



Level



Pressure



Flow



Temperature



Liquid
Analysis



Registration



Systems
Components



Services



Solutions

Density Measurement for Quality Monitoring and Process Control

Endress+Hauser – People for Process Automation

What is Endress+Hauser's complete product offering?
Our competence in products, solutions and services is always appreciated. We have developed from a supplier of instrumentation to a provider of complete systems with the goal of serving our customers throughout the entire life cycle of their plants and to increase their industrial productivity. Wherever level, pressure, flow, temperature, analytical and

recording data are needed and systems, components and solutions are used, companies appreciate the experience of Endress+Hauser. This is one of the reasons why we are a leading global provider of measurement, control and automation solutions for process industry production and logistics.

Curious? www.endress.com



Endress+Hauser is a family enterprise with a staff of more than 8,400 world-wide and sales of more than 1 billion euros. Our global presence with 19 production sites (Product Centers) in Europe, Asia, India and the US, as well as sales and service organizations worldwide in almost every country, ensures constant communication with our customers. This enables Endress+Hauser to consistently support the competitiveness of our customers with the highest degree of quality, safety and efficiency.

Continuous optimization of our processes and the use of innovative technology

enable us to extend the frontiers of measurement, control and automation engineering and to find safe and efficient solutions for the benefit of our customers. We ensure the compatibility of our processes with the environment to save energy and resources.

All this also makes our customers confident that they will be able to rely on us in the future as 'People for Process Automation'!

Our density meters at a glance



	Vibronic – Liquiphant	Coriolis – Promass	Radiometry – Gammapiilot M
Advantages	<ul style="list-style-type: none"> Large number of process connections to choose from: universal usage Density information and pump protection possible with one Liquiphant Calculation in customer specific units e.g °Brix, °Plato, °Baumé etc. possible Up to 5 Liquiphant density sensors can be connected to the density computer FML621 	<ul style="list-style-type: none"> Maximum process safety: density, temperature and mass flow are all measured directly Approval for custody-transfer applications No maintenance necessary 	<ul style="list-style-type: none"> Straightforward retrofitting without process interruption; the pipes do not have to be opened No maintenance necessary
Installation options	Direct installation in tanks and pipes	In-line measurement in the pipe	From outside through the pipe, in the bypass or tank
Process temperature	0...+80°C (+32...+176°F)	-50...+200°C (-58...+392°F) (-200...+350°C / -328...+662°F optional)	Independent
Process pressure	25bar (362psi)	400bar (5,801psi)	Independent
Accuracy	0.002g/cm ³	0.0005g/cm ³	±0.001g/cm ³
Reproducibility	0.0007g/cm ³	0.00025g/cm ³	±0.0005g/cm ³
Units of density	Standard density, °Brix, °Baumé, °Plato, % volume, concentration etc. with 2D and 3D tables. Formula editor to calculate customer specific units	Standard density, standard volume flow and totalizing, % mass, % volume, alcohol tables (for mass and volume), °Brix, °Plato, °Baumé, °API etc.	g/cm ³ , g/l, lb/gal, concentration, % mass, °Brix, °Baumé, °API etc.
Output/Communication	4...20mA, relay, Ethernet, PROFIBUS® DP	4...20mA, HART®, PROFIBUS® PA/DP, FOUNDATION™ fieldbus, MODBUS, Ethernet I/IP	4...20 mA, HART®, PROFIBUS® PA, FOUNDATION™ fieldbus
Approvals	ATEX, FM, CSA, IECEx, 3A, EHEDG, CRN, FDA	ATEX, FM, CSA, TIIS, SIL2, 3A, EHEDG, IECEx	ATEX, FM, CSA, IECEx, TIIS, NEPSI
Additional information	Connection of temperature and pressure transmitter for compensation possible	Approvals for applications in custody transfer (PTB, NMI, EAM/METAS, BEV)	With interface for a Pt100 temperature sensor for temperature compensation
Application limits	<ul style="list-style-type: none"> Gas bubbles or build-up at the sensor fork Fluid velocity > 2m/s in pipes Highly viscous liquids > 350mPa·s 	<ul style="list-style-type: none"> Not for non-homogeneous mediums Only for pipe diameters up to DN 250 	<ul style="list-style-type: none"> Not in outgassing media

Density measurement from Endress+Hauser

Quality monitoring, process control and environmental protection are some of the factors that contribute to the growing importance of measuring medium density and concentration in industrial production processes. Mediums must be precisely measured to avoid costly overdosage of raw, intermediate and end products. This is a straightforward, cost-effective way of ensuring much closer production tolerances.

