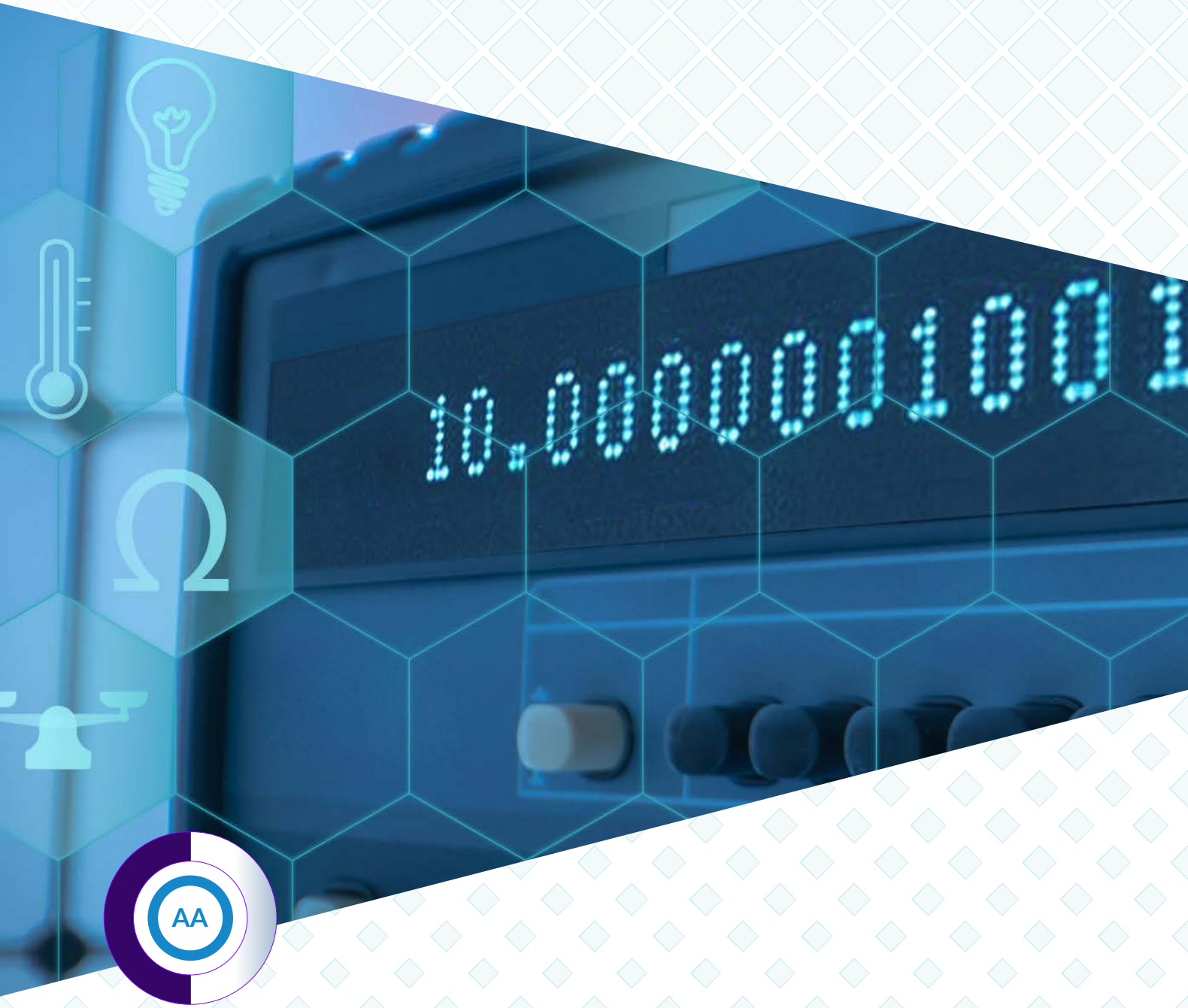
VPG Foil Resistors

VFR · ALPHA ELEC. · POWERTRON · APR

Standard Resistors Series

DATABOOK



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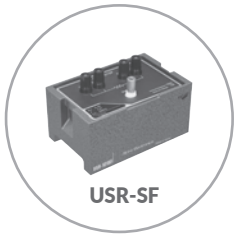
Standard Resistors
Resistance Boxes
Custom Products

Standard Resistors

Standard Resistors and Decade Boxes


HRU


USR-SF

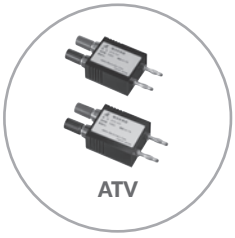

ASR


CSR


CSR


LSR


MSR


ATV

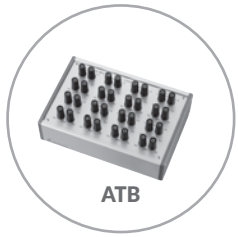

PSR


ADR-3204GR


ADR-6


ADR-1000


ATS


ATB

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New Stress-Free Ultra Stable Flagship Primary Standard Resistor

FEATURES

- Utilizing New Generation Stress Free Bulk Metal® Foil technology
- Extreme stability: 0.2 ppm/yr (0.05 ppm/yr typical)
- Temperature coefficient: less than α_{23}±0.05 ppm/°C, β ±0.005 ppm/°C² at 23 °C ±5 °C
- Excellent humidity coefficient of resistance less than 0.1 ppm/% RH
- Excellent pressure coefficient of resistance less than 0.001 ppm/hPa
- Available wide range of resistance values at 1 Ω, 10 Ω, 25 Ω, 100 Ω, 1 kΩ, 10 kΩ

Incorporated the technology of
The National Institute of
Advanced Industrial Science and Technology
(The Japanese patent application number 2010-114994)

MASS

Approx. 1.4 kg (3.1 lbs)

DESCRIPTION

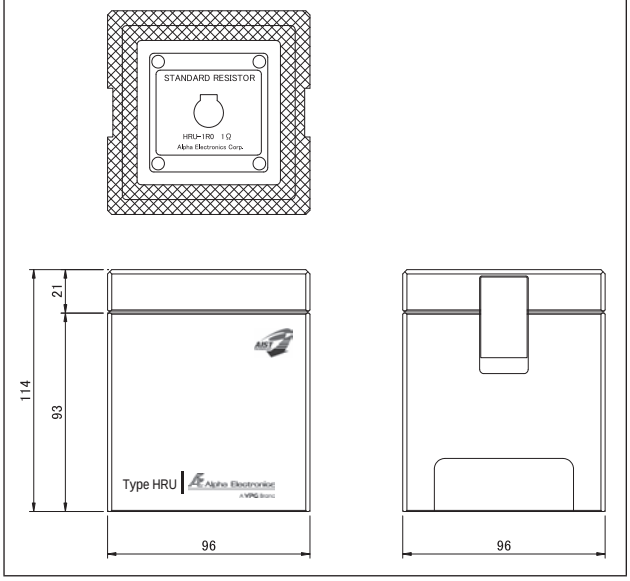
The HRU series is an ultra stable flagship primary standard resistor which is an enhanced version of the USR/ASR/CSR series through the use of Bulk Metal® Foil technology.

