

**TD Series
BATTERY CHARGER**

**OPERATION & MAINTENANCE
GUIDE**

Model: _____

Rated Output: _____ **Volts** _____ **Amps**

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Installation or Service problems? Call SENS at (800) 742-2326 between 8 a.m. and 5 p.m. Mountain time Monday through Friday, or visit our website.

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This manual contains important safety and operating instructions for Stored Energy Systems (SENS) TD series charger.

Before using the battery charger, read all instructions and cautionary markings on the battery charger, battery and equipment connected to the battery system.

WARNING:
Please read these safety warnings and heed them. Failure to do so could result in either severe personal injury or equipment damage.

This equipment uses and generates lethal voltages. The equipment should only be installed and maintained by trained persons. Do not attempt to install or operate this equipment unless you are certain you are adequately trained.

WARNING: This charger is intended for incorporation inside of OEM cabinets. For protection against personal injury and fire, the charger must be installed inside of a suitable and safe enclosure.

To reduce the risk of injury, charge only properly sized lead-acid or nickel cadmium batteries. Other types of batteries or under-sized batteries may burst causing personal injury and damage.

- Do not install or operate charger if it has been dropped or otherwise damaged. Return it to the factory for repair.
- Install the charger in accordance with all local codes.
- Do not expose charger to rain or snow.
- Do not disassemble charger; return to factory when service or repair is required. Incorrect assembly may result in a risk of electric shock or fire.
- To reduce risk of electric shock, de-energize and disconnect the AC input and the battery from the charger before attempting maintenance or cleaning.
- Use of an accessory not recommended or sold by SENS may result in a risk of fire, electric shock or personal injury.
- During normal operation, batteries may produce explosive hydrogen gas. *Never smoke, use an open flame, or create sparks near the battery or charger.*
- Remove jewelry, watches, rings, etc. before installing battery or charger.

1 READ THIS FIRST

The installation and use instructions are vital to the satisfactory operation of the charger. If you have any questions, contact SENS service department.

WARNING: Follow exactly the simple procedures outlined in this manual for electrical connection and start-up. Failure to follow prescribed procedures could lead to personal injury and/or equipment damage.

Changing factory-set potentiometers *voids the warranty*. Contact the factory if you believe that the settings on your charger are incorrect. Before determining that the charger is not working correctly, check the following:

1. Is AC power available to the charger?

2. Are any fuses blown?
3. Is the charger connected to a battery of the correct voltage?
4. Was the charger damaged in transit or installation?
5. If you determine that the charger is not working because it is not putting out any current, check the battery's state of charge. If the battery is fully charged and there are no other loads it is normal for the charger to indicate zero current flow.
6. If the battery is being over- or undercharged, check whether the output voltage settings have been tampered with. The pots should be locked, with a hard red varnish applied.
7. Are the remote temperature compensation (RTS) connections tight?

1.1 Description and Application

NOTE: This manual covers several charger models with different output voltage and current ratings. The power circuits are similar, and theory of operation is identical.

The TD is a fully automatic battery charger and DC current source offering the following features:

- Field selectable 120/208/240 VAC input, 60 Hz
- Constant voltage output
- Electronic current limiting
- High voltage shutdown
- AC and DC fuses
- Temperature compensation with remote sensing
- Charger "OK" auxiliary circuit

The charger is designed to maintain and recharge VRLA style batteries.

1.2 Upon Delivery

Inspect the charger for damage caused during transit, and report damage to the carrier immediately. Then contact SENS to determine how best to repair/replace the damaged unit.

WARNING: Pay particular attention to wires at the DC output terminal. If the DC output leads or the surge suppressor leads or bodies are bent or otherwise damaged from shipping, contact SENS immediately to remedy the problem. If any of these leads is bent a battery short-circuit could occur.

2 Installation

2.1 Mechanical Installation

Refer to the attached chassis diagram MEC\990104, which shows overall dimensions and hole centers. Attach the charger to cabinet, bulkhead or other robust surface using 1/4" bolts as follows:

- | | |
|--------------------|--------------------|
| • Vertical mount | Transformer at top |
| • Horizontal mount | Any orientation |
| • Inverted | Any orientation |

2.2 Electrical Installation

The attached diagram SCH\00210 shows location of AC input and DC output connections, as well as 120/208/240 VAC input selection.

CAUTION Ensure that no loose hardware or metal shavings fall into the charger. Operation with such debris in critical areas could cause charger malfunction..

