



NFPS



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www.nfps.net

August 1, 2023

Suwannee County

Bid No. 2023-14

Suwannee County Courthouse Generator Project

Engineer's Project Number L210211SUW

ADDENDUM #1 – Items from the Mandatory Prebid

Included:

1. Submittal for the ATS purchased by the County.
2. Submittal for the generator purchased by the County.
3. Revised construction plan sheets

Questions/clarification from the Mandatory Pre-bid:

1. The automatic transfer switch (ATS) has not been delivered to the County as of yet.
2. Per County, Saturday/Sunday is the best day to take the Courthouse offline for electrical hookup.
3. Removal of the old ATS will be done by the County.
4. County to handle the setting of the generator and ATS on the provided slab to be anchored by the contractor.
5. City of Live Oak is the natural gas supplier.

ADDENDUM ACKNOWLEDGEMENT

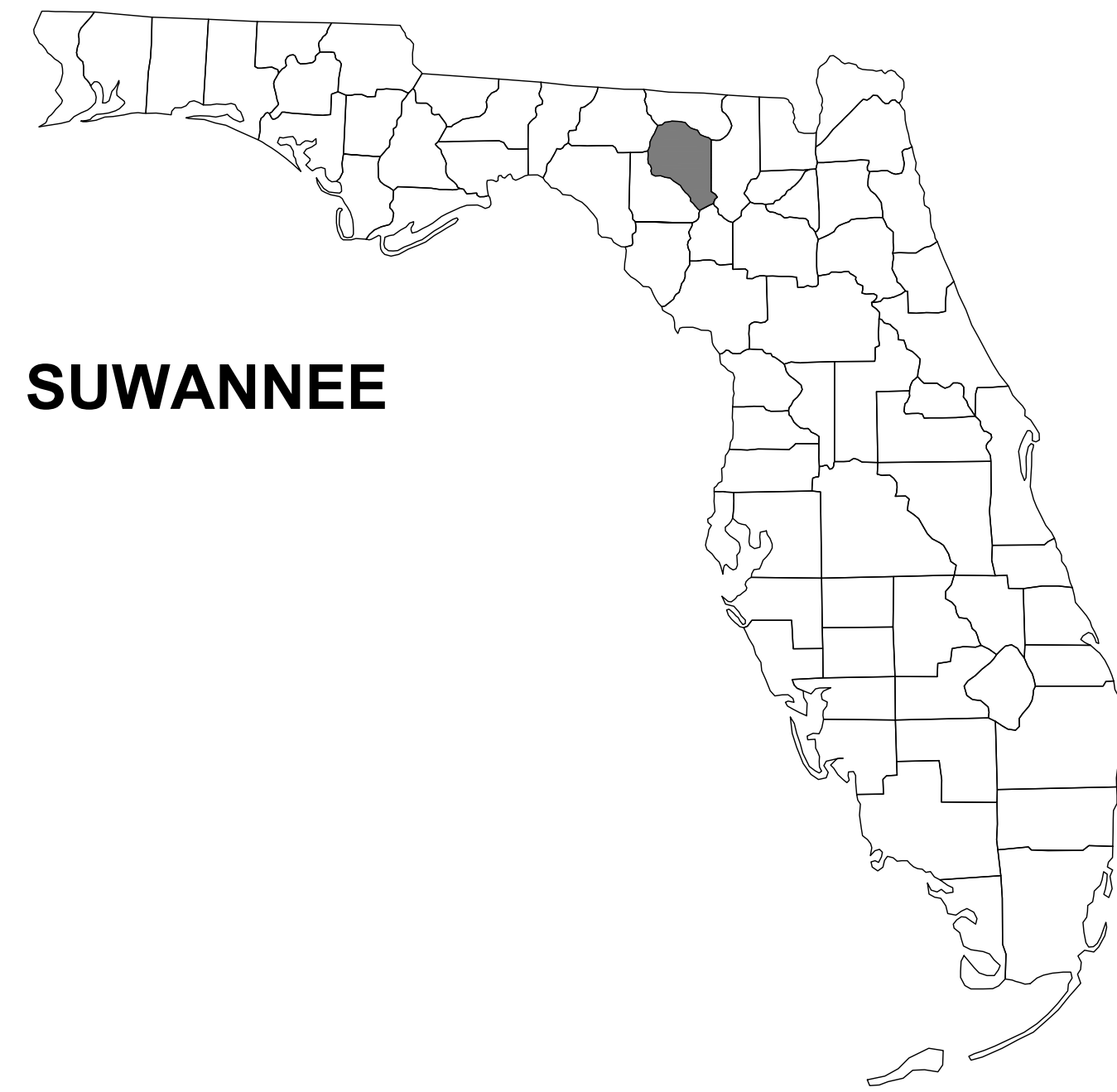
This is to certify that I have received a copy of Addendum #1 for BID 2023-14 Suwannee County Courthouse Generator/ATS with Site Work, Suwannee County, FL

Print Name

Signature

Date

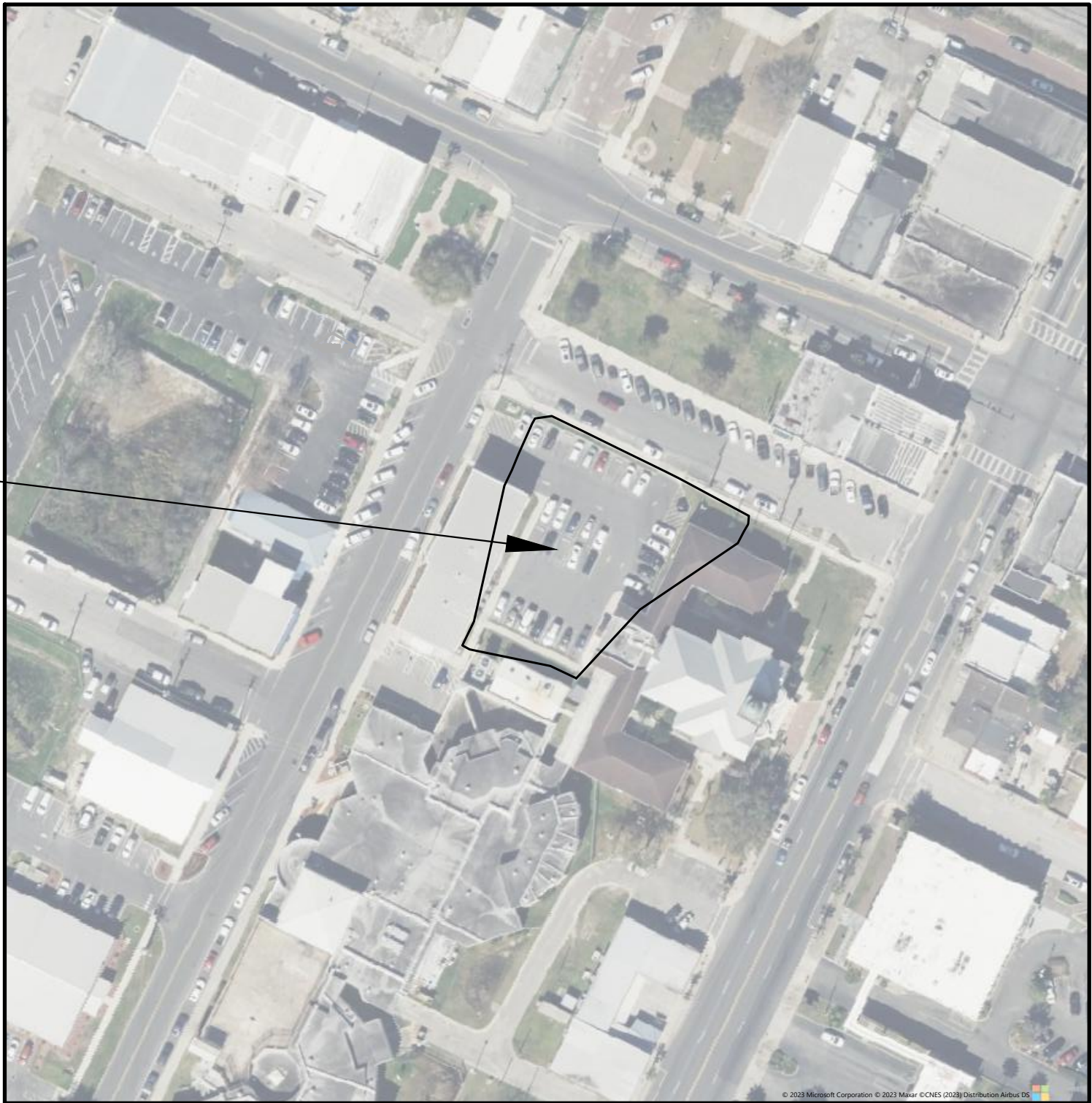
(THIS DOCUMENT IS TO BE INCLUDED IN PROPOSAL PACKAGE)



SUWANNEE

SUWANNEE COUNTY COURTHOUSE GENERATOR PROJECT SUWANNEE, FLORIDA

PROJECT LOCATION



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ELECTRIC

LEGEND, ABBREVIATIONS, CODES AND STANDARDS	E001
FLOOR PLAN	E101
SINGLE LINE DIAGRAM	E201

PLANS PREPARED FOR:

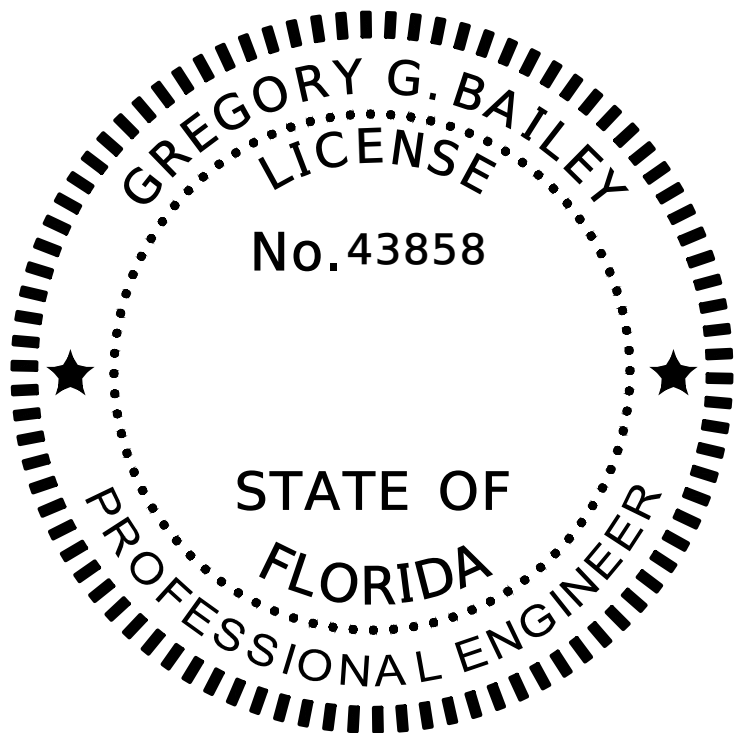
SUWANNEE COUNTY BOCC
13150 80TH TERRACE
LIVE OAK, FL 32060
(386)364-3400

04/2023

NOT FOR CONSTRUCTION

REVISIONS			NORTH FLORIDA PROFESSIONAL SERVICES, INC. P.O. BOX 3823 LAKE CITY, FL 32056 PH. 386-752-4675 LIC NO. LB8356	2551 BLAIRSTONE PINES DR. TALLAHASSEE, FL 32301 WWW.NFPS.NET CA# 29011	JOB NUMBER: L210211SUW EOR: GREGORY G. BAILEY P.E. NO.: 43858	COVER SHEET		SHEET NO. 1
DATE	DESCRIPTION							
8-1-2023	 ADDENDUM 1							

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.



THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY GREGORY G. BAILEY ON THE DATE ADJACENT TO THE SEAL.

PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES.

NORTH FLORIDA PROFESSIONAL SERVICES INC.
P.O. BOX 3823
LAKE CITY, FL 32056
CERTIFICATE OF AUTHORIZATION: 29011
GREGORY G. BAILEY, P.E. NO. 43858

THE ABOVE NAMED PROFESSIONAL ENGINEER SHALL BE RESPONSIBLE FOR THE FOLLOWING SHEETS IN ACCORDANCE WITH RULE 61G15-23.004, F.A.C.

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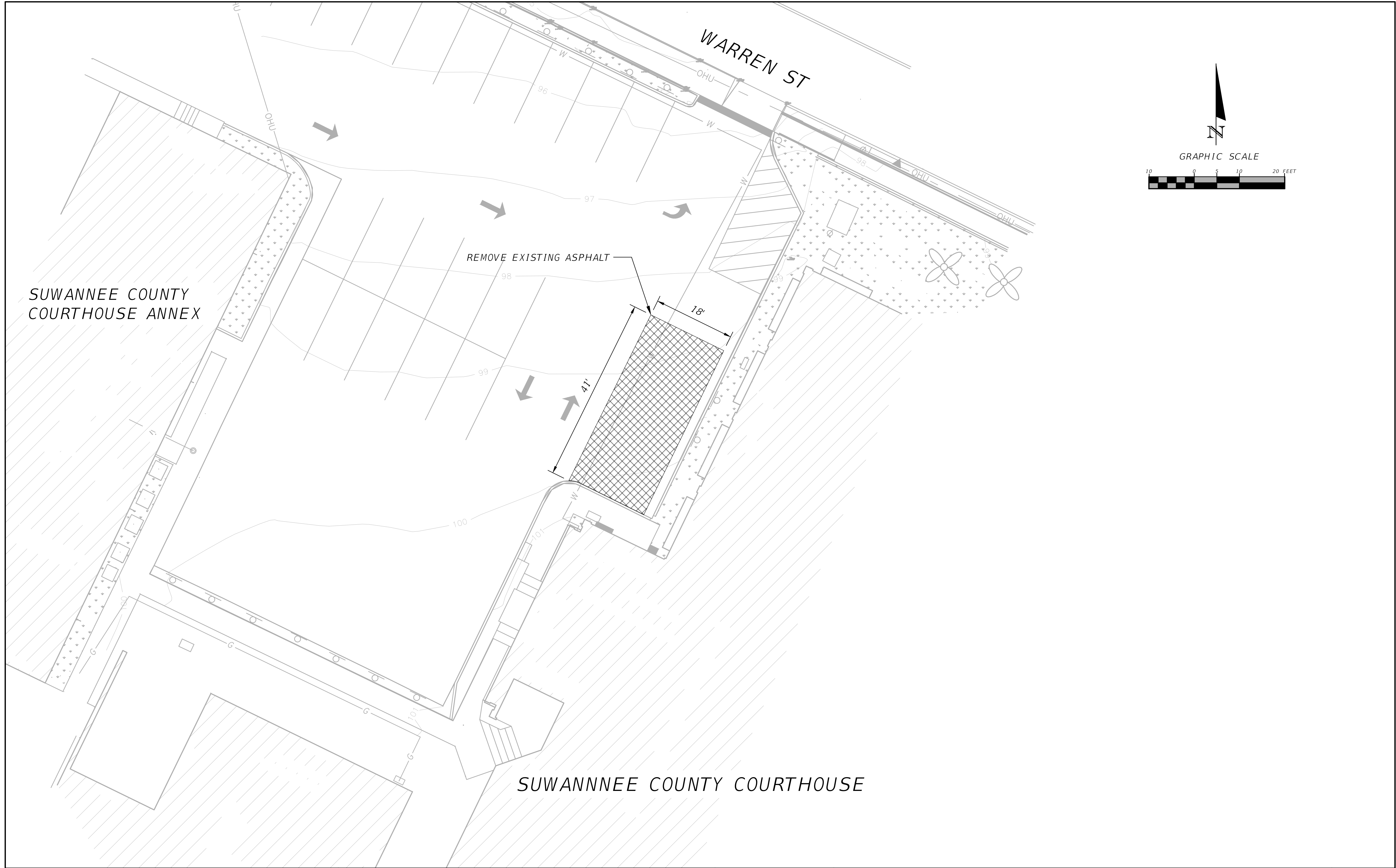
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DATE	DESCRIPTION						
							2

GENERAL NOTES

1. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS AT THE JOB SITE TO ENSURE THAT ALL NEW WORK WILL FIT IN THE MANNER INTENDED ON THE PLANS. SHOULD ANY CONDITIONS EXIST THAT ARE CONTRARY TO THOSE SHOWN ON THE PLANS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND SUWANEE COUNTY, FLORIDA OF SUCH DIFFERENCES IMMEDIATELY AND PRIOR TO PROCEEDING WITH THE WORK.
2. THE CONTRACTOR SHALL MAINTAIN THE CONSTRUCTION SITE IN A SECURE MANNER. ALL OPEN TRENCHES AND EXCAVATED AREAS SHALL BE PROTECTED FROM ACCESS BY THE GENERAL PUBLIC.
3. SURVEY INFORMATION SHOWN, WAS OBTAINED FROM A BOUNDARY SURVEY PREPARED BY J. SHERMAN FRIER & ASSOCIATES, FLORIDA CERTIFICATE NO. 7170.
4. ANY PUBLIC LAND CORNER WITHIN THE LIMITS OF CONSTRUCTION SHALL BE PROTECTED. IF A CORNER MONUMENT IS IN DANGER OF BEING DESTROYED AND HAS NOT BEEN PROPERLY REFERENCED, THE CONTRACTOR SHOULD NOTIFY THE ENGINEER.
5. THE SITE IS LOCATED IN SECTION 23, TOWNSHIP 02 SOUTH, RANGE 13 EAST SUWANNEE COUNTY, FLORIDA.
6. THE CONTRACTOR SHALL IMPLEMENT ALL COMPONENTS OF THE EROSION AND SEDIMENTATION CONTROL PLAN PRIOR TO ANY EARTH DISTURBING ACTIVITIES. ALL COMPONENTS SHALL BE MAINTAINED BY THE CONTRACTOR UNTIL ALL VEGETATION IS ESTABLISHED, THE ENTIRE PROJECT AREA IS STABILIZED AND THE OWNER HAS ACCEPTED OPERATION AND MAINTENANCE.
7. ALL DISTURBED AREAS NOT SODDED SHALL BE SEEDED WITH A MIXTURE OF LONG-TERM VEGETATION AND QUICK GROWING SHORT-TERM VEGETATION FOR THE FOLLOWING CONDITIONS. FOR THE MONTHS FROM SEPTEMBER THROUGH MARCH, THE MIX SHALL CONSIST OF 70 POUNDS PER ACRE OF LONG-TERM SEED AND 20 POUNDS PER ACRE OF WINTER RYE. FOR THE MONTHS OF APRIL THROUGH AUGUST, THE MIX SHALL CONSIST OF 70 PER ACRE OF LONG-TERM SEED AND 20 POUNDS PER ACRE OF MILLET.
8. THE LOCATION OF THE UTILITIES SHOWN IN THE PLANS ARE APPROXIMATE ONLY. THE EXACT LOCATION SHALL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION. CONTRACTOR SHALL PROTECT ALL UTILITIES WITHIN THE PROJECT AREAS.
9. ALL UTILITY CONSTRUCTION SHALL MEET THE CITY OF LIVE OAK WATER AND WASTEWATER UTILITY STANDARDS, AVAILABLE FROM CITY HALL OR PUBLIC WORKS.
10. ALL SITE CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF LIVE OAK LAND DEVELOPMENT REGULATIONS.
11. CONTRACTOR SHALL REVIEW AND BECOME FAMILIAR WITH ALL REQUIRED UTILITY CONNECTIONS PRIOR TO BIDDING. CONTRACTOR SHALL PROVIDE ALL WORK AND MATERIALS REQUIRED TO COMPLETE CONNECTION TO THE EXISTING UTILITIES. THIS INCLUDES BUT IS NOT LIMITED TO MANHOLE CORING, WET TAPS, PAVEMENT REPAIRS AND DIRECTIONAL BORING.
12. CONTRACTOR SHALL COORDINATE ALL WORK WITH OTHER CONTRACTORS WITHIN PROJECT AREA.
13. IF UNSUITABLE MATERIAL IS ENCOUNTERED DURING GRADING, CONTRACTOR SHALL REMOVE UNSUITABLE MATERIAL TO A DEPTH OF 24" BELOW FINISHED GRADE WITHIN THE CONSTRUCTION LIMITS.
14. THE CONTRACTOR SHALL NOTIFY THE COUNTY AT LEAST 48 HOURS PRIOR TO BEGINNING OF CONSTRUCTION.
15. NO WORK SHALL BE PERFORMED ON SATURDAY OR SUNDAY WITHOUT WRITTEN NOTIFICATION TO THE COUNTY.

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DATE	DESCRIPTION					
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REVISIONS	
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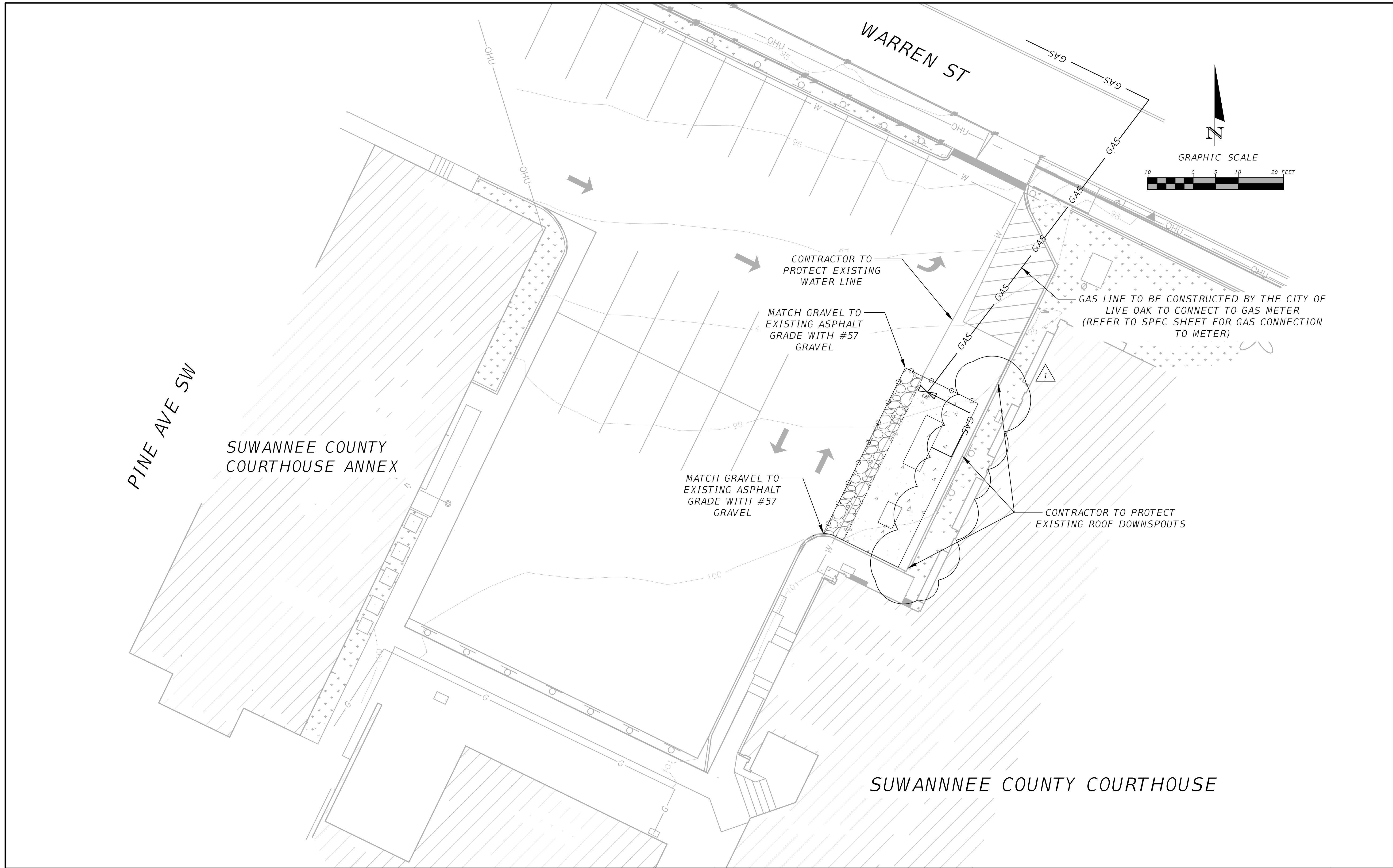
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P.E. NO.:
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DEMO PLAN
SUWANNEE COUNTY COURTHOUSE GENERATOR PROJECT
LIVE OAK, FLORIDA

SHEET NO.
4

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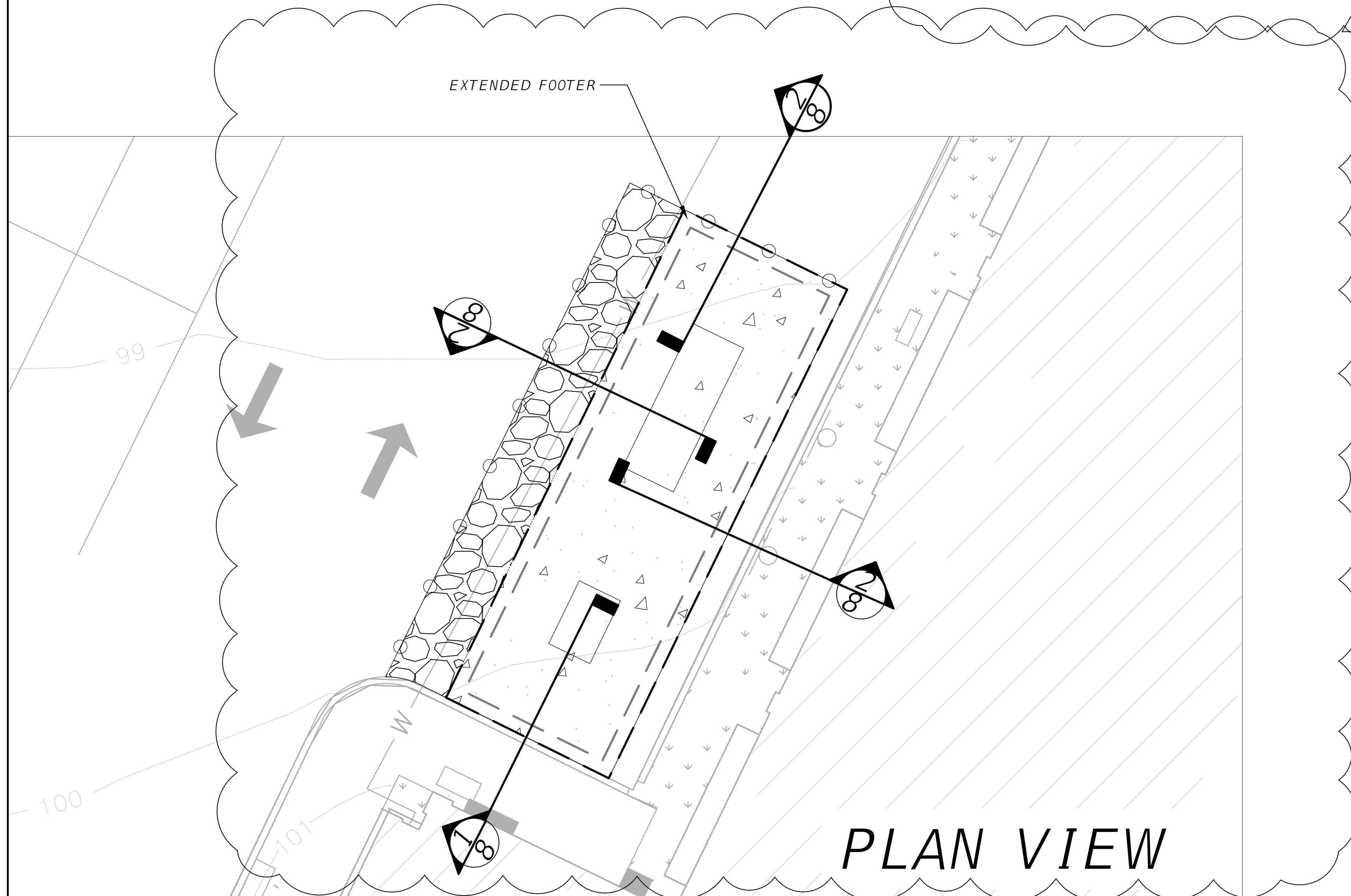
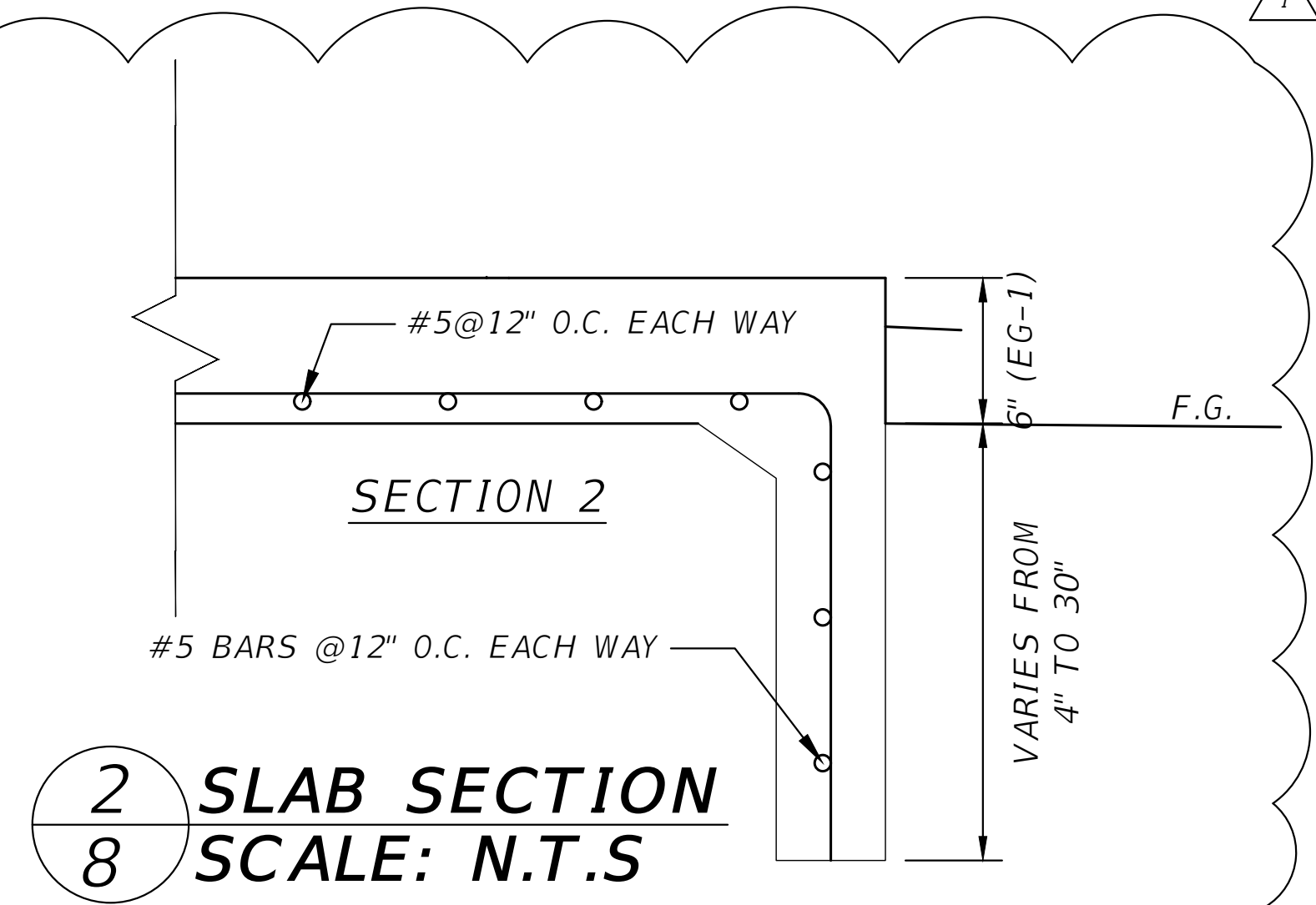
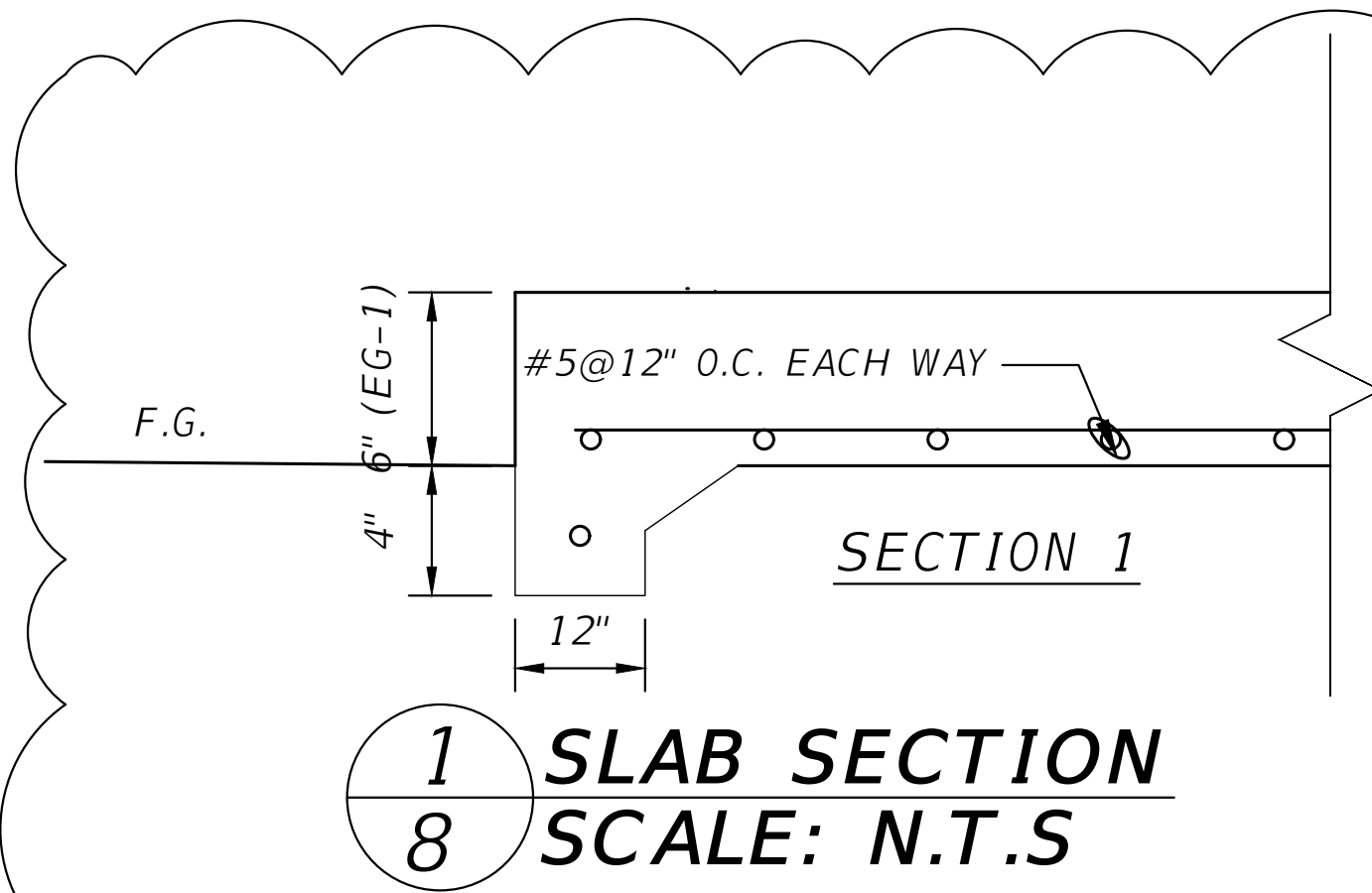


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DATE	DESCRIPTION							
8-1-2023	 ADDENDUM 1							

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DATE	DESCRIPTION					7
8-1-2023	 ADDENDUM 1					7



REVISIONS	
DATE	DESCRIPTION
8-1-2023	1 ADDENDUM 1



NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
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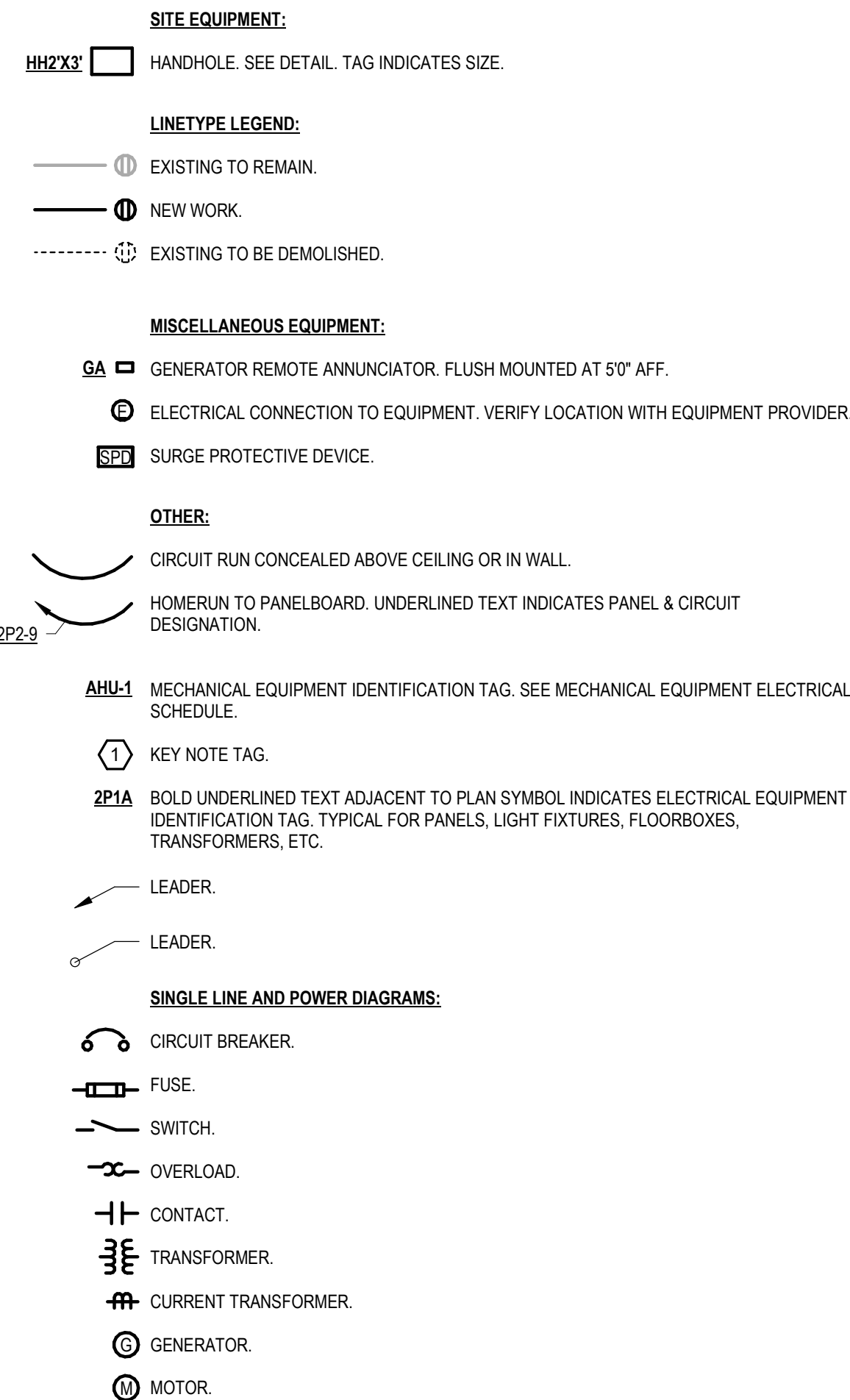
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EOR:
GREGORY G. BAILEY
P.E. NO.:
43858

DETAILS
SUWANNEE COUNTY COURTHOUSE GENERATOR PROJECT
SUWANNEE, FLORIDA

SHEET
NO.
8

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ELECTRICAL LEGEND



ABBREVIATIONS

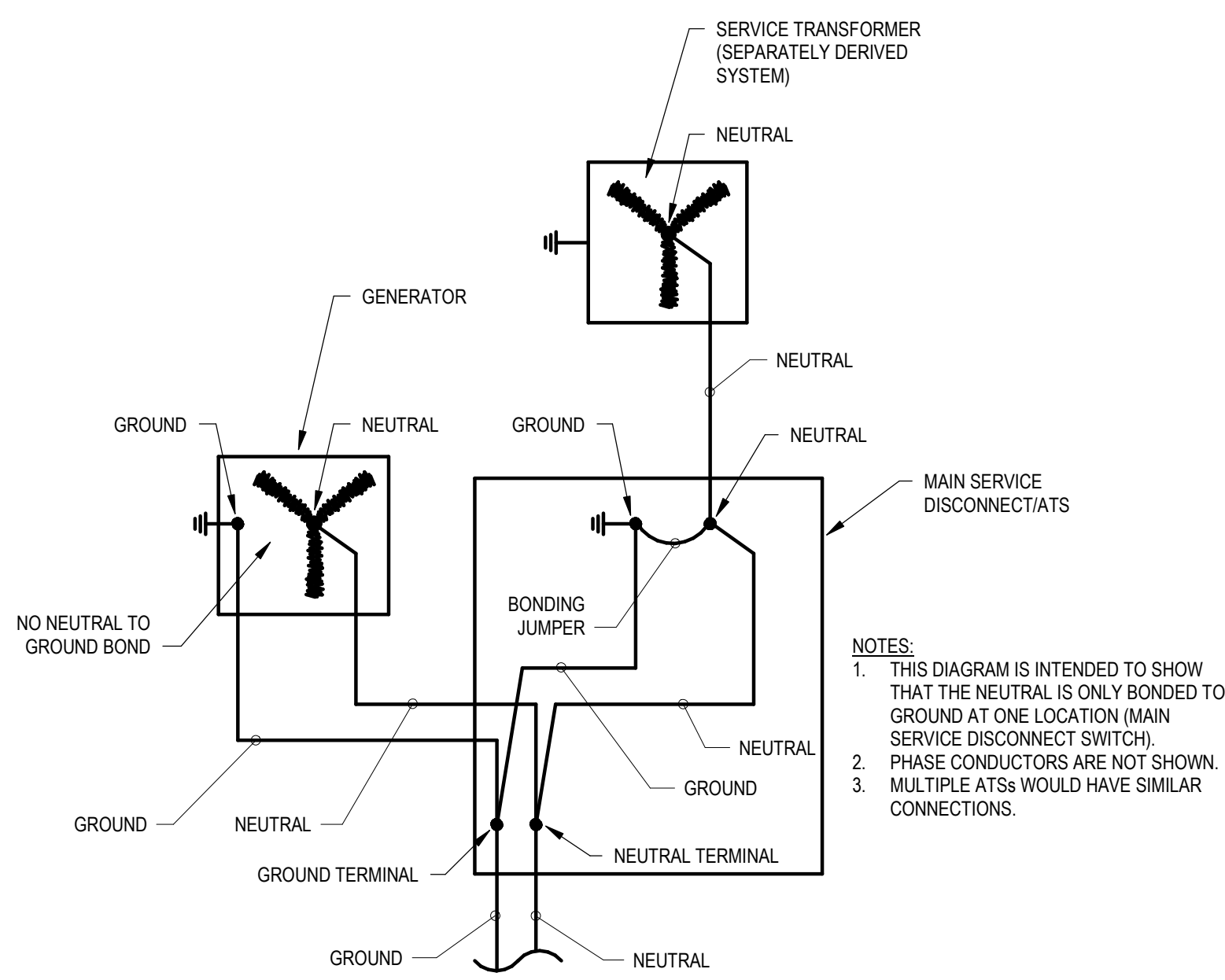
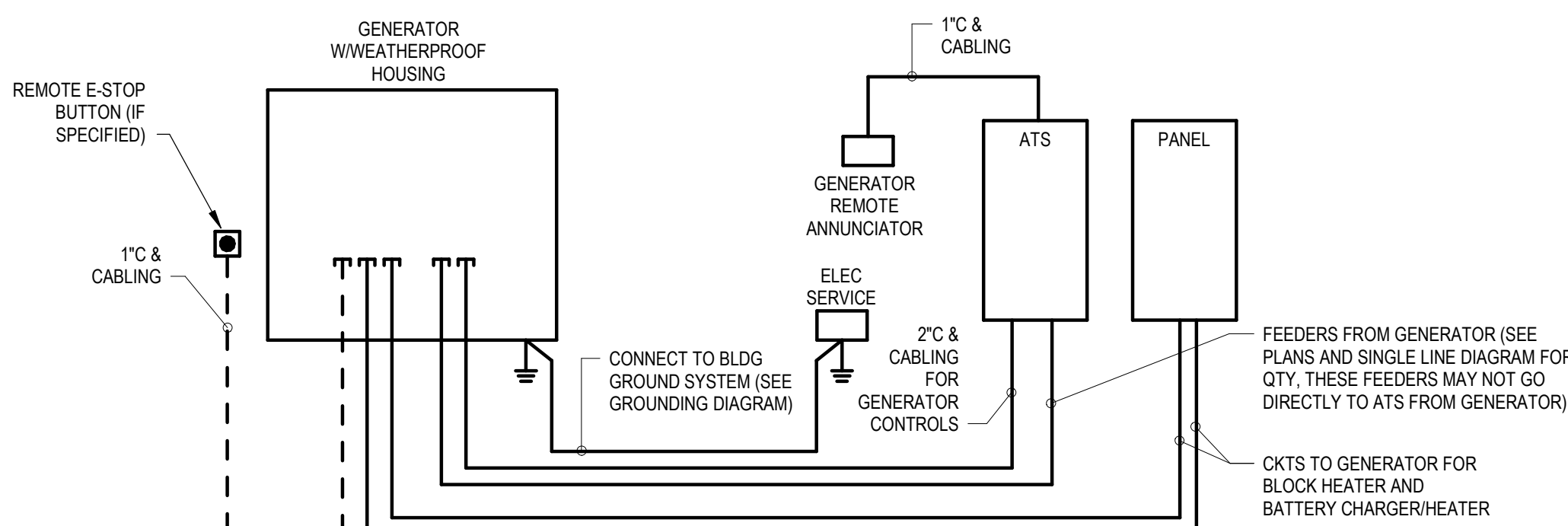
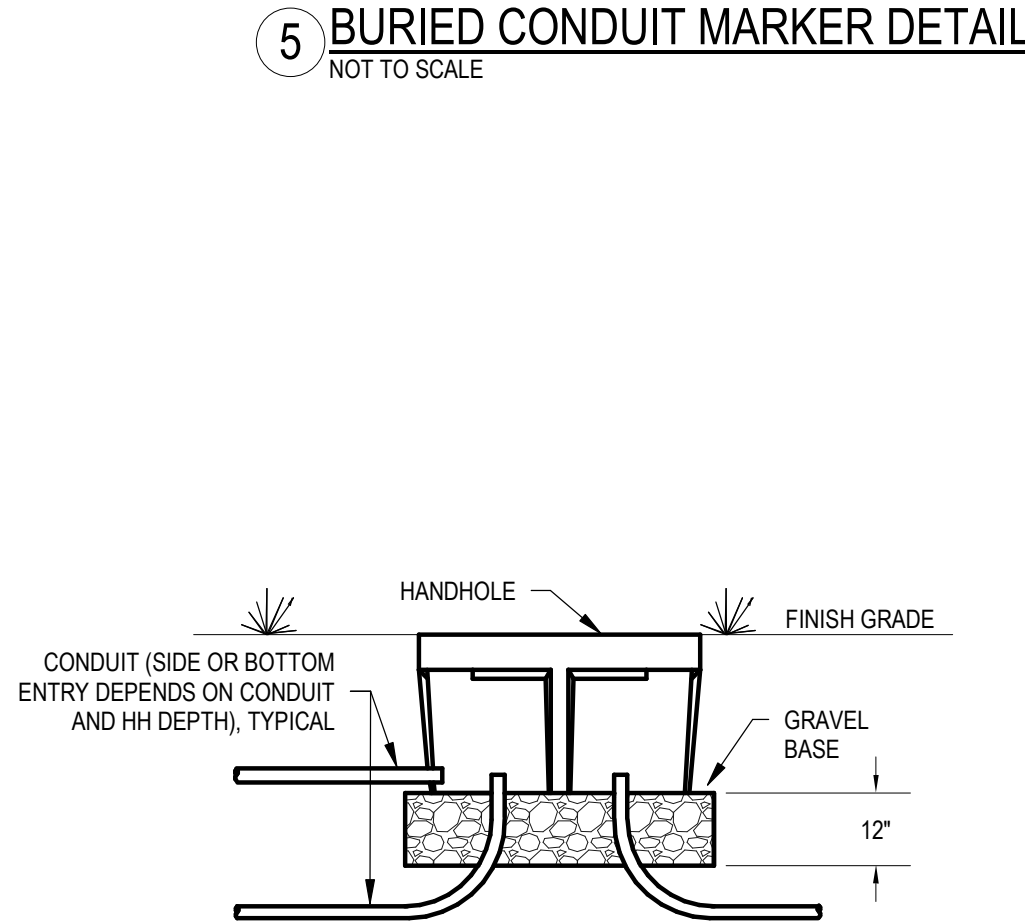
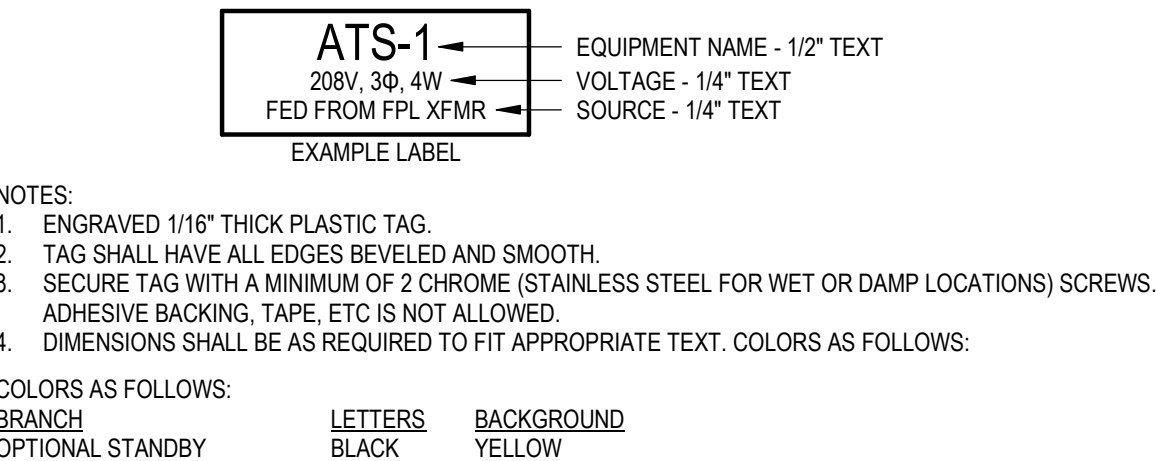
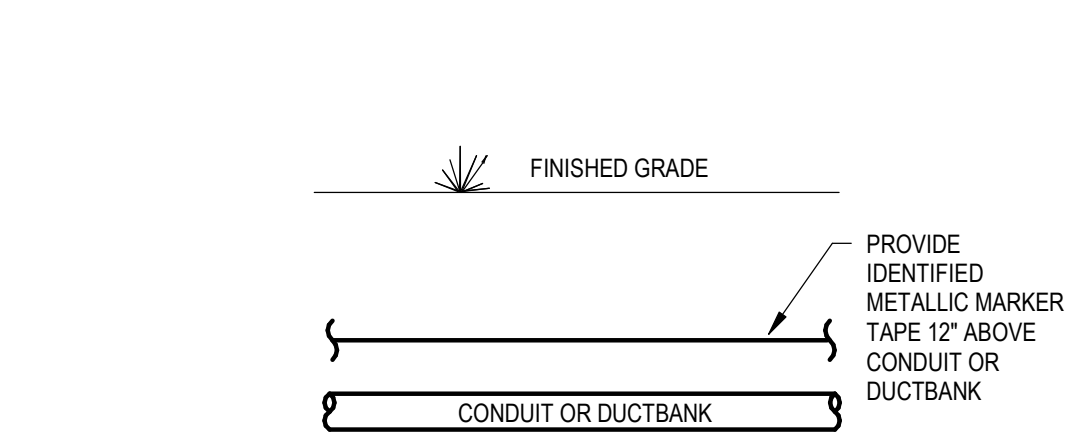
A	AMPS	MNT	MOUNTING HEIGHT
AC	ABOVE COUNTER	MTG	MOUNTING
ACS	ACCESS CONTROL SYSTEM	MTS	MANUAL TRANSFER SWITCH
AF	AMP FRAME	MV	MEDIUM VOLTAGE
AF	ABOVE FINISHED FLOOR	NAC	NOTIFICATION APPLIANCE CIRCUIT
AFG	ABOVE FINISHED GRADE	N1	NEMA 1
AHU	AIR HANDLING UNIT	N3R	NEMA 3R
AL	ALUMINUM	N/A, NA	NOT APPLICABLE
ARCH	ARCHITECT OR ARCHITECTURAL	NEC	NATIONAL ELECTRICAL CODE
AT	AMP TRIP	NESC	NATIONAL ELECTRICAL SAFETY CODE
ATS	AUTOMATIC TRANSFER SWITCH	N. NEU	NEUTRAL
ATU	AIR TERMINAL UNIT	NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
AWG	AMERICAN WIRE GAUGE	NTS	NOT TO SCALE
BAS	BUILDING AUTOMATION SYSTEM	OC	ON CENTER
BJ	BONDING JUMPER	OCPD	OVERCURRENT PROTECTION DEVICE
BKR	CIRCUIT BREAKER	OFOI	OWNER FURNISHED OWNER INSTALLED
BLDG	BUILDING	OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
BOD	BASIS OF DESIGN	OH	OVERHEAD
C	CONDUIT	OHE	OVERHEAD ELECTRIC
C/B, CB	CIRCUIT BREAKER	OHP	OVERHEAD PRIMARY
CL	CURRENT LIMITING	OHS	OVERHEAD SECONDARY
CLG	CENTERLINE	P	POLE OR PHASE
CLG	CEILING	PBD	PANELBOARD
OKT	CIRCUIT	PEM	POWER ENERGY MONITOR
CT	CURRENT TRANSFORMER	PF	POWER FACTOR
OU	COPPER	PNL	PANELBOARD
DDC	DIRECT DIGITAL CONTROL	PQM	POWER QUALITY METER
DEMO	DEMOLISH	PT	POTENTIAL TRANSFORMER
DIV	DIVISION	PWR	POWER
EC	ELECTRICAL CONTRACTOR	RCPT	RECEPTACLE
ELEC	EQUIPMENT GROUNDING CONDUCTOR	REQD	REQUIRED
ELCU	EMERGENCY LIGHTING CONTROL UNIT	RM	ROOM
ELEC	ELECTRICAL	RGS	RIGID GALVANIZED STEEL CONDUIT
EMGB	ELECTRICAL MAIN GROUNDING BUSBAR	RNC	RIGID NON-METALLIC CONDUIT
EF	EXHAUST FAN	RVSS	REDUCED VOLTAGE SOLID STATE
EX	EXISTING TO REMAIN	SA	SURGE ARRESTER
EXT	EXTERIOR	SCA	SHORT CIRCUIT AMPS
EWC	ELECTRIC WATER COOLER	SCCA	SHORT CIRCUIT CURRENT RATING
EMT	ELECTRICAL METALLIC TUBING	SF	SUPPLY FAN
EQUIP	EQUIPMENT	SLC	SIGNALING LINE CIRCUIT
FMC	FLEXIBLE METAL CONDUIT	SPD	SURGE PROTECTIVE DEVICE
FACP	FIRE ALARM SYSTEM CONTROL PANEL	SPEC	SPECIFICATION
FU	FUSE	SS	SAFETY SWITCH
FA, F/A	FIRE ALARM	SWBD	SWITCHBOARD
FLA	FULL LOAD AMPS	SWGR	SWITCHGEAR
FLR	FLOOR	TBB	TELECOMMUNICATIONS BONDING BACKBONE
FSS	FUSED SAFETY SWITCH	TCC	TIME CURRENT CURVE
FVNR	FULL VOLTAGE NON-REVERSING	TR	TELECOMMUNICATIONS ROOM
GFI	GROUND FAULT INTERRUPTER	TGB	TELECOMMUNICATIONS GROUNDING BUSBAR
G	GROUND (OR GFI FOR RECEPTACLE SUBSCRIPT)	TMGB	TELECOMMUNICATIONS MAIN GROUNDING BUSBAR
GC	GENERAL CONTRACTOR	TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSION
GND	GROUND	TX	TRANSFORMER
GEC	GROUNDING ELECTRODE CONDUCTOR	TYP	TYPICAL
GTD	GENERATOR TRANSFER DEVICE	UFR	UNDERFLOOR RACEWAY
HH	HANDHOLE	UG	UNDERGROUND
HOA	HAND-OFF-AUTOMATIC	UGE	UNDERGROUND ELECTRIC
HP	HEAT PUMP OR HORSEPOWER	UGP	UNDERGROUND PRIMARY
HVAC	HEATING, VENTILATION & AIR-CONDITIONING	UGS	UNDERGROUND SECONDARY
IG	ISOLATED GROUND	UL	UNDERWRITERS' LABORATORIES
IMC	INTERMEDIATE METAL CONDUIT	UNO	UNLESS NOTED OTHERWISE
JB, JBOX	JUNCTION BOX	UPS	UNINTERRUPTIBLE POWER SUPPLY
K	KILO	V	VOLT
KAIC	KILO-AMPERE INTERRUPTING CAPABILITY	VA	VOLT-AMPERES
KMIL	THOUSAND CIRCULAR MILS	VAR	VOLT-AMPERES REACTIVE
LCP	LIGHTING CONTROL PANEL	VAV	VARIABLE AIR VOLUME UNIT
LTC	LIGHTING	VFD	VARIABLE FREQUENCY DRIVE
LFG	LIQUID TIGHT FLEXIBLE METAL CONDUIT	W	WATTS OR WIRE
LV	LOW VOLTAGE	WAO	WORK AREA OUTLET
MAX	MAXIMUM	WP	WEATHERPROOF
MC	MECHANICAL CONTRCATOR	WSR	WITHSTAND RATING
MCA	MINIMUM CIRCUIT AMPACITY	XD	EXISTING TO BE DEMOLISHED
MCC	MOTOR CONTROL CENTER	XFMR	TRANSFORMER
MCE	MAIN COMMUNICATIONS EQUIPMENT ROOM	XP	EXPLOSION PROOF
MCM	THOUSAND CIRCULAR MILS	XR	EXISTING TO BE RELOCATED
MH	MANHOLE	Φ	PHASE
MIN	MINIMUM	72°	DEGREES
MISC	MISCELLANEOUS	Δ	DELTA
MLO	MAIN LUGS ONLY	Ω	OHMS