The economic advantage of such quality monitoring is easily verified. As a matter of fact, the medium concentration can be continually (in-line) monitored and controlled in many applications. It entails a drastic reduction of the expenditure for regular sampling and laboratory analyses which can even be completely omitted in many cases. In addition, there are savings in raw materials resulting from significantly improved process control.

Your benefits

- Boost in product quality
- Reduction in substandard quantities
- Compliance with tolerances

Our measuring principles for your measurement jobs

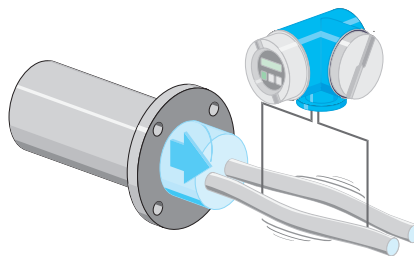
Vibronic measuring principle

A piezoelectric drive excites the tuning fork of the Liquiphant to its resonance frequency. If the density of the liquid medium changes, the resonance frequency of the tuning fork also changes. The density of the medium has a direct impact on the resonance frequency of the tuning fork. By storing specific medium properties and mathematic relations in the system, the exact concentration of the medium, for example, can be calculated.



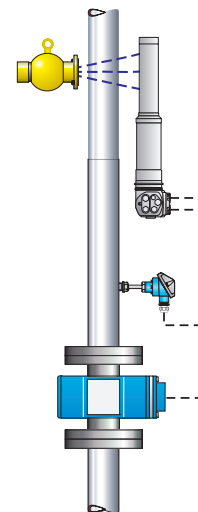
The Coriolis principle

Inside a Coriolis flowmeter there are one or two measuring tubes. The fluid flows through the measuring tube(s) which are constantly excited to oscillate at their resonance frequency. The resonance frequency is the frequency at which the measuring tubes are “most willing” to oscillate. Any change in the density of the fluid produces a corresponding change in the resonance frequency of the entire vibrating system (measuring tube and fluid). The resonance frequency, therefore, is a function of fluid density: the higher the density, the lower the resonance frequency.



The radiometric principle

The radiometric principle is based on the fact that isotopes – contained inside a source container – emit radiation that is damped as it penetrates a material (the medium). A detector mounted on the opposite side of a pipe containing this flowing medium converts the radiation it receives into an electric signal. The measuring effect as such derives from the absorption of radiation by the medium. Gammapiot M uses the received (attenuated) radiation to calculate density and also the concentration of the measured substance.



The right solution for each challenge



Density measurement using the vibronic principle

The vibration point level switch measures the density of the medium directly in the tank or pipe, i.e. in situ. Further piping is not required. Together with the switching unit, Liquiphant may be simultaneously used in pump protection and offers the option of calculating further parameters.

- Relative density for qualitative monitoring of the process steps
- Calculating the concentration of a dissolved fluid such as alcohol
- Calculating the specific density, for example based on 20°C (68°F)

In addition, together with continuous information on the level, the mass of the stored product can be calculated in a consistently precise manner regardless of the level.

Density measurement with the Coriolis principle

Coriolis flowmeters can measure a medium's mass flow, temperature and density all at the same time. This in-line mode of density measurement was developed so that processes can be controlled and monitored directly in-pipe. The results include improved quality control and a higher level of dependability for processes in a very wide range of applications. Once a medium's density is known, other parameters such as special density values, substance proportions and concentration can be calculated:

- Temperature-compensated density values (standard density, standard volume flow, totalizing)
- Percentage substance proportions in two-phase mediums (concentrations, %mass, %volume, alcohol content, target and carrier fluid etc.)
- Conversion from as-measured density to medium- or industry-specific units of density (°Brix, °Plato, °Baumé, °API etc.)



Endress+Hauser offers a special density calibration. This ensures accurate density measurement that covers a wide range of fluid densities and temperature for an entire process window and not only at reference conditions.



