

TIERRA

January 9, 2024

HDR, Inc.
4830 West Kennedy Blvd., Suite 400
Tampa, FL 33609

Attn: Ms. Jamie Zimmerman, P.E.

**RE: Geotechnical Engineering Services Report
Charlotte County Utilities WBS No. 4
New Generator Equipment Facility
Charlotte County, Florida
Tierra Project No.: 6511-22-336**

Ms. Zimmerman:

Tierra, Inc. has completed a geotechnical engineering study for the above referenced project site. The results of the study are provided herein.

The purpose of this report is to present the findings of our geotechnical exploration and to present geotechnical recommendations and considerations to support the design and construction for the proposed foundation for the new generator equipment facility structure.

Should there be any questions regarding this report, please do not hesitate to contact our office at (813) 989-1354. Tierra would be pleased to continue providing geotechnical services throughout the implementation of the project. We look forward to working with you and your organization on this and future projects.

Respectfully Submitted,

TIERRA, INC.



Sarah E. Strackbein, E.I.
Geotechnical Engineering Intern



Joseph R. Antinori, P.E.
Senior Geotechnical Engineer
Florida License No. 73176

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1.0 PROJECT DESCRIPTION

1.1 Project Information

The project consists of designing and constructing a new generator equipment facility structure at the Charlotte County Utilities Pump Station Water Booster Pump Station (WBS) No. 4 located at 17180 Walenda Avenue in Charlotte County, Florida.

Based on preliminary structural details provided by HDR, Inc., the foundation will consist of a 10-foot wide, 25-foot long and 1.5-foot-thick mat foundation. The weight of the generator will be approximately 16,000 pounds and the self-weight of the mat foundation will be approximately 56,250 pounds. Tierra should be provided with an opportunity to review final plans and loading conditions and amend the recommendations herein, if necessary.

1.2 Scope of Services

The objective of our study was to obtain information concerning subsurface conditions at the project site to base geotechnical engineering recommendations and considerations. The following services were provided:

1. Reviewed soil information from the "Soil Survey of Charlotte County, Florida" published by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). Reviewed topographic information obtained from the appropriate Quadrangle Map published by the United States Geological Survey (USGS). Reviewed as-built data for other structures and buried utilities at the site as made available by the County.
2. Conducted a visual reconnaissance of the project site, developed a soil boring location plan, staked/located the boring in the field and completed utility locate requests via Sunshine State One Call.
3. Coordinated with HDR or other designated utility locating contractor and/or representatives of Charlotte County Utilities to identify a safe soil boring location with respect to buried utilities.
4. Performed subsurface sampling and field-testing consisting of one (1) Standard Penetration Test (SPT) Boring to a depth of approximately 40 feet. Sampling was completed on 2-foot intervals to a depth of 10 feet and on 5-foot intervals thereafter. The location of the SPT boring was determined based on coordination with HDR, Inc.
5. Visually classified and stratified the soil samples in the laboratory using the American Association of State Highway and Transportation Officials (AASHTO).
6. Recorded the groundwater level at the SPT boring location.

7. Evaluated the feasibility of utilizing a shallow foundation for support of the proposed structure.
8. Generated design parameters required for the anticipated foundations including allowable bearing pressures, foundation levels and soil compaction recommendations.
9. Prepared this geotechnical report that summarizes the course of study pursued, the field and laboratory data generated, subsurface conditions encountered and our geotechnical recommendations.

The scope of our services did not include an environmental assessment for determining the presence or absence of wetlands or hazardous or toxic materials in the soil, bedrock, groundwater, or air, on or below or around this site. The Scope of Services did not include determination of potential sinkhole activity. Any statements in this report or on the boring logs regarding odors, colors, unusual or suspicious items or conditions are strictly for the information of our client.

2.0 REVIEW OF PUBLISHED DATA

2.1 USGS Quadrangle Map

Based on the “Murdock SE, Florida” United States Geological Survey (USGS) Quadrangle Map, the natural ground elevation at the project site is at approximately +10 feet National Geodetic Vertical Datum of 1929 (NGVD 29).

2.2 USDA Soil Survey

Soil data published by the USDA Soil Survey of Charlotte County, Florida was reviewed as part of the subsurface investigation. This information indicates that there are two (2) primary soil mapping units within the vicinity of the project site. The following paragraphs and table provide a brief description of the soil units as presented in the Soil Survey.

Copeland fine sandy loam, ponded-Urban land complex, 0 to 1 percent slopes (Map Unit 105) – The Copeland component makes up 48 percent of the map unit. Slopes are 0 to 1 percent. This component is on depressions on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits over limestone. The depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is moderate. This soil is not flooded; however, it is frequently ponded. The seasonal zone of water saturation is at 0 inches during July, August, September, and October. Organic matter content in the surface horizon is about 5 percent.

Felda fine sand-Urban land complex, 0 to 2 percent slopes (Map Unit 110) – The Felda component makes up 45 percent of the map unit. Slopes are 0 to 2 percent. This component is on flatwoods on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. The depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. The seasonal zone of water saturation is at 6 inches during July, August, September, and October. Organic matter content in the surface horizon is about 3 percent.

The Urban Land component of these soil types consists of areas where most of the soil surface is covered with impervious materials, such as buildings and paved areas. This land type consists of areas where the original soil has been modified through cutting, grading, filling, and shaping or has been altered for urban development.

SUMMARY OF USDA SOIL SURVEY							
Charlotte County, Florida							
USDA Map Symbol and Soil Name	Soil Classification				pH	Seasonal High Water Table	
	Depth (in)	USCS	AASHTO	Permeability (in/hr)		Depth (feet)	Months
(105) Copeland - Urban Land	0-8	CL, SM	A-2-4, A-2-6, A-4	0.6 - 6.0	6.1-7.3	+2.0-0.0	Jan, Feb, Jun-Dec
	8-20	CL, SC, SM	A-2-4, A-4, A-6	0.6 - 6.0	6.1-7.8		
	20-28	CL, SC	A-4, A-7-6	0.1 - 0.2	7.4-8.4		
	>28-38	WEATHERED LIMESTONE ⁽¹⁾		2.0 - 20.0	—		
	No information provided for Urban Land ⁽¹⁾						
(110) Felda - Urban Land	0-4	SP-SM, SM	A-2-4, A-3	6.0 - 20.0	5.1-7.8	0.3-1.5	Jul-Oct
	4-35	SP-SM, SM	A-2-4, A-3	6.0 - 20.0	5.1-7.8		
	35-43	CL, SC	A-2-4, A-6, A-7-6	0.6 - 6.0	6.1-7.8		
	43-80	SP-SM, SM	A-2-4, A-3	6.0 - 20.0	6.1-8.4		
	No information provided for Urban Land ⁽¹⁾						
⁽¹⁾ USDA does not provide information for Urban Land or weathered limestone.							

It should be noted that information contained in the USDA/NRCS Soil Survey may not be reflective of current subsurface conditions, particularly if recent development in the project vicinity has modified existing soils or surface/subsurface drainage.

3.0 SUBSURFACE CONDITIONS

3.1 General

The subsurface conditions at the site were explored with one (1) Standard Penetration Test (SPT) boring performed to a depth of approximately 40 feet below existing grades. The boring was located in the field by a representative of Tierra using our hand-held Global Positioning System (GPS) devices. If a more accurate determination of the boring location and elevation is required, then Tierra recommends the boring location be located by the project surveyor. The approximate boring location is presented on the **Boring Location Plan** in the **Appendix**.

The SPT boring was performed with the use of a drill rig using bentonite mud drilling procedures utilizing an automatic hammer. The soil sampling was performed in general accordance with American Society for Testing and Materials (ASTM) Test Designation D-1586 using a drill rig and mud drilling procedures. The upper 6 feet of the SPT boring was performed using a hand auger to verify utility clearances. SPT resistance N-values were then taken on 2-foot intervals to a depth of approximately 10 feet and at intervals of 5 feet thereafter. The soil strata encountered in the boring performed are summarized in the following table:

Stratum Number	Soil Description	USCS Symbol
1	Gray to Brown Sand to Sand with Silt	A-3
2	Gray Silty Sand with Shell Fragments	A-2-4

The subsurface soil stratification of the boring samples is of a generalized nature and is intended to highlight the significant features and material characteristics. The stratifications shown on the boring profile represent the conditions only at the actual boring location. The stratifications also represent the approximate boundary between subsurface materials and the actual transition may be gradual. The profile includes soil descriptions, stratifications and penetration resistances when applicable. Variations should be expected throughout the site. The specific information at the individual boring location is presented on the **Soil Profile** in the **Appendix**.

3.2 Groundwater

The groundwater table was measured at the SPT boring location at a depth of approximately 6 feet. The depth to the encountered groundwater table is shown adjacent to the soil profile on the **Soil Profile** sheet in the **Appendix**.

Groundwater conditions will vary with environmental variations and seasonal conditions, such as the frequency and magnitude of rainfall patterns, as well as man-made influences (i.e., existing swales, drainage drainages, underdrains and areas of covered soils, such as paved parking lots).

4.0 EVALUATIONS AND RECOMMENDATIONS

4.1 General

It is our understanding that the new generator facility structure will be utilizing a shallow mat foundation. The soils encountered appear suitable for support of the proposed structure on a shallow foundation when prepared in accordance with the recommendations herein. All earthwork activities including the site preparation, clearing and grubbing, removal and utilization/placement of soils, compaction of subgrade soils and selection of fill materials should be accomplished in accordance with the project plans and FDOT Specifications for Road and Bridge Construction (SSRBC).

4.2 Soil Suitability

The suitability of soil for reuse in construction should be evaluated against the project fill requirements. It is recommended that the FDOT SSRBC be consulted to determine the specific use/suitability of the soil types. Imported fill should consist of material considered "Select" in accordance with FDOT Standard Plans Index 120-001. Fill should be free of demolition debris, rubble, pavement, organics, clay, debris and other unsuitable material and evaluated against project fill requirements.

In general, the on-site sandy soils A-3 (Stratum 1) encountered within the boring are considered Select in accordance with Standard Plans Index 120-001 and may be moved and used for grading purposes, site leveling, and fill, provided the material is free of organics, clay, debris or any other material deemed unsuitable for construction.

A qualified inspector should be onsite to observe excavations to identify if the bearing soil is suitable in accordance with the recommendations in this report. Unsuitable soil encountered during footing construction will need to be removed and replaced with suitable backfill.

4.3 Foundation Recommendations

Based on preliminary structural details provided by HDR, Inc., the foundation will consist of a 10-foot wide, 25-foot long and 1.5-foot-thick mat foundation. The weight of the generator will be approximately 16,000 pounds and the self-weight of the mat foundation will be approximately 56,250 pounds.

The design of shallow foundations is governed by the soil bearing capacity and settlement criteria (total and differential). The surficial soils at the project site will require soil improvement consisting of subsurface compaction to achieve an adequate bearing resistance and minimize the potential for differential settlements. According to LRD methodology, the Nominal Bearing Resistance (NBR) for shallow foundations must satisfy the following requirement:

$$NBR > \frac{(Factored\ Design\ Load)}{\phi}$$

It is recommended that a Resistance Factor (ϕ) of 0.45 be used based AASHTO Table 10.5.5.2.2-1 (Resistance Factors for Geotechnical Resistance of Shallow Foundations at the Strength Limit State, assuming theoretical method in sand, SPT).

A Nominal Bearing Resistance of 5,000 psf may be used for design. When compacted in accordance with the recommendations in this report, the soils encountered will provide a suitable bearing resistance for the applied loads on a shallow mat foundation. A modulus of Subgrade Reaction (k) value of 90 pci can be used for mat foundation design.

Nominal Uplift Loads were not available for preparation of this report. The footings should also be sized to resist uplift loads, if applicable.

4.4 Settlement

The applied pressure using service loads and foundation dimensions provided by HDR, Inc. is estimated to be approximately 300 psf. The settlement of the foundation after proper site preparation consisting of compacting backfill and in-situ subsurface materials should occur rapidly after loading. Thus, the expected settlement should occur during construction as deadloads are imposed. Provided the site preparation operations are performed in accordance with Charlotte County guidelines and FDOT Specifications, the total settlement of the foundation should not exceed approximately ½ inch with maximum long-term differential settlement on the order of ¼ inch. The structural engineer should verify if the estimated settlements are within tolerance of the proposed structure.

5.0 CONSTRUCTION CONSIDERATIONS

5.1 Protection of Existing Structure

Structures and buried utilities are located within close proximity of the proposed improvements and construction activities. Tierra recommends addressing the protection of existing structures within the plans by stating that it is the responsibility of the Contractor to take necessary precautions to protect existing structures and utilities and that it is the Contractor's responsibility to repair any damage to adjacent structures/utilities caused by construction activities at no additional cost to Charlotte County. Pre- and post-condition surveys of existing structures/utilities can be included in the plans as an additional measure.

5.2 Site Preparation

It is our understanding that abandoned and/or existing subsurface utilities scheduled for removal and or relocation are in close proximity to the proposed mat foundation. Prior to construction, the location of any existing underground utilities within the construction area should be established. Provisions should then be made to relocate any interfering utility lines within the construction area to appropriate locations and backfilling the resulting excavations with compacted structural fill. In this regard, it should be noted that if abandoned underground pipes are not properly removed or plugged, they might serve as conduits for subsurface erosion, which subsequently may result in excessive settlement.

Clearing operations should be completed in accordance with Section 110 of the FDOT SSRBC. Plow the surface to a depth of at least 6-inches and remove all roots and/or debris thereby exposed to a depth of at least 12 inches. The clearing operations should extend at least 5 feet beyond the proposed footing, where practical. Deleterious materials to be removed include existing surface vegetation or other buried or surface debris. Material suitable for re-use may be stockpiled; however, any material stockpiled for re-use shall be tested for conformance to material specifications as indicated in the following sections of this report.

A qualified inspector should be retained to provide on-site observation of earthwork and to verify that foundation construction activities are performed in accordance with the plans and recommendations herein.

5.3 Excavations and Side Slope Considerations

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom in accordance with OSHA 29 CFR, Part 1926, Subpart P as well as the "Trench Safety Act" in Chapter 90-96 of the Florida Statutes. The contractors "responsible persons", as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures.

We are providing this information solely as a service to our client. Tierra does not assume responsibility for construction site safety or the contractor's or other party's compliance with current local, state, and federal safety or other regulations.

6.0 REPORT LIMITATIONS

The analyses, conclusions and considerations contained in this report are professional opinions based on the site conditions and project layout described herein and further assume that the conditions observed in the exploratory boring are representative of the subsurface conditions throughout the site, i.e., the subsurface conditions elsewhere on the site are the same as those disclosed by the boring. If, during construction, subsurface conditions different from those encountered in the exploratory boring are observed or appear to be present, Tierra should be advised at once so that we can review these conditions and reconsider our recommendations where necessary.

This report was prepared for the exclusive use of HDR Inc and their client for evaluating the design of the project as it relates to the geotechnical aspects discussed herein. It should be made available to prospective contractors for information on factual data only and not as a warranty of subsurface conditions included in this report. Unanticipated soil conditions may require that additional expense be made to attain a properly constructed project. Therefore, some contingency fund is recommended to accommodate such potential extra costs.

APPENDIX

Report of Core Boring Sheet

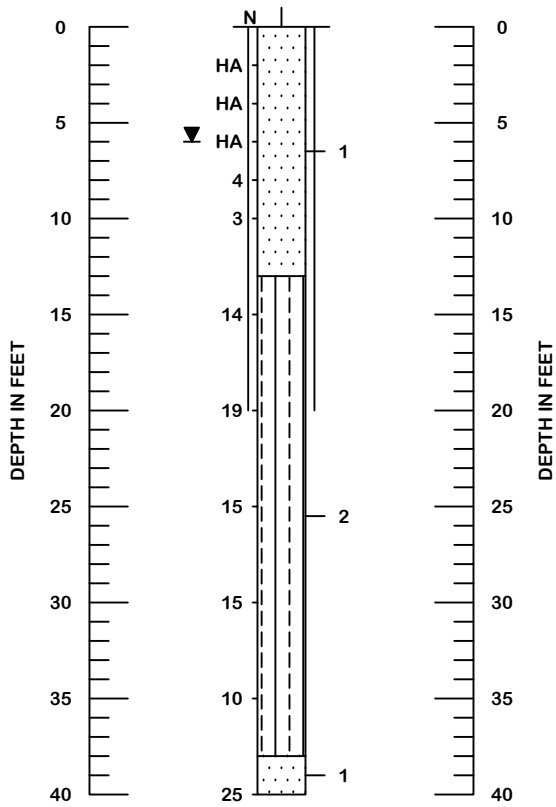
FoSSA Settlement Analysis

BORING LOCATION PLAN



SOIL PROFILES

BOR # B-1
EASTING 601813
NORTHING 973519
DATE 12/15/2023
DRILLER A. JACKSON
HAMMER AUTOMATIC
RIG D-25



LEGEND

- 1 GRAY TO BROWN SAND TO SAND WITH SILT (A-3)
- 2 GRAY SILTY SAND WITH SHELL FRAGMENTS (A-2-4)
- APPROXIMATE LOCATION OF SPT BORING
- GROUNDWATER LEVEL ENCOUNTERED DURING INVESTIGATION
- ESTIMATED SEASONAL HIGH GROUNDWATER TABLE
- N SPT N-VALUE IN BLOWS/FOOT FOR 12 INCHES OF PENETRATION (UNLESS OTHERWISE NOTED)
- SP UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2488) GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW AND LABORATORY TESTING ON SELECTED SAMPLES FOR CONFIRMATION OF VISUAL REVIEW
- HA HAND AUGERED TO VERIFY UTILITY CLEARANCES

EASTING EASTING COORDINATE REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, FLORIDA WEST ZONE, N.A.D. 83 DETERMINED USING HAND-HELD GARMIN ETREX GPS EQUIPMENT WITH A REPORTED ACCURACY OF +/- 10 FEET

NORTHING NORTHING COORDINATE REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, FLORIDA WEST ZONE, N.A.D. 83 DETERMINED USING HAND-HELD GARMIN ETREX GPS EQUIPMENT WITH A REPORTED ACCURACY OF +/- 10 FEET

AUTOMATIC HAMMER	
GRANULAR MATERIALS- RELATIVE DENSITY	SPT (BLOWS/FT.)
VERY LOOSE	LESS THAN 3
LOOSE	3 TO 8
MEDIUM	8 TO 24
DENSE	24 TO 40
VERY DENSE	GREATER THAN 40
SILTS AND CLAYS CONSISTENCY	SPT (BLOWS/FT.)
VERY SOFT	LESS THAN 1
SOFT	1 TO 3
FIRM	3 TO 6
STIFF	6 TO 12
VERY STIFF	12 TO 24
HARD	GREATER THAN 24

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*Note: Final Z is calculated assuming only 'Immediate Settlement' exists.

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License number FoSSA-200434

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**PANTROPIC
POWER**

CAT

SHOP DRAWING SUBMITTAL

**ONE (1) NEW CATERPILLAR MODEL C27, 800 KW GENERATOR SET
AND ACCESSORY EQUIPMENT**

PROJECT

Walenda Booster Station WBS#4



Image shown may not reflect actual configuration

TABLE OF CONTENT

1. BILL OF MATERIALS
2. GENERATOR SET
 - A. CATERPILLAR GENRATOR SET SPECIFICATION SHEET
 - B. GENERATOR SET PACKAGE PERFORMANCE DATA
 - C. SYSTEM DATA
 - D. GENERATOR TEST SPECIFICATION
 - E. ADEM™ A4 ENGINE CONTROLLER
 - F. RADIATOR PERFORMANCE DATA
 - G. GENERATOR SET PACKAGE DATA
3. GENERATOR SET, ENCLOSURE/TANK, MECHANICAL DRAWINGS
 - A. GENERATOR SET (ONLY) MECHANICAL DRAWINGS
 - B. ENCLOSURE AND TANK MECHANICAL DRAWINGS
4. GENERATOR
 - A. CATERPILLAR SR5 GENERATOR SPECIFICATION SHEET
 - B. GENERATOR DATA
 - C. SR5 GENERATOR THERMAL DAMAGE CURVE
 - D. INTEGRATED VOLTAGE REGULATOR
 - E. SPACE HEATER
 - F. CIRCUIT BREAKER, 1200AMP
5. ELECTRONIC MODULAR CONTROL PANEL 4.2B
 - A. ELECTRONIC MODULAR CONTROL PANEL SPECIFICATION SHEET
 - B. ELECTRICAL INTERCONNECT DRAWINGS
 - C. REMOTE ANNUNCIATOR
6. ENGINE ACCESSORIES
 - A. BATTERY CHARGER, 10AMPS
 - B. CAT BATTERIES
7. LINEAR SPRING TYPE VIBRATION ISOLATORS
8. REMOTE BREAKGLASS STATION
9. AUTOMATIC TRANSFER SWITCH, 1200AMP
10. PANTROPIC POWER, INC
 - A. SYSTEM SERVICE CONTRACT
 - B. PANTROPIC PARTS & SERVICE FACILITIES
 - C. START-UP CHECKLIST
11. CATERPILLAR TWO (2) YEAR WARRANTY

BILL OF MATERIALS

One (1) New Caterpillar Model C-27 **Diesel** Engine Generator set, UL 2200 Listed, rated @ 800kW / 1000 kVA Standby, 277/480VAC, 3 Phase, 60 Hz., 1800 rpm **Diesel** Engine Generator Set with the following accessories:

- UL-2200 Listed – UL Standard of Safety for stationary engine generator assemblies of 600 Volts or less

Requirements

- Generator with a temp rise of 125 C or less.
 - UL listed voltage regulator.
 - EMCP4.2B control panel.
 - Neutral ground connection
- EPA Tier II Emission compliant unit – meets USA Environmental Protection Agency (EPA) Tier 2 and California Air Resources Board (CARB) Non-Road Emissions Certifications and USA Environmental Protection Agency (EPA) Tier 2 Emissions Certification for stationary use. (per NSPS rule)
- EPA Tier II Emission compliant unit

AIR INLET

- Air cleaner, single element canister type with service indicator
- Combustion air inlet flow rate = 2,216.4 cfm

AUTO-START CONTROL PANEL (unit mounted)

EMCP 4.2B controls including:

- Run / Auto / Stop Control
- Speed and voltage adjust
- Engine Cycle crank
- Emergency stop pushbutton

EMCP 4.2B Controller features:

- 24-volt DC operation
- Environmental sealed front face
- Text alarm / event description.

Digital indication for:

- RPM
- DC volts
- Operating hours
- Oil pressure (psi, kPa or bar)
- Coolant temperature
- Volts (L-L & L-N), frequency (Hz)
- Amps (per phase & average)
- Power Factor (per phase and average)
- kW (per phase, average and percent)
- kVA (per phase, average and percent)
- kVA_r (per phase, average and percent)
- kW-hr and kVA_r –hr (total)

Warning / shutdown with common LED indication of shutdowns for:

- Low Oil pressure
- High coolant temperature
- Over-speed
- Emergency stop
- Failure to start (over-crank)
- Low coolant temperature
- Low coolant level
- Ground Fault "Indication Only"

Programmable protective relaying functions:

- Generator phase sequence
- Over / under voltage (27/59)
- Over / under frequency (81)
- Reverse power (kW) (32)
- Reverse reactive power (kVAr) (32RV)
- Over-current (50 / 51)

Communications:

- Six digital inputs
- Four relay outputs (form A)
- Two relay outputs (form C)
- Generator run relay
- Common alarm relay
- Two digital outputs
- Customer data link (Modbus RTU)
- Accessory module data link
- Serial annunciator module data link

ENGINE

- Caterpillar model C-27, V-12 cylinder, 4-stroke-cycle water-cooled
- Cylinder bore diameter = 5.4 inches
- Piston stroke = 6.0 inches
- Compression ratio = 16.5:1
- Total cylinder displacement = 1649.47 cubic inches
- Aspiration = TA
- Fuel system = MEUI
- Governor type = ADEM A4 control system
- Fuel consumption:
 - Full load = 57.3 gallons per hour
 - Three – quarters load = 45.4 gallons per hour
 - Half load = 32.3 gallons per hour
 - One – quarter load = 19.5 gallons per hour

PERMANENT MAGNET EXCITED GENERATOR SYSTEM

- Type SR5
- Frame = 1268
- Generator arrangement = 3850624
- Class H insulation
- 125C-degree temperature rise over 40C-degree
- Random wound
- Generator Rating (kW) = 800.0
- Generator Rating (kVA) = 1000.0
- Line voltage = 480

- Phase voltage = 277
- Rated current = 1202.8 amperes
- Power factor = 0.8
- Four (4) pole
- 3 phase
- Sync Speed = 1,800 RPM
- Single bearing
- Twelve (12) leads
- Two (2) wires be lead
- **Coil pitch = 0.6667-** (to match existing generator set)
- Voltage regulator
- Low voltage extension box (used for customer low voltage power and engine control wiring entrance for ease of terminating)
- Segregated low voltage (AC/DC) wiring panel
- Anti-condensation space heaters 208 - 240 VAC, 600 watts
- Circuit Breaker, 1200Amps, LSI-P, UL 3 pole, Thermal Magnetic Circuit Breaker with 24VDC shunt trip and auxiliary contacts. The generator is set up for bottom conduit entry into generator housing.

STARTING SYSTEM / CHARGING SYSTEM

- Battery cables
- Heavy Duty lead acid engine starting batteries
- Includes 1400 CCA, 200 ampere hour rated batteries, rack and cables.
- Battery disconnect switch
- 24VDC electric starting motor
- Battery charger (shipped loose); 24VDC, 10 Amp Output. 120 VAC, 1 Phase Input, wall mountable
- 45amp battery charging alternator
- Jacket Water Heater, 240 – 208 VAC input, 1 phase, 9kw

ENGINE COOLING SYSTEM

- Coolant drain line with valve terminated at edge of base
- Ambient radiator cooling capabilities of 50-degree C or 122 degrees Fahrenheit
- Radiator air flow (CFM) = 42,377 CFM
- Air flow restriction (system) = 0.48 inches in water
- Engine coolant capacity = 14.5 gallons
- Radiator coolant capacity = 10.0 gallons
- Total coolant capacity = 24.5 gallons
- Heat rejection to coolant (total) = 18,785 Btu/min
- Heat rejection to after-cooler = 9,235 Btu/min
- Heat rejection from engine = 6,240 Btu/min
- Low water level switch mounted on radiator for shutdown of engine
- Radiator duct flange
- Fan and belt guards
- Caterpillar Extended life coolant
- Coolant level sensor

EXHAUST SYSTEM

- Dry exhaust manifold
- Flanged faced outlets
- Exhaust stack gas temperature = 952.5 degrees F
- Exhaust gas flow rate = 6,011.7 CFM

- Exhaust flange size (internal diameter) = 8 inches
- Exhaust system back-pressure (maximum allowable) = 27.0 inches of water
- Heat rejection to exhaust (total) = 45,257 Btu/min

FUEL SYSTEM

- Primary fuel filter with integral water separator (installed on engine)
- Secondary fuel filters
- Fuel cooler
- Flexible fuel lines - installed
- Electric fuel priming pump

LUBE SYSTEM

- Lubricating oil.
- Standard Volume Oil Pan
- Gear type lube oil pump.
- Integral lube oil cooler.
- Oil filter, filler and dipstick.
- Oil drain lines and valve.
- Fumes disposal - open crankcase ventilation routed to front of package

MOUNTING SYSTEM

- Structural steel tube
- Anti – vibration mounts

GENERAL

- Paint – Caterpillar “Yellow” with high gloss black rails and radiator
- Right – hand service
- Damper guard
- Flywheel and flywheel housing SAE No. 00
- SAE standard rotation

AUTOMATIC TRANSFER SWITCH – (shipped loose installed and wired by others)

Catalog Number: H3ADTSA31200NGXC, 11BE, 18RX,

One (1) Asco 300 Series, Automatic **Delayed Transition Transfer Switch**, 400AMP, 3 phases, 4 wires, **3 poles**, 277/480vac, 60Hz, Nema 4X(U)-UL Type 4X - 316 Stainless Steel Secure Enclosure:

- Solid neutral bar
- Optional Accessories: 11BE, 18RX
- Option 11BE – Adds the following features to the Group G controller: (1) Serial RS-485 Modbus Communications (2) Multi-Schedule Engine Exerciser (3) a 300 Entry Event Log and (4) a common alarm output function. When applied on 3-phase systems it also enables: (1) 3-Phase Emergency Source VLL sensing (2) Phase Rotation Monitoring (3) Emergency Source VLL Unbalance Monitoring
- Strip heater w/ thermostat, wired to load terminals: 208-600 volts.

WEATHER RESISTANT, LEVEL 4 SOUND ATTENUATED, ALUMINUM ENCLOSURE:

- Approximate dimensions: 384” L x 102” W x 120” H (estimated weight: 7,500lbs)
- Enclosure Exterior to be of .080”, 3003-H14 Aluminum, Formed, Panel Construction, Pre-Painted Finish (Standard Color White)
- Air Intake: Sound Attenuated Intake Hood with Sound Baffles and Bird Screen. Insulated with 3” Sound Attenuating Fire Blanket Retained with .050” Perforated Aluminum.

- Air Discharge: Sound Attenuated Discharge Hood with Gravity Dampers and Bird Screen. Insulated with 3" Sound Attenuating Fire Blanket Retained with .032" Mill Finished Aluminum.
- 3" Sound Attenuating Fire Blanket in the Walls and Ceilings. Insulation Retained with .050" Perforated Aluminum. Enclosure is Designed to Reduce Source SPL by 30 dB (A) @ 7M in a Free-Field Environment.
- (4) 36" Single, Access Doors with Padlocking Provisions and Corrosion Resistant Hardware.
- Silencer Supports for *Coastline Furnished* Interior Mounted, Internally Insulated, Critical Grade Silencer.
- Install Coastline Provided Exhaust Discharge Elbow and Rain Cap.
- Install Coastline Provided Exhaust Flex Connectors, Exhaust Gaskets and Bolt Kits.
- Rain Collar and Rain Shield at Exhaust Penetration in Roof.
- Extend Oil and Coolant Drains to Exterior of Enclosure.
- Extend Crank Case Disposal to Radiator Discharge (if applicable)
- Cambered Roof Design to aid in Water Shedding.
- Enclosure Suitable for 170 MPH Wind Loading
- Enclosure to Bear the Insignia of the Florida Department of Business and Professional Regulation to Document Compliance with the 2020 Florida Building Code.

Generator Enclosure Electrical Package:

- Wire Customer Provided and Installed Jacket Water Heaters to Junction Box.
- Wire Customer Provided and Installed Generator Strip Heaters to Junction Box.
- Mount and Wire Customer Provided Battery Charger to Junction Box and DC Output to Batteries.
- All Electrical to be Run in EMT or Flexible Conduit to meet NFPA 70.

4,800-GALLON CPS "ENVIROSHIELD ECONOMY" ®, UL 142, FDEP BASE FUEL TANK (EQ# 533):

- Capacity based on 72 hours @ 57.3gph (100% Load) 4,130 Useable Gallons
- 10ga Mild Steel Primary Tank, 7ga Mild Steel Secondary Tank
- Mechanical Fuel Level Gauge (Kruger Model H EQ#730)
- Supply and Return Connections
- 2" Fill with Lockable Cap with FDEP Spill Containment with Overfill Prevention Valve (Morrison 9095AA-0200AV EQ#851)
- Normal and Emergency Vent Fittings Installed Per UL-142
- Interstitial Space with FDEP Approved Leak Detection Switch (Madison M-7000 EQ#682) Wired to Generator Control Panel (final termination to terminal strip to be done by installing technician)
- Low Level Fuel Alarm Switch (Madison M-7000 EQ#682) Set @ 35% Remaining Capacity Wired to Generator Control Panel (final termination to terminal strip to be done by installing technician)
- High Level Fuel Alarm Switch (Madison M-7000 EQ#682) Set @ 90% Tank Capacity Wired to Generator Control Panel (final termination to terminal strip to be done by installing technician)
- Cable Stub Up Opening Under Circuit Breaker
- Generator Mounting Beams
- 2 Lifting Points per Side (4 Total) for Lifting Generator Set, Enclosure and Tank (Empty)
- Tank Primed with Two Part Epoxy Zinc Based Primer and Two-Part Polyester/Polyurethane Topcoat -Gloss Black.

OSHA COMPLIANT STAIRS AND WALKWAYS: (*) Shipped Loose, Installed by Others

- (2) Set of OSHA Compliant Stairs with Railings and 120" Long x 42" Wide Walkway with Railings
- Railings to be Constructed of 1 ½" Aluminum Tube.
- Steps and Walkways Constructed of Extruded Aluminum
- Leveling Pads

ADDITIONAL ITEMS:

- One (1) Nema 3R remote break-glass station (shipped loose)
- Spring type vibration isolators (to be placed between generator and tank)
- Two (2) O&M Manuals

START UP AND TRAINING

- Start-Up of generator set by a factory trained technician (two (2) days of labor included during normal business hours of 8:00am to 5:00pm)
- Resistive load – bank test on-site after start-up of unit is completed four (4) hour test at 100% load using utilizing a resistive load bank. (during normal business hours of 8:00am to 5:00pm)
- One (1) day of instructional training on the generator set and transfer switch (during normal business hours of 8:00am to 5:00pm)

GENERATOR SET WARRANTY

- Two (2) Year Caterpillar Standard Warranty

End of Bill of Materials

Cat® C27

Diesel Generator Sets



Image shown may not reflect actual configuration

Bore – mm (in)	137.2 (5.4)
Stroke – mm (in)	152.4 (6.0)
Displacement – L (in ³)	27.03 (1649.47)
Compression Ratio	16.5:1
Aspiration	TA
Fuel System	MEUI
Governor Type	ADEM™ A4

Standby 60 Hz ekW (kVA)	Prime 60 Hz ekW (kVA)	Standby 60 Hz ekW (kVA)	Prime 60 Hz ekW (kVA)	Emissions Performance
750 (937)	680 (850)	800 (1000)	725 (906)	U.S. EPA Emergency Stationary Use Only (Tier 2)

Standard Features

Cat® Diesel Engine

- Meets U.S. EPA Emergency Stationary Use Only (Tier 2) emission standards
- Reliable performance proven in thousands of applications worldwide

Generator Set Package

- Accepts 100% block load in one step and meets NFPA 110 loading requirements
- Conforms to ISO 8528-5 G3 load acceptance requirements
- Reliability verified through torsional vibration, fuel consumption, oil consumption, transient performance, and endurance testing

Alternators

- Superior motor starting capability minimizes need for oversizing generator
- Designed to match performance and output characteristics of Cat diesel engines

Cooling System

- Cooling systems available to operate in ambient temperatures up to 50°C (122°F)
- Tested to ensure proper generator set cooling

EMCP 4 Control Panels

- User-friendly interface and navigation
- Scalable system to meet a wide range of installation requirements
- Expansion modules and site specific programming for specific customer requirements

Warranty

- 24 months/1000-hour warranty for standby and mission critical ratings
- 12 months/unlimited hour warranty for prime and continuous ratings
- Extended service protection is available to provide extended coverage options

Worldwide Product Support

- Cat dealers have over 1,800 dealer branch stores operating in 200 countries
- Your local Cat dealer provides extensive post-sale support, including maintenance and repair agreements

Financing

- Caterpillar offers an array of financial products to help you succeed through financial service excellence
- Options include loans, finance lease, operating lease, working capital, and revolving line of credit
- Contact your local Cat dealer for availability in your region

Optional Equipment

Engine

Air Cleaner

- ☒ Single element
- ☐ Dual element
- ☐ Heavy duty

Muffler

- ☐ Residential grade (25 dB)

Starting

- ☒ Standard batteries
- ☐ Oversized batteries
- ☐ Standard electric starter(s)
- ☒ Jacket water

Alternator

Output voltage

- ☐ 208V
- ☐ 240V
- ☒ 480V
- ☐ 600V

Temperature Rise (over 40°C ambient)

- ☐ 150°C
- ☒ 125°C
- ☐ 105°C
- ☐ 80°C

Winding type

- ☒ Random wound

Excitation

- ☐ Internal excitation (IE)

Attachments

- ☒ Anti-condensation heater
- ☐ Stator and bearing temperature monitoring and protection

Power Termination

Type

- ☐ Bus bar
- ☒ Circuit breaker
 - ☐ 400A ☐ 800A
 - ☒ 1200A ☐ 1600A
 - ☐ 2000A ☐ 2500A
 - ☐ 3000A
- ☒ UL ☐ IEC
- ☒ 3-pole ☐ 4-pole
- ☐ Manually operated
- ☒ Electrically operated

Trip Unit

- ☒ LSI-P ☐ LSI-G
- ☐ LSIG-P

Factory Enclosure

- ☐ Sound attenuated

Attachments

- ☐ Cold weather bundle
- ☐ DC lighting package
- ☐ Motorized louvers

Fuel Tank

- ☐ 1000 gal (3785 L)
- ☐ 2000 gal (7571 L)
- ☐ 3600 gal (13627 L)

Control System

Controller

- ☒ EMCP 4.2B
- ☐ EMCP 4.3
- ☐ EMCP 4.4

Attachments

- ☒ Local annunciator module
- ☒ Remote annunciator module
- ☐ Expansion I/O module
- ☐ Remote monitoring software

Charging

- ☒ Battery charger – 10A
- ☐ Battery charger – 20A
- ☐ Battery charger – 30A

Vibration Isolators

- ☐ Rubber
- ☒ Spring
- ☐ Seismic rated

Cat Connect

Connectivity

- ☒ Ethernet
- ☐ Cellular
- ☐ Satellite

Extended Service Options

Terms

- ☐ 2 year (prime)
- ☐ 3 year
- ☒ 5 year
- ☐ 10 year

Coverage

- ☐ Silver
- ☐ Gold
- ☒ Platinum
- ☐ Platinum Plus

Ancillary Equipment

- ☐ Automatic transfer switch (ATS)
- ☐ Uninterruptible power supply (UPS)
- ☐ Paralleling switchgear
- ☐ Paralleling controls

Certifications

- ☒ UL 2200 Listed
- ☐ CSA
- ☐ IBC seismic certification
- ☐ OSHPD pre-approval

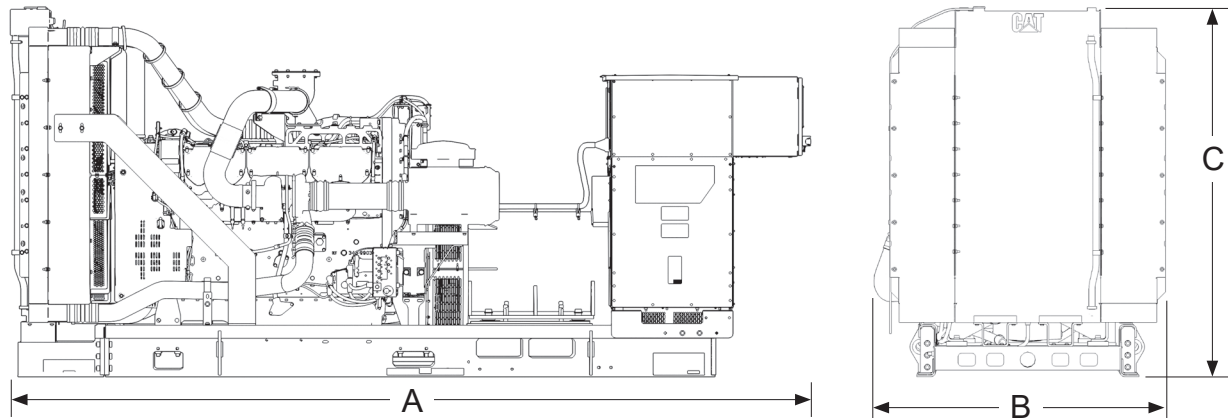
Note: Some options may not be available on all models. Certifications may not be available with all model configurations. Consult factory for availability.

Package Performance

Performance			Standby		Prime	
Frequency	60 Hz		60 Hz		60 Hz	
Gen set power rating with fan	750 ekW		680 ekW		800 ekW	
Gen set power rating with fan @ 0.8 power factor	937 kVA		850 kVA		1000 kVA	
Emissions	EPA ESE (Tier 2)		EPA ESE (Tier 2)		EPA ESE (Tier 2)	
Performance number	DM9071-03		DM9073-02		DM7696-02	
Fuel Consumption						
100% load with fan – L/hr (gal/hr)	202.9	(53.6)	187.4	(49.5)	216.9	(57.3)
75% load with fan – L/hr (gal/hr)	162.4	(42.9)	149.6	(39.5)	171.7	(45.4)
50% load with fan – L/hr (gal/hr)	116.2	(30.7)	107.0	(28.3)	122.3	(32.3)
25% load with fan – L/hr (gal/hr)	70.6	(18.7)	66.0	(17.4)	73.9	(19.5)
Cooling System						
Radiator air flow restriction (system) – kPa (in. water)	0.12	(0.48)	0.12	(0.48)	0.12	(0.48)
Radiator air flow – m³/min (cfm)	1200	(42377)	1200	(42377)	1200	(42377)
Engine coolant capacity – L (gal)	55.0	(14.5)	55.0	(14.5)	55.0	(14.5)
Radiator coolant capacity – L (gal)	41.0	(10.0)	41.0	(10.0)	41.0	(10.0)
Total coolant capacity – L (gal)	96.0	(24.5)	96.0	(24.5)	96.0	(24.5)
Inlet Air						
Combustion air inlet flow rate – m³/min (cfm)	58.7	(2073.6)	56.0	(1977.7)	62.8	(2216.4)
Exhaust System						
Exhaust stack gas temperature – °C (°F)	509.3	(948.7)	502.5	(936.5)	511.4	(952.5)
Exhaust gas flow rate – m³/min (cfm)	158.9	(5610.2)	149.7	(5285.5)	170.3	(6011.7)
Exhaust system backpressure (maximum allowable) – kPa (in. water)	6.7	(27.0)	6.7	(27.0)	6.7	(27.0)
Heat Rejection						
Heat rejection to jacket water – kW (Btu/min)	324	(18441)	307	(17433)	330	(18785)
Heat rejection to exhaust (total) – kW (Btu/min)	738	(41994)	693	(39387)	796	(45257)
Heat rejection to aftercooler – kW (Btu/min)	139	(7898)	123	(6970)	162	(9235)
Heat rejection to atmosphere from engine – kW (Btu/min)	110	(6249)	92	(5238)	110	(6240)
Heat rejection from alternator – kW (Btu/min)	53	(3014)	47	(2644)	40	(2292)
Emissions* (Nominal)						
NOx mg/Nm³ (g/hp-h)	2637.1	(5.25)	2330.9	(4.68)	2580.0	(5.18)
CO mg/Nm³ (g/hp-h)	123.9	(0.25)	147.4	(0.29)	115.1	(0.23)
HC mg/Nm³ (g/hp-h)	11.2	(0.03)	10.9	(0.02)	12.5	(0.03)
PM mg/Nm³ (g/hp-h)	8.8	(0.02)	8.8	(0.02)	9.7	(0.02)

*mg/Nm³ levels are corrected to 5% O₂. Contact your local Cat dealer for further information.

Weights and Dimensions



Dim "A" mm (in)	Dim "B" mm (in)	Dim "C" mm (in)	Dry Weight kg (lb)
4674 (184.0)	1723 (67.8)	2162 (85.1)	6622 (14,600)

Note: For reference only. Do not use for installation design. Contact your local Cat dealer for precise weights and dimensions.

Ratings Definitions

Standby

Output available with varying load for the duration of the interruption of the normal source power. Average power output is 70% of the standby power rating. Typical operation is 200 hours per year, with maximum expected usage of 500 hours per year.

Prime

Output available with varying load for an unlimited time. Average power output is 70% of the prime power rating. Typical peak demand is 100% of prime rated kW with 10% overload capability for emergency use for a maximum of 1 hour in 12. Overload operation cannot exceed 25 hours per year.

Applicable Codes and Standards

AS 1359, CSA C22.2 No. 100-04, UL 142, UL 489, UL 869, UL 2200, NFPA 37, NFPA 70, NFPA 99, NFPA 110, IBC, IEC 60034-1, ISO 3046, ISO 8528, NEMA MG1-22, NEMA MG1-33, 2014/35/EU, 2006/42/EC, 2014/30/EU.

Note: Codes may not be available in all model configurations. Please consult your local Cat dealer for availability.

Data Center Applications

- ISO 8528-1 Data Center Power (DCP) compliant per DCP application of Cat diesel generator set prime power rating.
- All ratings Tier III/Tier IV compliant per Uptime Institute requirements.
- All ratings ANSI/TIA-942 compliant for Rated-1 through Rated-4 data centers.

Fuel Rates

Fuel rates are based on fuel oil of 35° API [16°C (60°F)] gravity having an LHV of 42,780 kJ/kg (18,390 Btu/lb) when used at 29°C (85°F) and weighing 838.9 g/liter (7.001 lbs/U.S. gal.)

www.cat.com/electricpower

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Materials and specifications are subject to change without notice. The International System of Units (SI) is used in this publication.

PERFORMANCE DATA[DM7696]

Performance Number: DM7696

Change Level: 04

SALES MODEL:	C27	COMBUSTION:	DIRECT INJECTION
BRAND:	CAT	ENGINE SPEED (RPM):	1,800
MACHINE SALES MODEL:		HERTZ:	60
ENGINE POWER (BHP):	1,214	FAN POWER (HP):	39.3
GEN POWER WITH FAN (EKW):	800.0	ASPIRATION:	TA
COMPRESSION RATIO:	16.5	AFTERCOOLER TYPE:	ATAAC
RATING LEVEL:	STANDBY	AFTERCOOLER CIRCUIT TYPE:	JW+OC, ATAAC
PUMP QUANTITY:	1	INLET MANIFOLD AIR TEMP (F):	120
FUEL TYPE:	DIESEL	JACKET WATER TEMP (F):	210.2
MANIFOLD TYPE:	DRY	TURBO CONFIGURATION:	PARALLEL
GOVERNOR TYPE:	ADEM4	TURBO QUANTITY:	2
ELECTRONICS TYPE:	ADEM4	TURBOCHARGER MODEL:	GTA5008BS-56T-1.60
IGNITION TYPE:	CI	CERTIFICATION YEAR:	2010
INJECTOR TYPE:	EUI	PISTON SPD @ RATED ENG SPD (FT/MIN):	1,800.0
REF EXH STACK DIAMETER (IN):	10		
MAX OPERATING ALTITUDE (FT):	7,999		

INDUSTRY	SUBINDUSTRY	APPLICATION
ELECTRIC POWER	STANDARD	PACKAGED GENSET
OIL AND GAS	LAND PRODUCTION	PACKAGED GENSET

General Performance Data

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	ISO BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	ISO VOL FUEL CONSUMPTN (VFC)
EKW	%	BHP	PSI	LB/BHP-HR	LB/BHP-HR	GAL/HR	GAL/HR
800.0	100	1,190	318	0.331	0.323	55.6	54.3
720.0	90	1,073	286	0.335	0.327	50.7	49.5
640.0	80	957	255	0.340	0.332	45.9	44.8
600.0	75	900	240	0.342	0.334	43.4	42.3
560.0	70	842	225	0.343	0.335	40.7	39.8
480.0	60	728	194	0.345	0.337	35.4	34.6
400.0	50	615	164	0.346	0.338	30.0	29.3
320.0	40	504	135	0.350	0.342	24.9	24.3
240.0	30	393	105	0.358	0.350	19.9	19.4
200.0	25	337	90	0.364	0.356	17.3	16.9
160.0	20	280	75	0.375	0.366	14.8	14.5
80.0	10	162	43	0.435	0.424	9.9	9.7

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP
EKW	%	BHP	IN-HG	DEG F	DEG F	IN-HG	DEG F	IN-HG	DEG F
800.0	100	1,190	57.6	119.1	1,222.8	40.4	947.8	60	358.0
720.0	90	1,073	52.4	114.5	1,188.5	36.5	928.9	55	336.7
640.0	80	957	46.8	113.1	1,161.4	32.2	916.5	49	314.8
600.0	75	900	43.7	112.4	1,146.4	29.8	909.6	46	302.1
560.0	70	842	40.0	110.4	1,127.0	27.3	899.9	42	285.8
480.0	60	728	32.3	105.7	1,078.4	22.3	873.1	34	253.8
400.0	50	615	24.7	100.8	1,016.5	17.4	836.5	26	222.4
320.0	40	504	18.1	97.0	935.5	13.5	782.1	19	192.2
240.0	30	393	12.4	93.9	835.3	10.2	709.3	13	162.3
200.0	25	337	9.7	92.6	777.5	8.8	665.6	11	147.3
160.0	20	280	7.4	91.9	713.5	7.6	615.6	8	133.7
80.0	10	162	3.9	92.8	564.1	5.7	492.7	5	114.1

General Performance Data (Continued)

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	WET INLET AIR FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)
EKW	%	BHP	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
800.0	100	1,190	2,200.4	5,943.3	9,469.4	9,863.6	2,076.2	1,881.0

PERFORMANCE DATA[DM7696]

720.0	90	1,073	2,097.2	5,567.7	9,001.3	9,361.3	1,971.4	1,791.5
640.0	80	957	1,963.0	5,142.0	8,402.0	8,727.5	1,837.1	1,673.5
600.0	75	900	1,885.5	4,904.2	8,059.1	8,366.8	1,760.9	1,606.0
560.0	70	842	1,799.8	4,638.3	7,681.5	7,970.5	1,677.4	1,531.7
480.0	60	728	1,618.3	4,074.9	6,886.8	7,138.0	1,503.3	1,376.0
400.0	50	615	1,433.7	3,494.4	6,083.9	6,296.9	1,325.5	1,216.1
320.0	40	504	1,270.3	2,963.8	5,377.5	5,554.2	1,173.5	1,081.6
240.0	30	393	1,120.0	2,452.2	4,733.6	4,874.4	1,031.4	956.7
200.0	25	337	1,049.0	2,200.7	4,431.9	4,554.8	961.6	895.5
160.0	20	280	985.8	1,964.5	4,163.7	4,268.7	898.3	840.7
80.0	10	162	894.5	1,565.5	3,772.7	3,843.3	808.2	766.0

Heat Rejection Data

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXHAUST RECOVERY TO 350F	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
EKW	%	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN
800.0	100	1,190	18,779	5,849	44,601	25,213	6,438	9,057	50,481	120,880	128,767
720.0	90	1,073	17,808	4,992	41,200	23,106	5,876	8,008	45,509	110,318	117,517
640.0	80	957	16,691	4,461	37,677	21,034	5,311	6,786	40,598	99,707	106,213
600.0	75	900	15,607	4,786	35,758	19,900	5,022	6,124	38,160	94,283	100,435
560.0	70	842	14,638	4,988	33,616	18,603	4,718	5,397	35,720	88,579	94,359
480.0	60	728	13,512	4,464	29,060	15,798	4,100	4,083	30,880	76,976	81,999
400.0	50	615	11,598	4,504	24,410	12,913	3,477	2,962	26,073	65,288	69,549
320.0	40	504	10,383	3,959	19,934	10,055	2,886	2,050	21,390	54,180	57,716
240.0	30	393	9,677	2,739	15,613	7,277	2,301	1,296	16,686	43,193	46,011
200.0	25	337	9,195	2,146	13,533	5,943	2,007	969	14,304	37,688	40,147
160.0	20	280	8,507	1,714	11,540	4,657	1,717	697	11,882	32,236	34,340
80.0	10	162	6,156	1,807	7,874	2,218	1,152	322	6,882	21,629	23,040

Emissions Data

DIESEL

RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITH FAN	EKW	800.0	600.0	400.0	200.0	80.0
PERCENT LOAD	%	100	75	50	25	10
ENGINE POWER	BHP	1,190	900	615	337	162
TOTAL NOX (AS NO2)	G/HR	5,956	3,529	2,229	1,524	818
TOTAL CO	G/HR	280	349	332	272	326
TOTAL HC	G/HR	33	46	47	37	51
TOTAL CO2	KG/HR	553	431	296	169	97
PART MATTER	G/HR	27.0	28.2	46.7	51.5	52.4
TOTAL NOX (AS NO2) (CORR 5% O2)	MG/NM3	2,510.3	1,919.2	1,785.7	2,213.4	2,077.7
TOTAL CO (CORR 5% O2)	MG/NM3	118.7	192.5	268.7	409.6	929.9
TOTAL HC (CORR 5% O2)	MG/NM3	12.0	22.0	33.0	49.4	126.4
PART MATTER (CORR 5% O2)	MG/NM3	9.4	12.9	31.8	65.1	130.6
TOTAL NOX (AS NO2) (CORR 5% O2)	PPM	1,223	935	870	1,078	1,012
TOTAL CO (CORR 5% O2)	PPM	95	154	215	328	744
TOTAL HC (CORR 5% O2)	PPM	22	41	62	92	236
TOTAL NOX (AS NO2)	G/HP-HR	5.05	3.94	3.64	4.53	5.06
TOTAL CO	G/HP-HR	0.24	0.39	0.54	0.81	2.02
TOTAL HC	G/HP-HR	0.03	0.05	0.08	0.11	0.31
PART MATTER	G/HP-HR	0.02	0.03	0.08	0.15	0.32
TOTAL NOX (AS NO2)	LB/HR	13.13	7.78	4.91	3.36	1.80
TOTAL CO	LB/HR	0.62	0.77	0.73	0.60	0.72
TOTAL HC	LB/HR	0.07	0.10	0.10	0.08	0.11
TOTAL CO2	LB/HR	1,219	950	652	372	214
PART MATTER	LB/HR	0.06	0.06	0.10	0.11	0.12
OXYGEN IN EXH	%	9.0	10.1	11.3	13.5	16.2
DRY SMOKE OPACITY	%	0.3	1.3	2.8	4.8	5.3

PERFORMANCE DATA[DM7696]

BOSCH SMOKE NUMBER	0.15	0.44	1.05	1.58	1.69
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RATED SPEED POTENTIAL SITE VARIATION: 1800 RPM

GENSET POWER WITH FAN	EKW	800.0	600.0	400.0	200.0	80.0
PERCENT LOAD	%	100	75	50	25	10
ENGINE POWER	BHP	1,190	900	615	337	162
TOTAL NOX (AS NO2)	G/HR	7,207	4,271	2,697	1,844	990
TOTAL CO	G/HR	523	652	620	510	610
TOTAL HC	G/HR	62	87	89	71	96
PART MATTER	G/HR	52.7	55.0	91.2	100.4	102.2
TOTAL NOX (AS NO2) (CORR 5% O2)	MG/NM3	3,037.5	2,322.3	2,160.7	2,678.2	2,514.0
TOTAL CO (CORR 5% O2)	MG/NM3	221.9	360.0	502.4	766.0	1,738.9
TOTAL HC (CORR 5% O2)	MG/NM3	22.7	41.5	62.3	93.4	239.0
PART MATTER (CORR 5% O2)	MG/NM3	18.3	25.1	62.1	126.9	254.7
TOTAL NOX (AS NO2) (CORR 5% O2)	PPM	1,479	1,131	1,052	1,305	1,225
TOTAL CO (CORR 5% O2)	PPM	178	288	402	613	1,391
TOTAL HC (CORR 5% O2)	PPM	42	78	116	174	446
TOTAL NOX (AS NO2)	G/HP-HR	6.11	4.77	4.40	5.48	6.12
TOTAL CO	G/HP-HR	0.44	0.73	1.01	1.52	3.77
TOTAL HC	G/HP-HR	0.05	0.10	0.15	0.21	0.59
PART MATTER	G/HP-HR	0.04	0.06	0.15	0.30	0.63
TOTAL NOX (AS NO2)	LB/HR	15.89	9.41	5.95	4.07	2.18
TOTAL CO	LB/HR	1.15	1.44	1.37	1.12	1.34
TOTAL HC	LB/HR	0.14	0.19	0.20	0.16	0.21
PART MATTER	LB/HR	0.12	0.12	0.20	0.22	0.23

Regulatory Information

EPA TIER 2		2006 - 2010		
GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 89 SUBPART D AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.				
Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	NON-ROAD	TIER 2	CO: 3.5 NOx + HC: 6.4 PM: 0.20

EPA EMERGENCY STATIONARY			2011 - ----	
GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 60 SUBPART IIII AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE EMERGENCY STATIONARY REGULATIONS.				
Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	STATIONARY	EMERGENCY STATIONARY	CO: 3.5 NOx + HC: 6.4 PM: 0.20

Altitude Derate Data

STANDARD

ALTITUDE CORRECTED POWER CAPABILITY (BHP)

AMBIENT OPERATING TEMP (F)	50	60	70	80	90	100	110	120	130	NORMAL
ALTITUDE (FT)										
0	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214
1,000	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214
2,000	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214
3,000	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214
4,000	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214
5,000	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214
6,000	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,197	1,214
7,000	1,214	1,214	1,214	1,214	1,214	1,212	1,191	1,170	1,150	1,214
8,000	1,214	1,214	1,214	1,207	1,185	1,164	1,144	1,124	1,105	1,214
9,000	1,214	1,204	1,181	1,159	1,138	1,118	1,098	1,079	1,061	1,214

PERFORMANCE DATA[DM7696]

10,000	1,178	1,155	1,134	1,113	1,092	1,073	1,054	1,036	1,018	1,195
11,000	1,130	1,108	1,088	1,068	1,048	1,029	1,011	994	977	1,154
12,000	1,084	1,063	1,043	1,024	1,005	987	970	953	937	1,115
13,000	1,039	1,019	1,000	981	964	946	930	914	898	1,077
14,000	996	977	958	940	923	907	891	876	861	1,039
15,000	954	935	918	901	884	868	853	838	824	1,003

Cross Reference

Test Spec	Setting	Engine Arrangement	Engineering Model	Engineering Model Version	Start Effective Serial Number	End Effective Serial Number
0K7925	PP5660	2671232	GS327	-	MJE00001	
3704841	GG0523	3495619	GS603	LS	MJE00001	
0K4031	GG0383	3541450	GS582	-	PEN00001	
3704841	GG0523	3884919	GS603	-	MJE00001	
3704841	GG0523	6034727	PG458	-	MJE00001	

Performance Parameter Reference

Parameters Reference:DM9600-15
PERFORMANCE DEFINITIONS

PERFORMANCE DEFINITIONS DM9600

APPLICATION:

Engine performance tolerance values below are representative of a typical production engine tested in a calibrated dynamometer test cell at SAE J1995 standard reference conditions. Caterpillar maintains ISO9001:2000 certified quality management systems for engine test Facilities to assure accurate calibration of test equipment. Engine test data is corrected in accordance with SAE J1995. Additional reference material SAE J1228, J1349, ISO 8665, 3046-1:2002E, 3046-3:1989, 1585, 2534, 2288, and 9249 may apply in part or are similar to SAE J1995. Special engine rating request (SERR) test data shall be noted.

PERFORMANCE PARAMETER TOLERANCE FACTORS:

Power +/- 3%

Torque +/- 3%

Exhaust stack temperature +/- 8%

Inlet airflow +/- 5%

Intake manifold pressure-gage +/- 10%

Exhaust flow +/- 6%

Specific fuel consumption +/- 3%

Specific fuel consumption (C7-C18) +/- 4%

Fuel rate +/- 5%

Specific DEF consumption +/- 3%

DEF rate +/- 5%

Heat rejection +/- 5%

Heat rejection exhaust only +/- 10%

Heat rejection CEM only +/- 10%

Heat Rejection values based on using treated water.

Torque is included for truck and industrial applications, do not use for Gen Set or steady state applications.

On C7 - C18 engines, at speeds of 1100 RPM and under these values are provided for reference only, and may not meet the tolerance listed.

On 3500 and C175 engines, at speeds below Peak Torque these values are provided for reference only, and may not meet the tolerance listed.

These values do not apply to C280/3600. For these models, see the tolerances listed below.

C280/3600 HEAT REJECTION TOLERANCE FACTORS:

Heat rejection +/- 10%

Heat rejection to Atmosphere +/- 50%

Heat rejection to Lube Oil +/- 20%

Heat rejection to Aftercooler +/- 5%

TEST CELL TRANSDUCER TOLERANCE FACTORS:

Torque +/- 0.5%

Speed +/- 0.2%

Fuel flow +/- 1.0%

Temperature +/- 2.0 C degrees

Intake manifold pressure +/- 0.1 kPa

OBSERVED ENGINE PERFORMANCE IS CORRECTED TO SAE J1995 REFERENCE

AIR AND FUEL CONDITIONS.

REFERENCE ATMOSPHERIC INLET AIR

FOR 3500 ENGINES AND SMALLER

SAE J1228 AUG2002 for marine engines, and J1995 JAN2014 for other

PERFORMANCE DATA[DM7696]

engines, reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity at the stated aftercooler water temp, or inlet manifold temp.

FOR 3600 ENGINES

Engine rating obtained and presented in accordance with ISO 3046/1 and SAE J1995 JANJAN2014 reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity and 150M altitude at the stated aftercooler water temperature.

MEASUREMENT LOCATION FOR INLET AIR TEMPERATURE

Location for air temperature measurement air cleaner inlet at stabilized operating conditions.

REFERENCE EXHAUST STACK DIAMETER

The Reference Exhaust Stack Diameter published with this dataset is only used for the calculation of Smoke Opacity values displayed in this dataset. This value does not necessarily represent the actual stack diameter of the engine due to the variety of exhaust stack adapter options available. Consult the price list, engine order or general dimension drawings for the actual stack diameter size ordered or options available.

REFERENCE FUEL

DIESEL

Reference fuel is #2 distillate diesel with a 35API gravity;

A lower heating value is 42,780 KJ/KG (18,390 BTU/LB) when used at 15 deg C (59 deg F), where the density is

850 G/Liter (7.0936 Lbs/Gal).

GAS

Reference natural gas fuel has a lower heating value of 33.74 KJ/L (905 BTU/CU Ft). Low BTU ratings are based on 18.64 KJ/L (500 BTU/CU FT) lower heating value gas. Propane ratings are based on 87.56 KJ/L (2350 BTU/CU Ft) lower heating value gas.

ENGINE POWER (NET) IS THE CORRECTED FLYWHEEL POWER (GROSS) LESS

EXTERNAL AUXILIARY LOAD

Engine corrected gross output includes the power required to drive standard equipment; lube oil, scavenge lube oil, fuel transfer, common rail fuel, separate circuit aftercooler and jacket water pumps. Engine net power available for the external (flywheel) load is calculated by subtracting the sum of auxiliary load from the corrected gross flywheel out put power. Typical auxiliary loads are radiator cooling fans, hydraulic pumps, air compressors and battery charging alternators. For Tier 4 ratings additional Parasitic losses would also include Intake, and Exhaust Restrictions.

ALTITUDE CAPABILITY

Altitude capability is the maximum altitude above sea level at standard temperature and standard pressure at which the engine could develop full rated output power on the current performance data set.

Standard temperature values versus altitude could be seen on TM2001.

When viewing the altitude capability chart the ambient temperature is the inlet air temp at the compressor inlet.

Engines with ADEM MEUI and HEUI fuel systems operating at conditions above the defined altitude capability derate for atmospheric pressure and temperature conditions outside the values defined, see TM2001.

Mechanical governor controlled unit injector engines require a setting change for operation at conditions above the altitude defined on the engine performance sheet. See your Caterpillar technical representative for non standard ratings.

REGULATIONS AND PRODUCT COMPLIANCE

TMI Emissions information is presented at 'nominal' and 'Potential Site Variation' values for standard ratings. No tolerances are applied to the emissions data. These values are subject to change at any time. The controlling federal and local emission requirements need to be verified by your Caterpillar technical representative.

Customer's may have special emission site requirements that need to be verified by the Caterpillar Product Group engineer.

EMISSION CYCLE LIMITS:

Cycle emissions Max Limits apply to cycle-weighted averages only. Emissions at individual load points may exceed the cycle-weighted limit.

WET & DRY EXHAUST/EMISSIONS DESCRIPTION:

Wet - Total exhaust flow or concentration of total exhaust flow

Dry - Total exhaust flow minus water vapor or concentration of exhaust flow with water vapor excluded

EMISSIONS DEFINITIONS:

Emissions : DM1176

EMISSION CYCLE DEFINITIONS

1. For constant-speed marine engines for ship main propulsion, including,diesel-electric drive, test cycle E2 shall be applied, for controllable-pitch propeller sets test cycle E2 shall be applied.
2. For propeller-law-operated main and propeller-law-operated auxiliary engines the test cycle E3 shall be applied.

PERFORMANCE DATA[DM7696]

- 3. For constant-speed auxiliary engines test cycle D2 shall be applied.
- 4. For variable-speed, variable-load auxiliary engines, not included above, test cycle C1 shall be applied.

HEAT REJECTION DEFINITIONS:
Diesel Circuit Type and HHV Balance : DM9500
HIGH DISPLACEMENT (HD) DEFINITIONS:

3500: EM1500
RATING DEFINITIONS:
Agriculture : TM6008
Fire Pump : TM6009
Generator Set : TM6035
Generator (Gas) : TM6041
Industrial Diesel : TM6010
Industrial (Gas) : TM6040
Irrigation : TM5749
Locomotive : TM6037
Marine Auxiliary : TM6036
Marine Prop (Except 3600) : TM5747
Marine Prop (3600 only) : TM5748
MSHA : TM6042
Oil Field (Petroleum) : TM6011
Off-Highway Truck : TM6039
On-Highway Truck : TM6038
SOUND DEFINITIONS:
Sound Power : DM8702
Sound Pressure : TM7080
Date Released : 03/12/24

Systems Data

Reference Number: DM7696

**AIR INTAKE SYSTEM**

THE INSTALLED SYSTEM MUST COMPLY WITH THE SYSTEM LIMITS BELOW FOR ALL EMISSIONS CERTIFIED ENGINES TO ASSURE REGULATORY COMPLIANCE.

