



**SPECTRADYNAMICS, INC**



## **PPS-2RM-B 1 PPS GENERATOR OPERATING MANUAL**





## Contents

---

1.0 Introduction	1
2.0 Safety and preparation for use	2
2.1 Electrical	2
2.2 Instrument	4
3.0 Front panel description	5
4.0 Back panel description	6
5.0 Operation	7
6.0 Specifications	8
7.0 Warranty	9

---



## 1.0 Introduction

The PPS-2RM-B is a dual 1 pulse-per-second (1 PPS) generator. This instrument requires a sine-wave input signal of 1 MHz, 5 MHz or 10 MHz to generate the 1 PPS.

The PPS-2RM-B generates two pairs of independent 1 pulse-per-second outputs with variable pulse width. The input frequency and pulse width may be configured by DIP switch settings. The 1 PPS output can be synchronized to an external event. The synchronization is good to +/-1/2 of the input clock cycle. The outputs are designed to drive low impedance loads and long 50 or 75-ohm cables. The channel-to-channel delay differences are less than 500 ps.

The pulse per second generators are available in a 1U full rack mount enclosure that operate on 100 to 240 VAC. Optional DC operation option is available for all models upon request.

PPS Options:

Part Number	Description	AC Operation	DC Operation OPTION
PPS-2RM-A	One generator, two outputs Rear panel connectors	✓	
PPS-2RM-A-DC	One generator, two outputs Rear panel connectors	✓	✓
PPS-2RM-B	Two generators, Two outputs per generator Rear panel connectors	✓	
PPS-2RM-B-DC	Two generators, Two outputs per generator Rear panel connectors	✓	✓
PPS-2RM-B1	Two generators, Two outputs per generator FRONT panel connectors	✓	
PPS-2RM-B1-DC	Two generators, Two outputs per generator FRONT panel connectors	✓	✓

## 2.0 Safety and Preparation for Use

---

The PPS-2RM-B was designed for indoor use only and is not intended for operation outdoors or in a wet environment. The instrument may be mounted in a standard 19-inch instrumentation rack or may be used on a laboratory bench. Inspect the instrument and power cords for damage before first use.

### 2.1 Electrical safety and preparation for use.

**Voltages capable of causing injury or death are present in this instrument. Use extreme caution whenever the instrument cover is removed.**

#### Line Voltage

This instrument is designed to operate with a 100 to 240 VAC, 47 to 63 Hz power source. This instrument is also capable of operating with a DC power source that can supply +12 to +36 VDC at 2 Amperes when the DC option is acquired.

#### Fuse

A 1.0 Ampere 250V 5X10mm slow-blow fuse is used for 100 to 240 VAC operation.

A 2.0 Ampere 250V 5X10mm slow-blow fuse is used for DC power operation.

Only replace fuses with the same type and specifications.

#### AC Power

The instrument has a detachable three wire power cord for connection to a grounded AC power source. The enclosure of the unit is directly connected to the outlet ground to protect against electrical shock. Always use an outlet with a protective ground and do not disable this safety mechanism. Detaching the AC power cord is the only option of disconnecting the unit from the AC mains supply. Make sure you have access to the rear panel or provide an external accessible AC disconnect means for your PPS-2RM-B.

#### DC Power

The PPS-2RM-B may be acquired with a DC power option to allow the instrument to be powered by +12 to +36 VDC, 2 Amp source. The DC supply operation may be used as backup power to prevent loss of signal during power outages or as a mains supply source. The switching from AC to DC supply operation is affected by a Schottky diode network and charge storage capacitors to ensure glitch free operation.

*If the PPS-2RM-B was acquired with the DC operation option a 6 pin DC connector will be available on the back panel.*

## 2.0 Safety and Preparation for Use

---

The configuration for the DC connector, if available, is as follows:

- Pin 1 NC
- Pin 2 NC
- Pin 3 NC
- Pin 4 +12 to +36 VDC power return
- Pin 5 +12 to +36 VDC power
- Pin 6 Chassis GND /Earth GND

Verify that the connector of the external DC power supply providing voltage to the unit has the same pin configuration mentioned above. Do not apply AC voltage to the DC power connector. Failure to follow these directions may cause injury or death to personnel, cause irreparable damage to the instrument and voids all warranties.

Please note that the power return (pin 4) is NOT connected to the instrument case ground internally, however both ground connections (pin 4 and pin 6) are available at the DC power connector and may be connected together at this point.

The following specifications should be used to ensure optimum performance:

DC Supply voltage	+12 to +36 VDC, 2 Amps
Line regulation	+/- 0.05% for a 10% line change
Load regulation	+/- 0.05% for a 50% load change
Output ripple	< 5 mV peak-to-peak

Detaching the DC power cord is the only option of disconnecting the unit from the DC mains supply. Make sure you have access to the rear panel or provide an external accessible DC disconnect means for your PPS-2RM-B.

