Uninterruptible Power Supplies

POWER SOLVE

Xi Series
1-6kVA
True On-Line UPS

Features

- Rack-Mount/Standalone Format
- Universal Battery Design (Optional 10 year batteries)
- Dual Mains Input
- Dual Position Backlit LCD
- LCD Load Segment Control 2.5kVA & 3.0kVA
  (European Models)

Electrical Specification

Input Voltage (full load without using batteries)	115VAC version: 80-138VAC / 208VAC version: 176-276VAC / 230VAC version: 176-276VAC
Input Frequency	46-64Hz
Input Power Factor	>0.98 at full load
Input Protection	Fuse/Breaker (see notes on next page)
Output Voltage	115VAC nominal - 100/110/115/120VAC selectable 208VAC nominal - 208/220/230/240VAC selectable 230VAC nominal - 208/220/230/240VAC selectable
Output Regulation	±2% of nominal
Output Waveform	Sine Wave
Output THD	<3% linear load
Crest Factor	3:1
Output Protection	Electronic Overload Protection (ultimately by fuse/breaker)
Efficiency (AC-AC)	86% up to 1.5kVA, 90% up to 6kVA
Overload Capacity	See Overload Characteristics
Output Frequency	50/60Hz dependant on input
Internal Battery Type	VRLA 5 year design life. For 10 year option add suffix 'X' to model number
Battery Replacement	Hot-swap all models
Recharge	<4 hours to 90%, standard battery only
Battery String Voltage	48VDC: 1.5kVA, 96VDC: 2.5kVA-3.0kVA, 192VDC: 4.0kVA-6.0kVA
Autonomy	See Tables
Temperature	Autonomy, recharge & battery life based on 25°C ambient
Input Receptacles	See rear panel drawings
Output Receptacles	See rear panel drawings
Display/Alarm	Front panel LED menu driven, audible alarms. See front panel layout
Interface (Rear Panel)	1 x RS232 & 1 x USB (fitted in option slot)
Software	Supplied bundled to support Windows 95, 98, ME, 2000, XP & NT
Fitted Fuse/Breaker	Xi1000/Xi15000 - 10A, Xi2500/Xi3000 - 15A, Xi4000/Xi6000 - 30A, Xi1500L CE - 15A, Xi1500L - 15A, Xi3000L(208VAC) - 15A, Xi3000L 120 - 30A, Xi6000L - 32A
REPO	Remote emergency power off, must be fitted for unit to function. Connector on rear of unit. Remove link to shut down output in AC mode or shut down unit in battery mode
Operating Temperature	0°C to +40°C
Storage Temperature	-15°C to +50°C
Operating Humidity	0-95% RH non-condensing
Operating Altitude	3000m without derating
Acoustic Noise	<45dBA at 1 metre
Ingress	IP20
Emissions	EN55022 level B, EN50091-2 level B
ESD Immunity	EN61000-4-2, level 3
Radiated Immunity	EN61000-4-3, level 2
EFT/Burst	EN61000-4-4, level 2
Surge	EN61000-4-5, level 3
Safety Approvals	EN50091-1-1, EN60240-1-1, EN60950, CE, L versions: UL1778

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Models and Ratings

MODEL	OUTPUT POWER		OUTPUT CURRENT	AUTONOMY
	VA	Watts	(at 230VAC)	(full load)
Xi1000	1000VA	700W	4.3A	12 Minutes
Xi1500	1500VA	1050W	6.5A	9 Minutes
Xi2500	2500VA	1750W	10.8A	9 Minutes
Xi3000	3000VA	2100W	13.0A	7 Minutes
Xi4000	4000VA	2800W	17.3A	12 Minutes
Xi5000	5000VA	3500W	21.7A	9 Minutes
Xi6000	6000VA	4200W	26.0A	7 Minutes
MODEL	OUTPUT POWER		OUTPUT CURRENT	AUTONOMY
	VA	Watts	(at 115VAC)	(full load)
Xi1500L CE	1500VA	1050W	13.0A	5 Minutes
Xi3000L 120	3000VA	2100W	26.0A	5 Minutes

Accessory Products

Xi 232	RS232 Option Card giving second RS232 function
Xi BM 110C	Battery modules for Xi series UPS - fitted with 2 x Xi BP with additional 110V input charger for extended run times
Xi BP	Battery pack - contains 4 x 7Ahr VRLA 5 year design life batteries
Xi BMC	Battery module for Xi series UPS - populated with 2 x Xi BP, with additional charger for extended run times
Xi BB1K5[1]	Make before break dual input multi format bypass module for Xi1000 & Xi1500. Provides safety interlock when used with Xi V.
Xi BB3K[1]	Make before break dual input multi format bypass module for Xi2500 & Xi3000. Provides safety interlock when used with Xi V.
Xi BB6K[1]	Make before break dual input multi format bypass module for Xi4000 & Xi6000. Provides safety interlock when used with Xi V.
Xi R	Telescopic rack guides for UPS and battery modules
Xi S	SNMP Network Adaptor Option Card replaces USB port, allowing the UPS to be addressed directly on the LAN
Xi V	AS400 Volt Free Contact Option Card replaces USB comms port with a 15 way D-type connector Providing Utility Fail, Battery Low, Bypass & UPS Alarm Contacts

(1). Unit can be used without Xi V. However, there is no automatic protection against bypass operation while the unit is on inverter. Units must operate with common neutral. Contact sales office for details.

