

94-12-043275 D1  
OPERATING MANUAL

## **DPA 500**

480V UL – Modular UPS

100kW – 3MW



The DPA is a high-power, modular UPS system designed for today's critical high-density computing environments. The UPS is built using true online double conversion technology and delivers high-quality power. When combined with complete network integration software and communication connectivity, the DPA provides a comprehensive, easy-to-integrate power protection for data centers and network environments.

---

## The Company

We are an established world force in the design and manufacture of power electronics and power protection equipment.

As a part of ABB, a world leader in electrical technology, we offer customers application expertise, service and support worldwide. We are committed to teamwork, high quality manufacturing, advanced technology and unrivalled service and support.

The quality, accuracy and performance ABB's products result from over 100 years of experience, combined with a continuous program of innovative design and development to incorporate the latest technology.

---

### Quality control

To ensure that we meet our responsibilities and obligations to our customers, our people, our partners, our suppliers and to our shareholders, we are committed to deliver on-time and on-quality products, systems and services that meet or exceed our customers' expectations.

---

### For more information

Further publications for the Cyberex® SuperSwitch®4 Digital Static Transfer Switch and accessories are available for free download from <http://new.abb.com/ups/static-switches> or by scanning the QR code below.





## Contacting ABB for support

To contact ABB for information or repair service in the United States, call 1 800 292 3739. ABB offers a complete range of start-up services, repair services, preventive maintenance plans and service contracts.

For repair or maintenance service outside the 48 contiguous United States, contact ABB, if available in your area.

Please provide the following information for customer service when you contact the ABB service center:

Equipment
Part number
Serial number
Voltage rating
Current rating
Purchase date
Installation date
Location

To get important information on all equipment warranties, please contact the ABB service center or request service follow-up or by scanning the QR code below.







# Safety notices

The DPA 500 480V UL (DPA 500) is a high energy device.

The following safety instructions must be observed when working with the device. Refer to the unit’s nameplate for the specific model designation, operating voltage, and input power configuration. External input/output over-current protection is to be supplied by the user in accordance with nameplate ratings.

These symbols may appear on your UPS system or on labels inside the UPS. Most international safety agents accept them. Everyone in your organization who works with your system should understand the meaning of these symbols:

Safety notice	
	<p><b>CAUTION – Refer to manual</b></p> <p>Stop and refer to the operator manual for more information.</p>
	<p><b>WARNING – Risk of electric shock</b></p> <p>There is a risk of electric shock present, and you should observe associated warnings. The SS4 contains high voltages.</p>



# Important safety instructions

SAVE THESE INSTRUCTIONS - This manual contains important instructions for the DPA 500 Uninterruptible Power Supply (UPS), Commercial Series that should be followed during installation and maintenance of the UPS.



# Safety precautions

The DPA 500 UPS is designed to receive power from more than one power source (AC line power or DC input power) when any of the power sources are energized. This unit contains hazardous voltages. Hazardous voltages exist within the DPA 500 UPS regardless of the mode of operation. Before making any connections to the unit, ensure that all power sources are turned off and locked out.

As lethal voltages exist within all operating modes of the DPA 500 UPS, maintenance can only be performed by qualified and authorized trained service personnel.

All wiring should be performed by qualified electricians and in the accordance with local and national electrical safety codes. Before placing the unit into service, a thorough inspection and supervised start-up should be performed by a qualified service technician.

---

## Safety considerations

The DPA 500 UPS cabinet is designed for diverse applications. However, the UPS system is a sophisticated power system and should be handled with appropriate care, following these guidelines:

- Keep surroundings clean and free from excess moisture.
- Do not operate the UPS system close to gas or electric heat sources.
- The system is not intended for outdoor use.
- The operating environment should be maintained within the parameters stated in the manual.
- Keep the cabinet doors closed and locked to ensure proper cooling airflow and to protect personnel from dangerous voltages inside the unit.
- The UPS system contains its own power source. Lethal voltages can be present even when the UPS is disconnected from utility or battery power.

---

### Safety consideration

---



#### **CAUTION**

Only authorized service personnel should perform maintenance on or service the UPS system.

---

If service or routine maintenance is required:

- Ensure all power is disconnected before performing maintenance.
- Ensure the system is in BYPASS ISOLATE before maintenance or service is performed.
- Ensure the area around the UPS system is clean and uncluttered.
- Battery maintenance or battery replacement should be performed only by authorized service personnel.
- Observe all DANGER, CAUTION and WARNING notices affixed to the inside and outside of the equipment.

---

## Foreword

The UPS system operates with mains, battery, and/or bypass power. It contains components that carry high currents and voltages. The properly installed UPS system is grounded to earth and IP 20 rated against electrical shock and foreign objects when all dead fronts, doors, and screens are in place.

**As lethal voltage exist within all operating modes of the UPS, installation, commissioning, and maintenance shall be performed by authorized service personnel ONLY.**

**The instructions in this manual MUST be followed TO PERFORM ANY OPERATION ON THE UPS.**

# Table of contents

1	General .....	11
1.1	Using this manual .....	11
1.1.1	List of symbols .....	11
1.2	Introduction .....	12
1.3	General .....	12
1.4	Equipment Description Overview .....	12
1.5	Spare Parts .....	12
1.6	Getting Help .....	12
2	Safety Instructions .....	13
3	General Characteristics .....	14
3.1	Environmental Requirements .....	14
3.2	Regulatory Approvals and EMC Conformity .....	14
3.3	Type Plate and Model Identification .....	14
3.4	Conceptpower DPA 500 Basic System Configuration .....	16
3.5	Multiple Cabinet Configuration .....	19
3.5.1	Type 1 – up to 4 cabinets (12 modules) in parallel. Though the system is flexible (each cabinet can be equipped with 1-3 modules), it is strongly recommended that the number of module sets in each cabinet be identical. ....	19
3.5.2	Type 2 - up to 6 cabinets (30 modules) in parallel. Though the system is flexible (each cabinet can be equipped with 1-5 modules), it is strongly recommended that the number of module sets in each cabinet be identical. ....	19
4	Transport – Storage - Unpacking .....	20
4.1	Visual Inspection .....	20
4.2	Storage .....	20
5	UPS System Installation and Wiring .....	21
5.1	Preliminary Installation .....	21
5.2	Unpacking .....	21
5.3	Positioning of the UPS and Battery Cabinet .....	21
5.4	Electrical Installation .....	23
5.4.1	Input/Output Overcurrent Protection .....	24
5.4.2	Input/Output Ratings and External Wiring Requirements – Common Battery .....	24
5.5	Wiring Configurations .....	26
5.6	Front View .....	27
5.6.1	Type 1 Cabinet – 300kW .....	27
5.6.2	Type 2 Cabinet – 500kW .....	28
6	Connectivity .....	29
6.1	Interfacing .....	29
6.1.1	Smart Port JD1 on Each Cabinet (Serial RS 232 / D-Sub 9-pin / Male) .....	29
6.1.2	User Interface and Dry Ports (volt-free contacts) .....	30
6.1.3	USB PC / Laptop Interface .....	31
6.1.4	JR2 Interface for Multidrop .....	31
6.1.5	Optional Feature: Configuration of the External Output Breaker .....	31
7	Operation .....	33
7.1	Commissioning .....	33
7.2	Multi-Cabinet Configuration .....	33

7.2.1	Installation Instructions .....	34
7.2.2	Paralleling of UPS-Cabinets .....	34
7.2.3	DIP Switch SW1-9.....	35
7.2.4	Multidrop Configuration .....	36
7.2.5	On/Off – Main Buttons .....	36
7.2.6	Parallel Isolator (CB1) .....	36
7.2.7	Maintenance Bypass.....	37
7.2.8	Eco-Mode (Bypass Mode) in Parallel Systems .....	37
7.3	Commissioning of Multi-Cabinet Configuration .....	37
7.4	System Display.....	38
7.4.1	Graphical Display Operation .....	38
7.4.2	Start-up and Installation.....	39
7.4.3	Navigation .....	39
7.4.4	Mimic Diagram – System Level .....	39
7.4.5	Module Selection Screen .....	41
7.4.6	Home Screen .....	42
7.4.7	Operating Mode.....	45
7.5	Module Display – Control Panel.....	46
7.5.1	LED Indicators.....	47
7.5.2	Buttons .....	48
7.5.3	On/Off Start-up and Shutdown Buttons .....	48
7.5.4	Definition of a Single/Parallel-Module System .....	48
7.5.5	Definition of a Single/Multi-Cabinet Chain (DIP Switch SW1-9) .....	48
7.5.6	Status Screens .....	49
7.5.7	Main Menu Screen.....	50
7.5.8	Event Log Screen.....	50
7.5.9	Measurements Screen .....	51
7.5.10	Commands Screen .....	52
7.5.11	UPS Data .....	52
7.5.12	Set-Up User .....	53
7.5.13	Set-Up Service .....	53
7.6	Operating Modes.....	54
7.6.1	Mode “On Line” (Inverter Mode) .....	54
7.6.2	Mode “Off-Line” (Eco or Bypass Mode).....	54
7.6.3	“Maintenance Bypass” Mode .....	55
7.6.4	Output Switch/Parallel Isolator (CB1) .....	55
7.7	Operating Procedures .....	56
8	Maintenance .....	57
8.1	User Responsibilities.....	57
8.2	Preventative Maintenance .....	57
8.3	Deep Battery Test .....	57
8.4	Battery Maintenance, Disposal, and Recycling.....	57
9	Troubleshooting.....	59
9.1	Alarms.....	59
9.2	Fault Identification and Rectification .....	59
10	Options.....	60
10.1	Introduction .....	60
10.2	Remote Shutdown (EPO).....	60
10.3	Generator ON Facilities .....	61

10.4	WAVEMON Shutdown and Management Software .....	61
10.4.1	Why is UPS Management Important? .....	61
10.4.2	WAVEMON Shutdown and Monitoring Software .....	61
10.4.3	SNMP Card/Adapter for Network Management / Remote Monitoring .....	63
11	Technical Specifications .....	65
11.1	Conceptpower DPA 500 – General Characteristics .....	65
11.2	Input Characteristics .....	67
11.3	Output Characteristics .....	67
11.4	Battery Characteristics .....	69
11.5	Torque Specification .....	69
11.6	Heat Dissipation .....	70
12	Appendix A (Type 1 Cabinet – 300kW) .....	71
12.1	Wiring Configurations .....	71
12.1.1	Connections for External Wiring .....	71
12.1.2	AC Wiring Instructions .....	72
12.1.3	DC Wiring Instructions .....	73
12.1.4	Connections to External Battery Cabinet .....	73
12.2	Electrical Installation .....	74
12.2.1	Installation Checklist .....	75
12.3	Operating Procedure .....	75
12.4	Shutdown Procedure .....	78
12.4.1	Shutdown of Multi-Cabinet Configuration .....	79
12.5	Load Transfer: From Inverter Operation to Maintenance Bypass .....	79
12.6	Load Transfer: From Maintenance Bypass to Inverter Operations .....	80
12.7	Replacement of UPS Modules .....	81
12.7.1	Replacement of UPS-Module in Single-Module Systems .....	81
	If your Conceptpower DPA 500 consists of only one single UPS-Module, the UPS needs to be transferred to maintenance bypass. Before performing the operations described below, follow the procedure of the section 7.9 to transfer the UPS from inverter operation to maintenance bypass.	
	Replacement of UPS-Module in Redundant Multi-Module Systems .....	81
13	Appendix B (Type 2 Cabinet – 500kW) .....	85
13.1	Wiring Configurations .....	85
13.1.1	Connections for External Wiring .....	85
13.1.2	AC Wiring Instructions .....	86
13.1.3	DC Wiring Instructions .....	89
13.1.4	Connections to External Battery Cabinet .....	89
13.2	Electrical Installation .....	89
13.2.1	Installation Checklist .....	90
13.3	Operating Procedure .....	91
13.4	Shutdown Procedure .....	93
13.4.1	Shutdown of Multi-Cabinet Configuration .....	94
13.5	Load Transfer: From Inverter Operation to Maintenance Bypass .....	94
13.6	Load Transfer: From Maintenance Bypass to Inverter Operations .....	95
13.7	Replacement of UPS Modules .....	96
13.7.1	Replacement of Single-Module UPS Systems .....	96
14	Service .....	100



## Figures

Figure 3-1 Type Plate of DPA 500 .....	14
Figure 3-2 Type 1 Cabinet with 3 module sets.....	16
Figure 3-3 Type 1 Cabinet Maximum Multiple-Cabinet Configuration; 4 Cabinets, 12 Modules .....	19
Figure 3-4 Type 2 Cabinet Maximum Multiple-Cabinet Configuration; 6 Cabinets, 30 Modules .....	19
Figure 5-1 Top View and Indication of the Minimum Clearances for Single UPS .....	22
Figure 5-2 Top View and Indication of the Minimum Clearances for UPS + Other Cabinets in a Row .....	23
Figure 5-3 Front View of the DPA 500 Type 1 Cabinet, Left Side with Closed Doors and Right Side with Open Doors and Dead Fronts Removed .....	27
Figure 5-4 Front View of the DPA 500 Type 2 Cabinet, Left Side with Closed Doors and Right Side with Open Doors and Dead Fronts Removed .....	28
Figure 6-1 Connector Cable – RS-232 Serial Port with 9-Pin D-Sub connection.....	29
Figure 6-2 User Interface Board .....	32
Figure 7-1 Connection of the Bus Lines when Paralleling UPS-Cabinets by means of Parallel Adapters .....	34
Figure 7-2 Parallel Adapter and DIP Switch SW2-2 .....	35
Figure 7-3 System Display.....	38
Figure 7-4 Display Header .....	39
Figure 7-5 Mimic Diagram Screen – System Level .....	40
Figure 7-6 Home Screen .....	43
Figure 7-7 Online Mode on Mimic Diagram.....	45
Figure 7-8 Eco Mode on Mimic Diagram.....	45
Figure 7-9 Module Control Panel.....	47
Figure 10-1 Drawing of the Wiring for the REMOTE SHUTDOWN SWITCH .....	60
Figure 10-2 Drawing of the Wiring for the Generator Operation.....	61
Figure 10-3 Monitoring Image.....	62
Figure 10-4 SNMP Adapter .....	63
Figure 10-5 External SNMP Adapter .....	64
Figure 10-6 Internal SNMP Adapter .....	64

## Tables












Table 3-1 Identification Table with Dimensions of DPA 500 .....	15
Table 3-2 Weight Table without Batteries of DPA 500.....	15
Table 3-3 Cabinet Configurations .....	17
Table 5-1 Minimum Clearances for Single UPS Installation.....	22
Table 5-2 Minimum Clearances for UPS + Other Cabinets in a Row .....	22
Table 5-3 DPA 500 UPS Design Ratings.....	24
Table 5-4 Type 1 Cabinet Recommended OCPD.....	25
Table 5-5 Type 2 Cabinet Recommended OCPD.....	25
Table 5-6 Recommended AC Wiring (Copper Wires). Follow all National, State, and Local Codes. ....	26
Table 5-7 Maximum Cable Sizes.....	26
Table 6-1 User Interface Board DPA 500 .....	30
Table 7-1 DIP Switch SW1-9.....	48
Table 9-1 Troubleshooting .....	59
Table 11-1 Generic Torque Specifications .....	69
Table 11-2 Heat Dissipation Specifications.....	70

# 1 General

## 1.1 Using this manual

This user manual contains guidelines regarding receipt, installation, and commissioning of the UPS. This manual is intended to be used by those who will plan the installation, install, commission, use, and service the UPS. The reader is expected to know the fundamentals of electricity, wiring, electrical components and electrical schematic symbols.

### 1.1.1 List of symbols

Symbols	
	<b>DANGER – Risk of electric shock</b> This symbol in conjunction with the signal word "DANGER" indicates an imminent electrical hazard. Observe the warning associated with the risk of electric shock symbol.
	<b>WARNING – Bodily injury</b> This symbol in conjunction with the signal word "WARNING" indicates a potentially dangerous situation. Failure to observe the related safety note may cause personnel injury or death or equipment damages.
	<b>CAUTION – Refer to manual</b> This symbol in conjunction with the signal word "CAUTION" indicates that before proceeding, the user should refer to the appropriate section of this manual.
	<b>IMPORTANT – NOTE</b> This symbol indicates operator tips, particularly useful or important information for the use of the product. This symbol and wording does not indicate a dangerous situation.
	<b>PE – Protective Earth terminal</b> The PE terminal must be connected to earth prior to making any other connection to the equipment.
	<b>AC – alternating current or voltage</b> A terminal to which or from which an alternating current or voltage is applied or supplied.
	<b>DC – direct current or voltage</b> A terminal to which or from which direct current or voltage is applied or supplied.
	<b>Battery</b> This symbol indicates a battery (source of DC voltage and current) which can be both internal or external to the UPS system and accessories (battery cabinet).
	<b>Power ON/OFF or shutdown</b> Symbol used to indicate the action of Powering ON, Idle or shutdown the UPS.
	The universal symbol for Recycle.
	This symbol indicates that you should not discard waste electrical or electronic equipment (WEEE) in the trash. For proper disposal, contact your local recycling/reuse or hazardous waste center.

## 1.2 Introduction

This manual is provided to aid the user in the installation, operation, and maintenance of the DPA 500 Uninterruptible Power Supply (UPS).

## 1.3 General

The DPA 500 UPS is a true, on-line, double-conversion, three-phase UPS, designed to comply with UL standards as the optimal solution for commercial and datacenter applications. It is designed for controlled environment indoor applications and must be protected from excessive moisture or corrosive environments. The DPA 500 UPS is not intended for use in the presence of explosive gases.

Performance specifications and Manufacturer's claims are subject to change at all times. Please check website (refer to Section 1.5.) for up to date information.

## 1.4 Equipment Description Overview

The DPA 500 UPS is a solid state, three (3) phase input/output uninterruptible power supply. The primary power input includes a PWM rectifier (AFE) which feeds a split rail DC bus powering a full bridge inverter that supplies the critical load. A Static Bypass consisting of thyristors (SCRs), each sized to carry the full rated load, are connected from the shared mains input or dedicated bypass input (single vs. dual feed) to the critical load, in the event of a system overload, inverter fault, or battery depletion.

When specified at the time of ordering, the system may also be configured to use an optional external wrap-around Maintenance Bypass Cabinet (MBC), which allows the DPA 500 I/O cabinet to be completely electrically isolated without interrupting the critical load.

The DPA 500 UPS consists of the following major assembly types:

- I/O Cabinet (capable of housing up to five module sets)
- Active Module (up to five)
- Passive Module (up to five)

## 1.5 Spare Parts

Parts kits are available, in addition to individual parts. Start-up spares kits are appropriate with initial unit purchase. Critical spares kits should be kept on site for ready availability with accessible installation sites. Comprehensive spares kits are intended for remote sites. When ordering spares kits or individual parts please ensure you specify the model and serial number of the DPA 500 UPS unit being supported. Please contact your sales representative or visit our website to order spare part kits (refer to Section 1.5.).

## 1.6 Getting Help

If help is needed with any of the following:

- Scheduling initial startup
- Regional locations and telephone numbers
- A question about any of the information in this manual
- A technical question this manual does not answer

Please call the Help Desk at:

United States: +1 800 292 3739 or submit issue to following web page:  
<http://new.abb.com/ups/systems/three-phase-ups/conceptpower-dpa-500>

---

## 2 Safety Instructions

The user must follow all precautions and perform only the operations described within this manual. Any deviations from the instructions within this manual may lead to severe personal or property damage.

The only end-user(customer) operations permitted are:

- Use of the LCD control panel (LCD Display) and Maintenance Bypass
- Start up and shut down of the UPS (excluding the commissioning start-up)
- Operation of additional connectivity devices (remote monitoring, SNMP card access and programming)

Read carefully all instructions and save this manual for future reference.



IT IS PROHIBITED TO REMOVE ANY SCREWS FROM THE UPS SYSTEM OR FROM THE BATTERY CABINET (IF PRESENT). DANGER OF ELECTRICAL SHOCK.

DANGER

---



HIGH TOUCH CURRENTS (LEAKAGE CURRENTS). BEFORE CONNECTING THE UPS TO THE MAINS, YOU MUST ENSURE THAT THERE IS A PROPER PROTECTIVE EARTH (PE) CONNECTION

DANGER

---



THE USER MUST DISPLAY A WARNING SHIELD ON ALL PRIMARY UPS CIRCUIT BREAKERS. ALL SERVICE PERSONNEL SHALL BE INFORMED ABOUT DANGEROUS VOLTAGES. THE WARNING PANELS MUST CONTAIN THE FOLLOWING TEXT: "BEFORE STARTING MAINTENANCE WORK ON THE CIRCUIT BREAKERS, MAKE SURE THE UPS IS ISOLATED."

DANGER

---

## 3 General Characteristics

### 3.1 Environmental Requirements

To operate the UPS at the best efficiency point, your installation site should meet the environmental parameters outlined in this manual. Excessive amount of dust or moisture in the operating environment may cause damage or lead to malfunction. The UPS should be always protected from the outside weather and sunshine. The operating environment must meet all size, weight, clearance, airflow, temperature, and humidity requirements specified in the Section 11 *Technical Specifications* of this manual.

Under no circumstances should the UPS be installed in an airtight room, in the presence of flammable gases, or in an environment exceeding environmental requirements specified here below.

The ambient temperature for operating the UPS must be in the range 0 °C to +40 °C. The Ideal temperature also recommended to achieve a long life of the UPS and VRLA batteries is +20°C to +25°C. The relative humidity should be below 95% (non-condensing) and the maximum altitude without de-rating is 1000m above sea level.

### 3.2 Regulatory Approvals and EMC Conformity

The product has UL Listing to 1778, 5th edition.

### 3.3 Type Plate and Model Identification

The Type Plate shown in Figure 3-1 below is positioned on the internal side of the UPS door in a center position. It contains the basic electrical characteristics as well as, product name, serial number and production date. The Identification Table (Table 3-1) helps to crosscheck the Type (first part of the serial number) with the UPS model.

**Figure 3-1 Type Plate of DPA 500**

<b>ABB</b>			
5900 Eastport Blvd, Richmond, Virginia 23231-4453 Tel: (804) 236-3300			
UNINTERRUPTIBLE POWER SUPPLY		Mfg Date: XX / XX / XX	
Model: DPA-XXX-XXXXX			
S/N: XXXX-XX		JOB NUMBER: XXXXX	
NORMAL AC INPUT	480 V; 3W+PE	3Ø	XXX AMPS XX HZ
DC INPUT	XXX-XXX VDC	XXX AMPS	
ALTERNATE AC INPUT	480 V; 3W+PE	3Ø	XXX AMPS XX HZ
SYSTEM OUTPUT	480 V; 3W+PE	3Ø	XXX AMPS XX HZ
APPARENT POWER (OUT)	XXX KVA	1.0 PF	
ACTIVE POWER (OUT)	XXX KW	-	
Cabinet Wiring: _____ Test/Calibration: _____			
Final Inspection: _____			
INTENDED FOR INSTALLATION IN A CONTROLLED ENVIRONMENT WITH AN AMBIENT TEMPERATURE BETWEEN 0°C AND 40°C.			

**Table 3-1 Identification Table with Dimensions of DPA 500**

Type	Model Description	Unit Dimensions in Inches (mm)	Shipping Dimensions in Inches (mm)
DPA-M66	Conceptpower DPA 500 UPS Type 1 Cabinet	53.0 x 77.8 x 36.0 (1347 x 1975 x 914)	76.0 x 83.5 x 46.0 (1930 x 2120 x 1170)
DPA-D66	Conceptpower DPA 500 UPS Type 2 Cabinet	70.0 x 77.8 x 36.0 (1778 x 1975 x 914)	76.0 x 83.5 x 46.0 (1930 x 2120 x 1170)
DPA-100M	Active and passive sub-module set (dimensions per module)	27.8 x 6.9 x 29.5 (706 x 175 x 750)	29.5 x 7.9 x 31.5 (750 x 200 x 800) (approx.)

**Table 3-2 Weight Table without Batteries of DPA 500**

	100kW Modules Quantity	Unit Weight Lb. (kg)	Shipping Weight Lb. (kg)
	0	1224 (555)	1358 (616)
DPA 500 Type 1 Cabinet	1	1464 (664)	1598 (725)
	2	1704 (773)	1838 (834)
	3	1944 (881)	2078 (943)
	0	1450 (660)	1600 (725)
	1	1700 (770)	1850 (840)
DPA 500 Type 2 Cabinet	2	1950 (885)	2100 (950)
Decentralized	3	2200 (1000)	2350 (1065)
	4	2450 (1110)	2600 (1180)
	5	2700 (1225)	2850 (1295)
	0	1520 (690)	1680 (760)
	1	1770 (800)	1930 (875)
DPA 500 Type 2 Cabinet	2	2020 (915)	2180 (990)
Centralized, Dual Feed	3	2270 (1030)	2430 (1100)
	4	2520 (1145)	2680 (1215)
	5	2770 (1255)	2930 (1330)
Active sub-module (separately)	-	120 (55)	122 (56)
Passive sub-module (separately)	-	130 (59)	132 (60)

### 3.4 Conceptpower DPA 500 Basic System Configuration

The UPS system is housed in single free-standing cabinet. The cabinets line up and match in style and color, and have dead fronts behind the doors for hazardous voltage protection. There are two cabinet types which are currently offered in the DPA 500 product family:

3.4.1 Type 1 Cabinet is optimized for industry leading power density and has a maximum cabinet rating of 300kVA. Type 1 configuration (300kVA) is shown below:

**Nominal power 300kW**





***Figure 3-2 Type 1 Cabinet with 3 module sets***





3.4.2. Type 2 Cabinet is available in either centralized or decentralized configurations, and has a maximum cabinet rating of 500kVA.

**Table 3-3 Cabinet Configurations**

Nominal power 100kW	Nominal power 200kW
	
Nominal power 300kW	Nominal power 400kW
	

**Nominal power 500kW**



**Centralized Input Disconnect  
Rectifier Only, Bottom Entry**



**Centralized Input Disconnect  
Rectifier Only, Top Entry**



**Centralized Input Disconnects  
Rectifier and Bypass, Bottom Entry**



**Centralized Input Disconnects  
Rectifier and Bypass, Top Entry**



### 3.5 Multiple Cabinet Configuration

Multiple cabinet configuration is possible.

