



## MULTI FUNCTION ANALYSERS MFA-DEPOLOX® 4

FOR THE MEASUREMENT OF  $\text{Cl}_2$ ,  $\text{ClO}_2$ ,  $\text{O}_3$ ,  $\text{KMnO}_4$

### TECHNICAL INFORMATION

The **MFA** Multi Function Analysers are a modern generation of hardware for measurement and control applications in water treatment processes. This development is the result of experience and cooperation within the worldwide **Wallace & Tiernan** Group that has produced a powerful electronic system which ensures precise measurement and stable control. Application areas range from simple measurement through to demanding closed-loop control processes for the treatment of swimming pool, potable and process water as well as waste water. The development of the **MFA** module is designed for connection to the proven **DEPOLOX® 4** measuring cell.



### ADVANTAGES

- Modular construction
- Modern user-friendly microprocessor technology with interactive menu assistance
- Isolated signal inputs and outputs
- User-selectable measuring ranges
- Customisation programme for automatic optimisation of control parameters
- Digital input for automatic monitoring of sample water
- Automatic fault detection and monitoring of measuring cell
- Luminescent display with adjustable display contrast
- Plain-text menu assistance in 5 selectable languages
- User-adjustable limit contacts
- RS485 interface
- CE Mark (89/336/EEC)
- Diagnostics menu to assist maintenance and installation

### METHOD OF OPERATION

Special **MFA** modules and the proven **DEPOLOX® 4** measuring cell are available for the measurement of  $\text{Cl}_2$ ,  $\text{ClO}_2$ ,  $\text{O}_3$ ,  $\text{KMnO}_4$ .

Sample water is taken from the process water flow and fed to the measuring cell through a sample-water pipe. The **DEPOLOX® 4** consists of a plexiglass body mounted on a housing incorporating a built-in flow control valve. The transparent plexiglass body ensures that the flow of sample water and correct measurement conditions can be visually checked at any time, this includes the rotation of grit in order to clean the electrodes. Depending on the design of the measuring cell, the sample water either drains off freely or is returned back into the stream of process water under pressure (optional).

Actual measurement is performed using a 3-electrode configuration. The potentiostatic measurement principle is used. The selectivity of the measuring cell can be adjusted to suit different measurement tasks by means of the corresponding electric potential.

A **MFA** module is connected to the **DEPOLOX® 4** measuring cell via a special cable in order to analyse the measurement of chlorine, chlorine dioxide, ozone or potassium permanganate. All the necessary signals for the measurement, including optional temperature measurement, are transmitted via this cable.

The **MFA** module is also used to display additional process measurement data in order to perform functions such as limit-value monitoring, sample-water monitoring and PI control. The **MFA** module has an integral RS485 interface that supports data exchange with programmable controller systems or control rooms. In addition, a special interface module **MF485** allows direct output to a printer as line graphics.

### APPLICATIONS

The various processes for disinfecting water almost invariably use chlorine or chlorine dioxide as well as ozone as a disinfectant.

Measuring systems can be combined to suit the process requirements thanks to the modular construction of **MFA** electronics and the ability to fit electrodes in the **DEPOLOX® 4**. The most commonly used combination for potable water and swimming pool water comprises  $\text{Cl}_2$ , pH value and redox potential. As a contrast, in potable water applications, a combination of  $\text{Cl}_2$ , pH,  $\text{Cl}_2$  is useful with the first  $\text{Cl}_2$  measurement controlling the level of disinfection and the second  $\text{Cl}_2$  measurement acting as a check at the output of the waterworks.

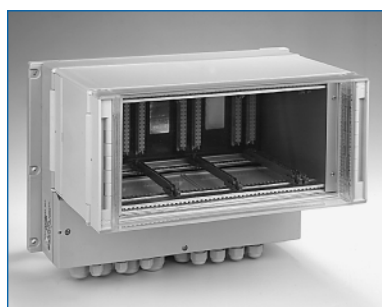




## TECHNICAL INFORMATION



**MFA Housing with MFA Cl<sub>2</sub>, MFA pH,  
MFA Redox Analysers and MF485 Interface Module**



### 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 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)

## MFA FOR Cl<sub>2</sub>, ClO<sub>2</sub>, O<sub>3</sub>, KMnO<sub>4</sub>

Electronic Measuring Module for **DEPOLOX® 4**  
 Measuring cell of 19" plug-in design. Equipped for monitoring of sample water with up to 4 limit contacts as standard. With PI control and automatic parameter optimisation and/or temperature measurement including temperature compensation. Can be combined with other **MFA** modules, e.g. for measurement of pH value or redox potential.