CODES AND STANDARDS

- THIS PROJECT WAS DESIGNED IN ACCORDANCE WITH THESE CODES:
- FLORIDA BUILDING CODE (FBC)
 - TEST PROTOCOLS FOR HIGH-VELOCITY HURRICANE ZONES - 2020 7TH EDITION
 - NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
 - NATIONAL ELECTRIC CODE (NFPA 70) - 2017
 - NATIONAL FIRE ALARM CODE (NFPA 72) - 2016
 - FLORIDA FIRE PREVENTION CODE - 2020 7TH EDITION
 - FIRE CODE (NFPA 1) - 2018 FLORIDA EDITION
 - LIFE SAFETY CODE (NFPA 101) - 2018 FLORIDA EDITION
- ALL SYSTEMS SHALL MEET THE REQUIREMENTS OF THE FOLLOWING STANDARDS:
- AMERICAN NATIONAL STANDARD INSTITUTES (ANSI)
 - ILLUMINATING ENGINEERING SOCIETY (IES)
 - INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)
 - NATIONAL ELECTRICAL MANUFACTURERS' ASSOCIATIONS (NEMA)
 - NATIONAL ELECTRICAL CONTRACTOR'S ASSOCIATION
 - NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
 - OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA)
 - UNDERWRITERS' LABORATORIES, INC. (UL)
 - OWNER'S CONSTRUCTION STANDARDS

ELECTRICAL SPECIFICATIONS

- GENERAL ELECTRICAL:**
 - THE CONTRACTOR SHALL FURNISH ALL LABOR, MATERIALS AND EQUIPMENT NECESSARY FOR THE INSTALLATION OF A COMPLETE ELECTRICAL SYSTEM AS INDICATED WITHIN THESE DRAWINGS. ALL WORK SHALL BE INSTALLED IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES AND ORDINANCES AND WITH MANUFACTURER'S RECOMMENDATIONS.
 - ALL WORK, MATERIALS AND EQUIPMENT SHALL COMPLY WITH THE NATIONAL ELECTRICAL CODE.
 - THE CONTRACTOR SHALL CAREFULLY EXAMINE THE ARCHITECTURAL, STRUCTURAL, ELECTRICAL AND MECHANICAL DRAWINGS PRIOR TO SUBMITTING HIS BID. THE CONTRACTOR WILL BE REQUIRED TO FURNISH, INSTALL AND CONNECT ALL ITEMS AS INDICATED ON THE DRAWINGS.
 - THE ARCHITECT/ENGINEER SHALL BE NOTIFIED OF ANY CONFLICTS, OR INTERFERENCES THAT OCCUR BETWEEN INDIVIDUAL DRAWINGS.
 - ALL MATERIALS AND EQUIPMENT SHALL BE INSTALLED IN A NEAT, FIRST CLASS, WORKMANLIKE MANNER, TO THE APPROVAL OF THE ARCHITECT/ENGINEER AND GOVERNING AUTHORITIES.
 - IN ADDITION TO THE MANUFACTURERS STANDARD GUARANTEES, THE CONTRACTOR SHALL GUARANTEE ALL MATERIALS, EQUIPMENT AND WORKMANSHIP AGAINST DEFECTS FOR ONE YEAR FROM THE DATE OF FINAL ACCEPTANCE, AND SHALL CORRECT ANY DEFECTS AT NO ADDITIONAL COST TO THE OWNER. ALL LAMPS SHALL BE GUARANTEED FOR 30 DAYS AFTER FINAL ACCEPTANCE.
 - THE LOADS SHOWN FOR APPLIANCES AND EQUIPMENT ARE BASED ON DESIGN INFORMATION. THE CONTRACTOR SHALL VERIFY ALL APPLIANCE LOADS PRIOR TO RUNNING THE CIRCUIT. THE MINIMUM CIRCUIT REQUIREMENTS SHALL BE BASED ON THE APPLIANCE NAMEPLATE VALUE OR CODE REQUIREMENTS, WHICHEVER IS MORE STRINGENT. ADDITIONAL COMPENSATION SHALL NOT BE ALLOWED FOR APPLIANCE MODIFICATIONS BY THE CONTRACTOR.
 - PRIOR APPROVAL: PRIOR APPROVAL SHALL BE REQUIRED FOR ANY MANUFACTURER OTHER THAN THOSE LISTED FOR ALL SPECIFIED ITEMS IN THESE DRAWINGS. SUBMIT ALL REQUESTS FOR PRIOR APPROVAL 2 WEEKS PRIOR TO BID OPENING. ENGINEER'S APPROVAL WILL BE IN THE FORM OF AN ADDENDUM.
 - APPROVAL SUBMITTALS: PROVIDE APPROVAL SUBMITTALS FOR ALL EQUIPMENT BEING PROVIDED FOR ENGINEERS REVIEW.
 - OS&M MANUALS: PROVIDE OPERATIONS AND MAINTENANCE MANUALS AT THE SUBSTANTIAL COMPLETION INSPECTION.
 - AS-BUILTS: PROVIDE A MARKED-UP SET OF DRAWINGS FOR AS-BUILTS.
 - ALTERATIONS & ADDITIONS TO EXISTING WORK:**
 - PROVIDE ALL NECESSARY ADDITIONS AND ALTERATIONS TO EXISTING WORK AS REQUIRED TO PROVIDE AND MAINTAIN A COMPLETE AND PROPER ELECTRICAL INSTALLATION.
 - AS NECESSARY, RELOCATE EXISTING ELECTRICAL WORK (LIGHT FIXTURES, BOXES, CONDUIT, ETC.) SO OTHER TRADES CAN PURSUE THEIR WORK.
 - MAINTAIN POWER TO EXISTING PORTIONS OF BUILDINGS FED FROM OR THROUGH AREA IN SCOPE OF THIS CONTRACT.
 - COORDINATE ALL REQUIRED OUTAGES WITH OWNER.
 - BASIC MATERIALS & METHODS:**
 - ALL ELECTRICAL EQUIPMENT, DEVICES, ETC. SHALL BE UL LISTED.
 - ALL ELECTRICAL EQUIPMENT, DEVICES, ETC. LOCATED OUTDOORS SHALL BE WEATHERPROOF.
 - COORDINATE WITH OTHER TRADES AND STRUCTURE.
 - ALL SIDEWALKS AND PARKING LOT ASPHALT AREAS THAT ARE CUT DUE TO NEW ELECTRICAL SERVICES SHALL BE REPAIRED TO MATCH EXISTING.
 - ALL DIMENSIONS TO DEVICES AFF SHALL BE TO CENTERLINE UNLESS NOTED OTHERWISE.
 - WIRES & CABLES:**
 - MC CABLE IS NOT ALLOWED.
 - ALL LINE VOLTAGE WIRING SHALL BE COPPER WITH INSULATION SUITABLE FOR THE APPLICATION.
 - MINIMUM SIZE LINE VOLTAGE WIRES SHALL BE #12AWG.
 - INCREASE WIRE SIZE DUE TO VOLTAGE DROP AS FOLLOWS (DISTANCE MEASURED TO CENTER OF LOAD):
 - 120V 100' - 150' :#10 AWG.
 - 120V 150' - 200' :#8 AWG.
 - 120V > 200' :#6 AWG.
 - RACEWAYS & BOXES:**
 - MINIMUM SIZE CONDUIT FOR ABOVE GROUND USE SHALL BE 1/2".
 - MINIMUM SIZE CONDUIT FOR BELOW GROUND USE SHALL BE 3/4".
 - THE CONDUIT MATERIAL SHALL BE AS FOLLOWS:
 - BELOW GRADE - RNC. ELBOWS >1-1/2" SHALL BE RGS.
 - RISER FROM 36" BELOW GRADE - RGS.
 - CONCEALED RISER FROM 36" BELOW GRADE - RNC.
 - ABOVE GRADE SUBJECT TO PHYSICAL ABUSE - RGS.
 - ABOVE GRADE NOT SUBJECT TO PHYSICAL ABUSE OR WEATHER - EMT.
 - INDOORS NOT SUBJECT TO PHYSICAL ABUSE - EMT.
 - FINAL CONDUIT CONNECTIONS TO VIBRATING EQUIPMENT SHALL BE FLEXIBLE (MAX LENGTH 3 FEET).
 - CONDUIT FITTINGS SHALL BE AS FOLLOWS:
 - EMT - COMPRESSION/SET-SCREW STEEL, CONNECTORS SHALL HAVE WITH INSULATED THROATS.
 - RGS - THREADED GALVANIZED STEEL.
 - PVC - PVC APPROVED FOR THE USE.
 - FMC - ZINC-PLATED STEEL OR CADMIUM-PLATED MALLEABLE IRON SCREW TYPE WITH INSULATED THROAT.
 - LFMC - CADMIUM-PLATED MALLEABLE IRON OR STEEL COMPRESSION TYPE WITH INSULATED THROAT.
 - ALL OUTLET BOXES SHALL BE 4"x4"x1-1/2" DEEP MINIMUM.
 - HANDHOLES SHALL BE POLYMER CONCRETE EQUIVALENT TO QUATZITE PG SERIES TIER 22.
 - JUNCTION BOXES LOCATED ABOVE CEILING SHALL BE INSTALLED FACING DOWN AND SHALL BE ACCESSIBLE AFTER INSTALLATION.
 - CONDUIT ROUTINGS AND DEVICE/EQUIPMENT LOCATIONS SHOWN ARE DIAGRAMMATIC ONLY, CONTRACTOR SHALL FIELD ROUTE AND LOCATE AS REQUIRED. CONDUIT ROUTINGS SHALL BE PARALLEL OR PERPENDICULAR TO BUILDING LINES.
 - INSTALL DETECTABLE WARNING TAPE IN ALL CONDUIT TRENCHES OUTSIDE OF BUILDING FOOTPRINTS.
- GROUNDING & BONDING:**
 - PROVIDE AN INSULATED EQUIPMENT GROUNDING CONDUCTOR IN ALL CONDUITS.
 - GROUND RODS SHALL BE 3/4"x10' COPPERCLAD STEEL SECTIONAL TYPE.
 - BELOW GRADE CONNECTIONS SHALL BE EXOTHERMIC TYPE.
 - ALL CABLES SHALL BE COPPER, ALL BOLTED CONNECTIONS SHALL BE BRONZE.
- IDENTIFICATION:**
 - EQUIPMENT:
 - PROVIDE ENGRAVED PHENOLIC LABELS FOR ALL PANELBOARDS, SAFETY SWITCHES, TRANSFORMERS, CABINETS, ETC.
 - RACEWAYS:
 - PAINT THE RACEWAY SYSTEM COUPLINGS AND BOX COVERS ABOVE CEILINGS FOR THE FOLLOWING SYSTEMS AS FOLLOWS:
 - 208 VOLT SYSTEMS - BLACK
 - EMERGENCY SYSTEMS - COLOR INDICATED ABOVE PLUS A DIAGONAL RED STRIPE.
 - AFTER PAINTING, WRITE THE CIRCUIT NUMBER (I.E. "LPA-34") ON ALL BRANCH CIRCUIT JUNCTION BOX COVERS ABOVE CEILING.
 - WIRING:
 - COLOR-CODING FOR PHASE & VOLTAGE IDENTIFICATION 600V AND LESS.
 - 208Y/120V CIRCUITS: PHASE A: BLACK, PHASE B: RED, PHASE C: BLUE, NEUTRAL: WHITE, GROUNDING CONDUCTOR: GREEN.
- GENERATOR AND ATS:**
 - THE GENERATOR AND THE ATS ARE OWNER FURNISHED AND CONTRACTOR INSTALLED (OFOI).
 - OBTAIN SPECS AND SHOP DRAWINGS OF THIS EQUIPMENT FROM THE OWNER FOR PROPER COORDINATION AND INSTALLATION.
- GENERATOR FUEL SUPPLY:**
 - THE OWNER IS PROVIDING THE NATURAL GAS TO THE NEW GENERATOR.
 - DETAILED DESIGN IS BY OTHERS.
 - THE NATURAL GAS CONNECTION DETAIL SHOWN IN THESE DRAWINGS WAS PROVIDED BY THE GENERATOR MANUFACTURER AND IS FOR INFORMATION ONLY.



Akin Brooks Engineering, Inc.
14260 W Newberry Rd #115
Newberry, FL 32669

FL License 35307
352.281.7104
akinbrooks.com

Owner:

Suwannee County



Project Name:

Suwannee County
Courthouse Generator

Submittal:

100% Construction
Documents

Seal:

Mark R Akin
PE - 0059242

Akin Brooks Project #: 21012
Drafted By: ATA
Checked By: MRA
Date: 4/20/2023

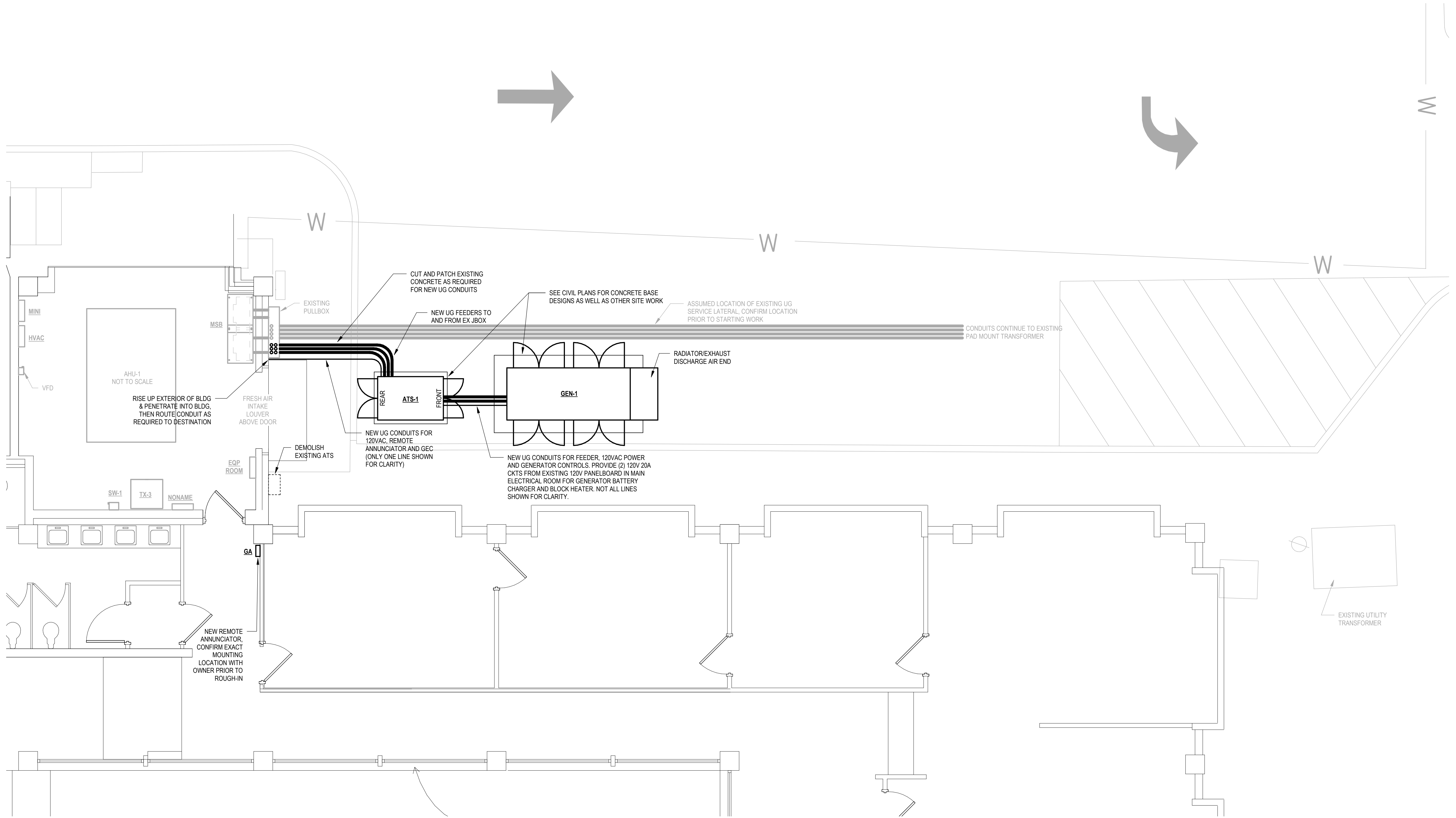
Revisions:

No.	Revision Description	Date
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Sheet Title:
LEGEND, ABBREVIATIONS, CODES AND STANDARDS

Sheet #:
E001

Autodesk Docu//21012 Suwannee County Courthouse Generator/21012 Suwannee County Courthouse Generator MEP.rvt



1 ELECTRICAL PLAN
SCALE: 1/4" = 1'-0"



**Akin Brooks
Engineering**

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14260 W Newberry Rd #115
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21012

Drafted By:

ATA

Checked By:

MRA

Date:

4/20/2023

Revisions:

No.	Revision Description	Date
-----	----------------------	------

Sheet Title:

FLOOR PLANS

Sheet #:

E101

Owner:

Suwannee County



Project Name:

Suwannee County
Courthouse Generator

Submittal:

100% Construction
Documents

Seal:

Mark R Akin
PE - 0059242

Akin Brooks Project #:

21012

Drafted By:

ATA

Checked By:

MRA

Date:

4/20/2023

Revisions:

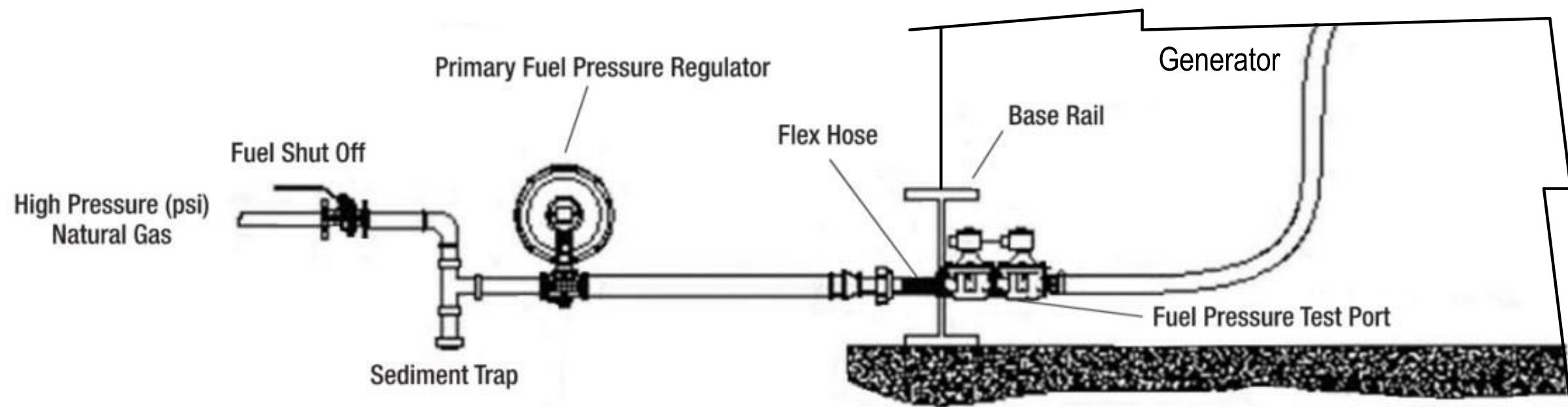
No.	Revision Description	Date
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Sheet Title:

SINGLE LINE DIAGRAM

Sheet #:

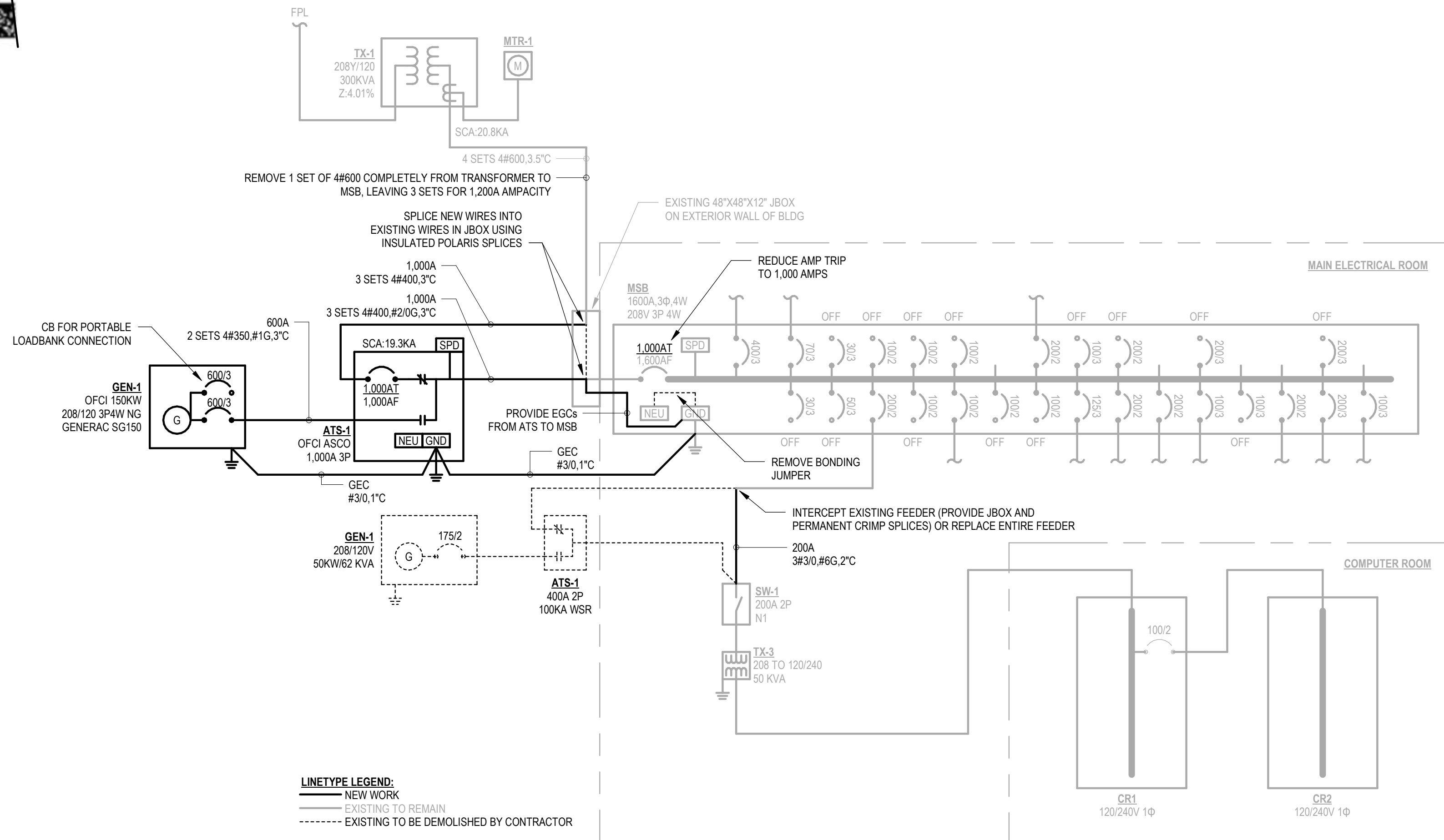
E201



Primary fuel pressure regulator no less than 10 feet of pipe length from the generator set connection point

NATURAL GAS CONNECTION DETAIL

NOTE:
THIS DETAIL IS FOR INFORMATION ONLY AND WAS
PROVIDED BY THE GENERATOR MANUFACTURER.
GAS DESIGN IS BY OTHERS. OWNER IS PROVIDING
GAS SERVICE.



SINGLE LINE DIAGRAM - COURTHOUSE

NOT TO SCALE

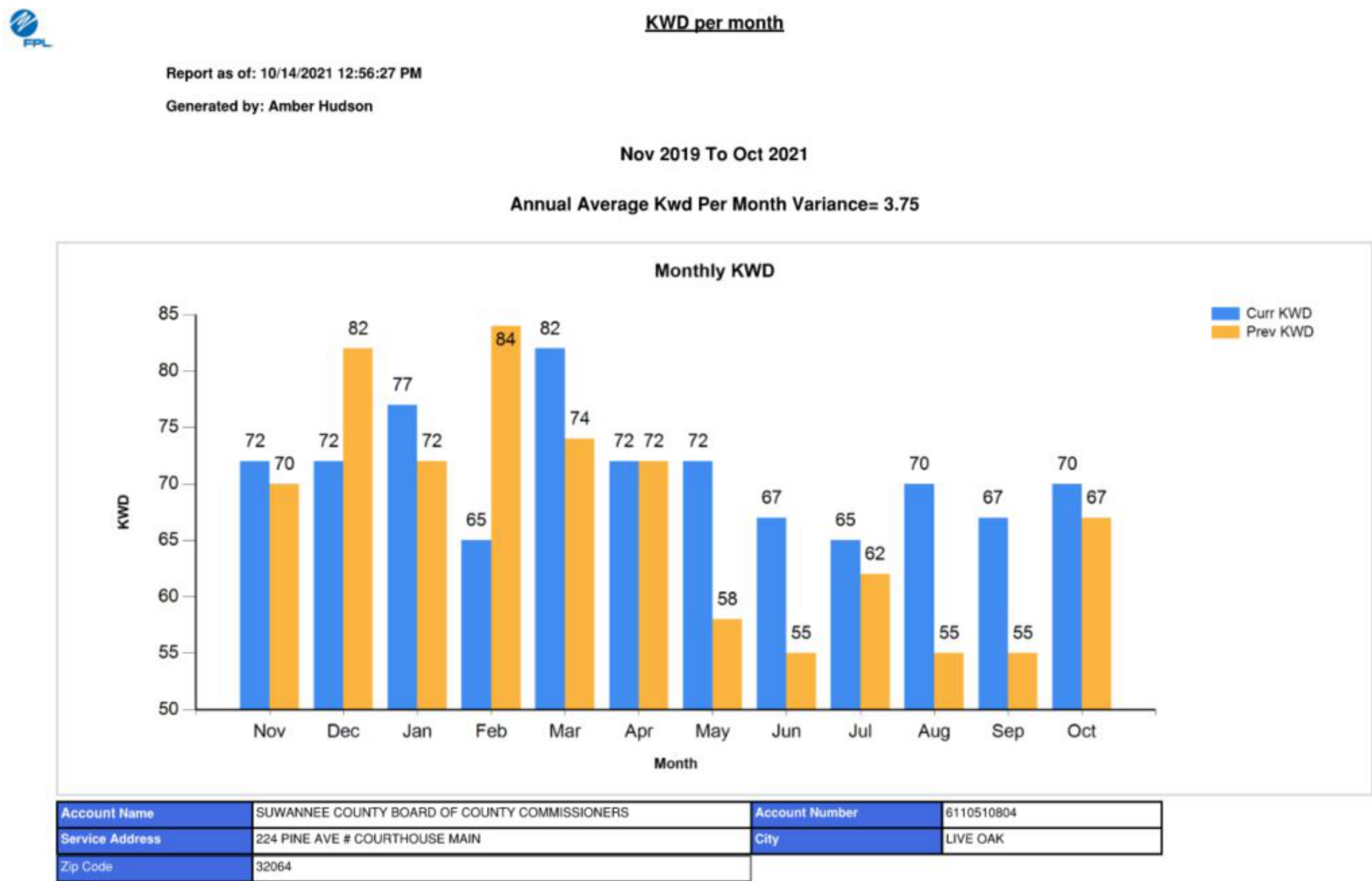
SERVICE LOAD CALCULATION

EXISTING PEAK DEMAND LOAD PER FPL 84 KW*
ASSUMED POWER FACTOR OF 0.9 94 KVA
@ 125% PER NEC 220.87 118 KVA
EQUIVALENT AMPS AT 208V 328 AMPS
PROPOSED SERVICE SIZE 1,000 AMPS
PROPOSED GEN SIZE 150 KW/187.5KVA/520A

* SEE FPL KWD PER MONTH CHART TO THE LEFT WHICH
INDICATES THE PEAK KW DEMAND IN THE PAST 2 YEARS WAS
84KW.

SINGLE LINE DIAGRAM GENERAL NOTES

- THIS IS AN ELECTRICAL POWER DISTRIBUTION SYSTEM SINGLE LINE DIAGRAM. NOT ALL BRANCH CIRCUITS ARE SHOWN.
- SIZES OF MOST FEEDERS CAN BE FOUND ON THE APPROPRIATE EQUIPMENT SCHEDULES. WHERE NOT SCHEDULED, THE SIZES ARE SHOWN ON THE SINGLE LINE DIAGRAM.
- UNO, FEEDERS THAT PASS THRU AN ATS, ENCLOSED SWITCH OR CB, ETC SHALL BE THE SAME SIZE FROM SOURCE OCPD TO DESTINATION. FOR EXAMPLE, A FEEDER FROM A CB IN A SOURCE PANEL THAT RUNS THRU AN ATS AND CONTINUES TO THE DESTINATION PANEL SHALL BE THE SIZE INDICATED FOR THE DESTINATION PANEL'S FEEDER.
- EQUIPMENT CONNECTIONS SHOWN ARE NOT INTENDED TO SHOW TOP OR BOTTOM MOUNTED MAIN BREAKER OR BOTTOM, TOP OR SIDE FEEDER ENTRY. THE SINGLE LINE DIAGRAM IS DIAGRAMMATIC. CONTRACTOR SHALL VERIFY PROPER BREAKER POSITIONS AND FEEDER ENTRIES INTO EQUIPMENT AND PROVIDE AS REQUIRED.



FPL HISTORIC KW DEMAND LOAD GRAPH

SUBMITTALS

**AUTOMATIC
TRANSFER
SWITCH
SUBMITTAL**



Suwannee Court House

SWITCH SUBMITTAL

REVISION 1

Alfredo Engay

Sales Representative

Alfredo.EngayJr@ascopower.com

Tel # 9739662040

Suwannee Court House

Reference Quote: E3-22-466316-2-1

Sales Order: 2963098

Transfer Switch Details									
ATS NAME	QTY	AMPS/ POLES (VOLTS)	BYPASS	TRANSITION TYPE	CATALOG NUMBER	ACCESSORIES	OUTLINE DRAWING	WIRING DIAGRAM	BOM NUMBER
	1	1000 / 3 (208V)	NOT APPLICABLE	OPEN	H03AUSA31000CGXM	11BE,44G,73 CC1,119BG,1 19RA,134,135 L	754578-051	1001657	1486156
	1	N/A/ N/A (N/A)	NOT APPLICABLE	NOT APPLICABLE	Kit with ASCO 5140 (72EE) Quad-Ethernet Communications Module and DIN Rail - provides 4 ethernet ports for external communication, 2 CANBUS ports for ASCO device connectivity, remote webpage with email, and MODBUS TCP communications.	NOT APPLICABLE	-----	-----	948551
	1	N/A/ N/A (N/A)	NOT APPLICABLE	NOT APPLICABLE	5310 Annunciator Assy 1 CH. Connects directly to an Ethernet network. Connects directly to a transfer switch accessory 72EE/72EE2.	NOT APPLICABLE	-----	-----	827420

AIC Rating for Service Entrance Rated Units				
ATS NAME	Catalog Number	ATS Ampacity	Square D Breaker Model (Rating)	Fault Current Rating (480V)
	H3AUS/H3ADUS	1000-1200A	RJF(1000-1200A)	50kA

Suwannee Court House

Transfer Switch Details

#1	ATS	AMPS: 1000	QTY: 1
Product	: Series 300	Catalog Number	: H03AUSA31000CGXM,11BE,44G 73CC1,119BG,119RA,134,135L
Service Voltage / Hz	: 208V/60Hz	Optional Accessories	: 134,11BE,44G,73CC1,119BG 119RA,135L
Bypass Isolation	: Not Applicable	Product Description	: 300 Series, Automatic Service Entrance Transfer Switch
No. of Switched Poles	: 3	Neutral Configuration	: Solid [A]
Withstand Rating:	: See WCR table below	No. of Cables & Lug Size	: See Applicable Outline Drawing Size
Frame = H, Switch Rating = 1000, Series = 300			
Enclosure	: 3R(M)-UL Type 3R secure double door enclosure (See Disclaimer 3)	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	44G	Strip heater w/ thermostat, wired to load terminals: 208-600 volts
3	73CC1	100KA—ASCO 430 series surge suppressor, 100kA per mode. Connected to Normal only 3 Phase 4 Wire Wye
4	119BG	120VAC shunt trip on normal source breaker.
5	119RA	0.4-0.45-0.5-0.6-0.63-0.7-0.8-1
6	134	100% Rated Breaker
7	135L	Power Meter on Load Side with CT

D

C

B

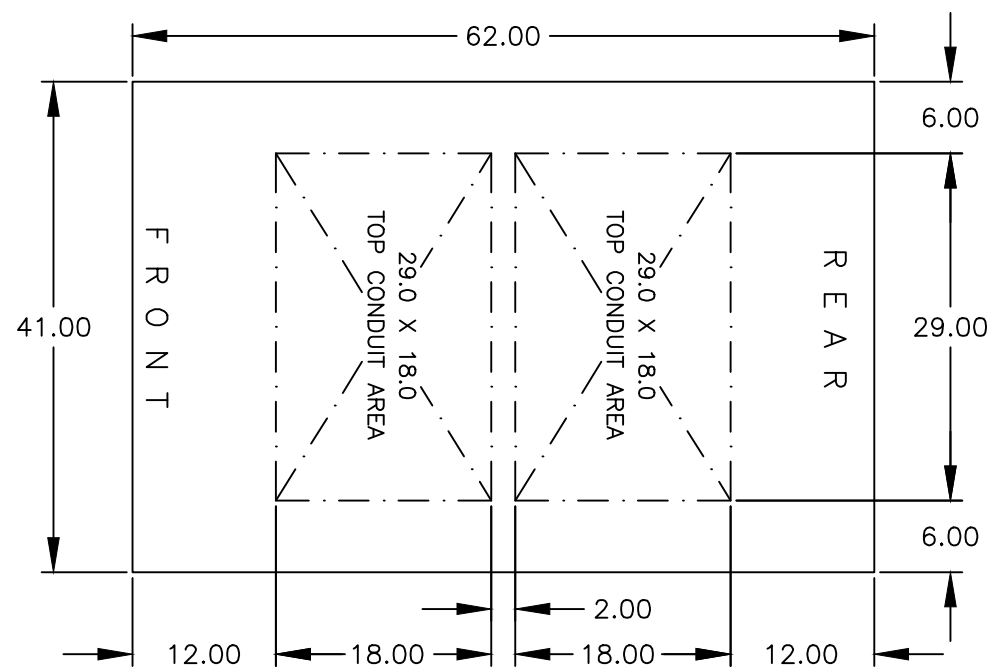
A

D

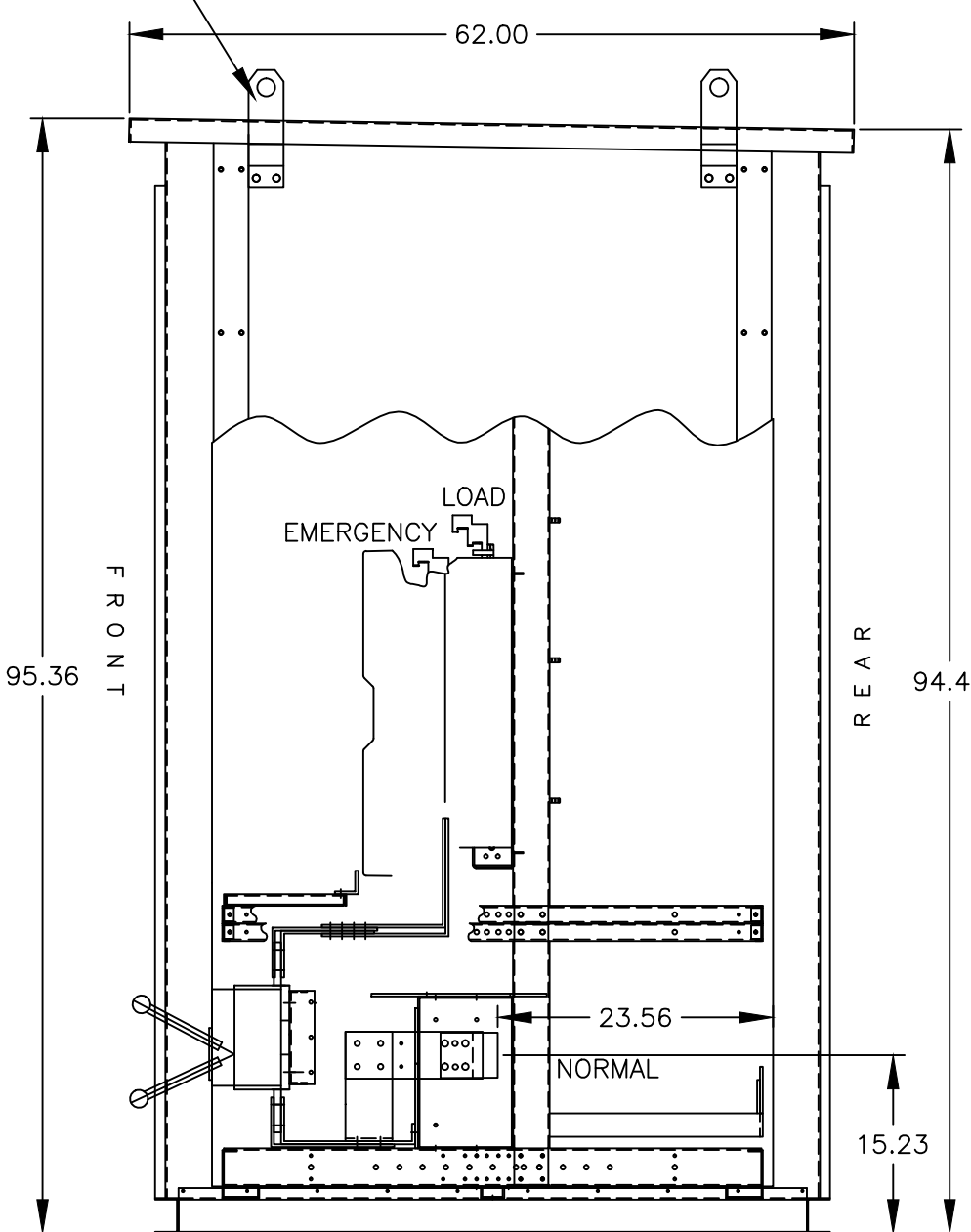
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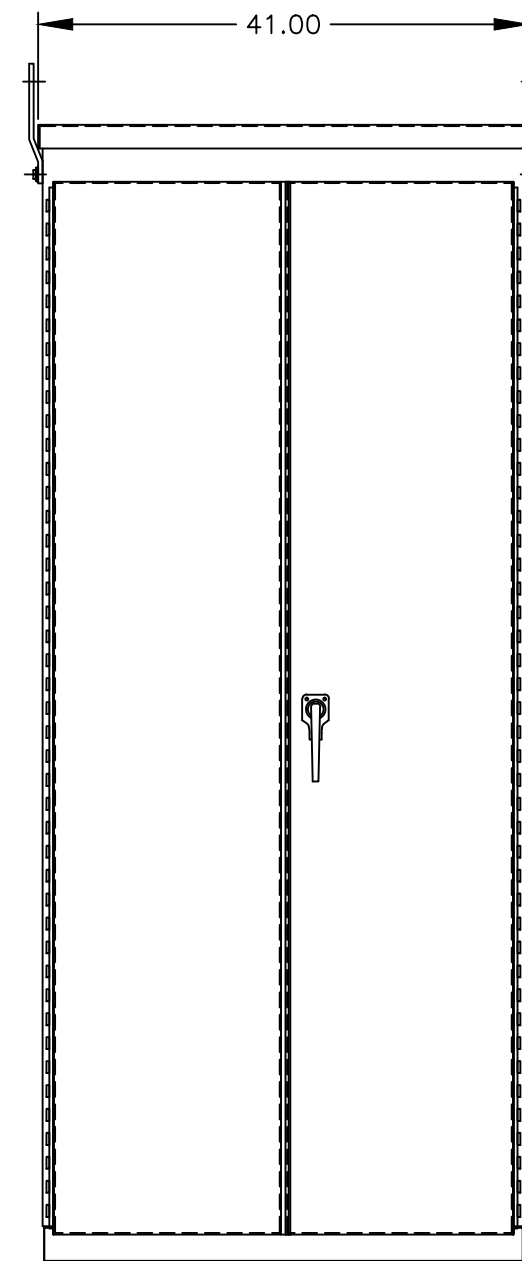
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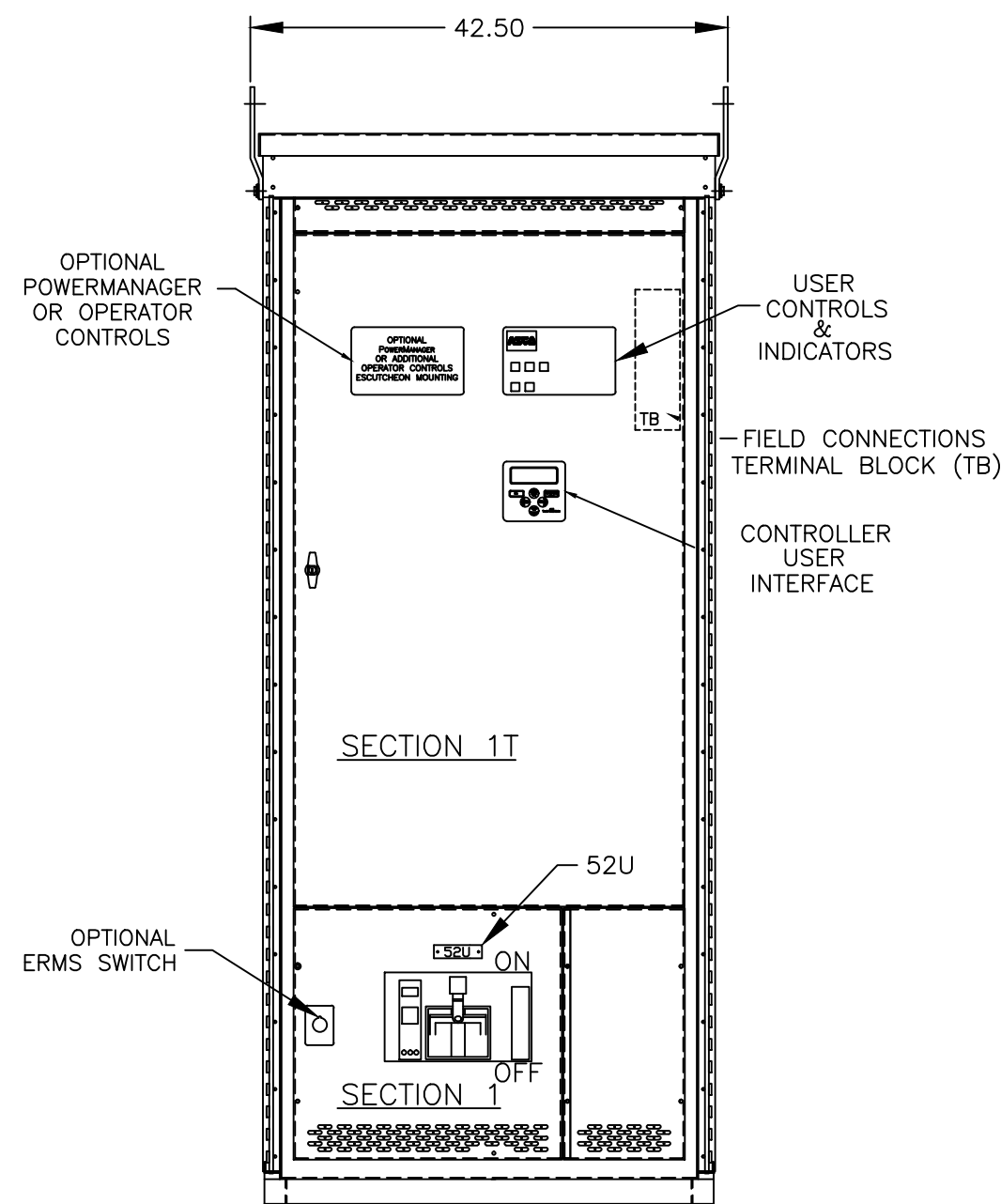
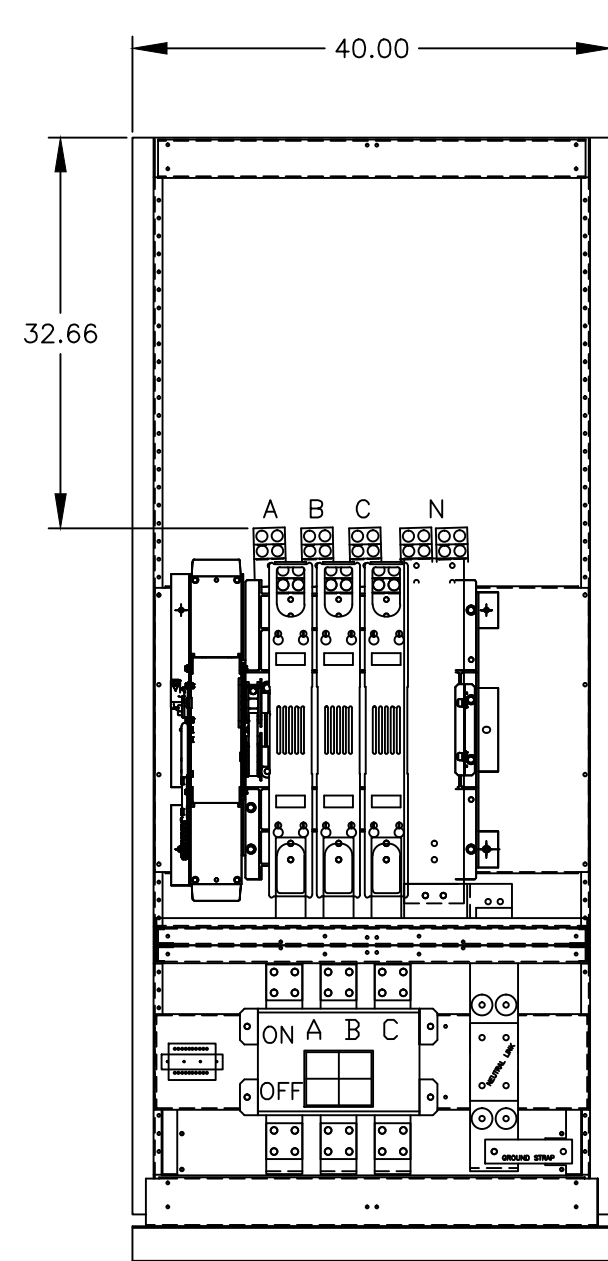
TOP VIEW

