PRODUCT DATASHEET

LTMAS Cooling Cabinet

The Low-Temperature Magic Angle Spinning (LT-MAS) Cooling Cabinet, currently in its 3rd generation, provides LT-MAS capabilities for a variety of applications in solid-state NMR. The most common application is Dynamic Nuclear Polarization (DNP). The LT-MAS Cooling Cabinet is also regularly used with low-temperature probes without DNP.

The LT-MAS cooling cabinet uses liquid nitrogen as a cooling source. To maximize cryogenic efficiency and to minimize temperature gradients along the rotor containing the sample substance, it provides cold VT gas, as well as cold gas streams for the MAS turbine and the rotor bearings. Since pressurized nitrogen gas is used to drive the MAS turbine and to the supply the bearings with gas, special precautions need to be taken to avoid droplet formation in these gas streams when the gas is cooled to temperatures close to its dew point. Bruker's LT-MAS cabinet thus uses an advanced heat exchanger concept which combines high thermal efficiency with superior stability and reliability of the MAS rotation.
In combination with a Bruker MAS III unit, the LT-MAS cabinet enables sample cooling to 95 K with probe-dependent spinning speeds up to 15 kHz (with 3.2 mm MAS rotors) and 65 kHz (with 0.7 mm MAS rotors).

The LT-MAS Cooling Cabinet provides Ethernet™ based communication to TopSpin and console electronics. The Cooling Cabinet controls the overall LT-MAS environment (temperature, pressure and flow) for the VT, bearing and drive channels, as well as automated liquid nitrogen fills and special features for DNP integration (e.g., interlocks for Gyrotron or Klystron microwave sources).

Bruker LT-MAS Cooling Cabinet (3rd generation)

Model:
LTMAS Cabinet, PH2700_01, W178371

Features:

- Full integration into the Bruker spectrometer environment, most importantly safety interlocks
- Automated spin-up, regulation, spin-down and cold insert/eject with separate MAS III for the full range of probes (0.7 - 3.2 mm)
- Pressure regulated heat exchanger chambers for optimal MAS stability
- TopSpin GUI for LT-MAS operation with MAS III:
  - Remotely operable via connection to TopSpin computer
  - Real-time feedback from MAS III to LT-MAS cabinet parameters
  - Configurable probe-specific LT-MAS or RT spinning profiles
- Front-panel touchscreen with convenient GUI for control at the cabinet that mirrors functionality of the TopSpin GUI
- Vacuum-insulated transfer line from LN2 supply to heat exchanger for best thermal efficiency
- 2nd generation LT-MAS cabinets that are up-to-date on maintenance & service can be upgraded. 1st generation cabinets cannot be upgraded.

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Specifications and Requirements:

General Features:

Temperature control range	95 K - 300 K
User interface	Equivalent operation via front-panel touchscreen or TopSpin user interface (MASdisp)
Remote control	Connection to TopSpin / NMR console
Compatibilities	• Console: Avance IIIHD or Avance NEO • TopSpin: 3.7 (or higher) and 4.3 (or higher), respectively • Magnets: Shielded 400 – 1200 MHz Bruker NMR magnets • Probes: Bruker LT-MAS, DNP/LT-MAS, static LT- and static DNP/LT-probes • Spinning Control: MAS III Unit

Liquid Nitrogen and Gas:

Nitrogen gas requirements	For 0.7 mm, 65 kHz MAS: > 180 L/min STP @ > 6 bar For 3.2 mm, 12.5 kHz MAS: > 120 L/min STP @ > 6 bar Supply pressures are specified at the input of the MAS III controller. The maximum pressure must not exceed 8 bar.				
Liquid nitrogen consumption	Rotor ø	3.2 mm	1.9 mm	1.3 mm	0.7 mm
	Flow (L/h STP)	7 – 10	9 – 12	9 – 12	10 – 13
	MAS Rate	5 – 15 kHz *	10 – 25 kHz	15 – 40 kHz	20 – 65 kHz
	* 12.5 kHz max recommended when using sapphire 3.2 mm rotors.				
Nitrogen gas exhaust (probe exhaust and heat exchanger reservoir boil-off)	Rotor ø	3.2 mm	1.9 mm	1.3 mm	0.7 mm
	Flow m^3/h (STP)	15	18	18	20
	MAS Rate	15 kHz *	25 kHz	40 kHz	65 kHz
	* 12.5 kHz max recommended when using sapphire 3.2 mm rotors.				
LN2 monitoring & refill	Automatic LN2 level controller. Flexible refill line with solenoid valve (vacuum insulated LN2 transfer line, length = 3 m).				
LN2 supply	• A low-pressure liquid nitrogen tank with max. 2 bar pressure and ≥ 200 liters capacity (e.g. Bruker AH0081) is required. • A suitable dedicated supply from an external LN2 bulk tank may also be used. This supply is subject to same operational conditions (e.g., max 2 bar). • Safety measures such as oxygen monitors and a LN2 safety shutoff valve are under the responsibility of the customer.				
Nitrogen gas supply purity	≥ 99.999% N_2 (input requirement)				

Power Requirements & Dimensions:

Line voltage	230 VAC 50/60 Hz +/- 10%
Power ratings	2500 W
Cabinet dimensions	188 cm (H) × 101 cm (D) × 80 cm (W) on casters
Cabinet Weight	*ca.* 500 kg with full LN2 reservoir / heat exchanger
Shipping Crate dimensions	197 cm (H) × 114 cm (D) × 94 cm (W)

Specifications are valid as of June 13, 2024. Technical data and specifications subject to change without notice.

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