PVM500/DIDRIVE10 Hydrogen and Chemical Production Corona Cell Plasma and Dielectric Driver Instructions REV915

Intended for capacitive loads up to>1ufd and single ended plasma gas displays up to 200pfd

For 115vac operation only (for 220 volt operation, use our 500+ watt step down transformer as shown below in optional parts section. You may purchase on your own a 220/110v, 300 to 500 watt unit.

CAUTION: *RUNNING PLASMA DISPLAYS AND SMALL OBJECTS CAN EASILY BE DAMAGED BY THE ABRUPT RESONANT POWER RISE OF THIS SYSTEM. ALWAYS START WITH VA1 SET AT ABOUT 5 TO 10% AND INCREASE SLOWLY. USE OWN JUDGEMENT ON DAMAGE POINT OF OBJECT USED FOR LOAD.*

This useful high frequency driver allows the user to tune to a capacitive load within the range of 5 pfd to >1ufd. ***See below data on optional coils for higher values of capacitive loads up to >1 µfd for other functions.**

Rdc....Duty-cycle/power control. *See duty cycle explanation*

NEON1...Power on indicator

AMP....Meter 0-3 amps for power input monitoring

FUSE....4 amp slo-blow

Please take note that the maximum voltage across a capacitive load is a function of the circuit Q and can peak to levels that can destroy the load under test, output transformer and associated circuitry. ***Therefore the unit in not totally "user friendly" and is intended for use by those experienced in powering up these resonant capacitive loads. Caution as the output transformer can be easily damaged if allowed to spark over encapsulation.***

Controls

VA1..... Independent voltage level control

S1/RFreq..... Main power switch and frequency control

S2....HI/LO input voltage switch enables voltage doubler

Always start with this switch in the "LO" position and keep in that position when using from 220 vac

J2…Remote control port. Accepts TTL level

J1…Frequency monitoring port BNC NOT SHOWN..

Operation

1. Connect HV output lead to load. Note output is referenced to chassis ground that is earth ground via the green lead of the power cord.
2. Verify that the **HI/LO** switch is in the down position, **VA1** is FCCW, S1 is FCCW and **Rdc** is fully FCCW/OFF.
3. Plug into a 115 vac source and rotate **VA1 QUARTER** range. Apply power via rotating **S1/RFreq** control until it clicks on noting that the **NEON1** indicator lamp comes on**. Note: Units made before Jan 2013**. **NEON1** lamp only comes on when VA1 is set for above 60 vac
4. Slowly adjust **S1/RFreq** until the display or meter starts to activate. IMPORTANT! This adjustment tunes the load capacitance to the units intrinsic leakage inductance of the output transformer and should be cautiously set to a peak reading. It preferably should be set on the CCW side of the peak meter reading. Note that the S1/RFreq control increases frequency in the CCW direction. Now slowly rotate VA1 CW noting desired effect. Note reading on the **AMP** meter for reference.
5. Repeat step 4 if necessary for required effect.
6. You may switch the **HI/LO** to HI for more power if output is below .5 amps in the LO position. Do not allow to exceed 3 amps and check transformer and circuit for heating and any excessive corona around transformer or leads.
7. Now set **Rdc** to the desired current reading or display texture. Some loads may cause premature shutdown in using **Rdc**

Special Notes

Always check the output transformer for excessive heating, corona or arcing preferably in the dark. Do not allow to operate in this state as the transformer will burn out. It may take 30 minutes for transformer to overheat. ***However if you burn out the transformer it is easily replaced and readily available***

Even though the output lead is rated for 40 kV, it must be clear of all conductive objects to prevent high frequency/voltage breakdown.

Certain loads may have different Q factors that will effect operation. Q factors is determined by the ratio of circuit reactance to resistance of the load. Reactance being the inductive and capacitive values at resonance. The resistance part is determined by your load resistance, component losses and the amount of useful corona or plasma ionization or whatever it is you need. *It might be wise to refresh your "j" operator or polar notation math skills*

Always attempt to operate **RF freq just slightly** below the current peak as indicated on the **AMP** meter. This is especially important when operating above 2 amps to avoid overheating the switching transistors.

CAUTION: Contact with the bare metal controls and other objects may cause annoying burns. This is especially noticeable when powering single ended plasma displays that are within several meters of the user. Insulated tubing may be placed on the control shafts to help avoid these annoying shocks and burns.