MAXIMUM ALLOWABLE INTAKE RESTRICTION WITH CLEAN ELEMENT	15	IN-H2O
MAXIMUM ALLOWABLE INTAKE RESTRICTION WITH DIRTY ELEMENT	25	IN-H2O
MAXIMUM PRESSURE DROP FROM COMPRESSOR OUTLET TO MANIFOLD INLET (OR MIXER INLET FOR EGR)	4.4	IN-HG
MAXIMUM TURBO INLET AIR TEMPERATURE	122	DEG F
MAXIMUM AIR FILTER INLET AIR TEMPERATURE	122	DEG F
CHARGE AIR FLOW AT RATED SPEED	166.7	LB/MIN
TURBO COMPRESSOR OUTLET PRESSURE AT RATED SPEED (ABSOLUTE)	90.6	IN-HG

COOLING SYSTEM

ENGINE ONLY COOLANT CAPACITY	14.5	GAL
MAXIMUM ALLOWABLE JACKET WATER OUTLET TEMPERATURE	210	DEG F
REGULATOR LOCATION FOR JW (HT) CIRCUIT	OUTLET	
MAXIMUM UNINTERRUPTED FILL RATE	5.0	G/MIN
MINIMUM COOLANT LOSS WITHOUT IMPACTING RADIATOR PERFORMANCE (PERCENT OF TOTAL)	12	PERCENT
COOLANT LOSS-MAXIMUM PERCENTAGE OF PUMP PRESSURE RISE LOSS	15	PERCENT

ENGINE SPEC SYSTEM

CYLINDER ARRANGEMENT	VEE	
NUMBER OF CYLINDERS	12	
CYLINDER BORE DIAMETER	5.4	IN
PISTON STROKE	6.0	IN
TOTAL CYLINDER DISPLACEMENT	1649	CU IN
STANDARD CRANKSHAFT ROTATION FROM FLYWHEEL END	CCW	
STANDARD CYLINDER FIRING ORDER	1-10-9-6-5- 12-11-4-3- 8-7-2	

NUMBER 1 CYLINDER LOCATION	LEFT FRONT	
STROKES/COMBUSTION CYCLE	4	
EXHAUST SYSTEM		
<i>THE INSTALLED SYSTEM MUST COMPLY WITH THE SYSTEM LIMITS BELOW FOR ALL EMISSIONS CERTIFIED ENGINES TO ASSURE REGULATORY COMPLIANCE.</i>		
MAXIMUM ALLOWABLE SYSTEM BACK PRESSURE	27	IN-H2O
MANIFOLD TYPE	DRY	
MAXIMUM ALLOWABLE STATIC WEIGHT ON EXHAUST CONNECTION	110.2	LB
MAXIMUM ALLOWABLE STATIC BENDING MOMENT ON EXHAUST CONNECTION	0	LB-FT
FUEL SYSTEM		
MAXIMUM FUEL FLOW FROM TRANSFER PUMP TO ENGINE	227.2	G/HR
MAXIMUM ALLOWABLE FUEL SUPPLY LINE RESTRICTION	8.9	IN-HG
MAXIMUM ALLOWABLE FUEL TEMPERATURE AT TRANSFER PUMP INLET	149	DEG F
MAXIMUM FUEL FLOW TO RETURN LINE FROM ENGINE	198.1	G/HR
MAXIMUM ALLOWABLE FUEL RETURN LINE RESTRICTION	10.2	IN-HG
NORMAL FUEL PRESSURE IN A CLEAN SYSTEM	90.9	PSI
FUEL SYSTEM TYPE	EUI	
MAXIMUM TRANSFER PUMP PRIMING LIFT WITHOUT PRIMING PUMP	12.1	FT
MAXIMUM ALLOWABLE BIOFUEL	20	PERCENT
LUBE SYSTEM		
CRANKCASE VENTILATION TYPE	TO ATM	
MOUNTING SYSTEM		
CENTER OF GRAVITY LOCATION - X DIMENSION - FROM REAR FACE OF BLOCK - (REFERENCE TM7077)	23.0	IN
CENTER OF GRAVITY LOCATION - Y DIMENSION - FROM CENTERLINE OF CRANKSHAFT - (REFERENCE TM7077)	11.5	IN
CENTER OF GRAVITY LOCATION - Z DIMENSION - FROM CENTERLINE OF CRANKSHAFT - (REFERENCE TM7077)	0.0	IN
DRY WEIGHT - ENGINE ONLY (REFERENCE VALUE)	6462	LB
STARTING SYSTEM		
MINIMUM CRANKING SPEED REQUIRED FOR START	100	RPM
LOWEST AMBIENT START TEMPERATURE WITHOUT AIDS	32	DEG F

TEST SPEC [LF3398]

Reference Number: 3704841

Effective Serial Number: MJE05518 ▼

Model: C27 DI TA AAAC

Make from Spec:

Test Spec Data				
Description	Measure	Nominal	Ceiling	Floor
Corr Full Load Power	hp	1,214	1,226	1,202
Full Load Speed	RPM	1800	1810	1790
High Idle Speed	RPM	1945	1955	1935
Low Idle Speed	RPM	1200	1210	1190
FL Static Fuel Setting	in	0.382		
FT Static Fuel Setting	in	0.394		
FLS (Intercept)		28		
FTS (Slope)		-2		
Corrected Fuel Rate	GAL/HR	56.7	59.6	53.9
CSFC	LB/HP.H	0.325	0.341	0.307
Adjusted Boost	IN_HG	63.2	72.7	53.7
Torque Check Speed	RPM	1500	1510	1490
Corr Torq Rise at TC RPM	%	15.0		
Corr Torque at TC RPM	LB.FT	4,071	4,356	3,785
C Fuel Rate at TC RPM	GAL/HR	54.5	57.2	51.8
CSFC at TC RPM	LB/HP.H	0.331	0.347	0.312
ADJ Boost at TC RPM	IN_HG	58.8	67.6	49.9
Power Loss/Cyl	% C FL PWR	10.5	11.1	9.9
Specific Blowby	CU FT/HP.H			
Temp Jacket Water Pump Inlet	F	192	197	186
Delta T Jacket Water (out-in)	F	10	19	1
Inlet Manifold Temp	F	118	129	109
Water Temp to Scac	F			
Scac Water Flow	GAL/MIN			
Oil Pressure	PSI	64	80	51
Oil Pressure Low Idle	PSI	59	65	15
Fuel Pressure	PSI	112	139	86
Inlet Fuel Pressure	PSI		4	
Inlet Fuel Temp	F	86	95	77
Inlet Air Pressure	IN_HG		31	26
Inlet Air Restriction	IN_HG		1.18	
Inlet Air Temperature	F		122	50
Fuel Density	DEG API		36.0	34.0
Boost Constant		1.0		
Governor Setting Constant				
Governor Setting Torque	% RTD TRQ			
High Idle Stability	RPM			
Low Idle Stability	RPM			
Set Point RPM	RPM	1820	1830	1810
Adjusted Boost (Gas Blending)	HG			
Corrected Fuel Rate - Diesel (Gas Blending)	GAL/HR			

Test Spec Data

Description	Measure	Nominal	Ceiling	Floor
Corrected Fuel Rate - Gas (Gas Blending) 	BTU/MIN			
Full Load Fueling (Gas Blending) 	MM3/ST			
Gas Substitution Ratio (Gas Blending) 	%			
Corr Full Load Power (Gas Blending) 	HP			
Full Load Speed (Gas Blending) 	RPM			
Exhaust Back Pressure	PSI			
TQ CK Exhaust Back Pressure	PSI			
Ataac Delta Pressure	PSI			

Engine Reference Information

Description	Measure	Data
FL Static/FT Static Fuel Settings	in	0.382 / 0.394
Fuel Valve Part Number		2323438
Unit Injector Part Number		6180750
Timing Dimension Field Service	in	
Timing Dimension Factory		
Torque Control Group Number		Change Level:
Fuel Pump/Gov Grp Part Number		2351401
Fuel Pump Type		EUI
Flyweight Part Number/Attitude		
Turbo Part No and Model		2711736 / GT5008-1.6A/RVTF
Advertised Power / Governor Speed		1,214hp 1,800 RPM
Compression Ratio		16.5
Torque Rise Cam Part Number		
Manifold Type		DRY
Engine Flash File Part Number		6425633
Rating Number		4
Flash File Change Number		
ASM Flash File Part Number		
ISM Flash File Part Number		
Advisor Flash File Part Number		
Secondary Module Flash File Part Number		
Messenger Flash File Part Number		
Tandem Software Flash File Part Number		
Governor Type		ELEC

Torque Control Group Spring Data

Part No	Thickness	Quantity
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Torque Control Group Spacer Data

Part No	Thickness	Quantity
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Timing Data
Mechanical Advance Part Number:
Chg. Level:
Advance: 0.0 DEG
Dog Leg Differentials: RPM: -- KW: --

Description	Measure	Spec	Minimum	Maximum
Timing Static @ 0 RPM BTDC	DEG		-2.0	2.0

Application/Performance Data

Description	Measure	Data
Application Identification		201 GS STANDBY
Engine Sales Model and Series		C27
Combustion System type		DI
Aspiration Type		TA
Engine Source Factory Ref Number		LE
Power Setting PL/PP Ref Number		GG0523
Engine Perf Data Ref No and Change Level		DM7696
Multi Engine Torq/Rating		
Emissions Family		
Generator Rating W/O Fan	EKW	
Generator	HZ	60
Brakesaver test		
Certified Engine Rating	hp	
Engineering Model Ref		GS603
Low Idle In-Veh Speed	RPM	
Sales Model		
Machine Facility		
Usage		
Transmission		
Description		GS
Serial Number Prefixs		

Altitude Derating Information

Description	Measure	Data
Altitude - Maximum	FT	7,998
Engine Power (ADV)	hp	1,214
Engine Power (Test)	hp	1,214
High Idle Speed	RPM	1945
FL Static Fuel Setting	in	0.382
FT Static Fuel Setting	in	0.394
Corrected Fuel Rate	GAL/HR	56.7

Altitude Derating Information			
Description	Measure	Data	
FL Boost Pressure	IN_HG	63.2	

Spec Number vs. Arrangement Number Cross Reference			
Arrangement	3495619	3884919	6034727



ADEM™ A4 Engine Controller

The ADEM™ A4 is the main Electronic Control Module (ECM) used on select diesel engines. The ADEM A4 provides a higher degree of control over a large number of combustion variables. The ADEM A4 is designed to control/interface Electronic Unit Injector (EUI) equipped engines. The ADEM A4 engine system is composed of the ADEM A4 ECM, control software, sensors, actuators, fuel injectors, and interface to the generator system. The prime benefit of an ADEM A4 engine system is to better control and maintain the particulate emissions, both steady state and transient, while improving engine performance.

Features

Reliable, Durable

All ADEM A4 controllers are designed to survive the harshest environments.

- Environmentally sealed, die-cast aluminum housing isolates and protects electronic components from moisture and dirt contamination
- Rigorous vibration testing ensures product reliability and durability
- Accuracy maintained from -40°C to 85°C
- Electrical noise immunity to 100 volts / meter
- Internal circuits are designed to withstand shorts to + battery and – battery

Simple Servicing

Each ADEM A4 system works in combination with the Cat® ET service tool software to keep the engine operating at peak performance.

- Displays measured parameters
- Retrieves active and logged event code documenting abnormal system operation
- Performs calibrations and diagnostic tests
- Supports flash programming of new software into the ADEM A4 ECM

Self Diagnostics

Each ADEM A4 ECM has a full compliment of diagnostics. The ECM can detect faults in the electrical system and report those faults to the service technician for quick repair.

- Self-diagnostic capability pinpoints operational problems in need of attention.

Advanced Features

- Enhanced performance from fuel injection timing and limiting
- Adjustable monitoring of vital engine parameters
- Programmable speed acceleration ramp rate
- Data link interfaces

Description

The ECM is housed in an environmentally sealed cast-iron. All wiring connections to the ECM are made using two sealed connectors: a single seventy-pin connector and a single one hundred twenty-pin connector.

Engine Speed Governing

Desired engine speed is calculated by the ECM and held within ± 0.2 Hz for isochronous and droop mode. The ECM accounts for droop that is requested. The proper amount of fuel is sent to the injectors due to these calculations. The ECM also employs cooldown/shutdown strategies, acceleration delays on startup, acceleration ramp times and speed reference.

Fuel Limiting

Warm and cold fuel-air ratio control limits are controlled by the ECM. Electronic monitoring system derates, torque limit, and cranking limit, programmable torque scaling, and cold cylinder cutout mode are standard features.

Fuel Injection Timing

Master timing for injection is controlled by the ECM control. Temperature dependencies are accounted for in the fuel injection calculations.

Electronic Monitoring

Electronic monitoring of vital engine parameters can be programmed. Warning, derate, and shutdown event conditions may be customized by the user.

Information Management

The ECM stores information to assist with electronic troubleshooting. Active and logged diagnostic codes, active events, logged events, fuel consumption, engine hours, and instantaneous totals aid service technicians when diagnosing electronic faults and scheduling preventive maintenance.

Calibrations

Engine performance is optimized through injection timing. Auto/manual sensor calibrations are standard features.

On-Board System Tests

System tests are available to assist in electronic troubleshooting. These tests include: injector activation, injector cutout, and override of control outputs.

Data Link Interfaces

The ADEM A4 communicates with the EMCP via a dedicated communication network.

Electronic Sensing

The following sensing is available on the ADEM A4: oil pressure, fuel pressure, fuel temperature, atmospheric pressure, air inlet temperature, turbo outlet pressure, engine coolant temperature, engine speed, throttle position, exhaust temperature, oil filter pressure differential, fuel filter pressure differential, air filter pressure differential and crankcase pressure.

SPECIFICATIONS

Impervious to:

Salt spray, fuel, oil and oil additives, coolant, spray cleaners, chlorinated solvents, hydrogen sulfide and methane gas, and dust.

Input and output protection

All inputs and outputs are protected against short circuits to +battery and –battery

Input voltage range (24 VDC nominal)

18 to 32 VDC

Mounting

Engine mounted

Reverse polarity protected

Shock, withstands 20g

Temperature range

Operating: –40°C to 85°C (–40°F to 185°F)

Storage: –50°C to 120°C (–58°F to 248°F)

Vibration

Withstands 8.0g @ 24 to 2 kHz

Information contained in this publication may be considered confidential. Discretion is recommended when distributing.

Materials and specifications are subject to change without notice.

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RADIATOR PERFORMANCE DATA [LF3398]

Component Performance Number: EM2229

Radiator Data

Radiator Part Number: 5088062
Radiator Type: ATTAC
Front Area: 24.33 ft2
Radiator Dry Weight: 701.1 lbs
Radiator Wet Weight: 787.0 lbs
Radiator Water Capacity High Temp Circuit: 10.83 gal
Radiator Water Capacity Low Temp Circuit: NA gal
Center of Gravity (X): 0.93 in (Distance from front face of core)
Center of Gravity (Y): 37.40 in (Distance from bottom of radiator support)
Center of Gravity (Z): 0.37 in (Distance from center line of core)

Engine Data

Performance Number: DM7696
Sales Model: C27
EKW: 800
Rating: STANDBY
Speed: 1800
Settings: NA
AC Temp Deg F: 120

Combination Data

Pully Ratio: 0.681
Fan Power: 60.346 hp

Ambient Restrictions (1/2 inH2O)			Ambient Restrictions (3/4 inH2O)			Ambient Restrictions (1.00 inH2O)			Air Flow Restrictions (1/2 inH2O)	Air Flow Restrictions (3/4 inH2O)	Air Flow Restrictions (1.00 inH2O)
984 Feet	2460 Feet	4921 Feet	984 Feet	2460 Feet	4921 Feet	984 Feet	2460 Feet	4921 Feet			
Max Ambient Pre-alarm Deg F										scfm	
120	114	107	116	113	104	NA	NA	NA	42377	41070	NA

No Graph data available...

Reference
Number: EM2229

No notes found...

Parameters
Reference:

No notes found...

PACKAGE DATA [LF3398]

Feature Code:	C27DRA1	Rating Type:	STANDBY	Sales model Package:	C27 SR5
Engine Sales Model:	C27 T2/ESE	Engine Arrangement Number:	3495619	Hertz:	60
EKW W/F:	800.0	Noise Reduction:	0 dBA	Back Pressure:	0.0 inH2O

Engine Package Information

Engine Package Data

Package Cooling Information

Data not available.

Package Sound Information

Sound Comments : As per SAE J1074 Standard

Open Sound Data

Distance: 3.3 Feet

EKW W/F	% LOAD	OVERALL SOUND DB(A)	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
800.0	100.0	108.0	107.1	102.5	102.5	104.0	100.8	96.5	97.3
600.0	75.0	107.6	106.9	101.9	102.4	104.0	100.5	95.3	92.8
400.0	50.0	107.3	106.6	101.6	102.2	104.0	100.3	94.4	89.9
200.0	25.0	107.2	106.1	101.7	102.2	104.0	100.2	94.1	88.3

Distance: 23.0 Feet

EKW W/F	% LOAD	OVERALL SOUND DB(A)	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
800.0	100.0	98.0	97.1	92.5	92.6	94.0	90.8	86.5	87.3
600.0	75.0	97.6	96.9	91.9	92.4	94.0	90.5	85.3	82.8
400.0	50.0	97.3	96.6	91.6	92.2	94.0	90.3	84.4	79.8
200.0	25.0	97.2	96.1	91.7	92.2	94.0	90.2	84.1	78.3

Distance: 49.2 Feet

EKW W/F	% LOAD	OVERALL SOUND DB(A)	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
800.0	100.0	92.0	91.1	86.5	86.6	88.0	84.8	80.5	81.3
600.0	75.0	91.6	90.9	85.9	86.4	88.0	84.5	79.3	76.8
400.0	50.0	91.3	90.6	85.6	86.2	88.0	84.3	78.4	73.8
200.0	25.0	91.2	90.1	85.7	86.2	88.0	84.2	78.1	72.3

SA Level 2 Canopy Sound Data

Distance: 3.3 Feet

EKW W/F	% LOAD	OVERALL SOUND DB(A)	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
800.0	100.0	88.6	94.3	91.1	87.5	81.4	75.8	70.1	67.8
600.0	75.0	87.5	73.3	89.6	87.2	79.6	74.2	67.9	64.4
400.0	50.0	88.2	93.8	88.1	88.2	81.2	75.9	69.6	65.9
200.0	25.0	87.2	94.5	87.0	86.5	80.6	75.2	67.9	63.9

Distance: 23.0 Feet

EKW W/F	% LOAD	OVERALL SOUND DB(A)	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
800.0	100.0	75.0	81.6	78.0	73.2	67.2	62.4	56.5	56.5
600.0	75.0	74.8	81.7	76.8	74.1	66.5	61.6	55.5	52.8
400.0	50.0	75.1	83.6	77.1	73.6	67.7	62.1	56.8	52.0
200.0	25.0	74.7	83.8	77.1	72.4	67.3	62.2	55.8	50.6

Distance: 49.2 Feet

EKW W/F	% LOAD	OVERALL SOUND DB(A)	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
800.0	100.0	73.7	82.9	76.4	72.7	63.6	59.4	53.4	52.7
600.0	75.0	73.6	81.7	74.9	73.7	63.2	58.7	52.9	49.5
400.0	50.0	73.1	82.0	74.4	72.7	64.0	59.3	53.7	49.0
200.0	25.0	72.8	82.4	75.0	71.5	63.6	59.2	52.9	48.0

Open Exhaust Sound Data

Distance: 3.3 Feet

EKW W/F	% LOAD	OVERALL SOUND DB(A)	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
800.0	100.0	110.0	100.1	109.7	105.9	104.7	104.3	95.0	75.8

Open Mechanical Sound Data

Distance: 3.3 Feet

EKW W/F	% LOAD	OVERALL SOUND DB(A)	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
800.0	100.0	101.6	95.2	94.6	95.6	96.9	94.7	91.8	90.4

Distance: 23.0 Feet

EKW W/F	% LOAD	OVERALL SOUND DB(A)	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
800.0	100.0	91.4	86.8	85.6	85.7	87.0	84.7	80.5	78.5

Distance: 49.2 Feet

EKW W/F	% LOAD	OVERALL SOUND DB(A)	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
800.0	100.0	85.0	81.6	80.7	79.1	81.1	77.7	73.9	68.5



Customer Name:	Pantropic Power
Job Name:	Walenda Booster Station WBS#4
Project Number:	20240054
Submittal Items	

<u>Item</u>	<u>Manufacturer</u>	<u>Model #</u>
Gravity Discharge Damper	Greenheck	EM-31
Door Operating Handle	Kason	778/48
Silencer	Custom	Custom
Normal Vent	Clay & Bailey	401
Emergency Vent	Clay & Bailey	366
Fuel Level Gauge	Kruger	H-2
Fuel Alarm Level Switches	Madison	M-7000
Overfill Prevention Valve	Morrison Brothers	9095AA-0200AV
Skirtboard	Rubber Cal	70A
Stairs and Platforms	Coastline	Custom
Enclosure & Tank Drawings	Coastline	20240054



EM-30 Series

Vertical Mount/Horizontal Airflow Extruded Backdraft Damper

Application and Design

The EM-30 series is a vertical mounted backdraft damper that is designed to allow horizontal airflow and prevent reverse airflow. The damper is opened by air pressure differential and closed by gravity.

Ratings (See page 2 for specific limitations)

Pressure: Up to 10.0 in. wg (2.5 kPa) differential pressure. For pressures over 10 in. wg, (2.5 kPa), consult factory

Velocity: 2,500 to 3,500 fpm (13 m/s - 18 m/s)

Temperature: 180°F (82°C)



*W & H dimensions furnished approximately 1/4 in. (6mm) under size.

	Standard
Frame Material	6063T5 Extruded Aluminum
Frame Thickness	.125 in. (3.2mm)
Blade Material	6063T5 Extruded Aluminum
Blade Thickness	.070 in. (1.8mm)
Axle Linkage	1/8 in. (3mm) plated steel
Bearings	Synthetic (acetal) sleeve type
Blade Seals	Vinyl

W x H	Minimum Size		Maximum Single Section Size	Maximum Multi Section Size
	With Weights	Without Weights		
Inches	8 x 11	8 x 8	48 x 74	144 x 148
mm	203 x 279	203 x 203	1219 x 1880	3657 x 3759

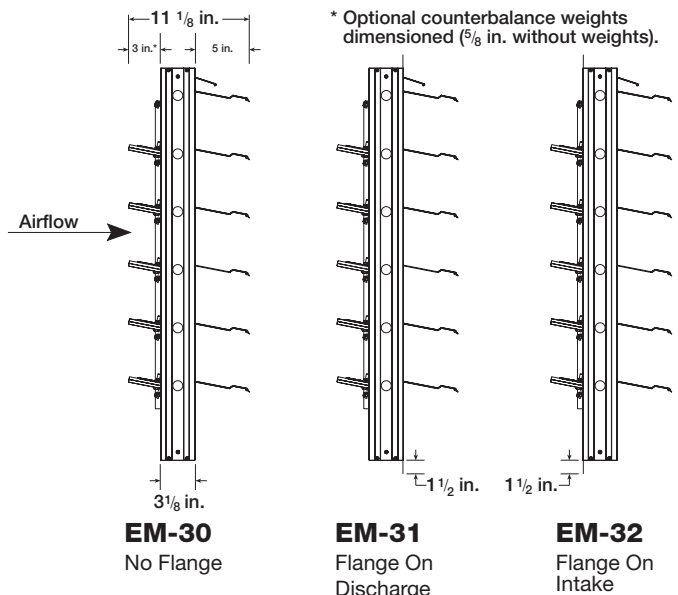
Sizes larger than maximum shown will be supplied as two or more equal size smaller dampers required to make up the size specified. These larger multiple damper assemblies require field assembly and may require additional reinforcement (not supplied by factory) to support the assembly.

- Counterbalance Weights
- 1 1/2 in. (38mm) flange on discharge: EM-31
- 1 1/2 in. (38mm) flange on intake: EM-32
- Sleeves

APC (Adjustable Pressure Controller)

Allows field setting of relief pressure on all EM dampers. Use one per panel. Maximum recommended pressure set limitations are as follows:

Area ft ² (m ²)	Maximum Set Pressure in. wg (Pa)
4 (.37)	.75 (187)
6 (.56)	.50 (125)
8 (100)	.40 (100)
10 (.93)	.30 (75)
15 (1.39)	.20 (50)
20 (1.86)	.15 (37)
24 (2.23)	.125 (31)



* Optional counterbalance weights dimensioned (5/8 in. without weights).

Counterbalance weights may require field adjustment. Instructions are available at www.greenheck.com.



Greenheck Fan Corporation certifies that the models EM-30, EM-31 and EM-32 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to Air Leakage and Air Performance Ratings.

Test Information

- Air leakage is based on operation between 32°F and 120°F (0°C and 48°C)
- Tests for air leakage were conducted in accordance with ANSI/AMCA Standard 500-D Figure 5.5, in the intake direction
- Air performance testing conducted in accordance with ANSI/AMCA Standard 500-D, Figure 5.5

Air Leakage

Model EM-30 series dampers with a width and height 24 in. (610mm) or greater leak a maximum of:

- 8.9 cfm/ft² or less at 1.0 inches w.g.

Model EM-30 series dampers with a width or height less than 24 in. (610mm) leak a maximum of:

- 35 cfm/ft² or less at 1.0 inches w.g.

*Note: This model complies with the International Energy Conservation Code (IECC) and ASHRAE 90.1 leakage requirements for non-motorized dampers.

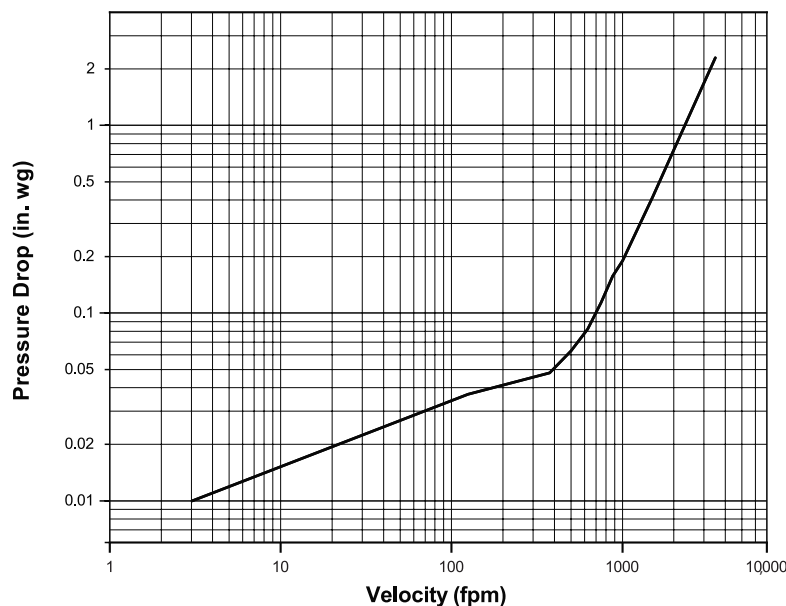
Air Performance

Performance data results from testing a 24 in. x 24 in. damper in accordance with AMCA Standard 500-D using Figure 5.5. All data has been corrected to represent standard air at 0.075 lb/ft³ (1.201 kg/m³).

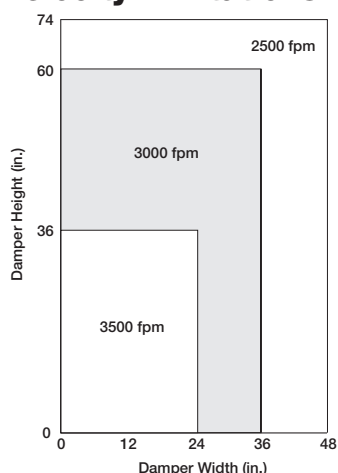
Pressure Drop

24 in. x 24 in. Damper
(610mm x 610mm)

VELOCITY VS. PRESSURE DROP



Velocity Limitations



Operational Data (AMCA Figure 5.3)	ΔP in. wg (Pa)	
	Without Weights	With Weights
Blades Start to Open	0.03 (7.5)	0.01 (2.5)
Blades Fully Open	0.25 (62)	0.055 (13.7)

Operational Data (AMCA Figure 5.5)	ΔP in. wg (Pa)	
	Without Weights	With Weights
Blades Start to Open	0.025 (6.2)	0.01 (3)
Blades Fully Open	0.32 (8)	0.08 (20)

Specifications

Backdraft dampers meeting the following specifications shall be furnished and installed where shown on plans and/or as described in schedules.

Dampers shall consist of: heavy gauge 6063T5 extruded aluminum channel frame (0.125 in. [3.2mm] thick) with 3 $\frac{1}{8}$ in. (79mm) depth; blades from 0.070 in. (1.8mm) 6063T5 extruded aluminum; synthetic acetal axle bearings; damper shall be equipped with extruded vinyl blade seals; and internal $\frac{1}{8}$ in. (3mm) plated steel

blade-to-blade linkage. Damper manufacturer's printed application and performance data including pressure, velocity and temperature limitations shall be submitted for approval showing damper suitable for pressures to 10 in. wg (2.5 kPa), velocities to 3500 fpm (18 m/s) and temperatures to 180°F (82°C). Testing and ratings to be in accordance with AMCA Standard 500-D.

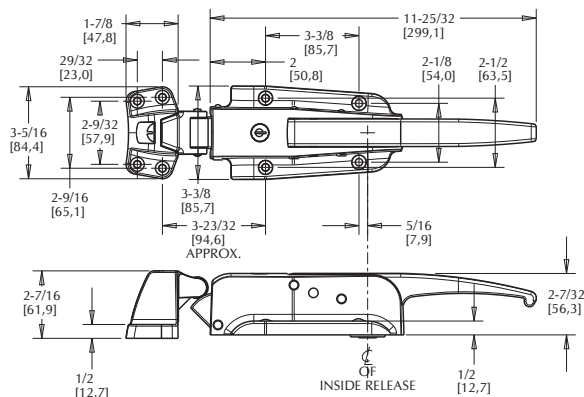
Basis of design is model EM-30.



778 STAINLESS STEEL LATCH



ITEM # 778



778 STAINLESS STEEL SAFEGUARD® LATCH

CORROSION RESISTANT SAFETY LATCH

- Radial tongue makes for effortless door closure when combined with Kason door closers
- The walk-in latch unsurpassed for reliability is now available for the most challenging applications
- No. 778 features unequalled strength and corrosion-resistance
- Tamper-resistant locking mechanism and mounting are built in.
- Adjustable roller strike assures precise adjustment
- Padlocking provision standard on all models
- Accepts Kason inside release lever to prevent accidental entrapment in locked walk-ins. Inside lever releases cylinder locked or padlocked door.

SPECIFICATIONS

MATERIAL:
Satin Finish, #316
stainless steel body
and strike housing

MOUNTING:
Holes drilled and
countersunk for 1/4"
(6mm) screws

PACKAGING:
6 per carton

INSIDE RELEASE:
Accepts any "C"
series inside release.
See No. 481SC,
shown below. Order
separately

Model No.	Description	
10778CL6020*	Cylinder Latch Body, Light Spring	UL
10778L06020*	Padlocking Latch Body, Light Spring	UL
10778CH6020	Cylinder Latch Body, Heavy Spring	-
10778H06020	Padlocking Latch Body, Heavy Spring	-
10778006002	Strike, -1/8" to 3/4" (-3 - 19mm)	
10778006003	Strike, 3/4" to 1-5/8" (19 - 41mm)	
10778006004	Strike, -5/8" to 2-1/2" (41-64mm)	
10778006102	Strike, Stainless Steel Roller -1/8" to 3/4" (-3 - 19mm)	
10778006103	Strike, Stainless Steel Roller 3/4" to 1-5/8" (19 - 41mm)	
10778006104	Strike, Stainless Steel Roller 5/8" to 2-1/2" (41-64mm)	
90531CM000401	Replacement Cylinder Kit #401	
90531CM000402	Replacement Cylinder Kit #402	
90531CM000403	Replacement Cylinder Kit #403	
90531CM000404	Replacement Cylinder Kit #404	
90531CM000405	Replacement Cylinder Kit #405	

**Light Spring Models with roller strike

481SC STAINLESS STEEL INSIDE RELEASE

- Opens padlocked or cylinder locked No. 778 latch from inside of walk-in.
- Clearly visible Safety-Glow knob for added safety.

SPECIFICATIONS

MATERIAL:
Stainless steel rod and
flange, glow in the dark
plastic knob.

MOUNTING:
Holes drilled for No. 10
(5mm) screws

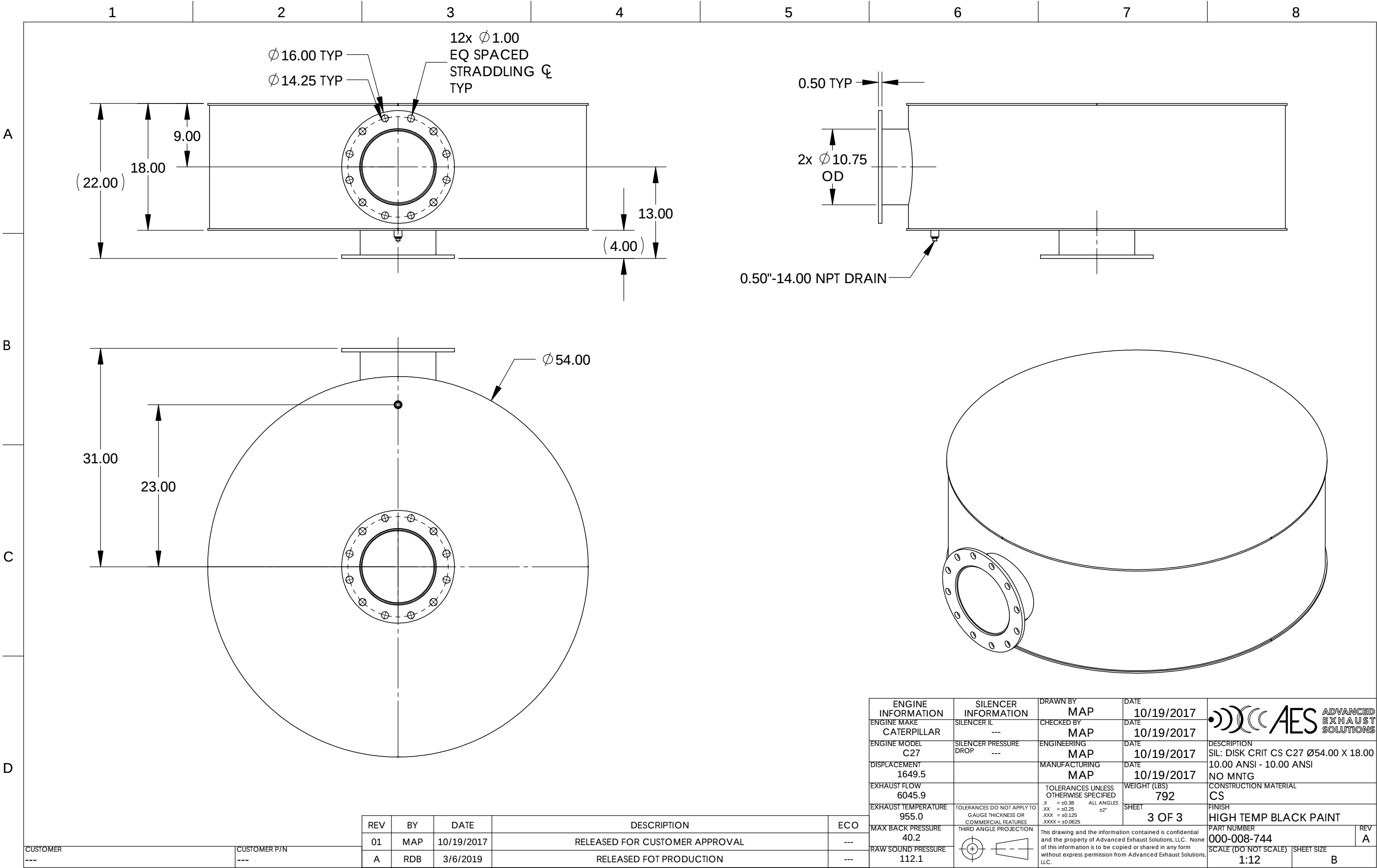
PACKAGING:
24 per carton



ITEM # 481SC



Model No.	Description
10481SC0400	Inside Release for 4" (102mm) Thick Door
10481SC0600	Inside Release for 6" (152mm) Thick Door



ENGINE INFORMATION		SILENCER INFORMATION		DRAWN BY	MAP	DATE	10/19/2017	 AES ADVANCED EXHAUST SOLUTIONS	
ENGINE MAKE		SILENCER I/L		CHECKED BY	MAP	DATE	10/19/2017		
ENGINE MODEL		SILENCER PRESSURE DROP		ENGINEERING		DATE	10/19/2017	DESCRIPTION	
DISPLACEMENT				MANUFACTURING		DATE	10/19/2017	SIL: DISK CRIT CS C27 Ø54.00 X 18.00	
EXHAUST FLOW						WEIGHT (LBS)	792	CONSTRUCTION MATERIAL	
EXHAUST TEMPERATURE						SHEET	3 OF 3	FINISH	
MAX BACK PRESSURE								PART NUMBER	
RAW SOUND PRESSURE								000-008-744	
								SCALE (DO NOT SCALE)	
								1:12	
								SHEET SIZE	
								B	

Mushroom Vent



401

Features:

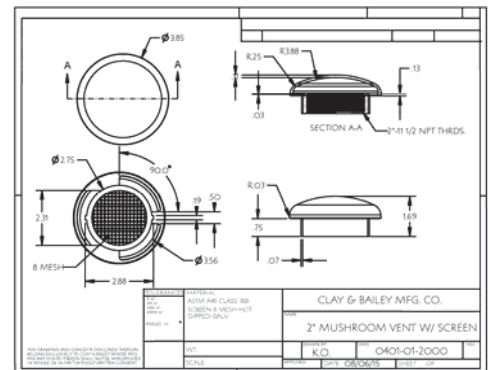
Mushroom style free flow vent is made of cast iron with a 8 mesh galvanized screen. Domed vent top prevents tank contamination from entering vent lines. NPT thread is standard. Also available in galvanized.

Cast iron Black

Part No.	Size	lbs	SCFH@ 2.5psi	A	B
0401-01-0750	3/4"	0.3	4,894	3/4"	1"
0401-01-1000	1"	0.5	8,711	1"	1 1/8"
0401-01-1250	1 1/4"	0.6	13,616	1 1/4"	1 1/2"
0401-01-1500	1 1/2"	0.7	19,532	1 1/2"	1 9/16"
0401-01-2000	2"	1.1	38,846	2"	1 11/16"
0401-01-4000	4"	2.5	54,873	4"	3"

Galvanized

Part No.	Size	lbs	2.5psi	A	B
0401-10-0750	3/4"	0.3	4,894	3/4"	1"
0401-10-1000	1"	0.5	8,711	1"	1 1/8"
0401-10-1250	1 1/4"	0.6	13,616	1 1/4"	1 1/2"
0401-10-1500	1 1/2"	0.7	19,532	1 1/2"	1 9/16"
0401-10-2000	2"	1.1	38,846	2"	1 11/16"
0401-10-4000	4"	2.5	54,873	4"	3"





Model 244 Emergency Vents | 8-inch

SPECIFICATION SHEET

Application

UL Listed emergency vent (pressure relief only) used on aboveground storage tanks, as a code requirement, to help prevent the tank from becoming over-pressurized and possibly rupturing if ever exposed to fire. The vent must be used in conjunction with a “normal vent.” Correct application of this vent requires proper vent size and selection for the tank system in order to meet the specific venting capacity.

Code Compliance

When properly sized for the tank, this vent will conform to the requirements of the International Fire Code; National Fire Code of Canada; National Fire Protection Agency - NFPA 1, 30, 30A, 31, 37, 110; Petroleum Equipment Institute - PEI RP200, PEI RP800; Underwriters Laboratories Inc. UL-142, UL-2085, UL- 2244; Underwriters Laboratories of Canada CAN/ULC S601, CAN/ULC S602, CAN/ULC S652

Approvals

California Air Resource Board (CARB) Phase 1 Enhanced Vapor Recovery (EVR) AST Certified Products (VR-402-B) 
Underwriters Laboratories Inc. UL-2583



WARNING: DO NOT FILL OR UNLOAD FUEL FROM A STORAGE TANK UNLESS IT IS CERTAIN THAT THE TANK VENTS WILL OPERATE PROPERLY. Morrison tank vents are designed only for use on shop fabricated atmospheric tanks which have been built and tested in accordance with UL 142, NFPA 30 & 30A, and API 650 and in accordance with all applicable local, state, and federal laws. In normal operation, dust and debris can accumulate in vent openings and block air passages. Certain atmospheric conditions such as a sudden drop in temperature, below freezing temperatures, and freezing rain can cause moisture to enter the vent and freeze which can restrict internal movement of vent mechanisms and block air passages. All storage tank vent air passages must be completely free of restriction and all vent mechanisms must have free movement in order to insure proper operation. Any restriction of airflow can cause excessive pressure or vacuum to build up in the storage tank, which can result in structural damage to the tank, fuel spillage, property damage, fire, injury, and death. Monthly inspection, and immediate inspection during freezing conditions, by someone familiar with the proper operation of storage tank vents, is required to insure venting devices are functioning properly before filling or unloading a tank.

Item numbers on next page...



MORRISON BROS. CO.



Model 244 Emergency Vents | 8-inch (continued)

SPECIFICATION SHEET

	Item Number	A	B	C	D	E	F	G	Overall Diameter	Height	Weight
	244O--0600 AV	8"	503,517		8	I	A	AL	13.5"	4.6"	33.0
EVR	244O--0600 AVEVR	8"	503,517		8	I	B	AL	13.5"	4.6"	33.0
	244O--0700 AV	8"	503,517		16	I	A	AL	13.5"	5.8"	62.0
EVR	244O--0700 AVEVR	8"	503,517		16	I	B	AL	13.5"	5.8"	62.0
	244OF-0100 AV †	8"	503,517	F	8	I	A	AL	13.5"	3.3"	33.0
EVR	244OF-0100 AVEVR	8"	503,517	F	8	I	B	AL	13.5"	3.3"	33.0
	244OF-0200 AV †	8"	503,517	F	16	I	A	AL	13.5"	4.5"	67.0
EVR	244OF-0200 AVEVR	8"	503,517	F	16	I	B	AL	13.5"	4.5"	67.0
	244OM-0600 AV	8"	503,517	M	8	I	A	AL	13.5"	5.8"	34.0
EVR	244OM-0600 AVEVR	8"	503,517	M	8	I	B	AL	13.5"	5.8"	34.0
	244OM-0700 AV	8"	503,517	M	16	I	A	AL	13.5"	6.9"	63.0
EVR	244OM-0700 AVEVR	8"	503,517	M	16	I	B	AL	13.5"	6.9"	63.0
	244OMB0700 AV	8"	503,517	M	16	I	A	AL	13.5"	6.9"	63.0
	244OMBSP0600 AV	8"	503,517	M	8	I	B	AL	13.5"	5.8"	34.0

Flange = 14" OD ; eight (8) .88" Diameter holes on 11.75" diameter B.C.

† Indicates model is available in a kit.

SPECIFICATION OPTIONS:

A—Size (inches)
B—Venting capacity / SCFH at 2.5 P.S.I.
C—Mounting connection: Female N.P.T. (BLANK); Male N.P.T.(M); Flanged (F)
D—Pressure settings: 8, 16 oz/in². Pressure required to open vent.
E—Cover: Cast iron powder coated (I)
F—Seat material: O-Ring Viton A (A) or Viton B (B)
G—Body material: Aluminum (AL) or Iron (I)
Diameter—Dimension across vent (inches)
Height—Dimension from base to top when closed (inches)
Weight—Shipping weight (lbs)
Bolt—Zinc plated steel

Size	Item Number	Flanged Kits	Weight (lbs)
8"	244OF-08080 AK	Includes 244OF-0100 AV vent, flange adaptor, gasket, and nuts/bolts	N/A
	244OF-08160 AK	Includes 244OF-0200 AV vent, flange adaptor, gasket, and nuts/bolts	N/A



MORRISON BROS. CO.

570 E. 7th Street, P.O. Box 238 | Dubuque, IA 52004-0238

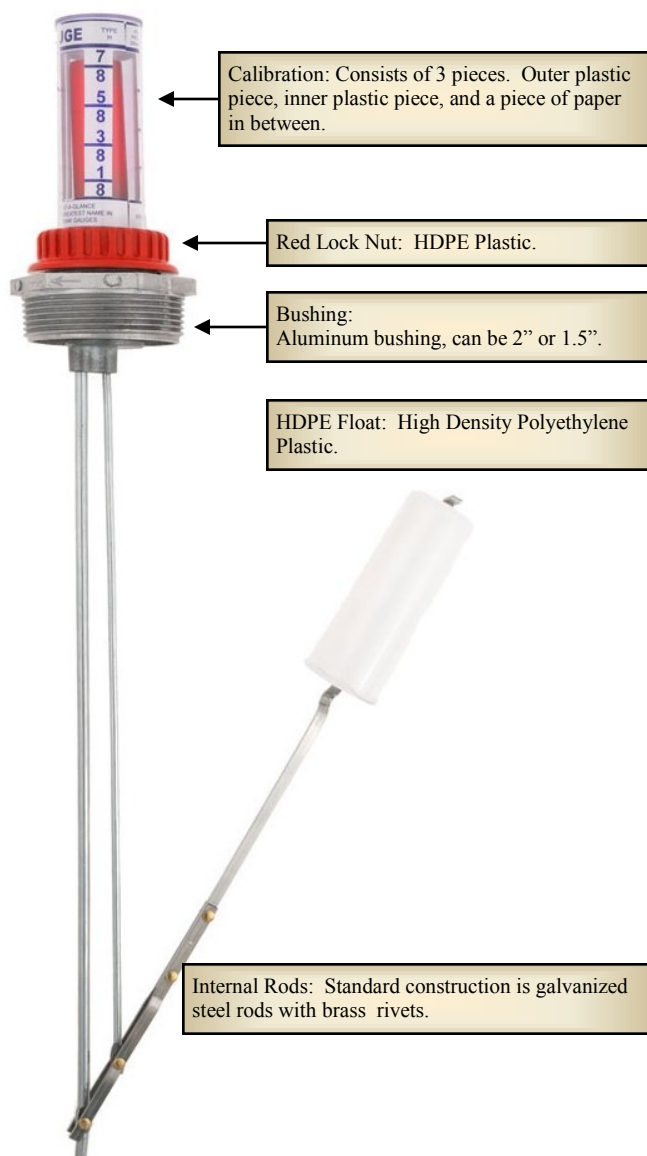
t. 563.583.5701 | 800.553.4840 | f. 563.583.5028

www.morbro.com



KRUEGER SENTRY GAUGE®

The Therma Gauge—Type H



Part Number—
H-(size opening)-(tank depth)+(ext)-(list options)
Sample—H-2-48+12

What it is:

Top mounted liquid level gauge that can measure from 6 inches to 144 inches in depth. Bushing size can be 2" or 1.5". Gauges are custom made in house to fit your tank. Can also accommodate for double walls and pipe risers. The Type H Gauge has a 2 piece bushing construction that allows you to aim your swing arm away from walls, corners, and other obstructions.

Additional Options - Not included:

Audible Alarm Accessory: This add on feature can turn your mechanical gauge into an audible Hi or Lo level alarm.

LED At-A-Glance Accessory: Another add on feature. This can give your mechanical gauge remote reading capability.

Gauge Guard: A cover that protects the exposed plastic components on top of the gauge.

Replacement Parts -

H-Kit - Replaces all of the gauge components from the red lock nut and up. Includes: Red HDPE Plastic Nut, Duro Nitrile Gasket, Plastic Cellulose acetate inner and outer calibration.

HG-Kit-ALN - Replaces all of the gauge components from the red lock nut and up with upgraded parts. Includes: Aluminum Lock Nut, Duro Nitrile Gasket, Plastic Cellulose acetate outer calibration, Glass inner calibration.

Instructions for Operation:

This gauge is a simple volume reading tool. The top of the red indicator is an indication of your approximate fuel level in your tank. Once installed, you simply view the calibration to monitor your tank level. Indicator is calibrated in eighths of a tank on one side, and quarters of a tank on the other.

Krueger Sentry Gauge
1873 Siesta Lane
Green Bay, WI 54313

www.ksentry.com



Contact us for more info:
Ph: 920-434-8860
Fax: 920-434-8897

Email: info@ksentry.com

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 27 Business Park Dr.
 Branford, CT 06405 US
 Phone: 203-488-4477
 Fax: 203-481-5036
 Toll-free: 800-466-5383
 Email: info@madisonco.com
 Website: <http://www.madisonco.com>



Plastic Miniature Liquid Level Float Switches

Madison Company offers a complete line of standard Single Point Plastic Miniature Liquid Level Float Switches. Madison Company can also custom design specific liquid level switches for OEM applications that require unique materials, configurations and system interfaces.

High reliability of the magnetic reed switch technology assures repeatability at an economical price.

Features

- Single-point
- Magnetic float switch technology
- High reliability
- Wide selection of available materials
- Direct interface to controllers available

Each style switch is equipped with a means to indicate Normally Open (NO) or Normally Closed (NC) operation:

Vertical Switches: NO/NC operation is indicated by the position of a witness mark. NO is indicated by circle up; NC is indicated by circle down.

An ohmmeter or continuity meter may be used to verify the switch setting and operation. Simply connect the meter to the leads with the float hanging down away from the fitting and measure the switch. If the meter reads a short, then the switch is normally closed and will open on rise.

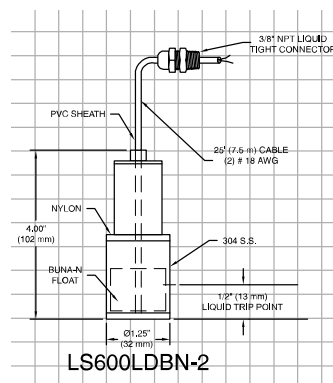
All switches are shipped in the NC position, unless otherwise specified. To change the contact operation, simply remove the retaining ring and float and reverse the float on the stem. The only exception to this is the subminiature switch (M3326/M3326-NO), for which operation must be specified when ordered, since the float is not reversible on this switch.

Results 1 - 8 of 8

Item #	Type	Stem Material	Float Material	Max. Temperature	Fittings	Nominal Current Rating(s)	Float SG	Max. Pressure
M8000-6PKG	Miniature Switch	Polypropylene	Polypropylene	105 °C 221 °F	1/8" NPT	30 VA SPST Switch	0.80	100 psig
M4008	Miniature Switch	Polypropylene	Buna-N	105 °C	1/8" NPT	30 VA SPST Switch	0.45	150 psig
M7000-6PKG	Miniature Switch	PBT	Buna-N	105 °C	1/8" NPT	30 VA SPST Switch	0.45	150 psig
M9000	Miniature Switch	Kynar	Buna-N	105 °C	1/8" NPT	30 VA SPST Switch	0.85	15 psig
MS8000	Miniature Switch with Slosh Shield	Polypropylene	Polypropylene	105 °C	1/8" NPT	30 VA SPST Switch	0.80	100 psig
MS4008	Miniature Switch with Slosh Shield	Polypropylene	Buna-N	105 °C	1/8" NPT	30 VA SPST Switch	0.45	150 psig
MS7000	Miniature Switch with Slosh Shield	PBT	Buna-N	105 °C	1/8" NPT	30 VA SPST Switch	0.45	150 psig
MS9000	Miniature Switch with Slosh Shield	Kynar	Buna-N	105 °C	1/8" NPT	30 VA SPST Switch	0.85	15 psig

Results 1 - 8 of 8

Narrow Body Secondary Containment Leak Sensor



Product Description

The LS600LDBN-2 float-actuated leak sensor provides secondary containment leak detection for above ground and underground storage tank applications where the LS600LDBN-1 cannot be used due to the smaller opening. The sensor assembly may be suspended at the desired point of actuation via the sensor cable and compression fitting, or allowed to rest at the bottom of the containment area being monitored. The compact size and favorable displacement properties of the LS600LDBN-2 make it ideal for monitoring shallow liquid levels. The LS600LDBN-2 optionally supports Pneumercator's FAULT-DETECT supervised wiring technology, which automatically detects field wiring faults when connected with a TMS series or LC2000 controller.

Applications

- Containment, Manway and Piping Sumps
- Dispenser Pan
- Turbine Enclosure
- Double-Wall Steel Tank
- Narrow Body Version For 1.25" NPT Opening

Specifications

- Technology: Magnetic Float, Hermetically Sealed Reed Switch
- Wetted Materials: Float: Buna-N
Housing: 304SS and Nylon
Stem: Brass
- Cable: 22AWG, 2-Conductor, 25' (7.5 m) Length, PVC-jacketed
- Operating Temperature: -20 °F to 175 °F (-30 °C to 80 °C)
- Pass-thru Opening Size: Minimum 1.25" NPT (38 mm)
- Location Approval*: UL Class I, Div 1, Groups C and D; cUL Class I, Zone 0, Group IIB

Installation

Sensor may be suspended by its cable or placed on the containment or sump floor.

Certifications/Approvals

- UL/cUL Approved*, File #E139464
- Third-Party EPA Listed*

Ordering

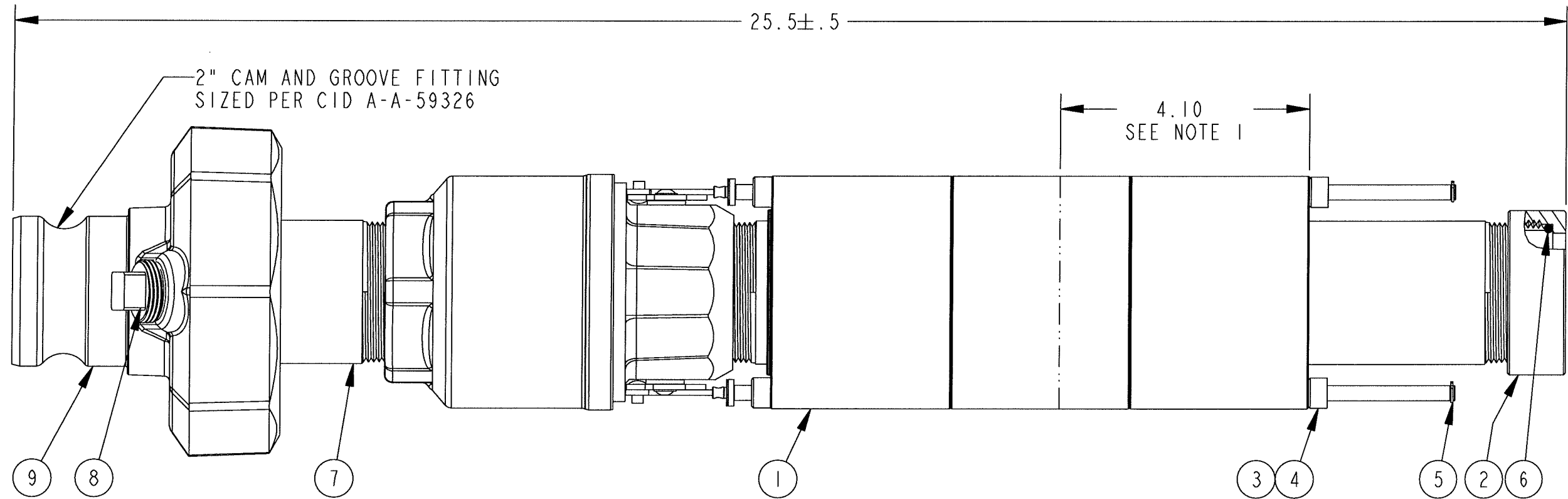
- LS600LDBN-2(-F,-FL) Buna-N Float, Brass Shaft, and PVC wiring

(-F) denotes Fault-Detect Option for LC2000/TMS2000/3000/4000

(-FL) denotes Fault Detect Option for TMS1000/2000W/4000W/WiDAM

*When used in conjunction with the LC2000/TMS series controllers or TMS2000W/4000W series WiDAM Wireless Data Acquisition Module

Note: Specifications subject to change without notice. 09-26-2016



NOTES:

- 1) SHUT OFF POINT SHOWN ON THE FLOAT IS FOR GASOLINE, TO DETERMINE THE SHUTOFF HEIGHT FROM THE BOTTOM OF THE FLOAT FOR THIS VALVE USE THE FOLLOWING FORMULA: ((1-SPECIFIC GRAVITY) X 4.69)+2.82
- 2) WETTED MATERIALS:
COATED ALUMINUM/STAINLESS STEEL ALLOYS / E-COATED STEEL PIPE / PTFE / FLOAT PROPRIETARY MATERIAL
- 3) THIS OVERFILL PREVENTION DEVICE IS COMPATIBLE WITH FLUIDS THAT HAVE A DENSITY GREATER THAN .658 GRAMS PER ML / 5.50 LBS PER GALLON AND A MAX VISCOSITY OF 300 CENTISTOKES.
- 4) THIS OVERFILL VALVE REQUIRES A MINIMUM INLET PRESSURE OF 5 PSI.
THE MAX INLET PRESSURE OF THIS VALVE IS 100 PSI.
- 5) WORKING TEMPERATURE: -40°F TO 140°F.
- 6) FLUID COMPATIBILITY:
GASOLINE, GASOLINE ETHANOL BLENDS TO E-100, DIESEL FUEL, BIODIESEL BLENDS TO B100, AVGAS, AND FUEL OIL. OTHER FLUIDS MAY ALSO BE COMPATIBLE WITH FURTHER REVIEW.

REPLACEMENT PARTS			
ITEM NO.	DESCRIPTION	PART NUMBER	QTY
1	FLOAT	9095A-0232 2F	3
2	DROP TUBE ADAPTOR	9095AA0206 2ICC	1
3	SET SCREW	9095C-0213 2S	4
4	COLLAR	9095C-0206 21A	4
5	SNAP RING	9095A-0208 2R	2
6	O-RING	122ALV0404 2R	1
7	PIPE NIPPLE	9095A-0215 MP	1
8	ADAPTOR	9095A-0201 MACC	1
9	PLUG	9095A-3202 2P	1

13-70	A	RELEASED TO PRODUCTION	JCY
ECO	REV	DESCRIPTION	BY

2" OVERFILL PREVENTION VALVE FIG. NO. 9095AA		STANDARD TOLERANCES UNLESS OTHERWISE SPECIFIED	Morrison Bros. Co. DUBUQUE, IA	
		2 PLACE DECIMALS (.00) ±.015 3 PLACE DECIMALS (.000) ±.005 DIMENSIONS IN INCHES		
MATERIAL SPEC:		CASTING:±.025 RADII:06 ANGLES±0.5°	DRAWN: JCY	DATE: 16-Dec-13
PART I.D. NO.	9095AA0200 AV	SCALE 0.500	CHECKED: <i>[Signature]</i>	DATE: 1-19-15
			DWG. NO. B-7738-0	SHEET 1 OF 1

Skirtboard - SBR Rubber - 70A

Specifications
March 2012

<u>Description:</u>	Skirtboard is a sturdy sheet product designed for use as conveyor skirtboard or belt wiper.
<u>Compound:</u>	SBR
<u>Color:</u>	Black
<u>Weight:</u>	Approximate weight per square foot: 1/8" weighs 1 lb.
<u>Durometer:</u>	65-75
<u>Temperature Range:</u>	-10 F to 190 F
<u>Minimum Tensile:</u>	725 PSI or 5 MPA
<u>Finish:</u>	Smooth
<u>Minimum Elongation:</u>	300%
<u>Gauges:</u>	1/8", 1/4", 3/8", 1/2", 3/4", 1", 1.5" (custom gauges up to 2" thick are available upon request)
<u>Widths:</u>	4", 6", 8", 10", 12", 36", 48" (custom widths up to 78" are available upon request)
<u>Roll Length:</u>	25 or 50ft.
<u>Chemical Resistance:</u>	Good resistance to Ethanol, Formaldehyde, Glycerin, Sea Water, Boric Acid, and Chlorine Solutions. Not suited for use with Oils, Fuels, Solvents, or Hydraulic Fluids. For Skirtboard's compatibility with your specific medium please consult a Rubber-Cal representative.
<u>Applications:</u>	Street Sweepers, Abrasion Resistant Applications, Snowplow Blades, Airfield Applications, General Industrial Padding and Gasketing
<u>Flexibility:</u>	This hard durometer (65-75) sheet rubber offers limited pliability and elasticity.
<u>Custom Cuts:</u>	In addition to hand fabrication, this product can be fabricated using laser, die, and water-jet cut. Please submit your drawings for a price quote.
<u>Availability:</u>	Popular gauges and widths and stock.



Rubber Cal

Specifications and/or prices are subject to change without prior notice.

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Rubber-Cal, Inc.
620 West Warner Ave
Santa Ana, CA 92707
800-370-9152
www.rubbercal.com

GENERATOR DATA

GENSET MODEL#: CAT C27
VOLTAGE: 277/480 V
RATING: 800 KW
DRY WEIGHT: 14,600 LBS
OVERALL DIMENSIONS: 184"L x 67.8"W x 85.1"H

AIR VELOCITY

RADIATOR COOLING AIR: 42,377 CFM
COMBUSTION AIR: 2,217 CFM

ENCLOSURE:

INTAKE VELOCITY: 1138 ft/min
DISCHARGE VELOCITY: 1246 ft/min

WEIGHTS

GENSET: 14,600 LBS

TANK/BASEFRAME: 11,510 LBS (DRY)

ENCLOSURE: 12,000 LBS



1965 BENNETT DRIVE DELAND, FL. 32724

PHONE: 386-469-0070

WEBSITE:

WWW.COASTLINEPOWERSOLUTIONS.COM

TANK DATA

TANK TYPE: ENVIROSHIELD ECONOMY
TANK TOTAL CAPACITY: 4,800 GAL
SECONDARY WETTED SQFT AREA: 481 SQFT
SECONDARY TANK DIMENSIONS: 330"L x 102"W x 45"H
PRIMARY WETTED SQFT AREA: 435 SQFT
PRIMARY TANK DIMENSIONS: 320.75"L x 89.75"W x 41.125"H

TANK FITTING LEGEND

F - 2" OVERFILL PREVENTION VALVE - 4" NPT
G - MECH. FUEL GAUGE - 2" NPT
D - LEAK DETECTOR [LS-600] - 2" NPT
S - FUEL SUPPLY - 2" NPT (W/1" DROP TUBE)
R - FUEL RETURN - 2" NPT (W/1" DROP TUBE)
DB - SPILL BOX DRAIN - 1/2" HALF COUPLING
V - MAIN VENT - 2" NPT
SV - SECONDARY EMERGENCY VENT - 8" NPT
PV - PRIMARY EMERGENCY VENT - 8" NPT
H - HIGH FUEL LEVEL SENSOR [MADISON M-7000 EQ#682] - 2" NPT
L - LOW FUEL LEVEL SENSOR [MADISON M-7000] - 2" NPT
SP - SPARE - 2" NPT
VP - SECONDARY VACUUM PORT - 1/2" NPT
SD - SECONDARY DRAIN PORT - 1" NPT

CPS UL-142 DOUBLE WALL TANK & SPILL CONTAINMENT – [EQ#533]

*NOTES: 1. THIS IS A STANDARD LEGEND, SOME FITTINGS MAY NOT APPLY
2. TANK FITTING SIZES SHOWN ON PLAN ARE OPENING SIZES

ISOLATOR DETAIL

ISOLATOR PART#: GP-1545 CHG 00
ISOLATOR QUANTITY: 6

SUBMITTAL OUTLINE:

SHEET	1-	COVER SHEET
SHEET	2-	DESIGN CRITERIA
SHEET	3-	PLAN VIEW
SHEET	4-	RIGHT SIDE ELEVATION
SHEET	5-	END VIEWS
SHEET	6-	PAD LAYOUT
SHEET	7-	ELECTRICAL DIAGRAM
SHEET	8-	LIFTING DIAGRAM
SHEET	9-	LIFTING DIAGRAM
SHEET	10-	STAIRS & PLATFORMS
SHEET	11-	STAIRS & PLATFORMS

SHIPPING NOTE:

UNIT TO BE SHIPPED IN 2 PIECE(S).
EXTRA TRUCK FOR SHIP LOOSE (IF APPLICABLE)

REVISIONS	BY:	REV:
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PANTBODIC POWER

PROJECT: WALENDA BOOSTER STATION WBS

SEE COVER PAGE OF SUBMITTAL FOR
ESTIMATED WEIGHTS AND DIMENSIONS

PROJECT #: 20240054

COMPONENT CAD DRAWINGS

TITLE: COVER SHEET

SHEET: 1 OF 11



1965 BENNETT DRIVE, DELAND, FL. 32724
PHONE: 386-469-0070

DESIGN CRITERIA	
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COASTLINE POWER SOLUTIONS TO PROVIDE THE FOLLOWING:

WEATHER RESISTANT, LEVEL 4 SOUND ATTENUATED, ALUMINUM ENCLOSURE:

- ENCLOSURE EXTERIOR TO BE OF .080",3003-H14 ALUMINUM, FORMED, PANEL CONSTRUCTION, PRE-PAINTED FINISH (STANDARD COLOR WHITE)
- AIR INTAKE: SOUND ATTENUATED INTAKE HOOD WITH SOUND BAFFLES AND BIRD SCREEN. INSULATED WITH 3" SOUND ATTENUATING FIRE BLANKET RETAINED WITH .050" PERFORATED ALUMINUM.
- AIR DISCHARGE: SOUND ATTENUATED DISCHARGE HOOD WITH GRAVITY DAMPERS AND BIRD SCREEN. INSULATED WITH 3" SOUND ATTENUATING FIRE BLANKET RETAINED WITH .032" MILL FINISHED ALUMINUM.
- 3" SOUND ATTENUATING FIRE BLANKET IN THE WALLS AND CEILINGS. INSULATION RETAINED WITH .050" PERFORATED ALUMINUM. ENCLOSURE IS DESIGNED TO REDUCE SOURCE SPL BY 30 DB (A) @ 7M IN A FREE-FIELD ENVIRONMENT.
- (4) 36" SINGLE, ACCESS DOORS WITH PADLOCKING PROVISIONS AND CORROSION RESISTANT HARDWARE.
- SILENCER SUPPORTS FOR COASTLINE FURNISHED INTERIOR MOUNTED, INTERNALLY INSULATED, CRITICAL GRADE SILENCER.
- INSTALL COASTLINE PROVIDED EXHAUST DISCHARGE ELBOW AND RAIN CAP.
- INSTALL COASTLINE PROVIDED EXHAUST FLEX CONNECTORS, EXHAUST GASKETS AND BOLT KITS.
- RAIN COLLAR AND RAIN SHIELD AT EXHAUST PENETRATION IN ROOF.
- EXTEND OIL AND COOLANT DRAINS TO EXTERIOR OF ENCLOSURE.
- EXTEND CRANK CASE DISPOSAL TO RADIATOR DISCHARGE (IF APPLICABLE)
- CAMBERED ROOF DESIGN TO AID IN WATER SHEDDING.
- ENCLOSURE SUITABLE FOR 170 MPH WIND LOADING
- ENCLOSURE TO BEAR THE INSIGNIA OF THE FLORIDA DEPARTMENT OF BUSINESS AND PROFESSIONAL REGULATION TO DOCUMENT COMPLIANCE WITH THE 2023 FLORIDA BUILDING CODE.

- WIRE CUSTOMER PROVIDED AND INSTALLED JACKET WATER HEATERS TO JUNCTION BOX.
- WIRE CUSTOMER PROVIDED AND INSTALLED GENERATOR STRIP HEATERS TO JUNCTION BOX.
- MOUNT AND WIRE CUSTOMER PROVIDED BATTERY CHARGER TO JUNCTION BOX AND DC OUTPUT FOR BATTERIES VIA TERMINATION ON STARTER.
- ALL ELECTRICAL TO BE RUN IN EMT OR LFMC TO MEET NFPA 70.

- CAPACITY BASED ON 72 HOURS @ 57.3GPH (100% LOAD) 4,130 USEABLE GALLONS
- 10GA MILD STEEL PRIMARY TANK, 7GA MILD STEEL SECONDARY TANK
- MECHANICAL FUEL LEVEL GAUGE (KRUGER MODEL H EQ#730)
- SUPPLY AND RETURN CONNECTIONS
- 2" FILL WITH LOCKABLE CAP WITH FDEP SPILL CONTAINMENT WITH OVERFILL PREVENTION VALVE (MORRISON 9095AA-0200AV EQ#851)
- NORMAL AND EMERGENCY VENT FITTINGS INSTALLED PER UL-142
- INTERSTITIAL SPACE WITH FDEP APPROVED LEAK DETECTION SWITCH (MADISON M-7000 EQ#682) WIRED TO GENERATOR CONTROL PANEL (FINAL TERMINATION TO TERMINAL STRIP TO BE DONE BY INSTALLING TECHNICIAN)
- LOW LEVEL FUEL ALARM SWITCH (MADISON M-7000 EQ#682) SET @ 35% REMAINING CAPACITY WIRED TO GENERATOR CONTROL PANEL (FINAL TERMINATION TO TERMINAL STRIP TO BE DONE BY INSTALLING TECHNICIAN)
- HIGH LEVEL FUEL ALARM SWITCH (MADISON M-7000 EQ#682) SET @ 90% TANK CAPACITY WIRED TO GENERATOR CONTROL PANEL (FINAL TERMINATION TO TERMINAL STRIP TO BE DONE BY INSTALLING TECHNICIAN)
- CABLE STUB UP OPENING UNDER CIRCUIT BREAKER
- GENERATOR MOUNTING BEAMS
- 2 LIFTING POINTS PER SIDE (4 TOTAL) FOR LIFTING GENERATOR SET, ENCLOSURE AND TANK (EMPTY)
- TANK PRIMED WITH TWO PART EPOXY ZINC BASED PRIMER AND TWO-PART POLYESTER/POLYURETHANE TOPCOAT -GLOSS BLACK.

- TANK SEALED AND SHIPPED UNDER VACUUM PER FLORIDA ADMINISTRATIVE CODE CHAPTER 62-762 AND NFPA30.
- TANK VACUUM TO BE VERIFIED AND DOCUMENTED PER NFPA-30 IMMEDIATELY UPON RECEIPT AND PLACEMENT AT THE JOB SITE.

- (2) SET OF OSHA COMPLIANT STAIRS WITH RAILINGS AND 120" LONG X 42" WIDE WALKWAY WITH RAILINGS
- RAILINGS TO BE CONSTRUCTED OF 1 1/2" ALUMINUM TUBE.
- STEPS AND WALKWAYS CONSTRUCTED OF EXTRUDED ALUMINUM
- LEVELING PADS

- UNLOAD CUSTOMER SUPPLIED GENERATOR SET AND COMPONENTS FROM TRUCKS.
- INSTALL GENERATOR TO FUEL TANK BASE.
- PLUMB FUEL TANK TO GENERATOR SET ENGINE.
- PROVIDE GASKET MATERIAL BETWEEN ENCLOSURE AND BASE TANK
- ATTACH ENCLOSURE TO DOUBLE WALL BASE/ FUEL TANK.
- INSTALL CPS SUPPLIED EXHAUST SILENCER AND COMPONENTS.
- PROVIDE FOR SHIP LOOSE 4" X ¼" NEOPRENE PADDING FOR INSTALLATION BETWEEN TANK AND PAD
- LOAD UNIT ONTO CUSTOMER PROVIDED TRUCKS FOR SHIPMENT.

