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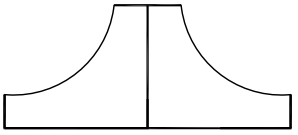
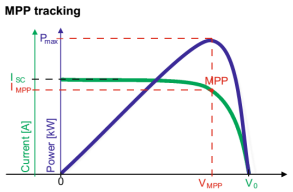
SM15K - System

双向恒功率馈网电源 和 光伏模拟系统

型 号	电 压	电 流	功 率
SM 70-CP-450	0 ... 70 V	– 450 ... 450 A	+- 15 kW
SM 210-CP-150	0 ... 210 V	– 150 ... 150 A	+- 15 kW
SM 500-CP-90	0 ... 500 V	– 90 ... 90 A	+- 15 kW
SM 1500-CP-30	0 ... 1500 V	–30 ... 30 A	+- 15 kW
SM 15K System	0 ... 1500 V	0 --- +- 5400A	+- 30 ... +- 900 kW





特 性

- 双向电源：15kW 电源+负载
- 输出模式：恒压，恒流，恒功率
- 节能环保：放电能量回馈电网
- 瞬态响应：100us 恢复时间
- 上升时间：Min. 1ms @ 10%—90%
- 下降时间：Min. 1ms @ 90%—10%
- 极低纹波：Min. 10 mVrms
- 稳 定 性 ：50.10E6 @ 8小时
- 数字设置：0.03% 分辨率（电压，电流）
- 工作温度：-20 至 +50度，75%输出@60度
- 系统功率：Max.900 kW（60 台并联）

功 能

- 交流输入：342—528 Vac，3L+GND
- 效　　率：> 95%
- 电磁兼容：EN61000-6-2, EN61000-6-3
  EN55022B
- 极低噪声：温控风扇，能量馈网
- 面板操作：大显示屏，极简界面
- 保护功能：过压，过流，过功率，短路等
- 可 靠 性 ：长时间，野外，海洋环境工作
- 程控接口：LAN/LXI & WebViewer 界面
- 测试功能：电池测试、内阻模拟、无线遥测
- 仿真功能：光伏曲线 (MPPT) 模拟，电池模拟

