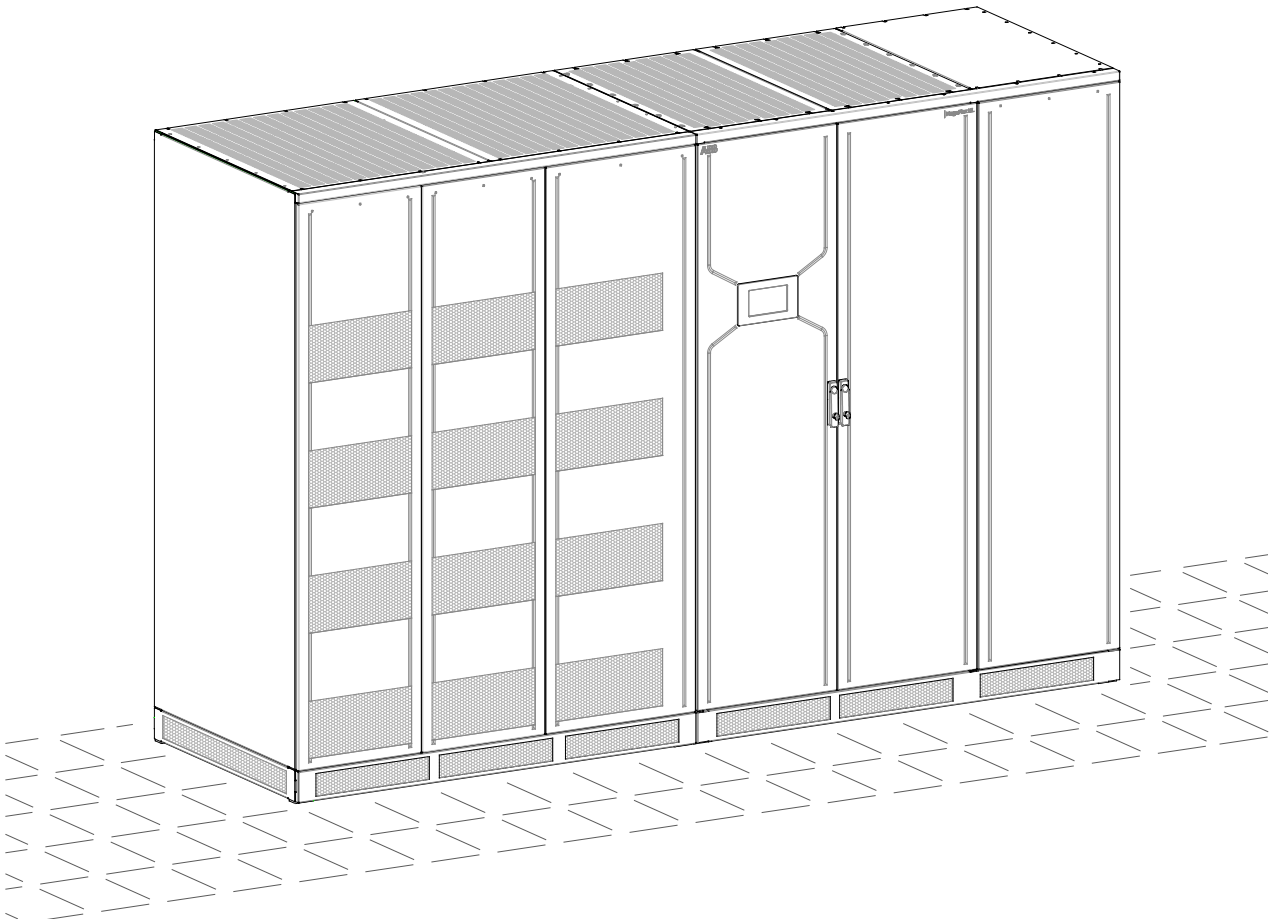
TECHNICAL DATA SHEET

MegaFlex

1000 to 1600 kW 4W 480V UL S1



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UPS model	:	MegaFlex 1000 – 1100 – 1200 — 1500 – 1600 kW 4W UL S1
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Contents

1 Introduction

ABB MegaFlex 1000 to 1600 kW is a three-phase 4-wire Double Conversion Uninterruptable Power Supply (UPS) providing power protection for critical infrastructures that need zero downtown as hybrid, Hyperscale and neo cloud data centers.
The MegaFlex 1000 to 1600 kW is a Monolithic Transformer-free UPS with 3-level Inverter technology.
It provides best –in-class efficiency and robust electrical protection.

