

DELPHYS Xtend GP

Hot-scalable UPS system

Green Power 2.0 range up to 1.2 MW



OBJECTIVES

The aim of these specifications is to provide the information required to prepare the system and installation site.

The specifications are intended for:

- installation engineers.
- design engineers.
- engineering consultants.

For detailed information, see the installation and operating manual.

INSTALLATION REQUIREMENTS AND PROTECTION

Connection to the mains power supply and to the load(s) must be made using cables of suitable size, in accordance with current standards. If not already present, an electrical control station which can isolate the network upstream of the UPS must be installed. This electrical control station must be equipped with a protection (or two, if there is a separate bypass line) of an appropriate rating for the power draw at full load.

If an external manual bypass is required, only the model supplied by the manufacturer must be installed.

We recommend fitting two meters of unanchored flexible cable between the UPS output terminals and the cable anchor (wall or cabinet). This makes it possible to move and service the UPS.

For detailed information, see the installation and operating manual.

1. ARCHITECTURE

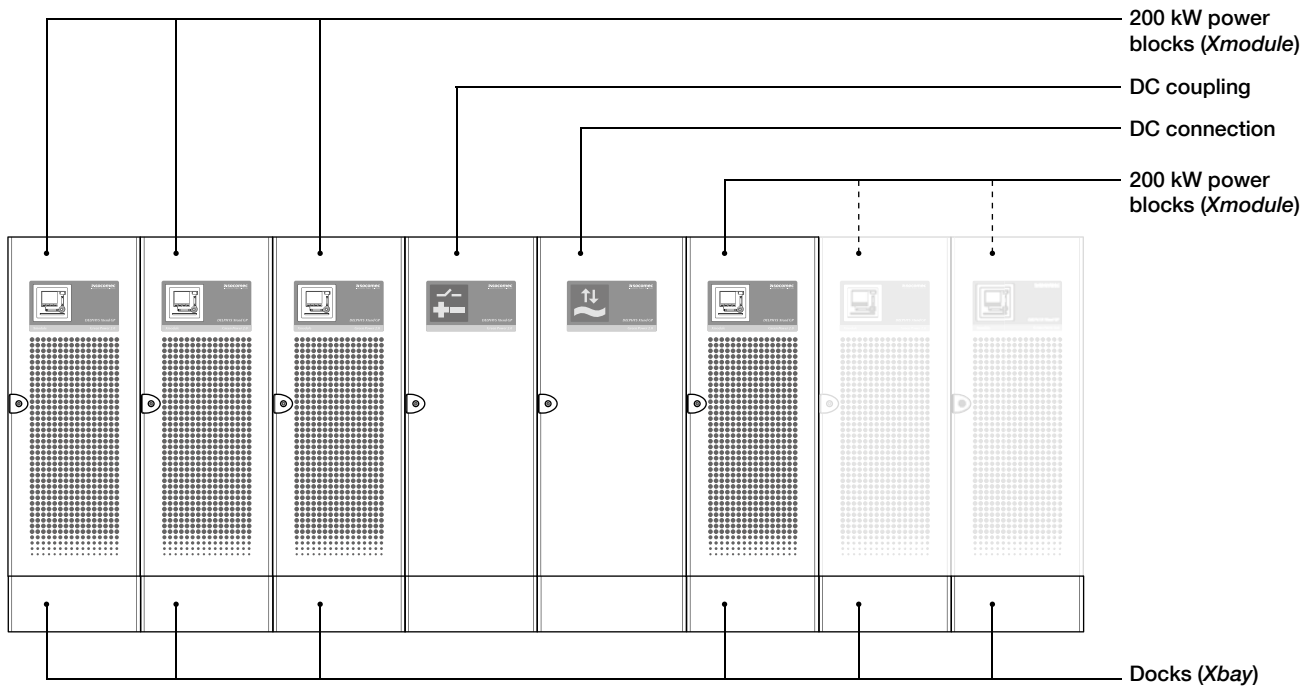
1.1. Range

DELPHYS XTEND GP is a scalable UPS system designed to provide high performance and power scalability.

Power scalability can be by adding power blocks of 200 kW (*Xmodule*) to extend the system up to 1200 kW or less, according to the maximum power requirement.

As the system has been designed to allow the power blocks to be hot-swappable, the load can be fully protected by on-line double conversion during system extension or maintenance.

Manufactured in Europe, DELPHYS XTEND GP is a prewired system including an individual Socomec switching system for each power block enabling easy and safe coupling and disconnection.



Description for a system composed of 6 Xbay docks and equipped with 4 Xmodule power blocks.

