Hydrophone and Ultrasonic Preamplifier

BII's low noise low power preamplifiers (amplifiers) have built-in filters and their gains are fixed or programmable with digital and analog control. These preamplifiers (amplifiers) are custom-fit for use in broadband (wideband) underwater SONAR, ultrasonic (Ultrasound, NDT, AE) system and material study.

Typical Applications

Hydrophone, SONAR, Underwater Communication, Navigation. Seafloor-mapping, Sub-bottom/Sediment Profiler, Acoustic Image. Target Strength Testing, Towed Array, Sonobuoy, Bottom Moored Systems.	Ultrasonic (Ultrasound, AE, NDT) Testing, Material Characterization. Low Noise Ultrasonic Preamplifier, Instrumentation, Pulse Amplifier. Sonic Cavitation Noise, Hand-held, Portable, Battery-operated Systems.

BII1090 Series Low Noise Programmable Gain Preamplifier: 0.02Hz to 10MHz, 1.0nV/√Hz, 0.8fA/√Hz, 80dB Gain Variation, 1000m Cable Capacity.

Digitally programmable-gain amplifiers are invaluable components in SONAR (Underwater and Air) and ultrasound systems which detect a variety of sources with varying signal levels. Gain-selection is accomplished by a two-bit (or one-bit) digital word (TTL/CMOS level compatible), or manual setup.

Specification

SE: Single-ended, **DF**: Differential, **V_{omax}**: Maximum Output. **BW**: -3dB Bandwidth, **HPF**: Highpass Filter, **BPF**: Bandpass Filter, **LPF**: Lowpass Filter. BNC Jack (**BNC**): for Single Ended Signal. 3.5 mm TRS Jack (**TRS35**): for Differential Signal. **DIN3 and DIN4**: for Differential Signal.							
Preamplifier	**BII1091DF**	**BII1092SE**	**BII1092DF**	**BII1093**	**BII1094**	**BII1097**	**BII1098**
Input Type:	Single ended (**SE**) or differential (**DF**) input signals.						**SE** only
Input Coupling:	AC						
Input Referred Noise: (f ≥ 1 kHz)	e_n: 5.6 nV/√Hz, i_n: 0.6 fA/√Hz.	e_n: 12 nV/√Hz. i_n: 1.0 fA/√Hz.	e_n: 12 nV/√Hz. i_n: 1.0 fA/√Hz.	e_n: 5.6 nV/√Hz. i_n: 0.6 fA/√Hz.	e_n: 20 nV/√Hz. i_n: 1.0 fA/√Hz.	e_n: 5.6 nV/√Hz. i_n: 0.6 fA/√Hz.	e_n: 3.0 nV/√Hz. i_n: 4.0 fA/√Hz.
	Roughly, electronic noise density at input, RTI, $V_n^2 = e_n^2 + [\, i_n$ * impedance of the transducer (or hydrophone)$]^2$.						
Input Impedance R_i:	44MΩ||4pF	20MΩ||4pF	20MΩ||4pF	10MΩ||4pF	200MΩ||5pF	44MΩ||4pF	1MΩ||8pF
	Bespoke Input Impedance: the default impedance stated above is maximum impedance the preamp can have, bespoke impedance should be less than the one above listed respectively.						
	Ri 50Ω matches 50Ω coax cable impedance and damps down NDT transducer to achieve good transient or pulse response or reduce decaying time (or ringing) of the transducer.						
	End user may set input impedance to be 50Ω with a T type BNC adaptor and a 50Ω BNC Terminator.						
Maximum Input:	2.4 Vpp or Maximum Output V_{omax}/Gain, whichever is less.						
Built-in Filter:	BPF **HPF:** 1st Order. **LPF:** 2nd Order.	BPF **HPF:** 2nd Order. **LPF:** 2nd Order.	BPF **HPF:** 2nd Order. **LPF:** 1nd Order.	BPF **HPF:** 2nd Order. **LPF:** 2nd Order.	HPF **HPF:** 2nd Order.	BPF **HPF:** 2nd Order. **LPF:** 1nd Order.	BPF **HPF:** 2nd Order. **LPF:** 1nd Order.
	Customized high pass or bandpass filters, Specify -3dB cut-off frequencies when ordering. White noise level is proportional to the square root of bandwidth.						
	Filters of Preamps. Both oceanic ambient noises and the self-noises of electronic devices decrease when frequency increases. It is recommended to choose a built-in high pass filter to reject noises in low frequency range. For example, if you are interested in the signals greater than 1 kHz, you may specify a high pass filter of a preamp with -3dB cut-off frequency 100 Hz to improve signal to noise ratio of the signals of the interest.						
	System Filters Consisting of Standalone Piezoelectric Hydrophones and Standalone Preamps. **-3dB High Pass Frequency:** $f_{-3dBH} = 1/(2\pi R_i C_h)$. that is, $R_i = 1/(2\pi f_{-3dBH} * C_h)$. R_i: Input Resistance or Impedance of Preamp. C_h: Capacitance of piezoelectric hydrophone/sensor/transducer at 1 kHz (non-resonance measurement) or f_s (resonance measurement such as NDT pulsing system). For example: (1) hydrophone 10nF at 1kHz and preamp R_i 10MΩ constitute high pass filter with -3dB frequency 1.59Hz. (2) hydrophone 10nF at 1kHz and preamp R_i 200MΩ constitute high pass filter with -3dB frequency 0.08Hz.						
Gain Options:	10, 40 dB. 10, 50 dB. 20, 50 dB. 30, 60 dB.	0,20,40,60 dB.	0,20,40,60 dB.	20,40,60,80 dB.	20, 60 dB.	20, 60 dB.	30, 60 dB.
-3dB Bandwidth:	1Hz to 2/0.9MHz.	1Hz to 1/0.35MHz.	1Hz to 1/0.35MHz.	1Hz to 1/0.35MHz.	0.1Hz to 250kHz	1Hz to 4.5MHz.	10kHz to 10MHz
	The -3dB Bandwidth varies with gains. Please refer to Gain-Frequency Charts for the -3dB Bandwidth at a specific gain.						
Settling Time, 0.01%:	1.2 µS	2 to 10 µS	2 to 10 µS	2 to 10 µS	20 µS	1.2 µS	0.4 µS
Output Type:	DF	SE	DF	DF	SE	SE	SE
Output Coupling:	AC	AC	AC	AC	AC	AC	AC
Output Impedance:	20 Ω	10 Ω	100 Ω	100 Ω	10 Ω	50 Ω	50 Ω
V_{omax} (Vpp):	Vs – 3.4	Vs – 3.4	Vs – 4.0	Vs – 4.0	Vs – 5.0	Vs – 1.0	Vs – 1.0
Cable Driving Capability:	1. 50Ω-Impedance Matching Coaxial Cable System: ≥ 300m. 2. Custom-fit Cable Length up to 305 m or 1000 ft, refer to Cable-Drive Capability. The chart is based on 5Vpp Sinusoidal signals. Maximum cable length which a hydrophone can drive is proportional to output voltage level of the hydrophone..						
Gain Selection:	Digitally (CMOS/TTL Compatible, controlled by Digital Outputs) and/or Manually. **One-bit**: A0 and Digital Common for Two Gain Selections. **Two-bit**: A1, A0 and Digital Common for Four Gain Selections.						
	One-bit	**Two-bit**	**Two-bit**	**Two-bit**	**One-bit**	**One-bit**	**One-bit**
	Logic Low "0": 0 to +0.8 VDC from digital outputs, or Gain Selection Wire is short to Digital COM. **Logic High "1"**: +2.4 VDC to +Vs from digital outputs, or Gain Selection Wire Opens. **Vs**: Power Supply Voltage.						
	Warning: Logic Voltage is greater than maximum voltage rating or less than -0.8V will damage the device.						

	Warning: digital outputs, switches, relays, optocouplers etc. can be used for gain selection and the voltage protection rating of these devices must be greater than power supply voltage level.						
Supply Voltage Vs:	+9 to +32 V	+8 to +32 V	+8 to +32 V	+8 to +32 V	+8 to +32 V	+14 to +35 V	+14 to +35 V
Quiescent Current:	18 or 20 mA	9 mA	13 mA	22 mA	3 mA	19 mA	14.4 mA
Suggested DC Supply V_s:	1.2 V to 12.6 V Batteries (AA, AAA, C, and D, 9V, Coin Cell, Marine and Automobile). Fixed DC Linear Power Supply, Not Included. DO NOT use variable power supply whose maximum supply voltage is higher than the above rated voltage. DO NOT use switching mode DC power supplies whose noise levels and harmonics are high.						
Service Temperature:	-40 to 70 °C or -40 to 158 °F						
Storage Temperature:	-40 to 70 °C or -40 to 158 °F						

Metal or Plastic Housing with Four Mounting Holes.

1. **BNC**: "Bayonet Neill–Concelman", miniature quick connect/disconnect radio/audio frequency connector used for coaxial cable. **Fastening Type**: Bayonet Lock.
2. **XLR**: Employed for balanced audio interconnections, 3 to 7 contacts. **Fastening Type**: Latch Lock. Only supported by BII Plastic Housing because of its large size.
3. **3.5mm TRS** stand for Tip, Ring, and Sleeve, miniature, quick connect/disconnect audio frequency connector used for shielded cable. **Fastening Type**: None.
4. **DIN**: Electrical cylindrical connectors, 3 to 14 contacts, Φ20mm diameter, used for audio, RF, digital, and DC or AC power signals. **Fastening Type**: Threaded.
5. **DC Power Connector**: Supply DC voltage and current to devices, miniature, quick connect/disconnect, used for shielded cable. **Fastening Type**: None.

Packages:	**Signal Type**	**Small Metal Housing with Four Mounting Holes**	**Large Metal or Plastic Housing with Four Mounting Holes**
Input Connector:	Single Ended	BNC Jack (**BNC**)	BNC Jack (**BNC**)
	Differential	3.5 mm (1/8") TRS Jack (**TRS35**)	XLR Plug with with 3 Sockets (**XLR3**)
			XLR Plug with with 4 Sockets (**XLR4**)
Output Connector:	Single Ended	BNC Jack (**BNC**)	BNC Jack (**BNC**)
	Differential	3.5 mm (1/8") TRS Jack (**TRS35**)	XLR Plug with with 3 Sockets (**XLR3**)
Gain Selection:	3.5 mm (1/8") **TRS Jack** on Housing for tow-bit digital signal. Gain Selection Cable A3: 0.9m Cable with 3.5mm TRS Plug and Wire leads.		
	BNC Jack on Housing for one-bit digital signal and analog gain control signal. Gain Selection Cable: Buy uses buyer's own BNC and coax.		
Power Supply:	DC Power Connector Jack on Housing.		
	Options of Power Supply Cable: DCBP24, DCBS18V.		
Size LxWxH (mm):	77x50.6x33 (No BNC Jacks) or 77x50.6x43 (with BNC Jacks)		109.45x83.4x65 (No BNC Jacks) or 109.45x83.4x67 (with BNC Jacks)
Weight:	115 grams ± 10%		150 grams ± 10%
Accessories:	A1: Bespoke length RG58, RG174, or RG178 Coax with BNC Male to BNC Male. A2: Bespoke length cable with 3.5mm TRS Plug to 3.5mm TRS Plug. A3: Bespoke length cable with 3.5mm TRS Plug to Wire Leads. A4: Bespoke length cable with 3.5mm TRS Plug to XLR Receptacle with 3 Male Pins. A7: Bespoke length cable with XLR Receptacle Male Pin to Wire Leads. Default: 1m.		

Gain Selection Table with One-bit

A0	**BII1091DF**				**BII1094**	**BII1097**	**BII1098**
0	10 dB	10 dB	20 dB	30 dB	20 dB	20 dB	30 dB
1	40 dB	50 dB	50 dB	60 dB	60 dB	60 dB	60 dB

Gain Selection Table with Two-bit

A1	**A0**	**BII1092SE, BII1092DF.**	**BII1093**
0	0	0 dB	20 dB
0	1	20 dB	40 dB
1	0	40 dB	60 dB
1	1	60 dB	80 dB

Standard Preamp, Metal or Plastic Housing. BII keeps standard parts in stock.

Part Number	**-Gain**	**-R_i**, Refer to R_iC_h Filter.	**-Input/Output Connector**	**-Accessory Cable Length**	**-Type**
BII1091DF	20/50 dB	44 MΩ.	TRS/TRS, XLR3/XLR3, XLR4/XLR3.	Blank: No Accessories. 0.6m, 0.9m, 1.8m, 10m, 20m. Cable Accessory. DCBP24, DCBS18V.	
BII1093	20/40/60/80 dB	10 MΩ.	TRS/TRS, XLR3/XLR3, XLR4/XLR3.		
BII1097	20/40 dB	44 MΩ.	BNC/BNC, XLR3/BNC, XLR4/BNC.		
BII1098	30/60 dB	1 MΩ.	BNC/BNC, XLR4/BNC.		
Example:		**Description:**			
BII1091DF-20/50dB-44MΩ-TRS/TRS-20m-A4-DCBS18V:		BII1091DF, Preamp, Gain: 20/50dB, Input Impedance: 44MΩ, Input and Output: TRS Jacks, Accessory: 20m A4. DC Supply Cable: DCBS18V.			
BII1091DF-20/50dB-44MΩ-XLR3/XLR3-20m-A7-DCBS18V:		BII1091DF, Preamp, Gain: 20/50dB, Input Impedance: 44MΩ, Input and Output: XLR3 Jacks, Accessory: 20m A7. DC Supply Cable: DCBS18V.			
BII1097-20/60dB-44MΩ-BNC/BNC-DCBS18V:		BII1097, Preamp, Gain: 20/60dB, Input Impedance: 44MΩ, Input and Output: BNC Jacks, DC Supply Cable: DCBS18V.			
BII1098-30/60dB-1MΩ-BNC/BNC-DCBS18V:		BII1098, Preamp, Gain: 30/60dB, Input Impedance: 1MΩ, Input and Output: BNC Jacks, DC Supply Cable: DCBS18V.			

How to Order Bespoke Preamplifiers (Metal or Plastic Housing). Non-stock.

Part Number	**-Gain**	**-R_i.**	**-HPF/LPF or HPF**	**-Input/Output Connector**	**-Accessory Cable Length**	**-Type**
BII1091DF	Gain Options.	Refer to R_iC_h Filter.	-3dB BPF or HPF in Hz, KHz, MHz.	TRS/TRS, XLR3/XLR3, XLR4/XLR3.	Blank: No Accessories. in meter. Cable Accessory. DCBP24, DCBS18V.	
BII1092DF			-3dB BPF or HPF in Hz, KHz, MHz..	TRS/TRS, XLR3/XLR3, XLR4/XLR3.		
BII1092SE			-3dB BPF or HPF in Hz, KHz, MHz.	TRS/BNC, XLR3/BNC, XLR4/BNC.		
BII1093			-3dB BPF or HPF in Hz, KHz, MHz.	TRS/TRS, XLR3/XLR3, XLR4/XLR3.		
BII1094			-3dB HPF in Hz, KHz, MHz.	TRS/BNC, XLR3/BNC, XLR4/BNC.		

BII1097			-3dB BPF or HPF in Hz, KHz, MHz.	BNC/BNC, XLR3/BNC, XLR4/BNC.	
BII1098			-3dB BPF or HPF in Hz, KHz, MHz.	BNC/BNC, XLR4/BNC.	

To avoid adverse effects of parasitic components of a resistor, input impedance ≤ 1MΩ is recommended for MHz applications.

Example:	**Description:**
BII1091DF-20/50dB-10MΩ-10Hz-TRS/TRS-DCBS18V:	BII1091DF, Preamp, Gain: 20/50dB, Input Impedance: 10MΩ; -3dB Highpass Filter: 10Hz, Input and Output: TRS Jacks, DC Supply Cable: DCBS18V.
BII1093-20/40/60/80dB-10MΩ-10Hz/200kHz-XLR3/XLR3-DCBS18V:	BII1093, Preamp, Gain: 20/40/60/80dB, Input Impedance: 10MΩ; -3dB Bandpass Filter: 10Hz to 200kHz, Input and Output: XLR Jacks, DC Supply Cable: DCBS18V.
BII1097-20/60dB-20MΩ-10Hz/1MHz-BNC/BNC-DCBP24:	BII1097, Preamp, Gain: 20/60dB, Input Impedance: 20MΩ; -3dB Bandpass Filter: 10Hz to 1MHz, Input and Output: BNC Jacks, DC Supply Cable: DCBP24.

1. Signals and Wiring of Small Metal Housing with Miniature Panel-mount Jacks of BNC, TRS, and DC Power Supply (Not Support DIN and XLR Jack).

1.1 Panel-Mount Connectors

Input or Output Signals		**Gain Selection (BII1090 Series).**		**DC Power Supply**
Single Ended (SE)	Differential/Balanced (DF)	Digital Signals, Logic "0" and "1".		Single DC Supply.
BNC Jack	3.5mm TRS, Signal, and Cable	3.5mm TRS Jack	BNC Jack	DC Power Jack,
Center: Signal Shield: Common	Tip: Signal +, Positive or Hot. Ring: Signal -, Negative or Cold. Sleeve: Shield and Common.	Tip: A1. Ring: A0. Sleeve: Digital COM.	Conductor: A0. Shield: Digital COM.	Center Contact: +VDC. Shell: Common.
Metal Case is for shielding and grounding.				

1.2 Accessory Cables

Input and Output Signals			**Gain Selection (BII1090 Series).**		**DC Supply Cable**
Single Ended (SE)	Differential/Balanced (DF)		Digital Signals Logic "0" and "1"		Single DC Supply.
BNC and Coax	Signal and Cable	1/8" TRS	3.5mm TRS and Cable	BNC and Coax	DC Power Plug
Center: Signal Shield: Common	**Signal+**: White	TRS Tip	Tip, White Wire: A1. Ring, Black or Red Wire: A0. Sleeve, Black Wire: Digital COM.	Conductor: A0. Shield: Digital COM.	Red Banana Plug: +VDC. Black Banana Plug: Common. Cable Shield: Shielding.
	Signal-: Black or Red	TRS Ring			
	Common: Shield	TRS Sleeve			
Warning: "Signal –" is the reverse (180° phase difference) of "Signal +", and "Signal –" MUST NOT be connected to Common or Ground.					

2. Signals and Wiring of Large Metal or Plastic Housing with Panel-mount Jacks of XLR3, DIN3, BNC, TRS, and DC Power Supply.

2.1 Panel-Mount Connectors

Input or Output Signals				**Gain Selection (BII1090 Series).**		**DC Power Supply**
Single Ended (SE)	Differential/Balanced (DF)			Digital Signals, Logic "0" and "1".		Single DC Supply.
BNC Jack	Signal and Cable	~~DIN3 Jack~~	XLR3 Jack	3.5mm TRS Jack	BNC Jack	DC Power Jack,
Center: Signal Shield: Common	Signal +, Positive or Hot.	~~Socket 3~~	Socket 2	Tip: A1. Ring: A0. Sleeve: Digital COM.	Conductor: A0. Shield: Digital COM.	Center Contact: +VDC. Shell: Common.
	Signal -, Negative or Cold.	~~Socket 1~~	Socket 3			
	Common/Shielding/Ground.	~~Socket 2~~	Socket 1			
Metal Case is for shielding and grounding.						

2.2 Accessory Cables

Input and Output Signals				**Gain Selection (BII1090 Series).**		**DC Supply Cable**
Single Ended (SE)	Differential/Balanced (DF)			Digital Signals Logic "0" and "1"		Single DC Supply.
BNC and Coax	Signal and Cable	~~DIN3~~	XLR3	3.5mm TRS and Cable	BNC and Coax	DC Power Plug
Center: Signal Shield: Common	Signal+: Red or White	~~Pin 3.~~	Pin 2.	Tip, White Wire: A1. Ring, Black or Red Wire: A0. Sleeve, Black Wire: Digital COM.	Conductor: A0. Shield: Digital COM.	Red Banana Plug: +VDC. Black Banana Plug: Common. Cable Shield: Shielding.
	Signal-: Black	~~Pin 1.~~	Pin 3.			
	Common: Shield	~~Pin 2~~	Pin 1.			
Warning: "Signal –" is the reverse (180° phase difference) of "Signal +", and "Signal –" MUST NOT be connected to Common or Ground.						

3. Signals and Wiring of Large Metal Housing with Panel-mount Jacks of XLR4, XLR3, DIN4, DIN3, BNC, TRS, and DC Power Supply (Not Support XLR Jack).

Note: this package processes signals from hydrophones (sensors) which have built-in preamps and/or filters.

