

Transducer Specification

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Doppler Transducer	BII-7616/45	BII-7616/70	BII-7616/150	BII-7615/300	BII-7614/600	BII-7612/1200
Echo Range:	760 m	600 m	400 m	200 m	80 m	15 m
Signal Type:	Spike (Negative or Positive), pulse and burst SINE/Square/Chirp excitation.					
Resonant Frequency f_s :	45 kHz	70 kHz	150 kHz	300 kHz	600 kHz	1.2 MHz
	1. Efficiency is low in the frequency range far from f_s, so it is NOT recommended to operate transducer at frequency far from f_s. 2. Transducer can operate in low power at frequency far from f_s, the input power P_i should be much less than 1% MCIP at f_s.					
Operating Frequency:	Minimum Operating Frequency to be determined for transducers with built-in Impedance Matching (IM).					
Quality Factor Q_m :	3.5	3.2	3.0	4.5	3.8	3.5
	-3dB bandwidth $\Delta f = f_s/Q_m$.					
TVR at f_s (dB $\mu\text{Pa}/V@1\text{m}$):	160.5	169.0	182.0	TVR Graph	190.5	TVR Graph
Radiation Sound Level SL:	SL = $20 \cdot \log V_i + \text{TVR}$, dB $\mu\text{Pa}@1\text{m}$. Driving Voltage V_i is in unit of V_{rms} .					
Maximum Drive Voltage V_{imax} :	600 Vrms	600 Vrms	600 Vrms	600 Vrms	600 Vrms	350 Vrms
Driving Voltage V_i :	Pulsed Driving Signal and Duty Cycle $D < 100\%$: refer to V_{imax} . How to determine pulse width, duty cycle and off-time with input pulse power (peak power) at f_s: 1. Determine the input pulse power (IPP, peak power) with sound intensity required by the project. IPP MUST be less than MIPP. 2. Pulse Width $\leq (MIPP * MPW * (120^\circ\text{C}-T)/103^\circ\text{C})/IPP$. T: Water Temperature in $^\circ\text{C}$. 3. Duty Cycle $D \leq MCIP * (120^\circ\text{C}-T)/103^\circ\text{C}/IPP$. 4. Off-time $\geq PW * (1-D)/D$. Continuous Operation at 100% Duty Cycle: $V_{imax} * \sqrt{(MCIP/MIPP)}$, Maximum. To achieve higher sound level, built-in impedance matching is recommended to step up driving voltage inside the transducer.					
Admittance (G and B) at f_s :	G=3.22 mS, B=2.30 mS.	G=5.02 mS, B=3.68 mS.	G=6.36 mS, B=5.60 mS.	G-B Graph	G=10.62 mS, B=9.56 mS.	G-B Graph
Input Power P_i :	$P_i = V_i^2 * G$. Refer to G-B Graph : G is conductance, G_{max} is maximum G at f_s .					
MIPP at f_s :	Maximum Input Pulse Power					
	1100 W	1800 W	2200 W	2700 W	600 W	200 W
MPW at MIPP & f_s :	Maximum Pulse Width at MIPP and f_s .					
	4 Seconds	4 Seconds	4 Seconds	4 Seconds	4 Seconds	4 Seconds
MCIP at f_s :	Maximum Continuous Input Power.					
	25 W	25 W	25 W	100 W	20 W	5 W
FFVS at f_s (dB $V/\mu\text{Pa}$):	-177.0	-180.0	-190.6	FFVS Graph	-201	FFVS Graph
	<i>Sensitivity Loss over extension cable at f_s (dB) = $20 * \log \{ (1 + 2\pi f_s C_c / B) / \sqrt{G^2 + (B + 2\pi f_s C_c)^2} / (G^2 + B^2) \}$</i> G: Conductance at f_s ; B: Susceptance at f_s ; C_c : Capacitance of Extension Cable. Cable is of 100 pF/meter roughly.					
Receiving Sound Level SL:	SL = $20 \cdot \log V_o - \text{FFVS}$, dB μPa . Receiving Voltage V_o is in unit of V_{rms} .					
Two-Way Beam Width:	11.0°	6.0°	2.6°	1.6°	1.0°	1.0°
Directivity Pattern:	Conical Beam at f_s					
Two-Way Side Lobe:	≤ -35.4 (dB) at f_s					
Operating Depth:	Maximum, 300 m and Limited by the cable length if the cable has wire leads or a non-waterproof connector.					
Mounting Options:	1. Default: Free Hanging (FH) 2. Thru-hole Mounting with Single O-ring (THSO) 3. Thru-hole Mounting with Double O-ring (THDO) 4. Bolt Fastening Mounting (Stainless Steel) (BFMSS) 5. End-face Mounting (EFM) 6. Flange Mounting (FGM) 7. Flush Mounting (FSM) Please refer to online document AcousticSystem.pdf for a complete list of Mounting Options and more details.					
Cable:	1. Two Conductor Shielded Cable (SC) 2. 50 Ω RG58 Coax (RG58) 3. 50 Ω RG174/U Coax (RG174) 4. 50 Ω RG178/U Coax (RG178) (Operating Temperature Range: -70°C To +200°C) 5. Two Conductor Unshielded Cable (USC) Handling: Do not use the cable to support transducer weight in air and water. Do not bend the cable.					
Cable Length:	1. Default: 1 m. 2. Custom.					
Connector:	1. Default: Wire Leads (WL) 2. 50 Ω BNC Male (BNC) 3. Underwater Mateable Connector (UMC) 4. MIL-5015 Style (5015) 5. Custom (custom) Note: Underwater Mateable Connector is for underwater uses. Other connectors and wire leads are for dry uses and are non-waterproof.					
Size ($\Phi \times H$):	$\Phi 168 \times 60\text{mm}$	$\Phi 168 \times 40\text{mm}$	$\Phi 168 \times 26\text{mm}$	$\Phi 141 \times 27\text{mm}$	$\Phi 114 \times 25\text{mm}$	$\Phi 60 \times 26\text{mm}$
	Actual length depends on Mounting Parts.					
Weight in Air (1m Cable):	3.2 kg	2.6 kg	2.2 kg	1.2 kg	0.7	0.3
	Actual weight depends on Mounting Parts, Cable Types and Length.					
Operation Temperature:	1. Default: -10 $^\circ\text{C}$ to +60 $^\circ\text{C}$ or 14 $^\circ\text{F}$ to 140 $^\circ\text{F}$. 2. Bespoke High Temperature Transducer: -10 $^\circ\text{C}$ to 120 $^\circ\text{C}$, or 14 $^\circ\text{F}$ to 248 $^\circ\text{F}$. Append HT to part number.					