At the initial stage, a system is composed of,

- **1 x AC Connection** cabinet: this comprises the general IN/OUT terminal connection and switches of the system.
- **1 x DC Coupling** cabinet: this includes terminal connection and switches allowing the batteries to be connected/disconnected from any Xbay dock.
- **N x Xbay**: dock including terminals and switches to connect/disconnect the Xmodule power block. All the Xbay docks are installed and prewired to AC and DC cabinets. "N" is the number of docks installed at the beginning, depending on the maximum rated power of the system.
- **N x Xmodule**: power blocks, where "N" corresponds to the number of 200 kW converters required at the initial stage.
- The batteries required for the installed power and for the any possible future power upgrades are connected to the DC coupling cabinet.

Power extension and back-up time can easily done by adding additional Xmodule power blocks and batteries.

1.2. Rated power

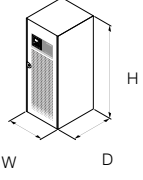
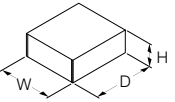
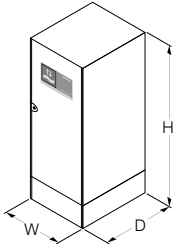
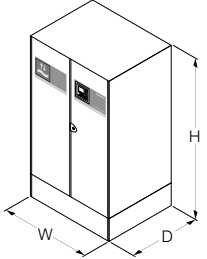
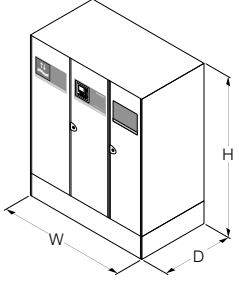
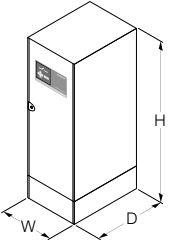
The rated power is related to the number of Xmodule power blocks

The maximum number of Xmodule power blocks is fixed by the number of Xbay docks

RATED POWER												
Number of Xbay docks	4			5				6				
Number of Xmodule power blocks (200 kW)	2	3	4	2	3	4	5	2	3	4	5	6
Power (kW) N configuration	400	600	800	400	600	800	1000	400	600	800	1000	1200
Power (kW) N+1 redundant configuration	200	400	600	200	400	600	800	200	400	600	800	1000

1.3. Configurations and dimensions

DELPHYS Xtend GP is built on a flexible brick concept. The **UPS system architecture** can be built by associating the bricks according to the requirements. Select the AC connection and DC coupling cabinets according to your need. The number of Xbay docks depends on the maximum number of power blocks that are planned to be installed at the final stage.

Dimensions and weight							
Section	View	Description	Max rated power (kVA/kW)	Width [W] (mm)	Depth [D] (mm)	Height [H] (mm)	Weight (kg)
Xmodule		Power block (to be placed onto the Xbay)	200	707	800	2020 ⁽¹⁾	490
Xbay		Prewired base plate for Xmodule docking	200	710	960	325 ⁽¹⁾	80
AC Connection		In/Out cabinet for distributed bypass system	Up to 1000	710	960	2120	520
		Common or separated input	Up to 1200				650
		In/Out cabinet with embedded centralised bypass	Up to 1200	1210	960	2120	700
		Common input					
	In/Out cabinet with embedded centralised bypass	Up to 1200	1710	960	2120	820	
Separated inputs							
DC Coupling		Distributed battery coupling, including up to 6 switches	-	810	960	2120	250
		Shared battery coupling, including up to 6 switches	-				350

(1) Height of the Xmodule docked on the Xbay: 2120 mm

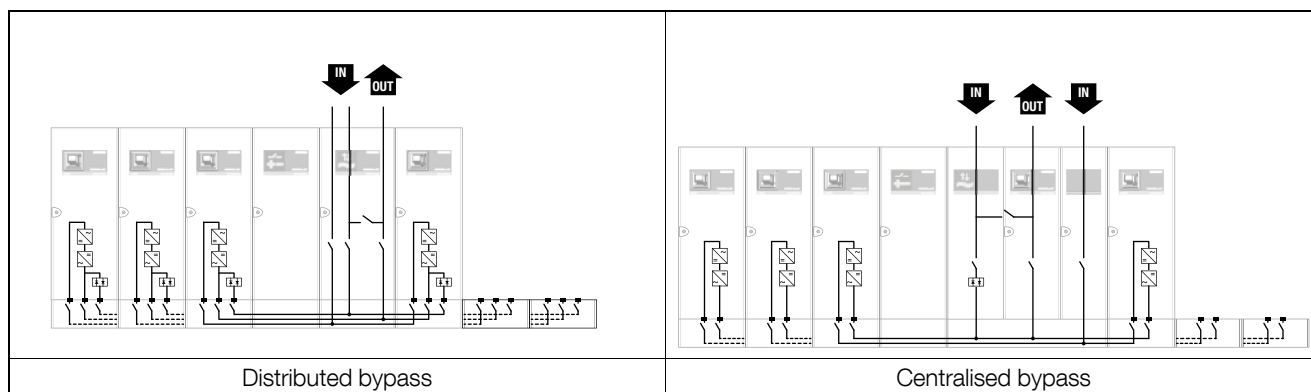
1.4. System architectures

DELPHYS XTEND GP's scalable design simplifies the connection to the upstream and downstream switchboards resulting in a simpler, faster and safer unit than a traditional parallel UPS solution. All connections and couplings are performed on the system, without any modification to the site installation when power blocks are added.

