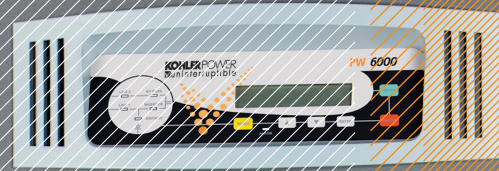


# Technical Specification

## Kohler PW 6000 (60-500kVA)



Pioneering solutions for  
total power protection



## Kohler PW 6000 UPS SYSTEM DESCRIPTION

Continuous power availability is essential in today's dynamic IT and process-related environments. It is equally important that any installed power protection system is sufficiently resilient and adaptable to handle any changes brought about by the introduction of new server technologies, migration and centralization. Such demands are well met by the Kohler PW 6000 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.

The Kohler PW 6000 UPS, which is available over a model range of 60kVA to 500kVA, incorporates the latest technological developments in power engineering and represents 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 PW 6000 features innovations that combine to deliver the industry's best key values such as: enhanced power performance, parallel capability and connectivity's interaction.

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.

### Kohler PW 6000 configurations

The Kohler PW 6000 UPS can be configured to operate as a single, stand-alone UPS or several (up to 10) UPS cabinets can be connected in parallel to operate as a multi-module UPS system. A multi-module configuration is generally chosen either to increase a system's total power capacity or to provide module redundancy in order to keep the load supplied in the event of a module failure.

Due to its Decentralised Parallel Architecture (DPA) design, each Kohler PW 6000 UPS can take the leadership role when operating in a multi-module system, which avoids single points of failure in the parallel chain and ensures the highest level of power availability.

### System expansion

Most data centres present a low initial power demand which increases as the data centre grows to its full capacity; and it is essential that the installed power protection system can be expanded to meet the growing demand without compromising the existing load. This situation is easily managed in a Kohler PW 6000 multi-module installation by adding an additional UPS(s) to an existing system to increase the overall system capacity without having to temporarily transfer the load to the raw mains (by-pass) supply. This results in the highest level of power availability interruption free.

### Key features


The highlights of this innovative UPS solution include its high reliability, upgrade ability, low operating costs and excellent electrical performance.

KEY FEATURES	
Compact size, small foot print	Space saving on expensive floor space
Flexible battery management	Advanced management of battery charging and preventive failure diagnostics avoids premature deterioration of battery life.
Best in class ac-ac efficiency, up to 96%	Energy-Operational cost savings (TCO)
Low input power factor (near unity)	Cost savings during installation and the entire life cycle (TCO)
Blade-server-friendly power; full power from 0.9 lead to 0.9 lag	No de-rating required with leading PF loads
Very low input current distortion THDi THDi = < 3.5% @ 100% load	Gen-set power and installation cost saving


## GENERAL SPECIFICATIONS

This Technical Specification provides detailed technical information on the mechanical, electrical and environmental performance of the Kohler PW 6000 60-500kVA model range; and is intended to support and provide answers to tender and end-user requirements.


MECHANICAL CHARACTERISTICS 60-100kVA (No Battery Enc.)				
Rating (kVA)		60	80	100
Dimensions (WxHxD)	mm	550 x 1820 x 750		
Dimensions with elevation kit (WxHxD)	mm	550 x 1975 x 750		
Weight	kg	205	225	230
Colour		Graphite Grey (RAL 7024)		
Batteries		Fitted in external enclosure		
Input and output power cable entry		Bottom		
Exhaust cooling air		Rear		



MECHANICAL CHARACTERISTICS 60-100kVA (Battery Enc. A)				
Rating (kVA)		60	80	100
Dimensions (WxHxD)	mm	970 x 1820 x 750		
Dimensions with elevation kit (WxHxD)	mm	970 x 1975 x 750		
Weight without batteries fitted	kg	250	260	285
Weight with 80 x 28Ah batteries fitted	kg	1140	1150	1175
Colour		Graphite Grey (RAL 7024)		
Batteries (Max configuration)		80 x 28Ah Battery blocks mounted on 16 shelves.		
Input and output power cable entry		Bottom		
Exhaust cooling air		Rear		



MECHANICAL CHARACTERISTICS 60-100kVA (Battery Enc. B)				
Rating (kVA)		60	80	100
Dimensions (WxHxD)	mm	1180 x 1820 x 750		
Dimensions with elevation kit (WxHxD)	mm	1180 x 1975 x 750		
Weight without batteries fitted	kg	260	270	295
Weight with 120 x 28Ah batteries fitted	kg	1590	1600	1625
Colour		Graphite Grey (RAL 7024)		
Batteries (Max configuration)		120 x 28Ah Battery blocks mounted on 24 shelves.		
Input and output power cable entry		Bottom		
Exhaust cooling air		Rear		



MECHANICAL CHARACTERISTICS 120-200kVA				
Rating (kVA)		120	160	200
Dimensions (WxHxD)	mm	850 x 1820 x 750		
Dimensions with elevation kit (WxHxD)	mm	850 x 1975 x 750		
Weight	kg	280	290	310
Colour		Graphite Grey (RAL 7024)		
Batteries		Fitted in external enclosure		
Input and output power cable entry		Bottom		
Exhaust cooling air		Rear		



MECHANICAL CHARACTERISTICS 250-300kVA				
Rating (kVA)		250	300	
Dimensions (WxHxD)	mm	1100 x 1920 x 750		
Dimensions with elevation kit (WxHxD)	mm	1100 x 1975 x 750		
Weight	kg	390	410	
Colour		Graphite Grey (RAL 7024)		
Batteries		Fitted in external enclosure		
Input and output power cable entry		Bottom		
Exhaust cooling air		Rear		



