

## Water Sampling Station PM04

Measurement of free chlorine or chlorine dioxide



**EN**

<sup>02</sup>

### **Operation & Maintenance Instructions**

Read these operation and maintenance instructions before start up!

To be held for future reference.

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## 1. General and Safety Instructions

### 1.1 General

This Operation & Maintenance Manual contains basic information to be noted during installation, operation and maintenance. It is therefore essential that the contractor read the manual before installing and commissioning the pump/system as well as by the relevant operating personnel/owner of the pump/system. It must remain accessible at the dosing pump/system for reference at all times.

In addition to the general safety instructions under this main heading of Safety, the special safety precautions outlined another section must also be observed.

### 1.2 Warning symbols used in this Operation & Maintenance Manual

This Operation & Maintenance Manual contains vital information, which may endanger people, the environment and the dosing pump/system if disregarded. These statements are identified by the following symbols:



**DANGER!** Refers to an imminent danger. Non-compliance can lead to death or serious injury.

**WARNING!** Refers to a potentially hazardous situation. Non-compliance can lead to death or serious injury.



**CAUTION!** Refers to a potentially hazardous situation. Non-compliance can lead to minor injury or property damage.

**NOTICE!** or **INFORMATION!** Appear in conjunction with safety instructions, which may endanger the pump/system and its operation if disregarded.

**IMPORTANT!** Draws attention to supplementary information to make the work easier and ensure trouble free operation.

### 1.3 Qualification and training of personnel

The personnel employed for installation, operation, inspection and maintenance work must be qualified to do so. The areas of responsibility, competence and supervision of the personnel must be precisely defined by the owner. Personnel who do not have the required knowledge must be duly trained and instructed. If necessary, this training can also be provided by the manufacturer/supplier on behalf of the dosing pump's owner. In addition, the owner of the system must ensure that the relevant personnel are fully familiar with and have understood the contents of this Operation & Maintenance Manual.

### 1.4 Important safety instructions

When installing and using this electrical equipment, basic safety precautions should always be followed, including the following:

1.) Read and follow all instructions!

**2.) WARNING! To reduce risk of injury, do not permit children to use this product unless they are closely supervised at all times.**



**WARNING!**

**3.) WARNING! Risk of electric shock. Connect only to a grounding type receptacle protected by a ground-fault circuit-interrupter (GFCI). Contact a qualified electrician if you cannot verify that the receptacle is protected by a GFCI.**

4.) Do not bury the cord. Locate the cord to minimize abuse from lawn mowers, hedge trimmers, and other equipment.

**5.) WARNING! To reduce the risk of electric shock, replace damaged cord immediately.**

**6.) WARNING! To reduce the risk of electric shock, do not use an extension cord to connect the unit to the electricity supply; provide a properly located outlet.**

7.) Save these instructions!



### **1.5 Hazards due to non-compliance with safety instructions**

Failure to comply with safety instructions may endanger not only people, but also the environment and the dosing pump/system. Non-compliance with the safety instructions can lead to the loss of all entitlement to damages. The following hazard in particular may arise:

- Danger to people due to electrical, mechanical and chemical effects. - Failure of system functions. - Danger to the environment due to leakage of hazardous substances. -

### **1.6 Safe operation**

The safety instructions in this Operation & Maintenance Manual must be observed.

The owner is responsible for ensuring the compliance with local safety regulations.

### **1.7 Safety instructions for the owner/operator**

Leakages (e.g. due to ruptures in the lining) of hazardous substances (e.g. toxic or abrasive) must be discharged in such a way as to exclude all danger to people and the environment. Statutory regulations must be observed.

Danger due to electric current must be excluded (for further details, refer to the German VDE standards as well as local regulations or chapter 1.4).

### **1.8 Safety instructions for inspection-, maintenance-, and installation work**

The owner must ensure that all inspection, maintenance and installation work is undertaken by authorized and duly qualified personnel who have also studied this Operation & Maintenance Manual.

The dosing pump must always come to a complete stop before starting any work on the pump. The procedure specified in this Operation & Maintenance Manual for shutting down the Dosing/pump/system must be observed without fail.

Dosing pumps or systems in contact with potentially harmful media must be decontaminated. All safety mechanisms and guards must be refitted and reactivated as the work is completed.

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## 1.9 Unauthorized modifications and production of spare parts

The device may only be modified or converted in consultation with the manufacturer. Genuine spare parts and accessories authorized by the manufacturer ensure greater safety. The use of other parts can void the liability for the subsequent consequences.

## 1.10 General notes of instruction!

Measuring cables must not be laid parallel or close to power supply or high-voltage current lines. Interferences would mutilate the measurement. At close distances, power supply and measuring lines may only cross at a 90° angle.

The admissible length of the measuring cables must be adhered to with regard to the sensor used. It is of decisive importance whether high-impedance (e.g. pH value) or low-impedance (e.g. free chlorine sensor) measurements are carried out. In the case high-impedance measurements, make sure that the (plug) connections are clean and dry (plug) and the lines do not become brittle due to sharp buckling. The screened cables normally used for such measuring lines must be handled according to the prescribed quality. Screening may only be connected to ground at one end of the cable (preferably at the controller).

Interface lines must be twisted and screened (see recommended cables).



