

Modular System Components

Modular System

The system is composed of three primary interchangeable components: chassis, plug-in power supplies, and plug-in signal conditioner modules. This interchangeability allows the system to be easily customized to meet the signal conditioning needs of most sensors.

Chassis

A chassis is the enclosure into which modules are inserted. It consists of a housing, mechanical brackets that physically hold modules, and a backplane into which the modules plug. Each chassis has a series of slots. A slot is defined as a position in a chassis where a module can be inserted and plugged into the backplane. The backplane is a circuit board assembly in the rear of the chassis that distributes power to the modules and provides the means by which modules communicate with each other, the rest of the system, and a personal computer. A module is a board assembly with its associated mechanical parts, including front panel, shields, and connector that can be plugged into a chassis. A module can occupy one or more slots in the chassis, depending on its width.



System chassis for the Modular System are available in 2-, 3-, 5-, and 9-slot sizes. The 9-slot chassis are standard 19-inch rack mount size. There are three types of chassis available based on their digital communication capability. All three reserve the right-most slot for a power supply module. The Model 441A38 chassis is supplied with a 100 watt power supply. It is the only chassis that includes a power supply and the only chassis that can be used with the 100 watt supply. All other chassis can be used with either the Model 441A101 AC Power Supply or the Model 441A102 DC Power Supply. All chassis come equipped with blank panels (model number 400A17) to cover any unused slots in the chassis.

Chassis are offered with three different levels of digital communication capability. Master chassis include RS-232 and RS-485 interfaces, slave chassis include an RS-485 interface, and standard chassis include no interfaces. The RS-232 interface is used for communication with a host computer. The RS-485 interface is used for communications between up to four daisy-chained chassis.

Power Supply Compatibility

Model	Type	Slots	RS-232	RS-485	Power Supply Compatibility			19" Rack Mount
					441A101 AC 45 W	441A102 DC 30 W	Includes AC 100 W	
441A42	Standard	2	No	No	x	x		
441A33	Master	3	Yes	Yes	x	x		
441A43	Standard	3	No	No	x	x		
441A35	Master	5	Yes	Yes	x	x		
441A45	Slave	5	No	Yes	x	x		
441A38	Master	9	Yes	Yes			x	x
441A39	Master	9	Yes	Yes	x	x		x
441A49	Slave	9	No	Yes	x	x		x

Power Supply Modules

One power supply is required for each chassis used in a system. Both an AC and a DC power supply module are available. Note: For **CE** compliance, the total power consumption in any chassis cannot exceed 30 watts. The Model 441A101 AC Power Supply module is a 45-watt supply with a universal power input that automatically senses and adjusts to input voltages from 100 to 240 VAC and frequencies from 50 to 60 Hz.

The Model 441A102 DC Power Supply module is a 30-watt supply that can be operated from either an internal rechargeable battery (included) or a 12 VDC source, such as the cigarette lighter in a car, using the included Model 017A22 DC Power Cord. Use of this power supply affords portability and field testing capability to the system. The module comes with a Model 488A08 Battery Charger that plugs into the front panel of the unit. It can be line powered when used in conjunction with optional Model 488A09 Universal AC Power Adapter.



Model 441A101
AC Power Supply



Model 441A102
DC Power Supply

ICP[®] SENSOR MODULES

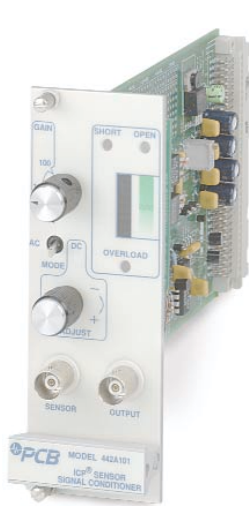
ICP[®] Sensor Signal Conditioner Modules

All ICP sensor signal conditioners supply a 24 VDC excitation voltage and up to 20 mA (factory set at 4 mA) constant current excitation to power all types of ICP sensors, including accelerometers, force sensors, microphones, pressure sensors, and dynamic strain sensors. All models are low noise and are **CE** marked when installed in a PCB chassis. Modules are

available in single or four-channel configurations, have AC and/or DC coupling, and have a wide frequency response. Refer to the ICP Sensor Signal Conditioner Module Specifications Table (below) for a comparison of module specifications.

