

## List of Contents

1. General
2. Scope of Delivery
3. Installation
4. Startup
5. Switching off the System
6. Maintenance
7. Troubleshooting

### 1. General

The water sampling station SR 400 and SR 500 includes additional to the chlorine measuring cell a connector with flow adjustment valve, a dirt trap, a hydrostatic flow controller for the chlorine measuring cell and a flow monitor with Reed contact. It is built in an activated-carbon filter for adjusting the OFF-SET of the chlorine measuring cell.

Water sampling station SR 500 includes additional a transparent housing for measurement of pH-value and redox-value. A groundig pin is built in, too.

The two electrodes of the chlorine measuring cell which is suitable for all types of pure water are normally made from platinum/copper. Because of the better chemical resistance, we recommend using platinum/silver electrodes for salt and sea water.

#### Note!

In order to avoid malfunctions due to contamination of the measuring cells or flow controllers, it is recommended to install an 80µm filter into the sampling tube.

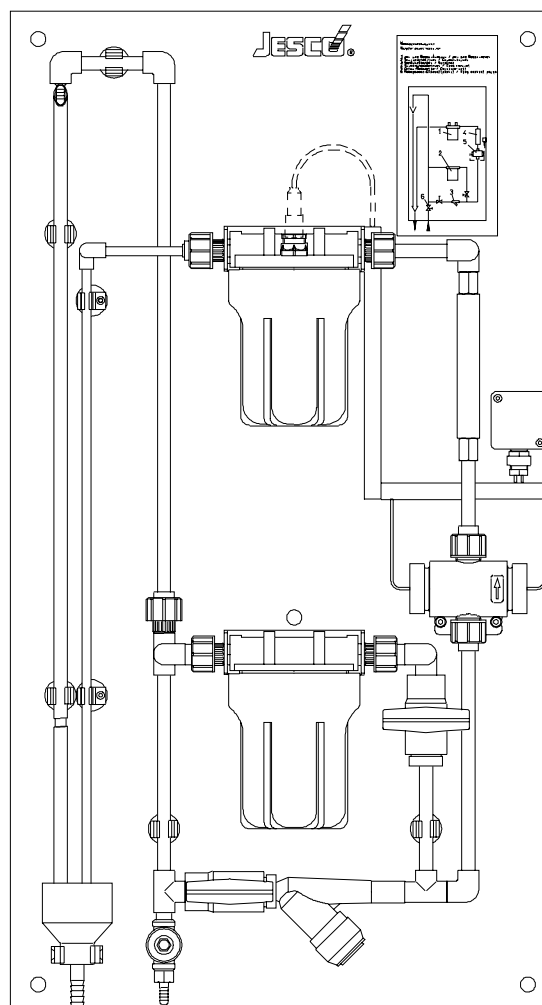
The filter element must be changed or cleaned regularly so that chlorine consumption in the sample water due to separated dirt particles does not occur.

### 2. Scope of Delivery

When unpacking the water sampling station and accessories, make sure that small parts are not overlooked. Compare the scope of delivery with the packing list.

### 3. Installation

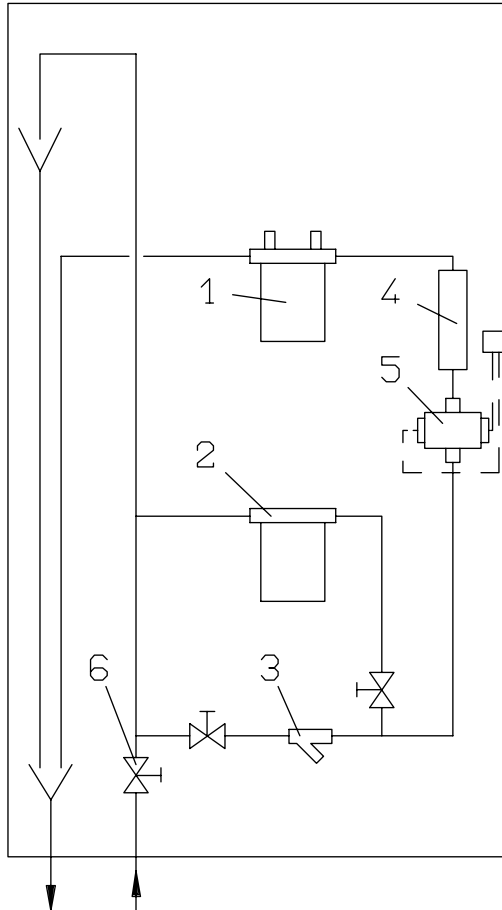
The water sampling station must be mounted vertically at eye level. Please use the delivered mounting set.



