VALVED NMR SAMPLE TUBE OPERATING INSTRUCTIONS

EXTREME SERIES High Pressure Valved NMR Sample Tubes

Norell, Inc. is delighted to present the Extreme Series line of High Pressure Valved NMR Sample Tubes. The Extreme Series remains similar in function, use, and pressure capability to the traditional High Pressure Valved NMR Sample Tubes, but the PTFE fluoropolymer valve plug has been upgraded and improved by changes to the design of the o-ring seal.

The Extreme Series line consists of two categories: Level 1 and Level 3. Both levels incorporate a higher degree of valve seal integrity to guard against leakage or pressure loss due to o-ring failure caused by wear or other physical damage, and/or deterioration or damage caused by chemical exposure. **Available with *ULTRA*THIN wall NMR Tubes.**

Base Protection: Level 1

Level 1 includes an additional standard fluoroelastomer o-ring seal to augment the existing fluoroelastomer o-ring, thus providing a secondary, backup o-ring if the primary one leaks or fails because of wear or physical damage.

Ultimate Protection: Level 3

Level 3 incorporates additional chemical and solvent resistance over Level 1 and the traditional High Pressure Valved NMR Sample tubes, by the substitution of Kalrez® perfluoroelastomer o-ring(s) in place of the standard fluoroelastomer o-rings. Kalrez® perfluoroelastomer o-rings offer the ultimate level of physical and chemical resistance with the inclusion of a secondary, backup o-ring.

Accessories for High Pressure Valved NMR Sample Tubes

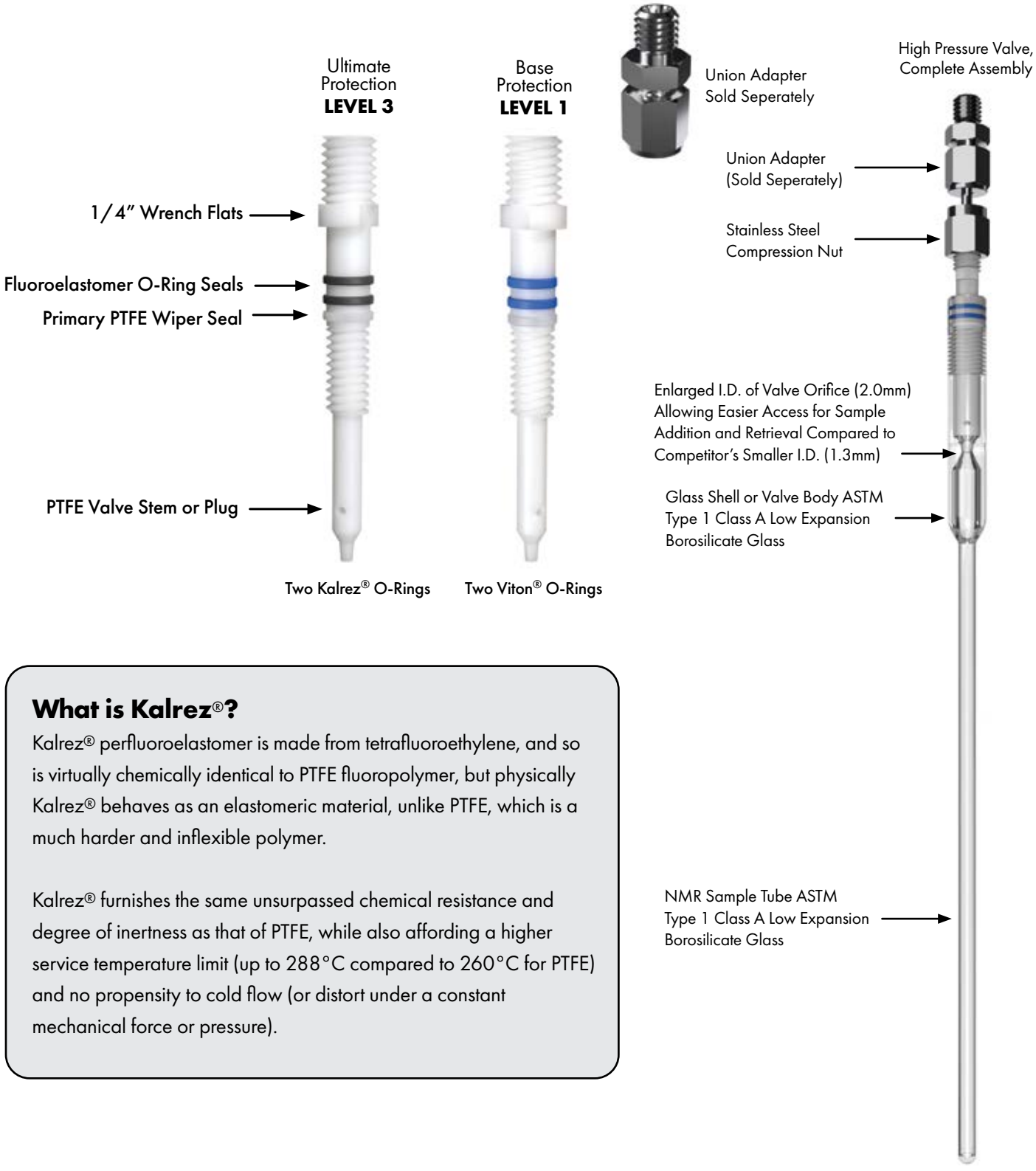
Item Number	Description
HPV-1/8X1/8-UNION	Optional Union Adapter, Type 316 Stainless Steel, for 1/8" metallic double ferrule line termination

