# SUPERCONDUCTING FOURIER NMR SPECTROMETER AVANCE III™ 400 MHz

High Performance Digital NMR Spectrometer equipped as follows:

**MAGNET SYSTEM / LOCK**
**High performance actively shielded Ultra Shield Plus™ ASCEND magnet, Ultra Long Hold Time**
- 54 mm bore (operation field at 9.397 Tesla)
- Helium hold time >365 days
- Helium level meter with alarm function for low helium level

Standard magnet stand with vibration damping by rubber pads; frequencies damped above 30 Hz

**SHIM SYSTEM/LOCK CHANNEL**
**Bruker Orthogonal Shim System (BOSS 1)** with 20 shim gradients, low current and low heat dissipation design for optimum homogeneity. (300 & 400 Mhz)

**Bruker Smart Magnet Control System (BSMS)** for shimand lock control and Digital Lock™ control unit, including:
- Digital lock frequency generation with variable frequency for operation at selectable fixed field
- Digital quadrature lock receiver
- Fast field adjustments with sample-and-hold circuit
- Shim control boards (SCB) with ultra-stable highprecision, low-noise shim current sources
- BSMS functions under full mouse control. Can be used remotely.
- 2H Transmitter equipped with 3W 2H amplifier and

**RCB for 3 axis 2H gradient shimming.**
**STAINLESS STEEL CABINET Micro Bay RF SECTION**
**Frequency Generation, Digital Control, and Acquisition System including:**
**Fast Ethernet™ based NMR LAN** for direct connection of host computer and all main spectrometer components.
**Pulse generating system** with a time base of highest precision for ultimate timing accuracy; timing resolution is 12.5 ns.
**Superior frequency and pulse generation for two channels (1 and 2) by digital frequency synthesis** (by proprietary Signal Generation Unit SGU),
- Frequency range each 6-430 MHz; for precise digital generation of phase (DDS),
- Amplitude and frequency.
- Provides <0.01° phase resolution and <0.005 Hz frequency resolution.
- Event time for change of phase, frequency and amplitude 25 ns.
- Coverage of the entire NMR frequency range at the specified field above 6 MHz.
- Includes waveform memory for pulse shaping in frequency, amplitude and phase and composite pulse decoupling generator for synchronous and asynchronous operation.
- Allows generation of 2 independent frequencies with separate phases and amplitudes within 2.5 MHz bandwidth by each SGU (channel).

**Receiver control unit for NMR (DRU)** signal accumulation with real-time digital filtering in combination with oversampling technology. The fast RISC coprocessor with buffer memory ensures flexible real-time data management.
**High-performance digitizer** for superior and highly flexible data acquisition at ultimate digitizer dynamic range of > 21 bit at 10 kHz spectral width.
**Digital quadrature detection** for complete elimination of quad-spikes, artifacts in the center of the spectrum.
**TRANSMITTER / RECEIVER SYSTEM**
- 2-Channel Amplifier System including: two high performance linear amplifiers (14–400 MHz) for observation or decoupling.
- Pulse power High Range, max. 50 W;
- Pulse power X range, max. 135 W
- Solid state power control for both channels over

the entire power range; compact design. Includes routing capabilities for frequency / amplifier selection under full computer control.

**ATR transmitter/receiver system** with high dynamic range, computer controlled indirect detection capability, quadrature detection.

**Multilink™ HPPR/2 Preamplifier (compatible with Bruker Cryoprobeheads™)**

- 1H preamplifier, low noise GaAs design
- Broadband preamplifier
- 2H preamplifier for lock and 2H observation
- Microprocessor control
- Built in tune/match display.

**NMR WINDOWS 7 WORKSTATION**

**HP Z400 workstation for the use with TopSpin software, equipped as follows:**

- Model: HP z400
- Processor: Intel Xeon Dual Core W3505, 2,53 GHz
- Chipset: Intel X58 Express chipset
- Controller: Integrated SATA Controller 3Gb/s, RAID 0,1,5,10
- Slots: 2x PCIe Gen2 (x16) / one used, 1x PCIe Gen2 (x8 mechanical, x4 electrical),1x PCIe Gen1 (x8 mechanical, x4 electrical) / used by 2nd network card, 2x PCI
- Memory: 4GB (2x 2GB) DDR3-1333 ECC

Video card: Graphic adapter NVIDIA Quadro FX580, 512 MB, PCI-E or equivalent

- Network adapters: 1x Broadcom 5764 on Board 10/100/1000 Mbits/s (NET) , 1x HP/Broadcom 5761 PCI-E network adapter 10/100/1000 Mbits/s (SPECT).
- Sound: High definition integrated Realtek ALC262, on board, internal loudspeaker.
- Ext. I/O-ports: 1x serial, 2x USB 2.0 (front) 6x USB 2.0 (rear), 1x PS/2 keyboard, 1x PS/2 mouse, sound in/out
- Hard disc: 500GByte, 3Gb/s, NCQ, SATA, 7200rpm.
- DVD drive: HP 16X DVD+/-RW DL SuperMulti
- Mouse: HP Optical Scroll Mouse, USB.
- Keyboard: HP Enhanced Keyboard USB US English or UK English.
- Case: Mini-tower. Dimensions: 44.9 x 17.0 x 45.7cm (h x w x d).
- Bays: 6 storage bays: 2 internal 3.5-inch (1 used, 1 free), 3 external 5.25-inch (2 used, 1 free), 1 external 3.5-inch (free).
- Power supply: Dual range 100-120/220-240V, 475W, 50/60Hz.
- Warranty: 30 months on-site.
- The standard operating system is „Microsoft Windows 7 32bit Prof.”. Downgrade to XP 32 Business is possible.
- Pre-installed software: - “Kaspersky Internet Security” 2010 incl. one year support (preinstalled,). Anti Malware software.
- Drive image software “ACRONIS True Image Home 2010 engl."
- Pre-installed BRUKER software: - TopSpin
- Without floppy drive
- **22" TFT monitor**
- BASH Bruker Advance Service Handbook containing all schematics.