LIFTING EYES
SEE NOTE 10

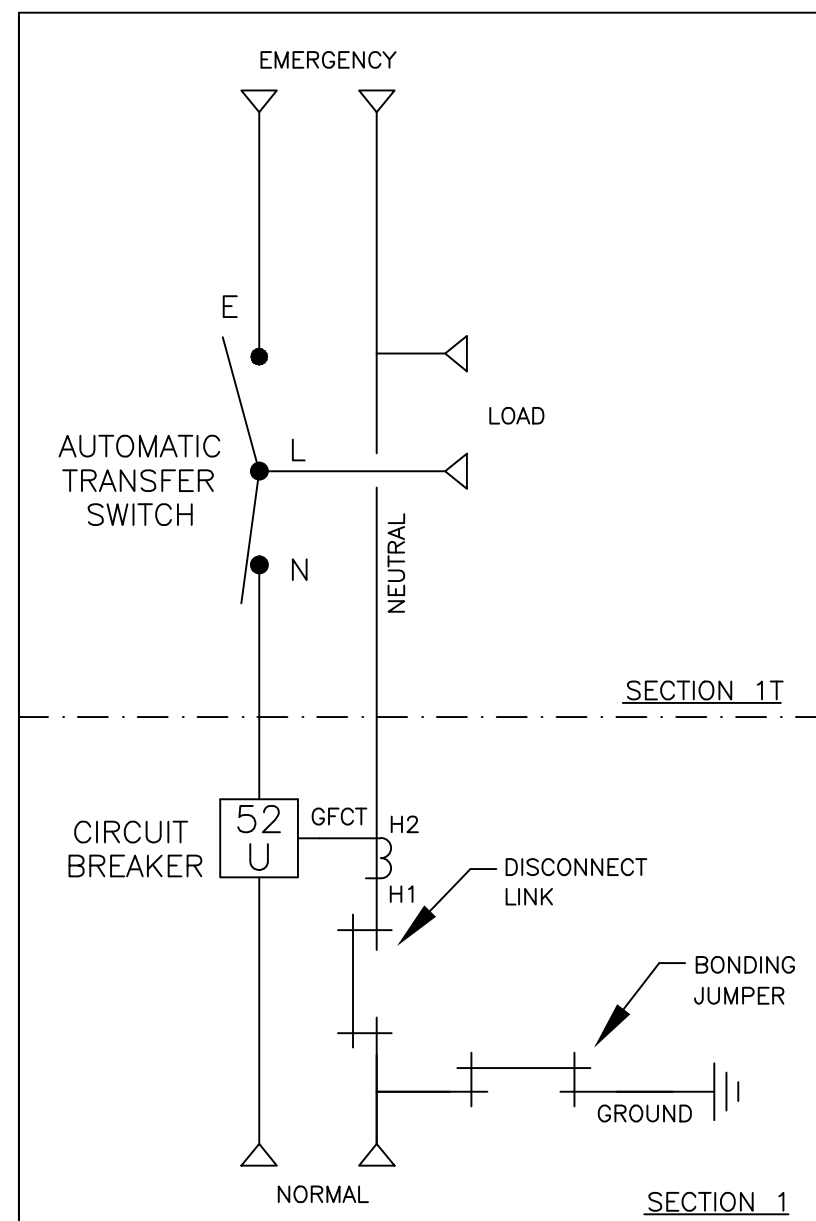
RIGHT SIDE VIEW



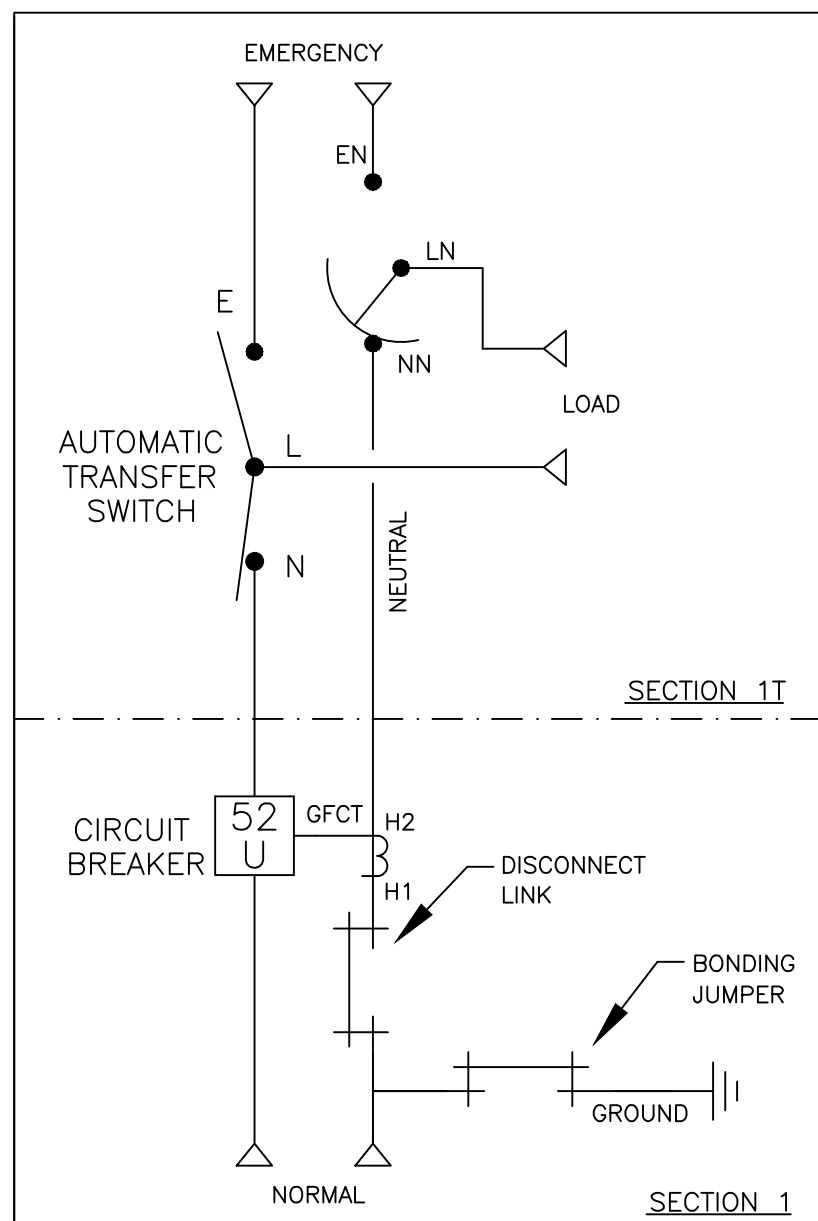
FRONT & REAR VIEW

FRONT VIEW: 7000 SERIES
WITHOUT EXTERIOR DOORSFRONT ELEVATION
INTERIOR VIEW

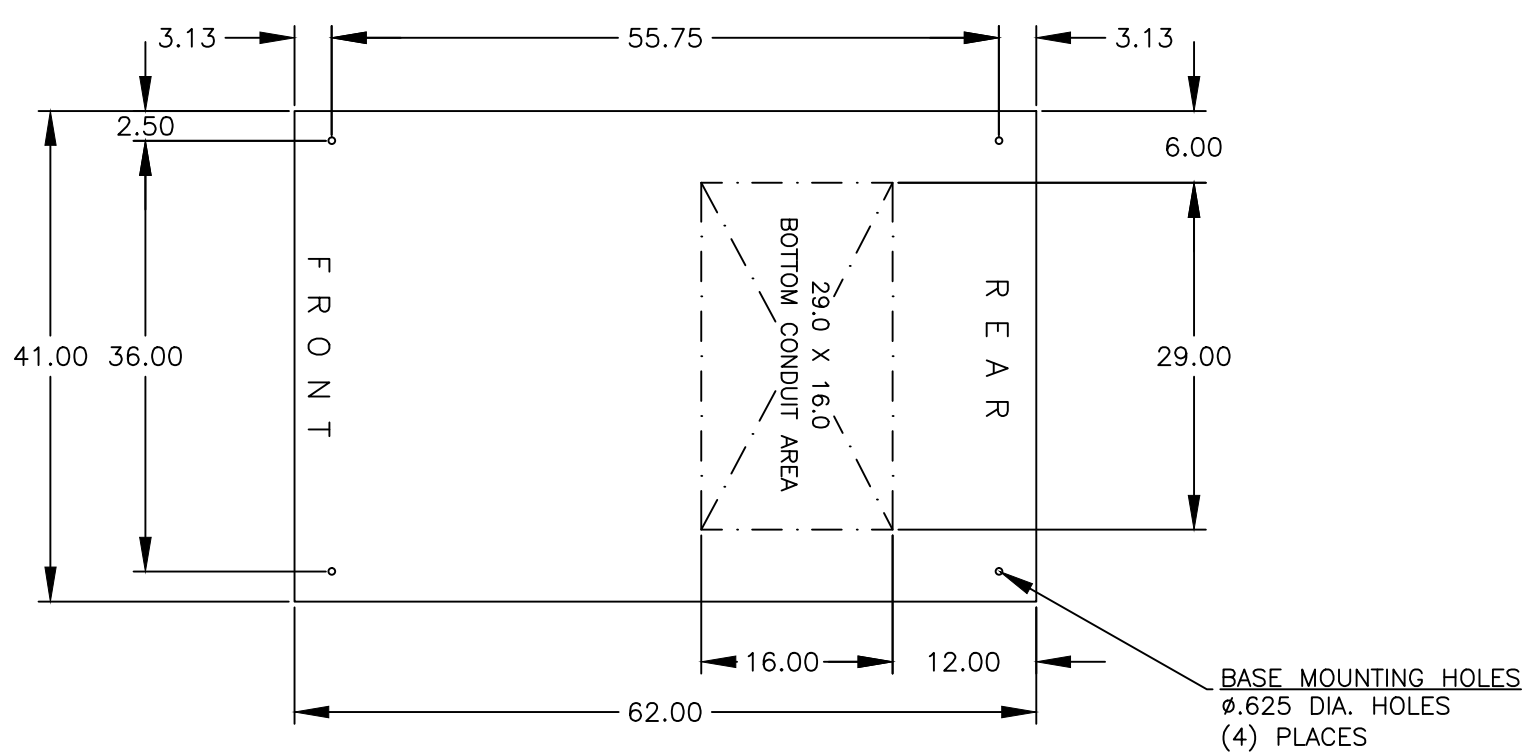
ONE LINE DIAGRAMS



(WITH SOLID NEUTRAL)



(WITH SWITCHED/OVERLAPPING NEUTRAL)



PLAN VIEW

GENERAL NOTES

- FLOOR MOUNTED ENCLOSURE.
TYPE 3R CONSTRUCTED FROM CODE GAUGE STEEL.
FINISH: TYPE 3R, ANSI 61 GRAY POLYESTER SEMI GLOSS ELECTROSTATIC POWDER.
TYPE 3RX EXTERIOR CONSTRUCTED FROM CODE GAUGE STAINLESS STEEL.
(R) EXTERIOR CONSTRUCTED FROM TYPE 304 STAINLESS STEEL.
(S) EXTERIOR CONSTRUCTED FROM TYPE 316 STAINLESS STEEL.
- EXTERIOR DOORS HAVE PADLOCKABLE HANDLES WITH 3-POINT LATCH
- DESIGNED FOR FRONT & REAR ACCESS.
- RECOMMENDED CLEARANCES: FRONT: 38" REAR: 36"
- EXTERIOR VENTS ARE SUPPLIED WITH POLYESTER DUST FILTERS.
- LIFTING PLATES: SECTIONS ARE SUPPLIED WITH LIFTING PLATES. INSPECT PLATES FOR DAMAGE AND TORQUE BOLTS TO 45 FT LBS BEFORE USE. REFER TO ANSI/NEMA PB 2.1 FOR PROPER HANDLING OF EQUIPMENT. AFTER INSTALLATION OF SECTION, REMOVE LIFTING PLATES. REINSTALL BOLTS INTO EXTERIOR HOLES AND TORQUE TO APPROXIMATELY 20 FT LBS.

SYSTEM NOTES

- SYSTEM RATING: 1000 AMPS, 1200 AMPS.
SHORT CIRCUIT RATING: 50,000 RMS SYM @ 480V.
THE EMERGENCY SOURCE MUST BE PROTECTED BY A REMOTE OVERCURRENT PROTECTION DEVICE AS LISTED ON THE MARKINGS ON THE TRANSFER SWITCH.
- ALL BUS IS SILVER-PLATED COPPER, BASED ON 1000A PER SQ. IN. DENSITY.
- GROUND: 20% RATED.
- NEUTRAL: 100% RATED.
- APPLICABLE LABEL(S): U.L. 891, SUITABLE ONLY FOR USE AS SERVICE EQUIPMENT.

TRANSFER SWITCH

- H FRAME AUTOMATIC TRANSFER SWITCH 1000A - 1200A.
- TRANSFER SWITCH RATING: 1000 AMPS, 1200 AMPS.
SHORT CIRCUIT RATING WHEN PROTECTED BY A CIRCUIT BREAKER
TIME RESPONSE, MAXIMUM 0.05 SECONDS: 50,000 RMS SYM @ 480V.
SPECIFIC BREAKER RATING: 65,000 RMS SYM @ 480V.
- A FULL RATED NEUTRAL CONNECTION FOR EACH SOURCE AND THE LOAD IS OPTIONAL.
WHEN PROVIDED IT IS IN ONE OF THE FOLLOWING FORMATS.
A. SOLID NEUTRAL
B. SWITCHED NEUTRAL POLE
C. OVERLAPPING NEUTRAL POLE
- UL 1008

TERMINATIONS 1000A-1200A

- SUPPLIED WITH MECHANICAL (SCREW TYPE) LUGS FOR CU/AL CABLE.
NORMAL: (4) 1/0 - 600MCM PER PHASE & NEUTRAL
LOAD: (4) 1/0 - 600MCM PER PHASE & NEUTRAL
EMERGENCY: (4) 1/0 - 600MCM PER PHASE & NEUTRAL
GROUND: (12) 1/0 - 600MCM
A. SUITABLE WIRE BENDING SPACE IS PROVIDED AS PER NEC.
- OPTIONAL LUGS MAY BE SUPPLIED.

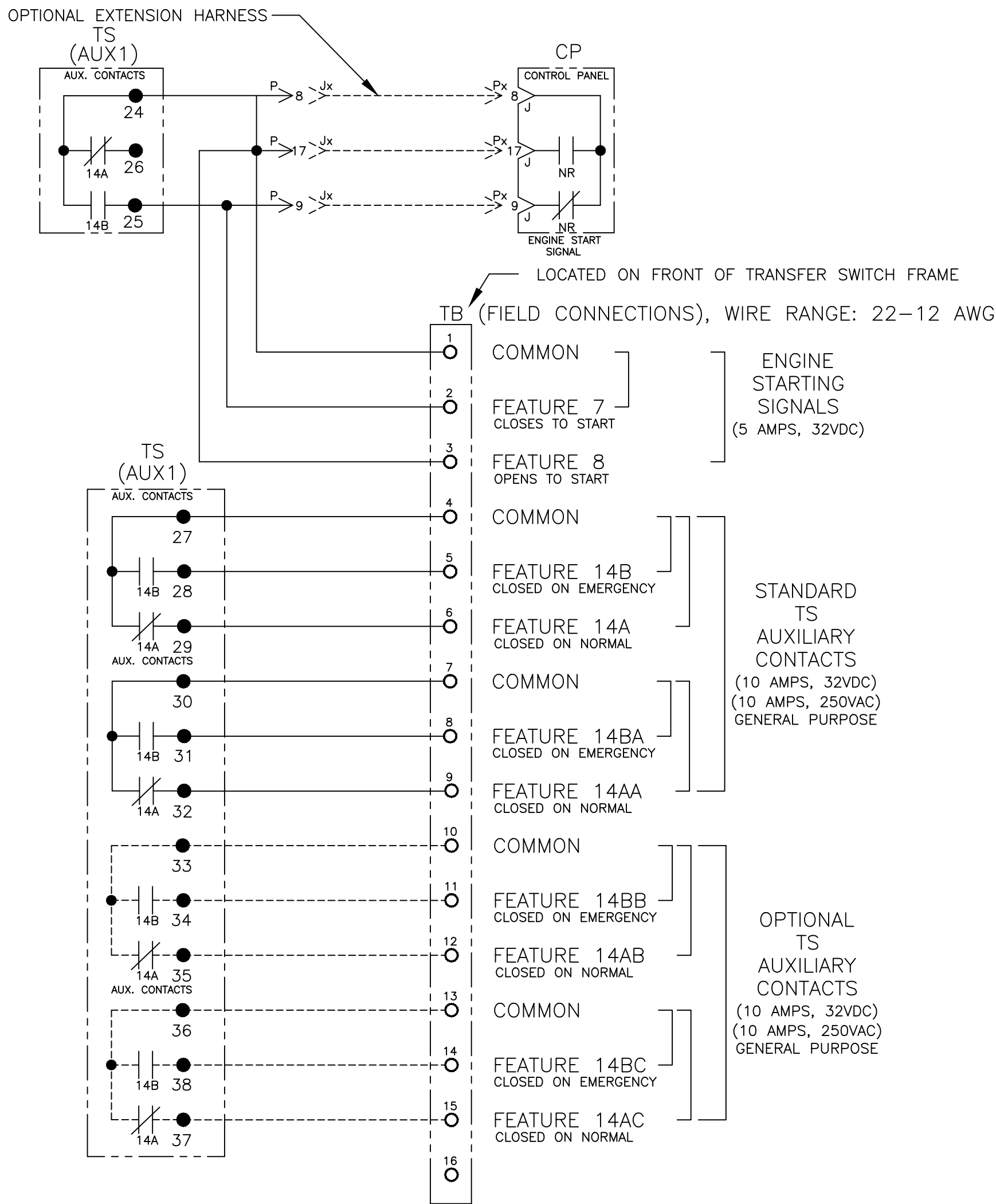
CIRCUIT BREAKER: ITEM 52U

- SQUARE "D" 80% RATED TYPE 'RJF', 3000AF/1000AT, 3000AF/1200AT, STATIONARY MOUNTED, MANUALLY OPERATED, WITH LONG DELAY, SHORT DELAY, INSTANTANEOUS AND GROUND FAULT TRIP SETTINGS.
SHORT CIRCUIT RATING: AIC 65,000 RMS SYM @ 480V.
- OPTIONAL ENERGY REDUCTION MAINTENANCE SETTING SYSTEM MAY BE SUPPLIED.
- OPTIONAL 100% RATED
- U.L. 489

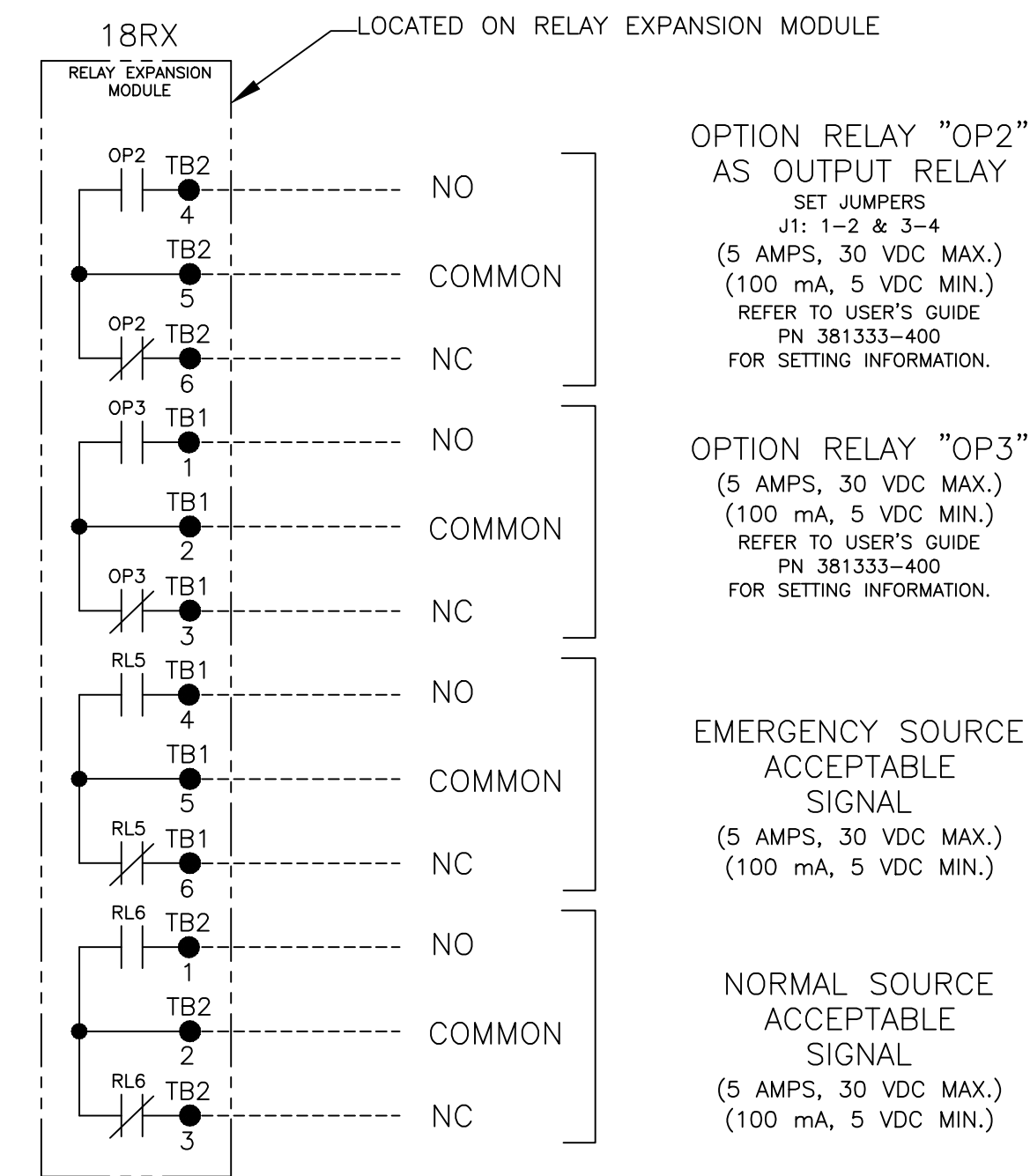
H03AUSA31000CGXM,11BE,44G
73CC1,119BG,119RA,134,135L

PROJECT NAME:		REV. TO SHEET	ECN NO.	BY	APP.	DATE
OUTLINE		MOUNTING				
HAUS, 1000A - 1200A, RJF SE BREAKER ON NORMAL						
TYPE 3R/3RX, 96 X 41 X 62						
DRAWN BY	BY	DATE	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	RN	04/24/07	PROPERTY OF ASCO POWER TECHNOLOGIES. USE PERMITTED FOR OUR WORK ONLY. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.			SCALE 1/16" = 1" SIZE DS
PROJECT APPROVAL						DWG. NO. 754578-051
FINAL APPROVAL			ASCOT [®] ASCO POWER TECHNOLOGIES, L.P. FLORHAM PARK, NEW JERSEY 07932 U.S.A.			DRAWING J ECN NO. 277317 SHEET 1 OF 1

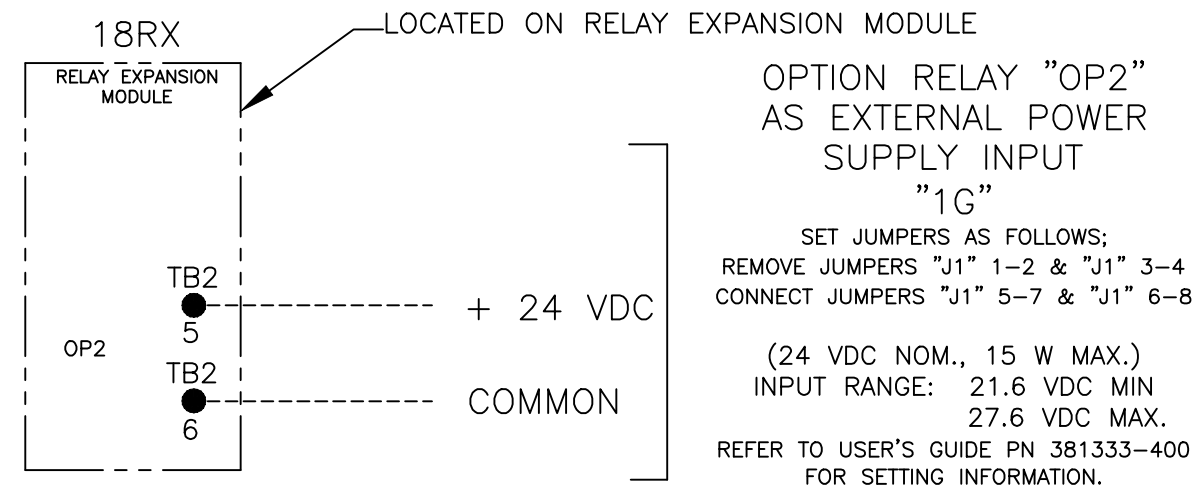
FIELD CONNECTIONS



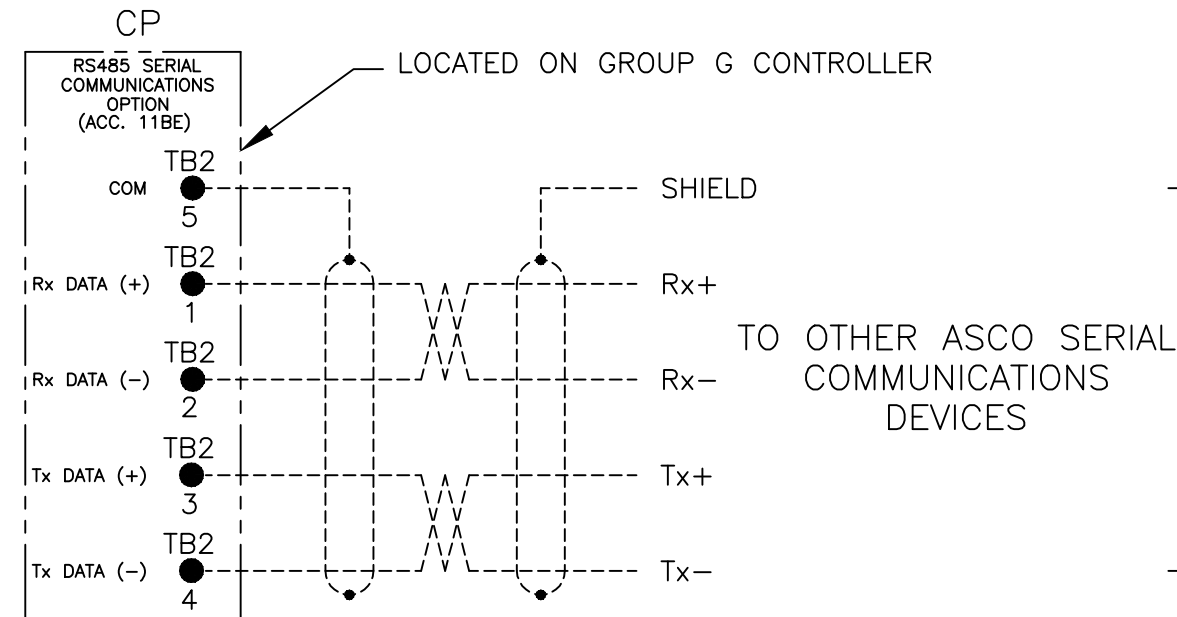
OPTIONAL ACCESSORY 18RX (RELAY EXPANSION MODULE)



"OP2" OPTIONAL USES

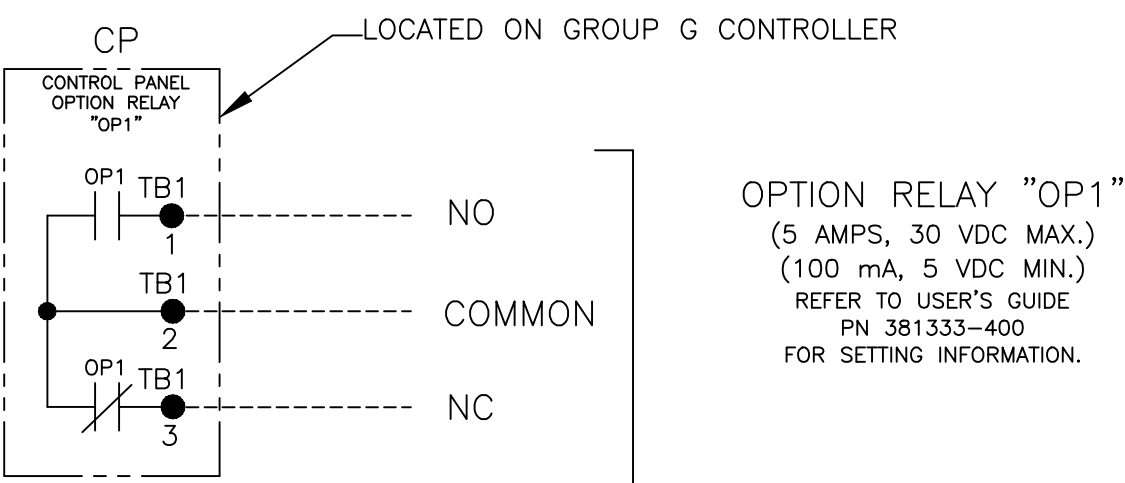


RS485 SERIAL COMMUNICATIONS OPTION AVAILABLE WITH OPTIONAL ACCESSORY 11BE: ADVANCED-FUNCTION SOFTWARE BUNDLE REFER TO USER'S GUIDE PN 381333-400 FOR SETTING INFORMATION.

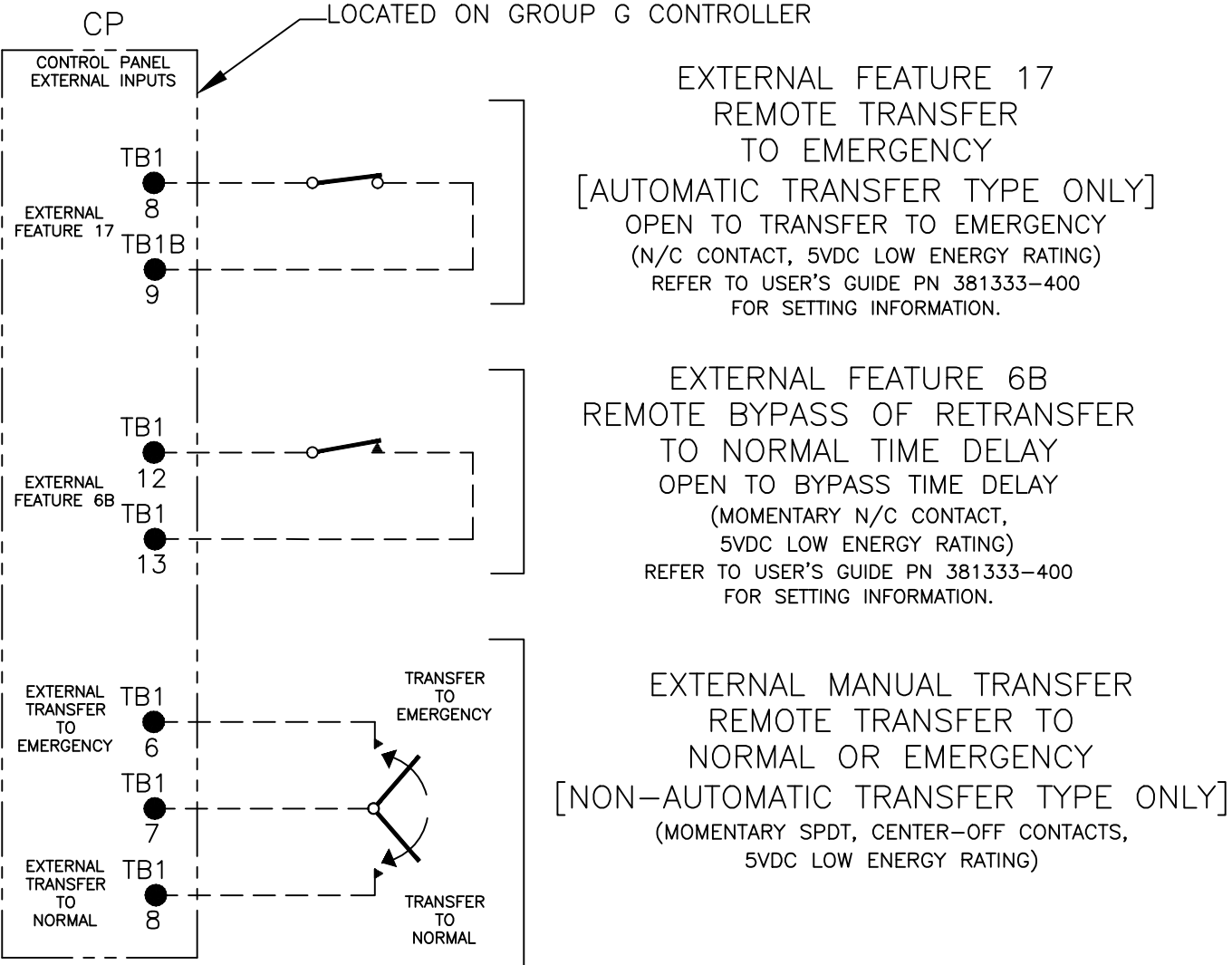


- NOTES:
- EARTH GROUND SHIELD AT HOST DEVICE ONLY.
 - FIELD WIRING: USE UL LISTED, STRANDED, TWISTED PAIRS, OVERALL FOIL SHIELD WITH STRANDED DRAIN WIRE SUITABLE FOR RS422 EQUIVALENT TO:
(STANDARD 80°C) BELDEN 9842 OR 9829 OR ALPHA 6202C OR 6222C
(PLENUM RATED) BELDEN 89729 OR 82729 OR ALPHA 58902

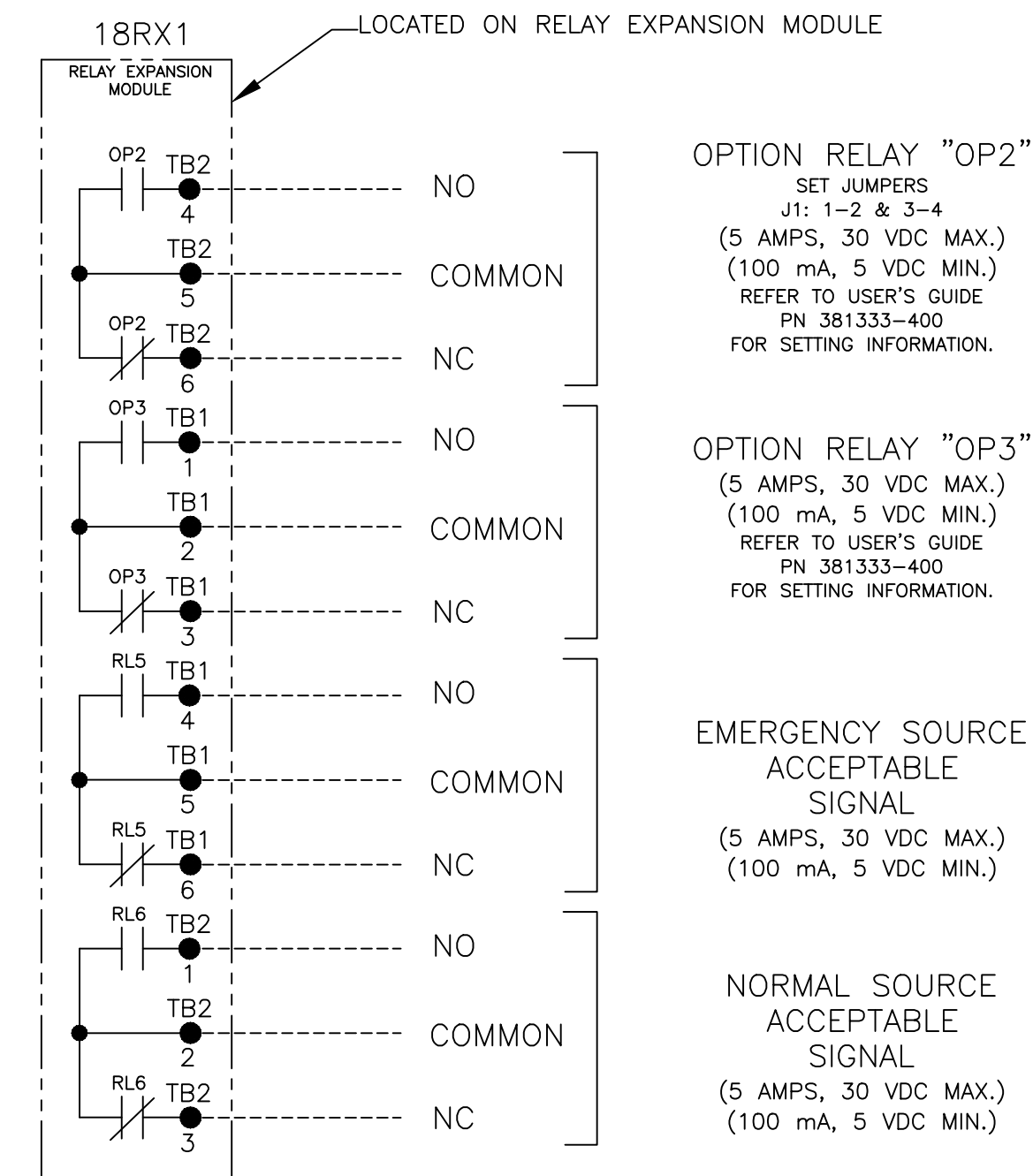
CONTROLLER OPTION RELAY "OP1" (STANDARD)



CONTROLLER REMOTE CONTROL FEATURES



OPTIONAL ACCESSORY 18RX1 (SECOND RELAY EXPANSION MODULE)



G	278250	TR	BK	04/22/19
F	275211	TR	BK	10/15/18
E	255133	TR	BK	6/4/15
D	248402	AE	BK	600A
C	247772	SDH	SDH	4/14/14
B	246325	AE	BK	01/16/14
A	245959	BK	BK	12/23/13
	245204	BK	BK	11/07/13
	ISSUE			

PROJECT NAME:	WIRING	DIAGRAM	REV. TO SHEET	ECN NO.	BY	APP.	DATE
300 SERIES (H3ATS/H3NTS) 3PH 800-1200 AMPS							
"H" FRAME, GROUP G CONTROLS							
DRAWN BY	DJB	11/07/13	MANUFACTURING TOLERANCES TO BE IN ACCORDANCE WITH ASCO PROCEDURE MP-1-003. FOR PLASTIC PARTS SEE MP-1-005	ASSEM. REF. NO.	SCALE	NONE	SIZE DS
CHECKED	BK	11/07/13	PROPERTY OF ASCO POWER TECHNOLOGIES, USE PERMITTED FOR OUR WORK ONLY. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.				
PROJECT APPROVAL	BK	11/07/13					
FINAL APPROVAL							
ASCO	ASCO POWER TECHNOLOGIES, L.P.	FLORHAM PARK, NEW JERSEY 07932 U.S.A.	DWG. NO. 1001657	ECN NO. 278250	SHEET 2 OF 6		

D

C

B

A

D

C

B

A

MAIN POWER POLES

TS OPERATOR CIRCUIT

EMERGENCY

NORMAL

LOAD

EMERGENCY

NORMAL

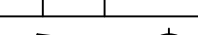
OPTIONAL NEUTRAL TYPES
REFER TO "EXPLANATION OF CATALOG NUMBER CODES"
IN CATALOG NUMBER CHART ON SHEET 1.

- SWITCHING CONTACTS
- SOLID BUS PLATE

NOTE:
ATS/NTS SHOWN CLOSED ON NORMAL SOURCE.

