GLOBAL SPECIALTIES
INSTRUMENTS

CE

1305

Regulated Dual DC Power Supply
(0 - 32V ; 0 - 5A Dual)

INSTRUCTION MANUAL

GLOBAL SPECIALTIES®

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M-00272 **EDITION : 1 (APR., 2002)**

PCB Components	2 X Z-DPM/01 PCB REV - 01
Ref Designator	**Value**
MISCILLANEOUS	
J1	2.54PITCH,5PIN M
J2	2.54PITCH,3PIN M
J3	2.54PITCH,4PIN M

PCB Components	2 X Z-TR/01 PCB REV - 01
Ref Designator	**Value**
RESISTORS	
R1	1K,2W,5%,MOR
R2	0.1E,2.5W,5%,WW
R129*	33K,0.25W,5%,MFR
CAPACITORS	
C1	0.1µF/50V, CD
C2	10µF/50V, ELE
C3	2.2µF/50V, ELE
DIODE	
CR1	1N5402 X 2

FRONT PANEL & CHASSIS

Ref Designator	Value
V' COARSE CONTROL	10K/1W W/W POT X 2
V' FINE CONTROL	1K/1W W/W POT X 2
I' COARSE CONTROL	1K/1W W/W POT X 2
I' FINE CONTROL	50E/1/W W/W POT X 2
INPUT FILTER	EMI 10AMP/125V
ON / OFF SWITCH	CHILLI 3022
INPUT FUSE	FOR 230V -- 4AMP/TYPE 'T' FOR 115V -- 8AMP/TYPE 'T'

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SECTION - 1
GENERAL INFORMATION

1.0 DESCRIPTION :

1.1 The 1305 DC Power Supply is a compact, high perfomance Dual output DC power supply for industrial and laboratory use.

1.2 The two main outputs are continuously variable from 0 to 32V and can supply 5A max each. They can be operated in constant voltage or constant current modes. Automatic transition from CV to CC mode may be set at any voltage or current within the range. Separate front panel meters are provided to monitor output voltage and load current of the variable output sections.

1.3 The output voltage and current limit settings of the variable outputs can be varied manually using front panel controls.

1.4 All outputs are floating i.e., neither the output positive terminal nor the negative terminal (nor any point within the regulator circuitry) is connected to ground.

1.5 The power supply is designed to operate in ambient temperature of upto 40°C and full output may be drawn continuously provided proper ventilation is provided around the power supply. The power supply works from mains supply of 115V or 230V AC, 47-63 Hz (With Internal Tap Selector).

PCB Components **2 X Z-DPM/01 PCB REV - 01**

Ref Designator	Value
PRESETS	
PR1	2.5K,LIN,VER (REF ADJ)
CAPACITORS	
C1	220pF,50V,CD
C2	0.1uF,100V,MP
C3	0.01uF,50V,CD
C4	0.47uF,100V,MP
C5	0.1uF,100V,MP
C6	0.1uF,100V,MP
C7	10uF,50V,EL
C8	0.1uF,50V,CD
C9	10uF,50V,EL
C10	0.1uF,50V,CD
IC's	
IC1	7107
VR1	TL - 431
FND's	
DS1	TSD566 RED
DS2	TSD566 RED
DS3	TSD566 RED
LED's	
LED1*	3MM RED
LED2*	3MM RED

PCB Components	ZSDT-CT/05 PCB
Ref Designator	**Value**
Q5	BC547
FET1	IRFP150
SCR1	2N6396
FET2	IRFP150
CONNECTORS	
CON2	2.54mm PITCH, 12PIN M
CON3	2.54mm PITCH, 12PIN M L TYPE
CON4	2.54mm PITCH, 8PIN M
MISCELLANEOUS	
TP1	RIM PIN MALE
TP2	RIM PIN MALE
TP3	RIM PIN MALE
TP4	RIM PIN MALE
TP5	RIM PIN MALE
TP6	RIM PIN MALE
SPADE CON	12H750

PCB Components	2 X Z-DPM/01 PCB REV - 01
Ref Designator	**Value**
RESISTORS	
R1	39K,0.25,5%,MFR
R2	470K,0.25W,5%,MFR
R3	1M,0.25W,5%,MFR
R4*	SEL(INPUT)
R5	10K,0.25W,5%,MFR
R6	2K4,0.25W,5%,MFR
R7	330E,0.25W,5%,MFR
R8	330E,0.25W,5%,MFR
R9	6K8, 0.25W,5%,MFR

SECTION - 2
SPECIFICATIONS

Two Identical Sections

Output Voltage : 0-32 VDC continuously variable.
Load Current : 0-5 A max. continuously variable.