- CAT 800KW ENGINE GENERATOR SET PACKAGE WITH FACTORY INSTALLED OPTIONS
- UNIT MOUNTED MAIN LINE CIRCUIT BREAKER
- BATTERY CHARGER
- VIBRATION ISOLATORS

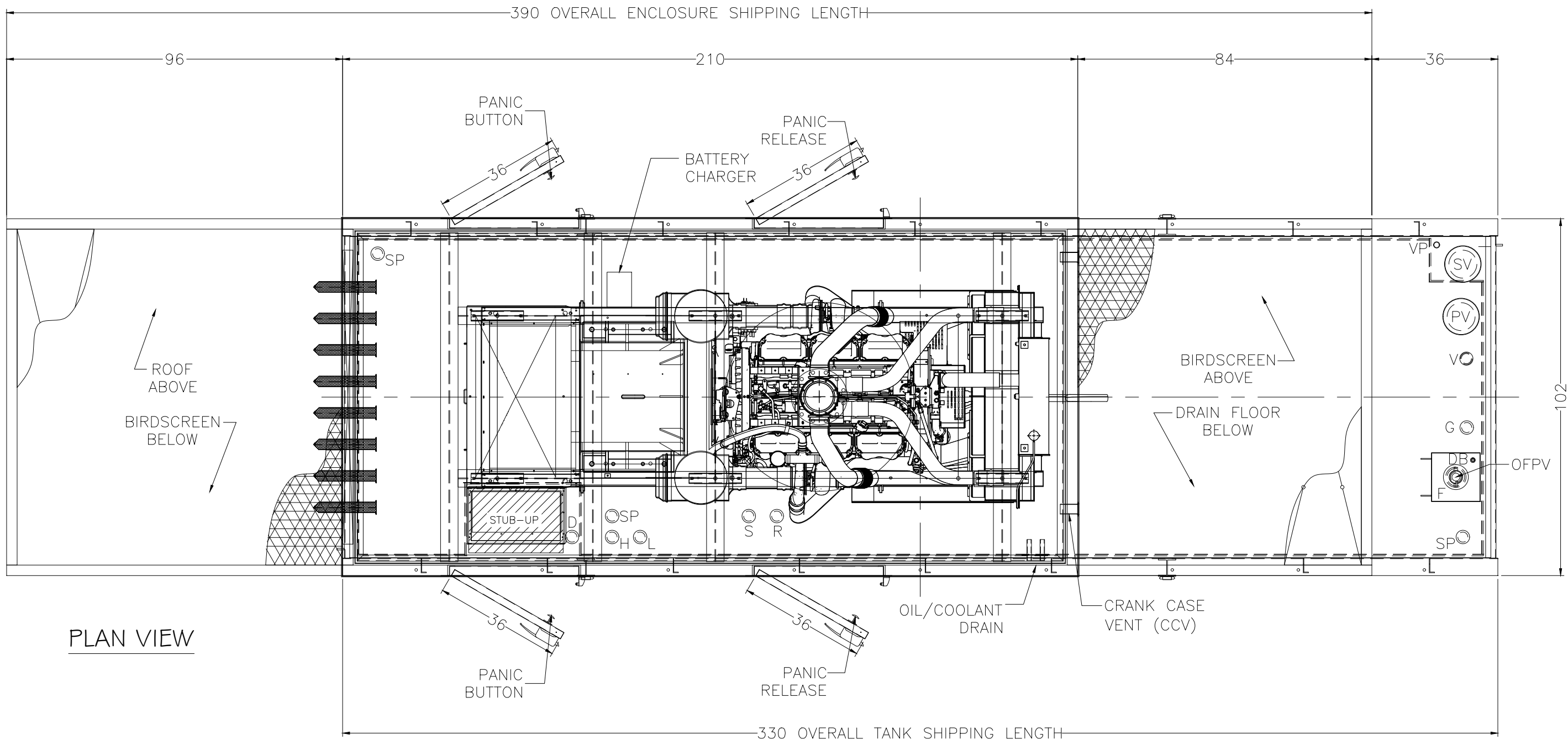
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REV:	DESCRIPTION:	DATE:	BY:	REV:	DESCRIPTION:
4					

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PROJECT:		WALENDA BOOSTER STATION WBS	
DRAWN BY:	DATE:	REVIEWED BY:	SCALE:
JRP	4/8/2024	JD/EJ	NTS

SEE COVER PAGE OF SUBMITTAL FOR
ESTIMATED WEIGHTS AND DIMENSIONS

PROJECT #:	20240054
COMPONENT CAD DRAWINGS	
LF3398	
TITLE: DESIGN CRITERIA	
SHEET:	2 OF 11





PLAN VIEW

REVISIONS			
REV.	DESCRIPTION:	DATE:	BY:

CUSTOMER:		PANTROPIC POWER	
PROJECT:		WALENDA BOOSTER STATION WBS#4	
DRAWN BY:	JRP	DATE:	4/8/2024
REVIEWED BY:	JD/EJ	SCALE:	NTS

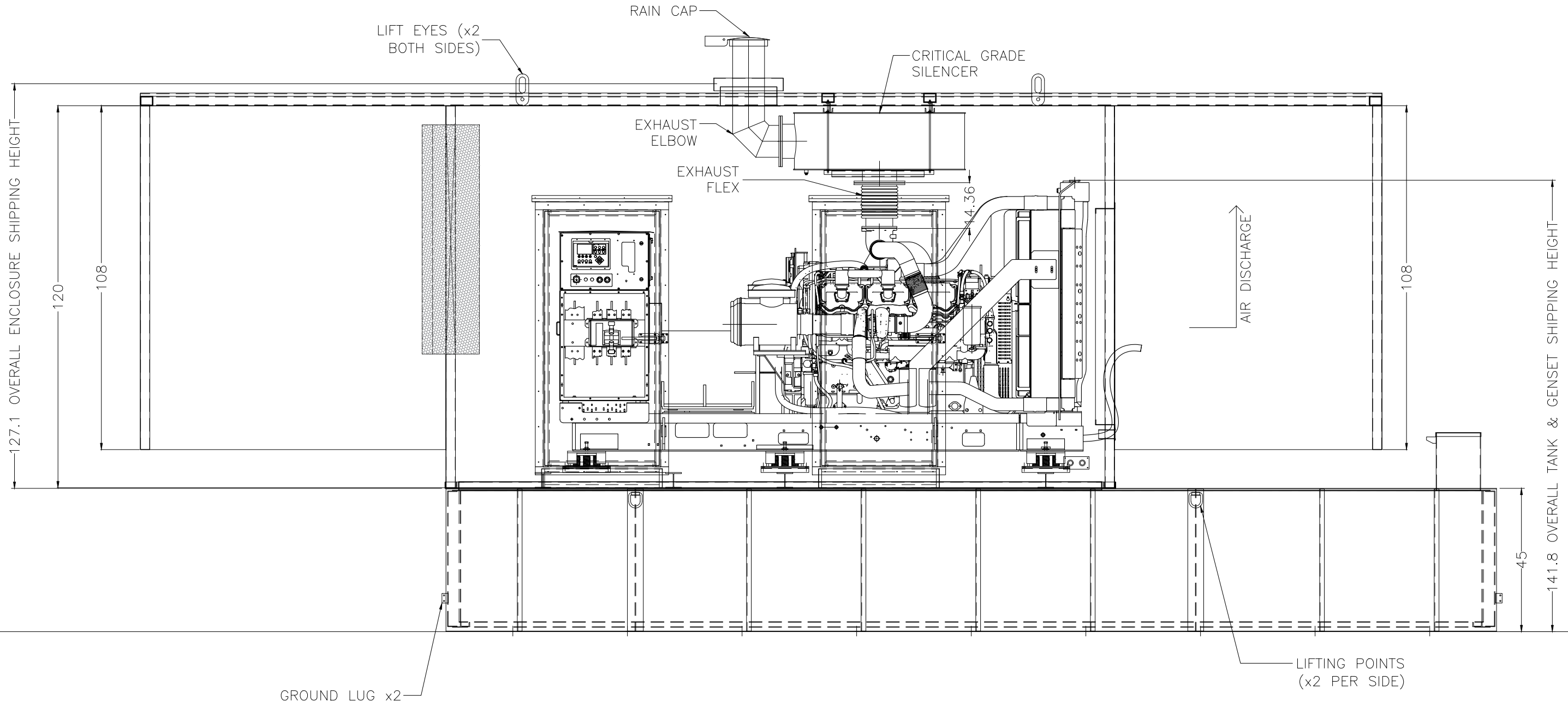
SEE COVER PAGE OF SUBMITTAL FOR ESTIMATED WEIGHTS AND DIMENSIONS

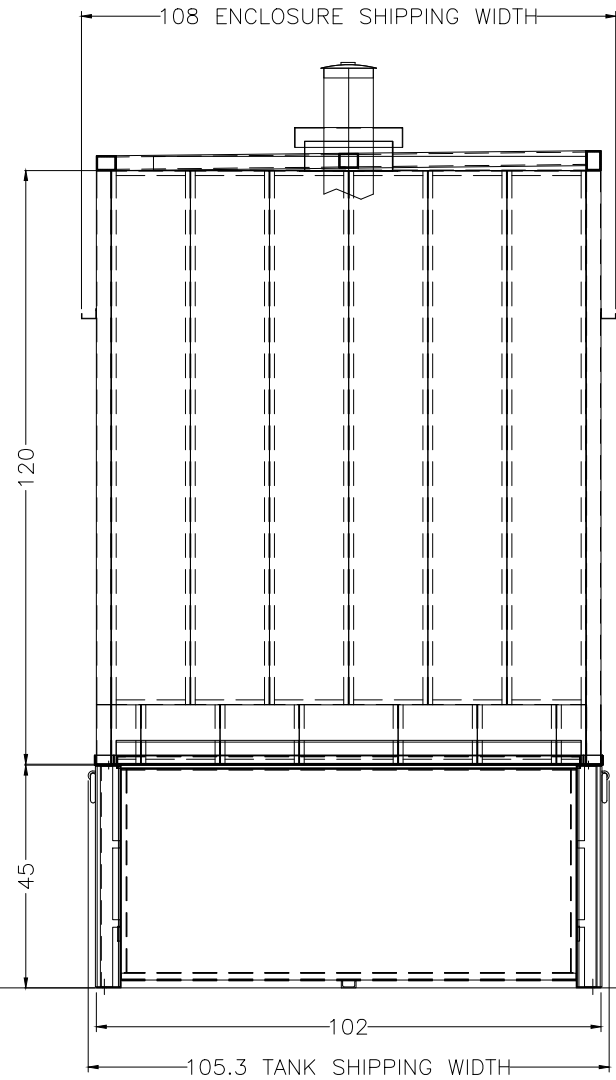
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LF3398	---
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SHEET:	3 OF 11



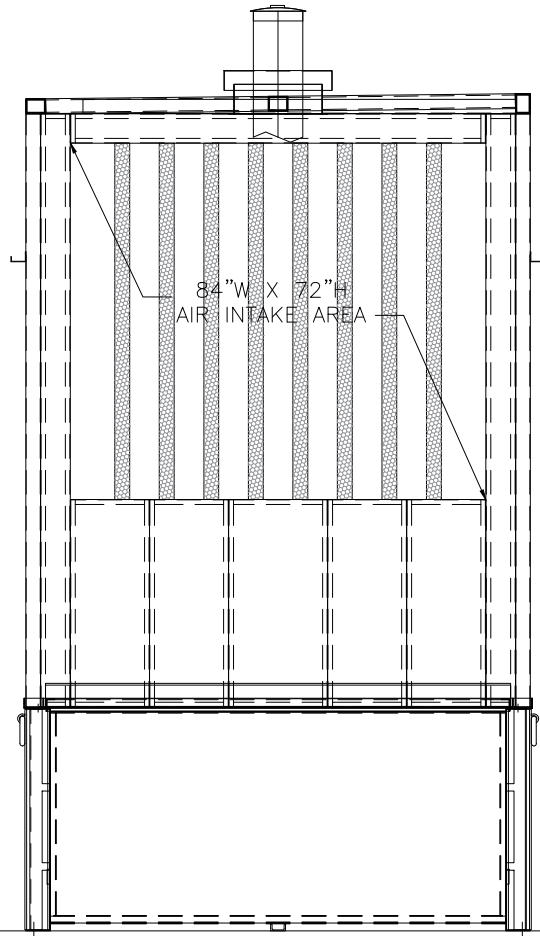
1965 BENNETT DRIVE DELAND FL 32724
PHONE: 386-469-0070
WEBSITE: WWW.COASTLINEPOWERSOLUTIONS.COM

RIGHT SIDE ELEVATION

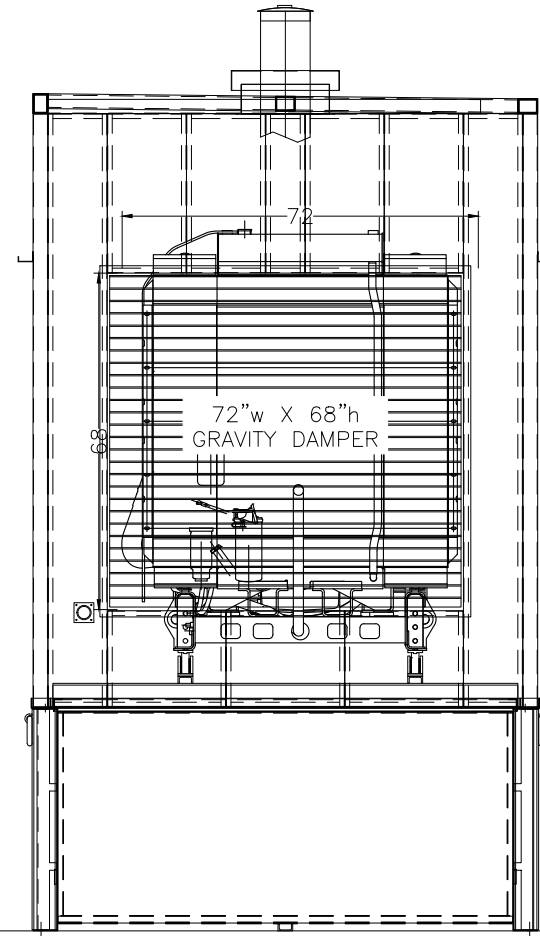




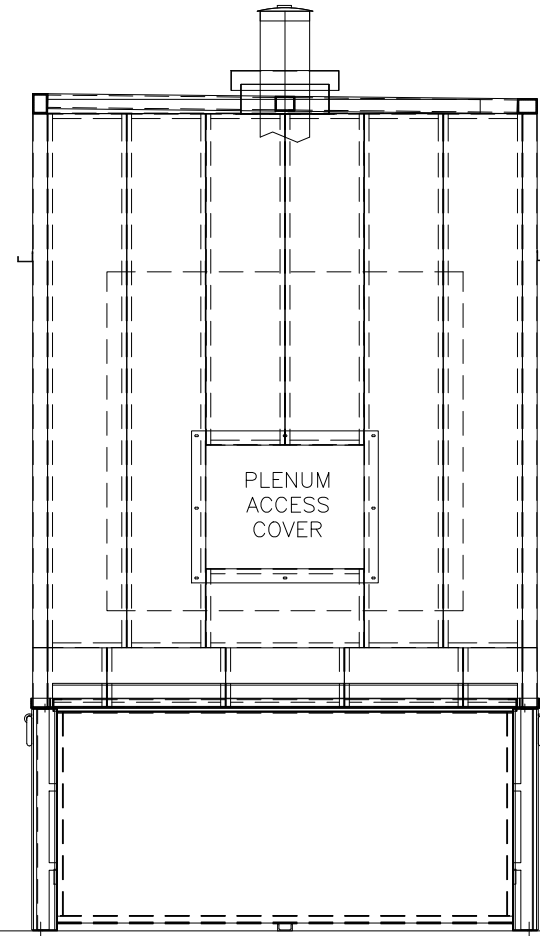
INTAKE END
W/ HOOD



INTAKE END
W/O HOOD



DISCHARGE END
W/O HOOD



DISCHARGE END
W/ HOOD

PROJECT #: 20240054

COMPONENT CAD DRAWINGS

LF3398

TITLE: ELEVATIONS

SHEET: 5 OF 11

CUSTOMER:

PANTROPIC POWER

PROJECT:

WALENDA BOOSTER STATION WBS#4

DRAWN BY:

JRP

DATE:

4/8/2024

REVIEWED BY:

JD/EJ

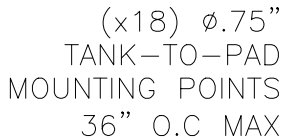
SCALE:

NTS

SEE COVER PAGE OF SUBMITTAL FOR
ESTIMATED WEIGHTS AND DIMENSIONS

REVISIONS

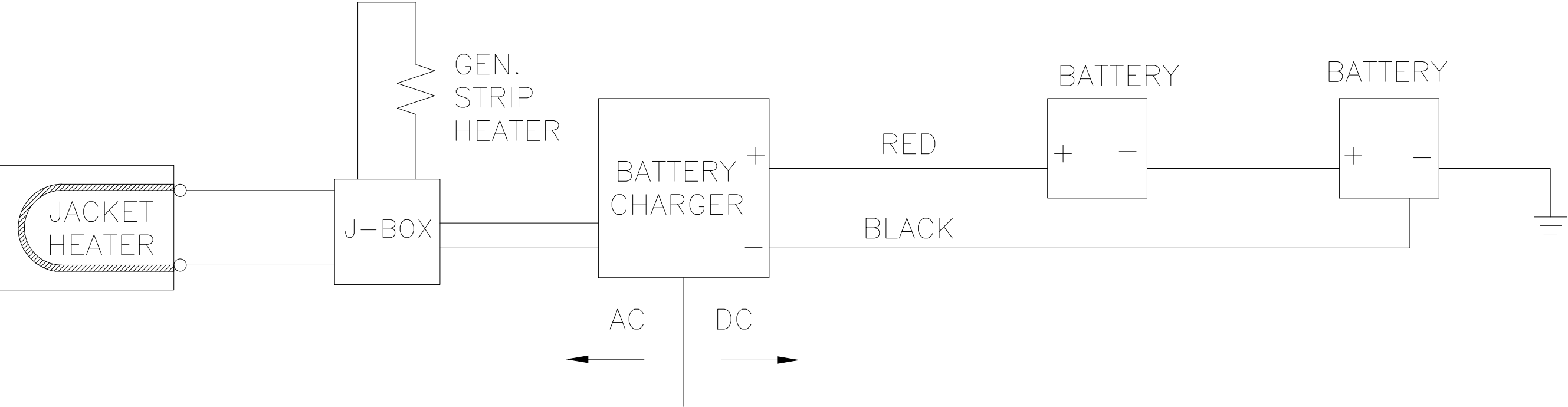
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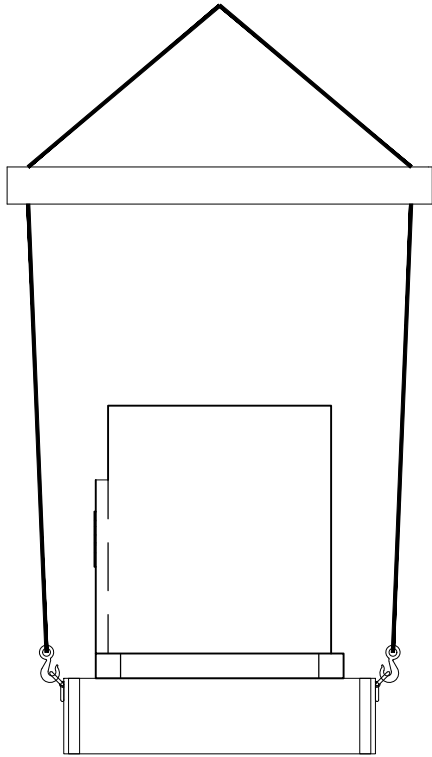
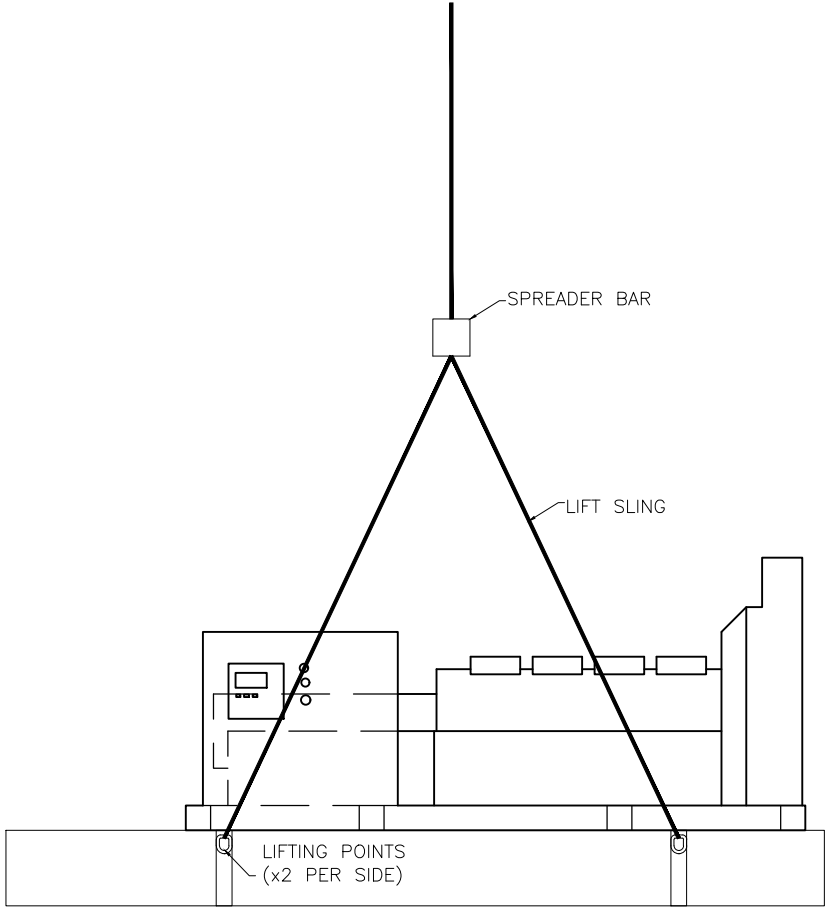
-BORDER LINE SHOWN FOR
RECOMMENDED MINIMUM
PAD EXTENTS

COASTLINE
POWER SOLUTIONS

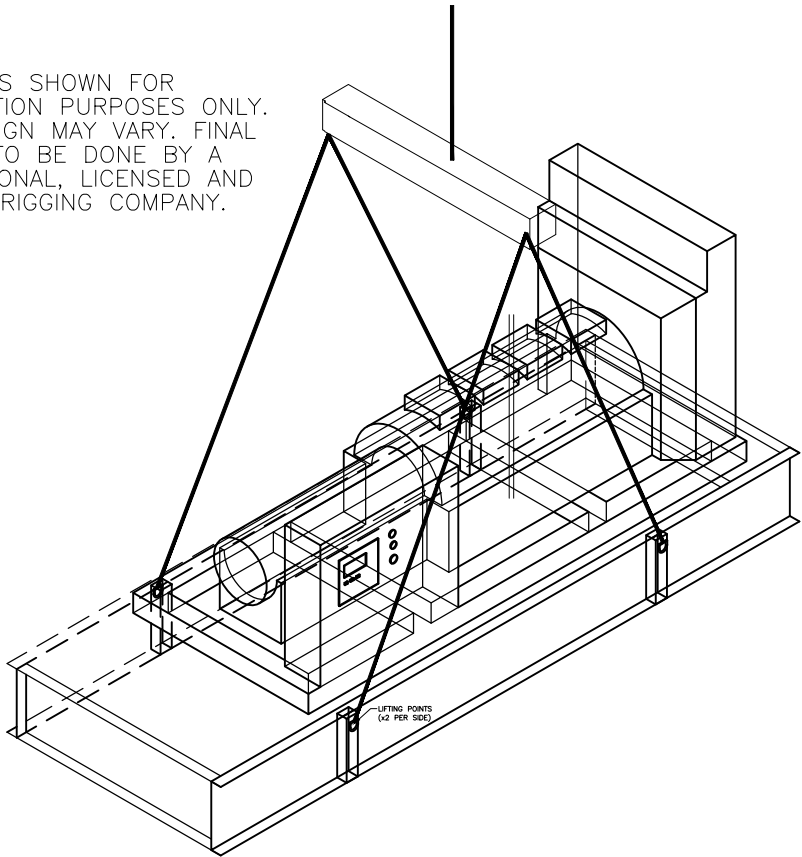
1961 BENNETT DRIVE, DELAND, FL 32724
PHONE: 386-469-0070
WEBSITE: WWW.COASTLINEPOWERSOLUTIONS.COM



SHARED NEUTRALS NOT ALLOWED



NOTE:
RIGGING IS SHOWN FOR
ILLUSTRATION PURPOSES ONLY.
UNIT DESIGN MAY VARY. FINAL
RIGGING TO BE DONE BY A
PROFESSIONAL, LICENSED AND
INSURED RIGGING COMPANY.



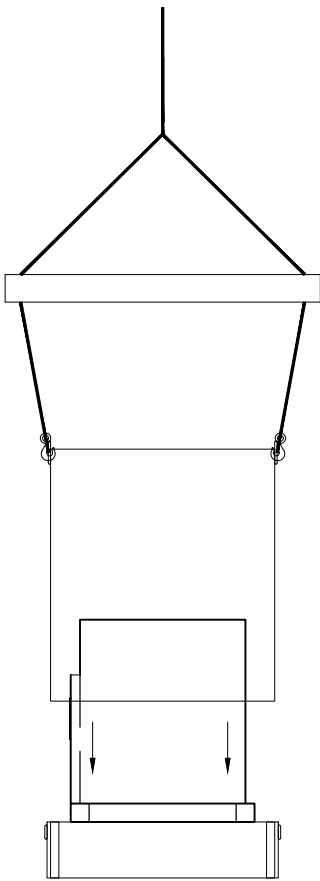
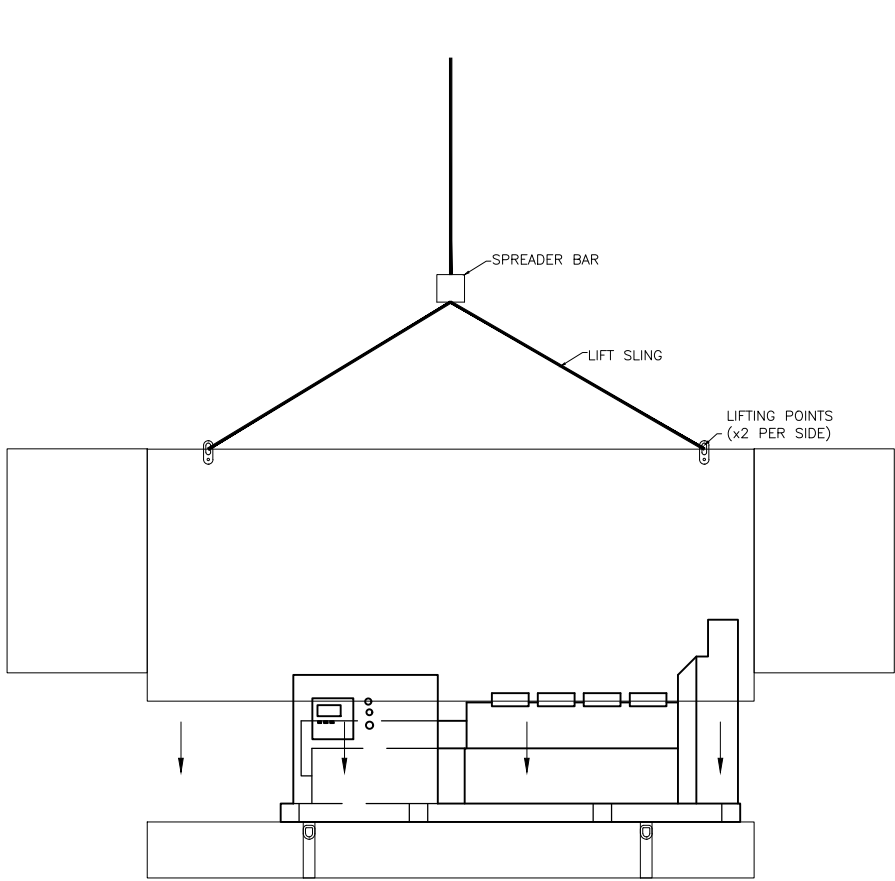
TANK AND GENSET

REVISIONS			
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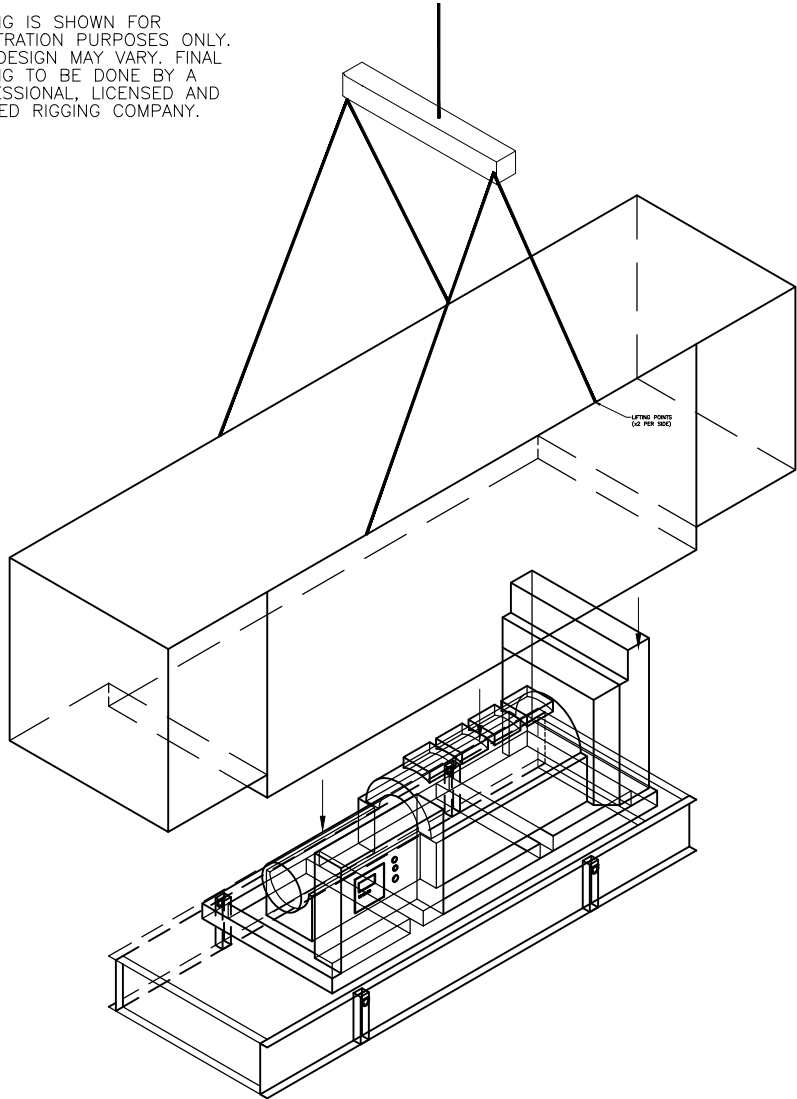
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PROJECT:		WALENDA BOOSTER STATION WBS#4	
DRAWN BY:	JRP	DATE:	4/8/2024
REVIEWED BY:	JD/EJ	SCALE:	NTS

SEE COVER PAGE OF SUBMITTAL FOR
ESTIMATED WEIGHTS AND DIMENSIONS

PROJECT #:	20240054
COMPONENT CAD DRAWINGS	---
LF3398	---
TITLE: TYP. LIFTING DIAGRAM	---
SHEET:	8 OF 11



NOTE:
RIGGING IS SHOWN FOR
ILLUSTRATION PURPOSES ONLY.
UNIT DESIGN MAY VARY. FINAL
RIGGING TO BE DONE BY A
PROFESSIONAL, LICENSED AND
INSURED RIGGING COMPANY.



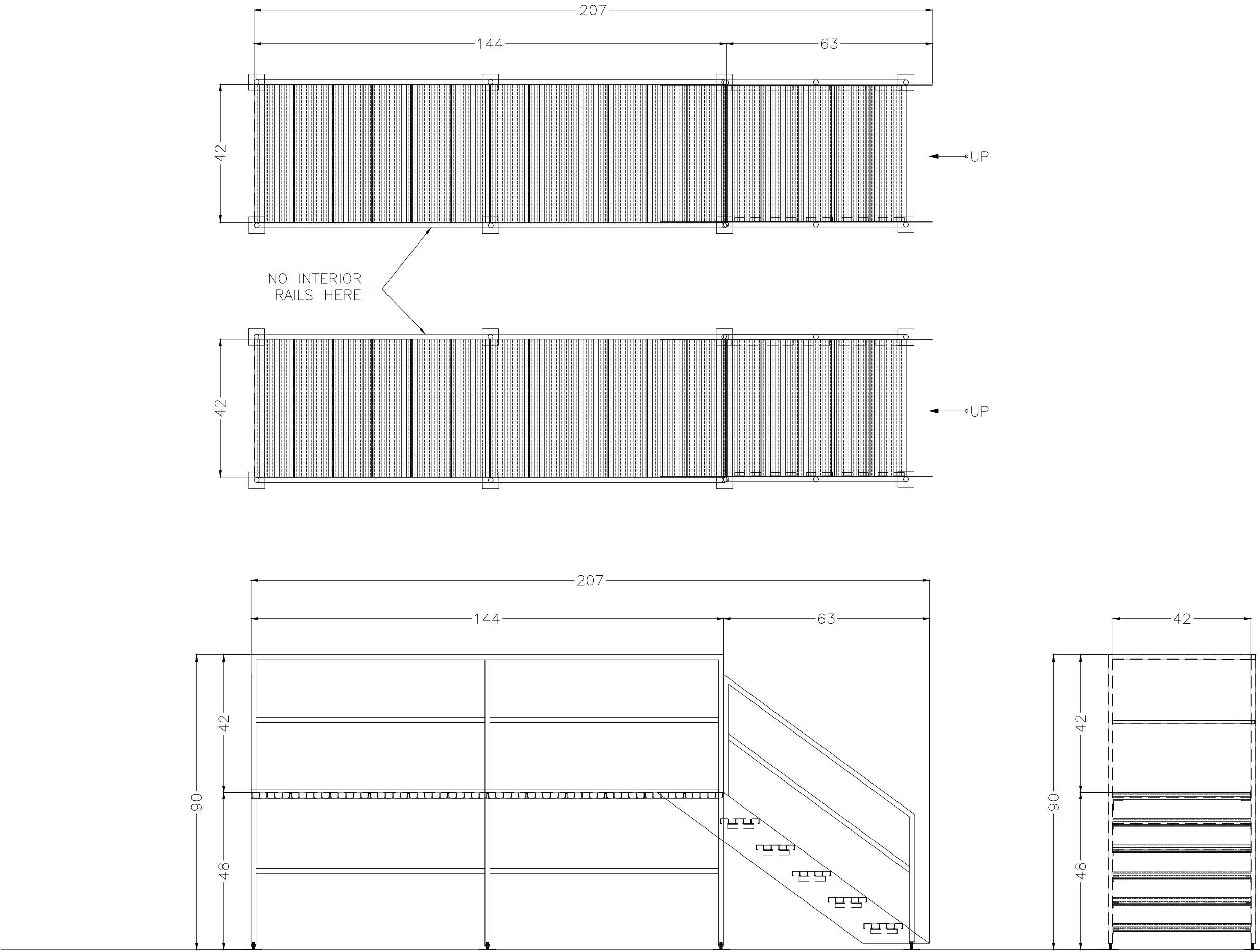
ENCLOSURE TO TANK

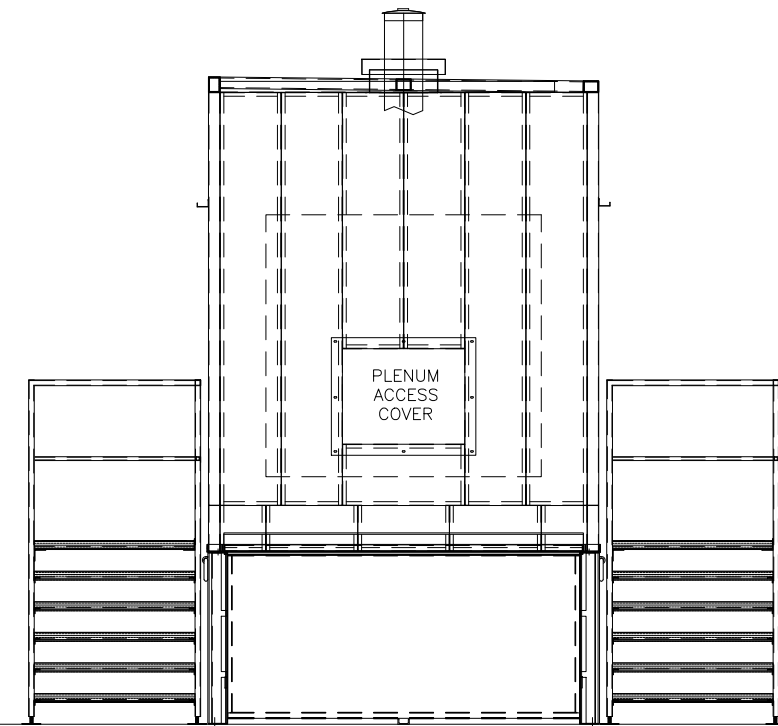
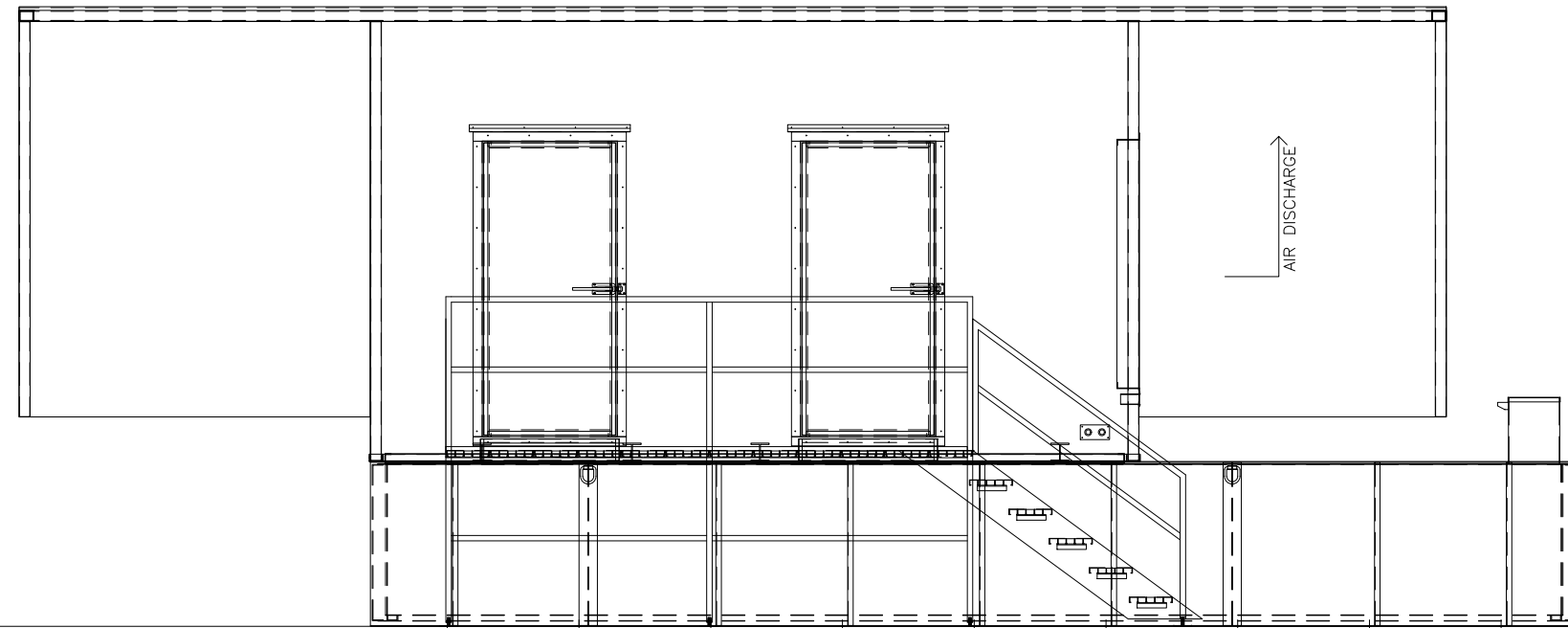
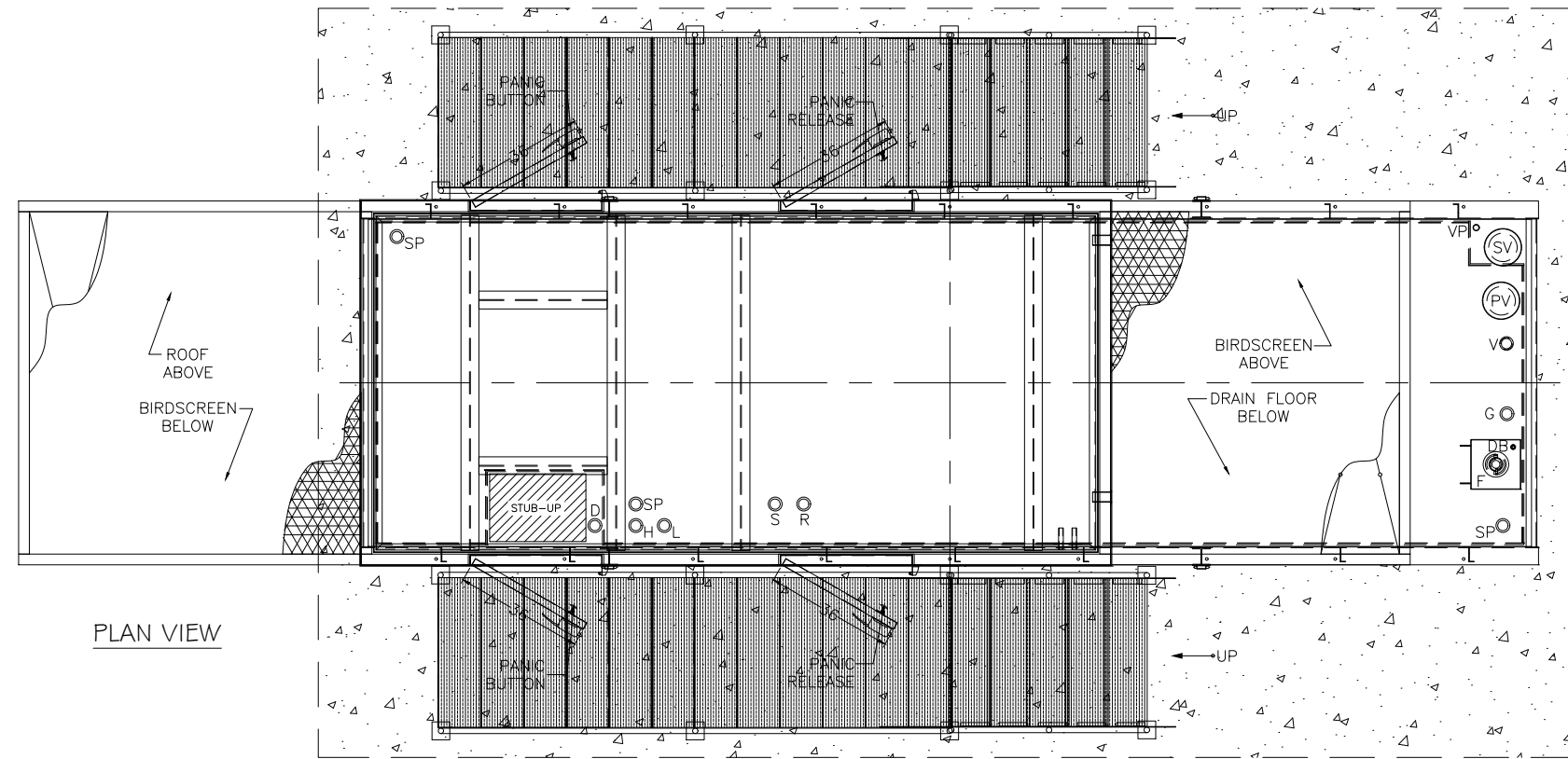
REVISIONS			
REV.	DESCRIPTION:	DATE:	BY:

CUSTOMER:		PANTROPIC POWER	
PROJECT:		WALENDA BOOSTER STATION WBS#4	
DRAWN BY:	JRP	DATE:	4/8/2024
REVIEWED BY:	JD/EJ	SCALE:	NTS

SEE COVER PAGE OF SUBMITTAL FOR
ESTIMATED WEIGHTS AND DIMENSIONS

PROJECT #:	20240054
COMPONENT CAD DRAWINGS	---
LF3398	---
TITLE: TYP. LIFTING DIAGRAM	---
SHEET:	9 OF 11



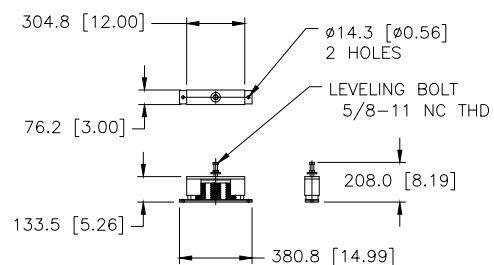
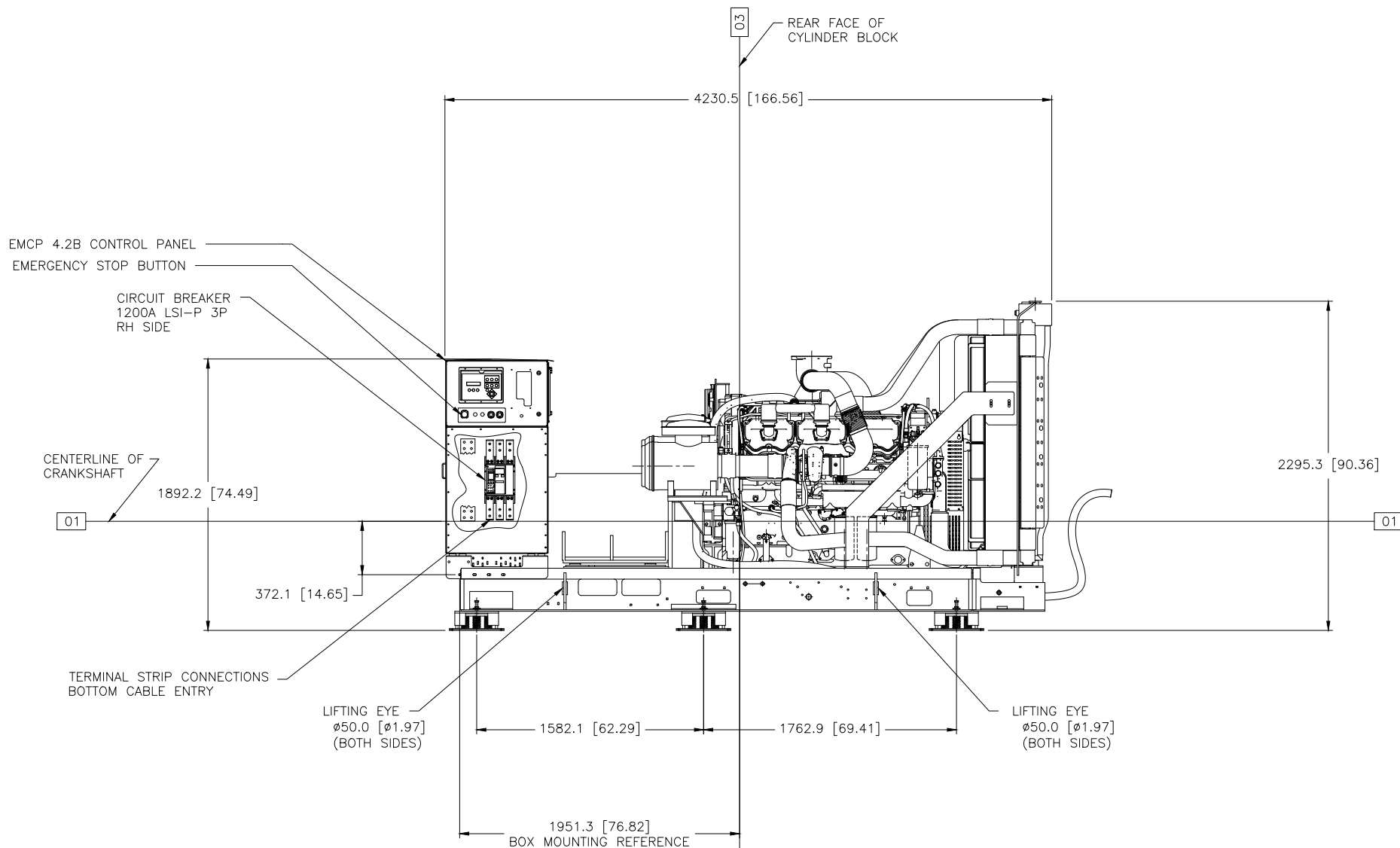


REVISIONS							
REV.	DESCRIPTION:	DATE:	BY:	REV:	DESCRIPTION:	DATE:	BY:
4							

CUSTOMER:	PANTROPIC POWER	
	PROJECT:	
WALENDA BOOSTER STATION WBS#		
DRAWN BY:	DATE:	SCALE:
JRP	4/8/2024	1" = 10'

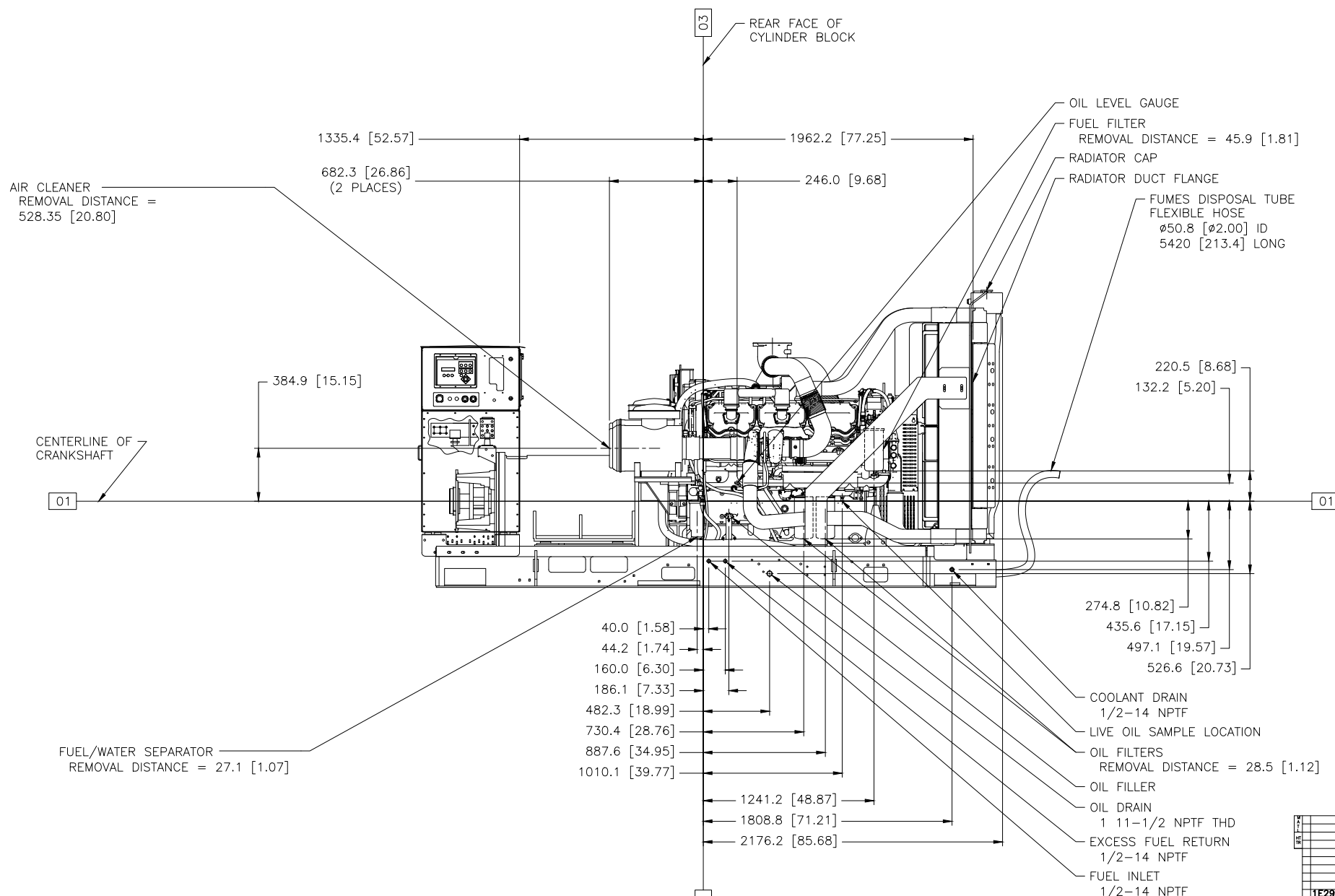
SEE COVER PAGE OF SUBMITTAL FOR
ESTIMATED WEIGHTS AND DIMENSIONS

PROJECT #:	20240054
COMPONENT CAD DRAWINGS	
LF3398	--- --- --- ---
TITLE: STAIRS & PLATFORMS	
SHEET:	11 OF 11



C27 LV 60HZ 1800RPM T2/LOW BSFC
METRIC [INCH]
RIGHT SIDE VIEW
LF-3398 ENGINE & 5088062 RADIATOR
LF-3622 RAIL & 3850626 ALTERNATOR
LF-2851 RH EXT BOX
LF-2833 RH CONTROL BOX
LF-9901 4.2B EMCP
LF-2854 BREAKER LF-4800 3P FRAME

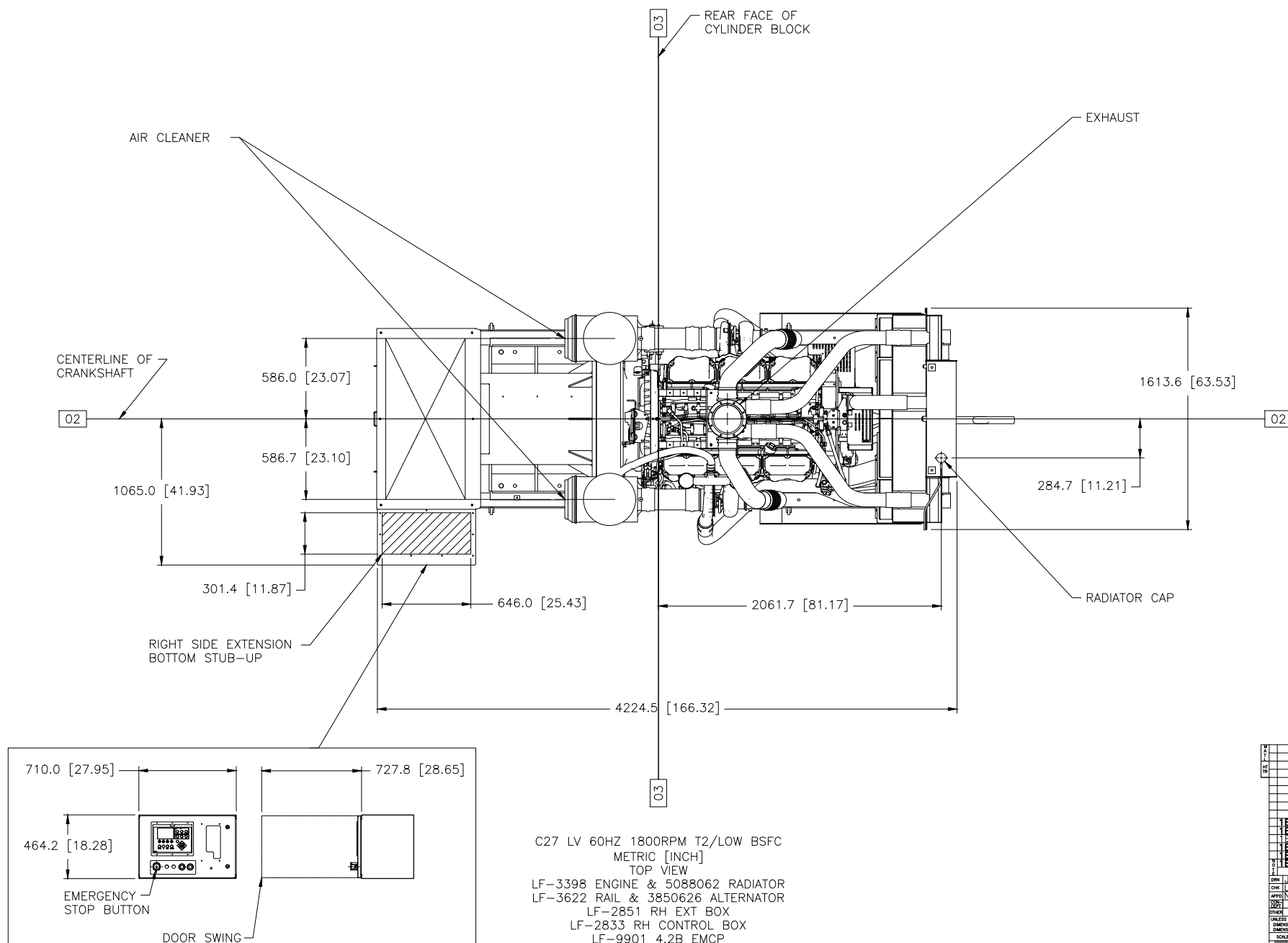
1	1E2968 IDENT	
2	1E2753 DRAWING-AUTOCAD	
3	1E0138WIRING MARKINGS	
4	1E0015G CONFIDENTIALITY	
5	1E0012A INTERPRETATION	
6	1E0011 INTER & TOL	
7	SPEC NO.	
8	NAME	
9	DATE	
10	APP'D	
11	CHK'D	
12	OTHER	
13	RECORDS	X
14	UNLESS OTHERWISE SPECIFIED	
15	DIMENSIONS ARE IN MM (INCH)	
16	DIMENSIONS ARE IN IN (MM)	
17	SCALE 1 = 10	
18	1/8" (3mm) 3/4" (19mm)	
19	PROJECTION	
20	DATE	02 01 NOV 19
21	SHEET 2 OF 7	
22	CATERPILLAR INC.	
23	FOR INFORMATION REFER TO THE MANUAL OF CONSTRUCTION AND MAINTENANCE	
24	INSTALLATION ENGINEER	
25	C27 PACKAGE GENSET	
26	533-1403	
27	W927	



C27 LV 60HZ 1800RPM T2/LOW BSFC
 METRIC [INCH]
 RIGHT SIDE VIEW
 LF-3398 ENGINE & 5088062 RADIATOR
 LF-3622 RAIL & 3850626 ALTERNATOR
 LF-2851 RH EXT BOX
 LF-2833 RH CONTROL BOX
 LF-9901 4.2B EMCP
 LF-2854 BREAKER LF-4800 3P FRAME

1	1E2968 IDENT	
2	1E2753 DRAWING-AUTOCAD	
3	1E0138 WIRING MARKINGS	
4	1E00136 CONFIDENTIALITY	
5	1E0012A INTERPRETATION	
6	1E0011 INTER & TOL	
7	SPEC NO.	
8	REV	
9	APP'D	
10	CHK'D	
11	DATE	
12	OTHER	
13	RECORDS	X
14	SCALE	10
15	UNIT	MM
16	DATE	02/01/NOV19
17	SHEET	2 OF 7
18	PROJECTION	1
19	DATE	
20	DATE	
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98	DATE	
99	DATE	
100	DATE	

CATERPILLAR INC.
 INSTALLATION ENGINEER
 C27 PACKAGE GENSET
 533-1403



C27 LV 60HZ 1800RPM T2/LOW BSFC
METRIC [INCH]
TOP VIEW
LF-3398 ENGINE & 5088062 RADIATOR
LF-3622 RAIL & 3850626 ALTERNATOR
LF-2851 RH EXT BOX
LF-2833 RH CONTROL BOX
LF-9901 4.2B EMCP
LF-2854 BREAKER LF-4800 3P FRAME

RIGHT SIDE EMCP 4.2B GENERATOR CONTROLLER

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	12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Image Shown may not Reflect Actual Package.

SR5 — 1200 Frame

Standby Power

60 Hz, 1800 rpm 750 – 800 ekW

Prime Power

60 Hz, 1800 rpm 680 – 725 ekW

Features

General

- Standards: meets the requirements of NEMA, IEC, ISO, IEEE, BS, AS
- Industry leading insulation technology
- Proven mechanical and electrical design
- Reliable and durable construction
- Improved excitation system for high power quality
- Improved motor starting capability
- Radio frequency noise suppression better than industry standards
- Superior construction and testing

Standard

- 3 Phase brushless, salient pole
- NEMA Class H insulation
- Class H Temperature rise at 40°C ambient
- 2/3 winding pitch
- Low voltage: Random Wound and Internal Excitation
- Standard voltages:
60 Hz: 480V, 4160V
- Busbar connections:
60 Hz models: NEMA standard hole pattern

Advanced Features

- Enhanced performance from fuel injection timing and limiting
- PM excitation capability to IE excitation
- Space heater kit
- Bearing temperature detectors
- Optional voltages:
60 Hz: 380V, 440V, 600V, 2400V
- Oversized generators for Class F temperature rise
- UL Listing
- CSA test and certification

NEMA MG-1 Temperature Rise (over 40° C ambient)

	Class A	Class B	Class F	Class H
Standby	85°C	105°C	130°C	150°C
Prime / Continuous	60°C	80°C	105°C	125°C

Specifications

Type

Brushless, revolving field solid-state automatic voltage regulator

Construction

One bearing three phase, series star connected

Enclosure

Drip proof IP23, guarded

Alignment

Cat® pilot shaft, single bearing only

Over-speed capability

60 Hz 125% of synchronous speed

50 Hz 150% of synchronous speed

Waveform deviation, line to line, no load

Less than 2%

Paralleling capability

Standard with adjustable voltage droop

Voltage regulator

3 Phase sensing with variable Volts-Per Hertz response

Voltage regulation, steady state

+/- 0.5%

Voltage regulation with 3% speed change

+/- 0.5%

Voltage gain

Adjustable to compensate for engine speed droop and line loss

Number of leads

6

Product Support

- Standard Caterpillar warranty
- Optional extended Caterpillar warranty
- Serviceable parts available through Caterpillar Parts System
- Service intervals agree with recommended engine practices

Serviceability

- Stator leads exit top
- Replaceable bearing sleeve(s) for longer life and lower repair cost
- Easy access to serviceable parts
- Improved wire and terminal identification ensuring reliable connection

Cable Entry

- Top cable entry on LV package

Main Stator Construction

The 1200 frame generators use Round lamination stator design.

Stator coil pitch, coil distribution designed to produce optimum waveform and minimum total harmonic distortion. Stator slots are insulated by slot liners and coil separators. Slot liners, coil separators, and top sticks provide a minimum of 25 mm (1 in) distance from the coil to ground. The thickness of liners, separators, and phase sheets provides superior protection between phases and ground.

Low voltage stator windings are given a 3000 volt "high pot" test (150% of the NEMA and IEC requirements for 460 volt generators) before the insulation is applied. The stators are then given a vacuum impregnation treatment of polyester material, followed by an application of epoxy resin. This sealed stator is then given a final 2000 volt "high pot" test.

Rotor Construction

The main rotor is constructed using a precision "wet" layer winding process with epoxy painted on the bare rotor and on each layer. This ensures bonding of all the wire layers together, bonding of the coils to the rotor laminations, and a sealed insulation system. The rotor is put in the oven for curing the epoxy.

The exciter rotor is machine wound and receives a trickle coat of a fungus-resisting resin. Numerically controlled turning and grinding machines produce rotor shafts with close repeatable tolerances. Grade-8 bolts are used wherever joints are subject to induced stresses. A complete coating of red sealer is applied to protect the rotors and shaft from corrosion.

Every production rotor is dynamically balanced in two planes to within 0.0508 mm deflection peak-to-peak amplitude and run at rated speed before assembly into the stator.

Information contained in this publication may be considered confidential. Discretion is recommended when distributing. Materials and specifications are subject to change without notice.

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GENERATOR DATA

Selected Model

Engine: C27 **Generator Frame:** 1268 **Genset Rating (kW):** 800.0 **Line Voltage:** 480
Fuel: Diesel **Generator Arrangement:** 3850624 **Genset Rating (kVA):** 1000.0 **Phase Voltage:** 277
Frequency: 60 **Excitation Type:** Permanent Magnet **Pwr. Factor:** 0.8 **Rated Current:** 1202.8
Duty: STANDBY **Connection:** SERIES STAR **Application:** EPG **Status:** Current

Version: 41205 /42979 /41379 /9960

Spec Information

Generator Specification			Generator Efficiency		
Frame: 1268	Type: SR5	No. of Bearings: 1	Per Unit Load	kW	Efficiency %
Winding Type: RANDOM WOUND			0.25	200.0	92.3
Connection: SERIES STAR			0.5	400.0	94.8
Phases: 3			0.75	600.0	95.2
Poles: 4			1.0	800.0	95.2
Sync Speed: 1800					
Flywheel: 18.0					
Housing: 0					
No. of Leads: 12					
Wires per Lead: 2					
Generator Pitch: 0.6667					

Reactances	Per Unit	Ohms
SUBTRANSIENT - DIRECT AXIS X''_d	0.1094	0.0252
SUBTRANSIENT - QUADRATURE AXIS X''_q	0.1189	0.0274
TRANSIENT - SATURATED X'_d	0.1354	0.0312
SYNCHRONOUS - DIRECT AXIS X_d	2.8802	0.6636
SYNCHRONOUS - QUADRATURE AXIS X_q	1.7292	0.3984
NEGATIVE SEQUENCE X_2	0.1141	0.0263
ZERO SEQUENCE X_0	0.0095	0.0022

Time Constants	Seconds
OPEN CIRCUIT TRANSIENT - DIRECT AXIS T'_{d0}	2.1110
SHORT CIRCUIT TRANSIENT - DIRECT AXIS T'_d	0.1000
OPEN CIRCUIT SUBTRANSIENT - DIRECT AXIS T''_{d0}	0.0130
SHORT CIRCUIT SUBTRANSIENT - DIRECT AXIS T''_d	0.0100
OPEN CIRCUIT SUBTRANSIENT - QUADRATURE AXIS T''_{q0}	0.1450
SHORT CIRCUIT SUBTRANSIENT - QUADRATURE AXIS T''_q	0.0100
EXCITER TIME CONSTANT T_e	0.0300
ARMATURE SHORT CIRCUIT T_a	0.0150

Short Circuit Ratio: 0.42

Stator Resistance = 0.0046 Ohms

Field Resistance = 0.435 Ohms

Voltage Regulation		Generator Excitation		
Voltage level adjustment: +/-	5.0%	No Load	Full Load, (rated) pf	
Voltage regulation, steady state: +/-	0.5%		Series	Parallel
Voltage regulation with 3% speed change: +/-	0.5%	Excitation voltage:	11.16 Volts	45.18 Volts Volts
Waveform deviation line - line, no load: less than	2.0%	Excitation current	0.93 Amps	3.1 Amps Amps
Telephone influence factor: less than	50			

Selected Model

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Generator Mechanical Information

Center of Gravity

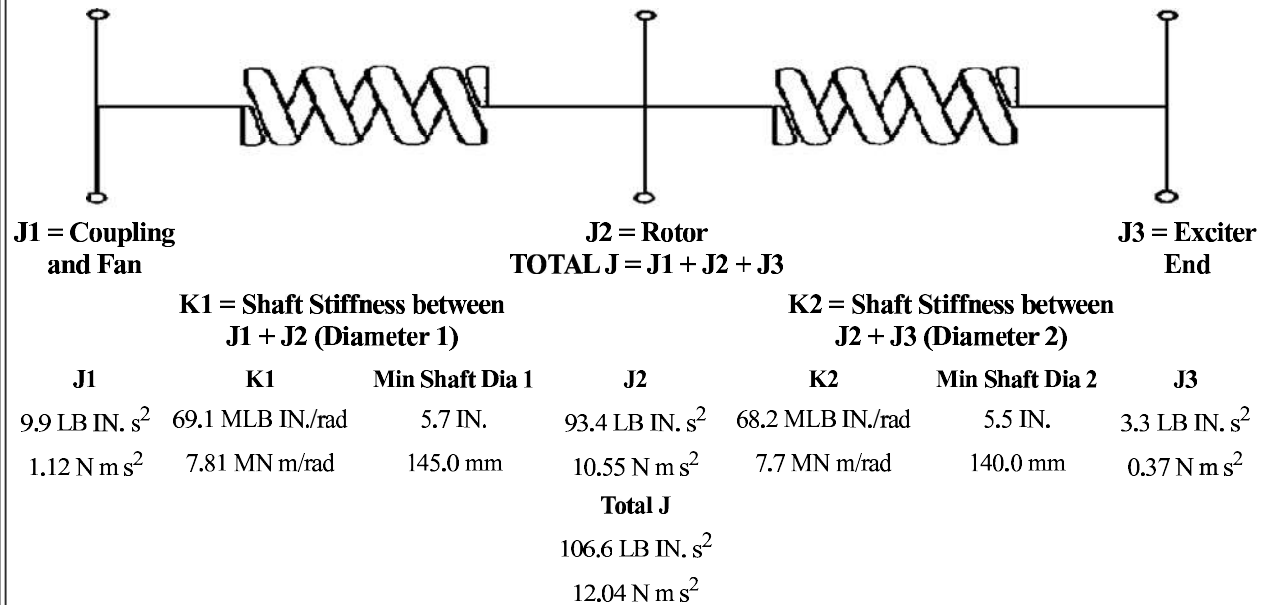
Dimension X	-710.0 mm	-28.0 IN.
Dimension Y	0.0 mm	0.0 IN.
Dimension Z	0.0 mm	0.0 IN.

- "X" is measured from driven end of generator and parallel to rotor. Towards engine fan is positive. See General Information for details
- "Y" is measured vertically from rotor center line. Up is positive.
- "Z" is measured to left and right of rotor center line. To the right is positive.

