Bruker Avance NMR Systems

General

The comprehensive AVANCE family of digital NMR spectrometers was developed in direct response to the increasing demands of the NMR community for optimum performance and stability in a highly automated, easy to use instrument. Within the AVANCE series there is a virtual continuum of configurations from 200 to 800 MHz, optimized for high resolution, solids, liquids and imaging applications. Whatever the environment or application, there is an appropriate AVANCE model to choose from.

The following basic building blocks of the RF electronics are common to all spectrometers of the AVANCE series:

- Digital Lock
- Digital frequency generation and acquisition control
- Digital filtering and oversampling using digital signal processors (DSP)
- Digital signal routing
- High performance microprocessor controlled preamplifier
- High performance transmitter systems

The AVANCE spectrometer platform has been specifically designed to allow different configurations according to customer's requirements.

Avance Models

Depending on customer's requirements, a one or two bay electronic cabinet of the AVANCE model is selected. The one bay electronic cabinet, as well as the previous AVANCE DPX configurations, contains all electronics required for high resolution spectroscopy with 2 channels.

The standard two bay electronic cabinet, as well as the previous AVANCE DRX configuration, contains all electronics for high resolution NMR applications with the capabilities for expansion up to 8 RF channels. The standard two bay electronic cabinet can be expanded to a configuration optimized for NMR solids, previously named AVANCE DMX/DSX.

Avance DRX/ Two Bay Cabinet

AQX:

•The acquisition control system AQX generates all digital control signals as specified by the user's pulse program. The CCU runs as a "diskless UNIX" client and controls TCU, FCU's, RCU and GCU. The TCU controls all timings and pulses. The FCU's generate RF phases, frequencies, and control the RF amplitudes and modulation. Amplified, demodulated and digitized NMR signals are fed to the RCU which performs real time digital filtering. The optional GCU generates the gradient shapes for GRASP experiments.

AQR:

•The acquisition rack AQR contains all the RF/AF components for signal routing, transmitting and receiving purposes. The NMR signal is mixed down from RF frequency by the RX22 to audio frequency and then digitized by the ADC. The local oscillator frequency is derived from the LOT module. The RF frequencies are shaped by the ASU's, and routed to the appropriate RF transmitters. The RF transmitters are controlled by the ACB module. Routing and output power information is displayed on the BSMS keyboard.

Synthesizer:

•The excitation signal for each channel is generated by combination of the appropriate FCU and synthesizer.

RF Transmitter:

•The linear RF transmitters generate both pulsed and CW frequencies for each channel with appropriate amplitudes.

BSMS:

•The BSMS unit provides NMR sample control (SLCB), shim (SCB) and H0 current (LCB) control, houses the digital lock (LTX, LRX) and the optional gradient amplifier (GAB).

HPPR preamplifier module:

•The HPPR amplifies, filters and routes the NMR response signals from the probehead to the RX22 receiver. It switches the RF transmitter output to the probehead.

Probeheads:

•General information common to most probeheads can be found here. See appropriate NMR probehead documentation for details.

Magnet:

• Specific documents are supplied with each magnet.

Accessories:

•Temperature Controller (BVT3300), Sample Changers (Sixpack, BACS-60), GRASP and many other accessories can be installed optionally.

Avance DPX/ One Bay Cabinet

AQX/P:

•The acquisition control system AQX/P generates all digital control signals as specified by the user's pulse program. The CCU runs as a "diskless UNIX" client and controls TCU, 2 FCU's, RCU and GCU. The TCU controls all timings and pulses. The FCU's generate RF phases, frequencies, and control the RF amplitudes. Amplified, demodulated and digitized NMR signals are fed to the RCU which performs real time digital filtering and accumulation. The optional GCU generates the gradient shapes for GRASP experiments.

AQR/P:

•The acquisition rack AQR/P contains all the RF/AF components for signal routing, transmitting and receiving purposes. The NMR signal is mixed down to audio frequency by the RX22 receiver system and then converted to digital data by the ADC. The local oscillator frequency is derived from the ASU/ LOT module.

Synthesizer:

•The excitation signal for each channel is generated by combination of the appropriate FCU and synthesizer.

RF Transmitter:

•The linear RF transmitters generate both pulsed and CW frequencies for each channel with appropriate amplitudes.

BSMS:

•The BSMS unit provides NMR sample control (SLCB), shim (SCB) and H0 current (LCB) control, houses the digital lock (LTX, LRX) and the optional gradient amplifier (GAB).

HPPR preamplifier module:

•The HPPR amplifies, filters and routes the NMR response signals from the probehead to the RX22 receiver. It switches the RF transmitter output to the probehead.

Probeheads:

•General information common to most probeheads can be found here. See appropriate NMR probehead documentation for details.

Magnet:

• Specific documents are supplied with each magnet.

Accessories:

•Temperature Controller (BVT3300), Sample Changers (Sixpack, BACS-60), GRASP and many other accessories can be installed optionally

AVANCE DMX/DSX / Optimized solids configurations

AQX:

•The acquisition control system AQX generates all digital control signals as specified by the user's pulse program. The CCU runs as a "diskless UNIX" client and controls TCU, FCU's, RCU and GCU. The TCU controls all timings and pulses. The FCU's generate RF phases, frequencies, and control the RF amplitudes and modulation. Amplified, demodulated and digitized NMR signals are fed to the RCU which performs real time digital filtering. The optional GCU generates the gradient shapes for GRASP experiments. For fast data acquisition the fast digitizer (FADC) is coupled to the RCU.

AQR:

•The acquisition rack AQR contains all the RF/AF components for signal routing, transmitting and receiving purposes. The signal is mixed down from RF frequency by the SE451 to audio frequency and then digitized by the ADC. The LO frequency is generated on the SE451 which is controlled by the RXC. For broadband applications the SE451 is followed by the antialiasing filters FTLP/4M and the FADC. - The RF frequencies are shaped by the ASU's, and routed to the appropriate RF transmitters. The RF transmitters are controlled by the ACB module. Routing and output power information is displayed on the BSMS keyboard. The 4-Phase Modulator performs fast phase adjustment for solids.

Synthesizer:

•The excitation signal for each channel is generated by combination of the appropriate FCU, SE451 and synthesizer.

RF Transmitters:

•The linear RF transmitters generate both pulsed and CW frequencies for each channel with appropriate amplitudes.

SE451 receiver module:

•The SE451 is used as frequency generation unit in conjunction with the synthesizer and FCU. It generates transmitter signals and contains the quadrature receiver. It uses an IF of 451 MHz. For wide line applications a fast n * 90 degrees phase shifting device is on board.

High Power Accessory:

•For experiments at kilowatt power levels (B-HPCU) and for wide line applications, ultrafast 90 degree phase shifting and high speed digitizer (FADC) are required.

BSMS:

•The BSMS unit provides NMR sample control (SLCB), shim (SCB) and H0 current (LCB) control, houses the digital lock (LTX, LRX), and the optional gradient amplifier (GAB).

HPPR preamplifier module:

•The HPPR amplifies, filters and routes the NMR response signals from the probehead to the SE451 receiver. It switches the output of the RF transmitter to the probehead. - The HPPR can be equipped with the optional High Power module.

Probeheads:

•General information common to most probeheads can be found here. See appropriate NMR probehead documentation for details.

Magnet:

• Specific documents are supplied with each magnet.

Accessories:

•Temperature Controller (BVT3300), Sample Changers for HR tubes or MAS rotors, and GRASP can be installed optionally.