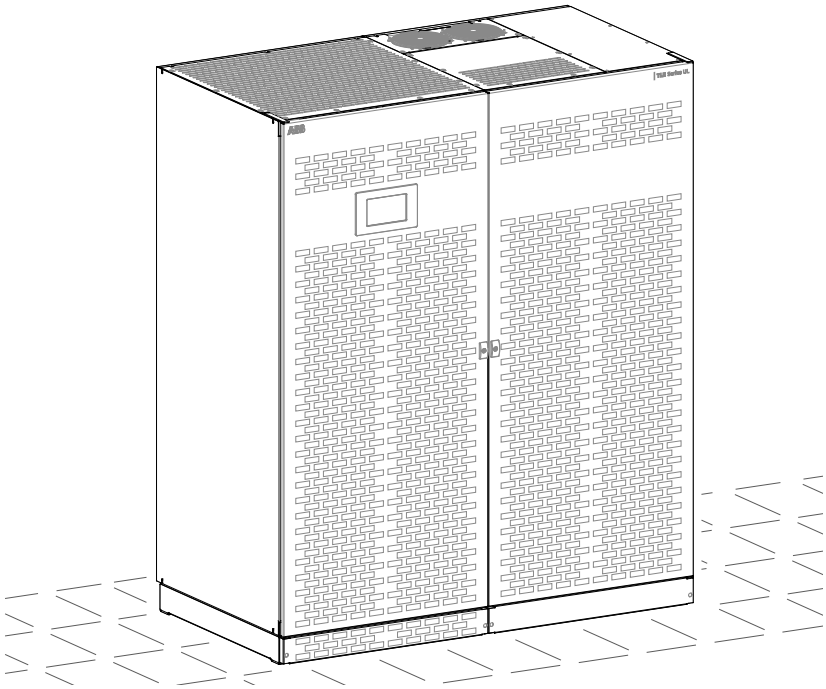
UPS TECHNICAL DATA SHEET

TLE Series

300 to 500 kVA UL S2B



About this document

Document information

File name	ABB_UPS_TDS_TLE_SUL_M30_M50_2bU_REV-C
UPS model	TLE Series 300 - 400 - 500 kVA UL S2B
Date of issue	03/25/2021
Issued by	Product Marketing
	After Sales
Checked by	R&D
Document number	4NWD005339
Article number	4NWP106231R0001
Revision	C
Revision date	02/16/2024

Contents

1 Introduction

1.1 Description

The TLE Series 300 to 500 Uninterruptible Power Supply (UPS) is a three-phase high power product with best-in-class multi-mode efficiency for global critical power needs.
The TLE Series 300 to 500 platform establishes ABB UPS technology leadership in high power applications with industry leading differentiation in efficiency, output power capacity and footprint.

ABB's TLE Series 300 to 500 is one of the most energy efficient multi-mode UPS in the industry and provides world-class energy efficiency across the operating load range.
The TLE Series 300 to 500 delivers efficiency up to 96.9% in double conversion mode and 98.9% in eBoost™ operating mode.
This system efficiency substantially reduces operating and cooling costs thus providing a reduced cost of ownership and improved power usage effectiveness (PUE) compared to conventional UPS.

Reliability & power can be further increased by paralleling up to 6 units utilizing ABB's unique RPA* (Redundant Parallel Architecture) technology.

1.2 Key features and benefits

RPA™

Redundant, reliable and scalable power up to 3000kW thanks to the Redundant Parallel Architecture (RPA) providing redundancy of power (N+1), control and communications.

Up to 96.9% Double Conversion Efficiency and 98.9% in eBoost™ mode", reduces energy losses minimizing cooling requirements and operating cost.

eBoost™

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 97% efficiency in premium protection mode (double conversion)
- Up to 99% efficiency in premium energy save mode (eBoost™)

