

# Instruction Manual

## MP SERIES

### High Voltage Power Supply

MODEL :  
SERIAL# :  
DATE :

**SPELLMAN**  
**HIGH VOLTAGE ELECTRONICS**  
**CORPORATION**  
475 Wireless Blvd.  
Hauppauge, New York, 11788

+1(631) 630-3000\*FAX: +1(631) 435-1620\*  
E-mail: [sales@spellmanhv.com](mailto:sales@spellmanhv.com)  
Website: [www.spellmanhv.com](http://www.spellmanhv.com)

## 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.

Copyright © 2000, Spellman High Voltage Electronics Corporation. All Rights Reserved.  
This information contained in this publication is derived in part from proprietary and patent data. This information has been prepared for the express purpose of assisting operating and maintenance personnel in the efficient use of the model described herein, and publication of this information does not convey any right to reproduce it or to use it for any purpose other than in connection with installation, operation, and maintenance of the equipment described.

# 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.



## INSTRUCTION MANUAL

### MP SERIES HIGH VOLTAGE POWER SUPPLY MODULES 0-1KV TO 0-40KV UP TO 10 WATTS

This manual is issued to enable users of MP series modules to connect up and use the product confidently. Whilst circuit information is given it is not intended that this manual be used as a repair and service document in the event of serious failure especially in the High Voltage area we recommend return to our factory or our agents and representatives.

The MP series of high voltage dc-dc convertors are complete modules designed to produce a high quality dc output for a very wide range of instrumentation and analytical applications.

The higher voltage units (10kV and above) have their high voltage sections encapsulated with silicone rubber for extra resistance to corona.

Encapsulation provides excellent protection against shock, vibration overvoltage and the possible ingress of moisture. The low voltage area is left unencapsulated and is accessible in the event of future repair needs.

All MP modules are delivered with a flying EHT output cable and mating input connector, molex type 3001-10. Input, control and monitor functions are on a common pin layout for all models in the series.

Stud fixing are standard (M3 x 12mm long) on centres appropriate to the model see sketches on page 4. Flange mounting is available as an option. Either stud fixing or flange mounting are used and denoted by /S and /F respectively.

The module has exposed components and therefore ESD handling precautions should be taken.

## CIRCUIT DESCRIPTION

See Block Diagram (Page 3)

MP Series modules have a linear regulated sine wave inverter set for optimum (resonant) operation at a frequency of around 100kHz.

The dc input is filtered by C1 and then passes through a linear regulator to the inverter. This linear regulator is the principle output control circuit performing output voltage control output current limit and input current limit functions.

The inverter is a single ended FET feeding into a resonant high voltage transformer. The pulse width is set to just deliver maximum output when required and the frequency adjusted to suit the high voltage output transformers natural resonance (approx. 100kHz).

The transformer output is fed to a voltage doubler in the case of the lower voltage units or a Cockroft Walton multiplier in the case of the higher output units. The transformer output current is fed to the current monitoring circuit which also drives an over current shutdown circuit.

A sample of the output voltage is fed via a high voltage divider to a differential amplifier, the output of which controls the regulator, forming the closed loop control of output voltage.

## SAFETY PROCEDURES

All models in the MP range have a fixed screened high voltage output lead.

This lead **must be terminated safely** before the MP is operated. If the termination is some form of test load in air allowances of one inch (25mm) per 10kV is a normal safe distance.

Before switch on it is advisable to ensure that the ten-turn central potentiometer on the PCB (RV1) is turned fully anti-clockwise (zero set).

All high voltage loads must have a separate ground lead taken to the

chassis stud in the RH corner of the exposed PCB. If the load is through an electronic vacuum system, ie., ion or electron gun, or gas discharge lamp the ground lead must be a low impedance braided cable or tape. On no account should any resistor or impedance be inserted in the HV return. The chassis stud must also be bonded to the system earth.

## OPERATION

### Local Control (RV1)

Refer to page 3.

Every MP Series unit is supplied with a Molex 10-way connector body, Molex item No. 3001-10 and 10 crimp terminals, Molex item No. 2478 TL. These items must be assembled and connected to appropriate power, monitor and earth points. Pin 2 is power input +ve (normally 24Vdc,) OV is pin 10.

For local control pins 4 and 5 are connected together and control is via the HV ADJ potentiometer (RV1).

