

Instruction Manual

600 SERIES

**SPELLMAN
HIGH VOLTAGE ELECTRONICS
CORPORATION**

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USA

EUROPE

JAPAN

MEXICO



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

Ripple:

See "model ratings" table

Stability:

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

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

www.spellmanhv.com/manuals/600

Accuracy:

Local Control $\pm 0.2\%$
Remote Programming $\pm(0.1\%$ of setting + 0.1% of maximum)
Voltage Monitor $\pm(0.1\%$ of reading + 0.1% of maximum)
Current Monitor $\pm(2\%$ of reading + 1% of maximum)

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)

Regulatory Approvals:

Compliant to 2004/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive. UL/CUL recognized, File E137710.

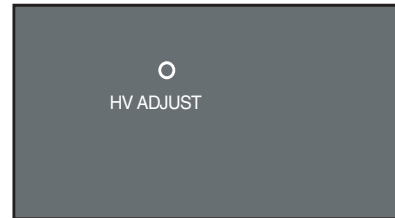
MODEL RATINGS TABLE

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]

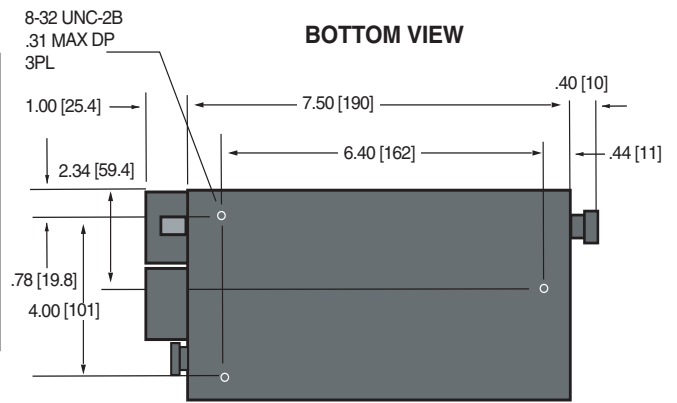
TOP VIEW



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

BOTTOM VIEW

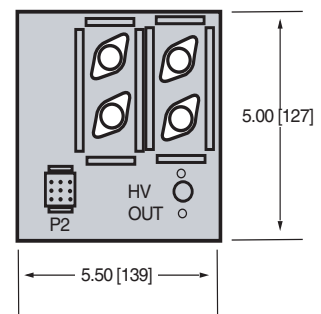


AC INPUT TERMINAL BLOCK

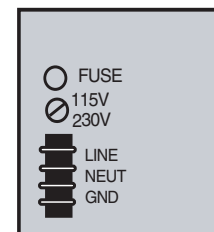
Terminal	Function
1	115/230 Vac Input
2	Neutral
3	Ground



FRONT VIEW



REAR VIEW





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

www.spellmanhv.com/manuals/600

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

Accuracy:

Local control $\pm 0.2\%$

Remote Programming $\pm (0.1\% \text{ of setting} + 0.1\% \text{ of maximum})$

Voltage Monitor $\pm (0.1\% \text{ of reading} + 0.1\% \text{ of maximum})$

Current Monitor $\pm (2\% \text{ of reading} + 1\% \text{ of maximum})$

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)

Regulatory Approvals:

Compliant to 2004/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive.

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

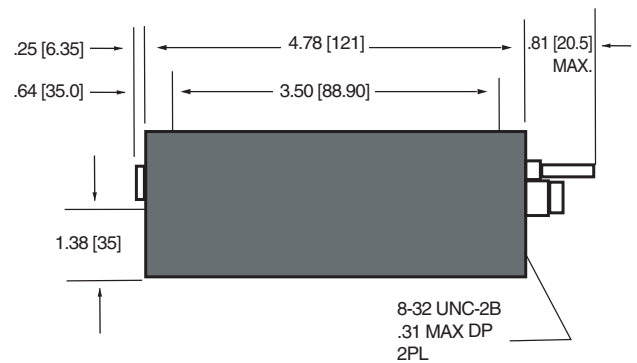
Specify "P" for positive polarity or "N" for negative polarity

DIMENSIONS: in.[mm]

TOP VIEW



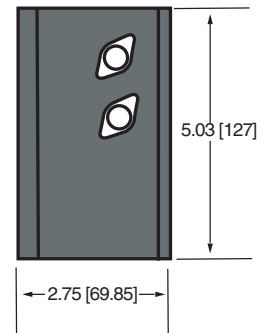
BOTTOM VIEW



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

FRONT VIEW



REAR VIEW





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

www.spellmanhv.com/manuals/600

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

Accuracy:

Local control $\pm 0.2\%$
Remote Programming $\pm (0.1\% \text{ of setting} + 0.1\% \text{ of maximum})$
Voltage Monitor $\pm (0.1\% \text{ of reading} + 0.1\% \text{ of maximum})$
Current Monitor $\pm (2\% \text{ of reading} + 1\% \text{ of maximum})$

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)

Regulatory Approvals:

Compliant to 2004/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive.