TS CONTROL CONTACTS				
TS	SOLENOID POSITION			
	CLOSED BEFORE NORMAL	BEFORE TDC	BEFORE TDC	CLOSED EMERG
13-14				
15-16				
17-18				
19-20				

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

PROJECT NAME:				REV. TO SHEET	ECN NO.	BY	APP.	DATE
WIRING				DIAGRAM				
300 SERIES (H3ATS/H3NTS) 3PH 800-1200 AMPS								
"H" FRAME, GROUP G CONTROLS								
BY	DATE	MANUFACTURING TOLERANCES TO BE IN ACCORDANCE WITH ASCO PROCEDURE MP-1-003. FOR PLASTIC PARTS SEE MP-1-005			ASSEM. REF. NO.			THIRD ANGLE PROJECTION
DRAWN BY	DJB	11/07/13				COMPUTER GENERATED DRAWING		
CHECKED	BK	11/07/13	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	11/07/13				DWG. NO. 1001657		
FINAL APPROVAL			ASCO ^E ASCO POWER TECHNOLOGIES, L.P. FLORHAM PARK, NEW JERSEY 07932 U.S.A.			DRAWING REV. G ECN NO. 278250 SHEET 3 OF 6		

G	278250	TR	BK	04/22/19
F	275211	TR	BK	10/15/18
E	255133	TR	BK	6/4/15
D	248402	AE	BK	
C	247772	SDH	SDH	4/14/14
B	246325	AE	BK	01/16/14
A	245959	BK	BK	12/23/13
	245204	BK	BK	11/07/13
	ISSUE			

D

C

B

A

D

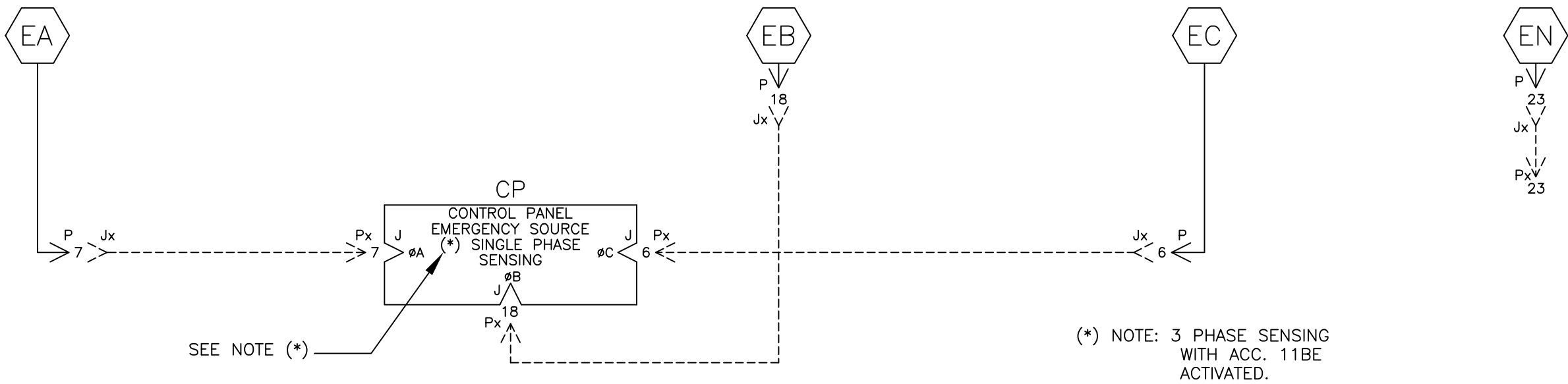
C

B

A

EMERGENCY SOURCE CIRCUITS

EMERGENCY



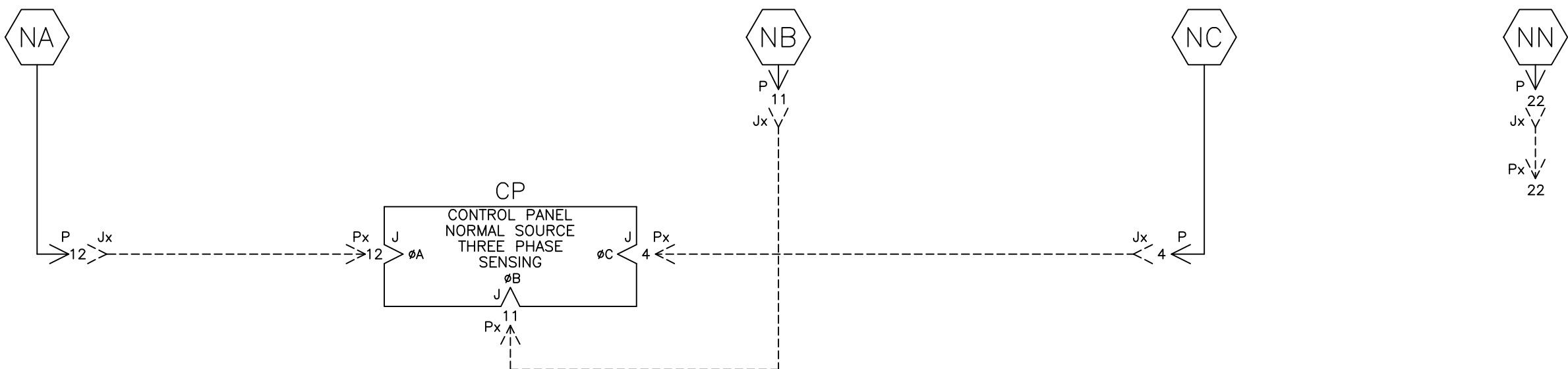
LOAD TERMINAL CIRCUITS

LOAD

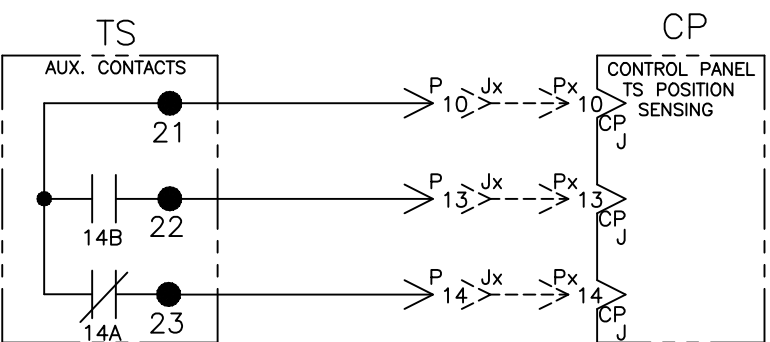


NORMAL SOURCE CIRCUITS

NORMAL



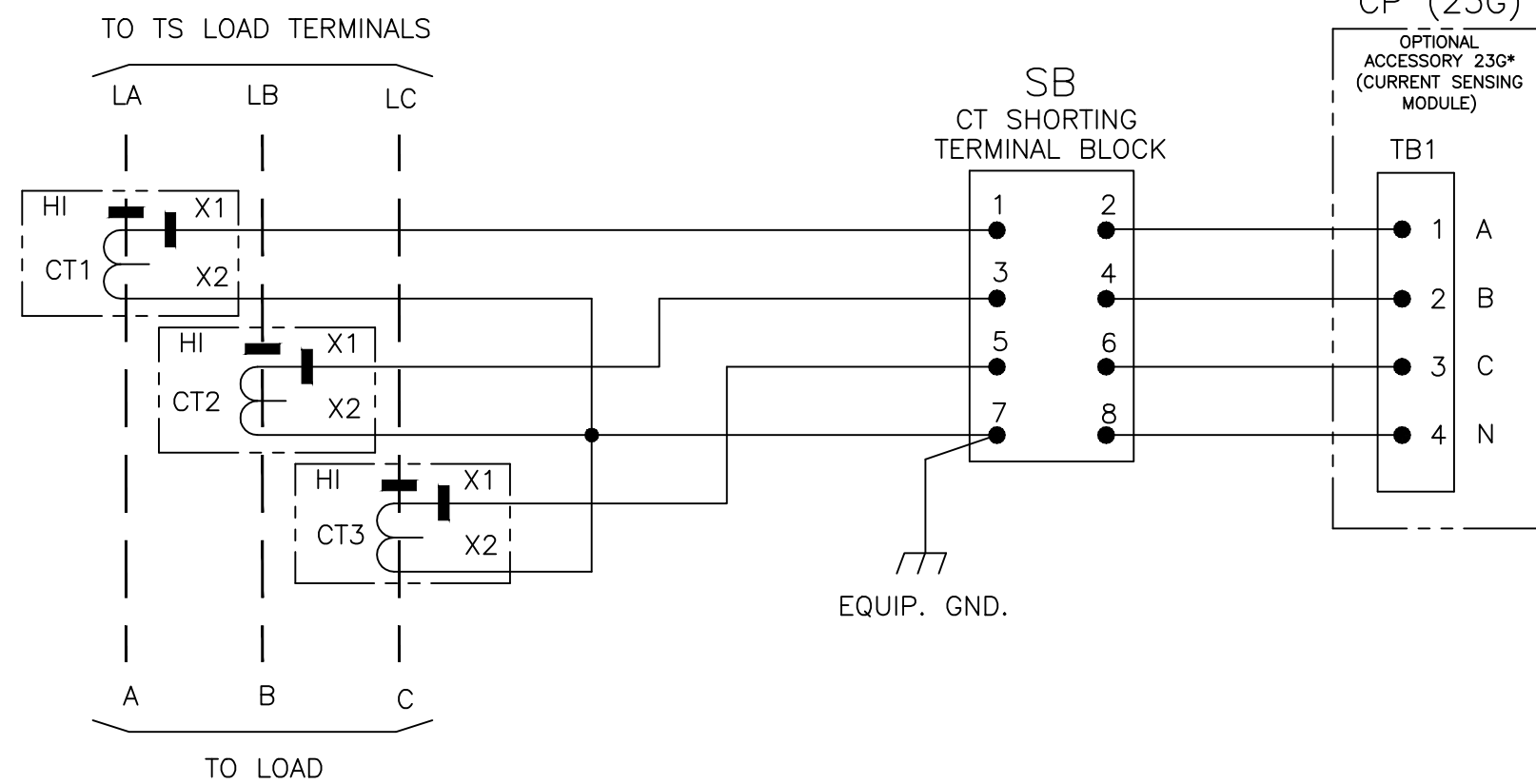
CONTROL CIRCUITS



ADDITIONAL CIRCUITS

OPTIONAL ACCESSORY 23GB (LOAD CURRENT METERING)

CURRENT TRANSFORMER RATIO TABLE	
SWITCH RATING	CT RATIO
800A	800:5A
1000A	1200:5A
1200A	



PROJECT NAME:		REV. TO SHEET	ECN NO.	BY	APP.	DATE
WIRING		DIAGRAM				
300 SERIES (H3ATS/H3NTS) 3PH 800-1200 AMPS						
"H" FRAME, GROUP G CONTROLS						
DRAWN BY	DJB	DATE	11/07/13	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	11/07/13	PROPERTY OF ASCO POWER TECHNOLOGIES, L.P. WORK ONLY. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.	SCALE	NONE
PROJECT APPROVAL	BK	DATE	11/07/13		SIZE	DS
FINAL APPROVAL		DATE			DWG. NO.	1001657
					DRAWING G	ECN NO. 278250
					REV.	4 OF 6

D

C

B

A

D

C

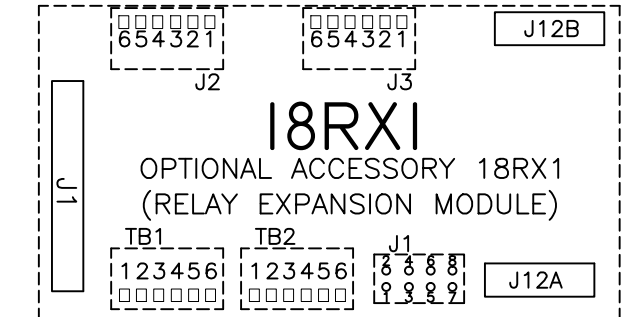
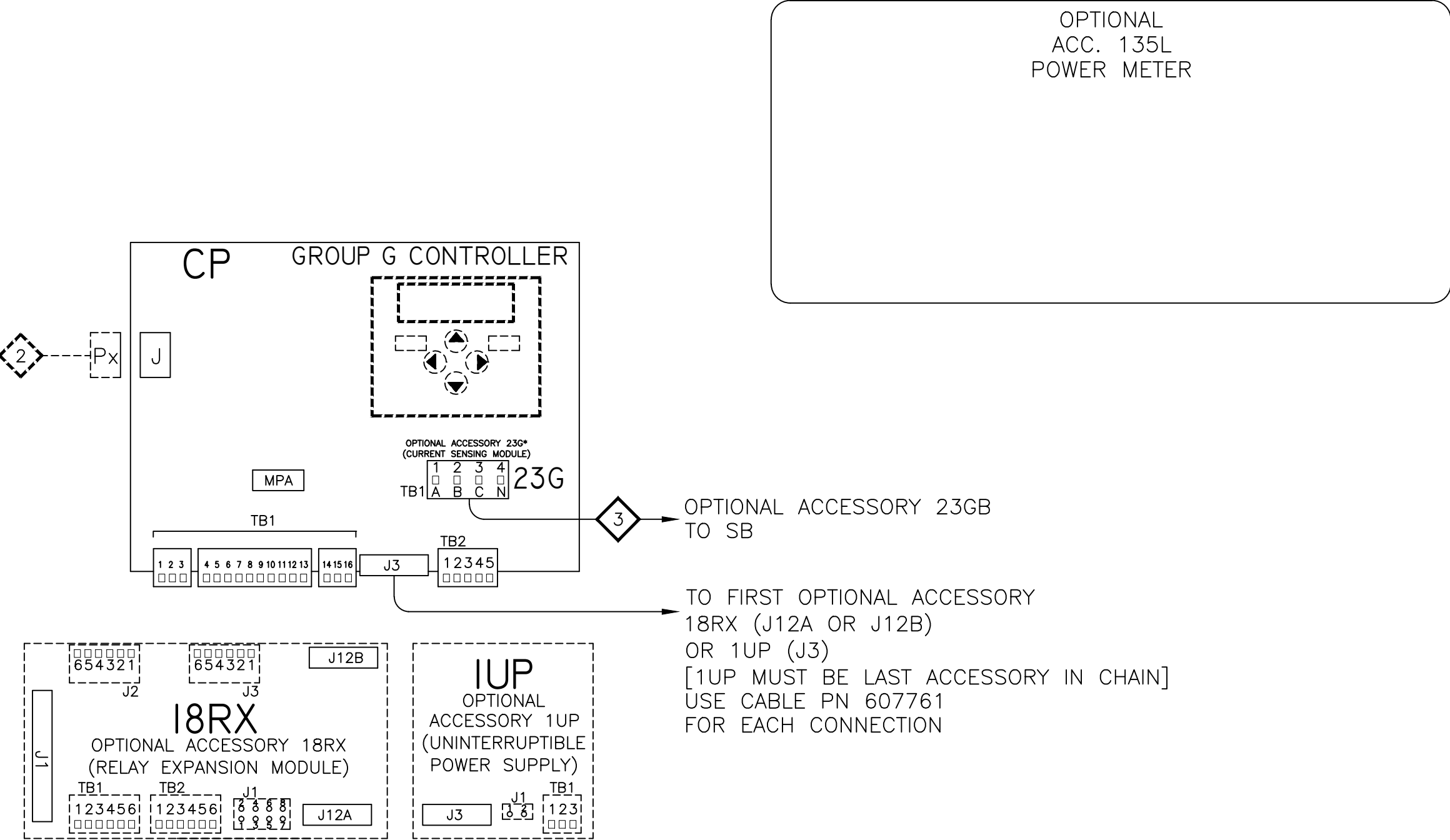
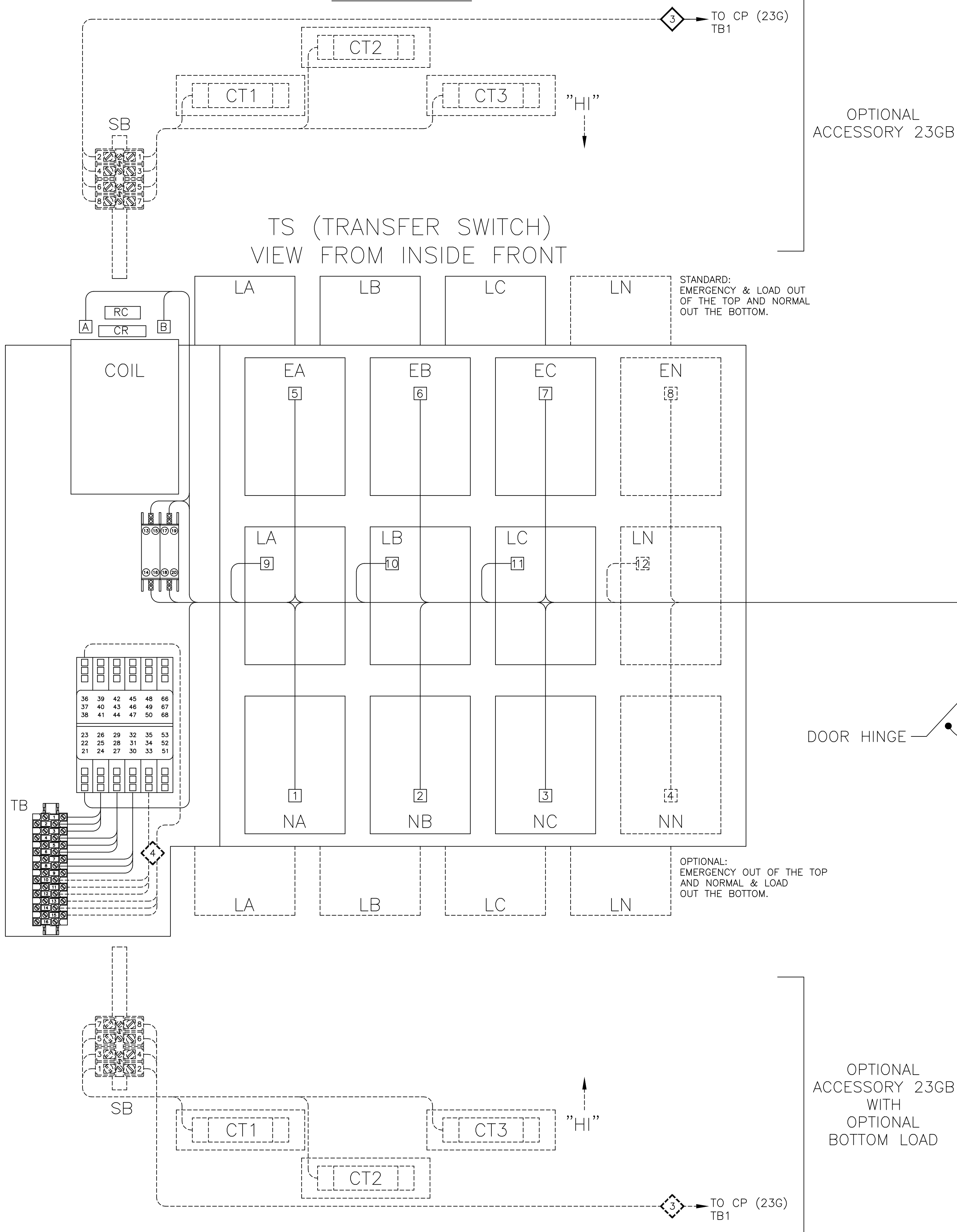
B

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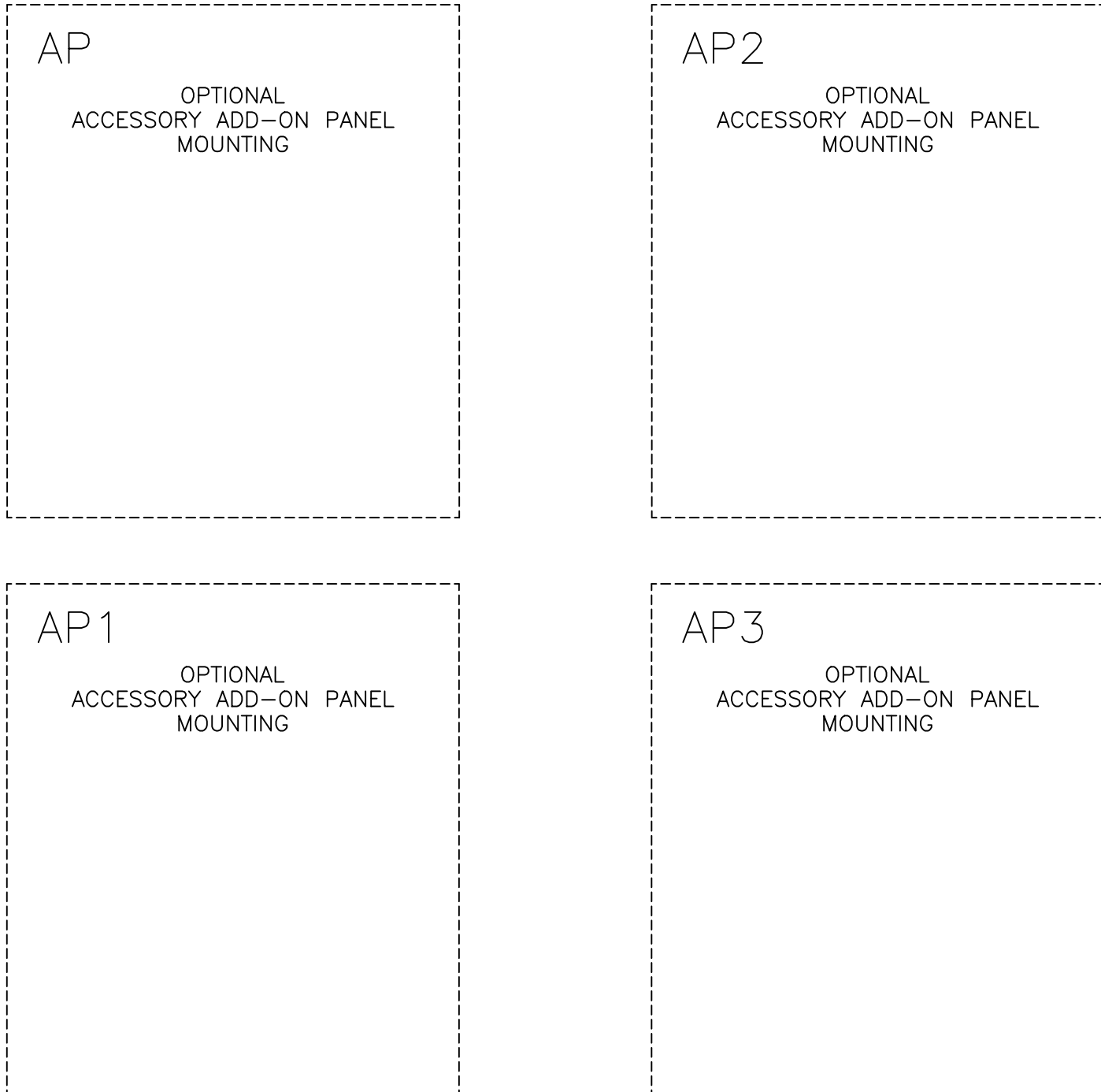
PHYSICAL DIAGRAM

ENCLOSURE

DOOR (INSIDE)



BOTTOM DOOR (INSIDE)



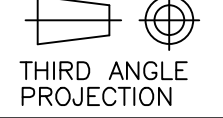
DOOR HINGE

BONDING STRAP
PN 098323-019

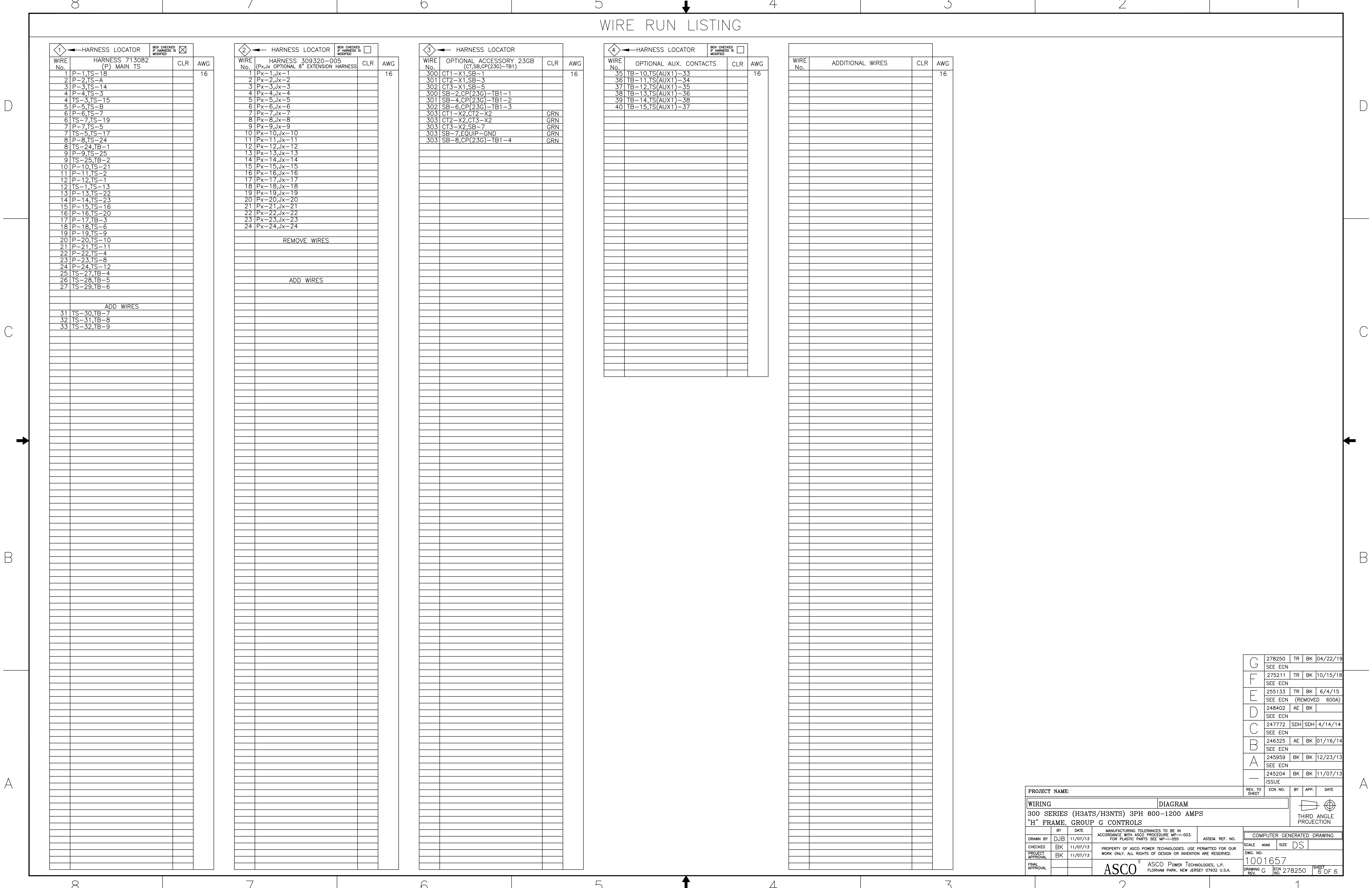
OPTIONAL
ACCESSORY 23GB
WITH
OPTIONAL
BOTTOM LOAD

OPTIONAL
ACC. 135L
POWER METER

PROJECT NAME:		REV. TO SHEET	ECN NO.	BY	APP.	DATE
WIRING		DIAGRAM				
300 SERIES (H3ATS/H3NTS) 3PH 800-1200 AMPS						
"H" FRAME, GROUP G CONTROLS						
DRAWN BY	DJB	DATE	11/07/13	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	11/07/13	PROPERTY OF ASCO POWER TECHNOLOGIES, L.P. WORK ONLY. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.	SCALE	NONE
PROJECT APPROVAL	BK	DATE	11/07/13		SIZE	DS
FINAL APPROVAL		DATE			DWG. NO.	1001657
ASCOT		ASCOT POWER TECHNOLOGIES, L.P.		DRAWING G		
		FLORHAM PARK, NEW JERSEY 07932 U.S.A.		ECN NO. 278250		
				SHEET 5 OF 6		



THIRD ANGLE
PROJECTION



G	278250	TR	BK	04/22/19
SEE ECN				
F	275211	TR	BK	10/15/18
SEE ECN				
E	255133	TR	BK	6/4/15
SEE ECN	(REMOVED	600A)		
D	248402	AE	BK	
SEE ECN				
C	247772	SDH	SDH	4/14/14
SEE ECN				
B	246325	AE	BK	01/16/14
SEE ECN				
A	245959	BK	BK	12/23/13
SEE ECN				
—	245204	BK	BK	11/07/13
ISSUE				

PROJECT NAME:				REV. TO SHEET	ECN NO.	BY	APP.	DATE
WIRING				DIAGRAM				
300 SERIES (H3ATS/H3NTS) 3PH 800-1200 AMPS								
"H" FRAME, GROUP G CONTROLS								
DRAWN BY DJB				DATE 11/07/13		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 11/07/13		PROPERTY OF ASCO POWER TECHNOLOGIES, USE PERMITTED FOR OUR WORK ONLY. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.		SCALE
PROJECT APPROVAL BK				DATE 11/07/13		DWG. NO. 1001657		SIZE DS
FINAL APPROVAL						ASCOPower Technologies, L.P. FLORHAM PARK, NEW JERSEY 07932 U.S.A.		DWG. NO. 1001657
						DRAWING G		ECN NO. 278250
						SHEET 6 OF 6		

Suwannee Court House

Transfer Switch Details

#2	ITEM		QTY: 1
Product Number : 948551		Description :	Kit with ASCO 5140 (72EE) Quad-Ethernet Communications Module and DIN Rail - provides 4 ethernet ports for external communication, 2 CANBUS ports for ASCO device connectivity, remote webpage with email, and MODBUS TCP communications.
Voltage :		Markings :	

Suwannee Court House

Transfer Switch Details

#3	ITEM		QTY: 1
Product Number : 827420		Description :	5310 Annunciator Assy 1 CH. Connects directly to an Ethernet network. Connects directly to a transfer switch accessory 72EE/72EE2.
Voltage :		Markings :	

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 Power Transfer Switch rated 200 amps

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

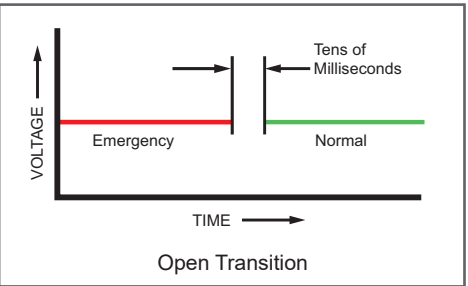
Power Knowledge

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

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.

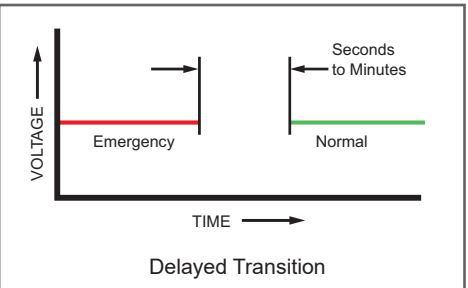
- 30 to 3000 amps
- Single-operator switching mechanism prevents simultaneous connection of both sources
- Available In-Phase Monitor can be activated for transferring motor loads



Delayed Transition Transfer Switching

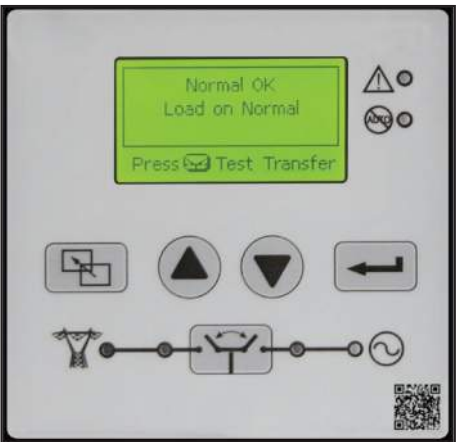
ASCO Delayed Transition Transfer Switches transfer loads between power sources using a timed load disconnect position with an adjustable delay.

- 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



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

Power Knowledge

[Transition Mode Basics](#)

[Transferring Motor Loads between Power Sources](#)

[Transferring Loads with Zero Power Interruption](#)

Product Details

[Group G Controller](#)

GENERATOR SUBMITTAL



TRANSMITTAL

PROJECT NAME: _____

PROJECT NO: _____

OWNER: _____

PO#: _____

SUBMITTED TO: _____

ATTN: _____

EMAIL: _____



ITEMS INCLUDED IN THIS SUBMITTAL		
Qty	Spec Section	Item Description

SUBMITTAL TRANSMISSION			
Qty	Description	Date	Method

☐ RELEASE AS SUBMITTED

☐ RELEASE AS NOTED

☐ REVISE & RESUBMIT

☐ REJECTED

SIGNATURE: _____ DATE: _____

PRINT NAME



ACF Standby Systems
Power Generation

GENERAC
INDUSTRIAL
POWER

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<http://acfstandbysystems.com/>

Zachary Stewart, M.E.

Sales Engineer

Direct (352) 502-2718

Fax (813) 621-6980

Email z.stewart@acfpower.com

SCOPE OF SUPPLY



A-F Standby Systems
Power Generation



Date: March 8, 2022

To: Shannon Roberts

Reference: Suwannee Co - 150kW NG – **REV2**

We are pleased to offer the following quote for the above project:

FSA20-EQU18.0: HEAVY EQUIPMENT

Quantity 1 - Generac Industrial gaseous 9.0L V-8 engine-driven generator, consisting of the following features and accessories:

- Stationary Emergency-Standby rated

- **150 kW Rating, wired for 120/208 VAC three phase, 60 Hz**
- *Permanent Magnet Excitation*
- **Level 2 Acoustic Enclosure, Aluminum**
 - Industrial Grey Baked-On Powder Coat Finish
- **150 MPH Wind Load Certified**
- UL2200
- EPA Certified
- H-100 Control Panel
 - Meets NFPA 99 and 110 requirements
 - Temp Range -40 to 70 degrees C
 - Digital Microprocessor:
 - Two 4-line x 20 displays, full system status
 - 3 Phase sensing, +/-0.25% digital voltage regulation
 - RS232, RS485 and Canbus remote ports
 - Waterproof connections
 - All engine sensors are 4-20ma for minimal interference
 - Programmable I/O
 - Built-in PLC for special applications
 - Engine function monitoring and control:
 - Full range standby operation; programmable auto crank, Emergency Stop, Auto-Off-Manual switch
 - Isochronous Governor, +/-0.25% frequency regulation
 - Full system status on all AC output and engine function parameters
 - Service reminders, trending, fault history (alarm log)
 - I2T function for full generator protection
 - Selectable low-speed exercise
 - 2-wire start controls for any 2-wire transfer switch
- *21 Light Annunciator - Surface*
- *Remote Emergency Stop Switch, break-glass, shipped loose*
- Natural Gas fuel system (7-11")
- 90 AH, 700 CCA Group 27F Battery, with rack, installed
- **150 MPH Wind Load Certified**
- Air Filter Restriction Ind
- Battery Charger, 10 Amp, NFPA 110 compliant, installed
- Coolant Heater, 1500W, 120VAC
- Pad Vibration Isolators
- AC/DC Enclosure Interior LED Lighting Kit
- Std set of 3 Manuals
- 120V GFCI and 240V Outlet
- Extreme Cold Weather Kit
- Flex Fuel Line
- Flush Mount Annunciator Kit
- *MLCB, 100% rated, LSI Electronic Trip*
 - **600 Amp**
 - Shunt trip and Auxiliary Contacts
- *Secondary MLCB, 100% rated, LSI Electronic Trip*
 - **600 Amp**
 - Shunt trip and Auxiliary Contacts
- *5-Year Comprehensive Warranty*

Quantity 1 - Start-up and testing Including a **2-hour load bank test & 2-hour Building Load Test, M-F, 8A-5P, No Holidays**. Maximum is one trip for this start-up. It is the contractor's responsibility to ensure this generator set is completely installed, and all fuel tank testing is completed before the start up is scheduled. If at time of start-up, the installation is incomplete and/or no fuel available, an additional trip will be required to complete this start-up. Additional trip(s) will be billed to our customer.

NOTES:

- Field start-up and testing conducted by a Factory Trained Certified Technician
- **Onsite training to be done on the same day as start-up(if return trip required a return trip fee will be required)**

- Start-up and testing is limited to one (1) day on site as described above.
- Load Bank Testing will be done using a resistive type load bank.

Access within 50 feet of the generator must be provided for the load bank test. If the distance between the load bank and the generator is greater than 50 feet, we reserve the right to requote this start-up and load bank testing. The distance must be provided to calculate the required additional cable and cost for this testing.

Quantity 1 - Freight to job site off-loading by others

Clarifications and Exceptions:

- *ACF is not supplying a space heater with Fixed Louvers. Heat will escape enclosure. Space heater is not necessary for Florida Climate.*
- *ACF is not supplying any automatic Dampers. Not required.*
- *ACF is not supplying Insulation Resistance Tests. supplied by others.*
- *Infrared Scanning supplied by others.*
- *ACF is not supplying an electrical installation, NG Piping, or gas regulators. ACF is supplying 150kW NG Generator equipment only.*
- Local Noise Ordinances unknown. Should lower dBA rating required price is subject to change.
- No Enclosure Wind Load P.E. Calculations. Optional adder.
- Buyers referenced to local, state, or federal government requirements.
- No Anchoring Calculations and/or anchors.
- Fire Pump ATS Provided by Others
- No Offloading.
- No installation.
- No rigging.
- No power systems or selective coordination study.
- Equipment performance beyond manufacturer's design.
- No Storage or insurance.
- No third-party electrical apparatus testing / inspections, and/or special testing (emissions, noise, harmonics, etc...
- NO NETA Testing Must be performed by third party agency.
- No Special testing equipment (oscilloscope, thermal camera, harmonic analyzer, InfraRed, etc...
- No general, civil and/or plumbing work or materials.
- No electrical and/or mechanical work including materials.
- No engineering or permitting.
- No third-party testing agency.
- If this project is an AHCA project and AHCA does not approve quote additional cost could occur to make AHCA Compliant.
- No Sound Testing by ACF.
- No fuel or equipment rental.
- No Sub-base in field pressure integrity testing.
- Arc Flash/ Coordination studies are to be completed by others.

Notes

1. This Quotation is based upon Engineering Specifications ____263213____ & Drawings ____N/A____. No other sections shall apply.
2. Quotation is valid for 60 days. If not released to production within 60 days, pricing, delivery extension and escalation charges may apply.

3. ACF Standby Systems is not responsible for any delays in delivery due to Act of Nature, explosion, fire, strikes, accidents, war, terrorism, flood, accidents or other causes beyond our company control. Quoted shipping schedules are not guaranteed and subject to change without notice. In no case is ACF Standby Systems responsible for incidental or consequential damages.
4. ACF Standby Systems does not accept liquidated damages as a part of third party contracts.
5. Equipment will be invoiced (and payment expected according to ACF's Terms and Conditions) at the time of shipment or when ready to ship from point of origin. Delays by the buyer may result in storage fees and/or additional freight charges.
6. Completed equipment to be delivered to a 3rd party manufacturer for further fabrication will be invoiced upon shipment to the 3rd party manufacturer.
7. The warranty is that of the above-named manufacturer(s). Refer to the manufacturer's warranty statement for details. No special warranty is implied. The Manufacturer's warranty begins on the day of start-up or 6 months after shipment, whichever occurs first, not substantial completion. It is the contractor's responsibility to coordinate start-up along with the date of substantial completion.
8. If the generator set is not installed and ready for startup within 6 months of shipment it will require long term storage procedures. Please refer to the Operation and Maintenance Manual for such requirements. All costs related to long term storage is the responsibility of the purchaser. Failure to follow these procedures may void warranty and affect equipment operation. Contact ACF Standby Systems for assistance.
9. Additional sets of O&M manuals are available at an additional cost. The manufacturer's standard format shall apply. Custom O&M manuals will be available at an additional charge.
10. Startup services will not proceed until the buyer's account is current and in good standing.
11. Quotation does not include offloading, rigging, anchoring, installation, exhaust plumbing, exhaust insulation, fuel or permitting.
12. ACF Standby Systems is not responsible for testing of fuel tank(s) provided by any party. Fuel tank testing, as required by FDEP (Florida Department of Environmental Protection) Chapters 62-761 and 62-762, is the responsibility of the installing Contractor and Generator Permit Applicant. ACF Standby Systems LLC is not responsible for damages or costs incurred by any party, when a fuel tank is filled before field testing required under FDEP or testing mandated by a Local Inspector of Authority under FBC, is performed.
13. Pricing is subject to ACF Standby Systems' Payment Terms.

Terms and Conditions

This proposal is subject to ACF Terms and Conditions of Sale, attached.

Sincerely,

Zach Stewart

ACF Standby Systems, LLC / GENERAC Industrial Distributor
(352) 502-2718
z.stewart@acfpower.com

Acceptance of Quote

Prior to ordering equipment or services, please sign and return as a confirmation of the content of this proposal and the attached terms and conditions

Customer Signature

_____ PO# _____

SPECIFICATION SHEET

SG150 | 9.0L | 150 kW
INDUSTRIAL SPARK-IGNITED GENERATOR SET
EPA Certified Stationary Emergency and Non-Emergency

GENERAC® | **INDUSTRIAL POWER**

DEMAND RESPONSE READY

Standby Power Rating
150 kW, 188 kVA, 60 Hz



Image used for illustration purposes only

Codes and Standards

Not all codes and standards apply to all configurations. Contact factory for details.



UL2200, UL508, UL489



CSA C22.2



BS5514 and DIN 6271



SAE J1349



NFPA 37, 70, 99, 110



NEC700, 701, 702, 708



ISO 3046, 7637, 8528, 9001



NEMA ICS10, MG1, 250, ICS6, AB1



ANSI C62.41



IBC 2009, CBC 2010, IBC 2012,
ASCE 7-05, ASCE 7-10,
ICC-ES AC-156 (2012)

Powering Ahead

Generac ensures superior quality by designing and manufacturing most of its generator components, such as alternators, enclosures, control systems and communications software. Generac also makes its own spark-ignited engines, and you'll find them on every Generac gaseous-fueled generator. We engineer and manufacture them from the block up — all at our facilities throughout Wisconsin. Applying natural gas and LP-fueled engines to generators requires advanced engineering expertise to ensure reliability, durability and necessary performance. By designing specifically for these dry, hotter-burning fuels, the engines last longer and require less maintenance. Building our own engines also means we control every step of the supply chain and delivery process, so you benefit from single-source responsibility.

Plus, Generac Industrial Power's distribution network provides all parts and service so you don't have to deal with third-party suppliers. It all leads to a positive owner experience and higher confidence level. Generac spark-ignited engines give you more options in commercial and industrial generator applications as well as extended run time from utility-supplied natural gas.

SG150 | 9.0L | 150 kW

INDUSTRIAL SPARK-IGNITED GENERATOR SET

EPA Certified Stationary Emergency and Non-Emergency

STANDARD FEATURES

DEMAND RESPONSE READY

ENGINE SYSTEM

- Oil Drain Extension
- Air Cleaner
- Fan Guard
- Stainless Steel Flexible Exhaust Connection
- Factory Filled Oil and Coolant
- Radiator Duct Adapter (Open Set Only)
- Critical Silencer/Catalyst

Fuel System

- NPT Fuel Connection on Frame
- Primary and Secondary Fuel Shutoff

Cooling System

- Closed Coolant Recovery System
- UV/Ozone Resistant Hoses
- Factory-Installed Radiator
- 50/50 Ethylene Glycol Antifreeze
- Radiator Drain Extension

Electrical System

- Battery Charging Alternator
- Battery Cables
- Battery Tray
- Rubber-Booted Engine Electrical Connections
- Solenoid Activated Starter Motor

ALTERNATOR SYSTEM

- UL2200 GENprotect™
- Class H Insulation Material
- 2/3 Pitch
- Skewed Stator
- Permanent Magnet Excitation
- Sealed Bearings
- Amortisseur Winding
- Full Load Capacity Alternator

GENERATOR SET

- Internal Genset Vibration Isolation
- Separation of Circuits - High/Low Voltage
- Separation of Circuits - Multiple Breakers
- Wrapped Exhaust Piping
- Standard Factory Testing
- 2 Year Limited Warranty (Standby Rated Units)
- Silencer Mounted in the Discharge Hood (Enclosed Units Only)

ENCLOSURE (If Selected)

- Rust-Proof Fasteners with Nylon Washers to Protect Finish
- High Performance Sound-Absorbing Material (Sound Attenuation Enclosures)
- Gasketed Doors
- Stamped Air-Intake Louvers
- Upward Facing Discharge Hoods (Radiator and Exhaust)
- Stainless Steel Lift Off Door Hinges
- Stainless Steel Lockable Handles
- RhinoCoat™ - Textured Polyester Powder Coat Paint

CONTROL SYSTEM



Digital H Control Panel- Dual 4x20 Display

Program Functions

- Programmable Crank Limiter
- 7-Day Programmable Exerciser
- Special Applications Programmable Logic Controller
- RS-232/485 Communications
- All Phase Sensing Digital Voltage Regulator
- 2-Wire Start Capability
- Date/Time Fault History (Event Log)
- Isochronous Governor Control
- Waterproof/Sealed Connectors
- Audible Alarms and Shutdowns
- Not in Auto (Flashing Light)

- Auto/Off/Manual Switch
- E-Stop (Red Mushroom-Type)
- NFPA 110 Level I and II (Programmable)
- Customizable Alarms, Warnings, and Events
- Modbus® Protocol
- Predictive Maintenance Algorithm
- Sealed Boards
- Password Parameter Adjustment Protection
- Single Point Ground
- 16 Channel Remote Trending
- 0.2 msec High Speed Remote Trending
- Alarm Information Automatically Annunciated on the Display

Full System Status Display

- Power Output (kW)
- Power Factor
- kW Hours, Total, and Last Run
- Real/Reactive/Apparent Power
- All Phase AC Voltage
- All Phase Currents
- Oil Pressure
- Coolant Temperature
- Coolant Level

- Engine Speed
- Battery Voltage
- Frequency

Alarms and Warnings

- Oil Pressure
- Coolant Temperature
- Coolant Level
- Low Fuel Pressure
- Engine Overspeed
- Battery Voltage
- Alarms and Warnings Time and Date Stamped
- Snap Shots of Key Operation Parameters During Alarms and Warnings
- Alarms and Warnings Spelled Out (No Alarm Codes)

SG150 | 9.0L | 150 kW

INDUSTRIAL SPARK-IGNITED GENERATOR SET

EPA Certified Stationary Emergency and Non-Emergency

APPLICATION AND ENGINEERING DATA

DEMAND RESPONSE READY

ENGINE SPECIFICATIONS

General

Make	Generac
Cylinder #	8
Type	V
Displacement - in ³ (L)	543 (8.9)
Bore - in (mm)	4.49 (114.3)
Stroke - in (mm)	4.25 (108)
Compression Ratio	G18 - 10.5:1 / G26 - 9.1:1 *
Intake Air Method	Turbocharged/Aftercooled
Number of Main Bearings	5
Connecting Rods	Forged Steel
Cylinder Head	Cast Iron
Cylinder Liners	No
Ignition	High Energy
Piston Type	Aluminum Alloy
Crankshaft Type	Forged Steel
Lifter Type	Hydraulic Roller
Intake Valve Material	Steel Alloy
Exhaust Valve Material	Stainless Steel
Hardened Valve Seats	Yes

Engine Governing

Governor	Electronic
Frequency Regulation (Steady State)	±0.25%

Lubrication System

Oil Pump Type	Gear Driven
Oil Filter Type	Full-Flow Spin-On Cartridge
Crankcase Capacity - qt (L)	G18 - 8.5 (8.0) / G26 - 9.5 (10.0) *

Cooling System

Cooling System Type	Pressurized Closed
Fan Type	Pusher
Fan Speed - RPM	G18 - 2,330 / G26 - 2,386 *
Fan Diameter - in (mm)	22 (559)

Fuel System

Fuel Type	Natural Gas, Propane Vapor/Liquid
Carburetor	Down Draft
Secondary Fuel Regulator	Standard
Fuel Shut Off Solenoid	Standard
Operating Fuel Pressure - in H ₂ O (kPa)	7 - 11 (1.7 - 2.7)
Operating Fuel Pressure (LPL) - psi (kPa)	30 - 312 (206 - 2,151)

Engine Electrical System

System Voltage	12 VDC
Battery Charger Alternator	Standard
Battery Size	See Battery Index 0161970SBY
Battery Voltage	12 VDC
Ground Polarity	Negative

* G18 refers to all engines manufactured before August 3rd, 2018. G26 refers to all engines manufactured after August 3rd, 2018.

ALTERNATOR SPECIFICATIONS

Standard Model	K0150124Y26
Poles	4
Field Type	Revolving
Insulation Class - Rotor	H
Insulation Class - Stator	H
Total Harmonic Distortion	<5%
Telephone Interference Factor (TIF)	<50

Standard Excitation	Permanent Magnet
Bearings	Single Sealed Ball
Coupling	Direct Drive
Prototype Short Circuit Test	Yes
Voltage Regulator Type	Full Digital
Number of Sensed Phases	All
Regulation Accuracy (Steady State)	±0.25%

SG150 | 9.0L | 150 kW

INDUSTRIAL SPARK-IGNITED GENERATOR SET

EPA Certified Stationary Emergency and Non-Emergency

GENERAC INDUSTRIAL POWER

OPERATING DATA

DEMAND RESPONSE READY

POWER RATINGS

	G18, G26 - Natural Gas *		G18, G26 - Propane/Dual Fuel *	
Single-Phase 120/240 VAC @1.0pf	144 kW	Amps: 600	134 kW	Amps: 558
Three-Phase 120/208 VAC @0.8pf	150 kW	Amps: 521	140 kW	Amps: 486
Three-Phase 120/240 VAC @0.8pf	150 kW	Amps: 452	140 kW	Amps: 422
Three-Phase 277/480 VAC @0.8pf	150 kW	Amps: 226	140 kW	Amps: 211
Three-Phase 346/600 VAC @0.8pf	150 kW	Amps: 181	140 kW	Amps: 169

MOTOR STARTING CAPABILITIES (skVA)

skVA vs. Voltage Dip			
277/480 VAC	30%	208/240 VAC	30%
K0150124Y26	327	K0150124Y26	250
K0200124Y21	478	K0200124Y21	361

FUEL CONSUMPTION RATES*

Natural Gas – scfh (m³/hr)		Propane Vapor – scfh (m³/hr)		Propane Liquid – gph (Lph)	
Percent Load	Standby	Percent Load	Standby	Percent Load	Standby
25%	668 (18.9)	25%	280 (7.9)	25%	6.7 (25.4)
50%	1,127 (31.9)	50%	430 (12.2)	50%	11.4 (43.2)
75%	1,583 (44.8)	75%	573 (16.2)	75%	15.7 (59.4)
100%	2,042 (57.8)	100%	720 (20.4)	100%	20.0 (75.7)

* Fuel supply installation must accommodate fuel consumption rates at 100% load.

COOLING

	Standby
Air Flow (Fan Air Flow Across Radiator)	scfm (m³/min) 5,598 (158.5)
Coolant Flow	gpm (Lpm) 27.5 (104)
Coolant System Capacity	gal (L) 6.3 (24.0)
Maximum Operating Air Temperature on Radiator	°F (°C) 122 (50)
Maximum Operating Ambient Temperature (Before Derate)	See Bulletin 0199270SSD
Maximum Radiator Backpressure	in H ₂ O (kPa) 0.5 (0.12)

COMBUSTION AIR REQUIREMENTS

Standby
Flow at Rated Power scfm (m³/min) 343 (9.7)

ENGINE

	Standby
Rated Engine Speed	RPM 1,800
Horsepower at Rated kW**	hp 229
Piston Speed	ft/min (m/min) 1,275 (389)
BMEP	psi (kPa) 185 (1,277)

EXHAUST

	Standby
Exhaust Flow (Rated Output)	scfm (m³/min) 1,206 (34.1)
Backpressure (Post Silencer)	inHg (kPa) 0.75 (2.54)
Exhaust Temp (Rated Output - Post Silencer)	°F (°C) 1,440 (782)

* G18 refers to all engines manufactured before August 3rd, 2018. G26 refers to all engines manufactured after August 3rd, 2018.

** Refer to "Emissions Data Sheet" for maximum bHP for EPA and SCAQMD permitting purposes.

Deration – Operational characteristics consider maximum ambient conditions. Derate factors may apply under atypical site conditions.

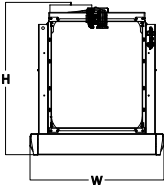
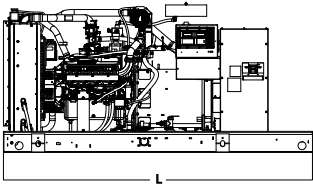
Please contact a Generac Power Systems Industrial Dealer for additional details. All performance ratings in accordance with ISO3046, BS5514, ISO8528, and DIN6271 standards.

Standby - See Bulletin 0187500SSB

Demand Response - See Bulletin 10000018250

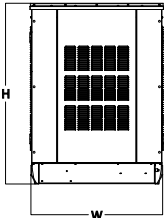
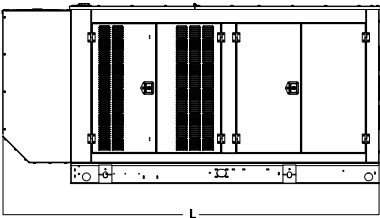
DIMENSIONS AND WEIGHTS*

DEMAND RESPONSE READY



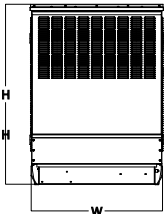
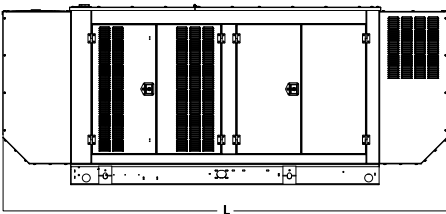
OPEN SET (Includes Exhaust Flex)

L x W x H - in (mm)	116.5 (2,959) x 49.7 (1,262) x 55.6 (1,412)
Weight - lbs (kg)	2,946 (1,336)



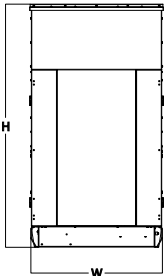
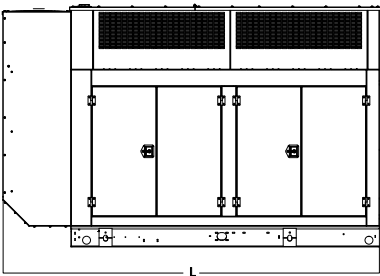
WEATHER PROTECTED ENCLOSURE

L x W x H - in (mm)	143.0 (3,631) x 50.4 (1,280) x 68.2 (1,732)
Weight - lbs (kg)	Steel: 3,843 (1,743) Aluminum: 3,384 (1,535)



LEVEL 1 ACOUSTIC ENCLOSURE

L x W x H - in (mm)	168.5 (4,280) x 50.4 (1,280) x 68.2 (1,732)
Weight - lbs (kg)	Steel: 4,129 (1,873) Aluminum: 3,508 (1,591)



LEVEL 2 ACOUSTIC ENCLOSURE

L x W x H - in (mm)	143.0 (3,632) x 50.4 (1,280) x 91.7 (2,329)
Weight - lbs (kg)	Steel: 4,321 (1,960) Aluminum: 3,592 (1,629)

* All measurements are approximate and for estimation purposes only.

YOUR FACTORY RECOGNIZED GENERAC INDUSTRIAL DEALER

Specification characteristics may change without notice. Dimensions and weights are for preliminary purposes only. Please contact a Generac Power Systems Industrial Dealer for detailed installation drawings.

