GP100 split output Modbus shelf

Model: J2014001L511S; J2014001L511S-Y

Description

The J2014001L5xx shelves provides the supporting enclosure for two GP100L3B54TEZ rectifiers with Modbus communication over RS485. The shelf is designed to be mounted into standard 19” enclosures, the shelf comes with adjustable mounting ears that provide either flush-front or further-forward positioned arrangements.

Features

- Mounts into standard 19” EIA-310-Dracks
- Single AC input feed (200~240V Delta +PE) & for 5W AC input refer AC connection detail section
- Separate 48V/6KW DC output on each side
- Active current sharing of shelf outputs when multiple shelf connected (Refer section shelf to shelf connection)
- Isolated output feed may be grounded to allow for both polarities
- Common +5V standby power & Logic GND isolated from the main output
- Adjustable mounting ears for flush or set back positions
- Supports hot swapping of modules
- Accommodates mechanical latching into the slot
- Common Modbus (over RS485) communications with address-setting switch
- Independent signal connector from each rectifier
- Supports vertical installation-anti-lift feature
- UL Recognized*
- Shock & Vibration: Meets IPC 9562 Class II standards
- SEMI-F47

Note: These units are to be used with TN-S power systems only.

* UL is a registered trademark of Underwriters Laboratories, Inc.

† CSA is a registered trademark of Canadian Standards Association.

§ This product is intended for integration into end-user equipment. All CE marking procedures of end-user equipment should be followed. (The CE mark is placed on selected products.)

** ISO is a registered trademark of the International Organization of Standards.

Document: 8600483972P

Safety Statements

- Insulation rating: 90°C minimum
- Size AC field-wired conductors with 75°C ampacity (NEC).
- Field-wired Conductors – Follow all National Electric Code (NEC) and local rules and regulations.
- Electrical Connection Securing: Torque to the values specified on labels or in the product documentation.
- A separate protective Earthing terminal is provided at each input terminal block of the shelf,
  - The building installation shall provide a means for connection to protective earth; and the equipment is to be connected to that means; and a SERVICE PERSON shall check whether or not the source from which the equipment is to be powered provides a connection to the building protective earth.
  - If not, the SERVICE PERSON shall arrange for the installation of a PROTECTIVE EARTHING CONDUCTOR from the separate protective Earthing terminal to the protective earth wire in the building.
- Personal protective and safety equipment must be used all the time.

Déclarations de sécurité

- Indice d'isolation : 90°C minimum
- Taille des conducteurs câblés sur site CA avec une intensité admissible de 75 °C (NEC).
- Conducteurs câblés sur site - Suivez tous les codes nationaux de l'électricité (NEC) ainsi que les règles et réglementations locales.
- Sécurisation des connexions électriques : serrez aux valeurs spécifiées sur les étiquettes ou dans la documentation du produit.
- Une borne de terre de protection distincte est prévue sur chaque bornier d'entrée de l'étagère,
  - L'installation du bâtiment doit fournir un moyen de connexion à la terre de protection ; et l'équipement doit être connecté à ce moyen ; et une PERSONNE DE SERVICE doit vérifier si la source à partir de laquelle l'équipement doit être alimenté fournit ou non une connexion à la terre de protection du bâtiment.
  - Dans le cas contraire, le PERSONNEL D'ENTRETIEN doit organiser l'installation d'un CONDUCTEUR DE TERRE DE PROTECTION depuis la borne de mise à la terre de protection séparée jusqu'au fil de terre de protection dans le bâtiment.
- Les équipements de protection individuelle et de sécurité doivent être utilisés à tout moment.

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only; functional operation of the device is not implied at these or any other conditions in excess of those given in the operations sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect the device reliability.

Parameter	Symbol	Min	Max	Unit
Input Voltage: Continuous	V_{IN}	0	310	V_{AC}
Operating Ambient Temperature	T_A	-10	50	°C
Storage Temperature	T_{stg}	-40	85	°C
I/O Isolation voltage to Frame (100% factory Hi-Pot tested)			2500	V_{DC}

Electrical Specifications

Unless otherwise indicated, specifications apply overall operating input voltage, load, and temperature conditions.

INPUT

Parameter	Symbol	Min	Typ.	Max	Unit
Operational Range (3Ø Delta + PE)	V_{IN}	176	200-240	275	V_{AC}
Frequency Range	F_{IN}	47	50/60	63	Hz
AC Input Current (3Ø - all phases operational) Full load	I_{IN}		35	45	A_{AC}
Recommended AC Breaker Size @200V_{AC} @240V_{AC}			50		A_{AC}
Leakage Current [Per Ø, 230V_{AC}, 60Hz - for shelf (Two rectifier units)]	I_{IN}			14.0	mA
Isolation (per EN62368) Input – Output Input – Chassis/Signals	V	 5000 2500			 V_{DC} V_{DC}

MAIN OUTPUT

Parameter	Symbol	Min	Typ.	Max	Unit
Total output power (Split DC output 6KW each)	W	0	-	12,000	W
Factory set default set point L511Sx	V		48		V_{DC}
Max output current (125A each@50°C)	I_{OUT}			250	A_{DC}
Isolation Output Chassis	V	100			V_{DC}