Check that the Molex connector is pressed fully home.

Check that the EHT connection is mechanically secure and that a good earth is in place, see safety procedures.

### Switch on Power Input

The EHT control (RV1) may now be turned clockwise to raise the output voltage to the desired level.

### Remote Control Potentiometer

Refer to Page 3.

Turn HV ADJ potentiometer fully clockwise to connect pin 4 to the internal 10v reference. Connect the external potentiometer (good quality 5kR - 20kR) between pin 4 and pin 10, connect its wiper to pin 5 (the voltage programming input). Adjust the external potentiometer to the 0v end pin 10 to keep output to a minimum at switch on. It is essential that all external leads

should be screened and be kept as short as possible. Also they should be routed to avoid close proximity to obvious sources of electrical noise such as electric motors, contactors etc.

### Remote Analogue (0-10V) control

Refer to Page 3

Connect pins 5 and 6 together. Connect the +ve line of the 0-10V control source to pin 7 and the -ve line to pin 9.

The external control voltage source now effectively forms the reference for the control of the MP module. Any electrical noise, ripple or spikes that appear on this control voltage source is likely to show itself on the output of the supply. In this configuration the HV output will only be as clean and as stable as its control source.

### Sync Pin 1

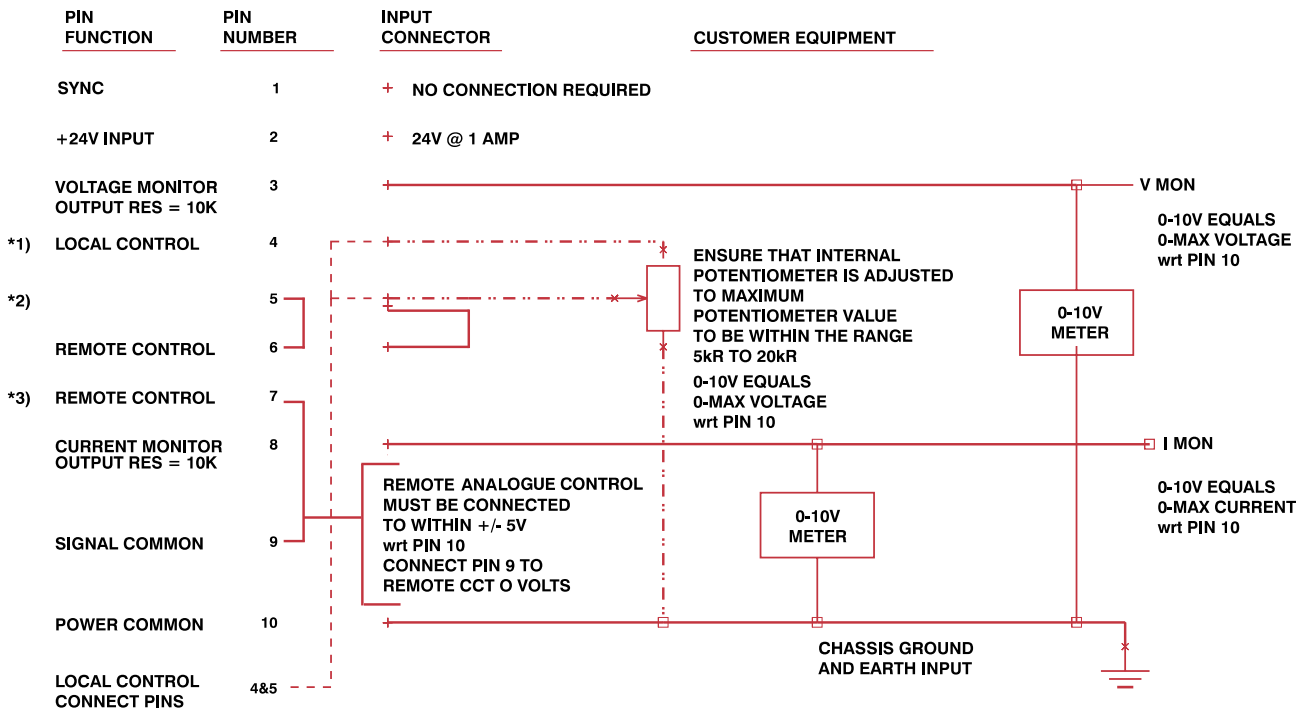
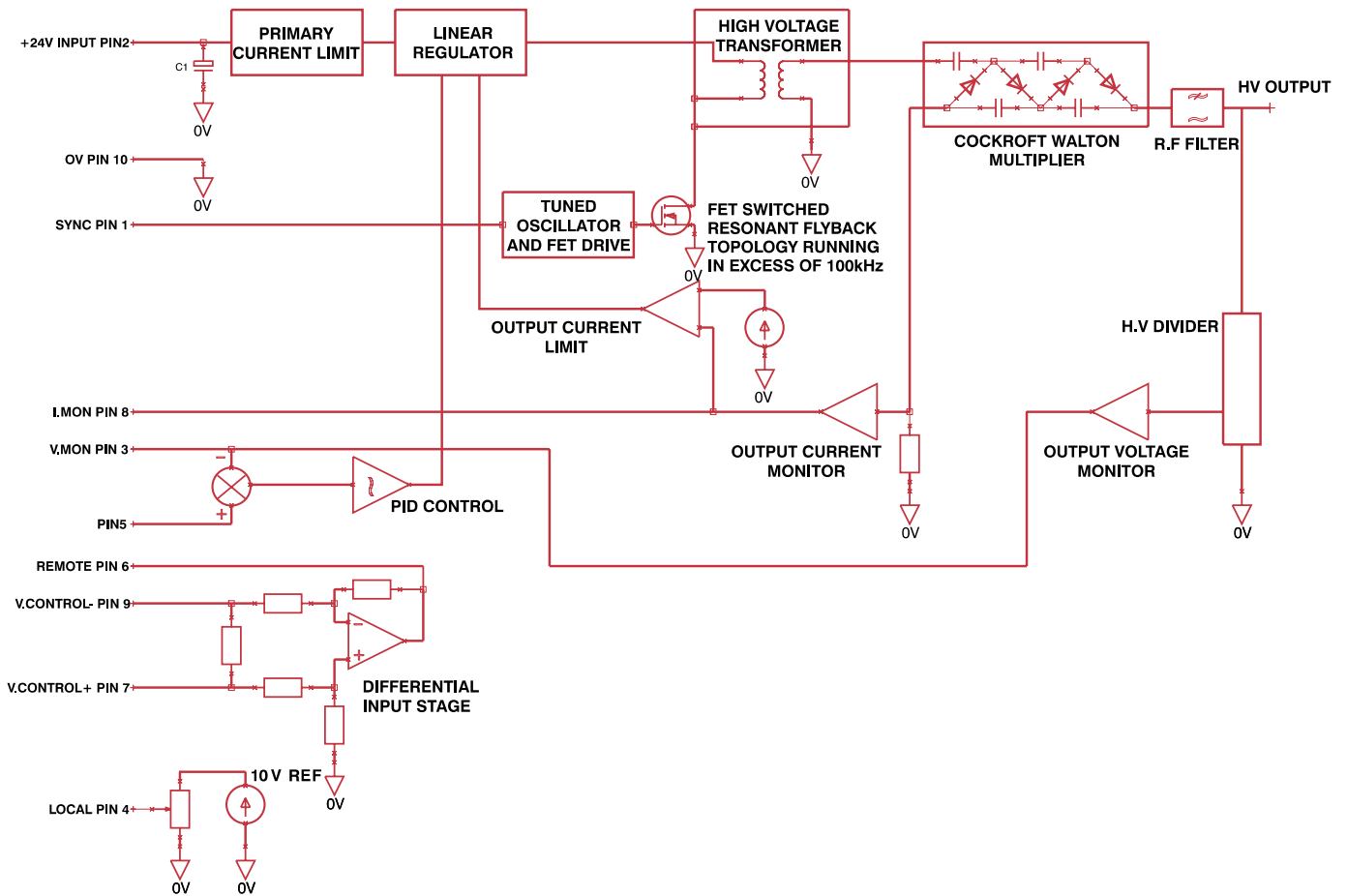
Synchronisation is a feature allowing oscillator frequencies to be synchronised for a number of MP Modules. This feature can only be set by the factory, and is not available as a standard option.

## EMC

MP series modules meet the relevant requirements of EN50081-1 and EN50082-1

The module should be configured as follows:

- Input supply leads over 50mm should be twisted together.
- Remote control, current monitor and sync leads over 50mm should be screened.
- The module should be mounted in an enclosure to protect it from Electro-Static Discharge.



