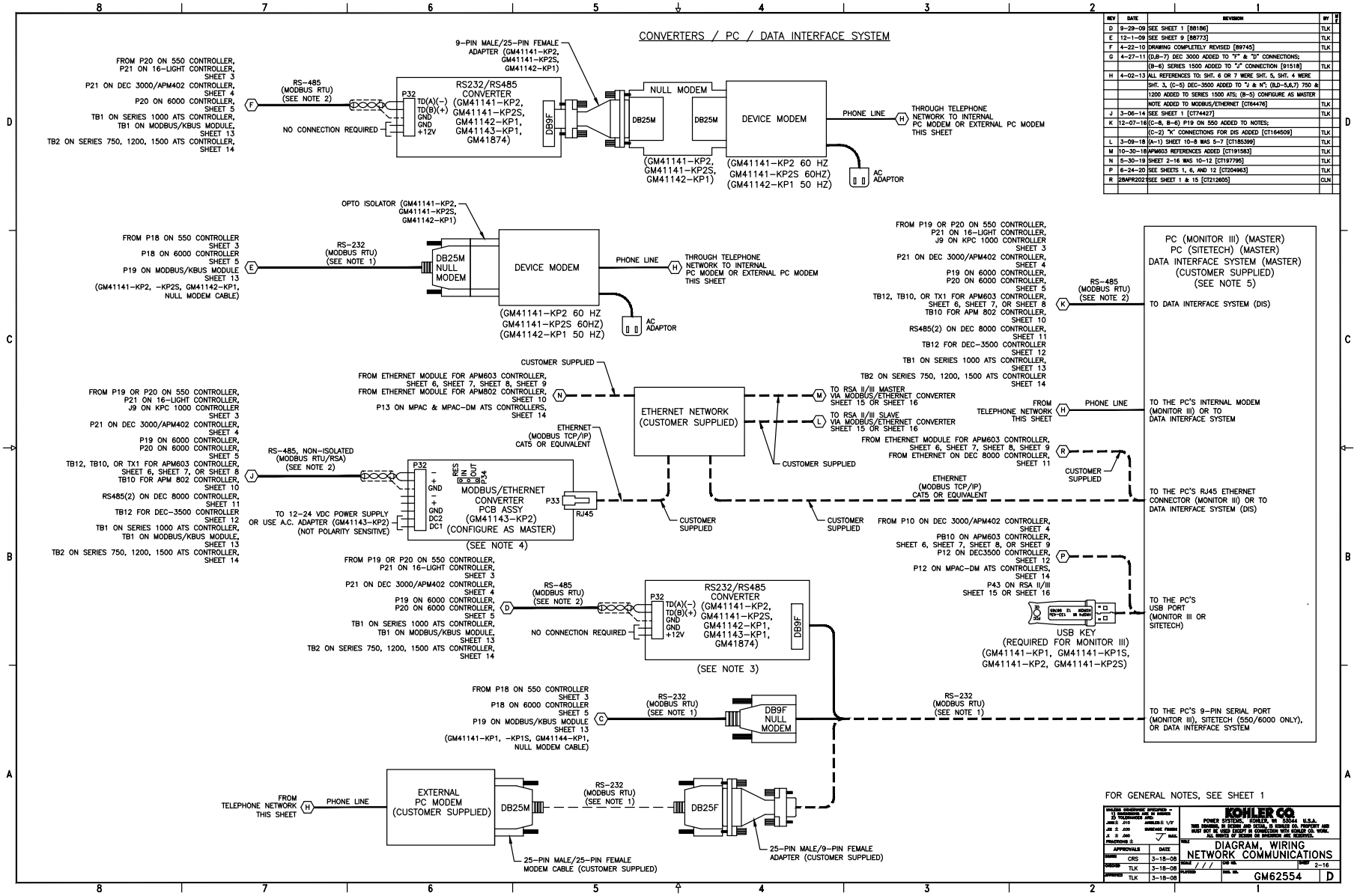
TITLE: DIAGRAM, WIRING
NETWORK COMMUNICATIONS

SCALE: / / / | DWG NO. | SHEET 1-16
SIZE: D | REVISED | DWG. NO. GM62554

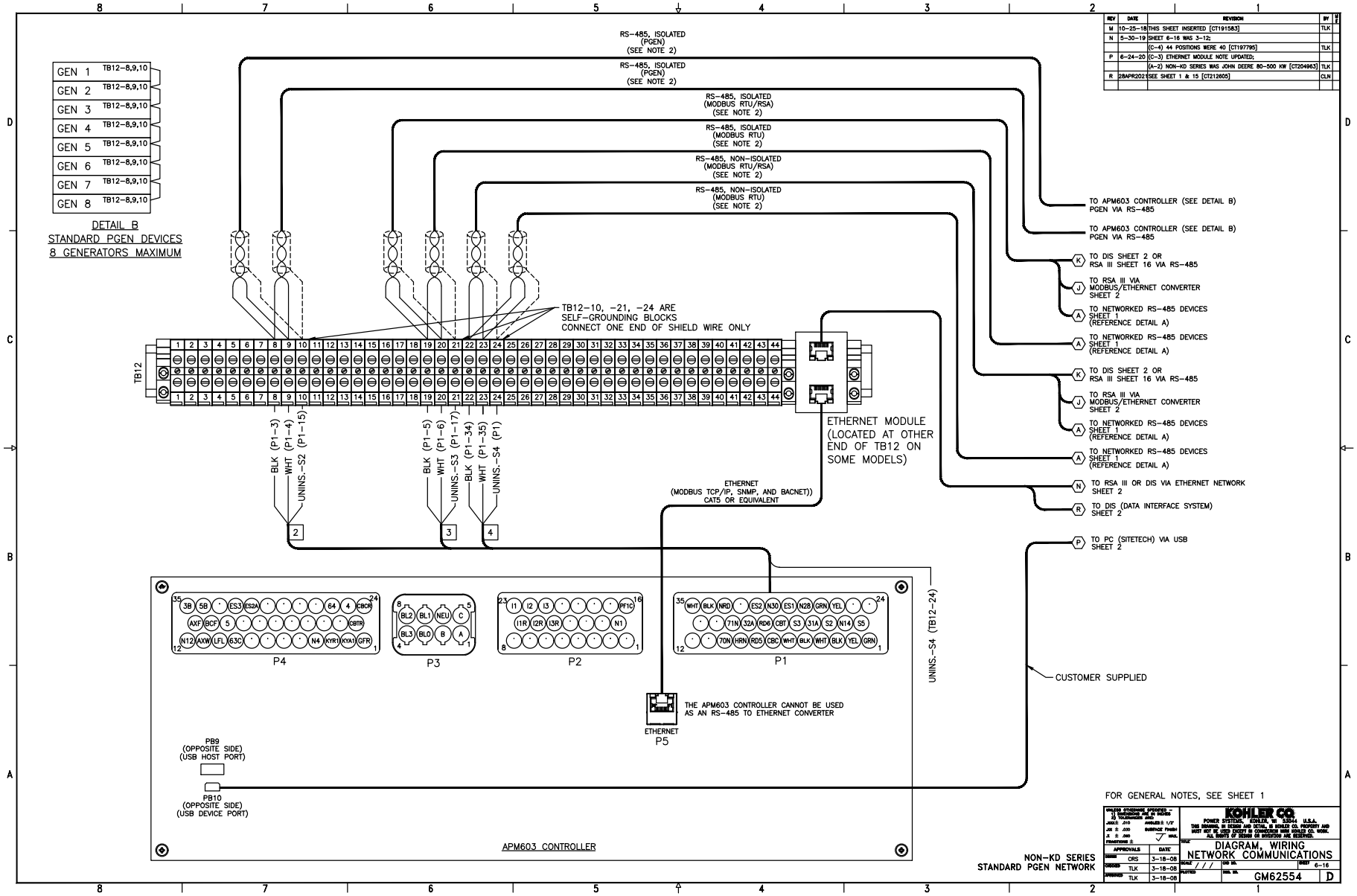
Attachment A



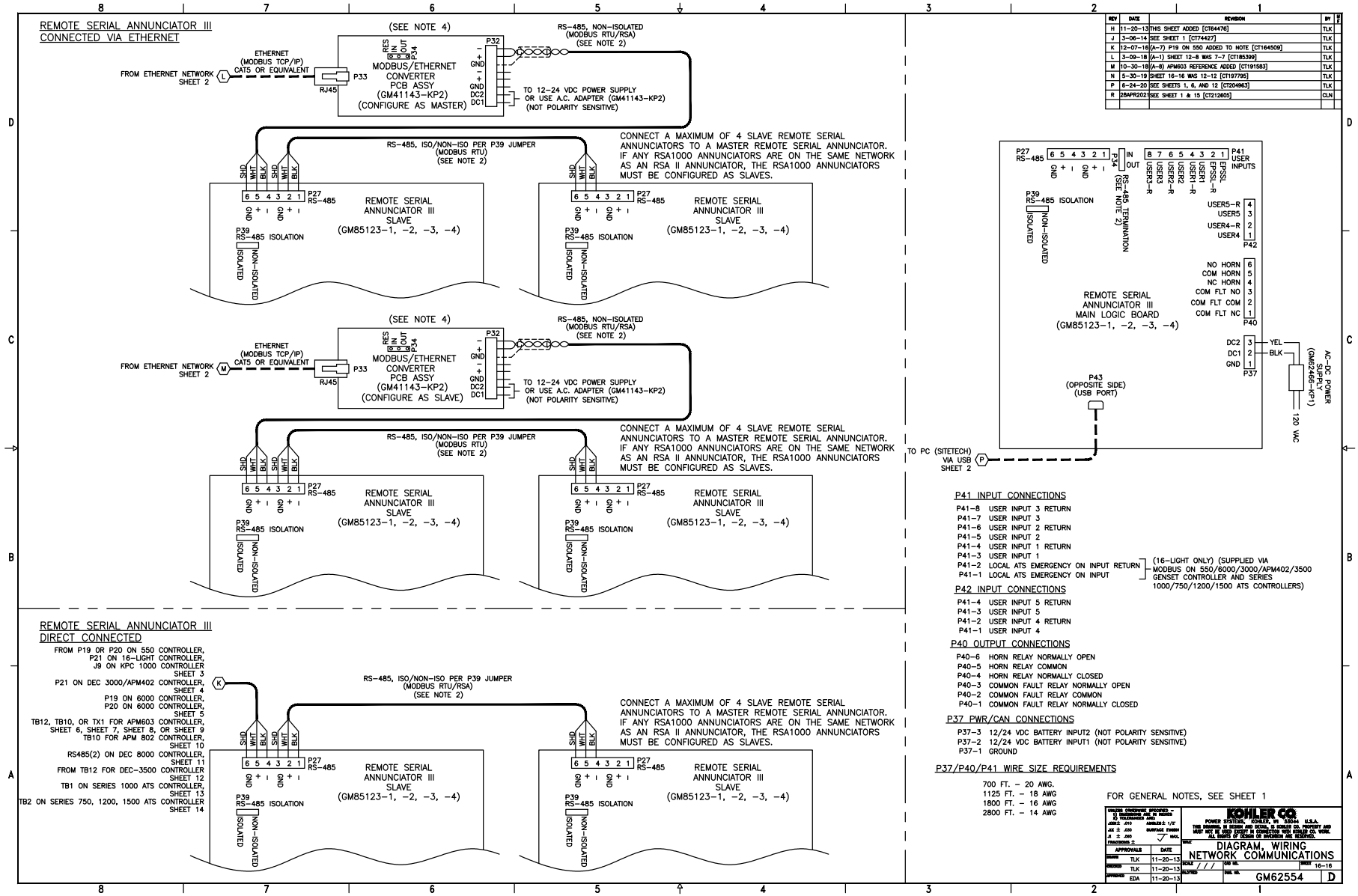
REV	DATE	REVISION	BY
D	9-29-09	SEE SHEET 1 [88186]	TLK
E	12-1-09	SEE SHEET 9 [88773]	TLK
F	4-22-10	DRAWING COMPLETELY REVISED [89745]	TLK
G	4-27-11	(D,B-7) DEC 3000 ADDED TO "F" & "D" CONNECTIONS;	
		(B-6) SERIES 1500 ADDED TO "J" CONNECTION [91518]	TLK
H	4-02-13	ALL REFERENCES TO: SHT. 6 OR 7 WERE SHT. 5, SHT. 4 WERE	
		SHT. 3, (C-5) DEC-3500 ADDED TO "J & N"; (B,D-5,6,7) 750 &	
		1200 ADDED TO SERIES 1500 ATS; (B-5) CONFIGURE AS MASTER	
		NOTE ADDED TO MODBUS/ETHERNET [CT64476]	TLK
J	3-06-14	SEE SHEET 1 [CT74427]	TLK
K	12-07-16	(C-8, B-6) P19 ON 550 ADDED TO NOTES;	
		(C-2) "K" CONNECTIONS FOR DIS ADDED [CT164509]	TLK
L	3-09-18	(A-1) SHEET 10-8 WAS 5-7 [CT185399]	TLK
M	10-30-18	APM603 REFERENCES ADDED [CT191583]	TLK
N	5-30-19	SHEET 2-16 WAS 10-12 [CT197795]	TLK
P	6-24-20	SEE SHEETS 1, 6, AND 12 [CT204963]	TLK
R	28APR202	SEE SHEET 1 & 15 [CT212605]	CLN

APPROVALS	DATE
CRS	3-18-08
TLK	3-18-08
TLK	3-18-08

Attachment A



Attachment A



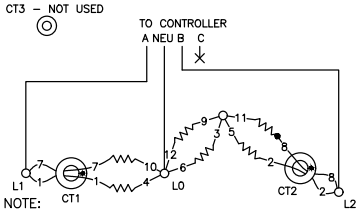
Attachment A

REV	DATE	REVISION	BY
AB	10-4-19	SEE SHEET 4 [CT199071]	DS
AC	02-25-20	SEE SHEET 5 [CT202143]	SBR
AD	3-30-23	(A-2,-3) ADDED NOTES, SEE SHEETS 4 & 8 [CT226524]	SBR
AE	11-4-23	(L0-L2) ADDED 4 LEAD ALTERNATOR , 4 WIRE WYE [CT231345]	SBR

12 LEAD ALTERNATOR, 3 WIRE, SINGLE PHASE

60 HZ: 100/200V
60 HZ: 120/240V
50 HZ: 100/200V
50 HZ: 110/220V

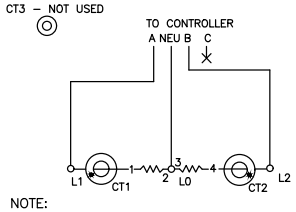
SOME SETS NOT RATED FOR SINGLE PHASE – SEE MANUALS



NOTE:
NEU MUST BE CONNECTED TO L0, EVEN IF LO IS NOT CONNECTED TO THE LOAD.

4 LEAD ALTERNATOR, 3 WIRE, SINGLE PHASE

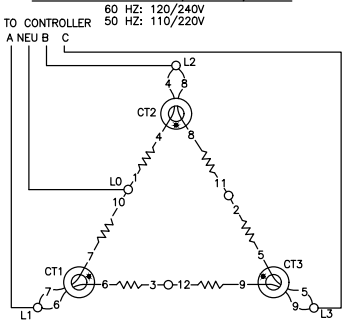
60 HZ: 100–120/200–240V
50 HZ: 100–120/200–240V



NOTE:
NEU MUST BE CONNECTED TO L0, EVEN IF LO IS NOT CONNECTED TO THE LOAD.

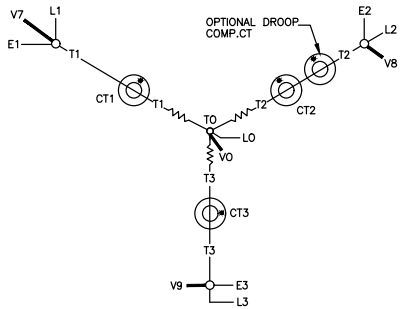
12 LEAD ALTERNATOR, 4 WIRE, DELTA

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



4 LEAD ALTERNATOR, 4 WIRE, WYE

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



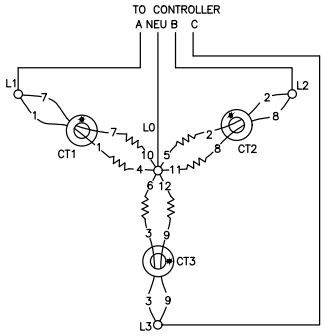
TB3 | UP | V7 | LO | METER SCALE LAMP JUMPER | W/APM603 CONTROLLER

PHASE ROTATION

A	B	C
L1	L2	L3

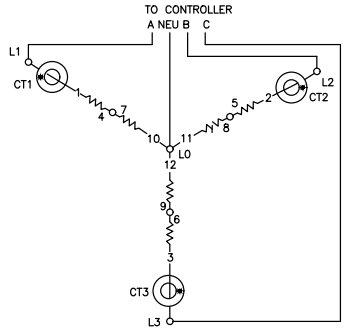
12 LEAD ALTERNATOR, 4 WIRE, LOW WYE

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



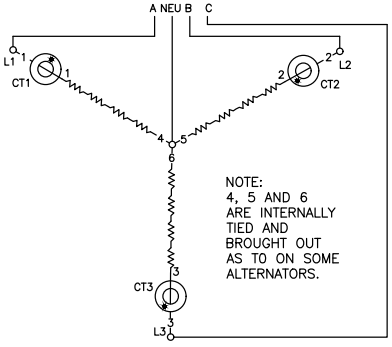
12 LEAD ALTERNATOR, 4 WIRE, HI WYE

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



6 LEAD ALTERNATOR, 4 WIRE, WYE

60 HZ: 347/600V



NOTE:
4, 5 AND 6 ARE INTERNALLY TIED AND BROUGHT OUT AS TO ON SOME ALTERNATORS.

PHASE ROTATION

A	B	C
L1	L2	L3

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

DEC3500 CONTROLLER
APM603 CONTROLLER
KOHLER & MARATHON ALTERNATORS ONLY

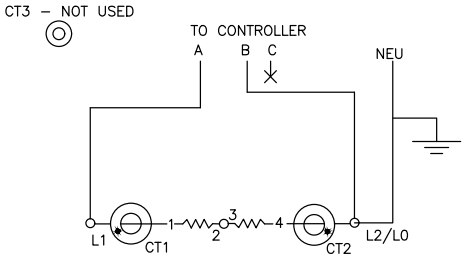
APPROVALS		DATE
DRAWN	PRH	5-27-04
CHECKED	IF	5-27-04
APPROVED	IF	5-27-04

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

TITLE: DIAGRAM, ALTERNATOR CONNECTIONS
SCALE: NONE
DRAWING NO. ADV-5875
SHEET 6-8
SIZE D

REV	DATE	REVISION	BY
AB	10-4-19	SEE SHEET 4 [CT199071]	DS
AC	02-25-20	SEE SHEET 5 [CT202143]	SBW
AD	3-30-23	SEE SHEETS 4, 6 & 8 [CT226524]	SBW
AE	11-4-23	SEE SHEET 6 [CT231345]	SBW

4 LEAD ALTERNATOR, 2 WIRE, SINGLE PHASE
60 HZ: 200–240V
50 HZ: 200–240V



NOTE:
NEU MUST BE CONNECTED TO L2/L0, EVEN IF LO IS NOT CONNECTED TO THE LOAD.

