

VALVED NMR SAMPLE TUBE OPERATING INSTRUCTIONS

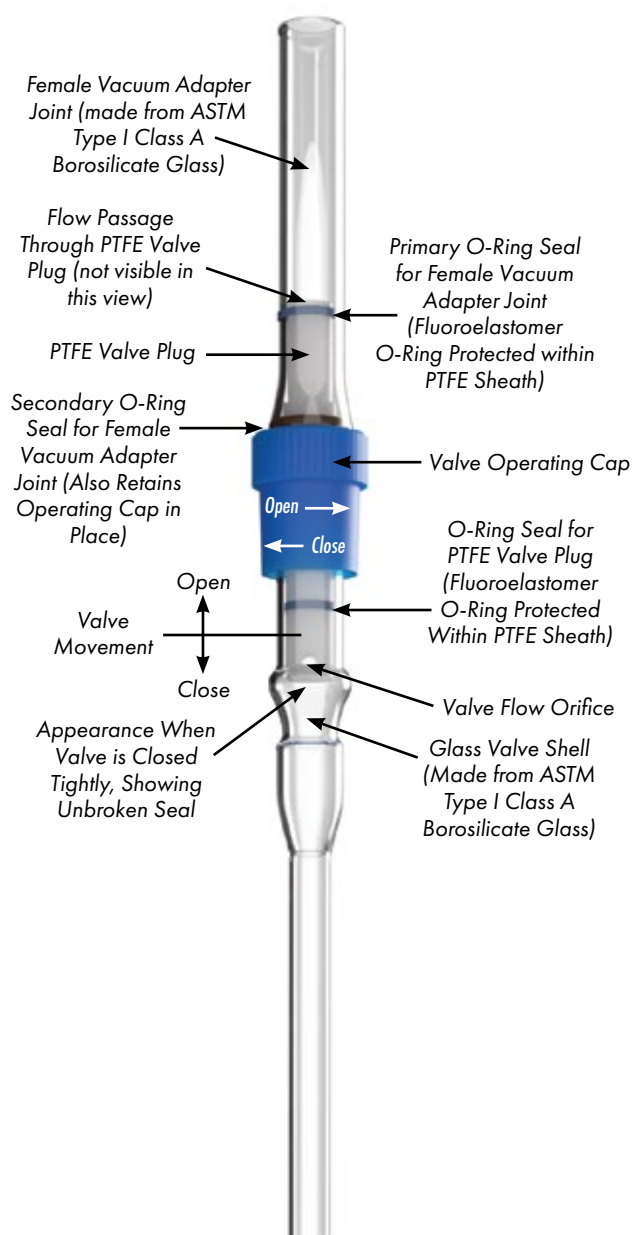
Valved NMR Tubes for Vacuum & Reduced Pressure

The VT Valved NMR Sample Tubes are designed principally for negative pressure use, from slightly less than ambient pressure to high vacuum (10–7 kPa or 10–6 torr) using the supplied female vacuum adapter joint.

A glassblower can seal the glass female joint to a glass vacuum manifold for the most reliable, permanent connection, but the female vacuum joint can also be attached to the vacuum source using rubber or other vacuum hose as a simpler alternative.

The VT Valved NMR Sample Tube can also withstand an internally generated positive pressure to 500 kPa (5 bar, 72 psi) when the valve is tightly closed, by, for example, heating the contents of the NMR tube, or from pressure generated internally by a chemical reaction.

However, the female vacuum adapter joint must not be used to apply positive pressure, or be exposed to a positive pressure, because it is held onto the PTFE valve plug by a frictional slip-fit only.



1. Once installed in the vacuum system, the female vacuum adapter joint enables fast and easy connection or disconnection of the VT Valved NMR tube to the vacuum source. To connect, simply push the end of the white PTFE valve plug into the female adapter joint until the flared end of the female joint contacts the lower, secondary o-ring seal, as shown in the adjacent Figure 1.

2. Commence evacuation of the VT Valved NMR tube by turning the Valve Operating Cap counter-clockwise (CCW) to lift the PTFE valve plug from its seated position and open the valve. Gas flow can now proceed from the interior of the VT Valved NMR tube through the open valve seat, into the expanded bulb of the glass valve shell, then into the Valve Flow Orifice at the bottom of the PTFE valve plug to finally be exhausted from the system through the axial flow passage of the PTFE valve plug.

3. Upon evacuation to the desired level, the VT Valved NMR tube can, for example, be used as a “cold finger” trap to collect sample by vacuum distillation, or pre-contained sample may be easily purified through a series of “freeze – pump – thaw” cycles to remove traces of paramagnetic oxygen gas. Very importantly, however, only the NMR tube should be cooled to cryogenic temperatures, because the PTFE valve plug contracts and shortens considerably more than glass, and in some instances may therefore become too short to reach the valve seat and seal tightly.

