HIOKI

SIGNAL SOURCE 7016

SIGNAL GENERATOR

Signal Generator with DMM

Constant voltage, constant current, pulse generation and measurement

The SIGNAL SOURCE 7016 incorporates high-performance DMM functions into a handy signal generator to provide a convenient, multi-function calibrator at a low price. In addition to generating constant voltage and constant current, it generates pulse signals such as the voltage pulses used for calibrating flow meters and similar devices. Along with its many signal generator functions, the substantial stand-alone DMM measurement functions of Model 7016 include AC and DC voltage and current, resistance, frequency and temperature, and continuity checking. Moreover, with the optional Communication Package 3856-02, measured values can be sent to a PC, which can also control functions such as source voltage settings and measurement range selection. The 7016 gives you multiple functions, high precision and high performance at low cost in an instrument that is suitable for use in the laboratory as well as in the field.

ISO 9001 JMI-0216

ISO14001 JQA-E-90091

INTERNET HIOKI Website

www.hioki.com

HIOKI company overview, new products, environmental considerations and other information are available on our website.

A handy signal generator that can simultaneously measure and generate pulse for calibration of industrial instruments

As a signal generator

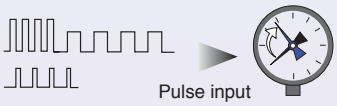
- DCCV [±1.5000 V/±15.000 V range]
- DCCA [±25.000mA range]
- PULSE [0.5 Hz to 4800 Hz, 5 V/12 V/±5 V/±12 V]
- Other Standard Features

  Bipolar sink/source generation, pulse generation with variable duty ratio, pulse width, and amplitude, memory generation, scan generation, and ramp generation function

Pulse signal generation for calibration of flow meters

■ Convenient pulse source for calibrating flow meters, as well generation of constant current and constant voltage

Meters that use pulse output as sensor signals, such as flow meters, can easily be calibrated in the field by using the 7016 as a pulse generator to supply reference signal input. Its ability to generate constant voltage and constant current in the range from 1-5 V and 4-20 mA makes it ideally suited to a variety of maintenance needs, such as calibration of equipment instrumentation in the 1-5 V/4-20 mA range.



Pulse input

■ Bipolar output expands test utility

Ability to function both as source and sink makes the 7016 well suited for signal loop testing in instrumentation systems or testing charge/discharge of secondary batteries.

■ Up to 16 steps of memory scan output

Memory scan output allows the 7016 to quickly accommodate calibration requirements that involve repetitive checks.

As a DMM

- DC/ACV [50 mV to 250 V range]
- DC/ACA [50 mA to 500 mA range]
- OHM [500 Ω to 50 MΩ range]
- FREQ [measurement range 1 Hz to 200 kHz]
- Continuity check
- Diode check
- Temperature

  [-40°C to 1372°C]

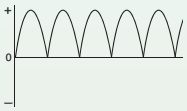
  [-40°F to 2502°F]
- AC+DC RMS measurement of voltage and current, 1 ms peak hold function

A high-performance, multi-function DMM

■ High resolution, high accuracy and advanced measurement functions

The 7016 achieves unparalleled performance for a handy DMM, providing DC voltage measurement accuracy of ±0.03% rdg. ±5 dgt. (excluding 50 mV range), with display switchable to 51000 count. Also, in addition to the basic measurements of DC voltage, DC current, AC voltage, resistance, diode, and grounding, this multi-function instrument also supports frequency and temperature measurement.

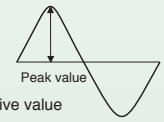
■ AC+DC measurement function provides RMS measurement of full- and half-wave rectified waveforms



The 7016 can measure RMS values of full-wave and half-wave rectified waveforms used in household electrical equipment.

■ 1ms Peak Hold Function maintains maximum/minimum peak values

The waveform peak values can be acquired and the crest factors calculated from measurement of the instantaneous peak value and calculated true RMS value.



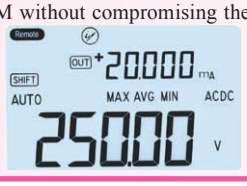
Crest factor = Peak value/effective value

■ Temperature measurement function

Measuring temperature by connecting the 7016 to the optional 9180-9183 or 9472-9476 temperature probes.

