INSTRUCTIONS TO BIDDERS

1. QUOTATION FORMS

1.1 Quotations must be submitted by email to kirsten.dunbar@creston.ca or enclosed in a sealed envelope delivered at Town Hall, plainly marked Generator Installation at CESB, and addressed to:

Kirsten Dunbar
Town of Creston
238-10th Avenue N
Creston, BC, V0B1G0

1.2 The quotation closing date is 2:00 p.m. Local Time, June 25th, 2024. Quotations received after this time will not be considered regardless of the reason for being late.

1.3 Site assessments can be conducted at 9:30 a.m. Local Time, June 14th, 2024. If you would like to participate in a site assessment, contact Asha DeLisle at asha.delisle@creston.ca. If you cannot make this time, we will try to accommodate a time for you to conduct a site assessment, but there are no guarantees time will be available.

2. SCOPE OF WORK

2.1 The project includes the installation of a supplied 300kW Standby Natural Gas Genset and a supplied 1200A Transfer Switch. The genset will provide backup power in the event of a utility power outage.

2.2 Site Preparation

(a) Conduct a site visit to assess the installation location and ensure suitability for the genset and transfer switch.
(b) Prepare the site for installation including any mounting platforms.

2.3 Electrical Installation:

(a) Install wiring, conduits, and electrical connections according to manufacturer specifications, BC regulatory laws (such as the Electrical Safety Regulation and Gas Safety Regulation), and local building codes including the BC Building Code and BC Fire Code.
(b) Connect the genset to the existing power grid, including ATS (Automatic Transfer Switch) connections for seamless power transfer during outages.

2.4 Mechanical Installation:

(a) Install the supplied genset and transfer switch in their designated locations, ensuring proper alignment and secure mounting.
(b) Provide support structures or brackets as needed to secure the equipment.
(c) Install fuel lines and connectors for the natural gas genset, ensuring proper sizing and connection to the fuel source.

2.5 Testing and Commissioning:

(a) Conduct thorough testing of the genset and transfer switch to ensure proper functionality and compliance with safety standards.
(b) Perform load testing to verify the capacity and performance of the genset under various conditions.

2.6 Reporting:

(a) Prepare test reports and commissioning documentation for review and approval.

2.7 Health and Safety Measures:

(a) Adhere to all legislated health and safety protocols throughout the installation process.
(b) Ensure compliance with OHS (Occupational Health and Safety) regulations and industry best practices.

2.8 Completion and Handover:

(a) Ensure all work is completed to the satisfaction of the Town of Creston and meets the requirements outlined in this RFQ.
(b) Conduct a final walkthrough with Town of Creston Staff to review the installed equipment and address any final adjustments or concerns.
(c) Provide 2 hours of training to facility staff on the operation and maintenance of the genset and transfer switch.

3. RIGHTS OF THE OWNER

3.1 The Town of Creston reserves the following rights:
(a) To reject any or all quotations.

(b) Not to accept the lowest priced quotation or any quotation and, at its sole discretion, accept any quotation deemed to provide the best overall value to the Town of Creston.
(c) To negotiate changes to the work scope with the lowest compliant bidder prior to an award.
(d) To waive informalities, irregularities, technicalities, and minor non-compliances.
(e) To cancel this quotation at any time prior to or after closing.
(f) To terminate this quotation process in the event that only one quotation is received.
(g) To reject any quotations that are unsigned, improperly signed, conditional, illegible, contain arithmetical errors, erasures, or irregularities of any kind.
(h) To change the scope of work and requote the Project.

4. QUOTATION INFORMATION

4.1 This quotation shall be evaluated by the Town of Creston (the "Town"), in its sole discretion and in the best interest of the Town.

4.2 Notwithstanding Section 4.9, if the Town rejects all quotations, the Town will not be liable to any bidder for any claims, whether for costs or damages incurred in preparing the quotation, loss of anticipated profits, or for any other matter whatsoever.

4.3 Any significant items omitted from the quotation or any additions, alterations, conditions or qualifications added to the quotation or failure to properly sign the quotation may cause the bid to be rejected. A quotation may be rejected where there is substantial evidence that the bidder would be unable to carry out the work required. The determination of whether or not to reject any quotation or to remove any quotation from the evaluation process will be made in the absolute discretion of the Town.

4.4 All quotations are irrevocable for a period of thirty (45) days.

4.5 The successful bidder will be required to completely install the supplied 300kW 120-208 VAC Standby Natural Gas Genset and 1200A 208V 3P NEMA 1ATS Transfer Switch in accordance with these Documents and the attached Schedules A and B. *Please note: relevant information may be highlighted in Schedule B.*

4.6 Any contract awarded to a bidder may be terminated by the Town if the service or product is not as quoted. In the event a contract must be terminated, the Town

reserves the right to exercise all available remedies including, but not limited to, the recovery of incidental and consequential damages.

4.7 Failure to comply with any condition of this quotation or of the contract awarded to a bidder may result in the contract cancellation without subsequent cost or liability to the Town of Creston.

4.8 Any inquiries regarding this quotation may be directed to:

Affordable Housing & Climate Coordinator
Email: asha.delisle@creston.ca
Phone: (250) 428-2214 ext 424
Email is the preferred method of contact.

4.9 The bidder, by submitting a quotation, agrees that it will not claim damages in excess of the reasonable costs incurred by the bidder in preparing its quotation for matters relating to the award of a contract or to the quotation process, and the bidder waives any claim for the loss of profits if no award is made to the bidder.

5. EARLIEST START DATE

5.1 A Notice to Proceed will be sent out to the successful bidder once the generator is on site. It would be appreciated if the installation could be completed within 30 days of the issuance of the Notice to Proceed. The Town will advise the successful bidder of the delivery date once it is firm. Expected delivery date is August 1st, but may be earlier or later.

6. BUSINESS LICENCE

6.1 The successful Bidder shall have or obtain a Town of Creston Business License prior to commencement of work or supply of materials.

7. ADDENDA

7.1 Where in its sole discretion it considers it to be necessary or desirable, the Town of Creston may issue Addenda to amend any portion of the Contract Documents. Such Addenda will become a part of the Contract Documents, and will supersede prior information.

8. AVAILABILITY OF RESOURCES

8.1 Bidders shall obtain their own information as to the availability of electric power and light, water, fuel, sanitation, and all other local materials required for the work; satisfying themselves as to the quality of the materials and the sufficiency of the quantities available.

8.2 In addition, bidders shall obtain their own information on all matters and things that may in any way influence them in making their quote and fixing the rates entered by them in the Schedule of Quantities and Prices. Bidders shall also satisfy themselves in all respects as to the risks and obligations to be undertaken under the terms of the Contract.

9. FREEDOM OF INFORMATION AND PROTECTION OF PRIVACY

9.1 All quotations submitted to the Town of Creston will become the property of the Town of Creston and as such are subject to the B.C. Freedom of Information and Protection of Privacy Act.

10. PAYMENT

10.1 Provided all terms and conditions on the part of the construction contractor or supplier have been complied with, each invoice shall be paid thirty (30) calendar days after receipt of the invoice, or thirty (30) calendar days after receipt of the total order by the construction contractor, whichever is later, as certified by the construction contractor and the Town's representative in writing.

10.2 A holdback of 10% of the total value of the invoice shall be retained by the Town for various purposes. Release of holdback will be paid 35 days after issuance of a CCC or a final invoice date providing no claims have been filed against the contractor.

11. TERMINATION OF CONTRACT

11.1 Any resultant contract may be terminated by the Town if the product/service is not as quoted. In the event the contract must be terminated, the Town reserves the right to exercise all available remedies including, but not limited to, the recovery of incidental and consequential damages.

11.2 Failure to comply with any condition may result in the contract cancellation without subsequent cost or liability to the Town of Creston.

12. WARRANTY/MAINTENANCE

12.1 It is the Town's intention to require the construction contractor to remedy all defects or deficiencies in the work, whether from the quality of work or materials, during construction, and during the one-year warranty period following issuance of a construction completion certificate.

13. BASIS OF QUOTATION

13.1 Bidders shall include in the Quotation Price sufficient amounts to cover all costs of performing and completing the Work, including elements not specifically listed in the Schedule of Quantities and Unit Prices (Schedule A). Claims for extra payment will not be considered on the grounds that the work performed or the materials supplied could not be properly included in the items listed in the Schedule of Quantities and Prices.

13.2 The Town reserves the right to increase, decrease or delete any quotation item and may award portions of the work. The quantities to be completed will be advised by the Town at the time of award.

13.3 If a discrepancy is found between a Unit Price and a Total Amount, the unit price shall be considered as representing the intention of the construction contractor or supplier and the Total Amount will be recalculated.

14. SCHEDULE OF COMPLETIONS

14.1 The Contractor shall complete the work in such a manner as to achieve the Completion Date stated below.

Component of Work	**Date of Completion**
Install of the backup generator & Transfer switch at CESB	December 1, 2024

14.2 All work including provisional items if required, rectification of all deficiencies, clean-up and issuance of a Construction Completion Certificate shall be fully completed no later than December 1st, 2024 (the “Completion Date”). There will be no extensions to the Completion Date except for delays, determined by the Town, to be beyond the control of the Contractor.

14.3 Time is of essence in this contract. If the work is not completed on or before the Completion Date, the Contractor shall be liable for all damages including but not limited to additional engineering and/or Town costs, third party claims being charged to the Town due to late completion, and any other costs or damages incurred by the Town.

15. CERTIFICATES OF INSURANCE

15.1 Contractor shall provide Certificates of Insurance prior to start of construction.

15.2 The Contractor shall provide and maintain, either by way of a separate policy or by an endorsement to its existing policy, Comprehensive General Liability Insurance acceptable to the Town and subject to limits of not less than three

million dollars ($3,000,000.00) inclusive per occurrence for bodily injury, death, and damage to property including loss of use thereof. Where the Contractor's current Insurance policy fails to provide adequate coverage, such policy may be combined with an Umbrella or excess Liability Policy to provide the necessary coverage.

15.3 The Contractor shall provide and maintain automobile Liability Insurance, in a form acceptable to the Town, in respect of all licensed vehicles owned, leased or rented by the Contractor subject to limits of not less than three million dollars ($3,000,000.00) inclusive per occurrence.

15.4 Insurance shall be maintained continuously until the issuance of the Construction Completion Certificate.

15.5 The Successful Proponent and any approved sub-consultants must be registered with WorkSafeBC, in which case WorkSafeBC coverage must be maintained for the duration of the contract. Prior to receiving any payment, the Consultant may be required to submit a WorkSafeBC Clearance Letter, indicating that all assessments have been paid. The Consultant will abide by all provisions of the Workers Compensation Act, R.S.B.C. 2019, c. 1.

16. ACCEPTANCE OR REJECTION OF QUOTATIONS

16.1 The Town reserves the right to reject any or all quotations, to accept individual items of any quotation and award more than one contract for supply, in a manner that the Town, at their sole discretion, deems to be in their best interests.

16.2 Pricing may not be the sole criteria of evaluation of this quotation.

16.3 Acceptance of a quotation, or part thereof, shall be by issuance of a Town Purchase Order.

17. VALIDITY

17.1 Quotation to be received by the Town before 2:00 p.m. local time, June 25th, 2024.

18. SPECIFICATIONS

18.1 All work is to be completed in accordance with the attached specifications

19. SIGNATURES

_____

(Full Legal Name of Corporation, Partnership or Individual)

(Authorized Signatory)	(Authorized Signatory)
(Address)	Date

TOWN OF CRESTON
Schedule A – Schedule of Quantities
Generator Installation
Creston Emergency Services Building

Quotations are invited for the supply of the goods or services, as specified below and in attached details. The Town reserves the right to award this quotation in whole or in part and any quotations received accept this criterion by way of their submission. Submissions shall be fully extended, checked for accuracy and totalled.

All prices quoted SHALL BE assumed to be F.O.B. Creston, BC, Canada, unless otherwise stated.

Quotations shall be submitted to:

AFFORDABLE HOUSING
& CLIMATE COORDINATOR Quotation required by: **2:00 p.m., ****June 25th****
Town of Creston
238-10th Avenue N
Creston, BC, V0B 1G0 Authorized by: _____

Quotation may be sent by email to kirsten.dunbar@creston.ca by the above closing date and time.

No.	Quantity	Description	Price
1.	1	Installation of supplied 300kW 120/208 VAC Standby Natural Gas Genset	
2.	1	Installation of supplied 1200A 208V 3P NEMA 1ATS Transfer Switch	
		G.S.T. @ 5%	
		Total	

THIS IS NOT AN ORDER

CONDITIONS:

1. **This quotation is valid until August 9th, 2024.**

2. **All work shall be completed by December 1st, 2024.**

DATE: _____ **SIGNATURE:** _____

Company Name, Address, Phone No. _____

_____

Signature of Authorized Rep. _____

BILL OF MATERIAL

EMERGENCY STANDBY GENERATOR SET
RADIATOR COOLED

Project Number: _____

Set Performance

Model Number:	2G300W
Rating:	300 Kw 375 Kva Standby Rated
Over Load Capacity:	No Overload
AC Volt:	120/208 Volt, 3 Phase
Speed:	1800 RPM

NG System

Engine Make:	PSI
Model:	13LTHO
Type:	4 Stroke Cycle, Turbocharged charge-air-cooled 6 Cylinder In line
Rating:	469 Hp at 1800 RPM
Standard Accessories	Air Filter, Dry Type Lube Oil Filter "Spin On" Type 24 Volt DC Starter Motor 24 Volt DC Alternator Wet Type Exhaust Manifold
Gas Requirement:	4,460,000 BTU/HR , 7-11" Water Column, 2" NPT Port

Radiator

Type:	Unit Mounted Radiator With Pusher Type Cooling Fan
Manufacturer:	Power Solutions Inc
Option:	Fan Guard First Fill Of Anti-Freeze

Governor

Type:	Electronic
Manufacturer:	PSI
Model:	
Regulation:	

Generator

Type:	Single Bearing, Brushless
Manufacturer:	Stamford
Model:	S4L1S-E4 311
Insulation Class:	H
Temperature Rise:	125 Deg C rise
Efficiency Rating:	92.6 %
Enclosure:	NEMA1 Drip-Proof
Rating:	300 Kw 375 kva
Speed:	1800 RPM
Voltage Regulator:	MX341

Genset Controller

Type:	Unit Mounted, Displaymaster 4
Manufacturer:	A B Gensets Inc.
Digital Readouts:	AC Volts
	AC Amps
	Frequency
	Oil pressure
	Water Temperature
	Battery Voltage
	Run Time
	Fuel Level
	Kw, Kva, PF, Avg Kva, Peak Kva
Shut Downs:	Low Oil Pressure
	High Water Temperature
	Over Crank
	Over Speed, Underspeed
	Low Coolant Level
	Over Voltage/Undervoltage
Prealarms	Low Battery Volts
	High Battery Volts
	Low Oil Pressure
	High Water Temperature
	Low Fuel Level
	Low Engine Temperature
Keypad Starting:	3 Position, Auto/Off/Manual
Accessories:	2 Wire Remote Auto Start

Circuit Breaker

Type:	Moulded Case, 3 Pole, M6S1200E3L
Manufacturer:	Noark
Frame Size:	1200 Amp
Trip System:	LSI Electroinc
Trip Rating:	Adjustable Trip
Enclosure:	Powerstar, Nema 1
Accessories:	Outlet Lugs, (4) 3/0-500 kcmil

Battery Charger

Type:	Float/ Equalize
Manufacturer:	Vulcan Electric
Model:	DSP24/10W
Input:	120 Volt
Output:	24 Volt
Rate:	10 Amp

Battery

Type:	Lead Acid
Manufacturer:	Vitalife
Model:	4D-1000
Quantity:	2
Rating:	1000 CCA

Block Heater

Type:	Free Flow Circulation, 80 F on, 100 F off
Manufacturer	Kim Hotstart
Model:	CB125108-200
Input:	2500 Watt
Quantity:	1

Exhaust System

Qty:	1
Model:	NTHO-C5
Manufacturer:	Nett Technologies Inc or AB Gensets
Silencers:	Hospital Grade Stainless
Size:	5"
Accessories:	Stainless Steel Corrugated Flex

Enclosure

Manufacture:	J M Bowman Mfg
Type:	Acostic Weatherproof/Sound Enclosure
Louvres:	Motorized Backdraft Damper, Belimo Motor
Access:	6 Doors
Finish:	Satin Coat Steel, Beige Powdercoat Painted

Frame

Unit Frame:	8" Heavy C Channel
Supports:	6" Heavy C Channel

Mounting

Type:	Rubber Isolators
Manufacture:	AV Products Inc
Model:	1040C16
Quantity:	8

Factory Test

Duration:	0% - 5 Minutes 50% - 5 Minutes 100% - 10 Minutes 110% - 0 Minutes 0% - 5 Minutes
Readings Recorded:	Voltage Amps Kw Frequency Oil Pressure Temperature

Warranty

Duration:	Two Year Or 2000 Hours From Date Of Startup Which Ever Comes First

POWER SOLUTIONS INTERNATIONAL

13LHO
Natural Gas / LPG

56100091
Revision 1
1/24/2023

General Engine Data [5]												
Type	Inline 4-cycle				Flywheel housing				SAE No. 1			
Number of cylinders	6				Flywheel				SAE No. 14			
Aspiration	Charged Cooled Forced Induction				Dry Weight	Fan to Flywheel			lb	kg	2315	1050
Firing Order	1 - 5 - 3 - 6 - 2 - 4					Radiator to Flywheel			lb	kg	3219	1460
Rotation Viewed from Flywheel	Counter Clockwise				Wet Weight	Fan to Flywheel			lb	kg	2425	1100
Bore	in	mm	5.0	127.0		Radiator to Flywheel			lb	kg	3475	1576
Stroke	in	mm	6.5	165.1	CoG from Rear Face of Flywheel Housing				in	mm	17.8	451
Displacement	in^3	L	765.4	12.54	Center of Gravity Above Crank Centerline				in	mm	6.3	161
Compression Ratio	10.5 : 1				Oil Specification				SAE 15W-40 Low Ash Gas engine oil Ash content 0.25 - 0.5% by weight			
Exhaust Manifold Type	Water Cooled				Engine Oil Capacity		Min		qts	L	29	27
Turbo Exhaust Outlet Pipe Size	in	mm	3.0	77.0			Max		qts	L	32	30
Catalyst Inlet Size (O.D)	in	mm	3.5	89.0	ECU Oil Pressure Warning [6]				psi	bar	50	3.5
Catalyst Dp	in-H_2O	kPa	29.9	7.5	ECU Oil Pressure Shut Down [6]				psi	bar	36	2.5
Maximum Allowable Exhaust Back Pressure	in-Hg	kPa	4.4	15.0	Oil Pressure Operating Range		Idle		psi	bar	58	4.0
Maximum Fuel System Pressure [8]	psi	kPag	0.9	6.2			Rated		psi	bar	75	5.2
Maximum Operating pressure to EPR	in-H_2O	kPa	10.9	2.7	Max Allowable Oil Temperature				°F	°C	235	113
Minimum Operating pressure to EPR	in-H_2O	kPa	6.8	1.7	Coolant Capacity (Engine only)				gal	L	6	22
Minimum Gas Supply Pipe Size [5]	2-11.5 NPT				Coolant Capacity (Radiator only)				gal	L	16	62
Maximum Pressure Drop Across CAC	psi	kPa	0.7	5.0	Radiator Weight (Dry)				lb	kg	904	410
Maximum Allowable Intake Restriction — Clean Air Filter	in-H_2O	kPa	12.1	3.0	Thermostat Operating Temperature Range [9]		Cracking		°F	°C	169	76
Maximum Allowable Intake Restriction — Dirty Air Filter	in-H_2O	kPa	24.9	6.2			Full Open		°F	°C	190	88
Spark Plug Part Number	Bosch R66857				ECU Coolant Temp Warning				°F	°C	220	104
Standard Spark Plug Gap [10]	in	mm	0.02	0.45	ECU Coolant Temp Shutdown				°F	°C	230	110
Spark Plug Coil - Primary Resistance	Ohms		0.59Ω ± 10%		Maximum Radiator Cooling Air Temp				°F	°C	140	60
Battery Voltage	Volts		24		Max External Coolant Friction Head				psi	kPa	7	50
Starter Motor Power	HP	kW	7.4	5.5	CAC Rise Above Ambient Specified				°F	°C	27	15

Performance Data 60Hz [3,5]												
Nominal Engine Speed	RPM		1800		Total Engine Coolant Flow				gal/min	L/min	146	553
Mean Piston Speed	ft/min	m/s	1950	9.9	Cooling Fan Power [11]				HP	kW	30	22.5
Steady-State RPM Range - ISO 8528-5 G3	RPM		1791 - 1809		Cooling Fan Speed				RPM		2192	
Charging Alternator Voltage	Volts		28		Cooling Fan Air Flow [11]				SCFM	m^3/min	25639	726
Charging Alternator Current	Amps		70									

Standby 60Hz Natural Gas	Load		100%		75%		50%		25%	
Power Rating [1,2,3,4] Per ISO 3046	HP	kWm	469	350	352	263	235	175	117	88
Brake Mean Effective Pressure	psi	bar	270	18.6	202	14.0	135	9.3	67	4.7
Fuel Consumption [3,4,7,12]	lb/hr	kg/hr	178	81	139	63	93	42	53	24
	ft^3/hr	m^3/hr	3979	113	3111	88	2079	59	1183	34
Brake Specific Fuel Consumption	lb/(hp-hr)	g/(kW-hr)	0.379	231	0.396	241	0.397	241	0.451	275
Turbine Outlet Temperature	°F	°C	1288	698	1269	687	1225	663	1128	609
Exhaust Flow at Turbine Outlet Conditions (entire engine)	lb/hr	kg/hr	3062	1389	2397	1087	1609	730	915	415
	ACFM	m^3/min	2197	62	1702	48	1117	32	604	17
Air Induction System [5]										
Combustion Air required (entire engine)	lb/hr	kg/hr	2881	1307	2257	1024	1515	687	861	391
	ACFM	m^3/min	661	19	518	15	348	10	198	6
Compressor Outlet Temperature [2]	°F	°C	325	163	255	124	194	90	120	49
Thermal Balance [5]										
Total Fuel	BTU/min	kW	58439	1028						
Mechanical Power	BTU/min	kW	19904	350						
Heat Rejected to Cooling Water	BTU/min	kW	14627	257						
Heat Rejected to CAC	BTU/min	kW	2730	48						
Heat Rejection to Exhaust	BTU/min	kW	17265	304						
Engine Radiated Heat	BTU/min	kW	3981	70						

1: Max load and overload ratings based on ISO 3046 gross flywheel power. For additional information on ratings and duty cycles see PSI Power Systems Technical Spec #56100017 - Engine Ratings Guidelines

2: Technical data based on ISO 3046-1 standards of 77°F(25°C), barometric pressure 14.5Psia (100kPa) and 30% relative humidity.

3: Production tolerances in engines and installed components can account for power variations of ± 5%. Altitude, temperature and excessive exhaust and intake restrictions should be applied to power calculations.

4: All fuel and thermal calculations unless otherwise noted are done at ISO 3046 rated load using LHV for NG of 48.17 MJ/kg.

5: All values in the following section are provided for informational purpose only and are non-binding.

6: >1400RPM.

7: See PSI Power Systems Technical Spec. 56100019 - Fuel Standard.

8: Maximum pressure the fuel system components can withstand without being damaged. Operating pressure should fall between the listed minimum and maximum pressures.

9: ± 2 degrees Celsius.

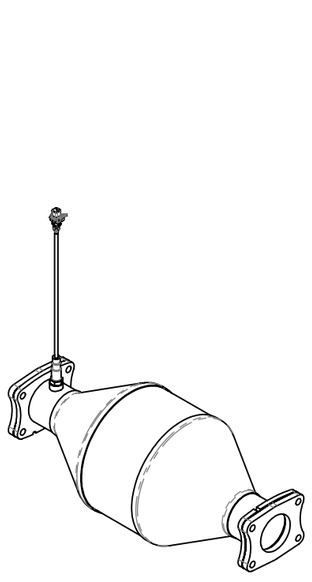
10: ± 0.002" or 0.05mm.

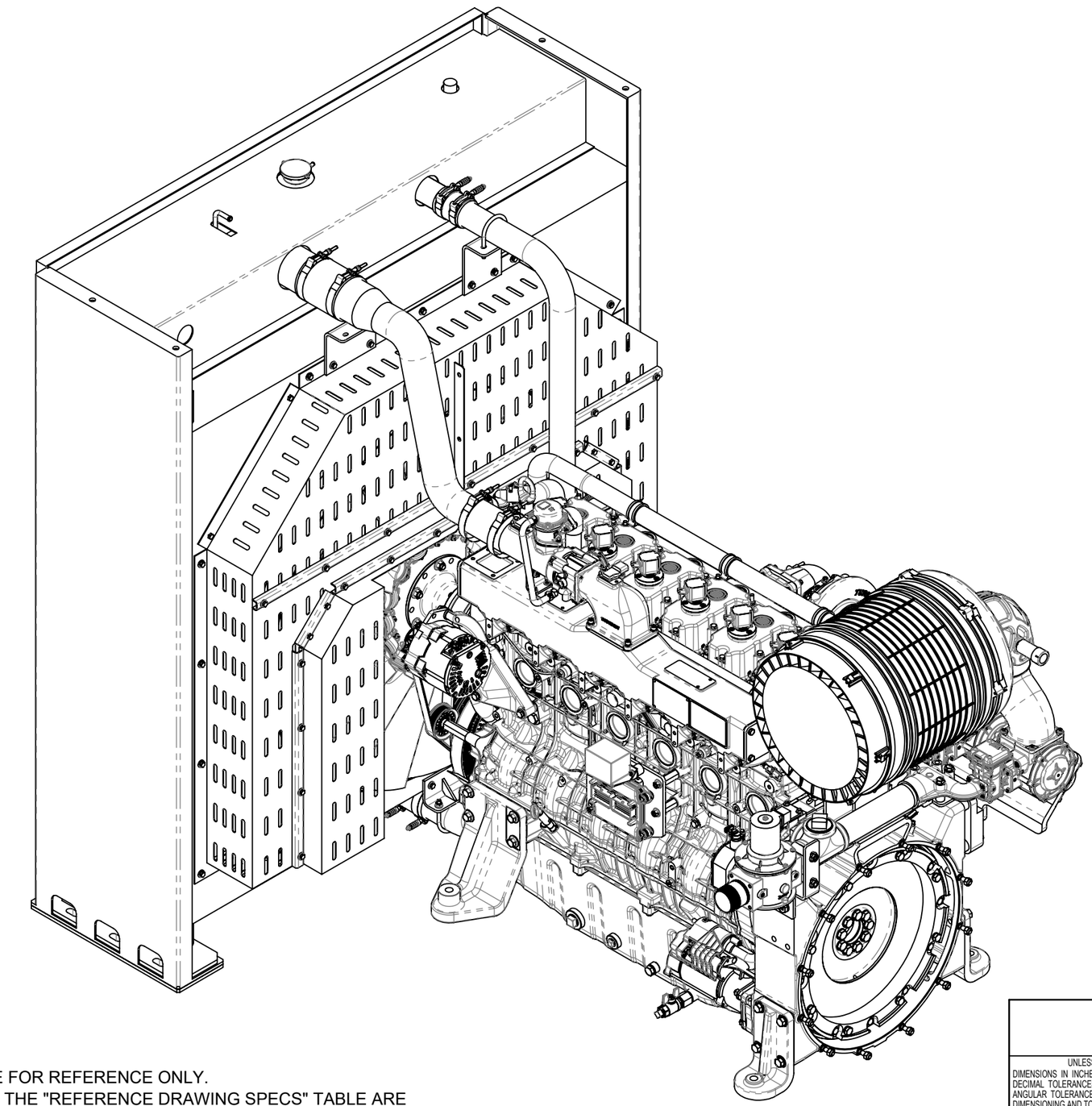
11: At 0.5 in-H2O of Package Restriction at STP.

