

Instruction Manual

600 SERIES

**SPELLMAN
HIGH VOLTAGE ELECTRONICS
CORPORATION**

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USA

EUROPE

JAPAN

MEXICO



- **1-20KV @ 10-15 WATTS**
- **AC INPUT MODULAR POWER SUPPLY**
- **115/230 VAC SELECTABLE**
- **EXCELLENT REGULATION**
- **VERY LOW RIPPLE**
- **ARC/SHORT CIRCUIT PROTECTED**

Spellman's Bertan brand of 602C modular high voltage power supplies offer well regulated, fixed polarity outputs up to 20kV, that operate off a standard switch selectable 115/230Vac input. These fully enclosed modules are designed for bench top or OEM applications like spectrometers, detectors, imaging and electron beam usage.

The output voltage can be controlled by either a local internal potentiometer or by a customer provided ground referenced signal for remote operation. Additionally ground referenced output voltage and current monitor signals are provided. A high voltage enable signal input allows remote control of the supply.

TYPICAL APPLICATIONS

Spectrometers
Detectors

SPECIFICATIONS

Input Voltage:

115Vac, $\pm 10\%$, 50/60 Hertz @ 0.5 amp
230Vac, $\pm 10\%$, 50/60 Hertz @ 0.25 amp
Input voltage is fused and switch selectable

Output Polarity:

Positive or negative, specify at time of order

Output Voltage:

See "model ratings" table

Output Current:

See "model ratings" table

Voltage Regulation:

Line - $\pm 0.001\%$ of rated output voltage over specified input voltage range
Load - $\pm 0.002\%$ of rated output voltage for a full load change

Ripple:

See "model ratings" table

Stability:

$\leq 0.01\%$ per hour, after a 1/2 hour warm up

Temperature Coefficient:

$\leq 50\text{ppm}/^\circ\text{C}$

Arc/Short Circuit:

All units are fully arc and short circuit protected and will limit continuous short circuit output current to less than 110% of maximum rated output current.

Operating Temperature:

0°C to $+50^\circ\text{C}$

Storage Temperature:

-40°C to $+85^\circ\text{C}$

Humidity:

20% to 85% RH, non-condensing

Interface Connector:

9 pin Molex connector, mating connector and pins provided

AC Input Line Connector:

3 position terminal block

Output Connector:

10' (3 meter) detachable HV cable is provided for units up to 5kV; 10kV through 20kV: 59" (1.5 meter) cable.

Cooling:

Convection cooled.

Dimensions:

5.0"H X 3.1"W X 8.7"D (128mm x 78mm x 220mm)

Weight:

≤ 6.75 pounds (3.1kg)

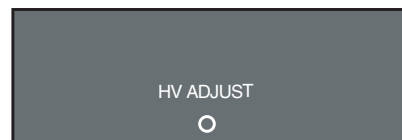
MODEL RATINGS TABLE

Model	Output Voltage	Output Current	Ripple (Vpp)
602C-10P,N	0 to 1kV	0 to 15mA	15mV
602C-15P,N	0 to 1.5kV	0 to 10mA	15mV
602C-30P,N	0 to 3kV	0 to 5mA	30mV
602C-50P,N	0 to 5kV	0 to 2mA	50mV
602C-100P,N	0 to 10kV	0 to 1mA	200mV
602C-150P,N	0 to 15kV	0 to 0.6mA	450mV
602C-200P,N	0 to 20kV	0 to 0.5mA	800mV

Specify "P" for positive polarity or "N" for negative polarity

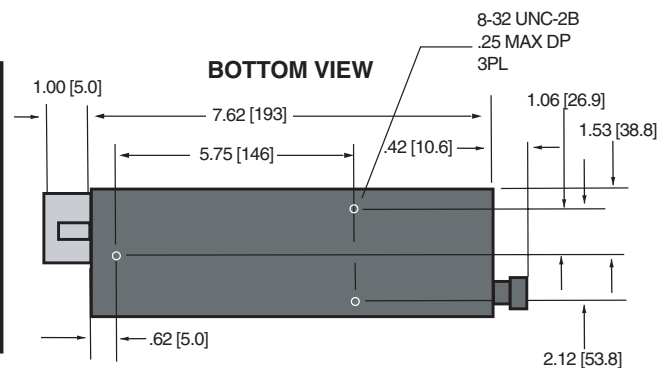
DIMENSIONS: in.[mm]