Option Order Codes

Xi ▮▮▮▮ ▮▮▮

Power (VA)   Options [1]
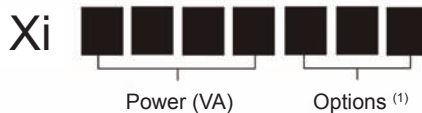
E.G. Xi1000RX
Xi Series, 1000VA
With telescopic rail guides and 10 year design life batteries fitted

Options (Examples)
Add suffix 'R' to Model Number - Adds rack guides to unit for 19" rack mounting
Add suffix 'S' to Model Number - Adds internal SNMP to UPS (in place of USB port)
Add suffix 'V' to Model Number - Adds AS400 VFC to UPS for Utility Fail, Bypass, Battery Low and UPS Fault (in place of USB port)
Add suffix 'X' to Model Number - Replaces 5 year design life batteries with 10 year

(1) Options should be listed in alphabetical order

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Uninterruptible Power Supplies

Models and Ratings (L versions)

MODEL	OUTPUT POWER		OUTPUT CURRENT (at 115VAC)	OUTPUT CURRENT (at 208VAC)	AUTONOMY (full load)
	VA	Watts			
Xi1500	1500VA	1050W	13.0A	N/A	9 Minutes
Xi3000	3000VA	2100W	N/A	14.4A	7 Minutes
Xi3000L 120	3000VA	2100W	26.0A	N/A	7 Minutes
Xi6000	6000VA	4200W	N/A	28.8A	7 Minutes

Accessory Products

Xi 232	RS232 Option Card giving second RS232 function
Xi BM	Battery modules for Xi series UPS - fitted with 2 x Xi BP
Xi BP	Battery pack - contains 4 x 7Ahr VRLA 5 year design life batteries
Xi BB3KL[1]	Make before break dual input bypass module for Xi2500L & Xi3000L Provides safety interlock when used with Xi V
Xi BB6KL[1]	Make before break dual input bypass module for Xi4000L & Xi6000L Provides safety interlock when used with Xi V
Xi R	Telescopic rack guides for UPS and battery modules (1 set of guides per 2U module, ie. Xi2500L needs 2 sets Xi R)
Xi S	SNMP Network Adaptor Option Card. See Options/Accessories
Xi V	AS400 Volt Free Contact Option Card. See Options/Accessories

(1). Unit can be used without Xi V. However, there is no automatic protection against bypass operation while the unit is on inverter. Units must operate with common neutral. Contact sales office for details.

Option Order Codes

Xi ████ L ███

Power (VA)   Options [1]

E.G. Xi1500LRX
Xi Series, 1500VA
With telescopic rail guides and 10 year design life batteries fitted

Options (Examples)
Add suffix 'R' to Model Number - Adds rack guides to unit for 19" rack mounting
Add suffix 'S' to Model Number - Adds internal SNMP to UPS (in place of USB port)
Add suffix 'V' to Model Number - Adds AS400 VFC to UPS for Utility Fail, Bypass, Battery Low and UPS Fault (in place of USB port)
Add suffix 'X' to Model Number - Replaces 5 year design life batteries with 10 year

(1) Options should be listed in alphabetical order

Option Card & REPO Details

Xi S Option Card

The Xi S card provides network connectivity and SNMP management protocol capability to the Xi series of UPS.

Supplied with the option card is a CD which contains all relevant software including the Manual and MIB.

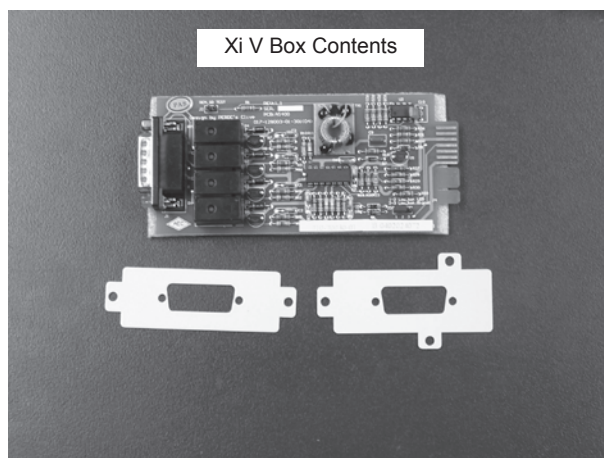The card can be factory fitted with this option on request - please contact sales for assistance

