mPDS 4000 : modular process data systems : density measuring cells DPR, concentration analyzers SPR : take quality control to the production floor... / Anton Paar K.G.

mPDS 4000

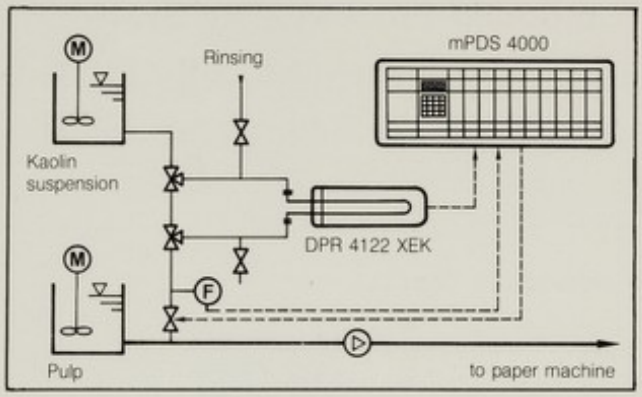
modular Process Data Systems

Density Measuring Cells DPR
Concentration Analyzers SPR

Take quality control to the production floor . . .

PAAR

For cost savings, safety and an optimal final product.



Paper Manufacturing

Kaolin suspensions are produced in batch processes. The dry weight of kaolin per liter of suspension is subject to high fluctuations. A DPR 4122 XEK density measuring cell measures the density of the kaolin suspension in the main flow. The mPDS 4000 system calculates the kaolin content and controls the addition of kaolin via flow, providing a constant dose rate of kaolin.

Density range: 1.18 — 1.28 g/cm³
corresp. 400 — 600 g/l Kaolin
Temperature range: 20 — 40 °C
Pressure: approx. 1 bar (15 psi)

Benefit: Improved paper quality, reduced waste, optimized utilization of raw materials.

Refining

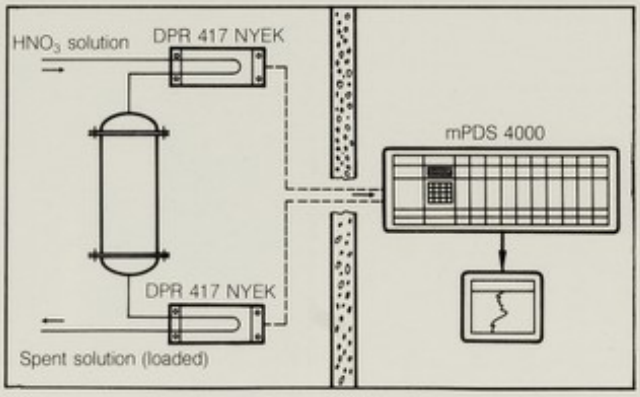
Refineries use Paar systems to measure the density of cracked gasoline. The measuring cell is installed in a hazardous area.

Measuring range: 0.650 — 0.750 g/cm³
Temperature range: 10 — 40 °C
Accuracy: ±0.0002 g/cm³
Pressure: 15 bars (225 psi)

The DPR 417 NYEIK intrinsically safe density measuring cell is connected to the mPDS 4000 computer which is located in the control station.

The density of cracked gasoline at 15.56 °C (60 °F) is calculated, its analog value transmitted to a recorder and both the density and temperature are sent to a host computer.

Benefit: Continuous measurement eliminates need for spot checks.



Nuclear Fuel Reprocessing

Nuclear fuel reprocessing plants use mPDS 4000 systems to monitor the extraction of plutonium, by measuring the difference in density. The systems measure the exact loading at the exit of extraction columns, independent of the density fluctuation of the HNO_3 solution.

Accuracy: ±0.0002 g/cm³
Temperature: 100 ±5 °C
Pressure: 1 bar

Benefit: Exact control of extraction process.

Process-matched density/concentration measuring systems provide unmatched quality control flexibility.

mPDS 4000
modular Process Data System

The mPDS 4000 modular Process Data System is an extremely flexible instrument for the collection, storage and processing of measured data as well as for monitoring and controlling industrial processes.

Each mPDS 4000 system is custom assembled from a large selection of plug-in modules according to the specific demands of the actual application. Each plug-in module comes with its own microprocessor.