### Selectable Measuring Ranges:

The following measurement ranges apply for all types (Cl<sub>2</sub>, ClO<sub>2</sub>, O<sub>3</sub>, KMnO<sub>4</sub>)

|                |                |
|----------------|----------------|
| 0 to 100 µg/l  | 0 to 5.00 mg/l |
| 0 to 200 µg/l  | 0 to 10.0 mg/l |
| 0 to 500 µg/l  | 0 to 20.0 mg/l |
| 0 to 1.00 mg/l | 0 to 50.0 mg/l |
| 0 to 2.00 mg/l | 0 to 100 mg/l  |

Display flashes if range limits are exceeded or undershot.

### Measurement Input:

Designed for **DEPOLOX® 4** measuring cell, isolated for up to 100 V with respect to earth

### Temperature Compensation (optional):

-10 °C to +55 °C  
 For Pt100 and NTC or AD592 sensors  
 Isolated, up to 100 V relative to earth

### Feedback Input:

Selectable feedback signals  
 100 Ω, 1 kΩ, 5 kΩ, 1 V, 5 V, 20 mA  
 Isolated for up to 100 V with respect to earth  
 With manual/automatic identification of the **V10k** Gas Feed System (positioner)

### Switching Input:

(e.g. for checking the sample water)  
 Contact input  
 Isolated, up to 500 V with respect to earth

### Analogue Output (0/4 to 20 mA):

Output load < 600 Ω, accuracy ± 0.1% FS  
 Isolated, up to 500 V with respect to earth

### Switching Outputs:

For four limit contacts or two limit contacts plus actuator drive circuit (positioner, metering pump)  
 max. 1250 VA to 250 V AC  
 max. 150 W to 220 V DC

### Interface:

RS485, asynchronous, complying with EIA RS485, DIN 66259 Pt 4 and ISO 8482, 19200 baud, non-isolated

### Power Supply:

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

### Plug-in Type Module (W x H x D):

76 x 129 x 175 mm (including contact strip)

### Weight (including packaging):

1.8 kg



## TECHNICAL INFORMATION

### ADVANTAGES

- Potentiostatic 3-electrode measuring cell for disinfectants and oxidising agents ( $\text{Cl}_2$ ,  $\text{ClO}_2$ ,  $\text{O}_3$ ,  $\text{KMnO}_4$ )
- Fast response time ( $T_{90} \leq 20$  s) due to absence of membrane covering
- Wall-mounted housing with plexiglass body to accommodate electrodes
- Hydromechanical electrode cleaning system
- Controlled sample water flow rate
- Built-in Pt100 temperature sensor (optional)
- Sample water shut-off valve with integral flow control
- Electrode service life approx. 5 years
- Easy to install and maintain

### DEPOLOX® 4 MEASURING CELL

#### Sample Water Flow Rate:

Adjustable by flow control valve, factory setting: 33 l/h

#### Inlet Pressure at Measuring Cell Input:

Min. 0.15 bar, max. 4 bar (no back pressure)

Min. 0.15 bar, max. 2 bar (with back pressure)

A pressure reducing valve is available.

#### Back Pressure at Measuring Cell Outlet:

In non-pressurised version, sample water drains away freely

max. 1.5 bar (pressurised version of measuring cell)

#### Accuracy:

0,01 mg/l  $\pm$  1 digit (2 % F.S.)

#### Sensitivity:

0,01 mg/l (1 % F.S.)

#### Stability:

$\pm$  2 % F.S. under typical conditions for 1 month

#### Response Time:

20 seconds ( $T_{90}$ )

#### Electrode service life:

approx. 5 years

#### Housing Dimensions (W x H x D):

260 x 230 x 165 mm

#### Weight:

3.8 kg (including packaging)

In addition to the measurement capabilities described in this Technical Information Sheet, the **DEPOLOX® 4** measuring cell can also be fitted with electrodes for the measurement of pH values, redox potentials and fluoride. There are drilled holes in the cover of the **DEPOLOX® 4** measuring cell in order to fit these combined measuring and reference electrodes.