Xi S Box Contents
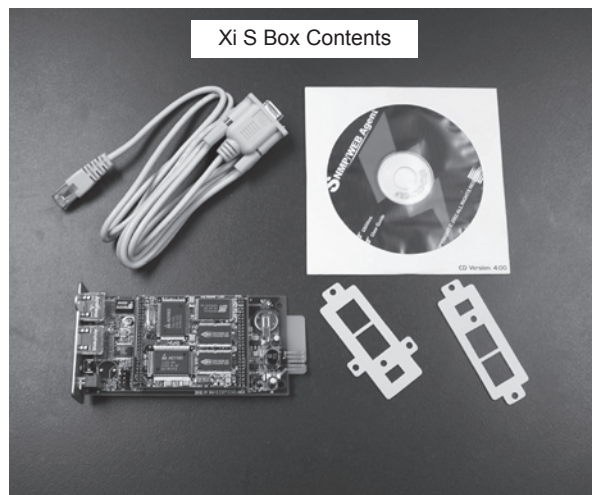
Xi V Option Card

The Xi V card provides true volt free contact indication of the following key parameters:

> Mains Fail
> Battery Low
> Bypass
> UPS Fault

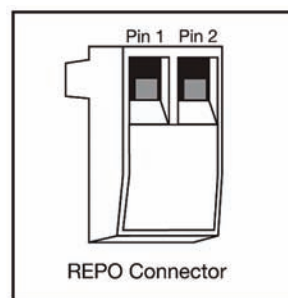These are 250VAC 2A rated contacts.

Xi V Box Contents

REPO

The REPO feature shuts down the protected equipment immediately and does not follow the orderly shutdown procedure initiated by any power management software.

This occurs when the link between pin 1 and 2 is broken.

Any devices which are operating on battery are also shutdown immediately. When the REPO switch is closed, the equipment will not return to battery power until the UPS input is re-cycled.

This can be done by shutting down the UPS and re-starting it.

Pin 1   Pin 2

REPO Connector

Run Time Charts

Standard Run Time in Minutes (Autonomy vs Load)

UPS Model	200VA (140W)	400VA (280W)	600VA (420W)	800VA (560W)	1000VA (700W)	1500VA (1050W)	2000VA (1400W)	2500VA (1750W)	3000VA (2100W)	4000VA (2800W)	5000VA (3500W)	6000VA (4200W)
Xi1000	86	39	24	17	12							
+1BM	328	142	90	62	49							
+2BM	569	264	163	114	86							
+3BM	*	385	244	171	132							
Xi1500(L)	86	39	24	17	12	9						
+1BM	328	142	90	62	49	30						
+2BM	569	264	163	114	86	55						
+3BM	*	385	244	171	132	80						
Xi2500N												
+1BM	201	86	55	39	30	18	12	9				
+2BM	439	201	122	86	69	43	29	23				
+3BM	684	325	199	140	108	68	49	38				
+4BM	*	467	296	207	161	100	71	54				
Xi3000(L)N												
+1BM	201	86	55	39	30	18	12	9	7			
+2BM	439	201	122	86	69	43	29	23	18			
+3BM	684	325	199	140	108	68	49	38	30			
+4BM	*	467	296	207	161	100	71	54	43			
Xi4000N												
+2BM	453	201	119	84	67	43	30	23	18	12		
+4BM	990	453	288	201	151	97	67	53	43	30		
+6BM	*	718	453	328	253	151	110	82	67	49		
+8BM	*	990	600	453	351	214	151	117	92	67		
Xi5000N												
+2BM	453	201	119	84	67	43	30	23	18	12	9	
+4BM	990	453	288	201	151	97	67	53	43	30	23	
+6BM	*	718	453	328	253	151	110	82	67	49	37	
+8BM	*	990	600	453	351	214	151	117	92	67	53	
Xi6000(L)N												
+2BM	453	201	119	84	67	43	30	23	18	12	9	7
+4BM	990	453	288	201	151	97	67	53	43	30	23	18
+6BM	*	718	453	328	253	151	110	82	67	49	37	30
+8BM	*	990	600	453	351	214	151	117	92	67	53	47

Recharge time will be extended as additional BM's are added. * indicates time not calculated - consult sales office for details.

Extended Run Time in Minutes (Autonomy vs Load)