TOP VIEW



INTERFACE CONNECTOR-P2

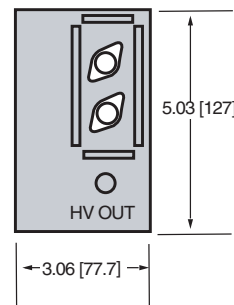
PIN	SIGNAL	SIGNAL PARAMETERS
1	n/c	None
2	n/c	None
3	Signal Ground	Ground
4	Voltage Program	0 to 5Vdc = 0 to 100% rated output, 1MΩ Zin
5	+5.0Vdc Reference	+5.0Vdc, 10mA maximum
6	kV Monitor	0 to 5Vdc = 0 to 100% rated output, 10KΩ Zout
7	mA Monitor	0 to 5Vdc = 0 to 100% rated output, 10KΩ Zout
8	Trip Input	Connect to ground to trip unit off
9	Local Voltage Program	Internal program potentiometer wiper, 0 to 5Vdc



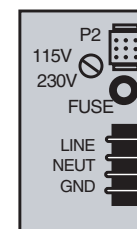
AC INPUT TERMINAL BLOCK

Terminal	Function
1	115/230 Vac Input
2	Neutral
3	Ground

FRONT VIEW



REAR VIEW





Spellman's Bertan brand of 603C modular high voltage power supplies offer well regulated, fixed polarity outputs up to 30kV, that operate off a standard switch selectable 115/230Vac input. These fully enclosed modules are designed for bench top or OEM applications like spectrometers, detectors, imaging and electron beam usage.

The output voltage can be controlled by either a local internal potentiometer or by a customer provided ground referenced signal for remote operation. Additionally ground referenced output voltage and current monitor signals are provided. A high voltage enable signal input allows remote control of the supply.

TYPICAL APPLICATIONS

Spectrometers
Detectors

SPECIFICATIONS

Input Voltage:

115Vac, $\pm 10\%$, 50/60 Hertz @ 1.0 amp
230Vac, $\pm 10\%$, 50/60 Hertz @ 0.5 amp
Input voltage is fused and switch selectable

Output Polarity:

Positive or negative, specify at time of order

Output Voltage:

See "model ratings" table

Output Current:

See "model ratings" table

Voltage Regulation:

Line: $\pm 0.001\%$ of rated output voltage over specified input voltage range
Load: $\pm 0.002\%$ of rated output voltage for a full load change

- **1-30KV @ 12-30 WATTS**
- **AC INPUT MODULAR POWER SUPPLY**
- **115/230 VAC SELECTABLE**
- **EXCELLENT REGULATION**
- **VERY LOW RIPPLE**
- **ARC AND SHORT CIRCUIT PROTECTED**

Ripple:

See "model ratings" table

Stability:

$\leq 0.01\%$ per hour, after a 1/2 hour warm up

Temperature Coefficient:

$\leq 50\text{ppm}/^\circ\text{C}$

Arc/Short Circuit:

All units are fully arc and short circuit protected and will limit continuous short circuit output current to less than 110% of maximum rated output current.

Operating Temperature:

0°C to $+50^\circ\text{C}$

Storage Temperature:

-40°C to $+85^\circ\text{C}$

Humidity:

20% to 85% RH, non-condensing

Interface Connector:

9 pin Molex connector, mating connector and pins provided

AC Input Line Connector:

3 position terminal block

Output Connector:

10' (3 meter) detachable HV cable is provided for units up to 5kV; 10kV through 20kV: 59" (1.5 meter) cable, 30kV: 78" (2 meter) cable

Cooling:

Convection cooled

Dimensions:

5.0"H X 5.5"W X 8.5"D (127mm x 140mm x 216mm)

Weight:

≤ 8.0 pounds (3.64kg)

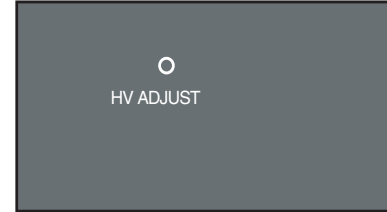
MODEL RATINGS TABLE

Model	Output Voltage	Output Current	Ripple (Vpp)
603C-10P,N	0 to 1kV	0 to 30mA	15mV
603C-15P,N	0 to 1.5kV	0 to 20mA	15mV
603C-30P,N	0 to 3kV	0 to 10mA	30mV
603C-50P,N	0 to 5kV	0 to 5mA	50mV
603C-100P,N	0 to 10kV	0 to 2mA	200mV
603C-150P,N	0 to 15kV	0 to 1.5mA	450mV
603C-200P,N	0 to 20kV	0 to 1.0mA	800mV
603C-300P,N	0 to 30kV	0 to 0.4mA	6 volts

Specify "P" for positive polarity or "N" for negative polarity

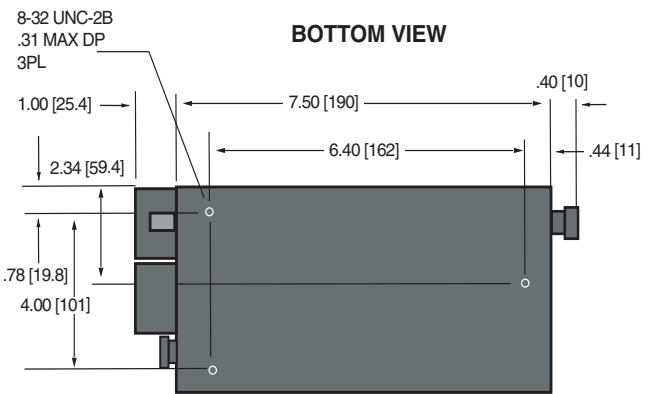
DIMENSIONS: in.[mm]

