

GSM-20H10

Source Measure Unit

FEATURES

- Maximum Output ±210V/±1.05A/22W
- Built-in 4 Sequence Output Modes (Stair, Log, SRC-MEM, Custom), up to 2500 Points
- OVP /OTP Protection Function
- 0.012% Basic Measure Accuracy with 61/2-digit Resolution
- Variable Sampling Speed
- SDM (Source Delay Measure) Cycle
- 2-, 4-, and 6-wire Remote V-source and Measure Sensing
- Variable Display Digits
- Built-in Limit Function
- Built-in 5 Calculation Functions
- 4.3" TFT LCD, Digital Number Keyboard
- Built-in RTC Clock
- Interface: RS-232, USBTMC, LAN, GPIB (Optional)



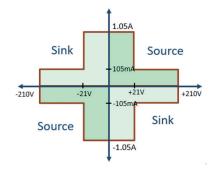
GW Instek GSM-20H10 is a Source Measure Unit that provides highly stable DC power and instrument-grade 6½-digit multimeter measurements. While operating, it can be used as a voltage source, current source, voltmeter, ammeter, and ohmmeter, which is uniquely ideal for the evaluation of component characteristics and the test applications of production, including nanomaterials and components, semiconductor architecture, organic materials, high-efficiency illumination, passive components and material characteristics analysis, etc.

GSM-20H10 provides four-quadrant operation of $\pm 210V/\pm 1.05A/22W$. The first and third quadrants operate as power supplies to supply power to the load. The second and fourth quadrants function as loads to consume power internally. Voltage value, current value and resistance value can be measured while operating the power supply or load function with an accuracy of 0.012% and a resolution of $1\mu V/10pA/10\mu\Omega$.

With respect to sampling rate, GSM-20H10 supports a sampling rate of up to 50k points/second, which can accurately analyze the characteristics of the DUT. With the large 4.3-inch screen, all measurement settings, parameters and results can be completely displayed on the screen. The SDM (Source Delay Measure) function is provided to delay sampling when the signal changes so as to prevent the unstable signal from being captured and cause misjudgment. There are four built-in sequence output modes (Stair, Log, SRC-MEM, Custom), which can support up to 2500 points of sequence variation output.

Pertaining to protection, GSM-20H10 provides OVP/OTP modes. The design of OVP allows users to self-define the range of OVP. OTP can effectively prevent errors caused by temperature drift during the test process. For interfaces, this product supports standard SCPI commands and provides RS-232, USBTMC, LAN, GPIB (optional) interfaces to meet users' different interface needs.

MAXIMUM OUTPUT: ±210V/±1.05A/22W



The power source output of the GSM-20H10 has two ranges.

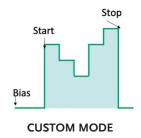
The voltage range is ± 21 volts, and the current is ± 1.05 A. The voltage range is ± 210 volts, and the current range is ± 105 mA. The power capacity is 22W.

Provide a full range of four-quadrant measurement without duty cycle limit.

BUILT-IN 4 SEQUENCE OUTPUT MODES, UP TO 2500 POINTS



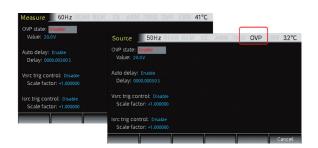




GSM-20H10 Source Measure Unit provides four sequence output modes: linear staircase, log staircase, SRC-MEM (source memory) and Custom(self-defined).

With these output modes, users can quickly generate output as needed. The total number of sequence points is 2,500.

C. OVP /OTP PROTECTION FUNCTION



In terms of protection, GSM-20H10 provides OVP/OTP protection modes; in the design of OVP, users can define the range of OVP, and the protection of OTP can effectively prevent errors caused by temperature drift during the test process.

D. 0.012% BASIC MEASURE ACCURACY WITH 6½DIGIT RESOLUTION



GSM-20H10 provides a measurement accuracy of up to 0.012%, and provides a meter display function of up to 6½ digits, allowing users to have more accurate results when measuring small signals...

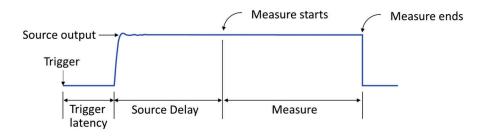


SAMPLING MODE	FAST MEDIUM		NORMAL	HIGH	OTHER	
Speed, NPLC	0.01	0.1	1	10	User defined	
Digit	3½	4½	5½	6½	Selectable	

The sampling rate of GSM-20H10 is variable. Therefore, users can choose the sampling rate from 0.01 PLC to 10 PLC according to their needs.

Where NPLC represents the number of power line cycles, for example, AC power frequency is 50Hz, 1 PLC means 20ms, 2 PLC means 40ms, and so on.

SDM (SOURCE DELAY MEASURE) CYCLE



The initial state of the source output may be unstable. If the meter starts measuring after the source is output, users can set the source delay to start the meter measurement after passing the unstable period so as to obtain stable measurement results.

GSM-20H10 Source Measure Unit delay range is 0 to 9999.999 seconds.

G. 2-, 4-, AND 6-WIRE REMOTE V-SOURCE AND MEASURE SENSING

2-wire 4-wire 6-wire

H. VARIABLE DISPLAY DIGITS



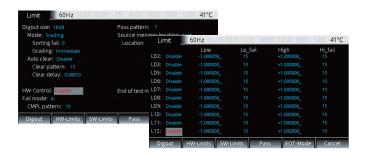
Other than 2-wire, GSM-20H10 also provides 4-wire and 6-wire resistance measurements.

4-wire measurement eliminates the effect of lead resistance, realizing accurate measurement of small resistances below 100ohm at high currents.

6-wire combining 4-wire connection and the protection of ohm characteristics eliminate the effects of internal parallel resistance, realizing the resistance measurement of a tiny wire.

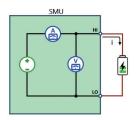
The display bits of GSM-20H10 are variable. Therefore, users can choose the number of display bits among 3.5, 4.5, 5.5, and 6.5 bits according to their needs.

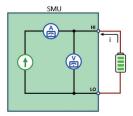
BUILT-IN LIMIT FUNCTION



GSM-20H10 has three built-in Pass/Fail limit line tests with a total of 11 sets.

