

Battery Chargers

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**Power
Generation**

Set Mounted

Incorporating Heater Terminals

FOREWORD

The purpose of this manual is to provide the user with sound general information for operating the battery charger. It is for guidance and assistance with recommendations for correct and safe procedure. Cummins Power Generation Limited cannot accept any liability whatsoever for problems arising as a result of following recommendations in this manual.

The information contained within the manual is based on information available at the time of going to print. In line with the Cummins Power Generation Limited policy of continuous development and improvement, information may change at any time without notice. The user should therefore ensure that, before commencing any work, he has the latest information available.

Users are respectfully advised that it is their responsibility to employ competent persons to carry out any installation work in the interests of good practice and safety. It is essential that the utmost care is taken with the application, installation and operation of any equipment. Careful reference should also be made to other Cummins Power Generation Limited literature, in particular the Health and Safety Manual (0908-0110-00), the Controller Operation and Maintenance, and Engine Manuals.

Should you require further assistance contact: -

Cummins Power Generation
1400 73rd Avenue NE
Minneapolis
MN 55432
USA

Tel:+1 (763) 574-5000
Fax:+1 (763) 574-5298

e-mail: pgamail@cummins.com

Web: www.cumminspower.com

Cummins Power Generation
35A/1/2, Erandawana
Pune 411 038
India

Tel.: (91 020) 3024 8600
Fax: (91 020) 6602 8090

e-mail:
cpqiservicesupport@cummins.com

Web: www.cumminspower.com

Cummins Power Generation
Columbus Avenue
Manston Park
Manston
Ramsgate
Kent CT12 5BF
United Kingdom

Tel:+44 (0) 1843 255000
Fax:+44 (0) 1843 255902

e-mail: cpgk.uk@cummins.com

Web: www.cumminspower.com

Cummins Power Generation
Rua Jati, 310 - Cumbica
Guarulhos –SP
Brazil
CEP: 07180-900

Tel.: (55 11) 2186 4195
Fax: (55 11) 2186 4729

e-mail: falecom@cumminspower.com.br

Web: www.cumminspower.com

Cummins Power Generation
10 Toh Guan Road #07-01
TT International Tradepark
Singapore 608838

Tel: (65) 6417 2388
Fax:(65) 6417 2399

e-mail: cpq.apmktg@cummins.com

Web: www.cumminspower.com



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SECTION 1 – SAFETY

1 Safety

1.1 Warning, Caution and Note Styles Used In This Manual

The following safety styles found throughout this manual indicate potentially hazardous conditions to the operator, service personnel or the equipment.

WARNING: WARNS OF A HAZARD THAT MAY RESULT IN SEVERE PERSONAL INJURY OR DEATH.

Caution: Warns of a hazard or an unsafe practice that can result in product or property damage.

Note: A short piece of text giving information that augments the current text.

1.2 Warnings

WARNING: IT IS IMPORTANT TO READ AND UNDERSTAND ALL SAFETY NOTICES PROVIDED IN THIS MANUAL. IMPROPER OPERATION OR MAINTENANCE COULD RESULT IN A SERIOUS ACCIDENT OR DAMAGE TO THE EQUIPMENT, CAUSING INJURY OR DEATH.

1.3 General Information

This manual should form part of the documentation package supplied by Cummins Power Generation Limited with specific generator sets. In the event that this manual has been supplied in isolation please refer to the other Cummins Power Generation Limited literature, in particular the Health and Safety Manual (0908-0110-00), the Controller manual, and the Engine Manual.

Note: It is in the user's interest to read and understand all Health and Safety information together with all Warnings and Cautions contained within the documentation relevant to the generator set and its operation and maintenance.

1.4 Generator Plant Safety Code

Before operating the generator set, read the Controller Manual and the Engine Manual and become familiar with them and the equipment. Safe and efficient operation can be achieved only if the equipment is properly operated and maintained. Many accidents are caused by failure to follow fundamental rules and precautions.

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SECTION 2 - BATTERY CHARGER – 3 AMP

2 Battery Charger – 3 Amp



WARNING: All installation and electrical connections must be made by trained experienced engineers and wired in accordance with applicable and relevant codes of practise.

2.1 C11 to C35 Installation

The generator set control housing provides for the mounting of the battery charger and the Customer's single phase AC connections for the battery charger.

A separate disconnecting device is required by BS EN 12601:2001.

Note: This disconnecting device is not provided as part of the generator set.

WARNING: THE AC SUPPLY TO THE TERMINAL BLOCK MUST BE ISOLATED BEFORE ATTEMPTING TO GAIN ACCESS TO THE TERMINAL BLOCK.

Note: It is the sole responsibility of the customer to provide means to isolate the AC input to the terminal block. Cummins Power Generation Limited accepts no responsibility for providing the means of isolation.