TOP VIEW



INTERFACE CONNECTOR-P2

PIN	SIGNAL	SIGNAL PARAMETERS
1	n/c	None
2	n/c	None
3	Signal Ground	Ground
4	Voltage Program	0 to 5Vdc = 0 to 100% rated output, 1MΩ Zin
5	+5.0Vdc Reference	+5.0Vdc, 10mA maximum
6	kV Monitor	0 to 5Vdc = 0 to 100% rated output, 10KΩ Zout
7	mA Monitor	0 to 5Vdc = 0 to 100% rated output, 10KΩ Zout
8	Trip Input	Connect to ground to trip unit off
9	Local Voltage Program	Internal program potentiometer wiper, 0 to 5Vdc

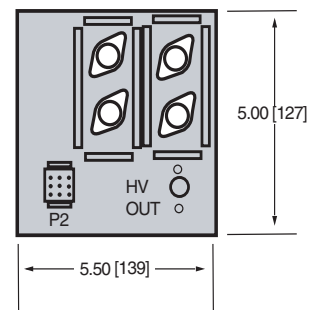


AC INPUT TERMINAL BLOCK

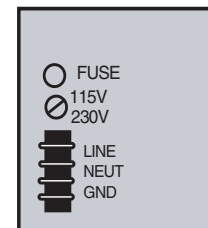
Terminal	Function
1	115/230 Vac Input
2	Neutral
3	Ground



FRONT VIEW



REAR VIEW





- **1-20KV @ 6-9 WATTS**
- **DC INPUT MODULAR POWER SUPPLY**
- **EXCELLENT REGULATION**
- **VERY LOW RIPPLE**
- **ARC/SHORT CIRCUIT PROTECTED**

Spellman's Bertan brand of 605C modular high voltage power supplies offer well regulated, fixed polarity outputs up to 20kV, which operate off a +28Vdc input (+24Vdc optional). These fully enclosed modules are designed for bench top or OEM applications like spectrometers, detectors, imaging and electron beam usage.

The output voltage can be controlled by either a local internal potentiometer or by a customer provided ground referenced signal for remote operation. Additionally ground referenced output voltage and current monitor signals are provided. A high voltage enable signal input allows remote control of the supply.

TYPICAL APPLICATIONS

Spectrometers
Detectors

SPECIFICATIONS

Input Voltage:

+28Vdc, $\pm 10\%$, @ 0.75 amp
+24Vdc, $\pm 10\%$, @ 1 amp (24V Option)

Output Polarity:

Positive or negative, specify at time of order

Output Voltage:

See "model ratings" table

Output Current:

See "model ratings" table

Voltage Regulation:

Line: $\pm 0.001\%$ of rated output voltage over specified input voltage range
Load: $\pm 0.002\%$ of rated output voltage for a full load change

Ripple:

See "model ratings" table

Stability:

$\leq 0.01\%$ per hour, after a 1/2 hour warm up

Temperature Coefficient:

$\leq 50\text{ppm}/^\circ\text{C}$

Arc/Short Circuit:

All units are fully arc and short circuit protected and will limit continuous short circuit output current to less than 110% of maximum rated output current.

Operating Temperature:

0°C to $+50^\circ\text{C}$

Storage Temperature:

-40°C to $+85^\circ\text{C}$

Humidity:

20% to 85% RH, non-condensing

Interface Connector:

9 pin Molex connector, mating connector and pins provided

Output Connector:

59" (1.5 meter) detachable HV cable is provided

Cooling:

Convection cooled

Dimensions:

5.0"H X 2.75"W X 4.75"D (128mm x 70mm x 121mm)

Weight:

≤ 3.2 pounds (1.45kg)

MODEL RATINGS TABLE

Model	Output Voltage	Output Current	Ripple (Vpp)
605C-10P,N	0 to 1kV	0 to 9mA	15mV
605C-15P,N	0 to 1.5kV	0 to 6mA	15mV
605C-30P,N	0 to 3kV	0 to 3mA	30mV
605C-50P,N	0 to 5kV	0 to 1.5mA	50mV
605C-100P,N	0 to 10kV	0 to 0.75mA	200mV
605C-150P,N	0 to 15kV	0 to 0.4mA	450mV
605C-200P,N	0 to 20kV	0 to 0.25mA	750mV