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

PHASE ROTATION

A	B	C
L1	L2	L3

APM603 CONTROLLER
DEC3500 CONTROLLER

APPROVALS	DATE
PRH	5-27-04
IF	5-27-04
IF	5-27-04

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

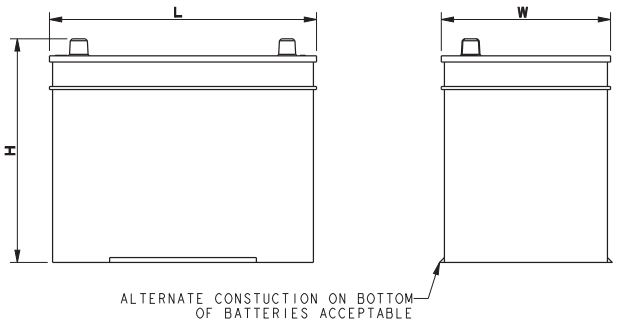
TITLE: DIAGRAM, ALTERNATOR CONNECTIONS
SCALE: NONE | SHEET: 7-8
DRWG NO.: ADV-5875 | D

Attachment A

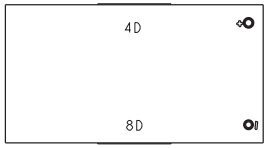
PART NO.	REV		SAE DIMENSION L	SAE DIMENSION W	SAE DIMENSION H	VOLTAGE	COLD CRANKING AMPS AT 0°F MINIMUM	RESERVE CAP MINUTES AT 80°F MINIMUM	POST LAYOUT /STYLE	CHARGE TYPE	BATTERY CONSTRUCTION	BCI GROUP	INTERNAL RESISTANCE (MΩ)
~~244578~~	~~AF~~		~~333.5 [13.13]~~	~~181.1 [7.13]~~	~~238.5 [9.39]~~	~~6~~	~~700~~	~~275~~	~~B/1~~	~~DRY~~	~~SEE NOTE 1~~	~~~~	-
~~244750~~	~~AD~~		~~342.9 [13.50]~~	~~173.2 [6.82]~~	~~238.3 [9.38]~~	~~12~~	~~600~~	~~165~~	~~D/1~~	~~DRY~~	~~SEE NOTE 1~~	~~~~	-
~~239102~~	~~AK~~		~~198.1 [7.80]~~	~~133.4 [5.25]~~	~~187.5 [7.38]~~	~~12~~	~~200~~	~~32~~	~~D/2~~	~~DRY~~	~~SEE NOTE 1~~	~~~~	-
~~289515~~	~~AC~~		~~539.8 [21.25]~~	~~282.7 [11.13]~~	~~276.4 [10.88]~~	~~12~~	~~1150~~	~~450~~	~~A/1~~	~~DRY~~	~~SEE NOTE 1~~	~~~~	-
~~291918~~	~~AC~~		~~333.2 [13.12]~~	~~173.0 [6.81]~~	~~239.8 [9.44]~~	~~12~~	~~700~~	~~150~~	~~C/3~~	~~WET~~	~~SEE NOTE 1~~	~~~~	-
~~299981~~	~~AD~~		~~333.2 [13.12]~~	~~173.0 [6.81]~~	~~239.8 [9.44]~~	~~12~~	~~700~~	~~150~~	~~C/3~~	~~DRY~~	~~SEE NOTE 1~~	~~~~	-
~~254425~~	~~AD~~		~~333.2 [13.12]~~	~~173.0 [6.81]~~	~~239.8 [9.44]~~	~~12~~	~~1000~~	~~200~~	~~C/3~~	~~WET~~	~~SEE NOTE 1~~	~~~~	-
~~299982~~	~~AC~~		~~333.2 [13.12]~~	~~173.0 [6.81]~~	~~239.8 [9.44]~~	~~12~~	~~950~~	~~200~~	~~C/3~~	~~DRY~~	~~SEE NOTE 1~~	~~~~	-
~~324367~~	~~BM~~		~~208.0 [8.19]~~	~~179.4 [7.06]~~	~~196.9 [7.75]~~	~~12~~	~~675~~	~~90~~	~~C/1~~	~~WET~~	~~SEE NOTE 1~~	~~~~	-
~~324368~~	~~AC~~		~~206.5 [8.13]~~	~~166.9 [6.57]~~	~~205.2 [8.08]~~	~~12~~	~~675~~	~~90~~	~~C/1~~	~~DRY~~	~~SEE NOTE 1~~	~~~~	-
~~324586~~	~~BU~~	□	~~330.2 [13.00]~~	~~173.0 [6.81]~~	~~239.8 [9.44]~~	~~12~~	~~950~~	~~185~~	~~C/3~~	~~WET~~	~~SEE NOTE 2~~	~~31~~	-
324587	BT		330.2 [13.00]	173.0 [6.81]	239.8 [9.44]	12	950	200	C/3	DRY	SEE NOTE 2	31	-
~~256984~~	~~BT~~	□	~~273.0 [10.75]~~	~~173.0 [6.81]~~	~~228.6 [9.00]~~	~~12~~	~~650~~	~~120~~	~~D/1~~	~~WET~~	~~SEE NOTE 1~~	~~24~~	-
225289	BR		273.0 [10.75]	173.0 [6.81]	228.6 [9.00]	12	650	130	D/1	DRY	SEE NOTE 1	24	-
~~345197~~	~~BS~~		~~273.0 [10.75]~~	~~173.0 [6.81]~~	~~228.6 [9.00]~~	~~12~~	~~510~~	~~80~~	~~E/1~~	~~WET~~	~~SEE NOTE 2~~	~~24F~~	-
354147	BT		330.2 [13.00]	173.0 [6.81]	239.8 [9.44]	12	700	170	C/3	WET	SEE NOTE 2	31	-
~~354148~~	~~BU~~		~~330.2 [13.00]~~	~~173.0 [6.81]~~	~~239.8 [9.44]~~	~~12~~	~~700~~	~~150~~	~~C/3~~	~~DRY~~	~~SEE NOTE 2~~	~~31~~	-
345309	BR		219.2 [8.63]	153.9 [6.06]	212.9 [8.38]	12	525	-	E/1	WET	SEE NOTE 1	55	-
~~GM22348~~	~~AC~~		~~525.3 [20.68]~~	~~220.5 [8.68]~~	~~251.0 [9.88]~~	~~12~~	~~1000~~	~~320~~	~~A/1~~	~~DRY~~	~~SEE NOTE 1~~	~~~~	-
GM22349	BR		527.1 [20.75]	282.4 [11.12]	276.4 [10.88]	12	1150	400	A/1	DRY	SEE NOTE 1	8D	-
~~GM34399~~	~~BT~~	□	~~527.1 [20.75]~~	~~282.4 [11.12]~~	~~276.4 [10.88]~~	~~12~~	~~1400~~	~~430~~	~~A/1~~	~~WET~~	~~SEE NOTE 1~~	~~8D~~	-
~~GM48784~~	~~BT~~	□	~~208.0 [8.19]~~	~~173.0 [6.81]~~	~~196.9 [7.75]~~	~~12~~	~~525~~	~~70~~	~~D/1~~	~~WET~~		~~26~~	-
~~GM75512~~	~~BT~~	□	~~238.0 [9.38]~~	~~129.0 [5.06]~~	~~223.0 [8.81]~~	~~12~~	~~500~~	~~85~~	~~D/1~~	~~WET~~	~~-~~	~~51~~	-
10702000701	A		527.1 [20.75]	216.0 [8.50]	258.0 [10.16]	12	1050	290	A/1	WET	-	4D	-
10702001800	A		527.1 [20.75]	216.0 [8.50]	254.0 [10.0]	12	1110	380	A/1	AGM	SEE NOTE 3	4D	-
GM106681	-	□	260.0 [10.25]	171.0 [6.75]	208.0 [8.19]	12	690	105	D/1	WET	-	34	4.29
GM106375	-	□	330.2 [13.00]	171.0 [6.75]	239.8 [9.44]	12	925	180	C/3	WET	SEE NOTE 2	31	3.31
GM106373	-	□	260.0 [10.25]	171.0 [6.75]	229.0 [9.00]	12	650	95	D/1	WET	SEE NOTE 1	24	4.71
GM106377	-	□	527.1 [20.75]	279.0 [11.0]	254.0 [10.00]	12	1400	380	A/1	WET	SEE NOTE 1	80	2.53
GM106369	-	□	208.0 [8.19]	172.0 [6.77]	200.0 [7.87]	12	500	95	D/1	WET	-	26	5.85
GM106374	-	□	237.0 [9.32]	125.0 [4.94]	220.0 [8.66]	12	500	70	D/1	WET	-	51	5.00

NOTE: DIMENSIONS IN [ ] ARE ENGLISH EQUIVALENTS.

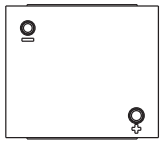
□ INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION



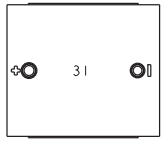
LAYOUT A



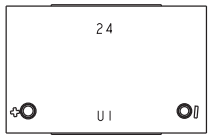
LAYOUT B



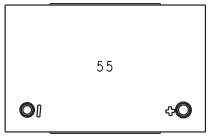
LAYOUT C



LAYOUT D



LAYOUT E



REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
BY	5-6-16	(C-6) 10702001800: COLD CRANKING AMPS 1110	
		WAS 1100 [CTI46053]	BGW
CA	4-15-19	(C-8) GM106681, GM106375, GM106373,	
		GM106377, GM106369 & GM106374 ADDED; (D-3)	
		INTERNAL RESISTANCE (MΩ) COLUMN ADDED;	
		(D-8) 324586 & 256984 VOIDED; (C-8)	
		GM34399, GM48784, GM75512	
		VOIDED;(A,B-8,7,6,5,4) VIEWS & NOTES MOVED	
		TO SHEET 2, SHEET 2 ADDED [CTI94425]	DS

DO NOT SCALE, REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN MILLIMETERS
GENERAL TOLERANCES: X.XX ± 0.25, X.X ± 1.0, X ± 1.3, ANGLES ± 0°30' SURFACE FINISH MAX.
THIRD-ANGLE PROJECTION

APPROVALS	DATE
DRAWN SLR	4-15-19
CHECKED EB	4-15-19
APPROVED RAD	4-15-19

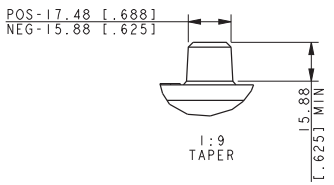
KOHLER.
KOHLER, WISCONSIN 53044

TITLE: DWG, BATTERY, DRY CHARGED

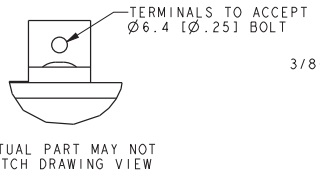
SCALE 0.30 | CAD NO. | SHEET 1 of 2

DWG NO. 244578-CMP | D

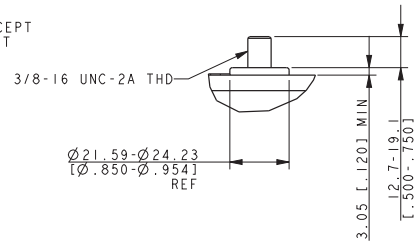
STYLE 1



STYLE 2



STYLE 3



NOTES:
1) STYLE 3 CAN BE CONVERTED TO STYLE 1 BY INSTALLATION OF 254427 STUD CONVERTION KIT.
2) BATTERIES USING ``STYLE 3'' STUDS MUST HAVE EITHER THE ``POS'' OR ``NEG'' STUD CLEARLY IDENTIFIED.
3) STYLE 3 TERMINAL TORQUE 10 Nm [15 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 TAP OF BATTERY. (BETWEEN TERMINALS ON LAYOUT D)
MANUFACTURER MUST PROVIDE A CERTIFICATE CONTAINING MFGRS. NAME, MFGRS. PART NUMBER,
AND KOHLER PART NUMBER CERTIFYING THAT THE BATTERY WAS BUIT TO INDUSTRY STANDARDS.
SEE N.F.P.A.-110 FOR SPECIFIC DETAILS. CERTIFICATE REQUIRED ONLY ONCE PER BATTERY PART NUMBER.
MAY NOT BE CALCIUM-CALCIUTYPE.

NOTES: (CHARGE TYPE)
ALL DRY CHARGED BATTERIES MUST BE SUPPLIED WITH ACTIVATION INSTRUCTIONS ADHERED TO BATTERY
AND LOOSE. BATTERY MUST ALSO BE IDENTIFED 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 DWGS, SEE PART NO. FOR REVISION LEVEL	BY
CA	4-15-19	NEW DRAWING; SEE SHEET 1 [CT194425]	DS

DO NOT SCALE, REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS IN MILLIMETERS
GENERAL TOLERANCES:
X.XX ± 0.25
X.X ± 1.0
X ± 1.3
ANGLES ± 0°30'
SURFACE FINISH 125 MAX.
THIRD-ANGLE PROJECTION

APPROVALS		DATE
DRAWN	DS	4-15-19
CHECKED	GFR	4-15-19
APPROVED	AMM	4-15-19

KOHLER.
KOHLER, WISCONSIN 53044

TITLE
DWG, BATTERY, DRY CHARGED

SCALE 0.30 | CAD NO. | SHEET 2 of 2
DWG NO. 244578-CMP | D

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

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

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

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

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

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

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

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

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

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

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

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

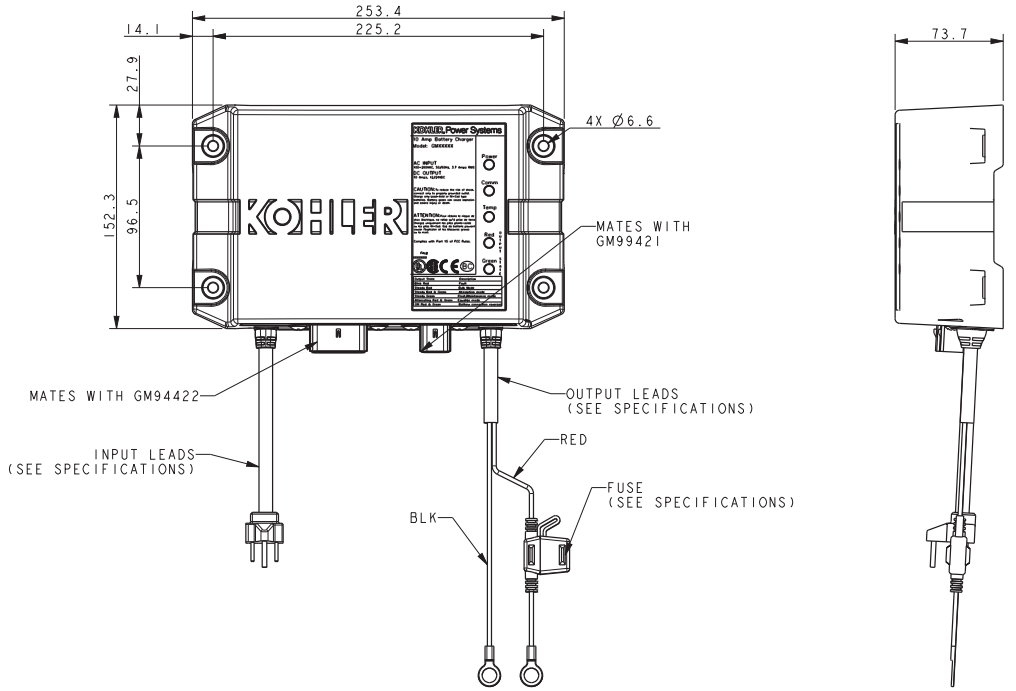
DOCUMENTATION:
THERE SHALL BE AN INSTALLATION / OPERATIONAL MANUAL SUPPLIED WITH EACH CHARGER. PER KOHLER SUPPLIED ARTWORK.

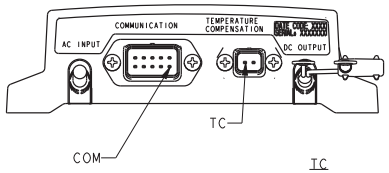
CERTIFICATIONS (US AND CANADA):
UL1236
CSA - C22.2 NO 107.2-01
FCC- TITLE 47, PART 15 CLASS A
CE
EN 61000-6-2
CEC AND DOE
NFPA-110 LEVEL1 (WHEN SUPPORTED WITH APPLICABLE KOHLER CONTROLLER)
IBC

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

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

WARRANTY:
2 YEAR FROM DATE OF PURCHASE FROM MANUFACTURE.





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

TC
PIN 1 TC SENSOR W1
2 TC SENSOR W2

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	9-22-14	NEW DRAWING [CT91634]	SAM
A	5-9-17	(C-4,2) MATING NOTE ADDED (A-2, 4) PIN CONNECTIONS ADDED [CT174256]	SAM

UNLESS OTHERWISE SPECIFIED:
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0° 30'
SURFACE FINISH 125 MAX.
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	SAM	9-22-14
CHECKED	SAM	9-22-14
APPROVED	AGT	9-22-14

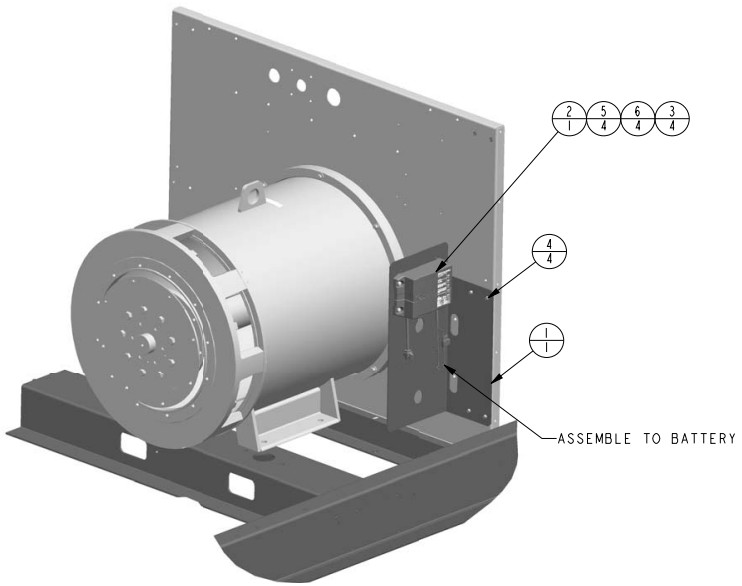
KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

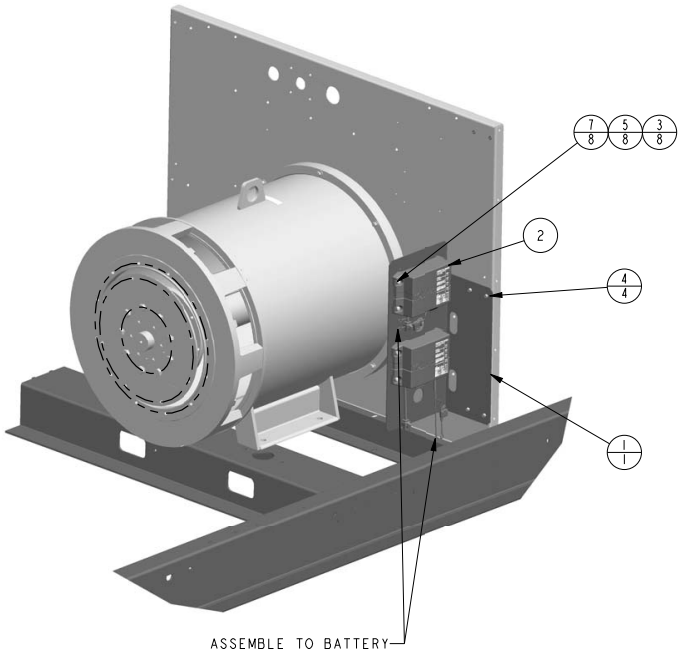
TITLE
CHARGER, BATTERY 10 AMP

SCALE 0.50 CAD NO. SHEET 1 of 1
DWG NO. GM87448 D

KIT NO.	ITEM	PART NO	QTY	DESCRIPTION
GM94922-KA1				ASSY BATTERY CHARGER 12/24V-10A
	1	GM78810	1	BRACKET, BATTERY CHARGER
	2	GM87448	1	CHARGER, BATTERY
	3	M125A-06-80	4	WASHER, PLAIN 6.4 ID X 12.0 OD
	4	M6921-06016-60	4	SCREW, HEX FLNGE M6X16MM FLLY THRD JS500
	5	M6923-06-80	4	NUT, HEX 6MM
	6	M933-06030-60	4	SCREW, HEX CAP
GM94922-KA2				BATTERY CHARGER, FLOAT, 12/24V-10A
	1	GM78810	1	BRACKET, BATTERY CHARGER
	2	GM87448	2	CHARGER, BATTERY
	3	M125A-06-80	8	WASHER, PLAIN 6.4 ID X 12.0 OD
	4	M6921-06016-60	4	SCREW, HEX FLNGE M6X16MM FLLY THRD JS500
	5	M6923-06-80	8	NUT, HEX 6MM
	7	M933-06030-60	8	SCREW, HEX CAP
	8	GM95050	1	HARNESS, Y

THIS IS AN AUTOMATED TABLE. ALL UPDATES MUST BE MADE IN THE ASSEMBLY.





