

# PROTOC RANGE



## PROTOC TOC on-line analysers



Pollution  
& Process  
Monitoring

**A fast & accurate means  
to determine organic contamination  
in waste-water and effluent.**



## Introduction:

The new range of PROTOC TOC (Total Organic Carbon) on-line analysers offer a highly reliable, fast and accurate means to determine, in real time, organic contamination in waste-water and effluent.

Developed and manufactured by Pollution and Process Monitoring Ltd. (PPM) - one of Europe's most experienced companies in the field of TOC based water quality analysis - PROTOC analysers can continuously report results with a response time from 2 minutes and a repeatability of 1-2%. A diverse range of sample acquisition and pre-treatment systems support the analysers and enable reliable monitoring of even the most difficult of effluent streams.

## Waste Minimisation:

Progressively, more and more companies are realising the benefits of monitoring their waste water for organic loading in realtime. Initially companies have installed PROTOC analysers to prevent waste water with high levels of organic load being either discharged to sewer or entering an effluent treatment plant. Having seen the benefit of realtime analysis they have then installed further PROTOC units within key areas of production enabling them to identify when and why high peaks of organic load are being discharged. Operators may thus use the real time data to quantify the loss, pin point faulty valve sequencing or inefficient process operation. Left undetected, the product loss would result in a significant loss of revenue and increased effluent costs. A small initial investment in PROTOC can result in not only a fast pay back but continued cost savings and process optimisation.



## Environmental Standards:

BS 1401 has been introduced as an environmental standard with a philosophy of continual improvement and reduced environmental impact.

Improved process and waste management may be achieved by installation of instrumentation to detect pollution events in real time, to reduce environmental emissions.

IPPC (Integrated Pollution & Prevention & Control) supersedes the IPC regulations and now forces companies to consider how best to achieve pollution prevention. The legislation, which has been targeted at a diverse range of industrial sectors including the food and beverage industry, will force affected companies to optimise the process, reduce waste and improve effluent quality. Instrumentation must be installed to continuously monitor and control individual processes, to reduce environmental emissions.

## TOC (Total Organic Carbon):

The parameter is a recognised methodology and reports the total amount of organic compounds contained within a water or effluent stream. The technique does not suffer interference affects from inorganic chemistry or physical contamination contained within the sample. The technique is particularly beneficial when used on-line, providing real time, second by second analysis. TOC may be correlated to predict chemical oxygen demands (COD) and biological oxygen demands (BOD) in real time, to ensure compliance to discharge consents.



## PROTOC 100 Analyser

An ideal, low cost on-line analyser for single stream monitoring applications.

### Outputs:

4-20mA, high and low alarms.

### Multiplexing:

Single stream only.

### Features:

Low cost trend monitoring, manual calibrate and clean.

### Options:

LCD display of measured value.

## PROTOC 300 Analyser

The Protoc 300 is a single stream analyser which is fully automated and it has many unique features making this instrument exceptionally versatile but amazingly is still very competitively priced. As standard it has automated zero, calibration, sample and wash sequences which enables the system to run on the dirtiest of samples. In addition it has a sleep mode, this can be controlled either by a programmed time basis or by using a float switch or similar device, when activated the analyser system goes to standby mode saving on chemical usage. This analyser also has a number of sensors to ensure that the utilities are present, an alarm is raised on a failure.

### Outputs:

Two High Alarm Relays, Utility Alarm Relay, No Sample/Off Line relay, Analogue 4 – 20 ma output, RS232.

### Features:

Auto zero, cal and self clean sequences, over range protection, sleep mode.

### Options:

RS485/Profibus and others, TOC by difference, Remote control and data logging.



# OC Range

## PROTOC *micro*-Spyder & Web

The Spyder and Web systems offer the very latest measurement and communications technology for multiple point, continuous monitoring. Up to four PROTOC Web analysers may be controlled by one PROTOC Spyder controller featuring a touch screen and menu programming.

### Outputs:

Four 4-20mA outputs.

Two High alarms & Utility alarm (@ Web analyser).

### Features:

Self-clean, auto-zero & auto-calibration, over range protection.

### Options:

Options for second channel analysis or chemical wash cycle. Over-range protection. TC/ TOC/ TOC by difference. RS232 data output.

## PROTOC Spyder & Web System

Spyder & Web systems allow each Web analyser to be configured to monitor a single sample stream with an automatic self cleaning cycle, or alternatively, the cleaning cycle can be replaced with a second sample stream.

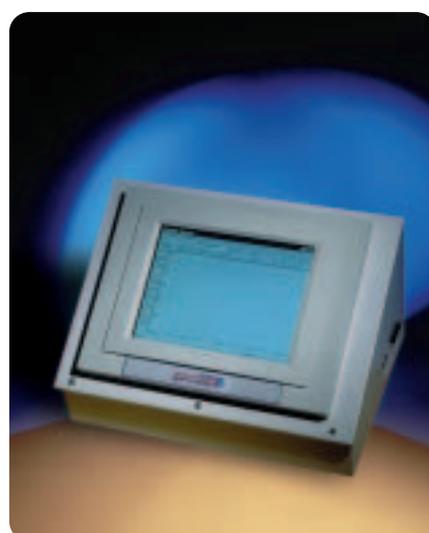
Where continuous 100% monitoring is critical, the Web analysers can be paired up so that whilst one analyser is off line, perhaps going through a clean cycle, the other is on line so that you always have a **real time** value. The Spyder Controller is a larger version of the *micro*-Spyder and may be either bench or surface mounted. Multiple analyser inputs are more clearly defined on the larger touch screen display, while the provision of a floppy disc drive, allows for simple data transfer of archived files held on the hard disc drive.

### Features:

As *micro*-Spyder and has additional communications such as USB, network, RS485 or RS232. Data can also be saved to floppy disc.

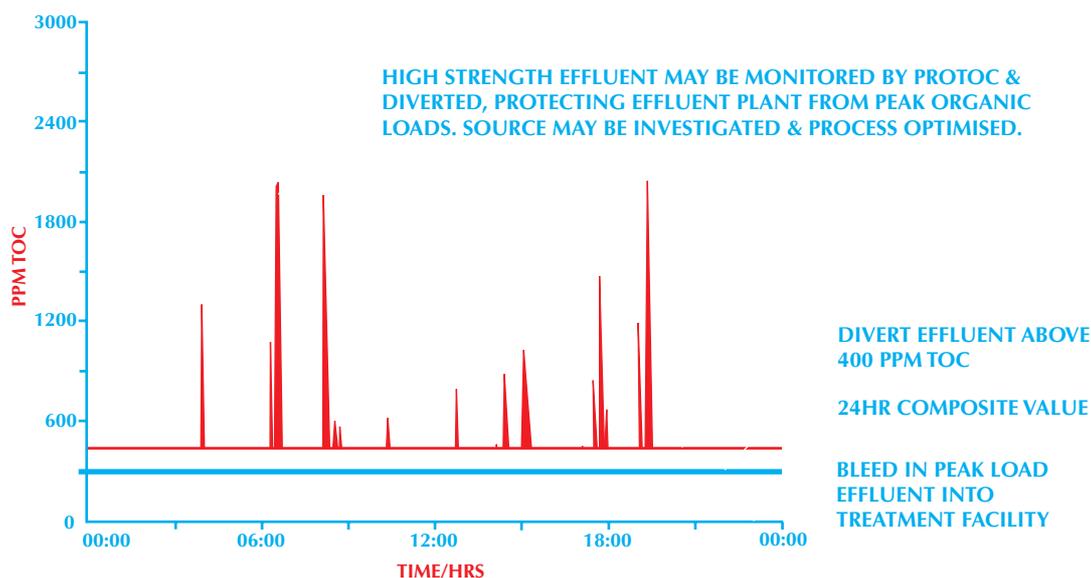
### Options:

Second channel analysis or chemical wash cycle, manual sample valve. TC/ TOC/ TOC by difference. Hard disc drive replacing flash memory.