DELPHYS XTEND GP can be:

- set for **distributed bypass** or with **centralised static bypass**, both with common or separated inputs.
- connected to **distributed** or **shared batteries** for energy storage optimization.

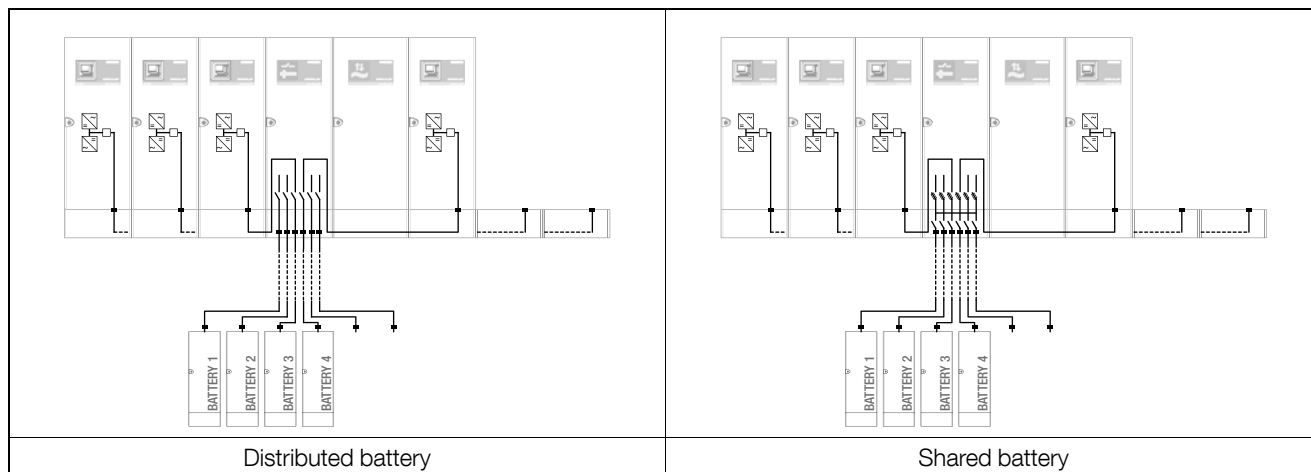
1.4.1. Bypass architecture



The above drawings show simplified diagrams for separated inputs (Rectifier / Bypass).

In addition of the switches detailed here, each *Xmodule* has embedded front accessible input(s) and output switches.

