



Spellman MXR Series DC Converters Hot Switchable Polarity Reversing Power Supply User Guide

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Product: MXR Series
Title: Installation and User Guide



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Change History

ISSUE	DATE	NAME	SECTION	CHANGE
A	N/A		All	Created from 80888-1 issue B
B	10-Apr-18		1	HV output cable paragraph added.
C	15-Sep-20		All	Revise and reformat for user guide
1	5-Mar-21	JS	1 2.1	Mating cable ordering info and specs added Regulatory approvals info added
2	8-Nov-21	JS	All 1.1.1 4 4 4.2 4.3.2	New document template Added peak reversing current info Connections and operation chapters and tables merged Connectors and mating pad numbers, pin indication and other info added Analog unit connector info corrected from Molex KK5.08 to Samtec FWS RS485 communication option added

SAFETY



DANGER HIGH VOLTAGE RISK OF ELECTROCUTION

Observe extreme caution when working with this equipment

- High voltage power supplies must always be connected to protective earth
- Do not touch connections unless equipment is turned off and the capacitance of both the load and power supply are grounded
- Allow adequate time for discharge of internal capacitance of the power supply
- Do not ground yourself or work under wet or damp conditions

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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

- **Return to supplier for servicing**

The HV power supply units MXR20PN24 and MXR30PN24 are intended for use in mass spectrometry, electron microscopy, capillary electrophoresis and electrostatic printing applications, they consist of one aluminum chassis containing the high voltage power supply.

Unit Description

Control and monitoring of the units is accomplished via either analog controls on the standard unit or serial communication interface on the DCC2 option:

Analog for MXR20PN24 and MXR30PN24

Serial for MXR20PN24/DCC2 and MXR30PN24/DCC2 A 2 meters HV output mating cable is available to order, with the following part number: HVC30/1S/1279, see section 4.1 for further details.

1.1 Unit Ratings

1.1.1 Power Input

Input Voltage:	24 Vdc \pm 10%
Input Current:	\leq 1.25 A nominal continuous \leq 4.5 A peak during reversing

1.1.2 HV Output

Unit	Output Voltage range	Max Output Current
MXR20	-20 kV to +20 kV	300 μ A
MXR30	-30 kV to +30 kV	300 μ A

1.1.3 Protection

Current limit: \pm 330 μ A +10% -5%

Protection: Arc and short-circuit protected

1.2 Environmental conditions

Operating Temperature:	10°C to +50°C
Storage Temperature:	-35°C to +85°C
Humidity:	0% to 80% RH (non-condensing)
Altitude:	0 to 2000m ASL

The HV outputs of the units are considered hazardous, the protection against electric shock provided by the units may be impaired if the units are not operated in accordance with the instructions in this manual.

Safety

The units are contained in an earthed case with a screened HV output cable and the HV output cable must be terminated safely before the units are operated.

This unit must be sourced with a double insulated or SELV 24 V dc supply.

The unit shall be properly bonded to the main protective earthing termination in the end product.




The units have been evaluated for use in a Pollution Degree 2, Installation Category II environment.

Consideration should be given to conducting the following tests with the unit installed in the end product:

- a. Permissible Limits Tests with the unit installed in the end product.
- b. Temperatures on accessible surfaces.

The units have not been the subject of a risk analysis; this should be done in the end product application.

2.1 Meaning of Symbols

SYMBOL	MEANING
	Refer to manual before operating
	Caution, the possibility of electric shock
	Protective conductor terminal (PE)

2.2 Regulatory Approvals

The unit is designed to meet the requirements of EN 61010-1, UL 61010-1 and CAN/CSA-22.2 No. 61010-1. Please consult the datasheet or the factory for further approval information.

Installing the Unit

3.1 Initial Inspection

Inspect the package exterior for evidence of damage due to handling in transit. Notify the carrier and Spellman immediately if damage is evident. Do not destroy or remove any of the packing material used in a damaged shipment.

After unpacking, inspect the panel and chassis for visible damage.

Note: Failure to comply with the above could compromise the safe operation of the unit and invalidate the warranty.

3.2 Mechanical Installation

The MXR units must be fitted in the end product and secured in position using screws.

The units must not be used in an environment with a level of pollution worse than Pollution Degree 2.

The units are intended for use as a component and no surface of the units should be accessible in the end product.

3.3 Electrical Installation

The units should only be connected to a Category II environment, the units are not intended for connection to the mains. The power for the units should be sourced from a UL recognized double insulated or SELV 24 V dc supply. There is no external fuse.

The units shall be properly bonded to the main protective earthing termination in the end product via the chassis.

