

04-3004\_S10\_TDS\_ABB\_POWERSCALE\_10-50 kVA\_EN\_REV-A.doc

# PowerScale 10-50 kVA

## Technical Specifications



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## 10.1 POWERSCALE SYSTEM DESCRIPTION

In environments that demand zero downtime, continuous power protection availability is essential. In order to respond to today's dynamic IT and process-related environments that experience daily change through new server technologies, migration and centralization, resilient and easily adaptable power protection concepts are required. POWERSCALE is the foundation for continuous power protection availability of network-critical infrastructures in enterprise data centers where business continuity has paramount importance and in process control environment where manufacturing continuity is essential.

POWERSCALE is an advanced double conversion UPS, VFI (Voltage and Frequency Independent) topology that responds fully to both highest availability and environmentally friendly requirements compliant with IEC 62040-3 (VFI-SS-111) standards.

The POWERSCALE UPS features innovations that combine to deliver the industry's best key values like: enhanced power performance, parallel capability and connectivity's interaction.


When operating in parallel configuration, each POWERSCALE can take the leadership role avoiding single points of failure in the parallel chain ensuring the highest level of power availability.

The most demanding IT infrastructures start with low power before achieving its full capacity. It is in this case essential to be able to recover the missing power requirement without risk for the applied load. POWERSCALE allows for system upgrades to meet the highest level of availability interruption free and without a temporary transfer the load to row mains (by-pass).


This Technical Specification provides detailed technical information on the mechanical, electrical and environmental performance of the POWERSCALE that can support to give answers to tender and end-user requirements. The POWERSCALE was designed to respond to the most stringent safety, EMC and other important UPS standards.

POWERSCALE is a stand-alone UPS which can be paralleled for power protection increase and/or for redundancy purpose. It offers 7 different power ranges: 10-15-20-25-30-40-50kVA in three different cabinet sizes. Up to 20 UPS can be paralleled together and provide any redundant power capacity with common or separate battery configuration.


**10.2 TECHNICAL CHARACTERISTICS**
**10.2.1 MECHANICAL CHARACTERISTICS POWERSCALE 10-20kVA Cabinet A**

PowerScale Cabinet A				
				
Power range	kVA	10	15	20
Dimensions (WxHxD)	mm	345x720x710		
Weight without battery	kg	60	62	64
Weight with battery with 48 block of 7Ah	kg	180	182	184
with standard packaging	kg	+ 4		
Colour		Graphite grey Pulverlacke No. 4222903402 serie 09RCCAT1 (RAL 7024)		

**10.2.2 ME**
**10.2.3 CHANICAL CHARACTERISTICS POWERSCALE 10-25kVA Cabinet B**

PowerScale Cabinet B					
					
Max. Power connection	kVA	10	15	20	25
Dimensions (WxHxD)	mm	345x1045x710			
Weight without battery	kg	88	90	92	94
Weight with battery with 96 block of 7Ah	kg	328	330	332	334
with standard packaging	kg	+ 5			
Colour		Graphite grey Pulverlacke No. 4222903402 serie 09RCCAT1 (RAL 7024)			

**10.2.4 MECHANICAL CHARACTERISTICS POWERSCALE 25-50kVA Cabinet C**

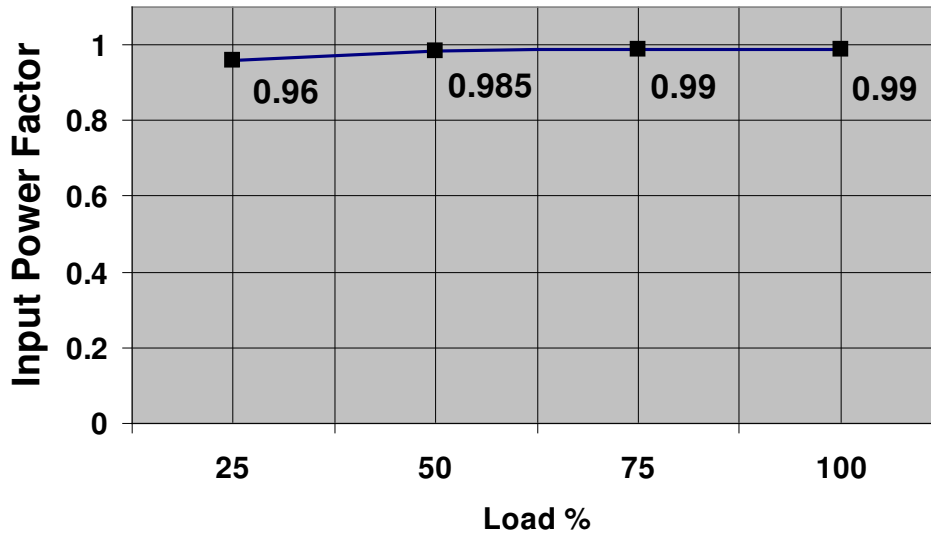
<b>PowerScale Cabinet C</b>					
					
Max. Power connection	kVA	25	30	40	50
Dimensions (WxHxD)	mm	440x1400x910			
Weight without battery	kg	(9Ah/28Ah) 151/135	(9Ah/28Ah) 160/145	9Ah/28Ah 165/150	9Ah/28Ah 170/155
<b>Weight with battery</b>					
144 blocks of 7/9Ah	kg	540	550	555	560
48 blocks of 28Ah	kg	605	615	620	625
with standard packaging	kg	+ 5			
Colour		Graphite grey Pulverlacke No. 4222903402 serie 09RCCAT1 (RAL 7024)			

**10.3 INPUT CHARACTERISTICS**

UPS Model		PS 10	PS 15	PS 20	PS 25	PS 30	PS 40	PS 50
<i>Output Power rating</i>	kVA	10	15	20	25	30	40	50
Nominal Input Voltage	V	3x380/220V+N, 3x400V/230V+N, 3x415/240V+N						
Input Voltage Tolerance (ref to 3x400/230V) for Loads in %:	V	(-10%/+15%) 3x360/207 V to 3x460/264 V for <100 % load (-20%/+15%) 3x320/184 V to 3x460/264 V for < 80 % load (-30%/+15%) 3x280/161 V to 3x460/264 V for < 60 % load						
Input Frequency	Hz	35 – 70						
Input Power Factor		PF=0.99 @ 100 % load						
Inrush Current	A	max. In						
Input Distortion THDi		Sine-wave THDi < 3 % @ 100% load						
Max. Input Power with rated output power and charged battery (output cosφ = 0.9)	kW	9.6	14.4	19.1	23.9	28.7	38.3	47.9
Max. Input Current with rated output power and charged battery (output cosφ = 0.9)	A	13.9	20.8	27.8	34.7	41.6	55.5	69.4
Max. Input Power with rated output power and discharged battery (output cosφ = 0.9)	kW	10.5	15.7	21	26.2	31.4	41.9	52.4
Max. Input Current with rated output power and discharged battery (output cosφ = 0.9)	A	15.2	22.8	30.4	37.9	45.5	60.7	75.9
Rated short-time withstand current (I <sub>cw</sub> )	kA, s	10 for 1.5 s						
AC power distribution system: TN-S note: in static bypass mode or eco-mode TN-C and TN-C-S can cause PE current to rise above 5% of phase currents.								
Phases required		3						
Neutral required		yes						