12: Volume calculated using density of 0.717 kg/m3 for NG, 0.51 kg/L for LPG

DRAWING NUMBER: SK85578 REVISION: A

	REFERENCE DRAWING SPECS	
ITEM	PART NUMBER	DESCRIPTION
1	59008073	G-DRIVE, 13LTHO STANDBY CERT
2	59008074	G-DRIVE, 13LTHO STANDBY NON-CERT





	STANDBY CERTIFIED SHIP LOOSE ITEMS		
ITEM	PART NUMBER	DESCRIPTION	QTY.
1	32501267	SENSOR, 02 GOLD TERMINALS	1
2	35001328	SCREW NAIL, #4 X 1/4 ROUND HEAD	4
3	38901309	CATALYST, INLINE 11L-22L NGE	1
4	50600077	FLANGED, CATALYST 13LT	2
5	50600146	GASKET, EXHAUST 6.7LT	2
6	56000001	SERIAL PLATE, NGE	1
7	56000144	LABEL, MOR 2022 13LT	1

	STANDBY NON-CERTIFIED SHIP LOOSE ITEMS		
ITEM	PART NUMBER	DESCRIPTION	QTY.
1	36000747	LABEL, BLANK EMISSIONS 1.75" X 7", W/DESTRUCTIVE	1
2	56000001	SERIAL PLATE, NGE	1
3	56000014	LABEL, EXPORT NGE	1

	CALIBRATION ITEMS		
ITEM	PART NUMBER	DESCRIPTION	QTY.
1	58080141	KIT, STANDBY CERT 13LTHO	1
2	58080142	KIT, STANDBY NON-CERT 13LTHO	1

	SHIP LOOSE KIT OPTIONS		
ITEM	PART NUMBER	DESCRIPTION	QTY.
1	59300180	KIT, LP 13LT/13LTHO	1
2	59300181	KIT, COOLING 13LTHO	1

NOTES:
1. ALL DIMENSIONS ARE FOR REFERENCE ONLY.
2. ALL SPECS LISTED IN THE "REFERENCE DRAWING SPECS" TABLE ARE DIMENSIONALLY IDENTICAL.

REV	DESCRIPTION	BY	DATE	APPROVED

MATERIAL: SEE BOM
ESTIMATED WEIGHT: -

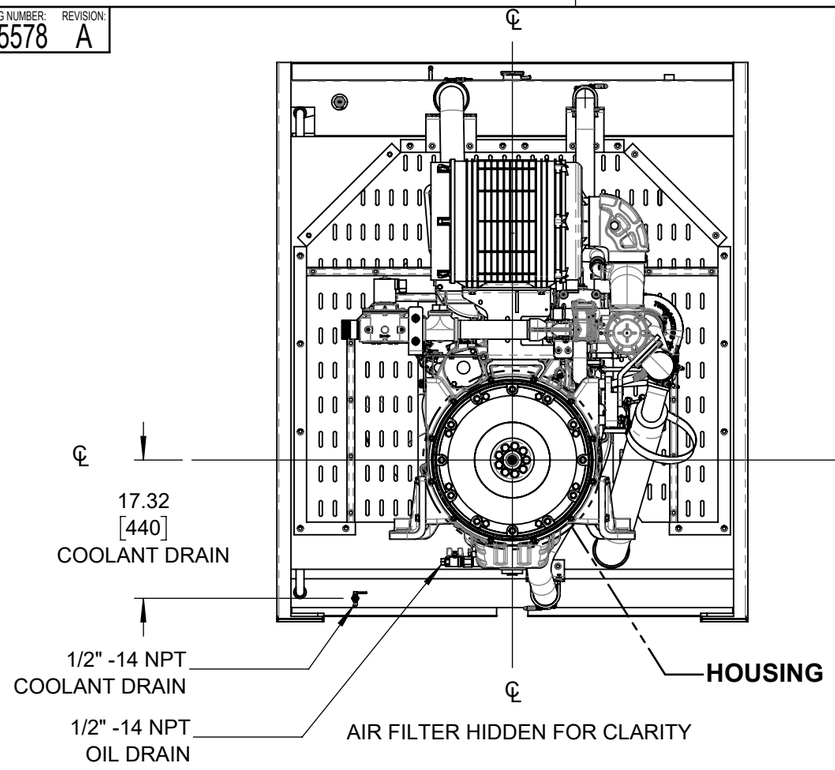
UNLESS SPECIFIED OTHERWISE:
DIMENSIONS IN INCHES; WEIGHT IN POUNDS
DECIMAL TOLERANCES: .XX ± .030; .XXX ± .010
ANGULAR TOLERANCE: ± 1°
DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2009
THIRD ANGLE PROJECTION

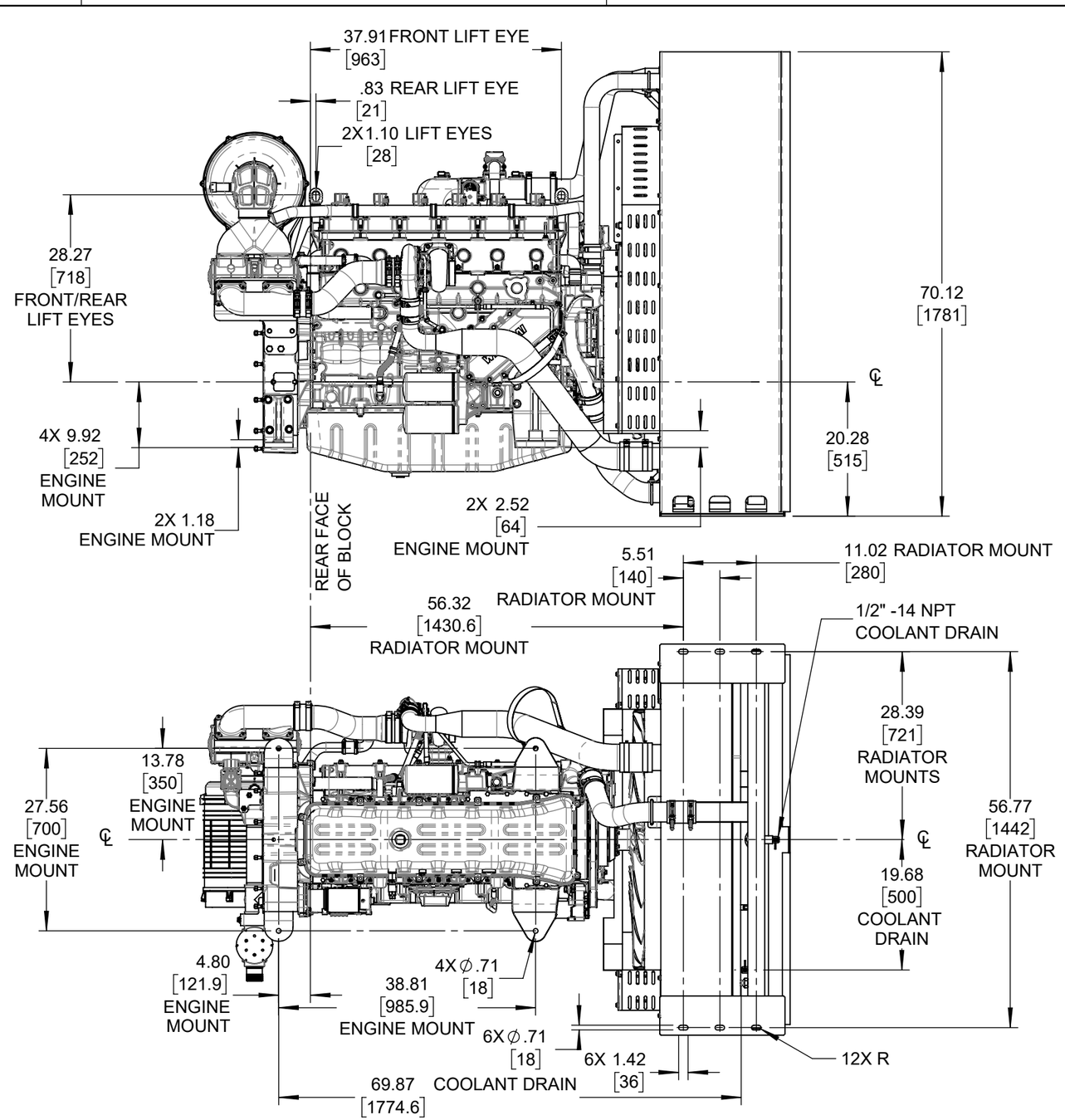
DESIGNED / DATE: CG 10/10/2022
DRAWN / DATE: DC 10/10/2022
DESIGN APPROVED / DATE: TO 11/01/2022
DRAWING APPROVED / DATE: TO 11/04/2022

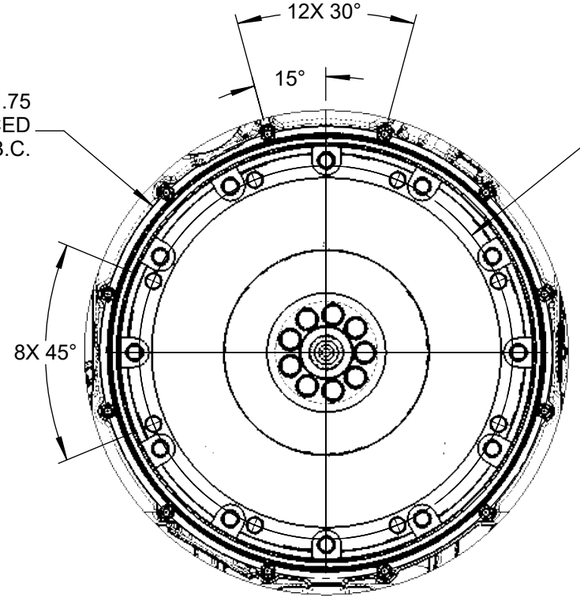
POWER SOLUTIONS INTERNATIONAL
201 MITTEL DRIVE, WOOD DALE, IL 60191, UNITED STATES OF AMERICA

DESCRIPTION:	EXPERIMENTAL PART NUMBER:	PRODUCTION PART NUMBER:	DRAWING NUMBER:	REVISION:	SHEET:
DRAWING, REFERENCE 13LTHO	SK85578	-	SK85578	A	1 OF 3

DRAWING NUMBER: SK85578 REVISION: A







DETAIL HOUSING
SAE 1M HOUSING
SAE 14 FLYWHEEL

NOTE:
1. ALL DIMENSIONS ARE REFERENCE

REV	DESCRIPTION	BY	DATE	APPROVED

MATERIAL: SEE BOM
ESTIMATED WEIGHT: -

UNLESS SPECIFIED OTHERWISE:
DIMENSIONS IN INCHES; WEIGHT IN POUNDS
DECIMAL TOLERANCES: .XX ± .030; .XXX ± .010
ANGULAR TOLERANCE: ± 1°
DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2009
THIRD ANGLE PROJECTION

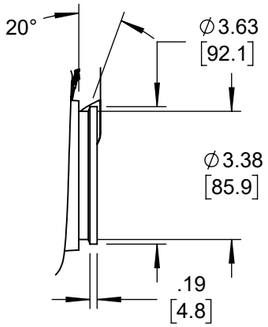
DESCRIPTION: DRAWING, REFERENCE 13LTHO

DESIGNED / DATE: CG 10/10/2022
DRAWN / DATE: DC 10/10/2022
DESIGN APPROVED / DATE: TO 11/01/2022
DRAWING APPROVED / DATE: TO 11/04/2022

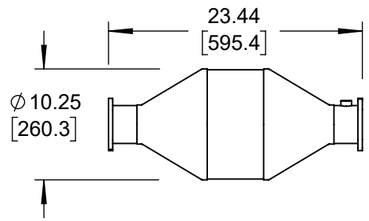
EXPERIMENTAL PART NUMBER: SK85578
PRODUCTION PART NUMBER: -
DRAWING NUMBER: SK85578
REVISION: A
SHEET: 2 OF 3

PSI POWER SOLUTIONS INTERNATIONAL
201 MITTEL DRIVE, WOOD DALE, IL 60191, UNITED STATES OF AMERICA

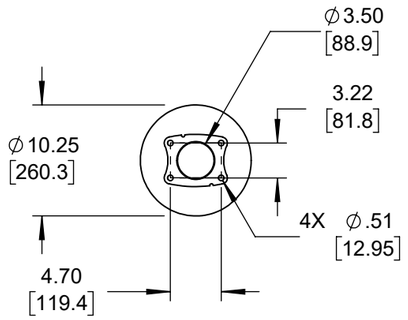
DRAWING NUMBER: SK85578 REVISION: A

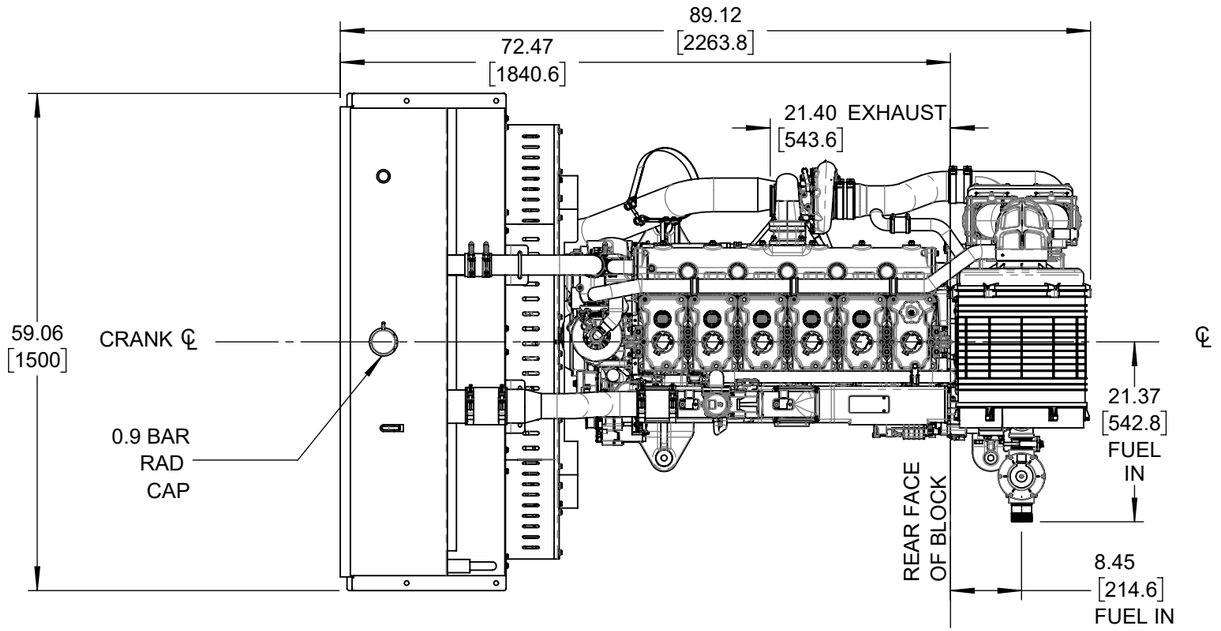


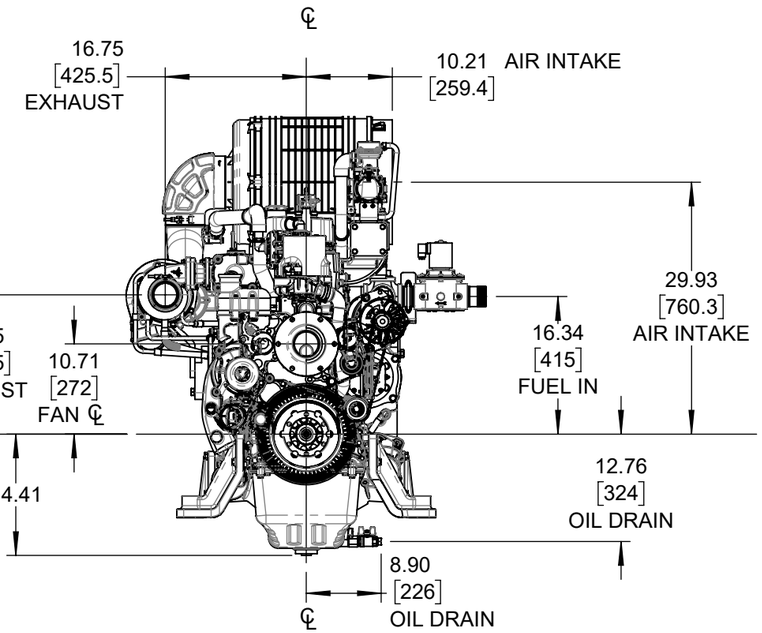
EXHAUST FLANGE DETAIL



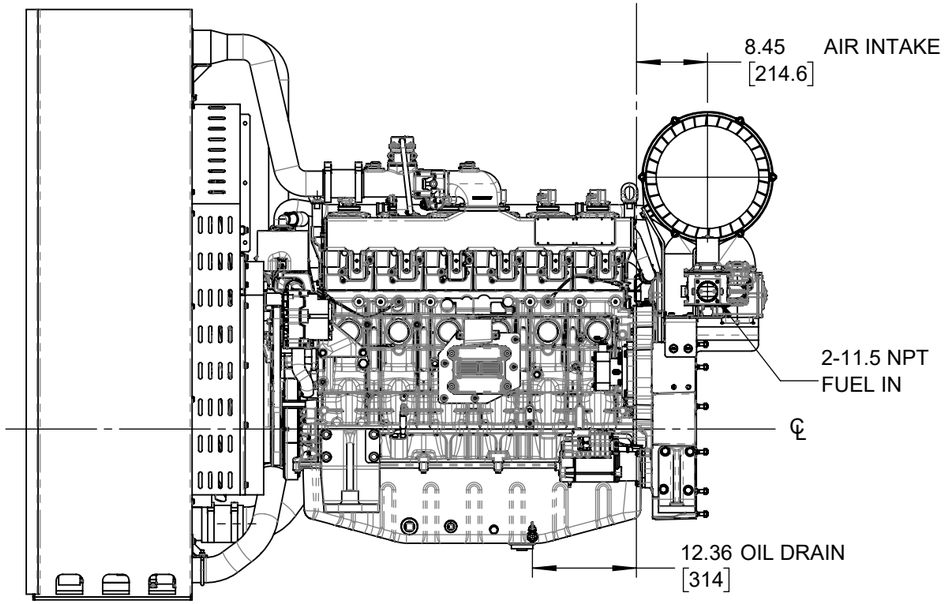
CATALYST FLANGE BOTH SIDES







FAN AND RADIATOR ARE HIDDEN FOR CLARITY



NOTE:
1. ALL DIMENSIONS ARE REFERENCE

REV	DESCRIPTION	BY	DATE	APPROVED

MATERIAL: SEE BOM
ESTIMATED WEIGHT: -

UNLESS SPECIFIED OTHERWISE:
DIMENSIONS IN INCHES; WEIGHT IN POUNDS
DECIMAL TOLERANCES: .XX ± .030; .XXX ± .010
ANGULAR TOLERANCE: ± 1°
DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2009
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EXPERIMENTAL PART NUMBER: SK85578
PRODUCTION PART NUMBER: -

POWER SOLUTIONS INTERNATIONAL
201 MITTEL DRIVE, WOOD DALE, IL 60191, UNITED STATES OF AMERICA

DRAWING NUMBER:	REVISION:	SHEET:
SK85578	A	3 OF 3

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

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **Weichai America Corporation**
(U.S. Manufacturer or Importer)

Certificate Number: RWCAB12.5GTA-006

Effective Date: 12/05/2023

Expiration Date: 12/31/2024

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 12/05/2023

Revision Date: N/A

Manufacturer: Weichai America Corporation
Engine Family: RWCAB12.5GTA
Mobile/Stationary Certification Type: Mobile and Stationary
Fuel : LPG/Propane
Natural Gas (CNG/LNG)
Emission Standards :
Part 60 Subpart JJJ Table 1
NOx (g/Hp-hr) : 1.0
CO (g/Hp-hr) : 2.0
VOC (g/Hp-hr) : 0.7
Mobile Part 1048
CO (g/kW-hr) : 20.6
HC + NOx (g/kW-hr) : 0.8
NMHC + NOx (g/kW-hr) : 0.8
Stationary Part 1048
NMHC + NOx (g/kW-hr) : 0.8
CO (g/kW-hr) : 20.6
HC + NOx (g/kW-hr) : 0.8
Emergency Use Only : N

Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547) and 40 CFR Part 60, 40 CFR Part 1048, 1065, 1068, and 60 (stationary only and combined stationary and mobile) and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following nonroad engines, by engine family, more fully described in the documentation required by 40 CFR Part 60, 40 CFR Part 1048 and produced in the stated model year.

This certificate of conformity covers only those new nonroad spark-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60, 40 CFR Part 1048 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60, 40 CFR Part 1048. This certificate of conformity does not cover nonroad engines imported prior to the effective date of the certificate.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068.20 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60, 40 CFR Part 1048. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60, 40 CFR Part 1048.

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

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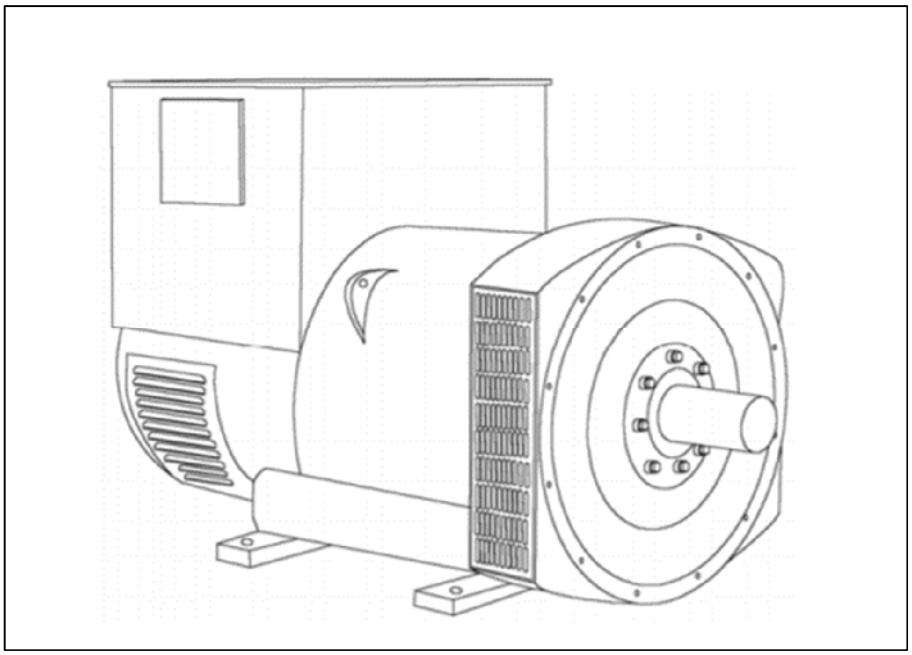
S4L1S-E4 Wdg.311 - Technical Data Sheet

Standards

STAMFORD industrial alternators meet the requirements of the relevant parts of the IEC 60034 and the relevant sections of other international standards such as BS5000-3, ISO 8528-3, VDE 0530, NEMA MG1-32, CSA C22.2-100 and AS 60034. Other standards and certifications can be considered on request.

Quality Assurance

Alternators are manufactured using production procedures having a quality assurance level to BS EN ISO 9001.



