MODULYS RM GP

Rack-mounted modular UPS system *Green Power 2.0* range up to 4 x 25 kW







OBJECTIVES

The aim of these specifications is to provide the information required to prepare the system and installation site.

The specifications are intended for:

- installation engineers,
- design engineers,
- engineering consultants.

Please contact us for further information, or if you would like to receive a full documentation package for detailed product know-how, including schematics, integration instructions, technical data sheets, user's manual, etc.





MODULYS RM GP up to 4 x 25 kW

1. ARCHITECTURE

1.1. Range and flexibility

MODULYS RM GP is a 3-phase modular UPS system designed for 19" rack integration. The product is easy to integrate and install, as well as being very simple to operate and maintain. It provides maximum power availability and protection in a compact design that leaves free space for other rack mounted devices.

MODULYS RM GP:

- provides easy and fully-assured rack integration to meet all requirement across multiple applications, even for existing installations;
- simplifies and optimises every step of the integration process from sizing to installation, including the logistics, making project management easy, risk-free and economic;
- provides reliable power whilst ensuring optimum load protection even during power upgrades or maintenance procedures.







centralised hot-swap auxiliary mains bypass



ARCHITECTURE



1.2. Flexible back-up time

Different extended back-up times are possible by using: (1) 4U rack-mounted battery modules; (2) a modular battery cabinet; (3) a high capacity battery cabinet.

Each battery pack comprises an acid-proof container designed to prevent damage in case of acid leakage.

Each Power Module has a powerful embedded battery charger able to provide up to 8 A (without power derating).

A special Power Module with extra battery charger inside is available when very long back-up times are required.

MODULYS RM GP is compatible with different battery technologies.

Battery block dynamics ⁽¹⁾					
Seeled lood agid	Min	108 + 108			
Sealed lead-acid	Max	144 + 144			
Open vented (flooded lood acid)	Min	108 + 108			
Open vented (nooded lead-acid)	Max	144 + 144			
Niekol Codmium	Min	180 + 180			
	Max	228 + 228			

2 strings/3 cables configuration (+ N -).



1.2.1. 4U rack-mounted battery modules

Dimensions and weight					
	Height (mm)	175			
	Depth (mm)	920			
	Width (mm)	442 (482)			
	Weight - empty (kg)	23			
M4-BR-009L	Weight - with batteries (kg)	136			





1.2.2. Modular hot-swap battery cabinet

The modular battery system is based on vertical and horizontal modularity thanks to independent battery strings connected in parallel, each string comprising hot-swap long life battery packs.

Each battery string has its own independent protection and its own independent switch for fast and safe maintenance.







Modular hot-swap battery cabinet Back up times in minutes @ 75% of rated load								
						N pow	umber ver mod	of Iules
Witho	ut redur	ndancy				1	2	3
N+1 redundancy						2	3	4
	1 9						-	-
			2		18	15	5	-
			3		27	23	9	5
			4		36	34	15	8
			5		45	44	19	11
	-		6		54	57	23	15
			7		63	68	28	18
			8		72	80	34	20
			9		81	92	40	23
			10		90	103	44	26
			11		99	116	51	30
			12		108	129	57	34
			13		117	141	63	38
			14	Cumulative Ah	126	151	68	41
(0)			15		135	163	73	44
inet			16		144	177	80	48
cab		ings	17		153	190	86	53
ttery	_	of str	18		162	206	92	57
of ba	2	Number o	19		171	221	98	61
oer o			20		180	235	103	65
Iumi			21		189	249	109	68
2			22		198	261	116	71
			23		207	272	123	75
			24		216	282	129	80
			25		225	294	135	84
			26		234	310	141	88
			27		243	326	146	92
			28		252	341	151	96
			29		261	354	156	99
	2		30		270	367	163	103
	3		31		279	383	170	107
			32		288	402	177	111
			33		297	419	183	116
			34		306	436	190	120
			35		315	451	197	125
			36		324	466	206	129

For very long BUT, it is recommended to use the power module
with 16 A charging current (refer to page 14).

