



Cleaning Recommendations for the DMA 35N

1. Introduction

Careful cleaning of the U-tube oscillators of digital density meters is of crucial importance for obtaining good results. The oscillator of the DMA 35N is made of high-quality DURAN borosilicate glass and should never be cleaned mechanically. All residues and contaminants have to be removed by **rinsing only**. The correct choice of cleaning agents will make cleaning faster and measurements more accurate.

2. Cleaning of the measuring cell

2.1 The question of cleaning agents

Usually, 2 cleaning agents have to be used. The first cleaning agent ("agent 1") is the one that actually cleans the cell. This means that this fluid must dissolve the sample. The second cleaning agent ("agent 2") must remove the first one (which is then already mixed with sample). It must not attack the U-tube or leave any deposits, as drops of agent 2 will remain in the U-tube. If, for example, water is used as agent 2, it must be purified water to prevent limestone deposits.

2.2 Performing the cleaning

1st step: Fill cleaning agent 1 into the measuring cell.

There are two possibilities to fill a liquid into the U-tube:

Hint: The filling options are also described in the DMA 35N instruction manual, under "Measurement".

The first method is to use the hand pump in order to suck the cleaning agent into the measuring cell. Just fill a vessel with an appropriate cleaning agent and suck the cleaning agent from the vessel into the measuring cell using the filling tube of the DMA 35N.

The second method is to use a syringe. To do this, remove the screw plug on the side of the DMA 35N and screw in the adapter Luer 1/4" UNF. Fill the syringe with an appropriate cleaning agent, connect the syringe to the "adapter Luer 1/4" UNF" and push the liquid from the syringe into the measuring cell. The liquid will leave the measuring cell via the filling tube.

Hint: If the cleaning is done with a syringe, move the plunger back and forth vigorously several times so that air bubbles add to the cleaning action.

2nd step: Let cleaning agent 1 dissolve the sample.

The time needed depends on how easy the sample dissolves in the cleaning agent and may vary between a few seconds and some minutes.

3rd step: Push cleaning agent 1 out of the measuring cell.

Use either the built-in hand pump or, if a syringe has been used, push air into the measuring cell by connecting an empty syringe and pushing the plunger.

4th step: Fill cleaning agent 2 into the measuring cell to remove residues of cleaning agent 1.

For filling, proceed as for cleaning agent 1.

5th step: Push cleaning agent 2 out of the measuring cell.

Proceed as for cleaning agent 1.

6th step: Make sure that no liquid remains in the measuring cell (a few drops of cleaning agent 2 are permitted).

If in doubt, repeat steps 4 and 5.

Hint: It does not matter if some drops of cleaning agent 2 remain in the measuring cell as long as the liquid does not attack the U-tube or leave any deposits (see also section 2.1).

2.3 When to clean?

If similar samples are to be measured in sequence, and the samples can be easily displaced from the measuring cell, it is not necessary to rinse the DMA 35N after each measurement. A careful rinsing procedure using appropriate cleaning agents (see also section 3) must take place after the measurement sequence.

If different samples with different chemical properties are to be measured, and the different samples are immiscible and/or cannot be easily displaced from the measuring cell, it is absolutely necessary to rinse the DMA 35N after each measurement. A careful rinsing procedure using appropriate cleaning agents (see also section 3) must take place after each measurement.



Application Note

3. Which cleaning agents for which applications?

Generally, the cleaning agents which should be used always depend on the samples that are measured.

The main applications of the DMA 35N are: Wort measurement (brewing industry), chemical industry (especially the measurement of sulfuric acid in batteries) and the petroleum industry.

The best cleaning agents are often the solvents of the samples. The following examples give an overview of which cleaning agents can be used for which samples.

3.2 Cleaning agents for wort measurements

Cleaning agent 1: Warm (tap) water (several times)

Cleaning agent 2: Purified (e.g. distilled) water

3.3 Cleaning agents/recommendations for the petroleum industry

Petroleum products require a strong organic solvent as cleaning agent 1, e.g. toluene, petroleum naphtha, petroleum ether, n-nonane, cyclohexane, etc. Of course, cleaning agent 2 must be able to dissolve agent 1 (e.g. alcohol, acetone...).

Important: Acetone must not be used as a cleaning agent for the "standard" DMA 35N because the O-ring which is in contact with the sample is made of Viton and is not resistant to acetone! The O-ring in the DMA 35N Ex and DMA 35N Ex Petrol is made of Kalrez. This material is resistant to acetone. Therefore acetone can only be used for cleaning the DMA 35N Ex and DMA 35N Ex Petrol!

3.4 Cleaning agents/recommendations for sulfuric acid measurement

If sulfuric acid was measured, the first step is to push out the sample from the measuring cell. Remaining drops can be rinsed with tap water (cleaning agent 1), followed by purified (e.g. distilled) water (cleaning agent 2).

Important: Always remember: Concentrated sulfuric acid must never be mixed with water because the reaction that takes place is very exothermic!

4 Additional use of a standard laboratory cleaner

Using a standard **laboratory cleaner** together with water will improve the cleaning action of the water (like washing powder in the washing machine), but for many samples this will not be required. However, if lab cleaners are used, always follow the

instructions given by the manufacturer concerning dosage and duration of application.

Strongly alkaline lab cleaners (pH above 10.5) should only be applied briefly and at temperatures below 25 °C because strong alkalis attack the glass surface upon prolonged exposure and at high temperature. Protein residues can build up when samples like beer wort are measured over a long period of time. Enzymatic lab cleaners are usually best suited for removal of these contaminants.

5 How to make sure that the DMA 35N remains in good condition

Ask your local Anton Paar representative for a maintenance contract.

6 Overview: Table of appropriate cleaning agents

Sample	Agent 1	Agent 2
Wort	Warm (tap) water	Purified (e.g. distilled) water
Petroleum products	Toluene, petroleum naphtha, petroleum ether, n-nonane, cyclohexane, etc.	Ethanol, acetone, etc.
Sulfuric acid	Tap water	Purified (e.g. distilled) water
Soft drinks	Tap water	Purified (e.g. distilled) water
Beer & schnapps	Tap water	Purified (e.g. distilled) water
Milk	Water, enzymatic lab cleaner	Purified (e.g. distilled) water