3.1 Differential Input and Differential Output.

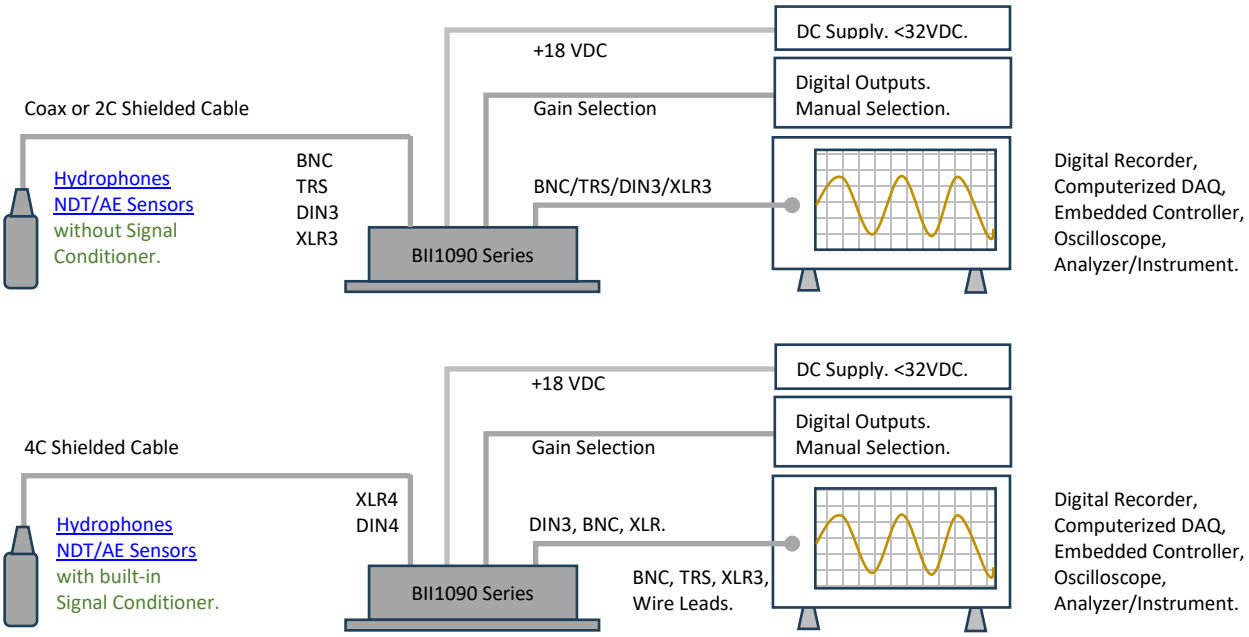
Signals	**Input Connector**		**Output Connector**			**TRS or BNC Connector for Gain Control**		**DC Power Jack**
	XLR4	~~**DIN4**~~	**XLR3**	~~**DIN3**~~	**Wires**			
+VDC	Socket 4	~~Socket 4~~	---			---		Center Contact
Common	Socket 1	~~Socket 1~~	---			---		Shell.
Signal+	Socket 3	~~Socket 3~~	~~Socket 2~~	Socket 3	Red or White.	---		---
Signal-	Socket 2	~~Socket 2~~	~~Socket 3~~	Socket 1	Black.	---		---
Signal Common	Socket 1	~~Socket 1~~	~~Socket 1~~	Socket 2	Shield Drain.	---		---
Shielding	Metal Shell		Metal Shell		Shield Drain.	---		---
A0	---		---			TRS: Socket 3	BNC Conductor	---
A1	---		---			TRS: Socket 1	---	---
Digital COM	---		---			TRS: Socket 2	BNC Shell.	---

3.2 Differential Input and Single-ended Output.

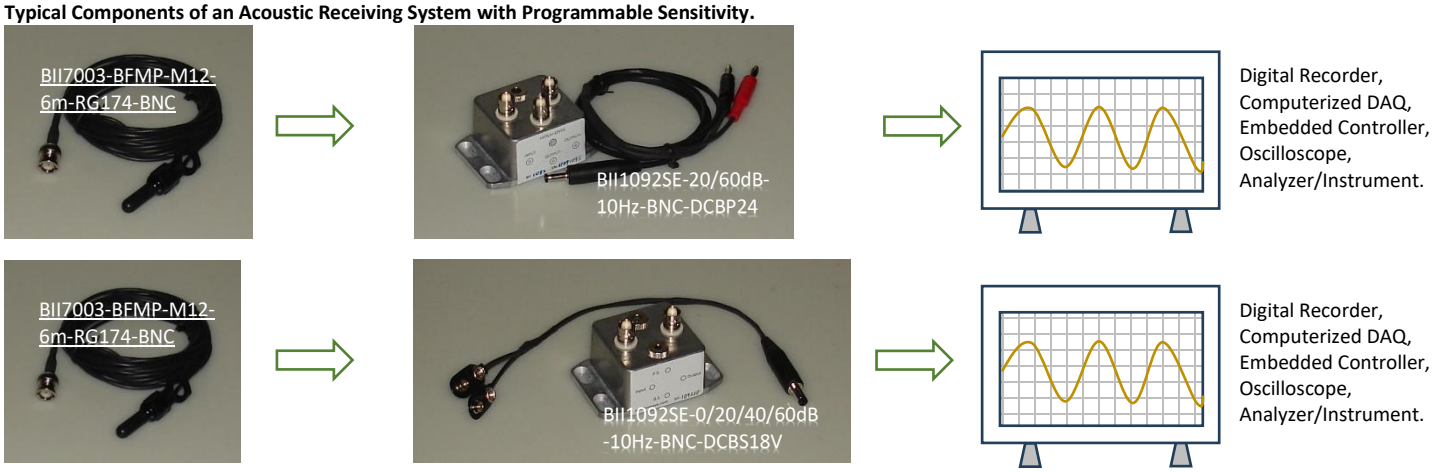
Signals	**Input Connector**		**BNC Output Connector**	**TRS or BNC Connector for Gain Control.**	**DC Power Jack**
	XLR4	~~**DIN4**~~			
+VDC	Socket 4	~~Socket 4~~	---	---	Center Contact
Common	Socket 1	~~Socket 1~~	---	---	Shell.
Signal+	Socket 3	~~Socket 3~~	BNC Center Contact	---	---

Signal-	Socket 2	~~Socket 2~~	---	---		---
Signal Common	Socket 1	~~Socket 1~~	BNC Shell	---		---
Shielding	Metal Shell		BNC Shell	---		---
A0	---		---	TRS: Socket 3	BNC Conductor	---
A1	---		---	TRS: Socket 1	---	---
Digital COM	---		---	TRS: Socket 2	BNC Shell.	---

Acoustic Programmable-Sensitivity Receiving System



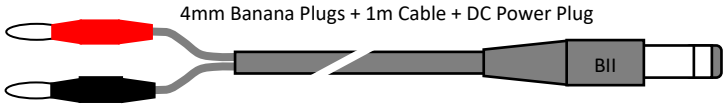
Typical Components of an Acoustic Receiving System with Programmable Sensitivity.