Excitation and Voltage Regulators

Excitation System					
AVR Type	AS440	MX341	MX321	MX322	
Voltage Regulation	± 1%	± 1%	± 0.5%	± 0.5%	with 4% Engine Governing
Excitation Type	Self-Excited	PMG	PMG	PMG	

No Load Excitation Voltage (V)	12 - 9
No Load Excitation Current (A)	0.7 - 0.5
Full Load Excitation Voltage (V)	41 - 39
Full Load Excitation Current (A)	2.3 - 2.2
Exciter Time Constant (seconds)	0.105

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Electrical Data

Insulation System	Class H							
Stator Winding	Double Layer Lap							
Winding Pitch	Two Thirds							
Winding Leads	12							
Winding Number	311							
Number of Poles	4							
IP Rating	IP23							
RFI Suppression	BS EN 61000-6-2 & BS EN 61000-6-4,VDE 0875G, VDE 0875N. Refer to factory for others							
Waveform Distortion	NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%							
Short Circuit Ratio	1/Xd							
Steady State X/R Ratio	13.56							
	50 Hz				**60 Hz**			
Telephone Interference	THF<2%				TIF<50			
Cooling Air	0.8 m³/sec				0.99 m³/sec			
Voltage Star	380	400	415	440	416	440	460	480
Voltage Parallel Star	190	200	208	220	208	220	230	240
Voltage Series Delta	220	230	240	254	240	254	266	277
kVA Base Rating (Class H) for Reactance Values	350	350	350	350	400	420	440	440
Saturated Values in Per Unit at Base Ratings and Voltages								
Xd Dir. Axis Synchronous	3.01	2.71	2.52	2.24	3.47	3.26	3.12	2.87
X'd Dir. Axis Transient	0.20	0.18	0.17	0.15	0.21	0.19	0.19	0.17
X"d Dir. Axis Subtransient	0.14	0.13	0.12	0.11	0.15	0.14	0.13	0.12
Xq Quad. Axis Reactance	2.58	2.33	2.16	1.92	2.92	2.74	2.62	2.41
X"q Quad. Axis Subtransient	0.36	0.32	0.30	0.27	0.41	0.39	0.37	0.34
XL Stator Leakage Reactance	0.07	0.06	0.06	0.05	0.08	0.08	0.08	0.07
X2 Negative Sequence Reactance	0.24	0.22	0.20	0.18	0.28	0.26	0.25	0.23
X0 Zero Sequence Reactance	0.10	0.09	0.08	0.07	0.10	0.09	0.09	0.08
Unsaturated Values in Per Unit at Base Ratings and Voltages								
Xd Dir. Axis Synchronous	3.61	3.26	3.02	2.69	4.17	3.91	3.75	3.44
X'd Dir. Axis Transient	0.23	0.21	0.20	0.17	0.24	0.22	0.21	0.20
X"d Dir. Axis Subtransient	0.17	0.15	0.14	0.12	0.17	0.16	0.15	0.14
Xq Quad. Axis Reactance	2.65	2.39	2.22	1.98	3.00	2.82	2.70	2.48
X"q Quad. Axis Subtransient	0.43	0.39	0.36	0.32	0.49	0.46	0.44	0.41
XL Stator Leakage Reactance	0.08	0.07	0.07	0.06	0.10	0.09	0.09	0.08
Xlr Rotor Leakage Reactance	0.12	0.10	0.10	0.09	0.13	0.12	0.12	0.11
X2 Negative Sequence Reactance	0.29	0.26	0.24	0.21	0.33	0.31	0.30	0.28
X0 Zero Sequence Reactance	0.11	0.10	0.09	0.08	0.11	0.11	0.10	0.09

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Time Constants (Seconds)	
T'd TRANSIENT TIME CONST.	0.08
T''d SUB-TRANSTIME CONST.	0.019
T'do O.C. FIELD TIME CONST.	1.7
Ta ARMATURE TIME CONST.	0.018
T''q SUB-TRANSTIME CONST.	0.0304

Resistances in Ohms (Ω) at 22^{0}C	
Stator Winding Resistance (Ra), per phase for series connected	0.009
Rotor Winding Resistance (Rf)	1.19
Exciter Stator Winding Resistance	18
Exciter Rotor Winding Resistance per phase	0.068
PMG Phase Resistance (Rpmg) per phase	1.9
Positive Sequence Resistance (R1)	0.01125
Negative Sequence Resistance (R2)	0.01296
Zero Sequence Resistance (R0)	0.01125

Saturation Factors	400V	480V
SG1.0	0.32	0.33
SG1.2	1.3	1.32

Mechanical Data		
Shaft and Keys	All alternator rotors are dynamically balanced to better than BS6861: Part 1 Grade 2.5 for minimum vibration in operation. Two bearing generators are balanced with a half key.	
	1 Bearing	2 Bearings
SAE Adaptor	SAE 0, 0.5, 1, 2. 3	SAE 0, 0.5, 1, 2
Moment of Inertia	4.6331kgm^2	4.4343kgm^2
Weight Wound Stator	470kg	470kg
Weight Wound Rotor	400kg	377kg
Weight Complete Alternator	1024kg	1030kg
Shipping weight in a Crate	1095kg	1100kg
Packing Crate Size	155 x 87 x 107 (cm)	155 x 87 x 107 (cm)
Maximum Over Speed	2250 RPM for two minutes	
Bearing Drive End	N/A	Ball 6317
Bearing Non-Drive End	Ball 6314	Ball 6314

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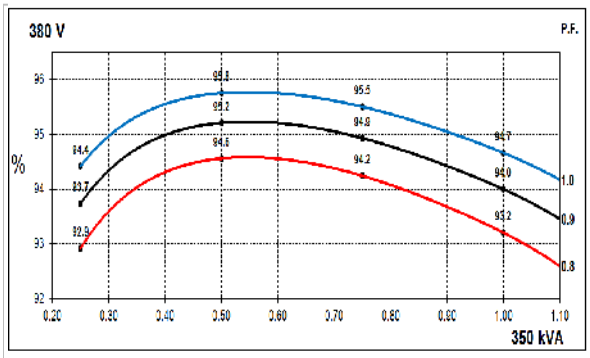
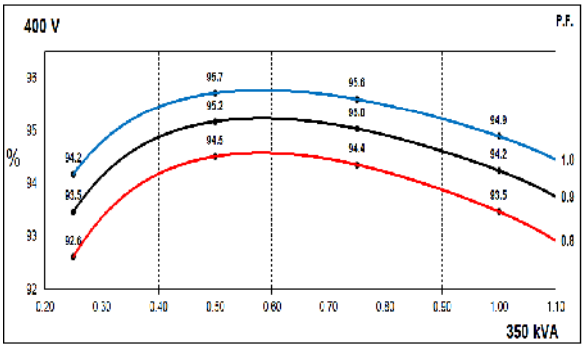
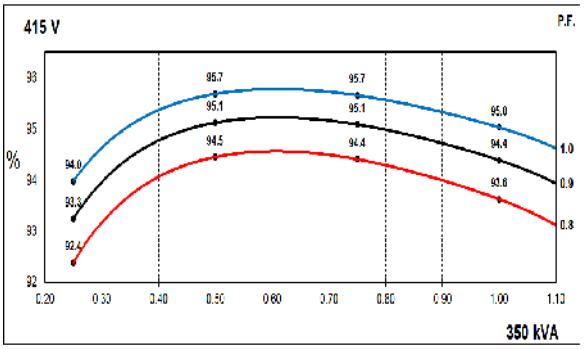
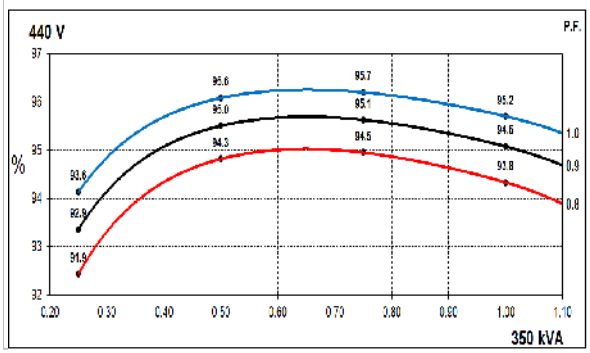
THREE PHASE EFFICIENCY CURVES

50Hz

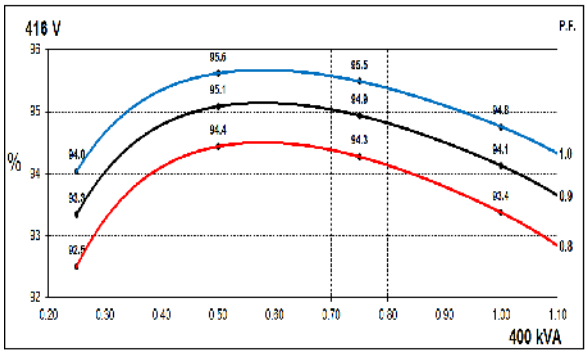


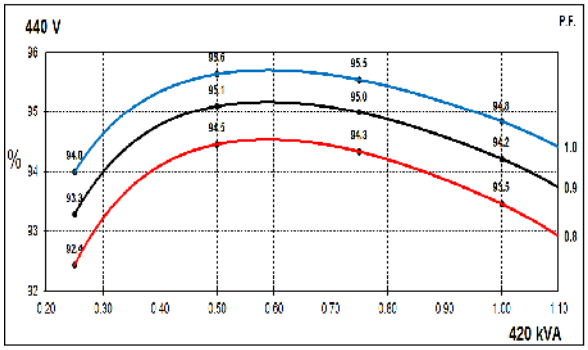


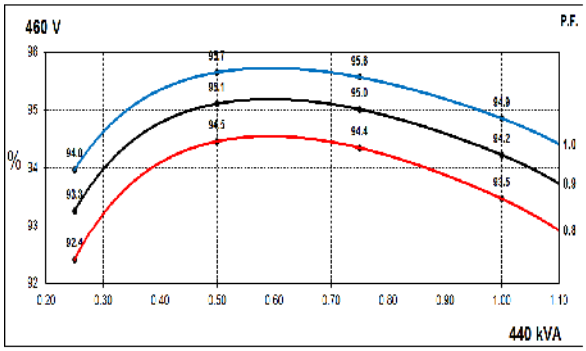


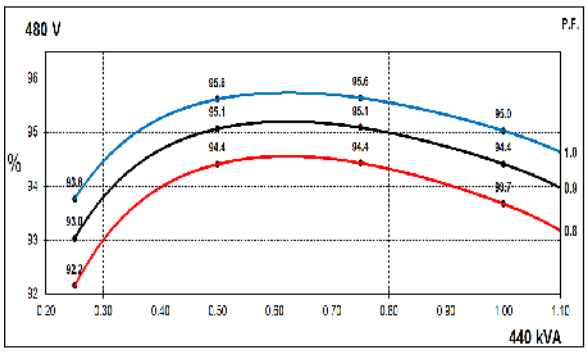


60Hz









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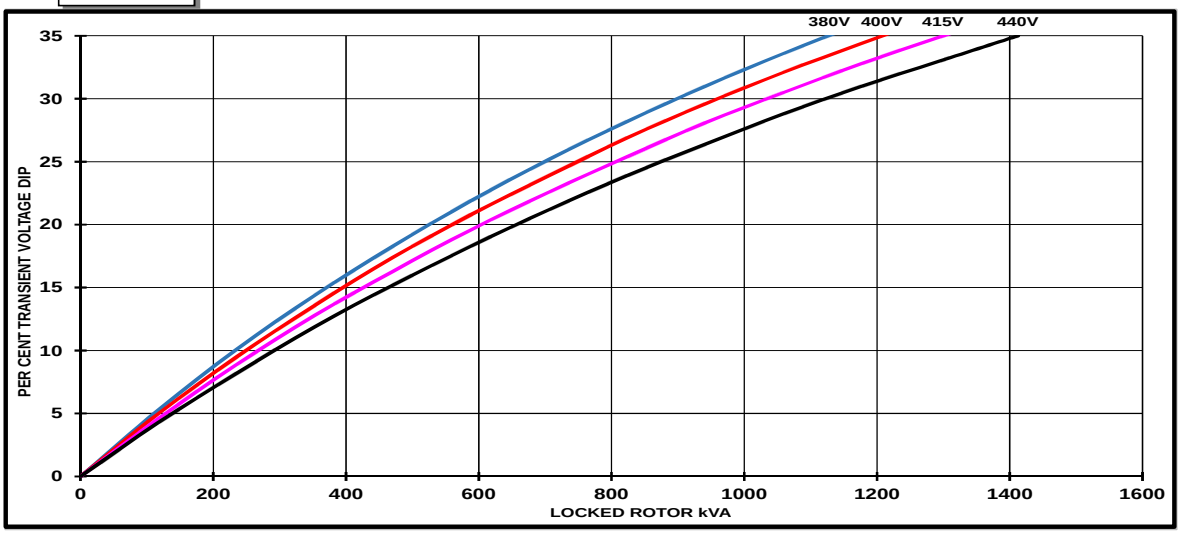
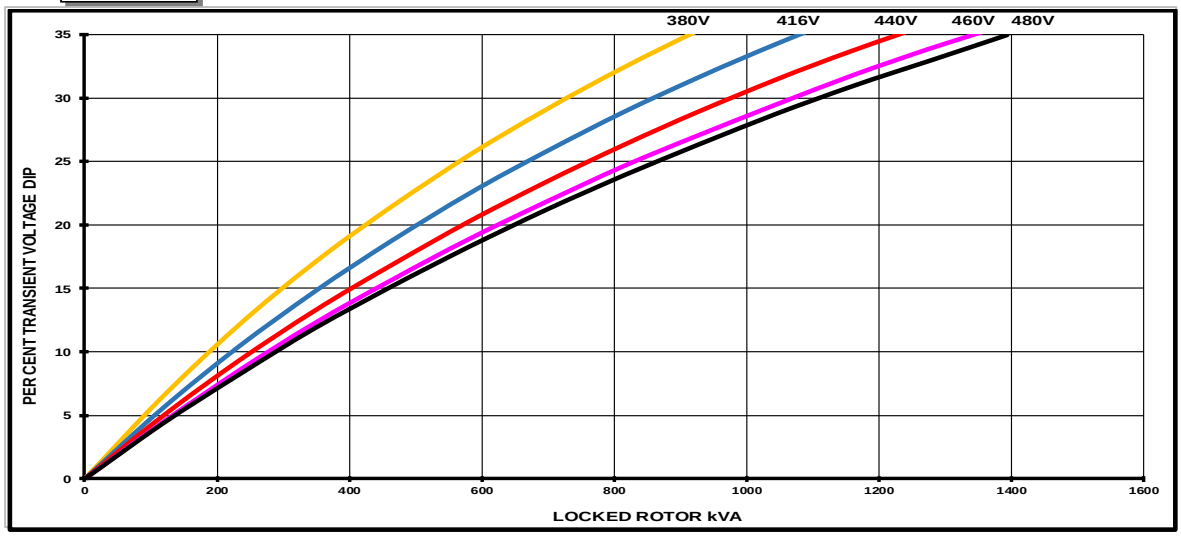
S4L1S-E4 Wdg.311

Locked Rotor Motor Starting Curves - Separately Excited

50Hz



60Hz



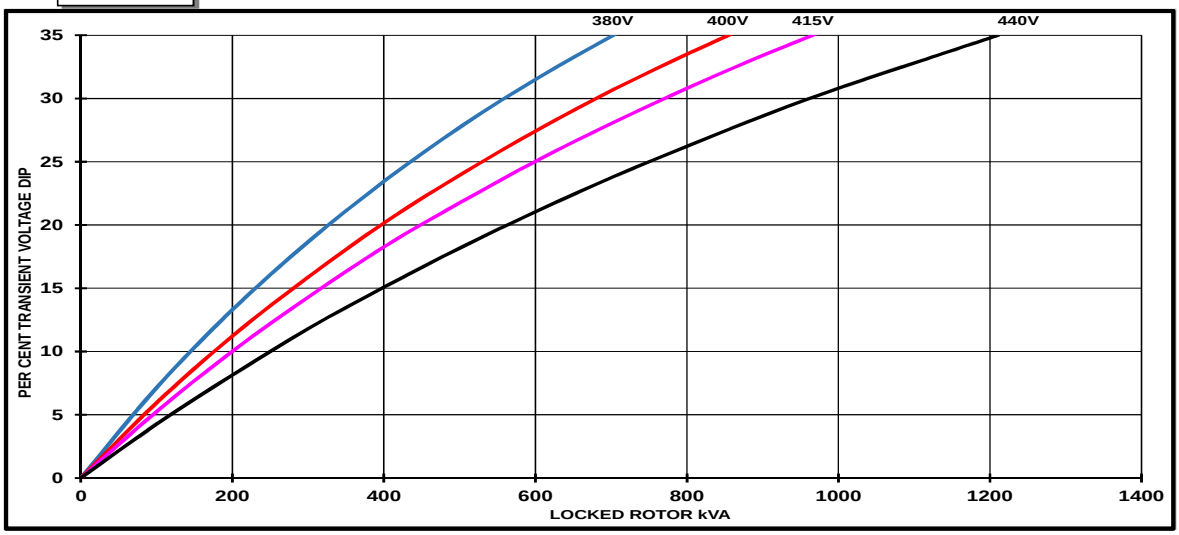
Transient Voltage Dip Scaling Factor	
Lagging PF	Scaling Factor
<= 0.4	1.00
0.5	0.95
0.6	0.90
0.7	0.86
0.8	0.83
0.9	0.75
0.95	0.70
1	0.65

Transient Voltage Rise Scaling Factor	
Lagging PF	Scaling Factor
<= 0.4	1.25
0.5	1.20
0.6	1.15
0.7	1.10
> 0.7	1.00

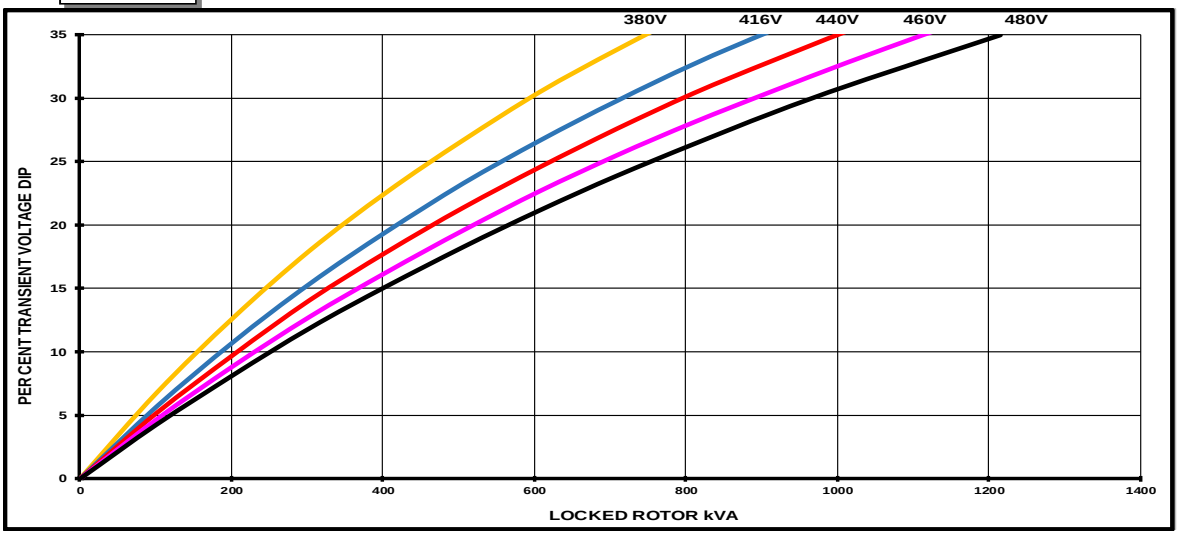
Note: To determine % Transient Voltage Dip or Voltage Rise at various PF, multiply the % Voltage Dip from the curve directly by the Scaling Factor.

Locked Rotor Motor Starting Curves - Self Excited

50Hz



60Hz



Transient Voltage Dip Scaling Factor	
Lagging PF	Scaling Factor
<= 0.4	1.00
0.5	0.95
0.6	0.90
0.7	0.86
0.8	0.83
0.9	0.75
0.95	0.70
1	0.65

Transient Voltage Rise Scaling Factor	
Lagging PF	Scaling Factor
<= 0.4	1.25
0.5	1.20
0.6	1.15
0.7	1.10
> 0.7	1.00

Note: To determine % Transient Voltage Dip or Voltage Rise at various PF, multiply the % Voltage Dip from the curve directly by the Scaling Factor.

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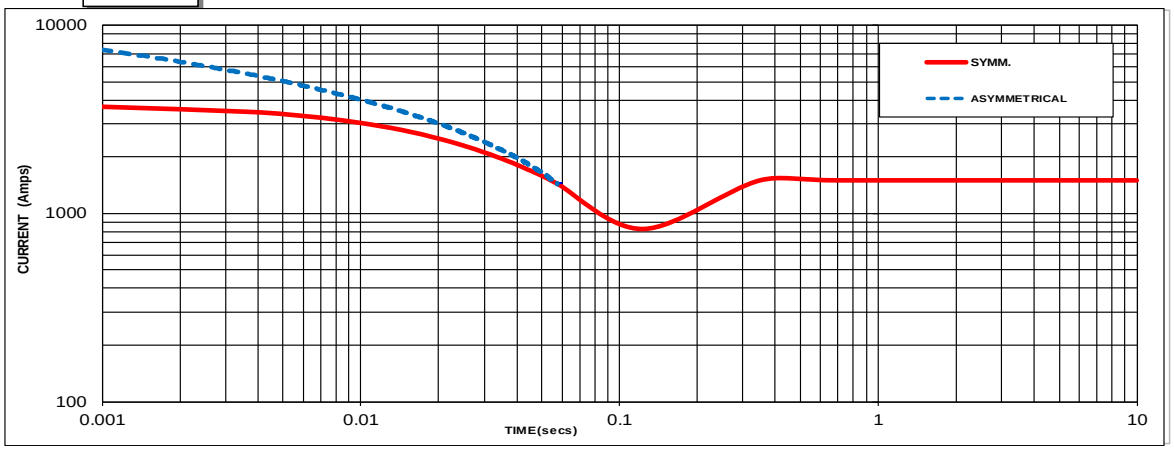
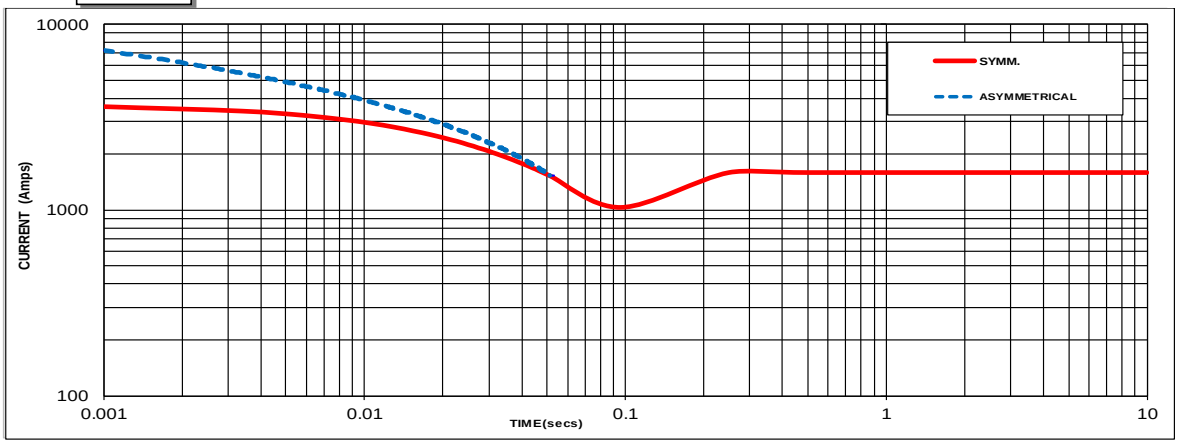
Three-phase Short Circuit Decrement Curve

50Hz



Sustained Short Circuit = 1500 Amps

60Hz



Sustained Short Circuit = 1600 Amps

Note 1
The following multiplication factors should be used to adjust the values from curve between time 0.001 seconds and the minimum current point in respect of nominal operating voltage :

50Hz		**60Hz**	
Voltage	Factor	Voltage	Factor
380V	X 1.00	416V	X 1.00
400V	X 1.05	440V	X 1.06
415V	X 1.09	460V	X 1.10
440V	X 1.16	480V	X 1.15

The sustained current value is constant irrespective of voltage level

If MX322 or digital AVR is used, the sustained short circuit current value is to be multiplied by a factor of 1.1.

Note 2
The following multiplication factor should be used to convert the values calculated in accordance with NOTE 1 to those applicable to the various types of short circuit :

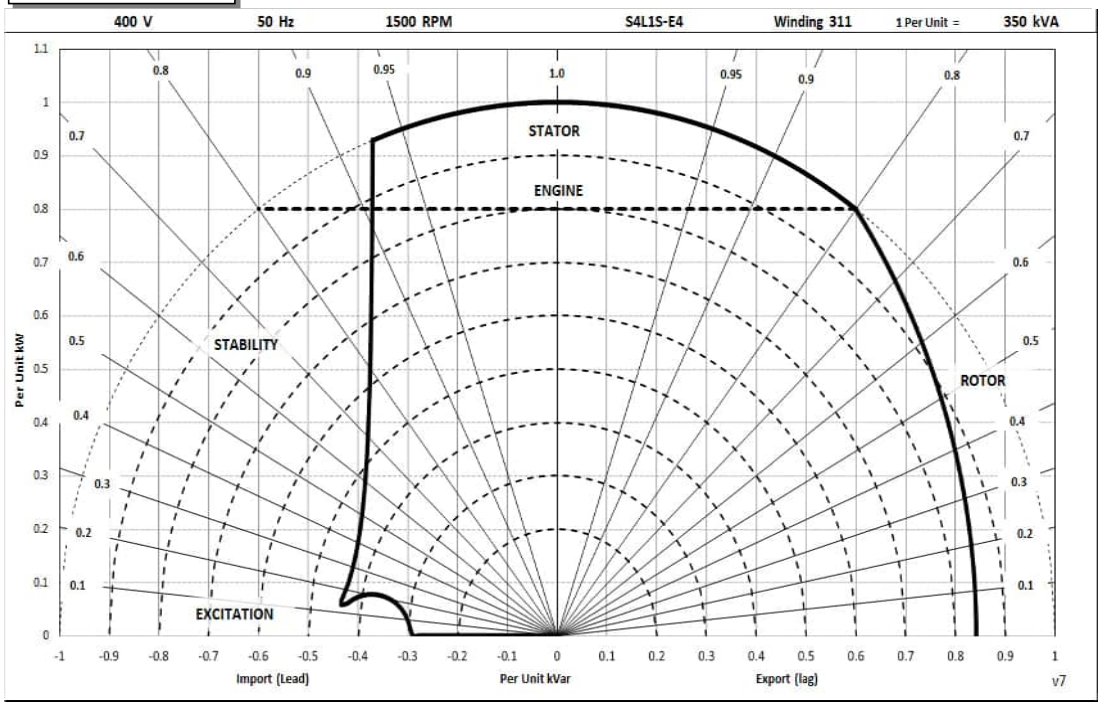
	3-phase	2-phase L-L	1-phase L-N
Instantaneous	x 1.00	x 0.87	x 1.30
Minimum	x 1.00	x 1.80	x 3.20
Sustained	x 1.00	x 1.50	x 2.50
Max. sustained duration	10 sec.	5 sec.	2 sec.

All other times are unchanged

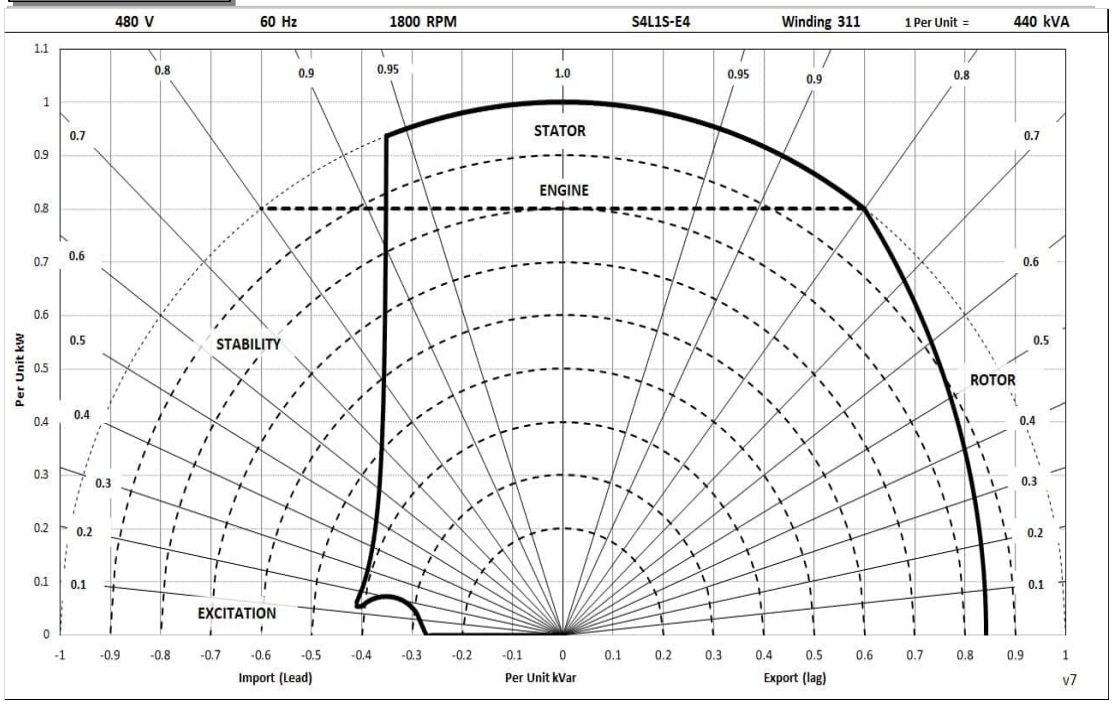
Note 3
Curves are drawn for Star connected machines under no-load excitation at rated speeds. For other connection the following multipliers should be applied to current values as shown :
Parallel Star = Curve current value X 2
Series Delta = Curve current value X 1.732

Typical Alternator Operating Charts

400V/50Hz



480V/60Hz



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RATINGS AT 0.8 POWER FACTOR

	Class - Temp Rise	Standby - 163/27℃				Standby - 150/40℃				Cont. H - 125/40℃				Cont. F - 105/40℃			
50 Hz	Series Star (V)	380	400	415	440	380	400	415	440	380	400	415	440	380	400	415	440
	Parallel Star (V)	190	200	208	220	190	200	208	220	190	200	208	220	190	200	208	220
	Series Delta (V)	220	230	240	254	220	230	240	254	220	230	240	254	220	230	240	254
	kVA	380	400	380	380	370	370	370	370	350	350	350	350	320	320	320	320
	kW	304	320	304	304	296	296	296	296	280	280	280	280	256	256	256	256
	Efficiency (%)	92.7	92.7	93.2	93.5	92.9	93.2	93.4	93.6	93.2	93.5	93.6	93.8	93.6	93.8	94.0	94.1
	kW Input	328	345	326	325	319	318	317	316	300	299	299	299	274	273	272	272

60 Hz	Series Star (V)	416	440	460	480	416	440	460	480	416	440	460	480	416	440	460	480
	Parallel Star (V)	208	220	230	240	208	220	230	240	208	220	230	240	208	220	230	240
	Series Delta (V)	240	254	266	277	240	254	266	277	240	254	266	277	240	254	266	277
	kVA	435	455	475	475	420	445	460	460	400	420	440	440	365	385	400	400
	kW	348	364	380	380	336	356	368	368	320	336	352	352	292	308	320	320
	Efficiency (%)	92.9	93.0	93.1	93.3	93.1	93.2	93.2	93.5	93.4	93.5	93.5	93.7	93.8	93.8	93.9	94.0
	kW Input	375	391	408	407	361	382	395	394	343	359	376	376	311	328	341	340

De-Rates

All values tabulated above are subject to the following reductions:

- 5% when air inlet filters are fitted
- 3% for every 500 meters by which the operating altitude exceeds 1000 meters above mean sea level
- 3% for every 5℃ by which the operational ambient temperature exceeds 40℃
- For any other operating conditions impacting the cooling circuit please refer to applications

Note: Requirement for operating in an ambient exceeding 60℃ and altitude exceeding 4000 meters must be referred to applications.

