

# Agilent ProTune Probe Tuning Accessory

## Data Sheet



### Introduction

Agilent ProTune allows laboratories to automatically adjust an NMR probe's tune and match to achieve optimal results with every sample. The Agilent ProTune driver modules offer an automated solution to the time consuming and often challenging requirement of manually tuning probes when changing solvents, sample temperature, or nuclei. In conjunction with an automatable NMR probe, the ProTune driver modules yield a completely integrated system that offers significant time savings and ease of use over the traditional manual approach for adjusting the probe's tune and match.



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## Superior Results on Every Sample

The ProTune accessory automatically adjusts the probe's tune and match to achieve the best possible results in the shortest amount of time, on every sample. Differences in the dielectric properties between samples (especially when different solvents are used) as well as changes in temperature affect the tune and match of a probe. Without optimization, pulse widths and sensitivity can be drastically degraded, compromising the quality of results. The example in Figure 1 shows the effect of a 60 °C temperature change on a sample without (B) and with (C) automatic tuning. Experiments requiring accurate 90 ° and 180 ° pulses would fail, while experiments using a 90 ° pulse would have poor sensitivity.

## Automatic

When using ProTune, it is easy to customize automatic tune and match to the needs of any laboratory. VnmrJ offers the option of specifying how and when the system tunes a sample, giving the user complete control. By setting the preference for the software to always use ProTune, automatic tune and match will occur unless the user decides to override that option by clicking a single checkbox (Figure 2).

## Integrated

The ProTune driver modules connect to an automatable probe's tune and match sticks with high performance flexible drive shafts, and they connect to the console through an Ethernet port. The driver modules are controlled by software embedded in VnmrJ. The tune reflection can be observed (Figure 3) when the system is tuning in order to confirm the speed and quality of the tune optimization. It is also possible to manually adjust tune and match of the probe using the knobs on the front panel.

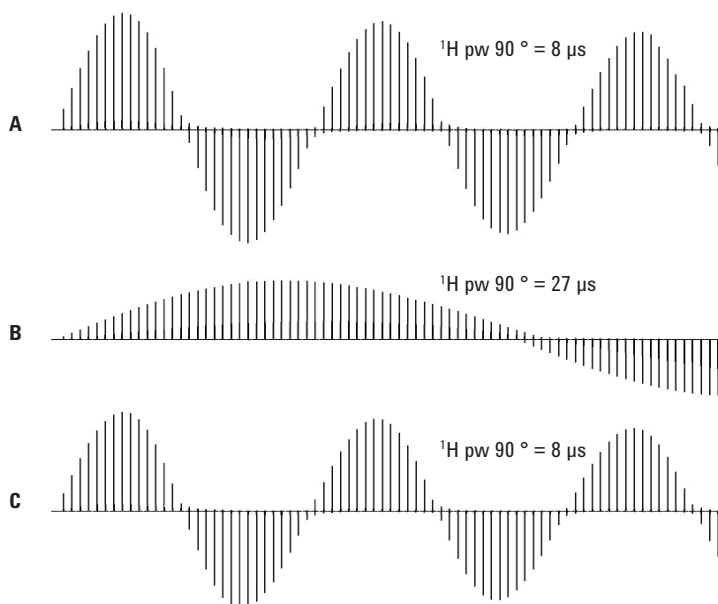


Figure 1.  ${}^1\text{H}$  90 ° pulse width (pw) calibration as a function of sample temperature: tuned and calibrated at 30 °C (A); tuned at 30 °C, but calibrated at 90 °C (B); and tuned and calibrated at 90 °C (C).

Figure 2 is a screenshot of the VnmrJ software interface. It shows a form with various fields and checkboxes. The 'Solvent' dropdown is set to 'Acetone'. The 'Comment' field is empty. The 'Before First Exp' section has 'Lock?' set to 'Yes (alock<=>n)', 'Shim' checked, and 'Tune' checked. The 'Select shimmap' dropdown is set to '2H gradient (read probe file at runtime)'. There are 'Insert' and 'Eject' buttons at the top right.

Figure 2. Automatic tuning and matching can be selected or unselected with a single click next to the **Tune** check box.