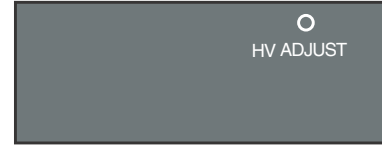
Specify "P" for positive polarity or "N" for negative polarity

INTERFACE CONNECTOR-P2

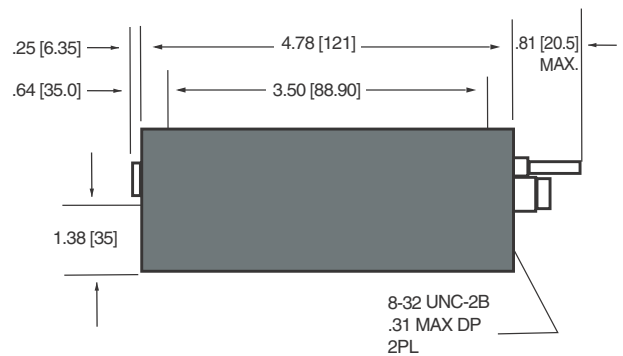
PIN	SIGNAL	SIGNAL PARAMETERS
1	Power Ground	Power Ground
2	Power Input	+28Vdc Power Input (+24Vdc optional)
3	Signal Ground	Signal Ground
4	Voltage Program	0 to 5Vdc = 0 to 100% rated output, 1MΩ Zin
5	+5.0Vdc Reference	+5.0Vdc, 10mA maximum
6	kV Monitor	0 to 5Vdc = 0 to 100% rated output, 10KΩ Zout
7	mA Monitor	0 to 5Vdc = 0 to 100% rated output, 10KΩ Zout
8	Trip Input	Connect to ground to trip unit off
9	Local Voltage Program	Internal program potentiometer wiper, 0 to 5Vdc

DIMENSIONS: in.[mm]

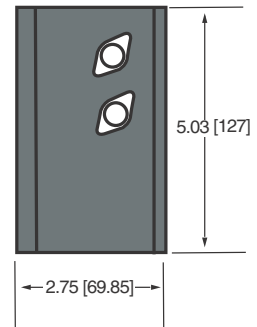
TOP VIEW



BOTTOM VIEW



FRONT VIEW



REAR VIEW





- **1-30KV @ 12-30 WATTS**
- **DC INPUT MODULAR POWER SUPPLY**
- **EXCELLENT REGULATION**
- **VERY LOW RIPPLE**
- **ARC SHORT CIRCUIT PROTECTED**

Spellman's Bertan brand of 606C modular high voltage power supplies offer well regulated, fix polarity outputs up to 30kV, which operate off a +28Vdc input (+24Vdc optional). These fully enclosed modules are designed for bench top or OEM applications like spectrometers, detectors, imaging and electron beam usage.

The output voltage can be controlled by either a local internal potentiometer or by a customer provided ground referenced signal for remote operation. Additionally ground referenced output voltage and current monitor signals are provided. A high voltage enable signal input allows remote control of the supply.

TYPICAL APPLICATIONS

Spectrometers
Detectors

SPECIFICATIONS

Input Voltage:

+28Vdc, $\pm 10\%$, @ 2.25 amps
+24Vdc, $\pm 10\%$, @ 2.5 amps (24V Option)

Output Polarity:

Positive or negative, specify at time of order

Output Voltage:

See "model ratings" table

Output Current:

See "model ratings" table

Voltage Regulation

Line: $\pm 0.001\%$ of rated output voltage over specified input voltage range
Load: $\pm 0.002\%$ of rated output voltage for a full load change

Ripple:

See "model ratings" table

Stability:

$\leq 0.01\%$ per hour, after a 1/2 hour warm up

Temperature Coefficient:

$\leq 50\text{ppm}/^\circ\text{C}$

Arc/Short Circuit:

All units are fully arc and short circuit protected and will limit continuous short circuit output current to less than 110% of maximum rated output current.

Operating Temperature:

0°C to $+50^\circ\text{C}$

Storage Temperature:

-40°C to $+85^\circ\text{C}$

Humidity:

20% to 85% RH, non-condensing

Interface Connector:

9 pin Molex, mating connector and pins provided

Output Connector:

10' (3 meter) detachable HV cable is provided for units up to 5kV; 10kV through 20kV: 59" (1.5 meter) cable; 30kV: 78" (2 meter) cable

Cooling:

Convection cooled

Dimensions:

5.0"H X 5.50"W X 4.75"D (128mm x 140mm x 121mm)

Weight:

≤ 3.2 pounds (1.45kg)

MODEL RATINGS TABLE

Model	Output Voltage	Output Current	Ripple (Vpp)
606C-10P,N	0 to 1kV	0 to 30mA	15mV
606C-15P,N	0 to 1.5kV	0 to 20mA	15mV
606C-30P,N	0 to 3kV	0 to 10mA	30mV
606C-50P,N	0 to 5kV	0 to 5mA	50mV
606C-100P,N	0 to 10kV	0 to 2mA	200mV
606C-150P,N	0 to 15kV	0 to 1.5mA	450mV
606C-200P,N	0 to 20kV	0 to 1.0mA	800mV
606C-300P,N	0 to 30kV	0 to 0.4mA	6 volts