MECHANICAL CHARACTERISTICS 400-500kVA				
Rating (kVA)		400	500	
Dimensions (WxHxD)	mm	1650 x 1994 x 850		
Dimensions with elevation kit (WxHxD)	mm	1650 x 2094 x 850		
Weight	kg	950	1000	
Colour		Graphite Grey (RAL 7024)		
Batteries		Fitted in external enclosure		
Input and output power cable entry		Bottom		
Exhaust cooling air		Top		



SYSTEM CHARACTERISTICS					
Topology		On-line, double conversion, Voltage and Frequency Independent (VFI)			
Technology		Second generation transformerless design			
Parallel configuration expansion		For added redundancy and/or capacity a parallel system can be extended to up to 10 modules on request			
Double conversion AC/AC efficiency with fully charged battery and linear load (PF = 1)	Load	25%	50%	75%	100%
	% eff.	95.5%	96.0%	95.5%	95.0%

INPUT CHARACTERISTICS		60	80	100	120	160	200	250	300	400	500
Nominal input voltage	V	3x 380/220V+N, 3x 400/230V+N, 3x 415/240V+N									
Input voltage tolerance (ref to 3x400/230V) for Loads in %:	V	(-23% to +15%) 3x308/177 V to 3x460/264 V for <100 % load (-30% to +15%) 3x280/161 V to 3x460/264 V for < 80 % load (-40% to +15%) 3x240/138 V to 3x460/264 V for < 60 % load									
Input frequency	Hz	35-70									
Inrush current	A	Limited by soft start									
Max. Input Power with rated output power and charged battery (pf=1.0)	kW	64	85	107	128	170	213	266	319	426	532
Max. Input Current with rated output power and charged battery (pf=1.0)	A	93	123	154	185	247	308	386	463	617	771
Max. Input Power with rated output power and discharged battery (pf=1.0)	kW	70	94	117	141	187	234	293	351	468	585
Max. Input Current with rated output power and discharged battery (pf=1.0)	A	102	136	170	204	271	339	424	509	679	848
		<b>Load</b>	<b>25%</b>	<b>50%</b>	<b>75%</b>	<b>100%</b>					
Input power factor (leading)		0.96	0.985	0.99	0.99						
Input current distortion (THDi) (%)		9.0	6.0	4.5	3.5						

BATTERY CHARACTERISTICS		60	80	100	120	160	200	250	300	400	500
Variable number of 12V battery blocks (only even numbers allowed)	No.	44/50				50		44/50			
Max. battery charger current	A	25			50			60		100	
Battery type		Maintenance-free VRLA or NiCd									
Temperature controlled charger		Yes (temperature sensor optional)									
Battery charging curve		Ripple-free: IU (DIN 41773)									
Battery test		Automatic and periodic (adjustable)									

OUTPUT CHARACTERISTICS		60	80	100	120	160	200	250	300	400	500
Output rated power (@min 44 battery blocks)	kW	60	80	100	120	160	*200	250	300	400	500
Output current In (PF=1.0) (@min 44 battery blocks)	A	87	116	145	174	232	*290	361	433	577	722
Output rated voltage	V	3x 380/220 or 3x 400/230 or 3x 415/250									
Output voltage stability (Static)	%	< ± 1.0									
Output voltage stability (Dynamic)	%	< ±4 (with load step 0-100%, 100-0%)									
Output voltage distortion with linear load	%	< 2 with linear load									

OUTPUT CHARACTERISTICS (Continued)		60	80	100	120	160	200	250	300	400	500
Output voltage distortion with non-linear load	%	< 4 (EN 62040-3:2001)									
Output frequency	Hz	50 or 60									
Output frequency tolerance	%	±0.1 free-running, quartz oscillator ±2 or ±4 with mains synchronised (selectable)									
Frequency slew rate	Hz/s	1.0									
Output waveform		Sinewave with 0deg. phase imbalance @ 100% unbalanced load									
Permissible unbalanced load	%	100% (all 3 phases independently regulated)									
Overload capability on inverter	%	At PF=1.0 110% load for 10 minutes At PF=1.0 135% load for 1 minute At PF=0.9 125% load for 10 minutes At PF=0.9 150% load for 1 minute									
Inverter short circuit capability (x rated output for 40ms)	A	2.7x	2.0x	2.3x	1.8x	1.9x	2.1x	1.8x	2.0x	2.0x	2.0x
Bypass short circuit capability		10x rated In for 10ms									
Crest factor		3:1									
Bypass operation		At ±15.0% of nominal input voltage									
* With 50 battery blocks only											

