Welding Research Institute
BHEL, Tiruchirappalli - 620 014, India

Report on

PERFORMANCE EVALUATION OF Technocrats Plasma

Inverter MIG Welder

MODEL:ICP-400, TYPE: INVERTER

Report No: WRI/SM/PST/0803
Date: 5-06-2008

1	Issued to	M/S Technocrats Plasma systems Pvt Ltd. Mumbai
2	Customer Reference No.	TCPL/PVV/08-09/122 dt May 08, 2008
3	WRI Work Order No.	: 7-376-115-08012
4	Study Conducted at	: Power source Test Center, WRI
5	Period of Study	: 02-06-2008 to 5-06-2008

Tested by:

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Deputy Manager
Welding Research Institute
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Tiruchirappalli-620 014.

Authorized Signatory

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Bharat Heavy Electricals Limited

(A Government of India undertaking)

WELDING RESEARCH INSTITUTE, Tiruchirappalli - 620014

American Welding Society
Educational Institution Member

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Ref : WRI / SM / PST

Date: 05th June, 2008

TO

M/S Technocrats Plasma Systems Pvt ltd.,
310, Tapo commercial center,
Ram Mandhir road, Goregaon (West)
Mumbai-400 104.

Please find enclosed copy of the "Detailed test report" on the performance evaluation of your Inverter Power source for MIG, Model ICP-400. The dynamic characteristics rating of the power source tested are given below

Dynamic Characteristics	For MIG/CO2
Arc Stability Index	97, 97, 98, 98, 98, 98
Arc Ignition Index	1, 2, 1, 2, 1, 2
Arc Spatter Index	0, 0, 0, 0, 0, 0

The performance of the Power source is satisfactory.

(Dr.S.Manoharan)
SDGM/WRI

WELDING RESEARCH INSTITUTE
B.H.E.L., TRICHY – 620 014

TEST REPORT FOR TECHNOCRATS MIG POWER SOURCE

EQUIPMENT : IGBT Inverterised Power Source for MIG/MAG(CO_2)

MODEL : Model: ICP-400

SUPPLIER : M/s Technocrats Plasma Systems Pvt Ltd, Mumbai

TESTED AT : WELDING RESEARCH INSTITUTE

EQUIPMENT SPECIFICATION :

INPUT :

Supply Voltage	:	3ph, 415 V +/-15% 50 Hz, 3ph AC
Rated KVA	:	9.7 kVA at 200Amps

OUTPUT:

Max. OCV	:	DC-54 Volts an input of 415 Volts
Rated output voltage	:	45V DC
Output current Range	:	60A – 400Amps adjustable
Output voltage Range	:	14 - 45 volts
Duty cycle	:	60%
Power control method	:	IGBT Inverter type
Weight (approx.)	:	55 kg
Dimension	:	400x700x450mm
Applicable wire size	:	0.8mm to 1.2mm
Set serial No	:	0804115673
Made at	:	M/S Technocrats Plasma Systems Pvt Ltd Mumbai-400104

1. 0 STATIC CHARACTERISTICS

The data for static characteristics are shown below:

OCV: Minimum 14 Volts
Maximum 45 Votls

The voltage once selected, the selected voltage remains constant during welding. The equipment is a voltage feedback controlled equipment.

2.0 DYNAMIC CHARACTERISTICS TESTS :

In this test while welding is being done, the welding voltage and welding current behaviour are recorded using a microcontroller based data acquisition system. Later we transfer the data to a personal computer and process the data and evaluate some of the aspects of welding such as arc stability, arc ignition, and spatter level. The recorded dynamic characteristics are shown in the annexure. The index values are given below:

Welding Condition	File No	Arc Stability Index	Arc Ignition Index	Arc Spatter Index
Solid Wire 1.0mm Co2 Shielding	TC400-03	93	0	1.3
	TC400-04	93	0	1.3
	TC400-07	92	1	1.34
	TC400-08	91	1	1.34
	TC400-09	97	1	0
	TC400-10	97	1	0
Flux cored wire, CO2 shielding	TC400-12	96	1	1.39
	TC400-15	96	2	1.33
	TC400-16	98	1	0
	TC400-17	98	1	0
Flux cored wire Mixed Gas	TC400-21	97	1	1.3
	TC400-22	96	1	1.3
	TC400-23	98	1	0
	TC400-24	98	2	0

ARC STABILITY

The deviation of the current pulse values from the average current value can be calculated as a percentage variation of the current pulses. This percentage can be used as a factor for evaluation of the arc stability for a given power source. If the arc stability index is found above 70 percent, the stability and weld bead formation are satisfactory.

From the index values it is seen that the Technocrat Plasma Inverter MIG power source is having very high arc stability of the order of 91 to 98 for different current ranges. The testing had been done for the following conditions at different conditions:

1. Solid wire with CO_2 Shielding
2. Flux cored wire with CO_2 Shielding
3. Flux cored wire with Mixed gas shielding

At all conditions, the performance is found to be satisfactory.

ARC IGNITION

By recording the moment of arc ignition, the time required for the arc to reach stability is calculated and number of current pulses during the ignition time is counted. It was found that when the ignition time is less than 15 millisecs and the number of pulses is less than 5, the arc ignition characteristics are satisfactory. The ignition of the arc by the inverter Mig welding power source is very good. It is found that the arc is getting ignited within 15 milliseconds and within 1 or 2 current pulses the current reaches the stable value. The ignition index value of 1 or 2 for all currents indicates that the power source has got a very good arc ignition and re-ignition capabilities.

SPATTER LEVEL

The difference between the average current and the average current pulse gives the factor, which is proportional to the spatter level at given current level. If the difference is large, it means that the current pulses are narrow and there will be excess spatter. If the ratio of average current pulse to average current is more than 2, then it means the spatter level is high. For this equipment the spatter index of 0 at high currents indicates that there is absolutely no spatter at high currents. At low or medium currents, the spatter index is at around 1.3 to 1.39 means that the instantaneous variations in the arc currents are less than 30 to 40 percent. Hence the spatter is fairly low.

3.0 LOAD TEST

In this test a resistive load is connected at the terminals of the power source and the capacity of the equipment to deliver the set current continuously for the required time without any failure is checked. The results are satisfactory.

4.0 MAINS VOLTAGE STABILIZATION

In this test power supply is given to the welding power source through a voltage stabilizer whose output voltage can be varied through a given range. It is found that for a variation of 3 phase, input supply from 375 to 425 volts, only the open circuit voltage varies marginally, but there was no variation of output current. This indicates that the inverter welder is having very good mains voltage stabilization built in it.

5.0 EFFICIENCY

In this test the welding is done at different current settings and the output voltage, current, input voltage and input current are measured. From this data the no load losses and the efficiency of the power source can be estimated. The no load losses are calculated as below:

No load losses = 1.732 * 407 * 0.2 = **0.14 KW**

It is found that the inverter based arc welding power source is having only **140 watts** as the no load losses.

