



### Precision 28000 Signal Conditioning System

*The standard for the world's most discriminating test labs*



The **Precision 28000 Signal Conditioning System** provides all the flexibility you need to manage your test measurements.

The Precision 28000 makes it easy to manage a test with hundreds of channels and a mix of programmable transducers. Choose bridge, charge, IEPE w/TEDS, voltage (filter amplifier), strain, thermocouple, RTD/potentiometer, frequency, or other transducers. Customize the 28000 for high-speed transient applications, static applications, or a combination of both.

The 28000 employs a graphical user interface (GUI) and a collection of algorithms to help you manage your measurements. The GUI provides control panels for configuration setup, operation and test. The 28000 can also be controlled as a server on an Ethernet network.

The built-in test hardware and software (optional) provide quick go/no-go measurements which can be run before each test, and rigorous factory acceptance tests to assure you that the 28000 meets your most stringent requirements for critical applications. It won't be long before these tests earn a permanent place in your maintenance routine. And since they are traceable to NIST, they eliminate the need for off-site calibration.

In every phase of your tests—record keeping, installation, design, set-up, operation, maintenance and upgrading—the Precision 28000 offers ways to help you save time and money over the life of the system.

### Applications

#### Aerospace

- Structural Vibration
- Rocket Engine Test
- Aerodynamics - Wind Tunnels

#### Aircraft Engines

- Aircraft Engine and APU Test
- Component Test

#### Energy

- Gas, Wind and Steam Turbines
- Nuclear
- Oil and Gas
- Hydro-electric

#### Transportation

- Automotive
- Trucks and Busses
- Rail

#### Marine

- Underwater Acoustics
- Navy Surface Ships
- Submarines
- Commercial Shipbuilding

#### Shock

- Weapons and Ordnance
- Survivability/Lethality

### System Benefits

- Manage hundreds of channels with a mix of sensors
- Friendly system setup via local or remote GUI and Ethernet network interface
- Assure system integrity before performing measurements
- Reduce life-cycle costs
- Automated factory acceptance and go/no-go tests verify performance
- Upgrade and expand as equipment and requirements change
- Count on unsurpassed performance and reliability

### Transducer Conditioning

- Resistive bridge
- Static and dynamic strain
- RTD/potentiometer
- Thermocouple
- Pressure
- Load cells
- Frequency to Voltage
- Charge
- Voltage
- Integral Electronics Piezoelectric (IEPE) w/TEDS Accelerometers



**PRECISION FILTERS, INC.**  
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# Salient Features

## Transducer Conditioning

- Mix up to 256 channels of fully programmable transducer conditioners in a single system.
- Condition charge, bridge, voltage, F-to-V, IEPE w/TEDS, dynamic strain, RTD/potentiometer, and thermo-couple.
- Choose from 4, 6, or 8-pole programmable filters—greater than 100 dB/octave and cutoffs from 1 Hz to 204.6 kHz.
- Up to 700 kHz amplifier bandwidth.

## System Control

- Graphical User Interface (GUI) for system control.
- Intelligent gain and system scaling algorithms.
- Ethernet network interface.
- Easily manage hundreds of channels with a mix of sensors in one system.
- Control up to eight systems with one PC controller.

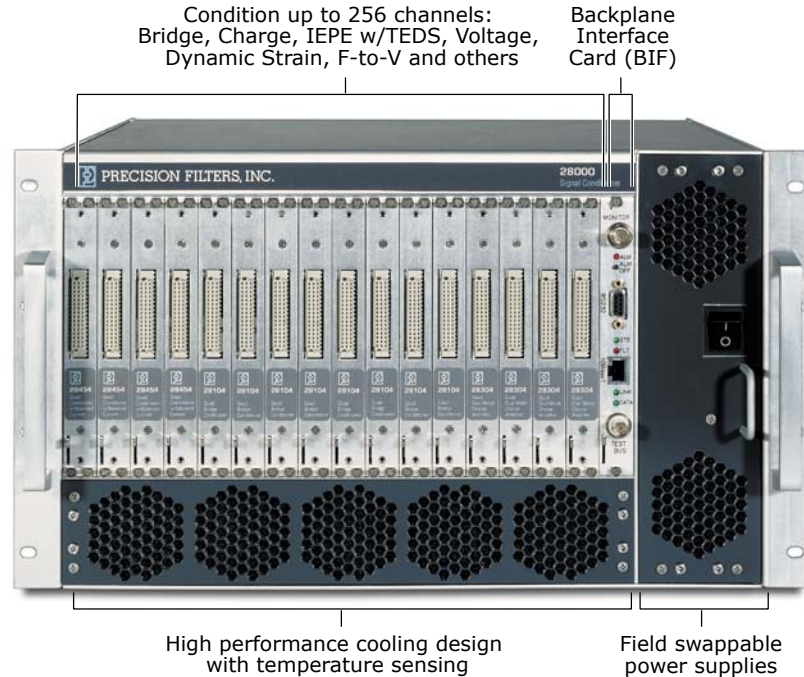
## System Integrity

- Verify system performance with self-tests traceable to NIST while reducing life-cycle costs and eliminating the need for off-site calibration.
- Go/No-Go tests with diagnostics to be used before performing measurements.
- Test input and output monitor busses.
- Check transducer health, cabling and connections with verification techniques tailored to each transducer type.
- Built-in temperature and power supply monitoring with alarms.

## System Flexibility

- Upgrade and expand equipment as requirements change.
- Customizable with field choice of I/O adapters, and output adapter modules to provide multiple buffered outputs per channel, RMS-to-DC converters, and other functions.
- Designed for high speed transient applications, static applications, or a combination of both.
- Stand-alone or remote operation.

# 28000 System Mainframe



**28016-M3** 16-slot chassis uses 10.5 inches of rack space.

Two mainframes are available for the 28000 system. For larger channel count configurations, the 28016 provides sixteen slots for signal conditioner cards. The smaller form factor of the 28008 8-slot chassis makes it more suitable for lower channel count configurations or systems where portability is important.

All 28000 mainframes accept field replaceable, low-noise AC power supplies to provide clean power to the signal conditioner cards. Binding posts at the rear panel are provided for connecting circuit and chassis grounds. Internal monitoring and reporting of system power supply levels is supported by the 28000 system architecture. System temperature monitoring is provided and an audible alarm is sounded should the internal chassis temperature exceed factory limits or should a cooling fan operate out of specification.

Cards are inserted/ejected through the front of the 28000 system. Most analog input and output signal interfacing is at the rear panel of the 28000 chassis. The rear panels of the mainframes have cutouts to allow low-level signal input cables to be mated directly to the conditioner cards for optimal signal-to-noise performance. Cables are attached to the rear panel using screw locks. Cards may be inserted and removed from the system without disconnecting cables at the rear panel.

The 28000 chassis with the M3 output option supports two and four channel card outputs with integrated 50-pin D-shell connectors at the rear panel. The M5 output option provides a 26-pin D-shell connector per slot at the rear panel to support all 28000 signal conditioning card outputs including the 28316C 16 channel card.

Precision Filters offers a wide variety of connector and cabling options in order to seamlessly integrate the 28000 into an existing cabling environment. Adapters to convert multi-pin connectors to BNC type are available as well as rugged cable assemblies and connector panels. Auxiliary output modules may be added to several 28000 cards to supply additional buffered outputs per channel with a variety of connector options.

The 28000 mainframes are equipped with TEST and MONITOR analog busses that allow the user to insert test signals to any conditioner input and monitor any signal conditioner output without disconnecting signal cables. Additionally, the TEST and MONITOR busses are used by the 28000 Test Subsystem for Factory Acceptance and Go/No-Go Tests.



**28008-M3** compact 8-slot chassis requires only 5.25 inches of rack space.

# Power Supplies

Field replaceable, low-noise AC power supplies provide clean power to the signal conditioning cards. The 28000 system supports internal monitoring and reporting of power supply levels. Internal temperature and fan operations are also monitored, sounding an alarm if conditions are out of specified limits.

Power supplies are available for 120 VAC, 220 VAC, 240 VAC and 100 VAC line voltage requirements.

All 28000 systems are configured with the proper power supply and fuse(s) for your country when shipped from the factory, unless other requirements are specified.

## Power Supplies for 28016 16-Slot Mainframes

### 28016-ACPS-1

120 VAC Power Supply for 28016-MF

### 28016-ACPS-2

220 VAC Power Supply for 28016-MF

### 28016-ACPS-3

240 VAC Power Supply for 28016-MF

### 28016-ACPS-4

100 VAC Power Supply for 28016-MF



28008-M3 with power supply pulled out.