- \*1) LOCAL CONTROL CONNECTIONS - - - - -
- \*2) REMOTE CONTROL EXTERNAL POTENTIOMETER - . . . . .
- \*3) REMOTE CONTROL 0-10VDC ANALOGUE INPUT - - - - -

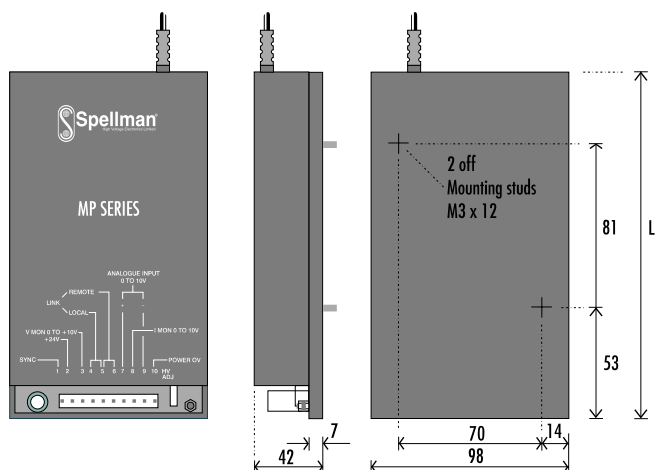


# MP SERIES

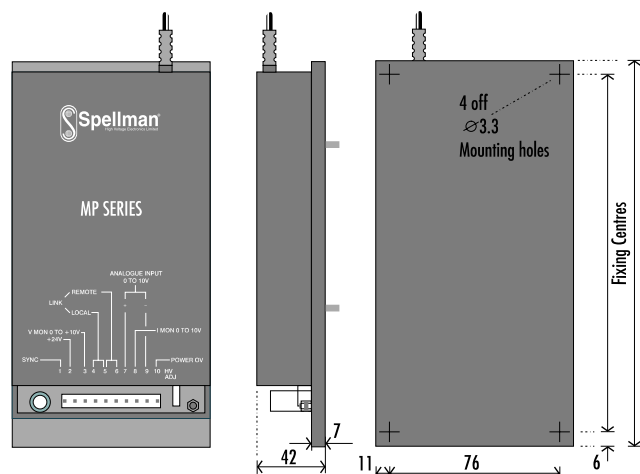
## MECHANICAL SPECIFICATION

MODEL NUMBER	CASE	LENGTH (MM)	WIDTH (MM)	HEIGHT (MM)	FIXING CENTRE
MP1 to MP5	STUD	148	98	42	-
MP10 to MP15	STUD	190	98	42	-
MP20 to MP30	STUD	240	98	42	-
MP1 to MP5	FLANGE	168	98	42	156
MP10 to MP15	FLANGE	210	98	42	198
MP20 to MP30	FLANGE	260	98	42	248
MP40	FLANGE	330	98	46	318

### STUD MOUNTING



### FLANGE MOUNTING

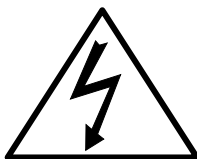


### OBSERVE EXTREME CAUTION WHEN WORKING WITH THIS EQUIPMENT

- High voltage power supplies must always be connected to a protective earth
- Do not touch connections unless equipment is turned off and the capacitance of both the load and power supply are earthed
- Allow adequate time 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 only be done by qualified personnel aware of the hazards.



**DANGER  
HIGH VOLTAGE  
RISK OF ELECTROCUTION**

### U.K. and Europe

Broomers Park, Broomers Hill Lane,  
Pulborough, West Sussex RH20 2RY, UK  
**Tel: +44 (0) 1798 877000**  
**Fax: +44 (0) 1798 872479**  
email: sales@spellmanhv.co.uk

### Japan

3-15 Kanayama-cho, Kawaguchi-shi  
Saitama-ken Japan, 332-0014  
**Tel: +81 (0) 48 228 3222**  
**Fax: +81 (0) 48 228 3224**

### United States of America

475 Wireless Boulevard,  
Hauppauge, New York 11788  
USA  
**Tel: +1 - 631 630 3000**  
**Fax: +1 - 631 435 1620**  
email: sales@spellmanhv.com  
[www.spellmanhv.com](http://www.spellmanhv.com)

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

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