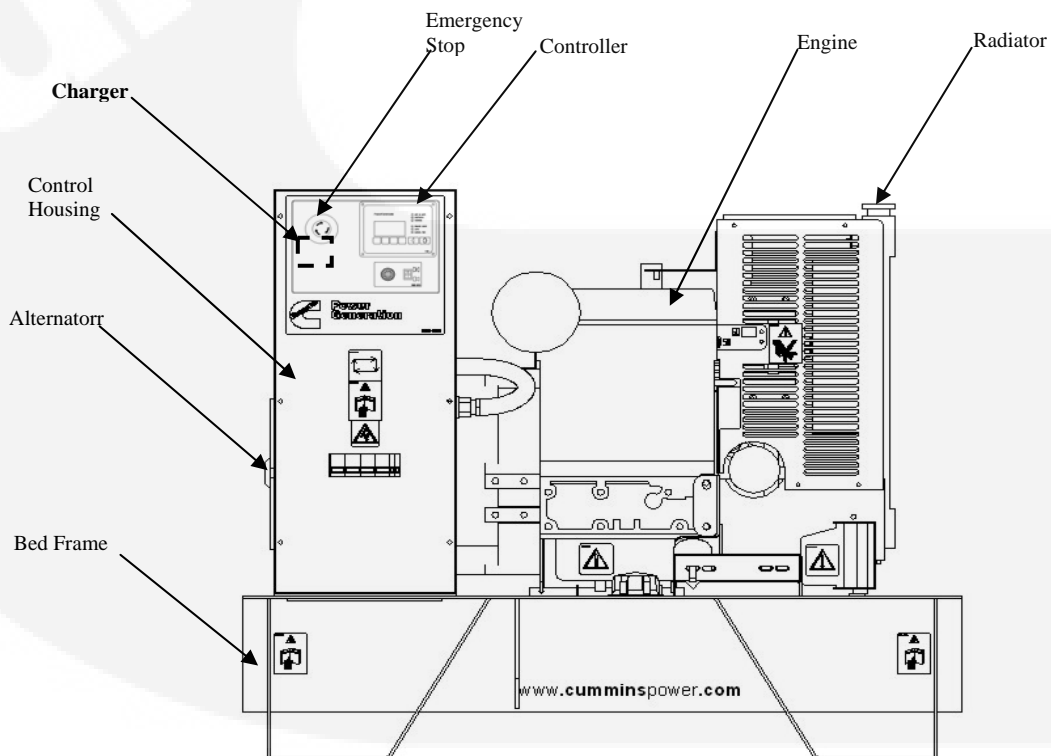


Figure 2-1 Position of Charger Installation for C11 to C35 Sets

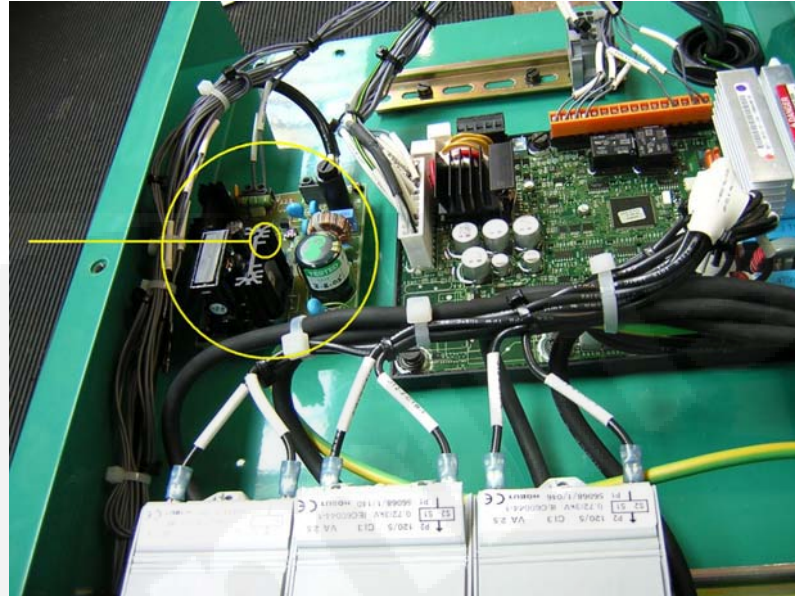


Figure 2-2 Charger Position

2.2 Description



Figure 2-3 3 Amp Charger

The charger provides accurate fast charging, optimum battery life and reliability.

The charger is designed to cater for continuous float charging and standby battery applications. Due to its smooth output the charger is suitable for sealed or vented batteries. e.g. NiCad, Lead Acid Sealed (VRLA), vented and plate cells.

Utilising the benefits of switch mode technology, the charger will give a constant current output up to its knee point (13 volts on a 12 Volt LA) and then ramp down to its float voltage. This gives an optimum charge time to ensure that the battery voltage is maintained at the pre-calibrated float level, whilst supplying any additional standing load current up to a specified maximum.

The charger is fitted with a 1A anti-surge fuse on the input and draws 0.7A at full load conditions at 110VAC

2.3 Specification

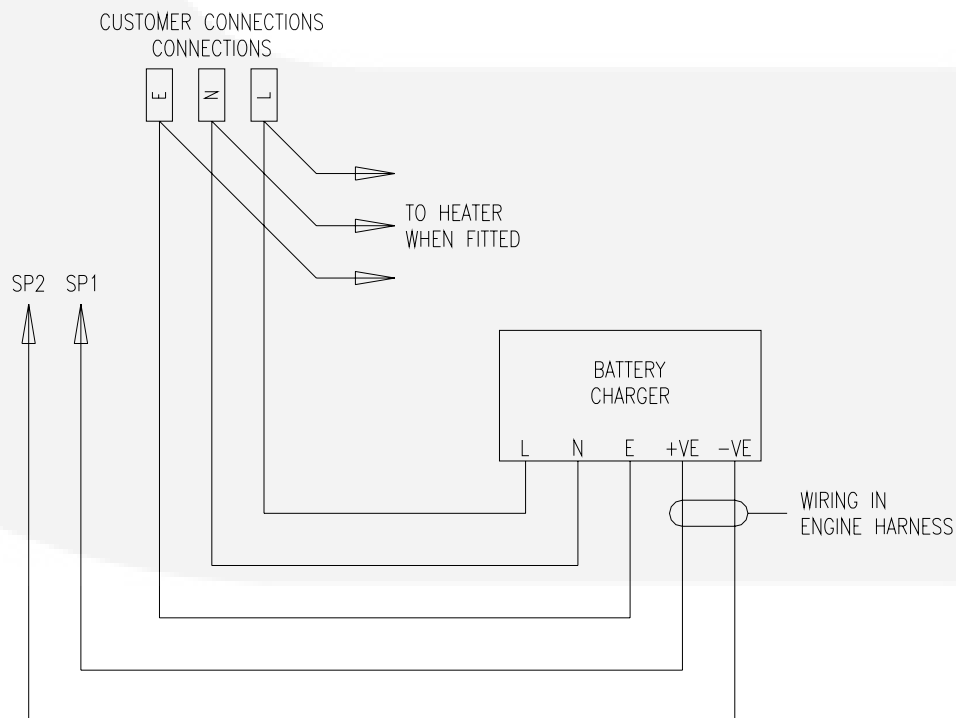
Power Supply			
Nominal operating voltages	95-277VAC		
Operating frequency	47-400Hz		
DC Charge Output			
Output current ADC	3	1.5	0.75
Nominal voltage VDC	12	24	48
Float/boost voltages	See Table Below		
General			
Operating temperature	-10 to +55°C		
EMC emission/immunity	EN58801-2/EN50082-2		

