

Acoustic Transducers and Measurement Systems

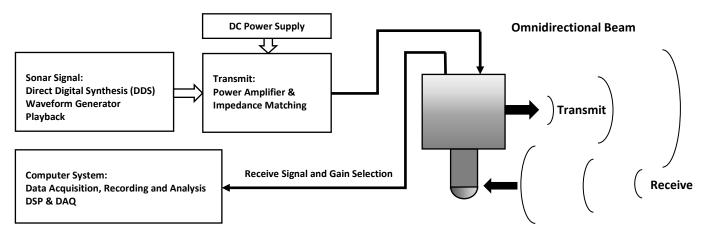
www.benthowave.com

BII-7640 Series Underwater Omnidirectional Transceiver

The underwater acoustic transceiver integrates an omnidirectional projector and an omnidirectional low noise hydrophone. Typical applications include artificial acoustic target which is able to simulate quantitatively the noise, Doppler effect, echo or characteristic sounds of the subjects such as ships, torpedoes, submarines, fish, marine animals, seabed, sub-bottom, etc...

Typical Applications	
Artificial Acoustic Target: Echo-Repeater Target, Active-Acoustic Target	Underwater Telephone
Underwater Communication and Modem, Acoustic Release	Long Range Sound Transmission
Underwater Acoustic Positioning: Transponder, Responder	Acoustic Deterrent to Marine Animals Marine
Tracking of Acoustic Tags/Transmitters in Marine Fisheries and Animals	Animal Behavior Research, Bioacoustic Stimuli & Playback
Related Products	
BII-5000 Series Power Amplifier	BII-8030 Series Underwater Acoustic Transmitter
Sonar Signal Generation Pulse Signal	BII-8000 Series Listening, Recording, Analysis, Synthesis and Playback

Communication & Artificial Acoustic Target



Specification

Acoustic Transceiver	BII-7641Q	BII-7642	BII-7643	BII-7644	BII-7645	BII-7646			
Operating Depths	500m	300m	300m	300m	300m	100m			
Operating Depth:	Limited by the cable length if the cable has wire leads or a non-waterproof connector.								
Operation Mode:	Half-duplex								
	1. Default: Free Hangi	1. Default: Free Hanging (FH)							
	2. Thru-hole Mounting with Single O-ring (THSO)								
Mounting Options:	3. Thru-hole Mountin	3. Thru-hole Mounting with Double O-ring (THDO)							
Mounting Options.	4. Bolt Fastening Mou	nting (Stainless Steel) (BFMSS)						
	5. End-face Mounting								
					ptions and more details				
Weight:	\geq 1.5 kg with 10m cab	le. Actual weight dep	ends on Mounting Par	rts, Cable Types and Le	ngth.				
Operation Temperature:	-10°C to +60°C or 14°F to 140°F.								
Storage Temperature:	-20°C to +60°C or -4°F	to 140°F.							
			Transmit Unit						
Signal Type:	Pulsed SINE, Chirp, PS	K, FSK, Pulsed Square	e Waveform, CW, Com	munication Signals, etc					
Transmitting Face:	Cylinder								
Directivity Pattern:	Toroidal Beam at fs; C)mnidirectional at f <-	< fs.						
Beam Width:	$\theta_{H-3dB} x \theta_{V-3dB}$ (°) = Omn	i x 80° , Horizontal x V	/ertical at fs.						
Side Lobe Level:	No side lobes.								
	40 kHz	30 kHz	14 kHz	8 kHz	6kHz	4.5kHz			
Operating Frequency fs:	1. Efficiency is low in the frequency range far from fs, so it is NOT recommended to operate transducer at frequency far from fs								
	2. Transducer can ope	erate in low power at	t frequency far from f	s, the input power P _i s	hould be much less tha	n 1% MCIP at fs.			
Quality Factor Q _m :	1.5	1.3	1.5	1.2	3	3			
TVR:	Refer to TVR Graph.								
Radiation Sound Level:	SL = 20*logV _i + TVR, dB μPa@1m. Driving Voltage V _i is in unit of V _{rms} .								
	G=0.68mS,	G=0.55mS,	G=0.86 mS,	G=0.485mS,	Gmax=0.439mS,	Gmax=0.2 mS,			
Admittance @ fs:	B=2.68 mS,	B=3.72mS.	B =3.6mS,	B=3.213mS,	B=2.4 mS,	B=1.0 mS,			
	(20m SC cable).	(3m SC cable).	(5m SC cable).	(3m SC cable).	(10m SC cable).	(10m SC cable)			
Transducer without Impe	dance Matching Unit		1						
Maximum Driving	225	300	300	300	450	600			
Voltage V _{dmax} in V _{rms} :	_								
		Pulsed Driving Signal and Duty Cycle D < 100%: Maximum V _i , V _{imax} = $V(MIPP/G_{max})$ or V _{dmax} , whichever is less, in V _{rms} .							
Driving Voltage V _i at f _s :	Continuous Operation at 100% Duty Cycle: Maximum Vi, Vimax = V(MCIP/Gmax), in Vrms.								
	To achieve higher sound level, built-in impedance matching is recommended to step up driving voltage inside the transducer.								