CONTROL PANEL AND OPTIONS

H-100 CONTROL PANEL



The Quiet-Test™ H-100 Control Panel is a digital microprocessor electronic controller that integrates all engine and transfer switch functions into a single control system.

- Digital Controls for All Safety Shutdowns
- Isochronous Governor Control
- Digital 3 Phase Sensing Voltage Regulator
- Sealed Digital Circuit Board
- Mates with HTS Transfer Switch and Any 2-wire Start ATS
- Alarm and Event Logging
- Built-in Diagnostics
- Internal PLC

Features

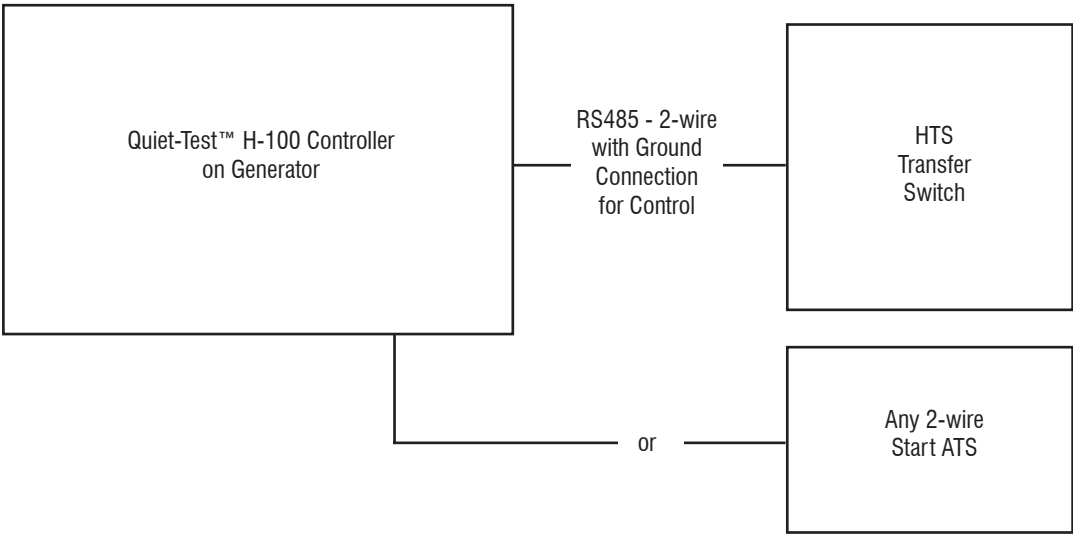
- Two 4-line x 20 Displays
- Full System Status
- 3 Phase Sensing Digital Voltage Regulator
- Remote Ports
 - RS232
 - RS485
 - CANbus
- Waterproof Connections
- Built -in PLC
- Full Range Standby Operation
- Full System Status
 - 3 Phase AC Volts
 - 3 Phase Amps
 - kW
 - Power Factor
 - Reactive Power
 - Oil Pressure
 - Water Temperature
 - Water Level
 - Oil Temperature (Optional)
 - Fuel Pressure
 - Engine Speed
 - Battery Voltage
 - Alternator Frequency
 - Time
 - Date
 - Transfer Switch Status
 - Run Hours
 - Service Reminders
 - Trending
 - Fault History (Alarm Log)
 - I²T Function for Full Generator Protection
- Shutdowns
 - Overvoltage
 - Overspeed
 - Low Oil Pressure
 - High Coolant Temperature
 - Low Coolant Level
- Remote Communications
- Configurable to NFPA 110, Level 1 or 2
- Programmable Auto Crank
- Emergency Stop
- On/Off/Manual Switch
- Not in Auto Flashing Light
- Audible Alarm for Fault Condition
- Transfer Switch Logic Communicates with HTS Transfer Switch
- Selectable Low Speed Exercise
- Temperature Range: -40° to +70°C

The generator set parameters can be manipulated and monitored without standing in front of the control panel with GenLink® software. The Generac H-100 control panel also monitors and controls transfer switch functions when used with the HTS transfer switch.

- Monitors Utility Voltage
- Monitors Generator Voltage
- Timer for Line Interrupt Delay
- Timer for Engine Warmup
- Timer for Minimum Engine Run Time
- Timer for Return to Utility Position
- Timer for Engine Cooldown
- Built-in Exerciser Timer (7 Day)
- Additional 2-wire Start Controls for Any 2-wire Transfer Switch

H-100 CONTROL PANEL

Typical Control Connection



21 LIGHT REMOTE ANNUNCIATOR AND REMOTE RELAY PANEL

- Model 0054650 Gray Remote Annunciator Panel without Relays
- Model 0054660 Gray Remote Relay Panel without LEDs and Keypad (Relays Only)
- Model 0054640 Gray Remote Annunciator Panel with 8 Relays
- Model 0056370 Tan Flush Mount Enclosure without Annunciator
- Model 0066950 Gray Flush Mount Enclosure without Annunciator



Description:

The Remote Annunciator Panel provides remote monitoring and annunciation of up to 18 generator parameters using LEDs located on the annunciator keypad. It also provides two system level warnings which are System Ready and Communications OK.

The Relay Panel has up to 8 selectable functions on form A relays; multiple relay panels can be connected for all 18 generator parameters.

The specific faults can be selected using either the DIP switches located on the annunciator circuit board or through a computer via the RS232 connection on the circuit board. All relays are energized on power up and open during a fault condition.

Communication is via a RS485 serial data link and power is supplied by the generator battery (+12 VDC or +24 VDC).

The Remote Annunciator Panel complies with NFPA 99 and NFPA 110.

Environmental Specifications:

Operating Temperature	-25 °C to 60 °C
Humidity	0 to 95% Non-Condensing
Power Supply	Generator Battery, +12 or +24 Volts DC
Power Usage.....	6 WattsTypical
Communication Line	RS485 Fully Isolated Twisted Pair Cable with Shield
Maximum Cable Length.....	4,000 ft
Relay Output	One NO Contact (Energized when Annunciator is Powered and No Faults are Present)
Relay Contact Rating	30 VDC, 1 A
Enclosure Rating	NEMA 1
Alarm Horn (Remote Annunciator Panels Only)	90 dB @ 10 cm

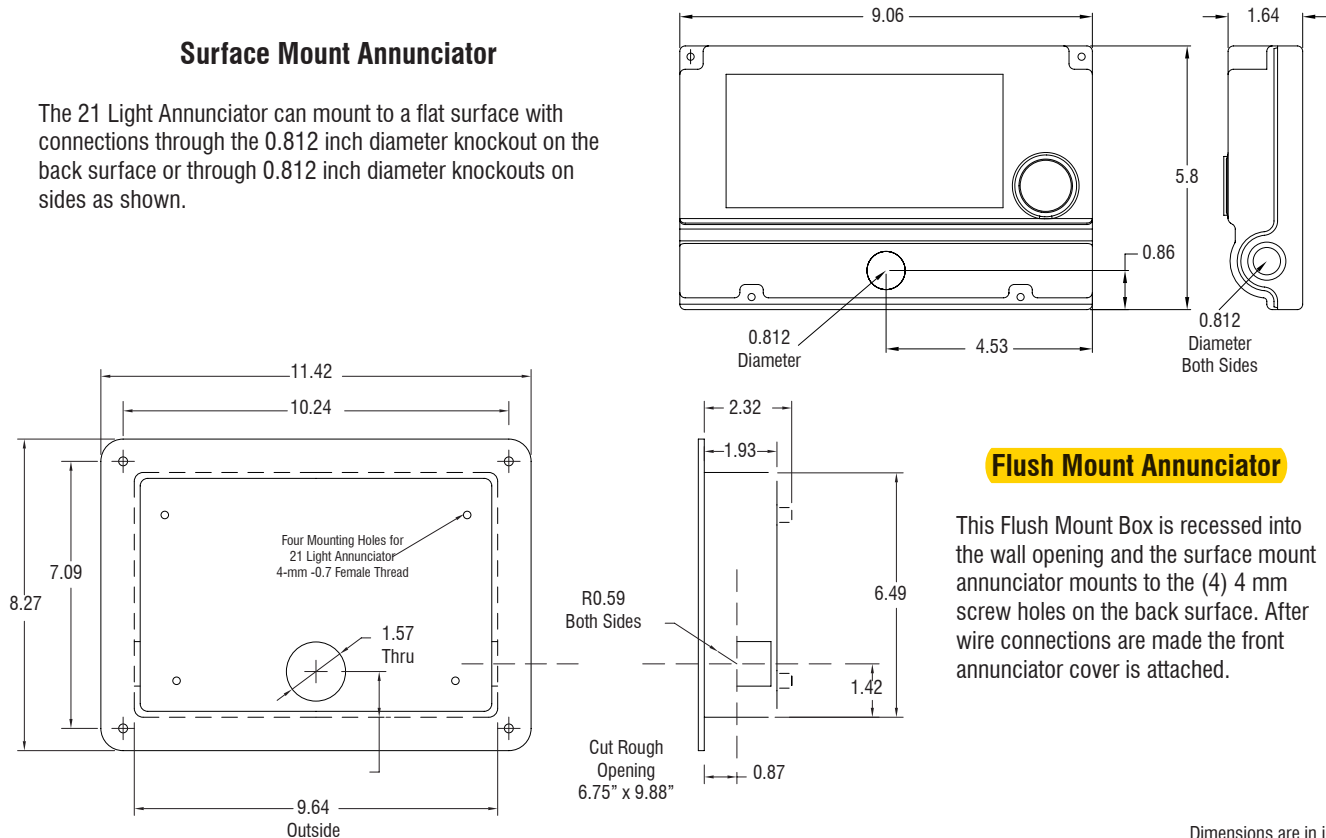
21 LIGHT REMOTE ANNUNCIATOR AND REMOTE RELAY PANEL

Function	Color	Alarm	Latched
Pre-Low Oil Pressure	Yellow	Yes	Yes
Pre-High Water Temperature	Yellow	Yes	Yes
Pre-Low Water Temperature	Yellow	Yes	Yes
Pre-Low Fuel	Yellow	Yes	Yes
Battery Charge AC Fail	Yellow	Yes	No
Low Battery Voltage	Yellow	Yes	No
High Battery Voltage	Yellow	No	No
Not in Auto	Red	Yes	No
RPM Sensor Loss	Red	Yes	Yes
Overcrank	Red	Yes	Yes
Overspeed	Red	Yes	Yes
Low Oil Pressure	Red	Yes	Yes
High Water Temperature	Red	Yes	Yes
Low Water Level	Red	Yes	Yes
Emergency Stop	Red	Yes	No
Gen Running	Yellow	No	No
Gen Power (ATS)	Yellow	No	No
Line Power (ATS)	Green	No	No
Systems Ready	Green	Yes	No
Communications OK	Green	Yes	No
Spare	Green	No	No

Spare Keypad Switch can be used to implement a remote start function (Model 0054640 only).

Surface Mount Annunciator

The 21 Light Annunciator can mount to a flat surface with connections through the 0.812 inch diameter knockout on the back surface or through 0.812 inch diameter knockouts on sides as shown.



Flush Mount Annunciator

This Flush Mount Box is recessed into the wall opening and the surface mount annunciator mounts to the (4) 4 mm screw holes on the back surface. After wire connections are made the front annunciator cover is attached.

Dimensions are in inches.

CONTROL INTERCONNECTIONS H-PANEL, CCI

NOTES:

1) SPARE OUTPUTS ARE STANDARD ON INDUSTRIAL PRODUCT ONLY. GENLINK™ REQUIRED FOR PROGRAMMING. CONTACTS RATED 5A AT 30VAC/30VDC.

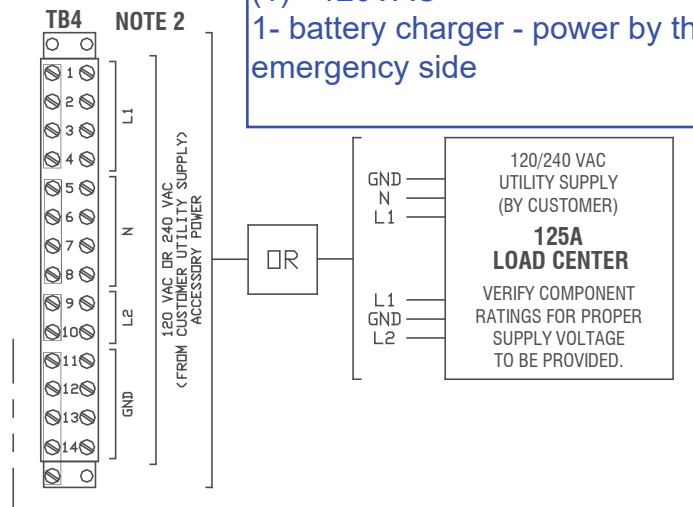
2) TB4 MAX WIRE SIZE: #10 AWG, RECOMMENDED TIGHTENING TORQUE: 14 LB-IN

3) TB1, TB2 & RB3 MAX WIRE SIZE: #14 AWG RECOMMENDED TIGHTENING TORQUE: 12 LB-IN

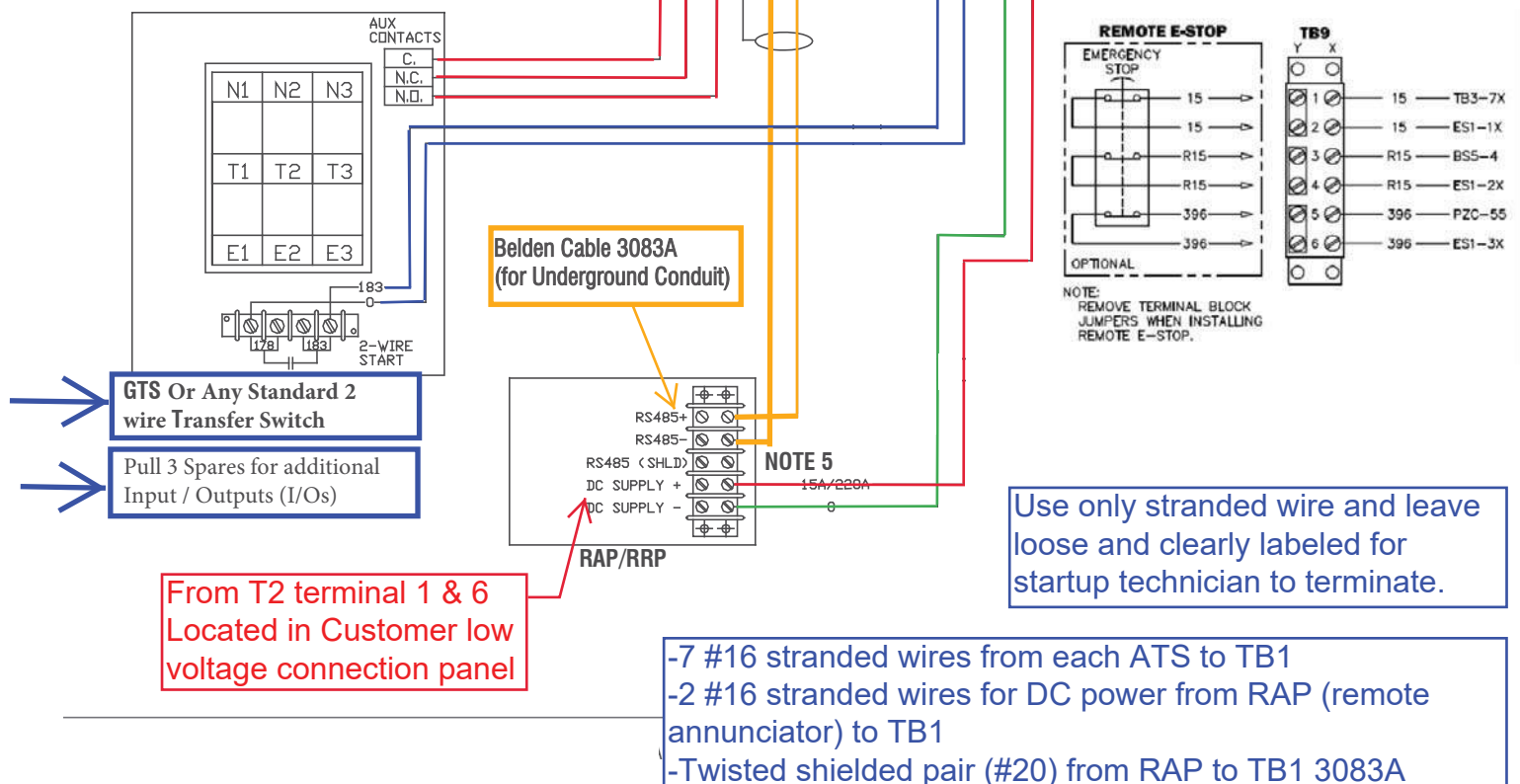
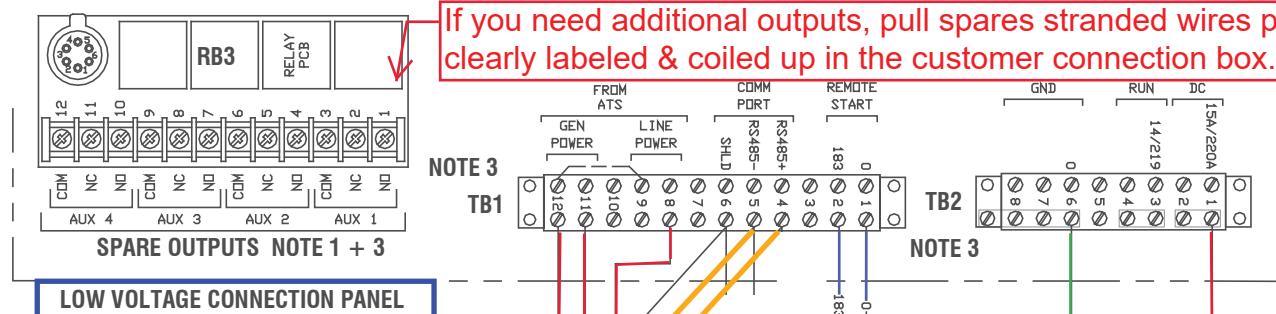
4) REFER TO H-PANEL MANUAL FOR INSTRUCTIONS ON ENABLING HTS TRANSFER SWITCH. REFER TO HTS TRANSFER SWITCH MANUAL FOR DIP SWITCH SETTINGS FOR MULTIPLE HTS APPLICATIONS.

5) CONNECT THE RS485 OVERALL SHIELD AT GENSSET CONNECTION TERMINAL ONLY.

(1) 240VAC circuits to be provided to TB4:
1- coolant heater,
1- strip heater,
1- battery warmer
(1) - 120VAC
1- battery charger - power by the emergency side



If you need additional outputs, pull spares stranded wires per output clearly labeled & coiled up in the customer connection box.



ALTERNATOR AND OPTIONS

ALTERNATOR DATA SHEET

K0150124Y21

General Characteristics

Voltages (V)	208/240 and 480	Number of Leads	12
Frequency (Hz)	60	Winding Type	Reconnectable
Phases	3	Air Flow (CFM)	1,660
Speed (RPM)	1,800	Total Harmonic Distortion (%)	<5
Excitation System	PMG	Largest Single Harmonic Value (%)	<3.5
Insulation Class	H	Telephone Interference Factor (TIF)	<50
Winding Pitch	2/3	Reference Part Number	0L3716E01R

Ratings at 0.8 pf based on 40°C Ambient

Voltage (V)	80°C Rise		105°C Rise		120°C Rise		150°C Rise	
	kW	kVA	kW	kVA	kW	kVA	kW	kVA
208/240	115	144	138	172	150	187	160	200
480	115	144	138	172	150	187	160	200

Base Data at 480V, 187 kVA, 1,800 RPM, 60 Hz, 3Ø

Description	Value	Description	Value
Stator Resistance, Line to Neutral, High Wye Connection (Ω)	0.0242	T"d, Direct Axis Subtransient Short Circuit Time Constant (s)	0.016
Rotor Resistance (Ω)	0.9400	T'do, Direct Axis Transient Open Circuit Time Constant (s)	1.950
Exciter Stator Resistance - PMG (Ω)	6.4250	Ta, Short Circuit Time Constant of Armature Winding (s)	0.023
Exciter Rotor Resistance - PMG(Ω)	0.2060	Phase Sequence CCW-NDE	T1, T2, T3
Excitation Winding Resistance - PMG (Ω)	1.4886	Voltage Balance, L-L or L-N (%)	2.5
Xd, Direct Axis Synchronous Reactance (p.u.)	3.360	Deviation Factor (%)	<7
X2, Negative Sequence Reactance (p.u.)	0.250	High Wye Connection, Sustained 3Ø Short Circuit Current (%) - PMG	300
X0, Zero Sequence Reactance (p.u.)	0.080	X/R	9
X'd, Direct Axis Transient Reactance (p.u.)	0.210	Short Circuit Ratio	0.53
X"d, Direct Axis Subtransient Reactance (p.u.)	0.190	Heat Rejection (BTU/hr) - 100% Rated Load, 480V, 0.8pf, 120°C Temperature Rise	75,130
Xq, Quadrature Axis Synchronous Reactance (p.u.)	1.610		
T'd, Direct Axis Transient Short Circuit Time Constant (s)	0.099		

Reference: Mil-STD-705B
All Ratings are Nominal

ALTERNATOR DATA SHEET

K0150124Y21

skVA

	10%	15%	20%	25%	30%	35%
480V @ 0.3PF	77	118	166	222	290	359
480V @ 0.6PF	90	136	188	249	326	393
208/240V @ 0.3PF	59	91	127	167	220	271
208/240V @ 0.6PF	68	102	142	185	244	299

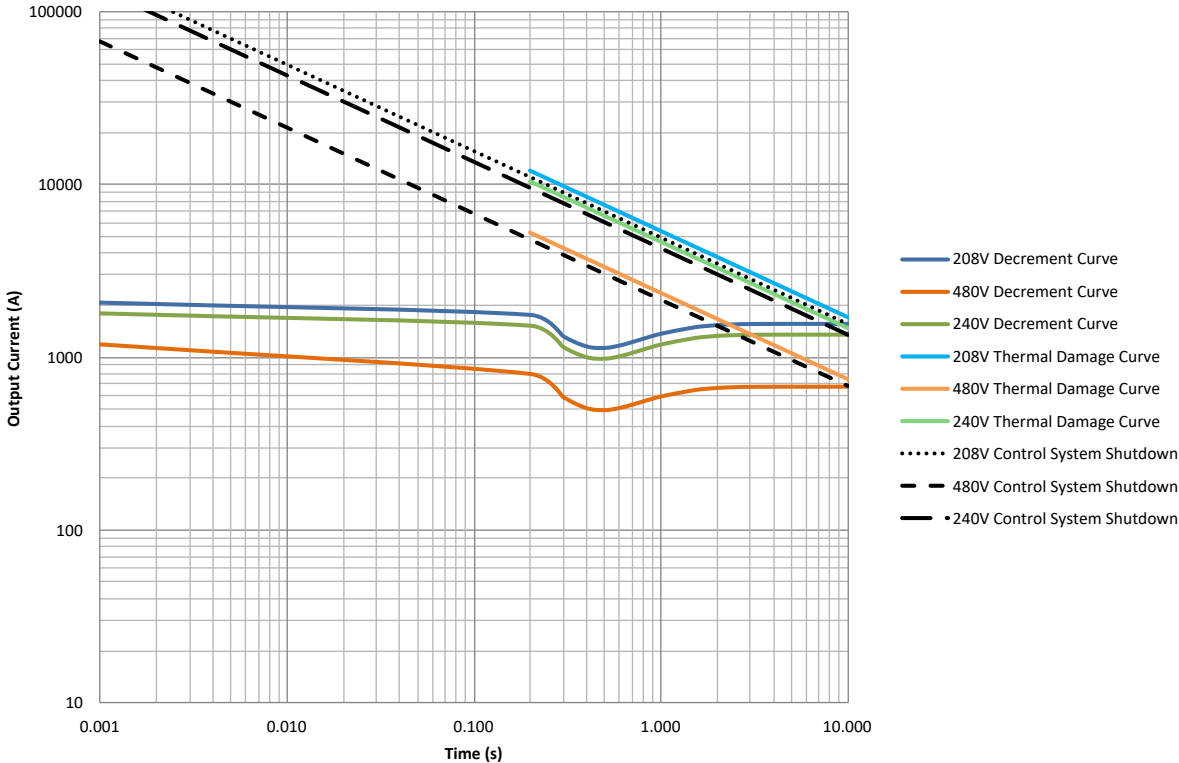
Efficiencies

*Rated Power	480V @ 0.8 PF	480V @ 1.0 PF	208/240V @ 0.8PF	208/240V @ 1.0 PF
20%	76.4	77.5	78.8	79.7
40%	83.5	85.1	84.6	86.2
60%	86.5	89.1	86.7	89.1
80%	87.4	90.5	87.2	90.0
100%	87.2	91.0	86.5	89.9

*Rated Power value is rating kW at 120°C Winding Temperature Rise and 0.8pf

LOG LOG Decrement Curve

Balanced 3-Phase Short Circuit Decrement & Thermal Damage Current Limit Curves



GENprotect™

Seamless Protection for Industrial Power Generators

GENprotect Operation

The design choice of an onsite power system using a Generac Industrial Power Generator assures your emergency power source is protected from unexpected power distribution faults. Typically, a generator will include some type of over-current device, such as a circuit breaker, or be protected by inherent design with the controller protecting the alternator through a protection algorithm. Generac's GENprotect generator protection system monitors the system current output and protects the alternator with extended security against fault scenarios that could occur within the site's downstream distribution system.

It is a common misconception that the alternator's main circuit breaker protects the alternator from a short circuit event. The main output breaker protects the cabling and provides a convenient disconnect. The characteristic trip curve for the industry standard thermal magnetic breaker (MCCB, molded case thermal magnetic or solid state) does not coordinate with the thermal damage limitation for an on-site generator. If circuit breakers are used for generator protection, a solid-state circuit breaker with full adjustments (Long Time, Short Time and Instantaneous, LSI) is required to coordinate the breaker protection curve within the generator thermal damage curve. Historically, this limitation was often accepted in system design since failures of the main generator feeder are extremely rare. Most short circuit events happen at a branch circuit, equipment level, where the fault is easily cleared by the smaller down stream breakers.

Given the mission critical nature of today's back-up power applications, it is more desirable to protect the system against even relatively rare failure modes. As generator controllers have become more powerful it is feasible for manufactures to supply coordinated short circuit protection integral to the generator control system, negating the need for a main-line circuit breaker.

Generac's GENprotect alternator protection algorithm monitors the generator output. If this monitoring senses short circuit current in excess of rated amps, GENprotect steps in to provide a controlled and safe approach to breaker coordination and alternator protection. GENprotect first limits the alternator short circuit current level to 300%. By limiting the available fault current, GENprotect extends the time the alternator can maintain fault current resulting in consistent breaker coordination. Without this functionality a

line to neutral fault may be at 800% of rated current and need to be cleared within 1.4 seconds. The second function GENprotect performs is I²T thermal protection for the alternator. Since a short circuit event can heat the alternator so rapidly, it is not possible to protect the alternator by monitoring temperature. Instead GENprotect calculates the heat energy of the fault current. When this energy reaches the limits of NEMA MG1, GENprotect trips the generator off-line. This configuration ensures the alternator is protected and the power system is ensured 10 seconds of 300% fault current for breaker coordination.

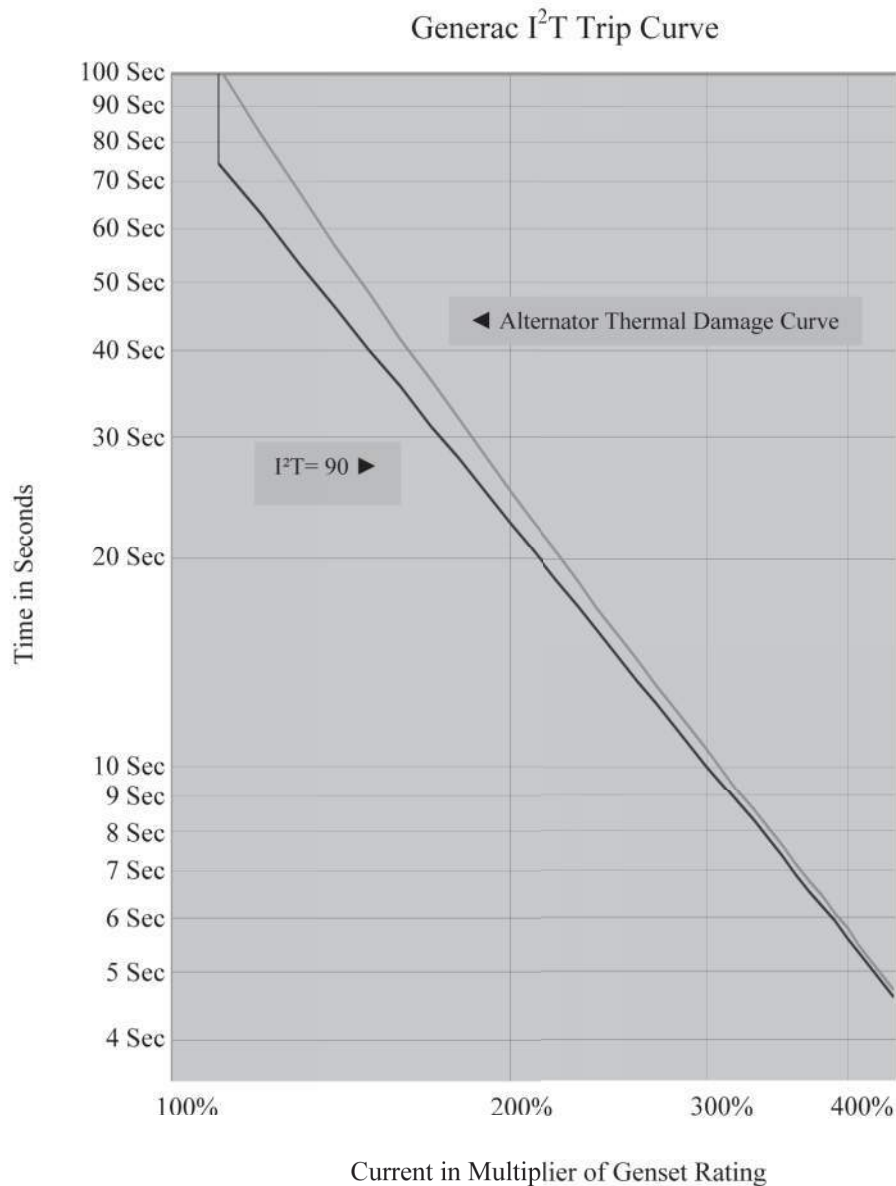
DESCRIPTION

- GENprotect is an alternator protection algorithm approved by UL.
- Protects alternator from damage due to shorts and electrical faults.
- Provides breaker coordination and alternator protection.
- Allows for use of multiple circuit breaker choices, including "no" breaker.



GENprotect™

Seamless Protection for Industrial Power Generators



The above Figure shows the Generac GENprotect thermal protection curve for use in protection and coordination studies. The alternator Thermal Damage Curve is shown just to the right of the GENprotect protection curve. If the alternator load is greater than the thermal damage protection curve for the alternator, the generator set will trip off-line. For example, an overload current of 110% for 75 seconds causes an overload alarm and will trip the generator off-line, shutting down the engine. GENprotect will provide generator protection over a full range of time and current, from instantaneous faults to overloads lasting several minutes. An advantage of GENprotect over a MCCB is that GENprotect allows for downstream breakers to clear faults without tripping the generator off-line, providing selective coordination with the first level of downstream breakers.

BATTERY AND OPTIONS

INDUSTRIAL GENSET - BATTERY INDEX

• Warranty by Exide Corp. • Exide e-mail: tbгна@exide.com • 800-782-7848 National Hot line

INDUSTRIAL SPARK-IGNITED GENSETS - AVAILABLE BATTERIES

Engine	System Voltage	Battery Quantity	GENERAC PART #					BT0015A02 (Group 8D)
			058208 (Group 24F)	077483 (Group 26)	058665 (Group 27F)	061119 (Group 31)	061104 (Group 8D)	
G2.4	12	1		X				
G4.5	12	1			X	X		
G9.0	12	1			X	X		
G14.2	24	2					X	
G21.9	24	2					X	
G25.8	24	2					X	
G33.9	24	4					X	
G49.0	24	4					X	X

INDUSTRIAL DIESEL GENSETS - AVAILABLE BATTERIES

Engine	System Voltage	Battery Quantity	GENERAC PART #				BT0015A02 (Group 8D)
			058665 (Group 27F)	061119 (Group 31)	061104/BT0015A00 (Group 8D)		
D2.2 Perkins	12	1		X			
D3.3 Perkins	12	1		X			
D4.5 FPT	12	1		X			
D6.7 FPT 100, 130kW	12	1 or 2†		X			
D6.7 FPT 150, 175kW	12	2†		X			
D8.7 FPT	24	2		X			
D10.3 FPT	24	2		X	X		
D12.9 FPT	24	2		X	X		
D12.5 Perkins	24	2			X		
D15.2 Perkins	24	2			X		
D16.0 Volvo	24	2		X	X		
D18.1 Perkins	24	2			X		
D30.6 Perkins	24	2			X		X
D33.9 MHI	24	2			X		X
D37.1 MHI	24	4			X		X
D49.0 MHI	24	4			X		X
D65.4 MHI	24	4			X		X

Part Number	Group Number*	Nominal CCA @ 0° F	DIMENSIONS (in) NOMINAL		
			L	W	H
058208	24F	525	6.75	10.63	9.00
077483	26	525	6.75	8.25	7.75
058665	27F	700	6.75	12.50	9.00
061119	31	925	6.75	13.00	9.40
061104/ BT0015A00	8D	1,200	11.00	20.80	10.00
BT0015A02	8D	1,400	11.00	20.80	10.00

All batteries are 12V, 6 cell construction, lead calcium type.
For 24V systems, batteries are wired in series.

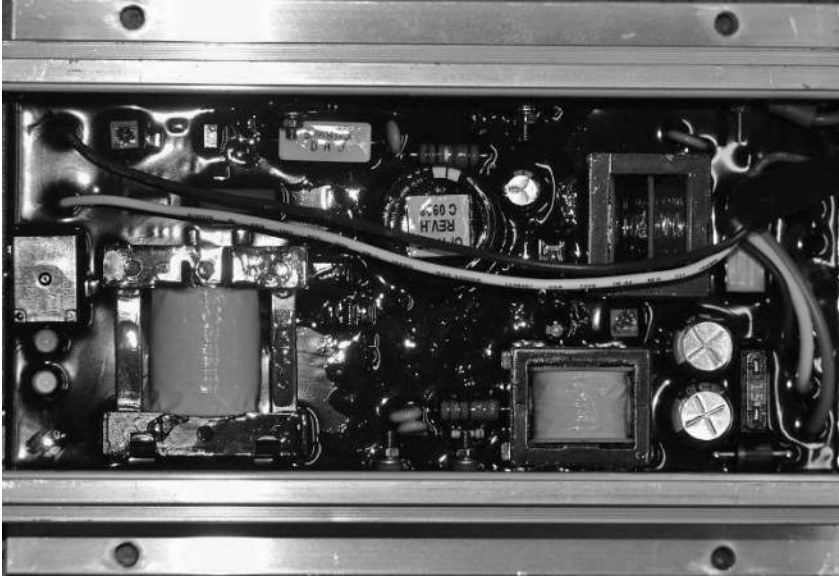
X Battery available with electrolyte and installed in genset.

† Single or dual-parallel battery options are available on 100 and 130kW. Single-battery option not available on 150 and 175kW.

* BCI Group Size reference.

BATTERY CHARGER

2.5 amp and 10 amp



Battery charger shown from inside of control panel enclosure.
Connections are made via an attached harness.

The Generac 2.5 amp 12 volt and 10 amp 12/24 volt battery chargers are designed to work with Generac Industrial Controls to provide the ultimate in automatic battery voltage maintenance.

The 2.5 amp charger is self-regulating and produces instantaneous output current adjustments to keep the battery charged to an optimum level. Battery voltage is read on the control panel digital display.

The 10 amp charger has automatic float and equalize control. It precisely monitors the battery's voltage and automatically activates the correct charging mode. The charge rate is limited and controlled to efficiently and safely maintain ideal battery levels under varying conditions.

The equalize system uses a control circuit to limit charging current to 10 amps. When battery voltage drops below a preset level, charging current increases to 5 amps and then to the 10 amp charge rate if needed. When the battery reaches maximum charge, the charger switches to float mode to supply just enough current to maintain the battery at or above 13/26 volts. Battery voltage and charging current are read at the control panel digital display.

Specifications	2.5A	10A
Nominal Input	120 VAC	120 VAC
Operating AC Line Voltage Range	108 to 132 VAC	108 to 132 VAC
Input AC Line Frequency	50/60 Hz	50/60 Hz
Battery Fuse	N/A	15 A
Nominal Charge Rate	2.5 A	10 A
Equalize Voltage	N/A	13.8/27.6 V
Float Voltage	13.4 V	13.0/26.0 V
Current @ Equalize to Float Transition	N/A	5 A
Battery Under-voltage shutdown	N/A	11/22 V
LED Indicators	No	Yes
AC Line Voltage	N/A	Green LED
Battery Connected and Charging	N/A	Yellow LED
Battery Current Drain	30 mA	30 mA
AC Line Connection	Connector Plug	Connector Plug
Battery Connection	Connector Plug	Connector Plug
Control Connection		AC Power Fail Form Relay Form C 2 A Rating
CUL Recognized	Yes	Yes
NFPA 110 Compliant	No	Yes
AGM Compatible	No	Yes
UL1236	No	Yes
CSA 22.2 No. 107	No	Yes



ENCLOSURE AND OPTIONS

GENERATOR ENCLOSURES



DESCRIPTION

GENERAC POWER SYSTEMS' generator enclosures provide year-round weather protection for your power equipment. Engineered with functionality and value in mind, the enclosure design benefits are unique in that the enclosures utilize dimensionally matched components for either a weather protective configuration or a sound attenuated/acoustic configuration. With common components used between design, modification and on-site upgrades can be accomplished with ease.

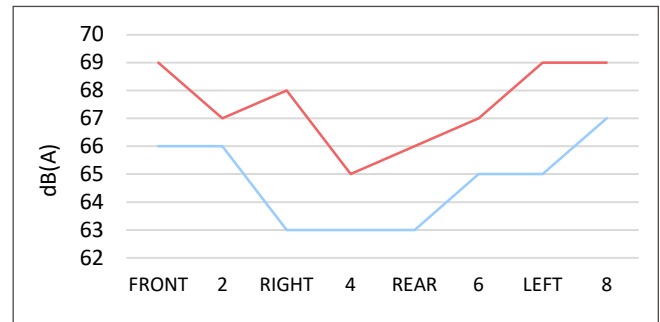
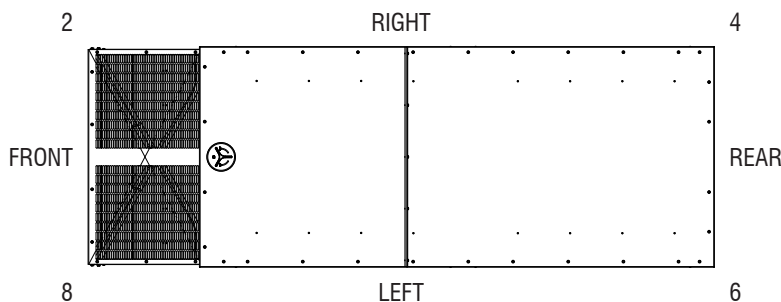
The enclosure design offers several benefits over the "standard enclosures" of other manufacturers. Generac's enclosures have been created with the goal of maximizing the customer's product performance satisfaction while maintaining the functionality of reducing exterior noise levels and discouraging product tampering.

Although others may require a "premium" for a self-enclosed exhaust system, rugged steel panel construction or protective polyethylene washers under all exterior panel fasteners, Generac includes these and several other features on every enclosure configuration. Be sure to compare. Generac Enclosures offer additional design enhancement extras that other "standard enclosures" do not.

LEVEL 2 SOUND ATTENUATED ENCLOSURE G9.0L Generac, SG/MG150

60Hz NO-LOAD, dB(A)										DISTANCE: 7 METERS
MICROPHONE LOCATION	OCTAVE BAND CENTER FREQUENCY (Hz)									
	31.5	63	125	250	500	1,000	2,000	4,000	8,000	dB(A)
FRONT	36	46	59	60	62	57	59	55	46	66
2	35	44	58	58	64	59	54	50	44	66
RIGHT	32	44	56	59	59	57	52	46	39	63
4	33	46	55	58	59	60	51	46	37	63
REAR	33	48	58	56	59	55	51	46	34	63
6	33	47	58	57	61	61	54	48	39	65
LEFT	31	45	58	58	60	60	53	48	40	65
8	35	46	56	60	64	63	54	50	43	67
AVERAGE	34	46	57	58	61	59	54	49	40	65

60Hz FULL-LOAD, dB(A)										DISTANCE: 7 METERS
MICROPHONE LOCATION	OCTAVE BAND CENTER FREQUENCY (Hz)									
	31.5	63	125	250	500	1,000	2,000	4,000	8,000	dB(A)
FRONT	37	56	64	62	63	57	58	55	47	69
2	37	55	62	60	63	58	57	53	46	67
RIGHT	34	54	66	60	61	58	55	49	43	68
4	31	54	57	60	59	58	53	48	42	65
REAR	32	58	62	59	60	56	53	48	39	66
6	31	55	62	59	61	63	55	49	41	67
LEFT	34	54	65	61	63	62	55	50	43	69
8	36	55	63	63	63	65	56	51	45	69
AVERAGE	34	55	63	60	62	60	55	50	43	67



- All positions at 23 feet (7 meters) from side faces of generator set.
- Test conducted on a 100 foot diameter asphalt surface.
- Sound pressure levels are subject to instrumentation, installation and testing conditions.
- Sound levels are ± 2 dB(A).

GENERATOR ENCLOSURES

Post-Free Twin Doors

Provide Large, Unobstructed Service Access

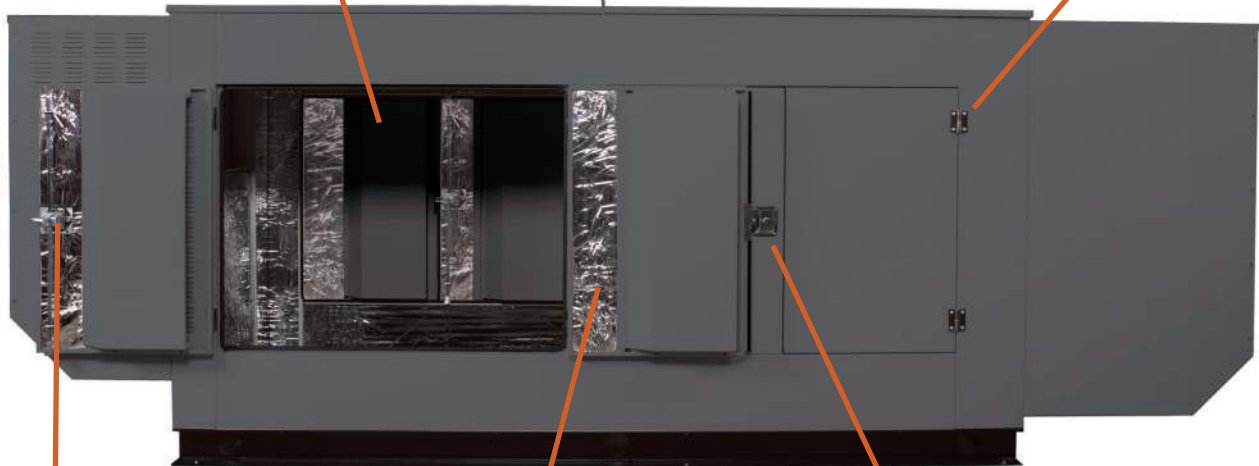


Gasket-Free, Interconnected Roof Panel Joint

Drip-Free, Maintenance-Free

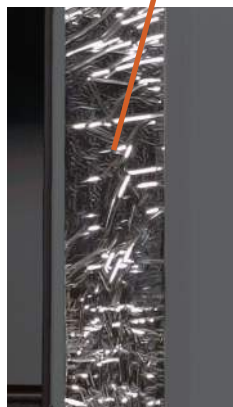
Heavy Gauge, Stainless Steel, Partial Pin Hinges with Nylon Spacers

Durable, Corrosion-Free, Removable Doors



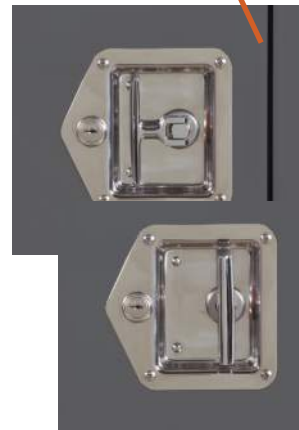
Two-Point Door Latch System

Ensures Proper Seal Preventing Water Ingress and Sound Egress



Dense, Closed-Cell Foam Insulation with Reflective Silver Mylar Layer

Improved Sound Attenuation Without Damaging Effects From Radiant Heat Exposure



Lockable Turn and Tuck Stainless Steel Latch Handle

Corrosion-Free, Non-Protruding and Secure



GENERATOR ENCLOSURES

FEATURES:

Dimensional matching of acoustic and non-acoustic enclosure designs

Standardized enclosure components *

Enclosure mounted directly to unit baseframe

Electrostatically painted panels

12 or 14 gauge steel based on kW rating

Aluminum Enclosure optional

Stainless steel door latch and hinge hardware

Stainless steel door latch strike plate

Door hinges utilize slip-pin design

Polyethylene gasketing under door hinges

Keyed door latches

Large removable access doors

Relocation of access doors

Redesigned door gasketing

Weather resistant aluminum roof design with drip ledge

Cabled and gasketed radiator access cover

Acoustic roof panels manufactured with mechanical retention pins

Polyethylene washers under all panel fasteners

Internally fastened enclosure panels (where possible)

Additional roof panel stiffener

Self-enclosed exhaust system

Discharge air duct has been designed with minimal fasteners

Stainless steel exhaust band clamps

Drain holes within air ducts

Rodent-proof, tamper proof enclosure design

Redesigned baseframe lifting lugs

Up to 200 MPH wind kit options (Contact Factory for Availability)

BENEFITS:

Reduces variation in fuel tank pricing, inventory; removes need to change out fuel tank or retrofit

Ease of retrofit or upgrade to acoustic system; reduced parts inventory, costs

Simplified delivery and installation with enclosure and unit in single component design

Maximum protection from weather elements

Maximum sound attenuation, protection and product life

Prevents corrosion in coastal regions

Provides extended component life; maximum protection against rusting

Maximum protection against enclosure paint damage from door latch pin

Provides quick door removal for full-unit access

Additional protection for enclosure paint finish

Protection for equipment and personnel

Ease of maintenance

Provides improved access to MLCB on all units

Improved sealing quality from sound and weather elements

Provides optimum moisture/rain runoff from unit

Provides improved radiator access and additional protection from weather elements

Increased acoustic foam retention within unit

Additional paint finish protection from stainless steel fastener

Provides streamlined unit appearance

Added overall compartment rigidity and acoustic foam panel retention

Provides safe unit operation; no enclosure hot spots; streamlined unit appearance

Ease of removal and access to exhaust system

Provides extended component life; ensures proper exhaust seal

Enables maximum water run-off

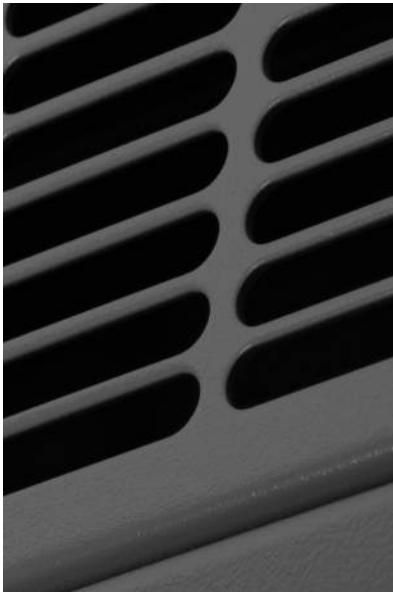
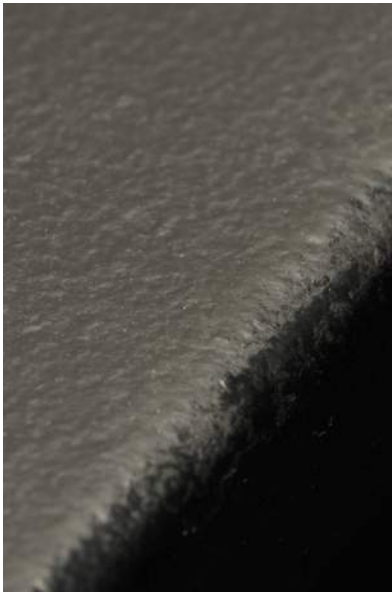
Safety and security for personnel and equipment

Ease of unit relocation; prevents compartment damage from lifting straps

Meets locally enforced wind requirements

* Consult Generac Power Systems, Inc. for installation drawings for specific configurations and dimensions.

RhinoCoat™



Generac's RhinoCoat™ finish system provides superior durability as a standard for all Generac Industrial enclosures, tanks and frames.*

Testing Standards

Generac's RhinoCoat™ finished surfaces are subjected to numerous tests. These include:

- ASTM D - 1186 - 87.....2.5+ MIL Paint Thickness
- ASTM D - 3363 - 92a.....Adequate Material Hardness
- ASTM D 522 - B.....Resistant to Cracking
- ASTM D 3359 - B.....Exceptional Adhesion
- ASTM B117 D 1654.....Resistant to Salt Water Corrosion
- ASTM D1735 D 1654.....Resistant to Humidity
- ASTM 2794 93 (2004).....Exceptional Impact Resistance
- SAEJ1690 - UV Specifications.....UV Protection

In addition to the testing standards above, Generac adds the following test requirements more specific to generator applications:

- Resistant to Typical Oils
- Resistant to Typical Fuels
- Resistant to Typical Antifreeze
- Resistant to Distilled Water

Primary Codes and Standards



*RhinoCoat™ powder coat paint is durable and corrosion resistant however it is not a rust preventative. Generac pretreats all powder coated parts to assist with resistance to corrosion.