AC Input Connection

Refer to the attached schematic diagram SCH\00210

Before connecting the AC leads, change the input voltage selection jumpers (if necessary) to the desired voltage. The factory setting is for 240 VAC. Connect your AC service to the terminal block.

Input Fusing

The charger is shipped with the correct fusing for 120 volt input. If configuring for 208 or 240 VAC input, the fuse must be changed to a voltage rating of 250 VAC, and to the correct current rating. Refer to Table 2.2

AC Service Required

Table 2.2 below shows the approximate input VA and amperes required by each unit in the series, along with recommended input fuse values.

WARNING: The user is responsible for ensuring that a fuse of the correct voltage and current rating is used in this charger. 125 volt rated fuses are satisfactory for 120 volt input. 250 volt fuses must be used when the input selection is 208 or 240 VAC.

TABLE 2.2
Input Power Consumption

Voltage	Output Current	Fuse	I/P VA	120 V		208 V		240 V	
				Curr.	Fuse	Curr.	Fuse	Curr.	Fuse
36/48	3 amps	6A	300	2.4	3A	1.6	2A	1.6	2A
36/48	5 amps	10A	499	4.0	5A	2.4	3A	2.4	3A
36/48	7 amps	15A	699	4.8	6A	3.2	4A	2.4	3A
60/72	3 amps	6A	434	4.0	5A	2.4	3A	2.4	3A
60/72	5 amps	10A	723	5.6	7A	4.0	5A	3.2	4A
60/72	7 amps	15A	1013	9.6	12A	4.8	6A	4.8	6A
84/120	3 amps	6A	707	8.0	10A	4.0	5A	4.0	5A
84/120	5 amps	10A	1179	9.6	12A	5.6	7A	4.8	6A
84/120	7 amps	15A	1650	12.0	15A	7.2	9A	6.4	8A
132/168	3 amps	6A	1044	9.6	12A	5.6	7A	4.8	6A
132/168	5 amps	10A	1739	16.0	20A	8.0	10A	7.2	9A
132/168	7 amps	15A	2435	20.0	25A	12.0	15A	9.6	12A
180/240	3 amps	6A	1369	12.0	15A	7.2	9A	6.4	8A
180/240	5 amps	10A	2282	20.0	25A	12.0	15A	9.6	12A
180/240	7 amps	15A	3194	26.0	30A	16.0	20A	16.0	20A
252	6 amps	15A	3328	N/A	N/A	16.0	20A	16.0	20A

Battery Connection

Before making DC connections, correctly identify the positive and negative leads;
DO NOT CONNECT BATTERY BACKWARDS.

2.3 Alarm Connections

An auxiliary 120 VAC output is provided to drive an external “charger OK” indicator. The output is rated at one amp. Make connections to TB7 pins 9 and 10 of the control as shown on drawing SCH\00210.

2.4 Remote Temperature Sensor

The charger is equipped with a remote temperature sensor. *THIS SENSOR IS AN INTEGRAL PART OF THE CHARGER'S CONTROL CIRCUIT, AND MUST BE CONNECTED TO THE CHARGER IN ORDER FOR IT TO OPERATE.* When installing the charger fix the sensor in a place that is most representative of the normal ambient temperature of the system battery. The sensor is non-polarized.

3 Operation

3.1 Before Energizing Charger

Before starting the charger, ensure that the battery polarity is correct, and that the input voltage selection is correct.

3.2 Normal Operation

Normal operation is indicated when the charger supplies current to the battery and when the auxiliary contact provides 120 VAC.

3.3 High Voltage Shutdown

The charger will automatically shut itself down when the DC voltage is more than about 3% higher than the output voltage setting. When the output voltage setting is changed, the high voltage shutdown point automatically adjusts along with the float setting.

3.4 Charger Failure

Any of the following conditions will cause an indication of charger failure (removal of 120 VAC from the auxiliary “charger OK” circuit).

- AC fuse blown
- DC fuse blown
- High voltage shutdown
- Disconnection or damage to the remote temperature sensor
- In rare occasions when the DC amps drop to less than 0.5 amps

Note that the charger will not operate without the remote temperature sensor attached.

4 Adjustments

4.1 Read This First

The only adjustment that can be made in the field is the output voltage adjustment. Do not attempt to change any other settings, as these are factory final test adjustments only.