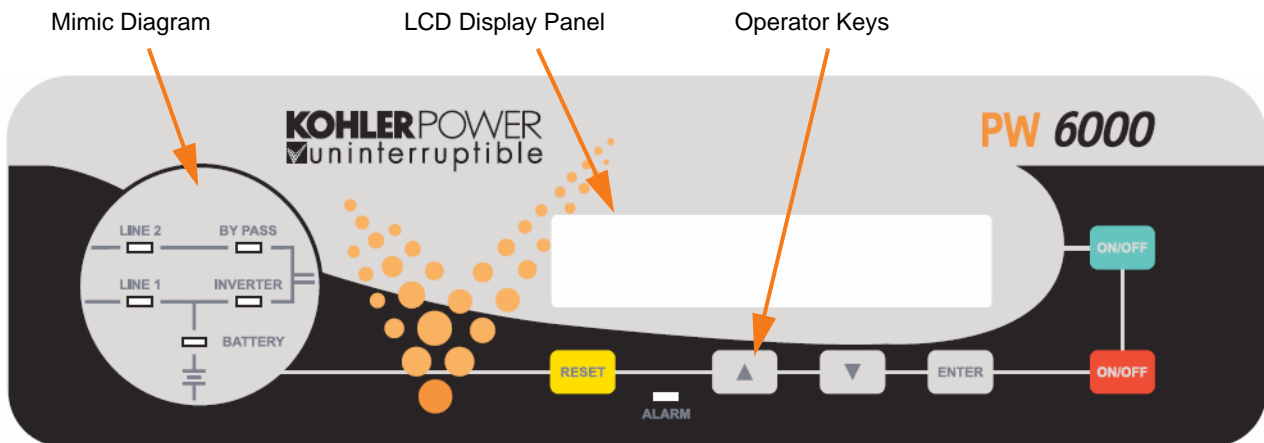
OUTPUT POWER VERSUS COS Ø															
Module		Inductive (lagging COS Ø)								Unity	Capacitive (leading COS Ø)				
		0.6	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1.0	0.95	0.9	0.85	0.8	
60	kVA	60	60	60	60	60	60	60	60	60	60	60	60	59	58
	KW	36	39	42	45	48	51	54	57	60	57	54	50	46	
80	kVA	80	80	80	80	80	80	80	80	80	80	80	80	78	77
	KW	48	52	56	60	64	68	72	76	80	76	72	66	61	
100	kVA	100	100	100	100	100	100	100	100	100	100	100	100	98	97
	KW	60	65	70	75	80	85	90	95	100	95	90	83	77	
120	kVA	120	120	120	120	120	120	120	120	120	120	120	120	117	116
	KW	72	78	84	90	96	102	108	114	120	114	108	100	92	
160	kVA	160	160	160	160	160	160	160	160	160	160	160	160	156	154
	KW	96	104	112	120	128	136	144	152	160	152	144	132	122	
200*	kVA	200	200	200	200	200	200	200	200	200	200	200	200	195	194
	KW	120	130	140	150	160	170	180	190	200	190	180	166	154	
250	kVA	250	250	250	250	250	250	250	250	250	250	250	250	245	241
	KW	150	163	175	188	200	213	225	238	250	238	225	208	192	
300	kVA	300	300	300	300	300	300	300	300	300	300	300	300	294	291
	KW	180	195	210	225	240	255	270	285	300	285	270	249	231	
400	kVA	400	400	400	400	400	400	400	400	400	400	400	400	392	388
	KW	240	260	280	300	320	340	360	380	400	380	360	333	310	
500	kVA	500	500	500	500	500	500	500	500	500	500	500	500	490	485
	KW	300	325	350	375	400	425	450	475	500	475	450	417	338	
Vout=230Vac (L-N), 50 Hz, with minimum of 44 battery blocks (*50 Battery blocks on 200kVA model)															

ENVIRONMENTAL CHARACTERISTICS											
		60	80	100	120	160	200	250	300	400	500
Audible noise @ 100/50% load	dBA	< 65			< 69			< 71		N/A	
Ambient temperature for UPS	°C	0-40									
Ambient temperature for batteries (recommended)	°C	20									
Battery storage time at ambient temperature		Maximum 6 months									
Fan assisted cooling air flow		Front entry, rear exit								Front entry top exit	
Airflow (25 - 30°C) with 100% non-linear load	m³/h	1300	1500	1700	2500			3350		6550	
Heat dissipation with 100% non-linear load	W	3830	5106	6368	7660	10213	12766	15957	19149	24000	30000
Heat dissipation with 100% non-linear load	BTU/h	13071	17428	21785	26142	34856	43570	54462	65355	81913	102389
Heat dissipation without load	W	850			1500			2300		4000	
Relative air-humidity		Maximum 95% (non-condensing)									
Max altitude above sea level without derating		1000m (3300ft) without derating									
De-rating factor for use at altitudes above 1000m sea level according (IEC 62040-3)	Height above sea level (m/ft)	1500 / 4850					Derating factor for power				
		2000 / 6600					0.95				
		2500 / 8250					0.91				
		3000 / 9900					0.86				
							0.82				

STANDARDS	
Safety	EN62040-1-1:2003 EN60950-1:2001/A11/;2004
Electromagnetic compatibility	IEC/EN 62040-2:2005, IEC/EN61000-3-2:2000, IEC/EN61000-6-2:2001,
Performance	EN 62040-3:2001
Product certification	CE
Degree of protections	IP20

COMMUNICATION OPTIONS	
Power Management Display (PMD)	LCD display and mimic diagram showing UPS operational status
Customer Interfaces: (Dry Ports)	Volt-free output interface provide status and alarm outputs for remote indication and interfacing with BMS systems. Together with customer inputs interface for connecting an Emergency Stop, On Generator status etc.
RS232 on Sub-D9 port RS232 on USB port	For monitoring and integration in network management
RS485 on RJ45 port	Remote monitoring system with graphical display (option)
RS485 on RJ45 port	For multidrop purposes (option)
Slot for SNMP Card	Ethernet card for monitoring and integration in network management (option)
Slot for SNMP Card	Modem card for GSM remote monitoring (option)

## Power management display (PMD)



The user-friendly Power Management Display provides access to all monitoring information and operator controls.

### Mimic diagram

The mimic diagram contains multi-coloured LEDs that change between GREEN, RED and OFF to indicate the UPS operation and power flow status.

LEDs LINE 1 and LINE 2 indicate the availability of the input mains and bypass mains power supplies respectively, and are both GREEN during normal operation.

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

The BATTERY LED indicator is a solid GREEN when the battery is being charged and flashes when the battery is discharging – e.g. when it is providing the output load power during a mains failure.

The ALARM LED, located at the lower-centre area of the Power Management Display, is a visual indication of any monitored internal or external alarm condition. When activated, it is accompanied by an audible alarm that can be cancelled by pressing the RESET button.

### LCD Display panel

The 2x 20 character multi-function LCD Display is menu-driven using the UP, DOWN and ENTER operator keys. It provides a simple communications interface that enables the operator to monitor important UPS operating parameters and alarm warnings, and carry out various control operations such as transferring the load between the inverter and bypass.

