

HIOKI



Provides power and signal sources for diverse testing needs

Highly responsive programmable DC/AC voltage/current source

PROGRAMMABLE DC/AC SIGNAL SOURCE

7020 7021



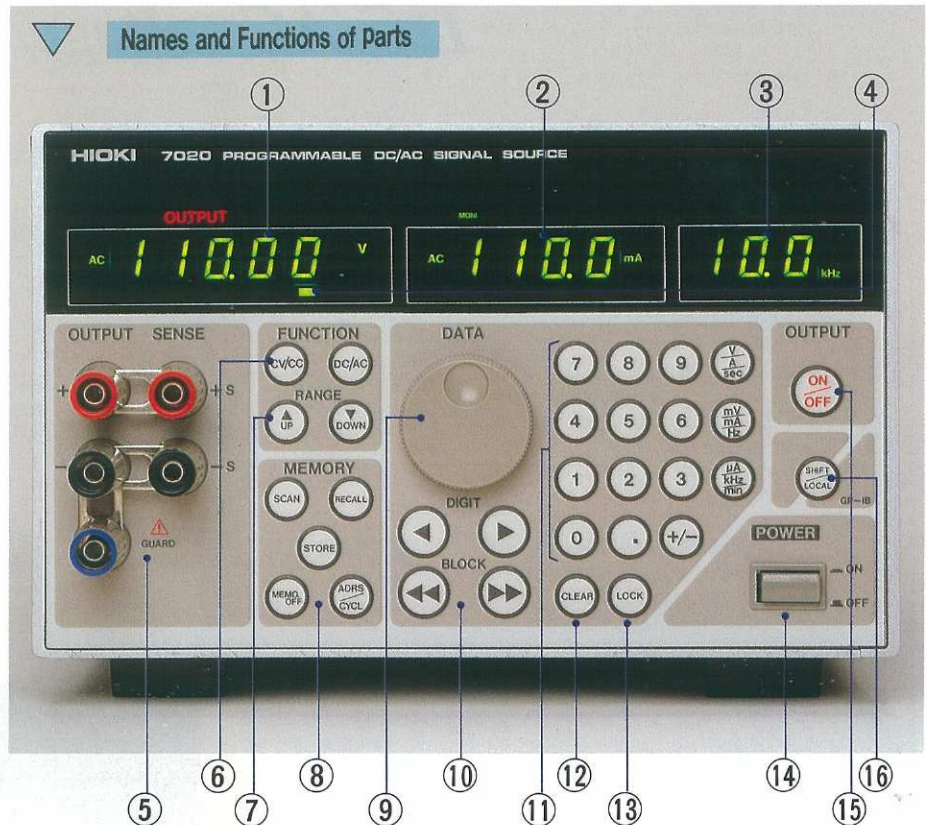
CALIBRATOR • POWER SUPPLIES

GP-IB

0~±160V(110V rms)/0~±1.6A(1.1A rms), Max.25VA

Provides flexible programming over a wide output range.

The Model 7020 is a DC/AC signal source suitable as a power source for semiconductors and electronics components or for evaluation/testing, and the Model 7021 is a DC signal source for similar purposes. A bi-polar output mode allows current sink and source functions. Both models accommodate a wide output range and are provided with a variety of functions such as the GP-IB interface. Such functions make the Model 7020/7021 useful not only as a signal source, but as a programmable voltage/current source or as an electronic load device in a automatic measurement system.



Note: Photo shows the Model 7020.

Features

- **Wide output range**
DC: ±160.00V (160mA) / ±1.6000A (13V) max.
AC: 110.00 Vrms (110mA rms) / 1.1000 Arms (9Vrms) max. 10Hz to 10kHz/10Hz step (CC mode 10Hz to 3kHz)
Note: 7021 outputs DC only.
- **Bipolar output capable of providing current source and sink**
- **Fast 1 ms response time**
- **High precision output**
- **Power amplifier to amplify external input**
- **Bias function for compensation of input value**
- **Load voltage/current monitor function**
- **Memory function to store events up to 500 steps**
- **Remote output ON/OFF, memory recall, and scanning possible**
- **Built-in GP-IB interface**

1. **Output block**
2. **Limiter block**
3. **Frequency block**

See page 2, "Display explanation"

4. **Cursor**
Illuminated digits can be set using the rotary knob, or using the 10-key.