1.1 Key features and benefits

RPA™

Redundant, reliable and scalable power up to 8100kW thanks to the Redundant Parallel Architecture (RPA) providing redundancy of power (N+1), control and communications.

Up to 96.4% Double Conversion Efficiency and 99% in eBoost™ mode, reduces energy losses minimizing cooling requirements and operating cost.

eBoost™ Plus

eBoost™ operating mode allows the energy flow to pass through the Bypass line and provides power conditioning when combined with Lagging Power Factor Loads.

Cable Saver

Up to 25% more flexibility on cable length in case of RPA Parallel System.

Technology

- Highly reliable and efficient tri-level conversion
- Automatic or manual multi-mode operation

Operating Efficiency

- Up to 96.4% efficiency in premium protection mode (double conversion)
- Up to 99% efficiency in premium energy save mode (eBoost™)

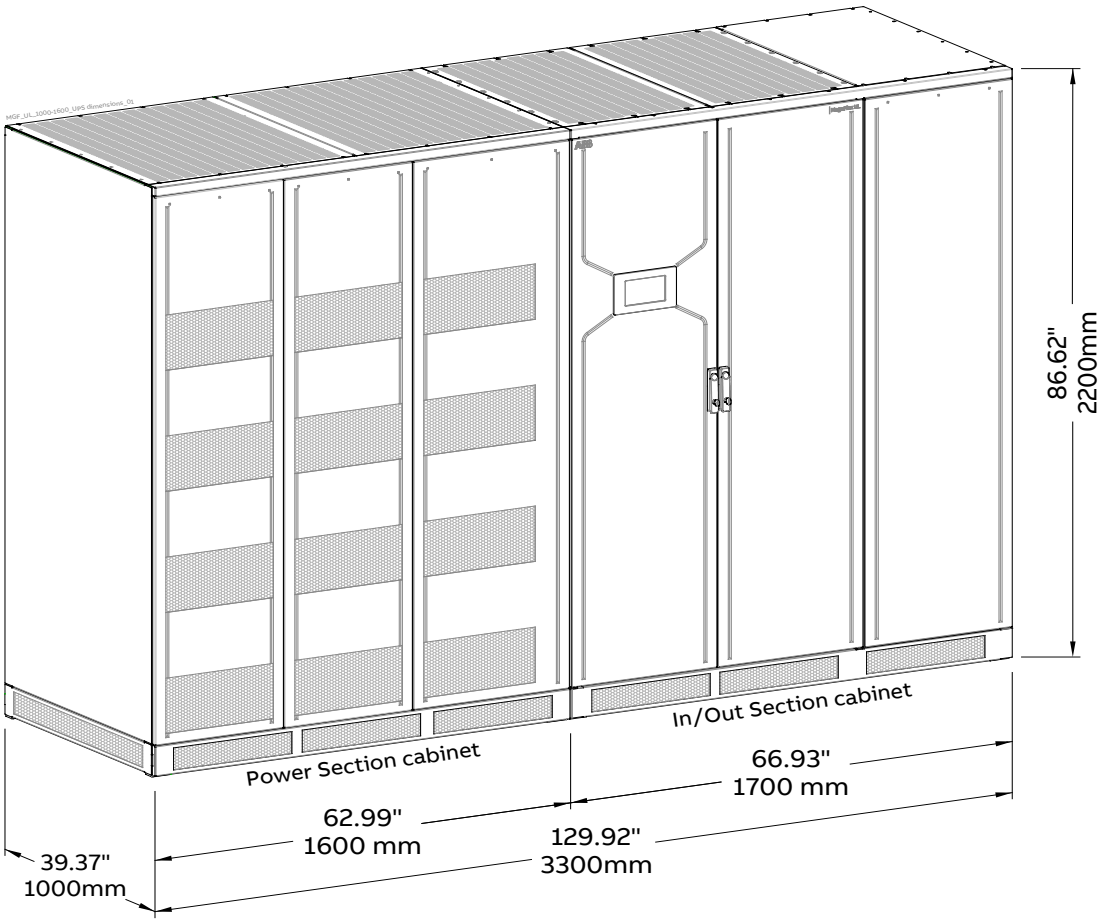
Features

- Multi-Mode Efficiency
- Superior Input, Output & Physical Characteristics
- Advanced User Interface
- Reliability, Diagnostic & Monitoring Enhancements

Key application

- Data Centers
- Healthcare Facilities
- Financial Institutions
- Colleges/Universities

1.2 Mechanical characteristics



Dimensions (W x D x H)	129.92 x 39.37 x 86.62 inches / 3300 x 1000* x 2200 mm *) For seismic installations allow additional 3" (76 mm) spacing at rear of the UPS to accommodate anchoring when placing against the wall!		
Weight	**MegaFlex 1000-1100-1200-**		
	UPS complete:	7830 lbs	3500 kg
	Power Section cabinet:	3970 lbs	1800 kg
	In/Out Section cabinet:	3860 lbs	1700 kg
	MegaFlex 1500-1600		
	UPS complete:	9480 lbs	4300 kg
	Power Section cabinet:	4850 lbs	2200 kg
	In/Out Section cabinet:	4630 lbs	2100 kg
Floor loading (UPS complete)	**MegaFlex 1000-1100-1200** 265 lbs/sq.ft / 1294 kg/m^2	**MegaFlex 1500-1600** 315 lbs/sq.ft / 1538 kg/m^2	

1.3 General specification

Topology	True double conversion (VFI - Voltage Frequency Independent) transformerless
