



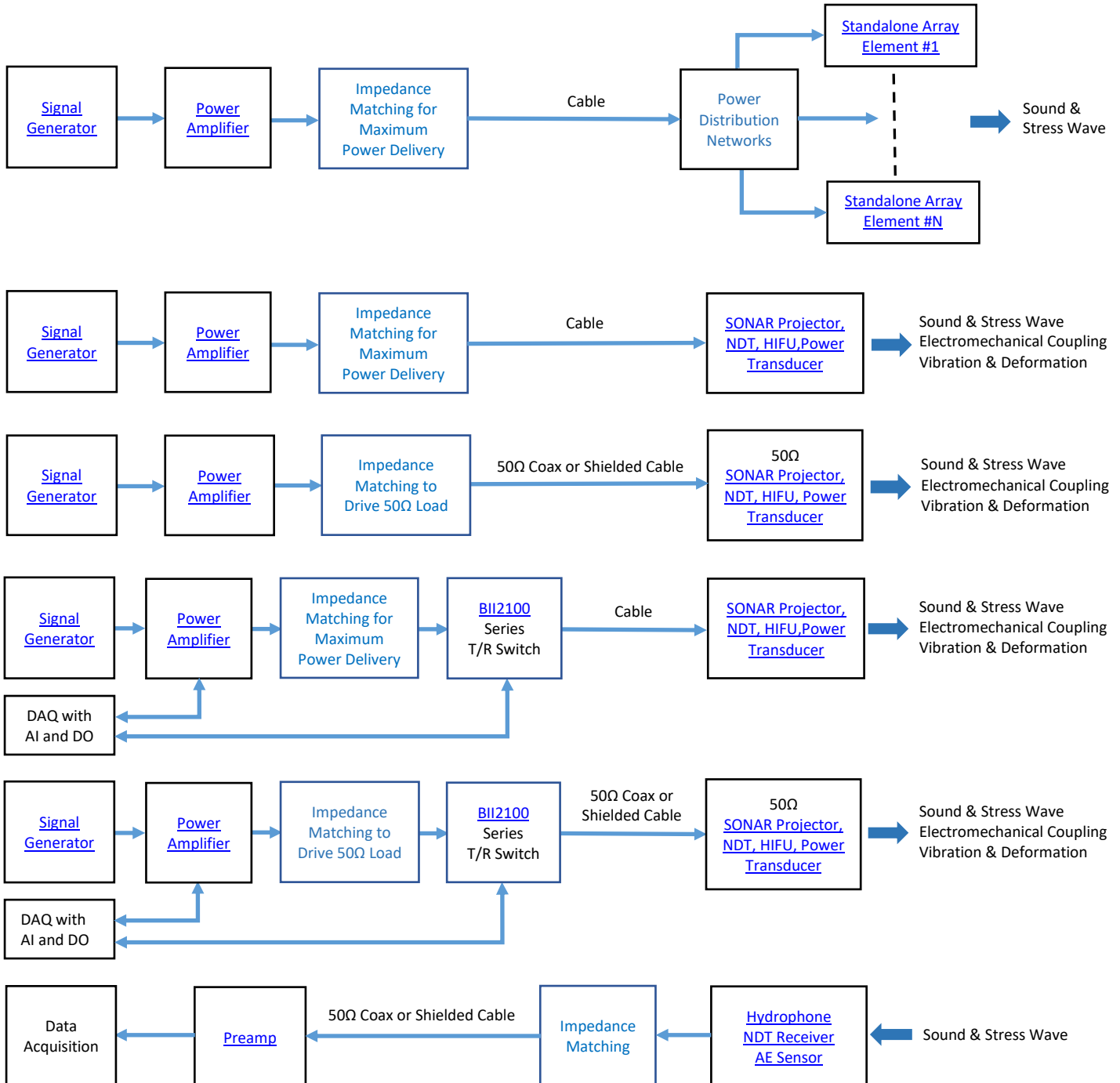
BII6000 Series Matching Network: Impedance Matching between Transducers and Amplifiers

The impedance (or admittance) of a piezoelectric transducer (SONAR, HIFU, NDT, AE Sensor, Hydrophone.) is frequency-dependent ranging from hundreds kΩ to several Ω, and is capacitive, resistive, or inductive at different frequency ranges. An impedance matching and tuning unit is a necessary device to change the impedance of the transducer in a specific frequency range to meet the load requirements of a power amplifier for maximum and efficient power transfer (high power factor) from the electric to the mechanical, or to match the input impedance of a preamplifier for maximum and efficient power transfer from the mechanical to the electric, or achieve optimum source resistance for minimum noise figure NF. Besides, BII6000s are necessary components in study of dielectric and ferroelectric (piezoelectric) materials.

Typical Applications

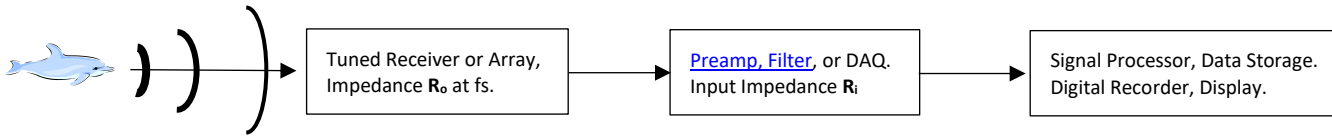
- ❖ Impedance matching between Amplifiers (Power Amplifier and Preamplifiers) and Piezoelectric Transducers.
- ❖ Wideband Step-up and Step-down Transformers for Study of Materials.

System Configuration



Tuned Transducer as a Receiver

Tuned transducers (hydrophones, AE sensor, NDT receivers, etc...) are band pass sound receivers and projector operating around resonance f_s , which feature broadband, possible maximum power transfer from the transducer to preamplifier, and offer flexible solutions to special transducer demanding in underwater acoustics and NDT (Non-destructive Test). Impedance of a tuned transducer is resistive at f_s .



Tuned Receiver Structure:

1. Tuning Unit integrated inside receiver housing
2. Receiver + Standalone Tuning Unit



Three Major Operations of tuned receivers: Impedance matching $R_o = R_i$, Open Circuit $R_i \gg R_o$, and $R_o < R_i \ll \infty$.

a. Impedance matching between the transducer and its signal conditioning circuit:

1. Sound energy being reflected from the transducer is minimized.
2. Maximum power transfer from transducer to preamplifier or signal conditioner.

Advantages:

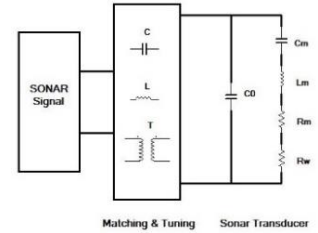
Broaden the bandwidth, reduce impulse rings, increase spatial resolution in tracking, positioning, and NDT applications. Reduce mutual interaction among array elements in an array. Reduce interference to incident acoustic waves.

Disadvantage:

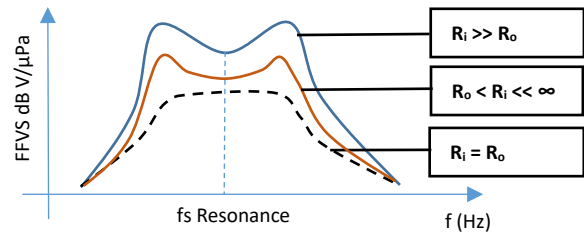
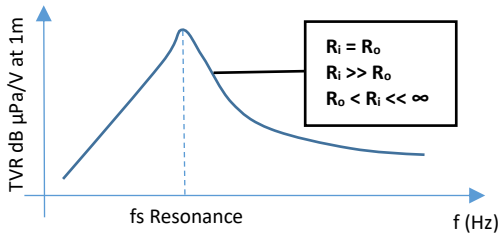
The sensitivity drops 6 dB around f_s comparing to FFVS (open circuit voltage).

b. Input impedance of signal conditioner $R_i \gg$ transducer impedance R_o :

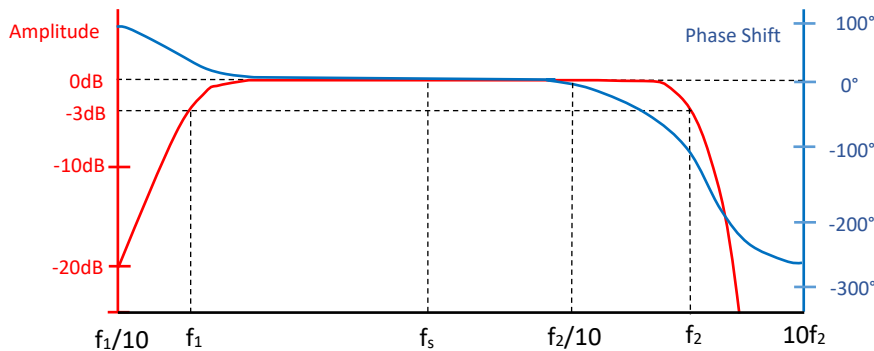
Output voltage of receiver is FFVS (open circuit voltage).



Typical TVR and FFVS of Tuned Transducer:



Typical Frequency Response of a Wideband Transformer Which is a key Component for Impedance Matching



APPLICATIONS

Impedance Matching between Power Amplifiers and Acoustic Transducers/Projectors.
Step-up Voltage Transformer for study of dielectric, ferroelectric, and piezoelectric materials.

Impedance Matching between preamplifiers and Piezo-Sensors.
1:2, 1:3, 1:4, 1:9 Broadband Transformer from 0.01 to 30 MHz.

Device Part Number

Series Number
BII60: Impedance Matching Device.
 Benthowave Product Series Designation.

BII6011

Device Type

- 1: Impedance Matching and Tuning with Single-ended Output f_s .
- 2: Impedance Matching and Tuning with Differential Output f_s .
- 3: Broadband Transformer, No Tuning Out C_0 of Piezoelectric Transducers.
 f_s is motional (mechanical) resonance frequency of a Piezoelectric Transducer at which its TVR reaches maximum.
 C_0 is shunt (clamped) capacitance of a Piezoelectric Transducer around f_s .

Working Mode, Housing, and Cable/Connector

1. Standalone Device. Metal Housing (**MH**), Four Mounting Holes, Panel Mount Connectors, a Grounding Stud.
2. Standalone or Embedded Device. Potted Plastic Housing (**PPH**), Metal Chassis, Mounting Holes and Slots, 0.15m Cable or Wire Bundles, Wire Leads or In-line Connectors.
3. Embedded Component, Metal Housing (**MH**), Four Mounting Holes, Cable, or Wire Bundles with Wire Leads.
4. Embedded Component, Metal Bracket with Chassis (**MBC**), Four Mounting Slots, Wire Bundle, Wire Leads.
5. Embedded Component, Printed Circuit Board (**PCB**), Four Mounting Holes, Round Pads on PCB (**PADS**) for Soldering Wires.
6. Standalone Device for Underwater Uses. Plastic Housing with Underwater Mateable Connectors (**PHUMC**).

Quick Reference of Matching Network Devices

SD: Standalone Device; **EC**: Embedded Component being embedded into buyer's enclosure or housing; **IMT**: Impedance Matching and Tuning; **BT**: Broadband Transformer. **MH**: Metal Housing with Four Mounting Holes; **MBC**: Metal Bracket with Chassis with Four Mounting Slots; **PPH**: Potted in Plastic Housing with Metal Chassis, with Mounting Holes and Slots; **PHUMC**: Plastic Housing with Underwater Mateable Connectors, Bolt-fastening Mounting (3/8"-16 x 1/4" 316 SS Screw); **PCB**: Printed Circuit Board with Four or Six Mounting Holes.

USAGE	APPLICATION	FREQUENCY	PART NUMBER	OUTPUT TYPE	PACKAGE	FEATURES and CUSTOMIZATION
SD	IMT	500 Hz to 10 MHz	BII6011	Single-Ended	MH	Medium Power at Low Frequency. Options: High Temperature and Waterproof IP68. Panel-mounted Connectors.
SD or EC	IMT	500 Hz to 10 MHz	BII6012	Single-Ended	PPH MH	High Power up to 10000 W RMS. Wire Bundles for high-power as embedded components . Shielded Cable for medium power as standalone devices . In-line Connectors or Wire Leads.
EC	IMT	500 Hz to 10 MHz	BII6013	Single-Ended	MH	Medium Power at Low Frequency. Options: High Temperature . Cable or Wire Bundles with Wire Leads.
		500 Hz to 50 kHz	BII6014	Single-Ended	MBC	Medium Power. Wire Bundles with Wire Leads.
		500 Hz to 10 MHz	BII6015 BII6025	Single-Ended Differential	PCB	Medium Power at Low Frequency.
SD	IMT	500 Hz to 1 MHz	BII6016	Single-Ended	PHUMC	Underwater Mateable Devices. Depth Rating: up to 500m in Water.
SD	BT	0.01 to 30 MHz	BII6031	Single-Ended	MH	Broadband Transformer without tuning function. Bandwidth $\Delta f_{-3dB} = 3f_s$ to $10f_s$. f_s : Center Frequency. Driving 50Ω load in high frequency range. Options: High Temperature.
Note:	With proper wirings, suitable piezoelectric element and structure designs, a transducer can implement dipole, multipole, or differential operation mode with single ended input driving signal. BII manufacture dipole, multipole, or differential transducers which need single-ended driving signals.					

