

Performance Maintenance Protocol

ACQUITY UPLC[®] TUV Detector

<i>Waters system:</i>	A10UPT477R
<i>PM date:</i>	11 Sep 20

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](https://www.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](https://www.waters.com/education) on [Waters.com](https://www.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](https://www.waters.com/compliance) on [Waters.com](https://www.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
Firmware version	Lamp	Initialization diagnostics
Fan		Calibrate wavelength
Flow cell		
Error logs		

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. Ensure that the fan grate on the rear of the instrument is clear of debris and dust; clean if necessary.
4. Inspect the flow cell for leaks.
5. 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. Using the Console, run calibrate wavelength.

If the maximum deviation is less than or equal to ($\leq$) 1 nm, record the result.

If the maximum deviation is greater than ($>$) 1 nm, run calibrate wavelength a second time, ensure the value is less than or equal to ($\leq$) 1 nm, and record the result.

Results/checklist

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

Test results

Table 2 – Firmware version

Firmware revision	1.60.2273
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Table 3 – Calibrate wavelength results

Pass or fail	Maximum deviation
☒ Pass ☐ Fail	0.01 nm Expected result: Maximum deviation less than or equal to ($\leq$) 1 nm

Checklist

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

Inspect

All inspect tasks completed	☒ Yes ☐ No ☐ N/A
	Comments: Unable to check flow cells for leaks due to limited capabilities of tester

Replace/Rebuild

Lamp	☒ Yes ☐ No ☐ N/A
	Comments: Replaced lamp due to expiry of lamp hours

Verify

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

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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Waters
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WATERS CORPORATION
CPSM FINAL TEST
PREVENTIVE MAINTENANCE RECORD
ACQUITY TUV DETECTOR

Instrument I.D. 91847	Test System Location: Venture Singapore		
Due Date: 11 Sep 20	Interval (Months): 12	Next Due Date: 11 Sep 21	
Calibration/Maintenance Coordinator: Mohammad Shamsul f			

TUV Firmware	Firmware Version	Performer	Date
Step 1.4 TUV Firmware Version Before	1.60.2273	Mohammad Shamsul f	11 Sep 20
Step 1.6 TUV Firmware Version After	1.60.2273	Mohammad Shamsul f	11 Sep 20

SECTION 4.1: TUV Maintenance Protocol

Location: Flex Singapore

	RESULT	Performer	Date
Performed Maintenance Protocol	PERFORMED ☒	Mohammad Shamsul f	11 Sep 20

SECTION 4.3: TUV Instrument Final Test

Location: Flex Singapore

	RESULT	Performer	Date
Step 4.3 Execute TUV Final Test (735001356) Attach Test Record	PASS ☒ FAIL ☐	Mohammad Shamsul f	22 Sep 20

NOTES

- 1) Refer to attachment for replacement of parts.
- 2) Unit tested using a known good shunt.
- End of data

Place TUV Expired Label
Here

Currently installed lamp:

State: On

Good Ignitions: 0

Total Ignitions: 0

- 1: Installation Date: 05Apr12
Serial Number: 000081458
Hours: 6039.58
- 2: Installation Date: 05Apr13
Serial Number: 000091525
Hours: 3191.10
- 3: Installation Date: 10Oct13
Serial Number: 111237
Hours: 5401.38
- 4: Installation Date: 08Oct14
Serial Number: 27223
Hours: 4550.65
- 5: Installation Date: 14Oct15
Serial Number: 60710
Hours: 5428.90
- 6: Installation Date: 10Oct16
Serial Number: 80221
Hours: 6111.28
- 7: Installation Date: 04Oct17
Serial Number: 000140599
Hours: 6285.82
- 8: Installation Date: 05Oct18
Serial Number: 000175041
Hours: 6170.77
- 9: Installation Date: 11Sep19
Serial Number: 000212831
Hours: 5382.47
- 10: Installation Date: 11Sep20
Serial Number: 000229853 (Current)
Hours: 0.00

Instrument: ACQ-TUV#A123456789* A10UPT 477R

TUV Detector: Calibrate Wavelength
Deviation Since Last Calibration: 0.01nm

*correction of data entry

for Mohammad Shamsul 246394 11/09/20

Waters Corporation

INSTRUMENT FINAL TEST RECORD

Part Number:	186015028	Description:	AcQuity UPLC TUV Detector
Tested By:	MOHAMMAD SHAMSUL	Date of Manufacture:	9/11/2020 11:43 AM
Serial Number:	A10UPT477R_91120201147	Control Number:	N/A
Software Revision:	1.60.2273	Factory Order:	N/A

