

SENSORS FOR FOOD AND BIOPHARMA



SANITARY BY DESIGN

ANDERSON-NEGELE

# Efficient Process Control

Make your quality measurable  
with analytical sensors from Anderson-Negele



Process  
Optimization

Costs saved

Time Reduced

Quality improved

# They see what you can't.

## Making quality visible with analytical sensors

Many processes are based on differentiating products through **qualitative characteristics** such as **turbidity**, **conductivity** or **concentration**. Deviations in these criteria are critical for the quality of the end product, and for the efficiency of the process. However, these deviations are not easily detectable.

**Manual sampling** is one method used for control, but this means **high personnel costs** and **uncertainties in the quality** between samples. **Time control** is another option, however, a safety buffer must be taken into account. Each phase change results in **product loss** and **high costs** for waste water treatment, as many litres of valuable product or cleaning agent get into the waste water during this buffer time.

We invite you to "EXPERIENCE THE DIFFERENCE" with Anderson-Negele. Our analytical sensors provide a solution to exactly this issue. They continuously measure the media in the running process according to qualitative criteria, thereby making the invisible visible and quality measurable.



### Turbidity Meter ITM-51

Less product loss due to  
efficient phase separation



### Turbidity Meter ITM-4

The benchmark for  
turbidity control



### Conductivity Meter ILM-4

More reliability in  
production and CIP  
processes



# Versatile Application Possibilities for more efficiency and quality

Field cases show that Anderson-Negele analytical sensors often have a payback period of only a few weeks due to the reduction of costs, product losses and waste water, and thanks to an improved compliance with quality criteria. Here are just a few examples:

## CIP Control

By **phase separation with an accuracy to the second** in CIP control with the **ILM-4 conductivity meter**, water consumption can be reduced extremely significantly. In a practical case at a manufacturer of ice cream, the saving was **175,000 litres per year**.



## UHT Phase Transition

Detecting loss of valuable organic milk in the UHT plant processes, a dairy installed **ITM-51 turbidity sensors** to replace the previous timer based control. The result: **118 fewer liters of product are lost with each phase transition (proven by measurement)**.



## Separator Control

In a brewery, the **ITM-51 turbidity sensor** continuously monitors the output of the separator. The desired turbidity level was entered by means of an individual learning curve at the installed sensor. When the predefined setpoint values are reached, the **yeast harvest is carried out automatically, precisely and reproducibly**.



## Filtrate Monitoring

In wine production, the integrity of the filter membrane used to be monitored through a sight glass. This was very time consuming and inaccurate. Thanks to its high measuring accuracy even at the lowest turbidity levels, the **ITM-4 turbidity meter** is ideal for quality assurance to **avoid secondary fermentation and quality degradation** due to filter damage.



## Bottling / Filling Control

With a response time of just under one second, the **ILM-4 conductivity sensor** can detect a phase switch with high accuracy and precisely control the corresponding valve via an active switching output.

In a brewery, in filling systems for bottles, cans, and kegs, one conductivity meter each ensures that the beer ends up in the bottle and rinse water in the sewer.



Reduce product loss with the modular, front flush ITM-51 turbidity sensor

# ITM-51 Turbidity Sensor

## Application in the production process

The ITM-51 enables active automated phase separation of milk/other milk products/water resp. of beer/yeast, by inline turbidity analysis and active process switching.

Passive phase separation by time or volume control always needs a safety margin. As a consequence, in every process step product is lost and/or quality is affected.

## Advantages of the ITM-51

- Minimize the loss of raw material leading to less value loss
- The filling of tanks with wrong medium is avoided
- Less cost for waste water treatment
- Less need for additional laboratory analysis of the tank content
- Best possible concentration ensuring constantly high quality of the product such as milk / cream resp. beer / wort
- Efficient separator control in brewery applications for uniform quality of infiltered beer

## Application in the CIP/SIP Process

Active automated and temperature-independent phase separation in the return line of product / acid / base / water.