4. To disconnect the VT Valved NMR tube upon completion of the vacuum work, first ensure that the VT valve is closed tightly, as shown by the white band of contact (Figure 1 at bottom) by turning the Valve Operating Cap fully clockwise (CW). After closing any additional valve(s) as necessary to the vacuum source, the end of the VT Valved NMR tube can be gently pulled free from the female vacuum adapter joint to be taken elsewhere as needed.

5. To disassemble the VT Valved NMR tube for cleaning, turn the Valve Operating Cap counter-clockwise (CCW) until the threads disengage. The white PTFE valve plug can now be carefully removed from the glass valve shell.

VALVED NMR SAMPLE TUBE OPERATING INSTRUCTIONS

Valved NMR Tubes for Vacuum & Reduced Pressure

Handle your NMR sample without flame-sealing your tubes. Fluoropolymer covered o-ring eliminates material incompatibilities. Completely greaseless fluoropolymer assembly, which is easy to use and to disassemble for cleaning. Includes female joint for quick attachment to your vacuum rack.

A vacuum level of 10⁻⁷ kPa (10⁻⁶ torr) can be attained with this valve. While this valve can also withstand an internal positive pressure to 500 kPa (5 bar, 72 psi), the VT Valved NMR Tube series is intended principally for vacuum work. When pressurizing internally (by heating the NMR tube, for instance), the valve must be fully closed, so that the female vacuum adapter joint (the short glass tube that slips over the top of the PTFE valve stem, sealing against the upper o-rings) cannot be used to apply or be exposed to a positive pressure.

The adjoining tables present a selection of 3 and 5 mm O.D. NMR tubes joined to the VT style valves. However, other tube diameters, lengths (such as 133mm for automated sampling), additional MHz ratings and tube materials (such as quartz) are available. Please feel free to request a quote on your custom requirements, as we are continually striving to provide the utmost service and satisfaction to our customers!

NOW AVAILABLE FOR AUTOMATED SYSTEMS

Custom NMR sample tube lengths for our Reduced Pressure Valve now available for automated sampling systems.

5mm Valved NMR Tubes for Vacuum & Reduced Pressure

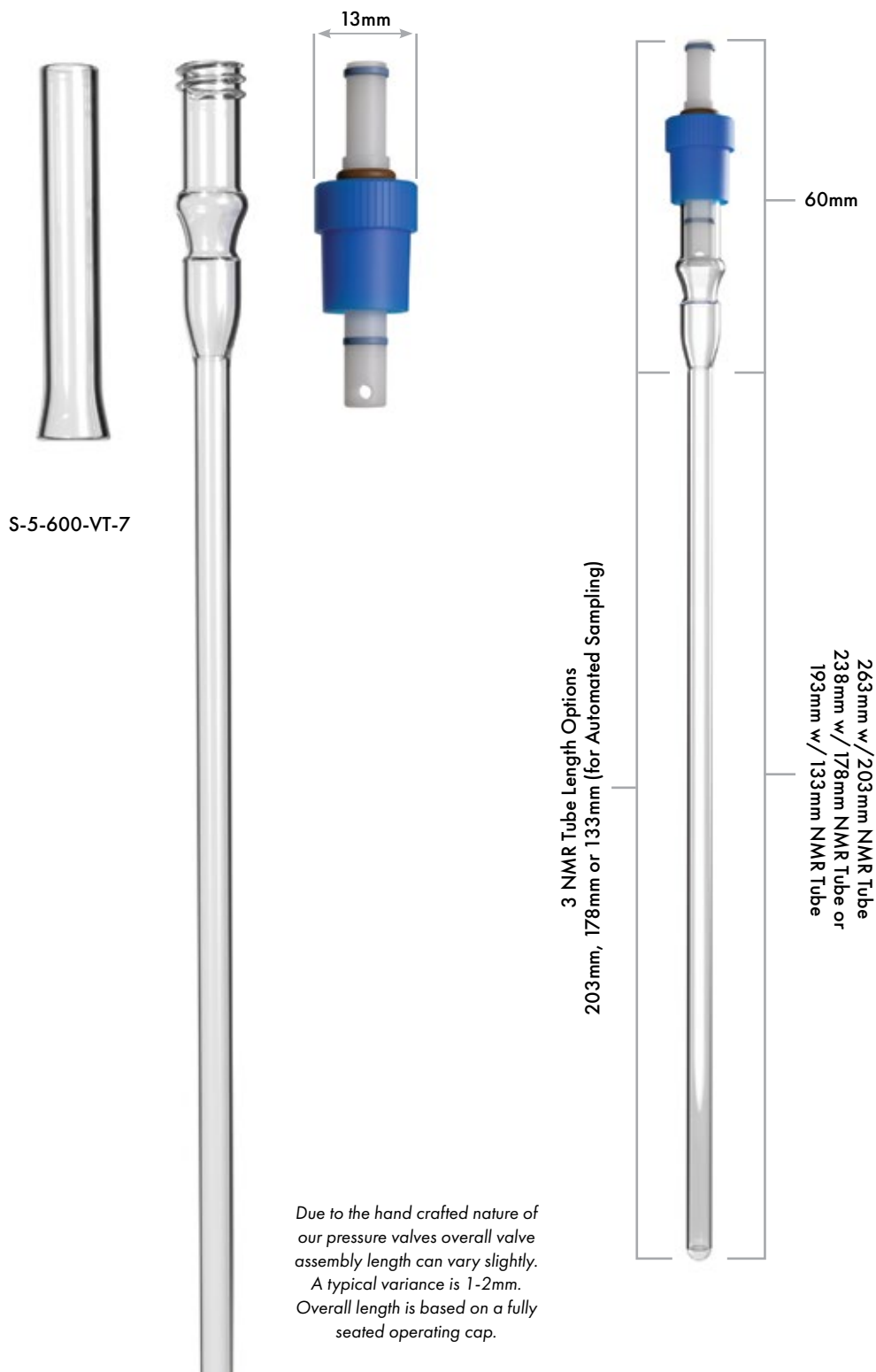
Item No.	MHz	Length (mm)	I.D. mm (Volume $\mu\text{L}/\text{cm}$)
S-5-500-VT-7	500	178	4.20 (138)
S-5-500-VT-8	500	203	4.20 (138)
S-5-600-VT-7	600	178	4.20 (138)
S-5-600-VT-8	600	203	4.20 (138)
Valved NMR for Automated Sampling			
S-5-500-VT-AS	500	133	4.20 (138)
S-5-600-VT-AS	600	133	4.20 (138)