## Power Supplies for 28008 8-Slot Mainframes

### 28008-ACPS-1

120 VAC Power Supply for 28008-MF

### 28008-ACPS-2

220 VAC Power Supply for 28008-MF

### 28008-ACPS-3

240 VAC Power Supply for 28008-MF

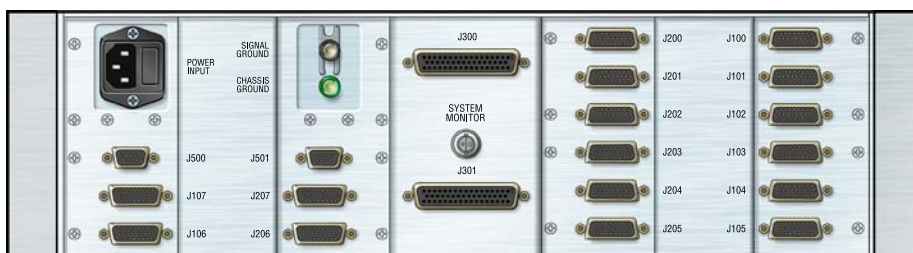
### 28008-ACPS-4

100 VAC Power Supply for 28008-MF

# Mainframe Rear Panels



28016-M5 Mainframe Rear Panel



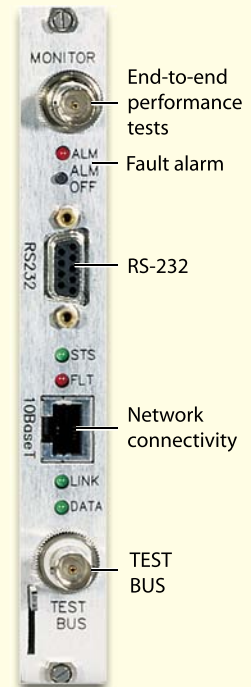
28008-M3 Mainframe Rear Panel

# Backplane Interface Card (BIF)

The 28000-BIF1-T backplane interface card (BIF) provides communication and control support to the 28000 system. The Graphical User Interface (GUI) control program is included with the BIF. Option F provides Factory Acceptance Test (FAT) and Go/No-Go Test (GNG) hardware and GUI software support for all 28000 transducer conditioning cards.

Control to the 28000 system is by either the supplied GUI or via a remote connection using high-level commands over the 10baseT Ethernet interface. The RS-232 serial interface supports control of the system from the GUI software operating on a Windows compatible PC. Up to eight 28000 systems can be operated from a single controller.

An alarm indicator on the BIF front panel identifies system problems such as an over-temperature condition, a cooling fan failure, or faulty power supply voltages. The BIF front panel TEST BUS connector provides a means to connect an external test signal to the system's test bus. The front panel BNC MONITOR connector may be used with a scope or other measurement device for viewing the output of a selected channel. The rear panel OUTPUT MONITOR connector is intended for use by the 28000-4A-TEST test subsystem DVM. System status and communication status LEDs are located on the front panel.



Backplane Interface Card (BIF) is installed in a dedicated card slot in the 28000 mainframe.

# 28000 Conditioner and Amplifier Cards

**The Precision 28000 Signal Conditioning System** provides up to 256 channels of fully programmable transducer conditioning. Condition a mix of Charge, IEPE w/TEDS, Bridge, Dynamic Strain, Voltage, F-to-V, and others.

## Bridge and Dynamic Strain Conditioner

### 28144 Quad-Channel Wideband Transducer Conditioner with Voltage and Current Excitation

offers four channels of conditioning to support a wide variety of transducers including those that require constant voltage excitation or constant current excitation. Balanced constant voltage excitation in a bridge configuration supports applications such as strain gages and pressure transducers. Balanced current excitation accommodates single arm static or dynamic strain gages, RTDs or other resistive transducers that require constant current to excite them. Gain is programmable to x8192.



*Auxiliary output connector on the front panel allows for custom output adapter modules and is standard on many 28000 conditioning cards.*

## Bridge Conditioners

**28104A Quad Bridge Conditioner** offers four channels of conditioning to support a wide variety of transducers including those that require constant voltage excitation in a bridge configuration such as strain gages and pressure transducers. The 28104A is easily configured to operate as a precise voltage filter/amplifier on low-level AC or DC voltage inputs.

**28108 Octal Bridge Conditioner with Constant Voltage Excitation** provides eight channels of conditioning to support a wide variety of transducers such as strain gages, load cells and pressure transducers. The 28108 is easily configured to operate as a precise voltage filter/amplifier on low-level voltage inputs. Additional features include automatic calibration of gain and offset settings, including the amplifier and filter, for the entire channel.