**IMPORTANT!**

### **IMPORTANT!**

**If possible, a continuous cable from sensor to measuring input should be used. An extension of the cable by plugs or terminal socket increases the risk of disturbances due to contamination, humidity or excessive transition resistances.**

## 1.11 Scope of delivery



**IMPORTANT!**

### **IMPORTANT!**

**Please unpack the product and ordered accessories with great care in order not to miss any small parts. Immediately compare the scope of delivery with the delivery note. The cause of any discrepancies must be determined.**

## 1.12 Disposal

Should the device need to be permanently taken out of operation, please bear in mind that it contains electrolytic capacitors and must therefore be disposed of accordingly.

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## 2. Assembly

### 2.1 General

For hygiene reasons the drinking water or other water with which people come in direct contact has to be treated frequently with agents that kill off any micro organisms contained therein. Chlorine or chlorine compounds are mainly used for this purpose as “disinfectants”. A high level of safety is an absolute necessity for the user in this sensitive area, therefore one uses devices that fully automatically monitor, regulate and record the concentration of disinfectant.

To measure the amount of free chlorine or chlorine dioxide, ampere-metric sensors are fitted in the PM04 instrument panel (3 electrode systems for a potentiostatic operating mode). Depending on the level of the assembly further water parameters can be measured, such as pH-value, redox-potentials and the temperature.

An electronic controller, e.g. the TOPAX model, which shows and evaluates the sensor values, can be fitted directly onto the instrument panel.

This provides a compact measuring and regulating unit to control the actuating elements like the regulating valve or dosing pump.

#### **IMPORTANT!**

*The “test water channel “ is of crucial importance for perfect “measuring results”. Therefore, before installing, carefully read through the information in particular regarding hydraulic installation.*



**IMPORTANT!**





Depending on the design, the sensors are fitted in a transparent “multi-functional control block”. In detail, it concerns the following functions:

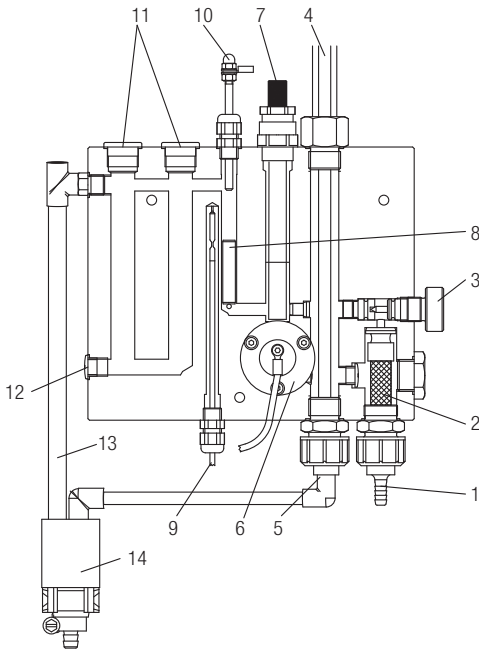


Fig. 2.2: View of the multi-functional control block

**Key:**

- ① measuring water inflow
- ② filter
- ③ needle valve DN 2,5
- ④ central drainage pipe of the overflow piping
- ⑤ pivoting drainage pipe for manual water testing
- ⑥ excess chlorine measurement cell
- ⑦ reference electrode for excess chlorine measurement cell
- ⑧ floating elements with bar magnet
- ⑨ dry reed contact
- ⑩ potentials-adjustment pin
- ⑪ receptacle holes for the pH- and REDOX-single-rod measuring cell
- ⑫ receptacle holes for the temperature gauge Pt100
- ⑬ water drainage from the measurement cell with PVC-pipe
- ⑭ collection hopper

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## 2.2. Measurement of free chlorine and/or chlorine dioxide

The measuring of excess chlorine works in accordance with the ampere-metric measurement principle with free measuring electrodes, i.e. the measuring electrode is in direct contact with the test water.

Ampere-metric sensors can be divided by the following criteria:

- 2-electrodes system
- 3- electrodes system with potentiostatic connection

A potentiostatic measuring cell is fitted on the PM 04 instrument panel to measure the concentration of disinfectant. It contains a “gold electrode” as a measuring electrode, a (high-grade steel electrode) as a backing electrode and a “glass reference electrode” (KCl). The potentiostatic connection is integrated in the corresponding measurement amplifier. A specific D.C. voltage is set on the measuring cell by the potentiostatic connection in the measurement amplifier, which polarises the measurement cell. It is therefore not necessary to zero calibrate this cell.

The current only flows with the addition of free chlorine and/or chlorine dioxide. This current increases proportionally to the concentration. The content of disinfectants is verified and the measurement amplifier is calibrated with the help of the comparative measurement as per the DPD1 method.

### **The excess chlorine measurement is heavily dependent on the pH-value.**

Consequently there is a need for the constant pH-value of the water to be analysed to be at preferably pH 7.20 or lower. Otherwise the same chlorine content would give different readings. The condition of the chlorine in the water changes depending on the pH-value and therefore so does the measurement signal. At pH 7.00 approx. 20% of the free chlorine is dissociated into hypochlorite ( $\text{ClO}^-$ ), and at 8.00 pH already about 80%. Hypochlorite ( $\text{ClO}^-$ ) only has a small disinfecting effect and therefore only produces a smaller current at the measurement cell.