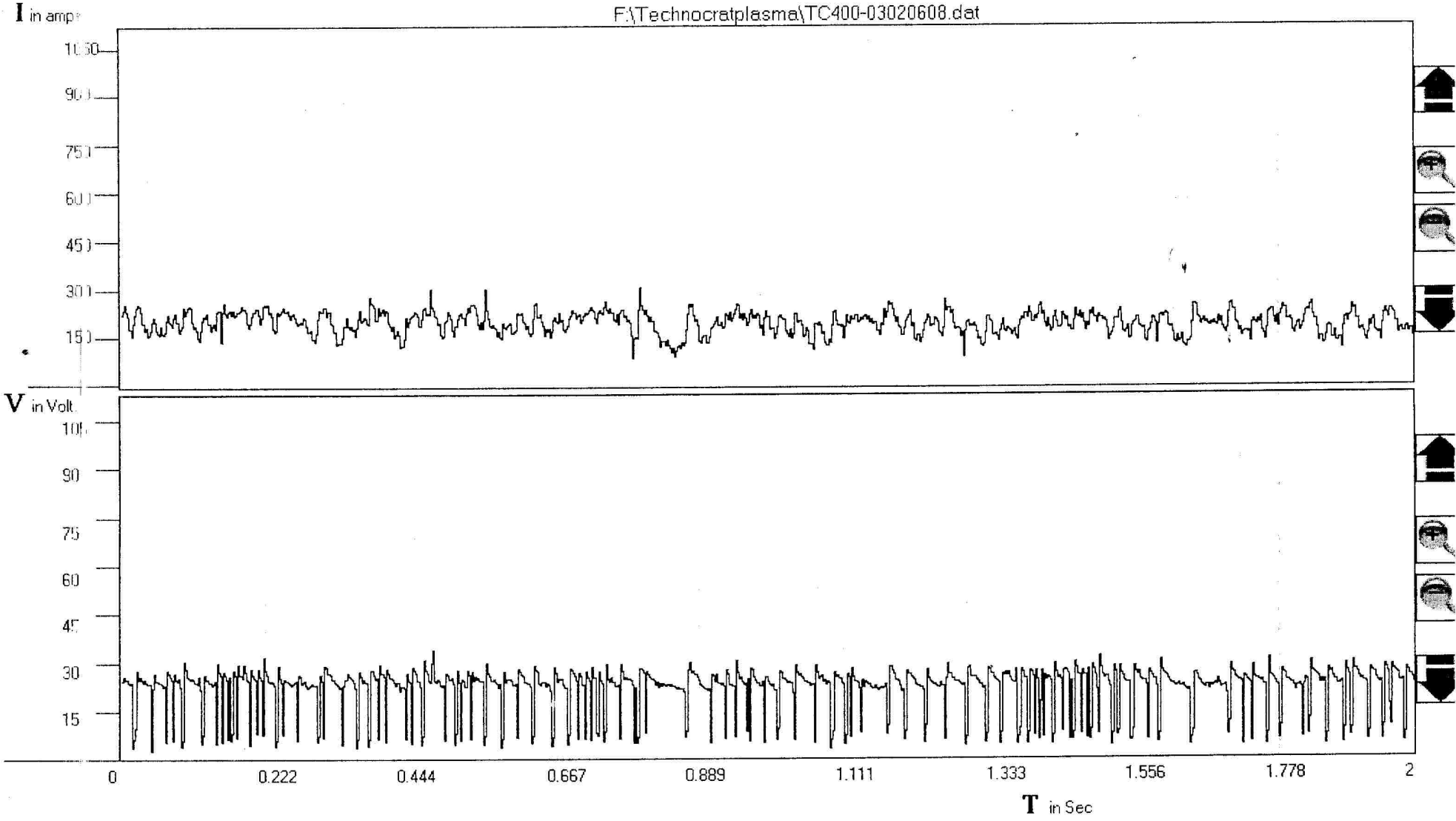
Energy consumption at 200 A welding current

While welding at 200Amps : 1.732 * 407 * 13.8 = **9.7 KW**

Dr.S.Manoharan
SDGM, WRI, BHEL

Bharat Heavy Electricals Ltd

Stability Index : 93 Very Good Arc ignition Index : 0 Arc spatter Index : 1.3 Excellent



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Stability Index : 93 Very Good Arc ignition Index : 2 Arc spatter Index : 1.33 Very Good

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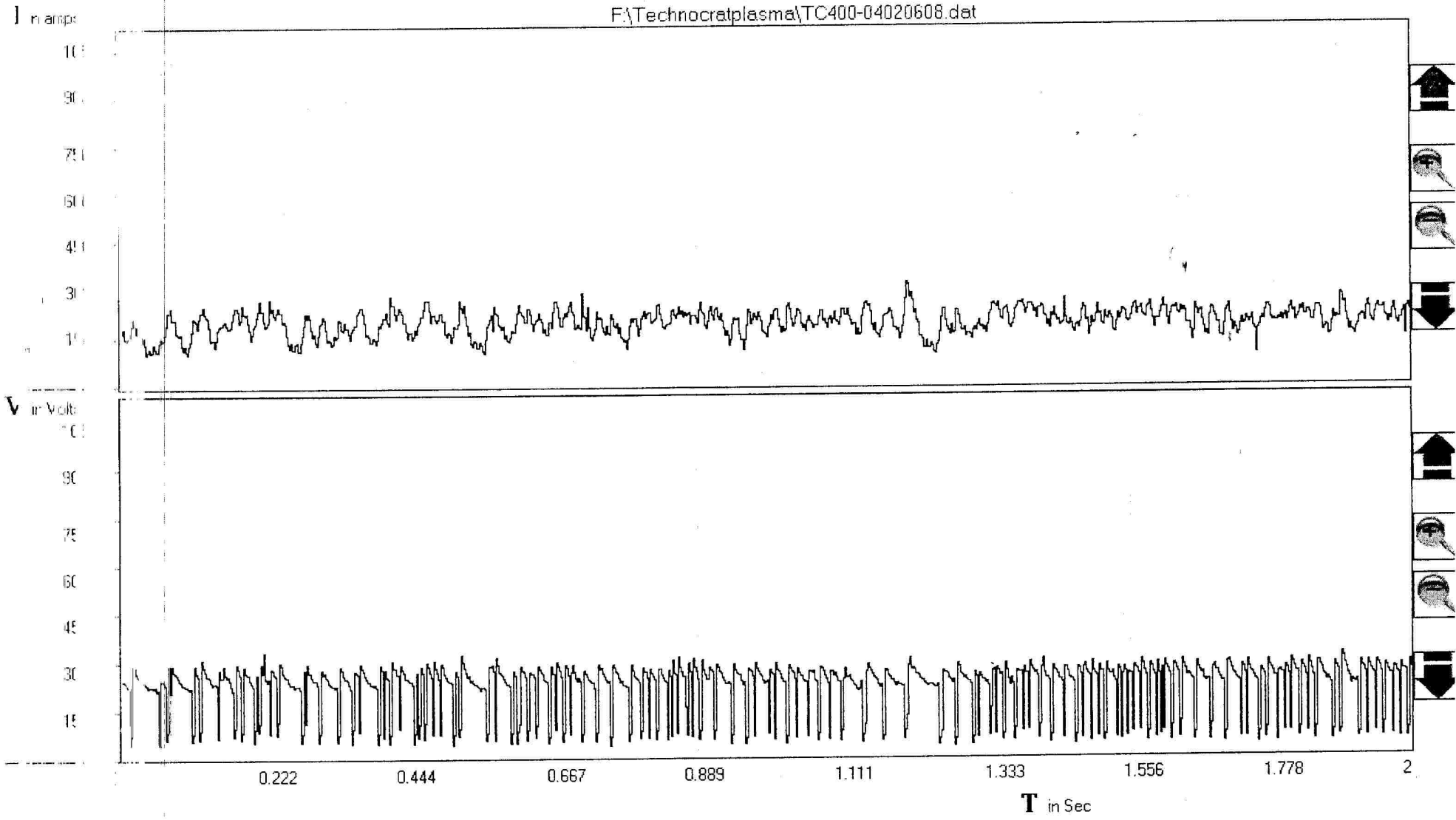

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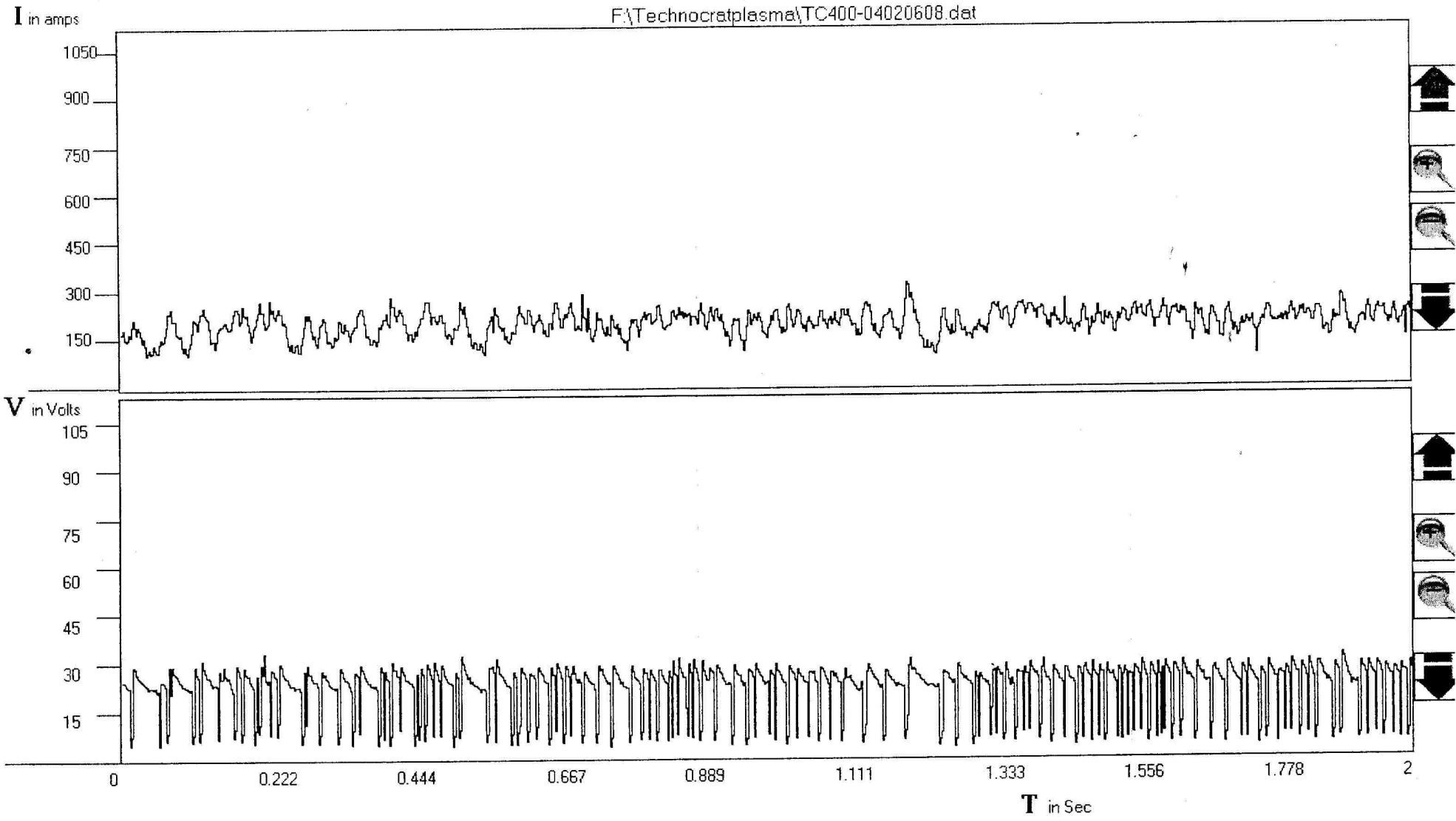
Stability Index : 93 Very Good Arc ignition Index : 2 Arc spatter Index : 1.33 Very Good



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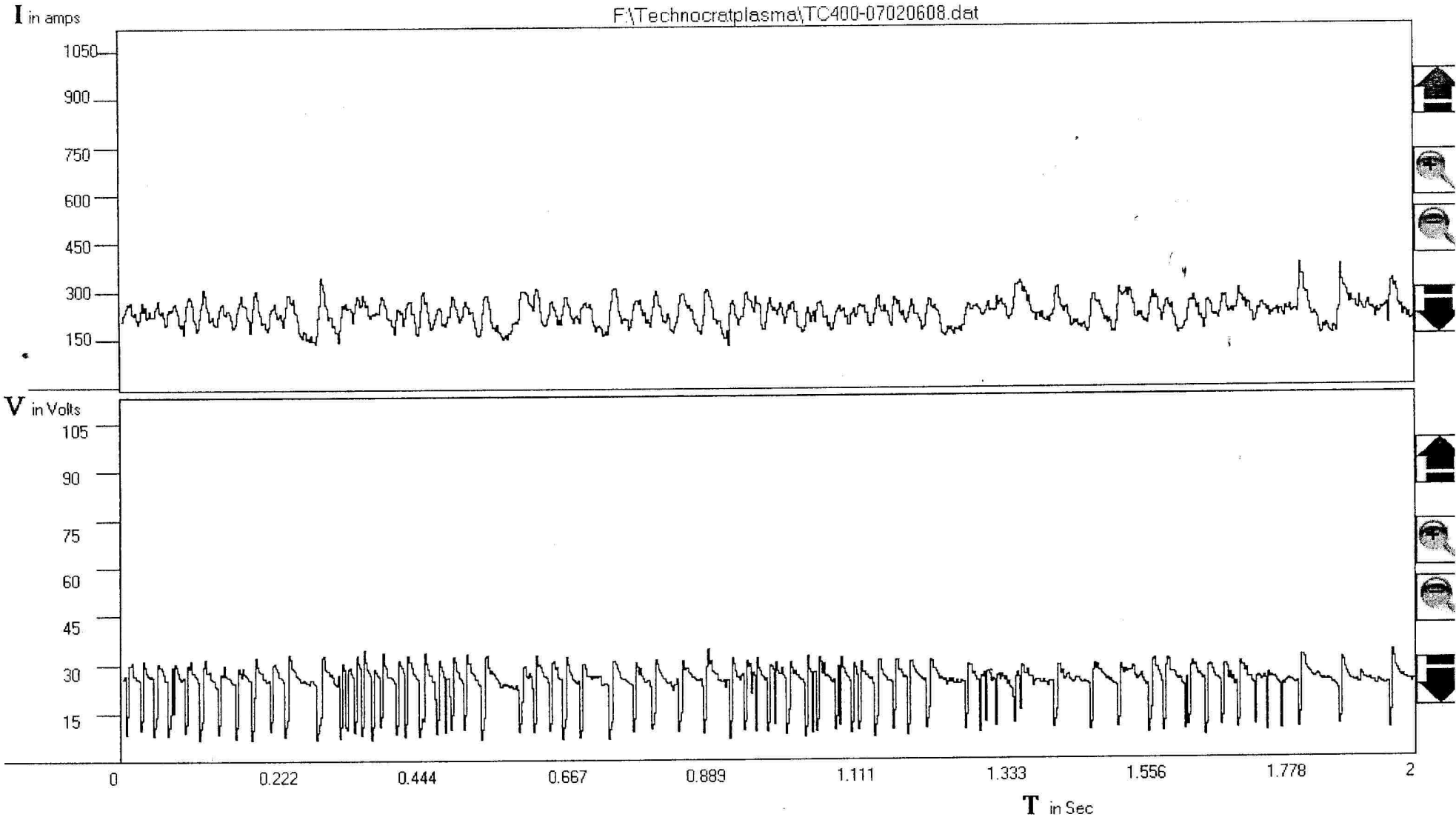
Stability Index : 92 Very Good Arc ignition Index : 1 Arc spatter Index : 1.34 Very Good