CIRCUIT BREAKER AND LUG SIZES

EATON CIRCUIT BREAKER DATA

100% Rated LSI Electronic Trip

AMPS	VOLTS	ACCESSORIES	EATON PART #	SERIES	FRAME	GENERAC PART #
300	600	No Accessories	LGE340032WCX1Y17	G	LG-FRAME	0H9321EH0N
		Shunt Trip and Aux. Contacts	LGE340032WCA2_*X1Y17			0H9321EH_**
350		No Accessories	LGE340032WCX1Y17			0H9321EH0N
		Shunt Trip and Aux. Contacts	LGE340032WCA2_*X1Y17			0H9321EH_**
400		No Accessories	LGE340032WCX1Y17			0H9321EH0N
		Shunt Trip and Aux. Contacts	LGE340032WCA2_*X1Y17			0H9321EH_**
450		No Accessories	LGE360032GC			0H9324EH0N
		Shunt Trip and Aux. Contacts	LGE360032GCA2_*			0H9324EH_**
500		No Accessories	LGE360032GC			0H9324EH0N
		Shunt Trip and Aux. Contacts	LGE360032GCA2_*			0H9324EH_**
600		No Accessories	LGE360032GC			0H9324EH0N
		Shunt Trip and Aux. Contacts	LGE360032GCA2_*			0H9324EH_**
700		No Accessories	CMDLB3800FT32WZ02	C	M-FRAME	0H9325EH0N
		Shunt Trip and Aux. Contacts	CMDLB3800FT32WA13S02Z02			0H9325EHBN
800		No Accessories	CMDLB3800FT32WZ02			0H9326EH0N
		Shunt Trip and Aux. Contacts	CMDLB3800FT32WA13S02Z02			0H9326EHBN
900		No Accessories	NGS312032MCZ08	G	NG-FRAME	0H9327EH0N
		Shunt Trip and Aux. Contacts	NGS312032MCA12S03Z08			0H9327EHBN
1,000		No Accessories	NGS312032MCZ08			0H9328EH0N
		Shunt Trip and Aux. Contacts	NGS312032MCA12S03Z08			0H9328EHBN
1,200		No Accessories	NGS312032MCX23Y08			0H9329EH0N
		Shunt Trip and Aux. Contacts	NGS312032MCA12S03Y08			0H9329EHBN
1,400		No Accessories	RGH316032MCY22		RG-FRAME	0H9360EH0N
		Shunt Trip and Aux. Contacts	RGH316032MCA12S21Y22			0H9360EHBN
1,600		No Accessories	RGH316032MCY22			0H9361EH0N
		Shunt Trip and Aux. Contacts	RGH316032MCA12S21Y22			0H9361EHBN
2,000		No Accessories	RGH320032MC			0H9367EH0N
		Shunt Trip and Aux. Contacts	RGH320032MCA12S21			0H9367EHBN

To finish part numbers with either a * or ** Please see data below:

* 12V System, Use - S4
24V System, Use - S6

** 12V System, Use CN
24V System, Use BN

EATON CIRCUIT BREAKER DATA LUG INFORMATION

Eaton Series C Circuit Breaker Lugs

Amps	Series	Frame	Standard Lug	
			Eaton Part #	Wire (QTY) Size
15-70	C	G	-	(1) #10-1/0
15-100	C	F	3T100FB	(1) #14-1/0
125-200	C	F	3TA225FD	(1) #4-4/0
225	C	F	3TA225FDK	(1) #6-300MCM
250	C	J	TA250KB	(1) #4-350MCM
300	C	K	TA350K	(1) 250-500MCM
350-400	C	K	3TA400K	(2) 3/0-250MCM
450-500	C	L	TA602LD	(2) 3/0-350MCM
600	C	L	3TA603LDK	(2) 400-500MCM
700-800	C	M	TA800MA2	(3) 3/0-400MCM
900-1,000	C	N	T1200NB3	(4) 3/0-400MCM
1,200	C	N	TA1201NB1	(3) 500-750MCM

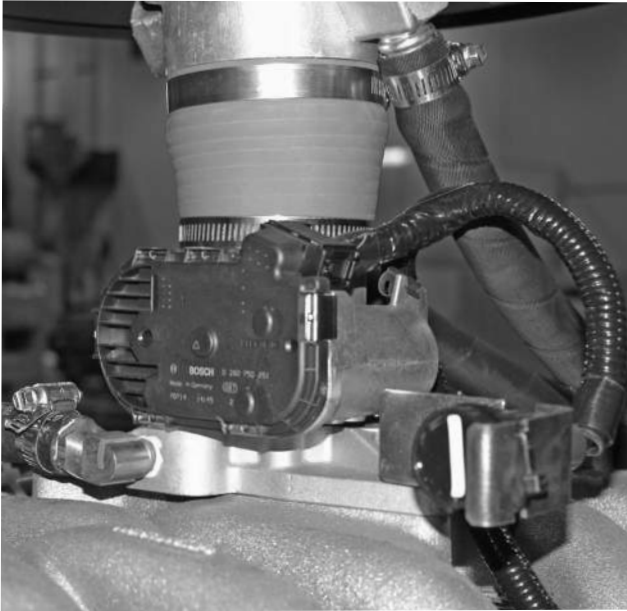
Eaton Series G Circuit Breaker Lugs

Amps	Series	Frame	Standard Lug	
			Eaton Part #	Wire (Qty) Size
50-250	G	JG	TA250FJ	(1) #8-350MCM
300-600	G	LG	3TA632LK	(2) #2-500MCM
900-1,200	G	NG	TA1201NB1	(3) 500-750MCM
1,400-1,600	G	RG	T1600RD	(4) 1-600MCM
2,000	G	RG	Lugs Not Included	
2,500	G	RG	Lugs Not Included	

GENERATOR SET ACCESSORIES

ELECTRONIC GOVERNOR

Spark-Ignited Engines



Generac's electronic isochronous governor systems are standard on all Spark-Ignited gensets utilizing Generac's Digital Control Platforms.

- Isochronous Speed Regulation
- $\pm 0.25\%$ Steady State Regulation
- Factory Installed and Adjusted
- Fully Adjustable
- Quiet-Test™ Low-Speed Exercise Capability
- Fast Response
- High Reliability
- Environmentally Sealed

ACTUATOR

Die cast enclosure housing the throttle plate and the gear-driven rotary actuator with the interior components sealed against dust, dirt and moisture. The gear drive is directly connected to the throttle plate for fast and precise control. Safety spring-return to a closed position upon loss of power.

Design	Bosch
Type.....	Electronically Actuated Throttle Valve
Operating Voltage.....	12/24VDC
Response Time	< 100 ms
Operating Temperature Range.....	-40°F to 284°F
Output.....	Rotary (internal - no linkage)

CONTROLLER

The governor driver module is located in the generator control panel. A sealed unit with waterproof connections and a feedback circuit from the actuator for throttle plate position. Generac software controls speed governing, and is fully adjustable.

The Generac electronic governor system applies to all spark-ignited gensets with Generac's Digital Control Platforms.

COOLANT HEATER OPTION 1500 WATT, 120VAC

SPECIFICATIONS:

VOLTAGE: 120VAC

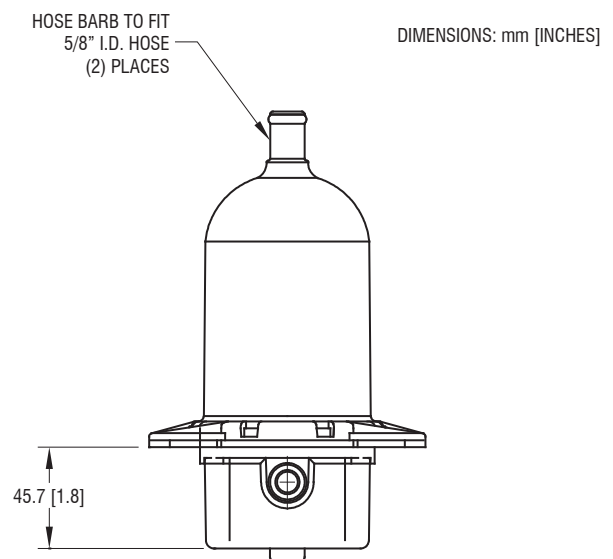
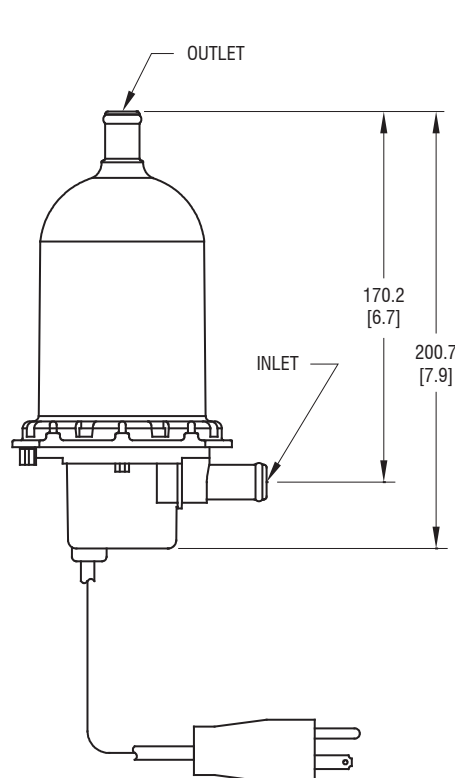
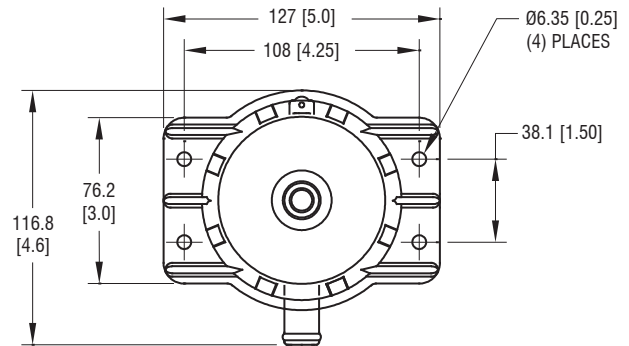
HEAT POWER: 1500W

FIXED THERMOSTAT: 60°-80°F

HEATING ELEMENT: INCOLOY 800

MAXIMUM PRESSURE: 90 PSI (620 kPa)

PLUG NEMA STD: 5-15P



DIMENSIONS: mm [INCHES]

PAD VIBRATION ISOLATORS

Description: Pad prevents equipment rocking by compensating for mismatch of 4 rigid support points to typical wavy floor surface.

Pad protects generator from low frequency shocks and high frequency vibrations present in the floor.

Pad Eliminates Noise and Reduces Vibration Transmitted From:

- Engines
- Transformers
- Pumps and Piping
- Steam Generators
- Crushers

Load Capacity

Load Capacity-60 Lbs per Square Inch

Thickness

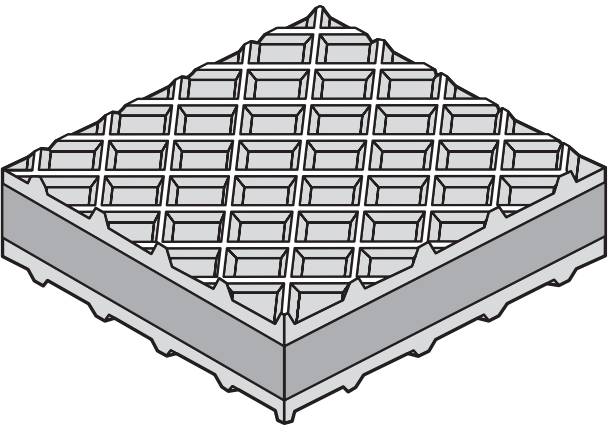
Standard Thickness-1 Inch

Non-Skid

Tread Surfaces Resist “Walking”

Durable

Cork and Neoprene are Oil and Ozone Resistant



STANDARD CAPACITY	
Size (Inches)	Maximum Load Selection at 40 PSI
3 x 24	2,880

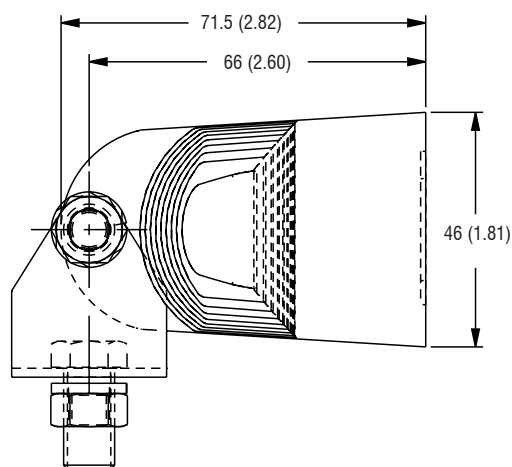
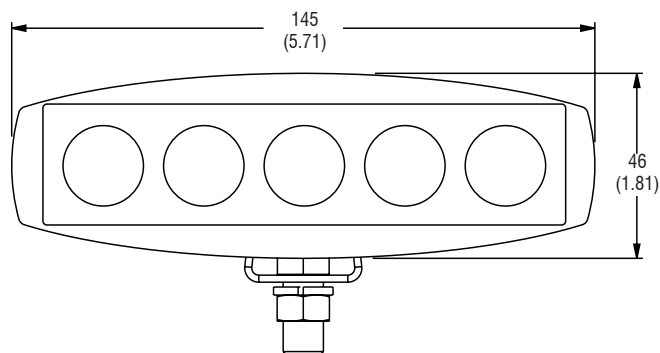
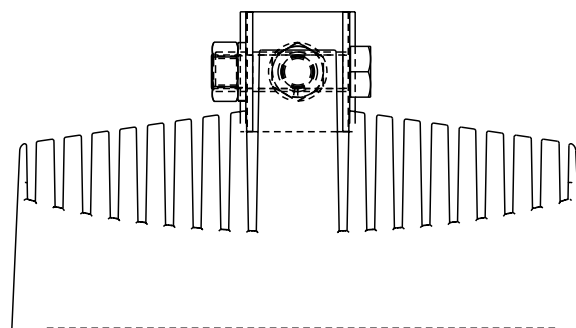
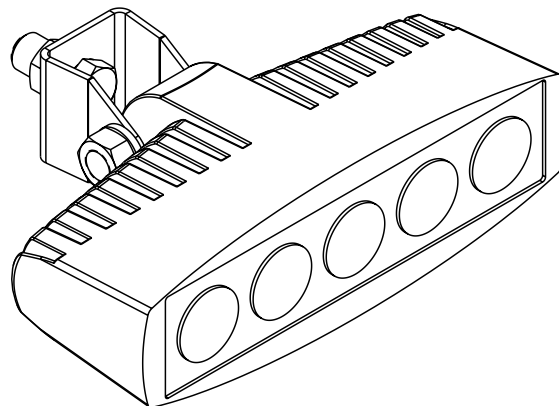
AC/DC LED LIGHT KITS FOR ENCLOSED UNITS ONLY

Description

6" Oval 15 WATT Heavy Duty High Powered LED Work Light

Specifications

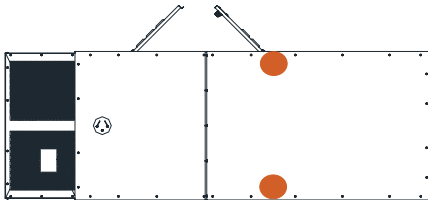
- Beam Angle: 45°
- LED Color: Cool White
- LED Type: Epistar
- Light Output: 780 Lumens
- RoHS Compliant
- Power Consumption: 11.61 WATTS
- Operating Voltage: 9~32 VDC
- Color Temperature 6,000 K
- Color Rendering Index: 69
- IP Rating: Waterproof IP68
- Construction: Aluminum, Black Finish
- Beam Pattern: Flood
- Oil and Weather Resistant Wiring
- Adjustable Mount Angles



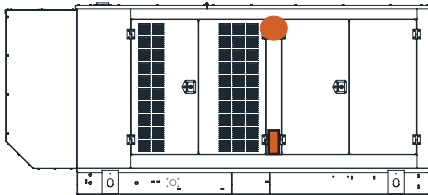
Dimensions: mm (inches)

AC/DC LED LIGHT KITS FOR ENCLOSED UNITS ONLY

Top View



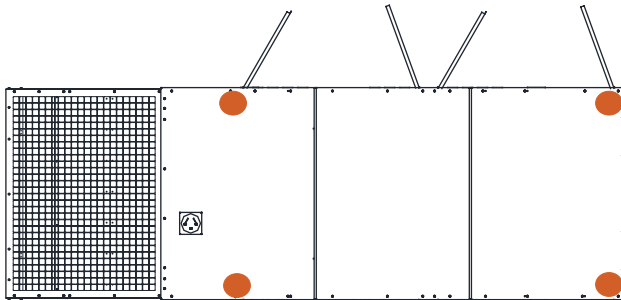
Side View



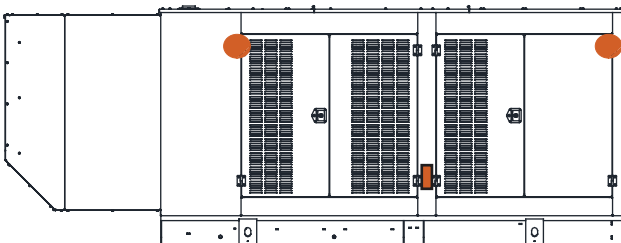
A-D Group Enclosures

- 2 Light Assemblies
- Diesel: 2.2L - 6.7L
- Gas: 4.5L - 9.0L

Top View



Side View



E-H Group Enclosures

- 4 Light Assemblies
- Diesel: 8.7L - 18.1L
- Gas: 14.2L - 33.9L

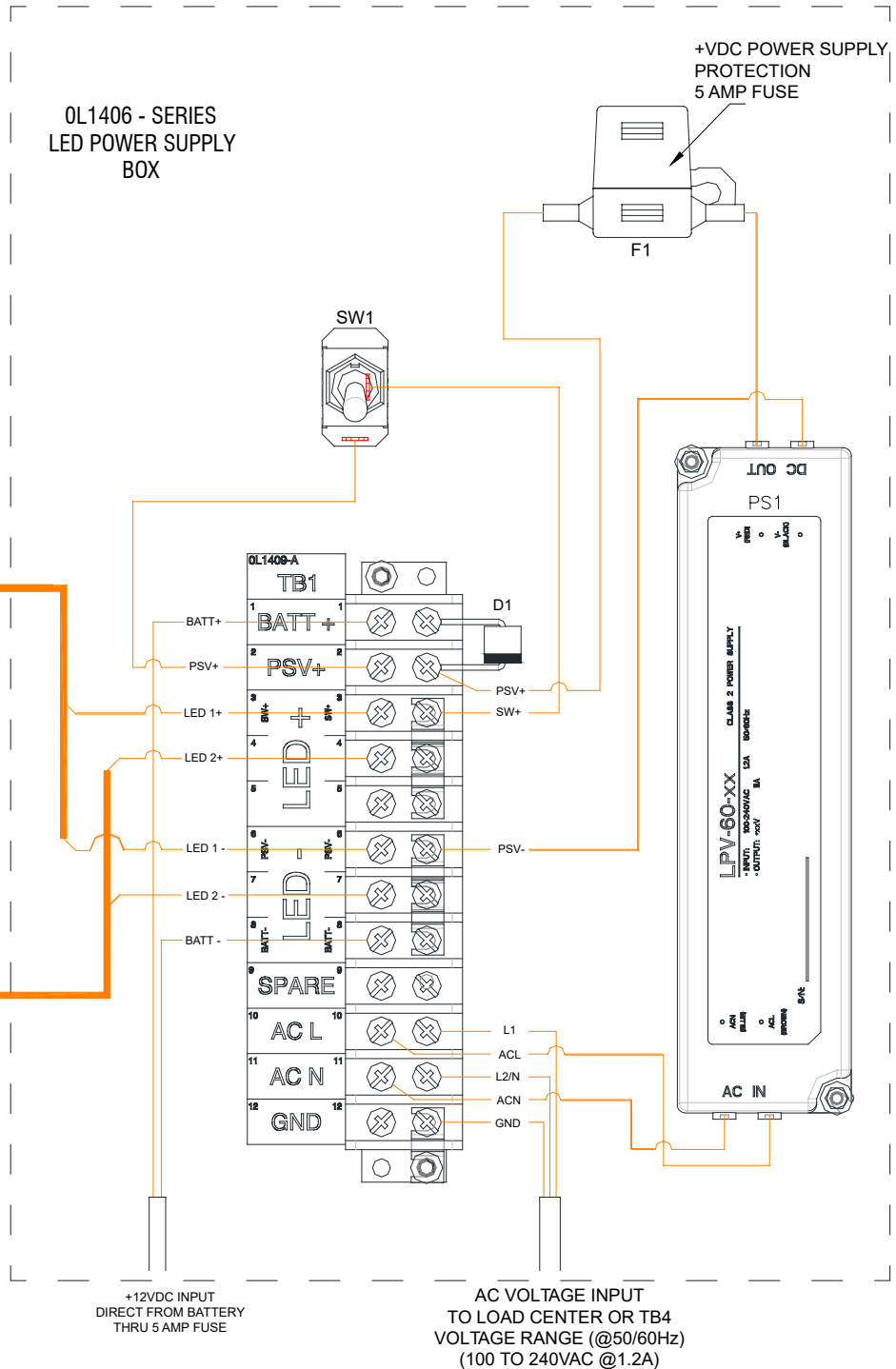
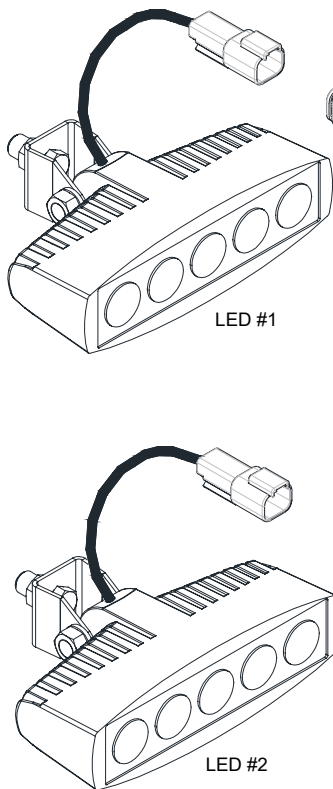
Legend

-  Light Assembly
-  Power Supply Box And Switch

AC/DC LED LIGHT KITS FOR ENCLOSED UNITS ONLY

POWER SUPPLY NOTES
AC INPUT: 1000-240VAC @ 1.2A @50-60HZ
LINE-TO-NEUTRAL OR LINE-TO-LINE
DC OUTPUT: 12VDC 25A (60W)

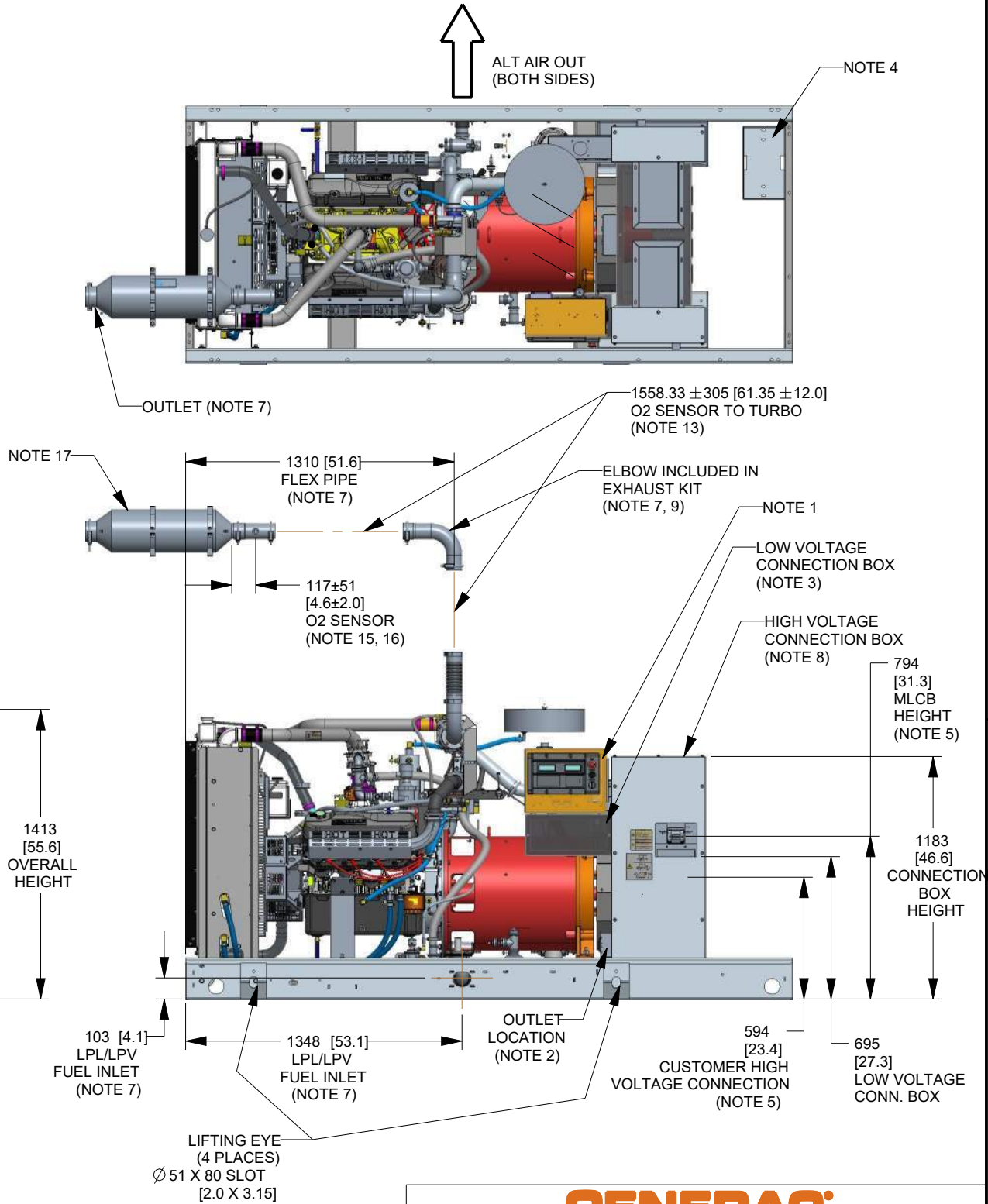
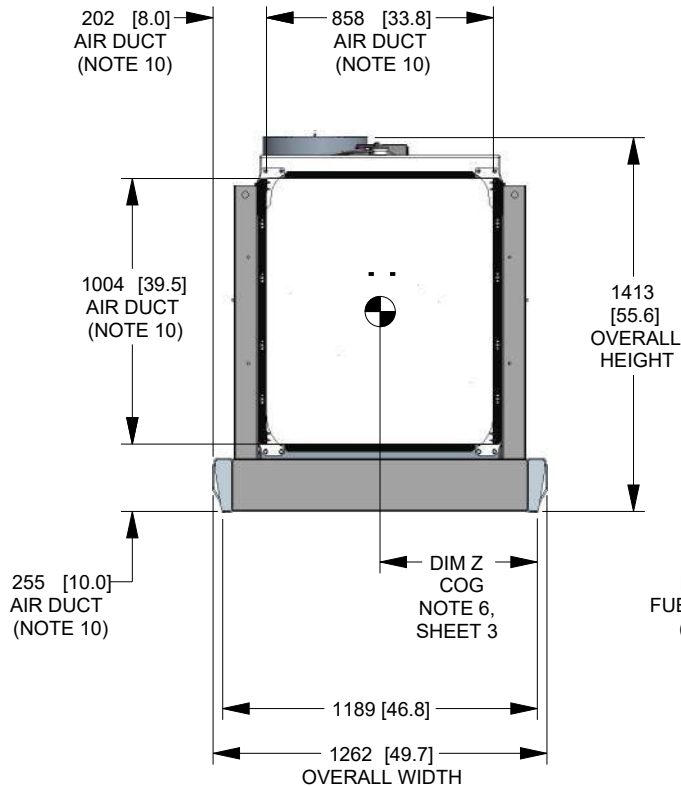
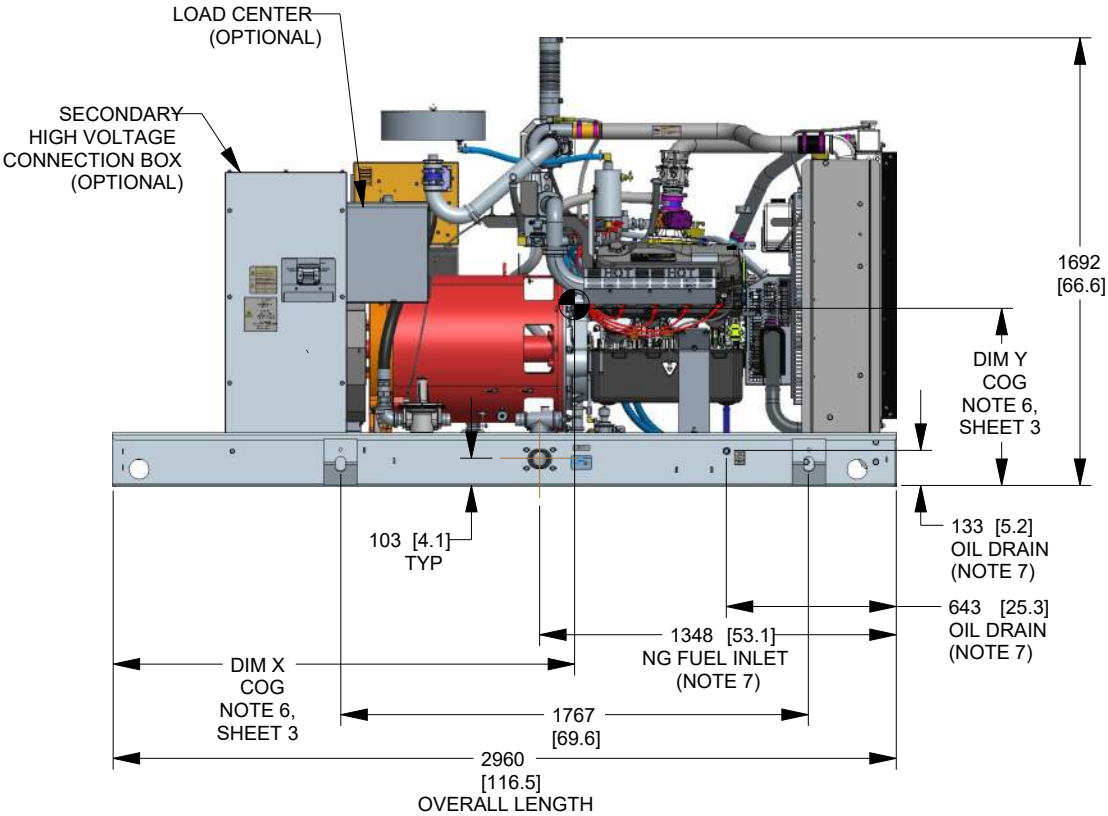
LEGEND	
ACL	AC LINE #1 (PS AC INPUT)
ACN	AC LINE #2/NEUTRAL (PS AC INPUT)
BATT_	BATTERY (+12VDC)
D_	DIODE (BACKFEED PROTECTION)
F_	FUSE
GND	AC GROUND
L1	AC HOT LEAD (L-L & L-N @10)
L2	AC HOT LEAD #2 (L-L & L-N @10)
LED_	LED LIGHT
N	AC NEUTRAL
PS_	POWER SUPPLY
PSV_	POWER SUPPLY DC VOLTAGE
SW_	SWITCH
TB_	TERMINAL BLOCK



GENERATOR SET INSTALLATION DRAWINGS

- Notes:
1. CONTROL PANEL, (OPTIONAL BATTERY CHARGER INSIDE).
 2. 120V, 20A GFCI & 250V, 15A OUTLET (OPTIONAL).
 3. CONNECTION POINTS FOR CONTROL WIRES PROVIDED IN THE LOW VOLTAGE CONNECTION BOX (USE LOW VOLTAGE STUB-UP AREA).
 4. BATTERY (12 VOLT NEGATIVE GROUND SYSTEM).
 5. MAIN LINE CIRCUIT BREAKER (MLCB), AC LOAD LEADS. (DIMENSIONS MAY VARY DUE TO UNIT CONFIGURATION)
 6. CENTER OF GRAVITY AND WEIGHT MAY CHANGE DUE TO UNIT OPTIONS.
7. ENGINE SERVICE CONNECTIONS:
- INLET NATURAL GAS = 2" NPT FEMALE COUPLING
 - INLET DIESEL = N/A
 - RETURN DIESEL = N/A
 - OIL DRAIN = 1/2" NPT
 - RADIATOR DRAIN = N/A
 - FLEX PIPE OUTLET = 3"
 - EXHAUST OUTLET = 4"
 - INLET LPL = 1/4" NPT FEMALE COUPLING
- ***** SEE GENERATOR SIZING GUIDE FOR FUEL PIPE SIZING TO SUIT APPLICATION *****

8. AUXILIARY AC CONNECTION FOR UNIT OPTIONS ARE LOCATED IN HIGH VOLTAGE CONNECTION BOX, UNLESS AN OPTIONAL LOAD CENTER IS INSTALLED.
9. EXHAUST PIPES MAY BE ROTATED TO ALLOW MUFFLER TO POINT OUT TO THE RIGHT OR LEFT SIDE OF GENERATOR. (MAY NOT APPLY TO ALL UNITS)
10. GENERATOR SET MUST BE INSTALLED SUCH THAT FRESH COOLING AIR IS AVAILABLE AND DISCHARGE AIR FROM THE RADIATOR IS NOT RECIRCULATED.
11. BOTTOM OF GENERATOR SET MUST BE ENCLOSED TO PREVENT PEST INTRUSION AND RECIRCULATION OF DISCHARGE AIR AND/OR IMPROPER COOLING AIR FLOW.
12. EXHAUST SYSTEM MAXIMUM BACK PRESSUE = 10" H2O, POST SILENCER.
13. INSTALL EXHAUST BLANKETS ALONG THIS LINE.
14. CONNECT THE OPEN SET EXHAUST PER NFPA 37
15. BLANKETS SHOULD NOT COVER OXYGEN SENSOR.
16. OXYGEN SENSOR (IF EQUIPPED) MUST BE MOUNTED BETWEEN ENGINE OUTLET AND CATALYST INLET AS SHOWN. IF ELBOW IS REQUIRED ONLY SINGLE ELBOW MAY BE USED.
17. CATALYST MUST BE MOUNTED IN DESCRIBED POSITION. FAILING TO FOLLOW THESE INSTRUCTIONS WHEN INSTALLING A CERTIFIED ENGINE IN A PIECE OF STATIONARY EQUIPMENT VIOLATES FEDERAL LAW 40CFR 1068.105(b), SUBJECT TO FINES OR PENALTIES AS DESCRIBED IN THE CLEAN AIR ACT.
18. BOLTS OR STUDS USED TO MOUNT UNIT TO PAD SHALL BE 5/8 - 11 GRADE 5.
- ADDITIONAL NOTES: FOR WEIGHT AND CENTER OF GRAVITY DATA SEE NOTE 6, AND SHEET 3.



DRAWING CREATED FROM PRO/ENGINEER 3D FILE. ECO MODIFICATION TO BE APPLIED TO SOLID MODEL ONLY.

DIMENSIONS ARE IN MILLIMETERS [INCHES]

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ELECTRONICALLY APPROVED
INSIDE WINDCHILL

GENERAC

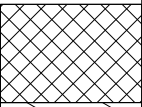
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OPEN SET
G9.0L, 60HZ: SG150
50HZ: SG120, SG104 (1 PH)
SG130/150, SG104/120-UPSIZE ALT

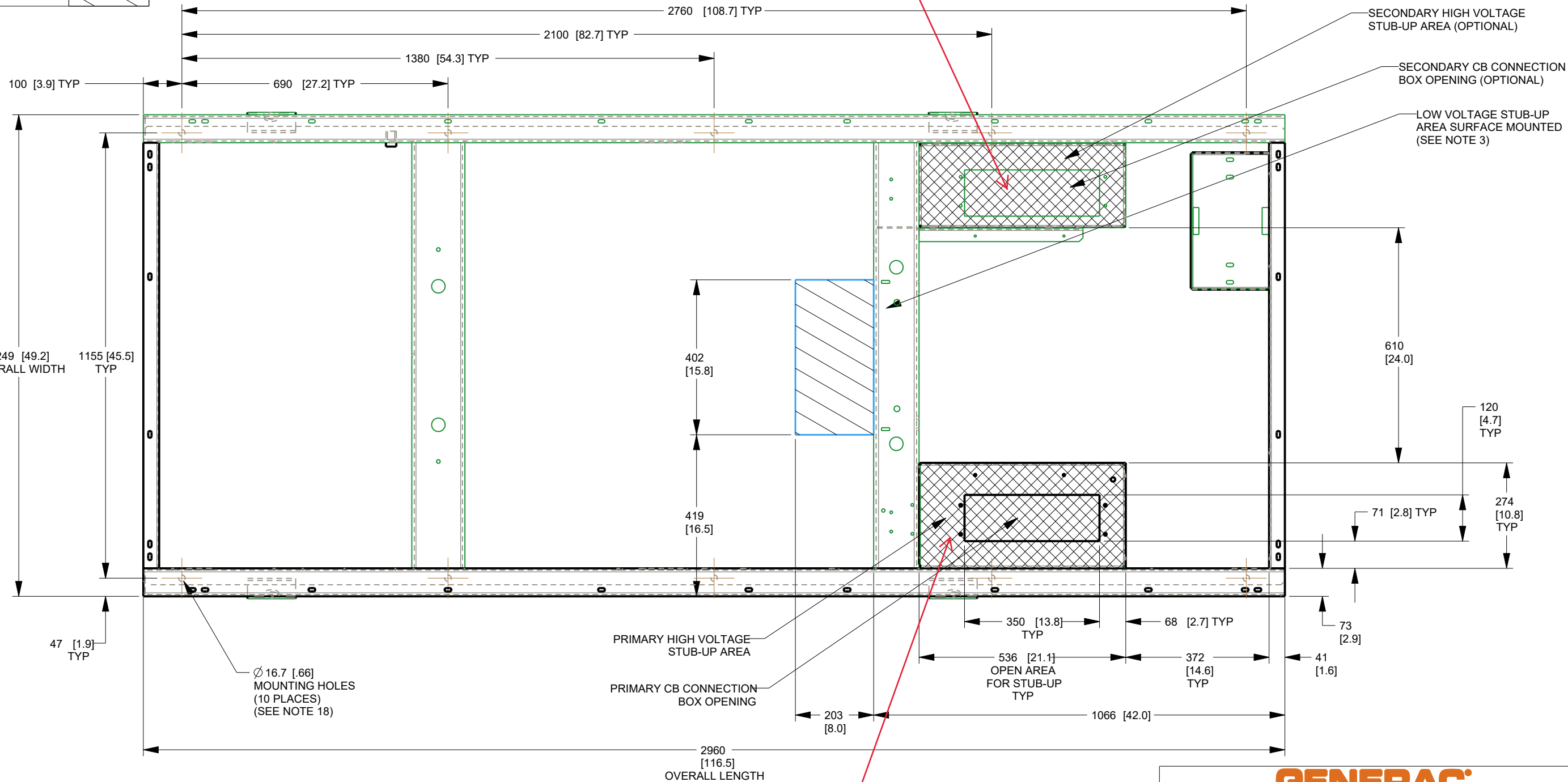
ISSUE DATE:

SIZE	CAGE NO	DWG NO	REV
B	N/A	10000018604	B
SCALE	0.035	WT-KG	SHEET 1 of 3

INSTALLATION DRAWING

RECOMMENDED ELECTRICAL STUB-UP	
HIGH VOLTAGE STUB-UP AC LOAD LEAD CONDUIT FOR CONNECTION BOX	
LOW VOLTAGE STUB-UP	

600A Secondary MLCB 100%
rated LSI Electronic w trips
and Aux



DRAWING CREATED FROM PRO/ENGINEER
3D FILE. ECO MODIFICATION TO BE
APPLIED TO SOLID MODEL ONLY.

600A MLCB 100% rated LSI
Electronic w trips and Aux



TITLE				
STUB-UP VIEW G9.0L, 60HZ: SG150 50HZ: SG120, SG104 (1 PH) SG 130/150, SG 104/120-UPSIZE ALT				
ISSUE DATE:				
SIZE	CAGE NO	DWG NO	REV	
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SCALE	WT-KG	SHEET	2 of 3	
0.090				

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INSTALLATION DRAWING

OPEN SET

MODEL	VOLTAGE	WEIGHT	CENTER OF GRAVITY DIM X	CENTER OF GRAVITY DIM Y	CENTER OF GRAVITY DIM Z
SG150, SG120	220V/240V Ø	1288 KG [2840 LBS]	1728 [68.0]	552 [21.7]	581 [22.9]
SG/MG150, SG/MG120	208V, 240V, 400V, 480V& 600V Ø	1337 KG [2948 LBS]	1710 [67.3]	551 [21.7]	

NOTE:
CENTER OF GRAVITY AND WEIGHT MAY CHANGE DUE TO UNIT OPTIONS.

STD ENCLOSURE, STEEL

MODEL	VOLTAGE	WEIGHT	CENTER OF GRAVITY DIM X	CENTER OF GRAVITY DIM Y	CENTER OF GRAVITY DIM Z
SG150, SG120	220V/240V Ø	1695 KG [3737 LBS]	1804 [71.0]	659 [25.9]	612 [24.1]
SG/MG150, SG/MG120	208V, 240V, 400V, 480V& 600V Ø	1744 KG [3845 LBS]	1788 [70.4]	655 [25.8]	

STD ENCLOSURE, ALUMINUM

WEIGHT	CENTER OF GRAVITY DIM X	CENTER OF GRAVITY DIM Y	CENTER OF GRAVITY DIM Z
1487 KG [3278 LBS]	1784 [70.2]	610 [24.0]	612 [24.1]
1536 KG [3386 LBS]	1767 [69.6]	607 [23.9]	

L1A ENCLOSURE, STEEL

MODEL	VOLTAGE	WEIGHT	CENTER OF GRAVITY DIM X	CENTER OF GRAVITY DIM Y	CENTER OF GRAVITY DIM Z
SG150, SG120	220V/240V Ø	1825 KG [4023 LBS]	1700 [66.9]	685 [27.0]	612 [24.1]
SG/MG150, SG/MG120	208V, 240V, 400V, 480V& 600V Ø	1874 KG [4131 LBS]	1689 [66.5]	680 [26.8]	

L1A ENCLOSURE, ALUMINUM

WEIGHT	CENTER OF GRAVITY DIM X	CENTER OF GRAVITY DIM Y	CENTER OF GRAVITY DIM Z
1411 KG [3111 LBS]	1732 [68.2]	625 [24.6]	612 [24.1]
1432 [3157 LBS]	1717 [67.6]	622 [24.5]	

L2A ENCLOSURE, STEEL

MODEL	VOLTAGE	WEIGHT	CENTER OF GRAVITY DIM X	CENTER OF GRAVITY DIM Y	CENTER OF GRAVITY DIM Z
SG150, SG120	220V/240V Ø	1912 KG [4215 LBS]	1805 [71.1]	814 [32.0]	614 [24.2]
SG/MG150, SG/MG120	208V, 240V, 400V, 480V& 600V Ø	1961 KG [4323 LBS]	1791 [70.5]	806 [31.7]	

L2A ENCLOSURE, ALUMINUM

WEIGHT	CENTER OF GRAVITY DIM X	CENTER OF GRAVITY DIM Y	CENTER OF GRAVITY DIM Z
1581 KG [3486 LBS]	1786 [70.3]	694 [27.3]	612 [24.1]
1630 KG [3594 LBS]	1770 [69.7]	689 [27.1]	

DRAWING CREATED FROM PRO/ENGINEER
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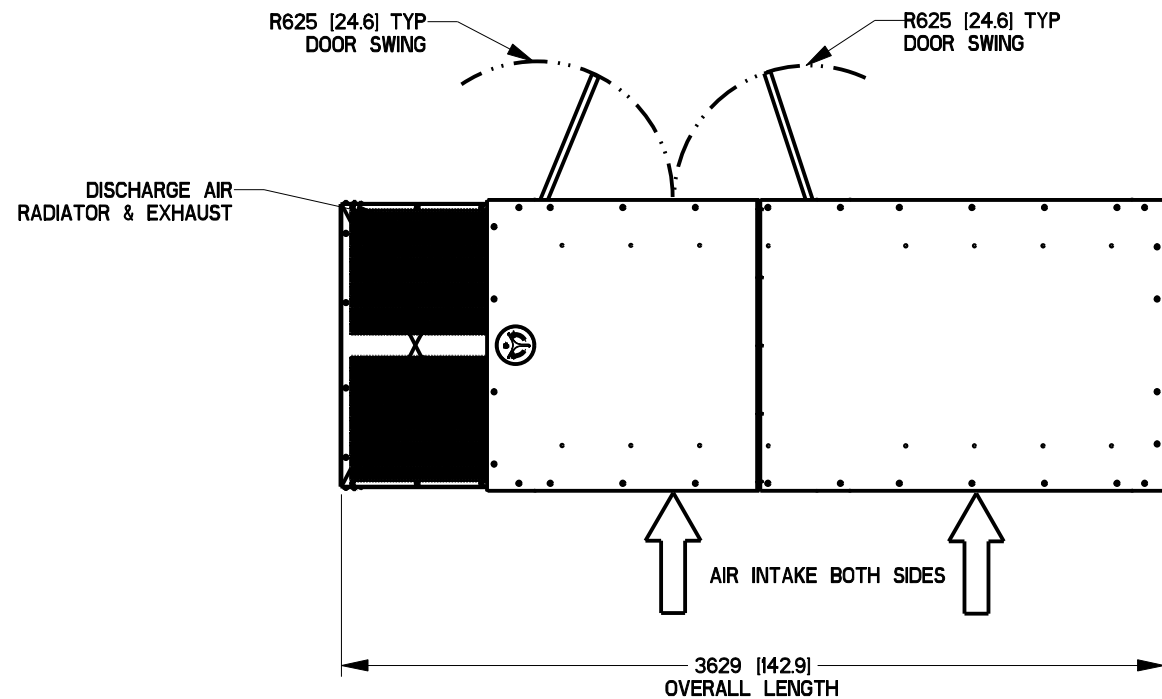
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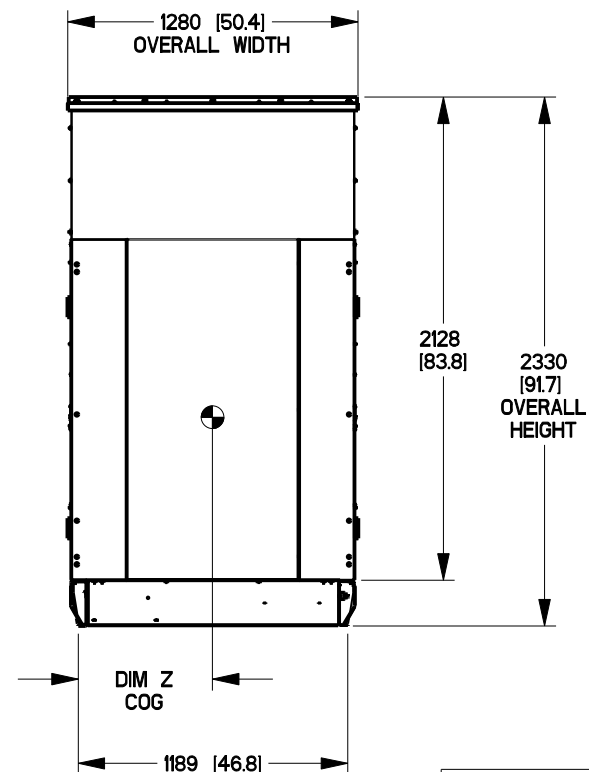
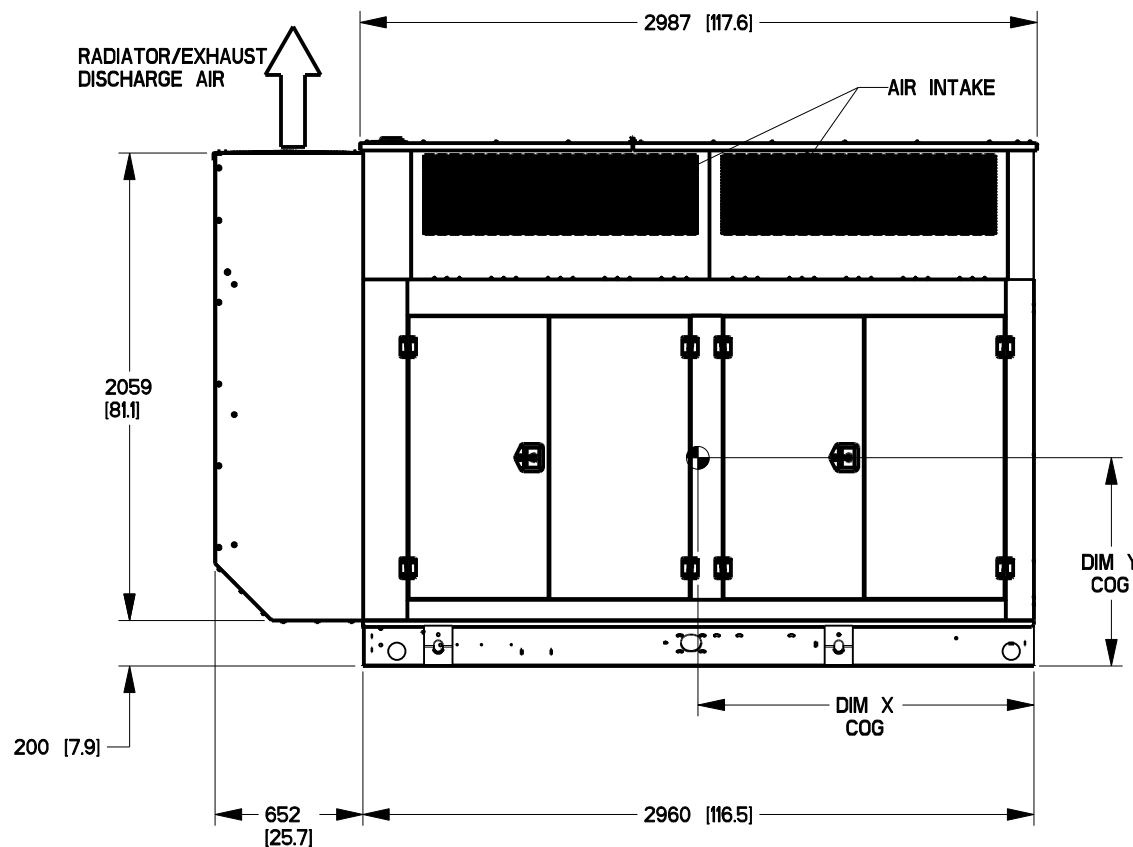
ELECTRONICALLY APPROVED
INSIDE WINDCHILL



TITLE				
WEIGHT & CENTER OF GRAVITY G9.0L, 60HZ: SG150 50HZ: SG120, SG104 (1 PH) SG 130/150, SG 104/120-UPSIZE ALT				
ISSUE DATE:				
SIZE	CAGE NO	DWG NO	REV	
B		10000018604	B	
SCALE	WT-KG		SHEET	3 of 3
0.035				



FOR ALL STUB-UP, WEIGHT, AND COG DETAILS, SEE
CORRESPONDING OPEN SET DRAWING PER UNIT CONFIGURATION.