5. **5-pin output connector**
When the distance to the load is great, a voltage can be supplied to the load without a voltage drop caused by the line resistance. Noise can be reduced by using the guard pin.

6. **Function keys**
Switches between constant voltage/constant current and DC/AC.
Note: With the Model 7021, AC operation similar to that of Model 7020 is possible by inputting an AC7V reference voltage to the OSC.IN connector on the rear panel.

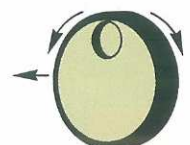
7. **Range keys**
When setting an output value in each range, selects the higher or lower range.
Note: AC mode provided only with Model 7020.

Mode	DC		AC	
	CV	CC	CV	CC
Range	160 V	1.6 A	110 V	1.1 A
	16 V	160 mA	11 V	110 mA
UP	1.6 V	16 mA	1.1 V	11 mA
	160 mV	1.6 mA	110 mV	1.1 mA
DOWN	16 mV	160 μA	—	—

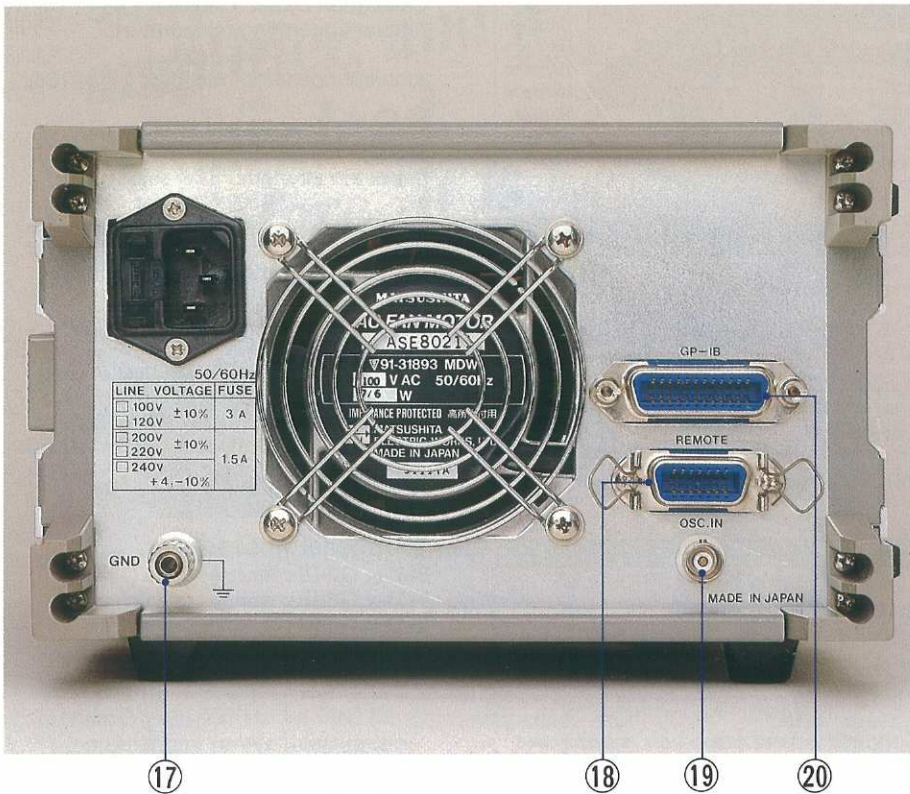
Note: AC outputs 7020 only.

8. **Memory function keys**
STORE: Stores desired data.
RECALL: Retrieves stored data from memory.
ADRS/CYCL: Sets an address or the number of scanning cycles.
SCAN: Automatically scans the stored data.
MEMO.OFF: Terminates the STORE, RECALL, or SCAN mode.

