



Transducer Specification

BII-7720 Series Flush-Mounting Transducer

BII-7720 series transducers mount through a hole or counterbore hole cut in the housing of underwater instruments, apparatus, vehicles (or towed streamlined body), pipes, or the wall of swimming pools. The flush-mounting design of these transducers minimizes surface discontinuity between the transducer and the mounting wall (or hull), and allows for smooth water flow over the surfaces, resulting in much lower induced acoustic noise (hydrodynamic noise, flow noise), less drag/resistance, avoidance of accidental collision and better acoustic performance for the underwater devices in motion such as towed fish/bodies, ROV/AUV/UUV, robots, etc... Low-profile flush installation protrudes only 4.75mm outside the housing with streamlined flange.

BII-7720 transducers emit and receive conical beams, and are designed for use as components in communication/positioning, navigation, fishery, oceanography, Seafloor-mapping, Marine Animals research, etc....

The housing can be mounted on different materials such as woods, plastics, fiber glass, ceramics and metals. Marine sealants shall be used for sealing, bedding and installation. The depth rating is limited by the sealing performance of the cured marine sealants.

If you do not find any transducer suitable to your project, please contact BII for bespoke designs on size, operating frequency, beam width, mounting, etc...

Applications

Towed Sonar/Bodies, Vessels in Motion, Sonobuoy, Towfish	Communication/Remote Control/Telemetry/Positioning
Sonar Navigation, Inspection and Survey	Object Detection/Tracking/Avoidance, Fish finder
Surface Continuity for Low Acoustic Perturbation	Aquarium/Pool/Underwater Security, Alarm System
Sound Velocity Profiler, Bathymetric Sounder, Depth Sounder	Precision Distance Gage, Altimeter, Liquid Level
Bioacoustics: Marine Animals, Fishery and Plankton	Process Measurement and Control

Features

High Sensitivity	Broadband (Low Q)	Low Hydrodynamic/Flow Noise
Easy Installation/Mounting/Removing	20kHz to 2MHz, Single or Dual Frequency	Conical Beam

Specification

TVR: Transmitting Voltage Response (dB μ Pa/V at 1m); FFVS: Free-filled Voltage Sensitivity (dB V/ μ Pa); θ : Beamwidth at -3dB; fs: Resonant Frequency (kHz); Q: Quality Factor, -3dB Bandwidth=fs/Q; Φ D: Flange Diameter; L: Body Length. MIPP: Maximum Input Pulse Power; MCIP: Maximum Continuous Input Power; MPW: Maximum Pulse Width at MIPP. C: Transducer Capacitance, D: Dissipation at 1kHz, G: Conductance.

Transducer	fs (kHz)	TVR	FFVS	θ	Q	C (nF)	MIPP	MCIP	MPW	G @ fs	Size Φ DxL	Mounting Thread
BII-7723/22	22	125	-177	160°	6	0.131	225W	2.0W	65s	0.014mS	Φ 59x80	M35x1.5
BII-7723/25	25	125	-176	140°	6	0.094	244W	2.0W	58s	0.028mS	Φ 59x80	M35x1.5
BII-7723/45	45	139	-177	78°	5	0.270	222W	2.5W	34s	0.220mS	Φ 59x50	M35x1.5
BII-7723/50	50	136	-182	70°	4	0.188	240W	2.6W	29s	0.150mS	Φ 59x50	M35x1.5
BII-7723/70	70	140	-184	50°	3.5	0.174	200W	4.0W	28s	0.220mS	Φ 59x40	M35x1.5
BII-7723/100	100	147	-187	35°	3.5	0.272	220W	4.6W	20s	0.255mS	Φ 59x40	M35x1.5
BII-7723/120	120	151	-189	29°	3.5	0.340	230W	5.2W	16s	0.405mS	Φ 59x30	M35x1.5
BII-7723/150	150	155	-191	23°	3.5	0.442	238W	6.0W	13s	0.702mS	Φ 59x30	M35x1.5
BII-7723/200	200	160	-193	17.5°	3.5	0.570	230W	6.2W	10s	1.300mS	Φ 59x30	M35x1.5
BII-7723/300	300	166	-196	12°	3.5	0.760	205W	6.7W	6.6s	2.500mS	Φ 59x30	M35x1.5
BII-7723/420	420	171	-199	8.3°	3.5	0.958	184W	7.0W	5.0s	4.240mS	Φ 59x30	M35x1.5
BII-7723/600	600	171	-196	5.8°	5	0.622	420W	4.3W	2.0s	4.890mS	Φ 59x30	M35x1.5
BII-7723/1000	1000	181	-200	3.5°	5	1.037	420W	4.5W	1.1s	13.58mS	Φ 59x30	M35x1.5
BII-7723/2000	2000	193	-206	1.8°	5	2.074	420W	4.7W	0.6s	54.34mS	Φ 59x30	M35x1.5
BII-7725/45	45	145	-184	47°	4	0.757	620W	7W	34s	0.286mS	Φ 80x50	M56x1.5
BII-7725/50	50	144	-182	42°	4	0.530	680W	7W	30s	0.215mS	Φ 80x50	M56x1.5
BII-7725/70	70	150	-184	30°	3.5	0.527	600W	10W	28S	0.345mS	Φ 80x40	M56x1.5
BII-7725/100	100	156	-187	21°	3.5	0.777	620W	13W	20S	0.729mS	Φ 80x40	M56x1.5
BII-7725/120	120	159	-189	17.6°	3.5	0.914	600W	14W	16S	1.064mS	Φ 80x30	M56x1.5
BII-7725/150	150	163	-191	14°	3.5	1.113	600W	15W	13S	1.695mS	Φ 80x30	M56x1.5
BII-7725/200	200	168	-193	11°	3	1.435	580W	17W	10S	3.101mS	Φ 80x30	M56x1.5
BII-7725/300	300	175	-197	7°	3	1.920	500W	18W	6S	5.910mS	Φ 80x30	M56x1.5
BII-7725/420	420	180	-200	5°	3	2.413	460W	19W	5S	10.11mS	Φ 80x30	M56x1.5
BII-7725/600	600	179	-196	3.9°	5	1.500	946W	10W	2.0s	12.00mS	Φ 80x30	M56x1.5

Please refer to BII-7690 series transducer for 0.1 to 7.5 MHz flush mounted NDT Transducers.

Signal Type:	Spike (Negative or Positive), Pulsed SINE, Chirp, PSK, FSK, etc.; Pulsed Square Waveform. Duty Cycle \leq 10% and Pulse Width \leq 100ms at Maximum Input Pulse Power.
-3dB Beam Width:	1. Default: listed in the table above. 2. Bespoke. Specify when ordering.
Directivity Pattern:	Conical
Side Lobe	No Side Lobes at Beamwidth \leq 50°; -17.7dB at Beamwidth $>$ 50°.
Amplitude Shading:	1. Default: None. 2. Bespoke, side lobes \leq 30dB is available upon request for some BII-7725/xxx transducers. Contact BII for details. Note: -3dB beam angle of the main lobe increases with amplitude weighting/shading.
Temperature Sensor:	1. Default: No built-in temperature sensor.

	2. Built-in temperature sensor. When ordering, append TS to part number for integrating a temperature sensor in transducer.
Marine Sealants or Gasket:	BII does NOT provide sealing materials. Buyer may buy them from local stores of adhesives, boats, automobiles, and industry suppliers.
Operating Depth:	≤100 m, limited by the performance of the sealing materials (such as marine sealants or gasket) over the mounting hole. For deeper underwater deployment (maximum 300m), one option is that O-ring grooves are cut on the mounting wall and O-rings are used besides marine sealants or casting sealants. The surface finish of the flange against the mounting wall: 50.8 microns Ra, Linear tolerance +/-0.12mm.
Mounting Options:	Refer to Table 1.
Cable:	1. Two Conductor Shielded Cable (SC) 2. 50 Ω RG58 Coax (RG58)
Cable Length:	1. Default: 1m 2. Custom
Connector:	1. Default: Wire Leads (WL) 2. 50 Ω BNC Male (BNC) 4. MIL-5015 Style (5015) 5. Custom (custom)
Weight:	≥ 0.2 kg with 1 m cable. Actual weight depends on Mounting Parts, Cable Types and Length.
Operation Temperature:	1. Default: -10 °C to +60 °C or 14 °F to 140 °F. 2. Bespoke High Temperature Transducer: -10 °C to 120 °C, or 14 °F to 248 °F. Append HT to part number.
Storage Temperature:	-20 °C to +60 °C or -4 °F to 140 °F.

How to determine pulse width, duty cycle and off-time with input pulse power (peak power):

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 $\leq (MIPP * MPW * (120^{\circ}C - T) / 103^{\circ}C) / IPP$; T: Water Temperature in °C.
3. Duty Cycle $D \leq MCIP * (120^{\circ}C - T) / 103^{\circ}C / IPP$;
4. Off-time $\geq PW * (1 - D) / D$.

Impedance Matching at f _s :	BII6000 Bespoke Impedance Matching between transducers and power amplifiers. Order Separately as standalone devices.
	Phase Angle θ of Complex Impedance ≤ 20° at fs.
TR Switch Module:	BII2100 Transmitting & Receiving Switch Module with Built-in Preamp and Bandpass Filter. Order Separately as standalone devices.
Temperature Sensor:	1. Default: No built-in temperature sensor. 2. Built-in temperature sensor . Append -TS to part number (BIIxxxx-TS) for integrating a temperature sensor in the transducer.
Power Amplifier:	BII5000 Power Amplifiers for SONAR, NDT, HIFU. Order Separately as standalone devices.
Portable Transmitter:	BII8030 series portable acoustic transmitters.
Portable T/R System:	BII8080 series portable transmit and receive systems.

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

The TVR of the transducer is NOT affected with the cable length.

Receiving Sensitivity Loss Over Extension Cable (dB) = $20 * \log[Ch / (Ch + Cc)]$; Ch - Transducer Capacitance; Cc - Extension Cable Capacitance.

Array directivity function = (directivity function of array element) * (directivity function of array pattern).

Wiring Information

Transducer Wiring:	Shielded Cable	Coax, BNC.	Underwater Connector	MIL-5015 Connector	XLR Plug
Signal:	White or Red	Center Contact	Contact 2	Contact C	Pin 2
Signal Common:	Black	Shield	Contact 1	Contact B	Pin 3
Shielding and Grounding	Shield	Shield	Contact 3	Contact A	Pin 1

Please contact us for bespoke wirings of differential transducers such as dipole, quadrupole, multimode rings, and flextensional sources.

Table 1. Flush Mounting (Marine Sealant or Gasket) (FSM)

Acoustic Aperture	Thread	Housing Length L (mm)	Flange Diameter ΦD	Hex Nut	Mounting Wall Thickness	Fastening Torque
≤ Φ5 mm	M10x1.5	24.75	Φ18	Included	≤ (L - 14)	≤ 14 Nm
≤ Φ10 mm	M14x1.5	26.75	Φ22	Included	≤ (L - 16)	≤ 14 Nm
≤ Φ27 mm	M35x1.5	29.75, 40, 50, 80.	Φ59	Included	≤ (L - 13)	≤ 14 Nm
≤ Φ46 mm	M56x1.5	29.75, 40, 50.	Φ80	Included	≤ (L - 13)	≤ 14 Nm

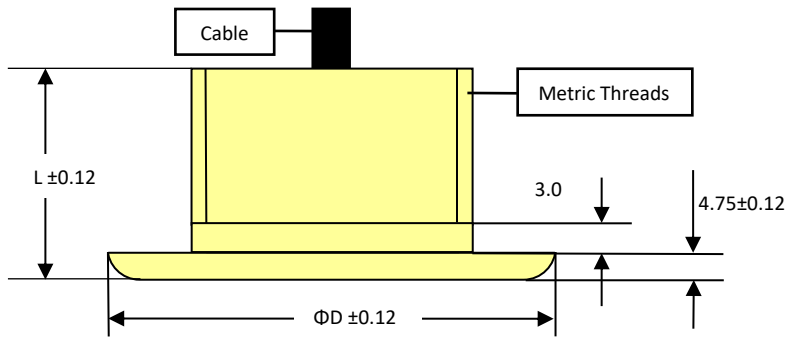
Counterbored Mounting Hole is the best.

