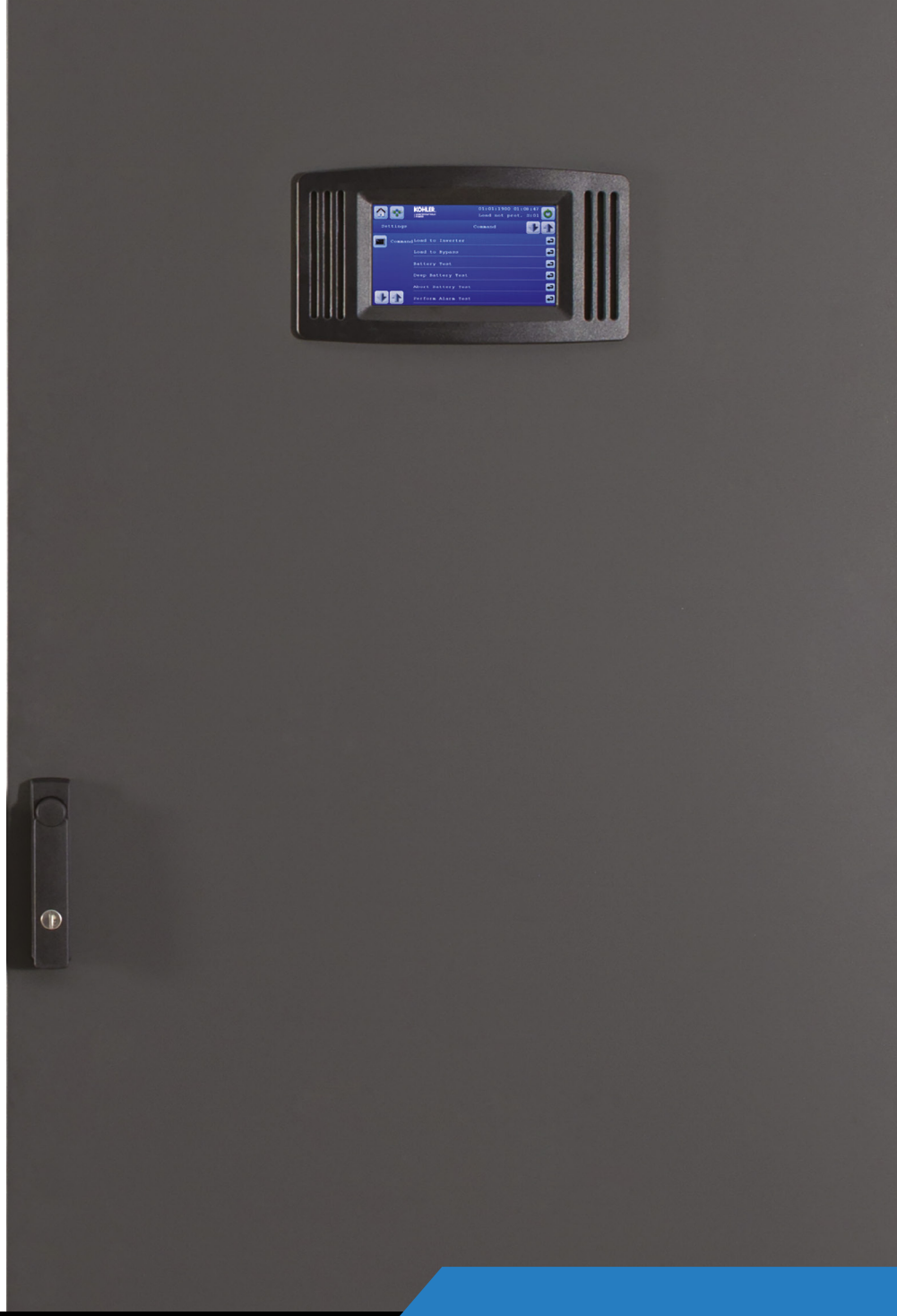
KOHLER®

UNINTERRUPTIBLE POWER



KOHLER *PW* 9500DPA

Modular three-phase uninterruptible power supply

(100-500 kVA/kW)
Parallelable up to 3 MVA/MW

Technical Specification

Document Control

ISSUE	DATE	REVISION SUMMARY
TS_760_01	30/11/2023	Rebranding to KUP International Version

Useful Contacts

UK

www.kohler-ups.co.uk	Kohler Uninterruptible Power web site
ukservice.ups@kohler.com	Service department – booking service, fault reporting etc.
uktechnicalsupport.ups@kohler.com	Technical queries
uksales.ups@kohler.com	Hardware sales
ukservicesales.ups@kohler.com	Extended warranty agreements etc

IRELAND

www.kohler-ups.ie	Kohler Uninterruptible Power web site
ieinfo.ups@kohler.com	Service department, technical queries, hardware sales and extended warranty agreements

SINGAPORE

www.kohler-ups.sg	Kohler Uninterruptible Power web site
salesups.sg@kohler.com	Hardware sales
serviceups.sg@kohler.com	Contract customer support, maintenance contracts renewals

All product, product specifications and data are subject to change without notice to improve reliability, function, design or otherwise. Kohler Uninterruptible Power has taken every precaution to produce an accurate, complete and easy to understand specification document and will assume no responsibility nor liability for direct, indirect or accidental personal or material damage due to any misinterpretation of, or accidental errors, in this manual.

Kohler PW 9500DPA UPS SYSTEM DESCRIPTION

Continuous power availability is essential in today's dynamic IT and process-dependent work environments. It is equally important that any installed power protection system is sufficiently resilient and adaptable to handle changes brought about by the introduction of new server technologies, migration and centralisation.

Such demands are well met by the Kohler PW 9500DPA UPS system, which provides the foundation for continuous power availability of network-critical infrastructures both in enterprise data centres, where business continuity has paramount importance, and in process control environments where manufacturing continuity is essential.

Reliability and quality standards

The Kohler PW 9500DPA UPS incorporates the latest technological developments in power engineering. Representing a completely new generation of high power three phase UPS systems, its advanced double conversion VFI (Voltage and Frequency Independent) topology responds fully to both the highest availability and environmentally friendly requirements compliant with IEC 62040-3 (VFI-SS-111) standards.

Kohler Uninterruptible Power specialises in the installation and maintenance of Uninterruptible Power Systems; and this powerful UPS is just one example of our wide range of state-of-the-art power protection devices that will provide your critical equipment with a steady and reliable power supply for many years.

System expansion

The Kohler PW 9500DPA is a truly expandable system, based on a number of plug-in 100 kW UPS modules installed in a purpose-designed cabinet. Up to five 100 kW modules can be fitted in the UPS cabinet and, thanks to the advanced Kohler PW 9500DPA system design, if a cabinet is not fully populated it is possible to add further UPS modules to increase the system capacity without having to power-down the system or in any way disrupt the load. For example, if a system is initially purchased with only two UPS modules fitted, an additional three modules can be installed at a later date as and when required. Depending on the system redundancy and existing load demand, this 'hot-swappable' design also allows individual modules to be exchanged while the equipment remains fully operational without having to transfer the load to the unprotected bypass supply.

Further expansion is made possible by connecting up to six UPS cabinets in parallel to provide a total system output of up to 3.0 MW.

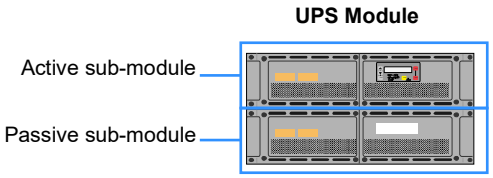
Key features

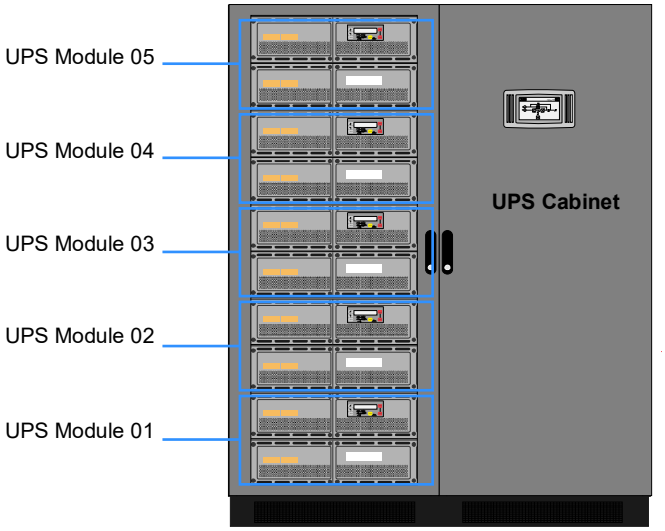
High reliability, upgrade ability, low operating costs and excellent electrical performance are just some of the highlights of this advanced UPS system. Other key features include:

- *Decentralised Parallel Architecture (DPA)* – Each UPS module contains its own static bypass circuit, which greatly improves the overall system reliability by removing a common point of failure that is often present in more traditional 'centralised' UPS systems.
- *Truly modular design* – The Kohler PW 9500DPA is designed around 100 kW UPS modules.
- *System expandability* – Each Kohler PW 9500DPA cabinet can contain up to five UPS modules (500 kW), and up to six cabinets can be connected together to offer a parallel system capacity of 3.0 MW.
- *Hot-swappable modules* – System expansion and module replacement can be carried out without disturbing the connected load.
- *Unity output power factor (kVA = kW)* – Blade server friendly. No de-rating required with leading PF loads.
- *Best in class AC-AC efficiency* – up to 96% efficiency minimises operational costs (TCO).
- *Xtra VFI double conversion mode* – A complementary feature which enhances the double conversion efficiency of the UPS when the load power demand is low compared to total UPS system capacity.
- *Low input power factor (0.99 @ 100% load)* – Cost savings during installation and the entire life cycle (TCO).
- *Ease of operation* – A graphical display panel on the front of the UPS cabinet provides a 'system level' control point from which the operator can control and interrogate each individual UPS module.
- *Flexible battery management* – Advanced battery charging management and preventive failure diagnostics help reduce premature battery deterioration.
- *Top or bottom cable entry* – Allows flexible installation into existing plant infrastructure.
- *Very low input current distortion* – A THDi = <3.5% @ 100% load leads to savings in generator-set power requirements and installation costs.