All industry standard analog and digital inputs and outputs are available. This allows sensors and actuators from any manufacturer to be used.

Special plug-in modules are used to connect the reliable Anton Paar DPR and SPR transmitters for high precision density/concentration measurement of liquids.

The system is designed for operation in the rough industrial environment. All inputs and outputs are isolated. A watchdog circuit monitors the system and minimizes the possibility of errors and data loss.

The IPC internal process computer, master processor of the mPDS 4000 system, can be programmed in the popular BASIC computer language. Due to the mPDS 4000's unique internal data management, a great number of applications are already covered by the basic program supplied. For special applications, custom programs can be provided. Also, users can easily write their own BASIC application programs. Software modification and installation of additional modules can easily be done on site.

Parameters and configuration data for the mPDS 4000 system are entered through the IPC-keyboard. This can also be used for digital readjustment of the sensors or service work. The IPC comes with two serial interfaces for connecting an external PC and a printer.

For normal operation, the mPDS 4000 does not need an external computer. A computer may be used to create special application programs and can serve as an output device.

mPDS 4000 Basic Equipment

The mPDS 4000 Basic Equipment consists of a 19" rack with one to five component levels. Each level can hold 10 plug-in modules. Furthermore, the basic equipment contains an IPC internal process computer and the power supply units.

Either stainless steel or sheet-metal cases of industrial quality are available.

mPDS 4000 Modules

All mPDS 4000 modules are custom designed to fulfill specific data input or output functions. Each module has a 3 character alpha-numeric name. The name usually describes the module's main function.
Some of the most common modules are listed below:

DSP: Density/Sound Processor for connecting an Anton Paar DPR or SPR measuring cell. DSP performs a mathematical temperature compensation of the measured values, if needed.

2AI: Two Analog Inputs 0 - 20 mA or 4 - 20 mA. For connecting pressure transducers, flowmeters, etc.

8DI: Eight Digital Inputs for connecting switches, control signals from external computers and limit switches. Two inputs provide counting and frequency measurement, e.g., for the connection of flowmeters.

4AV: Four Voltage Inputs for sensors with voltage signals.

PAO: Programmable Analog Output for connecting recorders, controllers, control valves, etc. 0 - 10 V, 0 - 20 mA and 4 - 20 mA active/passive output signals are available.

4AO: Four Analog Outputs 0 - 20 mA and 4 - 20 mA, for connecting recorders and analog indicators.

6DO: Six Digital Output, four relays with potential-free make and brake contacts for the control of alarm signals, pumps, valves, etc. Two pulse generators for connecting mechanical counters.

8DO: Eight Digital Output, seven relays with potential-free make contacts and one pulse generator.

RDD: Remote Display Driver for up to 6 NLD remote displays.

mPDS 4000
Remote Numeric LED Displays

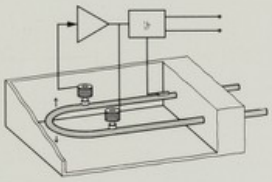
NLD: 6-digit remote Numeric LED Display with digital signal input, matched to the high precision of Anton Paar DPR and SPR measuring cells. With figures of 20 mm height, capable of showing six different measuring values per display.
Models:
- With housing for switchboard installation DIN 72 x 144.
- Stainless steel housing IP 55, with 6-position rotary switch.

DPR Density Measuring Cells

The density of a liquid is defined as its mass divided by its volume. Density is one of the most important properties that is measured and controlled in industrial processes.

Many known measuring techniques for exact determination of concentration (°Brix, °Plato, API Number, % Alcohol, ...) are based on density measurement.

The proven technique for industrial density measurement is the oscillating U-tube. The U-tube's sensitivity ensures that the accuracy of your process density measurement is equivalent to that of fine laboratory instruments.



DPR density measuring cells guarantee on-line density measurement with utmost accuracy under extreme ambient conditions.

The accuracy of DPR density measuring cells is ±0.0001 g/cm³ and the precision ±0.00001 g/cm³. The accuracy of temperature measurement is better than 0.1 °C, the resolution 0.01 °C.

Standard DPR density measuring cells use a stainless steel (SS 316 ti) or borosilicate glass U-tube oscillator. U-tubes made of special materials such as Monel 400, Inconel 600 or tantalum are also available.