Maximum Operating Depth: 100 m to 300 m, limited by the performance of the sealing materials.

BII does NOT provide sealing materials such as marine sealants and gaskets. Buyer may buy these materials from buyer's local stores of adhesives, boats, automobiles, and industry suppliers.

Threadlockers are recommended to prevent threaded fasteners from loosening due to shock and vibration. NOT provided by BII.

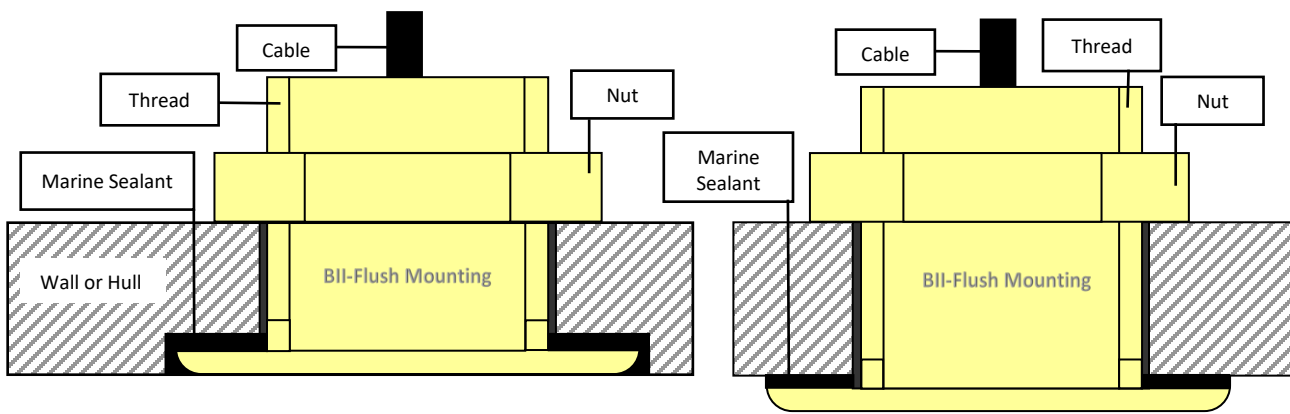
Physical Size (Dimensional Unit: mm): Nut is included with shipment.



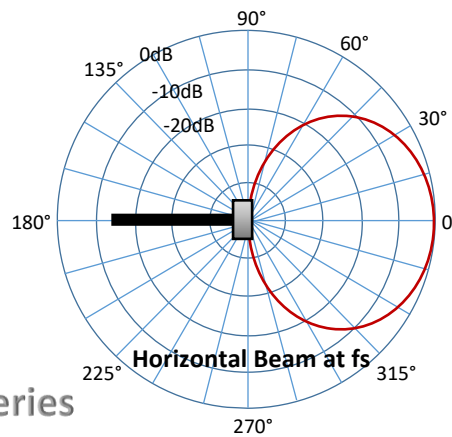
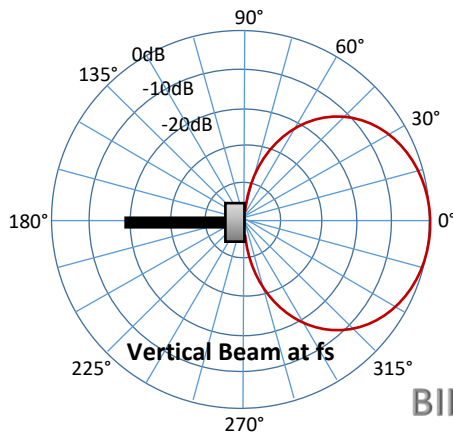
Installation/Mounting

Flush Mounting with Counterbore Hole.

Low-profile Flush Mounting



Directivity Pattern: illustration ONLY. Please refer to -3 dB beam width and side lobes of a specific transducer.



BII-7720 Series