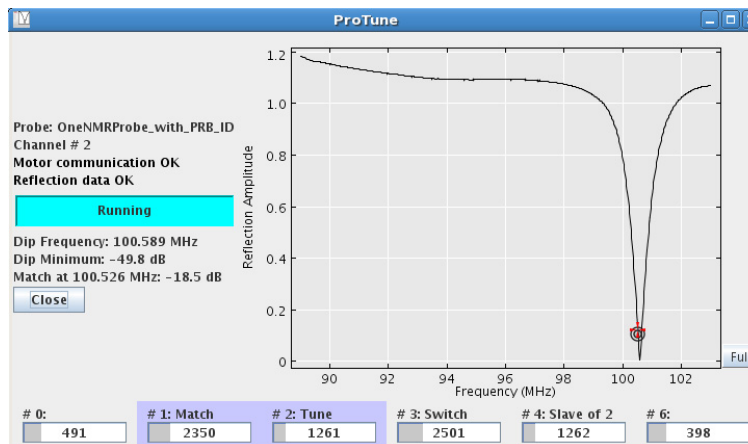


Figure 3. This ProTune window can be shown during probe optimization to view tuning in the automated mode or when running the system manually.

## Automation Friendly

ProTune delivers increased throughput and improved data quality, allowing the NMR user to focus on results rather than the details of data collection. By having optimal tuning for each sample, sensitivity is improved and access to multiple nuclei is possible in a hands-off, high-throughput manner (Figure 4).

## Modular Design

The ProTune driver modules are available in various configurations for automatic tune and match of 1–3 probe channels. Each system has a master driver module and may have a combination of dual and single driver modules, depending on the number of tune and match knobs on the probe. The dual and single driver modules are optional, allowing the greatest flexibility in customizing the tuning configuration of a probe. When only the high band is required for automatic tuning, just the master drive module is necessary.

## Versatile

ProTune is compatible with a large number of probe styles and can be interchanged between different Agilent probes, providing ultimate flexibility and maximum productivity for any laboratory.

## OneNMR probes

The OneNMR probe uses a hybrid approach to deliver the performance advantages of both the classic carbon probe (direct detect probe) and the highly sensitive proton probe (indirect detect probe). It is simultaneously optimized for both high and low band frequencies in a single unit.

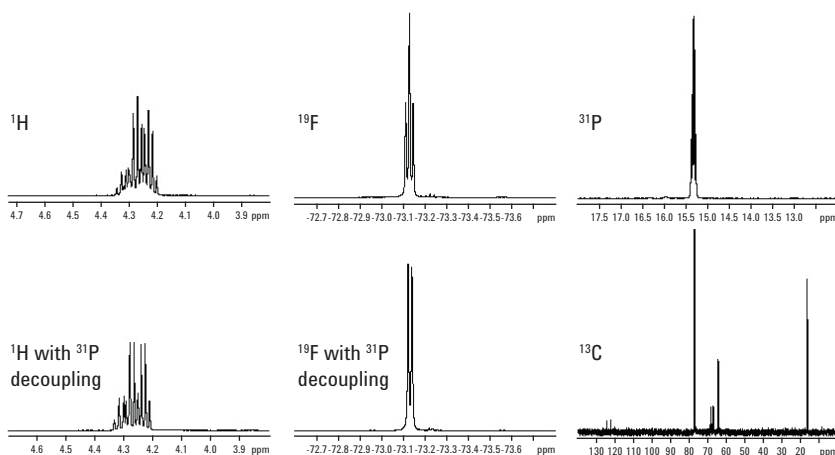


Figure 4. A series of data collected automatically with ProTune, using a 500 MHz AutoX Dual Broadband probe. The sample was diethyl(2,2,2-trifluoro-1-hydroxyethyl)-phosphonate in  $\text{CDCl}_3$ .

## AutoX Dual Broadband probes

These probes are optimized for single and double resonance experiments requiring high performance in both high frequency ( $^1\text{H}$ – $^{19}\text{F}$ ) and low frequency ( $^{15}\text{N}$ – $^{31}\text{P}$ ) observe and decouple experiments.

## AutoX Indirect Detection probes

These probes are optimized for single and double resonance experiments requiring high  $^1\text{H}$  sensitivity and overall performance with pulsing and decoupling capability at low frequency ( $^{15}\text{N}$ – $^{31}\text{P}$ ).

## Automatable Triple Resonance probes

These probes are optimized for single, double, or triple resonance experiments requiring high  $^1\text{H}$  sensitivity and overall performance with simultaneous pulsing and decoupling capability at two low frequencies.