Radiometric density measurement

Radiometric density measurement is used in all applications that exclude other measuring principles because of extreme process conditions, e.g. highly abrasive, aggressive or toxic media as well as mechanical, geometric or structural conditions on-site. This noninvasive and maintenance-free measuring method safeguards the highest degree of operational safety and thus high plant availability – irrespective of medium properties.

For radiometric density and concentration measurement, the respective sensors are mounted externally on existing pipes, i.e. an interruption of the running process is not required. Additional temperature sensors calculated temperature-compensated density values. All of the ascertained values may be displayed in different density units, e.g. g/cm³, % solids content, % concentration, °Brix etc.





Density measurement in the Chemical/ Petrochemical industry

Be it in the chemical or petrochemical industry, in the solution or decomposition of solids, the neutralization of acids, the determination of crystallizing temperatures or in fractional distillation – subjects like safety, resistance against aggressive media, monitoring and documentation of the production processes as well as ensuring product safety play a major role.

To meet these requirements, all details of the production processes must be mastered and, at the same time, more and more process variables have to be recorded. For in process monitoring, exact information on product quality, e.g. the concentration of solid and liquid media by in-line measurement, is indispensable.

Being able to monitor both the process and the product simultaneously constitutes an enormous advantage for plant operators. The density and concentration measurement with different physical measuring principles provides this additional benefit which is becoming more and more important.



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Product monitoring and quality control with Promass

The capability of Promass to monitor product density for indication of changing fluids is used to avoid cross contamination by different products in loading bays.

Whether operating in petrochemical, biochemical, base or special chemical, controlling the density of liquor products in the process always enables consistently high quality for the end product.

In-line density measurement reduces physical product manufacturing cycles for products with different densities and dynamic fluid properties. Promass provides additional product information, i.e. mass, viscosity, temperature that reduces the need for offline/lab measurement.

Other applications

- On-line dilution through continuous measurement and calculation of concentration of acids and alkalis
- Monitoring of density for additional information such as mass balance of intermediate products in batch processes
- Fuels transfer pipeline interface detection and in-line product quality measurements

Your benefits

- Density measurement for optimizing process conditions to ensure consistency in product manufacture
- Simultaneous and direct measurement of density and calculation of concentration
- Multivariable measurement in customer specific units
- Promass offers a dedicated portfolio with high temperature sensors suitable for demanding applications, i.e. for SIL2/3

Gammapiilot M in the production of polyethylene

In this application, radiometric density measurement takes place in the high-pressure loop reactor. Liquefied gas fills the loop reactor as the carrier medium. This gas is heated to 75°C to 95°C (167°F to 203°F) and pumped through the loop at a pressure of 50bar to 65bar (725psi to 942psi). Liquefied ethylene is admixed,

and the chemical reaction in the loop reactor is triggered by the measured injection of a catalyst. The proportion of ethylene to catalyst has to be precision-controlled, so radiometric density measurement is calibrated for the 300 to 600g/l range. Density is a crucially important measured variable for process control, so redundancy is a built-in feature of the measurement configuration.

Your benefits

- High plant availability due to noninvasive external measurement
- Easy temperature compensation by connecting an external Pt100 sensor
- Industry-optimized materials. All mechanical parts are made of 316L

Other application

- Measurement of solids concentration in the disposal of chemically contaminated sand. Exact ascertainment of the solids concentration for process control



Liquiphant to monitor the dilute acid concentration in sulphuric acid production

Sulphuric acid serves the production of fertilizers. Burning of elementary sulfur generates SO₂-containing gases from which the sulfur dioxide is scrubbed. In a further oxidation process with a catalyst, sulfur trioxide results. This SO₃ is processed to become 80 percent sulphuric acid. Scrubbing of the sulfur dioxide requires a venturi scrubber. During scrubbing, the dilute acid concentration rises. Once the concentration reaches a certain level, it must be diluted with water to safeguard proper functioning of the scrubber. Continuous measurement of the concentration with Liquiphant M Density is required to keep the dilute acid concentration on a constant level.