UPS Model	400VA (280W)	800VA (560W)	1000VA (700W)	1500VA (1050W)	2000VA (1400W)	2500VA (1750W)	3000VA (2100W)	4000VA (2800W)	5000VA (3500W)	6000VA (4200W)
Xi1000 + 3 BM + 1 BMC	509	235	176							
Xi1000 + 3 BM + 2 BMC	624	296	230							
Xi1000 + 3 BM + 3 BMC	772	356	280							
Xi1500 + 3 BM + 1 BMC	509	235	176	110						
Xi1500 + 3 BM + 2 BMC	624	296	230	139						
Xi1500 + 3 BM + 3 BMC	772	356	280	170						
Xi2500N+ 4 BM + 1 BMC	569	264	201	126	86	69				
Xi2500N+ 4 BM + 2 BMC	718	328	253	156	109	82				
Xi2500N+ 4 BM + 3 BMC	835	385	302	187	132	102				
Xi3000N+ 4 BM + 1 BMC	569	264	201	126	86	69	55			
Xi3000N+ 4 BM + 2 BMC	718	328	253	156	109	82	69			
Xi3000N+ 4 BM + 3 BMC	835	385	302	187	132	102	80			
Xi4000N + 8 BM + 2 BMC	*	569	453	288	201	156	126	86		
Xi4000N + 8 BM + 4 BMC	*	718	545	351	253	193	156	109		
Xi4000N + 8 BM + 6 BMC	*	835	665	410	302	234	187	132		
Xi5000N + 8 BM + 2 BMC	*	569	453	288	201	156	126	86	69	
Xi5000N + 8 BM + 4 BMC	*	718	545	351	253	193	156	109	82	
Xi5000N + 8 BM + 6 BMC	*	835	665	410	302	234	187	132	102	
Xi6000N + 8 BM + 2 BMC	*	569	453	288	201	156	126	86	69	55
Xi6000N + 8 BM + 4 BMC	*	718	545	351	253	193	156	109	82	69
Xi6000N + 8 BM + 6 BMC	*	835	665	410	302	234	187	132	102	80

Recharge as per standard battery pack. * indicates time not calculated - contact sales office for details. Not available for L versions.

Mechanical Formats

Xi1000 & Xi1500(L)
Standard unit with internal batteries 2U

Each additional battery adds 2U

Xi2500 & Xi3000(L)
Standard unit with internal batteries 4U

Each additional battery adds 2U

Xi4000 Xi5000 & Xi6000(L)
Standard unit with internal batteries 8U

Each additional battery comprises

2 x BM (2 x 2U)

Mechanical Formats

Xi1000 & Xi1500(L)	Xi2500 & Xi3000(L)	Xi4000, Xi5000 & Xi6000(L)
Unit supplied in 1 box	**Unit supplied in 2 boxes**	**Unit supplied in 3 boxes**
BOX 1	BOX 1	BOX 1
UPS with battery pack fitted (2U)	UPS electronics module (2U)	UPS electronics module (4U)
1 x Input Cable	1 x Input Cable	Input & Output Hard Wired
1 x Output Cable	1 x Output Cable	REPO Connector
REPO connector	REPO connector	RS232 Cable / USB Cable
RS232 Cable / USB Cable	RS232 Cable / USB Cable	Software CD
Software CD	Software CD	Manual (on CD)
Manual (on CD)	Manual (on CD)	19" rack ears and screws
Mounting feet	19" rack ears and screws	2 x battery connection cables
19" rack ears and screws		
	Box 2	Box 2
	Battery module with 2x Xi BP fitted (2U)	Battery module with 2x Xi BP fitted (2U)
	Battery connection cable	Battery connection cable
	19" rackears and screws	19" rackears and screws
	1 x key lock kit	1 x key lock kit
		Box 3
		Battery module with 2x Xi BP fitted (2U)
		Battery connection cable
		19" rackears and screws

Front Panel Layouts
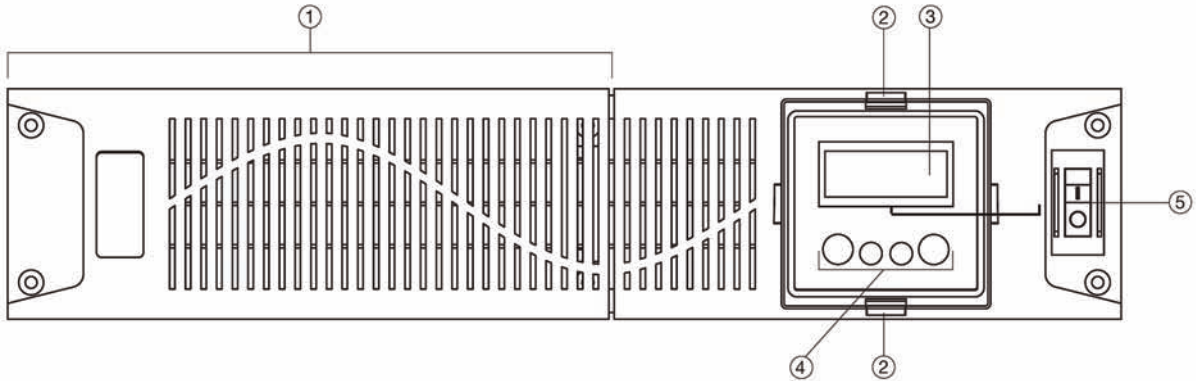
Number	Description
1	Remove panel to access battery compartment (up to 1.5kVA only - other models have separate battery module)
2	Top/bottom clips for releasing LCD display (to rotate through 90°) for standalone applications
3	Backlit full function LCD display
4	Keys for menu selection, bypass and menu select. See below
5	Input breaker

Xi LCD Display

To allow for use in either rack-mount or standalone format, the LCD display can be rotated using the top/bottom clip as shown to the right.