#### **LCD Display panel summary:**

- 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
- Enables battery run time monitoring
- Enables selection of commands such as UPS Start-up and Shut-down, Load transfer between inverter and bypass.
- Provides diagnostic facilities and access to UPS adjustments and testing facilities (service mode only)



### Customer interfaces (Dry ports)

Customer I/O interface facilities are made to Phoenix spring terminal blocks (cable 0.2mm<sup>2</sup> to 1.5mm<sup>2</sup>) annotated X1, X2 and X3. All voltage-free contacts are rated at 250Vac/8A, 30Vdc/8A, 110Vdc/0.3A, 220Vdc/0.12A

#### 60-300kVA Model interface connections

	Terminal	Contact	Signal	Display	Function
X1	X1/10	Gnd	Gnd		+12Vdc Power source (max 200mA)
	X1/9	In	+12Vdc		
	X1/8	Gnd	Gnd		REMOTE SHUTDOWN (Do not remove the factory-fitted bridge if this feature is not used)
	X1/7	In	+12Vdc		
	X1/6	Gnd	Gnd		Battery Temperature Sensing (If connected this input is battery temperature dependent)
	X1/5	In	+3.3V		
	X1/4	Gnd	Gnd		Customer Specific Input (1) (Function on request)
	X1/3	In	+12Vdc		
	X1/2	Out	Gnd		Customer Specific Input (2) (Default NC = Generator on line)
	X1/1	Gnd	+12Vdc		
X2	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

**400-500kVA Models interface connections**

	Terminal	Contact	Signal	Display	Function
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		Customer Specific Input (2) (No defined default function)
	X3/11	In	+12V		
	X3/10	Gnd	Gnd	GENERATOR OPER ON	Customer Specific Input (1) (Default NC = Generator on line)
	X3/9	In	+12V		
	X3/8	Gnd	Gnd	EXT MAN BYP	External Manual Bypass (Default NC = External bypass closed)
	X3/7	In	+12V		
	X3/6	Out	+12V		+12Vdc Power source (max 200mA)
	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	-			
X2	X2/18	Com			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			
X1	X1/2	230Vac	-	EXT MAN BYP	Castell Interlock Function
	X1/1	N	-		External Manual Bypass closed (230Vac 2AT)

**RS232 Computer serial interface**

A serial RS 232 interface is available through a standard 9-pin, female D-Type socket (JD1 Smart Port) and a standard USB port.

The Smart Port provides an intelligent RS 232 serial port which allows the UPS to be connected to a computer. When used in conjunction with the optional WAVEMON software, it enables the computer to continuously monitor the input mains voltage and UPS status, and display a message in the event of any UPS system changes.

### RS485 Interface for multidrop

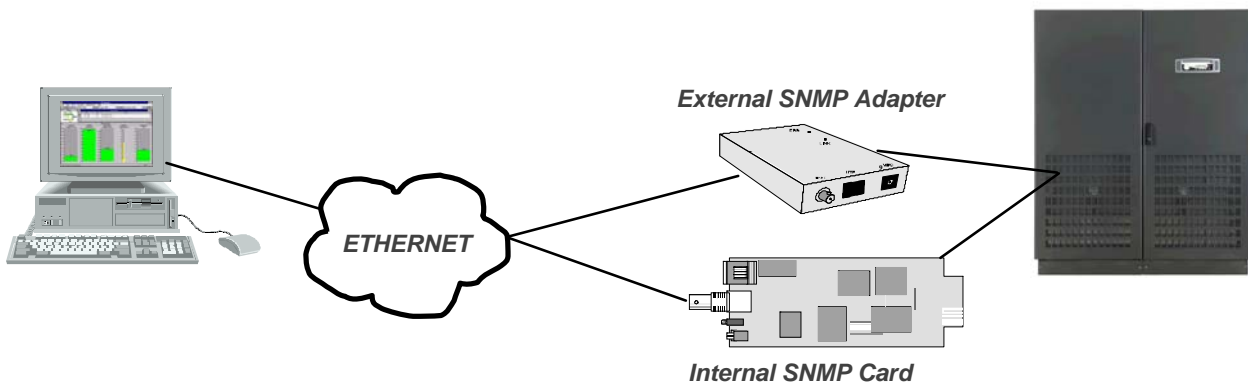
The computer interface (JR1) is an intelligent RS485 serial port that allows a computer to access system information from all the modules that are connected in a parallel system, using the Multidrop connection kit. The retrieved data can be used to display the system operating parameters and status. JR1 is a standard RJ45 socket.

### 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. The monitored results are displayed in an application running within a standard web browser.

The Kohler PW 6000 contains two SNMP slots; one is designed to house a Modem/Ethernet SNMP adapter card and the other a Modem/GSM adapter. Alternatively, SNMP connectivity can also be implemented using an external SNMP adapter connected to the UPS RS232 output.

An SNMP/Ethernet adapter contains an RJ-45 connector which allows it to be connected to the network using a standard network cable. Once connected, the UPS-Management software agent, which is already installed in the SNMP adapter, then monitors the UPS operating parameters 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.



## UPS MONITORING AND AUTOMATED CONTROL SOFTWARE

Three (optional) monitoring systems are available for use with the Kohler PW 6000 UPS system:

- SNMP – can be used for monitoring and controlled UPS shutdown
- WAVEMON – can be used for monitoring and controlled UPS shutdown
- PowerREPORTER – can be used to automatically email Kohler Uninterruptible Power details of monitored parameters and alarm events for appropriate service support response

### 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 designed to operate in conjunction with many of the systems supplied by Kohler Uninterruptible Power and features both UPS monitoring and automatic UPS/server shutdown facilities. The system comprises a bespoke software package which is installed on a local PC and communicates with the UPS over a standard RS232 cable of up to 15m in length.

Kohler Uninterruptible Power offer suitable monitoring software with SNMP functionality for NetWare, OS/2, all Windows NT systems on INTEL and ALPHA network platforms.

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.

## **PowerREPORTER™ management software**

PowerREPORTER™ is a remote monitoring and management service which is a part of the 'premium power protection concept'.

ThePowerREPORTER™ application:

- Provides affordable, continuous monitoring over mission-critical facilities and offers peace of mind by detecting and warning of any potential system problems before they become a crisis.
- Acquires key performance parameters and productivity information in real-time to enable you to better understand machine performance and faster troubleshoot downtime events
- Gives total transparent information concerning all actions performed on the system, such as all critical status changes, coordination of equipment service, reporting of all alarms with priorities

### **Key features**

- Redundant and secure communication
- Alarm acknowledgment
- Priority driven Management (with escalation)

### **Comprehensive management system**

- Reception and management of alarm calls from Kohler Uninterruptible Power
- Storage of UPS data in a database exportable in a CSV-format for easy handling in Excel
- Unlimited number of UPS that can be managed
- User administration with passwords and permission-level
- Administration of Log file
- Data logging with statistical analysis and diagnostics, report
- Visualization of the UPS data
  - Current status
  - Measured values for single or three phase
  - Recording function including graphs with zooming capabilities for selected measured values
  - Display of event log file
  - Display of UPS parameters
  - Web server functionality, for data access from any web browser

## **INSTALLATION PLANNING**

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

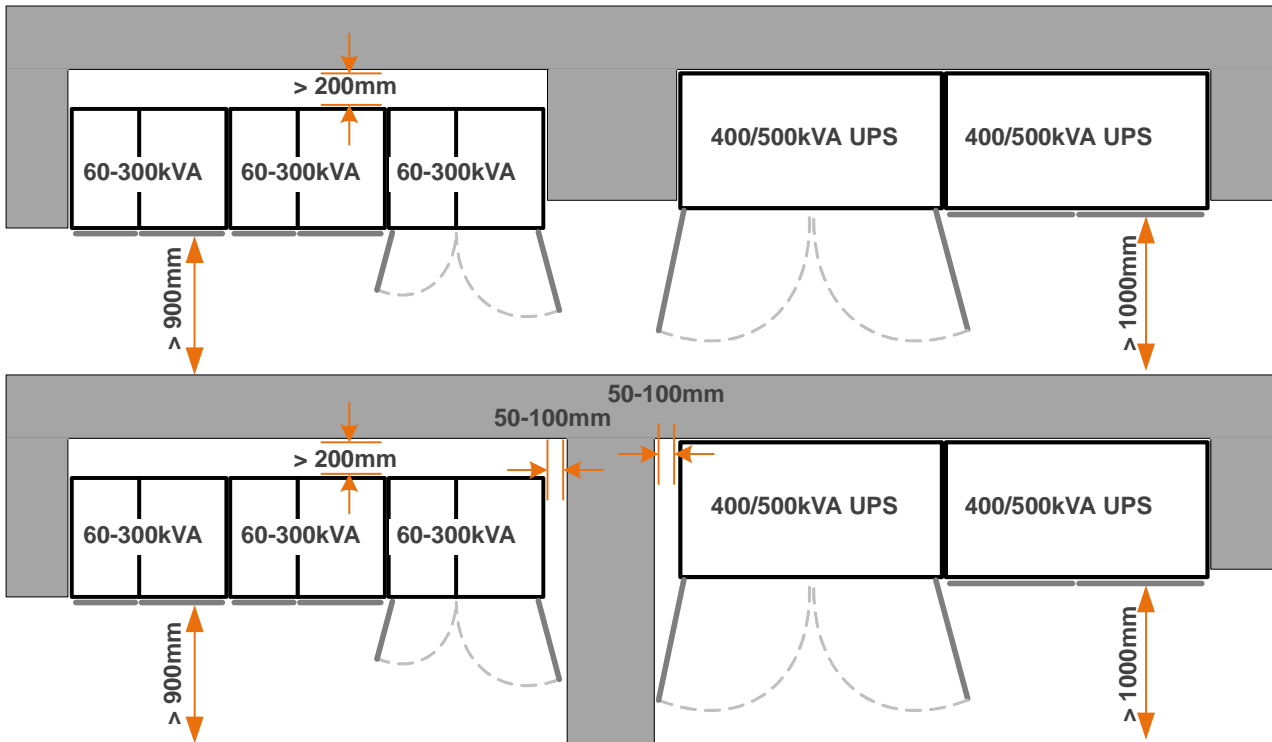
### **Location considerations summary**

- The 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
- Ensure that appropriate power supplies are available and that 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.  
Humidity (< 90% non-condensing) and temperature (+15°C / +25°C) are within prescribed limits
- An ambient 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.
- Ensure no dust or corrosive/explosive gases are present

**CLEARANCES**



The above diagram illustrates the recommended clearances to be provided around the UPS cabinets.

**Notes**

1. All cables enter the UPS via the bottom of the cabinet therefore no service/installation access is required from the rear or sides of the cabinets.
2. A minimum of 900-1000mm clearance is required at the front of the cabinets for service access, and where possible this should be increased to allow safe passage in front of the UPS with the doors open.
3. In order to gain full access to some internal components it is necessary to open the doors by slightly more than 90°. If the cabinet is located adjacent to a partition or wall that extends beyond the front of the cabinet a clearance of 50-100mm should be provided between the cabinet and the partition to allow the doors to open adequately, as illustrated in the lower diagram above. Note that there is no space required between cabinets.
4. The 60-300 kVA cabinets are force-cooled by rear-mounted extraction fans which require a minimum of 200mm space at the rear of the cabinet to allow adequate exhaust air flow.
5. The 400-500 kVA cabinets are force-cooled by roof-mounted extraction fans. These cabinets do not require any space at the rear of the cabinet but a minimum free space of 400mm is required above the cabinets to allow adequate exhaust air flow.