Other applications

- Neutralization
- Gel-production
- Polymerization of butadiene

Your benefits

- Appropriate materials for aggressive environments
- Installed directly in containers
- Cost saving since acid sampling is superfluous
- High plant availability due to in-line density measurement





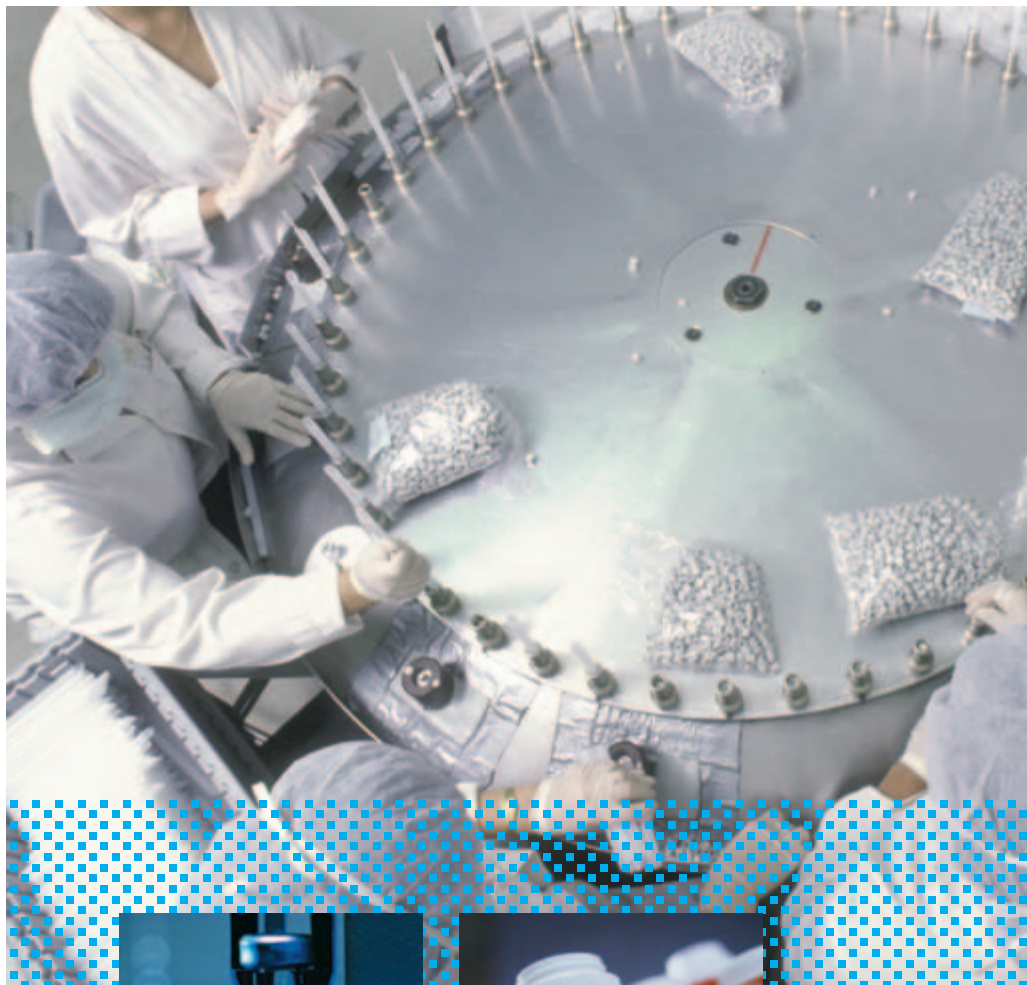
Density measurement in the Pharmaceutical industry

Be it in the pharmaceutical industry or biotechnology, in the production of active ingredients, i.e. live cells or bacteria, in the separation process for purification or further cleaning – hygiene, monitoring and documentation always play a central role to ensure product quality, for example in product acceptance tests.

To meet these requirements, all details of the production processes must be mastered and, at the same time, more and more process variables have to be recorded. For in process monitoring, exact information on product quality, e.g. the concentration of a liquid by in-line measurement, is indispensable.

Being able to monitor both the process and the product simultaneously constitutes an enormous advantage for plant operators. The density and concentration measurement with different physical measuring principles provides this additional benefit which is becoming more and more important.

- ASME BPE
- Pharma CoC
- CIP/SIP capability





Tablet coating with Promass

Tablet coating processes may include sugar coating (any mixtures of purified water, cellulose derivatives, polyvinyl, gums and sugar) or film coating (purified water, cellulose derivatives).