1.4.2. Battery coupling architecture

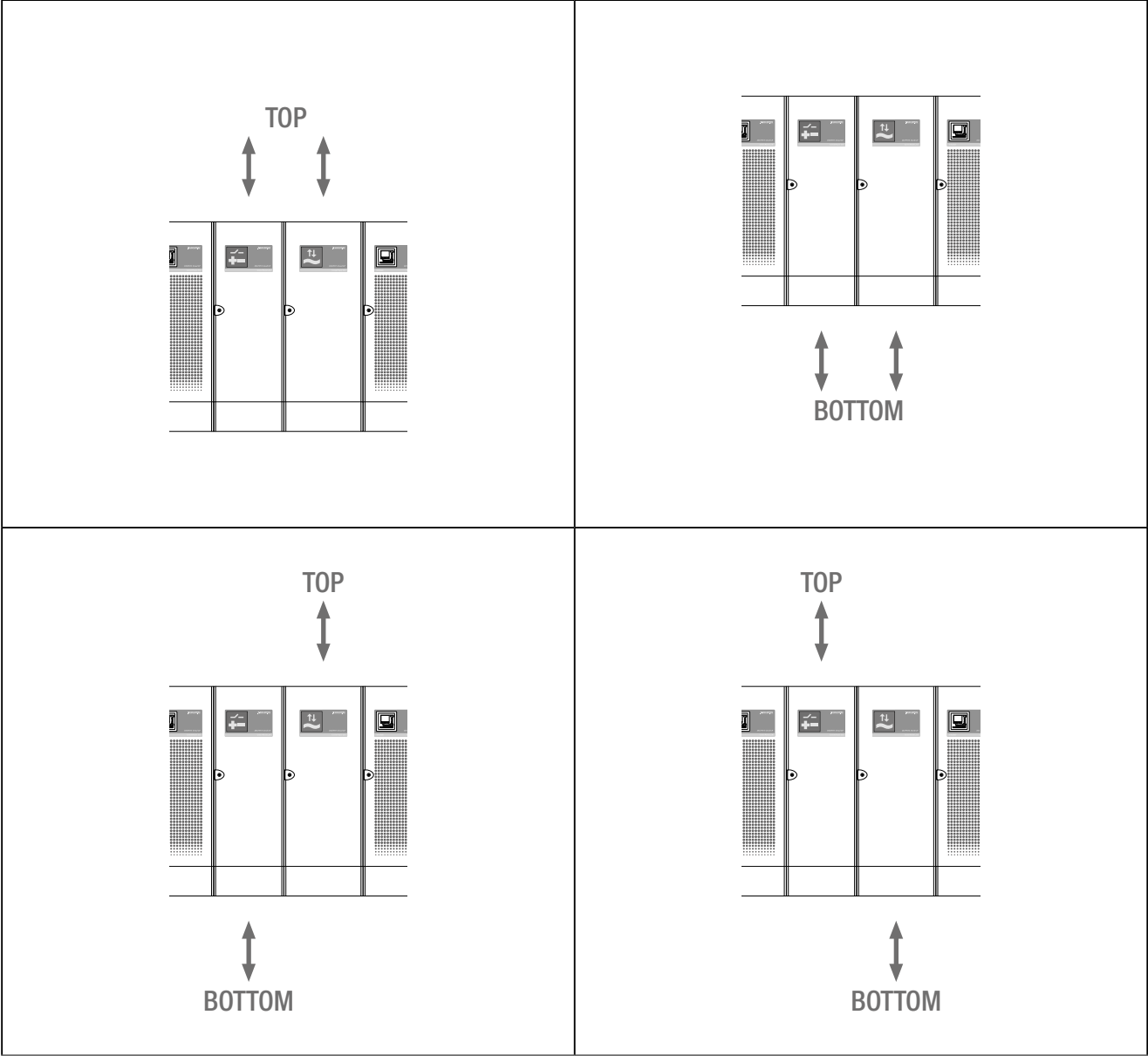


For full hot-scalability, the future battery connections should be prewired to the DC coupling cabinet.

The battery protections that have to be close to the batteries are not detailed here above.

1.5. Flexible connection

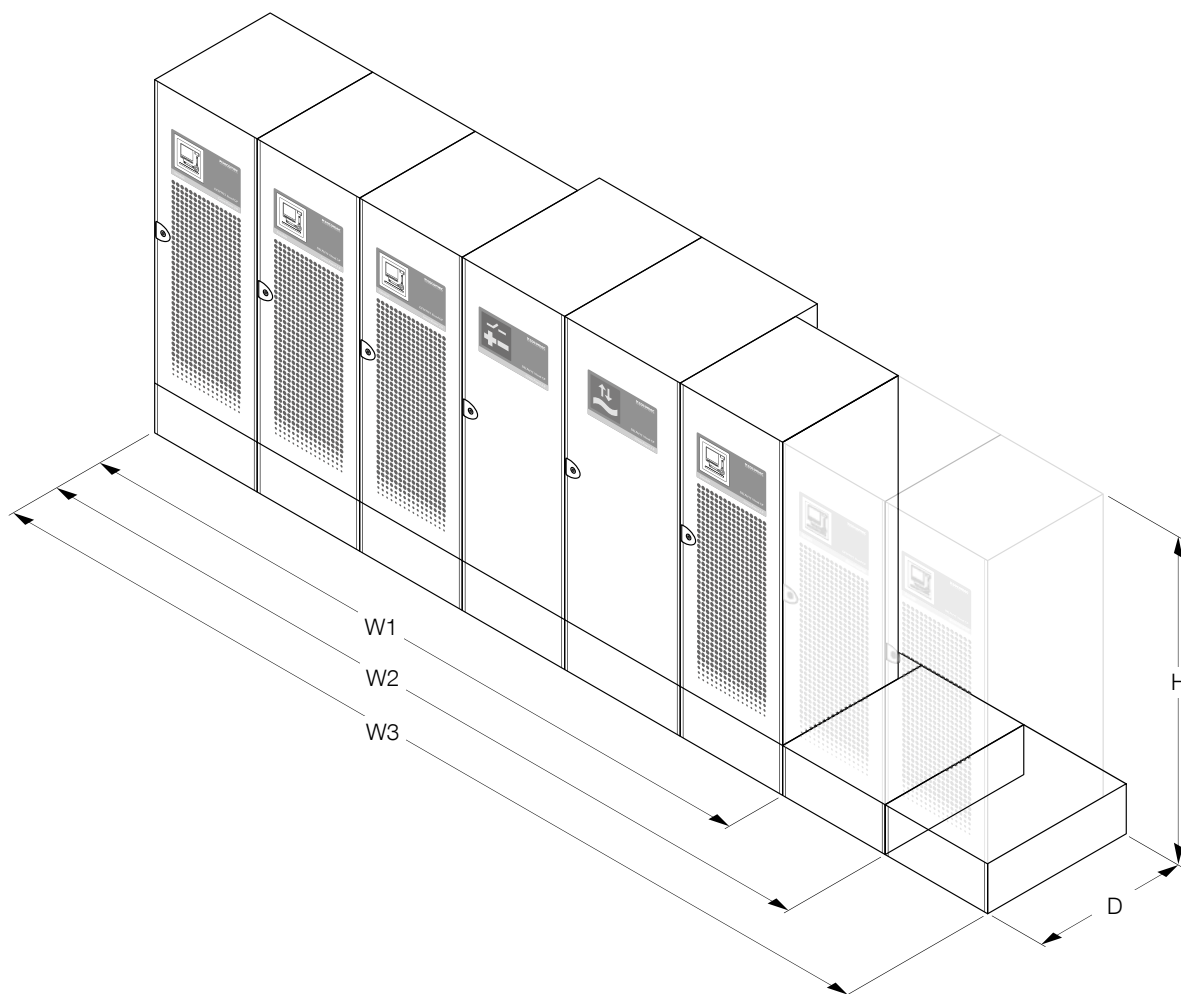
For full adaptation to all types of infrastructure and environments, DELPHYS XTEND GP is available for both top and bottom entry. The connection can even be different between the AC and the DC cabinets.