Union Adapter
Sold Seperately

NORELL® **E-MAIL:** customerservice@nmrtubes.com **WEBSITE:** nmrtubes.com
TO ORDER CALL: 1.828.584.2600 **FAX:** 1.828.584.2604

VALVED NMR SAMPLE TUBE OPERATING INSTRUCTIONS

EXTREME SERIES High Pressure Valved NMR Sample Tubes



What is Kalrez®?

Kalrez® perfluoroelastomer is made from tetrafluoroethylene, and so is virtually chemically identical to PTFE fluoropolymer, but physically Kalrez® behaves as an elastomeric material, unlike PTFE, which is a much harder and inflexible polymer.

Kalrez® furnishes the same unsurpassed chemical resistance and degree of inertness as that of PTFE, while also affording a higher service temperature limit (up to 288°C compared to 260°C for PTFE) and no propensity to cold flow (or distort under a constant mechanical force or pressure).

NORELL® **E-MAIL:** customerservice@nmrtubes.com **WEBSITE:** nmrtubes.com

TO ORDER CALL: 1.828.584.2600 **FAX:** 1.828.584.2604

VALVED NMR SAMPLE TUBE OPERATING INSTRUCTIONS

Due to the hand crafted nature of our pressure valves overall valve assembly length can vary slightly. A typical variance is 1-2mm.

EXTREME SERIES

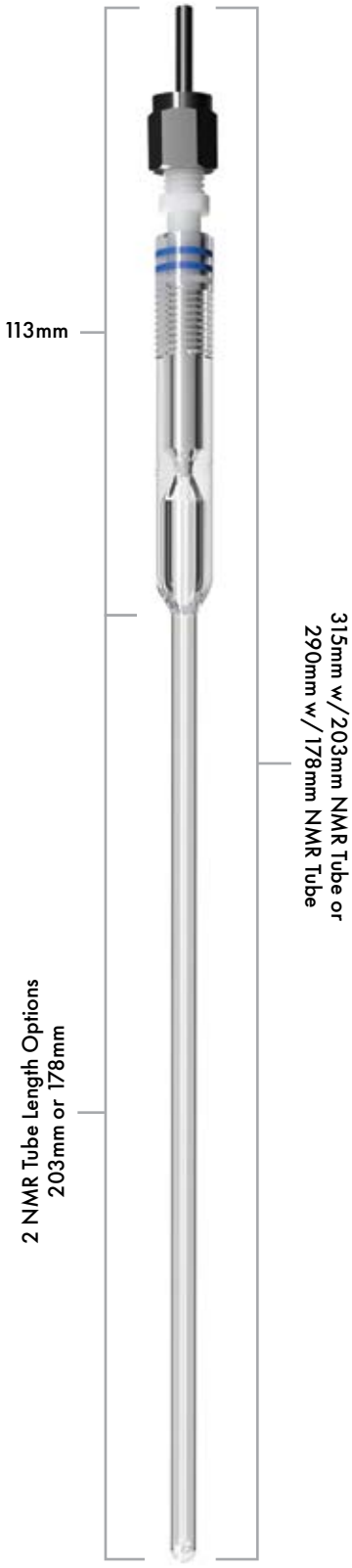
High Pressure Valved NMR Sample Tubes

3mm Extreme Series Level 1

Item No.	MHz	Tube Length (mm)	I.D. mm (Volume µL/cm)	Tube Wall	Recommended Maximum Operating Pressure		
					kPa	bar	psi
S-3-500-EX1-HPV-7	500	178	2.41 (46)	thin	960	9.6	140
S-3-500-EX1-HPV-8	500	203	2.41 (46)	thin	960	9.6	140
S-3-600-EX1-HPV-7	600	178	2.41 (46)	thin	960	9.6	140
S-3-600-EX1-HPV-8	600	203	2.41 (46)	thin	960	9.6	140