The input and output connectors are not intended for field connections and should only be connected to internal wiring in the end product. All external circuits connected to High Voltage outputs shall be Double/Reinforced insulated from any accessible parts.

Connections and Unit Operation

4.1 HV Output connector and mating cable

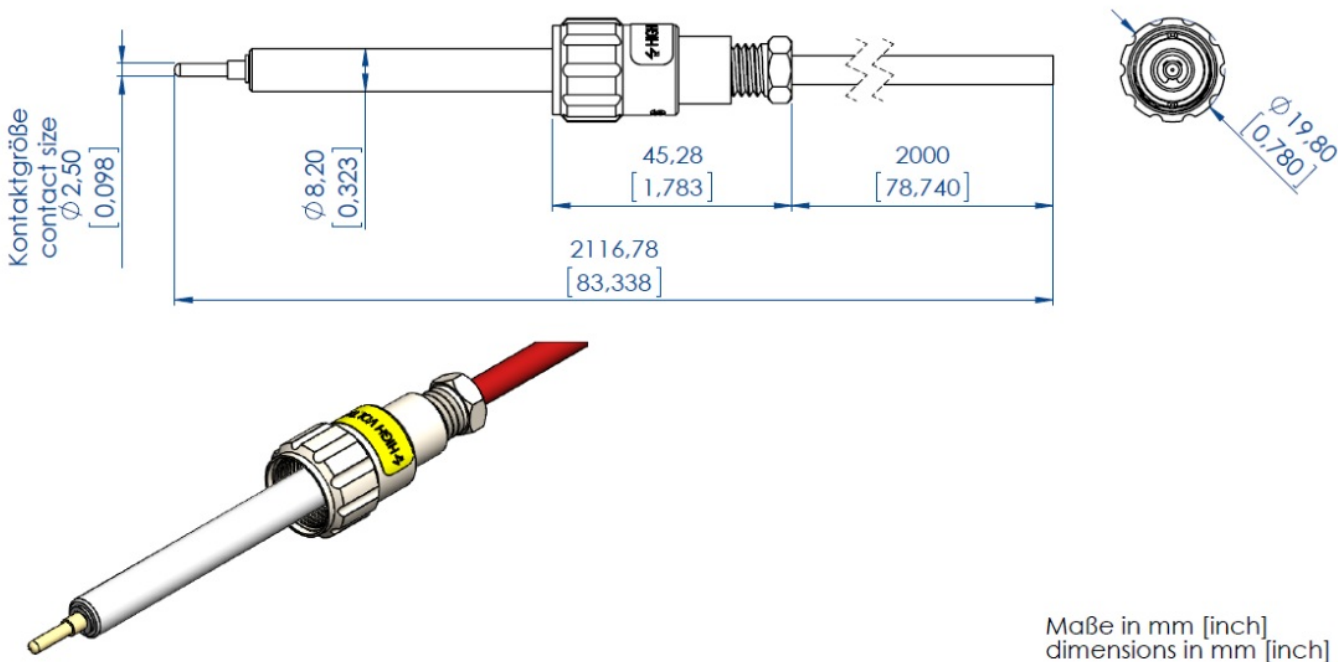


High Voltage output is via a GES HB30 high voltage receptacle for both analog and digital product versions. GES Part number: 7331051
A 2 meters HV output mating cable is available to order, with the following part number:

Power input cable part number:	HVC30/1S/1279	Length: :
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Different cable lengths are available upon request.
This cable is screened, and the shield provides the load return ground.
Mating Cable Details:

Part	Manufacturer	Part description	Manufacturer part number
HV cable	GES	HS30/Au PTFE	7331150
Plug, cable mount	GES	HV cable, 30kVDC, coaxial cable	3330007

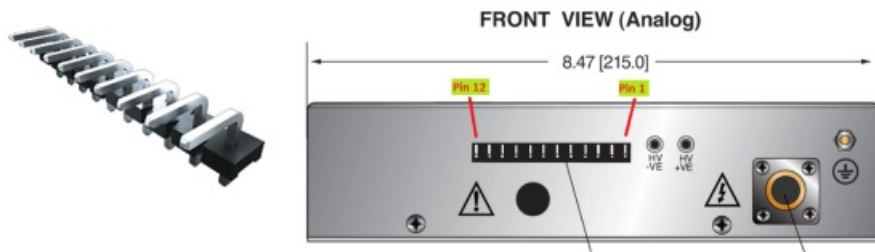


Note: Customised versions of the MXR units can be developed with an HV output cable encapsulated into the

unit, UL style 3873. Please consult with factory.