Storage Temperature:	-20 °C to +60 °C or -4 °F to 140 °F.
Impedance Matching:	BII-6000 Bespoke Impedance Matching between transducers and power amplifiers. Order Separately. Append IM to the part number for integrating BII-6000 in the transducer, and specify impedance in Ω . For example, BII-xxxxIM50 Ω : BII-xxxx transducer with built-in Impedance Matching unit as a 50 Ω load.
TR Switch:	BII-2100 Transmitting & Receiving Switch. Not Included. Order Separately, Append TR to part number (BII-xxxxTR).
Temperature Sensor:	1. Default: No built-in temperature sensor. 2. Built-in temperature sensor. Append TS to part number (BII-xxxxTS) for integrating a temperature sensor in the transducer.

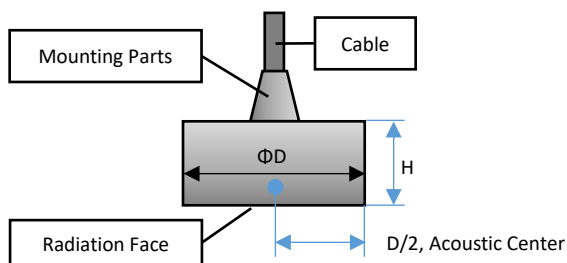
WARNING: DANGER — HIGH VOLTAGE on wires. Wires shall be insulated for safety. DO NOT TOUCH THE WIRES BEFORE THE DRIVING SIGNAL IS SHUT DOWN. Cable shield must be grounded firmly for safety.

for 50 Ω BNC Male connector, it is buyer's sole responsibility to make sure that the (female) BNC shield of the signal source is firmly grounded for operating safety before hooking up transducer/hydrophone to the signal source. Coax with BNC is not intended for hand-held use at voltages above 30Vac/60Vdc.

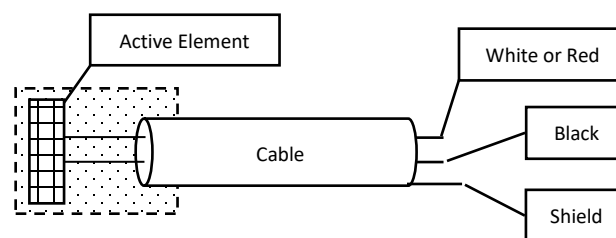
Transducer Wiring:

Wiring:	Two Conductor Shielded Cable	Coax/BNC	Underwater Connector	MIL-5015 Connector
Signal	White or Red	Center Contact	Contact 2	Contact C
Signal Common	Black	Shield	Contact 1	Contact B
Shielding and Grounding	Shield	Shield	Contact 3	Contact A

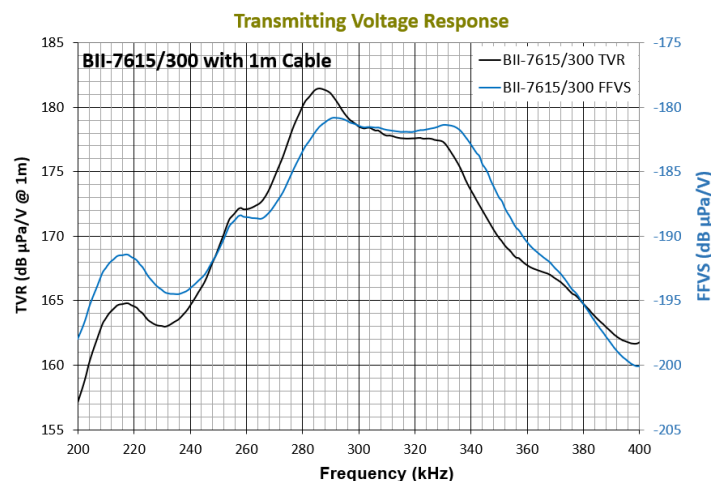
Physical Size (Dimensional Unit: mm)



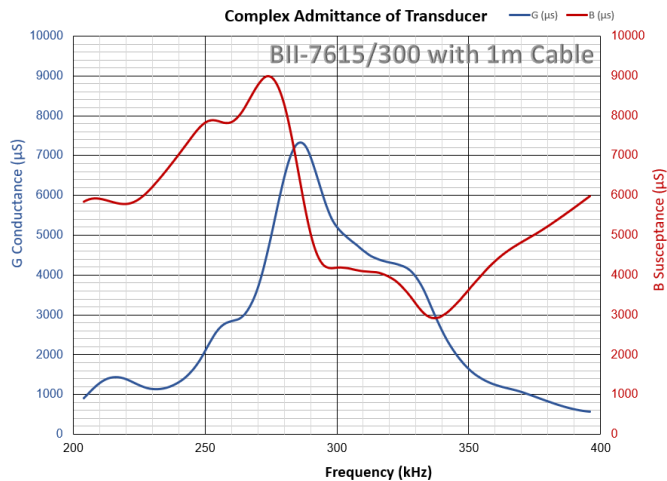
Electrical Wiring (Cable with Wire Leads)



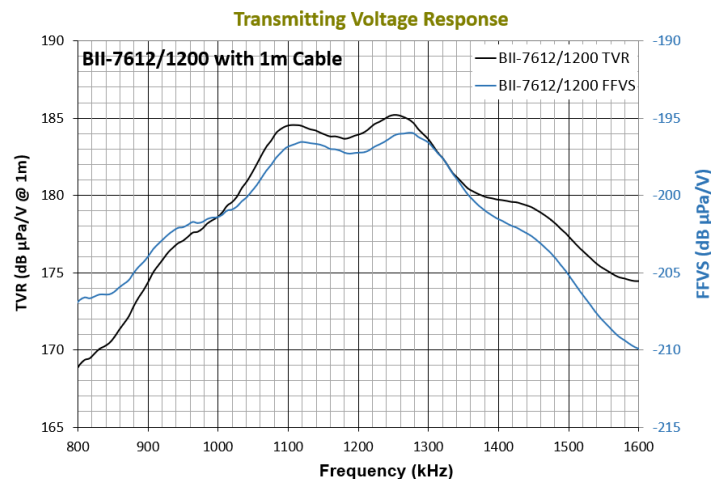
Transmitting Voltage Response (TVR) and Free-field Voltage Sensitivity (FFVS):



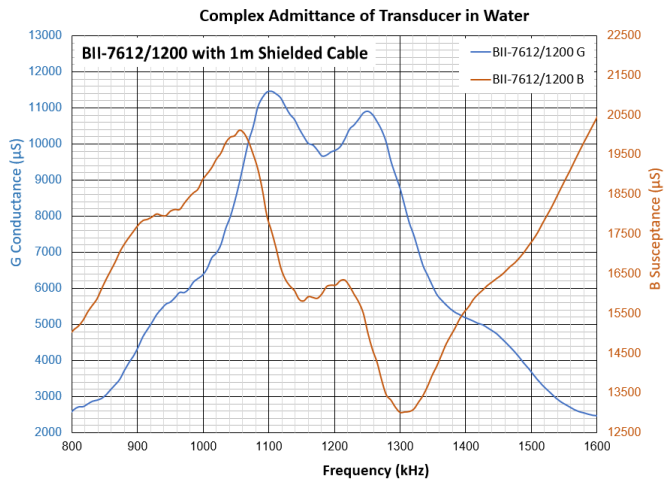
Admittance



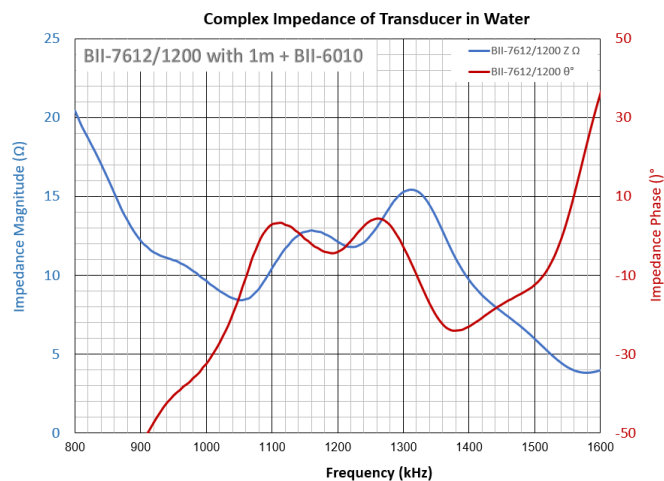
Transmitting Voltage Response (TVR) and Free-field Voltage Sensitivity (FFVS):



Admittance



Customized Impedance Matching



Directivity Pattern:

