



Advanced Test Equipment Rentals

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CUSTOMER SERVICE

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	THIS DOCUMENT CONSISTS OF THE FOLLOWING SHEETS AT THE REVISIONS SHOWN						
SHEET	REVISION						
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APPROVAL SIGNATURES							
CHANGE	N/A	E197	E248				
REVISION DATE	10/31/94	12/07/95	08/20/96				

APPROVAL SIGNATURES : JOB TITLE	ORIGINATING DEPT.: ENGINEERING/DRAFTING	
PROJECT ENGINEER	CONTROLLING DEPT.: ENGINEERING/DRAFTING	
MARKETING MANAGER/ DIRECTOR	CONTROL SHEET	
QA MANAGER	SPECIFICATION FOR ALL TCR MODELS	
ELECTRONIC MEASUREMENTS INC.	DOCUMENT NUMBER 08-470-001	Page 1 of 9

INPUT POWER

The power supply is designed to operate at input line voltage as specified in Table 1.

Power Rating of supply (W)	Phase	Frequency (Hz)	Input Suffix	Input voltage (Vrms)	Max. Input Current (rms)
600	1	47-63	1	105-125	10.2
1K	1	47-63	1	105-125	17
1.8K	1	47-63	2	190-250	17
2.8K	1	47-63	2	190-253	26.2
2.5K	3	47-63	1	190-253	13.5
2.5K	3	47-63	2	342-418	8
2.5K	3	47-63	4	414-505	6.2
2.5K	3	47-63	8	360-440	8
5K	3	47-63	1	190-253	27
5K	3	47-63	2	342-418	15
5K	3	47-63	8	360-440	15
5K	3	47-63	4	414-505	12.5
10K	3	47-63	1	190-253	50
10K	3	47-63	2	342-418	30
10K	3	47-63	4	414-505	25
10K	3	47-63	8	360-440	30

Table 1: Input Power

AC INRUSH

All models are "soft-started" so that at turn-on or during power interruption and reapplication, the input SCRs slowly phase-in from non-conduction to a conduction mode. There is no magnetic inrush current.

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REGULATION

- a. A regulation of less than 0.1 % of the maximum rated output is maintained over the entire range of the input line voltage given in table 1.
- b. Constant voltage mode: Variations in output current from 5 to 100% of maximum rating cause output voltage variations of less than 0.1% of the output voltage setting when output is 50 to 100% of the maximum rating. Below 50% output voltage, output variation will not exceed 0.05% of maximum output.
- c. Constant current mode: Variations of output voltage from 5 to 100% of maximum rating will result in output current variations of less than 0.1% of the output current setting when output is 50 to 100 % of maximum rating. Below 50% output current, output variations will not exceed 0.05 % of maximum output.

Watts	Model Number	Ripple (RMS)
600	TCR 7.5S70	80
1000	TCR 7.5S115	75
2000	TCR 7.5S200	80
2500	TCR 7.5S300	80
600	TCR 10S50	80
1000	TCR 10S90	75
2000	TCR 10S165	80
2500	TCR 10S240	80
600	TCR 20S30	80
1000	TCR 20S-50	60
2000	TCR 20S90	80
2500	TCR 20S135	80
600	TCR 40S15	100
1000	TCR 40S25	60
2000	TCR 40S45	100
2500	TCR 40S70	100
600	TCR 60S10	120
1000	TCR 60S18	70
2000	TCR 60S30	90
2500	TCR 60S45	90
600	TCR 80S8	150
1000	TCR 80S13	80
2000	TCR 80S23	120
2500	TCR 80S34	100

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1000	TCR 150S4	300
2000	TCR 150S7	150
2500	TCR 150S12	200
2500	TCR 150S18	200
1000	TCR 300S2	500
2000	TCR 300S3	250
2000	TCR 300S6	300
2500	TCR 300S9	300
1000	TCR 600S1	1000
2000	TCR 600S1.6	700
2000	TCR 600S3	700
2500	TCR 600S4.5	750