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Stability Index : 98 Very Good Arc ignition Index : 1 Arc spatter Index : 0 Excellent

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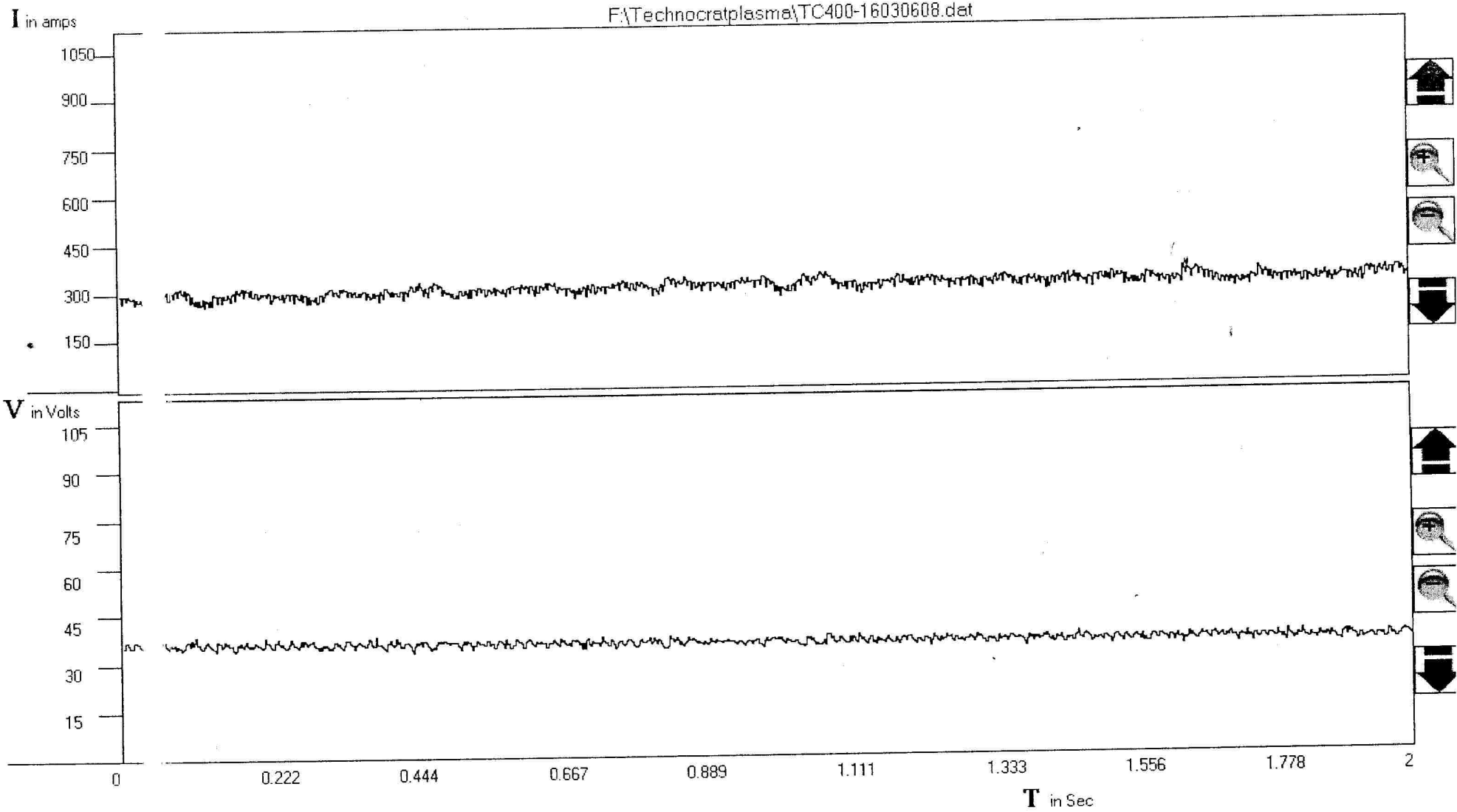

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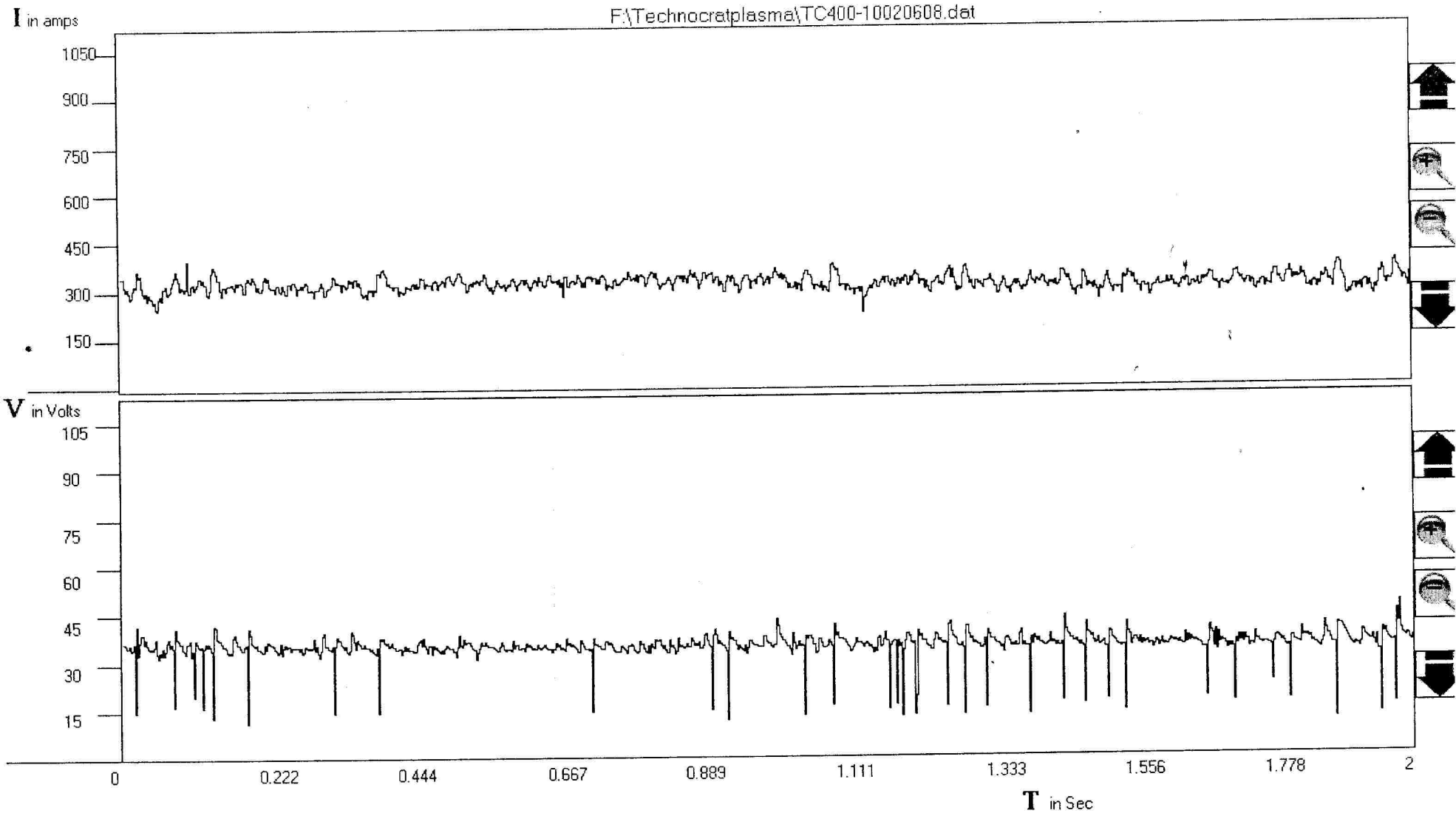
Bharat Heavy Electricals Ltd

