

Ferro / SCR Retrofit Power Solution

Cost Effective Energy Efficiency Upgrade



- Preserves distribution and cabling investments
- Retrofits legacy ferro or SCR rectifiers
- Modern Galaxy SC and Millennium II controllers
 - Adaptive Rectifier Management (efficiency management)
 - Thermal compensation and battery management features
- Efficiency approaching 97%
- Integrated 10/100Base-T Ethernet as well as serial port for local or modem connectivity

The DC Power industry offered stand-alone 200, 400 and 800 ampere ferro-resonant rectifiers throughout the 1980s and 1990s. These legacy ferro-resonant rectifiers have since been discontinued by most manufacturers. The Ferro / SCR Retrofit Power Solution allows GE and third party legacy ferro-resonant or SCR rectifiers to be upgraded to modern energy-efficient switched mode rectifiers and controller technology while preserving existing cabling and distribution investments. Bolting patterns remain the same as well.

The Ferro / SCR Retrofit Power Solution (RPS) utilizes 595LT Total Efficiency™ rectifiers to improve energy efficiency and deliver centralized management visibility and control. The 595LT TE rectifiers offer next generation efficiency approaching 97% with the proven reliability heritage of 595 rectifiers deployed in telecom networks for the past 20 years. The 595LT TE rectifiers are managed by the modern Galaxy Millennium® SC or Millennium II controllers.

The RPS cabinet is designed to accommodate multiples of 220A 595LT rectifier utilizing the same floorspace of the existing ferro-based product. The top section of each RPS cabinet is carefully designed to offer the AC and DC connection points at the same physical location as the ferro being replaced, enabling the existing AC and DC cabling infrastructure to be re-used. RPS configurations enable back-to-back or side-by-side deployments. If a Galaxy SC controller is not already present, either a Galaxy Millennium SC or Millennium II controller must be added.

GE has designed RPS cabinets to replace many combinations of ferro and SCR rectifiers manufactured by Emerson/Lorain (RL and RHM series), Lineage Power and PECO II (3875 and 3876).

The Ferro / SCR Retrofit Power Solution provides a cost-effective upgrade for the installed base of legacy telecom power systems. The design of the RPS cabinet is optimized to minimize installation time and effort by limiting cabling or distribution changes. For most applications the retrofit process can be completed in a single work shift.

Benefits

Reliability

- Delivers decades of service
- Proven field performance
- Controller continuity

Intelligence

- Industry leading controller features
- Ethernet interface for remote access
- Centralized network management

Investment Protection

- Energy efficiency improvement
- Seamless integration with ferro plants
- Re-certify and re-warranty whole plant

On Time Delivery

- Turn-key retrofit service option including plant assessment
- Fast track deployment
- 24/7 technical support

Total Efficiency

The GE Total Efficiency™ (TE) architecture reduces energy loss and lowers cooling costs by 50-70%. TE products will prioritize sustainable energy sources like solar, wind, water and fuel cells over traditional utility grid or diesel generator sources – and they will intelligently respond to smart grid information to reduce consumption during peak demand periods. Active Rectifier Management (ARM) and Battery Charging Optimization (BCO) features increase efficiency on current and legacy power infrastructures. The Total Efficiency architecture addresses issues end-to-end based on our proven experience and expertise in batteries, power distribution, DC energy systems, AC-DC power supplies, and DC-DC board mounted power to deliver a solution that is more safe, reliable and energy efficient than competitive alternatives.



Specifications

Input	
Nominal Input Voltage - 595A/LTA - 595B/LTB	380 Vac/400 Vac/480 Vac, 3-wire plus ground 208 Vac/220 Vac/240 Vac, 3-wire plus ground
Input Current - 595A/LTA - 595B/LTB	15.7A @ 480Vac Nominal 36.3A @ 208Vac Nominal
Input Voltage Range (per phase-phase): - 595A/LTA - 595B/LTB	320 Vac to 530 Vac 176 Vac to 260 Vac
Input Frequency Range	47-63 Hz
Power Factor	>0.97 at >50% load
Total Harmonic Distortion	<5% at >50% load