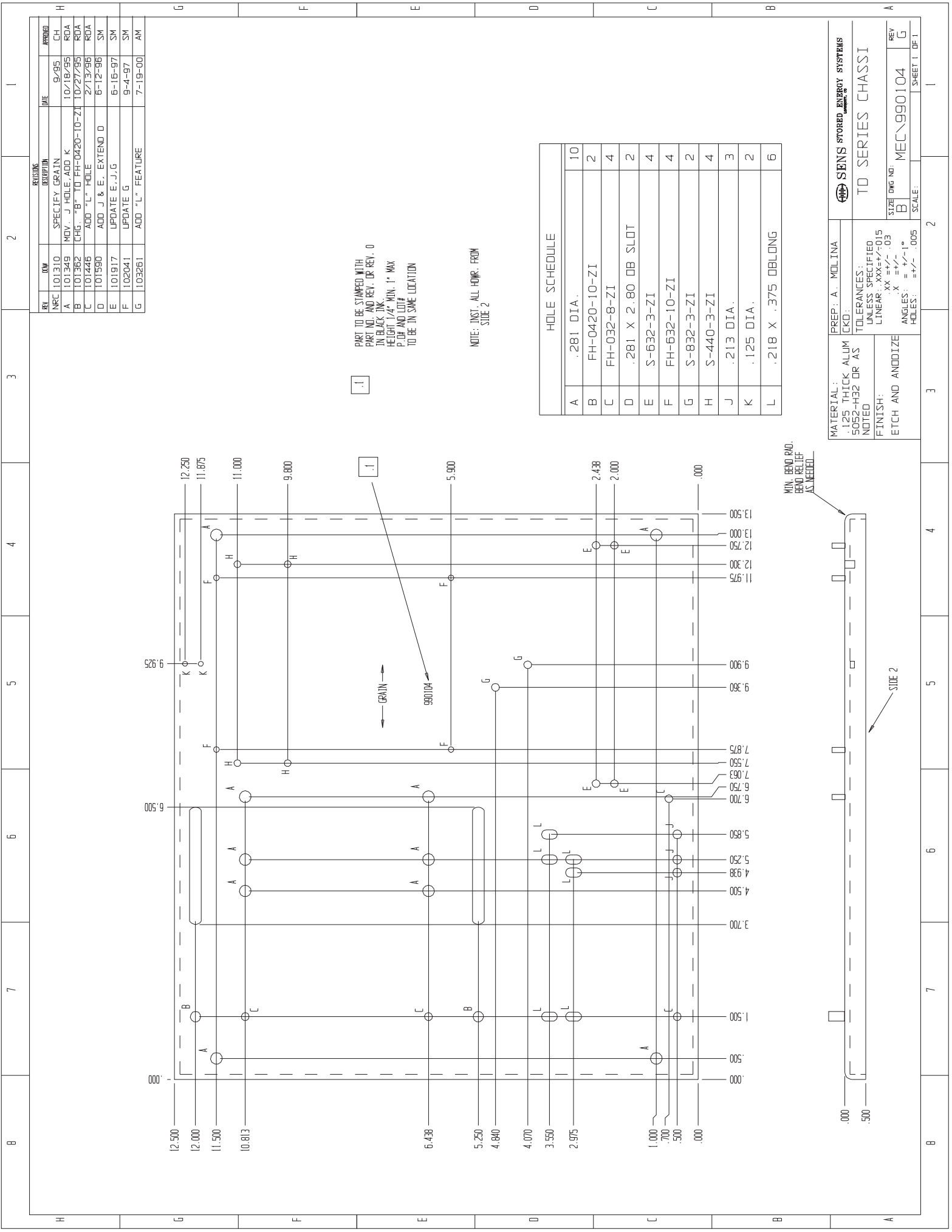
4.2 Output Voltage Adjustment

The charger’s output voltage can be adjusted in the field by acting on the potentiometer labeled “V ADJ”.

