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Introduction

The PELCO easiGlow™ laboratory glow discharge system has a combination of features not found with any other glow discharge system. These include:

Microprocessor Control	All functions regulated through a programmable controller
Touch screen Interface	3" touch screen with 5 function buttons for all control selection, settings and displays
Automated Proportional Gas Valves	Allows for precise PID vacuum control and stepped soft vent to prevent turbulence which could damage samples
Dual Process/Vent Gas Inlets	Two 6mm barbed gas inlets for dual process/vent gases.
Integrated Vacuum Pump Power Outlet	Allows control of the pump power from the main power switch
Dual Discharge Polarity	Can change discharge polarity in the program
Hold after Pump	Allows up to 4 hr hold after pump before discharge process
1000V 30mA power supply	For up to 30W of power
Operator controlled Discharge Time and pressure.	Controlled through the touch screen
Pirani Gauge	Allows Vacuum readings from atmosphere to .01 mBar
Adjustable process platform	Designed to hold one 25 X 75mm glass slide allowing variable cathode spacing 0-25mm.
Glass Process Chamber	120 Dia x 110mm H (4-1/4" x 4") with insulated top plate.
Small laboratory footprint	305 W x 292 D x 230mm H (12" x 11-1/2" x 9") plus pump
Dual vacuum/ High Voltage Interlocks	Prevents high voltage application without chamber vacuum to insure safe operation.

The above listed features make the PELCO easiGlow™ the most versatile glow discharge system available for laboratory use. It is the state-of-the-art in precision vacuum control and monitoring for glow discharge-assisted processing samples to achieve desired surface properties

Specifications

Delivered Glow Discharge Power to Glow Discharge System Chamber:

0 to 30 Watts in 1 Watt increments

Timer Operation:

Delay time

1 sec. to 4:00:00 in hr:min:sec

Process time

1 sec. to 15 min in hr:min:sec

Process gas/vent gas:

Two independent gas inputs that are user selectable as either process or vent gas inputs.

Dimensions/Weights/Power Requirements

Dimensions/Weights:

PELCO easiGlow™

- Chamber Dimensions..... 120 Dia x 110mm H (4-1/4" x 4")
- Outside Dimensions 305 W x 292 D x 230mm H (12" x 11-1/2" x 9")
- Weight..... 6.26 kg (13.8 lbs.)

Pump GD4 (optional)

- Outside Dimensions..... 337 W x 138 D x 244mm H (13.3" x 5.4" x 9.6")
- Weight 11.0 kg (24.0 lbs.)

Power Requirements:

PELCO easiGlow™

- 100-240VAC 60/50Hz 60W Plus Pump up to 11 kW total, IEC Inlet

GD4 Vacuum System (optional)

- 110-115V 60Hz 3.2 Amps and 220-250V 50/60Hz 1.6 Amps.

Plugs into back of PELCO easiGlow™

Mains supply voltage fluctuations not to exceed $\pm 10\%$ of the nominal voltage.

Contents of the PELCO easiGlow™

QTY	Description	Prod. No
1 each	PELCO easiGlow™ Laboratory Glow Discharge.....	91000
1 each	Glass Chamber with sealed top plate.....	91050
1 each	USB Cable.....	030-7861
1 each	Touch screen stylus.....	91000-2
1 each	Hex Key for table height adjustment.....	000-030
1 each	Instruction Manual.....	080-517

Additional Consumables

Description	Prod. No
O-ring for Glass Chamber 2/pk.....	91051
Ultra grade 19 Oil, 1 liter	891-31
Oil Mist Filter for GD4 Vacuum Pump.....	9609

Inspection of the PELCO easiGlow™

Please fill out the warranty card and return it to us.

Inspect the PELCO easiGlow™ laboratory glow discharge system for any damage. If there is any damage present, immediately notify Ted Pella, Inc. (Phone: 800-237-3526; Fax: 530-243-3761) and the appropriate commercial carrier. Please retain the shipping container and all contents including the packing material. Do not discard anything. Notify our Customer Service department of the problem and supply us with the following information from the Packing Slip (all such information will help in expediting follow-up service).

- Ted Pella, Inc. packing slip order number
- Your purchase order number
- Your customer code number

Immediately contact the carrier and arrange for an inspection (“request an inspection”). After the inspection is completed, please request and obtain a copy of the damage report from the carrier company’s inspector or representative.

Do not return damaged shipments until a claim has been filed, the inspection is completed and the report has been received by you. Obtain an RGA (Returned Goods Authorization) number from our Customer Service Department, who will assist you with repair/return/replacement.

Important Safety Instructions

Recognize this symbol as a safety message indicating risk of danger




Electrical Requirements

IMPORTANT SAFETY INSTRUCTIONS

Recognize this symbol as a SAFETY message indicating risk of electrocution.



-  WARNING - This glow discharge system must be grounded. The mains plug is considered the primary disconnect device of the equipment and should be readily identifiable and easily accessible at all times.

The glow discharge is equipped with a cord having a grounding wire with a grounding plug. DO NOT use a two-prong adapter or operate the glow discharge with a damaged cord.

- This glow discharge should be plugged into a 100-240VAC 60/50Hz, 1100 Watt circuit.
- DO NOT, UNDER ANY CIRCUMSTANCES, CUT OR REMOVE THE ROUND GROUNDING PRONG FROM THE PLUG OR BEND THE POWER PRONGS TO FIT A RECEPTACLE OTHER THAN THE ONE SHOWN FOR YOUR OVEN. SUCH ABUSE OF THE PLUG CAN RESULT IN ELECTRICAL SHOCKS OR OVERHEATING.

- Consult a qualified electrician or service provider if grounding instructions are not completely understood, or if doubt exists as to whether the glow discharge system is properly grounded.



- **WARNING:** Unplug the Glow Discharge System before replacing fuses.
- Fuse Configurations:
Mains (2 ea 215 Series 10A 250V Time Delay 5 x 20 mm)

Safety Instructions

Recognize this symbol as a safety message indicating risk of danger



- **READ THESE INSTRUCTIONS CAREFULLY PRIOR TO OPERATION OF THE PELCO easiGlow™ GLOW DISCHARGE CLEANING SYSTEM.**



- **Precautions to Avoid Possible Exposure to Glow Discharge Energy or Unsafe Operation of the System:**
 - DO NOT try to operate this system without the Chamber in place.
 - DO NOT allow residue to build up on top electrode and/or sample table.
 - DO NOT operate the system if the Chamber or O-ring seal is damaged.
- The system **SHOULD NOT** be adjusted or repaired by anyone except qualified glow discharge service personnel. The outer case of the glow discharge should not be removed at any time, except by a qualified service person.
- DO NOT install the system next to or above a source of heat.
- Keep air inputs clean and unrestricted (see “Care and Maintenance of the System”). Free air flow from the front and the back and the sides of unit is a must. Ensure that the required 5.1cm (2”) spacing is maintained behind and around the glow discharge enclosure. Make sure the location allows for 12.7cm (5”) clearance at the back. Inadequate ventilation will reduce the cooling capacity. If air flow is restricted, the units will not operate properly and the life of electrical parts will be shortened.
- DO NOT use the easiGlow with any process involving chemicals which may react with the glow discharge and dissociate. Such chemical dissociation may coat and contaminate the glow head assembly and the vacuum system. For example, polydimethylsiloxane (PDMS).
- **ENVIRONMENTAL CONDITIONS:** This device is to be used indoors, at an altitude up to 2000 meters, at ambient temperatures between 5°C and 40°C with the maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C.

This device is designed to be safe at transient over voltages according to Installation Categories (Over voltage Categories) II, and Pollution Degree 2 in accordance with IEC 644.

Instructions de Sécurité Importantes



Reconnaître ce symbole comme un message de sécurité indiquant le risque de danger

Électrique



INSTRUCTIONS DE SÉCURITÉ IMPORTANTES

Reconnaître ce symbole comme un message de sécurité indiquant le risque d'électrocution.



• **ATTENTION** - Cette lueur du système de déchargement doit être fondée. La fiche d'alimentation est considéré comme le principal dispositif de déconnexion de l'équipement et doivent être facilement identifiables et aisément accessibles en tout temps.

La décharge lumineuse est équipé d'un cordon ayant un fil de terre avec une fiche de terre. Ne pas utiliser de deux broches de carte ou de faire fonctionner la décharge lumineuse avec un cordon endommagé.

• Cette décharge lumineuse doit être relié à un domaine de 100-240VAC 60/50Hz, 1100 Watt circuit.

• Ne pas, en aucun cas, de réduire ou de supprimer le tour broche de terre de la fiche ou plier le pouvoir à la FIT PRONGS un récipient autre que celui indiqué pour votre four. De tels abus de la fiche peut entraîner des chocs électriques ou de surchauffe.

• Consulter un électricien qualifié ou si la terre servicer instructions ne sont pas complètement compris, ou si il existe un doute quant à savoir si la lueur du système de vidange est correctement mise à la terre.



• **ATTENTION:** Débranchez le système de décharge lumineuse avant de remplacer les fusibles.

• Fusible Configurations:

Mains..... (2 / pc 215 Series 10A 250V Time Delay 5 x 20 mm)

Instructions de Sécurité



Reconnaître ce symbole comme un message de sécurité indiquant le risque de danger

• **DE LIRE CES INSTRUCTIONS ATTENTIVEMENT AVANT DE FONCTIONNEMENT DE LA PELCO easiGlow™ À DÉCHARGE LUMINESCENTE SYSTÈME DE NETTOYAGE.**



• Les précautions nécessaires pour éviter une éventuelle exposition à l'énergie à décharge lumineuse ou dangereux fonctionnement du système:

- NE PAS essayer d'exploiter ce système sans la Chambre en place.
- NE PAS laisser de résidus à mettre en place des électrodes sur le dessus et / ou de l'échantillon table.
- NE PAS faire fonctionner le système si la Chambre ou de joint torique est endommagé.

- Le système NE DOIT PAS être ajusté ou réparé par une personne qualifiée, sauf à décharge lumineuse personnel de service. Le cas extérieur de la décharge lumineuse ne devrait pas être retiré à tout moment, sauf par une personne qualifiée.
- Ne pas installer le système à côté ou au-dessus d'une source de chaleur.
- Gardez les apports d'air propre et sans restriction (voir «Entretien et maintenance du système». Libre circulation de l'air de l'avant et l'arrière et les côtés de l'unité est un must. Veiller à ce que les 5,1 (2 ") l'espacement est maintenu derrière et autour de l'enceinte à décharge lumineuse. Assurez-vous que la situation permet de 12,7 (5 ") de dédouanement à l'arrière. Le manque de ventilation permettra de réduire la capacité de refroidissement. Si le débit d'air est limitée, les unités ne fonctionnent pas correctement et la vie des pièces électriques sera raccourcie.
- NE PAS utiliser le easiGlow tout processus impliquant des produits chimiques qui peuvent réagir avec la décharge lumineuse et dissocier. Cette dissociation chimique peut manteau et contaminer l'ensemble de la tête de préchauffage et le système de vide. Par exemple, le polydiméthylsiloxane (PDMS).
- ENVIRONNEMENT: Ce dispositif doit être utilisé à l'intérieur, à une altitude jusqu'à 2000 mètres, à une température ambiante comprise entre 5 ° C et 40 ° C avec le maximum d'humidité relative de 80% pour des températures jusqu'à 31 ° C avec décroissance linéaire jusqu'à 50% l'humidité relative à 40 ° C.

Cet appareil est conçu pour être en sécurité à la surtensions transitoires à l'installation selon les catégories (les catégories les surtensions) II, Degré de pollution et 2, conformément à la CEI 644.

Certifications



The C-ETL US Listing Mark applied to this product symbolizes compliance with both of the following Canadian and U.S. Safety Requirements as of October 24, 2008:

Standard for Safety for Electrical Equipment For Measurement, Control, and Laboratory Use; Part 1: General Requirements, UL 61010-1, 2nd Ed., Issued July 12, 2004, Revised July 22, 2005 and CAN/CSA C22.2 No. 61010-1, 2nd Ed., July 01, 2004

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.



The CE marking applied to this product symbolizes Declaration of Conformity with the following applicable Directives of the European Union as of October 24, 2008:

Conforms to CENELEC EN 61010-1: 2nd Ed., Issued 2004 Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use Part1: General Requirements.