## Dynamic Strain Conditioner

**28454A Quad Conditioner with Balanced Current Excitation** accommodates single arm static or dynamic strain gages, RTDs or other resistive transducers that require constant current to excite them. A unique balanced excitation circuit delivers accurate current yet has excellent immunity to noise pickup. Dynamic strain measurements may be made using only a 2-wire interface to the transducer. Gain is programmable to x8192.

## Charge/IEPE Amplifier for Shock and Vibration

### 28314 Quad Channel Wideband Charge/IEPE Conditioner

provides signal conditioning for both Charge or IEPE type sensors. The 28314 features 200 kHz filtered and 500 kHz wideband bandwidth for shock and vibration applications. In charge mode, ultra low drift and very large time constant circuits allow for both quasi-static charge measurements and accurate dynamic peak measurements. In IEPE mode, the 28314 is equipped with Precision Filters' long-distance TEDS (LDTEDS) capability and features programmable IEPE current to 25 mA. The card is equipped with 4 or 8-pole programmable filtering and programmable gain to x8192.

## Conditioner and Amplifier Card Selection Guide

Card	Type	Channels /Card	Channels /System	Application Transducer	Interface	Excitation
<b>28104A</b>	Bridge Conditioner	4	64	Strain, load cell, pot., pressure, low level AC, DC or any Bridge	2-10-Wire; 1, 2, 4-Arm;	Balanced Constant Voltage 0-20.475 VDC (30 mA)
<b>28108</b>	Bridge Conditioner	8	128	Strain, pressure, load, pot., low level AC, DC, or Bridge	2 to 6 Wire w/Shield	Balanced Constant Voltage 0-20.475 VDC (30 mA)
<b>28144</b>	Bridge Conditioner or Dynamic or Static Strain Conditioner	4	64	Dynamic or static strain, pressure, RTD, load, accels, AC, DC, or any Bridge	2-10-Wire w/Shield Bridge; 2 or 4 Wire w/Shield Constant Current	Balanced Constant Voltage; Balanced Constant Current
<b>28208</b>	Thermocouple Conditioner	8	128	Temperature, low-drift, low level DC or AC amp/filter	3-Wire Isothermal Block	N/A
<b>28302B</b>	SE or Diff Charge, IEPE, or Velocity Amplifier	2	32	Rotating machinery vibration, G, ips and mil outputs	Coaxial, Lemo	Constant Current (IEPE) 8.5 mA
<b>27304</b>	Charge/Voltage or IEPE Amplifier	4	64	Charge or IEPE Accels, vibration	Coaxial	Constant Current (IEPE) 1-12.75 mA
<b>28314</b>	Dynamic Charge or IEPE Conditioner w/LDTEDS	4	64	Dynamic measurement for shock and vibration	Coaxial	Constant Current (IEPE) 1-25 mA
<b>28316C</b>	IEPE Accelerometer Conditioner w/LDTEDS	16	256	IEPE Accels w/LDTEDS, AC filter/amp	2-Wire w/Shield	Constant Current (IEPE) 0, 1, 2, 4, or 8 mA
<b>28454A</b>	Dynamic or Static Strain, RTD Conditioner	4	64	Dynamic or static strain w/2-wires, RTD, bridge, low-level AC or DC	2/4-Wire w/Shield	Balanced Diff. Constant Current 0-25.5 mA
<b>28524</b>	F-to-V, Pulse Rate Conditioner	4	64	Frequency counter, pulse rate, flow rate, Hall effect sensors	2-Wire w/Shield	N/A
<b>28608B</b>	Programmable Filter/Amplifier	8	128	Low-level AC or DC amps and LP, HP or BP filtering	2-Wire w/Shield	N/A

### Charge/IEPE Amplifier for Rotating Machinery

**28302B Dual Vibration Amplifier** is designed to condition signals from rotating machinery. The card accepts inputs from single-ended or differential piezoelectric accelerometers, IEPE accelerometers, or remote velocity sensors. AC outputs are provided for acceleration, velocity and displacement. A DC output for acceleration, velocity or displacement is also provided. A fully programmable 12-pole band-pass filter is provided to eliminate unwanted noise.

### General Purpose Vibration Measurements

**27304 Quad Dual-Mode Charge Amplifier** supports the two common piezoelectric transducer types, charge and voltage (IEPE), providing flexibility for use in a wide range of applications including vibration measurements. Programmable gain of up to x4096 is provided. The 27304 accommodates both isolated and grounded inputs.

*28000 Transducer Conditioning cards are quality engineered to the highest standards and thoroughly tested before shipping.*



**28316C Isolated IEPE Accelerometer Conditioner with Long Distance TEDS™** provides 16 channels of precision signal conditioning for IEPE (Integrated Electronic Piezoelectric) accelerometers or remote charge converters (RCC's). Programmable channel gain and 4-pole low-pass filters provide clean, amplified "data acquisition ready" output signals. Each channel input can be isolated to allow connection to grounded accelerometers without introducing ground loops. In addition, the 28316C may be used as a 16-channel precision AC filter/amplifier with balanced differential input. The 28316C card is equipped with Precision Filters' long-distance TEDS (LDTEDS) technology that extends communication with TEDS equipped sensors to 1500 feet.

### Voltage Conditioner

**28608B Octal Programmable Filter/Amplifier** card is ideal for conditioning low-level voltage inputs in front of high-resolution digital data acquisition systems. Low-pass, high-pass and band-pass configurations are available. Programmable pre- and post-filter amplifiers provide an overall gain of 8192.

### Thermocouple Conditioner

**28208 Octal Thermocouple Conditioner** provides eight channels of conditioning for thermocouples or other DC and AC voltage inputs. The 28208 consists of a low-drift programmable differential pre-amplifier, a 3-pole programmable filter and a programmable post-amplifier. A rugged remote isothermal block with digital temperature sensor provides the reference junction temperature for hardware correction.



### Frequency-to-Voltage Conditioner

**28524 Quad Frequency-to-Voltage Converter Module** provides conditioning for pulse, rate and frequency transducers, giving a voltage output proportional to input frequency or rate for frequencies from 1 Hz to 50 kHz with inputs from 10 mV to 100 V. Distorted inputs such as signals with ringing, crossover or harmonic distortion are handled with programmable trigger threshold and trigger hold-off time.

## Conditioner and Amplifier Card Selection Guide

Card	Vcm	Bandwidth	Gain	Filter Poles	Filter Types	Fc Range
<b>28104A</b>	10 V	700 kHz	x1/16 to x8192	4, 8	Pulse/Flat LP	Flat Mode: 2 Hz to 204.6 kHz Pulse Mode: 1 Hz to 102.3 kHz, Programmable.
<b>28108</b>	10 V	100 kHz	x1/4 to 8192	4	Pulse/Flat LP	Flat Mode: 100 Hz to 25.5 kHz Pulse Mode: 50 Hz to 12.75 kHz, Programmable
<b>28144</b>	10 V	500 kHz	x1/4 to 8192	4, 8	Pulse/Flat LP	Flat Mode: 2 Hz to 204.6 kHz Pulse Mode: 1 Hz to 102.3 kHz, Programmable.
<b>28208</b>	10 V	1 kHz	x1, 10, 100, 1000	3	BE	1, 10, 100 Hz, Programmable.
<b>28302B</b>	10 V	5 Hz to 20 kHz	Sensor Sensitivity: 0.1 pC/g to 110 pC/g	12	LP, HP, Band-Pass	HP: 5 Hz to 1,275 Hz, Programmable LP: 50 Hz to 12,750 Hz, Programmable.
<b>27304</b>	3.2 V	200 kHz	x1/16 to x4096	4, 6, 8	BE, BU, EL, LP, TD	Available in many ranges, 2-Range Models; 1 Hz to 127.5 kHz, Single 255:1 Range and Fixed Range Models
<b>28314</b>	10 V	500 kHz	x1/16 to x8192	4, 8	Pulse/Flat LP	Flat Mode: 2 Hz to 204.6 kHz Pulse Mode: 1 Hz to 102.3 kHz, Programmable.
<b>28316C</b>	N/A	150 kHz	x0.5 to x512	4	BU, TD	100 Hz to 30 kHz, Programmable.
<b>28454A</b>	10 V	700 kHz	x1/16 to x8192	4, 8	Pulse/Flat LP	Flat Mode: 2 Hz to 204.6 kHz Pulse Mode: 1 Hz to 102.3 kHz, Programmable.
<b>28524</b>	10 V	1 Hz to 50 kHz	Input Range 10 mV to 100 V	4	Band-Pass	1 Hz to 50 kHz, Programmable.
<b>28608B</b>	10 V	500 kHz	x1/4 to x8192	4, 8	Pulse/Flat LP, HP, BP	Flat Mode: 2 Hz to 204.6 kHz Pulse Mode: 1 Hz to 102.3 kHz, Programmable.

