

Benthowaye Instrument Inc.

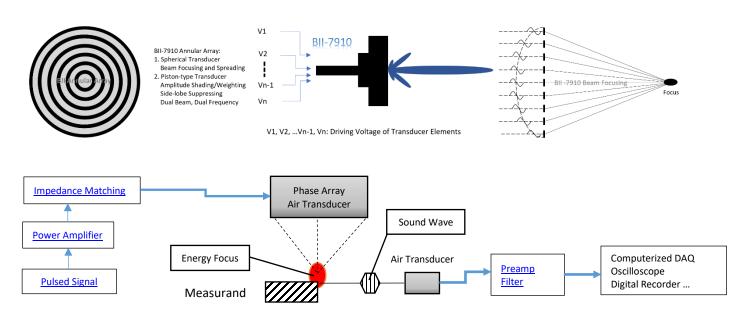
BII-7910 Series Annular Array Air Transducer: Electronic Beam Focusing and Amplitude Shading/Weighting

BII-7910s air transducers featuring low to medium Q_m in air are for air-coupled NDT (Non-destructive Testing), navigation, ranging, measurement and control, and characterization of airlike fluids (gases) and materials such as woods, plastics, rubber, foam, and composites. Water-proofed transducers to withstand 50m water depth is available.

These annular array (ring-array) transducers have radially distributed symmetric ring elements on the circular radiation face. The elements are driven separately with voltage sources to support beam focusing (Phase Shift or Time Delay), amplitude shading (Weighting), and tune the best compromise between main-beam sharpness and the side-lobe suppression.

With proper phase shift of each signal applied to ring elements, the sound energy is concentrated on a small focal point in air, airlike liquids, or on the material under test for air-coupled NDT, measurement, and control. Improved performances comparing to planar air transducers are achieved such as higher signal to noise ratio, greater penetration depth into material, and better lateral resolution, etc...

Typical Applications													
Measurands influence propagation time, phase, and attenuation.				Measurands influence reflection, refraction, scattering and transmission.									
Robotics, Proximity Detection, Sound Ranging, Material Study				Countir	Counting, Monitoring, Remote Control, Alarming, Motion Detection								
Level Measurement, Speed Measurement, Leak Detection				Autom	Automatic Sizing, Sorting & Positioning of Parts, Ultrasonic Testing and Analysis								
Edge Detection, Web	Edge Detection, Web Guiding System, Air-Coupled NDT				Surface	Surface/Profile Characterization and Quick Scanning for Quality Control							
Absorption of Sound	in Air at 20°0	C (68°F), Re	lative Hun	nidity: 10%	, 1 atm.	•							
Frequency (kHz)	30	40	50	70	100	120	150	200	250	300	400	500	1000
Absorption (dB/m)	0.3	0.4	0.5	0.7	1.8	2.5	4.0	6.5	10	16	28	43	200



Transducer Specification

BII-7910	Annular Array Air Transducer, refer to How to Order to specify array parameters.				
	Pulse and burst SINE/Square/Chirp/FM.				
Signal Type:	Warning: ONLY pulsed signals can be used to drive these transducers. Please determine the pulse width, duty cycle and input pulse				
	power before putting the transducer in service. Otherwise, the transducer shall be damaged beyond repair.				
1	lth, duty cycle and off-time with input pulse power (peak power):				
· · · · · · · · · · · · · · · · · ·	power (IPP, peak power) with sound intensity required by the project. IPP MUST be less than MIPP.				
•	W*(120°c-T)/103°c)/IPP, or Pulse Width ≤ 100 mS, whichever is less. T: Air or Airlike Fluids Temperature in °c.				
, ,	°c-T)/103°c)/IPP, or D ≤ 1%, whichever is less.				
4. Off-time ≥ PW*(1-D)/D.					
Resonant Frequency fs:	Available from 30 to 300 kHz, customized. In-Stock Elements: 30, 40, 50, 60, 70, 100, 120, 150, 200, 250, and 300 kHz.				
Orientation:	Plane Circular Piston at Center: #1. Numbering of Array Elements: Outward Sequentially.				
Circular Piston at Center:	Diameter ΦD in mm, Customized. Array Number: #1.				
Ring Elements:	All ring elements has identical radial length.				
King Elements.	Radial Length of ring elements: L in mm, customized. Contact BII for availability (frequency dependent).				
	Centric Spacing d among Ring Elements in mm: $d = L + T$; Customized, generally, $d \le \lambda/2$.				
	λ: Wavelength of Underwater Sound.				
Ring Element Spacing d:	d : Distance between central lines of two neighboring ring elements excluding Circular Piston at Center.				
	L: Radial Length of a ring element.				
	T: Radial length of pressure release materials among the ring elements.				
Number of Elements N:	Customized. The number includes circular piston at center and is confined by sizes of housings and mounting parts.				
TVR:	115.0 to 140.0 dB μPa/V@1m at fs, all rings are tied together. Transmitting Voltage Response.				
FFVS:	-190.0 to -170.0 dB V/μPa at fs, all rings are tied together. Free-field Voltage Sensitivity.				
Quality Factor Q _m :	3 to 8 (typical 5)3 dB bandwidth of TVR = fs/Q _m .				
Beam Pattern:	Conical				
-3dB Beam Width:	One Way: 20203°kHz*mm/(f*ФID) without amplitude shading/weighting, all rings are tied together.				