Conforms to CENELEC EN 61326-1 Issued: 2006/05/01 Electrical Equipment for Measurement, Control and Laboratory Use EMC Requirements Part 1: General Requirements

Conforms to FCC 47CFR 15B C1A Issued: 2001/10/01 Title 47 CFR Part 15 Subpart B Unintentional Radiators Class A

Installation Steps for the PELCO easiGlow™

1. READ THE SAFETY INSTRUCTIONS IN THE FIRST SECTION OF THIS MANUAL BEFORE OPERATING YOUR GLOW DISCHARGE SYSTEM.
2. IMPORTANT: This manual will show you how to operate the PELCO easiGlow™ laboratory glow discharge system. When the glow discharge main power switch is turned on the touch screen which controls the unit is activated. Glow Discharge energy is not generated until a run is initiated.
3. Assembly: WARNING - The glow discharge system should not be “plugged in” during assembly.
4. Location of the System. The glow discharge system will require an area having the following minimum dimensions: 47 cm W x 60 cm D x 45 cm H (17.5" x 23.5" x 17.5"). Make sure the location allows for 5.1cm (2") clearance behind the pump and sides of the easiGlow™. Allow for the height of the oil filter on the pump. Make sure the location allows 12.7cm (5") clearance between the back of the easiGlow™ and the pump. Inadequate ventilation will reduce cooling capacity. (see Figure 20, 21, 22, 23).
5. External Connections (Figure 23)
 - Remove the protective caps and rubber tube from gas inlets. Connect gas sources to the appropriate gas inlet using 6mm (¼") tubing. In most applications where just air is being used no connection is necessary.
 - Connect the vacuum pump to the NW-16 flange using a centering ring and clamp. On the dual chamber system a 3-way valve is installed to switch between systems (see Figure 22). Please refer to the Tech Note included with the connection kit for the pump on how to connect to the easiGlow™.
 - Connect the vacuum pumps power cord to the IEC style plug using Product No. 92080-10 ADAPTER CORD, IEC/NEMA 5-15P. When connecting the dual chamber system the adapter cord must be plugged into the unit being run at that time.
6. The glow discharge power cord can be plugged into the wall outlet at this time. The main plug is considered the primary disconnect device of the equipment and should be readily identifiable and easily accessible at all times.
7. USB Hyperterminal
 - Connect the B connector of the USB cable provided to the PELCO easiGlow™ then connect the A connector of the USB cable to the PC. The computer should automatically install the USB drivers if the computer is connected to the internet.
 - Follow the procedure in Appendix E to view Step number, Time at step, Vacuum, Current, Voltage, and Polarity.

Operation of the PELCO easiGlow™

• Theory of operation and control

The PELCO easiGlow™ Glow Discharge Cleaning System is a compact, quick, and easy-to-use standalone system. It is primarily designed for hydrophilization of TEM carbon support films which have the tendency to be hydrophobic. A glow discharge treatment with air will make the carbon film surface negatively charged (hydrophilic) which allows aqueous solution to “attach” easily.

With increasingly demanding imaging applications, using clean and consistent quality TEM grids and supports has become more important than ever. The PELCO easiGlow™ is an affordable and easy to operate glow discharge system for any TEM lab. The practical chamber size with its newly designed glow discharge head and adjustable stage with glass slide holder allows for easy loading and fast turnaround times. The system is fully microprocessor controlled and includes an intelligent touch screen device for operation and display of operation parameters. The PELCO easiGlow™ supports both hydrophilic and hydrophobic treatment with either negative or positive charge and includes two separately controlled gas inlets. The required vacuum level is set by an electronically controlled precision valve. This novel approach eliminates manual setting with a needle valve. A soft venting procedure ensures that the TEM grids are not disturbed when the system is vented.

Glow Discharge Methods supported:		
Surface Condition	Charge	Atmosphere
Hydrophilic	Negative	Air
Hydrophilic	Positive	Air (with subsequent magnesium Acetate treatment)
Hydrophobic	Positive	Alkylamine
Hydrophobic	Negative	Methanol

• First Power up and AUTO RUN quick start guide

1. Follow the installation instructions to connect the vacuum pump and plug the glow discharge into a dedicated 15 amp plug as described in Electrical Requirements.
2. Turn on the main power button by depressing the top rocker labeled “I”. When this is done, the touch screen will display the **AUTO RUN** screen (Figure 1).

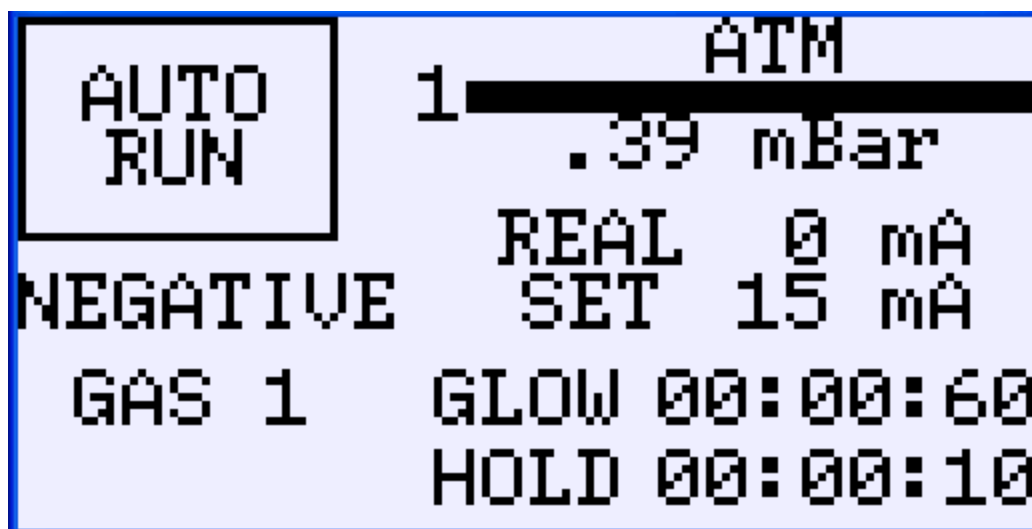


Figure 1

3. Place a test sample on the sample table.
4. Check that the o-ring is correctly positioned.
5. Cover the glow discharge head with the glass chamber.
6. Touch the AUTO RUN button. This will initiate the factory installed program of pump to .40 mbar using gas 1 inlet, hold for 10 seconds, then glow discharge for 60 seconds at 15 mA negative polarity and soft vent to atmosphere using gas 1 inlet.

• Touch Screen and Function Buttons

The Touch screen display acts as both an input keypad and a parameter display. When a parameter area is active - thus allowing input - it will be displayed with a bold border.

When the parameter area is acting as an output or status display it will have no border. Parameters that retain the bold border can be changed during the cycle.

Button annotations are commands, not status. The command shows the next action taken when the button is touched. For instance, if the Auto Run/Stop button reads “**AUTO RUN**” that indicates the process is not running. Touching that button will command it to “RUN”. The button immediately changes to a **STOP** button indicating that the process is started; and touching the **STOP** button will command it to stop.

When an active region is touched it may toggle a parameter, or another screen will open. That screen will either allow keypad entry of alpha-numeric values, or that screen will be a second level screen with its own parameter area.

The 5 function buttons located below the touch screen are used to navigate between display screens (see Figure 2).

Active buttons have the red LED lit:

- The **Back** function returns back one screen
- The **Next** function advances to the next screen
- The **Main** function goes to the **MAIN** screen
- The **Auto** function goes to the **AUTO RUN** screen
- The **Prog** function goes to the first of the automatic run program screens

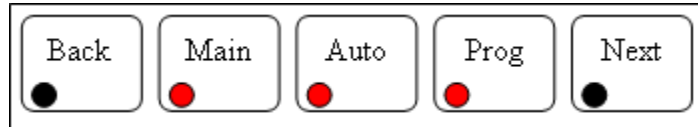


Figure 2

- **Main Screen**

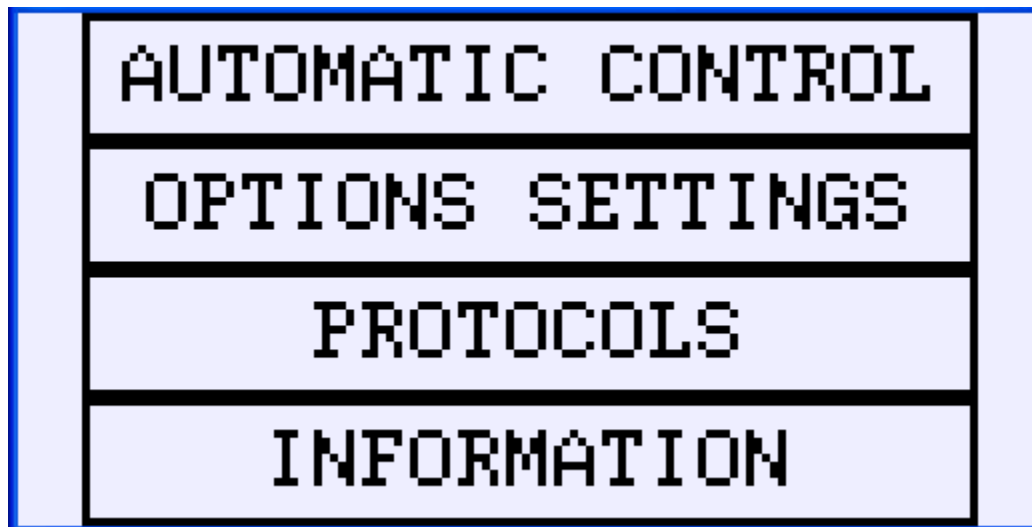


Figure 3

The **MAIN** screen (Figure 3) is accessed by pressing the **Main** function button. It is used to access the main functional areas used to operate this system.

Touching the **AUTOMATIC CONTROL** button takes you to the automatic run screen used to run an automatic glow discharge cycle (see **Auto Run Screen**).

Touching the **OPTIONS SETTING** button takes you to the first options setting screen where automatic run programming, factory settings and manual control can be accessed (see **Options Setting Screen**).

Touching the **PROTOCOLS** button takes you to the select protocol screen where 4 different 10 step protocols can be programmed and run (see **Protocol Screens**).

Touching the **INFORMATION** button takes you to the first of three Ted Pella, Inc. corporate information and contact screens (see **Information Screen**).

• Auto Run Screen

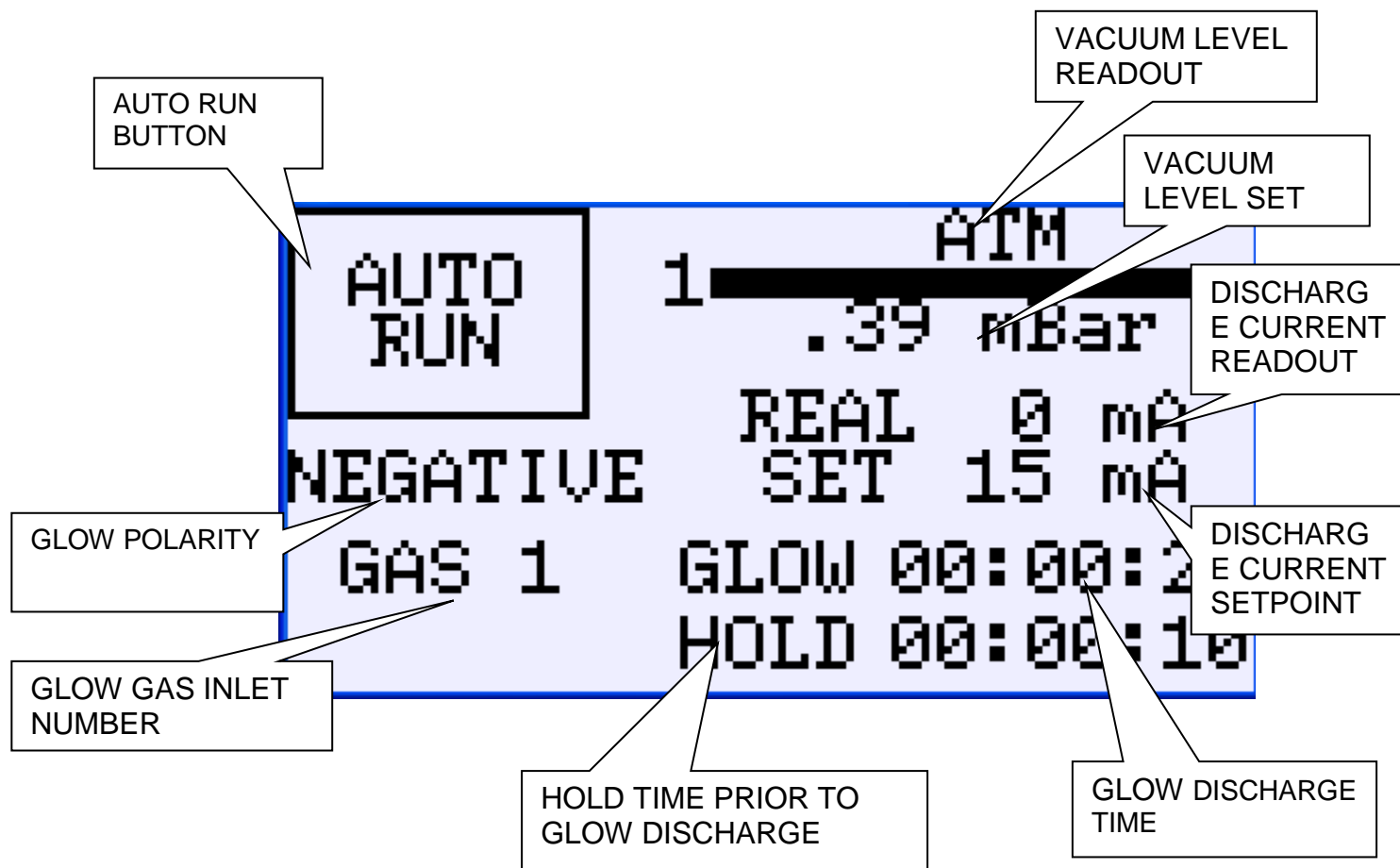


Figure 4

The Automatic Control process is designed to be a one-button operation, with easy to programming screens. The factory setting for Auto Run is a short hydrophilization procedure for TEM grids.