3.5.1 Type 1 – up to 4 cabinets (12 modules) in parallel. Though the system is flexible (each cabinet can be equipped with 1-3 modules), it is strongly recommended that the number of module sets in each cabinet be identical.

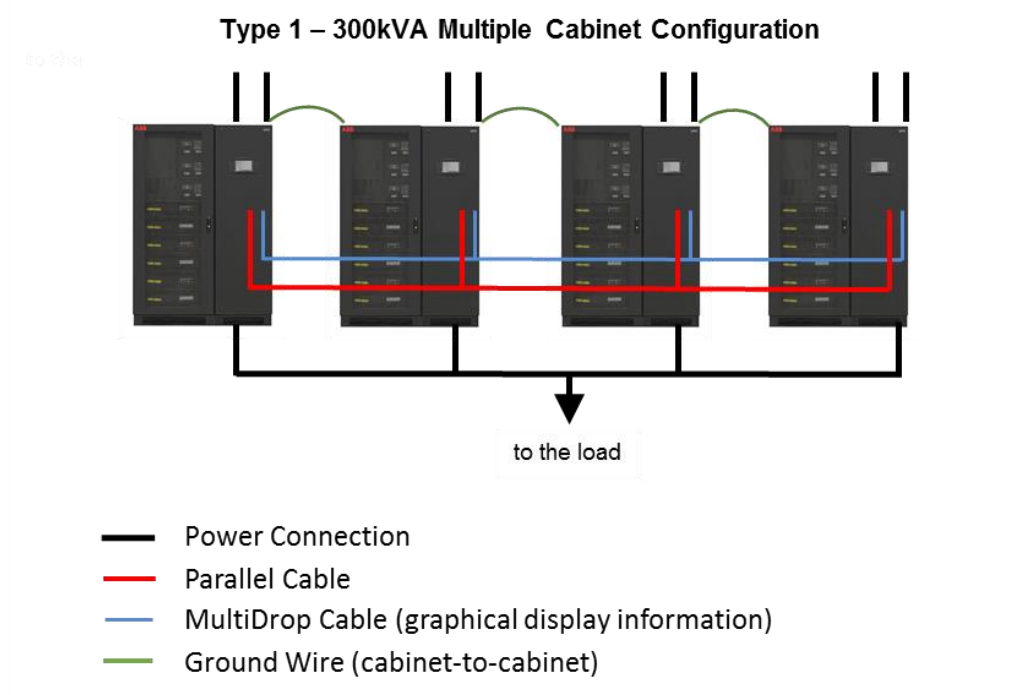
3.5.2 Type 2 - up to 6 cabinets (30 modules) in parallel. Though the system is flexible (each cabinet can be equipped with 1-5 modules), it is strongly recommended that the number of module sets in each cabinet be identical.

Multiple cabinet system requires:

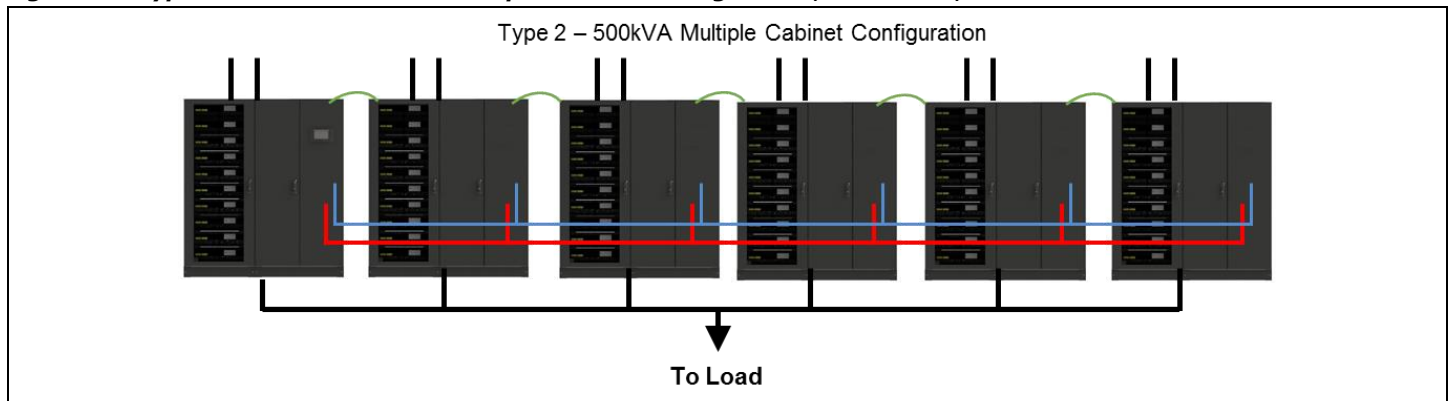
- at least two UPS cabinets with at least 1 module each
- each cabinet to be equipped with the parallel kit
- one parallel cable and one Multidrop cable connect that connect two cabinets

**As with all DPA 500 products, the installation, commissioning, and maintenance of a multiple-cabinet system should only be performed by authorized service personnel.**

**Figure 3-3 Type 1 Cabinet Maximum Multiple-Cabinet Configuration; 4 Cabinets, 12 Modules**



**Figure 3-4 Type 2 Cabinet Maximum Multiple-Cabinet Configuration; 6 Cabinets, 30 Modules**



## 4 Transport – Storage - Unpacking

### 4.1 Visual Inspection

Upon receiving the goods, make sure that they correspond to the material indicated in the delivery note. Carefully examine the packed unit(s) for any sign of physical damage. In case of damaged unit(s) or even suspect of damaged inform immediately:

- The carrier
- The manufacturer

---

<b>i</b> IMPORTANT NOTES	VISIBLE TRANSPORT DAMAGES MUST BE CLAIMED TO THE CARRIER IMMEDIATELY AFTER RECEIPT.
	OTHER CLAIM FOR SHIPPING DAMAGE MUST BE FILED ALSO IMMEDIATELY AND THE CARRIER MUST BE INFORMED WITHIN 7 DAYS OF RECEIPT OF THE EQUIPMENT. THE PACKING MATERIALS SHOULD BE STORED FOR FURTHER INVESTIGATION.

---

### 4.2 Storage

The shipping packaging of the UPS protects it from mechanical and environmental damage normal to the shipping/storage process. UPS and Battery cabinets should be stored in their original packaging. Make sure that the UPS and Battery cabinets are stored indoors, protected from water and sunshine in a clean environment.

---

<b>i</b> IMPORTANT NOTES	THE RECOMMENDED TEMPERATURE FOR STORAGE OF THE UPS SYSTEM AND BATTERIES IS BETWEEN +20 °C AND +25°C, HUMIDITY < 95% (NON-CONDENSING).
	FOR UPS SYSTEM <u>ONLY</u> THE STORAGE TEMPERATURE CAN BE BETWEEN -25 °C AND +70°C, HUMIDITY < 95% (NON-CONDENSING). BEFORE SWITCHING ON THE UNIT(S), MAKE SURE THE AMBIENT TEMPERATURE HAS BEEN WITHIN THE ACCEPTABLE OPERATION TEMPERATURE RANGE (0°C - 40°C) FOR AT LEAST 8 HOURS. SEALED BATTERIES MUST NEVER BE STORED IN A DISCHARGED OR PARTIALLY DISCHARGED STATE. EXTREME TEMPERATURE, UNDER- AND OVERCHARGE AND OVERDISCHARGE WILL DESTROY BATTERIES!  FOR LONG-TERM STORAGE, MAKE SURE THAT THE BATTERY IS FULLY RECHARGED EVERY SIX (6) MONTHS. CHARGE THE BATTERY BEFORE AND AFTER EVERY PERIOD OF STORAGE.

---

---

## 5 UPS System Installation and Wiring

---



**Installation should be performed only by authorized personnel.**

**DANGER**

---

### 5.1 Preliminary Installation

Refer to the following while planning/installing the UPS system:

- Section 3.3 for cabinet dimensions, weights, and installation notes.
- Do not tilt the cabinet more than +/- 10 degrees during installation.
- Remove gland plates to add conduit landing holes as necessary. See outline drawing for plate material details.

### 5.2 Unpacking

Prior to unpacking, make sure that the floor surface is solid and suitable for supporting the weight of all the equipment. The UPS cabinet is bolted to a wooden pallet supported by wood skids.



**WARNING**

UPS AND BATTERY CABINETS ARE HEAVY AND TALL. MAKE SURE YOU ARE ALWAYS WORKING SAFELY BY USING APPROPRIATE TOOLS AND EQUIPMENT. WHEN MOVING THE UNITS AROUND USING FORKLIFT, ALWAYS MAKE SURE THE UNITS ARE IN UPRIGHT POSITION AND MOVE AT LOW VELOCITY/ACCELERATION.

DPA 500 TYPE 1 CABINET(S) HAS THE COG SHIFTED TO THE LEFT (FACING THE FRONT OF THE CABINET). DPA 500 TYPE 2 CABINET(S) EQUIPPED WITH 1-2 MODULES HAVE THE COG APPROXIMATELY IN THE CENTER, WITH 3-5 MODULES HAS IT SHIFTED TO THE LEFT SIDE (FACING THE FRONT OF THE CABINET).

---

Perform the following steps to unpack the UPS equipment from the standard packaging:

1. Bring the unit(s) close to their final location.
2. Unfasten the clamping feet from the pallet and from the unit.
3. Using a forklift, remove the unit from the pallet, paying attention to the COG (see the warning above), and position the unit in its final location.
4. Remove the plastic film from the UPS, by cutting it on one edge (where there is the cardboard underneath). Remove the 4x cardboard edges carefully; ensure that the accessory box placed on top of the UPS does not fall down. Remove the accessory box from the top of the cabinet using appropriate method in accordance with applicable safety standards.

### 5.3 Positioning of the UPS and Battery Cabinet

The UPS is designed for location in a restricted access location only and should be located where:

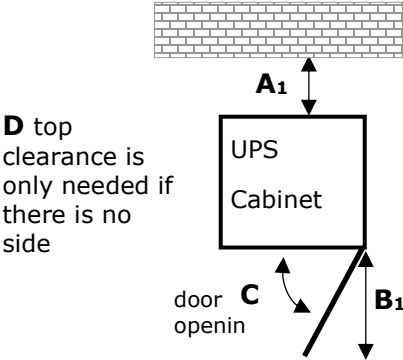
- The relative humidity does not exceed 95% (non-condensing) and the temperature remains always between 0°C and +40°C. Note: an optimal temperature for the UPS and especially for VRLA batteries is 20°C- 25°C. The UPS room shall have temperature control (air-cooling)
- Location should be free of dust/debris sources and/or corrosive/explosive gases
- All local and national fire protections standards shall be followed.
- The location should be free of regular exposure to shock and/or vibration.

- The floor material should be non-flammable and strong enough to support the heavy load.
- The locations should be convenient for all cabling operations.
- The location should afford a front panel access of 36 inches from front of the unit for maintenance or service
- If the UPS will be installed in bayed enclosures, partition walls have to be installed as well
- Follow all clearance requirements (refer to Tables 5-1 and 5-1 and Figures 5-1 and 5-2 below) to allow proper airflow to the UPS cabinet.

**Table 5-1 Minimum Clearances for Single UPS Installation**

UPS Model	A <sub>1</sub> inch (mm)	B <sub>1</sub> inch (mm)	C (°)	D inch (mm)
DPA 500 TYPE 1	12 (300)	42 (1066)	115°	16 (400)
DPA 500 TYPE 2	12 (300)	42 (1066)	115°	16 (406)

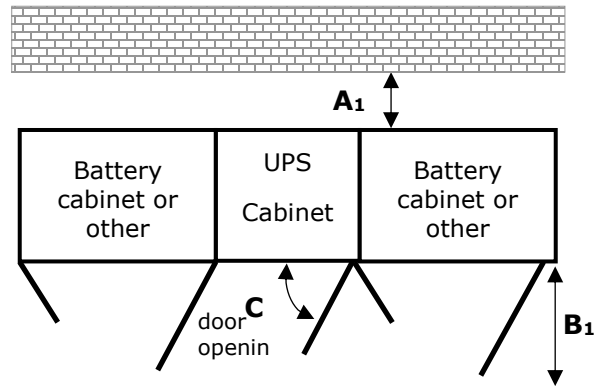
**Figure 5-1 Top View and Indication of the Minimum Clearances for Single UPS**



**Table 5-2 Minimum Clearances for UPS + Other Cabinets in a Row**

UPS Model	A <sub>1</sub> inch (mm)	B <sub>1</sub> inch (mm)	C (°)	D inch (mm)
DPA 500 TYPE 1	12 (300)	42 (1066)	115°	16 (400)
DPA 500 TYPE 2	12 (300)	42 (1066)	115°	16 (406)

**Figure 5-2 Top View and Indication of the Minimum Clearances for UPS + Other Cabinets in a Row**



## 5.4 Electrical Installation

The electrical installation procedure is described in the following section. The installation, inspection, and commissioning start-up of the UPS and external battery cabinet(s) must be carried out by authorized service personnel, such as a licensed service engineer from the manufacturer or an agent certified by the manufacturer.



WARNING

THE INSTRUCTIONS IN THIS USER MANUAL MUST ALWAYS BE FOLLOWED IN ORDER TO AVOID INJURIES FROM ELECTRICAL IMPACTS.



WARNING

ALL OF THE OPERATIONS IN THIS MANUAL MUST BE PERFORMED BY AUTHORIZED ELECTRICIANS OR BY QUALIFIED INTERNAL PERSONNEL.

DO NOT OPERATE IN CASE OF PRESENCE OF WATER OR MOISTURE.

BY OPENING OR REMOVING THE DEAD FRONTS BEHIND THE UPS DOOR, YOU ARE EXPOSED TO HAZARDOUS VOLTAGES.

IF THESE INSTRUCTIONS ARE IGNORED PHYSICAL INJURY OR DEATH MAY RESULT, AND/OR DAMAGE MAY OCCUR TO THE UPS OR THE LOAD EQUIPMENT.

To ensure correct operation of the UPS and its ancillary equipment it is necessary to provide the appropriate wiring and with fuse protection in accordance with the prescribed local standards or with the local regulations/law. Alternatively refer to the suggested appropriate wiring and fuse protection in the following sections.

The DPA 500 UPS is 3W + PE. The UPS can accommodate L-L loads only, NOT L-N. The UPS unit has the following power connections:

**Rectifier input: three-phase** (1-L1, 1-L2, 1-L3)

**Bypass input: three-phase** (2-L1, 2-L2, 2-L3)

**Neutral (N) Neutral connection** at UPS input (upstream) is NOT available as standard. Please consult factory for 4W+PE installations.

**Note:**

For parallel cabinet installations, neutral cable must be connected from UPS 1 to UPS 2, to UPS X (where X is the number of cabinets in parallel). The Neutral is between ups cabinets only and is not for distribution to downstream equipment.

**IMPORTANT**

**Load Output: three-phase** (3-L1, 3-L2, 3-L3)

**Battery: (+) and (-)**

Note: The battery (-) is at the same potential and is the same connection point as N.

**Protective Earth (PE)**

#### 5.4.1 Input/Output Overcurrent Protection

Overcurrent protection (provided by others) must be installed at the distribution panel of the incoming main supply and all branch circuits and loads connected to the output bus of the DPA 500 UPS. Sizing of circuit breakers, fuses and cables for Input Utility, Output Load and Battery must meet the requirements of local, state, and national electrical codes. Please refer to Section 5.6.1 and Table 5-3 for additional details.

**Note:**

**Overcurrent circuit protection shall be provided by others. The delivery and installation of fuses and input/output connections of the UPS are at the customer's expense, unless agreed otherwise. Please refer to Table 5-4 for recommendations. Consult factory with questions.**

**IMPORTANT**

**The DPA 500 UPS** is pre-configured at the factory exactly as ordered. Wiring configurations cannot be changed on site.

**IMPORTANT**

#### 5.4.2 Input/Output Ratings and External Wiring Requirements – Common Battery

##### UPS System Ratings:

The values below are design ratings per phase. Consult the values below when selecting appropriate upstream AC Over Current Protective Devices (OCPD). ABB OCPDs are recommended; other manufacturer parts are shown for comparison. Ensure that any selected OCPD will meet the requirements in Table 5-3. To reduce the risk of fire, only connect UPS to a circuit with recommended OCPD.

**Table 5-3 DPA 500 UPS Design Ratings**

Cabinet Type	UPS Rating (kW)	Rectifier AC Input Current (A)		Battery Current		Bypass Current	Output Current
		Nominal	Maximum	Nominal	Maximum		
Type 1	300	380	413	567	675	364	360
Type 2	500	633	689	945	1125	607	601



## OCPD Recommendations:

**Table 5-4 Type 1 Cabinet Recommended OCPD**

Recommended Upstream Protection Breaker MFR	MFR Part Number	IPeak Let-Through (Amps)	I <sup>2</sup> T Let-Through X 1,000,000	Total Clearing Time (Msec.)	Available Source Fault Current @480VAC
ABB	T5HQ400W	(100%)	44,500	2.40	65kA
ABB	T5LQ400W	(100%)	49,500	2.40	100kA
ABB	T5VQ400W	(100%)	49,500	2.40	150kA
Square D	LXI(L)36600	(80%)	43,000	2.80	200kA
Square D	LI(L)36600	(80%)	48,000	2.45	200kA
Square D	LC(L)36600	(80%)	92,000	26.40	65kA
Square D	LLA36600	(80%)	54,000	3.4	100kA
GE	SGPA36AT0400	—	62,000	12.50	100kA
GE	SGPA36AT0600	—	62,000	12.50	100kA

**Table 5-5 Type 2 Cabinet Recommended OCPD**

Recommended Upstream Protection Breaker MFR	MFR Part Number	IPeak Let-Through (Amps)	I <sup>2</sup> T Let-Through X 1,000,000	Total Clearing Time (Msec.)	Available Source Fault Current @480VAC
ABB	T5V600W (80%)	49,500	2.4	1.96	150kA
ABB	T6HQ800W (100%)	60,250	10.80	5.95	65kA
ABB	T6LQ800W (100%)	75,000	11.30	4.01	100kA
Square D	CKHED36808LI	87,000	25.00	7.50	65kA
Square D	LI(L)36600	48,000	2.45	6.00	200kA
Square D	LXI(L)36600	56,000	2.80	4.80	200kA
Square D	LLA36600 (80%)	54,000	3.4	10	100kA
GE	SGPA36AT0600	62,000	12.50	8.30	100kA
GE	SGLA36AT0600	55,000	10.30	10.20	65kA

## Recommended Connecting Wire Ratings:

**Table 5-6 Recommended AC Wiring (Copper Wires). Follow all National, State, and Local Codes.**

Cabinet Type	UPS Rating (kW)	Rectifier AC Input		DC Input		Bypass Input		Maintenance Bypass AC Input	
		80% Rated	100% Rated	80% Rated	100% Rated	80% Rated	100% Rated	80% Rated	100% Rated
Type 1	300	600A	600A	800A	600A	600A	400A	600A	400A
Type 2	500	1000A	800A	1200A	1000A	800A	800A	1000A	800A



### WARNING

**Wire sizing according to NEC Section 210-20 (A) Table 310-16**

**Use 167°F (75°C) (minimum) copper or aluminum wire**

**Refer to Section 2.5.2 for wiring connection means**

### Wiring Requirements:

AC Input Rectifier: 3-phase, 3 wire plus Ground (PE)

## Maximum Recommended Cable Size:

**Table 5-7 Maximum Cable Sizes**

Cabinet Type	UPS Rating (kW)	Rectifier AC Input	DC Input	Bypass Input	AC Output
Type 1	300	3 x 250 kcmil	4 x 250 kcmil	3 x 250 kcmil	3 x 250 kcmil
Type 2	500	4 x 500 kcmil	4 x 500 kcmil	4 x 500 kcmil	4 x 500 kcmil

## 5.5 Wiring Configurations

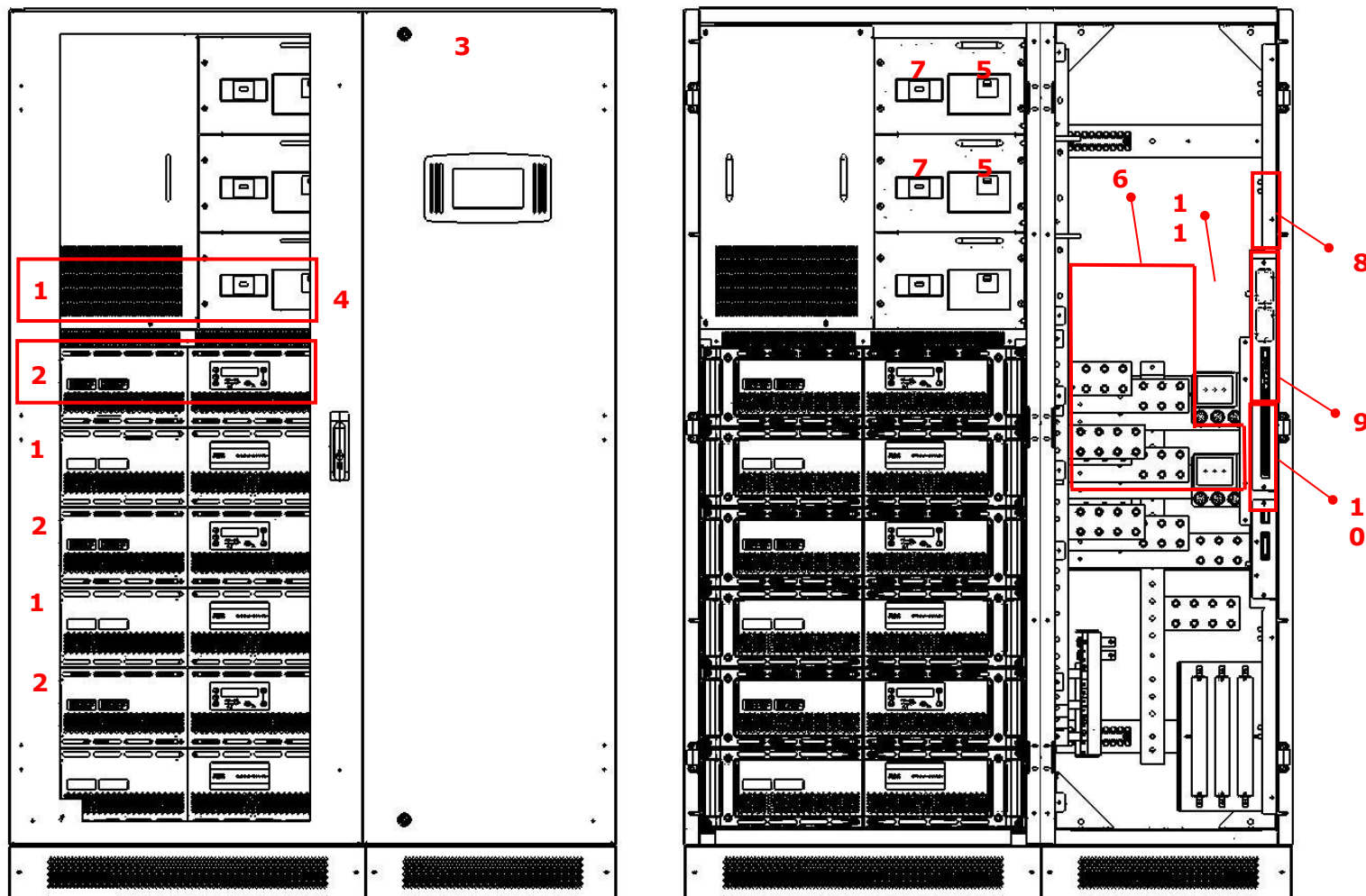
See **Appendix A** (Type 1 Cabinet – 300kW) for details.

See **Appendix B** (Type 2 Cabinet – 500kW) for details.

## 5.6 Front View

### 5.6.1 Type 1 Cabinet – 300kW

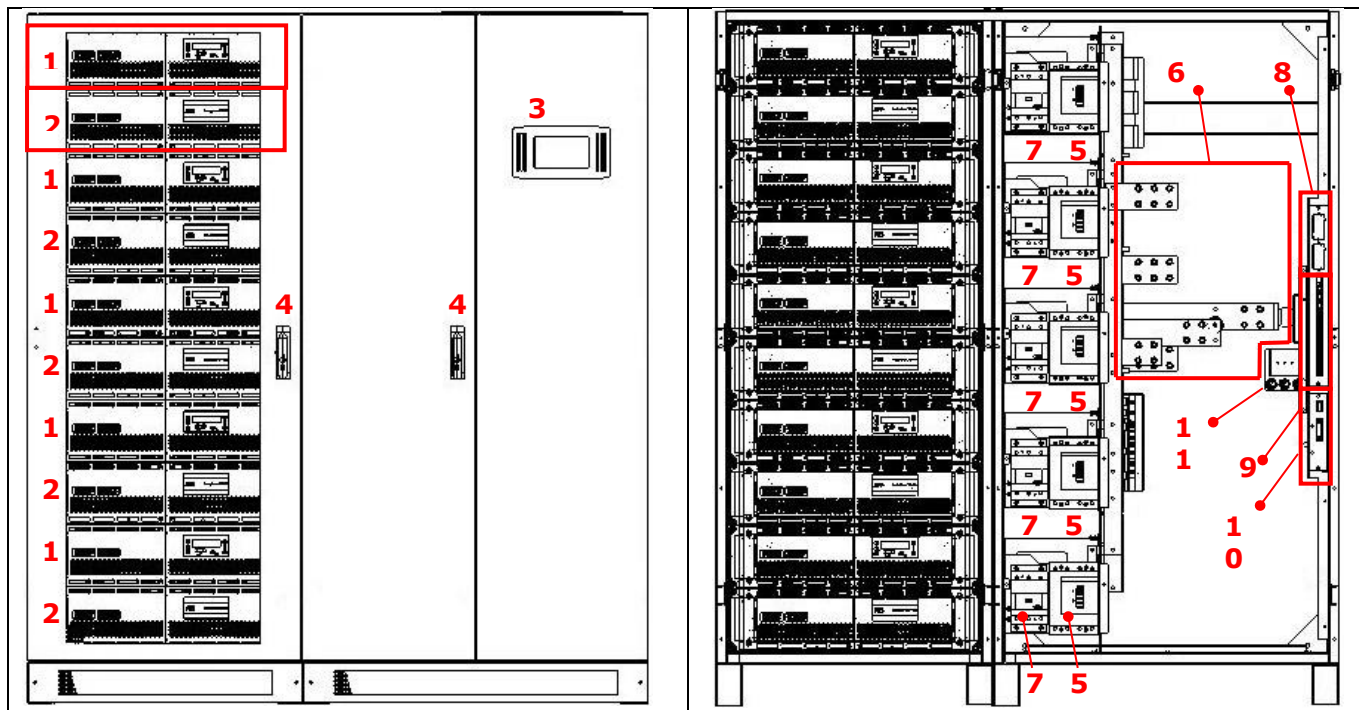
**Figure 5-3 Front View of the DPA 500 Type 1 Cabinet, Left Side with Closed Doors and Right Side with Open Doors and Dead Fronts Removed**



- 1 Active sub-modules
- 2 Passive sub-modules
- 3 System display
- 4 Door handle
- 5 Module-dedicated battery breakers (CB2-1, CB2-2, CB2-3) 250A / 600-800 VDC
- 6 I/O connection terminals
- 7 Module-dedicated output disconnects (CB1-1, CB1-2, CB1-3) 225A / 600 VAC MCS
- 8 Slot for SNMP or modem cards (cards are Optional)
- 9 User interface
- 10 Parallel interface
- 11 Surge Protection Devices

## 5.6.2 Type 2 Cabinet – 500kW

**Figure 5-4 Front View of the DPA 500 Type 2 Cabinet, Left Side with Closed Doors and Right Side with Open Doors and Dead Fronts Removed**



- 1 Active sub-modules
- 2 Passive sub-modules
- 3 System display
- 4 Door handles
- 5 Module-dedicated battery breakers (CB2-1, CB2-2, CB2-3, CB2-4, CB2-5) 250A / 600-800 VDC
- 6 I/O connection terminals
- 7 Module-dedicated output disconnects (CB1-1, CB1-2, CB1-3, CB1-4, CB1-5) 225A / 600 VAC MCS
- 8 Slot for SNMP or modem cards (cards are Optional)
- 9 User interface
- 10 Parallel interface
- 11 Surge Protection Device

## 6 Connectivity

### 6.1 Interfacing

Each UPS cabinet is provided with the User Interface Board (UIB). The UIB contains communication ports which provide information about the UPS (single units) or the UPS system (parallel system).