Specifications

Matching Network	BII601x Series	BII602x Series	BII603x Series
Applications:	Single Ended Transducers. Impedance Matching and Tuning at f_s	Differential Transducers (Dipoles , etc.) Impedance Matching and Tuning at f_s	Step up Driving Voltage ONLY Broadband Transformer
f_s Range:	1 kHz to 10 MHz	1 kHz to 10 MHz	0.02 to 10 MHz
Usable Frequency Range:	0.5 kHz to 10 MHz	0.5 kHz to 10 MHz	0.01 to 30 MHz for 50Ω Coaxes.
-3dB Bandwidth Δf_{-3dB}:	$\Delta f_{-3dB} \geq$ Transducer Bandwidth.	$\Delta f_{-3dB} \geq$ Transducer Bandwidth.	$\Delta f_{-3dB} = 3f_s$ to $10f_s$. f_s center frequency.
Integration:	BII transducers with built-in BII601x or BII602x are impedance-matched to be 50 Ω.		Step up Driving Voltage ONLY
Gain (V_{out}/V_{in}):	Transducer load / PA Load.	Transducer load / PA Load.	Bespoke Fixed Voltage Gain.
Isolation or Insulation:	Input and Output are DC isolated, ≥ 1000 VDC.		
Power Capacity:	Up to 6000 W. Customized. Specify when ordering. ONLY pulsing signal can be applied to the devices with high power application (≥ 1000 W) to avoid overheating.		Limited by BNC Connectors.
Device Type:	Magnetic Devices based on Ferromagnetic Materials.		
Input Signal:	Single Ended Signals or Differential Signals.		Single Ended Signals
Input Terminals:	Signal and Common. or Signal + and Signal -.	Signal and Common. or Signal + and Signal -.	Signal and Common.
Output Signal:	Single-ended	Differential	Single-ended
Output Terminals:	Signal and Common	Signal +, Signal -, and Common.	Signal and Common.
Grounding Terminal:	ONLY for Standalone Device with Metal Housing: Grounding Stud , Two #10-24 nuts and Two #10 washers are included. Support Single-Point Grounding with Multiple Devices.		

	Grounding Cable GWL18 or GWL16 , 0.6m AWG18 or AWG16 Green Wire with #10 Ring Terminal and Wire Lead. One #10 washer and one 4mm Banana Plug (Green) included.
Input DC Resistance:	1 mΩ to 1 Ω. Note: DC offset of the output of power amplifiers must be low enough to avoid DC overcurrent. Recommended are the power amplifiers with AC-coupling output or negligible DC-offset output such as at μV level.
Cable Length if any:	1. Default: 0.15 m. 2. Custom.

Cable and Connector Information for High Power Signals (from Power Amplifier and to Transducers). Non-UL Uses.

Cable Options:	Cable Types	Ratings of Voltage, Current or Power, and Temperature.
	1. AWG18 Wire Bundle (WR)	
2. Two Conductor Shielded Cable (SC)		600 Vrms, 5 Arms.
3. Two Two-conductor Shielded Cable Bundle (2SC)		600 Vrms, 10 Arms.
4. High Temperature Shielded Cable (HTSC199)		600 Vrms, 6 Arms, up to +199°C or 390 °F, Non-waterproof.
5. Coax RG58 (50Ω) (RG58)		1400 Vrms, 4 Arms.
6. Coax RG174/U (50Ω) (RG174)		1100 Vrms, 1.6 Arms.
7. Coax RG178B/U (50Ω) (RG178).		750 Vrms, 0.86 Arms, up to +200°C or 390°F.
Connector Options: (In-line or Panel Mount)	Connector Type	Ratings of Voltage, Current or Power, and Temperature.
	1. Wire Leads (WL)	Used for Cables or Wires.
	2. 50Ω BNC (BNC), Bayonet Lock. Panel Mount or In-line. In-line BNC: Input uses Pin, output uses Socket. Panel Mount BNC: Both Input and Output use BNC Jacks.	500Vrms, 316W. Used for Metal Enclosures or Coax Cables.
	3. MIL-5015 Type Connector (MIL), Thread Fastening. Panel Mount or In-line. Input uses Pin, output uses Socket.	500Vrms, 13 A; Up to +125°C or 257°F, or, 900Vrms, 13 A; Up to +125°C or 257°F. Used for Metal Enclosures or Shielded Cables.
	4. XLR (XLR), Latch Lock System. Panel Mount or In-line. Input uses Pin, output uses Socket.	133Vrms, 10A; Up to +75°C or 167°F. If end users use their own mating XLR connectors, please choose XLRs whose service voltage and current ratings support 133Vrms and 10A.
	5. Underwater Mateable Connector (UMC), Thread Fastening. Panel Mount or In-line. Input uses Pin, output uses Socket.	600Vrms, 10A. Waterproof, IP68. Used for Metal Enclosures or Shielded Cables.
	6. Sheathed Banana Jack. Panel Mount or In-line.	1000V CAT III/600V CAT IV, 25A. IEC61010-021-rated. NOT USED in this device.
	7. SMA (Plug, Male Pin) (SMA). Thread Fastening. In-line.	Voltage Rating: 335 VRMS Continuous. (Max. Diameter Ø9.24 mm). Up to 155°C or 311°F.
	8. SMC (Plug, Female Socket) (SMC). Thread Fastening. In-line.	Voltage Rating: 335 VRMS Continuous. (Max. Diameter Ø6.4 mm). Up to 155°C or 311°F.
	9. LEMO (Plug Male Pins) (LEMO). Push-Pull Fastening. Panel Mount or In-line.	900 V (AC), 1270 V (DC), 8A, (Max. Diameter Ø9.5 mm with 3 contacts). Temp (min / max) -55°C / +250°C.
10. Round Pads on PCB (PADS).	600 Vrms, 10 A.	

How to choose cable and connector for BII devices: Driving Voltage $V_{drive} (V_{rms}) = \sqrt{RMS\ Power * \frac{G}{G^2+B^2}}$.

BII lists G-B data at fs and/or the graph of G-B vs Frequency in online datasheet.

Case 1. Deliver 1000 Wrms to 3 kΩ transducer at fs. Note: $G/(G^2+B^2)=3\ k\Omega$ is the resistive load of the transducer in load medium at fs.
Driving voltage to transducer $V_{drive} = \sqrt{1000 * 3000} = 1732\ V_{rms}$. The current to 3 kΩ transducer $I_{drive} = V_{drive}/R_L = 1732Vrms/3000\Omega = 0.57733\ A_{rms}$.
Therefore, AWG18 Wire and Wire leads are suitable.

Case 2. Deliver 500 Wrms to 300 Ω transducer at fs. Note: $G/(G^2+B^2)=300\ \Omega$ is the resistive load of the transducer in load medium at fs.
Driving voltage to transducer $V_{drive} = \sqrt{500 * 300} = 387.3\ V_{rms}$. The current to 300 Ω transducer $I_{drive} = V_{drive}/R_L = 387.3Vrms/300\Omega = 1.291\ A_{rms}$.
Therefore, Two Conductor Shielded Cable and MIL-5015 Type Connector or Underwater Mateable Connector (UMC) are suitable.

Case 3. Deliver 300 Wrms to 50 Ω transducer at fs.
Driving voltage to transducer $V_{drive} = \sqrt{300 * 50} = 122.5\ V_{rms}$. The current to 50 Ω transducer $I_{drive} = V_{drive}/R_L = 122.5Vrms/50\Omega = 2.45A_{rms}$.
Therefore, 50Ω RG58 Coax and BNC are suitable.

Size:	Varies with power ratings determined by transducers.
Weight:	5 g to 15 kg depending on power capacity and operating frequency.
Mounting:	Four holes and/or slots for installing the device to a firm base. Refer to the respective drawings for the size. Fasteners (Screws, Washers, Nuts, etc.) for installing or mounting the devices: not included.
Operating Temperature:	Default: -10 to +60 °C, or 14 to 140 °F Customization: a. -10 to +120 °C, or 14 to 248 °F. b. -10 to +200 °C, or 14 to 392 °F. available for MH package.
Storage Temperature:	-40 to +60 °C, or -40 to 140 °F

WARNING: HIGH VOLTAGES MAY BE PRESENT AT THE OUTPUT OF THIS UNIT. All operating personnel should use extreme caution in handling these voltages and be thoroughly familiar with the specification. DO NOT TOUCH THE DEVICE, ITS WIRES, CABLES, AND CONNECTORS BEFORE THE POWER SUPPLIES AND SIGNAL SOURCES ARE SHUT DOWN.

The buyer should observe the National Electrical Code or other related codes of buyer's country to assemble and integrate this device into buyer's product or system, and follow the code to ground and insulate this device. It is buyer's sole responsibility to make sure the proper insulation and grounding for operating safety before putting the device into service.

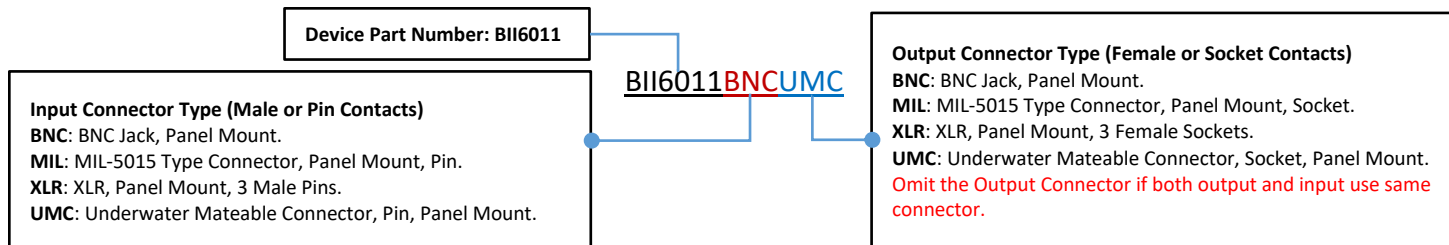
1. All exposed bare wires, metal wires, wire leads, and solders are insulated with insulation material such as heat shrink tubing, electric/insulating tape, etc. The insulation voltage must be greater than twice the maximum voltage of the device.
2. Ground the device (including metal chassis and/or metal housing, cable shield, etc.) firmly for operation safety.
3. Coax with BNC is not intended for hand-held use at voltages above 30VAC/60VDC. Make sure that the BNC shield of the signal source is firmly grounded for operation safety before hooking up the device to the signal source.

A. BII-6011 Series Standalone Device.

- ❖ 500 Hz to 10 MHz. Metal Housing (MH), Four Holes for Mounting, a Grounding Stud (316SS, #10-24 Screw).
- ❖ Available are higher service temperature up to 200 °C (392 °F) and and Waterproof, IP68.
- ❖ Size of Metal Housing varies with power capacity, operating frequency, etc. refer to [Metal Housing](#) for size info.
- ❖ **Mounting Hole** $\Phi 5.5\text{mm}$ ($\Phi 0.217''$) accepts M5 or #10 screw. BII does not supply screws.
- ❖ BII6011UMC, IP68 Waterproof: Test Depth: 1m water; Test Duration: 1 hour.



Part Number Designation



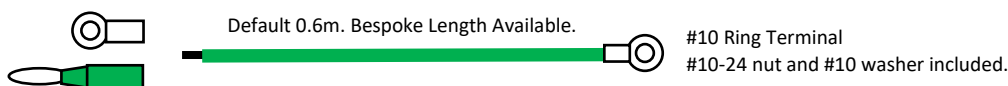
Customization of BII6011 Series: Besides panel-mount connectors, 0.15m Cables with in-line Connectors are available as input and output.

Grounding Cable and Terminals

Grounding Cable, Part Number: GWL18 or GWL16, Support Single-Point Grounding with Multiple Devices. One 0.6m AWG 18 or AWG 16 Green Wire with #10 Ring Terminal and Wire Lead. One #10 Ring Terminal and one 4mm Banana Plug (Green) are included. Depending on buyer's grounding terminal type, buyer assembles #10 Ring Terminal, 4mm Banana Plug, or other type connector to grounding cable at buyer's cost.

Terminal to buyer's Grounding Terminal:

- Default: Wire Lead
- One #10 Ring Terminal
- One 4mm Banana Plug



Customer's Questions

How do I assemble #10 Ring Terminal or 4mm Banana Plug to Grounding Cable?

- for #10 Ring Terminal, crimp or solder is acceptable. Please choose a suitable crimp tool for crimping connector and cable, or a suitable solder station for soldering.
- for 4mm Banana Plug, solder is acceptable. Please choose a suitable solder station for soldering.

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

Buyer may order a BNC to SMA (or SMC) adaptor from local electronic distributors in buyer's country. BII may ship the adaptor as accessory of the device. Please discuss with BII for customizations.

What if the connector of my transducer/projector is NOT MIL-5015 type connector with pins?

Buyer may order a MIL-5015 Connector (Pins) from BII to replace original transducer connector or use it as a component of the connector adaptor. MIL-5015 Connector has solder contacts. A buyer may also order the connector from local electronic distributors in buyer's country. For example, if you have a transducer with Underwater connector (pin) or Lemo (Pin), you may make a connector adaptor from MIL-5015 (pin) to Underwater connector (Socket) or Lemo (Socket). BII may make this connector adaptor as accessory of the device. Please discuss with BII for customizations.

Single Ended Signal and Differential Signal: Wiring Information of Panel-mounted Connectors (or Customization: 0.15m Cable with In-line Connectors)

Single-Ended Signal	Underwater Mateable 3-Contact Connector	MIL-5015 type 3-contact Connector	XLR 3-contact Connector	BNC
Signal	Contact 2	Contact C or G	Pin 2	Center Conductor
Signal Common	Contact 1	Contact B	Pin 3	BNC Shell Body
Grounding	Contact 3	Contact A	Pin 1	BNC Shell Body
Differential Signal	Underwater Mateable 3-Contact Connector	MIL-5015 type 3-contact Connector	XLR 3-contact Connector	
Signal +	Pin 2	Contact C or G	Pin 2	
Signal -	Pin 1	Contact B	Pin 3	
COM and Grounding	Pin 3	Contact A	Pin 1	

Input Connector are male or pin contacts, **Output Connector** are female or socket contacts.