9. **Rotary knob**
This rotary knob allows quick and smooth data setting and alteration. It also allows data to be changed over a continuous range during output.



DC/AC Model 7020, DC Model 7021



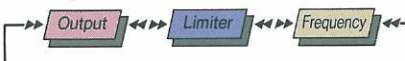
▲Rear panel

10. Select keys

: Moves the cursor to the desired digit within a block.



: Moves the cursor to the desired display block.



11. 10-keys/Unit keys

Sets the data to be output. Setting is completed by pressing a unit key.

12. CLEAR

Clears the data being input with the 10-keys.

13. LOCK

Locks keys other than the OUTPUT ON/OFF key to protect data from accidental key operation.

14. POWER

Turns ON/OFF the power.

15. OUTPUT

Turns ON/OFF output of the set value.

16. SHIFT/LOCAL (GP-IB)

Modes indicated in the table below can be set using the SHIFT and 10-keys. During the remote mode, this key serves as the LOCAL key for releasing the remote mode.

SHIFT+NO	Mode	Function
①	External oscillator input	Amplifies and outputs an any desired externally input waveform. (7020 only)
②	External reference voltage input	Inputs the reference voltage from the remote connector.
③	Bias input	Adds the bias signal input from the remote connector to the set value.
④	AGC. ON/OFF (Note)	Turns ON/OFF the internal AGC. circuit. (7020 only)
⑤	GP-IB address setting	Sets the GP-IB address in the range 0 to 30.
⑥	Panel store setting	Selects the mode for storing displayed set data.
⑦	FAST / SLOW	Selects the output response time

Note: The AGC. circuit automatically adjusts the external signal to 7 Vrms, which is the same level as the internal reference signal.

Description of indications in

Display block	RECALL SCAN STORE	
	OUTPUT	CYCL
Mode	Output block	
Constant voltage (CV)	Set voltage value	CV
Constant current (CC)	Set current value	CC
Memory store	Displays STORE mode	Di (A)
	Current/voltage value	Li
Memory recall	Displays RECALL mode	Di (A)
	Displays output data	Di
Memory scan	Displays SCAN mode and number of repetitions	Di
	Displays output data	Di
Shift	—	Di

17. GND terminal

18. REMOTE connector

By shorting the common pin to the relevant REMOTE connector pin, the memory call function and scanning can be turned ON/OFF, the output can be turned ON/OFF, and the memory call function and scanning can be externally controlled. The REMOTE connector is also used to input the external reference voltage and the bias input ($\pm 8V$ max.).

19. OSC.IN connector

Using this connector, any desired waveform can be input, amplified, and output. (The 7020 inputs 1 Vrms signals and 7021 inputs 7 Vrms signal from the OSC.IN connector.)

20. GP-IB connector

This connector allows remote control of all operations except power control. It also allows monitor values and settings to be output to the controller.

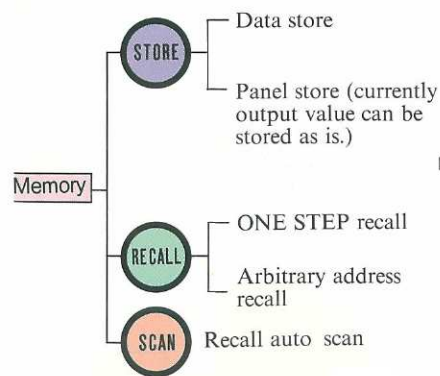


h mode

MIT	RMT	LTN	START	LOCK	END	
ONI	TLK	SRQ	ADRS	SHIFT	ADRS	INTVL
Limiter block			Frequency block			
at limiter value	at monitor value		Frequency (7020 AC)			
e limiter value	e monitor value		Frequency (7020 AC)			
ys store address	S) (1 to 500 steps)		Data output time			
r value			Frequency (7020 AC)			
ys START ADRS	Displays		END ADRS			
ys called address	S) for 0.5 s					
monitor display, limiter			Frequency (7020 AC)			
ys START ADRS	Displays		END ADRS			
ys limiter, monitor			Frequency (7020 AC)			
ys mode No.	ON Displays 1		OFF Displays 0			

Memory function

The memory function stores up to 500 steps of event conditions in memory. The minimum step interval is 10 ms. It also allows recall and scan cycles to be set as desired.