Dimensional and Torsional Drawing

For dimensional and torsional information please refer to the alternator General Arrangement and rotor drawings available on our website (http://stamford-avk.com/)

Note: Continuous development of our products means that the information contained in our data sheets can change without notice, and specifications should always be confirmed with Cummins Generator Technologies prior to purchase.

STAMFORD®

MX341 AUTOMATIC VOLTAGE REGULATOR (AVR)

SPECIFICATION, INSTALLATION AND ADJUSTMENTS

General description

MX341 is a two phase sensed Automatic Voltage Regulator and forms part of the excitation system for a brush-less generator. Excitation power is derived from a three-phase permanent magnet generator (PMG), to isolate the AVR control circuits from the effects of non-linear loads and to reduce radio frequency interference on the generator terminals. Sustained generator short circuit current is another feature of the PMG system.

The AVR senses the voltage in the main generator winding and controls the power fed to the exciter stator and hence the main rotor to maintain the generator output voltage within the specified limits, compensating for load, speed, temperature and power factor of the generator.

Soft start circuitry is included to provide a smooth controlled build up of generator output voltage.

A frequency measuring circuit continually monitors the shaft speed of the generator and provides under-speed protection of the excitation system by reducing the generator output voltage proportionally with speed below a pre-settable threshold. A further enhancement of this feature is an adjustable volts per Hertz slope to improve engine recovery time on turbo charged engines. Soft start circuitry is included to provide a smooth controlled build up of generator output voltage.

Uncontrolled excitation is limited to a safe period by internal shutdown of the AVR output device. This condition remains latched until the generator has stopped.

Provision is made for the connection of a remote voltage trimmer, allowing the user fine control of the generator's output.

An analogue input is provided allowing connection to a STAMFORD Power Factor controller or other external devices with compatible output.

The AVR has the facility for droop CT connection, to allow parallel running with other similarly equipped generators.

Technical specification

SENSING INPUT

Voltage	190-264V ac max, 1 phase, 2 wire
Frequency	50-60 Hz nominal

POWER INPUT (PMG)

Voltage	140-220V ac max, 3 phase, 3 wire
Current	3A/phase
Frequency	100-120 Hz nominal

OUTPUT

Voltage	max 120V dc
Current	continuous 2.7 A Intermittent 6A for 10 secs.
Resistance	15 ohms minimum

REGULATION

+/- 1% (see note 1)

THERMAL DRIFT

0.03% per ^{o}C change in AVR ambient (note 2)

SOFT START RAMP TIME

3 seconds

TYPICAL SYSTEM RESPONSE

AVR Response	10 ms
Filed current to 90%	80 ms
Machine Volts to 97%	300 ms

EXTERNAL VOLTAGE ADJUSTMENT

+/-10% with 1 k ohm 1 watt trimmer (see note 3)

UNDER FREQUENCY PROTECTION

Set point	95% Hz (see note 4)
Slope	170% down to 30 Hz

UNIT POWER DISSIPATION

12 watts maximum

ANALOGUE INPUT

Maximum input	+/- 5V dc (see note 5)
Sensitivity	1v for 5% Generator Volts (adjustable)
Input resistance	1k ohm

QUADRATURE DROOP INPUT

10 ohms burden
Max. sensitivity: 0.07 A for 5% droop 0PF
Max. input: 0.33 A

OVER EXCITATION PROTECTION

Set point	75 V dc
Time delay	10 seconds (fixed)

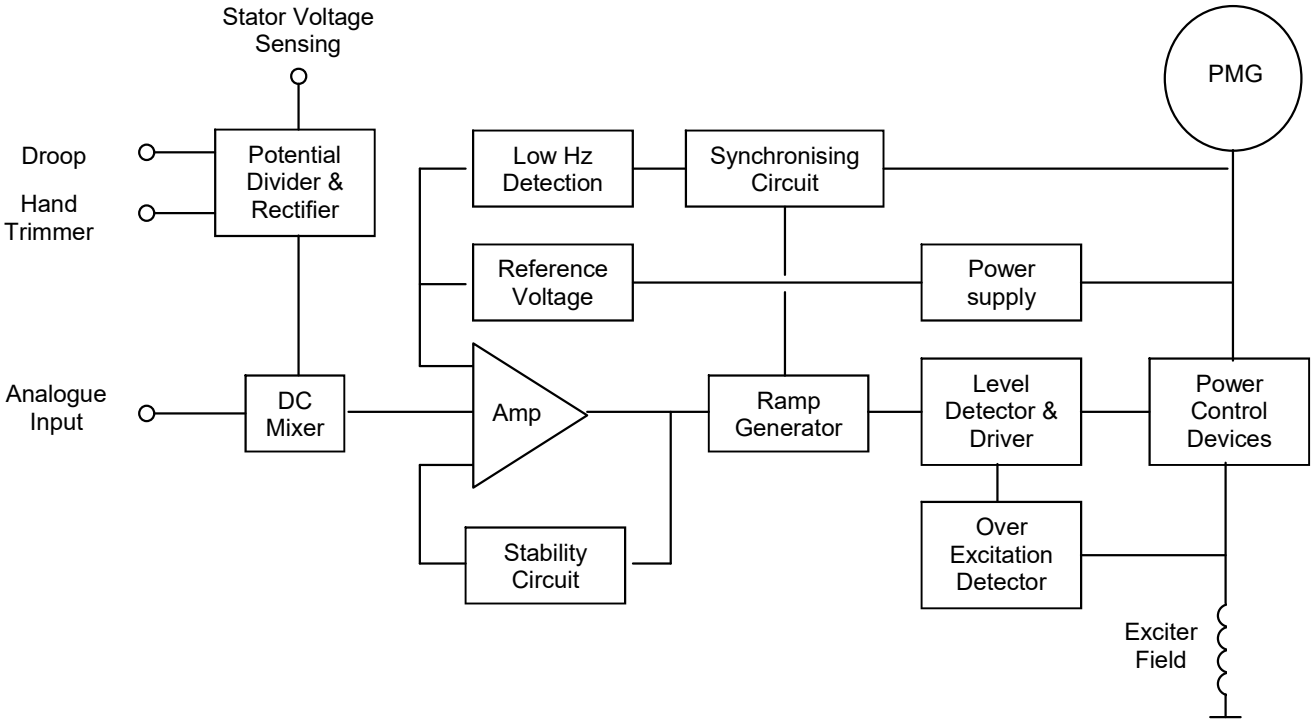
ENVIRONMENTAL

Vibration	20-100 Hz	50mm/sec
	100Hz – 2kHz	3.3g
Operating temperature		-40 to +70^{o}C
Relative Humidity 0-70^{o}C		95% (see note 6)
Storage temperature		-55 to +80^{o}C

NOTES

1. With 4% engine governing.
2. After 10 minutes.
3. Applies to Mod status D onwards. Generator de-rate may apply. Check with factory.
4. Factory set, semi-sealed, jumper selectable.
5. Any device connected to the analogue input must be fully floating (galvanically isolated from ground), with an insulation strength of 500V ac.
6. Non condensing.

DESIGN DETAIL



The main functions of the AVR are:

Potential Divider and Rectifier takes a proportion of the generator output voltage and attenuates it. The potential divider is adjustable by the AVR Volts potentiometer and external hand trimmer (when fitted). The output from the droop CT is also added to this signal. An isolating transformer is included allowing connection to various winding configurations. A rectifier converts the a.c. input signal into d.c. for further processing.

The DC Mixer adds the Analogue input signal the Sensing signal.

The Amplifier (Amp) compares the sensing voltage to the Reference Voltage and amplifies the difference (error) to provide a controlling signal for the power devices. The Ramp Generator and Level Detector and Driver infinitely control the conduction period of the Power Control Devices, and hence provide the excitation system with the required power to maintain the generator voltage within specified limits.

The Stability Circuit provides adjustable negative ac feedback to ensure good steady state and transient performance of the control system.

The Low Hz Detector measures the period of each electrical cycle and causes the reference voltage to be reduced approximately linearly with speed below a presettable threshold. A Light Emitting Diode gives indication of underspeed running.
A further enhancement of this feature is the variable DIP adjustment, which provides greater voltage roll off to aid the recovery of turbo charge engines taking large impact loads.

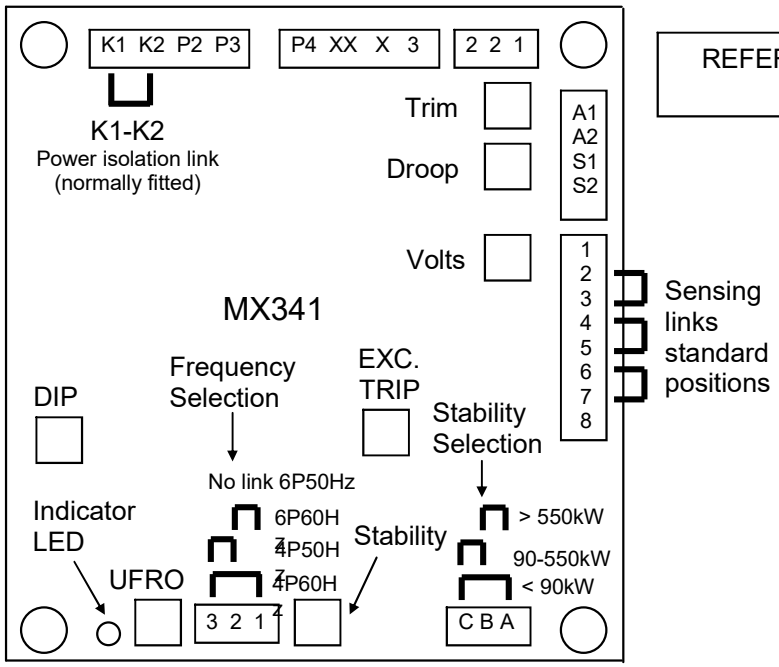
The Synchronising circuit is used to keep the Ramp Generator and Low Hz Detector locked to the Permanent Magnet Generator waveform period.

Power Control Devices vary the amount of exciter field current in response to the error signal produced by the Amplifier.

The Over Excitation Detector continuously monitors the exciter field voltage and provides signals, to shut down the power device if an over excitation condition persists for the specified time period.

The Power Supply provides the required voltages for the AVR circuitry.

FITTING AND OPERATING



REFER TO GENERATOR WIRING DIAGRAM FOR CONNECTION DETAILS

SUMMARY OF AVR CONTROLS		
CONTROL	**FUNCTION**	**DIRECTION**
Volts	To adjust generator output voltage	Clockwise increases output voltage
Stability	To prevent voltage hunting	Clockwise increase the damping effect
Ufro	To set the ufro knee point	Clockwise reduces the knee point frequency
Droop	To set the generator droop to 5% at 0pf	Clockwise increases the droop
Vtrim	To optimise analogue input sensitivity	Clockwise increases the gain or sensitivity
Exc trip	To set the over excitation cut off level	Clockwise increase the cut off level
Dip	To set the frequency related voltage dip	Clockwise increases the voltage dip

ADJUSTMENT OF AVR CONTROLS

VOLTAGE ADJUSTMENT

The generator output voltage is set at the factory, but can be altered by careful adjustment of the VOLTS control on the AVR board, or by the external hand trimmer if fitted. Terminals 1 and 2 on the AVR will be fitted with a shorting link if no hand trimmer is required.

CAUTION! Do not increase the voltage above the rated generator voltage. If in doubt, refer to the rating plate mounted on the generator case.
CAUTION! Do not ground any of the hand trimmer terminals, as these could be above earth potential. Failure to observe this could cause equipment damage.

If a replacement AVR has been fitted or re-setting of the VOLTS adjustment is required, proceed as follows:

CAUTION!
1. Before running generator, turn the VOLTS control fully anti-clockwise.
2. Turn remote volts trimmer (if fitted) to midway position.
3. Turn STABILITY control to midway position.
4. Connect a suitable voltmeter (0-300V ac) across line to neutral of the generator.
5. Start generator set, and run on no load at nominal frequency e.g. 50-53Hz or 60-63Hz.
6. If the red Light Emitting Diode (LED) is illuminated, refer to the Under Frequency Roll Off (UFRO) adjustment.
7. Carefully turn VOLTS control clockwise until rated voltage is reached.
8. If instability is present at rated voltage, refer to stability adjustment, then re-adjust voltage if necessary.
9. Voltage adjustment is now completed.

FITTING AND OPERATING

STABILITY ADJUSTMENT

The AVR includes a stability or damping circuit to provide good steady state and transient performance of the generator.

The correct setting can be found by running the generator at no load and slowly turning the stability control anti-clockwise until the generator voltage starts to become unstable.

The optimum or critically damped position is slightly clockwise from this point (i.e. where the machine volts are stable but close to the unstable region).

OPTIMUM RESPONSE SELECTION

The stability selection 'jumper' should be correctly linked, A-B, B-C or A-C at the bottom of the board for the frame size of the generator, (see drawing).

UNDER FREQUENCY ROLL OFF (UFRO) ADJUSTMENT

The AVR incorporates an underspeed protection circuit which gives a volts/Hz characteristic when the generator speed falls below a presettable threshold known as the "knee" point.

The red Light Emitting Diode (LED) gives indication that the UFRO circuit is operating.

The UFRO adjustment is preset and sealed and only requires the selection of 50 / 60Hz, 4 pole / 6pole using the jumper link (see diagram). Adjustment of the UFRO potentiometer will only be necessary if the AVR is being fitted to a 6 pole generator to replace an AVR of an earlier type.

For optimum setting, the LED should illuminate as the frequency falls just below nominal, i.e. 47Hz on a 50Hz system or 57Hz on a 60Hz system.

DROOP ADJUSTMENT

Generators intended for parallel operation are fitted with a quadrature droop C.T. which provides a power factor dependent signal for the AVR. The C.T. is connected to S1, S2 on the AVR.

The DROOP adjustment is normally preset in the works to give 5% voltage droop at full load zero power factor.

Clockwise increases the amount of C.T. signal injected into the AVR and increases the droop with lagging power factor (cos Ø). With the control fully anti-clockwise there is no droop.

TRIM ADJUSTMENT

An analogue input (A1 A2) is provided to connect to a STAMFORD Power Factor Controller or other devices. It is designed to accept dc signals up to +/- 5 volts.

CAUTION! Any devices connected to this input must be fully floating and galvanically isolated from ground, with an insulation capability of 500 Vac. Failure to observe this could result in equipment damage.

The dc signal applied to this input adds to the AVR sensing circuit. A1 is connected to the AVR 0 volts. Positive on A2 increases excitation. Negative on A2 decreases excitation.

The TRIM control allows the user to adjust the sensitivity of the input. With TRIM fully anti-clockwise the externally applied signal has no effect. Clockwise it has maximum effect.

Normal setting is fully clockwise when used with a STAMFORD Power Factor Controller.

DIP ADJUSTMENT

The DIP adjustment allows some control over the generator voltage dip upon the application of load. This feature is mostly used, when the generator is coupled to turbo charged engines with limited block load acceptance and operates only when the speed is below the UFRO knee point, (LED illuminated).

With the DIP potentiometer fully anticlockwise, the generator voltage characteristics will follow the normal V/Hz line as the speed falls below nominal. Turning the DIP potentiometer more clockwise increases the V/Hz slope, providing a greater voltage dip and aiding engine recovery. The DIP potentiometer can be set at any desired position to suit a particular engine type.

OVER EXCITATION (EXC TRIP) ADJUSTMENT

The adjustment is set and sealed in the works and should not be altered.
An over excitation condition is indicated on the common LED which also indicates under speed running.
The generator must be stopped to reset an over excitation condition.

DisplayMaster4 **Generator Controller**

- ✓ Rugged solid state microprocessor design, with dual line back lit LCD display
- ✓ Modular design with plug-in terminal block connectors for easy serviceability
- ✓ Easy keypad programming of all set points – *multi-level password protected* for security
- ✓ Flexible feature set for a wide range of applications

- Remote start/stop engine control with warm-up and cool down cycles
- Compatible with CAN/J1939 electronic & standard DIESEL/NG/LPG engines (including Tier4 diesel)
- Integrated TSSA required air intake/cooling vent shutter control & monitoring
- Accurate digital readout with true RMS readings of AC volts (LN-LN & LN-N), AC amps, and phase, frequency, kW, KVA, power factor, % load, battery volts, engine/service hours, oil pressure, coolant temperature, fuel level, oil temperature, intake air temperature
- Display of all available CAN/J1939 engine parameters broadcast by engine ecu
- Programmable over/undervoltage, over-current and load-shedding capabilities
- Battery backed real time clock with automatic daylight savings update (if enabled)
- Flexible automatic exerciser with 8 programs and 7 modes for: daily, weekly, weekdays, weekends, biweekly, monthly
- Indicator lights for normal operation, pre-alarm and fault conditions, and remote start signals

- System lock feature disables starting of generator for maintenance purposes (password to unlock)
- Low power sleep mode with wake on remote inputs, exerciser start & automatic start
- Programmable low battery start with run time
- Optional room temperature sensing with programmable set points for generator room heating/cooling/ventilation
- Programmable low room temperature start/run
- All shutdowns latched with display message until fault is reset by operator
- Audible alarm for shutdown/pre-alarm conditions
- Six user configurable high current dry contact *relay outputs* with plug in sockets (with 38 pre-programmed functions)
- Eight user configurable *digital inputs* – for contact sensing with NO/NC contact modes and delay setting to generate a message only, a prealarm or a shutdown for functions such as: low coolant, gas pressure, intrusion, fuel leak, vent shutter, etc. (with 29 pre-programmed functions)
- Optional webserver module for complete remote web monitoring/control + additional relay outputs
- Optional remote displays w/ up to four installable up to 2000ft from genset (RS-485)

Pre-alarms: (58 total)

Low engine temp	Over/Under speed
High Engine temp	Mag pickup failure
Low oil pressure	Unit NOT IN AUTO
Low oil level	Fuel/Crank Fuse
High intake air temperature	Low fuel level
Oil pressure sender fail	Low coolant level
High/Low battery volts	Charger failure
Over/under voltage	Over-current
Fuel tank leak	Oil/temp sender fail
High/Low gas pressure	High room temp
Relay failures	Service engine
High room temperature	Comms failure

Multiple CAN service codes – *with codes & descriptions*

Safety Shutdowns: (66 total)

High engine temp	Over speed
Low oil pressure	Over crank
Low fuel level	Under speed
Low coolant level	No speed signal
High oil temp	Emergency stop
Low battery	Weak battery
Fuel/Crank fuse	Fuel/Crank relay failure
Under/Over voltage	Over-current
High exhaust temp	High intake air temp
Shutter vent failed	Ground fault
Low gas pressure	High gas pressure

Multiple CAN fault codes – *with codes & descriptions*

+ Four Prealarms/Shutdowns *with custom programmable messages*

Specifications:

Enclosure:	powder coated 16 ga steel
DC power supply:	12 or 24VDC (8 to 40VDC)
AC Voltage inputs:	rated (LN-N/LN-LN): 346/600Vac configurable: 120/240/480/600Vac
Configurations:	Wye, Delta, Offset Delta
Frequency:	50/60Hz (10 to 90Hz)
High Impedance inputs:	AC line input resistance: 3Mohm
Current Transformer inputs:	rated (per line) 5A
Digital inputs:	contact to ground (12V max)
Relay outputs:	16A 277Vac/30Vdc 30A 277Vac/30Vdc
Analog inputs:	7V bias, 12 bit resolution
Ambient temperature (operating):	-20 to 85 deg C
Ambient temperature (storage):	-40 to 95 deg C
Ambient humidity:	90% non-condensing
Dimensions:	13.5W x 12D x 10H (in)
Weight:	15lbs
Listings/Approvals:	CSA 22.2, UL508, UL2200

DisplayMaster5 Remote Annunciator

✓ Rugged solid state microprocessor design, with 29 separate indicator lights and relay output contacts (NO & NC)

- Separate indicator lights for each pre-alarm/fault with lamp test
- Separate relay output contacts (NO & NC) for pre-alarms & faults/shutdowns
- Transfer switch contact inputs for Utiltiy/Generator connected indication & relay contacts
- System Okay indication showing no faults/pre-alarms at a glance
- Generator running indication showing when genset is running at nominal speed and ready to accept load
- Audible alarm for pre-alarms & faults/shutdowns with mute button
- Remotely connects to DisplayMaster4 up to 2000ft away (RS-485)

Pre-alarms:

Unit NOT IN AUTO
Low oil pressure
High Engine temperature
Low engine temperature
Low battery volts
Low fuel level
ATS bypassed
Vents not open

Faults/Shutdowns:

Low oil pressure
Overcrank
Under speed
Over voltage
Low fuel level
Emergency Stop
High engine temp
No speed signal
Over speed
Low coolant level
Overcurrent

Specifications:

Enclosure:	powder coated 16 ga steel
DC power supply:	12 or 24VDC (8 to 40VDC)
Digital inputs:	contact to ground (12V max)
Relay outputs:	5A 250Vac/30Vdc
Ambient temperature (operating):	-20 to 85 deg C
Ambient temperature (storage):	-40 to 95 deg C
Ambient humidity:	90% non-condensing
Dimensions:	10W x 10D x 4H (in)
Weight:	6lbs
Listings/Approvals:	CSA 22.2, UL508

NOARK®

Data Sheet

Molded Case Circuit Breakers
Molded Case Motor Circuit Protectors
Molded Case Switches

Ex9 Series - M

M2N250T3L

M1H150T3L

na.noark-electric.com

NOARK

Molded Case Circuit Breakers/Switches
NOARK Ex9 Series - M

Features

Molded Case Circuit Breakers (M1-M6)

NOARK Electric offers a complete range of Molded Case Circuit Breakers in six frame sizes: M1 - 150 A, M2 - 250 A, M3 - 400 A, M4 - 600 A, M5 - 800 A, and M6 - 1,200 A. Each frame size offers a range of interrupting voltage ratings from 240-690 Vac and 250-600 Vdc. The M series conforms to global standards that include UL 489, CSA C22.2 No 5 and IEC 60947-2.

- High-breaking capacity and a new patented arc extinguishing design
- New patented technology reduces the manual operating force
- High quality compact modular with energy saving and environmentally friendly design
- Installation flexibility: Bus Bar Connection, Lug Line/Load Side Connection, Plug-In, Rear Connection, Draw-Out
- Fixed and adjustable trip setting units
- Wide range of accessories: Alarm Switch and Auxiliary Contact, Shunt and Under-Voltage Trip, Interlock, NEMA and IEC Type Rotary Handle, NEMA Type Flange Handle, Motor Operator

Molded Case Motor Circuit Protectors (M1M-M6M)

NOARK Electric offers a complete range of 3 pole Molded Case Motor Circuit Protectors (MCPs, magnetic only) which are used to protect the three phase asynchronous motors in six frame sizes: M1M - 150 A, M2M - 250 A, M3M - 400 A, M4M - 600 A, M5M - 800 A, and M6M - 1,200 A. Each frame size offers a range of interrupting voltage ratings from 240-690 Vac. This series MCP conforms to global standards that include UL 489, CSA C22.2 No 5 and IEC 60947-2.

The traditional system used for this purpose is based on three different devices: a circuit breaker for protection against short-circuit, a thermal relay for protection against overload and phase loss or unbalance of phase, and a contactor for motor switching.

In particular, when selecting these devices, different factors must be taken into consideration, such as:

- The motor power
- The diagram and type of starting
- The type of motor: with cage rotor or with wound rotor
- The fault current at the point of the network where the motor is installed

Molded Case Switches (M1D-M6D)

NOARK Electric offers a complete range of Molded Case Switches in six frame sizes: M1 - 150 A, M2 - 250 A, M3 - 400 A, M4 - 600 A, M5 - 800 A, and M6 - 1,200 A. Each frame size offers a range of interrupting voltage ratings from 240-690 Vac and 250-600 Vdc. The Ex9 Series – M Molded Case Switches are only used for magnetic protection applications mainly as supply circuit protection and emergency-off disconnect switches. The Ex9 Series – M conforms to global standards that include UL 489, CSA C22.2 No 5 and IEC 60947-2.

- Instantaneous trip ability and a new patented arc extinguishing design
- New patented technology reduces the manual operating force
- High-quality compact modular with energy saving and environmentally friendly design
- Installation flexibility: Bus Bar Connection, Lug Line/Load Side Connection, Plug-In, Rear Connection, Draw-Out
- Wide range of accessories: Alarm Switch and Auxiliary Contact, Shunt and Under-Voltage Trip, Interlock, NEMA and IEC Type Rotary Handle, NEMA Type Flange Handle, Motor Operator

Molded Case Circuit Breakers/Switches
NOARK Ex9 Series - M

Accessories

- Alarm Switch
- Auxiliary Contact
- Shunt Trip
- Under-Voltage Trip
- Handle Lock
- Mechanical Interlock
- Motor Operator
- Rotary Handle
- DIN Rail Plate
- Extended Rotary Handle
- Flange Handle
- Terminal Lugs
- Plug-In Base
- Rear Connection Kit
- Draw-Out Base

Certifications

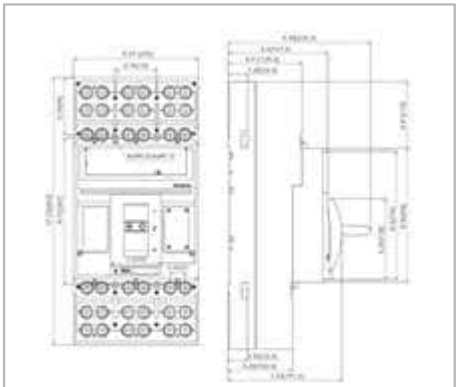
- UL 489 Listed, File No. E355392
  For: Molded Case Circuit Breaker, Alarm Switch, Auxiliary Contact, Shunt Trip, Under-Voltage Trip, Handle Lock, Mechanical Interlock, Motor Operator, Rotary Handle, Extended Rotary Handle, Plug-In Base, Rear Connection Kit and Draw-Out Base
- UL 489 Listed, File No. E355396
  For: Molded Case Switches
- UL 489 Listed, File No. E349009
  For: Terminal Lugs
- Compliant for Canada according to CSA C22.2 No. 5-02
- IEC/EN 60947-2 Compliant
- CE Approved
- RoHS Compliant

Noark
2188 Pomona Blvd.
Pomona, CA 91768
Phone: 626.330.7007
Fax: 626.330.8035
Email:nasales@noark-electric.com
Website: www.noarkelectric.com

PRINT BACK

Catalog Number M6S1200E3L, Ex9M6S Series MCCB; Electronic Trip Unit

1200A - M6S Lug Line/Load Side Connection; 3 Poles; 80% Rated
Electronic Trip Unit, MCCB



Specifications | Certifications | Features | Note | Downloads

Specifications

Rated Current	1200 A
Number of Poles	3
Interrupting Capacity at 480VAC	65 kA
Rate Code	80 %

IC Class	S
Interrupting Capacity	22kA at 600Vac 42kA at 480Vac 65kA at 240Vac
Termination Type	Lug Line/Load Side Connection

Certifications

Certifications	• UL 489 Listed, File Number E355392 • CSA Standards 22.2 No.5 File Number E355392 • IEC/EN 60947-2 • CE Compliant • RoHS Compliant

Features

Features	• High-breaking capacity and a patented arc extinguishing design • Bearing-type spindle reduces the operating force required to open and close the operating mechanism • High quality compact modular design • Fixed and adjustable trip unit settings • Line and load lugs installed standard

Note

Note	Lug Line/Load Side Connection MCCB sold with Terminal Lugs.