# 28000 System Filter Characteristics

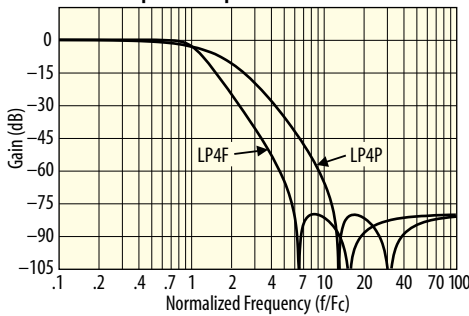
*You want your analog data to come clean before digital conversion.*

The 28000 System has a variety of high performance filter characteristics available for HP, LP or BP Precision filtering.

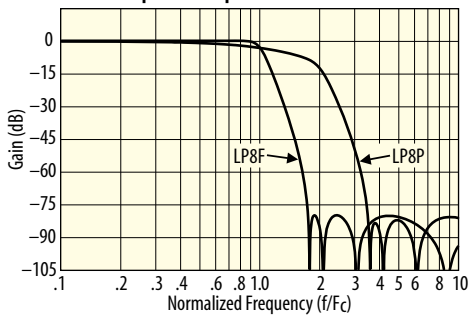
## Flat/Pulse Low-Pass Filters

Our new choice of LP4FP 4-pole or LP8FP 8-pole flat/pulse low-pass filters provide the user with the versatility to address applications in either the time or frequency domain and are available on many 28000 card models. Frequencies can range as high as 204.6 kHz with fixed frequency choices for economy.

LP4F and LP4P Amplitude Response



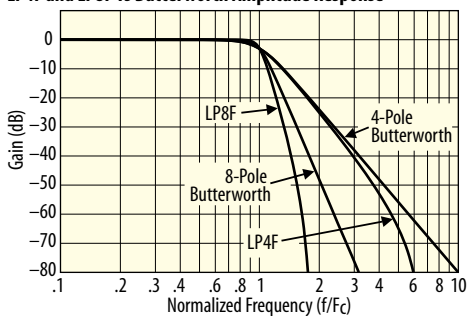
LP8F and LP8P Amplitude Response



## Flat Mode Low-Pass Filters

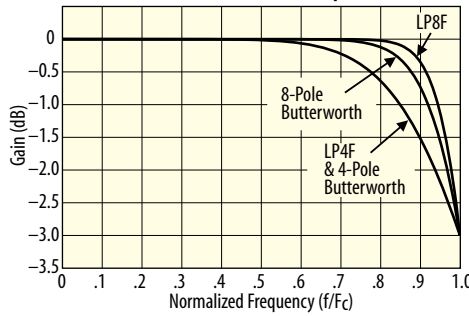
Precision LP4F and LP8F "flat" mode characteristics are specified to have outstanding passband flatness equivalent to the Butterworth yet deliver very sharp roll-off characteristics.

LP4F and LP8F vs Butterworth Amplitude Response



The LP4F and LP8F are a good choice as an anti-aliasing filter and for applications such as spectral analysis. The LP8F has zero passband ripple and over 100 dB/octave attenuation slope.

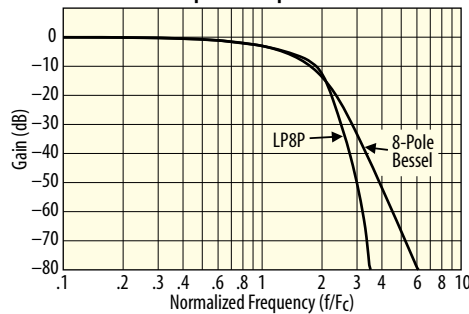
LP4F and LP8F vs Butterworth Passband Response



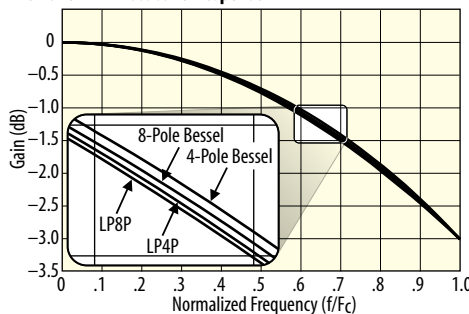
## Pulse Mode Low-Pass Filters

For the time domain, there are the LP4P and LP8P "pulse" mode low-pass filters. These filters have excellent transient response and phase linearity making them ideal filters for time domain applications including transient (shock) measurements and time domain waveform analysis ... all with roll-off characteristics superior to their Bessel filter counterparts.