DPR density measuring cells cover a flow rate range from 0.02 to 6 m³/hr. Higher flow rates require bypass installation. Special versions are optimized to measure aggressive media, cold samples, suspensions, muds or pressurized fluids. Intrinsically safe versions (EEx ia IIC T6) are also available.

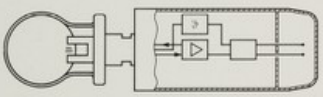
A twin-core cable is used to connect the DPR density measuring cell to the mPDS 4000 system; a cable length of some kilometers is possible.

For detailed information see the appropriate DPR leaflets.

SPR Concentration Analyzers

SPR concentration analyzers, measure both the propagation speed of sound pulses in the fluid and the fluid's temperature.

Using a patented method to measure sound velocity, SPR concentration analyzers provide utmost resolution and are practically both drift and maintenance-free.



SPR concentration analyzers measure the sound velocity a few hundred times every second thus recognizing a change in concentration immediately.

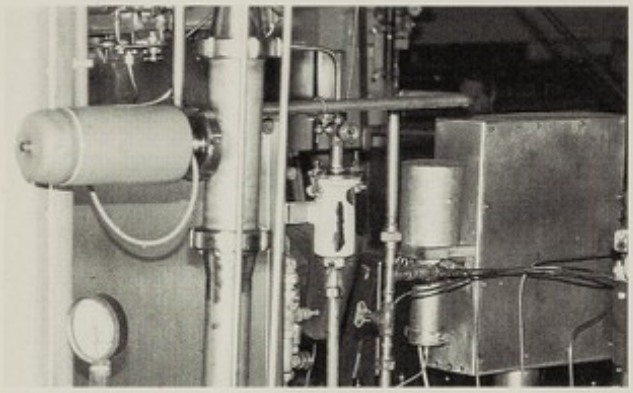
The accuracy of sound velocity measurement is better than ±1 m/s. The accuracy of calculated concentration depends on the liquid to be measured; it ranges from 0.01 to 0.1%. The accuracy of temperature measurement is better than 0.1 °C, the resolution being 0.01 °C.

All wetted parts of the SPR concentration analyzer are made of stainless steel. Special materials are available on request.

A twin-core cable is used to connect the SPR concentration analyzer to the mPDS 4000 sytsem; a cable length of some kilometers is possible.

For detailed information see the appropriate SPR leaflets.

Here's how:

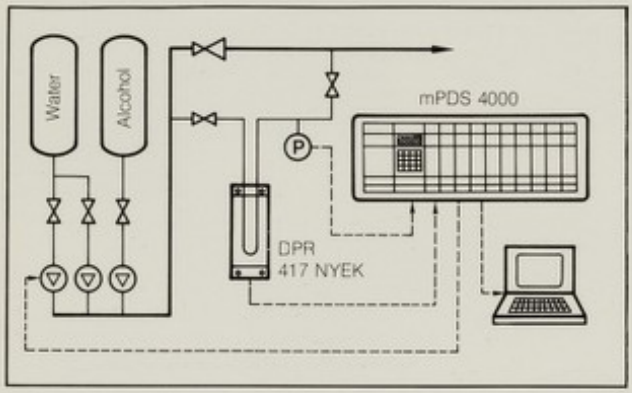


Brewing

Research on beer has shown an outstanding correlation between original gravity and sound velocity. The accuracy of correlation is better than with the RI-Density method.
The SPR 4115A concentration analyzer measures the sound velocity in the main flow. From this the mPDS 4000 system calculates the original gravity of the beer.
The installation site is typically between the beer filter and filling station. System output can be used to control original gravity.

Measuring range: 0 — 20 °Plato
Temperature range: -2 to +15 °C
Accuracy: ±0.1 °Plato

Benefit: Continuous monitoring of beer quality, exact determination of filter first and last runnings, exact separation, reduced extract losses.



