Reduce Product Waste and Waste Management Costs with Low-Cost, Easily Installed Turbidity Sensors

Do you have $16,000 to over $120,000 in profit to waste this year?

If you're still using sight glass, time control, or volume acquisition for Phase Separation or Interface Detection at your dairy, *you're losing money*. Product waste is a reality in any dairy, but with the continually shrinking profit margins you face year-after-year, the need to *reduce* product waste is also a reality.

How You Lose Money

Even a slight inefficiency from sight, time control or volume acquisition tactics can add up to as much as $120,000 in unnecessary costs over the course of a year. We've seen waste management bills in excess of $30,000 for excess solids in the system. If you're using sight, time control or volume acquisition for phase separation, you're losing money through:

- Unnecessary BOD fines for excess solids in waste water.
- Excess product loss through inefficient CIP Monitoring.
- Excess product loss when switching media.
- Increases in your water bill by using far more water than needed.
- And, added cost due to undetected failure of cooling circuits.

Saving $16,281.80 Every Year

To put this into perspective, an ice cream maker replaced a time-based system with turbidity sensors. Once the ITM-3 was fully integrated and running, the plant witnessed a thirty second difference between the old timer based method and the new turbidity based method when they reviewed changeovers recorded on their PLC system.

The old timer method switched the control valve 30 seconds earlier than the new turbidity based method both for water pushing the product at the end of a run and when the next product was introduced into the system and pushed the water. This meant that they were losing good product down the drain with every changeover and were also pushing residual flush water into the pasteurized storage tanks when they ran the next mix through the pasteurizer.

Once we introduce the water, we have a timer that at some point creates a diversion. If the timer is too short, we send good product down the drain before the water makes it to the valve. The system shuts down after some period and we leave that pipeline charged with water. On the other hand, if the timer is too long, we'll end up with water in the product tank or water on the next load going into the product tank.

Product moves through the system at approximately 30 GPM, so the net water savings per water flush/changeover is about 15 gallons of water. The bottom line for the plant is a water savings of 75-150 gallons daily at that one application point, which adds up to a conservation of between 19,500 and 39,000 gallons of fresh water annually at that single application point.

ANDERSON INSTRUMENT CO., INC • 156 AURIESVILLE RD. • FULTONVILLE, NY 12072 • USA • 800-833-0081 • FAX 518-922-8997
ANDERSON INSTRUMENT CO. LP • 400 BRITANNIA RD. EAST, UNIT 1 • MISSISSAUGA, ONTARIO L4Z 1X9 • CANADA • 905-603-4358 • FAX 905-568-1652
NEGELE MESSTECHNIK GmbH • Raiffeisenweg 7 • D-87743 Egg a. d. Günz • GERMANY • +49 (0) 8333/9204-0 • FAX +49 (0) 8333/9204-49

In addition to water savings, they are recovering 15 gallons of good product that was going down the drain with each changeover at a cost of $4.25 per gallon plus sewer charges of $7.48 /1000 gallons.

Their net actual annual cost savings *after* payback of the system was $16,281.80.

How to Attain Secure and Reliable Phase Transition without Product Loss

> ***"We had no idea that our old timer based method was wasting an average of $63.93 per day in profit or $16,621.80 annually after payback."*** --
> Southeastern US Ice Cream Manufacturer

There is always a mixture of milk product and water during phase transition. To save money, you must minimize the time in which usable product flows through the pipe at both ends of the transition.

The sight method is the worst case scenario. Timer-based methods fail to take into account the daily changes in water pressure, equipment changes, and product changes. Time-based methods are prone to error, and erring on the "safe side" results in more product loss, excess water usage, and excess solids in waste water.

The mixing ratio and concentration must be precisely measured to affect the change-over at the optimal point every time the process is run.

An **Anderson Instrument ITM-3 turbidity sensor** can automatically trigger the optimum transition point with great reliability and precision in contrast to the time-controlled phase separation where the required safety time interval forces costly product loss every time.

If you process relatively durable products like yogurt, cheese and ice cream, turbidity sensors help avoid unwanted water that may add coliform bacteria into your product. This reduces product durability, presents a potentially serious safety risk, and creates recall exposure and damage to your company image.

In this application nothing can beat the Anderson Instrument ITM-3 turbidity sensor for a guarantee of consistent and reliable product quality.

How It Works

Turbidity is the phenomenon where by a specific portion of a light beam passing through a liquid medium is reflected by undissolved particles. The sensor measures the light that is reflected by these particles to determine their concentration in the liquid. Purified water would have close to zero undissolved particles, while ice cream mix has a high concentration of undissolved particles.

