

SM 1540-D  
SM 7020-D  
SM 3004-D

DELTA ELEKTRONIKA BV



ZIERIKZEE  
NETHERLANDS

# DELTA ELEKTRONIKA BV



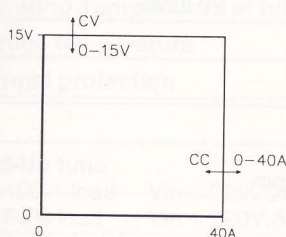
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## SWITCHED MODE DC POWER SUPPLIES

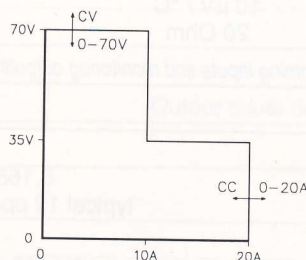
### SM 1540

- \* 600 W
- \* 0 - 15 V 0 - 40 A



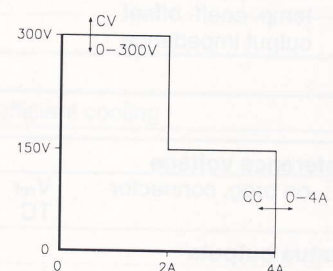
### SM 7020

- \* 700 W
- \* AUTORANGING
- 0 - 35 V 0 - 20 A
- 35 - 70 V 0 - 10 A



### SM 3004

- \* 600 W
- \* AUTORANGING
- 0 - 150 V 0 - 4 A
- 150 - 300 V 0 - 2 A



- Available with analog or digital meters. For digital meters add -D to model no.
- 100 kHz power conversion technique.
- Efficiency 90 %.
- Weight only 7.4 kgs.
- Natural convection cooling, no blower, no noise.
- Designed for long life at full power
- Remote programming of voltage and current by analog voltages 0 - 5 V.
- IEEE 488 programming with external interface PSC 44M (pin compatible).
- Master / Slave parallel and series operation with equal current and voltage sharing.
- Input / output insulation 3750 V rms.

		SM 1540	SM 7020	SM 3004
<b>Output</b>				
voltage range		0 - 15 V	0 - 70 V	0 - 300 V
current range		0 - 40 A	0 - 20 A	0 - 4 A
max. output power		600 W	700 W	600 W
AUTORANGING (2 ranges)		no	yes	yes
max. output <b>current</b> / volt. range		40 A / 0 - 15 V -	20 A / 0 - 35 V 10 A / 35 - 70 V	4 A / 0 - 150 V 2 A / 150 - 300 V
<b>Input</b>				
AC input, 50 - 60 Hz	110 V range 220 V range	94 - 132 V 185 - 265 V	98 - 132 V 190 - 265 V	95 - 132 V 185 - 265 V
DC input		220 - 350 V	232 - 350 V	228 - 350 V
current (220 V AC)		4.1 A rms	4.8 A rms	4.1 A rms
current (110 V AC)		8.5 A rms	9.7 A rms	8.4 A rms
fuses	220 / 110 V	8 AT / 16 AT	8 AT / 16 AT	8 AT / 16 AT
standby input power ( $V_o=I_o=0$ )		6 W	6 W	6 W
standby input power ( $V_o=V_{max.}$ )		12 W	15 W	20 W
Digital meters	1.5 W extra			
<b>Efficiency</b>				
DC input, full load		88 %	90 %	90 %
AC input, full load		87 %	89 %	88 %
<b>Regulation</b>				
Load 0 - 100%	<b>CV</b>	5 mV	5 mV	20 mV
Line 190 - 265 V AC	<b>CV</b>	5 mV	5 mV	20 mV
Load 0 - 100%	<b>CC</b>	25 mA	12 mA	3 mA
Line 190 - 265 V AC	<b>CC</b>	25 mA	12 mA	3 mA
<b>Ripple + noise, rms / p-p</b>	<b>CV</b>	2 / 10 mV	3 / 15 mV	10 / 50 mV
	<b>CC</b>	10 / 25 mA	5 / 15 mA	1 / 3 mA
<b>Temp. coeff., per °C</b>	<b>CV</b>		$5.10^{-5}$	
	<b>CC</b>		$1.10^{-4}$	
<b>Stability</b>				
during 8 hrs after 1hr warm-up and $t_{amb} = 25 \pm 1 \text{ °C}$	<b>CV</b>		$3.10^{-4}$	
	<b>CC</b>		$1.10^{-3}$	