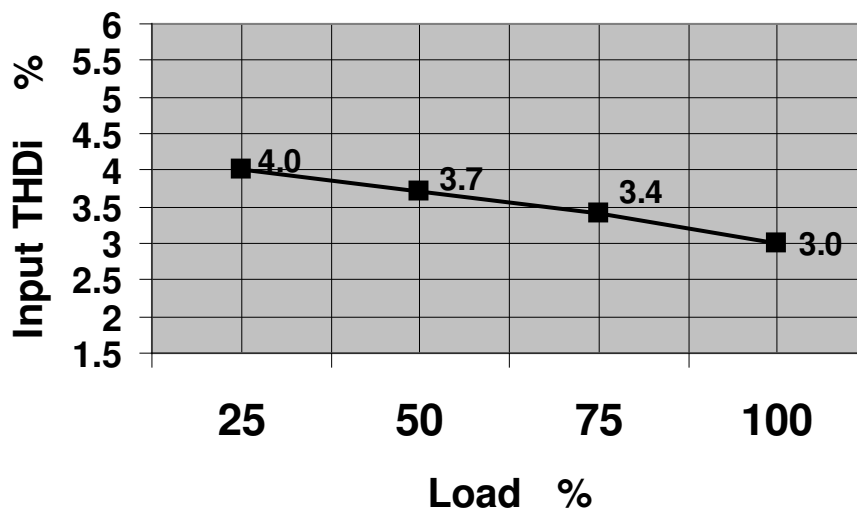
10.3.1 GRAPH: INPUT PF VERSUS % LOAD

**Input Power factor (Leading)**



10.3.2 GRAPH: INPUT DISTORTION THDi VERSUS % LOAD

**Input Current Distortion THDi**



NOTE: Depending on power ratings

**10.4 BATTERY CHARACTERISTICS**

UPS Range Cabinet Type		10kVA		15kVA		20kVA		25kVA		30kVA	40kVA	50kVA		
		A	B	A	B	A	B	B	C	C	C	C		
Min/Max number of 12V Battery Blocks per string	No.	20-50(*)		24-50(*)		26-50(*)		26-50(*)		32-50(*)		20-50(*)	20-50(*)	30-50(*)
Min/Max number of 1.2V NiCd-Cells	No.	200-500(*)		240-500(*)		260-500(*)		260-500(*)		320-500(*)		200-500(*)	200-500(*)	300-500(*)
Maximum discharge current	A	20		24		31				59	79	67		
Maximum Battery Charger Current	A	4A						6A						
Floating voltage (VRLA / NiCd)	VDC /cell	2.25 / 1.40												
End of discharge voltage (VRLA / NiCd)	VDC /cell	1.65 / 1.05												
Battery Charging Curve		Ripple free ; IU (DIN 41773)												
Temperature compensation ready		Standard (temp. sensor optional)												
Battery Test		Automatic and periodically (adjustable)												
Battery Type		Maintenance free VRLA or NiCd												

Note : (\*) Depending of the effective load in kW used by system (see table below and table in chapter 10.10.1).

Max no. for internal batteries is 48, max no. for extern batteries is 50

Description	10 kVA						15 kVA						20 kVA						25 kVA							
	A			B			A			B			A			B			B							
Maximum Power in [kW]	6	8	9	6	8	9	8	10	12	13.5	8	10	12	13.5	9	12	16	18	9	12	16	18	12	16	20	22.5
Minimum number of battery blocks per String	20	24	26	20	24	26	24	28	32	36	24	28	32	36	26	32	40	44	26	32	40	44	32	40	46	48
Maximum number of battery blocks intern the PSC cabinet	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48

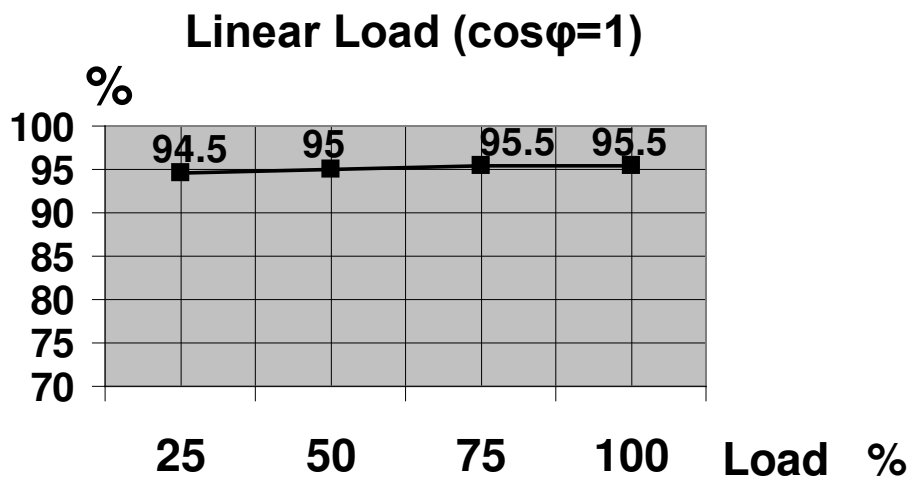
Description	25 kVA				30 kVA			40 kVA			50 kVA				
Cabinet type	C														
Maximum Power in [kW]	12	16	20	22.5	20	24	27	25	32	36	30	35	40	45	
Minimum number of battery blocks per string	24	32	40	46	20	24	28	26	32	36	30	34	40	46	
Maximum number of internal battery block 7/9 Ah	3 x 48														
Maximum number of internal battery blocks 28 Ah	1 x 48														



**10.5 OUTPUT CHARACTERISTICS**

UPS Model		PS 10	PS 15	PS 20	PS 25	PS 30	PS 40	PS 50	
Output rated power	kVA	10	15	20	25	30	40	50	
Load power factor, rated		0.9 (lead)							
Power factor displacement (permissible lead range)		≤ 0.9							
Output rated current (In) @ rated power in kVA and @ 400VAC	A	14.4	21.7	28.9	36.1	43.3	57.7	72.2	
Output rated power	kW	9	13.5	18	22.5	27	36	45	
Output rated current (In) @ rated power in kW and @ 400VAC	A	13.0	19.5	26.0	32.5	39.0	52.0	65.0	
Output Rated Voltage	V	3x380/220V or 3x400/230V or 3x415/240V							
Output Voltage Stability	%	Static: Dynamic (Step load 0%-100% or 100%-0%)						< +/- 1% < +/- 4%	
Total harmonic distortion (THDu), 100% load, normal mode:									
linear	%								< 2.0
non-linear (according to IEC 62040-3)	%								< 4.0
Total harmonic distortion (THDu), 100% load, battery mode:									
linear	%								< 2.0
non-linear (according to IEC 62040-3)	%								< 4.0
Voltage unbalance and phase displacement, 100 % load unbalance	°								< +/- 0.1
Output Frequency	Hz	50 Hz or 60 Hz							
Output Frequency Tolerance	%	Synchronized with mains (selectable for bypass operation) Free running						< +/- 2 % or < +/- 4 % +/- 0.1 %	
Max slew-rate	Hz/s								1
Bypass operation		At Nominal Input voltage of 3x400 V or 196 V to 264 V ph-N						+/- 15 %	
Permissible Unbalanced Load (All 3 phases regulated independently)	%	100%							
Phase Angle Tolerance (With 100 % Unbalanced load)	Deg.	+/- 0 deg.							
Overload Capability on Inverter	min	110% Load → 5 min 125% Load → 20 seconds				110% Load → 10 min 125% Load → 1 min			
Fault clearing capability normal mode and battery mode for 40 ms	A	3.0 x In	2.1 x In	2.2 x In	2.5 x In	2.1 x In	2.3 x In	2.6 x In	
Fault clearing capability current (RMS) on static-bypass for 10 ms	A	approx. 10 x output rated current (In) (RMS)							
Crest – Factor (Load supported)		3 : 1							
Output overvoltage protection	%	+15							
AC power distribution system: TN-S,									
available phases		3							
neutral available		yes							