Accessories:

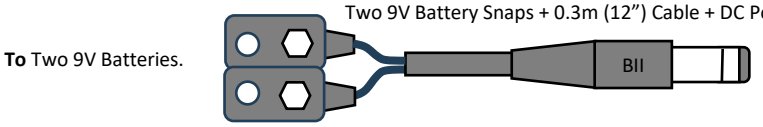
Part Number: DCBP24. One 1m DC supply cable with Red and Black Banana Plugs, and DC Power Plug.

To Terminals of DC Supply:
a. One Red 4mm Banana Plug.
b. One Black 4mm Banana Plug.

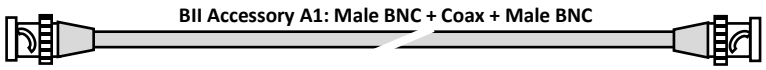


Red Banana Plug or Red Wire Lead: +VDC.	**Black Banana Plug or Black Wire Lead:** Common.	**Cable Shield, if any**: Shielding.

Part Number: DCBS18V. One 0.3m (12”) DC supply cable with two 9V Battery Snaps which supplies +18VDC to amplifiers, and one DC Power Plug.



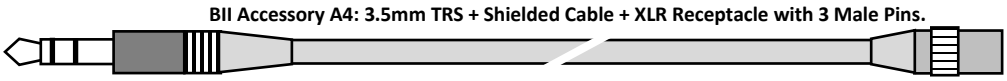
A1: Bespoke length RG58, RG174, or RG178 Coax with BNC Male to BNC Male. Default: 0.6m.



A2: Bespoke length cable with 3.5mm TRS Plug to 3.5mm TRS Plug. Default: 1.828m.

A3: Bespoke length cable with 3.5mm TRS Plug to Wire Leads. Default: 0.9m.

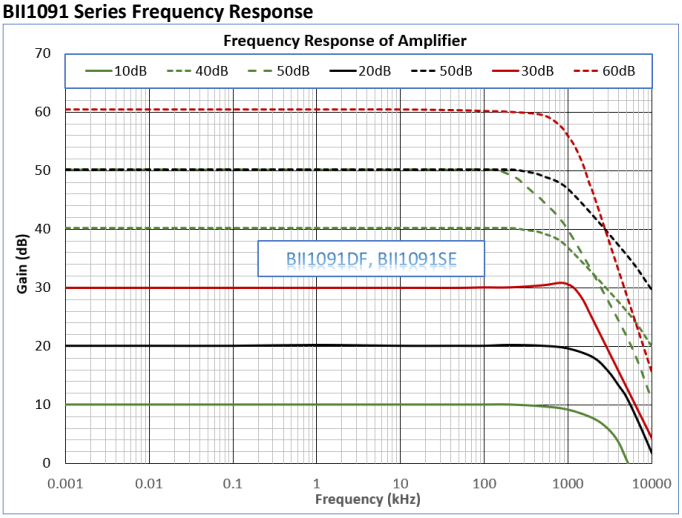
A4: Bespoke length cable with 3.5mm TRS Plug to XLR Receptacle with 3 Male Pins. Default: 0.9m.



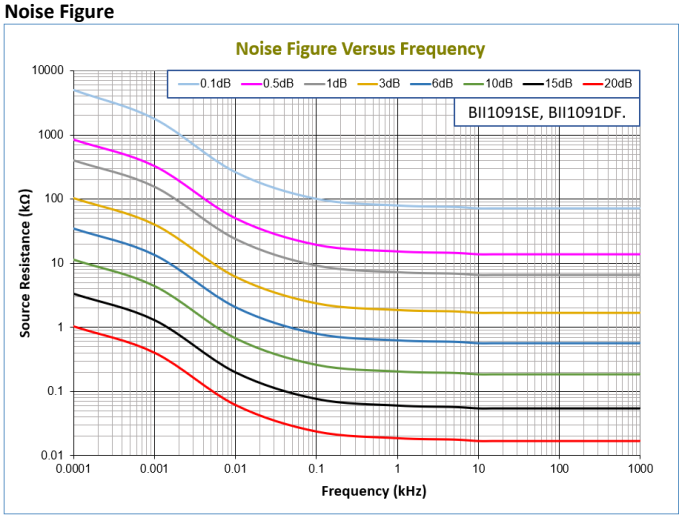
Most recorders and analyzers use **XLR Plug with 3 Female Sockets** on front panel as differential/balance input connector and BII's XLR of A4 is compatible to it.

A7 Receiving Signal Cable. Part Number: XLR-P-WL-1m, Bespoke length cable with XLR Receptacle Male Pin to Wire Leads. Default: 1m.

