Noisecom

Data Sheet

NBS-Series
Primary Noise Standards

The NBS-Series are calibrated standards based on the primary fundamental physic constants of thermal noise and blackbody radiation and provide the ultimate accuracy in the measurement of extremely low noise figures (noise temperatures). Simple to use, the NBS-series is an ideal solution for noise source calibrations, radiometer test and verification and low noise amplifier tests.

Noisecom's primary noise broadband standards are based on the primary physic constants of thermal noise and blackbody radiation. They are designed by W.C. Daywitt, a referenced designer of NIST's primary noise standard. Meticulous engineering has been deployed in the development and further enhancement of accuracy and user friendliness of these horn-type primary standards.

The NBS-Series eliminates annual single frequency calibrations as it is a primary noise broadband standard by nature.

The precision waveguide horn with known insertion loss is monitoring a blackbody embedded in a cryogenic, liquid nitrogen bath. The benefits of this construction are better accuracy, lower noise temperature and improved repeatability.

The insertion loss of the horn is commonly less than that of a conventional waveguide termination embedded in liquid nitrogen. The lower insertion loss provides a desirable lower effective noise temperature. In turn, the accuracy becomes two to three times better due to the lower loss and the fact that the horn physically is at room temperature, while the received thermal noise is that radiated by the liquid nitrogen embedded microwave absorbing material, thereby eliminating the uncertainty associated with any temperature gradient. Reflection losses are at room temperature and therefore make integration with switches and room temperature terminations easier.

The NBS-Series is designed with paths directing the boil-off of the liquid nitrogen to purge air, moisture vapor and carbon dioxide out of the microwave cavity. This automatic nitrogen purge eliminates the need for dangerous and costly helium equipment.

The noise standards consist of a cavity/reservoir with associated circulating water bath. One water bath can drive up to three cavities/ reservoirs if located within 10 feet (3 meters).

A precision barometer and a precision thermometer are also offered and required for accurate measurements.

The Noisecom primary noise standards are available in waveguide bands from 18 GHz to 400 GHz. Each additional frequency range can be covered by merely replacing the horn. The NBS-Series may thereby adapt from project to project, extending the value of the system and providing savings on future investments.

Noise and Radiometer Calibration Systems

Noise and radiometer calibration systems further consist of an optional low loss switch and an optional ambient temperature termination.

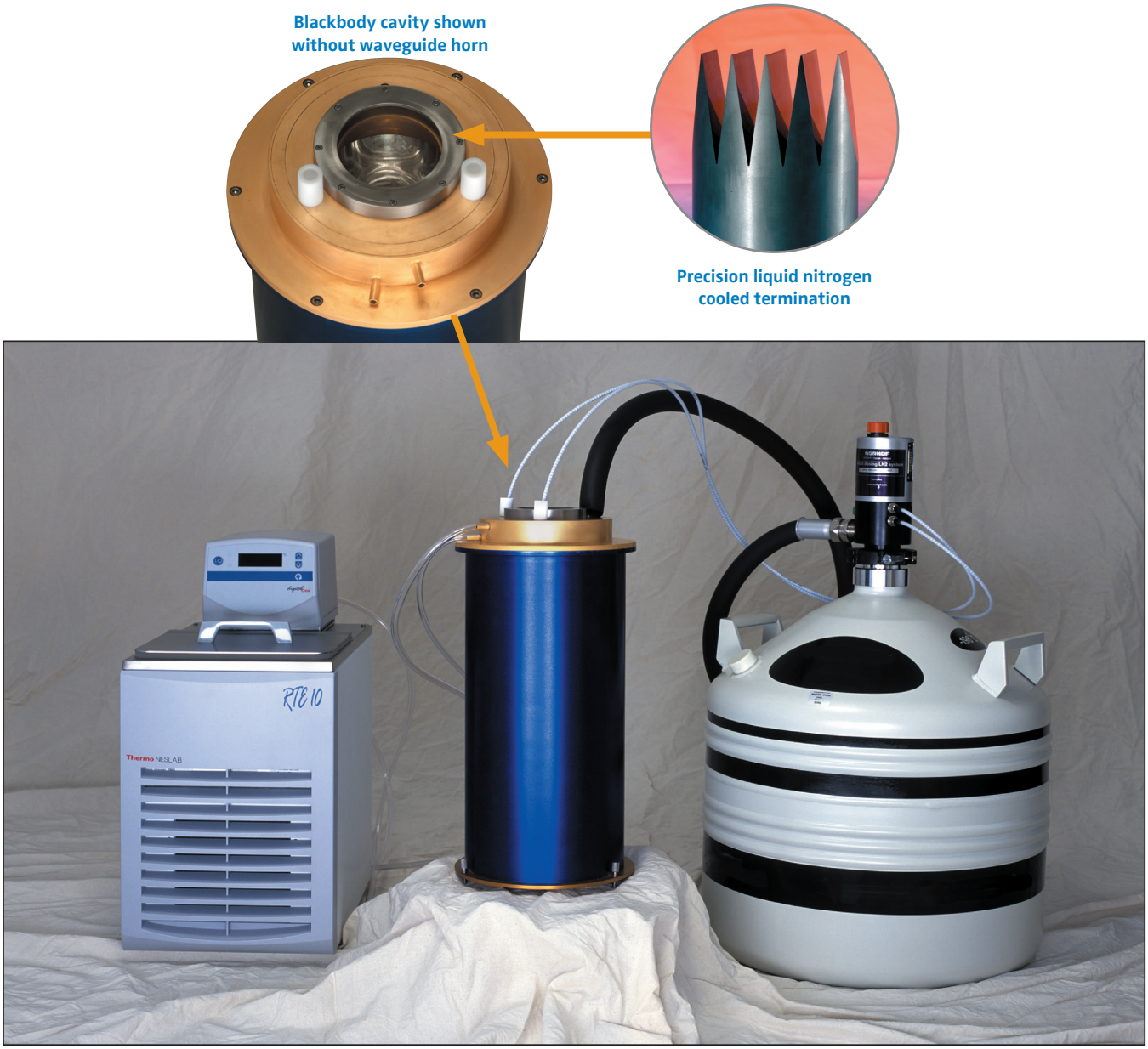
Ambient temperature terminations are preferred as hot noise temperature sources rather than heated terminations as the influence on the accuracy of the thermal noise temperature due to the reflections between the termination and the switch is thereby eliminated.

