

## SAFETY & INSTALLATION INSTRUCTIONS FOR FLOATING FILAMENT PSUS PSUs USING THE APPLIED KILOVOLTS DIGITAL INTERFACE SYSTEM

### PLEASE READ CAREFULLY BEFORE INSTALLING OR OPERATING THE SYSTEM

#### Power Supply Warning Symbols

Caution,  
Risk of electric shock



Caution  
Refer to accompanying documentation



#### SAFETY

**The 24V supply wiring is different to that of the interface for the HP or LS Series modules, as the ribbon cable connector system cannot handle the current requirement of these power supplies.**

Digital On/Off control of these modules is provided by the interface driving the INH input of the power supply, and does NOT remove the 'source of energy' for the supply. The ON/OFF control provided by the digital interface **cannot** therefore be considered as a safety On/Off control.

For simplicity of wiring, a separate 24V connector is provided to power the Supply. This feed is also taken to power the interface electronics, so no additional 24V supply connection need be made via the ribbon cable, to power the Interface electronics.

In the default mode, if the USB connection powers down, or is unplugged, then the high voltage enable bus control line goes low and the high voltage supplies are turned off. This can be disabled by moving a link in the USB receiver box. It is the responsibility of the user to ensure the safety and integrity of the resulting system. If the high voltage enable (D-Type Interface connection 14) is forced low externally by an open collector transistor, then the high voltage supplies are turned off.

The optical link sends idle packets so if these packets are not seen for 2 frames, then the high voltage enable is turned off, and all isolated supplies will be turned off.

#### WIRING

**NOTE** The 24V power supply **must** be OFF before disconnecting the Power Connector.

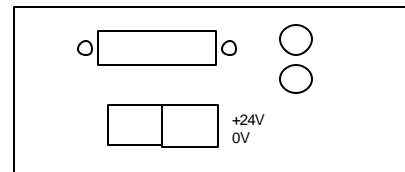
Separate Power Connector – upper is +24V, lower is 0V

Connections to D-type, to power the Interface electronics:

Pin 1, 2 & 9 = +24V supply to all PSUs/Interfaces

Pin 15, 7, & 8 = 0V supply to all PSUs/Interfaces

All connections must be daisy-chained to all connectors.



#### Notes

1/ The PSUs connect 0V to their chassis and to their HV o/p cable braid, however the 24Vdc supply should not rely on either of these paths for the power connection.

2/ Each HP style of PSU can draw up to 1 amp, so with multiple PSUs connected to a single ribbon cable, in addition to the FF unit, additional power connections will need to be made to the ribbon to distribute the power. The maximum current the ribbon cable can take is 1 amp.

(An HP Series PSU drawing no load current will take approx 300mA)

#### INTERFACE SPECIFICATION

**Input voltage:** 24Vdc  $\pm$  10% at 150mA per Interface (USB Receiver is powered by USB connection)

**Resolution:** 16bit monotonic Voltage Control, 8 bit Voltage Readback, 12 bit Current Readback.

**Temperature Coefficient:** 5ppm/ $^{\circ}$ C

**Cleaning:** Use a lint free cloth soaked with isopropyl alcohol, ensuring the unit is completely dry before use.

#### Environmental Conditions :

Indoor use only,

Operating Temperature 0 $^{\circ}$ C to +50 $^{\circ}$ C,

Altitude up to 2000m,

Storage Temperature -35 $^{\circ}$ C to +85 $^{\circ}$ C.

Maximum relative humidity 80% for temperatures up to 31 $^{\circ}$ C, decreasing linearly to 50% relative humidity at 40 $^{\circ}$ C,

The unit is to be supplied from a current limited supply providing 24Vdc, impulse limited to (overvoltage)

Category I of IEC60364-4-443.

For use in an environment of pollution degree 2.

## ORDER CODES

DCG1HPU16S1	Unipolar HP Card, 1kV, 2.5kV, 5kV, 10kV, 15kV	DCG1FFU16S4	– Floating Filament/HW Card
DCG1HPR16S1	Reversible HP Card 1kV, 2.5kV, 5kV, & 10kV	DCG1LSU16S5	– Unipolar or Reversible LS Card
DCG1HPR16S2	Reversible HP Card, 15kV, 20kV, & 30kV.	USB2CAF001	USB receiver + fibre-optic channel
DCG1HPU16S3	Unipolar HP Card, 20kV, 30kV & HF series	USB1CAA001	USB receiver [no fibre-optic channel]
FORM1F001	Fibre Optic Relay Module	USB2CDAA001	– Software Driver CD

## GENERAL

On receipt the unit should be carefully unpacked and inspected to ensure that no transit damage has occurred. Provided that this inspection is satisfactory and reveals no evidence of damage then installation can proceed.