■ Signal generator and measurement functions can be used simultaneously to measure input/output insulation

When measuring insulation between inputs and outputs, the 7016 can be simultaneously used as both a signal generator and DMM without compromising the functionality of either. A dual display makes it easy to simultaneously check inspection results for both inputs and outputs.



■ 3-way power supply for use in any location

Power the 7016 with a choice of 3 different power supplies for easy use regardless of your location: AA alkaline batteries, Ni-MH battery pack, and AC adapter.

■ A wide variety of accessories

A wide variety of accessories, such as an AC adapter, Ni-MH battery and three types of test leads are provided with the 7016 as standard features. The 7016 is also equipped with a carrying case for transporting the unit together with all of its accessories.

Control and data import by PC

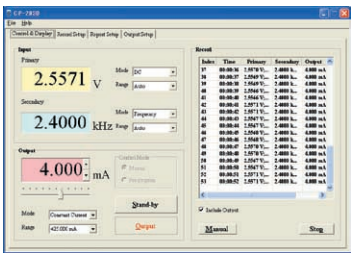
■ Full data transfer compatibility included as a standard feature

(Dedicated cable and communication software sold separately)

The optional COMMUNICATION PACKAGE 3856-02 consists of a dedicated USB cable and software for transferring measurement data and control signals to and from a PC. Imported data can be stored in text format on the PC, enabling efficient data management using commercial spreadsheet software.

COMMUNICATION PACKAGE 3856-02 (USB)

Communication Package Import Screen



● Functions

- Change settings, record measurements
- Data points: up to 65,525
- File operations: open/save
- Printing: data printing
- Recording: text format
- Interface: USB

● Operating environment

PC requirements: At least 200-MHz Pentium running Windows 98SE/ME/2000/XP* /
RAM: At least 128 MB / Display: At least 800 × 600 SVGA /
Hard disk: At least 40 MB free space

** Windows 98/ME/2000/XP are registered trademarks of Microsoft Corp., USA*

■ Generation Range and Accuracy

Accuracy is guaranteed at 23±5°C and at 80% rh or less after 5 minutes warm-up. In other conditions, add ±(50 ppm setting + 0.5dgt.)/°C.

● DC constant voltage generation (CV)

Range	Resolution	Accuracy	Remarks
±1.5000 V	0.1 mV	±(0.03% setting +3 dgt.)	sink/source output max. output: ±25 mA
±15.000 V	1 mV		

- Load regulation: 0.012 mV/mA
- Maximum input voltage: ±30 Vdc

● DC constant current generation (CC)

Range	Resolution	Accuracy	Remarks
±25.000 mA	1 µA	±(0.03% setting +5 dgt.)	sink/source output max. output: ±12 V

- Load regulation: 1µA/V
- Maximum input voltage: ±30 Vdc

● Pulse generation (PULSE)

Parameter	Output range	Resolution	Accuracy
Frequency	0.5, 1, 2, 5, 10, 15, 20, 25, 30, 40, 50, 60, 75, 80, 100, 120, 150, 200, 240, 300, 400, 480, 600, 800, 1200, 1600, 2400, 4800 Hz	–	±(0.005% setting + 0.01Hz)
Duty ratio	0.39 % to 99.60 %	0.390625%	±(0.01% setting + 0.2%) *1
Pulse width	$\frac{1}{f}$ × (0.39 % to 99.60 %)	$\frac{1}{256 \times f}$	±(0.01% setting + 0.3 ms)
output voltage	5 V, 12 V	–	±(2% setting + 0.2 V)
	±5 V, ±12 V	–	±(2% setting + 0.4 V)

- Duty ratio and pulse width should be set so that positive-polarity pulse width is at least 50 µs.
- Duty ratio, pulse width and output voltage accuracy specifications are based on at least 50 µs positive-polarity pulse width.
- Maximum applied voltage: ±30 VDC

*1. At 1 kHz or more, add ±0.1%/ kHz of setting.

