

Lab NMR Analyzer Performance Specification for H⁺ ; F¹⁹ Applications

General System Performance

Observe nuclei	H ¹ , F ¹⁹
Operating frequency	60 ±0.5 MHz for H ¹
NMR probe	Option 1: ambient temperature probes designed to accept samples in 5mm or 8mm or 10mm NMR tubes. Option 2: VT-Probe (Variable Temperature) designed to accept samples in 5mm NMR while controlling the sample temperature (from 40°C up to 90°C).
Working Ambient Temperature	20°C to 30° with temperature fluctuation less than ±3°C
Ambient Humidity	less than 70%
Power requirements	Standard 220v at 3A / 110v at 5A

Magnet System

Magnet System	Temperature stabilized self-condensed-field permanent magnet including computer-controlled magnet field gradient coils.
Field Strength	At 45C° - 1.47 tesla
Fringe Field	On external magnet enclosure less than 1 gauss.
Clear Bore Size	30 millimeters diameter
Frequency Stability	Change of ambient temperature of ±5°C frequency drift will not exceed ±1000 Hz at H ¹ observed frequency

Key Software Features

4IR Solutions NMR Software has four principle functions:

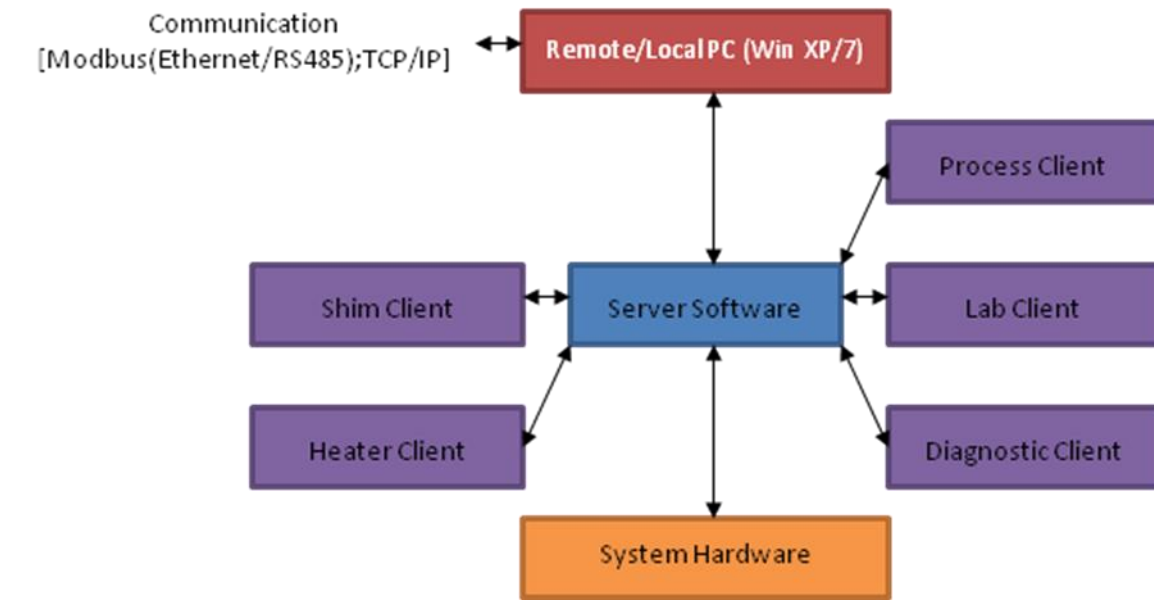
1. Control and Interface to NMR Hardware Functions and System diagnostics
2. NMR data acquisition
3. NMR data processing
4. NMR communications

The Lab Client software supports the following features:

- Multiple clients on a single machine
- Client can select which channel to receive FID from
- Configuration selectable channel for shim, RF calibration and frequency lock

In addition, the software supports the following advanced sequences (using graphical editor):

- Multi Tx
- Multi Rx
- Support of tables
- Support of shape tables
- Simultaneous/overlapping events



Probe Specification

Unloaded Q of H^1 coil > 180
Impedance matching to 50Ω > 20 dB

H^1 Performance

Proton Resolution, (non spin) < 3 Hz

H^1 Line shapes Line width at the average peak height of the C^{13} satellites (0.55%) is less than <65Hz

H^1 Sensitivity Single pulse Sufficient to observe the largest peak of a 1% ethyl benzene quartet with a signal to average noise ratio of 20:1, 1 pulse acquisition.

Signal averaging Sufficient to observe the largest peak of a 1% ethyl benzene quartet with a signal to average noise ratio of 80:1, 16 pulse acquisitions.

H^1 Pulse width Pulse width of a 90° flip angle at 6 Watt RF power is less than 30 microseconds.

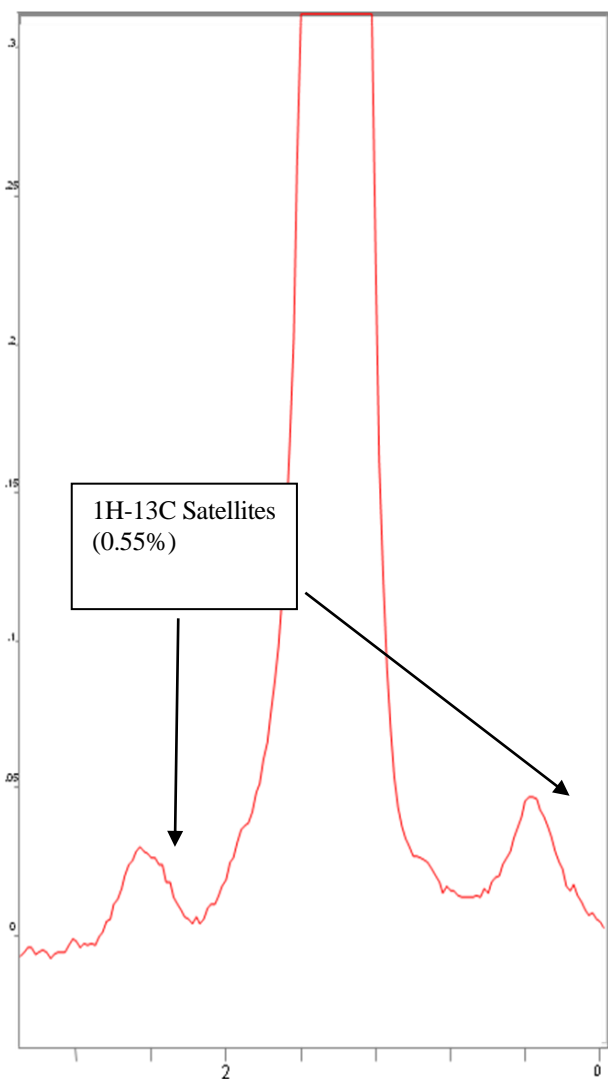
Quantization Integral ratios for the total of the three groups in the spectrum of a 5% by volume solution of ethyl benzene:

The Accuracy Ratio of the three groups shall be 5:2:3 ± 0.2

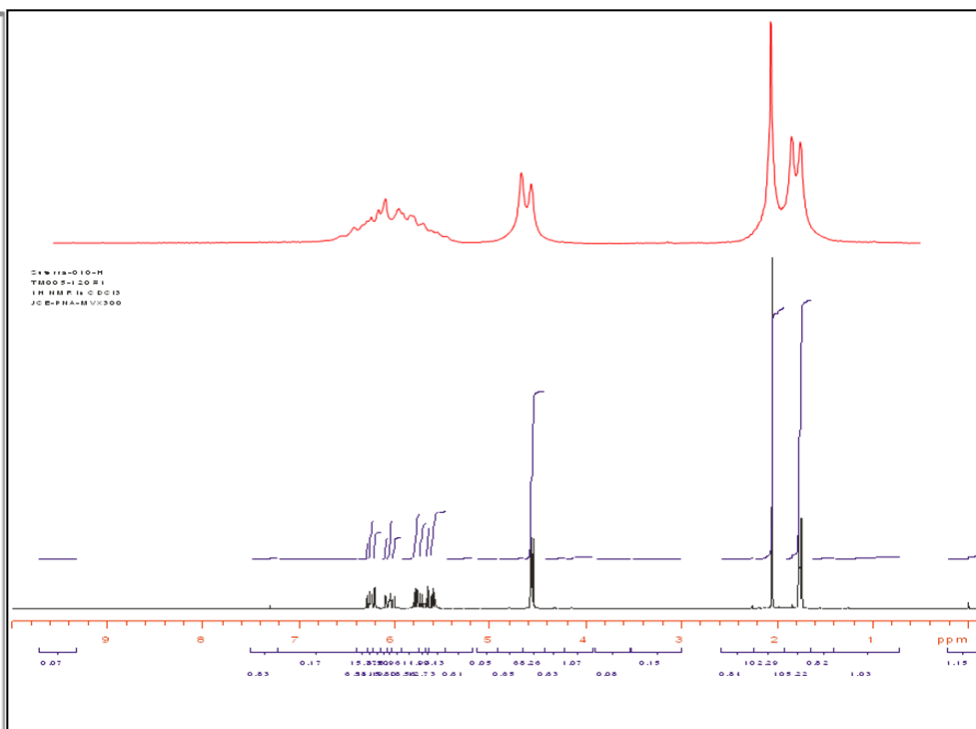
The Precision Standard deviation of 10 successive integrals shouldn't exceed: $\pm 0.25\%$

H¹ Spectra

Cyclohexane in standard 5 mm NMR tubes
(Non-Spinning)



Varian samples (black) in deuterated chloroform with TMS.
Aspect samples (red) run neat and non-spinning.



1% ETB in CDCl₃ 16 Acquisition Pulses (Non-Spinning)