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

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	10-1-14	NEW DRAWING [CT95303]	SAM

UNLESS OTHERWISE SPECIFIED:
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0° 30' MAX.
SURFACE FINISH
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	SAM	10-1-14
CHECKED	SAM	10-1-14
APPROVED	AGT	10-1-14

TITLE: DWG, ASSY BATTERY CHARGER

SCALE 0.12 | CAD NO. | SHEET 1 of 1

DWG NO. GM94922 | D

BATTERY CHARGER KIT

Attachment A

BLOCK HEATER	PART REV		VOLTS/PHASE	REPLACEMENT ELEMENT (SERVICE)	WATTS	TYPE	OPERATING TEMPERATURE
GM62498	D		480V / 3Ø	GM62638	9000	1	120-140
GM62499	D		240V / 1Ø	GM62639	9000	2	120-140
GM62500	D		480V / 1Ø	GM62640	9000	3	120-140
GM62501	D		240V / 3Ø	GM62641	9000	1	120-140
GM62502	D		380V / 3Ø	GM62642	9000	1	120-140
GM62509	D		208V / 1Ø	GM62649	9000	2	120-140
GM62504*	D		240V / 1Ø	GM62644	12000	3	120-140
GM62505	D		480V / 1Ø	GM62645	12000	3	120-140
GM62506	D		240V / 3Ø	GM62646	12000	1	120-140
GM62507	D		380V / 3Ø	GM62647	12000	1	120-140
GM62503	D		480V / 3Ø	GM62643	12000	1	120-140
GM62508	D		208V / 1Ø	GM62648	10500	3	120-140
GM62510	E		480V / 3Ø	GM74181	6000	1	120-140
GM62511	E		240V / 1Ø	GM74182	6000	2	120-140
GM62512	E		480V / 1Ø	GM74183	6000	3	120-140
GM62513	E		240V / 3Ø	GM74184	6000	1	120-140
GM62514	E		380V / 3Ø	GM74185	6000	1	120-140
GM77835	H		208V / 1Ø	GM77836	6000	2	120-140
ES-75396	G		208V / 3Ø	ES-75397	9000	1	120-140
ES-79356	J		208V / 3Ø	ES-79357	6000	1	120-140
ES-80588	A		208V / 3Ø	ES-80589	12000	1	120-140
ES-82106	A		400V / 3Ø	ES-82107	12000	1	120-140
ES-87795	-	☐	400V / 3Ø	ES-87803	9000	1	120-140

BLOCK HEATER	PART REV		VOLTS/PHASE	REPLACEMENT ELEMENT (SERVICE)	WATTS	TYPE	OPERATING TEMPERATURE
10305000200	B		480V / 3Ø	10305000800	6000	4	120-140
10305000300	B		240V / 1Ø	10305000900	6000	4	120-140
10305000400	B		480V / 1Ø	10305001000	6000	4	120-140
10305000500	B		240V / 3Ø	10305001100	6000	4	120-140
10305000600	B		380V / 3Ø	10305001200	6000	4	120-140
10305000700	B		208V / 1Ø	10305001300	6000	4	120-140
10305003100	-		208V / 3Ø	10305003200	6000	4	120-140
10305001500	A		480V / 3Ø	10305002100	9000	4	120-140
10305001600	A		240V / 1Ø	10305002200	9000	4	120-140
10305001700	A		480V / 1Ø	10305002300	9000	4	120-140
10305001800	A		240V / 3Ø	10305002400	9000	4	120-140
10305001900	A		380V / 3Ø	10305002500	9000	4	120-140
10305002000	A		208V / 1Ø	10305002600	9000	4	120-140
10305003300	-		208V / 3Ø	10305003400	9000	4	120-140
GM97609	A		208V / 1Ø	GM98493	6000	4	100-120
GM97610	A		240V / 1Ø	GM98494	6000	4	100-120
GM97611	A		480V / 1Ø	GM98495	6000	4	100-120
GM97612	A		240V / 3Ø	GM98496	6000	4	100-120
GM97613	A		380V / 3Ø	GM98497	6000	4	100-120
GM97614	A		480V / 3Ø	GM98498	6000	4	100-120
GM97615	A		208V / 1Ø	GM98499	9000	4	100-120
GM97616	A		240V / 1Ø	GM98500	9000	4	100-120
GM97617	A		480V / 1Ø	GM98501	9000	4	100-120
GM97618	A		240V / 3Ø	GM98502	9000	4	100-120
GM97619	A		380V / 3Ø	GM98503	9000	4	100-120
GM97510	A		480V / 3Ø	GM98504	9000	4	100-120
10305003801	-		208V / 1Ø	-	10500	4	120-140
10305003802	-		208V / 3Ø	-	12000	4	120-140
10305003803	-		240V / 1Ø	-	12000	4	120-140
10305003804	-		240V / 3Ø	-	12000	4	120-140
10305003805	-		380V / 3Ø		12000	4	120-140
10305003806	-		480V / 1Ø	-	12000	4	120-140
10305003807	-		480V / 3Ø	-	12000	4	120-140
ES-85343	-		208V / 3Ø	ES-75397	9000	4	100-120
ES-87792	-	☐	400V / 3Ø	ES-87803	9000	4	120-140

NOTES:
LABEL ON FRONT CONTROL BOX DOOR MUST INCLUDE KOHLER PART NO.

THE HEATING SYSTEM MUST BE MOUNTED IN THE HORIZONTAL POSITION.

DO NOT EXCEED A CONCENTRATION OF MORE THAN 60% ANTIFREEZE AS ELEMENT FAILURE CAN RESULT.

T-STAT SETTING: SEE CHART

MOUNTING BRACKETS SHIPPED ATTACHED.

*GM62504: REFERENCE TYPE 2 WIRING DIAGRAM

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

☐ INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
N	10-12-15	(D-8) GM62511 AND GM77835: TYPE 2 WAS TYPE 3 (C-6) GM97619: 380V WAS 280 (D-3,2) VIEWS OF BOX AND ELEMENT REVISED, SEE SHEETS 2, 3 AND 4 [CT123009]	SAM
P	11-2-15	(D-1) ELEMENT REMOVED (B-4) 1 PHASE REMOVED FROM DIAGRAM, SEE SHEET 4 [CT123009]	SAM
R	3-7-16	(D-6) 10305003100 & 10305003300 ADDED [CT127089]	CEK
T	4-10-17	10305003801 THROUGH *07 ADDED [CT173173]	BGW
U	3-13-18	ES-85343 ADDED [CT184831]	AMH
V	12-4-19	(B-6/C-8) ES-87792 & ES-87795 ADDED [CT200123]	JMR

UNLESS OTHERWISE SPECIFIED: 1) DIMENSIONS ARE IN MILLIMETERS 2) TOLERANCES ARE: X.XX ± 0.25, X.X ± 1.0, X ± 1.5, ANGLES ± 0° 30' MAX. SURFACE FINISH. THIRD ANGLE PROJECTION

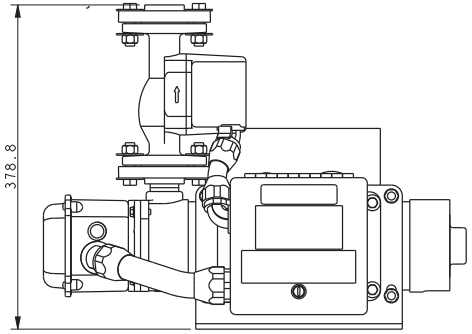
APPROVALS		DATE
DRAWN	DCF	3-14-08
CHECKED	JMS	3-14-08
APPROVED	JDZ	3-14-08

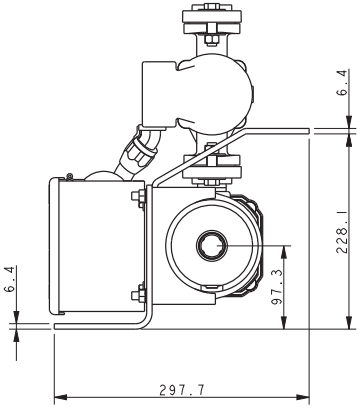
KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

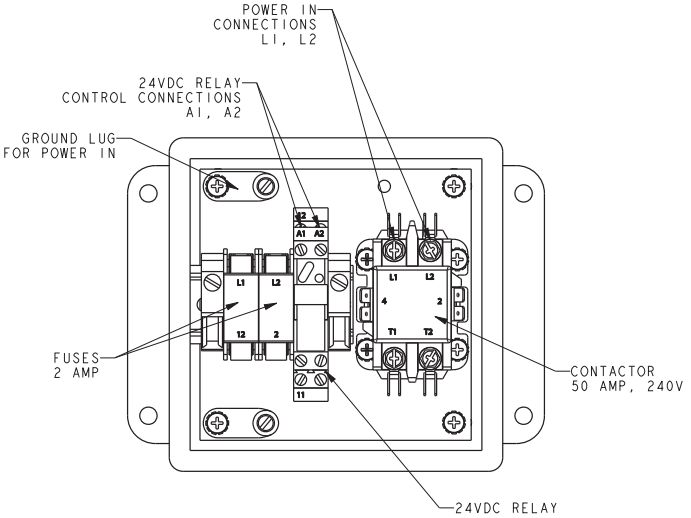
TITLE: DWG, HEATER, BLOCK

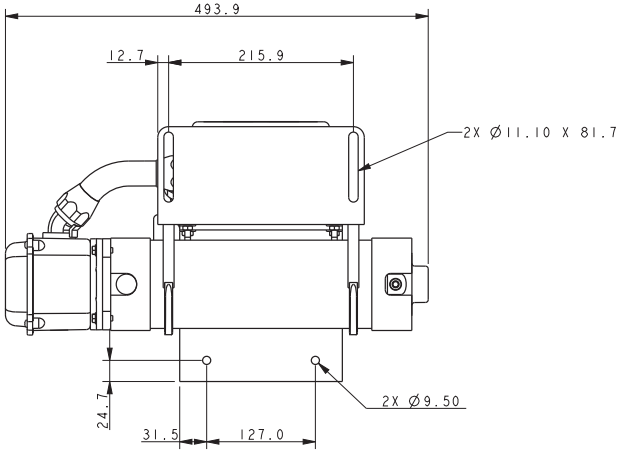
SCALE 0.25 | CAD NO. | SHEET 1 of 5

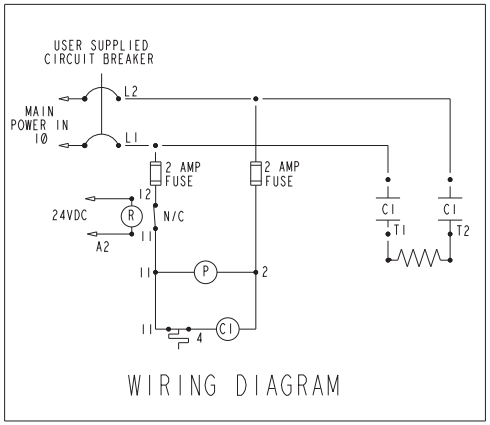
DWG NO. GM62498-CMP | D











TYPE 2

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
K	4-15-15	SEE SHEET 1, SHEET 4 ADDED [CT114235]	SVP
L	6-23-15	SEE SHEET 1 [CT112581]	ARG
M	8-14-15	SEE SHEET 1 [CT122952]	JMR
N	10-12-15	(D-8,2) VIEW OF TYPE & ELEMENT REVISED, RANGE WAS RATE, SEE SHEETS 1, 3 & 4 [CT123009]	SAM
P	11-2-15	(D-1) ELEMENT REMOVED, SEE SHEET 4 [CT123009]	SAM
R	3-7-16	SEE SHEET 1 [CT127089]	CEK
T	4-10-17	SEE SHEET 1 OF 5 [CT173173]	BGW
V	12-3-19	SEE SHEET 1 FOR CHANGE. [CT200123]	JMR

UNLESS OTHERWISE SPECIFIED:
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0° 30'
SURFACE FINISH 3.2 MAX.
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	DCF	4-7-08
CHECKED	JMS	4-7-08
APPROVED	JDZ	4-7-08

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

TITLE: DWG, HEATER, BLOCK

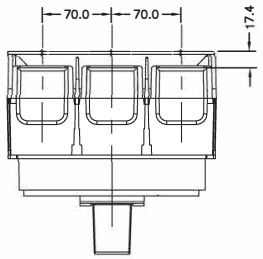
SCALE 0.30 | CAD NO. | SHEET 3 of 5

DWG NO. GM62498-CMP | D

Attachment A

PART NO.	REV	AMPS	% RATING	GFI	INT@480V	TRIP	VENDOR NO.
GM24181-1	C	600	100	NO	35kA	5.0 LSI	PGP36060CU33A
GM24181-2	C	600	100	YES	35kA	6.0A LSIG	PGP36060CU44A
GM24181-3	C	800	80	NO	35kA	5.0 LSI	PGP36080U33A
GM24181-4	C	800	80	YES	35kA	6.0A LSIG	PGP36080U44A
GM24181-5	C	800	100	NO	35kA	5.0 LSI	PGP36080CU33A
GM24181-6	C	800	100	YES	35kA	6.0A LSIG	PGP36080CU44A
GM24181-7	C	1000	80	NO	35kA	5.0 LSI	PGP36100U33A
GM24181-8	C	1000	80	YES	35kA	6.0A LSIG	PGP36100U44A
GM24181-9	C	1000	100	NO	35kA	5.0 LSI	PGP36100CU33A
GM24181-10	C	1000	100	YES	35kA	6.0A LSIG	PGP36100CU44A
GM24181-11	C	1200	80	NO	35kA	5.0 LSI	PGP36120U33A
GM24181-12	C	1200	80	YES	35kA	6.0A LSIG	PGP36120U44A
GM24181-13	C	1200	100	NO	35kA	5.0 LSI	PGP36120CU33A
GM24181-14	C	1200	100	YES	35kA	6.0A LSIG	PGP36120CU44A
GM24181-15	D	1200	80	NO	65kA	5.0 LSI	PJP36120U33A
GM24181-16	D	1200	80	YES	65kA	6.0A LSIG	PJP36120U44A
GM24181-17	D	1200	100	NO	65kA	5.0 LSI	PJP36120CU33A
GM24181-18	D	1200	100	YES	65kA	6.0A LSIG	PGP36120CU44A

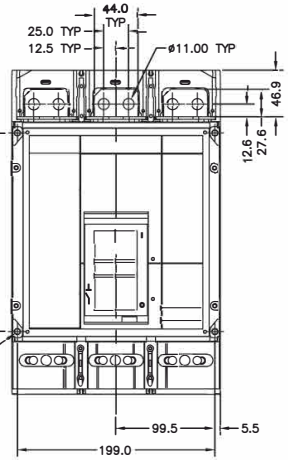
NOTE: (4) #10-32 X 4.5 INCH MOUNTING SCREWS INCLUDED.

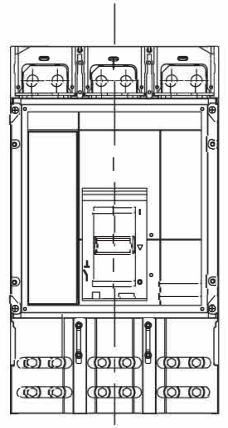


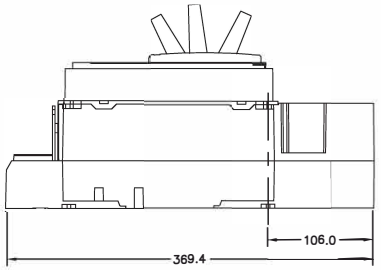
NOTE:
KOHLER PART # TO BE CLEARLY VISIBLE ON
CIRCUIT BREAKER AND ON INDIVIDUAL PACKAGING.

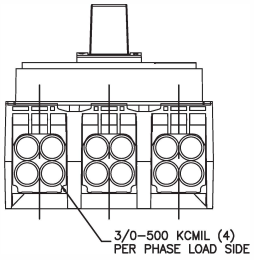
NOTE:
THREADED BAR SUPPLIED WITH BREAKER IS USED WITH LUGS OR WHEN BUS BARS ARE INSTALLED WITH BOLTS INSERTED FROM THE FRONT. REMOVE AND DISCARD BAR WHEN BOLTS ARE INSTALLED FROM THE REAR OF BREAKER.