## Cold probes

A ProTune probe adapter module (PAM) is used to provide a universal interface between the ProTune drive module and the Cold probe.

## Maintenance

There is no required maintenance for the individual units.

Minimum requirements		
Agilent NMR system	DD2 MR, 400-MR DD2, VNMRS, and 400-MR NMR	
Probe	OneNMR, AutoX, automatable room temperature probes, automatable Triple Resonance Cold probe, automatable Dual Cold probe, Auto H/F/X	
VnmrJ	VnmrJ 2.2C or newer	
Host workstation	Dell 390N to currently released NMR workstation	
Host OS	Linux RH Enterprise WS v.3, update 4, 64-bit or newer NMR OS	
ProTune software	User software ver. 1.1 and probe-specific tuning files	
Specifications	Master driver module	Dual/Single drive module
Power	On master driver only	N/A
Supply voltage or voltage range, current	100–120 V, 2 A 220–240 V, 1 A	N/A
Frequency range	50/60 Hz	N/A
Fuse rating	115 V fuse type rated 250 V, 2A 220 V fuse type rated 250 V, 1A	N/A
Connectors		
Input	A/C power cord, Control RJ45 to DIO board, Ethernet	N/A
Output	Two flexible drive shafts	Dual: two flexible drive shafts Single: one flexible drive shaft
Dimensions W x H x D in (cm)	7.5 (19.05) x 10.94 (27.79) x 8.7 (22.14)	7.5 (19.05) x 10.94 (27.79) x 8.7 (22.14)
Weight lb (kg)	10 (4.5)	9 (4)

## Ordering Information

Product name	Part number	Includes
ProTune accessory for RT and Cold probes	G5140A	<ul style="list-style-type: none"> <li>ProTune master driver module</li> <li>Two dual drive modules</li> <li>Six flexible shafts for tuning and matching</li> <li>Interface cables</li> </ul>
<p>Compatible with AutoX probes, ProTune style OneNMR Probes, other special room temperature probes (check probe specifications), and all Cold probes.</p> <p>For use with H/C/N or H-F/C/N automatable Cold probes, requires p/n G5140A-001 ProTune Adapter Module.</p> <p>Note: Only the high band channel will be tuned and matched by this adapter module.</p> <p>For use with Dual automatable Cold probes, requires p/n G5140A-002 ProTune Adapter Module</p>		
ProTune accessory for Cold probes only	G5141A	<ul style="list-style-type: none"> <li>ProTune master driver module</li> <li>ProTune Adapter Module for H/C/N or H-F/C/N Cold probes</li> <li>Two flexible shafts for tuning and matching a single channel</li> <li>Interface cables</li> </ul>
<p>Compatible with automatable Cold probes with the included ProTune Adapter Module for H/C/N and H-F/C/N Cold probes.</p> <p>Note: Only high band channel will be tuned and matched by this product. Not for use with room temperature probes. Not Expandable.</p>		
ProTune accessory for HFX, RT, and Cold probes	G7444A	<ul style="list-style-type: none"> <li>Two dual drive modules</li> <li>One single drive module</li> <li>Seven flexible shafts for tuning and matching</li> <li>Interface cables</li> </ul>
<p>Compatible with all probes in G5140A and RT HFX automatable probes.</p> <p>For use with H/C/N or H-F/C/N automatable Cold probes, requires p/n G5140A-001 ProTune Adapter Module.</p> <p>For use with Dual automatable Cold probes, requires G5140A-002 ProTune Adapter Module.</p>		
ProTune accessory for RT high band tune only	G7445A	<ul style="list-style-type: none"> <li>ProTune master driver module</li> <li>Two dual drive modules</li> <li>Two flexible shafts for tuning and matching a single channel</li> <li>Interface cables</li> </ul>
<p>Compatible with all RT probes in p/n G5140A for tuning high band only.</p> <p>Note: Only high band channel will be tuned and matched by this product. Not for use with Cold probes. Not Expandable.</p>		

### Notes

- If you are planning to add a room temperature as well as a Cold probe in the future, we advise purchasing p/n G5140A.
- The ProTune driver modules require a special module when operating with an ultra high field (UHF), unshielded magnet.
- HFX RT probe: p/n G7444A will tune and match H and low band, and tune only F. In most cases, an H/F liquids filter kit will be required, as well as a 2nd high band channel.

[www.agilent.com/chem/nmr](http://www.agilent.com/chem/nmr)

This information is subject to change without notice.

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