Battery Type	Float volts (V DC)
12V Lead acid (6 cells)	13.6
24V Lead acid (12 cells)	27.2

2.4 C11 to C35 Circuit

The Customer must provide a suitable, fused and isolatable supply.

For generator specific information refer to the drawings and circuits provided with your generator set.



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SECTION 3 – BATTERY CHARGER – 5 AMP

3 Battery Charger – 5 Amp

3.1 General

The generator set terminal box assembly provides for the mounting of the battery charger and the Customer's single phase AC connections for the battery charger. The terminal box also has the facilities to cater for engine heater, alternator heater and control panel heater (where these options are applicable).

Depending on which options have been selected, a single Customer input of 240V or 110V will pass through a maximum of four separate fuses to power each individual selection.

3.1.1 Heater Supplies

The alternator and control panel heater supplies pass through a Generator Set Running Relay in order to remove the power supply from the heaters once the generator set is running.

The engine heater has an internal thermostat which automatically isolates the supply when the required temperature is reached, thereby removing the coolant heating facility when the generator set is running.

3.1.2 Battery Charger

The battery charger provides an output to recharge the batteries after use, with the facility for Boost charging if required.

3.1.3 Terminal Block

The heater terminal block is required for the operation of the generator set.

A separate disconnecting device is required by BS EN 12601:2001.

Note: *This disconnecting device is not provided as part of the generator set.*

WARNING: THE AC SUPPLY TO THE TERMINAL BLOCK MUST BE ISOLATED BEFORE ATTEMPTING TO GAIN ACCESS TO THE TERMINAL BLOCK.

Note: *It is the sole responsibility of the customer to provide means to isolate the AC input to the terminal block. Cummins Power Generation Limited accepts no responsibility for providing the means of isolation.*