Stability Index : 97 Very Good Arc ignition Index : 2 Arc spatter Index : 0 Excellent



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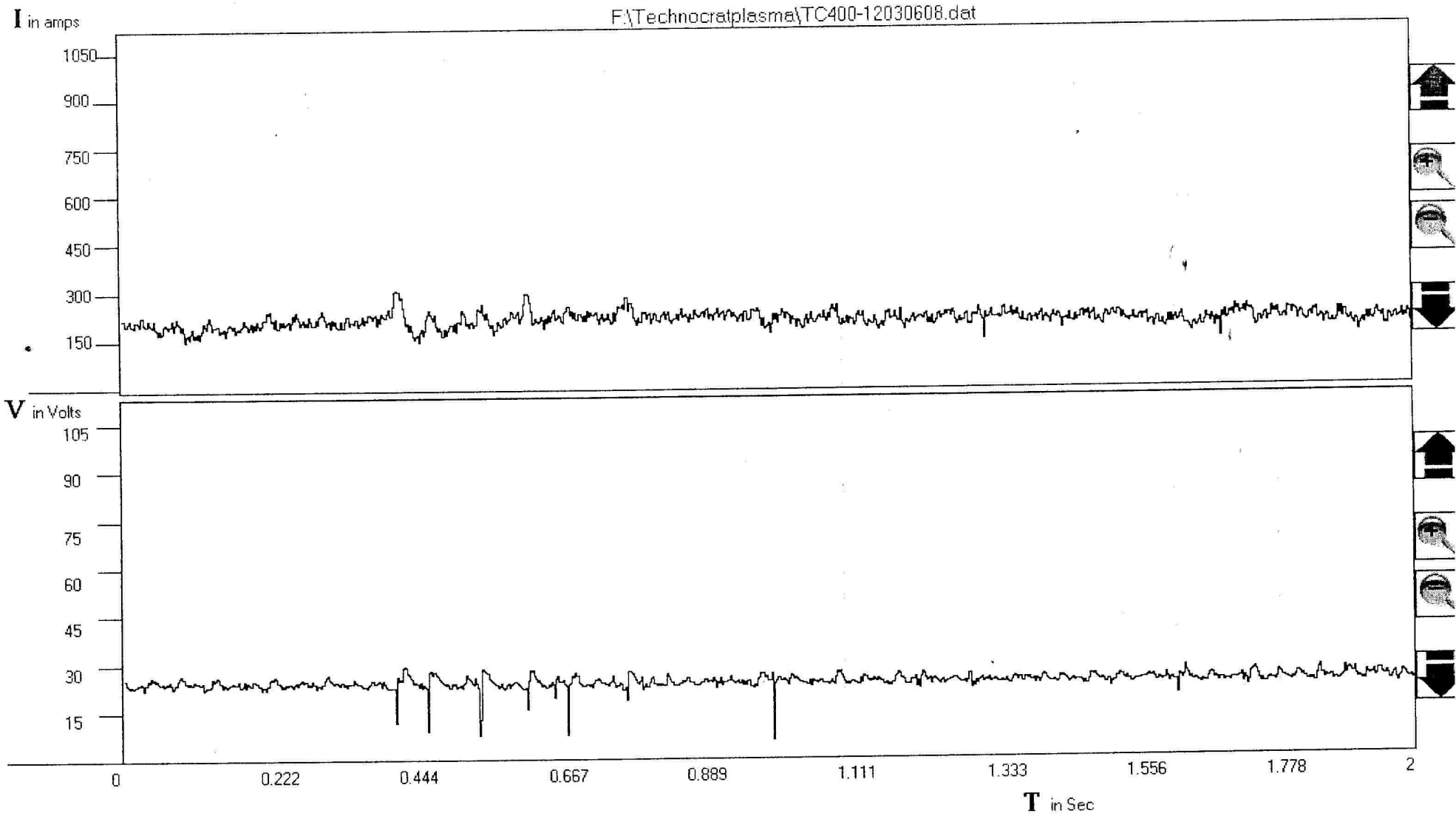
Stability Index : 96 Very Good Arc ignition Index : 1 Arc spatter Index : 1.39 Very Good