## 2.0 Safety and Preparation for Use

---

### 2.2 Instrument safety and preparation for use.

#### Reference Frequency Configuration

The PPS-2RM-B may be configured to operate on 1 MHz, 5 MHz or 10 MHz frequency reference. **The default configuration for the unit is 5 MHz.** To change the input reference frequency, the unit must be unplugged from the power source(s). Remove ONLY the top cover of the instrument. Once the cover is removed you will find an aluminum bracket cover in the middle section of the instrument. Locate the DIP switch labeled S5 on the pps module(s).

Modify the setting to reflect the selection of your choice following the next table.

DIP SW 1	DIP SW 2	FREQUENCY
ON	ON	10 MHz
<b>ON</b>	<b>OFF</b>	<b>5 MHz</b>
OFF	ON	1 MHz
OFF	OFF	RESERVED

#### Pulse Delay Settings

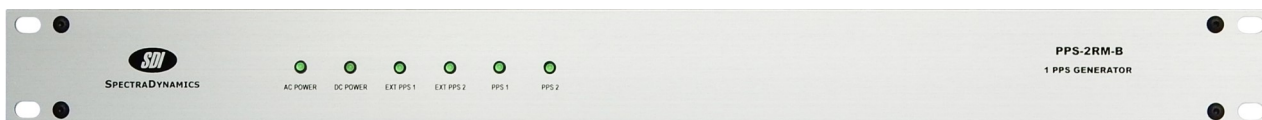
The PPS-2RM-B pulse generator can be configured for different pulse widths. **The default configuration for the unit is 51.2 us pulse-width.** To change the pulse-width selection, the unit must be unplugged from the power source. Remove ONLY the top cover of the unit. Locate the DIP switch labeled S5 on the module(s) to be configured. The pulse width of the generator is a multiple of the clock period and can be set according to the table below.

DIP SW 3	DIP SW 4	DIP SW 5	1 MHz pw	5 MHz pw	10 MHz pw
OFF	OFF	OFF	4.096 ms	819.2 us	409.6 us
OFF	OFF	ON	2.048 ms	409.6 us	204.8 us
OFF	ON	OFF	1.024 ms	204.8 us	102.4 us
OFF	ON	ON	512 us	102.4 us	51.2 us
<b>ON</b>	<b>OFF</b>	<b>OFF</b>	<b>256 us</b>	<b>51.2 us</b>	<b>25.6 us</b>
ON	OFF	ON	64 us	12.8 us	6.4 us
ON	ON	OFF	16 us	3.2 us	1.6 us
ON	ON	ON	4 us	0.8 us	0.4 us



## 3.0 Front Panel

---



### **AC Power LED**

The LED will turn on when AC power is applied to the instrument.

### **DC Power LED**

If the instrument was acquired with the DC operation option the DC power LED will light up when DC power is applied to the unit.

### **EXT PPS1 LED**

The LED will flash on the rising edge of the 1 PPS external synchronization signal from the first module.

### **EXT PPS2 LED**

The LED will flash on the rising edge of the 1 PPS external synchronization signal from the second module.

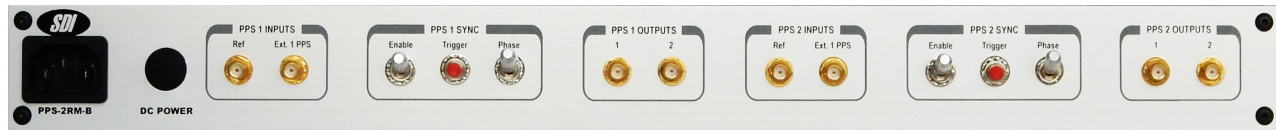
### **PPS1 LED**

The LED will flash on the rising edge of the 1 PPS output signal from the first PPS generator module.

### **PPS2 LED**

The LED will flash on the rising edge of the 1 PPS output signal from the second PPS generator module.

## 4.0 Back Panel



### AC POWER

The PPS-2RM-B is configured to operate on 100 to 240 VAC

### DC POWER

If the instrument was acquired with the DC operation option a DC connector will be available on the back panel. Operation on DC from +12 to +36 VDC will be possible as the main power supply or as backup power in case of AC power outages when both, AC and DC, are powering the instrument.

### PPS 1 INPUTS

**Ref** - Receives a sine-wave input signal of 1 MHz, 5 MHz or 10MHz. Power level must be in the range of +3 to +13 dBm.

**Ext. 1 PPS** - Receives a 1 PPS synchronization input. The 1PPS signal must conform to TTL specifications.

### PPS 1 SYNC

**Enable** - When the switch is positioned to “Enable” selection, the 1 PPS output will have the possibility to be synchronized to an external 1 PPS signal. **Warning!!!** After a synchronization event this switch should be returned to the off or down position to prevent accidental synchronization.

**Trigger** - When synchronization is enabled and a 1 PPS signal is present on the Ext. 1 PPS input, the 1 PPS synchronization event can be triggered by the push button. Only one synchronization will occur for each trigger.

**Phase** - Selects the reference clock edge of the synchronization event. The 1 PPS will be synchronized to the next reference clock rising edge after the incoming synchronization PPS input when the switch is in the Enable position. When the switch is in the down position, the 1 PPS will be synchronized to the reference clock falling edge that occurred before the incoming synchronization PPS input. **Warning!!!** Toggling the Phase switch will cause loss of synchronization.