Modular hot-swap battery cabinet Back up times in minutes @ 75 % of rated load							
						Num power r	per of nodules
Witho	ut redur		1	2			
1+1 re	edundar		2	-			
			1		9	5	-
			2		18	15	5
			3		27	23	9
			4		36	34	15
			5		45	44	19
	1		6		54	57	23
			7		63	68	28
			8		72	80	34
			9		81	92	40
			10		90	103	44
			11		99	116	51
			12		108	129	57
	2		13		117	141	63
			14		126	151	68
S			15	Cumulative Ah	135	163	73
oinet		()	16		144	177	80
y cat		tring	17		153	190	86
atter		of st	18		162	206	92
of b		lber	19		171	221	98
her		Nun	20		180	235	103
Num			21		189	249	109
			22		198	261	116
			23		207	272	123
			24		216	282	129
			25		225	294	135
			26		234	310	141
			27		243	326	146
			28		252	341	151
			29		261	354	156
	3		30		270	367	163
	Ũ		31		279	383	170
			32		288	402	177
			33		297	419	183
			34		306	436	190
			35		315	451	197
			36		324	466	206

For very long BUT, it is recommended to use the power module with 16 A charging current (refer to page 14).







Dimensions and weight					
	Number of strings				
	0	1			
Height (mm)	1990				
Depth (mm)	890				
Width (mm)	810				
Weight (kg)	220 1792				

Modular battery cabinet Back up times in minutes @ 75 % of rated load																											
Number of power module							modules																				
Without redundancy						1	2	3																			
N+1	1 redundancy				2 3 4			4																			
nets	ets	y racks	1		92	119	56	33																			
cabir			2	ttive Ah	184	279	119	75																			
ttery	4	atter	3		276	447	201	119																			
of ba		of b	- Ther of b	ofb	ofb	ofb	ofb	ofb	ofb	ofb	ofb	ofb	ofb	of b	of b	of b	ofb	ofb	ofb	. of b	of b	y jo 4	mula	368	654	279	170
per (5		Cu	460	-	378	226																			
Nun		Nur	6		552	-	-	279																			

For very long BUT, it is recommended to use the power module with 16 A charging current (refer to page 14).

Modular battery cabinet Back up times in minutes @ 75 % of rated load							
						Number of po	ower modules
Without redundancy						1	2
1+1	1+1 redundancy					2	-
inets		acks	1		92	119	56
ny cab		ery ra	2	e Ah	184	279	119
batte	oer of batter	ber of batt	3	ulativ	276	447	201
ber of			4	Cum	368	654	279
Num		Nun	5		460	-	378

For very long BUT, it is recommended to use the power module with 16 A charging current (refer to page 14).



2. SPECIFICATIONS

2.1. Installation parameters



Configurations and rated power (kW)						
	Number of power modules					
	1	2	3	4		
N configuration	25	50	75	-		
N+1 redundancy	-	25	50	75		

Rated current and max current						
	Number	of power	modules			
Without redundancy	1	2	3			
N+1 redundancy	2	3	4			
Rated rectifier input current (A) (EN 62040-3)	37.7	75	113.1			
Max rectifier input current (A) (EN 62040-3)	45.0	90	135			
Rated inverter output current (A)	36.2	72	109			
Maximum bypass input current (A) (EN 62040-3)	120					
Max battery current (A)	80	160	240			

Cooling						
		Number of power modules				
Without redundancy		1	2	3		
N+1 redundancy		2	3	4		
Maximum air flow (m ²	³/h)	400	800	1200		
	(VV)	1140	2280	3420		
Max dissipation in nominal conditions ⁽¹⁾	(kcal/h)	980	1961	2941		
	(BTU/h)	3891	7782	11672		
	(VV)	1350	2650	3950		
Max dissipation in worst conditions ⁽²⁾	(kcal/h)	1161	2279	3397		
	(BTU/h)	4608	9044	13481		

(1) Nominal input voltage and rated output active power (PF1).

(2) Low input voltage, battery recharge and rated output active power (PF1).



Configurations and rated power (kW)						
Number of power modules						
	1	2				
N configuration	25	50				
1+1 redundancy	-	25				

Rated current and max current		
	Number of power modules	
Without redundancy	1	2
1+1 redundancy	2	-
Rated rectifier input current (A) (EN 62040-3)	37.7	75
Max rectifier input current (A) (EN 62040-3)	45.0	90
Rated inverter output current (A)	36.2	72
Maximum bypass input current (A) (EN 62040-3)	12	20
Max battery current (A)	80	160

Cooling			
		Number of power modules	
Without redundancy		1	2
1+1 redundancy		2	-
Maximum air flow (m ³	³/h)	400	800
	(VV)	1140	2280
Max dissipation in nominal conditions ⁽¹⁾	(kcal/h)	980	1961
	(BTU/h)	3891	7782
	(VV)	1350	2650
Max dissipation in worst conditions ⁽²⁾	(kcal/h)	1161	2279
	(BTU/h)	4608	9044

Nominal input voltage and rated output active power (PF1).
 Low input voltage, battery recharge and rated output active power (PF1).