A retaining screw is then used to fix the panel in place.

Never rotate panel while UPS is on.

Information available from LCD:
Input Voltage: VAC
Output Frequency: Hz
Output Voltage: VAC
Battery Voltage: VDC
Load: %
Ambient Temperature: °C
Heatsink Temperature: °C
Output Current: A

Xi Front Panel Buttons

Turn on/off the inverter or force unit to bypass. Start UPS from battery when mains is not available.

Select the status shown on the second (bottom) row of the LCD. Used for setting the function or parameter.

Select the status shown in the first (top) row of the LCD or review parameters in the M menu.

Enter edit menu. Selects standard UPS parameters including output voltage, battery test, etc.
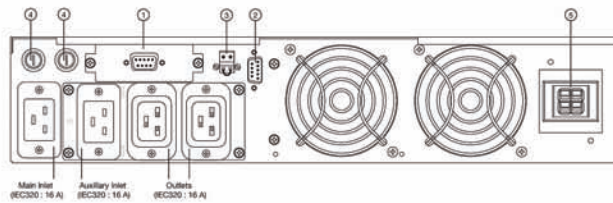
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Rear Panel Layouts

Xi1000 & Xi1500(L CE)
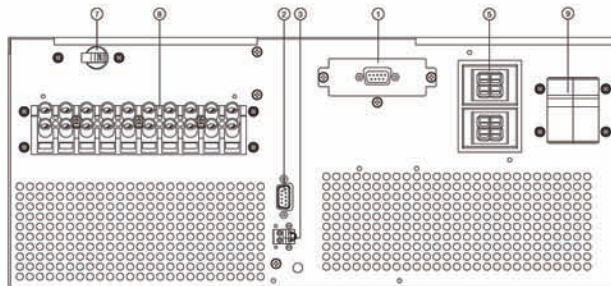

Main Inlet
(IEC320 : 10 A)   Auxiliary Inlet
(IEC320 : 10 A)   Outlets
(IEC320 : 10 A)
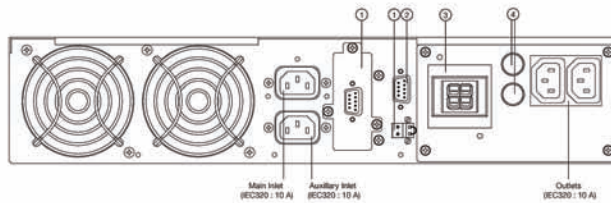
Xi 2500 & Xi3000L Electronic Module

Main Inlet
(IEC320 : 16 A)   Auxiliary Inlet
(IEC320 : 16 A)   Outlets
(IEC320 : 16 A)

Xi4000 - Xi6000

Xi BM Battery Module

Xi BMC Battery Module

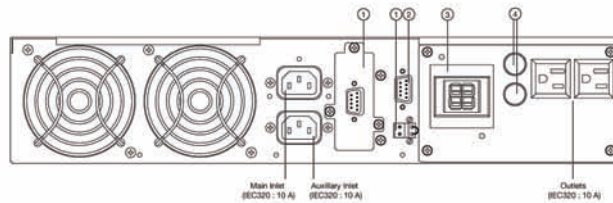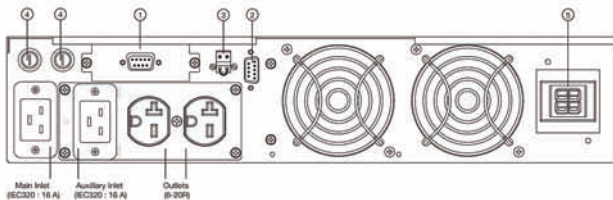| No.	Item	Description
1	Option Slot	Option slot allows user to fit AS400 Dry Contact Card or SNMP Internal Network Adaptor
2	Comms. Port	Standard Serial RS232 Communications via 9 pin D-type connector
3	REPO	Remote Emergency Power Off (remove link to shutdown)
4	Input/Output Fuses	Overload Protection
5	External Battery	Allows user to connect external battery packs
6	Maintenance Bypass	Allows unit to be isolated for maintenance
7	Input Breaker	Input breaker for 4, 5 & 6kVA Models
8	Hardware Terminals	For Input, Output & Battery (if required)
9	Battery Breaker	Breaks DC voltage to/from battery module
10	Battery Connector	Remove plates to access battery connectors

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Rear Panel Layouts

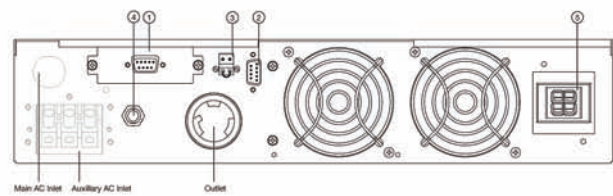### Xi1000 & Xi1500L

Main Inlet (IEC320 : 10 A) Auxiliary Inlet (IEC320 : 10 A) Outlets (IEC320 : 10 A)