Benefits:

- 2 to 3 times better accuracy
- Expandable frequency range at minimal additional cost through replacement of broadband horns
- 2 K lower noise temperature
- Automatic Nitrogen purge eliminates need for dangerous and costly helium equipment
- Less reflection loss uncertainty
- Primary calibration standards
- Eliminates cost and time of annual calibrations

Applications

- Noise temperature calibrations
- Noise source calibrations
- Radiometer reference sources
- Low noise amplifier (LNA) noise figure (NF) measurements
- Antenna system effective input noise temperature tests
- SATCOM earth station conformance verifications


Blackbody cavity shown
without waveguide horn
Precision liquid nitrogen
cooled termination
RTE 10
Thermo NESLAB

Model	Frequency (GHz)	Output Noise Temperature (K)	Temperature Accuracy* (K)	Waveguide
NBS-26	18.0 – 26.5	75.97	+0.24/-0.34	WR-42
NBS-33	22.0 – 33.0	75.93	+0.24/-0.36	WR-34
NBS-40	26.5 – 40.0	75.98	+0.25/-0.39	WR-28
NBS-50	33.0 – 50.0	76.03	+0.27/-0.43	WR-22
NBS-60	40.0 – 60.0	76.10	+0.29/-0.47	WR-19
NBS-75	50.0 – 75.0	76.04	+0.31/-0.52	WR-15
NBS-90	60.0 – 90.0	76.00	+0.33/-0.56	WR-12
NBS-110	75.0 – 110.0	75.99	+0.37/-0.64	WR-10
NBS-140	90.0 – 140.0	76.17	+0.44/-0.77	WR-8
NBS-170	110.0 – 170.0	76.22	+0.51/-0.90	WR-6
NBS-220	140.0 – 220.0	75.99	+0.61/-1.06	WR-5
NBS-260	170.0 – 260.0	75.76	+0.68/-1.19	WR-4
NBS-325	220.0 – 325.0	75.30	+0.81/-1.40	WR-3
NBS-350	325.0 – 350.0	73.81	+0.94/-1.42	WR-2.8
NBS-400	260.0 – 400.0	73.90	+1.53/-2.27	WR-2.8
NBS-500	330.0 – 500.0	74.42	+2.43/-3.57	WR-2.2

*Effective output noise temperature and accuracy data are supplied with each individual horn at 628 mmHg and 293K.

Accessories included:

Wooden horn case, hoses, couplings and cables.

Ordering Information

Model Number	Applications
NBS-000	Cavity and Dewar Assembly.
NBS-001	PC-based Controller with Circulating Water Bath, Precision Thermometer and Barometer
NBS-xxx	Horn per above table
NBS-002	Liquid Nitrogen Resevoir and Automatic Filling System

Options

NBA-xxx	Ambient temperature termination and switch assembly (associated with and using the same frequency range codes as the horns in above table)

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Note: Specifications, terms and conditions are subject to change without prior notice.

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