Model Range

As described previously, the Kohler PW 9500DPA UPS cabinet can house up to five 100 kW UPS modules, so each cabinet can be rated up to 500 kW in 100 kW increments.





Each UPS module comprises two sub-modules; one is known as the 'Active' sub-module and the other as the 'Passive' sub-module. These are mounted in the UPS cabinet in pairs, with the Active sub-module installed on top of the Passive sub-module. The first module to be installed in the cabinet must be fitted to the bottom position with subsequent modules fitted in the next lowest available slot. Each installed module is assigned an ID number to allow it to be identified by the system control logic for purposes such as monitoring and event logging. The modules fitted in the first cabinet identified as illustrated above. In a multi-cabinet installation, the modules in the second cabinet are given an identity '06' to '10', those in the third cabinet are given '11' to '15' and so on…

The following table shows the static parameters for each configuration:

	1 Module	2 Module	3 Module	4 Module	5 Module
System power rating (per cabinet) (kVA/kW)	100	200	300	400	500
Cabinet weight including modules (kg)	539	648	757	866	975
Cabinet weight without fitted modules (kg)	430				
Cabinet dimensions (w x h x d) mm	1580 x 1975 x 940				
Heat dissipation 100% linear load (W)	4500	9000	13500	18000	22500
Heat dissipation 100% linear load (BTU)	15395	30717	46076	61434	76793
Heat dissipation 100% non-linear load (W)	4500	9000	13500	18000	22500
Heat dissipation 100% non-linear load (BTU)	15395	30717	46076	61434	76793
Heat dissipation no load (W))	660	1320	1980	2640	3300
Acoustic noise (@ 100% / 50% load)	75/67dBA (with 5 modules fitted)				
Cooling airflow (25°C - 30°C) at full load (m³/h)	1200	2400	3600	4800	6000
Installation clearances (mm)	Front 1500, Side 100, Rear 300, Top 400				
UPS Module weight	Active sub-module = 55 kg, Passive sub-module = 54 kg				
UPS Module dimensions (w x h x d) mm	Active & Passive modules 710 x 178 x 750				

GENERAL SPECIFICATIONS

Mechanical Data

UPS Cabinet		
Maximum cabinet rating	500 kVA / 500kW (with 5 power modules fitted)	
Dimensions (W x D x H) mm	1580 x 940 x 1975	
UPS Type	On-line, transformerless, modular, decentralized parallel architecture	
Parallel capability	Up to 6 frames (with up to 5 x 100 kVA modules in each frame)	
Battery	Not included	
Performance specification	VFI-SS-111	
Weight	975 kg (with five power modules fitted)	
Colour	Black (RAL 9005)	
Positioning	Min. 200mm space required at the rear for ventilation Min. 1500mm space required at front for access Min. 400mm space required at the rear for ventilation	
Input/output power cabling	From the top or bottom	
Upstream Overvoltage Category and Withstand Voltage: II (2500Vpk)		
Upstream Overvoltage Category and Withstand Voltage with external SPD: III (4000Vpk)		
100 kVA UPS Power module		
	 Active Sub-module	 Passive Sub-module
Dimensions (W x H x D) mm	710 x 178 x 750	
Weight (kg)	55 kg (active module)	54 kg (passive module)
UPS Type	On-line, transformerless, modular, decentralized parallel architecture	

100 kVA UPS Module Data

General Data	
Output power factor	1.0
Output rated power @ 1.0 p.f.	100 kW
Output current In @ 1.0 p.f.	145A (@400 V)
Efficiency AC-AC at various loads (at up to unity power factor)	Load: 100% 75.0% 50.0% 25.0% Eff: 95.6% 96.0% 96.1% 95.8%
ECO mode efficiency at 100% load	99% or better
Back feed protection	Standard
Rectifier Data	
Input voltage	3x380/220V+N, 3x400V/230V+N, 3x415/240V+N (Three phases, Neutral and Earth required)
Input voltage tolerance (ref to 3x400/230V) for loads in %	(-10% to +15%) for <100% load (-20% to +15%) for < 80% load (-30% to +15%) for < 60% load
Input frequency	35 Hz – 70 Hz (nominal 50/60 Hz)
Input power factor	PF=0.99 @ 100% load
Inrush current	<100% of rated current, limited by soft start
Input distortion THDI	<3.5% @ 100% load
Max. input current with rated output power and charged battery (output p.f. = 1.0)	152A
Max. input current with rated output power and discharged battery (output p.f. = 1.0)	167A
Inverter Data	
Output voltage (steady state rms)	3x380/220V or 3x400/230V or 3x415/240V (3 phase + Neutral)
Output voltage variation	± 1.5% (Normal and battery mode)
Output waveform	Sine wave
Output current (rms rated)	145 A
Output frequency	50 Hz or 60 Hz
Output frequency tolerance	Free running, quartz oscillator < ±0.1% Synchronized with mains < ±2% or < ±4% (selectable)
Permissible unbalanced load	100% (All 3 phases are regulated independently)
Phase angle tolerance	0 deg. (With 100% unbalanced load)
Inverter overload capability	110% load for 20 minutes; 125% load for 5 minutes; 150% load for 30 seconds.
Output short capability (rms)	(2.4 x In) A during 100 ms
Output voltage transient recovery time with 100% step load	Linear < ±4% Non linear < ±4% (EN62040-3)
Output voltage distortion (THD) @100% load (normal and battery mode)	< 2.0% With linear load < 4.0% With non linear load (EN62040-3)

Static Bypass Data	
Transfer time (inv-byp), (byp-inv), (Eco)	<1 ms, <5 ms, <6 ms
Rated current	160A
overload current	110% load continuous
Bypass short capability (RMS)	(10 x In) A during 20 ms

General Data

Environmental Data	
Audible noise at 100% / 50% load (fully populated cabinet)	75 / 67 dBA for normal (mains) operation. 73 / 66 dBA when operating on battery,
Operating temperature (UPS)	0°C to +40°C
Storage temperature (UPS)	-25°C to +40°C
Battery Temperature	20°C (recommended for maximum battery life)
Relative air-humidity	Max. 95% (non-condensing)
Max. altitude (above sea level)	1000m (3300ft) without de-rating
Heat dissipation with 100% linear load	4500W, 15359 BTU/m per module (EN 62040-1-1:2003)
Heat dissipation with 100% non-linear load	5710W, 19488 BTU/m per module (EN 62040-1-1:2003)
Heat dissipation at no load	660 W per module
Airflow (25° - 30°C) with non-linear load	1200 m³/h per module (EN 62040-1-1:2003)

Battery Data

Battery data (external)	
Technology	VRLA, vented lead acid, NiCd, Li-Ion
Number of 12V blocks (even and odd number permissible) See note Limitation to runtime	40 to 50 @ 380/220V or 400/230V output 42 to 50 @ 415/240V output
Charger capability (each module)	60.0A
Ripple current (rms)	< 2.0%
Floating voltageFloating voltage	2.25 VDC (VLRA), 1.4 VDC (NiCd)
End of discharge voltage	1.65 VDC (VLRA), 1.05 VDC (NiCd)
Temperature compensation	Standard
Battery test	Automatic and periodic (selectable)

