

**LECOL** SWAS series On-line Steam Quality Analyzer

## On-Line Steam Quality analyzer

- Steam Quality Measurement
- Steam Quality Monitoring and Control



**LECOL** Luchan Enterprises Co., Ltd

## Preview

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- **Critical parameter** - Steam line is commonly used in factories, the quality of steam is a major parameter for the production line and maintenance of the equipments.
- **Proper analyzers** - The analyzers used in steam monitoring are pH, conductivity or Cation conductivity analyzers, Dissolved Oxygen and Silica analyzers can be also found in some applications.
- **Tough equipment** - Due to high temperature or pressure of steam, the sampling (conditioning) system will be necessary in front of the analyzers, to make the measurement be possible.
- **Wide range application** - Applications for those steam and condensate recycling are the necessary equipment in modern chemical or petrochemical factory.
- **Customized design** - a proper sampling system and use a suitable analyzers according to the customer requirement , provides easy maintenance and lowest ownership cost .



# Introduce

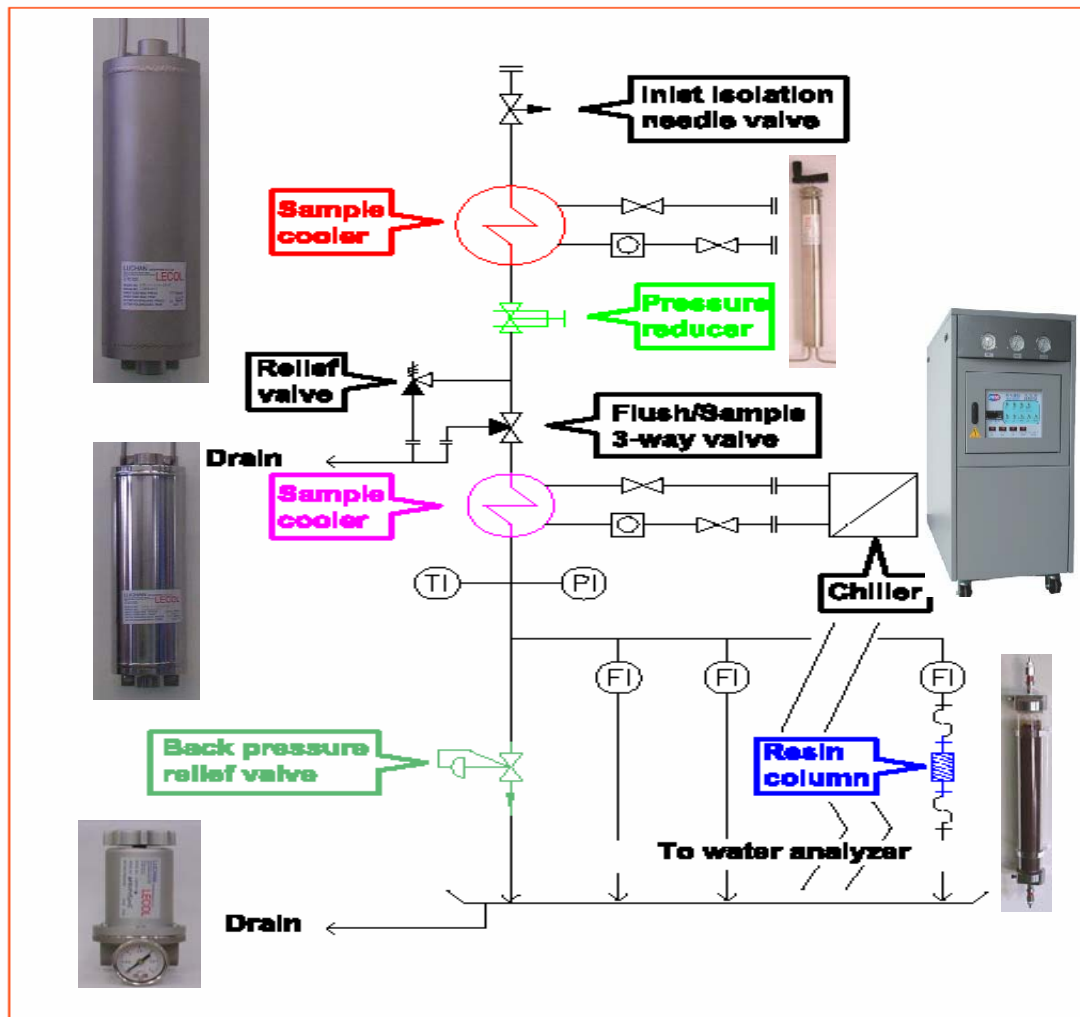
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- **Sampling (conditioning) system**  
Due to the high temperatures and pressures of most steam, it would require a sampling system before the process flows into the analyzers, the system can provide a safe operating environment for maintenance people and a accurate measuring reading for control parameter.
  - **Conductivity analyzer**  
The most common analyzer used in steam monitoring, conductivity reading means the concentration of impurity in the steam (condensate), it is the most important parameter for steam quality. Two methods of the conductivity measurement.  
**Specific conductivity measurement** – Directly measure the conductivity (impurity) of steam condensate.  
**After Cation conductivity measurement** – Measure the concentration of Anion or relative salt in steam condensate. It is most common application to detect the leakage in condenser. Especially, for sea water cooling condenser.
  - **pH analyzer**  
A control parameter of chemical dosing which can avoid the corrosive of the boiler.
  - **Dissolved Oxygen analyzer**  
Provide the concentration of Dissolved Oxygen which is also a corrosive parameter.
  - **Silica analyzer**  
Silica can be carried-out into steam, in some of the steam quality monitoring, measure the silica level is necessary
  - **Others** –Such as Hydrazine analyzer, Turbidity analyzer etc. may be used in the steam quality analysis.
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# Sampling (Conditioning) system

