Eaton 93PM 30-200 kW UPS Technical Specification

Manufacturer's declaration in accordance with IEC 62040-3

IEC 62040-3 Subclause	MODEL RATING (1.0 pf)	30-50 kW	30-100 kW	30-150 kW	30-200 kW
	Model catalogue reference	93PM-XX(50)	93PM-XXX(100)	93PM-XXX(150)	93PM-XXX(200)
	Number of UPM's (Uninterruptible Power Modules)	1 UPM	1...2 UPM's	1...3 UPM's	1...4 UPM's
	UPS Options:				
	Internal batteries, standard or long life	X			
	Internal Battery Breaker (BB)	Default	X	X	
	Internal maintenance bypass (MBS)	X	X	X	
	Integrated maintenance bypass (SIAC-MBS)				X
	Separate battery per UPM (SB)		X	X	X
	Top Cable Access (C)	X	X	X	Default
	Plywood package	X	X	X	X
	Upgradeability	up to 50 kW	up to 100 kW	up to 150 kW	up to 200 kW
	External paralleling	Up to 8 units with HotSync technology			
5.1.1	UPS topology	Double conversion, 3-level IGBT converters			
5.3.4	UPS performance classification	VFI-SS-111			

MECHANICAL

	UPS dimensions (width x depth x height)	560 x 914 x 1876 mm			760 x 914 x 1876 mm
	UPS dimensions with top air exhaust (width x depth x height)	N/A	560 x 1114 x 1876 mm		760 x 1114 x 1876 mm
	Shipping weight, UPS and internal batteries	UPS+0bat: 330 kg UPS+3bat: 615 kg UPS+4bat: 745 kg UPS+5bat: 845 kg UPS+6bat: 945 kg	1 UPM: 337 kg 2 UPMs: 408 kg	1 UPM: 378 kg 2 UPMs: 443 kg 3 UPMs: 508 kg	1 UPM: 431 kg 2 UPMs: 496 kg 3 UPMs: 561 kg 4 UPMs: 626 kg
	Installed weight, UPS and internal batteries	UPS+0bat: 288 kg UPS+3bat: 579 kg UPS+4bat: 676 kg UPS+5bat: 773 kg UPS+6bat: 870 kg	1 UPM: 267 kg 2 UPMs: 338 kg	1 UPM: 279 kg 2 UPMs: 341 kg 3 UPMs: 438 kg	1 UPM: 346 kg 2 UPMs: 408 kg 3 UPMs: 471 kg 4 UPMs: 556 kg
	UPS Cable entry	Bottom / rear entry Top entry with optional kit			Top / bottom / rear entry
	UPS Degree of protection	IP20 (EN60529), with front door mounted washable dust filter			
	UPS colour	Black, RAL 9005			
	Mean time to repair (MTTR)	< 30 minutes			

ENVIRONMENTAL

6.5.5	Acoustic noise at 1m, in 25 °C ambient temperature	< 60 dBA in double conversion < 47 dBA in ESS	< 65 dBA in double conversion < 47 dBA in ESS
4.1.4	Ambient storage temperature range		
	UPS	-25 °C to +55 °C in the protective package	
	Internal and external VRLA battery	-25 °C to +25 °C in the protective package* **Recommended for optimized battery life time*	

Updated: 11.1.2018
Document: Eaton 93PM 30-200 kW technical specification
The technical specification is subject to change without notice
Rev003

Eaton 93PM 30-200 kW UPS Technical Specification

Manufacturer's declaration in accordance with IEC 62040-3

IEC 62040-3 Subclause	MODEL RATING (1.0 pf)	30-50 kW	30-100 kW	30-150 kW	30-200 kW
4.2.1.1 and 5.4.2.2 h	Ambient operating temperature range UPS Internal and External VRLA battery	+5 to +40 °C The *maximum rate of change shall be limited to 1.67 °C over 5 minutes (20 °C/hour), based on the ASHRAE standard 90.1-2013* + 20 °C to + 25 °C recommended for optimized battery life time			
4.2.1.1	Relative humidity range during storage and operation	5 to 95%, no condensation allowed. T*here 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 Maximum 2000 m with 1% de-rating per each additional 100m above 1000m			
	RoHS/WEEE compliancy	Yes			

EFFICIENCY

	Efficiency in double-conversion, rated linear load	30	40	50	60	80	100	90	120	150	120	160	200kW
5.3.2 r and 6.4.1.6	100% load	96,6	96,5	96,3%	96,7	96,6	96,4%	96,7	96,7	96,5%	96,7	96,6	96,4%
	75% load	96,6	96,6	96,6%	96,6	96,7	96,6%	96,7	96,7	96,7%	96,6	96,7	96,6%
	50% load	96,1	96,5	96,6%	96,2	96,6	96,7%	96,4	96,7	96,7%	96,3	96,6	96,7%
	25% load	94,0	95,1	95,7%	93,4	95,5	96,0%	94,0	95,7	96,1%	93,4	95,3	95,9%

	Heat dissipation in double conversion, [W]	30	40	50	60	80	100	90	120	150	120	160	200kW
	100% load	1055	1450	1921 W	2049	2816	3734 W	3071	4095	5440 W	4095	5631	7469 W
	75% load	791	1056	1320 W	1584	2048	2640 W	2304	3071	3839 W	3167	4095	5280 W
	50% load	609	725	880 W	1185	1408	1706 W	1680	2048	2559 W	2305	2816	3413 W
	25% load	479	515	562 W	1060	942	1042 W	1436	1348	1623 W	2120	1973	2138 W
	No load	366 W			760 W			1120 W			1520 W		

	Efficiency in ESS, rated linear load	30	40	50	60	80	100	90	120	150	120	160	200kW
	100% load	99,0	99,1	99,2%	99,1	99,2	99,3%	99,2	99,2	99,3%	99,1	99,2	99,2%
	75% load	99,0	99,0	99,1%	99,0	99,1	99,2%	99,0	99,2	99,2%	99,0	99,1	99,2%
	50% load	98,5	98,9	99,0%	98,7	99,0	99,0%	98,8	99,0	99,2%	98,8	99,0	99,0%
	25% load	97,5	98,1	98,3%	98,4	98,6	98,6%	98,2	98,4	98,7%	98,2	98,4	98,6%

	Heat dissipation in ESS	30	40	50	60	80	100	90	120	150	120	160	200kW
	100% load	303	363	403 W	544	645	705 W	723	968	1057 W	1090	1290	1613 W
	No load	128 W			216 W			340 W			500 W		
	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 Rectifier input Bypass input	 rated voltage -20% / +20% rated voltage -10% / +10%
5.2.1 c and 5.2.1 d	Rated input frequency	50 or 60 Hz
	Frequency tolerance	42 to 72 Hz

Eaton 93PM 30-200 kW UPS Technical Specification

Manufacturer's declaration in accordance with IEC 62040-3

IEC 62040-3 Subclause	MODEL RATING (1.0 pf)	30-50 kW	30-100 kW	30-150 kW	30-200 kW
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 at 100% load			
		30 40 50	60 80 100	90 120 150	120 160 200kVA
5.2.2 c	Rated rectifier input current, 100% load without charging	45 A 60 A 75 A	90 A 120 A 150 A	135 A 180 A 226 A	180 A 241 A 301 A
5.2.2 f	Maximum rectifier input current	57 A 76 A 95 A	114 A 152 A 190 A	171 A 228 A 285 A	228 A 304 A 380 A
	Rated Bypass input current	44 A 58 A 73 A	87 A 117 A 146 A	131 A 175 A 219 A	175 A 233 A 292 A
5.2.2 h and 5.2.2. i	Input current distortion at rated input current	30 40 50	60 80 100	90 120 150	120 160 200kVA
	Resistive load	< 5% <3%	<5% <3%	<5% <3%	<5% <3%
5.2.2 e	In-rush current	≤ 145 A	≤ 150 A	≤ 180 A	≤ 380 A
5.2.2 k	AC power distribution system compatibility	TN, TT, IT (4-wire)			
	Rectifier ramp-up, at rectifier start and load step	10 A/s (default), configurable. Minimum 1 A/s.			
	Backfeed protection	Yes, for rectifier and bypass lines			

ELECTRICAL CHARACTERISTICS

OUTPUT

5.3.2 k	Output power rating	30kVA; 40kVA; 50kVA; 60kVA; 80kVA; 100kVA; 90kVA; 120kVA; 150kVA; 160kVA; 200kVA			
	Output power factor	1.0			
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			
5.3.2 f and 5.3.2 g	Number of output phases	3 phase + neutral + PE			
	Crest factor	2,3			
5.3.2 b	Rated output voltage	220/380 V; 230/400 V; 240/415 V, configurable			
	Output voltage variation, steady state	< 1%			
5.3.2 i	Total voltage harmonic distortion 100% linear load 100% non-linear load	< 1,0% < 3,0%	< 1,2% < 3,0%		
5.3.2 q	Voltage unbalance at reference unbalanced load	< 0,1%			< 0,6 %
	Phase displacement at reference unbalanced load	< 0,3 deg			< 1,0 deg
5.3.2 j	Voltage transient (r.m.s) and recovery time	0% during transfer from stored energy to normal mode			
		±4% with 110 ms recovery from 100% load step	±4% with 140 ms recovery from 100% load step		
5.3.2 c	Rated output frequency	50 or 60 Hz, configurable			
	Output frequency variation	± 0,1 Hz			
5.3.2 d and 5.3.2 e	Maximum frequency range for synchronization with bypass	± 4 Hz as default. User settable ± 0,5 to ± 5 Hz.			
	Maximum synchronized phase error	< 1° with static balanced load			
	Maximum slew-rate when synchronizing	0,4 Hz/s			