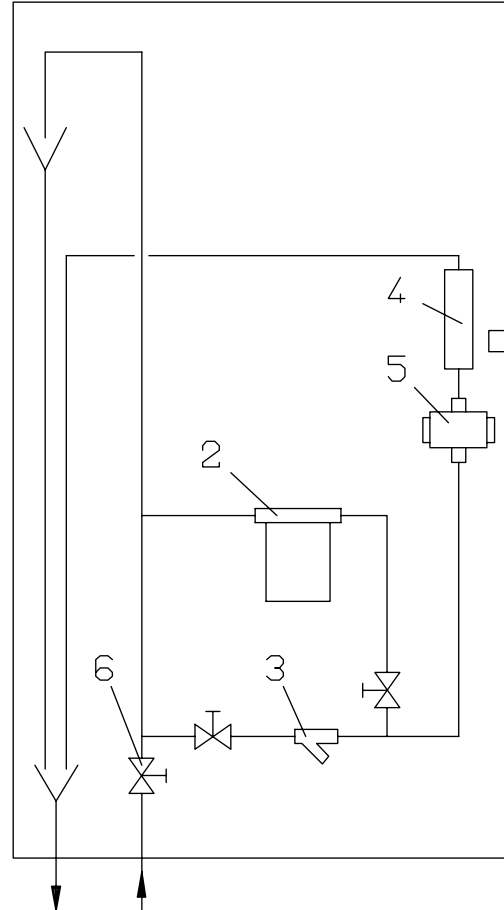
### 3.1 Electrical Connection

For the general electric installation, observe the local standard regulations. Always let an expert do the electrical connection. Controller and amplifier should be located as close as possible to the water sampling station, either in the switch cabinet or at the wall. Connecting lines between the pH and redox sensors and the amplifier in particular must not be longer than 15 m unless special measures have been taken. If longer distances must be overcome, the electrode must be fitted with an impedance transformer. Measuring cables must never be laid directly in parallel to mains and control lines or their installation channels. Crossings must be rectangular.

A grounding pin is required if imported voltages might cause wrong measurements (especially pH measurement).

**Water Sampling Station SR 500**


- 1 pH- and redox-meter (not at SR 400)
- 2 activated carbon filter
- 3 dirt trap

**SR 400**


- 4 flow monitor
- 5 Chlorine measuring cell
- 6 flow control valve

The task of the Reed contact of the flow monitor (4) is to block the controller output and to deactivate a servomotor (if available) if the sample water quantity required is too small for a reliable measurement.

**3.2 Sample Water Connection**

The sample water is to be routed without delay from the sampling point to the measuring cell. Consequently, large line cross-sections must be avoided. We recommend using PE or PVC tubes or pipes with 6...10 mm internal diameters. A 50 m long DN 6 tube causes a dead time of about 2 minutes and a pressure loss of 0.25 bar.

The inlet of the water sampling station is fitted with a tubing connection for 6/12 PVC tubes.

The supply pressure for the sample water must be at least 0.15 bar.

*Note!*

Never use metal pipes as they alter the measurements due to chlorine consumption!

The sample water must be directed into open collecting basins or the sewerage.