In tablet coating processes it is critical to monitor and control the concentration of aqueous film solutions to be deposited/sprayed onto the tablet surface. The coating can be specially formulated to regulate how fast the tablet dissolves and where the active drugs are to be absorbed into the body after ingestion. The use of Promass for deriving concentration allows for continuous in-line quality control of final product.

Other applications

Increase throughput and plant capacity by in-line density measurement to ensure correct recipe selection and batch identification making the process more streamlined and improving mixing times for:

- Water solvents
- Colloidal solutions
- Glycols
- Oils
- Syrups
- Vitamin emulsions
- Personal healthcare products
- Soaps
- Deodorants
- Hair care products

Your benefits

- In-line CIP and SIP, complete drainability
- Meets 3-A sanitary requirements
- Uses FDA approved materials
- Fulfills EHEDG cleanability requirements
- Single tube design for low pressure loss and unrestricted flow path
- ASME, BPE compliant
- All parts in contact with the process are of 316L



Gammapiilot M in the vitamin production

Process control of a liquid vitamin calls for precision monitoring of the medium's density. The material has to be ducted through a glass pipe on account of its aggressiveness, and non-contacting, radiometric monitoring is the only option capable of achieving long-life operation. The hazardous-environment area is the primary field of deployment.

Other application

- Wherever other measurement methods are not reliable enough or completely impractical on account of the process conditions

Your benefits

- External noninvasive and maintenance-free measurement
- Aggressive media can be easily recorded
- Retrofitting without any interruption of the process and without opening the pipe
- No special or additional brackets required
- Industry-optimized materials, also suitable for extreme ambient conditions. All mechanical parts are of 316L



CIP process logging with Liquiphant

This process is used in numerous applications. It ensures that also plant parts which are difficult to clean meet the hygienic requirements. The product is transferred from process containers to an interim storage tank. Subsequently, acid phases, alkaline liquids and hot water are introduced to the process in defined quantities and under respective pressures and temperatures. Density and concentration measurement is required since all of these processes require evidence concerning their correct realization and since a cleaning profile has to be generated.

Other applications

- Quality control of the individual interim processes and of the final product, e.g. in the Product Acceptance Test (PAT)

Your benefits

- Conformity with the requirements of FDA, EHEDG and 3A
- Extensive documentation, e.g. the Pharma CoC and versions conforming to ASME BPE
- Materials in contact with the process have a delta-ferrite content < 1%

Density measurement in the Food industry



Be it at a dairy or in the brewing industry, metering of ingredients or filling of final products, be it molasses, yoghurt, condiment or liquid sugar – hygiene and a constantly high product quality play a central role in the food industry. To meet these requirements, all details and subtleties of the production processes must be mastered and, at the same time, more and more process variables have to be recorded. For the optimization of individual processes exact information on quantities and product composition is indispensable. Consistent monitoring of both process and product offers users the possibility of intervening and regulating it at an early stage. Density and concentration measurement with different physical measuring principles provides this additional benefit which is becoming more and more important.

- CIP/SIP capability





Concentration measurement with Promass

In alcohol applications the concentration of pure alcohol and mixed fluids in %mass or %volume is measured at operating conditions. The concentration range can vary from 10% to 70 vol. % and

between 10°C to 30°C (50°F to 86°F). The measured value can also be standardized back to reference conditions for continuous in-line blending systems and custody transfer measurement.

Measuring the fat content of dairy products with Promass

The first processing stage in a dairy is separation and fat standardization, which is carried out using separators or centrifuges. Two significant stages are achieved by de-creaming/skimming.

At the stage of direct fat adjustment/standardization, the raw milk is separated into cream and skimmed milk with a constant fat content. After both products have left the separator, a certain quantity of cream is added to the skimmed milk, Promass measures the desired fat content to be determined via the density signal (i.e. 3% fat).

Since the difference of the density of skim milk and blended milk does not vary significantly the best possible density measurement is essential.

Promass density measurement in the cream pipeline continuously determines the fat content of the cream. For fat content standardization, repeatability is essential for dosing the exact quantity of cream. Repeatability is one of the most important factors in a control loop for creating the desired consistency.