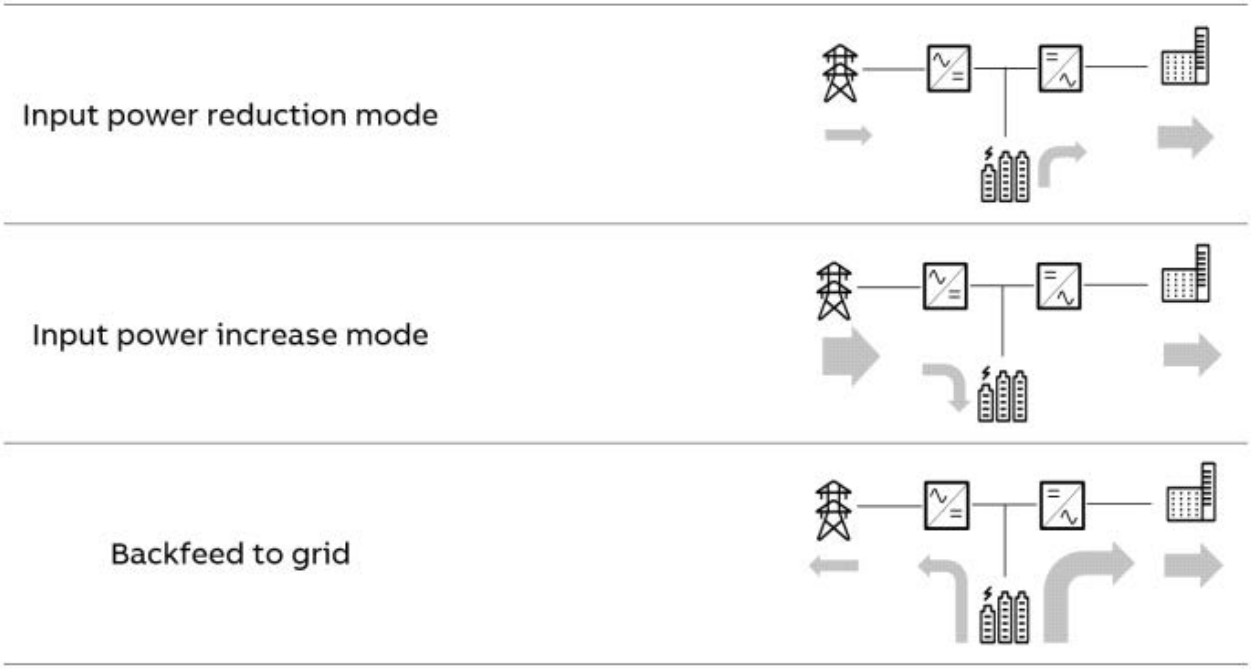
Note: Limitation to runtime

No. Batts (12V)	Temp (ºC)	Load (%)	Max Runtime (mins)
50	25	100	10
48	25	100	15
46	25	100	30
44	25	100	Any
42	25	100	Any
40	25	100	20
50	35	90	10
48	35	90	15
46	35	90	30
44	35	90	30
42	35	90	30
40	35	90	20
50	40	80	10
48	40	80	15
46	40	80	30
44	40	80	30
42	40	80	30
40	40	80	20

Communications options (fitted as standard)	
RJ45 Plug (Not used)	RJ45 Plug (for future options)
Customer interfaces: outputs DRY PORT X2	5 Volt-free contacts For remote signalling and automatic computer shut down
Customer interfaces: inputs DRY PORT X1	1 x Remote Shut-down [EMERGENCY OFF (normally closed)] 1 x Programmable Customer Inputs 1 x GEN-ON (normally open) 1 x Temperature sensor for battery charging control 1 x 12Vdc output (max 200mA)
Serial ports RS232 on Sub-D9	1 x System frame for monitoring integration in network management and service
USB	1x For monitoring and software management
Slot for SNMP card	For monitoring and integration in network management
Slot for Modem/Ethernet card	For monitoring and integration in network management
Remote signalling and alarms (fitted as standard)	
Dry port (volt-free contacts)	For remote signalling and automatic computer shut down
Smart port (RS 232)	For monitoring and integration in network management
RS485 on RJ45 port	For multi-drop purposes
SNMP card slot	For monitoring and integration in network management
Signalling input terminals	EMERGENCY OFF (normally closed) GENERATOR-ON (normally open) BATTERY TEMPERATURE SENSOR EXTERNAL BYPASS INTERLOCK
Standards (UPS Modules)	
Safety	EN 62040-1-1
Electromagnetic compatibility	EN 62040-2
Emission class	C2
Immunity class	C3
Performance	EN62040-3
Product certification	CE UKCA
Degree of protection	IP 20

Power Exchanger

PowerExchanger is a function enabling the UPS to interact with the grid and supply (upon external request) ancillary grid services. Through this function the UPS is able to reduce/increase the input power absorbed from the grid or even to inject power into the grid (backfeed), while maintaining constant the output power.



Input power reduction mode

Activation power (input reduction)	From actual load down to 0%
Response time from activation request	< 1 Second
Input power reduction duration	Modbus RTU: until minimum state of charge is reached dry contact: 0-200, selectable
Deactivation ramp	Modbus RTU: instantaneous control, dynamic setpoint dry contact: 0-100%, selectable
Battery minimum state of charge*	0-100%, selectable
Battery type compatibility	VRLA, Li-Ion**, NiCd
Communication with external gateways	Modbus RTU or dry contact***
Activation	Dedicated Module 1 license

*defines the minimum level beyond which the input power reduction mode is inhibited

** valid for Li-Ion batteries officially compatible with this UPS, lithium iron phosphate battery is recommended.

*** if dry contact communication is selected, the activation power is a predefined setpoint (programmable)

Input power increase mode

Input power increase	Max 30Kw/UPS module, on top of actual load. (limitations may apply depending on initial battery state of charge)
Response time from activation request	< 1 Second
Input power increase duration	Modbus RTU: until minimum state of charge is reached dry contact: 0-200, selectable
Deactivation ramp	Modbus RTU: instantaneous control, dynamic setpoint dry contact: 0-100%, selectable
Battery maximum charge status*	0-100%, selectable
Battery type compatibility	Li-Ion**
Communication with external gateways	Modbus RTU or dry contact***
Activation	Dedicated Module 1 license

* during input power increase mode the battery is charged, therefore to enable this mode the battery should be normally kept in a partial state of charge; this parameter specifies the maximum charge allowed (100% equals then to disabling the function). The initial state of charge and the amount of battery capacity installed influences the amount of power increase.

** valid for Li-Ion batteries officially compatible with this UPS, lithium iron phosphate battery is recommended.

*** if dry contact communication is selected, the activation power is a predefined setpoint (programmable).

Backfeed to Grid

Activation power (backfeed to grid)	Up to 25kW/UPS module exported towards the grid
Response time from activation request	< 1 Second
Backfeed to grid duration	Modbus RTU: until minimum state of charge is reached dry contact: 0-200, selectable
Deactivation ramp	Modbus RTU: instantaneous control, dynamic setpoint dry contact: 0-100%, selectable
Battery maximum charge status*	0-100%, selectable
Battery type compatibility	VRLA, Li-Ion**, NiCd
Communication with external gateways	Modbus RTU or dry contact***
Activation	Dedicated Module 2 license

* defines the minimum level beyond which the back feed reduction mode is inhibited

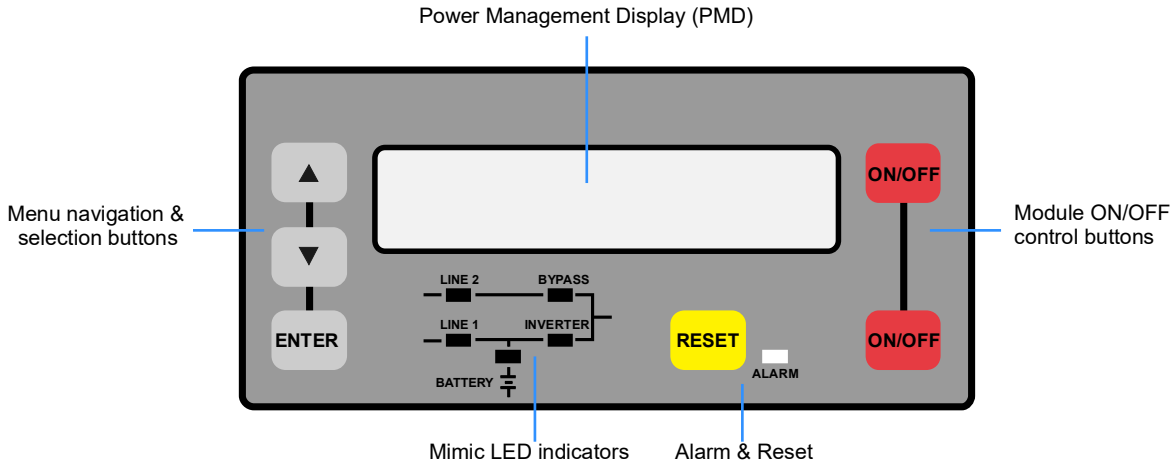
** valid for Li-Ion batteries officially compatible with this UPS, lithium iron phosphate battery is recommended.

*** if dry contact communication is selected, the activation power is a predefined setpoint (programmable)

Key Point: Compliance with local technical standards and grid operators/distributors regulations may be required to activate backfeed to grid mode, depending on the upstream electrical system architecture and where the grid point of connection is located. Project specific evaluation may be needed.

UPS CONTROLS

Module Control Panel



A module control panel is fitted to each UPS module to provide independent monitoring and module control. As the control panel is mounted on the face of the UPS module it is only accessible when the left-hand UPS cabinet door is open.

Mimic diagram

The mimic diagram contains multi-coloured LEDs that change between Green, Red and Off to indicate the UPS operational power flow.

LEDs LINE 1 and LINE 2 indicate the availability of the input and bypass mains power supplies respectively. They indicate Green during normal operation and Red when there is a mains supply error.

The INVERTER and BYPASS LEDs indicate which of the two power sources is providing the critical load supply and illuminate Green to indicate which is the active supply source.

The BATTERY LED indicator is a permanent Green when the battery is being charged and flashes when the battery is discharging – e.g. when the battery is providing the load power during a mains failure. It changes from Green to Red if there is a battery fault or the battery is fully discharged.

The ALARM LED, located at the lower-centre area of the Module control panel, is a visual indication of an active internal or external alarm condition. When activated, it is accompanied by an audible alarm that can be silenced using the RESET button.

Power management display

A 2 x 20 character multi-function LCD display panel provides a simple communications interface that enables the operator to monitor important UPS operating parameters and alarm warnings. It also allows the operator to undertake various control operations such transferring the load between the inverter and bypass. The display panel is menu-driven using the UP/DOWN and ENTER buttons.

