# 7011 Strain Gage Signal Conditioning Amplifier

## Features:

- Plug-in amplifier
- Maximum loading of 12-channel
- Accepts foil type strain gage, piezo resistive, potentiometers, etc.
- Selectable bridge Constant-voltage excitation: 0.5 to 10V
- Fully adjustable calibrated gain from 1 to 11,000
- Automatic bridge balance, with EEROM to preserve balance without power
- Built-in with all bridge completion including 120 or 1000 and 350 Ω dummies.
- Built-in with shunt calibration circuits
- Built-in with optically isolated shunt calibration relays
- Built-in with four-pole Bessel low-pass filter with cutoff frequencies of 1 Hz, 10 Hz, 100 Hz, 1 kHz and 10 kHz
- Front-panel monitoring: Automatic balance status

## Applications:

- Dynamic Material Test
- Strain/Stress Analysis
- Dynamic Material Elasticity Testing
- SHPB Signal Conditioning
- Load Cell Signal Conditioning
- Foil Strain Gage Signal Conditioning
- Semiconductor Strain Gage Signal Conditioning

## Description:

7011 Signal Conditioning System is designed with and incorporates all the features necessary for precise conditioning of strain gage and transducer inputs in the most severe operating environments.

7011 Signal Conditioning and amplifier's low-level signals to high-level outputs for multiple channels can be simultaneously and dynamically recorded and displayed on external devices.

# 7011 Strain Gage Signal Conditioning Amplifier

## Specification:

- Input
  - Strain gages: 1/4, 1/2 or full bridge (50 to 1000 Ω )
  - Built-in 120 Ω and 350 Ω dummy gages; 1000 Ω dummy capability
  - Transducers: foil or piezo resistive strain gage types; DCDT displacement transducers; potentiometers

- Excitation
  - Fixed settings: 0, 0.5, 1, 2, 2.5, 3, 3.5, 4, 4.5, 5, 6, 7, 8, 9, 10 VDC ± 3mV
  - Current: 100mA, min
  - Regulation ( 0-100mA ± 10% line change ) ± 0.05 mV ± 0.004 %, max measured at remote sense points. ( Local sense: -5mV, typical, 100mA, measured at plug. )
  - Remote sense error: 0.0005% per Ω of lead resistance ( 350 Ω load )
  - Noise and ripple: 0.005%Vp-p, max (dc to 10 kHz)
  - Stability: ± 0.002%/° C
  - Level: Normally symmetrical above ground; Either side may be grounded with no effect on performance.

- Bridge Balance
  - Method: Automatic
  - Ranges ( Auto ranging ): ± 13000μ ε Resolution 2.5μ ( 0.0012mV/V )
  - Balance time: 8 seconds
  - Manual vernier balance range: 0.1V/Step, Max ± 5V

- Calibration
  - Four internal shunt calibration resistors, ± 0.1% tolerance
    - 174.8k, 1000μ ε ( 0.50mV/V ) 350 Ω bridge; 874.8k, 200μ ε ( 0.10mV/V ) 350 Ω bridge; 59.94k, 1000μ ε ( 0.50mV/V ) 120 Ω bridge.
  - Activated by front-panel switch, or by optically isolated remote contact closure or low TTL level
  - Internal selector switches for selection of two-point unipolar, bipolar, or two-point double shunt calibration circuits bipolar

- Amplifier
  - Gain: 1 to 11 000 continuously variable. Direct reading, ± 1% Max, 10-turn counting knob ( × 1 to × 11 ) plus decade multiplier ( × 1 to × 1000 )
  - Frequency response, all gains full output
    - DC coupled: DC to 145 kHz, -3dB Max
    - DC to 60 kHz, -0.5dB Max
  - Frequency response versus gain, full output:

| Gain | -0.5 dB | -3 dB |
|---|---|---|
| 1-11 | 130 kHz | 300 kHz |
| 10-110 | 110 kHz | 250 kHz |
| 100-1100 | 80 kHz | 160 kHz |
| 400-4400 | 60 kHz | 120 kHz |

  - Stability ( gain over × 100 )
    - ± 2μV/° C, max, RTI ( referred to input )
  - Noise (gain over X100, all outputs)
    - 0.01 to 10Hz: 1μVp-p RTI
    - 0.5 to 125 kHz: 6 μVRMS, Max, RTI

- Filter
  - Characteristics
    - Low-pass active four-pole Butterworth standard
    - Frequencies ( -3 ± 1dB ): 1, 10, 100, 1k and 10 kHz and wide-band

- Input & Output
  - D type 15 pin input connector for sensor input
  - BNC connector for each 7011 amplifier output
  - Each Enclosure have one D type 15 pin connector and terminal board for output signal

- Operational Environment
  - Operation temperature: -10° C ~ 60° C
  - Storage: -20° C ~ 70° C
  - Humidity: Below 95% RH, non-condensing

- Power Requirement
  - Input: 110 or 220 VAC ± 10% by switch, 50 or 60 Hz, 2A

- Dimensions & Weight
  - Module: 1.3” × 5.2” ( 33.4 × 133.3 mm )
  - Amplifier depth behind panel: 10.6” ( 270 mm )
  - Weight: 1.32 Lb ( 0.6 Kg )
  - Dimensions & Weight of 7001C, 7006C & 7012C

- Optional Accessories
  - 7001C. Single-Channel Enclosure with power supply
  - 7006C. 6-Channel Enclosure with power supply
  - 7012C. 12-Channel Enclosure with power supply
  - 7M04. 4-channels digital readout module
  - 7M10. 10-channels digital readout module