Configuration	Stand-alone
Fault current rating	UPS is designed for installation in an electrical system up to 100kA
Audible noise level (at 5 ft. / 1.52 m)	80 dBA in double conversion mode 70 dBA in eBoost™ mode
Standards	ETL Listed to UL 1778, ANSI C62.41b
Access (Operator access or restricted access)	Front and top service access
Degree of protection against hazards and water ingress	IP20
Ventilation	Forced ventilation with fan failure detection and fan speed regulation
UPS frame cabinet color	RAL 9005 (black)
Transport	On pallet Cabinet suitable for handling by forklift
Installation and maintenance access	Front access required for normal maintenance
Mounting	Floor mounting holes provided
Cooling	Forced air
Cable entry	Bottom or Top
RPA – Redundancy Parallel Architecture	Up to 6 units for redundancy or capacity in RPA Parallel System configuration (option)
eBoost™ Operation Mode	Option (see 3.8)

1.4 Electromagnetic compatibility

Emission	[Cat]	EN/IEC 62040-2 Category C3
Electrostatic discharge immunity	[kV]	4kV contact / 8kV air discharge

1.5 Environmental characteristics

Ambient operating temperature range	[° F/° C]	32 - 104° F / 0 - 40° C
Relative humidity range	[%]	≤ 95%, non-condensing
Altitude without de-rating	[ft/m]	Up to 3280 ft / 1000 m
Altitude with de-rating	[ft/m]	4921 ft / 1500 m: -2.5% 6526 ft / 2000 m: -5% 8202 ft / 2500 m: -7.5% 9843 ft / 3000 m: -10%
Ambient storage temperature range	[° F/° C]	-13 - 131° F / -25 - 55° C

2 Input electrical characteristics

2.1 Input ac power distribution system

Configuration		Three phases Rectifier bridge with three level IGBT technology
Input AC power distribution system compatibility (earthing system)		4-wire + PE
Input voltage window		480 Vac +/- 15%
Input rated short-time with- stand current (I_{xx})	[kA]	100 (1000 to 1600kW)
Input frequency window		60 Hz +/- 10% (54 - 66 Hz)
Utility feed		Single or Dual input feed for Rectifier and Bypass