Grounding Metal Case for operating safety. Grounding Stud: #10-24 Screw, Nut and Washer included. Support Single-Point Grounding with Multiple Devices.

BII6011UMC Cable Accessory mating from Power Amplifier to Impedance Matching Unit: Male Underwater Connector + 0.6m Cable + Female Underwater Connector, Qty. 1.

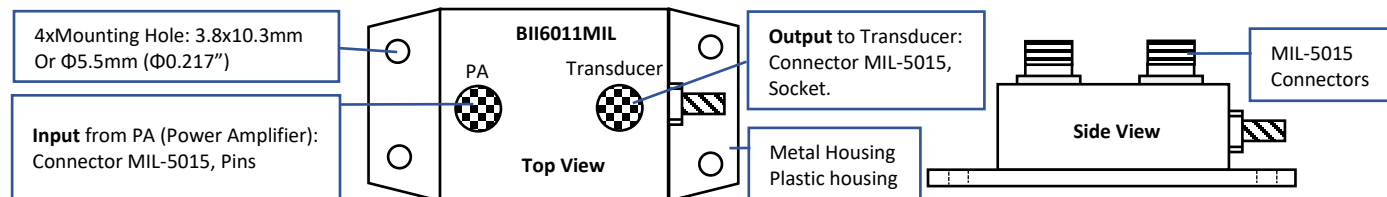
Ordering Information of BII6011 Series.

Power: RMS or Peak Power delivered to Transducer from PA, in RMS Watt (Sine/Chirp Pulses, etc.) or Peak Watt (Spike or Single Pulse for NDT). **The POWER can be ignored with blank if RMS power of the transducer and/or the amplifier is known. In these cases, BII will use RMS power of the transducer and/or the amplifier to design the power capacity of the device;** **PW:** Maximum Pulse Width in μs , mS, or S; **D:** Maximum Duty Cycle in %; **fs:** Frequency of Impedance Matching, in kHz or MHz; **Z_{TX}:** Transducer Impedance, in Ω ; **θ :** Transducer Phase in °; **Z_{IM}:** Impedance for Optimum Power Transfer from the PA to the Transducer, in Ω ; **PA:** Power Amplifier; **TX:** Transducer; **PN:** Part Number.

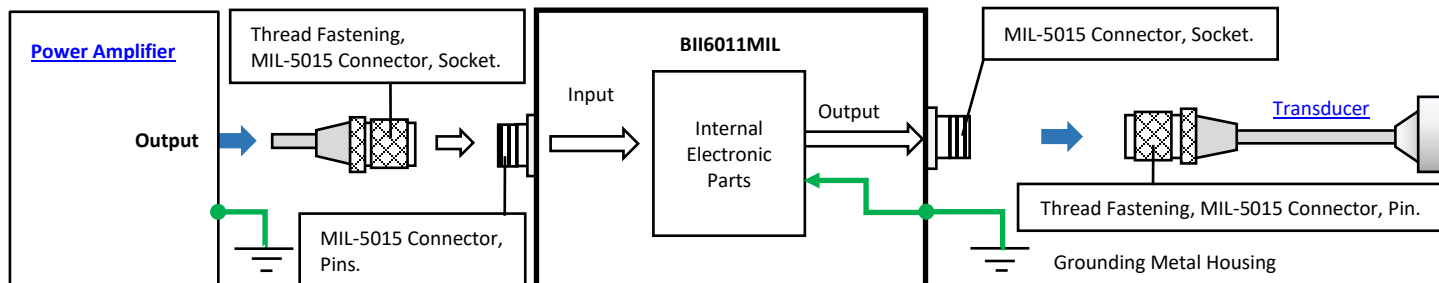
Refer to [Power Amplifier](#) for available options and wirings. Refer to [Transducer](#) for available options and wirings.

(1) BII6011MIL

500 Hz to 1 MHz. Metal Housing. Four Mounting Holes; **Input and Output:** Panel Mount Connectors MIL-5015 style, -4° F (-20° C) to 176° F (80° C) service temperature range. Size of Metal Housing varies with power capacity, operating frequency, etc. refer to [Metal Housing](#) for different size options.



System Block Diagram and Wirings:

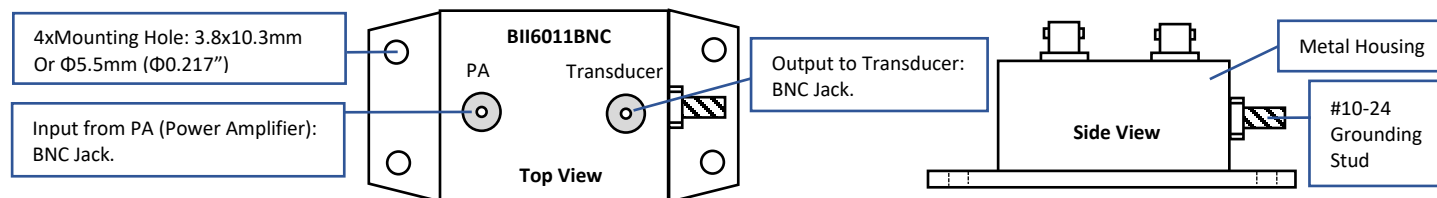


How to Order, refer to [Ordering Information of BII6011 Series](#) for explanations of the terms or initials.

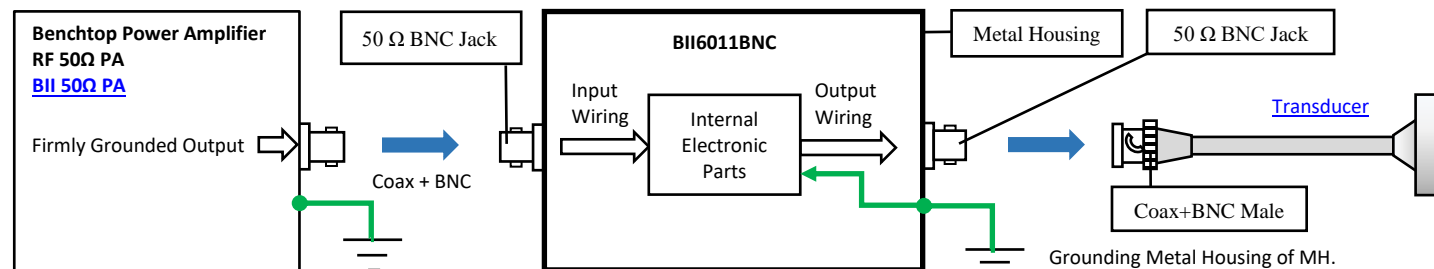
BII6011MIL	-Power or Blank	-PW	-D	-fs-Z _{TX} /θ or BII Transducer PN	-Z _{IM} or BII PA PN
Example of Part Number:		Description			
BII6011MIL-500Wrms-10S-10%-6kHz-2kΩ/-60°-50Ω				BII6011MIL, Metal Housing with MIL-5015 Connectors as Input and Output, 500W RMS; Maximum Pulse Width: 10 Seconds, Maximum Duty Cycle 10%; 6kHz Transducer, Impedance matching Transducer (Z=2kΩ, θ=-60°) to 50Ω.	
BII6011MIL-10S-10%-BII7563/70-BII5122MIL				BII6011MIL, Metal Housing with MIL-5015 Connectors as Input and Output; Maximum Pulse Width: 10 Seconds, Maximum Duty Cycle 10%; Impedance matching between BII7563/70 Transducer and BII5122MIL Power Amplifier.	

(2) BII6011BNC.

500 Hz to 10 MHz. **Input:** Panel Mounted BNC Jack. **Output:** Panel Mounted BNC Jack.



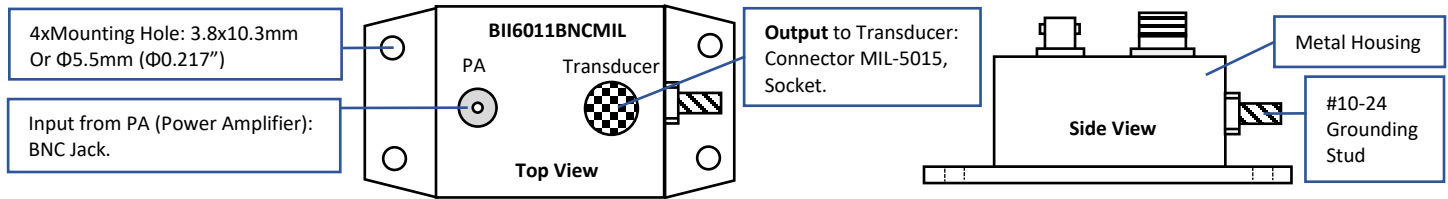
System Block Diagram and Wirings:



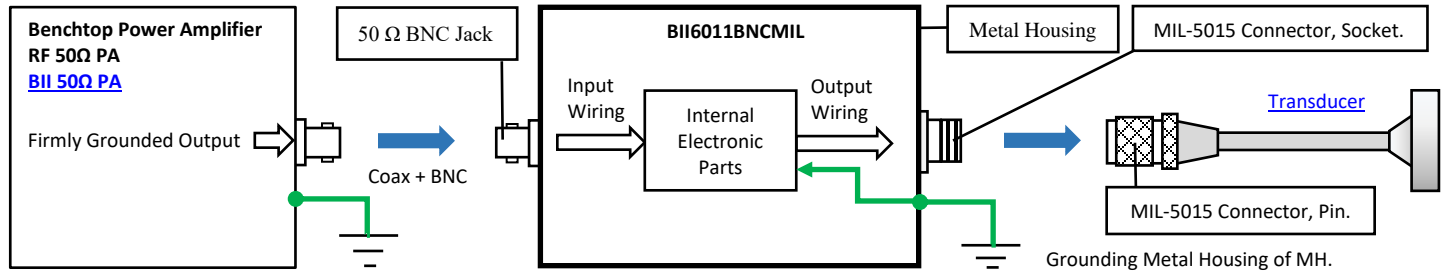
How to Order, refer to [Ordering Information of BII6011 Series](#) for explanations of the terms or initials.

BII6011BNC	-Power or Blank	-PW	-D	-fs-Z _{TX} /θ or BII Transducer PN	-Z _{IM} or BII PA PN
Example of Part Number:		Description			
BII6011BNC-10μS-20%-BII7691/1MHz-BII5122BNC				BII6011BNC, Metal Housing (MH) with BNC Jacks as Input and Output; Maximum Pulse Width: 10 μS, Maximum Duty Cycle 20%; Impedance matching between BII7691 1MHz Transducer and BII5122BNC Power Amplifier.	

(3) BII6011BNCMIL.
500 Hz to 1 MHz. **Input:** Panel Mounted BNC Jack. **Output:** Panel Mounted MIL-5015 Type Socket.



System Block Diagram and Wirings:

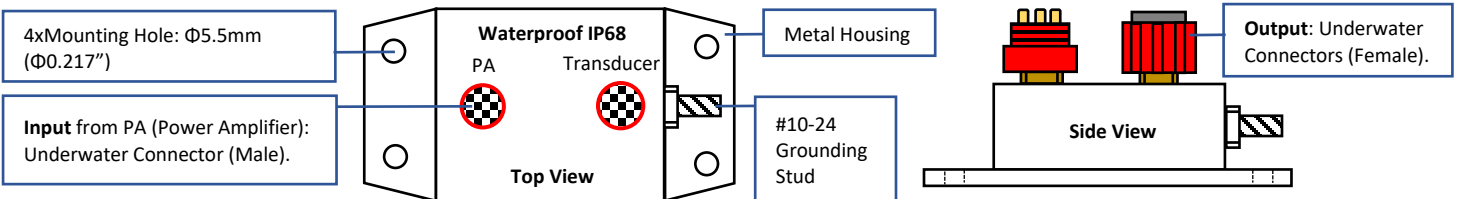


How to Order, refer to [Ordering Information of BII6011 Series](#) for explanations of the terms or initials.