10.5.1 GRAPH: AC – AC EFFICIENCY with Linear load up to  $\cos\phi$  1



NOTE: Depending on power rating

**10.6 ENVIRONMENTAL CHARACTERISTICS**

UPS range		10kVA	15kVA	20kVA	25kVA	30kVA	40kVA	50kVA
Audible Noise with 100% / 50% Load	dBA	60/53	60/53	58/50	58/50	58/50	58/50	66/57
Operation temperature	°C	0 – 40						
Ambient Temperature for Batteries (recommended)	°C	20 – 25						
Storage Temperature	°C	-25 – +70						
Battery Storage Time at Ambient Temperature		Max. 6 months						
Max. altitude (above sea level)	m	1000m (3300ft) without de-rating						
De-rating factor for use at altitudes above 1000m sea level according ( IEC 62040-3)		Meter above sea level (m / ft)			De-Rating Factor for Power			
		1500 / 4850			0.95			
		2000 / 6600			0.91			
		2500 / 8250			0.86			
		3000 / 9900			0.82			
Relative Air-humidity		Max. 95% (non-condensing)						
Accessibility. Safety: operator / restricted		Rear access			Front access			
Positioning		Min. 20 cm rear space (required for fan)						
Input and Output Power Cabling		Rear side bottom			Front side bottom			
Efficiency double conversion (at cosφ1.0) (depending on power rating)	%	<i>Load</i>	: 100 %	75 %	50%	25%		
			95.5%	95.5%	95%	94.5%		
Eco-Mode efficiency at 100% load	%	98 %						

**10.7 STANDARDS**

Safety	IEC/EN 62040-1, IEC/EN 60950-1	
Electromagnetic Compatibility	IEC/EN 62040-2, IEC/EN61000-3-2, IEC/EN61000-6-2	
EMC Classification for	10kVA	15-50kVA
Emission Class	C2	C3
Immunity Class	C3	
Performance	IEC/EN62040-3	
Product certification	CE	
Degree of protection	IP 20	

**10.8 COMMUNICATION**

**STANDARD ITEMS**

RS232 on Sub-D9 port	For monitoring and integration in network management
Customer Interfaces : Inputs DRY PORT	1 Remote Shut down [EMERGENCY OFF (Normally closed)] 1 GEN-ON (Normally open) 1 Programmable Customer's Inputs (Normally open) 1 Temp. Sensor for Battery Control 1 12 vdc source (max. 250 mA)
RJ45 port	For multidrop purpose
Power Management Display (PMD)	LCD display

**OPTIONAL ITEMS**

Relay card + USB Including: Customer Interfaces: 5 output DRY PORTS	<ul style="list-style-type: none"> <li>• Common alarm</li> <li>• Load on bypass</li> <li>• Battery low</li> <li>• Load on inverter</li> <li>• Mains failure</li> </ul>
RS232 on USB port	For remote signalling and automatic computer shutdown
SNMP Card (slot already included)	SNMP card For monitoring and integration in network management

**10.8.1 POWER MANAGEMENT DISPLAY (PMD)**

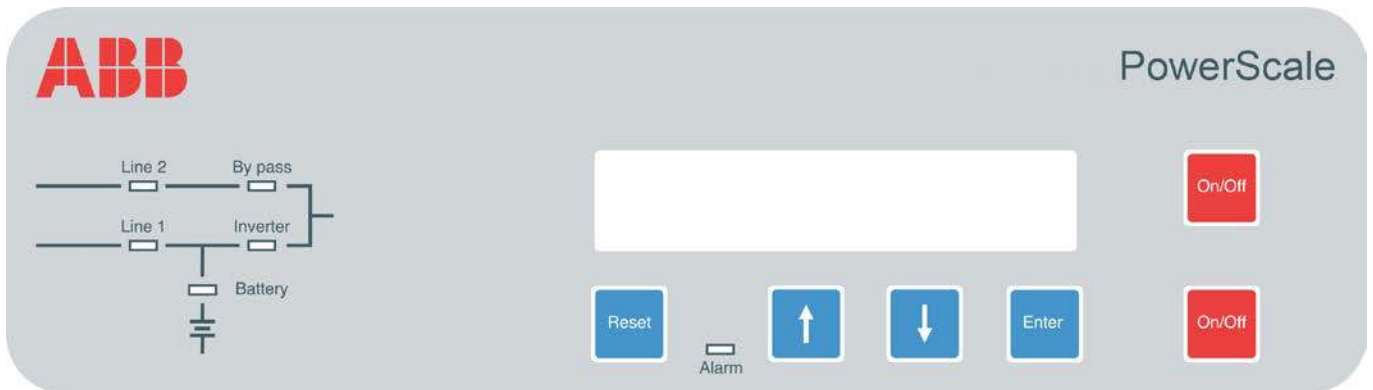
The user-friendly PMD consists of three parts the MIMIC DIAGRAM, CONTROL KEYS and LCD that provides the necessary monitoring information about the UPS.

**10.8.2 MIMIC DIAGRAM**

The mimic diagram serves to give the general status of the UPS. The LED-indicators show the power flow status and in the event of mains failure or load transfer from inverter to bypass and vice-versa the corresponding LED-indicators will change colour from green (normal) to red (warning). The LED's LINE 1 (rectifier) and LINE 2 (bypass) indicate the availability of the mains power supply. The LED's INVERTER and BYPASS if green indicate which of the two are supplying power to the critical load. The LED-indicator BATTERY is normally lit green, and when it supplies the load is blinking. The LED-indicator ALARM is a visual indication of any internal or external alarm condition. At the same time the audible alarm will be activated.

**10.8.3 DISPLAY**

The 2 x 20 character LCD simplifies the communication with the UPS. The menu driven LCD enables the access to the EVENT REGISTER, or to monitor the input and output U, I, f, P, Autonomy Time and other Measurement's, to perform commands like start-up and shut-down of UPS or load transfer from UPS to BYPASS and vice-versa and finally it serves for the DIAGNOSIS (SERVICE MODE) for adjustments and testing.