Benthowaye Instrument Inc.

Acoustic Solutions

www.benthowave.com

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	Two Way: 14546°kHz*	mm/(f*ΦID) without amp	litude shading/w	eighting, all rings are tied	together.							
Sida Laba Laval	One Way: ≤ -20 dB wit	hout amplitude shading/v	veighting, all rings	are tied together.								
Side Lobe Level:	Two Way: ≤ -40 dB, without amplitude shading/weighting, all rings are tied together.											
Maximum Driving Voltage:	300 to 600 Vrms, or voltage rating of cables, whichever is less.											
MIPP at fs:	Maximum Input Pulse Power: 100W to 2000W RMS, Transducer dependent.											
MCIP at fs:	Maximum Continuous Input Power: 1W to 5W RMS, Transducer dependent.											
MPW @ MIPP and fs:	Maximum Pulse Width: ≤ 100 mS, Transducer dependent.											
Capacitance (nF@1kHz):	Transducer dependent.											
Dissipation @ 1kHz:	Transducer dependent.											
Admittance @fs:	Transducer dependent											
Waterproof:	Water-proofed for 50 r											
	1. Default: Free Hangin											
	J	with Single O-ring (THSO))									
	_	with Double O-ring (THD										
Mounting Ontions	4. Bolt Fastening Mour	nting (Stainless Steel) (BFN	ASS)									
Mounting Options:	5. End-face Mounting (* · · · · · · · · · · · · · · · · · · ·										
	6. Flange Mounting (FC	·										
	7. Flush Mounting (FSN	•	10.0									
		document AcousticSystem	-	ete list of Mounting Option	ons and more deta	nils.						
		Ided Cable (SC), Rubber of	r PVC Jacket.									
	2. 50 Ω RG58 Coax (RG	•										
	3. 50 Ω RG174/U Coax	(RG174) (RG178) (Operating Temp	nerature Range: -	70°C To +200°C)								
Cable:		Twisted Pair and Teflon (F	_	·	0°C. AWG26 Cond	uctors.						
		Twisted Pair and Teflon (F	, ,	, ,, ,	•							
	7. Custom		,	(), sp 20	,							
	Handling: Do not use t	the cable to support trans	ducer weight in a	air if the transducer has	a mounting part. I	Do not bend the cable.						
Cable Longth:	1. Default: 1 m for each				<u>J.</u>							
Cable Length:	2. Customs, Specify wh	nen ordering.										
	Default: Wire Leads (WL)											
	2. Male BNC (BNC) (Max. Diameter Φ14.3 mm)											
	3. SMA (Plug, Male Pin) (SMA), Voltage Rating: 335 VRMS Continuous. (Max. Diameter Φ9.24 mm)											
	4. SMC (Plug, Female Socket) (SMC), Voltage Rating: 335 VRMS Continuous. (SMC) (Max. Diameter Φ6.4 mm)											
Connector:	5. MIL-5015 Style (pin) (5015) (Max. Diameter Φ30 mm with 3 contacts)											
	6. LEMO (Plug Male Pins) (LEMO) (Max. Diameter Φ9.5 mm with 3 contacts)											
	7. Underwater Mateable Connector (pin) (UMC) (Max. Diameter Ф21.5 to Ф35 mm)											
	8. Customized, buyer specifies the connector. (Custom) Note: Underwater Mateable Connector is for uses underwater. Other connectors and wire leads are for dry uses and are not											
	waterproofed.	iteanie connector is for	uses unuerwater	. Other connectors and	wile leads die 10	n ury uses and are not						
Housing Diameter:	· · · · · · · · · · · · · · · · · · ·	ve material ΦID ≤ 153 mn	n: Outside diamot	er ФОD < 168 mm								
Weight:		ight depends on Mounting	-									
ŭ	-10°C to +60°C or 14°F	•	5 i ai is, cable Typ	es and Length.								
Operation Temperature:												
Storage Temperature:			L. Lattered 1.1	P.C	500 55 :	perature: -20°C to +60°C or -4°F to 140°F.						
Power Amplifier:				s power amplifiers such a	BII-5000 Series Power Amplifier, Order Separately, or Third-party's power amplifiers such as 50Ω RF power amplifiers.							
Impedance Matching:	BII-6000 Bespoke, Standalone, Impedance Matching between transducers and power amplifiers. Order Separately.											
impedance Matering.	BII-2100 Transmitting & Receiving Switching, Not Included, Order Separately, Append TR to part number for integrating a T/R											
T/R Switch:	BII-2100 Transmitting 8		t Included, Order	Separately. Append TR t	olifiers. Order Sepa o part number for	arately.						
	BII-2100 Transmitting 8 in the transducer. This	is available ONLY for large	t Included, Order	Separately. Append TR t	olifiers. Order Sepa o part number for	arately.						
	BII-2100 Transmitting 8 in the transducer. This 1. Default: No built-in t	is available ONLY for large temperature sensor.	t Included, Order e transducers who	Separately. Append TR tose housing diameter ≥ Q	olifiers. Order Sepa o part number for 260mm.	arately. integrating a T/R Switch						
T/R Switch: Temperature Sensor:	BII-2100 Transmitting & in the transducer. This 1. Default: No built-in t 2. Built-in temperature	is available ONLY for large temperature sensor. e sensor. Append TS to par	t Included, Order e transducers who	Separately. Append TR tose housing diameter ≥ 0 (xxTS) for integrating a ter	olifiers. Order Sepa o part number for 060mm. nperature sensor	arately. integrating a T/R Switch in the transducer.						
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Benthowaye Instrument Inc.