Generator WT = 1865 kg * Rotor WT = 703 kg * Stator WT = 1162 kg
4,112 LB 1,550 LB 2,562 LB

Rotor Balance = 0.0508 mm deflection PTP
Overspeed Capacity = 125% of synchronous speed

Generator Torsional Data



Selected Model

Engine: C27 **Generator Frame:** 1268 **Genset Rating (kW):** 800.0 **Line Voltage:** 480
Fuel: Diesel **Generator Arrangement:** 3850624 **Genset Rating (kVA):** 1000.0 **Phase Voltage:** 277
Frequency: 60 **Excitation Type:** Permanent Magnet **Pwr. Factor:** 0.8 **Rated Current:** 1202.8
Duty: STANDBY **Connection:** SERIES STAR **Application:** EPG **Status:** Current

Version: 41205 /42979 /41379 /9960

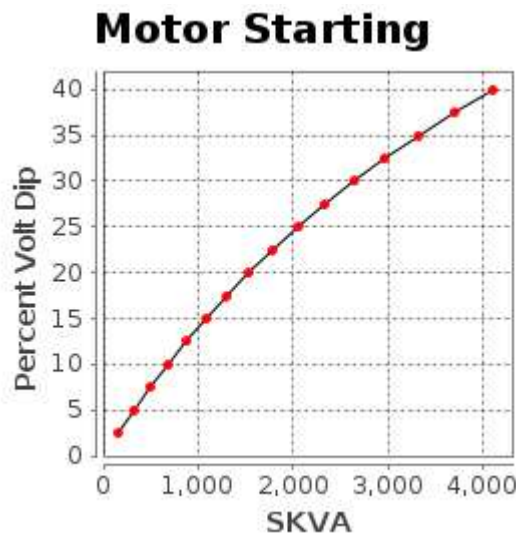
Generator Cooling Requirements - Temperature - Insulation Data			
Cooling Requirements:		Temperature Data: (Ambient 40 °C)	
Heat Dissipated:	40.3 kW	Stator Rise:	125.0 °C
Air Flow:	66.0 m ³ /min	Rotor Rise:	125.0 °C
Insulation Class: H			
Insulation Reg. as shipped: 100.0 MΩ minimum at 40 °C			
Thermal Limits of Generator			
Frequency:	60 Hz		
Line to Line Voltage:	480 Volts		
B BR 80/40	850.0 kVA		
F BR -105/40	965.0 kVA		
H BR - 125/40	1060.0 kVA		
F PR - 130/40	1060.0 kVA		
H PR - 150/40	1124.0 kVA		
H PR27 - 163/27	1166.0 kVA		

Selected Model

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Duty: STANDBY	Connection: SERIES STAR	Application: EPG	Status: Current
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Starting Capability & Current Decrement Motor Starting Capability (0.4 pf)

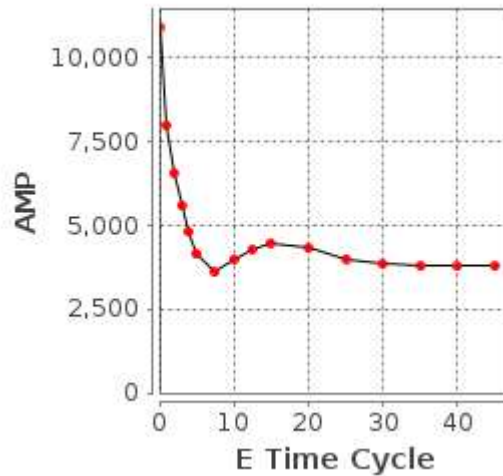
SKVA	Percent Volt Dip
158	2.5
324	5.0
500	7.5
685	10.0
880	12.5
1,088	15.0
1,307	17.5
1,541	20.0
1,789	22.5
2,054	25.0
2,338	27.5
2,641	30.0
2,968	32.5
3,319	35.0
3,698	37.5
4,109	40.0



Current Decrement Data

E Time Cycle	AMP
0.0	10,948
1.0	7,996
2.0	6,584
3.0	5,602
4.0	4,811
5.0	4,149
7.5	3,604
10.0	3,995
12.5	4,292
15.0	4,490
20.0	4,325
25.0	4,009
30.0	3,847
35.0	3,792
40.0	3,783
45.0	3,791

Current Decrement



Instantaneous 3 Phase Fault Current: 10948 Amps

Instantaneous Line - Line Fault Current: 9276 Amps

Instantaneous Line - Neutral Fault Current: 15420 Amps

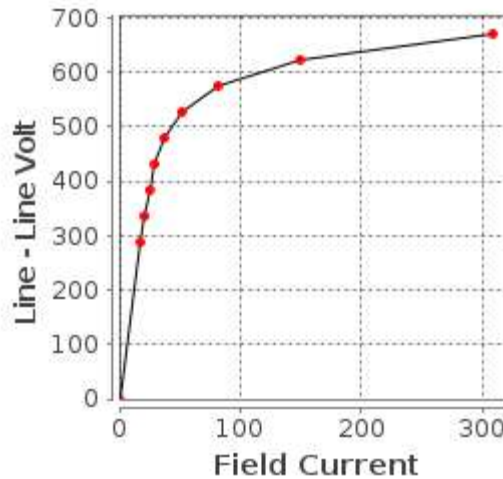
Selected Model

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Duty: STANDBY	Connection: SERIES STAR	Application: EPG	Status: Current
Version: 41205 /42979 /41379 /9960			

Generator Output Characteristic Curves Open Circuit Curve

Open Circuit

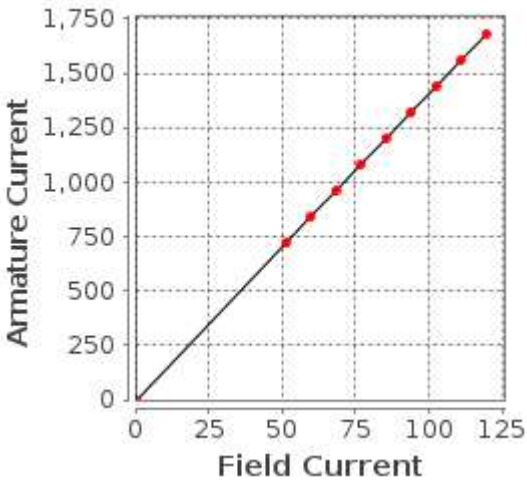
Field Current	Line - Line Volt
0.0	0
17.9	288
21.2	336
25.0	384
29.8	432
37.4	480
51.5	528
81.3	576
149.2	624
309.3	672



Short Circuit Curve

Short Circuit

Field Current	Armature Current
0.0	0
51.3	722
59.8	842
68.3	962
76.9	1,083
85.4	1,203
94.0	1,323
102.5	1,443
111.1	1,564
119.6	1,684



Selected Model

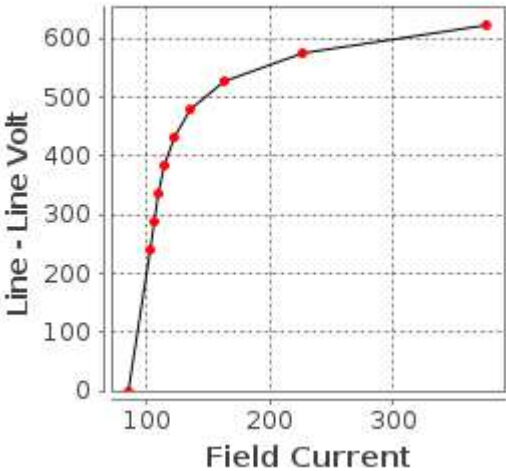
Engine: C27	Generator Frame: 1268	Genset Rating (kW): 800.0	Line Voltage: 480
Fuel: Diesel	Generator Arrangement: 3850624	Genset Rating (kVA): 1000.0	Phase Voltage: 277
Frequency: 60	Excitation Type: Permanent Magnet	Pwr. Factor: 0.8	Rated Current: 1202.8
Duty: STANDBY	Connection: SERIES STAR	Application: EPG	Status: Current

Version: 41205 /42979 /41379 /9960

Generator Output Characteristic Curves
Zero Power Factor Curve

Zero Power

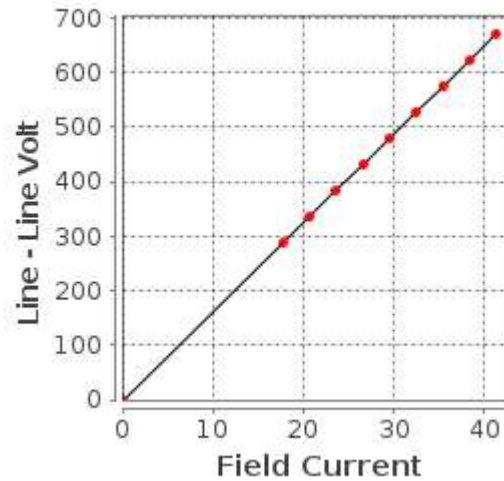
Field Current	Line - Line Volt
85.4	0
102.9	240
106.2	288
109.9	336
114.7	384
121.9	432
135.2	480
163.1	528
226.5	576
375.4	624



Air Gap Curve

Air Gap

Field Current	Line - Line Volt
0.0	0
17.7	288
20.7	336
23.6	384
26.6	432
29.5	480
32.5	528
35.4	576
38.4	624
41.3	672

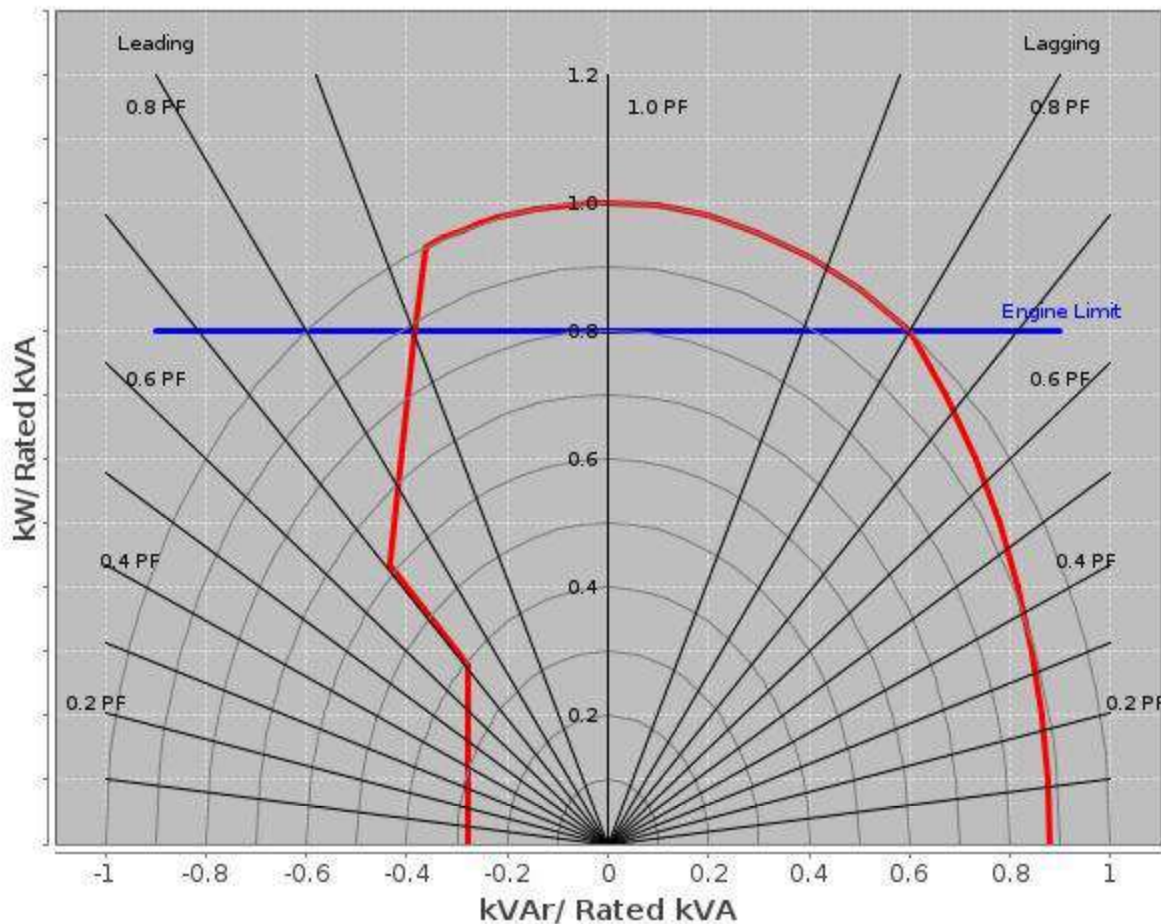


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Fuel: Diesel **Generator Arrangement:** 3850624 **Genset Rating (kVA):** 1000.0 **Phase Voltage:** 277
Frequency: 60 **Excitation Type:** Permanent Magnet **Pwr. Factor:** 0.8 **Rated Current:** 1202.8
Duty: STANDBY **Connection:** SERIES STAR **Application:** EPG **Status:** Current

Version: 41205 /42979 /41379 /9960

Reactive Capability Curve Operating Chart



Selected Model

Engine: C27	Generator Frame: 1268	Genset Rating (kW): 800.0	Line Voltage: 480
Fuel: Diesel	Generator Arrangement: 3850624	Genset Rating (kVA): 1000.0	Phase Voltage: 277
Frequency: 60	Excitation Type: Permanent Magnet	Pwr. Factor: 0.8	Rated Current: 1202.8
Duty: STANDBY	Connection: SERIES STAR	Application: EPG	Status: Current

Version: 41205 /42979 /41379 /9960

General Information

DM7825 Caterpillar SR5 Generators (50 Hz, 60 Hz)
Data for 1400, 1600, 1700, 1800 and 1900 frames Caterpillar SR5
generators built by Leroy Somer - USA and Leroy Somer □ France.

Refer to DM7821 for explanation of all generator data in Technical
Marketing Information (TMI) except generator efficiency for which the
explanation is given below.

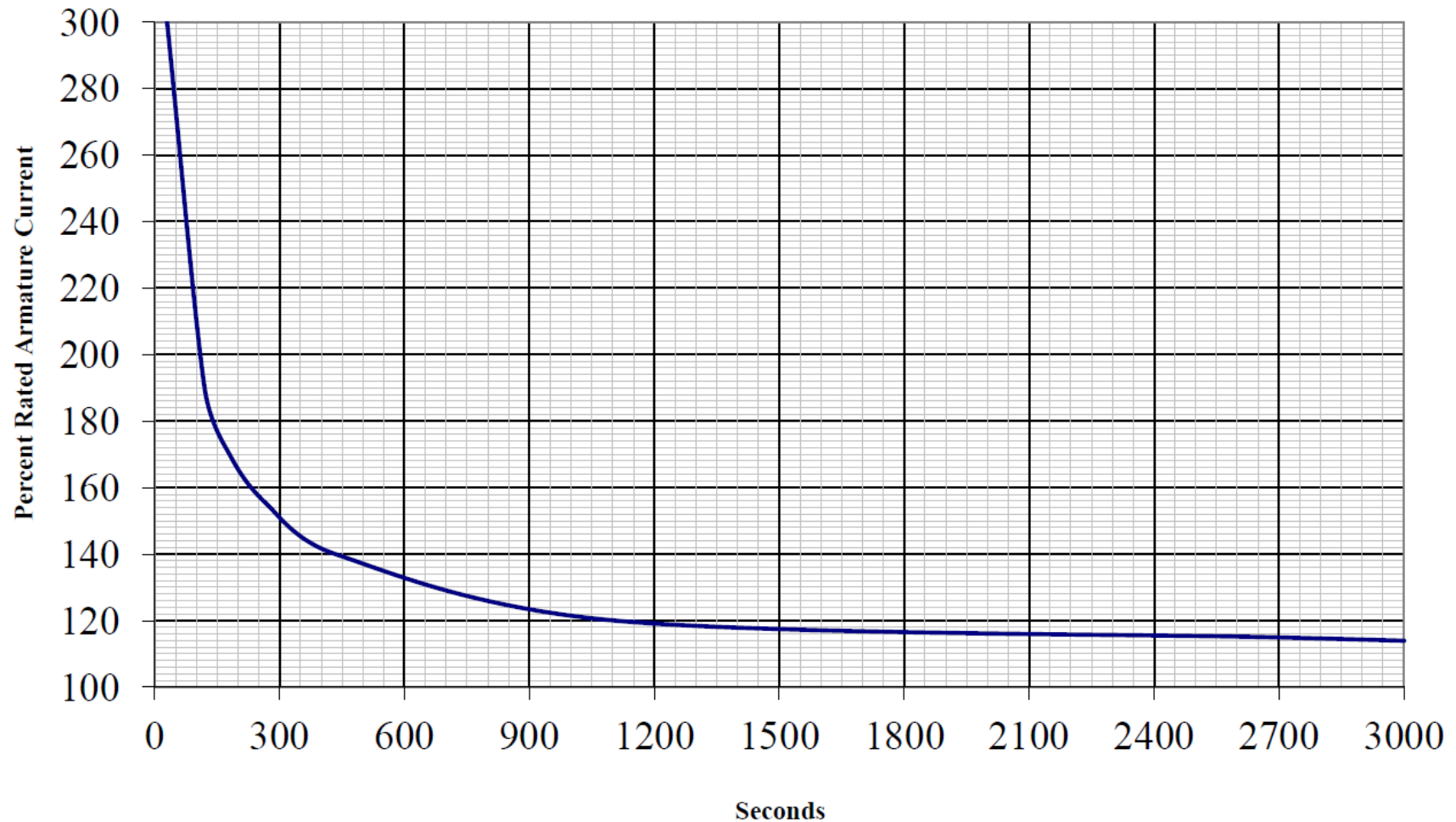
GENERATOR EFFICIENCY

Generator efficiency is the percentage of engine flywheel (or other
prime mover) power that is converted into electrical output. The
generator efficiency shown is calculated by the summation of all
losses method, and is determined in accordance with the IEC Standard
60034. The efficiency considers only the generator. There is no
consideration of engine or parasitic losses here.

Refer to DM7829 for low and medium voltage protective setting values and limits.

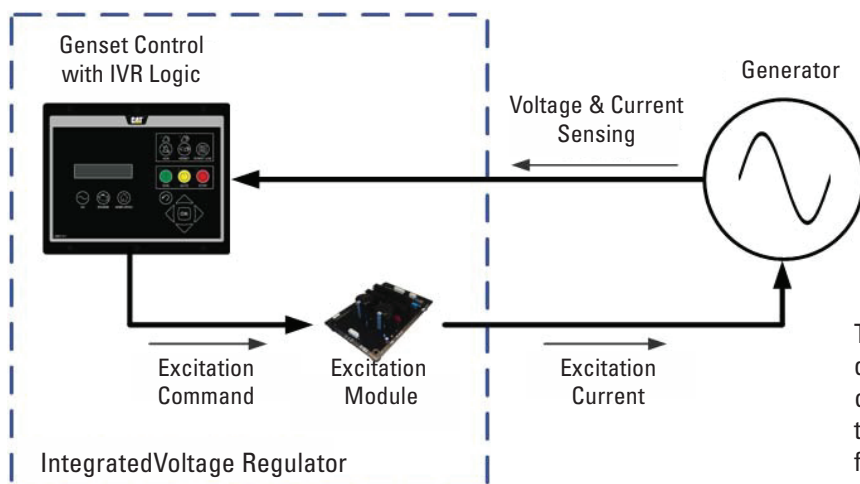
Cat[®] SR5 Alternator Thermal Damage Curve

<700V Alternators with Class H Insulation



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INTEGRATED VOLTAGE REGULATOR

The Integrated Voltage Regulator (IVR) is designed to provide robust, precise closed-loop control of the generator voltage, optimized transient performance and industry leading feature specification.

Caterpillar is leading the power generation marketplace with power solutions engineered to deliver unmatched flexibility, expandability, reliability and cost-effectiveness.

FEATURES

When used with an Excitation Module, EMCP 4.3/4.4 and IVR-compatible EMCP 4.1/4.2 (B) controllers offers:

- Automatic Voltage Regulation (AVR)
- Programmable stability settings
- Soft start control with an adjustable time setting in AVR control mode
- Dual Slope, Configurable Under Frequency (Volts/Hz) regulation
- Three-phase or single-phase generator voltage (RMS) sensing/regulation in AVR mode
- Setpoint adjustment from the EMCP display or Cat ET ServiceTool
- IVR Operating Status and Voltage Bias Overview screens to provide an enhanced level of user interface
- Integrated Voltage Regulator event monitoring

EMCP 4.3/4.4 and IVR-compatible EMCP 4.2 (B) controllers also offer:

- Power Factor Regulation (PF)
- Reactive Droop compensation
- Line drop compensation

WORLDWIDE PRODUCT SUPPORT

- Worldwide parts availability through the Cat dealer network
- Over 1,800 dealer branch stores operating in 200 countries
- The best product support record in the industry
- Cat dealers provide extensive post sale support including maintenance and repair agreements

COMPLETE SYSTEM INTEGRATION

Fully designed and factory tested to work seamlessly with Cat generators using Self Excitation (SE), Internal Excitation (IE) or Permanent Magnet (PMG) excitation systems and EMCP controls.

INTEGRATED VOLTAGE REGULATOR FEATURE SPECIFICATION

	EMCP 4.1	EMCP 4.2(B)	EMCP 4.3	EMCP 4.4
				
SPECIFICATIONS				
No Load to Full Load Regulation	±0.5%	±0.25%	±0.25%	±0.25%
Configurable Volts / Hz Characteristic	•	•	•	•
Configurable Knee Frequency	•	•	•	•
Regulator ResponseTime	10 ms	10 ms	5 ms	5 ms
Single and Three Phase Sensing	•	•	•	•
Voltage Adjustment Range	± 30%	± 30%	± 30%	± 30%
CONTROL				
Characteristic	•	•	•	•
Excitation Enable I Disable Selection	•	•	•	•
Line Loss (I ² R) Compensation	—	•	•	•
Reactive Droop Compensation	—	•	•	•
Power Factor Control Mode	—	•	•	•
PROTECTION I ALARMS				
Generator Overvoltage	•	•	•	•
Generator Under voltage	•	•	•	•
Over Excitation	•	•	•	•
Loss of Sensing	•	•	•	•
Generator Reverse VARs	—	•	•	•
Event Log	•	•	•	•
METERING				
EMCP AC Metering	•	•	•	•
EMCP Power Metering	—	•	•	•
Excitation Command Percentage	•	•	•	•
Operating Mode Status 1ndication	•	•	•	•
VOLTAGE ADJUSTMENT				
EMCP 4 Display Voltage Bias	•	•	•	•
Digital Input (Raise I Lower) Voltage Bias ¹	•	•	•	•
Potentiometer Voltage Bias ¹	•	•	•	•
Analog Voltage Bias -Voltage Range ¹	0V to 5V	0V to 5V	-10V to +10V	-10V to +10V
Analog Voltage Bias - Current Range ¹	-	-	0mA to 20mA	0mA to 20mA
Analog Voltage Bias - PWM Range ¹	-	-	0% to 100%	0% to 100%
SCADA (Modbus) Voltage Bias	-	•	•	•

¹Requires an available input on the EMCP 4.

EMCP 4 DISPLAY

EXAMPLE SCREENS - EMCP 4.1/4.2

VOLTS / Hz	
TARGET VOLT	480 V
EXCITATION CMD	4.5 %

Figure 3: IVR Overview Screen

VOLTAGE BIAS OVERVIEW	
MANUAL	10.0%
ANALOG	2.0%

DROOP	-2.0%
TOTAL	10.0%

Figure 4: Voltage Bias Overview Screens

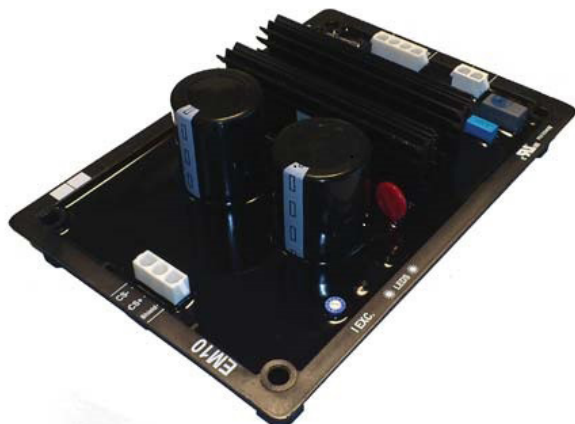
EXAMPLE SCREENS - EMCP 4.3/4.4

IVR OVERVIEW			
OPERATING MODE:			
VOLTS / Hz			
TARGET VOLTAGE	480 V		
EXCITATION COMMAND	4.5 %		
COMPENSATION	DROOP		
GENSET			PAGE DOWN

Figure 5: IVR Overview Screen

VOLTAGE BIAS OVERVIEW			
ACTIVE VOLTAGE BIASING:			
MANUAL	10.0%		
ANALOG INPUT	2.0%		
DROOP	- 2.0%		
TOTAL BIAS	10.0%		
GENSET		PAGE UP	

Figure 6: Voltage Bias Overview Screen



EM10

The EM10 Excitation Module is a power electronics component designed to provide excitation current to the generator that is controlled by the Integrated Voltage Regulator (IVR) feature in the EMCP 4 controls.

Caterpillar is leading the power generation marketplace with power solutions engineered to deliver unmatched flexibility, expandability, reliability and cost-effectiveness

Features

- Over-excitation protection – limit can be adjusted via a potentiometer (IEXC)
- Green status LED indicating unit is powered on
- Red status LED indicating excitation current limiting (flashing) or shutdown (solid)

When used with EMCP 4.3 / 4.4 and IVR-compatible EMCP 4.1 / 4.2 controllers, the Integrated Voltage Regulator system offers:

- Automatic Voltage Regulation (AVR)
- Programmable stability settings
- Soft start control with an adjustable time setting in AVR control mode
- Dual Slope Under Frequency (Volts / Hz) regulation
- 3 Phase or single-phase generator voltage (RMS) sensing / regulation in AVR mode

EMCP 4.3 / 4.4 and IVR-compatible EMCP 4.2 controllers also offer:

- Power Factor Regulation (PF)
- Generator paralleling with reactive droop compensation
- Line drop compensation

Worldwide Product Support

- Worldwide parts available through the Cat® dealer network
- Over 1,800 dealer branch stores operating in 200 countries
- The best product support record in the industry
- Cat dealers provide extensive post sale support including maintenance and repair agreements

Complete System Integration

Fully designed and factory tested to work seamlessly with Cat generators using Self Excitation (SE), Internal Excitation (IE) or Permanent Magnet (PMG) excitation systems and EMCP controls.

Excitation Module – EM10

Specifications	
Electrical	
Generator Excitation Types	Self Excitation / Internal Excitation / Permanent Magnet (PMG)
Max. Continuous Field Current Output	6 Amps
Max. Forcing Field Current Output	10 Amps
Max. AC Voltage Input (X1:X2, Z1:Z2)	180 Vrms

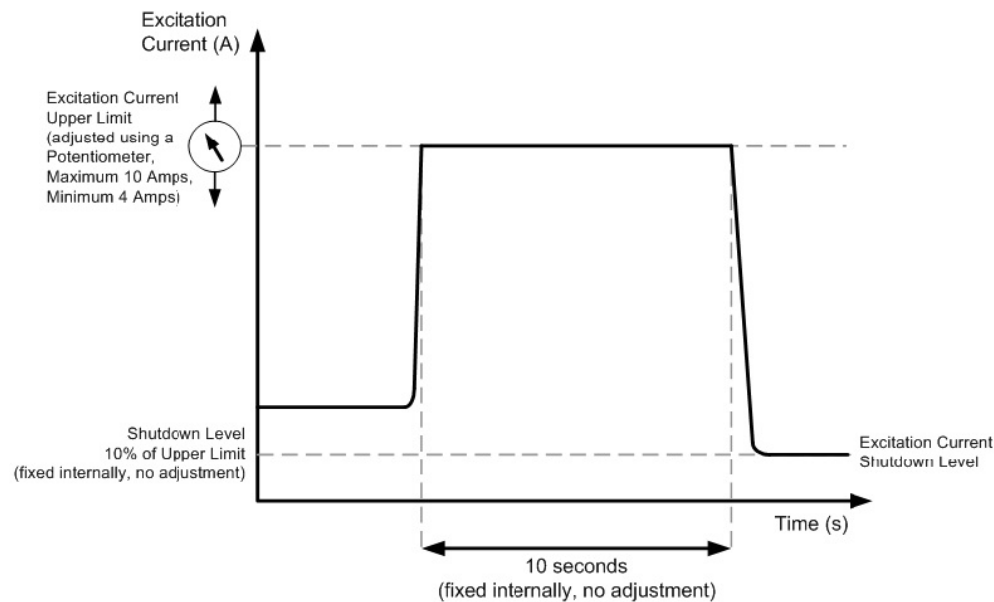
Environmental	
Operating Temperature Range	-40°C (-40°F) to +70°C (+158°F)
Storage Temperature Range	-40°C (-40°F) to +85°C (+185°F)
Relative Humidity Tolerance	95% non-condensing humidity
Salt Spray	5% salt (NaCl) solution for 120 hrs
Vibration	4.5 G-rms, 24-2000 Hz in 3 orthogonal planes
Electromagnetic Compatibility	RF Immunity (Radiated & Conducted) RF Emissions (Radiated & Conducted) Electrical Transients
Weight	770g ±30g
Power Consumption (at Max. Continuous Rating)	450 VA

Conformity	
UL	UL Recognized (U.S. and Canada) File No. E334232
CE Integrated Certificate	In conformity with the applicable requirements of the following Standards: EN 50178 EN 60204-1 EN 61000-6-2 EN 61000-6-4

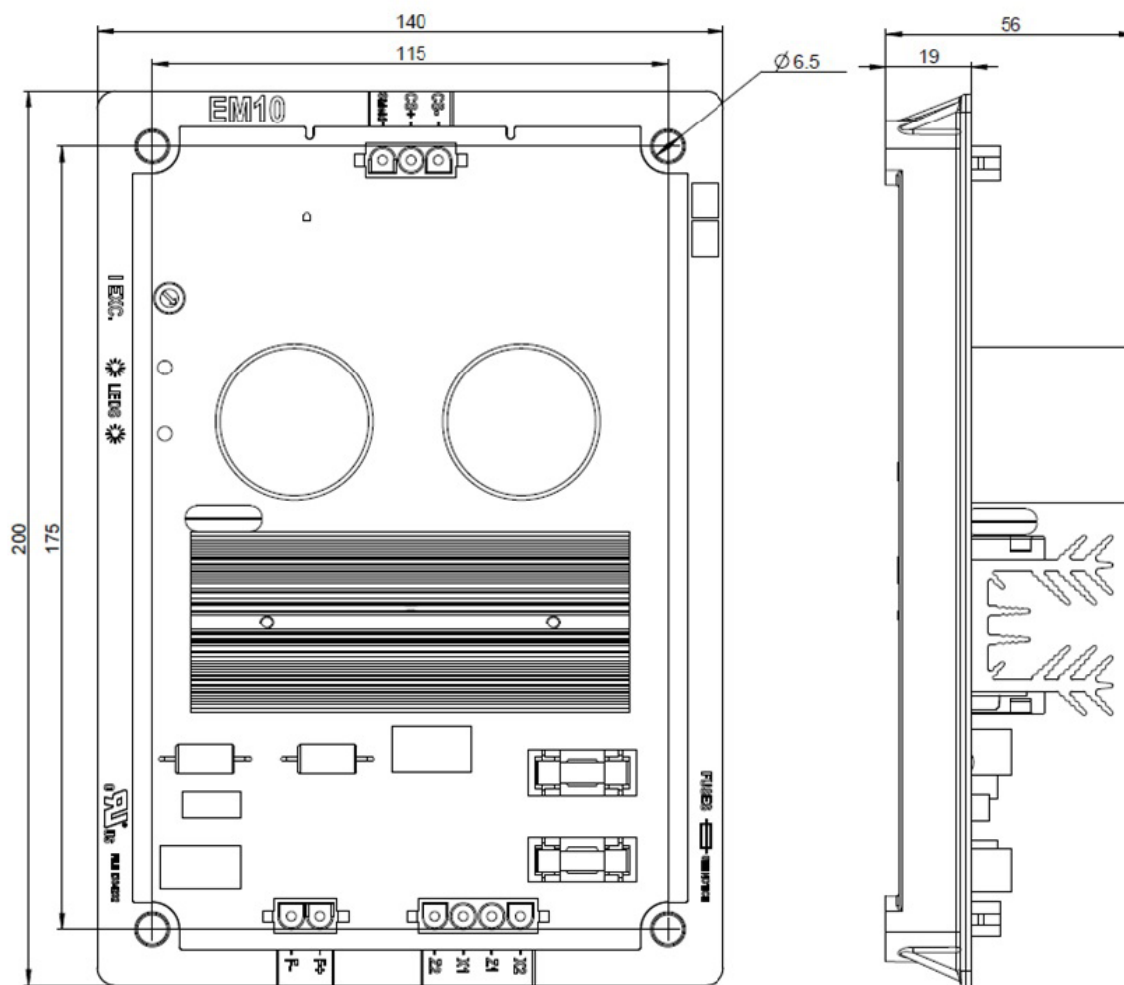
Excitation Module – EM10

Over-Excitation Protection

- If a short-circuit fault occurs at the generator terminals, the EM10 will allow the excitation current to rise to the upper limit value set by the adjustment potentiometer (max. 10 Amps).
- The excitation current will be clamped at the upper limit value for 10 seconds (fixed internally).
- After 10 seconds, the excitation current is reduced to a value of 10% of the potentiometer setting.

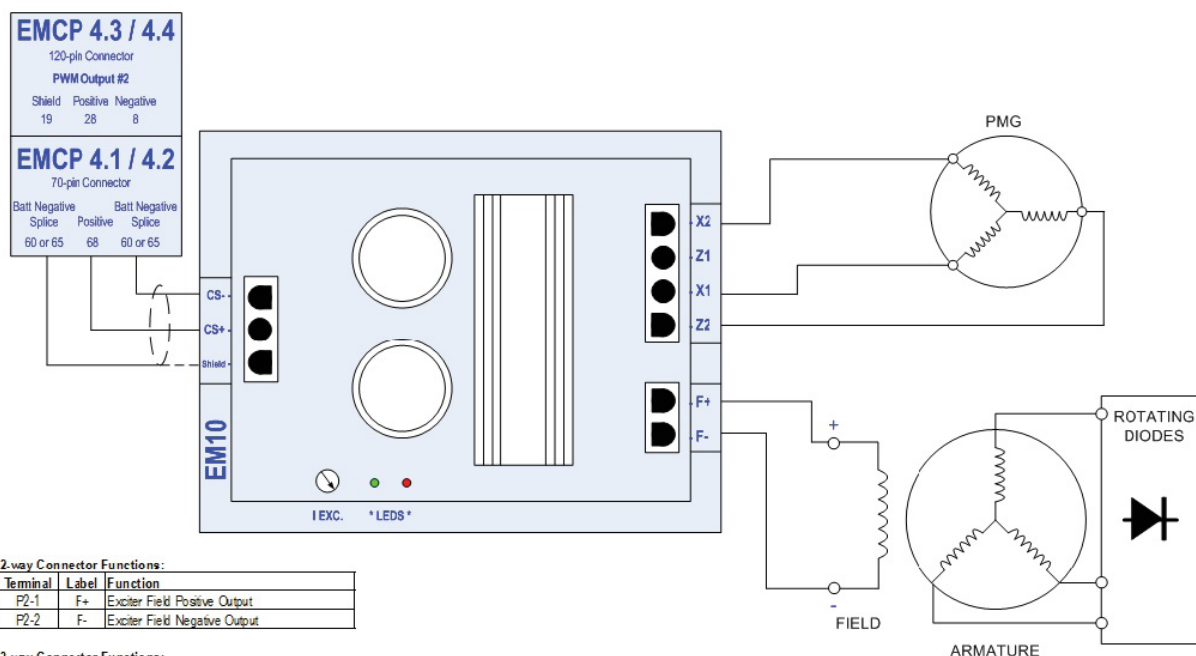


Outline Drawing (Dimensions in mm)



Excitation Module – EM10

Example Connection Diagram (Permanent Magnet Excitation)



2-way Connector Functions:

Terminal	Label	Function
P2-1	F+	Exciter Field Positive Output
P2-2	F-	Exciter Field Negative Output

3-way Connector Functions:

Terminal	Label	Function
P3-1	Shield	Excitation Command Shield
P3-2	CS+	Excitation Command Positive Input
P3-3	CS-	Excitation Command Negative Input

4-way Connector Functions (PMG Excitation):

Terminal	Label	Function
P4-1	X2	Excitation Power Supply Input (PMG Phase B)
P4-2	Z1	Not Connected
P4-3	X1	Excitation Power Supply Input (PMG Phase A)
P4-4	Z2	Excitation Power Supply Input (PMG Phase C)

4-way Connector Functions (Self-Excitation):

Terminal	Label	Function
P4-1	X2	Excitation Power Supply Input (single-phase)
P4-2	Z1	Not Connected
P4-3	X1	Excitation Power Supply Input (single-phase)
P4-4	Z2	Not Connected

4-way Connector Functions (Internal Excitation):

Terminal	Label	Function
P4-1	X2	Excitation Power Supply Input (Aux Winding 1 - Positive)
P4-2	Z1	Excitation Power Supply Input (Aux Winding 2 - Positive)
P4-3	X1	Excitation Power Supply Input (Aux Winding 1 - Negative)
P4-4	Z2	Excitation Power Supply Input (Aux Winding 2 - Negative)

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Picture shown may not reflect actual configuration

Generator Space Heater

for 1200, 1400*, 1600 and 1800 Frames

*only with 3512C

GENERAL DESCRIPTION

Humidity is a natural enemy of generators and all electrical equipment.

Space heaters are designed to protect generator windings from abnormally high humidity conditions when the generator is idle. The heater maintains the air around the windings at a suitable temperature to prevent winding corrosion due to condensation.

Generator space heaters use electrical resistance and are located within the generator stator housing.

Space heaters are particularly recommended for generator sets located in a low ambient and/or high humidity environment. As a further benefit, space heaters provide an excellent method of drying out a generator after long transit or storage.

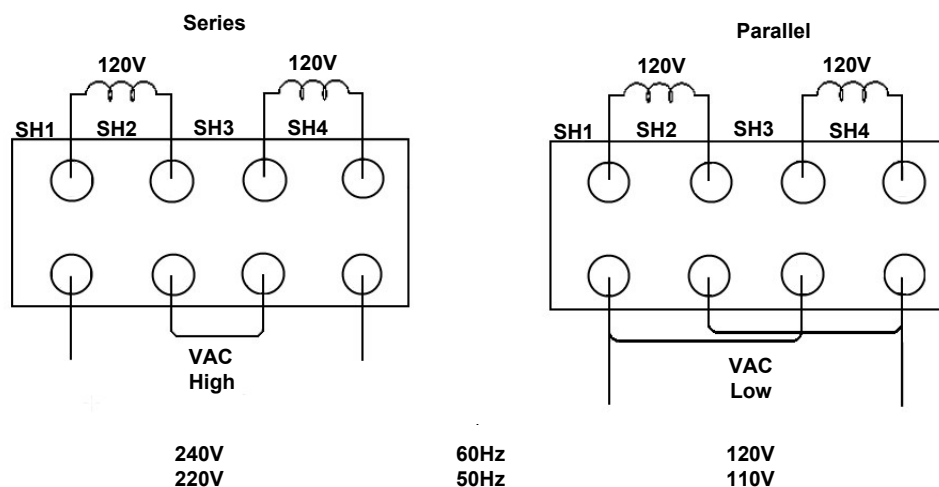
Because space heaters are required only during non-operative periods, they require availability of a power source separate from the generator set itself.

When the generator set is not running the heater automatically connects to the AC supply through a power relay mounted in the control panel. Upon receiving a start signal the AC supply is automatically disconnected by the power relay and automatically reconnected when the start signal is removed.

The generator space heater uses two heating elements.

Heater element electrical data: Voltage - 120V, Power - 600W.

Space Heaters Connection Diagram



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Picture shown may not reflect actual configuration

Features

- Moisture and fungus protection
- Clear indication of breaker status
- Reinforced insulation
- Shunt trip
- Auxiliary contacts
- Load side extension bars
- Maintenance-free operation
- Exceptional characteristics under short-circuit conditions
- Adjustable trip settings

NS-Frame

- Federal Specification W-C-375B/GEN
- NEMA AB1
- UTE, VDE, BS, CEI, UNE

Molded Case and Insulated Case Circuit Breakers:

C27-C175 North America built packages (50/60Hz)

L-Frame

400A (UL)

P-Frame

800-1200A (UL)

R-Frame

1600-3000A (UL)

NS-Frame

1600-3200A (IEC)

NW-Frame

1200-5000A (UL), 1600-5000A (IEC)

Conformity with International Standards

Circuit Breakers have been designed to comply with the international standard IEC 60947-2 as well as these other major standards:

L-Frame

UL 489

CSA 22.2 No 5

Federal Specification W-C-375B/GEN

NEMA AB1

NMX J-266

CCC

CE Marking

P-Frame & R-Frame

UL 489

IEC Standard 60947-2

CSA 22.2 No 5-02

Federal Specification W-C-375B/GEN

NEMA AB1

NMX J-266

UTE, VDE, BS, CEI, UNE

NW-Frame

UL 489

NEMA AB1

CSA 22.2 No. 5096

NMX J-266-ANCE

ANSI C37.13, C37.16, C37.17, C37.50

UL 1066 (cULus Listed)

NEMA SG3

Standard Features

Standards

- UL-CSA
 - L-Frame
 - **P-Frame**
 - R-Frame
 - NW-Frame
- IEC
 - NS-Frame

Shunt trip

- The shunt trip provides a means of tripping the circuit breaker electronically
- Shunt trip ratings
- Voltage: 24VDC
- Coil Burden (Holding/Inrush): 4.5/200 VA
- Power Consumption: 4.5 VA

Auxiliary contacts

The auxiliary contacts provide a means of remote circuit breaker position indication and consists of (1) Form C Contact (1 Normally open and 1 Normally closed contact) with the following current ratings:
6A @ 240-480 VAC, 50/60Hz

Trip units

All circuit breakers come equipped with True RMS Current Sensing. The trip units for each of the circuit breaker ratings sample the current waveform to provide true RMS protection through the 15th harmonic. This true RMS sensing gives accurate values for the magnitude of a nonsinusoidal waveform. Therefore, the heating effects of harmonically distorted waveforms are accurately evaluated. The trip system comes equipped with a set of current transformers (CT's) to sense current, a trip unit to evaluate the current, and a tripping solenoid to trip the circuit breaker. Additionally, each trip unit comes equipped with Active Thermal Imaging which is active 20 minutes before and after tripping.

Customer cable connections

Connections include bus for installation flexibility.

Optional Features

Electrically-operated Circuit Breakers

Circuit breakers that are electrically-operated come with a two-step stored energy mechanism and come standard with a motor assembly. Motor assemblies provide on and off control from remote locations. These assemblies contain a spring-charging motor, a shunt trip, and shunt close. Motor Assembly Voltage Rating: 24-30VDC

Undervoltage trip

Undervoltage trip option trips the circuit breaker when the voltage drops to a value between 35% and 70% of the control voltage. An attempt to close the circuit breaker when the UV is not energized produces no movement in the main contacts. Closing is allowed when the supply voltage of the UV trip reaches 85% of the rated voltage.

- Voltage Rating: 24-30VAC/VDC
- Operating Threshold:
 - Opening: 0.35 to 0.7Vn
 - Closing: 0.85 Vn
- Power Consumption: 4.5VA
- Circuit Breaker Response Time at Vn: 50ms +/- 10

Circuit Breakers Table (Continued)

Cat® Part Number	Frame and Rating (Amps)	IEC/UL	No. Poles	Operation	Trip Unit	Circuit Breaker Characteristics	Options	Instantaneous Override (kA RMS) +/- 10%
2449988	1200A P-Frame MCCB	UL	3P	EO	5.0P LSI-P	Table 1	1 Aux Contact, Shunt Trip, Modbus	24
3834673	1200A NW-Frame ICCB	UL	3P	EO	5.0A LSI	Table 7	4 Aux Contacts, Shunt Trip, UV	40
3834674	1200A NW-Frame ICCB	UL	3P	EO	6.0A LSI-G	Table 7	4 Aux Contacts, Shunt Trip, UV	40
5858050	1200AP-Frame MCCB	UL	3P	EO	6.0P LSI-G-P	Table 1	1 Aux Contact, Shunt Trip, Modbus	24
5858067	1200A P-Frame MCCB	UL	3P	EO	5.0P LSI-P	Table 1	1 Aux Contact, Shunt Trip, Modbus	24
2449764	1250A NS-Frame MCCB	IEC	4P	EO	5.0A LSI	Table 3	1 Aux Contact, Shunt Trip	—
2449765	1250A NS-Frame MCCB	IEC	4P	EO	6.0A LSI-G	Table 3	1 Aux Contact, Shunt Trip	—
2449767	1250A NS-Frame MCCB	IEC	4P	EO	6.0P LSI-G-P	Table 3	1 Aux Contact, Shunt Trip, Modbus	—
2449772	1600A NS1600 MCCB	IEC	3P	EO	5.0A LSI	Table 3	1 Aux Contact, Shunt Trip	—
2449773	1600A NS1600 MCCB	IEC	3P	EO	6.0A LSI-G	Table 3	1 Aux Contact, Shunt Trip	—
2449775	1600A NS1600 MCCB	IEC	3P	EO	6.0P LSI-G-P	Table 3	1 Aux Contact, Shunt Trip, Modbus	—
2449776	1600A NS1600 MCCB	IEC	3P	MO	5.0A LSI	Table 4	1 Aux Contact, Shunt Trip	—

Circuit Breakers Characteristics

Model		P-Frame	
Number of Poles		3	
Rated Current (Amps)		800-2500A (UL)	
Voltage Rating (VAC)		600UL/ 690 IEC	
Interrupt Rating (UL/CSA) (60Hz) - kA RMS	240V	65	
	480V	35	
	600V	18	
IEC 60947-2 Rating (50/60Hz) - kA RMS	Icu	240V	50
		380/415V	35
	Ics	240V	25
		380/415V	20

Table 1

Model			NS-Frame MO
Number of Poles			3 & 4
Rated Current (Amps)			1600- 3200A (IEC)
Voltage Rating (VAC)			690 (IEC)
IEC 60947-2 Rating (50/60Hz) - kA RMS	Icu	240V	85
		380/415V	70
	Ics	240V	65
		380/415V	52

Table 4

Model			NS-Frame MO
Number of Poles			3 & 4
Rated Current (Amps)			630- 800A (IEC)
Voltage Rating (VAC)			690 (IEC)
IEC 60947-2 Rating (50/60Hz) - kA RMS	Icu	240V	85
		380/415V	50
	Ics	240V	50
		380/415V	50

Table 2

Model		NW-Frame
Number of Poles		3 & 4
Rated Current (Amps)		2000A - 4000A (IEC)
Voltage Rating (VAC)		690 IEC
IEC 60947-2 Rating (50/60Hz) -kA RMS	240V	65
	440V	65
	690V	65

Table 5

Model			NS-Frame EO
Number of Poles			
Rated Current (Amps)			1250- 1600A (IEC)
Voltage Rating (VAC)			690 (IEC)
IEC 60947-2 Rating (50/60Hz) - kA RMS	Icu	240V	50
		380/415V	50
	Ics	240V	37
		380/415V	37

Table 3

Circuit Breakers Characteristics (Continued)

Model		R-Frame	
Number of Poles		3	
Rated Current (Amps)		1600-3000A (UL)	
Voltage Rating (VAC)		600UL/ 690 IEC	
Interrupt Rating (UL/CSA) (60Hz) - kA RMS		240V	65
		480V	35
		600V	18
IEC 60947-2 Rating (50/60Hz) - kA RMS	Icu	240V	50
		380/415V	35
	Ics	240V	25
		380/415V	20

Table 6

Model		NW-Frame
Number of Poles		3 & 4
Rated Current (Amps)		1200-2000A (UL)
Voltage Rating (VAC)		600UL
Interrupt Rating (UL/CSA) (60Hz) - kA RMS	240V	65
	480V	65
	600V	50

Table 7

Model		NW-Frame
Number of Poles		3 & 4
Rated Current (Amps)		2500-5000A (UL)
Voltage Rating (VAC)		600UL
Interrupt Rating (UL/CSA) (60Hz) - kA RMS	240V	100
	480V	100
	600V	85

Table 8

Model		R-Frame	
Number of Poles		3	
Rated Current (Amps)		1600-3000A (UL)	
Voltage Rating (VAC)		600UL/ 690 IEC	
Interrupt Rating (UL/CSA) (60Hz) - kA RMS	240V	100	
	480V	65	
	600V	25	
IEC 647-2 Rating (50/60Hz) - kA RMS	Icu	240V	65
		380/415V	50
	Ics	240V	35
		380/415V	25

Table 9

Model		L-Frame	
Number of Poles		3	
Rated Current (Amps)		400A (UL)	
Voltage Rating (VAC)		600UL/ 525 IEC	
Interrupt Rating (UL/CSA) (60Hz) - kA RMS	240V	65	
	480V	35	
	600V	18	
IEC 647-2 Rating (50/60Hz) - kA RMS	Icu	240V	65
		380/415V	35
	Ics	220V	65
		380/415V	35

Table 10

Circuit Breakers Characteristics (Continued)

Model		L-Frame
Number of Poles		3
Rated Current (Amps)		400A (UL)
Voltage Rating (VAC)		600UL/ 525 IEC
Interrupt Rating (UL/CSA) (60Hz) - kA RMS	240V	200
	480V	200
	600V	100
IEC 647-2 Rating kA RMS	240V	150
	480V	75
	690V	20

Table 11

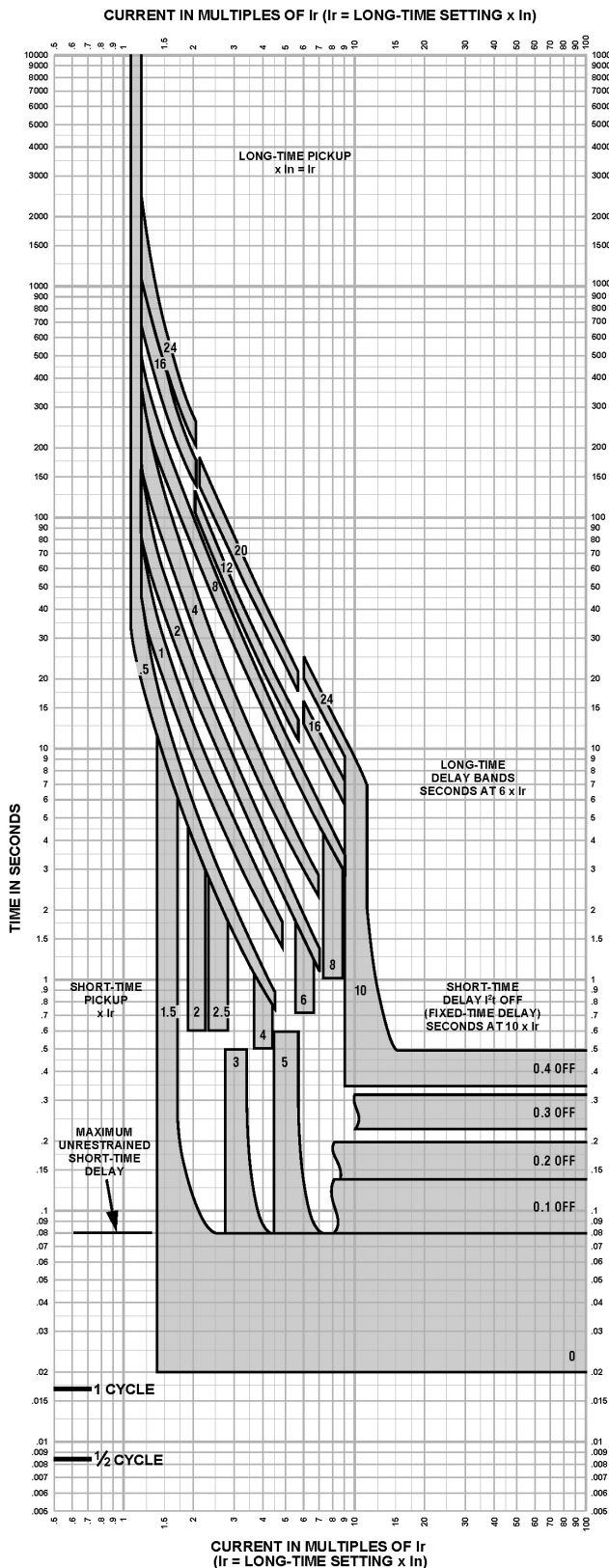
Model		NW-Frame
Number of Poles		3
Rated Current (Amps)		1600A (IEC)
Voltage Rating (VAC)		690 IEC
kAIC	240V	42
	440V	42
	690V	42

Table 13

Model		NW-Frame
Number of Poles		3
Rated Current (Amps)		5000A (IEC)
Voltage Rating (VAC)		690 IEC
kAIC	240V	100
	440V	100
	690V	100

Table 12

P, R, NS-Frame Long-Short Trip Curve and NW-Frame Long-Short Trip Curve



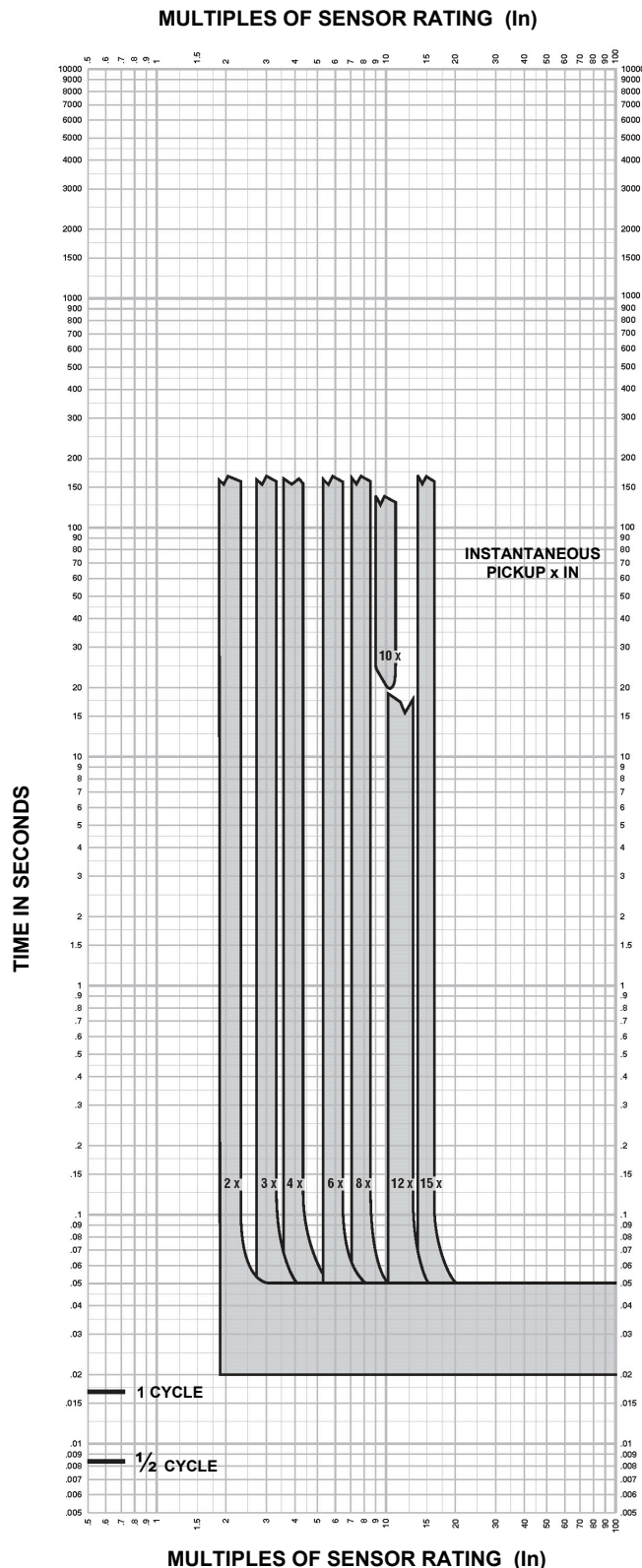
Long-time Pickup and Delay Short-time Pickup and I^2t OFF Delay

The time-current curve information is to be used for application and coordination purposes only. Curves apply from -30°C to $+60^\circ\text{C}$ ambient temperature.

Notes:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermalimaging 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 Page 22 for instantaneous trip curve. See tables on pages 03-18 for instantaneous override values..
6. Overload indicator illuminates at 100%.

P, R, NS-Frame Instant Curve and NW-Frame Instant Trip Curve



Instantaneous Pickup 2x–15x and OFF

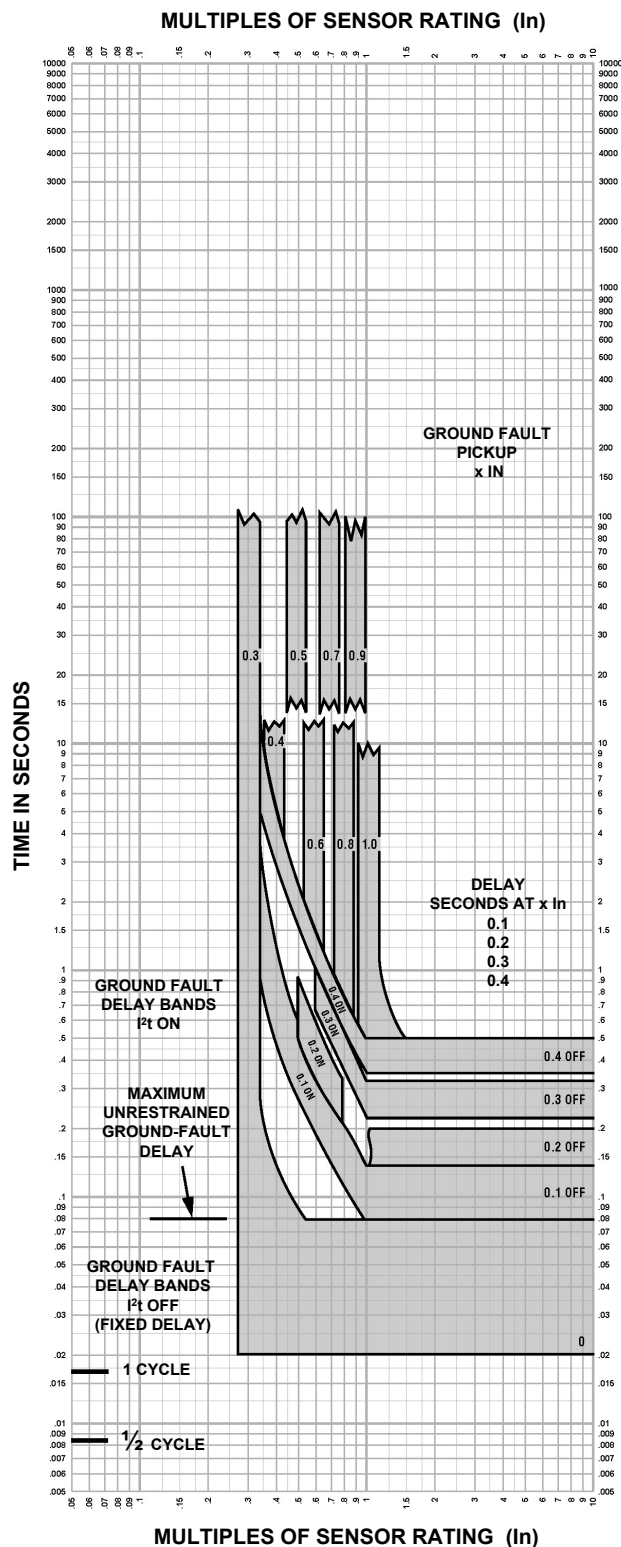
The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30° to $+60^{\circ}\text{C}$ ambient temperature.

Notes:

1. The end of the curve is determined by the interrupting rating of the circuit breaker.
2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
3. The instantaneous region of the trip curve shows maximum total clearing times. Actual clearing times in this region can vary depending on the circuit breaker mechanism design and other factors. The actual clearing time can be considerably faster than indicated. Contact your local Sales Office for additional information.
4. For a withstand circuit breaker, instantaneous can be turned OFF. See tables on pages 03-18 for instantaneous override values.
5. See page 22 for long-time pickup, long-time delay, short-time pickup, and short time delay trip curves.

P, R, NS-Frame Ground Curve and NW-Frame Ground Fault Trip Curve



Ground-fault I^2t OFF and ON $I_n \leq 400$ A

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

Curves apply from -30°C to $+60^\circ\text{C}$ ambient temperature.

Materials and specifications are subject to change without notice.

CAT, CATERPILLAR, LET'S DO THE WORK, their respective logos, "Caterpillar Corporate Yellow", the "Power Edge" and Cat "Modern Hex" trade dress as well as corporate and product identity used herein, are trademarks of Caterpillar and may not be used without permission.



Picture shown may not reflect actual configuration

Full range of attachments

- Wide range of system expansion attachments, designed specifically to work with the EMCP 4
- Flexible packaging options for easy and cost effective installation

World wide product support

- Cat dealers provide extensive pre and post sale support
- Cat dealers have over 1,600 dealer branch stores operating in 200 countries

Features

- A 33 x 132 pixel, 3.8 inch, white backlit graphical display denotes text alarm/event descriptions, set points, engine and generator monitoring, and is visible in all lighting conditions.
- Textual display with support for 26 languages
- Advanced engine monitoring is available on systems with an ADEM™ controller.
- Integration with the CDVR and IVR provides enhanced system performance
- Fully featured power metering, protective relaying, engine and generator parameter viewing, and expanded AC metering are all integrated into this controller.
- Real-time clock allows for date and time stamping of diagnostics and events in the control's logs as well as service maintenance reminders based on engine operating hours or calendar days. Up to 40 diagnostic events are stored in the non-volatile memory

EMCP 4.2B GENERATOR SET CONTROLLER

The Cat® EMCP 4.2B offers fully featured power metering, protective relaying and engine and generator control and monitoring. Engine and generator controls, diagnostics, and operating information are accessible via the control panel keypads; diagnostics from the EMCP 4 optional modules can be viewed and reset through the EMCP 4.2B.

Features

- Ability to view and reset diagnostics on EMCP 4 optional modules via the control panel removes the need for a separate service tool for troubleshooting
- Set points and software stored in non-volatile memory, preventing loss during a power outage
- Five levels of security allow for configurable operator privileges
- Programmable security levels for groups of setpoints.
- Programmable kW Relays (3)
- Programmable weekly exerciser timer
- Dealer configurable resistive maps
- Default overview screen
- Real (kW) Load histogram
- Auto mains failure
- Programmable logic functionality
- Selectable units
 - Temperature: °C or °F
 - Pressure: psi, kPa, bar
 - Fuel Consumption: Liter/hr or Gal/hr (U.S. or U.K.)

Standard Features

- Voltage (L-L, L-N)
- Current (Phase)
- Average Volt, Amp, Frequency
- kW, kVA, kVA (Average, Phase, %)
- Power Factor (Average, Phase)
- kW-hr, kVA-hr (total)
- Excitation voltage and current (with CDVR)
- Desired Voltage, Excitation Command, Operating Mode (with IVR)
- Generator stator and bearing temp (with optional module)
- kW load histogram

Generator Protection

- Generator phase sequence
- Over/Under voltage (27/59)
- Over/Under frequency (81 O/U)
- Reverse Power (kW) (32)
- Reverse Reactive Power (kVA) (32RV)
- Overcurrent (50/51)
- Thermal Damage Curve

Engine Monitoring

- Coolant temperature
- Oil pressure
- Engine speed (RPM)
- Battery voltage
- Run hours
- Crank attempt and successful start counter
- Enhanced engine monitoring (with electronic engines)

Engine Protection

- Control switch not in auto (alarm)
- High coolant temp (alarm and shutdown)
- Low coolant temp (alarm)
- Low coolant level (alarm)
- High engine oil temp (alarm and shutdown)
- Low, high, and weak battery voltage
- Overspeed
- Overcrank
- Low Oil Pressure

Control

- Run / Auto / Stop control
- Speed and voltage adjust
- Local and remote emergency stop
- Remote start/stop
- Cycle crank

Inputs & Outputs

- Two dedicated digital inputs
- Three analog inputs
- Six programmable digital inputs
- Eight relay out
- Two programmable digital outputs

Communications

- Primary and accessory CAN data links
- RS-485 annunciator data link
- Modbus RTU (RS-485 Half duplex)

Language Support

Arabic, Bulgarian, Czech, Chinese, Danish, Dutch, English, Estonian, Finnish, French, German, Greek, Hungarian, Italian, Icelandic, Japanese, Latvian, Lithuanian, Norwegian, Polish, Portuguese, Romanian, Russian, Spanish, Swedish, Turkish

Environmental

- Control module operating temperature: -40°C to 70°C
- Display operating temperature: -20°C to 70°C
- Humidity: 100% condensing 30°C to 60°C
- Storage temperature: -40°C to 85°C
- Vibration: Random profile, 24-1000 Hz, 4.3G rms

Standards

- UL Recognized
- CSA C22.2 No.100,14, 94
- Complies with all necessary standards for CE Certification
 - 98/37/EC Machinery Directive
 - BS EN 60204-1 Safety of Machinery
 - 89/336/EEC EMC Directive
 - BS EN 50081-1 Emissions Standard
 - BS EN 50082-2 Immunity Standard
 - 73/23/EEC Low Voltage Directive
 - EN 50178 LVD Standard
- IEC529, IEC60034-5, IEC61131-3
- MIL STND 461

Optional Modules

CAN annunciator



The EMCP 4 CAN Annunciator serves to display generator set system alarm conditions and status indications.

The annunciator has been designed for use on the accessory communication network and may be used in either local (package mounted) or remote (up to 800 feet) application. A maximum of four annunciators may be used with a single EMCP.

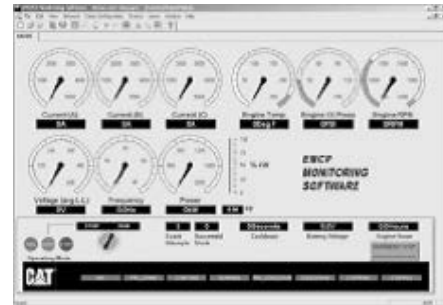
RS-485 annunciator



The EMCP 4 RS-485 Annunciator serves to display generator set system alarm conditions and status indications. The annunciator has been designed for use on the long distance annunciator datalink and is used for remote (up to 4000 feet) application.

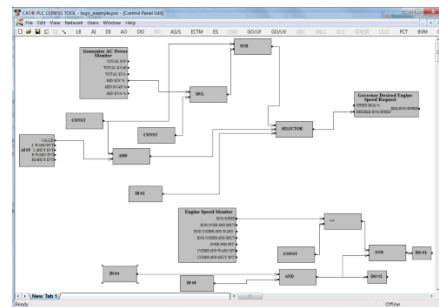
The remote monitoring software allows the user to configure data monitoring and data acquisition processes for monitoring, graphing, and logging of generator set data.

Remote monitoring software



The EMCP remote monitoring software package is a PC based program which allows the user to monitor and control a generator set, and is capable of running on a Windows based operating system. The remote monitoring software allows the user to configure data monitoring and data acquisition processes for monitoring, graphing, and logging of generator set data.

Programmable logic software



The EMCP programmable logic software package is a PC based program which allows the configuration of the programmable logic blocks, and is capable of running on a Windows based operating system. The programmable logic software allows the user to configure logic to change the operation of the EMCP control and interfaces within a limited scope.

Optional Modules (Continued)

Digital input/output module



The Digital Input/Output (DI/O) module serves to provide expandable Input and Output event capability of the EMCP 4 and is capable of reading 12 digital inputs and setting 8 relay outputs.

The DI/O module has been designed for use on the accessory Communication Network and may be used in either local (package mounted) or remote (up to 800 feet) application.

RTD module

The RTD module serves to provide expandable generator temperature monitoring capability of the EMCP 4 and is capable of reading up to eight type 2-wire, 3-wire and 4-wire RTD inputs.

The RTD Module has been designed for use on the Accessory Communication Network and may be used in either local (package mounted) or remote (up to 800 feet) application. A maximum of one RTD Module may be used with a single EMCP 4.

Thermocouple module

The thermocouple module serves to provide expandable engine and generator temperature monitoring capability of the EMCP 4 and is capable of reading up to twenty Type J or K thermocouple inputs.

The thermocouple module has been designed for use on the primary communication network for engine information and the accessory communication network for generator information. It may be used in either local (package mounted) or remote (up to 800 feet) application. A maximum of one thermocouple modules may be used with a single EMCP 4 on each datalink.