Power Management Display (PMD) of POWERSCALE

**10.8.4 CUSTOMER INTERFACES: Terminals X1 Standard**

**10.8.5 CUSTOMER INPUTS DRY PORTs: Terminal block X1**

Connection of Remote Shut down facilities, Generator Operation, Customers specials  
(see UM Section 9 / OPTIONS)

**10.8.6 CUSTOMER OUTPUTS DRY PORTs : Terminal blocks X1 (optional relay slot card)**

Provision of signals for the automatic and orderly shutdown of servers, AS400 or Automation building systems  
All voltage free contacts are rated 60 VAC max. and 500 mA max.:  
All the interfaces are connected to Phoenix Spring terminals with wires: 0.5 mm<sup>2</sup>

STANDARD

Block	Terminal	Contact	Signal	On Display	Function
X1	X1 / 10	GND	GND		<b>12 Vdc source</b> (Max 200mA load)
	X1 / 9	IN	+12Vdc		
	X1 / 8	GND	GND		<b>Remote Shut down</b> (Do not remove the factory mounted bridge until an external remote shut down is connected)
	X1 / 7	IN	+12Vdc		
	X1 / 6	GND	GND		<b>Temperature Battery</b> (If connected, the battery charger current is batt. temperature dependent)
	X1 / 5	IN	+3.3Vdc		
	X1 / 4	GND	GND		<b>Customer IN 1</b> (Function on request, to be defined)
	X1 / 3	IN	+12Vdc		
	X1 / 2	GND	GND		<b>GEN_OPERATION</b> (NC = Generator ON)
X1 / 1	IN	+12Vdc			

OPTION (relay card and USB (Slot))

X1	X1 / 15	C	ALARM	COMMON_ALARM	Common
	X1 / 14	NC		NO Alarm Condition	
	X1 / 13	NO		<b>Common Alarm</b> (System)	
	X1 / 12	C	Message	LOAD_ON_MAINS	Common
	X1 / 11	NC		(Load on Inverter)	
	X1 / 10	NO		<b>Load on bypass</b> (Mains)	
	X1 / 9	C	ALARM	BATT_LOW	Common
	X1 / 8	NC		Battery OK	
	X1 / 7	NO		<b>Battery Low</b>	
	X1 / 6	C	Message	LOAD_ON_INV	Common
	X1 / 5	NC		(Load on Mains bypass)	
	X1 / 4	NO		<b>Load on Inverter</b>	
	X1 / 3	C	ALARM	MAINS_OK	Common
	X1 / 2	NC		<b>Mains Failure</b>	
	X1 / 1	NO		Mains Present	
	+ USB				

Phoenix Spring Terminals (X1) Connection

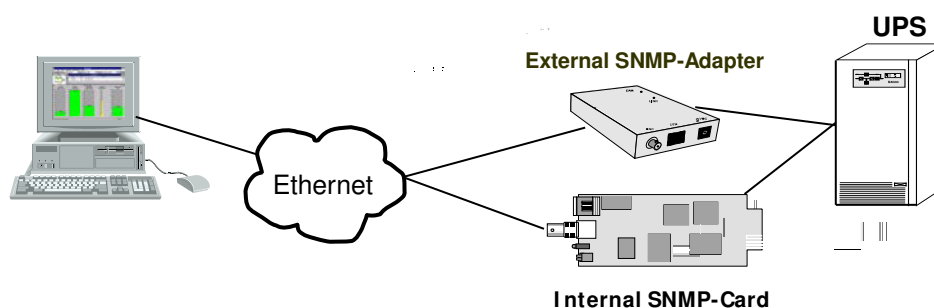
## 10.9 OPTIONS

- SNMP card and WaveMon Management Software , Modbus Protocol, USB
- External Battery Cabinets
- Parallel kit
- In/output Transformer for special voltages
- Back-feed protection
- Temp. sensor for battery temp. control
- Relays and USB card

### 10.9.1 SNMP card / WaveMon Management Software

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

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



**10.10 BATTERY AUTONOMIES**

**10.10.1 EXAMPLES OF BATTERY AUTONOMY AT FULL LOAD WITH STANDARD CABINETS AND STANDARD BATTERY CONFIGURATION**

<b>Powerscale 10kVA, 9kW</b>						
	<b>Load Power</b>					
	<b>6kW</b>		<b>8kW</b>		<b>9kW</b>	
<b>Autonomy (min)</b>	<b>7Ah batt</b>	<b>9Ah batt</b>	<b>7Ah batt</b>	<b>9Ah batt</b>	<b>7Ah batt</b>	<b>9Ah batt</b>
6	1 x 24	1 x 20	1 x 32	1 x 24	1 x 34	1 x 26
8	1 x 28	1 x 22	1 x 38	1 x 26	1 x 42	1 x 28
10	1 x 32	1 x 24	1 x 46	1 x 32	1 x 48	1 x 34
12	1 x 40	1 x 28	2 x 26	1 x 36	2 x 30	1 x 40
15	1 x 48	1 x 32	2 x 32	1 x 42	2 x 36	1 x 48
18	2 x 28	1 x 38	2 x 36	1 x 48	2 x 40	2 x 28
20	2 x 30	1 x 40	2 x 40	2 x 28	2 x 44	2 x 30
22					2 x 48	2 x 32
25	2 x 36	1 x 48	2 x 48	2 x 32	n.a.	2 x 36
30	2 x 40	2 x 28	n.a.	2 x 38	n.a.	2 x 42
35	2 x 46	2 x 32	n.a.	2 x 42	n.a.	2 x 48
40	n.a.	2 x 36	n.a.	2 x 48	n.a.	n.a.
60	n.a.	2 x 48	n.a.	n.a.	n.a.	n.a.
<b>Limit batt min A</b>	<b>20 blocs</b>		<b>24 blocs</b>		<b>26 blocs</b>	
<b>Limit batt min B</b>						
		Cabinet A: max 1 x 48 x 7/9Ah batteries				
		Cabinet B: max 2 x 48 x 7/9Ah batteries				

<b>Powerscale 15kVA, 13.5kW</b>								
	<b>Load Power</b>							
	<b>8kW</b>		<b>10kW</b>		<b>12kW</b>		<b>13.5kW</b>	
<b>Autonomy (min)</b>	<b>7Ah batt</b>	<b>9Ah batt</b>	<b>7Ah batt</b>	<b>9Ah batt</b>	<b>7Ah batt</b>	<b>9Ah batt</b>	<b>7Ah batt</b>	<b>9Ah batt</b>
6	1 x 32	1 x 24	1 x 40	1 x 28	1 x 48	1 x 32		1 x 36
8	1 x 38	1 x 26	1 x 48	1 x 34	2 x 32	1 x 40	2 x 36	1 x 42
10	1 x 46	1 x 32	2 x 28	1 x 40	2 x 34	1 x 48	2 x 40	1 x 48
12	2 x 26	1 x 36	2 x 34	1 x 48	2 x 40		2 x 48	
15	2 x 32	1 x 42	2 x 40	2 x 28	2 x 48	2 x 32	n.a.	2 x 36
18	2 x 36	1 x 48	2 x 46	2 x 32	n.a.	2 x 38	n.a.	2 x 42
20	2 x 40	2 x 28	2 x 48	2 x 36	n.a.	2 x 40	n.a.	2 x 48
25	2 x 48	2 x 32	n.a.	2 x 40	n.a.	2 x 48	n.a.	n.a.
30	n.a.	2 x 38	n.a.	2 x 48	n.a.	n.a.	n.a.	n.a.
35	n.a.	2 x 42	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
40	n.a.	2 x 48	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
60	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
<b>Limit batt min A</b>	<b>24 blocs</b>		<b>28 blocs</b>		<b>32 blocs</b>		<b>36 blocs</b>	
<b>Limit batt min B</b>								
		Cabinet A: max 1 x 48 x 7/9Ah batteries						
		Cabinet B: max 2 x 48 x 7/9Ah batteries						