Eaton 93PM 30-200 kW UPS Technical Specification

Manufacturer's declaration in accordance with IEC 62040-3

IEC 62040-3 Subclause	MODEL RATING (1.0 pf)	30-50 kW	30-100 kW	30-150 kW	30-200 kW
5.3.2 l	Overload capability On inverter	**30, 40, 60, 80, 90, 120, 160 kW** 10 min 135% load 60 sec 155% load 10 sec 185% load 300 ms >185% load		**50, 100, 150, 200 kW** 10 min 110% load 60 sec 125% load 10 sec 150% load 300 ms >150% load	
	Overload capability On inverter, stored energy mode	**30, 40, 60, 80, 90, 120, 160 kW** 10 min 135% load 60 sec 155% load 300 ms >155% load		**50, 100, 150, 200 kW** 10 min 110% load 60 sec 125% load 300 ms >125% load	
	Overload capability On bypass	Continuous < 125% load 10 ms 1000% load			
5.3.2 m	Output current limitation, short-circuit capability	170 A, 400 ms	345 A, 400 ms	510 A, 400 ms	670 A, 400 ms
6.4.2.10.3 and 6.4.2.10.4	Fault clearing capability	**35 A gL/gG** fuse / **B25/C10** circuit breaker	**35 A gL/gG** fuse / **B50/C25** circuit breaker	**63 A gL/gG** fuse / **B63/C32** circuit breaker	**63 A gL/gG** fuse / **B100/C50** circuit breaker

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.

VMMS MODE CHARACTERISTICS

	VMMS Availability	Available for multi-module 93PM UPS system, 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			
	Static Bypass rating	50 kVA	100 kVA	150 kVA	200 kVA
	Static Bypass voltage range	220/380 V; 230/400 V; 240/415 V tolerance -10% / +10% of rated voltage			

Eaton 93PM 30-200 kW UPS Technical Specification

Manufacturer's declaration in accordance with IEC 62040-3

IEC 62040-3 Subclause	MODEL RATING (1.0 pf)	30-50 kW	30-100 kW	30-150 kW	30-200 kW
	Transfer time break	No break			
	Maintenance bypass	Option, internal or external			Option, integrated sidecar or external
	Backfeed protection	Integrated as standard			
	Rated conditional short-circuit current, Icc Static bypass	100 kA (internal ultra rapid fusing)			
	Optional internal or integrated Maintenance bypass	10 kA*	25 kA*	10 kA*	50 kA*
		*using external protective fuse			
	Internal static bypass ultra-rapid fuse	Bussmann 160LET	Bussmann 550 A 170M4465	Bussmann 900 A 170M4419	
	Bypass fuse i^2t value Pre-arc i^2t Total clearing i^2t	1 100 A^2s 16 000 A^2s	96 100 A^2s 230 000 A^2s	155 000 A^2s 850 000 A^2s	
	External bypass protective fuse, recommended rating	30 40 50	60 80 100	90 120 150	120 160 200kVA
	3x	63 A 80 A 100 A	125 A 160 A 200 A	200 A 250 A 315 A	250 A 315 A 400 A

BATTERY CHARACTERISTICS

5.4.2.2 d	Battery technology	12 V, VRLA	
5.4.2.2 b	Battery quantity, internal batteries	36 blocks, 216 cells per battery string	N/A
		Note! Units with internal batteries only support 36 block string length	
	Battery quantity, external batteries	**30, 40, 60, 80, 90, 120, 160 kW:** 32 ... 40 blocks, 192...240 cells per battery string **50, 100, 150, 200 kW:** 36 ... 40 blocks, 216...240 cells per battery string	
		Note! Never connect battery strings with different battery quantity and voltage in parallel	
5.4.2.2 c	Battery voltage, internal batteries	432 V (36 blocks)	N/A
	Battery voltage, external batteries	**30, 40, 60, 80, 90, 120, 160 kW:** 384 V (32 blocks) to 480 V (40 blocks) **50, 100, 150, 200 kW:** 432 V (36 blocks) to 480 V (40 blocks)	
5.4.2.2 o	Recharge profile	Advanced Battery Management (ABM®) = 90% resting,10% 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…29 A per UPM At > 40 kVA load per UPM, automatically limited to 16,5 A per UPM	
	Battery start	Yes	
	Temperature compensated battery charging option	Yes, standard for internal batteries Yes, with Environmental Monitoring Probe (EMP) for external batteries	
	Alternative backup power technologies	Wet cell batteries NiCd batteries Lithium-ion batteries Supercapacitors	

COMMUNICATION CIRCUITS

5.6	Display	Touchscreen LCD, 4x LEDs for notice and alarm, status LED light stripes
	Standard connectivity ports	3x 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
	Optional	Mini-Slot cards: Web/SNMP/Modbus, Industrial relay card

Updated: 11.1.2018
Document: Eaton 93PM 30-200 kW technical specification
The technical specification is subject to change without notice
Rev003

IEC 62040-3 Subclause	MODEL RATING (1.0 pf)	30-50 kW	30-100 kW	30-150 kW	30-200 kW
	Complete list of indications and interface devices	See User's Manual			

COMPLIANCE WITH STANDARDS				
IEC 62040-1	Safety Access Degree of protection	Operator access area IP20; protection against medium sized foreign matter (incl. finger) IP21 available as option		
IEC 62040-2	Electromagnetic Compatibility Immunity and Emissions	EMC Category C3 EMC Category C2 as option	EMC Category C3	