TRANSFORMER RESONANT SPECIFICATIONS FOR THOSE WHO WISH TO USE FOR HIGHER LOAD CAPACITY UP TO >1µFD

Transformers use our own standard tooled UU69 ferrite core with the following specs: CORE is 69 x 39 x 23 mm, u=2000 Ae=2.3 cm sq Le=22.9

Approximate Values for Load Capacity 2500 Turn Included Bobbin ***Note primary air gap remains at 2 mils***

2500 turns 0 gap =16.5 H (6.2M)@60kHz ……. .04 pfd Self resonant/60kHz
2500 turns 4 mil gap =8.5 H(3.2M)@60kHz..…….... .31pfd/60kHz
2500 turns 8 mil gap =5.7 H(2.1M)@60kHz ……. .46 pfd/60kH
2500 turns 20 mil gap =2.9H(1M)@60kHz ……. .91 pfd/60kHz

2500 turns 0 gap =16.5 H (2.07M)@20kHz ……3.8 pfd 20kHz
2500 turns 4 mil gap =8.5 H(1.06m)@20kHz…… 7.5 pfd/20kHz
2500 turns 8 mil gap =5.7 H(.72M)@20kHz …… 11 pfd/20kHz
2500 turns 20 mil gap =2.9H(.36M)@20kHz …… 22 pfd/20kHz

Approximate Values for Load Capacity 1000 Turn Optional Bobbin

1000 turns 0 gap =2.6 H(+j.98M)@60kHz ……. 2.7 pfd/60kHz
1000 turns 4 mil gap = 1.36 H(+j.51M)@60kHz ……...5 pfd/60kHz
1000 turns 8 mil gap =.9 H(+j.34M)@60kHz)……..7.8 pfd/60kHz
1000 turns 20 mil gap =.46 H(+j.17M)@60kHz ……15 pfd/60kHz

1000 turns 0 gap =2.6 H(+j.33M)@20kHz ……..24 pfd/20kHz
1000 turns 4 mil gap = 1.36 H(+j.17M)@20kHz……46 pfd/20kHz
1000 turns 8 mil gap =.9 H(+j.11M)@20kHz……70 pfd/20kHz
1000 turns 20 mil gap =.46 H(.j05M)@20kHz……138 pfd/20kHz

The above possible combination of the 1000 turn coil combined with the adjustable frequency of from 20 to 64 kHz allow resonating any capacitive cell from 2.7 to 138 pfd and provides plenty overlap by just changing the airgap in the secondary of the transformer.

TRANSFORMERS with the 1000 potted turns or 2500 potted turns secondary coil will have 2 mils air gap per side. You may take apart and change the gap on the secondary side ***ONLY*** to bring larger load capacities within tuning range. Leads must be as short as possible for low capacitive loads <2.5 pfd

We have roughly calculated transformer secondary turns at the frequencies of 20 to 65 kHz for those who need to go 1nf, 10nf 100nf and >1ufd. These are the following optionally available coils covering all ranges. The 2500 potted coil is supplied with all units. Hand wound coils are easily pruned by removing or adding turns.

FLYPVM500/2500

Similar looking to the FLYPVM400 but intended for resonant operation. 30kV pk at 20ma, 15kHz-60kHz operating frequency, with 3" size large ferrite core and flexible silicon output lead. 2500 turns #35 on secondary with silicon output lead. Primary is included.. UU69 large core is air gapped and can easily be adjusted to change the resonant frequency and is noted on the PVM500 instructions. Output voltage will vary as to the external load complexity being the load capacity and resistance. For end point grounded circuits. (We can manufacture these, and variations, in large volume for the trade -- contact us for details.) Here is an example of a PVM500 schematic.

FLYPVM500/2500 Replacement of ***complete original*** transformer should you burn it out.. Ready to install as a replacement **……$69.50**

COIL2500L 2500 turn secondary coil only for replacement. Fits above transformer and is less costly…. Coil Bobbin only … **$39.50**

FLYPVM500/1000 Optional transformer 1000 turns for capacitive loads of < 150 pfd. Ready to install in PVM500 Plasma generator**……..$69.50**

COIL1000L 1000 turn secondary coil only for replacement. Fits above transformer and is less costly…. Coil Bobbin only **... $39.50**

#COIL560 turns non potted *hand wound* coil tunes 100 to 1000 pfd between 20 to 65 Khz…**……..……$49.50**

#COIL200 turns non potted *hand wound* coil tunes .001 to .01 ufd between 20 to 65 Khz……..……$39.50

#COIL50 turns non potted *hand wound* coil tunes .01 to .1 ufd between 20 to 65 Khz……$34.50

#COIL15 turns non potted *hand wound* coil tunes .1 to >1 ufd between 20 to 65 Khz……$29.50

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