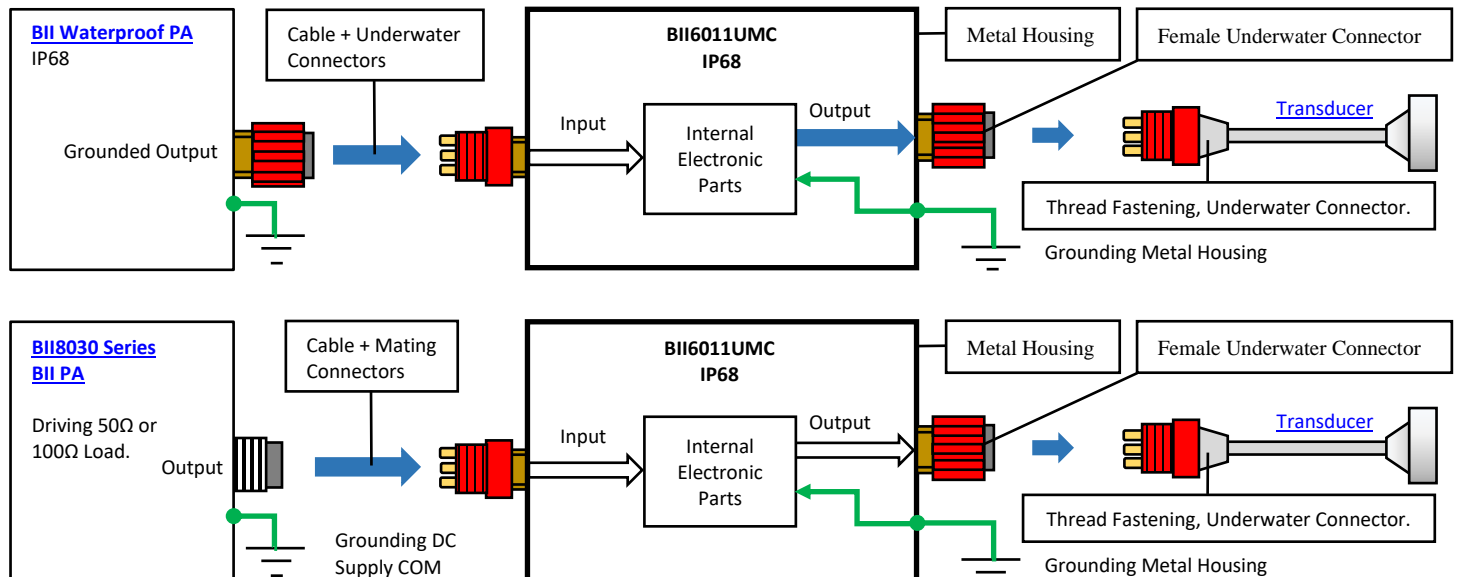
BII6011BNCMIL	-Power or Blank	-PW	-D	-fs- Z_{TX}/θ or BII Transducer PN	- Z_{IM} or BII PA PN
Example of Part Number:		Description			
BII6011BNCMIL-10S-10%-BII7563/70-BII5122MIL		BII6011BNCMIL, Metal Housing, Input Connector: BNC Jack, Output Connector: MIL-5015 Connector Socket; Maximum Pulse Width: 10 Seconds, Maximum Duty Cycle 10%; Impedance matching between BII7563/70 Transducer and BII5122MIL Power Amplifier.			

(4) BII6011UMC

500 Hz to 1 MHz. **Input:** Panel Mounted Underwater Mateable Pin Connector. **Output:** Panel Mounted Underwater Mateable Socket Connector. **Features:** Waterproof, IP68. Underwater mateable connectors are made by global underwater connector manufacturers which have sales branches all over the world. Please contact BII for more information about availability, compatibility and manufacturers of the connectors.



System Block Diagram and Wirings:

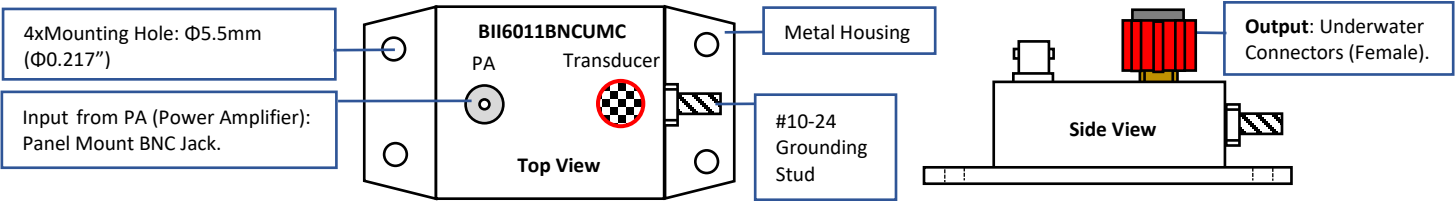


How to Order, refer to [Ordering Information of BII6011 Series](#) for explanations of the terms or initials.

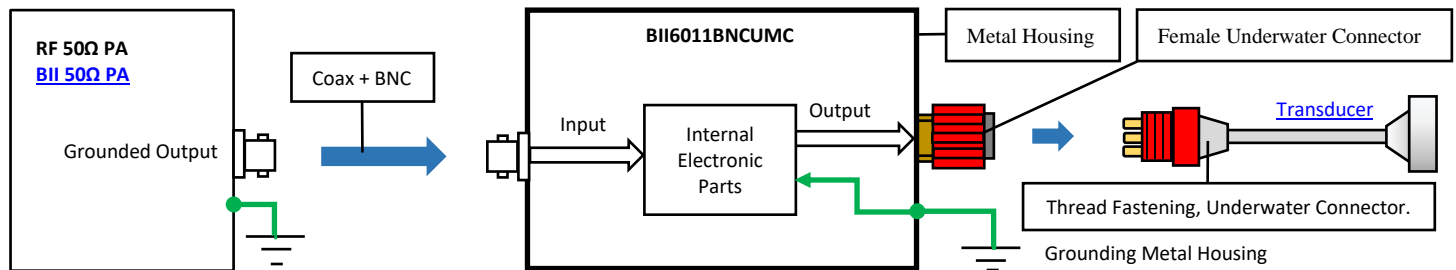
BII6011UMC	-Power or Blank	-PW	-D	-fs-Z _{TX} /θ or BII Transducer PN	-Z _{IM} or BII PA PN
Example of Part Number:		Description			
BII6011UMC-500Wrms-5S-10%-30kHz-400Ω/-60°-50Ω		BII6011UMC, Metal Housing (MH) with Underwater Mateable Connectors as Input and Output, 500Wrms; Maximum Pulse Width: 5 Seconds, Maximum Duty Cycle 10%; 30kHz Transducer, Impedance matching Transducer (Z=400Ω, θ=-60°) to 50Ω. Accessory: One Input customized Cable.			

(5) BII6011BNCUMC

500 Hz to 1 MHz. **Input:** Panel Mounted BNC Jack. **Output:** Panel Mounted Underwater Mateable Socket Connector. Underwater mateable connectors are made by global underwater manufacturers which have sales branches all over the world. Please contact BII for information about availability, compatibility and manufacturers of the connectors.



System Block Diagram

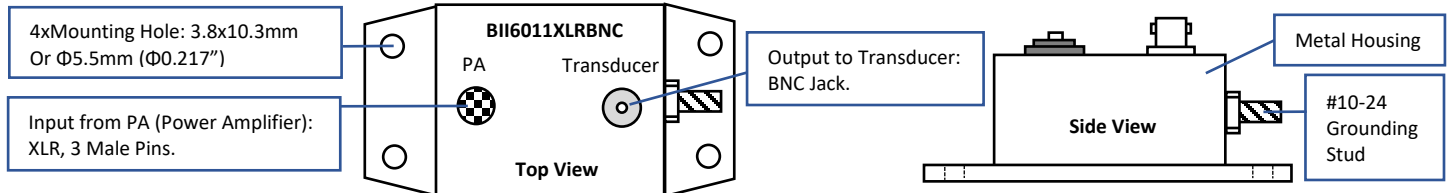


How to Order, refer to [Ordering Information of BII6011 Series](#) for explanations of the terms or initials.

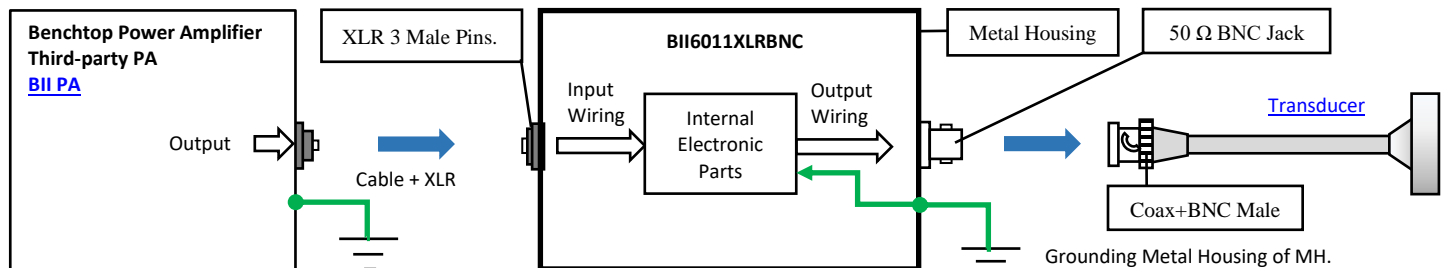
BII6011BNCUMC	-Power or Blank	-PW	-D	-fs-Z _{TX} /θ or BII Transducer PN	-Z _{IM} or BII PA PN
Example of Part Number:		Description			
BII6011BNCUMC-500Wrms-5S-10%-30kHz-400Ω/-60°-50Ω		BII6011BNCUMC, Metal Housing (MH); Input Connector: BNC Jack, Output Connector: Underwater Mateable Connector; 500Wrms; Maximum Pulse Width: 5 Seconds, Maximum Duty Cycle 10%; 30kHz Transducer, Impedance matching Transducer (Z=400Ω, θ=-60°) to 50Ω.			

(6) BII6011XLRBNC

500 Hz to 10 MHz. **Input:** Panel Mounted XLR 3 Male Pins. **Output:** Panel Mounted BNC Jack.



System Block Diagram and Wirings:

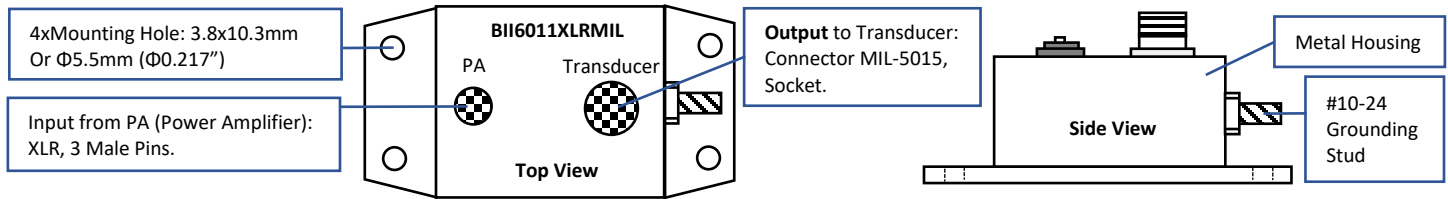


How to Order, refer to [Ordering Information of BII6011 Series](#) for explanations of the terms or initials.

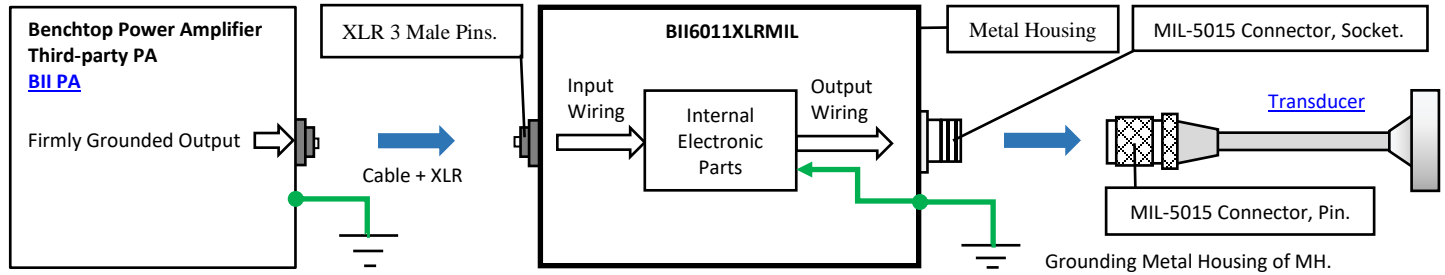
BII6011XLRBNC	-Power or Blank	-PW	-D	-fs-Z _{TX} /θ or BII Transducer PN	-Z _{IM} or BII PA PN
Example of Part Number:		Description			
BII6011XLRBNC-200Wrms-10mS-10%-50kHz-200Ω/-60°-6Ω		BII6011XLRBNC, Metal Housing (MH); Input Connector: XLR 3 male Pins, Output Connector: BNC Jack; 200Wrms; Maximum Pulse Width: 10 mS, Maximum Duty Cycle 10%; 50kHz Transducer, Impedance matching Transducer (Z=200Ω, θ=-60°) to 6Ω.			

(7) BII6011XLRMIL.

500 Hz to 1 MHz. **Input:** Panel Mounted XLR 3 Male Pins. **Output:** Panel Mounted MIL-5015 Type Sockets.



System Block Diagram and Wirings:

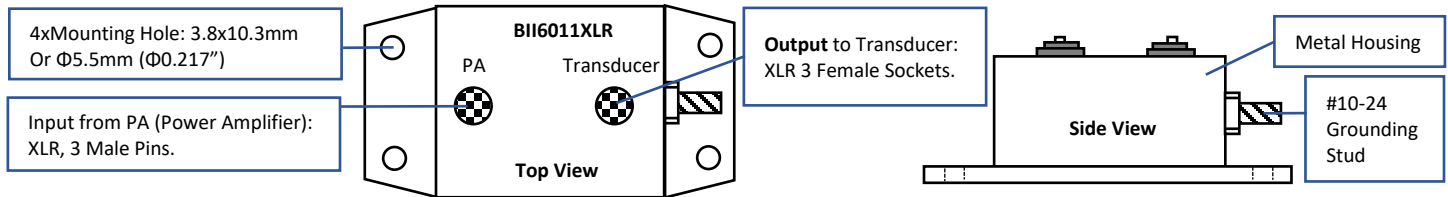


How to Order, refer to [Ordering Information of BII6011 Series](#) for explanations of the terms or initials.