4.2 Analog version – Connections and Operation

Both power input and control are via a 12-way Samtec connector:



Manufacturer: Samtec Series: FWS Part number: FWS 12-04-T-S-RA				
pin#	Signal	I/O	Description	Levels
1	IRON	O	Current Monitor	0 to 10V for 0 to 500uA, always positive, Zout = 10kΩ, Accuracy ±5%
2	+24VDC	I	DC in	
3	VMON	O	Voltage Monitor	0V to 10V for 0 to 20kV (MXR20) or 30kV (MXR30) always positive. Zout = 10kΩ, Accuracy ±2%
4			NC	
5			NC	
6			NC	
7	VIET	I	Voltage Control	0V to 10V for 20kV (MXR20) or 30kV (MXR30), always positive Zin >1MΩ, Accuracy ±2%
8	POST	I	Polarity Change	TTL: Low = positive HV High/open = negative HV
9	SGND	I/O	Signal ground	
10	+24VDC RTN	I	DC in return	
11			NC	
12	POL STATUS	O	Polarity monitor	positive HV: 0V (<200mV), source 1.5kΩ negative HV: +24V, source 2.2kΩ

A mating connector is not provided.

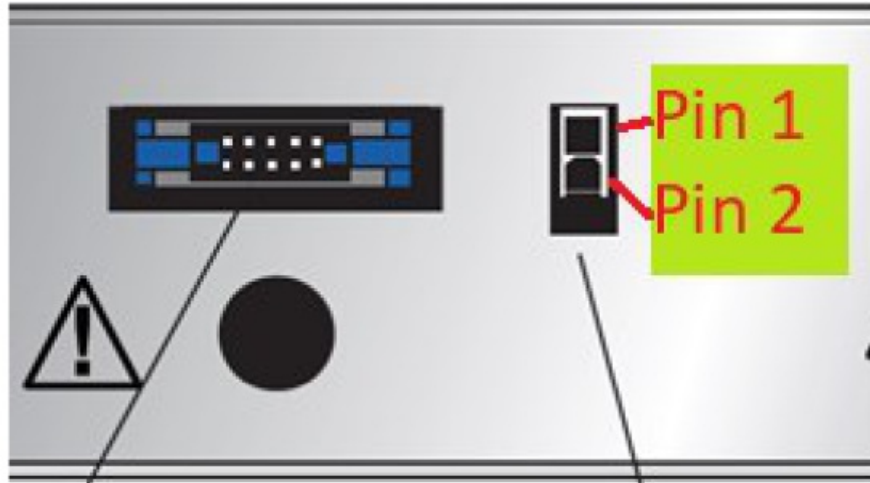
Mating receptacle: for example, Molex KK 508 3001 part number 10-01-1124, with Molex crimps: KK 396 part number: 08-55-0106, and wire gauge of 18 to 26 AWG.

4.3 Digital Version – Connections and Operation

4.3.1 Power input connector

24V power input connections are via a 2-way Molex

Manufacturer: Molex		Series: Mini-fit Jr	Part number: 39-30-1022
pin#	Signal	I/O	Description
1	+24VDC	I	DC in
2	+24VDC RTN	I	DC in return



Please see Molex connector product page for range of mating receptacles (for example, Molex receptacle part number: 39012020, crimps part number: 39000038, and wire gauge of 18 to 24 AWG): https://www.molex.com/molex/products/part-detail/pcb_headers/0039301022

4.3.2 Control connector

The serial communication link (default RS232, see details below about RS485 options) is via a 10 way “IDC ribbon cable” connector. See the table below for pin-out details.

Manufacturer: 3M Series: 3000 Part number: N3793-5302RB				
pin#	Signal	I/O	Description	Level
1	Z/TXD	O	Transmit data (output) with respect to pin 2	Serial
2	GND	I/O	Serial signal ground return (if required)	RTN (see *)
3	Y/RXD	I	Receive data (input) with respect to pin 2	Serial
4		–	NC	
5	RS485 mode**	–	Link these two pins together for RS485 communication. Only for Rev ≥ 3D for MXR20 and ≥ 2B for MXR30. See **	
6		–		
7	INTER LOCK	I	Opto-isolator input – [0mA = INHIBIT]	3V3 @ 6mA
8		I	Opto-isolator signal return	5V @ 10mA
9	POLSET	I	Polarity Change Signal opto-isolator input 0mA = -VE	3V3 @ 6mA
10		I	Polarity Change Signal opto-isolator signal return	5V @ 10mA

* Note: Take care in choosing a suitable ground connection for pin 2.