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

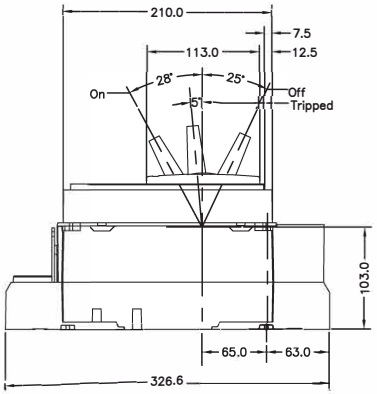


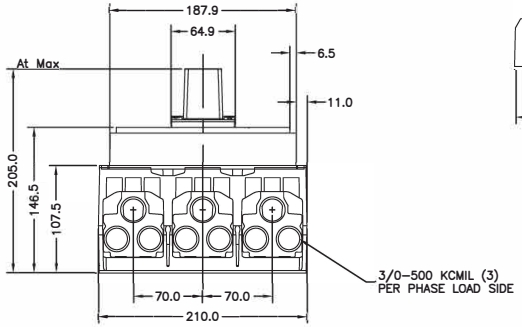






1000-1200A
DIMENSIONS SAME AS 600-800A
EXCEPT WHERE NOTED





600-800A

METRIC CAD FILE

SQUARE D P-FRAME CIRCUIT BREAKER
3 POLE ELECTRONIC TRIP

KOHLER CO.
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.
THIS DRAWING IS 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	DATE
DRAWN WSD	3-22-02
CHECKED WSD	3-22-02
APPROVED AJH	3-22-02

TITLE: BREAKER, CIRCUIT
SCALE .5XP | SIZE D | DWG NO. GM24181.DWG | SHEET 1-1
DWG NO. GM24181 | D

Attachment A

STANDARD BREAKERS

RATING	AMPS	TRIP TYPE	FRAME	MAG TRIP
80% OR 100%	15	THERMAL MAGNETIC	HD	NA
	20			
	25			
	30			
	35			
	40			
	45			
	50			
	60			
	70			
	80			
	90			
	100			
	110			
	125			
	150			
	175		JD	
	200			
	225			
	250			
80%	60	ELECTRONIC LI OR LSI	HD/HG	
	100			
	150			
	250		JD/JG	
	60	ELECTRONIC LSIG	HD/HG	
	100			
	150			
	250		JD/JG	
100%	60	ELECTRONIC LI OR LSI	HD/HG	
	100			
	150			
	250		JD/HG	
	60	ELECTRONIC LSIG	HD/HG	
	100			
	150			
	250		JD/JG	
80%	30	MAGNETIC ONLY	HJ	9-325
	50			84-546
	100			180-1040
	150			348-1690
	250		JJ	684-2500
	300	THERMAL MAGNETIC	LA	NA
	350			
	400			
	400	MAGNETIC ONLY	LA	500-1000
				750-1600
				1000-2000
				1125-2250
				1250-2500
				1500-3000
				1750-3500
				2000-4000

ELECTRICALLY OPERATED BREAKERS FOR DEC6000 DPS OR APM603 PARALLELING ONLY NO ADDITIONAL BREAKERS ARE ALLOWED

RATING	AMPS	TRIP TYPE	FRAME
100%	600	ELECTRONIC LI OR LSI	PJ OR PL
	800		
	1000		
	1200		
	1600	ELECTRONIC LSI OR LSIG	NW
	2000		
	2500		
	3000		

STANDARD BREAKERS CONTINUED

RATING	AMPS	TRIP TYPE	FRAME
80%	400	ELECTRONIC LI OR LSI	LG
		ELECTRONIC LSIG	
	600	ELECTRONIC LI OR LSI	
		ELECTRONIC LSIG	
	800	ELECTRONIC LI	MG
	1000	ELECTRONIC I	PG
	1200		
	800	ELECTRONIC LSI	
	1000		
	1200		
	800	ELECTRONIC LSIG	
	1000		
	1200		
	1200	ELECTRONIC I	PJ
		ELECTRONIC LSI	
		ELECTRONIC LSIG	
100%	400	ELECTRONIC LI OR LSI	LG
		ELECTRONIC LSIG	
	600	ELECTRONIC LSI	PG
	800		
	1000		
	1200		
	600	ELECTRONIC LSIG	
	800		
	1000		
	1200		
	1200	ELECTRONIC LSI	PJ
		ELECTRONIC LSIG	
80%	1600	ELECTRONIC I	RJ
	2000		
	2500		
80% OR 100%	1600	ELECTRONIC LSI	
	2000		
	2500		
	1600	ELECTRONIC LSIG	
	2000		
	2500		
100%	1600	ELECTRONIC LSI OR LSIG	NW
	2000		
	2500		
	3000		

ELECTRONIC TRIP UNITS

FRAME	TRIP UNIT	
H	LI	MICROLOGIC 3.2
	LSI	MICROLOGIC 3.2S
	LSIG	MICROLOGIC 6.2A
J	LI	MICROLOGIC 3.2
	LSI	MICROLOGIC 3.2S
	LSIG	MICROLOGIC 6.2A
LG	LI	MICROLOGIC 3.3
	LSI	MICROLOGIC 3.3S
	LSIG	MICROLOGIC 6.3A
M	LI	ET 1.0
P	I	ET 1.01
	LI	MICROLOGIC 3.0
	LSI	MICROLOGIC 5.0
	LSIG	MICROLOGIC 6.0A
R	I	ET 1.01
	LSI	MICROLOGIC 5.0
	LSIG	MICROLOGIC 6.0A
NW	LSI	MICROLOGIC 5.0
	LSIG	MICROLOGIC 6.0A

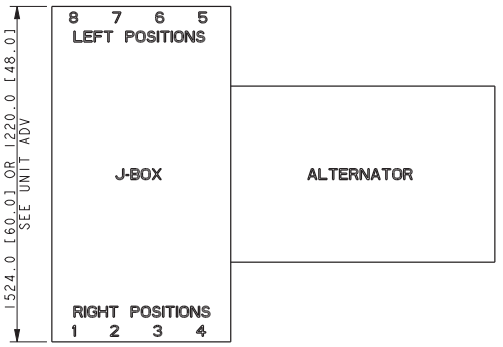
AL/CU MECHANICAL LOAD LUGS PER PHASE

BREAKER FRAME	AMPS	WIRE RANGE	WIRE BENDING SPACE 4M/5M	WIRE BENDING SPACE 7M
H	15-150	(1) #14 TO 3/0	653 [25.7]	785 [30.9]
J	175	(1) 1/0 TO 4/0	639 [25.1]	771 [30.3]
	200-250	(1) 3/0 TO 350 KCMIL		
LA	300-400	(1) #1 TO 600 KCMIL OR (2) #1 TO 250 KCMIL	551 [21.6]	683 [26.8]
LG	400-600	(2) 2/0 TO 500 KCMIL AL/CU	559 [22.0]	691 [27.2]
M	800	(3) 3/0 TO 500 KCMIL	523 [20.5]	655 [25.7]
P	250-800			
P	1000-1200	(4) 3/0 TO 500 KCMIL	480 [18.9]	612 [24.0]
R	1600-2500	(8) 1/0-750 KCMIL OR (16) 1/0-300 KCMIL	483 [19.0]	615 [24.2]
NW	3000	(10) 1/0-750 KCMIL OR (20) 1/0-300 KCMIL	510 [20.0]	642 [25.2]

WIRE BENDING SPACE DIMENSIONS ARE FROM BOTTOM OF LOAD LUGS TO TOP OF ENTRANCE PANEL

UL INTERRUPT RATINGS

BREAKER	kA ∘ 240V	kA ∘ 480V	kA ∘ 600V
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	65	35	18
PG	65	35	18
PJ	100	65	25
PL	125	100	25
RJ	100	65	25
NW	100	100	85



NOTES:

1) SEE UNIT DIMENSION PRINT (ADV-XXXX) FOR ADDITIONAL DIMENSIONS, JUNCTION BOX AND STUB-UP LOCATION.

2) CONSULT FACTORY FOR BREAKER COMBINATIONS NOT SHOWN ON THIS PRINT.

3) MECHANICAL LUGS ARE AVAILABLE FOR NEUTRAL AND LOAD BUS KIT. SEE ADV-7376.

4) UNITS ARE SHIPPED WITH NEUTRAL BUS ASSEMBLIES THAT ARE NOT BONDED TO GROUND. IF A GROUND FAULT CIRCUIT BREAKER OR GROUND FAULT RELAY IS PROVIDED THE NEUTRAL WILL BE BONDED TO GROUND. CONSULT NEC AND/OR LOCAL ELECTRICAL CODES FOR THE PROPER INSTALLATION REQUIREMENTS.

5) CIRCUIT BREAKER FRAMES REFER TO STANDARD SCHNEIDER PRODUCT.

6) STANDARD NEUTRALS PROVIDED ARE SIZED FOR MAXIMUM UNIT AMPS. GFI NEUTRALS ARE MATCHED TO THEIR CIRCUIT BREAKER AMPS.

7) DIMENSIONS ARE MM, DIMENSIONS IN [ ] ARE INCHES.

8) SEE IB49 FOR PART NUMBER CROSS REFERENCE.

9) BREAKER AND LOAD BUS PHASING ON RIGHT IS A-B-C, ON LEFT IS C-B-A.

10) 48" WIDE JUNCTION BOXES ARE NOT AVAILABLE WITH M OR P FRAMES IN POSITION 3 & 4, OR LG FRAME BREAKERS IN POSITION 4.

STANDARD BREAKER COMBINATIONS

POSITIONS (SEE DIAGRAM)			
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	LA	LA	
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	H/J
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			

NOTE:
H, J AND LG-FRAMES WITH LSIG TRIP REQUIRE (2) SPACES. (ONE FOR BREAKER, ONE FOR LSIG NEUTRAL). THESE COMBINATIONS ARE NOT REFLECTED IN THE CHART ABOVE.

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
C	11-7-12	(A-5) NOTE 10 ADDED; (C-4) J-BOX WIDTH DIMS ADDED; SHEET 6 ADDED [CT281281]	WSD
D	11-2-16	(D-5) REMOVED SEPARATE LINES FOR H & J 100% LUGS; ADDED DATA FOR H, J & LG LSI TRIPS [CT114236]	WSD
E	4-26-18	(D-4) NW:(10)OR(20) WAS (8)OR(16) [CT186966]	WSD
F	3-25-19	(A-8) EOB TABLE ADDED [CT194577]	WSD
G	11-11-19	(A-8) NW EOBS ADDED, NOTE 10 UPDATED TO ALLOW NW'S ON 48" BOXES; SEE SHT 3 [CT199840]	WSD
H	6-23-21	(D-6) M 800A WAS 700 & 800,LI WAS I [CT212837]	WSD

DO NOT SCALE, REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

APPROVALS		DATE
DRAWN	WSD	4-29-11
CHECKED	WSD	4-29-11
APPROVED	AJH	4-29-11

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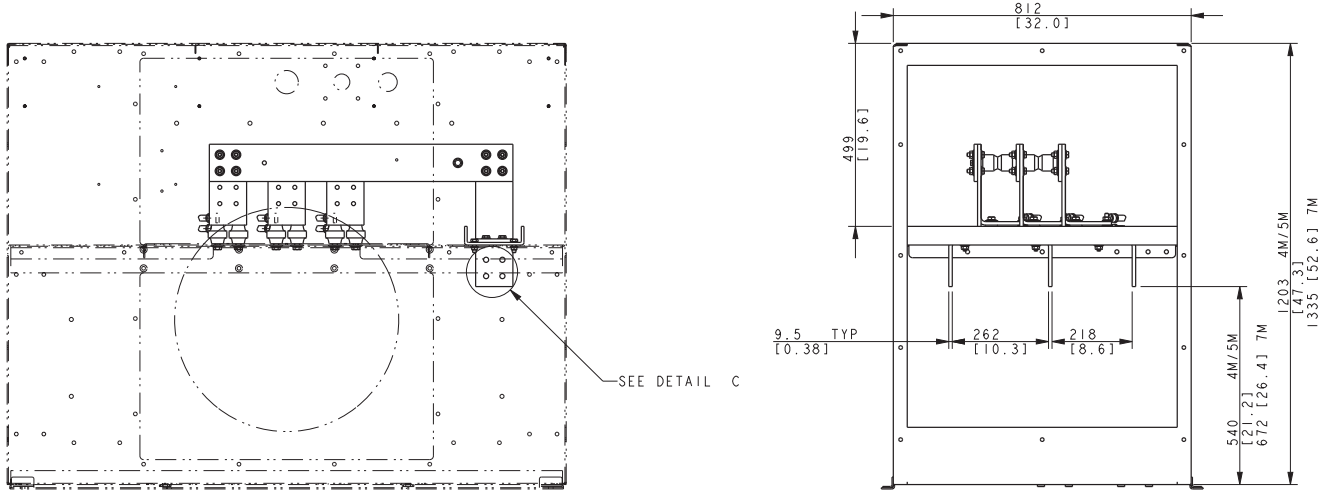
TITLE: DIMENSION PRINT

SCALE | CAD NO. | SHEET 1 of 6

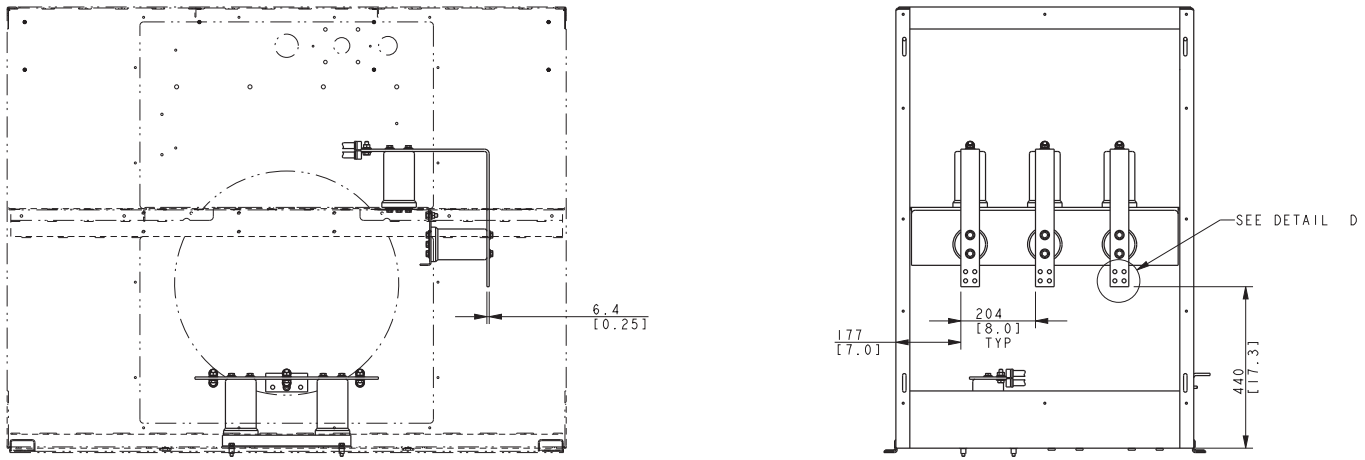
DWG NO. ADV-8030 | D

4M/5M/7M GENSETS



DETAIL C
SCALE 0.400

STANDARD LOW VOLTAGE LOAD BUS KIT
RIGHT-FACING SHOWN, LEFT FACING AND DUAL AVAILABLE



DETAIL D
SCALE 0.600

STANDARD MEDIUM VOLTAGE (5kV) LOAD BUS KIT
RIGHT-FACING ONLY

BREAKER AND LOAD BUS PHASING		
RIGHT		
A	B	C
LEFT		
C	B	A

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	4-29-11	NEW DRAWING [91732]	WSD
A	12-12-11	SEE SHEETS 1 & 5 [CN00646]	WSD
B	10-3-12	SEE SHEETS 1 & 3 [CT26372]	WSD
C	11-7-12	SEE OTHER SHEETS [CT28128]	WSD
D	11-2-16	(D-4) J-BOX DIMS ADDED [CT114236]	WSD
E	4-26-18	SEE SHEET 1 [CT186966]	WSD
F	3-25-19	SEE SHEET 1 [CT194577]	WSD
G	11-11-19	SEE SHEETS 1 & 3 [CT199840]	WSD
H	6-23-21	SEE SHEET 1 [CT212837]	WSD

DO NOT SCALE, REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

THIRD-ANGLE PROJECTION

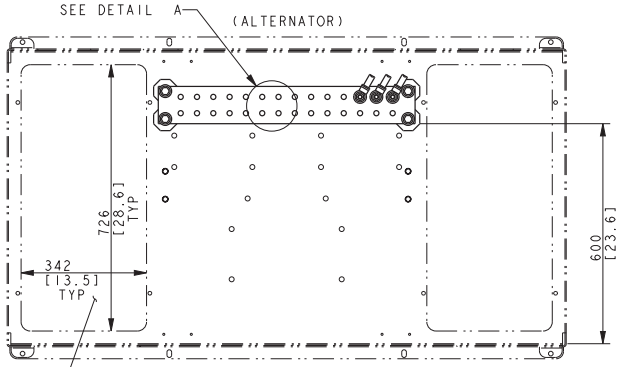
APPROVALS		DATE
DRAWN	WSD	4-29-11
CHECKED	WSD	4-29-11
APPROVED	AJH	4-29-11

TITLE: DIMENSION PRINT

SCALE | CAD NO. | SHEET 2 of 6

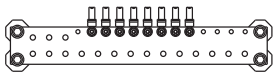
DWG NO. ADV-8030 | D

4M/5M/7M GENSETS

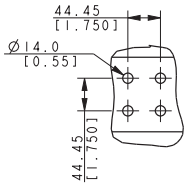


SECTION A-A
STANDARD 4M/5M LOW VOLTAGE NEUTRAL

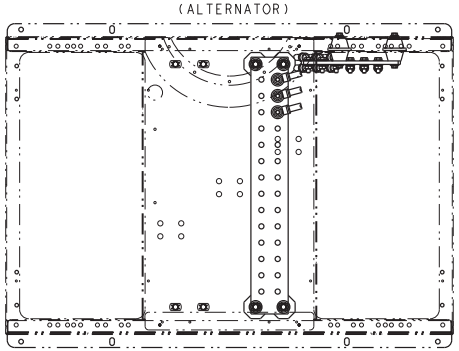
BOTTOM ENTRY (TYP BOTH SIDES)
SEE UNIT ADV FOR RELATION TO GENSET FOOTPRINT



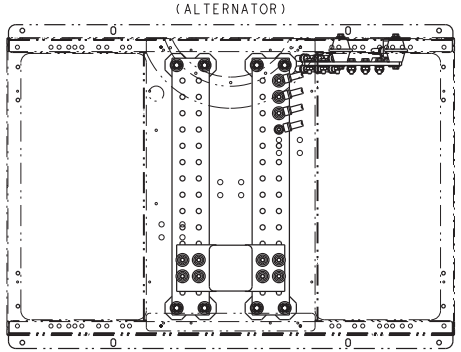
7M LOW VOLTAGE NEUTRAL
NOTE SMALL ALTERNATOR-FACING HOLES ARE UNAVAILABLE.