A special **Cl<sub>2</sub>++ MFA** module is available if there is a need to measure the pH value of the sample water during chlorine measurement. Using this module, the form of chlorine that is present is indicated depending on the pH value and temperature after correction. This requires the **Cl<sub>2</sub>++ MFA** module, one **DEPOLOX® 4** measuring cell with the temperature option and one pH combined electrode.

### TEMPERATURE OPTION FOR DEPOLOX® 4 AND MFA MODULE:

The **DEPOLOX® 4** measuring cell can be equipped with an optional Pt100 temperature sensor. The signal is processed by the connected **MFA** module and is used as a compensation temperature.

The temperature compensation option is useful in the **MFA** system if sample water temperature fluctuations exceed 10 °C.

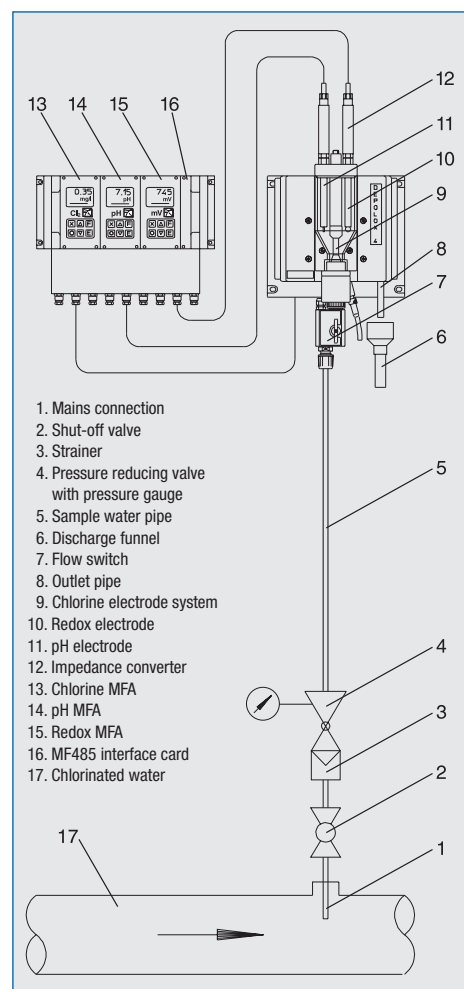
In addition to the optional temperature input, there is a facility to process the feedback signal from a positioner (e.g. **V10k** automatic).

### BUILT-IN CONTROLLER FOR MFA Cl<sub>2</sub>

In this case the **MFA** module uses a specially developed control algorithm to drive electric actuators:

- Positioner
- Solenoid metering pump
- Metering pump
- Continuous-action actuators

Adjustment of the control parameters is made easier by customisation. This eliminates time-consuming manual optimisation which can often take all day. The customisation automatically determines the optimum control parameters, thereby ensuring good control characteristics.



1. Mains connection
2. Shut-off valve
3. Strainer
4. Pressure reducing valve with pressure gauge
5. Sample water pipe
6. Discharge funnel
7. Flow switch
8. Outlet pipe
9. Chlorine electrode system
10. Redox electrode
11. pH electrode
12. Impedance converter
13. Chlorine MFA
14. pH MFA
15. Redox MFA
16. MF485 interface card
17. Chlorinated water



## MFA – SAMPLE WATER MONITORING

The sample water monitoring device is fitted at the inlet of the **DEPOLOX® 4** cell. The built-in floating contact is suitable for direct connection to the **MFA** module and can trigger various functions such as safety shutdown. Proportional and analogue outputs are maintained (**hold function**) during the calibration process and one of the following actions is taken (depending on selection made by user from menu) in the event of any problem with the sample water during normal operation:

- Actuator in OFF position (safety shutdown)
- Hold actuator in current position
- Hold mA output
- Display flashes
- De-energise alarm relay
- De-energise all relays

In the standard operating mode the actuator is moved to the OFF position by the floating contact, i.e. excess metering is prevented if the required quantity of water is not flowing through the measuring cell.

Operating instructions and menu prompts for **MFA** modules are available in English, German, French, Italian and Spanish for all our equipment. The equipment complies with quality standards and is CE-compliant in accordance with 89/336/EEC.

Information concerning other equipment in the **Wallace & Tiernan** product range can be obtained by quoting the following numbers:

TI-50.400-6 DE **MF485** Serial Interface Card for Printer Control and Bus Connection

SB-25.100 DE **V10k** Gas Feed System

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