J. BATTERY CHARGING/DISCHARGING TEST





Battery Charging Test

Battery Discharging Test

During charging, the GSM-20H10 acts as a source with voltage higher than the battery, causing current to flow from the SMU to the battery. During discharging, it acts as a load with voltage lower than the battery, so current flows from the battery to the SMU.

K. BUILT-IN 5 CALCULATION FUNCTIONS

- Power = V*I
- CompOhms = $\frac{(V2-V1)}{(I2-I1)}$
- Vceoff(%) = $\left[\frac{\Delta R}{\{R2*\Delta V\}}\right]$ * 100%
- VarAlpha , $\alpha = \frac{log(I2 \div I1)}{log(v2 \div V1)}$
- Dev = $\left[\frac{(X-Y)}{Y}\right] * 100\%$



GSM-20H10 provides five built-in calculation functions: Power, Offset Compensation Ohms, Voltage Coefficient, Varistor Alpha, and Percent Deviation.

PANEL INTRODUCTION



SPECIFICAT	IONS							
MAXIMUM F	RANGE							
Voltage		± 210 V						
Current		± 1.05 A						
Power		22 W						
Voltage Resolution		1 μV						
Current Resolu	ution	10 pA						
SOURCE	L o	22.1// 2.05.4	230.1/ 305 4					
DC Voltage	Output Voltage Current Limit	± 21 V / ± 1.05 A, Min. 0.1 % of rans	± 21 V / ± 1.05 A, ± 210 V / ± 105 mA					
	Programming Resolution & Accuracy *1		nge	Resolution	Accuracy			
	Trogramming resolution as recuracy		000 mV	1 μV	± (0.02 % + 600 μV)			
		l	0000 V	10 μV	± (0.02 % + 600 μV)			
			0000 V	100 μV	± (0.02 % + 2.4 mV)			
		± 200.000 V		1 mV	± (0.02 % + 24 mV)			
	Load Regulation	0.01 % of range + 100 μV						
	Line Regulation	0.01 % of range						
	Overshoot	< 0.1 % typical (fu	ll scale step, resistive	load, 10 mA range)				
	Recovery Time (1000% Load Change)	< 250 μs (within 0	.1 % plus load regula	tion errors, 1 A and 100 mA compliance.)				
	Ripple and Noise	4 mVrms (20 Hz to 1 MHz) / 10 mVpp (20 Hz to 1 MHz)						
	Temperature Coefficient	± (0.15 × accuracy specification)/ °C (0 °C to 18 °C & 28 °C to 50 °C)						
DC Current	Output Current		± 105 mA / ± 210 V					
	Voltage Limit	Min. 0.1 % of rang		Developed	A			
	Programmed Source Resolution & Accuracy		nge	Resolution	Accuracy			
			000 μA 000 μA	10 pA 100 pA	± (0.035 % + 600 pA) ± (0.033 % + 2 nA)			
			000 μA 000 μA	100 pA	± (0.033 % + 2 nA) ± (0.031 % + 20 nA)			
			000 μΑ 000 mA	10 nA	± (0.031 % + 20 nA) ± (0.034 % + 200 nA)			
			000 mA	100 nA	± (0.045 % + 2 µA)			
			000 mA	1 μΑ	± (0.066 % + 20 μA)			
			0000 A	10 μΑ	± (0.27 % + 900 μA)			
	Load Regulation	0.01 % of range +	100 pA	1				
	Line Regulation	0.01 % of range						
	Overshoot	$<$ 0.1 % typical (1 mA step, RL = 10 k Ω , 20 V range).						
	Temperature Coefficient	\pm (0.15 × accuracy specification)/ °C (0 °C to 18 °C & 28 °C to 50 °C)						
General	Output Settling Time *1	100 μs typical time						
	Output Rise Time (± 30 %)			ce ; 150 V/µs, 20 V range, 100 mA compli	ance.			
	DC Floating Voltage		ated up to ± 250 VDC					
	Remote Sense Compliance Accuracy	Up to 1 V drop pe		ding to base specification				
	Range Change Overshoot *2	Add 0.3 % of range and \pm 0.02 % of reading to base specification. Adjacent range changes between 200 mV, 2 V and 20 V ranges, 100 mV typical.						
	Minimum Compliance Value	0.1 % of range						
	-	Autorange On:10 ms. Autorange Off: 7 ms.						
	Command Processing Time *3	Autorange On:10	ms. Autorange Off: 7	ms.				
MEASUREMI	Command Processing Time *3 ENT	Autorange On:10	ms. Autorange Off: 7	ms.				
MEASUREM! Voltage		Autorange On:10 >10 GΩ	ms. Autorange Off: 7	ms.				
	ENT	>10 GΩ	nge	Resolution	Accuracy			
	ENT Input Resistance	>10 GΩ Rai ± 200.0	nge 000 mV	Resolution 1 μV	± (0.012 % + 300 μV)			
	ENT Input Resistance	>10 GΩ Rai ± 200.0 ± 2.00	nge 000 mV	Resolution 1 μV 10 μV	± (0.012 % + 300 μV) ± (0.012 % + 300 μV)			
	ENT Input Resistance	$>10~\text{G}\Omega$ Rai $\pm~200.0$ $\pm~2.00$ $\pm~2.00$	nge 000 mV 0000 V	Resolution 1 μV 10 μV 100 μV	± (0.012 % + 300 μV) ± (0.012 % + 300 μV) ± (0.015 % + 1.5 mV)			
	ENT Input Resistance Measurement Resolution & Accuracy	>10 GΩ Ra ± 200.0 ± 2.00 ± 2.00 ± 2.00 ± 2.00	nge 000 mV 0000 V 0000 V	Resolution 1 μV 10 μV 100 μV 1 mV	± (0.012 % + 300 μV) ± (0.012 % + 300 μV)			
Voltage	ENT Input Resistance Measurement Resolution & Accuracy Temperature Coefficient	>10 GΩ Ra ± 200.0 ± 2.00 ± 2.00 ± 20.0 ± 20.0 ± 200 ± (0.15 × accuracy	nge 000 mV 0000 V 0000 V	Resolution 1 μV 10 μV 100 μV	± (0.012 % + 300 μV) ± (0.012 % + 300 μV) ± (0.015 % + 1.5 mV)			