Constant Voltage Mode Operation

Line Regulation (±10% line change) : Less than ±0.01% +2mV
Load Regulation (no load to full load) : Less than ±0.01%+2mV.
Ripple & Noise : Less than 1mVrms max (20Hz - 20MHz).

Constant Current Mode Operation

Line Regulation (±10% line change) : Less than ±0.1%± 250µA
Load Regulation (no load to full load) : Less than ±0.1%± 250µA.
Ripple & Noise : 0.04% rms max (2.0mA).

Metering : Independent 3 digit DPMs for monitoring output voltage and load current of each section.
Meter Accuracy : ± 3 counts.

Overload Protection : Automatic overload and short circuit protection.

General

Operating Temperature : 0 to 40°C.

Input Voltage : 115V or 230V AC, 47 to 63 Hz. (With Internal Tap Selector)

Dimensions (W x D x H) : 420mm x 300mm x 133mm

Weight : 16.6 Kg. (36.88 lbs) approx.

SECTION - 3
INSTALLATION

3.1 INITIAL INSPECTION :

As soon as the power supply unit is unpacked, inspect for any damage that may have occured during transit. Save all packing material until inspection is complete. If any damage is found, notify the carriers immediately. Our authorised representatives should also be notified.

3.2 PHYSICAL CHECK :

This check should confirm that there are no broken knobs or connectors, that the cabinet and panel surfaces are free of dents and scratches and the meters are not scratched and cracked.

3.3 ELECTRICAL CHECK :

The power supply unit should be checked against its electrical specifications.

3.4 INSTALLATION DATA :

The power supply unit is shipped ready for bench operation. It is necessary only to connect the unit to a rated source of power and it is ready for operation.

3.5 LOCATION :

The power supply unit is naturally cooled. Sufficient space should be kept around the unit while in operation, so that heatsinks do not remain in confined space or close to another heating source. The ambient temperature of the area around the unit should be less than 40°C.

3.6 INPUT POWER REQUIREMENTS :

The power supply unit may be operated continuously from a source of 115V or 230V AC with 10A Source.

3.7 REPACKAGING FOR SHIPMENT :

To ensure safe shipment of the power supply unit, the package designed for the unit be reused. Attach a tag to the unit specifying the owner, and a brief description of the fault observed.

Ref Designator	Value
DIODES	
CR23	1N4007, 1KV/1A
CR24	1N4007, 1KV/1A
CR25	1N4148, 100V/10mA
CR26	1N4148, 100V/10mA
CR27	1N4148, 100V/10mA
CR28	1N4148, 100V/10mA
CR29	1N4007, 1KV/1A
CR30	1N4007, 1KV/1A
ZENERS	
Z1	1N758, 10V, 0.4W
Z2	1N758, 10V, 0.4W
Z3	1N750, 4.7V, 0.4W
BRIDGE	
BR1	10A/600V PC MTG BRIDGE
BR2	CSB-1, 100V/1A BRIDGE.
ICs	
IC1	4N25 OPTO
IC2	7812
IC3	TL431
IC4	LM324
IC5	7812
IC6	TL431
IC7	79L05
IC8	7805
TRANSISTORS/FET/SCR	
Q1	BC109
Q2	MPSA12
Q3	BC557
Q4	BC557

PCB Components	ZSDT-CT/05 PCB
Ref Designator	**Value**
C24	10µF/50V, ELE
C25	10µF/50V, ELE
C26	0.1µF/50V, CD
C27	470µF/50V, ELE
C29	1000µF/35V,ELE
DIODES	
CR1	Not Used
CR2	1N4007, 1KV/1A
CR3	1N4007, 1KV/1A
CR4	1N4007, 1KV/1A
CR5	1N4007, 1KV/1A
CR6	1N4007, 1KV/1A
CR7	1N4007, 1KV/1A
CR8	1N4007, 1KV/1A
CR9	1N4007, 1KV/1A
C10	1N4007, 1KV/1A
CR11	1N4007, 1KV/1A
CR12	1N4007,1KV/1A.
CR13	1N4007,1KV/1A.
CR14	1N4007,1KV/1A
CR15	1N4007,1KV/1A
CR16	1N4007, 1KV/1A
CR17	1N4007, 1KV/1A
CR18	1N4007, 1KV/1A
CR19	1N4007, 1KV/1A
CR20	1N4007, 1KV/1A
CR21	1N4007, 1KV/1A
CR22	1N4007, 1KV/1A

SECTION - 4
OPERATING INSTRUCTIONS

4.1 ACCEPTANCE TEST :

These acceptance tests ensure that the unit is in working order after shipping. These tests may also be used to verify basic operation when the unit has been restored to normal use after prolonged storage.