3mm Valved NMR Tubes for Vacuum & Reduced Pressure

Item No.	MHz	Length (mm)	I.D. mm (Volume $\mu\text{L}/\text{cm}$)
S-3-500-VT-7	500	178	2.41 (46)
S-3-500-VT-8	500	203	2.41 (46)
S-3-600-VT-7	600	178	2.41 (46)
S-3-600-VT-8	600	203	2.41 (46)
Valved NMR for Automated Sampling			
S-3-500-VT-AS	500	133	2.41 (46)
S-3-600-VT-AS	600	133	2.41 (46)

VALVED NMR SAMPLE TUBE OPERATING INSTRUCTIONS

Valved NMR Tubes for Vacuum & Reduced Pressure



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VALVED NMR SAMPLE TUBE OPERATING INSTRUCTIONS

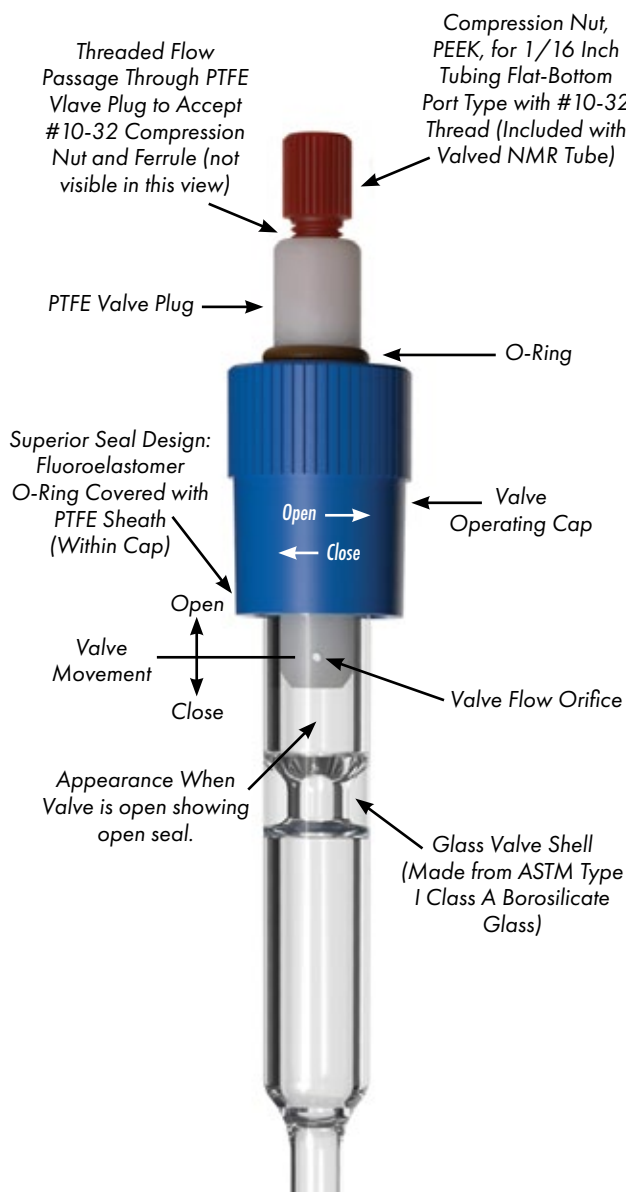
Valved NMR Sample Tubes for Intermediate Pressure

The IPV Valved NMR Sample Tubes for Intermediate Pressure are very useful for 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, etc.

The IPV Valved NMR tube quickly and easily connects to 1/16 inch (1.6mm) OD PEEK or PTFE pressure tubing (a common size of laboratory instrumentation pressure line often found on HPLC and GC instruments) using the included 1/16 inch flat-bottom port ferrule and #10-32 threaded compression nut.

We recommend limiting the maximum operating pressure to 600 kPa (6 bar, 87 psi) for a 5mm thin wall NMR tube, 900 kPa (9 bar, 130 psi) for a 5mm medium wall NMR tube, or 1200 kPa (12 bar, 175 psi) for a 5mm heavy wall NMR tube. (Additional information can be found on our website at: Valved NMR Sample Tubes for Intermediate Pressure from NORELL®).

Though the IPV Valved NMR Tube can be used under full vacuum, the small inner diameter of the 1/16 inch tubing used may cause a longer evacuation time to reach a high vacuum level.



1. To make the connection to a pressure source, such as an argon or hydrogen gas cylinder, for example, one end of a short length of PEEK or PTFE pressure tubing of 1/16 inch OD (not supplied with the IPV 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 IPV Valved NMR Tube to be used, as well).

2. After this connection is made, the IPV 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 ferrule, oriented so that the tapered end of the ferrule faces into the threaded end of the compression nut, with the large flat end of the ferrule flush with the end of the tubing.

3. Insert the pressure tubing with the ferrule into the threaded opening of the white PTFE valve plug until the ferrule bottoms, then slide the 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 gently until it begins to tighten upon reaching full depth, then finger tighten an additional 1/4 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. Gas pressure can now be applied to the IPV Valved NMR Tube. Turn the Valve Operating Cap counter-clockwise (CCW) to lift the white PTFE valve plug from its seated, closed position and open the valve, 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.

5. After the desired level of pressure has been reached, the IPV Valve can be closed by turning the Valve Operating Cap fully clockwise (CW) until the PTFE valve plug is tightly sealed, as shown by the white band of contact (Figure 1 at bottom) then close any additional valve(s) as necessary to the pressure source.

6. To disconnect the IPV 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 IPV Valved NMR Tube to be taken elsewhere as needed.

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

VALVED NMR SAMPLE TUBE OPERATING INSTRUCTIONS

Intermediate Pressure Valved NMR Sample Tubes

Norell, Inc. is pleased to announce the introduction of a new NMR sample tube product line, featuring a glass/PTFE pressure valve permanently joined to your choice of a wide selection of available NMR sample tubes.

**This valve incorporates an advanced seal design that is superior to alternative valves currently available from other manufacturers. A fluoroelastomer o-ring imparts resilience and a high degree of chemical resistance. A PTFE sheath, forming the primary seal, completely covers the fluoroelastomer o-ring, creating the ultimate barrier against aggressive, reactive substances while providing a totally inert surface.*

These pressure 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.

We recommend that the maximum operating pressure should be limited to 600 kPa (6 bar, 87 psi) when using a thin wall pressure tube, up to 1200 kPa (12 bar, 175 psi) if using a heavy wall pressure tube. (Please see accompanying table for complete details).

Cautionary Note: Glass can be an unpredictable material, especially if it has been scratched or

subjected to rough handling. As such, EXTREME CAUTION should be exercised when using glass at elevated pressure or temperature, because it has the potential to fail suddenly and catastrophically. Therefore, anyone attempting to use glass components, such as NMR sample tubes at elevated or reduced pressures and/or temperatures should ensure that adequate personal protection, such as explosion shields, full face coverage shields, heavy gloves, etc., are employed to protect oneself against flying glass fragments if a glass component fails explosively.

The valve accepts 1/16 inch O.D. PTFE tubing, a common laboratory instrumentation pressure line. The required components, a 1/16 inch ferrule and matching compression nut, are included with the valve assembly. The valve easily and quickly connects and disconnects by means of the single compression nut.

All components of the valved pressure tube consist of either glass or polymer, as described in more detail below, allowing safe use in high magnetic field environments.