Table 2: Ripple for single phase

Watts	Model Number	Ripple (RMS)
2500	TCR 7.5T300	30
5000	TCR 6T600	30
5400	TCR 6T900	30
2500	TCR 10T250	35
5000	TCR 10T500	35
7500	TCR 10T750	35
2500	TCR 20T125	20
5000	TCR 20T250	20
10000	TCR 20T500	20
3000	TCR 30T100	15
6000	TCR 30T200	15
2500	TCR 40T60	15
5000	TCR 40T125	15
10000	TCR 40T250	15
10000	TCR 50T200	18
2500	TCR 80T30	25
5000	TCR 80T60	25
10000	TCR 100T100	40
2500	TCR 120T20	40
5000	TCR 120T40	40
2500	TCR 160T15	60
5000	TCR 160T30	60
10000	TCR 160T60	60
2500	TCR 250T10	90
5000	TCR 250T20	90
10000	TCR 250T40	90

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2500	TCR 500T5	125
5000	TCR 500T10	125
10000	TCR 500T20	125

Table 3: Ripple for Three phase

The maximum output voltage and maximum output current shall be calibrated to:

$$V_{OUT RATED} < V_{OUT} \leq (V_{OUT RATED} + 5\%)$$

$$I_{OUT RATED} < I_{OUT} \leq (I_{OUT RATED} + 5\%)$$

PEAK TO PEAK RIPPLE CALCULATION FOR OUTPUT VOLTAGES NOT COVERED BY CHART (for $\phi 3$ Only).

- a. Output between 10 and 20 volts Ripple = 35-1.5(V_{out} - 10)
- b. Output between 20 and 30 volts Ripple = 30-0.5 V_{out}
- c. Output between 50 and 80 volts Ripple = 0.233 V_{out} + 6.33
- d. Output between 80 and 100 volts Ripple = 0.75 V_{out} - 35
- e. Output between 120 and 160 volts Ripple = 0.5 V_{out} - 20
- f. Output between 160 and 250 volts Ripple = 0.33 out + 6.7
- g. Output between 250 and above Ripple = 0.14 V_{out} + 55

TRANSIENT RESPONSE


A 30% step increase in power demanded by the load will cause a transient in the regulated output which will typically recover within 2% of final value within 75 ms.

STABILITY

Maximum deviation in either voltage or current mode for an eight (8) hour period is 0.05% under conditions of constant line, load and temperature.

OPERATING TEMPERATURE

All TCR $\phi 1$ models are capable of continuous duty performance without deviation from their specifications in ambient temperatures between 0 °C and 40 °C. For ambient temperatures

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between 40 °C and 50 °C the supply's performance is derated by a factor of 1% per 1 °C. Units may be safely stored at temperatures of -40 °C to +85 °C. The output voltage temperature coefficient is 0.02%/ °C of the max. rated output voltage. The output current temperature coefficient is 0.03%/ °C of the max. rated output current.

All TCR ϕ 3 models are capable of continuous duty performance without deviation from their specifications in ambient temperatures between 0 °C and 50 °C. Units may be safely stored at temperatures of -40 °C to +85 °C. The output voltage temperature coefficient is 0.02%/ °C of the max. rated output voltage. The output current temperature coefficient is 0.03%/ °C of the max. rated output current.

OVER TEMPERATURE PROTECTION

Automatic protection against excessive temperatures is provided by a thermostat mounted on the heat sink. If the heat sink temperature reaches 90 °C (194 °F) the unit will shut down to prevent damage. An automatic restart circuit will be activated once safe temperature operating levels are restored.

OVERVOLTAGE PROTECTION

The Overvoltage protection circuitry, adjustable from the front panel, is an option on all TCR models. This circuitry will short circuit (crowbar) the power supply's output to protect the load, and turns the control circuitry off if the output voltage reaches the preset (50% to 110% of rated output) value. This protection is effective regardless of the cause of the over-voltage.

REMOTE PROGRAMMING

The supply may be controlled locally or remotely. In the remote programming mode, externally provided resistance voltage or current will control the supply's output. Programming sensitivity is 5000 ohms, 5 volts or 1 mA for full scale voltage output or 100 ohms, 100 mV or 1 mA for full scale current operation.

Voltage Programming	0-5 volts	0-10 volts	Current Programming	0-5 volts	0-10 volts	0-100 mV
Output Voltage	± 2.5 %	± 5 %	Output Current	± 2.5 %	± 5 %	± 2.5 %

METER TOLERANCE

- Tolerance of Analog front panel voltmeter at full scale is ±2 %
- Tolerance of Analog front panel ammeter at full scale is ±2 %
- Tolerance of Digital front panel voltmeter at full scale is ±2 %
- Tolerance of Digital front panel ammeter at full scale is ±2 %

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OVERALL EFFICIENCY


Efficiency ranges from 75% to 94% depending on the output voltage. Units with higher output voltages have higher efficiency. Efficiency is measured at nominal input line voltage and full load (maximum current and maximum voltage).