AUXILIARY OUTPUT

Parameter	Symbol	Min	Typ.	Max	Unit
Set point	V_{OUT}		5		V_{DC}
Overall Regulation		-5		+5	%
Output current	I_{OUT}	0		2	A_{DC}
Ripple and Noise (20mHz bandwidth)			50	100	mV_{p-p}
Over-voltage Clamp				7	V_{DC}
Over-current Limit		110		225	%FL
Aux Output Chassis	V		TBD		V_{DC}

Technical Specifications J2014001L511Sx (Continued)

General Specifications

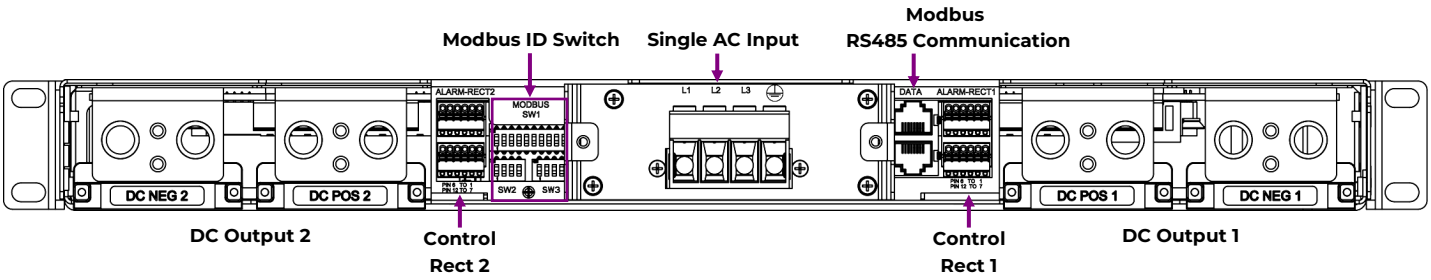
Parameter	Min	Typ.	Max	Units	Notes
Service Life		10		Yrs	Full load, excluding fans
Unpacked Weight		5.2 / 11.5		Kgs/Lbs	
Packed Weight		7.9 / 17.4		Kgs/Lbs	
Safety/Standards Compliance					
Safety Standards	ANSI/UL* 62368-1 and CAN/CSA† C22.2 No. 62368-1 Recognized				
Certification Marks	UL Recognized (Canada and U.S.)				

Environmental Specifications

Parameter	Min	Typ.	Max	Units	Notes
Ambient Temperature					Air inlet from sea level to 2000m (~6500 feet)
Operating	-10		50	°C	No derating up to 50°C
Storage	-40		85	°C	
Humidity					
Operating	5		95	%	Relative humidity, non-condensing
Storage	5		95	%	
Shock and Vibration acceleration			6	Grms	IPC9592 Class II

Technical Specifications J2014001L511Sx (Continued)

Shelf terminations



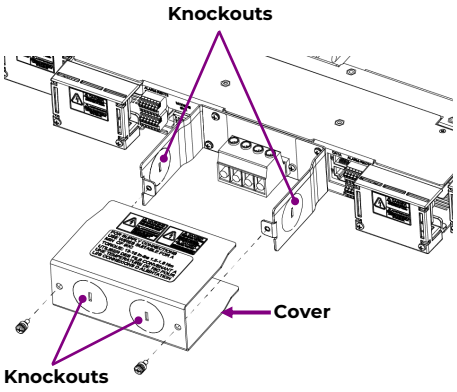
AC Input Connections

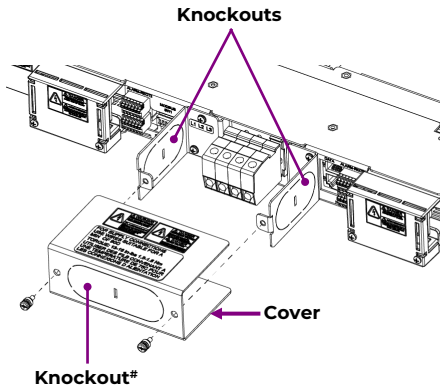
Wire size: 8 (65A) AWG

Torque: 13-16 In-lb. (1.47-1.80 Nm)

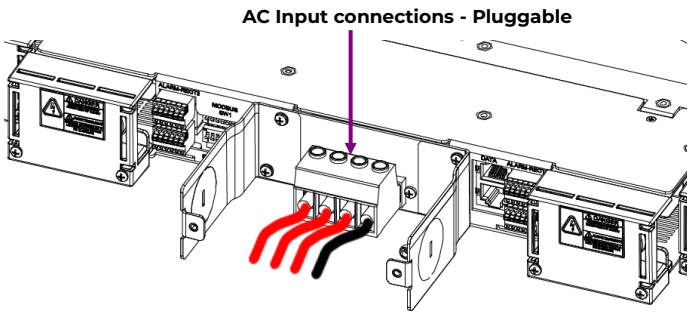
Min strip length: 3/8 inch

Recommended Branch Protection AC Breaker Rating: 50Amp





#After removal of knockout install grommet (Shipped loose).



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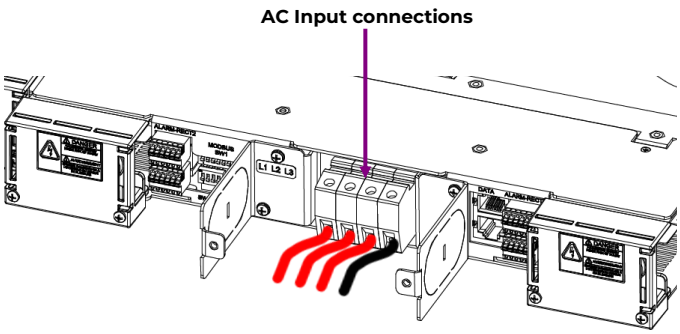


J2014001L511S-Y

Warning: High leakage current

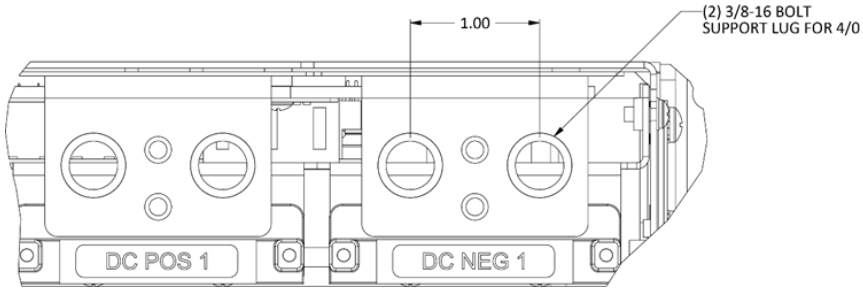
Potential touch current: 14.0mA

Note: For 5-wire AC input(L1, L2, L3, N & GND) no need to run the neutral connection to shelf.

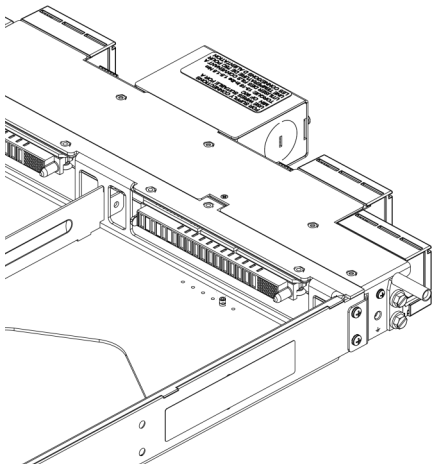
In case of phase lose the system may not work.

DC Output Connections for DC POS 1 & DC POS 2

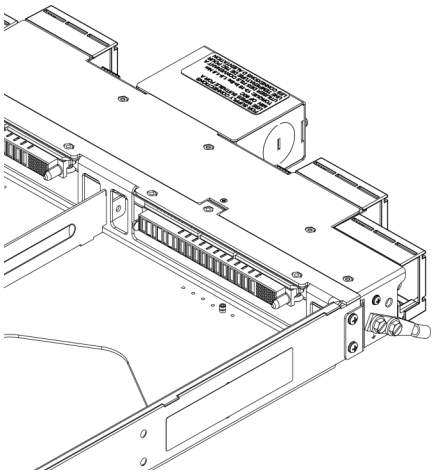
Wire size: 1/0 AWG Minimum
4/0 AWG Maximum
Lug landings: 3/8-16 double hole on 1 inch center
Torque: 240±12 In-lb. (27.12 Nm)



Ground Connections



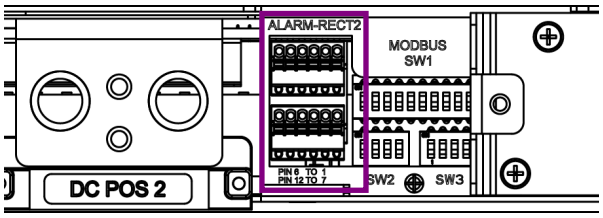
With 90° Lug connections



With 45° Lug connections

Wire size: 6AWG
SCREW MCH #10-32
Lug landings: #10 double hole on 0.625 inch center
Torque: 30±1.5 In-lb. (3.4Nm)

Control & Alarm Signals



Connector: Phoenix Contact part #1894846
Plug-in mate: Phoenix Contact part #1881367

Control & Alarm Signals (Continued)

Alarm connector: ALARM-RECT 1, ALARM-RECT 2 Connector

Pin	Signal	Pin	Signal
1	5VA	7	FAULT_1
2	LOG_GND	8	PG_1
3	ISHARE_1	9	MODULE_PRESENT_1
4	LOG_GND	10	EXT_RTN_1
5	VPROG_1	11	REMOTE1 ON/OFF
6	LOG_GND	12	N/A

In the above table,
ISHARE reference to V_{OUT}-.
5VA, VPROG1 and Remote ON/OFF are signals reference to the Logic-GND.
The signal FAULT, PG, MODULE-PRESENT are Opto isolated on shelf and details of the same is in below table.
*For signals referring the LOG_GND, please refer the rectifier data sheet.

Alarm connector pin values

Parameter	Symbol	Min	Typ	Max	Unit
REMOTE ON/OFF (Referenced to logic_gnd)					
Main output OFF	V_{OUT}	2.5		12	V_{DC}
Main output ON	V_{OUT}	0		0.4	V_{DC}
VPROG (Vprog Margining) (Referenced to logic_gnd)					
Output voltage range	V_{OUT}	44		58	V_{DC}
Voltage control range	$V_{control}$	0		3.3	V_{DC}
Programmed output voltage range	V_{OUT}	44		58	V_{DC}
Voltage adjustment resolution (12-bit A/D)	$V_{control}$		3.3		mV_{DC}
Output configured to $54V_{DC}$	$V_{control}$	3.0		3.3	V_{DC}
Output configured to $44V_{DC}$	$V_{control}$	0		0.1	V_{DC}
ISHARE (Only applicable if shelves are stacked non-Isolated) Single wire connection between rectifiers Signal referenced to Vout(-), no external components to be used on this signal	V	0	-	3.3	V_{DC}
FAULT (Referenced to EXT_RTN)					
Logic HI (No fault is present)	V	2.4	-	28	V_{DC}
Logic LO (Fault is present)	V	0	-	0.4	V_{DC}
*The voltage input must be externally current limited to max of 10mA					
POWER GOOD (PG) (Referenced to EXT_RTN)					
Logic HI (No fault is present)	V	2.4	-	28	V_{DC}
Logic LO (V_O is out of regulation)	V	0	-	0.4	V_{DC}
*The voltage input must be externally current limited to max of 10mA					
MODULE PRESENT (Referenced to EXT_RTN) Normal operation					
Logic HI (Rectifier Module is present)	V	-		0.4	V_{DC}
Logic LO (Rectifier Module is not present)	V	2.4	-	28	V_{DC}
*The voltage input must be externally current limited to max of 10mA					

Control & Alarm Signals (Continued)

$5V_{DC}$ Standby Output

It supports the $5V_{DC}$ auxiliary output with max of 2Amp available on the Alarm connector 1 and Alarm connector 2 for more technical spec please refer the rectifier datasheet. It is protected with the PTC for overload protection at shelf backplane.

Remote On/Off

Remote on/off main output with system control. Logic low to turn on main output and Logic High to turn off in 100-200ms.

Vprog

Voltage programming (Vprog): Hardware voltage programming controls the output voltage until a software command to change the output voltage is executed. Software voltage programming permanently overrides the hardware margin setting and the rectifier no longer listens to any hardware margin settings until power to the controller is interrupted, for example if input power or bias power is recycled.

When bias power is recycled to the controller the controller restarts into its default configuration, programmed to set the output as instructed by the Vprog pin.

2.2K resistor is connected between Vprog and LGND inside shelf to get default $48V_{DC}$ output.

Note: Refer rectifier datasheet for details on this signal.

I_share

Load share (Ishare): This is a single wire analog signal that is generated and acted upon automatically by rectifiers connected in parallel. Ishare pins should be connected to each other for rectifiers, if active current share among the rectifiers is desired. No resistors or capacitors should get connected to this pin. This pin is referenced to Vout(-).

Status Signals

Power Good: This signal is HI when the main output is delivered and goes LO if the main output is out of regulation.

Fault: This signal representing whether a Fault occurred. This signal goes LO for any failure.

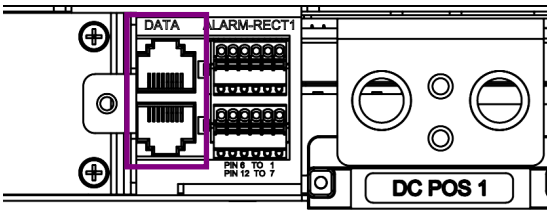
Communication signals

Modbus RS485 DATA Connector (RJ45 type)

This connector is used to interconnect communications lines between shelves as well as to connect to external devices over RS485 Modbus.

Connector (or equivalent): Samtec MODM-B-02-8P8C-L-S4.

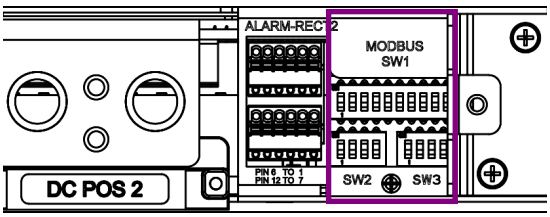
Pin	Signal	Pin	Signal
A1		B1	
A2		B2	
A3		B3	
A4	RS485_B	B4	RS485_B
A5	RS485_A	B5	RS485_A
A6		B6	
A7		B7	
A8	Logic_GND	B8	Logic_GND



Communication signals (Continued)

Modbus Register

Refer GP100L3B54TEZ datasheet for Modbus register information.



Setting MODBUS ID

10s	1s
X	X

The rectifiers MODBUS IDs are factory default to '11' and '12'respectively.

However, The 2-digit MODBUS ID for each rectifier(GP100L3B54TEZ) can be re-assigned with help from ID switches SW1, SW2 and SW3.

The SW1 (10 position) switch sets the MODBUS ID for tens place, and it same for both the rectifier module.

within the shelf. The switch SW1 can be used to set any value between 0 to 9.

The ON position for SW1-1 to SW1-9 set the digit 1 to 9 respectively and SW1-10 ON position represents the '0'.

The left rectifier (view from front) one's place can be set using the SW2 four position switch, the switch positions SW2-1 to SW2-4 allows to set the ones place for 1,3,5 and 7 respectively.