3.2 C40 to C250 Installation

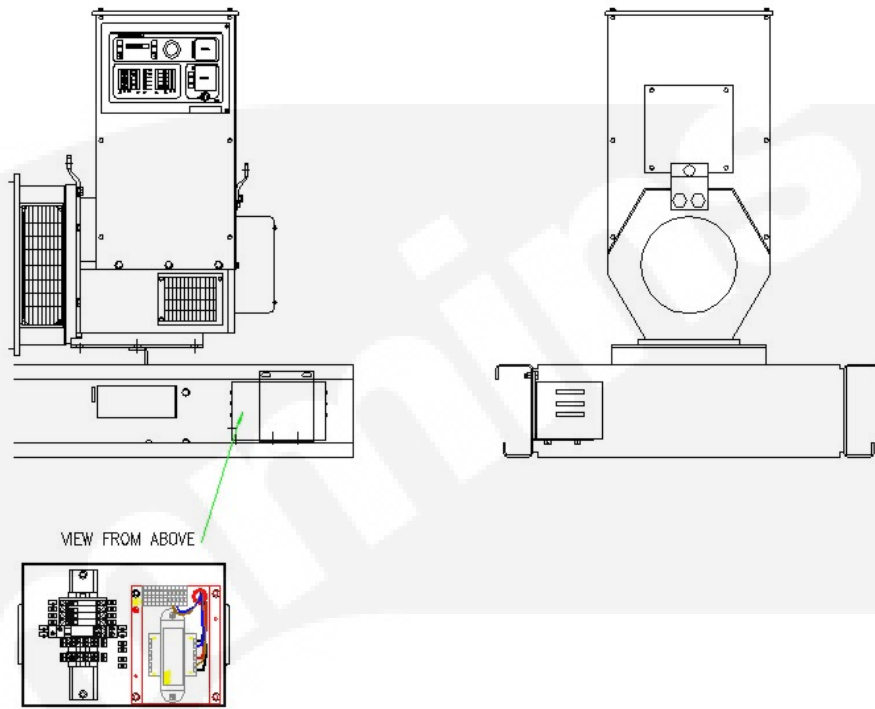


Figure 3-1 Position of Charger Installation for C40 to C250 Sets

3.3 C250 to C330 Installation

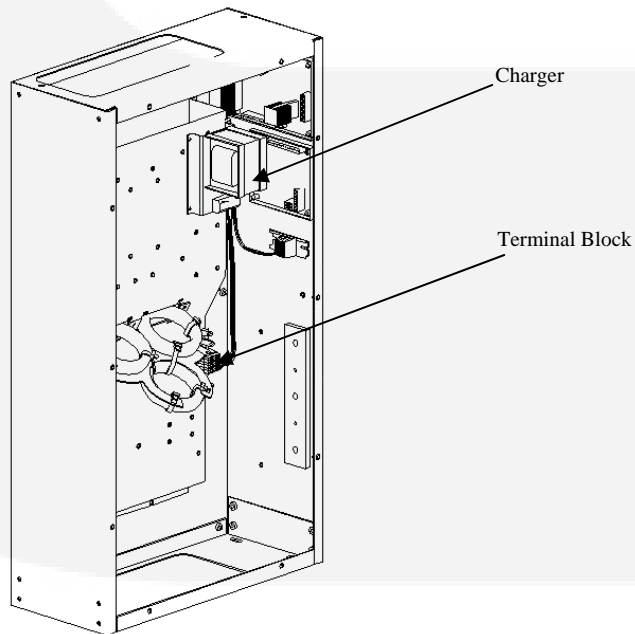


Figure 3-2 Position of Charger Installation for C250 to C330 Sets

3.4 C350 to C550 Installation

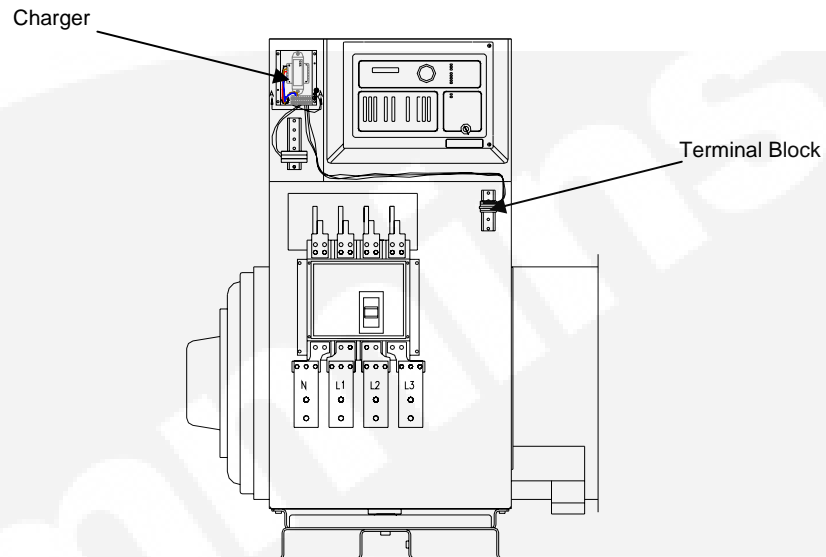


Figure 3-3

Position of Charger Installation for C350 to C550 Sets

3.5 Description

The charger provides automatic, current limited and voltage controlled charging of vented, lead acid batteries.

The control circuit ensures that the charger maintains the battery voltage at a pre-calibrated float level, whilst supplying any additional load current up to a specified maximum.



View on Arrow A

OUTPUT		INPUT		CHARGE FAIL				BOOST	
+	-	0	250	2	3	4	5	↓	↓
□	□	□	□	□	□	□	□	□	□

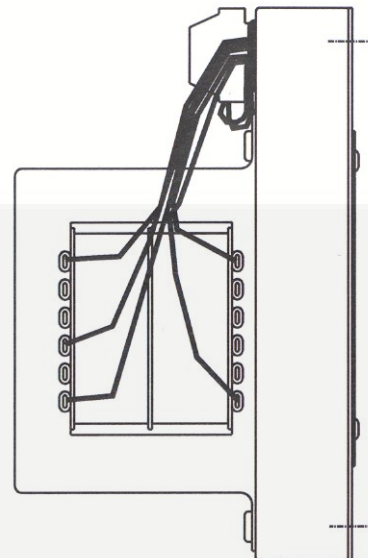
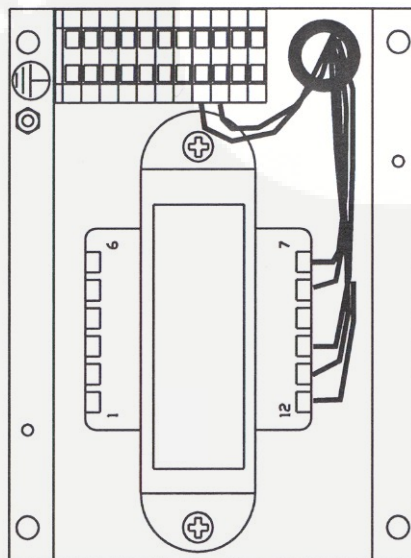


Figure 3-4 Battery Charger



3.6 Auto Boost (Equalising) Operation

Auto boost operation provides an increased output voltage when batteries are below a preset point. When the batteries reach the boost voltage, the charger reverts to its float voltage. This operation equalizes the batteries, maximizing battery life and capacity.

The charger monitors battery voltage and will initiate auto boost if the battery voltage falls below 12.5V DC (on a 12V battery). The charger switches to its increased boost output voltage stage until the battery reaches the set voltage (14.5V DC on a 12V battery). It will then switch to its float voltage of 13.8V DC.

3.7 Temperature Compensation

The remote temperature compensation provides control of the output voltage based upon the temperature. As the temperature increases the charging voltage is decreased at a negative coefficient of $3\text{mV}/^{\circ}\text{C}/\text{Cell}$.

The charger's output voltage is compensated dependent upon battery temperature. In high ambient temperatures the charging voltage is decreased to prevent gassing of battery, and in low temperatures the charging voltage is increased to prevent sulphating.

3.8 Self-resetting Polyfuse

The charger is fitted with a self-resetting polyfuse on its DC output. In the event of a short-circuit or reverse polarity, the fuse will trip preventing damage to the charger or equipment. Upon correct connection the fuse will reset and operate correctly.

3.9 Specification

On the input side, the charger is fitted with a 2A fuse for 240VAC, or 4A fuse for 120VAC.