Specify "P" for positive polarity or "N" for negative polarity

INTERFACE CONNECTOR-P2

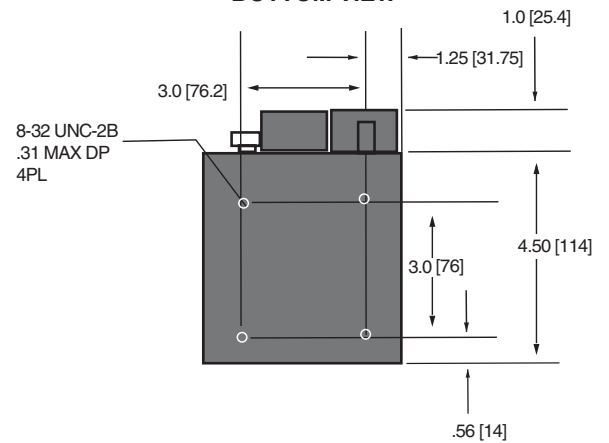
PIN	SIGNAL	SIGNAL PARAMETERS
1	Power Ground	Power Ground
2	Power Input	+28Vdc Power Input (+24Vdc optional)
3	Signal Ground	Signal Ground
4	Voltage Program	0 to 5Vdc = 0 to 100% rated output, 1MΩ Zin
5	+5.0Vdc Reference	+5.0Vdc, 10mA maximum
6	kV Monitor	0 to 5Vdc = 0 to 100% rated output, 10KΩ Zout
7	mA Monitor	0 to 5Vdc = 0 to 100% rated output, 10KΩ Zout
8	Trip Input	Connect to ground to trip unit off
9	Local Voltage Program	Internal program potentiometer wiper, 0 to 5Vdc

DIMENSIONS: in.[mm]

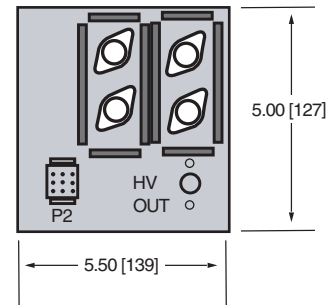
TOP VIEW



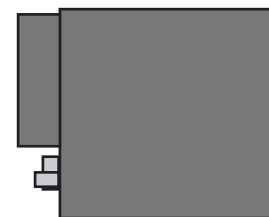
BOTTOM VIEW



FRONT VIEW



REAR VIEW



IMPORTANT SAFETY PRECAUTIONS

SAFETY

THIS POWER SUPPLY GENERATES VOLTAGES THAT ARE DANGEROUS AND MAY BE FATAL.
OBSERVE EXTREME CAUTION WHEN WORKING WITH THIS EQUIPMENT.

High voltage power supplies must always be grounded.

Do not touch connections unless the equipment is off and the Capacitance of both the load and power supply is discharged.

Allow five minutes for discharge of internal capacitance of the power supply.

Do not ground yourself or work under wet or damp conditions.

SERVICING SAFETY

Maintenance may require removing the instrument cover with the power on.

Servicing should be done by qualified personnel aware of the electrical hazards.

WARNING note in the text call attention to hazards in operation of these units that could lead to possible injury or death.

CAUTION notes in the text indicate procedures to be followed to avoid possible damage to equipment.

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**SECTION I –
INTRODUCTION/SPECIFICATIONS**

1.0 SCOPE OF MANUAL

This manual is provided to assist the user in the installation and operation of the Bertan Series 602C, 603C, 605C, 606C and 612C modular high voltage power supplies. Statements will apply to models in all of the Series unless reference is made to specific models. For the protection of personnel and equipment, it is essential that this manual be thoroughly read prior to the installation and application of power.

1.1 PURPOSE OF EQUIPMENT

The Series 602C, 603C, 605C, 606C and 612C are families of regulated fixed output polarity modular high voltage power supplies. They provide exceptional performance in applications such as CRT's spectrometers, detectors, medical imaging, image intensifiers, E-Beam, I-Beam, medical imaging and capillary electrophoresis (HPCE) systems.

1.2 DESCRIPTION

The units are fully enclosed and designed to easily satisfy system or bench top operation. A wide range of stable output voltages, up to 30kV are available. The output voltage is controlled locally by a minimum 15-turn potentiometer. Remote analog voltage of resistance programming is also available to the user as a standard feature. All units offer a 0 to +5Vdc analog monitor output proportional to the output current.