	CV	CC
<b>Analog Programming</b>		
<b>Programming inputs</b>		
input range	0 - 5 V	0 - 5 V
accuracy	$\pm 0.2\%$ + 0 mV / + 8 mV	$\pm 0.5\%$ + 0 mV / + 20 mV
temp. coeff. offset	10 $\mu\text{V} / \text{°C}$	150 $\mu\text{V} / \text{°C}$
input impedance	1 MOhm	1 MOhm
<b>Monitoring output</b>		
output range	0 - 5 V	0 - 5 V
accuracy	$\pm 0.2\%$ - 3 mV / + 11 mV	$\pm 0.5\%$ - 5 mV / + 0 mV
temp. coeff. offset	10 $\mu\text{V} / \text{°C}$	150 $\mu\text{V} / \text{°C}$
output impedance	20 Ohm	20 Ohm
<i>Lower offset programming inputs and monitoring outputs on request.</i>		

<b>Reference voltage</b>		
on prog. connector	$V_{ref}$ TC	$5.165 \pm 31 \text{ mV}$ typical 12 ppm / max. 30 ppm
<b>Status outputs</b>		
CC-status		5V / 10 mA = logic 1
OVP-status		5V / 10 mA = logic 1
<b>Remote shutdown</b> (option)		with + 5V or relay contact

Programming speed	SM 1540		SM 7020		SM 3004	
<b>programming UP</b>						
settling within	50 mV	500 mV	50 mV	1 V	200 mV	5 V
output voltage step	0 → 15 V	0 → 15 V	0 → 35 V	0 → 35 V	0 → 150 V	0 → 150 V
time, (100 % load)	30 ms	18 ms	50 ms	12 ms	50 ms	14 ms
time, (10 % load)	30 ms	10 ms	50 ms	12 ms	40 ms	12 ms
output voltage step	-	-	0 → 70 V	0 → 70 V	0 → 300 V	0 → 300 V
time, (100 % load)	-	-	100 ms	40 ms	100 ms	60 ms
time, (10 % load)	-	-	100 ms	12 ms	60 ms	16 ms
<b>programming DOWN</b>						
settling within	50 mV	500 mV	50 mV	1 V	200 mV	5 V
output voltage step	15 → 0.5 V	15 → 0.5 V	35 → 2 V	35 → 2 V	150 → 10 V	150 → 10 V
time, (100 % load)	30 ms	20 ms	50 ms	10 ms	50 ms	14 ms
time, (10 % load)	200 ms	200 ms	200 ms	100 ms	180 ms	120 ms
output voltage step	-	-	70 → 2 V	70 → 2 V	300 → 10 V	300 → 10 V
time, (100 % load)	-	-	100 ms	55 ms	100 ms	70 ms
time, (10 % load)	-	-	800 ms	120 ms	800 ms	700 ms
<b>Programming bandwidth</b>						
small signal		50 Hz		50 Hz		50 Hz
large signal, 100 % load		50 Hz		50 Hz		50 Hz
large signal, 10 % load		5 Hz		5 Hz		5 Hz

	SM 1540	SM 7020	SM3004
<b>Recovery time</b>			
recovery within	50 mV	50 mV	300 mV
di/dt of load step	4 A/μs	2 A/μs	0.5 A/μs
time, @ 50 - 100% load step	100 μs	150 μs	100 μs
max. deviation (high / low outp. range)	200 mV	80 / 150 mV	450 / 900 mV
<b>Noise suppression</b>			
line - line ⇒ output	88 dB	82 dB	75 dB
line - earth ⇒ output	88 dB	88 dB	75 dB
<b>Output impedance</b>			
CV, 0-100 kHz	< 40 mOhm	< 60 mOhm	< 700 mOhm
<b>Pulsating load</b>			
max. tolerable AC component of load current	10 A rms	5 A rms	1 A rms