2.2 Input current and overload characteristics

		1000	1100	1200	1500	1600
Rated input power (Rated Output Power & Battery charger, PF 1)	[kW]	1043	1143	1250	1560	1663
Max input power (rated Output Power and max Battery recharge current, PF 1)	[kW]	1145	1263	1352	1698	1802
Nominal current on Rectifier at full Load	[A]	1260	1385	1510	1890	2015
Max current on Rectifier during Battery recharge at full Load	[A]	1386	1510	1638	2058	2185
Max current on Bypass	[A]	1202	1323	1443	1805	1925
Total harmonic distortion (THDi), 100 % Load - normal mode - linear Load	[%]	< 3%				
Total harmonic distortion (THDi), 100 % Load - normal mode - non-linear Load	[%]	< 5%				
Rectifier input in-rush (% of rated current against time)	[%]	< 100 % of rated current				
Power walk-in	[min]	From 0 to 100				
Rectifier input power factor (rated linear Load; rated non-linear Load)		0.99 at 100% rated Load				

3 Output electrical characteristics

Output AC power distribution system compatibility (earthing system)	4-wire + PE

3.1 Output voltage

Output rated voltage	[V]	480V ph-ph	
Output voltage stability	[%]	Static: Dynamic (step Load 0%-100%-0) Dynamic (step Load 0%-50%-0)	+/- 1 +/- 3 +/- 2
Recovery time +/- 1%	[ ]	< 20	
Total harmonic distortion (THDu), 100% Load -normal mode – linear	[%]	< 3	
Total harmonic distortion (THDu), 100% Load -normal mode non linear	[%]	< 5	

3.2 Output frequency

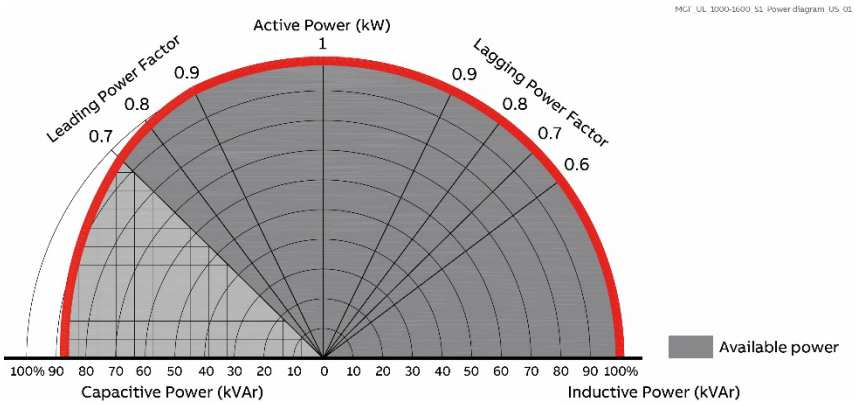
Output rated frequency	[Hz]	60 Hz	
Output frequency tolerance	[Hz]	Synchronized with mains	+/- 3
	[%]	Free running	+/- 0.1

3.3 Output current

		1000	**1100**	**1200**	**1500**	**1600**
Output rated current (480 V configuration)	[A]	1205	1323	1445	1805	1925
Output overload (% of rated current / time duration) at 77° F / 25° C, 480 V rated voltage	[%/s]	150% 30 sec 125% 1 min 110% 10 min 103% continuous				
Output current limitation, "short circuit current" (% or rated current / time du- ration, 480V rated voltage)	[%/s]	2.2 x In, 100 ms				
	[A]	2651	2910	3175	3970	4235
Crest factor capability		3:1				

3.4 Power factor

Load power factor - rated	1.0
Load power factor - displacement (permissible lead-lag range)	0.6 lag to 0.9 lead



Output UPS power versus power factor for:

- Inductive Loads
- Resistive Loads
- Capacitive Loads

3.5 Efficiency

		1000	1100	1200	1500	1600
Double conversion efficiency - 100% rated Load	[%]	95.9	96.0	96.1	96.1	96.2
Double conversion efficiency - 75% rated Load	[%]	96.1	96.2	96.3	96.3	96.4
Double conversion efficiency - 50% rated Load	[%]	96.2	96.3	96.4	96.4	96.5
Double conversion efficiency - 25% rated Load	[%]	95.0	95.0	95.1	96.1	95.2
Efficiency eBoost™ Plus	[%]	Up to 99.0				

3.6 Heat rejection and cooling air

Heat rejection in Double Conversion operating mode, **At PF=1 Load, nominal voltage/frequency, energy storage disconnected**		**25% Load**	**50% Load**	**75% Load**	**100% Load**
MegaFlex 1000	[BTU/hr]	44907	67408	103881	145914
	[W]	13158	19751	30437	42753
MegaFlex 1100	[BTU/hr]	49398	72122	112233	156428
	[W]	14474	21132	32588	45833
MegaFlex 1200	[BTU/hr]	52756	76473	118018	166209
	[W]	15457	22407	34579	48699
MegaFlex 1500	[BTU/hr]	51940	95591	147523	207761
	[W]	15219	28008	43224	60874
MegaFlex 1600	[BTU/hr]	68833	99029	152964	215705
	[W]	20168	29016	44813	63202
Heat rejection in eBoost™ operating mode, **At PF=1 Load, nominal voltage/frequency, energy storage disconnected**		**25% Load**	**50% Load**	**75% Load**	**100% Load**
MegaFlex 1000	[BTU/hr]	13874	24230	33715	37960
	[W]	4065	7099	9878	11122
MegaFlex 1100	[BTU/hr]	15261	26653	37086	41756
	[W]	4472	7809	10866	12235
MegaFlex 1200	[BTU/hr]	16649	29076	40458	45552
	[W]	4878	8519	11854	13347
MegaFlex 1500	[BTU/hr]	19490	33715	46635	51712
	[W]	5711	9878	13664	15152
MegaFlex 1600	[BTU/hr]	20790	35962	49744	55159
	[W]	6091	10537	14575	16162
Max Cooling Air (77°F - 86°F / 25°C - 30°C) Double conversion					
MegaFlex 1000	[CFM / m^3/h]	7339 / 12470			
MegaFlex 1100	[CFM / m^3/h]	7868 / 13368			
MegaFlex 1200	[CFM / m^3/h]	8360 / 14204			
MegaFlex 1500	[CFM / m^3/h]	10450 / 17755			
MegaFlex 1600	[CFM / m^3/h]	10850 / 18434			

Open air installations, cooled environment with minimum overhead clearance of 18” and no obstructions. Containerized solutions with recirculated air, non-cooled environments during discharge, or other cooling restrictions may require de-rating, discharge run-time limitations, increased overhead clearance, exhaust hoods with forced air, or other means to extract heat at all operating modes.
Containerized solutions must have constant cool airflow available to UPS inlet during steady state and during battery discharge mode. Loss of air flow with will impact static pressure of UPS and will raise internal temperature of UPS component and will cause shutdown.

3.7 Static Bypass switch

		1000	1100	1200	1500	1600
Static Bypass		Yes				
Rated current	[A]	1205	1323	1445	1805	1925
Primary components		Fully rated continuous duty static switch. Back feed protection + Semiconductor fuse for clearing fault currents				
Transfer limits	[%]	+/- 10% of nominal output voltage (adjustable)				
Bypass voltage tolerance (% of rated voltage at 480 V)	[%]	+/- 10				
Bypass fault clearing capability (% of rated current / time duration at 480 V)	[%/s]	22 x In /10 ms				
Overload capability on Bypass	[%/m]	110% continuous 150% for 1 minute				

3.8 eBoost™ operating mode (option)