Benthowaye Instrument Inc.

Acoustic Transducers and Measurement Systems

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Transducer with Impedan	Pulsed Driving Signal	and Duty Cycl	e D < 100%: Vimay = VIMIPP *	[Z]], [] Vrmc. 7 [S][[1]]		ibedance "		
Driving Voltage V _i at f _s :		Pulsed Driving Signal and Duty Cycle D < 100%: V _{imax} = $V(MIPP * Z)$, in V _{rms} . Z is impedance with Impedance Matching Unit at fs. Continuous Operation at 100% Duty Cycle: Maximum V _i , V _{imax} = $V(MCIP * Z)$, in V _{rms} .						
					ms.			
Input Power Pi:			conductance, G _{max} is maximu		2.001/		20014	
MIPP at fs:	250W	400W	300W	240W	240W		200W	
MPW at MIPP and fs:	25s	60s	70s	120s	130s		200s	
MCIP at fs:	60W	95W	100W	130W	150W		150W	
			us Input Power, MPW: Maxin		MIPP.			
			put pulse power (peak powe ad intensity required by the p	•	loss than MIDD			
2. Pulse Width \leq (MIPP * N						•		
3. Duty Cycle $D \leq MCIP^*(1)$			emperature in c.					
4. Off-time \geq PW*(1-D)/D.	,. ,.							
		G20 Shielded	Cable (SC), Rubber or PVC Ja	cket.				
	2. 50 Ω RG58 Coax (RG							
		,	and Teflon (PTFE) Jacket, ΦD	=3.2 mm (SC32), up	to 200°C, AWG	26 Conduct	tors.	
Cable:	4. Shielded Cable with	Twisted Pair a	and Teflon (PTFE) Jacket, ΦD	=4.0 mm (SC40), up	to 200°C, AWG	20 Conduct	tors.	
	5. Two Conductor AW	G20 Unshielde	ed Cable (USC)					
	Handling: Do not use t	he cable to su	upport transducer weight in	air and water if the	transducer has	a mountin	g part. Do not ber	
	the cable.							
Cable Length:	1. Default: 10 m. 2. Cu	stom.						
	1. Default: Wire Leads	(WL)						
	2. Male BNC (BNC) (Ma	ax. Diameter (Ф14.3 mm)					
	, , ,	. ,.	Diameter Ø30 mm with 3 co					
Connector:			lax. Diameter Φ9.5 mm with					
			(pin) (UMC) (Max. Diameter	Φ21.5 to Φ35 mm)				
	6. Customized, buyer s							
		Note: Underwater Mateable Connector is for uses underwater. Other connectors and wire leads are for dry uses and are not						
	waterproofed. Ф42x55mm	Ф60x60mm	Ф89х50mm	Φ114x50mm	Φ141x6	0	Ф168x60mm	
Size (ФDxH):			hing between transducers a					
Impedance Matching:	number for integrating							
impedance matering.	number for integrating							
	with built-in Impedance				example, bil-x	AAAIIVIJ0122.		
	with built-in Impedance	e Matching u	nit as a 50 Ω load.		example, bil-x			
Temperature Sensor:	1. Default: No built-in	e Matching u temperature s	nit as a 50 Ω load. sensor.	·				
•	1. Default: No built-in t 2. <u>Built-in temperature</u>	e Matching u temperature s <u>e sensor</u> . Appe	nit as a 50 Ω load. sensor. end <mark>TS</mark> to part number (BII-x»	xxxTS) for integrating	g a temperature	e sensor in	the transducer.	
•	1. Default: No built-in 2. <u>Built-in temperature</u> GH VOLTAGE on wires. W	e Matching u temperature s <u>e sensor</u> . Appe	nit as a 50 Ω load. sensor.	xxxTS) for integrating	g a temperature	e sensor in	the transducer.	
WARNING: DANGER — HI Cable shield must be grou	1. Default: No built-in t 2. <u>Built-in temperature</u> GH VOLTAGE on wires. W nded firmly for safety.	e Matching u temperature s <u>e sensor</u> . Appe /ires shall be i	nit as a 50 Ω load. sensor. end <mark>TS</mark> to part number (BII-x»	xxTS) for integratin TOUCH THE WIRES	g a temperature BEFORE THE DR	e sensor in t IVING SIGN	the transducer. IAL IS SHUT DOWI	
WARNING: DANGER — HI Cable shield must be groun for 50Ω BNC connector, it	1. Default: No built-in 1 2. <u>Built-in temperature</u> GH VOLTAGE on wires. W nded firmly for safety. : is buyer's sole responsil	e Matching u temperature s sensor. Appe /ires shall be i bility to make	nit as a 50 Ω load. sensor. end TS to part number (BII-xo insulated for safety. DO NOT	xxxTS) for integrating TOUCH THE WIRES the signal source is	g a temperature BEFORE THE DR s firmly grounde	e sensor in t IVING SIGN ed for oper	the transducer. NAL IS SHUT DOWI rating safety befor	
WARNING: DANGER — HI Cable shield must be groun for 50Ω BNC connector, it hooking up transducer/hy	1. Default: No built-in 1 2. <u>Built-in temperature</u> GH VOLTAGE on wires. W nded firmly for safety. is buyer's sole responsil drophone to the signal so	e Matching u temperature s <u>e sensor</u> . Appe /ires shall be i bility to make purce. Coax w	nit as a 50 Ω load. sensor. end TS to part number (BII-xo insulated for safety. DO NOT a sure that the BNC shield of	xxxTS) for integrating TOUCH THE WIRES the signal source is	g a temperature BEFORE THE DR s firmly grounde	e sensor in t IVING SIGN ed for oper	the transducer. NAL IS SHUT DOWI rating safety befor	