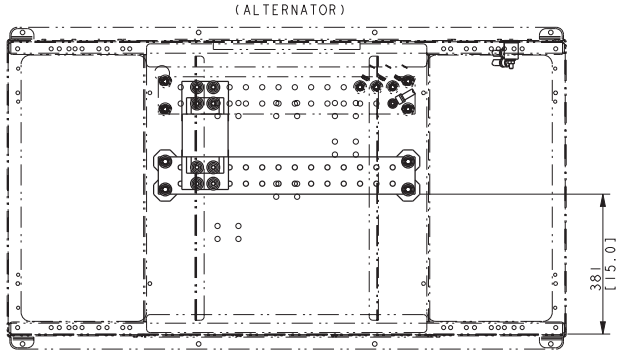
DETAIL A
SCALE 0.300



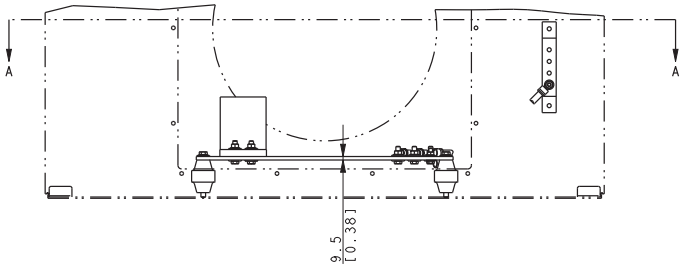
STANDARD LOW-VOLTAGE NEUTRAL
IN 48" WIDE JUNCTION BOX

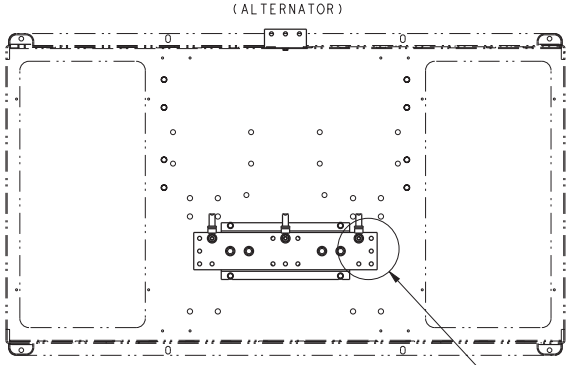


LSIG LOW-VOLTAGE NEUTRAL
IN 48" WIDE JUNCTION BOX

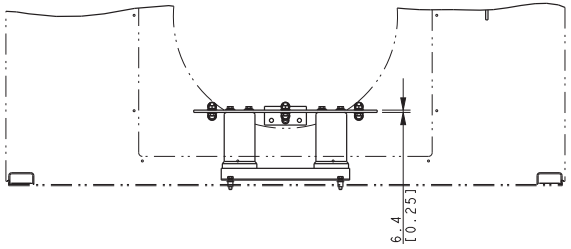


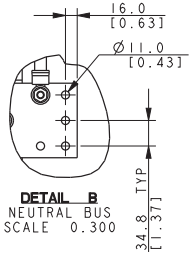
SECTION A-A
R OR NW FRAME LSIG NEUTRAL





SECTION B-B
STANDARD MEDIUM VOLTAGE (5kV) NEUTRAL





DETAIL B
NEUTRAL BUS
SCALE 0.300

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	4-29-11	NEW DRAWING [91732]	WSD
A	12-12-11	SEE SHEETS 1 & 5 [CN00646]	WSD
B	10-3-12	(D-5) H, J, LG GFI NEUTRAL UPDATED, LUG CHART ADDED [CT26372]	WSD
C	11-7-12	48" J-BOX NEUTRAL VIEWS ADDED [CT28128]	WSD
D	11-2-16	SEE SHEETS 1 & 2 [CT114236]	WSD
E	4-26-18	SEE SHEET 1 [CT186966]	WSD
F	3-25-19	SEE SHEET 1 [CT194577]	WSD
G	11-11-19	(D-5) 7M N VIEW ADDED, SEE SHEET 1 [CT199840]	WSD
H	6-23-21	SEE SHEET 1 [CT212837]	WSD

DO NOT SCALE, REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

THIRD-ANGLE PROJECTION

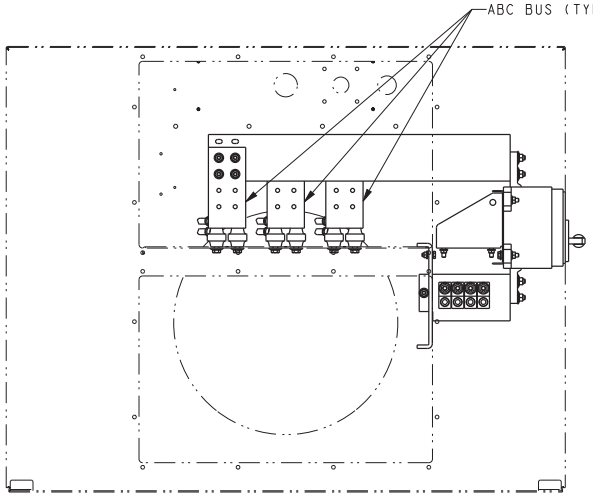
APPROVALS		DATE
DRAWN	WSD	4-29-11
CHECKED	WSD	4-29-11
APPROVED	AJH	4-29-11

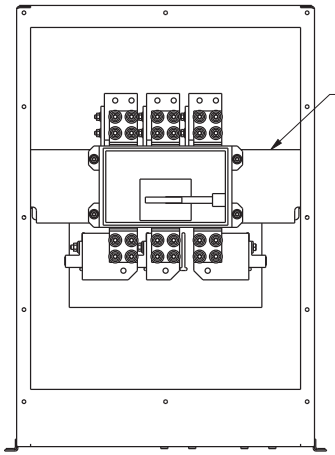
TITLE: DIMENSION PRINT

SCALE | CAD NO. | SHEET 3 of 6

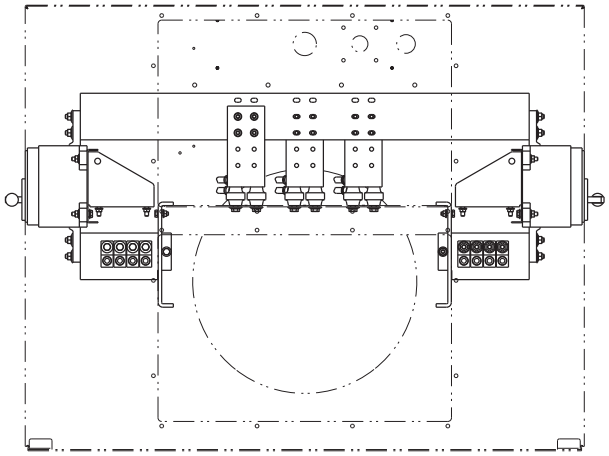
DWG NO. ADV-8030 | D

4M/5M/7M GENSETS

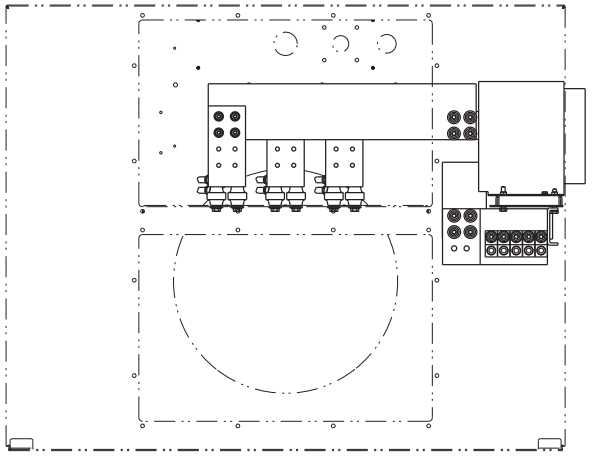


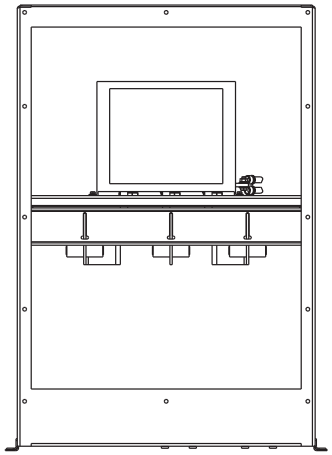


R-FRAME CIRCUIT BREAKER
RIGHT-FACING SHOWN, LEFT FACING AVAILABLE
SEE CHARTS ON PAGE 1 FOR LUGS AND BENDING SPACE

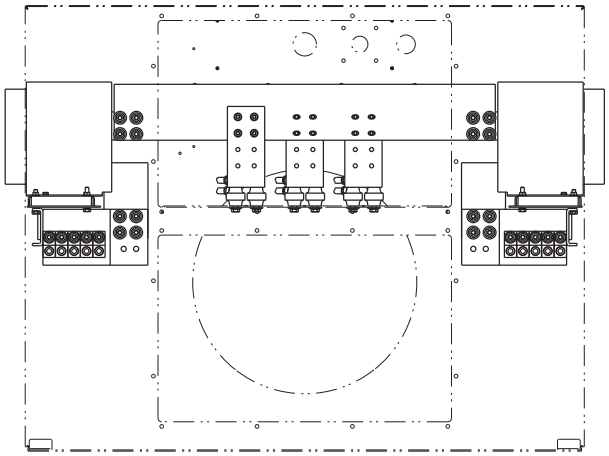


DUAL R-FRAME CIRCUIT BREAKER





NW-FRAME CIRCUIT BREAKER
RIGHT-FACING SHOWN, LEFT FACING AVAILABLE
SEE CHARTS ON PAGE 1 FOR LUGS AND BENDING SPACE



DUAL NW-FRAME CIRCUIT BREAKER

NOTE: COMBINATIONS OF R-FRAME WITH NW-FRAME NOT AVAILABLE.

BREAKER AND LOAD BUS PHASING		
RIGHT		
A	B	C
LEFT		
C	B	A

4M/5M/7M GENSETS

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	4-29-11	NEW DRAWING [91732]	WSD
A	12-12-11	SEE SHEETS 1 & 5 [CN00646]	WSD
B	10-3-12	SEE SHEETS 1 & 3 [CT26372]	WSD
C	11-7-12	SEE OTHER SHEETS [CT28128]	WSD
D	11-2-16	SEE SHEETS 1 & 2 [CT114236]	WSD
E	4-26-18	SEE SHEET 1 [CT186966]	WSD
F	3-25-19	SEE SHEET 1 [CT194577]	WSD
G	11-11-19	SEE SHEETS 1 & 3 [CT199840]	WSD
H	6-23-21	SEE SHEET 1 [CT212837]	WSD

DO NOT SCALE, REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

THIRD-ANGLE PROJECTION

APPROVALS		DATE
DRAWN	WSD	4-29-11
CHECKED	WSD	4-29-11
APPROVED	AJH	4-29-11

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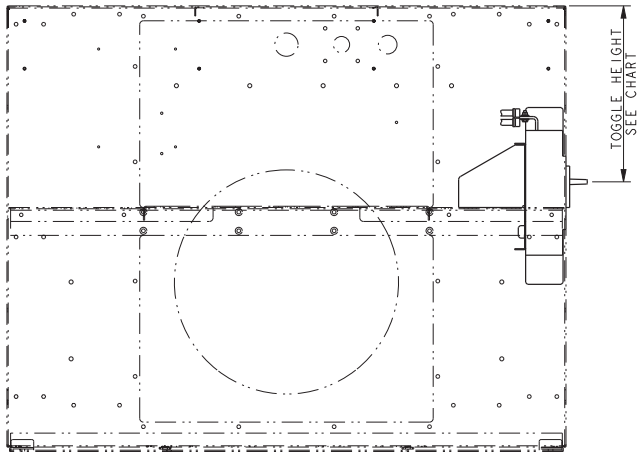
TITLE: DIMENSION PRINT

SCALE | CAD NO. | SHEET 5 of 6

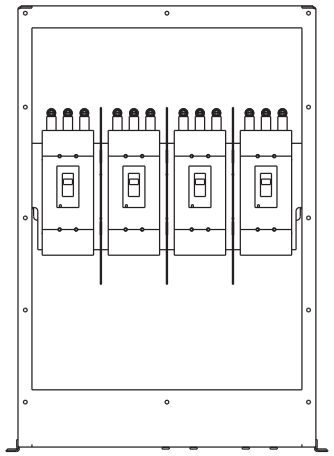
DWG NO. ADV-8030 | D

BREAKER AND LOAD BUS PHASING		
RIGHT		
A	B	C
LEFT		
C	B	A

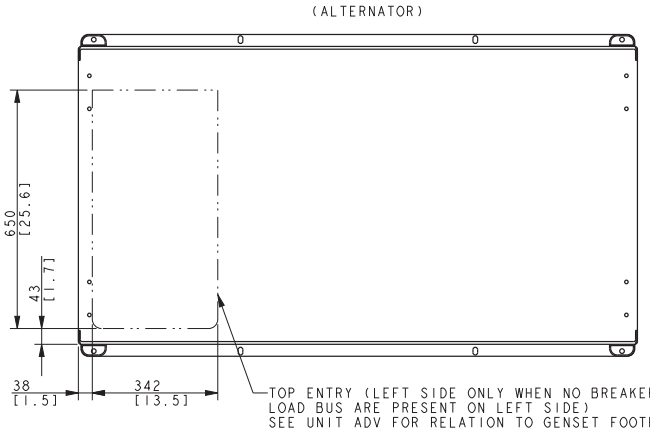


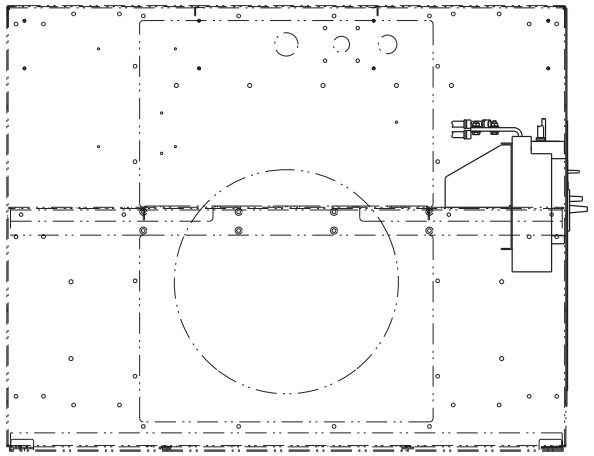
BREAKER	TOGGLE HEIGHT
J/H	453 [17.8]
LA	527 [20.7]
LG	480 [18.9]
P/M	555 [21.8]
RJ	530 [20.9]
NW	228 [9.0]

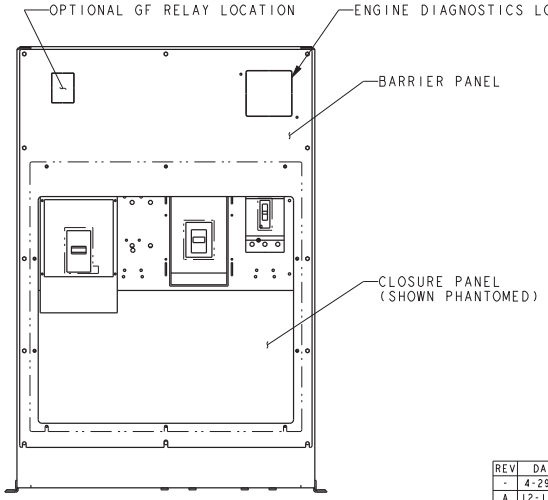
NOTE: TOGGLE HEIGHTS ARE FROM TOP OF J-BOX TO CENTER POSITION. NW DIMENSION IS TO TOP OF CHARGING HANDLE.
TO CALCULATE HEIGHT FROM FLOOR, USE THESE HEIGHTS IN COMBINATION WITH DIMENSIONS FROM UNIT ADV'S.



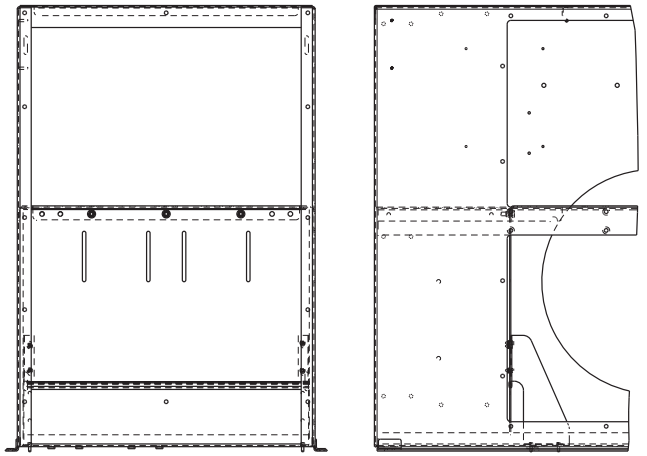
SMALL CIRCUIT BREAKERS
(4) LG-FRAMES SHOWN WITH SEPARATORS
RIGHT-FACING SHOWN, LEFT FACING AVAILABLE
SEE CHARTS ON PAGE 1 FOR LUGS AND BENDING SPACE







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



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

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	4-29-11	NEW DRAWING [91732]	WSD
A	12-12-11	(C-7) TOGGLE HEIGHT CHART ADDED; (B-2) LOWER COMPARTMENT SEPARATOR ADDED [CN00646]	WSD
B	10-3-12	SEE SHEETS 1 & 3 [CT26372]	WSD
C	11-7-12	SHEET 6 ADDED [CT28128]	WSD
D	11-2-16	SEE SHEETS 1 & 2 [CT114236]	WSD
E	4-26-18	SEE SHEET 1 [CT186966]	WSD
F	3-25-19	SEE SHEET 1 [CT194577]	WSD
G	11-11-19	SEE SHEETS 1 & 3 [CT199840]	WSD
H	6-23-21	SEE SHEET 1 [CT212837]	WSD

DO NOT SCALE, REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

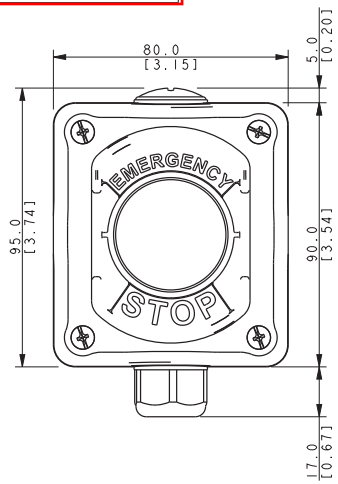
APPROVALS		DATE
DRAWN	WSD	4-29-11
CHECKED	WSD	4-29-11
APPROVED	AJH	4-29-11

TITLE: DIMENSION PRINT
SCALE | CAD NO. | SHEET 6 of 6
DWG NO. ADV-8030 | D

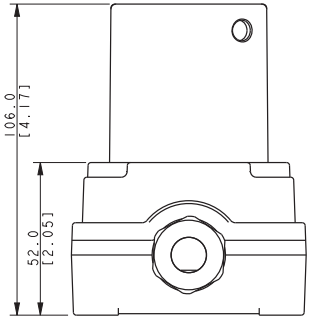
4M/5M/7M GENSETS

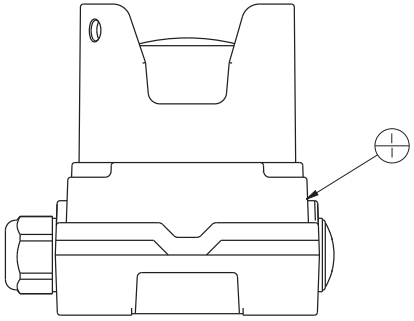
KIT NO.	ITEM	PART NO	QTY	DESCRIPTION
GM103743				E-STOP, NEC REMOTE
	1	GM103743-1	1	E-STOP W/ YELLOW SHROUD, LOTO
	2	GM103743-2	4	#10 X 1.25□ Sheetmetal Screw
	3	GM103743-3	1	TERMINAL, FAST-ON, MALE, 18-22 AWG
	4	GM103743-4	1	TERMINAL, FAST-ON, FEMALE, 18-22 AWG
	5	GM103743-5	2	TERMINAL, SPADE, 22-16 AWG
	6	GM103743-6	1	LITERATURE, TT-1736

THIS IS AN AUTOMATED TABLE. ALL UPDATES MUST BE MADE IN THE ASSEMBLY.