### **The chlorine dioxide measurement only depends to a lesser extent on the pH-value.**

In the potentiostatic measurement cell of the PM 04 instrument panel, rotating balls in the water current ensure the continuous cleaning of the electrodes. After the intake phase of a couple of hours they secure a long-term stability of the chlorine measurement. It is not necessary to clean the measuring cells by hand at specific intervals.

## 2.3. Measuring the “pH-value”, “redox-potentials” and “temperature”

The receptacle holes for the pH and redox single-rod measuring cells and a Pt100 temperature sensor are located in the transparent flow-through casing. The sensors are screwed directly onto the flow-through casing. The single-rod measuring cells can be hung up with mounting plates on the acrylic-block during calibration.

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### 3. Functions

All of the following functional units of the instrument panel are located in a transparent multi-functional control block:

- potentiostatic chlorine measurement cells with electrode cleaning without zero point calibration
- pH- and Redox- single-rod measuring cells (depending on the design)
- hydrostatic through flow with vapour lock- separator for an even through current for the measurement cell
- Test water filter to protect the measurement cell from abrasive dirt
- Fine tuned valve to adjust the water current
- Flow through monitoring – contact “test water deficiency” for the controller
- Potentials-adjustment pin to discharge unwanted and disruptive foreign potentials.
- Sample withdrawal for manual water testing when calibrating

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## 4. Installation

If a measurement amplifier or controller is installed on the instrument panel, then it has to be mounted at such a height on the wall that the operator can read off the controller and operate the electronic automatic controller with ease. The test water must be able to drain down freely from the panel.

Use the screws and washers provided to fix it to the wall. These are purpose made with regard to the size and material of this application. Install the instrument panel without mechanical tension! The nuts are to be adjusted on the threaded rods in such a way that all four fixing points are all on one level.

### 4.1 Hydraulic connection

#### 4.1.1. Water inflow

The test water travels through plastic tubes or hoses made of PVC or PE. Under no circumstances may metal tubes be used, as they can falsify the measurement through chlorine loss through shrinkage.

The test water must be carried to the instrument panel with as little deceleration as possible, so that it is possible to control the water quality well. Brief dead times are attained by using the shortest possible hoses and smallest possible cross sections. 50 metre long pipes DN 6 already yield approx. 2 minutes of dead time. If the pipe's cross section were widened to DN 15 due to losses from friction in the pipes, then the dead time increases to approx. 10 minutes. Therefore it is recommended for when there are great distances between the withdrawal of the test water and the instrument panel, to build an installation as per the following diagram (fig. conduit with water pump gauge).

The use of a measuring water pump is useful if the test water is not flowing through with enough pressure (at least 0.2 bar at the connection with the instrument panel). Long periods of deceleration due to the great distance between the withdrawal point and the measuring panel, can be avoided, too, by using measuring water pumps.

The pump pushes the test water over the long distance in a ring circuit to the instrument panel and only one component current is taken for the actual measurement. Under no circumstances may the throttle valve be closed, as otherwise very long deceleration periods hinder the control. In addition the water in the pump is warmed up a lot and can lead to measurement errors. It is helpful having a manometer in the circuit ring when adjusting the throttle valve.

When withdrawing test water (see fig. 4.2.) the applicable regulations have to be observed. When withdrawing test water from a pipe it must be done from the line's centre as shown in the diagram.

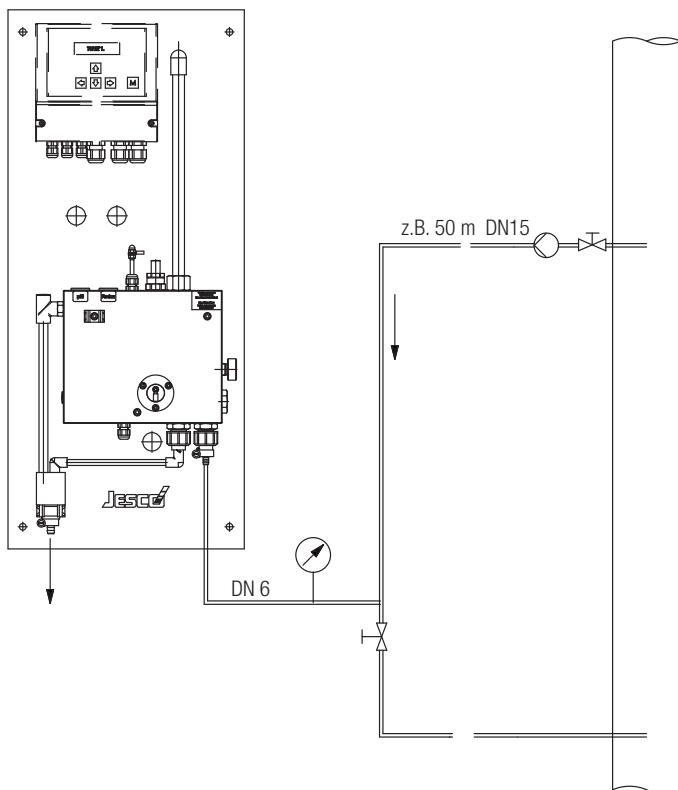


Fig. 4.1: Conduit with water pump gauge

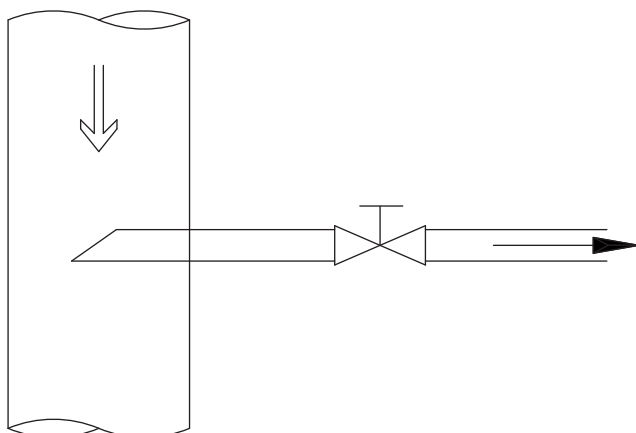


Fig. 4.2: Water withdrawal gauge

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#### 4.1.2. Water drainage

The drainage of water from the instrument panel is free from pressure. Two streams of water run off the acrylic-block, one from the overflow pipe and one from the actual measurement cell. Both of the water streams are pooled together in the collection hopper at the bottom left hand corner of the instrument panel. The water for the manual tests is withdrawn at the pivoting drainage pipe. The water from the hopper must be able to drain downwards freely. The recirculation of water in a pressure system is possible with a submerged pump in a collection tank, for instance (see installation example).

#### 4.2 Electric connection

The local (DIN, VDE, ...) must be observed for the general electric installation. A specialist must always carry out the electrical work.

The controller and/or measurement amplifier should be installed directly on to the instrument panel and/or for the installation of the control cabinet as near to the instrument panel as possible. The connecting lines for the pH- and redox single-rod measuring cells, in particular, should not be any longer than approx. 10 cm without any special precautions. If larger distances have to be bridged, an impedance transformer then has to be put on the electrode. Under no circumstance may the measuring cables be laid directly parallel to the power and control lines or their pipe ducts, junctions have to be at a 90° angle. Equipotential bonding is necessary if the tension introduced causes measuring errors, especially in the chlorine and pH measurements. The sensors are directly connected to the measurement amplifier via terminal blocks.



#### WARNING!

##### WARNING!

*Measuring cables must not be laid parallel to or in close proximity to the power lines and/or high-voltage lines. Interfering random agents distort the measurement. Power lines and measuring lines may only cross at close proximity at right angles. The permissible length for the measuring line is to be considered with the given sensor in mind. It is of crucial importance to know whether it concerns high-impedance (e.g. pH-value) or low impedance (e.g. surplus chlorine measurement cell) measurements. For high impedance measurements pay particular attention to ensuring that the connections and/or plug socket are clean and dry, and that the lines are not weakened by major kinks. The shielded cables normally used for such measuring lines have to be used in the prescribed quality.*



#### IMPORTANT!

##### IMPORTANT!

*If possible a continuous length should be used from the sensor to the measured value input. Extending the cable with connectors and/or connection boxes increases the risk of disturbances through contamination, humidity or transfer resistance.*

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## 5. Setting-up

### 5.1 Installation of the sensors

During the transport a plastic rod is inserted in place of the reference electrode, this stops the glass ball from falling out of the measuring cell. The rod is removed along with the clamping screw connection and the reference electrode is screwed in. Prior to this the O-ring supplied, approx. 30 cm, is slid onto the reference electrode and serves as a centring device.

#### **WARNING!**

*When installing the reference electrode the test water may not flow, so that the glass ball is not flushed out of the chlorine measurement cell.*



**WARNING!**

The pH and chlorine single-rod measuring cells are fitted from above in the acrylic-block, the temperature sensor if necessary, below on the side with a smaller clamping screw connection. The cable's connection to the pH and redox single-rod measuring cells has to be attached with great care. Even the smallest amount of contamination or humidity leads to false measuring results.

#### **INFORMATION!**

*The protective caps for the glass electrodes should be removed. They are needed when the instrument panel is shutdown to stop the electrodes getting damp.*



**INFORMATION!**

### 5.2 Adjusting the test water quantity

The needle valve on the acrylic-block is set up in such a way, that some water drains off in the overflow pipe. Fluctuations in the system's pressure are to be expected (for example, when the pumps are turned off overnight), so the needle valve has to be adjusted at the lowest system pressure, so that enough flows through the measurement cell. If sufficient test water flows, the glass balls in the chlorine measurement cell start to rotate in the same way, the floats come up and the dry-reed contacts connect. This signals to the electric controller that there is enough test water current and that the adjustment control can be enabled.

### 5.3 Calibrating the measurement amplifier

Before the measurement amplifier is calibrated, the test water should flow for about an hour, as the excess chlorine measurement cell needs an inflow phase before a stable measurement value can be given out. The measurement amplifier is calibrated with the same procedure regardless of its make.

The detailed procedure is to be taken from the user manual for the measurement amplifier and/or controller. Before the excess chlorine measurement cell is calibrated the pH value should be constant as varying pH values from the chemical procedures in the water create different chlorine ions and thereby different measurements of chlorine (the chlorine measurement's dependence on the pH-value is described in point 2.2.).



**WARNING!**

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### **WARNING!**

*The pH-value has a decisive influence on the chlorine measurement!*

### **pH-Value**

In order to calibrate the pH-measurement amplifier one requires two buffer solutions. They should isolate the anticipated test range, (e.g. buffer solutions pH 6.8 and pH 9.28 for test values of pH 7.2). During the calibration the pH-single-rod measuring cell can be hung up on the mounting plates in the acrylic block.