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WARNING: DANGER — HI Cable shield must be groun for 50Ω BNC connector, it hooking up transducer/hy Transmitting Wiring with Wiring:	1. Default: No built-in 1 2. <u>Built-in temperature</u> GH VOLTAGE on wires. W nded firmly for safety. : is buyer's sole responsil drophone to the signal so Single Ended Driving Sig	e Matching u temperature s <u>e sensor</u> . Appe /ires shall be i bility to make <u>purce. Coax w</u> nal	nit as a 50 Ω load. sensor. end TS to part number (BII-xy insulated for safety. DO NOT e sure that the BNC shield of rith BNC is not intended for h	xxTS) for integrating TOUCH THE WIRES the signal source is and-held use at volt	g a temperature BEFORE THE DR s firmly grounde tages above 30V	e sensor in IVING SIGN ed for oper 'ac/60Vdc.	the transducer. IAL IS SHUT DOWN rating safety befor 5015 Connector	
WARNING: DANGER — HIC Cable shield must be groun for 50Ω BNC connector, it hooking up transducer/hy Transmitting Wiring with Wiring: Transmitting Signal	1. Default: No built-in 1 2. <u>Built-in temperature</u> GH VOLTAGE on wires. W nded firmly for safety. : is buyer's sole responsil drophone to the signal so Single Ended Driving Sig Two Conductor Shield	e Matching u temperature s <u>e sensor</u> . Appe /ires shall be i bility to make <u>purce. Coax w</u> nal	nit as a 50 Ω load. sensor. end TS to part number (BII-xy insulated for safety. DO NOT e sure that the BNC shield of rith BNC is not intended for h Coax/BNC	xxxTS) for integrating TOUCH THE WIRES the signal source is and-held use at volt Underwater C	g a temperature BEFORE THE DR s firmly grounde tages above 30V	e sensor in 1 IVING SIGN ed for oper fac/60Vdc. MIL-5	the transducer. NAL IS SHUT DOWN rating safety befor 5015 Connector act C	
WARNING: DANGER — HIC Cable shield must be groun for 50Ω BNC connector, it hooking up transducer/hyu Transmitting Wiring with Wiring: Transmitting Signal Transmitting Common	1. Default: No built-in t 2. <u>Built-in temperature</u> GH VOLTAGE on wires. W nded fimly for safety. : is buyer's sole responsil drophone to the signal so Single Ended Driving Sig Two Conductor Shield White or Red Black	e Matching u temperature s <u>e sensor</u> . Appe /ires shall be i bility to make <u>purce. Coax w</u> nal	nit as a 50 Ω load. sensor. end TS to part number (BII-xo insulated for safety. DO NOT a sure that the BNC shield of ith BNC is not intended for h Coax/BNC Center Contact Shield	xxxTS) for integrating TOUCH THE WIRES the signal source is and-held use at volt Underwater C Contact 2 Contact 1	g a temperature BEFORE THE DR s firmly grounde tages above 30V	e sensor in 1 IVING SIGN ed for oper 'ac/60Vdc. MIL-5 Conta Conta	the transducer. NAL IS SHUT DOWI rating safety befor 5015 Connector act C act B	
WARNING: DANGER — HIC Cable shield must be groun for 50Ω BNC connector, it hooking up transducer/hy Transmitting Wiring with Wiring: Transmitting Signal Transmitting Common Shielding and Grounding	1. Default: No built-in t 2. <u>Built-in temperature</u> GH VOLTAGE on wires. W nded firmly for safety. is buyer's sole responsil drophone to the signal so Single Ended Driving Sig Two Conductor Shield White or Red Black Shield	e Matching u temperature s <u>sensor</u> . Appe /ires shall be i bility to make purce. Coax w nal ed Cable	nit as a 50 Ω load. sensor. end TS to part number (BII-xo insulated for safety. DO NOT a sure that the BNC shield of ith BNC is not intended for h Coax/BNC Center Contact	xxxTS) for integrating TOUCH THE WIRES the signal source is and-held use at volt Underwater C Contact 2	g a temperature BEFORE THE DR s firmly grounde tages above 30V	e sensor in 1 IVING SIGN ed for oper 'ac/60Vdc. MIL-5 Conta	the transducer. NAL IS SHUT DOWI rating safety befor 5015 Connector act C act B	
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Benthowaye Instrument Inc.