Our HRU Series features an ultra-stable resistive element due to our new generation of stress-free Bulk Metal® Foil technology and our proprietary nickel chrome alloy. The resistor is also encapsulated in a speciallydesigned ceramic case, which protects the element against humidity and oxidation. These features deliver an impressive long-term performance of less than 0.2 ppm/year (0.05 ppm/year typical) and an extremely low temperature coefficient of α_{23} ±0.05 ppm/°C, β ±0.005 ppm/°C². This performance is unique to Alpha Electronics throughout the world.

Alpha's Bulk Metal® Foil construction provides excellent AC characteristics—superior to performance of conventional wirewound standard resistors.

The resistive elements are held by special designed case so, it's suitable for environment with vibration during transportation.

CONFIGURATION in millimeters



SPECIFICATIONS

Series	Nominal Value	Accuracy	Uncertainty of Calibration	Temp. Coefficient	Temp. Retrace	Stability	Power Rating	Power Coefficient	Operating Temp. Range	Storage Temp. Range	Terminal
		ppm	ppm	ppm/°C	ppm	ppm/yr	W	ppm/power*	°C	°C	
HRU-1R0	1 Ω	±1	±1 @ 23 °C	α_{23} ±0.05 ppm/°C β ±0.005 ppm/°C² @23±5 °C	±0.1 @23±5 °C	±0.2 (±0.05 actual)	1.0	0.5	15–30 <60 %RH	10-40	LEMO 1B Recep-tacle
HRU-100	10 Ω										
HRU-250	25 Ω										
HRU-101	100 Ω										
HRU-102	1 kΩ										
HRU-103	10 kΩ										

New Stress-Free Ultra Stable Primary Standard Resistor

FEATURES

- Utilizing New Generation Stress Free Bulk Metal® Foil technology
- Long-term stability: 0.5 ppm/yr (0.2 ppm/yr typical)
- Temperature coefficient: less than ±0.05 ppm/°C at 23 °C ±5 °C
- Excellent humidity coefficient of resistance less than 0.1 ppm/% RH
- Excellent pressure coefficient of resistance less than 0.001 ppm/hPa
- Available wide range of resistance values at 1 Ω, 10 Ω, 25 Ω, 100 Ω, 1 kΩ, 10 kΩ

Incorporated the technology of
The National Institute of
Advanced Industrial Science and Technology
(The Japanese patent application number 2010-114994)

MASS

Approx. 2.5 kg (5.5 lbs)

DESCRIPTION

The USR-SF series is an ultra stable primary standard resistor which is an enhanced version of the USR/ASR series through the use of Bulk Metal® Foil technology.

This results in extremely low temperature coefficients as ±0.05 ppm/°C at 23 °C ±5 °C. This performance is unique to Alpha Electronics throughout the world.

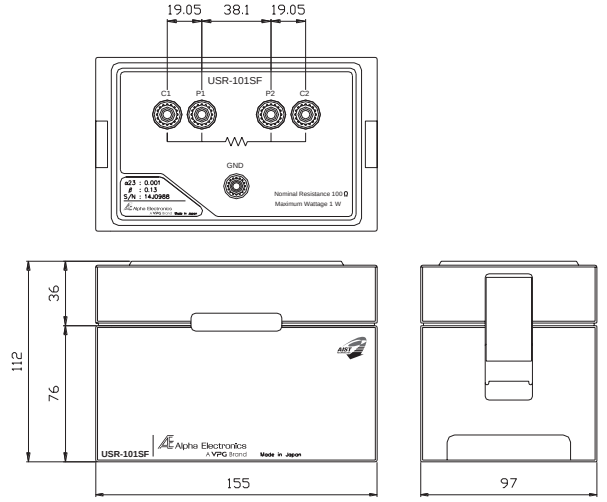
The stress-free resistance element eliminates stress factors using a special stabilizing process and is encapsulated in a specially-designed ceramic case to protect against humidity and oxidation. Thus, less than 0.5 ppm/year (0.2 ppm/year typical) is realized.

Alpha's Bulk Metal® Foil construction provides excellent AC characteristics—superior to performance of conventional wirewound standard resistors.

The USR-SF, with its extreme long-term stability and low TCR, can be used in air which reduces cost and operation for maintenance of oil bath.

The resistive elements are held by special designed case so, it's suitable for environment with vibration during transportation.

CONFIGURATION in millimeters



SPECIFICATIONS

Series	Nominal Value	Accuracy	Uncertainty of Calibration	Temp. Coefficient	Temp. Retrace	Stability	Power Rating	Power Coefficient	Operating Temp. Range	Storage Temp. Range	Number of Terminals
		ppm	ppm	ppm/°C	ppm	ppm/yr	W	ppm/power*	°C	°C	
USR-1R0SF	1 Ω	±2	±2.5 @ 23 °C	±0.05 @23±5 °C	±0.5 @23±5 °C	±0.5 (±0.2 actual)	1.0	±1	18–28	0–50	5
USR-100SF	10 Ω										
USR-250SF	25 Ω										
USR-101SF	100 Ω										
USR-102SF	1 kΩ										
USR-103SF	10 kΩ										

* Rated power will be different per future additional low values.