The flow adjusting valve must be adjusted, that just a few drops come out at the overflow-pipe.

#### 4. Startup

After installation, the sample water must flow through the connected devices for at least four hours in order to put the electrodes into a balanced condition before initial adjustment. Otherwise, the adjustment would have to be repeated several times. The hydrostatic flow controller ensures a constant sample water flow of approximately 40 l/h, if some drops come out of the overflow. Before adjusting the chlorine measuring cell, the pH value must be stable. The pH adjustment must be carried out first.

##### 4.1 pH Value

The connected measuring and control devices are adjusted following the same steps irrespective of the model. In order to set the measuring points, two buffer liquids are required, the pH values of which are slightly higher / lower than the operating level to be measured finally (e.g. pH 6.8 and pH 9.27). For a detailed description of the adjustment procedure, refer to the operating instructions of the amplifier.

For buffering, loosen the clamping screw of the pH electrode, remove the electrode carefully and put it into the buffer liquid.

After buffering the clamping screw must be fixed carefully to ensure that no air is sucked in at the connection. Otherwise the flow of water will be too low for the chlorine measurement cell and the flow monitor will go down.

*Note!*

The pH electrode must be resistant to a weak vacuum, because at the electrode is a vacuum of nearly 0.1 bar.

##### 4.2 Redox Value

For the adjustment of the redox value, only one buffer liquid is required (e.g. 468 mV). For a detailed adjustment description, refer to the operating instructions of the amplifier.

For buffering, loosen the clamping screw of the redox electrode, remove the electrode carefully and put it into the buffer liquid.

After buffering the clamping screw must be fixed carefully to ensure that no air is sucked in at the connection. Otherwise the flow of water will be too low for the chlorine measurement cell and the flow monitor will go down.

*Note!*

The redox electrode must be resistant to a weak vacuum, because at the electrode is a vacuum of nearly 0.1 bar.

#### 4.3 Chlorine Measuring Cell

The chlorine measuring cell can be adjusted as follows after several hours of running.

Check that the balls move freely in the chlorine measuring cell and also reach the upper cell section. If necessary, collect and measure the sample water (approximately 0.66 l/min correspond to approximately 40 l/h).

##### OFFSET Adjustment

Prepare controller/amplifier for OFFSET adjustment. The OFFSET can be adjusted with or without the activated-carbon filter. We recommend using an activated-carbon filter because the adjustment procedure can be carried out more quickly and does not influence the cell flow.

##### OFFSET Adjustment with Activated-Carbon Filter

Lead the sample water through the activated-carbon filter by closing the bottom ball valve and open the top ball valve. The dechlorinated sample water produces a residual current in the chlorine measuring cell, which must be compensated by the OFFSET corrector of the connected device. Indicator and digital device must show „zero“.

##### OFFSET Adjustment without Activated-Carbon Filter

This procedure is helpful if the activated carbon is consumed and no spare filter is available. Close both ball valves on the water sampling station and wait for about 10 minutes. The cell current droppage due to polarization gradually reaches a constant residual value. This value is adjusted as "OFFSET" display as described before.

### Range Setting

After the OFFSET adjustment, the measuring range (slope of curve) is set using chlorinated water. For this purpose, the sample water must bypass the activated-carbon filter with the help of the both ball valves. The balls in the chlorine measuring cell (5) must rotate correctly.

After a few minutes, the measurement amplifier / controller displays a value. This display must be adapted immediately to the results of an independent comparison measurement. For the comparison measurement, a sufficiently accurate device working according to the DPD method is appropriate. The water sample used for the comparison measurement may only be taken from the overflow of the sampling station and not from a more distant system section. Observe the operating instructions for the comparison measuring device carefully in order to avoid faulty displays (receptacles contaminated by water, finger prints, residues, etc. often cause errors).

The deviating display on the amplifier or controller is then corrected in accordance with this result of this comparison measurement. The whole device is now adjusted.