Acoustic Transducers and Measurement Systems

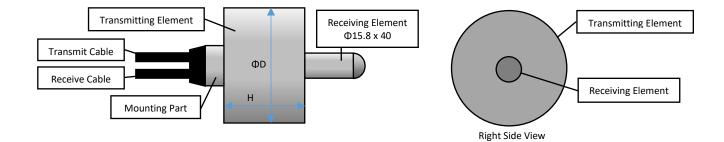
www.benthowave.com

Acceleration Sensitivity:	103.8 dBµPa/(m/s ²) at Acoustic Axis and other directions.					
Cable:	Six Conductor Shielded Cable (SC).					
Cable Length:	1. Default: 10 m. 2. Custom-fit Cable Length.					
Connector:	1. Defa 2. Male 3. SMA 4. SMC 5. 1/8" 6. XLR 7. MIL- 8. LEM 9. Und 10. +9\ 11. Cus Note: U	ult: Wire Leads (WL) BNC (BNC) (Max. Di- (Plug, Male Pin) (SM (Plug, Female Socket (3.5mm) TRS Plug (T (pin) (XLR) (Max. Diar 5015 Style (pin) (501 O (Plug Male Pins) (LI erwater Mateable Co /DC Battery Snap (BS stomized, buyer speci	Differential Output. Ameter Φ14.3 mm), for SE ONLY. (A), Voltage Rating: 335 V _{RMS} Continuou. (SMC), Voltage Rating: 335 V _{RMS} Continuou. (Max. Diameter Φ10.5 mm), for meter Φ20.2 mm), for SE or DF. (Max. Diameter Φ30 mm with 3 con EMO) (Max. Diameter Φ90.5 mm with 3 connector (pin) (UMC) (Max. Diameter Φ) (Exclusive to preamplified hydrophon ifies the connector. (Custom)	inuous. (SMC) (Max. Diameter Φ6.4 SE or DF. tacts), for SE or DF. contacts), for SE or DF. i21.5 to Φ35 mm), for SE or DF. e)	ዛ mm), for SE ONLY.	
Supply Voltage V _s :	•	+30 VDC				
Suggested DC Supply:	+9 VDC Battery, Marine Battery, Automobile Battery, Fixed DC Linear Power Supply, Not Included. DO NOT use variable power supply whose maximum supply voltage is higher than the rated voltage. DO NOT use switching mode DC power supply.					
Current (Quiescent):	10.5 m					
Size (Φ DxH):	Φ15.8	x 40 mm				
Wiring Information of Red	ceiving					
Wiring of Single Ended Ou	utput:	Wire Leads	9V Battery Snap and Wire Leads	Wire/Cable Buddle	Underwater Connector	
+VDC		Red	+9VDC Battery Female Snap	Red Wire	Pin 3	
Common Digital Common		Black	+9VDC Battery Male Snap Black	Black Wire	Pin 1	
Output Signal		White	White	White wire of Shielded Cable	Pin 2	
Output Signal Common		Green	Green	Black wire of Shielded Cable	Pin 4	
Digital A0 (Gain Selection)		Blue	Blue	Blue Wire	Pin 6	
Digital A1 (Gain Selection)		Yellow or Brown	Yellow or Brown	Yellow Wire	Pin 5	