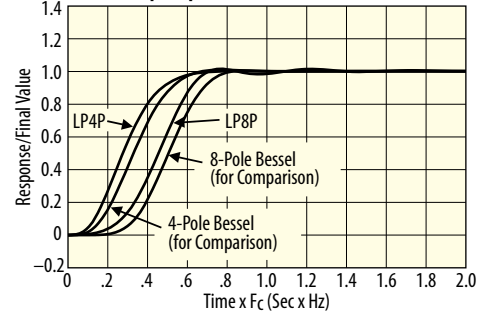
LP8P vs 8-Pole Bessel Amplitude Response



LP8P and LP4P Passband Response



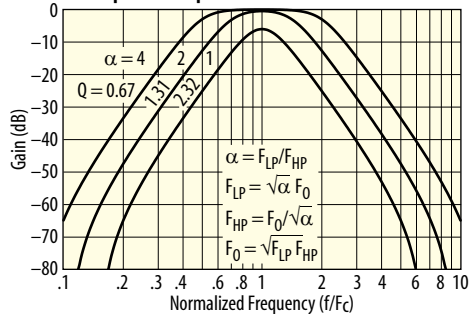
LP8P and LP4P Step Response



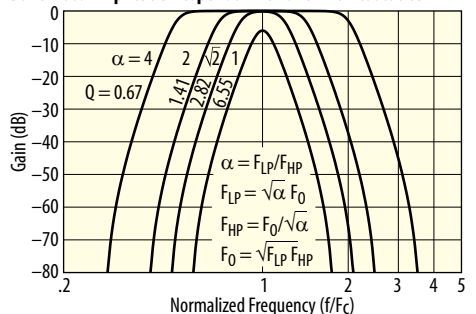
## High-Pass and Band-Pass Filters

For high-pass filtering, we offer the HP4F 4-pole and HP8F 8-pole characteristics. For band-pass filtering, choose the HP4F/LP4FP band-pass characteristic to provide programmable bandwidth and center frequency filters. For more selective band-pass filtering, cascade an HP8F with an LP8F.

Band-Pass Amplitude Response HP4F and LP4F Cascaded



Band-Pass Amplitude Response HP8F and LP8F Cascaded



## Traditional Filters

Of course, we offer the traditional filter types such as Butterworth and Bessel characteristics ... just ask!

In any case, we deliver to you a tightly controlled filter with phase match better than 1 degree and usually better than 0.5 degrees.

# Test Subsystem & Accessories

## Test Subsystem

The performance verification of test instruments is a critical part of insuring data integrity of any measurement system. The 28000-4A-TEST test subsystem and the 28000-BIF1-FT card provide a complete suite of tests that may be run on the instrument "in-place" without removing the system from the equipment rack. The tests check out all critical system specifications, are NIST traceable and are the same manufacturing tests that are run at the factory.

Three levels of test are provided. Pre-Test Verify and Diagnostics are used to confirm that all elements of the Test System are functional. The Factory Acceptance Test (FAT) does a complete parametric performance checkout of the conditioner. Parameters



*Test Subsystem with 28008-M3 installed in optional transit case.*

such as common mode rejection ratio, noise, offset, gain, frequency response, amplitude match and phase match are tested to original specifications. For a quick checkout of the equipment prior to a test run, the Go/No-Go test may be run to measure system performance of the current programmed setup.

## Accessories

### Output Adapter Modules



Several 28000 conditioner cards incorporate an auxiliary output connector at the front panel to support the use of output modules. A variety of output modules are available to provide additional buffered outputs per channel, different connector types, filtering, RMS-to-DC conversion, or other functions.

### Input and Output Connector Adapters

Connector adapters are available for several conditioner cards (including the 27304) to provide either coaxial BNC or twinaxial BNC I/O connections or high density wire terminal adapters, rather than the multipin connectors that are standard on the cards.



### Mating Connectors

Mating connectors are available for all system I/O connections, including the input and output connectors for conditioner cards, for the frames' 50-pin output connectors, and for the backplane interface card connector. Mating connectors include high quality gold plated machined contacts for long life and are available in both crimp-pin and solder-cup styles.

### Rack Mount Slide Kits

Slide mount kits for both the 28008 and 28016 frames are available for installing the chassis in standard 19" rack systems.