## Advantages with the ITM-51

- Reliable control of the degree of concentration of the agents
- Optimize multiple usages of the cleaning agents
- Minimize cost due to less waste disposal
- Reduce the length of the cleaning process time and amount of water consumption: Active switching after reaching the desired degree of purity by inline turbidity analysis, and not after passive, fixed timing

## Practical experiences & Customer applications

- Reduction of product lost from 5% to 3%, with 15% cost reduction due to less waste water treatment
- Less laboratory analysis necessary, leading to less personnel / time required and faster reaction to deviations
- 3,000 l less water consumption in each CIP process
- The ITM-51 reliably prevents the contamination of a glycol cooler with milk products, an issue which, in the past, repeatedly disturbed the cooling process and caused a complete cleaning
- 80% more consistency in the quality of the end product due to more precise separation of cream, mild and low-fat milk
- Constant turbidity level for Craft Beer without filtering due to precise separator control in a brewery



## Technical Specifications At-a-Glance

- Compact front flush turbidity sensor with backscatter principle, in a modular set-up
- Flex-Hybrid-Technology with digital + analog interface (IO-Link + 4...20 mA)
- Process temp. up to 266 °F (130°C), pressure -14.5...290 psi (-1...20 bar)
- Independent to reflections at small diameters or electro-polished surfaces
- No color dependency (wave length 860 nm)
- High reproducibility: ≤ 1% of full scale
- Selectable range (%TU, NTU, EBC, %solids)
- Extended sensitivity: 200...300.000 NTU equivalent
- Smart Replace Design with Remote version for hassle free replacement of all components



**Modular Sensor Platform with IO-Link and 4...20mA**

The Flex-Hybrid Technology with IO-Link and 4...20 mA combines the best of both worlds: Data from the sensor can be transmitted digitally, analogously or in parallel. The bidirectional communication enables status control and preventive maintenance at any time to avoid production downtimes. Installation and commissioning are time- and cost-saving thanks to plug-and-play technology, and sensor replacement is easier than ever before thanks to "Smart Replace Design" with automatic detection, configuration and parameterization.

**Order code**

**ITM-51** relative turbidity meter  
**ITM-51R** relative turbidity meter, remote version, remote cable must be ordered separately

**Process connection** (Ⓐ: 3-A approval, Ⓔ: EHEDG approval)

- S0L** CLEANadapt G1/2", extended sensor stem
- S01** CLEANadapt G1/2"
- TC1** Tri-Clamp 1½" Ⓐ Ⓔ
- TC2** Tri-Clamp 2" Ⓐ Ⓔ
- T25** Tri-Clamp 2½" Ⓐ Ⓔ
- TC3** Tri-Clamp 3" Ⓐ Ⓔ
- TL1** Tri-Clamp 1½", extended sensor stem Ⓐ Ⓔ
- TL2** Tri-Clamp 2", extended sensor stem Ⓐ Ⓔ
- TL5** Tri-Clamp 2½", extended sensor stem Ⓐ Ⓔ
- TL3** Tri-Clamp 3", extended sensor stem Ⓐ Ⓔ
- V25** Varivent type F, DN 25 Ⓔ
- V40** Varivent type N, DN 40/50 Ⓔ

**Enclosure orientation** (not selectable for ITM-51R)

- H** horizontal
- V** vertical

**Signal module**

- I42** IO-Link and 1x 4...20 mA turbidity
- I52** IO-Link and 1x 4...20 mA turbidity, 1x switching out
- I53** IO-Link and 1x 4...20 mA turbidity, 1x switching out, external range switching

**Electrical connection**

- P** cable gland M16x1.5
- D** 2x cable gland M16x1.5
- M** 1x M12 connector, 4 pin output/power supply
- N** 2x M12 connector, 4 pin output, 5 pin input/power supply
- A** 2x M12 connector, 4 pin output/power supply, 5 pin output/input
- C** 1x M12 connector, 5 pin analog output and IO-Link
- R** 2x M12 connector, 4 pin analog and switching output, 3 pin IO-Link and input

**Interface/Display**

- X** without Interface
- S** Simple User Interface with small display
- L** Large User Interface with display

**Enclosure**

- X** opaque plastic cap
- P** clear plastic cap
- M** without control window
- W** with control window

**Configuration**

- X** factory setting
- S** special customer setting

ITM-51/	S01/	V/	I53/	D/	L/	P/	X
ITM-51R/	S01/		I42/	D/	L/	P/	X

Reliable measurement even with low turbidity values and turbidity variations

## Four-Beam Turbidity Meter ITM-4

### ITM-4 – The benchmark for turbidity measurement

If even the slightest turbidity or turbidity alterations in products and media are important for process monitoring, the ITM-4 Four-beam turbidimeter comes into its own. With its very high measuring sensitivity and a response time of <1 sec. it detects and signals any variation immediately. This offers significant advantages in many applications:

- **Phase separation:** immediate detection of transitions of different products, e.g. skimmed milk to whole milk; shorter transition phases without time buffer mean less product loss and thus cost savings
- **Filter monitoring:** Immediate reporting of possible malfunctions for reliable quality management
- **Water control:** monitoring of water and wastewater
- **Damage prevention:** Reliable protection against incorrect transfer of media, e.g. of product into the cooling circuit
- **Process automation:** Continuous in-line monitoring eliminates the need for manual sampling and visual inspection, providing highly accurate compliance with specifications

### Advantages of ITM-4

- **Permanent precision:**  
The colour-independent measurement (860 nm) with 2 transmitters and 2 receivers (90° scattered light and 180° transmitted light) ensures reliable measurement results irrespective of the influence of solids or air bubbles that occur. Contamination on the sapphire optics is automatically compensated
- **Highly accurate, application-specific measurement:**  
Resolution and measuring range can be selected for easy adaptation to media and processes
- **Simple installation, commissioning and operation:**  
Nominal pipe widths from DN 25 with various process connections and the complete fitting made of stainless steel ensure trouble-free and durable operation

### Customer applications

- **Breweries:** lauter tun control, CIP systems, filter monitoring, yeast harvesting, separator control, water and waste water control
- **Dairies:** Phase separation during media change (e.g. whey-cream-milk), CIP systems, separator control, cooling system monitoring, water and waste water control
- **Juice or wine production:** quality monitoring at specified turbidity levels, filter monitoring, water and wastewater control



### Technical specifications at a glance

- **Four-beam turbidimeter** with 2 transmitters and 2 receivers in alternating light technology
- **Measured value setting** in NTU or EBC
- **Adjustable measuring range:**  
min. 0...5 NTU up to max. 0...5000 NTU respectively  
min. 0...1 EBC up to max. 0...11250 EBC
- **Measuring accuracy:** Resolution from 0.1% upwards
- **High reproducibility:** from  $\leq 2\%$  of end value
- **Temperature and pressure range for flexible use:**  
process temp. up to 100°C, pressure up to 10 bar
- **CIP-/SIP cleaning** up to 130 °C / max. 30 minutes
- **More economical version** especially for process and drinking water: ITM-4DW



ITM-4

**Process Connection / Diameter**

- GG25** (diameter DN25; process connection dairy flange DN25 acc. to DIN11851)
- GG40** (diameter DN40; process connection dairy flange DN40 acc. to DIN11851)
- GG50** (diameter DN50; process connection dairy flange DN50 acc. to DIN11851)
- GG65** (diameter DN65; process connection dairy flange DN65 acc. to DIN11851)
- GG80** (diameter DN80; process connection dairy flange DN80 acc. to DIN11851)
- GG100** (diameter DN100; process connection dairy flange DN100 acc. to DIN11851)
- HH25** (diameter DN25; process connection hygienic thread DN25 acc. to DIN11864-1)
- HH40** (diameter DN40; process connection hygienic thread DN40 acc. to DIN11864-1)
- HH50** (diameter DN50; process connection hygienic thread DN50 acc. to DIN11864-1)
- HH65** (diameter DN65; process connection hygienic thread DN65 acc. to DIN11864-1)
- HH80** (diameter DN80; process connection hygienic thread DN80 acc. to DIN11864-1)
- HH100** (diameter DN100; process connection hygienic thread DN100 acc. to DIN11864-1)
- TC25** (diameter DN25; process connection Tri-Clamp)
- TC40** (diameter DN40; process connection Tri-Clamp)
- TC50** (diameter DN50; process connection Tri-Clamp)
- TC65** (diameter DN65; process connection Tri-Clamp)
- TC80** (diameter DN80; process connection Tri-Clamp)
- TC100** (diameter DN100; process connection Tri-Clamp)
- TC1"** (diameter ASME 1"; process connection Tri-Clamp)
- TC1,5"** (diameter ASME 1,5"; process connection Tri-Clamp)
- TC2"** (diameter ASME 2"; process connection Tri-Clamp)
- TC2,5"** (diameter ASME 2,5"; process connection Tri-Clamp)
- TC3"** (diameter ASME 3"; process connection Tri-Clamp)
- TC4"** (diameter ASME 4"; process connection Tri-Clamp)
- DF25** (diameter DN25; process connection DIN flange acc. to DIN2632/33)
- DF40** (diameter DN40; process connection DIN flange acc. to DIN2632/33)
- DF50** (diameter DN50; process connection DIN flange acc. to DIN2632/33)
- DF65** (diameter DN65; process connection DIN flange acc. to DIN2632/33)
- DF80** (diameter DN80; process connection DIN flange acc. to DIN2632/33)
- DF100** (diameter DN100; process connection DIN flange acc. to DIN2632/33)