The **AUTO RUN** screen appears upon powering up the PELCO easiGlow™ system. It is also accessed by touching the **AUTO** function button. It is used to view the auto run programmed parameters, initiate the automatic run program, and monitor the times, pressure, current etc. during the run. Figure 4 describes the displayed fields on this screen.

To use this screen to run a cycle:

1. Place your sample on the sample table.
2. Cover the glow head with the glass chamber making sure it is centered on the o-ring.
3. Touch the **AUTO RUN** button. This will initiate the auto run program with the saved parameters. The factory installed program of pump to .40 mbar using gas 1 inlet then glow discharge for 60 seconds at 15 mA negative polarity and soft vent to atmosphere using gas 1 inlet is the default program.

If the system fails to reach a base pressure of .27 mBar within 60 seconds or the pressure does not stabilize at the set point within 60 seconds an error screen will appear (Figure 5) and the system will vent to atmosphere. This screen will remain until a function key is pressed like **AUTO** to

return to the **AUTO RUN** screen. This error may occur if the system has not been used for a long period. If it occurs a second time, then troubleshoot the vacuum pump and chamber seals.

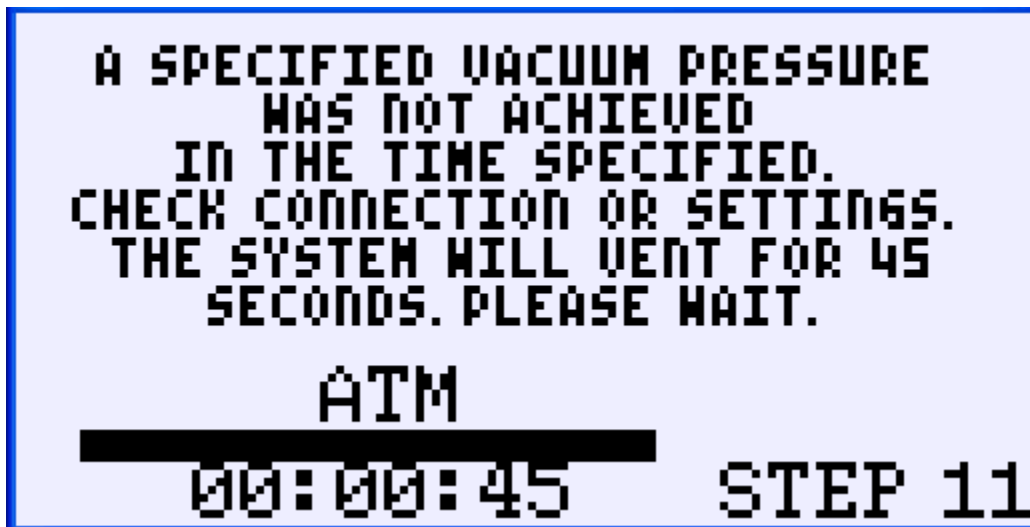


Figure 5

If the **STOP** button is touched at any point during a run an error screen will appear (Figure 6) and the system will vent to atmosphere and then return to the **AUTO RUN** screen.

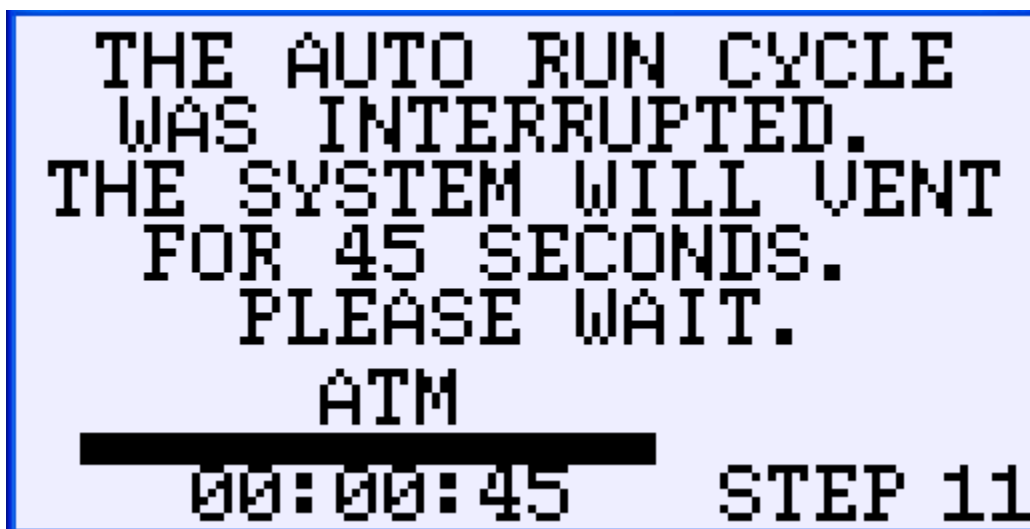


Figure 6

To change the auto run program press the “**Prog**” function button below the touch screen and see the **Automatic Run Program Screens** section below.

- **Automatic Run Program Screens**

To reprogram the AUTO RUN automatic control process:

1. Press the "**Prog**" function button. This takes you to the **PROGRAM PRESSURE** screen (Figure 7). This is the first of four auto run program screens.

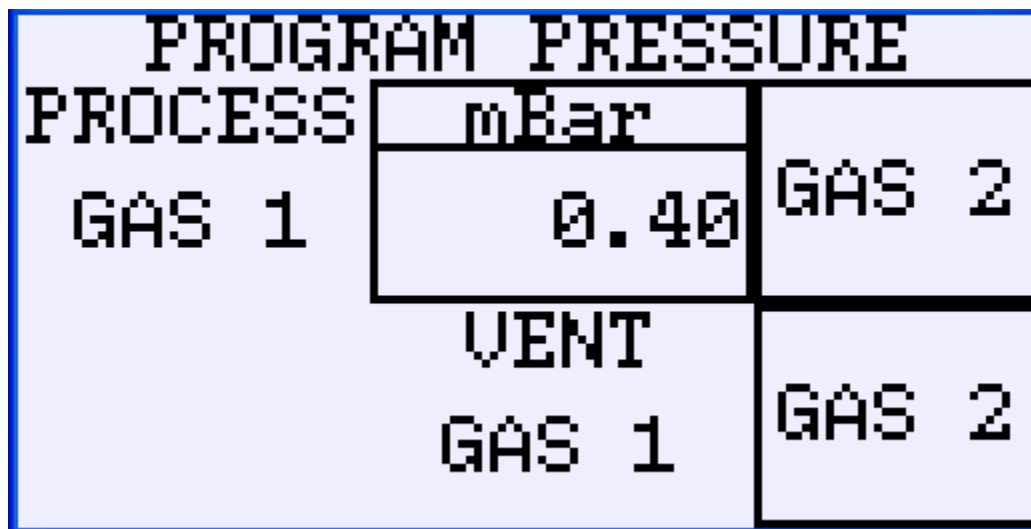


Figure 7

2. Touch the **mBar** button to popup the numeric entry keypad (Figure 8).

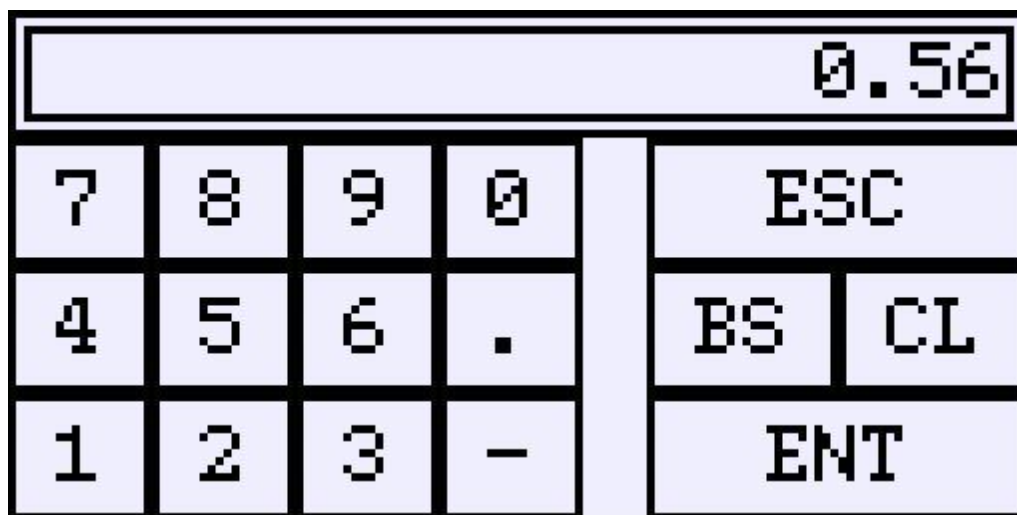


Figure 8

3. Clear the current entry by touching **CL**.
4. Enter the desired glow discharge process pressure by touching the appropriate numeric keys. The allowable values are between the range of 1.11 mBar and 0.20 mBar. Values entered above this range will default to 1.11 mBar. Values entered below this range will default to 0.20 mBar.

5. Enter and return to the program pressure screen by touching **ENT**.
6. Confirm that the new pressure is displayed in the **mBar** button.
7. Touch the upper **GAS 1** button to change the process gas to the gas 2 inlet. When touched it will change to a **GAS 2** button and the **PROCESS GAS** display will change from **2** to **1**.
8. Touch the lower **GAS 1** button to change the vent gas to the gas 2 inlet. When touched it will change to a **GAS 2** button and the **VENT GAS** display will change from **2** to **1**.
9. Press the **Next** function button; this takes you to the **PROGRAM TIME** screen (Figure 9). This is the second of four auto run program screens.