Features

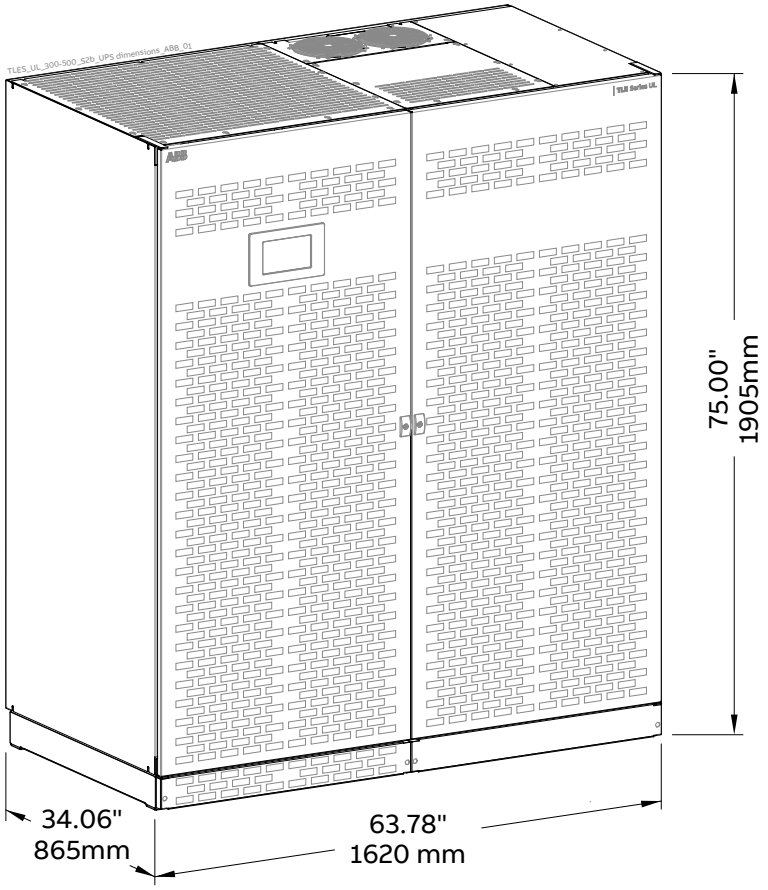
- Multi-Mode Efficiency
- Superior Input, Output & Physical Characteristics
- Advanced User Interface
- Reliability, Diagnostic & Monitoring Enhancements

Key application

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

1.3 Mechanical characteristics

TLE Series 300 to 500



TLE Series 300 - 400 - 500 **Dimensions and weights**		
Dimensions (W x D x H)	63.78 x 34.06 x 75.00 inches	1620 x 865 x 1905 mm
Weight	2756 lbs	1280 kg
Floor loading	187 lbs/sq.ft	914 kg/m^2

1.4 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)	75 dBA in double conversion mode 66 dBA in eBoost™ mode
Standards	ETL Listed to UL 1778, ANSI C62.41b
Access (Operator access or restricted access)	Front access only
Degree of protection against hazards and water ingress	Indoor IP 20 and NEMA PE 1
Internal protection	All internal live parts shrouded
Safety	Internal dead front construction
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	Top and Bottom standard
RPA – Redundancy Parallel Architecture	Up to 6 units for redundancy or capacity in RPA Parallel System configuration (option)
eBoost™ Operation Mode	Option

1.5 Electromagnetic compatibility

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

1.6 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 3281 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 Rectifier

Configuration	Three phases Rectifier bridge with three level IGBT technology
Voltage	480 Vac, 3-phase, 4 wire + ground or 3 wire + ground (+/- 15% without battery discharge)
Frequency	60 Hz +/- 10% (54 ÷ 66 Hz)
Harmonic current distortion	< 5%
Power factor	0.99 lagging
Inrush current	Limited by soft-start circuit
Power walk-in	30 seconds (adjustable)
Output voltage tolerance	+/- 1%
DC ripple voltage	+/- 1%
DC ripple current	Max. 5% of Battery capacity expressed in amps

2.2 UPS rating vs. Current limits

		300 kVA/kW	400 kVA/kW	500 kVA/kW
Nominal input at 100% Load	[Amps]	376.4	502.4	628.0
PF=1 Load, fully chrg'd Battery	[kVA]	313.0	417.7	522.1
	[kW]	305.8	413.5	516.9
Maximum input at 100% Load	[Amps]	376.4	557.0	682.6
PF=1 Load, max chrg current	[kVA]	358.3	463.1	567.5
	[kW]	354.7	458.5	561.8
Maximum charge current	[Amps]	90	90	90

2.3 Static Bypass

Input connection	Single input (standard) or dual input (option)
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)
Overload capability on Bypass	110% continuous 150% for 1 minute
Short circuit capability on Bypass	1000% for 1/2 cycle (non-repetitive)

2.4 eBoost™ operating mode (option)

Input wiring configuration	480 Vac, 3-phase, 4 wire + ground or 3 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)	