<b>Insulation</b>	
input / output	3750 Vrms (1 min.)
creepage / clearance	8 mm
input / case	2500 Vrms (1 min.)
output / case	600 V DC
<b>Safety</b>	IEC 348 / IEC 950
<b>RFI suppression</b>	VDE 0871 B
<b>EMC</b>	IEC 801-4 level 4
<b>Operating Temperature at full load</b>	- 20 to + 50 °C
<b>Storage temperature</b>	- 40 to + 85 °C
<b>Thermal protection</b>	Output shuts down in case of insufficient cooling

<b>Hold-Up time</b>	
100% load Vin = 220V AC	20 ms
50% load Vin = 220V AC	45 ms
<b>Turn on delay</b>	
after mains switch on	500 ms
<b>Inrush current</b>	40 A peak @ 220V AC input

	SM 1540	SM 7020	SM 3004
<b>Series operation</b>			
max. total voltage	600 V	600 V	600 V
Master / Slave operation	yes	yes	option

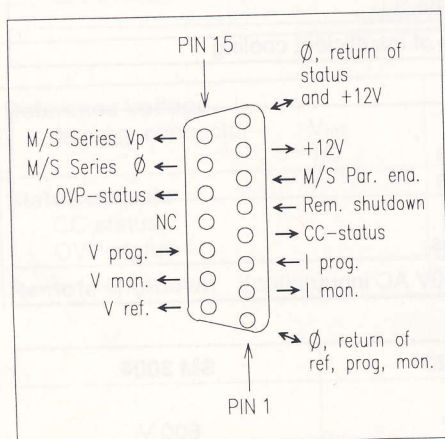
	SM 1540	SM 7020	SM 3004
<b>Parallel operation</b> max. total current Master / Slave operation	no limit yes	no limit yes	no limit yes
<b>Remote sensing</b> max. voltage drop per load lead	2 V	2 V	not available
<b>OVP</b> trip range	0 - 17 V	0 - 80 V	0 - 350 V

	SM 1540	SM 7020	SM 3004
<b>Potentiometers</b> front panel control with knobs resolution	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
<b>Meters</b> digital scale voltage / current accuracy	digital / 3.5 digit 0 - 15.00 V / 0 - 40.0 A 0.5% + 2 digits	digital / 3.5 digit 0 - 70.0V / 0 - 20.0 A 0.5% + 2 digits	digital / 3.5 digit 0 - 300 V / 0 - 4.00 A 0.5% + 2 digits
analog scale voltage / current accuracy	0 - 15 V / 0 - 40 A 1.5 %	0 - 70 V / 0 - 20 A 1.5 %	0 - 300 V / 0 - 4 A 1.5 %

	SM 1540	SM 7020	SM 3004
<b>Input Terminals</b> input connections	10 Amp / 65 °C Euro-connector at rear panel		
<b>Output Terminals</b> at rear panel	M8 bolts	6 mm bind post	4 mm bind post
<b>Programming connector</b>	15 pole D-connector at rear panel		
<b>Cooling</b>	convection cooling		
<b>Enclosure</b> degree of protection	IP20		
<b>Dimensions</b> behind front panel front panel	428 x 89 x 257 mm 483 x 89 mm (19", 2 U)		
<b>Weight</b>	7.4 kgs		

CV= Constant Voltage  
CC=Constant Current  
OVP=Over Voltage Protector

Specifications measured at  
 $t_{amb} = 25 \pm 5 \text{ }^\circ\text{C}$  and  $V_{in} = 220 \text{ V AC}$ ,  
50 Hz unless otherwise noted.



Connections programming connector