### Cables and Connector Panels

Precision Filters offers a wide range of cables to meet application requirements. A comprehensive set of input and output signal cables is available. Also, custom interconnection systems can be designed using bulkhead mounted BNC panels such as the PNL-32BNCBH-1U together with a wide selection of bulkhead cables. System cables available include RS-232 cables for control of the 28000 system and cables for the 28000-4A-TEST test subsystem.

### Extender Cards

Extender cards provide access to the signal conditioner cards for routine maintenance.

### Transit Case

Transit cases are available from Precision Filters for the 28000. This family of transit cases assures safe transport of your valuable equipment.



# System Control

The 28000 system is controlled by the PF Graphical User Interface (GUI) operating on a Windows compatible PC controller or over the network using the built-in 28000-LCS interactive command line interpreter. The PC controller communicates with the 28000 frames via the backplane interface card. A single PC controller can support up to eight 28000 systems. Both the GUI control software and the 28000-LCS interpreter are included with each 28000 system.

### PF Graphical User Interface

The PF Graphical User Interface (GUI) control software provides an easy-to-use spreadsheet-style environment with well-organized menus and point and click ease of use. All system functions are controlled by the GUI, from configuration, set-up and operations through pre-test verify and diagnostics, FAT and Go/No-Go tests. The GUI's display and control panels are customizable to the application or user preference. Selectable security settings control access to the system and movement between various system functions protecting critical programmed system parameters.

On power-up, the GUI automatically configures the system to control the exact set of signal conditioner cards installed in the 28000 frames. The GUI incorporates a collection of algorithms to automate tedious setup tasks. Based on user input, the GUI apportions gain in each channel to provide best signal-to-noise ratio while minimizing the chance of an overload occurring on out-of-band signals. Databases allow the user to import TEDS capable transducer information including type, sensitivity, last calibration date and serial number.

### 28000-LCS Interpreter

The resident 28000-LCS program is an interactive command line interpreter that allows the 28000 system to be controlled on an Ethernet network. During operation, the system status and commands pass between the host computer and the 28000 system via a TCP/IP connection. The 28000-LCS is a straightforward method for controlling the 28000 system since status messages and commands are readable sequences of ASCII characters.

# 28000 General Specifications

## General Characteristics

### 28008-M3 8-Slot Mainframe

Size:	5.25 x 19 x 19 inches (HWD) for standard RETMA rack installation
Weight:	17 lb. (net)
28008-ACPS Power Supply Weight:	10 lb. (net)

### 28016-M3 16-Slot Mainframe

Size:	10.5 x 19 x 20 inches (HWD) for standard RETMA rack installation
Weight:	30 lb. (net)
28016-ACPS? Power Supply Weight:	29 lb. (net)

### Backplane Interface Module (BIF)

28000-BIF1-T Size:	6.6 x 17.5 x 0.75 inches
28000-BIF1-T Weight:	1.5 lb. (net)

### 28000 Conditioner Cards

28000 Conditioner Card Size:	6.6 x 17.5 x 0.75 inches
28000 Conditioner Card Weight:	1.5 lb. (net) typical

### Temperature

Operating Temperature:	0° C to 40° C
Storage Temperature:	-20° C to 70° C

## Precision PF-1U-FA Multi-Channel Programmable Filter/Amplifier System



### Exceptional desktop performance.

Ideal for conditioning low-level voltage inputs in front of high-resolution digital data acquisition systems. Fully programmable 8-channel and 16-channel configurations are available, both offering a choice of either 4 or 8-pole low-pass filters with programmable gain.

## High Density Programmable Switch Systems

Computer controlled analog signal switching replaces tedious manual patch panels.



### Precision 4164 64x64 Switch Matrix System



### Precision 464kB Switch Matrix System

Precision switch systems are reliable solid-state switch matrix systems, providing computer-controlled connection between inputs and outputs signals. Configure the 464kB with up to 256 inputs and 256 outputs, all in a single mainframe, or choose the compact 4164 system with 64 inputs and 64 outputs. Save time and reduce errors on test system setup. Download switch configurations from the host computer over the network. Built-in self-test with fault diagnostics.

## Typical 28000 Platform Requirements

Qty.	Description
1	28016-M3 16-slot Mainframe
1	28016-ACPS-1 Power Supply
1	28000-BIF1-FT Backplane Interface Module with Graphical User Interface (GUI) and test software for Windows Operating System
1-16	28000 Signal Conditioner Cards
1	SM22A Slide Mount Kit
1	28000-4-TEST Test Subsystem Instrumentation and Cables



28016-M3 16-slot mainframe



28008-M3 8-slot mainframe