Power Supply	
Nominal operating voltages	120V Units $\pm 6\%$ 230V Units $\pm 10\%$
Operating frequency	50-60Hz
DC Charge Output	
Maximum current ADC	5 10
Nominal voltage VDC	24 12
Float/boost voltages	See Table Below
Charge Fail Output	
Relay type	Volt free SPDT contacts relay de-energised on fault
Contact rating	1A @ 30V DC (resistive load)
General	
Operating temperature	-10 to +55°C
EMC emission/immunity	EN58801-2/EN50082-2

Battery Type	Float volts (V DC)	Boost volts (V DC)
12V Lead acid (6 cells)	13.6	14.1
24V Lead acid (12 cells)	27.2	28.2

Caution: *The battery charger is designed for use with vented lead-acid batteries only. These chargers are NOT suitable for valve regulated lead acid (VRLA) or sealed type cells.*

Note: *For vented, NiCad batteries please consult your authorised distributor.*



3.10 Operation

As the charge cycle commences, current is limited to the maximum allowable by the electronic control circuitry. As the battery becomes increasingly charged, the current demanded by the battery reduces proportionally, until the battery terminal float voltage equals the reference voltage of the charger at which point the charger maintains a trickle charge only, which is insufficient to either overcharge the battery or cause “gassing” effects.

A Boost Charge facility enables the constant voltage of the charger to be increased, allowing charge time to be reduced and periodic equalisation of battery cells to take place.

3.10.1 Circuits

For generator set specific Information refer to the drawings and circuits provided with your generator set.