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Primary Standard Resistor

FEATURES

- Excellent long-term stability of resistance, less than 3 ppm/year
- Low temperature coefficient, less than 0.2 ppm/°C
- The resistance value may be specified from 1 Ω to 10 MΩ
- Excellent AC characteristics due to non-wirewound technology
- Compact and sturdy construction designed for easy operation and storage
- Certificate of Calibration, Calibration Report and Traceability Chart traceable to NMIJ* are available per request
  *NMIJ: National Metrology Institute of Japan

MASS

Approx. 2.5 kg (5.5 lbs)

DESCRIPTION

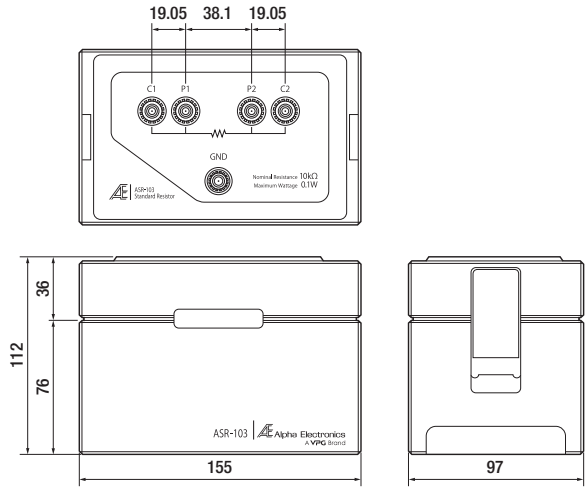
The ASR series is an extremely stable standard resistor. Alpha's Ni/Cr alloy Bulk Metal® Foil technology is used as the resistive element, providing high stability and low temperature coefficient. The process of building a standard resistor requires significant experience and a great degree of skill. Due to our long-term experience in developing and enhancing ultra stable Bulk Metal® Foil technology, we are able to provide products with consistency of performance under strict quality control.

With the extreme stability of this resistor relative to temperature change, the ASR can be used in air without oil bath or critical environmental temperature control eliminating added expense and maintenance problems.

The ASR is designed to be used in a broad range of environments—from a production floor for making precise measurements, to a corporate traceability system as a calibration and reference standard.

The resistors are mounted in a compact sturdy box with cover whose construction is designed to protect the resistor and terminals from any damages.

CONFIGURATION in millimeters



*Terminal space for series with 3 terminals is 76.20 mm

SPECIFICATIONS

Series	Nominal Value	Accuracy	Uncertainty of Calibration	Temp. Coefficient	Temp. Retrace	Stability	Power Rating	Power Coefficient	Max. Working Temp.	Max. Working Current	Max. Working Voltage	Operating Temp. Range	Storage Temp. Range	Number of Terminals
		ppm	ppm	ppm/°C	ppm	ppm/yr	W	ppm/power*	°C	mA	V	°C	°C	
ASR-1R0	1 Ω	±5	±2.5 @ 23 °C	±0.2 @ 0~23 °C 23~50 °C	±2 @ 23~0 °C ~23 °C 23~50 °C ~23 °C	±3	0.5	±5	50	707	0.70	0~50	–10~60	5
ASR-100	10 Ω						0.1	±1		100	1.00			
ASR-101	100 Ω									31.6	3.16			
ASR-102	1 kΩ									10.0	10.0			
ASR-103	10 kΩ									3.16	31.6			
ASR-104	100 kΩ									1.00	100			3
ASR-105	1 MΩ									0.31	316			
ASR-106	10 MΩ	±10	±5	±0.5		±6		±3		0.10	1000			

* Power=Power rating

Working Standard Resistor

FEATURES

- Usable in air without oil bath
- Wide resistance range available from 1 mΩ to 1 GΩ
- Excellent performance versus cost
- Terminals aligned in a single row for easier wiring and placement
- Certificate of Calibration, Calibration Report and Traceability Chart traceable to NMIJ* are available per request
  *NMIJ: National Metrology Institute of Japan

MASS

Approx. 300 g (0.66 lbs)

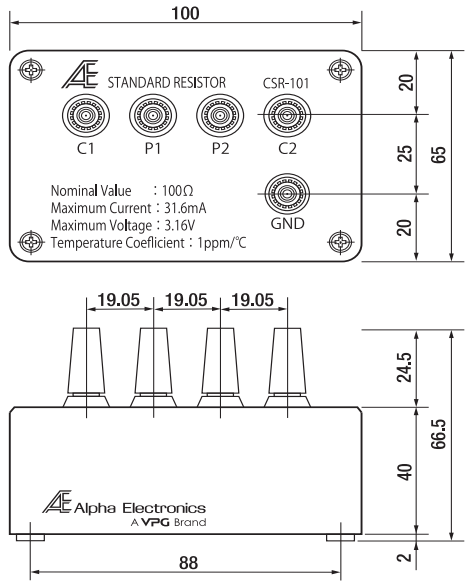
DESCRIPTION

The CSR series has Bulk Metal® Foil resistance elements, which have the same excellent stability and low temperature coefficient of resistance as the ASR series—a precision level that cannot be provided by any other resistance material. In addition, the CSR is designed for equal ease of use in the laboratory or on the production floor. It's construction is designed to give priority for portability and workability, being used in air without an oil bath.

CUSTOMIZED SPECIFICATIONS

Available for any customized resistance value.
Contact to our sales department for more details.

CONFIGURATION in millimeters



*Terminal space for series with 3 terminals is 57.15 mm

SPECIFICATIONS

Series	Nominal value	Accuracy	Temp. Coefficient	Stability	Power Rating	Power Coefficient	Storage Temp. Range	Max. Working Current	Max. Working Voltage	Working Temp. Range	Number of Terminals
		ppm	ppm/°C	ppm/year	W	ppm/mW	°C	A	V	°C	
CSR-1N0	1 mΩ	±100	±10	±20	0.5	±0.05	0~50	22.3	22.4m	18~28	5
CSR-10N	10 mΩ	±50	±5	±15				7.07	70.7 m		
CSR-R10	100 mΩ	±25	±2.5	±10				2.24	224 m		
CSR-1R0	1 Ω	±5	±1	±5	0.1	±0.01		316 m	316 m		
CSR-100	10 Ω							100 m	1.00		
CSR-101	100 Ω							31.6 m	3.16		
CSR-102	1 kΩ							10 m	10.0		
CSR-103	10 kΩ							3.2 m	31.6		
CSR-104	100 kΩ							1 m	100		3
CSR-105	1 MΩ							0.3 m	316		
CSR-106	10 MΩ	±5		±10	0.1			0.1 m	1000		
CSR-107	100 MΩ	±10	±2.5	±25	0.01			0.01 m	1000		3 (BNC)
CSR-108	1 GΩ	±25			0.0025			1.5 μ	1500		

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High Power Standard Resistor

FEATURES

- For high power measurement
- Excellent long-term stability
- Compact size. Usable in air. Low temperature coefficient for small resistance values
- Temperature efficient design to control self-heating
- Certificate of Calibration, Calibration Report and Traceability Chart traceable to NMIJ* are available per request
  *NMIJ: National Metrology Institute of Japan

MASS

Approx. 600 g (1.3 lbs)

DESCRIPTION

The LSR series is developed to meet the requirements of high current / low resistance applications. Bulk Metal® Foil resistive elements are used to ensure the best long-term stability and lowest temperature coefficient is achieved.