Downloads

UL Certificate	Ex9 Series M6 Bus Bar and Lug Line/Load Side Connection Molded Case Circuit Breakers (NOA_M6_UL Certificate)
3D CAD Drawing STP	Ex9M6 Series 3 Poles Bus Bar and Lug Line/Load Side Connection Molded Case Circuit Breakers (CAD Step File)
DWG - 2D CAD Drawing	Ex9M6 Series 3 Poles Bus Bar and Lug Line/Load Side Connection Molded Case Circuit Breakers (CAD Drawing)
PDF - 2D CAD Drawings	Ex9M6 Series 3 Poles Bus Bar and Lug Line/Load Side Connection Molded Case Circuit Breakers (PDF)

2.0 Product Description	
Product	Circuit Breaker Indoor Enclosures (Type 1)
Brand name	PowerStar
Description	Type 1 enclosures constructed for indoor use to provide a degree of protection to personnel against access to hazardous parts and provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects.
Models	BRE followed by M1-150, M2-225, M2-250, M3-400, M4-600, M5-800 or M6-1200. BRED followed by M1-225, M2-250, M3-400, M4-600 or M5-800.
Model Similarity	Models vary in rating and size as follows: M1 15-150 Amp Breaker 8" x 22" x 4.75" 16ga BREM1-150 M2 175-225 Amp Breaker 10" x 22" x 4.75" 16ga BREM2-225 M2 250 Amp Breaker 12" x 28" x 4.75" 16ga BREM2-250 M3 300-400 Amp Breaker 16" x 36" x 5.5" 16ga BREM3-400 M4 500-600 Amp Breaker 20" x 36" x 6" 16ga BREM4-600 M5 700-800 Amp Breaker 22" x 48" x 6" 16ga BREM5-800 M6 1000-1200 Amp Breaker 24" x 48" x 8" 14ga BREM6-1200 -M1 Double 15-225 Amp x2 15” x 26” x 6.5” 16ga BREDM1-225 -M2 Double 250 Amp x2 18” x 32” x 6.5” 16ga BREDM2-250 -M3 Double 400 Amp x2 22” x 36” x 6.5” 16ga BREDM3-400 -M4 Double 600 Amp x2 28” x 45” x 7” 13ga BREDM4-600 -M5 Double 800 Amp x2 28” x 48” x 7” 13ga BREDM5-800
Ratings	600V maximum BREM1-150 15-150 Amp BREM2-225 175-225 Amp BREM2-250 250 Amp BREM3-400 300-400 Amp BREM4-600 500-600 Amp BREM5-800 700-800 Amp BREM6-1200 1000-1200 Amp BREDM1-225 15-225 Amp x2 BREDM2-250 250 Amp x2 BREDM3-400 400 Amp x2 BREDM4-600 600 Amp x2 BREDM5-800 800 Amp x2
Other Ratings	Type 1 enclosure

3.0 Product Photographs

Photo 1 - External view of enclosure

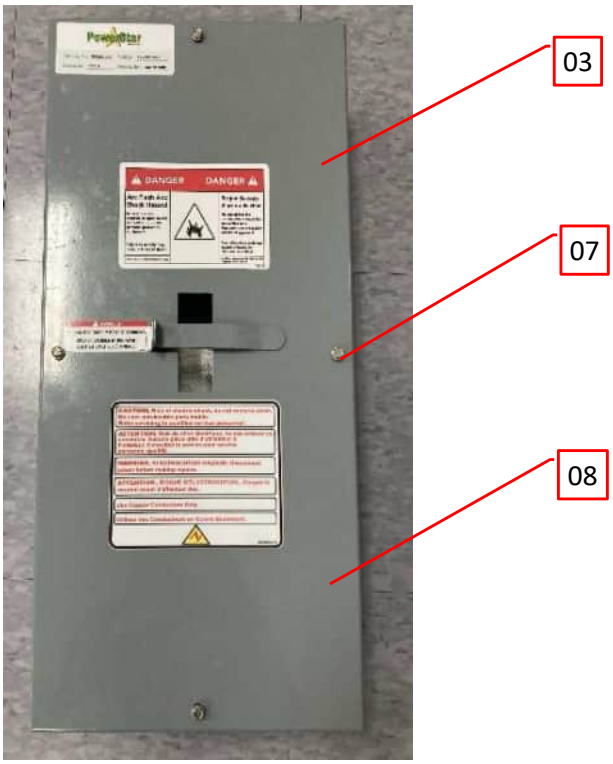


Photo 2 - Internal view of enclosure

Accessories For MCCB/MCP/MCS

Connection Hardware: Terminal Lugs and Plug-In Base

1-Hole

3-Holes

Dimensions D107

LTC	21	N	A
Description	Type	Device Category	Number of Holes
Terminal Lugs	21: for M1 22: for M2 23: for M3 24: for M4 25: for M5 26: for M6	N: UL 489	A: 1-Hole (for M1-M3, Internal) B: 2-Holes (for M3, external with terminal cover) (for M4, for M5: 600a, 700A, internal) C: 3-Holes (for M1 external) (for M5 & M6: 800A, internal) D: 4-Holes (for M6:1000A, 1200A, internal)

Accessory Description	Type	Voltage	Product	Part Number
Terminal Lugs	M1	1-Hole	LTC21NA	1100608
		3-Holes	LTC21NC	1100669
	M2	1-Hole	LTC22NA	1100609
	M3	1-Hole	LTC23NA	1100610
		2-Holes*	LTC23NB	1100611
	M4	2-Holes	LTC24NB	1100612
	M5**	2-Holes	LTC25NB*	1101184
		3-Holes	LTC25NC*	1101185
	M6**	3- Holes	LTC26NC*	1101166
		4-Holes	LTC26ND*	1101167

* External terminal cover ordered separately
**Factory installed only

Accessory Description	Type	Voltage	Product	Part Number
Terminal Cover	M3	2-Holes	TC23NB	1101186

PIA	21	N
Description	Type	Device Category
Plug-In Base	21: for M1 22: for M2 23: for M3	N: UL 489

Accessory Description	Type	Product	Part Number
Plug-In Base (3 Pole Only)	M1	PIA21N	1100591
	M2	PIA22N	1100592
	M3	PIA23N	1100593

Dimensions ...D108-D110

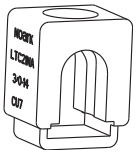
Accessories For MCCB/MCP/MCS

Connection Hardware Dimensions

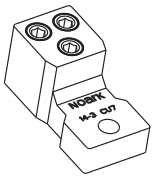
LTC21-26N

Terminal Lug Connection

Unit: in [mm]

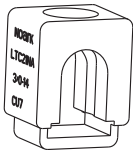


M1 1-Hole
167 °F (75 °C)
Cu wire only
14-3/0 AWG
2.5~95 mm^2
89 in-lb (10 N.m)



M1 3-Holes
167 °F (75 °C)
Cu wire only
14-10 AWG
2.5~6 mm^2
44.5 in-lb (5 N.m)

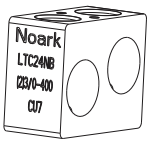
8-3 AWG
10~35 mm^2
89 in-lb (10 N.m)



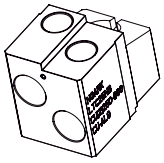
M2 1-Hole
167 °F (75 °C)
Cu wire only
8 AWG - 350 kcmil
10~185 mm^2
230 in-lb (23 N.m)

M3 1-Hole
167 °F (75 °C)
Cu wire only
3/0 AWG - 500 kcmil
95~240 mm^2
310 in-lb (35 N.m)

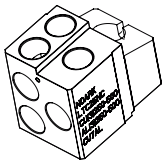
M3 2-Holes
167 °F (75 °C)
Cu wire only
3 AWG - 250 kcmil
35~120 mm^2
310 in-lb (35 N.m)



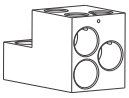
M4 2-Holes
167 °F (75 °C)
Cu wire only
(2) 3/0 AWG - 400 kcmil
(2) 95~185 mm^2
310 in-lb (35 N.m)



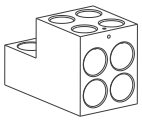
M5 2-Holes
75/90°C
Al/Cu Wire Only
(2)250kcmil-600kcmil
398 lb-in/pulg/po
(2)120-300mm^2
45N·m



M5 3-Holes
75/90°C
Al/Cu Wire Only
(3)250kcmil-500kcmil
398 lb-in/pulg/po
(3)120-240mm^2
45N·m



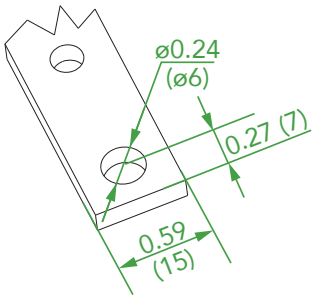
M6 3-Holes
75°C/90°C
Al/Cu Wire
(3)3/0AWG-750kcmil
310 lb-in/pulg/po
(3)95-300mm^2
35N·m



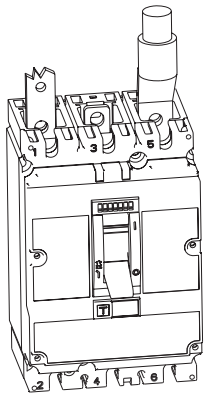
M6 4-Holes
75°C/90°C
Al/Cu Wire
(4)3/0AWG-500kcmil
310 lb-in/pulg/po
(4)95-240mm^2
35N·m

Bus Bar Connection

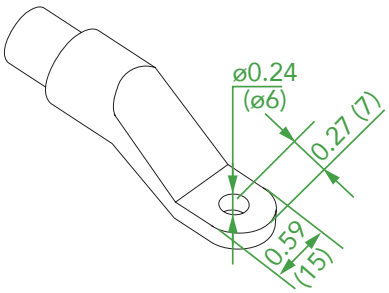
Unit: in [mm]



Bus Bar Connection
Copper Plate



Distance Between Poles
1.18 (30)



Bus Bar Connection
Copper Cable

2019 DSP STANDBY BATTERY CHARGER

General Information

The 2019 DSP Small systems standby Charger is packed with new features!

NEW! Illuminated 1% Digital Panel Meter with Voltage, Amperage, Current Wattage and resettable Accumulated Wattage meters.

NEW! Visual Low Voltage AND High Alarm, (display flashes on and off.)

NEW! Standard Manual Start / Auto finish 4 hour Equalize.

Vulcan's DSP automatic constant voltage battery charger is available in 12 or 24 Volt models and is ideal for keeping lead acid and Gel batteries up to full charge at all times. Designed for reliability, the DSP protects batteries against overcharging, and starts charging at the high-rate, and automatically reducing to a float rate of 2.20 VPC. Engine cranking will automatically place the charger back in the high-rate mode.

- Input 120 V, 60 Hz
- DC auto reset circuit breaker; AC fuse
- High rate, Taper, and Float modes
- Optional: low voltage alarm with form C contacts, no visual display

- Full-wave bridge silicon rectifier
- Transformer is double-wound copper bobbin type
- CSA approved

Technical Data

Model	Rating	Dimensions
DSP12/10W	Input: 120 Volts, 60 Hz, 1.9 Amps Output: 12 Volts, 10 Amps DC	Height: 11 in. (279 mm) Width: 7 in. (178 mm) Depth: 6 in. (152 mm)
DSP24/10W	Input: 120 Volt, 60 Hz, 3.5 Amps Output: 24 Volts, 10 Amps DC	

Warranty

Three Year Limited Warranty

Vulcan Electric Inc. 205B Konrad Cres, Markham, Ontario, L3R 8T9 Phone 905-513-1550, Fax 905-513-1557 www.chargers.ca

Heavy. Duty.

Commercial Heavy Duty Batteries from Crown. Hard to beat. Few try.

Crown Batteries. The line that separates the *heavy duty batteries* from the *heavy duty wannabees*. No other line is engineered to Crown's tough, durable standards. No other battery performs or lasts like a Crown.

There's a word that industries around the world use when they need a dependable, long-lasting, heavy duty battery: Crown. That's as tough as you can get.

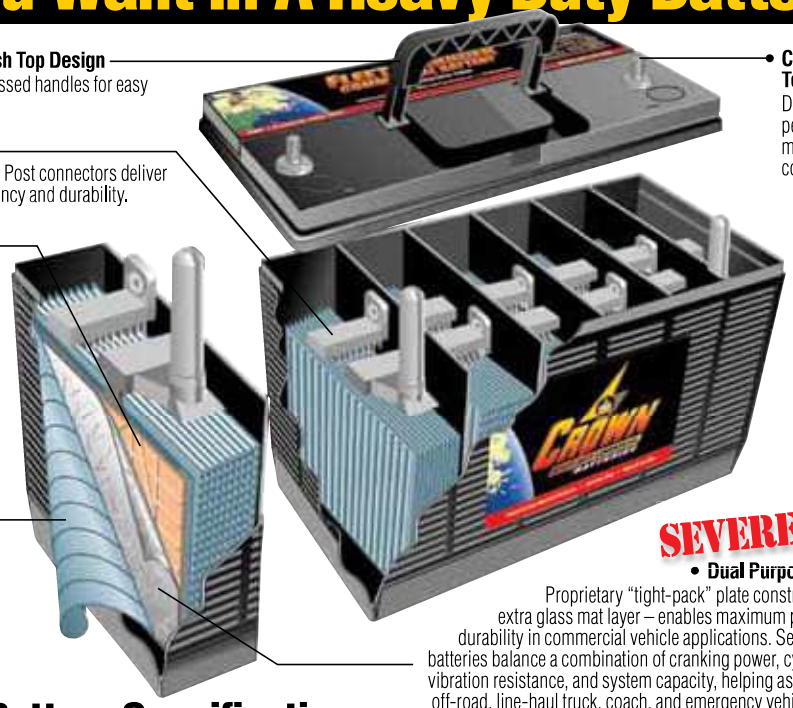
The Power Behind Performance

CROWN®
HEAVY DUTY COMMERCIAL BATTERIES

CROWN BATTERY MANUFACTURING CO. | FREMONT, OHIO | MADE IN THE USA

What You Want In A Heavy Duty Battery.

- **Maintenance Free Flush Top Design**
  Innovative cover with recessed handles for easy installation and handling.
- **Rigid Connectors**
  Heavy-duty TTP, COS and Post connectors deliver maximum electrical efficiency and durability.
- **PowerHouse Plate Construction with LifePlus™ Paste Technology**
  Framed C/L plates with proprietary LifePlus™ paste for superior electrical performance and longer life than competitor batteries.
- **PosiWrap™ Envelope Separators**
  PosiWrap™ separators reduce maintenance and prevent failure due to short-circuiting and plate shredding, ensuring reliability and durability.
- **Cold Forged Terminal Posts**
  Deliver maximum performance with minimum terminal corrosion.



SEVERE DUTY

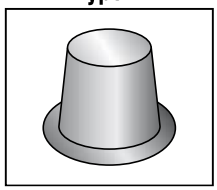
- **Dual Purpose/High Cycle**

Proprietary "tight-pack" plate construction – with an extra glass mat layer – enables maximum performance and durability in commercial vehicle applications. Severe Duty Series batteries balance a combination of cranking power, cycling capability, vibration resistance, and system capacity, helping assure reliability in off-road, line-haul truck, coach, and emergency vehicle applications.

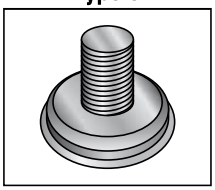
Heavy Duty Battery Specifications

BCI Group	Model Description	Item Number	Electrical Capacity				Inches			Millimeters			Product Footnotes
			Volts	CCA Rating	CA Rating	RC Minutes	L	W	H	L	W	H	
HEAVY DUTY COMMERCIAL 31 MAINTENANCE FREE STARTING BATTERIES													
31	31A-1100	C311100A	12	1100	1375	185	13.00	6.75	9.44	330	171	240	AHJKM
	31S-1100	C311100S	12	1100	1375	185	13.00	6.75	9.44	330	171	240	FHJKM
	31A-940	C31940A	12	940	1175	175	13.00	6.75	9.44	330	171	240	AHJKM
	31S-940	C31940S	12	940	1175	175	13.00	6.75	9.44	330	171	240	FHJKM
	31A-750	C31750A	12	750	940	165	13.00	6.75	9.44	330	171	240	AHJKM
	31S-750	C31750S	12	750	940	165	13.00	6.75	9.44	330	171	240	FHJKM
SEVERE DUTY COMMERCIAL 31 MAINTENANCE FREE STARTING BATTERIES													
31	31A-SD1000	C311000A	12	1000	1250	180	13.00	6.75	9.44	330	171	240	AHJKMT
	31S-SD1000	C311000S	12	1000	1250	180	13.00	6.75	9.44	330	171	240	FHJKMT
	31A-SD775	C31775A	12	775	970	175	13.00	6.75	9.44	330	171	240	AHJKMT
	31S-SD775	C31775S	12	775	970	175	13.00	6.75	9.44	330	171	240	FHJKMT
HEAVY DUTY COMMERCIAL STARTING BATTERIES													
4D	4D-1300	C4D1300	12	1300	1625	375	20.63	8.63	10.00	524	219	254	AIJM
	4D-1000	C4D1000	12	1000	1250	300	20.63	8.63	10.00	524	219	254	AIJM
8D	8D-1400	C8D1400	12	1400	1750	400	20.63	10.94	10.00	524	278	254	AIJM
	8D-1100	C8D1100	12	1100	1375	325	20.63	10.94	10.00	524	278	254	AIJM
8B	8B-1400	C8B1400	12	1400	1750	400	21.75	10.94	9.56	552	278	243	BIJM
	8B-1100	C8B1100	12	1100	1375	325	21.75	10.94	9.56	552	278	243	BIJM
4H	4H-950	C04950	6	950	1190	300	12.63	7.00	9.50	321	178	241	AIM

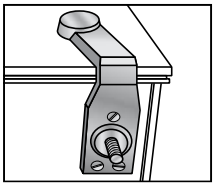
Type A



Type S



Bus



Key

- **A** = Automotive / SAE Top Terminal
- **B** = Bus / Hanging Terminal with Fastener
- **F** = Stainless Steel Threaded Stud Terminal
- **H** = Flush Manifold Vented Cover
- **I** = Cover with POD Vents or Individual Vent Caps
- **J** = Battery Fitted with Handle or Lifting Lug
- **K** = PROeye Fluid Indicator *(Available Option)*
- **M** = Calcium Alloy Construction: Maintenance Free Service
- **T** = TightPack Cell Construction

The Power Behind Performance

CROWN®
HEAVY DUTY COMMERCIAL BATTERIES

1445 Majestic Drive | P.O. Box 990
Fremont, OH 43420-0990 USA
+1-419-334-7181 | Fax +1-419-334-7124
www.crownbattery.com
sales@crownbattery.com


31A-940


31S-940


31A-SD775


31S-SD775


4H-950


4D-1000


8D-1400

Printed in U.S.A.

Form No. CHD-SS-B1012

Hotstart
THERMAL MANAGEMENT

Thermosiphon Heating Systems

CB · CL · WL

Hotstart's CB, CL and WL Thermosiphon heating systems are coolant preheaters developed to maintain optimal temperatures for diesel and gas engines in stationary land power, marine, construction equipment, and truck applications.

CB heater with thermostat shown

CL heater without thermostat shown

c UL us LISTED

CE

HEAVY DUTY HEATING

OEMs expect dependable heating for their engines. Hotstart's Thermosiphon Tank Heaters are the industry standard for consistent, reliable coolant heating for stationary power, equipment, marine and truck applications.

SAFE AND EASY OPERATION

PRECISE HEATING CONTROL

Keeping critical fluids heated is key to easy engine starts regardless of ambient temperature. The CB, CL and WL heaters come with or without flow-through thermostats for precise heat control. The heaters can be configured with fixed or adjustable thermostats to best meet your heating needs.

EQUIPMENT MANUFACTURERS SOLUTION

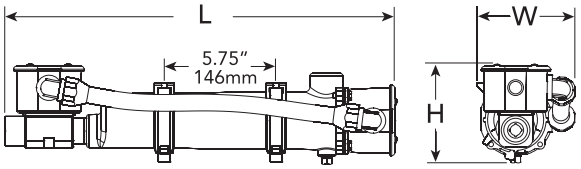
The CB, CL and WL heaters are ideal for OEM specifications requiring a wide range of heat power and phase options that can be hard wired into existing power systems.

Hotstart
THERMAL MANAGEMENT

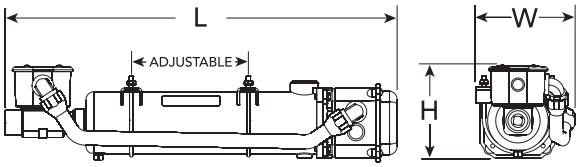
Thermosiphon Heating System

CB • CL • WL

CB Heater with thermostat shown



CL / WL Heater with thermostat shown



CB Model			
Length (L)	Width (W)	Height (H)	Weight
20.1"	5.1"	5.2"	6.9 lbs
510 mm	129 mm	132 mm	3 kg

CL / WL Models			
Length (L)	Width (B)	Height (H)	Weight
23.5"	6.2"	5.8	10 lbs
597 mm	158 mm	147 mm	4.5 kg

CB / CL System	
Phase	single-phase (1 Ø)
Voltage	120 V | 208 V | 240 V | 277 V | 380 V | 480 V
Ingress	NEMA 4
Min./Max. Ambient Temp.	-4–104 °F (-20–40 °C)
Certification	UL/C-US listed, CE-compliant

WL System	
Phase	three-phase (3 Ø)
Voltage	208 V | 240 V | 400 V | 480 V | 575 V
Ingress	NEMA 4
Min./Max. Ambient Temp.	-4–104 °F (-20–40 °C)
Certification	CE-compliant

CB / CL Coolant			
Fluid Type	Water | Coolant mix (50% water/50% glycol)		
CB Heat Power	1.5 kW	2 kW	2.5 kW
CL Heat Power	3 kW	4 kW	5 kW
Temp. Control	Fixed, 100–120 °F (38–49 °C)		
Temp. High-limit	205 °F (96 °C)		
Max. Pressure	125 psi (860 kPa)		
Inlet/Outlet	1" NPT		

Temperature Range	
ON	OFF
80 °F (27 °C)	100 °F (38 °C)
100 °F (38 °C)	120 °F (49 °C)
120 °F (49 °C)	140 °F (60 °C)
Adjustable 90–130 °F (32–54 °C)	

Options shown represent typical tested or certified configurations. Additional options or configurations may be available. For assistance with your heating system application, contact Hotstart at 509.536.8660 or sales@hotstart.com.

WL Coolant			
Fluid Type	Water | Coolant mix (50% water/50% glycol)		
WL Heat Power	2.5 kW	4 kW	5 kW
Temp. Control	Fixed, 100–120 °F (38–49 °C)		
Temp. High-limit	205 °F (96 °C)		
Max. Pressure	125 psi (860 kPa)		
Inlet/Outlet	1" NPT		

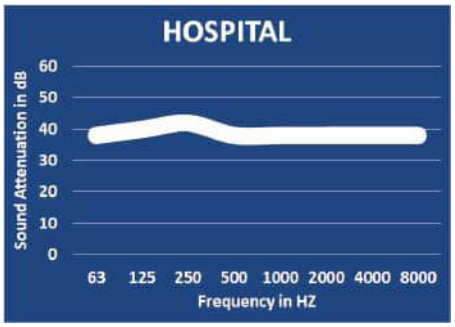
Temperature Range	
ON	OFF
80 °F (27 °C)	100 °F (38 °C)
100 °F (38 °C)	120 °F (49 °C)
120 °F (49 °C)	140 °F (60 °C)
Adjustable 90–130 °F (32–54 °C)	

Options shown represent typical tested or certified configurations. Additional options or configurations may be available. For assistance with your heating system application, contact Hotstart at 509.536.8660 or sales@hotstart.com.

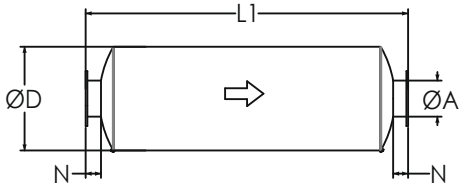
Hospital Grade Silencers

Model NTHO-C (Cylindrical), 35-40 dBA

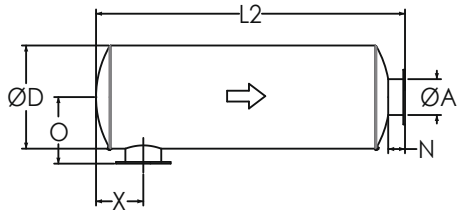
TYPICAL ATTENUATION CURVE



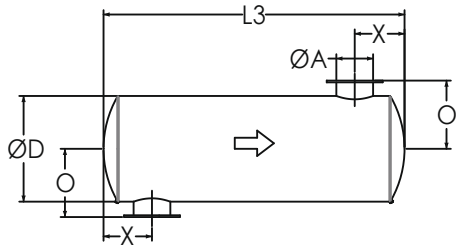
TYPICAL CONFIGURATIONS



END IN END OUT (EI-EO)



SIDE IN END OUT (SI-EO)



SIDE IN SIDE OUT (SI-SO)

Nett Technologies' Hospital Grade Silencers are designed to achieve maximum performance with the least amount of backpressure.
The silencers are Reactive Silencers and are typically used for reciprocating or positive displacement engines where noise level regulations are high.

FEATURES & BENEFITS

- Over 25 years of excellence in manufacturing noise and emission control solutions
- Compact modular designs providing ease of installations, less weight and less foot-print
- Responsive lead time for both standard and custom designs to meet your needs
- Customized engineered systems solutions to meet challenging integration and engine requirements

Contact Nett Technologies with your projects design requirements and specifications for optimized noise control solutions.

OPTIONS

- Versatile connections including ANSI pattern flanges, NPT, slip-on, engine flange, schedule 40 and others
- Aluminized Steel, Stainless Steel 304 or 316 construction
- Horizontal or vertical mounting brackets and lifting lugs

ACCESSORIES

- Hardware Kits
- Flexible connectors and expansion joints
- Elbows
- Thimbles
- Raincaps
- Thermal insulation: integrated or with thermal insulation blankets

Please see our accessories catalog for a complete listing.