The sample tube portion, manufactured from ASTM Type 1 Class A glass (Pyrex® or an equivalent) tolerates a maximum temperature of about 230°C, and resists sudden temperature changes, or thermal shock, very well without breakage, but sudden temperature changes should be restricted to a range of 120°C or less.

VALVED NMR SAMPLE TUBE OPERATING INSTRUCTIONS

Intermediate Pressure Valved NMR Sample Tubes (Cont.)

The pressure valve portion possesses superior chemical and corrosion resistance. The glass shell, also formed from ASTM Type 1 Class A glass, matches that of the sample tube, thereby minimizing breakage of the joint caused by internal strain or thermal shock.

The valve stem, composed of PTFE fluoropolymer (polytetrafluoroethylene) is completely inert and resists virtually all solvents, reactive chemicals and reagents, and deterioration induced by corrosive conditions.

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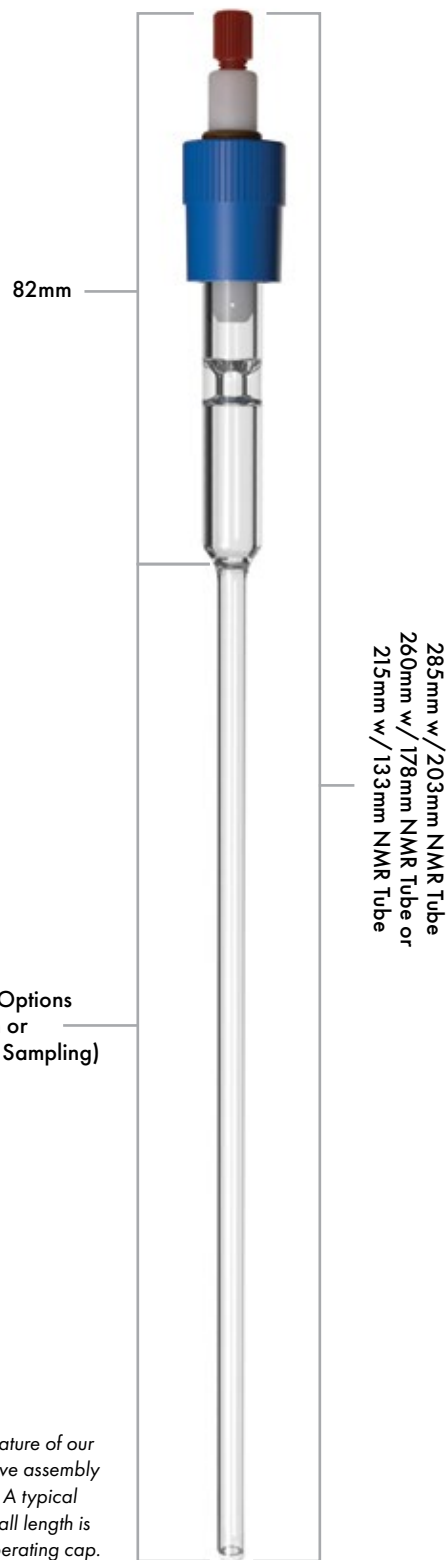
Custom NMR sample tube lengths for our Intermediate Pressure Valve now available for automated sampling systems.

The ferrule, or sealing nut (included with the valve), used to seal the pressure supply tubing to the valve, also displays excellent corrosion and chemical resistance. Constructed from ETFE (ethylene-tetrafluoroethylene) fluoropolymer, this material combines excellent mechanical properties, such as toughness, high impact strength, long flex life, medium stiffness and good abrasion resistance with nearly the same level of chemical resistance shown by the fully fluorinated polymers such as PTFE.

The compression nut (also included with the valve) is machined from PEEK (polyether ether ketone). This material is an advanced, high-performance polymer having excellent mechanical properties, ensuring long life and reliable performance throughout numerous connecting and disconnecting operations. It is a very hard material, with a very high degree of tensile strength, stiffness and dimensional stability, along with excellent chemical resistance.

3 NMR Tube Length Options
203mm, 178mm or
133mm (for Automated Sampling)

Due to the hand crafted nature of our pressure valves overall valve assembly length can vary slightly. A typical variance is 1-2mm. Overall length is based on a fully seated operating cap.



VALVED NMR SAMPLE TUBE OPERATING INSTRUCTIONS

Intermediate Pressure Valved NMR Sample Tubes (Cont.)

5mm Intermediate Pressure Valved NMR Tubes

Item No.	MHz	Tube Length (mm)	I.D. mm (Volume µL/cm)	Tube Wall	Recommended Maximum Operating Pressure		
					kPa	bar	psi
S-5-500-IPV-7	500	178	4.20 (138)	thin	600	6	87
S-5-500-MW-IPV-7	500	178	3.43 (92)	medium	900	9	130
S-5-500-HW-IPV-7	500	178	2.20 (38)	heavy	1200	12	175
S-5-500-IPV-8	500	203	4.20 (138)	thin	600	6	87
S-5-500-MW-IPV-8	500	203	3.43 (92)	medium	900	9	130
S-5-500-HW-IPV-8	500	203	2.20 (38)	heavy	1200	12	175
S-5-600-IPV-7	600	178	4.20 (138)	thin	600	6	87
S-5-600-MW-IPV-7	600	178	3.43 (92)	medium	900	9	130
S-5-600-HW-IPV-7	600	178	2.20 (38)	heavy	1200	12	175
S-5-600-IPV-8	600	203	4.20 (138)	thin	600	6	87
S-5-600-MW-IPV-8	600	203	3.43 (92)	medium	900	9	130
S-5-600-HW-IPV-8	600	203	2.20 (38)	heavy	1200	12	175
Valved NMR for Automated Sampling							
S-5-500-IPV-AS	500	133	4.20 (138)	thin	600	6	87
S-5-600-IPV-AS	600	133	4.20 (138)	thin	600	6	87

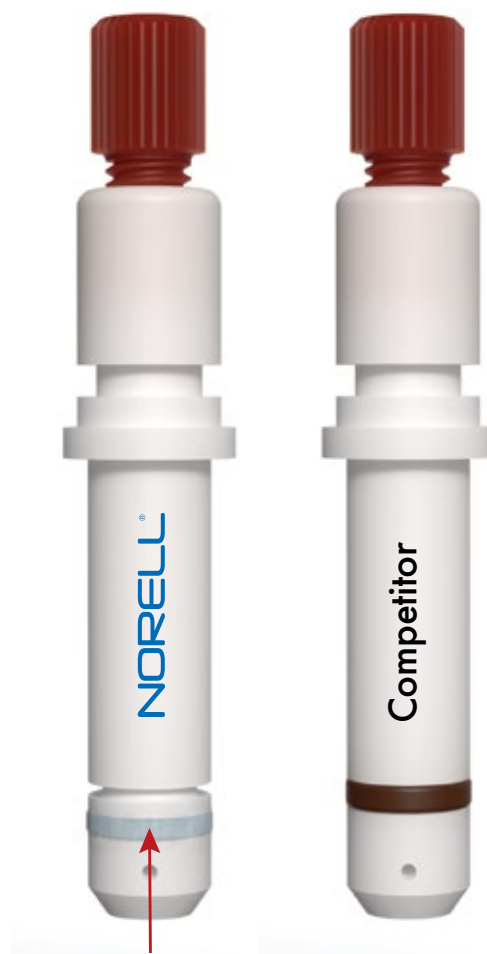
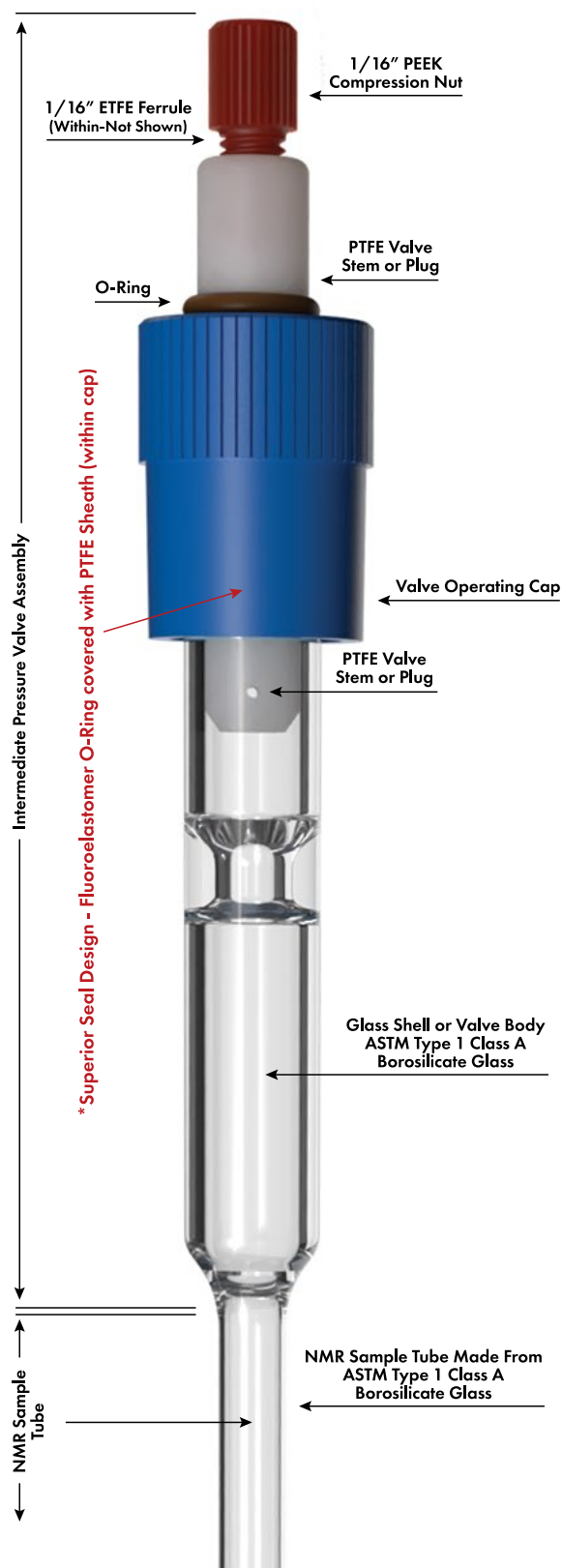
3mm Intermediate Pressure Valved NMR Tubes

Item No.	MHz	Tube Length (mm)	I.D. mm (Volume µL/cm)	Tube Wall	Recommended Maximum Operating Pressure		
					kPa	bar	psi
S-3-500-IPV-7	500	178	2.41 (46)	thin	860	8.6	125
S-3-500-IPV-8	500	203	2.41 (46)	thin	860	8.6	125
S-3-600-IPV-7	600	178	2.41 (46)	thin	860	8.6	125
S-3-600-IPV-8	600	203	2.41 (46)	thin	860	8.6	125
Valved NMR for Automated Sampling							
S-3-500-IPV-AS	500	133	2.41 (46)	thin	860	8.6	125
S-3-600-IPV-AS	600	133	2.41 (46)	thin	860	8.6	125



VALVED NMR SAMPLE TUBE OPERATING INSTRUCTIONS

Intermediate Pressure Valved NMR Sample Tubes (Cont.)



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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 certain 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.



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.

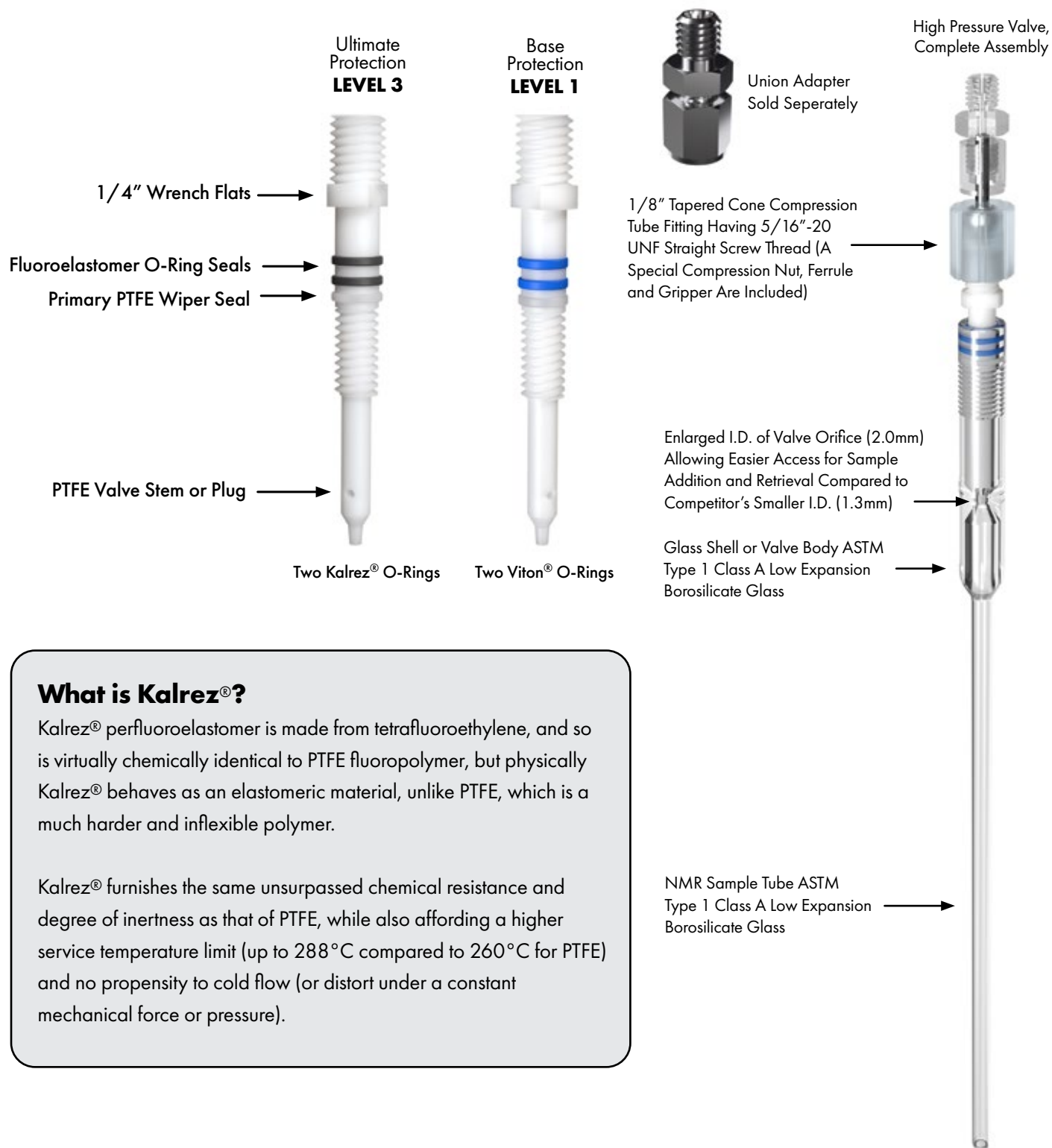
Kalrez® perfluoroelastomer o-rings offer the ultimate level of physical and chemical resistance with the inclusion of a secondary, backup o-ring.

