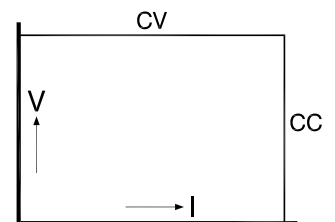




SM 3000 - Series 3000 W DC POWER SUPPLIES

Models	Voltage range	Current range
SM 15-200 D	0 - 15 V	0 - 200 A
SM 30-100 D	0 - 30 V	0 - 100 A
SM 45-70 D	0 - 45 V	0 - 70 A
SM 70-45 D	0 - 70 V	0 - 45 A
SM 120-25 D	0 - 120 V	0 - 25 A
SM 300-10 D	0 - 300 V	0 - 10 A

Three phase input



Features

- Designed for long life at full power
- Excellent dynamic response to load changes
- Protected against all overload and short circuit conditions
- EMC surpasses CE requirements: low emission & high immunity
- Low audible noise: fans are temperature controlled
- Available options: High Speed Programming, Interfaces, Extra Isolation, Sequencer, Power Sink etc.

Functionalities

- Master/Slave parallel and series operation with voltage and current sharing
- Stacking is allowed, space between units is not required
- High power system configuration from multiple units
- 19" rack mounting or for laboratory use (feet included)
- Remote sensing

		SM 15-200 D	SM 30-100 D	SM 45-70 D	SM 70-45 D	SM 120-25 D	SM 300-10 D
Output							
voltage		0-15V	0-30V	0-45V	0-70V	0-120V	0-300V
current		0-200A	0-100A	0-70A	0-45A	0-25A	0-10A
Input							
AC	3 phase, 48 - 62 Hz for use at 380 V, 400 V, 415 V nominal line - line voltage	342-457V	342-457V	342-457V	342-457V	342-457V	342-457V
	current (400 V AC / 3 phase)	5.7Arms	5.5Arms	5.8Arms	5.8Arms	5.5Arms	5.5Arms
	power factor (380 V / 3 phase)						
	100% load	0.88	0.88	0.88	0.88	0.88	0.88
	50% load	0.78	0.78	0.78	0.78	0.78	0.78
DC		contact factory	contact factory	contact factory	contact factory	contact factory	contact factory
	fuses	16AT	16AT	16AT	16AT	16AT	16AT
	standby input power ($V_o=I_o=0$)	25W	25W	25W	25W	25W	25W
	standby input power ($V_o=V_{max}$)	50W	50W	50W	50W	50W	50W
Efficiency							
	AC 3 phase input, full load	87%	90%	89%	90%	90%	90%
Regulation							
	Load 0 - 100%	CV	5mV	5mV	5mV	10mV	10mV
	Line 342 - 457 V AC	CV	5mV	5mV	5mV	10mV	10mV
	Load 0 - 100%	CC	50mA	25mA	15mA	10mA	10mA
	Line 342 - 457 V AC	CC	50mA	25mA	15mA	10mA	3mA
Ripple + noise, rms / p-p (BW = 20 MHz)		CV	2/12mV	1.6/8mV	3.5/17mV	2/12mV	5/25mV
		CC	100/250mA	20/60mA	20/60mA	6/25mA	7/25mA
							10/50mV below 50V: 25/120mV 3/10mA below 50V: 60/200mA
Temp. coeff., per °C	CV CC				typical $10 \cdot 10^{-6}$, max. $35 \cdot 10^{-6}$ typical $20 \cdot 10^{-6}$, max. $60 \cdot 10^{-6}$		
Stability							
	after 1 hr warm-up during 8 hrs	CV CC			typical $2 \cdot 10^{-5}$, max $4 \cdot 10^{-5}$ typical $3 \cdot 10^{-5}$, max. $10 \cdot 10^{-5}$		
	during 30 hrs	CV CC			typical $2 \cdot 10^{-5}$, max. $5 \cdot 10^{-5}$ typical $5 \cdot 10^{-5}$, max. $10 \cdot 10^{-5}$		
	$t_{amb} = 25 \pm 1 \text{ °C}$						

Analog Programming		CV	CC
Programming inputs			
input range		0-5V	0-5V
accuracy	$\pm 0.2\%$	0mV... +8mV (on 5V)	$\pm 0.5\%$ 0mV... +20mV (on 5V)
temp. coeff. offset		$10 \mu\text{V}/\text{°C}$	$150 \mu\text{V}/\text{°C}$
input impedance		1M Ω	1M Ω
Monitoring output			
output range		0-5V	0-5V
accuracy	$\pm 0.2\%$	-3mV... +11mV	$\pm 0.5\%$ -5mV... +0mV
temp. coeff. offset		$10 \mu\text{V}/\text{°C}$	$150 \mu\text{V}/\text{°C}$
output impedance		20 Ω	20 Ω

Reference voltage		
on prog. connector	V_{ref} TC	$5.165 \pm 31 \text{ mV}$ typical 12ppm/max. 30ppm
+12 V output		
on prog. connector	V_o I_{max} R_o	$12 \text{ V} \pm 1 \text{ V}$ 25mA 500 Ω
Status outputs		
CC-status		5V/10mA=logic 1
OVP-status		5V/10mA=logic 1
Remote ShutDown		with +5V or relay contact

Programming speed <i>Standard Version</i> (resistive load)	SM 15-200 D	SM 30-100 D	SM 45-70 D	SM 70-45 D	SM 120-25 D	SM 300-10 D
Rise time (10 - 90%) output voltage step time, (100 % load) time, (10 % load)	0 → 15V 7 ms 7 ms	0 → 30V 7 ms 7 ms	0 → 45V 7 ms 7 ms	0 → 70V 7 ms 7 ms	0 → 120V 7 ms 7 ms	0 → 300V 7 ms 7 ms
Fall time (90 - 10%) output voltage step time, (100 % load) time, (10 % load)	15 → 0V 7 ms 32 ms	30 → 0V 7 ms 58 ms	45 → 0V 8 ms 29 ms	70 → 0V 8 ms 82 ms	120 → 0V 7 ms 39 ms	300 → 0V 11 ms 91 ms
Programming bandwidth small signal large signal, (100 % load) large signal, (10 % load)	50Hz 50Hz 5Hz	50Hz 50Hz 5Hz	50Hz 50Hz 5Hz	50Hz 50Hz 5Hz	50Hz 50Hz 5Hz	50Hz 50Hz 5Hz
Programming speed <i>High Speed Version</i> (resistive load)	SM 15-200 D <i>option P104</i>	SM 30-100 D <i>option P031</i>	SM 45-70 D <i>option P105</i>	SM 70-45 D <i>option P032</i>	SM 120-25 D <i>option P106</i>	SM 300-10 D <i>option P061</i>
Rise time (10 - 90%) output voltage step time, (100 % load) time, (10 % load)	0 → 15V 0.36 ms 0.26 ms	0 → 30V 0.33 ms 0.32 ms	0 → 45V 0.50 ms 0.35 ms	0 → 70V 0.45 ms 0.30 ms	0 → 120V 0.34 ms 0.32 ms	0 → 300V 1.00 ms 0.40 ms
Fall time (90 - 10%) output voltage step time, (100 % load) time, (10 % load)	15 → 0V 0.37 ms 1.60 ms	30 → 0V 0.55 ms 3.50 ms	45 → 0V 0.60 ms 5.00 ms	70 → 0V 0.67 ms 6.00 ms	120 → 0V 0.38 ms 3.50 ms	300 → 0V 1.20 ms 11.0 ms

Recovery time recovery within di/dt of load step time, @ 50 - 100% load step max. deviation	50mV 2.7A/μs 100μs 250mV	50mV 1.9A/μs 100μs 150mV	100mV 1.2A/μs 100μs 200mV	50mV 2.2A/μs 100μs 250mV	0.5V 1.7A/μs 100μs 1.5V	1.5V 0.6A/μs 100μs 2V
Noise suppression line - line ⇒ output line - earth ⇒ output	90 dB 90 dB	84 dB 90 dB	85 dB 90 dB	75 dB 90 dB	75 dB 90 dB	90 dB 90 dB
Output impedance CV, 0-100 kHz	<25mOhm	<20mOhm	<60mOhm	<60mOhm	<150mOhm	<800mOhm
Pulsating load max. tolerable AC component of load current f > 1 kHz f < 1 kHz	15Arms 200Apeak	15Arms 100Apeak	10Arms 70Apeak	10Arms 45Apeak	5Arms 25Apeak	2.5Arms 10Apeak

Insulation input / output creepage / clearance input / case output / case	3750Vrms (1 min.) 8mm 2500Vrms 600VDC
Safety	EN60950/EN61010
EMC Power Supply Standard	EN 61204-3 , Emission: residential, light industrial environment (CISPR22-Class B) Immunity: industrial environment
Generic Emission Generic Immunity	EN 61000-6-3 , residential, light industrial environment (EN 55022 B) EN 61000-6-2 , industrial environment
Operating temperature at full load	-20 to +50 °C
Humidity	max. 95% RH, non condensing, up to 40 °C max. 75% RH, non condensing, up to 50 °C
Storage temperature	-40 to +85 °C
Thermal protection	Output shuts down in case of insufficient cooling
MTBF	500 000 hrs

Hold-Up time 100% load Vin = 3x 380 V AC 50% load Vin = 3x 380 V AC	6 ms 15 ms
Turn on delay after mains switch on	300 ms
Inrush current	5.8 A @ 400 V AC input
Phase loss	The power supply will continue to operate on one phase but at 90% of V _{out(max)} (a SM30-100D adjusted at 27 V will continue to deliver 27 V after phase loss)

	SM 15-200 D	SM 30-100 D	SM 45-70 D	SM 70-45 D	SM 120-25 D	SM 300-10 D
Series operation max. total voltage Master / Slave operation	600 V yes	600 V yes	600 V yes	600 V yes	600 V yes	600 V yes
Parallel operation max. total current Master / Slave operation	no limit max. 4 units	no limit max. 4 units	no limit max. 4 units	no limit max. 4 units	no limit max. 4 units	no limit max. 4 units
Remote sensing max. voltage drop per load lead	2 V	2 V	2 V	2 V	2 V	2 V
OVP / OVL adjustment range	0-17 V	0-35 V	0-54 V	0-80 V	0-140 V	0-350 V

Potentiometers front panel control with knobs resolution	standard 0.03%	standard 0.03%	standard 0.03%	standard 0.03%	standard 0.03%	standard 0.03%
screwdriver adjustment at front panel at rear panel	option P001 option P002	option P001 option P002	option P001 option P002	option P001 option P002	option P001 option P002	option P001 option P002
Meters scale voltage scale current accuracy	3.5 digit 0-15.00 V 0-200 A 0.5%+2 digit	3.5 digit 0-30.0 V 0-100.0 A 0.5%+2 digit	3.5 digit 0-45.0 V 0-70.0 A 0.5%+2 digit	3.5 digit 0-70.0 V 0-45.0 A 0.5%+2 digit	3.5 digit 0-120.0 V 0-25.0 A 0.5%+2 digit	3.5 digit 0-300 V 0-10.00 A 0.5%+2 digit

Mounting	Stacking of units allowed, air flow is from left to right.					
Input Terminals input connections	screw terminals for cable 1.5-4.0 mm ² 3 phase + earth (no neutral required)					
Output Terminals	M10 bolts	M10 bolts	M10 bolts	M8 bolts	7 mm bind post	6 mm bind post
Programming connector	15 pole D-connector at rear panel (FEMALE)					
Cooling audio noise level	Low noise blower, fan speed adapts to temperature of internal heatsink. ca. 50 dBA at full load and 25 °C ambient temperature ca. 60 dBA at full load and 50 °C ambient temperature					
Enclosure degree of protection	IP20					
Dimensions behind front panel: h x w x d front panel: h x w	128.5 x 443 x 416 mm		(with option P099, feet are removed)			
	128.5 x 483 mm		(19", 3 U)			
Weight	15 kg					

Typical Applications

- Solar inverter testing, PV-Simulation
- Plasma chambers
- Hybrid Car test systems
- ATE in industrial production lines
- Automotive battery simulations
- Controlled battery (dis)charging
- Lasers
- Driving PWM-controlled DC-motors
- Accurate current sources
- Aerospace and military equipment

Available Options



Increased Output Power

The conservatively rated unit allows to deliver extra output with the same reliability.