Input wiring configuration	480 Vac, 3-phase 4-wire + ground	
Output waveform	Continuously monitored	
Transfer time to Inverter	< 2ms (typical)	
Transfer limits		
Steady-state RMS tolerance	+/- 20 Vrms (adjustable)	
Instantaneous voltage distortion (with respective to Normal Sine wave)	Magnitude	+/- 75Vp
	Duration	500µs (adjustable)
Steady-state frequency tolerance	+/- 3 Hz	
Instantaneous phase shift	0.15 radians (8.5 Deg)	

4 Battery and energy storage

		1000 1100 1200 1500 1600
Energy storage type		No integrated Batteries, external energy storage needed. Line-and-match cabinets available as accessory
Technology		Lithium ion, VRLA, NiCd, Nickel-Zinc
Design life	[years]	Lithium ion: 15 years VRLA, NiCd: Ref to Battery manufacturer provided information
Quantity of cells and strings	[pcs]	Lithium ion: 136 cells / 17 modules VRLA 12 Vdc: 40-44 blocks/ 240-264 cells per string Nickel-Zinc: 38 modules / 304 cells per string
Nominal voltage (total)	[Vdc]	480 Vdc - 600 Vdc
Nominal Ah capacity (C10)	[Ah]	Battery type dependent Lithium ion: 67 Ah Nickel-Zinc: 80Ah
Stored energy time (back-up time at 100% rated Load)	[min]	Up to any autonomy value without derating Refer to Battery autonomy calculator of suppliers for proper sizing
Restored energy time (re- charge time to 90% capacity)	[h]	Lithium ion: 3 h VRLA: 10 h NiCd: 10 h Nickel-Zinc: 2 h to 5 h (dependent on charge current)
Ambient reference temperature	[° F/° C]	Battery type dependent: Lithium ion: 64.4 - 82.4° F / 18 - 28° C VRLA: 68 - 77° F / 20 - 25° C NiCd: Refer to manufacturer provided information Nickel-Zinc: Refer to manufacturer provided information
Nominal discharge current	[A d.c.]	2400 2650 2900 3600 4000
CHARGING REGIME		
Charge voltage (float, boost) and tolerance band	[V d.c.]	4.20 Vdc/Cell Lithium ion 2.27 Vdc/Cell VRLA 1.9 Vdc/cell Nickel-Zinc
End of discharge voltage	[V d.c.]	3.20 Vdc/Cell Lithium ion 1.8Vdc/Cell VRLA 1.25 Vdc/cell Nickel-Zinc
Max Battery charging current	[A]	210 A 210A 210A 280A 280A
Battery ripple current max.	[A]	Max. 5% the Battery capacity
ADDITIONAL INFORMATION		
Cable voltage drop recommendation		1%
Battery temperature compensation		Supported by standard UPS Temperature sensor available as option
Battery test		Automatic Battery test performed by UPS

Note: Lithium-ion battery values indicated in table above are valid just for Samsung SDI 136S product. Nickel-Zinc battery values indicated in table above are valid just for Zinc-Five UPS battery cabinets.

5 Control & Monitoring

5.1 System display

The UPS Control Panel is a touch screen graphical display which provides the following information to the user:

- Mimic diagram indication UPS status
- UPS measurements
- History of event (alarms and messages)
- UPS settings
- Operation command
- Parallel UPS configuration

The UPS Control Panel can be provided in the following 14 languages:
English, German, Italian, Spanish, French, Finnish, Polish, Portuguese, Czech, Slovakian, Chinese, Swedish, Russian and Dutch.

5.2 Communication interfaces

RS232 serial port	Standard
EPO - Emergency Power OFF (n/c contact, customer supplied)	Standard
UVR - Battery breaker Under Voltage Release	24V, max 5W
Customer Interface board	Standard
6 programmable signaling voltage-free contacts (available on block terminals)	- Standard information for easy integration and signaling - 27 user settable signals
Connector RJ45	With adaptation cable for a serial port RS232 / sub DB9 connection
Input signals	- 2 auxiliary signal, with settable functionality