**Note:**  
Version with special approval for process and drinking water (not suitable for food such as milk, beer, juice...) see separate product information ITM-4DW

**Electrical Connection**

- X** (2 x cable gland M16 x 1,5)
- M12** (2 x M12 plug; 1.4305)

ITM-4 /	GG65 /	M12	Dairy flange (-GG) acc. to DIN 11851		Hygienic thread connection (-HH) acc. to DIN 11864-1 version A		DIN Flange (-DF) acc. to DIN 2632/33	
Process connection / Diameter								
DIN DN25			356 mm	4 kg	350 mm	4 kg	374 mm	8 kg
DIN DN40			298 mm	4 kg	294 mm	4 kg	316 mm	9 kg
DIN DN50			236 mm	4 kg	228 mm	4 kg	256 mm	10 kg
DIN DN65			250 mm	5 kg	236 mm	5 kg	290 mm	11 kg
DIN DN80			250 mm	5 kg	244 mm	5 kg	260 mm	12 kg
DIN DN100			373 mm	5 kg	365 mm	5 kg	369 mm	13 kg

**Total length L of the fitting with process connection Tri-Clamp (-TC) acc. to DIN 32676 (tolerance ±2 mm) with Tri-Clamp-size and weight**

Diameter DIN	DN25	TCØ	Weight	DN40	TCØ	Weight	DN50	TCØ	Weight
	341 mm	50,5 mm	4 kg	275 mm	50,5 mm	4 kg	209 mm	64 mm	5 kg
Diameter ASME	DN 1"	TCØ	Weight	DN 1,5"	TCØ	Weight	DN 2"	TCØ	Weight
	355 mm	50,5 mm	4 kg	290 mm	50,5 mm	4 kg	223 mm	64 mm	4 kg
Diameter DIN	DN65	TCØ	Weight	DN80	TCØ	Weight	DN100	TCØ	Weight
	256 mm	91 mm	5 kg	216 mm	106 mm	5 kg	321 mm	119 mm	5 kg
Diameter ASME	DN 2,5"	TCØ	Weight	DN 3"	TCØ	Weight	DN 4"	TCØ	Weight
	166 mm	77,5 mm	4 kg	172 mm	91 mm	5 kg	308 mm	119 mm	5 kg

More process reliability in phase separation through inline conductivity measurement

# ILM-4 Inductive Conductivity Meter

## Benefits in production and CIP / SIP processes

The ILM-4 with IO-Link and 4...20 mA enables an active, automated and temperature compensated phase separation. This applies both to different media in production processes and to the CIP / SIP return flow of acid / caustic / water.

These media can be drained or returned to the storage tanks in the highest possible grade by means of precise inline conductivity measurement. The multiple use of the cleaning media ensures in addition maximum cost efficiency and environmental protection.

## Benefits in cleaning agents control

For an optimal and reproducible cleaning result, each cleaning agent must be concentrated to the specified value by re-dosing with concentrate and fresh water. This is ensured by the highly precise measurement of conductivity with the ILM-4.