■ General Specifications

Generator functions	: DC constant voltage, DC constant current, pulse generation
Measurement functions	: AC voltage, DC voltage, AC+DC voltage, AC current, DC current, AC+DC current, resistance, diode, continuity, temperature, frequency, duty ratio, pulse width measurement
Output method	: Bipolar sink/source output
AC measurement method	: True RMS
Additional functions	: Settable duty ratio, pulse width and amplitude pulse generation, memory generation (16 memory data settings per range), scan generation (single/continuous); ramp generation, AC+DC RMS voltage/current measurement, 1-ms peak hold (for voltage/current measurement), recording, data hold/refresh hold, relative display, 4-20 mA current-loop percentage display, 0-20 mA percentage display, RS-232C data communications, power-on option.
Range selection	: Full auto or manual
Display device	: LCD with backlight
Display contents	: Two 5-digit numeric digital displays (for generation and measurement functions, one large main display and one small sub display)
Max. measurement count	: 51,000 counts
Auto power off	: Settable 0 to 99 minutes in 1-minute intervals
Battery charge state	: Warning on LCD when battery voltage falls below 9V
Sampling rate	: 3/s (except AC+DC and frequency measurement) 1/s for AC+DC and frequency measurement 0.25 - 4/s for duty ratio and pulse width measurement
Noise susceptibility	: NMRR DCV; - 60dB or more(50/60 Hz) CMRR DCV; - 90dB or more(50/60 Hz)
Withstand voltage	: [Case]-[Combined power supply terminals] [Case]-[Combined output terminals] [Combined output terminals]-[Combined power supply terminals] 510-Vrms 50/60-Hz sine wave for one minute [Case]-[Combined input terminals] [Combined power supply terminals]-[Combined input terminals] [Combined output terminals]-[Combined input terminals] 2.3-kVrms 50/60-Hz sine wave for one minute
Operating temp. & humidity	: 0 to 40°C, 0 to 80% rh (non-condensating)
Storage temp. & humidity	: -20 to 60°C, 0 to 80% rh (non-condensating, w/o batteries)
Operating location	: Indoors, below 2,000m altitude
Power supply	: 1.5V AA-size alkaline batteries (LR6) × 8 1.2V Ni-MH batteries × 8 (supplied) AC Adapter (Model SA-141A0F-11 supplied, for 100 to 250 VAC, 47 to 63 Hz)
Maximum rated power	: 5 VA
Continuous operation	: 20 h or more (measurement only), 4 h or more (generation and measurement) (with supplied Ni-MH batteries, new and after full charge)
Charging time	: 8 h or more
Dimensions and mass	: Approx. 90W × 192H × 54D mm, 735 g (instrument only)
Conforming standards	: Safety; EN61010 Measurement category II (anticipated transient overvoltage 2.5 kV), pollution level 2 EMC; EN61326-1, EN61326-2-2, EN61000-3-2, EN61000-3-3

Related Product

The DC SIGNAL SOURCE SS7012: a DC signal generator for calibrating thermocouples.

In addition to measuring and generating ±25 V, ±25 mA, the SS7012 is capable of generating eight types of thermoelectromotive force by temperature settings.

■ Measurement Range and Accuracy [Accuracy is guaranteed at 23±5°C and at 80% rh or less after 5 minutes warm-up. In other conditions, add ±(measurement accuracy 0.15)/°C]

● DC Voltage (DCV) / AC Voltage (ACV) / AC+DC Voltage (ACDCV) / 1-ms peak-hold Voltage (V)

Range	Measurement range	Resolution	DC V Accuracy	AC V Accuracy*2		ACDC V Accuracy*2		V Accuracy*3	Input impedance
				45 Hz to 5 kHz	5 kHz to 20 kHz	45 Hz to 5 kHz	5 kHz to 20 kHz		
50 mV	0 to ±51.000 mV	1 µV	±(0.05% rdg.+ 5 dgt.)*1	±(0.7% rdg.+ 40 dgt.)	±(1.5% rdg.+ 40 dgt.)	±(0.8% rdg.+ 70 dgt.)	±(1.6% rdg.+ 70 dgt.)	±(2% rdg.+ 400 dgt.)	1000 MΩ
500 mV	0 to ±510.00 mV	10 µV	±(0.03% rdg.+ 5 dgt.)	±(0.7% rdg.+ 20 dgt.)	±(1.5% rdg.+ 20 dgt.)	±(0.8% rdg.+ 25 dgt.)	±(1.6% rdg.+ 25 dgt.)		
5 V	0 to ±5.1000 V	100 µV							10 MΩ (100 pF or less)
50 V	0 to ±51.000 V	1 mV							
250 V	0 to ±250.00 V	10 mV							

*1. When measuring REL after shorting input terminals before measurement. Accuracy when not measuring REL is ±(0.05% rdg +50 dgt.). *2. Specified for 5% or more from the low end of range. Crest factor: 3 or less.
*3. Specified for signals with at least 1ms pulse width. ■ Overvoltage protection: 250 Vrms AC. Upper limit frequency product: 10^6 VHz.

