



*Instruction Manual*

**SPSR-115/230 Kits**  
**Self-Powered Sensor**  
TTL Pulse Output



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## SAFEGUARDS AND PRECAUTIONS



Read and follow all instructions in this manual carefully, and retain this manual for future reference.

Do not use this instrument in any manner inconsistent with these operating instructions or under any conditions that exceed the environmental specifications stated.

This instrument is not user serviceable. For technical assistance, contact the sales organization from which you purchased the product.



To comply with worldwide regulations such as the U.S. Environmental Protection Agency Resource Conservation and Recovery Act (RCRA) and EU Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE): This product may contain material which could be hazardous to human health and the environment. **DO NOT DISPOSE** of this product as unsorted municipal waste. This product needs to be **RECYCLED** in accordance with local regulations; contact your local authorities for more information. This product may be returnable to your distributor for recycling; contact the distributor for details.



SPSR units contain Nickel-Metal Hydride (NiMH) batteries which must be recycled and disposed of in accordance with Federal, State, & Local Regulations. Do not incinerate. Batteries should be shipped to a reclamation facility for recovery of the metal and plastic components as the proper method of waste management. Contact the distributor for appropriate product return procedures.

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Monarch Instrument's Limited Warranty applies.  
See [www.monarchinstrument.com](http://www.monarchinstrument.com) for details.

Warranty Registration and Extended Warranty Coverage information is available online at [www.monarchinstrument.com](http://www.monarchinstrument.com).

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## 1.0 OVERVIEW

The SPSR-IM Self-Powered Sensor Interface Module is a self-contained, rechargeable battery powered device for developing a TTL compatible one pulse per revolution output for triggering external equipment such as vibration analyzers, spectrum analyzers, stroboscopes, data acquisition equipment, tachometers, balancers, waveform analyzers and magnetic tape recorders.



**SPSR-115/230 Kit**  
*SPSR-IM, 8 ft. ROS-P, &  
Universal Recharger*

The SPSR-115/230 Kits are comprised of the SPSR-IM Interface Module, which provides power to a sensor and couples the sensor to a BNC output; an input sensor with a visible red LED light source (ROS-P or ROS-P-25); and a battery recharger.

Optional sensors such as an optical laser sensor (ROLS-P-not shown), infrared sensor (IRS-P), or an amplified magnetic sensor (MT-190P) may also be combined with the SPSR-IM Interface Module when appropriate. (See separate instructions for these configurations.)



*IRS-P  
Infrared Sensor*



*MT-190P  
Magnetic  
Trigger Sensor*

## 2.0 SPSR-IM FUNCTIONS AND OPERATION

The SPSR Interface Module (SPSR-IM) provides power to the input sensor, receives and optionally inverts the return pulse signal, and provides a switch selectable positive going 0 to 5 Vdc or negative going 5 to 0 Vdc pulse train trigger output on a BNC connector. Connections and operation are common to all SPSR models. Fully charged internal NiMH batteries will typically provide greater than 40 hours of continuous operation. In addition, the SPSR system can be operated continuously on external power by use of the recharger/power supply provided.

## 2.1 Connections

Connect the desired input sensor via the 1/8" [3.5 mm] phone plug to the mating connector on the SPSR-IM. The sensor may remain connected even when recharging the internal batteries of the SPSR-IM.

**Note:** Do not plug an input sensor into the SPSR with the Power switch in the ON position. Before plugging the sensor in, switch the power to OFF and unplug any external power supply.

Connect the output signal cable to the BNC connector on the opposite end of the SPSR-IM and to the external equipment to be triggered.

If operating from the recharger/power supply, connect the recharger to the connector marked **EXTERNAL DC** on the SPSR-IM and connect the wall unit to the appropriate power source.

## 2.2 Switches

The **POWER** switch on the SPSR-IM controls both the operation and the charging of the system. The unit will only charge from external power in the power OFF position. In the power ON position, the unit will operate directly from external power any time that it is being supplied. Otherwise, it functions on internal battery power.

The **OUTPUT SELECTION** switch determines the polarity of the leading edge of the TTL compatible output signal. In the **NONINVERTING** position, the output signal on the BNC connector will be a negative going 5 to 0 Vdc pulse derived directly from the conditioned sensor output. When the switch is in the **INVERTING** position, the BNC output signal will be a positive going 0 to 5 Vdc, TTL compatible.

## 2.3 LED Indication

The LED indication is as follows:

Solid green = Unit operational  
Blinking red = Unit charging  
Solid red = Charging done

**Note:** Short red blinks followed by long blink = charge error; contact factory.

## 2.4 Operating the SPSR as a Triggering Source

Make the necessary connections for the input sensor and external equipment to be triggered as described in section [2.1 Connections](#). Make sure input sensor is properly mounted and aligned.

The pulse signal on the connector marked **OUTPUT** provides a sharp leading edge for reliable and repeatable triggering of the connected device. This output can drive up to one hundred feet of coax cable. Be sure to position the **OUTPUT SELECTION** switch to set the required polarity of the leading edge (0 to 5 Vdc or 5 to 0 Vdc) to properly trigger the connected equipment.

## 3.0 SPSR-115/230 KITS – SPSR-IM WITH ROS

SPSR-115/230 Kits consist of the SPSR-IM Interface Module, a Remote Optical Sensor with either an 8-foot cable (ROS-P) or 25-foot cable (ROS-P-25) and mounting hardware, a universal recharger/power supply (SPSR-U), and 1-foot of T-5 Reflective Tape.

### 3.1 Remote Optical Sensor (ROS)

When connected to the SPSR-IM as described in section [2.1 Connections](#), the Remote Optical Sensor illuminates the target with a visible red light from a high intensity LED and detects the reflected pulses from the rotating reflective tape target with an internal photo-detector. The Remote Optical Sensor can detect a reflected pulse from T-5 Reflective Tape at distances of up to 3 feet and angles up to 45 degrees from the target. The sensor is supplied with a set of two M16 jam nuts and a 90° angle slotted aluminum mounting bracket.

For most applications, a 1/2" square piece of T-5 Reflective Tape should be applied to a clean area on the rotating object. The sensor should be mounted and optically aligned to illuminate the reflective target once per revolution. It is recommended that the optical sensor be placed

at a slight angle (approximately 10-15 degrees) from perpendicular, so that the sensor will detect only the reflected pulses from the target. The sensor should be at least 2 inches and no more than 3 feet from the target. The green LED On-Target Indicator on the ROS will blink at the input frequency or be continuously illuminated when properly aimed.

## 4.0 BATTERIES

The SPSR-IM is fitted with rechargeable NiMH (nickel-metal hydride) batteries which are prone to self-discharge. When not in use, the batteries should be charged at least every three months, otherwise the battery capacity may be reduced or the batteries may become unusable.

The enclosure contains control electronics to properly and safely charge the batteries. Never remove the batteries from the enclosure and attempt to charge externally. **Always use the recharger supplied (SPSR-U).**

### 4.1 Recharging the Batteries

**To recharge the SPSR-IM Interface Module batteries:**

1. Connect the recharger/power supply to the **EXTERNAL DC** input connector.
2. Make sure the correct adapter plug is inserted into the recharger/power supply (see section [5.0 RECHARGER/POWER SUPPLY](#)) and then plug the recharger/power supply into an AC mains outlet.
3. Be sure the **POWER** switch is in the **OFF (CHARGE)** position. The red **CHARGE** LED will indicate that the batteries are being charged. Allow up to 4 hours to fully charge.



**CAUTION:** Use of rechargers other than the one supplied (SPSR-U) may damage the SPSR-IM and void the warranty.

## 4.2 Battery Disposal



Prior to disposing of the SPSR-IM, the unit must be disassembled to properly dispose of the electronic components in the device. In particular, the nickel metal hydride (NiMH) batteries must be removed and RECYCLED in accordance with environmental regulations in the country of use.



To remove the NiMH batteries, unplug all connections from the SPSR-IM and then remove the four (4) rubber feet on the bottom of the unit. This will expose four (4) screws that must be removed to dismantle the bottom case piece, exposing the batteries. Remove the batteries and place tape over the battery terminals to prevent them from shorting. The batteries should be sent to a recycling center or returned to the factory.

## 5.0 RECHARGER/POWER SUPPLY

The recharger/power supply provided with the SPSR-IM has interchangeable adapter plugs allowing it to be used with AC outlets in different countries.

To change the adapter plugs, depress the button on the installed plug and slide the plug up and out of the recharger/power supply. Select the correct adapter plug and slide it back into the recharger/power supply until the plug seats firmly. Make sure the plug cannot slide out.



### CAUTION

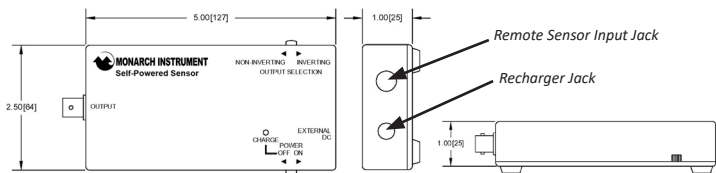
#### RISK OF ELECTRIC SHOCK

- Do not insert the adapter plugs into an AC outlet without the recharger/power supply attached
- Avoid touching the plug blades when inserting or removing the recharger/power supply from the ACT outlet
- Indoor use only

## 6.0 SPECIFICATIONS

Specifications*	SPSR-IM Interface Module
Internal Batteries	Nickel-metal hydride (NiMH) battery pack, 4.8 Vdc
Operating Interval	>40 hours typical with ROS-P (~40 mA load)
Charge Time	Up to 4 hours
Output	TTL compatible pulse, INVERTED or NON-INVERTED switch selectable With ROS (negative pulse) input, output will be a positive pulse when set to inverted or negative pulse when set to non-inverted; optionally, the output can be open collector (external pull-up required)
Bandwidth	0 to 100 kHz
Battery Current Draw	12 mA with k $\Omega$ load (operational)
7.5 V Input Current Draw	14 mA with k $\Omega$ load (operational)
Power Supply	SPSR-U (operational/charge)
LED Indicator	Status indication; see LED Indication section
Output Connector	BNC connector (female)
Operating Temperature	32 °F to 122 °F (0 °C to 50 °C)
Weight	8.3 oz. (235 g)
Dimensions	5.0 in. x 2.5 in. x 1 in. [127 mm x 64 mm x 25 mm]

\*Specifications are subject to change without notice.



SPSR-IM Dimensions - inches [mm]

Specifications*	ROS-P Remote Optical Sensor
Operating Envelope	Up to 3 ft. [0.9 m] and 45° from reflective target
Speed Range	1 to 250,000 RPM
Illumination Source	Visible red LED, 5 Vdc @ 30 mA
Operating Temperature	14 °F to 158 °F (-10 °C to 70 °C)
Output Signal	5 to 0 Vdc TTL compatible pulse
On-Target Indicator	Green LED on end cap
Material	303 Stainless steel
Lens	Acrylic plastic
Cable Length	6150-020: 8 ft. [2.5 m] 6150-020-25: 25 ft. [7.62 m]
Dimensions	Threaded Tube: 2.90 in. L x 0.625 in. diameter [M16 x 1.5 x 74 mm] supplied with two M16 jam nuts and mounting bracket

\*Specifications are subject to change without notice.

## 6.1 Compliance

### CE Compliant

Please visit our website ([www.monarchinstrument.com](http://www.monarchinstrument.com)) to download our Declaration of Conformity for this product.

## 7.0 SENSORS/OPTIONS AND ACCESSORIES

ROS-P Remote Optical Sensor with 8 ft. [2.5 m] cable and mounting bracket



PN: 6180-057  
PN: 6180-057-25

ROS-P-25 Remote Optical Sensor with 25 ft. [7.6 m] cable and mounting bracket



PN: 6180-029

ROLS-P Remote Optical Laser Sensor with 8 ft. [2.5 m] cable and mounting bracket



PN: 6180-020

IRS-P Infrared Sensor with 8 foot [2.5 m] cable for use without reflective target at 0.5 inch [12.7 mm] gap (5 to 500,000 RPM)



PN: 6180-036

MT-190P Magnetic Trigger Sensor/Amplifier with 8 ft. [2.5 m] cable - 0.250" [6.4 mm] operating gap from target, 2" (L) x 5/8" [50.8 x 15.9 mm]



PN: 6180-028

EC-25P 25 foot [7.6 m] Extension Cable for remote sensors with male 1/8" [3.5 mm] phone plug to female 1/8" [3.5 mm] connector



PN: 6180-070

T-5 Reflective Tape 5 ft. [1.5 m] roll, 1/2 inch [13 mm] wide



PN: 6180-079

T-5WP Reflective Tape, waterproof, honeycomb pattern, 5 ft. [1.5 m] roll, 1-inch [25 mm] wide



PN: 6180-066

BP-R Replacement NiMH Battery Pack *(for SPSR-IM ONLY)*

SPSR-U Universal Recharger with plugs, 115/230 V ac - 50/60 Hz



PN: 6180-059

# Measure • Monitor • Maintain

Monarch Instrument is committed to excellence and quality in manufacturing, sales, and service.



*Portable Tachometers*



*Track-It™ Data Loggers*



*Panel Tachometers*



*Fixed Mounted Strobes*



*Portable Strobes*



*Frequency Converters*



*Speed Sensors*



*DataChart™ Paperless Recorders*



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