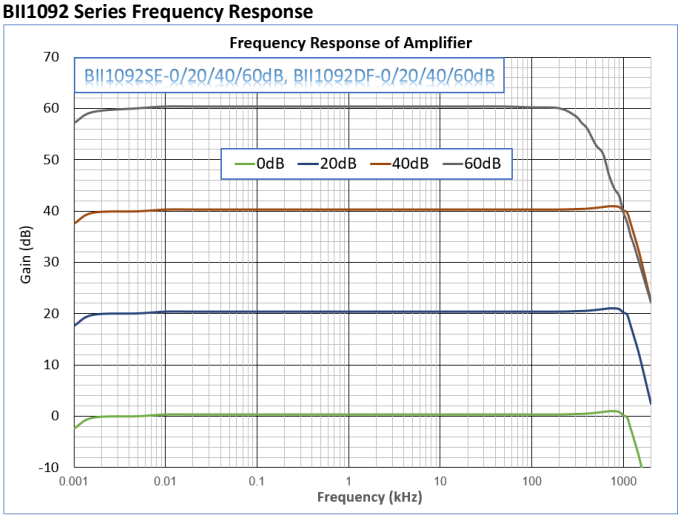
BII1091 Series Frequency Response



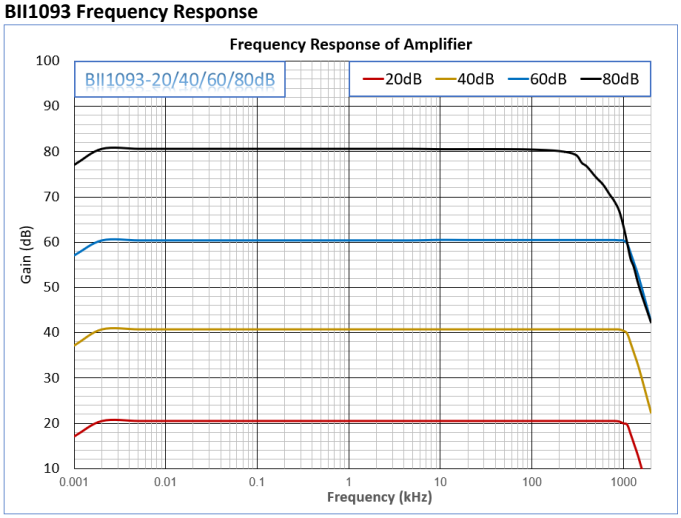
Noise Figure



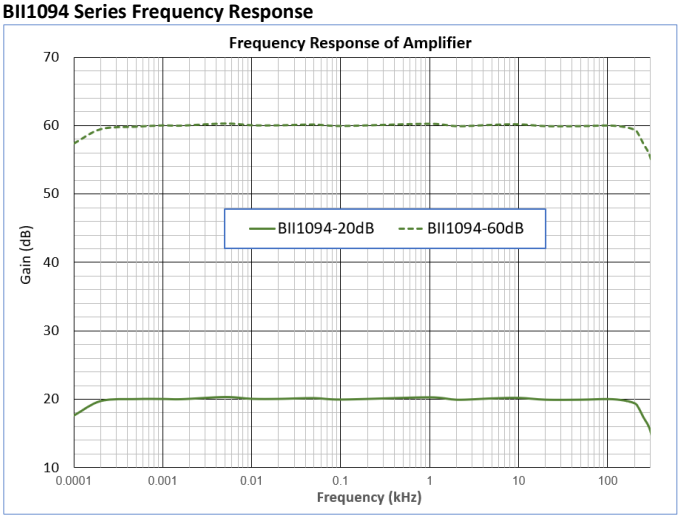
BII1092 Series Frequency Response



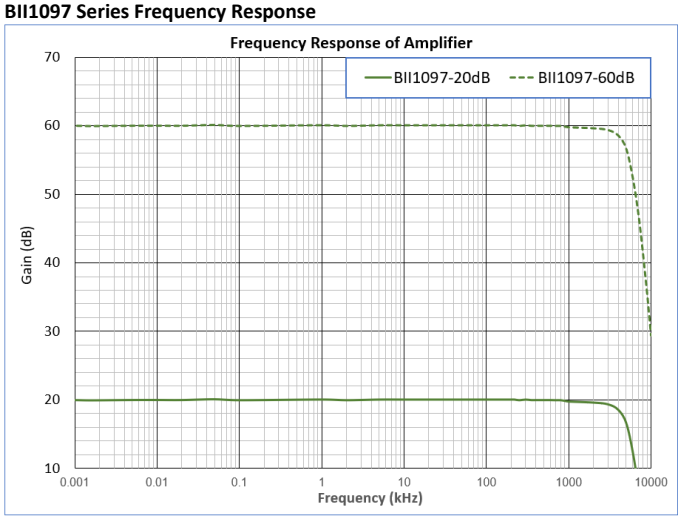
BII1093 Frequency Response



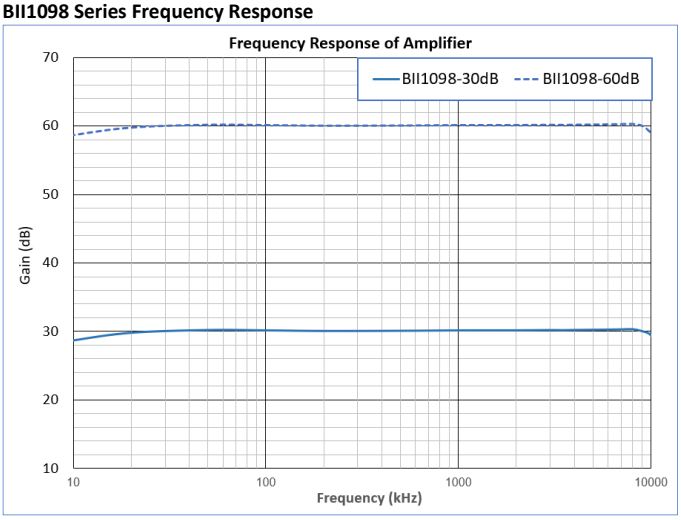
BII1094 Series Frequency Response



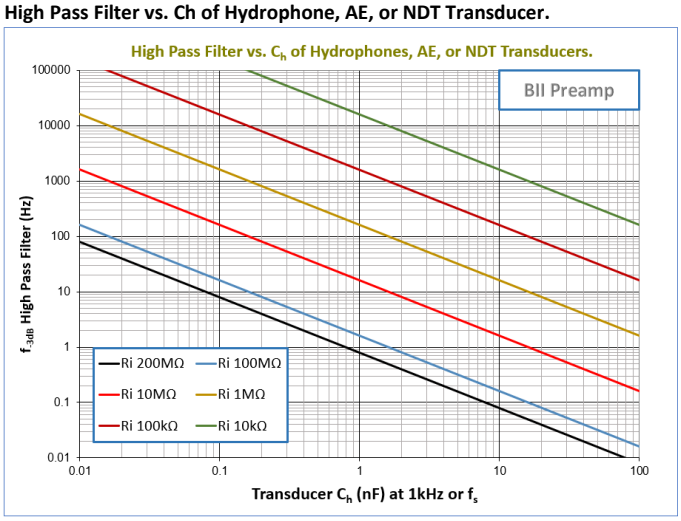
BII1097 Series Frequency Response



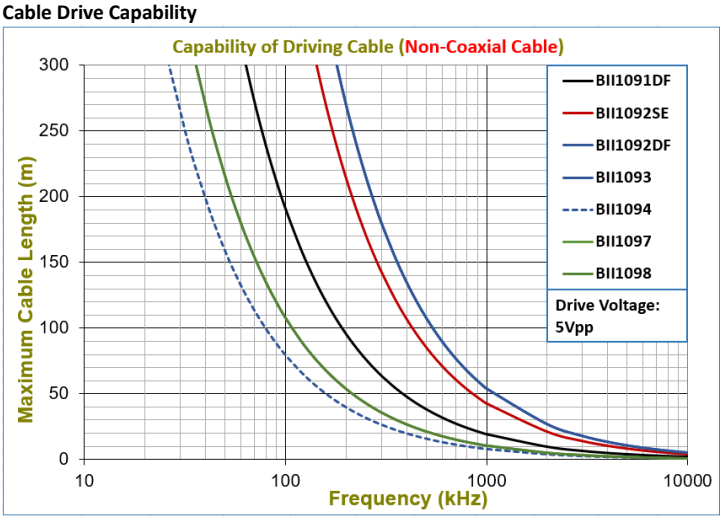
BII1098 Series Frequency Response



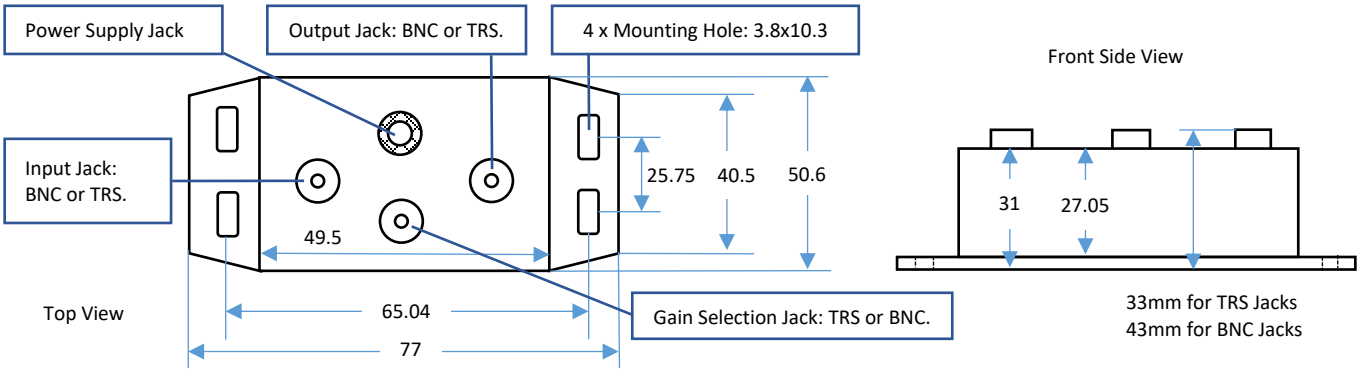
High Pass Filter vs. Ch of Hydrophone, AE, or NDT Transducer.