● DC Current (DCA) / AC Current (ACA) / AC+DC Current (ACDCA) / 1-ms peak-hold Current (A)

Range	Measurement range	Resolution	DC A Accuracy*1	AC A Accuracy*2	ACDC A Accuracy*2	A Accuracy*3	Maximum voltage Shunt resistance
				45 Hz to 2 kHz	45 Hz to 2 kHz		
50 mA	0 to ±51.000 mA	1 µA	±(0.03% rdg.+ 5 dgt.)	±(0.6% rdg.+ 20 dgt.)	±(0.7% rdg.+ 40 dgt.)	±(2% rdg.+ 400 dgt.)	0.06V/1 Ω
500 mA	0 to ±510.00 mA	10 µA					0.6V/1 Ω

*1. When measuring REL after opening input terminals before measurement, or for "0 mA" input. Accuracy when not measuring REL is ±(0.03% rdg + 25 dgt.). *2. Specified for 5% or more from the low end of range. Crest factor: 3 or less.
*3. Specified for signals with at least 1ms pulse width. ■ Overcurrent protection: fast-blow fuse (630 mA /250 V)

● Resistance (OHM)

Range	Measurement range	Resolution	Accuracy	Measurement current	Open terminal voltage
500 Ω*1	0 to 510.00 Ω	0.01 Ω	±(0.15% rdg.+ 8 dgt.)	0.45 mA	< +4.8 VDC
5 kΩ*1	0 to 5.1000 kΩ	0.1 Ω	±(0.15% rdg.+ 5 dgt.)		
50 kΩ	0 to 51.000 kΩ	1 Ω		45 µA	
500 kΩ	0 to 510.00 kΩ	10 Ω		4.5 µA	
5 MΩ	0 to 5.1000 MΩ	0.1 kΩ		450 nA	
50 MΩ	0 to 51.000 MΩ	1 kΩ	±(1% rdg.+ 8 dgt.)	45 nA	

*1. When measuring REL.
■ Beeps when measured value is 1000 dgt or less (can be set on or off)
■ Accuracy of 50-MΩ range is specified for humidity up to 60% rh. ■ Overvoltage protection: 250 Vrms AC

● Frequency (FREQ)

Range	Measurement range	Resolution	Accuracy
100 Hz	0.500 Hz to 99.999 Hz	0.001 Hz	±(0.02% rdg. + 3 dgt.)
1 kHz	0.50 Hz to 999.99 Hz	0.01 Hz	
10 kHz	0.5 Hz to 9.9999 kHz	0.1 Hz	
100 kHz	1 Hz to 99.999 kHz	1 Hz	
200 kHz	10 Hz to 199.99 kHz	10 Hz	

▮ Minimum input frequency: 0.5 Hz (set by power-on option). ▮ Overvoltage protection: 250 Vrms AC.

(Voltage measurement sensitivity)

Input range	Minimum input level (rms sine wave)		Trigger level (DC coupling)	
	1 Hz to 100 kHz	>100 kHz	< 20 kHz	20 kHz to 200 kHz
50 mV	15 mV	25 mV	20 mV	30 mV
500 mV	35 mV	200 mV	50 mV	80 mV
5 V	0.3 V	0.5 V	0.5 V	0.8 V
50 V	3 V	5 V	5 V	8 V
250 V	30 V	–	60 V	–

(Current measurement sensitivity)

Input range	Minimum input level (rms sine wave)
	30Hz to 20kHz
50 mA	2.5 mA
500 mA	25 mA

(Duty ratio, Pulse width) [Accuracy is specified for 5V pulse in 5V DC range]

DUTY RATIO	PULSE WIDTH
Measurement range: 0.1 to 99.9% (DC coupling) 5 to 95% (AC coupling)	Measurement range: 0.1 to 1999 ms
Accuracy: < ±(0.3%/kHz + 0.3% f.s.)	Accuracy: < ±(0.2% rdg. + 3 dgt.) When pulse width >10µs, specification. Measurement range depends on signal frequency.