1.6. Linear configuration

DELPHYS XTEND GP allows the scalability to be designed easily:

1. Specify the number of Xbay docks to protect the load at the final stage,
2. Specify the number of Xmodule power blocks needed to protect the load at the initial stage; the unused Xbay docks are ready for connecting additional Xmodule power blocks when needed.
3. Specify the bypass capacity and configuration.
4. Specify the battery coupling configuration.



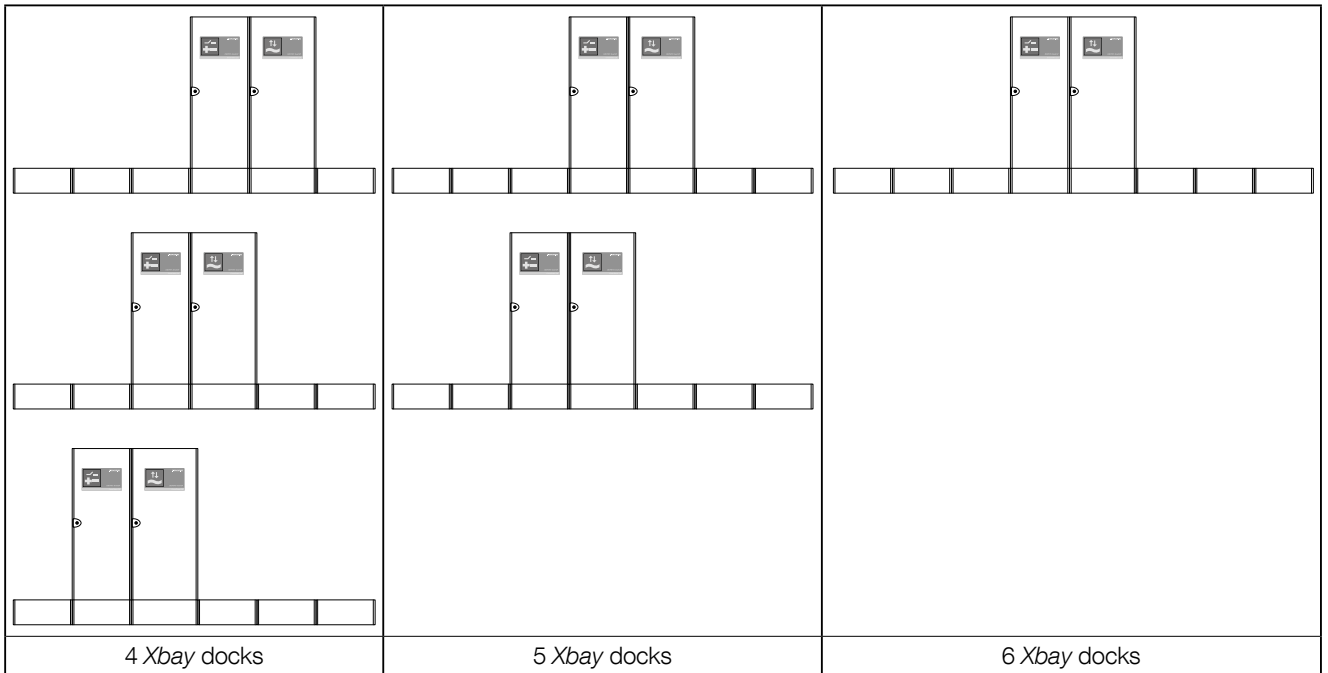
LINEAR CONFIGURATION - DIMENSIONS						
System configuration		Number of Xbay docks			Depth ⁽²⁾ [D] (mm)	Height [H] (mm)
		4	5	6		
		Width ⁽¹⁾ (mm)				
		W1	W2	W3		
Distributed bypass	Dual or common input	4340	5050	5760	960	2120
	Centralised bypass	Common input	4840	5550		
		Separated inputs	5340	6050		

(1) Dimensions for linear configuration. Other configurations (i.e., "L-shape" or "U-shape") are available.