5mm Extreme Series Level 1

Item No.	MHz	Tube Length (mm)	I.D. mm (Volume µL/cm)	Tube Wall	Recommended Maximum Operating Pressure		
					kPa	bar	psi
S-5-500-EX1-HPV-7	500	178	4.20 (138)	thin	700	7	100
S-5-500-MW-EX1-HPV-7	500	178	3.43 (92)	medium	1050	10.5	150
S-5-500-HW-EX1-HPV-7	500	178	2.20 (38)	heavy	1400	14	200
S-5-500-EX1-HPV-8	500	203	4.20 (138)	thin	700	7	100
S-5-500-MW-EX1-HPV-8	500	203	3.43 (92)	medium	1050	10.5	150
S-5-500-HW-EX1-HPV-8	500	203	2.20 (38)	heavy	1400	14	200
S-5-600-EX1-HPV-7	600	178	4.20 (138)	thin	700	7	100
S-5-600-MW-EX1-HPV-7	600	178	3.43 (92)	medium	1050	10.5	150
S-5-600-HW-EX1-HPV-7	600	178	2.20 (38)	heavy	1400	14	200
S-5-600-EX1-HPV-8	600	203	4.20 (138)	thin	700	7	100
S-5-600-MW-EX1-HPV-8	600	203	3.43 (92)	medium	1050	10.5	150
S-5-600-HW-EX1-HPV-8	600	203	2.20 (38)	heavy	1400	14	200
S-5-800-EX1-HPV-7	800	178	4.20 (138)	thin	700	7	100
S-5-800-MW-EX1-HPV-7	800	178	3.43 (92)	medium	1050	10.5	150
S-5-800-HW-EX1-HPV-7	800	178	2.20 (38)	heavy	1400	14	200
S-5-800-EX1-HPV-8	800	203	4.20 (138)	thin	700	7	100
S-5-800-MW-EX1-HPV-8	800	203	3.43 (92)	medium	1050	10.5	150
S-5-800-HW-EX1-HPV-8	800	203	2.20 (38)	heavy	1400	14	200
ULTRATHIN Valved NMR							
S-5-500-HPV-EX1-UTW-7	500	178	4.39 (144)	Ultra-Thin	500	5	73
S-5-500-HPV-EX1-UTW-8	500	203	4.39 (144)	Ultra-Thin	500	5	73
S-5-600-HPV-EX1-UTW-7	600	178	4.39 (144)	Ultra-Thin	500	5	73
S-5-600-HPV-EX1-UTW-8	600	203	4.39 (144)	Ultra-Thin	500	5	73

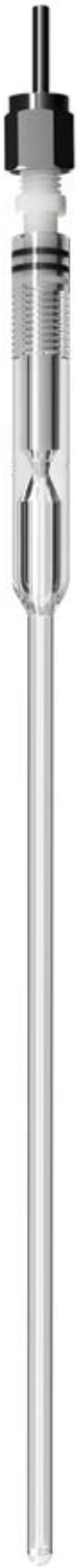


NORELL®
E-MAIL: customerservice@nmrtubes.com **WEBSITE:** nmrtubes.com
TO ORDER CALL: 1.828.584.2600 **FAX:** 1.828.584.2604

VALVED NMR SAMPLE TUBE OPERATING INSTRUCTIONS

EXTREME SERIES

High Pressure Valved NMR Sample Tubes



3mm Extreme Series Level 3

Item No.	MHz	Tube Length (mm)	I.D. mm (Volume µL/cm)	Tube Wall	Recommended Maximum Operating Pressure		
					kPa	bar	psi
S-3-500-EX3-HPV-7	500	178	2.41 (46)	thin	960	9.6	140
S-3-500-EX3-HPV-8	500	203	2.41 (46)	thin	960	9.6	140
S-3-600-EX3-HPV-7	600	178	2.41 (46)	thin	960	9.6	140
S-3-600-EX3-HPV-8	600	203	2.41 (46)	thin	960	9.6	140

5mm Extreme Series Level 3

Item No.	MHz	Tube Length (mm)	I.D. mm (Volume µL/cm)	Tube Wall	Recommended Maximum Operating Pressure		
					kPa	bar	psi
S-5-500-EX3-HPV-7	500	178	4.20 (138)	thin	700	7	100
S-5-500-MW-EX3-HPV-7	500	178	3.43 (92)	medium	1050	10.5	150
S-5-500-HW-EX3-HPV-7	500	178	2.20 (38)	heavy	1400	14	200
S-5-500-EX3-HPV-8	500	203	4.20 (138)	thin	700	7	100
S-5-500-MW-EX3-HPV-8	500	203	3.43 (92)	medium	1050	10.5	150
S-5-500-HW-EX3-HPV-8	500	203	2.20 (38)	heavy	1400	14	200
S-5-600-EX3-HPV-7	600	178	4.20 (138)	thin	700	7	100
S-5-600-MW-EX3-HPV-7	600	178	3.43 (92)	medium	1050	10.5	150
S-5-600-HW-EX3-HPV-7	600	178	2.20 (38)	heavy	1400	14	200
S-5-600-EX3-HPV-8	600	203	4.20 (138)	thin	700	7	100
S-5-600-MW-EX3-HPV-8	600	203	3.43 (92)	medium	1050	10.5	150
S-5-600-HW-EX3-HPV-8	600	203	2.20 (38)	heavy	1400	14	200
S-5-800-EX3-HPV-7	800	178	4.20 (138)	thin	700	7	100
S-5-800-MW-EX3-HPV-7	800	178	3.43 (92)	medium	1050	10.5	150
S-5-800-HW-EX3-HPV-7	800	178	2.20 (38)	heavy	1400	14	200
S-5-800-EX3-HPV-8	800	203	4.20 (138)	thin	700	7	100
S-5-800-MW-EX3-HPV-8	800	203	3.43 (92)	medium	1050	10.5	150
S-5-800-HW-EX3-HPV-8	800	203	2.20 (38)	heavy	1400	14	200
ULTRATHIN Valved NMR							
S-5-500-HPV-EX3-UTW-7	500	178	4.39 (144)	Ultra-Thin	500	5	73
S-5-500-HPV-EX3-UTW-8	500	203	4.39 (144)	Ultra-Thin	500	5	73
S-5-600-HPV-EX3-UTW-7	600	178	4.39 (144)	Ultra-Thin	500	5	73
S-5-600-HPV-EX3-UTW-8	600	203	4.39 (144)	Ultra-Thin	500	5	73

NORELL®

E-MAIL: customerservice@nmrtubes.com **WEBSITE:** nmrtubes.com

TO ORDER CALL: 1.828.584.2600 **FAX:** 1.828.584.2604

VALVED NMR SAMPLE TUBE OPERATING INSTRUCTIONS

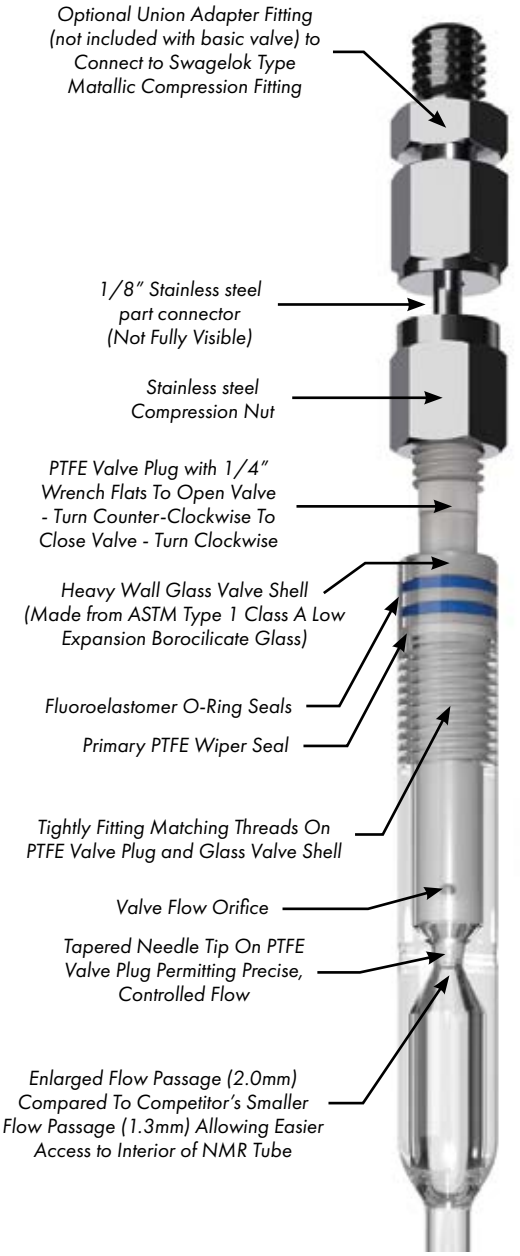
High Pressure Valved NMR Sample Tubes (Cont.)