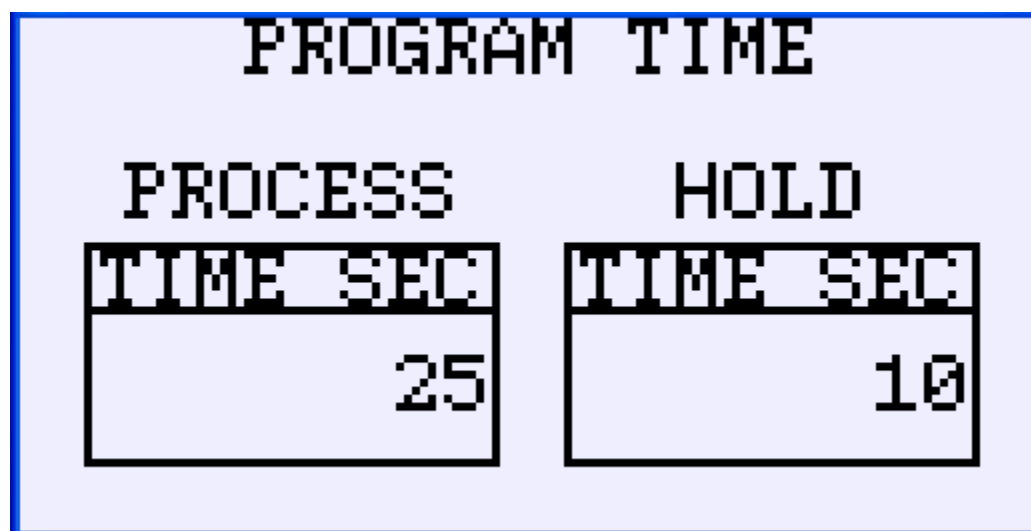


Figure 9

10. Touch the **PROCESS TIME SEC** button to popup the numeric entry keypad (Figure 8).
11. Clear the current entry by touching **CL**.
12. Enter the desired glow discharge process pressure by touching the appropriate numeric keys. The allowable values are between the range of 1 and 900 sec (15 min) in increments of 1 second. Values entered above this range will default to 900 sec.
13. Enter and return to the program pressure screen by touching **ENT**.
14. Confirm that the new time is displayed in the **PROCESS TIME SEC** button.
15. Touch the **HOLD TIME SEC** button to popup the numeric entry keypad (Figure 8).
16. Clear the current entry by touching **CL**.
17. Enter the desired glow discharge process pressure by touching the appropriate numeric keys. The allowable values are between the range of 1 and 14400 sec (4 hr) in increments of 1 second. Values entered above this range will default to 14400 sec.
18. Enter and return to the **PROGRAM TIME** screen by touching **ENT**.
19. Confirm that the new time is displayed in the **HOLD TIME SEC** button.
20. Press the **Next** function, this takes you to the **PROGRAM CURRENT** screen (Figure 10). This is the third of four auto run program screens.

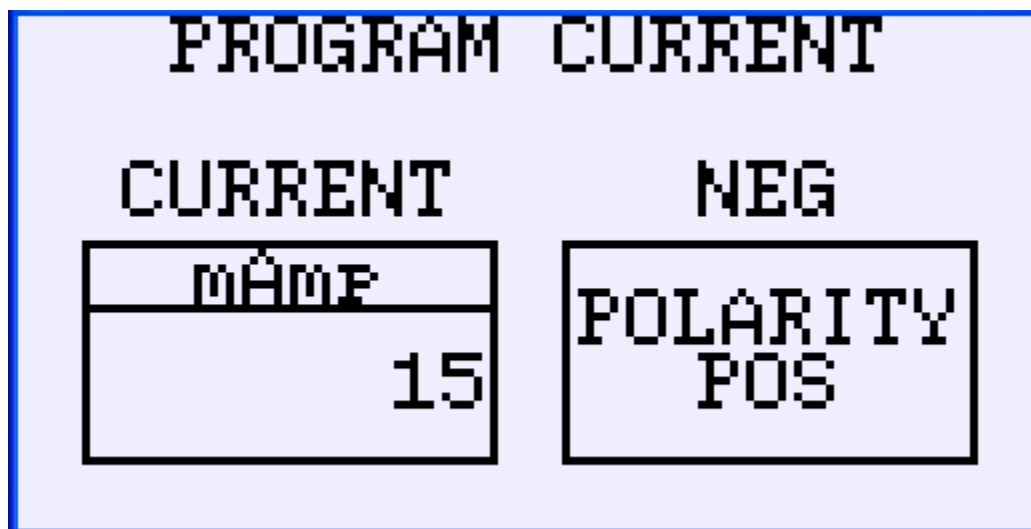


Figure 10

21. Touch the **CURRENT mAmp** button to popup the numeric entry keypad (Figure 8).
22. Clear the current entry by touching **CL**.
23. Enter the desired glow discharge process current by touching the appropriate numeric keys. The allowable values are between the range of 1 and 30 mAmp in increments of 1 mAmp. Values entered above this range will default to 30 mAmp.
24. Enter and return to the **PROGRAM CURRENT** screen by touching **ENT**.
25. Confirm that the new current is displayed in the **CURRENT mAmp** button.
26. Touch the **POLARITY POS** button to change the polarity (as indicated above the button) of the high voltage supply. When touched it will change to a **POLARITY NEG** button and the header above the button will change from **NEG** to **POS**.
27. Press the **Next** function, this takes you to the **SAVE PERMANENTLY** screen (Figure 11). This is the final auto run program screen where the program can be saved to memory.



Figure 11

28. Touch the **SAVE PROGRAM SETTINGS** button to permanently save the new auto program settings so that they will be applied if the main power is turned off and then on again. While touching it will change to read **SAVING**. If you choose not to permanently save, the new settings will be active when returning to the **AUTO RUN** but will revert to the previously permanently saved program when the main power is turned off and then on again.
29. Press the **Auto** function button to return to the **AUTO RUN** screen to run your new program or press the **Next** function, to return to the **PROGRAM PRESSURE** screen (Figure 7). This is the first of four auto run program screens.

- Options Setting Screen



Figure 12

The **OPTIONS SETTING** screen (Figure 12) is accessed by pressing the **Main** function button to display the **MAIN** screen (Figure 3) and then touching the **OPTIONS SETTING** button. This is the first options setting screen where automatic run programming, factory settings and manual control can be accessed.

Touching the **AUTOMATIC PROGRAM STEPS** button is the same as pressing the “**Prog**” function button. See **Automatic Run Program Screens** section for operation.

Touch the **FACTORY SETTING** button to go to the first of two factory setting screens. These screens are used to troubleshoot and restore factory settings and are not used to operate the system. Detailed instructions on the use of these screens will not be given in this manual. A flow diagram in Appendix A shows the factory setting screen hierarchy for intuitive use of these screens.

Touch the **MANUAL CONTROL** button to go to the first of 6 manual control screens. These screens are used to troubleshoot and manually operate the system. Detailed instructions on the use of these screens will not be given in this manual. A flow diagram in Appendix B shows the manual control screen hierarchy for intuitive use of these screens.

- Protocol screens

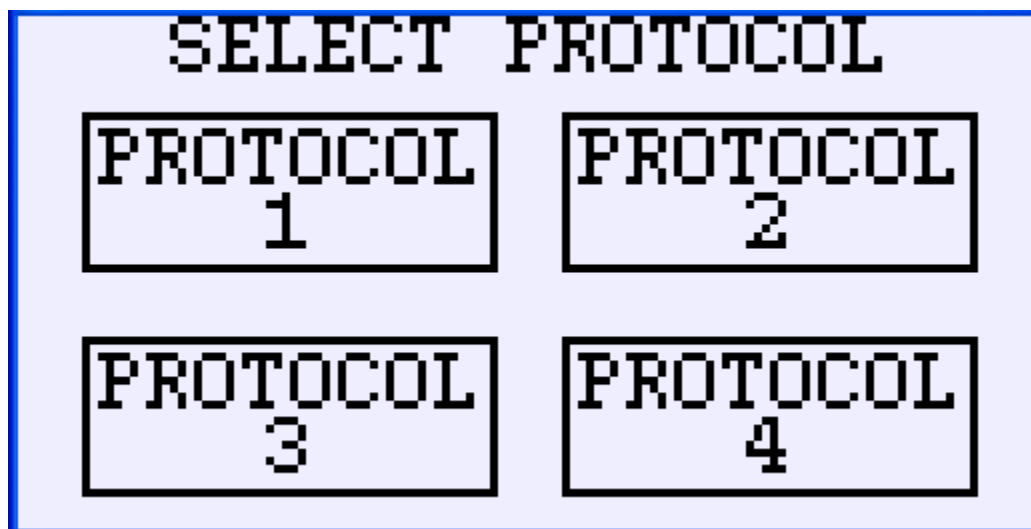


Figure 13

The **SELECT PROTOCOL** screen (Figure 13) is accessed by pressing the **Main** function button to display the **MAIN** screen (Figure 3) and then touching the **PROTOCOLS** button brings up to the **SELECT PROTOCOL** screen where 4 different 10 step protocols can be programmed and run.

Touch any of the four protocol buttons to bring up that protocol's run/program screen (Figure 14).

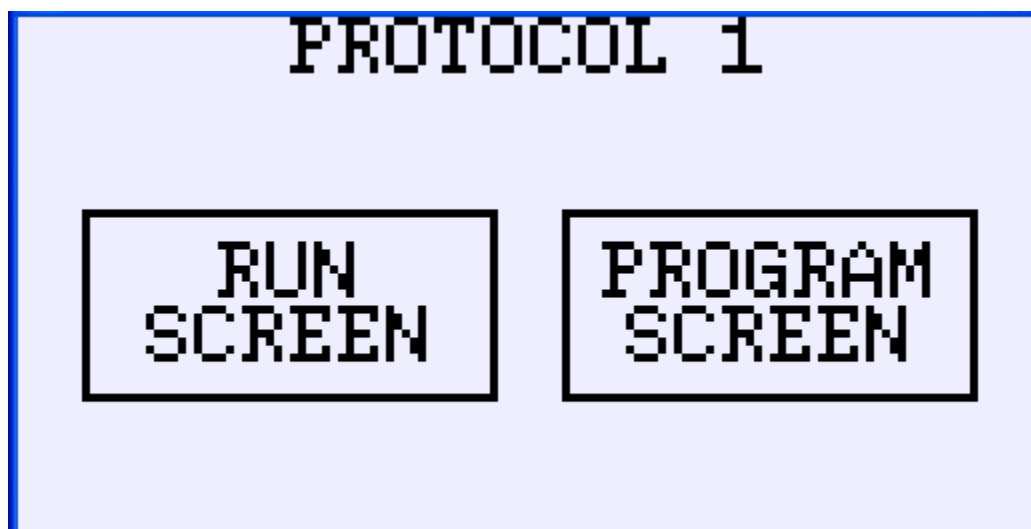


Figure 14

Touch the **RUN SCREEN** button to bring up the **PROTOCOL 1 AUTO RUN** screen (Figure 15).

Touch the **PROGRAM SCREEN** button to bring up the protocol step screen that allows changes in programming (Figure 18).

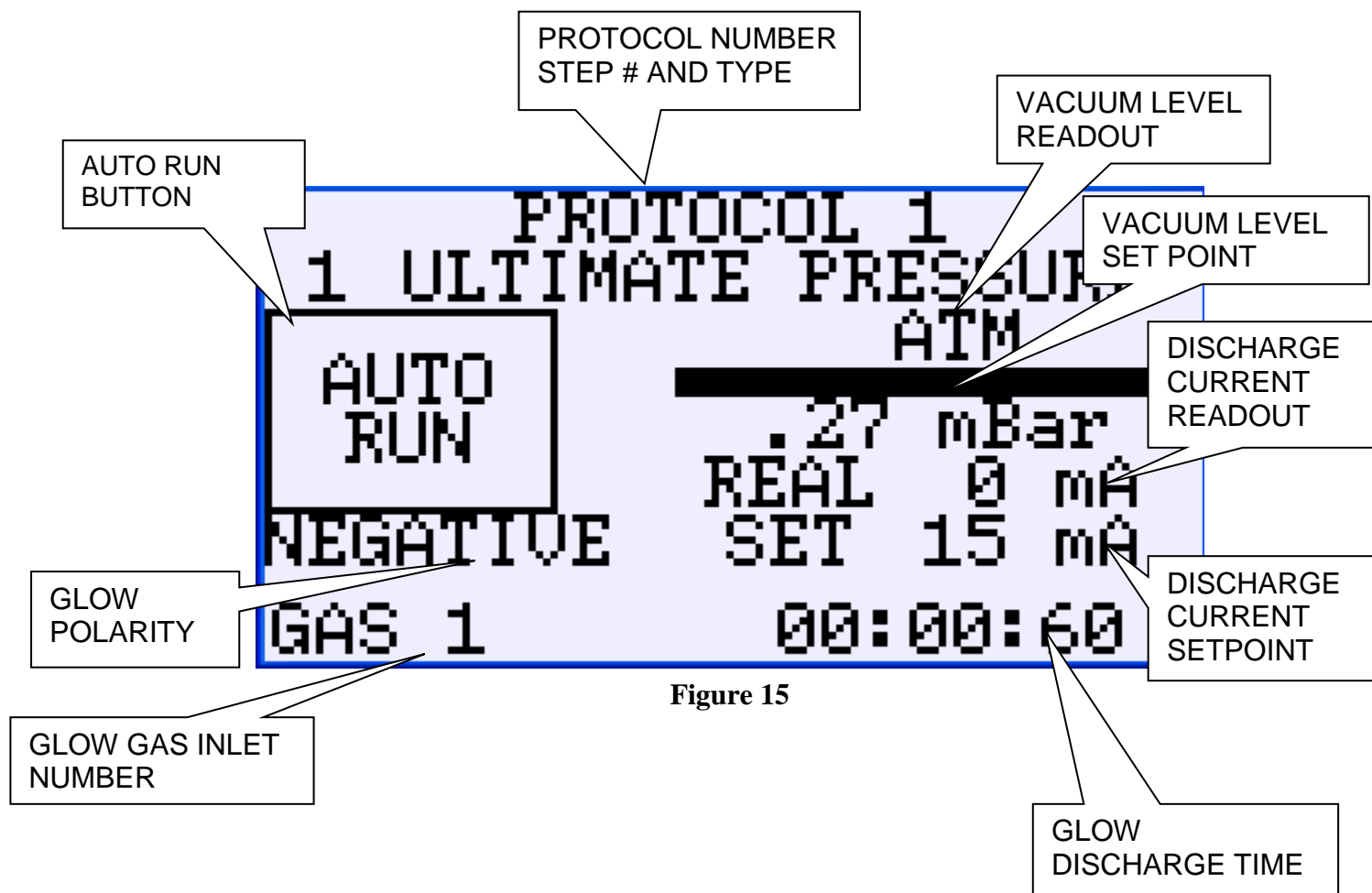


Figure 15

The protocol process is design to be a one-button operation, with flexible programming screens. The protocol process will allow the user to program a ten step program with a user definable sequence of pump, vent/purge, hold and glow steps.