The user interface is composed of (see also the figure 6-2 at the end of this section):

- Slot for optional Modem card
- Slot for optional SNMP card
- PC / laptop connection JD1 (RS232 9-pin D-Sub/female) or USB
- Status LED's 1 red LED and 1 green LED
- Graphical display connection JR3 (RJ 45)
- Multidrop configuration SW2 (DIP-SWITCH)
- Multidrop connection JR2 (RJ 45)
- UPS inputs X3 (Phoenix terminals)
- 12VDC source X3 5/6 (Phoenix terminals)
- UPS outputs, dry ports X2 (Phoenix terminals)
- Interlock Function X1 1/2 (Phoenix terminals)
- Multi-Cabinet Configuration SW1-9 (DIP-SWITCH)
- Parallel BUS connector JD8 (Sub D25/female)

#### 6.1.1 Smart Port JD1 on Each Cabinet (Serial RS 232 / D-Sub 9-pin / Male)

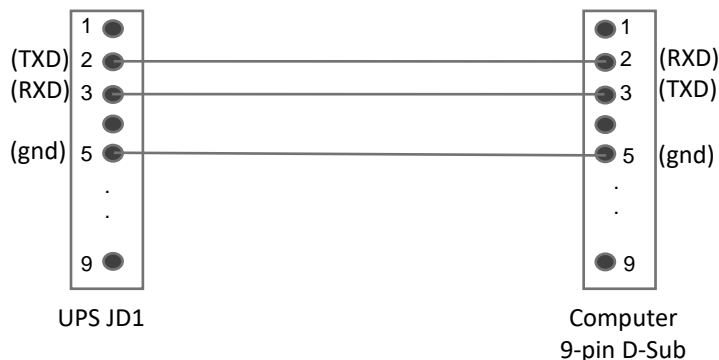
The **SMART PORT JD1** located on the UIB (see figure 5-4 above, detail 9) RS-232 serial port that allows the UPS module to be connected to an external computer. The connector is a standard D-Sub, 9-pin, male. When installed, the optional SMART PORT in conjunction with the software WAVEMON, allows an external computer to monitor the mains voltage and the UPS status continuously.

In the event of any changes the computer terminal will display a message.

(For details see our Monitoring Package: WAVEMON)

Figure 6-1 below represents the standard RS-232 interface cable used to connect an external computer to the UPS.

**Figure 6-1 Connector Cable – RS-232 Serial Port with 9-Pin D-Sub connection**  
Interface Cable  
(9-pin D-Sub male-to-female)



### 6.1.2 User Interface and Dry Ports (volt-free contacts)



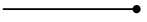



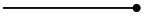
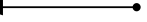
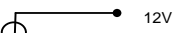
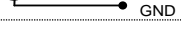


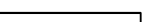



















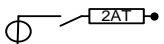
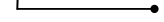
All Terminals X1-X3 can hold Cable from 0.2 mm<sup>2</sup> – 1.5mm<sup>2</sup>.

X1 is a 230VAC output which allows to interface with an interlock system.

All X2 are potential free contacts and are rated: Max 250Vac/8A; 30Vdc/8A; 220Vdc/0.12A

All X3 (except X3 5/6 which is a 12VDC source) are inputs, cable max. R 50Ω at 20mA

**Table 6-1 User Interface Board DPA 500**

Block	Terminal	Contact	Signal	On Display	Function
X3	X3 / 14	GND 	GND	-	Battery temperature (only the optional battery sensor from ABB is compatible)
	X3 / 13	IN 	+3.3VDC	-	
	X3 / 12	GND 	GND	GENERATOR_	Generator operation (N.O.) Min. contact load 12V / 1mA
	X3 / 11	IN 	+12Vdc	OPER_ON	
	X3 / 10	GND 	GND	PARRALEL_SW_O	External output breaker (N.O.) Min. contact load 12V / 20mA.
	X3 / 9	IN 	+12Vdc	PEN PARRALEL_SW_C LOSE	
	X3 / 8	GND 	GND	EXT_MAN_BYP	External manual bypass (Ext. IA1) (N.O.) Min. contact load 20mA
	X3 / 7	IN 	+12Vdc		
	X3 / 6	 12V	+12Vdc	-	+ 12 VDC source (UPS protected) (Max. 200mA)
	X3 / 5	 GND	GND	-	
	X3 / 4	GND 	GND	REMOTE_	RSD (Remote Shut down) for external switch Default setting: disabled. Possibility to enable and set NO or NC via NewSet.
	X3 / 3	IN 	+12Vdc	SHUTDOWN-	
	X3 / 2	C 	-	REMOTE_	RSD (Remote Shut down) output signal Max. 250Vac/8A ;30Vdc/8A ;110Vdc/0.3A ;220Vdc/0.12A
	X3 / 1	NO 	-	SHUTDOWN-	
X2	X2 / 18	C 	-	-	Common
	X2 / 17	NC 	-	-	Relays AUX (function on request, to be defined)
	X2 / 16	NO 	-	-	
	X2 / 15	C 		COMMON_ALARM	Common
	X2 / 14	NC 	ALARM		No alarm condition
	X2 / 13	NO 			Common alarm (System)
	X2 / 12	C 		LOAD_ON_MAINS	Common
	X2 / 11	NC 	Message		No load on bypass
	X2 / 10	NO 			Load On bypass (Mains)
	X2 / 9	C 		BATT_LOW	Common
	X2 / 8	NC 	ALARM		Battery ok
	X2 / 7	NO 			Battery low
	X2 / 6	C 		LOAD_ON_INV	Common
	X2 / 5	NC 	Message		No load on inverter
	X2 / 4	NO 			Load on inverter
	X2 / 3	C 		MAINS_OK	Common
	X2 / 2	NC 	ALARM		Mains failure
	X2 / 1	NO 			Mains present
X1	X1 / 2	 2AT 230Vac	-		Interlock function (Ext manual bypass) Max 230Vac / 2AT
	X1 / 1	 N	-	EXT_MAN_BYP	



Located on the UIB are two LEDs:

- Green LED showing the status of the interface:
  - Fast Blinking: 2 times/sec = Interface is master (1st Cabinet of a parallel System)
  - Slow Blinking: 1 times/sec = Interface is slave (2nd,.. 6th cabinet of a //- System)
- Red LED board alarm (indicates service required for the board)

On the **Master** cabinet the following ports of the UIB are active:

- The Input ports (X3)
- The Output ports (X2)
- The Interlock function (X1)

On the **Slave** cabinet(s) following ports of the UIB are active:

- The Input ports (X3)
- External Output Breaker (X2 9/10) and External Manual Bypass (X2 7/8)

**All other ports on the Slave cabinet(s) are inactive.**

### 6.1.3 USB PC / Laptop Interface

The User Interface Board **USB** has the same function as **SmartPort JD1**. **NOTE: Use either USB or SmartPort JD1, communication errors or failure will result if the user attempts to use both.**

### 6.1.4 JR2 Interface for Multidrop

The User Interface Board **JR2** (RJ 45 connector) located on the distribution part is the Multidrop connection which is needed for multi-cabinet configurations. To enable the Multidrop communication between cabinets it is necessary to set JP2 jumper correctly on the UIB as shown in the table here below.

UIB PCB NW22085**D** (with ROM76-12) or NW22085**E** or later versions

First unit ( <b>Master</b> )	JP2 = OFF
Middle Unit ( <b>Slave</b> )	JP2 = ON
Last Unit ( <b>Slave</b> )	JP2 = ON

**Note:** on the (older) versions NW22085**B/C** without ROM76-12 make a bridge between X3-11 & X3-12.

### 6.1.5 Optional Feature: Configuration of the External Output Breaker

An External Output Breaker can be connected to each UPS cabinet. Pin 9 and 10 of the phoenix terminal X2 is the input of the UPS for the auxiliary contact of the External Output Breaker. To enable this function, it is necessary to set JP8 and JP1-JP5 jumpers correctly on the UIB and parallel board of each unit as shown in the two tables here below.

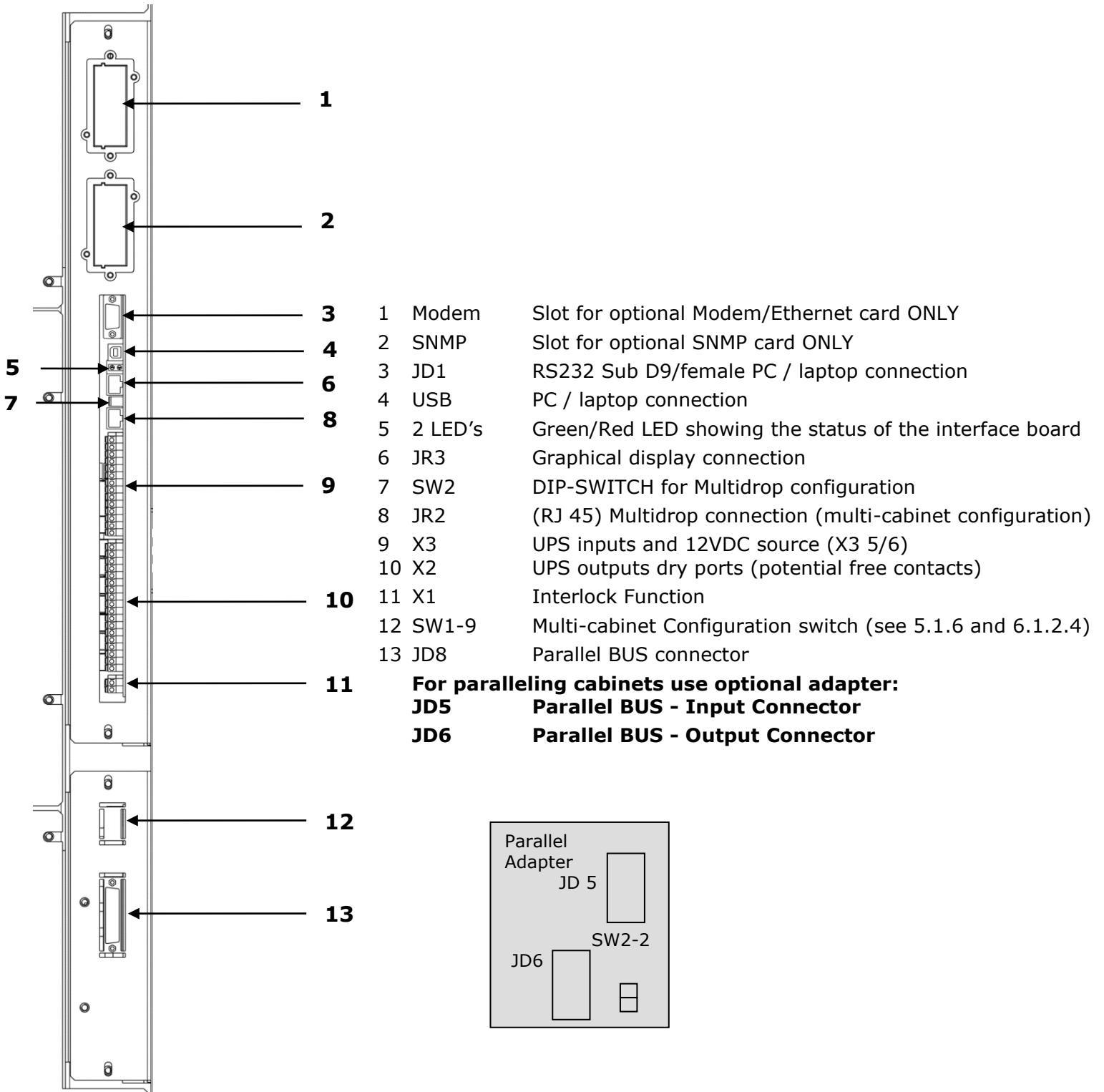
UIB PCB NW22085**D** (with ROM76-12) or NW22085**E** or later versions

External Output Breaker disabled (default setting)	JP 8 = ON
External Output Breaker enabled	JP 8 = OFF

Parallel Board, PCB NW28140**D** or later versions:

External Output Breaker disabled (default setting)	JP1-JP2-JP3-JP4-JP5 = ON
External Output Breaker enabled	JP1-JP2-JP3-JP4-JP5 = OFF

**Figure 6-2 User Interface Board**





---

## 7 Operation

### 7.1 Commissioning

The DPA 500 is a high-quality electronic UPS that must be commissioned by a fully trained and certified field service engineer before being put into use.

The commissioning of the UPS involves the connection of the UPS and battery, verifying the electrical installation and operating environment of the UPS, the controlled start-up and testing of the UPS, and customer training.



**WARNING**

**OPERATIONS ON THE UPS MUST BE PERFORMED BY A SERVICE ENGINEER FROM THE MANUFACTURER OR FROM AN AGENT CERTIFIED BY THE MANUFACTURER.**

---

### 7.2 Multi-Cabinet Configuration

The DPA 500 Cabinets may be paralleled for power capacity or for redundancy indefinitely. Every standard DPA 500 is provided with the parallel option and therefore time-consuming upgrades are not necessary on-site. Additional information regarding Multi-Cabinet configurations may be found in section 3.5.

The Multi-Cabinet Chain is based on a decentralized bypass architecture (i.e. every UPS is provided with its own static bypass). In a parallel system there is always one Master Module and the other Modules are slaves. If at any time the Master is faulty the next UPS (former slave) will immediately take over the Master function and the former Master will switch off.



**IMPORTANT**

**Note:**

For parallel UPS cabinet installations, neutral cable must be connected from UPS 1 to UPS 2, to UPS X (where X is the number of cabinets in parallel). Each UPS cabinet needs to have neutral bus bars hardwired together with power cable sized at one half the phase cable gauge or larger. The Neutral is between UPS cabinets only, and is not for distribution to downstream equipment.

---

Every UPS module in a parallel configuration is provided with a proper output parallel Isolator (CB1) which, when opened isolates the corresponding module from the parallel system. Once the parallel isolator (CB1) of a module is open that module is isolated from the rest of the parallel system and therefore does not provide power to the output.

For example, if you perform the command "LOAD TO BYPASS" on any Cabinet, all the modules will transfer the load simultaneously to mains and if you perform the command "LOAD TO INVERTER" on any Cabinet, all the modules will simultaneously transfer the load to the inverters. The DPA 500 is paralleled for redundancy (highest availability) or for power parallel systems.

**IMPORTANT:**

1. The BYPASS MODE (ECO-MODE) function of a parallel systems is the same as in single units of DPA 500. If in a parallel UPS system the load is transferred to the BYPASS (load on mains) and if the mains fail, all UPS's will be automatically transferred to inverter within 5msec.
2. The ECO-MODE function is currently NOT available on the UL DPA 500. Please consult the factory for more information.

### 7.2.1 Installation Instructions



**THE OPERATIONS DESCRIBED IN THIS CHAPTER MUST BE PERFORMED BY A SERVICE ENGINEER FROM THE MANUFACTURER OR BY AN AGENT CERTIFIED BY THE MANUFACTURER.**

#### **WARNING**

#### **NOTE:**

In order to achieve equal load sharing between the UPS-cabinets, the input cable lengths from the input distribution board to the UPS and from the output cable to the output distribution board must be the same length. When cabling each UPS, connect input and output wires to the corresponding terminals, respecting the same phase sequence on all UPS Cabinets.

### 7.2.2 Paralleling of UPS-Cabinets

For the correct performance of different parallel functions and operations, the parallel units communicate continuously between each other. This is achieved by means of the JD8 Parallel BUS communication lines.

After terminating the input and output cabling of each single UPS, it is necessary to connect the units together to form the parallel system by connecting the JD8 Parallel BUS lines sequentially between the units. Connect Parallel BUS lines according to Figure 7-1.

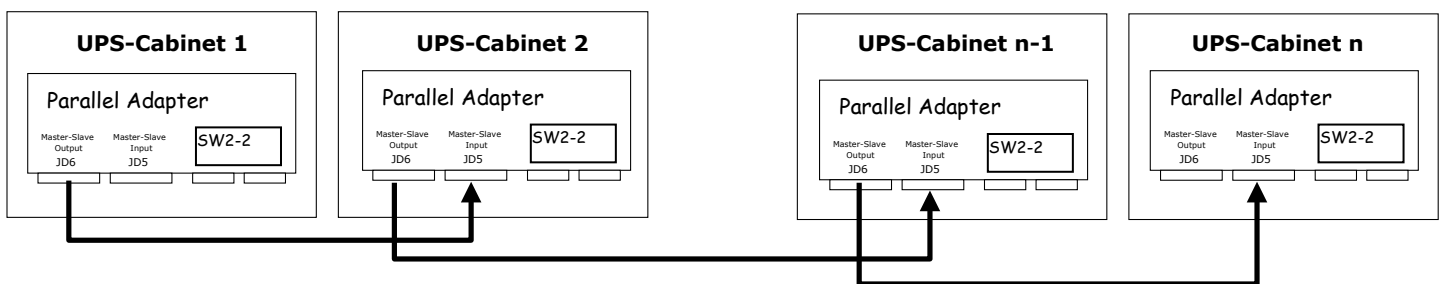


#### **NOTE!**

**CONNECT THE BUS CABLES ONLY WITH SWITCHED OFF UPS AND OPENED PARALLEL ISOLATORS CB1. RESPECT THE FOLLOWING CONNECTION SEQUENCES.**

1. Fit the Parallel Adapter over the Connector JD8 on all UPS-cabinets
2. Set DIP Switch SW2-2 on each Parallel Adapter depending on the UPS Cabinet in the parallel cabinet configuration (see Figure 7-2)
3. Connect PORT JD6 on Parallel Adapter of UPS Cabinet 1 and PORT JD5 of Parallel Adapter of UPS Cabinet 2 with the corresponding BUS Cable
4. Connect PORT JD6 on Parallel Adapter of UPS Cabinet 2 and PORT JD5 of UPS Cabinet 3 with the corresponding BUS Cable
5. Continue in the same manner for the remaining UPS Cabinets.

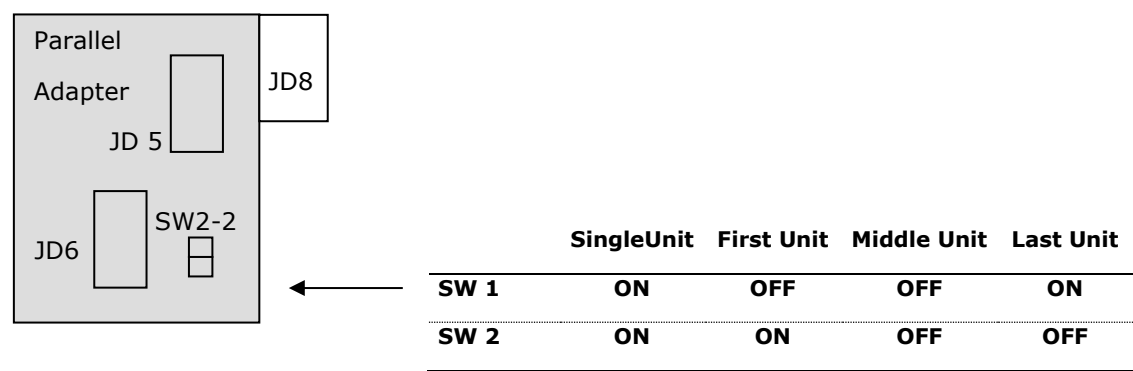
**Figure 7-1 Connection of the Bus Lines when Paralleling UPS-Cabinets by means of Parallel Adapters**



If the UPS Cabinets are paralleled, the Parallel Adapter will be placed on the Connector JD8 on the distribution panel and the communications cables between the cabinets will be connected through the connectors JD5 and JD6.

NOTE: set the Switch SW2-2 correctly according to the corresponding cabinet configuration.

Figure 7-2 Parallel Adapter and DIP Switch SW2-2



7.2.3 DIP Switch SW1-9

The DIP Switch SW1-9 is located on every cabinet of DPA 500. With this switch it is possible to determine the "position of the cabinet" in a Multi-Cabinet Chain. Define each DPA 500 - Cabinet in a Multi-Cabinet Chain as:

- 1. The "First",
- 2. The "Middle" (there may be more than one) and
- 3. The "Last"

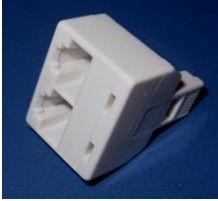
Cabinet in the Multi-Cabinet Chain by setting the DIP Switch SW1-9 on each cabinet according to the Table below:

SW1-9	First Cabinet	Middle Cabinet	Last Cabinet
1	OFF	OFF	OFF
2	OFF	OFF	OFF
3	OFF	OFF	OFF
4	OFF	OFF	OFF
5	OFF	OFF	ON
6	ON	OFF	OFF
7	OFF	OFF	OFF
8	OFF	OFF	OFF
9	ON	ON	ON

After having set the SW1-9 on all the DPA 500 Cabinets correctly the UPSs may be commissioned.

## 7.2.4 Multidrop Configuration

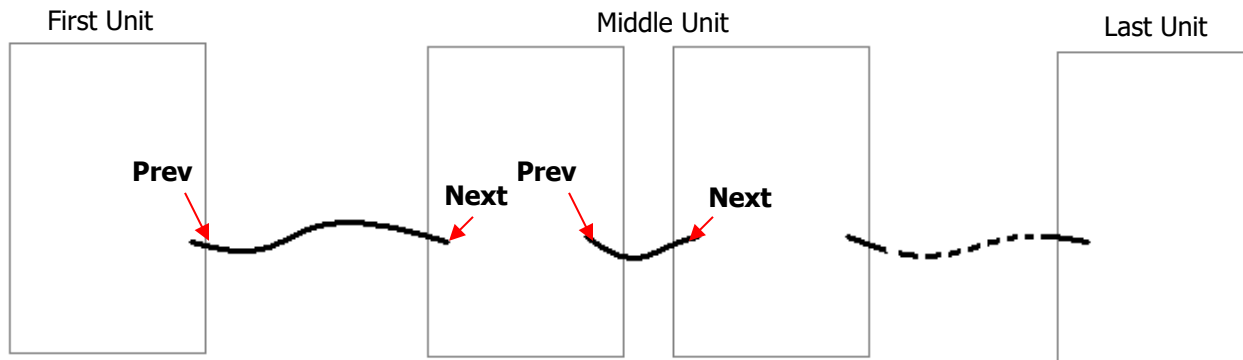
### Multidrop Cable Connection



Insert the splitter(s) supplied with the installation in the Multidrop connector JR2 on NW22085 on all middle cabinet UIBs.

Connect the “**Previous**” end of the multidrop cable on the First Cabinet to the “**Next**” end on the Second Cabinet (If more than two unit inside the splitter).

Proceed on the same way with all other cabinets as shown on the picture.



### Board NW22085 Jumper & Switches configuration

Verify that the User Interface Board (NW22085) of each unit correctly configured according to the following table.

**JUMPER JP2** on PCB NW22085**D** (with ROM76-12) or NW22085**E** or later versions

First unit	OFF
Middle Unit	ON
Last Unit	ON

## 7.2.5 On/Off – Main Buttons

The ON/OFF-Buttons serve to shut down the UPS Modules for service or maintenance or for emergency reasons.



**NOTE!**

**WHEN BOTH ON/OFF BUTTONS ON ALL UPS MODULES IN A PARALLEL SYSTEM ARE PUSHED THE POWER SUPPLY TO THE LOAD WILL BE INTERRUPTED.**

## 7.2.6 Parallel Isolator (CB1)

Every UPS Module is provided with a parallel isolator CB1. The parallel isolator is an important element of the UPS Cabinet, and allows the isolation of a Module from the parallel system without the need to transfer the load to bypass.