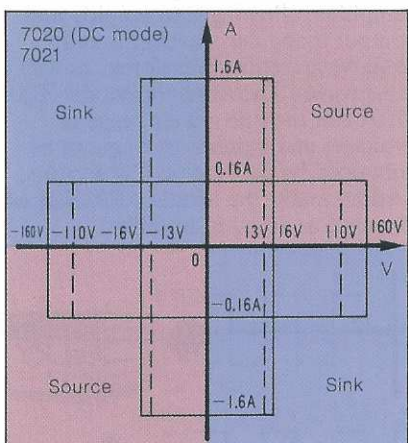
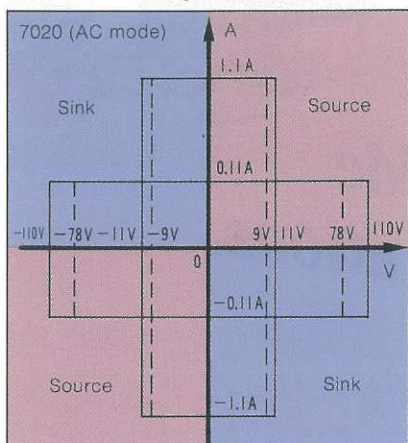


Intervals that can be set

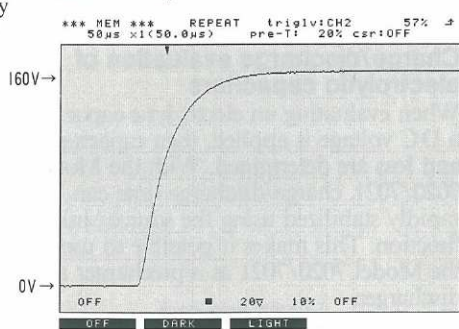
Range	Minimum step
10 to 999 ms	10 ms
1.0 to 9.9 s	100ms
10 to 99 s	1s
1 to 99 min	1min

Characteristics

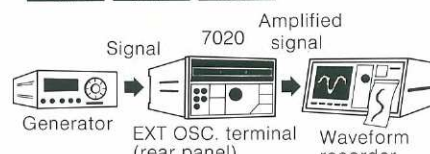
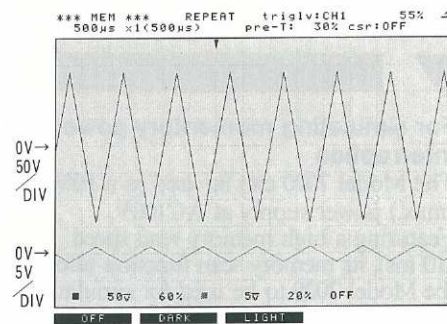
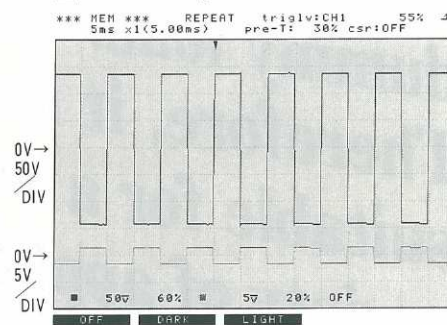
Sink source performance



Start-up characteristic

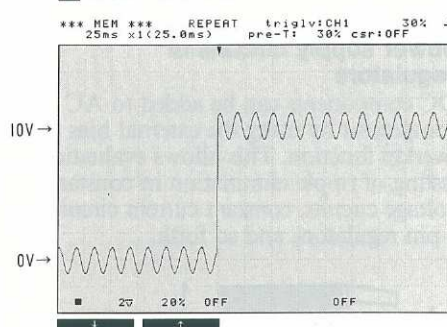


Power amplifier function

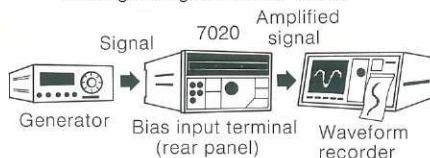


Waveform when output is amplified 100 times by using 7020 amplifier function with signal input to EXT OSC. terminal of 7020 from generator.