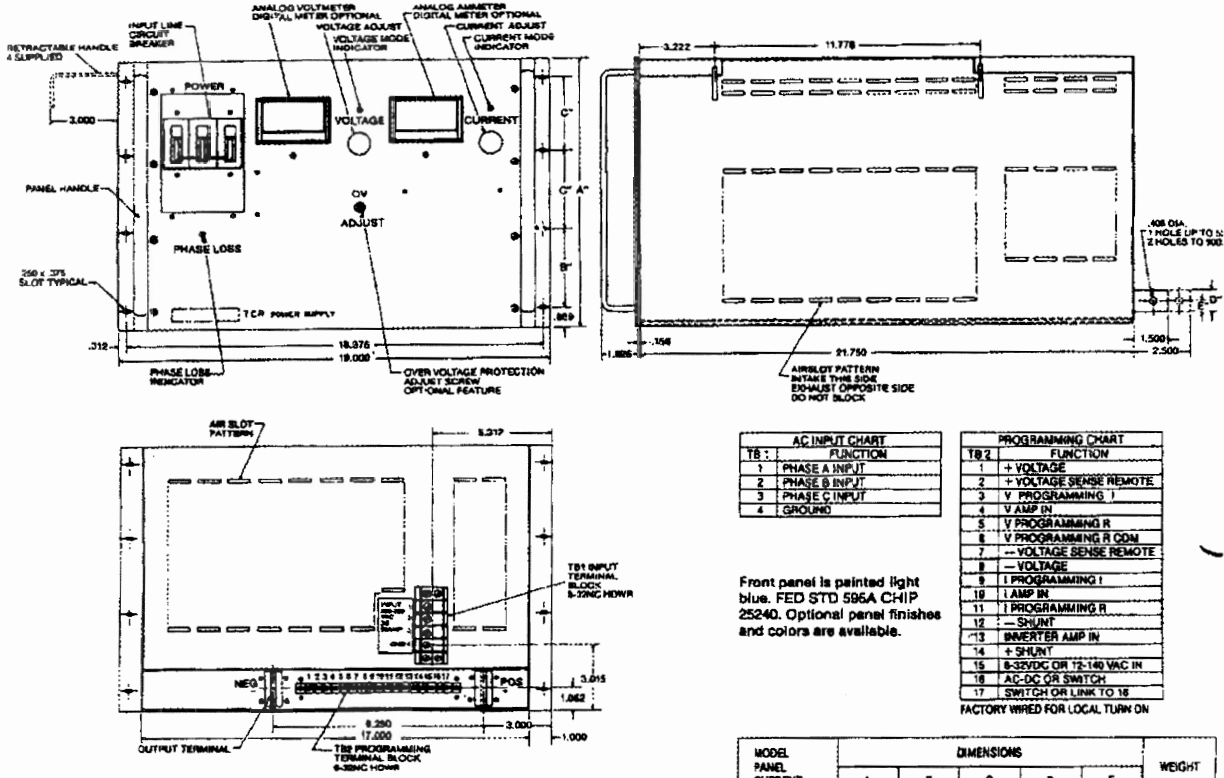
ISOLATION (HI-POT)

The input line terminals must be shorted together when Hi-Pot potentials are applied. This will eliminate the possibility of internal damage to the power supply. Also, the output terminals should be shorted together. Place a short between the terminals (input, output, and chassis ground), to discharge high potential that may still exist after Hi-Pot test.

Input - Output	Input -Chassis	Output - Chassis
3000 Vdc	3000 Vdc	1500 Vdc

Table 4: Isolation Test

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AC INPUT CHART

TERMINAL	FUNCTION
1	PHASE A INPUT
2	PHASE B INPUT
3	PHASE C INPUT
4	GROUND

PROGRAMMING CHART

TERMINAL	FUNCTION
1	+ VOLTAGE
2	+ VOLTAGE SENSE REMOTE
3	V PROGRAMMING I
4	V AMP IN
5	V PROGRAMMING R
6	V PROGRAMMING R COM
7	-- VOLTAGE SENSE REMOTE
8	-- VOLTAGE
9	I PROGRAMMING I
10	I AMP IN
11	I PROGRAMMING R
12	-- SHUNT
13	INVERTER AMP IN
14	+ SHUNT
15	8-32VDC OR 12-140 VAC IN
16	AC-DC OR SWITCH
17	SWITCH OR LINK TO 16

FACTORY WIRED FOR LOCAL TURN ON

Front panel is painted light blue. FED STD 596A CHIP 25240. Optional panel finishes and colors are available.