To use this screen to run a cycle:

1. Place your sample on the sample table.
2. Cover the glow head with the glass chamber making sure it is centered on the o-ring.
3. Touch the **AUTO RUN** button. This will initiate the auto run program with the saved parameters. The factory installed program of pump to .40 mbar using gas 1 inlet then glow discharge for 60 seconds at 15 mA negative polarity and soft vent to atmosphere using gas 1 inlet, is the default program.

If the system fails to reach the programmed ultimate or set pressure within the programmed time or the pressure does not stabilize at the set point within the programmed time, an error screen will appear (Figure 16) and the system will vent to atmosphere. This screen will remain until a function

key is pressed like **Auto** to return to the **AUTO RUN** screen. This may occur if the system has not been used for a long period. If it occurs a second time, then troubleshoot the vacuum pump and chamber seals.

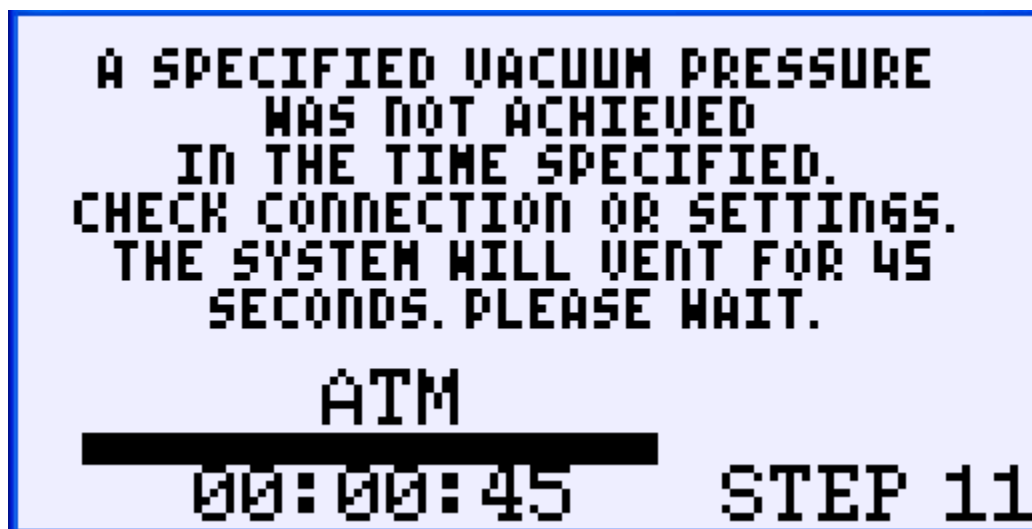


Figure 16

If the **STOP** button is touched at any point during a run the error screen will appear (Figure 17) and the system will vent to atmosphere and then return to the protocol **AUTO RUN** screen.

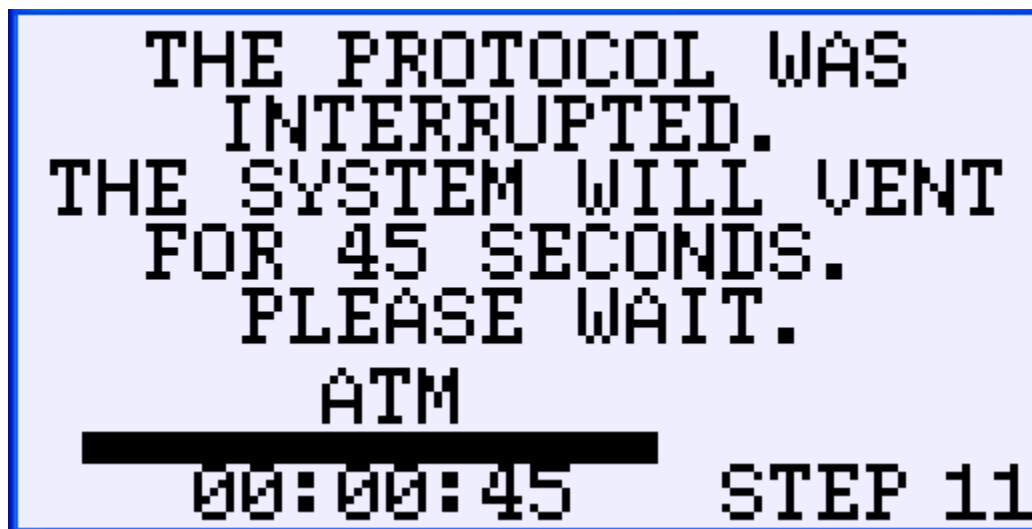


Figure 17

To change the protocols program touch the **PROGRAM SCREEN** function button on the protocol run/program screen (Figure 14) and see the **Program Protocol Screens** section below.

- Program Protocol Screens



Figure 18

The protocol step screen is accessed by following steps 1 and 2 below.

The information on the screen changes depending on the type of step chosen when programming. The step number is displayed in the upper left corner of the screen and is step 4 on the screen shown in figure 18. The up and down arrows can be used to change the step displayed and thus view the programmed protocol.

To reprogram the protocol:

1. Select the desired protocol number from the **SELECT PROTOCOL** (Figure 13) screen by touching the protocol number button. The **SELECT PROTOCOL** screen is accessed by pressing the **Main** function button to display the **MAIN** screen (Figure 3) and then touching the **PROTOCOLS** button.
2. Touch the **PROGRAM SCREEN** button to bring up the protocol step screen which allows changes in programming (Figure 18).
3. Use the arrow buttons to get to the program step desired.
4. To reprogram the displayed program step press the **Next** function button. This takes you to the step type selection screen (Figure 19) where one of the six types of steps used to build a protocol are selected.

4 PROTOCOL 1 GLOW DISCHARGE	
ULTIMATE	GLOW
STABLE	VENT
HOLD	END

Figure 19

5. Once the desired step type button is touched the first of that step types program screens will open. There will be one to three screens depending on the step type. These are used to enter current, polarity, gas number, pressure and time as needed.
6. Program the desired parameters and press the **Next** function button.
7. Continue in the same fashion until the last **SAVE PROGRAM SETTINGS** screen appears.
8. Touching the **SAVE PROGRAM SETTINGS** button or pressing the **Next** function button returns to the protocol step screen (Figure 18) where the settings can be confirmed and the next step can be selected.
9. Repeat steps 3-8 to change other program steps.
10. Press the Back function button to return to that protocol's run/program screen (Figure 14). The screen can now be used to run your new protocol.

The 6 types of steps are as follows:

1. Pump to Ultimate Pressure before Set Time
 - a. This is used to test the ability of the system to pump down to a given pressure in a given time.
 - b. A pressure range of ATM to .12 mBar is allowed.
 - c. The time in seconds of 0 to 14400 (4 hours) is allowed.
 - i. The pump is on and the gas valves are closed and current is off.
 - ii. When the pressure is achieved the step is completed.
 - iii. If the time is completed the step has **FAILED**—vent and end.
2. Pump to Stable Set Pressure before Set Time using One Gas.
 - a. This is used to pump to a stable pressure before continuing.
 - b. The pressure range of 1.1 mBar (Atmosphere) to .12 mBar is allowed.
 - c. The time in seconds of 0 to 14400 (4 hours) is allowed.
 - d. Selection of gas 1 or 2 is allowed.
 - i. The pump is on and the gas valves are controlled but current is off.
 - ii. When a stable pressure is achieved the step is completed.

- iii. If the time is completed the step has **FAILED**—vent and end.
- 3. Hold Set Pressure for Set Time using One Gas
 - a. This is used to hold a pressure for a set time before continuing.
 - b. The pressure range of 1.1 mBar (Atmosphere) to .12 mBar is allowed.
 - c. The time in seconds of 0 to 14400 (4 hours) is allowed.
 - d. Selection of gas 1 or 2 is allowed.
 - i. The pump is on and the gas valves are controlled but current is off.
 - ii. There is no fail test - When the time is completed, the step is completed.

Note: Hold steps should be preceded by a Pump to Stable set to the same pressure programmed in this hold step in order to achieve a stable hold pressure.

- 4. Glow and Hold Set Pressure for Set Time using One Valve and Polarity.
 - a. This is used to apply glow current for a given time before continuing.
 - b. The Ampere range of 0 mA to 30 mA is allowed.
 - c. The pressure range of 1.1 mBar (Atmosphere) to .12 mBar is allowed.
 - d. The time in seconds of 0 to 14400 (4 hours) is allowed.
 - e. Selection of gas 1 or 2 is allowed.
 - f. Selection of polarity positive or negative is allowed.
 - i. The pump is on and the gas valves are controlled and current is on.
 - ii. There is no fail test - When the time is completed, the step is completed.

Note: Glow steps should be preceded by a Pump to Stable Pressure and Hold at Stable Pressure step set to the same pressure programmed in this glow step in order to achieve a stable glow pressure.

- 5. Vent to Set Pressure for Set Time using One Gas.
 - a. This is used to vent or purge with a selectable gas.
 - b. The pressure range of 1.1 mBar (Atmosphere) to .12 mBar is allowed.
 - c. The time in seconds of 0 to 14400 (4 hours) is allowed.
 - d. Selection of valve 1 or 2 is allowed.
 - i. The pump is off, the gas valves are controlled, and the current is off.
 - ii. There is no fail test - When the time is completed, the step is completed.

Note: In order to vent to atmosphere, the vent step should be set 1029 mBar or greater. One should allow plenty of time for the valves to open completely (30 seconds or better).

- 6. End Protocol and Reset Machine
 - a. No parameters can set, this will stop everything.
 - i. The pump is off, the gas valves are off, and the current is off.
 - ii. There is no fail test - This will ready the machine to be turned off and reset step counter to step 1. The protocol can then be run again.

Every protocol will have two steps add to the end that the user will not be able to access.

The two steps will be:

Step 11) vent to atmosphere (using valve 1) for 45 seconds

Step 12) end the batch program and reset the step counter to 1.

The purpose for is for a controlled shutdown if fatal errors in any of the user programmable protocols are found.

Adjusting The Platform

Photo 1 shows the glow head of the PELCO easiGlow™. The platform can be adjusted by loosening the set screw in the adjusting base with a 1/16 Allen wrench and gently moving the platform to the desired height. Retighten the set screw making sure the set screw screws onto the flattened part of the adjusting rod. Refer to Photos 1 to 4.

91000 GLOW HEAD



PHOTO 1

ADJUSTING BASE. SET SCREW. PLATFORM.