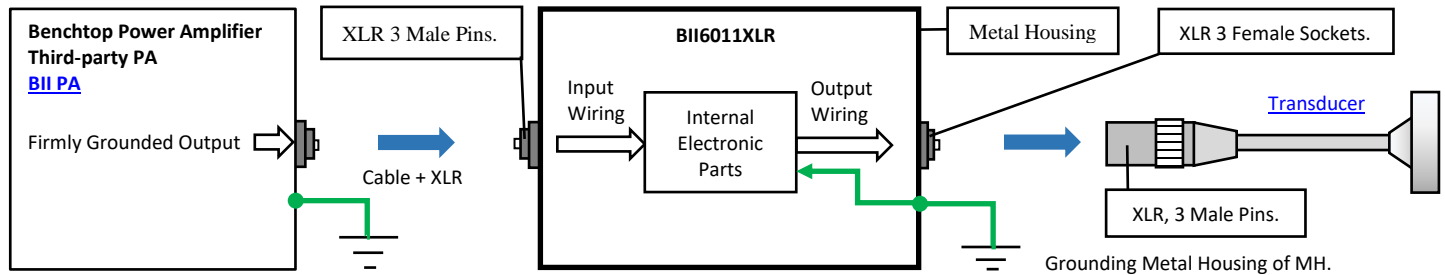
BII6011XLRMIL	-Power or Blank	-PW	-D	-fs-Z _{TX} /θ or BII Transducer PN	-Z _{IM} or BII PA PN
Example of Part Number:		Description			
BII6011XLRMIL-10S-10%-BII7563/70-BII5122MIL		BII6011XLRMIL, Metal Housing, Input Connector: XLR 3 male Pins, Output Connector: MIL-5015 Connector Socket; Maximum Pulse Width: 10 Seconds, Maximum Duty Cycle 10%; Impedance matching between BII7563/70 Transducer and BII5122MIL Power Amplifier.			

(8) BII6011XLR.

500 Hz to 1 MHz. **Input:** Panel Mounted XLR 3 Male Pins. **Output:** Panel Mounted XLR 3 Female Sockets.



System Block Diagram and Wirings:



How to Order, refer to [Ordering Information of BII6011 Series](#) for explanations of the terms or initials.

BII6011XLR	-Power or Blank	-PW	-D	-fs-Z _{TX} /θ or BII Transducer PN	-Z _{IM} or BII PA PN
Example of Part Number:		Description			
BII6011XLR-10S-10%-BII7563/70-BII5122MIL		BII6011XLR, Metal Housing, Input Connector: XLR 3 male Pins, Output Connector: XLR 3 Female Sockets; Maximum Pulse Width: 10 Seconds, Maximum Duty Cycle 10%; Impedance matching between BII7563/70 Transducer and BII5122MIL Power Amplifier.			

B. BII6012 Series Standalone or Embedded Component Device.

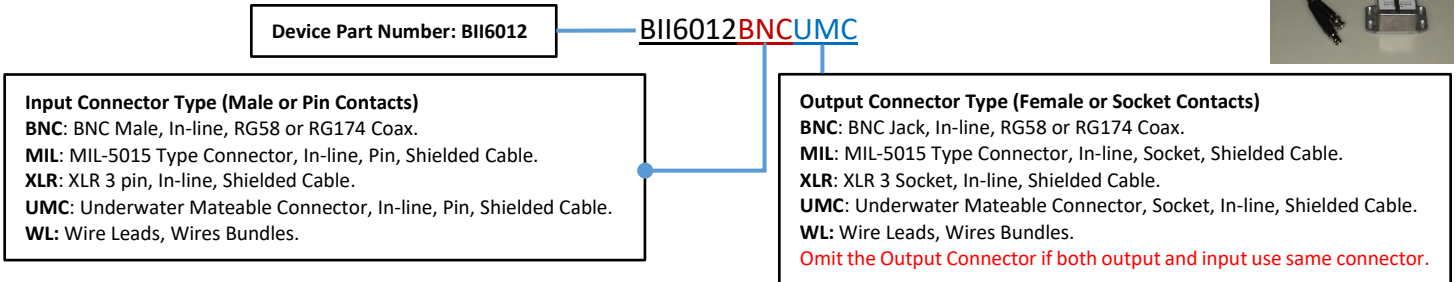
Metal Housing (MH) with Four Mounting Holes or Potted in Plastic Housing with Metal Chassis (PPH) with Mounting Holes and Slots. 0.3m (1ft), or 0.6m (2ft) Cable or Wire Bundles, Wire leads or In-line Connectors. The device can be used as an embedded component or a standalone device.

500 Hz to 10 MHz, High Power is available in low frequency range, for example, greater than 3000 W rms is available at 30 kHz.

Pulse Signal ONLY for high power applications to avoid overheating the device. For example, Pulse Duration PD ≤ 5 seconds, Duty Cycle: ≤ 10%, at 3000 W rms, 30 kHz.

Ordering Tips: 1. Comparing to BII6011 Series, major applications of BII6012 series are for high power applications in low frequency range. Because of dimensional limitation of available metal enclosures, the power capacity of BII-6011 series is much lower than BII6012 series in low frequency range (≤ 30kHz). 2. BII6011 features panel-mounted connectors, and BII6012 features in-line cable/Wire Bundles with wire leads or connectors.

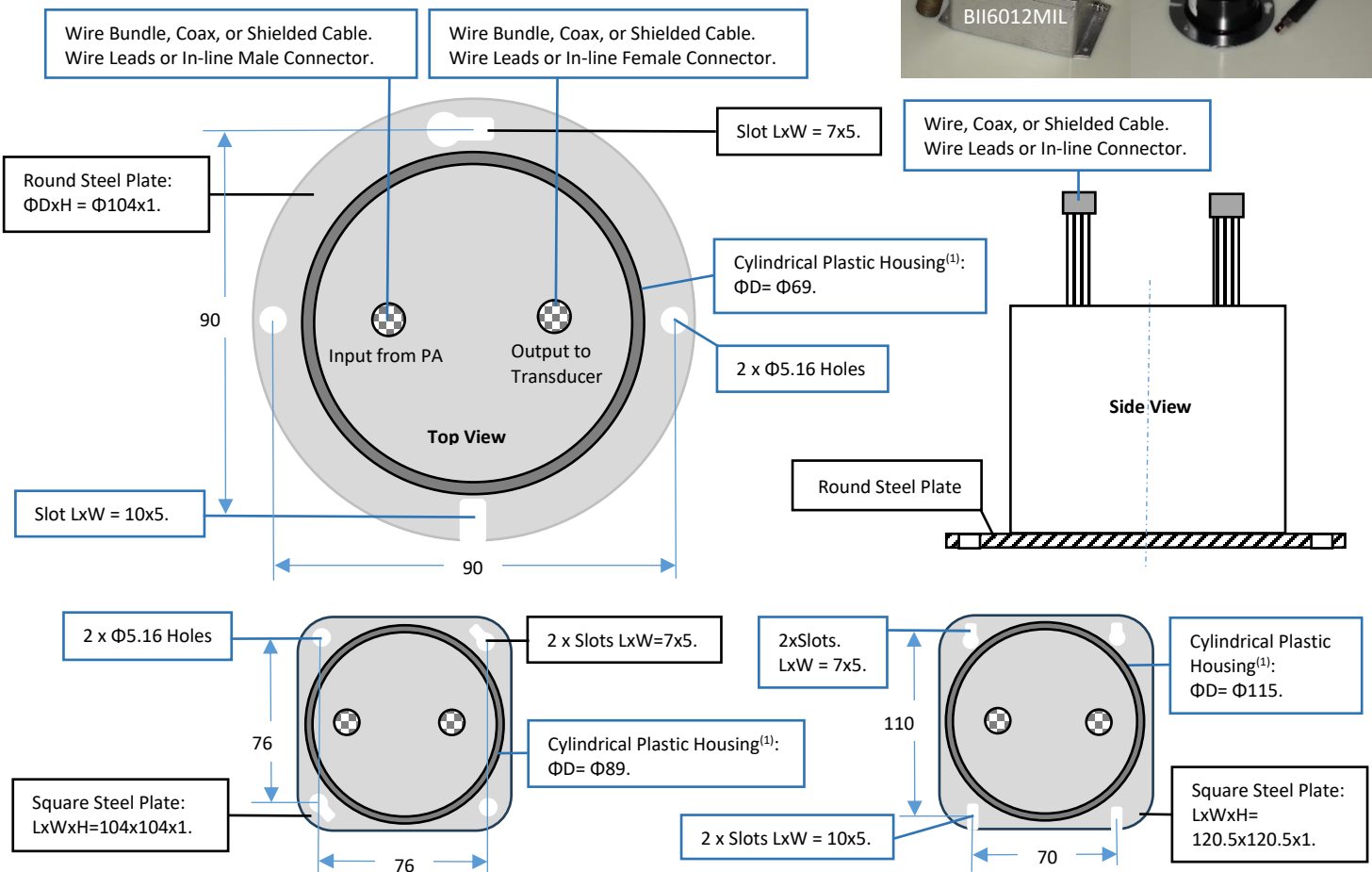
Part Number Designation



- (1) If other kind of connectors are used with buyer's devices such as SMA, SMC, Lemo, etc., please refer to [Customers' Questions](#).
- (2) Length of cables or wire bundles are fixed to 0.15m (6"), 0.3m (1ft), or 0.6m (2ft).
- (3) The device with both input and output connectors are UMC (Underwater Mateable Connector) is IP68 rated. **BNC, MIL, and WL are NOT waterproofed.**
IP68 Waterproof: Test Depth: 1m water; Test Duration: 1 hour.

Outline Dimensions (mm), Illustration ONLY, Scale is NOT 1:1.

- 1. **Plastic Cylindrical Housing with a Round or Square Steel Chassis**, Four Mounting Hole/Slots, Accept #10 or M5 Screw. Housing Height: Varies with Power Capacity.
- 2. **Metal Housing (MH) with Four Mounting Holes.** Click [Metal Housings Outline Dimensions](#) for details.
- 3. **Fasteners (Screw, Washer, Nut etc.) for mounting/installation are NOT included.**



Note: ⁽¹⁾ Height and Diameter of Cylindrical Plastic Housing and Round or Square Steel Chassis are determined by power rating.

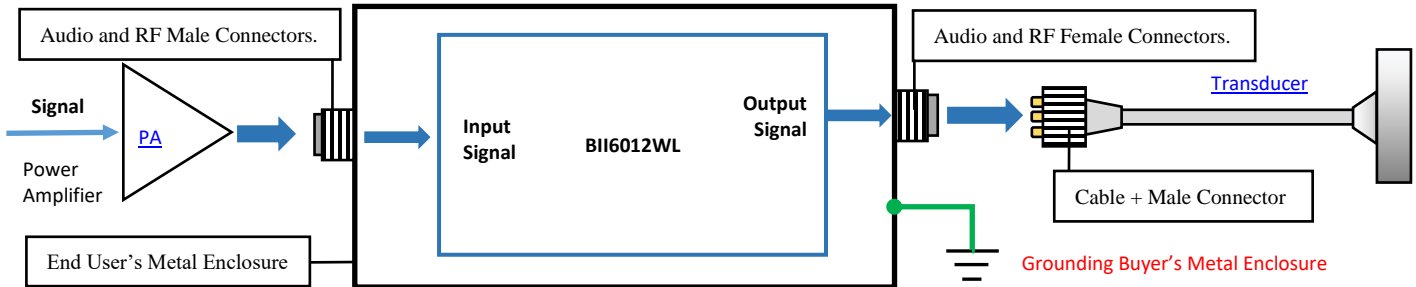
Ordering Information of BII6012 Series.

Power: RMS or Peak Power delivered to Transducer from PA, in RMS Watt (Sine/Chirp Pulses, etc.) or Peak Watt (Spike or Single Pulse for NDT). **The POWER can be ignored with blank if RMS power of the transducer and/or the amplifier is known. In these cases, BII will use RMS power of the transducer and/or the amplifier to design the power capacity of the device;** **PW:** Maximum Pulse Width in μS , mS, or S; **D:** Maximum Duty Cycle in %; **fs:** Frequency of Impedance Matching, in kHz or MHz; **Z_{TX}:** Transducer Impedance, in Ω ; **θ :** Transducer Phase in $^\circ$; **Z_{IM}:** Impedance for Optimum Power Transfer from the PA to the Transducer, in Ω ; **PA:** Power Amplifier; **TX:** Transducer; **PN:** Part Number.

Refer to [Power Amplifier](#) for available options and wirings. Refer to [Transducer](#) for available options and wirings.

(2) BII6012WL: Cable or Wire Bundles with Wire Leads as Embedded Components.

System Block Diagram as Embedded Components.



Wiring Information of Cable with Wire Leads and Wire Bundles

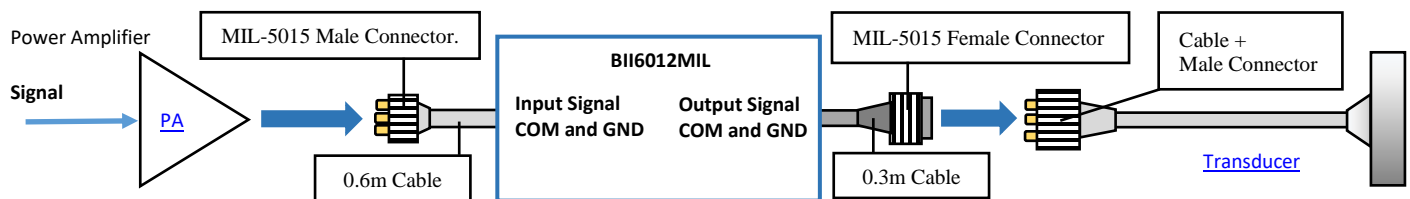
Single-Ended Signal	Wire Bundle + Wire Leads	Shielded Cable + Wire Leads	Coaxes + Wire Leads
Signal	Red Wire	Red or White Wire	Coax Center Contact
Signal Common	Black Wire	Black Wire	Coax Shield
Shielding if any.	---	Shield	---
Differential Signal	Wire Bundle + Wire Leads	Shielded Cable + Wire Leads	
Signal +	Red Wire	Red or White Wire	
Signal -	Black Wire	Black Wire	
Shielding if any.	---	Shield	
Input Cables or Wire Bundles: Label "1". Output Cable or Wire Bundles: Label "0". Cables or Wire Bundles Length of Input and Output are 0.3m (1ft).			
Install the device inside a metal enclosure and grounding the metal enclosure for operating safety.			
BII will choose suitable wire bundles or cables for this device. Buyer does NOT need to specify wire or cable types.			