	ENT Input Resistance Measurement Resolution & Accuracy	>10 GΩ Ra ± 200.0 ± 2.00 ± 2.00 ± 20.0 ± 20.0 ± 10.15 × accuracy < 1 mV	nge 000 mV 0000 V 0000 V .000 V r specification)/ °C (C	Resolution 1 μV 10 μV 100 μV 1 mV	± (0.012 % + 300 µV) ± (0.012 % + 300 µV) ± (0.015 % + 1.5 mV) ± (0.015 % + 10 mV)			
Voltage	ENT Input Resistance Measurement Resolution & Accuracy Temperature Coefficient Voltage Burden (4-wire Mode)	>10 GΩ Ra ± 200.0 ± 2.00 ± 2.00 ± 20.0 ± 200 ± (0.15 × accuracy < 1 mV Rai	nge 000 mV 0000 V 0000 V	Resolution 1 μV 10 μV 100 μV 1 mV °C to 18 °C & 28 °C to 50 °C)	± (0.012 % + 300 μV) ± (0.012 % + 300 μV) ± (0.015 % + 1.5 mV)			
Voltage	ENT Input Resistance Measurement Resolution & Accuracy Temperature Coefficient Voltage Burden (4-wire Mode)	>10 GΩ Rai ± 200.0 ± 2.00 ± 20.0 ± 20.0 ± 10.15 × accuracy < 1 mV Rai ± 1.00	nge)00 mV)000 V)000 V .000 V specification)/ °C (C	Resolution 1 μV 10 μV 100 μV 1 mV °C to 18 °C & 28 °C to 50 °C) Resolution	± (0.012 % + 300 µV) ± (0.012 % + 300 µV) ± (0.015 % + 1.5 mV) ± (0.015 % + 10 mV)			
Voltage	ENT Input Resistance Measurement Resolution & Accuracy Temperature Coefficient Voltage Burden (4-wire Mode)	>10 GΩ Rai ± 200.0 ± 2.00 ± 20.0 ± 20.0 ± 20.0 × 200 ± 10.15 × accuracy < 1 mV Rai ± 1.00 ± 10.0	nge 000 mV 0000 V 0000 V 0000 V r specification)/ °C (C	Resolution	± (0.012 % + 300 µV) ± (0.012 % + 300 µV) ± (0.015 % + 1.5 mV) ± (0.015 % + 10 mV) Accuracy ± (0.029 % + 300 pA)			
Voltage	ENT Input Resistance Measurement Resolution & Accuracy Temperature Coefficient Voltage Burden (4-wire Mode)	>10 GΩ Rai ± 200.6 ± 2.00 ± 2.00 ± 20.0 ± 20.0 ± 20.0 ± 1.00 ± 1.00 ± 1.0	nge 000 mV 0000 V 0000 V specification)/ °C (C nge 000 µA 000 µA 000 µA 000 µA	Resolution 1 μV 10 μV 100 μV 1 mV 1 mV	± (0.012 % + 300 µV) ± (0.012 % + 300 µV) ± (0.015 % + 1.5 mV) ± (0.015 % + 10 mV) Accuracy ± (0.029 % + 300 pA) ± (0.027 % + 700 pA) ± (0.025 % + 6 nA) ± (0.027 % + 60 nA)			
Voltage	ENT Input Resistance Measurement Resolution & Accuracy Temperature Coefficient Voltage Burden (4-wire Mode)	>10 GΩ Ra ± 200.6 ± 2.00 ± 2.00 ± 20.0 ± 20.0 ± 10.00 ±	nge 000 mV 0000 V 0000 V specification)/ °C (C nge 000 µA 000 µA 000 µA 000 µA 000 µA	Resolution 1 μV 10 μV 100 μV 1 mV °C to 18 °C & 28 °C to 50 °C) Resolution 10 pA 100 pA 1 nA 10 nA 100 nA	± (0.012 % + 300 µV) ± (0.012 % + 300 µV) ± (0.015 % + 1.5 mV) ± (0.015 % + 10 mV) Accuracy ± (0.029 % + 300 pA) ± (0.027 % + 700 pA) ± (0.025 % + 6 nA) ± (0.027 % + 60 nA) ± (0.035 % + 600 nA)			
Voltage	ENT Input Resistance Measurement Resolution & Accuracy Temperature Coefficient Voltage Burden (4-wire Mode)	>10 GΩ Ra	nge 000 mV 0000 V 0000 V specification)/ °C (C nge 000 μΑ 000 μΑ 000 μΑ 000 μΑ 000 μΑ 000 πΑ 000 mA	Resolution 1 μV 10 μV 100 μV 1 mV 100 μV 1 mV 1 mV 100 μV 1 mV 100 μV 1 mV 100 μV 1 mV 100 μA 100 μA 100 μA 100 μA 100 μA 100 μA 1μA 100 μA 1μA 100 μA 1μA 100 μA 1 μA 100 μ	± (0.012 % + 300 μV) ± (0.012 % + 300 μV) ± (0.015 % + 1.5 mV) ± (0.015 % + 10 mV) Accuracy ± (0.029 % + 300 pA) ± (0.027 % + 700 pA) ± (0.027 % + 60 nA) ± (0.027 % + 600 nA) ± (0.035 % + 600 nA) ± (0.055 % + 6 μA)			
Voltage	Input Resistance Measurement Resolution & Accuracy Temperature Coefficient Voltage Burden (4-wire Mode) Programmed Source Resolution & Accuracy *4	>10 GΩ Ra ± 200.0 ± 2.00 ± 2.00 ± 2.00 ± 2.00 ± 1.00 ± 10.00 ± 10.00 ± 10.00 ± 10.00 ± 10.00 ± 10.00 ± 10.00 ± 1.000 ± 1.	nge 000 mV 0000 V 0000 V 0000 V specification)/ °C (C nge 000 μΑ 000 μΑ 000 μΑ 000 μΑ 000 mA 000 mA	Resolution	± (0.012 % + 300 µV) ± (0.012 % + 300 µV) ± (0.015 % + 1.5 mV) ± (0.015 % + 10 mV) Accuracy ± (0.029 % + 300 pA) ± (0.027 % + 700 pA) ± (0.025 % + 6 nA) ± (0.027 % + 60 nA) ± (0.035 % + 600 nA)			
Voltage	Input Resistance Measurement Resolution & Accuracy Temperature Coefficient Voltage Burden (4-wire Mode) Programmed Source Resolution & Accuracy *4 Temperature Coefficient	>10 GΩ Ra ± 200.0 ± 2.00 ± 2.00 ± 2.00 ± 20.0 ± 20.0 ± 1.00 ± 10.0 ± 10.00 ± 10.00 ± 10.00 ± 10.00 ± 10.00 ± 10.00 ± 10.00 ± 10.00 ± 1.00	nge 000 mV 0000 V 0000 V specification)/ °C (C nge 000 μΑ 000 μΑ 000 μΑ 000 μΑ 000 mA 000 mA 000 mA 000 mA 000 mA 000 mA	Resolution 1 μV 10 μV 100 μV 1 mV °C to 18 °C & 28 °C to 50 °C) Resolution 10 pA 100 pA 1 nA 10 nA 100 nA 1 μA 10 μA °C to 18 °C & 28 °C to 50 °C)	± (0.012 % + 300 μV) ± (0.012 % + 300 μV) ± (0.015 % + 1.5 mV) ± (0.015 % + 10 mV) Accuracy ± (0.029 % + 300 pA) ± (0.027 % + 700 pA) ± (0.025 % + 6 nA) ± (0.027 % + 60 nA) ± (0.035 % + 600 nA) ± (0.055 % + 6 μA) ± (0.025 % + 6 μA)			
Voltage	Input Resistance Measurement Resolution & Accuracy Temperature Coefficient Voltage Burden (4-wire Mode) Programmed Source Resolution & Accuracy *4 Temperature Coefficient Range	>10 GΩ Ra ± 200.0 ± 2.00 ± 2.00 ± 2.00 ± 20.0 ± 200 ± (0.15 × accuracy < 1 mV Ra ± 1.00 ± 10.0 ± 10.0 ± 10.00 ± 10.00 ± 10.00 ± 10.00 ± 1.00 ± 1.00 ± (0.15 × accuracy Resolution Resolution Resolution 1	nge 000 mV 0000 V 0000 V specification)/ °C (C nge 000 μΑ 000 μΑ 000 μΑ 000 mA 000 mA 000 mA 000 mA 000 mA c specification)/ °C (C Test current	Resolution	± (0.012 % + 300 μV) ± (0.012 % + 300 μV) ± (0.015 % + 1.5 mV) ± (0.015 % + 10 mV) Accuracy ± (0.029 % + 300 pA) ± (0.027 % + 700 pA) ± (0.025 % + 6 nA) ± (0.027 % + 60 nA) ± (0.035 % + 600 nA) ± (0.035 % + 6 μA) ± (0.025 % + 570 μA)			
Voltage	ENT Input Resistance Measurement Resolution & Accuracy Temperature Coefficient Voltage Burden (4-wire Mode) Programmed Source Resolution & Accuracy *4 Temperature Coefficient Range < 2.00000 Ω	>10 GΩ Rai ± 200.0 ± 2.00 ± 2.00 ± 2.00 ± 20.0 ± 20.0 ± 20.0 ± 10.0 ± 10.00 ± 10.	nge 000 mV 0000 V 0000 V specification)/ °C (C nge 000 μΑ 000 μΑ 000 μΑ 000 μΑ 000 mA 000 mA 000 mA 000 mA 000 mA 000 mA	Resolution	± (0.012 % + 300 μV) ± (0.012 % + 300 μV) ± (0.015 % + 1.5 mV) ± (0.015 % + 10 mV) Accuracy ± (0.029 % + 300 pA) ± (0.027 % + 700 pA) ± (0.025 % + 6 nA) ± (0.027 % + 60 nA) ± (0.035 % + 600 nA) ± (0.035 % + 600 nA) ± (0.035 % + 600 nA)			
Voltage	Input Resistance Measurement Resolution & Accuracy Temperature Coefficient Voltage Burden (4-wire Mode) Programmed Source Resolution & Accuracy *4 Temperature Coefficient Range	>10 GΩ Rai ± 200.0 ± 2.00 ± 2.00 ± 2.00 ± 20.0 ± 20.0 ± 20.0 ± 1.00 ± 1.00 ± 10.0	nge 2000 mV 20000 V 20000 V 20000 V 3000 V 3000 μ 3000 μA 3000 μA 3000 μA 3000 mA 3000 mA 3000 mA 3000 mA 3000 mA 40000 A	Resolution	± (0.012 % + 300 μV) ± (0.012 % + 300 μV) ± (0.015 % + 1.5 mV) ± (0.015 % + 10 mV) Accuracy ± (0.029 % + 300 pA) ± (0.027 % + 700 pA) ± (0.025 % + 6 nA) ± (0.027 % + 60 nA) ± (0.035 % + 600 nA) ± (0.035 % + 600 nA) ± (0.022 % + 570 μA)			
Voltage	ENT Input Resistance Measurement Resolution & Accuracy Temperature Coefficient Voltage Burden (4-wire Mode) Programmed Source Resolution & Accuracy *4 Temperature Coefficient Range < 2.00000 Ω 2.00000 Ω	>10 GΩ Rai ± 200.0 ± 2.00 ± 2.00 ± 2.00 ± 20.0 ± 20.0 ± 20.0 ± 10.0 ± 10.00 ± 10.	nge 000 mV 0000 V 0000 V 0000 V r specification)/ °C (C nge 000 μΑ 000 μΑ 000 μΑ 000 μΑ 000 πΑ 000 mA 000 mA 000 M r specification)/ °C (C Test current	Resolution	± (0.012 % + 300 μV) ± (0.012 % + 300 μV) ± (0.015 % + 1.5 mV) ± (0.015 % + 10 mV) Accuracy ± (0.029 % + 300 pA) ± (0.027 % + 700 pA) ± (0.025 % + 6 nA) ± (0.027 % + 60 nA) ± (0.035 % + 600 nA) ± (0.055 % + 6 μA) ± (0.025 % + 6 μA)			
Voltage	ENT Input Resistance Measurement Resolution & Accuracy Temperature Coefficient Voltage Burden (4-wire Mode) Programmed Source Resolution & Accuracy *4 Temperature Coefficient Range < 2.00000 Ω 2.00000 Ω 20.00000 Ω	>10 GΩ Rai ± 200.0 ± 2.00 ± 2.00 ± 2.00 ± 20.0 ± 20.0 ± 20.0 ± 20.0 ± 1.00 ±	nge 000 mV 0000 V 0000 V 0000 V 0000 V 0000 V 0000 μΑ 000 μΑ 000 μΑ 000 μΑ 000 πΑ 000 mA 000 mA 0000 A 0000 A 000 Test current 100 mA	Resolution	± (0.012 % + 300 μV) ± (0.012 % + 300 μV) ± (0.015 % + 1.5 mV) ± (0.015 % + 10 mV) Accuracy ± (0.029 % + 300 pA) ± (0.027 % + 700 pA) ± (0.025 % + 6 nA) ± (0.027 % + 60 nA) ± (0.035 % + 600 nA) ± (0.035 % + 6 μA) ± (0.025 % + 570 μA)			
Voltage	ENT Input Resistance Measurement Resolution & Accuracy Temperature Coefficient Voltage Burden (4-wire Mode) Programmed Source Resolution & Accuracy *4 Temperature Coefficient Range < 2.00000 Ω 2.00000 Ω 20.0000 Ω 200.0000 Ω	>10 GΩ Rai ± 200.0 ± 2.00 ± 2.00 ± 2.00 ± 20.0 ± 20.0 ± 20.0 ± 20.0 ± 20.0 ± 1.00 ± 1.00 ± 10.00 ± 10.00 ± 100.0 ± 1.00 ± 100.0 ± 100.0 ± 100.0 ± 100.0 ± 100.0 ± 100.0 ± 100.0 ± 100.0 ± 100.0 ± 100.0 ± 100.0 ± 100 μΩ 100 μΩ 1 mΩ 1 mΩ 1 mΩ	nge 200 mV 2000 v 2000 v 2000 v 2000 v 2000 μ 2000	Resolution	± (0.012 % + 300 μV) ± (0.012 % + 300 μV) ± (0.015 % + 1.5 mV) ± (0.015 % + 10 mV) Accuracy ± (0.029 % + 300 pA) ± (0.027 % + 700 pA) ± (0.025 % + 6 nA) ± (0.027 % + 60 nA) ± (0.035 % + 600 nA) ± (0.035 % + 6 μA) ± (0.025 % + 6 μA) ± (0.027 % + 0.01 Ω), Enhanced *5 ± (0.07 % + 0.001 Ω), Enhanced			
Voltage	ENT Input Resistance Measurement Resolution & Accuracy Temperature Coefficient Voltage Burden (4-wire Mode) Programmed Source Resolution & Accuracy *4 Temperature Coefficient Range < 2.00000 Ω 2.00000 Ω 20.0000 Ω 20.0000 Ω 2.00000 kΩ	>10 GΩ Rai ± 200.0 ± 200.0 ± 200.0 ± 200.0 ± 200.0 ± 200.0 ± 200.0 ± 10.00 ± 10.00 ± 10.00 ± 100.0 ± 100.0 ± 100.0 ± 100.0 ± 100.0 ± 100.0 ± 100.0 ± 100.0 ± 100.0 ± 100.0 ± 100.0 ± 100.0 ± 100.0 ± 100.0 ± 100.0 ± 100 μΩ ± 100 μ	nge 200 mV 2000 v 2000 v 2000 v 3000 v 3000 μ 2000 μA 2000 μA 2000 μA 2000 μA 2000 μA 2000 πA 200	Resolution	± (0.012 % + 300 μV) ± (0.012 % + 300 μV) ± (0.015 % + 1.5 mV) ± (0.015 % + 10 mV) Accuracy ± (0.029 % + 300 pA) ± (0.027 % + 700 pA) ± (0.027 % + 60 nA) ± (0.027 % + 60 nA) ± (0.035 % + 6 00 nA) ± (0.035 % + 6 00 nA) ± (0.025 % + 6 ηA) ± (0.035 % + 6 ηA)			
Voltage	ENT Input Resistance Measurement Resolution & Accuracy Temperature Coefficient Voltage Burden (4-wire Mode) Programmed Source Resolution & Accuracy *4 Temperature Coefficient Range < 2.00000 Ω 2.00000 Ω 20.0000 Ω 20.0000 Ω 2.00000 kΩ 2.00000 kΩ 20.0000 kΩ	$ \begin{array}{c} > 10 \ G\Omega \\ \hline & \textbf{Ra} \\ & \pm 200.0 \\ & \pm 20.0 \\ & \pm 20.0 \\ & \pm 200.0 \\ & \pm 200.0 \\ & \pm 200.0 \\ & \pm 200.0 \\ & \pm 10.00 \\ $	nge 000 mV 0000 V 0000 V specification)/ °C (C nge 000 μΑ 000 μΑ 000 μΑ 000 μΑ 000 μΑ 000 μΑ 100 mA 10 mA 1 mA 100 μΑ	Resolution	± (0.012 % + 300 μV) ± (0.012 % + 300 μV) ± (0.015 % + 1.5 mV) ± (0.015 % + 1.5 mV) ± (0.015 % + 10 mV) Accuracy ± (0.029 % + 300 pA) ± (0.027 % + 700 pA) ± (0.027 % + 60 nA) ± (0.027 % + 60 nA) ± (0.035 % + 600 nA) ± (0.035 % + 600 nA) ± (0.025 % + 6 μA) ± (0.025 % + 6 μA) ± (0.055 % + 0.01 μA) Accuracy C+Meas.VACC ± (0.07 % + 0.001 Ω), Enhanced *5 ± (0.05 % + 0.1 Ω), Enhanced ± (0.05 % + 0.1 Ω), Enhanced ± (0.05 % + 10 Ω), Enhanced ± (0.05 % + 10 Ω), Enhanced ± (0.05 % + 10 Ω), Enhanced			
Voltage	ENT Input Resistance Measurement Resolution & Accuracy Temperature Coefficient Voltage Burden (4-wire Mode) Programmed Source Resolution & Accuracy *4 Temperature Coefficient Range < 2.00000 Ω 2.00000 Ω 20.0000 Ω 2.00000 kΩ 20.0000 kΩ	$ \begin{array}{c} > 10 \text{ G}\Omega \\ \hline & \textbf{Ra} \\ & \pm 200.0 \\ & \pm 20.0 \\ & \pm 20.0 \\ & \pm 20.0 \\ & \pm 200 \\ & \pm 10.0 \\ & \pm 10.00 \\ & $	nge 2000 mV 20000 V 20000 V 20000 V 20000 V 20000 μ 2000 μA 2000 μA 2000 μA 2000 μA 2000 mA 2	Resolution	± (0.012 % + 300 μV) ± (0.012 % + 300 μV) ± (0.015 % + 1.5 mV) ± (0.015 % + 1.5 mV) ± (0.015 % + 10 mV) Accuracy ± (0.029 % + 300 pA) ± (0.027 % + 700 pA) ± (0.025 % + 6 nA) ± (0.025 % + 6 nA) ± (0.025 % + 60 nA) ± (0.055 % + 600 nA) ± (0.055 % + 600 nA) ± (0.055 % + 600 nA) ± (0.05 % + 0.01 Ω), Enhanced *5 ± (0.05 % + 0.01 Ω), Enhanced ± (0.04 % + 1 Ω), Enhanced ± (0.05 % + 100 Ω), Enhanced ± (0.05 % + 100 Ω), Enhanced			
Voltage	ENT Input Resistance Measurement Resolution & Accuracy Temperature Coefficient Voltage Burden (4-wire Mode) Programmed Source Resolution & Accuracy *4 Temperature Coefficient Range < 2.00000 Ω 2.00000 Ω 20.0000 Ω 20.0000 kΩ 20.0000 kΩ 20.0000 kΩ 20.0000 kΩ 20.0000 kΩ 20.0000 kΩ 20.0000 MΩ 20.0000 MΩ 20.0000 MΩ 20.0000 MΩ 20.0000 MΩ	$ \begin{array}{c} > 10 \ G\Omega \\ \hline & \textbf{Rai} \\ & \pm 200.0 \\ & \pm 20.0 \\ & \pm 20.0 \\ & \pm 20.0 \\ & \pm 200 \\ & \pm 10.00 \\ & \pm $	nge 2000 mV 20000 V 20000 V 20000 V 20000 V 20000 μ 2000 μA 2000 μA 2000 μA 2000 mA 2	Resolution	± (0.012 % + 300 μV) ± (0.012 % + 300 μV) ± (0.015 % + 1.5 mV) ± (0.015 % + 1.5 mV) ± (0.015 % + 10 mV) Accuracy ± (0.029 % + 300 pA) ± (0.027 % + 700 pA) ± (0.027 % + 60 nA) ± (0.027 % + 60 nA) ± (0.035 % + 600 nA) ± (0.035 % + 600 nA) ± (0.025 % + 6 μA) ± (0.025 % + 6 μA) ± (0.055 % + 0.01 μA) Accuracy C+Meas.VACC ± (0.07 % + 0.001 Ω), Enhanced *5 ± (0.05 % + 0.1 Ω), Enhanced ± (0.05 % + 0.1 Ω), Enhanced ± (0.05 % + 10 Ω), Enhanced ± (0.05 % + 10 Ω), Enhanced ± (0.05 % + 10 Ω), Enhanced			
Voltage	Temperature Coefficient Voltage Burden (4-wire Mode) Programmed Source Resolution & Accuracy *4 Temperature Coefficient Range < 2.00000 Ω 2.00000 Ω 20.0000 Ω 20.0000 Ω 20.0000 kΩ 20.0000 kΩ	$ \begin{array}{c} > 10 \ G\Omega \\ \hline & \textbf{Rai} \\ & \pm 200.0 \\ & \pm 20.0 \\ & \pm 1.00 \\ & \pm 1.00 \\ & \pm 1.00 \\ & \pm 1.00.0 \\$	nge 200 mV 2000 v 2000 v 2000 v 2000 v 2000 μ 2000	Resolution	± (0.012 % + 300 μV) ± (0.012 % + 300 μV) ± (0.015 % + 1.5 mV) ± (0.015 % + 1.5 mV) ± (0.015 % + 10 mV) Accuracy ± (0.029 % + 300 pA) ± (0.027 % + 700 pA) ± (0.025 % + 6 nA) ± (0.025 % + 6 nA) ± (0.035 % + 600 nA) ± (0.035 % + 600 nA) ± (0.025 % + 6 pA) ± (0.055 % + 0.01 Ω), Enhanced ± (0.05 % + 100 Ω), Enhanced			
Voltage	Temperature Coefficient Voltage Burden (4-wire Mode) Programmed Source Resolution & Accuracy *4 Temperature Coefficient Range < 2.00000 Ω 2.00000 Ω 20.0000 Ω 20.0000 kΩ 20.0000 MΩ 20.0000 MΩ 20.0000 MΩ 200.000 MΩ 200.000 MΩ 200.000 MΩ 200.000 MΩ 200.000 MΩ 200.000 MΩ	>10 GΩ Rai ± 200.0 ± 200.0 ± 200.0 ± 20.0 ± 20.0 ± 20.0 ± 20.0 ± 20.0 ± 20.0 ± 20.0 ± 10.0 ± 10.0 ± 10.0 ± 10.0 ± 10.0 ± 100.0 ± 100.0 ± 100.0 ± 100.0 ± 100.0 ± 100.0 ± 100 μΩ 1 mΩ 100 mΩ 1 00 mΩ 1 0 Ω 100 Ω 1 kΩ ± (0.15 × accuracy 1 kΩ 100 Ω 1 kΩ 100 Ω 1 kΩ ± (0.15 × accuracy ± (0.15 × accuracy ± (0.15 × accuracy ± (0.15 × accuracy ± 0.15 × accuracy ± 200.0	nge 200 mV 2000 v 2000 v 2000 v 2000 v 2000 μ 2000	Resolution	± (0.012 % + 300 μV) ± (0.012 % + 300 μV) ± (0.015 % + 1.5 mV) ± (0.015 % + 1.5 mV) ± (0.015 % + 10 mV) Accuracy ± (0.029 % + 300 pA) ± (0.027 % + 700 pA) ± (0.025 % + 6 nA) ± (0.027 % + 60 nA) ± (0.035 % + 600 nA) ± (0.035 % + 600 nA) ± (0.035 % + 6 μA) ± (0.026 % + 0.01 nA) ± (0.095 % + 6 μA) ± (0.095 % + 10 μA) Extracy E			
Voltage	Temperature Coefficient Voltage Burden (4-wire Mode) Programmed Source Resolution & Accuracy *4 Temperature Coefficient Range < 2.00000 Ω 2.00000 Ω 20.0000 Ω 20.0000 kΩ	>10 GΩ Ra	nge 000 mV 0000 V 0000 V 0000 V specification)/ °C (C nge 000 μΑ 000 μΑ 000 μΑ 000 mA 000 mA 000 mA 10 mA 10 mA 10 μΑ 10 μΑ 5 μΑ 0.5 μΑ 100 nA 10 μΑ	Resolution	± (0.012 % + 300 μV) ± (0.012 % + 300 μV) ± (0.015 % + 1.5 mV) ± (0.015 % + 1.5 mV) ± (0.015 % + 10 mV) Accuracy ± (0.029 % + 300 pA) ± (0.027 % + 700 pA) ± (0.025 % + 6 nA) ± (0.027 % + 60 nA) ± (0.035 % + 600 nA) ± (0.035 % + 6 μA) ± (0.025 % + 6 μA) ± (0.035 % + 6 μA) ± (0.035 % + 6 μA) ± (0.035 % + 6 μA) ± (0.055 % + 6 μA) ± (0.055 % + 0.01 Ω), Enhanced ± (0.05 % + 0.01 Ω), Enhanced ± (0.05 % + 0.01 Ω), Enhanced ± (0.05 % + 100 Ω), Enhanced ± (0.05 % + 100 Ω), Enhanced ± (0.05 % + 500 Ω), Enhanced ± (0.05 % + 500 Ω), Enhanced			
Voltage	Temperature Coefficient Range < 2.00000 Ω 2.0000 Ω 2.0000 Ω 2.00000 Ω 2.00000 Ω 2.00000 Ω 2.00000 Ω 2.00000 Ω 2.0	>10 GΩ Ra	nge 000 mV 0000 V 0000 V 0000 V specification)/ °C (C nge 000 μA 000 μA 000 μA 000 mA 000 mA 000 mA 10 mA 10 mA 10 μA 10 μA 5 μA 0.5 μA 100 nA specification)/ °C (C = I source accuracy + = V source accuracy +	Resolution	± (0.012 % + 300 μV) ± (0.012 % + 300 μV) ± (0.015 % + 1.5 mV) ± (0.015 % + 1.5 mV) ± (0.015 % + 10 mV) Accuracy ± (0.029 % + 300 pA) ± (0.027 % + 700 pA) ± (0.027 % + 60 nA) ± (0.025 % + 6 nA) ± (0.035 % + 600 nA) ± (0.035 % + 600 nA) ± (0.055 % + 6 μA) ± (0.025 % + 6 μA) ± (0.055 % + 6 μA) ± (0.055 % + 6 μA) ± (0.055 % + 6 μA) ± (0.05 % + 0.01 Ω), Enhanced ± (0.05 % + 0.1 Ω), Enhanced ± (0.05 % + 10 Ω), Enhanced ± (0.05 % + 10 Ω), Enhanced ± (0.05 % + 100 Ω), Enhanced ± (0.05 % + 500 Ω), Enhanced			
Voltage	Temperature Coefficient Voltage Burden (4-wire Mode) Programmed Source Resolution & Accuracy *4 Temperature Coefficient Range < 2.00000 Ω 2.00000 Ω 20.0000 Ω 20.0000 kΩ	>10 GΩ Ra	nge 2000 mV 20000 V 20000 V 20000 V 20000 V 20000 μ 2000 μA 2000 μA 2000 μA 2000 μA 2000 mA 2000 mA 2000 mA 2000 mA 2000 mA 2000 mA 2000 μ 2000 mA 2000 μ 2000 mA 2000 μ 2000 mA 2000 mA 2000 mA 2000 μ 2000 mA 2000	Resolution	± (0.012 % + 300 μV) ± (0.012 % + 300 μV) ± (0.015 % + 1.5 mV) ± (0.015 % + 1.5 mV) ± (0.015 % + 10 mV) Accuracy ± (0.029 % + 300 pA) ± (0.027 % + 700 pA) ± (0.027 % + 60 nA) ± (0.027 % + 60 nA) ± (0.035 % + 600 nA) ± (0.055 % + 6 μA) ± (0.025 % + 6 μA) ± (0.055 % + 6 μA) ± (0.055 % + 6 μA) ± (0.055 % + 6 μA) ± (0.05 % + 0.01 Ω), Enhanced ± (0.05 % + 0.01 Ω), Enhanced ± (0.05 % + 10 Ω), Enhanced ± (0.05 % + 10 Ω), Enhanced ± (0.05 % + 100 Ω), Enhanced ± (0.05 % + 500 Ω), Enhanced			
Voltage	Temperature Coefficient Range < 2.00000 Ω 2.0000 Ω 2.0000 Ω 2.00000 Ω 2.00000 Ω 2.00000 Ω 2.00000 Ω 2.00000 Ω 2.0	Ra ± 200.0 ± 2.00 ± 2.00 ± 2.00 ± 2.00 ± 2.00 ± 2.00 ± 2.00 ± 2.00 ± 1.00 ± 1.00 ± 1.00 ± 1.00 ± 1.00 ± 1.00 ± 1.00 ± 1.00 ± 1.00 μΩ 1 μΩ 10	nge 200 mV 2000 V 2000 V 2000 V 2000 V 2000 V 2000 μA 2000 μA 2000 μA 2000 mA	Resolution	± (0.012 % + 300 μV) ± (0.012 % + 300 μV) ± (0.015 % + 1.5 mV) ± (0.015 % + 10 mV) **Accuracy **Letting (0.029 % + 300 pA) ± (0.027 % + 700 pA) ± (0.025 % + 6 nA) ± (0.027 % + 600 nA) ± (0.035 % + 600 nA) ± (0.055 % + 6 μA) ± (0.025 % + 6 μA) ± (0.025 % + 6 μA) ± (0.055 % + 6 μA) ± (0.055 % + 6 μA) ± (0.055 % + 6 μA) ± (0.05 % + 0.01 Ω), Enhanced ± (0.05 % + 0.01 Ω), Enhanced ± (0.05 % + 10 Ω), Enhanced ± (0.05 % + 10 Ω), Enhanced ± (0.05 % + 100 Ω), Enhanced ± (0.05 % + 500 Ω), Enhanced ± (0.05 % + 500 Ω), Enhanced			