SCALE 1.50





NOTE:

DIMENSIONS IN [ ] ARE IN INCH EQUIVALENTS.

SCREWS AND TERMINALS ARE TO BE BAGGED AND PLACED IN THE BOX

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	2-12-18	NEW DRAWING [CT176728]	CCL

UNLESS OTHERWISE SPECIFIED:
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0° 30'
SURFACE FINISH 125 MAX.
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	CCL	2-12-18
CHECKED	KJB	2-12-18
APPROVED	KJB	2-12-18

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

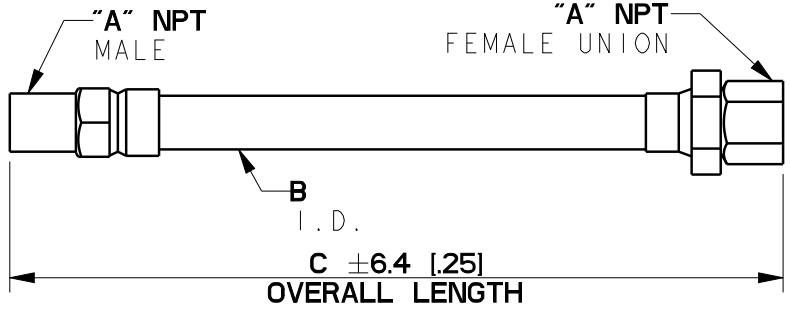
TITLE: E-STOP, NEC REMOTE

SCALE 1.50 | CAD NO. | SHEET 1 of 1

DWG NO. GM103743 | D

Attachment A

PART NO.	REV		A	B	C		SERVICE ONLY
					MM	IN	
X-504-1	AT	□	1/2	1/2	304.8	12	
X-504-2	AS		3/4	3/4	304.8	12	X
~~X-504-12~~	~~AS~~		~~3/8~~	~~3/8~~	~~385.8~~	~~15 3/16~~	
X-504-16 *	AT	□	2	2	457.2	18	
X-504-17	AS		1	1	508.0	20	X
X-504-18	AS		3/4	3/4	730.3	28 3/4	X
X-504-20 *	AT	□	1	1	736.6	29	
X-504-21 *	AV	□	1	1	457.2	18	
X-504-22 *	AV	□	1 1/2	1 1/2	717.6	28 1/4	
~~X-504-23~~	~~AS~~		~~1~~	~~1~~	~~342.9~~	~~13 1/2~~	
X-504-25 *	AU	□	1/4	3/8	1066.8	42	
X-504-26 *	AU	□	3	3	838.2	33	
X-504-27 *	A	□	2	2	825	32 1/2	
THIS IS A MANUAL TABLE							



NOTE:
PAINT MALE ENDS OF FUEL LINE
1200° F, HIGH TEMPERATURE BLACK.

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

MATERIAL:
ANNULAR CORRUGATED BRONZE/STAINLESS STEEL HOSE WITH BRONZE/
STAINLESS STEEL TUBULAR WIRE BRAID OR EQUIV.

FITTINGS-
FEMALE UNION - STEEL OR BRASS (NO GALVANIZED FITTING)
ALL FLUX USED IN BRAZING MUST BE REMOVED.
INSTALL HAND TIGHT.
* PRODUCT SHALL MEET UL 536 AND ULC ORD-C536 FOR CANADA
-USE-
NATURAL GAS, LP FUEL, GASOLINE, DIESEL FUEL, WATER & OIL.

□ INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
AW	1-9-19	(A-2,3) NOTE: CSA B149 WAS CSA 8.1 [CT192179]	PAS
AY	3-11-19	(C-3) X-504-2, 12, 17, 18 & 23 VOIDED;	
		'SERVICE ONLY' COLUMN ADDED; X-504-1, 16,	
		20, 25, 26, 27 CSA ASTERISK ADDED [CT194154]	ARP
BA	10-9-19	(B-1,2) NOTE "PRODUCT SHALL MEET UL 536...CANADA" WAS	
		"MUST MEET CSA B149"; (C-1,2) MATERIAL NOTE UPDATED;	
		(D-4) X-504-1: "*" SYMBOL REMOVED; (B-4)	
		"PEP-RML-001" NOTE ADDED; (D-1,2) VIEW & NOTES	
		UPDATED [CT199012]	YBY

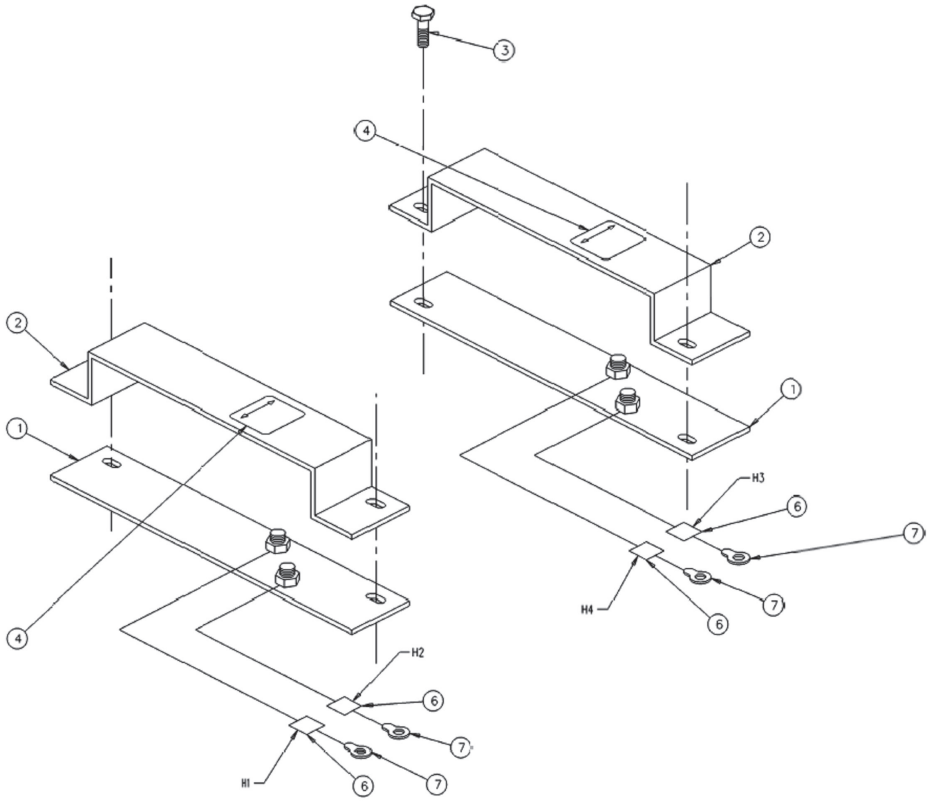
UNLESS OTHERWISE SPECIFIED -
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0° 30'
SURFACE FINISH MAX.
THIRD ANGLE PROJECTION

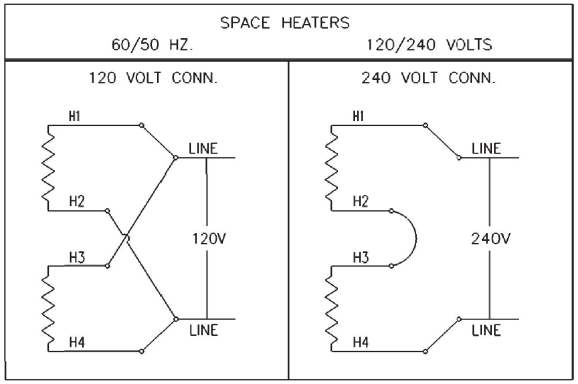
APPROVALS		DATE
DRAWN	DKO	11-19-62
CHECKED	EB	9-21-68
APPROVED	SAS	2-22-84

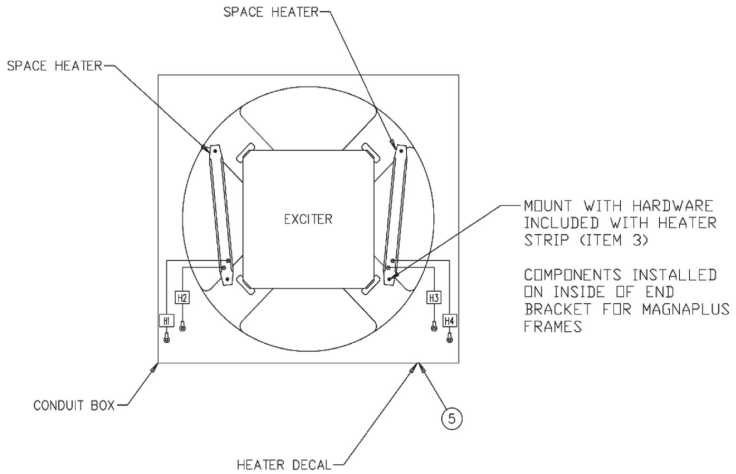
KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE
DWG, LINE, FLEX FUEL

SCALE 1.00 | CAD NO. | SHEET 1 of 1
DWG NO. X-504 | B







NOTE:

1. ALIGN THE SPACE HEATER AND GUARDS WITH THE PREDRILLED HOLES IN THE FRONT BRACKET AND MOUNT WITH THE SCREWS PROVIDED IN THE SPACE HEATER KIT.
2. APPLY THE SPACE HEATER CONNECTION DECAL ON THE BOTTOM OF THE CONDUIT BOX IN A VISIBLE LOCATION.
3. WIRE THE SPACE HEATER TO EITHER 120 VOLTS OR 240 VOLTS ACCORDING TO THE CONNECTION DIAGRAM. INSULATE THE CONNECTION.
4. ASSEMBLE CAUTION DECAL IN DIRECTION OF ARROW.

DESCRIPTION			FOR #572-575 AND #740 FRAMES			FOR #431-433 FRAME - MAGNAMAX			FOR #430-433 FRAME - MAGNAPLUS		
			REV			REV			REV		
KOHLER KIT NUMBER				H	272800		H	279750	☐	-	GM109472-KA1
PURCHASED COMPLETE FROM MARATHON			☐	A	272803	☐	A	279749	☐	-	GM10947I
1	2	SPACE HEATER			A-21138-33			A-21138-32			A-21138-32
2	2	GUARD			A-525855			A-525591			B-527461
3	4	SCREW			A-9646-75			A-9646-75			A-9646-75
4	2	DECAL, CAUTION			A-525590			A-525590			A-525590
5	1	DECAL, CONNECTION			A-510663			A-510663			A-510663
6	8	MARKERS			A-57829B			A-57829B			A-57829B
7	4	LEAD ASSEMBLY			L6H16W-24B8B8			L6H16W-24B8B8			L6H16W-42B8B8
ITEM	QTY.	DESCRIPTION			PART NO. MARATHON			PART NO. MARATHON			PART NO. MARATHON

350-1000 KW DDC
120/240 VOLT MARATHON GENERATOR HEATER
TOTAL HEATER WATTAGE 500 WATTS

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
D	6-24-97	(A-2) 1000 KW WAS 800 KW [50803]	JDH
E	5-18-98	(A-2,A-7) #572, 573, 574, 575 & 740 WAS #570;	
		#433 WAS #430 [54622]	LDS
F	10-29-98	(A-6,7,8) KIT # AND DESCRIPTION ADDED [56529]	LDS
G	9-21-09	(B-1) X-101-8 (4), X-465-7 (4) AND X-25-53 (8)	
		REMOVED (C-1) NOTE REVISED [88337]	SAM
H	7-11-12	(B-1) VIEW A-A REMOVED , HARDWARE NOTE ADDED [CT15979]	SAM
J	7-31-19	CREO FORMAT WAS AUTOCAD; (A-7,8) TABLE UPDATED;	
		(A-6) GM10947I AND GM109472-KA1 ADDED; (B-2)	
		NOTE ADDED [CT197472]	HM

DO NOT SCALE, REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN MILLIMETERS
GENERAL TOLERANCES: X.XX ± 0.25, X.X ± 1.0, X ± 1.5, ANGLES ± 0°30' MAX.
SURFACE FINISH
THIRD-ANGLE PROJECTION

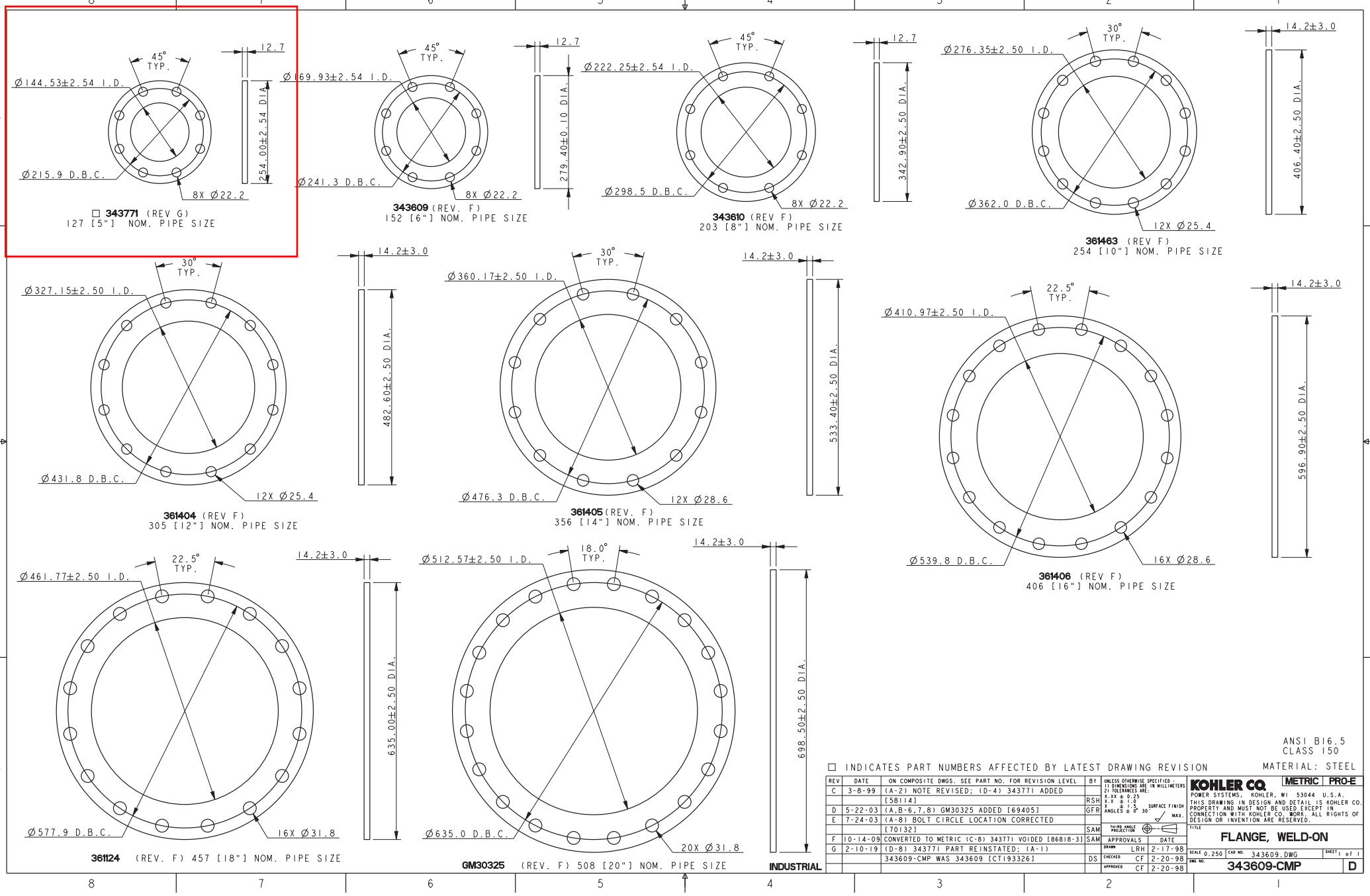
APPROVALS		DATE
DRAWN	DCC/RD	10-20-86
CHECKED	RLD	10-26-86
APPROVED	DRF	11-29-86

TITLE: **DRAWING, ASSEMBLY**

SCALE | CAD NO. | SHEET 1 of 1

DWG NO. **S-272000** **D**

Attachment A



REV	DATE	ON COMPOSITE DWGS. SEE PART NO. FOR REVISION LEVEL	BY
C	3-8-99	(A-2) NOTE REVISED; (D-4) 343771 ADDED	
		[58114]	RSH
D	5-22-03	(A,B-6,7,8) GM30325 ADDED [69405]	GFR
E	7-24-03	(A-8) BOLT CIRCLE LOCATION CORRECTED	
		[70132]	SAM
F	10-14-09	CONVERTED TO METRIC (C-8) 343771 VOIDED [86818-31]	SAM
G	2-10-19	(D-8) 343771 PART REINSTATED; (A-1)	
		343609-CMP WAS 343609 [CT193326]	DS

APPROVALS	DATE
DRAWN LRH	2-17-98
CHECKED CF	2-20-98
APPROVED CF	2-20-98

Attachment B

5656 S. Staples, Suite 360
Corpus Christi, TX 78411
361/852-2727 FX: 361/852-2922
TX Firm Registration No. F-005318

ENGINEERING

LETTER OF TRANSMITTAL

DATE: 09/26/2023

TO: Texas A&M University - Corpus Christi
6300 Ocean Drive
Corpus Christi, TX 78412-5731

ATTN: Scott Meares

Reference: Corpus Christi Central Plant Mechanical Equipment
NRG #: 22159

WE ARE SENDING YOU: ( ) Attached ( ) Under separate cover via _____ the following items:

☐ Drawings ☐ Documents ☑ Electronic Copies
☐ Specifications ☑ Submittals ☐ Other

Copies	*Description*
1	TAMUCC Central Plant Renovations VFD Submittal Rev00 07252023

THESE ARE TRANSMITTED AS CHECKED BELOW:

☐ For Approval ☐ As Requested ☐ Make Corrections Noted
☐ For Your Use ☐ No Exception Taken ☐ Rejected

REMARKS: See attached

Sent by: Sean Rodriguez Received by: _____

Copy to: binder

5656 S. Staples, Suite 360
Corpus Christi, TX 78411
PH:361/852-2727 FX: 361/852-2922
TX Firm Registraion No. F-005318

Date: 9/26/2023

SUBMITTAL REVIEW

NRG Job #: 22159

Client: TAMU-CC Construction

Subject: Corpus Christi Central Plant Mechanical Equipment

Description: TAMUCC Central Plant Renovations VFD Submittal Rev00 07252023

☐ Reviewed ☑ Reviewed with Comments

☐ Revise and Resubmit ☐ Submit Specified Item

This review is only for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Corrections or comments made on the shop drawings during this review do not relieve contractor from compliance with the requirements of the plans and specifications. Review of a specific item shall not include approval of an assembly of which the item is a component. Contractor is responsible for: confirming all quantities, dimensions to be confirmed and correlated at the jobsite; information that pertains solely to the fabrication processes or to the means, methods, techniques, sequences and procedures of construction; coordination of his or her Work with that of all other trades; and for performing all work in a safe and satisfactory manner.