ICP [®] Sensor Signal Conditioner Module Specifications				
Model Number	442A101	442A102	442A103	442B104
Channels	1	1	1	4
Excitation Voltage	24 VDC	24 VDC	24 VDC	25.5 VDC
Constant Current Excitation (preset to 4)	1 to 20 mA	1 to 20 mA	1 to 20 mA	0.5 to 20 mA
Voltage Gain	x1, x10, x100	Unity	x1, x10, x100	x1, x10, x100
Coupling	AC/DC	AC	AC	AC
Time Constant	>10 sec	>10 sec	>10 sec	>10 sec
Frequency Response (-5%)	DC to 100k Hz	0.05 to 100k Hz	0.05 to 100k Hz	0.05 to 100k Hz
Broadband Noise ¹ (1 Hz to 10 kHz)	9.11 μ V	7.2 μ V	8.91 μ V	8.5 μ V
Output Range	\pm 10 V	\pm 10 V	\pm 10 V	\pm 10 V
Power Consumption	2.0 W	1.25 W	1.5 W	5.5 W
Chassis Slots	1	1	1	1
Input Connectors	BNC	BNC	BNC	BNC
Output Connectors	BNC	BNC	BNC	BNC

¹ AC coupled, gain x 1



Model 442A101
Single-Channel ICP[®] Sensor Signal Conditioner with AC/DC coupling and x1, x10, x100 Gain



Model 442A102
Single-Channel ICP[®] Sensor Signal Conditioner with unity Gain



Model 442A103
Single-Channel ICP[®] Sensor Signal Conditioner with x1, x10, x100 Gain



Model 442B104
Four-Channel ICP[®] Sensor Signal Conditioner with x1, x10, x100 Gain

DUAL-MODE AND CAPACITIVE MODULES

Dual-Mode Amplifier Modules

The Dual-Mode amplifiers are multiple-purpose signal conditioners and amplifiers that can be used as an ICP® sensor signal conditioner, charge amplifier, or general-purpose instrumentation (voltage) amplifier. Additionally, these units support digital communication with TEDS Sensors. TEDS (Transducer Electronic Data Sheet) are smart transducers that conform to IEEE P1451.4. The dual-mode amplifiers are microprocessor based, menu driven, have a digital display, and set all parameters to four-digit accuracy. Additionally, they have low pass filters, single and double integration, continuous gain, and can normalize sensor sensitivities. The amplifiers also provide sensor fault detection, sensor and amplifier overload detection, and operate in both English and Metric units. The dual-mode amplifiers have a very low noise floor and are **CE** marked when installed in a PCB chassis. **Note:** The Model 443B101 (shown) is the standard vibration amplifier. Also available is the Model 443B102, long discharge time constant unit, for quasi-static measurements and calibration.



Model 443B101 Dual Mode Amplifier

Capacitive Sensor Signal Conditioner Modules

The capacitive sensor signal conditioner provides a regulated 18 VDC power for operating PCB and IMI capacitive (response to DC) sensors. The DC voltage adjustment feature allows the user to remove the bias offset from the signal up to ± 1.15 volts. The capacitive sensor signal conditioner has a very low noise floor and is **CE** marked when installed in a PCB chassis.

Capacitive Sensor Signal Conditioner Module Specifications

Model Number	445A101
Channels	1
Excitation Voltage	18 VDC
Gain	x1, x10, x100
Coupling	DC
DC Adjustment Range	± 1.15 V
Frequency Response (-5%)	DC to 25k Hz
Broadband Noise (0.1Hz to 10 kHz)	14 μ V
Output Range	± 10 V
Power Consumption	1 W
Chassis Slots	1
Input Connectors	Microtech 4-Pin
Output Connectors	BNC

Dual-Mode Amplifier Module Specifications

Model Number	443B101	443B102
Channels	1	1
Input Sensor Type (selectable)	ICP, charge, voltage, TEDS	ICP, charge, voltage, TEDS
Input Sensitivity Adjustment	0.001 to 9999 pC or mV/unit	0.001 to 9999 pC or mV/unit
Excitation Supplied (ICP mode)	24 VDC @ 0-20 mA	24VDC @ 0-20 mA
Voltage Gain (ICP, voltage, and TEDS modes)	0.1 to 1000	0.1 to 1000
Charge Converter (charge mode)	0.1 to 10,000 mV/pC	0.1 to 10,000 mV/pC
Charge Input Limit	100,000 pC	100,000 pC
Accuracy	$\pm 1\%$	$\pm 1\%$
Output Range	± 10 V	± 10 V
Discharge Time Constant (selectable)	0.18, 1.8 sec	0.18, 1.8, 10, 100, 1000, >100k sec
Low Frequency Response (-10%)	2, 0.2 Hz	2, 0.2, 0.03, 0.003, -0 Hz
High Frequency Response (-10%)	100, 1k, 3k, 10k, >100k Hz	100, 1k, 3k, 10k, 100k, >200k Hz
Integration (selectable)	Velocity or Displacement	Velocity or Displacement
Low Frequency Response (Vel. or Displ., -10%)	1, 10 Hz (selectable)	1, 10 Hz (selectable)
Broadband Noise (ICP mode) (2 to 22.4k Hz)	<3 μ V (-110.5 dB)	<3 μ V (-110.5 dB)
Broadband Noise (charge mode) (2 to 22.4k Hz)	<5 fC	<5 fC
Serial Interface	RS-232/RS-485	RS-232/RS-485
Power Consumption	6.25 watts	6.25 watts
Input Connectors	BNC / 10-32 ¹	BNC / 10-32 ¹
Output Connector	BNC	BNC
External Zero	N/A	SMB
Chassis Slots Required	2	2