An inline turbidity sensor is installed at leverage points in the dairy product (see Fig. 1) handling process to facilitate instant detection of the following phase changes:

- Product-to-Product
- Product-to-Water
- Water to Cleaning Agent

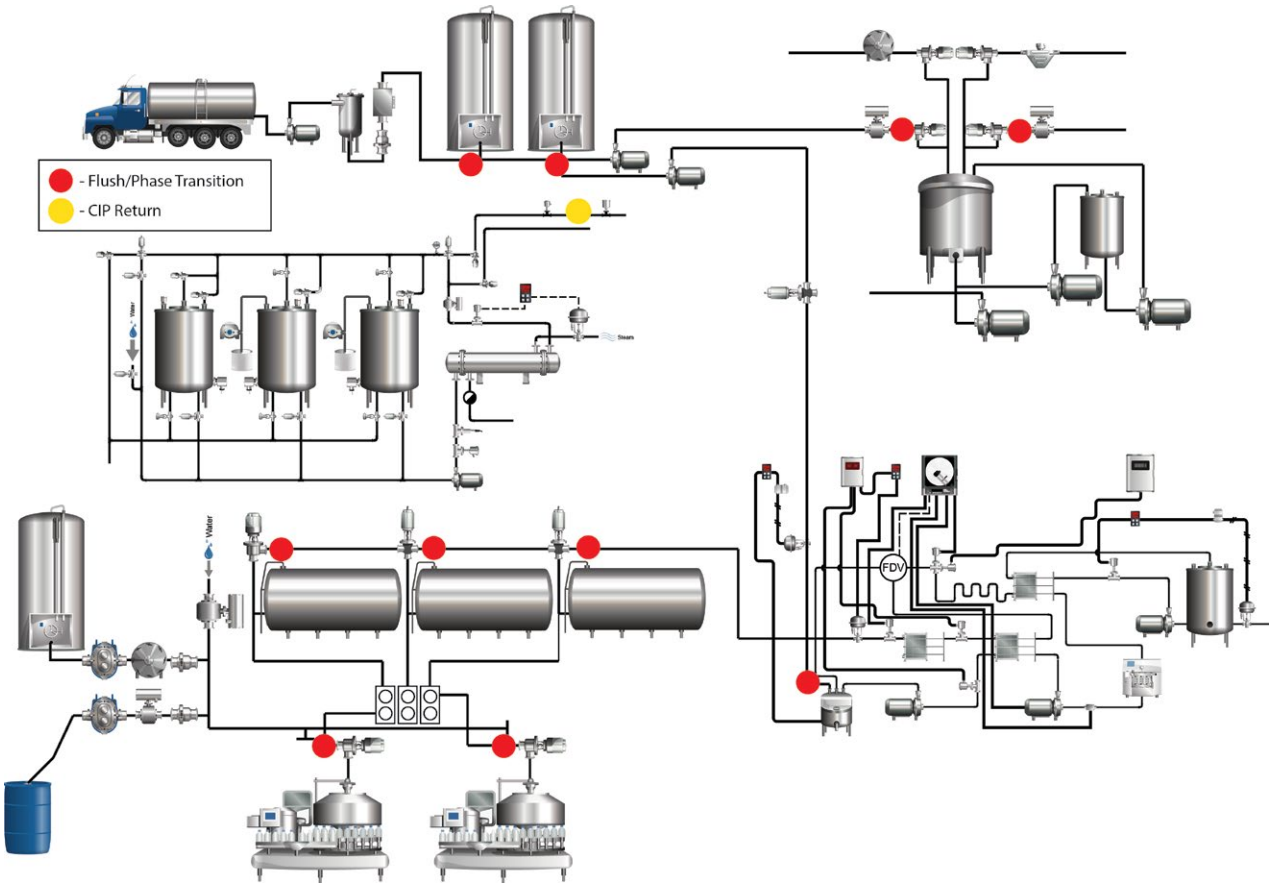


Figure 1 - Possible locations of Turbidity Sensors

The turbidity sensor allows instant and accurate monitoring of product changeovers or CIP programs. During the phase separation of the media or during the start-up and emptying of the process, the media must be differentiated. The turbidity sensor can detect *the instant* a liquid media reaches a pre-defined specification, automatically switching media to its appropriate container.

The benefit to a CIP system comes from having a god control pre-rinse. The turbidity sensor determines when the pre-rinse has flushed the soil from the system. If the water runs to long, you use far too much water and don't know where your soil or high BOD comes in. If the first rinse is done correctly, the rest of the wash cycle is predictable with corresponding chemical savings.

