

Performance Maintenance Protocol

2690/2695/e2695 Separations Module

<i>Waters system:</i>	
<i>PM date:</i>	

Guidelines

This performance maintenance (PM) protocol outlines maintenance tasks you should regularly perform on Waters systems. Regular maintenance ensures optimum performance and uninterrupted trouble-free operation.

Schedule

Waters recommends that performance maintenance visits be performed once a year. Systems under heavy use or using aggressive solvents need more frequent maintenance. For detailed maintenance schedules, refer to the appropriate user guide located on Waters.com. Failure to follow the maintenance schedules as described in the user guide might result in unreliable operation and inaccurate laboratory results.

Safety considerations

Some protocols might involve removing instrument covers, exposing the performer to high voltages, high currents, and moving parts. This presents risks of electric shock or damage to the instrument. To reduce these risks, Waters recommends that these protocols be conducted by certified Waters field service engineers with access to the latest information on Waters products. Waters is not responsible for actions initiated by an unqualified performer. If you are unsure, have a Waters certified field service engineer conduct the performance maintenance activity.

Waters Quality Parts

Waters designs and manufactures Waters Quality Parts® to the same strict regulatory standards it uses for its high-performance Waters systems. Waters recommends using Waters Quality Parts for all maintenance activities. Failure to use Waters Quality Parts might compromise laboratory results and reliability.

Customer education

Waters offers courses on operating and maintaining its high-performance systems, as well as courses designed to help you maintain professional competency and further your knowledge in chromatography, mass spectrometry, and Waters data systems. For more information on available training courses, visit [Waters Educational Services](#) on Waters.com.

Qualification/compliance services

Waters Compliance Services help you achieve and maintain the regulatory compliance of your LC and MS instruments and software with a combination of expertise, compliant-ready systems and software, and a portfolio of services to ensure that you consistently obtain quality data. To learn more, visit [Qualification/Compliance Services](#) on Waters.com.

PM task overview

Table 1 is an overview of the PM tasks performed.

Note: For instructions on performing these procedures, refer to the online Help or the appropriate user manual on Waters.com.

Table 1 - PM tasks

Inspect	Replace/rebuild	Verify	Optional calibration tests ¹
Firmware version	Filters	Initialization diagnostics	Flow rate accuracy
Lifetime counter	Solvent management components	Static leak test	Gradient proportioning valve
Solvent manager door filter	Sample management components	Adjust the seals	Injection accuracy
Fan	Lithium battery ²	Compression check	
Valves			
Carousel drive mechanism			
PerformancePlus™ degasser			
Seal wash system			
Fittings and tubing (leaks)			
Error logs			

¹ Waters field service engineers perform optional calibration tests as part of a Total Assurance with Calibration Plan. For an additional charge, Waters can perform these tests for customers without this plan. Some of these tests require chemistry kits not supplied in the performance maintenance kit. For details on performing the optional calibration tests, see the appropriate user guide on Waters.com.

² Only Waters field service engineers can replace batteries.

PM task descriptions

Performance maintenance consists of three task categories:

- Inspect
- Replace or rebuild parts
- Verify

Note: If the instrument fails pre- or post-performance maintenance inspections or verifications, it might need additional service beyond the scope of this protocol. Such service might incur additional parts and labor charges.

Inspect

1. If the instrument is off, power it on and allow it to complete software checks.
2. Inspect the firmware and, if appropriate, update it.
3. Inspect the lifetime counter and record the eluent delivered and injection count.
4. Ensure that the solvent manager door filter is clear of debris and dust; clean if necessary.
5. Ensure that the fan grate on the rear of the instrument is clear of debris and dust; clean if necessary.
6. Inspect the following for leaks, precipitation, corrosion, proper operation, or any obvious damage:
 - Valves – prime/vent; high pressure 1 and 2; low pressure 3; gradient proportioning
 - Carousel drive mechanism
 - PerformancePlus degasser
 - Seal wash system
 - Fittings and tubings
7. Review error logs for any errors and troubleshoot as necessary.

Replace or rebuild parts

Using the parts in the PM kit, replace or rebuild parts as necessary.

Note: For instructions on replacing parts, see the appropriate user manual on Waters.com.

Verify

After completing the maintenance tasks, verify instrument performance:

1. Power-on the instrument and allow it to complete on-board software checks.
2. Perform the static leak test on the primary and accumulator pump heads and record the results.
3. Adjust the seals from the Diagnostics menu and record the results.
4. Perform a compression check and record the results.

Results/checklist

A Waters field service engineer completes the test results, checklist, and confirmation sections.

Test results

Table 2 - Firmware version

Firmware revision	
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Table 3 – Lifetime counter results

	Lifetime counters
Eluent delivered	
Injection count	

Table 4 - Static leak test results

Pumps	PSI/minute	% Volume	Pass or fail
Primary			☐ Pass ☐ Fail
Accumulator			☐ Pass ☐ Fail

Table 5 - Adjust seals test results

Seal data	New	Previous	Acceptable range	Pass or fail
Top			30 to 80	☐ Pass ☐ Fail
Bottom			80 to 200	☐ Pass ☐ Fail
Width			50 to 120	☐ Pass ☐ Fail

Table 6 - Compression check test results

Parameter	Value	Pass or fail
Compression volume	μL	☐ Pass ☐ Fail
Delta decay pressure	psi	☐ Pass ☐ Fail
Final pressure	psi	☐ Pass ☐ Fail

Table 7 - Optional calibration test results – flow rate accuracy

	Timer
Serial/ID number	
Calibration date	

Table 8 - Optional calibration test results – flow rate accuracy

Value	Pass or fail
min Expected result: 2:51 to 3:09 minutes	☐ Pass ☐ Fail

Table 9 - Optional calibration test results – gradient proportioning valve

Solvent	Measured volume	Pass or fail
A	mL	☐ Pass ☐ Fail
B	mL	☐ Pass ☐ Fail
Expected result: B cylinder volume = A cylinder volume ± 3 mL		

Table 10 - Optional calibration test results – injection accuracy

	Balance
Serial/ID number	
Calibration date	

Table 11 - Optional calibration test results – injection accuracy

W1	W2	Programmed volume (μ L)	Calculated volume (μ L)	Pass or fail
g	g	50 μ L	μ L Expected result: 50 μ L $\pm$ 2.0 μ L	☐ Pass ☐ Fail
g	g	12 μ L	μ L Expected result: 12 μ L $\pm$ 1.0 μ L	☐ Pass ☐ Fail

Checklist**Note:** Select N/A if the task does not apply.**Inspect**

All inspect tasks completed	☐ Yes ☐ No ☐ N/A
	Comments:

Replace/Rebuild

Filters	☐ Yes ☐ No ☐ N/A
Solvent management components	☐ Yes ☐ No ☐ N/A
Sample management components	☐ Yes ☐ No ☐ N/A
Lithium battery	☐ Yes ☐ No ☐ N/A
	Comments:

Verify

All verify tasks completed	☐ Yes ☐ No ☐ N/A
	Comments:

Performance maintenance confirmation

I confirm on behalf of _____	
<i>Company name</i>	
that this performance maintenance procedure has been satisfactorily completed on: _____	
<i>Serial no.</i>	
Signed: _____	Date: _____
<i>Customer</i>	

<i>Print name</i>	
I certify that the maintenance procedure has been successfully completed.	
Signed: _____	Date: _____
<i>Waters engineer</i>	

<i>Print name</i>	
Comments: _____	

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