Xi3000L Electronic Module

Main Inlet (IEC320 : 16 A) Auxiliary Inlet (IEC320 : 16 A) Outlets (6-20R)

Xi3000L 120V Electronic Module

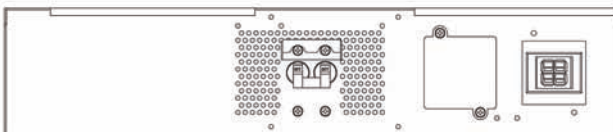Main AC Inlet Auxiliary AC Inlet Outlet

Xi6000L*
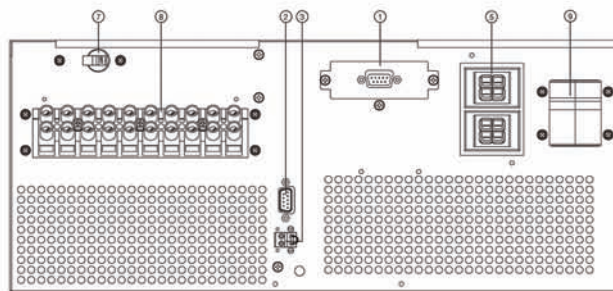
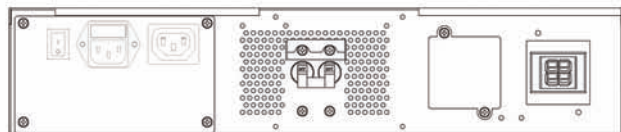* Plug & Play version also available - contact sales office

Xi BM Battery Module

Xi BMC Battery Module

| No.	Item	Description
1	Option Slot	Option slot allows user to fit AS400 Dry Contact Card or SNMP Internal Network Adaptor
2	Comms. Port	Standard Serial RS232 Communications via 9 pin D-type connector
3	REPO	Remote Emergency Power Off (remove link to shutdown)
4	Input/Output Fuses	Overload Protection
5	External Battery	Allows user to connect external battery packs
6	Maintenance Bypass	Allows unit to be isolated for maintenance
7	Input Breaker	Input breaker for 4, 5 & 6kVA Models
8	Hardware Terminals	For Input, Output & Battery (if required)
9	Battery Breaker	Breaks DC voltage to/from battery module
10	Battery Connector	Remove plates to access battery connectors

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UPS Topology

The Xi series of On Line UPS provides a high integrity AC power source with zero transfer time on mains fail conditions to battery. This On Line double conversion topology ensures that the load is protected against noise and transients.

The Xi series also offers dual input feeds ensuring that even if the main input fails, and the auxiliary supply is available, the load will continue to be protected against power failure.

The Xi series also incorporates load segment control (2.5kVA and 3kVA European models), allowing the user to turn off (via the LCD front panel menu) any load that is surplus to the critical part of the system. This then ensures that any critical component connected can achieve the longest run time available.

Xi Series Schematic
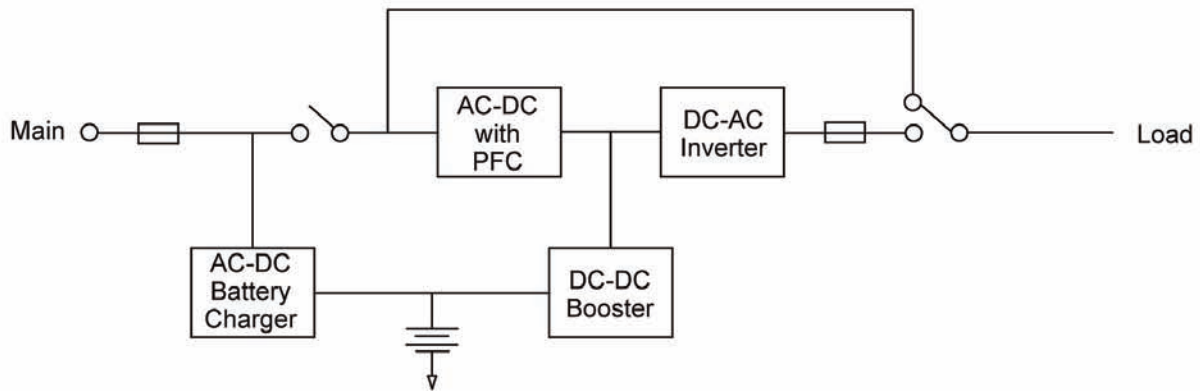
Weights & Dimensions