## Advantages of the ILM-4 conductivity sensor

- Extremely short response time (1.2 s) for maximum efficiency
- Ready for IoT: digital IO-Link interface and analog 4...20 mA data transmission in parallel
- Precise phase separation of different media means less product loss and cost minimization
- Optimum multiple use of the cleaning chemicals due to correct return to the respective tanks
- Minimization of cleaning time and water consumption: inline conductivity analysis for active switching after reaching the desired value and not after a passive, fixed time
- Precise concentration control of the cleaning agents
- Reliable product monitoring / quality assurance
- Very favorable price-performance ratio

## Practical experience / customer applications

- **CIP cleaning for milk trucks:** Minimum losses in cleaning agents and maximum recyclability thanks to active, precise switching
- **CIP process in a fully automated dairy:** In combination with the ITM-51 turbidity sensor, almost all media in the production and CIP/SIP processes can be precisely distinguished and separated.
- Breweries and beverage producers: Maximum product yield through precise phase separation



Remote version  
ILM-4R



## Technical Specifications At-a-Glance

- Extremely compact & robust conductivity sensor
- Hybrid technology with digital + analog interface (IO-Link + 4...20 mA): from simple data transfer to intelligent communication
- Fast sensor response time: approx. 1.2 s
- Modular design: configurable from the low-priced basic version to the high-end model
- Product-contacting sensor head made of 100 % PEEK prevents thermal stress cracking
- Measuring range freely selectable: 1...999 mS/cm
- High reproducibility of  $\leq 1\%$  of measured value
- Compensated measurement up to 130 °C (266 °F), CIP/SIP cleaning up to 150 °C (302 °F) / 60 min.
- Smart Replace Design with Remote version for hassle free replacement of all components



**Modular Sensor Platform with IO-Link and 4...20mA**

The Flex-Hybrid Technology with IO-Link and 4...20 mA combines the best of both worlds: Data from the sensor can be transmitted digitally, analogously or in parallel. The bidirectional communication enables status control and preventive maintenance at any time to avoid production downtimes. Installation and commissioning are time- and cost-saving thanks to plug-and-play technology, and sensor replacement is easier than ever before thanks to "Smart Replace Design" with automatic detection, configuration and parameterization.

**Order code**

- ILM-4** Inductive conductivity sensor
- ILM-4R** Inductive conductivity sensor - remote version, remote cable must be ordered separately

**Submersion length of toroid**

- L20** 20 mm
- L50** 50 mm

**Process connection** (Ⓐ: 3-A conform, Ⓔ: EHEDG approval)

- S01** CLEANadapt G1" Ⓐ Ⓔ
- TC1** Tri-Clamp 1½" Ⓐ Ⓔ
- TC2** Tri-Clamp 2" Ⓐ Ⓔ
- T25** Tri-Clamp 2½" Ⓐ Ⓔ
- TC3** Tri-Clamp 3" Ⓐ Ⓔ
- V25** Varivent type F, DN 25 Ⓐ Ⓔ
- V40** Varivent type N, DN 40/50 Ⓐ Ⓔ

**Head orientation** (not selectable for ILM-4R)

- H** Horizontal head orientation
- V** Vertical head orientation

**Signal module**

- I42** IO-Link and 1x 4...20 mA conductivity
- I62** IO-Link and 2x 4...20 mA conductivity/temperature selectable
- I63** IO-Link and 2x 4...20 mA conductivity/temperature selectable, external range switching

**Electrical connection**

- P** Cable gland M16x1.5
- D** 2x cable gland M16x1.5
- M** 1x M12 connector, 4 pin output/power supply
- N** 2x M12 connector, 4 pin output, 5 pin input/power supply
- A** 2x M12 connector, 4 pin output/power supply, 5 pin output/input
- C** 1x M12 connector, 5 pin analog output and IO-Link
- R** 2x M12 connector, 4 pin analog and switching output, 3 pin IO-Link and input

**Interface/Display**

- X** Without
- S** Simple User Interface with small display (not for ILM-4R)
- L** Large User Interface with big display

**Enclosure**

- X** Plastic cap without sight glass
- P** Plastic cap with sight glass
- M** Stainless steel cap without sight glass
- W** Stainless steel cap with sight glass

**Configuration**

- X** Default factory settings
- S** Special customer settings

<b>ILM-4 /</b>	<b>L20 /</b>	<b>S01 /</b>	<b>V /</b>	<b>I63 /</b>	<b>D /</b>	<b>S /</b>	<b>P /</b>	<b>X</b>
<b>ILM-4R /</b>	<b>L20 /</b>	<b>S01 /</b>		<b>I63 /</b>	<b>D /</b>	<b>L /</b>	<b>P /</b>	<b>X</b>