**NOTE!**

**CB1 OPEN:**

**THE CORRESPONDING UPS-MODULE IS ISOLATED FROM THE OUTPUT. THERE IS NO COMMUNICATION BETWEEN THE ISOLATED UNIT AND THE REST OF THE PARALLEL SYSTEM. THE ISOLATED UPS-MODULE MAY BE REPLACED WITHOUT COMPROMISING THE REST OF THE SYSTEM.**

**CB1 CLOSED:**

**THE CORRESPONDING UPS IS BEING ADDED TO THE REST OF THE PARALLEL SYSTEM.**

**IMPORTANT: BEFORE CLOSING THE CB1 OF A UPS-MODULE BE SURE THAT THE STATUS OF THAT UPS-MODULE IS THE SAME AS OF THE REST OF THE OPERATING UPS-MODULE WITH CLOSED CB1. EXAMPLE: IF ALL UPS'S WITH CLOSED CB1 ARE ON INVERTER, MAKE SURE THAT THE UNIT ON WHICH ISOLATOR CB1 IS BEING CLOSED IS ALSO ON INVERTER.**

---

### 7.2.7 Maintenance Bypass

The optional Maintenance Bypass Cabinet allows users with either a Redundant Parallel or Capacity Parallel configured system to completely isolate the DPA 500 UPS System from the load. While optional, the Maintenance Bypass Cabinet would be required for complete isolation of the load in a Capacity Parallel Configuration.

- Redundant Parallel Configuration

In a redundant parallel system, a UPS Module may easily be isolated from the parallel system by opening the respective isolator (CB1). It is now possible to operate or shut down this module without influencing the rest of the parallel system. The rest of the parallel system will continue to protect the load. The isolated UPS Module may be replaced without the need of transferring the load to bypass by means of the optional Maintenance Bypass Cabinet (MBC).

- Capacity Parallel Configuration

In the event of a fault in one of the UPS Modules in a capacity parallel system the load will automatically be transferred to static bypass (mains). In order to replace the faulty module, the load must be transferred to mains by means of Maintenance Bypass.

### 7.2.8 Eco-Mode (Bypass Mode) in Parallel Systems

The Eco-Mode function in a Parallel System is the same as in Single Systems. If in a DPA 500 Parallel System the load is supplied by the mains (load on mains) and in the event of mains failure, all UPSs will automatically transfer the load back to the inverters within 5msec.



**IN ORDER TO PROVIDE THE LOAD WITH MAXIMUM PROTECTION, THE MANUFACTURER ALWAYS RECOMMENDS THAT THE LOAD BE SUPPLIED BY THE INVERTER (ON-LINE MODE).**

---

## 7.3 Commissioning of Multi-Cabinet Configuration



**WARNING!**

**THE OPERATIONS DESCRIBED IN THIS CHAPTER MUST BE PERFORMED BY A SERVICE ENGINEER FROM THE MANUFACTURER OR BY AN AGENT CERTIFIED BY THE MANUFACTURER.**

---

Before commissioning a Multi-Cabinet Configuration verify that:

1. All the input and output cabling has been performed correctly according to Section 5 of this User Manual;

2. The parallel communication cables have been connected correctly according to Section 7.2.2.
3. All the DIP Switches for the Modules and DPA Cabinets been set correctly according to Section 7.2.2, 7.2.3, and 7.2.4.
4. All the internal (if any) and/or external battery cabinets/racks have been connected correctly.

## 7.4 System Display

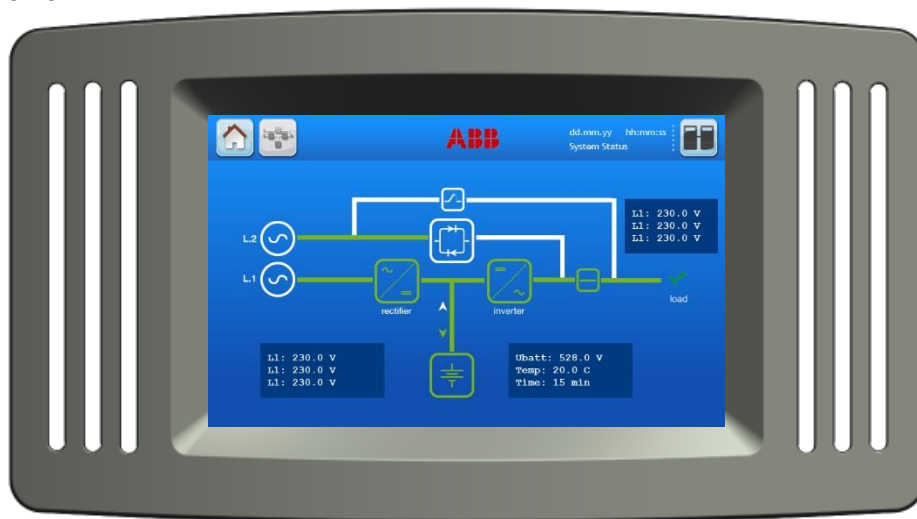


### WARNING!

**ONLY PERSONS THAT HAVE BEEN TRAINED BY SERVICE TECHNICIANS OF THE MANUFACTURER OR CERTIFIED SERVICE PARTNERS ARE ALLOWED TO OPERATE ON THE CONTROL PANEL WITH CLOSED DOORS. ALL OTHER INTERVENTIONS ON THE UPS SYSTEM HAVE TO BE DONE ONLY BY SERVICE TECHNICIANS OF THE MANUFACTURER.**

The user-friendly, touchscreen graphical display on the system level offers the opportunity of directly monitoring the system status as well as the status of each individual module. The graphical display additionally provides all the measurements (module and system level) and the user is able to transfer from INVERTER to BYPASS and vice-versa. All other commands must be performed on the DPA display. With both displays in place (module and system level), the UPS offers full user friendliness without making compromises on robustness.

**Figure 7-3 System Display**



### 7.4.1 Graphical Display Operation

For simple operation and configuration, the UPS is optionally delivered with a microprocessor-based touchscreen display. The navigation, procedures and the features of the display are detailed in subsequent sections.

- The touchscreen display enables the operator to perform the following:
  - Check operational status and measurements
  - Execute operational commands
  - Monitor the power flow through the UPS system
  - Check events and alarm history
  - Silence alarms
  - Adjust programmable parameters
  - Check the status of the batteries

### 7.4.2 Start-up and Installation

When the UPS is energized, the display is automatically turned on. It is initiated for a few seconds and subsequently the user is directed to the mimic diagram screen.

### 7.4.3 Navigation

A few icons and some information are displayed in the top of every screen as indicated in the Figure 7-4.

**Figure 7-4 Display Header**



<b>A Home</b>	Directs the user to the navigation screen.
<b>B Mimic diagram</b>	Directs the user to the mimic diagram screen.
<b>C Warning symbol</b>	Warning symbol: Appears in case of alarms or events. Touching this icon, the alarm is silenced and the events screen is displayed.
<b>D Date</b>	Adjustable in the user menu.
<b>E Time</b>	Adjustable in the user menu.
<b>F Module selection</b>	Directs the user to the module selection screen from where it is possible to select the module and start the navigation (status and measurements) on module level.
<b>G System status</b>	System status: indicates that the user is in the system level navigation.
<b>Status of the load</b>	Status of the load indicates if the load is protected, when the user is in the module level.
<b>H UPS number</b>	The numbering after the symbol "P" is sequential and represents each cabinet in the system. For example, "P01" indicates the UPS number 01 in a parallel system. This information can be configured by a service technician.

Defining the UPS positioning in a system:

The position of each UPS within a system has to be configured not only in the graphical interface but also in the hardware. The position is determined as one of the following:

- "First" UPS in the parallel configuration
- "Middle" UPS in the parallel configuration (there may be more than one)
- "Last" UPS in the parallel configuration.

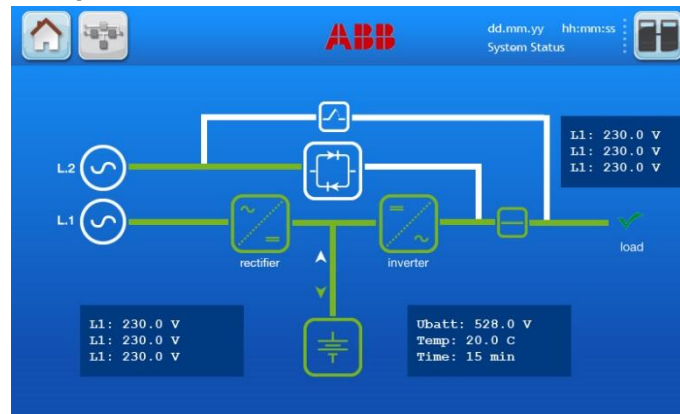
In a multi-cabinet configuration chain, the cabinet is seen as "First" and "Last" in an imaginary chain.

Configure the DIP switch for the existing system. For more details concerning the positions of this DIP switch, refer to Chapter 7.2.3.

### 7.4.4 Mimic Diagram – System Level

The mimic diagram is the default screen. It shows the power flow through the UPS system (single cabinet as well as multi-cabinet configuration) and indicates its status. This diagram can be accessed from any screen using the corresponding icon in the display header.

**Figure 7-5 Mimic Diagram Screen – System Level**



The color of each block identifies its functional status. There are four main colors in the mimic diagram:

- Green: In operation
- White: Inactive block
- Yellow: Warning condition
- Red: Fault condition

Device	Color meaning
Rectifier	Green: Rectifier is on. Red: Rectifier is switched off.
Inverter	Green: Load is on inverter. Red: Inverter is switched off.
Bypass	Green: Load is on bypass or eco-mode White: Bypass is switched off.
Battery	Green: Battery is charging or discharging. Yellow: Battery is not charging nor discharging. Red: Battery is in fault condition or is discharged.  Arrows indicate if battery is charging or discharging.
Maintenance Bypass IA1	Yellow: Load is on maintenance bypass White: Maintenance bypass opened
Output Breaker CB1	Green: Parallel- Output breaker is closed (Position ON) (Default condition with single UPS) White: Parallel- Output breaker is opened (Position OFF)

Touching the functional blocks in the mimic diagram, the measurements related to the object selected are displayed. The interactive blocks are the following:

- Rectifier
- Inverter
- Battery
- Bypass
- Load

The green connecting lines indicate the power flow in the system.



### 7.4.5 Module Selection Screen

By pressing button F (see 7.4.3 Navigation) directs the user to the module selection screen from where it is possible to select the module and start the navigation (status and measurements) on module level.

The module selection screen will show the amount of module in the system show the status of each module as follows:

- Black: module in operation
- White: inactive module / switched off
- Red: module with general alarm

**Example with 5 modules all in operation.**



**Example with 20 modules all in operation.**



**Example with 5 modules, 01-03 in operation, 04 inactive and 05 with general alarm.**



**Example with 30 modules all in operation.**



By touching on one of the icons the user gets to the mimic diagram and from there the navigation gives the same possibility but on the module level.

#### 7.4.6 Home Screen

The display is driven by a menu-prompted software. The home screen is accessible from any screen and gives access to the following:

- Events:** Stores and displays the last events occurred in chronological order;
- Measures:** Displays electrical measurements of the UPS such as voltages, power, frequencies, currents, autonomy, etc.;
- Command:** Enables the operator to execute the following basic operations: "Load to inverter", "Load to bypass" and "Clear all alarms". Once a command is executed the user is immediately re-directed to the mimic diagram screen.
- UPS Data:** Gives information regarding the identity of the UPS;
- User:** Enables the adjustment of data such as date and time, automatic battery test, etc.;
- Service:** Enables the service technician to adjust several UPS parameters

Figure 7-6 Home Screen



Events

Displays a list of recently occurred events with date, time, event name, description and sequential identification number. It is possible to order the events and as default the most recent appears on top.

Measures

This item displays the full set of measurements for each functional block of the UPS: rectifier, bypass, inverter and load. It also displays the battery parameters such as temperature, cell voltage, current, capacity and run time.

UPS Measurements	Battery
Output Voltage (V)	Temperature (°C)
Output Current (A)	Discharge Current (A)
Output Frequency (Hz)	Charge Current (A)
Output Power (%)	Voltage (V)
Active Power (kW)	Run Time
Reactive Power (kVAr)	Capacity(%)
Apparent Power (kVA)	
Inverter Voltage (V)	
Bypass Voltage (V)	
Bypass Frequency (Hz)	
Rectifier Voltage (V)	
Booster Temperature (°C)	
Inverter Temperature (°C)	
Udc Gain +	
Udc Gain -	

Commands

In this menu, the user can change the operating mode of the UPS. Once the command is executed, the user is immediately directed to the mimic diagram where the new status of the UPS is indicated.

Command
Load to inverter
Load to bypass
Battery test
Deep battery test
Abort battery test
Perform alarm test

## UPS Data

This menu gives access to information regarding the manufacturing of the UPS.

UPS Data
Serial Number
Manufacturing
Firmware Version
Hardware Version
Display Version

## User

This menu enables the user to program battery tests and to configure operations using generators. It also allows to set the time and date and the selection of the language of the display.

User Settings
Language
Date
Time
Battery Test
Repeat Test
Generator Operation

## Service

This menu is reserved for certified service engineers. It is not to be used by end users and is protected by a password.

UPS Measurements	Battery	Offset	UPS
Output Voltage (V)	Run Time	P Load Offset L1	Type
Output Current (A)	Voltage + (V)	P Load Offset L2	Power
Output Frequency (Hz)	Voltage - (V)	P Load Offset L3	Unit Number
Output Power (%)	Charge Current (A)	Q Load Offset L1	Slot ID
Active Power L1 (kW)	Discharge Current (A)	Q Load Offset L2	Cosphi
Active Power L2 (kW)	Temperature (°C)	Q Load Offset L3	System
Active Power L3 (kW)	I Battery Offset	Inverter DC L1 Inverter	Parallel
Reactive Power (kVAr)	Capacity(%)	DC L2	Frequency
Apparent Power (kVA)	V Battery Offset +	Inverter DC L3	Sync Window
Inverter Voltage (V)	V Battery Offset -	Output DC L1 Output DC	Inverter Voltage (V)
Bypass Voltage (V)	Autonomy (min)	L2	Rectifier Voltage (V)
Bypass Frequency (Hz)	Type	Output DC L3	General Alarm Delay
Rectifier Voltage (V)	Blocks	I Inverter Offset L1 I	Converter
Rectifier Temperature (°C)	Cells	Inverter Offset L2	Separate Bypass
Inverter Temperature (°C)	Floating Voltage (V)	I Inverter Offset L3	
Udc Gain +	Minimum Threshold	I Bypass Offset L1 I	
Udc Gain -	Common Battery	Bypass Offset L2	
	Start Fast Charge	I Bypass Offset L3	
	Stop Fast Charge	I Battery Offset	
		V Battery Offset + V	
		Battery Offset -	

UPS Data	Commands	Tests
Manufacturing	Clear Alarms	Inverter Voltage
Firmware Version	Service Mode	Open K Bypass
Hardware Version	Standby Mode	Close K Bypass
Display Version	Default Config.	
Dynamic Password		

## Upgrading from LCD to Graphical Interface

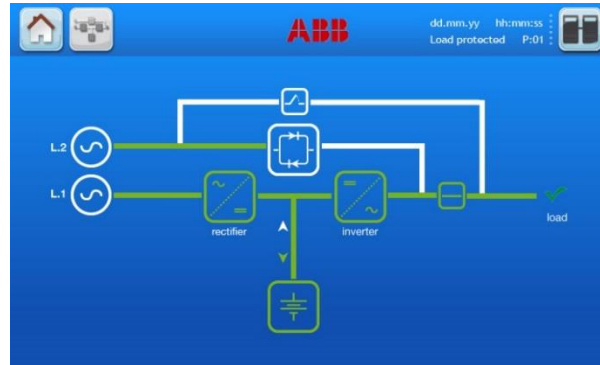
For substitution of past generations displays, certify that the UPS software version is compatible with the graphical display. If that is not the case, upgrade the system to the newest software version. Then substitute the entire door of the UPS and connect the display using the same connector as for the LCD control panel. All information from the UPS (such as serial number, manufacturing date and version of the software and hardware) will be automatically loaded to the new interface once it is connected to your UPS.

### 7.4.7 Operating Mode

#### 7.4.7.1 Online Mode (Inverter Mode)

The Online mode is the UPS operating mode in which the load is supplied through the rectifier and the inverter.

**Figure 7-7 Online Mode on Mimic Diagram**



The Online mode provides the highest degree of protection, especially in the event of a mains disturbance or failure.

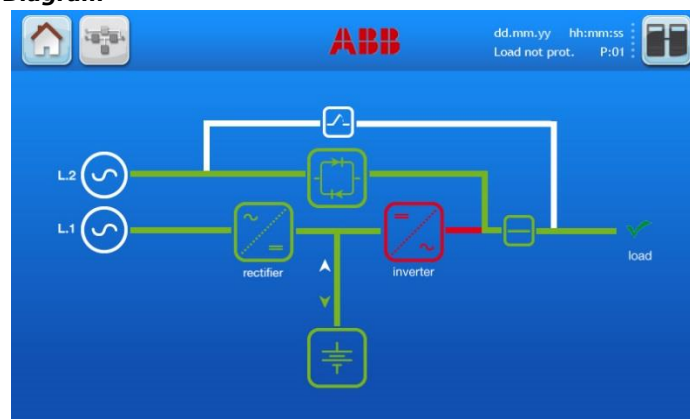
This operating mode is always recommended if the critical loads will not tolerate any interruption of the supply (not even the shortest).

In the unlikely event of an inverter fault or overload condition the UPS will transfer the load automatically and without interruption to the static bypass-mains supply (transfer time = 0ms).

#### 7.4.7.2 Eco Mode (Offline or Bypass Mode)

In double conversion, the DPA 500 can achieve efficiency levels reaching up to 96%. To achieve higher efficiency levels, the UPS can be operated in Eco mode which increases the overall system efficiency up to 99%. In Eco mode, the load is supplied from the mains through the static bypass. In the event of a mains failure the load will automatically be transferred from mains to inverter within 5 ms (this is valid for single and parallel systems). The battery charger remains active in Eco mode.

**Figure 7-8 Eco Mode on Mimic Diagram**



Operating in Eco mode is recommended only if the load can tolerate interruptions of 3-5 ms (transfer time from Eco mode to Online mode).



**TO HAVE THE MOST ESSENTIAL SECURITY LEVEL, WE RECOMMEND TO RUN THE UPS ON ONLINE OPERATION MODE.**

7.4.7.3 Maintenance Bypass Mode

**Before transferring the load to maintenance bypass (IA1) always check that all the UPS-modules are in Eco-Mode (Bypass-Mode).**

The Maintenance Bypass mode is performed using the IA1 bypass switch in the front of the UPS:

Switch Position	Effect	Status
ON	<p><b>Maintenance bypass switch closed:</b></p> <p>(Load supplied directly from mains)</p> <p>Warning indicates in the display:</p> <p><b>"Manual bypass is closed"</b></p>	
OFF	<p><b>Maintenance bypass switch open:</b></p> <p>Normal operating condition (Load supplied by inverter)</p> <p>Warning indicates in the display:</p> <p><b>"Manual bypass is opened"</b></p>	



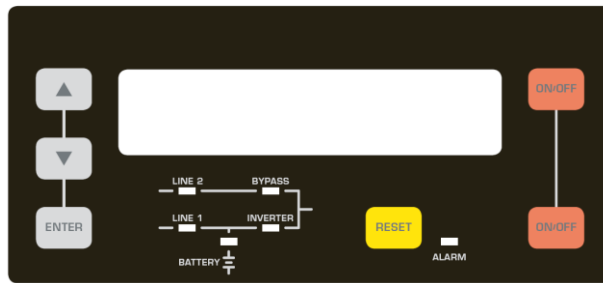
**ON MANUAL OR MAINTANENCE BYPASS MODE, THE LOAD IS NOT PROTECTED AGAINST ANY MAINS FAILURES OR MAINS DISTURBANCES.**

7.5 Module Display – Control Panel

The user-friendly control panel is composed of three parts:

- LCD DISPLAY
- MIMIC DIAGRAM (dual color-LED)
- BUTTONS
- BUZZER (generating a sound when an alarm is active)

**Figure 7-9 Module Control Panel**



The 2 x 20 character LCD simplifies the communication with the UPS and provides the necessary monitoring information about the UPS. The menu driven LCD enables the access to the:

- Event register (event log)
- Show measurements such as U, I, f, P, Q, S, load %, battery runtime and others
- Perform commands like start-up and shut-down of UPS and others
- Load transfer from INVERTER to BYPASS and vice-versa
- Diagnosis (SERVICE MODE)
- Adjustments and testing

### 7.5.1 LED Indicators

The mimic diagram serves to indicate the general status of the UPS. The LED-indicators show the power flow status and in the event of mains failure or load transfer from inverter to bypass and vice-versa. The corresponding LED-indicators will change colors from green (normal) to red (warning).

The LEDs LINE 1 (rectifier) and LINE 2 (bypass) indicate the availability of the mains power supply.

The LEDs INVERTER and BYPASS if green indicate which of the two is supplying power to the critical load. When the battery is supplying the load due to mains failure the LED-indicator BATTERY is flashing.

The LED-indicator ALARM is a visual indication of any internal or external alarm condition. At the same time an audible alarm will be activated.

INDICATOR	INDICATOR STATUS	MEANING
ALARM	OFF	No alarm condition
	RED	Alarm condition
LINE 1	GREEN	Mains rectifier available
	RED	Mains rectifier not available
LINE 2	GREEN	Mains bypass available
	RED	Main bypass not ok or not available
	OFF	UPS is turned off
BYPASS	GREEN	Load on bypass (Bypass-or Eco-Mode)
	OFF	Bypass not operating (switched-off)
INVERTER	GREEN	Load on inverter
	RED	Inverter fault or load not transferable to inverter
	OFF	Inverter not operating (switched-off)
BATTERY	GREEN	Battery OK
	RED	Battery fault or battery is discharged
	Flashing RED	Battery in discharge and battery voltage critical or battery fuse open
	Flashing GREEN	Battery in discharge and battery voltage good

### 7.5.2 Buttons

The buttons allow the user to operate the UPS to perform settings and adjustments, to start-up and shutdown the UPS, to monitor on the LCD display the voltages, currents, frequencies and other values.

BUTTON	FUNCTION
ON/OFF	• By pressing both keys simultaneously, it switches the UPS ON
ON/OFF	• By pressing both keys simultaneously, it switches the UPS OFF (shutdown)
UP (↑)	• Move upwards through the menu • Increase values
DOWN (↓)	• Move downwards through the menu • decrease values
RESET	• Cancel the audible alarm. If the alarm condition remains the LED will remain red. • Return to previous menu
ENTER	• Confirms a chosen menu item • Confirms a chosen value

### 7.5.3 On/Off Start-up and Shutdown Buttons



**IN THE CASE THAT THE PARALLEL UPS SYSTEM HAS TO BE TURNED OFF, BOTH ON/OFF BUTTONS ON ALL UPS MODULES HAVE TO BE PUSHED. IN THIS CASE THE POWER SUPPLY TO THE LOAD WILL BE INTERRUPTED.**

### 7.5.4 Definition of a Single/Parallel-Module System

To define a single or parallel UPS the "SET-UP SERVICE" menu, which is password protected, needs to be activated using program line 4 "UPS MODEL".

### 7.5.5 Definition of a Single/Multi-Cabinet Chain (DIP Switch SW1-9)

By means of the DIP Switch SW1-9, which is located on the front of a Cabinet, it is possible to determine the "position" of the Cabinets in Multi-Cabinet Chain:

- "First" in the Multi-Cabinet Chain
- "Middle" in the Multi-Cabinet Chain (there may be more than one)
- "Last" in the Multi-Cabinet Chain.

NOTE: If a Cabinet is a Single Cabinet then it is seen as the "First" and "Last" in an imaginary Chain. So the positions of the DIP Switch SW1-9 must be set as shown below:

**Table 7-1 DIP Switch SW1-9**

SW1-9	Single cabinet
1	ON
2	ON
3	ON
4	OFF
5	ON
6	ON
7	OFF
8	OFF
9	ON



### 7.5.6 Status Screens

#### DESCRIPTION

- 1 Load is protected by UPS power. Load is supplied by inverter (Normal Operation) and the batteries are connected and are OK.
- 2 Load is not protected by UPS power. Load is supplied by mains power (load on bypass) or it is supplied by the inverter (normal operation) and the batteries are not OK.
- 3 Load not supplied. UPS is switched off.  
To start the UPS press the two ON/OFF buttons simultaneously.
- 4 The UPS/module is not supplying load anymore. The output switch is open.

#### LCD-DISPLAY

<b>LOAD PROTECTED</b>	<b>P01</b>
<b>LOAD NOT PROTECTED</b>	<b>P01</b>
<b>LOAD OFF SUPPLY FAILURE</b>	<b>P01</b>
<b>LOAD DISCONNECTED PARALLEL SWITCH OPEN</b>	<b>P01</b>

**S** stands for Single UPS. The system consists only of one UPS.

**P01** stands for Parallel UPS in a Multi- UPS system and 01 stands for the first UPS (MASTER) in the parallel UPS system.

**P02** stands for Parallel UPS in a Multi- UPS system and 02 stands for the second UPS (SLAVE) in the Multi- UPS system.

**P03** stands for Parallel UPS in a Multi- UPS system and 03 stands for the third UPS (SLAVE) in the Multi-UPS system.

The definition of the UPS "Position" in a parallel system is achieved in the Menu Set-Up Service.

#### DESCRIPTION

Single UPS Systems

Parallel System e.g. first UPS cabinet

Parallel System e.g. second UPS cabinet / Slave

#### LCD-DISPLAY

<b>SYSTEM CONFIGURATION SINGLE</b>	<b>S</b>
<b>SYSTEM CONFIGURATION PARALLEL</b>	<b>P01</b>
<b>LOAD OFF SUPPLY FAILURE</b>	<b>P02</b>

Note: The max no. of UPS units is 6.

### 7.5.7 Main Menu Screen

#### DESCRIPTION

- 1 Logging Control. A log of the last 99 events is stored in the Power Management Display.
- 2 In Menu Measurements: monitor voltages, power, frequencies, currents, autonomy etc.
- 3 The Command Menu is where to perform the commands "Load to inverter", "Load to bypass", "battery test".
- 4 The UPS Data are the UPS personalized information "serial number"
- 5 Various settings can be performed by the user: Date/Time, automatic battery test, etc.
- 6 Various adjustments can be performed by the service staff

#### LCD-DISPLAY

→ <b>EVENT LOG</b>
<b>MEASUREMENTS</b>
→ <b>MEASUREMENTS</b>
<b>COMMANDS</b>
→ <b>COMMANDS</b>
<b>UPS DATA</b>
→ <b>UPS DATA</b>
<b>SET-UP USER</b>
→ <b>SET-UP USER</b>
<b>SET-UP SERVICE</b>
→ <b>SET-UP SERVICE</b>
<b>NO MORE MENU</b>

### 7.5.8 Event Log Screen

#### DESCRIPTION

- 1 Logging Control; a log of the last 99 events is stored in the Power Management Display.
- 2 Every stored event is identified with a sequential number and time stamp.
- 3 By press ENTER the code of the event will be displayed. (Press ENTER to come back to the previous indication)
- 4 All events and alarms are indicated with their date and time of appearance.

#### LCD-DISPLAY

<b>01</b>	<b>05-10-08</b>	<b>14:38:59</b>
<b>LOCAL LOAD OFF</b>		
<b>02</b>	<b>05-10-08</b>	<b>14:38:56</b>
<b>LOCAL LOAD TO BYP</b>		
<b>03</b>	<b>8104</b>	
<b>LOCAL LOAD TO INV</b>		
<b>04</b>	<b>05-10-08</b>	<b>14:37:14</b>
<b>LOCAL LOAD TO INV</b>		

## 7.5.9 Measurements Screen

### DESCRIPTION

- 1 Battery Runtime
- 2 UPS-Output Frequency
- 3 Bypass Frequency
- 4 Battery Voltage
- 5 Battery Charger Current
- 6 Discharge Current
- 7 Rectifier Voltage of all three phases
- 8 Bypass Voltage of all three phases
- 9 Output Voltage of all three phases
- 10 Output Current of all three phases
- 11 Active Output Power of all three phases
- 12 Reactive Output Power of all three phases
- 13 Apparent Output Power of all three phases
- 14 Output Power of all three phases
- 15 Battery capacity
- 16 Battery temperature
- 17 Booster (BST) / Inverter (INV) temperatures

### LCD-DISPLAY

<b>BATT. RUN TIME (MIN)</b>		
00h 00m		
<b>OUTPUT FREQUENCY (HZ)</b>		
50.00		
<b>BYPASS FREQUENCY (HZ)</b>		
50.00		
<b>BATTERY VOLTAGE (V)</b>		
+ 0.0		
<b>BATT. CHARGE CUR. (A)</b>		
+ 0.0		
<b>DISCHARGE CURRENT (A)</b>		
00.0		
<b>RECTIFIER VOLTAGE (V)</b>		
230	230	230
<b>BYPASS VOLTAGE (V)</b>		
230	230	230
<b>OUTPUT VOLTAGE (V)</b>		
230	230	230
<b>OUTPUT CURRENT (A)</b>		
00.0	00.0	00.0
<b>ACTIVE POWER (KW)</b>		
00.0	00.0	00.0
<b>REACTIVE POWER (kVAr)</b>		
00.0	00.0	00.0
<b>APPARENT POWER (KVA)</b>		
00.0	00.0	00.0
<b>OUTPUT POWER (%)</b>		
00	00	00
<b>BATT. CAPACITY (%)</b>		
00		
<b>BATTERY TEMPERATURE</b>		
00.0		
<b>MODULE TEMP BST/INV</b>		
00.0	00.0	00.0

### 7.5.10 Commands Screen

#### DESCRIPTION

- 1 Transfer Load to inverter
- 2 Transfer Load to bypass
- 3 Battery Test
- 4 Deep battery test
- 5 Abort battery test
- 6 Perform alarm test

#### LCD-DISPLAY

→ <b>LOAD TO INVERTER</b> <b>LOAD TO BYPASS</b>
→ <b>LOAD TO BYPASS</b> <b>PERFORM BATT.TEST</b>
→ <b>PERFORM BATT.TEST</b> <b>PERF. DEEP BATT.TEST</b>
→ <b>PERF. DEEP BAT. TEST</b> <b>ABORT BATT. TEST</b>
→ <b>ABORT BATT. TEST</b> <b>PERFORM ALARM TEST</b>
→ <b>PERFORM ALARM TEST</b> <b>NO MORE COMMANDS</b>

### 7.5.11 UPS Data

#### DESCRIPTION

- 1 These general UPS Data are set by the manufacturer.
- 2 Manufacturing date
- 3 EPROM Version
- 4 Hardware Version
- 5 Dynamic password
- 6 Actual Date and Time

#### LCD-DISPLAY

<b>UPS SERIAL NUMBER</b> <b>PWA nnnnnnn</b>	
<b>DATE OF MANUFACTURE</b> <b>15/01/2014</b>	
<b>EPROM VERSION</b> <b>V.V CCCC</b>	
<b>HARDWARE VERSION</b> <b>00000000</b>	
<b>DYNAMIC PASSWORD</b> <b>YES/NO</b>	
<b>DATE</b> <b>dd-mm-yyyy</b>	<b>TIME</b> <b>hh:mm:ss</b>

### 7.5.12 Set-Up User

#### DESCRIPTION

- 1 Set-up Language
- 2 Set-up Date and Time
- 3 Set-up battery test
- 4 Set-up operation with Gen-Set

#### LCD-DISPLAY

→ SET LANGUAGE
SET DATE AND TIME
→ SET DATE AND TIME
SET-UP BATT. TEST
DD/MM/YY HH:MM:SS
→ SET BATTERY TEST
SET GENERATOR OP.
DAY OF MONTH
(1-31)
HOUR OF DAY
(1-24)
REPETITIVE (Y/N)
YES/NO
→ SET GENERATOR OP.
NO MORE SETTINGS
BATT.CHARGE LOCK
YES/NO
BYPASS LOCK
YES/NO

### 7.5.13 Set-Up Service

#### DESCRIPTION

- 1 This Menu is reserved for CERTIFIED service engineers. It is not to be used by End-Users
- 2 Type in password

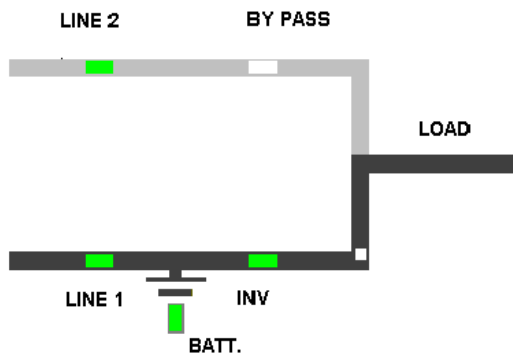
#### LCD-DISPLAY

→ SET-UP SERVICE
PASSWORD
→ PASSWORD.

## 7.6 Operating Modes

### 7.6.1 Mode "On Line" (Inverter Mode)

The ON-LINE-Mode is the UPS-Operating Mode in which the load is supplied through the RECTIFIER and INVERTER.

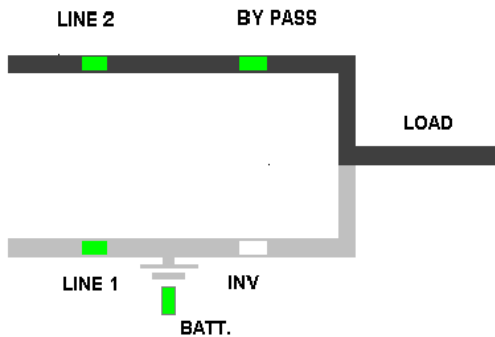


LED Indicator	Color
LINE 1	Green
LINE 2	Green
BYPASS	OFF
INVERTER	Green
BATTERY	Green

Using the control panel, the UPS can easily be transferred to the ON-LINE-Mode. The ON-LINE-Mode provides the highest degree of protection, especially in the event of a mains disturbance or failure. This operating mode is always recommended if the critical loads (computer systems) will not tolerate any interruption of the supply (not even the shortest). In the unlikely event of an inverter fault or overload condition the UPS will transfer the load automatically and without interruption to the static bypass-mains supply (transfer time = 0).

### 7.6.2 Mode "Off-Line" (Eco or Bypass Mode)

In the "OFF-Line Mode", the load is supplied from the mains through the static bypass. Using the control panel the UPS may be easily transferred to "Bypass Mode".



LED Indicator	Color
LINE 1	Green
LINE 2	Green
BYPASS	Green
INVERTER	OFF
BATTERY	Green

When the UPS is operating in "Bypass Mode", the efficiency of the system is higher. In the event of a mains failure the load will automatically be transferred from mains to inverter within 5 msec (this is valid for single and parallel systems). The battery charger remains active in the "Bypass-Mode".

The "Bypass-Mode", is recommended only if the loads can tolerate interruptions of 3-5 ms (transfer time from Bypass Mode to ON-LINE Mode).

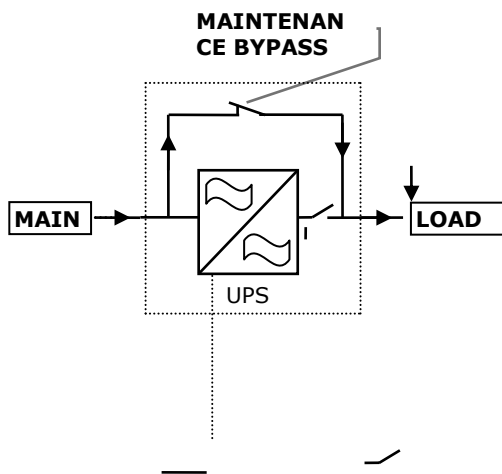


**FOR OPTIMAL PROTECTION OF THE LOAD, WE RECOMMEND RUNNING THE UPS IN NORMAL (ON-LINE) OPERATION MODE.**

### 7.6.3 "Maintenance Bypass" Mode

**NOTE: Optional Maintenance Bypass Cabinet must be installed for following operations to be performed.** Before transferring the load to Maintenance Bypass (IA1) always make sure all the UPS-modules are in the "Bypass-Mode" or "ECO-Mode". The Maintenance Bypass mode is performed by closing (put in position ON) the IA1 Maintenance Bypass switch on the front of the UPS.

POSITION OF IA1	EFFECT
ON	Bypass-Switch Closed (Load supplied directly from mains) LCD-indication: "MANUAL BYP IS CLOSED" LED Indicators will indicate as shown in table below.
OFF	Bypass-Switch Open – Normal operating condition (Load supplied by inverter) LCD-indication "MANUAL BYP IS OPEN" LED Indicators will indicate as shown in table below.



LED Indicator	Bypass Switch	
	ON	OFF
LINE 1	Green	Green
LINE 2	Green	Green
BYPASS	Green	OFF
INVERTER	RED	Green
BATTERY	Green	Green



**ON OPERATION MODE "MANUAL BYPASS" THE LOAD IS NOT PROTECTED AGAINST ANY MAINS FAILURES OR MAINS DISTURBANCES.**

### 7.6.4 Output Switch/Parallel Isolator (CB1)

Every UPS-unit is provided with an output parallel isolator (CB1) which, when opened isolates the corresponding unit from the PARALLEL BUS and from the LOAD. Once CB1 is open there is no power on the load coming from the UPS.

**Redundant parallel configurations** are used to isolate a unit from the parallel system without the need of transferring the load to bypass.

POSITION	EFFECT
ON	Normal Operation (Load supplied by UPS)
OFF	UPS isolated from Parallel Bus for maintenance or UPS replacement (UPS not supplying load)

## 7.7 Operating Procedures



### **WARNING!**

**THE OPERATIONS DESCRIBED IN THIS CHAPTER MUST BE PERFORMED BY A SERVICE ENGINEER FROM THE MANUFACTURER OR AN AGENT CERTIFIED BY THE MANUFACTURER.**

---

See Appendix C (Type 1 Cabinet – 300kW) for details.

See Appendix D (Type 2 Cabinet – 500kW) for details.



## 8 Maintenance



### **WARNING!**

**THE OPERATIONS DESCRIBED IN THIS CHAPTER MUST BE PERFORMED BY A SERVICE ENGINEER FROM THE MANUFACTURER OR BY AN AGENT CERTIFIED BY THE MANUFACTURER.**

### **8.1 User Responsibilities**

There are no user serviceable parts within the UPS, therefore there is no requirement for user maintenance. To maximize the useful working life and reliability of the UPS system and its batteries, the environment in which the UPS operates should be kept cool (20°C - 25°C), dry, dust free and vibration free. The batteries should be maintained in a fully charged state.

### **8.2 Preventative Maintenance**

The UPS system requires annual preventative maintenance by authorized service personnel, even during the warranty period, to ensure proper, reliable operation.

When the UPS is commissioned, the commissioning field service engineer will attach a service record book to the front of the UPS and this will be used to record the full service history of the UPS.

During a preventative maintenance the field service engineer might carry out some or all of following checks:

- Status and function check of UPS and batteries
- UPS and batteries visual inspection (dust, mechanical damages)
- Visual inspection of screws and cable connections
- Check air ventilation and room temperature
- Check the operation and function (communications, remote monitoring and signaling)
- Current, voltage and frequencies measures
- Measure and record the current load conditions
- Check the load sharing (only in parallel systems)
- Battery voltage check
- Battery discharge test
- Check transfer of the load from UPS to mains operation via static bypass
- Unit cleaning

### **8.3 Deep Battery Test**

The battery test takes approx. 3 minutes and should be performed only if:

- there are no alarm conditions
- the battery is fully charged
- mains is present.

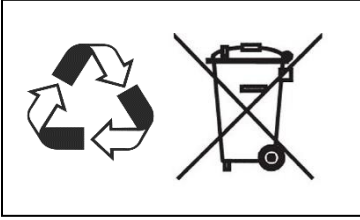
The battery testing can be carried out regardless of operating mode (OFF-LINE or ON-LINE) and whether or not the load is connected. The battery test procedure can be performed from the UPS display in the service setup mode.

### **8.4 Battery Maintenance, Disposal, and Recycling**

The battery maintenance shall be done by a certified Service Partner.

To ensure optimum operation of the UPS system and a continuous and efficient protection of the connected load, it is recommended to check the batteries every 12 months.

Batteries contain dangerous substances that will harm the environment if thrown away. If you change the batteries yourself, call qualified organizations for battery disposal and recycling.



## 9 Troubleshooting



### WARNING!

**THE OPERATIONS DESCRIBED IN THIS CHAPTER MUST BE PERFORMED BY A SERVICE ENGINEER FROM THE MANUFACTURER OR FROM AN AGENT CERTIFIED BY THE MANUFACTURER.**

### 9.1 Alarms

In the event of an alarm condition the red LED-Indicator "Alarm" and the audible alarm will turn on.

In this case proceed as follows:

1. Silence the audible alarm by pressing the button "Reset".
2. Identify the cause of the alarm condition by means of the EVENT LOG in the MAIN menu.
3. In case of doubts please contact the Service Team.
4. Fault identification and rectification information is given on the following pages.

### 9.2 Fault Identification and Rectification

The major alarm conditions that will be encountered are:

**Table 9-1 Troubleshooting**

Alarm Condition	Meaning	Suggested Solution
MAINS RECT. FAULT	Mains power supply is outside prescribed tolerance.	The input power to UPS is too low or missing. If site power appears to be OK, check the input circuit breakers etc. supplying the UPS.
MAINS BYP FAULT	Mains power supply is outside prescribed tolerance.	The input power to UPS is too low or missing. If site power appears to be OK, check the input circuit breakers etc. supplying the UPS.
OUTPUT SHORT	There is a short circuit at the output of UPS (on load side).	Check all output connections and repair as required.
OVERLOAD	Load exceeds the UPS rated power.	Identify which piece of equipment is causing the overload and remove it from the UPS. Do not connect laser printers, photocopiers, electric heaters, kettles etc. to the UPS.
TEMPERATURE HIGH	UPS temperature has exceeded the allowed value.	Check that the ambient temperature of the UPS is less than 40° C. If the ambient temperature is normal call the authorized service center for assistance.
INV. PHASE FAULT	Inverter is faulty.	Call the authorized service center for assistance.
SYNCHRON. FAULT	The inverter and mains are not synchronised.	The frequency of the input voltage to the UPS is outside operational limits and the UPS static bypass has been temporarily disabled.
BATTERY IN DISCHARGE	Battery is near end of autonomy.	Shutdown load connected to UPS before the UPS switches itself off to protect its batteries.
MANUAL BYP IS CLOSED	Maintenance Bypass closed. Load supplied by mains.	This alarm is only displayed if the UPS is on Maintenance Bypass.

In case of alarms not included in the list above, please contact the nearest authorized service center for assistance.

## 10 Options

### 10.1 Introduction

The DPA 500 is provided with the following accessories:

- REMOTE SHUT DOWN (EPO)
- GENERATOR OPERATION
- SOFTWARE FOR REMOTE COMMAND SHUTDOWN AND MONITORING
- SNMP INTERFACES FOR NETWORK MANAGEMENT AND REMOTE MONITORING

### 10.2 Remote Shutdown (EPO)

The REMOTE SHUT DOWN must use a normally closed contact, which opens to operate the remote shutdown sequence. Usually the shutdown procedure is disabled and it should be activated by a Hardware Code on "Setup Service" menu". Please contact your distributor to enable this operation.



**THE UPS IS PROVIDED WITH AN "EMERGENCY BYPASS" WHICH IS AUTOMATICALLY ENABLED IN CASE OF A SINGLE MODULE CONFIGURATION. IN THIS CASE THE EPO WILL BE AUTOMATICALLY DISABLED AND MUST BE ACHIEVED IN THE BUILDING/FACILITY. THE FACILITY EPO MUST OPEN THE BYPASS PATH.**

The remote shutdown on terminal port X3/3.. X3/4 is located on the DPA 500 Cabinet.

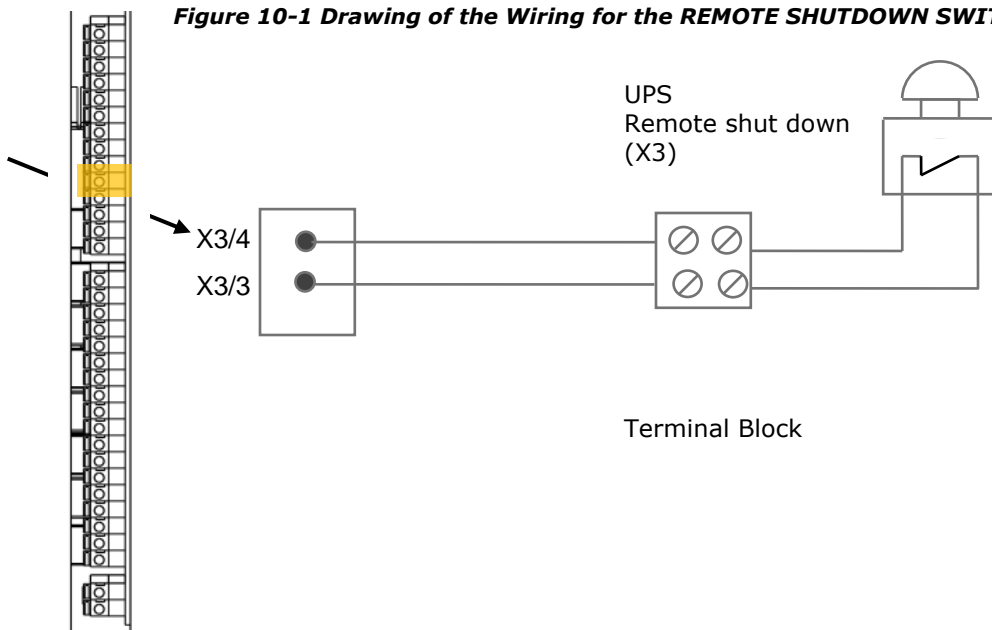
In order to allow removal, maintenance or testing of any remote shut down facility without disturbing the normal operation of the UPS, it is recommended that a terminal block, with linking facilities, be installed between the UPS and the stop button.

1. Use a screened cable with 1 pair (section of wires can be chosen from 0.5 to 1.5mm<sup>2</sup>) and maximum length of 100 m.
2. Connect the cable as shown in Fig. 23.

REMOTE SHUT DOWN SWITCH

(N.C. = Normally Closed)

**Figure 10-1 Drawing of the Wiring for the REMOTE SHUTDOWN SWITCH**

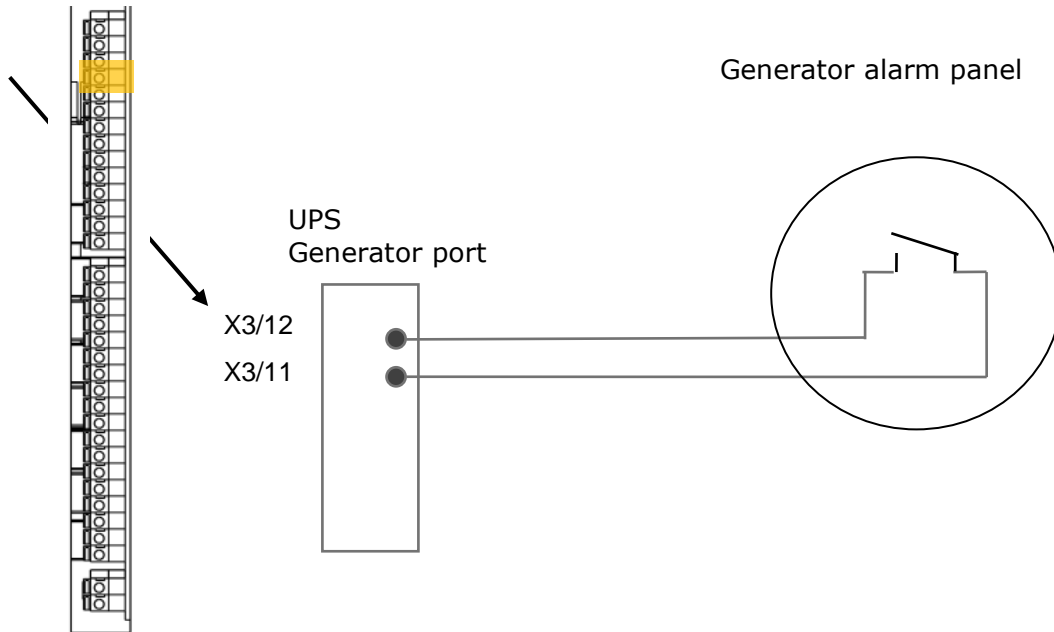


### 10.3 Generator ON Facilities

The Generator ON facility must use a normally open contact that closes to indicate that a generator is running and supplying input power to UPS. It is located at the bottom of the DPA 500 Cabinet.

When used, this facility disables the UPS static bypass and prevents the UPS from transferring the load on to the generator power supply and/or block the battery charger during the time the UPS is supplied from the Genset.

**Figure 10-2 Drawing of the Wiring for the Generator Operation**



### 10.4 WAVEMON Shutdown and Management Software

#### 10.4.1 Why is UPS Management Important?

By combining a UPS with network management products, such as a Simple Network Management Protocol (SNMP), System-administrators are guaranteed their data and their system will constantly be protected from corruption or data loss even in the event of an extended power failure or when batteries reach a critical low-state. In the event of a power disturbance system administrators can also monitor their network from a central location, allowing an early detection of problems. Utility power can be unreliable at times, and ensuring that all network systems have constant power can be a difficult task. The situation becomes even more complex if systems are managed across a Local Area Network (LAN) or Wide Area Network (WAN) around the world.

When a power failure occurs, action can be taken to protect the system and its valuable data. If no action is initiated by the operator, this event can seriously damage the system. The UPS software will react automatically in such a case and shutdown the operating system. ABB has found that it is important to have a complete solution for its UPS and is able to offer a wide range of monitoring/remote controls for assuring the maximum protection degree to the customers.

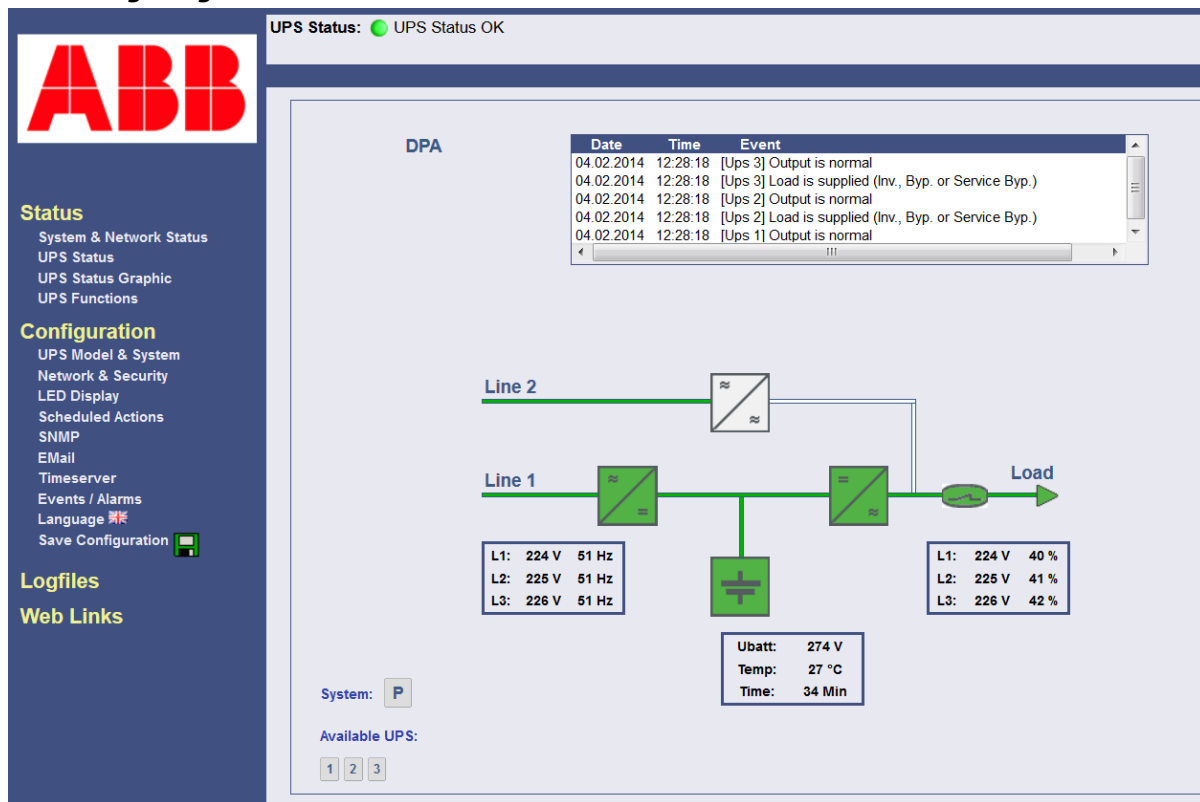
#### 10.4.2 WAVEMON Shutdown and Monitoring Software

**WAVEMON Software** is an external monitoring and shutdown software which was designed to operate with all UPS products, both with the DRY PORT (Relays) on Terminal block X2 ...X4 and with the SmartPort JD1 (RS232) port on the UIB (see section 6.1.3).

The software packet consists of: a CD-ROM for most operating systems (Windows, Unix, OS/2, DEC VMS, Novell, Apple), a standard connection, and a user manual.

The dry port X2...X4 with voltage-free contacts may also be used for automatic shutdown in connection with **WAVEMON Software**. It is necessary to provide a cable of 0.5 mm<sup>2</sup> to connect Terminals X2..X4 of the UPS and the serial port of the server.

**Figure 10-3 Monitoring Image**



The main characteristics of **WAVEMON Software** are:

- Automatic unattended master/slave shutdown in heterogeneous networks
- On-screen autonomy time / battery time countdown
- On-screen server log off and shutdown procedure
- Extensive logging of all UPS activity and power quality data, with timestamp
- Scheduled UPS economy mode, service mode, other systems status
- Graphical user interface for Windows compatible platforms
- Automatic unattended local shutdown
- Special software modules to close and save open MS-Office documents.
- Compatible for all optional modules like UPSDIALER, SNMP adapters, Temperature sensors, etc. The UPS-Management Software is a client/server-application for networks and local workstations. **WAVEMON Software** consists of two parts: **UPSServ** and **UPSCli**. The server-module of the UPS-Management Software is **UPSServ**, which communicates via RS-232 cable with the UPS. Working as a background process the UPSServ collects messages, received from the UPS. The UPSServ interprets received messages and makes them available to the client-module **UPSCli** and to any SNMP-based management station.

When UPSServ detects voltage variations or a power failure it can execute various so-called system "event routines", which for example may shutdown the server or send warning to connected users. These system event routines which are a part of the UPS-Management Software can be adjusted to your demands.

The UPS management software includes with every serial number the license for using the UPS service on one server with one UPS and an unlimited number of connected WINDOWS workstations. When operating with two or more servers a license for every additional server is required. It doesn't matter if the UPS service runs at that location or if the server is halted by a UPS service via remote command. The same regulations are applicable to the use of Remote Console Command (RCCMD) and multiserver shutdown under NT, UNIX and other operating systems. The service programs are generally delivered as a single-license. To use a single CD-ROM to shutdown multiple servers you have to purchase additional CD license keys.

Parallel/redundant UPS systems are also managed by the software.

The overall goal is to facilitate the shutdown of a Server only when strictly necessary. A correct Parallel Handling process must manage the parallel system as a whole, always considering redundancy. The following statements apply:

- Every alarm on any unit is immediately notified, but ...
- ... a reaction to a severe fault is introduced only when the minimum number of UPS –Modules necessary to supply the load exhibits an alarming situation.
- The real Battery autonomy time of the (whole) parallel system is computed continuously.
- Maintenance on a redundant unit may be executed without annoyance to the management system (supervisor).

In order to be managed, a UPS can be integrated into a network in two ways:

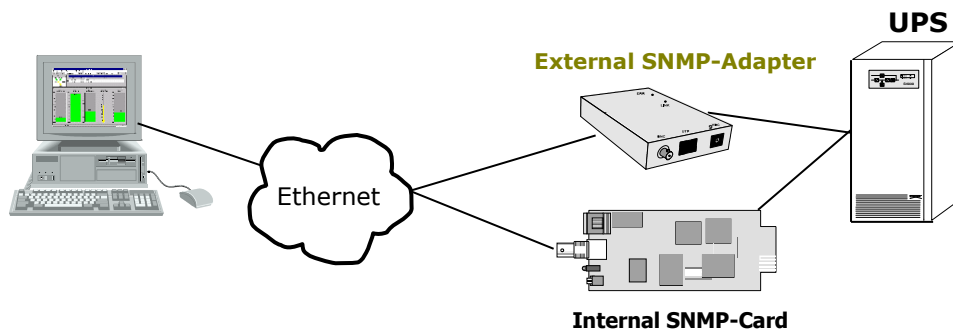
1. By means of the server which is being powered by the UPS and is integrated in the network. In most of the cases the server is used as sub-agent and you only need the PMC-Software without any SNMP Adapter. You need a *standard* serial connection between the SmartPort JD1 (RS232) of the UPS and the RS232 port of the computer/server.
2. In some situations, it is preferable to interface the network via an SNMP adapter. By this way up to 50 computers can be shut down in a RCCMD environment. RCCMD is an additional software module, which can be triggered by the SNMP device to executes a command (typically a shutdown command) on a remote system.

#### 10.4.3 SNMP Card/Adapter for Network Management / Remote Monitoring

The SNMP is a worldwide-standardized communication-protocol. It is used to monitor any device in the network via simple control language. The UPS-Management Software also provides its data in this SNMP format with its internal software agent. The operating system you are using must support the SNMP protocol. We offer our software with SNMP functionality for Novell, OS/2, all Windows running on INTEL and ALPHA, DEC VMS, and Apple operating systems.

Two types of SNMP interfaces with identical functionality are available: an external SNMP-Adapter (Box) and an internal SNMP-Card. Both can manage a parallel system (N modules) and return either global values which are consistent for the whole parallel system or specific values from the single modules.

**Figure 10-4 SNMP Adapter**



The adapter may be configured via Telnet, HTTP (Web-Browser) or serial connection (Terminal). For normal operation at least one network connection (Ethernet) is required.

The SNMP adapter can be used, utilizing the RCCMD send function, for an automatic network wide shut down or just for informing connected users. The shutdown procedure can be initiated on a low residual battery autonomy time (downtime) or by a countdown timer which is started at the beginning of the alarm. A shut down is therefore possible without extra input from the operator, and is fully software controlled.

The small (125x70 mm) External SNMP adapter comes with following interfaces:

**Figure 10-5 External SNMP Adapter**



1. RJ-45 connector for 10/100 Base-T (auto switchable)
2. Serial Port for configuration (COM2) or optional ModBus interface.
3. Error/Link LED for UPS status
4. Aux Port
5. DIP Switch
6. Serial Port to the UPS (COM1)
7. DC Supply (9 VDC or 9-36 VDC supply, depending on model);

**Figure 10-6 Internal SNMP Adapter**





The Internal SNMP-Card can be inserted into an appropriate extension slot of the **PMC**. This adapter communicates via the serial port of the UPS and makes a direct multiple server shut down possible without additional SNMP management software.

For detailed information please see Software Manual provided with the PMC-Software CD ROM. **RCCMD - Remote Console Command module** for a multi-server shutdown. This stand-alone software module is designed to receive and execute a command issued by a remote device. Thanks to RCCMD it is possible to execute a shutdown in a heterogeneous multiplatform network. The new release RCCMD2 is an application available for all Operating Systems, analogous to PMC-Software. Our SNMP Interfaces are compatible to RCCMD.




# 11 Technical Specifications

## 11.1 Conceptpower DPA 500 – General Characteristics

General Characteristics - Cabinet	Type 1 Values	Type 2 Values	Unit
Model: DPA 500			
			
Power, rated:			
apparent	300	500	kVA
active	300	500	kW
Power, range	100 - 1200	100 - 3000	kW
UPS type: On-Line, Transformer-less, Modular, Decentralized Parallel Architecture (DPA)			
Parallel capability: up to 6 cabinets			
Battery: not included			
Performance classification: VFI-SS-111			
Mechanical			
Dimensions (width × height × depth)	53 x 77.75 x 36 (1347 x 1975 x 914)	70 x 77.75 x 36 (1778 x 1975 x 914)	In (mm)
Mass, approx. (Full Cabinet)	1944 (882)	2770 (1255)	Lb (kg)
(Empty Cabinet)	1224 (555)	1520 (690)	
Acoustic noise (acc. to IEC 62040-3)			
in normal mode (at <=25°C) at 100% / 50% Load	75 / 67		dBA
in battery mode (at <=25°C) at 100% / 50% Load	73 / 66		
Safety			
Access: Operator / Restricted Access			
Degree of protection against hazards and water ingress: IP 20			
Electromagnetic Compatibility			
Emission UPS Cat / Immunity UPS Cat	C3 / C3		
Environmental			

Storage temperature range	-25 - +70	°C
Operative temperature range	0 - +40	°C
Relative humidity range (non-condensing)	≤ 95	%
Max. altitude without de-rating	1000	m
<b>Additional and Usual Information</b>		
Connection: 4 wires, 3 phase + Ground (PE)		
Cable entry: Top. Bottom cable entry available upon request		
Accessibility: Front access only		
Unit Color: Powder coat, Midnight Black Wrinkle (Rohm & Haas #12-7001)		
<b>Standards</b>		
Safety	UL 1778 5th edition, CSA C22.2 No. 107.3-14 Third Edition	
Electromagnetic Compatibility (EMC)	IEC/EN 62040-2 Cat. 3	

General Characteristics - Module	Values	Unit
Model: DPA 500		
		
Power, rated:		
apparent	100	kVA
active	100	kW
UPS type: On-Line, Transformer-less, Modular, Decentralized Parallel Architecture (DPA)		
Battery: Not included, line-match options available		
Performance classification: VFI-SS-111		
<b>Mechanical</b>		
Dimensions (width × height × depth):		
active sub-module / passive sub-module	28 x 7 x 30 (710 x 178 x 750)	In (mm)
Mass, approx.:		
active sub-module / passive sub-module	121 / 119 (55 / 54)	Lbs. (kg)
<b>Additional and Usual Information</b>		
Back feed protection: Included		
Color: Black (RAL 9005)		

## 11.2 Input Characteristics

Input Characteristics	Type 1 Cabinet	Type 2 Cabinet	UPS Module Values	Unit
Power, rated:	300 Max	500 Max	100	kW
Voltage (steady-state, r.m.s), rated:		3 x 480V		VAC
Tolerance at 480V		-10 / +15 at <100% load		
		-20 / +15 at <80% load		%
		-30 / +15 at <60% load		
Frequency, rated		60 +/- 5%		Hz
Current (r.m.s), rated (with battery charged and input 480V)	380	633	127	A
Maximum (with Battery charging and input 400/230V)	413	689	138	A
Total Harmonic Distortion (THDi)		< 3.5		%
in-rush current		< 100% of rated current		%
Power factor		0.99 @ 100% load		
Rated Short Circuit Current Rating (Withstand Current)		100	-	kA
AC power distribution system: TN-S, TN-C, TN-C-S, TT				
Note: in static bypass mode or eco-mode TN-C and TN-C-S can cause PE current to rise above 5% of phase currents.				
phases required		3		
neutral required		No		

### Additional and Usual Information

Connection: 4 wires, 3 phase + PE
Cable entry: top or bottom
Accessibility: Front access only
Walk In/Soft Start: yes
Single input feed is standard. Dual input feed also available upon request.

## 11.3 Output Characteristics

Output Characteristics	Type 1 Cabinet	Type 2 Cabinet	UPS Module Values	Unit
Power, rated:	300	500	100	kW
AC power distribution system: TN-S, TN-C, TN-C-S, TT				
available phases		3		
neutral available		No		
Voltage (steady state, r.m.s.), rated:		3 x 480		VAC
variation in normal mode / battery mode		± 1.5 / ± 1.5		%
Total harmonic distortion (THDu), 100% load, normal mode:				
linear		< 2.0		%

non-linear (according to IEC 62040-3)		< 4.0			
Total harmonic distortion, 100 % load, battery mode:					
linear		< 2.0		%	
non-linear (according to IEC 62040-3)		< 4.0			
Voltage unbalance and phase displacement, 100 % load unbalance		0		°	
Voltage transient and recovery time, 100% step load:					
linear		± 4		%	
non-linear (according to IEC 62040-3)		± 4		%	
Transfer normal mode --> battery mode		0		%	
Frequency (steady-state), rated:		60		Hz	
Frequency tolerance / variation in normal mode (frq. Synchronized with mains)		± 2 / ± 4		%	
Frequency tolerance / variation in battery mode (free-running)		± 0.1			
Max synch phase error (referred to a 360° cycle)		< 2		°	
Max slew-rate		1		Hz/s	
Nominal current (In), r.m.s. rated:		360	601	120	A
overload on inverter		0.17 @ 150% load, 5 @ 125% load, 20 @ 110% load			min
Inverter Output Short Circuit Capability		300% for 100 ms			-
Load power factor, rated		1.0			-
Displacement (permissible lead-lag range)		(all range) 0			%, s
AC / AC efficiency in normal mode, linear load:					
100% load	96.00	96.00			%
75% load	96.20	96.20			
50% load	96.00	96.20			
25% load	95.40	95.30			
Eco-mode efficiency, linear load		≥ 99			%
Crest – Factor (Load supported)		3:1			
Static Bypass					
Type: automatic, static switch in each module					
transfer time: inverter → bypass / bypass → inverter / in eco-mode		<1 / <5 / <6			ms
rated current	399	666	133	A	
fault clearing capability (bypass mode) for 20 ms		10xIn			A
overload current on bypass mode (< 25°C)		continuously @ 110% load			min

## 11.4 Battery Characteristics

Battery Characteristics	Values	Unit
Technology: VRLA, vented lead-acid, NiCd		
Battery/DC Nominal Input	540V (nom)	
Number of 12 V blocks	45	
Number of 1.2 V NiCd cells (even and odd)	450	
Battery charger - each module has its own decentralized charger		
Max. current charger capability	60	A
Max. power charger capability	30	kW
Floating voltage (VRLA / NiCd)	2.25 / 1.40	VDC
End of discharge voltage (VRLA / NiCd)	1.68 / 1.05	
r.m.s. ripple current (percentage of the battery capacity )	2	%
Temperature compensation: optional		
Battery test: automatic and periodic battery test (selectable)		

### 1) IMPORTANT NOTES:

- At output voltage 480VAC, the minimum number of 12V blocks is 45.

## 11.5 Torque Specification

**Table 11-1 Generic Torque Specifications**

Thread Size	SAE Grade 5	
	120,000 psi Med Carbon Heat T.	
Inch	Lb-In.	N-M
1/4	6	8
5/16	11	15
3/8	20	27
1/2	48	65
ALL INTERNAL BOLTS ARE SAE GRADE 5.		
NOTE BOLT HEAD MARKINGS ABOVE TO DISTINGUISH BETWEEN GRADES.		
ALL INTERNAL MACHINE SCREWS ARE GRADE 2.		

## 11.6 Heat Dissipation

**Table 11-2 Heat Dissipation Specifications**

Module Quantities		1	2	3	4	5
UPS power rating	kW	100	200	300	400	500
Heat Dissipation with 100% linear load	W	4500	9000	13500	18000	22500
	BTU	15359	30717	46076	61434	76793
Heat Dissipation with 100% non-lin.load (acc. to IEC 62040-3)	W	5710	11420	17130	22840	28550
	BTU	19488	38976	58465	77953	97441
Airflow (25° - 30°C) with 100% non-lin. Load (acc. to IEC 62040-3)	m³/h	1200	2400	3600	4800	6000
Heat Dissipation without load	W	660	1320	1980	2640	3300

---

## 12 Appendix A (Type 1 Cabinet – 300kW)

### 12.1 Wiring Configurations

Conceptpower DPA 500 can be factory-wired in different configurations. The DITE and DIBE configuration is effected in the field by removing the jumper(s) connecting the Main and Bypass input bus bars.

The AC wiring (rectifier input, bypass input and output) has the following possibilities:

- SITE - Single Input Top Entry
- SIBE - Single Input Bottom Entry
- DITE - Dual Input Top Entry (Field Configurable)
- DIBE - Dual Input Bottom Entry (Field Configurable)

The DC wiring (battery) will be located ideally for the applicable top or bottom entry, matching the AC wiring access by default.

Two gland plates are provided at both the top and bottom of the cabinet. The forward gland plate is for DC wiring and for AC output wiring. The rear gland plate is ideal for AC inputs (rectifier and bypass).



**CAUTION**

**CAUTION: Risk of unit damage.**

**Verify input and control circuits are de-energized before making any connections inside the unit.**



**WARNING**

**WARNING: Risk of electric shock**

**Exercise extreme care to avoid equipment damage or injury to personnel.**

---

Insulated conductors of different circuits within the DPA 500 UPS shall be separated by barriers or physically spaced apart. For insulated conductors, if each conductor is provided with insulation acceptable for the highest circuit voltage, no additional action such as separation is necessary. All circuits 24V and less shall be physically spaced one (1) inch apart from voltages 30V and greater. Above all else, power and control wiring must comply with the NEC and applicable local codes. At a minimum, refer to NEC Section 210-20 (A), Table 310-16 for Allowable Ampacities of Insulated Conductors.



**WARNING**

**WARNING:** UPS installation and connections must be performed by a qualified service personnel/electrician.

It is the responsibility of the installation technician to ensure that all local, state and national electric codes are adhered to.

---

#### 12.1.1 Connections for External Wiring

Use *Thomas & Betts* or UL listed equivalent two-hole lugs for the phase, neutral, and ground bus bar connections, when the hard-wired connections are installed. Check bolted joints for tightness. Always use two (2) wrenches when tightening connections to prevent distortion or damage. Refer to Section 11.10 for the torque specifications.

Insulated conductors of different circuits within the DPA 500 UPS shall be separated by barriers or physically spaced apart. For insulated conductors, if each conductor is provided with insulation acceptable for the highest circuit voltage, no additional action such as separation is necessary. All circuits 24V and less shall

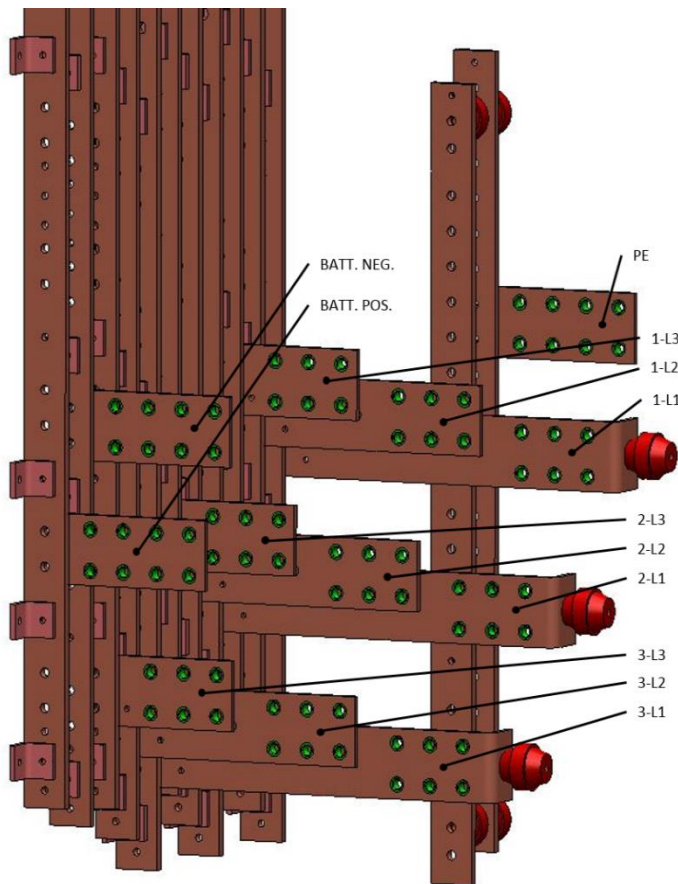
be physically spaced one (1) inch apart from voltages 30V and greater. Above all else, power and control wiring must comply with the NEC and applicable local codes.

### 12.1.2 AC Wiring Instructions

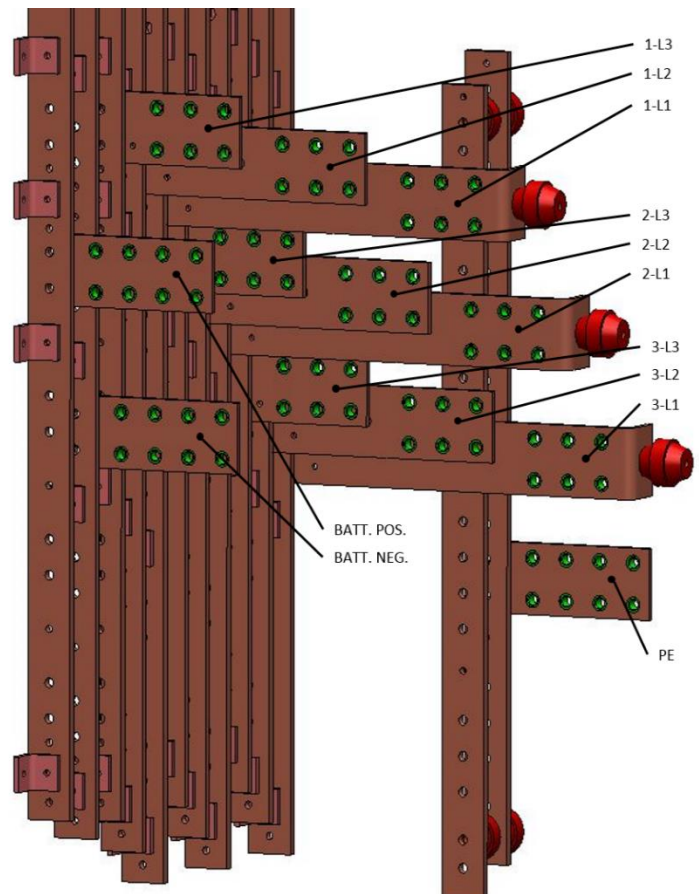
Before proceeding to wire the UPS, make sure that you have read and understood Section 5.4 “Electrical Installation” and make sure that the following recommendations are observed:

- The cable sections and fuse ratings must follow all applicable the local and national standards. Recommended cable and OCPD ratings may be found in tables 5-3, 5-4, 5-5 and 5-6.
- No mains voltage is present on the wires
- All loads are shut down and disconnected
- UPS is shut down and voltage-free (no battery is connected)
- All three (3) parallel isolators CB1-1, CB1-2, CB1-3 are in the open (OFF) position.
- Mains voltage (Input Voltage) and frequency (Input Freq.) correspond to the values indicated on the type plate of the UPS. The type plate (Figure 3-1) is on the inside part of the door in a center position.
- Make sure that the total power of the load is equal or lower than the rated power of the UPS (Output power) indicated on the type plate of the UPS.
- PE wiring is performed in accordance with the prescribed NEC Standards or with local regulations;
- UPS is connected to the mains through a Low Voltage Distribution Board with a separate mains line (protected with a circuit breaker or fuse) for the UPS.
- A torque wrench shall be used to tighten the cables; Refer to Section 11.10 for the recommended torque(s).

The figures below show the standard, decentralized I/O terminals for both bottom and top cable entry.

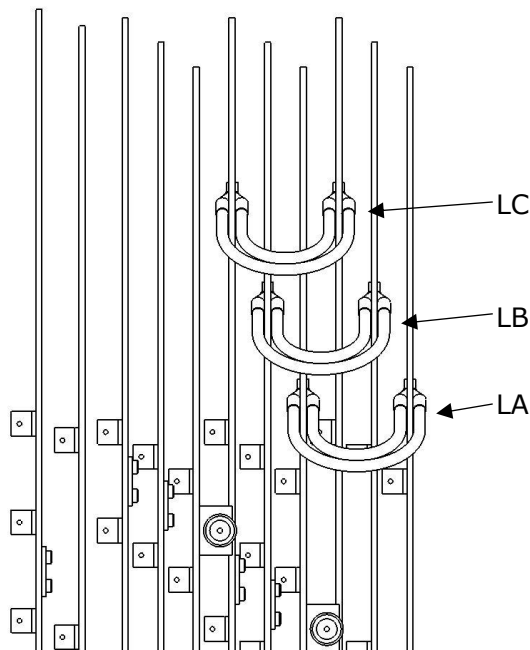


**Bottom entry I/O terminals – view from above.**



**Top entry I/O terminals – view from below.**





**LA, LB, LC must be removed for dual fed**

**Bus bar shown with single source jumper wires.**

**Wire locations are not accurate and are for illustration only.**

### 12.1.3 DC Wiring Instructions

The UPS-cabinet of the DPA 500 does not have internal batteries; therefore, the battery will be external either in cabinets or in shelves/racks. All DC wiring shall be in accordance with local and national regulations. It is strongly recommended that any DC component be part of an engineered system solution.



**CABLES BETWEEN BATTERIES AND THE UPS SHOULD BE RUN IN MATCHED PAIRS, POSITIVE-WITH NEGATIVE, WITHIN EACH CONDUIT OR CABLE RUN.**

**CAUTION**

**GROUPING LIKE-POLARITY CABLES TOGETHER, FOR EXAMPLE, POSITIVE-WITH-POSITIVE AND NEGATIVE-WITH-NEGATIVE, CAN CAUSE STRESS OR DAMAGE TO THE CABLES, CONDUIT OR BUSWORK.**

### 12.1.4 Connections to External Battery Cabinet

The DPA 500 UPS uses only externally connected batteries. They may be sealed, maintenance-free lead-acid batteries, flooded lead-acid cells, or NiCad batteries and are installed and should be connected at the time the UPS is commissioned. The battery charging system allows adaptation for any of these types of batteries but must be properly set at installation to the selected battery type. Nominal battery voltage of 540 volts must be used (refer to Section 11.4 for additional details). Overcurrent protection shall be external to the unit and supplied by others. The overcurrent protective device should be sized as recommended by the battery system supplier. Wiring shall be based on overcurrent protective device requirements and recommendations. At a minimum, refer to NEC Section 210-20 (A), Table 310-16 for Allowable Ampacities of Insulated Conductors.



**WARNING**

**Wire sizing according to**

**NEC Section 210-20 (A) Table 310-16**

**Use 167°F (75°C)(minimum) copper or aluminum wire**

The battery back-up should be sized according to the desired backup time. Note that the backup time is longer if the load is less than the nominal power rating of the UPS system(s).