The Series 602C, 603C and 612C require an input of 115/230Vac (switch selectable) +10%, 50-60Hz. The Series 605C and 606C require a +28Vdc +10% input (or +24Vdc ±10% for units equipped with +24V Option). Each unit in the Series converts the applied power to a high voltage DC output. This output voltage is highly regulated and filtered. The high voltage assembly is fully encapsulated in silicone rubber for reliable, arc-free, stable operation.

HV Connector:		SERIES 602C, 603C, 605C	606C
MODEL	HV OUTPUT CONNECTOR	MATING HV CONNECTOR	
602C -15 P, N thru -50 P, N	UG-931/U (MHV)	UG-932/U (Bertan PDB)	
603C & 606C -15 P, N thru -50 P, N	KINGS 1707-1 (SHV)	1705-1 Bertan PAE)	
All 605C and all -100 P, N and -150 P, N	8101FP	8101M (Bertan PGC-008L151-000)	
All -200P,N	8101FP	8101M (Bertan PGC-008L1 51-000)	
All -300P,N	8111SFP	8111M (Bertan PGQ-008L201 -000)	

Only the mating connectors for the 8101 FP and 8111 SFP (assembled to an unshielded high voltage cable) are provided. For other HV mating connectors order separately.

SERIES 612C

MODEL	HV OUTPUT CONNECTOR	MATING HV CONNECTOR KIT
612C-200	JJA	405787
612C-300	JJA	405787
612C-500	JJB	405786

The appropriate mating connector kit is provided with each Series 612C unit. For pre-assembled high voltage cables, please consult factory.

Size and Weight

SERIES	SIZE H" x W" x D" (mm)	WEIGHT Lbs (kg)
602C	5.03 x 3.06 x 8.66 (125 x 78 x 220)	6.75 (3.1)
603C	5.00 x 5.50 x 8.50 (127 x 140 x 216)	8.0 (3.64)
605C	5.04 x 2.75 x 4.75 (128 x 70 x 114)	3.2 (1.45)
606C	5.00 x 5.50 x 4.50 (127 x 140 x 114)	3.5 (1.6)
612C	4.88 x 8.38 x 9.75 (124 x 213 x 248)	9 (4.1)

SECTION II – OPERATION

CAUTION: THIS UNIT CAN STORE HAZARDOUS VOLTAGE! COMPLETELY DISCHARGE THE HIGH VOLTAGE TO GROUND BEFORE ATTEMPTING REMOVAL OF THE HIGH VOLTAGE CABLE.

2.1 INSTALLATION

All power supplies can be mounted in any position using the tapped holes in the base plate. The mounting screws should extend no more than ¼” into the unit. Series 602C and 605C require #8-32 mounting screws. Series 603C, 606C, and 612C require #10-32 mounting screws.

2.2 INPUT POWER

Input power is applied via the 3-terminal terminal strip for the Series 602C, 603C, and 612C or via the 9-pin connector for the Series 605C and 606C. The terminal or pin connections are as listed in Section 2.7.

CAUTION: APPLICATION OF INPUT POWER CAN IMMEDIATELY PRODUCE A HIGH VOLTAGE OUTPUT!

2.3 HIGH VOLTAGE CONTROL

There are three modes of controlling the high voltage. The user can select mode by making appropriate connections via the 9-pin Molex connector. All modes provide high voltage control from 0 to 100% ($\pm 0.5\%$).

2.3.1 INTERNAL POTENTIOMETER CONTROL

See Section 2.7 for hook-up information. This will allow control of the high voltage output by means of the multi-turn potentiometer accessible via a hole in the cover.

2.3.2 EXTERNAL POTENTIOMETER CONTROL

See Section 2.7 for hook-up information. Connecting an external potentiometer (recommended value of 5kW) will control the high voltage output independently of the

internal potentiometer setting.

2.3.3 EXTERNAL VOLTAGE CONTROL

See Section 2.7 for hook-up information. The output high voltage can be controlled by a 0 to +5Vdc analog signal.

2.4 HIGH VOLTAGE MONITOR

See Section 2.7 for hook-up information. A 0 to +5Vdc analog signal, which is proportional to the output high voltage. The monitor has a series impedance of 10kW.

2.5 OUTPUT CURRENT MONITOR

See Section 2.7 for hook-up information. A 0 to +5Vdc analog signal, which is proportional to the output current. The monitor has a series impedance of 10kW.

2.6 TRIP UNIT

See Section 2.7 for hook-up information. It provides the user with a means of remote turn ON/OFF. This input requires a contact closure to ground to turn off the high voltage. A NPN open collector transistor logic can also be employed. When no connection is made to this input the high voltage is enabled.