How to Order, refer to [Ordering Information of BII6012 Series](#) for explanations of the terms or initials.

BII6012WL	-Power or Blank	-PW	-D	-fs-Z _{TX} / θ or BII Transducer PN	-Z _{IM} or BII PA PN
Example of Part Number:		Description			
BII6012WL-3000Wrms-5S-5%-20kHz-600 Ω -60 $^\circ$ -50 Ω		BII6012WL, Plastic Housing with Metal Chassis (PPH) with Wire Bundles as Input and Output; Power: 3000Wrms; Maximum Pulse Width: 5 Seconds, Maximum Duty Cycle: 5%; Operating Frequency: 20kHz; Impedance Matching between Transducer (Z=500 Ω , θ =60 $^\circ$) and 50 Ω Power Amplifier.			

(3) BII6012 Series as Standalone Devices: Shielded Cable or Coax; MIL-5015 Connector, Underwater Mateable Connector, or BNC Connector.

System Block Diagram with MIL-5015 Connectors. System with Underwater Mateable Connectors, XLR, and/or BNC Connectors are the same to followings.



Single Ended Signal and Differential Signal: Wiring Information of Inline Connectors

Single-Ended Signal	Underwater Mateable 3-Contact Connector	MIL-5015 type 3-contact Connector	XLR 3 Contact	BNC
Signal	Contact 2	Contact C or G	Contact 2	Center Conductor
Signal Common	Contact 1	Contact B	Contact 3	BNC Shell Body
Grounding	Contact 3	Contact A	Contact 1	BNC Shell Body
Differential Signal	Underwater Mateable 3-Contact Connector	MIL-5015 type 3-contact Connector	XLR 3 Contact	
Signal +	Pin 2	Contact C or G	Contact 2	
Signal -	Pin 1	Contact B	Contact 3	
Common and Grounding	Pin 3	Contact A	Contact 1	

Input Connector are male or pin contacts, **Output Connector** are female or socket contacts.

Cable Length of Input are fixed to 0.6m (2ft). **Cable Length of Output** are fixed to 0.3m (1ft).

Grounding contacts of both input and output connectors are connected inside the device.

Warning: Grounding contact of input connector of the device MUST be grounded for operating safety.

How to Order, refer to [Ordering Information of BII6012 Series](#) for explanations of the terms or initials.

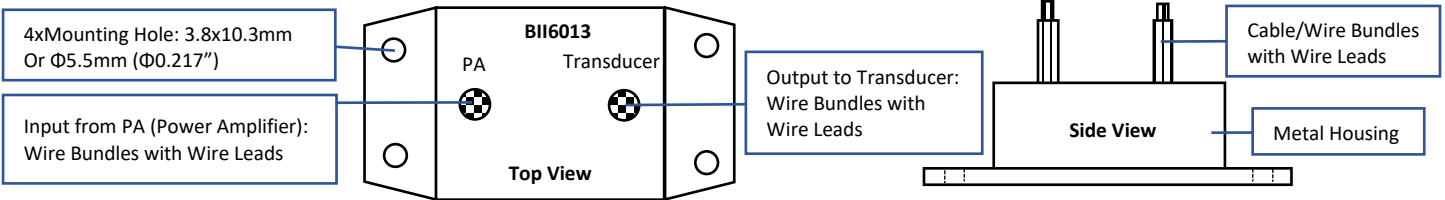
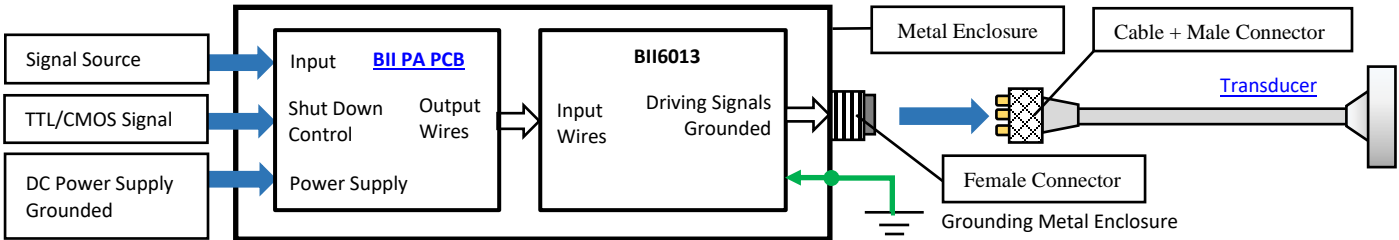
BII6012BNC, BII6012MIL, BII6012UMC, BII6012BNCMIL, BII6012BNCUMC, BII6012XLRBNC, BII6012XLRMIL, etc.	-Power or Blank	-PW	-D	-fs-Z_{TX}/θ or BII Transducer PN	-Z_{IM} or BII PA PN
Example of Part Number:	Description				
BII6012BNC-10S-10%-BII7561/600- BII5122BNC	BII6012BNC, Metal Housing (MH) with Four Mounting Holes or Plastic Housing with Metal Chassis (PPH), 0.6m/0.3m Coax, In-line BNC as Input and Output; Maximum Pulse Width: 10 Seconds, Maximum Duty Cycle 10%; Impedance Matching between BII7561/600 Transducer and BII5122BNC Power Amplifier.				
BII6012MIL-500Wrms-10S-10%-30kHz- 360Ω/-60°-50Ω	BII6012MIL, Metal Housing (MH) with Four Mounting Holes or Plastic Housing with Metal Chassis (PPH), 0.6m/0.3m Shielded Cables, In-line MIL-5015 Connectors as Input and Output; Power: 500Wrms; Maximum Pulse Width: 10 Seconds, Maximum Duty Cycle: 10%; Operating Frequency: 25kHz; Impedance Matching between Transducer (Z=360Ω, θ=-60°) and 50Ω Power Amplifier.				
BII6012UMC-500Wrms-10S-10%-30kHz- 360Ω/-60°-50Ω	BII6012MIL, Metal Housing (MH) with Four Mounting Holes or Plastic Housing with Metal Chassis (PPH), 0.6m/0.3m Shielded Cables, In-line Underwater Mateable Connectors as Input and Output; Power: 500Wrms; Maximum Pulse Width: 10 Seconds, Maximum Duty Cycle: 10%; Operating Frequency: 25kHz; Impedance Matching between Transducer (Z=360Ω, θ=-60°) and 50Ω Power Amplifier.				
BII6012BNCMIL-500Wrms-10S-10%- 30kHz-360Ω/-60°-50Ω	BII6012BNCMIL, Metal Housing (MH) with Four Mounting Holes or Plastic Housing with Metal Chassis (PPH), 0.6m Coax, In-line BNC as Input; 0.3m Shielded Cable, In-line MIL-5015 Connector as Output; Power: 500Wrms; Maximum Pulse Width: 10 Seconds, Maximum Duty Cycle: 10%; Operating Frequency: 25kHz; Impedance Matching between Transducer (Z=360Ω, θ=-60°) and 50Ω Power Amplifier.				
BII6012BNCUMC-500Wrms-10S-10%- 30kHz-360Ω/-60°-50Ω	BII6012BNCUMC, Metal Housing (MH) with Four Mounting Holes or Plastic Housing with Metal Chassis (PPH), 0.6m Coax, In-line BNC as Input; 0.3m Shielded Cable, In-line Underwater Mateable Connector as Output; Power: 500Wrms; Maximum Pulse Width: 10 Seconds, Maximum Duty Cycle: 10%; Operating Frequency: 25kHz; Impedance Matching between Transducer (Z=360Ω, θ=-60°) and 50Ω Power Amplifier.				

C. Embedding Components BII6013 for Uses in Grounded Metal Enclosure

500 Hz to 10 MHz. Metal Housing (MH). Four Mounting Holes; **Input and Output:** 0.3m (1ft) Wire/Cable Bundles with Wire Leads. Besides wire bundles, Coax (RG58, RG174, RG178) and shielded multi-pair cables (140°F or 390°F, +60°C or 199°C) with wire leads are available for impedance matching among cables, high temperature ambiances, etc... Size of [Metal Housing](#) varies with power capacity, operating frequency, etc..



System Block Diagram and Wirings of Embedding Use in Grounded Metal Enclosure.



Wiring Information of Cable with Wire Leads and Wire Bundles Wire Leads

Single-Ended Signal	Wire Bundle + Wire Leads	Shielded Cable + Wire Leads	Coaxes + Wire Leads
Signal	Red Wire	Red or White Wire	Coax Center Contact
Signal Common	Black Wire	Black Wire	Coax Shield
Shielding if any.	---	Shield	---
Differential Signal	Wire Bundle + Wire Leads	Shielded Cable + Wire Leads	
Signal +	Red Wire	Red or White Wire	
Signal -	Black Wire	Black Wire	
Shielding if any.	---	Shield	
Input Cable: Label "1". Output Cable: Label "0". Cable or Wire Length: 0.3m (1ft).			
Install the device inside a metal enclosure and grounding the metal enclosure for operating safety.			
BII will choose suitable wires or cables for this device. Buyer does NOT need to specify wire or cable types.			

How to Order, refer to [Ordering Information of BII6013 Series](#) for explanations of the terms or initials.

BII6013	-Power or Blank	-PW	-D	-fs- Z_{TX} / θ or BII Transducer PN	- Z_{IM} or BII PA PN	-Other Info. Service Temperature
Example of Part Number:				Description		
BII6013-10S-1%-BII7561/600-BII5121				BII6013, Metal Housing (MH); Maximum Pulse Width: 10 Seconds, Maximum Duty Cycle 1%; Impedance Matching between BII7561/600 Transducer and BII5121 Power Amplifier.		
BII6013-500Wrms-10S-10%-30kHz-400 Ω /-60°-50 Ω				BII6013, Metal Housing (MH); 500Wrms; Maximum Pulse Width: 10 Seconds, Maximum Duty Cycle 10%; 30kHz Transducer, Impedance matching Transducer ($Z=400\Omega$, $\theta=-60^\circ$) to 50 Ω .		
BII6013-100Wrms-1S-1%-30kHz-400 Ω /-60°-50 Ω -120°C				BII6013, Metal Housing (MH); 500Wrms; Maximum Pulse Width: 10 Seconds, Maximum Duty Cycle 10%; 30kHz Transducer, Impedance matching Transducer ($Z=400\Omega$, $\theta=-60^\circ$) to 50 Ω . Service Temperature: 120°C.		

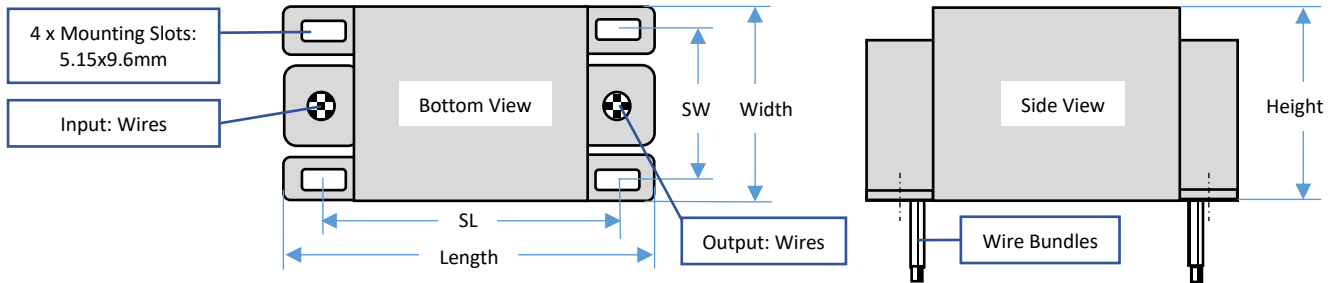
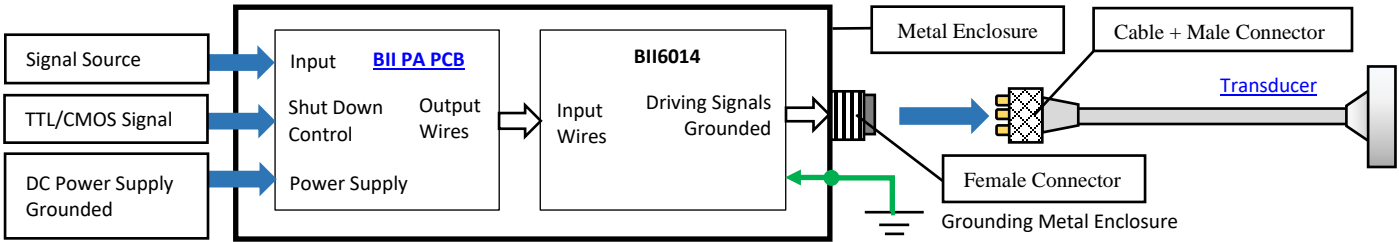
Ordering Information of BII6013 Series.