Output	
Voltage Nominal	-48 Vdc
Voltage Adjust Range	-44 Vdc to -58 Vdc
Output Current (system maximum)	20,000A
Regulation (line and load range)	±0.5%
Ripple	<100 mVrms
Psophometric Noise	<2 mV

Mechanical	
Height (cabinet only)	72.0 in. (1,829 mm)
Width (cabinet only)	23.6 in. (600 mm) (List 102) 26 in. (660.4 mm) (List 112) 26 in. (660.4 mm) (List 113) 26 in. (660.4 mm) (List 201) 48 in. (1219.2 mm) (List 202) 24 in. (609.6 mm) (List 301) 24 in. (609.6 mm) (List 302) 24 in. (609.6 mm)
Depth (cabinet only)	23.6 in. (600 mm) (List 102) 32 in. (812.8 mm) (List 112) 32 in. (812.8 mm) (List 113) 32 in. (812.8 mm) (List 201) 23.5 in. (596.9 mm) (List 202) 30 in. (762 mm) (List 301) 35 in. (889 mm) (List 302) 35 in. (889 mm)
Weight for 72.0" cabinet (approximate)	485 lb (220 kg)

Environmental Specifications	
Operating Temperature	0°C to +50°C (32°F to 122°F)
Storage Temperature	-40°C to +85°C (-40 to 185 °F)
Operating Relative Humidity	5-95% non-condensing
Input Frequency Range	47-63 Hz
Power Derating	3% per °C from +55°C to +65°C
Altitude	4000M max

Safety and Standards Compliance	
NEBS	Evaluated by independent test lab with NRTL status to Telcordia GR63 and GR1089 (including level 3 testing)
Safety	UL Listed (US and Canada); UL Subject 1801 with applicable sections of UL1950/CSA3 950 Applicable sections of IEC950/EN60950 CE mark meets 72/23/EEC and 93/68/EEC directives
RoHS	Compliant to RoHS EU Directive 2002/95/EC
EMC	FCC and EN 55022, Class B; FCC, Class B
ESD	EN61000-4-2, Level 4

Ordering Information – Ferro / SCR Retrofit Power Solution

Understanding the Choices

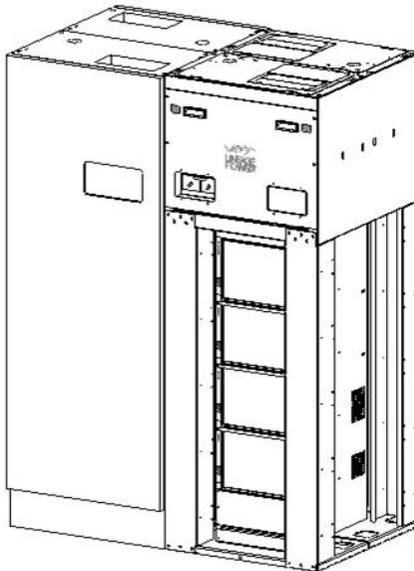
The RPS product line has been designed specifically for the replacement of ferro-resonant / SCR rectifiers. The numerous configurations allow the user to determine the exact match for the application. Besides recognizing the model number of the ferro-resonant / SCR rectifier and input voltage, it is important to recognize the installed orientation as part of the replacement strategy. Also when desired, 400 and 800 Amp models can be ordered with AC input breakers located on the face of each RPS unit.

All RPS selections assume the configuration will match the current AC and DC cable attachment locations that were in the original equipment design. However, local conditions, at the time of installation may have impacted the final installed design requiring the AC and DC cables to be replaced. Additionally, cable age and condition may also effect the local decision to reuse these cables or not.