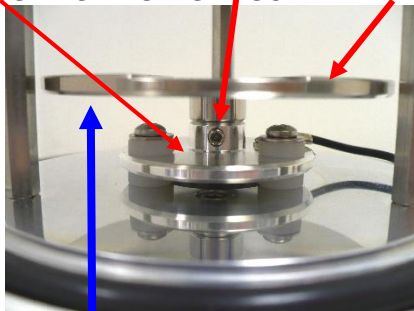


PHOTO 2 PLATFORM IN LOWEST POSITION

ALLEN WRENCH IN THE SET SCREW

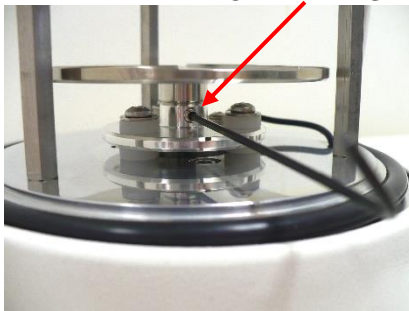


PHOTO 3

PLATFORM RAISED TO A NEW POSITION. FLAT SIDE OF THE ADJUSTING ROD

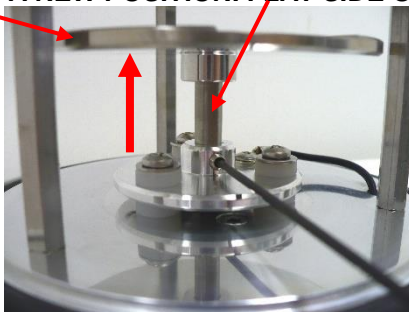


PHOTO 4

Care and Maintenance of the PELCO easiGlow™

- **Cleaning the Glow Discharge Exterior**

Simply wipe with a soft towel or clean with a mild detergent in warm water using a soft sponge or cloth. Be sure to properly “wring” sponge or cloth to remove excess water before wiping unit. Water-pressure cleaning systems should not be used to clean the system interior or exterior. Do not use abrasive cleansers or cleaners containing ammonia; they might damage the finish. Never pour water onto the system.

- **Cleaning the Glow Discharge Chamber Interior and Head**

Wipe with a lint free cloth wet with a small amount of IPA.

- **Cleaning the Glass Chamber**

Wipe with a lint free cloth wet with a small amount of IPA. Examine the chamber for cracks and or chips. If found replace with a new glass chamber.

- **Cleaning the Glow Discharge Air Intake Slots.**

The air vents on the bottom and the back of the unit should remain opened and unblocked. Wipe with soft towel and clean off debris using a soft brush.

Allow for 5.1cm (2")
Clearance for filter.