## PROTOC: Providing Efficient Effluent Management

The real time data produced by PROTOC shows considerable variation of organic load discharged from a food manufacturing plant. Conversely, the composite sample provides a very limited representation of the process waste. The PROTOC has been installed to continuously manage effluent by either containing high strength effluent (which may be bleed back into the treatment plant when loads are low) or by determining when to discharge effluent to either trade sewer or local watercourses. Continuous monitoring can therefore generate considerable cost savings through more effective management of process effluent.



### Application of TOC Technology:

Instrumentation to measure the TOC of effluent and surface water streams has already been extensively installed throughout industry. The chemical and agro-chemical industries have used the technology on-line to continuously monitor and control regulated site discharges and ensure compliance to imposed consents. Progressively, other industries such as the pharmaceutical, food & beverage sectors have adopted the technique for compliance monitoring and waste minimisation.

### Surface Water Management:

Additionally, industry has used the PROTOC to segregate surface water and effluent streams. As a consequence, surface water may be diverted to local watercourses, reducing effluent volumes to foul sewer and significantly reducing trade effluent charges.

### Effluent Treatment Optimisation:

The PROTOC analyser, when installed on raw effluent, has enabled optimisation of biological treatment plants, preventing ingress of high strength raw effluents which may arrest the treatment process or cause a deterioration of effluent quality. Diversion of peak organic loads may therefore be automatically controlled by the analyser to more effectively manage the treatment process. Tertiary treatment, such as activated carbon, may also be controlled by TOC instrumentation, to extend the operational life and ensure discharge compliance.



## Water Recycling:

Progressively, industry is accessing how to reduce water consumption and reduce associated costs. The PROTOC analyser has been used to continuously measure the water quality of recovered water, pre and post treatment, to ensure water quality standards are maintained. Recovered wash water and condensate return can be continuously monitored using the Protoc Spyder and Dual Web system, giving total confidence of the quality of the recycled water, thus giving reduced towns water usage and a significant cost saving.

## Principle of Operation:

PROTOC instruments use an ultra-violet promoted persulphate oxidation to continuously determine the contamination of organic chemicals present in the sample.

When a sample containing organic compounds is mixed with a persulphate solution (enhancing the ultra-violet oxidation of hard-to-oxidise compounds and thus speeding up the reaction) and then exposed to ultra-violet radiation, it is quickly oxidised to CO<sub>2</sub> as shown in the following formula:



The sample flows continuously into the analyser unit. Here, in the case of TOC, the sample is acidified with a sodium persulphate/phosphoric acid solution and sparged with gas to remove inorganic carbon. Passing through a liquid/gas separator, the sample flows into the reaction chamber where it is exposed to ultra-violet light. The UV radiation, together with the persulphate, completely oxidises

the organic carbon to CO<sub>2</sub>. Gas is then added to the reaction chamber to act as a carrier for the CO<sub>2</sub>.

## Complete Package Ability:

PPM specialises in delivering the complete measurement solution. Many wastewater applications require carefully designed sample acquisition & preparation systems, to ensure the analyser remains on-line during and after polluting events. Reliability is critically important. A wide range of filtration methodologies, including automatic cleaning, using air or chemical injection, reduces maintenance and the risk of blockage. A variety of proven sample acquisition systems, including duplex pumping with automatic back flushing, have been developed to maintain sample supply. To accompany installations, PPM also engineers analyser kiosks, instrument panels, sample distribution and data acquisition.

## Other Instrumentation:

PPM manufactures and distributes an extensive range of instrumentation covering ultra-pure, potable and wastewater applications.

## Customer Service:

PPM supports the supply of instrumentation by providing a full installation, commissioning and training service. Maintenance contracts may also be provided to support installations tailored to individual site requirements.

PPM is committed to a policy of continuous research and development. The right is therefore reserved to change specifications without notice in the interest of ongoing product development.



Pollution  
& Process  
Monitoring

**Pollution & Process Monitoring Limited**

**Bourne Enterprise Centre, Borough Green, Sevenoaks, Kent TN15 8DG England**

**Tel: +44(0) 1732 882044 Fax: +44(0) 1732 780190**

**Email: [toc@pollution-ppm.co.uk](mailto:toc@pollution-ppm.co.uk) Website: [www.pollution-ppm.co.uk](http://www.pollution-ppm.co.uk)**