The infrared light is directed to the center of the pipe. This eliminates any potential variances caused by temperature, changes in viscosity, or build-up on the pipe. **The measurements are always accurate and repeatable.**

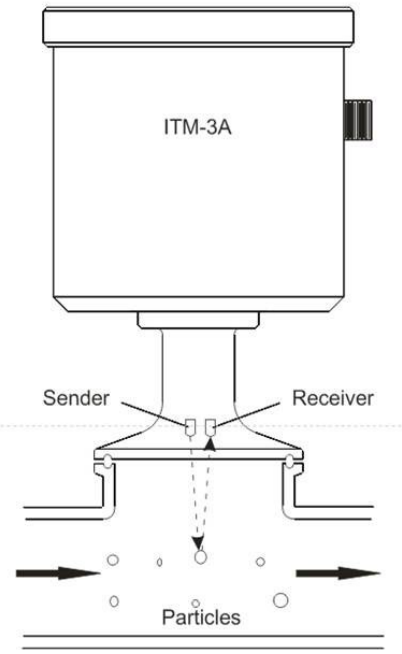


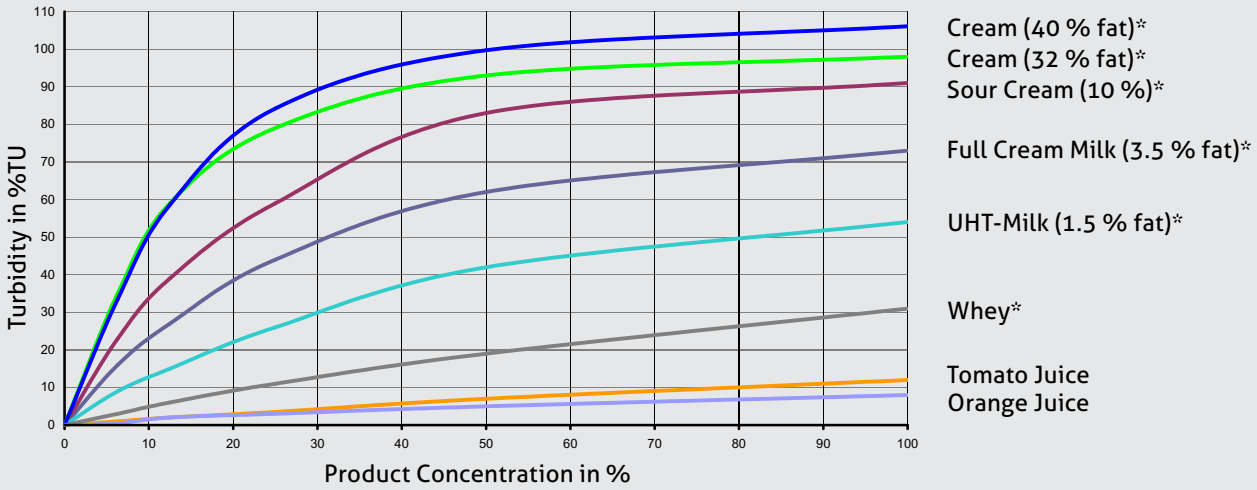
Figure 2 - ITM-3 Operation

For example, here are the principles of operation of the ITM-3 turbidity sensor:

- An Infra-red LED emits light into media through the sapphire lens
- The receiver measures the amount of light reflected back by particles suspended in the media
- It generates a signal that is proportional to the amount of particles. **This is the relative turbidity**

Turbidity Readings of Typical Products

Showcase Diagram of different Media



* Average turbidity of customary milk products at different dilutions.

Figure 3 - Turbidity Readings of Typical Products

Advantages of Turbidity Sensors

Using the Anderson Instrument ITM-3, even minor changes to the dairy product can be detected and acted upon by the system – automatically and instantly. Your personnel and systems can be in total control and Instrument outputs automatically recorded for quality control records.

The stainless steel sensor resists corrosion, and the highly resistant sapphire glass optics provides incredible precision and a lifetime of five years or more (versus the required annual maintenance of quartz glass).

Overall, you'll see:

- Improved product quality
- Quicker product changeovers
- Product waste reduction
- Reduced in sewage and water usage costs
- Lower BOD fees
- Less chemical use
- Enhanced process availability and reduced water consumption from cleaning efficiency
- Improved process control
- **A return on your minimal investment in months or weeks**

The improvement oversight, time control or volume acquisition is immediate and consistent.

Installation and Reliability Considerations

Generally, the ITM-3 is easy to install because it is a fully-contained unit. It is extremely durable and rarely fails in the dairy environment. In the unlikely event of a failure you won't have to wait long for a replacement sensor because the Anderson Instrument ITM-3 is always available.

Which Turbidity Sensor is Best?