## Digital (R)evolution in sanitary measurement technology

# IO-Link with Flex-Hybrid Technology

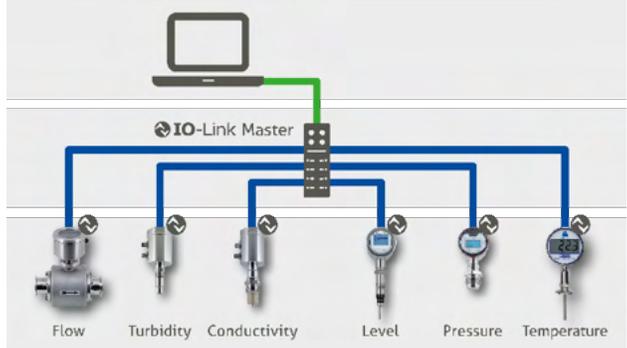
### Digital + Analog: The best of both worlds

IO-Link offers significant advantages when it comes to reliably controlling the entire system technology in processes, with a multitude of measuring points, control and operating elements. After extensive tests of the practical usability, we transfer this technology as digital data transfer standard of the future into our entire product range. Here we offer specific advantages with our Flex-Hybrid Technology with digital IO-Link AND analogue 4...20mA interface.



### Dual way data highway instead of one-way track

Installation and set-up are extremely time- and cost-saving. For interference-free signal transmission and power supply a three-pole standard cable, which does not even have to be specially shielded, is sufficient. In practice, point-to-point connections are made at field level from various sensors to IO-Link masters and from there, via a wide variety of fieldbus systems, to the control center.



### From simple data transfer to intelligent communication

With IO-Link, data streams in the opposite direction, towards the sensors, are also possible. This means that each sensor can be parameterized by the IO-Link Master, independently of the manufacturer. The status can be checked and specifically queried at any time. In this way, potential faults, signs of wear or an increased risk of failure can be detected early and condition-dependently and production downtimes can be better avoided.

### "Plug-and-play" gets a new meaning

Sensor replacement with IO-Link is easier and safer than ever before and can be carried out independently, at any time and by any employee without any programming effort. The device configuration of each connected sensor can be stored in the IO-Link Master. The new sensor is automatically recognized, configured and parameterized by the IO-Link Master as soon as it is plugged in.

### The advantages at a glance

- Available sensors: Turbidity ITM-51, Conductivity ILM-4, Level NSL-F, Flow FMQ, Temperature TSMA and TSBA, Pressure P42
- Flex-Hybrid Technology with digital + analog interface (IO-Link and 4...20 mA)
- Status control and sensor diagnostics for preventive maintenance and avoidance of production downtimes
- Fail-safe plug-and-play technology with standard cable for time- and cost-saving installation and set-up
- Uniform configuration for all sensors - without company-specific programming adapters
- Sensor replacement easier than ever before: Automatic detection, configuration and parameterization when plugged in

## Flex-Hybrid Technology with IO-Link and 4...20 mA

The Flex-Hybrid sensors combine the best of both worlds: The sensor can transmit data in digital, in analog or in both technologies in parallel. This creates an important advantage especially in times of technological change from today's analogue to digital IOT generation: If, for example, a system is currently controlled in analogue mode, but a conversion to IO-Link is being considered, the customer no longer has to make a decision. Instead of "either ... or", the Flex-Hybrid solution says "and". Simply by connecting a new cable, the sensor is easily converted to digital without having to touch the hardware or the settings.

## The future of hygienic measurement technology is hybrid and modular

IO-Link alone is a big step towards industry 4.0 in hygienic process technology. The Flex-Hybrid connection of digital and analog communication enables the simultaneous use of both worlds and creates planning security and flexibility for the later changeover without changing hardware.

## Case Study: Bellarine Foods, a milk powder plant of the future

Bellarine Foods in Victoria, Australia, has broken new ground with a completely new plant for whey powder production. The entire project including the full range of analytical sensor technology, was planned, designed, and installed with the IO-Link Digital Communication System. From the construction phase to production operation, Bellarine Foods has been a pioneer for a technology that represents the future standard for food and beverage companies. The benefits of this project are numerous, and one thing is clear to project partner Lindon Giuffrida of GP Systems: „The future of hygienic process technology is digital.“





HYGIENIC BY DESIGN

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