### **REDOX- Potentials**

Only one buffer solution is required to calibrate the REDOX- measurement amplifier. During the calibration the REDOX-single-rod measuring cell can be hung up on the mounting plates in the acrylic block.



**WARNING!**

### **WARNING!**

*Buffer solutions only last for a limited amount of time. Once they expire the calibration of the sensors is unreliable.*

### **Chlorine and/or chlorine dioxide measurement cells**

Free chlorine and/or chlorine dioxide are measured with the same measurement cell. It is not necessary to zero point calibrate with the potentiostatic measurement cell with 3 electrodes. This only needs to be done if either the zero point on the measurement amplifier is moved or if the measurement amplifier implicitly requires a zero point calibration.

The "zero-status" of the measurement cell is achieved by disconnecting the cable from the gold electrode.

After the zero-point calibration is complete the cable is connected again. If the displayed value is set at a stable value then the slew-rate calibration can be carried out. This can take a few minutes.

To perform the slew-rate calibration a water sample is taken from the pivot pipe on the overflow of the measurement cell and the content of the effective chlorine and/or chlorine dioxide ions is determined manually. For this purpose a photometer is usually used, that works according to the DPD method.

The user manual for the photometer has to be followed to the letter and regard must be given to cleanliness. Dirty cuvettes or fingerprints on the cuvette can cause huge errors in the measurements.

The value determined manually is immediately set in the measurement amplifier.



**WARNING!**

### **WARNING!**

*For the first run the chlorine and/or chlorine dioxide measurement has to be calibrated again after one to two days. During this time the surface of the electrodes adapts to the chemical and mechanical operating conditions.*



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## 6. Operating

When it is operating one must be careful that there is always some water flowing out of the overflow pipe. If necessary the needle valve has to be opened a little further.

The measurement has to be checked every week unless there are local regulations stipulating shorter intervals. If need be the measurement inserts should be calibrated again.

In the same cycle a visual check should be made on the filters in the test water inflow. If they are dirty they have to be cleaned and/or replaced, in order to avoid false measurement readings through the loss of chlorine in the filters.

## 7. Turning the unit off

For short interruptions to the operation, the water flow through the measurement cell should not be stopped. An oxide coating forms on the outer surface of the electrodes, the rotating balls remove this when the operation starts again. It is then seen as a new inflow phase of the chlorine measurement cell. For longer shutdown periods over several days we recommend to empty the water out of the control block and to dry out the chlorine measurement cell. The reference electrode and the pH and REDOX- single-rod measuring cell are to be disassembled and stored accordingly.

### **WARNING!**

*Be careful not to lose the glass balls when dismantling the electrodes*

Before the pH- and REDOX- and reference electrodes are dried out they must first be protected. To do this, the rubber protective cap and/ or storage tank supplied (depending on the type of measurement section) are filled with KCl solution and put on the electrodes. The electrodes are stored vertically.



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## 8. Maintenance

The annual maintenance work is limited to a visual inspection of all the components and if necessary the cleaning of the control block with a replacement of the washers.

The service life of the single-rod measuring cell depends on the operating conditions and the properties of the water (e.g. corrosiveness, grease, etc.). They normally last about 12 to 15 months, whereby a 50% storage time is counted on. When re-assembling the reference electrode ensure that the O-ring is mounted on the glass shaft.

The gold and high-grade steel electrodes can have a service life of several years, depending on the corrosiveness and abrasiveness of the water. They only have to be replaced when there are strong signs of wear (e.g. very thin points on the gold wire). If there are strong impurities on the surface of the metal, these can be carefully removed with a fine emery cloth (e.g. grit 800).

The nozzle for the incoming flow of the potentiostatic measurement cell can be pulled out from the side with a M5 threaded rod to clean and then be installed again.

After dismantling the complete block, the upper catch of the floating element has to be positioned again. To check the switching function the electrical through-flow of the dry reed contact is verified. (Floating elements above: contact closed, floating elements below: contact opened). If the switching function does not work after the upper catch has been adjusted, then the dry reed contact can be moved to the fine alignment in the clamping screw connection.

### INFORMATION!

*Electro-chemical sensors are wear and tear parts and are not covered by the warranty terms. .*



**INFORMATION!**

## 9. Technical Data

Water test panel		
Mesh aperture of the filter	mm	0.5
Water requirement	l/h	approx. 45
Temperature	°C	maximum 45
Water inflow	mm	hose connection ø 6 (0.2..6 bar)
Water drain	mm	hose connection ø 10 (drain in free downward incline)
Dimensions	mm	320x680x105 (WxHxD)
Potentiostatic excess chlorine measurement cell		
Test range	mg/l	0...2.00 (free chlorine) 0...1.00 (chlorine dioxide)
pH – range	pH	5.5...8.0 (only for chlorine measurement)
Electrode materials		
Measuring electrode	gold	
Backing electrode	high-grade steel	
Reference electrode	KCl-gel filling	
pH-single rod measuring cell		
Test range	pH	0.00 – 14.00
REDOX-single-rod measuring cell		
Test range	mV	- 1000 – +1000