Other applications

- Measurement of sugar content in °Brix for mixing soft drinks and juices
- Determining the sugar content of liquids
- Measurement of ingredients (in mass or volume percent)
- Measuring beer extract in °Plato, for example for ascertaining original wort and alcohol content

Your benefits

- CIP and SIP
- Full drainability unrestricted flow path
- Compliant with the requirements of the 3A directives
- Materials used are FDA-compliant
- EHEDG cleanability tests successfully completed



Liquiphant to monitor fermentation processes

The continuous density measurement serves monitoring fermentation processes, e.g. in cidre production. The fermentation process is supposed to proceed as evenly as possible in order to obtain high quality results. This requires cooling of the tank content in accordance with its density. Liquiphant density measurement optimizes the cooling process and saves cooling energy.

Your benefits

- Hygienic design in accordance with EHEDG and 3A
- The device speaks your language (°Brix, °Baumé, °Plato, g/cm³ etc.)
- Cost savings by the reduction of laboratory tests
- Energy and cost savings due to the optimized cooling process



Density measurement in the Pulp and Paper industry

Be it in pulp production or paper manufacturing – plant availability always plays a central role. Optimum mastering and monitoring of the production processes is a basic prerequisite to safeguard this availability in the best possible way – ensuring the highest degree of product quality at the same time. Reliable instrumentation, chemically resistant materials but also functional safety are key criteria which, among other aspects, are used for the qualification of components and instruments.

Apart from traditional variables like pressure, level, flow, temperature and pH value measured parameters containing quality information are becoming more and more important in the control of processes. This is particularly applicable to density measurement directly in pipes (in-line), e.g.

- To ascertain the concentration in lime milk
- To measure the density in green liquor or different lyes in chemical recovery processes
- To monitor the homogeneity of brines in bleaching processes



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Control of liquor concentration with Gammapiilot M

Radiometric liquor density measurement – e.g. for green or black liquor – is standard in the pulp/paper industry. Due to the strong build-up in pipes, only external noninvasive measurement safeguards high plant availability. In such applications with a pipe diameter of DN 250, the measuring range covers from 0.990 to 1.300g/cm³.

Other application

- Measurement of lime milk suspension

Your benefits

- The influence of growing deposits in pipes can be easily re-calibrated
- All parts of 316L, well suited to aggressive media or rough ambient conditions
- Measurement free of wear and maintenance



Measurement of proportionate quantities with Promass

Lime mud density measurement is tied into the mass balance system, Lime is an important chemical used in the mill cooking process. For Lime kiln optimization as well as maximum efficiency oil density and to the burners in the Recovery Boiler is consistency monitored.

Other applications

- Interface detection between black liquor and soap underflow from the skim tank allows for process optimization
- Improved monitoring and control of the chemicals such as mixtures of sodium hydroxide and sodium sulphide with concentration measurement in feed lines to the digester
- Continuously monitoring dry titanium dioxide (TiO₂) slurry concentrations
- Density measurement for concentration, of soda lye or chlorate
- Quality control by monitoring the consistency of additives mixed into white liquor and process control in the blending kitchens



Lime milk concentration control with Liquiphant

Ready for use lime milk is predominantly employed in neutralization processes, for example, in waste water neutralization. The density in the pipe is measured and lime milk is added as required to keep the concentration as constant as possible.

Other application

- Neutralization of acid

Your benefits

- Chemical resistance due to suitable coatings and higher-quality steels (Alloy)
- Density measurement and point level detection (pump protection) may be realized in one instrument
- Optimized neutralization by in-line measurement



Density measurement in the Primary and Mining industry

Be it in mining or wet processing of mixtures of solids and water, the acquisition of product densities or concentrations as additional quality information plays an increasingly significant role in the early recognition of (undesirable) product changes.

- Density measurement of raw materials or exploited primary products in water mixtures
- Ascertainment of solids content in thickeners, sedimentation and precipitation tanks
- Density ascertainment in sludges for disposal
- Mass ascertainment in additives or bitumen

Robustness, reliability, simple handling, resistance against abrasion as well as increased plant availability are other aspects of great importance for such applications. The in-line density measurement to monitor quality, to increase plant profitability and to optimize processes forms part of this development.

Being able to monitor both the process and the product simultaneously constitutes an enormous advantage for plant operators. The ascertainment of density and solids with different physical measuring principles provides this additional benefit which is becoming more and more important.