The enclosure is made of perforated aluminum to allow effective temperature dissipation, especially under conditions of high electrical power.

The LSR can be used in air without oil bath or cooling unit, it is suitable for a wide range of applications, such as high precision measurements, calibration in corporate metrology labs, and a reference for precision power supplies, etc.

HIGH CURRENT OPTION

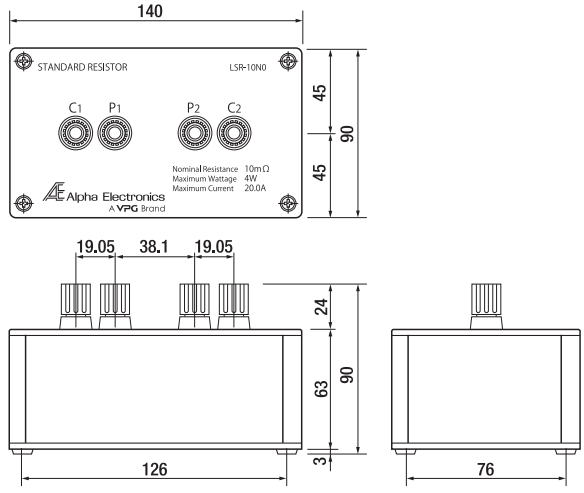
Ability to change terminal knobs for measuring the power up to 4 W (63 A) for 1 mΩ type (see the picture). Add P to the end of model number, when ordering.

Type: LSR-N10P 0.1 mΩ high current version is capable to be loaded up to 100 A

Type: LSR-1N0P Terminal space between P1 and P2: 19.05 mm

High Current Option

CONFIGURATION in millimeters



SPECIFICATIONS

Series	Nominal Value	Accuracy	Temp. Coefficient	Stability	Power Rating	Power Coefficient	Storage Temp. Range	Max. Working Current	Max. Working Voltage	Working Temp. Range	Number of Terminals
		ppm	ppm/°C	ppm	W	ppm/mW	°C	A	mV	°C	
LSR-N10P	0.1 mΩ	±100	±5	±20	1	±0.025	0-50	100	10.0	18-28	4
LSR-1N0	1 mΩ		±2.5					31.5	31.6		
LSR-1N0P					4			63.2	63.2		
LSR-10N	10 mΩ	±50		±10				20.0	200		
LSR-R10	100 mΩ	±25						6.32	632		

Milliohm Meter Calibration Resistor

FEATURES

- Compact, lightweight, portable and easy to operate
- Excellent performance versus cost
- Resistive pattern designed to minimize difference performance between AC and DC
- Certificate of Calibration, Calibration Report (DC) and Traceability Chart traceable to NMIJ* are available per request
  *NMIJ: National Metrology Institute of Japan

MASS AND SIZE

- Mass: 150 g (0.33 lbs)
- Size: 50 D × 44 H × 65 W mm

CUSTOMIZED SPECIFICATIONS

Available for any customized resistance value.
Contact to our sales for more details.

DESCRIPTION

The MSR series is a standard resistor whose internal construction and terminals are designed to optimize AC characteristics and minimize the effect of thermo-electromotive force, respectively. The MSR is a compact suitable standard resistor for daily calibration of milliohm meters, etc. Although the MSR series is a low cost, easy to use product, it offers both high stability and low temperature coefficient. The MSR is most suitable as a standard resistor to be used on the job site.

SPECIFICATIONS

Series	Nominal Value	Accuracy	Temp. Coefficient	AC Characteristics 1kHz (Ref. Value)	Stability	Power Rating	Max. Working Temp.	Max. Working Current	Max. Working Voltage	Working Temp. Range
		ppm	ppm/°C	%	ppm	W	°C	A	mV	°C
MSR-1N0	1 mΩ	500	±15	±0.3	±25	0.1	50	10.0	10.0	0~50
MSR-10N	10 mΩ	200	±10	±0.1				3.16	31.6	
MSR-R10	100 mΩ		±5					1.00	100	

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I/V Converter

FEATURES

- Lightweight, compact size
- Full resistance range available from 1 Ω to 100 kΩ

DESCRIPTION

The ATV series is a current / voltage conversion adaptor to measure a current by using a voltage meter.

It is small, lightweight, and attached directly to a voltage meter for ease of operation.

SPECIFICATIONS

Series	Nominal Value	Accuracy	Temperature Coefficient	Max.Working Current	Max.Working Voltage	Power Rating
		%	ppm/°C	mA	V	W
ATV-1R0	1 Ω	±0.1	±2.5	500	0.50	0.25
ATV-100	10 Ω			100	1.00	0.1
ATV-101	100 Ω			31.6	3.16	
ATV-102	1 kΩ			10.0	10.0	
ATV-103	10 kΩ			3.16	31.6	
ATV-104	100 kΩ			1.00	100	

Precision Programmable Resistance Box

RTD Simulator

FEATURES

- Controllable by PC with GB-IB and RS232C interfaces
- Compact design
- Utilizing ultra precision Bulk Metal® Foil resistor
- Quick response capable of setting desired resistance in as fast as 100 ms
- Accuracy ≤0.01 % +2 mΩ in 6½ digit readings
- Temperature coefficient of resistance ≤5 ppm/°C (>100 Ω)
- Double electrical shielding protection against noise
- Interface specification open to users

MASS

Approx. 5 kg (11 lbs)

