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1. General

The items (...) refer to the drawing of the water sampling station.

The water sampling station WM 500 consists of a connector with shutoff device and dirt trap and a flow controller for the chlorine measuring cell, a transparent holder for the pH and redox electrode, a flow monitor with Reed contact and thermometer probe Pt 100 for temperature measurement / compensation and a grounding pin. For manual check measurements, a sampling valve is available.

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.

To adjust the OFFSET of the chlorine measuring cell by dechlorination of the sample water, an activated-carbon filter should be used. It is premounted on a separate plate with tubing connections.

Note:

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

The filter element must be changed 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. The three-point fastening allows a non-warping installation even in the case of uneven walls.

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).

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 water sampling station is fitted with tubing connections for 6/12 PVC tubes.

Note:

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

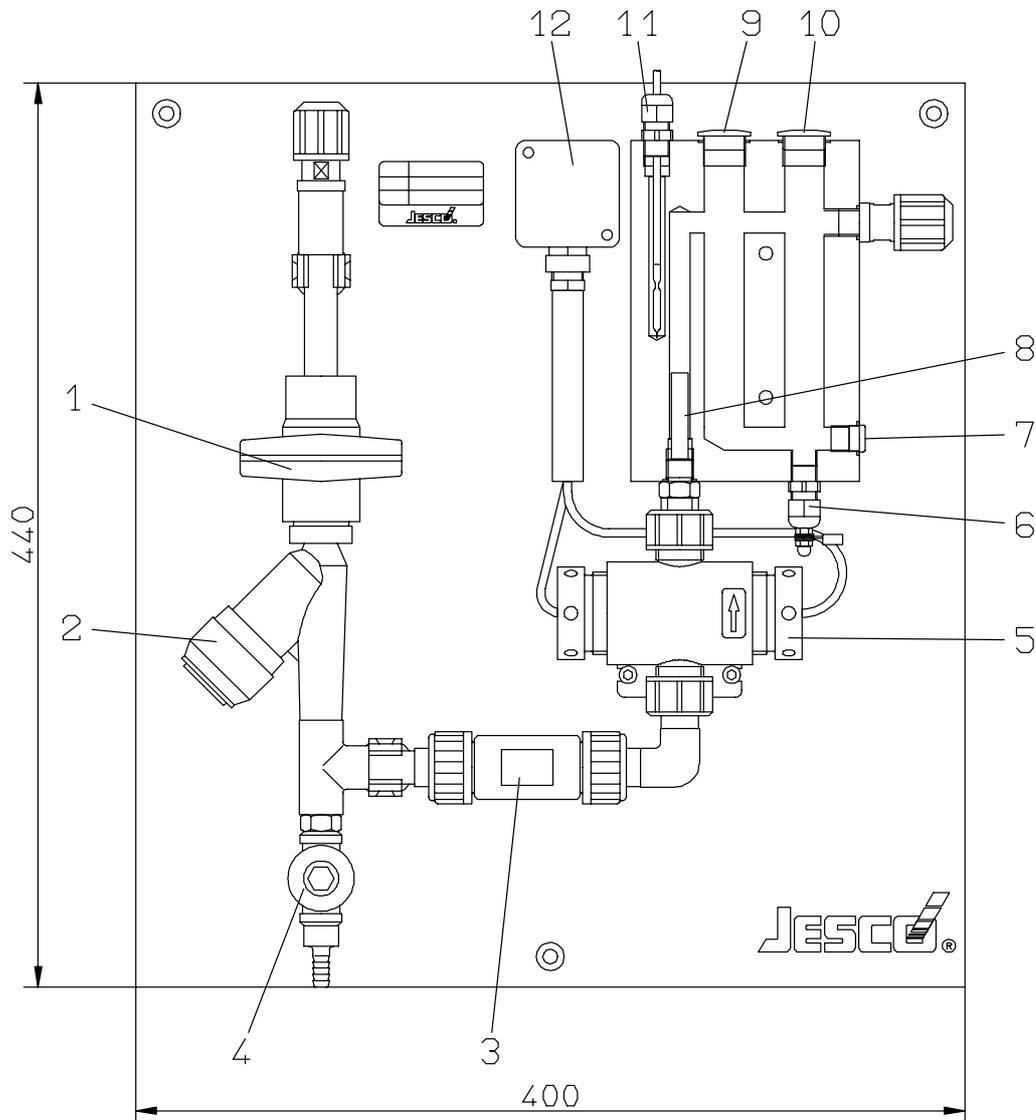
The flow controller (3) of the water sampling station has a shield. In order to avoid malfunctions (due to insufficiently filtered water), it is recommended to use an 80 µm filter at the sampling point. This filter must be changed regularly so that chlorine consumption in the sample water does not occur.