### PPS 1 OUTPUTS

**1 and 2** - Two 1 PPS outputs will be available at the SMA connectors labeled 1, 2.

## 5.0 Operation

---

To operate the PPS-2RM-B, locate the AC power entry module on the rear of the enclosure and/or the DC connector and connect the power cord(s). Plug the unit into appropriate power outlet(s). The LED on the front panel labeled AC will turn on when AC voltage is applied. If you also apply DC voltage, the LED labeled DC on the front panel should light up.

Please remember that there are two independent modules in the PPS-2RM-B. In order to generate a second 1 PPS, an input reference signal for each module is required.

Attach a frequency reference signal to the SMA connector on the back panel labeled PPS INPUTS Ref. The unit will generate one pulse per second signals at each of the output ports of the module receiving the reference signal. An LED on the front panel will flash on the rising edge of each pulse.

To synchronize the output pulses to an external event, connect the external reference pulse signal to the input labeled Ext. 1 PPS on the back panel. Enable the synchronization sequence by moving the Enable switch to the Enable position. The Trigger button will arm the synchronization sequence to occur on the next rising edge at the Ext. 1 PPS input. Only one synchronization event occurs per push of the Trigger button.

The 1 PPS will be synchronized to the reference clock rising edge after the incoming synchronization PPS input when the switch labeled Phase is in the up position. When the Phase switch is in the down position, the 1 PPS will be synchronized to the reference clock falling edge that occurred before the incoming synchronization PPS input. It is important to turn off the synchronization enable switch by moving it to the down position to disable further inadvertent synchronization events.

## 6.0 Specifications

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Rise time	10 - 90 %	-	1.5	2	ns
Fall time	10 - 90 %	-	1.5	2	ns
Differential delay	Channel - Channel	-	200	500	ps
Impedance	input	-	50	-	Ohms
	output	-	10	-	
Input High Level	Input signal into 50 ohm load	2	-	5	V
Input Low Level	Input signal into 50 ohm load	-0.7	-	0.8	
Output High Level	50 ohm load	3	4	5	V
Output Low Level	50 ohm load	-	0.1	0.2	
Input Signal Level	1 MHz, 5 MHz and 10 MHz	0	+7	+13	dBm
External Sync. Error	1 MHz	-	+/- 500	-	ns
	5 MHz	-	+/- 100	-	
	10 MHz	-	+/- 50	-	
Temperature-delay Coefficient	0 - 50 °C	-	3	5	ps/°C

Rackmount chassis	1U H, 19" W, 14" D
Storage temperature	-10 to +75 °C
Operation environment	0 to +50 °C
Humidity	5% to 95% Non-condensing
AC Input Voltage Range	110 to 240 VAC, 8 W, 47-63 Hz
DC Input Voltage Range	+12 to +36 VDC, 6 W
Weight	10 lbs.



## 7.0 Warranty and Service

---

### **WARRANTY**

The PPS-2RM-B is warranted to be free of defects under normal operating conditions, as specified, for one year from date of shipment from SpectraDynamics, Inc (SDI). SDI's obligation and liability under this warranty is expressly limited to repairing or replacing, at SDI's option, any product not meeting the said specifications. This warranty shall be in effect for one (1) year from the date a PPS-2RM-B is sold by SDI. SDI makes no other warranty, express or implied, and makes no warranty of the fitness for any particular purpose. SDI's obligation under this warranty shall not include any transportation charges or costs of installation or any liability for direct, indirect, or consequential damages or delay. Any improper use, operation beyond capacity, substitution of parts not approved by SDI, or any alteration or repair by others in such manner as in SDI's reasonable judgement affects the product materially and adversely shall void this warranty. No employee or representative of SDI is authorized to change this warranty in any way or grant any other warranty.

### **SERVICE**

Do not attempt to service or adjust the instrument unless another person, capable of providing first aid or resuscitation, is present. *Please remember that any alteration or repair may void the warranty.* Contact SDI with any questions or to request an RMA if a repair is needed.

SpectraDynamics, Inc.  
1849 Cherry Street Unit 2.  
Louisville, CO 80027  
USA

Tel: (303) 665-1852  
Fax: (303) 604-6088  
support@spectradynamics.com  
www.spectradynamics.com



---

## EC Declaration of Conformity

This Product has been designed and manufactured in accordance with the below referenced Standards and complies with all essential requirements of the Directives listed below.

### Directives:

**2014/35/EU** of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits.

**2014/30/EU** The Electromagnetic Compatibility Directive and its amending directives.

**2011/65/EU** of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

### Standards:

**EN 55011 2009 + A1: 2010**, Product family standard for Industrial, Scientific and Medical (ISM) equipment.

**EN 61010-1:2010** Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use – Part 1: General Requirements

**EN 61326-1:2013** Electrical Requirements for Electrical Equipment for Measurement, Control and Laboratory Use – Part 1: General Requirements