Bias function

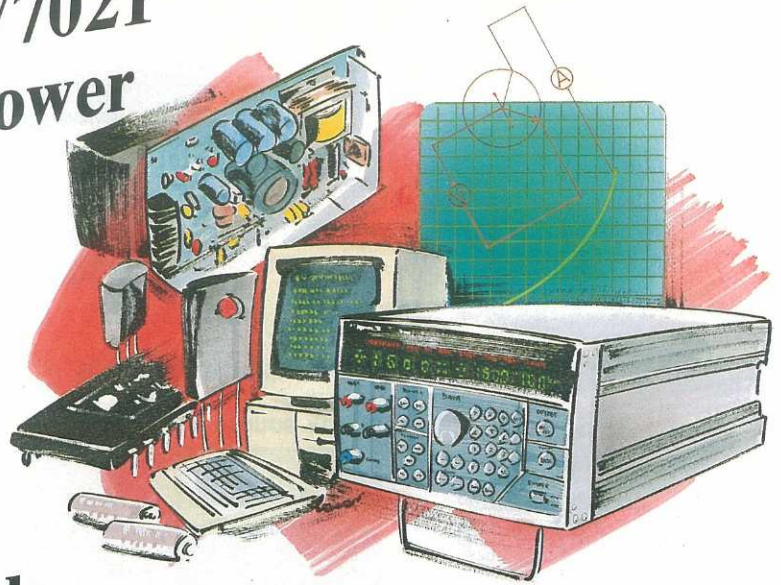


Setting changed from 0V to 10V



Waveform when setting is changed from 0V to 10V with 7020 in the OUTPUT ON status when using the DC16V range and inputting AC 60Hz 0.5V to the bias input terminal.

The Model 7020/7021 can serve as a power supply, signal source, power amplifier, and a dummy load. Therefore, it is suitable for a wide variety of applications.

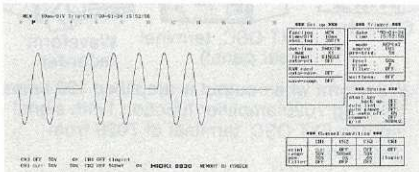


▼ Applications

For simulating momentary power interruption

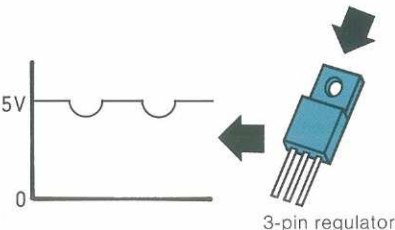
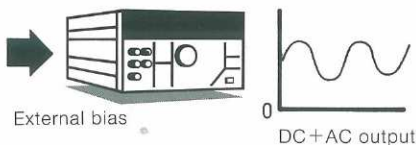
The Model 7020 can be used as a 10VA (max.) power supply at AC100V. Featuring a high memory read speed (10 ms), its memory scan function allows the Model 7020 to be used for simulating momentary power interruption.

Example of memory output for momentary power interruption



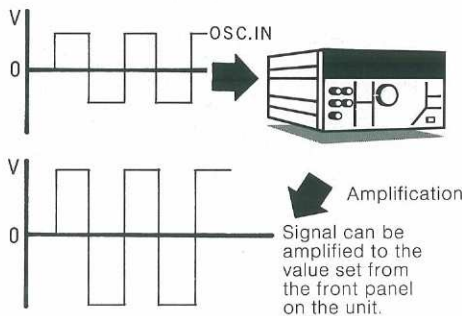
For evaluation and testing of power supply circuits or regulators

DC components can be added to AC component by using the external bias overlap function. This allows evaluation/testing of ripple elimination in constant voltage circuits, constant current circuits, 3-pin regulators, and so forth.