PRODUCT DIMENSIONS (in)

Model*	A	D	L1	L2	L3	X**	X	N	O
	Outlet	Dia	EI-EO	SI-EO	SI-SO	Min	Max	Nipple	O
NTHO-C1	1	6	28	26	24	3	9	2	5
NTHO-C1.5	1.5	8	32	30	28	3	9	2	6
NTHO-C2	2	9	34	31	28	4	10	3	8
NTHO-C2.5	2.5	9	40	37	34	5	12	3	8
NTHO-C3	3	10	46	43	40	5	13	3	8
NTHO-C3.5	3.5	12	56	53	50	6	15	3	9
NTHO-C4	4	14	66	63	60	7	17	3	10
NTHO-C5	5	16	76	73	70	8	20	3	11
NTHO-C6	6	20	72	68	64	9	23	4	14
NTHO-C8	8	24	100	96	92	11	28	4	16
NTHO-C10	10	24	120	116	112	15	32	4	16
NTHO-C12	12	30	132	128	124	16	35	4	19
NTHO-C14	14	36	142	137	132	16	37	5	23
NTHO-C16	16	40	180	175	170	17	49	5	25
NTHO-C18	18	42	190	185	180	20	52	5	26
NTHO-C20	20	48	200	195	190	22	54	5	29
NTHO-C22	22	50	210	205	200	25	57	5	30
NTHO-C24	24	50	230	225	220	27	63	5	30

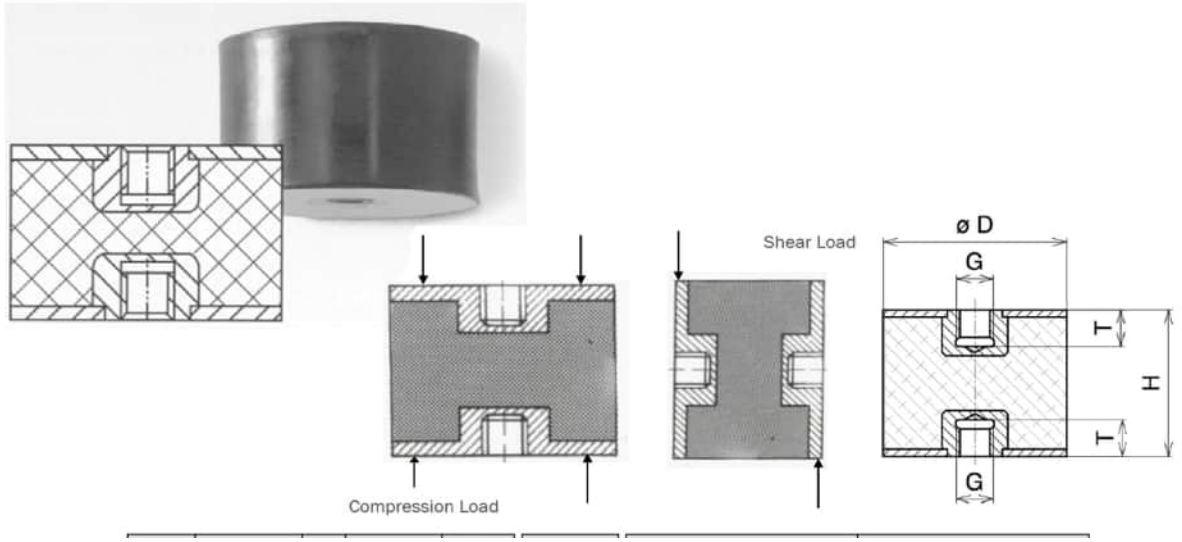
* Other models and custom designs are available upon request. Dimensions subject to change without notice. All silencers are equipped with drain ports on inlet side. The silencer is all welded construction and coated with high heat black paint for maximum durability.

** Standard inlet/outlet position.

Female/Female Cylindrical Bobbin Mounts

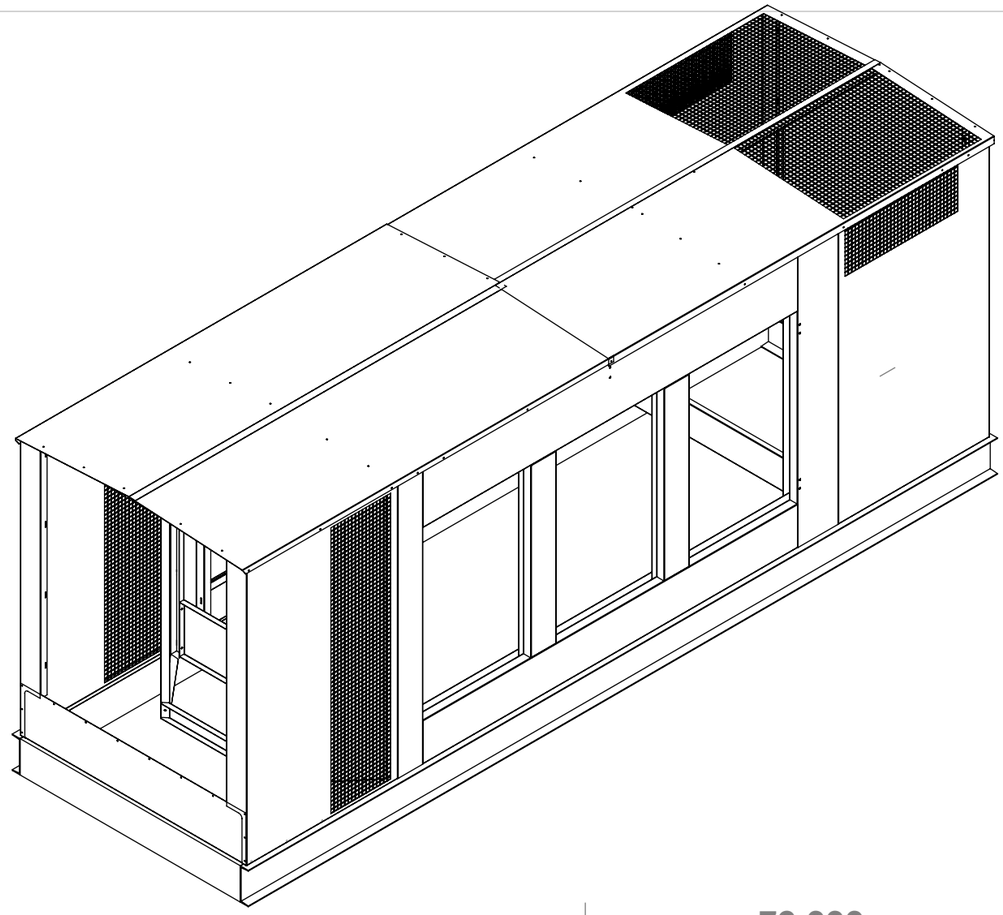
Type C metric thread mounts are rubber cylindrical mounts that are suitable for the elastic mounting of machine units such as motors, compressors and pumps. They can be loaded either in compression or shear taking into consideration individual demands for actual applications. These rubber mounts' resilience and their broad range of different sizes and dimensions allow these mounts to be used in many applications that require noise and vibration isolation. Cylindrical mounts are available in natural rubber as standard but other compounds are available on request. Stainless steel metal parts are also available on request for substantial volume orders.

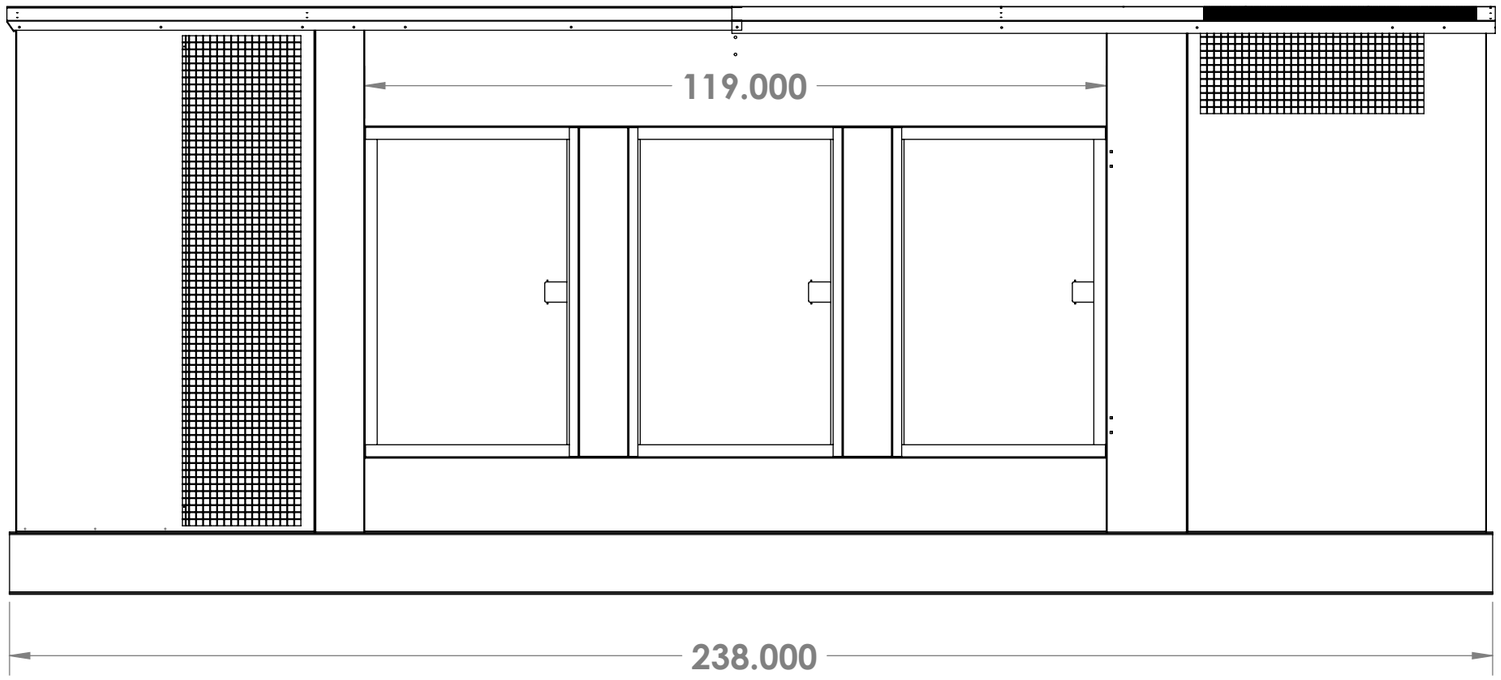
Other compounds available: Chloroprene (Baypren, Neoprene), Ethylene Propylene Terpolymer, Ntrile Butadine (Perbunan), Styrene Butadiene, Butyl, Polyurethane, Silicone Rubber, Fluorocarbon (Viton)

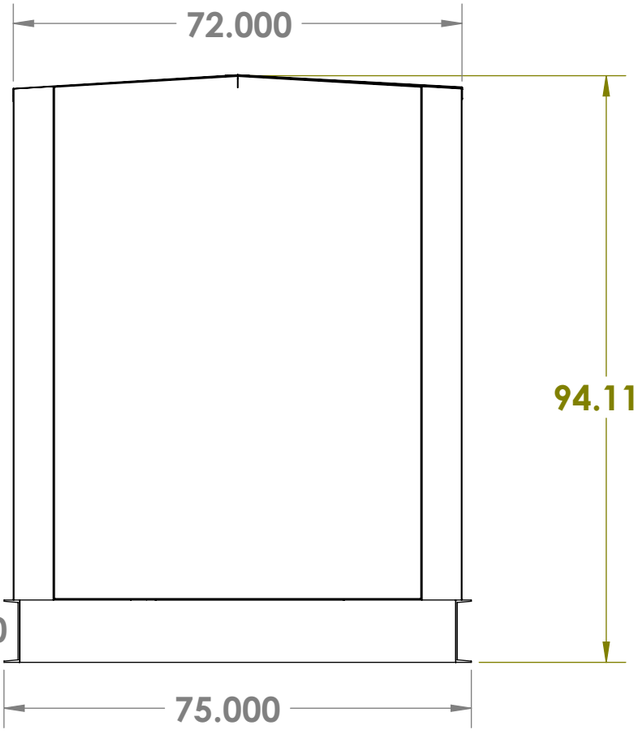


Part Number	Dia. x Heigth mm (Inch) (D) x (H)	Thread (G)	Depth mm (Inch) (T)	Thickness mm (Inch) (S)	Quality NR ShoreA Duro	Compression				Shear			
						Max. Static Load		Spring Rate Ks		Max. Static Load		Spring Rate Ks	
						N	lbs	N/mm	lbs/in	N	lbs	N/mm	lbs/in
1040I	100 x 40 (3.94) x (1.57)	M16	16 (.63)	4 (.16)	43	4279	962	1813	10246	1426	321	190	1074
1040C					57	7916	1780	3354	18954	2638	593	352	1986
1040M					68	12837	2886	5439	30737	4278	962	570	3221
1045I	100 x 45 (3.94) x (1.77)	M16	16 (.63)	4 (.16)	43	3548	798	1241	7013	1183	266	157	887
1045C					57	6564	1476	2296	12974	2189	492	290	1641
1045M					68	10644	2393	3723	21039	3549	798	471	2662
1050I	100 x 50 (3.94) x (1.97)	M16	16 (.63)	4 (.16)	43	3090	695	920	5199	1030	232	133	752
1050C					57	5717	1285	1702	9618	1906	428	246	1390
1050M					68	9270	2084	2760	15597	3090	695	399	2255
1055I	100 x 55 (3.94) x (2.17)	M16	16 (.63)	3 (.12)	43	2780	625	720	4069	927	208	116	656
1055C					57	5143	1156	1332	7527	1715	386	215	1213
1055M					68	8340	1875	2160	12207	2781	625	348	1967
1060I	100 x 60 (3.94) x (2.36)	M16	16 (.63)	3 (.12)	43	2558	575	587	3317	853	192	103	582
1060C					57	4732	1064	1086	6137	1578	355	191	1077
1060M					68	7674	1725	1761	9952	2559	575	309	1746
1065I	100 x 65 (3.94) x (2.56)	M16	16 (.63)	3 (.12)	43	2393	538	492	2780	798	179	92	520
1065C					57	4427	995	910	5144	1476	332	170	962
1065M					68	7179	1614	1476	8341	2394	538	276	1560
1070I	100 x 70 (3.94) x (2.76)	M16	16 (.63)	3 (.12)	43	2265	509	423	2390	755	170	84	475
1070C					57	4190	942	783	4422	1397	314	155	878
1070M					68	6795	1528	1269	7171	2265	509	252	1424
1075I	100 x 75 (3.94) x (2.95)	M16	16 (.63)	3 (.12)	43	2164	486	369	2085	721	162	77	435
1075C					57	4003	900	683	3858	1334	300	142	805
1075M					68	6492	1459	1107	6256	2163	486	231	1305
1080I	100 x 80 (3.94) x (3.15)	M16	16 (.63)	3 (.12)	43	2081	468	327	1848	694	156	70	396
1080C					57	3850	865	605	3419	1284	289	130	732
1080M					68	6243	1403	981	5544	2082	468	210	1187
10100I	100 x 100 (3.94) x (3.94)	M16	16 (.63)	4 (.16)	43	1867	420	223	1260	622	140	54	305
10100C					57	3454	776	413	2331	1151	259	100	565
10100M					68	5601	1259	669	3781	1866	419	162	915
10140I	100 x 140 (3.94) x (5.51)	M16	16 (.63)	4 (.16)	43	1672	376	135	763	557	125	36	203
10140C					57	3093	695	250	1411	1030	232	67	376
10140M					68	5016	1128	405	2289	1671	376	108	610

Part No: 600kw_NG







A.B.Gensets	**Mat. Thick.:**	**Desc.:**			2024-01-18
	Pcs Per Unit :	**Mat Type:**	WEIGHT:	**SCALE:1:12**	**SHEET 1 OF 1**

Outdoor Weather & Silenced Genset Enclosures

- Black Powder-Coated channel frame
- Sound attenuating insulation available as an option
- Enclosure formed with satin-coated steel to prevent corrosion
- Powder-coated beige paint finish
- Stainless steel hardware
- Lockable paddle latches
- Rubber door sealer
- Plastic door stops/holders to hold doors open when servicing
- Motorized louver opens before unit starts to meet TSSA regulations
- Enclosure designed for harsh Canadian winters with a motorized intake louver that only opens when the unit runs.
- Interior will stay warm from heat radiated off engine if enclosure is insulated and the block heater is plugged in
- Designed to keep rodents out of main genset compartment
- CSA-282 available as an option
- Stub-up area for bottom electrical conduit entry with side access lids

All dimensions are in inches

Model	Genset Size	A	B (Full Width Stub Up)	C	D	E
E025	7-15 Kw Kubota	93	16	50	74	30
E028	25 Kw 2.4L Mitsubishi	103	16	56	84	36
E075	40-60 Kw GM	115	16	56	96	42
E100	80-125 Kw GM	133	16	62	114	42
E175	150-200 Kw GM	165	20	74	142	54
E275	110-200 Kw Weichai	185	24	82	158	54
E300	200-300 kw Weichai	205	24	82	179	60

Product data sheet

Specifications

Loadcentre, Homeline, 1 phase, 6 spaces, 12 circuits, 100A main breakers, Type 1, surface

CHOM612L100S

60 1 PH AMP MAIN BREAKER INSTALLED

Main

Range of product	Homeline
Product or component type	Loadcentre
[In] rated current	100 A
[Ue] rated operational voltage	120/240 V AC
Mounting mode	Wall mount
Short-circuit current	10 kA

Complementary

Electrical connection	Lugs
AWG gauge	AWG 8...AWG 1 aluminum/copper
Loadcentre type	Main lugs
Number of spaces	6
Number of circuits	12
Number of tandem circuit breakers	6
Network number of phases	1 phase
Cover type	Surface cover
Device composition	Grounding bar (factory installed)
Wiring configuration	3-wire
Material	Tin plated aluminum busbar
Enclosure material	Welded sheet steel
Cover colour	White
Box number	4

Environment

Product certifications	CSA
NEMA degree of protection	NEMA 1 indoor)
Ambient air temperature for operation	23 °F (-5 °C) 104 °F (40 °C)

Packing Units

Unit Type of Package 1	PCE
Number of Units in Package 1	1
Package 1 Height	4.41 in (11.2 cm)
Package 1 Width	10.59 in (26.9 cm)
Package 1 Length	14.49 in (36.8 cm)
Package 1 Weight	7.85 lb(US) (3.56 kg)

Offer Sustainability

Sustainable offer status	Green Premium product
REACh Regulation	REACh Declaration
EU RoHS Directive	Compliant EU RoHS Declaration
Toxic heavy metal free	Yes
Mercury free	Yes
China RoHS Regulation	China RoHS declaration Pro-active China RoHS declaration (out of China RoHS legal scope)
RoHS exemption information	Yes
Environmental Disclosure	Product Environmental Profile

Recommended replacement(s)

c UL us LISTED

Series 16 - 300 and 400 Amp, 600 Volts

Enclosure Types
3R, 4X, 12

300 Amp Inlines

Description	Color	Male Inline	Female Inline
300 amp, thermoplastic elastomer, cable size #6 - 2/0 AWG.	Black	**HBL300MBK**	**HBL300FBK**
	White	**HBL300MW**	**HBL300FW**
	Green	**HBL300MGN**	**HBL300FGN**
	Red	**HBL300MR**	**HBL300FR**
	Blue	**HBL300MBL**	**HBL300FBL**
	Brown	**HBL300MBN**	**HBL300FBN**
	Orange	**HBL300MO**	**HBL300FO**
	Yellow	**HBL300MY**	**HBL300FY**
	Gray*	—	—

*Note: *Gray is available upon request. Contact factory.*

400 Amp Inlines

Description	Color	Male Inline	Female Inline
400 amp, thermoplastic elastomer, cable size 2/0 - 4/0 AWG.	Black	**HBL400MBK**	**HBL400FBK**
	White	**HBL400MW**	**HBL400FW**
	Green	**HBL400MGN**	**HBL400FGN**
	Red	**HBL400MR**	**HBL400FR**
	Blue	**HBL400MBL**	**HBL400FBL**
	Brown	**HBL400MBN**	**HBL400FBN**
	Orange	**HBL400MO**	**HBL400FO**
	Yellow	**HBL400MY**	**HBL400FY**
	Gray	**HBL400MGY**	**HBL400FGY**

Receptacles, Double Set Screw Through Hole Mounting

Description	Color	Male Receptacles	Female Receptacles
400 amp, Panel Mount, thermoplastic elastomer, cable size #4 - 4/0 AWG, mates with 300 and 400 amp Inlines.	Black	**HBLMRBK**	**HBLFRBK**
	White	**HBLMRW**	**HBLFRW**
	Green	**HBLMRGN**	**HBLFRGN**
	Red	**HBLMRR**	**HBLFRR**
	Blue	**HBLMRBL**	**HBLFRBL**
	Brown	**HBLMRBN**	**HBLFRBN**
	Orange	**HBLMRO**	**HBLFRO**
	Yellow	**HBLMRY**	**HBLFRY**
	Gray	**HBLMRGY**	**HBLFRGY**

Angled Receptacles, Double Set Screw Through Hole Mounting

Description	Color	Male Receptacles	Female Receptacles
400 amp, Panel Mount, thermoplastic elastomer, cable size #4 - 4/0 AWG, mates with 300 and 400 amp Inlines.	Black	**HBLMRABK**	**HBLFRABK**
	White	**HBLMRAW**	**HBLFRAW**
	Green	**HBLMRAGN**	**HBLFRAGN**
	Red	**HBLMRAR**	**HBLFRAR**
	Blue	**HBLMRABL**	**HBLFRABL**
	Brown	**HBLMRABN**	**HBLFRABN**
	Orange	**HBLMRAO**	**HBLFRAO**
	Yellow	**HBLMRAY**	**HBLFRAY**
	Gray*	—	—

*Note: *Gray is available upon request. Contact factory.*

Receptacles, Stud Type Threaded Hole Mounting

Description	Color	Male Receptacles	Female Receptacles
400 amp Panel Mount, thermoplastic elastomer, mates with 300 and 400 amp Inlines.	Black	**HBLMRSCBK**	**HBLFRSCBK**
	White	**HBLMRSCW**	**HBLFRSCW**
	Green	**HBLMRSCGN**	**HBLFRSCGN**
	Red	**HBLMRSCR**	**HBLFRSCR**
	Blue	**HBLMRSCBL**	**HBLFRSCBL**
	Brown	**HBLMRSCBN**	**HBLFRSCBN**
	Orange	**HBLMRSCO**	**HBLFRSCO**
	Yellow	**HBLMRSCY**	**HBLFRSCY**

Receptacles, Extended Stud Type Threaded Hole Mounting

Description	Color	Male Receptacles	Female Receptacles
400 amp Panel Mount, thermoplastic elastomer, mates with 300 and 400 amp Inlines.	Black	**HBLMRSCEBK**	**HBLFRSCEBK**
	White	**HBLMRSCEW**	**HBLFRSCEW**
	Green	**HBLMRSCEGN**	**HBLFRSCEGN**
	Red	**HBLMRSCER**	**HBLFRSCER**
	Blue	**HBLMRSCEBL**	**HBLFRSCEBL**
	Brown	**HBLMRSCEBN**	**HBLFRSCEBN**
	Orange	**HBLMRSCEO**	**HBLFRSCEO**
	Yellow	**HBLMRSCEY**	**HBLFRSCEY**

Receptacles, Stud Type Through Hole Mounting

Description	Color	Male Receptacles	Female Receptacles
400 amp Panel Mount, thermoplastic elastomer, mates with 300 and 400 amp Inlines.	Black	**HBLMRSBK**	**HBLFRSBK**
	White	**HBLMRSW**	**HBLFRSW**
	Green	**HBLMRSGN**	**HBLFRSGN**
	Red	**HBLMRSR**	**HBLFRSR**
	Blue	**HBLMRSBL**	**HBLFRSBL**
	Brown	**HBLMRSBN**	**HBLFRSBN**
	Orange	**HBLMRSO**	**HBLFRSO**
	Yellow	**HBLMRSY**	**HBLFRSY**

Angled Receptacles, Stud Type Through Hole Mounting

Description	Color	Male Receptacles	Female Receptacles
400 amp Panel Mount, thermoplastic elastomer, mates with 300 and 400 amp Inlines.	Black	**HBLMRASBK**	**HBLFRASBK**
	White	**HBLMRASW**	**HBLFRASW**
	Green	**HBLMRASGN**	**HBLFRASGN**
	Red	**HBLMRASR**	**HBLFRASR**
	Blue	**HBLMRASBL**	**HBLFRASBL**
	Brown	**HBLMRASBN**	**HBLFRASBN**
	Orange	**HBLMRASO**	**HBLFRASO**
	Yellow	**HBLMRASY**	**HBLFRASY**

THREE PHASE WIRING FOR ASCO® 300 SERIES TRANSFER SWITCHES TYPES H3ATS & H3NTS RATED 800, 1000 & 1200 AMPERES

GENERAL INFORMATION

THIS WIRING APPLIES TO 300 SERIES TRANSFER SWITCHES THAT UTILIZE THE "H" FRAME POWER TRANSFER SWITCH RATED 800–1200 AMPERES.

THE GROUP G CONTROLLER PROVIDES EITHER AUTOMATIC (D3ATS) OR NON–AUTOMATIC [MANUAL] (H3NTS) OPERATION BASED ON ITS FACTORY SETTING ACCORDING TO THE CUSTOMER ORDER REQUIREMENTS.

THE TYPE OF TRANSFER SWITCH PROVIDED CAN BE DETERMINED FROM THE PRODUCT IDENTIFICATION MARKINGS LOCATED ON BOTH THE POWER TRANSFER SWITCH AND THE COVER OF THE GROUP G CONTROLLER.

ALL OPERATIONAL SETTINGS AND SEQUENCES OF THE GROUP G CONTROLLER AND ITS RELATED OPTIONAL ACCESSORIES (1UP, 18RX, 23G) ARE PROVIDED IN THE USER'S GUIDE, ASCO GROUP G CONTROLLER FOR AUTOMATIC & NON–AUTOMATIC TRANSFER SWITCHES, PART NUMBER 381333–400.

INFORMATION FOR INSTALLATION AND TESTING OF THE TRANSFER SWITCH IS PROVIDED IN THE INSTALLATION MANUAL, ASCO 3ATS & 3NTS, H–DESIGN 800–1200 A TRANSFER SWITCHES, PART NUMBER 381333–405.

ENGINE CONTROL CONTACTS

FEATURE 7 & FEATURE 8:
ONE SET OF FORM C CONTACTS "NR" (FEAT. 7 N/C, FEAT. 8 N/O) THAT CHANGE POSITION ON EXPIRATION OF THE FEATURE 1C, OVERRIDE MOMENTARY NORMAL SOURCE OUTAGES TIME DELAY, AND RESET ON EXPIRATION OF THE FEATURE 2E ENGINE COOLDOWN TIME DELAY.
AN AUXILIARY CONTACT THAT IS CLOSED WHEN THE TRANSFER SWITCH IS CONNECTED TO THE EMERGENCY SOURCE, IS CONNECTED ACROSS THE N/C CONTACT (FEATURE 7).

ADDITIONAL SET OF ENGINE STARTING CONTACTS ARE AVAILABLE ON THE GROUP G CONTROLLER WHEN THE FEATURE SETTING OF THE CONTROLLER OUTPUT CONTACTS "OP1" IS SET TO OPERATE AS "NR2".

ADDITIONAL, OPTIONAL ENGINE STARTING CONTACTS "NR2" ARE AVAILABLE WHEN OPTIONAL ACCESSORY 18RX (RELAY EXPANSION MODULE) IS INCLUDED IN THE TRANSFER SWITCH ASSEMBLY. OUTPUT CONTACTS "OP2" AND/OR "OP3" PROVIDE THE ENGINE STARTING FUNCTION WHEN THE FEATURE SETTING OF EACH IS SET TO OPERATE AS "NR2".