		SM70-CP-450	SM210-CP-150	SM500-CP-90	SM1500-CP-30
直流输出					
voltage		0 - 70 V	0 - 210 V	0 - 500 V	0 - 1500 V
current		– 450 - 450 A	– 150 - 150 A	– 90 - 90 A	– 30 - 30 A
交流输入		342 - 528 V			
3 phase, 48 - 62 Hz		380 - 480 V			
rated voltage range		50 / 60 Hz			
rated frequency		maximum 27 A			
rated current					
current (400 V / 3 ph, 15kW)		23 A			
power factor, 15kW, 7.5kW		0.996 / 0.988			
internal fuses		30 AT			
standby input power (V_o=I_o=0)		96 W			
standby input power (V_o=V_{max})		180 W			
效率					
Sink & Source mode:					
400 V AC, 3 ph input,					
15 kW, I_{out}=100%		95 %			
15 kW, U_{out}=100%		96 %			
电源调整率					
Load 0 - 100%	**CV**	6 mV	5 mV	4 mV	10 mV
Line 342 - 528 V AC	**CV**	< 1 mV	< 1 mV	< 1 mV	< 1 mV
(external voltage sense)					
Load 0 - 100%	**CC**	35 mA	12 mA	8 mA	2 mA
Line 342 - 528 V AC	**CC**	4 mA	3 mA	1 mA	1 mA
(internal voltage sense, after warm up)					
纹波＋噪声					
Source mode:		33 V / 450 A	100 V / 150 A	167 V / 90 A	500 V / 30 A
rms (BW=300 kHz)	**CV**	10 mV	30 mV	10 mV	25 mV
p-p (BW=20 MHz)	**CV**	60 mV	125 mV	55 mV	150 mV
rms (BW=300 kHz)	**CC**	100 mA	t.b.d.	45 mA	12 mA
p-p (BW=20 MHz)	**CC**	-	-	200 mA	70 mA
Source mode:		70 V / 215 A	210 V / 71.5 A	500 V / 30 A	1500 V / 10 A
rms (BW=300 kHz)	**CV**	10 mV	20 mV	25mV	35mV
p-p (BW=20 MHz)	**CV**	60 mV	100 mV	115mV	250mV
rms (BW=300 kHz)	**CC**	100 mA	t.b.d.	45 mA	5 mA
p-p (BW=20 MHz)	**CC**	-	-	200 mA	25 mA
Sink mode:		33 V / 450 A	100 V / 150 A	167 V / 90 A	500 V / 30 A
rms (BW=300 kHz)	**CV**	8 mV	30 mV	7 mV	15 mV
p-p (BW=20 MHz)	**CV**	50 mV	125 mV	35 mV	130 mV
rms (BW=300 kHz)	**CC**	100 mA	t.b.d.	45 mA	10 mA
p-p (BW=20 MHz)	**CC**	-	-	200 mA	60 mA
Sink mode:		70 V / 215 A	210 V / 71.5 A	500 V / 30 A	1500 V / 10 A
rms (BW=300 kHz)	**CV**	8 mV	20 mV	10 mV	25 mV
p-p (BW=20 MHz)	**CV**	50 mV	100 mV	50 mV	200 mV
rms (BW=300 kHz)	**CC**	100 mA	t.b.d.	90 mA	3 mA
p-p (BW=20 MHz)	**CC**	-	-	320 mA	12 mA
CC-ripple at full load					
编程 和 测量精度					
accuracy *(excluding INT MOD ANA)*					
Voltage		± 0.08%			
Current		± 0.15%			
最低电压 @ 放电电流		1.2 V @ – 450 A	3.0 V @ – 150 A	5.5 V @ – 90 A	16.0 V @ – 30 A
		0.8 V @ – 215 A	1.5 V @ – 75 A	3.0 V @ – 30 A	7.0 V @ – 10 A
		0.8 V @ – 45 A	1.5 V @ – 15 A	1.0 V @ – 10 A	2.0 V @ – 3 A
温度一致性 / **°C**	**CV**	20.10^{-6}			
	CC	50.10^{-6}			
工作稳定度 [1]					
after 1 hr warm-up					
during 8 hrs	**CV**	50.10^{-6}			
	CC	80.10^{-6}			
t_{amb} = 25 ± 1 °C, V_{in} = 400 VAC					
(internal voltage sensing for CC-stab.)					

Notes: 1. Measured at full load. 2. Signal latency depends on the interface used & data traffic. 3. See "Safety instructions"

编程速度 [2] (resistive load)	SM70-CP-450	SM210-CP-150	SM500-CP-90	SM1500-CP-30
上升时间 **(10 - 90%)**				
output voltage step	0 → 33 V	0 → 100 V	0 → 167 V	0 → 500 V
time, (load = 15 kW)	2.2 ms	1.6 ms	1.5 ms	1.5 ms
time, (load = 1500 W)	1.5 ms	1.3 ms	1 ms	1 ms
output voltage step	0 → 70 V	0 → 210 V	0 → 500 V	0 → 1500 V
time, (load = 15 kW)	5.5 ms	3 ms	4.5 ms	4.5 ms
time, (load = 1500 W)	3.5 ms	2.7 ms	3.5 ms	3.5 ms
下降时间 **(90 - 10%)**				
output voltage step	33 → 0 V	100 → 0 V	167 → 0 V	500 → 0 V
time, (load = 15 kW)	1.5 ms	1.3 ms	0.8 ms	0.8 ms
time, (load = 1500 W)	1.5 ms	1.3 ms	0.9 ms	0.9 ms
output voltage step	70 → 0 V	210 → 0 V	500 → 0 V	1500 → 0 V
time, (load = 15 kW)	2.6 ms	2.5 ms	2.5 ms	2.8 ms
time, (load = 1500 W)	3.5 ms	2.5 ms	3.5 ms	3.5 ms
DC Output Capacitance				
X-capacitors (typical)	22000 µF	1170 µF	560 µF	58 µF
Y-capacitors (typical)	950 nF	950 nF	145 nF	145 nF