If installing a customer-supplied battery system, install the battery system according to the battery and battery system manufacturer's instructions and all applicable codes and regulations, including the NEC, Article 480.

## 12.2 Electrical Installation



**DANGER**

**STAY CLEAR OF BATTERY TERMINALS; THEY CONTAIN DANGEROUS DC-VOLTAGES AND CURRENTS AND CAN CAUSE FATAL ACCIDENTS.**

**DO NOT OPERATE IN CASE OF PRESENCE OF WATER OR MOISTURE. BY OPENING OR REMOVING THE UPS-COVERS YOU RUN RISK OF EXPOSURE TO DANGEROUS VOLTAGES!**

**SERVICE OF BATTERY SYSTEM SHOULD ONLY BE DONE BY TRAINED SERVICE AND MAINTENANCE PERSONNEL OF THE MANUFACTURER OR AUTHORIZED SERVICE PARTNERS.**

---

To ensure protection of service personnel during the UPS installation, make sure that the connections are performed under the following conditions:

- No mains voltage is present in the UPS
- All loads are disconnected
- The UPS and external battery are voltage-free

To verify the complete shutdown of the DPA 500 perform following steps:

- No mains voltage is present
- All loads are shut down and disconnected
- UPS is shut down and voltage-free
- All 3x parallel Isolators CB1-1, CB1-2, CB1-3 are in position OFF (open)
- All 3x battery breakers CB2-1, CB2-2, CB2-3 are in position OFF (open)
- Verify external battery circuit breakers/fuses in the external battery cabinet are open.

### 12.2.1 Installation Checklist

- ☐ All packing materials and restraints have been removed from each cabinet.
- ☐ Each cabinet in the UPS system is placed in the installed location.
- ☐ All conduits and cables are properly routed to the UPS and auxiliary cabinets.
- ☐ All power cables are properly sized and terminated.
- ☐ A ground conductor is properly installed.
- ☐ If the cabinet does not use all module mounting locations, the provided dead fronts are installed on the front of the cabinet.
- ☐ Battery cabinet installation instructions have been completed.
- ☐ Air conditioning equipment is installed and operating properly.
- ☐ The area around the installed UPS system is clean and dust-free. (It is recommended that the UPS be installed on a level floor suitable for computer or electronic equipment.
- ☐ Adequate workspace exists around the UPS and other cabinets.
- ☐ Adequate lighting is provided around all UPS equipment.
- ☐ Any optional accessories are mounted in their installed location and properly wired.
- ☐ Summary alarms and/or building alarms are wired appropriately. (OPTIONAL)
- ☐ Startup and operational checks performed by certified service personnel.

### 12.3 Operating Procedure



#### **WARNING!**

**THE OPERATIONS DESCRIBED IN THIS CHAPTER MUST BE PERFORMED BY A SERVICE ENGINEER FROM THE MANUFACTURER OR AN AGENT CERTIFIED BY THE MANUFACTURER.**

---

Configuration of UPS-System before switching it on:

1. Make sure the fuses for the supply of UPS-System in the Input Distribution Board on site are open.
2. Make sure all the input and output cabling has been performed correctly and check the input phase rotation.
3. Verify that all Parallel Isolator Switches CB1-1, CB1-2, CB1-3, (depending on the number of UPS Cabinets) are all open (Position "OFF").
4. Verify that the Maintenance Switch IA1 (if present) is open (Position "OFF").
5. Make sure all the battery breakers CB2-1, CB2-2, CB2-3, (depending on the number of UPS Cabinets) in the UPS (if any) and the external battery cabinets are open.
6. Check the Position of the DIP Switches SW1-9. This is a Single-Cabinet Configuration, and the DIP Switches SW1-9 must be set according to positions shown in section 7.2.3.

## Start up procedure of DPA 500:

1. Close circuit breaker(s) for the supply of UPS-System in the Input Distribution Board.
  - The LED-indicators LINE 1 and battery on UPS-Module are lit – green
  - On LCD-Display "LOAD OFF, SUPPLY FAILURE" will appear.
2. UPS-Module 1 (bottom-most module in cabinet):

Press both "ON/OFF" Main Buttons to switch on UPS.

LCD panel must display: "LOAD DISCONNECTED PARALLEL SWITCH OPEN" and the LED-indicator will appear as shown below:

LED Indicator	Color
LINE 1	Green
LINE 2	Green
BYPASS	Green
INVERTER	OFF
BATTERY	Flashing Green

3. Check Command: LOAD TO INVERTER  
LED indicator will appear as shown below:

LED Indicator	Color
LINE 1	Green
LINE 2	Green
BYPASS	OFF
INVERTER	Green
BATTERY	Flashing Green

4. Scroll through the menu to the "Measurement" screen and verify all values are nominal.
5. Modules 2-3: Repeat same procedure as for Module 1: Steps 2-4.
6. Check battery polarity and voltage.
7. If the battery polarity and voltage is correct insert internal (if any) and external battery fuses (breakers).
8. Testing of Parallel Functions  
(The load fuses in output Distribution Board are still open—i.e. the loads are disconnected).  
All UPS-Modules are on INVERTER MODE
9. Press simultaneously the two ON/OFF buttons on the Active Sub-Module control panel **on all control panels** to turn the modules OFF. On the LCD's message "LOAD OFF, SUPPLY FAILURE" will appear.

10. Close Parallel Isolator CB1-1 (position ON) of Module 1, on LCD: "PARALLEL SW CLOSED" will appear. Repeat the same for all other modules.
11. Press simultaneously the two ON/OFF buttons on the Active Sub-Module control panel **on all control panels** to turn the modules ON. On output Terminal Block there is now UPS power and on all LCD's: "LOAD PROTECTED" will appear.
12. Load transfer to Maintenance Bypass  
Go to Menu COMMANDS and choose command "LOAD TO BYPASS" and transfer the load to mains on control panel of any one of the Active Sub-Modules.  
Close Maintenance Bypass Switch IA1 (position ON)  
On LCD: "MANUAL BYP IS CLOSED" will appear and the LED-indicator will indicate as shown below:

LED Indicator	Color
LINE 1	Green
LINE 2	Green
BYPASS	Green
INVERTER	RED
BATTERY	Green

13. Connect Load to the UPS Output  
Insert fuses in output Distribution Board. Verify on Control Panel that the load is on bypass.
14. Open Maintenance Bypass Switch IA1  
On LCD: "MANUAL BYP IS OPEN" will appear followed by "LOAD NOT PROTECTED"
15. Check on LCD the Output Powers, Voltages Currents and Frequencies.
16. Load transfer to Inverter  
Go to Menu COMMANDS and choose command "LOAD TO INVERTER" and transfer the load to inverter on control panel of any one of the UPS-modules.  
On all LCD's: "LOAD PROTECTED" will appear.
17. Check the output Voltages and Currents once again.

**THE LOAD IS NOW PROTECTED BY THE DPA 500.**

## 12.4 Shutdown Procedure



### WARNING!

**THE OPERATIONS DESCRIBED IN THIS CHAPTER MUST BE PERFORMED BY A SERVICE ENGINEER FROM THE MANUFACTURER OR BY AN AGENT CERTIFIED BY THE MANUFACTURER.**

The DPA 500 may be shut down completely if the load does not need input power for an extended period of time. It may be switched to Maintenance Bypass Mode for service or maintenance purposes or transferred to the OFF-LINE Mode (ECO-Mode), if the load does not need the highest degree of protection.

The load may be disconnected by means of the two ON/OFF (LOAD-OFF) buttons for security reasons.

### Complete Shutdown Procedure of DPA 500

If there is no need to supply the load, the UPS System can be completely shut down. The following procedures can only be executed after the load has completely been de-energized.



**IN THE CASE THAT THE PARALLEL UPS SYSTEM HAS TO BE TURNED OFF, PRESS BOTH ON/OFF BUTTONS ON ALL SUB-MODULES. IN THIS CASE THE POWER SUPPLY TO THE LOAD WILL BE INTERRUPTED.**

1. Verify that the loads are shut down and that there is no need for power supply to the load.
2. If the loads are all disconnected, press simultaneously both ON/OFF-Buttons on the UPS module control panel. On the LCD: "LOAD OFF, SUPPLY FAILURE" will appear and the LED-indicator will indicate as shown below:

LED Indicator	Color
LINE 1	Green
LINE 2	OFF
BYPASS	OFF
INVERTER	OFF
BATTERY	Green

3. Open all Parallel Isolator Switches CB1-1, CB1-2, CB1-3, (depending of the number of UPS cabinets).
4. Open battery fuses/breakers on external battery cabinets or racks.
5. Open the mains fuses/breaker (upstream of UPS) in the building distribution panel.



**WAIT 5 MINUTES BEFORE PERFORMING ANY OTHER OPERATIONS TO ENSURE COMPLETE, SAFE DISCHARGING OF THE DC CAPACITORS.**

**THE DPA 500 IS NOW VOLTAGE FREE.**

### 12.4.1 Shutdown of Multi-Cabinet Configuration

Before shutting-down a Multi-Cabinet Configuration make sure that the loads do not need power protection and that the loads are disconnected.



**THE UPS MAY BE SHUT DOWN COMPLETELY IF THE LOADS DO NOT NEED ANY POWER SUPPLY. THEREFORE, THE STEPS IN THIS PARAGRAPH ARE TO BE PERFORMED ONLY AFTER THE LOAD HAS BEEN DISCONNECTED AND DOES NOT NEED ANY POWER SUPPLY.**

---

**To perform a complete shutdown of a Multi-Cabinet Configuration, proceed as described in the shutdown procedure described in section 7.8**

### 12.5 Load Transfer: From Inverter Operation to Maintenance Bypass

If it is necessary to perform service or maintenance on the UPS, it is possible to transfer the UPS to MAINTENANCE BYPASS.



**WARNING!**

**THE OPERATIONS DESCRIBED IN THIS CHAPTER MUST BE PERFORMED BY A SERVICE ENGINEER FROM THE MANUFACTURER OR BY AN AGENT CERTIFIED BY THE MANUFACTURER.**

---

#### **Configuration of UPS-System before starting the Transfer Procedure to Maintenance Bypass:**

The load is protected by DPA 500 and running in normal operation. (The UPS-Module is operating on inverter).

1. Using LCD panel, select the COMMANDS menu and choose command "LOAD TO BYPASS" and transfer the load to mains.  
On LCD panel "LOAD NOT PROTECTED" will appear.
2. Close Maintenance Bypass Switch IA1 (position ON).  
On LCD: "MANUAL BYP IS CLOSED" will appear and the mimic panel will show:

LED Indicator	Color
LINE 1	Green
LINE 2	Green
BYPASS	Green
INVERTER	RED
BATTERY	Green

3. Press simultaneously the two ON/OFF buttons on the UPS module control panel on all control panels. On the LCD's message "LOAD OFF, SUPPLY FAILURE" will appear and the mimic panel will show:

LED Indicator	Color
LINE 1	Green
LINE 2	OFF
BYPASS	OFF
INVERTER	OFF
BATTERY	Flashing Green

4. Open Parallel Isolators CB1-1, CB1-2, CB1-3, (depending on the number of UPS cabinets).
5. Open battery fuses/breakers on the internal (if any) and the external battery cabinets or racks.



**THE UPS SYSTEM IS STILL POWERED (DANGEROUS VOLTAGE).**



**THE LOAD IS NOW SUPPLIED BY MAINS AND IS THEREFORE NOT PROTECTED THROUGH THE UPS.**

---

## 12.6 Load Transfer: From Maintenance Bypass to Inverter Operations

This procedure describes the sequence of operations to be done in order to restart the UPS and restore ON-LINE mode (Load on Inverter).



**WARNING!**

**THE OPERATIONS DESCRIBED IN THIS CHAPTER MUST BE PERFORMED BY A SERVICE ENGINEER FROM THE MANUFACTURER OR BY AN AGENT CERTIFIED BY THE MANUFACTURER.**

---

### Configuration of UPS-System before starting the Transfer Procedure to ON-LINE mode:

The load is supplied directly by Input Mains power and the UPS is OFF.

1. Close battery fuses/breakers in the external battery cabinets or racks.
2. On the LCD's: "LOAD OFF, SUPPLY FAILURE" will appear and the mimic panel will show:

LED Indicator	Color
LINE 1	Green
LINE 2	OFF
BYPASS	OFF
INVERTER	OFF
BATTERY	Flashing/Green



3. Close Parallel Isolators CB1-1, CB1-2, CB1-3, (depending on the number of UPS cabinets) and check message "PARALLEL SW CLOSED" on LCD of each module.
4. Press simultaneously the two ON/OFF buttons on the UPS module control panel on all control panels. Unit will start-up and after about 60 seconds the mimic panel will show:

LED Indicator	Color
LINE 1	Green
LINE 2	Green
BYPASS	Green
INVERTER	RED
BATTERY	Green

5. Make sure that the bypass LED is green, then open the Maintenance Bypass Switch IA1 (position OFF).
6. Using LDC panel, select the COMMANDS menu and choose command "LOAD TO INVERTER". This will transfer the LOAD to Inverter on the complete system (all units). On LCD panel "LOAD PROTECTED" will appear.

## THE LOAD IS NOW SUPPLIED BY INVERTER POWER AND IS PROTECTED

### 12.7 Replacement of UPS Modules

#### 12.7.1 Replacement of UPS-Module in Single-Module Systems

If your DPA 500 consists of only one single UPS-Module, the UPS needs to be transferred to maintenance bypass. Before performing the operations described below, follow the procedure of the section 7.9 to transfer the UPS from inverter operation to maintenance bypass. Replacement of UPS-Module in Redundant Multi-Module Systems



#### WARNING!

**THE OPERATIONS DESCRIBED IN THIS CHAPTER MUST BE PERFORMED BY A SERVICE ENGINEER FROM THE MANUFACTURER OR BY AN AGENT CERTIFIED BY THE MANUFACTURER.**

##### 12.7.1.1 Procedure To Extract a UPS Module

1. Reset the Alarm on faulty Module. The chime sound will stop. If the Alarm condition persists (the LED Indicator ALARM will remain red) it means that there is a fault in the UPS-Module.
2. If the load is supplied by the mains in Bypass-Mode (Eco-Mode) the Maintenance Bypass (IA1) may be closed by turning it to position "ON".  
**NOTE:** If the load is on inverter, before closing the Maintenance Bypass IA1, transfer load to bypass by means of the command "LOAD TO BYPASS" in submenu COMMANDS. On LCD: "LOAD NOT PROTECTED" will appear.
3. Make sure that the system is redundant.
4. Press both ON/OFF Buttons on the UPS-Module simultaneously. This will switch the module off.  
**NOTE:** The rest of the system remains on-line. **THE LOAD IS STILL PROTECTED BY THE DPA 500.**

5. Open the Parallel Isolator Switch CBx, where 'x' denotes the number of the unit to be removed, (switch to position "OFF") The UPS-Module is now disconnected from output.
6. Open battery fuses/breakers of the external battery cabinet or rack
7. Unscrew the four screws on the front side of the module that are fixing it to the UPS-cabinet.
8. Pull Module **only partially out** horizontally by means of the 2 black handles until the rear connectors are disconnected.



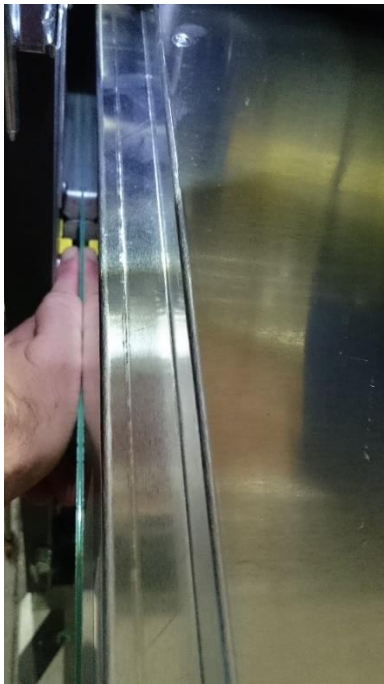
**The weight of a UPS module is at least 55kg, therefore it can be lifted only by 2 persons. The use of lifting tools such as trolley with adjustable height or similar devices may be helpful by handling modules.**



**BEFORE DRAWING THE UPS MODULE COMPLETELY OUT, WAIT 5 MINUTES UNTIL THE INTERNAL DC-CAPACITORS ARE DISCHARGED.**

---

9. To extract the module completely out, press down the two yellow tabs top-right and top-left of the module (as shown in the figure here below) and then draw the UPS-module out by pulling it out horizontally.



10. Cover the module slot with the appropriate dead front or follow the procedure below to fit another module back in the cabinet.

To fit back a UPS module, follow this procedure:

1. Remove UPS-Module compartment protection cover by unscrewing four screws on the front.
2. Slide two thirds of UPS-Module into dedicated UPS-compartment (make sure not to plug the UPS-Module into the rear connector).  
Push UPS-module to its final position and push strongly to assure good contact on the rear plugs.  
**NOTE:** Two persons are needed to remove/install the module from the UPS-Cabinet. The weight of a DPA 500 100 kW module is at least 55kg.
3. Tighten the four screws on the front of module.
4. Check if the LEDs for LINE1 and BATTERY are green. If yes, mains voltage is OK;  
On the LCD: "LOAD OFF, SUPPLY FAILURE" will appear and the LED-indicator will indicate as shown below:

LED Indicator	Color
LINE 1	Green
LINE 2	OFF
BYPASS	OFF
INVERTER	OFF
BATTERY	Flashing Green

5. Close internal and external battery fuses/breaker (if available);
6. Press simultaneously both "ON/OFF" Buttons to start-up UPS.  
LCD panel must display: "LOAD DISCONNECTED PARALLEL SWITCH OPEN" and the LED-indicator will appear as shown below:

LED Indicator	Color
LINE 1	Green
LINE 2	Green
BYPASS	OFF
INVERTER	Green
BATTERY	Green

7. Transfer load to mains and inverter for testing using submenu COMMANDS
8. Transfer Load to Bypass-Mode by means of COMMAND "LOAD TO BYPASS"

9. Verify the status (Load on Bypass, Eco-Mode) by checking the LED-indicators as shown below:

LED Indicator	Color
LINE 1	Green
LINE 2	Green
BYPASS	Green
INVERTER	OFF
BATTERY	Green

10. Close Parallel Isolator (CBx, where 'x' denotes the number of the unit installed);
11. Open Maintenance Bypass (IA1) by turning it to position "OFF". The load is now supplied by the static bypass.
12. Transfer load to Inverter-Mode by means of COMMAND "LOAD TO INVERTER". On LCD: "LOAD PROTECTED" will appear.

**THE LOAD IS NOW PROTECTED BY THE DPA 500.**

---

## 13 Appendix B (Type 2 Cabinet – 500kW)

### 13.1 Wiring Configurations

Conceptpower DPA 500 can be factory-wired in different configurations.

The AC wiring (rectifier input, bypass input and output) has the following possibilities:

- DITE - Dual Input Top Entry
- DIBE - Dual Input Bottom Entry
- SITE - Single Input Top Entry
- SIBE - Single Input Bottom Entry

Each of these, in turn, can be configured with or without centralized input disconnects.

The DC wiring (battery) will be located ideally for the applicable top or bottom entry, matching the AC wiring access by default.

Two gland plates are provided at both the top and bottom of the cabinet. The forward gland plate is for DC wiring and for AC output wiring. The rear gland plate is ideal for AC inputs (rectifier and bypass).



**CAUTION: Risk of unit damage.**

**CAUTION**

**Verify input and control circuits are de-energized before making any connections inside the unit.**

---



**WARNING: Risk of electric shock**

**WARNING**

**Exercise extreme care to avoid equipment damage or injury to personnel.**

---

Insulated conductors of different circuits within the DPA 500 UPS shall be separated by barriers or physically spaced apart. For insulated conductors, if each conductor is provided with insulation acceptable for the highest circuit voltage, no additional action such as separation is necessary. All circuits 24V and less shall be physically spaced one (1) inch apart from voltages 30V and greater. Above all else, power and control wiring must comply with the NEC and applicable local codes. At a minimum, refer to NEC Section 210-20 (A), Table 310-16 for Allowable Ampacities of Insulated Conductors.



**WARNING:** UPS installation and connections must be performed by a qualified service personnel/electrician.

**WARNING**

It is the responsibility of the installation technician to ensure that all local, state and national electric codes are adhered to.

---

#### 13.1.1 Connections for External Wiring

Use *Thomas & Betts* or UL listed equivalent two-hole lugs for the phase, neutral, and ground bus bar connections, when the hard-wired connections are installed. Check bolted joints for tightness. Always use two (2) wrenches when tightening connections to prevent distortion or damage. Refer to Section 11.10 for the torque specifications.

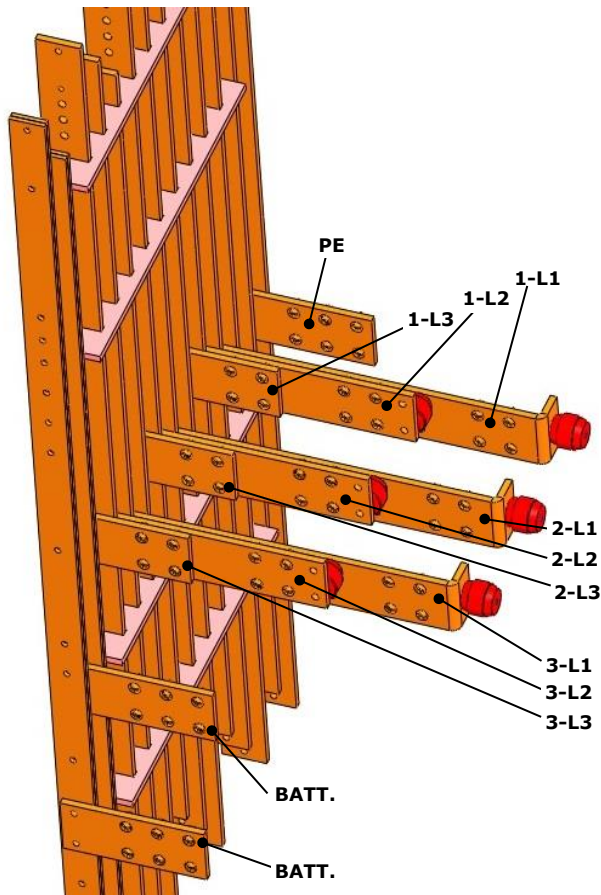
Insulated conductors of different circuits within the DPA 500 UPS shall be separated by barriers or physically spaced apart. For insulated conductors, if each conductor is provided with insulation acceptable for the highest circuit voltage, no additional action such as separation is necessary. All circuits 24V and less shall be physically spaced one (1) inch apart from voltages 30V and greater. Above all else, power and control wiring must comply with the NEC and applicable local codes.

### 13.1.2 AC Wiring Instructions

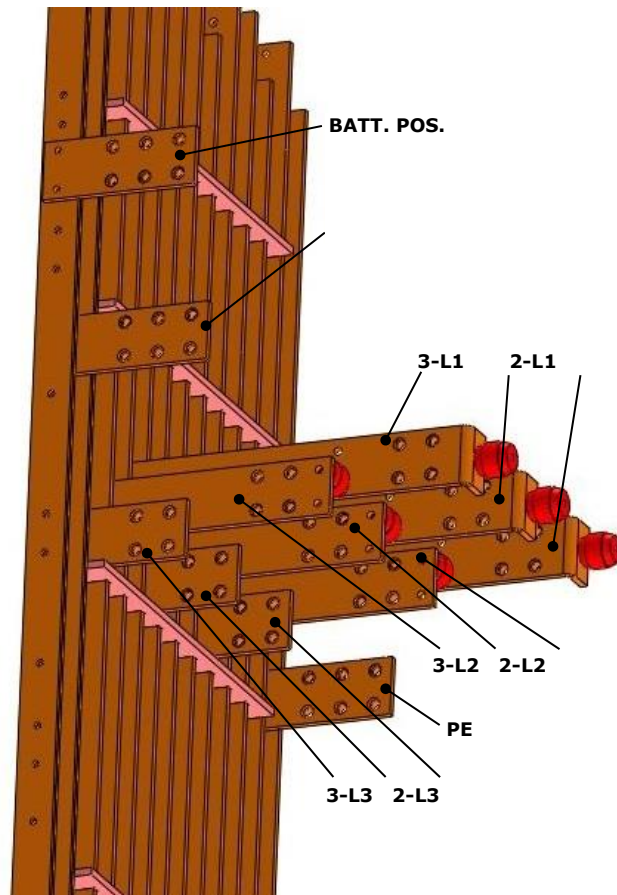
Before proceeding to wire the UPS, make sure that you have read and understood Section 5.4 "Electrical Installation" and make sure that the following recommendations are observed:

- The cable sections and fuse ratings must follow all applicable the local and national standards. Recommended cable and OCPD ratings may be found in tables 5-3, 5-4, 5-5 and 5-6.
- No mains voltage is present on the wires
- All loads are shut down and disconnected
- UPS is shut down and voltage-free (no battery is connected)
- Centralized mains disconnect(s) are in the open (OFF) position.
- All five (5) parallel isolators CB1-1, CB1-2, CB1-3, CB1-4, CB1-5 are in the open (OFF) position.
- Mains voltage (Input Voltage) and frequency (Input Freq.) correspond to the values indicated on the type plate of the UPS. The type plate (Figure 3-1) is on the inside part of the door in a center position.
- Make sure that the total power of the load is equal or lower than the rated power of the UPS (Output power) indicated on the type plate of the UPS.
- PE wiring is performed in accordance with the prescribed NEC Standards or with local regulations;
- UPS is connected to the mains through a Low Voltage Distribution Board with a separate mains line (protected with a circuit breaker or fuse) for the UPS.
- A torque wrench shall be used to tighten the cables; Refer to Section 11.10 for the recommended torque(s).

The figures below show the standard, decentralized I/O terminals for both bottom and top cable entry. Busbar Set 2 (Bypass) will not be present in some configurations.