**Note 2: RS485 is supported for:

- Revision 3D and onwards (4D or 4E etc.) for the MXR20 units
- Revision 2B and onwards for the MXR30 units

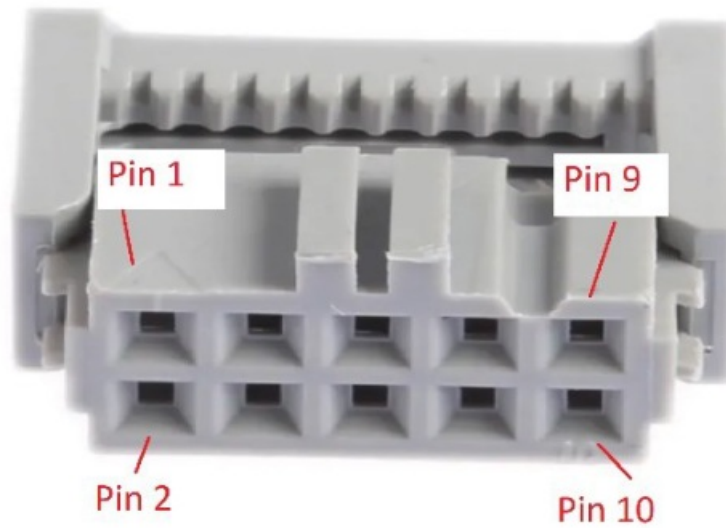
The unit's revision is indicated on the label, under the field "Prod Status" for the units supporting RS232 only, and under the field "Rev" for the units supporting both RS232 and RS485. See labels examples below.



A mating connector is not provided.

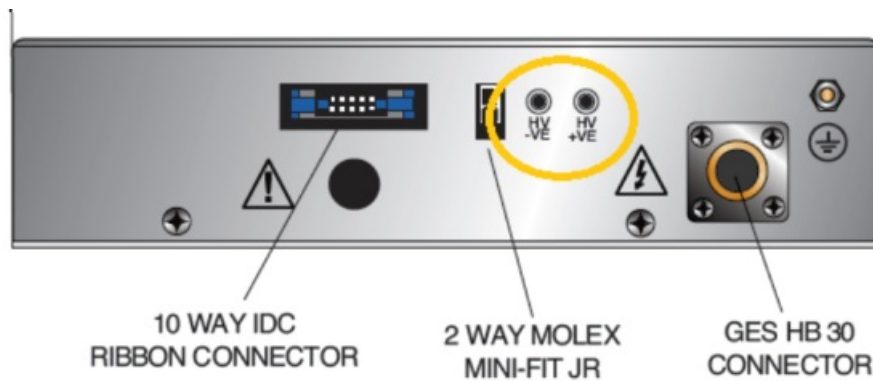
Please see 3M product page for range of mating receptacles (for example 3M part number 89110-0101HA)

Mating receptacle pin positions:



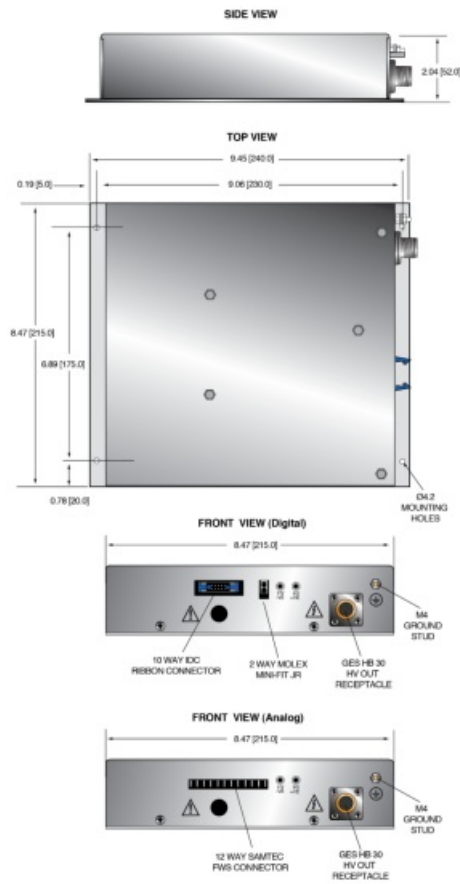
4.4 HV On Indicators

The MXR units use the following LEDs to indicate polarity when the unit is powered, and the optional interlock is enabled:



- HV +VE
- HV -VE

Appendix A – Mechanical layout



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Documents / Resources

	Spellman MXR Series DC Converters Hot Switchable Polarity Reversing Power Supply [pdf] User Guide MXR Series, DC Converters Hot Switchable Polarity Reversing Power Supply
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References

- hvsales@spellmanhv.co.uk
- [Molex Connector Part Number - 39-30-1022](#)