3.10.1.1 C70 to C250 Sets

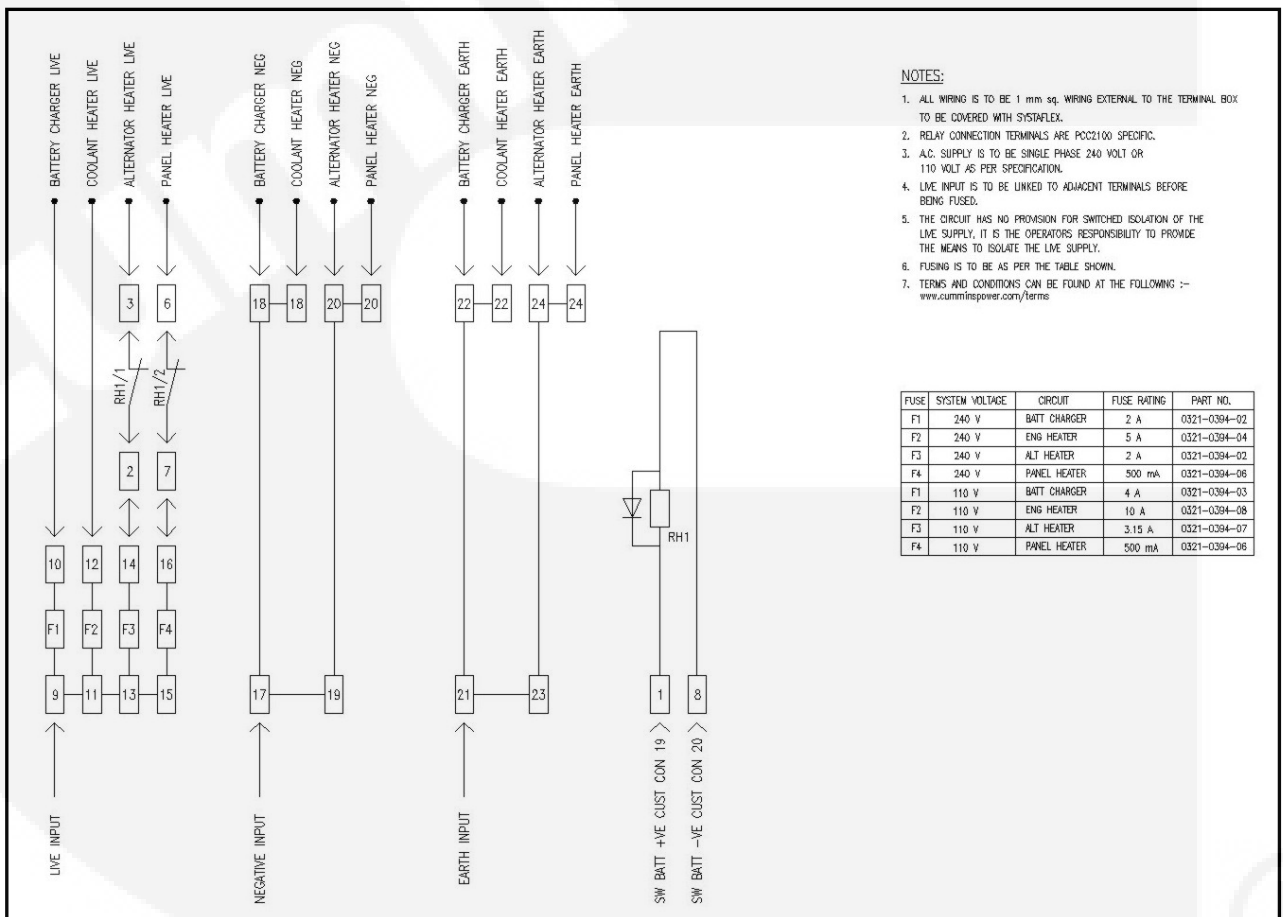


Figure 3-5 C70 to C250 WD Schematic

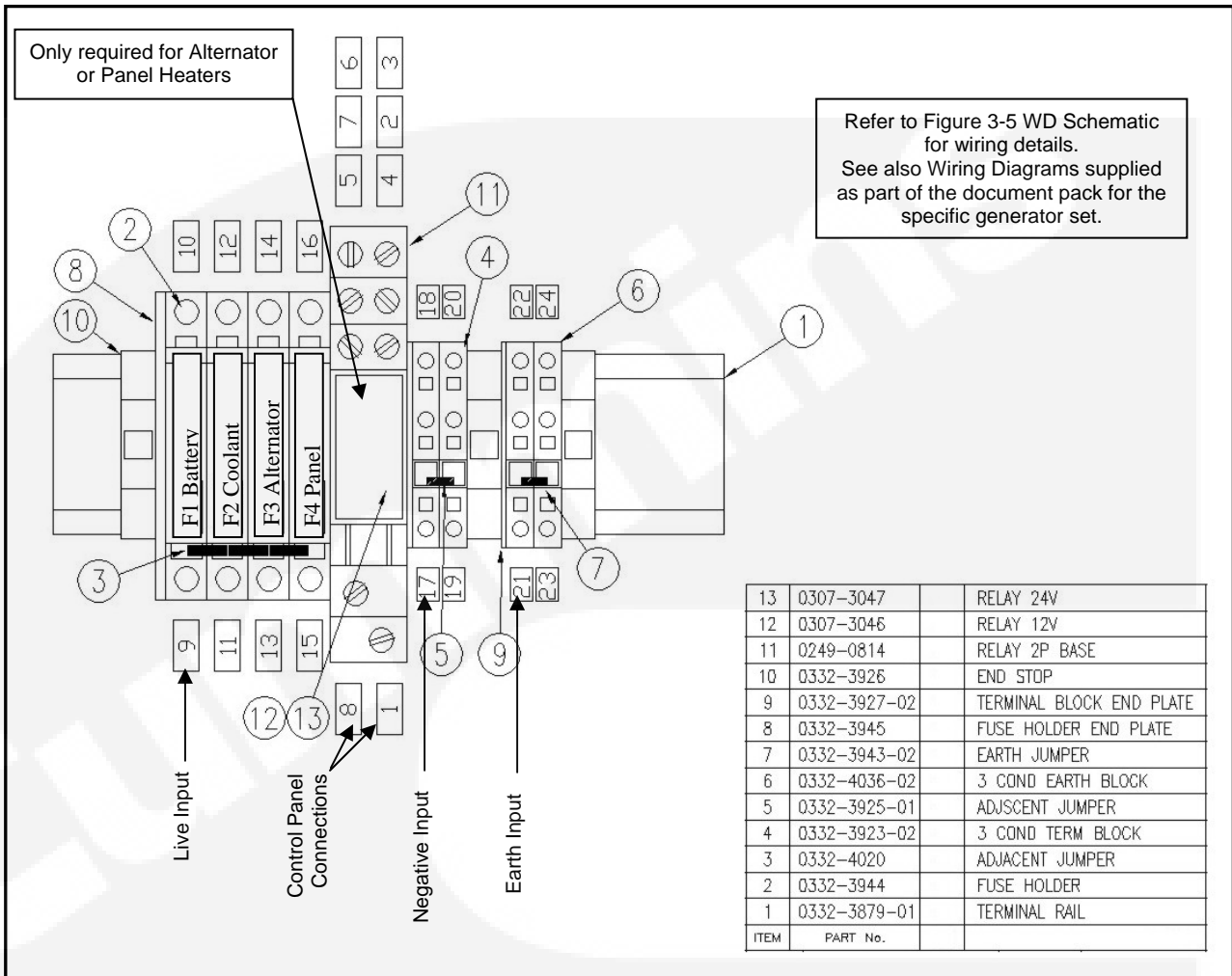


Figure 3-6 Terminal Assembly for C70 to C250 Sets

3.10.1.2 C250 to C330 Sets

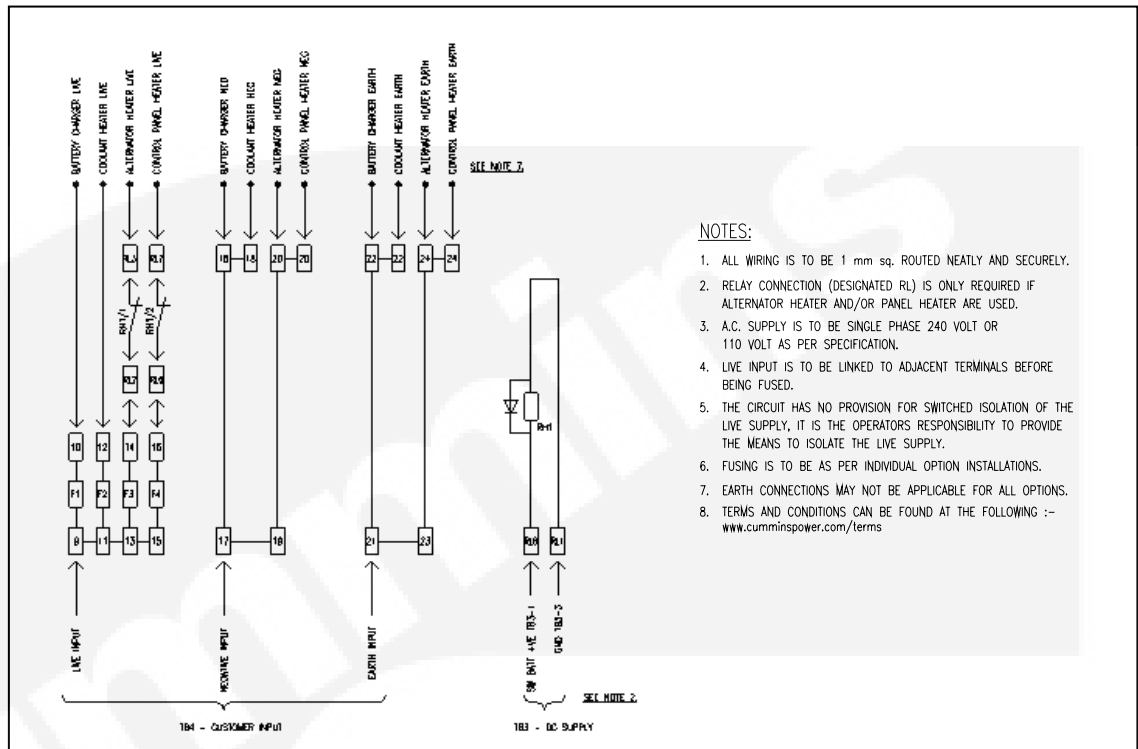


Figure 3-7 C250 to C330 WD Schematic

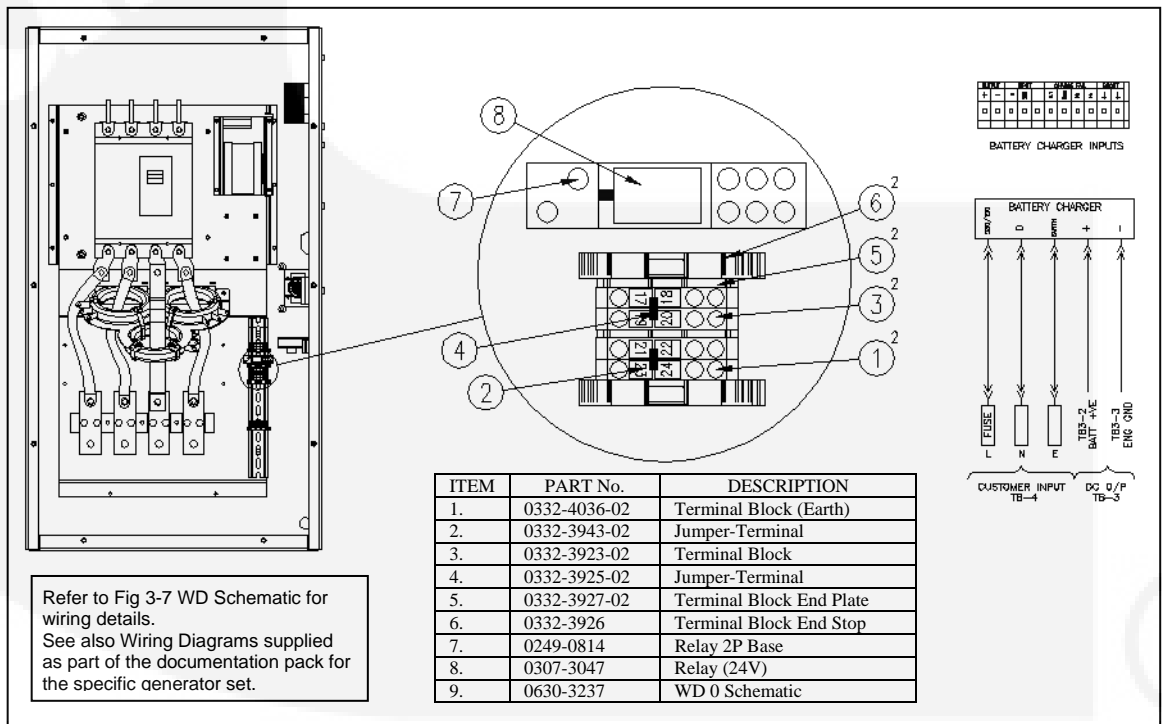


Figure 3-8 C250 to C330 Terminal Assembly

3.10.1.3 C350 to C550 Sets

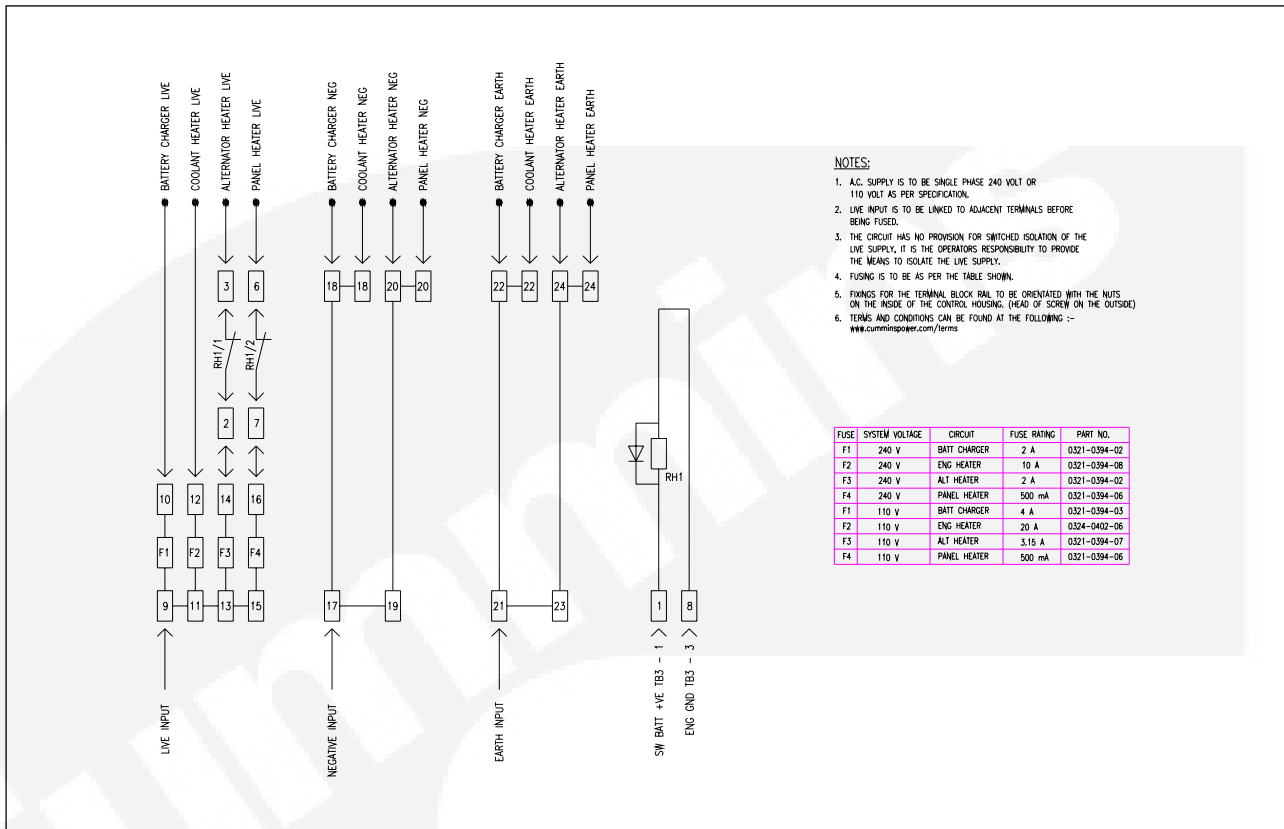


Figure 3-9 C350 to C550 WD Schematic

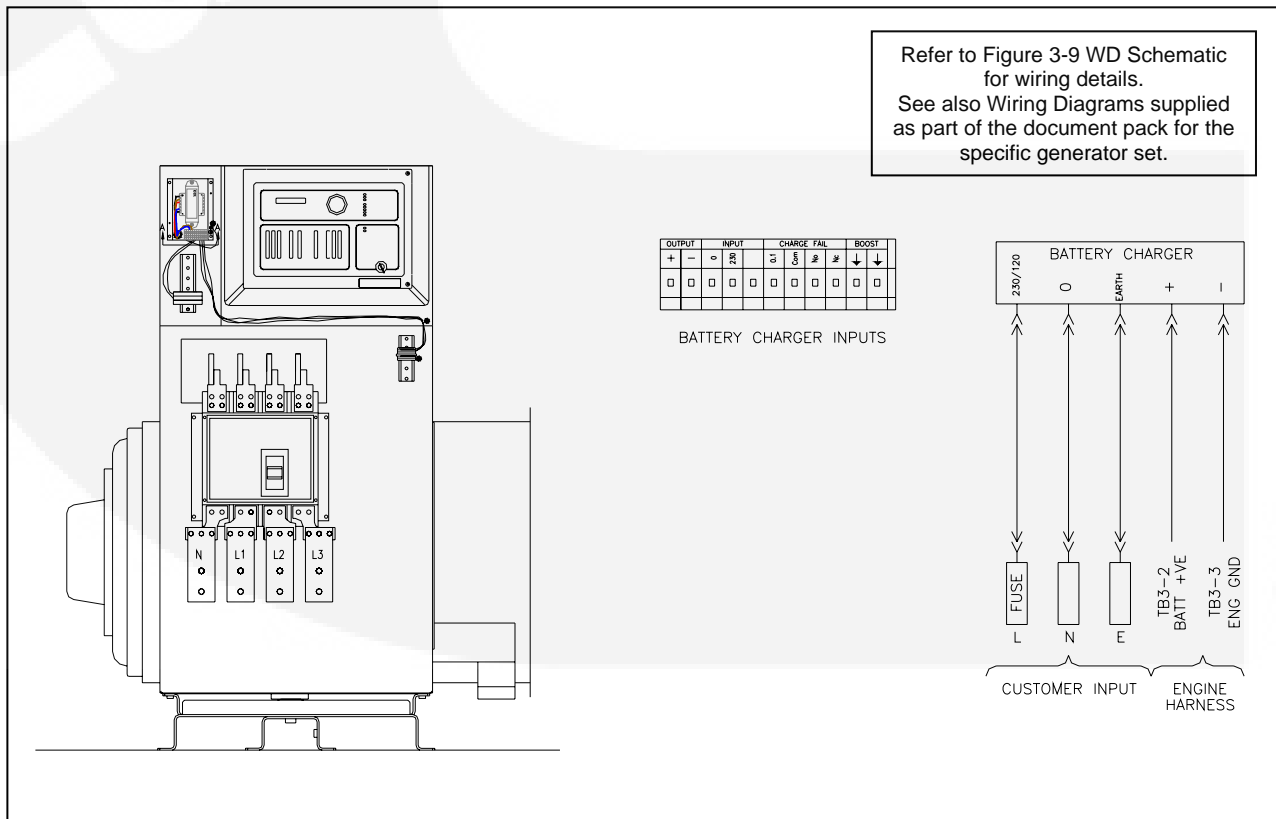