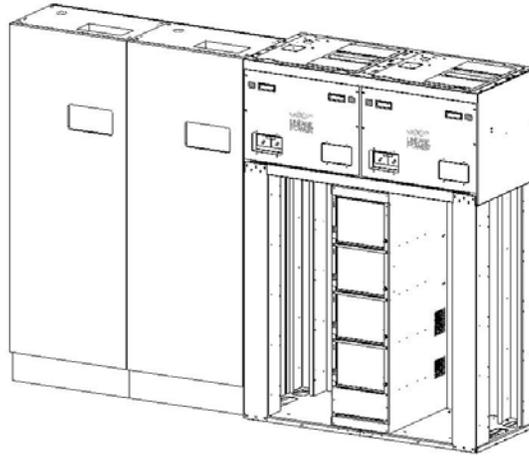
In addition to the listed replacement models, a portable power solution (Watts on Wheels - WOW) is also available. This product is designed to support temporary power needs during RPS transition or for situations needing additional temporary power.

The following graphics represent the RPS solution installed next to the existing ferro-resonant rectifiers as installed in the stated configurations.

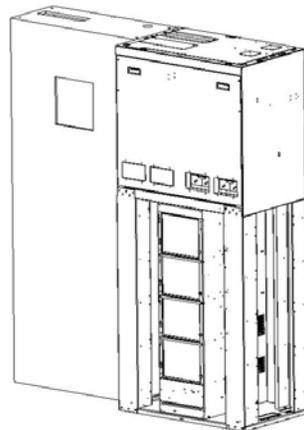
- **Back to Back (B2B):** Choosing a solution identified as B2B assumes when the original rectifiers were installed, they were aligned back to back. This single cabinet RPS solution replaces (two rectifiers) both the front and rear rectifiers and utilizes input and output cables as installed.



- **Side by Side (S by S):** Choosing the solution identified as S by S assumes when the rectifiers were installed, they were aligned side by side. This single cabinet RPS solution replaces (two rectifiers) side by side rectifiers and utilizes input and output cables as installed.



- **Single:** Or one-for-one replacement allows the user to replace one ferro-resonant rectifier at a time. This choice is exclusive to the 400 and 800 Amp RPS models. This single cabinet RPS solution replaces (one rectifier) and utilizes input and output cables as installed for each ferro-resonant rectifier.



Step 1: Choose Replacement Solution

Locate the in-service rectifier model identified in the first three columns. Choose the correct input voltage and orientation style (S by S, B2B or Single). Certain 400/800 Amp models can also be optioned with input AC Breakers.

Manufacturer	Model	Size	Ordering Code	J2010002-AD	Style	208/240V	480V	AC Breaker Option
TYCO	J85503B1L2 J85503B1L4 J85503B-2	200	CC109171732	L151	S by S	208/240	480	
			CC109171740	L152	B2B	208/240	480	
TYCO	J85503C1	400	CC109172103	L131	S by S	208/240	480	
			CC109172111	L131A	S by S	208/240		Yes
			CC109172128	L131B	S by S		480	Yes
			CC109172136	L132	B2B	208/240	480	
			CC109172144	L132A	B2B	208/240		Yes
			CC109172152	L132B	B2B		480	Yes
			CC109172160	L133	Single	208/240	480	
			CC109172177	L133A	Single	208/240		Yes
			CC109172185	L133B	Single		480	Yes
AT&T	J85503C2 J85503C3	400	CC109162244	L101	S by S	208/240	480	
			CC109171690	L101A	S by S	208/240		Yes
			CC109171708	L101B	S by S		480	Yes
			CC109162252	L102	B2B	208/240	480	
			CC109164694	L112	B2B	208/240		Yes
			CC109164843	L113	B2B		480	Yes
			CC109162260	L103	Single	208/240	480	
			CC109171716	L103A	Single	208/240		Yes
			CC109171724	L103B	Single		480	Yes
PECO	PEC3874L21 PEC3874L22	200	CC109172020	L451	S by S	208/240	480	
			CC109172037	L452	B2B	208/240	480	
PECO	PEC3875BL21 PEC3875BL22	400	CC109171930	L401	S by S	208/240	480	
			CC109171947	L401A	S by S	208/240		Yes
			CC109171955	L401B	S by S		480	Yes
			CC109171963	L402	B2B	208/240	480	
			CC109171971	L402A	B2B	208/240		Yes
			CC109171988	L402B	B2B		480	Yes
			CC109171996	L403	Single	208/240	480	
			CC109172004	L403A	Single	208/240		Yes
			CC109172012	L403B	Single		480	Yes
PECO	PEC3876	800	CC109172805	L483	1 for 1	208/240	480	
			CC109172821	L483B	1 for 1		480	Yes

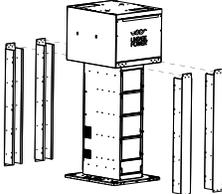
Note: Side by Side models are designed to use in single row side by side replacements. Due to dimensional differences, specify back to back models when rectifiers are back to back and side by side together.