3 Output electrical characteristics

3.1 Inverter

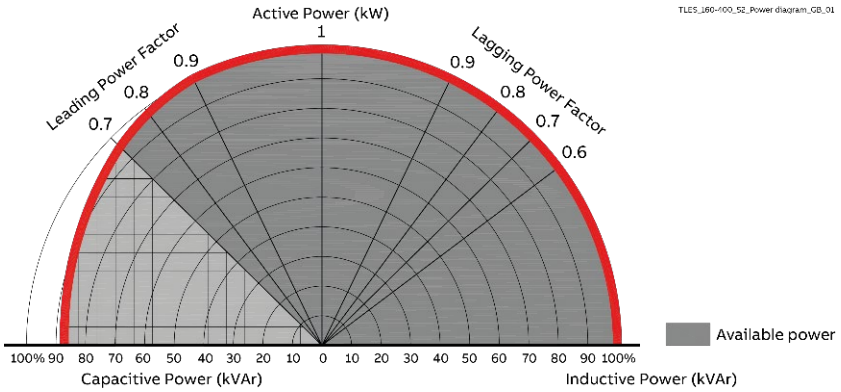
Nominal output voltage		480 Vac, 3-phase, 4 wire + ground or 3 wire + ground
Inverter bridge		Three phases Inverter bridge with three level IGBT technology IGBT
Output waveform		True sine wave
Output voltage tolerance		
Static	[%]	+/- 1%
Load step 0 - 100 - 0%	[%]	+/- 3%, recovering to within +/- 1% in 1 cycle
Load step 0 - 50 - 0%)	[%]	+/- 2%, recovering to within +/- 1% in 1 cycle
100% unbalanced load (Ph-N)	[%]	+/- 3%
Output voltage distortion		
100% linear Load	[%]	3% THD maximum
100% non-linear Load (per IEC 62040)	[%]	5% THD maximum
Crest factor capability		>3:1
Output neutral rating	[%]	200%
Phase displacement		
At 100% balanced Load	[%]	120°: +/- 1%
At 100% unbalanced Load	[%]	120°: +/- 2%
Output frequency		
Free running	[Hz/%]	60Hz, +/-0.1%
Synchronized with utility	[%]	+/- 4% (adjustable from 57.6Hz to 62.4Hz)
Overload capability (on Inverter)		125% at PF=1 for 1 minute 150% at PF=1 for 30 seconds
Short-circuit characteristic	[%/min]	220% for 100 ms, electronically limited

3.2 UPS rating

		300 kVA/kW	400 kVA/kW	500 kVA/kW
Maximum output current at PF=1	[Amps]	360.8	481.1	601.4

3.3 Power factor

Load power factor - rated		1		
Nominal output power at PF=0.7 to 0.9 leading	[kVA]	300	400	500
Nominal output power at PF=1	[kW]	300	400	500



Output UPS power versus power factor for:

- Inductive Loads
- Resistive Loads
- Capacitive Loads

3.4 Efficiency

System Efficiency in Double Conversion operating mode At PF=1 Load, nominal voltage/frequency, energy storage disconnected		**25% Load**	**50% Load**	**75% Load**	**100% Load**
TLE Series 300	[%]	94.3	96.5	96.8	96.9
TLE Series 400	[%]	95.8	96.8	96.8	96.7
TLE Series 500	[%]	96.0	96.7	96.7	96.6
System Efficiency in eBoost™ operating mode At PF=1 Load, nominal voltage/frequency, energy storage disconnected		**25% Load**	**50% Load**	**75% Load**	**100% Load**
TLE Series 300	[%]	96.3	97.6	98.0	98.1
TLE Series 400	[%]	97.0	98.2	98.6	98.6
TLE Series 500	[%]	97.2	98.3	98.7	98.8

3.5 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**
TLE Series 300	[BTU/hr]	14603	17847	24326	31675
	[kW]	4.3	5.2	7.1	9.3
TLE Series 400	[BTU/hr]	14502	22038	32405	44642
	[kW]	4.2	6.5	9.5	13.1
TLE Series 500	[BTU/hr]	16934	27941	41987	58703
	[kW]	5.0	8.2	12.3	17.2
Heat rejection in eBoost™ operating mode **At PF=1 Load, nominal voltage/frequency, energy storage disconnected**		**25% Load**	**50% Load**	**75% Load**	**100% Load**
TLE Series 300	[BTU/hr]	9471	12287	15358	19454
	[kW]	2.8	3.6	4.5	5.7
TLE Series 400	[BTU/hr]	10553	12509	14534	17977
	[kW]	3.1	3.7	4.3	5.3
TLE Series 500	[BTU/hr]	12287	14752	16853	20722
	[kW]	3.6	4.3	4.9	6.1
Max Cooling Air (77°F - 86°F / 25°C - 30°C)					
TLE Series 300 to 500	[CFM]	2710/3294			