**Bottom entry I/O terminals – view from above.**

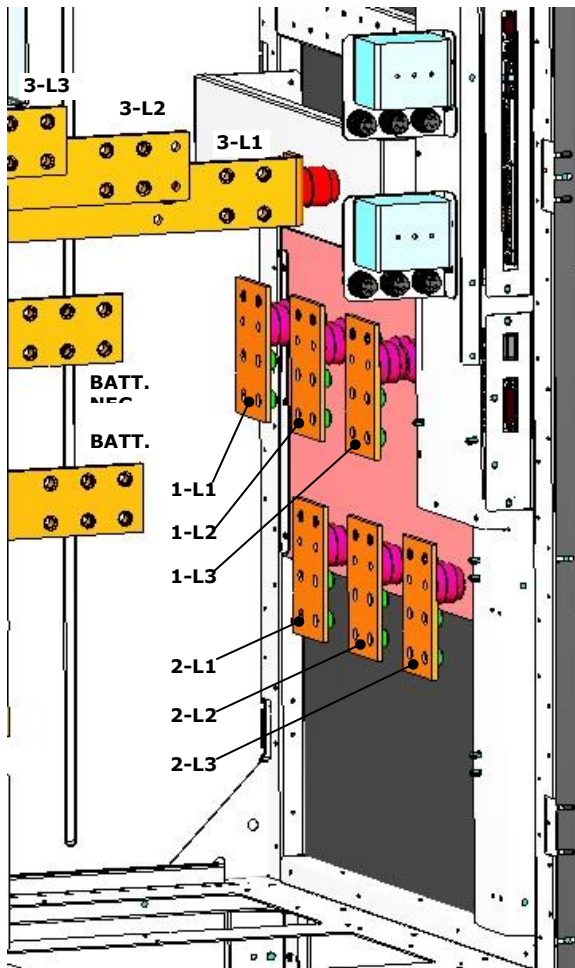


**Top entry I/O terminals – view from below.**

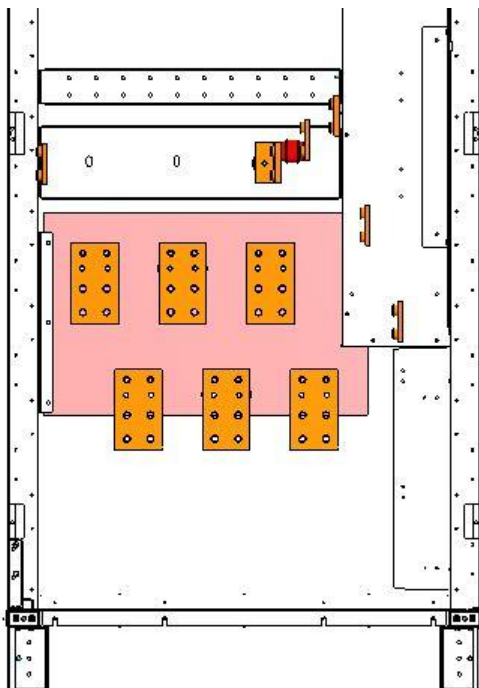
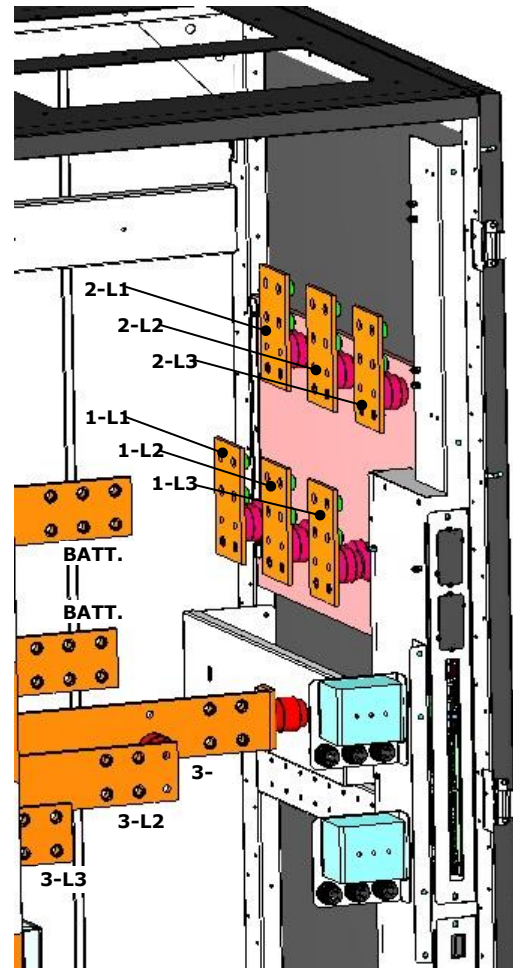
The figures below show the I/O terminals, top and bottom entry, when centralized disconnects are present. Busbar Set 2 (Bypass) will not be present in some configurations.



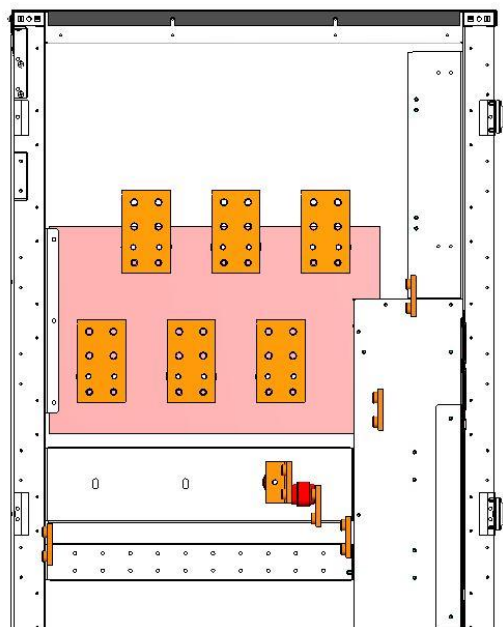
**Bottom cable entry – Centralized Disconnects**



**Top cable entry – Centralized Disconnects**



**ANOTHER OPTION FOR THE CENTRALIZED VIEW**





### 13.1.3 DC Wiring Instructions

The UPS-cabinet of the DPA 500 does not have internal batteries; therefore the battery will be external either in cabinets or in shelves/racks.



**CAUTION**

**CABLES BETWEEN BATTERIES AND THE UPS SHOULD BE RUN IN MATCHED PAIRS, POSITIVE-WITH NEGATIVE, WITHIN EACH CONDUIT OR CABLE RUN.**

**GROUPING LIKE-POLARITY CABLES TOGETHER, FOR EXAMPLE, POSITIVE-WITH-POSITIVE AND NEGATIVE-WITH-NEGATIVE, CAN CAUSE STRESS OR DAMAGE TO THE CABLES, CONDUIT OR BUSWORK.**

---

### 13.1.4 Connections to External Battery Cabinet

The DPA 500 UPS uses only externally connected batteries. They may be sealed, maintenance-free lead-acid batteries, flooded lead-acid cells, or NiCad batteries and are installed and should be connected at the time the UPS is commissioned. The battery charging system allows adaptation for any of these types of batteries, but must be properly set at installation to the selected battery type. Nominal battery voltage of 540 volts must be used (refer to Section 11.4 for additional details). Overcurrent protection shall be external to the unit and supplied by others. The overcurrent protective device should be sized as recommended by the battery system supplier. Wiring shall be based on overcurrent protective device requirements and recommendations. At a minimum, refer to NEC Section 210-20 (A), Table 310-16 for Allowable Ampacities of Insulated Conductors.



**WARNING**

**Wire sizing according to**

**NEC Section 210-20 (A) Table 310-16**

**Use 167°F (75°C)(minimum) copper or aluminum wire**

---

The battery back-up should be sized according to the desired backup time. Note that the backup time is longer if the load is less than the nominal power rating of the UPS system(s).

If installing a customer-supplied battery system, install the battery system according to the battery and battery system manufacturer's instructions and all applicable codes and regulations, including the NEC, Article 480.

## 13.2 Electrical Installation



**DANGER**

**KEEP OUT OF BATTERY POLES WHICH CONTAIN DANGEROUS DC-VOLTAGES CAUSING FATAL ACCIDENTS.**

**DO NOT OPERATE IN CASE OF PRESENCE OF WATER OR MOISTURE. BY OPENING OR REMOVING THE UPS-COVERS YOU RUN RISK OF EXPOSURE TO DANGEROUS VOLTAGES!**

**SERVICE OF BATTERY SYSTEM SHOULD ONLY BE DONE BY TRAINED SERVICE AND MAINTENANCE PERSONEL OF THE MANUFACTURER OR AUTHORIZED SERVICE PARTNERS.**

---

To ensure protection of service personnel during the UPS installation, make sure that the connections are performed under the following conditions:

- No mains voltage is present in the UPS
- All loads are disconnected
- The UPS and external battery are voltage-free

To verify the complete shutdown of the DPA 500 perform following steps:

- No mains voltage is present
- All loads are shut down and disconnected
- UPS is shut down and voltage-free
- All 5x parallel Isolators CB1-1, CB1-2, CB1-3, CB1-4, CB1-5 are in position OFF (open)
- All 5x battery breakers CB2-1, CB2-2, CB2-3, CB2-4, CB2-5 are in position OFF (open)
- Verify external battery circuit breakers/fuses in the external battery cabinet are open.

### 13.2.1 Installation Checklist

- ☐ All packing materials and restraints have been removed from each cabinet.
- ☐ Each cabinet in the UPS system is placed in the installed location.
- ☐ All conduits and cables are properly routed to the UPS and auxiliary cabinets.
- ☐ All power cables are properly sized and terminated.
- ☐ A ground conductor is properly installed.
- ☐ If the cabinet does not use all module mounting locations, the provided dead fronts are installed on the front of the cabinet.
- ☐ Battery cabinet installation instructions have been completed.
- ☐ Air conditioning equipment is installed and operating properly.
- ☐ The area around the installed UPS system is clean and dust-free. (It is recommended that the UPS be installed on a level floor suitable for computer or electronic equipment.
- ☐ Adequate workspace exists around the UPS and other cabinets.
- ☐ Adequate lighting is provided around all UPS equipment.
- ☐ Any optional accessories are mounted in their installed location and properly wired.
- ☐ Summary alarms and/or building alarms are wired appropriately. (OPTIONAL)
- ☐ Startup and operational checks performed by certified service personnel.

### 13.3 Operating Procedure



#### **WARNING!**

**THE OPERATIONS DESCRIBED IN THIS CHAPTER MUST BE PERFORMED BY A SERVICE ENGINEER FROM THE MANUFACTURER OR AN AGENT CERTIFIED BY THE MANUFACTURER.**

Configuration of UPS-System before switching it on:

1. Make sure the fuses for the supply of UPS-System in the Input Distribution Board on site are open.
2. Make sure all the input and output cabling has been performed correctly and check the input phase rotation.
3. Verify that all Parallel Isolator Switches CB1-1, CB1-2, CB1-3, CB1-4, CB1-5 (depending on the number of UPS Cabinets) are all open (Position "OFF").
4. Verify that the Maintenance Switch IA1 (if present) is open (Position "OFF").
5. Make sure all the battery breakers CB2-1, CB2-2, CB2-3, CB2-4, CB2-5 (depending on the number of UPS Cabinets) in the UPS (if any) and the external battery cabinets are open.
6. Check the Position of the DIP Switches SW1-9. This is a Single-Cabinet Configuration, and the DIP Switches SW1-9 must be set according to positions shown in section 7.2.3.

#### **Start up procedure of DPA 500:**

1. Insert fuses for the supply of UPS-System in the Input Distribution Board.
  - The LED-indicators LINE 1 and battery on UPS-Module are lit – green
  - On LCD-Display "LOAD OFF, SUPPLY FAILURE" will appear.
2. UPS-Module 1 (bottom-most module in cabinet):  
Press both "ON/OFF" Main Buttons to switch on UPS.  
LCD panel must display: "LOAD DISCONNECTED PARALLEL SWITCH OPEN" and the LED-indicator will appear as shown below:

LED Indicator	Color
LINE 1	Green
LINE 2	Green
BYPASS	Green
INVERTER	OFF
BATTERY	Flashing Green

3. Check Command: LOAD TO INVERTER  
LED indicator will appear as shown below:

LED Indicator	Color
LINE 1	Green
LINE 2	Green
BYPASS	OFF
INVERTER	Green
BATTERY	Flashing Green

4. Navigate the menu to the "Measurement" screen and verify all values are nominal.
5. Modules 2-5: Repeat same procedure as for Module 1: Steps 2-4.
6. Check battery polarity and voltage.
7. If the battery polarity and voltage is correct insert internal (if any) and external battery fuses (breakers).
8. Testing of Parallel Functions  
(The load fuses in output Distribution Board are still open—i.e. the loads are disconnected).  
All UPS-Modules are on INVERTER MODE
9. Press simultaneously the two ON/OFF buttons on the Active Sub-Module control panel **on all control panels** to turn the modules OFF. On the LCD's message "LOAD OFF, SUPPLY FAILURE" will appear.
10. Close Parallel Isolator CB1-1 (position ON) of Module 1, on LCD: "PARALLEL SW CLOSED" will appear. Repeat the same for all other modules.
11. Press simultaneously the two ON/OFF buttons on the Active Sub-Module control panel **on all control panels** to turn the modules ON. On output Terminal Block there is now UPS power and on all LCD's: "LOAD PROTECTED" will appear.
12. Load transfer to Maintenance Bypass  
Go to Menu COMMANDS and choose command "LOAD TO BYPASS" and transfer the load to mains on control panel of any one of the Active Sub-Modules.  
Close Maintenance Bypass Switch IA1 (position ON)  
On LCD: "MANUAL BYP IS CLOSED" will appear and the LED-indicator will indicate as shown below:

LED Indicator	Color
LINE 1	Green
LINE 2	Green
BYPASS	Green
INVERTER	RED
BATTERY	Green

13. Connect Load to the UPS Output  
Insert fuses in output Distribution Board. Verify on Control Panel that the load is on bypass.
14. Open Maintenance Bypass Switch IA1  
On LCD: "MANUAL BYP IS OPEN" will appear followed by "LOAD NOT PROTECTED"
15. Check on LCD the Output Powers, Voltages Currents and Frequencies.
16. Load transfer to Inverter  
Go to Menu COMMANDS and choose command "LOAD TO INVERTER" and transfer the load to inverter on control panel of any one of the UPS-modules.  
On all LCD's: "LOAD PROTECTED" will appear.
17. Check the output Voltages and Currents once again.

**THE LOAD IS NOW PROTECTED BY THE DPA 500.**

## 13.4 Shutdown Procedure



### WARNING!

**THE OPERATIONS DESCRIBED IN THIS CHAPTER MUST BE PERFORMED BY A SERVICE ENGINEER FROM THE MANUFACTURER OR BY AN AGENT CERTIFIED BY THE MANUFACTURER.**

---

The DPA 500 may be shut down completely if the load does not need input power for an extended period of time. It may be switched to Maintenance Bypass Mode for service or maintenance purposes, or transferred to the OFF-LINE Mode (ECO-Mode), if the load does not need the highest degree of protection.

The load may be disconnected by means of the two ON/OFF (LOAD-OFF) buttons for security reasons.

### Complete Shutdown Procedure of DPA 500

If there is no need to supply the load, the UPS System can be completely shut down. The following procedures can only be executed after the load has completely been de-energized.



**IN THE CASE THAT THE PARALLEL UPS SYSTEM HAS TO BE TURNED OFF, PRESS BOTH ON/OFF BUTTONS ON ALL SUB-MODULES. IN THIS CASE THE POWER SUPPLY TO THE LOAD WILL BE INTERRUPTED.**

---

1. Verify that the loads are shut down and that there is no need for power supply to the load.
2. If the loads are all disconnected, press simultaneously both ON/OFF-Buttons on the UPS module control panel. On the LCD: "LOAD OFF, SUPPLY FAILURE" will appear and the LED-indicator will indicate as shown below:

LED Indicator	Color
LINE 1	Green
LINE 2	OFF
BYPASS	OFF
INVERTER	OFF
BATTERY	Green

3. Open all Parallel Isolator Switches CB1-1, CB1-2, CB1-3, CB1-4, CB1-5 (depending of the number of UPS cabinets).
4. Open battery fuses/breakers on external battery cabinets or racks.
5. Open the mains fuses/breaker (upstream of UPS) in the building distribution panel.



**WAIT 5 MINUTES BEFORE PERFORMING ANY OTHER OPERATIONS TO ENSURE COMPLETE, SAFE DISCHARGING OF THE DC CAPACITORS.**

---

**THE DPA 500 IS NOW VOLTAGE FREE.**

### 13.4.1 Shutdown of Multi-Cabinet Configuration

Before shutting-down a Multi-Cabinet Configuration make sure that the loads do not need power protection and that the loads are disconnected.



**THE UPS MAY BE SHUT DOWN COMPLETELY IF THE LOADS DO NOT NEED ANY POWER SUPPLY. THEREFORE, THE STEPS IN THIS PARAGRAPH ARE TO BE PERFORMED ONLY AFTER THE LOAD HAS BEEN DISCONNECTED AND DOES NOT NEED ANY POWER SUPPLY.**

**To perform a complete shutdown of a Multi-Cabinet Configuration, proceed as described in the shutdown procedure described in section 7.8**

### 13.5 Load Transfer: From Inverter Operation to Maintenance Bypass

If it is necessary to perform service or maintenance on the UPS, it is possible to transfer the UPS to MAINTENANCE BYPASS.



**WARNING!**

**THE OPERATIONS DESCRIBED IN THIS CHAPTER MUST BE PERFORMED BY A SERVICE ENGINEER FROM THE MANUFACTURER OR BY AN AGENT CERTIFIED BY THE MANUFACTURER.**

#### **Configuration of UPS-System before starting the Transfer Procedure to Maintenance Bypass:**

The load is protected by DPA 500 and running in normal operation. (The UPS-Module is operating on inverter).

1. Using LCD panel, select the COMMANDS menu and choose command "LOAD TO BYPASS" and transfer the load to mains.  
On LCD panel "LOAD NOT PROTECTED" will appear.
2. Close Maintenance Bypass Switch IA1 (position ON).  
On LCD: "MANUAL BYP IS CLOSED" will appear and the mimic panel will show:

LED Indicator	Color
LINE 1	Green
LINE 2	Green
BYPASS	Green
INVERTER	RED
BATTERY	Green

3. Press simultaneously the two ON/OFF buttons on the UPS module control panel on all control panels. On the LCD's message "LOAD OFF, SUPPLY FAILURE" will appear and the mimic panel will show:

LED Indicator	Color
LINE 1	Green
LINE 2	OFF
BYPASS	OFF
INVERTER	OFF
BATTERY	Flashing Green

4. Open Parallel Isolators CB1-1, CB1-2, CB1-3, CB1-4, CB1-5 (depending on the number of UPS cabinets).
5. Open battery fuses/breakers on the internal (if any) and the external battery cabinets or racks.



**THE UPS SYSTEM IS STILL POWERED (DANGEROUS VOLTAGE).**



**THE LOAD IS NOW SUPPLIED BY MAINS AND IS THEREFORE NOT PROTECTED THROUGH THE UPS.**

---

### 13.6 Load Transfer: From Maintenance Bypass to Inverter Operations

This procedure describes the sequence of operations to be done in order to restart the UPS and restore ON-LINE mode (Load on Inverter).



**WARNING!**

**THE OPERATIONS DESCRIBED IN THIS CHAPTER MUST BE PERFORMED BY A SERVICE ENGINEER FROM THE MANUFACTURER OR BY AN AGENT CERTIFIED BY THE MANUFACTURER.**

---

#### Configuration of UPS-System before starting the Transfer Procedure to ON-LINE mode:

The load is supplied directly by Input Mains power and the UPS is OFF.

1. Close battery fuses/breakers in the external battery cabinets or racks.
2. On the LCD's: "LOAD OFF, SUPPLY FAILURE" will appear and the mimic panel will show:

LED Indicator	Color
LINE 1	Green
LINE 2	OFF
BYPASS	OFF
INVERTER	OFF
BATTERY	Flashing/Green

3. Close Parallel Isolators CB1-1, CB1-2, CB1-3, CB1-4, CB1-5 (depending on the number of UPS cabinets) and check message "PARALLEL SW CLOSED" on LCD of each module.
4. Press simultaneously the two ON/OFF buttons on the UPS module control panel on all control panels. Unit will start-up and after about 60 seconds the mimic panel will show:

LED Indicator	Color
LINE 1	Green
LINE 2	Green
BYPASS	Green
INVERTER	RED
BATTERY	Green

5. Make sure that the bypass LED is green, then open the Maintenance Bypass Switch IA1 (position OFF).
6. Using LDC panel, select the COMMANDS menu and choose command "LOAD TO INVERTER". This will transfer the LOAD to Inverter on the complete system (all units). On LCD panel "LOAD PROTECTED" will appear.

## THE LOAD IS NOW SUPPLIED BY INVERTER POWER AND IS PROTECTED

### 13.7 Replacement of UPS Modules

#### 13.7.1 Replacement of Single-Module UPS Systems

If your DPA 500 consists of only one single UPS-Module, the UPS needs to be transferred to maintenance bypass.



#### Note:

Maintenance bypass is not included within the UPS cabinet. Optional external maintenance bypass cabinet is required to perform the above recommendation.

#### IMPORTANT

---

Before performing the operations described below, follow the procedure of the section 7.9 to transfer the UPS from inverter operation to maintenance bypass. Replacement of UPS-Module in Redundant Multi-Module Systems



**THE OPERATIONS DESCRIBED IN THIS CHAPTER MUST BE PERFORMED BY A SERVICE ENGINEER FROM THE MANUFACTURER OR BY AN AGENT CERTIFIED BY THE MANUFACTURER.**

#### WARNING!

---

##### 13.7.1.1 Procedure To Extract a UPS Module

1. Reset the Alarm on faulty Module. The chime sound will stop. If the Alarm condition persists (the LED Indicator ALARM will remain red) it means that there is a fault in the UPS-Module.



2. If the load is supplied by the mains in Bypass-Mode (Eco-Mode) the Maintenance Bypass (IA1) may be closed by turning it to position "ON".  
**NOTE:** If the load is on inverter, before closing the Maintenance Bypass IA1, transfer load to bypass by means of the command "LOAD TO BYPASS" in submenu COMMANDS. On LCD: "LOAD NOT PROTECTED" will appear.
3. Make sure that the system is redundant.
4. Press both ON/OFF Buttons on the UPS-Module simultaneously. This will switch the module off.  
**NOTE:** The rest of the system remains on-line. **THE LOAD IS STILL PROTECTED BY THE DPA 500.**
5. Open the Parallel Isolator Switch CBx, where 'x' denotes the number of the unit to be removed, (switch to position "OFF") The UPS-Module is now disconnected from output.
6. Open battery fuses/breakers of the external battery cabinet or rack
7. Unscrew the four screws on the front side of the module that are fixing it to the UPS-cabinet.
8. Pull Module **only partially out** horizontally by means of the 2 black handles until the rear connectors are disconnected.



**The weight of a UPS module is at least 55kg, therefore it can be lifted only by 2 persons. The use of lifting tools such as trolley with adjustable height or similar devices may be helpful by handling modules.**



**BEFORE DRAWING THE UPS MODULE COMPLETELY OUT, WAIT 5 MINUTES UNTIL THE INTERNAL DC-CAPACITORS ARE DISCHARGED.**

---

9. To extract the module completely out, press down the two yellow tabs top-right and top-left of the module (as shown in the figure here below) and then draw the UPS-module out by pulling it out horizontally.



10. Cover the module slot with the appropriate dead front or follow the procedure below to fit another module back in the cabinet.

To fit back a UPS module, follow this procedure:

13. Remove UPS-Module compartment protection cover by unscrewing four screws on the front.
14. Slide two thirds of UPS-Module into dedicated UPS-compartment (make sure not to plug the UPS-Module into the rear connector).  
Push UPS-module to its final position and push strongly to assure good contact on the rear plugs.

**NOTE:** Two persons are needed to remove/install the module from the UPS-Cabinet. The weight of a DPA 500 100 kW module is at least 55kg.

15. Tighten the four screws on the front of module.
16. Check if the LEDs for LINE1 and BATTERY are green. If yes, mains voltage is OK;  
On the LCD: "LOAD OFF, SUPPLY FAILURE" will appear and the LED-indicator will indicate as shown below:

LED Indicator	Color
LINE 1	Green
LINE 2	OFF
BYPASS	OFF
INVERTER	OFF
BATTERY	Flashing Green

17. Close internal and external battery fuses/breaker (if available);
18. Press simultaneously both "ON/OFF" Buttons to start-up UPS.  
LCD panel must display: "LOAD DISCONNECTED PARALLEL SWITCH OPEN" and the LED-indicator will appear as shown below:

LED Indicator	Color
LINE 1	Green
LINE 2	Green
BYPASS	OFF
INVERTER	Green
BATTERY	Green

19. Transfer load to mains and inverter for testing using submenu COMMANDS
20. Transfer Load to Bypass-Mode by means of COMMAND "LOAD TO BYPASS"
21. Verify the status (Load on Bypass, Eco-Mode) by checking the LED-indicators as shown below:

LED Indicator	Color
LINE 1	Green
LINE 2	Green
BYPASS	Green
INVERTER	OFF
BATTERY	Green

22. Close Parallel Isolator (CBx, where 'x' denotes the number of the unit installed);
23. Open Maintenance Bypass (IA1) by turning it to position "OFF". The load is now supplied by the static bypass.
24. Transfer load to Inverter-Mode by means of COMMAND "LOAD TO INVERTER". On LCD: "LOAD PROTECTED" will appear.

**THE LOAD IS NOW PROTECTED BY THE DPA 500.**

## 14 Service

See <https://new.abb.com/ups/service-ups-and-power-conditioning> for information on service offerings and contact forms.

---

**ABB Power Protection LLC**

5900 Eastport Boulevard  
Richmond, VA 23231 USA  
Tel: +1 800 292 3739  
Tel: +1 804 236 3300  
Fax: +1 804 236 4040

<https://new.abb.com/ups>

**Note**

We reserve the right to make technical changes or modify the contents of this document without prior notice. With regard to purchase orders, the agreed particulars shall prevail. ABB does not accept any responsibility whatsoever for potential errors or possible lack of information in this document.

We reserve all rights in this document and in the subject matter and illustrations contained therein. Any reproduction, disclosure to third parties or utilization of its contents in whole or in parts – is forbidden without prior written consent of ABB.

94-12-043275 D0

Copyright© 2018 ABB  
All rights reserved