At some derating, either the maximum output voltage or the maximum output current can be increased by about 10%.

- Order Code - P069



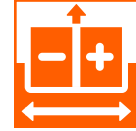
High speed programming

A 10 to 20 times higher programming speed (down to 0.33 ms rise time at full load)

and lower output capacitance.

Excellent for laser applications, test systems or as current source with low parallel capacitance as used in plasma chambers.

- Order Code :
SM 15-200 D P104 - SM 70-45 D P032
SM 30-100 D P031 - SM 120-25 D P106



Two-Quadrant Output: Power sink

Two quadrant operations maintains the output voltage constant regardless the

output power is positive or negative. Ideal for PWM-speed controlled DC-motors and ATE systems.

- Order Code :
SM 15-200 D P127 - SM 45-70 D P129
SM 30-100 D P128 - SM 70-45 D P130



Sequencer

Arbitrary Waveform generator or standalone automation.

The sequencer is integrated in the Ethernet controller.

- Order Code - P149



Secured Voltage and Current Setting

For a maximum security, the CV/CC settings can be adjusted

with a screwdriver only and are protected with a plastic cap from accidental adjusting.

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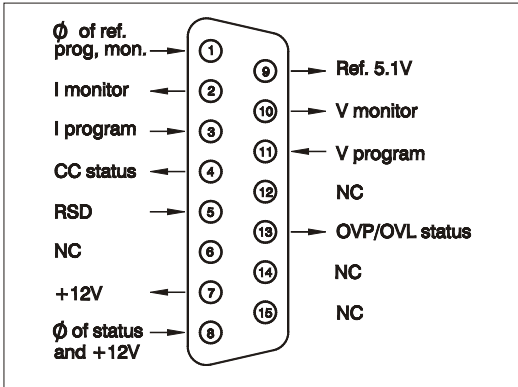


Software control and interfaces

Factory installed programming interfaces:

- ISO AMP Card - isolated analog - P145
- RS232 controller - P146
- IEEE488 controller - P164
- Ethernet controller (incl. sequencer) - P149
- PROFIBUS controller - P275
- CANBUS controller - P276

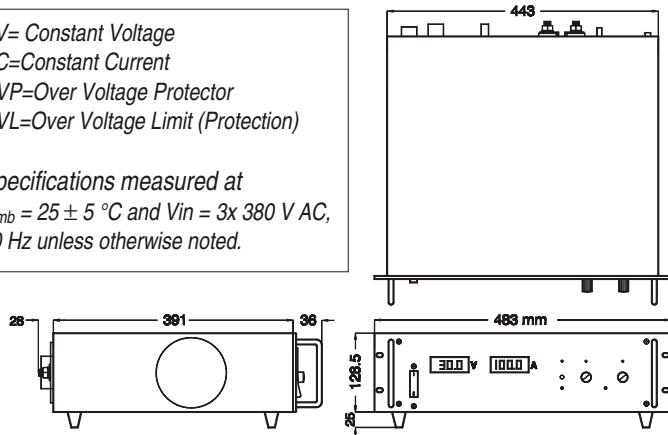
Notes: 1. Download datasheet about High Speed Program., Power Sink and Battery Charging from www.DeltaPowerSupplies.com.
2. There is only room for one of the interfaces in a unit (P145, P146, P149, P164, P275, P276).



Connections programming connector

CV= Constant Voltage
 CC=Constant Current
 OVP=Over Voltage Protector
 OVL=Over Voltage Limit (Protection)

Specifications measured at
 $t_{amb} = 25 \pm 5 \text{ }^\circ\text{C}$ and $V_{in} = 3 \times 380 \text{ V AC}$,
 50 Hz unless otherwise noted.



Analog Programming (standard) or Ethernet or RS232 or IEEE488 or CANBUS or PROFIBUS or isolated analog (all optional)

Output Terminals

No Line Cord supplied

Input Connector



Progr. Switches Manual / Program

Sense Block

Safety Cover supplied for input. Cover for output must be ordered separately.

Feet can be removed (option P099)

