

# REPORT

## Upgrade of membrane filtration unit at TFNS to crossflow nanofiltration for TwINSol-CECs research on CECs removal from water

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Upgrade of the existing membrane system at TFNS was planned within the TwINSol-CECs project and the Work Package (WP) 3 - Reinforcing research knowledge and skills of TFNS, but also to boost the research capacity and ensure sustainable research infrastructure of TFNS. The upgrade of existing membrane filtration unit has been agreed and previously discussed with Prof. Joao Crespo, a leading investigator from the project partner institution, NOVA University of Lisbon (UNL), as well as other UNL representatives during the onsite trainings and mobilities at UNL having in mind expertise of UNL team members in corresponding scientific topic. Prof. Crespo suggested that upgrade of the existing equipment of TFNS should be directed towards the possibility to test larger amounts of water samples coming both from real time surface water streams and prepared model solutions in the laboratories.

Furthermore, highly significant discussion and suggestions were obtained in the meetings with representatives from companies which were involved in the process of upgrading giving large number of ideas and practical examples of good processing practices on market.

The upgrade included several new operating parts, which all combined opened the possibilities for high pressure membrane filtration processes in crossflow regime. All parts were welded using TIG technique and no plastic parts were used in the production, only stainless steel. New parts included:

1. High pressured multistage pump
2. Digital pressure sensors
3. Digital temperature sensors
4. Electromagnetic flowmeter
5. Membrane module (for spiral wound membranes)
6. Pipes, valves and gaskets
7. Collecting tank.

The upgraded equipment was successfully installed at TFNS (Figures 1-2) by the representatives of the company involved in upgrading equipment under the supervision of Dr. Nikola Maravić, Prof. Zita Šereš, and Jelena Šurlan, PhD student, as members of membrane filtration research team within TwiNSol-CECs project. The initial testing was performed in the presence of contracted company representatives.

The conducted upgrade will provide possibilities to create in line micro-, ultra-, and nanofiltration treatments of water samples. Furthermore, all parts are designed to facilitate easy installation of future upgrades, enabling this pilot unit to serve as a means for TFNS's future research endeavors in addressing CEC removal at higher levels of technology readiness.



**Figure 1** Membrane filtration unit during the upgrade in the production stage



**Figure 2** *Additional membrane filtration unit in the TFNS laboratories*

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