Acoustic noise			
	Number	of power	modules
Without redundancy	1	2	3
N+1 redundancy	2	3	4
Acoustic noise at 1 m (dBA)(1)	51	53	54

(1) 75% of nominal load.

Dimensions and weight				
	Numb	Number of power modules		
	1	2	3	4
Height (mm)		66	54	
Depth (mm)		92	20	
Width (mm)		442	(482)	
Weight - sub-rack (kg)		4	9	
Weight (kg)	82	115	148	181

Environment	
Storage temperature	-5 to +50 °C
Operating temperature	0 to 40 °C ⁽¹⁾⁽²⁾
Maximum relative humidity	95% condensation-free
Degree of protection	IP20

(1) According to EN 62040-3.

(2) For optimum battery lifetime the ideal temperature range is 15 °C - 25 °C.



Acoustic n	oise
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	Number of po	ower modules
Without redundancy	1	2
1+1 redundancy	2	-
Acoustic noise at 1 m (dBA) ⁽¹⁾	51	53

(1) 75% of nominal load.

Dimensions and weightNumber of power modules12Height (mm)397Depth (mm)920Width (mm)442 (482)Weight - sub-rack (kg)43Weight (kg)76

Environment	
Storage temperature	-5 to +50 °C
Operating temperature	0 to 40 °C ⁽¹⁾⁽²⁾
Maximum relative humidity	95% condensation-free
Degree of protection	IP20

(1) According to EN 62040-3.

(2) For optimum battery lifetime the ideal temperature range is 15 °C - 25 °C.









2.2. Electrical characteristics

2.2.1. Electrical characteristics independent of the number of modules

Electrical characteristics - Input	
Rated mains supply voltage (V)	400 V 3-phase+N
Voltage tolerance at full load	340 V to 480 V (+20/-15%)
Voltage tolerance at derated load	up to 240 V @ 50 % of nominal load (linear decrease)
Rated frequency (Hz)	50/60 ±10%
Power factor	> 0.99 ⁽¹⁾
Total harmonic input current distortion (THDi)	\leq 3 % (@: Pn, Resistive load, Mains THDv \leq 1 %)
Max inrush current at start-up	Power walk-in/Soft-start (selectable parameters)

(1) Pout \geq 50 % Sn.

Electrical characteristics - Bypass	
Bypass rated voltage (V)	Nominal output voltage $\pm 15\%$ ($\pm 20\%$ if GENSET is used)
Bypass rated frequency (Hz)	50/60
Bypass frequency tolerance (Hz)	$\pm 2\%$ selectable ($\pm 8\%$ if GENSET is used)
Bypass frequency variation speed	50/60 ±10%

Electrical characteristics - Inverter	
Rated output voltage (V)	(3ph + N) 380/400/415 selectable
Output voltage tolerance (Hz)	±1
Rated output frequency (Hz)	50/60 (selectable)
Output frequency tolerance	±0.05% (on battery mode)
Load crest factor	≥ 2.7:1
Total output voltage distortion (THDv)	\leq 1 % (Ph/Ph); \leq 2 % (Ph/N) (@: Pn, Resistive load)

Electrical characteristics - Stored energy operating mode	
Number of battery blocks (VRLA)	From 18+18 to 24+24

Electrical characteristics - Efficiency	
Efficiency (on-line mode)	up to 96.5 %
Efficiency (eco-mode)	up to 99.3 %



2.2.2. Electrical characteristics dependent of the number of modules



Electrical characteristics - Inverter overload						
		Number	of power	modules		
		1	2	3-4		
Inverter overload	10'	31.2	62.4	94		
	5'	33.3	66.5	100		
	1'	37.5	75.0	113		

(1) Initial condition Pout $\leq 80\%$ Pn.