Step 1: Choose Replacement Solution (cont.)

Manufacturer	Model	Size	Ordering Code	J2010002-AD	Style	208/240V	480V	AC Breaker Option
Lorain	RL200D50 RL200E50	200	CC109171914	L351	S by S	208/240	480	
			CC109170775	L352	B2B	208/240	480	
			CC109171922	L353	4pk	208/240	480	
Lorain	RL400D50 RL400E50	400	CC109165098	L301	S by S	208/240	480	
			CC109171848	L301A	S by S	208/240		Yes
			CC109171856	L301B	S by S		480	Yes
			CC109165107	L302	B2B	208/240	480	
			CC109171864	L302A	B2B	208/240		Yes
			CC109171872	L302B	B2B		480	Yes
			CC109171880	L303	Single	208/240	480	
			CC109171897	L303A	Single	208/240		Yes
Lorain	RHM800D50 RHM800E50	800	CC109172771	L283	1 for 1	208/240	480	
			CC109172796	L283B	1 for 1		480	Yes
Lorain	RHM400	400 SCR	CC109164711	L201	S by S	208/240	480	
			CC109164728	L201A	S by S	208/240		Yes
			CC109171765	L201B	S by S		480	Yes
			CC109163597	L202	B2B	208/240	480	
			CC109164323	L202A	B2B	208/240		Yes
			CC109171773	L202B	B2B		480	Yes
			CC109171781	L203	Single	208/240	480	
			CC109171798	L203A	Single	208/240		Yes
WATTS ON WHEELS			CC109171807	L203B	Single		480	Yes
			CC109171682	L003	Single	208/240	480	

Step 2: Select Zone 4 Kit (If Required)

Order 1 kit per cabinet where Zone 4 rating is required with B2B versions. *Zone 4 bracing kits are included with all S by S versions. Zone 4 kits are not required for B2B 200A rectifier replacements as the product meets the zone 4 requirement without the need of the kit.

-48V Distributed Architecture Primary (Control) Bays		
Ordering Code	Model	Picture
CC109166971	<p>Zone 4 Kit (Optional with all back to back versions) J2010002 L501 Required with applications that exceed Zone 2 classification. One kit required per base.</p>	

Step 3: Order Rectifiers

Rectifiers				
Output	Ordering Code	Model		Picture
	108979238	220A, 48Vdc output, 480Vac 3 Phase input rectifier		
220A		595LTA TE		
	108990405	220A, 48Vdc output, 208Vac 3 Phase input rectifier		
220A		595LTB TE		
	848693586	Spare rectifier fan assembly (2) required for each rectifier		

In applications where the RPS solution will be mixed with working ferro-resonant rectifiers, the site must be equipped with the Galaxy Millennium SC controller. The following six steps (Step 4A - 4F) will define the controller configuration.

If all the ferro-resonant rectifiers are removed, the standalone Millennium II may be used for the application. See Step 4G.

Step 4A: Select Controller

Ordering Code	Description	Photo
CC109169280	Galaxy Millennium SC Equipped with onboard M2 controller and BSL3_MSC Insulation displacement Alarm Block. (Up to (2) BJC1 or BJC2 circuit cards per system)	
	J2011002 L1	
CC109169272	Galaxy Millennium SC without M2 (Up to (2) BJC1 or BJC2 circuit cards per system) Requires Remote Galaxy Millennium II controller	
	J2011002 L2	

Step 4B: Select Ferro Rectifier Control Card

Ordering Code	Description	Photo
CC109167771	BJC1_MSC Monitoring board for ATT type rectifiers. Up to 8 Rectifiers per circuit card	
	J2011002 L21	
CC109167788	BJC2_MSC Monitoring board for non-ATT rectifiers. Up to 8 Rectifiers per circuit card	
	J2011002 L22	