MODEL PANEL CURRENT	DIMENSIONS					WEIGHT
	A	B	C	D	E	
TCR 2.5 KW 7.500" NOMINAL 5 TO 300 AMP	6.980"	5.250"	---	1.000"	0.500"	153-189 lbs.
TCR 5 KW 8.750" NOMINAL 10 TO 600 AMP	8.748"	7.000"	---	1.000"	0.500"	210-256 lbs.
TCR 10 KW 12.250" NOMINAL 20 TO 900 AMP	12.218"	3.500"	3.500"	1.000"	0.500"	300-368 lbs.
TCR 10 KW 12.250" NOMINAL 20 TO 900 AMP	12.218"	3.500"	3.500"	1.375"	0.887"	300-395 lbs.

TCR Three-Phase Power Supplies

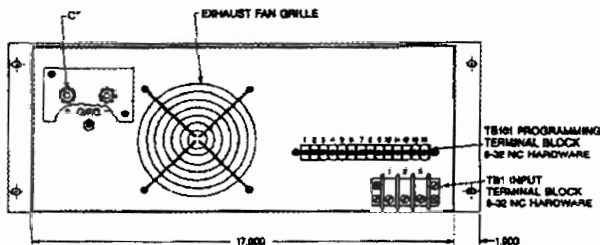
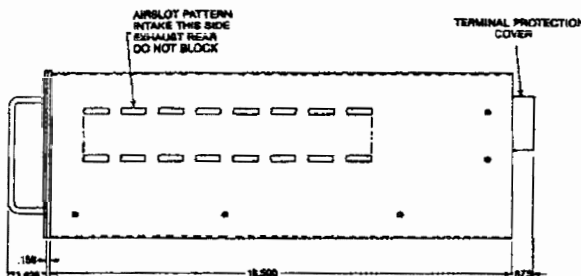
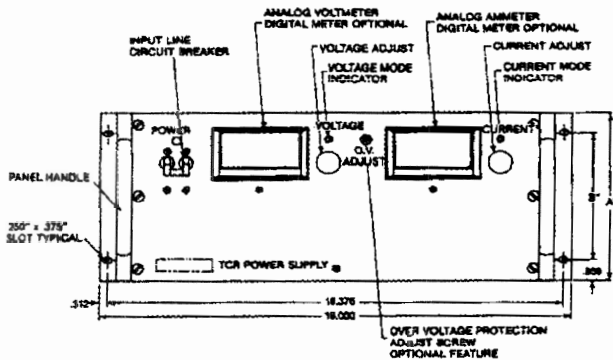
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Front panel is painted light blue. FED STD 595A CHIP 25240. Optional panel finishes and colors are available.

PROGRAMMING CHART	
TB101	FUNCTION
1	+ VOLTAGE
2	+ VOLTAGE SENSE REMOTE
3	V PROGRAMMING I
4	V AMP IN
5	V PROGRAMMING R
6	V PROGRAMMING R COM
7	-VOLTAGE SENSE REMOTE
8	-VOLTAGE
9	I PROGRAMMING I
10	I AMP IN
11	I PROGRAMMING R
12	-SHUNT
13	INVERTER AMP IN
14	+ SHUNT

TB1	FUNCTION
1	AC INPUT
2	AC INPUT
3	GROUND

1600W & 2800W

TB1	AC INPUT CHART
1	AC INPUT
2	GROUND
3	AC INPUT

600-1000W

MODEL PANEL CURRENT	DIMENSIONS			WEIGHT
	A	B	C	
TCR 800W 3.5" NOMINAL 1 TO 70 AMPS	3.468"	1.750"	1/4-20	58-60 lbs.
TCR 1000W 3.5" NOMINAL 1.6 TO 115 APMS	3.468"	1.750"	1/4-20	59-64 lbs.
TCR 1800W 5.25" NOMINAL 3 TO 200 AMPS	5.218"	3.500"	3/8-16	92-98 lbs.
TCR 2800W 7" NOMINAL 4.5 TO 300 AMPS	8.968"	5.250"	3/8-16	124-127 lbs.

TCR Single-Phase Power Supplies

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