Power: RMS or Peak Power delivered to Transducer from PA, in RMS Watt (Sine/Chirp Pulses, etc.) or Peak Watt (Spike or Single Pulse for NDT). **The POWER can be ignored with blank if RMS power of the transducer and/or the amplifier is known. In these cases, BII will use RMS power of the transducer and/or the amplifier to design the power capacity of the device;** **PW:** Maximum Pulse Width in μ S, mS, or S; **D:** Maximum Duty Cycle in %; **fs:** Frequency of Impedance Matching, in kHz or MHz; **Z_{TX} :** Transducer Impedance, in Ω ; **θ :** Transducer Phase in $^\circ$; **Z_{IM} :** Impedance for Optimum Power Transfer from the PA to the Transducer, in Ω ; **PA:** Power Amplifier; **TX:** Transducer; **PN:** Part Number. **Refer to [Power Amplifier](#) for available options and wirings. Refer to [Transducer](#) for available options and wirings.**

D. Embedding Components BII6014 for Uses in Grounded Metal Enclosure

500 Hz to 50 kHz. Metal Bracket with Chassis (MBC). Four Mounting Holes; **Input and Output:** 0.3m (1ft) Wire Bundles with Wire Leads.

System Block Diagram and Wirings of Embedding Use in Grounded Metal Enclosure.



Input Wire Bundle	Output Wire Bundle	Mounting Slots	Weight	Applications	
0.15 m Colored Wires	0.15 m Colored Wires	L x W = 5 x 9.6 mm, Four.	>1.25 kg	Embedded in Grounded Metal Housing	
Size varies with power rating, following sizes will be used.					
Physical Size	Length (mm)	Width (mm)	Height (mm)	SL (mm)	SW (mm)
Size 1	70	63.5	77.8	43	50.8
Size 2	82.6	63.5	77.8	55.6	50.8
Size 3	89	63.5	77.8	62	50.8
Size 4	108	79.5	96.8	74.7	63.5

Wiring Information of Wire Bundles with Wire Leads

Single-Ended Signal	Wire Bundle + Wire Leads
Signal	Red Wire or Other Color
Signal Common	Black Wire or Other Color
Differential Signal	Wire Bundle + Wire Leads
Signal +	Red Wire or Other Color
Signal -	Black Wire or Other Color
Input Cable: Label "1". Output Cable: Label "0". Wire Length: 0.3m (1ft).	
Install the device inside a metal enclosure and grounding the metal enclosure for operating safety.	

How to Order, refer to [Ordering Information of BII6014 Series](#) for explanations of the terms or initials.

BII6014	-Power or Blank	-PW	-D	-fs	-Z _{TX} /θ or BII Transducer PN	-Z _{IM} or BII PA PN
Example of Part Number:		Description				
BII6014-500Wrms-10S-10%-30kHz-400Ω/-60°-5Ω		BII6014, Metal Bracket with Chassis (MBC), 500Wrms; Maximum Pulse Width: 10 Seconds, Maximum Duty Cycle 10%; 30kHz Transducer, Impedance matching Transducer (Z=400Ω, θ=-60°) to 5Ω; 0.15m Wires; Input: Wires with Wire Leads; Output: Wires with Wire Leads.				

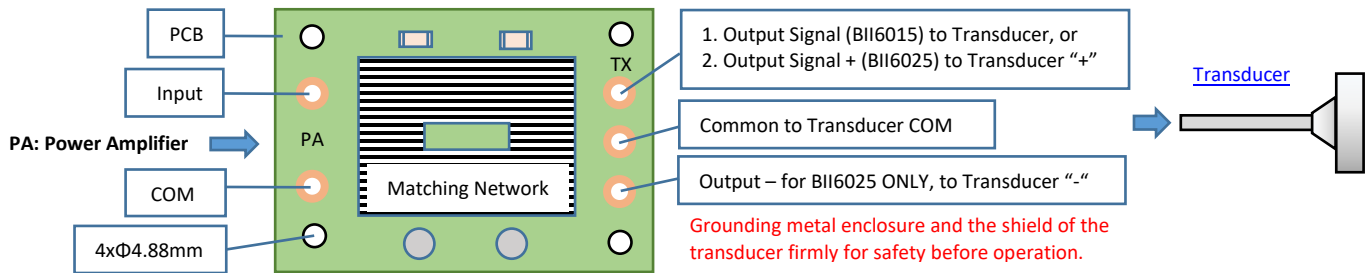
Ordering Information of BII6014 Series.

Power: RMS or Peak Power delivered to Transducer from PA, in RMS Watt (Sine/Chirp Pulses, etc.) or Peak Watt (Spike or Single Pulse for NDT). **The POWER can be ignored with blank if RMS power of the transducer and/or the amplifier is known. In these cases, BII will use RMS power of the transducer and/or the amplifier to design the power capacity of the device;** **PW:** Maximum Pulse Width in μS, mS, or S; **D:** Maximum Duty Cycle in %; **fs:** Frequency of Impedance Matching, in kHz or MHz; **Z_{TX}:** Transducer Impedance, in Ω; **θ:** Transducer Phase in °; **Z_{IM}:** Impedance for Optimum Power Transfer from the PA to the Transducer, in Ω; **PA:** Power Amplifier; **TX:** Transducer; **PN:** Part Number. Refer to [Power Amplifier](#) for available options and wirings. Refer to [Transducer](#) for available options and wirings.

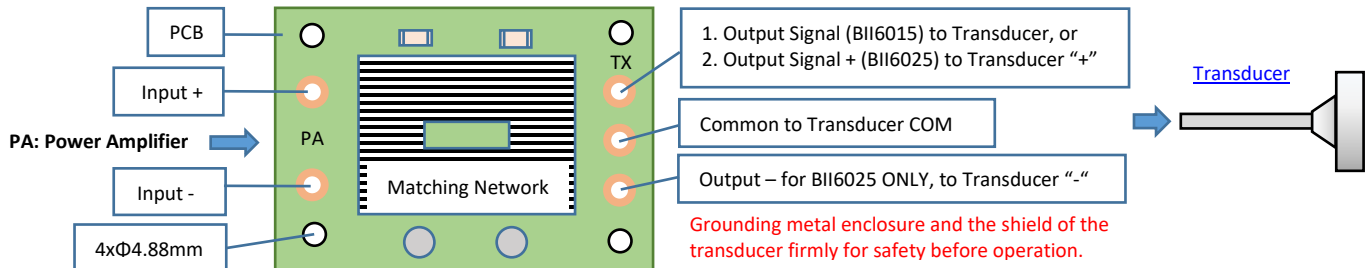
D. BII6015 and BII6025

500 Hz to 10 MHz. Printed Circuit Board (PCB) with Four Mounting Holes.

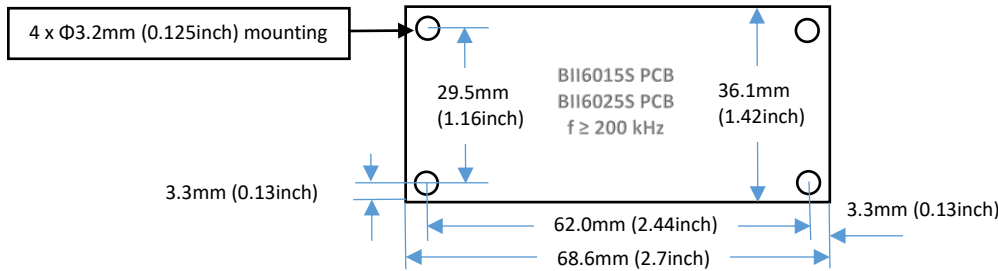
(1) Wiring Information to Power Amplifiers with Single Ended Output.



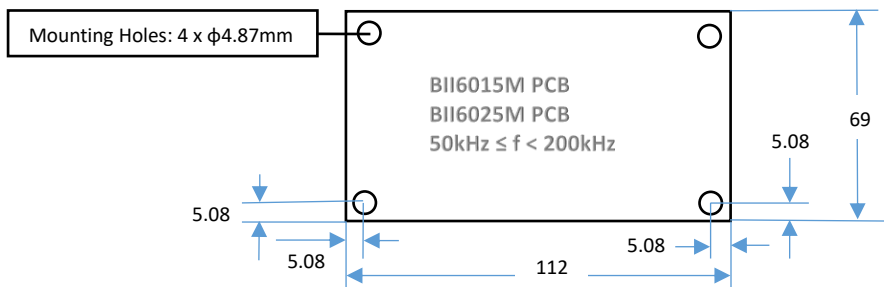
(2) Wiring Information to Power Amplifiers with Differential Outputs.



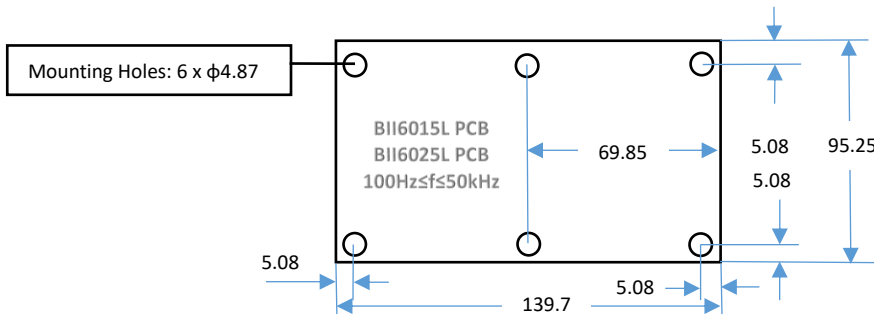
BII6015S or BII6025S Small PCB. Physical Size: LxW = 68.6x36.1mm, height depends on power rating. Operating frequency ≥ 200 kHz.



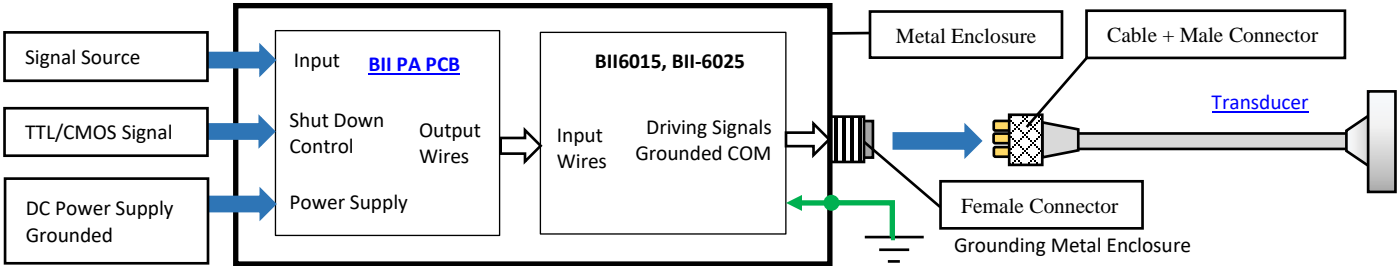
BII6015M or BII6025M Medium PCB. Physical Size: LxW = 112x69mm, height depends on power rating. 50 kHz \leq Operating frequency ≤ 200 kHz.



BII6015L Large PCB. Physical Size: LxW = 140x95.25mm or 5.5"x3.5", height depends on power rating. 100 Hz \leq Operating frequency ≤ 100 kHz.



System Block Diagram: BII Power Amplifier (PCB) + BII6015 PCB.



(1) BII6015 Wirings

Outputs of Power Amplifiers	Inputs of BII6015	Outputs of BII6015	Acoustic Transducers or Projector
Differential Signal	Round Pads on PCB	Round Pads on PCB	Transducer Cable
Output Signal +	Input + Pad	Output Signal Pad	Wire or Contact of Driving Signal
Output Signal -	Input - Pad	"Common to Transducer COM" Pad	Wire or Contact of Driving Signal COMMON
Single-Ended Output	Round Pads on PCB	Round Pads on PCB	Transducer Cable
Output Signal	Input Pad	Output Signal Pad	Wire or Contact of Driving Signal
Output Common	COM Pad	"Common to Transducer COM" Pad	Wire or Contact of Driving Signal COMMON
Grounding Metal Cases for operating safety.			Grounding Shield of the Transducer Cable.

(2) BII6025 Wirings

Outputs of Power Amplifiers	Inputs of BII6025	Outputs of BII6025	Transducers
Differential Signal	Round Pads on PCB	Round Pads on PCB	Transducer Cable
Output Signal +	Input + Pad	Output Signal + Pad	Wire or Contact of Driving Signal+
Output Signal -	Input - Pad	Output Signal - Pad	Wire or Contact of Driving Signal-
N/A	N/A	Common Pad to Transducer COM	Wire or Contact of Driving Signal COMMON
Single-Ended Output	Round Pads on PCB	Round Pads on PCB	Transducer Cable
Output Signal	Input Pad	Output Signal + Pad	Wire or Contact of Driving Signal+
Output Common	COM Pad	Output Signal - Pad	Wire or Contact of Driving Signal-
N/A	N/A	Common Pad to Transducer COM	Wire or Contact of Driving Signal COMMON
Grounding Metal Cases for operating safety.			Grounding Shield of the Transducer Cable.

Ordering Information of BII6015 and BII6025 Series.

Power: RMS or Peak Power delivered to Transducer from PA, in RMS Watt (Sine/Chirp Pulses, etc.) or Peak Watt (Spike or Single Pulse for NDT). **The POWER can be ignored with blank if RMS power of the transducer and/or the amplifier is known. In these cases, BII will use RMS power of the transducer and/or the amplifier to design the power capacity of the device;** **PW:** Maximum Pulse Width in μ S, mS, or S; **D:** Maximum Duty Cycle in %; **fs:** Frequency of Impedance Matching, in kHz or MHz; **Z_{TX}:** Transducer Impedance, in Ω ; **θ :** Transducer Phase in $^{\circ}$; **Z_{IM}:** Impedance for Optimum Power Transfer from the PA to the Transducer, in Ω ; **PA:** Power Amplifier; **TX:** Transducer; **PN:** Part Number.

Refer to [Power Amplifier](#) for available options and wirings. Refer to [Transducer](#) for available options and wirings.