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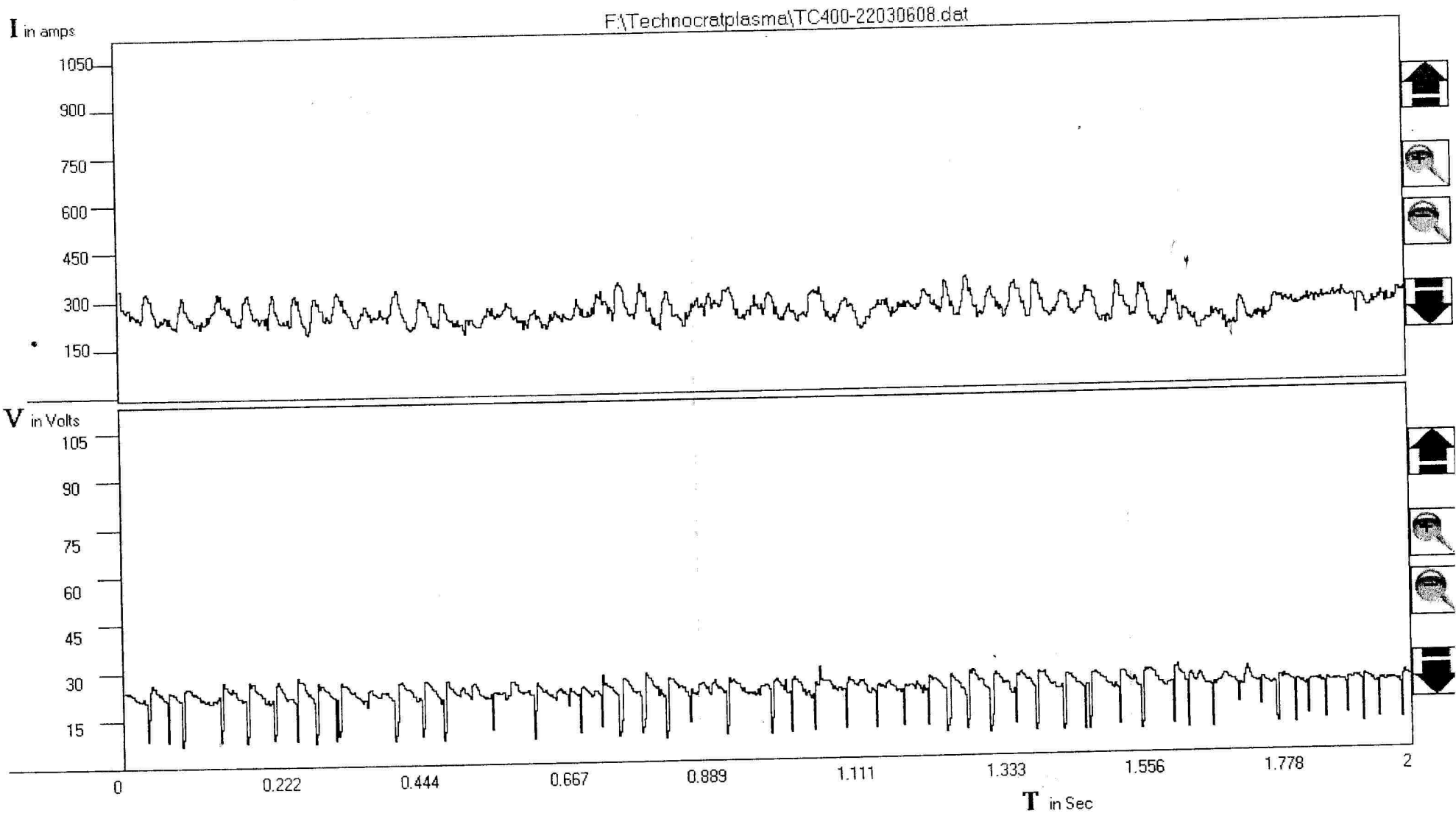
Bharat Heavy Electricals Ltd

Stability Index : 96 Very Good Arc ignition Index : 1 Arc spatter Index : 1.3 Excellent



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Bharat Heavy Electricals Ltd

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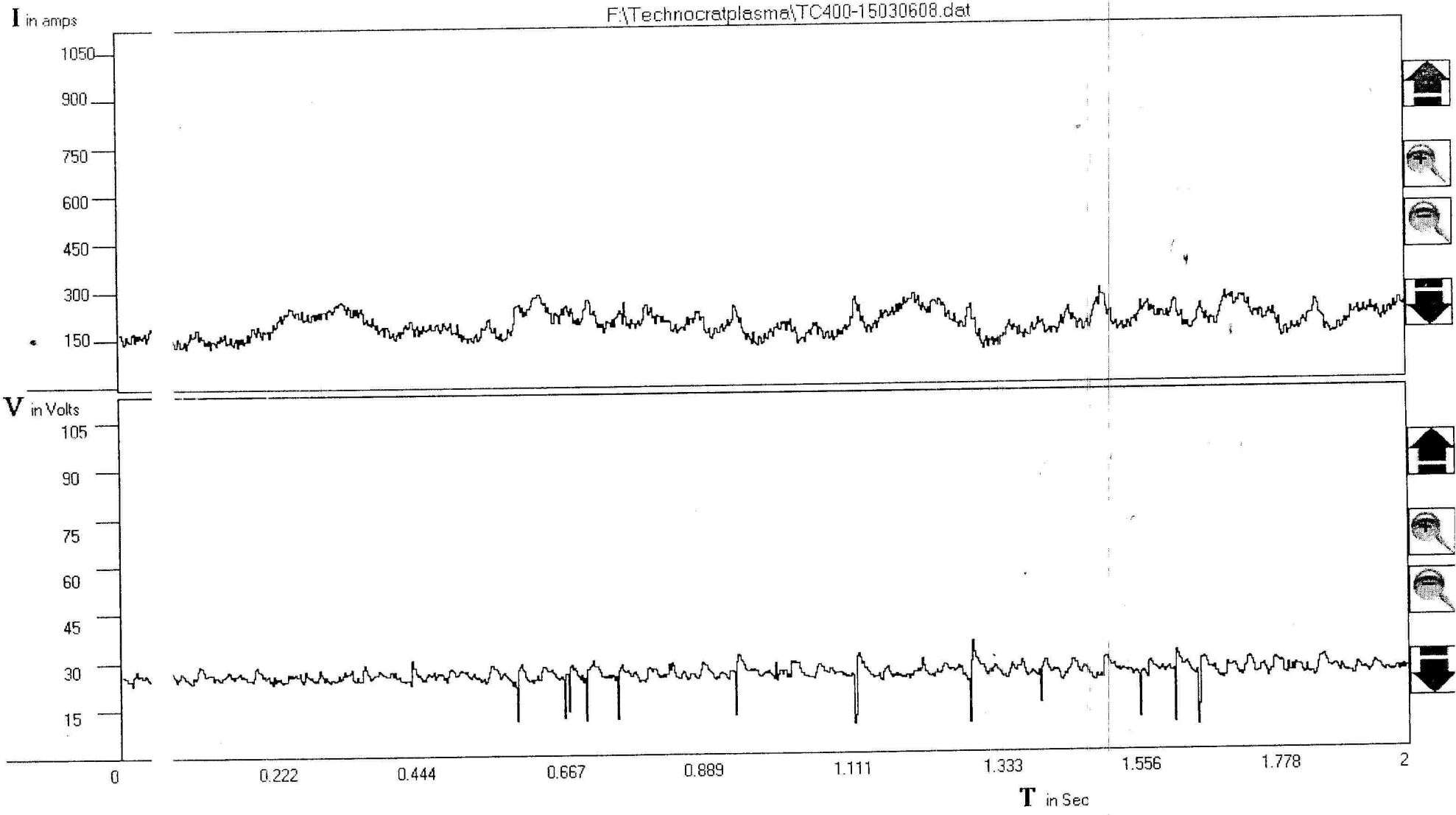

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Bharat Heavy Electricals Ltd

Stability Index : 98 Very Good Arc ignition Index : 1 Arc spatter Index : 0 Excellent