oustic Solutions ww

15	14.72	90	1.265	165	0.2128	240	0.0628
20	12.10	95	1.105	170	0.1923	245	0.0597
25	10.00	100	0.9679	175	0.1742	250	0.0570
30	8.311	105	0.8500	180	0.1581		

Wiring:	Two Conductor Shielded Cable	Coax/BNC/SMA/SMC	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

Shielding and Grounding Shield				Shleid	Contact 3			Contact A	
How to Orde	How to Order								
BII-7910	/fs	-ФD	-L	-d	-N	-Mounting	-Cable Length	-Cable	-Connector
Transducer	in kHz	Diameter of Circular Piston at center, in mm	Radial Length of Ring Elements, in mm	Centric Spacing of Ring elements, in mm	Number of Elements	Refer to specs.	of Each Element, in meter	Refer to	specs.
Example of Pa	art Nun	nber:	Description						
BII-7910/70kHz-Φ20mm-7mm-10mm-8- FH-10m-SC-WL		BII-7910 transducer, 70kHz, Diameter of Circular Piston at center: Φ 20mm, Radial Length of Ring Elements: L=7mm, Centric Spacing of Ring Elements: 10mm, 8 Array Elements, Free Hanging, 8x10m Shielded Cable, Wire leads.							
BII-7910/70kHz-Φ20mm-7mm-10mm-8- FGM-10m-WCB-WL		BII-7910 transducer, 70kHz, Diameter of Circular Piston at center: Φ20mm, Radial Length of Ring Elements: L=7mm, Centric Spacing of Ring Elements: 10mm, 8 Array Elements, Flange Mounting, 8x10m Wire/Cable Bundle, Wire leads.							
BII-7910/200 -FH -5m -RG1		3mm -3mm -3.8mm -6 x -BNC:		er, 200kHz, Diameter Ring Elements: 3.8m			, ,	0	•

Structure:

