

The 6053 input module has four channels of high performance signal-conditioning amplifier-digitizers for strain gages and bridge transducers. Each channel has programmable excitation with remote sensing, voltage calibration, local or remote shunt calibration, programmable gain instrumentation amplifier and six-pole low pass programmable filter. The high level outputs are multiplexed and digitized to 16 bits then output to the 6000 data bus. In addition to the digitized output, each channel provides two continuous, calibrated analog outputs.

The input and excitation are isolated from the outputs, power, and control interface. This gives the user complete freedom to ground the input without creating ground loops that introduce noise and offset errors.

The 6053 is used with quarter, half and full bridge transducers, potentiometers and low-level voltage signals in demanding applications such as load control. The filter is a six-pole programmable filter with cutoff frequency from 10 Hz to 20 kHz.

Voltage substitution using an external voltage standard is provided for traceable gain calibration. Internal or external shunt calibration is provided for transducer calibration. Transducer balance, zero, and gain calibration are automatic. Two programmable alarms with upper and lower limits are checked for each digitized output. The high-level analog outputs provide a means to independently monitor or record each channel.

## SPECIFICATIONS

### INPUT

Configuration .....4 channels, 2 to 8 wire with guard shield. Bridge configuration is programmable for 1/4, 1/2, and full bridge. 120 Ohm and 350 Ohm.  
Balance.....Automatic by program control. Balance accuracy  $\pm 0.05\%$  of range,  $\pm 1$  mV RTO. Stability  $\pm 0.02\%$  for 8 hours,  $\pm 0.005\%/^{\circ}\text{C}$ . Range set by resistor up to 10 mV/V, 2 mV/V (for 350 Ohms) installed.  
Impedance .....44 Megohms, shunted by 500 pF.  
Protection..... $\pm 50$  Volts, differential or  $\pm 350$  Volts common mode without damage.

### EXCITATION / TRANSDUCER POWER

Voltage .....Programmable from 0-12 Volts in 1 Volt  $\pm 0.1\%$  steps, with 3.3 mV resolution adjustment.  
Current.....50 mA limited to 70 mA.  
Regulation.....Accuracy  $\pm 0.01\%$  for  $\pm 10\%$  line and no-load to full-load using remote sensing.  
Stability..... $\pm 0.01\%$ ,  $\pm 0.005\%/^{\circ}\text{C}$ .  
Noise .....200  $\mu\text{V}$  peak to peak.  
Monitor .....Calibration mode applies excitation voltage to amplifier input.

### AMPLIFIER

Gain.....Programmable from 1 to 5000 in 1, 2, 3, 5 steps with  $\pm 0.05\%$  accuracy.  
Gain Stability..... $\pm 0.01\%$ ,  $\pm 0.004\%/^{\circ}\text{C}$ .  
Linearity..... $\pm 0.01\%$  for gains  $< 1,000$ ,  $\pm 0.02\%$  for gains 1,000 and higher.  
Common Mode .....78 dB plus gain in dB to 120 dB for balanced input and 110 dB for a 350 Ohm source unbalanced,  $\pm 300$  Volts, DC to 60Hz.  
Zero .....Automatic to  $\pm 1$   $\mu\text{V}$  RTI,  $\pm 0.5$  mV RTO.  
Zero Stability..... $\pm 5$   $\mu\text{V}$  RTI,  $\pm 1$  mV RTO,  $\pm 1$   $\mu\text{V}/^{\circ}\text{C}$  RTI,  $\pm 0.2$  mV/ $^{\circ}\text{C}$  RTO. Short term  $\pm 2$   $\mu\text{V}$  RTI,  $\pm 0.4$  mV RTO.  
Source Current ..... $\pm 25$  nA,  $\pm 0.01$  nA/ $^{\circ}\text{C}$ .  
Noise (10 Hz) .....0.1  $\mu\text{V}$  RMS RTI plus 0.5 mV RMS RTO.  
Noise (wideband).....2  $\mu\text{V}$  RMS RTI plus 0.5 mV RMS RTO.  
Bandwidth.....25 kHz (-3dB) or better.



## FEATURES

- Isolated excitation & input with 300 Volts common mode
- Programmable input configuration 1/4, 1/2 & full bridge
- Programmable excitation with remote sensing
- Shunt & voltage calibration
- Automatic zero & balance
- Gains 1 to 5,000 with 0.05% accuracy
- Up to 40 kS/s per channel with 16-bit resolution
- Two buffered 10 Volt analog outputs per channel
- Two alarms with programmable upper and lower limits

Slew Rate.....5 V/ $\mu\text{s}$ .  
Recovery.....800  $\mu\text{s}$  to  $\pm 0.1\%$  for 10X overload to  $\pm 10$  V.  
Analog Output .....Two  $\pm 10$  Volt full scale, wideband or filtered outputs. Accuracy is  $\pm 0.05\%$ . Outputs are independently buffered and either may be shorted indefinitely without affecting the other.

### FILTER

Type .....Six pole, programmable, low pass Butterworth.  
Frequency.....Continuously programmable 10Hz to 20kHz, 1.25Hz resolution, 3% accuracy.  
Noise .....0.5 mV RMS RTO  
Other.....Other filter characteristics and cut offs available.

### DIGITIZER (6053)

Resolution .....16 bits, two's complement output.  
Sample Rate .....0 to 40 kS/s per channel.  
Linearity ..... $\pm 2$  LSB ( $\pm 0.006\%$ )  
Continuity.....Monotonic to 15 bits.  
Alarms .....Two alarms each with programmable upper and lower limits and persistence checked on each ADC sample.

### CALIBRATION

Shunt .....Two steps shunt, internal or external connection, 174k Ohm 0.1% and 357k Ohm 0.1%.  
Voltage Subst. ....Alternate input for external calibration source. Programmable attenuator with steps of 1, 0.1 and 0.01,  $\pm 0.02\%$  accuracy. Output of the attenuator is provided for calibration.  
Zero .....Amplifier input disconnected and shorted.

### MECHANICAL

Mounting.....Occupies one slot in Series 6000 enclosures.  
Connectors .....Input is 50-pin Type D output is 9-pin Type D.  
Indicators .....LED indicators are provided on the card and on the Series 6000 enclosure for status indication of the channels.  
Temperature .....0 $^{\circ}\text{C}$  to +50 $^{\circ}\text{C}$  operating.

### ORDERING INFORMATION

6053-PF4/5K-BU6 .....4-Ch Strain-Bridge, PF 10Hz-20kHz 6-Pole Butterworth.