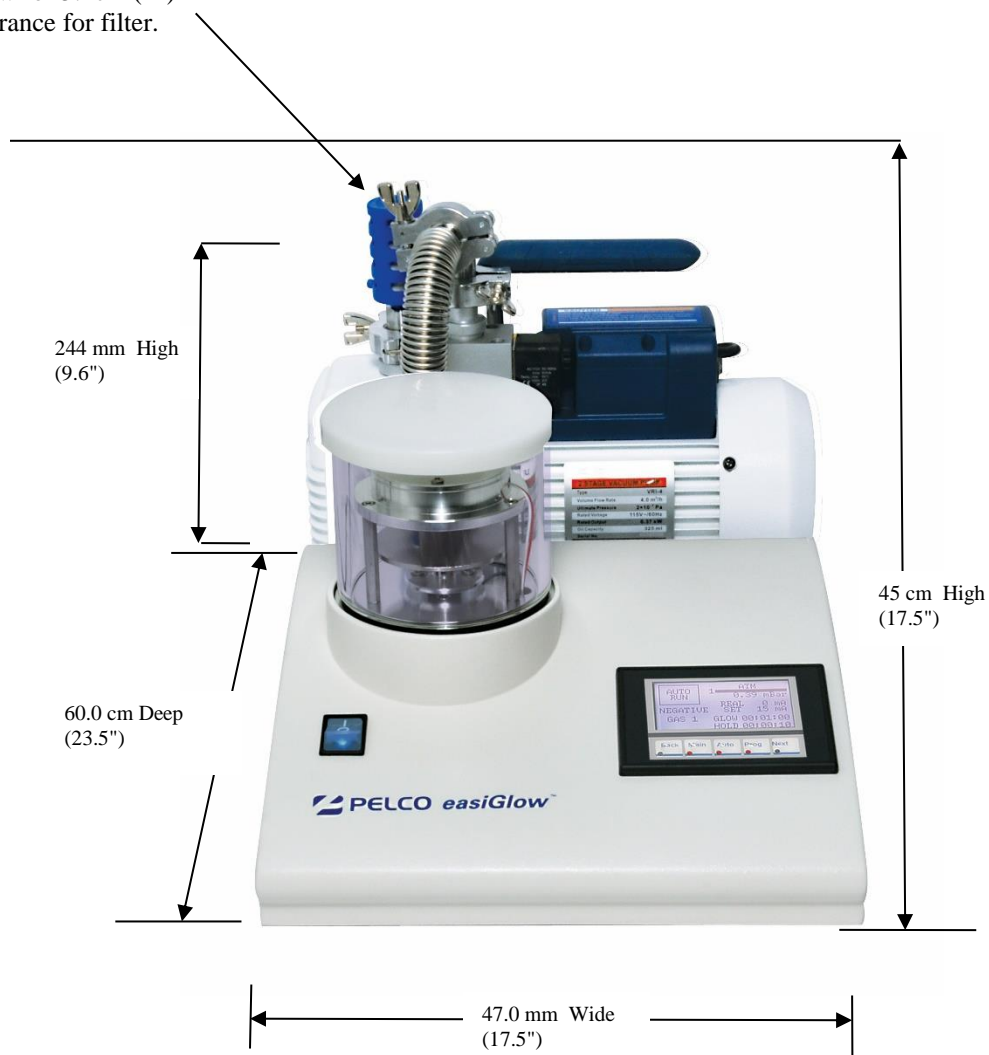


Figure 20: Dimensions and placement information for PELCO easiGlow™

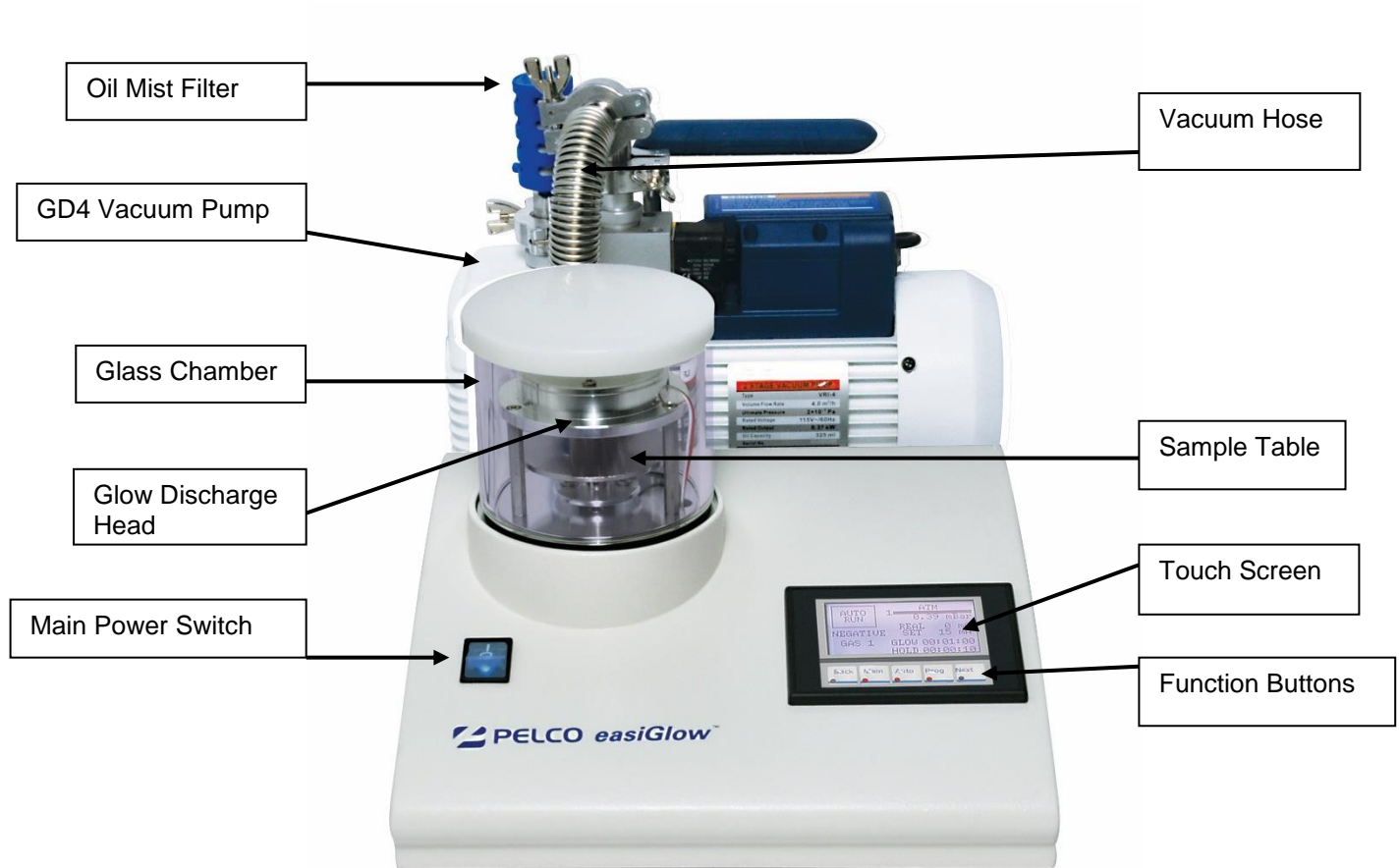


Figure 21: PELCO easiGlow™ System Front View

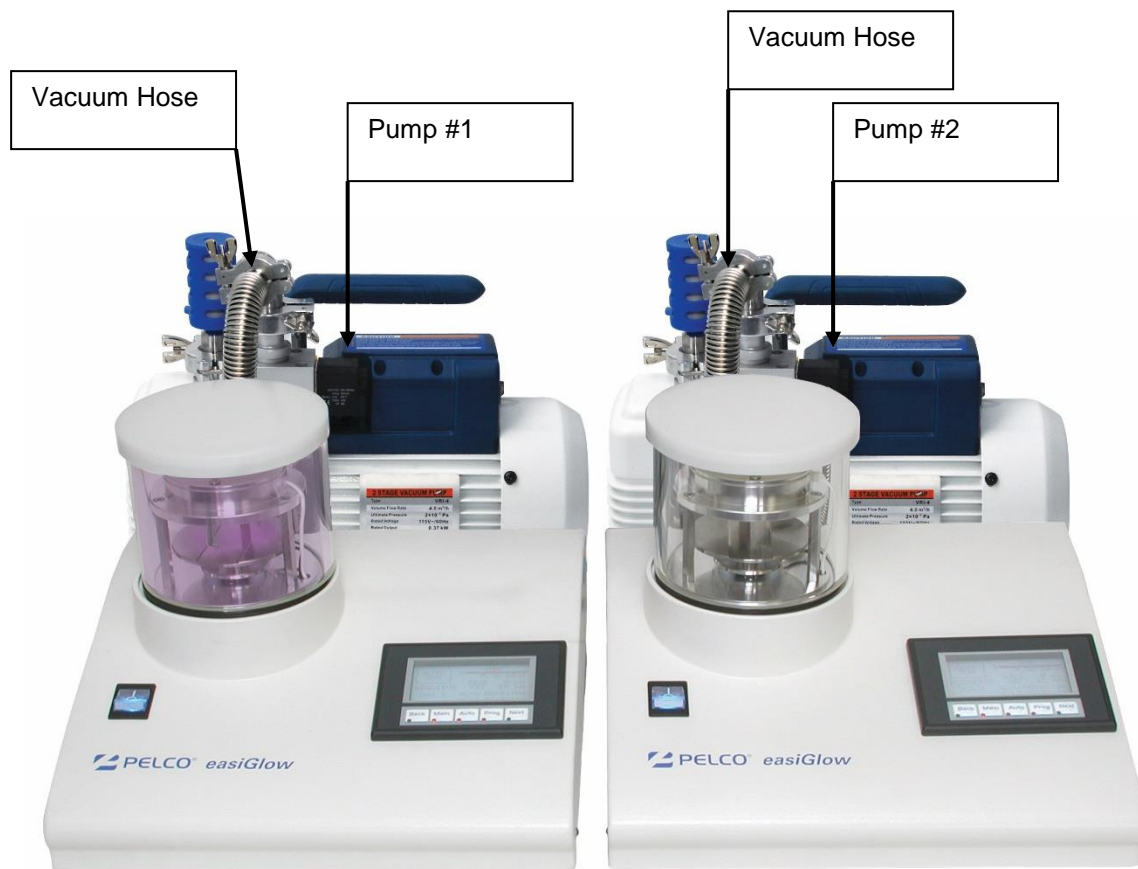


Figure 22: PELCO easiGlow™ Dual Chamber System Front View

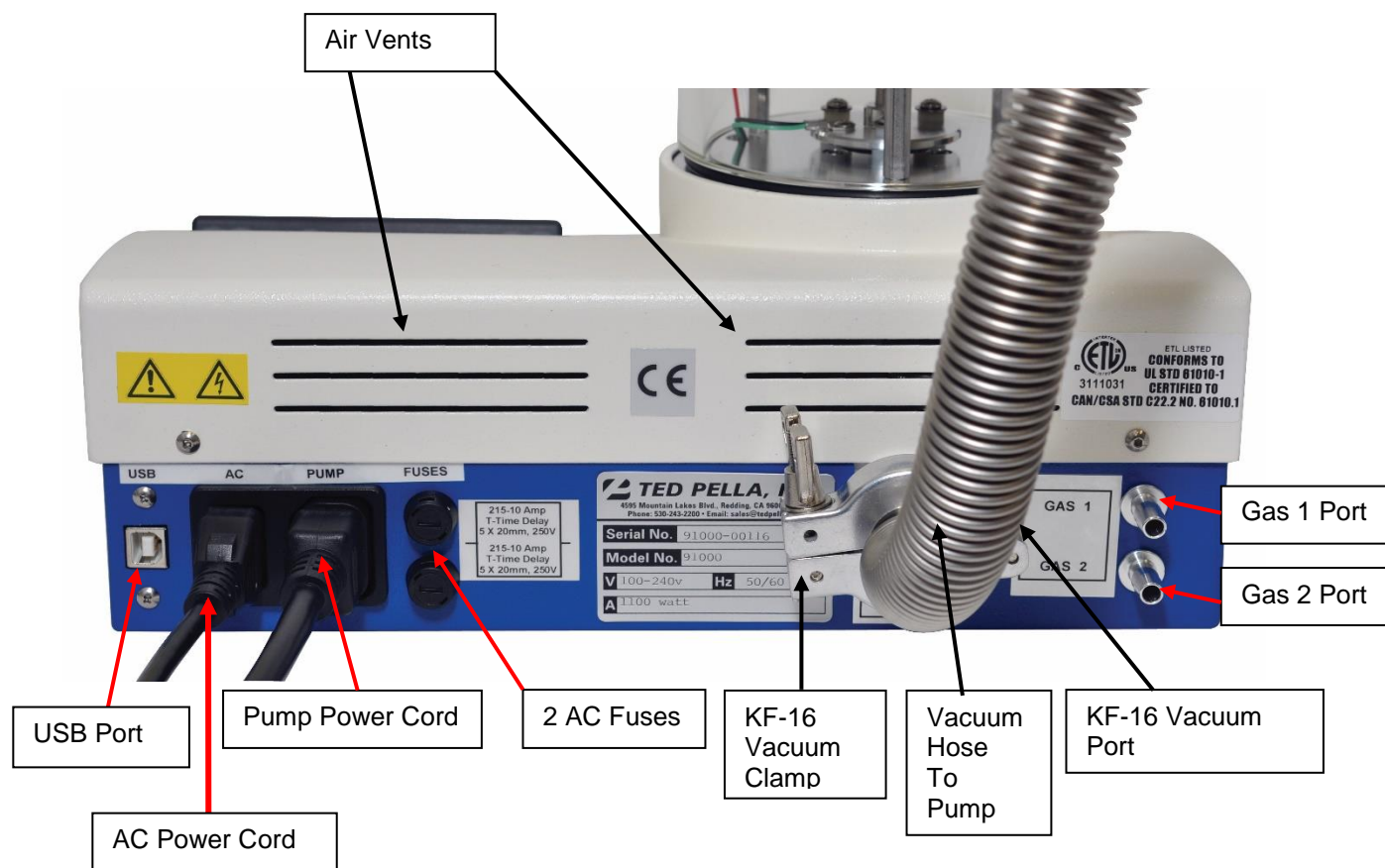
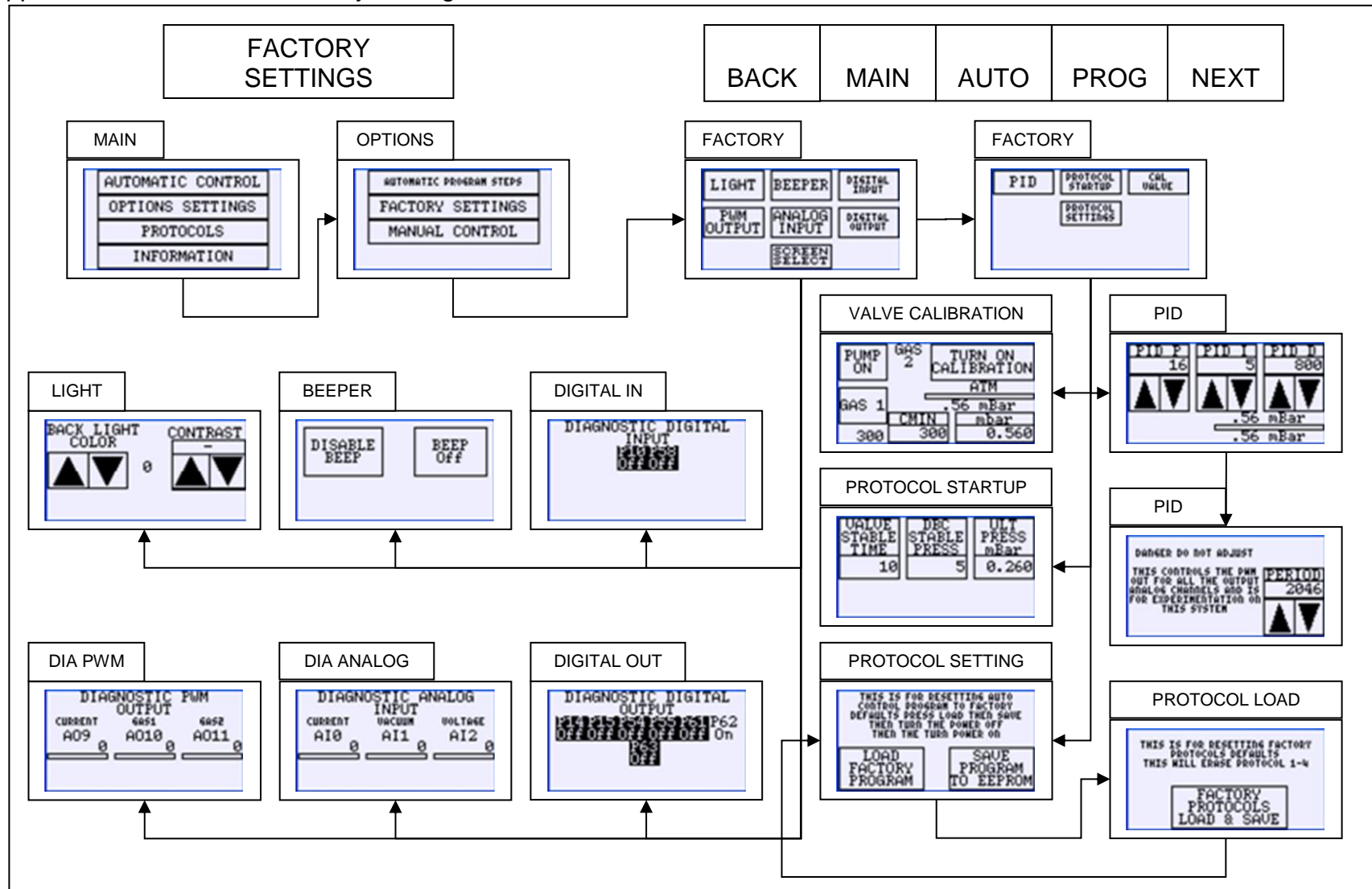


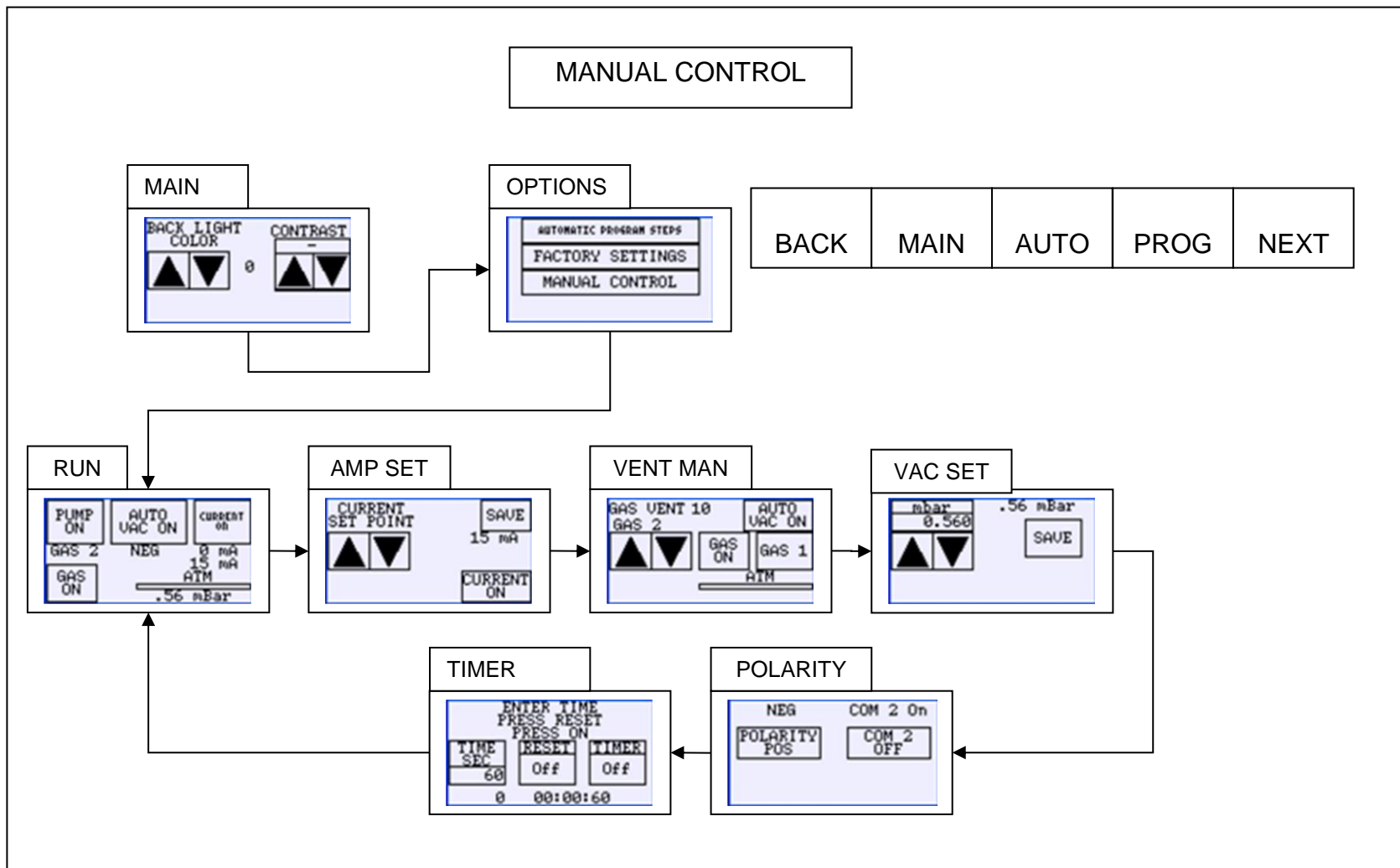
Figure 23: PELCO easiGlow™ System Back View

NOTES:

Appendix A: Flow Chart - Factory Settings



Appendix B: Flow Chart - Manual Control



Appendix C: USB Hyperterminal

NOTE: These instructions apply to PCs using Windows XP. The Hyperterminal is not supported in newer operating systems.