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INSIDE WINDCHILL

GENERAC

TITLE

L2A ENCLOSURE
G9.0L 60HZ: SG/MG150
50HZ: SG/MG120

SG/MG130/150, SG/MG104/120-UPSIZE ALT

ISSUE DATE:

SIZE
B

CAGE NO
N/A

DWG NO

10000019096

REV
A

SCALE 0.030

WT-KG

5196.003

SHEET 1 of 1

GENERATOR ELECTRICAL DRAWINGS/WIRING DIAGRAMS

GROUP G

LEGEND

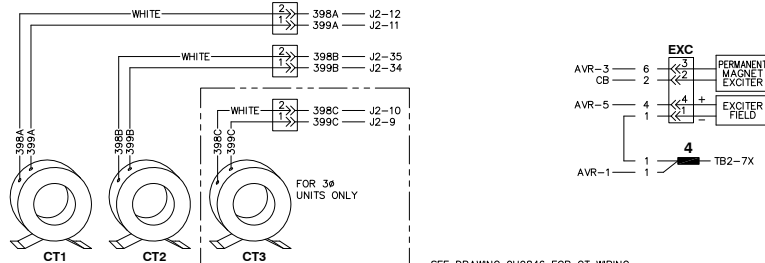
AFS - AIR/FUEL SOLENOID	IFT - INTERFACE TRANSFORMER
AH1 - ALARM HORN	INS - IGNITION NOISE SUPPRESSION
ALT - DC CHARGE ALTERNATOR	J - ENGINE CONTROL MODULE CONN.
ATS - AIR TEMPERATURE SENDER	LFP - LOW FUEL PRESSURE SWITCH
AVR - AUTOMATIC VOLTAGE REGULATOR	MLCB - MAIN LINE CIRCUIT BREAKER
BCC - BATTERY CHARGER CONNECTOR	MOD - MODERN CONNECTOR
BCH - BATTERY CHARGER	MPU1 - MAGNETIC PICKUP
CB - CIRCUIT BREAKER DPE	NB - NEUTRAL BLOCK
CO - CROSSOVER CONNECTOR	OPSI - OIL PRESSURE SENDER
COM - COMMUNICATIONS PORT	OS - OXYGEN SENSOR
CT - CURRENT TRANSFORMER	OTO - OIL TEMPERATURE CONNECTOR
DB - DIODE BRIDGE	OTS - OIL TEMPERATURE SENDER
DIST - DISTRIBUTOR	R1 - RESISTOR
ESI - EMERGENCY STOP SWITCH	RB - RELAY BOARD
EXC - EXCITER	RB_A - RELAY BOARD CONNECTOR
F - FUSE	SC - START CONTACTOR
FS - FUEL SOLENOID	SM - STARTER MOTOR
FSP - FUEL SOLENOID PLUG	SW - OFF/AUTO/MANUAL SWITCH
FSR - FUEL SOLENOID RECEPTACLE	SWO - OPERATOR SWITCH CONNECTOR
GA - GOVERNOR ACTUATOR	TB - TERMINAL BLOCKS
GD - GOVERNOR DRIVER	WLS - COOLANT LEVEL SENDER
GFCI - GROUND FAULT CURRENT INTERRUPT	WTS - COOLANT TEMPERATURE SENDER
GND - GROUND BAR CONNECTION	

NOTE: ALL WIRES 18 AWG
300V UL LISTED UNLESS
SHOWN OTHERWISE.

12 AWG SIZE

3 SPICE
NUMBER
WIRE
SPLICE

COMPONENTS LOCATED IN ALTERNATOR CONNECTION BOX



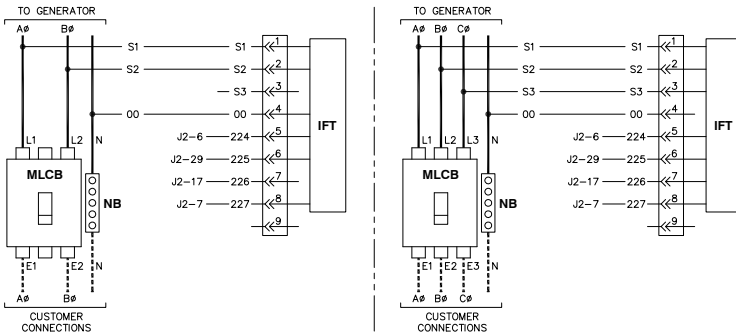
SEE DRAWING QH9846 FOR CT WIRING.

COMPONENTS LOCATED IN HIGH VOLTAGE CUSTOMER CONNECTION MODULE

CONNECTIONS FOR 10 UNIT

NOTE: ALL WIRES IN THIS
SECTION ARE 600V RATED

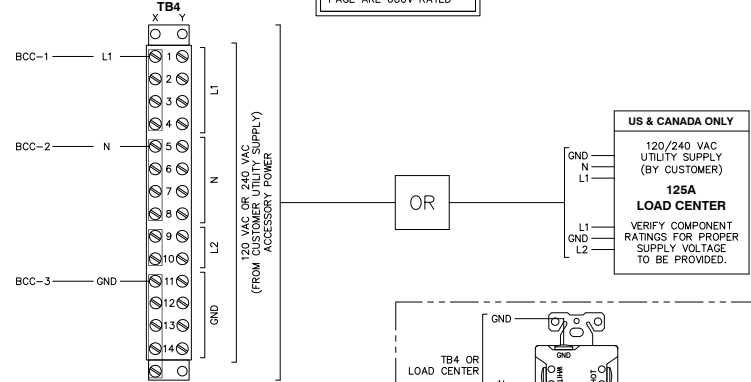
CONNECTIONS FOR 30 UNIT



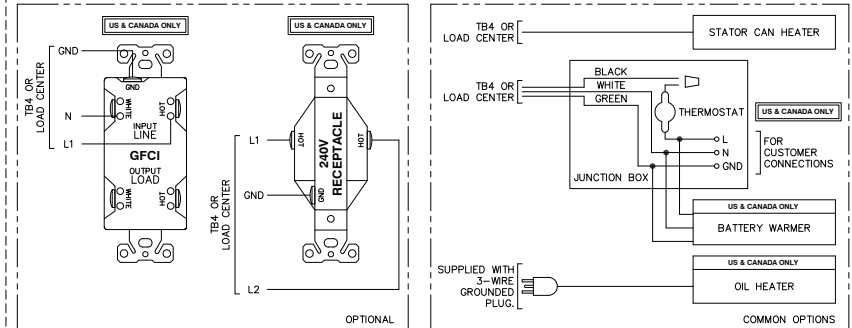
GROUP G

COMPONENTS LOCATED IN HIGH VOLTAGE CUSTOMER CONNECTION MODULE

NOTE: ALL WIRES ON THIS
PAGE ARE 600V RATED



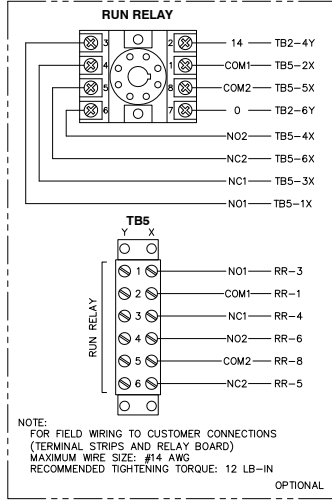
NOTE:
FOR FIELD WIRING TO CUSTOMER CONNECTIONS
(TERMINAL STRIP)
MAXIMUM WIRE SIZE: #10 AWG
RECOMMENDED TIGHTENING TORQUE: 14 LB-IN



GROUP G

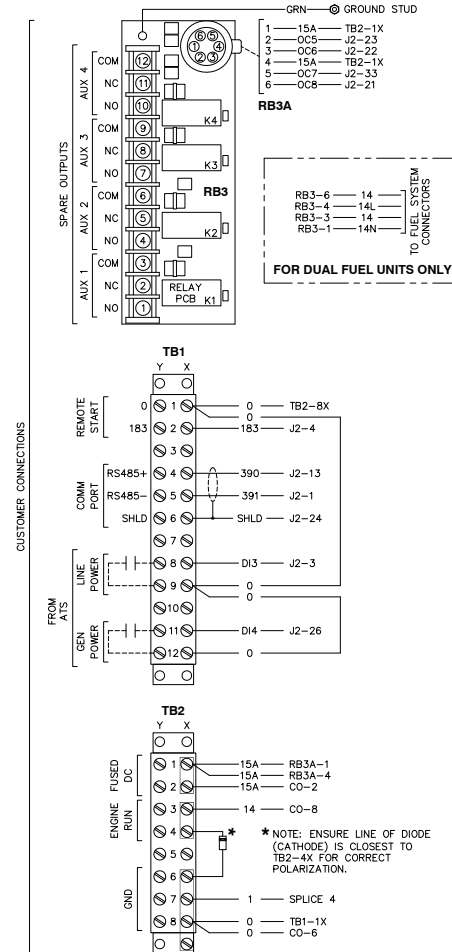
COMPONENTS LOCATED IN HIGH VOLTAGE CUSTOMER CONNECTION MODULE

NOTE: ALL WIRES ON THIS PAGE ARE 600V RATED

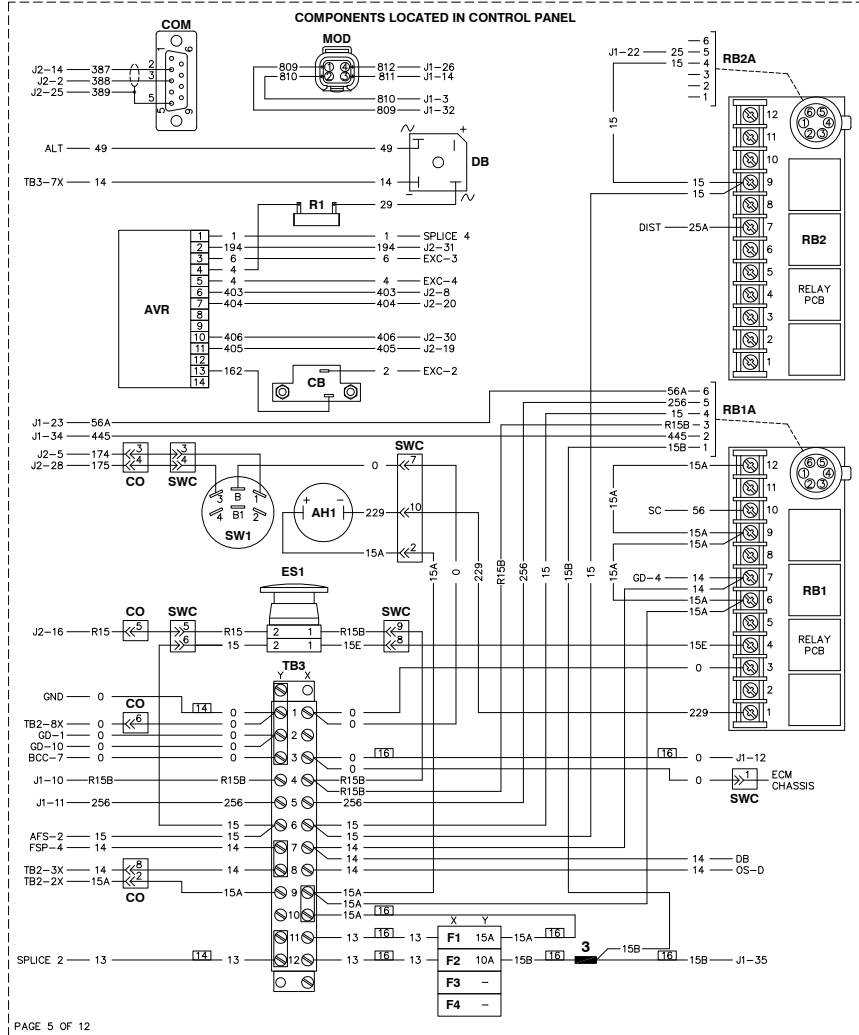


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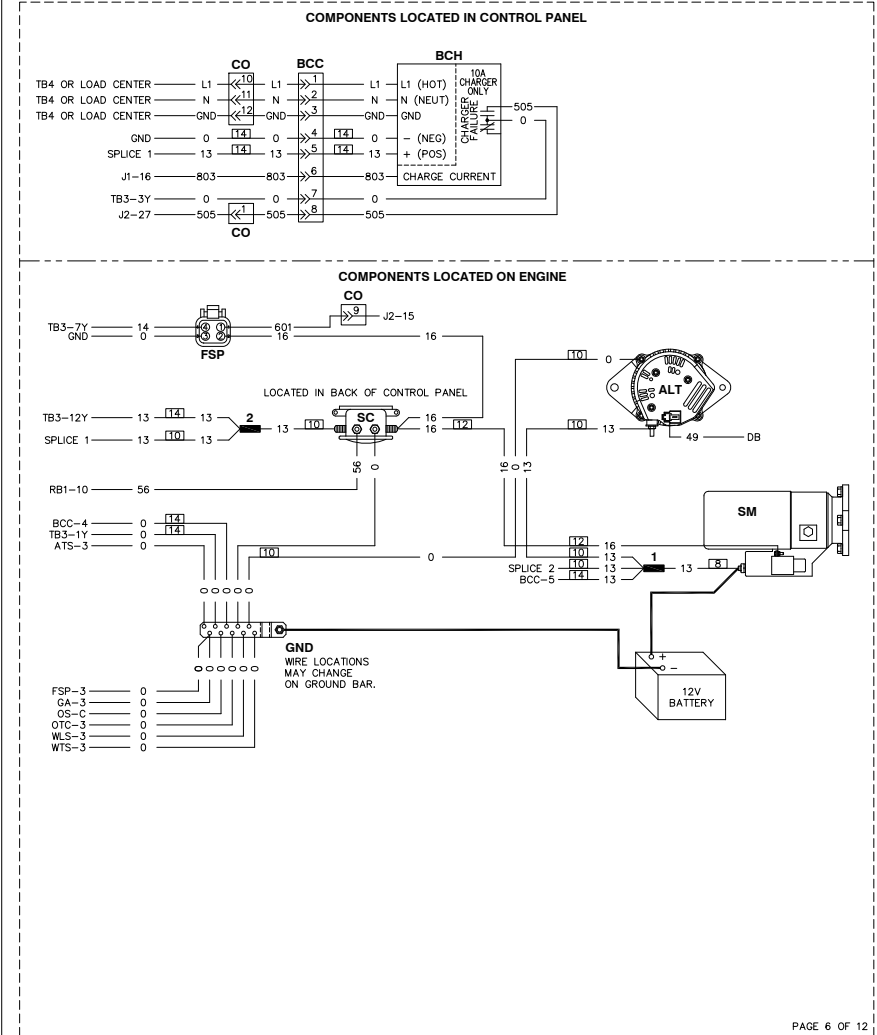
COMPONENTS LOCATED ON LOW VOLTAGE CUSTOMER CONNECTION PANEL



GROUP G

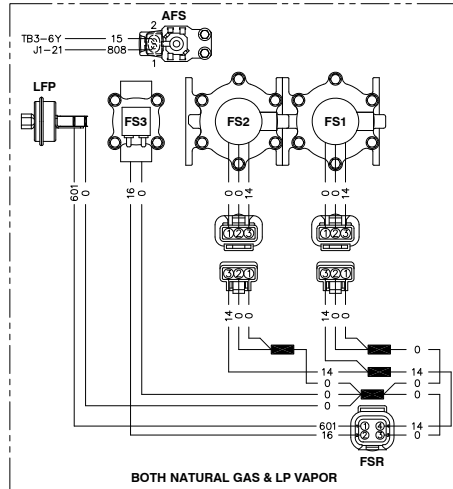
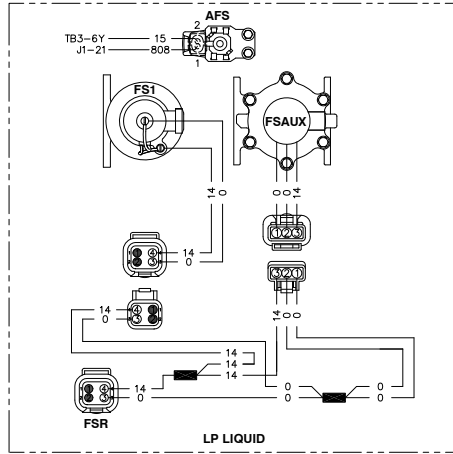


GROUP G



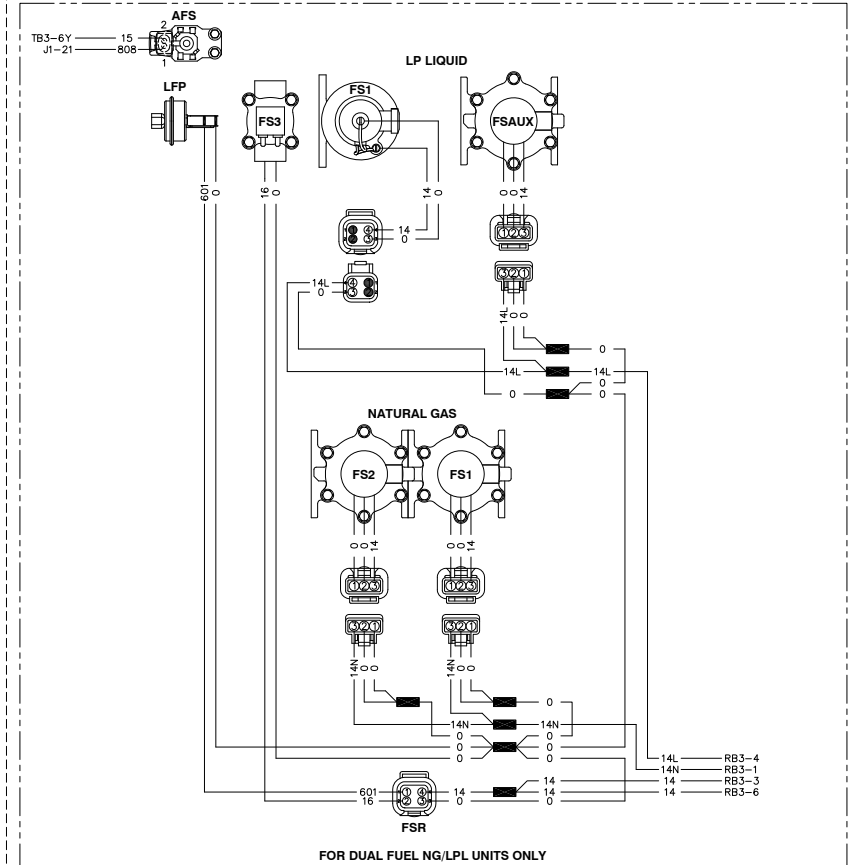
GROUP G

COMPONENTS LOCATED ON ENGINE



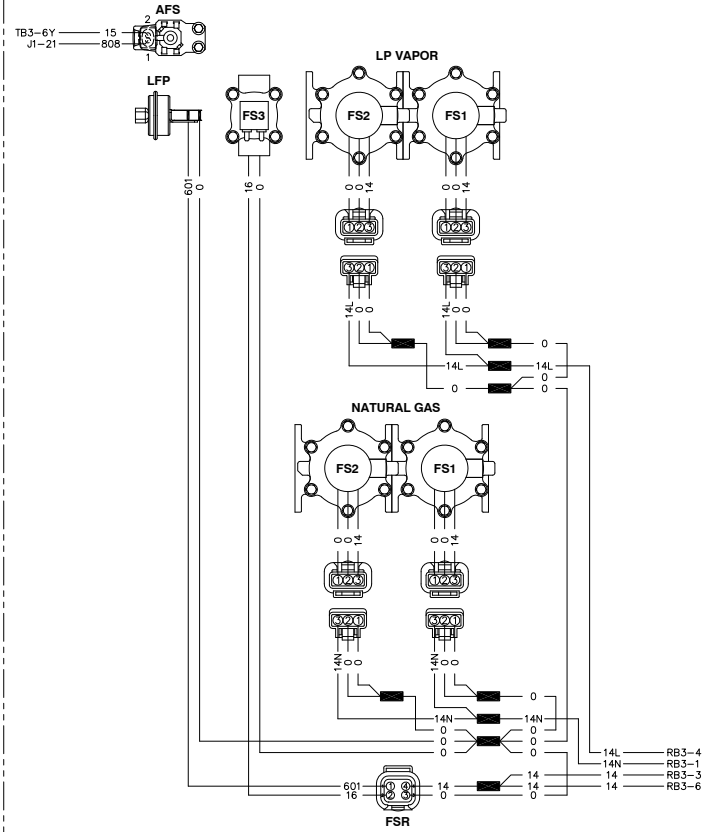
GROUP G

COMPONENTS LOCATED ON ENGINE



GROUP G

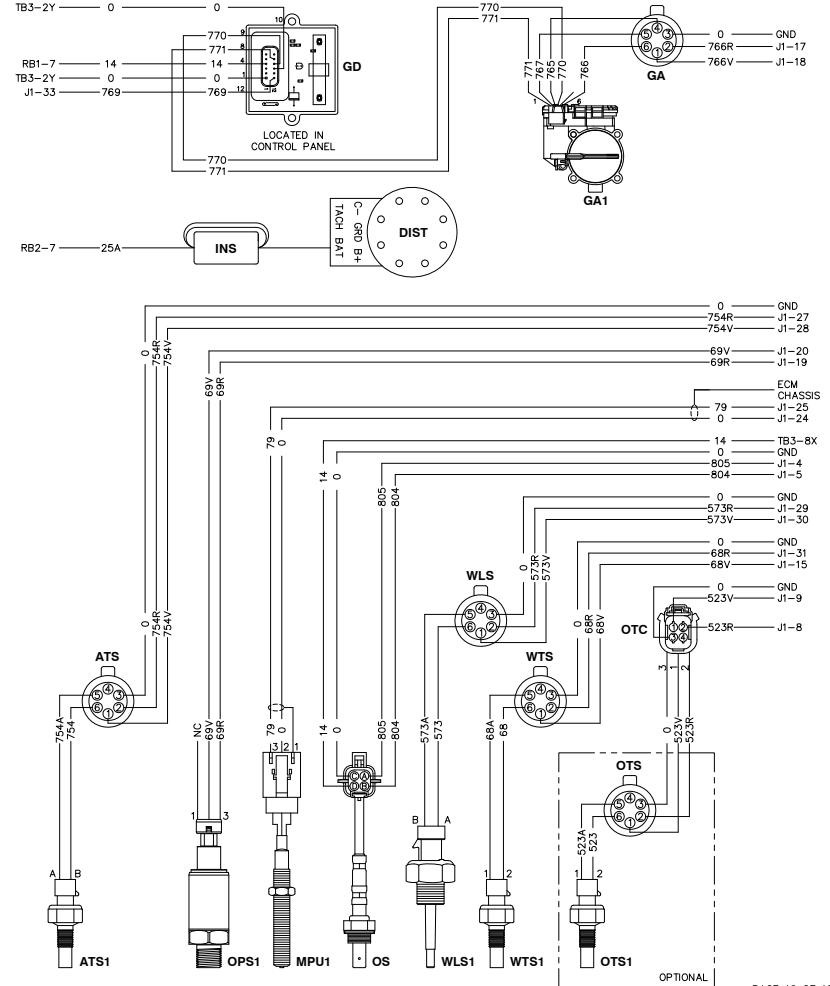
COMPONENTS LOCATED ON ENGINE



FOR DUAL FUEL NG/LPV UNITS ONLY

GROUP G

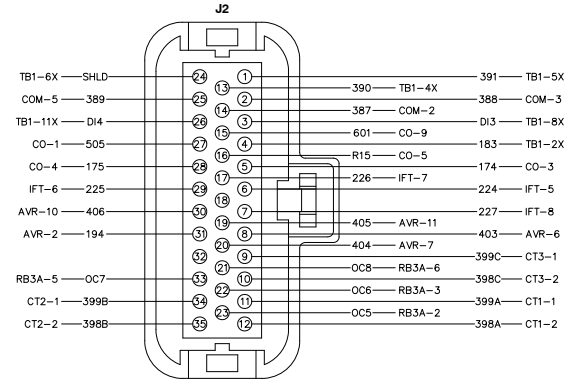
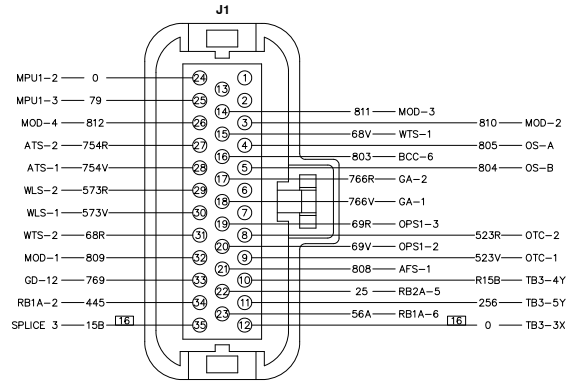
COMPONENTS LOCATED ON ENGINE



OPTIONAL

GROUP G

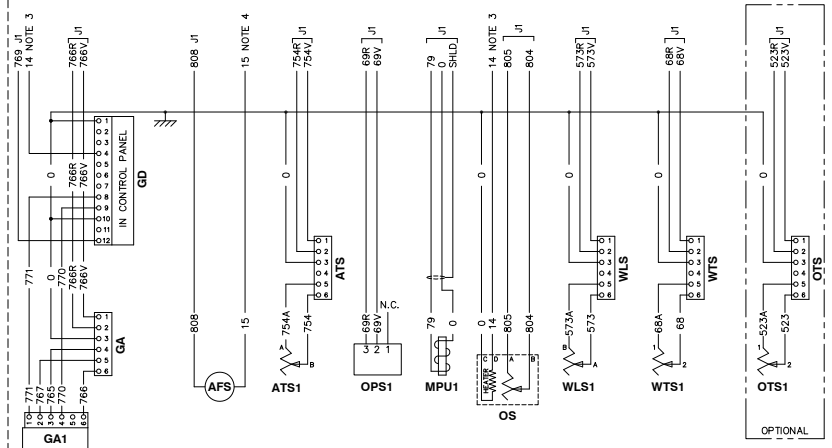
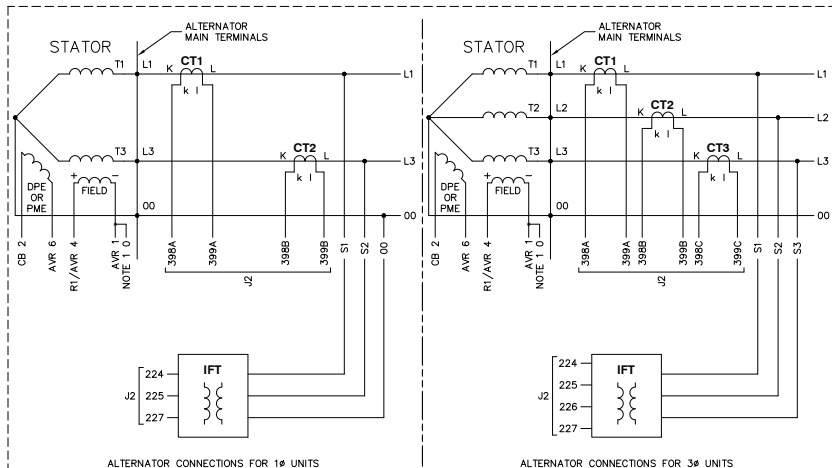
ENGINE CONTROL MODULE CONNECTORS



GROUP G

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GROUP G



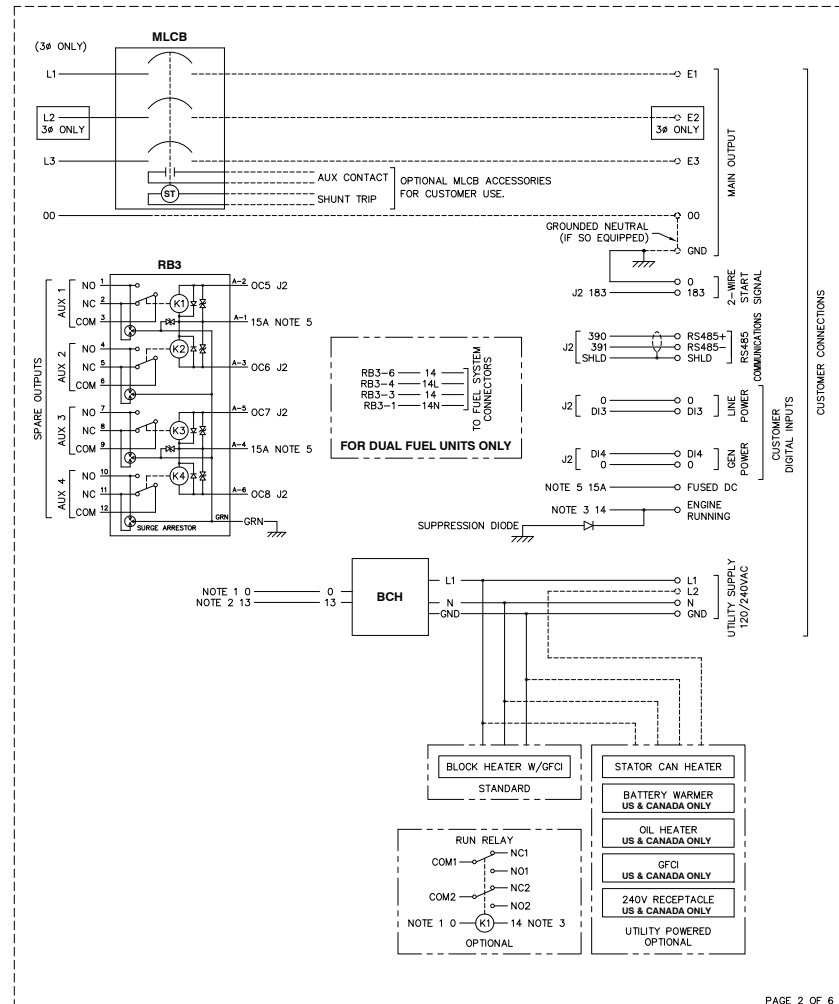
PAGE 1 OF 6

REVISION: J-1105-B
DATE: 10/24/14

PAGE 1 OF 6

SCHEMATIC - DIAGRAM
G9.0L G18 TURBO H-PANEL
DRAWING #: 0K9430

GROUP G



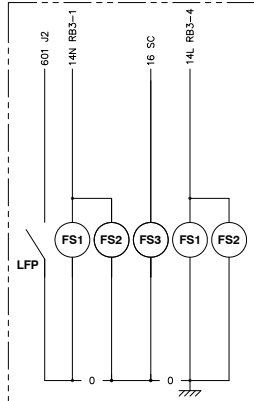
PAGE 2 OF 6

REVISION: J-1105-B
DATE: 10/24/14

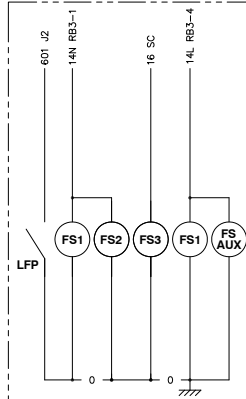
PAGE 2 OF 6

SCHEMATIC - DIAGRAM
G9.0L G18 TURBO H-PANEL
DRAWING #: 0K9430

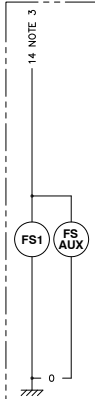
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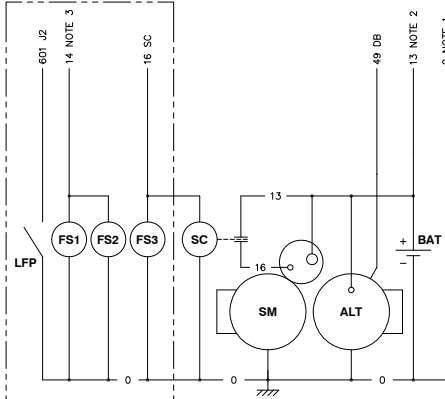
FOR DUAL FUEL NG/LPV UNITS ONLY



FOR DUAL FUEL NG/LPL UNITS ONLY



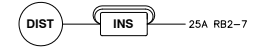
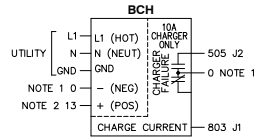
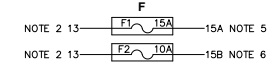
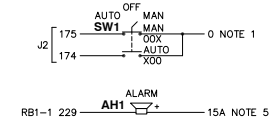
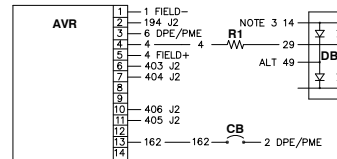
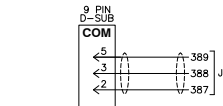
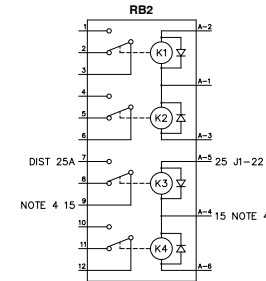
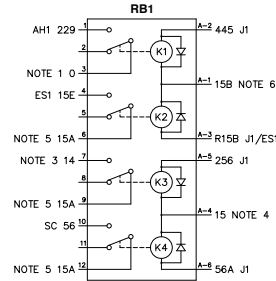
FOR LPL UNITS ONLY



FOR NG & LPV UNITS ONLY

SCHEMATIC - DIAGRAM
G9.0L G18 TURBO H-PANEL
DRAWING #: 0K9430

GROUP G



SCHEMATIC - DIAGRAM
G9.0L G18 TURBO H-PANEL
DRAWING #: 0K9430

GROUP G

AVR CONNECTOR

PIN	WIRE	TO	FUNCTION
1	1	FIELD	- FIELD
2	194	J2-31	+12VDC
3	6	DPE/PME	EXCITER OUTPUT
4	4	R1/FIELD	+ FIELD
5	4	R1/FIELD	+ FIELD
6	403	J2-8	GATE TRIGGER B
7	404	J2-20	GATE TRIGGER A
10	406	J2-30	ZERO CROSSING INPUT
11	405	J2-19	GROUND (ISO)
13	162	CB	EXCITER OUTPUT (AFTER CB)

GD CONNECTOR

PIN	WIRE	TO	FUNCTION
1	0	GND	NOTE 1
4	14	R81-7	NOTE 3
8	771	GA1-1	THROTTLE DRIVE LO
9	770	GA1-4	THROTTLE DRIVE HI
10	0	GND	NOTE 1
12	769	J1-33	THROTTLE PULSE WIDTH MODULATION

NOTES:

1) WIRE# 0 IS CHASSIS GROUND (BATTERY-) UNLESS NOTED OTHERWISE.

2) WIRE# 13 IS UNFUSED +12VDC (BATTERY+).

3) WIRE# 14 IS FUSED +12VDC WHEN GENERATOR IS CRANKING OR RUNNING.

4) WIRE# 15 IS FUSED +12VDC WHEN E-STOP IS NOT ACTIVATED.

5) WIRE# 15A IS FUSED +12VDC FOR GENERAL USE.

6) WIRE# 15B IS FUSED +12VDC FOR THE ENGINE CONTROL MODULE.

7) WIRE# 15E IS FUSED +12VDC CONTROLLED BY ENGINE CONTROL MODULE PRIOR TO E-STOP.

ENGINE CONTROL MODULE CONNECTIONS

J1

PIN	WIRE	TO	FUNCTION
3	810	MOD-2	MODEM SIGNAL RETURN
4	805	OS-A	OXYGEN SENSOR RETURN
5	804	OS-B	OXYGEN SENSOR +
8	523R	OTS-2	OIL TEMPERATURE RETURN
9	523V	OTS-1	OIL TEMPERATURE +
10	R15B	RB1A-3/EST	OVERSPEED/WATCHDOG
11	256	RB1A-3	FUEL RELAY
12	0	GND	NOTE 1
14	811	MOD-3	MODEM DATA CARRIER DETECT
15	68V	WIS-1	COOLANT TEMPERATURE +
16	803	BCH	BATTERY CHARGER CURRENT
17	768R	GA-2	THROTTLE POSITION RETURN
18	768V	GA-1	THROTTLE POSITION +
19	69R	OPS1-3	OIL PRESSURE RETURN
20	69V	OPS1-2	OIL PRESSURE +
21	808	AFS	AIR/FUEL SOLENOID
22	25	RB2A-5	DELAYED IGNITION RELAY
23	56A	RB1A-6	STARTER RELAY
24	0	MPU1-2	MPU1 SIGNAL (-)
25	79	MPU1-3	MPU1 SIGNAL (+)
26	812	MOD-4	MODEM ENABLE
27	754R	ATS-2	AIR TEMPERATURE RETURN
28	754V	ATS-1	AIR TEMPERATURE +
29	573R	WLS-2	COOLANT LEVEL RETURN
30	573V	WLS-1	COOLANT LEVEL +
31	68R	WIS-2	COOLANT TEMPERATURE RETURN
32	809	MOD-1	MODEM 12V POWER
33	769	GD-12	THROTTLE PULSE WIDTH MODULATION
34	445	RB1A-2	ALARM RELAY
35	15B	F2	NOTE 6

J2

PIN	WIRE	TO	FUNCTION
1	391	CUST CON	RS485- (TRANSFER SWITCH)
2	388	COM-3	RS232 TX (GENLINK)
3	03	CUST CON	LINE POWER SIGNAL
4	183	CUST CON	REMOTE START
5	174	SW1	*AUTO* START
6	224	IFT	V SENSE GENERATOR A PHASE
7	227	IFT	V SENSE RETURN
8	403	AVR-6	AVR GATE TRIGGER B
9	399C	CT3	GENERATOR C PHASE CURRENT -
10	399C	CT3	GENERATOR C PHASE CURRENT +
11	399A	CT1	GENERATOR A PHASE CURRENT -
12	399A	CT1	GENERATOR A PHASE CURRENT +
13	390	CUST CON	RS485+ (TRANSFER SWITCH)
14	387	COM-2	RS232 RX (GENLINK)
15	601	LFP	LOW FUEL PRESSURE
16	R15	EST	EMERGENCY STOP
17	226	IFT	V SENSE GENERATOR C PHASE
19	405	AVR-11	AVR GROUND
20	404	AVR-7	AVR GATE TRIGGER A
21	OC8	RB3A-6	SPARE OUTPUT 4
22	OC6	RB3A-3	SPARE OUTPUT 2
23	OC5	RB3A-2	SPARE OUTPUT 1
24	394D	CUST CON	RS485 DRAIN (TRANSFER SWITCH)
25	389	COM-5	RS232 COM (GENLINK)
26	014	CUST CON	GENERATOR POWER SIGNAL
27	505	BCH	BATTERY CHARGER FAIL
28	175	SW1	*MANUAL* START
29	225	IFT	V SENSE GENERATOR B PHASE
30	406	AVR-10	AVR ZERO CROSSING INPUT
31	194	AVR-2	AVR +12VDC
33	OC7	RB3A-5	SPARE OUTPUT 3
34	399B	CT2	GENERATOR B PHASE CURRENT -
35	399B	CT2	GENERATOR B PHASE CURRENT +

LEGEND

AFS - AIR/FUEL SOLENOID	EST - EMERGENCY STOP SWITCH	OPS1 - OIL PRESSURE SENDER
AH1 - ALARM HORN	F - FUSE	OS - OXYGEN SENSOR
ALT - DC CHARGE ALTERNATOR	FS - FUEL SOLENOID	OTS - OIL TEMPERATURE SENDER
ATS - AIR TEMPERATURE SENDER	GA - GOVERNOR ACTUATOR	PME - PERMANENT MAGNET EXCITER
AVR - AUTOMATIC VOLTAGE REGULATOR	GD - GROUND FAULT CIRCUIT INTERRUPT	R1 - RESISTOR
BAT - BATTERY	GFCI - GROUND FAULT CIRCUIT INTERRUPT	RB - RELAY BOARD
BCH - BATTERY CHARGER	GND - GROUND	RB_A - RELAY BOARD CONNECTOR
CB - CIRCUIT BREAKER	IFT - INTERFACE TRANSFORMER	SC - STARTER CONTACTOR
COM - COMMUNICATIONS PORT	INS - IGNITION NOISE SUPPRESSION	SM - STARTER MOTOR
CT - CURRENT TRANSFORMER	J - ENGINE CONTROL MODULE CONNECTOR	SW1 - OFF/AUTO/MANUAL SWITCH
CUST CON - CUSTOMER CONNECTION	LFP - LOW FUEL PRESSURE SWITCH	WLS - COOLANT LEVEL SENDER
DB - DIODE BRIDGE	MLCB - MAIN LINE CIRCUIT BREAKER	WTS - COOLANT TEMPERATURE SENDER
DIST - DISTRIBUTOR	MOD - MODEM CONNECTOR	
DPE - EXCITER	MPU1 - MAGNETIC PICKUP	

SCHEMATIC - DIAGRAM

G9.0L G18 TURBO H-PANEL

DRAWING #: 0K9430

GROUP G

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SCHEMATIC - DIAGRAM

G9.0L G18 TURBO H-PANEL

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NATURAL GAS DESIGN GUIDELINES

GAS SUPPLY CHECK LIST

- **Gas Service Meter and Serving Utility**
 - Available on site and reliable
 - Rated for the combined loading of the facility and the generator (total BTU)
 - Maintains generator minimum pressure requirements while under maximum loading
- **Step Down Pressure Regulators**
 - Selected for the pressure and flow needs of the generator
 - Direct acting type with good dynamic response (no significant time lags in regulation)
 - Selected for minimum no-load to full load pressure droop (< 1-2" w.c. desired)
 - Located near the generator (allows the long piping runs to be at higher pressure)
 - Located at least 10' away from generator connection (avoids regulator oscillations)
 - Dedicated to a single generator (increases system reliability)
- **Piping**
 - Sized large enough to minimize pressure drops to acceptable levels under full gas flow
 - Minimize the number of elbows to avoid unwanted pressure drops
 - Ensure entire gas supply system maintains acceptable generator pressure under full gas flow conditions
 - Should be connected to generator with a flexible connection
 - Should include a drip leg (sediment trap)
- **LP**
 - LP tank's boil off rate (BTU capacity) needs to support rated BTU at minimum ambient
 - LP liquid withdrawal systems should be considered: cold ambients, small tanks, large generators
 - LP liquid systems require pressure rated piping and vaporization outside a building
- **Generac Design Resources**
 - "Installation Guidelines for Stationary Industrial Generators" manual 046622 (detailed information)
 - "Power Design Pro" software -- mechanical design tab (gas piping pressure drop calculator)
- **National Codes and Standards**
 - NFPA 37 "Installation and use of Stationary Combustion Engines"
 - NFPA 54 "National Fuel Gas Code"
 - NFPA 58 "LP Gas Code"

DESIGN GUIDELINES

Natural Gas Supply System Design Guide for Generac Industrial Spark Ignited Generators

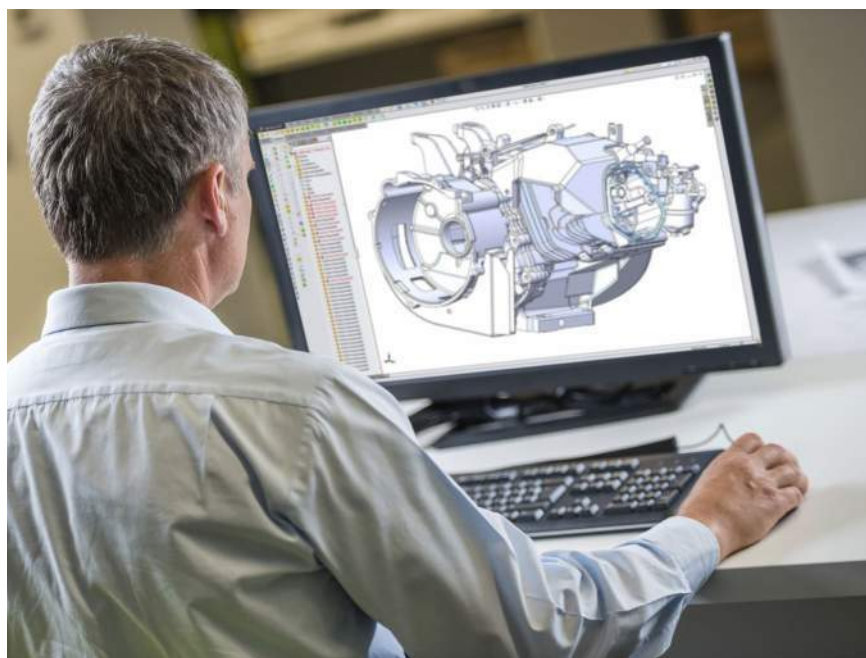
DESIGN GUIDE

Natural Gas Supply System Design Guide for Generac Industrial Spark Ignited Generators

INTRODUCTION

This design guidance document is to be provided to the consulting engineer during the project design phase and again at the time of submittal to the engineer and mechanical contractor for all Generac Industrial natural gas and propane fueled generator sets.

The following pages provide information and design best practices that have been demonstrated to minimize gas pressure instability and flow deficiency problems in the field. These design guidelines are to be used in combination with applicable national standards,¹ local fuel gas piping codes, and Generac's Installation Guidelines for Stationary Industrial Generators (Document #046622).



1. DESIGN OBJECTIVES

1.1. Provide the generator with a stable gas supply pressure over varying gas flow demand conditions. Maximum gas flow for all Generac generators are listed on the unit nameplate and generator data sheets.²

1.2. The pressure difference measured at the generator fuel pressure test port should typically be less than 2" water column (w.c.) from no-load running to full-load running condition.

1.3. The gas pressure must remain above the minimum specified for the generator set at all times, under all operating conditions. Failure to maintain adequate gas pressure and flow will result in operational problems such as extended crank cycles, inability to carry full load, and unstable engine speed.

1.4. Maintain a pressure and flow margin to allow for seasonal pressure variation on the upstream gas system. The emergency system must be before the facility shutoff.

1.5. Other facility loads must be factored in while sizing the Generator fuel system. It is recommended that the generator should have a dedicated fuel supply, which is not shared with any other appliances (furnace, water heaters, ranges, etc.) and the Generator fuel supply line shall be installed away from a high heat source so that the fuel temperature must remain at an acceptable operating range.

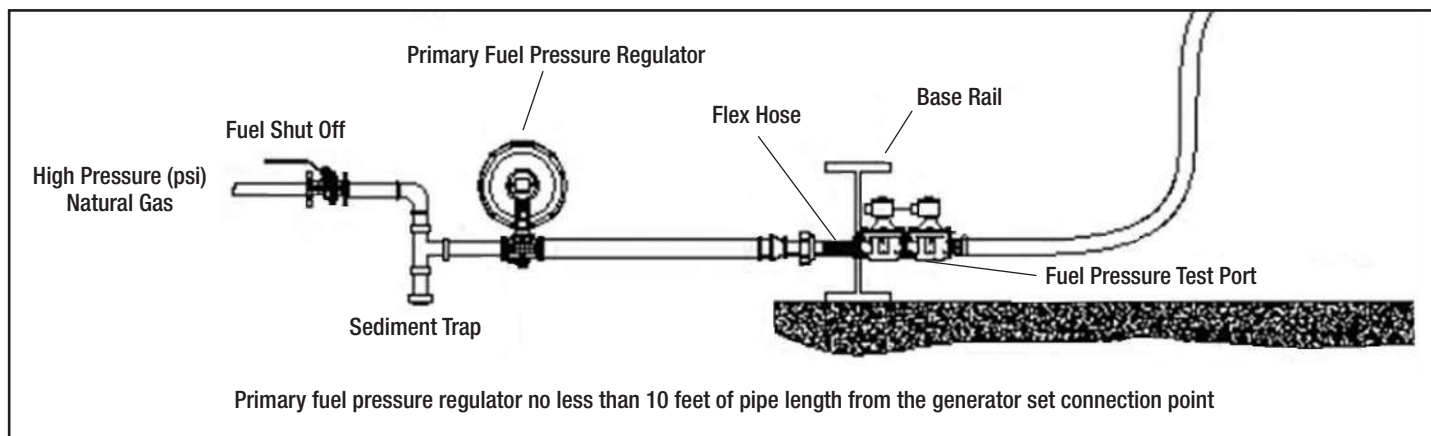


Figure 1: Typical natural gas supply regulator and piping configuration.

2. REGULATOR PERFORMANCE ATTRIBUTES³

2.1. Regulator Body Size: The inlet and outlet ports on a regulator are typically a single metal casting. The “body size” refers to the nominal diameter of the inlet and outlet pipe threads (or flange).

The regulator body size should never be larger than the pipe size, but it may be smaller provided the required flow can be obtained through the smaller regulator body size.

2.2. Pressure differential: The maximum flow rate of a service regulator is constrained by the gas pressure differential across the inlet and outlet port. When selecting a regulator for a specific gas flow requirement, it must correspond to the expected nominal upstream and downstream gas pressures. Consult manufacturers' published flow rate tables at various inlet and outlet pressure values to select an appropriate regulator (See the example in Table 1).

2.3. Flow and droop: Select a direct acting regulator that will deliver approximately 1.5 times the maximum gas flow required by the generator with 1" – 2" water column (w.c.) pressure droop at the expected nominal upstream and downstream gas pressures. Direct acting regulators provide the quick

response required for controlling fast changing gas flow demands encountered in engine-generator applications.