| Model Number	Unit Dimensions Inches (mm)			Unit Weight (total kg)	Shipping Dimensions Inches (mm)			Shipping Weight	Boxes
	Height	Depth	Width		Height	Depth	Width		
Xi1000	3.5 (88.9)	20.1 (510)	16.8 (426)	24 (24)	8.3 (210)	25.6 (650)	21.3 (540)	28	1 Box
Xi1500(L)	3.5 (88.9)	20.1 (510)	16.8 (426)	24 (24)	8.3 (210)	25.6 (650)	21.3 (540)	28	1 Box
Xi2500	7.0 (177.8)	20.1 (510)	16.8 (426)	14+32 (46)	8.3 (210)	25.6 (650)	21.3 (540)	18	1 of 2
					8.3 (210)	25.6 (650)	21.3 (540)	35	2 of 2
								53	2 Boxes
Xi3000(L)	7.0 (177.8)	20.1 (510)	16.8 (426)	14+32 (46)	8.3 (210)	25.6 (650)	21.3 (540)	18	1 of 2
					8.3 (210)	25.6 (650)	21.3 (540)	35	2 of 2
								53	2 Boxes
Xi4000	14.0 (355.6)	20.1 (510)	16.8 (426)	28+32+32 (92)	13.4 (340)	27.6 (700)	23.6 (600)	31	1 of 3
					8.3 (210)	25.6 (650)	21.3 (540)	35	2 of 3
					8.3 (210)	25.6 (650)	21.3 (540)	35	3 of 3
								101	3 Boxes
Xi5000	14.0 (355.6)	20.1 (510)	16.8 (426)	28+32+32 (92)	13.4 (340)	27.6 (700)	23.6 (600)	31	1 of 3
					8.3 (210)	25.6 (650)	21.3 (540)	35	2 of 3
					8.3 (210)	25.6 (650)	21.3 (540)	35	3 of 3
								101	3 Boxes
Xi6000(L)	14.0 (355.6)	20.1 (510)	16.8 (426)	28+32+32 (92)	13.4 (340)	27.6 (700)	23.6 (600)	31	1 of 3
					8.3 (210)	25.6 (650)	21.3 (540)	35	2 of 3
					8.3 (210)	25.6 (650)	21.3 (540)	35	3 of 3
								101	3 Boxes
Xi BM	3.5 (88.9)	20.1 (51.0)	16.8 (426)	32 (32)	8.3 (210)	25.6 (650)	21.3 (540)	35	1 Box
Xi BMC	3.5 (88.9)	20.1 (51.0)	16.8 (426)	32 (32)	8.3 (210)	25.6 (650)	21.3 (540)	36	1 Box
Xi BP				12 (12)				15.0	1 Box

Depth shown excludes front panel. Total depth is 21.65" (550mm)

Software Options

The Xi Series is supplied as standard with XProtect software. However, the Xi Series has been designed to work with UPSilon software packages, which allow the user to use the Xi Series where MSXP UPS have previously been used.

UPSilon software must be used with the supplied RS232 cable. It will not function if used with the green UPSilon cable.

UPSilon is also available for Unix operating systems - please consult sales office for details.
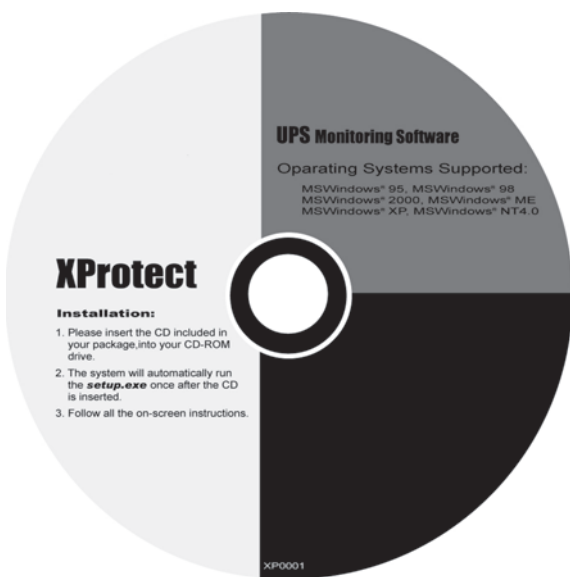
XProtect Features:

• Simple installation & configuration

• Read/write function allows for engineer configuration of UPS

• Simple meter display of load battery capacity & temperature

• Complete data & event logging as standard
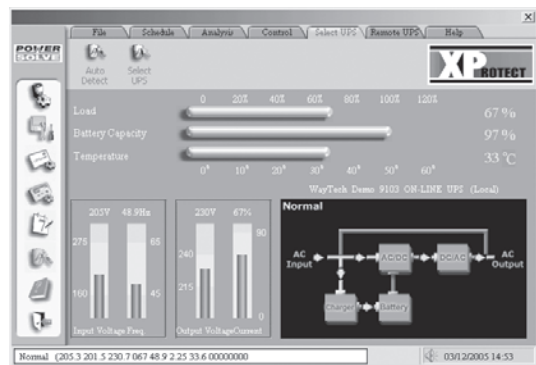
• Configurable tool bars

All models within the Xi range are provided as standard with shutdown & monitoring software.