4 Battery and energy storage

4.1 Battery technical data

Energy storage type		No integrated Batteries, external energy storage needed. Line-and-match cabinets available as accessory
Battery compatibility		Lead-acid or NiCd, VRLA or flooded
Float voltage at 68°F / 20°C	[Vd]	540 Vdc
Number of cells	[pcs]	240 cells (lead acid)
Minimum discharge voltage	[Vdc]	396 Vdc (adjustable)
Recharge time	[h]	10 times the discharge time
Battery ground fault detection		Standard
Automatic and manual Battery test		Standard
Common Battery in RPA Parallel System	[unit]	Up to 4 units
Ambient operating temperature range	[° F/° C]	68 ÷ 77° F / 20 ÷ 25° C (higher the temperature, shorter the storage time of the Battery)
Ambient storage temperature range	[° F/° C]	-4 ÷ 104° F / -20 ÷ 40° C (higher the temperature, shorter the storage time of the Battery)
Storage time (Battery VRLA)	[month]	3 months at 77° F / 25° C (higher the temperature, shorter the storage time of the Battery)
Matching Battery cabinets		On request, see Section 6.1

4.2 UPS rating

		300 kVA/kW	400 kVA/kW	500 kVA/kW
At 100% Load at PF=1	[kVB]	312	416	520
Maximum Discharge Current (1.65V cell)	[A]	788	1051	1313

5 Control & Monitoring

5.1 System display

The UPS Control Panel is a touch screen graphical display which provide 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 15W
Customer Interface board	Standard
6 programmable signaling voltage-free contacts (available on block terminals – form 'C' - 1A / 24 Vdc)	- Standard information for easy integration and signaling - 27 user settable signals
Input signals	- GEN ON (emergency power supply ON, n/o contact, customer supplied) - 1 auxiliary signal, with settable functionality
3-ph SNMP/WEB plug-in Adapter	Option
Diagnostic	Internal Waveform Capture. Input and output w/pre and post event data (Field Service Only)

6 Options

6.1 Connectivity options

1. Additional Customer Interface Board
2. 3-ph SNMP/WEB plug-in Adapter
3. iUPSGuard
4. Data Protection

6.2 Options in UPS cabinet

1. eBoost™ Operation Mode
2. “IEMi - Intelligent Energy Management integrated” Operation Mode
3. Dual input Utility
4. RPA Parallel System (Redundant Parallel Architecture)
5. 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

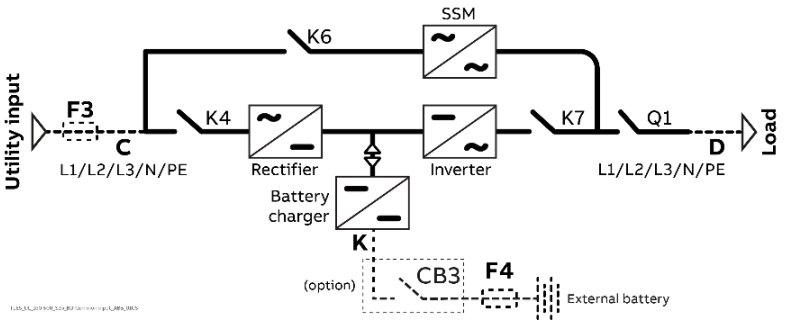
6.3 Options in additional cabinet

1. Input/output transformer
   Available in external cabinets for isolation or voltage transformation
2. External Maintenance Bypass
   Available in external or as a part of output switchgear cabinet
3. Battery cabinet

7 UPS block diagram, Line protection and cables section

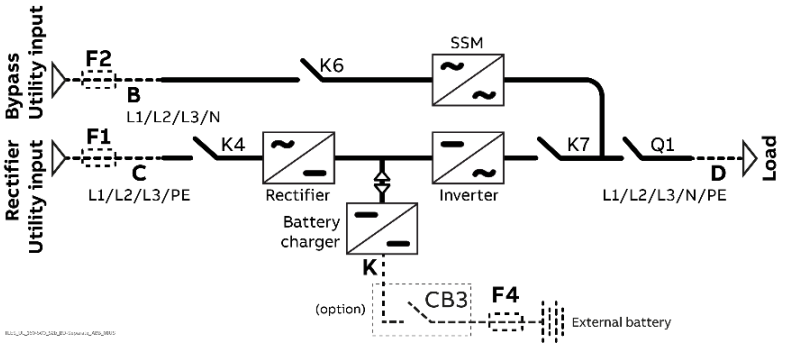
7.1 Block diagram input Utility

Common Input Utility Rectifier & Bypass



Dual Input Utility Configuration Rectifier & Bypass

With separate Bypass Utility: connect a single input Neutral to Bypass Utility (inside the UPS, common neutral for Bypass and Rectifier)



7.2 Line protection

The AC values below are current ratings per phase.

