

General Data Sheet

## Co-Axial Shunts

R values from 0.0001 ohms to 0.5 ohms  
Ratings from 2 watts to 850 watts  
E values of 1.5 Joules to 60,000 Joules  
Bandwidths up 2GHz

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## Company Profile

Powertek has two divisions; Powertek US Inc Holbrook NY USA, Powertek UK Ltd Reading United Kingdom. These offices support a network of worldwide service centers, distributors and representatives.

Powertek specializes in the design and manufacture of electrical power, voltage and current measuring instrumentation: Measurement Transducers, Current Probes, Wattmeters, Power Analyzers, phase measuring measurement equipment along with multifunction calibration standards. The Sensor Division offers a range of ac/dc current/voltage sensors, current shunts, wideband current probes, current transformers and ac/dc power related transducers. PC based software solutions allow the Powertek measuring instruments and transducers to be controlled via Ethernet, RS232, RS485 and IEEE-488 interfaces. Various display and storage options are available to suit the customer need. An "in house" software customization service is available.

Powertek's customer base includes heavy industrial plants, avionics, positional control, military systems, power electronics & power conversion (inverters, switching power supplies, UPS, variable speed motor drives), single/three phase ac motors, ac generators, power transformers, electrical process control equipment, office and household appliance testing, electrical supply utilities and calibration.

All Powertek products are supplied CE marked with measurement uncertainties traceable to UKAS (UK) or NIST (USA) in accordance with ISO9001 2008. Our support includes application support, technical advice, servicing, repair and calibration. Flexible Current Sensing Rogowski coils with 5A output in accordance with ISO9001 2015, Z540, ISO/IEC 17025.

Powertek US Inc is a CAGE coded Military supplier, Cage code 4S5P4.

# Co-Axial Current Shunt Models



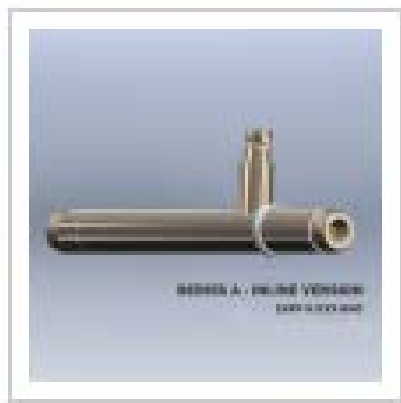
**Series A**  
0.001 to 0.2ohms 4-6 watts



**Series F**  
0.001 to 0.2ohms 75-300 watts



**Series K**  
0.0001 to 0.01ohm 150 to



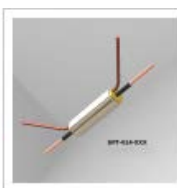
**Series L**  
0.001 to 0.2ohms 4-6 watts



**Series M**  
0.001 to 0.1 ohm 20 to 125 watts



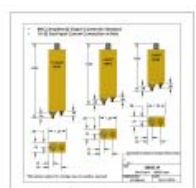
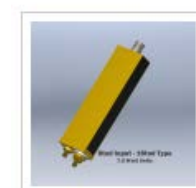
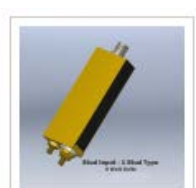
**Series R**  
0.00015 to 0.01ohm 225-850 watts



**Series SDN**  
0.001 to 0.5ohm 2-3 watts



**Series SDN-414**  
0.01 to 0.1ohm 2 watts

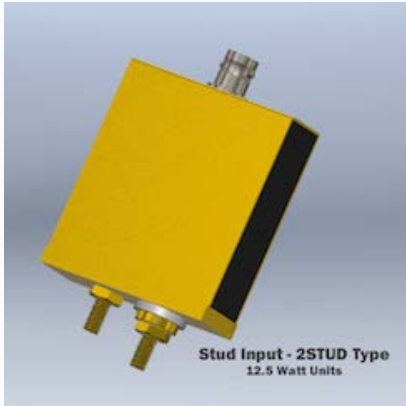


**Series W 1 Stud Type**  
0.001 to 0.5ohms 5-7.5 watts

# Non inductive co-axial current shunt and CVR

Series W2 thru to High Power W Flange Models  
0.000025 to 0.004 ohms  
Emax. 500 to 84,400 Joules  
Over 10000A depending on duty cycle

## Depending on W Model

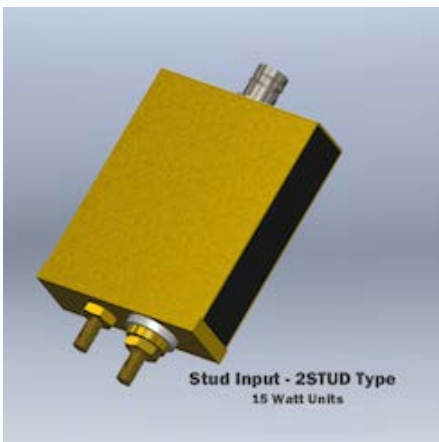


Series W non inductive co-axial current shunt

- Up to 200Arms continuous
- 10000Arms for 10mS (depending on model)
- DC-300 MHz frequency range
- High energy experiments
- BNC, GR, UHF, N, HN and C connectors
- Traceable to international standards via NIST (USA) and UKAS(UK)
- Lifetime warranty