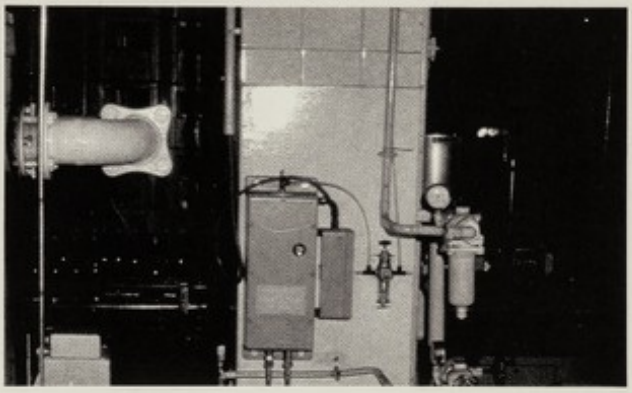
Distillation

mPDS 4000 systems calculate the concentration of ethanol from the density/temperature of ethanol/water solutions. Fluctuations in pressure are measured and compensated. Blending is kept constant via an integrated PI controller — a proportioning pump serves as the final control device.

Measuring range: 0 — 100 % ethanol
Target value: e.g. 38 ±0.01 % vol.
Temperature range: 10 — 40 °C
Pressure: 3 — 8 bars (45 — 120 psi)

An external computer receives the actual values of ethanol concentration and measured temperature and calculates and displays statistical data.

Benefit: Optimized product quality and yield.



Soft Drink Bottling/Canning

An mPDS 4000/DPR 417 NYEK system monitors the beverage filling line and measures in the range of 8 to 14 °Brix, to ±0.025 °Brix. Digital outputs are used to adjust the piston stroke of the metering pump.

Measuring range: 1.02 — 1.05 g/cm³
Temperature range: 5 — 15 °C
Accuracy: ±0.0001 g/cm³
Pressure: 3 bars (45 psi)

CO_2 compensation is performed by the mPDS 4000.
Optionally a CO_2 analyzer can be connected to the system.

Benefit: Continuous monitoring of soft drink quality, optimized syrup utilization.

Other typical applications are:

Acid/lye production	**Coal slurry control**	**Pharmaceuticals**	**Liquid food products**
Polymerization control	**Fuel control**	**Cosmetics**	**Milk standardization**
Wastewater control	**Etching bath control**	**Paints**	**Wine filtration**

DPR Density Measuring Cells – SPR Concentration Analyzers

	**DPR 402 YEK**	Density measuring cell with borosilicate glass U-tube; 2 mm i.d., for flow rates between 0.02 and 0.05 m^3/hr (0.09 to 0.2 gal/min). For aggressive fluids and small quantities. Special version with heat exchanger available.
	**DPR 412 YEK**	Density measuring cell with stainless steel U-tube; 2.6 mm i.d., for flow rates between 0.02 and 0.05 m^3/hr (0.09 to 0.2 gal/min). Suitable for small quantities at high pressure. Special version with heat exchanger available.
	**DPR 407 YEK**	Density measuring cell with borosilicate glass U-tube. 7 mm i.d., for flow rates between 0.1 and 0.5 m^3/hr (0.5 to 2.3 gal/min). To be used for aggressive fluids like acids, salt solutions, etc. Intrinsically safe version available.
	**DPR 417 NYEK** **DPR 427 NYEK**	Density measuring cell with stainless steel U-tube; 6.6 mm i.d., for flow rates between 0.1 and 0.5 m^3/hr (0.5 to 2.3 gal/min). For measurements with maximum precision. U-tube made of special materials available. Intrinsically safe version available.
	**DPR 4114 XEK**	Density measuring cell with stainless steel U-tube; 13 mm i.d., for flow rates between 0.2 and 1.5 m^3/hr (0.9 to 6.8 gal/min). Especially suitable for fermentation control.
	**DPR 4122 XEK**	Density measuring cell with stainless steel U-tube; 22 mm i.d., for flow rates between 0.35 and 6.0 m^3/hr (1.6 to 27 gal/min). Especially suitable for slurries and fibrious suspensions.
	**SPR 4114** **SPR 4122**	Concentration analyzer with stainless steel tube; 14/22 mm i.d., for flow rates between 0.05 and 5/0.1 and 10 m^3/hr (0.2 to 22.5/0.5 to 45 gal/min).
	**SPR 4115 A**	Concentration analyzer with stainless steel tube. Especially suitable for the food industry. To be mounted to pipes from 65 mm i.d., or to container walls.

Specifications subject to change without notice.

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