**UPS POWER CABLING**

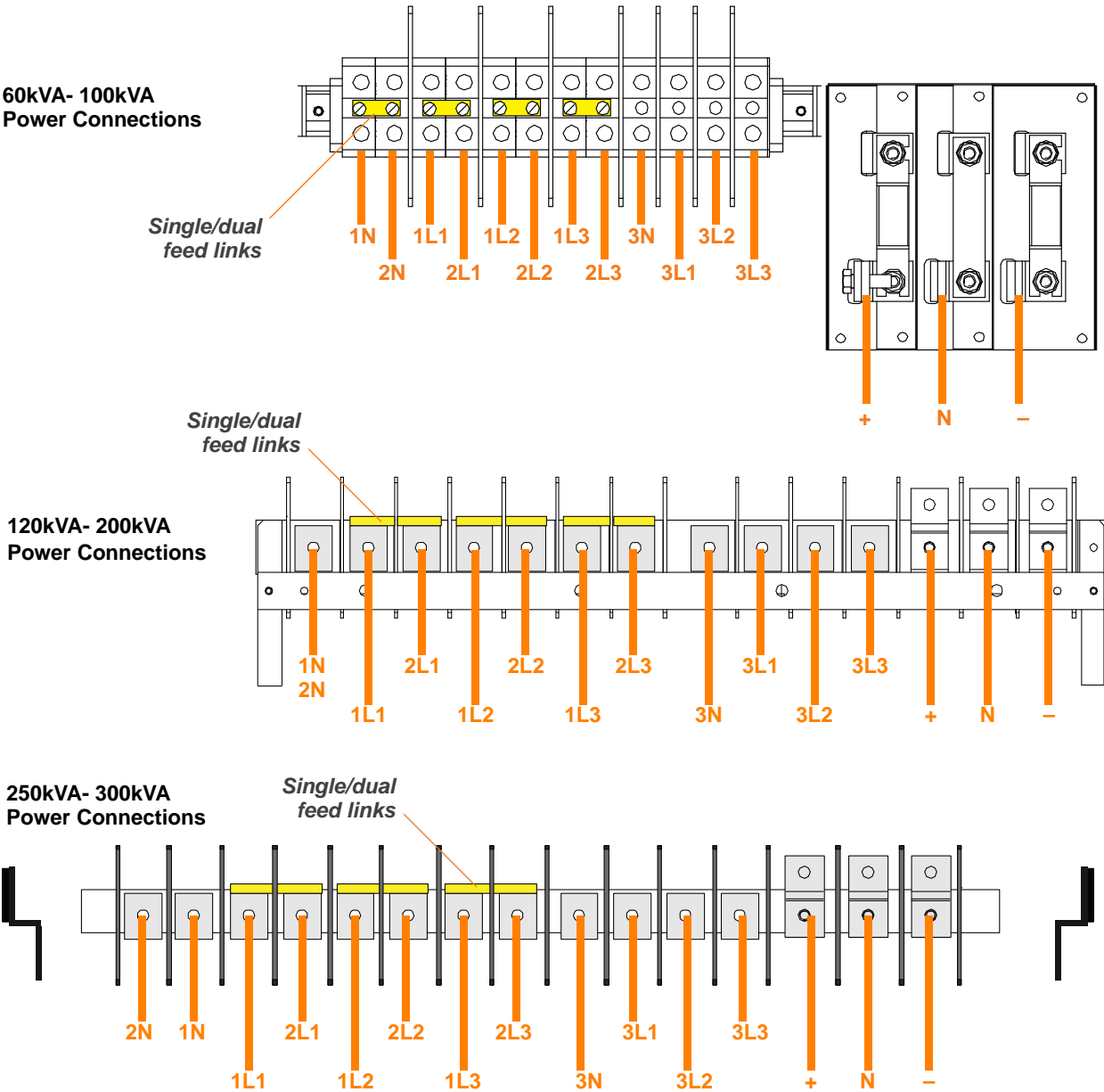
All power cables are connected to a row of busbars or terminal blocks located near the bottom of the UPS cabinet.

**Single/dual feed input**

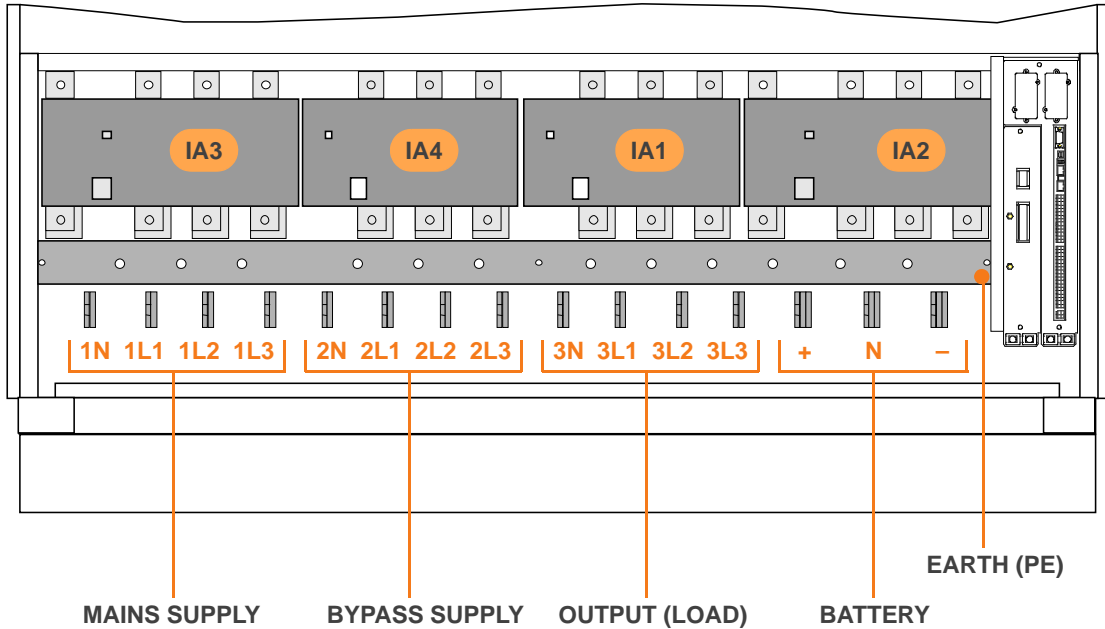
The UPS can be configured for either a 'single feed' or 'dual feed' input. In the case of a single feed input (standard) the bypass supply terminals are linked to the mains supply terminals and the mains supply cables therefore feed both inputs. Where a 'dual feed' configuration is used, the links between the bypass supply and mains supply terminals are removed and the bypass supply is connected to a separate power source.