Materials and specifications are subject to change without notice.
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SHEET		DESCRIPTION		SHEET		DESCRIPTION		METRIC		521-9364																																																																																					
1		SHEET INDEX 1		43		DC SCHEMATIC - SHEET 1 OF 18 (EMCP 4.2B)		SHEET INDEX 1 CATERPILLAR: CONFIDENTIAL GREEN		<table><tr><td>1E5167A</td><td>INT-PROP</td></tr><tr><td>1E2733</td><td>DRAWING - AUTOCAD</td></tr><tr><td>1E0198W</td><td>BRAND MARKINGS</td></tr><tr><td>1E0013G</td><td>CONFIDENTIALITY</td></tr><tr><td>1E0012A</td><td>INTERPRETATION</td></tr><tr><td>1E0011</td><td>INTPR & TOL</td></tr><tr><td colspan="2">SPEC NO.</td><td colspan="2">NAME</td></tr><tr><td colspan="2">DRN</td><td colspan="2">SOMESH</td></tr><tr><td colspan="2">CHK</td><td colspan="2">D SHEPPERD</td></tr><tr><td colspan="2">APPD</td><td colspan="2">LYLE SEWALL</td></tr><tr><td colspan="2">COK</td><td colspan="2">EXP</td></tr><tr><td colspan="2">CEPT</td><td colspan="2">PRD</td></tr><tr><td colspan="2">RECORDS</td><td colspan="2">X</td></tr><tr><td colspan="2">UNLESS OTHERWISE SPECIFIED</td><td colspan="2">DIMENSIONS ARE IN MM [INCHES]</td></tr><tr><td colspan="2">DIMENSIONS W/O TOL ARE BASIC</td><td colspan="2">02 31JAN22</td></tr><tr><td colspan="2">SCALE: NONE</td><td colspan="2">01 23AUG19</td></tr><tr><td colspan="2">10mm 25 50 75 100</td><td colspan="2">00 11JUL18</td></tr><tr><td colspan="2">SHEET 1 OF 122</td><td colspan="2">THIRD ANGLE PROJECTION</td></tr><tr><td colspan="2">CHG</td><td colspan="2">DATE</td></tr><tr><td colspan="2">CATERPILLAR INC.</td><td colspan="2"></td></tr><tr><td colspan="2">THE INFORMATION HEREON IS THE PROPERTY OF CATERPILLAR INC. AND/OR ITS SUBSIDIARIES. WITHOUT WRITTEN PERMISSION, ANY COPYING, TRANSMISSION, TO OTHERS, AND ANY USE EXCEPT THAT FOR WHICH IT IS ISSUED IS PROHIBITED.</td><td colspan="2"></td></tr><tr><td colspan="2">DIAGRAM - WIRING</td><td colspan="2"></td></tr><tr><td colspan="2">MODULAR CONTROLS</td><td colspan="2"></td></tr><tr><td colspan="2">521-9364</td><td colspan="2">VER - DES X W944</td></tr></table>		1E5167A	INT-PROP	1E2733	DRAWING - AUTOCAD	1E0198W	BRAND MARKINGS	1E0013G	CONFIDENTIALITY	1E0012A	INTERPRETATION	1E0011	INTPR & TOL	SPEC NO.		NAME		DRN		SOMESH		CHK		D SHEPPERD		APPD		LYLE SEWALL		COK		EXP		CEPT		PRD		RECORDS		X		UNLESS OTHERWISE SPECIFIED		DIMENSIONS ARE IN MM [INCHES]		DIMENSIONS W/O TOL ARE BASIC		02 31JAN22		SCALE: NONE		01 23AUG19		10mm 25 50 75 100		00 11JUL18		SHEET 1 OF 122		THIRD ANGLE PROJECTION		CHG		DATE		CATERPILLAR INC.				THE INFORMATION HEREON IS THE PROPERTY OF CATERPILLAR INC. AND/OR ITS SUBSIDIARIES. WITHOUT WRITTEN PERMISSION, ANY COPYING, TRANSMISSION, TO OTHERS, AND ANY USE EXCEPT THAT FOR WHICH IT IS ISSUED IS PROHIBITED.				DIAGRAM - WIRING				MODULAR CONTROLS				521-9364		VER - DES X W944	
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2		ABBREVIATIONS & SYMBOLS		44		DC SCHEMATIC - SHEET 2 OF 18 (EMCP 4.2B)																																																																																									
3		COMPONENT LAYOUT - SHEET 1 OF 11 (MODULAR CONTROL PANEL/VR SUBPAN)		45		DC SCHEMATIC - SHEET 3 OF 18 (EMCP 4.2B)																																																																																									
4		COMPONENT LAYOUT - SHEET 2 OF 11 (MODULAR CONTROL PANEL)		46		DC SCHEMATIC - SHEET 4 OF 18 (EMCP 4.3/4.4)																																																																																									
5		COMPONENT LAYOUT - SHEET 3 OF 11 (MODULAR CONTROL PANEL)		47		DC SCHEMATIC - SHEET 5 OF 18 (EMCP 4.3/4.4)																																																																																									
6		COMPONENT LAYOUT - SHEET 4 OF 11 (2700/941 FRAME GENERATORS)		48		DC SCHEMATIC - SHEET 6 OF 18 (EMCP 4.3/4.4)																																																																																									
7		COMPONENT LAYOUT - SHEET 5 OF 11 (3000 FRAME GENERATORS)		49		DC SCHEMATIC - SHEET 7 OF 18 (CIRCUIT BREAKERS)																																																																																									
8		COMPONENT LAYOUT - SHEET 6 OF 11 (B5600H4 GENERATORS)		50		DC SCHEMATIC - SHEET 8 OF 18 (2700 FRAME GENERATORS)																																																																																									
9		COMPONENT LAYOUT - SHEET 7 OF 11 (Y5000 GENERATORS)		51		DC SCHEMATIC - SHEET 9 OF 18 (3000 FRAME GENERATORS)																																																																																									
10		COMPONENT LAYOUT - SHEET 8 OF 11 (RECESSED MODULAR CONTROL PANEL/EMCP 4.2B)		52		DC SCHEMATIC - SHEET 10 OF 18 (B5600H4 GENERATORS)																																																																																									
11		COMPONENT LAYOUT - SHEET 9 OF 11 (RECESSED MODULAR CONTROL PANEL/EMCP 4.3)		53		DC SCHEMATIC - SHEET 11 OF 18 (Y5000 GENERATORS)																																																																																									
12		COMPONENT LAYOUT - SHEET 10 OF 11 (GAS MODULAR CONTROL PANEL)		54		DC SCHEMATIC - SHEET 12 OF 18 (3500 MUI)																																																																																									
13		COMPONENT LAYOUT - SHEET 11 OF 11 (GDI CONTROL PANEL)		55		DC SCHEMATIC - SHEET 13 OF 18 (3500 MUI)																																																																																									
14		CUSTOMER INTERCONNECTS SHEET 1 OF 12 (EMCP 4.2B, 4.3, 4.4)		56		DC SCHEMATIC - SHEET 14 OF 18 (3500 MUI)																																																																																									
15		CUSTOMER INTERCONNECTS SHEET 2 OF 12 (EMCP 4.2B)		57		DC SCHEMATIC - SHEET 15 OF 18 (G3500 GAS)																																																																																									
16		CUSTOMER INTERCONNECTS SHEET 3 OF 12 (EMCP 4.2B, 4.3, 4.4)		58		DC SCHEMATIC - SHEET 16 OF 18 (G3500 GAS)																																																																																									
17		CUSTOMER INTERCONNECTS SHEET 4 OF 12 (LOW VOLTAGE TO WALL MOUNT)		59		DC SCHEMATIC - SHEET 17 OF 18 (G3500 GAS)																																																																																									
18		CUSTOMER INTERCONNECTS SHEET 5 OF 12 (2700/3000 FRAME TO WALL MOUNT)		60		DC SCHEMATIC - SHEET 18 OF 18 (CIRCUIT BREAKER EMAX2)																																																																																									
19		CUSTOMER INTERCONNECTS SHEET 6 OF 12 (B5600H4/Y5000 TO WALL MOUNT)		61		CAT CONNECT																																																																																									
20		CUSTOMER INTERCONNECTS SHEET 7 OF 12 (EMCP 4.3/4.4)		62		COMMUNICATIONS - CAN1																																																																																									
21		CUSTOMER INTERCONNECTS SHEET 8 OF 12 (EMCP 4.3/4.4)		63		COMMUNICATIONS - CAN2																																																																																									
22		CUSTOMER INTERCONNECTS SHEET 9 OF 12 (HARDWIRED DBA & LSLD)		64		AC OPTIONS - SHORE POWER SHEET 1 OF 5 (1200,1200/1400,1600,1800 FRAMES)																																																																																									
23		CUSTOMER INTERCONNECTS SHEET 10 OF 12 (GAS MODULAR CONTROL PANEL)		65		AC OPTIONS - SHORE POWER SHEET 2 OF 5 (2700 FRAME GENERATORS)																																																																																									
24		CUSTOMER INTERCONNECTS SHEET 11 OF 12 (GAS MODULAR CONTROL PANEL)		66		AC OPTIONS - SHORE POWER SHEET 3 OF 5 (3000 FRAME GENERATORS)																																																																																									
25		CUSTOMER INTERCONNECTS SHEET 12 OF 12 (1G1U)		67		AC OPTIONS - SHORE POWER SHEET 4 OF 5 (B5600H4 GENERATORS)																																																																																									
26		AC SCHEMATIC - SHEET 1 OF 12 (LOW VOLTAGE 1200/1400/1600/1800 FRAMES)		68		AC OPTIONS - SHORE POWER SHEET 5 OF 5 (Y5000 GENERATORS)																																																																																									
27		AC SCHEMATIC - SHEET 2 OF 12 (LOW VOLTAGE CDVR OPTION)		69		SPEED AND VOLTAGE CONTROL																																																																																									
28		AC SCHEMATIC - SHEET 3 OF 12 (MED VOLTAGE (3300-4160V) IVR OPTION)		70		3516C/E 50 HZ LOW EMISSIONS (GEARBOX WIRING)																																																																																									
29		AC SCHEMATIC - SHEET 4 OF 12 (MED VOLTAGE (3300-4160V) CDVR OPTION)		71		MGDL NETWORK - SHEET 1 OF 4																																																																																									
30		AC SCHEMATIC - SHEET 5 OF 12 (SWITCHGEAR TYPE PT AND DCT OPTION)		72		MGDL NETWORK - SHEET 2 OF 4																																																																																									
31		AC SCHEMATIC - SHEET 6 OF 12 (2400V 1400/1600/1800 FRAMES)		73		MGDL NETWORK - SHEET 3 OF 4																																																																																									
32		AC SCHEMATIC - SHEET 7 OF 12 (2700 FRAME GENERATORS)		74		MGDL NETWORK - SHEET 4 OF 4																																																																																									
33		AC SCHEMATIC - SHEET 8 OF 12 (3000 FRAME GENERATORS)		75		12V COMMON ENCLOSURE - AC SCHEMATIC																																																																																									
34		AC SCHEMATIC - SHEET 9 OF 12 (B5600H4 GENERATORS)		76		12V COMMON ENCLOSURE - DC SCHEMATIC - SHEET 1 OF 2 (EMCP 4.2B)																																																																																									
35		AC SCHEMATIC - SHEET 10 OF 12 (Y5000 GENERATORS)		77		12V COMMON ENCLOSURE - DC SCHEMATIC - SHEET 2 OF 2 (EMCP 4.3/4.4)																																																																																									
36		AC SCHEMATIC - SHEET 11 OF 12 (LOW VOLTAGE GDI OPTION)		78		12V COMMON ENCLOSURE - CONDUIT - SHEET 1 OF 2																																																																																									
37		AC SCHEMATIC - SHEET 12 OF 12 (HIGH VOLTAGE GDI OPTION)		79		12V COMMON ENCLOSURE - CONDUIT - SHEET 2 OF 2																																																																																									
38		ENGINE INTERFACE HARNESS SHEET 1 OF 18 (ON PACKAGE CONTROLS (3500))		80		ENGINE INTERFACE HARNESS SHEET 1 OF 18 (ON PACKAGE CONTROLS (3500))																																																																																									
39		ENGINE INTERFACE HARNESS SHEET 2 OF 18 (OFF PACKAGE CONTROLS (3500))		81		ENGINE INTERFACE HARNESS SHEET 2 OF 18 (OFF PACKAGE CONTROLS (3500))																																																																																									
40		ENGINE INTERFACE HARNESS SHEET 3 OF 18 (ON PACKAGE CONTROLS (C27/C32))		82		ENGINE INTERFACE HARNESS SHEET 3 OF 18 (ON PACKAGE CONTROLS (C27/C32))																																																																																									
41		ENGINE INTERFACE HARNESS SHEET 4 OF 18 (OFF PACKAGE CONTROLS (C27/C32))		83		ENGINE INTERFACE HARNESS SHEET 4 OF 18 (OFF PACKAGE CONTROLS (C27/C32))																																																																																									
42		ENGINE INTERFACE HARNESS SHEET 5 OF 18 (ON PACKAGE CONTROLS (3500 MUI))		84		ENGINE INTERFACE HARNESS SHEET 5 OF 18 (ON PACKAGE CONTROLS (3500 MUI))																																																																																									
6		5		4		3		2		1																																																																																					

SHEET	DESCRIPTION
85	ENGINE INTERFACE HARNESS SHEET 6 OF 18 (OFF PACKAGE CONTROLS (3500 MUI))
86	ENGINE INTERFACE HARNESS SHEET 7 OF 18 (ON PACKAGE CONTROLS (3500 DGB))
87	ENGINE INTERFACE HARNESS SHEET 8 OF 18 (ON PACKAGE CONTROLS (C175-16))
88	ENGINE INTERFACE HARNESS SHEET 9 OF 18 (ON PACKAGE CONTROLS (C175-16 T4))
89	ENGINE INTERFACE HARNESS SHEET 10 OF 18 (OFF PACKAGE CONTROLS (C175-16))
90	ENGINE INTERFACE HARNESS SHEET 11 OF 18 (ON PACKAGE CONTROLS (GAS-G3500 C/E))
91	ENGINE INTERFACE HARNESS SHEET 12 OF 18 (ON PACKAGE CONTROLS (GAS-G3500 STANDBY))
92	ENGINE INTERFACE HARNESS SHEET 13 OF 18 (ON PACKAGE CONTROLS (GAS-G3500 A))
93	ENGINE INTERFACE HARNESS SHEET 14 OF 18 (ON PACKAGE CONTROLS (GAS-G3500 B))
94	ENGINE INTERFACE HARNESS SHEET 15 OF 18 (ON PACKAGE CONTROLS (GAS-G3500 H GEARBOX))
95	ENGINE INTERFACE HARNESS SHEET 16 OF 18 (OFF PACKAGE CONTROLS (GAS-G3500 H))
96	ENGINE INTERFACE HARNESS SHEET 17 OF 18 (ON PACKAGE CONTROLS (GAS-G3500 H))
97	ENGINE INTERFACE HARNESS SHEET 18 OF 18 (ON PACKAGE CONTROLS (GAS-G3500 E))
98	ENGINE INTERFACE HARNESS SHEET (3516/C175 CEM/AFTERTREATMENT CONNECTIONS)
99	ENGINE SCHEMATIC - SHEET 1 OF 4 (C27/C32 ENGINE)
100	ENGINE SCHEMATIC - SHEET 2 OF 4 (C27/C32 ENGINE)
101	ENGINE SCHEMATIC - SHEET 3 OF 4 (C27/C32 ENGINE)
102	ENGINE SCHEMATIC - SHEET 4 OF 4 (C27/C32 ENGINE)
103	ENGINE SCHEMATIC - SHEET 1 OF 2 (3500 EUI ENGINE)
104	ENGINE SCHEMATIC - SHEET 2 OF 2 (3500 EUI ENGINE)
105	ENGINE SCHEMATIC - SHEET 1 OF 2 (3500 MUI ENGINE)
106	ENGINE SCHEMATIC - SHEET 2 OF 2 (3500 MUI ENGINE)
107	ENGINE SCHEMATIC - SHEET 1 OF 5 (3516 DGB ENGINE)
108	ENGINE SCHEMATIC - SHEET 2 OF 5 (3516 DGB ENGINE)
109	ENGINE SCHEMATIC - SHEET 3 OF 5 (3516 DGB ENGINE)
110	ENGINE SCHEMATIC - SHEET 4 OF 5 (3516 DGB ENGINE)
111	ENGINE SCHEMATIC - SHEET 5 OF 5 (3516 DGB ENGINE)
112	ENGINE SCHEMATIC - SHEET 1 OF 3 (C175-16/20 ENGINE)
113	ENGINE SCHEMATIC - SHEET 2 OF 3 (C175-16/20 ENGINE)
114	ENGINE SCHEMATIC - SHEET 3 OF 3 (C175-16/20 ENGINE)
115	ENGINE SCHEMATIC - SHEET 1 OF 5 (G3500 C/E)
116	ENGINE SCHEMATIC - SHEET 2 OF 5 (G3500 STANDBY)
117	ENGINE SCHEMATIC - SHEET 3 OF 5 (G3500 A)
118	ENGINE SCHEMATIC - SHEET 4 OF 5 (G3500 B)
119	ENGINE SCHEMATIC - SHEET 5 OF 5 (G3500 H)
120	ENGINE SCHEMATIC - (GAS-G3500) SERIES
121	AC SCHEMATIC - 600V-LOW VOLTAGE DVC-550 OPTION
122	AC SCHEMATIC - 4160V-MEDIUM VOLTAGE DVC-550 OPTION
123	AC OPTIONS - SHORE POWER, DUAL JWH (2700 FRAME)

[illegible]

SHEET INDEX 2
CATERPILLAR: CONFIDENTIAL GREEN

6

5

4

3

2

1

METRIC

521-9364

ENGINE TYPE	GENERATOR	VOLTAGE	CONTROLLER	SUGGESTED PRINT LIST																												
C27 / C32	1200/1400 FRAME	LV(<1000V)	EMCP 4.3/4.4	1-7	9	18	20	21	24	26	27	31	46-49	61-64	69	71-74	82	83	99-102													
C32	1400 FRAME	MV(1000-5000V)	EMCP 4.3/4.4	1-7	9	18	20	26	27	32	33	46-48	61-64	69	71-74	82	83	99-102														
C32	2700 FRAME	HV(>5KV)	EMCP 4.3/4.4	1-7	9	9	18	20	22	26	27	37	46-48	50	61-63	65	69	71-74	83	99-102												
3512MUI/3516MUI	1400/1600/1800 FRAME	LV(<1000V)	EMCP 4.3/4.4	1-7	9	18	20	21	24	26	27	32	33	46-49	54-56	61-64	69	71-74	84	85	105	106										
3512MUI/3516MUI	1400/1600/1800 FRAME	MV(1000-5000V)	EMCP 4.3/4.4	1-7	9	18	20	26	27	32	33	46-48	54-56	61-64	69	71-74	84	85	105	106												
3512MUI/3516MUI	2700 FRAME	HV(>5KV)	EMCP 4.3/4.4	1-7	9	9	18	20	22	26	27	37	46-48	50	54-56	61-63	65	69	71-74	85	105	106										
3512EUI/3516EUI	1400/1600/1800	LV(<1000V)	EMCP 4.3/4.4	1-7	9	18	20	21	24	26	27	31	46-49	61-64	69	71-74	80	81	103	104												
3512EUI/3516EUI	1400/1600/1800	MV(1000-5000V)	EMCP 4.3/4.4	1-7	9	18	20	26	27	32	33	46-48	61-64	69	71-74	80	81	103	104													
3512EUI/3516EUI	2700 FRAME	HV(>5KV)	EMCP 4.3/4.4	1-7	9	9	18	20	22	26	27	37	46-48	50	61-63	65	69	71-74	81	103	104											
3516EUI	Y5000 FRAME	HV(>5KV)	EMCP 4.3/4.4	1-7	9	13	18	20	23	26	27	40	46-48	53	61-63	68	69	71-74	81	103	104											
3516EUI	B5600H4 FRAME	HV(>5KV)	EMCP 4.3/4.4	1-7	9	12	18	20	23	26	27	39	46-48	52	61-63	67	69	71-74	81	103	104											
3516EUI	3000 FRAME	HV(>5KV)	EMCP 4.3/4.4	1-7	9	11	18	20	22	26	27	38	46-48	51	61-63	66	71-74	81	103	104												
C175-16	1800 FRAME	LV(<1000V)	EMCP 4.3/4.4	1-7	9	18	20	21	24	26	27	31	46-49	61-64	69	71-74	87	89	112	113	114											
C175-16	1800 FRAME	MV(1000-5000V)	EMCP 4.3/4.4	1-7	9	18	20	26	27	32	33	46-48	61-64	69	71-74	87	89	112	113	114												
C175-16/C175-20	3000 FRAME	MV-HV(>1000V)	EMCP 4.3/4.4	1-7	9	11	18	20	22	26	27	38	46-48	51	61-63	66	71-74	89	112	113	114											
G3500A	1400 FRAME	LV(<1000V)/MV-HV(>1000V)	EMCP 4.3/4.4	1-7	16-18	20-22	26-35	41	49	57-64	69-74	92	117	120																		
G3500C/E	1600/1800 FRAME	LV(<1000V)/MV-HV(>1000V)	EMCP 4.3/4.4	1-7	16-18	20-22	26-35	41	49	57-64	69-74	90	115	120																		
G3500C/E	2600/2700 FRAME	HV(>5KV)	EMCP 4.3/4.4	1-7	10	16-18	20	22	26-30	37	42	50	57-63	65	69	71-74	90	115	120													
G3500H	1600/1800 FRAME	LV(<1000V)/MV-HV(>1000V)	EMCP 4.3/4.4	1-7	16-18	20-22	26-35	41	49	57-64	69-74	94-96	119	120																		
G3500H	2700 FRAME	HV(>5KV)	EMCP 4.3/4.4	1-7	10	16-18	20	22	26-30	37	38	42	50	57-63	65	69	71-74	94-96	119	120												
G3500H	3000 FRAME	HV(>5KV)	EMCP 4.3/4.4	1-7	11	16-18	20	22	26-30	37	38	42	51	57-63	66	69	71-74	94-96	119	120												
G3500B	1600 FRAME	LV(<1000V)/MV-HV(>1000V)	EMCP 4.3/4.4	1-7	16-18	20-22	26-35	41	49	57-64	69	71-74	93	118	120																	
G3500 STANDBY	1400/1600/1800 FRAME	LV(<1000V)/MV-HV(>1000V)	EMCP 4.3/4.4	1-7	16-18	20-22	26-35	41	49	57-64	69	71-74	91	116	120																	
C27	1200/1400 FRAME	LV(<1000V)	EMCP 4.2B	1-8	18-21	24	31	43-45	61-64	69	82	83	99-102																			
C32	1200/1400 FRAME	LV(<1000V)	EMCP 4.2B	1-8	18-21	24	31	43-45	49	61-64	69	82	83	99-102																		
C32	1400 FRAME	MV(1000-5000V)	EMCP 4.2B	1-8	18-20	33	36	43-45	61-64	69	82	83	99-102																			
C32	2700 FRAME	HV(>5KV)	EMCP 4.2B	1-8	10	18-20	22	37	43-45	50	61-63	65	69	83	99-102																	
3512MUI/3516MUI	1400/1600/1800 FRAME	LV(<1000V)	EMCP 4.2B	1-8	18-20	33	36	43-45	54-56	61-64	69	84	85	105	106																	
3512MUI/3516MUI	1400/1600/1800 FRAME	MV(1000-5000V)	EMCP 4.2B	1-8	18-21	24	31	43-45	49	54-56	61-64	69	84	85	105	106																
3512MUI/3516MUI	2700 FRAME	HV(>5KV)	EMCP 4.2B	1-8	10	18-20	22	37	43-45	50	54-56	61-63	65	69	85	105	106															
3512EUI/3516EUI	1400/1600/1800 FRAME	LV(<1000V)	EMCP 4.2B	1-8	31	43-45	49	61-64	69	80	81	102	103	105	106																	
3512EUI/3516EUI	1400/1600/1800 FRAME	MV(1000-5000V)	EMCP 4.2B	1-8	18-20	33	36	43-45	61-64	69	80	81	103	104																		
3512EUI/3516EUI	2700 FRAME	HV(>5KV)	EMCP 4.2B	1-8	10	18-20	22	37	43-45	50	61-63	65	69	81	103	104																
3516EUI	Y5000 FRAME	HV(>5KV)	EMCP 4.2B	1-8	13	18-20	23	40	43-45	53	61-63	68	69	81	103	104																
3516EUI	B5600H4 FRAME	HV(>5KV)	EMCP 4.2B	1-8	12	18-20	23	39	43-45	52	61-63	67	69	81	103	104																
3516EUI	3000 FRAME	HV(>5KV)	EMCP 4.2B	1-8	11	18-20	22	38	43-45	52	61-63	66	69	81	103	104																
C175-16	1800 FRAME	LV(<1000V)	EMCP 4.2B	1-8	18-21	24	31	43-45	49	61-64	69	87	89	112	113	114																
C175-16	1800 FRAME	MV(1000-5000V)	EMCP 4.2B	1-8	18-20	33	36	43-45	61-64	69	87	89	112	113	114																	
C175-16/C175-20	3000 FRAME	MV-HV(>1000V)	EMCP 4.2B	1-8	11	18-20	22	38	43-45	52	61-63	66	69	89	112	113	114															

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METRIC

521-9364

ENGINE TYPE	GENERATOR	VOLTAGE	CONTROLLER	SUGGESTED PRINT LIST																												
C27 / C32	1200/1400 FRAME	LV(<1000V)	EMCP 4.3/4.4	1-7	9	18	20	21	24	26	27	31	46-49	61-64	69	71-74	82	83	99-102													
C32	1400 FRAME	MV(1000-5000V)	EMCP 4.3/4.4	1-7	9	18	20	26	27	32	33	46-48	61-64	69	71-74	82	83	99-102														
C32	2700 FRAME	HV(>5KV)	EMCP 4.3/4.4	1-7	9	9	18	20	22	26	27	37	46-48	50	61-63	65	69	71-74	83	99-102												
3512MUI/3516MUI	1400/1600/1800 FRAME	LV(<1000V)	EMCP 4.3/4.4	1-7	9	18	20	21	24	26	27	32	33	46-49	54-56	61-64	69	71-74	84	85	105	106										
3512MUI/3516MUI	1400/1600/1800 FRAME	MV(1000-5000V)	EMCP 4.3/4.4	1-7	9	18	20	26	27	32	33	46-48	54-56	61-64	69	71-74	84	85	105	106												
3512MUI/3516MUI	2700 FRAME	HV(>5KV)	EMCP 4.3/4.4	1-7	9	9	18	20	22	26	27	37	46-48	50	54-56	61-63	65	69	71-74	85	105	106										
3512EUI/3516EUI	1400/1600/1800	LV(<1000V)	EMCP 4.3/4.4	1-7	9	18	20	21	24	26	27	31	46-49	61-64	69	71-74	80	81	103	104												
3512EUI/3516EUI	1400/1600/1800	MV(1000-5000V)	EMCP 4.3/4.4	1-7	9	18	20	26	27	32	33	46-48	61-64	69	71-74	80	81	103	104													
3512EUI/3516EUI	2700 FRAME	HV(>5KV)	EMCP 4.3/4.4	1-7	9	9	18	20	22	26	27	37	46-48	50	61-63	65	69	71-74	81	103	104											
3516EUI	Y5000 FRAME	HV(>5KV)	EMCP 4.3/4.4	1-7	9	13	18	20	23	26	27	40	46-48	53	61-63	68	69	71-74	81	103	104											
3516EUI	B5600H4 FRAME	HV(>5KV)	EMCP 4.3/4.4	1-7	9	12	18	20	23	26	27	39	46-48	52	61-63	67	69	71-74	81	103	104											
3516EUI	3000 FRAME	HV(>5KV)	EMCP 4.3/4.4	1-7	9	11	18	20	22	26	27	38	46-48	51	61-63	66	71-74	81	103	104												
C175-16	1800 FRAME	LV(<1000V)	EMCP 4.3/4.4	1-7	9	18	20	21	24	26	27	31	46-49	61-64	69	71-74	87	89	112	113	114											
C175-16	1800 FRAME	MV(1000-5000V)	EMCP 4.3/4.4	1-7	9	18	20	26	27	32	33	46-48	61-64	69	71-74	87	89	112	113	114												
C175-16/C175-20	3000 FRAME	MV-HV(>1000V)	EMCP 4.3/4.4	1-7	9	11	18	20	22	26	27	38	46-48	51	61-63	66	71-74	89	112	113	114											
G3500A	1400 FRAME	LV(<1000V)/MV-HV(>1000V)	EMCP 4.3/4.4	1-7	16-18	20-22	26-35	41	49	57-64	69-74	92	117	120																		
G3500C/E	1600/1800 FRAME	LV(<1000V)/MV-HV(>1000V)	EMCP 4.3/4.4	1-7	16-18	20-22	26-35	41	49	57-64	69-74	90	115	120																		
G3500C/E	2600/2700 FRAME	HV(>5KV)	EMCP 4.3/4.4	1-7	10	16-18	20	22	26-30	37	42	50	57-63	65	69	71-74	90	115	120													
G3500H	1600/1800 FRAME	LV(<1000V)/MV-HV(>1000V)	EMCP 4.3/4.4	1-7	16-18	20-22	26-35	41	49	57-64	69-74	94-96	119	120																		
G3500H	2700 FRAME	HV(>5KV)	EMCP 4.3/4.4	1-7	10	16-18	20	22	26-30	37	38	42	50	57-63	65	69	71-74	94-96	119	120												
G3500H	3000 FRAME	HV(>5KV)	EMCP 4.3/4.4	1-7	11	16-18	20	22	26-30	37	38	42	51	57-63	66	69	71-74	94-96	119	120												
G3500B	1600 FRAME	LV(<1000V)/MV-HV(>1000V)	EMCP 4.3/4.4	1-7	16-18	20-22	26-35	41	49	57-64	69	71-74	93	118	120																	
G3500 STANDBY	1400/1600/1800 FRAME	LV(<1000V)/MV-HV(>1000V)	EMCP 4.3/4.4	1-7	16-18	20-22	26-35	41	49	57-64	69	71-74	91	116	120																	
C27	1200/1400 FRAME	LV(<1000V)	EMCP 4.2B	1-8	18-21	24	31	43-45	61-64	69	82	83	99-102																			
C32	1200/1400 FRAME	LV(<1000V)	EMCP 4.2B	1-8	18-21	24	31	43-45	49	61-64	69	82	83	99-102																		
C32	1400 FRAME	MV(1000-5000V)	EMCP 4.2B	1-8	18-20	33	36	43-45	61-64	69	82	83	99-102																			
C32	2700 FRAME	HV(>5KV)	EMCP 4.2B	1-8	10	18-20	2																									

		METRIC		521-9364	
SHEET 43,44,46,49	NOTE A:	SEE LEBE0049 TO PROGRAM EMCP 4.2B INPUTS AND OUTPUTS.			
55,18,60,77	NOTE B:	REMOVE JUMPER BAR BETWEEN ESTOP-A AND ESTOP-B TERMINAL BOARD POINTS AFTER INSTALLATION OF C27/C32 ENCLOSURE OR ENGINE MOUNTED EMERGENCY STOP.			
SHEET 43,46,54,18,21,22,23		REMOVE THE JUMPER WIRE FROM BTRY NEG AND ESTOP-A WITH THE INSTALLATION OF THE CUSTOMER SUPPLIED ESTOP. (CUSTOMER ESTOP IS CONNECTED ACROSS TERMINALS BTRY NEG AND ESTOP-A.)			
SHEET 18,19	NOTE C:	CUSTOMER LOADING FROM TERMINAL STRIP SHOULD BE LIMITED TO 5A RESISTIVE ONLY AND FOR EXCESS DEMAND USE BATTERY CONNECTION.			
SHEET 44,56,18,21,22	NOTE D:	SEE LEBE0010 FOR EMCP 4 SCADA DATA LINKS.			
23,71,72,73,74	NOTE E:	SEE SHEET "CUSTOMER INTERCONNECTS SHEET 3 OF 12" FOR CONNECTION TO REMOTE DEVICES.			
SHEET 44,56,18,21,22,23	NOTE F:	SEE LEBE0049 TO PROGRAM DISCRETE I/O MODULE INPUTS AND OUTPUTS.			
SHEET 45,20	NOTE G:	WHEN THE ENGINE IS RUNNING, THE EMCP ENERGIZES THE SPDR, CR1, CR21 & CR22 RELAYS TO DISABLE AC SHORE POWER.			
SHEET 64	NOTE H:	AMPACITY OF SHORE POWER CUSTOMER WIRING SHOULD BE DETERMINED BY OPTIONS INSTALLED.			
SHEET 48,64,65,66,19,21,22,23	NOTE J:	USE THE EXISTING RESISTOR ON THE DC TERMINAL BLOCK.			
SHEET 48,20	NOTE K:	DIODE 1 IS USED FOR BEST BATTERY CIRCUIT. SEE LEBE0007 (EMCP 4.3, 4.4 GENERATOR SET CONTROL A&I GUIDE) AND MANUAL UENR1210 (SYSTEMS OPERATION TROUBLESHOOTING TESTING AND ADJUSTING - SOTTA) FOR CONNECTIONS DETAILS.			
SHEET 48,27	NOTE L:	REFERENCE 524-1257 FOR CIRCUIT BREAKER INSTALLATION DRAWINGS.			
SHEET 49,60	NOTE M:	DIGITAL INPUT 3 IS ONLY AVAILABLE ON PACKAGES WITHOUT A CIRCUIT BREAKER. DIGITAL INPUT 5, 6 ARE USED BY THE FACTORY FOR THE C175 GENSET.			
SHEET 44,49,55,18,60	NOTE N:	ANALOG INPUT (-)'S MUST BE REFERENCED TO BATTERY (-).(EMCP 4.2B)			
SHEET 44,55,18,22,23	NOTE P:	CIRCUIT BREAKER TERMINAL LABELS ARE LOCATION BASED, LF=LEFT, RT=RIGHT, RR=REAR.			
SHEET 19	NOTE R:	RECOMMENDED WIRING FOR ACTIVE SENSORS.			
SHEET 18,21,22,23	NOTE S:	RECOMMENDED WIRING FOR RESISTIVE SENSORS.			
SHEET 18,21,22,23	NOTE U:	THE EMCP 4.4 MULTIPLE GENSET DATA LINK (MGDL) FEATURE IS AN ETHERNET DATA LINK USED BETWEEN ENGINE/GENERATOR SETS FOR ON-PACKAGE PARALLELING AND CONTROL.THE EMCP 4.4 MGDL FEATURE DOES NOT EMPLOY A MASTER CONTROLLER STRATEGY FOR PARALLELING OPERATION. THE EMCP 4.4 CONTROLLER USES A PROPRIETARY PROTOCOL TO COMMUNICATE INFORMATION BETWEEN GENERATOR SETS TO CONTROL PARALLELING FEATURES LIKE DEAD BUS ARBITRATION, SYNCHRONIZING, LOAD SHARING AND LOAD SEQUENCING. THE EMCP 4.4 IS NOT DESIGNED OR INTENDED TO CONNECT TO THIRD-PARTY PRODUCTS OVER THIS DATA LINK. SEE LEBE0031 (EMCP 4.4 MULTIPLE GENSET DATA LINK) FOR DETAILED CONFIGURATION AND OPERATION GUIDE.			
SHEET 48,71,72,73,74	NOTE V:	LEBE0032 (EMCP 4.4 MULTIPLE GENSET DATA LINK QUICK START GUIDE) PROVIDES INFORMATION NECESSARY TO SET UP THE MULTIPLE GENSET DATA LINK (MGDL) FEATURE FOR OPERATION ON CAT GENERATOR SETS. THIS QUICK START GUIDE IS NOT A DETAILED CONFIGURATION AND OPERATION GUIDE. FOR STEPS TO PROPERLY SETUP MGDL HARDWARE, SETPOINT CONFIGURATION, AND ALL MGDL PARALLELING FEATURE OPERATION REVIEW THE EMCP MULTIPLE GENSET DATA LINK CONFIGURATION & OPERATION GUIDE.			
SHEET 71,72,73,74	NOTE W:	ETHERNET NETWORK TOPOLOGY SHOWN USING 6-PORT ETHERNET SWITCH. ETHERNET SWITCH AND CABLES SUPPLIED BY OTHERS.			
SHEET 27	NOTE X:	ONE, AND ONLY ONE, UNIT MUST BE DESIGNATED AS THE LEAD UNIT. THIS IS ACCOMPLISHED BY CONNECTING THE BEST BATTERY POSITIVE LINE OF A UNIT TO THE HWDBA 3 INPUT OF THAT SAME UNIT. IF BREAKER CONTROLS ON A GENSET ARE WIRED TO THE EMCP 4.4 INPUTS, THE BREAKER WILL NOT CLOSE IF THE CLOSE CONTROL IS ACTIVATED UNLESS HWDBA IS ENABLED AND THE LEAD UNIT CONNECTION IS INSTALLED.			
SHEET 22,23	NOTE Y:	USE 169-8670 CONNECTOR WITH 155-2276 WEDGE			
SHEET 33,34,35,42	NOTE Z:	FUSES ARE DEDICATED TO EMCP VOLTAGE SENSING ONLY, NOT FOR OTHER USES.			
SHEET 57,58	NOTE AA:	REFER BELOW TABLE FOR MODEL AND SERIAL NUMBER PREFIX TO IDENTIFY RELEVANT CIRCUIT			

MODEL	SERIAL NO PREFIX
C175-16	1E8 , 1B8
C175-20	1Z8
3516 MUI	YL2 , JCG , SNC
3516	LY3 , LY4 , ZNT , LY5 , LY6 , LYM , JD7 , JCH , JCN , JCB , PXY , LNW , LNZ , SNE , SN7 , JGX , N7N , F38
3512 MUI	LY7 , JM2 , LNF , TLL
3512	LY8 , LY9 , LYH , LYP , JM3 , JM4 , LNJ , LNM , TLN , TLT
3516 GEARBOX	GBZ
C32	JSJ , TZJ
C27	2A3
G3516 B	ZBC , E6T
G3516 A	ZAZ , ZBA
G3512 STANDBY	E2X , E2P , E2T , E2N
G3512 E	NWC
G3520 E	GZE
G3512 H	GF5 , GF4
G3516 H	NWH , NWJ
G3512 H	GFP , GFR
G3516 C	NWD , NWF , NWE
G3520 C	RLP , LGS , GZB , GZA , GZJ

ALL CUSTOMER WIRE SIZES ARE 16 AWG/1.0sq mm MINIMUM, 600V STRANDED WIRE, UNLESS OTHERWISE SPECIFIED.

THIS SCHEMATIC REPRESENTS	DIAGRAM—WIRING	491—3960/05	(MODULAR CONTROLS)
THIS SCHEMATIC REPRESENTS	DIAGRAM—WIRING	237—9000/03	(3500 EU) ENGINE
THIS SCHEMATIC REPRESENTS	DIAGRAM—WIRING	533—6559/01	(3516B DGB) ENGINE
THIS SCHEMATIC REPRESENTS	DIAGRAM—WIRING	415—1146/04	(3500 MU) ENGINE
THIS SCHEMATIC REPRESENTS	DIAGRAM—WIRING	420—8316/02	(C175—16) ENGINE
THIS SCHEMATIC REPRESENTS	DIAGRAM—WIRING	420—8317/00	(C175—20) ENGINE
THIS SCHEMATIC REPRESENTS	DIAGRAM—WIRING	260—9515/06	(C27/C32) ENGINE
THIS SCHEMATIC REPRESENTS	DIAGRAM—WIRING	324—7474/07,	292—5340/03, 329—4396/09, 324—7475/05 (G3500 C&E) ENGINE
THIS SCHEMATIC REPRESENTS	DIAGRAM—WIRING	550—1000/01	(G3500 STAND BY) ENGINE
THIS SCHEMATIC REPRESENTS	DIAGRAM—WIRING	384—1372/03	(G3500 A) ENGINE
THIS SCHEMATIC REPRESENTS	DIAGRAM—WIRING	237—5810/04	(G3500 B) ENGINE
THIS SCHEMATIC REPRESENTS	DIAGRAM—WIRING	358—6954/09,	533—7000/02 (G3500 H) ENGINE

NOTES
CATERPILLAR: CONFIDENTIAL GREEN

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EMCP 4.3/4.4 I/O DEFAULT CONFIGURATION

METRIC 521-9364

DESCRIPTION	RELAY	3500-EUI	C175-16/C175-20	C27 & C32	G3500
ESTOP (DEDICATED DI-1)		E-STOP (DEDICATED)	E-STOP (DEDICATED)	E-STOP (DEDICATED)	E-STOP (DEDICATED)
START (DEDICATED DI-2)		REMOTE INITIATE (DEDICATED)	REMOTE INITIATE (DEDICATED)	REMOTE INITIATE (DEDICATED)	REMOTE INITIATE (DEDICATED)
PROG. DI-01		SPARE	SPARE	FUEL LEAK (ENCLOSURE)	SPARE
PROG. DI-02		SPARE	SPARE	AC BATTERY CHARGER FAILURE (ENCLOSURE)	SPARE
PROG. DI-03		52G#1 OPEN (OPTIONAL)	52G#1 OPEN (OPTIONAL)	52G#1 OPEN (OPTIONAL)	52G#1 OPEN (OPTIONAL) ²
PROG. DI-04		52G#2 OPEN (OPTIONAL)	52G#2 OPEN (OPTIONAL)	52G#2 OPEN (OPTIONAL)	52G#2 OPEN (OPTIONAL) ²
PROG. DI-05		GEAR OIL PRESSURE SWITCH(GEARBOX)	JACKET WATER COOLANT LEVEL ALARM	SPARE	SPARE
PROG. DI-06		SPARE	SCAC COOLANT LEVEL ALARM	SPARE	SPARE
PROG. DI-07		SPARE	SPARE	SPARE	SPARE
PROG. DI-08		SPARE	SPARE	SPARE	SPARE
ISOLATED DI-01		SPARE	SPARE	SPARE	SPARE
ISOLATED DI-02		SPARE	SPARE	SPARE	SPARE
ISOLATED DI-03		SPARE	SPARE	SPARE	SPARE
ISOLATED DI-04		SPARE	SPARE	SPARE	SPARE
ANALOG INPUT-1		GEAR OIL TEMPERATURE (GEARBOX)	SPARE	SPARE	SPARE
ANALOG INPUT-2		SPARE	SPARE	SPARE	SPARE
ANALOG INPUT-3		SPARE	SPARE	SPARE	SPARE
ANALOG INPUT-4 ¹		SPARE	SPARE	SPARE	SPARE
DO-1	R1	STARTER MOTOR MAG RELAY	SPARE	SPARE	STARTER MOTOR MAG RELAY
DO-2	R2	SPARE	SPARE	SPARE	START(FUEL ENABLE)
DO-3	R3	SPARE	SPARE	DISABLE AUX AC SUPPLY (ENCLOSURE)	ECU FAULT RESET
DO-4		SPARE	SPARE	SPARE	SPARE
DO-5		SPARE	SPARE	SPARE	SPARE
DO-6		COMMON SHUTDOWN	COMMON SHUTDOWN	COMMON SHUTDOWN	COMMON SHUTDOWN
DO-7		SPARE	SPARE	SPARE	SPARE
DO-8		SPARE	SPARE	SPARE	SPARE
DO-9		SPARE	SPARE	SPARE	SPARE
DO-10		SPARE	SPARE	SPARE	SPARE
DO-11		SPARE	SPARE	SPARE	SPARE
DO-12	R12	SPARE	SPARE	SPARE	COMMON SHUTDOWN
DO-13	R13	SPARE	IDLE SPEED COMMAND	IDLE SPEED COMMAND	CSOV ²
DO-14	R14	PRELUBE	SPARE	SPARE	RATED/IDLE SPEED ²
DO-15	R15	DISABLE AUX AC SUPPLY	DISABLE AUX AC SUPPLY	DISABLE AUX AC SUPPLY	DISABLE AUX AC SUPPLY
DO-16	R16	SPARE	SPARE	SPARE	GOVERNOR 24VDC ²
DO-17 ¹		SPARE	SPARE	SPARE	SPARE
DDI 1 ¹		GROUP START	GROUP START	GROUP START	GROUP START
DDI 2 ¹		CIRCUIT BREAKER OVERCURRENT ALARM	CIRCUIT BREAKER OVERCURRENT ALARM	CIRCUIT BREAKER OVERCURRENT ALARM	CIRCUIT BREAKER OVERCURRENT ALARM
DDI 3 ¹		MANUAL CIRCUIT BREAKER OPEN	MANUAL CIRCUIT BREAKER OPEN	MANUAL CIRCUIT BREAKER OPEN	MANUAL CIRCUIT BREAKER OPEN
DDI 4 ¹		MANUAL CIRCUIT BREAKER CLOSE	MANUAL CIRCUIT BREAKER CLOSE	MANUAL CIRCUIT BREAKER CLOSE	MANUAL CIRCUIT BREAKER CLOSE
DDO 1 ¹	R17	DEAD BUS ARBITRATION RELAY	DEAD BUS ARBITRATION RELAY	DEAD BUS ARBITRATION RELAY	DEAD BUS ARBITRATION RELAY
DDO 2 ¹	R20	CIRCUIT BREAKER CLOSE	CIRCUIT BREAKER CLOSE	CIRCUIT BREAKER CLOSE	CIRCUIT BREAKER CLOSE
DDO 3 ¹	R19	CIRCUIT BREAKER OPEN	CIRCUIT BREAKER OPEN	CIRCUIT BREAKER OPEN	CIRCUIT BREAKER OPEN

¹ EMCP 4.4 ONLY² G3500A SERIES GAS PACKAGES ONLY³ EMCP 4.3 ONLY

EMCP 4.2B I/O DEFAULT CONFIGURATION

DESCRIPTION		3500-EUI	3500-MUI	C175-16/C175-20	C27 & C32
RELAY 01 (R01)	SMMS	SMMS	SPARE	SPARE	SPARE
RELAY 02 (R02)	SPARE	SPARE	SPARE	SPARE	SPARE
RELAY 03 (R03)	SPARE	SPARE	SPARE	SPARE	DISABLE AUX AC SUPPLY (ENCLOSURE)
RELAY 04 (R04)	SPARE	FUEL ENABLE	SPARE	SPARE	SPARE
RELAY 05 (R05)	PRELUBE	IDLE/RATED SPEED	SPARE	SPARE	SPARE
RELAY 06 (R06)	COMMON SHUTDOWN	COMMON SHUTDOWN	COMMON SHUTDOWN	COMMON SHUTDOWN	COMMON SHUTDOWN
RELAY 07 (R07)	LOW IDLE SPEED	SPARE	LOW IDLE SPEED	LOW IDLE SPEED	LOW IDLE SPEED
RELAY 08 (R08)	SPARE	SPARE	SPARE	SPARE	SPARE
DIGITAL OUTPUT #1 (D01)	DISABLE AUX AC SUPPLY	DISABLE AUX AC SUPPLY	DISABLE AUX AC SUPPLY	DISABLE AUX AC SUPPLY	DISABLE AUX AC SUPPLY
DIGITAL OUTPUT #2 (D02)	CONTROL SIGNAL TO IVR (DEDICATED)	CONTROL SIGNAL TO IVR (DEDICATED)	CONTROL SIGNAL TO IVR (DEDICATED)	CONTROL SIGNAL TO IVR (DEDICATED)	CONTROL SIGNAL TO IVR (DEDICATED)
DIGITAL INPUT E-STOP (E-STOP)	E-STOP (DEDICATED)	E-STOP (DEDICATED)	E-STOP (DEDICATED)	E-STOP (DEDICATED)	E-STOP (DEDICATED)
DIGITAL INPUT START (START)	REMOTE INITIATE (DEDICATED)	REMOTE INITIATE (DEDICATED)	REMOTE INITIATE (DEDICATED)	REMOTE INITIATE (DEDICATED)	REMOTE START (DEDICATED)
DIGITAL INPUT #1 (D11)	SPARE	SPARE	SPARE	SPARE	FUEL LEAK (ENCLOSURE)
DIGITAL INPUT #2 (D12)	SPARE	SPARE	SPARE	SPARE	AC BATTERY CHARGER FAILURE (ENCLOSURE)
DIGITAL INPUT #3 (D13)	52G#1 OPEN (OPTIONAL)	52G#1 OPEN (OPTIONAL)	52G#1 OPEN (OPTIONAL)	52G#1 OPEN (OPTIONAL)	52G#1 OPEN (OPTIONAL)
DIGITAL INPUT #4 (D14)	52G#2 OPEN (OPTIONAL)	52G#2 OPEN (OPTIONAL)	52G#2 OPEN (OPTIONAL)	52G#2 OPEN (OPTIONAL)	52G#2 OPEN (OPTIONAL)
DIGITAL INPUT #5 (D15)	GEAR OIL PRESSURE SWITCH(GEARBOX)	ENGINE COOLANT LEVEL ALARM	JACKET WATER COOLANT LEVEL ALARM	SPARE	SPARE
DIGITAL INPUT #6 (D16)	SPARE	ENGINE OIL PRESSURE	SCAC COOLANT LEVEL ALARM	SPARE	SPARE
ANALOG INPUT #1 (AI1)	GEAR OIL TEMPERATURE (GEARBOX)	ENGINE COOLANT TEMPERATURE	SPARE	SPARE	SPARE
ANALOG INPUT #2 (AI2)	SPARE	ENGINE OIL TEMPERATURE	SPARE	SPARE	SPARE
ANALOG INPUT #3 (AI3)	SPARE	ENGINE OIL TEMPERATURE	SPARE	SPARE	SPARE

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1E5167A	INT-PROP
1E2735	DRAWING - AUTOCAD
1E0198W	BRAND MARKINGS
1E0013G	CONFIDENTIALITY
1E0012A	INTERPRETATION
1E0011	INTPR & TOL

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ABBREVIATIONS

52G	GENERATOR CIRCUIT BREAKER	LSM	LOAD SHARE MODULE
AC	ALTERNATING CURRENT	LV	LOW VOLTAGE
ADEM	ADVANCED DIESEL ENGINE MANAGEMENT	LVL	LEVEL
AFDPS	AIR FILTER DIFFERENTIAL PRESSURE SWITCH	MAG	MAGNETIC
ALM	ALARM	MBUS	MODBUS
ALT	ALTERNATOR	MGDL	MULTIPLE GENSET DATA LINK
AI	ANALOG INPUT	MPU	MAGNETIC PICKUP
ARB	ARBITRATION	MUI	MECHANICAL UNIT INJECTOR
ASOS	AIR SHUTOFF SOLENOID	MV	MEDIUM VOLTAGE
ASOR	AIR SHUTOFF RELAY	N	NEUTRAL
ASOSR	AIR SHUTOFF SOLENOID RELAY	NC	NORMALLY CLOSED
ASS	AIR START SOLENOID	NEG	NEGATIVE
AUX	AUXILIARY	N/C	NO CONNECTION
BAT	BATTERY	NFPA	NATIONAL FIRE PROTECTION AGENCY
BATT-	BATTERY NEGATIVE	NO	NORMALLY OPEN
BATT+	BATTERY POSITIVE	OPT	OPTIONAL
BB	BEST BATTERY	P	PUMP
BKR	BREAKER	PB	PUSH BUTTON
BTRY	BATTERY	PID	PARALLELING INPUT OUTPUT
C	COMMON	PM	PRELUBE MOTOR
CAM	CAMSHAFT	PMG	PERMANENT MAGNET GENERATOR
CAN	CONTROLLER AREA NETWORK	POS	POSITIVE
CB	CIRCUIT BREAKER	POT	POTENTIOMETER
CBOPB	CIRCUIT BREAKER CLOSE PUSH BUTTON	PPRM	PRELUBE PRESSURE RELAY MAINTAINED
CBOPB	CIRCUIT BREAKER OPEN PUSH BUTTON	PPRS	PRELUBE PRESSURE RELAY START
CDL	CAT DATA LINK	PPS	PRELUBE PRESSURE SWITCH
CHG	CHARGER	PR	PRELUBE RELAY
CR	CONTROL RELAY	PROG	PROGRAMMABLE
CS	CONTROL SIGNAL	PS	POWER SUPPLY
CT	CURRENT TRANSFORMER	PT	POTENTIAL TRANSFORMER
CW	CLOCKWISE	PWM	PULSE WIDTH MODULATION
D	DIODE	PWR	POWER
DC	DIRECT CURRENT	R	RELAY
DDO	DEDICATED DIGITAL OUTPUT	REF	REFERENCE
DI	DIGITAL INPUT	RES	RESISTOR
DIAG	DIAGNOSTICS	RH	RIGHT HAND
DIDI	DEDICATED ISOLATED DIGITAL INPUT	RHASOCB	RIGHT HAND AIR SHUTOFF CIRCUIT BREAKER
DIFF	DIFFERENTIAL	RLY	RELAY
DIO	DIGITAL INPUT/OUTPUT	RO	RELAY OUTPUT
DO	DIGITAL OUTPUT	RTD	RESISTANCE TEMPERATURE DETECTOR
DTR	DATA TERMINAL READY	RTN	RETURN
ECM	ELECTRONIC CONTROL MODULE	RXD	RECEIVE DATA
ECMR	ELECTRONIC CONTROL MODULE RELAY	SCAC	SEPARATE CIRCUIT AFTER COOLER
EIH	ENGINE INTERFACE HARNESS	SH	SHIELD
EJ	ETHERNET JACK	SHNT	SHUNT
EM	EXCITATION MODULE	SMMS	STARTER MOTOR MAGNETIC SWITCH
EMCP	ELECTRONIC MODULAR CONTROL PANEL	SNSR	SENSOR
ENG	ENGINE	SPD	SPEED
ES	ETHERNET SWITCH	SPDR	SHORE POWER DISCONNECT RELAY
ESPB	EMERGENCY STOP PUSH BUTTON	ST	SERVICE TOOL
ESTOP	EMERGENCY STOP	STR	START
EUI	ELECTRONIC UNIT INJECTOR	SR	STARTER RELAY
F	FUSE	STR	SHUNT TRIP RELAY
FPP	FUEL PRIMING PUMP	STRTR	STARTER
FPR	FUEL PRIMING RELAY	SW	SWITCH
GDI	GRID DEVICE INTERFACE	TB	TERMINAL BOARD
GEN	GENERATOR	TDC	TOP DEAD CENTER
GND	GROUND	TEL	TELEMATICS
GOV	GOVERNOR	TEMP	TEMPERATURE
GP	GROUP	TMG	TIMING
GFCI	GROUND FAULT CT	THRT	THROTTLE
HPC	HYSTAT PRESSURE CONTROL	TXD	TRANSMIT DATA
HWOBA	HARDWIRED DEAD BUS ARBITRATION	UV	UNDERVOLTAGE RELEASE
HWLSLD	HARDWIRED LOAD SENSE LOAD DEMAND	V	VOLTS
HZ	HERTZ	VA	VOLT AMPERES
I/O	INPUTS/OUTPUTS	VR	VOLTAGE REGULATOR
IDI	ISOLATED DIGITAL INPUT	VS	VOLTAGE SUPPLY
IE	INTERNAL EXCITATION	XFMR	TRANSFORMER
ISOL	ISOLATED		
IVR	INTEGRATED VOLTAGE REGULATOR		
JW	JACKET WATER		
JWH	JACKET WATER HEATER		
KW	KILOWATT		
KVAR	KILOVOLT-AMPERE REACTIVE		
L	LAMP		
LH	LEFT HAND		
LHASOCB	LEFT HAND AIR SHUTOFF CIRCUIT BREAKER		
LS	LAMP SWITCH		

WIRE COLOR

RD	RED
WH	WHITE
OR	ORANGE
YL	YELLOW
CL	CLEAR
BK	BLACK
OY	GRAY
CU	COPPER
BR	BROWN
GN	GREEN
BU	BLUE
GN_YL	GREEN/YELLOW
VI	VIOLET
BK_WH	BLACK/WHITE

LAMP COLOR

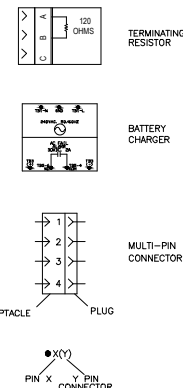
R	RED
G	GREEN
Y	YELLOW
A	AMBER
W	WHITE
O	ORANGE
B	BLUE

LINE STYLES

	STANDARD WIRING
	CUSTOMER SUPPLIED WIRING
	SHIELDED CABLE
	TWISTED PAIR
	CIRCUIT BREAK
	WIRE CONNECTION
	CIRCUITS NOT CONNECTED
	CIRCUIT CONNECTED
	COMPONENT CALLOUT
	OPTIONAL

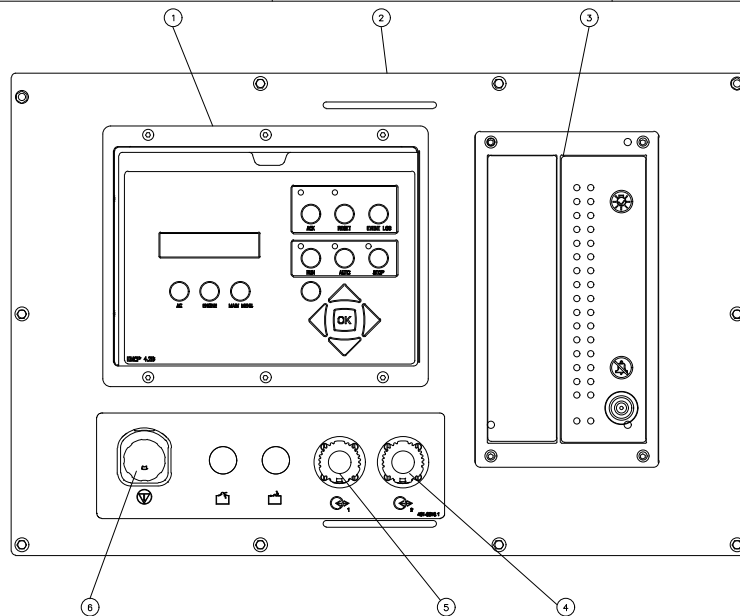
SYMBOLS

	RELAY CONTACT (NORMALLY OPEN)
	GROUND
	LAMP
	FUSE
	DIODE
	HEATING ELEMENT
	RELAY COIL
	PUMP MOTOR
	EMERGENCY STOP PUSH BUTTON
	TOGGLE SWITCH
	CIRCUIT BREAKER (1 POLE)
	TERMINAL BOARD POINT
	PIN
	SOCKET
	POTENTIOMETER
	3-WIRE RTD
	2-WIRE RTD
	TEMPERATURE SWITCH (NORMALLY CLOSED)
	CURRENT TRANSFORMER
	EXCITER COIL

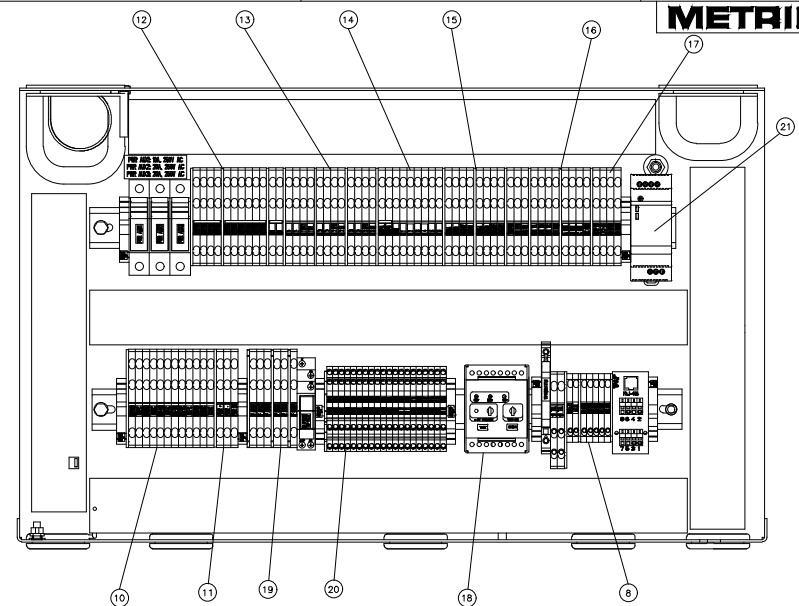


ABBREVIATIONS & SYMBOLS
FOR NOTES SEE SHEET 4
CATERPILLAR: CONFIDENTIAL GREEN

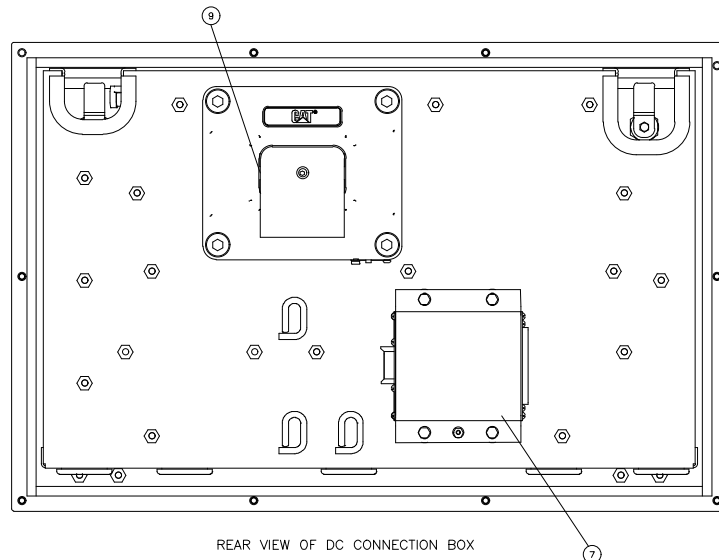
1E5167A	INT-PROP
1E2733	DRAWING - AUTOCAD
1E0198W	BRAND MARKINGS
1E0013G	CONFIDENTIALITY
1E0012A	INTERPRETATION
1E0011	INTPR & TOL
SPEC NO. NAME	
DRN	SOMESH
CHK	D SHEPPERD
APPR	LYLE SEWALL
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DEPT	PROD
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UNLESS OTHERWISE SPECIFIED	
DIMENSIONS ARE IN MM [INCHES]	
DIMENSIONS W/O TOL ARE BASIC	
SCALE	NONE
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SHEET 6 OF 122	THIRD ANGLE PROJECTION
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DIAGRAM - WIRING	
MODULAR CONTROLS	
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FRONT VIEW OF EMCP 4.2B CONTROL PANEL



FRONT VIEW OF DC CONNECTION BOX (DOOR REMOVED)

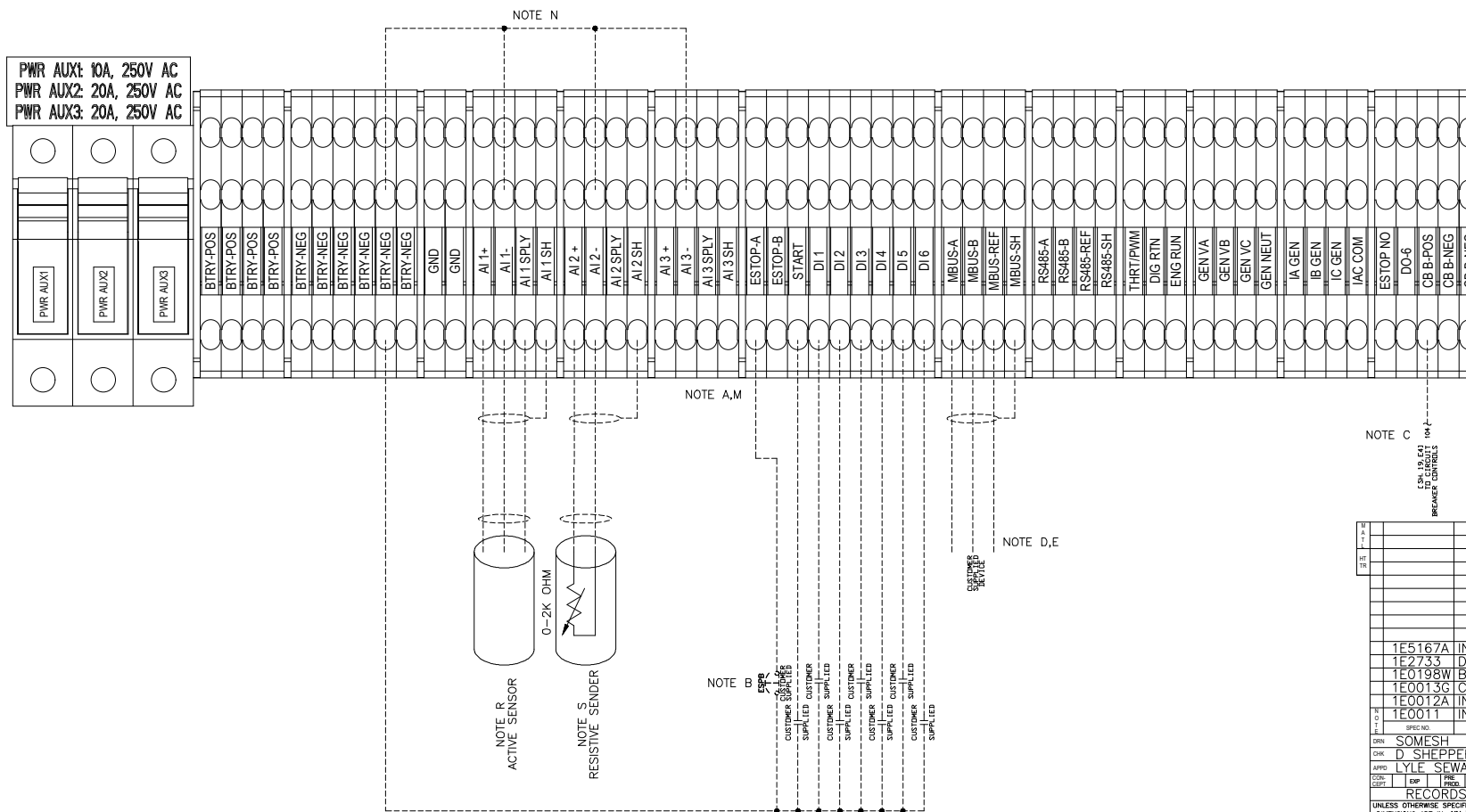


REAR VIEW OF DC CONNECTION BOX

- ① EMCP 4
- ② EMCP 4 PANEL
- ③ RS-485 ANNUNCIATOR (OPTIONAL)
- ④ SERVICE TOOL CONNECTOR #2 (CAN2: EXPANSION MODULES, RTD AND DIO)
- ⑤ SERVICE TOOL CONNECTOR #1 (CDL& CAN1: ADEM, EMCP, THERMOCOUPLE, CAT CONNECT)
- ⑥ EMERGENCY STOP PUSH BUTTON
- ⑦ DIO MODULE (OPTIONAL)
- ⑧ CAT CONNECT TERMINAL STRIP
- ⑨ CAT CONNECT CONTROLLER
- ⑩ RELAY OUTPUTS
- ⑪ PWM (IVR MODULE CONTROL SIGNAL)
- ⑫ 24VDC TERMINAL STRIP
- ⑬ ANALOG INPUTS
- ⑭ DIGITAL INPUTS
- ⑮ RS485 REMOTE ANNUNCIATOR TERMINAL BOARD POINTS
- ⑯ VOLTAGE AND CURRENT SENSING
- ⑰ CIRCUIT BREAKER INTERFACE TERMINALS
- ⑱ GROUND FAULT RELAY (OPTIONAL)
- ⑲ CIRCUIT BREAKER 1 CONTROLS (OPTIONAL)
- ⑳ DIO MODULE TERMINAL STRIP (OPTIONAL)
- ㉑ 24V TRIP UNIT POWER SUPPLY

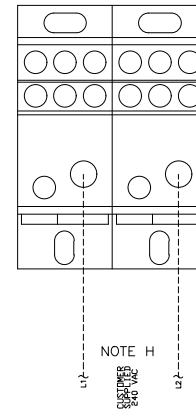
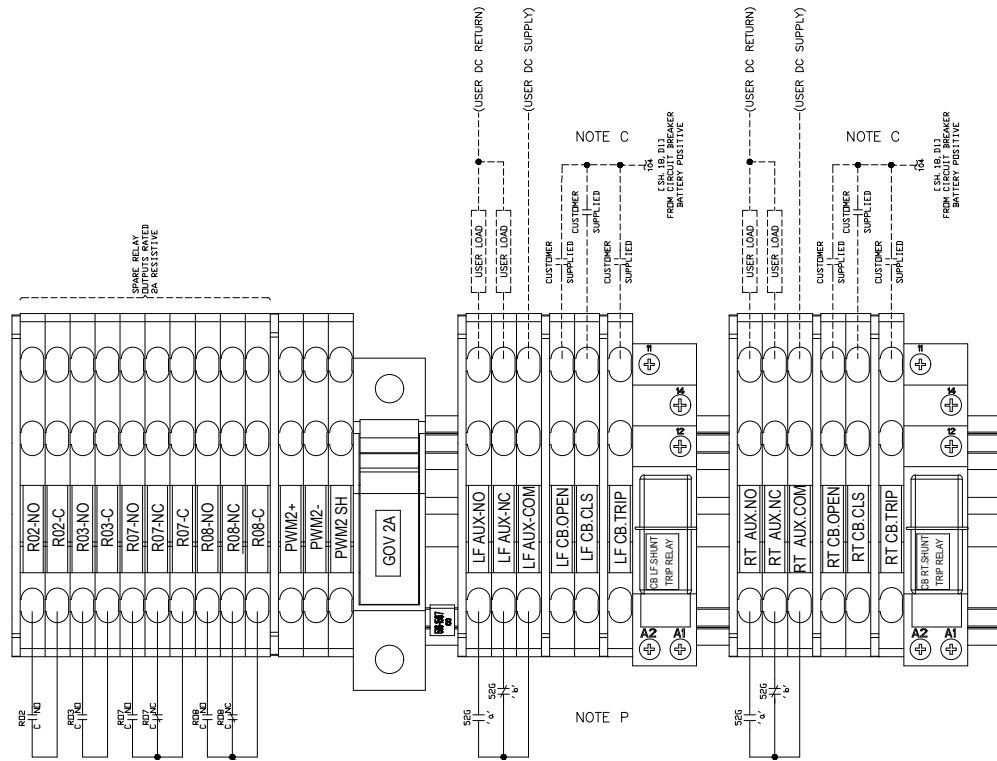
COMPONENT LAYOUT - SHEET 8 OF 11
RECESSED MODULAR CONTROL PANEL/EMCP 4.2B
FOR NOTES SEE SHEET 4
CATERPILLAR: CONFIDENTIAL GREEN