**NMR Suite (TOPSPIN) including:**

- NMR data acquisition program (arbitrary dimensions) and processing and display program for 1D, 2D, 3D,4D for liquid and solid state experiments.
- ICON NMR, automation program used with and without sample changer.
- TOPSPIN-PLOT, data printing program.
- NMRSIM, Experiments simulation program for 1D and 2D including shape pulses and gradient simulation.
- NMRGUIDE NMR encyclopedia interactive HTML base guide for the study and understanding of NMR.

**Computer desk for host computer** (workstation) and for printer/plotter
**HP Laser Jet** or equivalent for printing of text and spectra, single sheet, DIN A4 format, black and white incl. cable.

**Helium Transfer Line for the helium refill of the magnet.**

**Temperature Control Unit**
**B-SVT Bruker Smart multichannel Temperature**
**Control System with digital smart VT sensor interface and enhanced gas flow supervision.**
- Connects to thermocouple and heater incorporated into Bruker probes.
- All functions under full computer control. Temperature settability +/-0.1ºC.
- Temperature measurement precision +/-0.01ºC (with +/-1ºC room temperature stability).
- Maximum temperature 200ºC (400ºC and higher with optional BVTB-3500 booster)

**BSCU unit for temperature control of HR and CP/MAS**
probeheads to minimum 0°C including BSVT interface.
Transfer line length 2m.

**Gradient Accessory**
**GRASP II accessory**; z-gradient electronics for Avance spectrometers consisting of gradient control unit (GCU) and 10A amplifier, for probeheads equipped with actively shielded z-gradient coil. Capability of gradient pulse strength of up to 50 Gauss/cm.

**PROBEHEADS**
**BBFO-Z plus broadband Observe probehead,** BB + 19F Observe /decoupling; standard range BB=31P-15N and 1H observe/decoupling, 2H lock, 5 mm sample diameter.
**Equipped with gradient coil Z**. Maximum gradient strength of up to 55 Gauss/cm.
**Operating temperature range** from –150º up to +180º with 0.1º precision.
**ATMA (Automatic Tuning and Matching)** for both observe and decoupling channels

**AZBBI-Z broadband inverse probehead,** 1H observe/decoupling , 2H lock, BB decoupling/observe standard range BB=31P-15N, 5 mm sample diameter.
**Equipped with gradient coil Z**. Maximum gradient strength of up to 55 Gauss/cm.
Operating temperature range from –150º up to +180º with 0.1º precision.
**Equipped with Automatic Tuning and Matching System ATMA**
**Upgrade of the existing amplifier to BLAXH300/100**
**Amplifier System needed for CPMAS operations including:**
- high performance linear amplifier for observation or decoupling of 1H or 19F, with 100 W pulse power, max. 35 W average power in the range of 1H/19F
- high performance linear amplifier for the multinuclear range, with 300 W pulse power, max. 30 W average power in the range of 6-365 MHz.

Solid state power control for both channels over the entire power range. Includes routing capabilities for frequency / amplifier selection under full computer control.
**Fully automated pneumatic unit featuring:**
- automated spinning up and down of rotors,
- precise spinning rate stabilization,
- automated eject,
- trigger output for synchronization with rotation,
- remote control by RS232C interface for automated operation,
- manual keyboard for local operation, and status indicator

**MAS Rotor transfer system** for 4 mm rotors.
**CPMAS Accessories**
**VTN CP/MAS Probehead, SB, broadband CPMAS probehead with BB range 15N-31P + 1H separated channel.**
- Rotor size 4mm,
- Temperature range -50° - +120°C,
- Including 3x standard zirconia's rotors.

- 1 x Filter 1H Pass High Power.
- 1 x Filter Band Pass (15N up to 31P) High Power.

**MAS accessory set for handling of samples including:** spoon, mortar and pestle
**Rotor for CPMAS in zirconium**, including 2 x KEL-F cap and 1 x Boron Nitride for each rotor.
**UPS with 8 KVA output power.**

**ATLAS COPCO SF2 8P Air Oil free Compressor including Absorption Air dryer CD6**
**Compressor:**
Max air flow: 180 liters /minutes at 5 bar.
Max pressure 7 Bar
Air buffer tank 100 liters
Oil free scroll technology.
Automatic water drain.
Power supply country specific.
Includes additional refrigeration air dryer for above compressors for tropical environment
**Air Dryer:**
Maximum flow 21 m3/h
Dew point -40 ºC
Designed for the use with highly sophisticated NMR experiments.

**Additional Network Processing licenses**
**TOPSPIN Processing license** including:
- **NMR data** processing and display program for **1D, 2D, 3D,** for liquid and solid state experiments.
- **TOPSPIN-PLOT**, data printing program.
- **NMRSIM**, Experiments simulation program for 1D and 2D including shape pulses and gradient simulation.