¹ Panel connection is BNC. 10-32 achieved with supplied adaptor.



Model 445A101
Capacitive Sensor Signal
Conditioner with Gain

Multi-Channel Signal Conditioner Modules

Model 441A175 Bank Switch Output Module

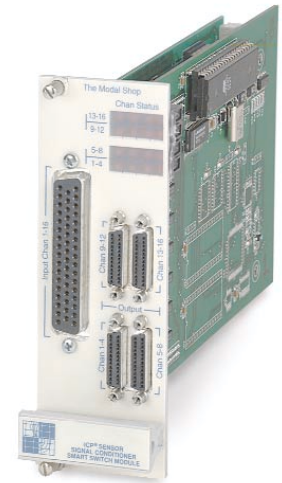
The Model 441A175 Bank Switch Output module transfers sensor signals from a selected 16-channel ICP® sensor signal conditioner to the output connectors on the Model 441A175. The bank switch can select the signals (via the chassis backplane) from up to seven 16-channel ICP sensor signal conditioners. Multiple bank switch modules can be used in a single chassis or in multiple chassis to switch more than 16 channels at a time. Switching is controlled either manually by push button or via computer using the System Control Software. The Model 441A175 also provides a user-selectable buffered signal output from any channel of any module controlled by the bank switch to a BNC connector on the front panel.



Model 441A175 Bank Switch

The constant current can be disabled on a channel-by-channel basis via on-board selection switches. This allows the use of voltage mode sensors such as tachometers.

Sixteen front panel LEDs indicate the channel's sensor status (short, open, or good). Signal input is made through a 50-pin front panel connection, typically using a standard PCB ribbon cable with a DB50 connector. Signal output is also provided at the front panel from 4 Agilent VXI E1432A connectors. Additionally, the output can be directed to a Bank Switch Module that also has 4 VXI output connectors. For special connection requirements, please contact PCB.



Series 442 16 Channel ICP® Input Module

Smart modules are compatible with bank switching and are software controllable. Gain, pre-filters, and TEDS are only accessible through software control and cannot be accessed through the front panel. Smart modules are available with any combination of the following options

- Unity or selectable gain (x1, x10, and x100).
- Unfiltered or selectable pre-filter (2-pole Butterworth LP with 100 Hz, 500 Hz, 5000 Hz, and 30k Hz cutoff frequencies). Custom filters are also available.
- With or without TEDS (Transducer Electronic Data Sheet) support.

Note: Due to the power requirements of the pre-filters, systems using modules with the pre-filter option must use the 441A38 chassis with the 100 watt power supply.

16-Channel ICP® Sensor Signal Conditioner Module Specifications

Model Number	442B116 to 442A126	441A175
Channels	16	16
Excitation Voltage	22 VDC	N/A
Constant Current Excitation ¹	2-10 mA	N/A
Coupling	AC	N/A
Time Constant	>10 sec	N/A
Frequency Response (±5%)	0.125 Hz to 30k Hz	N/A
Broadband Noise (0.3 Hz to 30k Hz)	100 µV	N/A
Output Range	±10 V	N/A
Power Required	See options table	1 W
Chassis Slots Required	1	1
Input Connector	DB50 Female	N/A
Output Connector (4)	Agilent E1432A ²	Agilent E1432A ²

¹ Factory preset at 4 mA

² Direct connection compatibility with Agilent VXI Model E1432A

N/A= Not applicable

16-Channel ICP® Sensor Signal Conditioner Module Options

Model	Smart	TEDS	Gain	Pre-Filter	Power Consumption ¹
442B116	No	No	x1	No	5.7 W
442B117	Yes	No	x1	No	5.7 W
442B119	Yes	Yes	x1	No	5.7 W
442A121	Yes	No	x1, x10, x100	No	5.7 W
442A122	Yes	Yes	x1, x10, x100	No	5.7 W
442A123	Yes	No	x1	Yes	9.2 W
442A124	Yes	No	x1, x10, x100	Yes	9.2 W
442A125	Yes	Yes	x1	Yes	9.2 W
442A126	Yes	Yes	x1, x10, x100	Yes	9.2 W

¹ Power consumption at factory set 4mA constant current excitation.