Similarly, The right rectifier (view from front) one's place can be set using the SW3 four position switch, the switch positions SW3-1 to SW3-4 allows to set the ones place for 2, 4, 6 and 8 respectively.

e.g., Switch SW1-2 is ON will set the tens place to 2. SW2-2 is ON will set the ones place to 3 and SW3-2 ON will set the ones place for right rectifier to 4.

Thus, the MODBUS ID assigned to left rectifier and right rectifier (View from front) will have MODBUS ID 23 and 24, respectively.

Note: Switches SW1, SW2, and SW3 are multi position switches, however each switch should only have only one 'ON' position at any given point of time to set rectifier IDs.

SW1 Switch Position

10s Place	SW1-1	SW1-2	SW1-3	SW1-4	SW1-5	SW1-6	SW1-7	SW1-8	SW1-9	SW1-10
1	ON									
2		ON								
3			ON							
4				ON						
5					ON					
6						ON				
7							ON			
8								ON		
9									ON	
0										ON

SW2 Switch Position

1s Place	SW2-1	SW2-2	SW2-3	SW2-4
1	ON			
3		ON		
5			ON	
7				ON

SW3 Switch Position

1s Place	SW3-1	SW3-2	SW3-3	SW3-4
2	ON			
4		ON		
6			ON	
8				ON

ON
OFF

Rectifier Installation

Caution: The rectifier latch is not a carrying handle.

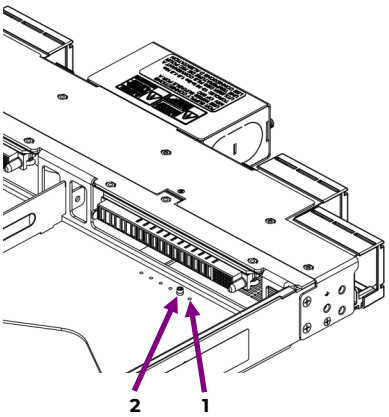
To release the latch, press the dark gray area.

Slide in the rectifier while the latch is in the open position.

As resistance is felt when inserting, slowly close the latch to complete the insertion. When the latch is locked the rectifier is positively engaged in its housing.

The rectifier can get extracted or inserted while the bus is hot.

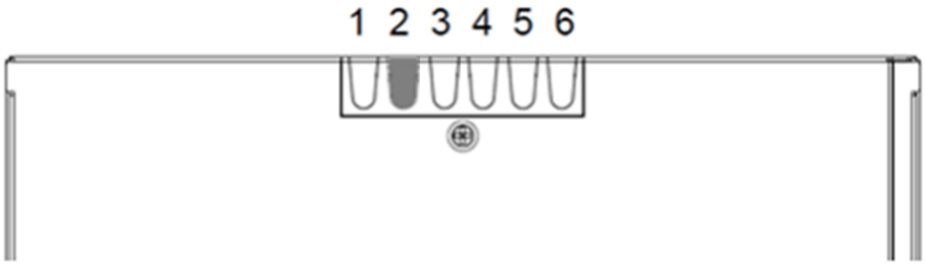
The rectifier is keyed to ensure that it gets inserted into the correct shelf. Do not force mating beyond normally anticipated resistance to avoid permanent damage.



Shelf keying

The key is a pin positioned in one of six holes on the bottom of the shelf.