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UNLESS OTHERWISE SPECIFIED			
DIMENSIONS ARE IN MM [INCHES]			
DIMENSIONS W/O TOL ARE BASIC			
SCALE	NONE		
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14	122	THIRD ANGLE	PROJECTION
SHEET	14	OF	122
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DIAGRAM - WIRING			
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CUSTOMER INTERCONNECTS SHEET 1 OF 12
EMCP 4.2B, 4.3, 4.4
FOR NOTES SEE SHEET 4
CATERPILLAR: CONFIDENTIAL GREEN

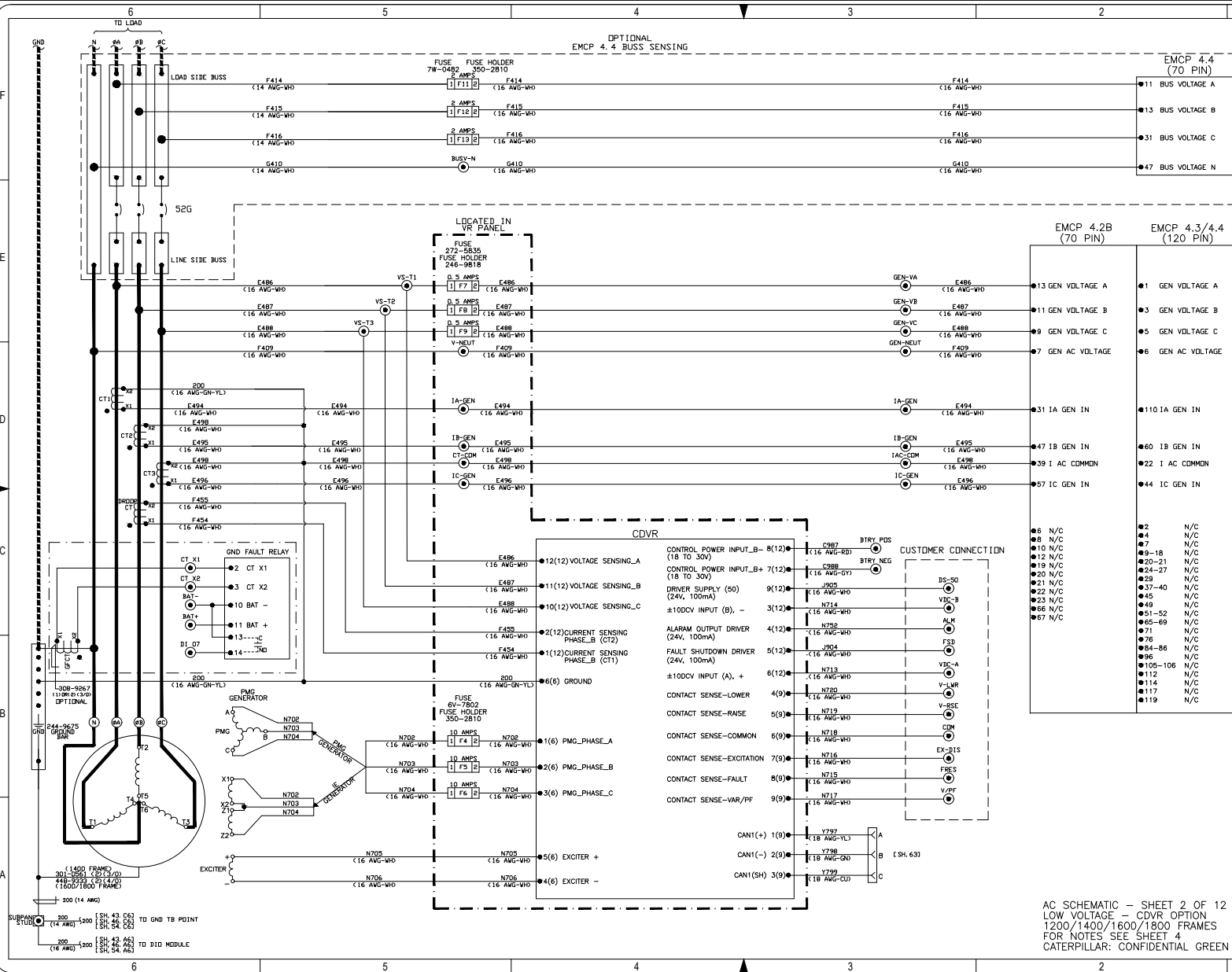
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LOCATED IN THE VOLTAGE REGULATOR PANEL

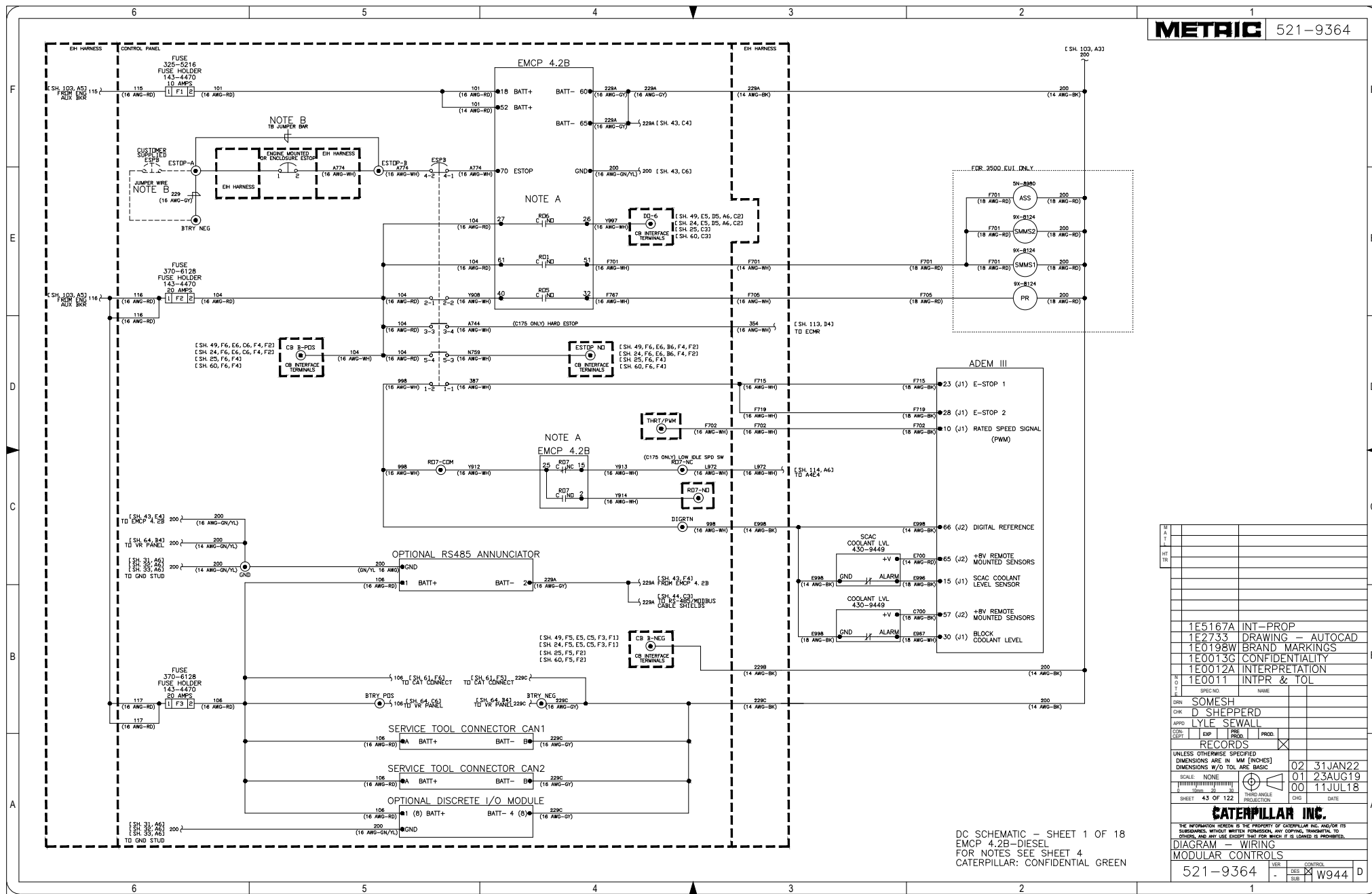
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CUSTOMER INTERCONNECTS SHEET 2 OF 12
EMCP 4.2B
FOR NOTES SEE SHEET 4
CATERPILLAR: CONFIDENTIAL GREEN



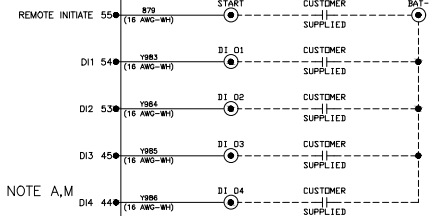
AC SCHEMATIC - SHEET 2 OF 12
LOW VOLTAGE - CDVR OPTION
1200/1400/1600/1800 FRAMES
FOR NOTES SEE SHEET 4
CATERPILLAR: CONFIDENTIAL GREEN

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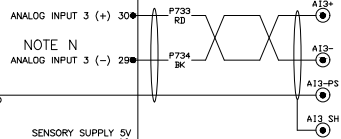
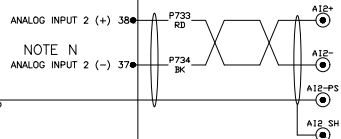
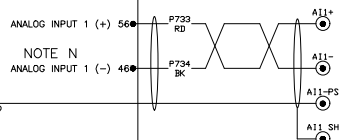
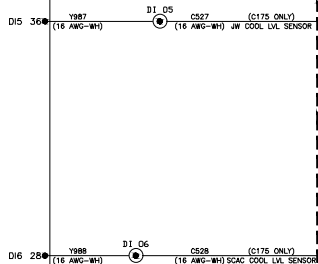


DATE	1E5167A	INT-PROP
CHK	1E2733	DRAWING - AUTOCAD
APPD	1E0198W	BRAND MARKINGS
CON	1E0013G	CONFIDENTIALITY
DEPT	1E0012A	INTERPRETATION
	1E0011T	INTPR & TOL
NAME		
DRN	SOMESH	
CHK	D SHEPPERD	
APPD	LYLE SWALL	
CON	1E0198W	PROJ.
DEPT	1E0013G	
RECORDS		
UNLESS OTHERWISE SPECIFIED		
DIMENSIONS ARE IN MM [INCHES]		
SCALE: NONE		
THIRD ANGLE PROJECTION		
SHEET 43 OF 122		
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DIAGRAM - WIRING		
MODULAR CONTROLS		
521-9364	VER	CONTROL
	DES	W944
	SUB	

EMCP 4.2B

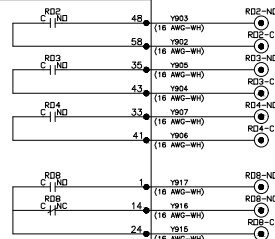


NOTE A,M

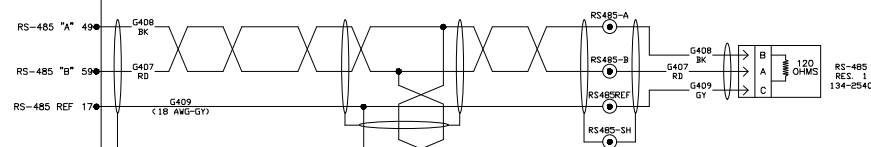


SENSORY SUPPLY 5V 16

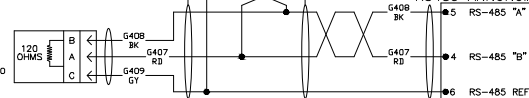
NOTE A
EMCP 4.2B



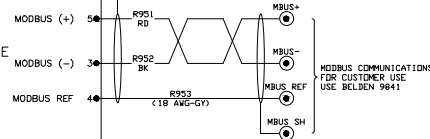
RELAY OUTPUTS
FOR CUSTOMER USE
RATED 2A RESISTIVE



OPTIONAL
RS485 ANNUNCIATOR

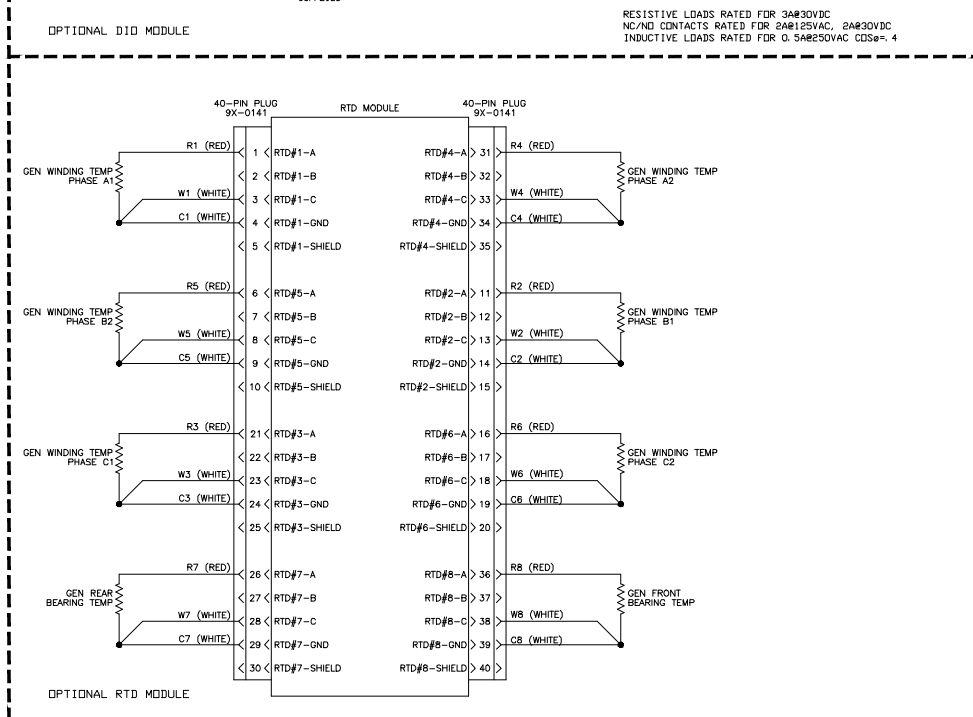
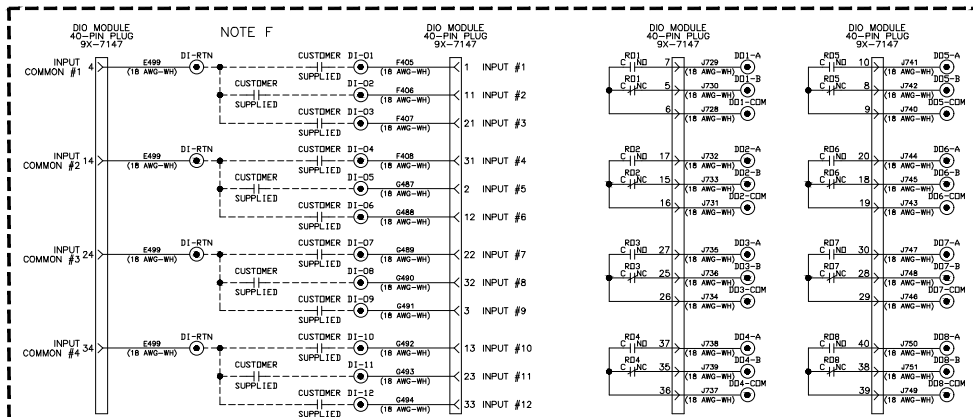


NOTE D,E



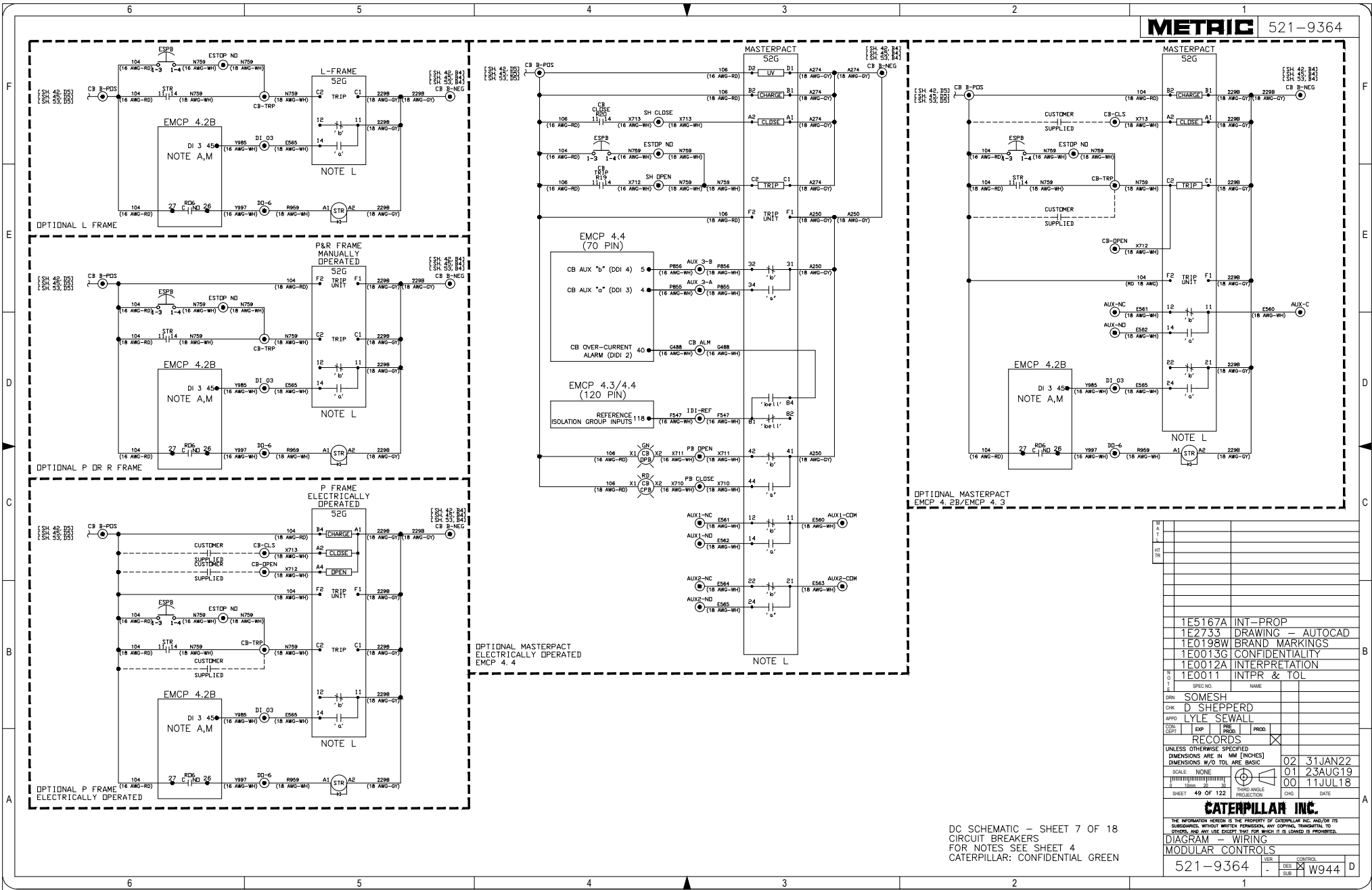
DC SCHEMATIC - SHEET 2 OF 18
EMCP 4.2B-DIESEL
FOR NOTES SEE SHEET 4
CATERRILLAR: CONFIDENTIAL GREEN

1E5167A	INT-PROP
1E2733	DRAWING - AUTOCAD
1E0198W	BRAND MARKINGS
1E0013G	CONFIDENTIALITY
1E0012A	INTERPRETATION
1E0011	INTRP & TOL
NAME	
DESIGNED BY	SOMESH
CHECKED BY	D SHEPPERD
APPROVED BY	LYLE SEWALL
CONCEPT	DESIGN
PRODUCTION	PRODUCTION
RECORDS	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MM (INCHES) DIMENSIONS W/O TOL ARE BASIC	02 31JAN22
SCALE: NONE	01 23AUG19
THIRD ANGLE PROJECTION	00 11JUL18
SHEET 44 OF 122	DATE
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DIAGRAM - WIRING	
MODULAR CONTROLS	
521-9364	DESIGN CONTROL SUB W944

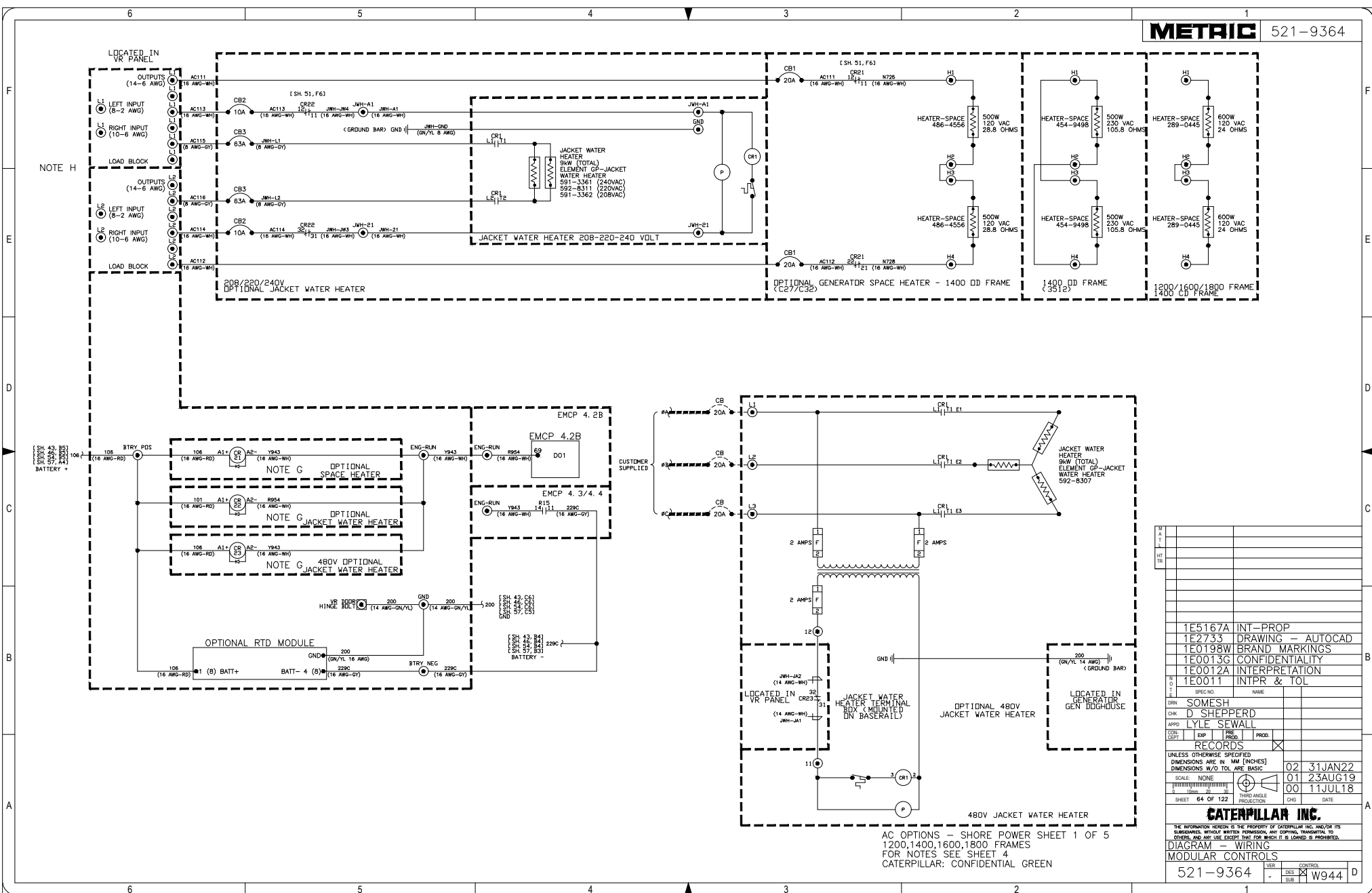


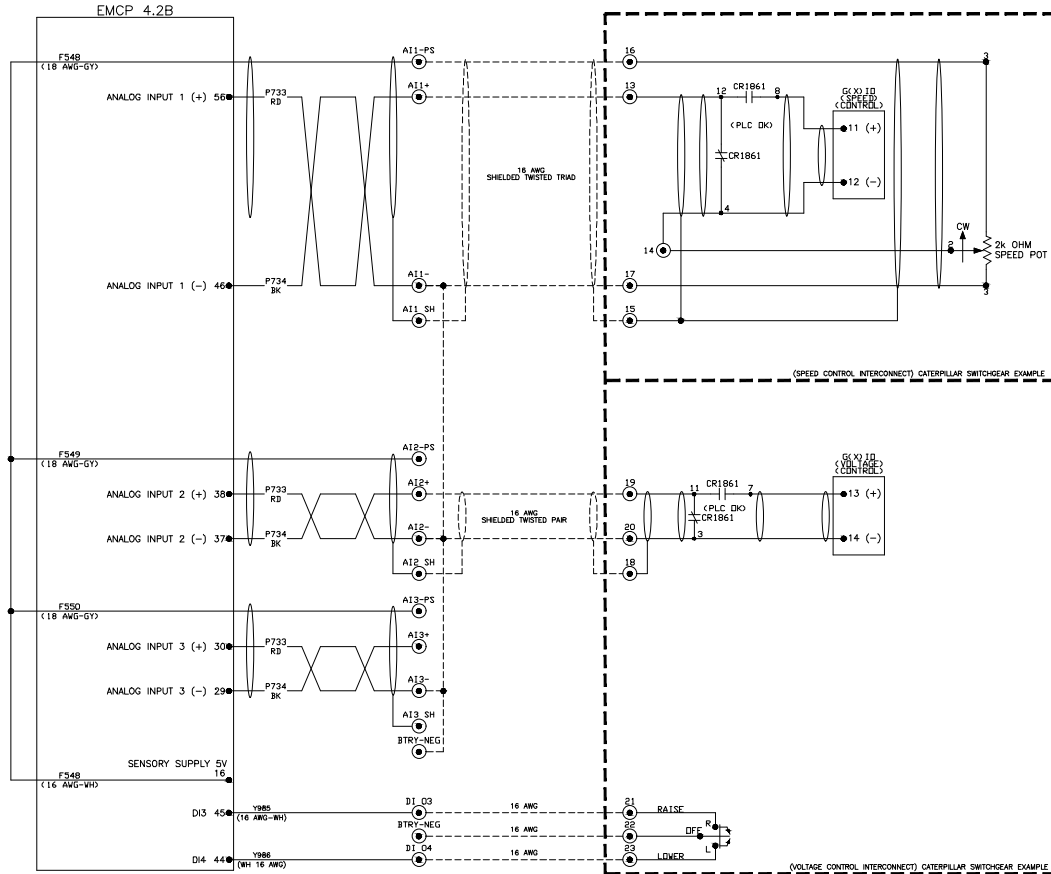
DC SCHEMATIC - SHEET 3 OF 18
 EMCP 4-2B-DIESEL
 FOR NOTES SEE SHEET 4
 CATERPILLAR: CONFIDENTIAL GREEN

1E5167A	INT-PROP
1E2733	DRAWING - AUTOCAD
1E0198W	BRAND MARKINGS
1E0013G	CONFIDENTIALITY
1E0012A	INTERPRETATION
1E0011	INTPR & TOL
SHEET NO. NAME	
SOMESH	
D SHEPPERD	
LYLE SEWALL	
APPD	DES
CHK	CHK
COPI	COPI
CEPT	CEPT
RECORDS	
UNLESS OTHERWISE SPECIFIED	
DIMENSIONS ARE IN MM (INCHES)	
DIMENSIONS W/O TOL ARE BASIC	
SCALE	NONE
PROJ	THIRD ANGLE
SHEET	48 OF 122
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DIAGRAM - WIRING	
MODULAR CONTROLS	
521-9364	VER. DES. SUB. CONTROL. W944



DC SCHEMATIC - SHEET 7 OF 18
CIRCUIT BREAKERS
FOR NOTES SEE SHEET 4
CATERPILLAR: CONFIDENTIAL GREEN





Using an available analog input, configure in ET (A#1, #2, or #3) or display (#3) an analog input for Desired Engine Speed Command. Program the Analog Input Signal Range for 0 to 5V. The physical range is then mapped to a change in speed using the Minimum Data Range and Maximum Data Range. Keep in mind this value is a bias, so if you desire to change the speed from 1710 rpm to 1890 rpm, values of -90 for Minimum Data Range and +90 for Maximum Data Range would be used. (Based on 1800 RPM = Rated)

Voltage adjustments are categorized into two types: Manual biasing and Analog biasing.

Manual voltage adjustment includes fine tuning the generator output voltage via digital input, EMCP display or SCADA (Modbus). Analog voltage adjustment is performed via programmable analog inputs to the EMCP and provide a voltage control interface for external potentiometers or external control systems (such as switchgear).

It is important to note that the setpoint Gen Maximum Voltage Bias Percentage must be correctly configured to be greater than the expected bias range, otherwise it may not be possible to achieve the required voltage bias. The parameter Gen Maximum Voltage Bias Percentage is accessed within the CAT ET Service Tool configuration menu under Generator AC Monitor, or can be accessed from the EMCP display by navigating to the following sub-menu:

MAIN MENU
CONFIGURE
ALL SETPOINTS
GEN AC MONITOR

Note: All manual voltage biasing is removed and reset to zero when the engine is stopped. Manual voltage bias levels are not carried over to the next start up after an engine shutdown.

Analog voltage adjustment is done via a programmable analog input to the EMCP configured for Generator Voltage Control. Analog inputs provide a voltage control interface for external potentiometers or external control systems (such as switchgear). The Generator Voltage Control analog input signal is interpreted and converted by the EMCP into a voltage bias percentage of (nominal) rated voltage. For example, consider an analog input configured for a signal range of 0 to +5V and a data range of -10% to 10%. When this analog input signal value equals +3 V, a voltage bias percentage of +2.0 % of rated will be applied to the generator output voltage.

ANALOG INPUTS

The EMCP 4.1 and 4.2 support three 2-wire (plus shield) Analog Inputs. None of these inputs are dedicated to specific functions. These are individually selectable as either Voltage or Resistive Sender inputs for interface to senders, customer signals, etc. The modes of operation are described below:

- Voltage mode: 0-5 Volts with software-selectable sub-ranges.

The input impedance is a minimum of 10k Ohms and a maximum of 1M Ohms. The Analog Input return signals must be tied to battery negative external to the controller.

Voltage Sender Ranges

0 to 5V

1 to 5V

0.5 to 4.5V

Any Analog Input can be configured for any one of the Data Identification parameters shown below:

- Engine Oil Pres
- Eng Coolant Temp
- Data Link – SCADA (EMCP 4.2 only)
- Engine Oil Temp
- **Engine Speed Control**
- Engine Fuel Level
- **Generator Voltage Control**
- Ext Tank Fuel Level
- Custom Parameters

DIGITAL INPUTS

The EMCP 4.1 and 4.2 have six user-programmable Digital Inputs. The user programmable Digital Inputs are referenced to Battery (-) and will see a change in state at -3VDC with a 1VDC hysteresis. The Digital Inputs seen on the display that are labeled "A" and "B" are reserved for E-Stop and Remote Start.

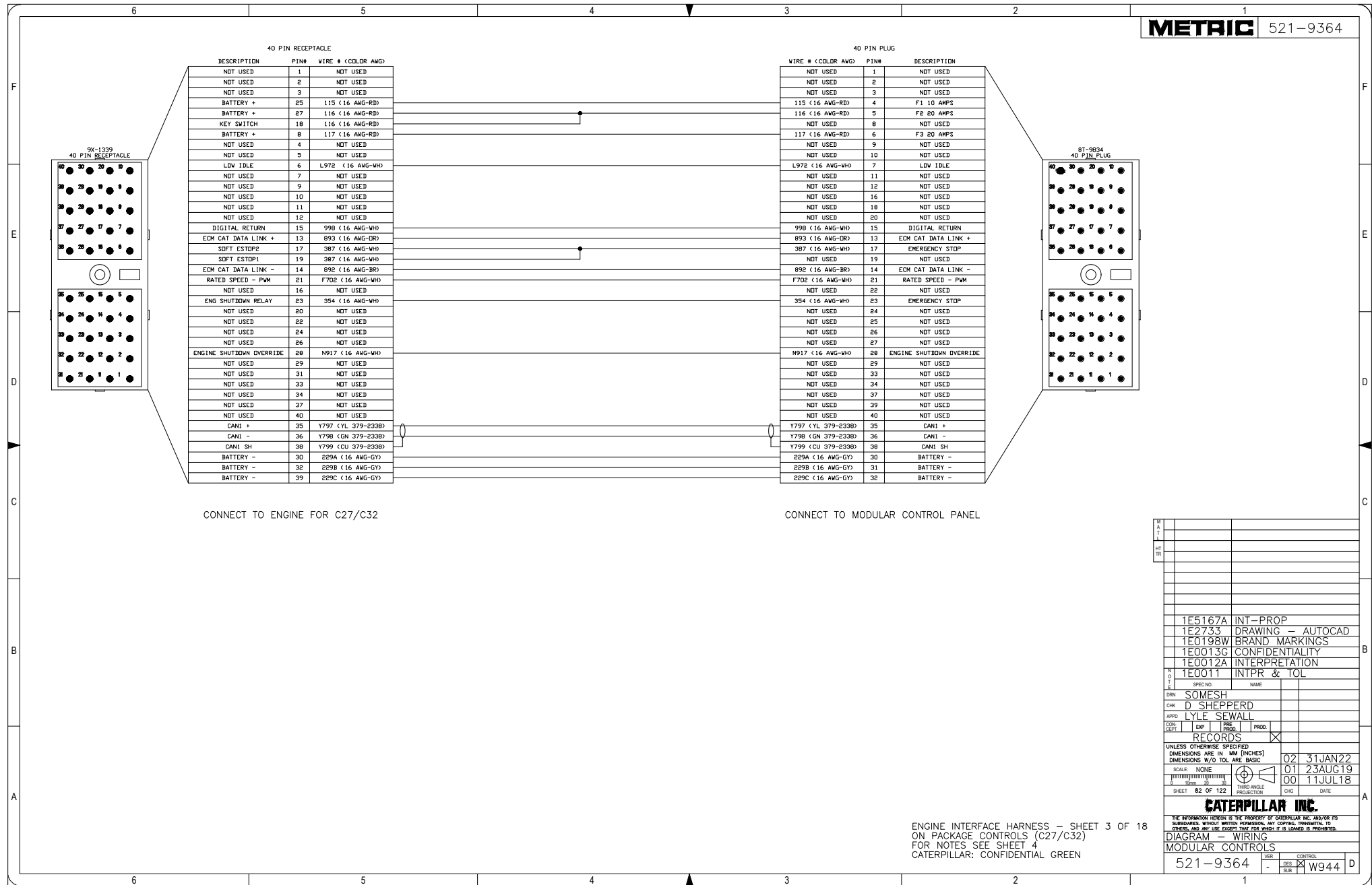
The Usage Type of **COMMAND/STATUS** is used to make certain system conditions be known by the EMCP 4; an example of a Command/Status parameter is:

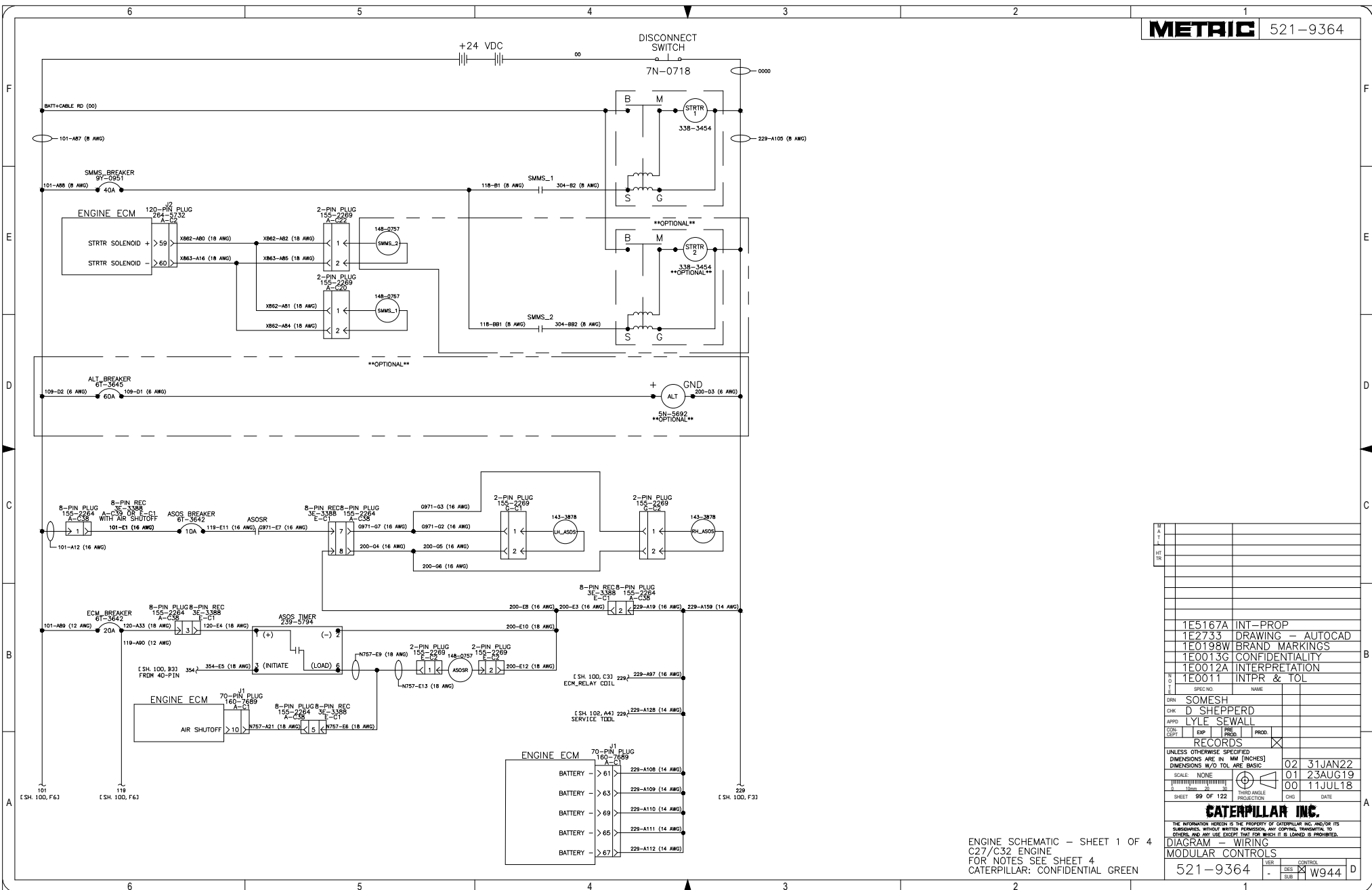
- Raise Speed
- Lower Speed
- Raise Voltage
- Lower Voltage

Remote voltage adjustment toggle switches may be used to fine tune the generator output voltage by programming an EMCP digital input for Raise Voltage and Lower Voltage. Each activation of the digital input raises or lowers the voltage by 0.2% of rated. When the digital input is activated continuously, the voltage bias is raised or lowered by 0.2% of rated approximately every 400ms.

[illegible]

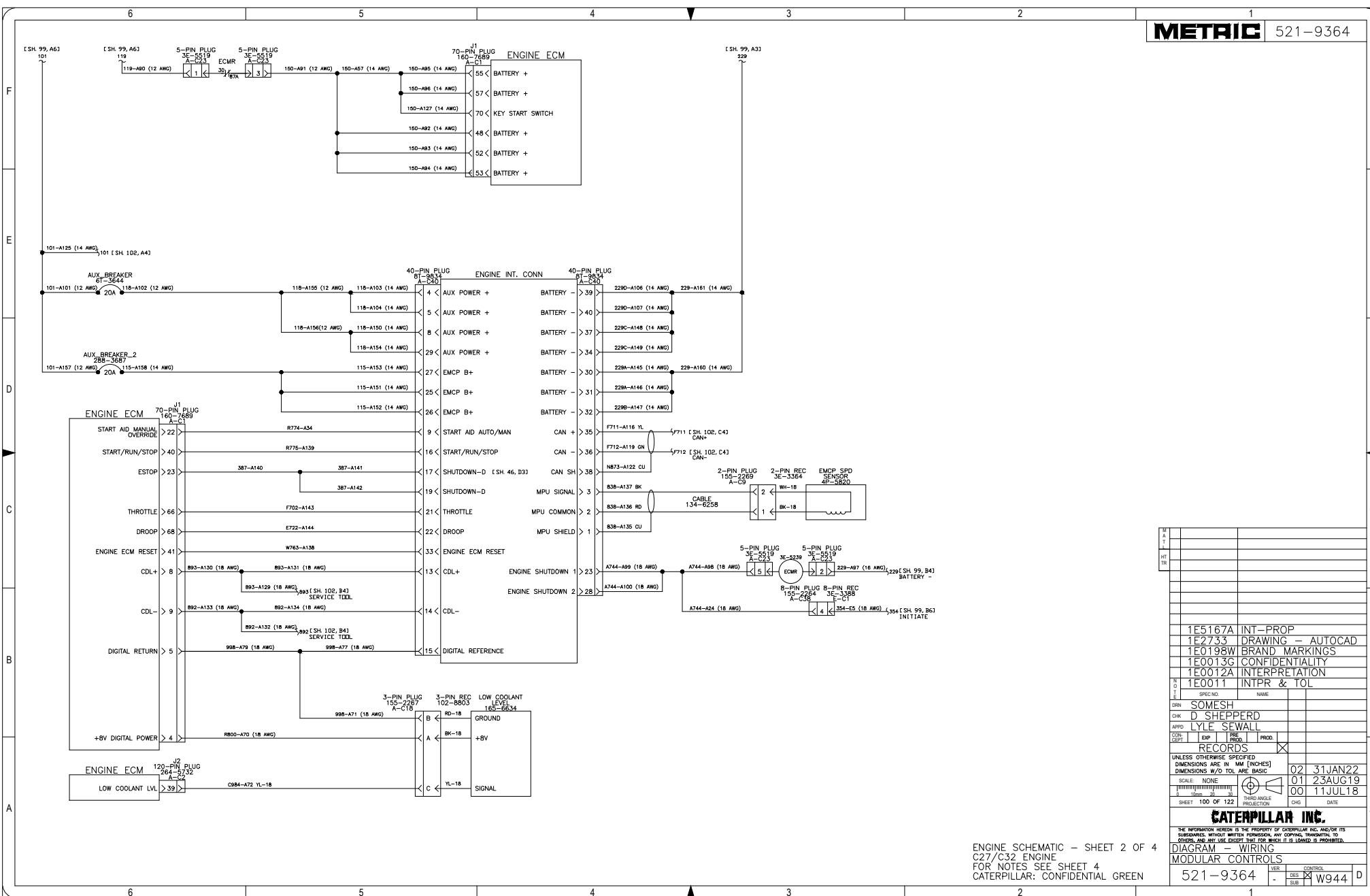
SPEED AND VOLTAGE CONTROL
FOR NOTES SEE SHEET 4
CATERPILLAR: CONFIDENTIAL GREEN

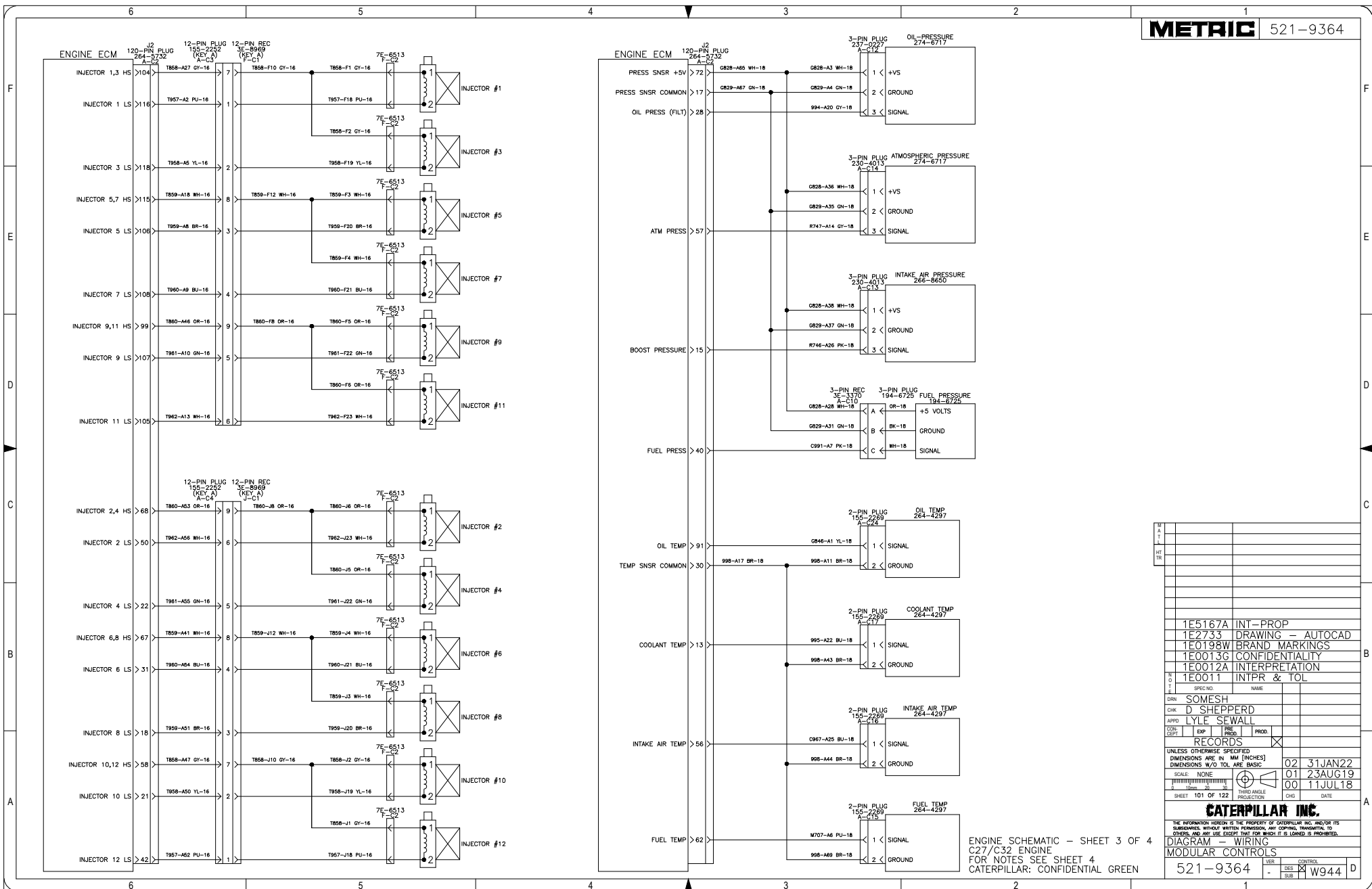




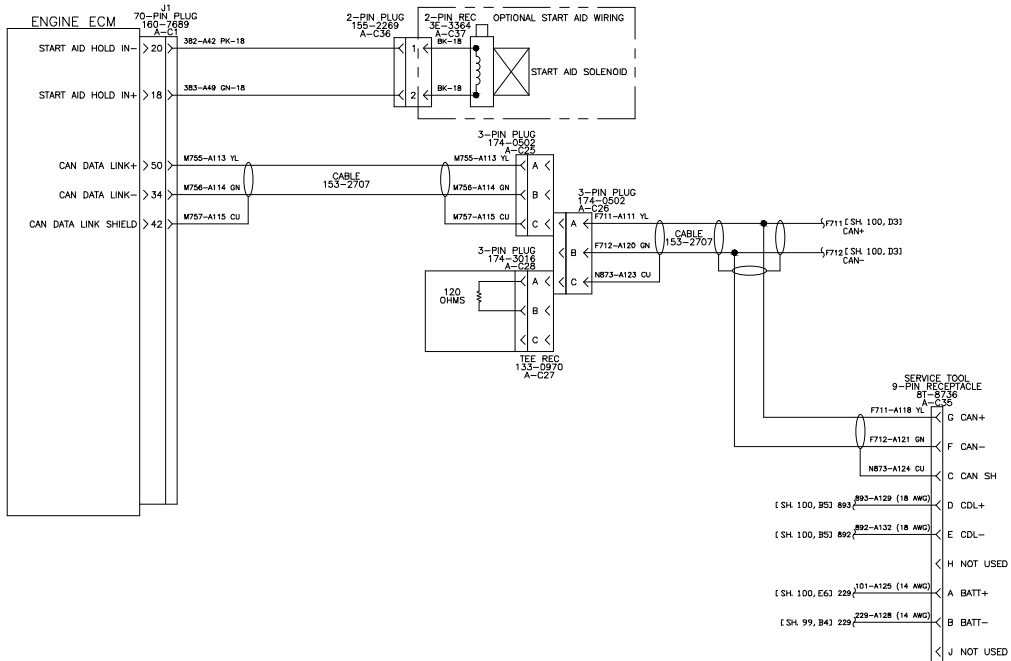
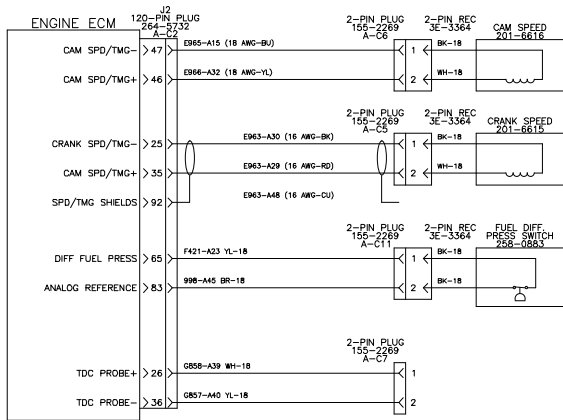
ENGINE SCHEMATIC - SHEET 1 OF 4
C27/C32 ENGINE
FOR NOTES SEE SHEET 4
CATERPILLAR: CONFIDENTIAL GREEN

1E5167A	INT-PROP
1E2733	DRAWING - AUTOCAD
1E0198W	BRAND MARKINGS
1E0013G	CONFIDENTIALITY
1E0012A	INTERPRETATION
1E0011	INTPR & TOL
SPEC NO.	NAME
DRN	SOMESH
CHK	D. SHEPPERD
APPD	LYLE SEWALL
COOK	EXP
CEPT	PROB
PROD	PROD
RECORDS	
UNLESS OTHERWISE SPECIFIED	
DIMENSIONS IN MM [INCHES]	
DIMENSIONS W/O TOL ARE BASIC	
SCALE: NONE	02 31JAN22
DATE: 01 23AUG19	
SHEET 99 OF 122	THIRD ANGLE PROJECTION
CHG	DATE
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DIAGRAM - WIRING	
MODULAR CONTROLS	
521-9364	VER DES SUB
W944	D





1E5167A	INT-PROP
1E2733	DRAWING - AUTOCAD
1E0198W	BRAND MARKINGS
1E0013G	CONFIDENTIALITY
1E0012A	INTERPRETATION
1E0011	INTPR & TOL
SPEC NO. NAME	
DRN	SOMESH
CHK	D. SHEPPERD
APPR	LYLE SEWALL
COPI	EXP
PROJ	PROD
RECORDS	
UNLESS OTHERWISE SPECIFIED	
DIMENSIONS ARE IN MM [INCHES]	
SCALE	NONE
DATE	02 31JAN22
TIME	01 23AUG19
SHEET	101 OF 122
THIRD ANGLE	PROJECTION
CHG	DATE
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DIAGRAM - WIRING	
MODULAR CONTROLS	
521-9364	W944

[illegible]

ENGINE SCHEMATIC - SHEET 4 OF 4
C27/C32 ENGINE
FOR NOTES SEE SHEET 4
CATERPILLAR: CONFIDENTIAL GREEN



Picture shown may not reflect actual configuration.
Shown with Optional Equipment.

Features

- The EMCP 4 annunciator provides sixteen (16) individual points of annunciation, with two (2) LED's included for each point.
- An additional pair of LED's provides status indication of the RS-485 communication network.
- Includes alarm horn with lamp test and alarm acknowledge pushbuttons.
- Configurable to NFPA 99/110 requirements for local and remote annunciation on emergency standby generator systems.
- Provides custom label kit including software for customer's specific alarms and arrangement
- Designed and tested to meet stringent impulse shock and operating vibration requirements
- Uses high quality shielded twisted-triad cable for robust remote communications
- Graphic symbols are provided next to each pair to indicate various alarms and events
- The annunciator can be mounted remotely up to 1200 m (4,000 ft).
- Provides superior visibility of the LED's in direct sunlight.

EMCP 4

RS-485 Annunciator

The EMCP 4 RS-485 annunciator serves to display generator set system alarm conditions and status indications. The annunciator has been designed for use on the EMCP 4 RS-485 annunciator data link for remote applications, providing customers with enhanced site flexibility.

The EMCP 4 annunciator is configurable to the standards of NFPA 99/110 for emergency standby generator systems.

Specifications

Technical Data

Electrical

Battery Voltage Functional Range: 9 to 32 VDC

Power Consumption

Maximum: _ 12 watt at 24 VDC

Standby: _ 5 watt at 24 VDC

Control Power: 12-24 VDC

Communication: RS-485

Single, 8-pin Connector

Alarm

Sound Level 80 db

Physical

Weight 2.5 lb or _ 1.13 kg

Environmental

Operating Temperature -40° C to 70° C

-40° F to 158° F

Storage Temperature -50° C to 70° C

-58° F to 158° F

Relative Humidity 90%

Certifications

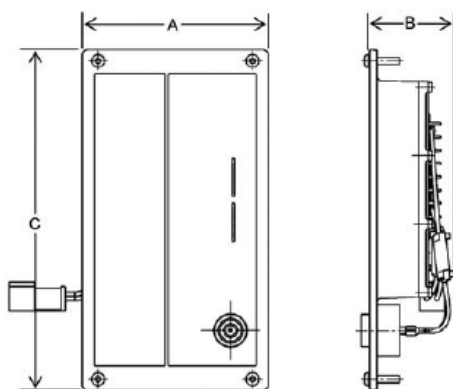
UL Recognized

LED Color Scheme

Each pair of LED's on the annunciator consists of two of three colors: green, yellow and red, which allows for custom configuration of status, warning and shutdown conditions.

The available colors and combinations are:

Row	LED 1	LED 2
1	Red	Yellow
2	Red	Yellow
3	Red	Yellow
4	Red	Yellow
5	Red	Yellow
6	Red	Green
7	Red	Yellow
8	Red	Yellow
9	Red	Yellow
10	Red	Yellow
11	Red	Yellow
12	Red	Yellow
13	Green	Yellow
14	Green	Yellow
15	Red	Green
16	Red	Yellow



LED Color Scheme

- Emergency stop shutdown
- Overcrank shutdown
- Low coolant temperature warning
- High coolant temperature warning/shutdown
- Low oil pressure warning/shutdown
- Overspeed warning/shutdown
- Low coolant level warning/shutdown
- Low fuel level warning/shutdown
- EPS supplying load status
- Control switch not in auto warning
- High battery voltage warning/shutdown
- Low battery voltage warning/shutdown
- BATT charger AC failure warning/shutdown
- Low cranking voltage
- Engine running
- Tier 4 SCR

Annunciator Dimensions		
A	158 mm	6.22 in
B	60 mm	2.37 in
C	288 mm	11.34 in

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www.CatElectricPower.com

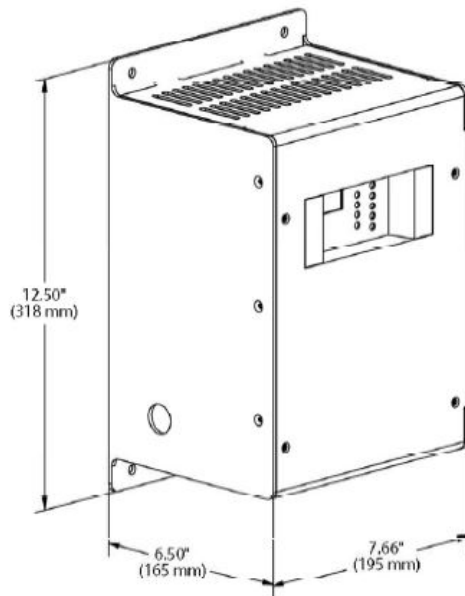


Image Shown may not Reflect Actual Package.

UL 10 Amp Battery Charger

This battery charger offers accurate, automatic charging of lead-acid and nickel cadmium batteries. The output voltage automatically adjusts to changing input, load, battery and ambient conditions. This prevents battery over-charging and consequent loss of battery electrolyte.

Standard features include AC line compensation, precision voltage regulation, current limiting, automatic 2-rate charging, voltmeter and ammeter, temperature compensation and UL Listing.

The user interface is easy to understand with digital metering, NFPA 110 alarms and a battery fault alarm.

Features

- Electronically current limited at 105% of rated output
- Alarm system
- Digital display
- Lightning and voltage transient protection
- Protection of connected equipment against load dump protection
- Constant voltage, current limited, 4-rate automatic equalization
- IP 20 housing
- Temperature compensation
- On board temperature sensor with remote port
- Auto AC line compensation
- Output regulated by sensed battery voltage

Standards

- C-UL listed to UL 1236
- NFPA 70, NFPA 110
- CSA 22.2 No 107 certified
- CE DOC to EN 60335
- IBC Seismic Certification

Specifications

Input supply	110 – 120 V 208 – 240 V
AC and DC fuses	2 input and 2 output)
Output voltage	24V
Output amps	10
Frequency	50 / 60 Hz
Operating temperature	-20°C (-4°F) to +60°C (140°F)
Housing constructed of rustproof anodized Aluminum	

Dimensions			
Width	Depth	Height	Weight
195 mm (7.66 in)	165 mm (6.5 in)	318 mm (12.5 in)	10.4 kg (23 lb)

NFPA 110 alarm package as follows:

- AC on Green led (indication)
- AC fail Red led and form C contact (2A)
- Float mode LED
- Fast charge LED
- Temp comp active LED
- Low battery volts Red led and Form C conta
- High Battery Volts Red led and Form C conta
- Charger fail Red led and Form C conta
- Battery fault Red led and Form C conta
- Battery disconnected
- Battery polarity reversed
- Mismatched charger battery voltage
- Open or high resistance charger to battery connection
- Open battery cell or excessive internal resistance

Feature Codes:

BTC1024 BTC1028 BTC1035 BTC1025 BTC1032

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Cat® Batteries



Cat Batteries — Greater Starting Power — Lower Maintenance — Longer Life

Cat Premium High Output (PHO) batteries are used in all Caterpillar Machines and Engine Gen-Sets. They are designed to meet stringent Caterpillar design specifications, which provide industry leading cold cranking amp (CCA) capability and maximum vibration resistance.

Maintenance Free or low maintenance designs are available in wet and dry configurations.

General Service Line batteries are available in Maintenance Free or low maintenance designs and in wet or dry configurations. Wide selections of BCI group sizes are available for automotive, light truck, bus, industrial, agricultural, marine, recreational and valve regulated (VRLA-AGM & Gel) applications.

Caterpillar. The difference counts.™

Cat Dealers define world – class product support. We offer you the right parts and service solutions, when and where you need them.

The Cat Dealer network of highly trained experts keeps your entire fleet up and running to maximize your equipment investments.

CATERPILLAR®

World's Toughest Batteries



Premium High Output – Maximum Vibration Resistance

- Vibration Resistance...five times the Industry Standard
- Exclusive “flat top” BCI group 4D & 8D batteries are Maintenance Free and have the industries highest cold cranking amps (CCA)
- Popular BCI group 31 Maintenance Free batteries with industry leading cold cranking amps...up to 1000 (CCA), for electric power, machine or on-highway truck and bus applications. Deep cycle models available for truck, marine or recreational usage

Specifications for Cat Premium High Output Batteries – Available Worldwide

BCI Group Size	Part No.	Cold Cranking Amps**	Reserve Capacity Minutes*	Volts	Amp Hr. Capacity @ 20 Hrs.	Construction	Add Water Maintenance Check Hours	BCI Overall Dimensions				Nominal Weight	
								Length In (mm)	Width In (mm)	Height In (mm)	Wet Lb (kg)	Dry Lb (kg)	Nominal Acid to Fill Qt (liter)
8D	153-5720	1500	465	12	210	C	MF	20.47 (520)	10.8 (275)	9.76 (248)	132 (60)	–	–
8D	101-4000	1400	400	12	190	LAC+	1000	20.7 (526.5)	10.96 (278)	9.76 (248)	132 (60)	86 (39)	18.0 (17.0)
4D	153-5710	1400	425	12	200	C	MF	20.47 (520)	8.58 (218)	9.76 (248)	119 (54)	–	–
4D	153-5700	1125	305	12	145	C	MF	20.47 (520)	8.58 (218)	9.76 (248)	101 (46)	–	–
4D	9X-9730	1300	400	12	190	LAC+	1000	20.75 (527)	8.58 (218)	9.76 (248)	119 (54)	81 (37)	14.8 (14.0)
4D	9X-9720	1000	275	12	140	LAC+	1000	20.75 (527)	8.58 (218)	9.76 (248)	101 (46)	59 (27)	15.9 (15.0)
31	175-4390					C/S	MFA	12.9 (328.4)	6.74 (171.2)	9.29 (236)	60 (27)	–	–
31	175-4370					C/S**	MFA	12.9 (328.4)	6.74 (171.2)	9.29 (236)	60 (27)	–	–
31	175-4360					C/S***	MFA	12.9 (328.4)	6.74 (171.2)	9.29 (236)	60 (27)	–	–
31	250-0480					C/SDT***	MF	12.9 (328.4)	6.74 (171.2)	9.29 (236)	60 (27)	–	–
31	115-2422					C SAE	MFA	12.9 (328.4)	6.74 (171.2)	9.46 (240.3)	60 (27)	–	–
31	115-2421	950	170	12	90	C SAE +	MFA	12.9 (328.4)	6.74 (171.2)	9.46 (240.3)	60 (27)	44 (20)	6.6 (6.2)
31	9X-3404	950	165	12	100	C SAE	MF	13 (330.2)	6.77 (172)	9.46 (240.3)	58 (26)	–	–
31	3T-5760	750	165	12	100	C SAE	MF	13 (330.2)	6.77 (172)	9.46 (240.3)	55 (25)	–	–
24	153-5656	650	110	12	52	SC	MF	10.98 (278.9)	6.85 (174)	9.0 (229.1)	39 (18)	–	–
65	230-6368	880	140	12	80	SC	MF	11.9 (303.4)	7.5 (190.8)	7.5 (191.4)	45.5 (21)	–	–
74	153-5660	650	110	12	52	SC*	MF	10.98 (278.9)	7.0 (178.2)	8.15 (206.9)	39 (18)	–	–
58	175-4280	500	70	12	35	SC	MF	9.96 (253.1)	7.2 (182.5)	6.9 (176)	31 (14)	–	–
2	153-5690	765	210	6	90	LAC+	1000	10.24 (260)	6.8 (173)	8.72 (221.6)	37 (17)	22 (10)	4.8 (4.5)

Construction Notes:

LAC = Low Maintenance, Hybrid Construction

C = Calcium Lead Alloy Grid Design

MF = Maintenance Free

MFA = Maintenance Free with Accessible Vent Caps

S = Stud Terminals

+ = Shipped Dry Only

* = Side Terminals

** = Starting and Deep Cycle Battery

*** = Deep Cycle and Starting Battery

" = For 30 seconds at 0° F (-18° C)

' = Minimum of 25 amp output at 80° F (27° C)

SAE = Uses SAE Posts

SDT = Dual, Top mounted Terminals, Stud and SAE Post, Marine Deep Cycle/Starting Battery

SC = Silver (Ag) Calcium Alloy Grids for resistance to high underhood temperatures

Rugged Design – Built Tough – Reliable Starting

- Positive and Negative plates are anchored to container bottom and locked at the top of cell element for maximum vibration resistance.
- Heavy-duty forged terminal post bushings provide maximum strength and resistance to acid seepage.
- Hefty full-frame grids, no sharp edges, optimum acid/paste combination provides better charge acceptance after deep discharge.
- Manifold vented cover with built-in Flame Arrestor...a safety feature that directs corrosive gases away from the battery and hold-downs.
- Thick, robust container resists rugged treatment typical of heavy-duty commercial use. Embossed part number & descriptors for easy serviceability.

Cat General Service Batteries — Available Worldwide



Premium Batteries for a Wide Range of Applications

Ideal for Automotive, Light Truck, Bus, Marine, Industrial, Agricultural, Stationary Power and Recreational Usage.