If an electrical test is to be carried out prior to fitting the power supply, it is essential that the person undertaking this work has received appropriate technical training to be aware of the hazards to which that person may be exposed in performing the tests, and of measures to minimise the risks to themselves, and other personnel. Metallic or conductive tools should not be used to adjust any of the potentiometers. The unit has no user serviceable parts and should not be dismantled.

DO NOT HANDLE OR TOUCH THESE UNITS WHEN THE 24V SUPPLY, IS CONNECTED. AFTER DISCONNECTION FROM THE SUPPLY, ALLOW 30 SECONDS BEFORE HANDLING SO THAT ALL THE CAPACITORS CAN DISCHARGE. ALSO ENSURE THAT THE POWER INPUT TO THE BIASING SUPPLY IS REMOVED AND THIS SUPPLY ALSO IS FULLY DISCHARGED. To ensure that the output is fully discharged, short to ground before touching any high voltage circuit. Care should be taken not to operate the unit outside the specified limits given above; failure to do so may damage the unit.

## COMPLIANCE WITH SAFETY STANDARDS

The unit is designed to meet Normalised European Safety Standards Standards for installation in equipment conforming to EN61010 and hence installation of the power supply unit into the equipment should comply with the following requirements.

- a. A PROTECTIVE EARTH must be provided for safety in accordance with EN61010 Part 1 : latest : Clause 6.5.1. The case of the units must be bonded to this protective earth.
- b. The output is classed as hazardous and must therefore not be accessible to operators. The output must be isolated from accessible circuits by Double Insulation or a protective screen as defined in EN61010-1.
- c. It is intended to be installed in an electrical enclosure and the unit and its connections should not be accessible to the operator. Access should be restricted to authorised service personnel only, with use of a tool. Care should be taken to prevent access to the interior of the unit and protect against items (e.g. tools or wires) inadvertently entering the interior of the unit.
- d. The unit is not fitted with a fuse and so should be operated from a limited supply of <8 amp.
- e. The o/p current of the biasing supply, providing the floating voltage **must** be limited to 10mA.

## INSTALLATION

The outputs of these units are considered hazardous and should be installed such that they cannot become accessible. The output should be connected such that the shortest creepage and clearance path is to a protective earth connection. ENSURE that a LOW IMPEDANCE connection is made to the unit chassis from the system PROTECTIVE EARTH. The safety earth (ground) conductor must not contain any switches or fuses.

Under worst case conditions the unit draws a current of 1A and any input supply cable must be of a suitable type and rating. The unit is not fitted with a fuse and so should be operated from a limited supply. Fuses may be fitted externally to the unit to protect unit and interconnecting wiring etc. but these should be rated to prevent nuisance failures. Care should be taken in the design of the interconnecting wiring within the system to ensure that connectors with hazardous voltages cannot be connected to accessible circuits.

Ensure that the output is connected to the load prior to operation of the unit and that a good low impedance high voltage joint is made. Sharp points on either the high voltage or return joint should be avoided as this will cause corona which will make the output appear noisy. In general a tracking distance (creepage distance) of 25mm (1 inch), per 10kV to earth is advised as a minimum to ensure no breakdown or corona occurs, a much greater distance will be required under adverse conditions. Care must be taken not to damage the cable inner when forming the connections.

During arcing currents exceeding 1000 Amps will flow. It is important that these currents return to the high voltage power supply by the shortest possible route using the screen (shield) of the output cable. Failure to observe this will result in the control terminals of the unit seeing large voltage spikes during arcing and radiation of electromagnetic interference.

Adequate ventilation should be provided to keep the unit cool and the ventilation inlets should not be covered in any way. The ambient air temperature around the inlet must not exceed 50°C . The unit will operate in any orientation, however it is not recommended to operate with the side fitted with the silk-screen as the lowest face.

## OPERATING NOTES

- 1/ HIGH VOLTAGES ARE DANGEROUS. ENSURE THE OUTPUT IS FULLY DISCHARGED BY SHORTING TO GROUND BEFORE TOUCHING ANY HIGH VOLTAGE CIRCUIT.
- 2/ The unit is short circuit proof but care should be taken that the high voltage cannot be shorted into one of the control pin connections.
- 3/ Option Codes HW POWER SUPPLIES ARE DISPATCHED WITH INTERNAL POTENTIOMETER SET TO MAXIMUM. TURN DOWN TO ZERO BEFORE CONNECTING TO 24 VOLT SUPPLY.