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Gammapiilot M in coal-mining

Coal slurry with a density of 1.3 to 2.0g/cm³ is conveyed through a DN 400 pipe. Since coal slurry is extremely abrasive, radiometry is the only alternative to safeguard high long-term availability of the plant.

Other applications

- In mines with abrasive ore-water mixtures, e.g. copper, zinc or gold ore, in compressors or flotation plants and solids content measurement in turbid liquids
- Solids quantity measurement in floating dredger applications. In this industry, often used in combination with electromagnetic flowmeters to measure not only the solids concentration but also the mass flow

Your benefits

- All materials of 316L, well suited to the rough requirements of the mining industry
- Clear on-site display for quick measured value check and easy diagnostics
- Free of maintenance since the measuring method is noninvasive

Monitoring of hydrochloric acid concentration

Concentrated hydrochloric acid is used to clean steel plates. The acid is continually reused and increasingly contaminated by iron (II) chloride and deposits on the plates.

The acid content in the storage tank is reliably and quickly ascertained via density measurement with Liquiphant and, if required, a cleaning process is started. The density measurement replaces time-intensive spindle tests and laboratory measurements.

Your benefits

- Corrosion resistant materials
- High plant availability due to continuous density measurement of the acid



Measurement of percentage solids content with Promass

Promass is well suited for the demanding applications in the primaries and mining industry. The density measurement applications are sometimes aggressive both chemically and mechanically.

Promass offers reliable % solids measurement from settlers or thickeners. The solids component of the feed settles to the bottom of the thickener and is then removed as underflow. Typically thickeners produce an underflow slurry with a solids density between 60 to 70% cw.



Other applications

- Density measurement of product liquor after flash vessels for product monitoring
- Concentration measurement of acids used in leaching processes
- Monitoring of flocculants that are dosed to feed slurry

Your benefits

- Simultaneous and direct measurement of density and calculation of concentration, i.e. % solids
- Promass offers solutions for high temperature applications as well as mechanically robust and corrosion resistant measuring tubes



Density measurement in the Oil and Gas industry

Despite the fact that density is not measured in oil fields very frequently it is, nevertheless, a variable extremely critical for the process. In drilling sludge handling, for example, the density is surely the most important parameter. For the density is finally responsible for the balance between “safe drilling” (with sufficiently high hydrostatic pressure in the drill hole) and “the lowest possible formation damage” (with the lowest acceptable hydrostatic pressure on the formation). Further areas of application for high-precision density measurement are cement handling and Frac engineering.

In all of these applications, Coriolis mass flowmeters offer reliable and exact in-line measurement. Radiometric density measurement has also proven itself as the perfect solution for such applications. For it does not contact the medium and can be installed and commissioned without any interruption of the drilling process or mass flow.

A density profile in a separator opens a window to the internal separation process and can finally visualize the layers of the crude oil emulsion of water and possible sediments. Coriolis offers mass flow and gross density for the transmission stations of measured values of crude or refined products. A flow computer easily convert these online measurements on basis of ASTM/API tables to the net volume so that customers can be billed immediately.



NACE

Measurement of oil/water mixtures with Promass

Coriolis mass flowmeters are multivariable offering both density and flow simultaneously. Therefore Promass is used in various applications within the oil and gas industry for density measurement. Applications range from density measurement of oil/water mixtures in 2-phase separators, through to feed stock density monitoring to ensure no intrusion of sea water. In blending stations Promass offers high accuracy and product control for in-line blending and control of mixing ratios of oils.



Your benefits

- Meters comply with all requirements in accordance with NACE MR0175-2003, because materials such as 316L, Alloy C-22 and 904L are listed
- Compact meters for nominal diameters up to DN 250
- Measuring tubes are self-emptying, maintenance-free and non-clogging