- Maintenance Free and low maintenance... Accessible or Sealed
- Deep Cycle and Valve Regulated (VRLA) Gelled or Absorbed Glass Mat (AGM) batteries
- Hefty full frame grids, no sharp edges. Optimum acid/paste combination provides better charge acceptance after deep discharge
- Silver (Ag) Calcium Grids for high temperature automotive usage
- Commercial batteries have Anchor Lock elements for vibration resistance
- Flame Arrestor Safety Vents to direct corrosive gases away from the battery and hold-downs

Wet Batteries

							BCI Overall Dimensions		Nominal Weight	
BCI Group Size	Part No.	Cold Cranking Amps"	Reserve Capacity Minutes'	Volts	Amp Hr. Capacity @ 20 Hrs.	Construction	Length In (mm)	Width In (mm)	Height In (mm)	Wet Lb (kg)
Truck/Agricultural/Industrial										
1	8C-3617	650	180	6	100	C/MF	9.0 (229)	6.9 (175)	8.8 (224)	33.5 (15)
2	8C-3629	780	215	6	90	LA	10.4 (264)	6.9 (175)	8.8 (224)	36.5 (17)
3EE	8C-3620	400	95	12	54	LA	19.3 (490)	4.3 (109)	9.0 (229)	43 (20)
3EH	8C-3632	925	250	6	115	LA	19.3 (490)	4.3 (109)	10.0 (254)	47.5 (22)
4	8C-3633	1010	270	6	125	C/MF	12.5 (318)	6.9 (175)	9.5 (241)	47 (21)
4D	8C-3623	900	260	12	115	LA	20.8 (508)	8.5 (216)	10.1 (257)	97 (44)
4DLT	8C-3622	900	240	12	100	LA	20.0 (508)	8.2 (208)	8.2 (208)	79 (36)
7D	8C-3635	950	350	6	156	LA	15.8 (401)	7.0 (178)	9.2 (234)	59.5 (27)
8D	8C-3624	1375	430	12	190	LA	20.7 (526)	11.0 (279)	10.0 (254)	130 (59)
24F	3T-5858	650	120	12	55	SC/MF	10.6 (269)	6.8 (173)	9.0 (229)	40 (18)
27	8C-3601	675	120	12	65	SC/MF	12.0 (305)	6.7 (170)	9.0 (229)	45.5 (21)
27F	8C-3602	675	120	12	65	SC/MF	12.4 (315)	6.7 (170)	9.0 (229)	45.5 (21)
30H	8C-3627	850	180	12	100	C/MF	13.0 (330)	6.8 (173)	9.5 (241)	57.5 (26)
31	8C-3628	760	170	12	80	C/MF/S	13.0 (330)	6.8 (173)	9.5 (241)	54.5 (25)
Bus-Special Terminal										
8D	250-0473	1450	450	12	190	C/MFA/TB	20.7 (526)	11.0 (279)	10.0 (254)	134 (61)
Automotive/Light Truck & SUV										
22F	3T-5859	425	65	12	35	SC/MF	9.4 (239)	6.8 (173)	8.3 (211)	29.5 (13)
24	3T-5857	650	120	12	55	SC/MF	10.2 (259)	6.8 (173)	9.0 (229)	38.5 (17)
26	8C-3600	540	80	12	45	SC/MF	8.8 (224)	6.8 (173)	8.0 (203)	24.5 (11)
41	8C-3605	660	110	12	64	SC/MF	11.5 (292)	6.9 (175)	6.9 (175)	37 (17)
42	250-0490	475	70	12	40	SC/MF	9.5 (241)	6.9 (175)	6.9 (175)	29 (13)
55/56/62	8C-3611	585	95	12	52	SC/MF/DT	8.8 (224)	6.0 (152)	8.5 (216)	33 (15)
58	8C-3612	580	85	12	53	SC/MF	10.0 (254)	7.2 (183)	6.9 (175)	31.5 (14)
75	7X-6100	720	100	12	60	SC/MF *	9.0 (229)	7.0 (178)	7.3 (185)	34.5 (16)
75/86	250-0489	540	85	12	47	SC/MF/DT	9.7 (248)	7 (178)	8.1 (206) !	32 (15)
Automotive/Light Truck & SUV, Severe Service/High Temperature, Silver Lead Alloy Technology										
25	250-0488	600	90	12	45	ST/MF	9.1 (230)	6.8 (175)	8.8 (225)	31 (14)
35	250-0487	600	90	12	45	ST/MF	9.1 (230)	6.8 (175)	8.8 (225)	31 (14)
34/78	250-0486	690	100	12	60	ST/MF/DT	10.7 (273)	6.8 (175)	8 (203) !	39 (18)
65	250-0484	650	105	12	55	ST/MF	12 (304)	7.3 (187)	7.6 (194)	39 (18)

Construction Notes:

LA = Low Maintenance, Low Antimony Grids
 LAC = Low Maintenance, Hybrid Construction
 C = Calcium Lead Alloy Grid Design
 MF = Maintenance Free

SC = Silver (Ag) Calcium Alloy Grids – for resistance to high underhood temperatures
 MFA = Maintenance Free, Calcium Grids, Accessible Vent Caps
 ST = Silver (Ag) Calcium Alloy Heavy Duty Grids

* = Side Terminals
 S = Stud Terminals
 DT = Dual Terminal
 TB = Transit Bus one piece end Terminal.
 Right end of Battery.
 1/2"-13 Steel positive stud
 3/8"-16 Steel negative stud

" = For 30 seconds at 0° F (-18° C)
 ' = Minimum of 25 amp output at 80° F (27° C)
 ! For height with removable adapter, add 7/8" (22 mm)

Cat General Service Batteries — Available Worldwide

Wet Batteries Continued

BCI Group Size	Part No.	Cold Cranking	Reserve Capacity	Volts	Amp Hr. Capacity	Construction	BCI Overall Dimensions			Nominal Weight
		Ampos"	Minutes'		@ 20 Hrs.		Length In (mm)	Width In (mm)	Height In (mm)	Wet Lb (kg)

Marine-Deep Cycle Capability

24M	8C-3638	650	120	12	55	SC/MF/DT/~	10.8 (274)	6.8 (173)	9.4 (239)	40 (18)
27M	8C-3639	625	150	12	80	@ /S/DT	12.5 (318)	6.8 (173)	9.4 (239)	49 (22)

Lawn & Garden

U1	8C-3636	275	32	12	25	C/MF	7.8 (198)	5.1 (130)	7.3 (185)	16.5 (7)
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Golf Cart/Scissor & High Lifts

75 amps @ 80° F										
GC-2	8C-3641	115 mins.	—	6	215	@ OP	10.3 (262)	7.1 (180)	10.9 (277)	63 (29)

Dual Terminal Batteries

24/24F/74	127-0824	930	130	12	63	SC/MF/DT	10.9 (277)	7.0 (178)	9.0 (229)	45 (20)
34/78	127-0826	875	120	12	66	SC/MF/DT	10.8 (274)	6.9 (175)	8.0 (203) !	41 (19)
75/86	250-0489	540	85	12	47	SC/MF/DT	9.7 (248)	7 (178)	8.1 (206) !	32 (15)
34/78	250-0486	690	110	12	60	ST/MF/DT	10.7 (273)	6.8 (175)	8 (203) !	39 (18)

Dry Batteries

Dry Batteries							<u>BCI Overall Dimensions</u>			<u>Nominal Weight</u>		
BCI Group Size	Part No.	Cold Cranking Amps"	Reserve Capacity Minutes'	Volts	Amp Hr. Capacity @ 20 Hrs.	Construction	Length In (mm)	Width In (mm)	Height In (mm)	Wet Lb (kg)	Dry Lb (kg)	Nominal Acid to Fill Qt (liter)

Truck/Agricultural/Industrial

1	8T-9734	650	180	6	100	C/MF +	9.0 (229)	6.9 (175)	8.8 (224)	33.5 (15)	17.5 (8)	4.5 (4.3)
3D	8T-9730	1400	675	6	320	LA +	20.4 (518)	8.7 (221)	10.0 (254)	120 (54)	84 (38)	11.0 (10.4)
7D	8T-9731	950	350	6	156	LA +	15.7 (399)	7.0 (178)	9.1 (231)	59.5 (27)	34 (15)	7.5 (7.1)
24F	9X-1382	650	120	12	50	SC/MF +	10.6 (269)	6.8 (173)	9.0 (229)	40 (18)	26 (12)	6.0 (5.7)
26	145-4517	540	80	12	48	SC/MF +	8.8 (224)	6.8 (173)	8.0 (203)	29.5 (13)	23 (10)	3.5 (3.3)
26R	145-4518	540	80	12	48	SC/MF +	8.8 (224)	6.8 (173)	8.0 (203)	29.5 (13)	23 (10)	3.5 (3.3)
27	3E-8925	675	120	12	55	SC/MF +	12.0 (305)	6.7 (170)	9.0 (229)	45.5 (21)	29.5 (13)	6.5 (6.2)

Automotive/Light Truck

22F	9X-1384	425	65	12	32	SC/MF +	9.4 (239)	6.8 (173)	8.3 (211)	29.5 (13)	18 (8)	4.5 (4.3)
24	9X-1383	650	120	12	50	SC/MF +	10.2 (259)	6.8 (173)	9.0 (229)	40 (18)	26 (12)	6.0 (5.7)

Marine/Recreational

8V	8C-3640	980	350	8	175	LA +	20.8 (528)	7.3 (185)	10.6 (269)	90 (41)	60 (27)	11.5 (10.9)
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Construction Notes:

LA = Low Maintenance, Low Antimony Grids
 LAC = Low Maintenance, Hybrid Construction
 C = Calcium Lead Alloy Grid Design
 MF = Maintenance Free
 MFA = Maintenance Free, Calcium Grids, Accessible Vent Caps
 ST = Silver (Ag) Calcium Alloy Heavy Duty Grids
 SC = Silver (Ag) Calcium Alloy Grids – for resistance to high underhood temperatures
 * = Side Terminals
 S = Stud Terminals

DT = Dual Terminal
 OP = Offset Post with Horizontal Hole Stainless Steel 5/16" Bolt & Hex Nut
 " = For 30 seconds at 0° F (-18° C)
 ' = Minimum of 25 amp output at 80° F (27° C)
 ! For height with removable adapter, add 7/8" (22 mm)
 @ = Deep Cycle – Antimony Grids
 ~ = Marine Starting
 + = Shipped Dry Only
 # = Wing Nut for 8C-3638 & 8C-3639 is Part # 3B-0723

Valve Regulated Lead Acid (VRLA) Batteries

Gelled (GEL) Electrolyte, Marine/Recreational, Deep Cycle Capability

BCI Group Size	Part No.	Cold Cranking Amps"	Reserve Capacity Minutes'	Volts	Amp Hr. Capacity @ 20 Hrs.	Construction	BCI Overall Dimensions			Nominal Weight
							Length In (mm)	Width In (mm)	Height In (mm)	Wet Lb (kg)
4D	152-8006	1050	375	12	183	MF-G/VRLA	20.8 (528)	8.5 (216)	10 (254)	129.8 (59)
8D	152-7242	1265	475	12	225	MF-G/VRLA	20.8 (528)	11.1 (282)	10 (254)	160.8 (73)

Marine Cranking Amps (MCA) = Cold cranking Amps divided by 0.8

MF-G/VRLA = Maintenance Free Gel Battery. Sealed, Valve-Regulated Lead Acid (VRLA) battery with gelled electrolyte.

Starting/Deep Cycle Marine or Recreational Use Battery. Could be used for Gen-Sets or UPS type applications requiring a sealed battery.

VRLA batteries use recombination reaction to prevent the escape of hydrogen and oxygen gases normally lost in a flooded lead acid battery.

They are non-spillable, never need watering and should never be opened.

" = For 30 seconds at 0° F (-18° C)

' = Minimum of 25 amp output at 80° F (27° C)

Important: Alternator and charger instructions:

For 12-volt Gel Batteries charge to 13.8 volts but no more than 14.1 volts at 68° F (20° C)

Absorbed Glass Mat (AGM) Batteries, Designed for High-rate Uninterruptible Power Supplies (UPS) or Standby Applications

Discharge Ratings

Power Watts per Cell

Discharge Rating in Amperes

BCI Group Size	Part No.	For 15 mins. to 1.67 V.P.C. @ 77° F (25° C)	For 15 mins. to end voltage of 1.75 V.P.C. @ 77° F (25° C)	Amp Hour @ 20 hour rate to 1.75 volts per cell @ 77° F (25° C)	Normal Voltage	Construction	Terminal	BCI Overall Dimensions			Nominal Weight	
								Length In (mm)	Width In (mm)	Terminal Height In (mm)	Container Height In (mm)	Wet Lb (kg)
U1	250-0474	119	60	1.46	12	MF-AGM/VRLA	1	7.71 (196)	5.18 (132)	7.18 (182)	6.18 (157)	24 (11)
45	250-0475	168	85.4	2.42	12	MF-AGM/VRLA	2	8.84 (225)	5.31 (135)	8.7 (221)	8.14 (207)	38.5 (18)
24	250-0476	253	127	3.65	12	MF-AGM/VRLA	2	10.2 (259)	6.8 (173)	9.14 (232)	8.12 (206)	53 (24)
27	250-0477	314	156	4.41	12	MF-AGM/VRLA	2	12.72 (323)	6.8 (173)	8.68 (220)	8.12 (206)	63 (29)
31	250-0478	377	192	4.68	12	MF-AGM/VRLA	3	12.93 (329)	6.75 (171)	8.75 (222)	8.58 (218)	69 (31)
31(A)	250-0479	475	238	6.66	12	MF-AGM/VRLA	3	13.5 (342)	6.77 (172)	11.25 (286)	11.08 (281)	98 (45)
4D(H)	250-0483	624	318	9.91	12	MF-AGM/VRLA	4	21.73 (552)	8.82 (210)	9.34 (237)	8.74 (222)	129 (59)

MF-AGM/VRLA = Maintenance Free-Absorbed Glass Mat (AGM) Battery. Battery has Flame Arrestor and is low-pressure self sealing.

Housed in flame-retardant polypropylene (rated 28 LOI) 12-Volt Monoblocks

(A) = Battery is 2.5 in (63.5 mm) taller and 0.57 in (13 mm) longer than standard Group 31

(H) = Battery has handles

Sealed Valve-Regulated Lead Acid (VRLA) with electrolyte absorbed in separators consisting of a sponge-like mass of matted glass fibers.

Preferred for high-rate performance in uninterruptible power supply (UPS) or standby applications.

VPC = Volts per Cell

WPC = Watts per Cell. Ratings conform to IEEE-485 Standards

VRLA batteries use recombination reaction to prevent the escape of hydrogen and oxygen gases normally lost in a flooded lead acid battery. They are non-spillable, never need watering and should never be opened.



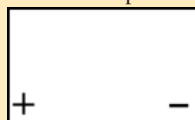
UL Recognized Component

AGM batteries have a longer production lead time than regular lead-acid type batteries

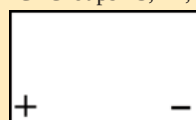
Important: Alternator and charger instructions: for 12-volt AGM Batteries charge to 14.4 volts but no more than 14.6 volts at 68° F (20° C)

Valve Regulated AGM Batteries – Terminal Locations

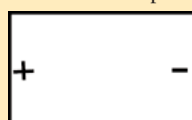
1-BCI Group U1



2-BCI Groups 45, 24, 27



3-BCI Group 31



4-BCI Group 4D



Terminals

1 = Lead terminal. L shaped. Terminals have square holes.

2 = Lead terminal with brass inserts. 1/4-20 x 0.25 Deep Female Thread.

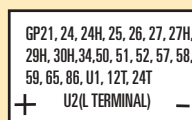
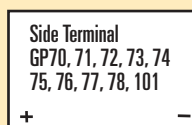
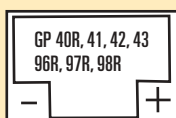
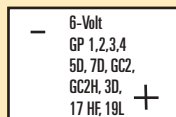
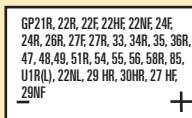
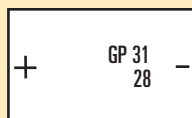
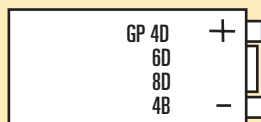
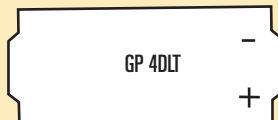
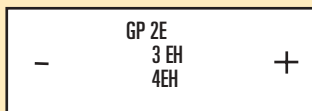
3 = Lead terminal with brass inserts. Centerline terminals. 1/4-20 x 0.25 Deep Female Thread.

4 = End terminals with brass inserts. 1/4-20 (UNC) Female Thread. Ratings conform to IEEE-485 Standards.

VRLA batteries are a UL Recognized Component and are I.C.C.A., I.C.A.O., I.M.D.G., I.A.T.A. and D.O.T. Air Transport Approval pending.

Battery Information

BCI Terminal Locations



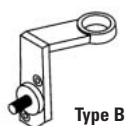
Transit Bus Terminal for 8D Part # 250-0473

One piece end terminal.

Right end of Battery.

1/2" - 13 Steel Positive Stud

3/8" - 16 Steel Negative Stud



Cat Premium High Output Batteries – Built Tough to Exceed Demanding Performance Test Requirements:

100 hour Vibration Testing – Five Times the Industry Standard

- Battery must be able to withstand vibration forces without suffering mechanical damage, loss of capacity, loss of electrolyte or without developing internal/external leaks
- Battery must pass a high rate discharge test after the vibration testing

Five 72-hour Deep Discharge/Recharge Test Cycles

- Battery must recover to 25 charging amps within 20 minutes and meet Industry Electrical Performance Standards

30 Day Complete Discharge Test

- Battery must recover to 25 charging amps within 60 minutes and meet Industry Electrical Performance Standards after recharging

SAE J2185 Life Cycle Test

- Battery subject to deeper discharge and charge cycles at extreme temperatures not normally encountered in starting a machine or vehicle

Cold Soak Test

- Battery cold soaked at sub-freezing temperatures and then tested by starting an equally cold engine



Battery Accessories

Group 31 – Charging Posts for Stud Terminals – Part # 4C-5637

Screw-in Charging Posts for Side Terminals – Part # 4C-5638

Wing Nut – Part # 2B-9498 for Part #'s 175-4390/175-4370/175-4360/8C-3628

Wing Nut – Part # 3B-0723 for Part #'s 8C-3638 and 8C-3639

Digital Battery Analyzer – Part # 177-2330

Battery Voltmeter – Part # 4C-6600

Battery Load Tester – Part # 4C-4911

Booster Cable 12' (3.66 m) – Part # 4C-4933

Booster Cable 20' (6.00 m) – Part # 4C-4937

Heavy Duty Commercial Fast Charger (110V) – Part # 4C-4921

Heavy Duty Commercial Fast Charger (220V) – Part # 4C-4910

Extra Vent Caps (6) for Dry Batteries – Part # 7N-0060

Note: Ratings and Part Numbers are subject to change without notice.



Recycle all scrap batteries.
We accept lead-acid batteries
for recycling.

Cat Batteries

World Wide Application Flexibility

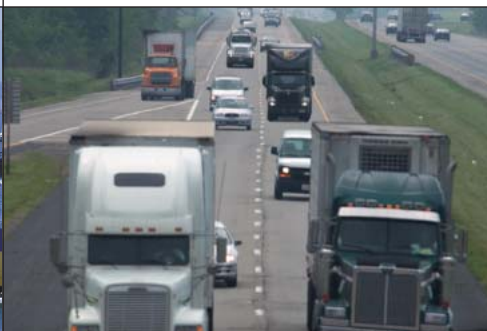
Marine Commercial Vessels

Maintenance Free 4D, 8D and Group 31 Batteries. General Service Line valve regulated (VRLA) Gel batteries. High Marine Cranking Amps (MCA) and Deep Cycling capabilities.



Automotive-Truck-Bus & RV

A wide selection of popular BCI group sizes. Maintenance Free, Severe Service and Deep Cycle models. Application Specific Group 31 Truck Batteries.



Commercial & Recreational

A wide selection of premium batteries in most BCI group sizes for light commercial, recreational, agricultural and industrial applications.



Marine Pleasure Craft

Premium High Output BCI Group 31, Dual Terminal Deep Cycle Batteries. General Service Line BCI group 24M, 27M and 8V sizes.



Electric Power Generation

Premium High Output Maintenance Free and Accessible batteries in BCI group 4D, 8D, & 31 sizes. High Cold Cranking Amp (CCA) Capability. General Service Line valve regulated (VRLA) AGM batteries for UPS or stationary power applications.



Construction & Mining

Premium High Output Maintenance Free batteries. BCI group 4D, 8D and 31 Sizes. Industry leading cold cranking amps (CCA) and maximum vibration resistance.



Cat Batteries

Heavy-duty Forged Terminal Post Bushings

Built-in Flame Arrestor

Robust Reinforced Case

Vibration Resistant Plates & Elements

Heavy-duty Grids

Rugged Separators

Robust Components = Long Life + Reliable Starts

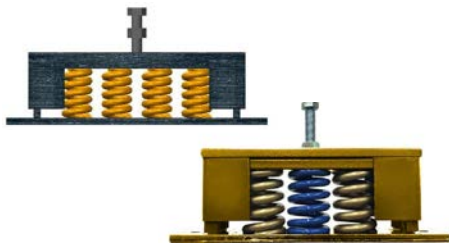
- Heavy-duty forged terminal post bushings provide maximum strength and resistance to acid seepage that causes corrosion and black posts. Thicker internal terminal posts provide lower electrical resistance and higher cold cranking amp output.
- Rugged microporous polyethylene envelope separators protect against “shorts” and vibration damage. Deep Cycle batteries utilize double insulated Glass mat separators for longer cycling life.
- Maintenance Free batteries utilize calcium lead alloy on both positive and negative plates that reduces gassing and water consumption. Automotive batteries have Silver (Ag) Calcium Alloy Grids for resistance to high underhood temperatures.
- Heavy-duty, full frame battery grids with no sharp edges. An optimum acid/paste combination provides better charge acceptance after a deep discharge.
- Positive and Negative plates are anchored to the container bottom and the cell element is locked at the top for maximum vibration resistance. Straps are thicker, heavier and cast (not welded) into the plates.
- Manifold vented cover with built-in Flame Arrestor...a safety feature that directs corrosive gases away from the battery and hold-downs.
- Robust reinforced case provides extra strength in all temperature extremes. Brickwork design on sides reduces chance of punctures and case flexing. Embossed part number and descriptors for easy serviceability.

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For more information, see us today or visit our web site at www.cat.com

Caterpillar. The difference counts.™

CATERPILLAR®



Picture shown may not reflect actual configuration

Linear Spring-Type Vibration Isolators

GENERAL DESCRIPTION

The most effective isolators for low frequency vibration are of steel spring design. They can isolate up to 95 percent of all vibration and noise transmitted from rotating machinery to the foundation or mounting surface. Conversely, isolators can absorb disturbances generated by adjacent machinery and prevent damage from being transmitted to idle equipment.

Spring-type linear vibration isolators are available as attachments for generator sets to be used in stationary applications. These isolators permit mounting the generator set on a surface capable of supporting only the static load.

The spring-type isolator is constructed of a telescoping welded steel housing containing color coded springs. Each isolator is packaged with three (3) or four (4) spring inserts. The springs are freestanding stable springs and are designed for **19 mm (0.75-inch)** deflection at rated load. The spring wires meet/comply with: SAE 1065, ASTM A229-56, MIL QQ-W-428 Type 1.

Each isolator is furnished with spring adjusting bolts, resilient neoprene alignment inserts and non-skid neoprene acoustical pad cemented to the base plate.

Isolator Data

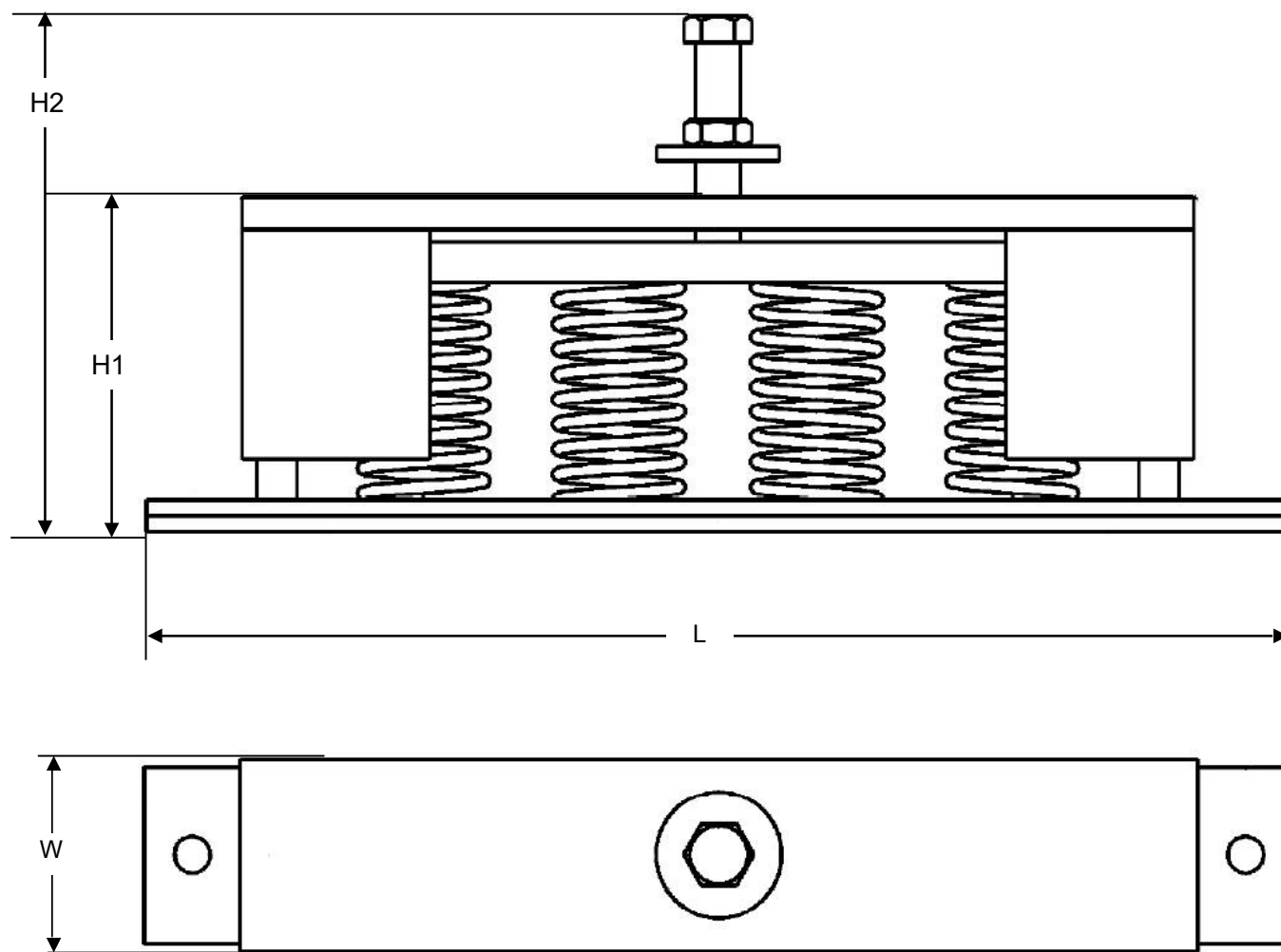
Part Number	Color Code (Springs)	Rated Capacity kg (lb)*	Spring Rate kg/cm (lb/in)*	Solid Load kg (lb)*	X6
153-3864	3 x Gold	2039 (4495)	1074 (6000)	3058 (6742)	
153-3865	1 x Blue & 2 x Gold	1700 (3748)	895 (5000)	2550 (5622)	
178-5048	4 x Gold	2722 (6001)	1428 (7995)	4083 (9001)	

* value per isolator

Weights and Dimensions

Isolator	Weight	Length (L)	Height (H1)	Height (with leveling bolt) (H2)	Width (W)
153-3864	8.2 kg (18.1 lb)	381 mm (15.0")	134 mm (5.3")	197 mm (8.9")	76 mm (3.0")
153-3865					
178-5048	12.5 kg (27.6 lb)	457 mm (18.0")	133 mm (5.3")	206 mm (8.1")	76 mm (3.0")

Isolator Drawing



Materials and specifications are subject to change without notice.
 CAT, CATERPILLAR, LET'S DO THE WORK, their respective logos, "Caterpillar Corporate Yellow", the "Power Edge"
 and Cat "Modern Hex" trade dress as well as corporate and product identity used herein, are trademarks of Caterpillar
 and may not be used without permission.

EMERGENCY DISCONNECT

OPERATOR STATION

BREAK GLASS TO RELEASE BUTTON

(BREAK GLASS - PUSH BUTTON also Available)

PILLA MODEL SERIES ST120



ST120FNI
Flush
(Standard Legend)



ST120SN3RSL
Weatherproof,
Specific Legend



ST120SN1SL
Surface,
Specific Legend



ST120SN1SL
Surface,
Specific Legend



ST120SN1SL
Surface,
Specific Legend



ST120SN3RSL
Weatherproof, Illuminated,
Specific Legend



ST120SN1SL
Surface,
Specific Legend



ST120SN1SL
Surface,
Specific Legend



ST120SN1SL
Surface,
Specific Legend



ST120SN1SL
Surface, Illuminated,
Specific Legend

A complete, finish-quality break glass station with a full range of factory installed options. Standard models include several NEMA ratings.

SERIES ST120 EMERGENCY ELECTRICAL DISCONNECT Break Glass Station

"Break Glass To Release Button" is Standard - Also see Suffix BP Below

Standard Models

Description

ST120SN3R	Surface mount	NEMA 3R	Rainproof, all-metal	1/2-3/4" knockout on bottom
ST120SN1	Surface mount	NEMA 1	all-metal	1/2-3/4" knockout on bottom
ST120FN1	Flush mount	NEMA 1	all-metal	1/2-3/4" knockout on bottom
ST120SN4	Surface mount	NEMA 4 & 12	all-metal	1/2" threaded fitting bottom
ST120FN4	Flush mount	NEMA 4 & 12	all-metal	1/2" threaded fitting bottom
ST120SN4XS304	Surface mount	NEMA 4X & 12	304 Stainless Steel	1/2" threaded fitting bottom
ST120SN4XS316	Surface mount	NEMA 4X & 12	316 Stainless Steel	1/2" threaded fitting bottom
ST120SN4XA	Surface mount	NEMA 4X & 12	Aluminum	1/2" threaded fitting bottom

OPTIONS AVAILABLE

TO ORDER: The above standard models may include optional features listed below. Add the indicated suffix(s) for the optional feature(s) desired to the standard model number chosen from above.

Add suffix **BP**

"Break Glass - Push Button" model, momentary (Note 1 below)

Add suffix **TG**

Two position toggle switch model, maintained toggle behind glass instead of button operator

Add suffix **IL**

Illuminated operator model with 120V lamp standard (specify other voltage)

Add suffix **XD**

Extra depth model for eight contact block capacity

Add suffix **SL**

Specific legend (specify when ordering)

*NOTE 1:

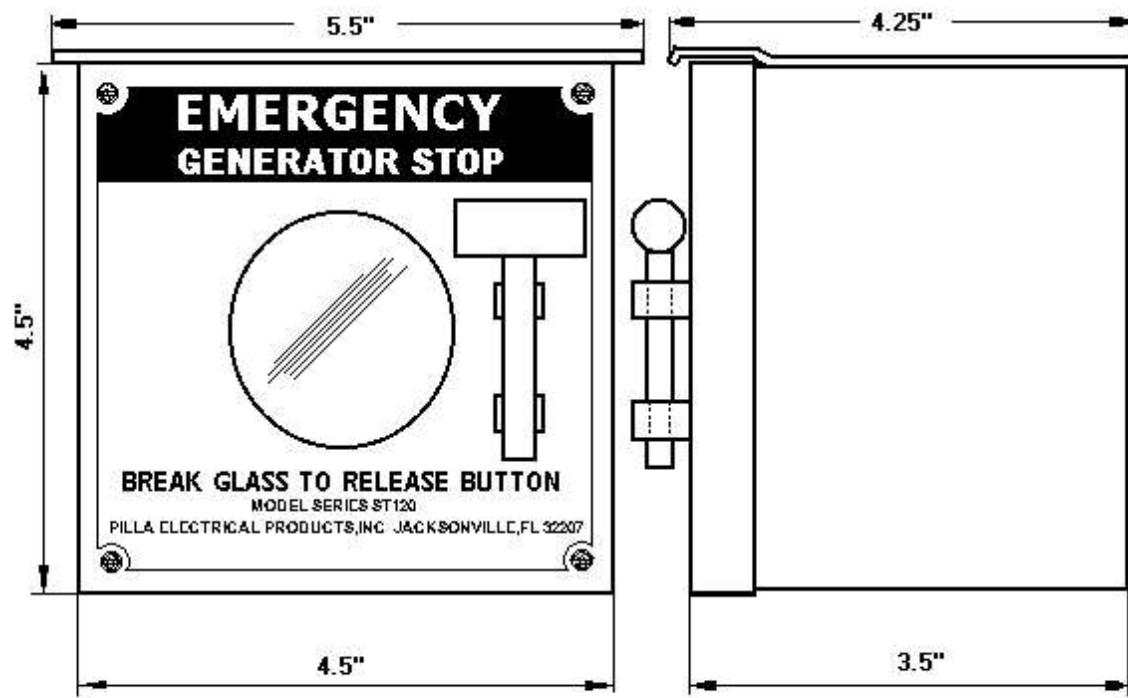
For maintained operation of suffix BP models, use accessory PILMTNADP from Series PIL accessories preceding page

FEATURES

- Operator automatically releases when glass is broken
- Contact blocks rated 10 AMP continuous up to 600 Volts *
- Type PILNCCB contacts remain open with glass intact, close when glass is broken
- Type PILNOCB contacts remain closed with glass intact, open when glass is broken
- Accepts up to four contact blocks in standard 3.5 inch depth backbox
- Extra depth model accepts up to eight contact blocks: Add model suffix **XD**
- Compact 4.5 x 4.5 inch metal backbox has red enamel finish with 1/2-3/4 inch knockout provided
- Illuminated model includes 120V lamp standard (specify other voltage): Add model suffix **IL**
- Two double strength replacement glasses included
- SPECIFIC LEGENDS AVAILABLE IN ANY LANGUAGE: (Specify when ordering): Add model suffix **SL**

* NOTE: Contact block(s) supplied separately. See Series PIL accessories preceding page.

UL LISTED 9F36 (CANADA)



PILLA MODEL ST120SN3RSL GENERATOR STOP BREAK GLASS STATION



Walenda Booster Station WBS#4

SWITCH SUBMITTAL

REVISION 1

MARCH 25, 2024

Walenda Booster Station WBS#4

Reference Quote: E3-23-608584-1-1

Sales Order: 3238055

TRANSFER SWITCH DETAILS									
ATS NAME	QTY	AMPS / POLES (VOLTS)	BYPASS	TRANSITION TYPE	CATALOG NUMBER	ACCESSORIES	OUTLINE DRAWING	WIRING DIAGRAM	BOM NUMBER
	1	1200 / 3 (480V)	N/A	DELAYED	H3ADTSA31200NGXC	11BE,18RX	1001394-001	1001660	1383430

Transfer Switch Withstand and Closing Ratings																						
				300, 4000 & 7000 Series																		
ATS NAME	FRAME SIZE	SWITCH RATING AMPS		CURRENT LIMITING FUSES				SPECIFIC BREAKER			TIME BASED				Short Time Ratings³ (sec)							
															480V Max.				600V Max.			
		Transfer Switches	Bypass Switches	480V Max.	600V Max.	MAX SIZE, A	CLASS	240V Max.	480V Max.	600V Max.	Time(Sec)	240V Max.	480V Max.	600V Max.	.13	.2	.3	.5	.1	.13	.3	.5
-	H	800 - 1200	800 - 1200	200kA	200kA	1600 ^d	L	65kA	150kA	65kA	0.05	50kA	50kA	50kA	36kA		-	36kA		-		

NOTES:

- 1) All WCR values indicated are tested in accordance with the requirements of UL 1008, 7th Edition.
- 2) Application requirements may permit higher WCR for certain switch sizes.
- 3) Short Time ratings are provided for applications involving circuit breakers that utilize trip delay settings for system selective coordination
- 4) Max fuse rating is 1200A on front connected H frame switches

Walenda Booster Station WBS#4

Transfer Switch Details

#1	ATS	AMPS: 1200	QTY: 1
Product	: Series 300	Catalog Number	: H3ADTSA31200NGXC
Service Voltage / Hz	: 480V/60Hz	Optional Accessories	: 11BE,18RX
Bypass Isolation	: Not Applicable	Product Description	: 300 Series, Automatic Delayed Transition Transfer Switch
No. of Switched Poles: 3	: 3	Neutral Configuration	: Solid [A]
Withstand Rating:	: See WCR Table Below	No. of Cables & Lug Size	: 4, 1/0 AWG to 600 MCM
Frame = H, Switch Rating = 1200, Series = 300			
Enclosure	: 1(C)-UL Type 1 Enclosure	Service	: Three Phase, 4-wire
Extended Warranty	: Not Included	Markings	:

#	ACCESSORY DESCRIPTIONS	
	Accessory Code	Description
1	11BE	Adds the following features to the Group G controller: (1) Serial RS-485 Modbus Communications (2) Multi-Schedule Engine Exerciser (3) a 300 Entry Event Log and (4) a common alarm output function. When applied on 3-phase systems it also enables: (1) 3-Phase Emergency Source VLL sensing (2) Phase Rotation Monitoring (3) Emergency Source VLL Unbalance Monitoring.
2	18RX	REX (Relay Expansion Module) with Normal and Emergency available output contacts (18B & 18G)

OUTLINE FOR ASCO® 300 SERIES 1200 AMPERE "H" FRAME (H3ATS,H3NTS,H3ADTS,H3NDTS) FRONT CONNECTED TRANSFER SWITCHES TYPE 1 ENCLOSURE

GENERAL NOTES

- TYPE 1 ENCLOSURE, FREE STANDING. FLOOR MOUNTED. CODE GAUGE FORMED FRAME CONSTRUCTION.
- NEC STANDARD GAUGE PAN TYPE DOOR WITH LOCKABLE HANDLE.
- FINISH: ANSI 61 GRAY, POLYESTER POWDER STANDARD. OTHER ANSI COLORS AVAILABLE CONSULT FACTORY UL RECOGNIZED.
- RECOMMENDED CLEARANCES: FRONT: 38.00" [965mm].
- A 20% RATED GROUND BUS IS PROVIDED.
- UNIT IS DESIGNED FOR COMBINATION TOP AND BOTTOM CABLE ENTRY. THE STANDARD SWITCH CONFIGURATION IS FOR TOP LUGS EMERGENCY AND LOAD AND BOTTOM LUGS NORMAL. OPTIONALLY, THE SWITCH MAY BE SUPPLIED WITH REVERSE NORMAL & EMERGENCY LUGS. (REFER TO THE WIRING DIAGRAM FURNISHED WITH EACH TRANSFER SWITCH TO DETERMINE TERMINATION POSITIONS).
- NEUTRAL CONFIGURATIONS:
AN OPTIONAL FULL RATED NEUTRAL CONFIGURATION FOR EACH SOURCE AND THE LOAD MAY BE PROVIDED. WHEN EQUIPPED IT IS IN ONE OF THE FOLLOWING FORMATS AS SPECIFIED BY THE CATALOG NUMBER NO. NEUTRAL TYPE:
(A) SOLID (COPPER BUS) NEUTRAL
(B) SWITCHED NEUTRAL POLE
-  CENTER OF GRAVITY.
- NO KNOCKOUTS ARE PROVIDED.

CABLING NOTES

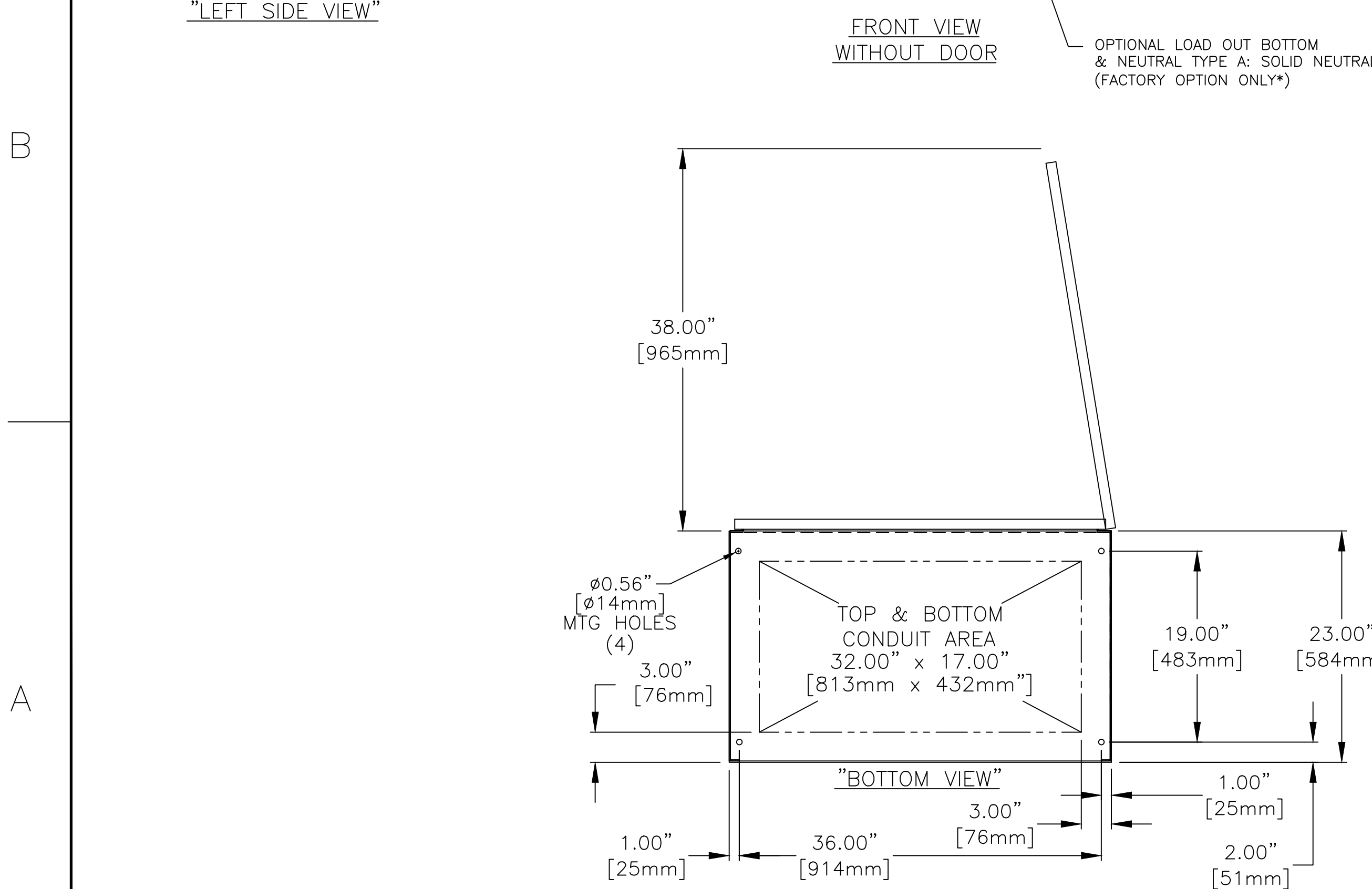
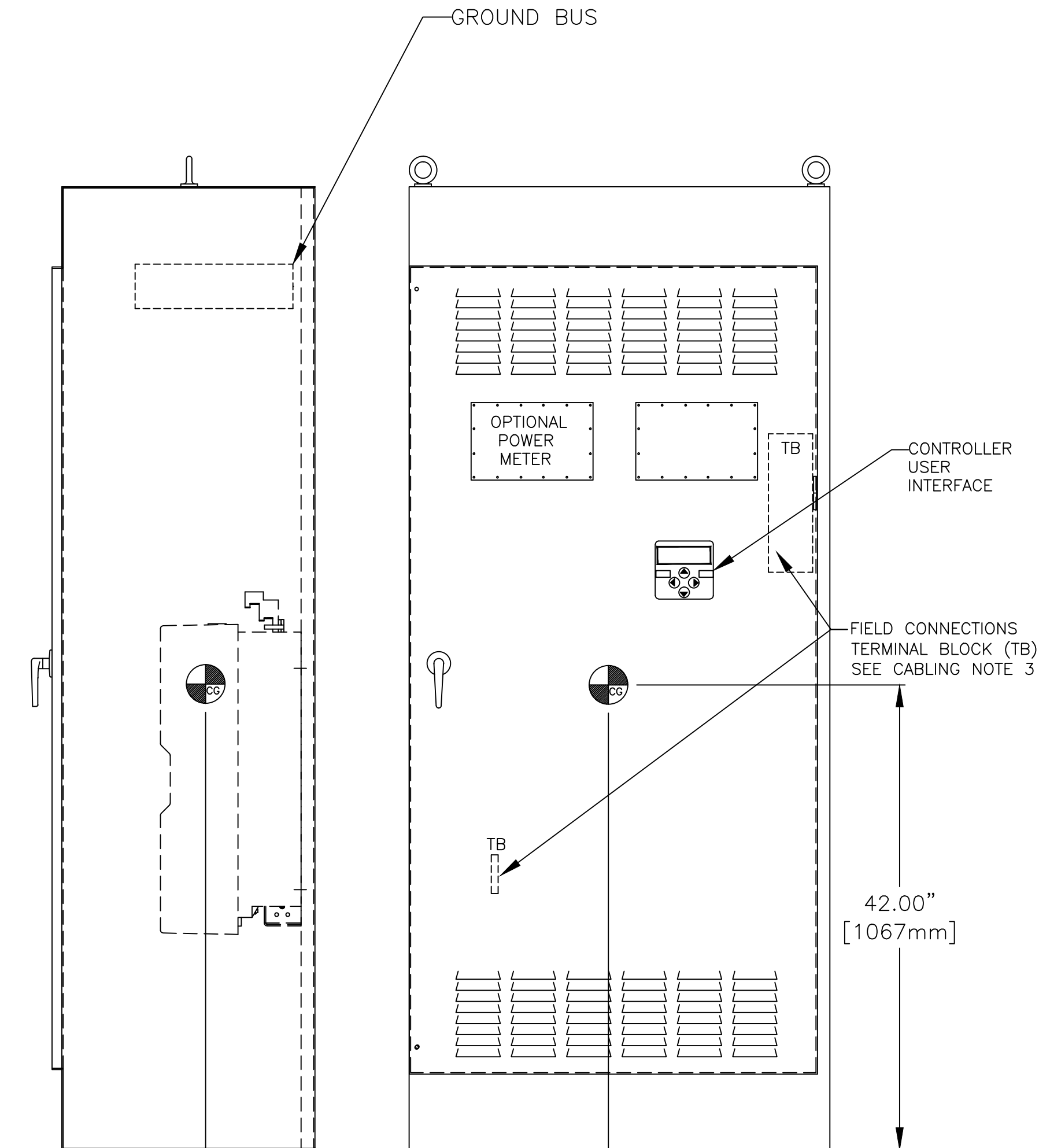
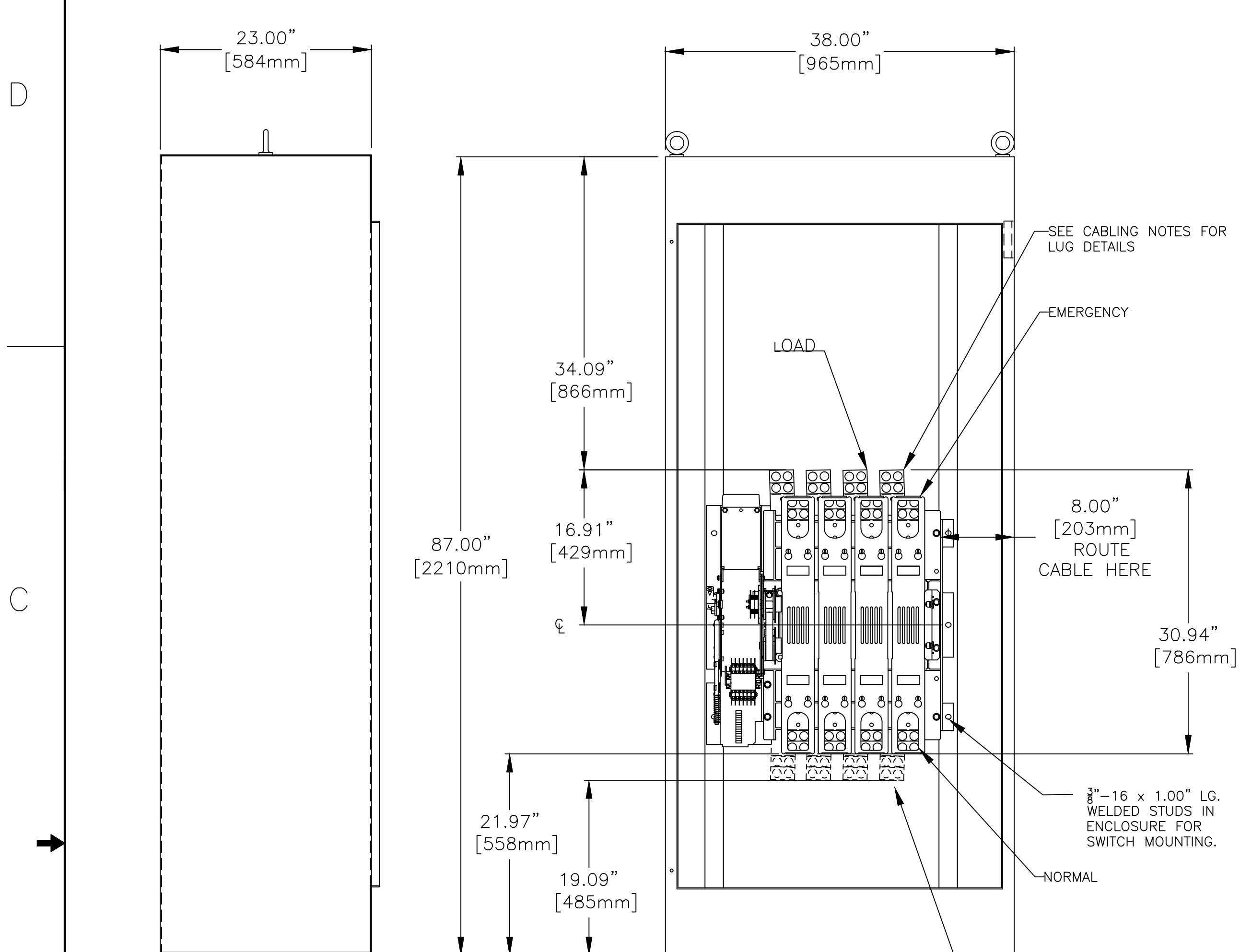
- ALL SIZES SUPPLIED STANDARD WITH MECHANICAL (SCREW TYPE) LUGS. (SEE AMP SIZE BELOW)
A. LUG MATERIAL: ALUMINUM ALLOY 6061-T6 WITH ELECTRO TIN PLATED FINISH.
B. SCREW MATERIAL: ALUMINUM ALLOY 6262-T9 WITH ELECTRO TIN PLATED FINISH.
C. UL LISTED, CSA CERTIFIED.
D. LUG SCREW TIGHTENING TORQUE PER UL 486B: 19 FT-LBS.
E. SUITABLE WIRE BENDING SPACE IS PROVIDED. (SEE AMP SIZE BELOW)
- GROUND LUGS ARE PROVIDED STANDARD AS FOLLOWS. (SEE AMP SIZE BELOW).
- CUSTOMER TERMINAL BLOCKS:
FOR ALL 300 SERIES 3NDTS, 3ADTS UNITS THE TB WILL BE MOUNTED ON THE UPPER RIGHT INSIDE OF ENCLOSURE.
FOR ALL 3ATS AND 3NTS UNITS TB WILL BE MOUNTED ON THE TRANSFER SWITCH FRAME AS INDICATED.

NOTES 1200 AMP SWITCHES

- SUPPLIED WITH STANDARD MECHANICAL (SCREW TYPE) LUGS ON THE NORMAL, EMERGENCY & LOAD BUS STABS. ONE (1) LUG PER PHASE AND NEUTRAL EACH SUITABLE FOR CONNECTION OF FOUR (4) 1/0 - 750MCM CU/AL CABLE.
A. SUITABLE WIRE BENDING SPACE IS PROVIDED FOR UP TO FOUR (4) 600MCM CABLES PER TERMINAL PER NEC.
- GROUND LUGS ARE PROVIDED STANDARD AS FOLLOWS;
(12) 1/0 - 750MCM CU/AL CABLE CONNECTIONS.

APPROXIMATE SHIPPING WEIGHT, LBS (KG)

SWITCH RATING (AMPS)	POLES	WEIGHTS LB (KG)
1200	2	581 (264)
1200	3	610 (277)
1200	4	639 (290)



H3ADTSA31200NGXC,11BE,18RX

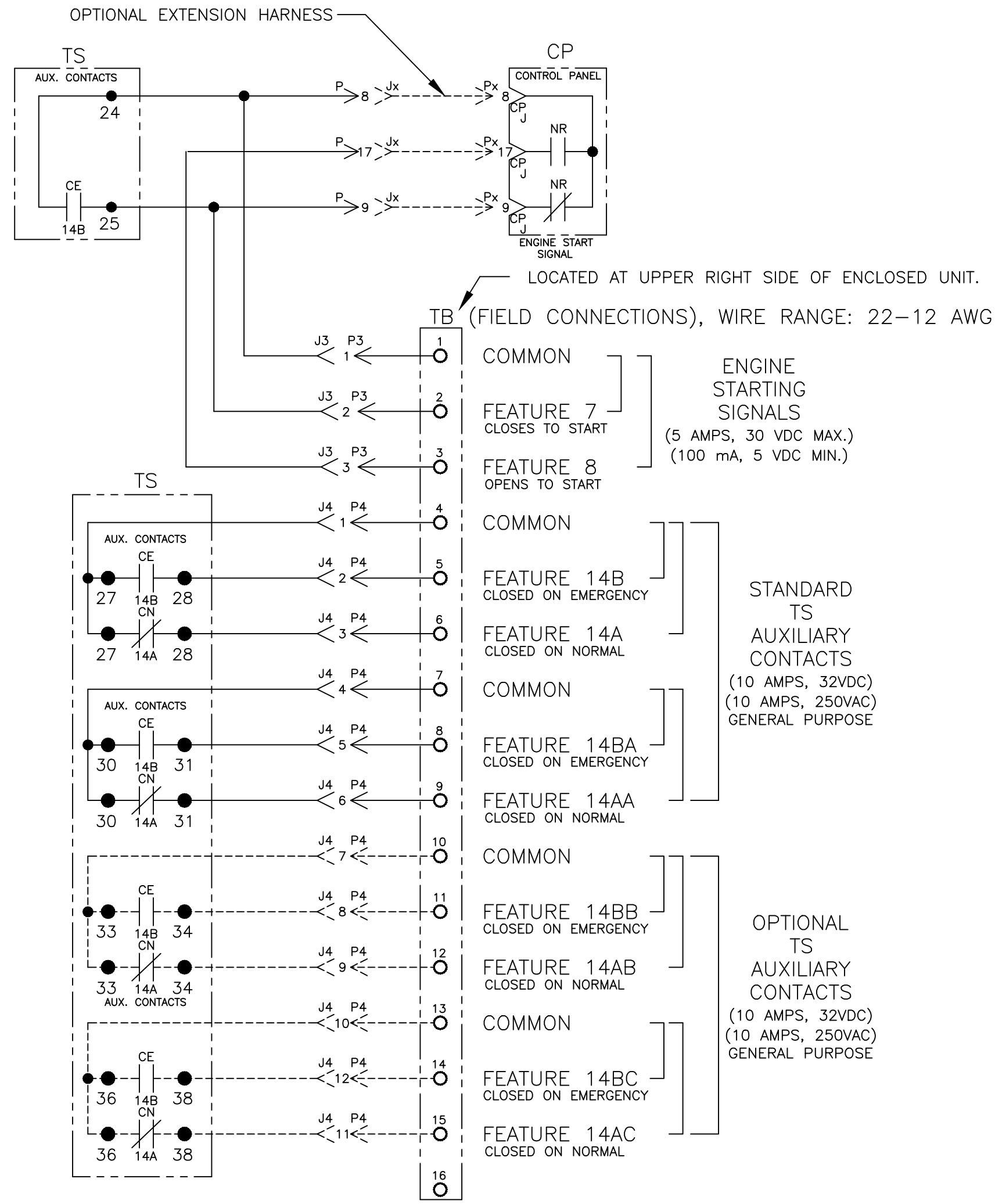
PROJECT NAME:		REV. TO SHEET	ECN NO.	BY	APP.	DATE
OUTLINE						
300 SERIES, 87x38x23						
1200 AMP. TYPE 1						
DRAWN BY	DJB	DATE	11/20/13	MANUFACTURING TOLERANCES TO BE IN ACCORDANCE WITH ASCO PROCEDURE MP-1-003. FOR PLASTIC PARTS SEE MP-1-005.		
CHECKED	BK	DATE	11/20/13	PROPERTY OF ASCO POWER TECHNOLOGIES, USE PERMITTED FOR OUR WORK ONLY. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.		
PROJECT APPROVAL	BK	DATE	11/20/13	ASCO® ASCO POWER TECHNOLOGIES, L.P. FLORHAM PARK, NEW JERSEY 07932 U.S.A.		
FINAL APPROVAL		DATE		COMPUTER GENERATED DRAWING		
SCALE		NONE	SIZE	DS	DWG. NO.	
DRAWING D		ECN NO.	289439	SHEET		1 OF 1

D

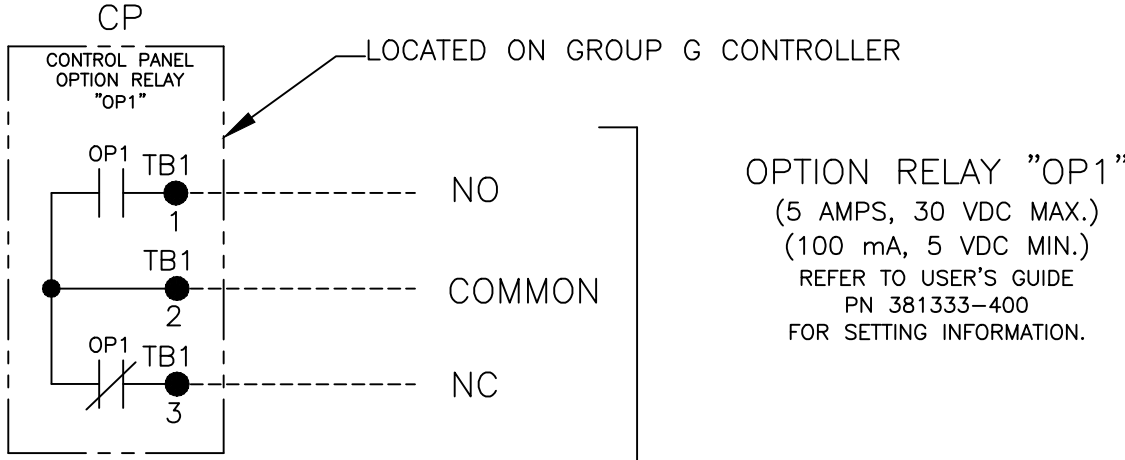
C

B

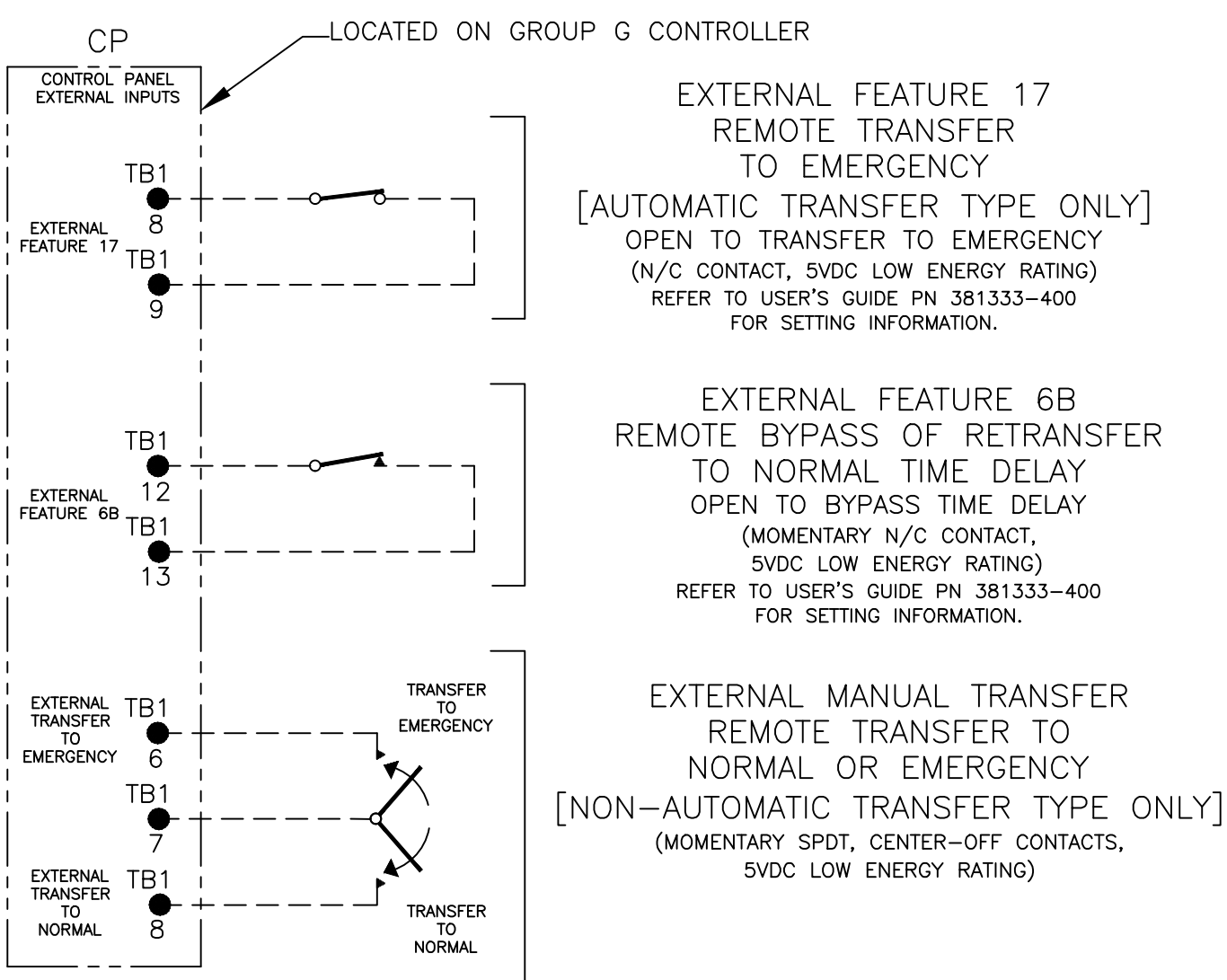
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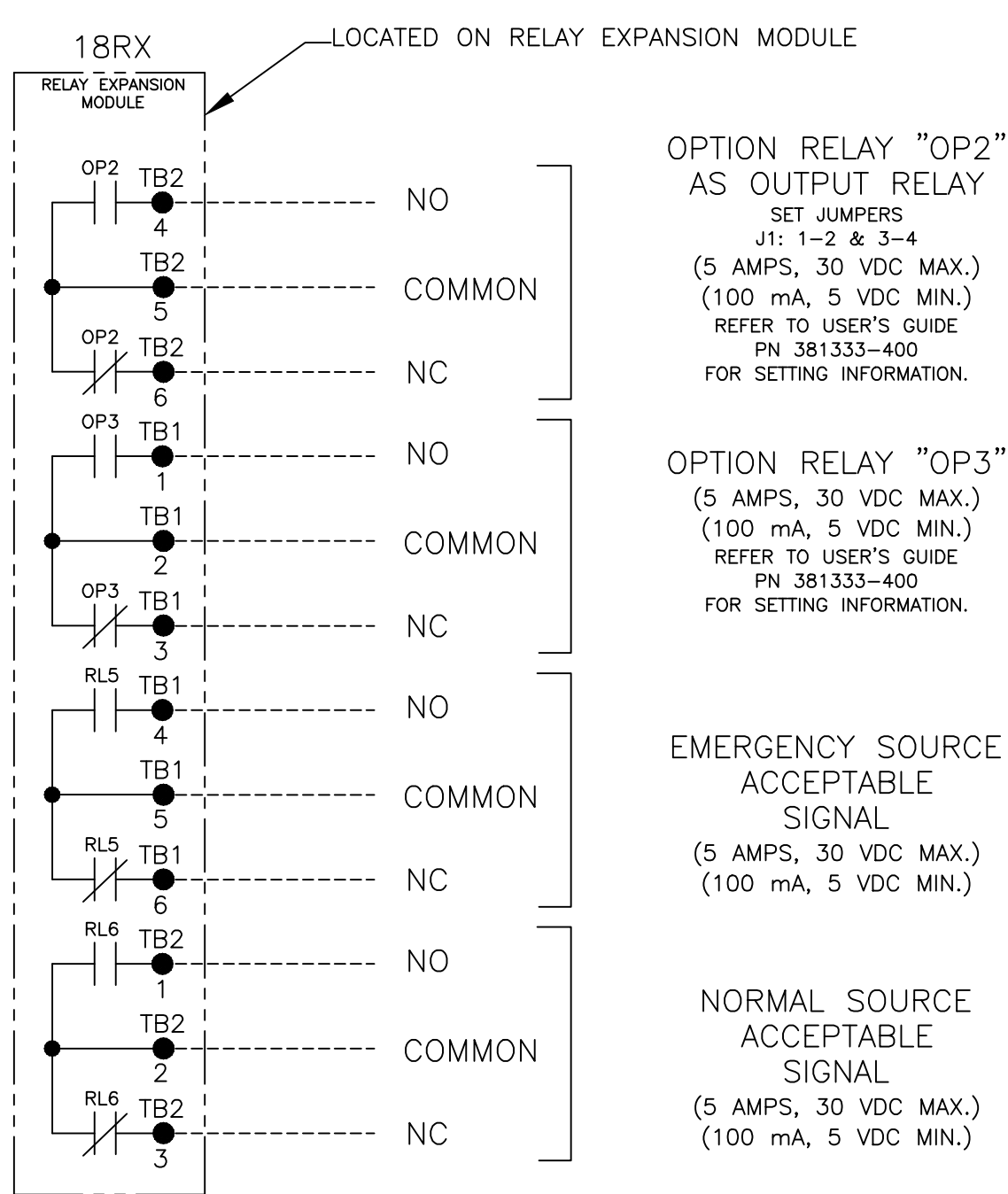
CONTROLLER OPTION RELAY "OP1" (STANDARD)



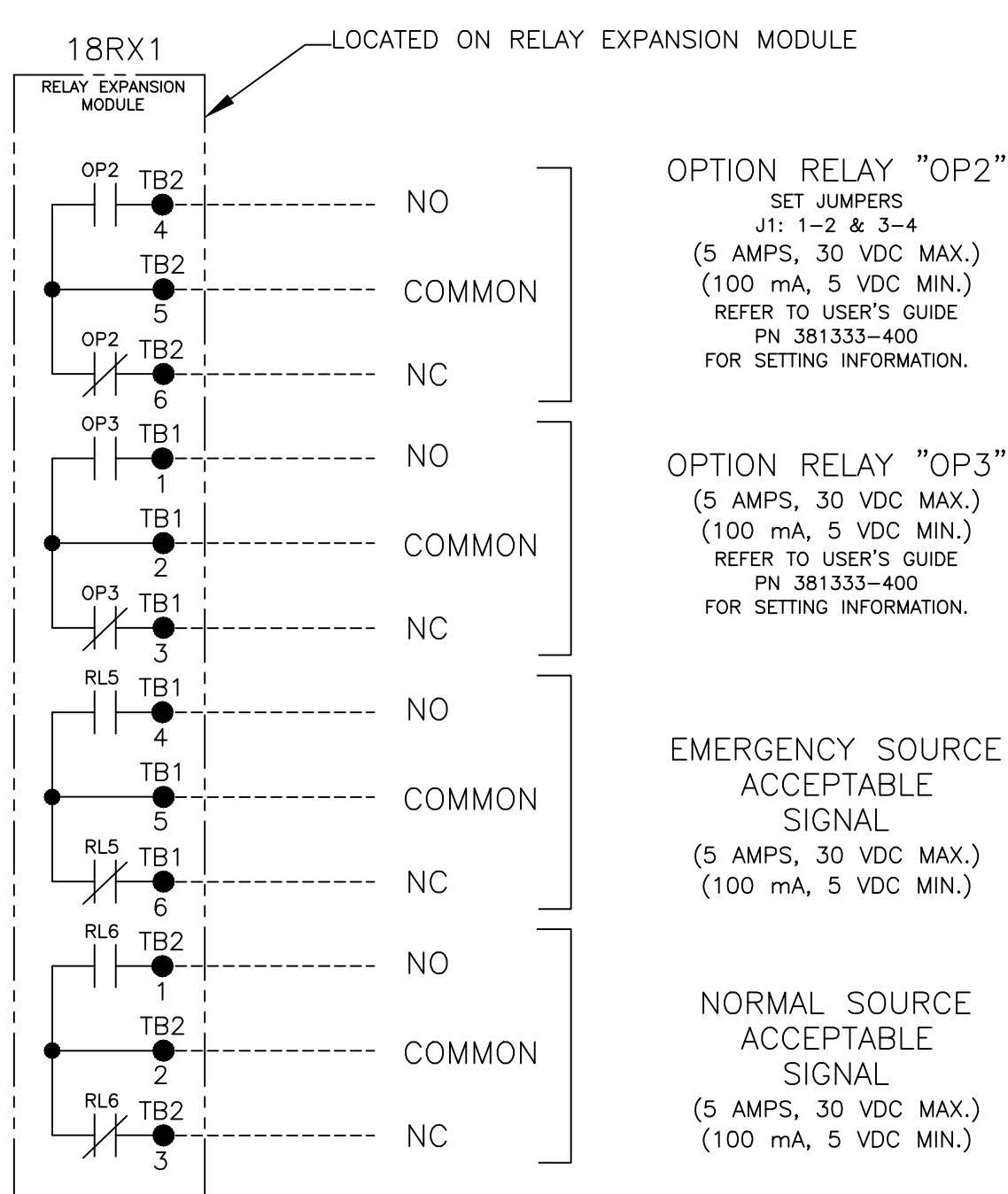
CONTROLLER REMOTE CONTROL FEATURES



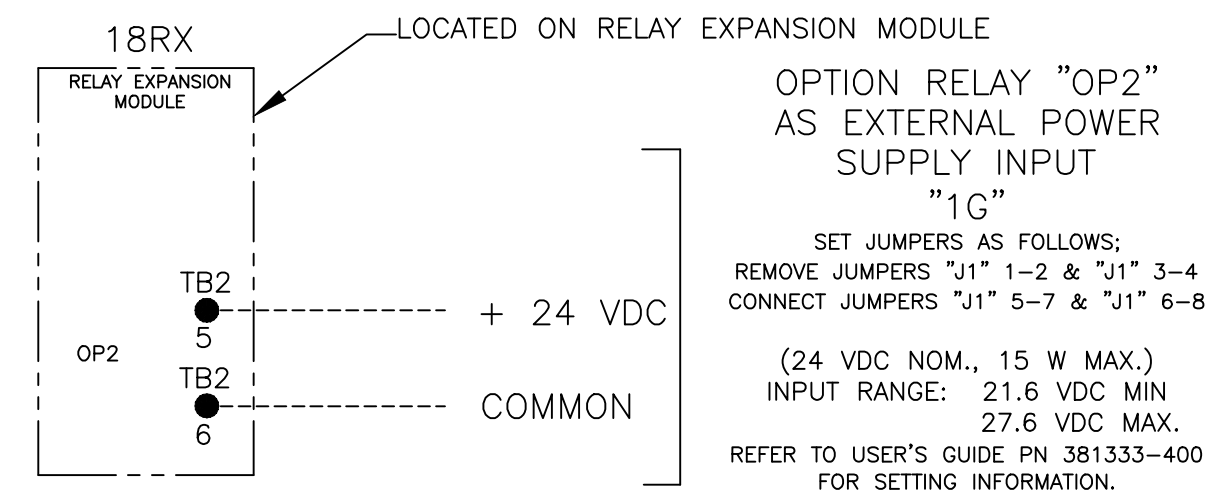
OPTIONAL ACCESSORY 18RX (RELAY EXPANSION MODULE)



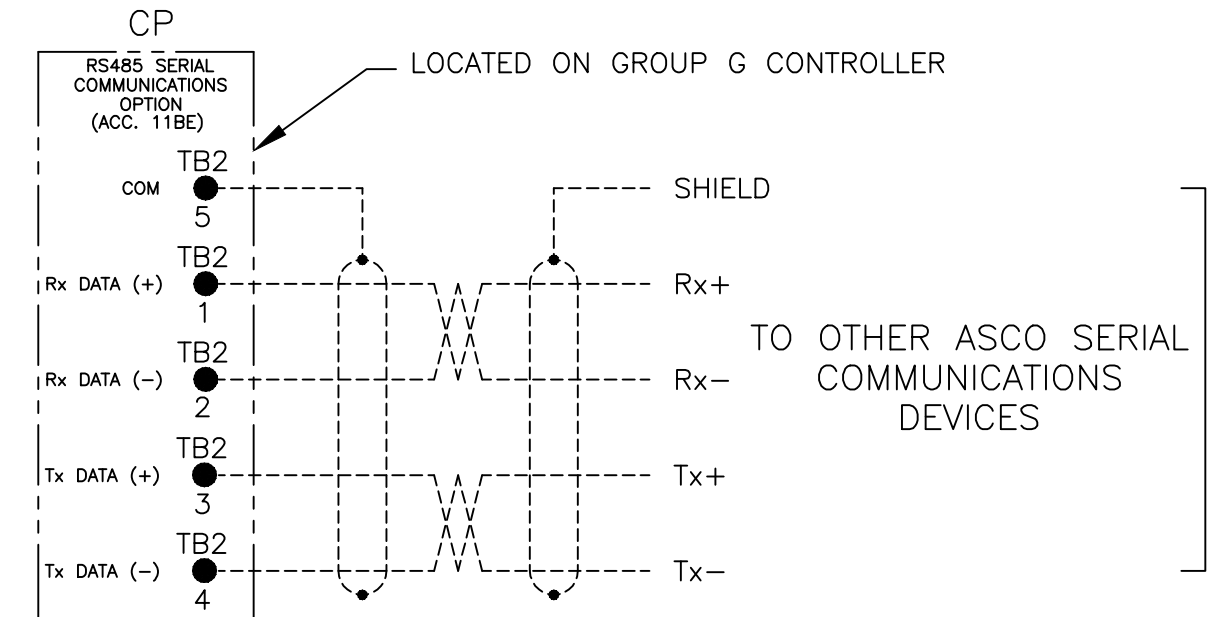
OPTIONAL ACCESSORY 18RX1 (SECOND RELAY EXPANSION MODULE)



"OP2"
OPTIONAL
USES



RS485 SERIAL COMMUNICATIONS OPTION AVAILABLE WITH OPTIONAL ACCESSORY 11BE: ADVANCED-FUNCTION SOFTWARE BUNDLE REFER TO USER'S GUIDE PN 381333-400 FOR SETTING INFORMATION.