BII6015, BII6025	-Power or Blank	-PW	-D	-fs-Z _{TX} / θ or BII Transducer PN	-Z _{IM} or BII PA PN
Example of Part Number:		Description			
BII6015-500Wrms-5S-10%-30kHz-400 Ω /-60 $^{\circ}$ -5 Ω		BII6015, Printed Circuit Board (PCB), 500W; Maximum Pulse Width: 5 Seconds, Maximum Duty Cycle 10%; 30kHz Transducer, Impedance matching Transducer (Z=400 Ω , θ =-60 $^{\circ}$) to 5 Ω .			
BII6015-10S-1%-BII7561/600-BII5121		BII6015, Printed Circuit Board (PCB), 100W, Maximum Pulse Width: 10 Seconds, Maximum Duty Cycle 1%; Impedance Matching between BII7561/600 Transducer and BII5121 Power Amplifier.			
BII will choose suitable PCB size to meet the power requirement.					

E. BII6016

500 Hz to 1 MHz. **Input:** Panel Mounted Underwater Mateable Pin Connector. **Output:** Panel Mounted Underwater Mateable Socket Connector.

Underwater mateable connectors are made by global underwater connector manufacturers which have sales branches all over the world. Please contact BII for more information about availability, compatibility and manufacturers of the connectors.

Secure and fix the device on submersibles: besides the screw, the housing can be used for fastening or clamping to secure the device reliably on submersibles.

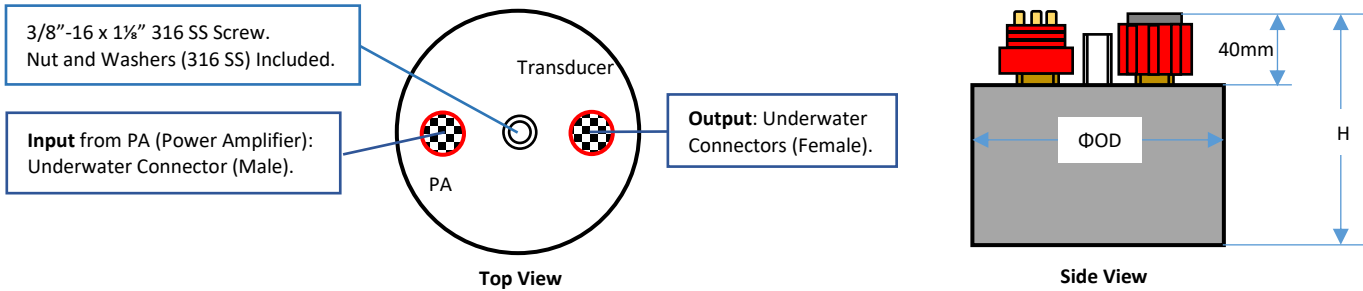
Force of Fastening or Clamping around Housing: ≤ 200 N.

Recommended Torque on the Screw: 6.5 Nm.

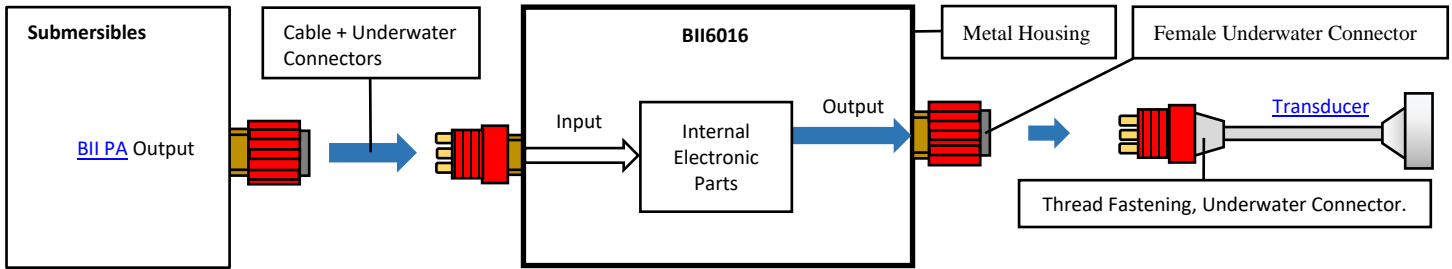
Installation Accessory: One 3/8"-16 Nut and Two Washers (316 SS), included in shipment.

Depth Rating in Water: 100m to 500m depending on device size and operating frequency. Specify Depth Rating when ordering. BII will contact the buyer if the depth rating is beyond the capability BII can make.

Housing Size ΦOD x H: Determined by BII. Customized with power, operating frequency, and depth ratings.



System Block Diagram and Wirings



How to Order

Power: RMS or Peak Power delivered to Transducer from PA, in RMS Watt (Sine/Chirp Pulses, etc.) or Peak Watt (Spike or Single Pulse for NDT). **The POWER can be ignored with blank if RMS power of the transducer and/or the amplifier is known. In these cases, BII will use RMS power of the transducer and/or the amplifier to design the power capacity of the device;** **PW:** Maximum Pulse Width in μS, mS, or S; **D:** Maximum Duty Cycle in %; **fs:** Frequency of Impedance Matching, in kHz or MHz; **Z_{TX}:** Transducer Impedance, in Ω; **θ:** Transducer Phase in °; **Z_{IM}:** Impedance for Optimum Power Transfer from the PA to the Transducer, in Ω; **PA:** Power Amplifier; **TX:** Transducer; **PN:** Part Number.

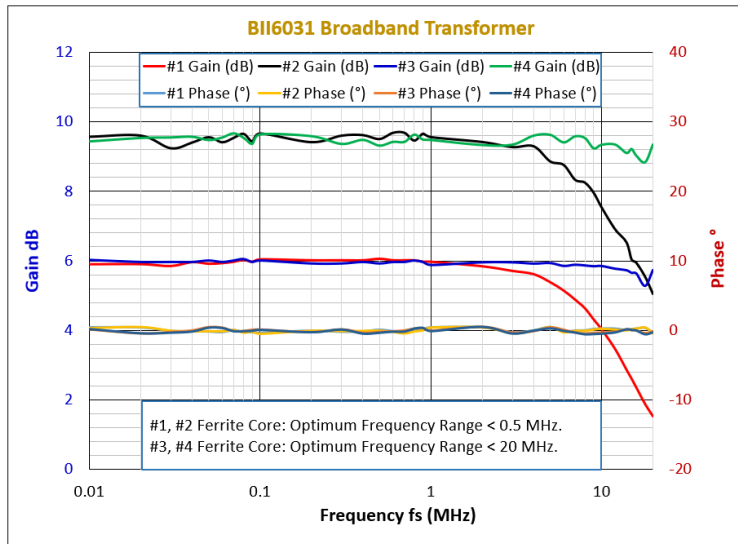
Refer to [Power Amplifier](#) for available options and wirings. Refer to [Transducer](#) for available options and wirings.

BII6016	-Power or Blank	-PW	-D	-fs-Z _{TX} /θ or BII Transducer PN	-Z _{IM} or BII PA PN	Depth Rating in Water
Example of Part Number:			Description			
BII6016-500Wrms-5S-10%-30kHz-400Ω/-60°-50Ω-300m.	BII6016, Plastic Housing with Underwater Mateable Connectors as Input and Output. 500Wrms. Maximum Pulse Width: 5 Seconds. Maximum Duty Cycle 10%. 30kHz Transducer. Impedance matching Transducer (Z=400Ω, θ=-60°) to 50Ω. Depth Ratings: 300m.					
BII6016-5S-10%-30kHz-400Ω/-60°-BII5062-300m.	BII6016, Plastic Housing with Underwater Mateable Connectors as Input and Output. Maximum Pulse Width: 5 Seconds. Maximum Duty Cycle: 10%. 30kHz Transducer. Impedance matching Transducer (Z=400Ω, θ=-60°) to BII5062 Power Amplifier . Depth Ratings: 300m.					
BII6016-1mS-10%-BII7562/200-BII5121-300m.	BII6016, Plastic Housing with Underwater Mateable Connectors as Input and Output. Maximum Pulse Width: 1mS. Maximum Duty Cycle: 10%; BII7562/200 Transducer . Impedance matching to BII5121 Power Amplifier . Depth Ratings: 300m.					

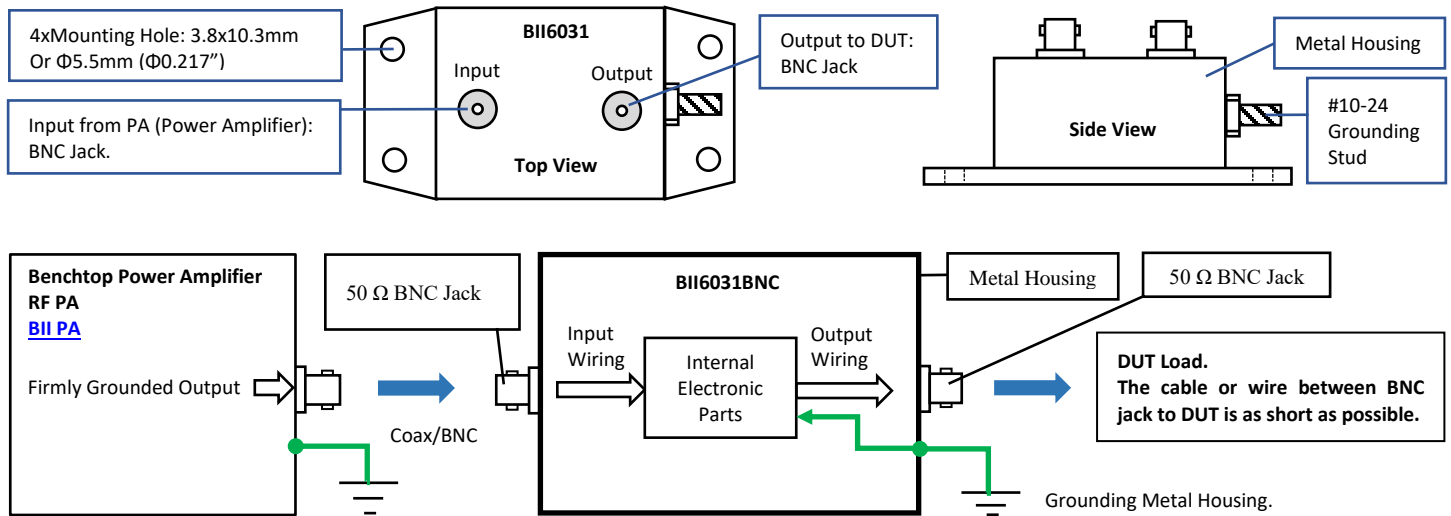
F. BII6031

0.01 to 30 MHz, Broadband Transformer. When a BII6031 provides step-up gain N, it can also provide step-down gain 1/N by switching its input and output. BII6031 only transforms the load impedance and does not cancel out reactance of the load. That is, **BII6031 is a step-up or step-down broadband transformer**. BII6031 is designed for 50 Ω cabling.

Typical Gain and Phase Response. DUT: 50 Ω Resistor.



System Block Diagram and Wirings:



Single-Ended Signal	BNC
Signal	Center Conductor
Signal Common	BNC Shell Body
Grounding	BNC Shell Body
Grounding Metal Case for operating safety. Grounding Stud: #10-24 Screw, Nut and Washer included. Support Single-Point Grounding with Multiple Devices.	
Switching input and output, the voltage gain N of the device changes to 1/N.	

Voltage Gain Options. Two BII6031s can be in series to implement different step-up and step-down voltage gains.

Voltage Gain:	4/3 or 3/4	1.5 or 2/3	2 or 1/2	3 or 1/3	4 or 1/4	9 or 1/9
Impedance Change:	50 to 37.5 Ω	50 to 22.22 Ω	50 to 12.5 Ω	50 to 5.56 Ω	50 to 3.125 Ω	50 to 0.617 Ω
	50 to 66.67 Ω	50 to 112.5 Ω	50 to 200 Ω	50 to 450 Ω	50 to 800 Ω	50 to 4050 Ω

Ordering Information

Power: RMS or Peak Power delivered to Transducer from PA, in RMS Watt (Sine/Chirp Pulses, etc.) or Peak Watt (Spikes or Single Pulse for NDT); **PW:** Maximum Pulse Width in μS, mS, or S; **D:** Maximum Duty Cycle in %; **fs:** Center frequency, in kHz or MHz.

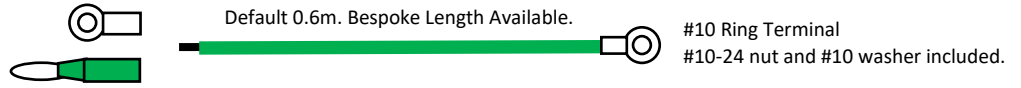
BII6031BNC	-Power	-PW	-D	-fs Center frequency	-Voltage Gain
Example of Part Number:	Description				
BII6031BNC-100Wrms-20S-30%-1MHz-3	BII-6031, Broadband Transformer, Metal Housing with BNC Jack as Input and Output, 100Wrms Power; Maximum Pulse Width: 20 Seconds, Maximum Duty Cycle: 30%; Center Frequency fs: 1MHz, Voltage Gain: 3.				

Grounding Cable and Terminals

Grounding Cable, Part Number: GWL18 or GWL16, Support Single-Point Grounding with Multiple Devices.
One 0.6m AWG 18 or AWG 16 Green Wire with #10 Ring Terminal and Wire Lead. One #10 Ring Terminal and one 4mm Banana Plug (Green) are included.
Depending on buyer's grounding terminal type, buyer assembles #10 Ring Terminal, 4mm Banana Plug, or other type connector to grounding cable at buyer's cost.

Terminal to buyer's Grounding Terminal:

- a. Default: Wire Lead
- b. One #10 Ring Terminal
- c. One 4mm Banana Plug



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