1) Electrical Safety

Ground Continuity

PASS ☒ FAIL ☐

2) Drift @ 230 nm

(<= 375 μ AU) - Actual:

0

AU

PASS ☒ FAIL ☐

3) Noise @ 230 nm

(<= 5 μ AU) - Actual:

7.9u

AU

PASS ☐ FAIL ☒

4) Dual Noise @ 230/280 nm

(<= 75 μ AU) - Actual:

0

AU

PASS ☐ FAIL ☒

Instrument Result: PASS ☐ FAIL ☒ Signed:  (246394)

Date: 11 / 09 / 20

Notes:

1) Replaced lamp PIN: 402000351 due to expiry of lamp hours.

2) Replaced Seal (Flow Cell TUV) PIN: WATH-425000407 due to wear and tear.

Unit is tested using a known good shunt.

End of data

Drift Count: 0

Noise Count: 5

Dual Noise Count: 0

230 nm Energy [nA]: Sample Energy: 11.811741 Reference Energy: 14.758809

This Test Record and any data contained within it are proprietary to Waters Corporation and must be retained by Waters for the time period prescribed in its Quality Records Retention Policy. If any of the individual tests noted above fail; a note must be referenced that details the work performed to correct that specific deficiency. An overall failure indicates a special circumstance in which case a complete retest is to be done. A second form is required to document that testing; the initial form must be attached and retained

Waters Corporation

INSTRUMENT FINAL TEST RECORD

Part Number:	186015028	Description:	AcQuity UPLC TUV Detector
Tested By:	MOHAMMAD SHAMSUL	Date of Manufacture:	9/22/2020 5:02 PM
Serial Number:	A10UPT477R_9222020503	Control Number:	N/A
Software Revision:	1.60.2273	Factory Order:	N/A

1) Electrical Safety

Ground Continuity

PASS ☒ FAIL ☐

2) Drift @ 230 nm

(<= 375 µAU) - Actual: -317.8u AU PASS ☒ FAIL ☐

3) Noise @ 230 nm

(<= 5 µAU) - Actual: 2.8u AU PASS ☒ FAIL ☐

4) Dual Noise @ 230/280 nm

(<= 75 µAU) - Actual: 5u AU PASS ☒ FAIL ☐

Instrument Result: PASS ☒ FAIL ☐ Signed:  (246394)

Date: 22/09/20

Notes:

1) Refer to attachment for replacement of parts

2) Unit tested using a known good shunt.

_____ End of data _____

Drift Count: 1

Noise Count: 1

Dual Noise Count: 1

230 nm Energy [nA]: Sample Energy: 107.33784 Reference Energy: 180.262375

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Attachment for the replacement of parts on A10UPT477R (22 Sep 20)			
No	Description	P/N	Reasons of change
1	ASSY, HB DEUTERIUM LAMP	WAT-402000351	Expiry of lamp hours(Exceed 2000hrs)
2	FILTER WHEEL, 2487	WAT-415000231	Crack Found at the holder (Wear and Tear)
3	SEAL, FLOW CELL TUV	WATH-425000407	Worn out (Wear and tear)
4	GRATING, 1800 G/MM,W HOLDER	WAT-WAT081308	Oxidation found on mirror surface
5	MIRROR, SPHERICAL	WAT-WAT081067	Oxidation found on mirror surface
6	MIRROR, 3X ELLIPSOIDAL DT	WAT-402000170	Oxidation found on mirror surface
7	ASSY, CABLE, THERMAL SWITCH	WATH-441000588	Broken cable (Wear and Tear)
8	PHOTODIODE S-1227-66 BQ MATCH	WAT-WAT081100	Noise failure 7.9 μ AU (Specs $\leq$ 5 μ AU)
9	BLOCK, HOLDER PHOTODIODE	WAT-405003496	Noise failure 7.9 μ AU (Specs $\leq$ 5 μ AU)
10	ASSY, CABLE, SAMPLE, RED	WATH-WAT081251	Noise failure 7.9 μ AU (Specs $\leq$ 5 μ AU)
11	ASSY,CABLE,SAMPLE,BLK	WATH-WAT081252	Noise failure 7.9 μ AU (Specs $\leq$ 5 μ AU)

Replaced by: Mohammad Shamsul  246324 22 Sep 20

Reviewed by: JOEL MANUELATED DEGUZO  246154 22 SEP 20