Electrical characteristics - Inverter short-circuit					
		Number of power modules			
		1	2	3	4
Inverter short-circuit	40 ms	100	200	300	400
(A) $ k1 = k2 = k3$	40 to 80 ms	80	160	240	320

Electrical characteristics - Bypass overload and short-circuit							
		Number of power modules					
		1	2	3	4		
Bypass overload (A)	Nominal		109				
	Continuous	120					
	30'	136					
	10'	163					
	1"	> 190					
Bypass max short- circuit current (A)	20 ms	5000					

Electrical characteristics - Bypass rating					
	Number of power modules				
	1	2	3	4	
Bypass I ² t (A ² s)	130000				
Bypass Max Peak Current (A)	5000				

Electrical characteristics - Battery charger max current					
	Number of power modules1234				
Standard max. current (A) M4-RI-25	8	16	24	32	
Enhanced battery charger max. current (A) M4-RI-25+CH	16	32	48	64	



Electrical characteristics - Inverter overload					
		Number of po	ower modules		
		1	2		
	10'	31.2	62.4		
Inverter overload (kW) ⁽¹⁾	5'	33.3	66.5		
	1'	37.5	75.0		

(1) Initial condition Pout $\leq 80\%$ Pn.

Electrical characteristics - Inverter short-circuit					
		Number of power modules			
		1	2		
Inverter short-circuit	40 ms	100	200		
(A) lk1 = lk2 = lk3	40 to 80 ms	80	160		

Electrical characteristics - Bypass overload and short-circuit Number of power modules 2 1 Nominal 73 Continuous 80 Bypass overload (A) 30' 91 10' 109 1" > 127 Bypass max short-20 ms 5000 circuit current (A)

Electrical characteristics - Bypass rating				
	Number of po	ower modules		

	1	2	
Bypass I²t (A²s)	130000		
Bypass Max Peak Current (A)	50	00	

Electrical characteristics - Battery charger max current					
Number of power modules					
	1 2				
Standard max. current (A) M4-RI-25	8	16			
Enhanced battery charger max. current (A) M4-RI-25+CH	16	32			





The installation and system should comply with national plant regulations.

The electrical distribution panel should have a sectioning and protection system installed for input and auxiliary mains.



Recommended protection devices - Rectifier						
	Number of power modules					
Without redundancy	hout redundancy 1 2 3					
N+1 redundancy		2	3	4		
C curve circuit breaker (A)	Min	50	100	160		
	Max	160				
Gg fuse (A)	Min	50	100	160		
	Max	160				



Recommended protection devices - Rectifier				
		Number of power modules		
Without redundancy		1	2	
1+1 redundancy		2	-	
C curve circuit breaker (A)	Min	50	100	
	Max	160		
Gg fuse (A)	Min	50	100	
	Max	100		

2.3. Recommended protection devices



A circuit breaker switch is recommended with a magnetic tripping threshold of \geq 10 ln (curve C). A D curve selective breaker should be fitted if an optional external transformer is used.

The minimum value depends on the size of the power cables in the installation, while the maximum value is limited by the UPS cabinet.

The system can accept the max. value of protection, whatever the number of modules installed, in order to allow future scalability, while the min. value depends on the size of the power cables in the installation. A value of protection less than the recommended Max shall be used when the mains network structure cannot support the full power load, and shall be chosen between max. and min. values (as per the table below) according to the mains network design.

Rectifier protection should be taken into account in the event of separate inputs; when the auxiliary mains and rectifier inputs are combined (common input), the general input protection rating should be higher than both (auxiliary mains or rectifier).

Recommended protection devices - Auxiliary mains					
		Number of power modules			
		1	2	3	4
C curve circuit breaker (A)	Min	50	100	160	200
	Max	200			
Gg fuse (A)	Min	50	100	160	200
	Max	200			

If an optional external transformer is used, a D curve selective breaker should be used.

Auxiliary mains protection should be taken into account in the event of separate inputs; when the auxiliary mains and rectifier inputs are combined (common input), the general input protection rating should be higher than both (auxiliary mains or rectifier).

Recommended protection devices - Input residual current circuit breaker				
	Number of power modules			
	1	2	3	4
Input residual current circuit breaker (A)	0.5			

An RCD is not necessary when the UPS is installed in TN-S system. RCDs are not allowed on TN-C systems. If an RCD is required, a B type should be used.

Caution!

Use four-pole selective (S) residual current detectors (RCDs). Load leakage currents are to be added to those generated by the UPS and during transitory phases (power failures and power returns) short current peaks may occur. If loads with high leakage current are present, adjust the residual current protection. It is advisable in all cases to carry out a preliminary check on the earth current leakage with the UPS installed and operating with the definitive load, so as to prevent the sudden activation of the RCD switch.