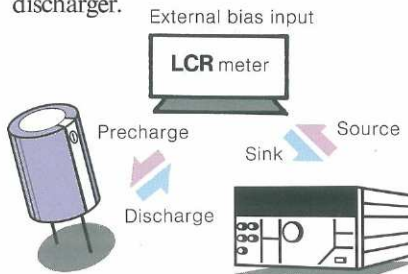
Application as power generator

Model 7020/7021 employs a DC power amplifier, allowing it to amplify and output triangular waveforms and half-wave rectifier waveforms, as well as sine waves. Therefore, the Model 7020/7021 can provide a wide range of voltages and currents that cannot be obtained by conventional generators. Additionally, the Model 7020/7021 can be used as a power amplifier.



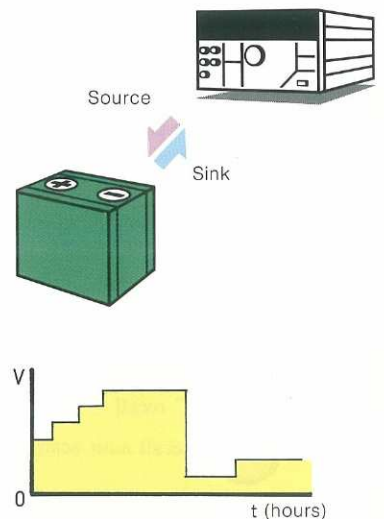
Charge/discharge evaluation of electrolytic capacitors

When evaluating an electrolytic capacitor, a DC voltage is applied, then capacitance and loss are determined. With the Model 7020/7021, charge/discharge time can be rapidly stabilized using the source/sink function. This makes it possible to use the Model 7020/7021 as a precharger and discharger.



Battery charge/discharge test

Battery charge/discharge characteristics can be evaluated using the source/sink function. Since the bipolar output mode is used, the charge mode/discharge mode can be selected simply by changing the polarity. Therefore, characteristics can be easily evaluated. Additionally, memory can be used to generate a simulated rectified waveforms for charging tests, to simulate various discharge waveforms, or to run repetitive charge/discharge test.



Specifications

After minimum 30 min warm-up with Temperature=23°C ±3°C and Humidity=80% RH or less.

	Range	Output range	Resolution	Max output * 1	Accuracy (of range)	Temperature coefficient*3
DC V	16mV	0~±16.000mV	1μV	1Ω * 2	0.08%+1μV	100ppm
	160mV	0~±160.00mV	10μV	約±1.6A	0.06%+10μV	200ppm
	1.6V	0~±1.6000V	100μV	約±1.6A	0.025%+100μV	50ppm
	16V	0~±16.000V	1mV	約±1.6A	0.025%+1mV	50ppm
	160V	0~±160.00V	10mV	約±160mA	0.03%+10mV	50ppm
DC A	160μA	0~±160.00μA	10nA	約±110V	0.05%+10nA	100ppm
	1.6mA	0~±1.6000mA	100nA	約±110V	0.03%+100nA	50ppm
	16mA	0~±16.000mA	1μA	約±110V	0.03%+1μA	50ppm
	160mA	0~±160.00mA	10μA	約±110V	0.08%+10μA	50ppm
	1.6A	0~±1.6000A	100μA	約±13V	0.08%+100μA	100ppm
AC V	110mV	5m~110.00mV	10μV	約1.1A	0.5%≤1kHz, 0.6%≤10kHz	200ppm
	1.1V	0~1.1000V	100μV	約1.1A	0.15% 0.2%	150ppm
	11V	0~11.000V	1mV	約1.1A	0.15% 0.2%	150ppm
	110V	0~110.00V	10mV	約110mA	0.15% 0.8%	150ppm
AC A	1.1mA	0~1.1000mA	100nA	約78V	0.3%≤1kHz, 0.6%≤3kHz	150ppm
	11mA	0~11.000mA	1μA	約78V	0.25% 0.5%	150ppm
	110mA	0~110.00mA	10μA	約78V	0.25% 0.5%	150ppm
	1.1A	0~1.1000A	100μA	約9V	0.3% 0.6%	200ppm

