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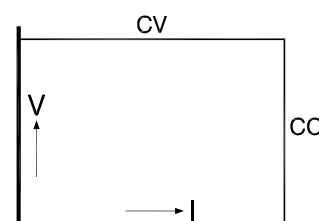
DELTA ELEKTRONIKA B.V.



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

Analog Programming	CV	CC
Programming inputs input range accuracy temp. coeff. offset input impedance	0-5V $\pm 0.2\%$ 0mV... +8mV (on5V) 10 μ V/°C 1MOhm	0-5V $\pm 0.5\%$ 0mV... +20mV (on5V) 150 μ V/°C 1MOhm
Monitoring output output range accuracy temp. coeff. offset output impedance	0-5V $\pm 0.2\%$ -3mV... +11mV 10 μ V/°C 20Ohm	0-5V $\pm 0.5\%$ -5mV... +0mV 150 μ V/°C 20Ohm

Reference voltage on prog. connector	V_{ref} TC	5.165 $\pm$ 31 mV typical 12 ppm/max. 30 ppm
+ 12 V Output on prog. connector	V_o I_{max} R_o	± 12 V 25 mA 500 Ω
Status outputs CC-status OVP-status		5V/10mA = logic 1 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 → 15 V 7 ms 7 ms	0 → 30 V 7 ms 7 ms	0 → 45 V 7 ms 7 ms	0 → 70 V 7 ms 7 ms	0 → 120 V 7 ms 7 ms	0 → 300 V 7 ms 7 ms
Fall time (90 - 10%) output voltage step time, (100 % load) time, (10 % load)	15 → 0 V 7 ms 32 ms	30 → 0 V 7 ms 58 ms	45 → 0 V 8 ms 29 ms	70 → 0 V 8 ms 82 ms	120 → 0 V 7 ms 39 ms	300 → 0 V 11 ms 91 ms
Programming bandwidth small signal large signal, (100 % load) large signal, (10 % load)	50 Hz 50 Hz 5 Hz	50 Hz 50 Hz 5 Hz	50 Hz 50 Hz 5 Hz	50 Hz 50 Hz 5 Hz	50 Hz 50 Hz 5 Hz	50 Hz 50 Hz 5 Hz
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 → 15 V 0.36 ms 0.26 ms	0 → 30 V 0.33 ms 0.32 ms	0 → 45 V 0.50 ms 0.35 ms	0 → 70 V 0.45 ms 0.30 ms	0 → 120 V 0.34 ms 0.32 ms	0 → 300 V 1.00 ms 0.40 ms
Fall time (90 - 10%) output voltage step time, (100 % load) time, (10 % load)	15 → 0 V 0.37 ms 1.60 ms	30 → 0 V 0.55 ms 3.50 ms	45 → 0 V 0.60 ms 5.00 ms	70 → 0 V 0.67 ms 6.00 ms	120 → 0 V 0.38 ms 3.50 ms	300 → 0 V 1.20 ms 11.0 ms

Recovery time recovery within di/dt of load step time, @ 50 - 100% load step max. deviation	50 mV 2.7 A/μs 100 μs 250 mV	50 mV 1.9 A/μs 100 μs 150 mV	100 mV 1.2 A/μs 100 μs 200 mV	50 mV 2.2 A/μs 100 μs 250 mV	0.5 V 1.7 A/μs 100 μs 1.5 V	1.5 V 0.6 A/μs 100 μs 2 V
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	<25 mOhm	<20 mOhm	<60 mOhm	<60 mOhm	<150 mOhm	<800 mOhm
Pulsating load max. tolerable AC component of load current f > 1 kHz f < 1 kHz	15 Arms 200 A peak	15 Arms 100 A peak	10 Arms 70 A peak	10 Arms 45 A peak	5 Arms 25 A peak	2.5 Arms 10 A peak

Insulation input / output creepage / clearance input / case output / case	3750 Vrms (1 min.) 8 mm 2500 Vrms 600 VDC
Safety	EN 60950/EN 61010
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 $V_{in} = 3 \times 380 \text{ V AC}$ 50% load $V_{in} = 3 \times 380 \text{ V AC}$	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

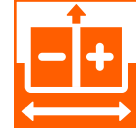


High speed programming

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
SM 45-70 D P105 - SM 300-10 D P061



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



High Voltage Isolation

A higher output isolation allows series operation up to 1000V.

- Order Code - P089



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.

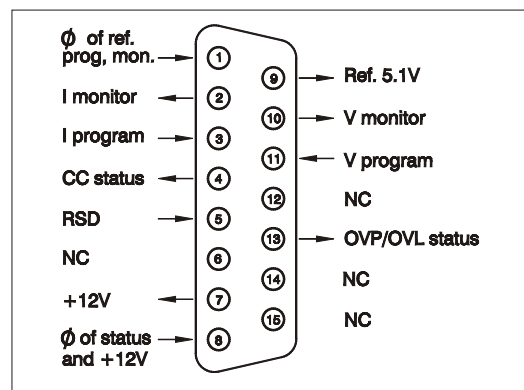
- Order Code - P001



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



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.

