

# What you put is what you get!

## ADVANCED ONLINE HARDNESS MONITOR

MODEL: AquaTest PL -103

ONLY  
FROM  
IONIC

### Introduction:-



Improper monitoring of the water treatment equipment leads to problems in the processes that use water as well as damages some units like Boilers, Cooling towers, Reverse Osmosis units, Electro deionization modules etc. It defeats the very purpose of treating raw water. After filtration, water softening is the most common method of treatment of water to remove Calcium and Magnesium hardness.

Traditionally water softener operation is taken for granted. Soft water hardness is rarely checked. Even if checked, the frequency of checking is less – may be once or twice in a shift. Hardness break through from softeners are common. This hardness break through can be due to many reasons such as changing feed water hardness, improper regeneration, over exhaustion of ion exchange resin, negligence etc.

Most of the softeners installed in India are manually operated and this aggravates the problem. Even if it is automated, the regeneration is carried out at fixed intervals based on time or output between two successive regenerations. This works fine as long as the flow rate, water demand and feed water hardness

remains constant. However in real life, none of these remain constant. Raw water hardness changes due to seasonal fluctuation or due to changes in raw water source or multiple sources are used. We do not have any control over the raw water characteristics. When water is scarce it is common to use water from various sources. Under these circumstances it is very difficult to predict and monitor the softener performance.

Regenerating the softener based on time or OBR will lead to either under utilisation of softener capacity or over exhaustion of the softener. Both are undesirable. Under utilisation of softener capacity will lead to more salt consumption and more waste water generation. Over exhaustion will lead to hardness leakage in the treated water. With increasing environmental discharge norms and water scarcity it is essential to have a water treatment process that is green. Softening process is not environment friendly as the regenerant utilisation is only 35%. About 65% of the salt used are unutilized and goes to waste. Now there are strict government regulations in place which defines

waste water discharge to soil. Many companies are being asked to recycle the waste water for gardening or for process. Even if the water is to be used for gardening this water should be low in TDS and Sodium as high amount of TDS and Sodium will retard plant growth. Sodium absorption ratio which defines the soils salinity is one of the many parameters that is checked for land pollution. Uncontrolled discharge of salty water to the land has contaminated many ground water sources and ground water at many places has turned brackish. When raw water is sourced from the same land what you get is brackish water that is high in TDS and Sodium. This is a close cycle. We not only pollute the ground water from which we source, we also pollute the water which others may source.

Under this circumstances the best thing to do is to install our breakthrough product “Eco Soft” online hardness monitor at the outlet of the softener to continuously monitor the performance of the softener and regenerate the softener only as and when it is exhausted. Installing this unit are beneficial in many ways.

Conventionally softener is regenerated either based on fixed time or based on output between two regenerations (OBR). Both has inherent disadvantages since the time based regeneration may result in either under utilisation of capacity of the softener or over exhaustion and premature hardness leakage. Under utilisation of the softener capacity will lead to more frequent regeneration, more salt usage, water wastage and more operating cost which is undesirable.

On the other hand if regeneration is initiated based on expected OBR there is a possibility of hardness leakage due to fluctuating feed water hardness and under utilisation of the capacity. OBR is calculated based on resin volume, feed water hardness and operating exchange capacity of the resin.

In order to prevent hardness leakage an online hardness monitor should be installed at the outlet of softener to trigger an alarm when the residual hardness levels are more than the desired value. This helps in many ways as highlighted below

- a. Continuous monitoring of treated water quality
- b. No human dependency for checking treated water hardness
- c. Regeneration initiation only when required
- d. No wastage of salt
- e. No wastage of water
- f. Low operating cost

**AquaTest PL- 103** is an instrument to monitor Total Hardness (TH) of water from the softener output line. The instrument is located near softener plant. PL 103 monitor automatically takes water sample and performs chemical test to detect total hardness (TH). If the Hardness exceeds the desired (predefined ) limit it gives audio visual alarm. Command for regeneration of softener (if softener is automatic ) can also be programmed.

The instrument is designed for standalone operation. However it can also be controlled remotely by Personal Computer via RS 232, as well as by PLC via potential free I/O and RS 485.

The result data and error log is stored with respect to time in the memory.

Wireless communication via GSM (like SMS) or GPRS is also possible through interfacing card.

## Design:

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AquaTest PL -103 is designed for Indoor use, wall or stand mounted. It works on electrical power (230VAC single phase). The plumbing connections (Inlet and Outlets) are provided at the base of the unit. The monitor consumes chemical reagent for each test. The reagent bottles (200mL) needs to be replaced after about 1,400 tests.

Connections for remote monitoring are located at right side of monitor and AC inputs and power supply are located on the left side of the monitor.

The monitor has 4 line LCD display and 6 function keys. It has microcontroller which controls the functions within the instrument and also communicates to remote PLC and PC.

## Logic:

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AquaTest PL-103 is programmed to perform test through sequential operations like valve opening & closing, driving pumps, checking sensor inputs etc. The test time is typically 55 - 60 seconds. The time interval between 2 tests can be programmed through various ways. Also the machine can be put in standby or can be ordered to perform instant test.

It has built-in self diagnostic check system to detect failures like low reagent level, low sample level, pump motor failure, power supply failure etc.

## Operation Modes:

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1. **Default Mode** ( Default value- 15min) in this mode time interval between 2 tests is settable from 10 – 99 min. If hard water is detected, the result is reconfirmed and then declared as Hard. Regeneration command initiated with settable on delay. ( settable from 0 -9 min) During this time brine can be prepared. The regeneration can be aborted during this period.
2. **Rapid Mode** (Default Value – 2min) in this mode time interval between 2 tests is settable from 0 – 9 min. This is used when the softener resin is about to exhaust. If hard water is detected the regeneration protocol is followed as mentioned above.
3. **Programmable mode:** Tests interval can be programmed according to softener capacity. It runs in following modes:
  - i. **Programmed default:** Time interval 10 – 99min. It remains active for settable number of tests up to 999 tests. After the set number of tests are over, it will automatically shift to *programmed rapid mode*.
  - ii. **Programmed rapid:** Time interval 0 – 9 min. It remains active till the hard water is detected. Hard water is indicated by indication on LCD, Red LED flashing, Hooter. ( Also Logic 0 to potential free contact for PLC.)
  - iii. **Regeneration:** Monitor will wait for settable time (0 – 9 min)and give regeneration command. Brine can be prepared during this time. The regeneration command can be aborted by manually in this period.

- iv. **Standby:** No tests are conducted (except for instant test command). This standby duration is settable up to 99min. It is set according to the time required for regeneration process.
- v. **Warm Up:** During this more water is flushed. This will ensure fresh water (after regeneration) is taken for testing.

**General rules followed in the programmed logic:**

- Result of the last successful test will always be shown on the screen. (default: Soft)
- Hard water detection with previous soft result will always be reconfirmed and then declared.
- Hard water indication with some instrument failure like Sensor failure will not initiate regeneration command.
- Hard water indications are ON till next soft result is obtained.
- At least 1 soft water result will reset the regeneration command and Hard water indications.
- If the last test conducted before 4 Hrs (or more) monitor will WARM UP.
- Power failure will not cause any data loss. The unit will start running in the previous mode as soon as power is regained.

**For further information contact:-**

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