*1 With output range of 500 dgt. or greater *2 1Ω resistance output *3 /C° of range

Monitor

	Range	Display range	Resolution	Accuracy *
Current monitor	DC160mV, 1.6V, 16V DC160V	0~approx.±1.600A 0~approx.±160.0mA	1mA 0.1mA	±8dgt. ±8dgt.
	AC110mV, 1.1V, 11V AC110V	0~approx.1.100A 0~approx.110.0mA	1mA 0.1mA	50Hz~1kHz: 1kHz~10kHz ±8dgt. ±15dgt. ±8dgt. Not designated
Voltage monitor	DC160μA, 1.6mA, 16mA, 160mA DC1.6A	0~approx.±110.0V 0~approx.±13.00V	0.1V 0.01V	±8dgt. ±40dgt.
	AC1.1mA, 11mA, 110mA AC1.1A	0~approx.78.0V 0~approx.9.00V	0.1V 0.01V	±8dgt. ±30dgt.

* Regulation not designated for frequencies of less than 40Hz, and not applicable when limiter operates.

Load regulation (added to basic accuracy)

	Range	Accuracy (of range)
Voltage	DC16mV DC160mV, 1.6V DC16V, 160V	Not designated ±400μV ±0.005%
	AC	10Hz~1kHz ±0.08% ±1mV 1kHz~10kHz ±0.08% ±10mV
Current	DC	±0.001% × Vz
	AC11mA, 110mA AC1.1mA, 1.1A	10Hz~100Hz ±0.001% × Vz 100Hz~1kHz ±0.002% × Vz × f/100 ±0.005% × Vz × f/100 1kHz~3kHz Not designated

Vz: Output voltage f: Output frequency

Limiter (peak value)

	Setting range	Resolution	Range, function
Current limiter	0.01A ~ 1.60A	0.01A	DC160mV~16V, AC110mV~11V
	0.01A ~ 0.16A	0.01A	DC160V, AC110V
Voltage limiter	1V ~ 110V	1V	DC160μA~160mA, AC1.1mA~110mA
	1V ~ 13V	1V	DC1.6A, AC1.1A

During limiter operation, output is controlled by the limiter setting. The limiter is automatically reset when the triggering factor is eliminated.

Output response time

FAST : 1 ms

SLOW: 10 ms (voltage range) or 4 ms (current range)

Time indicated are those required for voltage or current to return to within 0.1% of the final value following a load change. Assumes output setting range of 500 dgt. or greater for CV and maximum output in selected range for CC. Also assumes a purely resistive load. Time is doubled when polarity is reversed.

AC section (7020 only)

Output frequency range:
10Hz to 10.00kHz, in 10Hz steps
(CC mode 10Hz to 3kHz)

Accuracy: ±0.3%, ±0.4Hz

General specifications

Memory function: Memory data capacity-500 items, Data backup function-About 5 years by built-in lithium battery, Auto-scan interval-10 ms to 99 min

Lock function: Locks and remembers settings of all control switches

Bias function: External signal bias function

External control: Output ON/OFF, memory recall, and scanning can be controlled externally

GP-IB: Conforms to IEEE488-1978

Calibration cycle: 3 months

Ambient operating temperature:
0 to +40°C

Ambient operating humidity: 80% RH or less

Warm-up time: 30 min or more

Storage temperature: -10°C to +60°C

Dielectric strength: Power supply-Case

1500V AC for 1 min
Insulation resistance: Power supply-Case
100MΩ or greater at 500V DC

Power supply: AC100V ±10%,
50/60 Hz (120V, 220V,
240V available, but must be specified at time of order)

Power consumption: Approx. 200 VA

Dimensions and weight: 132H×215W×
415D mm, approx. 10 kg

Standard accessories: Power cord (1),
3A midjet fuse (1)

Optional Accessories

9151-01 GP-IB connector cable (1 m)

9151-02 GP-IB connector cable (2 m)

9151-04 GP-IB connector cable (4 m)

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All specifications are subject to change without notice.

F7020E1-09M-05K Printed in Japan