## 10. Installation example

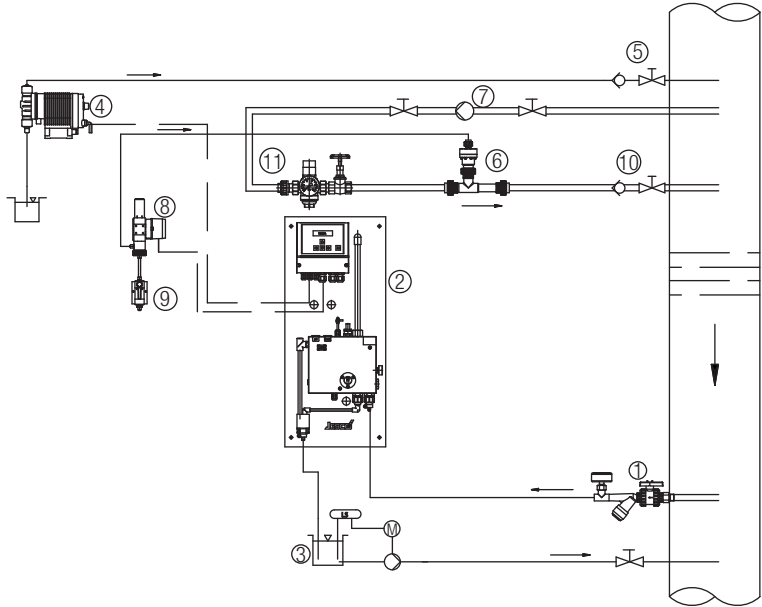


Fig. 10.1: Installation example

### Key:

- ① Test water withdrawal
- ② Instrument panel PM04
- ③ Pump for test water recirculation
- ④ Dosing pump pH- adjustment
- ⑤ Injection point pH- adjustment
- ⑥ Jet pump with check valve
- ⑦ Drive-water pump
- ⑧ Chlorine gas – control valve
- ⑨ Chlorine gas – flow meter
- ⑩ Introduction of chlorine solution
- ⑪ Drive-water rate

## 11. Order documents

### 11.1. Pre-assembled instrument panel

Model	Order no..
PM 04 to measure free chlorine and/or chlorine dioxide: potentiostatic measurement cells with gold-, high-grade-, reference-electrodes	42200010
PM 04 to measure free chlorine and/or chlorine dioxide, pH-value potentiostatic measurement cells with gold-, high-grade-, reference-electrodes pH-single-rod measuring cell with 1.50cm measuring cable	42200011
PM 04 to measure free chlorine and/or chlorine dioxide, pH-value, temperature potentiostatic chlorine measurement cells with gold-, high-grade-, reference-electrodes and balls to clean the electrodes pH-single-rod measuring cell with 1.50cm measuring cable temperature gauge Pt100 with 2.5m connection cable	42200012
PM 04 to measure free chlorine and/or chlorine dioxide, pH-value, REDOX potentiostatic chlorine measurement cells with gold-, high-grade-, reference-electrodes and balls to clean the electrodes pH-single-rod measuring cell with 1.50cm measuring cable Redox-Electrode with 1.50cm measuring cable	42200013
PM 04 to measure free chlorine and/or chlorine dioxide, pH-value, REDOX temperature potentiostatic chlorine measurement cells with gold-, high-grade-, reference-electrodes and balls to clean the electrodes pH-single-rod measuring cell with 1.50cm measuring cable Redox-Electrode with 1.50cm measuring cable temperature gauge Pt100 with 2.5m connection cable	42200014

### 11.2. Accessories and spare parts

Model	Order no.
Reference electrodes for the potentiostatic measuring cell	41100060
pH-single-rod measuring cell with N-cable cap screw PG 13.5 and separate connection cable	41100004
Redox- single-rod measuring cell with N-cable cap screw PG 13.5 and separate connection cable	41100011
Temperature gauge Pt 100 with fixed cable 2.5m	41100022
Special measuring cable with N-socket link for pH-value and REDOX single-rod measuring cells; 0.60m long for instrument panel.	78103