CONTACTS ARE RATED 5 AMPS RESISTIVE AT 30 VDC MAXIMUM, 100 mA AT 5 VDC MINIMUM.

REFER TO USER'S GUIDE, ASCO GROUP G CONTROLLER FOR AUTOMATIC & NON–AUTOMATIC TRANSFER SWITCHES, PART NUMBER 381333–400 FOR SETTING INFORMATION.

LOAD DISCONNECT FEATURE

FEATURE 31: INCLUDES SUB–FEATURES 31F, 31G, 31M, 31N
A SET OF FORM C CONTACTS ARE PROVIDED ON THE GROUP G CONTROLLER AS "OP1". WHEN THE FEATURE SETTING OF "OP1" IS SET TO OPERATE THE CONTACTS AS "FEATURE 31", THE TIME DELAY SETTINGS OF THE SUB–FEATURES ARE AVAILABLE.

"OP1" CAN BE SET TO OPERATE TO PROVIDE THE FOLLOWING FUNCTIONS USING THE TIME DELAY SETTINGS ASSOCIATED WITH EACH SUB–FEATURE;

31F – NORMAL TO EMERGENCY PRE–TRANSFER SIGNAL
31G – EMERGENCY TO NORMAL PRE–TRANSFER SIGNAL
31M – NORMAL TO EMERGENCY POST–TRANSFER SIGNAL
31N – EMERGENCY TO NORMAL POST TRANSFER SIGNAL

THE "OP1" OUTPUT CONTACTS CHANGE POSITION FOLLOWING EACH OF THE ABOVE TIME DELAYS.

ADDITIONAL LOAD DISCONNECT CONTACTS, "FEATURE 31" ARE AVAILABLE WHEN OPTIONAL ACCESSORY 18RX (RELAY EXPANSION MODULE) IS INCLUDED IN THE TRANSFER SWITCH ASSEMBLY. OUTPUT CONTACTS "OP2 AND/OR "OP3" WILL PROVIDE LOAD DISCONNECT FUNCTIONS WHEN THE FEATURE SETTING OF EACH IS SET TO OPERATE AS "FEATURE 31".

ALL OUTPUT CONTACTS ("OP1", "OP2", "OP3") SET TO OPERATE AS "FEATURE 31", SHARE THE COMMON TIME DELAY SETTINGS OF SUB–FEATURES 31F, 31G, 31M, AND 31N.

CONTACTS ARE RATED 5 AMPS RESISTIVE AT 30 VDC MAXIMUM, 100 mA AT 5 VDC MINIMUM.

REFER TO USER'S GUIDE, ASCO GROUP G CONTROLLER FOR AUTOMATIC & NON–AUTOMATIC TRANSFER SWITCHES, PART NUMBER 381333–400 FOR SETTING INFORMATION.

INPHASE TRANSFER FEATURE FOR LOAD TRANSFER

INPHASE TRANSFER CONTROL INITIATES AN INPHASE TRANSFER OF LOADS BETWEEN LIVE SOURCES. THIS IS USED TO PREVENT NUISANCE TRIPPING OF DISTRIBUTION CIRCUIT BREAKERS AND POSSIBLE DAMAGE TO MECHANICAL LOADS ASSOCIATED WITH OUT OF PHASE TRANSFER.

REFER TO USER'S GUIDE, ASCO GROUP G CONTROLLER FOR AUTOMATIC & NON–AUTOMATIC TRANSFER SWITCHES, PART NUMBER 381333–400 FOR SETTING INFORMATION.

SOURCE AVAILABILITY SIGNALS

SIGNALS INDICATING THE AVAILABILITY OF THE NORMAL & EMERGENCY SOURCES IS PROVIDED WHEN OPTIONAL ACCESSORY 18RX (RELAY EXPANSION MODULE) IS INCLUDED IN THE TRANSFER SWITCH ASSEMBLY. OUTPUT CONTACTS "RL5" (EMERGENCY SOURCE AVAILABLE) AND "RL6" (NORMAL SOURCE AVAILABLE) CHANGE POSITION WHEN THE SOURCE IS ACCEPTABLE.

CONTACTS ARE RATED 5 AMPS RESISTIVE AT 30 VDC MAXIMUM, 100 mA AT 5 VDC MINIMUM.

COMMON ALARM & NOT IN AUTO SIGNALING FEATURES

A SET OF FORM C CONTACTS IS PROVIDED ON THE GROUP G CONTROLLER AS "OP1". THE FEATURE SETTING OF "OP1" CAN BE SET TO OPERATE THE CONTACTS AS A "NOT IN AUTO" SIGNAL.

WHEN "OP1" IS SET FOR "NOT IN AUTO", THE OUTPUT CONTACTS CHANGE POSITION WHEN THE TRANSFER IS BEING INHIBITED FROM TRANSFERRING TO THE EMERGENCY SOURCE (FEATURE 34B) OR THE TRANSFER SWITCH HAS BEEN SET FOR NON–AUTOMATIC (MANUAL) OPERATION.

WHEN OPTIONAL ACCESSORY 11BE "SOFTWARE BUNDLE" IS PART OF THE TRANSFER SWITCH ASSEMBLY, "OP1" MAY ALTERNATIVELY SET FOR A "COMMON ALARM" SIGNAL. THE OUTPUT CONTACTS CHANGE POSITION WHEN A "COMMON ALARM" IS NOT PRESENT AND RESET WHEN A "COMMON ALARM" CONDITION IS PRESENT. THE "COMMON ALARM" SIGNAL CONDITIONS ARE SELECTABLE.

ADDITIONAL "COMMON ALARM" AND "NOT IN AUTO" CONTACTS ARE AVAILABLE WHEN OPTIONAL ACCESSORY 18RX (RELAY EXPANSION MODULE) IS INCLUDED IN THE TRANSFER SWITCH ASSEMBLY. OUTPUT CONTACTS "OP2 AND/OR "OP3" WILL PROVIDE SIGNAL FUNCTIONS WHEN THE FEATURE SETTING OF EACH IS SET TO OPERATE AS "COMMON ALARM" OR "NOT IN AUTO".

CONTACTS ARE RATED 5 AMPS RESISTIVE AT 30 VDC MAXIMUM, 100 mA AT 5 VDC MINIMUM.

REFER TO USER'S GUIDE, ASCO GROUP G CONTROLLER FOR AUTOMATIC & NON–AUTOMATIC TRANSFER SWITCHES, PART NUMBER 381333–400 FOR SETTING INFORMATION.

EXTERNAL POWER SUPPLY COMPATIBILITY

USE OF AN EXTERNAL POWER SUPPLY IS USEFUL WHEN REQUIRED TO EXTEND THE FOLLOWING CONTROLLER TIME DELAYS BEYOND 6 SECONDS;

FEATURE 1C – OVERRIDE MOMENTARY NORMAL SOURCE OUTAGES
FEATURE 1F – OVERRIDE MOMENTARY EMERGENCY SOURCE OUTAGES

AN EXTERNAL POWER SUPPLY IS ALSO USEFUL WHEN THE TRANSFER SWITCH IS USED WITH COMMUNICATIONS FEATURES BY ENABLING THE CONTROLLER TO CONTINUE COMMUNICATING.

AN EXTERNAL POWER SOURCE MAY BE PROVIDED TO THE CONTROLLER, UNTIL THE NORMAL SOURCE OR EMERGENCY SOURCE IS AVAILABLE, BY USE OF;

- AN EXTERNAL 24 VDC POWER SUPPLY WITH ACCESSORY 18RX (RELAY EXPANSION MODULE) OR
- OPTIONAL ACCESSORY 1UP (UNINTERRUPTIBLE POWER SUPPLY MODULE)

EXTERNAL 24 VDC POWER SUPPLY "1G":
AN EXTERNAL 24 VDC POWER SUPPLY MAY BE USED TO POWER THE CONTROLLER WHEN ACCESSORY 18RX (RELAY EXPANSION MODULE) IS INCLUDED IN THE TRANSFER SWITCH ASSEMBLY. OUTPUT CONTACTS "OP2" WILL PROVIDE EXTERNAL 24 VDC POWER SUPPLY FUNCTIONALITY WHEN ITS FEATURE SETTING IS SET TO OPERATE AS "1G". ADDITIONALLY, JUMPERS MUST BE RECONFIGURED ON ACCESSORY 18RX (RELAY EXPANSION MODULE) TO ENABLE THIS FUNCTION AS FOLLOWS;

REMOVE JUMPERS "J1" 1–2 & "J1" 3–4
CONNECT JUMPERS "J1" 5–7 & "J1" 6–8

THE OUTPUT CONTACTS CHANGE POSITION WHEN EITHER THE NORMAL SOURCE OR EMERGENCY SOURCE IS AVAILABLE AND RESET WHEN NEITHER SOURCE IS AVAILABLE. THE "OP2" N/C CONTACT SWITCHES CUSTOMER PROVIDED +24 VDC FROM THE EXTERNAL POWER SUPPLY TO THE CONTROLLER.

REFER TO USER'S GUIDE, ASCO GROUP G CONTROLLER FOR AUTOMATIC & NON–AUTOMATIC TRANSFER SWITCHES, PART NUMBER 381333–400 FOR SETTING INFORMATION.

ACCESSORY 1UP (UNINTERRUPTIBLE POWER SUPPLY):
WHEN OPTIONAL ACCESSORY 1UP IS INCLUDED IN THE TRANSFER SWITCH ASSEMBLY, THE CONTROLLER IS PROVIDED WITH LIMITED RESERVE POWER (APPROXIMATELY 3 MINUTES).

LOAD CURRENT METERING

WHEN OPTIONAL ACCESSORY 23GB IS PART OF THE TRANSFER SWITCH ASSEMBLY, THREE PHASE CURRENT MEASUREMENTS ARE AVAILABLE FOR DISPLAY ON THE GROUP G CONTROLLER.

REFER TO USER'S GUIDE, ASCO GROUP G CONTROLLER FOR AUTOMATIC & NON–AUTOMATIC TRANSFER SWITCHES, PART NUMBER 381333–400 FOR INFORMATION ON USE.

ADVANCED-FUNCTION SOFTWARE BUNDLE

WHEN OPTIONAL ACCESSORY 11BE IS PART OF THE TRANSFER SWITCH ASSEMBLY, AN ADVANCED–FUNCTION SOFTWARE BUNDLE IS AVAILABLE TO PERFORM THE FOLLOWING FUNCTIONS;

- SERIAL COMMUNICATIONS (RS–485)
- PROGRAMMABLE ENGINE EXERCISER
- EVENT LOG
- COMMON ALARM SIGNAL CAPABILITY ON GROUP G CONTROLLER "OP1" OUTPUT.

(3 PHASE SENSING ONLY)
- 3 PHASE EMERGENCY SOURCE SENSING.
- PHASE ROTATION SENSING.
- EMERGENCY VOLTAGE UNBALANCE SENSING.

REFER TO USER'S GUIDE, ASCO GROUP G CONTROLLER FOR AUTOMATIC & NON–AUTOMATIC TRANSFER SWITCHES, PART NUMBER 381333–400 FOR INFORMATION ON THESE FUNCTIONS.

NON-AUTOMATIC (MANUAL) OPERATION

TRANSFER SWITCH ASSEMBLIES FACTORY SET FOR NON–AUTOMATIC OPERATION PROVIDE USER INITIATED, ELECTRICAL OPERATION OF THE TRANSFER SWITCH TO EITHER AVAILABLE SOURCE. THE TRANSFER SWITCH ASSEMBLY IS PHYSICALLY IDENTICAL TO THAT OF THE AUTOMATIC TYPE.

WHEN THE TRANSFER SWITCH IS SET FOR NON–AUTOMATIC OPERATION, A CUSTOMER PROVIDED SELECTOR SWITCH MAY BE USED TO OPERATE IT FROM A REMOTE LOCATION.

REMOTE CONTROL FEATURES

THE FOLLOWING CONTROL PANEL INPUTS PROVIDE REMOTE CONTROL FUNCTIONS FOR THE TRANSFER SWITCH. EACH FUNCTION CAN BE IMPLEMENTED BY THE CUSTOMER PROVIDING THE FORM OF CONTROL DESCRIBED. EACH CONTROL CONTACT MUST BE SUITABLE FOR A 5 VDC LOW ENERGY CIRCUIT.

EXTERNAL FEATURE 17: REMOTE TRANSFER TO EMERGENCY FEATURE (FOR AUTOMATIC TRANSFER TYPE ONLY) – REQUIRES A CUSTOMER SUPPLIED, NORMALLY CLOSED CONTACT. OPENING OF THE CONTACT CAUSES ENGINE START AND TRANSFER TO THE EMERGENCY SOURCE. RE–CLOSURE OF THE CONTACT ACTIVATES THE FEATURE 3A "RETRANSFER TO NORMAL (IF JUST TEST) TIME DELAY PRIOR TO RETRANSFER. IN THE EVENT THAT THE EMERGENCY SOURCE FAILS WHILE THE TRANSFER SWITCH IS CONNECTED TO EMERGENCY AND THE CUSTOMER SUPPLIED CONTACT IS OPEN, THE TRANSFER SWITCH WILL AUTOMATICALLY RETRANSFER TO THE NORMAL SOURCE.

EXTERNAL FEATURE 6B: REMOTE BYPASS OF RETRANSFER TO NORMAL TIME DELAY – REQUIRES A CUSTOMER SUPPLIED, NORMALLY CLOSED CONTACT. OPENING OF THE CONTACT BYPASSES FEATURE 3A RETRANSFER TO NORMAL DELAY IF ACTIVE.

REFER TO USER'S GUIDE, ASCO GROUP G CONTROLLER FOR AUTOMATIC & NON–AUTOMATIC TRANSFER SWITCHES, PART NUMBER 381333–400 FOR SETTING INFORMATION.

NOTES

1. SWITCH SHOWN DE–ENERGIZED CONNECTED TO NORMAL SOURCE.
2. DEVICE SYMBOLS AND DESIGNATIONS ARE IN ACCORDANCE WITH NEMA PUB. ICS 1, PART 1–101A.
3. ○ INDICATES CUSTOMER CONNECTION POINTS.
4. ● INDICATES FACTORY CONNECTION POINTS.
5. CONNECTION POINTS THAT HAVE BOTH CUSTOMER CONNECTIONS AND FACTORY CONNECTIONS ARE SHOWN OPEN AS CUSTOMER CONNECTION POINTS.
6. THE TRANSFER UNIT IS MOUNTED ON THE BACK INSIDE SURFACE OF THE ENCLOSURE. THE CONTROL PANEL AND ANY OPTIONAL ACCESSORIES ARE MOUNTED ON THE INSIDE SURFACE OF THE DOOR.
7. AN OPERATOR'S MANUAL IS FURNISHED WITH EACH AUTOMATIC TRANSFER SWITCH. REFER TO THIS PUBLICATION PRIOR TO INSTALLATION AND OPERATION OF THE SWITCH.
8. GROUND STRAP ON CONTROL PANEL IS AFFIXED TO CHASSIS (ENCLOSURE) AT LOWER LEFT CONTROL PANEL MOUNTING STUD.

BASE CATALOG NUMBER					CATALOG NUMBER SUFFIXES			
TS FRAME	CATALOG TYPE	NEUTRAL TYPE	PHASE POLES	AMPS	VOLT CODE	CONTROLLER	OPTIONAL ACCESSORY	ENCLOSURE CODE
H	3ATS 3NTS	A B	3	800 1000 1200	C D E F H J K L M N P Q R	G	X	C E F G H J K L M N P Q
		BLANK FOR NONE					BLANK FOR NONE	BLANK FOR OPEN TYPE

EXPLANATION OF CATALOG NUMBER CODES

CATALOG TYPE		NEUTRAL TYPE		VOLTAGE CODES 3 PHASE (3 OR 4 WIRE) 50 OR 60 Hz		ENCLOSURE CODES		
CODE	DESCRIPTION	CODE	DESCRIPTION	CODE	NOMINAL VOLTAGE	CODE	TYPE	DESCRIPTION
3ATS 3NTS	AUTOMATIC MANUAL	A B	SOLID SWITCHING			BLANK		OPEN TYPE (NO ENCLOSURE)
						C	1	GENERAL PURPOSE, INDOOR
				C	208	E	2	INDOOR, WATER & DUST RESISTANT
				D	220	F	3R	OUTDOOR, RAINPROOF, SLEET & ICE RESISTANT
				E	230	G	4	INDOOR/OUTDOOR, WATERTIGHT & DUSTTIGHT
				F	240	H	4X	TYPE 4 PLUS CORROSION RESISTANCE (STAINLESS STEEL)
						J	4X	TYPE 4 PLUS CORROSION RESISTANCE (FIBERGLASS)
				H	380	K	7	EXPLOSION PROOF
				J	400	L	12	INDOOR, INDUSTRIAL ENVIRONMENTS, OILTIGHT & DUSTTIGHT
				K	415			
				L	440			(SECURE ENCLOSURES)
				M	460	M	3R	OUTDOOR, RAINPROOF, SLEET & ICE RESISTANT
				N	480	N	4	INDOOR/OUTDOOR, WATERTIGHT & DUSTTIGHT
				P	550	P	4X	TYPE 4 PLUS CORROSION RESISTANCE (STAINLESS STEEL)
				Q	575	Q	12	INDOOR, INDUSTRIAL ENVIRONMENTS, OILTIGHT & DUSTTIGHT
				R	600			

CATALOG NUMBER _____
ASCO® CERTIFIED TO S.O. _____
BY _____
DATE _____
FORM REV G

REV.	TO SHEET	ECN NO.	BY	APP.	DATE
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:
WIRING DIAGRAM
300 SERIES (H3ATS/H3NTS) 3PH 800–1200 AMPS
"H" FRAME, GROUP G CONTROLS

THIRD ANGLE PROJECTION

	BY	DATE
DRAWN BY	DJB	11/07/13
CHECKED	BK	11/07/13
PROJECT APPROVAL	BK	11/07/13
FINAL APPROVAL		

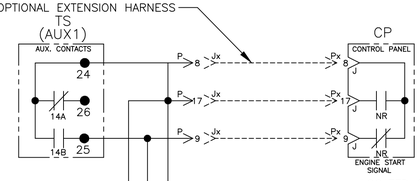
MANUFACTURING TOLERANCES TO BE IN ACCORDANCE WITH ASCO PROCEDURE MP–I–003. FOR PLASTIC PARTS SEE MP–I–055
ASSEM. REF. NO.

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

COMPUTER GENERATED DRAWING
SCALE NONE SIZE DS
DWG. NO. 1001657
DRAWING REV. G ECN NO. 278250 SHEET 1 OF 6

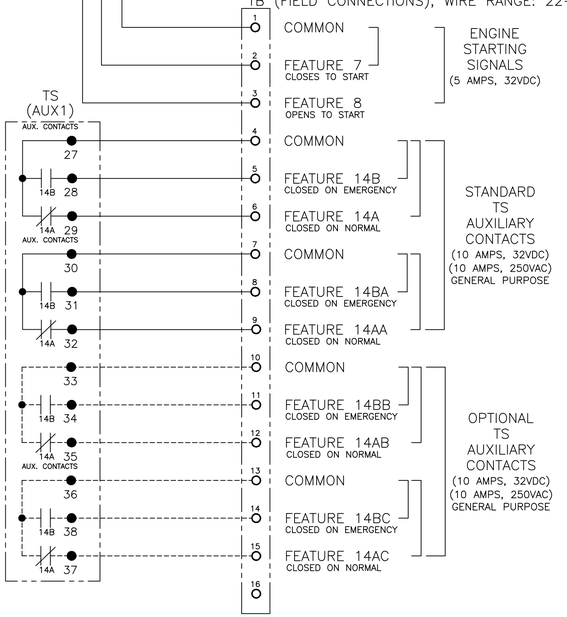
FIELD CONNECTIONS

OPTIONAL EXTENSION HARNESS

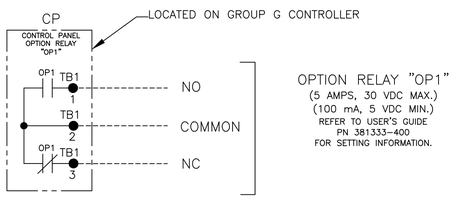


LOCATED ON FRONT OF TRANSFER SWITCH FRAME

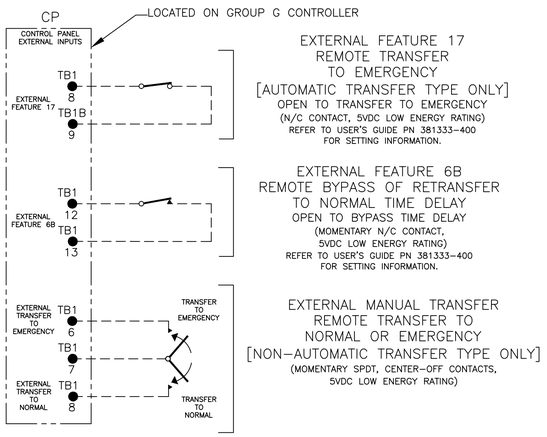
TB (FIELD CONNECTIONS), WIRE RANGE: 22–12 AWG



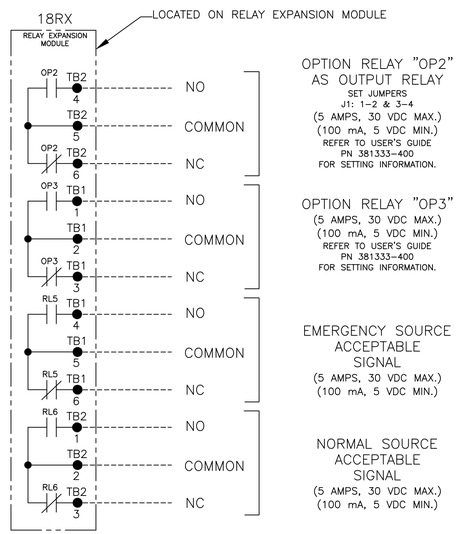
CONTROLLER OPTION RELAY "OP1" (STANDARD)



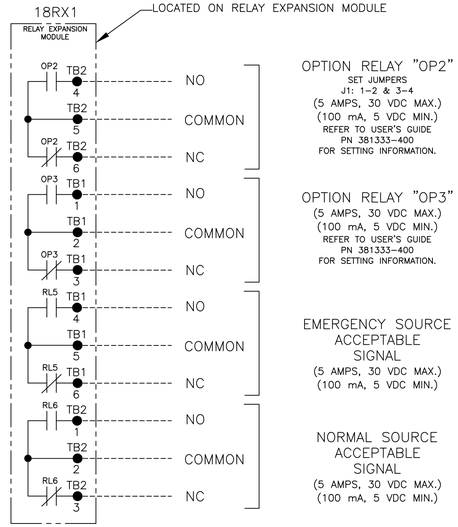
CONTROLLER REMOTE CONTROL FEATURES



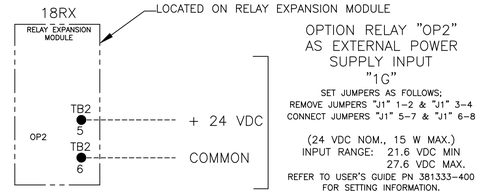
OPTIONAL ACCESSORY 18RX (RELAY EXPANSION MODULE)



OPTIONAL ACCESSORY 18RX1 (SECOND RELAY EXPANSION MODULE)

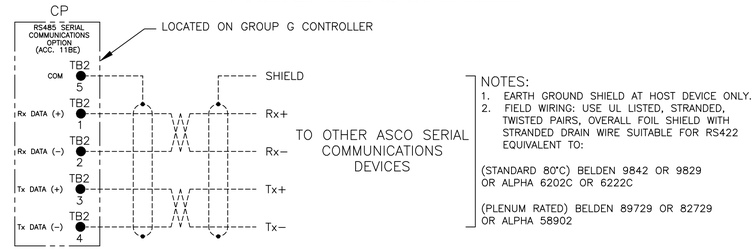


"OP2" OPTIONAL USES



RS485 SERIAL COMMUNICATIONS OPTION

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



REV.	REV. TO SHEET	ECN NO.	BY	APP.	DATE
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:

WIRING DIAGRAM

300 SERIES (H3ATS/H3NTS) 3PH 800–1200 AMPS
"H" FRAME, GROUP G CONTROLS

THIRD ANGLE PROJECTION

	BY	DATE
DRAWN BY	DJB	11/07/13
CHECKED	BK	11/07/13
PROJECT APPROVAL	BK	11/07/13
FINAL APPROVAL		

MANUFACTURING TOLERANCES TO BE IN ACCORDANCE WITH ASCO PROCEDURE MP–1–003. FOR PLASTIC PARTS SEE MP–1–055

ASSEM. REF. NO.

COMPUTER GENERATED DRAWING

SCALE NONE SIZE DS

DWG. NO. 1001657

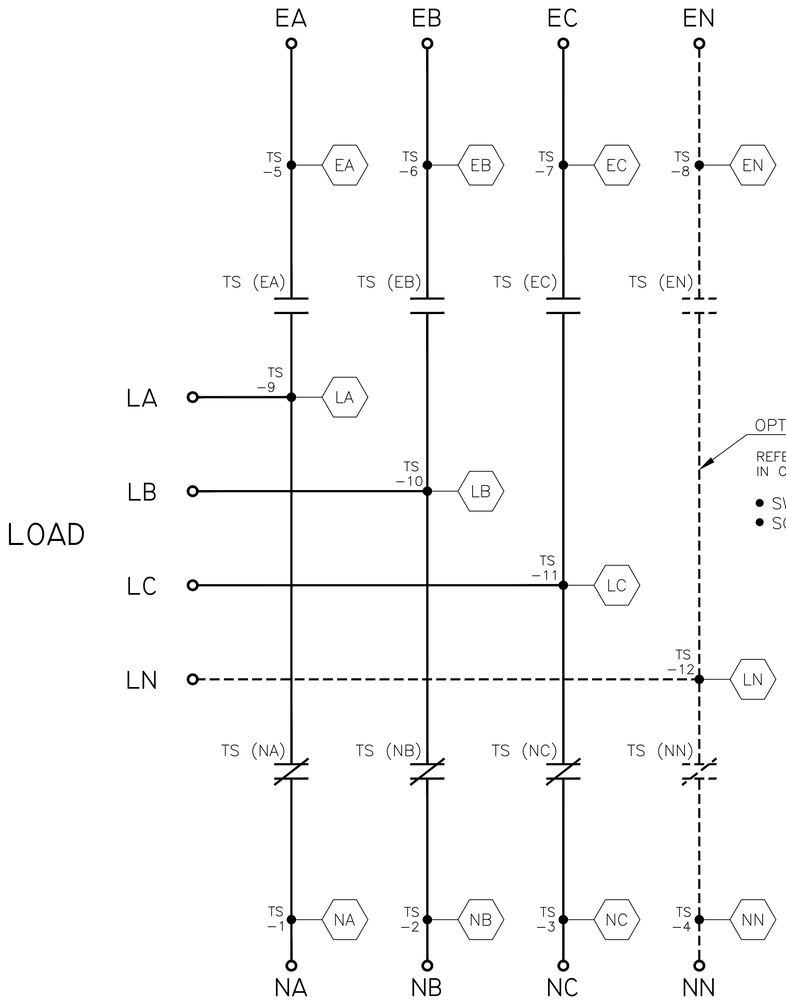
ASCO® ASCO POWER TECHNOLOGIES, L.P.
FLORHAM PARK, NEW JERSEY 07932 U.S.A.

