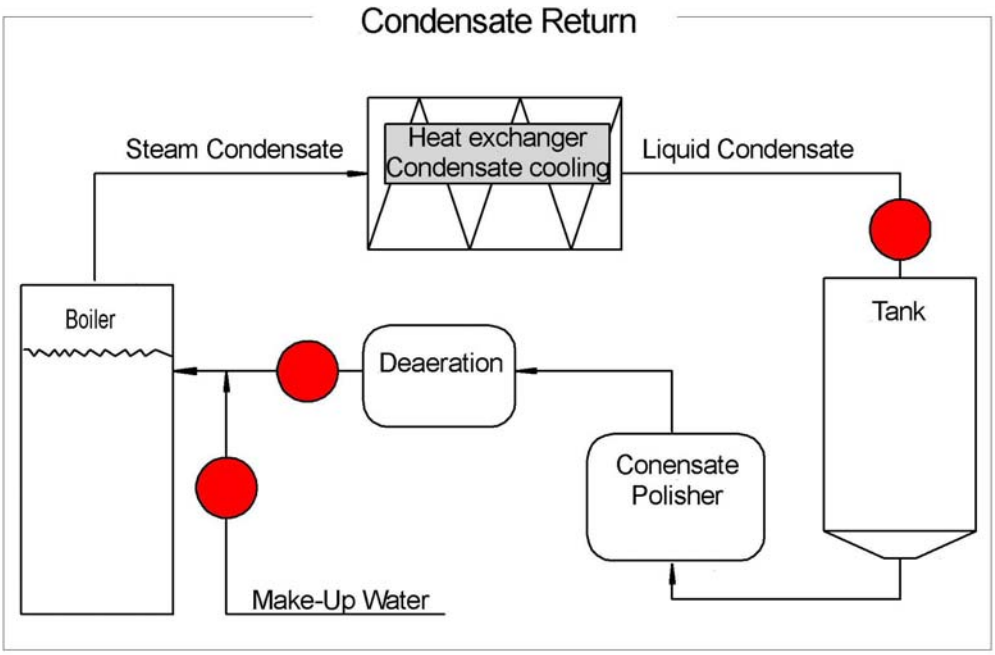
Detection Oil / Particles in Condensate



Point of measurement
Typical range: 0-5 ppm

Condensate is typically clean water. Condensate return is used as boiler feedwater whenever possible, since it is clean and hot. It takes significantly less energy to re-boil condensate return than to use fresh make-up water.
Condensate goes through turbines, pumps, heat exchangers and other equipment. Oil or other contaminants may leak unrecognized into the condensate. These contaminants involve coating, foaming, corrosion and other problems if they reach the boiler. Even if there are no oil leaks, the condensate can become contaminated with iron resulting from an improperly treated piping system or corrosion. This iron will cause high erosion at the turbine blades. Sometimes condensate is cleaned by passing it through polishing filters to remove filterable contaminants, but this is expensive and the measurement system is required for filtration control.

Optical or Acoustic

Two different principles of measurement are typically used for oil and particle monitoring of condensate or feedwater, the classic optical 12°forward scatter turbidity measurement as well as the ultrasonic reflection. Both methods detect even low contaminations (down to ppb level) immediately.

Optical: forward scatter turbidity (model MoniTurb-F / Messenger)
The optical measurement allows very high process temperatures. The sapphire windows of the sensor typically become opaque after some weeks or month of operation, due to mineral coatings. This requires a consistent manual cleaning of the windows in diluted HCL.

Acoustic: Ultrasonic reflection (model AS3 / AT3)
The ultrasonic pulses of the measurement probe are not affected by any coatings. The accruing of mineral coatings is prevented by the ultrasonic cleaning effect additionally. The probe does no have any wearing parts, shows extreme high long term stability and is usually free of maintenance. The design of the probe allows an easy and cost-effective installation. These advantages make the ultrasonic reflection to a perfect technology for this application.