- Universal Serial Bus (USB)

The USB provides a bidirectional serial interface for displaying and reprogramming the PELCO easiGlow™.

Plug the power cable for the PELCO easiGlow™ glow discharge to the appropriate receptacle and allow the PELCO easiGlow™ a moment to startup. Attach a USB cable to the USB port on the (powered up) personal computer to the USB port on the port PELCO easiGlow™ glow discharge. The Universal serial bus connection can be found on the right side of the glow discharge. Windows automatically recognizes the USB device and will offer to install the necessary drivers for communication. Install the new driver (an internet connection will probably be required.)

Note: If you have problems making this USB connection, contact the vendor of the computer, for the latest versions of the USB drivers.

- HyperTerminal

HyperTerminal is a program that one can use to communicate with PELCO easiGlow™.

HyperTerminal can capture all data transmitted during the connection session.

One can use HyperTerminal to receive data from the PELCO easiGlow™. One can also capture the dialog with the PELCO easiGlow™ and send the information directly to a printer.

HyperTerminal records the messages passed to and from the PELCO easiGlow™. HyperTerminal has scroll functionality that allows you to look at received text that has scrolled off the screen.

When saving incoming data to a text file or sending the data to a printer, HyperTerminal will capture all data transmitted during the connection session.

- Opening a HyperTerminal session

Using Microsoft Windows find HyperTerminal under All Programs/Accessories/Communication/HyperTerminal and left click it with one's mouse.

- Creating a Connection

Opening a HyperTerminal the program will want a name for the connection that will be configured. Enter “easiGlow”. Select an optional Icon from option shown and click “OK” (Figure 24).

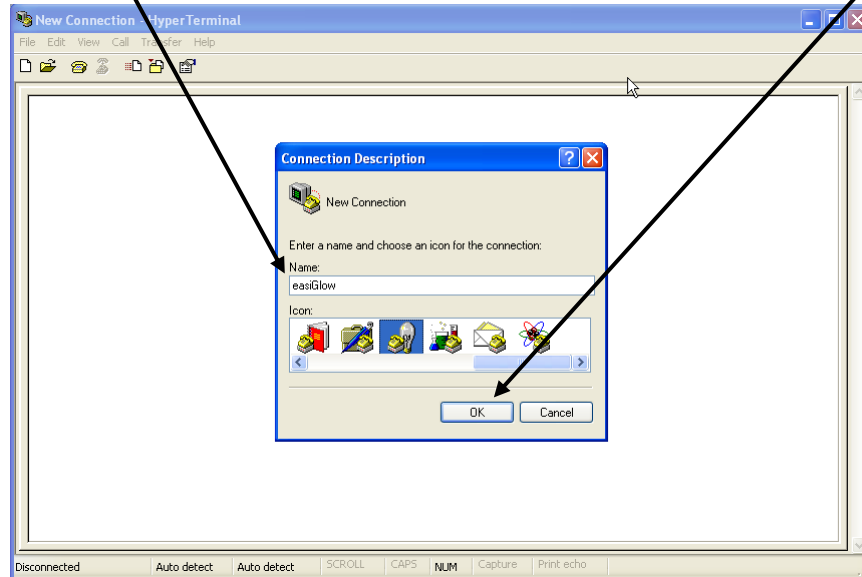


Figure 24

- Port Connection

Select the COM PORT on the computer that will connect to the PELCO easiGlow™ and select “OK” (Figure 25).

If one does not know the com port to select for the connection, please contact a network administrator.

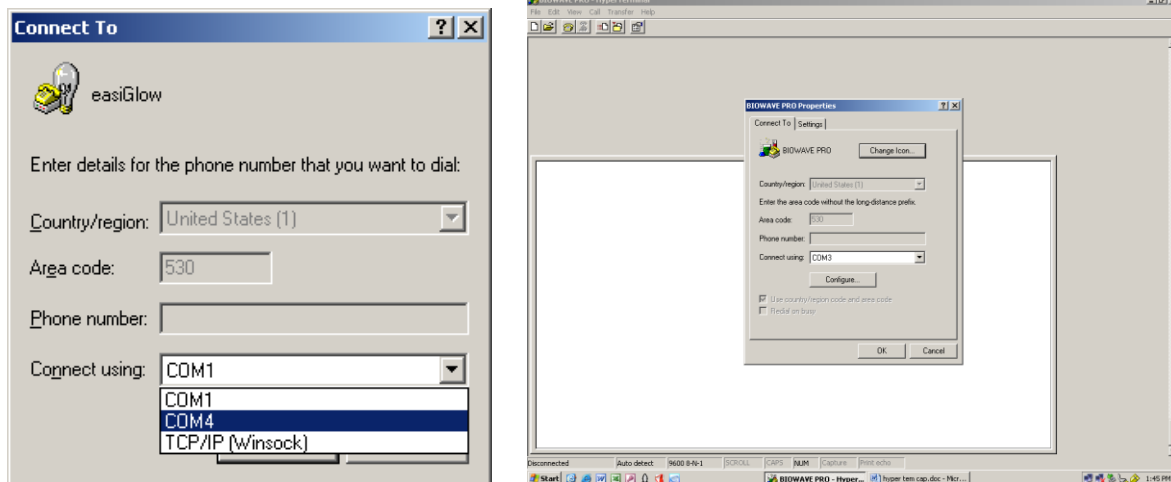


Figure 25

- Port Settings

Set Port connection to Bits per seconds 9600, Data bits 8, Parity none, Stop bits1, Flow control none and select “OK” (Figure 26).

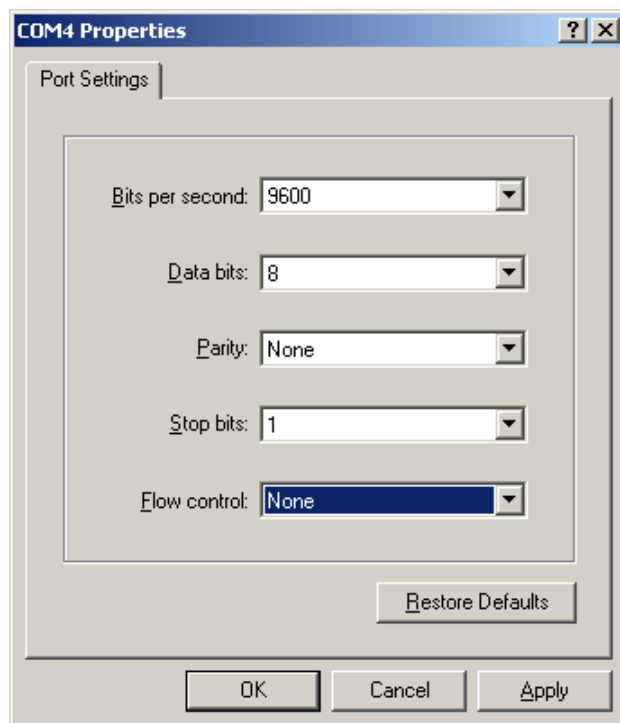


Figure 26

Note: At the end of the session you will be asked to save a HyperTerminal file that can be used again to reconnect to the PELCO easiGlow™. By opening a new HyperTerminal session you can cancel the configuration and open the previously save HyperTerminal from the file menu.

- Successful Connection

If the PELCO easiGlow™ is powered up and running a process and the cables are connected, a successful connection will show a reading every second (Figure 27). However, if it is not running you will have a blank screen (Figure 28). The PELCO easiGlow™ only sends data when it is running the countdown process timer.

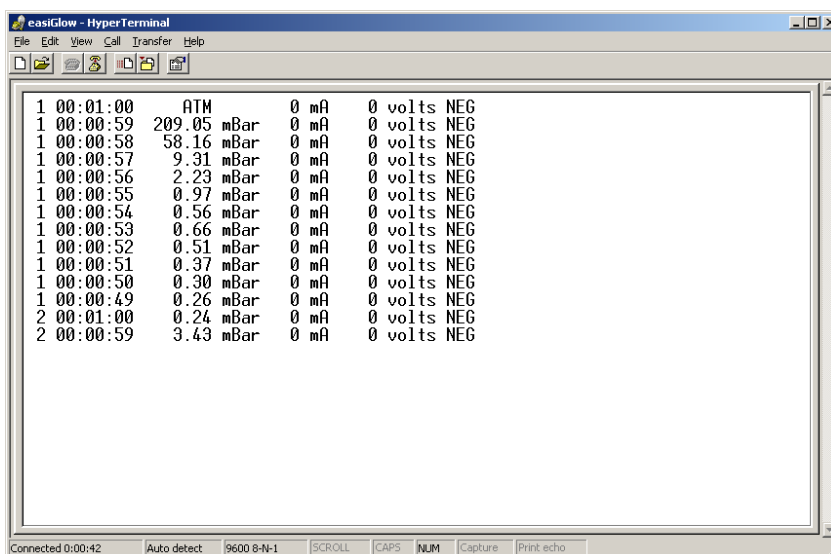


Figure 27

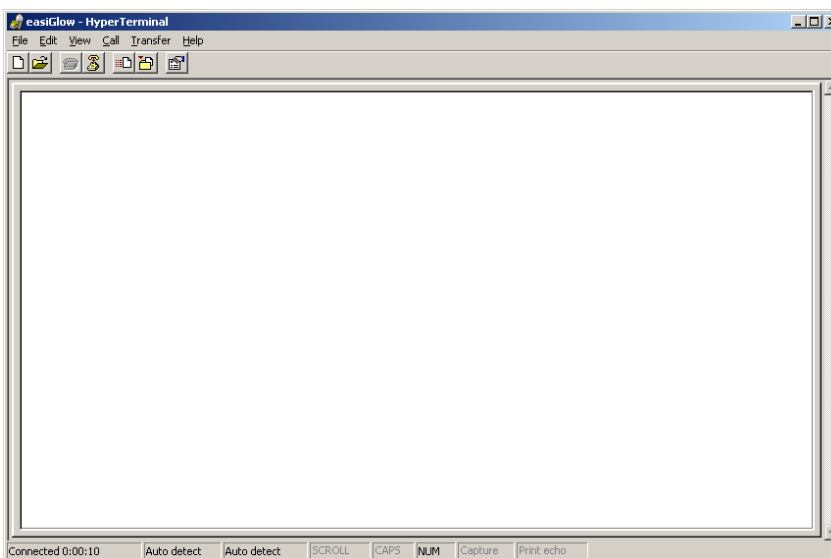


Figure 28

- Capturing Text with HyperTerminal

To capture the data from the PELCO easiGlow™ glow discharge, select the Transfer, Capture Text (Figure 29),

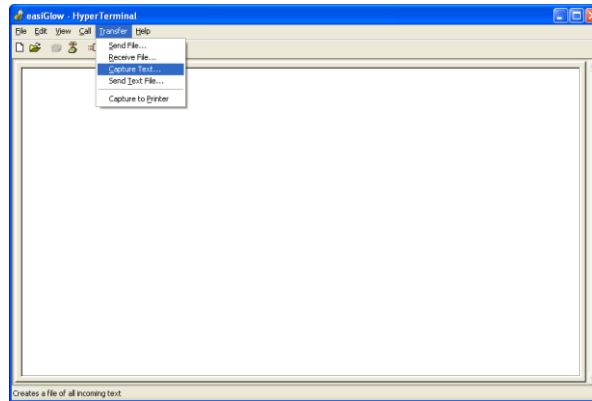


Figure 29

Either enter a filename and then click start (Figure 30),



Figure 30

or select the Browse button and select an existing text file name (Figure 31) and click Open.

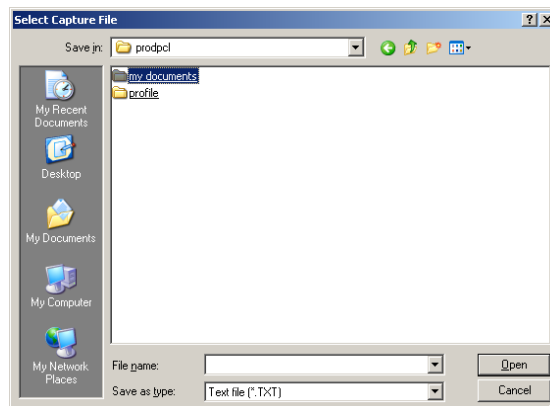


Figure 31