**Input/Output supply protection**

The UPS mains/bypass cables must be connected to their respective power supplies via an LV-Distribution board. Suitable fuses or circuit breakers must be installed to provide both overload protection and a means of isolating the UPS from the mains supply when required. Similarly, the UPS output cables should be connected to the load equipment via a suitably protected load distribution panel.



**400kVA- 500kVA  
Power Connections**



**Terminal Connections**

	Mains Supply (3+N+PE)	Bypass Supply (3+N)	Output Load (3+N+PE)	Battery (+ / N / - / PE)	Max admissible cable section (mm <sup>2</sup> )	Tightening Torque (Nm)
60kVA	4 x 35 mm <sup>2</sup> + PE M8	4 x 35 mm <sup>2</sup>	4 x 35 mm <sup>2</sup> + PE M8	4 x M8	35	3.5
80kVA	4 x 50 mm <sup>2</sup> + PE M8	4 x 50 mm <sup>2</sup>	4 x 50 mm <sup>2</sup> + PE M8	4 x M8	50	5
100kVA	4 x 70 mm <sup>2</sup> + PE M8	4 x 70 mm <sup>2</sup>	4 x 70 mm <sup>2</sup> + PE M8	4 x M8	95	8
120kVA	5 x M10	4 x M10	5 x M10	4 x M10	185	Max. 50
160kVA	5 x M10	4 x M10	5 x M10	4 x M10	185	Max. 50
200kVA	5 x M10	4 x M10	5 x M10	4 x M10	240	Max. 50
250kVA	5 x M10	4 x M10	5 x M10	4 x M10	240	Max. 50
300kVA	5 x M10	4 x M10	5 x M10	4 x M10	240	Max. 50
400kVA	3x (5 x M12)	3x (4 x M12)	3x (5 x M12)	3x (4 x M12)	240	Max 84
500kVA	3x (5 x M12)	3x (4 x M12)	3x (5 x M12)	3x (4 x M12)	240	Max 84

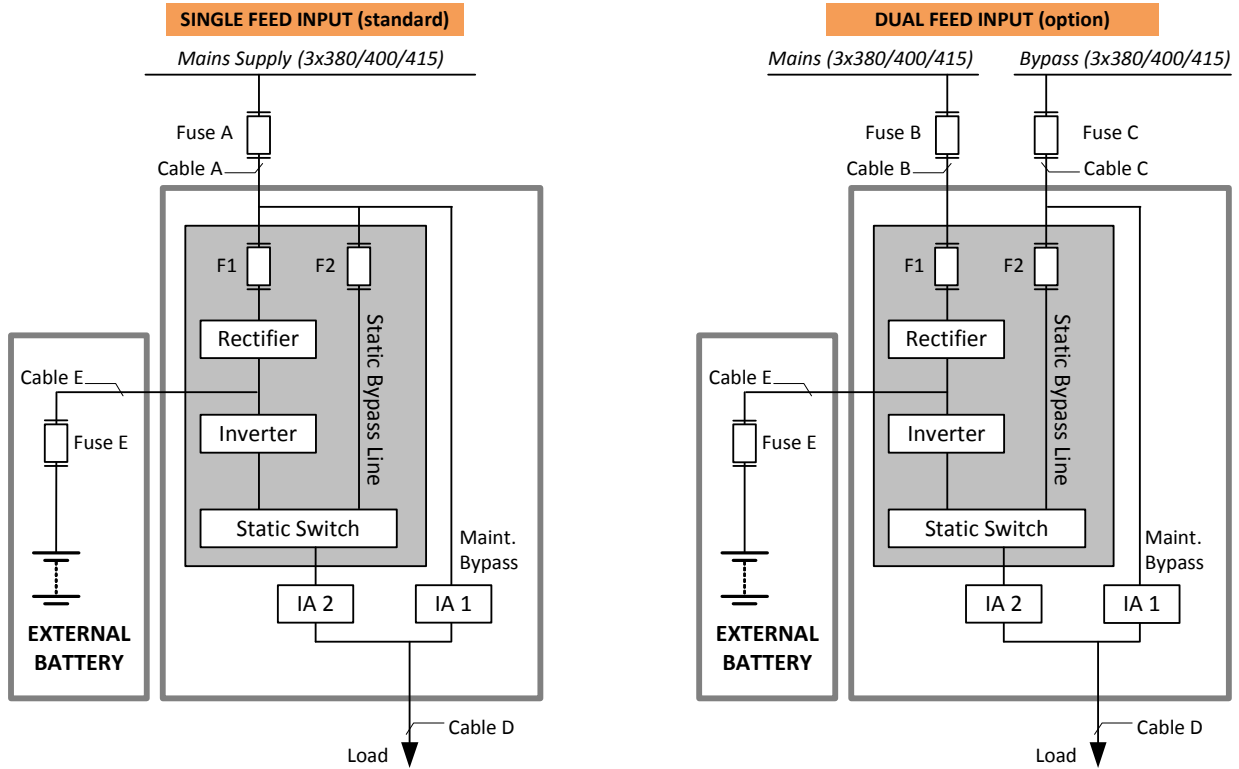
**FUSE & CABLE SIZING**

The diagrams on the following page identify the UPS input/output cabling requirements and provide information regarding the necessary fuse ratings and cable sizes.

