MIRION TECHNOLOGIES

JSR-15™

Handheld Multiplicity Register (HHMR)

KEY FEATURES

- Fast clock rate for high count-rate applications (>10 times that of pre-existing instruments)
- 512 channel histogram of multiplicity data
- Battery-operated with extended battery life
- Compact size and lightweight for greater portability
- USB communications
- Both TTL and differential input options
- Compatible with the INCC (IAEA Neutron Coincidence Counting) and NDA 2000™ software packages
- Multi-Instrument Collect (MIC) compatible
- Applications include: Nuclear Safeguards, Process Monitoring, Nuclear Waste Assay
- Complies with current EU directive for CE marking and current FCC(UL)/CSA 61010-1 directives for NRTL certification

DESCRIPTION

The JSR-15 Handheld Multiplicity Register (HHMR) is a handheld shift register/multiplicity circuit intended for neutron counting applications. As a shift register the instrument counts and records total number of pulses and the time correlation of the pulses to provide coincidence timing. Multiplicity distributions of the coincident events are recorded as well. The JSR-15 device has an internal clock rate of 50 MHz and is therefore capable of handling high count-rate applications in nuclear safeguards, nuclear waste assay, and process monitoring. The JSR-15 instrument has been tested up to a count rate of 20 MHz using the NDA 2000 software, ensuring that the shift register will not be the limiting factor in any current or near-term practical counting situations.

The JSR-15 unit has built-in batteries, a built-in charging circuit, and a battery monitoring circuit. The instrument can run for up to eight hours on a single charge, when operated in battery-save mode with a single JAB-01 charge amplifier/discriminator. The battery capability, along with the compact size and lightweight make the instrument extremely portable.

Two interface mechanisms are available on the JSR-15 instrument. In addition to the typical software interface through a notebook or suitable computer, the unit has a front panel push-button LCD display. Through the front panel interface the user may change the setup parameters (count time, high voltage, gate width, pre-delay, etc.), start and stop acquisitions, and view the measurement results. An estimate of the battery level is displayed on the LCD display, and a separate menu option allows for checking battery diagnostics. The LCD display can be controlled for efficient use of the battery.

The software interface is compatible with the INCC (IAEA Neutron Coincidence Counting) and NDA 2000 software packages. The JSR-15 device utilizes a USB pipeline for communication with a computer, in place of the older RS-232 serial port. (The USB port also supplies power, thereby reducing the drain on the battery.)

The signal input to the JSR-15 instrument can be in the form of TTL pulses via coaxial cable or differential pulses via a twisted pair cable. The instrument also has two auxiliary scaler inputs which are available as either TTL or differential inputs. In addition the unit supports fast accidentals. The JSR-15 unit contains a user-programmable High Voltage (HV) power supply and a 5 V supply that can provide bias and power to the pre-amplifier/discriminator boards.

SPECIFICATIONS

- 50 MHz internal clock speed with a pulse pair resolution of 20 ns.
- 512 channel histogram of multiplicity data.
- Signal input can be differential or TTL. Two auxiliary scaler channels also available as differential or TTL input. Minimum pulse width 10 ns.
- Serial data communication over USB pipe.

CONNECTORS

- SIGNAL – BNC connector labeled SIG is the main digital input to the JSR-15 unit. TTL-level signals (>2.5 V); input impedance ~100 Ω.
- AUX1 – BNC input for first totals scaler.; TTL-level (>2.5 V).
- AUX2 – BNC input for second totals scaler.; TTL-level (>2.5 V).
- DIFFERENTIAL INPUTS – Three inputs located on the right side of the unit. Can be used in place of BNC signal and scaler inputs. Accepts 7.5 to 12.5 V max input voltage; input impedance ~100 Ω.
- +5 V – BNC output connector.
- HVPS – SHV output supplies high voltage.
- USB – USB serial connection located on the right side of the unit. USB driver supplied with unit must be loaded on user computer prior to communicating with the JSR-15 unit.
- POWER – Input located on the left side of the unit for external power source. The Battery Green and Red LEDs indicate the battery status.

HVPS

- MULTI-RANGE – Programmable 0 to +2000 V dc; resolution to within 1 part in 2048. Accuracy: Output HV ±2 V typical (±5 V guaranteed) over range of 500 V to 2000 V; front panel read-back ±5 V over range of ≥1000 V to 2000 V and ±10 V over range of 500 V to 999 V.
- Maximum current 7 µA.

LOW VOLTAGE

- 5 V output (500 mA nominal).

PROGRAMMABLE PARAMETERS

- Gate width 0.040-1300 µs; 20 ns steps.
- Pre-delay 0.040-1300 µs; 20 ns steps.
- Run time 0.2-100 000 s; 0.1 s steps.

SHIFT REGISTER COUNTING REGISTERS

- INTERNAL CLOCK – 50 MHz.
- PULSE PAIR RESOLUTION – 20 ns.
- TOTALS – 48 bit synchronous counter read in three 16 bit words.
- REALS+ACCIDENTALS – 48 bit synchronous counter read in three 16 bit words.
- ACCIDENTALS – 48 bit synchronous counter read in three 16 bit words.
- AUX1 – 48 bit synchronous counter read in three 16 bit words.
- AUX2 – 48 bit synchronous counter read in three 16 bit words.
- MULTIPLICITY 512 – 32 bit words read in pairs of 16 bit words. (256 R+A, 256 Acc) (standard MSR4/2150 mode).
- MULTIPLICITY 1024 – 32 bit words read in pairs of 16 bit words. (512 R+A, 512 Acc) (extended JSR-15 mode).
- DERANDOMIZING BUFFER – 16-event deep buffer on signal input; random input capture rate; synchronized output rate at 50 MHz.

OTHER SHIFT REGISTER FEATURES

- Long delay fixed at 4096 µs.
- Standard and fast accidentals options.

SOFTWARE

- Compatible with NDA 2000 and INCC software.
- Multi-Instrument Collect (MIC) compatible.

PHYSICAL & ENVIRONMENTAL

- FORM FACTOR – 203 x 254 x 25 mm (8 x 10 x 1 in.) (L x W x H).
- WEIGHT – 1.7 kg (<4 lb).
- OPERATING TEMPERATURE – 0 to 50 °C.
- OPERATING RELATIVE HUMIDITY – 0 to to 80%, non-condensing.
- Tested to the environmental conditions specified by EN 61010, Installation Category I, Pollution Degree 2.

INPUT POWER

- Battery life up to eight hours.
- Input power 5 V dc (3 A).
- Universal AC to DC adapter provided with each unit.

ISO 9001 SYSTEM CERTIFIED MERIDEN CT SMYRNA GA OAK RIDGE TN CONCORD ON

CANBERRA