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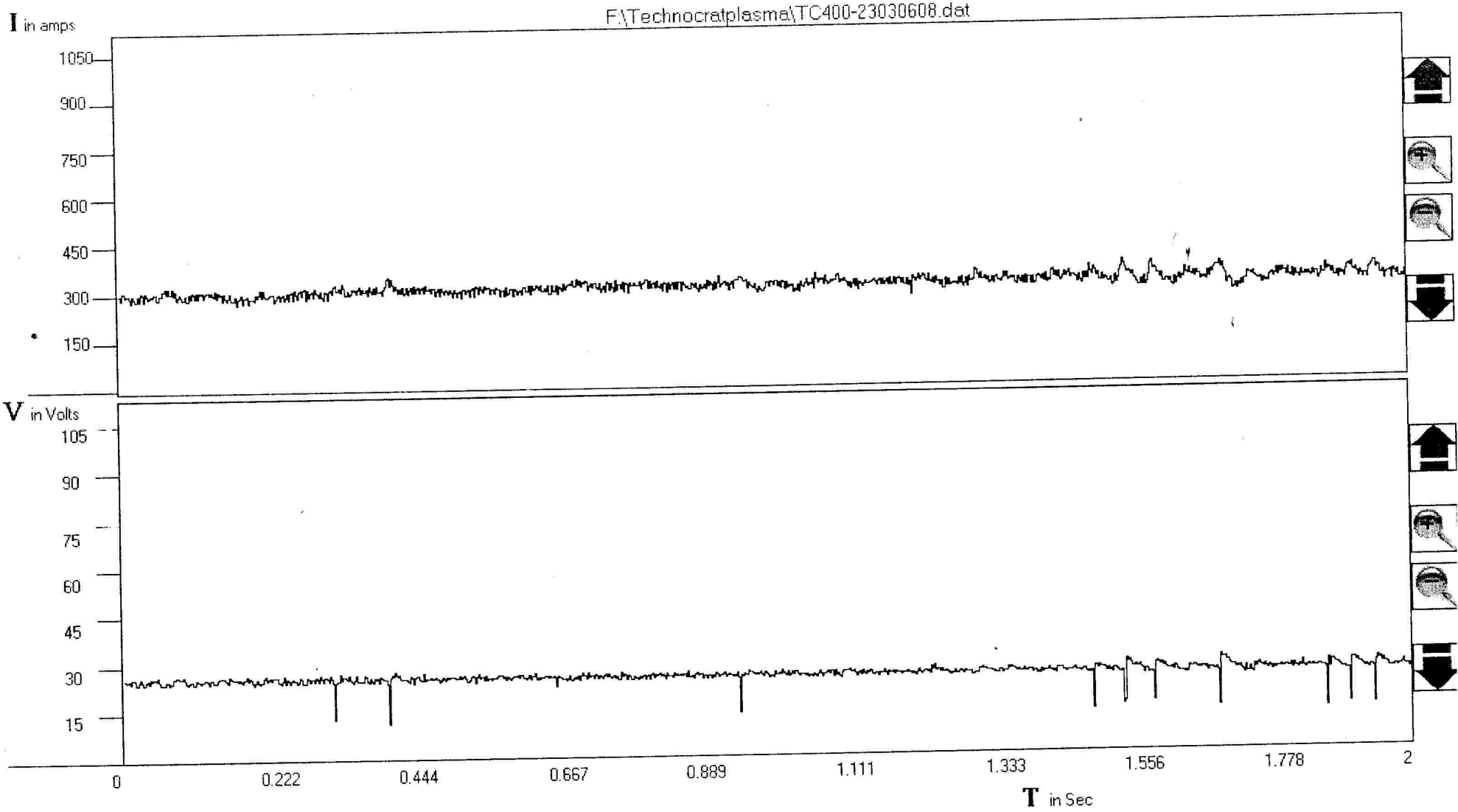

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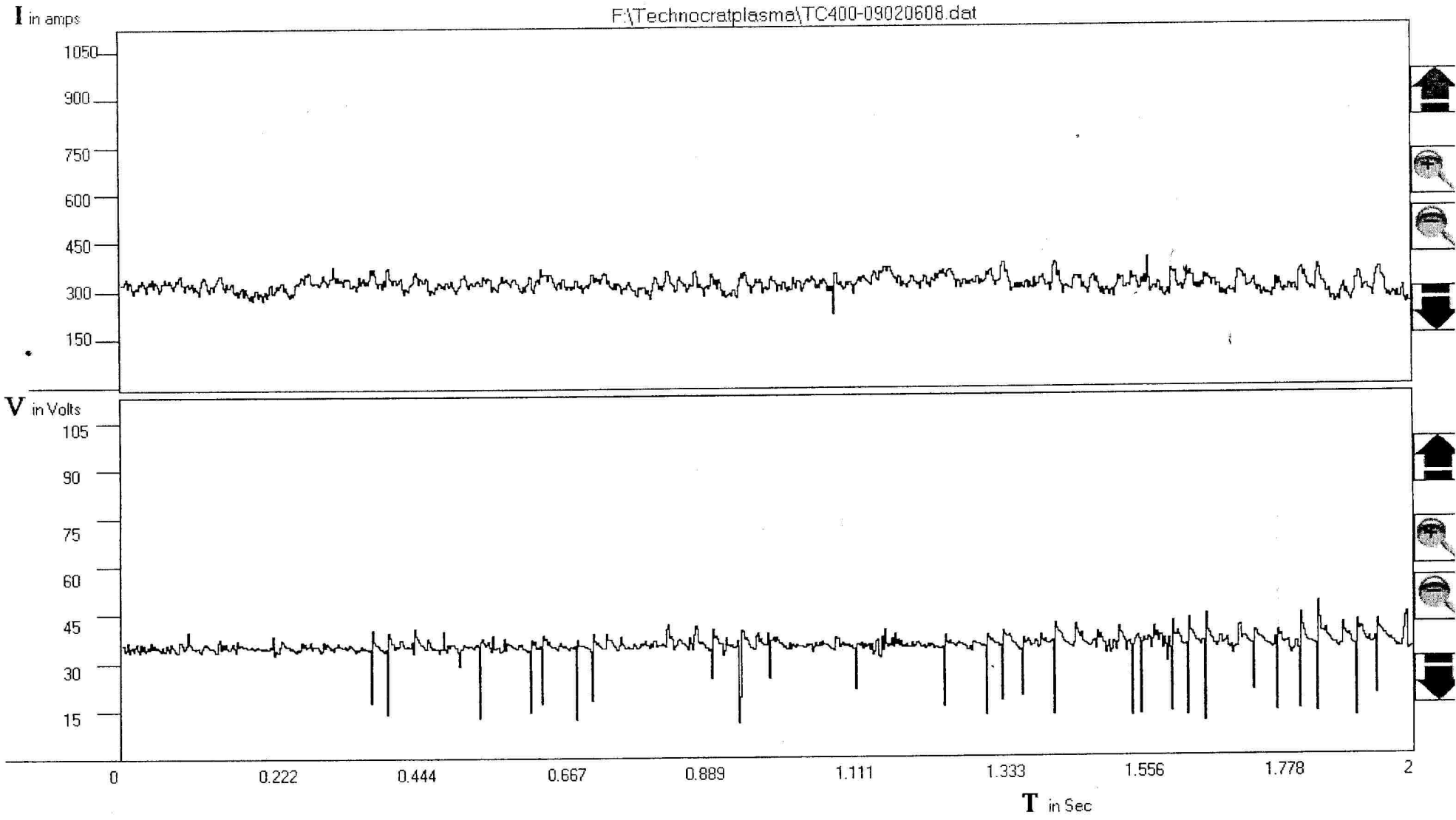
Bharat Heavy Electricals Ltd

Stability Index : 97 Very Good Arc ignition Index : 1 Arc spatter Index : 0 Excellent