This software is supplied on a CD and covers all Windows® based platforms. The software offers all of the functionality of standard shutdown packages with some additional features for remote monitoring and control.

Monitoring is achieved either locally through the RS232 cable (supplied) or remotely via a connected network. This can provide the user with information about major input and output parameters along with alarm information as and when it appears.

Control is via the console in the software and allows the user (again locally via the serial connection or remotely via network connection) to schedule remote system shutdown (password controlled) and general UPS housekeeping.

In combination with its very flexible shutdown features, the software also lets the user know which programs were shutdown at last mains failure, to ensure that no saved files go unmissed.
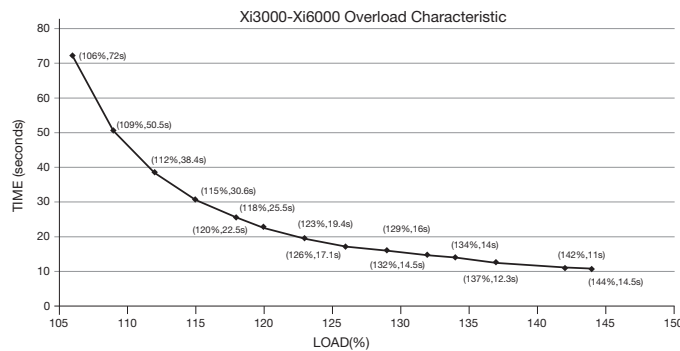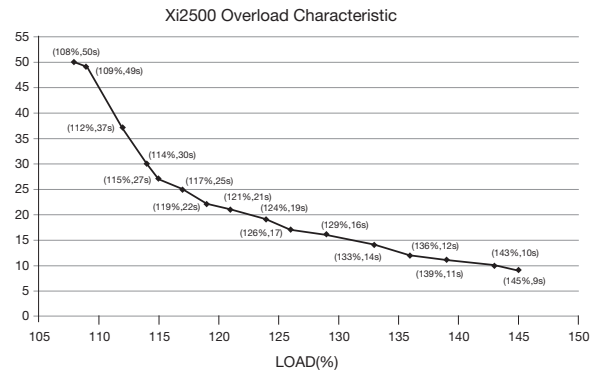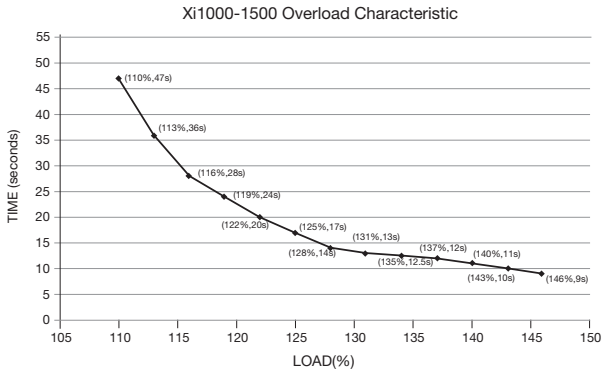
Overload Graphs

Xi1000-1500 Overload Characteristic

(110%,47s)
(113%,36s)
(116%,28s)
(119%,24s)
(122%,20s)
(125%,17s)
(128%,14s)
(131%,13s)
(135%,12.5s)
(137%,12s)
(140%,11s)
(143%,10s)
(146%,9s)

TIME (seconds) / LOAD(%)

Xi2500 Overload Characteristic

(108%,50s)
(109%,49s)
(112%,37s)
(114%,30s)
(115%,27s)
(117%,25s)
(121%,21s)
(119%,22s)
(124%,19s)
(126%,17)
(129%,16s)
(133%,14s)
(136%,12s)
(139%,11s)
(143%,10s)
(145%,9s)

TIME (seconds) / LOAD(%)

Xi3000-Xi6000 Overload Characteristic

(106%,72s)
(109%,50.5s)
(112%,38.4s)
(115%,30.6s)
(118%,25.5s)
(120%,22.5s)
(123%,19.4s)
(126%,17.1s)
(129%,16s)
(132%,14.5s)
(134%,14s)
(137%,12.3s)
(142%,11s)
(144%,14.5s)

TIME (seconds) / LOAD(%)

NOTE:
Once the parameters shown are exceeded, the UPS will go into bypass mode. If the overload is greater than 160%, it will latch in bypass mode until mains is manually recycled.

The UPS will support the load in bypass mode until the fuse/breaker ratings are reached. At this point the unit will trip and shutdown.

Modular Design & Key Lock Function

The Xi series modular design makes for a one man install up to 3kVA. For 4-6kVA models, two men are needed to install. The weight of each part of the system is no greater than 30kg.

Part of the design concept is to allow one unit to be created from a number of modules. When using the modules in free-standing mode, a key lock facility is provided. The basic principle of the key lock is illustrated below.

A key lock kit is provided with every battery module.

Key lock bolt fixing points on electronics module