2.7 INPUT/CONTROL/MONITOR CONNECTIONS

INPUT POWER CONNECTIONS SERIES 602C/603C/612C ONLY

TERMINAL	FUNCTION
1	115/230Vac Input
2	Neutral
3	Ground

CONTROL AND MONITORING CONNECTIONS ALL MODELS

P2/PIN#	FUNCTION
3	Ground
4	Program Input
5	+5Vdc Reference
6	kV Monitor
7	Current Monitor
8	Trip (Short to Gnd)
9	Internal Program

INPUT POWER CONNECTIONS SERIES 605C/606C ONLY

P2/PIN#	FUNCTION
1	+Vcc Return
2	+Vcc Input

PIN LAYOUT INPUT/CONTROL/MONITOR CONNECTOR (P2)



Note: To obtain local control using the internal potentiometer accessible at the top of the unit, jumper P2 pin 4 to pin 9.

For remote potentiometer control connect the remote potentiometer as follows:
 CW terminal to P2 pin 5
 CCW terminal to P2 pin 3
 Wiper terminal to P2 pin 4

For remote 0 to +5V voltage programming, apply the input program voltage to P2 pin 4.

For remote TRIP connect P2 pin 8 to P2 pin 3

SECTION III PROGRAMMING OPTIONS

3.1 GENERAL

To provide additional flexibility and compatibility with earlier models, provision has been included to allow voltage programming of all models with a 0 to -5 Volt programming input. There are four different jumper-selectable modes for programming. The jumpers for selecting the required operating mode are located on PCB100 (the large PCB), easily accessible upon removal of the cover. Jumper locations are shown below in Table III-1.

The four modes are described below. The

first three modes apply to all Series 602C, 603C, 605C, 606C and 612C units. The last mode applies only to the Series 612C and is included only with Series 612C units ordered with the –5VPRO option.

3.2 STANDARD MODE

The unit is shipped in this configuration and operation is as described in the previous sections of this instruction manual. The unit can be controlled using the internal pot or programmed with a remote 0 to +5 Volt signal or controlled with a remote potentiometer.

3.3 -5 VOLT PROGRAMMING (for 0 to 100% output voltage) MODE

To achieve this operation the jumpers on PCB100 must be configured as shown in the chart below. In this mode the programming signal is applied to P2 pin 4, same as for Standard Mode, only now a 0 to –5 Volt programming input is required to achieve 0 to 100% output voltage programming. No jumpers should be attached to P2, the external connector. In this mode there is no internal control, the internal potentiometer is bypassed.

3.4 -5 VOLT PROGRAMMING (for 0 to 103% output voltage) MODE:

To achieve this operation the jumpers on PCB100 must be configured as shown in the chart below. In this mode the programming signal is applied to P2 pin 4, same as for Standard Mode. No jumpers should be attached to P2, the external connector.

In this mode the internal potentiometer is used to control the maximum programmed output voltage at –5 Volt programming input. With the potentiometer fully clockwise, the output will be 0 to 103% of maximum for a 0 to –5 Volt input. With the potentiometer turned up approximately half way, a 0 to –5 Volt input will produce a 0 to approximately 50% of maximum output voltage.

This mode is included to provide exact compatibility with some previous units. It also provides the user with a controllable upper limit on the programmed output for an input of –5 Volts.

3.5 SERIES 612C –5 VOLT PROGRAMMING MODE

Series 612C units ordered with the –5VPRO (–5 Volt Programming) option, include an extra 5 pin hexagonal connector (J3). The connector contains additional monitor outputs and a 0 to – 5 Volt programming input. This option provides compatibility with earlier Series 612C models when used with –5 Volt programming. The mating connector for J3 is included and J3 connections are shown below in Table III-2.

In this mode the programming signal is applied to J3 pin A. A 0 to –5 Volt programming input is required to achieve 0 to 100% output voltage programming. No jumpers should be attached to P2, the external connector. In this mode there is no internal control, the internal potentiometer is bypassed.

TABLE III-1 PCB 100 JUMPER POSITIONS

STANDARD MODE:

Jumper pins 1 to 3, pins 5 to 7

3.3 -5 VOLT PROGRAMMING (for 0 to 100% output voltage) MODE: Jumper pins 1 to 2, pins 3 to 4

3.4 -5 VOLT PROGRAMMING (for 0 to 103% output voltage) MODE: Jumper pins 1 to 2, pins 3 to 5, and pins 6 to 8

3.5 ERIES 612C -5 VOLT PROGRAMMING MODE: Jumper pins 3 to 5, pins 4 to 6, and pins 7 to 8

TABLE III-2 J3 PIN CONNECTIONS (Series 612C Option -5VPRO only)

PIN A: 0 to -5Volt programming input

PIN B: NC

PIN D: Output voltage monitor (0 to +5V for 0 to maximum HV output) **PIN E:** GND

PIN H: Output current monitor (0 to +5V for 0 to maximum current out)

SECTION IV – CIRCUIT DESCRIPTION

4.1 FUNCTIONAL DESCRIPTION

The 602C, 603C, and 612C employ a standard step-down transformer to obtain a nominal +28Vdc from the input ac power. The Series 605C and 606C obtain +28Vdc (+24Vdc for +24V Option models) from the input ac power. The circuit converts the +Vdc low voltage input

DC power to a high voltage DC output. This output voltage is highly regulated and filtered and can be varied either by the local potentiometer control or through the REMOTE PROGRAM input.