Comments:

Specified electrical is based on the specified equipment. Contractor shall coordinate with other trades providing equipment to ensure that no electrical modifications are required as a result of substituted equipment. If modifications are required, contractor and subcontractors are responsible for coordinating and implementing the required changes at no extra cost.

1. No exceptions taken. Coordinate delivery location and date with Owner's representative.

Review By: Sean Rodriguez, P.E. Date: 9/26/2023

NRG ENGINEERING

5656 S. Staples, Suite 360
Corpus Christi, TX 78411
361/852-2727 FX: 361/852-2922
TX Firm Registration No. F-005318

Review By: Sean Rodriguez, P.E.

Date: 9/26/2023

Attachment B

Reviewed By: Sean Rodriguez, P.E. Date: 9/26/2023

Attachment B

SUBMITTAL
FOR REVIEW

ABB VARIABLE SPEED DRIVE

SUBMITTAL DATA

FOR

TEXAS A&M UNIVERSITY CORPUS CHRISTI

CENTRAL PLANT RENOVATIONS

Corpus Christi, TX

Owner:	TAMU Corpus Christi
Mechanical Engineer:	NRG Engineering
Mechanical Contractor:	Pro Tech Mechanical

Date:	7/19/2023
Revision:	Original
Submitted By:	Ken Wertz, Texas AirSystems, Inc.
Equipment Manufacturer:	ABB
Equipment Type:	Variable Speed Drives
Specification Section:	23 68 30
Unit Tags:	VFD-CHWP-1,2

TEXAS AIRSYSTEMS

SUBMITTAL
FOR REVIEW

(2) Variable speed drives with the following options:

- Model ABB-ACH580 Passive filter drive package with bypass and circuit breaker in NEMA 1 enclosure
  - Qty:2-20HP
- BACNET Interface capability
- Provided for field installation and wiring by others
- Service switch
- 1st thru 5th Replacement parts and labor warranty
- Startup and owner training is provided by Factory-Authorized Technician
  - M-F, 0800-1500 Local time. Drives must be ready for startup upon arrival

Notes: Installation, external mounting hardware, input line filters, and any other products, options, services, and warranties are excluded unless mentioned above. Harmonic analysis is not included in this proposal.

Deviations:

1. Extra stock called out in paragraph 1.06 is not included.
2. Servicing technician must be ABB certified to comply with the manufacturer's terms of the 5 year parts and labor warranty as specified in paragraph 1.09.
3. Output line filtering as specified in paragraph 2.04F is excluded.

Submittal Schedule

This schedule includes the products supplied as part of this submittal.

Schedule			Motor Data[1]			Drive Data			
Item	Qty	Tag	HP	FLA	Volts	Product ID	HP	Amps	Volts
1	2	VFD-CHWP-1,2	20	54	230 VAC	ACH580-BCR-059A-2+E211+F267	20	59.4	208 VAC

Notes:

1. AC motor data is per National Electrical Code Table 430.250 for typical motors used in most applications. It is provided as typical data only. DC motor data is per typical industry standards. Actual motor data may vary

Attachment B

Submittal Schedule Details for VFD-CHWP-1,2

Item	Tag / Equipment ID	Product ID
1	VFD-CHWP-1,2	ACH580-BCR-059A-2+E211+F267

Item Description
Input Voltage: 208 VAC Three Phase **Rated Output Current:** 59.4A **Enclosure:** UL (NEMA) Type 1 **Nominal Horsepower:** 20 HP **Frame Size:** R3 **Input Disconnecting Means:** Circuit Breaker **Bypass:** E-Clipse Bypass (Box) **Input Impedance:** 5% equivalent impedance **Short Circuit Current Rating:** 100 kA **Communication Protocols:** Johnson Controls N2, Modbus RTU, BACnet (MS/TP) **Other Options:** [+E211]: Passive Filter Drive, [+F267]: Service Switch (+F267)

Drive Input Fuse Ratings	
Fuse Class	**Amps (600 V)**
Class T	80

Wire Size Capacities of Power Terminals		
Input Wiring	**Output Wiring**	**Ground Wiring**
#14…#1/0 5.2 lbf-ft	#8…#2/0 9.1 lbf-ft	#14…#2 3.3 lbf-ft

Dimensions and Weights			
Height ***in (mm)***	**Width** ***in (mm)***	**Depth** ***in (mm)***	**Weight** ***lbs (kg)***
61.9 (1571)	19.3 (490)	19.0 (482)	279 (127)

Heat Dissipation & Airflow Requirements			
Power Losses		**Airflow**	
BTU/Hr	**Watts**	**CFM**	**CM/Hr**
2,660	780	448	761.2

PRODUCT OVERVIEW

ACH580 E-Clipse Bypass

The ACH580 drive sets new standards in both simplicity and reliability, and ensures smooth, energy-efficient operation of your HVAC systems in normal and mission-critical situations.

The ACH580 with ABB E-Clipse bypass is an ACH580 HVAC Drive in an integrated UL (NEMA) Type 1, 12 or 3R enclosure with a bypass motor starter. The ACH580 with ABB E-Clipse bypass provides an input disconnect switch or circuit breaker with door mounted and interlocked operator (padlockable in the OFF position), a bypass starter, electronic motor overload protection, a door mounted control panel with graphical display for local control, provisions for external control connections, and serial communications capability. Configurations with the +F267 option include a drive service switch.

UL (NEMA) Type 1 and 12 E-Clipse units are available from 1 to 100 HP at 208/230V, 1 to 350 HP at 460V, and 2 to 150 HP at 575V. UL (NEMA) Type 1 and 12 units are wall mounted from 1 to 200 HP.

For outdoor applications, UL (NEMA) Type 3R E-Clipse unit are available from 1 to 100 HP at 208/230V, 1 to 350 HP at 460V and 2 to 150 HP at 575V. Construction is sheet steel with a tough powder coat paint finish for corrosion resistance. A thermostatically controlled space heater and forced ventilated air cooling system are standard.

The ACH580 with ABB E-Clipse bypass includes two contactors. One contactor is the bypass contactor, used to connect the motor directly to the incoming power line in the event that the ACH580 is out of service. The other contactor is the ACH580 output contactor that disconnects the ACH580 from the motor when the motor is operating in the Bypass mode. The drive output contactor and the bypass contactor are electrically interlocked to prevent “back feeding”.

The ACH580 with ABB E-Clipse bypass is a microprocessor-controlled “intelligent” system which features programmable Class 10, 20, or 30 overload curves, programmable underload (broken belt) and overload trip or indication. Also included as standard features are single-phase protection in bypass mode, programmable manual or automatic transfer to bypass, fireman’s override, smoke control, damper control, no contactor chatter on brown-out power conditions and serial communications. Should a drive problem occur, fast acting fuses exclusive to the ACH580 drive path disconnect the drive from the line prior to clearing upstream branch circuit protection, maintaining bypass capability.

Technical specifications

Product compliance (complete list on following page)	
ACH580-VxR/BxR	UL508A
Supply connection	
Input voltage (U_1) ACH580-xx-xxxA-2 ACH580-xx-xxxA-4 ACH580-xx-xxxA-6 Input voltage tolerance Phase	 208/240V 480V 600V +10% / -15% 3-phase
Frequency	48 to 63 Hz
Line Limitations	Max ±3% of nominal phase to phase input voltage
Power Factor (cos φ) at nominal load ACH580-VxR ACH580-BxR	 0.98 0.98
Efficiency at rated power ACH580-VxR ACH580-BxR	 98.0% 98.0%
Power Loss	Approximately 2% of rated power
Motor connection	
Supported motor control	Scalar and vector
Supported motor types	Asynchronous motor
Voltage	3-phase, from 0 to supply voltage
Frequency	0 to 500 Hz
Short Term Overload Capacity Variable Torque	110% for 1 min/10min
Peak Overload Capacity Variable Torque	1.35 for 2 second (2 sec / 10 min)
Switching Frequency	2, 4, 8 or 12 kHz Automatic fold back in case of overload
Acceleration/Deceleration Time	0 to 1800 s
Short Circuit Current Rating (SCCR)	

	240V	480V	600V
-VCR	100kA	100kA	10 kA
-VDR*	100kA	100kA	100 kA
-BCR	100kA	100kA	10 kA
-BDR*	100kA	100kA	100 kA

* External fuses are required for 100 kA rating as specified in the “Technical Data” section of User Manual 3AXD50000289554.

Technical specifications

Inputs and outputs (drive)	
2 analog inputs	Selection of Current/Voltage input mode is user programmable.
Voltage reference	0 (2) to 10 V, R_{in} > 200 kΩ
Current reference	0 (4) to 20 mA, R_{in} = 100 Ω
Potentiometer reference value	10 V ±1% max. 20 mA
2 analog outputs	AO1 is user programmable for current or voltage. AO2 current
Voltage reference	0 to 10 V, R_{load}: > 100 kΩ
Current reference	0 to 20 mA, R_{load}: < 500 Ω
Applicable potentiometer	1 kΩ to 10 kΩ
Internal auxiliary voltage	24 V DC ±10%, max. 250 mA
Accuracy	+/- 1% full scale range at 25°C (77°F)
Output updating time	2 ms
6 digital inputs	12 to 24 V DC, 10 to 24 V AC, Connectivity of PTC sensors supported by a single digital input. PNP or NPN connection (5 DIs with NPN connection). Programmable
Input Updating Time	2 ms
3 relay outputs	Maximum switching voltage 250 V AC/30 V DC. Maximum continuous current 2 A rms. Programmable, Form C
Contact material	Silver Tin Oxide ($AgSnO_2$)
PTC, PT100 and PT1000	Any of the analog inputs, or digital input 6, are configurable for PTC with up to 6 sensors.
Adjustable filters on analog inputs and outputs	
All control inputs isolated from ground and power	
Operation	
Air temperature	0 to -15 °C (32 to 5 °F). -15 to +50 °C (5 to 122 °F): No frost allowed. Output derated above +40 °C (104 °F)
Installation site altitude	0 to 1000 m (3281 ft) above sea level Output derated above 1000 m (3281 ft)
Relative humidity	5 to 95% No condensation allowed Maximum relative humidity is 60% in the presence of corrosive gasses
Atmospheric pressure	70 to 106 kPa (10.2 to 15.4 PSI) 0.7 to 1.05 atmospheres
Siesmic	Risk category IV Certified (IBC 2018)

Feature overview

Communication
Protocols as standard (EIA-485): BACnet MS/TP, Modbus RTU, Johnson Controls N2
Available as plug-in options: BACnet/IP, Modbus TCP, PROFIBUS-DP, DeviceNet, EtherNet/IP

Application functions
Start interlock
Delayed start
Run permissive (damper monitoring)
Override operation mode
Real-time clock (scheduling)
PID controllers for motor and process
Motor flying start
Motor preheating
Energy optimizer and calculators
Timer
2 or 3 wire start/stop
Ramp to stop
2 independent adjustable accel/decel ramp

Protection functions
Overvoltage controller
Undervoltage controller
Motor earth-leakage monitoring
Motor short-circuit protection
Motor overtemperature protection
Output and input switch supervision
Motor overload protection (UL508C)
Phase-loss detection (both motor and supply)
Under load supervision (belt loss detection)
Overload supervision
Stall protection
Loss of reference
Panel loss
Ground fault
External events
Overcurrent
Current limit regulator
Transient/Surge protection (MOV and choke)

Panel functions
First start assistant
Primary settings for HVAC applications
Hand-Off-Auto operation mode
HVAC quick set-up
Includes Day, Date and Time
Operator Panel Parameter Backup (read/write)
Full Graphic and Multilingual Display for Operator Control, Parameter Set-Up and Operating Data Display:
- Output Frequency (Hz)
- Speed (RPM)
- Motor Current
- Calculated % Motor Torque
- Calculated Motor Power (kW)
- DC Bus Voltage
- Output Voltage
- Heatsink Temperature
- Elapsed Time Meter (resettable)
- kWh (resettable)
- Input / Output Terminal Monitor
- PID Actual Value (Feedback) & Error Fault Text
- Warning Text
- Three (3) Scalable Process Variable Displays
- User-Definable Engineering Units

Motor control features
Scalar (V/Hz) and vector modes of motor control
V/Hz shapes
- Linear
- Squared

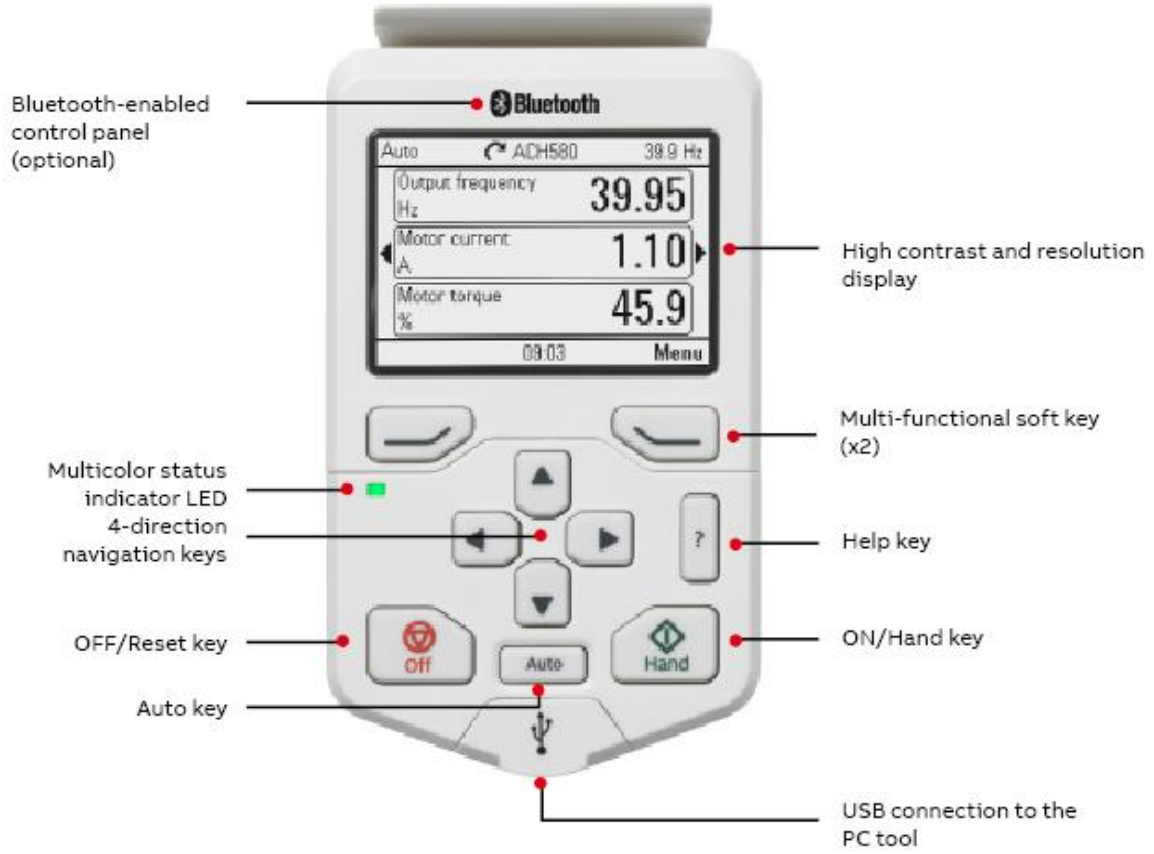
Energy optimization
IR compensation
Slip compensation
Three (3) Critical Frequency Lockout Bands

PID control
One (1) Process PID
Four (4) Integral Independent Programmable PID Setpoint Controllers (Process and External)
External Selection between Two (2) Sets of Process PID Controller Parameters
PID Sleep/Wake-Up

Control panel features

The ACH580 Assistant Control Panel features:

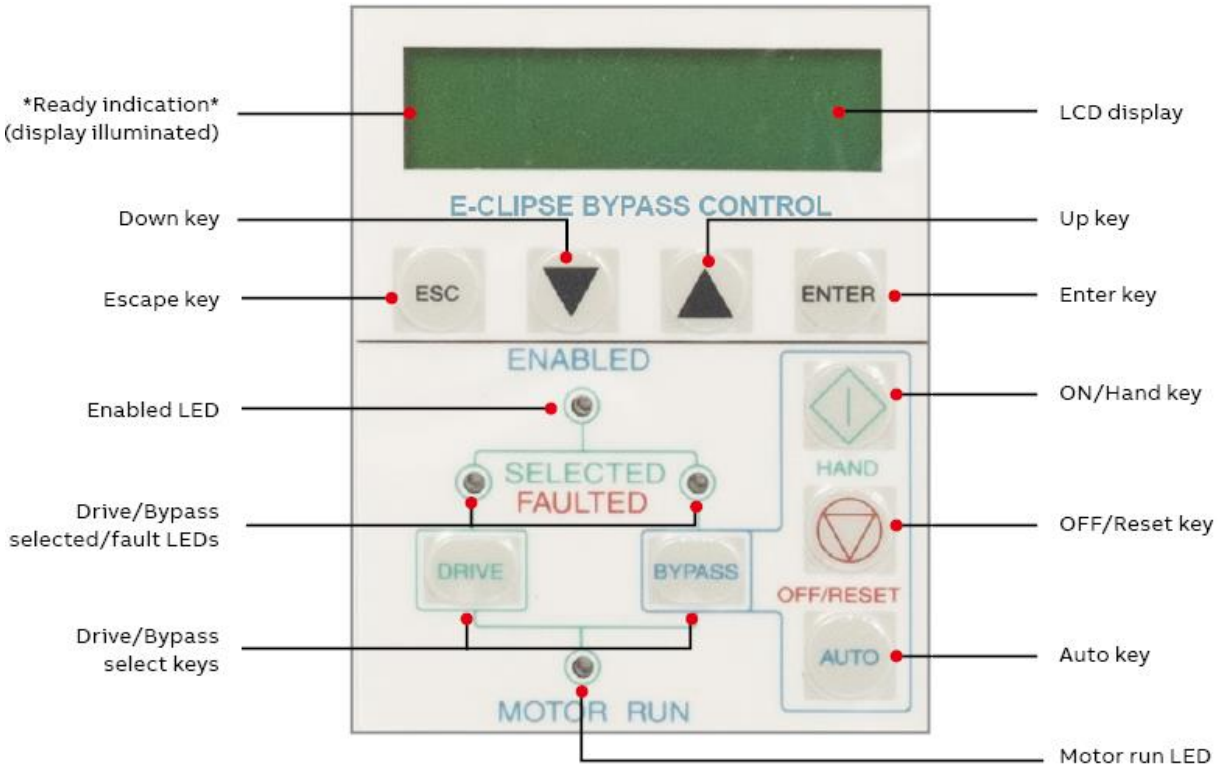
- Intuitive to operate
- Primary Setting menu to ease drive commissioning
- Real-time clock
- Diagnostic and maintenance functions
- Full-graphic display, including chart, graph, and meter options
- 21 editable home views
- USB interface for PC and tool connection as standard
- Parameters are alpha-numeric
- North American version supports 14 languages as standard
- Dedicated “Help” key
- 4 user sets
- Parameter are stored in control panel memory for later transfer to other drives or for backup of a particular system
- Back-up and restore parameters and/or motor data
- Automatic back-up 2 hours after parameter change
- Modified parameter display
- Creates unique short menu
- Shows parameters that differ from the default
- Bluetooth connectivity for use with mobile device (requires +J429 option)