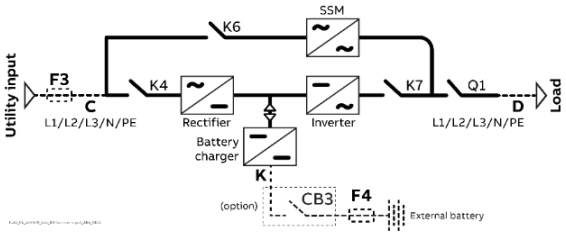
These maximum and nominal ratings should be considered when choosing the appropriate AC over current protection device.

NEC (National Electric Code) Section 210-20 a rule must be applied.

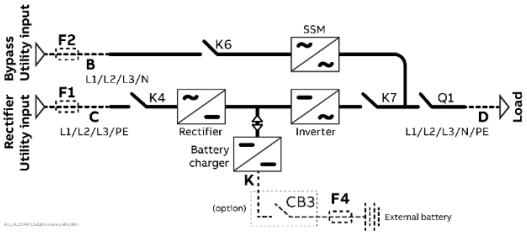
DC current rating is the nominal battery discharge current which the UPS allows

kW	F1 AC Input Rectifier		F2 AC Input Bypass	F3 AC Input		F4 DC Input
	Nom.	Max.		Nom.	Max.	
300	378 A	430 A	361 A	378 A	430	727 A
400	504 A	555 A	481 A	504 A	569 A	968 A
500	630 A	690 A	601 A	630 A	690 A	1210 A

Common Input Utility Rectifier & Bypass



Dual Input Utility Configuration Rectifier & Bypass

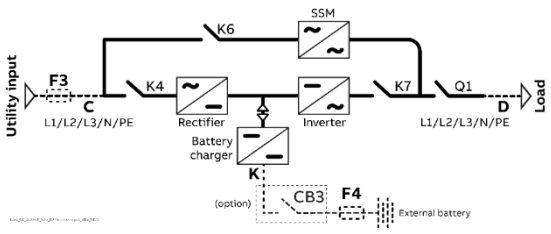


Size of Branch Circuit Over Current Protection - All Models: - "CAUTION - To reduce the risk of fire, only connect UPS to a circuit provided with (see below) maximum amperes branch circuit over current protection in accordance with the NEC (National Electric Code), NSI / NFPA 70

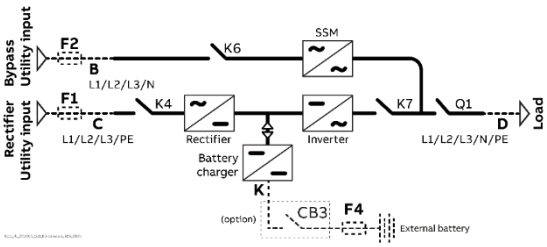
kW	F1 AC Input Rectifier		F2 AC Input Bypass		F3 AC Input		F4 DC Input	
	80% rated	100% rated	80% rated	100% rated	80% rated	100% rated	80% rated	100% rated
300	600 A	450 A	500 A	400 A	600 A	450 A	800 A	800 A
400	700 A	600 A	600 A	500 A	700 A	600 A	1000 A	1000 A
500	900 A	700 A	800 A	700 A	900 A	700 A	1200 A	1200 A

7.3 Cables section

Common Input Utility Rectifier & Bypass



Dual Input Utility Configuration Rectifier & Bypass



Maximum recommended cable size

kW	Rectifier Input (A & C)	Bypass Input (B)	DC Input (K)	AC Output (D)	GND
300	3 x 300 kcmil	2x 400 kcmil	3 x 500 kcmil	2x 400 kcmil	1 x 1/0 AWG
400	4 x 4/0 AWG	4 x 3/0 AWG	4 x 400 kcmil	4 x 3/0 AWG	1 x 2/0 AWG
500	4 x 350 kcmil	4 x 300 kcmil	4 x 600 kcmil	4 x 300 kcmil	1 x 3/0 AWG

Wiring!
Wire sizing according to
NEC Section 210-20 (a) - Table 310-16
Use 167°F (75°C) copper or aluminum wire.

Wiring requirements:
3-Phase, 4 wire plus Ground
3-Phase, 4 wire plus Ground
3-Phase, 4 wire plus Ground
DC Input 2 wire (positive and negative) plus Ground.

https://library.abb.com

ABB Switzerland Ltd.
Via Luserte Sud 9
6572 Quartino
Switzerland

abb.com/ups