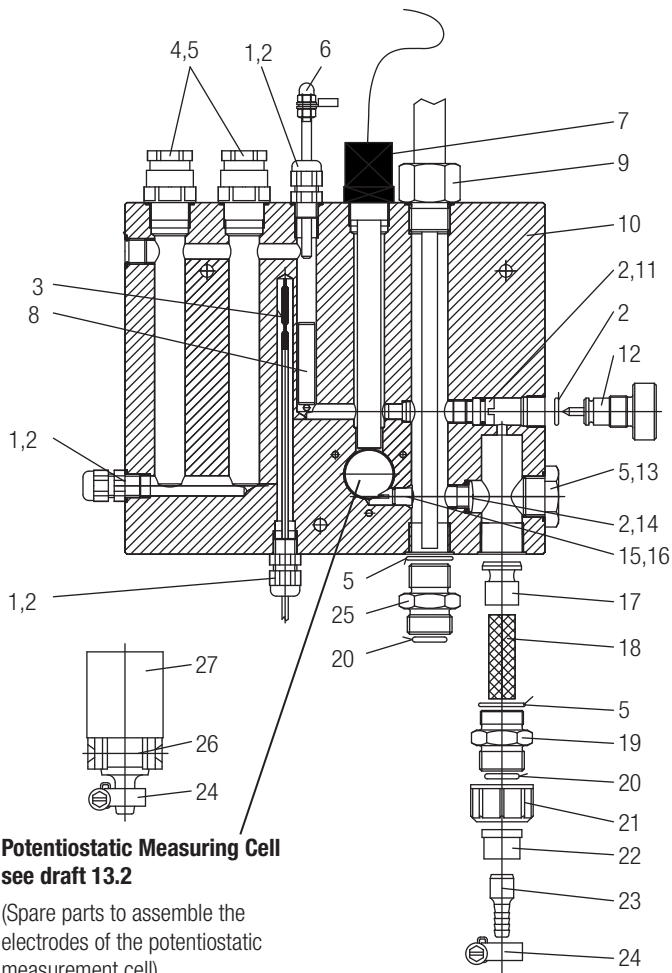
## 12. Fault analysis

Type of fault	Possible cause	Eliminating the fault
Balls in the chlorine measurement cell rotate too slowly and/or floating elements do not float	Inflow water pressure too low	Install test water line with a larger cross section. WARNING! observe delay time
		Install a measuring water pump (see 4.1 Hydraulic connection) Installation
	Filter in the test water line or in the control block is dirty	Clean the filter set and/or replace it
	Blocked needle valve	Fully open the needle valve once and install again
	Inflow nozzle of the chlorine measurement cell is very dirty	Clean the nozzle (see 9. Maintenance)
	The chlorine measurement cell's reference electrode is not centred in the hole	Fit an O-Ring on the reference electrode (see 5.1 Installation of the Sensors)
Floating elements float up, but the dry reed contact does not switch to channel pass	The adjustment between the floating elements and the dry reed contact is wrong	Align the upper catch for the floating elements (see 9. Maintenance) move poss. reed contact in the clamping screw connection
	Dry reed contact defect	Replace the dry reed contacts
The display of the connected measurement amplifier varies erratically and does not concur with the comparative measurement	In particular during excess chlorine measurement: varying pH-values strongly affects the chlorine measurement disproportionately. (with the DPD- manual measurement even with lower pH the active chlorine in the water is not ascertained and so a higher value of free chlorine is simulated).	Stabilise the pH-value in the water (e.g. optimise control path, control parameters)

### 13. Spare parts

potentiostatic excess chlorine measuring cells (single electrodes)

Electrode	Order no.
Reference electrode with 1.5m fixed cable and O-Ring to centralise in the acrylic-block	41100060
Gold electrode	34168
High-grade steel electrode	34146



**Potentiostatic Measuring Cell**  
**see draft 13.2**

(Spare parts to assemble the electrodes of the potentiostatic measurement cell)

Fig. 13.1: Spare parts for the complete multi-control block

## Spare parts for the complete multi-control block

Pos.	Piece	Description	Order no.
1	3	Screw connection M12x1.5	78232
		Alternative blank plugM12x1.5	78235
2	5	O-Ring d12x2	80058
3	1	Dry reed contact with cable 2.5m	25070
4	2	Screw connection Pg 13,	33906
		Alternative blank plugM12x1PG 13,5	78883
5	4	O-Ring d20, 35x1.78	80001
6	1	Potentials adjustment pin	35177
7	1	Screw connection PG 13,5	33906
8	1	Floating elements d8, 3x42mm	34145
9	1	Standpipe cpl. with reducer and O-Ring	35418
10	1	Control-block	34168
11	1	Valve inset	34183
12	1	Valve spindle	34182
13	1	Threaded connectors G 1/2	35709
14	1	Blank plug M12x1.5	78235
15	1	Slit nozzle	34184
16	1	O-Ring d7x1	80782
17	1	Upper filter withdrawal	34181
18	1	Filter tray	88093
19	1	Lower filter withdrawal	34180
20	2	O-Ring d12, 4x2.62	80004
21	1	Coupling nut G 5/8	82087
22	1	Bonding connection d12i	82013
23	1	Hose connector for hose d6	18266
24	2	Hose clamp 8...15	82398
25	1	Reducer G 5/8a-G1/2a	34166
26	1	Pipe clamps d25	13606
27	1	Hopper with hose connector d10	34167
29	2	O-Ring 10x2	80384



## Spare parts to assemble the electrodes of the potentiostatic measurement cell

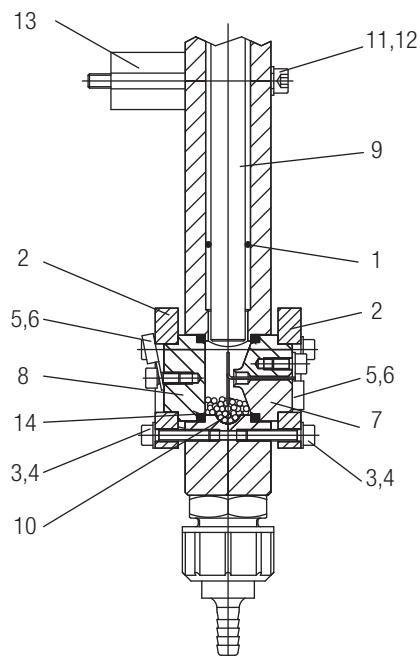


Fig. 13.2: Spare parts to assemble the electrodes of the potentiostatic measurement cell

Pos.	Piece	Description	Order no.
1	1	O-Ring d12x2	81384
2	2	Clamp ring for electrodes	34179
3	6	Cylinder head screw M4x20 DIN 912	83187
4	6	Washer d4.3 DIN 125	84201
5	2	Ring guide M4	77578
6	2	Cylinder head screw M4x8 DIN 912	83016
7	1	Gold-electrode cpl.	34148
8	1	High-grade steel-Electrode	34146
9	1	Reference Electrode	34187
10	1	Ball set (200 St.)	31613
11	3	Cylinder head screw M5x65 DIN 912	83756
12	3	Washer d5.3 DIN 125	84202
13	3	Separating washer d20/5,5x25	34185
14	2	O-Ring d25x3	80138

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Please copy and send in with your device!  
Please display anon the outer packaging!