6 Options

6.1 Connectivity options

1. Additional Customer Interface Board
2. Smart tracker

6.2 Options in UPS cabinet

1. eBoost™ Operation Mode
2. RPA Parallel System (Redundant Parallel Architecture)
3. RPA Parallel System cables 20 ft / 6 m, 40 ft / 12 m, 98 ft / 30 m, 196 ft / 60 m and 279 ft / 85 m

6.3 Options in additional cabinet

1. Battery cabinet
2. Battery temperature sensor

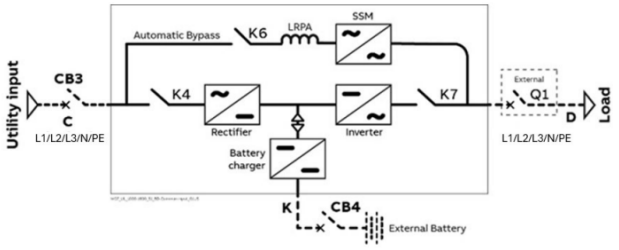
7 UPS block diagram, Line protection and cables section

7.1 Block diagram input Utility

Common Input Utility Rectifier & Bypass

The same power source is to be used for both Bypass supply and Rectifier input (input CB3).

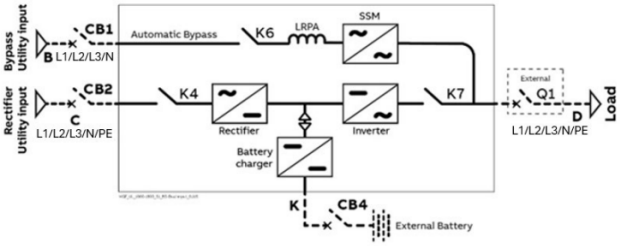
Bear in mind that when the Utility breakers are opened there is a supply failure to the Rectifier as well as to the Automatic Bypass.



Dual Input Utility Configuration Rectifier & Bypass

The Bypass and Rectifier use different power sources (CB1 and CB2 inputs).

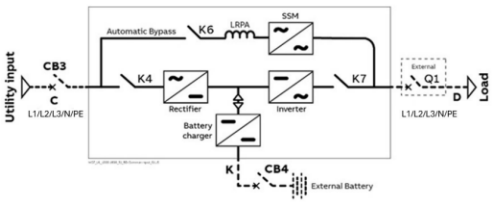
In this case, when the Rectifier-input breakers are opened, the Automatic Bypass is supplied by the other connection.



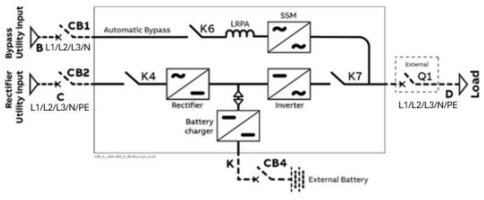
7.2 Line protection

The AC values below are current ratings per phase.
These maximum and nominal ratings should be considered when choosing the appropriate AC over current protection device.
DC current rating is the nominal Battery discharge current with 1.8 V/cell (see below figures).
Wiring shall not be sized for more than 2.0 Vdc/cell.

Common Input Utility Rectifier & Bypass

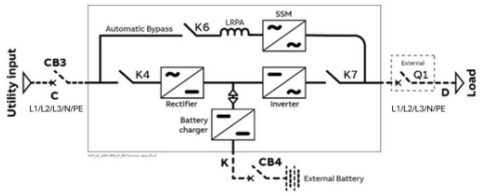


Dual Input Utility Rectifier & Bypass

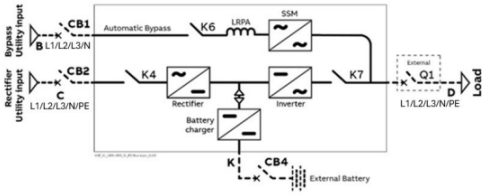


kW	CB2 - AC Input Rectifier		CB1- AC Input Bypass	CB3 - AC Input		CB4 - DC Input
	Nom.	Max.		Nom.	Max.	
1000	1260 A	1386 A	1202 A	1260 A	1386 A	2388 A
1100	1385 A	1510 A	1323 A	1385 A	1510 A	2626 A
1200	1510 A	1638 A	1443 A	1510 A	1638 A	2865 A
1500	1890 A	2058 A	1805 A	1890 A	2058 A	3582 A
1600	2015 A	2185 A	1925 A	2015 A	2185 A	3820 A