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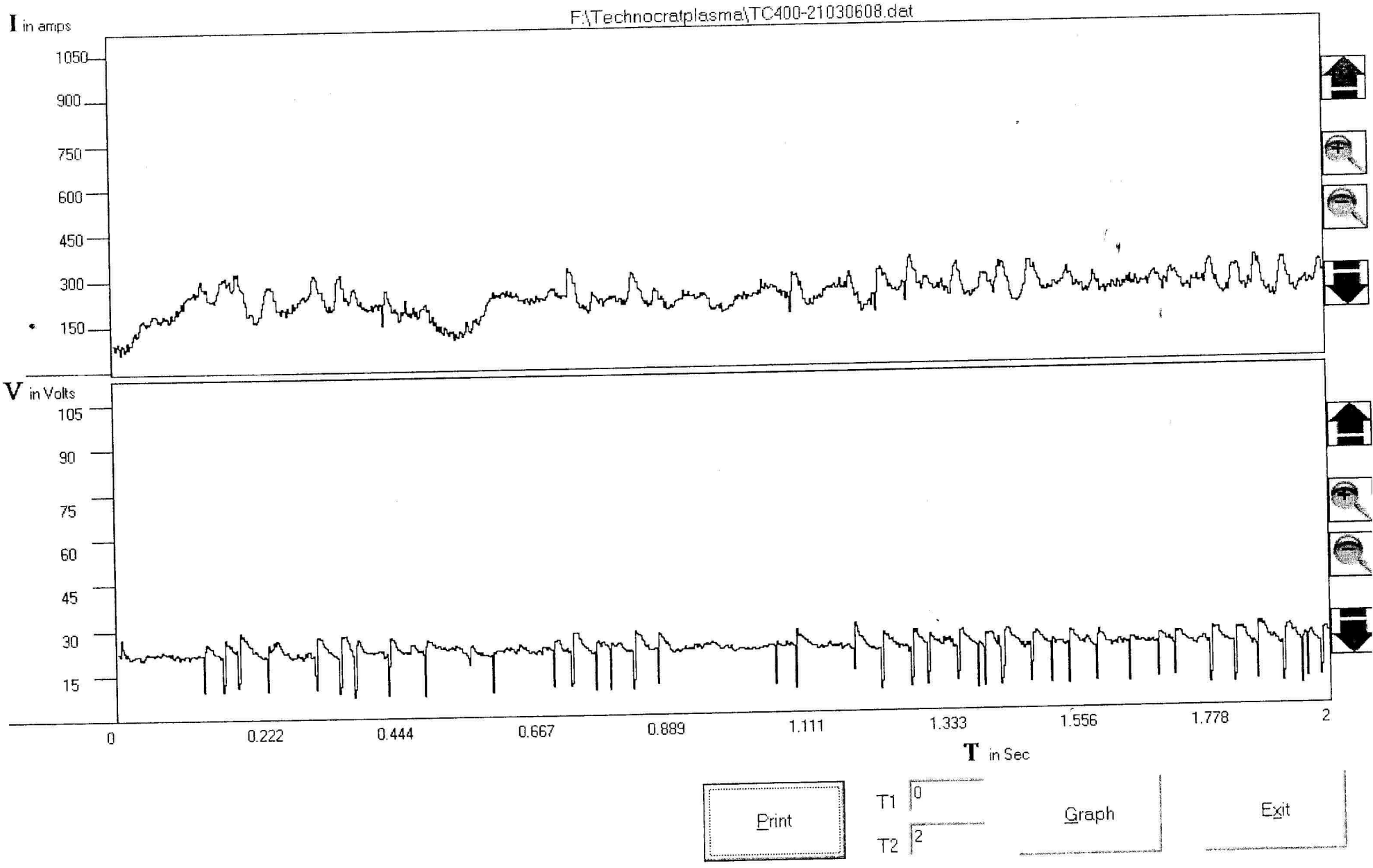
Bharat Heavy Electricals Ltd

Stability Index : 97 Very Good Arc ignition Index : 1 Arc spatter Index : 1.36 Very Good



Bharat Heavy Electricals Ltd

Stability Index : 98 Very Good Arc ignition Index : 2 Arc spatter Index : 0 Excellent

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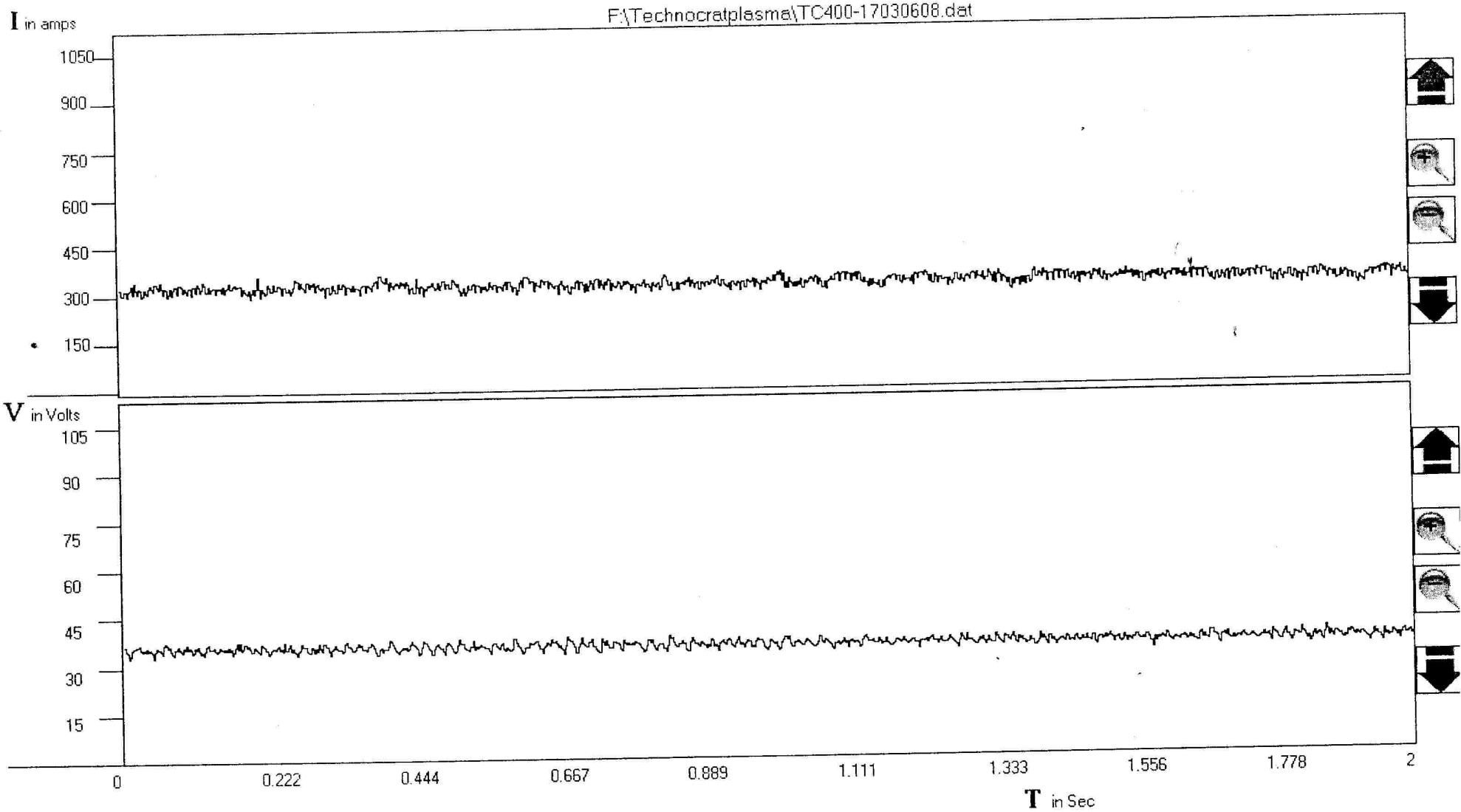

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