(please fill out a separate form for each appliance)

Medium used: \_\_\_\_\_ Properties: irritant: yes/no  
corrosive: yes/no

---

## 16. Revision

This Operating Manual is valid for the following devices:

Gerät und Typ	Revisions-Stand	Software-Version
PM04	4.2007	1.0

It contains all the technical information required for installation, start-up and maintenance. Should you have any questions or require further informations regarding these operating instructions, please contact the manufacturer or its official national representative.

---

## 17. Warranty

Relays for the main voltage switch have to be protected from damages through demolishing sparks, by a wireless quenching circuit.

Please copy and send with the device.

If the device breaks down within the period of warranty, please return it in a cleaned condition with the complete warranty application, filled out.

---

Sender

Company:..... Phone:..... Date:.....

Address:.....

Contact person: .....

Lutz-Jesco order-no.:..... Delivery date:.....

Device type:..... Serial no.:.....

Nominal capacitynominal pressure: .....

Description of fault: .....

.....

.....

---

Type of fault:

1. Mechanical fault

- premature wear
- wear parts
- breakage/other damage
- damage in transit

3. Leaks

- connections
- dosing head

2. Electrical fault

- loose connections such as plug connector or cable
- operating elements (e.g., switches/buttons)
- electronics - corrosion

4. No or inadequate suction

- defective diaphragm
- other

---

Service conditions of the dosing pump

Point of use / system designation:.....

Accessories used (Suction line, PDS, etc.):.....

.....

.....

Commissioning (date):.....

Duty period (approx. operating hours): .....

Please describe the specifics of the installation and provide a simple diagram with details of the material, diameter, length and levels.



## **Lutz-Jesco GmbH**

Am Bostelberge 19  
30900 Wedemark  
Germany

Phone: +49 5130 5802-0  
Fax: +49 5130 5802-68  
E-Mail: [info@lutz-jesco.de](mailto:info@lutz-jesco.de)  
Internet: [www.lutz-jesco.de](http://www.lutz-jesco.de)

24h-Hotline: +49 5130 580 280

## **Austria**

Lutz-Jesco GmbH

Aredstraße 29/212  
2544 Leobersdorf  
Austria

Phone: +43 2256 62180  
Fax: +43 2256 6218062  
E-Mail: [info@lutz-jesco.at](mailto:info@lutz-jesco.at)  
Internet: [www.lutz-jesco.at](http://www.lutz-jesco.at)

## **Great Britain**

Lutz-Jesco (GB) Ltd.

Gateway Estate  
West Midlands Freeport  
Birmingham B26 3QD  
Great Britain

Phone: +44 121 782 2662  
Fax: +44 121 782 2680  
E-Mail: [info-gb@jesco.de](mailto:info-gb@jesco.de)  
Internet: [www.lutz-jesco.de](http://www.lutz-jesco.de)

## **Netherlands**

Lutz-Jesco Nederland B.V.

Nijverheidstraat 14 C  
2984 AH Ridderkerk  
Netherlands

Phone: +31 180 499460  
Fax: +31 180 497516  
E-Mail: [info@lutz-jesco.nl](mailto:info@lutz-jesco.nl)  
Internet: [www.lutz-jesco.nl](http://www.lutz-jesco.nl)

## **Hungary**

Lutz-Jesco Üzetlég

Vasvári P. u. 9.  
9024 Győr  
Hungary

Phone: +36 96 523046  
Fax: +36 96 523047  
E-Mail: [info-hu@jesco.de](mailto:info-hu@jesco.de)  
Internet: [www.lutz-jesco.hu](http://www.lutz-jesco.hu)

## **USA**

Lutz-JESCO America Corp.

55 Bermar Park  
Rochester, NY 14624  
USA

Phone: +1 585 426-0990  
Fax: +1 585 426-4025  
E-Mail: [mail@jescoamerica.com](mailto:mail@jescoamerica.com)  
Internet: [www.jescoamerica.com](http://www.jescoamerica.com)

## **East Asia**

Lutz-Jesco  
East Asia Sdn Bhd

Taman Perindustrian Jaya  
47200 Petaling Jaya  
Malaysia

Phone: +603 78454812  
Fax: +603 78458413  
E-Mail: [info@lutz-jescoasia.com](mailto:info@lutz-jescoasia.com)  
Internet: [www.lutz-jescoasia.com](http://www.lutz-jescoasia.com)

## **Middle East**

Lutz-Jesco Middle East FZE

P.O. Box 9614  
SAIF-Free Zone Center  
Sharjah  
UAE

Phone: +971 6 5572205  
Fax: +971 6 5572230  
E-Mail: [info-me@jesco.de](mailto:info-me@jesco.de)  
Internet: [www.jescome.com](http://www.jescome.com)



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