Common Input Utility Rectifier & Bypass



Dual Input Utility Configuration Rectifier & Bypass

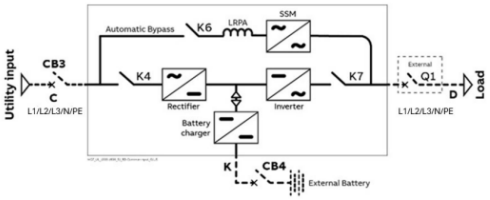


Size of Branch Circuit Over Current Protection:
Every power line must be singularly protected by UL 489 overcurrent protective devices (provided by others) according to the ampacity table below.
Non-standard Circuit Breakers shall be restricted to access, in **accordance with NEC 240.6(c).**
Maximum input short circuit current at CB1 and CB2 is 100 kArms.

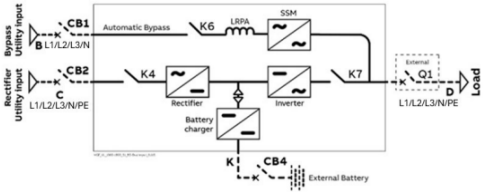
kW	**CB2 - AC Input Rectifier** 100% Rated	**CB1 -AC Input Bypass** 100% Rated	**CB 3 - AC Input** 100% Rated	**CB 4 - DC Input** 100% Rated
1000	1400 A	1400 A	1400 A	3000 A
1100	1600 A	1400 A	1600 A	3000 A
1200	2000 A	1600 A	2000 A	3000 A
1500	2500 A	2000 A	2500 A	4000 A
1600	2500 A	2000 A	2500 A	4000 A

7.3 Cables section

Common Input Utility Rectifier & Bypass



Dual Input Utility Configuration Rectifier & Bypass



Maximum recommended cable size (type THWN/THHN copper, 167°F/75°C) * per phase/pole and ground conductors. Each conduit shall terminate its ground conductor to UPS ground bus bar. Wires shall be rated 600V. Conduits (provided by others) must be installed between UPS and the power source.

kW	**Rectifier Input (A & C)**	**Bypass Input (B)**	**AC Output (D)**	**DC Input (K)**
1000	6x500 kcmil + AWG 4/0	6x500 kcmil + AWG 4/0	6x500 kcmil + AWG 4/0	8x600 + 250 kcmil
1100	8x500 kcmil + AWG 4/0	6x500 kcmil + AWG 4/0	8x500 kcmil + AWG 4/0	8x600 + 250 kcmil
1200	8x500 + 250 kcmil	8x500 kcmil + AWG 4/0	8x500 kcmil + AWG 4/0	8x600 + 250 kcmil
1500 **1600**	10x500 + 350 kcmil	8x500 + 250 kcmil	8x500 + 250 kcmil	14x600 + 250 kcmil

* for AA-8000 Aluminum cables contact ABB Service Center.

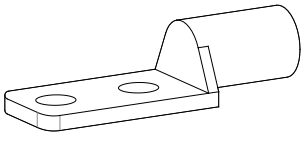
Wiring! Wire sizing according to NEC for 167°F (75°C) copper or aluminum wire at 104°F (40°C).

Wiring requirements:

Rectifier AC input/Bypass AC input / AC output ports.	3-phase, 4-wire plus ground (each conduit shall contain one cable per circuit's phase and one ground cable).
DC Input.	2 poles (positive and negative) plus ground (each conduit shall contain one positive, one negative and one ground cable).

Recommended two-hole cable lugs:

Cable Size	T&B Copper / Two holes	T&B Aluminum / Two holes
500 kcmil	TnB 54223	-
750 kcmil	-	TnB 60278NT



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