## SERIES W - STUD INPUT - 2 STUD INPUT CURRENT VIEWING RESISTORS SPECIFICATIONS

WIDE BANDWIDTH - HIGH FREQUENCY - ULTRA LOW PHASE SHIFT



Small terminating type CVR available with BNC, GR, UHF, N, HN and C connectors  
Other connector options available upon request  
Standard connections are the "S" input (8-32 stud with threaded case) BNC output connector

# SPECIFICATIONS

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## 12 1/2 Watt Units - 3 1/2 Inch Overall Height

Model	Resistance ohms	Bandpass MHz.	Risetime nsec.	E <sub>max</sub> joules
W-1-05-2STUD	0.05	400	1	425
W-1-025-2STUD	0.025	400	1	213
W-1-01-2STUD	0.01	800	0.45	85
W-2-005-2STUD	.005	200	2	165
W-4-0025-2STUD	0.0025	48	8	330
W-8-001-2STUD	0.001	12	30	350

## 15 Watt Units - 4 Inch Overall Height

Model	Resistance ohms	Bandpass MHz.	Risetime nsec.	E <sub>max</sub> joules
W-2-01-2STUD	0.01	200	2	330
W-4-005-2STUD	0.005	48	8	660
W-8-0025-2STUD	0.0025	12	30	1320

Ordering information - specify model number and tolerance  
W-1-01-2Stud, 12 1/2 watts, 4%

## Wattage Rating

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We recommend that the case body does not exceed 140 deg F or 60 deg C.

## Energy Capacity

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A convenient criteria for selection of a CVR is provided by its pulse energy capacity. This rating is defined as:  $E_{max} = R_{cvr} [\int i^2 dt]_{max}$

Thus by definition the pulse energy capacity is the maximum recommended energy that should be dissipated in the CVR over a period so short that losses are negligible. When a square wave current pulse is utilized, the energy input (E) into the CVR is equal to  $R_{cvr} i^2 t$ , and any unit in which  $E_{max}$  greater than E can be used.

Capacitor bank systems present a more difficult problem since a major fraction of the initial stored energy is dissipated external to the CVR, i.e.,  $E_{cvr} = E_{stored} (R_{cvr} / (R_{cvr} + R_{external}))$  Prior to measurement, the effective system resistance is generally unknown. However, from consideration of peak current, CVR resistance, and a practical CVR output voltage, the ratio of  $E_{cvr} / E_{stored}$  is about 1/10 in typical underdamped capacitor systems.

Consider a system in which  $L = .5\mu h$ ,  $C = 500\mu f$ ,  $V = 20kv$ , and  $E = 25$  kilojoules. Assume an effective resistance of 1/10 critical. That is,  $R_{eff} = 1/5 (\sqrt{L/C}) = .0063$  IF  $R_{cvr} = .001$  ohms THEN  $E_{cvr} = E_{stored} (R_{cvr} / R_{eff}) = 4$  kilojoules, a value well within the capacity of our 5-kilojoule F-5000-20 model.

The  $E_{max}$  (joule) value tabulated for each resistor model is conservative, and all CVR's will sustain limited use at energy inputs to 1.5  $E_{max}$  without destruction. If a resistor is continuously operated at energy overload, its DC resistance should be checked frequently, since some permanent variations may result.

## Frequency Response

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Depending on Co-axial shunt / CVR inductance and mounting, expected values are 2-6nH

## Resistance Values

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Unless otherwise specified, resistors are supplied with resistance tolerance of  $\pm 4\%$  of nominal value. In addition, a Kelvin Bridge determination of its exact resistance, accurate to  $\pm 0.2\%$  is supplied with each unit. A wide range of special resistance values for any of our standard units can be supplied.

## Mechanical Design

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Case construction of all coaxial CVRs is silverplated brass. Standard output signal connector is BNC with other connectors available. Large coaxial CVRs utilize a high current flange and coaxial threaded stud input connections. Powertek's flat configuration CVRs, the Series W, originally developed for flat plate transmission line installation, are available in a wide range of unit widths and input configurations and have been found to be particularly useful in applications requiring resistors with extreme energy and wattage ratings.

## World Wide Traceability

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All measurements made using the CVR Series W shunts are traceable to National and International standards; through the measurement standards of Powertek. All CVR series W shunts are supplied with a certificate of conformance necessary for quality assurance standards such as IEC17025/ISO9001. Independent measurement certification is possible using UKAS, A2LA or Z540/NAVLAP certificate.

## Non inductive coaxial shunt - CVR applications

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- Pulsed current applications
- Calibration laboratories
- Current sensing for phase meters
- Single phase angle indicators V-A
- Three phase phase angle indicators V-A
- Power factor meters
- High Frequency Watt Meters
- Wideband Power meters
- Power analysis
- Current transformer calibration
- Current probe phase delay characterization
- SCR current measurements
- Current control of automatic welders
- Measure output of automotive alternators
- Fault current detection to determine bearing wear of ac generators
- Electron beam welding
- Current detection in detonation systems
- Three-phase fault testing in power transmission substations
- Fault detection in modulators
- Measurement of laser system lamp currents
- IGBT chopper current control in electric cars
- Circuit breaker testing

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