(2) Depth including door handles: 995 mm

800 mm rear clearance is recommended to facilitate the prewiring of the system during its installation.

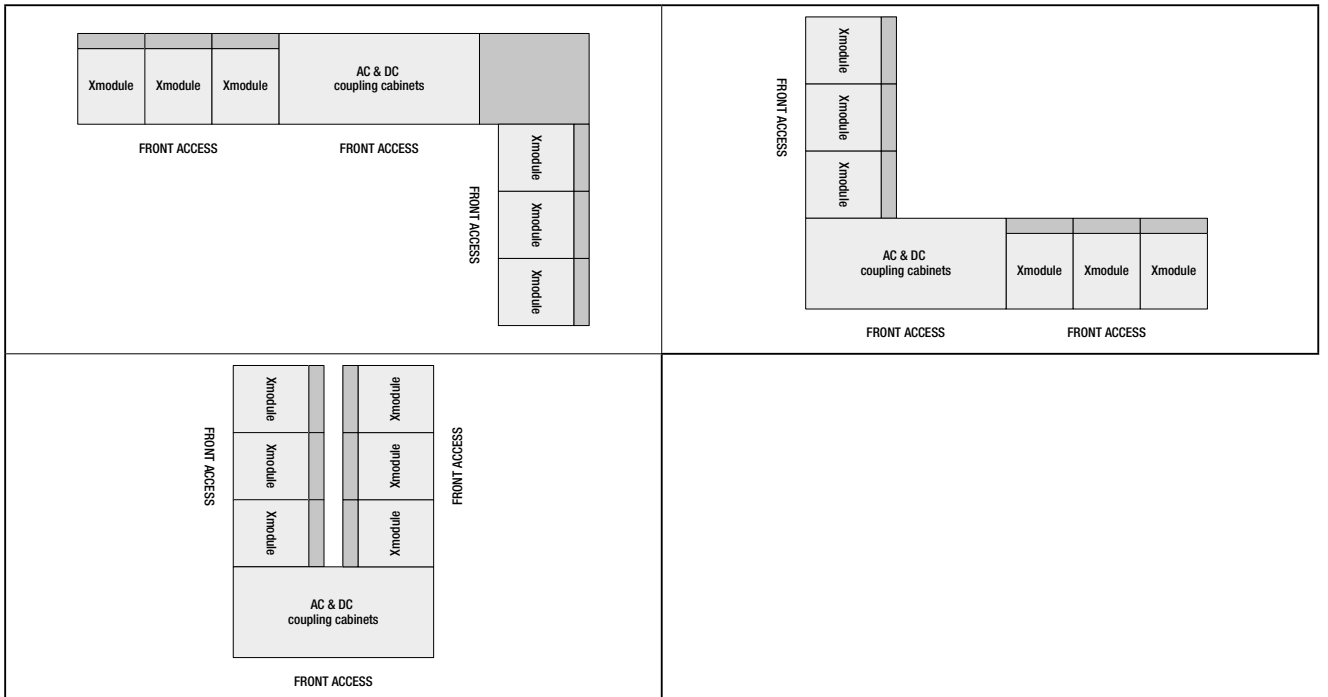
1.6.1. System disposition flexibility



1.7. NON-linear configuration

DELPHYX XTEND GP fully matches with any disposition requirements.

The system's flexibility allows different configurations and connections to be designed (consult us to produce the adapted solution).



2. SPECIFICATIONS

2.1. Installation parameters

Installation parameters											
System configuration		N configuration					N+1 redundant configuration				
		Number of <i>Xmodule</i> power blocks (200 kW)					Number of <i>Xmodule</i> power blocks (200 kW)				
		2	3	4	5	6	1+1	2+1	3+1	4+1	5+1
Rated rectifier input current (EN 62040-3)	(A)	610	915	1220	1525	1830	305	610	915	1220	1525
Maximum rectifier input current (EN 62040-3)	(A)	666	999	1332	1665	1998	666	999	1332	1665	1998
Inverter output current @ 230 V P/N	(A)	578	867	1156	1445	1734	289	578	867	1156	1445
Maximum air flow	(m ³ /h)	4500	6750	9000	11250	13500	4500	6750	9000	11250	13500
Power dissipation in nominal conditions ⁽¹⁾	(W)	23200	34800	46400	58000	69600	11600	23200	34800	46400	58000
	(kcal/h)	19948	29923	39897	49871	59845	9974	19948	29923	39897	49871
	(BTU/h)	79162	118743	158323	197904	237485	39581	79162	118743	158323	197904
Power dissipation (max) in the worst conditions ⁽²⁾	(W)	28400	42600	56800	71000	85200	14200	28400	42600	56800	71000
	(kcal/h)	24420	36629	48839	61049	73259	12210	24420	36629	48839	61049
	(BTU/h)	96905	145357	193810	242262	290714	48452	96905	145357	193810	242262