For the adjustment of the OFFSET, an activated-carbon filter should be installed leading in the water sampling station (due to the position of the connections).

The sample water can be directed either back into the pressure system, into open collecting basins or the sewerage.

In any case, the supply pressure for the sample water must be at least 1 bar higher than the back-pressure. If the sample water is to be returned into a 2 bar pressure line, for example, the sample water must be available at minimum 3 bar.

Water Sampling Station



- 1 Shutoff valve
- 2 Dirt trap
- 3 Flow controller
- 4 Needle valve for manual sampling
- 5 Chlorine measuring cell
- 6 Grounding pin
- 7 Holder for Pt 100 thermometer
- 8 Float element (flow monitor)
- 9 Holder for redox electrode
- 10 Holder for pH electrode
- 11 Reed contact (flow monitor) used to indicate low flow condition
- 12 Terminal box

The task of the Reed contact of the flow monitor (11) 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.

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 flow controller ensures a constant sample water flow of approximately 48 l/h, if the pressure gradient is 1 bar or more, i.e.: at least 1 bar supply pressure in the case of free discharge or e.g. 3 bar supply pressure at 2 bar or less back-pressure.

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 relevant devices.

For buffering, close the ball valve (1) (in the case of pressurized systems also close the shutoff valve of the return line). Loosen the clamping screw of the pH electrode (9), remove the electrode carefully and put it into the holder at the fitting.

Note!

The pH electrode must be resistant to pressure if the sample water is used with a pressurized system with > 0.4 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 relevant device.

For buffering, close the ball valve (1) (in the case of pressurized systems also close the shutoff valve of the return line). Loosen the clamping screw of the redox electrode (10), remove the electrode carefully and put it into the holder at the fitting.

Note!

The redox electrode must be resistant to pressure if the sample water is use with a pressurized system with > 0.4 bar.

4.3 Thermometer Probe Pt 100

In the case of large fluctuations in the temperature of the sample water, temperature compensation of the pH value may become necessary. For this purpose, a thermometer probe Pt 100 can be installed at (7) in order to correct the measurement. In any case, a Pt 100 is suited to display the sample water temperature via an amplifier / controller.

Note!

The temperature displayed must not necessarily be identical to the actual system temperature because heat loss or heat input is likely due to longer or shorter supply lines.

4.4 Chlorine Measuring Cell

The chlorine measuring cell (5) 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 0.8 l/min correspond to approximately 48 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.