## *Typical P& ID drawing*

**Typical boiler steam/water sampling system**



# Sampling (Conditioning) system

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## Descriptions

- ❑ **Inlet isolation valve**  
To isolate the inlet process, need to use the type which can be suitable in high pressure and temperature environment.
  - ❑ **Primary (First) sample cooler**  
The first step for cooling the process, it needs to choose a proper heat transfer area to do the first cooling.
  - ❑ **Pressure reducer**  
To reduce process pressure and flow rate, it is an important element for controlling the flow rate and final process temperature.
  - ❑ **Secondary sample cooler**  
For more accurate measurement, use secondary sample cooler and control the process temperature at 25 °C which can reduce the effect of solution temperature.
  - ❑ **3-way valve**  
To switch the process between "flush" and "service"
  - ❑ **Thermal shut-off valve**  
A safety element for protecting the analyzers or maintenance people when operating.
  - ❑ **Temperature and pressure indicator**  
To display the final conditioned temperature and pressure.
  - ❑ **Back pressure relief valve**  
Provide proper back pressure and can be the manual sample point.
  - ❑ **Flow meter**  
Display the flow rate of the flow to each analyzer, an adjustable needle valve is necessary which can adjust the proper flow to analyzer.
  - ❑ **Sink**  
To collect the waste water together and provide a sample collection platform.
  - ❑ **Chiller unit**  
Provide cold cooling water for secondary cooler.
  - ❑ **Waste water collection pump**  
To collect all the waste water from sampling system and pump them back to the proper tank for recycle.
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# Water analyzers

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## Conductivity analyzer

- Provide the control parameter for chemical dosing
- Need to choose a proper range of measurement which will increase the accuracy
- To detect some un-wanted contaminates concentration which exist in steam
- Auto-temperature compensation for solution is necessary for better accuracy
- The anti-bubbles or anti-siphon design to avoid noise easy maintenance sensor and flow chamber design to lower ownership cost
- After Cation Conductivity measurement is to measure the conductivity after Cation exchange resin, the resin remove the  $\text{NH}_4^+$  ion which is coming from the adding Ammonia or similar chemicals.
- The after Cation conductivity reading should be as low as possible theoretically, if the conductivity reading is higher than expected, that means contaminate exists.
- Use the color-changeable resin to indicate the resin saturated or not.
- Before and after Cation conductivity reading can calculate the inferred pH, this can be use to compare with the existing pH analyzer but can not replace it since it is a calculated pH reading.

## pH analyzer

- The re-fillable electrolyte and re-changeable liquid junction reference electrode design can reduce the effect of offset after using a period of time .
- pH reading can be the parameter of chemical dosing control and a indication of corrosive.

## D.O. analyzer

- To measure the dissolved Oxygen concentration in ppb level
- Common equipment in Power plant or Cogeneration plant
- Oxygen residual treatment method needs to measure Dissolved Oxygen concentration for the control parameter.
- Use stainless steel tube to avoid air contaminate

## Silica analyzer

- To measure the Silica concentration in ppb
  - Common equipment use in power plant or cogeneration plant
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## SWAS On-line Steam Quality Analyzer

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- ❑ Let us know what you need and process conditions, we will complete a sampling analysis unit for you.
- ❑ Customized design and manufacturing according to process conditions and the demand of operation in job site.
- ❑ Complete all the components and analyzers together in a certain panel rack.
- ❑ Compact design can save space but not sacrifice the convenience of operation and maintenance.
- ❑ Easy to recognize every single analysis line and analyzers, to help the new engineers get used to operate.
- ❑ Safe design for operator by simply isolating the inlet valve when the unit needs to replacement or maintenance.

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