Figure 3-10 C350 to C550 Terminal Assembly

Cummins Power Generation
1400 73rd Avenue NE
Minneapolis
MN 55432
USA

Tel:+1 (763) 574-5000
Fax:+1 (763) 574-5298

e-mail: pgamail@cummins.com

Web: www.cumminspower.com

Cummins Power Generation
35A/1/2, Erandawana
Pune 411 038
India

Tel.: (91 020) 3024 8600
Fax: (91 020) 6602 8090

e-mail:
cpgiservicesupport@cummins.com

Web: www.cumminspower.com

Cummins Power Generation
Columbus Avenue
Manston Park
Manston
Ramsgate
Kent CT12 5BF
United Kingdom

Tel:+44 (0) 1843 255000
Fax:+44 (0) 1843 255902

e-mail:cpgk.uk@cummins.com

Web: www.cumminspower.com

Cummins Power Generation
Rua Jati, 310 - Cumbica
Guarulhos –SP
Brazil
CEP: 07180-900

Tel.: (55 11) 2186 4195
Fax: (55 11) 2186 4729

e-mail: falecom@cumminspower.com.br

Web: www.cumminspower.com

Cummins Power Generation
10 Toh Guan Road #07-01
TT International Tradepark
Singapore 608838

Tel: (65) 6417 2388
Fax:(65) 6417 2399

e-mail: cpg.apmktg@cummins.com

Web: www.cumminspower.com

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