Other applications

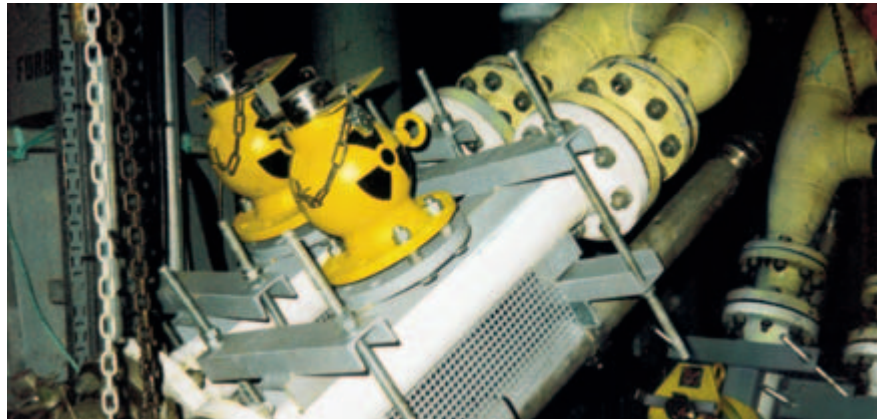
- The oil and gas service industry monitor and control the proportional mix of fracturing fluid
- Monitoring of gel and proppant. This ensures the correct blend during the fracturing process
- Monitoring of crude oil going to the upgrader
- Use of the API scale to express the density of liquid oil products and fluids containing oil

Drilling sludge measurement with Gammapiot M

The Gammapiot facilitates robust and maintenance-free measurement of abrasive drilling sludge on the platform. The low radiation activity permits several measuring points at the same site without any interference with each other.

Your benefits

- Maintenance not required, high plant availability
- Welding or modification of piping is not required
- Industry-optimized materials, well suited to rough ambient conditions. All mechanical parts are of 316L



Other applications

- Recognition/signaling of different types of oil in the same pipe to switch valves and diverters
- Density profile measurement in separators to separate oil, water and sediments

Density measurement in saltwater tanks with Liquiphant

Saltwater is often required for oil drilling. The dissolved salt, e.g. sodium or potassium chloride, increases the weight of the water thus providing sufficient drilling pressure. Every day, saltwater with a different concentration is prepared in plastic storage tanks with agitators. Reliable density measurement is important for the brine mixture.

Other applications

- Separation of water and oil
- Quality monitoring in refineries



Your benefits

- Suitable materials for aggressive environments
- Cost savings since manual sampling is not required
- Traceability of product quality
- High plant availability because of constant product quality of the salt solution



Applicator

Selection and Sizing Tool for your Planning Processes

Time is money

The challenges in instrumentation engineering of a plant are numerous: Planners must obtain an overview of the whole project right from the start, they have to combine application and instrumentation to arrive at safe decisions. This is equally true for product selection, calculation and the administration of different projects. Calculations are complex and the variety of products cannot be mastered. Safe calculations and sizing of measuring points become time-consuming cost generators.

Applicator provides planning reliability, fast and flexibly

The Applicator software of Endress+Hauser is a convenient selection and sizing tool for planning processes. Using the entered application parameters, e.g. from measuring point specifications, Applicator determines a selection of suitable products and solutions. Supplemented by sizing functions and a module for project administration Applicator will alleviate your daily engineering work. Applicator has been steadily developed for many years and proves its worth every day a thousand times in the most varied applications of customers.

Take the easy way

Just work with this clear Applicator desktop and straightforward module structure. Selection, calculation or administration, regardless of where you intend to enter a project, Applicator provides an open door for you to start anywhere.

And if you want to proceed from one module to another one, this is accomplished by a mere click and there is nothing to prevent a smooth exchange of data.

The Applicator provides you:

- Planning reliability
- Timesaving
- Safe project data
- Flexibility in work processes

The fast way to your Applicator

Applicator of Endress+Hauser may be used free of charge both via the Internet and in form of a CD. You can order the CD version quite conveniently online

<http://www.products.endress.com/applicator>





Worldwide service close to you

Wherever you are situated, your local Endress+Hauser organization or regional customer support office will provide the exact performance you need, be it commissioning, repairs, on-site support, training or maintenance and calibration services.

As one of the largest networks of service experts in process automation, it is our desire to help you discover new opportunities and potentials for maximum benefit and minimum operating risk. We see ourselves as your fair partner in this task, providing the right advice and recommendations to ensure constant reduction of costs and risks.

Endress+Hauser Service:
Global, competent, reliable

At a glance

- Commissioning and installation
- Project management
- Preventive maintenance
- Maintenance contracts
- Spare part service
- Repair service
- Training
- Helpdesk
- Online documentation
- Calibration services



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