Powerscale 20kVA, 18kW								
Autonomy (min)	Load Power							
	9kW		12kW		16kW		18kW	
	7Ah batt	9Ah batt	7Ah batt	9Ah batt	7Ah batt	9Ah batt	7Ah batt	9Ah batt
4					1 x 48			
6	1 x 34	1 x 26	1 x 48	1 x 32		1 x 44		1 x 46
7						1 x 48	2 x 44	
8	1 x 42	1 x 30	2 x 32	1 x 40	2 x 40			
10	2 x 26	1 x 36	2 x 34	1 x 48	2 x 46		2 x 48	
11					2 x 48		n.a.	
12	2 x 30	1 x 40	2 x 40	2 x 32	n.a.	2 x 40	n.a.	2 x 44
15	2 x 36	1 x 48	2 x 48		n.a.	2 x 42	n.a.	2 x 48
17			n.a.		n.a.	2 x 48	n.a.	n.a.
18	2 x 40	2 x 28	n.a.	2 x 38	n.a.	n.a.	n.a.	n.a.
20	2 x 44	2 x 32	n.a.	2 x 40	n.a.	n.a.	n.a.	n.a.
25	2 x 48	2 x 36	n.a.	2 x 48	n.a.	n.a.	n.a.	n.a.
30	n.a.	2 x 42	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
35	n.a.	2 x 48	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Limit batt min A	26 blocs		32 blocs		40 blocs		44 blocs	
Limit batt min B								
		Cabinet A: max 1 x 48 x 7/9Ah batteries						
		Cabinet B: max 2 x 48 x 7/9Ah batteries						

Powerscale 25kVA, 22.5kW												
Autonomy (min)	Load Power											
	12kW			16kW			20kW			22.5kW		
	7Ah batt	9Ah batt	28Ah batt	7Ah batt	9Ah batt	28Ah batt	7Ah batt	9Ah batt	28Ah batt	7Ah batt	9Ah batt	28Ah batt
6	1 x 48	1 x 32			1 x 44		2 x 46					
8	2 x 32	1 x 40		2 x 40	1 x 48		2 x 48			2 x 48		
10	2 x 34	1 x 48		2 x 46			3 x 40			3 x 46		
12	2 x 40	2 x 28		2 x 48	2 x 40		3 x 44	2 x 46		3 x 48	2 x 48	
13							3 x 48	2 x 48		n.a.		
15	2 x 48	2 x 32	1 x 24	3 x 42	2 x 44		n.a.	3 x 40		n.a.		
18	3 x 36	2 x 38	1 x 24	3 x 48	2 x 48	1 x 34	n.a.	3 x 42	1 x 40	n.a.	3 x 46	1 x 48
20	3 x 38	2 x 40	1 x 28	n.a.	3 x 36		n.a.	3 x 46		n.a.	3 x 48	n.a.
22	3 x 42	2 x 44	1 x 30	n.a.	3 x 38	1 x 40	n.a.	3 x 48	1 x 48	n.a.	n.a.	n.a.
24			1 x 32	n.a.			n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
25	3 x 46	2 x 48		n.a.	3 x 42	1 x 44	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
27	3 x 48	3 x 34		n.a.	3 x 48		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
28	n.a.		1 x 36	n.a.	n.a.	1 x 48	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
29	n.a.	3 x 36		n.a.	n.a.		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
31	n.a.	3 x 38		n.a.	n.a.		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
32	n.a.		1 x 40	n.a.	n.a.		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
33	n.a.	3 x 40		n.a.	n.a.		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
35	n.a.	3 x 42		n.a.	n.a.		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
36	n.a.		1 x 44	n.a.	n.a.		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
37	n.a.	3 x 44		n.a.	n.a.		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
39	n.a.	3 x 46		n.a.	n.a.		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
41	n.a.	3 x 48	1 x 48	n.a.	n.a.		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Limit batt min B	32 blocs			40 blocs			46 blocs			48 blocs		
Limit batt min C	24 blocs			32 blocs			40 blocs			46 blocs		
		Cabinet B: max 2 x 48 x 7/9Ah batteries										
		Cabinet C: max 3 x 48 x 7/9Ah batteries										