An oscillator determines the frequency (approximately 20kHz) at which all amplification, high voltage transformation, rectification and filtering occurs. The amplification is a function of a control voltage which performs the function of control and regulation. A sample of the output voltage is compared against a reference voltage in the sensing circuit. The sensing circuit generates the control voltage to set and maintain a fixed high voltage output.

The encapsulated high voltage assembly includes a high voltage power transformer, rectifier or multiplier circuits, ripple filter and sensing circuits. These are all critical, custom designed and encapsulated components.

SECTION V – MAINTENANCE

5.1 GENERAL

The high voltage power supply should not require any maintenance or calibration. It is designed for reliable, trouble free operation. If any question should arise, contact the Bertan Customer Service Department for assistance or return authorization. Although it is felt that adequate information is provided in this manual, it is suggested that the unit be returned to the factory if service should become necessary.

The power supply can be returned to the factory for annual calibration and certification to its original specification. For traceability, a certificate will be issued, identifying the serial number of the unit calibrated and all test

equipment used to perform the calibration. All measurements are traceable to the National Institute of Standards and Technology (N.I.S.T.). Contact the factory for additional details.

5.2 CLEANING

Cleaning of the power supply should **only** be performed with the supply disconnected from the ac power source. A soft cloth moistened with conventional ammonia-based cleaning agents will suffice for all exposed surfaces. The exposed shell of the HV connector should be cleaned with isopropyl alcohol.

If the supply is operated in a dusty environment, an accumulation of dust/debris may build-up inside the unit which may cause noisy operation (i.e., “ticking” or minor crackling) in the area of the HV cabling on the 10kV through 30kV models. The safest way to remove such debris is with compressed air. Ensure that no dust/debris is left behind in the insulative medium of the HV output connector after this cleaning operation. Such dust may be removed with a cotton swab moistened with isopropyl alcohol.

SPELLMAN HIGH VOLTAGE ELECTRONICS

WARRANTY

Spellman High Voltage Electronics (“**Spellman**”) warrants that all power supplies it manufactures will be free from defects in materials and factory workmanship, and agrees to repair or replace, without charge, any power supply that under normal use, operating conditions and maintenance reveals during the warranty period a defect in materials or factory workmanship. The warranty period is twelve (12) months from the date of shipment of the power supply. With respect to standard SL power supplies (not customized) the warranty period is thirty-six (36) months from the date of shipment of the power supply.

This warranty does not apply to any power supply that has been:

- Disassembled, altered, tampered, repaired or worked on by persons unauthorized by **Spellman**;
- subjected to misuse, negligent handling, or accident not caused by the power supply;
- installed, connected, adjusted, or used other than in accordance with the original intended application and/or instructions furnished by **Spellman**.

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THOSE OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

The buyer’s sole remedy for a claimed breach of this warranty, and **Spellman’s** sole liability is limited, at **Spellman’s** discretion, to a refund of the purchase price or the repair or replacement of the power supply at **Spellman’s** cost. The buyer will be responsible for shipping charges to and from **Spellman’s** plant. The buyer will not be entitled to make claim for, or recover, any anticipatory profits, or incidental, special or consequential damages resulting from, or in any way relating to, an alleged breach of this warranty.

No modification, amendment, supplement, addition, or other variation of this warranty will be binding unless it is set forth in a written instrument signed by an authorized officer of **Spellman**.

Factory Service Procedures

For an authorization to ship contact **Spellman’s** Customer Service Department. Please state the model and serial numbers, which are on the plate on the rear panel of the power supply and the reason for return. A Return Material Authorization Code Number (RMA number) is needed from **Spellman** for all returns. The RMA number should be marked clearly on the outside of the shipping container. Packages received without an RMA Number may delay return of the product. The buyer shall pay shipping costs to and from **Spellman**. Customer Service will provide the Standard Cost for out-of-warranty repairs. A purchase order for this amount is requested upon issuance of the RMA Number (in-warranty returns must also be accompanied by a “zero-value” purchase order). A more detailed estimate may be made when the power supply is received at **Spellman**. In the event that the cost of the actual repair exceeds the estimate, **Spellman** will contact the customer to authorize the repair.

Factory Service Warranty

Spellman will warrant for three (3) months or balance of product warranty, whichever is longer, the repaired assembly/part/unit. If the same problem shall occur within this warranty period **Spellman** shall undertake all the work to rectify the problem with no charge and/or cost to the buyer. Should the cause of the problem be proven to have a source different from the one that has caused the previous problem and/or negligence of the buyer, **Spellman** will be entitled to be paid for the repair.

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