- NOTES:
- EARTH GROUND SHIELD AT HOST DEVICE ONLY.
 - FIELD WIRING: USE UL LISTED, STRANDED, TWISTED PAIRS, OVERALL FOIL SHIELD WITH STRANDED DRAIN WIRE SUITABLE FOR RS422 EQUIVALENT TO:
(STANDARD 80°C) BELDEN 9842 OR 9829 OR ALPHA 6202C OR 6222C
(PLENUM RATED) BELDEN 89729 OR 82729 OR ALPHA 58902

E	278250	TR	BK	04/22/19
SEE ECN				
D	275211	TR	BK	10/15/18
SEE ECN				
C	255133	TR	BK	6/5/15
SEE ECN (REMOVE 600A)				
B	247772	SDH	SDH	4/14/14
SEE ECN				
A	246325	AE	BK	01/16/14
SEE ECN				
—	245960	BK	BK	12/23/13
ISSUE				

PROJECT NAME:				REV. TO SHEET		ECN NO.		BY		APP.		DATE			
WIRING				DIAGRAM											
300 SERIES (H3ADTS/H3NDTS), 3PH 800-1200 AMPS															
"H" FRAME, GROUP G CONTROLS															
DRAWN BY		DJB		DATE		12/23/13		MANUFACTURING TOLERANCES TO BE IN ACCORDANCE WITH ASCO PROCEDURE MP-1-003. FOR PLASTIC PARTS SEE MP-1-005			ASSEM. REF. NO.				
CHECKED		BK		DATE		12/23/13		PROPERTY OF ASCO POWER TECHNOLOGIES, USE PERMITTED FOR OUR WORK ONLY. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.							
PROJECT APPROVAL		BK		DATE		12/23/13									
FINAL APPROVAL															
								COMPUTER GENERATED DRAWING							
								SCALE		NONE		SIZE DS			
								DWG. NO.		1001660					
								DRAWING		E		ECN NO. 278250		SHEET 2 OF 6	
								ASCO® ASCO POWER TECHNOLOGIES, L.P. FLORHAM PARK, NEW JERSEY 07932 U.S.A.							

D

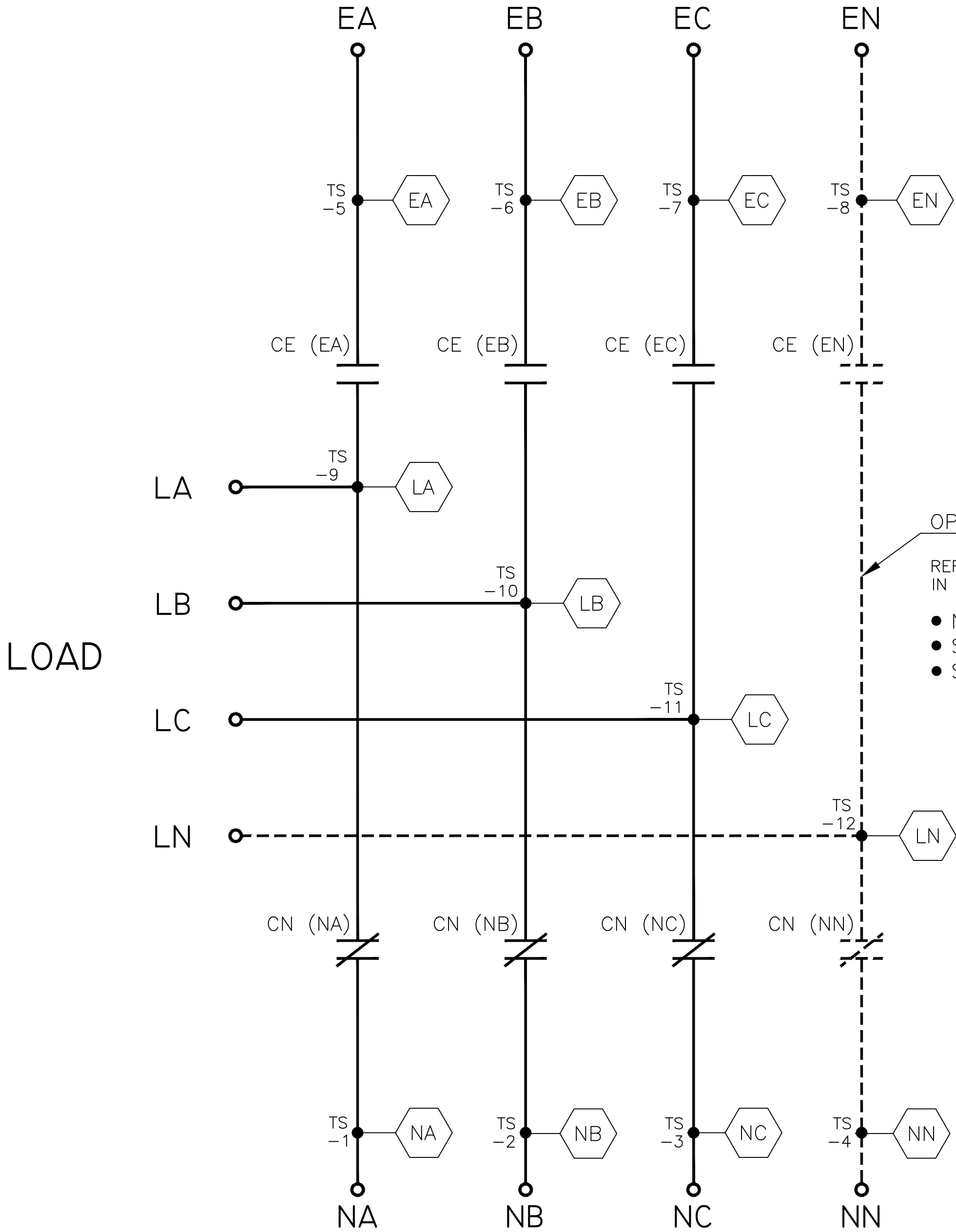
C

B

A

MAIN POWER POLES

EMERGENCY



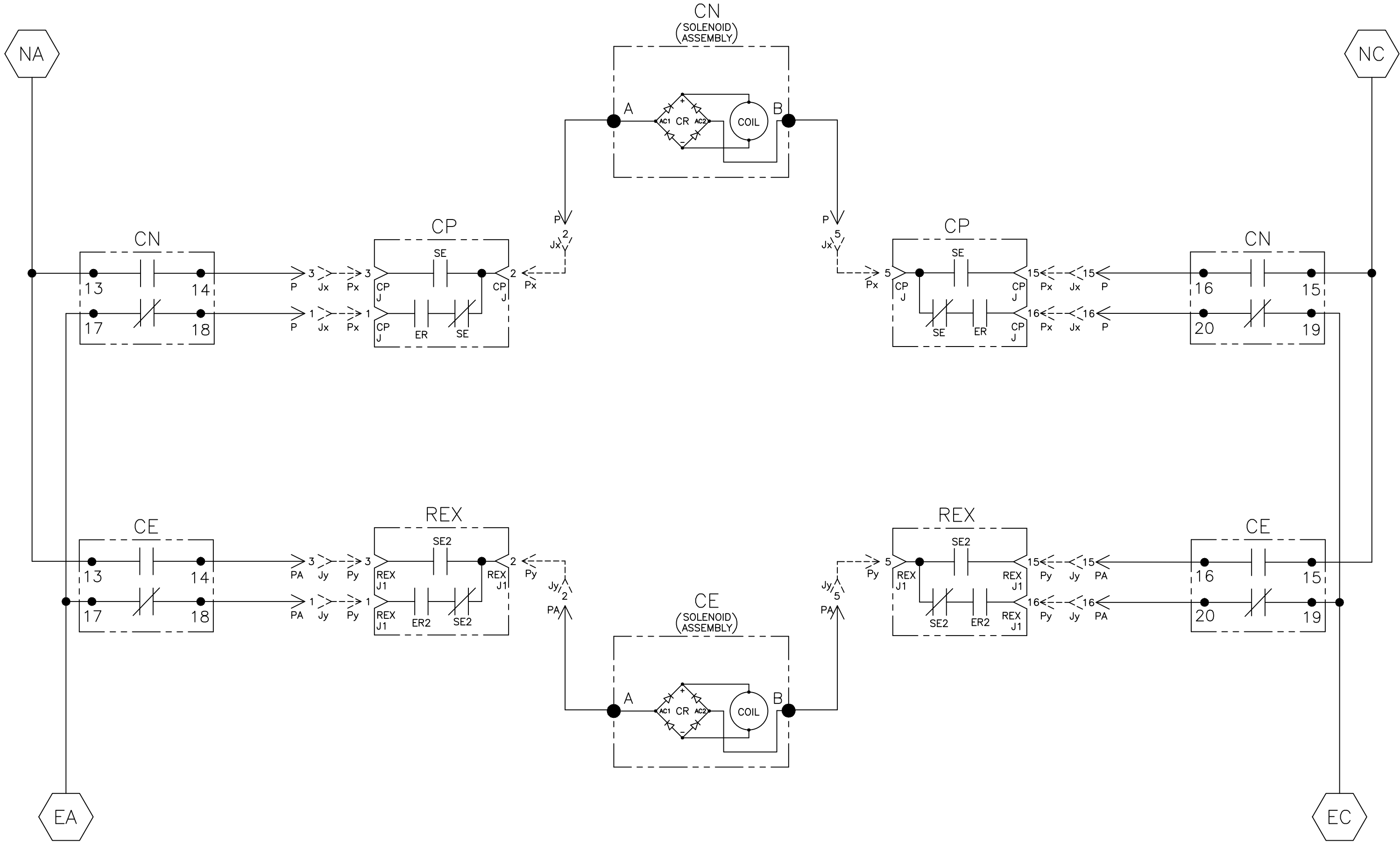
OPTIONAL NEUTRAL TYPES
REFER TO "EXPLANATION OF CATALOG NUMBER CODES"
IN CATALOG NUMBER CHART ON SHEET 1.

- NONE
- SOLID BUS PLATE
- SWITCHING

NOTE:
ATS SHOWN CLOSED ON
NORMAL SOURCE.

TS OPERATOR CIRCUIT

NORMAL



EMERGENCY

CN CONTROL CONTACTS		SOLENOID POSITION			
CN		CLOSED BEFORE NORMAL TDC >		BEFORE TDC <	
		>		<	
13-14					
15-16					
17-18					
19-20					

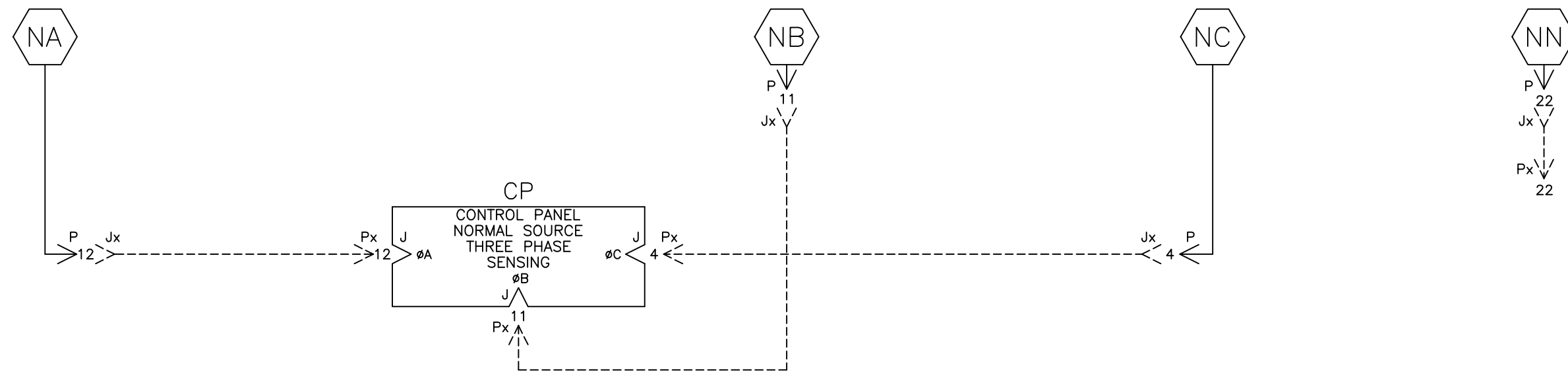
TDC (TOP DEAD CENTER)
TRANSFER SWITCH TEST & ADJUSTMENT PROCEDURE
SPECIFIES CONTROL CUT-OFF (CONTACT OPENING)
SETTING.

CE CONTROL CONTACTS		SOLENOID POSITION			
CE		OPEN BEFORE TDC >		BEFORE TDC <	
		>		<	
13-14					
15-16					
17-18					
19-20					

PROJECT NAME:		REV. TO SHEET	ECN NO.	BY	APP.	DATE
WIRING						
300 SERIES (H3ADTS/H3NDTS), 3PH 800-1200 AMPS						
"H" FRAME, GROUP G CONTROLS						
DRAWN BY	DJB	DATE	12/23/13	MANUFACTURING TOLERANCES TO BE IN ACCORDANCE WITH ASCO PROCEDURE MP-1-003. FOR PLASTIC PARTS SEE MP-1-005	ASSEM. REF. NO.	COMPUTER GENERATED DRAWING
CHECKED	BK	DATE	12/23/13	PROPERTY OF ASCO POWER TECHNOLOGIES, USE PERMITTED FOR OUR WORK ONLY. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.		SCALE NONE SIZE DS
PROJECT APPROVAL	BK	DATE	12/23/13	DRAWING E		DWG. NO. 1001660
FINAL APPROVAL		DATE		ASCOS		ECN NO. 278250 SHEET 3 OF 6

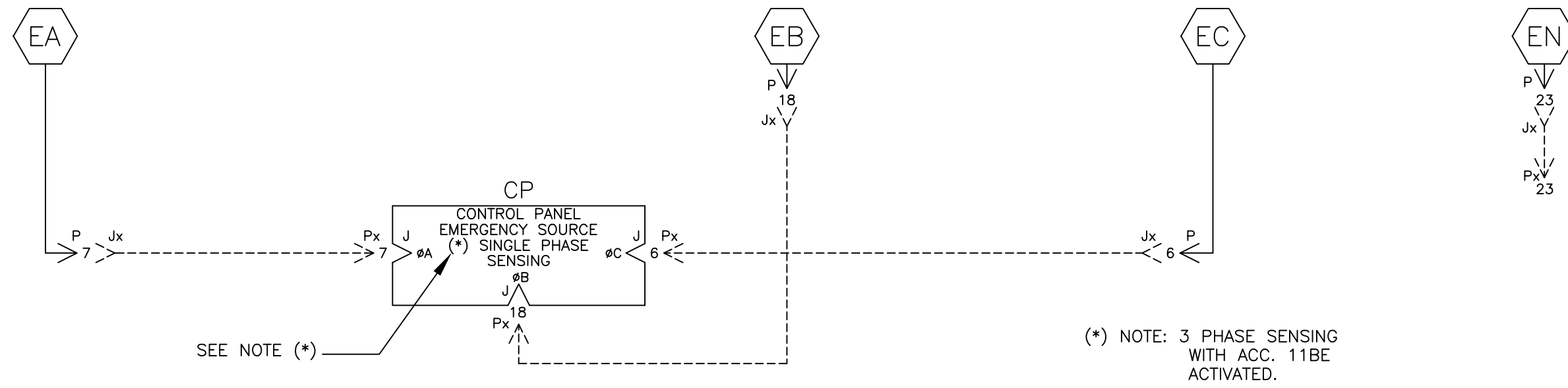
NORMAL SOURCE CIRCUITS

NORMAL



EMERGENCY SOURCE CIRCUITS

EMERGENCY



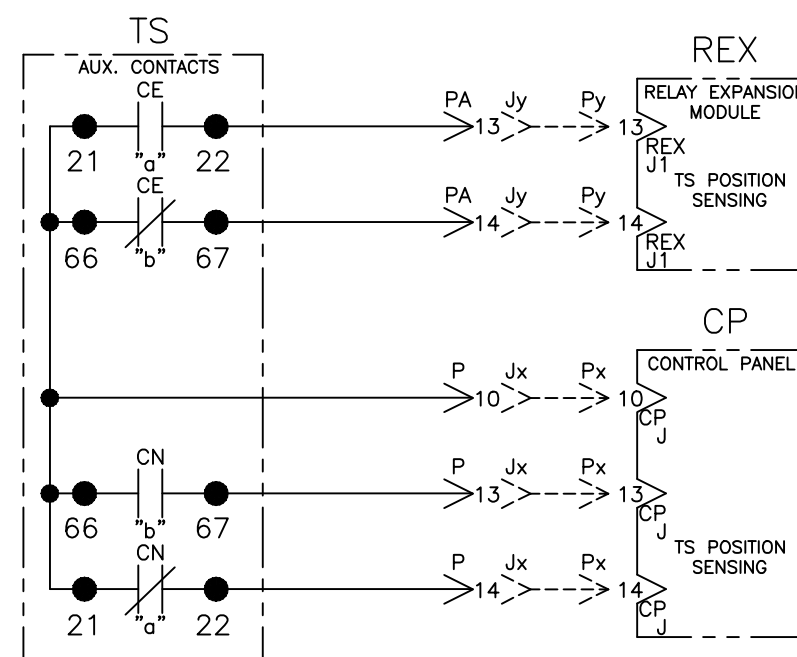
LOAD TERMINAL CIRCUITS

LOAD



CONTROL SIGNALS & INDICATION

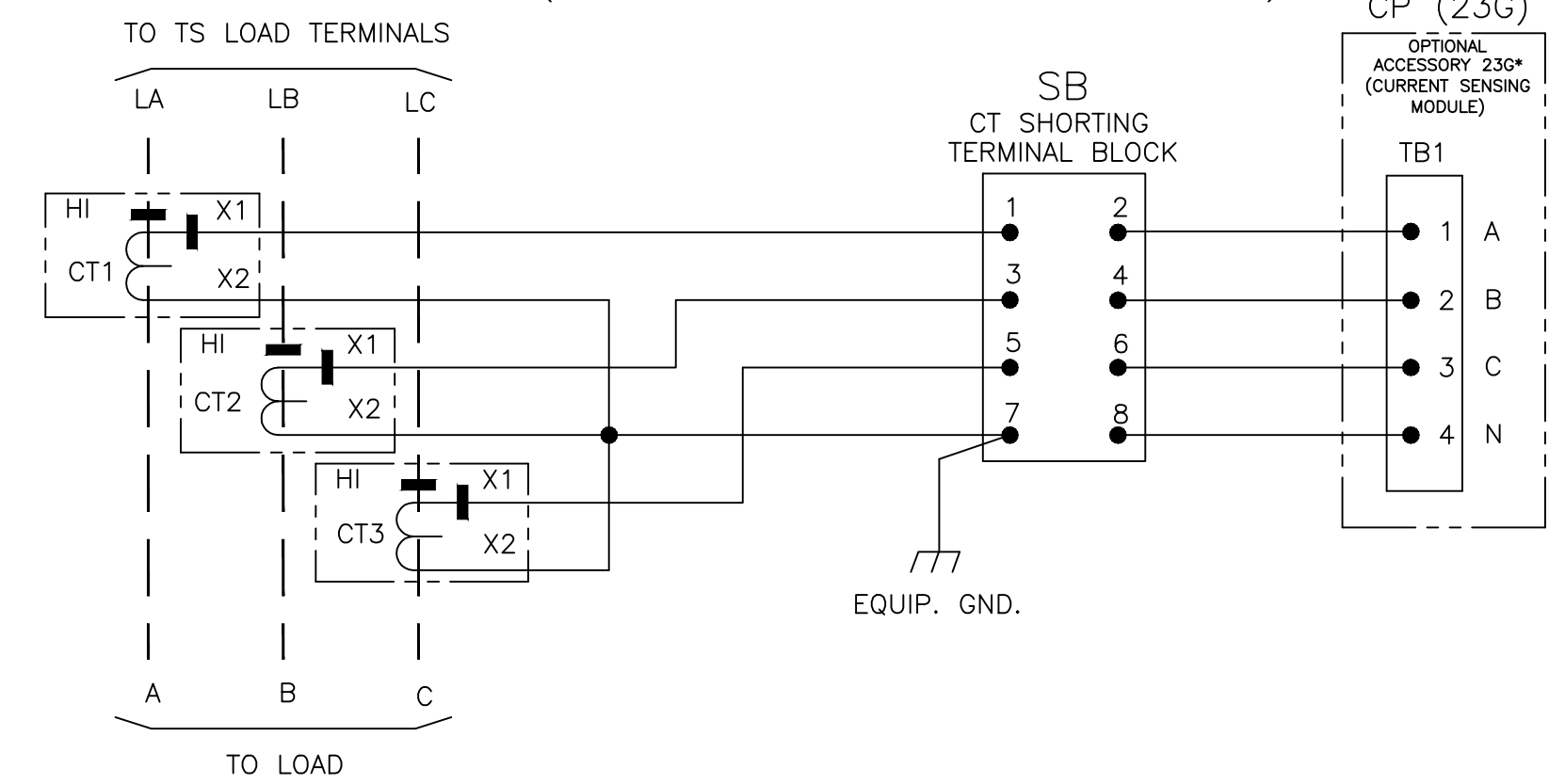
TS POSITION SENSING



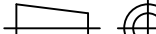
ADDITIONAL CIRCUITS

OPTIONAL ACCESSORY 23GB (LOAD CURRENT METERING)

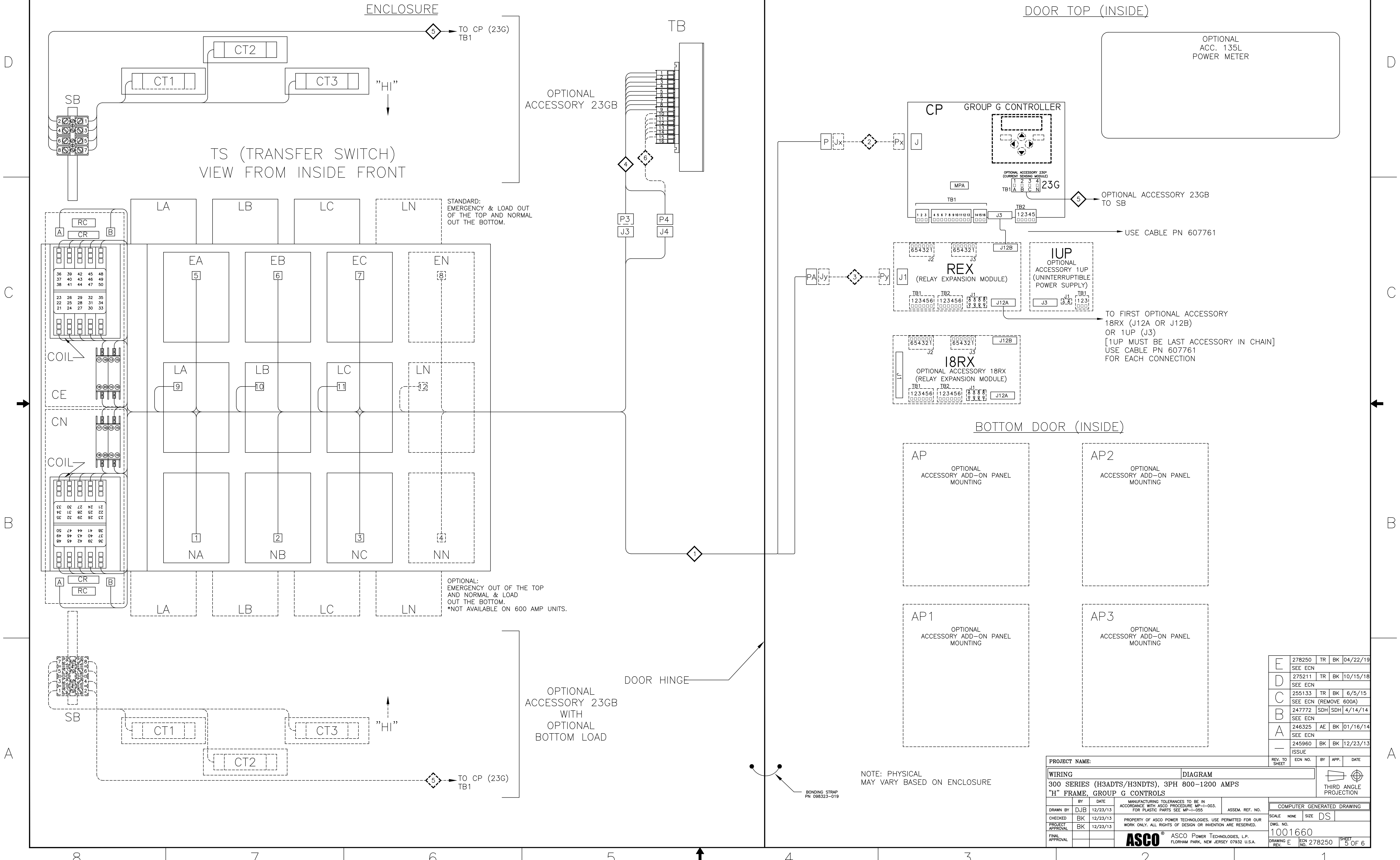
SWITCH RATING	CT RATIO
800A	800:5A
1000A	1000:5A
1200A	1200:5A



E	278250	TR	BK	04/22/19
	SEE ECN			
D	275211	TR	BK	10/15/18
	SEE ECN			
C	255133	TR	BK	6/5/15
	SEE ECN (REMOVE 600A)			
B	247772	SDH	SDH	4/14/14
	SEE ECN			
A	246325	AE	BK	01/16/14
	SEE ECN			
—	245960	BK	BK	12/23/13
	ISSUE			

PROJECT NAME:				REV. TO SHEET		ECN NO.		BY		APP.		DATE	
WIRING				DIAGRAM				 THIRD ANGLE PROJECTION					
300 SERIES (H3ADTS/H3NDTS), 3PH 800-1200 AMPS													
"H" FRAME, GROUP G CONTROLS													
BY		DATE		MANUFACTURING TOLERANCES TO BE IN ACCORDANCE WITH ASCO PROCEDURE MP-1-003.				ASSEM. REF. NO.		COMPUTER GENERATED DRAWING			
DJB		12/23/13		FOR PLASTIC PARTS SEE MP-1-055						SCALE		NONE	
CHECKED		BK		12/23/13		PROPERTY OF ASCO POWER TECHNOLOGIES, USE PERMITTED FOR OUR WORK ONLY. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.				SIZE		DS	
PROJECT APPROVAL		BK		12/23/13						1001660			
FINAL APPROVAL						 ASCO POWER TECHNOLOGIES, L.P. FLORHAM PARK, NEW JERSEY 07932 U.S.A.				DRAWING NO.		ECN 278250	
										SHEET		4 OF 6	

PHYSICAL DIAGRAM



E	278250	TR	BK	04/22/19
SEE ECN				
D	275211	TR	BK	10/15/18
SEE ECN				
C	255133	TR	BK	6/5/15
SEE ECN (REMOVE 600A)				
B	247772	SDH	SDH	4/14/14
SEE ECN				
A	246325	AE	BK	01/16/14
SEE ECN				
—	245960	BK	BK	12/23/13
ISSUE				

PROJECT NAME:		REV. TO SHEET	ECN NO.	BY	APP.	DATE
WIRING						
DIAGRAM						
300 SERIES (H3ADTS/H3NDTS), 3PH 800-1200 AMPS						
"H" FRAME, GROUP G CONTROLS						
DRAWN BY	DJB	DATE	12/23/13	MANUFACTURING TOLERANCES TO BE IN ACCORDANCE WITH ASCO PROCEDURE MP-1-003. FOR PLASTIC PARTS SEE MP-1-005	ASSEM. REF. NO.	COMPUTER GENERATED DRAWING
CHECKED	BK	DATE	12/23/13	PROPERTY OF ASCO POWER TECHNOLOGIES, L.P. USE PERMITTED FOR OUR WORK ONLY. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.	SCALE	NONE
PROJECT APPROVAL	BK	DATE	12/23/13		SIZE	DS
FINAL APPROVAL					DWG. NO.	1001660
					DRAWING E	ECN NO. 278250
					REV.	5 OF 6



ASCO POWER TECHNOLOGIES, L.P.
FLORHAM PARK, NEW JERSEY 07932 U.S.A.

DCBA

Limited Warranty



Series 150, 200, 300 and 4000 Series Power Transfer Switches

This Warranty is given ONLY to purchasers who buy for commercial or industrial use in the ordinary course of each purchaser's business.

General:

ASCO Power Technologies, LP products and systems are in our opinion the finest available. We take pride in our products and are pleased you have chosen them. Under certain circumstances we offer with our products the following Twenty Four Month Limited Warranty Against Defects in Material and Workmanship.

Please read your Warranty carefully. This Warranty sets forth our responsibilities in the unlikely event of defect and tells you how to obtain performance under this Warranty.

TWENTY FOUR MONTH LIMITED WARRANTY AGAINST DEFECTS IN MATERIAL AND WORKMANSHIP ASCO PRODUCTS COVERED:

Product Description	Series	Catalog Code
Automatic Transfer Switch	150, 200	1ATS, 2ATS
	300	3ATS, 3ADTS
	4000	4ATS, 4ADTS, 4ACTS
Non Automatic Transfer Switch (Electrically Operated)	300	3NTS, 3NDTS
	4000	4NTS, 4NDTS, 4NCTS
Manual Transfer Switch	300	3MTS
Service Entrance Transfer Switch (SEATS)	300	3AUS, 3ADUS, 3APS, 3ARS
Power Transfer Load Center (PTLC)	300	300L
Quick Contact Panels	300	3QC

LIMITED WARRANTY:

ASCO warrants that the ATS will be free from defects in material and workmanship and will conform to ASCO's standard specifications for the ATS for a period of twenty four (24) months from date of product shipment from ASCO (the "Warranty Period"). This Limited Warranty does not extend to subsequent owners of the structure during the Warranty Period.

Terms of Warranty:

The foregoing Limited Warranty is conditioned upon User's compliance with the following:

1. The ASCO Power Transfer Switch is installed in accordance with ASCO specifications and state and local codes and standards by an electrician licensed in the state of installation.

2. The ASCO Power Transfer Switch is maintained in accordance with ASCO instructions and used under normal conditions for the purposes intended by ASCO.

All warranty field-related repairs, replacements or adjustments must be made by ASCO Services Inc. or its duly authorized representative.

Optional Available Extended Warranty

Optional extended warranty coverage may be purchased from ASCO for a specified fee at the time of the original sale. If purchased, warranty period shall be extended up to an additional thirty - six (36) months beyond the standard twenty - four (24) months to provide up to five (5) year coverage applicable to the above referenced products, except for 3AUS, 3APS, and 3ARS products where the warranty period for the circuit breaker shall be limited to 24 months from date of shipment from ASCO. The length of optional extended coverage shall be reflected on the ASCO invoice and/or order acknowledgement document.

Warranty Extends to First Purchaser for Use, Non-transferable:

This Warranty is extended to the first person, firm, association or corporation for whom the ASCO product specified herein is originally installed for use (the "User") in the fifty United States or Canada. This Warranty is not transferable or assignable without the prior written permission of ASCO.

Assignment of Warranties:

ASCO assigns to User any warranties which are made by manufacturers and suppliers of components of, or accessories to, the ASCO product and which are assignable, but ASCO makes NO REPRESENTATIONS as to the effectiveness or extent of such warranties, assumes NO RESPONSIBILITY for any matters which may be warranted by such manufacturers or suppliers and extends no coverage under this Warranty to such components or accessories.

Drawings, Descriptions:

ASCO warrants for the period and on the terms of the Warranty set forth herein that the ASCO product will conform to the descriptions contained in the certified drawings, if any, applicable thereto, to ASCO's final invoices, and to applicable ASCO product brochures and manuals current as of the date of product shipment ("Descriptions"). ASCO does not control the use of any ASCO product. Accordingly, it is understood that the Descriptions are NOT WARRANTIES OF PERFORMANCE and NOT WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE.

Warranty Claims Procedure:

Within a reasonable time, but in no case to exceed thirty (30) days, after User's discovery of a defect, User shall contact **ascopowerwarranty@ascopower.com**. Subject to the limitations specified herein, an ASCO Services field service representative will repair the non-conforming ASCO product warranted hereunder, without charge for parts, labor, or travel expenses. Warranty coverage will apply only after ASCO's inspection discloses the claimed defect and shows no signs of treatment or use that would void the coverage of this Warranty . All defective products and component parts replaced under this warranty become the property of

ASCO.

Warranty Performance of Component Manufacturers:

It is ASCO's practice, consistent with its desire to remedy Warranty defects in the most prompt and effective manner possible, to cooperate with and utilize the services of component manufacturers and their authorized representatives in the performance of work to correct defects in the product components. Accordingly, ASCO may utilize third parties in the performance of Warranty work, including repair or replacement hereunder, where, in ASCO's opinion, such work can be performed in less time, with less expense, or in closer proximity to the ASCO product.

Items Not Covered By Warranty:

THIS WARRANTY DOES NOT COVER DAMAGE OR DEFECT CAUSED BY misuse, improper application, wrong or inadequate electrical current or connection, negligence, inappropriate on site operating conditions, repair by non-ASCO designated personnel, accident in transit, tampering, alterations, a change in location or operating use, exposure to the elements, water, or other corrosive liquids or gases, Acts of God, theft or installation contrary to ASCO's recommendations or specifications, or in any event if the ASCO serial number has been altered, defaced, or removed.

THIS WARRANTY DOES NOT COVER shipping costs, installation costs, external circuit breaker resetting or maintenance or service items and further, except as may be provided herein, does NOT include labor costs or transportation charges arising from the replacement of the ASCO product or any part thereof or charges to remove or reinstall same at any premises of User.

REPAIR OR REPLACEMENT OF A DEFECTIVE PRODUCT OR PART THEREOF DOES NOT EXTEND THE ORIGINAL WARRANTY PERIOD.

THE PRODUCTS LISTED IN THIS WARRANTY ARE NOT FOR USE IN THE CONTROL AREA OR ANY REACTOR CONNECTED OR SAFETY APPLICATIONS OR WITHIN THE CONTAINMENT AREA OF A NUCLEAR FACILITY OR FOR INTEGRATION INTO MEDICAL DEVICES.

Limitations:

THIS WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

USER'S SOLE AND EXCLUSIVE REMEDY IS REPAIR OR REPLACEMENT OF THE ASCO PRODUCT AS SET FORTH HEREIN.

IF USER'S REMEDY IS DEEMED TO FAIL OF ITS ESSENTIAL PURPOSE BY A COURT OF COMPETENT JURISDICTION, ASCO'S RESPONSIBILITY FOR PROPERTY LOSS OR DAMAGE SHALL NOT EXCEED THE NET PRODUCT PURCHASE PRICE.

IN NO EVENT SHALL ASCO ASSUME ANY LIABILITY FOR INDIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL OR EXEMPLARY DAMAGES OF ANY KIND WHATSOEVER, INCLUDING WITHOUT LIMITATION LOST PROFITS, BUSINESS INTERRUPTION OR LOSS OF DATA, WHETHER ANY CLAIM IS BASED UPON

THEORIES OF CONTRACT, NEGLIGENCE, STRICT LIABILITY, TORT, OR OTHERWISE.

Miscellaneous:

NO SALESPERSON, EMPLOYEE OR AGENT OF ASCO IS AUTHORIZED TO ADD TO OR VARY THE TERMS OF THIS WARRANTY. Warranty terms may be modified, if at all, only in writing signed by an ASCO officer.

ASCO obligations under this Warranty are conditioned upon ASCO timely receipt of full payment of the product purchase price and any other amounts due. ASCO reserves the right to supplement or change the terms of this Warranty in any subsequent warranty offering to User or others.

In the event that any provision of this Warranty should be or becomes invalid and/or unenforceable during the warranty period, the remaining terms and provisions shall continue in full force and effect.

This Warranty shall be governed by, and construed under, the laws of the State of New Jersey, without reference to the conflict of laws principles thereof.

This Warranty represents the entire agreement between ASCO and User with respect to the subject matter herein and supersedes all prior or contemporaneous oral or written communications, representations, understandings or agreements relating to this subject.



Flexible Power Transfer Solutions for Commercial & Industrial Applications

ASCO Power
Technologies™

ASCO SERIES 300
Power Transfer Switches



ascopower.com

Life Is On

Schneider
Electric

ASCO SERIES 300 Automatic Transfer Switches

Power outages impact small and large facilities alike. ASCO SERIES 300 Automatic Transfer Switches offer rugged design and reliable performance to small and mid-size commercial and industrial facilities in packaged solutions that are easy to select, procure, install, and operate.

Every SERIES 300 generator transfer switch is engineered with ASCO's reliability expertise in a package that makes backup power accessible for small and mid-size facilities. Leveraging knowledge derived from a century of critical power transfer experience, each SERIES 300 is backed by the same ASCO technical support and service that solves the most demanding critical power challenges facing facilities today.

Product Details

[Transfer Switch
Overview](#)



ASCO's SERIES 300 lineup offers flexible backup power solutions for businesses of every size.

SERIES 300 Automatic Transfer Switches

Designed to Fit Anywhere

The ASCO SERIES 300 product line provides the most compact design of generator power transfer switches in the industry.

Available to mount on walls or floors, all models through 2000 amperes are designed to be completely front-accessible. This permits installation flush against walls while allowing installation of cabling and connections from the front of the switch. Cable entrance plates are standard on 1600 and 2000 amperes units; these allow use of optional side-mounted pull boxes for additional cable bending space.

- 30 through 3000 amperes in compact designs
- Up to 600 VAC, single or three phase
- Listed to UL 1008 - Standard for Safety - Transfer Switch Equipment
- True double-throw operation: The single solenoid design is inherently interlocked to prevent simultaneous connections of two power sources.
- Will not transfer to a dead source - single solenoid operator derives power from the destination source
- Easy-to-navigate 128x64 graphical LCD display with keypad provides LED indicators for switch position, source availability, not-in-auto mode, and alert conditions.
- Integrated, multilingual, user interface for configuration and monitoring
- Available Delayed Transition operation
- Non-automatic operation can be selected without opening enclosure door
- Optional Relay Expansion Module with extra relays for accessory outputs
- Soft keys for test function and time delay bypass
- Emergency source failure alert indication
- Optional Historical Event Log
- Displays statistical ATS monitoring information
- Built-in diagnostic functions
- Password protection to prevent unauthorized actions
- Adjustable delay feature prevents nuisance transfer due to momentary utility power outages and generator dips
- Auxiliary contacts signal position of main contacts - two for normal and two for emergency position
- Standard solid neutral terminals
- Restriction of Hazardous Substances (RoHS) compliant controller
- Standard 2 year warranty. Optional 1, 2, and 3 year extensions

Power Knowledge

[Basic Automatic
Transfer Switch
Functions](#)



SERIES 300 Automatic Switching Solutions

Automatic and Non-Automatic Transfer Switching

ASCO Transfer Switches are available in both automatic and non-automatic types. Both are electrically operated. For automatic transfer switches, the controller initiates transfer between power sources. For non-automatic transfer switches, a user initiates transfer using local or remote controls.

SERIES 300 non-automatic transfer switches offer the following features:

- Models range from 30 through 3000 amperes, up to 600V
- Source acceptability lights inform operator when sources are available to accept load
- Controller prevents inadvertent operation under low voltage conditions
- Standard in-phase monitor for transferring motor loads between live sources

Power Knowledge

[Non-Automatic and Manual Transfer Switches for Backup Power Applications](#)

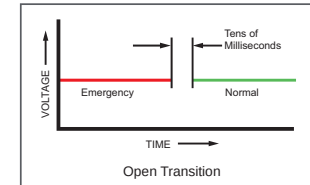


400 Amp, Type 1 Enclosure

Open Transition Transfer Switching

ASCO Transfer Switches are available with a standard, 2-position, open transition models that reliably transfer loads in less than 100 milliseconds. Open transition switches are suitable for a wide range of applications.

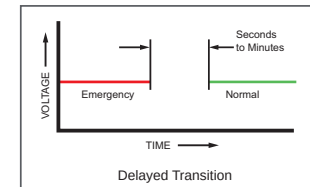
- 30 to 3000 amps
- Single-operator switching mechanism prevents simultaneous connection of both sources
- Available In-Phase Monitor can be activated for transferring motor loads



Delayed Transition Transfer Switching

ASCO Delayed Transition Transfer Switches transfer loads between power sources using a timed load disconnect position with an adjustable delay.

- 150 through 3000 amps
- Reliable, field-proven, dual-solenoid operating mechanism
- Mechanical interlocks to prevent simultaneous connection of both power sources
- Adjustable delay for load disconnect - 0 to 5 minutes
- Non-automatic models available in manual operation configuration
- Automatic models available with load shed feature



Power Knowledge

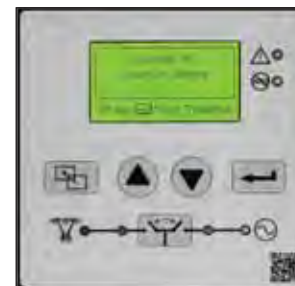
[Transition Mode Basics](#)

[Transferring Motor Loads between Power Sources](#)

[Transferring Loads with Zero Power Interruption](#)

SERIES 300 Group G Controller

The SERIES 300 Group G Controller is reliable and field-proven. It provides all of the voltage, frequency, control, timing, and diagnostic functions required for most emergency and standby power applications.



- Touch pad programming
- Displays active timers
- On-board diagnostics
- Password protection
- Voltage and frequency sensing
- Status and control functions

Product Details

[Group G Controller](#)

EQUIPMENT STORAGE REQUIREMENTS

Equipment provided by Schneider-Electric and/or ASCO Power Technologies that is stored for a short-term duration (i.e., days to weeks) or long-term duration (i.e., months to years), must be kept in a cool, dry, temperature-controlled environment. Storage of equipment in open warehouses, locations without proper temperature and humidity control, and/or outdoor storage is not acceptable without the utilization of heating elements, thermostats, humidistats, and protection from weather and dirt. Failure to comply may result in moisture ingress and/or condensation to form resulting in rusting and or corrosion, component and/or equipment failure and replacement, and/or nullification of any manufacturer warranty.

For **General Instructions for Proper Handling, Installation, Operation, and Maintenance of Deadfront Distribution Switchboards Rated 600 Volts or Less**, refer to [ANSI NEMA PB 2.1-2013](#)

Copies of the following documents should be included on the submittals, depending on the units that are on the proposal:

For ASCO Power Technology's **Switchgear and Switchboards**, refer to Instruction Bulletin **381333-393**.

For Schneider-Electric/Square D's **Power Zone 4 (PZ4) Switchgear**, refer to Instruction Bulletin **80298-002-09**.

For Schneider-Electric/Square D's **Power Zone 4 (PZ4) NEMA 3R Walk-In Switchgear**, refer to Instruction Bulletin **80298-156-02**.

For Schneider-Electric/Square D's **Quality, Efficient, Delivery" (QED2) Switchboard**, refer to Instruction Bulletin **80043-055-14**.

For Schneider-Electric/Square D's **Masterclad Metal-Clad Indoor Switchgear**, refer to Instruction Bulletin **6055-30**.



SYSTEM SERVICE CONTRACT

The following is a copy of Pantropic Power, Inc. standard equipment maintenance contract. It is included in this **Shop Drawing Submittal** as a courtesy to advise the equipment end user/owner of its availability.

We suggest that this information be made available to the owner or his appointed representative so that they may contact or request a meeting with one of our Parts, Service, Sales, Representative to obtain additional information and discuss initial or renewal costs as well as any other particular requirements or recommendations for this specific application.

Please contact Pantropic Power, Inc. at telephone number (305) 592-4944 in Miami, FL and ask for the Parts, Service, Sales, Representative for further details and assistance regarding equipment service information.



PREVENTIVE MAINTENANCE SERVICE AGREEMENT TERMS AND CONDITIONS

TERMS AND CONDITIONS:

Customers that have not established an open account, must pay the full amount of the PM Service Agreement before any services are rendered by Pantropic Power.

The customer agrees to permit Pantropic Power to perform the P.M. Service at the service address from 7:30 A.M. to 4:00 P.M. Monday through Friday. The customer agrees to provide one employee qualified to start-up and run the unit when necessary. It is specifically agreed to that Pantropic Power employees are not allowed to start-up and run customer's unit(s) due to insurance regulations.

The customer agrees to make the P.M. Service Agreement unit immediately available for servicing upon arrival of Pantropic Power, also to permit reasonable accessibility, and close by parking at no cost to Pantropic Power. The customer also agrees to pay all cost(s) incurred by Pantropic Power for not providing reasonable accessibility and adequate parking close to the unit being serviced.

The customer specifically releases Pantropic Power from any liability or consequential damages, losses or expenses, directly or indirectly in connection with any workmanship or materials furnished by someone other than Pantropic Power, or failure of the unit to start due to accident, disaster, water damage, wind, lightning, vandalism, burglary, neglect, misuse, customer maintenance, abuse control(s), or repair(s) made to the unit by someone other than Pantropic Power.

This Agreement shall be deemed breached and canceled if the customer has someone other than Pantropic Power service the unit unless the customer receives prior written consent by Pantropic Power for that service to be performed. Upon cancellation, as stated in this paragraph, the customer agrees to allow Pantropic Power to cancel this P.M. Service Agreement as of the date of the unauthorized service and further agrees that all money paid by the customer for the Agreement is deemed "non-refundable" so that Pantropic Power will be entitled to retain all funds paid.

Subject to the terms and conditions set forth herein this P.M. Service Agreement shall become effective once the customer receives written notification of acceptance from Pantropic Power, and will continue for the full term of the Agreement unless canceled by either party after 30 days written notification is given. If this Agreement is canceled due to paragraph 6 of these terms and conditions, the language contained in paragraph 6 will apply; otherwise, Pantropic Power will reimburse the customer the balance of any money paid by the customer for service still not rendered, minus a 25% administrative handling charge (25% of the P.M. Service Agreement price).

All invoices will include Florida State sales tax, unless exempt in Florida.

The customer agrees to pay reasonable attorney's fees and all other costs and expenses which may be incurred by Pantropic Power in the enforcement of this Agreement.

The customer agrees to excuse, and not charge Pantropic Power for delays in performing the P.M. Service Agreement due to acts of nature, fire, labor controversies, delays in the procurement of parts or supplies, or any other causes beyond Pantropic's control.

The customer agrees to pay for all repairs not included in the P.M. Service Agreement at the selling dates and prices established by Pantropic, including all charges for labor performed.

If any of the provisions hereof are unenforceable in whole or in part under the laws of the State of Florida. Where the same is sought to be enforced, or as applied to any persons or circumstances, the remainder of this Agreement and the application of such provision or part thereof to other persons or circumstances shall not be affected hereby.



All covenants and Agreements contained herein shall survive the execution of this Agreement.

No waiver of any provision of this Agreement shall be valid unless in writing and signed by the person against whom it is sought to be enforced. The failure of any party at any time to insist upon strict performance of any condition, promise, Agreement or understanding set forth in the Agreement, shall not be construed as a waiver of relinquishment of the right to insist upon strict performance of the same condition, promise, agreement, or understanding in a future times.

This Agreement shall be governed and construed in accordance with the laws of the State of Florida.

The Circuit Court of the 11th Judicial Circuit and for Dade County, Florida shall have exclusive jurisdiction to enforce and/or to construe this Agreement. The prevailing party shall be awarded all reasonable attorneys' fees and/or costs if such an action is necessary.

Customer's Signature

Title

Date



PREVENTIVE MAINTENANCE SERVICE AGREEMENT

Pantropic Power, Inc. agrees to provide this SERVICE AGREEMENT for 12 months at the cost outlined below on;

ENGINE MODEL _____ SERIAL _____

<u>TYPE OF SERVICE REQUESTED</u>	<u>YEARLY INTERVAL</u>	<u>SERVICE COST</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

Total contract cost _____

P.O. Number _____

The undersigned acknowledges that he/she has authorized this service agreement on the above equipment, and affirms that he/she has received a copy of the terms and conditions of this agreement, and understands the liabilities; limitations, terms, and conditions, and further affirms that he/she has the authority to sign this document for the owner of the equipment identified above in this agreement

Company or Firm Name

Mailing Address

Servicing Address

Telephone Number

Account Number

Date

Owner or Owner's Agent Signature

Authorized Signature



**INSPECTION
AND
PREVENTIVE MAINTENANCE CHECKLIST**
PAGE 1 OF 2

Agreement No	Customer Name and Address		
Generator Set Location	Contact	Telephone No:	
Engine Model	Serial No	Service Meter	Date
Generator Model	Serial No	Volts	Service Level

SERVICE ITEM	SATISFACTORY	UNSATISFACTORY	COMMENTS
COOLING SYSTEM			
RADIATOR/HEATEXCHANGER			
COOLANT			
HOSES AND CONNECTIONS			
FAN DRIVE PULLEY AND FAN			
FAN BELTS			
JACKET WATER HEATER			
WATER PUMP			
THERMOSTATS			
FUEL SYSTEM			
FUEL TANK			
WATER TRAP/SEPARATOR			
FUEL LINES & CONNECTIONS			
GOVERNOR & CONTROLS			
FUEL FILTERS – PRIM./SEC.			
FUEL PRESURE			
AIR INDUCTION AND EXAHUST SYSTEM			
AIR FILTER			
AIR FILTE SERVICE INDICATOR			
AIR INLET SYSTEM			
TURBOCHARGER			
EXHAUST MANIFOLD			RECOMMENDED LOAD BANK
EXHAUST SYSTEM			YES NO
VALVES & VALVE ROTATORS			
LUBE OIL SYSTEM			
OIL			
OIL FILTERS			
OIL PRESSURE			
CRANK CASE BREATHER			
S.O.S.			
STARTING SYSTEM			
BATTERIES			
BATTERIES– SPECIFIC GRAVITY			
BATTERY CHARGER			
STARTING MOTOR			
ALTERNATOR			
ENGINE MONITORS AND SAFETY CONTROLS			
GAUGES			
SAFETY CONTROLS			
REMOTE ANNUNCIATORS/ALARMS			
GENERATOR			
BEARINGS			
SLIP RINGS &BRUSHES			

[illegible]

**PANTROPIC
POWER**



Pantropic Power, Inc.
ONE SOURCE – ONE CALL – ONE SOLUTION™

www.pantropic.com

Pantropic Power Parts & Service Facilities

Miami Facility
8205 NW 58th Street
Miami, Florida 33166
Tel: 305-592-4944
Fax – Main: 305-477-1943
Fax – Parts: 305-477-4643
Fax – Service: 305-593-1135

Fort Lauderdale Facility
1881 W State Road 84, Ste 103
Fort Lauderdale, Florida 33315
Tel: 954-797-7972
Fax – Main: 305-791-7719

West Palm Beach Facility
Tel: 772-692-3442
West Palm Beach, Florida 33417
Tel: 561-640-0818
Fax – Main: 561-640-7894

Miami
8205 NW 58 Street
Miami, FL 33166
305.592.4944 tel
305.477.1943 fax

Fort Lauderdale
1881 State Road 84, #103
Ft. Lauderdale, FL 33315
954.797.7972 tel
954.791.7719 fax

West Palm Beach
5460 Okeechobee Boulevard
West Palm Beach, FL 33417
561.640.0818 tel
561.640.7894 fax



Pantropic Power, Inc.

8205 NW 58TH Street
Miami, FL 33166-3406
305.592.4944 tel
305.477.1943 fax

Project: _____

Date: _____

In order to help facilitate successful generator set equipment commissioning, Pantropic Power, Inc. requires the following items (as applicable) be completed prior to the actual dispatching of our technical personnel to the referenced Project job-site for the purpose of start-up, testing, and commissioning of the generator set equipment.

NOTE: Please mark the status of completion of the following items as noted below and fax return to Pantropic Power, Inc at Main Fax 305-477-1943, Attention _____ in order for Pantropic to confirm the generator set equipment Start up schedule.

For item completion mark "X"
For non completion mark "No"
If not applicable mark "N/A"

Completion Status	Brief Description (For Each Generator) Reference the below item numbers with any applicable comments or explanations at the back of this form.
-------------------	---

1. _____ Generator set in place (installed).

2. _____ Exhaust system installed.

- A) _____ Exhaust silencer.
- B) _____ Exhaust flexible connector.
- C) _____ All exhaust system pipework & supports.
- D) _____ Exhaust system insulation.
- E) _____ No exhaust air flow restrictions / obstructions.
- F) _____ No exhaust air flow recirculation into generator room

3 _____ Room intake and exhaust louvers installed.

- A) _____ No operational air flow obstructions for louvers.
- B) _____ No operational air re-circulation through louvers.

4. _____ Radiator installed.

- A) _____ No radiator air flow intake and discharge restrictions

5. _____ Fuel system installed

- A) _____ Fuel is available on site and is adequate quantity for generator set start-up and all testing.
- B) _____ Alarm wiring connected to appropriate panel.

6. _____ All electrical and mechanical connections to the generator set are flexible.

Miami
8205 NW 58 Street
Miami, FL 33166
305.592.4944 tel
305.477.1943 fax

Fort Lauderdale
1881 State Road 84, #103
Ft. Lauderdale, FL 33315
954.797.7972 tel
954.791.7719 fax

West Palm Beach
5460 Okeechobee Boulevard
West Palm Beach, FL 33417
561.640.0818 tel
561.640.7894 fax

Project: _____

Date: _____

7. _____ Battery charger installed.
- A) _____ Electric service connected. (Do not energize battery charger until batteries are filled with acid at the time of start up to avoid electrical damage.
 - B) _____ Charging wires installed.
 - C) _____ Alarms wires interconnected to appropriated location / panel.
8. _____ Remote annunciator panel (s) installed.
9. _____ Remote emergency break glass station (s) installed
10. _____ All interconnection cabling and wiring completed (AC and DC as applicable)
- A) _____ Generator AC power cables.
 - B) _____ Circuit breaker.
 - C) _____ Transfer switch equipment. (All ATS) *
 - 1) _____ Generator power cables.
 - 2) _____ Utility power cables.
 - 3) _____ Load power cables.
 - 4) _____ Control wiring (Engine start)
 - 5) _____ Alarms (Auxiliary contacts) - D) _____ Distribution equipment.
 - E) _____ Proper phase rotations checked.
 - F) _____ Generator set jacket water heater. (AC power)
 - G) _____ Generator set space heater. (AC power)
 - H) _____ Remote annunciator panel (s)
 - I) _____ Room intake and exhaust fans.
 - J) _____ Remote emergency stop switch (s).
 - K) _____ Electric louvers.
 - L) _____ Remote annunciation signals
11. _____ Generator equipment training / instruction class specified in Contract Documents to be performed at later time. Pantropic to be notified in writing of scheduling.
12. _____ Pantropic's equipment start-up and testing forms shall be signed by a representative of your company when Pantropic's technician completes the commissioning of generator set package.
13. _____ Generator set equipment training/instruction to be provided on day of start up.

Note:

- * Contractor to supply proper fittings upon supplying / connecting cables to ATS. If proper fittings are not supplied, moisture can permeate ATS and cause electrical board to go bad.
- * Replacement and/or repair of ATS as a result of the aforementioned is the responsibility of contractor/customer.

Effective with sales to the first user on or after August 1, 2016

CATERPILLAR LIMITED WARRANTY

Industrial, Petroleum, Locomotive, and Agriculture Engine Products and Electric Power Generation Products

Worldwide

Caterpillar Inc. or any of its subsidiaries ("Caterpillar") warrants new and remanufactured engines and new and rebuild electric power generation products sold by it (including any products of other manufacturers packaged and sold by Caterpillar), to be free from defects in material and workmanship.

This warranty does not apply engines sold for use in on-highway vehicle or marine applications; engines in machines manufactured by or for Caterpillar; C175, 3500 and 3600 series engines used in locomotive applications; 3000 Family engines, C0.5 through C4.4 and ACERT™ (C6.6, C7, C7.1, C9, C9.3, C11, C13, C15, C18, C27, and C32) engines used in industrial, mobile agriculture and locomotive applications; or Cat[®] batteries; or Electric Power Generation Products manufactured or assembled in India. These products are covered by other Caterpillar warranties.

This warranty is subject to the following:

Warranty Period

- For industrial engines, engines in a petroleum applications or Petroleum Power Systems (excluding petroleum fire pump application), or engines in a Locomotive application, or Uninterruptible Power Supply (UPS) systems, the warranty period is 12 months after date of delivery to the first user.
- For engines used in petroleum fire pump and mobile agriculture applications the warranty period is 24 months after date of delivery to the first user.
- For controls only (EPIC), configurable and custom switchgear products, and automatic transfer switch products, the warranty period is 24 months after date of delivery to the first user.
- For new CG132, CG170 and CG260 series power generation products the warranty period is 24 months/16,000 hours, whichever comes first, after date of delivery to first user.
- For electric power generation products other than CG132, CG170 and CG260 series in prime or continuous applications the warranty period is 12 months. For standby applications the warranty period is 24 months/1000 hours. For emergency standby applications the warranty period is 24 months/400 hours. All terms begin after date of delivery to the first user.
- For Caterpillar rebuild electric power generation products the warranty period is 12 months, but not to exceed 24 months from shipment of rebuilt electric power generation product from Caterpillar.
- For all other applications the warranty period is 12 months after date of delivery to the first user.

Caterpillar Responsibilities

If a defect in material or workmanship is found during the warranty period, Caterpillar will, during normal working hours and at a place of business of a Cat dealer or other source approved by Caterpillar:

- Provide (at Caterpillar's choice) new, Remanufactured, or Caterpillar approved repaired parts or assembled components needed to correct the defect.
- Note:** New, remanufactured, or Caterpillar approved repaired parts or assembled components provided under the terms of this warranty are warranted for the remainder of the warranty period applicable to the product in which installed as if such parts were original components of that product. Items replaced under this warranty become the property of Caterpillar.
- Replace lubricating oil, filters, coolant, and other service items made unusable by the defect.
- Provide reasonable and customary labor needed to correct the defect, including labor to disconnect the product from and reconnect the product to its attached equipment, mounting, and support systems, if required.

For new 3114, 3116, and 3126 engines and, new and Caterpillar rebuild electric power generation products (which includes the following: any new products of other manufacturers packaged and sold by Caterpillar)

- Provide travel labor, up to four hours round trip, if in the opinion of Caterpillar, the product cannot reasonably be transported to a place of business of a Cat dealer or other source approved by Caterpillar (travel labor in excess of four hours round trip, and any meals, mileage, lodging, etc. is the user's responsibility).

For all other products:

- Provide reasonable travel expenses for authorized mechanics, including meals, mileage, and lodging, when Caterpillar chooses to make the repair on-site.

User Responsibilities

The user is responsible for:

- Providing proof of the delivery date to the first user.
- Labor costs, except as stated under "Caterpillar Responsibilities," including costs beyond those required to disconnect the product from and reconnect the product to its attached equipment, mounting, and support systems.

- Travel or transporting costs, except as stated under "Caterpillar Responsibilities."
- Premium or overtime labor costs.
- Parts shipping charges in excess of those that are usual and customary.
- Local taxes, if applicable.
- Costs to investigate complaints, unless the problem is caused by a defect in Caterpillar material or workmanship.
- Giving timely notice of a warrantable failure and promptly making the product available for repair.
- Performance of the required maintenance (including use of proper fuel, oil, lubricants, and coolant) and items replaced due to normal wear and tear.
- Allowing Caterpillar access to all electronically stored data.

Limitations

Caterpillar is not responsible for:

- Failures resulting from any use or installation that Caterpillar judges improper.
- Failures resulting from attachments, accessory items, and parts not sold or approved by Caterpillar.
- Failures resulting from abuse, neglect, and/or improper repair.
- Failures resulting from user's delay in making the product available after being notified of a potential product problem.
- Failures resulting from unauthorized repairs or adjustments, and unauthorized fuel setting changes.
- Damage to parts, fixtures, housings, attachments, and accessory items that are not part of the engine, Cat Selective Catalytic Reduction System or electric power generation product (including any products of other manufacturers packaged and sold by Caterpillar).
- Repair of components sold by Caterpillar that is warranted directly to the user by their respective manufacturer. Depending on type of application, certain exclusions may apply. Consult your Cat dealer for more information.

(Continued on reverse side...)

This warranty covers every major component of the products. Claims under this warranty should be submitted to a place of business of a Cat dealer or other source approved by Caterpillar. For further information concerning either the location to submit claims or Caterpillar as the issuer of this warranty, write Caterpillar Inc., 100 N. E. Adams St., Peoria, IL USA 61629.

Caterpillar's obligations under this Limited Warranty are subject to, and shall not apply in contravention of, the laws, rules, regulations, directives, ordinances, orders, or statutes of the United States, or of any other applicable jurisdiction, without recourse or liability with respect to Caterpillar.

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CATERPILLAR IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

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IF OTHERWISE APPLICABLE, THE VIENNA CONVENTION ON CONTRACTS FOR THE INTERNATIONAL SALE OF GOODS IS EXCLUDED IN ITS ENTIRETY.

For personal or family use engines or electric power generation products, operating in the USA, its territories and possessions, some states do not allow limitations on how long an implied warranty may last nor allow the exclusion or limitation of incidental or consequential damages. Therefore, the previously expressed exclusion may not apply to you. This warranty gives you specific legal rights and you may also have other rights, which vary by jurisdiction. To find the location of the nearest Cat dealer or other authorized repair facility, call (800) 447-4986. If you have questions concerning this warranty or its applications, call or write:

In USA and Canada: Caterpillar Inc., Engine Division, P. O. Box 610, Mossville, IL 61552-0610, Attention: Customer Service Manager, Telephone (800) 447-4986. Outside the USA and Canada: Contact your Cat dealer.

B) For products operating in Australia, Fiji, Nauru, New Caledonia, New Zealand, Papua New Guinea, the Solomon Islands and Tahiti, the following is applicable:

THIS WARRANTY IS IN ADDITION TO WARRANTIES AND CONDITIONS IMPLIED BY STATUTE AND OTHER STATUTORY RIGHTS AND OBLIGATIONS THAT BY ANY APPLICABLE LAW CANNOT BE EXCLUDED, RESTRICTED OR MODIFIED ("MANDATORY RIGHTS"). ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED (BY STATUTE OR OTHERWISE), ARE EXCLUDED. WITHOUT LIMITING THE FOREGOING PROVISIONS OF THIS PARAGRAPH, WHERE A PRODUCT IS SUPPLIED FOR BUSINESS PURPOSES, THE CONSUMER GUARANTEES UNDER THE CONSUMER GUARANTEES ACT 1993 (NZ) WILL NOT APPLY.

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IF THE MANDATORY RIGHTS MAKE CATERPILLAR LIABLE IN CONNECTION WITH SERVICES OR GOODS, THEN TO THE EXTENT PERMITTED UNDER THE MANDATORY RIGHTS, THAT LIABILITY SHALL BE LIMITED AT CATERPILLAR'S OPTION TO (a) IN THE CASE OF SERVICES, THE SUPPLY OF THE SERVICES AGAIN OR THE PAYMENT OF THE COST OF HAVING THE SERVICES SUPPLIED AGAIN AND (b) IN THE CASE OF GOODS, THE REPAIR OR REPLACEMENT OF THE GOODS, THE SUPPLY OF EQUIVALENT GOODS, THE PAYMENT OF THE COST OF SUCH REPAIR OR REPLACEMENT OR THE ACQUISITION OF EQUIVALENT GOODS.

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CATERPILLAR IS NOT LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES UNLESS IMPOSED UNDER MANDATORY RIGHTS.

IF OTHERWISE APPLICABLE, THE VIENNA CONVENTION ON CONTRACTS FOR THE INTERNATIONAL SALE OF GOODS IS EXCLUDED IN ITS ENTIRETY.

C) For products supplied in Australia:

IF THE PRODUCTS TO WHICH THIS WARRANTY APPLIES ARE:

I. PRODUCTS OF A KIND ORDINARILY ACQUIRED FOR PERSONAL, DOMESTIC OR HOUSEHOLD USE OR CONSUMPTION; OR

II. PRODUCTS THAT COST AUD 40,000 OR LESS,

WHERE THOSE PRODUCTS WERE NOT ACQUIRED FOR THE PURPOSE OF RE-SUPPLY OR FOR THE PURPOSE OF USING THEM UP OR TRANSFORMING THEM IN THE COURSE OF PRODUCTION OR MANUFACTURE OR IN THE COURSE OF REPAIRING OTHER GOODS OR FIXTURES, THEN THIS SECTION C APPLIES.

THE FOLLOWING MANDATORY TEXT IS INCLUDED PURSUANT TO THE AUSTRALIAN CONSUMER LAW AND INCLUDES REFERENCES TO RIGHTS THE USER MAY HAVE AGAINST THE DIRECT SUPPLIER OF THE PRODUCTS: OUR GOODS COME WITH GUARANTEES THAT CANNOT BE EXCLUDED UNDER THE AUSTRALIAN CONSUMER LAW. YOU ARE ENTITLED TO A REPLACEMENT OR REFUND FOR A MAJOR FAILURE AND COMPENSATION FOR ANY OTHER REASONABLY FORESEEABLE LOSS OR DAMAGE. YOU ARE ALSO ENTITLED TO HAVE THE GOODS REPAIRED OR REPLACED IF THE GOODS FAIL TO BE OF ACCEPTABLE QUALITY AND THE FAILURE DOES NOT AMOUNT TO A MAJOR FAILURE. THE INCLUSION OF THIS TEXT DOES NOT CONSTITUTE ANY REPRESENTATION OR ACCEPTANCE BY CATERPILLAR OF LIABILITY TO THE USER OR ANY OTHER PERSON IN ADDITION TO THAT WHICH CATERPILLAR MAY HAVE UNDER THE AUSTRALIAN CONSUMER LAW.

TO THE EXTENT THE PRODUCTS FALL WITHIN THIS SECTION C BUT ARE NOT OF A KIND ORDINARILY ACQUIRED FOR PERSONAL, DOMESTIC OR HOUSEHOLD USE OR CONSUMPTION, CATERPILLAR LIMITS ITS LIABILITY TO THE EXTENT IT IS PERMITTED TO DO SO UNDER THE AUSTRALIAN CONSUMER LAW TO, AT ITS OPTION, THE REPAIR OR REPLACEMENT OF THE PRODUCTS, THE SUPPLY OF EQUIVALENT PRODUCTS, OR THE PAYMENT OF THE COST OF SUCH REPAIR OR REPLACEMENT OR THE ACQUISITION OF EQUIVALENT PRODUCTS.

THE WARRANTY SET OUT IN THIS DOCUMENT IS GIVEN BY CATERPILLAR INC. OR ANY OF ITS SUBSIDIARIES, 100 N. E. ADAMS ST, PEORIA, IL USA 61629, TELEPHONE 1 309 675 1000, THE USER IS RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH MAKING A CLAIM UNDER THE WARRANTY SET OUT IN THIS DOCUMENT, EXCEPT AS EXPRESSLY STATED OTHERWISE IN THIS DOCUMENT, AND THE USER IS REFERRED TO THE BALANCE OF THE DOCUMENT TERMS CONCERNING CLAIM PROCEDURES, CATERPILLAR RESPONSIBILITIES AND USER RESPONSIBILITIES.

TO THE EXTENT PERMISSIBLE BY LAW, THE TERMS SET OUT IN THE REMAINDER OF THIS WARRANTY DOCUMENT (INCLUDING SECTION B) CONTINUE TO APPLY TO PRODUCTS TO WHICH THIS SECTION C APPLIES.

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