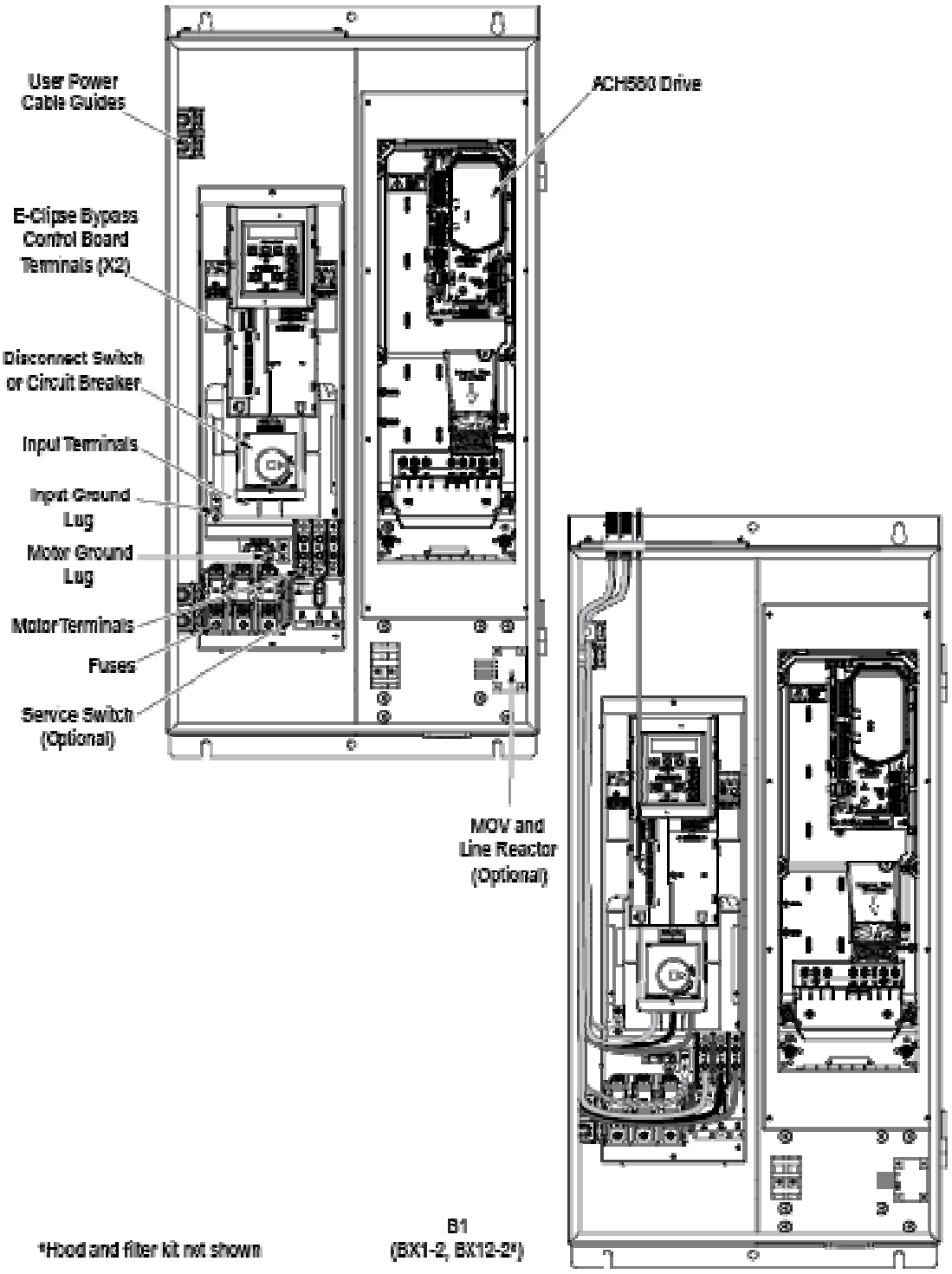
E-Clipse control panel features

The ACH580 E-Clipse Control Panel features:

- Dedicated programming and operating controls (keys) are logically grouped on the keypad by their function.
  - H-O-A, Drive/Bypass Selection keys (Control)
  - UP/DOWN arrows, ESC, ENTER keys (Programming)
- LCD display provide:
  - Operating Control Status
  - Bypass Status
  - Fault/Warning annunciation
  - Parameter Lists and Values
  - Power On indication
- Individual LEDs arranged to provide a logical control path visual:
  - System Enabled
  - Separate multi colored Drive and Bypass “SELECTED/FAULTED LEDs in separate paths
  - Motor Run Indicator
  - LEDs that illuminate, change color, and flash to provide visible indication of system status
- Provides System control from one location



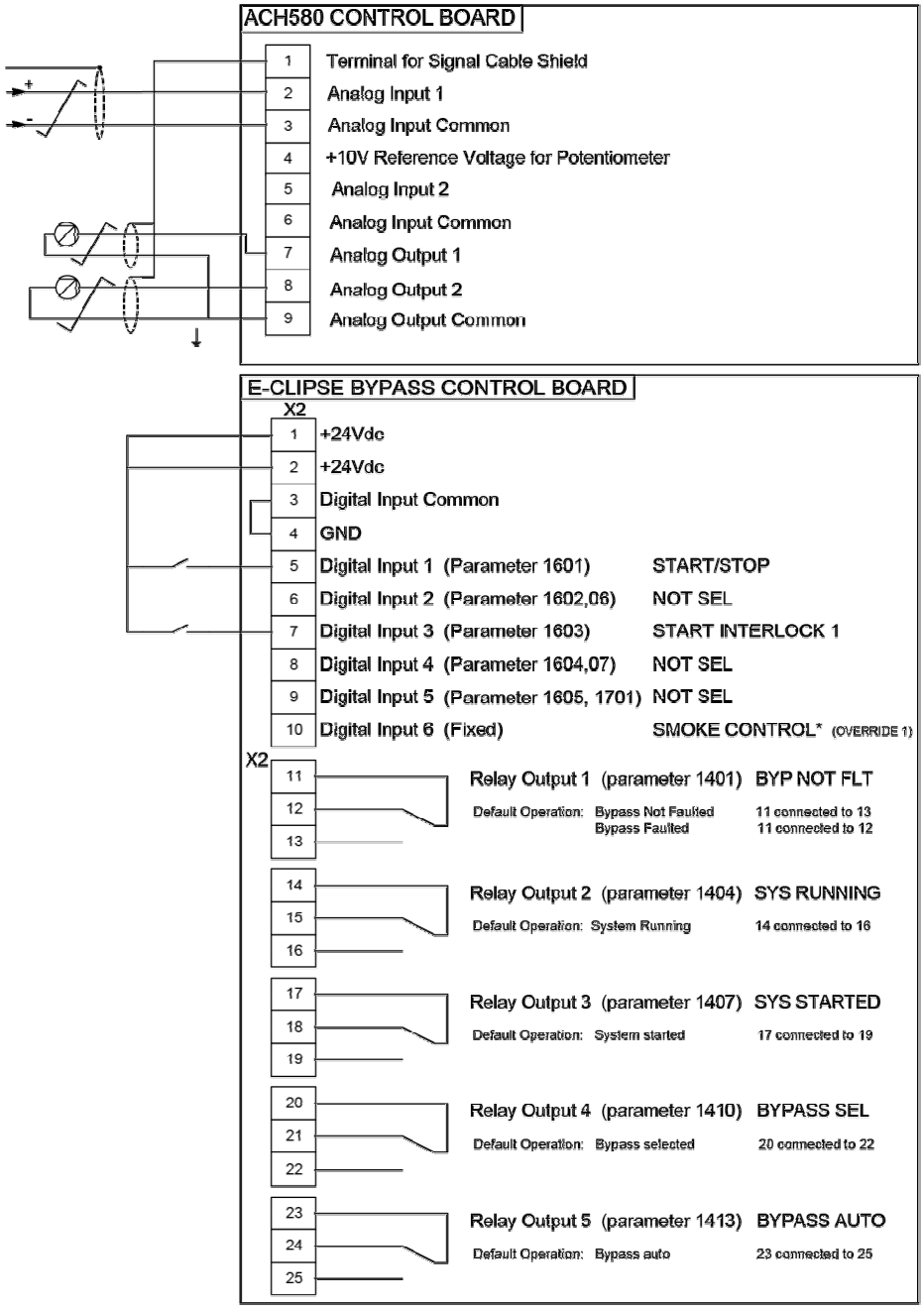
Cable connections



Bx1-1, Bx12-1, Bx3R-1

Control connections

The control wiring includes connections to an analog speed command signal and a start/stop relay contact for controlling the motor in the AUTO mode. There may also be connections to external run permissive interlock contacts and a connection from the Motor Run contact to an external status indication circuit. For a detailed description of the control circuit functions and alternate Control Connection diagrams, refer to the ACH580 E-Clipse bypass and packaged drive manual.



Engineering Data Summary

Replacement Fuses

Drive input fuses are recommended to disconnect the drive from power in the event that a component fails in the drive's power circuitry. Recommended drive input fuse specifications are listed in the *Submittal Schedule Details* and in the *Fuse Ratings* Table. Fuse rating information is provided for customer reference.

Item	Catalog Number	Drive Input Fuse Ratings	
		Amps (600V)	Bussmann Type
1	ACH580-BCR-059A-2+E211+F267	80	Class T

Terminal Sizes / Cable Connection Requirements

Power and motor cable terminal sizes and connection requirements are shown in the *Submittal Schedule Details* and in the *Terminal Sizes / Cable Connection Requirements* Table. The information provided below is for connections to input power and motor cables. These connections may be made to an input circuit breaker or disconnect switch, a motor terminal block, overload relay, and/or directly to bus bars and ground lugs. The table also lists torque that should be applied when tightening terminals and spacing requirements where multiple mounting holes are provided in the bus bar.

Item	Catalog Number	Input Wiring	Output Wiring	Ground Wiring
1	ACH580-BCR-059A-2+E211+F267	#14…#1/0 5.2 lbf-ft	#8…#2/0 9.1 lbf-ft	#14…#2 3.3 lbf-ft

Heat Dissipation Requirements

The cooling air entering the drive must be clean and free from corrosive materials. The *Submittal Schedule Details* and the *Heat Dissipation Requirements* table below give the heat dissipated into the hot air exhausted from the drives. If the drives are installed in a confined space, the heat must be removed from the area by ventilation or air conditioning equipment.

Item	Catalog Number	Watts	BTU/Hr
1	ACH580-BCR-059A-2+E211+F267	780	2,660

Dimensions and Weights

Dimensions and weights of the drives provided are given in the *Submittal Schedule Details* and in the *Dimensions and Weights* Table. The table also lists the applicable dimension drawings that include additional detail. Dimension drawings may be provided in the back of this submittal.

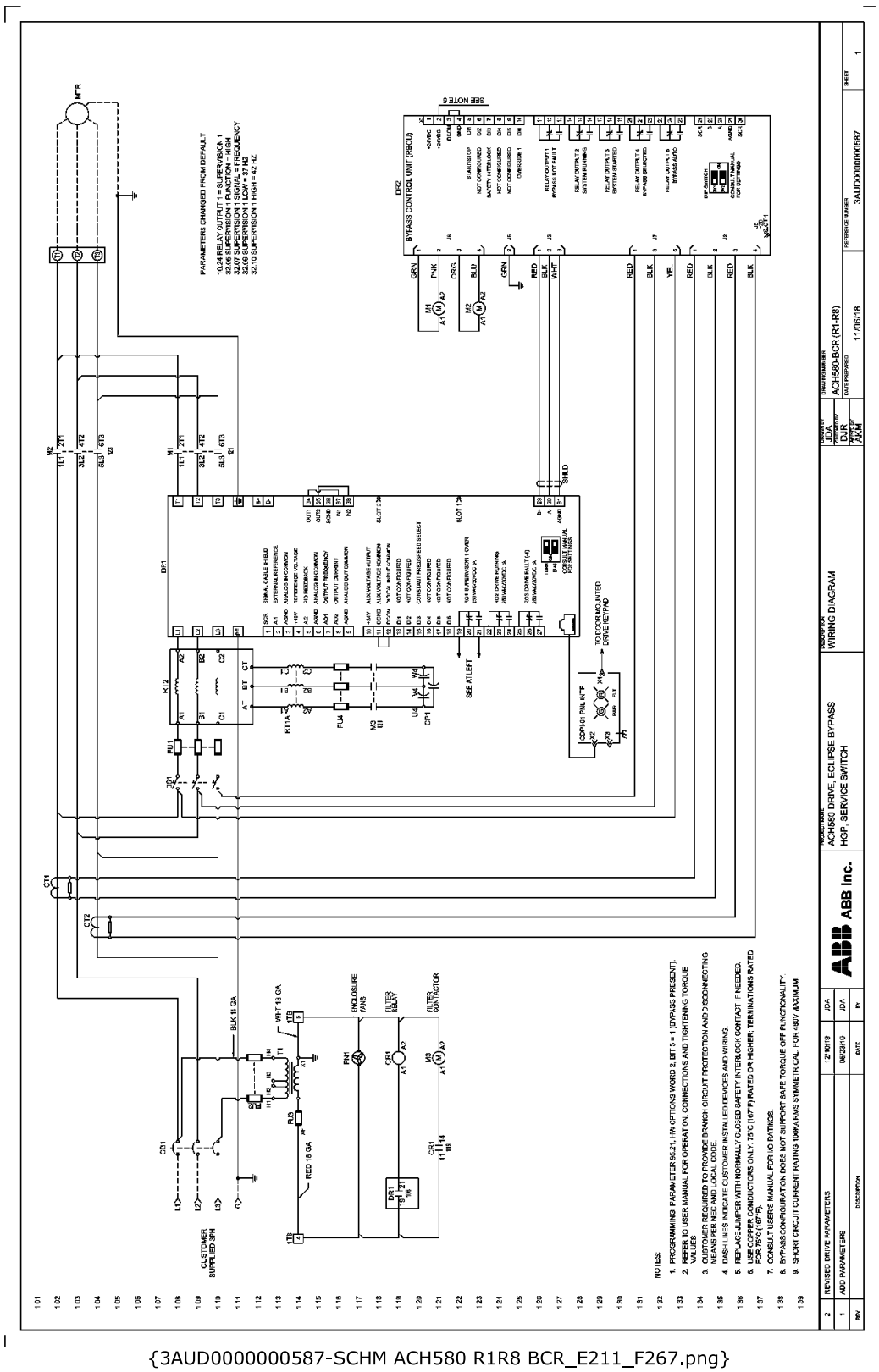
Item	Catalog Number	Height *mm* *(in)*	Width *mm* *(in)*	Depth *mm* *(in)*	Weight *kg* *(lbs)*
1	ACH580-BCR-059A-2+E211+F267	1571 (61.86)	490 (19.30)	482 (18.98)	127 (280)

Product Short Circuit Current Rating

Short circuit ratings shown below are as show on the device rating label.

Item	Catalog Number	Short Circuit Current Rating
1	ACH580-BCR-059A-2+E211+F267	100 kA

Item	Part Number	Customer Designation
1	ACH580-BCR-059A-2+E211+F267	VFD-CHWP-1,2



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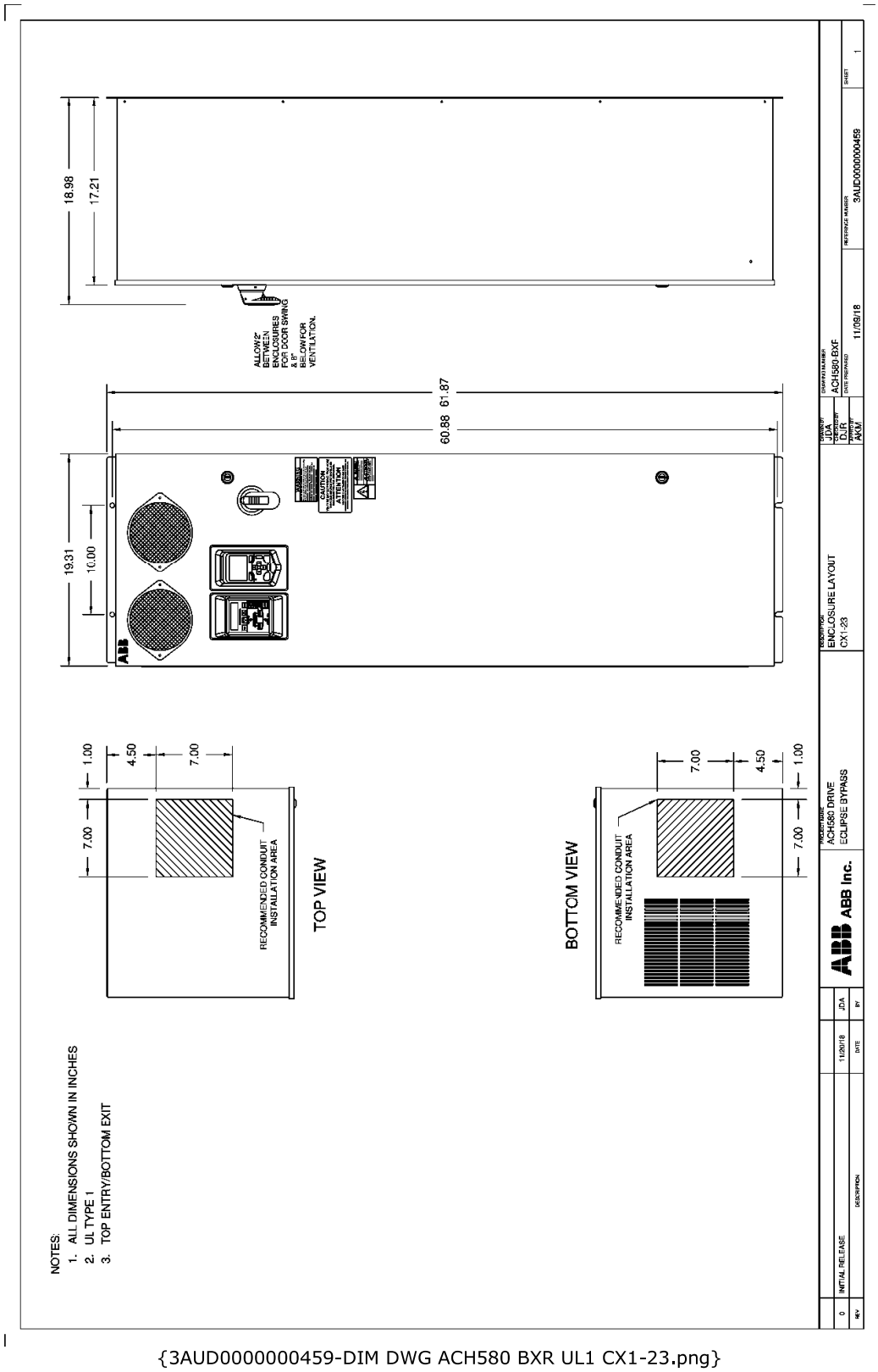
Item	Part Number	Customer Designation
1	ACH580-BCR-059A-2+E211+F267	VFD-CHWP-1,2



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