

428 SPECIFICATIONS

PA
SP

GAIN SETTING V/A	ACCURACY ¹		LOW NOISE ²		MAXIMUM SPEED		DC INPUT RESISTANCE
	18°-28°C ±(% input + offset)	TEMPERATURE COEFFICIENT ±(% input + offset)/°C	RISE TIME (10%-90%) msec.	NOISE RMS	RISE TIME (10%-90%) µsec. ³	NOISE RMS ³	
10 ³	0.45 + 1.2 µA	0.01 + 40 nA	0.1	90 nA	2	100 nA	< 0.6 Ω
10 ⁴	0.31 + 120 nA	0.01 + 4 nA	0.1	9 nA	2	15 nA	< 0.7 Ω
10 ⁵	0.31 + 12 nA	0.01 + 400 pA	0.1	900 pA	5	2 nA	< 1.6 Ω
10 ⁶	0.34 + 1.2 nA	0.01 + 40 pA	0.1	90 pA	10	500 pA	< 10 Ω
10 ⁷	0.5 + 122 pA	0.015 + 4.3 pA	0.1	9 pA	15	200 pA	< 100 Ω
10 ⁸	1.4 + 14 pA	0.015 + 700 fA	1	0.5 pA	40	30 pA	< 1 kΩ
10 ⁹	2.5 + 3 pA	0.025 + 300 fA	10	50 fA	100	10 pA	< 10 kΩ
10 ¹⁰	2.5 + 1.6 pA	0.025 + 250 fA	100	4 fA	250	2 pA	< 100 kΩ
10 ^{11*}	2.7 + 1.6 pA	0.028 + 250 fA	300	1.2 fA	250	2 pA	< 100 kΩ

¹ When properly zeroed using zero correct.

² Selectable filtering will improve noise specifications; see operator's manual for details (typical value shown).

³ With up to 100pF shunt capacitance; autofilter on; low pass filter off.

* 10¹¹ setting is 10¹⁰ setting with GAIN x10 enabled; other entries are for GAIN x10 disabled.

INPUT:

Voltage Burden: <200µV (18°-28°C) for inputs <100µA; <10mV for 10mA input; 20µV/°C temperature coefficient.

Maximum Overload: 100V on 10⁴ to 10¹¹V/A ranges; 10V on 10³V/A range.

Higher voltage sources must be current limited at 10mA.

OUTPUT:

Range: ±10V, 1mA; bias voltage off.

Impedance: <100Ω DC-175kHz.

LOW PASS FILTER:

Ranges: 10µsec. to 300msec. (±25%) in 1, 3, 10 sequence or OFF.

Attenuation: 12dB/octave.

GAIN x10: Rise time, noise, and input resistance are unchanged when selecting GAIN x10; gain accuracy and temperature coefficient are degraded by 0.2% and 0.003%/°C respectively.

CURRENT SUPPRESSION:

RANGE	RESOLUTION	ACCURACY ±(% setting + offset)
±5 nA	1 pA	3.0 + 10 pA
±50 nA	10 pA	1.6 + 100 pA
±500 nA	100 pA	0.8 + 1 nA
±5 µA	1 nA	0.7 + 10 nA
±50 µA	10 nA	0.6 + 100 nA
±500 µA	100 nA	0.6 + 1 µA
±5 mA	1 µA	0.6 + 10 µA

BIAS VOLTAGE:

Range: ±5V.

Resolution: 2.5mV.

Accuracy: ±(1.1%rdg + 25mV).

IEEE-488 BUS IMPLEMENTATION (428-PROG ONLY)

MULTILINE COMMANDS: DCL, LLO, SDC, GTL, UNT, UNL, SPE, SPD.

UNILINE COMMANDS: IFC, REN, EOI, SRQ, ATN.

INTERFACE FUNCTIONS: SH1, AH1, T6, L4, LE0, SR1, RL1, PP0, DC1, DT0, C0, E1.

PROGRAMMABLE PARAMETERS: All parameters and controls programmable except for IEEE-488 bus address.

EXECUTION SPEED: (measured from DAV true to RFD true on bus)

Zero correct and autosuppression commands: <3 sec.

Save/Recall Configuration commands: <500 msec.

All other commands: <40 msec.

GENERAL

DISPLAY: Ten character alphanumeric LED display with normal/dim/off intensity control.

REAR PANEL CONNECTORS:

Input BNC: Common connected to chassis through 1kΩ.

Output BNC: Common connected to chassis.

IEEE-488 Connector: 428-PROG only.

5-Way Binding Post: Connected to chassis.

WARM-UP: 1 hour to rated accuracy.

ENVIRONMENT: Operating: 0°-50°C, <70% R.H. up to 35°C; linearly derate R.H. 3%/°C up to 50°C. Storage: -25°C to 65°C.

POWER: 105-125 VAC or 210-250 VAC, switch selected. (90-110/180-220 VAC available.) 50Hz or 60Hz. 45VA maximum.

DIMENSIONS, WEIGHT: 90mm high x 213mm wide x 397mm deep (3½ in. x 8½ in. x 15½ in.). Net weight 3.4kg (7.4 lbs.).

ACCESSORIES SUPPLIED: Instruction Manual, Quick Reference Guide, power line cord.