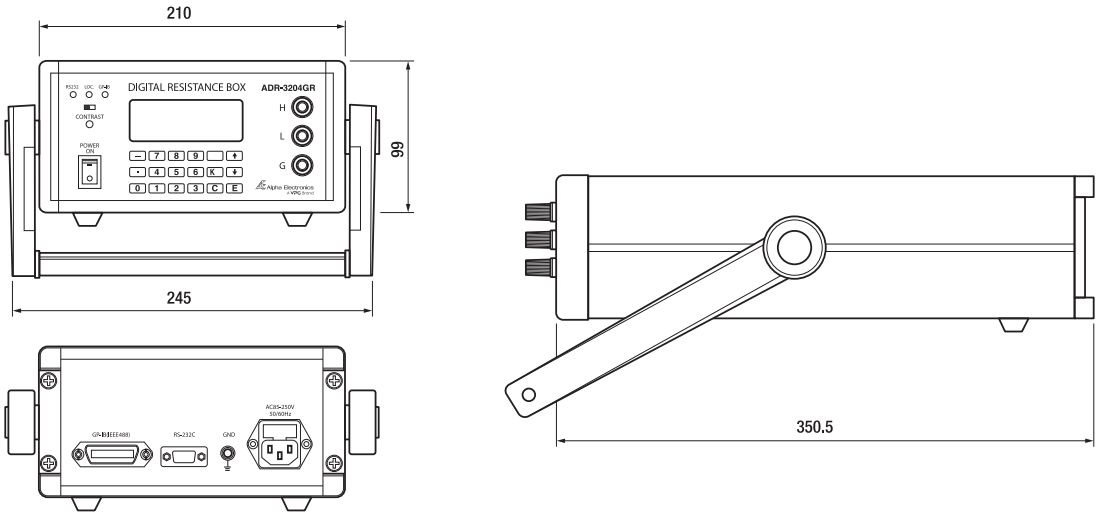
DESCRIPTION

The ADR Digital box is easy to set to any desired resistance value using a PC. The ADR Digital box realizes automated inspection to minimize inspection time while avoiding human error. The ADR Digital is the most efficient product for simulating input resistance values, and panel keys allow local-mode resistance value input. The JIS C1604/IEC60751 Pt thermometer table is stored in memory to facilitate entry of specific temperatures for specific resistance values in the Pt standard table.

Utilizing ultra precision Bulk Metal® Foil technology with very low Resistance Temperature Characteristics and excellent long-term stability assures high accuracy and high stability.

AVAILABLE PT STD OF TEMP INPUT					
IEC60751	Pt100	Pt200	Pt300	Pt500	Pt1000

CONFIGURATION in millimeters



SPECIFICATIONS

Model	Min. Resistance Value	Max. Resistance Value	Resolution (Ω)	Accuracy	Max. Wattage
ADR-3204GR	5.000 Ω	1.999999 kΩ	0.001	±(0.01 % +2 mΩ)	0.5 W
	2.00 kΩ	19.99999 kΩ	0.01		
	20.0 kΩ	199.9999 kΩ	0.1		

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6-Dial Decade Resistance Box

RTD Simulator

FEATURES

- Accuracy ≤0.005 % +2 mΩ
- Temperature coefficient of resistance ≤ 5 ppm/°C
- Long-term stability in resistance ≤50 ppm/year (storage life)
- Low contact resistance switch and three clip-typed contacts in parallel
- Low thermal EMF terminal
- Double electrical shielding protective against noise
- Utilizing Bulk Metal® Foil ultra precision resistance inside

MASS

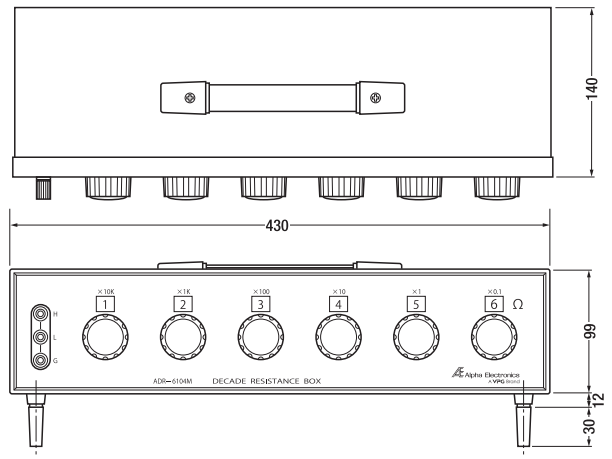
Approx. 4.5 kg (10 lbs)

DESCRIPTION

The ultra precision resistors, the rotary switches, the output terminals and the double shielded construction are all features of the 6-Dial Decade Resistance Box with 6½ digit readings.

Resistors used in the 6-Dial Decade Resistance Box are ultra precision Bulk Metal® Foil resistors manufactured by Alpha Electronics Corp., assuring high stability over time and environment change. Rotary switches have very low contact resistance as three clip-typed contacts are connected in parallel. The three contacts assure higher mechanical reliability mechanically. Output terminals have very low thermal EMF, using rectangular wires of low thermal resistance material in a well-designed circuit configuration. Double shielded construction inhibits interference of environmental noise.

CONFIGURATION in millimeters



SPECIFICATIONS

Series	Min. Resistance Value	Max. Resistance Value	Resolution	Dial Resistance Value/Step (Ω)						Accuracy	Max. Wattage
				Dial 1	Dial 2	Dial 3	Dial 4	Dial 5	Dial 6		
ADR-6102M	0.100 Ω	1.111210 kΩ	0.001	100	10	1	0.1	0.01	0.001	±(0.005 % ±2 mΩ)	0.5 W
ADR-6103M	0.10 Ω	11.11110 kΩ	0.01	1 k	100	10	1	0.1	0.01		
ADR-6104M	0.1 Ω	111.1110 kΩ	0.1	10 k	1 k	100	10	1	0.1		
ADR-6105M	1 Ω	1.111110 MΩ	1	100 k	10 k	1 k	100	10	1		
ADR-6106M	10 Ω	11.11110 MΩ	10	1 M	100 k	10 k	1 k	100	10	<1 MΩ ±(0.01 % +50 mΩ) ≥1 MΩ ±0.1 %	
ADR-6107M	100 Ω	111.1110 MΩ	100	10 M	1 M	100 k	10 k	1 k	100	<1 MΩ ±(0.02 %+50 mΩ) ≥1 MΩ ±0.1 %	

1-Dial Resistance Box

RTD Simulator

FEATURES

- Up to 5-digit resistance values on switching contacts may be specified
- Improved work efficiency and elimination of careless mistakes
- Lightweight, compact size
- High precision, high stability

MASS

Approx. 1 kg (2.2 lbs)

TERMINALS AND CONTACTS

- Contacts: Max. 24
- Terminals: 2 to 5

DESCRIPTION

The ADR-1000 series is a standard resistor which is ideally suited for repetitive daily work, the resistance is easily switched from one value to another. This greatly improves work efficiency and helps to avoid careless mistakes, as compared with using a decade standard resistor (6-dial type).

Also suitable as RTD simulator for Pt related products and conductive meters.

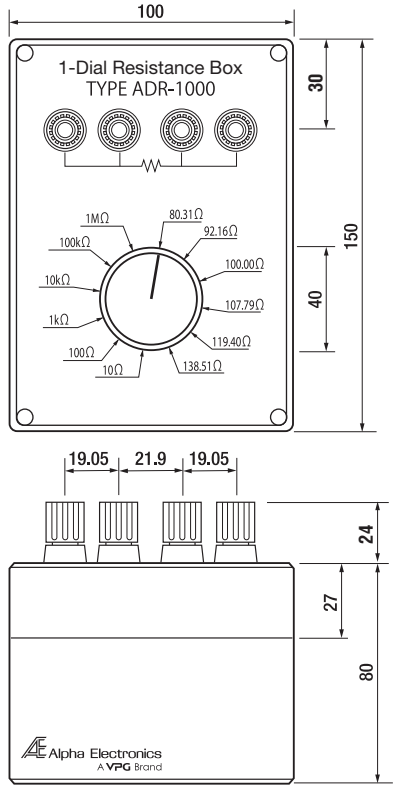
The resistance elements utilize Bulk Metal® Foil technology and the connections to a rotary switch are made by using 4-terminal junctions. This ensures that high precision, high stability and low temperature coefficient are achieved.

PRODUCT MODEL NUMBER

ADR - *1xxx

*1xxx is our internal code which is determined at order receipt

CONFIGURATION in millimeters



NOMINAL VALUE, TOLERANCE, TEMPERATURE COEFFICIENT

Resistance Value Range (Ω)	Tolerance (%)	Temperature Coefficient (ppm/°C)
1-1 M	±0.02 ±0.05 ±0.1	0±2.5 0±5

Tolerance and temperature coefficient varies with resistance values.
For detailed specifications, contact our sales office.

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Resistance Transfer Standard

FEATURES

- Using Bulk Metal® Foil as a resistive element
- Usable in air without oil bath due to superior temperature coefficient
- Very tight matching accuracy
- Excellent long-term stability and usable as a standard resistor

MASS AND SIZE

- Weight: Approx. 3 kg (6.67 lbs)
- Size: 180 D × 70 H × 332 W mm

OPTIONS

- ATS-LC Lead Compensator
- ATS-SB Shorting Bar

DESCRIPTION

The ATS series is a resistance transfer standard to calibrate working standard resistors by using a primary standard.

The ATS consists of the same 10 nominal value resistors connected in series known as Haymon bridge construction.

A maximum resistance ratio if 1:100 is obtainable in high precision, using either a lead compensator or a shorting bar. Configurations consist of from “10 resistors connected in parallel (1/10R)” to “10 resistors connected in series (10R)”.

The ATS uses Bulk Metal® Foil technology as a resistive element, ensuring very tight matching accuracy.

The ATS can be used as a standard resistor due to the special features of Bulk Metal® Foil technology (low temperature coefficient and high stability).

ATS-LC Option

ATS-SB Option

SPECIFICATIONS

Series	Rsistance Range	Step	Accuracy		Temperature Coefficient		Stability	Power Rating	Power Coefficiency	Working Temperature Range	Terminal Junctions
			Absolute	Matching	Absolute	Tracking					
	Ω	Ω/step	ppm	ppm	ppm/ °C	ppm/ °C	ppm/yr	mW	ppm/mW	°C	
ATS-1E1	1-100	10	±20	±5	±5	±2.5	±10	10/ element 100/unit	±0.1/ element	23 ±10	4 terminals
ATS-1E2	10-1 k	100	±10		±1	±1					
ATS-1E3	100-10 k	1 k									
ATS-1E4	1 k-100 k	10 k									
ATS-1E5	10 k-1 M	100 k									
ATS-1E6	100 k-10 M	1 M					±50				2 terminals
ATS-1E7	1 M-100 M	10 M	±50	±10	±10	±5					

High Precision Reference Shunt Resistor

FEATURES

- High precision reference shunt resistor utilizing Bulk Metal® Foil technology
- Accurate nominal value within ±0.05 % (class 0.05)
- Low TCR provide extremely stable output voltage
- Specially designed perforated side panal for air cooling
- Mountable chassis with screw holes on equipment or test bench

MASS

3 kg (6.6 lbs) max.

DESCRIPTION

PSR series is high precision and high reliable reference shunt resistor which is utilizing Bulk Metal® Foil technology provide an excellent stability and low TCR. High current handling capability with excellent linearity for variety of current measurements.

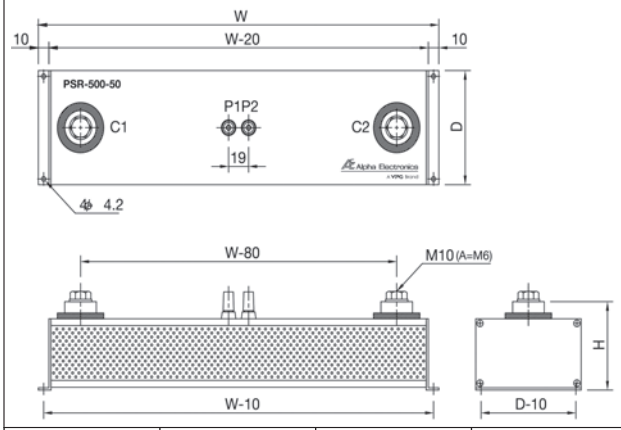
PSR series is used for calibration of test equipment, automotive battery test application, maintenance or installation of ISO/IEC17025.

Available up to 1000 A *Please contact to sales office.

PRECAUTION IN USING PSR RESISTOR

- Use within the current rating
- Tighten torque of C1&C2 terminals for minimizing electrical contact resistance

CONFIGURATION in millimeters



Type	W	D	H
A	320	75	75
B	380	75	78
C	380	100	78

SPECIFICATIONS

Series	Current Rating	Output	Nominal Value	Accuracy @10A	Temp. Coefficient	Power Coefficient	Working Temp. Range	Type
	A	mV	mΩ	ppm	ppm/°C	%	°C	
PSR-100-100	100	100	1.000	±500	0±5	±0.1	0-50	A
PSR-200-50	200	50	0.250					B
PSR-200-60		60	0.500					
PSR-200-100		100	0.500					
PSR-300-50	300	50	0.167					
PSR-300-60		60	0.200					
PSR-300-100		100	0.333					C
PSR-400-50	400	50	0.125					
PSR-400-60		60	0.150					
PSR-500-50	500	50	0.100					
PSR-500-60		60	0.120					

Alpha Electronics
A VPG Brand

Products for Standard Resistors

ADS SERIES
AC Shunt Standard Resistor

- Max. ±5 ppm AC/DC difference @10 kHz and DC operations
  (Joint development with JEMIC: Japan Electric Meter Inspection Corp.)

KSR SERIES
AC Standard Resistor

- Excellent AC stability with specially designed Bulk Metal® Foil element and package

AVR SERIES
DC Voltage Divider

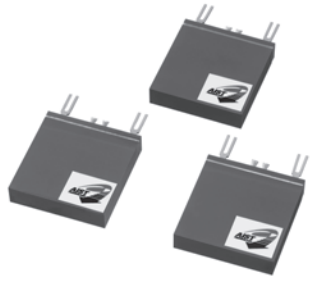
- Digital voltage meter calibration
- Dividing 50 V with ±0.001 % accuracy

ATB SERIES
Custom Resistance Box

- Available any resistance values with electrical and mechanical specifications per requests

APS SERIES
High Power Current Shunt Resistor

- Available any resistance value
- Max. working current up to 1000 A



TYPE SSS
Stress free Bulk Metal® Foil resistor element (ceramic package)

- 1 ppm/year (actual) stability

Calibration/Calibration Room/Options

CALIBRATION

- Traceability chart
- Certificate of calibration
- Inspection sheet

CALIBRATION LABORATORY

Options	Type	Descriptions
Carrying Case	CC-2000	Two USR-SFs or ASRs
	CC-3200GR	ADR Digital type
	CC-6100	ADR 6-Dial type
	CC-8000	Eight CSRs
Rack Mount Adapter	AM-3200	ADR Digital type
	AM-6100	ADR 6-Dial type

CC-8000

CC-6100

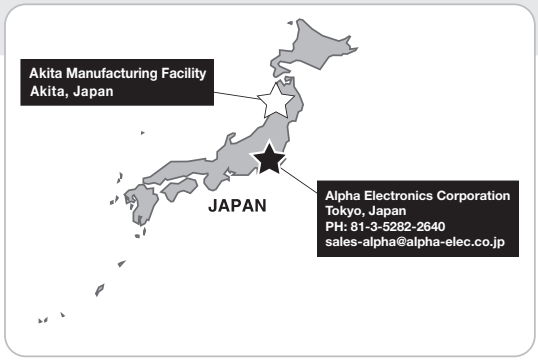
Alpha Electronics
A VPG Brand

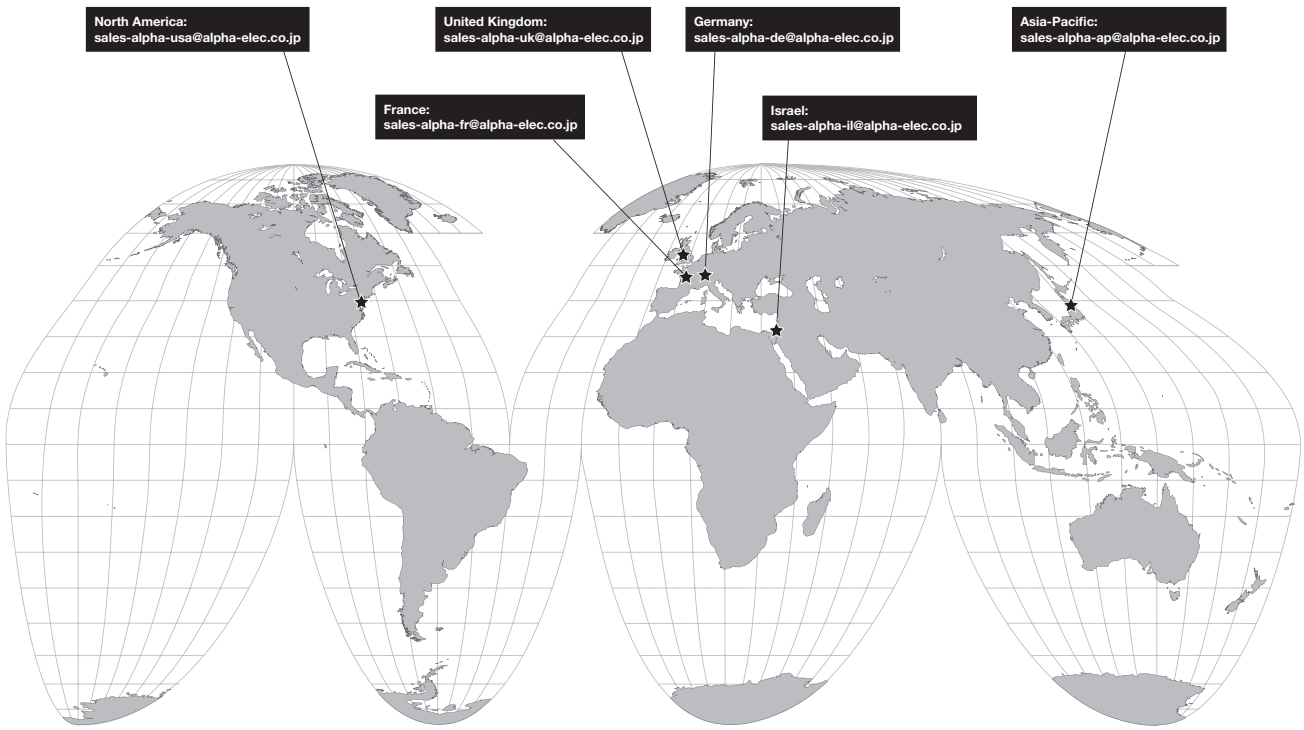
Product and Contact Information

PRODUCT LISTING

Bulk Metal® Foil Ultra Precision Resistors
Precision Thin Film Resistors
Thermosensitive Resistors
Standard Resistors

