



Model Quick-TOC of LAR Process Analysers AG is the superior solution for airport deicing applications

## General

LAR Process Analysers AG from Berlin Germany offers the on-line Quick-TOC analyzer for airport deicing applications. Model Quick-TOC has worldwide been installed in many airports. This proven technology is shown to be reliable and most suitable to use, even in this harsh environment. An airport covering hundreds of square kilometres may have many natural "outfalls", which have evolved over the years with the airport expansion. The stormwater runoff can contain a wide variety of complex chemicals, from luboils, aviation fuels, surfactants from washdowns, glycol from deicing and the like. Cost dangers can lie in the airport installing instrumentation on an ad hoc basis to meet each analyses problem as it arises, rather than taking a "total site" approach. An early audit of monitoring requirements can lead to a more effective, tailored approach specific to the individual airport. LAR Process Analysers AG installed over 25 Quick-TOC-analysers at a number of airports and works closely together with the airport companies to achieve a tailor made solution that leads to an efficient and individual approach for that specific airport.



The Quick TOC-analyser of Lar Process Analysers AG

## Features of LAR's model Quick-TOC-analyzer

LAR's TOC-analyzers offer the following important features:

- LAR's TOC-analyser have two NDIR detectors. One is used for the low range, typical 0 - 200 [mg/l C.] The other NDIR for the high range, typically 0—80.000 [mg/l C.].
- Should an organics overload occur then the analyzer responds to the TOC-level by actuating the necessary control valves. Automatically the low or high range is selected.
- The typical response time is 3 minutes. Typical TOC-levels are up to 70.000 [mg/l C.]. Preset limits can be programmed. Relays will be activated for controlling pumps, valves or a sampler. Polluted water can be hold or divert. The analyser also offers two 4-20 mA outputs for a control system.
- This TOC-analyser has no memory effects, even not after measuring a high TOC-overload. The analyser will quickly return to normal the TOC-background levels of < 150 [mg/l C.], even after measuring a high TOC peak. Clean storm water can safely being discharged without any harm to the environment.
- Responds directly to all hydrocarbons such as glycols, potassium acetate deicing fluid aircraft fuel (kerosene), diesel and other contaminants. This analyser uses a thermal oxidation technique at 1200 degrees Celsius without use of any catalyst. All hydrocarbons, even when difficult to oxidise, will be measured.
- Justification and burden of proof to the environmental local authorities. The internal data logger will store TOC-data, calibration data, parameters, presets and alarms. No matter the weather conditions - storm or draught - the system will provide a continuous record for both, the airport company and the regulatory authorities.



A big airport may have many outfalls



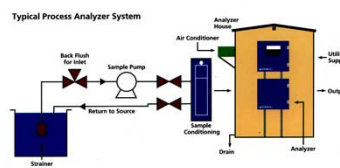
Deicing of an airplane

Status Screen				
Day	Time	TC mg/l	TIC mg/l	TOD mg/l
Me	13:16			982
Me	13:20			977
Me	13:24			951
Me	13:28			977
Me	13:32			973
Me	13:36			952
Me	13:40			943
Me	13:44			941
Me	13:48			1818
Me	13:54			998
Me	14:02			954
Me	14:06			1040
Me	14:10			979
Me	14:14			999
Me	14:18			1100
Me	14:22			1030

A record for the airport company and the regulatory authorities



A big display shows directly the TOC or correlated COD value



ODS offers complete packages including an analyser shelter



Maintenance training of operators at LAR in Berlin





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## More Features of LAR's model Quick-TOC-analyzer

- Should a TOC-reading exceed a predetermined threshold value, then the Quick-TOC can instruct an additional grab sampler to collect water samples for further lab analyses. In this way, airport personal will not only know that a potentially "out of consent" discharge has been avoided, but can determine in their own time whether what type of contaminant is "the chief culprit".
- Low maintenance and self diagnostics. Due to the thermal oxidation technique the analyser is capable of handling salts. The analyser measures also additional parameters such as inlet and - outlet carrier gas flow, carrier gas pressure (also pressure peaks) and carrier gas humidity. Via these sensors, in combination with an advanced control menu, the condition of the analyser is carefully monitored. Any abnormal condition such as a line blockage or leakage will be detected and displayed.
- Calibration and evaluation: Model Quick-TOC offers either an automatic calibration procedure, an automatic self check via a standard or a manually activated calibration routine. The standard internal robot takes care of the selection of either sample, standard or zero water. TOC standards degree over the time but using high level standards, an automatic calibration procedure can run unattended over many weeks.
- Suitable for a demanding environment. A small analyzer shelter is recommended. The standard rugged instrument cabinet offers a well protection to the environment. ODS offers a package that can be used in an environment from -20 up to 40 degrees Celsius, a high degree of UV-light, silt environment, rain, wind and storm, ice and snow. The enclosure can be secured and left unattended for weeks at a time.
- ODS offers a complete analyser system and engineering package. We take care of the sample transport, conditioning, shelter, utilities, communication, multi stream, etcetera. We offer a factory acceptance test, a site acceptance test, documentation package and personal training.