● Diode test (DIODE), Continuity test (CONT)

Range	Resolution	Accuracy	Measurement current	Open terminal voltage
DIODE	0.1 mV	±(0.05% rdg.+ 5 dgt.)	Approx. 0.45 mA	< +4.8 VDC
CONT	–	Beeps below about 50 mV		

▮ Overvoltage protection: 250 Vrms AC.

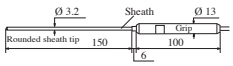
● Temperature(TEMP)(K type thermocouple)

Range	Measurement range	Resolution	Accuracy
˚C	– 40 ˚C to 1372 ˚C	0.1 ˚C	±(0.3% rdg.+ 3 ˚C)
˚F	– 40 ˚F to 2502 ˚F	0.1 ˚F	±(0.3% rdg.+ 6 ˚F)

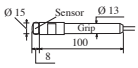
▮ The above accuracy does not include accuracy of thermocouple. ▮ Overvoltage protection: 250 Vrms AC.

● Probes

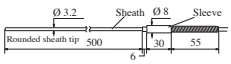
SHEATH TYPE TEMPERATURE PROBE 9180, 9183



SURFACE TYPE TEMPERATURE PROBE 9181

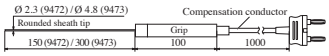


SHEATH TYPE TEMPERATURE PROBE 9182

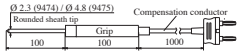


Model name	9180, 9183	9181	9182
Type of element wire	K (CA) Chromel/Alumel		
Tolerance	JIS C 1602, class 2*(class 1* for 9183)		
Sheath dimensions	3.2×150 mm	15×8 mm	3.2×500 mm
Compensation lead	for general use 1m (-20 to 90˚C, -4˚F to 194˚F)		2m (-20 to 150˚C, -4˚F to 302˚F)
Max. use temperature	750˚C (1382˚F)	400˚C (752˚F)	750˚C (1382˚F)
Grip heat resistance	150˚C (302˚F)		90˚C (194˚F)

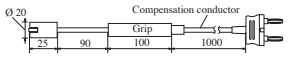
SHEATH TYPE TEMPERATURE PROBE 9472, 9473



SHEATH TYPE TEMPERATURE PROBE 9474, 9475



SURFACE TYPE TEMPERATURE PROBE 9476



9272-9275 are water resistant

Model name	9472	9473	9474	9475	9476
Type of element wire	K (CA) Chromel/Alumel (JIS C 1602: 1995)				
Tolerance	Class 1 (the greater of ±1.5˚C (±2.7˚F) or ±0.4% of the measurement temperature)				Class 2*
Sheath dimensions	2.3 × 100 mm	4.8 × 30 mm	2.3 × 100 mm	4.8 × 100 mm	20 mm
Compensation lead	for general use 1 m (-20 to 90˚C, -4˚F to 194˚F)				
Max. use temperature	300˚C (572˚F)	800˚C (1472˚F)	300˚C (572˚F)	500˚C (932˚F)	
Grip heat resistance	80˚C (176˚F)				

*Class 2 is the greater of ±2.5˚C (±4.5˚F) or ±0.75% of the measurement temperature)

* SIGNAL SOURCE 7016

[Accessories: Carrying case × 1, AC adapter × 1, Ni-MH battery × 8, Test lead L9207-10 × 1 set (for measurement), Test lead × 1 set (for generation), Test lead × 1(yellow)]

● OPTION

COMMUNICATION PACKAGE 3856-02 (USB)
* SHEATH TYPE TEMPERATURE PROBE 9180
* SURFACE TYPE TEMPERATURE PROBE 9181
* SHEATH TYPE TEMPERATURE PROBE 9182
SHEATH TYPE TEMPERATURE PROBE 9183 (class 1)
SHEATH TYPE TEMPERATURE PROBE 9472 (class 1)
SHEATH TYPE TEMPERATURE PROBE 9473 (class 1)
SHEATH TYPE TEMPERATURE PROBE 9474 (class 1)
SHEATH TYPE TEMPERATURE PROBE 9475 (class 1)
SURFACE TYPE TEMPERATURE PROBE 9476
TEST LEAD L9207-10 (Lead length: Approx.1 m / standard accessories)
Non-CE mark products

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