How to Drive Normalized Transducers with Nominal Impedance 50/60/70/75/100Ω

1. Impedance Matching between Power amplifiers and Transducers.

The cable has adverse effect on power transmission between the power amplifier and the transducer caused by cable’s resistive, capacitive and inductive performance in different frequency range. Transducer itself is resistive, capacitive and inductive load at different frequency range. Therefore, an impedance matching unit is a necessary part between power amplifier and transducer for maximum power transmission and the best power factor.

**Standalone Impedance Matching**

![Diagram of Standalone Impedance Matching](image)

There are some drawbacks about this setup: a. Besides voltage ratings of transducer’s materials inside, driving voltage of transducer is limited by cable voltage rating; b. More works such as grounding and insulation need to be done on operating safety with high driving voltage. c. Impedance mismatch exists between cable and transducer. This mismatch can not be ignored in high frequency range which causes voltage attenuation and low power factor.

**Impedance Matching Unit Integrated inside Transducer Housing**

![Diagram of Impedance Matching Unit Integrated inside Transducer Housing](image)

Generally, the driving voltage over the transducer cable is much less than the one in **Standalone Impedance Matching** Setup. The voltage step-up is done inside transducer housing. Impedance matchings among power amplifier, cable and transducers result in optimum power delivery to the transducer from power amplifier.

2. Cable Impedance

BII stocks cable with characteristic impedance 50, 60, 70, 100Ω. Please contact BII for details about impedance matching.

3. Driving normalized transducers with BII components.

Impedances of many commercial transducers (including BII transducers) are normalized to be 50Ω, 60Ω, 70Ω, 75Ω or 100Ω with phase angle $\theta = 0° ± 30°$ (or tighter tolerance).

**Transmitting Sound**

![Diagram of Transmitting Sound](image)
Transmitting and Receiving Sound

Signal Generator
Computer + DAQ
Microcontroller
BII-4000 Series
BII-8000 Series etc...

BII-5000 Series
Power Amplifier

BII-6000 Series
Impedance Matching Network

BII-2100 Series
T/R Switch

Computer + DAQ
Oscilloscope
Digital Recorder
BII-8000 Series etc...

BII-8080 Series
Underwater Acoustic Transmitter and Receiver

Computer + DAQ
Oscilloscope
Digital Recorder
BII-8000 Series etc...

BII-8030 Series
Underwater Acoustic Transmitter

Normalized Transducer:
Nominal Impedance
50Ω, 60Ω, 70Ω, 75Ω or 100 Ω

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