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).

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).

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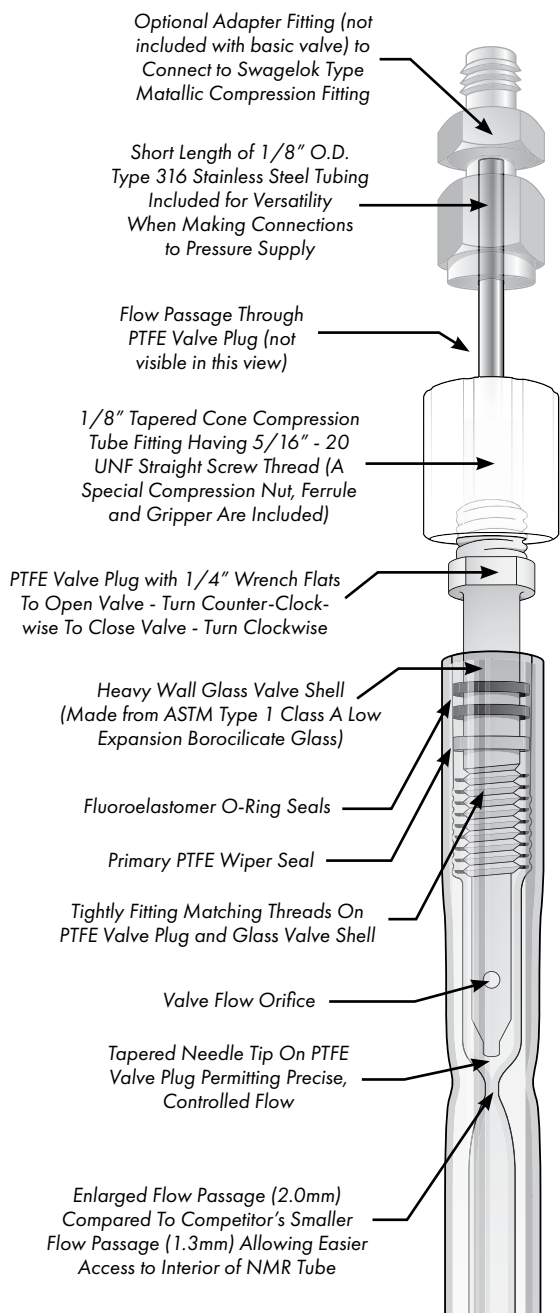
High Pressure Valved NMR Sample Tubes

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.

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VALVED NMR SAMPLE TUBE OPERATING INSTRUCTIONS

EXTREME SERIES

High Pressure Valved NMR Sample Tubes



3mm Extreme Series Level 1

Item No.	MHz	Tube Length (mm)	I.D. mm (Volume $\mu\text{L}/\text{cm}$)	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 $\mu\text{L}/\text{cm}$)	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-5-800-EX1-HPV-7	800	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

113mm

2 NMR Tube Length Options
203mm or 178mm

315mm w/ 203mm NMR Tube or
290mm w/ 178mm NMR Tube

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

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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 $\mu\text{L}/\text{cm}$)	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 $\mu\text{L}/\text{cm}$)	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

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
HPV-1/4-WRENCH	Wrench, 1/4" double open-end, 15° and 75° angled openings, forged steel



Union Adapter
Sold Separately

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