SPECIFICATI	ONS								
SYSTEM SPE	ED *6								
Maximum Measure Auto Range Time		40 ms (fixed source) *7							
Sequence Reading Rates (rdg./second) for 60 Hz (50 Hz) *8		Speed	Fast 488.2		Medium	488.2	Normal	488.2	
		NPLC/ Trig Origin	0.01 / internal	0.01 / external	0.1 / internal	0.1 / external	1 / internal	1 / external	
Measure		TO MEMORY	2081 (2030)	1239 (1200)	510 (433)	438 (380)	59 (49)	57 (48)	
		TO GPIB	1198 (1210)	1079 (1050)	509 (433)	438 (380)	59 (49)	57 (48)	
Source-M	easure *10	TO MEMORY	1551 (1515)	1018 (990)	470 (405)	409 (360)	58 (48)	57 (48)	
		TO GPIB	1000 (900)	916 (835)	470 (410)	409 (365)	58 (48)	57 (47)	
Source-M	easure Pass/Fail test *9, *10	TO MEMORY	902 (900)	830 (830)	389 (343)	374 (333)	56 (47)	56 (47)	
		TO GPIB	809 (840)	756 (780)	388 (343)	374 (333)	56 (47)	56 (47)	
Measure	Memory *9, *10	TO MEMORY	165 (162)	163 (160)	133 (126)	131 (125)	44 (38)	44 (38)	
		TO GPIB	164 (162)	162 (160)	132 (126)	131 (125)	44 (38)	44 (38)	
	Operation Rates	Speed		8.2		8.2		8.2	
,	or 60 Hz (50 Hz)	NPLC/ Trig Origin	0.01 / external		0.1 / external		1 / external		
Measure		TO GPIB	256 (256)		167 (166)		49 (42)		
	Source-Measure TO GPIB *10		79 (83)		72 (70)		34 (31)		
	easure Pass/Fail Test *9, *10	TO GPIB	79 (83)		69 (70)		35 (30)		
	omponent Interface Handler Time Speed r 60 Hz (50 Hz): *9, *11 NPLC/ Trig Origin		Fast		Medium		Normal		
•	12): "9, "11	NPLC/ Trig Origin		0.01 / internal		0.1 / internal		1 / internal	
		TO GPIB	1.04 ms (1.08 ms)		2.55 ms (2.9 ms)		17.53 ms (20.9 ms)		
•		TO GPIB	0.5 ms (0.5 ms)		0.5 ms (0.5 ms)		0.5 ms (0.5 ms)		
Source-Measure Pass/Fail Test *10, *12 TO GPIB GENERAL SPECIFICATIONS		4.82 ms (5.3 ms) 6.27 ms (7.1 ms) 21.31 ms (25.0 m				(25.0 ms)			
System	Load Impedance		Stable into 20,000	a C trustical					
General	Differential Mode Voltage		250 VPk	рг турісаі					
	Common Mode Voltage		250 VPK 250 VDC						
	Common Mode Isolation		250 VDC > 10 GΩ, < 1000 pF 105 % of range, source and measure. 5 V						
	Over Range								
	Max. Voltage Drop								
	Max. Sense Lead Resistance		Ι 1 ΜΩ						
	Sense Input Impedance		$ M\Omega $ > 100 G Ω						
	Guard Offset Voltage		> 100 GΩ < 150 μV, typical						
	Source Output Modes		Fixed DC level, Memory List (mixed function), Stair (linear and log)						
	Source Memory List		100 points max.						
	Memory Buffer		5,000 readings @ 5 digits (two 2,500 point buffers). Includes selected measured value(s) and time stamp.						
	Power on Settings		Lithium battery backup (3 yr+ battery life). 5 user-definable power-up states plus factory default and *RST.						
	Digital I/O Connector		Active low input. Start of test, end of test, 3 category bits.; +5V@ 300 mA supply.; 1 trigger input, 4 TTL/Relay Drive outputs (33V @ 500 mA, diode)						
	Remote Interface		USB, GPIB, LAN, RS-232						
Insulation			Chassis and termi	nal: 20 M Ω or above	(DC 500V); Chassis a	and AC cord: 30 M Ω o	r above (DC 500V)		
Operation Environment		Indoor use, Altitude: ≤ 2000 m Ambient temperature: 0 °C to 40 °C Relative humidity: ≤ 80 %; Installation category: II, Pollution degree: 2							
Storage Environment			Temperature: -20 °C to 70 °C; Humidity: < 80 %						
Input Power			AC 100 V to AC 240 V, 50 Hz or 60 Hz						
Power Consumption			80 W						
Dimensions & Weight			214 mm x 86 mm x 356.5 mm (W x H x D), Approx. 4.8 kg						