Chemtronic Waltemode GmbH, Sales & Service Partner for your MONITEK Products
40789 Monheim Niederstr. 14 Phone: +49-(0)2173-57007 Fax: +49-(0)2173-56007 E-mail: info@chemtronic-gmbh.de Internet: www.chemtronic-gmbh.de

Turbidity by Ultrasound or by using the traditional optical Methods

Ultrasonic reflection as an alternative for the optical turbidimetry

Per definition is Turbidity an optical Impression.

Turbidity describes the characteristic of a transparent product, to scatter or absorb light. A focused light beam will be attenuated and scattered in hazy products, so that this product can become practically opaque in bigger layers. Turbidity is caused by particles in transparent products. A particle is defined as something with a different refractive index as the carrier liquid. Some examples of particles are minerals, yeast cells, metals, oil drops in water, milk in water, gas bubbles and aerosol's.

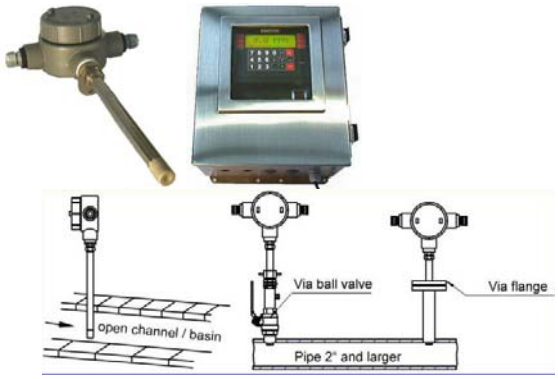
Ultrasonic Refection

The ultrasonic particle measurement is used to detect non-dissolved (suspended) particles in a liquid, similar to a turbidimeter. Turbidity is an optical effect. Therefore the acoustical method is typically named as particle or concentration measurement. The acoustic probe transfers ultrasonic pulses into the measurement sample, equal to a sonar system. When the acoustic pulses hit particles inside the sample, a part of this ultrasonic energy will be reflected as an echo. The quantity and intensity of these echoes will be detected, evaluated and shown as measurement values.
Possible measuring ranges are 0 - 1ppm up to 0 - 20000ppm.

Scattered light turbidimetry the classics

An intense collimated beam of light is projected through a sample contained within the sensor. The intensity of this light beam is measured by the direct beam detector, located opposite to the light source. The light, scattered by particles inside the sample is measured by a scatter light detector. The more the scattering the higher the turbidity. Measuring ranges of 0 - 1ppm up to 0 - 4000ppm are possible (absorption sensors up to 50000ppm) depending by sensor.

Model AS3/AT3



Advantages Ultrasonic Reflection

- **Extreme low maintenance**
- **No wearing parts**
- **Calibration interval: typical 24 month**
- **Wide span of measurement ranges**
- **Pressure rating: ANSI class 400 / PN40**
- **Line size not limited**
- **Easy installation due to probe technology**
- **Self cleaning due to the ultrasonic pulses**
- **Not affected by product colour**
- **Insensitive against coatings**
- **Programmable measuring range**
- **Programmable units (ppm, mg/l, etc.)**

Typical Applications

- **Product concentration**
- **Filtration control**
- **Quality control**
- **Iron in Water**
- **Oil in Condensate**
- **Oil in cooling water**

Model Series MoniTurb / Messenger

Advantages optical Turbidimetry

- **12° scattered light and / or 90° scattered light**
- **Low maintenance**
- **Calibration interval: typical 12 month**
- **Material measuring windows: Sapphire**
- **Pressure rating: ANSI class 150 / PN16**
- **Line size: ¼" up to 5" (DN10 to DN125)**
- **Installation flanges: DIN, ANSI, NPT, APV, TH, ...**
- **Optional cleaning jets**
- **Programmable measuring range**
- **Programmable units (ppm, mg/l, etc.)**

Typical Applications:

- **Product concentration**
- **Filtration control**
- **Quality control**
- **Wells water**
- **Water in Oil**
- **etc.**

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40789 Monheim Niederstr. 14 Phone: +49-(0)2173-57007 Fax: +49-(0)2173-56007 E-mail: info@chemtronic-gmbh.de Internet: www.chemtronic-gmbh.de