5

Troubleshooting

Symptom	Possible Cause	Test	Corrective Action
No output / Charge Fail alarm	Control board failure	Replace with known good board	Replace board, send bad board to SENS for repair
	AC failure	Measure AC line voltage	Tighten connections and verify AC jumper positions
	Fuse blown	Check fuse for continuity	Replace if open
	High DC Shutdown	Check LED D7 on control board	If lit, see "High output voltage" under Symptom
	Remote Temperature Sensor disconnected	Check remote connections	Tighten connections or replace if necessary
	Power rectifier circuit failure	Test all power diodes with meter; perform SCR test on all SCRs	Replace all shorted, open or bad parts
	Charger producing less than 0.5 amps with fully charged batteries	Apply a load	System okay if charger produces current when load applied. If not, see failure options above.
AC or DC fuse blows	Power diode, SCR, or freewheeling diode short	Check all devices for shorts	Replace shorted device(s)
AC or DC fuse blows	Control board failure	Replace with known good board	Replace board, send bad board to SENS for repair
Low output voltage	Control board failure	Replace with known good board	Replace board, send bad board to SENS for repair
	Misadjusted Voltage pot (R7) on control board	Adjust pot and see if output voltage is affected	Adjust R7 to correct output voltage
	Overload	Disconnect load and check output voltage	Check load for problems
		Check for AC line voltage over charger's specified operating range	Contact utility company
	Line voltage less than charger's specified operating range	Measure AC line voltage and check AC jumper positions	Use larger gauge AC wires or contact utility company
High DC voltage shutdown	Control board failure	Replace with known good board	Replace board, send bad board to SENS for repair
	Alternate/secondary charging source connected in parallel with a float voltage 6% higher than the TD	Disconnect alternate charging source	Replace/repair alternate charging source
Excessive output voltage	Misadjusted Voltage pot (R7) on control board	Adjust pot and see if output voltage is affected	Adjust R7 to correct output voltage
Improperly functioning alarms or indicators	Control board failure	Replace with a known good board	Replace board, send bad board to SENS for repair



.1

PART TO BE STAMPED WITH
PART NO. AND REV. OR REV. 0
IN BLACK INK.
HEIGHT 1/4" MIN. 1" MAX
P.OH AND LOT#
TO BE IN SAME LOCATION

NOTE: INST. ALL HOUR. FROM
SIDE 2

HOLE SCHEDULE	
A	.281 DIA.
B	FH-0420-10-ZI
C	FH-032-8-ZI
D	.281 X 2.80 DB SLOT
E	S-632-3-ZI
F	FH-632-10-ZI
G	S-832-3-ZI
H	S-440-3-ZI
J	.213 DIA.
K	.125 DIA.
L	.218 X .375 OBLONG

SENS STORED ENERGY SYSTEMS
TO SERIES CHASSI

PREP: A. MOLINA
CHKD:

MATERIAL:
.125 THICK ALUM
5052-H32 OR AS
NOTED

FINISH:
ETCH AND ANODIZE

TOLERANCES:
UNLESS SPECIFIED
LINEAR: XXX±.03
XX ±.01
X ±.02
ANGLES: ±.1°
HOLES: ±.005

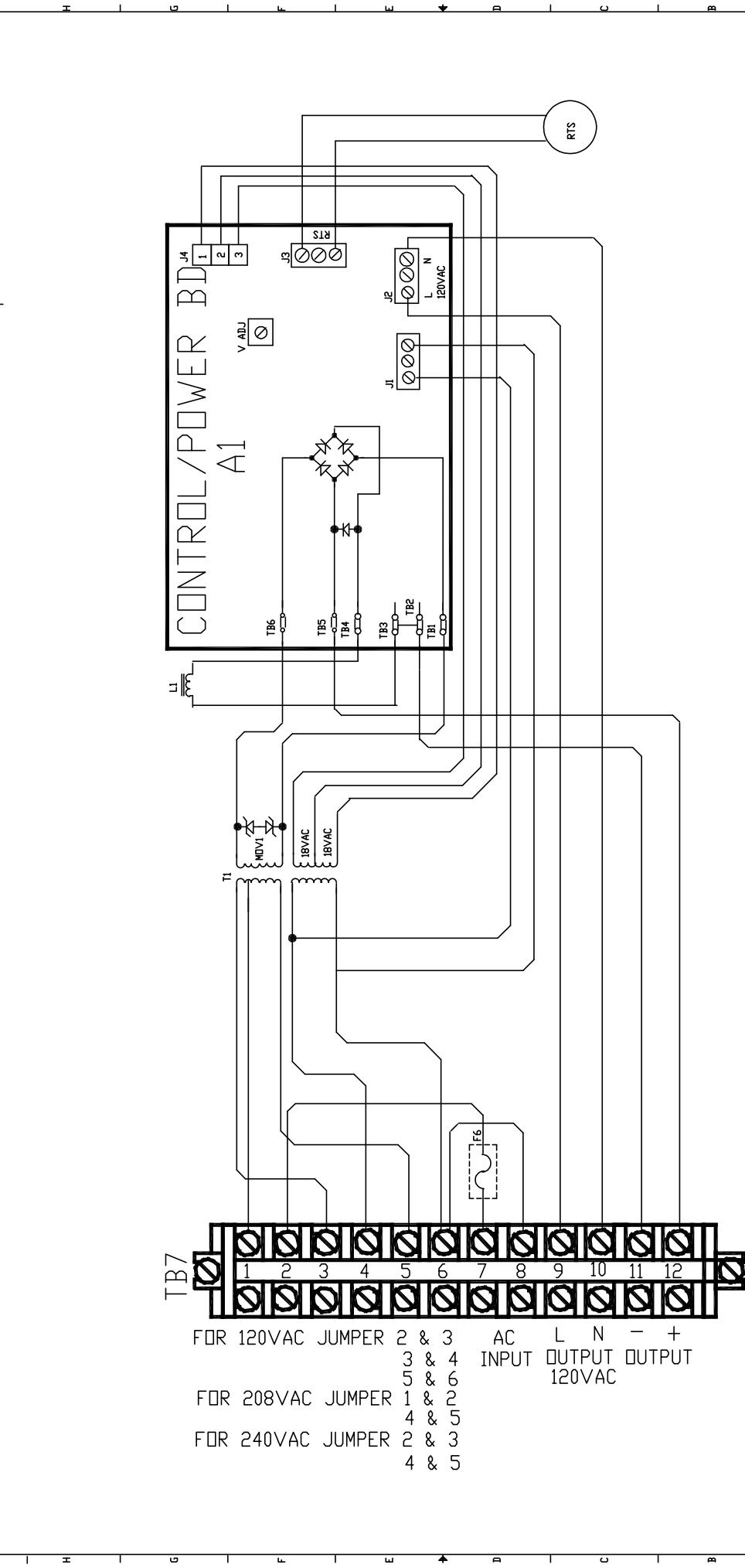
SIZE DNG NO:
B | MEC\990104 | G

SCALE:
1 | SHEET 1 OF 1

MIN. BEND RAD.
BEND RELIEF
AS NEEDED

SIDE 2

revisions	
esc. #	description
101150	A REFLECT IS PIN TERM
101153	B REVISED
101165	C LETTER SIZE CHG
101280	D REMOVE MOV
101339	E BEVERSE * & -
106971	F REMOVE CI



