SECTION 1
INTRODUCTION

1.1 INTRODUCTION

This manual contains operation and maintenance data on the 5 kilowatt (5KW) units of the DCR-T Series Sorensen Power Supplies. It is intended to familiarize the user with the function of the unit, to introduce the varied applications to which the unit may be adapted, and to furnish sufficient maintenance data to assure long operating life.

Six major sections form the manual divisions. Section 1 contains a brief functional description of the DCR-T series power supplies along with complete unit specifications. Initial inspection and checkout procedures are outlined in Section 2. Operating instructions, including methods for adapting units to various applications, comprise Section 3. Sections 4 and 5 provide the principles of operation and maintenance procedures respectively. System drawings and the replacement parts list are included in Section 6.

1.2 DESCRIPTION

1.2.1 General

The DCR-T series is designed for either rack or floor mounting, and to provide stable, highly regulated dc outputs from a wide range of three phase input voltages and frequencies. (For complete unit specifications refer to Table 1-1.) The series exhibits excellent transient response and low ripple in both voltage regulating and current limiting modes. Other design features include: provisions for remote programming, remote sensing, and series and parallel operation. Increased versatility is also provided by the use of an industrial control technique for main power disconnect and line protection. This feature facilitates the remote control of the line power to the supply.

A variety of Sorensen power supply application notes are available through your Sorensen Service Representative. These notes detail many hook-up configurations available to meet most power supply applications.

1.2.2 Automatic Crossover

There are two basic operating modes: voltage and current. In the voltage mode, the voltage is held constant while the current varies with the load. In the current mode, the voltage varies and current is held constant. The automatic crossover feature enables the unit to switch operating modes as a function of load requirements. If, for example, load currents attempt to increase above a preset current limit, the unit will switch

operation automatically from the voltage to the current mode. In this mode, the current will be regulated at the value preset on the front panel. If load requirements are lowered, a return to the voltage regulating mode will occur automatically.

1.2.3 Remote Sensing

Terminals located on the rear-mounted connector (J-2) offer a means of extending a unit's regulating point from the output terminals to the load. This effectively compensates for variations in the load lead voltage drop. Section 3 outlines the connections for remote sensing.

1.2.4 Series Operation

For applications requiring output voltages higher than a single unit can provide, DCR-T power supplies may be connected in series (see Section 3). Regulation in series operation is the sum of the regulations for all units.

1.2.5 Parallel Operation

Parallel operation may be used to service those applications requiring an output current higher than a single unit can provide. DCR-T power supplies may be direct paralleled with no limit to the number of units which can be paralleled. However, the regulation will deteriorate, and will be the sum of the regulations for the individual settings plus the output voltage differences between units at no load.

1.2.6 Remote Programming

Output voltage or current of DCR-T power supplies may be remotely programmed in either the voltage or current mode by resistance or voltage signal. Details and consideration are given in Section 3.

1.2.7 Failure Protection

In addition to the constant limiting protection provided by automatic crossover and the current regulator, the DCR-T power supply incorporates several other protection systems. Loss of one input phase drops the output to zero and energizes an indicator lamp on the control panel. Thermal overload, usually resulting from a cooling fan failure, will also drop the output to zero and energize an indicator lamp on the front panel. In the event of an overvoltage condition at the output, such as a failure in the power supply or an externally induced condition, the adjustable overvoltage protection (OVP) will drop the output to zero and disconnect the AC power from the main power components. Protection against the effects of overloads and internal short circuits is also provided.

The main power components are protected by a thermal overload relay working in conjunction with a contactor to provide mechanical disconnect of the AC line to the main power components. (See Section 2 for complete input wiring requirements.) Control circuitry is protected by rear mounted fuses and an internal fuse.

1.3 OPTIONAL MODIFICATIONS

1.3.1 Chassis Slide Kit

The sides of the DCR-T have inserts which allow attachment of slide rails. Consult the factory for information on this optional Chassis Slide Kit.

1.4 SPECIFICATIONS

See Table 1-1 for complete specifications on the DCR-T 5KW series power supply.

Table 1-1 Specifications

DCR-T SPECIFICATIONS
5K WATT SERIES

DCRT Model	OUTPUT POWER				Constant Voltage Mode					Temp. Coeff. Voltage mV/°C	Voltage Drift % Eo Max. (Typ.)	Programming Constants Voltage Mode	
	Voltage (Vdc)	Current (Adc) 50°C	60°C	70°C	Regulation Line & Load mV[1]	Ripple (PARD) mV rms	mV p-p	Resolution	Transient Response Time ms (Typ.)			Ohms/V	V/V
4-800T1	0-4	800	680	440	2-4	30	100	Note 4	40	1.0	.05	2500	Note 4
8-400T1	0-8	400	340	220	4-8	30	100	Note 4	40	2.0	.05	1250	Note 4
16-310T1	0-16	310	266	188	8-16	30	100	Note 4	40	3.2	.05	625	Note 4
32-155T1	0-32	155	132	93	16-32	20	120	Note 4	40	6.4	.05	313	Note 4
55-90T1	0-55	90	74	54	27-55	20	120	Note 4	40	11.0	.05	182	Note 4
80-62T1	0-80	62	54	37	40-80	20	120	Note 4	40	16.0	.05	125	Note 4
110-45T1	0-110	45	38	27	55-110	40	140	Note 4	40	22.0	.05	91	Note 4
160-30T1	0-160	30	27	18	80-160	60	180	Note 4	40	32.0	.05	63	Note 4
300-16T1	0-300	16	14	10	150-300	100	300	Note 4	40	60.0	.05	33	Note 4
600-8T1	0-600	8	7	4.8	300-600	150	600	Note 4	40	120.0	.05	17	Note 4

NOTE 1: Regulation range as stated 0.1% of voltage or current, or stated range, whichever is greater.