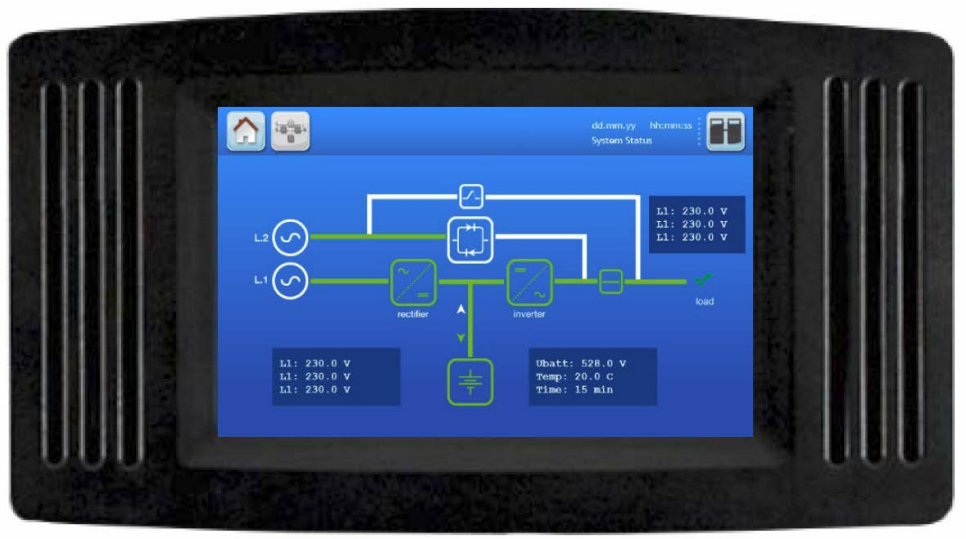
LCD Display panel functions:

- Displays the input and output voltage, current, frequency and power.
- Displays an 'Event register' which stores a date/time stamped history of the 99 most recent alarms and events.
- Enables battery run time monitoring.
- Enables selection of commands such as load transfer from inverter to bypass and vice-versa, and battery test.
- Provides diagnostic facilities (service mode only).
- Provides module adjustments and testing facilities (service mode only).

ON/OFF Control buttons

The two ON/OFF control buttons must be pressed simultaneously to turn ON or OFF the Module. These buttons are duplicated to reduce the likelihood of inadvertent operation.

System Control Panel



The system control panel contains a microprocessor-controlled TFT touch-screen which enables the operator to monitor and control the UPS installation at a 'system' level. In a multi-cabinet UPS system, the system control panel is usually installed on the door of the cabinet that contains the 'master' UPS module (Module 01).

The system control panel displays the operational status of the overall UPS system as well as that of each individual UPS module. It enables the operator to:

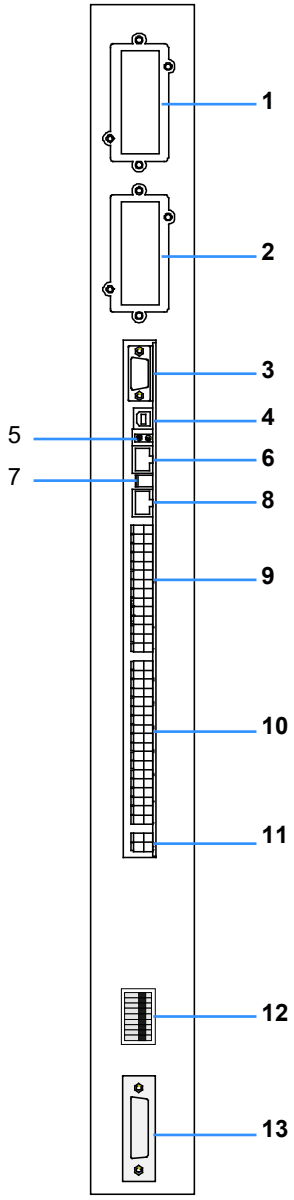
- view the input/output/battery operating parameters (voltage, current, frequency etc.) for the entire system
- view the input/output/battery operating parameters (voltage, current, frequency etc.) for a selected UPS module
- execute a load transfer from inverter and bypass, and vice-versa
- monitor the power flow through the UPS system, or selected UPS module, through an illuminated, colour-coded mimic diagram
- check alarm and events histories
- acknowledge an event occurrence
- silence alarms
- monitor the battery state and autonomy time.

Customer Interface Board

A customer interface board, which provides a means of connecting the cabinet to a range of external monitoring and control facilities, is fitted in the right-hand side of each UPS cabinet. It also includes a facility to connect a parallel communications bus between the individual UPS cabinets in a multi-cabinet installation which is required to enable the system's parallel control operation.

The customer interface board connections include:

- dry-port inputs for customer remote control options (X3)
- relay operated dry-port alarm outputs for remote monitoring (X2)
- RS232 computer interface for remote monitoring/control applications (JD1)
- RS232 computer interface for multidrop (JR2)
- USB port for computer monitoring applications
- an SNMP/CS141 card slot
- an SNMP slot for Modem/Ethernet card



1	MODEM	Slot for optional Modem/Ethernet card ONLY.
2	SNMP	Slot for optional SNMP card ONLY.
3	JD1	Sub D9 female connector RS232 User interface – UPS system to computer.
4	USB	Standard USB interface – UPS system to computer.
5	LEDs	2 LEDs that indicate the interface board status.
6	JR3	RJ45 Port RS485 communication for remote panel.
7	DIP SW	Module selection used by multidrop configuration.
8	JR2	RJ45 Port RS485 communication for multidrop cable connected between all the UPS cabinets. Used with RJ45 splitter adapter to enable module daisy chaining.
9	X3	Terminal block used for external customer inputs.
10	X2	Terminal block with volt-free outputs for use with customer remote indications panel.
11	X1	Castell interlock function.
12	SW1-9	9-pole configuration DIP switch used to configure module for parallel operation.
13	JD8	Parallel communication bus connector. Used in parallel cabinet system only, and fitted with parallel adapter board to enable module daisy chaining.

RS485 Interface for multidrop – JR2

An optional ‘Multidrop’ feature, which is available only in a parallel-cabinet system, allows the customer interface board in the master cabinet to collect data/messages from the other system cabinets. The received data is then processed at a centralised point on the ‘master’ customer interface board and made available to the user via the RS232 port (JD1). It is also transmitted to the SNMP/CS141 card if inserted in the relevant card-slot.

The multidrop connection between the cabinets is made using a purpose-designed cables which is connected to JR2 on the customer interface in each cabinet in a daisy-chain manner. via cables connected to JR2. If the multidrop feature is requested, the commissioning engineer will install the required kit of parts and test the system to ensure it is fully functional as part of the UPS commissioning procedure.

Key Point: When the multidrop feature is used, the I/O facilities on the customer interface board fitted to the ‘slave’ cabinet(s) are disabled but those on the customer interface board fitted to the ‘master’ cabinet remain fully functional.

Dry-port customer interface (X1, X2, X3)

Customer I/O interface facilities are made to Phoenix spring terminal blocks (cable 0.5 mm² to 1.5 mm²). All voltage-free contacts are rated at 250 VAC/8A, 30 VDC/8A, 110 VDC/0.3A, 220VDC/0.12A.

	Terminal	Contact	Signal	Display	Function
INPUTS					
X3	X3/14	Gnd	Gnd		Battery Temperature Sensing (If connected this input is battery temperature dependent
	X3/13	In	+3.3V		
	X3/12	Gnd	Gnd	GENERATOR OPER ON	Customer Specific Input (1) (Default NC = Generator on line)
	X3/11	In	+12V		
	X3/10	Gnd	Gnd	Parallel Switch OPEN/CLOSED	External output circuit breaker (When used, both the external and the internal (IA2) output breakers have to be either open or closed in order to isolate or connect the UPS output.)
	X3/9	In	+12V		
	X3/8	Gnd	Gnd	EXT MAN BYP	External Manual Bypass (External IA1)
	X3/7	In	+12V		
	X3/6	Out	+12V		+12Vdc Power source (max 200mA load
	X3/5	Gnd	Gnd		
	X3/4	Gnd	Gnd	REMOTE SHUTDOWN	RSD Remote Shut Down Leave jumper JP5 in place if no Remote Shut Down input is connected
	X3/3	In	+12V		
	X3/2			REMOTE SHUTDOWN	RSD Remote Shut Down (For external switch) Max 250VAC/8A, 30VDC/8A, 110VDC/0.3A, 220VDC/0.12A
	X3/1				
OUTPUTS					
X2	X2/18	Com	Spare function		Common
	X2/17	NC			Auxiliary NO
	X2/16	NO			Auxiliary NC
	X2/15	Com	Alarm	COMMON ALARM	Common
	X2/14	NC			No Alarm Condition
	X2/13	NO			Common (System) Alarm active
	X2/12	Com	Status	LOAD ON MAINS	Common
	X2/11	NC			No Load On Bypass
	X2/10	NO			Load on Bypass (Mains) active
	X2/9	Com	Alarm	BATT LOW	Common
	X2/8	NC			Battery OK
	X2/7	NO			Battery Low active
	X2/6	Com	Status	LOAD ON INV	Common
	X2/5	NC			Load not On Inverter
	X2/4	NO			Load on Inverter active
	X2/3	Com	Alarm	MAINS OK	Common
	X2/2	NC			Mains Failure
	X2/1	NO			Mains Present
CASTELL INTERFACE					
X1	X1/2	230Vac	–	EXT MAN BYP	Castell Interlock Function External Manual Bypass closed (230VAC 2AT)
	X1/1	N	–		

Key Point: If the 'multidrop' feature is enabled in a multi-cabinet system, the customer interface board input port (X3) is disabled in the 'slave' cabinet(s) and any remote 'input' connections should be made to the customer interface board fitted in the 'master' module only. The output dry port (X2) will remain active on the customer interface board fitted to the slave cabinet(s); however, all the information available from these ports can be obtained through the serial output port (JD1), or USB, on the customer interface board in the master cabinet

Serial RS-232/ USB Computer interface – JD1 & USB (Smart Port)

JD11 is an intelligent RS 232 serial port that allows the UPS system to be connected to a computer for monitoring purposes. Its connector is a 9-pin female D-type and it can be connected to a computer using a standard computer serial communications cable with a maximum length of 15m.

When used in conjunction with suitable software, this port allows the connected computer to continuously monitor the input mains voltage and UPS status, and display messages if there are any UPS system changes.

The USB port on the customer interface board is connected in parallel with JD1 and output the same data stream.

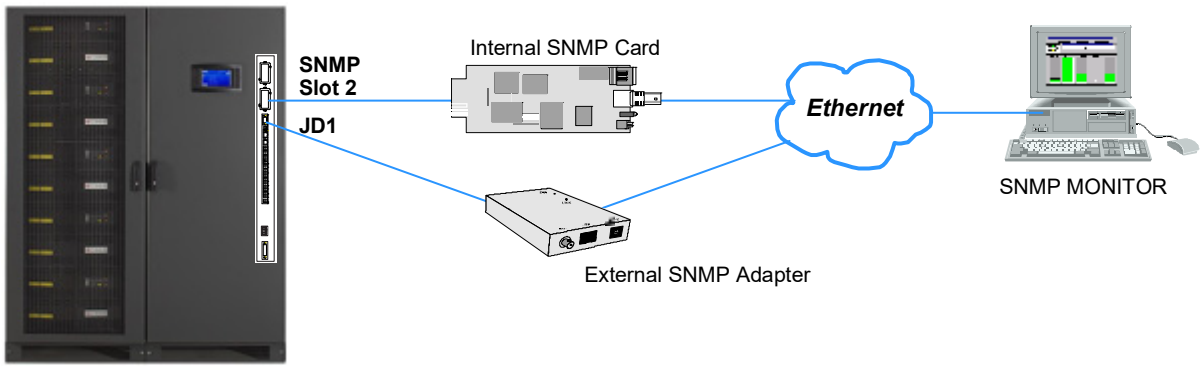
SNMP Card slots

Simple Network Management Protocol (SNMP) is a world-wide, standardised communication protocol that can be used to monitor any network-connected device via a simple control language and display the results in an application running within a standard web browser.

The customer interface board contains two SNMP/CS141 slots; one is designed to house a Modem/Ethernet SNMP adapter card and the other a Modem/GSM adapter. SNMP connectivity can also be implemented using an external SNMP adapter connected to the UPS RS232 output (JD11), as shown in the diagram below.

The SNMP/Ethernet adapter is fitted with an RJ-45 connector which allows it to be connected to the network using a standard CAT-5 network cable. Once connected, the UPS-Management software agent installed in the SNMP adapter, then monitors the UPS operation and outputs its data in SNMP format to the connected network. In a multi-module UPS system the SNMP interface can communicate 'system-wide' data or data for an individual UPS module.

The SNMP adaptor requires a PC with terminal connections, and for normal operation at least one Ethernet connection. The SNMP card can be configured to send event/alarm emails, provide controlled server shut down (with optional licenses) and perform other tasks that can be integrated with BMS software over a local area network (LAN) for SNMP, or Modbus information over IP. An optional card is available to enable Modbus communications over RS485.



Parallel adapter (JD8)

In any multi-cabinet UPS system it is necessary to connect a parallel control bus between each cabinet. This is achieved by fitting a parallel interface board, which contains the necessary connectors to allow the cabinets to be connected together in a daisy chain fashion, into JD8 on the customer interface board. The parallel interface board, and cables, are supplied as an accessory kit that will be installed by the commissioning engineer.

UPS Monitoring and automated control software

The importance of UPS management

The utility supply is inevitably unreliable every now and then; and assuring continuous power to all the facilities connected to it can be a difficult task. The situation is further complicated if worldwide systems are managed via a Local or Wide Area Network (LAN/WAN).

However, by interfacing the PW9500DPA UPS system with purpose-designed network management tools, a System Administrator can take measures to back-up data and prevent system errors in the event of a long utility supply outage.

Suitable UPS management software can enable a System Administrator to monitor all attached networks from a central point and identify bottlenecks at an early stage but, in spite of extensive system monitoring, serious damage can still occur if an administrator fails to intervene in a timely manner. It is therefore important that, when appropriate, the installed UPS software can react automatically to shut down the supplied system in a safe and controlled manner.

Kohler Uninterruptible Power considers it important to have a complete solution for its UPS systems and offers its customers a number of remote control and monitoring tools to provide optimum protection.

Optional monitoring systems are available for use with the Kohler PW 9500DPA UPS system:

- SNMP – can be used for monitoring and controlled UPS shutdown
- WAVEMON – can be used for monitoring and controlled UPS shutdown

SNMP monitoring software

The SNMP adapter described above requires a PC with terminal connections and, for normal operation, at least one Ethernet network connection. It also requires that the network operating system in use is SNMP-compatible.

WAVEMON UPS monitoring and control software

WAVEMON is a bespoke software package, designed to operate in conjunction with many of the systems supplied by Kohler Uninterruptible Power, which features both UPS monitoring and automatic UPS/server shutdown facilities.

The package is installed on a local PC and communicates with the UPS via USB or an RS-232 serial cable so does not require the purchase of an SNMP card or adapter.

The main features of WAVEMON are:

- on-screen autonomy time/battery time countdown
- on-screen server log-off and shutdown procedure
- time and date stamp event log
- extensive logging of all UPS activity and power quality data
- permits alarm warnings to be monitored remotely via email
- scheduled UPS service mode and other systems status
- graphical user interface for Windows-compatible platforms
- automatic unattended local shutdown
- special modules for MS-Office software to close and save open documents
- compatible with all optional modules like UPSDIALER, SNMP adaptors, temperature sensors, etc.

Functional description

WAVEMON is a client/server software application designed for networks and local workstations. In general, it consists of two parts: the server module of the UPS management software is *UPSMAN,* which communicates with the UPS via an RS232/USB interface. Running as a background application, *UPSMAN* collects and interprets the messages received from the UPS and places them at the disposal of the client module *UPSMON,* as well as any connected SNMP-based instrumentation and control system.

If *UPSMAN* detects voltage variations or a power failure, it can execute various 'system event' routines, by means of which, for example, the server is switched off or a warning/alarm is sent to the connected users. These 'system event' routines are a part of the management software and can be configured in to suit local application requirements.

The PW9500DPA UPS software unit can be integrated into a network in two ways:

1. By the server which is supplied by the UPS itself and has been integrated into the network.

   In most cases this server is used as a sub-agent and you only need the WAVEMON software (without an SNMP adapter). You will also need to establish an RS232/USB connection between the UPS and computer/server.

2. By the use of an SNMP card/adapter

   An SNMP card/adapter is to be preferred in order to integrate the UPS into the network. In this case up to 50 computers can be shut down in one RCCMD environment. RCCMD (remote console command) is an additional software module that is used in order to execute a command (typically a shutdown command) in a remote system.

Licensing

A licence is issued with every software serial number for use of what is known as the 'UPS service' on a single server in connection with one UPS and an unlimited number of connected WINDOWS workstations. For operation with two or more servers, a further licence is required for each additional server. In this case it is of no importance whether the UPS service on these servers is active or whether the server was stopped by a remote UPS service. The same applies to the use of RCCMD with the 'remote send/receive' modules for 'multi-server shutdown' under NT, UNIX and other operating systems.

The service programs are generally supplied as single licences. In order to use a single CD-ROM for several 'multi-server shut-down' units you must acquire additional licence codes.

RCCMD Server shutdown

In order that remote shutdown of servers can take place, initiated by the SNMP card or WAVEMON software, further licenses must be purchased. The license is for the RCCMD client (or listening) software that resides in each target server.

PowerREPORTER™ management software

PowerREPORTER is a remote monitoring and management service which provides peace-of-mind protection by offering a continuous (24/7/365) watch over mission-critical facilities. Continuous monitoring is an affordable insurance policy to detect issues and provide an early warning before they develop into a crisis.