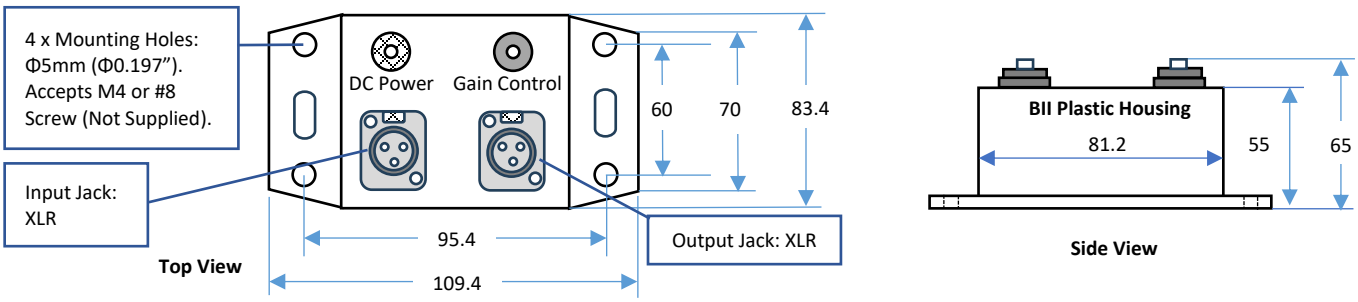
Cable Drive Capability

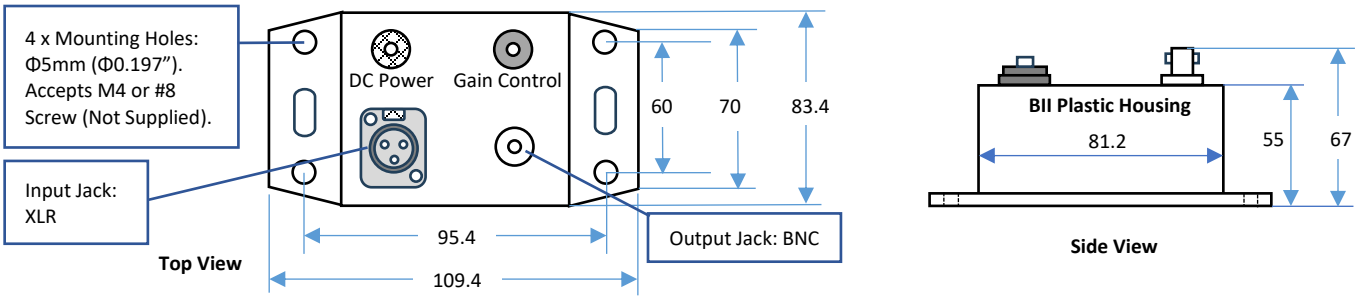


Metal Housing, Programmable Gain Preamplifier BII1090 Series, Outline Dimensions (mm), Illustration only, the scale is not 1:1.



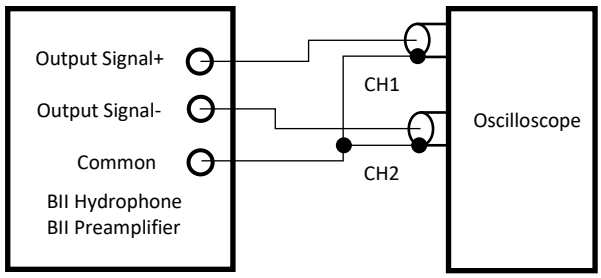
Plastic Housings Outline Dimensions (mm), Illustration only, the scale is not 1:1.



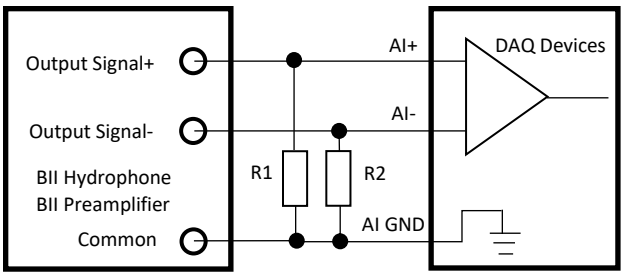


Preamplifier Wirings to DAQ (Data Acquisition): DAQ: Data Acquisition Hardware; AI: Analog Input; CH: Channel; GND: Ground.
R1 and R2 resistors are NOT necessary for most applications. If DAQ saturation occurs, use R1 = R2 = 10kΩ to 1MΩ resistors.

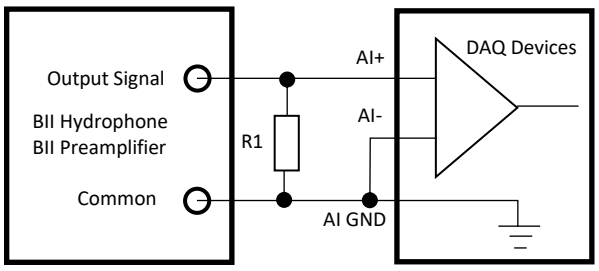
BII's Differential Output to BNC Input of an Oscilloscope



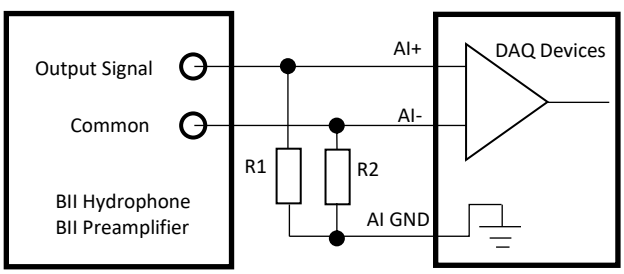
BII's Differential Output to Differential Input of a DAQ