The air inlet is on the front of the *Xmodule* power block, with outflow from the upper side.

(1) Nominal input current and rated output active power (PF1).

(2) Low input voltage, battery recharge and rated output active power (PF1).

2.2. Electrical characteristics

Electrical characteristics - Rectifier input ⁽¹⁾	
Xmodule rated power	200 kW
Rated mains supply voltage	400 V 3ph
Voltage tolerance	200 V to 480 V ⁽²⁾
Rated frequency	50/60 Hz
Frequency tolerance	42 to 65 Hz
Power factor	> 0.99
Total harmonic distortion (THDi) (at full load and rated voltage)	< 2.5% ⁽³⁾
Max inrush current at start-up	< I _n (no overcurrent)
Soft start	50 A/sec (settable) per Xmodule

(1) IGBT rectifier. (2) Conditions apply. (3) With input THDV < 1%.

Electrical characteristics - Battery	
Min/Max number of battery cells with load PF=1	258/258
Min/Max number of battery cells with load PF ≤ 0,9	234/258
Min/Max number of battery cells with load PF ≤ 0,8	216/258
Battery AC ripple current	< 3% C10
Battery AC ripple voltage	< 1% on the battery bloc

Electrical characteristics - Bypass input mains	
Bypass frequency variation speed	1.5 Hz/s settable from 1 to 3 Hz/s
Bypass rated voltage	Nominal output voltage $\pm 15\%$ (settable)
Bypass rated frequency	50/60 Hz (selectable)
Bypass frequency tolerance	$\pm 2\%$ (from $\pm 1\%$ to $\pm 8\%$ (operation with generator unit))

Electrical characteristics - Distributed Bypass system					
Number of installed <i>Xmodule</i> power blocks (200 kVA/kW)	2	3	4	5	6
Maximum I ² t supported by the bypass (A ² s)	778700	1752200	3115000	4867200	7008700
Isc max (A peak)	12500	18700	25000	31200	37400
Overload tolerated on the bypass mains	25 min	110% of the installed apparent power			
	3 min	125% of the installed apparent power			

Electrical characteristics - Centralised Bypass system					
Number of installed <i>Xmodule</i> power blocks (200 kVA/kW)	2	3	4	5	6
Maximum I ² t supported by the bypass (A ² s)	6660000 A ² s				
Isc max (A peak)	36500 A peak				
Overload tolerated on the bypass mains	60 min	110% of the installed apparent power			
	10 min	125% of the installed apparent power			

Electrical characteristics - Inverter						
Number of installed <i>Xmodule</i> power blocks (200 kVA/kW)	2	3	4	5	6	
Rated output voltage (selectable)	400 V 3ph + N					
Output voltage tolerance	static load $\pm 1\%$, dynamic load VF-SS-111 compliant					
Rated output frequency	50/60 Hz (selectable)					
Autonomous frequency tolerance	$\pm 0.02\%$ on mains power failure					
Load crest factor (according IEC 62040-3)	3:1					
Harmonic voltage distortion	ThdU $\leq 1,5\%$ with rated linear load					
Overload tolerated ⁽¹⁾ by the inverter - 25 °C	10 min	450 kW	675 kW	900 kW	1125 kW	1350 kW
	1 min	540 kW	810 kW	1080 kW	1350 kW	1620 kW

(1) The tolerated output overload corresponds to the inverter capability only. The output overload performance is incremented by the static bypass capability (when available)

Electrical characteristics - Efficiency	
Xmodule rated power	200 kW
Xmodule efficiency in double conversion (VFI)	up to 96%
Fast EcoMode	up to 99%

Environment characteristics	
Storage temperatures	-20 to +70 °C (-4 to +158 °F) (15 to 25 °C for longer battery life)
Start-up and working temperature	+10 to +40 °C ⁽¹⁾ (+50 to +104 °F) (15 to 25 °C for longer battery life)
Maximum relative humidity (non-condensing)	95%
Maximum altitude without derating	1000 m (3,300 ft)
Degree of protection	IP 20 (other IP as option)
Portability	EN 60068-2
Colour	cabinet: RAL 7012, door: silver grey