The HPV High Pressure Valved NMR Sample Tubes facilitate experiments requiring conditions such as pressurized inert atmosphere blanketing, addition of reactive gaseous reagents under pressure, containment of low boiling point solvents or samples at elevated temperatures, and so on.

The High Pressure valves feature a heavy wall glass shell, along with a fully threaded, closely fitting PTFE valve plug held tightly within the glass valve shell for maximum pressure capability and leak resistance, thereby allowing high vacuum use as well. The tapered tip design of the PTFE valve plug permits precise flow control through the valve under high pressure or vacuum.

The HPV Valved NMR tube quickly and easily connects to 1/8 inch(3.2mm) OD metallic or nonmetallic pressure tubing, such as stainless steel, brass, aluminum, PEEK, PTFE, etc., using the included special compression fittings.

We recommend limiting the maximum operating pressure to 700 kPa (7 bar, 100 psi) for a 5mm thin wall NMR tube, 1050 kPa (10.5 bar, 150 psi) for a 5mm medium wall NMR tube, or 1400 kPa (14 bar, 200 psi) for a 5mm heavy wall NMR tube. (Additional information can be found on our website at: Valved NMR Sample Tubes for High Pressure from NORELL®).



1. To make the connection to a pressure source, such as an argon or hydrogen gas cylinder, for example, one end of a length of new pressure tubing of 1/8 inch OD (not supplied with the HPV Valved NMR Tube) must first be connected to the gas pressure regulator outlet, or other source of gas pressure. (Ensure that the regulated pressure is within the safe limits described above for the particular HPV Valved NMR Tube to be used, as well).

2. After this connection is made, the HPV Valved NMR Tube can be easily and quickly connected to the other end of the pressure tubing by slipping the compression nut onto the tubing, followed by the slotted gripper, oriented with the tapered end facing into the threaded end of the compression nut, and lastly the solid ferrule, with the tapered end facing away from the gripper and compression nut.

3. Insert the pressure tubing into the threaded opening of the white PTFE valve plug until the tubing bottoms, then slide the ferrule, gripper and compression nut over the tubing, into the white PTFE valve plug and turn the compression nut until the threads engage. Continue turning the compression nut until it contacts the gripper and ferrule, then finger tighten one additional complete turn to fully compress the ferrule onto the pressure tubing. Lightly tug at the pressure tubing to be sure it is held firmly in place.

4. The HPV Valved NMR Tube can also be connected directly to an existing pressure line having 1/8 inch Swagelok® type metallic double-ferrule fittings already installed, but we advise using the Optional Union Adapter (not included but available separately as Item No. HPV-1/8X1/8-UNION) to make a transition to Swagelok® type fittings, as shown in the adjacent illustration. This adapter can be installed to one end of the short piece of included stainless steel tube, allowing the other end to be connected to the HPV Valved NMR Tube using the recommended special compression fittings included with the HPV Valved NMR Tube. The short length of stainless steel tube can also be inserted into, for example, a flexible 1/8 inch ID braid-reinforced pressure hose and secured with a small worm drive hose clamp.

5. Gas pressure can now be applied to the HPV Valved NMR Tube. Turn the top of the white PTFE valve plug counter-clockwise (CCW) to lift the valve plug from its seated, closed position, allowing gas to flow through the central axial passage of the PTFE valve plug, out through the valve flow orifice, into the surrounding annular space of the glass valve shell and finally through the open valve into the interior of the NMR tube. (Note: an optional 1/4 inch open end wrench, not included but available separately as Item No. HPV-1/4-WRENCH, is very helpful to open and close the valve using the wrench flats at the top of the valve plug).

6. After the desired level of pressure has been reached, the HPV Valve can be closed by turning the white PTFE valve plug fully clockwise (CW) until the valve plug is tightly sealed, as shown by the white band of contact then close any additional valve(s) as necessary to the pressure source.

7. To disconnect the HPV Valved NMR Tube from the pressure supply, turn the compression nut counter-clockwise (CCW) until the compression nut, ferrule and pressure line pull free, allowing the HPV Valved NMR Tube to be taken elsewhere as needed.

8. To disassemble the HPV Valved NMR Tube for cleaning, while working in a fume hood, slowly turn the white PTFE valve plug counter-clockwise (CCW) to release any residual pressure contained within, then continue turning the valve plug until the threads disengage, allowing the valve plug to be gently pulled and removed from the glass valve shell.

NORELL® **E-MAIL:** customerservice@nmrtubes.com **WEBSITE:** nmrtubes.com

TO ORDER CALL: 1.828.584.2600 **FAX:** 1.828.584.2604