	SM70-CP-450	SM210-CP-150	SM500-CP-90	SM1500-CP-30
恢复时间 output voltage	33 V, 225 → 450 A	100 V, 75 → 150 A	167 V, 45 → 90 A	500 V, 15 → 30 A
recovery within	100 mV	500 mV	750 mV	2.8 V
di/dt of load step	5 A/µs	2.4 A/µs	0.8 A/µs	0.25 A/µs
time, @ 50 - 100% load step	100 µs	100 µs	100 µs	100 µs
max. deviation	0.8 V	1.4 V	2.8 V	9.0 V
output voltage	70 V, 112 → 215 A	210V, 36 → 72 A	500 V, 15 → 30 A	1500 V, 5 → 10 A
recovery within	100 mV	250 mV	500 mV	1.2 V
di/dt of load step	2 A/µs	1.15 A/µs	0.25 A/µs	0.085 A/µs
time, @ 50 - 100% load step	100 µs	100 µs	150 µs	150 µs
max. deviation	0.3 V	0.75 V	1.2 V	3.5 V
脉动负载				
max. tolerable AC component of load current				
f > 1 kHz	60 Arms	15 Arms	15 Arms	5 Arms
f < 1 kHz	450 Apeak	150 Apeak	90 Apeak	30 Apeak

结缘隔离		
AC power terminals / DC pwr terminals	3750 Vrms (1 min.)	3750 Vrms (1 min.)
creepage / clearance	8 mm	8 mm
AC power terminals / case	2500 Vrms	2500 Vrms
DC power terminals / case	1000 V DC [3]	1500 V DC [3]
安 规	EN 60950 / EN 61010	
EMC Generic Emission	**EN 61000-6-3,** residential, **light** industrial environment (EN 55022 **B**)	
Generic Immunity	**EN 61000-6-2,** industrial environment	
工作温度 @ 满载	– 20 to + 50 °C derate output to 75% at 60 °C	
湿 度	maximum 95% RH, non condensing, up to 40 °C maximum 75% RH, non condensing, up to 50 °C	
存储温度	– 40 to + 85 °C	
热 保 护	output shuts down in case of insufficient cooling	
MTBF 平均无故障时间	500 000 hrs	

	SM70-CP-450	SM210-CP-150	SM500-CP-90	SM1500-CP-30
保持时间 (@ 400 VAC input)				
V_{out} = 100%, P_{out} = 15 kW	10 ms	10 ms	15 ms	15 ms
I_{out} = 100%, P_{out} = 15 kW	10 ms	10 ms	15 ms	15 ms
V_{out} = 100%, P_{out} = 7.5 kW	25 ms	20 ms	35 ms	35 ms
缓启动时间 **after mains switch on**	2.5 s			
浪涌电流	23 A			

Notes: 1. Measured at full load. 2. Signal latency depends on the interface used & data traffic. 3. See "Safety instructions"

	SM70-CP-450	SM210-CP-150	SM500-CP-90	SM1500-CP-30
串联操作 max. total voltage Master / Slave operation	Not possible	Not possible	750V* 1000V** maximum 6 units [3] **) units delivered before Q4 / 2018* ***) units delivered Q4 / 2018 or newer* *Contact factory for upgrading to enable 1000V series operation for older units.*	Not possible
并联操作 Master / Slave operation	maximum 6 units *contact factory for more units*	t.b.d.	maximum 60 units	maximum 60 units
遥测补偿 max. voltage drop per load lead	default 1 V, can be set to 10 V			
保护设置 **Voltage** adjust range **Current** adjust range **Power** adjust range **Voltage** OverLoad level **Voltage** Self-Protection level	0 - 101 % 0 - 101 % 0 - 101 % 102.5 % - unit will continue to operate (OL-indication in display) 105 % - output is automatically disabled (PROT-indication in display)			
数字编码电位器 front panel control with knobs resolution	15 bits			
表头显示 scale voltage scale current scale power accuracy read output	4 digit 0.00 - 70.00 V – 450.0 - 450.0 A – 15000 - 15000 W 0.2% + 2 digit	4 digit 0.0 - 210.0 V – 150.0 - 150.0 A – 15000 - 15000 W 0.2% + 2 digit	4 digit 0.0 - 500.0 V – 90.0 - 90.00 A – 15000 - 15000 W 0.2% + 2 digit	4 digit 0 - 1500 V – 30.00 - 30.00 A – 15000 - 15000 W 0.2% + 2 digit