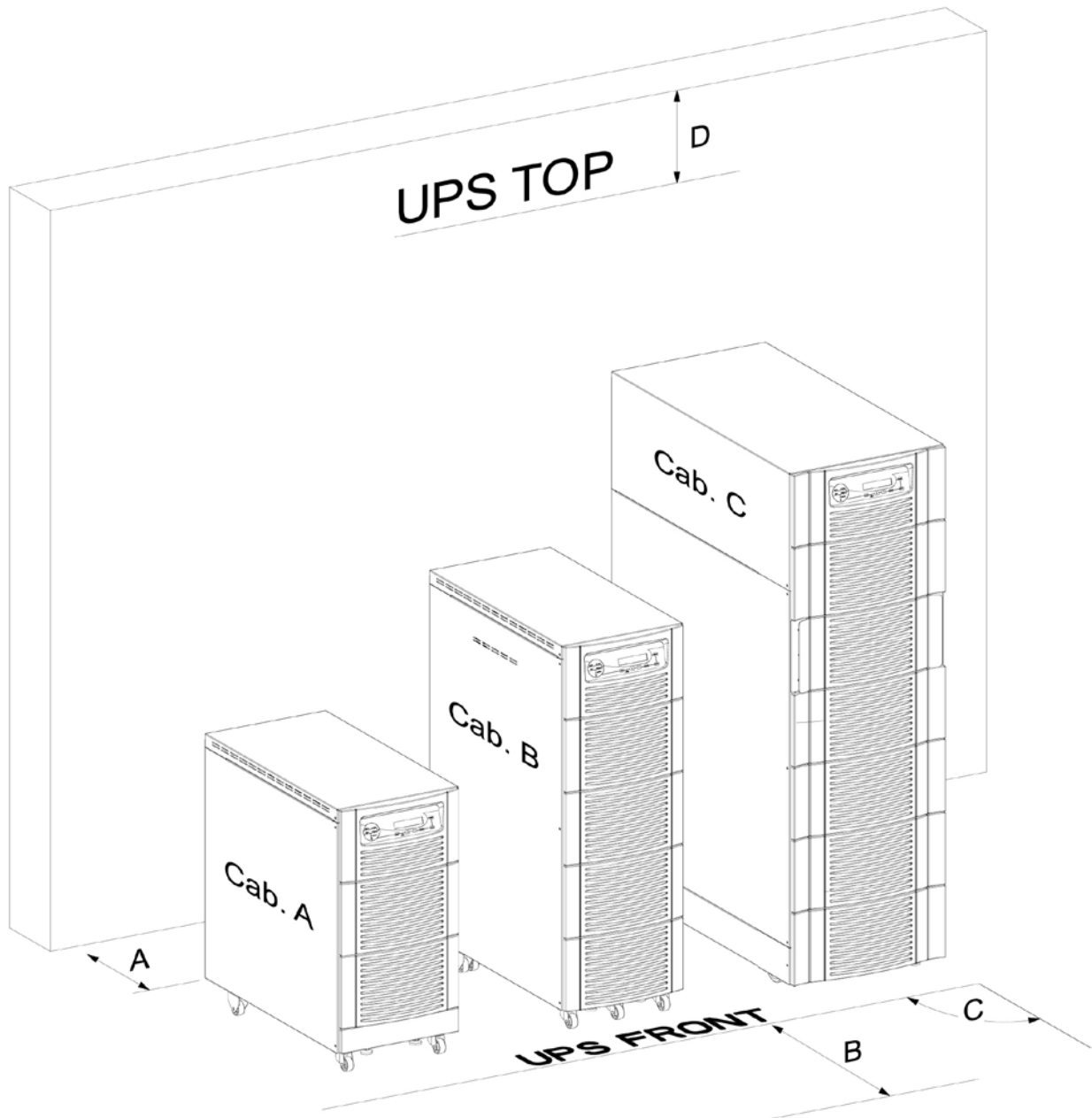


Powerscale 30kVA, 27kW												
Autonomy (min)	Load Power											
	16kW			20kW			24kW			27kW		
	7Ah batt	9Ah batt	28Ah batt	7Ah batt	9Ah batt	28Ah batt	7Ah batt	9Ah batt	28Ah batt	7Ah batt	9Ah batt	28Ah batt
6	2 x 34	1 x 40		2 x 40			2 x 48			3 x 36		
7		1 x 48				1 x 20			1 x 24			1 x 28
8	2 x 40		1 x 20	2 x 48							3 x 28	1 x 30
10	2 x 44	2 x 32			2 x 40			2 x 48		3 x 48		1 x 36
12	2 x 48	2 x 40		3 x 44	2 x 44		3 x 48			n.a.		1 x 42
13				3 x 48	2 x 48		n.a.			n.a.	3 x 48	1 x 44
15	3 x 42	2 x 44		n.a.			n.a.	3 x 48		n.a.	n.a.	1 x 48
18	3 x 48	2 x 48	1 x 34	n.a.	3 x 42	1 x 40	n.a.	n.a.	1 x 48	n.a.	n.a.	n.a.
20	n.a.	3 x 36		n.a.	3 x 46		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
22	n.a.	3 x 38	1 x 40	n.a.	3 x 48	1 x 48	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
24	n.a.			n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
25	n.a.	3 x 42	1 x 44	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
27	n.a.	3 x 48		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
28	n.a.	n.a.	1 x 48	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
29	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
31	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
32	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
33	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
35	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
36	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
37	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
39	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
41	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Limit batt min C	20 blocs			20 blocs			24 blocs			28 blocs		
	Cabinet C: max 3 x 48 x 7/9Ah batteries											

Powerscale 40kVA, 36kW												
Autonomy (min)	Load Power											
	18kW			25kW			32kW			36kW		
	7Ah batt	9Ah batt	28Ah batt	7Ah batt	9Ah batt	28Ah batt	7Ah batt	9Ah batt	28Ah batt	7Ah batt	9Ah batt	28Ah batt
6	2 x 36	2 x 22		2 x 48	2 x 32		3 x 48	2 x 48		3 x 48	2 x 48	
7						1 x 26			1 x 32	n.a.	3 x 36	1 x 36
8	2 x 42	2 x 28	1 x 20	3 x 40	2 x 40		n.a.		1 x 34	n.a.		1 x 42
9	2 x 48		1 x 22				n.a.			n.a.	3 x 46	1 x 44
10	3 x 34	2 x 34		3 x 48	2 x 48	1 x 34	n.a.		1 x 40	n.a.	3 x 48	1 x 48
12	3 x 40	2 x 40	1 x 28	n.a.	3 x 38		n.a.	3 x 48	1 x 48	n.a.	n.a.	n.a.
13	3 x 42	2 x 44		n.a.	3 x 40	1 x 40	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
15	3 x 48	2 x 48	1 x 32	n.a.	3 x 44		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
16	n.a.	3 x 34		n.a.	3 x 48	1 x 48	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
18	n.a.	3 x 38		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
20	n.a.	3 x 40	1 x 40	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
22	n.a.	3 x 44	1 x 44	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
24	n.a.		1 x 48	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
25	n.a.	3 x 48	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
27	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
28	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
29	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
31	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
32	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
33	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
35	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
36	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
37	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
39	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
41	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Limit batt min C	20 blocs			26 blocs			32 blocs			36 blocs		
	Cabinet C: max 3 x 48 x 7/9Ah batteries											

Powerscale 50kVA, 45kW												
Autonomy (min)	Load Power											
	30kW			35kW			40kW			45kW		
	7Ah batt	9Ah batt	28Ah batt	7Ah batt	9Ah batt	28Ah batt	7Ah batt	9Ah batt	28Ah batt	7Ah batt	9Ah batt	28Ah batt
6	3 x 40	2 x 40	1 x 30	3 x 48	2 x 48	1 x 34	n.a.			n.a.		
7	3 x 44	2 x 44		n.a.			n.a.	3 x 40	1 x 40	n.a.	3 x 46	1 x 46
8	3 x 48	2 x 48	1 x 34	n.a.	3 x 40	1 x 40	n.a.	3 x 44		n.a.	3 x 48	1 x 48
9	n.a.	3 x 36		n.a.			n.a.	3 x 48	1 x 48	n.a.	n.a.	n.a.
10	n.a.	3 x 40	1 x 40	n.a.	3 x 44	1 x 48	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
12	n.a.	3 x 44		n.a.	3 x 48	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
13	n.a.	3 x 48	1 x 48	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
15	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
16	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
18	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
20	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
22	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
24	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
25	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
27	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
28	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
29	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
31	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
32	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
33	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
35	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
36	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
37	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
39	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
41	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Limit batt min C	30 blocs			34 blocs			40 blocs			46 blocs		
	Cabinet C: max 3 x 48 x 7/9Ah batteries											

**10.11 INSTALLATION PLANNING**



<b>PowerScale Cabinets</b>		<i>Cab. A</i>	<i>Cab. B</i>	<i>Cab. C</i>
<b>A</b>	Back clearances for ventilation (forced air outlet) / access for wiring in case the unit cannot be pulled forward	200 / 500 mm	200 / 500 mm	200 mm / front wiring
<b>B</b>	Front clearances for pulling the unit forward (to get rear access for wiring or side access for battery. replacement)	800 mm	800 mm	1000 mm
<b>C</b>	Maximum door opening angle (there is no door)	-	-	-
<b>D</b>	Top Clearance, not needed	0 mm	0 mm	0 mm
	Side clearances R for vent. (natural air-exchange) / access for battery replacement in case the unit cannot be pulled forward	50 / 800 mm	50 / 800 mm	0 / 800 mm
	Side cl. L for ventilation (natural air-exchange)	50 mm	50 mm	0 mm

### 10.11.1 HEAT DISSIPATION PER UPS RANGE WITH NON-LINEAR LOAD

UPS Range		10kVA	15kVA	20kVA	25kVA	30kVA	40kVA	50kVA
Heat Dissipation with 100% Non-linear Load per range (EN 62040-3)	W	600	900	1100	1400	1700	2300	2900
Heat Dissipation with 100% Non-linear Load per range (EN 62040-3)	BTU/h	2048	3072	3754	4778	5802	7850	9898
Airflow (25° - 30°C) with 100% Non-linear Load per range (EN 62040-3)	m <sup>3</sup> /h	150	150	150	150	570	570	570
Heat Dissipation without load	W	120	150	150	170	250	300	350