**Notes:**

1. It is the customer's responsibility to provide all external fuses, isolators and cables used to connect the UPS input and output power supplies.
2. **Fuse and Cable recommendations to IEC 60950-1:2001, or locally recognised standards.**
3. The fuse and cable rating details in the tables are provided as a recommendation only.
4. The UPS must be installed to prescribed IEC or local regulations.
5. External DC Cables and Battery fuses are bespoke to the installation.

**60-300kVA Fuses & cables quick reference**



**Single feed input**

Power (kVA)	Fuse A (Agl/CB)	Cable A	Cable D
60	3x100	5x35	5x35
80	3x125	5x50	5x50
100	3x160	5x50	5x50
120	3x200	5x70	5x70
160	3x250	5x120 or 5x(2x50)	5x120 or 5x(2x50)
200	3x315	5x185 or 5x(2x70)	5x185 or 5x(2x70)
250	3x400	5x240 or 5x(2x95)	5x240 or 5x(2x95)
300	3x500	5x(2X120)	5x(2X120)

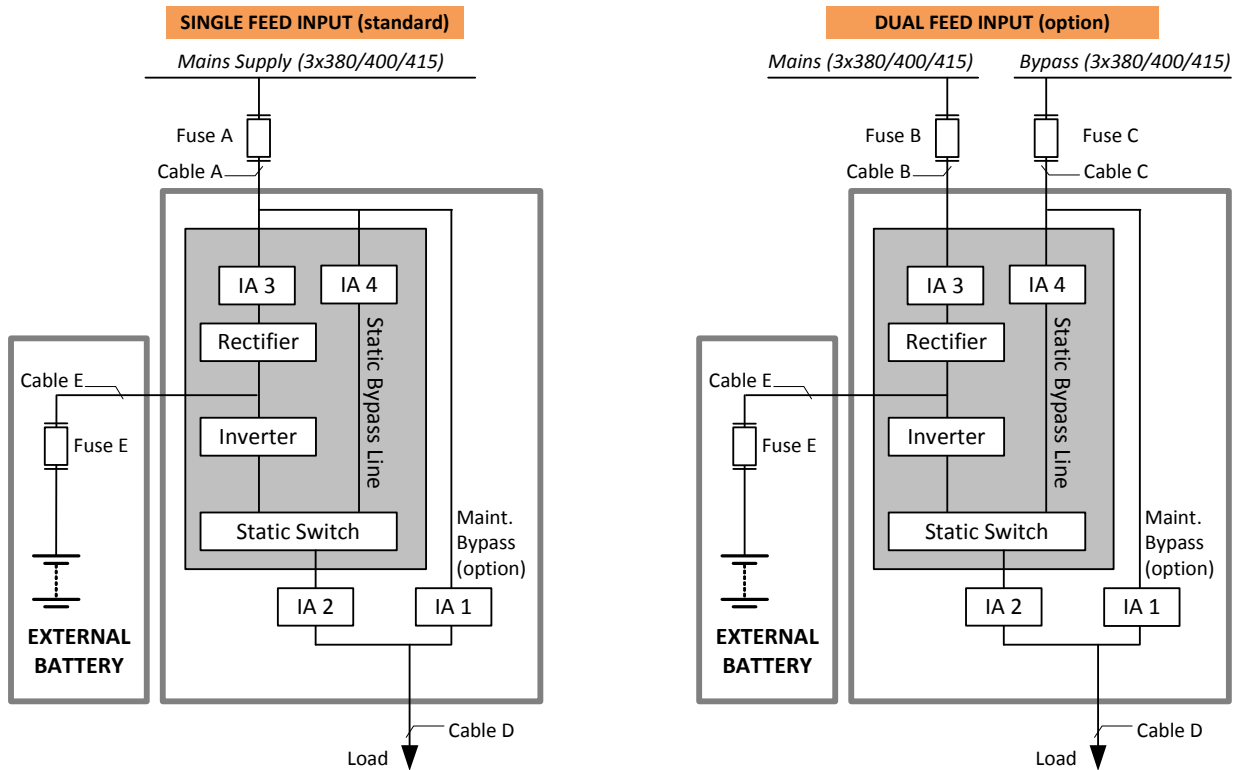
**Dual feed input**

Power (kVA)	Fuse B (Agl/CB)	Cable B	Fuse C (Agl/CB)	Cable C	Cable D
60	3x100	5x35	3x100	5x35	5x35
80	3x125	5x50	3x125	5x50	5x50
100	3x160	5x50	3x160	5x50	5x50
120	3x200	5x70	3x200	5x70	5x70
160	3x250	5x120 or 5x(2x50)	3x250	5x120 or 5x(2x50)	5x120
200	3x315	5x185 or 5x(2x70)	3x315	5x185 or 5x(2x70)	5x185
250	3x400	5x240 or 5x(2x95)	3x400	5x240 or 5x(2x95)	5x240 or 5x(2x95)
300	3x500	5x(2x120)	3x500	5x(2x120)	5x(2x120)

*Note: Battery cabling (Cable E) and battery fuses (Fuse E) are bespoke to the installation*



**400-500kVA Fuses & cables quick reference**



**Single feed input**

Power (kVA)	Fuse A (Agl/CB)	Cable A	Cable D
400	3x630	5x (3x95) or 5x (2x185)	5x (3x95) or 5x (2x185)
500	3x800	5x (3x150)	5x (3x150)

**Dual feed input**

Power (kVA)	Fuse B (Agl/CB)	Cable B	Fuse C (Agl/CB)	Cable C	Cable D
400	3x630	5x(3x95) or 5x(2x185)	3x630	5x (3x95) or 5x(2x185)	5x(3x95) or 5x(2x185)
500	3x800	5x (3x150)	3x800	5x50	5x(3x150)

*Note: Battery cabling (Cable E) and battery fuses (Fuse E) are bespoke to the installation*