#### *Note!*

If the device is operated for the first time, a correction of the adjustment becomes necessary after one or two days, because at least one OFFSET drift can be expected. The reason for this drift is that the electrode surfaces adapt slowly to the chemical and mechanical operating conditions.

### 5. Switching off the System

For short interruptions of operation, the sample water flow should not be switched off in order to keep the chlorine measuring cell prepared for operation and to avoid unnecessary OFFSET drifts. If the sample water rests in the chlorine measuring cell for several days, chemical changes at the copper electrode in particular are likely. These can be removed either by dismantling the copper electrode and using sandpaper (400 grit) or the balls themselves by running sample water through the measuring cell for several hours.

#### *Note!*

When dismantling the electrode, the 200 glass balls might get lost. To avoid this, remove the chlorine measuring cell and open it with electrode pointing upwards before dismantling it. We recommend draining and drying the measuring cell completely before standstills of several days. By no means should the sample water be drained from the measuring cell (e.g. by siphoning) during normal maintenance operations, or during off-shift shutdowns. Otherwise, exact measurements cannot be guaranteed after recommissioning.

### 6. Maintenance

The correctness of the measurement must be verified by separate comparison measurements (manual measurement). The intervals for these measurements depend on the procedure used and on the rules (e.g. for waterworks, swimming pools, etc.).

Maintenance consists of checking the filters, activated-carbon filter and dirt trap, every six months and of visually inspecting the electrodes from outside (is the platinum spiral still in the center or has it moved?). If the water sampling station is not contaminated, there is no reason to dismantle it. The service life of the individual components, such as the pH and redox electrodes or the chlorine measuring cell, depends on the water properties (aggressiveness, abrasiveness, lubricants). To increase the operating reliability, it is recommended to have spare electrodes, balls and activated-carbon filters ready at the system.

Please consider the limited operational life of the pH and redox electrodes. It is normally about 12...15 months, including storage time which must be calculated with at least 50 %. The electrodes must be stored vertically so that the electrolyte reservoir wets the lower ends of the measuring surfaces and leaking of the electrolyte is avoided.

## 7. Troubleshooting

| NATURE OF PROBLEM  | POSSIBLE CAUSE   | RECOMMENDED ACTION   |
|--|--|--|
| Balls do not move at all or insufficiently.  | Water supply pressure too low.   | Check pressure conditions (Dp > 0.15 bar), use booster pump, if necessary.   |
|  | flow adjustment valve is blocked by dirt.  | Open the valve for one short moment totally and readjust the flow.   |
|  | 80 µ filter blocked.   | Clean or replace filter element.   |
|  | Air is sucked in at pH- or redox electrode.  | Fix the clamping screw carefully.  |
| Flow monitor does not switch although the balls rotate correctly.  | Contamination stops float element.   | Dismount and clean float.  |
|  | Position of Reed contact is not aligned with reference to float element in upper position.   | After loosening the setscrew, adjust Reed contact.   |
| Despite correct sample water flow (flow monitor and ball rotation okay) insufficient current input into the connected measuring devices. | The pH value might be too high and thus the amount of measurable free chlorine too low (with the DPD method, a large amount of chlorine seems to be available because the tablet releases the chlorine contained in the water by acidification). | Reduce the pH value of the whole system, if possible, or acidify the sample water before entering cell.                                    |
|  | 80 µ filter is dirty and consuming chlorine.   | Replace filter element.  |
| The display of the connected devices fluctuates at random and does not correspond to the pH and redox values determined by other means.  | Faulty measurements are possible several devices connected are not physically separated or have different ground potentials.   | Connect one grounding pin end of the fittings block to earth (e.g. to ground of amplifier). Use voltage separator at 0(4)...20 mA outputs. |
| OFFSET can not be adjusted.  | The base current due to certain water components is too high.  | Install a 500 or 1000 ohm shunt resistor in the measuring cell feedback line.  |