安 装	stacking of units allowed, air flow is from left to right	
交流输入端子 (CON A)	screw terminals for wire 4 mm^2, 3 phase + earth (no neutral)	
直流输出端子 (CON B1 & B2)	M12 bolts	M8 bolts
编程接口连接器 (LAN)	standard with RJ45-connector for Ethernet at rear panel	
机柜锁 (CON F)	input for contact at rear panel	
自动散热 audio noise level air flow	low noise blower, fan speed adapts to temperature of internal system ca. 50 dBA at full load, 25 °C ambient temperature, 1 m distance ca. 65 dBA at full load, 50 °C ambient temperature, 1 m distance From left to right	
保护等级	IP20	
安装尺寸 front panel: h x w behind front panel: h x w x d	132 x 483 mm (19", 3 U) 128 x 448 x 591 mm (excluding feet) no extra depth is required with optional interfaces assembled	
重 量	27 kg	

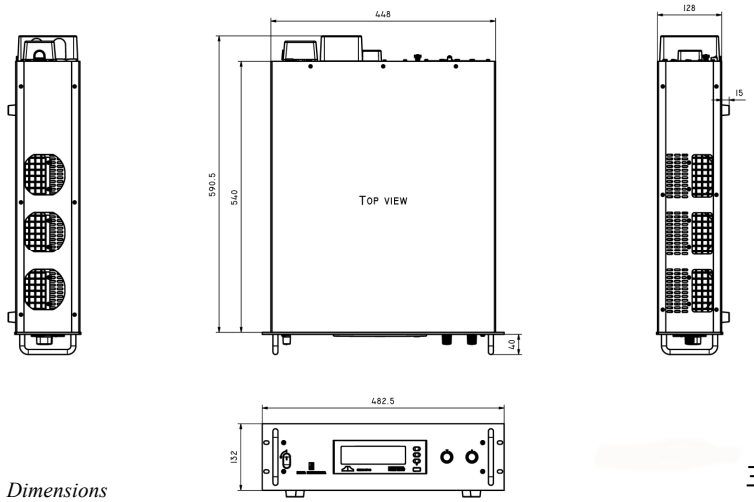
CV = Constant Voltage 恒 压
CC = Constant Current 恒 流
CP = Constant Power 恒功率

Specifications measured at t_{amb} = 25 ± 5 °C and Vin = 400 VAC, 50 Hz unless otherwise noted.

The information in this document is subject to change without notice.

Notes:

1. *Measured at full load.*
2. *Signal latency depends on the interface used and data traffic.*
3. *See safety Instructions in the operating manual.*



Dimensions 三维视图

典型应用

汽车电器测试 和 汽车测试系统
汽车电池仿真 和 汽车动力总成测试
电池电芯、电池组、电池包测试
太阳能逆变器测试（光伏PV曲线模拟）
激光元器件测试 和 激光器驱动
精密电流源
自动生产线测试系统
航空航天 和 军用系统
PWM 直流电机驱动
10nm 光刻机应用
等离子溅射应用
高能粒子加速器应用

标准配置

双向 (二相限) 操作
15kW 电源
15kW 负载

应用：仿真电池特性
电池充放电测试
PWM 直流电机驱动

数字设置
精密数字编码电位器
分辨率 0.03%

内置波形发生器
任意波形输出
可脱机独自运行

高压绝缘隔离
1000V for SM500-CP-90
1500V for SM1500-CP-30

以太网接口 LXI
WebViwer 窗口
设置 编程 测量 控制

USB 接口
A 数据交换
B 控制脱机运行

可选配置

可选程控接口
可以现场安装

－主从控制接口
－隔离接触器
－数字I/O信号
－隔离式模拟量程控接口
－串口控制器－多协议
RS232, RS485, RS422, USB 接口

订货编码：
· INT MOD M/S-2
· INT MOD CON
· INT MOD DIG
. INT MOD ANA
· INT MOD SER

Under development is:
- Simulation Interface

WebViewer 控制界面

光伏曲线模拟（MPPT）