The main features and benefits offered by PowerREPORTER are:

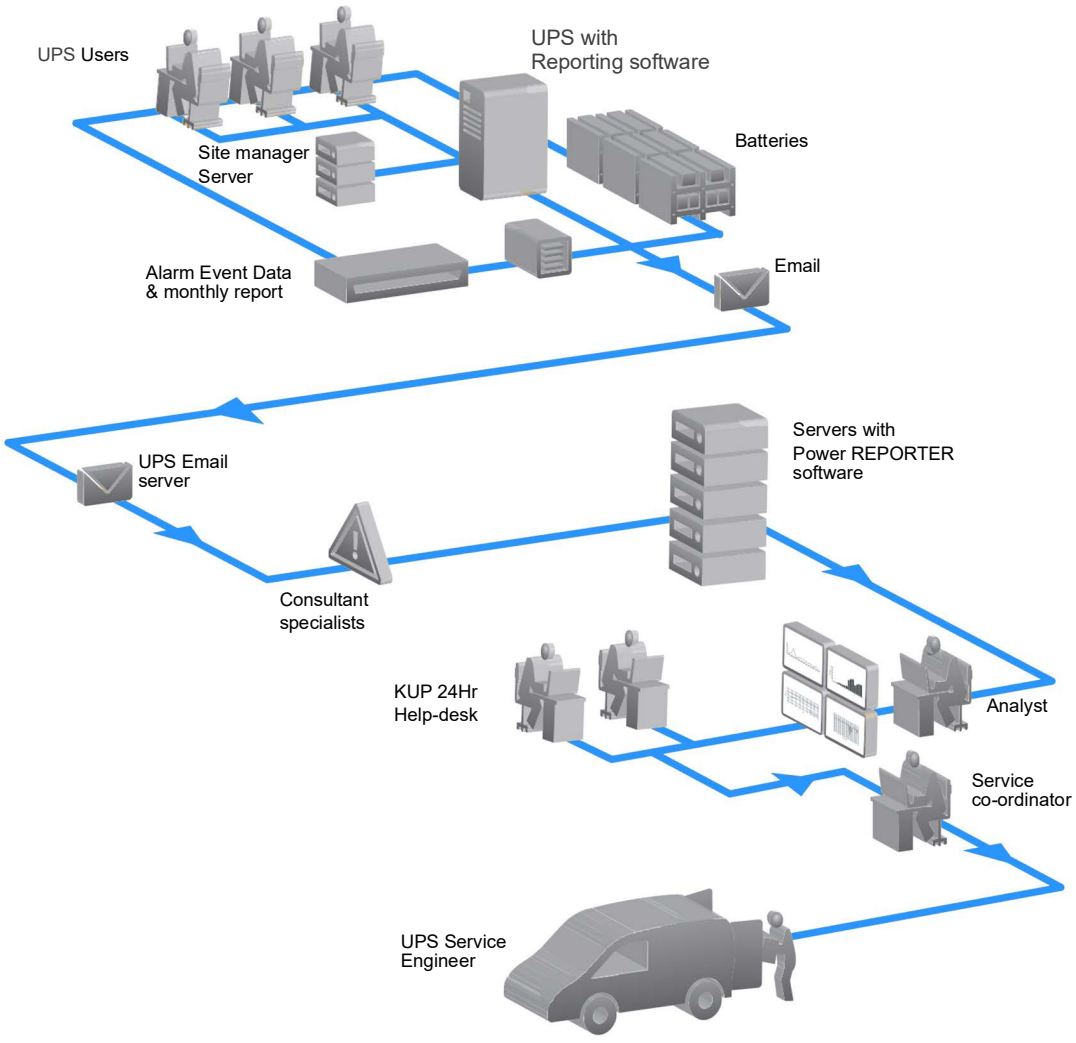
- Real time email notification sent directly to KUP Service Centre in response to alarm/critical events
- Acquisition of key performance data and productivity information. Empowers you with the details needed to better understand machine performance and quickly troubleshoot downtime events
- Improved service level. Combined with a service contract, PowerREPORTER ensures an engineer can determineif site attendance is necessary and bring relevant spare parts
- Monthly Status Report detailing trends and alarms

An optional battery analysis and care service; PowerNSURE - measures battery voltage, temperature, impedance and prolongs battery service life through the application of battery charge equalization

Functional description

PowerREPORTER communicates constantly with your UPS system to automatically detect any error or alarm messages. If it encounters an incident, PowerREPORTER will automatically transmit a status message, via email, to the Kohler Uninterruptible Power Ltd service centre providing details relating to the identified fault, a snapshot of the UPS performance parameters and a device identification string.

The email automatically alerts the service centre personnel who then remotely diagnose the UPS incident and liaise with the company's field service team so that they can reach the facility with appropriate spare parts within the contracted service agreement time-frame.



Remote monitoring communications chain

INSTALLATION PLANNING

The following *guidelines* should be taken into account when planning a suitable UPS location and working environment.

Location considerations summary

- The UPS equipment must be installed and transported in a upright position.
- The floor at the installed location and en-route from the off-loading point must be able to safely take the weight of the UPS and battery equipment.
- The floor material where the UPS is to be located should be non-flammable.
- Local fire protection standards must be respected.
- The appropriate power supplies must be accessible so that the UPS cabling can be performed easily.
- The location must be vibration free.
- If the UPS is to be installed in bayed enclosures, partition walls must be installed.

Environmental considerations summary

- Avoid high ambient temperature, moisture and humidity.The prescribed limits are humidity (<90% non-condensing) and temperature (0°C to +40°C and ideally 20°C to 25°C).
- A temperature of 20°C is recommended to achieve a long battery life.
- Any prescribed air cooling flow must be available. Ensure the air conditioning system can provide a sufficient amount of air cooling to keep the room at, or below, the maximum desired temperature.
- No dust or corrosive/explosive gases should be present.
- The location must be vibration-free.

UPS Cabinet Installation

Before moving the UPS to its final position, carry out any necessary pre-installation cabling (power and control cables) to ensure that full cable access is available once the UPS is placed in-situ. Top or bottom cable access is possible, or a combination of the two.

Key Point: The required cable entry method must be specified when placing an order.

Battery Cabinet Installation

We recommend that where possible the battery is contained in a purpose-designed cabinet installed immediately adjacent to the UPS cabinet. The battery cabinet can be positioned on either side of the UPS cabinet but we recommended that it is installed on the right hand side to minimise the length of the interconnecting DC cables.

If the batteries are to be mounted on external battery racks, rather than cabinet mounted, the battery must be sized to take into account the voltage drop between the battery installation and UPS. Contact Kohler Uninterruptible Power for installation advice and support if necessary.

Clearances

Cooling air enters the front and bottom of the UPS cabinet and is extracted by ventilation fans mounted on the cabinet rear. If the UPS cabinet is installed immediately adjacent to another cabinet, battery enclosure or wall, a minimum clearance of 300mm is required at the rear of the cabinet to allow sufficient cooling air flow.

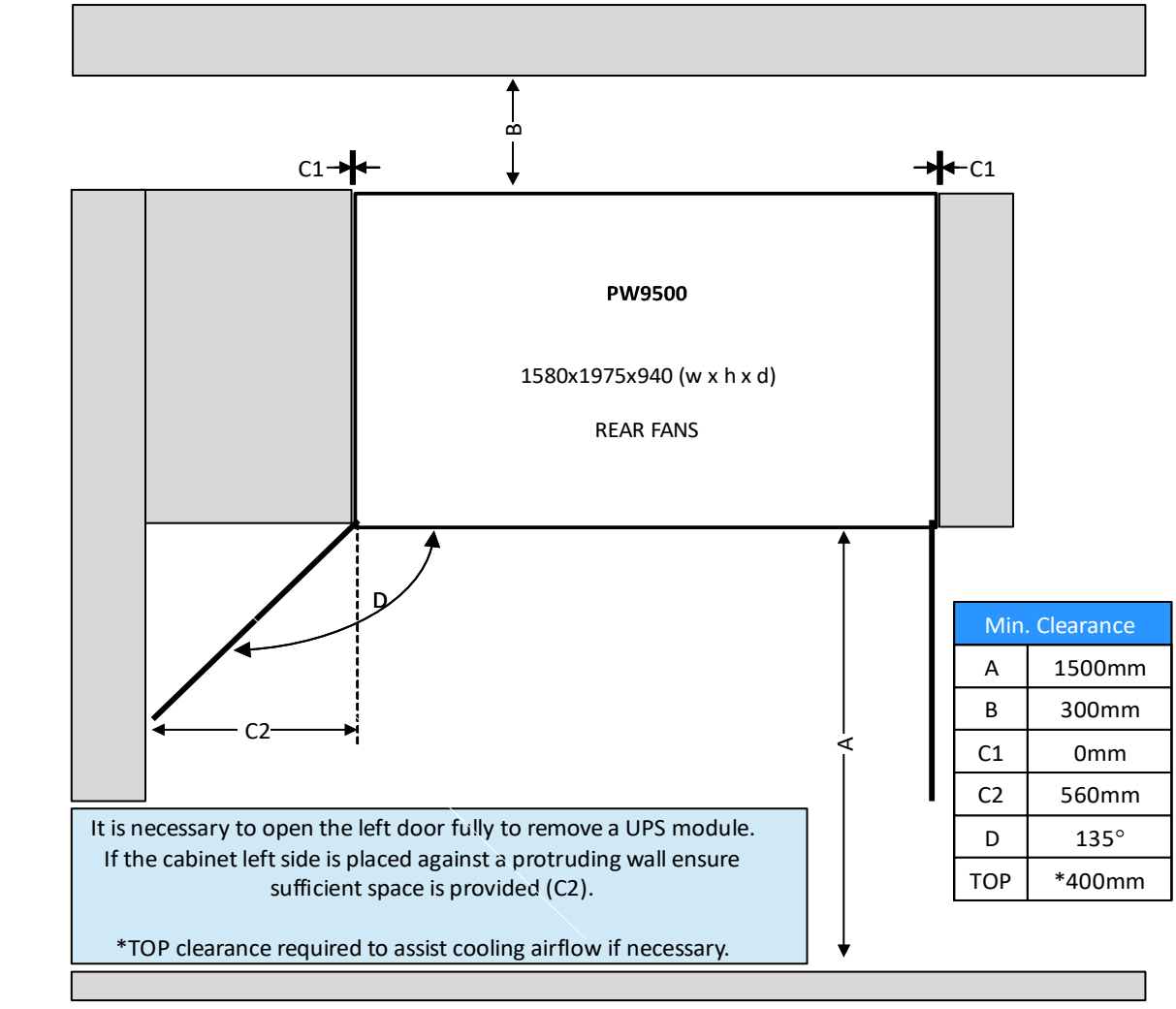
The UPS cabinet does not require any side clearance for ventilation or service access, so it can be installed immediately alongside another UPS cabinet or battery cabinet to form an equipment suite.