TB7

FOR 120VAC JUMPER 2 & 3 AC L N - +
 3 & 4 INPUT OUTPUT OUTPUT
 5 & 6 120VAC

FOR 208VAC JUMPER 1 & 2
 4 & 5

FOR 240VAC JUMPER 2 & 3
 4 & 5

STURRED ENERGY SYSTEMS Longmont, CO

SFNS Description: TD SERIES GENERIC SCHEMATIC

Checked: PND
 Engineer: PND
 Part of: SCH 00210

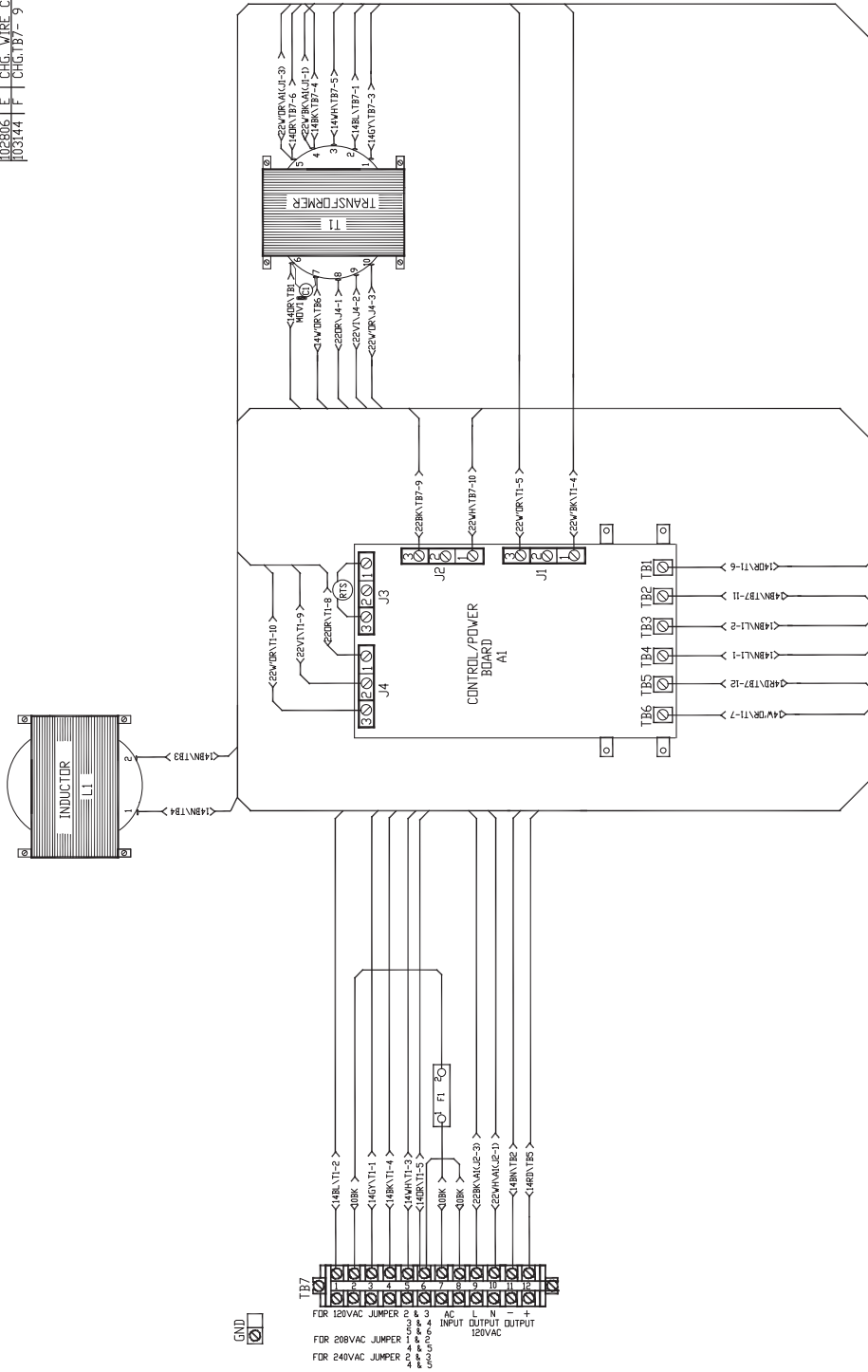
2-27-95 SCALE: N/A

REV: E

Sheet 1 of 1

revisions

draw#	rev	description	date	by
101148	NRC	DESCRIPTION CHG	4-95	RDA
101153	A	CHG TB7 & T1	4-95	PNJ
101171	NRC	CORRECTION	5-95	PNJ
101280	B	UPDATE TO SPEC	8-95	PNJ
101339	C	REVISED	8-95	PNJ
101340	D	CHG WIRE COLOR	8-95	PNJ
101341	E	CHG WIRE COLOR	8-95	PNJ
103144	F	CHG TB7-9 & 10	8-00	AM



STUDIED ENERGY SYSTEMS Longmont, CO
 PROJECT: TDXXX-X-MA10
 DRAWING: WIRING DIAGRAM
 DATE: 4-3-95
 SCALE: NONE
 DRAWN BY: W.D.00424
 CHECKED BY: F
 APPROVED BY: BRACKETT OF L



SENS Limited Warranty Policy

What is covered:

This warranty covers any defect in material and workmanship on battery chargers manufactured by Stored Energy Systems, a Colorado Limited Liability Company (SENS).

What this warranty does not cover:

This warranty does not cover damages, defects or failures of your equipment resulting from shipping damage, accidents, installation errors, unauthorized adjustment or repair, unauthorized third-party service, failure to follow instructions, misuse, fire, flood, acts of persons not in our control, and acts of God.

For how long:

Two years from date of shipment.

What we will do:

If your battery charger is defective within two years of date of shipment, we will repair it or, at our option, replace it at no charge to you.

If we choose to replace your charger, we may replace it with a new or refurbished one of the same or similar design. The repair or replacement will be warranted for the remainder of the original two-year warranty period. If we determine that your charger cannot be repaired or replaced, we will refund its purchase price to you.

What we ask you to do:

First contact SENS service department to obtain warranty service instructions. To obtain warranty service the product must be returned, freight prepaid, to the factory under a Return Merchandise Authorization (RMA) number provided by SENS. If, in SENS' opinion, the problem can be rectified in the field, SENS may elect to ship replacement parts for customer installation instead of having the product returned to the factory.

Limitation:

This warranty is limited to defects in material or workmanship of the product. It does not cover loss of time, inconvenience, property damage or any consequential damages. Repair, replacement or refund of the purchase price of the equipment is your exclusive remedy.