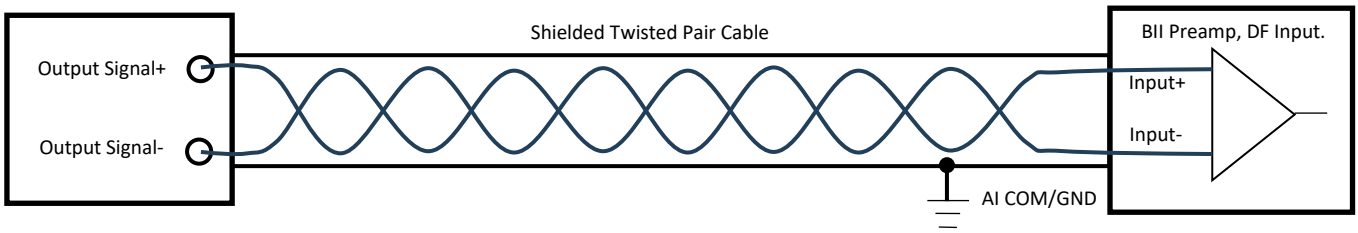
BII's Single-Ended Output to Single-Ended Input of a DAQ



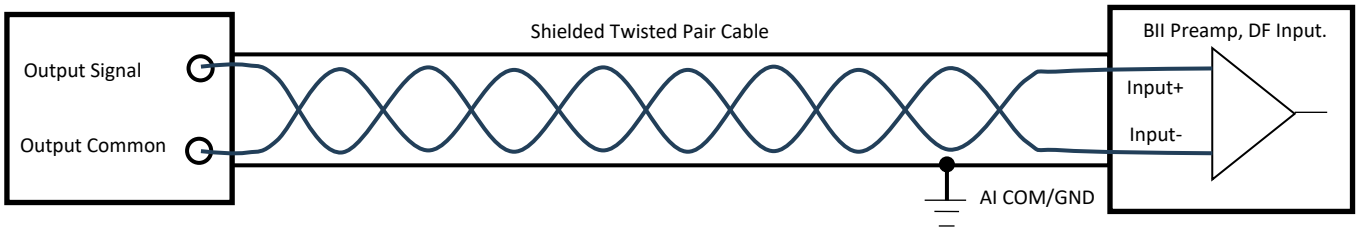
BII's Single-Ended Output to Differential Input of a DAQ



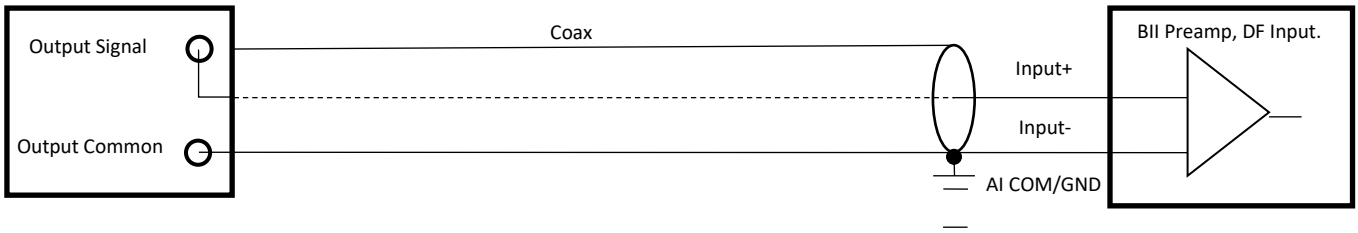
BII's Differential Sound Receiver to Differential Input of a BII Preamp (Signal Conditioner)



BII's Single-ended Receiver to Differential Input of a BII Preamp



BII's Single-ended Receiver to Differential Input of a BII Preamp



Questions

What if the connector of my transducer/sensor is SMA or SMC Connector?

SMA (or SMC) to BNC (Male) adaptors are available from many electronic distributors. BII may sell the adaptor as an accessory of the device upon request. **By default, BII does NOT supply the adaptor as accessories.**

How do I wire 50Ω transducer/sensor to preamplifiers in high frequency applications?

Many BII preamplifiers have non-50Ω input resistances which does NOT match 50Ω in high frequency applications. Therefore, one T type BNC adaptor and one 50Ω BNC terminal are necessary between 50Ω transducer/sensor and the preamplifier to change the impedance of the preamp to be 50Ω. BII may ship T type BNC adaptor and one 50Ω BNC terminal as accessories of the device. Please specify this request when ordering. **By default, BII does NOT supply these two parts as accessories**. By the way it is NOT necessary to do 50Ω matching in low frequency range applications in which electromagnetic wave lengths are much greater than the cable length.

How do I wire BII preamplifiers to audio connectors XLR Plug with 3 Female Sockets (Differential Signal) of my recording devices?

BII Preamplifiers have panel mount TRS Jacks as output connectors. Please order accessory A4 with preamplifiers. **By default, BII does NOT supply the cable assembly as accessories**.

My acoustic sensors generate differential signals in MHz range, are TRS connectors of BII preamps suitable for my applications?

Our test shows the TRS connectors (Plug and Jack) of BII preamps can be used up to 20 MHz. Test Conditions: TRS Jack with 0.2m cable and TRS plug with 1m cable. Oscilloscope: 1MΩ||30pF, Signal Source: DDS Signal Generator.

Can 3.5mm (1/8") TRS be configured for single-ended signal of a hydrophone/transducer which does not have built-in preamplifier?

Yes, the preamp with differential-input TRS can accept single-ended signals from hydrophones/transducers whose TRS wiring should be like followings: **TRS Tip**: Signal. **TRS Ring and Sleeve:** Both terminals are soldered together for Signal Common and Shielding. Common and shielding should be "one-point" contact.

Can BII explain why the capacitance of my hydrophone/transducer affect high pass filtering?

(1). Hydrophone/transducer is high impedance devices in low frequency range. Its simplified complex impedance = $j/(2\pi f C_h)$, C_h is the capacitance of hydrophone/transducer, f is frequency in Hz. This impedance is in series with preamp R_i and can reach several MΩ to hundreds MΩ depending on C_h and f. (2). Most high-performance operational amplifiers (IC chips) can use input resistors R_i up to 1 to 200 MΩ to avoid bumping into saturation issue.

My recorder (or signal processing device) is about 100m away from the hydrophone (or AE Sensor), which type of preamplifiers should I choose?

Choose differential-output preamps to drive the 100m cable and ensure that your data acquisition device can accept differential signals.

I need a low noise preamp, How do I choose the BII preamps?

Generally, choose low i_n preamp if useful signal consists of low frequency components less than 10 kHz; choose low e_n preamp if frequency components of useful signal are greater than 10 kHz.

Can the hydrophone with differential outputs be wired to single-ended inputs of a DAQ device (Data Acquisition Equipment) such as an Oscilloscope?

Yes, output+ and Common of a BII hydrophone can be used a single-ended signal, or Output- and Common of the hydrophone can be used a single-ended signal. But, neither output+ nor output – of the hydrophone can be wired to common which is going to destroy the hydrophone by short circuit.

Driving 100Ω Balanced Twisted Pair Cable/Wires and 50 or 75 Ω Coax.

(1) **Impedance of most Balanced Twisted Pair Cable/Wire is from 100Ω to 150Ω**.
BII preamp has 100Ω output impedance or bespoke impedance to match the impedance of Balanced Twisted Pair Cable/Wires.

(2) **Impedance of most Coax is 50Ω or 75Ω**.
BII preamp has 50Ω output impedance or bespoke 75Ω impedance to match the impedance of coaxes.