NOTE 2: Line current at min. line voltage.

NOTE 3: Efficiency taken at max. power out and nominal ac volts input.

NOTE 4: Contact factory.

COMMON SPECIFICATIONS

DC OUPUT CONSTANT VOLTAGE MODE:

Voltage Regulation: Line Load combined: All models 0.1% of the voltage setting or specification in table, whichever is greater.
Temperature Coefficient: 0.2%/°C of Eo max.
Voltage Signal Programming: 100 mV per 1% of rated output. (0-10V for 0-100% of rated output.)
Resistive Programming: 100 ohms per 1% of rated output. (0-10) k ohms for 0-100% of rated output.)
Stability: 0.1% Eo max. for 8 hours after 30 minute warm up with fixed line, load and temperature.
Remote Sensing: 3 to 10V max. drop + line. 0.75V max. drop - line.
Transient Response: 40 ms (typical) to return to ± 1% band for a step load change of 50% to 100% or 100% to 50% of full load.

INPUT:

T1 - 208 Vac ± 10% @ 60Hz.
T2 - 380 Vac ± 10% @ 50Hz.
T3 - 405 Vac ± 10% @ 50Hz.
T4 - 440 Vac ± 10% @ 60Hz.
T5 - 480 Vac ± 10% @ 60Hz.

OPERATING DATA:

Efficiency: 60% to 80% of full rated output depending on model.
Series Operation: 200 Vdc maximum; consult factory for series operation of more than 2 units.
Parallel Operation: Direct paralleling of any number of units.
Overvoltage Protection: Standard.
Ambient Operating Temperature Range: 0 to 70°C.
Storage Temperature Range: -45°C to +70°C.
Cooling: Forced Air.

DCR-T SPECIFICATIONS
5KW SERIES

DCRT Model	Constant Current Mode: Regulation mA[1]	Constant Current Mode: Ripple (PARD) mA rms	Constant Current Mode: Resolution (Typ.)	Temp. Coeff. Current mV/°C	Current Drift % Eo Max. (Typ.)	Programming Constants Current Mode: Ohms/V	Programming Constants Current Mode: V/V	Standard Input Power (3 phase, 60 ± 1 hz): Voltage Vac	Standard Input Power (3 phase, 60 ± 1 hz): Current Aac (Max.)[2]	Power Factor (Typ.): Lead	Power Factor (Typ.): Lag	Efficiency[3] %	Case Size
4-800T1	400-900	3000	Note 4	320	.05	12.5	Note 4	187-229	26.0	.9	.2	50	II
8-400T1	200-450	3000	Note 4	200	.05	25.0	Note 4	187-229	Note 4	.9	.2	Note 4	II
16-310T1	155-310	1500	Note 4	200	.05	32.0	Note 4	187-229	Note 4	.9	.2	Note 4	II
32-155T1	80-155	1000	Note 4	100	.05	64.0	Note 4	187-229	Note 4	.9	.2	Note 4	II
55-90T1	48-90	600	Note 4	58	.05	111.0	Note 4	187-229	Note 4	.9	.2	Note 4	II
80-62T1	30-62	600	Note 4	40	.05	161.0	Note 4	187-299	Note 4	.9	.2	Note 4	II
110-45T1	22-45	500	Note 4	29	.05	222.0	Note 4	187-299	Note 4	.9	.2	Note 4	II
160-30T1	15-30	330	Note 4	20	.05	333.0	Note 4	187-229	Note 4	.9	.2	Note 4	II
300-16T1	8-16	200	Note 4	10	.05	625.0	Note 4	187-229	Note 4	.9	.2	Note 4	II
600-8T1	4-8	100	Note 4	5	.05	1250.0	Note 4	187-299	Note 4	.9	.2	Note 4	II

NOTE 1: Regulation range is 0.1% of voltage or current, or stated range, whichever is greater.

NOTE 2: Line current at min. line voltage.

NOTE 3: Efficiency taken at max. power out and nominal ac volts input.

NOTE 4: Contact factory.

COMMON SPECIFICATIONS

CONSTANT CURRENT MODE:

Current Regulation: Line and load combined: All models 0.1% Io max. of the output current setting or specification in table, whichever is greater.

Temperature Coefficient: 0.04%/°C of Io max.

Current Signal Programming: 100 mV per 1% of rated output. (0-10V for 0-100% of rated output.)

Resistive Programming: 100 ohms per 1% of rated output. (0-10 kohms for 0-100% of rated load.)

Stability: 0.2% Io max. for 8 hours after 30 minute warm up with fixed line, load and temperature.

DCRT ACCESSORIES:

Chassis Slides: Part No. 1060247-1 (Optional).

Digital Programmer: Available for all models in DCRT Series. IEEE-488 Interface to GPIP Bus. Order Model 488 MICRO-DAP.

OPTIONAL EQUIPMENT:

OVP: OVP shutdown is standard.

Option: SCR crowbar M5.

METERING:

Digital: Standard

Analog: add M52

DCRT INPUT VOLTAGE			
T1	208V	60HZ	STD. U.S. VOLTAGE
T2	380V	50HZ	STD. CONTINENTAL EUROPE VOLTAGE
T3	415V	50HZ	STD. BRITISH ISLES VOLTAGE
T5	480V	60HZ	STD. U.S. VOLTAGE

CASE SIZE	DIMENSIONS IN. (mm): HEIGHT	DIMENSIONS IN. (mm): WIDTH	DIMENSIONS IN. (mm): LENGTH	WEIGHT lb. (kg)
II	8.75(222.3)	19(492.6)	24(609.6)	185(407)
III	12.25(311.2)	19(482.6)	24(609.6)	310(682)