Communication	V_{IN}	V_{OUT}	1	2	3	4	5	6
Modbus	3Ø 200-240	48		X				

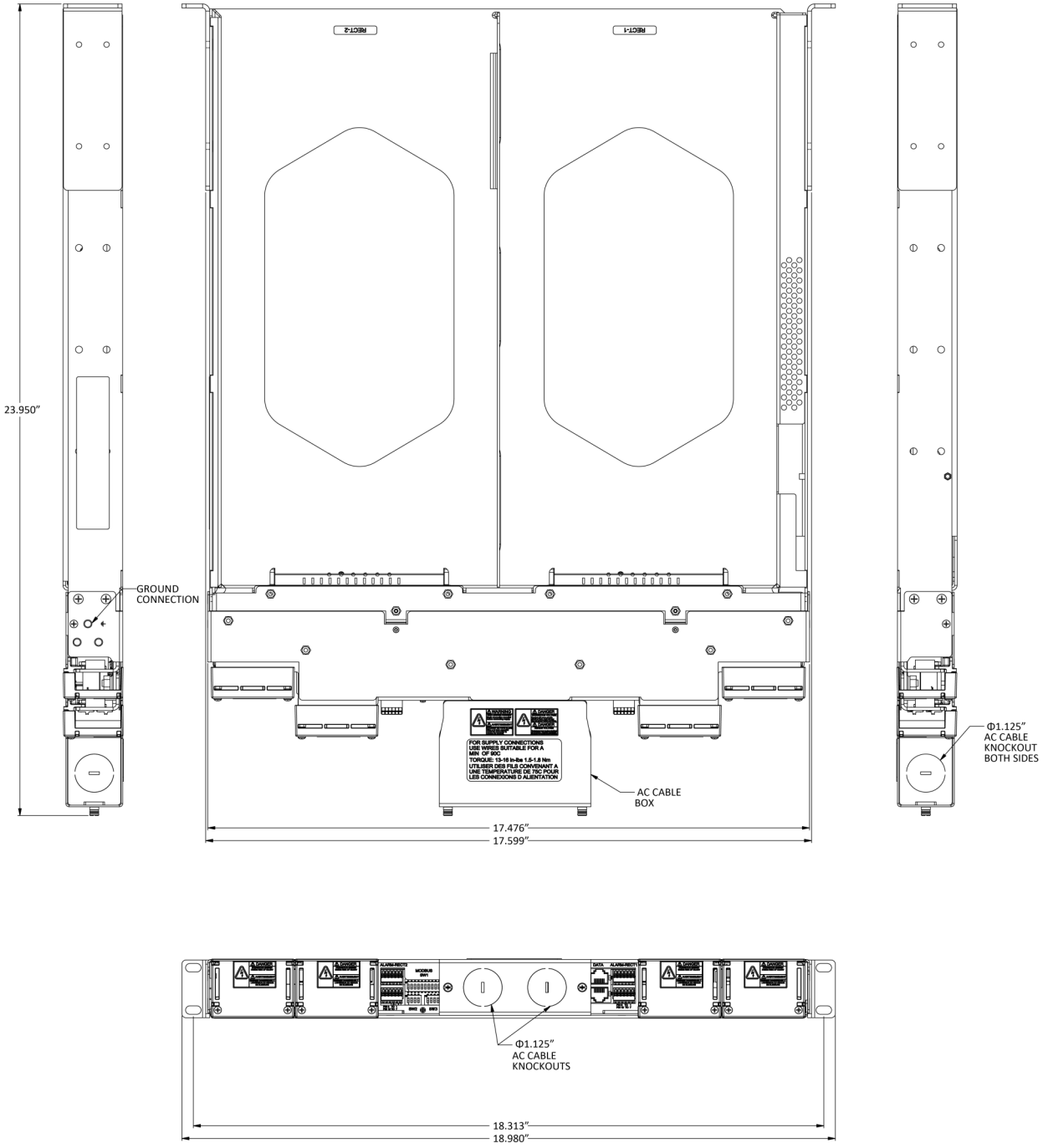


Keying

Product	Keying Location Knotched
J2014001L511Sx	2

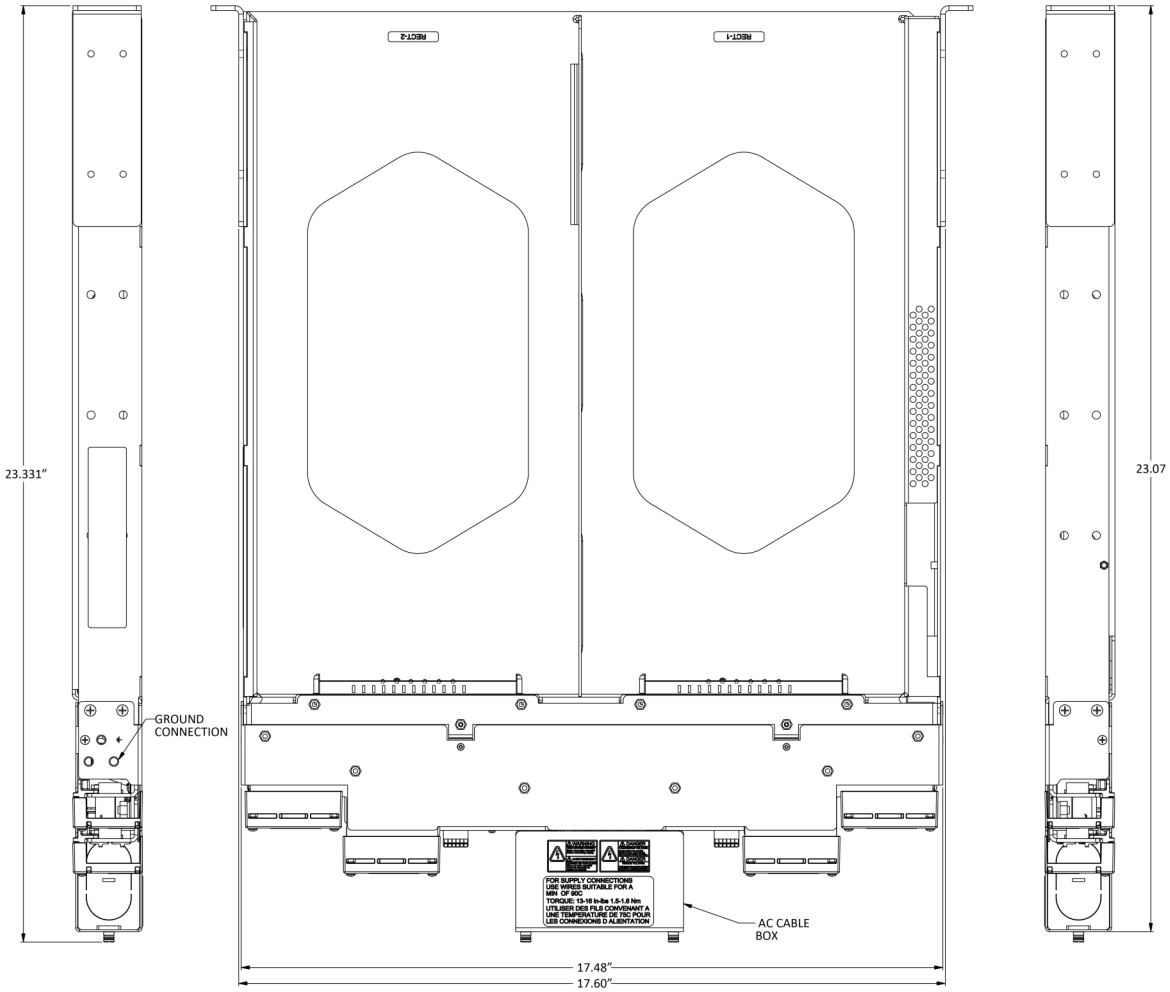
Package Outline

J2014001L511S



Package Outline (Continued)

J2014001L511S-Y



Ordering Information

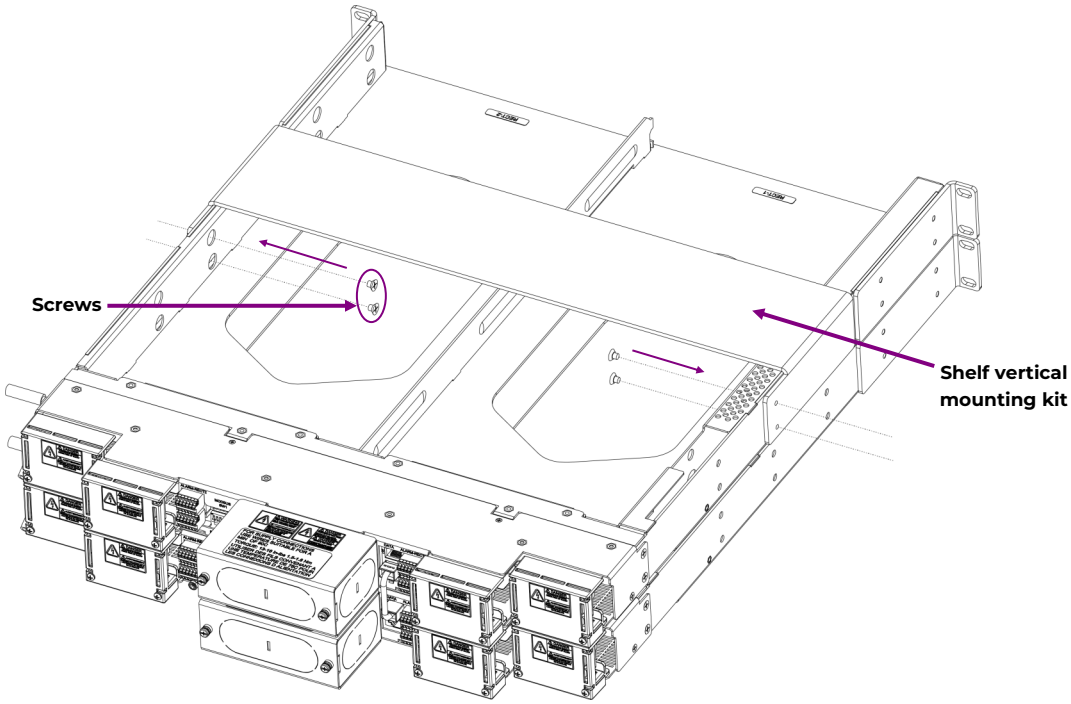
Part Number	Description	Ordering code
Shelves		
J2014001L511S	Standard depth shelf with pluggable single AC input, 3Ø-200/240 V_{AC}, GP100 Modbus shelf with split DC output, Mounting hardware and shelf data interconnect included	1600482551A
J2014001L511S-Y	Short depth shelf with AC input, 3Ø-200/240 V_{AC}, GP100 Modbus shelf with split DC output, Mounting hardware and shelf interconnect included	1600483645A
GP100L3B54TEZ	110A rectifier with ModBus/RS485 communication, 54V_{DC} default	1600408967A
Accessories		
	GP100 Slot Filler	150045141
	Shelf vertical mounting kit	1600482691A

Modbus test utility

Item	Description	Part number
Modbus Adaptor kit	Modbus Adaptor kit	**TBA**

Vertical mounting kit bracket Installation (1600482691A)