The recommended external battery cabinet supplied by Kohler Uninterruptible Power does not require any side or rear clearance.

All UPS cabling, maintenance and servicing procedures can be carried out from the front of the cabinet, and a front clearance of at least 1500mm should be provided to enable component replacement.

Key Point: When installing the UPS cabinet next to an external battery cabinet or battery rack, the battery cabinet/rack might require more than 1500mm front clearance which must be taken into consideration when installing a cabinet suite.

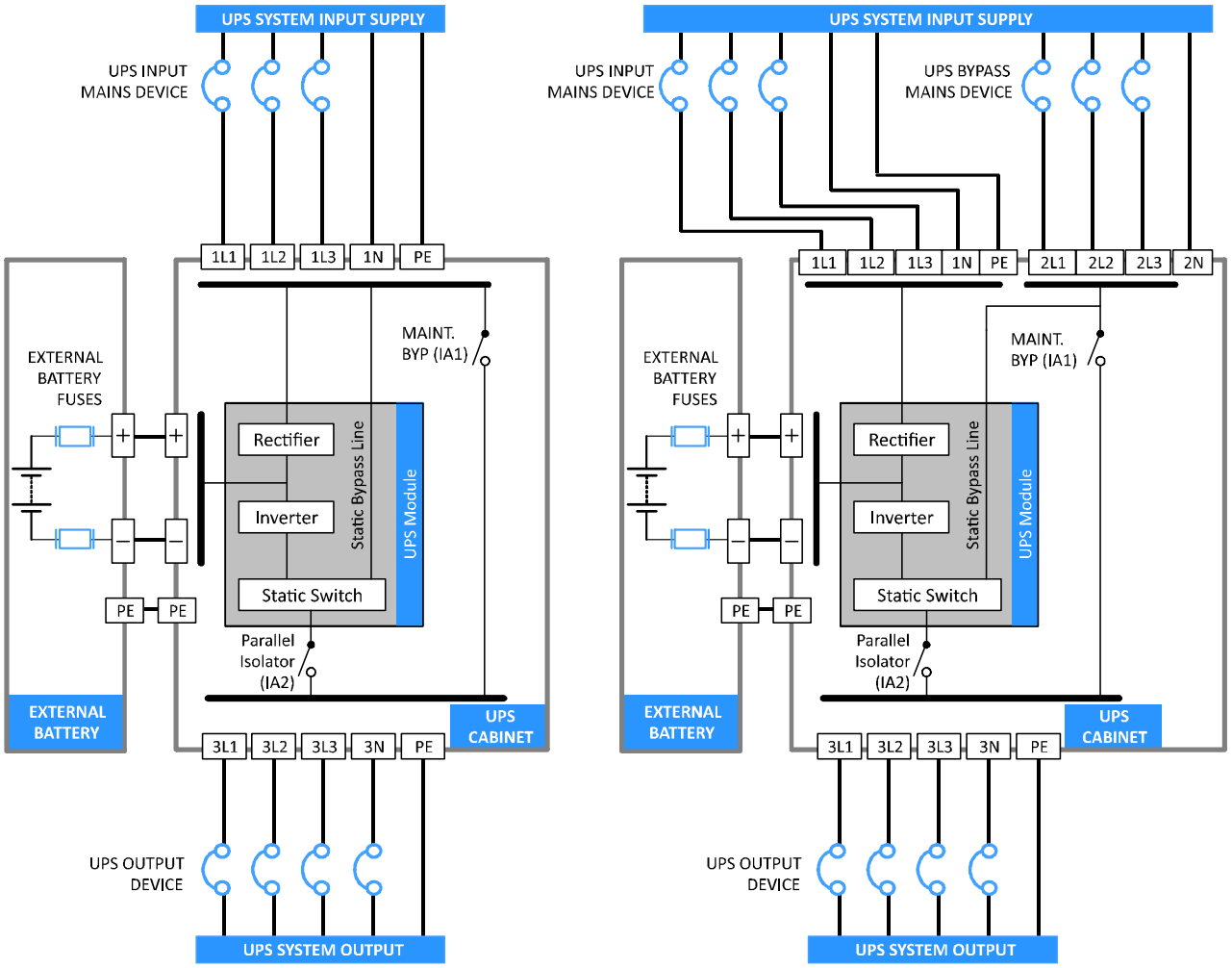
Key Point: The UPS left door must be fully opened (to approximately 135°) to enable some major component to be extracted from the cabinet. If the cabinet is positioned against a wall that protrudes in front of the cabinet you must allow adequate, additional side clearance. See the clearance diagram for details.



Min. Clearance	
A	1500mm
B	300mm
C1	0mm
C2	560mm
D	135°
TOP	*400mm

Cabling Planning

General requirements



The UPS cabinet can be designed for a single input feed, where the UPS input mains supply is connected internally to the UPS bypass terminals, or for a dual feed input where the UPS bypass circuit is connected to a dedicated bypass mains supply. The two designs are shown in the diagram above. Note that the input configuration must be selected when placing the order for the UPS system and it is not possible to change the configuration on site.

It is the customer's responsibility to design and install the UPS supply and distribution circuits and provide the external fuses, isolators and cables required to connect the UPS input and output power supplies, and external battery. The information provided in this section should assist in the planning and preparation of the UPS power cabling.

As shown above, the UPS input mains and bypass mains inputs should be connected to the UPS system via a circuit breaker or fused device. The input device provides a means of isolating the UPS from the utility mains supply and must be suitably rated to provides overload protection for the UPS.

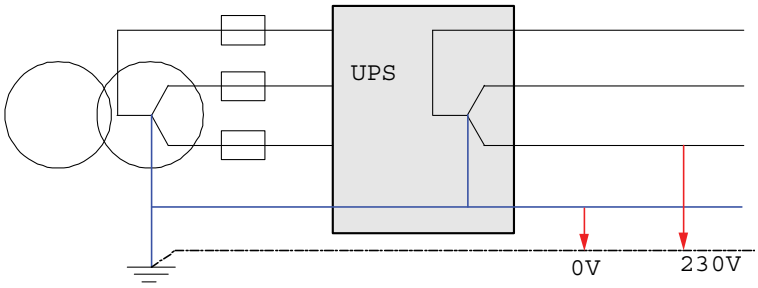
Similarly, the UPS output should be connected to the load equipment via a suitably protected UPS system output panel.

As shown, the battery positive and negative feeds must be fused within the battery cabinet (or immediately adjacent to the battery rack, where used). Kohler Uninterruptible Power can supply a matching battery cabinet containing the necessary fuses and switchgear.

Input neutral grounding

A permanently connected input neutral is required to enable the rectifier to operate correctly and allow the UPS to function properly when operating on battery.

The input neutral must also be grounded to permit correct operation when the UPS is running on battery.

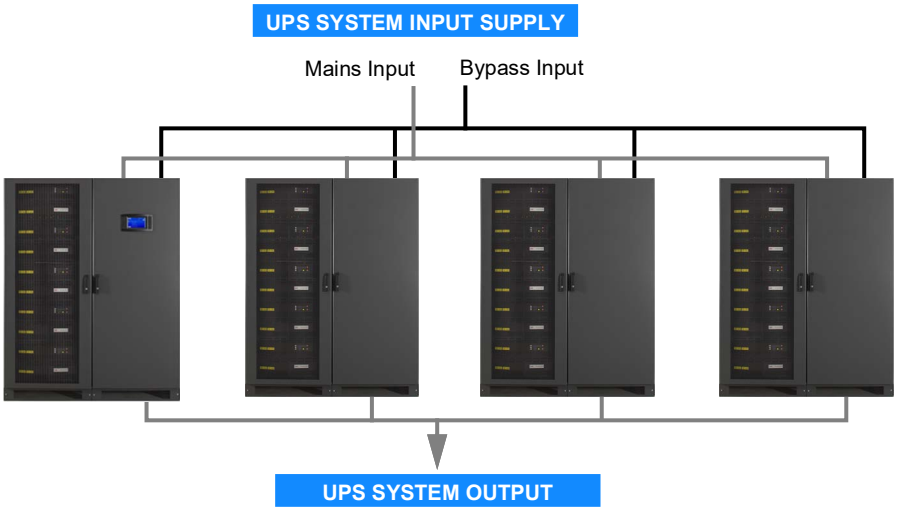


Key Point: As the input neutral must be unswitched and connected to the UPS at all times. DO NOT use, a 4-pole input switch or isolator at the LV Distribution board on a TN-S system.

