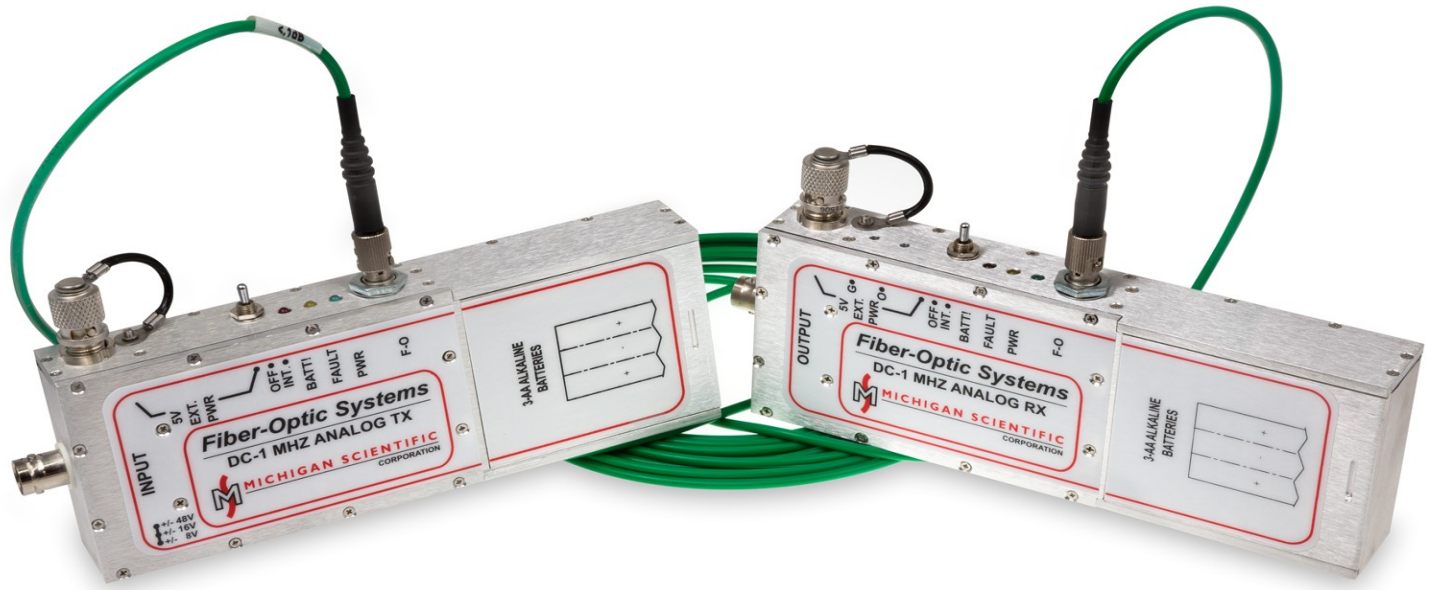
Fiber-Optic Systems

User Manual



Model: FO-HBST & FO-HBSR

DC to1 MHz EM Hardened Analog Signal Link

Michigan Scientific Corporation

1. Description

The FO-HBST (transmitter) and FO-HBSR (receiver) form a versatile fiber-optic, analog signal pair. A DC to 1 MHz voltage signal is monitored or sourced to the device under test (DUT) by connecting either the FO-HBST or FO-HBSR. Fiber-optic cable connects to the corresponding module to monitor or source the desired signal remotely.

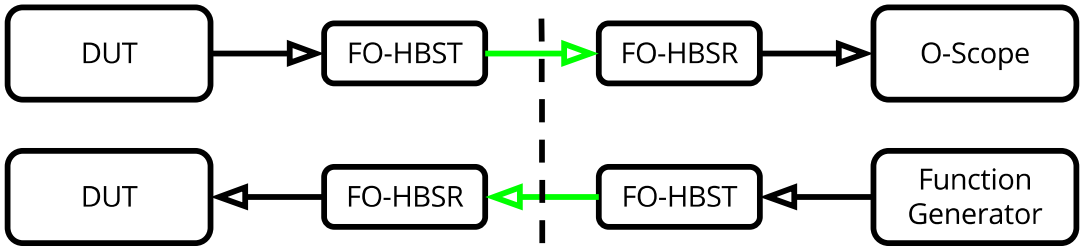


Figure 1: Setup to source or monitor a signal

Full-scale input level on the transmitter is easily changed by a 3-position slide switch to ±8 V, ±16 V, or ±48 V. The receiver outputs up to ±16 V regardless of the input range.

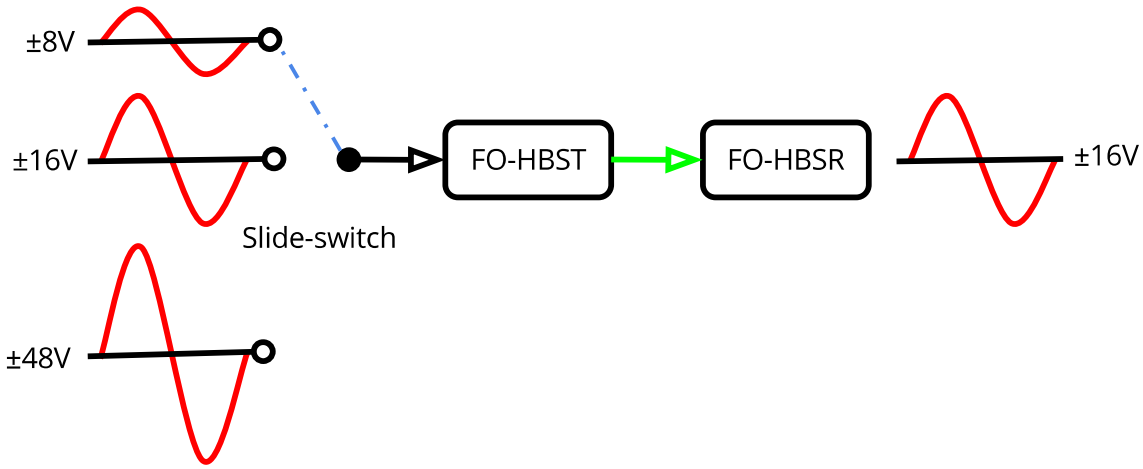


Figure 2: Full-scale input selection

Each module may be powered by 3-AA batteries or an external power adapter.

Both modules have shielding and custom input/output filtering that provides high immunity from electromagnetic interference (EMI), electromagnetic pulse (EMP), or high voltages associated with plasma research. This allows for rigorous electromagnetic compatibility (EMC) testing/engineering. The satellite modules are validated for EMC up to 200 V/m (46 dBV/m) at 500 kHz to 18 GHz and 600 V/m (pulsed 5 % duty-cycle, 5 µs rise-time) 1 GHz to 2.5 GHz.

2. Setup

Either the FO-HBST or FO-HBSR may be connected to the DUT to measure or source a signal. Connect the FO-HBST to FO-HBSR with ST multimode fiber-optic cables. The module connected to the DUT must be battery powered. The remote module may be powered by batteries or the external power adapter.

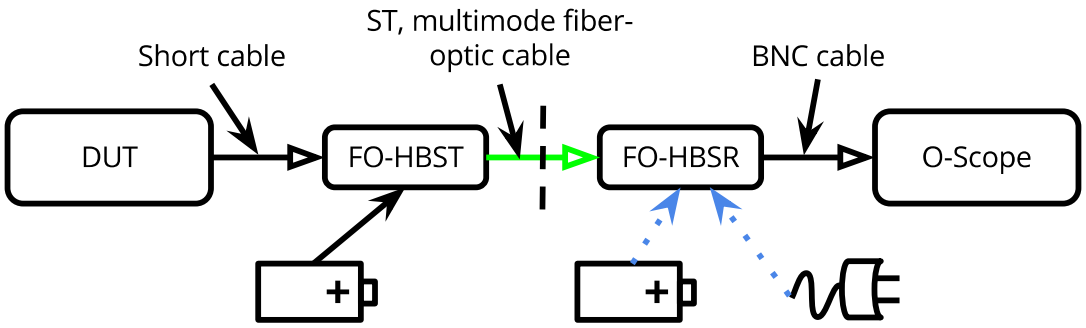


Figure 3: Setup connections

***WARNING*:** The module connected to the DUT must be separated from the ground plane on a 50 mm thick foam block. The module enclosure cannot be touching any other piece of testing equipment (another module, cable harness, etc.).

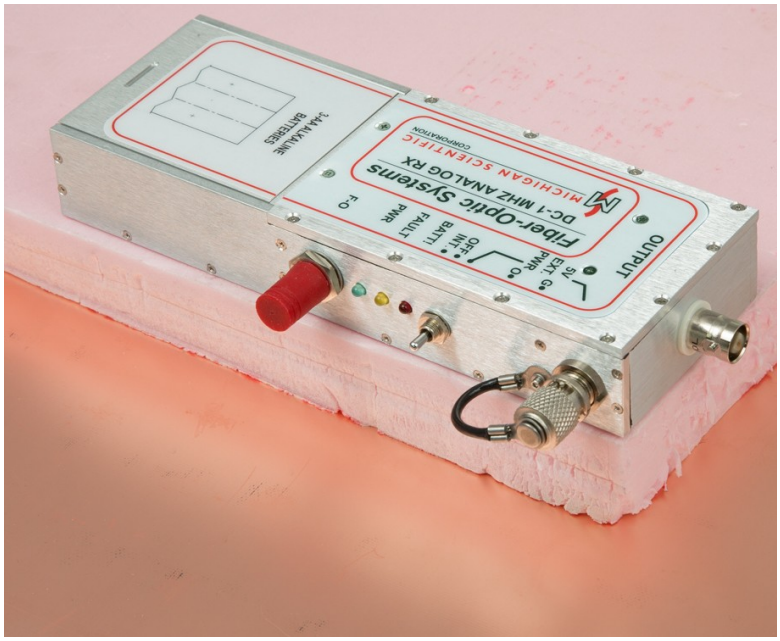


Figure 4: FO-HBST on 50 mm of foam

***WARNING*:** The FO-HBSR can only source a maximum of 16 mA. Do not connect the FO-HBSR to a low impedance device, such as a 50 Ω terminated oscilloscope.

Set the full-scale input range on the FO-HBST as shown in Figure 5.

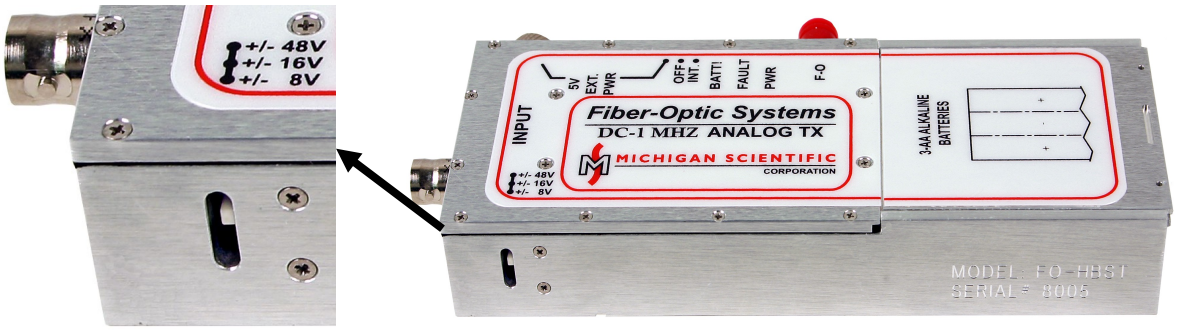


Figure 5: FO-HBST input range switch

Note: Changing the FO-HBST full-scale input changes the system gain; ±16 V has a gain of 1, ±8 V has a gain of 2, and ±48 V has a gain of 1/3.

3. Operation

The FO-HBST and FO-HBSR were designed for use with alkaline batteries. The red **BATT!** indicator illuminates when the alkaline batteries need replacement. NiMH may be used but the low-battery indicator will not work as intended. To power the unit select **INT.•** for internal batteries, **5V EXT. PWR** for the external power adapter, or **OFF•** to turn off.

Note: Only the manufacturer supplied power adapter may be used.

3.1. FO-HBST

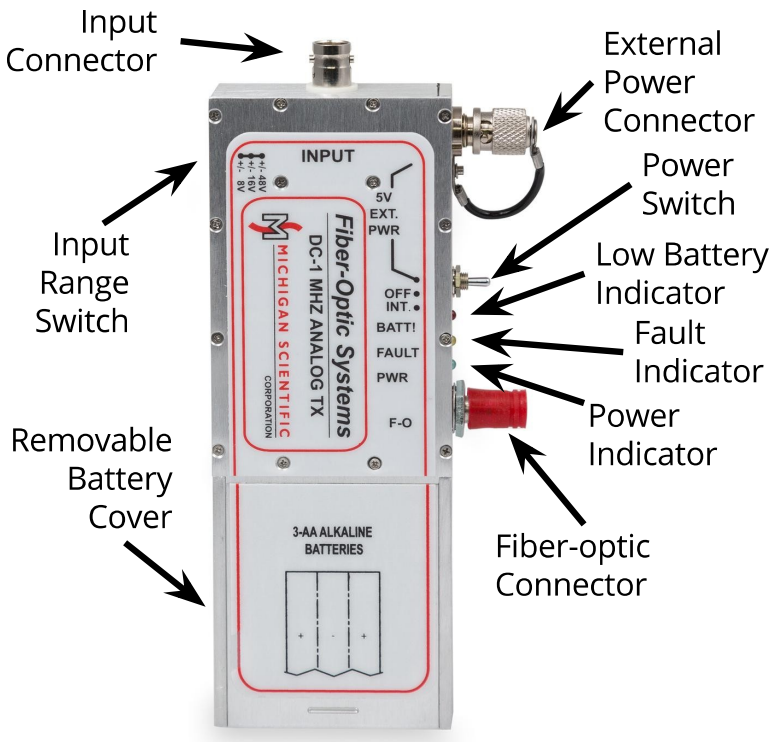


Figure 6: FO-HBST point out

The yellow **FAULT** indicator shows when the input voltage exceeds full-scale.

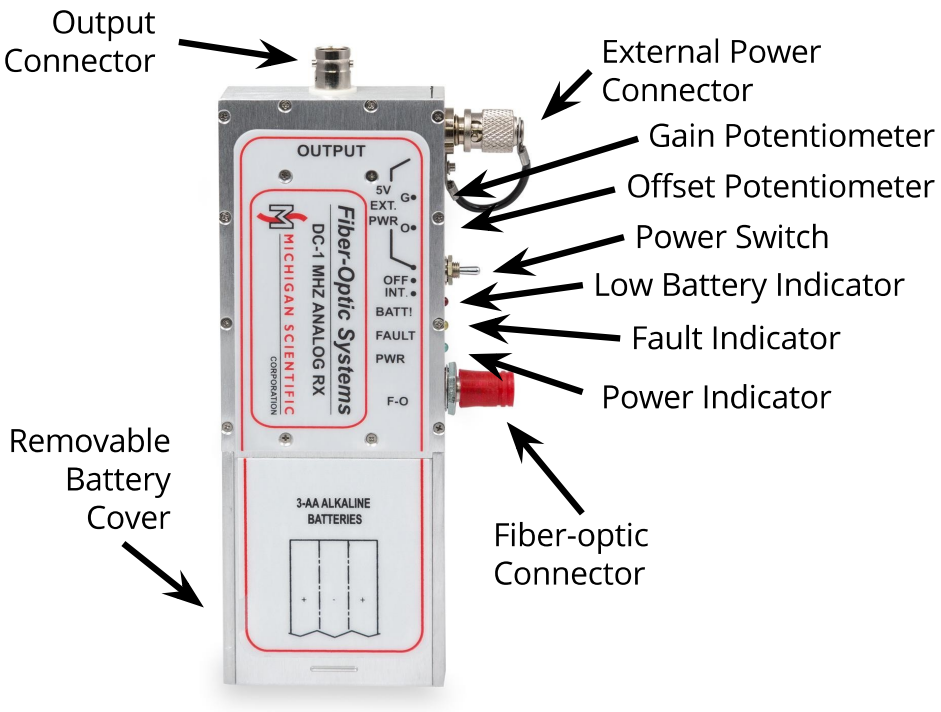


Figure 7: FO-HBSR point out

To adjust the gain (**G•**) and offset (**O•**) potentiometers, carefully insert the provided flat head screw driver and turn. Offset and gain are set by following the User Adjustment Procedure. The yellow **FAULT** indicator will trigger if there is no fiber-optic cable connected or the fiber-optic cable is causing too much optical loss. Test the fiber-optic cable for optical loss greater than 10 dB.

***WARNING*:** The FO-HBSR potentiometers can be damaged by applying too much force.

4. User Adjustment Procedure

Note: Perform a user adjustment at the start of each testing day and when the FO-HBST input range is changed.

1. Turn on both the FO-HBST and FO-HBSR and allow for 5 min to warm-up
2. Note the FO-HBST input range setting (±8 V, ±16 V, or ±48 V)
3. Connect a digital volt meter (DVM) to the FO-HBSR output
4. Connect a voltage reference to the FO-HBST input
5. Set the voltage reference to apply 0 V to the FO-HBST input
6. Adjust the FO-HBSR offset potentiometer until output indicates 0 V on the DVM
7. Apply a known voltage that is 75 % of full-scale to the FO-HBST input

   Note: Use 6 V, 12 V, or 36 V for ±8 V, ±16 V, or ±48 V respectively
8. Adjust the FO-HBSR gain potentiometer until output reaches 12 V (75 % of 16 V) on the DVM
9. Repeat from step 5 until within specification

5. Technical Support

For technical support please contact:

Tel: +1-248-685-3939 Fax: +1-248-684-5406

fiber@michiganscientific.com

MICHIGAN SCIENTIFIC CORPORATION
321 EAST HURON STREET
MILFORD MI 48381-2352
USA

6. Specifications

Transmitter (FO-HBST)

Voltage range	slide-switch selectable to ±8 V, ±16 V, ±48 V
Impedance (±8 V, ±16 V, ±48 V)	72.5 kΩ / 145 kΩ / 435 kΩ
Over-voltage protection	±100 V continuous, ±350 V peak
Resolution (±8 V, ±16 V, ±48 V)	4 mV / 8 mV / 24 mV
Battery life	25 h

Receiver (FO-HBSR)

Noise	10 mV RMS
Impedance	100 Ω
Maximum current	16 mA
Battery life	16 h (load dependent)

System General

Signal type	differential input/ signal-ended output
Signal connector	BNC
Bandwidth (10 V peak to peak sine)	1 MHz (-3 dB)
Flatness (10 V peak to peak sine)	±1 dB up to 500 kHz
Rise/fall times	300 ns (20 % to 80 %)
End to end delay	1.8 µs
Offset voltage drift	0.5 % full-scale across temperature range
Optical connector	ST
Optical cable	multimode
Operating temperature	-12 °C to 85 °C
Power requirement	3-AA alkaline batteries or external adapter
Dimension (L x W x H)	172 mm x 76 mm x 25 mm
Weight	285 g
EMC	300 V/m 500 kHz to 1 GHz 200 V/m 1 GHz to 18 GHz 600 V/m pulsed 1 GHz to 2.5 GHz