CONTACT US





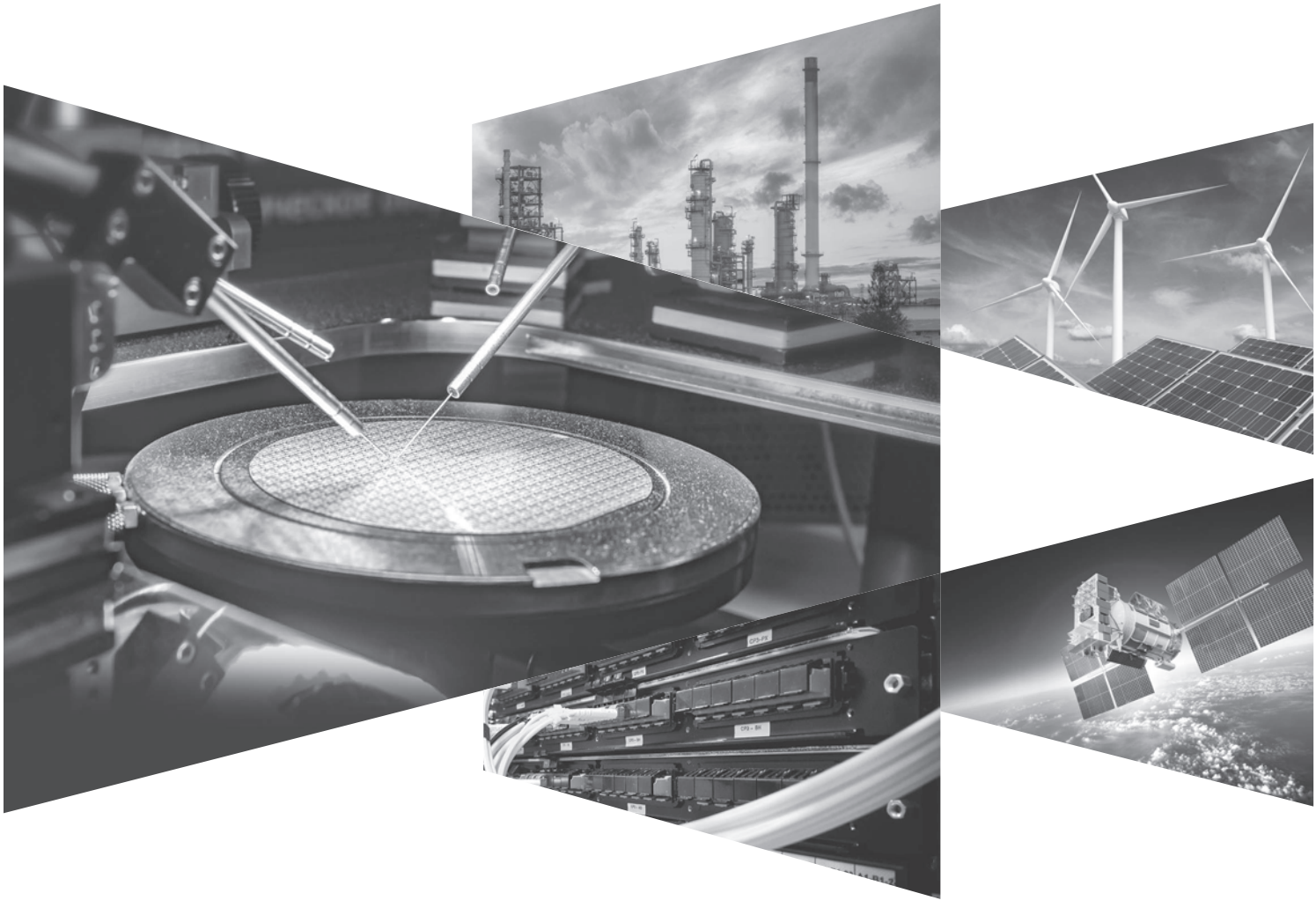
VPG Foil Resistors

VFR · ALPHA ELEC. · POWERTRON · APR

Consistent Precision & Reliability

Precision and reliability are the **heart and soul** of VPG Foil Resistors. For decades we have been known to produce supreme quality products complying with the strictest global standards worldwide. As market demands, we've extended our product line with APR – our new brand for standardized products.

Providing you with the widest selection of highly precise and reliable foil resistors from made-to-order to standardized, that meet any required qualifications.



AAA — VFR RESISTORS, A VPG Brand

AA — Alpha Electronics, A VPG Brand

AA — POWERTRON, A VPG Brand

+A — APR, A VPG Brand

VPG Foil Resistors consists of four brands

VFR – Bulk Metal® Foil

Foil precision resistors produces AAA-class resistors made-to-order, offering high standing reliability and best long-term stability, meeting the EEE /QPL standards.

Key Features

Temperature coefficient of resistance (TCR):
± 0.2 ppm/°C - typical

Resistance Range: 1 mΩ-1.84 MΩ

Resistance tolerance: to ±0.005%

Power Rating: to 10 W

Load Life Stability under Rated Power: to ±0.0025% -typical

EEE / QPL

Alpha Electronics

provides AA class foil resistors, high precision programmable certified resistance decade boxes, primary & secondary standard resistors. Custom designs for thin film resistors and RTD simulators complying with MIL standard.

Key Features

Temperature coefficient of resistance (TCR):
±0.2 ppm/°C - typical

Resistance Range: 1 mΩ-10 MΩ

Resistance tolerance: to ±0.01%

Power Rating: to 500 W

Load Life Stability under Rated Power: to ±0.005% -typical

MIL Standard

Powertron

provides AA class high precision power current sense foil resistors in lower resistance and custom design for thick film power resistors complying with MIL standards.

Key Features

Temperature coefficient of resistance (TCR):
±25 ppm/°C - typical

Resistance Range: 20 mΩ-10 TΩ

Resistance tolerance: to ±0.05%

Power Rating: to 900 W

Load Life Stability under Rated Power: to ±0.5%

MIL Standard

APR

provides off the shelf A+ class standard surface mount resistors packaged in tape & reel and power current-sense resistors with resistance values based on E24 & E96 codes complying with the AEC-Q200 standardization.

Key Features

Temperature coefficient of resistance (TCR):
±2 ppm/°C - typical

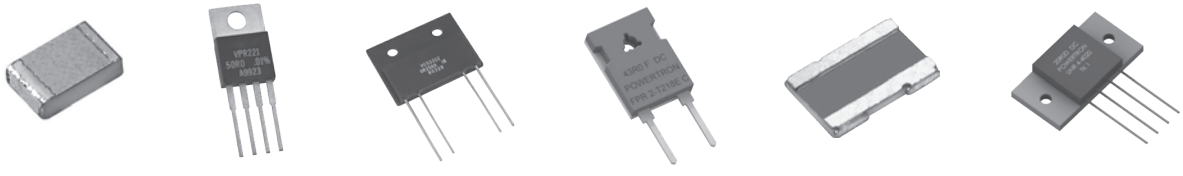
Resistance Range: 0.3 mΩ-1 TΩ

Resistance tolerance: to ±0.005%

Power Rating: to 20 W

Load Life Stability under Rated Power: to ±0.005% -typical

AEC-Q200



VPG Foil Resistors
VFR • ALPHA ELEC. • POWERTRON • APR

Contact us at foil@vpgsensors.com | vpgfoilresistors.com

9655-EN_Dec23

Alpha Electronics
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Contact us at alpha-elec.co.jp

4388-EN_Jul25