2.3. Recommended protections

Recommended protection devices – Rectifier input ⁽¹⁾					
Max power (kVA)	Configuration	Number of Xbay docks	AC Cabinet rating (kVA)	Protection rating (A)	Max rectifier current (A)
800	N	4	1000	1600	1332
	N+1	5	1000	2000	1665
1000	N	5	1000	2000	1665
	N+1	6	1200	2000	1998
1200	N	6	1200	2000	1998

Recommended protection devices – Distributed bypass system ⁽¹⁾					
Max power (kVA)	Configuration	Number of Xbay docks	AC Cabinet rating (kVA)	Protection rating (A)	Rated current (A)
800	N	4	1000	1250	1154
	N+1	5	1000	1250	1154
1000	N	5	1000	1600	1443
	N+1	6	1200	1600	1443
1200	N	6	1200	2000	1731

Recommended protection devices – Centralised bypass system ⁽¹⁾					
Max power (kVA)	Configuration	Number of Xbay docks	AC Cabinet and Static Bypass rating (kVA)	Protection rating (A)	Rated current (A)
800	N	4	1200	1250	1154
	N+1	5	1200	1600	1154
1000	N	5	1200	1600	1443
	N+1	6	1200	2000	1443
1200	N	6	1200	2000	1731

Recommended protection devices – Output ⁽²⁾					
Number of Xmodule power blocks (200 kVA/kW)	2	3	4	5	6
Inverter short-circuit current Ik1=Ik2=Ik3 ⁽³⁾ (A) - (0 to 100 ms) (when AUX MAINS is not present)	1600	2400	3200	4000	4800
Output protection rating (A)	≤ 160	≤ 200	≤ 250	≤ 400	≤ 400

Cables connection – Maximum capability – AC cabinet			
In/Out cabinet type	Distributed bypass		Centralised bypass
Rated power	up to 1000 (kVA)	up to 1200 (kVA)	up to 1200 (kVA)
Rectifier terminals	4x300 mm ² per pole	6x300 mm ² per pole	8x240 mm ² per pole
Bypass terminals	4x300 mm ² per pole	6x300 mm ² per pole	8x240 mm ² per pole
Output terminals	4x300 mm ² per pole	6x300 mm ² per pole	8x240 mm ² per pole

Cables connection – Maximum capability – DC cabinet		
Battery coupling type	Distributed batteries	Shared batteries ⁽⁴⁾
Number of terminals	up to 6 x 2 poles	up to 6 x 2 poles
Battery terminals	1x240 mm ² per pole	1x240 mm ² per pole

(1) Rectifier protection should only be considered in the event of separate inputs. The bypass protection is given as a recommendation (including overload capability). When the bypass and rectifier inputs are combined (common input), the general input protection rating must be higher than both (bypass or rectifier). The protection shall be settable according to the number of installed power blocks, its setting range shall be from 0.4 to 1 x rated current.

(2) Selectivity of distribution after the UPS with inverter short-circuit current (short-circuit with AUX MAINS not present).

This must be selective with residual current circuit breakers downstream of the UPS connected to the UPS output. If the bypass network is separate from the rectifier circuit, or in the event of parallel UPS, use a single residual current circuit breaker upstream of the UPS.

(3) Ik1: phase to neutral, Ik2: phase to phase, Ik3: three-phase.

(4) If required, a shared battery coupling cabinet can be provided for a single battery set connection (2 poles)

3. REFERENCE STANDARDS AND DIRECTIVES

3.1. Overview

The construction of the equipment and choice of materials and components comply with all laws, decrees, directives and standards currently in force. In particular, the equipment is fully compliant with all European Directives concerning CE marking.

2006/95/EC

Council Directive 2006/95/EC, dated 16 February 2007, on the reconciliation of legislation within Member States regarding electrical material for use within specific voltage ranges.

2004/108/EC

On the approximation of the laws of the Member States relating to electromagnetic compatibility.

3.2. Standards

3.2.1. Electromagnetic compatibility

“Electromagnetic Compatibility Provisions (EMC)”.

EN 62040-2 Electromagnetic compatibility (C3 category).

3.2.2. Safety

“General and safety requirements for UPS used in operator access areas”.

EN 60950-1 General and safety requirements for equipment used in operator access areas.

EN 62040-1 General and safety requirements for UPS used in restricted access locations.

EN 50272-2 Safety requirements for secondary batteries and battery installations.

EN 60529 Degrees of protection provided by enclosures.

3.2.3. Type and performances

“Performance requirements and methods of test”.

EN 62040-3 Uninterruptible power systems (UPS). Methods of specifying the performance and test requirements.

3.2.4. System and installation guidelines

The above standards are applicable to the product (UPS) and shall be complied with by the UPS manufacturer. The installer should refer to the standards applicable to the specific electrical installation (e.g. EN 60364).