The TOC will very fast indicate an overload of deicing fluids



Easy to program and to operate via a menu driven software

## References

- LAR has worldwide installed analysers for deicing applications in many airports such as: Atlanta Airport USA (2x)
- St. Louis Airport USA (1x)
- Seoul Airport Korea (1x in combination with TNb)
- Dresden Airport Germany (3x)
- Erfurt Airport Germany (4x)
- Nurnberg Airport Germany (2x)
- Ramstein Airport Germany ( US airbase) (6x)
- Frankfurt Hahn Germany (5x)
- BBI Shonefeld Germany Berlin Brandenburg Airport (1x)
- Airport of Bale Mullhouse, France (1x)



The robot will select: sample, acid solution, a standard or zero water



Even under an angle, the display is still clear to read



Extra menu's for diagnostics and evaluating the analyser status



Airport environment: hot, cold, windy, rain and snow.



Standard and an acid solution are stored in a cabinet



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## TOC-Airport deicing project on the Munich/Dresden Airport.

The advantage of the auto-range and non memory effects of the Quick-TOC has been clearly demonstrated in this project. These features saves the airport yearly many 100.000's of Euros.

### Background:

December 2000, the Munich/Dresden airport was looking for a reliable on-line method of measuring TOC of their glycol run off. Their goal was the precise/reliable measurement of TOC to determine whether the run off should be discharged directly into an irrigation reservoir or should be diverted to a storage basin for further treatment. Glycol is poisonous to the ecosystem. High concentrations of glycol will cause the bacteria in a wastewater plant to go dormant or die resulting in serious problems and possible fines.

### Costs involved with slow response and memory effects:

Glycol is a sticky substance that absorbs easy to all sample transport lines and parts. It causes contaminate of samples resulting in slow response, false readings and memory effects.

Slow response results in missing an event which can cause the airport company to:

- accidentally polluting the environment by discharging contaminated stormwater.
- resulting in fines by the water quality authorities.

Memory effects result in:

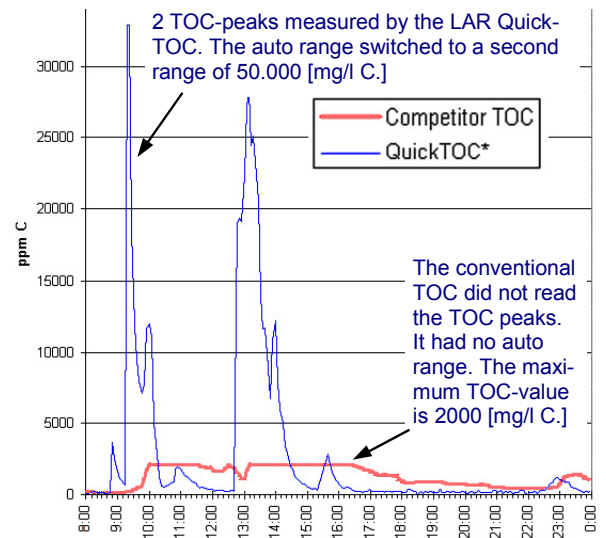
- Keeping up and treating water that is no longer polluted by glycols even up to hours even after an event.
- Proof to authorities that the duration of the event period was relatively short.

### The advantages of the Quick-TOC demonstrated:

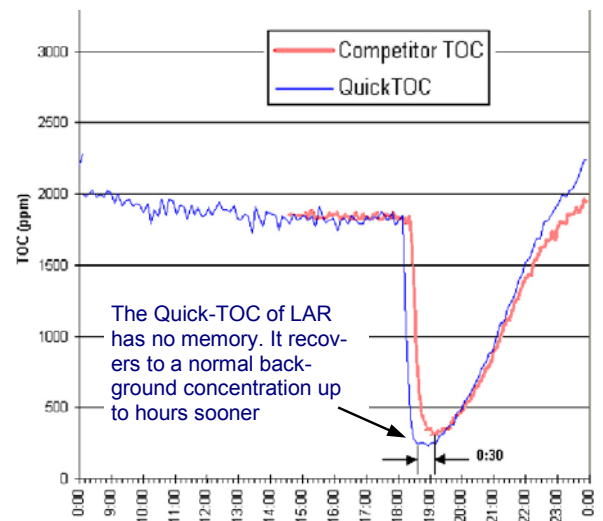
The Quick-TOC was chosen and installed parallel to another conventional TOC-analyser. TOC-data of both analysers were compared (see both graphs).

- Graph 1: The LAR analyser normally measures in the low range. It reacts immediately to an event. Above for example 2000 [mg/l C.] it switches to the high range, using a second NDIR high range detector. It measures the complete event peak.
- Graph 2: LAR's Quick-TOC follows the true TOC-value and does not suffer to memory effects. Up to hours earlier the airport can make the decision to switch over to normal conditions.

Conclusion: The airport stated "the analyser performance and the obtained measuring results were excellent". They went on to say "the analyser up-time was over 99%" and "the Quick-TOC fulfilled the application specifications 100%".



Graph 1: Conventional TOC-analysers like UV-persulphate and Ozone oxidation methods react slow. A T-95 response may take over 10 minutes. The Quick-TOC of LAR Process Analysers are equipped with an auto range. They are stable in the low range and switch immediately to a high range in case of an event. The quick-TOC responds within 3 minutes.



Graph 2: Conventional TOC analysers suffer by a phenomena called memory. After a TOC-peak or event, these analysers keep indicating a value over a long period up to many hours. Sticky glycols absorb to wetted parts resulting absorption and adsorption effects. Due to the thermal oxidation of the Quick-TOC of LAR this analyser does not suffer to memory effects.

