

# Eaton 93PM G2 50-360 kVA UPS Technical Specification

Manufacturer's declaration in accordance with IEC 62040-3

IEC 62040-3 Subclause	UPS FRAME RATING	200 kW PF 1.0	300 kW PF 1.0	240 kVA PF 0.9	360 kVA PF 0.9
	Model catalogue reference	93PM-G2-xxx(200)	93PM-G2-xxx(300)	93PM-G2-xxx(240)	93PM-G2-xxx(360)
	UPS power rating	50-200 kW PF 1.0	300 kW PF 1.0	60-240 kVA PF 0.9	360 kVA PF 0.9
	Number of UPMs (Uninterruptible Power Modules)	1-4	1-6	1-4	1-6
	UPM power rating	50 kW PF 1.0		60 kVA PF 0.9	
	UPS options:	Top air exhaust (for installing against the wall), internal maintenance bypass (MBS), internal battery breaker (for external batteries), Synchronization control interface, plywood package		Top air exhaust (for installing against the wall), internal battery breaker (for external batteries), Synchronization control interface, plywood package	
	Upgradeability	Up to 200 kW	Up to 300 kW	Up to 240 kVA	Up to 360 kVA
	External paralleling	Up to 4 units with HotSync technology			
5.1.1	UPS topology	Double conversion, 3-level IGBT converters			
	Rated conditional short-circuit current, $I_{cc}$ Rectifier	100 kA 50 kA with internal Maintenance Bypass Switch (MBS)			
5.3.4	UPS performance classification	VFI-SS-111			

## MECHANICAL

	UPS dimensions (width x depth x height)	800 x 990 x 1987 mm			
	Shipping weight	1 UPM: 454 kg 2 UPMS: 497 kg 3 UPMS: 540 kg 4 UPMS: 583 kg 5 UPMS: 626 kg 6 UPMS: 669 kg			
	Installed weight	1 UPM: 361 kg 2 UPMS: 404 kg 3 UPMS: 447 kg 4 UPMS: 490 kg 5 UPMS: 533 kg 6 UPMS: 576 kg			
	UPS Cable entry	Top / bottom entry			
	UPS Degree of protection	IP20 (EN60529), with optional front door dust filter			
	UPS colour	Black, RAL 9005			
	Mean time to repair (MTTR)	< 20 minutes			

## ENVIRONMENTAL

6.5.5	Acoustic noise at 1m, in 25 °C ambient temperature	Rear exhaust: 74 dB(A) With top air exhaust option: 77 dB(A)			
4.1.4	Ambient UPS storage temperature range	-15 °C to +55 °C in the protective package			
4.2.1.1 and 5.4.2.2 h	Ambient operating temperature range UPS	0 to +40 °C The maximum rate of temperature		0 to +35 °C The maximum rate of temperature	
	External battery	+ 20 °C to + 25 °C recommended for optimized battery life time (VRLA batteries)			

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4.2.1.1	Relative humidity range	5 to 95%, no condensation allowed. Recommended range 20-60%. There shall be at least a 1.0 °C difference between the dry bulb temperature and the wet bulb temperature, at all times, to maintain a non-condensing environment.			
4.2.1.2	Operating altitude	1000 m above sea level at 40 °C		1000 m above sea level at 35 °C	
		Maximum 2000 m with 1% de-rating per each additional 100m above 1000m			
	RoHS/WEEE compliancy	Yes			

EFFICIENCY		(for more detailed information, please refer to the separate efficiency declaration)			
	POWER RATING	50 kW	100 kW	200 kW	300 kW
5.3.2 r and 6.4.1.6	Efficiency in double-conversion, rated linear load				
	100% load	96,10%	96,20%	96,30%	96,30%
	75% load	96,40%	96,50%	96,60%	96,60%
	50% load	96,6 %	96,6 %	96,7 %	96,8 %
	25% load	96,0 %	96,1 %	96,2 %	96,2 %
	Heat dissipation in double conversion				
	100% load	2	4	7,8	11,4
	75% load	1,4	2,7	5,3	7,9
	50% load	0,9	1,8	3,4	5
	25% load	0,5	1	2	3
	No load	0,3	0,6	1,2	1,8
	Efficiency in ESS, rated linear load				
	100% load	TBD	TBD	TBD	TBD
	75% load	TBD	TBD	TBD	TBD
	50% load	TBD	TBD	TBD	TBD
	25% load	TBD	TBD	TBD	TBD
	Efficiency in stored energy mode, up to	95,5 %			

## ELECTRICAL CHARACTERISTICS

### INPUT

5.2.1.a and 5.2.1 b	Rated input voltage	220/380 V; 230/400 V; 240/415 V			
	Voltage tolerance	188-276 V		196-276 V	
	Rectifier input Bypass input	rated voltage -10% / +10%		rated voltage -10% / +10%	
5.2.1 c and 5.2.1 d	Rated input frequency	50 or 60 Hz			
	Frequency tolerance	42 to 70 Hz			
5.2.2 a and 5.2.2 b	Number of input phases	3 phases + neutral + PE			
5.2.2 d	Input power factor	0,99 pf at 100% load			
5.2.2 c	Rated rectifier input current	90-360 A	90-540 A	90-360 A	90-540 A
		90 A / UPM	90 A / UPM	90 A / UPM	90 A / UPM
5.2.2 f	Maximum rectifier input current	95-380 A	95-570 A	95-380 A	95-570 A
		95 A / UPM	95 A / UPM	95 A / UPM	95 A / UPM
	Maximum bypass input current	380 A	570 A	380 A	570 A

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5.2.2 h and 5.2.2. i	Input current distortion at rated input current Resistive load Non-linear load	< 2,5% < 5%			
5.2.2 e	In-rush current	<100% of rated current			
5.2.2 k	AC power distribution system compatibility	TN, TT, IT (4-wire)			
	Rectifier ramp-up, rectifier start and load step	Yes			
	Backfeed protection	Yes, for rectifier and bypass lines			

## ELECTRICAL CHARACTERISTICS

### OUTPUT

5.3.2 k	Output power rating	50-200 kW	50-300 kW	60-240 kVA	60-360 kVA
	Output power factor	1.0	1.0	0.9	0.9
5.3.2 f and 5.3.2 g	Number of output phases	3 phase + neutral + PE			
5.3.2 b	Rated output voltage	220/380 V; 230/400 V; 240/415 V, configurable			
5.3.2 b	Output voltage variation, steady state	< 1%			
5.3.2 i	Total voltage harmonic distortion 100% linear load 100% non-linear load	< 1,5% < 3,0%			
5.3.2 q	Voltage unbalance at reference unbalanced load	< 0,6%			
5.3.2 j	Voltage transient (r.m.s) Recovery time to steady state	0% during transfer from stored energy to normal mode ±4% with 140 ms recovery from 100% load step			
5.3.2 c	Rated output frequency Output frequency variation	50 or 60 Hz, configurable ± 0,1 Hz			
5.3.2 d and 5.3.2 e	Maximum frequency range for synchronization with bypass Maximum synchronized phase error Maximum slew-rate when synchronizing	± 4 Hz as default. User settable ± 0,5 to ± 5 Hz. < 1° with static balanced load 0,4 Hz/s			
5.3.2 l	Overload capability On inverter	60 min 110% load 10 min 125% load 60 s 150% load	10 min 110% load 60 s 125% load 10 s 150% load		
	Overload capability On inverter, stored energy mode	10 min 110% load 30 s 125% load 300 ms 150% load	10 min 110% load 30 s 125% load 300 ms 150% load		
	Overload capability @ 40 °C On bypass	Continuous < 125% load 10 ms 1000% load	Continuous < 115% load 10 ms 1000% load		
5.3.2 m	Output current limitation, short-circuit capability, 300 ms	180-720 A 180 A / UPM	180-1080 A 180 A / UPM	180-720 A 180 A / UPM	180-1080 A 180 A / UPM
5.3.2 o and 5.3.2 p	Load power factor, permitted range	From 0,8 lagging to 0,8 leading without de-rating			

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## ESS MODE CHARACTERISTICS

Transfer time to double-conversion	Mains available Mains failure	No break < 2 ms in normal transfer conditions, < 10 ms maximum
Output voltage variation setting		±10% of nominal voltage, default
Output frequency variation setting		±4 Hz, default
Storm detection		UPS locks into double-conversion mode when three power line disturbances have forced the unit to double-conversion three times (user adjustable) within a one-hour period (user adjustable).
High Alert mode		UPS will stay on double-conversion for one hour (user adjustable), after which the unit will automatically return to operate on ESS.
Reactive power compensation		When enabled, allows compensating for the reactive power produced by the UPS or the load while operating on ESS mode.

## VMMS MODE CHARACTERISTICS

VMMS availability		Available for 93PM G2 UPS systems with more than 1 UPM, both between internal modules and modules in an external parallel connected system.
VMMS operation		When load level per module is less than 55%, VMMS will automatically optimise the number of online modules for optimised operating efficiency. The extra UPMs will be set to ready state mode, capable to transfer online in < 2ms transfer time. The load will be fed in double conversion mode the entire time, even during and after a load step.
Redundancy level setting		Number of redundant online UPMs (system wide), configurable.
UPM module rotation		System will automatically rotate the ready state UPMs. Enabled by default, configurable.

## BYPASS

Type of bypass		Static
Bypass rating	200 kW	300 kW 240 kVA 360 kVA
Bypass voltage range		220/380 V; 230/400 V; 240/415 V tolerance -10% / +10% of rated voltage
Transfer time break		No break
Backfeed protection		Integrated as standard
Rated conditional short-circuit current, $I_{cc}$ Static bypass		100 kA
Internal static bypass ultra-rapid fuse		Bussmann 900A uR 170M4419
Bypass fuse $i^2t$ value		
Pre-arc $i^2t$		155 000 A <sup>2</sup> s
Total clearing $i^2t$		850 000 A <sup>2</sup> s

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## BATTERY CHARACTERISTICS

5.4.2.2 d	Battery technology	VRLA, Lithium-Ion batteries			
5.4.2.2 b	Battery quantity	36 to 44 battery blocks (VRLA, 12 V) 216 to 264 cells per string  (32 - 35 battery blocks supported with power de-rating)		40 to 44 battery blocks (VRLA, 12 V) 240 to 264 cells per string	
5.4.2.2 c	Battery voltage range	432 V (216 cells) to 528 V (264 cells)		480 V (240 cells) to 528 V (264 cells)	
5.4.2.2 f	Stored energy time	See separate declaration			
5.4.2.2 o	Recharge profile	Advanced Battery Management (ABM <sup>®</sup> ) = 90% resting, 10% floating/charging (typical) OR float charge			
5.4.2.2 q	End of discharge voltage	1.67 VPC to 1.75 VPC Configurable or automatic (load adaptive)			
5.4.2.2 r	Charging current at nominal load	Configurable 0...50 A per UPM At > 40 kVA load per UPM, automatically limited to 20 A per UPM			
	Battery start option	Yes			
	Temperature compensated battery charging option	Yes			
	Alternative backup power technologies	Wet cell batteries NiCd batteries			

## COMMUNICATION CIRCUITS

5.6	Display	Touchscreen LCD, 4x LEDs for notice and alarm, UPS status LED light stripes, UPM status LEDs			
	Standard connectivity ports	4x Mini-Slot ports for optional cards, Device USB and Host USB, RS-232 service port, 1 x relay output, 5 x building alarm inputs and a dedicated EPO, Web/SNMP card			
	Optional	Mini-Slot cards: Industrial relay, ModBus card			
	Complete list of indications and interface devices	See User's Manual			

## COMPLIANCE WITH STANDARDS

IEC 62040-1	Safety Access Degree of protection	Restricted access IP20; protection against medium sized foreign matter (incl. finger), protection against vertically dripping water.			
IEC 62040-2	Electromagnetic Compatibility Immunity Emissions	EMC Category C3 EMC Category C3			
	RoHS	EU directive 2015/863/EU			
	WEEE	EU directive 2012/19/EU			