DC Voltage/Current Generators/Calibrators

For Evaluating and Calibrating Precision Instruments and Circuits

R6144

- **Large Capacity of Up To 32 V/160 mA**
- **High Accuracy (0.03%), High Stability**
- **Low Noise (3 mVp-p)**
- **50 ms Settling Time**

R6144

Programmable DC Voltage/Current Generators

The R6144 is precision voltage and current generators ideal for evaluation of precision circuits and parts as well as calibration of temperature controllers.
The units use a time-sharing D/A conversion circuit which provides excellent linearity and stability. Settling time and output noise are greatly reduced for higher reliability, allowing construction of a high throughput measurement system.
GPIB and BCD parallel interfaces are provided as standard features, enabling compatibility with a wide range of host devices such as personal computers, sequencers or general purpose I/O interfaces.

- **Up to 32 V/160 mA Voltage, Current Output**
- **High Resolution (1 μV/100 nA steps)**
- **High Accuracy Guaranteed For 6 Months: 0.03% (Voltage), 0.035% (Current)**
- **Low Noise Increases Measurement Reliability: 3 mVp-p, One-Fifth of Previous Models' Noise Level**
- **Reduced Settling Time Enables Improvements In Throughput: 50 ms, One-Third of Previous Models' Time**
- **Built-In 160-Step Memory**
- **All-Digit Continuous Variable Sweep Function Enables Wider Range of Measurement Applications**
- **Programs Written For Previous Model (TR6142) Can Be Used Without Modifications**

Specifications

Voltage/Current Generation

Voltage generation range:

Range	Voltage generating/range	Setting resolution
10 mV	0 to ± 16.000 mV/± 11.999 mV	1 µV
100 mV	0 to ± 160.00 mV/± 119.99 mV	10 µV
1 V	0 to ± 1.6000 mV/± 1.1999 mV	100 µV
10 V	0 to ± 16.000 mV/± 11.999 mV	1 mV
30 V (R6144 only)	0 to ± 32.000 V	2 mV

Current generation range:

Range	Voltage generating/range	Setting resolution
10 mA	0 to ± 1.6000 mA/1.1999 mA	100 nA
100 mA	0 to ± 16.000 mA/11.999 mA	1 µA
100 mA	0 to ± 160.00 mA/119.99 mA	10 µA

Overall accuracy: Guaranteed for 6 months (including linearity) at 23˚C ± 5˚C, RH 70% max., with constant power and load conditions.

Range	Generating accuracy ± (% of setting + range error)
10 mV	0.03 + 5 µV
100 mV	0.03 + 25 µV
1 V	0.03 + 200 µV
10 V	0.03 + 2 mV
30 V	0.03 + 4 mV
1 mA	0.035 + 300 nA
10 mA	0.035 + 3 µA
100 mA	0.04 + 30 µA

One-day stability: Under temperatures of 23˚C ± 5˚C and relative humidity of 70% or less with constant power supply and load.

Range	Generating stability ± (% of setting + range error)
10 mV	0.01 + 4 µV
100 mV	0.01 + 10 µV
1 V	0.01 + 50 µV
10 V	0.01 + 200 µV
30 V	0.01 + 300 µV
1 mA	0.01 + 20 nA
10 mA	0.01 + 200 nA
100 mA	0.01 + 2 µA

Temperature coefficient: From 0˚C to +50˚C, per 1˚C

Range	Generating temperature coefficient ± (ppm/˚C of set. ++ range error/˚C)
10 mV	20 + 200 nV
100 mV	20 + 2 µV
1 V	20 + 10 µV
10 V	20 + 40 µV
30 V	60 + 4 µV
1 mA	20 + 4 nA
10 mA	20 + 40 nA
100 mA	20 + 400 nA

Maximum load and output resistance: 4-wire resistance for 1 V, 10 V and 30 V ranges and 2-wire resistance for the other ranges

Range	Maximum load current/voltage	Output resistance
10 mV	0.8µA (R6144), 0.6 µA (R6142)*	Approx. 2 Ω
100 mV	8 µA (R6144), 6 µA (R6142)*	
1 V	Source: 160 mA (R6144)	0.4 mΩ max.
10 V	120 mA (R6142)	4 mΩ max.
30 V	Sink: 100 mA	8 mΩ max.
1 mA	28 V output follow-up voltage (R6144)	100 MΩ min.
10 mA	10 V output follow-up voltage (R6142)	10 MΩ min.
100 mA		1 MΩ min.

* 20 kΩ load equivalent to 0.01% error

Output noise: At 1 kΩ load resistance for 1 mA, 10 mA and 100 mA ranges

Range \ Frequency	100 Hz	10 kHz	20 Hz to 20 MHz
10 mA	5 µVp-p	10 µVp-p	3 mVp-p
100 mA	15 µVp-p	30 µVp-p	
1 V	80 µVp-p	150 µVp-p	
10 V	200 µVp-p	500 µVp-p	
30 V	400 µVp-p	1 mVp-p	
1 mA	30 nAp-p	150 nAp-p	6 µAp-p
10 mA	300 nAp-p	400 nAp-p	
100 mA	3 µAp-p	4 µAp-p	

Line regulation: ±0.005% of range or less at rated voltage - 15% to + 10%.
Load regulation: ±0.005 of range or less at maximum load when 4-wire connected (except for 10 mV and 100 mV ranges)
Maximum load capacity and inductance:

Range	Maximum load capacity	Maximum load inductance
1, 10, 30 V	1000 µF	500 µF
1, 10, 100 mV	100 µF	1 mH

* The maximum load capacity for 1, 10, 100 mA and inductance for 1 V, 10 V and 30 V are measured when the limiter is activated at the maximum setting.

Settling time: Time for output to reach an expected value ± 0.1% when the limiter is activated at maximum setting from zero to full scale.

Range	Load requirement	Over/under shoot	Settling time
All ranges	Maximum load resistance	Expected value ± 0.1%	50 ms max.
1/10/30 V ranges	Load at 30 µF capacity		50 ms max.
	Load at 100 µF capacity		60 ms max.

* Maximum load resistance in current ranges: Maximum load voltage/resistance value by full scale

Operating conditions: Ambient temperature 0˚C to +50˚C
Relative humidity 85% max. (no condensation)
Storage conditions: Ambient temperature -25˚C to +70˚C
Power supply: 90 VAC to 110 VAC, 48 to 66 Hz
Options

Option No.	Standard	32	42	44
Supply voltage	90 V to 110 V	103 V to 132 V	198 V to 242 V	207 V to 250 V

Power consumption: 27 VA max.
External dimensions: Approx. 240 (W) × 88 (H) × 350 (D) mm
Mass: Approx. 4 kg
Accessories

Item	Model	Product code	Quantity
Power cable	**A01402**		1
100/120 V fuse	**EAWK 0.315A**		2
220/240 V fuse	**EAWK 0.16A**		2

Accessories (Sold separately)

Item	Model	Note
Connection cable	**MI-49**	2-wire cable with a banana-alligator clip (105 cm)
Connection cable	**A01023**	4-wire cable with a banana-alligator clip (100, 150 or 250 cm length must be specified)
Panel mount set	**A02017**	
Rack mount set	**A02621-J**	JIS standard
Rack mount set	**A02621**	EIA standard