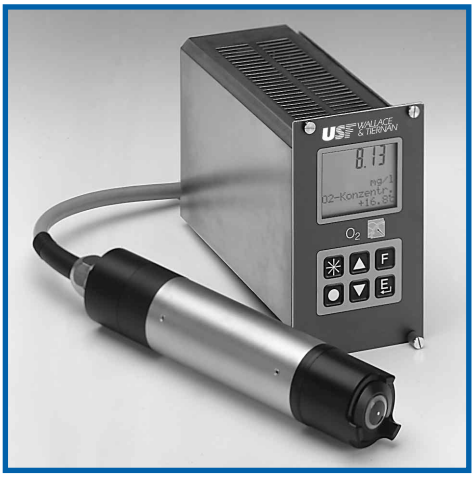
MULTI FUNCTION ANALYSERS MFA-O_2

FOR THE MEASUREMENT OF DISSOLVED OXYGEN

TECHNICAL INFORMATION

The new Multi Function Analysers **MFA** are a modern generation of hardware for measurement and control applications in water treatment processes. This latest development is the result of experience and cooperation within the worldwide **USF Wallace & Tiernan** Group which has produced a powerful electronic system ensuring precise measurement and stable control. Applications range from simple measurement through to demanding closed-loop control processes for the treatment of potable and process water as well as waste water. The totally new development of the **MFA-O_2** modules are designed for connection to the **WTW probe TriOxmatic 700** with integral temperature sensor.



ADVANTAGES

- **High accuracy and maximum reproducibility**
- **Selectable measuring ranges in mg/l or %**
- **Short response time**
- **Stable probe and automatic temperature compensation**
- **Probe free from zero currents**
- **Modern, user-friendly microprocessor technology with interactive menu assistance**
- **Isolated signal inputs and outputs**
- **Modular construction**
- **Luminescent display with adjustable display contrast**
- **Plain-text menu assistance with 5 selectable languages**
- **User-adjustable limit contacts**
- **RS485 interface**
- **CE mark (89/336/EEC)**

INTRODUCTION

In almost every liquid there is more or less dissolved oxygen present. For example at a temperature of 20 °C and an atmospheric air pressure of 1013 mbar water contains approximately 9 mg/l of oxygen. Ethyl alcohol may contain 40 mg/l, whereas for glycerine the value is only 2 mg/l.

A liquid absorbs oxygen until the oxygen partial pressures in the liquid and in the ambient air or the ambient gas are in equilibrium. The actual oxygen concentration also depends on a number of other factors like temperature, atmospheric pressure, the consumption of oxygen in microbiological processes or the generation of oxygen by, for example, algae.

The oxygen concentration determines for example

- decomposition in municipal or industrial sewage treatment
- quality of drinking water
- shelf life of beverages
- success of fish farms
- conditions of life for fish and micro-organisms
- pipe corrosion.

Earlier, the determination of oxygen concentration was made by the WINKLER titration method. Today the electronic measurement is the generally accepted method approved by most industrial standards.

Oxygen reacts to the following equations:

Alkaline solution:

$O_2 + 2\ H_2O + 4e^- \rightarrow 4\ OH^-$
(Standard Redox potential = + 401 mV)

Acid solution:

$O_2 + 4\ H^+ + 4e^- \rightarrow 2\ H_2O$
(Standard Redox potential = +1230 mV)

THEORY OF OPERATION

The **WTW TriOxmatic 700** probe operates on the amperiometric principle using a potentiostatic 3-electrode system. The sensor consists of a working electrode, a reference electrode and a counter electrode. All electrodes are located in an electrolyte system which is separated from the sample by a membrane permeable to gas. The working electrode reduces the oxygen molecules to hydroxide ions. This electro-chemical reaction generates an electric current flowing from the counter to the working electrode. This current is proportional to the contents of oxygen in the sample. Based on the solubility function, the **MFA-O_2** module computes from this signal the oxygen concentration in the sample water.

The **MFA-O_2** module is also used to display additional process measurement data in order to perform functions such as limit value monitoring. The system is equipped to monitor up to four limit values. Limit contact settings and all operating procedures are straightforward thanks to a plain-language menu assistance.

The **MFA** module has an integral **MF485** interface which supports data exchange with PLC systems. A special interface module **MF485** allows direct output as 24-hours line graphics.

The **MF485** enables data recording with galvanic isolation. Up to 3 **MFA** modules may be connected to a PC or up to 12 **MFA** modules to a printer (DIN A3).

USF WALLACE & TIERNAN

a U.S. Filter Company

Wallace & Tiernan GmbH
Postfach 1563, D-89305 Günzburg, GERMANY
Street address: Auf der Weide 10,
D-89312 Günzburg, GERMANY
Tel.: (49) 8221-9040, Fax: (49) 8221-904203

TECHNICAL DATA

MFA-O_2 MODULE

Measuring Ranges:
selectable 0 … 20 mg/l O_2
0 … 60 mg/l O_2
0 … 600 % saturation
(= 0 … 1200 mbar pO_2)

Accuracy:
≤ 1 % of FS

Analogue Output:
0/4 … 20 mA
Isolated up to 500 V with respect to earth
Output load ≤ 600 Ohm, Accuracy ± 0.1 % FS
Temperature drift 0.1 % / 10 K

Ambient Temperature:
0 °C … 50 °C (non condensing)
Storage – 20 °C … 70 °C

Switching Outputs:
For up to four limit contacts,
max. 1250 VA up to 250 V AC
max. 150 W up to 220 V DC

Electrode Input:
For W & T-O_2 TriOxmatic 700,
galvanically isolated up to 100 V relative to earth

Digital Input:
User-selectable in the menu (e.g. sample flow monitor)
Selectable inputs: 24 V, 115 V, 230 V AC
or own supply for unpowered contacts

Interface:
RS485 asynchronous to EIA RS485,
DIN 66259 Part 4 or ISO 8482,
19200 baud, non-isolated

Power Supply:
115/230 V ± 10 %, 50 – 60 Hz, 14 VA,
24 V DC to EN 61131-2

Dimensions Module (W x H x D)**:**
76 x 129 x 175 mm (incl. terminal strip)

Weight (incl. packing):
1.5 kg

OXYGEN PROBE TRIOXMATIC

Measurement Principle:
Membrane covered amperiometric probe with
potentiostatic 3-electrode system.
Electrode with integral pre-amplifier

Membrane Size:
50 µm

Temperature Sensor / Compensation:
By integral NTC sensor to IMT procedure

Temperature Range:
Use 0 °C … 50 °C
Storage – 5 °C … 50 °C

Max. Operating Pressure:
10 bar g

Materials of Construction:
Head – POM, Shaft – st. steel 1.4571,
Membrane – Fluoridated plastic

MFA HOUSINGS

MFA modules are presently available for Cl_2, ClO_2, O_2, O_3, $KMnO_4$, pH, Redox, conductivity, temperature, fluoride.
All **MFA** modules can be freely combined with each other.

Triple Wall-Mounted Housing:
Dimensions (W x H x D): 360 x 266 x 235 mm
Weight: 2.8 kg
Enclosure: IP 66

Triple Housing for Panel-Mounting:
Dimensions (W x H x D): 288 x 144 x 195 mm
Weight: 1.7 kg
Enclosure: IP 41 (IP 65 with cover)

Single Wall-Mounted Housing:
Dimensions (W x H x D): 210 x 266 x 235 mm
Weight: 1.5 kg
Enclosure: IP 66

Single Housing for Panel-Mounting:
Dimensions (W x H x D): 144 x 144 x 195 mm
Weight: 1.2 kg
Enclosure: IP 41 (IP 65 with cover)

WALLACE & TIERNAN WORLDWIDE

Australia
USF Chem Feed Pty. Limited
Unit 1A
6 – 8 Lyon Park Road
North Ryde 2113
Tel.: (61) 2-8875 2800
Fax: (61) 2-8875 2700

Brazil
U.S. FILTER DO BRASIL LTDA.
Av. Alfredo Egydio de Souza Aranha, 384 – 4º a.
04726-170 Sao Paulo / SP.
BRASIL
Tel.: (55) 11-521 6011
Fax: (55) 11-522 9288

Canada
U.S. FILTER/WALLACE & TIERNAN
250 Royal Crest Court
Markham, Ontario L3R 3S1
CANADA
Tel.: (905) 944-2800
Fax: (905) 474-1660

France
WALLACE & TIERNAN S.A.R.L.
BP 150
1/3 rue Pavlov
F-78196 Trappes Cedex, FRANCE
Tel.: (33) 1-34 82 18 50
Fax: (33) 1-30 50 98 08

Germany
WALLACE & TIERNAN GmbH
Auf der Weide 10
D-89312 Günzburg, GERMANY
Postfach 1563, D-89305 Günzburg, GERMANY
Tel.: (49) 8221-9040
Fax: (49) 8221-904203
Email: wtger@usfinternational.com

Mexico
U.S. Filter / WALLACE & TIERNAN De Mexico
SA de CV
Via Jose Lopez Portillo No. 321
Col. Santa Maria Cuautepec
54900 Tultitlan, Edo. Mexico, MEXICO
Tel.: (52) 5 875-5127
(52) 5 875-2309
Fax: (52) 5 879-8183
(52) 5 875-2171
Email: tserratos@usf.com.mx

United Kingdom
USF Limited
USF WALLACE & TIERNAN
Priory Works
Tonbridge
Kent TN11 0QL, ENGLAND
Tel.: (44) 1732-771777
Fax: (44) 1732-771800
Email: inform@usfwt.co.uk

USA
U.S. Filter/WALLACE & TIERNAN Inc.
1901 West Garden Road
Vineland, NJ 08360, USA
Tel.: (609) 507-9000
Fax: (609) 507-4125

USF WALLACE & TIERNAN
a U.S. Filter Company

Wallace & Tiernan GmbH
Postfach 1563, D-89305 Günzburg, GERMANY
Street address: Auf der Weide 10,
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Tel.: (49) 8221-9040, Fax: (49) 8221-904203

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