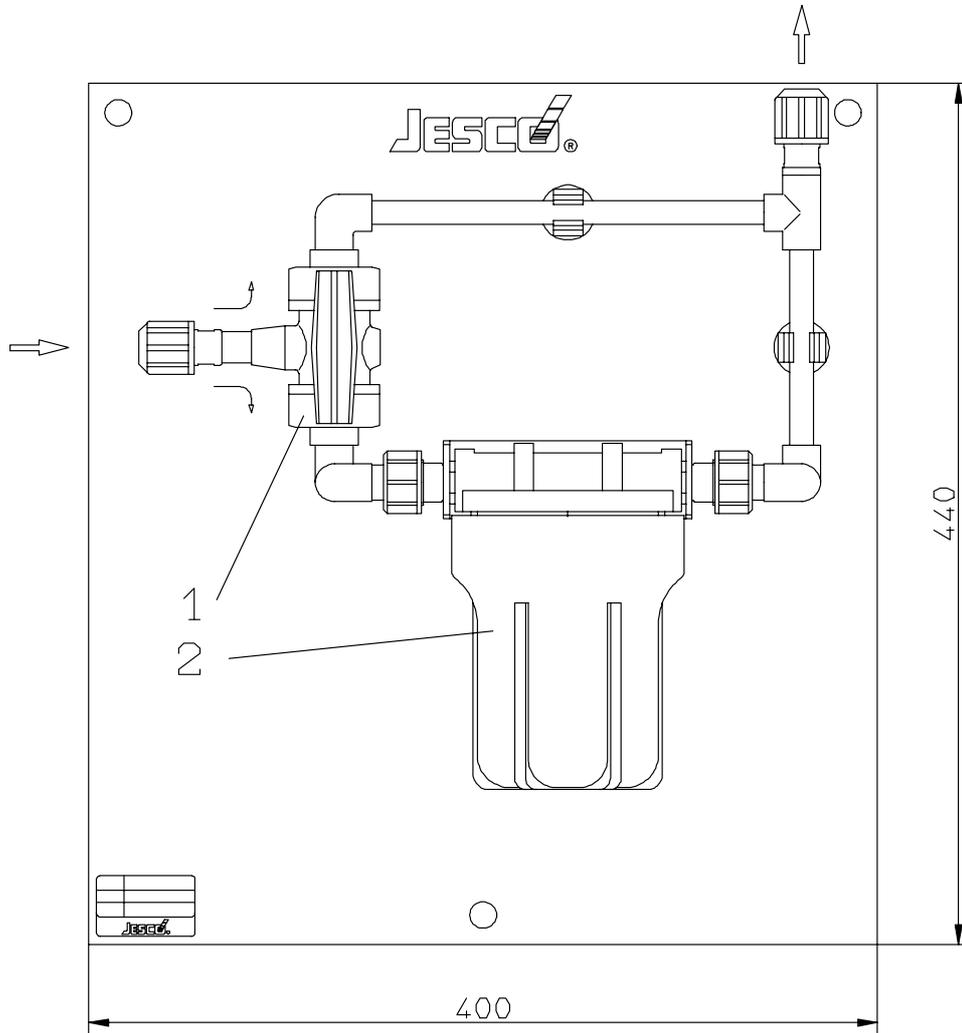
OFFSET Adjustment with Activated-Carbon Filter

Open the three-way ball valve on the activated-carbon filter board (1) so that the sample water flows through the activated-carbon filter. 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

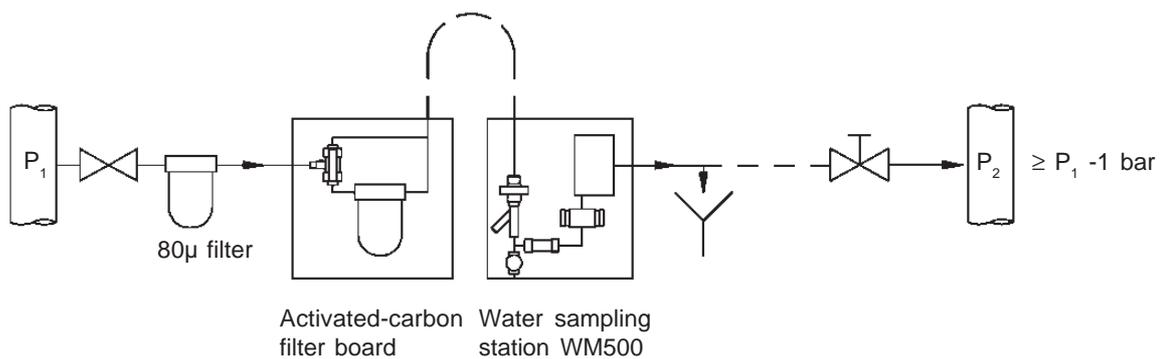
Close ball valve (1) on the water sampling station and wait for about 10 minutes. The cell current droppage due to polarization gradually reaches a constant residual value. This value is adjusted as "OFFSET" display as described before.

Activated-Carbon Filter Board



- 1 Three-way ball valve
- 2 Activated-carbon filter

Installation Drawing



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 three-way ball valve (1). The balls in the chlorine measuring cell (5) must rotate correctly (in the case of malfunction, check the flow controller (3) for free passage).

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 sampling valve (4) 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 ($\Delta P > 1$ bar), use booster pump, if necessary
	80 μ filter blocked	Clean or replace filter element
	Flow controller blocked	Clean controller (Caution! Do not disturb controller cover plate)
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 the 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 if 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 watercomponents is too high	Install a 500 or 1000 ohm shunt resistor in the measuring cell feedback line