For example, a Generac SG500 generator, configured for 7" – 11" w.c. nominal gas pressure, requires 6,000 CFH of gas at full load. The selected regulator must be rated to flow approximately 9,000 CFH (1.5 X 6000 CFH = 9000 CFH). Given an upstream gas pressure of 2 psi, a 1½" Model 122-12 regulator with a blue spring would be the first choice. However, assume there is a substantial risk of seasonal pressure variation where the upstream gas pressure may fall closer to 1 psi, a larger 2" Model 122-12 regulator with a blue spring will still provide the required flow at the lower upstream pressure.

INLET PRESSURE	Set Point 5" w.c.	Set Point 7" w.c.	Set Point 11" w.c.	Set Point 18" w.c.	Set Point 28" w.c.	Set Point 2 w.c.	REGULATOR SIZE AND MODEL
	Red Spring 1" w.c. DROOP	Blue Spring 1" w.c. DROOP	Green Spring 2" w.c. DROOP	Orange Spring 2" w.c. DROOP	Orange Spring 3" w.c. DROOP	Black Spring 1/4" PSI DROOP	
8" w.c.	4000	3000	-	-	-	-	1 ½" Model 122-12
14" w.c.	4900	4500	3700	-	-	-	
1 psi	6600	6500	6000	5750	-	-	
2 psi	10500	10000	9800	9000	9500	-	
3 psi	12000	12000	11100	10000	10500	8900	
5 psi	14500	14500	13900	12000	12700	10000	
10 psi	16000	16000	15000	13500	14000	12700	
15 psi	18000	18000	19000	19000	20000	18000	2 ½" Model 122-12
8" w.c.	5000	4000	-	-	-	-	
14" w.c.	8800	8000	6600	-	-	-	
1 psi	12200	12000	11500	10700	-	-	
2 psi	18200	18000	17300	16500	16900	-	
3 psi	25000	25000	24000	22300	23000	18000	
5 psi	32000	32000	30000	28100	29000	27400	
10 psi	38000	38000	35000	32200	33000	30000	
15 psi	38000	38000	40000	39000	40000	36000	

Table 1: Typical regulator flow capacity table. Note how the same model regulator will flow larger volumes of gas with a higher inlet pressure while maintaining a set downstream pressure. Courtesy of Sensus.

Gas pressure regulators are feedback control systems driven by the pressure differential across the diaphragm and the case spring. When gas flow on the low-pressure side of the regulator causes a pressure drop, spring force in the regulator case pushes on the diaphragm and opens the valve to increase gas flow to maintain the set pressure.

The dynamic pressure maintained by the regulator decreases slightly as gas flow rate increases (Figure 2). This phenomenon is known as pressure droop or, more simply, “droop”. Regulator manufacturers design products to minimize pressure droop while still maintaining regulator stability for a given gas flow rate.

Regulators tend to exhibit the best stability and response time when they operate near the middle of their proportional band. Selecting a regulator with a published maximum gas flow of approximately 1.5 times the full-load gas flow required by the generator avoids operation very close to the fully open or fully closed position, minimizing the probability of unstable operation. A regulator that is too large, capable of flowing several times the maximum gas flow required by the generator, will operate very close to its fully closed position which may also result in unstable operation.

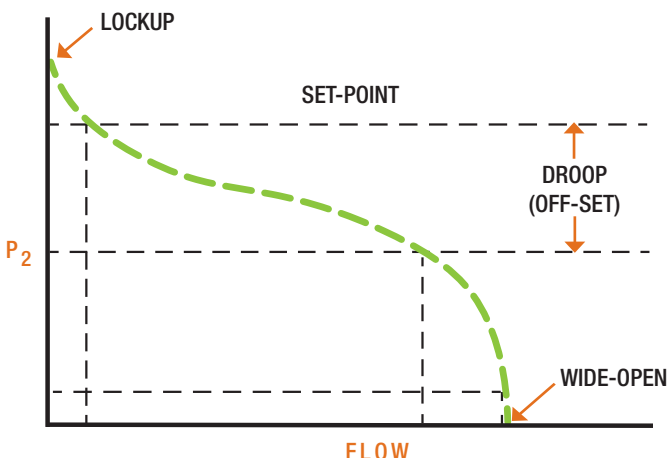


Figure 2: Pressure droop characteristic of a typical direct-operated regulator. Courtesy of Emerson-Fisher Natural Gas Application Guide.

2.4. Spring Rate, Accuracy, and Response Time:⁴

The regulator spring provides the force required to open the regulator valve and maintain the desired operating pressure. There may be more than one spring covering a desired operating pressure. Spring selection plays a role in regulator accuracy and response time.

In general, using the lightest spring rate (*a blue spring from the prior example referencing Figure 2*) that achieves the desired operating pressure will provide the best accuracy, minimizing pressure droop across the range of expected gas flow rates. However, a response that is “too fast” can introduce oscillation and instability. If instability is experienced during operation, moving to the next higher spring (*a green spring from the prior example referencing Table 1*) that includes the desired operating pressure is one potential method to mitigate oscillations.

2.5. Orifice size: For regulators where various orifice sizes are available, select the smallest orifice that will provide approximately 1.5 times the maximum gas flow required by the generator. Selecting an orifice that is significantly larger than necessary will result in the valve operating very close to the seat (nearly closed) and may result in pressure instability, increased seal wear, or audible noise from the regulator.

2.6. Lockup or hard shutoff: A regulator with a lockup or hard shutoff feature must be used. Lockup is the pressure above the regulator setpoint that is required to shut the regulator off tight so no gas flows. Typically, the lockup pressure is 1"-3" W.C. above the dynamic pressure setpoint measured when a small volume of gas is flowing (*i.e. no-load running condition on the generator*). The lockup feature prevents the low-pressure side of the regulator from

creeping up to the regulator line side pressure during long periods of zero gas flow when the generator is not running. If excessive gas pressure is allowed to build up on the low-pressure side of the regulator, the generator solenoid valves may be unable to open against the excessive pressure and the engine will not start.

2.7. Internal vs. external pressure registration:

Internally registered regulators are recommended because they generally have fewer operational problems in the field.

The diaphragm case of a regulator must have a connection to the low-pressure side in order to function. Internally registered regulators have a passage built into the body casting which provides a path for low-pressure gas to act against the diaphragm and spring force. Externally registered regulators lack this internal connection path but instead have an additional pipe fitting on the regulator case where a smaller diameter pipe is field-fabricated to a downstream location on the low-pressure side of the main gas piping system. Because all the pipe fabrication is done in the field, variation in the main gas piping system and the remote pressure registration line can cause unpredictable performance that is difficult to troubleshoot.

Externally registered regulators can be used, but the engineer and installation contractor must be aware of the dynamic effects introduced by variables such as; flow turbulence, length and diameter of the sensing line, location of the sensing point in the low pressure piping system, increases and decreases in pipe diameter.

If an externally registered regulator is used, locate the remote sensing point 8 to 10 pipe diameters downstream of the regulator in the largest diameter pipe section. The start of 8 to 10 pipe diameters is

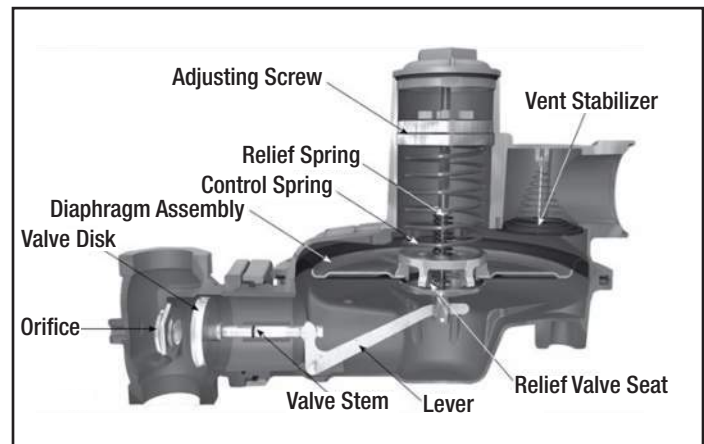


Figure 3: Major components of a direct-acting lever-type regulator, internally registered.
(Courtesy Emerson Fisher).

after the transition to the largest diameter pipe or any other throttling devices, component and/or fittings that will disrupt flow and create turbulence. The sensing line should be taken off the top of the main line to keep it free of debris and condensate. If possible, it should horizontally slope back to the main so that any condensate will drain back into the main rather than accumulate in the regulator's diaphragm case. Minimize the fittings used in running the sensing line. An externally registered regulator will respond to the pressure changes sensed at the remote tap rather than within the regulator body. It is advisable to install a pressure gauge at the sensing line tap on the main as this will be the control point of the regulator.

2.8. Recommended gas regulators:

The list of regulators below is not an exhaustive list of all suitable regulators that are available in the market, nor is it a list of "Generac Approved" regulators. The list is intended to help design engineers and mechanical contractors identify a range of products that have demonstrated their suitability for engine-generator service in past projects. Consult your Generac Distributor or gas regulator supplier for additional information.

- Sensus⁵
- Emerson Fisher
- Itron

3. FLOW CHARACTERISTICS OF GAS PIPING SYSTEMS:

3.1. Elbows and Tees: Minimize the number of elbows and tee fittings that increase pressure drop and flow turbulence in the system. Where more than three elbows and/or tees are required, use of swept radius elbows (typical for welded pipe sections) will help reduce pressure loss.

3.2. Reducing bushings (swages): Pipe reducing bushings are the transition from a larger to smaller pipe diameter or vice versa. Gas flow velocity is slower in a larger diameter pipe compared to a smaller diameter pipe moving the same volume of gas. If a remote sensing regulator is used, it is important to understand the dynamic pressure effects caused by the gas flow velocities in different sized pipe sections and design accordingly.⁶

In some installations where it is impractical to run approximately 10 feet of pipe, swaging up to a larger diameter pipe is a practical method to increase the gas volume between the service regulator and the generator fuel system. For installations where this method is used, an internally registered regulator is strongly recommended.

3.3. Flexible fuel lines: Flexible fuel lines are intended to isolate the rigid gas piping system from vibrations on the generator set and must be installed as straight as possible. They are not intended to correct misaligned pipe sections or to serve as an elbow.

3.4. Regulator vent lines: Regulator vents must open downward and be screened to prevent insects and water from entering the regulator case. Regulator vent lines should be kept as short as possible to reduce the possibility of affecting the regulator response time.

4. DESIGN REQUIREMENTS:

4.1. Use Generac's Power Design Pro⁷ gas pipe sizing module to determine the minimum recommended pipe size for the selected generator's gas flow given the anticipated length of the pipe run between the service regulator and the generator fuel inlet, including all elbows. Select the option to design for <0.5" water column pressure drop. Refer to the Table 1 for more detail.

4.2. The flexible fuel line shall be installed at the generator fuel inlet located on the frame rail and must exit the generator perpendicular to the frame rail. No pipe fittings (elbows or swages) are permitted between the flexible fuel line and the generator fuel inlet port.

4.3. The flexible fuel line must be as straight as possible. It is designed to isolate the rigid gas piping system from vibrations on the generator set. It is not intended to correct misaligned pipe sections or to serve as an elbow.

4.4. Given the combined effects of pipe friction loss and regulator droop, gas pressure should typically not drop more than 2" w.c. from no-load running to full-load running. Under no circumstances shall the gas pressure measured at the test port on the inside frame rail of the generator set drop below the minimum rated gas pressure listed on the generator nameplate.

4.5. Full-port ball valves, the same diameter as the pipe which they are connected to, are to be used for all shut-offs.

4.6. For multiple generator set installations (Generac MPS), each generator set must have its own regulator installed. Do not share a single large regulator across multiple generator sets.

Table 2: Natural Gas Fuel Pipe Sizing

KW	PIPE SIZE (inches)							
	1.00"	1.25"	1.5"	2"	2.5"	3"	4"	5"
25	10	95	220	739				
30		60	147	565				
40		25	75	315	790			
50			50	220	560			
60			25	145	390	1185		
70			5	75	225	710		
80				65	195	630		
100				40	140	460		
130					50	215		
150					30	150		
200					15	95	475	
250						62	315	1020
300						35	255	850
350						10	145	535
400							107	452
500							42	245
625								120
750								112

TABLE VALUES ARE MAXIMUM PIPE RUN IN (feet)

NOTE: Pipe sizing is based on 0.5" H₂O pressure drop for Natural Gas. Also sizing includes nominal number of elbows and tees. Please verify adequate service and meter sizing.

5. RECOMMENDED DESIGN BEST PRACTICES:

5.1. Provide approximately 10 feet of pipe between the regulator and generator gas inlet. This does not have to be a single straight run. The pipe volume decouples the dynamic response of the generator throttle control system and the service regulator, reducing the probability of oscillation and unstable operation.

5.2. Avoid installing elbows or pipe swages immediately upstream or downstream of a regulator, unless specifically allowed by the regulator manufacturer. This will increase the turbulence of the gas flow, having a negative impact on pressure regulation accuracy and stability. Regulator

manufacturers typically recommend 10 pipe diameters of straight pipe run upstream and downstream of a regulator. For example, on a regulator with 2" diameter pipe fittings, 20" of straight pipe should be fitted upstream and downstream of the regulator. When field conditions prohibit meeting both constraints, place the elbow on the high-pressure side of the regulator. The straight run on the low-pressure side is more critical for proper regulator operation.

5.3. Avoid installing pipe swages immediately before or after an elbow. The combined flow turbulence of the swage and elbow in close proximity can cause unexpectedly large pressure drops at high flow rates.

5.4. Minimize the number of 90-degree elbows.

If more than three elbows are needed downstream of the regulator to accommodate the design, swept radius elbows are recommended to minimize pressure drop.

5.5. Use of an internally registered regulator is strongly recommended. Regulators with external pressure registration lines add an additional variable into the system that can be difficult to troubleshoot should the gas pressure become unstable under high-flow conditions.

5.6. For more stable gas flow with longer gas piping, the high pressure side may be raised as high as code allows and regulate it down to generator operating pressure at the generator. (This is the same design concept used in the electrical industry; “high voltage for long distances, transformation at the loads”). This may also help reduce cost as pipe diameters can be smaller, saving material and installation costs.

6. INSTALLATION AND COMMISSIONING RECOMMENDATIONS:

6.1. Refer to Generac’s Installation Guidelines for Stationary Industrial Generators (Document #046622) for additional installation details.

6.2. Pig all gas pipes after installation to remove pipe dope, weld slag and other contaminants that could damage the regulator valve seat and cause pressure creep.

6.3. Install a dirt trap and/or screen before the gas regulator.

6.4. Set the regulator pressure with the generator running at no-load. Measurements are taken at the generator fuel pressure test port on the inside of the frame rail. For units configured for 7"-11" w.c. operating pressure, set the regulator to 11" w.c. no-load running. For units configured for 11-14" w.c. operating pressure, set the regulator to 14" w.c.

no-load running. Pressure droop at full-load running will be a combination of regulator droop and pipe friction loss. Proper design will limit the no-load to full-load running pressure drop to no more than 2" w.c. and at no time can the gas pressure fall below the minimum pressure listed on the generator nameplate. Expect the lockup static pressure typically to be higher than the no-load running dynamic pressure.

7. METHODS FOR CORRECTING UNDESIRABLE PERFORMANCE:

7.1. Pressure surging and cycling: Should the regulator experience “hunting” or other unstable operating behavior, an extended vent line may be creating resonant condition on the atmospheric side of the regulator diaphragm. If this is suspected, temporarily disconnect the vent line or remove the cap from the regulator spring case and observe if the unstable behavior stops. Shortening the length or increasing the diameter of the vent line will often correct an instability caused by vent line resonance.

The pipe volume between the service regulator and the generator may be insufficient to decouple the control action of the regulator and the generator’s throttle control system. Increase the pipe volume between the regulator and the generator.

Change the response time of the regulator. In some cases, a small adjustment of the regulator spring (up or down 1 w.c.) will be enough to restore stability to the system. If available for the selected regulator, using the next higher spring is another inexpensive and easy to implement option. This will slow the regulator response and can reduce or eliminate the instability. Keep in mind that changing to a higher spring rate will also increase pressure droop and reduce the regulator’s maximum flow capacity which limits the applicability of this corrective measure.

7.2. Low gas pressure under high load: There are several potential causes of low gas pressure under high load.

Pipe runs with excessive friction loss caused by a pipe diameter that is too small for the required gas flow and pipe length and/or a large number of elbows. The only corrective action for this is to increase the pipe diameter between the regulator and the generator or to raise the pressure of the high pressure gas. Avoid this problem by using a gas pipe sizing tool during the design phase.

Insufficient regulator capacity. Confirm the upstream gas main and regulator flow capabilities for a given upstream gas pressure. If the upstream gas pressure is lower than originally anticipated, investigate the possibility adjusting the utility regulator (if present). If increasing upstream gas pressure is not possible, a larger orifice and/or different spring combination may be available for the existing regulator to increase flow and reduce pressure droop. If the previous steps fail to correct the situation, a larger regulator will be required. Avoid this problem by thoroughly reviewing the regulator manufacturer's flowrate tables prior to ordering.

7.3. Excessive transient pressure drop during generator crank cycle or block load application: If the transient pressure drop during a generator crank cycle or block load application is large enough to impact performance, speeding up the regulator response will reduce the transient pressure drop. Avoid this problem by using a direct-acting regulator that is suitable for engine-generator applications. If available for the selected regulator, using a lighter spring will increase the regulator response speed and reduce transient pressure dip. Finally, if a remotely registered regulator is used, increase the pipe diameter of the remote sensing line.

7.4. Pressure creep: Ensure the selected regulator has a lockup or hard-shutoff feature. Pressure creep is almost always caused by contaminants in the pipe system upstream of the regulator. The contaminants either get caught on the regulator valve disk or cause physical damage to the valve disk, making it impossible to achieve a hard shutoff. Avoid this problem by pigging all pipe components prior to installing the regulator and ensure a dirt trap is installed upstream of the regulator.

7.5. Failure to start, run smoothly, or accept 100% load: Barring a mechanical failure on the generator, failure to make 10-second start, run smoothly, or carry full load is almost always caused by an underlying gas supply problem.

8. PROPANE VAPOR AND LIQUID:

8.1. Propane vapor system: This type of system uses the vapors formed above the liquid fuel in the supply tank. The maximum tank liquid capacity is 80% and a minimum of approximately 20% of the tank capacity is required to boil off liquid into the vapor state. Gas pressure and volume requirements for an LPG system at the connection point of the generator are listed on the unit specification sheet. The piping system connecting the outlet of the first stage regulator to the connection point on the second stage regulator must be properly sized to provide the fuel volume required by the unit at 100% load.

The piping system between the outlet of the second stage regulator and the generator connection point must be sized to provide the fuel volume required by the generator at 100% load while also staying within the pressure range noted on the unit specification sheet.

8.2. Tank vaporization rate: In addition to sizing the gas piping system in a similar manner to natural gas, LP-vapor systems must also size the propane storage tanks to ensure a sufficient volume of gas will boil off

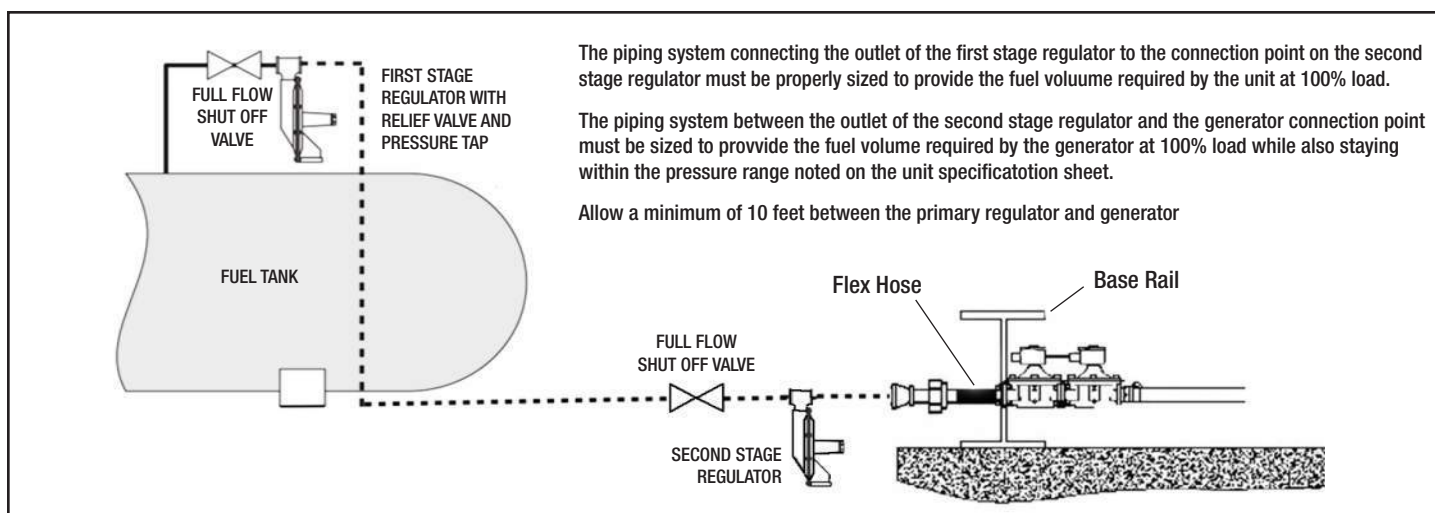


Figure 4: Typical LP vapor withdrawal system.

under a range of environmental conditions and various liquid levels in the tank. Liquid propane absorbs ambient heat from the surrounding environment to boil off liquid into a gas. Low liquid levels in a tank coupled with cold ambient temperatures can result in a condition where the tank boil off rate is insufficient to meet the demands of the generator.

The local propane supplier is often a good resource to help with tank sizing. The Emerson-Fisher LP-Gas Serviceman's Handbook is another valuable resource for sizing propane systems and includes tank vaporization tables.⁸ In many cases, the tank volume must be larger (sometimes much larger) than the gas required to achieve a desired runtime. Where practical, buried tanks can improve the vaporization rate by protecting the tank from extremely low ambient air temperatures.

8.3. Liquid propane system: This system delivers propane in a liquid state (LPL) to the connection point on the generator set. Liquid propane systems are used where it is impractical to achieve the required boil off rate from the available fuel tank volume. For the engine to use the LPL fuel, the liquid must be vaporized prior to being delivered to the fuel mixer (carburetor). LPL will vaporize at a temperature of

Max. Intermittent Withdrawal Rate (BTU/HR) Without Tank Frosting* If Lowest Outdoor Temperature (Average for 24-Hours) Reaches . . .

TEMPERATURE	TANK SIZE (Gallons)			
	150	250	500	1,000
40°F	214,900	288,100	478,800	852,800
30°F	187,900	251,800	418,600	745,600
20°F	161,800	216,800	360,400	641,900
10°F	148,000	198,400	329,700	587,200
0°F	134,700	180,600	300,100	534,500
-10°F	132,400	177,400	294,800	525,400
-20°F	108,800	145,800	242,300	431,600
-30°F	107,100	143,500	238,600	425,000

* Tank frosting acts as an insulator, reducing the vaporization rate.

Table 3: Above ground AMSE Tank vaporization rate, LP-Gas Serviceman's Handbook.

(-44°F/-42.2°C). The generator set LPL fuel system delivery pressure operates over the range of 58-180 psi (400-1242 kPa), depending on the ambient temperature and liquid level in the storage tank. LPL enters the vaporizer and passes into a "flash" chamber. The pressure drop in this chamber vaporizes the liquid to a gas and is regulated to negative 11"-14" w.c. (2.9-3.5 kPa). Heated engine coolant from the jacket water heater is used to heat the flash chamber of the vaporizer and to prevent the vaporizer from icing.

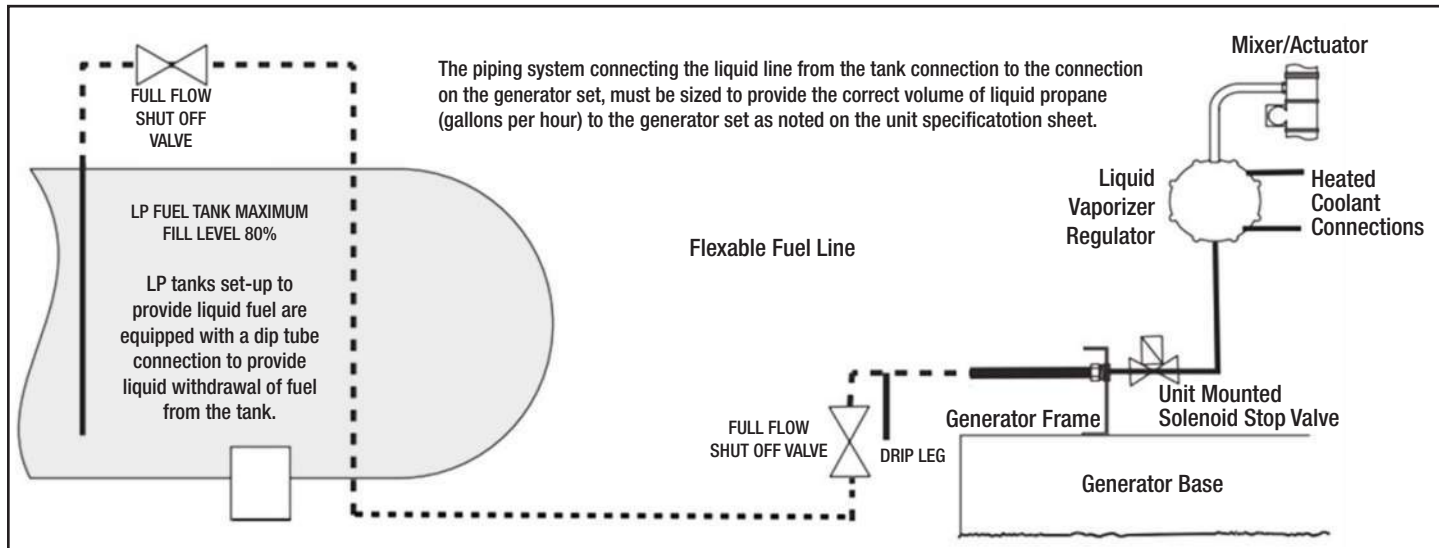


Figure 5: Typical LP liquid withdrawal system.

8.4. Dual fuel, natural gas primary and propane secondary: Some applications use a dual fuel system where the primary source may not be available during a power outage. Dual fuel systems use natural gas as

the primary fuel and LPG or LPL withdrawal as the secondary fuel. For dual fuel units, the specific fuel pressure, volume, and pipe sizing requirements for each fuel type must be observed.

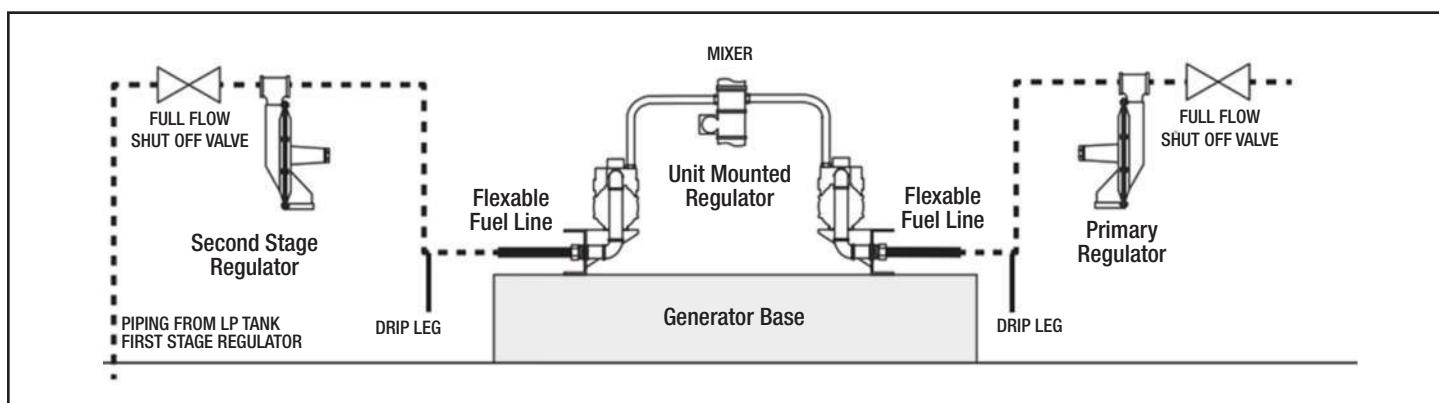


Figure 6: Typical dual-fuel system.

FUEL SPECIFICATION

Natural Gas

Generac products are designed to run on natural gas and are tested for performance and reliability with clean, dry, pipeline quality natural gas. The properties presented in this standard represent the natural gas used in product testing. The performance and reliability of Generac products using non-conforming fuels are unknown and cannot be guaranteed.

Natural gas is, by definition, any gas that occurs organically, but this standard focuses on natural gas that is intended for use as fuel in reciprocating internal combustion engines. This natural gas is generally assumed to have specific properties, but compositional differences and contaminants greatly influence the fuel's quality and combustion stability. This variation can lead to lower power output, pre-ignition, detonation, and corrosion if the fuel does not meet this standard. This standard identifies an acceptable fuel composition for use in Generac products.

Fuel Specifications

The fuel used by Generac is clean, dry, pipeline quality natural gas adhering to the following:

Component / Property	Unit	Range
Methane	% Volume	80 Minimum
Ethane	% Volume	0-10
Propane	% Volume	0-5
Butanes	% Volume	0-2
Pentanes and Heavier	% Volume	0-0.5
Nitrogen and Other Inerts	% Volume	0-3
Carbon Dioxide	% Volume	0-3
Total Diluents Gases	% Volume	0-5
Hydrogen Sulfide	g/100scf (mg/m3)	0.25-0.3 (6-7)
Total Sulfur	g/100scf (mg/m3)	5-20 (115-460)
Water Vapor	lb/MMscf (mg/m3)	4-7 (60-110)
High Heating Value	Btu/scf (kJ/m3)	950-1,150 (35,400-42,800)
Methane Number	MN	80 Minimum

Notes:

- The fuel must be free of liquid water and hydrocarbons at delivery temperature and pressure.
- The fuel must be free of particulate matter.

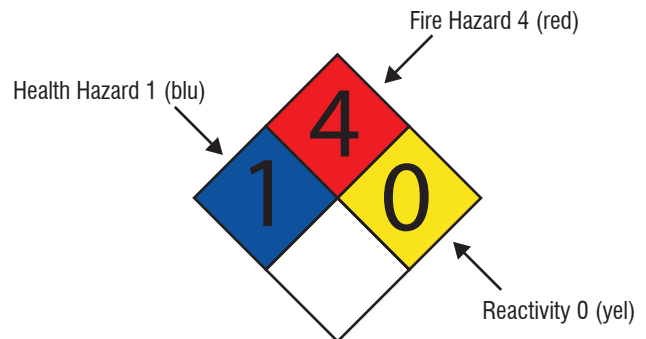
Hazards Information

Emergency Overview

DANGER!
EXTREMELY FLAMMABLE GAS - MAY CAUSE FLASH FIRE OR EXPLOSION!

High concentrations may exclude oxygen and cause dizziness and suffocation. Contact with pressurized vapor may cause frostbite or freeze burn.

NFPA 704 Hazard Identification System



4 - Severe 3 - Serious 2 - Moderate 1 - Slight 0 - Minimal

CERTIFICATIONS/ WARRANTY



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2021 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

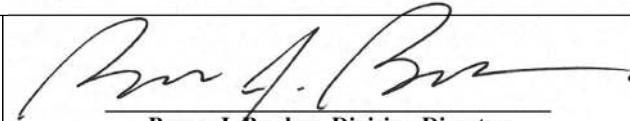
OFFICE OF TRANSPORTATION
AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: Generac Power Systems, Inc.
(U.S. Manufacturer or Importer)

Certificate Number: MGNXB08.9203-032

Effective Date:
10/16/2020

Expiration Date:
12/31/2021


Byron J. Bunker, Division Director
Compliance Division

Issue Date:
10/16/2020
Revision Date:
N/A

Manufacturer: Generac Power Systems, Inc.
Engine Family: MGNXB08.9203
Mobile/Stationary Certification Type: Stationary
Fuel : Natural Gas (CNG/LNG)
Emission Standards :
Part 60 Subpart JJJJ Table 1
NO_x (g/Hp-hr) : 2.0
VOC (g/Hp-hr) : 1.0
CO (g/Hp-hr) : 4.0
Emergency Use Only : Y

Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547) and 40 CFR Part 60, 1065, 1068, and 60 (stationary only and combined stationary and mobile) and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following nonroad engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new nonroad spark-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60. This certificate of conformity does not cover nonroad engines imported prior to the effective date of the certificate.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068.20 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

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

Certification of Quality

Generac Power Systems certifies that the products we manufacture have been built and tested in accordance with strict internal and external standards for quality. Our quality management system has been registered with the internationally recognized ISO 9001:2008 standard and our products comply with external standards that include, but are not limited to, CSA, NEMA, EGSA, ISO, and UL.

The Generac Quality Management System (GQMS) ensures the highest standards of quality at every level of production, from raw materials to the finished product. This includes receiving inspection, in-process checks, product and process audits, testing, final inspections, and shipping standards.

Tests of our products are performed in accordance with our internal procedures and controlled through the GQMS to ensure accuracy and effectiveness. The testing process and product designs comply with external standards which may include, but are not limited to: ISO 8528-5, ISO 3046, NFPA 99, NFPA 110, BS 5514, SAE J1349, and DIN 6271.

Generac Power Systems has over one million square feet of manufacturing space and over 2000 employees dedicated to designing and manufacturing power generation equipment in our multiple State of Wisconsin, USA factories. All of our installed and mobile generators are built with pride by our skilled American workforce to ensure our customers receive the quality that they expect from Generac.

We are committed to producing quality products for both our internal and external customers. We will continuously improve our processes and diligently measure all aspects of our business.

Daniel Waschow

Vice President of Quality
Generac Power Systems, Inc.
Waukesha, Wisconsin USA

Generac Power Systems 5 Year (5C) Extended Limited Warranty for Industrial Standby Generators

For the period of warranty noted below, which begins upon the successful start-up and/or on-line activation of the unit, Generac Power Systems, Inc. "Generac" warrants that its Generator will be free from defects in material and workmanship for the items and period set forth below. Generac will, at its discretion, repair or replace any part(s) which, upon evaluation, inspection and testing by Generac or an Independent Authorized Service Dealer, is found to be defective. Any equipment that the purchaser/owner claims to be defective must be evaluated by the nearest Independent Authorized Service Dealer. Emissions components are excluded from coverage under this extended warranty. Emissions warranty coverage is detailed in a separate emissions warranty.

Warranty Coverage: Warranty coverage period is for Five (5) years or two-thousand (2,000) hours, whichever occurs first.

Warranty Coverage in Year(s) 1-5
Parts, Labor and Limited Travel

Limited Gearbox Coverage:

Year(s): 1-5 Coverage	Year(s): 6-10 Coverage
Limited Parts and Labor	Limited Parts Only

Guidelines:

- Unit must be registered and proof of purchase available.
- Any and all warranty repairs and/or concerns must be performed and/or addressed by an Independent Authorized Service Dealer, or branch thereof. Repairs or diagnostics performed by individuals other than Independent Authorized Service Dealers not authorized in writing by Generac will not be covered.
- This Warranty is transferable between ownership of original install site.
- Generac supplied engine coolant heaters (block-heaters), heater controls and circulating pumps are only covered during the first year of the warranty provision.
- Generac may choose to repair, replace or refund a piece of equipment in its sole discretion.
- Enclosures are warranted against rust for the first year of ownership only. Damage caused after receipt of generator is the responsibility of the owner and is not covered by this warranty. Nicks, scrapes, dents or scratches to the painted enclosure should be repaired promptly by the owner.
- Warranty only applies to permanently wired and mounted units.
- Damage to any covered components or consequential damages caused by the use of a non-OEM part will not be covered by the warranty.
- Proof of performance of all required maintenance must be available.
- Travel allowance is limited to 300 miles maximum and seven and one half (7.5) hours maximum (per occurrence, whichever is less) round trip from the nearest Independent Authorized Service Dealer. Any additional travel required will not be covered.
- Engines, driven components and fuel tanks used in Generac's standby power products system can carry a separate manufacturer's (OEM) warranty (the "OEM Warranties"), unless otherwise expressly stated. OEM Warranties are in addition to this Warranty. All warranty claims for defects in material and/or workmanship on Generac product OEM components, may be directed through the OEM distributor/dealer network. OEM Warranties may vary and are subject to change. Generac shall have no liability under OEM warranties.

The following will NOT be covered by this warranty:

- Costs of normal maintenance (i.e. tune-ups, associated part(s), adjustments, loose/leaking clamps, installation and start-up).
- Damage/failures to the generator caused by accidents, shipping, handling, or improper storage.
- Damage/failures caused by operation with improper fuels, speeds, loads or installations other than what's recommended or specified by Generac Power Systems.
- Damage to the generator due to the use of non-Generac parts and/or equipment, contaminated fuels, oils, coolants/antifreeze or lack of proper fuels, oil or coolants/antifreeze.
- Failures due to normal wear and tear, accident, misuse, abuse, neglect, improper installation, improper sizing, or rodent, reptile, and/or insect infestation.
- Rental equipment used while warranty repairs are being performed and/or any extraordinary equipment used for removal and/or reinstallation of generator (i.e. cranes, hoists, lifts, et. al.).
- Planes, ferries, railroad, buses, helicopters, snowmobiles, snowcats, off-road vehicles or any other mode of transport deemed not standard by Generac.
- Products that are modified or altered in a manner not authorized by Generac in writing.
- Starting batteries, fuses, light bulbs, engine fluids and any related labor.
- Steel enclosures that rust as a result of improper installation, location in a harsh or salt water environment, or are scratched where the integrity of applied paint is compromised.
- Units sold, rated or used for "Prime Power", "Trailer Mounted" or "Rental Unit" applications as defined by Generac. Contact an Independent Authorized Service Dealer for definitions.
- Shipping costs associated with expedited shipping.
- Additional costs for overtime, holiday or emergency labor costs for repairs outside of normal business hours.
- Any incidental, consequential or indirect damages caused by defects in materials or workmanship, or any delay in repair or replacement of the defective part(s).
- Failures caused by any act of God or external cause including without limitation, fire, theft, freezing, war, lightning, earthquake, windstorm, hail, water, tornado, hurricane, or any other matters which are reasonably beyond the manufacturer's control.

THIS WARRANTY SUPERSEDES ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. SPECIFICALLY, GENERAC MAKES NO OTHER WARRANTIES AS TO THE MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ANY IMPLIED WARRANTIES WHICH ARE ALLOWED BY LAW, SHALL BE LIMITED IN DURATION TO THE TERMS OF THE EXPRESS WARRANTY PROVIDED HEREIN. SOME JURISDICTIONS DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU. GENERAC'S ONLY LIABILITY SHALL BE THE REPAIR OR REPLACEMENT OF PART(S) AS STATED ABOVE. IN NO EVENT SHALL GENERAC BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, EVEN IF SUCH DAMAGES ARE A DIRECT RESULT OF GENERAC'S NEGLIGENCE. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS. YOU ALSO HAVE OTHER RIGHTS UNDER APPLICABLE LAW.

FOR AUSTRALIA ONLY: 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 for 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.

FOR NEW ZEALAND ONLY: Nothing in this warranty statement excludes, restricts or modifies any condition, warranty right or remedy which pursuant to the New Zealand Legislation (Commonwealth or State) including the Fair Trading Practices Act of 1986 or the Consumer Guarantees Act 1993 ("CGA") applies to this limited warranty and may not be so excluded, restricted or modified. Nothing in this statement is intended to have the effect of contracting out of the provisions of the CGA, except to the extent permitted by that Act, and these terms are to be modified to the extent necessary to give effect to that intention. If you acquire goods from Generac Power Systems or any of its authorized resellers and distributors for the purposes of a business, then pursuant to section 43(2) of the CGA, it is agreed that the provisions of the CGA do not apply.

GENERAC POWER SYSTEMS, INC. • P.O. BOX 8 • Waukesha, WI, USA 53187
Ph: (888) GENERAC (436-3722) • Fax: (262) 544-4851

To locate the nearest Independent Authorized Service Dealer and to download schematics, exploded views and parts lists
visit our website: www.generac.com



CERTIFICATE



This is to certify that

Generac Power Systems, Inc.

S45 W29290 Hwy. 59
Waukesha, WI 53189
United States of America

with the organizational units/sites as listed in the annex

has implemented and maintains a **Quality Management System**.

Scope:

Design, Manufacture, and Distribution of Power Products and Solutions.

Through an audit, documented in a report, it was verified that the management system fulfills the requirements of the following standard:

ISO 9001 : 2015

Certificate registration no.	10012920 QM15
Date of original certification	2013-12-09
Date of revision	2021-06-25
Date of certification	2021-07-16
Valid until	2024-07-15



DQS Inc.

Brad McGuire
Managing Director



Annex to certificate
Registration No. 10012920 QM15

Generac Power Systems, Inc.

S45 W29290 Hwy. 59
Waukesha, WI 53189
United States of America

Location

Scope

10012920
Generac Power Systems, Inc.
S45 W29290 Hwy. 59
Waukesha, WI 53189
United States of America

Design and Support of Power Products and Solutions.

10012922
Generac Power Systems, Inc.
211 Murphy Dr.
Eagle, WI 53119
United States of America

Manufacture and Distribution of Power Products and Solutions.

10012923
Generac Power Systems, Inc.
757 N. Newcomb St.
Whitewater, WI 53190
United States of America

Manufacture and Distribution of Power Products and Solutions.

10012924
Generac Power Systems, Inc.
900 N. Parkway
Jefferson, WI 53549
United States of America

Manufacture of Power Products and Solutions.

10013528
Generac Power Systems
3815 Oregon St.
Oshkosh, WI 54902
United States of America

Manufacture and Distribution of Power Products.

10017103
Generac Mobile
215 Power Drive
Berlin, WI 54923
United States of America

Manufacture and Distribution of Power Products.

This annex (edition: 2021-06-25) is only valid in connection with the above-mentioned certificate.



Annex to certificate
Registration No. 10012920 QM15

Generac Power Systems, Inc.

S45 W29290 Hwy. 59
Waukesha, WI 53189
United States of America

Remote Location

Scope

10014175
Generac Power Systems, Inc.
351 Collins Road
Jefferson, WI 53549
United States of America

The remote location at Jefferson, WI performs the following primary functions: Parts and Components Receiving, Inventory, Return and Reconditioning of Product, and Distribution to Generac Locations.

10017439
Generac Mobile
745 E. Knopf St.
Berlin, WI 54923
United States of America

The remote location at Berlin, WI performs the following primary functions: Warehousing and Shipping.

10018422
Generac Power Systems, Inc.
303 Venture Court
Janesville, WI 53546
United States of America

The remote location at Janesville, WI performs the following primary functions: Parts and Components Receiving, Kitting, Warehousing, Inventory, and Distribution to Generac locations.

United States Environmental Protection Agency Warranty Statement (Stationary Emergency Spark-Ignited Generators)

Warranty Rights, Obligations and Coverage

The United States Environmental Protection Agency (EPA) and Generac Power Systems, Inc. (Generac) are pleased to explain the Emission Control System Warranty on your new stationary emergency engine. If during the warranty period, any emission control system or component on your engine is found defective in materials or workmanship, Generac will repair your engine at no cost to you for diagnosis, replacement parts and labor provided it be done by a Generac Authorized Warranty Service Facility. Your emission control system may include parts such as the fuel metering, ignition, and exhaust systems and other related emission related components listed below. Generac will warrant the emissions control systems on your 2009 and later model year engines provided there has been no abuse, neglect, unapproved modification, or improper maintenance of your engine. For engines less than 130 HP the warranty period is two years from the date of sale to the ultimate purchaser. For engines greater than or equal to 130 HP the warranty period is three years or 2500 hours of operation, whichever comes first, from the date of the engine being placed into service. For high-cost warranted components, the Emission Control System warranty is valid for 5 years or 3500 hours of operation, whichever comes first.

Purchaser's/Owner's Warranty Responsibilities

As the engine purchaser/owner you are responsible for the following: 1) The engine must be installed and configured in accordance to Generac's installation specifications. 2) The completion of all maintenance requirements listed in your Owner's Manual. 3) Any engine setting adjustment must be done in accordance and consistent with the instructions in the Owner's Manual. 4) Any emission control system or component must be maintained and operated appropriately in order to ensure proper operation of the engine and control system to minimize emissions at all times.

Generac may deny any/or all Emission Control System Warranty coverage or responsibility of the engine, or an emission control system or component on your engine thereof, if it has failed due to abuse, neglect, unapproved modification or improper maintenance, or the use of counterfeit and/or "gray market" parts not made, supplied or approved by Generac. Warranty service can be arranged by contacting either your selling dealer or a Generac Authorized Warranty Service dealer, 1-800-333-1322 for the dealer nearest you. The purchaser/owner shall be responsible for any expenses or other charges incurred for service calls and/or transportation of the product to/from the inspection or repair facilities. The purchaser/owner shall be responsible for any and/or all damages or losses incurred while the engine is being transported/shipped for inspection or warranty repairs. Contact Generac Power Systems Inc. for additional Emission Control System Warranty related information, Generac Power Systems, Inc., PO. Box 8, Waukesha, WI 53187, or call 1-800-333-1322 or www.generac.com.

Important Note

This warranty statement explains your rights and obligations under the Emission Control System Warranty, which is provided to you by Generac pursuant to federal law. Note that this warranty shall not apply to any incidental, consequential, or indirect damages caused by defects in materials or workmanship or any delay in repair or replacement of the defective part(s). This warranty is in place of all other warranties, expressed or implied. Specifically, Generac makes no other warranties as to the merchantability or fitness for a particular purpose. Any implied warranties which are allowed by law, shall be limited in duration to the terms of the express warranty provided herein. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

Emission Related Parts Include the Following (if so equipped)

- | | |
|--|---|
| 1) Fuel Metering System | 3) Ignition System Including A) Spark Plug, B) Ignition Module, C) Ignition Coil, D) Spark Plug Wires |
| 1.1) Gasoline Carburetor Assembly and Internal Components
A) Fuel Filter, B) Carburetor, C) Fuel Pump | 4) Exhaust System
A) Catalyst Assembly*, B) Exhaust Manifold, C) Muffler, D) Exhaust Pipe, E) Muffler Gasket |
| 1.2) Carburetion Assembly and Its Components
A) Fuel Controller, B) Carburetor and Its Gaskets, C) Mixer and Its Gaskets, D) Primary Gas Regulator, E) Liquid Vaporizer | 5) Crankcase Breather Assembly Including
A) Breather Connection Tube, B) PCV Valve |
| 1.3) Fuel Regulator | 6) Oxygen Sensor |
| 2) Air Induction System Including A) Intake Pipe/Manifold, B) Air Cleaner | 7) Diagnostic Emission-Control System |

*High-Cost Warranted Component

United States Environmental Protection Agency Compliance Requirements (Stationary Emergency Spark-Ignited Generators)

Purchaser's/Owner's Record Keeping Responsibilities

The United States Environmental Protection Agency (EPA) and Generac Power Systems, Inc. (Generac) are pleased to explain your record keeping requirements for compliance with Subpart JJJJ- Standards of Performance for Stationary Spark Ignition Internal Combustion Engines as listed in the Electronic Code of Federal Regulations Title 40 Part 60. As the engine purchaser/owner who operates and maintains their certified emergency stationary engine and emission control system according to applicable emission related guidelines as specified in this Owner's Manual, you are required to meet the following notification and record keeping requirements to demonstrate compliance: 1) Maintain documentation that the engine is certified to meet emission standards. 2) Record keeping of maintenance conducted. 3) Record keeping of the provision allowing natural gas engines to operate using propane for a maximum of 100 hours per year as an alternate fuel solely during emergency operations provided the engine is not certified to operate on propane. 4) Meet all compliance notifications submitted to the purchaser/owner and maintain all supporting documentation. 5) Record keeping of hours of operation, including what classified the operation as emergency and how many hours are spent for non-emergency operation. For emergency engines greater than or equal to 130 HP, record keeping of hours of operation begins January 1, 2009; engines are equipped with non-resettable hour meters to facilitate record keeping.

Specific Air Quality Management or Air Pollution Control Districts may have different and additional record keeping/reporting requirements. Your permit to construct and/or operate the engine may be contingent upon compliance with those requirements. Check with your local Air Quality Management or Air Pollution Control District for specific requirements.

Emergency stationary internal combustion engines (ICE) may be operated for the purpose of maintenance checks and readiness testing, provided that the tests are recommended by Federal, State or local government, Generac, or the insurance company associated with the engine. Maintenance checks and readiness testing of such units is limited to 100 hours per year. There is no time limit on the use of emergency stationary ICE in emergency situations. The purchaser/owner may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the owner maintains records indicating that Federal, State, or local standards require maintenance and testing of emergency ICE beyond 100 hours per year. Emergency stationary ICE may operate up to 50 hours per year in non emergency situations, but those 50 hours are counted towards the 100 hours per year provided for maintenance and testing.

The 50 hours per year for non-emergency situations cannot be used for peak shaving or to generate income for a facility to supply power to an electric grid or otherwise supply power as part of a financial arrangement with another entity. For purchaser/owner of emergency engines, any operation other than emergency operation, maintenance and testing, and operation in non-emergency situations for 50 hours per year, as permitted in this section is prohibited.

If you operate and maintain your certified emergency stationary SI internal combustion engine and emissions control systems in accordance to the specifications and guidelines in this Owner's Manual, EPA will not require engine performance testing. If not, your engine will be considered non-certified and you must demonstrate compliance according to Subpart JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines as listed in the Electronic Code of Federal Regulations Title 40 Part 60.

Emission-Related Installation Instructions

Your certified emergency stationary engine has pre-set emission control systems or components that require no adjustment. Inspection and replacement of an emissions related component is required to be done so in accordance with the requirements cited in the United States Environmental Protection Agency Warranty Statement or can be arranged by contacting either your selling dealer or a Generac Authorized Warranty Service dealer, 1-800-333-1322 for the dealer nearest you. Failing to follow these instructions when installing a certified engine in a piece of non-road equipment violates federal law 40 CFR 1068.105 (b), subject to fines or penalties as described in the Clean Air Act.