## 10.12 BLOCK DIAGRAMS

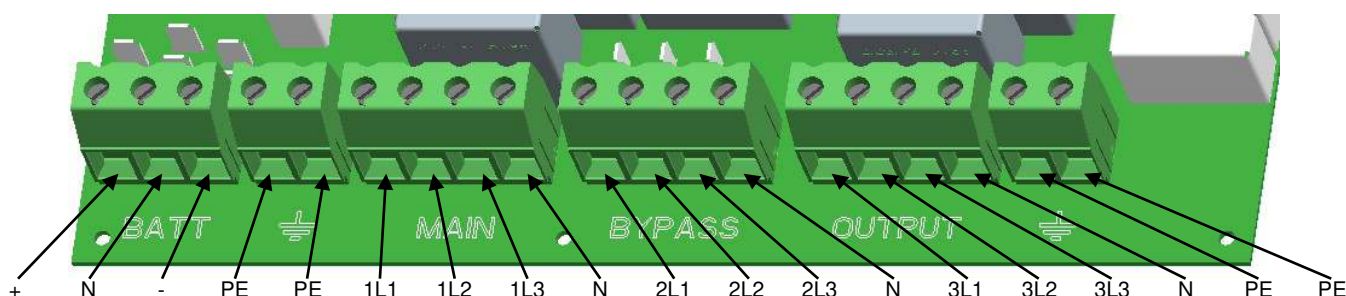
### 10.12.1 WIRING AND BLOCK DIAGRAMS

The customer has to supply the wiring to connect the UPS to the local power source. The installation inspection and initial start up of the UPS and extra battery cabinet must be carried out by a qualified service personnel such as a licensed service engineer from the manufacturer or from an agent certified by the manufacturer

### 10.12.2 RECOMMENDED CABLE SECTIONS & FUSE RATINGS

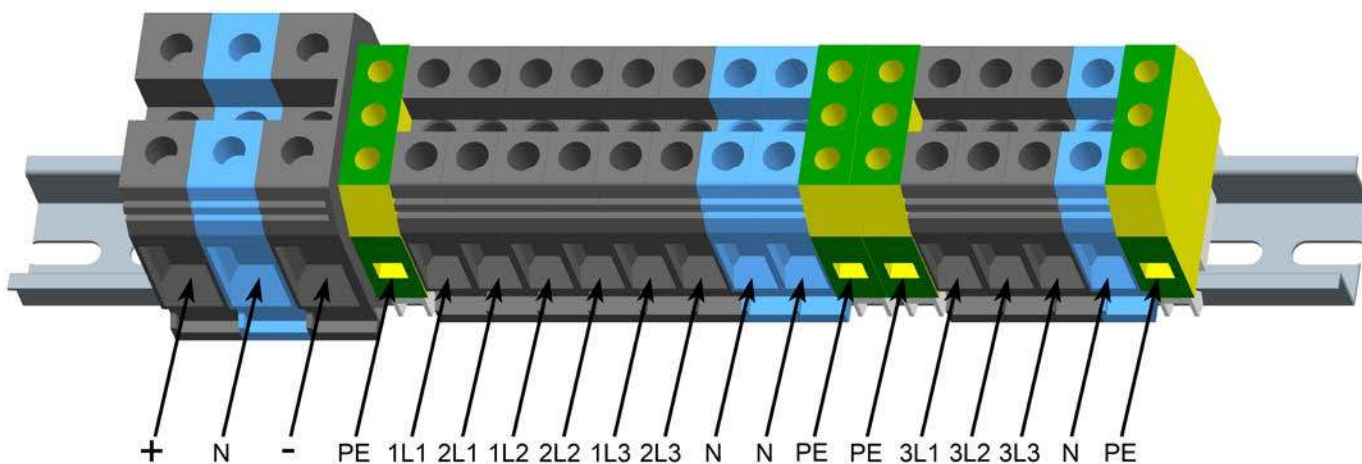
**Cabinet A (10-15-20 kVA) & Cabinet B (10-15-20-25 kVA) terminal connections overview**

Battery (+ / N / -) + PE [quantity x mm <sup>2</sup> ]	Input Rectifier 1L1, 1L2, 1L3 + N + PE [quantity x mm <sup>2</sup> ]	Input Bypass 2L1, 2L2, 2L3 + N + PE [quantity x mm <sup>2</sup> ]	Output load 3L1, 3L2, 3L3 + N + PE [quantity x mm <sup>2</sup> ]	Tightening Torque [Nm]
4 x 16	5 x 16	5 x 16	5 x 16	1.5



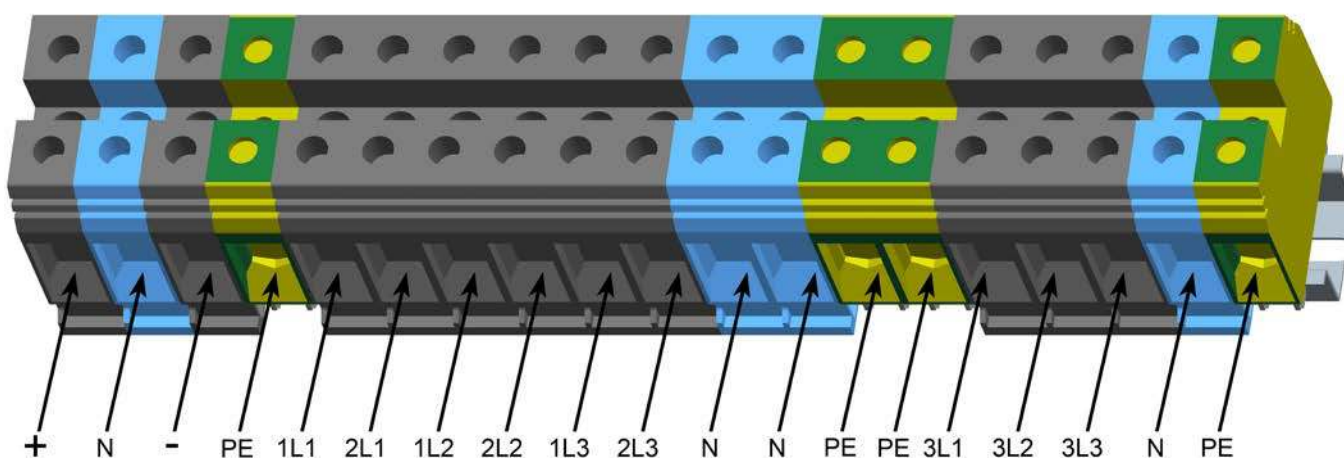
**Cabinet C (25-30 kVA) terminal connections overview**