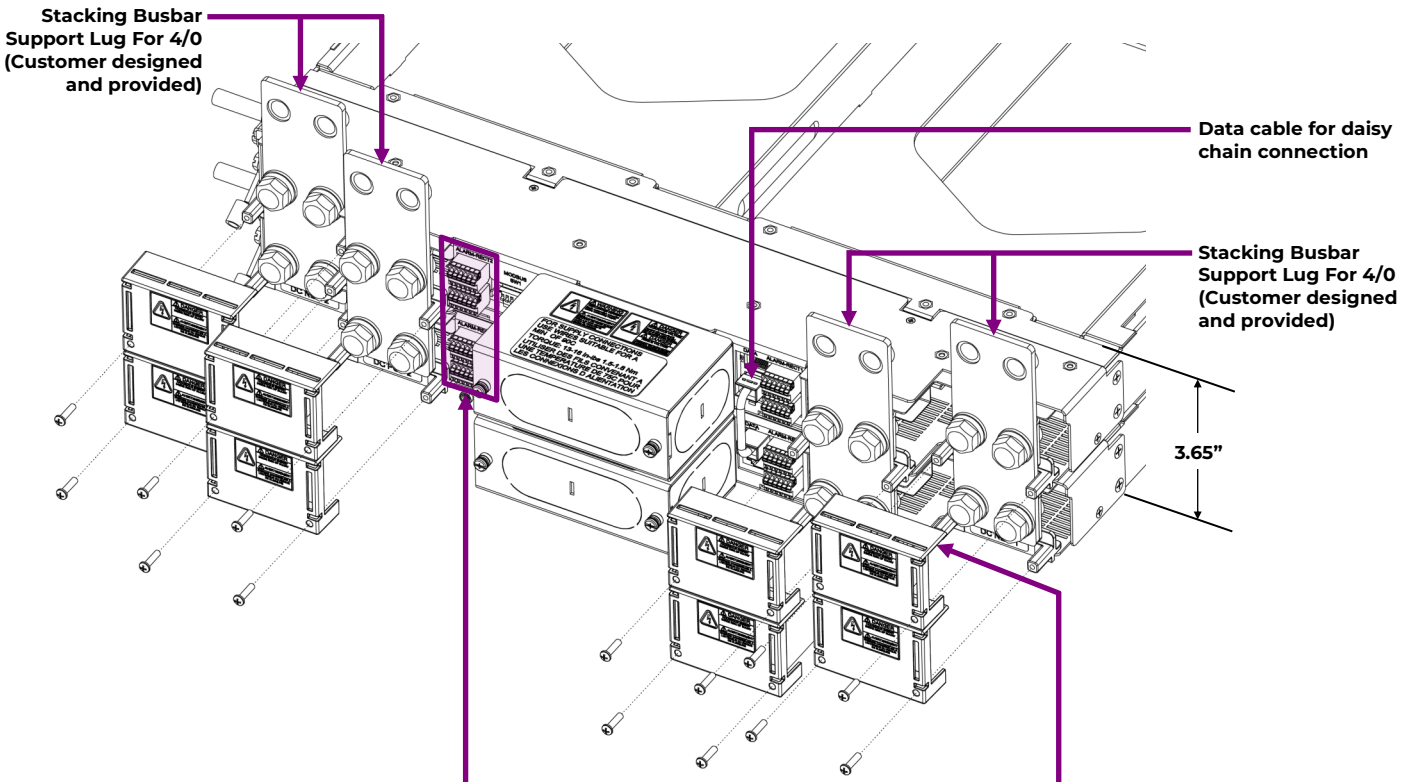
1. Place the bracket over the top shelf and align the holes of mounting bracket and shelf.
2. Install the screw from inside of the shelf as shown in figure below.
3. The threads for the screws are in the bracket, pass the screw from the wall of shelf and then screw into bracket.

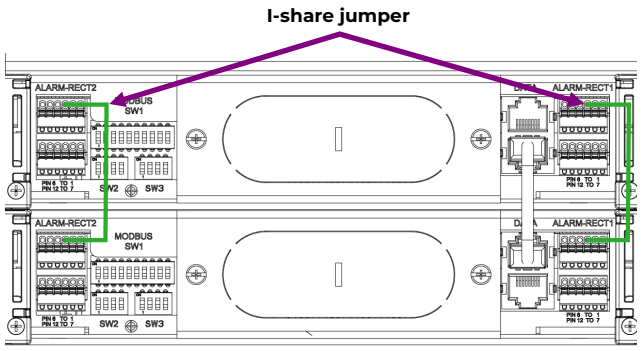


Stacked Shelves with vertical mounting bracket support

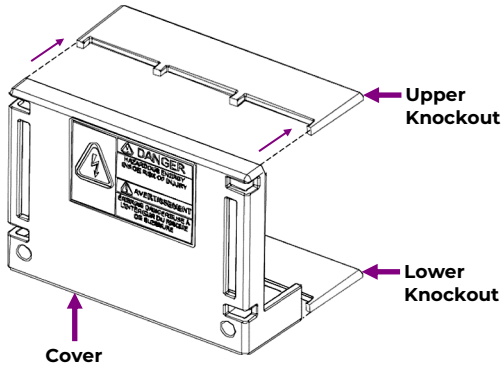
Multiple shelves for increased power with Bussed output connection

Multiple rectifier shelves can be connected in parallel for the increase power demand as shown in below image.
The custom jumper copper bus bars (size properly for the overall system current) shall be used to connect the outputs.
The control Ishare signal shall be connected between the paralleled rectifiers (left to left and right to right) for active current sharing.
For systems consisting of multiple shelves in such configurations, additional thermal consideration may apply for safety qualification.





- Connect I-share jumper from top shelf alarm connector “pin 3” to bottom shelf alarm connector “pin 3” for I-share alarm connections.
- Jumper size: 26 AWG



After installation of stacking busbar,

- Remove the upper & lower knockout from back cover of top shelf and install back cover.
- Remove the only upper knockout from back cover of bottom shelf and install back cover.

Change History (excludes grammar & clarifications)

Revision	Date	Description of the change
1.0	02/15/2023	Initial Release

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