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

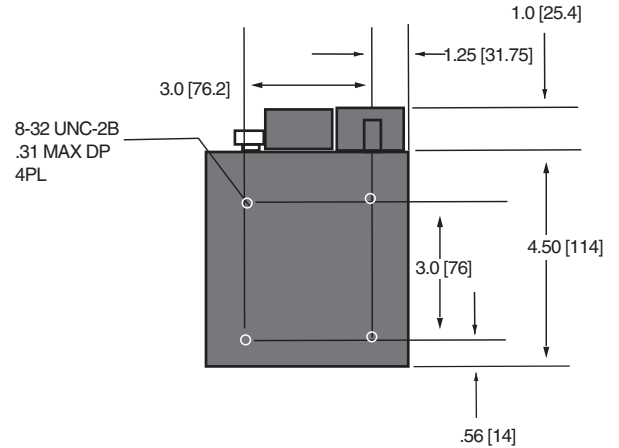
Specify "P" for positive polarity or "N" for negative polarity

DIMENSIONS: in.[mm]

TOP VIEW



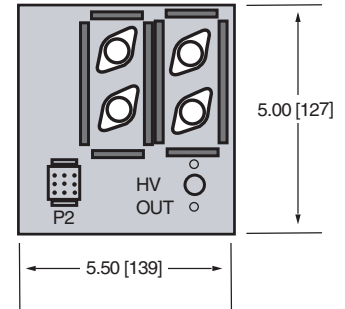
BOTTOM VIEW



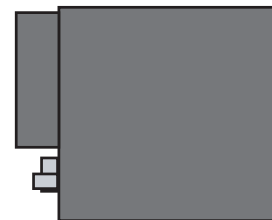
INTERFACE CONNECTOR-P2

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

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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WICHTIGE SICHERHEITSHINWEISE

SICHERHEIT

DIESES HOCHSPANNUNGSNETZTEIL ERZEUGT LEBENSGEFÄHRLICHE HOCHSPANNUNG.
SEIN SIE SEHR VORSICHTIG BEI DER ARBEIT MIT DIESEM GERÄT.

Das Hochspannungsnetzteil muß immer geerdet sein.

Berühren Sie die Stecker des Netzteiles nur, wenn das Gerät ausgeschaltet ist und die elektrischen Kapazitäten des Netzteiles und der angeschlossenen Last entladen sind.

Die internen Kapazitäten des Hochspannungsnetzteiles benötigen ca. 5 Minuten, um sich zu entladen.

Erden Sie sich nicht, und arbeiten Sie nicht in feuchter oder nasser Umgebung.

SERVICESICHERHEIT

Notwendige Reparaturen können es erforderlich machen, den Gehäusedeckel während des Betriebes zu entfernen.

Reparaturen dürfen nur von qualifiziertem, eingewiesenem Personal ausgeführt werden.

“WARNING” im folgenden Text weist auf gefährliche Operationen hin, die zu Verletzungen oder zum Tod führen können.

“CAUTION” im folgenden Text weist auf Prozeduren hin, die genauestens befolgt werden müssen, um eventuelle Beschädigungen des Gerätes zu vermeiden.

PRECAUTIONS IMPORTANTES POUR VOTRE SECURITE

CONSIGNES DE SÉCURITÉ

CETTE ALIMENTATION GÉNÈRE DES TENSIONS QUI SONT DANGEUREUSES ET PEUVENT ÊTRE FATALES.
SOYEZ EXTRÊMEMENT VIGILANTS LORSQUE VOUS UTILISEZ CET ÉQUIPEMENT.

Les alimentations haute tension doivent toujours être mises à la masse.

Ne touchez pas les connectiques sans que l'équipement soit éteint et que la capacité à la fois de la charge et de l'alimentation soient déchargées.

Prévoyez 5 minutes pour la décharge de la capacité interne de l'alimentation.

Ne vous mettez pas à la masse, ou ne travaillez pas sous conditions mouillées ou humides.

CONSIGNES DE SÉCURITÉ EN CAS DE REPARATION

La maintenance peut nécessiter l'enlèvement du couvercle lorsque l'alimentation est encore allumée.

Les réparations doivent être effectuées par une personne qualifiée et connaissant les risques électriques.

Dans le manuel, les notes marquées « **WARNING** » attire l'attention sur les risques lors de la manipulation de ces équipements, qui peuvent entraîner de possibles blessures voire la mort.

Dans le manuel, les notes marquées « **CAUTION** » indiquent les procédures qui doivent être suivies afin d'éviter d'éventuels dommages sur l'équipement.

IMPORTANTI PRECAUZIONI DI SICUREZZA

SICUREZZA

QUESTO ALIMENTATORE GENERA TENSIONI CHE SONO PERICOLOSE E POTREBBERO ESSERE MORTALI.
PONI ESTREMA CAUTELA QUANDO OPERI CON QUESTO APPARECCHIO.

- Gli alimentatori ad alta tensione devono sempre essere collegati ad un impianto di terra.
- Non toccare le connessioni a meno che l'apparecchio sia stato spento e la capacità interna del carico e dell'alimentatore stesso siano scariche.
- Attendere cinque minuti per permettere la scarica della capacità interna dell'alimentatore ad alta tensione.
- Non mettere a terra il proprio corpo oppure operare in ambienti bagnati o saturi d'umidità.

SICUREZZA NELLA MANUTENZIONE.

- Manutenzione potrebbe essere richiesta, rimuovendo la copertura con apparecchio acceso.
- La manutenzione deve essere svolta da personale qualificato, coscio dei rischi elettrici.
- Attenzione alle **AVVERTENZE** contenute nel manuale, che richiamano all'attenzione ai rischi quando si opera con tali unità e che potrebbero causare possibili ferite o morte.
- Le note di **CAUTELA** contenute nel manuale, indicano le procedure da seguire per evitare possibili danni all'apparecchio.

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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.

To obtain information on Spellman's product warranty please visit our website at:

<http://www.spellmanhv.com/en/About/Warranty.aspx>