16-Channel ICP Sensor Signal Conditioner

All 16-channel ICP sensor signal conditioner modules supply a 22 VDC, user adjustable 2 to 10 mA (factory set at 4 mA) constant current excitation to all channels simultaneously.

Modular System Ordering Information

Modular System Ordering information

Individual Modules (A complete instrument requires a chassis, power supply, and at least one signal conditioner module.)

Function	Model Number	Description
Chassis	441A42	2-slot standard chassis
Chassis	441A33	3-slot master chassis
Chassis	441A43	3-slot standard chassis
Chassis	441A35	5-slot master chassis
Chassis	441A45	5-slot slave chassis
Chassis	441A38	9-slot master chassis with 100 W power supply
Chassis	441A39	9-slot master chassis
Chassis	441A49	9-slot slave chassis
Blank Panel	400A17	Blank panel
AC Power Supply	441A101	45 watt AC power supply ¹
DC Power Supply	441A102	30 watt DC power supply
ICP Sensor Signal Conditioner	442A101	1-channel, AC/DC coupling, x1, x10, x100 gain
ICP Sensor Signal Conditioner	442A102	1-channel, AC coupling, x1 gain
ICP Sensor Signal Conditioner	442A103	1-channel, AC coupling, x1, x10, x100 gain
4-Channel ICP® Sensor Signal Conditioner	442B104	4-channel, AC coupling, x1, x10, x100 gain
Dual-Mode Vibration Amplifier	443B101	Charge/ICP, normalization, TEDS support
Dual-Mode Amplifier	443B102	Charge/ICP, LDTc, normalization, TEDS support
Capacitive Sensor Signal Conditioner	445A101	1-channel, DC coupling, x1, x10, x100 gain
16-Channel ICP Sensor Signal Conditioner	442B116	x1 gain
16-Channel ICP Sensor Signal Conditioner	442B117	Smart, x1 gain
16-Channel ICP Sensor Signal Conditioner	442B119	Smart, TEDS, x1 gain
16-Channel ICP Sensor Signal Conditioner	442A121	Smart, x1, x10, x100 gain
16-Channel ICP Sensor Signal Conditioner	442A122	Smart, TEDS, x1, x10, x100 gain
16-Channel ICP Sensor Signal Conditioner	442A123	Smart, Pre-filter, x1 gain
16-Channel ICP Sensor Signal Conditioner	442A124	Smart, x1, x10, x100 gain, pre-filter
16-Channel ICP Sensor Signal Conditioner	442A125	Smart, TEDS, x1 gain, pre-filter
16-Channel ICP Sensor Signal Conditioner	442A126	Smart, TEDS, x1, x10, x100 gain, pre-filter
Bank Switch	441A175	16-channel bank switch

Preconfigured Instruments (Preconfigured instruments include chassis and power supply.)

Function	Model Number	Description
ICP Sensor Signal Conditioner	442B01	1-channel, AC coupling, x1 gain
ICP Sensor Signal Conditioner	442B02	1-channel, AC coupling, x1, x10, x100 gain
4-Channel ICP Sensor Signal Conditioner	442C04	4-channel, AC coupling, x1, x10, x100 gain
8-Channel ICP Sensor Signal Conditioner	442C05	8-channel, AC coupling, x1, x10, x100 gain
ICP Sensor Signal Conditioner	442B06	1-channel, AC/DC coupling, x1, x10, x100 gain
5-Channel ICP Sensor Signal Conditioner	442A07	5-channel, AC coupling, x1, x10, x100 gain plus 1-channel AC/DC coupling
Dual-Mode Vibration Amplifier	443B01	Charge/ICP, normalization, TEDS support
Dual-Mode Amplifier	443B02	Charge/ICP, LDTc, normalization, TEDS support
Capacitive Sensor Signal Conditioner	445B01	1-channel, DC coupling, x1, x10, x100 gain

¹ Power consumption cannot exceed 30 watts in any chassis for CE Marking compliance.