NOTE: 1. Required to reach 0.1 % of final value after Command is processed. Resistive load. 10 µA to 100 mA range.

2. Overshoot into a fully resistive 100 k Ω load, 10 Hz to 1 MHz BW, adjacent ranges: 100 mV typical, except 20 V / 200 V.

- 3. Maximum time required for the output to begin to change following the receipt of: SOURce: VOLTage | CURRent <nrf> Command 4. Speed = Normal (1 PLC). For 0.1 PLC, add 0.005 % of range to offset specifications, except 200 mV, 1 A ranges, add 0.05 %.
- For 0.01 PLC, add 0.05 % of range to offset specifications, except 200 mV, 1 A ranges, add 0.5 %.

 5. Enhanced mode is Source readback ON, offset compensation ON, add system noise but don't include offsets.
- 6. Reading rates applicable for voltage or current measurements, autorange off, filter off, display off, trigger delay = 0, and binary reading forma.
- 7. Purely resistive lead. 1 μ A and 10 μ A ranges < 65 ms. 8. 1000 point sweep was characterized with the source on a fixed rang.
- Pass/Fail test performed using one high limit and one low math limit.
 Includes time to re-program source to a new level before making measurement.

- 11. Time from falling edge of START OF TEST signal to falling edge of END OF TEST signal.

 12. Command processing time of: SOURce: VOLTage | CURRent: TRIGgered <nrf> Command not included.

SM-01/SM-02 Digital I/O Adapter



GTL-248

Specifications subject to change without notice.



GSM-20H10 E BH2

ORDERING INFORMATION

GSM-20H10 (GPIB) Precision Source Measure Unit with GPIB GSM-20H10 Precision Source Measure Unit

Power Cord x 1, GTL-207A Test Lead x 1, Alligator Clip x 2

OPTIO

SM-01 Digital I/O Adapter, Convert DB15 to DB9 + 8-pin micro-DIN SM-02 Digital I/O Adapter, Convert DB15 to DB37 + 8-pin micro-DIN

GTL-207A Test Lead, Banana to Probe Test Lead, 800 mm USB Cable (USB 2.0 A-B Type, approx. 1200 mm) GTL-246

PC Software, LabVIEW Driver

GPIB Cable (25 pin Micro-D Connector)

GRA-450-I Rack Mount Kit for IIS type

GRA-450-E Rack Mount Kit for EIA type

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