Battery (+ / N / -) + PE [quantity x mm <sup>2</sup> ]	Input Rectifier 1L1, 1L2, 1L3 + N + PE [quantity x mm <sup>2</sup> ]	Input Bypass 2L1, 2L2, 2L3 + N + PE [quantity x mm <sup>2</sup> ]	Output load 3L1, 3L2, 3L3 + N + PE [quantity x mm <sup>2</sup> ]	Tightening Torque [Nm]
(+ / N / -): <b>3 x 35</b> PE: <b>1 x 16</b>	1L1, 1L2, 1L3 + N: <b>4 x 16</b> PE: <b>1 x 16</b>	2L1, 2L2, 2L3 + N: <b>4 x 16</b> PE: <b>1 x 16</b>	3L1, 3L2, 3L3 + N: <b>4 x 16</b> PE: <b>1 x 16</b>	35 mm <sup>2</sup> : <b>3.5</b> 16 mm <sup>2</sup> : <b>1.5</b>



**Cabinet C (40-50 kVA) terminal connections overview**

Battery (+ / N / -) + PE [quantity x mm <sup>2</sup> ]	Input Rectifier 1L1, 1L2, 1L3 + N + PE [quantity x mm <sup>2</sup> ]	Input Bypass 2L1, 2L2, 2L3 + N + PE [quantity x mm <sup>2</sup> ]	Output load 3L1, 3L2, 3L3 + N + PE [quantity x mm <sup>2</sup> ]	Tightening Torque [Nm]
(+ / N / -): <b>3 x 35</b> PE: <b>1 x 35</b>	1L1, 1L2, 1L3 + N: <b>4 x 35</b> PE: <b>1 x 35</b>	2L1, 2L2, 2L3 + N: <b>4 x 35</b> PE: <b>1 x 35</b>	3L1, 3L2, 3L3 + N: <b>4 x 35</b> PE: <b>1 x 35</b>	35 mm <sup>2</sup> : <b>3.5</b>



### 10.12.3 CONNECTION DIAGRAM POWERSCALE

Cable Sections and Fuse Ratings recommended. Alternatively, local standards to be respected

Block Diagram

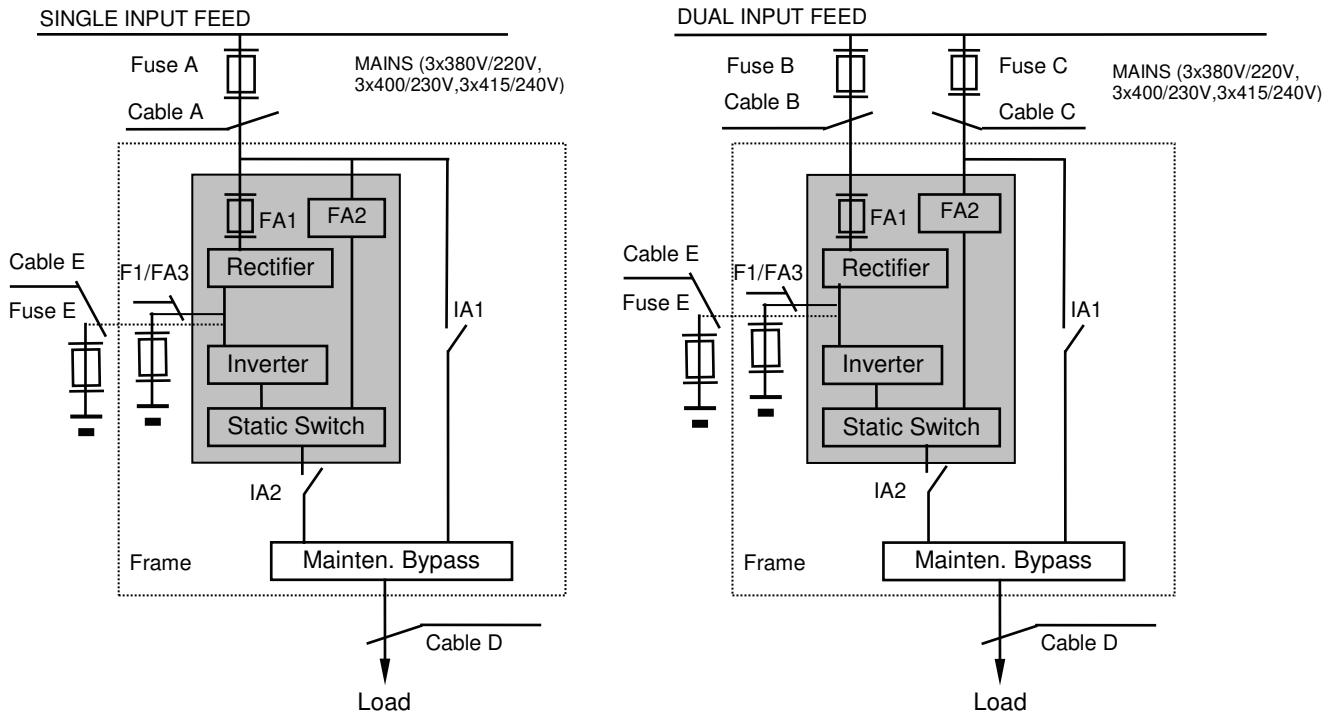


Figure 3: Block Diagram POWERSCALE from 10-50 kVA

SINGLE INPUT FEED – Cable sections and fuse ratings recommended according to IEC 60950-1

Power [kVA]	UPS Cabinet	Fuse A 1L1, 1L2, 1L3 [quantity x A]	Cable A 1L1, 1L2, 1L3, N, PE [quantity x mm <sup>2</sup> ]	Cable D 3L1, 3L2, 3L3, N, PE [quantity x mm <sup>2</sup> ]	Fuse E +, N, -, PE [quantity x A]	Cable E +, N, -, PE [quantity x mm <sup>2</sup> ]
10	A, B	3 x 20	5 x 2.5	5 x 2.5	3 x 32	4 x 4
15	A, B	3 x 32	5 x 4	5 x 4		
20	A, B	3 x 40	5 x 6	5 x 6	3 x 50	4 x 10
25	B, C					
30	C	3 x 63	5 x 10	5 x 10	3 x 80	4 x 16
40	C	3 x 80	5 x 25	5 x 25	3 x 100	5 x 25
50						

DUAL INPUT FEED – Cable sections and fuse ratings recommended according to IEC 60950-1

Power [kVA]	UPS Cabinet	Fuse B 1L1, 1L2, 1L3 [quantity x A]	Cable B 1L1, 1L2, 1L3, N, PE [quantity x mm <sup>2</sup> ]	Fuse C 2L1, 2L2, 2L3 [quantity x A]	Cable C 2L1, 2L2, 2L3, N, PE [quantity x mm <sup>2</sup> ]	Cable D 3L1, 3L2, 3L3, N, PE [quantity x mm <sup>2</sup> ]	Fuse E +, N, -, PE [quantity x A]	Cable E +, N, -, PE [quantity x mm <sup>2</sup> ]
10	A, B	3 x 20	5 x 2.5	3 x 20	5 x 2.5	5 x 2.5	3 x 32	4 x 4
15	A, B	3 x 32	5 x 4	3 x 32	5 x 4	5 x 4		
20	A, B	3 x 40	5 x 6	3 x 40	5 x 6	5 x 6	3 x 50	4 x 10
25	B, C							
30	C	3 x 63	5 x 10	3 x 63	4 x 10	5 x 10	3 x 80	4 x 16
40	C	3 x 80	5 x 25	3 x 80	5 x 25	5 x 25	3 x 100	5 x 25
50								