There are dozens of turbidity sensors on the market. How do you compare apples to apples? Here are a few questions you can ask either your Anderson Instrument Regional Sales Manager or your dairy process control integrator:

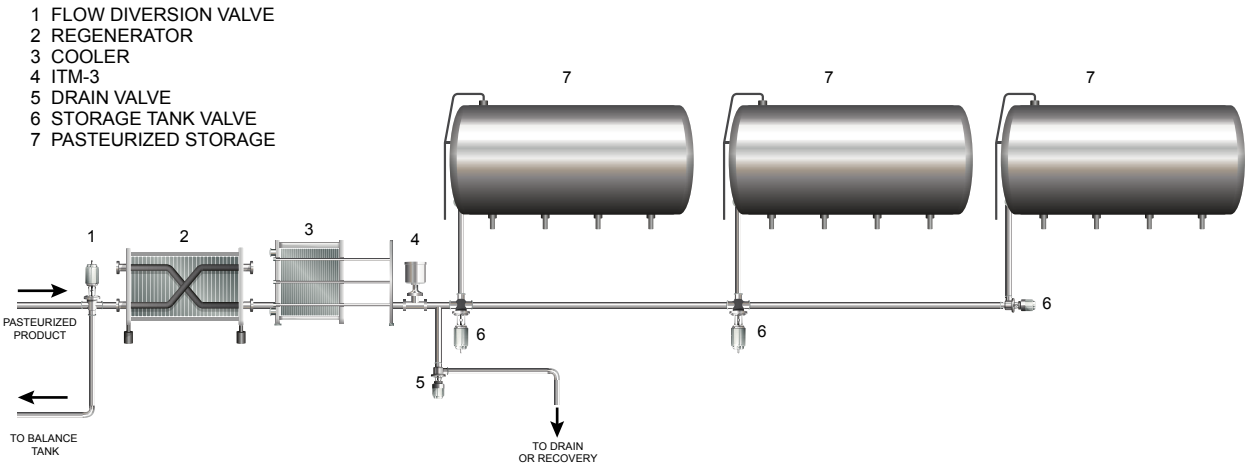
1. **Cost**: Cost is always a consideration, and "more" isn't always better. That 240mph Porsche might be fun, but it's not going to get you back and forth to work any faster than your trusty Ford pickup. Always consider what you need along with the cost.
2. **Reliability and maintenance**: What kind of glass does it use, and what's the lifetime cost of maintenance? Does it contain an extension on the lens to keep it clean and free of build-up?
3. **Ease of installation and use**: Does it contain one or multiple pieces that have to be installed? What control systems, electrical connections, and mechanical connections does it require? Does it contain an operator interface and an easy way to reprogram it for different ranges?
4. **Output types**: Does it contain a secondary output, such as a relay output in case you'd like to do simple automation without requiring a computer?
5. **Designed for Dairy**: Has the product been adapted from other uses, or is it designed for the rigorous demands of the dairy industry?

*The **Anderson Instrument ITM-3** provides the fastest ROI, costs 40% less than comparable products, and is the only turbidity sensor designed with 80+ years of dairy experience for rigorous demands of the dairy industry.*

*We guarantee no other product on the market in 2014 can outperform the ITM-3 in accurate detection of phase transition for product optimization, CIP optimization and BOD mitigation. The vast majority of Dairy process control integrators insist upon the Anderson Instrument ITM-3 turbidity sensor in their designs **because nothing** works better, is more reliable, and is more accurate while providing the best value.*

An Example of How it's Used

The ITM-3 is located at the discharge of an HTST processing system to continuously monitor the relative turbidity of liquid in the pipeline. When a product process run is completed a water flush is initiated on the input side of the system to push the product from the system into the pasteurized storage tanks. The ITM-3 continuously monitors the solids content of the outgoing liquid and gives an analog output signal of the relative turbidity. As the turbidity begins to decline caused by dilution with water a decision is automatically made by the control system to redirect flow from the storage tanks to drain or the waste water recovery system.



Find Out for Yourself

Speak today with your dairy process control integrator or your Anderson Instrument Regional Sales Manager to confirm that the Anderson Instrument ITM-3 is right for your situation.

You can be using the ITM-3 in as little as three to four weeks, quickly reduce your product loss, and begin seeing a return on your investment within a relatively short time.

The Anderson Instrument ITM-3 is the easiest turbidity sensor to install and implement. Using the Anderson Instrument ITM-3 is the fastest and most reliable way to reduce product waste and increase your profits without changes to your production process or product mix.

Key Advantages of the Anderson Instrument ITM-3

- Patented frontal sensor (EHEDG-compliant)
- Equipped with **sapphire glass optics** which are significantly more durable and abrasion –resistant than the competitor's quartz glass approach
- No interference from reflections even when used with small nominal widths or electro-polished surfaces (i.e. nominal widths from DN25)
- Illuminated integral display
- Meets the CIP/SIP, etc. dairy industry process requirements