4.2 VARIABLE OUTPUT SECTIONS

4.2.1 CONSTANT VOLTAGE MODE :

a) Ensure that the AC power switch is in the OFF position.

b) Connect the unit to a rated power source.

c) Turn the voltage and current controls fully counter clockwise.

d) Connect a digital voltmeter (DVM) to the output terminals, observing correct polarirty. The DVM must be rated better than 0.5% accuracy.

e) Turn the power switch ON. The front panel digital meters will light up and voltmeter and ammmeter displays will read zero.

f) Turn the current control a 1/2 turn clockwise. Slowly turn the voltage control clockwise and observe both the front panel voltmeter and the DVM.

g) Compare the DVM reading with the front panel voltmeter reading. The control range will be from 0 to 32V. The green voltage mode LED will be illuminated to indicate CV mode of operation.

4.2.2 CONSTANT CURRENT MODE :

a) Ensure that the AC power switch is in the OFF position.

b) Connect the unit to a rated power source.

c) Turn the voltage and current controls fully counter clockwise.

d) Connect a DC ammeter or a shunt-digital voltmeter (DVM) combination across the output terminals using appropriately-gauged wire and hardware. The recommended current ratings for the ammeter or the shunt and the wire must be atleast 5A. The ammeter or shunt-DVM combination must be rated better than 0.5% accuracy.

e) Turn the AC power switch ON. The front panel digital meters will light up and voltmeter and ammeter displays will read zero.

f) Turn the Voltage control knob clockwise.

h) Turn the Current control slowly clockwise.

g) Compare the ammeter reading with the front panel ammeter reading. Calculate the output current I using the formula I=V/R where V is the DVM reading and R is the resistance of the external shunt.

The control range will be from 0 to 5A. The red current mode LED will be illuminated to indicate CC mode of operation.

4.3 LOAD CONNECTIONS :

Each load should be connected to the power supply output terminals using separate pairs of connecting wires. This will minimize mutual coupling effects between loads and will retain full advantage of the low output impedance of the power supply. Each pair of connecting wires should

4.4 REVERSE VOLTAGE LOADING :

A diode is connected across the output terminals. Under normal operation, the diode is reverse biased (anode connected to the negative terminal). If a reverse voltage is applied to the output terminals(positive voltage applied

PCB Components **ZSDT-CT/05 PCB**

Ref Designator	Value
PRESETS	
PR101	5K, PRE, LIN, (V)(DEV. DROP)
PR102	500E, PRE, LIN, (V)(V CAL)
PR103	500E, PRE, LIN, (V)(I CAL)
CAPACITORS	
C1	0.1µF/100V, MP
C2	0.1µF/250VAC MKP
C3	15,000µF/50V ELE
C4	0.1µF/50V, MP 10%
C5	33µF/50V, ELE
C6	100µF/50V, ELE
C7	100µF/50V, ELE
C8	1µF/50V, ELE
C9	4.7µF/50V, ELE
C10	10µF/50V, ELE
C11	100µF/50V, ELE
C12	47µF/50V, ELE
C13	1kpF/50V, CD
C14	1kpF/50V,.CD
C15	0.1µF/50V, CD
C16	10µF/50V, ELE
C17	10µF/50V, ELE
C18	0.1µF/50V, CD
C19	220µF/50V, ELE
C20	220µF/50V, ELE
C21	47µF/50V, ELE
C22	10µF/50V, ELE
C23	0.1µF/50V, CD