Output selectivity on battery mode (Aux mains not present)					
	Number of power modules				
	1	2	3	4	
B curve circuit breaker (A)	≤ 20	≤ 40	≤ 50	≤ 80	
C curve circuit breaker (A)	≤ 10	≤ 20	≤ 25	≤ 40	

Selectivity of distribution downstream of UPS with downstream short-circuit (AUX MAINS not present).



2.4. Communication options

2.4.1. Programmable IN/OUT dry contact card with serial link

The board is plug&play: the UPS is able to recognize its presence and configuration.

Up to 4 standard operating modes can be selected simply using two jumpers; the selected operating mode manages the ADC outputs and the inputs accordingly.

It is also possible to create a custom operation mode (consult us).

Programmable in/out dry contact card with serial link				
CP-OP-,	ADC+SL			
• 4 relays for external device activation (can be set as normally closed or normally open)	- general alarm, - back-up operation, - bypass operation, - preventive maintenance request.			
• 3 free inputs to report external contacts to UPS	 emergency stop devices (ESD), operation with generating set, battery protection status. 			
 1 connector for external temperature sensor (optional) RS485 insulated serial link providing MODBUS RTU protocol 2 LEDs to display the board status 				

2.4.2. MODBUS TCP card for connection with BMS system

MODBUS TCP – IDA interface (MODBUS TCP card)				
CP-OP-MODTCP				
Detailed information on the MODBUS protocol serial link or Ethernet network for MODULYS RM GP is available in the Modbus TCP User Manual.				



2.4.3. NET VISION card for interface with IT infrastructure

Net Vision is a network adapter for the professional monitoring and remote control of MODULYS RM GP. The Net Vision network adaptor allows the UPS to be connected directly to the Ethernet network allowing secure management of the UPS over the network using a web browser, a TELNET interface or NMS application via SNMP. The protocols used for connection are independent of the platform and operating system, therefore Net Vision is extremely flexible and suitable for all systems. In addition to monitoring and control, the Net Vision interface is able to provide a high level of protection for servers powered by the UPS. In critical conditions, up to 250 devices powered by the UPS can be switched off in an orderly sequence whilst ensuring data integrity. The remote shutdown is provided by a client shutdown to be installed on all computers that require this automatic function. Some clients for Net Vision are native to certain operating systems, otherwise a universal shutdown client (JNC) can be used.



2.4.4. EMD (Environment Monitoring Device)

The EMD monitors temperature, humidity and other conditions in the room's environment and also offers 4 digital input connections for external dry contacts to monitor water, fire and smoke security alarms. All information is processed by MODULYS RM GP for a complete monitoring of external conditions and alarms. Easy connection to Net Vision card using standard CAT5 cables with straight through wiring. The LCD display on the EMD device provides direct temperature and humidity information.



2.4.5. External Temperature Sensor

The temperature sensor can be used to monitor the battery temperature should the battery cabinet be provided by another supplier by Socomec (all battery cabinets provided by Socomec are fitted with the temperature sensor as standard). The sensor should be connected to the ADC-SL board, using the relative connector. MODULYS RM GP uses the temperature measured by this sensor to correctly set the battery charge profile.



MODULYS RM GP up to 4 x 25 kW

3. REFERENCE STANDARDS AND DIRECTIVES

3.1. Overview

The construction of the equipment and choice of materials and components comply with all laws, decrees, directives and standards currently in force. In particular, the equipment is fully compliant with all European Directives concerning CE marking.

2006/95/EC

Council Directive 2006/95/EC, dated 16 February 2007, on the reconciliation of legislation within Member States regarding electrical materials for use within specific voltage ranges.

2004/108/EC

On the approximation of the laws of the Member States relating to electromagnetic compatibility.

3.2. Standards - Tests, verifications and certifications

	Standards		
Safety	IEC 62040-1		
EMC	IEC 62040-2 (C2)		
Performance ⁽¹⁾	IEC 62040-3 (VFI-SS-111)		
Power module efficiency ⁽²⁾	IEC 62040-3	up to 96,5 %	
Power module MTBF ⁽³⁾	IEC 62380	1.000.000 h	
Degree of protection	IEC 60529	IP20	
Product certification	CE		

(1) EMC performances are tested and verified by CREI VEN.

(2) Power module efficiency is tested and verified by TÜV SÜD.

(3) Power Module MTBF is calculated and tested by SERMA ELECTRONICS.