DRAWING REV. G ECN NO. 278250 SHEET 2 OF 6

MAIN POWER POLES

TS OPERATOR CIRCUIT

EMERGENCY



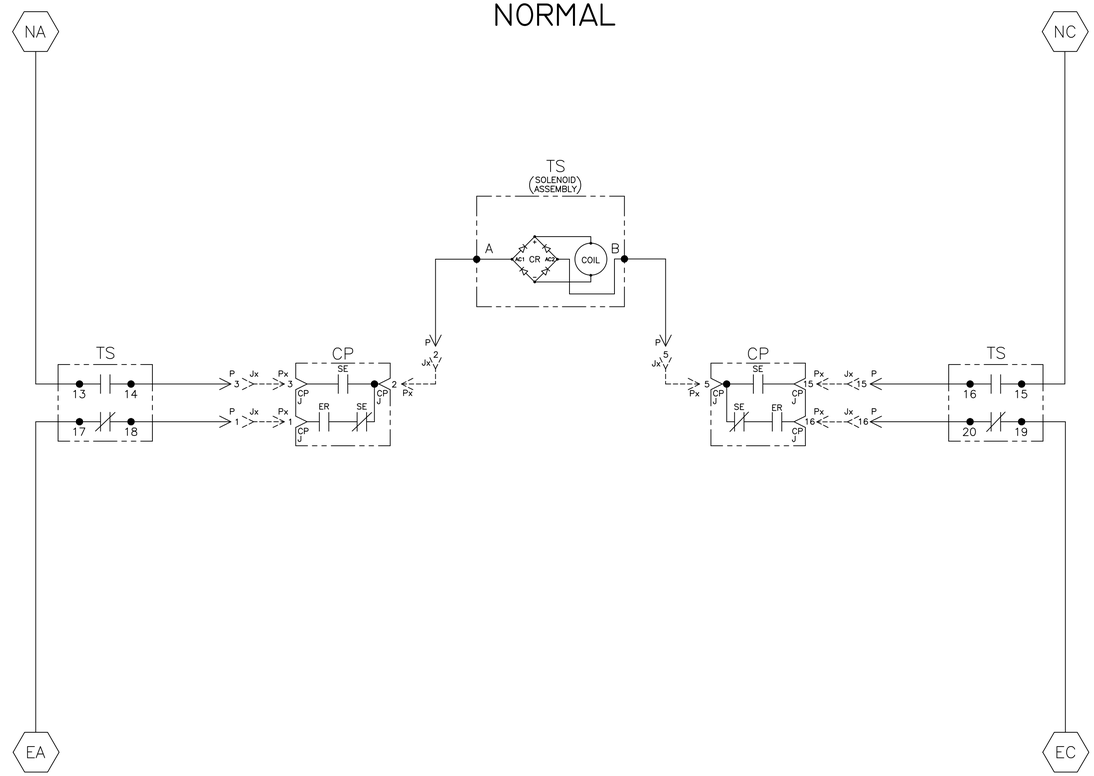
NORMAL

NOTE:
ATS/NTS SHOWN CLOSED ON NORMAL SOURCE.

OPTIONAL NEUTRAL TYPES

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

- SWITCHING CONTACTS
- SOLID BUS PLATE



EMERGENCY

TS CONTROL CONTACTS					
TS	SOLENOID POSITION				
	CLOSED 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.

REV.	TO SHEET	ECN NO.	BY	APP.	DATE
G		278250	TR	BK	04/22/19
		SEE ECN			
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		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:

WIRING DIAGRAM

300 SERIES (H3ATS/H3NTS) 3PH 800–1200 AMPS
"H" FRAME, GROUP G CONTROLS

THIRD ANGLE PROJECTION

	BY	DATE
DRAWN BY	DJB	11/07/13
CHECKED	BK	11/07/13
PROJECT APPROVAL	BK	11/07/13
FINAL APPROVAL		

MANUFACTURING TOLERANCES TO BE IN ACCORDANCE WITH ASCO PROCEDURE MP–1–003. FOR PLASTIC PARTS SEE MP–1–055

ASSEM. REF. NO.

COMPUTER GENERATED DRAWING

SCALE NONE SIZE DS

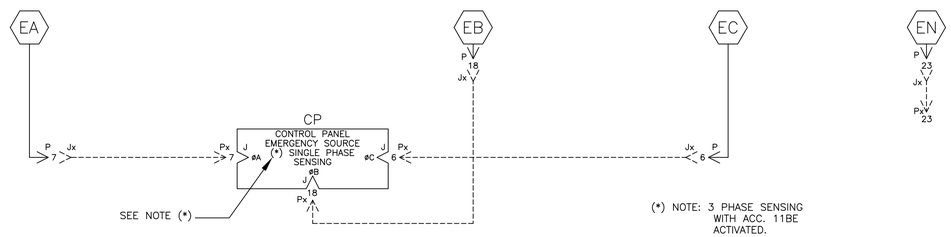
DWG. NO. 1001657

DRAWING REV. G ECN NO. 278250 SHEET 3 OF 6

ASCO® ASCO Power Technologies, L.P.
FLORHAM PARK, NEW JERSEY 07932 U.S.A.

EMERGENCY SOURCE CIRCUITS

EMERGENCY

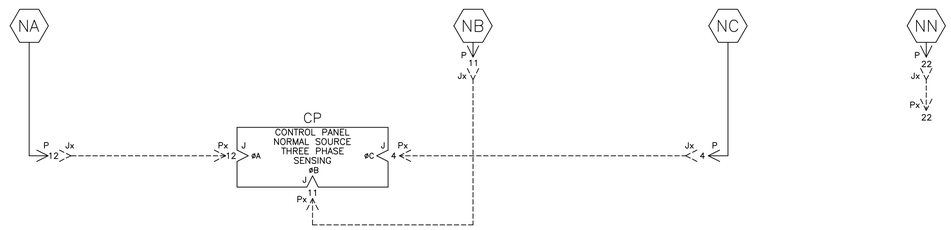


LOAD TERMINAL CIRCUITS

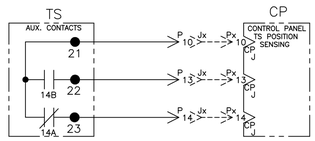
LOAD

NORMAL SOURCE CIRCUITS

NORMAL

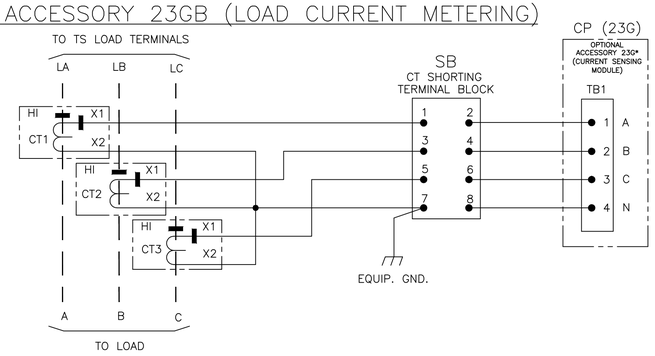


CONTROL CIRCUITS



ADDITIONAL CIRCUITS

OPTIONAL ACCESSORY 23GB (LOAD CURRENT METERING)



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

REV.	REV. TO SHEET	ECN NO.	BY	APP.	DATE
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:

WIRING DIAGRAM

300 SERIES (H3ATS/H3NTS) 3PH 800–1200 AMPS
"H" FRAME, GROUP G CONTROLS

THIRD ANGLE PROJECTION

	BY	DATE
DRAWN BY	DJB	11/07/13
CHECKED	BK	11/07/13
PROJECT APPROVAL	BK	11/07/13
FINAL APPROVAL		

MANUFACTURING TOLERANCES TO BE IN ACCORDANCE WITH ASCO PROCEDURE MP-I-003. FOR PLASTIC PARTS SEE MP-I-055

ASSEM. REF. NO.

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

COMPUTER GENERATED DRAWING

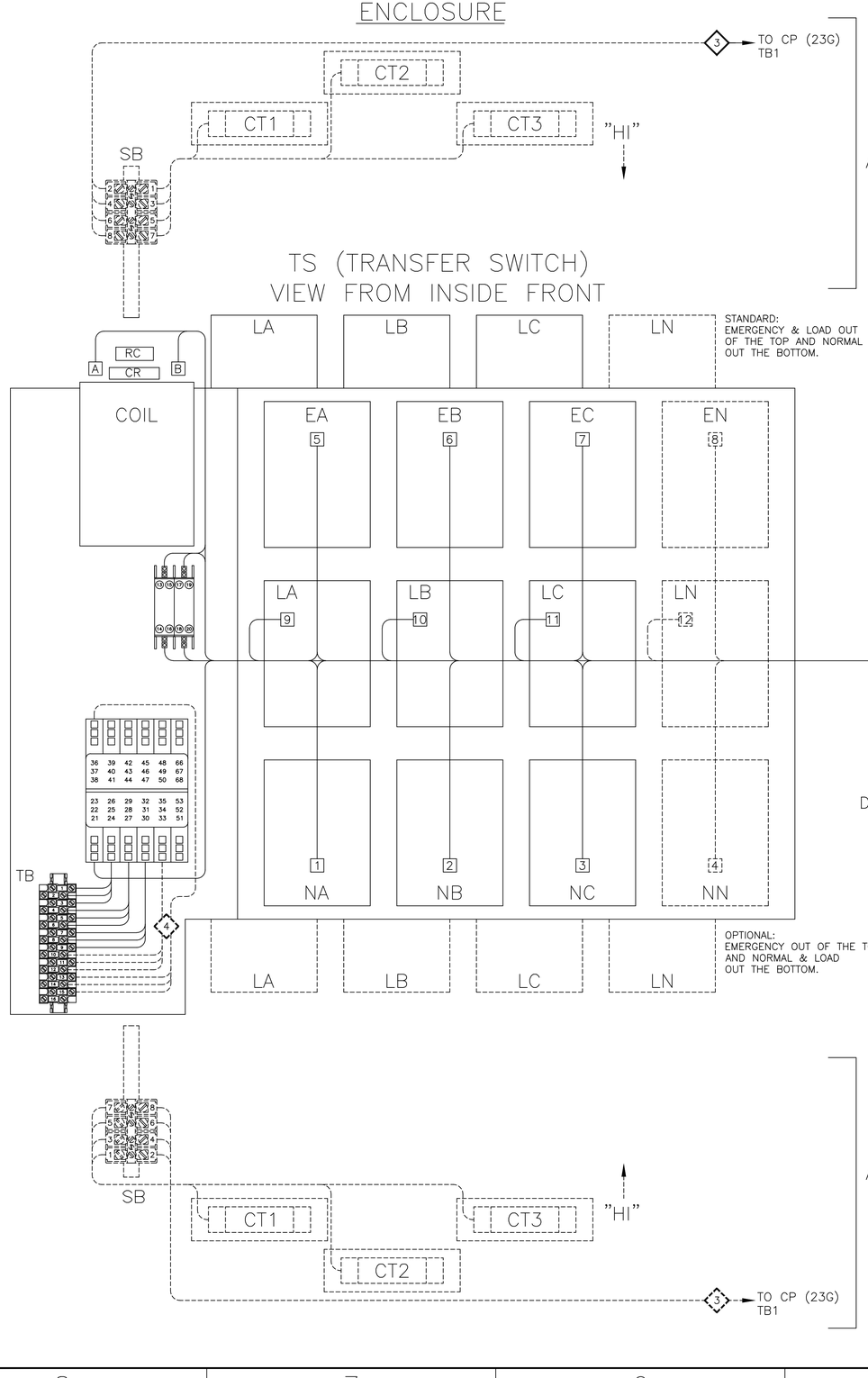
SCALE NONE SIZE DS

DWG. NO. 1001657

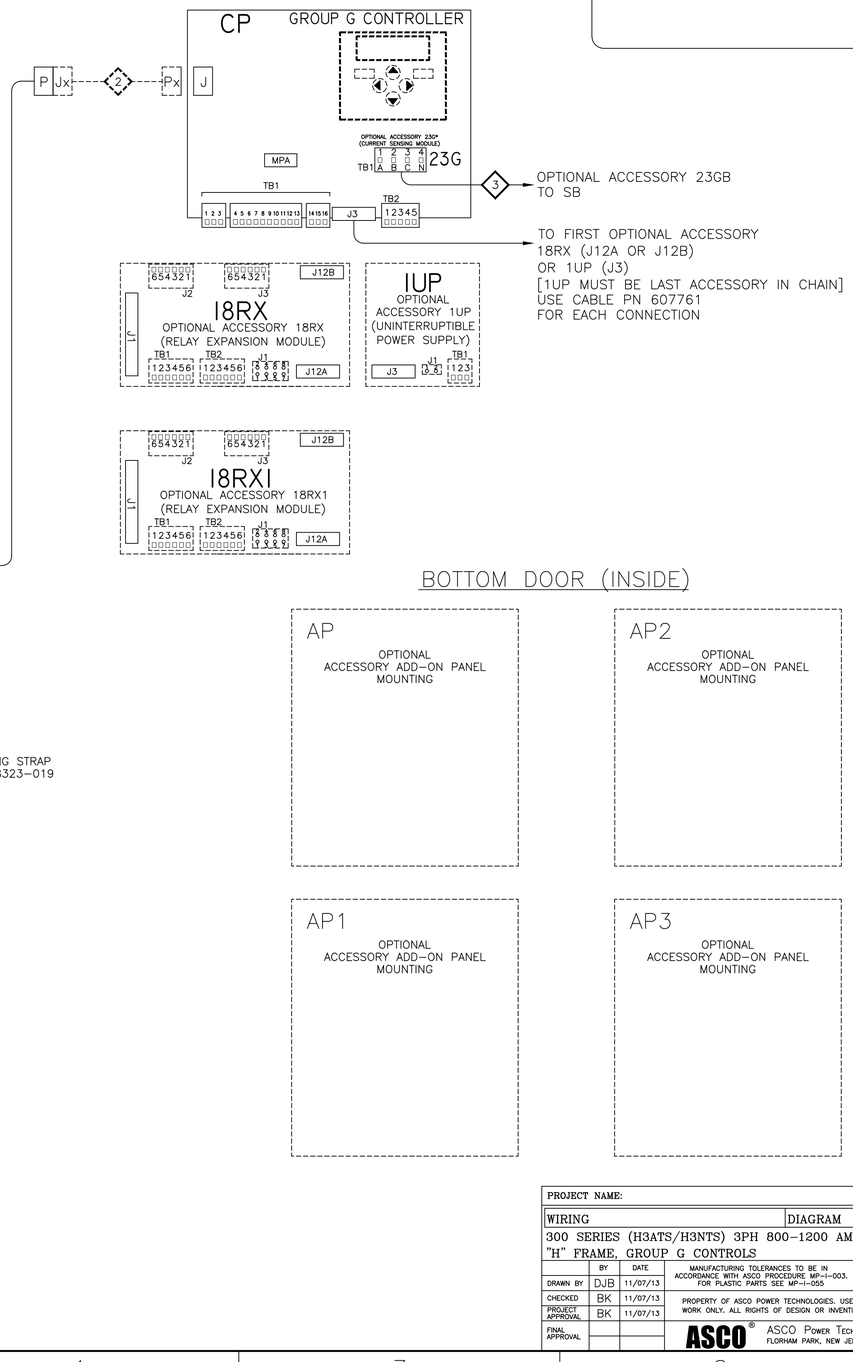
DRAWING REV. G ECN NO. 278250 SHEET 4 OF 6

PHYSICAL DIAGRAM

ENCLOSURE



DOOR (INSIDE)



BOTTOM DOOR (INSIDE)

DOOR HINGE

BONDING STRAP PN 098323-019

REV.	ECN NO.	BY	APP.	DATE
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			

REV. TO SHEET

PROJECT NAME:

WIRING | DIAGRAM

300 SERIES (H3ATS/H3NTS) 3PH 800-1200 AMPS
"H" FRAME, GROUP G CONTROLS

THIRD ANGLE PROJECTION

	BY	DATE
DRAWN BY	DJB	11/07/13
CHECKED	BK	11/07/13
PROJECT APPROVAL	BK	11/07/13
FINAL APPROVAL		

MANUFACTURING TOLERANCES TO BE IN ACCORDANCE WITH ASCO PROCEDURE MP-I-003. FOR PLASTIC PARTS SEE MP-I-055

ASSEM. REF. NO.

COMPUTER GENERATED DRAWING

SCALE NONE | SIZE DS

DWG. NO. 1001657

DRAWING REV. G | ECN NO. 278250 | SHEET 5 OF 6

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

WIRE RUN LISTING

1 ← HARNESS LOCATOR — BOX CHECKED IF HARNESS IS MODIFIED ☒

WIRE No.	HARNESS 713082 (P) MAIN TS	CLR	AWG
1	P-1,TS-18		16
2	P-2,TS-A		
3	P-3,TS-14		
4	P-4,TS-3		
4	TS-3,TS-15		
5	P-5,TS-B		
6	P-6,TS-7		
6	TS-7,TS-19		
7	P-7,TS-5		
7	TS-5,TS-17		
8	P-8,TS-24		
8	TS-24,TB-1		
9	P-9,TS-25		
9	TS-25,TB-2		
10	P-10,TS-21		
11	P-11,TS-2		
12	P-12,TS-1		
12	TS-1,TS-13		
13	P-13,TS-22		
14	P-14,TS-23		
15	P-15,TS-16		
16	P-16,TS-20		
17	P-17,TB-3		
18	P-18,TS-6		
19	P-19,TS-9		
20	P-20,TS-10		
21	P-21,TS-11		
22	P-22,TS-4		
23	P-23,TS-8		
24	P-24,TS-12		
25	TS-27,TB-4		
26	TS-28,TB-5		
27	TS-29,TB-6		
	ADD WIRES		
31	TS-30,TB-7		
32	TS-31,TB-8		
33	TS-32,TB-9		

2 ← HARNESS LOCATOR — BOX CHECKED IF HARNESS IS MODIFIED ☐

WIRE No.	HARNESS 309320-005 (Px,Jx OPTIONAL 8" EXTENSION HARNESS	CLR	AWG
1	Px-1,Jx-1		16
2	Px-2,Jx-2		
3	Px-3,Jx-3		
4	Px-4,Jx-4		
5	Px-5,Jx-5		
6	Px-6,Jx-6		
7	Px-7,Jx-7		
8	Px-8,Jx-8		
9	Px-9,Jx-9		
10	Px-10,Jx-10		
11	Px-11,Jx-11		
12	Px-12,Jx-12		
13	Px-13,Jx-13		
14	Px-14,Jx-14		
15	Px-15,Jx-15		
16	Px-16,Jx-16		
17	Px-17,Jx-17		
18	Px-18,Jx-18		
19	Px-19,Jx-19		
20	Px-20,Jx-20		
21	Px-21,Jx-21		
22	Px-22,Jx-22		
23	Px-23,Jx-23		
24	Px-24,Jx-24		
	REMOVE WIRES		
	ADD WIRES		

3 ← HARNESS LOCATOR

WIRE No.	OPTIONAL ACCESSORY 23GB (CT,SB,CP(23G)-TB1)	CLR	AWG
300	CT1-X1,SB-1		16
301	CT2-X1,SB-3		
302	CT3-X1,SB-5		
300	SB-2,CP(23G)-TB1-1		
301	SB-4,CP(23G)-TB1-2		
302	SB-6,CP(23G)-TB1-3		
303	CT1-X2,CT2-X2	GRN	
303	CT2-X2,CT3-X2	GRN	
303	CT3-X2,SB-7	GRN	
303	SB-7,EQUIP-GND	GRN	
303	SB-8,CP(23G)-TB1-4	GRN	

4 ← HARNESS LOCATOR — BOX CHECKED IF HARNESS IS MODIFIED ☐

WIRE No.	OPTIONAL AUX. CONTACTS	CLR	AWG
35	TB-10,TS(AUX1)-33		16
36	TB-11,TS(AUX1)-34		
37	TB-12,TS(AUX1)-35		
38	TB-13,TS(AUX1)-36		
39	TB-14,TS(AUX1)-38		
40	TB-15,TS(AUX1)-37		

WIRE No.	ADDITIONAL WIRES	CLR	AWG
			16

REV.	ECN NO.	BY	APP.	DATE
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:

WIRING DIAGRAM

300 SERIES (H3ATS/H3NTS) 3PH 800-1200 AMPS
"H" FRAME, GROUP G CONTROLS

THIRD ANGLE PROJECTION

	BY	DATE
DRAWN BY	DJB	11/07/13
CHECKED	BK	11/07/13
PROJECT APPROVAL	BK	11/07/13
FINAL APPROVAL		

MANUFACTURING TOLERANCES TO BE IN ACCORDANCE WITH ASCO PROCEDURE MP-I-003. FOR PLASTIC PARTS SEE MP-I-055

ASSEM. REF. NO.

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

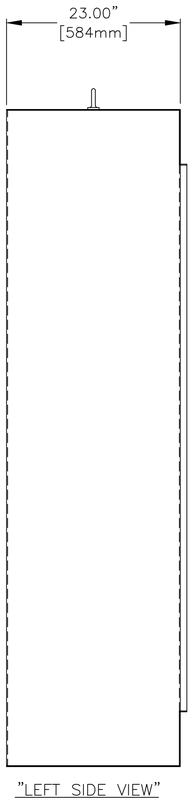
COMPUTER GENERATED DRAWING

SCALE NONE SIZE DS

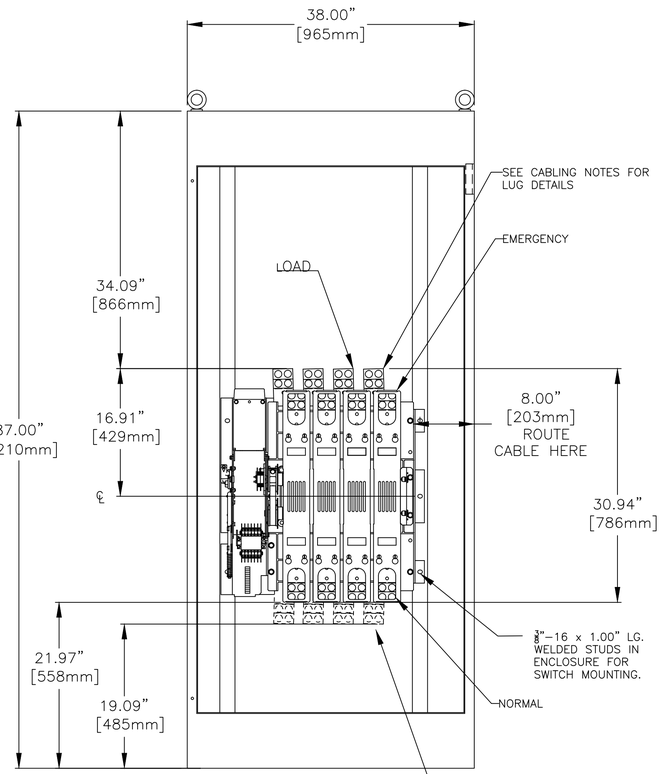
DWG. NO. 1001657

DRAWING REV. G ECN NO. 278250 SHEET 6 OF 6

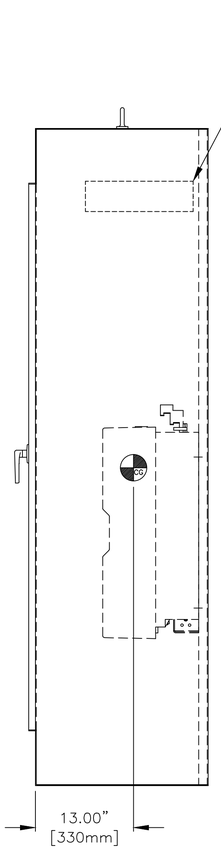
OUTLINE FOR ASCO® 300 SERIES 1200 AMPERE "H" FRAME (H3ATS,H3NTS,H3ADTS,H3NDTS) FRONT CONNECTED TRANSFER SWITCHES TYPE 1 ENCLOSURE



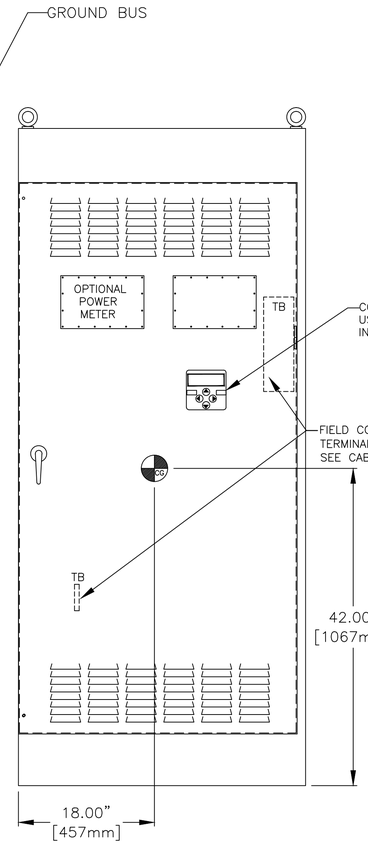
"LEFT SIDE VIEW"



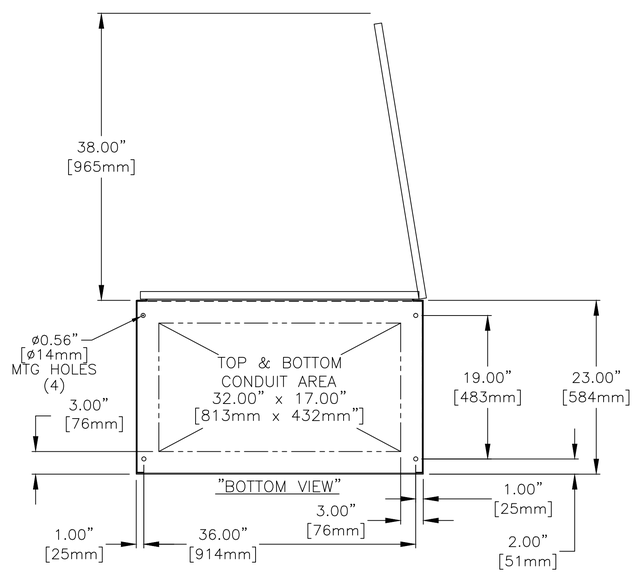
FRONT VIEW
WITHOUT DOOR



RIGHT SIDE
WITH DOOR



FRONT VIEW
WITH DOOR



"BOTTOM VIEW"

GENERAL NOTES

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

CABLING NOTES

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

NOTES 1200 AMP SWITCHES

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

APPROXIMATE SHIPPING WEIGHT, LBS (KG)

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

REV. TO SHEET	ECN NO.	BY	APP.	DATE
D	289439 SEE ECN	TR	NS	05/07/21
C	279762 SEE ECN	WK	BK	07/09/19
B	251585 SEE ECN	BK	BK	11/04/14
A	248271 SEE ECN	BK	TR	5/8/14
—	245452 ISSUED	WK	BK	11/20/13

PROJECT NAME:

OUTLINE
300 SERIES, 87x38x23
1200 AMP. TYPE 1

THIRD ANGLE PROJECTION

	BY	DATE
DRAWN BY	DJB	11/20/13
CHECKED	BK	11/20/13
PROJECT APPROVAL	BK	11/20/13
FINAL APPROVAL		

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FLORHAM PARK, NEW JERSEY 07932 U.S.A.

COMPUTER GENERATED DRAWING

SCALE NONE | SIZE DS

DWG. NO. 1001394-001

DRAWING REV. D | ECN NO. 289439 | SHEET 1 OF 1