PCB Components	ZSDT-CT/05 PCB
Ref Designator	**Value**
R26	820E, MFR, 1/4W, 5%
R27#	330K, MFR, 1/4W, 5%
R28#	39K, MFR, 1/4W, 5%
R29#	180K, MFR, 1/4W, 5%
R30	1K, MFR, 1/4W, 5%
R31	15E, MFR, 1/4W, 5%
R32	6.8K, MFR, 1/4W, 5%
R33	15K, MFR, 1/4W, 5%
R34	6.8K, MFR, 1/4W, 5%
R35	15K, MFR, 1/4W, 5%
R36	1K, MFR, 1/4W, 5%
R37	2K, MFR, 1/4W, 5%
R38	1K, MFR, 1/4W, 5%
R39	1K, MFR, 1/4W, 5%
R40	4.7K, MFR, 1/4W, 5%
R41	330K, MFR, 1/4W, 5%
R42	100E, MFR, 1/4W, 5% (I CAL)
R43*	3.9K, MFR, 1/4W, 5% (I CAL)
R44	1K, MFR, 1/4W, 5%
R45	1K, MFR, 1/4W, 5%
R46*	10K, MFR, 1/4W, 5% (V CAL)
R47*	100E, MFR, 1/4W, 5% (V CAL)
R48	2K, MFR, 1/4W, 5%
R49	Shorting Link
R50	Shorting Link
R51	10E, MFR, 1/4W, 5%
R59	10E, MOR, 2W

to the negative terminal), the diode will conduct, shunting current across the output t erminals to the forward voltage drop of the diode. This diode protects the series transistor and the output electrolytic capacitors.

4.5 OUTPUT CAPACITANCE :

Internal capacitor connected across the output terminals of the power supply, helps to supply high current pulses of short duration during constant voltage operation. Any capacitance added externally will improve the pulse current capability, but will decrease the safety provided by the constant current circuit. A high current pulse may damage load components before the average output current is large enough to cause the constant current circuit to operate.

The effects of the output capacitor during constant current operation are as follows:

a. The output impedance of the power supply decreases with increasing frequency.

b. The recovery time of the output voltage is longer for load resistance changes.

c. A large surge current causing a high power dissipation in the load occurs when the load resistance is reduced rapidly.

4.6 REVERSE CURRENT LOADING :

Active loads connected to the power spply may actually deliver a reverse current to the power supply during a portion of its operating cycle.

An external source cannot be allowed to pump current into the supply without loss of regulation and possible damage to the output capacitor. To avoid these effects, it is necessary to preload the supply with a dummy load resistor so that the power supply delivers current through the entire operation cycle of the load device.

4.7 REMOTE SENSE :

Remote sensing is accomplished by connecting the load to remote sensing terminals on the front panel and selecting the remote mode by pressing the "SENSE MODE" push switch. The leads from the sensing (+S and -S) terminals to the load will carry much less current than the load leads and it is not required that these leads be heavy as the load leads. However they must be twisted or shielded to minimize noise pickup.

For reasonable load lengths remote sensing greatly improves the performance of the supply. However, if the load is located at a considerable distance from the supply, added precautions must be observed to obtain satisfactory operation. Notice that the voltage drop in the leads subtracts directly from the available output voltage and also reduces the amplitude of the feedback error signals that are developed within the unit. Because of these factors it is recommended that the drop in each load lead does not exceed 0.5V.

SECTION 5
PART LIST & SCHEMATICS

PCB Components **ZSDT-CT/05 PCB**

Ref Designator	Value
RESISTORS	
R1	270E, 2W, 5%, MOR
R2	47E, MFR, 1/4W, 5%
R3	10K, MFR, 1/4W
R4*	1K, MFR, 1/4W, 5%
R5	10E, MFR, 1/4W, 5%
R6	3.9K, MFR, 1/4W
R7	3.3K, 2W, 5%, MOR
R8	10K, MFR, 1/4W
R9	8.2K, MFR, 1/4W
R10	100K, MFR, 1/4W
R11	4.7E, MFR, 1/4W.
R12	1.5K, MFR, 1/4W.
R13	180K, MFR, 1/4W.
R14	390E, MFR, 1/4W.
R15	6.8K, MFR, 1/4W, 5%
R16	12K, MFR, 1/4W, 5%
R17	3.9K, MFR, 1/4W, 5%
R18	10K, MFR, 1/4W
R19	10K, MFR, 1/4W
R20	10K, MFR, 1/4W
R21	3.3K, 2W, 5%, MOR
R22	270E, 2W, 5%, MOR
R23#	82K, MFR, 1/4W, 5%
R24	4.7K, MFR, 1/4W, 5%
R25	24E, MFR, 1/4W, 5%