Multi-cabinet cabling

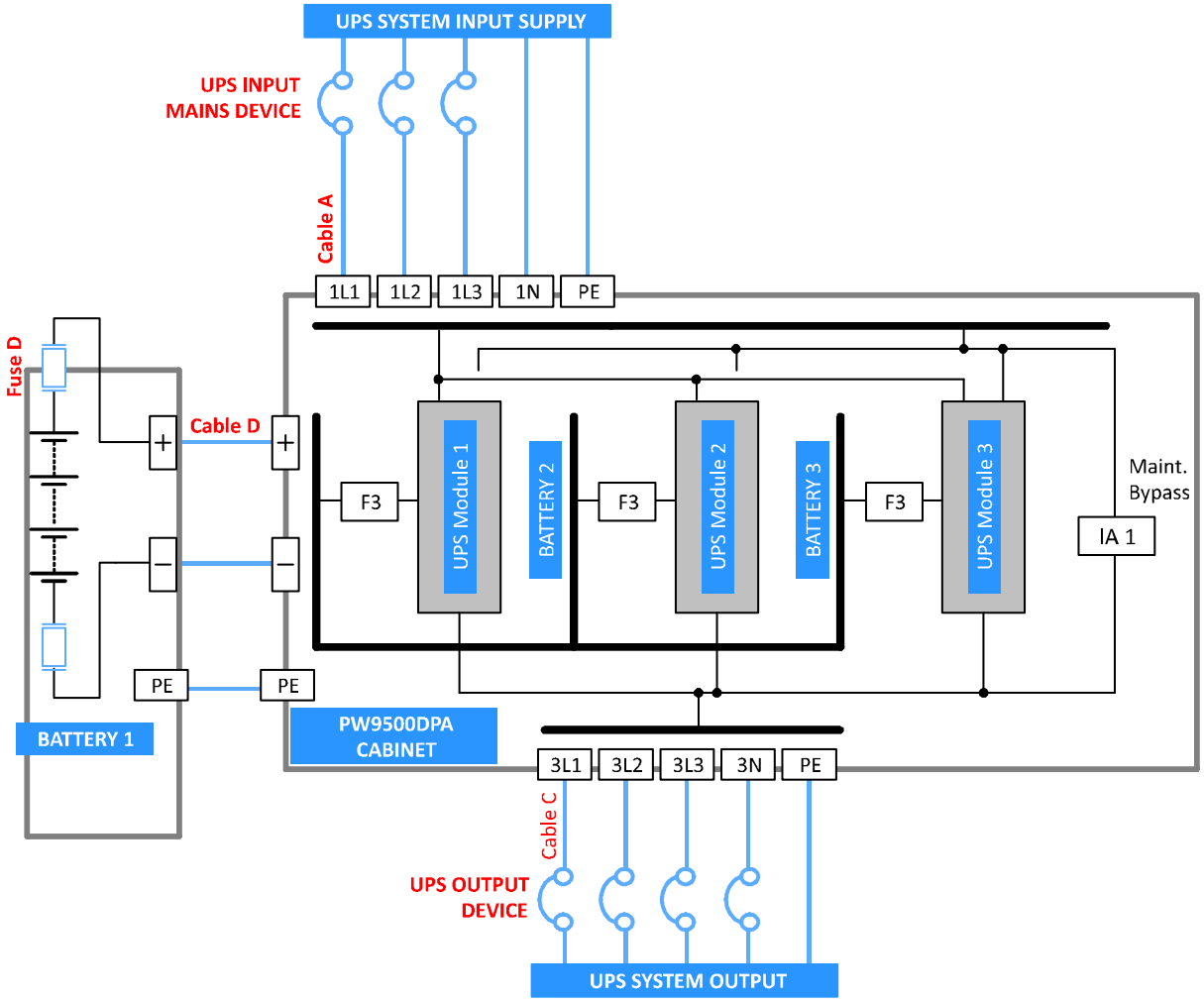
All the cabinets In a multi-cabinet installation must be fed from the same mains power source and the cables from the UPS system input supply panel to each cabinet should be of equal length. Similarly, the cables connected to the UPS system output panel should be of equal length – this helps to balance the load sharing between the cabinets

Correct



Incorrect

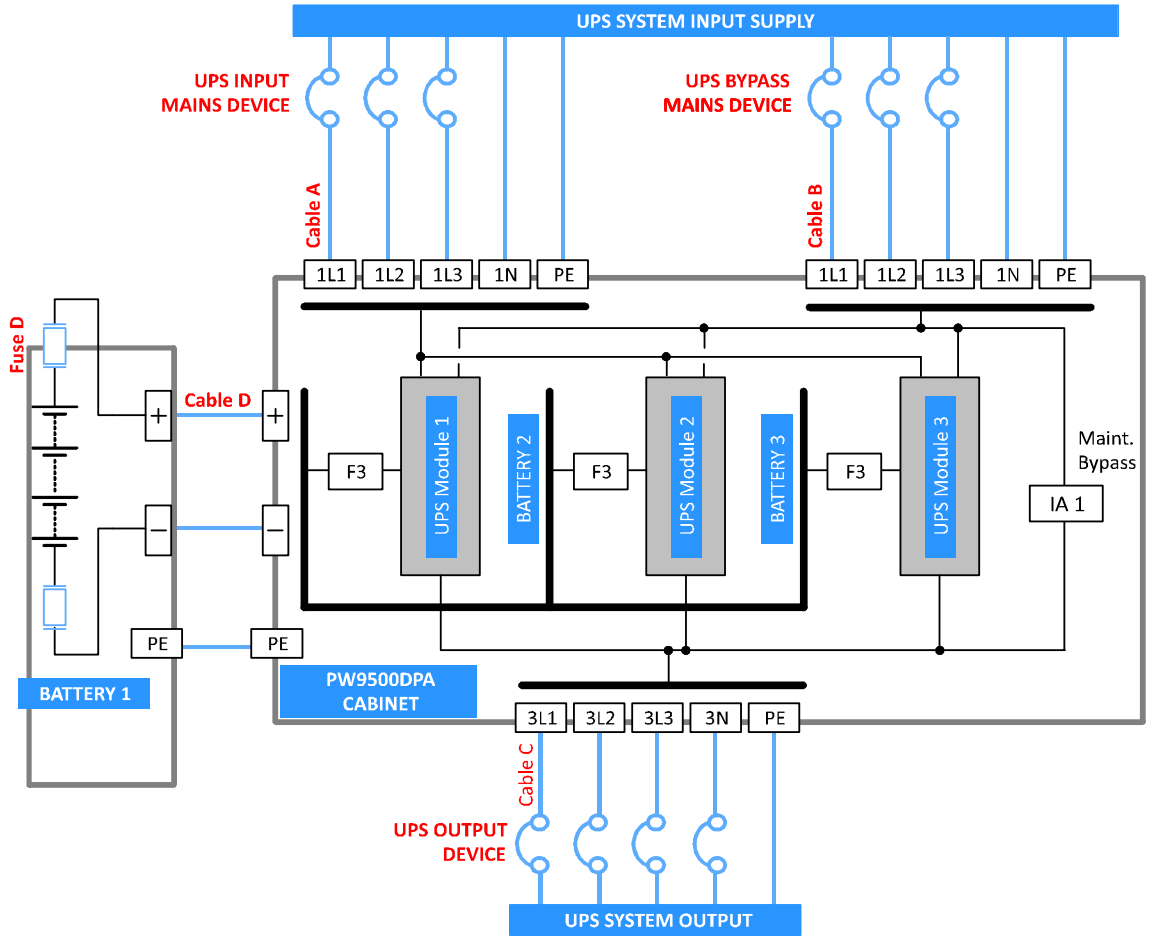
CABLE SIZING



These circuit diagrams identify (in red) the power cables, fuses and other protective devices that must be provided by the customer for a single-feed and dual-feed connected installation respectively. The table below shows the maximum UPS input and output current for each set of cables together with the cable termination details. This is provided to assist the customer in selecting appropriately rated power cables and external switchgear.

These illustrations show a single set of DC cables (cable D) connected between the UPS and external battery cabinet. In a ‘common battery’ installation (as shown) the battery positive and negative cables are connected to the common battery busbars which are located adjacent to the UPS input/output mains busbars. In a ‘separate battery’ installation the UPS battery busbars are removed and the individual battery positive and negative cables are connected directly to the modules’ battery circuit breaker (F3)

.



400V / 230V						BATTERY		
INPUT MAINS (A)		BYPASS MAINS (B)		UPS OUTPUT (C		PE	+ and –	N
Max. Current	Terminal	Max. Current	Terminal	Max. Current	Terminal	Terminal	Terminal	Terminal
835A	3x M12 (B) 1x M12 (N)(B) 1x M12 (PE)(B	732A	3 x M12 (B) 1x M12 (PE)(B)	724A	3x M12 (B) 1x M12 (N)(B) 1x M12 (PE)(B)	Separate Batteries +/- M8 (B) Separate Batteries M12 (N)(PE)(B) Common Battery +/- M12 (B) Common M12 (N)(PE)(B)		

(PE) = Protective Earth
(N) = Neutral
(B) = Busbar connections with indicated bolt size. Cable must be terminated with a suitable lug.
(T) = Screwed terminal block with indicated maximum cable c.s.a. Cable ends must be suitably prepared.

Key Point: This information is given for guidance only:

- Fuse and cable size recommendations are to IEC 60950-1:2001.
- All external fuses, isolators and power cables must be rated and installed in accordance with the prescribed IEC standards or local regulation – e.g. BS7671.
- External DC cables and battery fuses are bespoke to the installation.