Shielding		Shield	Shield Shield of Shielded Cable		N/A	
Note: Power Supply Comm	non and o	able shield must be g	grounded firmly for safety.	-	·	
Selecting Sensitivity of Di	gitally Pro	ogrammable	· · · ·			
Gain Selection Wire A1	Gain Selection Wire A0 Hydrophone Sensitivity					
0 (Logic Low)	0 (Logi	c Low)	FFVS + 0dB V/µPa, or FFVS + 20dB	V/µPa,		
0 (Logic Low)	1 (Logi	c High)	FFVS + 20dB V/µPa, or FFVS + 40dB	V/µPa,		
1 (Logic High)	0 (Logic Low) FFVS + 40dB V/ μ Pa, or FFVS + 60dB V/ μ Pa,					
	- (- 0					

How to Order BII-7640 Series Transducers (if a parameter is not used, please leave it in blank)

Transducer	TS	IM	-Z	-HP/LP	-Mounting	-Cable Length	-Connector	
BII-764x	Temperature	Impedance	Matching Impedance in Ω	Receiving Bandpass	Refer to specs.	in meter	Refer to specs.	
DII-704X	Sensor	Matching	at fs or BII Power Amplifier	Filter in kHz				
Example of Par	Example of Part Number: Description							
BII-7642-1Hz/90kHz-THSO-0.1m-WL			BII-7642 Transducer, Receiving Band Pass Filter: 1Hz to 90kHz, Thru-hole Mounting (Single O-ring), 0.1m					
			Cable, Wire Leads.					
BII-7642 Transducer, Bui				Impedance Matching for	or 50Ω at fs; Receivi	ing Band Pass Filte	er: 1kHz to 50kHz,	
BII-7642IM-50Ω-1kHz/50kHz-FH-20m-WL			Free Hanging, 20m Cable, Wire Leads.					
BII-7642TSIM-BII-5061-0.1kHz/70kHz-FH-20-WL			BII-7642 Transducer, Built-in Temperature Sensor, and Built-in Impedance Matching for BII-5061 Power					
DII-704215IIVI-I	DII-3001-0.1KHZ/ /(JKNZ-FN-20-VVL	Amplifier at fs; Receiving Band Pass Filter: 0.1kHz to 70kHz, Free Hanging, 20m Cable, Wire Leads.					

Physical Size (Dimensional Unit: mm)



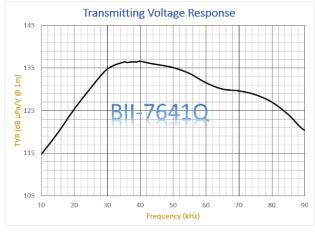


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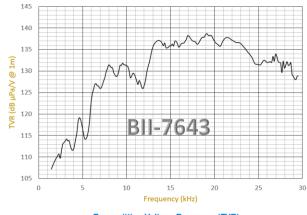
Acoustic Transducers and Measurement Systems

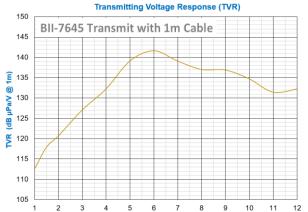
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Transmitting Voltage Response (TVR):









Free-field Voltage Sensitivity (FFVS):



Frequency (kHz)