Step 4C: Select Alarm Card

Note: List 1 and List 2 systems are E/W BSL3_MCS

Ordering Code	Description	Photo
CC109170123	BSL3_MSC Insulation Displacement Alarm Termination Board Included with List 1	
	J2011002 L40	
CC109170131	BSL4_MSC Wire-Wrap Alarm Termination Board Order separately as a field installed card	
	J2011002 L41	
CC109170362	BSM6 Modem E/W Power Connector Cable	
	J2011002 L81	
CC109130630	MCR1B-MCR2B M2 Controller Circuit Card Included with List 1	

Step 4D: Select Rectifier Interface Module (RIM)

Ordering Code	Description	Photo
108028671	For use with List 21, MSC style 24-pin cable, connects up to 8 Lineage ferros without enhanced communications	
	J2011002 L31	
108028697	For use with List 21, 40-pin cables, connect up to 8 J55 Series Lineage ferros with enhanced communications	
	J2011002 L32	
108028689	For use with List 22, 40-pin, connects up to 8 commercial ferro rectifiers with shunt signals	
	J2011002 L34	
108572660	For use with List 22, 40-pin, connects up to 8 ECS style SMR ferro rectifiers with shunt signals	
	J2011002 L35	

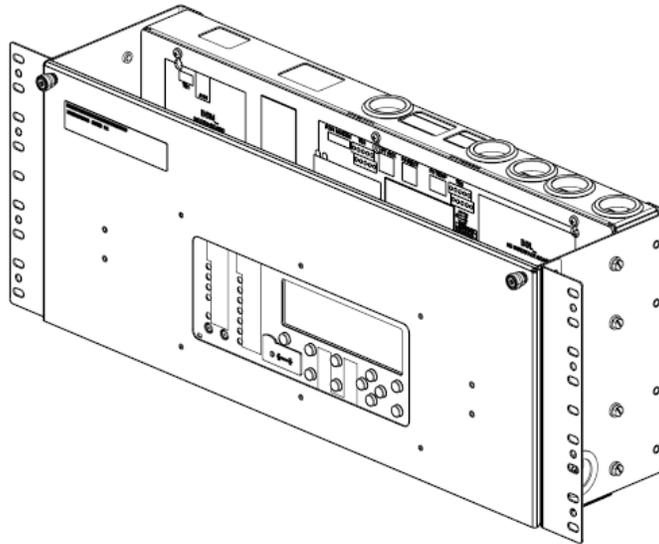
Step 4E: Select Control Cables

Ordering Code	Description	List
H285-226 G63 Control Cable (Commercial RIM) all commercial rectifiers		
108967290	60 ft long, H285 G62 control cable (Commercial RIM). All commercial rectifiers For use with L34	List 150
108969486	100 ft long, H285 G62 control cable (Commercial RIM). All commercial rectifiers For use with L34	List 151
H285-226 G60 Control Cable (Ferro Enhanced RIM) J8550x -48V Ferro or J85702H -48V PXS with GCM Interface		
108967258	35 ft long, H285-226 G60 control cable (Ferro Enhanced RIM) J8550X -48V Ferro or J85702H -48V PXS with GCM interface. For use with L32	List 152
108967274	60 ft long, H285-226 G60 control cable (Ferro Enhanced RIM) J8550X -48V Ferro or J85702H -48V PXS with GCM interface. For use with L32	List 153
108969478	100 ft long, H285-226 G60 control cable (Ferro Enhanced RIM) J8550X -48V Ferro or J85702H -48V PXS with GCM interface. For use with L32	List 154
H285-226 G5 Control Cable (MCS Compatible RIM) J8550x -48V Ferro or J85702H -48V PXS with GCM Interface		
108967175	15 ft long, H285-226 G5 control cable (MSC compatible RIM) J8550X -48V Ferro or J85702H -48V PXS with GCM interface For use with L31	List 155
108967183	25 ft long, H285-226 G5 control cable (MSC compatible RIM) J8550X -48V Ferro or J85702H -48V PXS with GCM interface For use with L31	List 156
108967191	35 ft long, H285-226 G5 control cable (MSC compatible RIM) J8550X -48V Ferro or J85702H -48V PXS with GCM interface For use with L31	List 157
108967217	60 ft long, H285-226 G5 control cable (MSC compatible RIM) J8550X -48V Ferro or J85702H -48V PXS with GCM interface For use with L31	List 158
108969460	100 ft long, H285-226 G5 control cable (MSC compatible RIM) J8550X -48V Ferro or J85702H -48V PXS with GCM interface For use with L31	List 159
108967316	40 ft long, H285-226 G61 control cable (SMR compatible RIM) J85702B-2 L-5 -48V SMR shelf with 364A (50A SMR shelf) For use with L35	List 160
108967308	40 ft long, H285-226 G63 control cable (SMR compatible RIM) J85702E-2 -48V SMR For use with L35	List 161
Serial Cables for List 2 (with remote M2)		
847690799	10' serial	List 200
847865425	25' serial extension cable includes coupler	List 201

Step 4F: Order Standalone Millennium II Controller

Note: This controller option can only be used if all ferro-resonant rectifiers are removed.

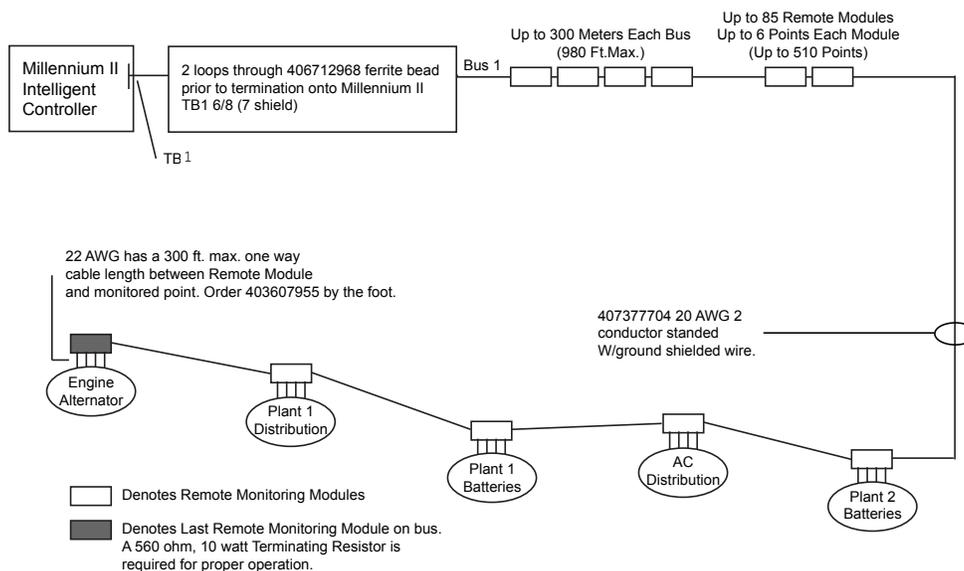
Millennium II Rack Mount Controller	
Ordering Code	Description
CC109132024	Millennium II Controller in a rack mount configuration (for switch mode rectifiers only)
CC109111077	Millennium II spare controller circuit card, MCR1B-MCR2B



Step 5: Select Remote Peripheral Monitoring Options

Ordering Code	Description			Photo
Modules	# Inputs	# Temp		
108469461	J85501G1L21 RPM Shunt Monitoring (221F)	6	1	
108469479	J85501G1L22 RPM Voltage 0-200VDC (221D)	6	1	
108469495	J85501G1L23 RPM Transducers (221J)	6	1	
108298431	J85501G1L24 RPM Voltage 0-3VDC (221A)	6	1	
108298498	J85501G1L25 RPM Voltage 0-16VDC (221B)	6	1	
108469503	J85501G1L26 RPM Voltage 0-70VDC (221C)	6	1	
108298449	J85501G1L27 RPM Binary (222A)	6	1	
108483538	J85501G1L28 RPM Temperature (223T)	0	7	
108298456	J85501G1L9 RPM Control Relay (214A)	3	0	
Supporting Material				
407377704	Connecting Cable for RPMs (Order by foot)			
848535332	Blue panel for mounting 6 modules above a GPS cabinet			
847307410	12' Cable to be used with Temperature Probes			
847917879	½" Diameter Ring Terminal Temperature Probe (Cable Required)			
848528881	5/16" Diameter Ring Terminal Temperature Probe (Cable Required)			
405298308	Termination Resistor (1 per bus)			
406712968	Ferrite Bead (1 per bus)			
403607955	Monitor Channel cable KS13385 22AWG stranded pair, R&Bk (order by the foot)			
108984477	23" grey panel, 6 RPM mounting panel for Lorain plants			

Millennium Remote Monitoring



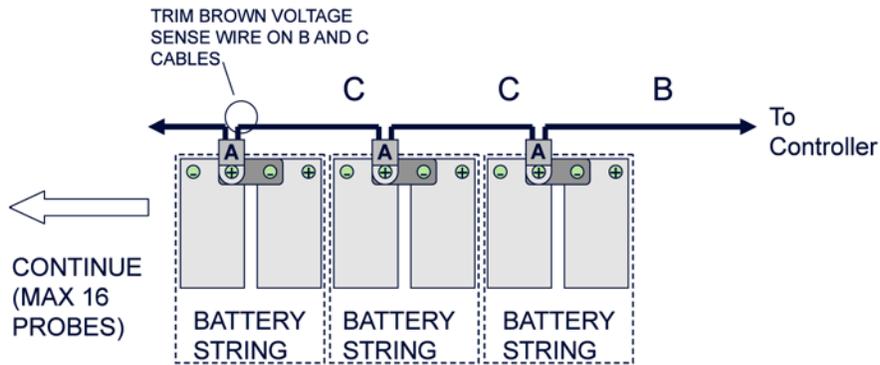
Step 6: Select Optional AC Monitoring Equipment

AC Monitoring Options		
Ordering Code	Description	Photo
Configured Panels		
CC408646005	3P/3W 208/240V Line to Line, 10x12x14 box provides current, voltage, and power	
CC408646046	3P/3W 480V Line to Line, 10x12x14 box provides current, voltage, and power	
CC408646054	3P/4W 208V Line to Neutral, 10x12x14 box provides current, voltage, and power	
Transducers		
CC408645808	1-phase AC Current Transducer (Built-in CT; 150A max current; 350 kcmil max conductor size)	
CC408645816	1-phase AC Voltage Transducer 120V	
CC408645824	1-phase AC Voltage Transducer 208/240V	
CC408644537	3-phase AC Voltage Transducer 208/240V Line to Line	
CC408645741	3-phase AC Voltage Transducer 208/240V Line to Neutral (120V)	
CC408645832	3-phase AC Voltage Transducer 480V Line to Line	
CC408645840	3-phase AC Current Transducer	
Current Transformers (Required for configured panels and current transducers)		
CC408645857	Current Transformer, 200A primary, 5A secondary, 4 in inside diameter	
408524862	Current Transformer, 400A primary, 5A secondary, 4 in inside diameter	
CC408645865	Current Transformer, 600A primary, 5A secondary, 6 in inside diameter	
CC408645873	Current Transformer, 800A primary, 5A secondary, 6 in inside diameter	
CC408645881	Current Transformer, 1000A primary, 5A secondary, 8 in inside diameter	
CC408645898	Current Transformer, 1200A primary, 5A secondary, 8 in inside diameter	
Miscellaneous		
CC408645907	Barrier terminal block to extend the CT secondary leads beyond their 12 ft factory length. Use 12 AWG THHN wire in conduit.	
CC408645915	Bud Industries Wall Box (12H x 10W x 8D) w/captive screw cover & internal mounting panel. For mounting transducers	

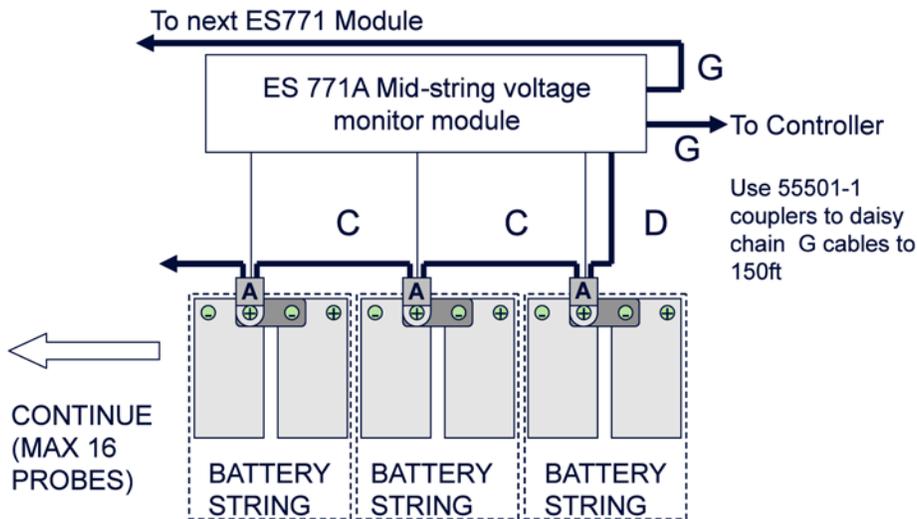
Step 7: Select Battery Monitoring

Ordering Code	Description	Photo
CC109142980	QS873A Thermal Probe (A)	
CC848817024	10 ft wire set (B: thermal probe to controller)	
CC109157434	20 ft wire set (B: thermal probe to controller)	
CC848822560	1 ft wire set (C: thermal probe to thermal probe)	
848719803	5 ft wire set (C: thermal probe to thermal probe)	
CC848822321	10 ft wire set (C: thermal probe to thermal probe)	
850027334	20 ft wire set (C: thermal probe to thermal probe)	
108958422	ES771A Battery Voltage Monitor Card	
CC848791517	2-1/2 ft wire set (D: ES771A to thermal probe)	
CC848797290	6 ft wire set (D: ES771A to thermal probe)	
848719829	10 ft wire set (D: ES771A to thermal probe)	
CC848791500	4 ft wire set (G: ES771A to ES771A or controller)	
848652947	10 ft wire set (G: ES771A to ES771A or controller)	
555052-1	In-Line Coupler (for extending item G above)	

Temperature/Voltage probes are needed for battery monitoring. They are connected to each battery or battery string to provide slope thermal compensation, temperature alarms and voltage imbalance alarms.



Temperature Measurement



Temperature and Voltage Measurement

Management Visibility

Galaxy Manager™ software is the centralized visibility and control component of a comprehensive power management system designed to meet engineering, operations and maintenance needs. The Galaxy Manager client-server architecture enables remote access to system controllers across the power network.

- Dashboard display with one-click access to management information database
- Trend analysis
- Scheduled or on demand reports
- Fault, configuration, asset, and performance management

Training

GE Energy offers on-site and classroom training options based on certification curriculum. Technical training can be tailored to individual customer needs. Training enables customers and partners to more effectively manage and support the power infrastructure. We have built our training program on practical learning objectives that are relevant to specific technologies or infrastructure design objectives.

Service & Support

GE Energy field service and support personnel are trusted advisors to our customers – always available to answer questions and help with any project, large or small. Our certified professional services team consists of experts in every aspect of power conversion with the resources and experience to handle large turnkey projects along with custom approaches to complex challenges. Proven systems engineering and installation best practices are designed to safely deliver results that exceed our customers' expectations.

Warranty

GE Energy is committed to providing quality products and solutions. We have developed a comprehensive warranty that protects you and provides a simple way to get your products repaired or replaced as soon as possible.

For full warranty terms and conditions please go to www.ge.com/powerelectronics.



Contact Us

For more information, call us toll free at **+1 877 546 3243**, or +1 972 244 9288 and visit us on the web at www.ge.com/powerelectronics