Single-source measuring instruments for filling and bottling

When every drop counts

Endress+Hauser
People for Process Automation

Endress+Hauser – Your partner

Endress+Hauser is a global leader in measurement instrumentation, services and solutions for industrial process engineering.

With dedicated sales centers and a strong network of partners, Endress+Hauser guarantees competent worldwide support. Our production centers in twelve countries meet your needs and requirements quickly and effectively. The Group is managed and coordinated by a holding company in Reinach, Switzerland. As a successful family-owned business, Endress+Hauser is set to remain independent and self-reliant.

Endress+Hauser provides sensors, instruments, systems and services for level, flow, pressure and temperature measurement as well as analytics and data acquisition. The company supports you with automation engineering, logistics and IT services and solutions. Our products set standards in quality and technology.

We work closely with the chemical, petrochemical, food and beverage, oil and gas, water and wastewater, power and energy, life science, primary and metal, renewable energy, pulp and paper and shipbuilding industries. Endress+Hauser supports customers to optimize their processes in terms of reliability, safety, economic efficiency and environmental impact.

To learn more about Endress+Hauser, visit:
www.endress.com

Flow measurement as competence

The Endress+Hauser group is a global player. Within the group, Endress+Hauser Flowtec AG ranks internationally as one of the leading producers of industrial flowmeters for liquids, gases and steam. As a competence center, we have achieved a top position in global markets for over 35 years. Endress+Hauser Flowtec AG currently employs a workforce of more than 1700 at six production facilities in Reinach (Switzerland), Cernay (France), Greenwood (USA), Aurangabad (India), Suzhou (China) and Itatiba (Brazil).


Reinach, Switzerland


Cernay, France


Greenwood, USA


Aurangabad, India


Suzhou, China


Itatiba, Brazil

Precise filling with state-of-the-art flow measuring technology

Filling and dosing in a cycle of mere seconds with the greatest accuracy possible. More and more operators of filling plants are relying on innovative flowmeters such as Dosimag and Dosimass from Endress+Hauser.

In many industries, filling plants are part of often large and capital-intensive production systems. Here, very diverse products are filled in containers such as bottles, bags or carton packages. The measuring technology used in these plants must meet stringent demands when it comes to reliability, speed, efficiency and cleanability. Filling often occurs round the clock in cycles of mere seconds. High-tech systems can thus handle up to 120 000 containers per hour. Production stoppages due to defective devices or maintenance work must be avoided at all costs.

State-of-the-art flowmeters represent an important core element of today's filling plants as they fulfill the increasing demands of this industry with no exception:

- Fast and precise filling:
  - of the smallest quantities (short-term filling)
  - of beverages with solids (e.g. pieces of fruit)
  - during hot filling (e.g. with orange juice)
- Reliable filling:
  - in the aseptic area (e.g. iced tea)
  - of corrosive fluids (e.g. acids, bases)
  - of carbonated beverages
  - in the Ex area (e.g. alcoholic beverages or disinfectants)
- Flawless traceability (e.g. for the duration of cleaning)
- Fast and efficient control of closing valves

More than ten years ago, Endress+Hauser developed two flowmeters specifically designed for industrial filling applications: Dosimag and Dosimass. These flowmeters have surpassed all common demands with regard to hygiene, cleaning, measuring accuracy and process control. The most diverse fluids can be reliably filled using the tried-and-tested Dosimag and Dosimass, which have been used to equip more than 175 000 measuring points since 1996:

Beverages ▸ page 4
Milk, tea, fruit juice, water, beer, etc.

Liquid foodstuffs ▸ page 8
Yoghurt, cooking oil, ketchup, sauces, purees, etc.

Pharmaceutical products ▸ page 12
Eye drops, cough syrup, nasal spray, etc.

Personal care products ▸ page 16
Shower gel, shampoo, baby oil, skin cream, etc.

Chemical products (household) ▸ page 20
Lubrication oil, paints, solvents, liquid fertilizers, etc.

Beverages

Filling: hot, cold or under pressure

In the beverage industry, millions of bottles, beverage cartons, aluminum cans or bags are filled each day with highly diverse liquids. The required daily output can often only be achieved using enormous filling plants and multiple measuring points. This makes compact flowmeters even more important as they allow for a space-saving and narrow arrangement, particularly in rotary filling systems.

Since the filling process can occur “hot” as well as “cold,” the flow measuring technology being used must meet high demands with regard to robustness and material compatibility. Requirements for the measuring technology itself are equally stringent since, for example, carbonated beverages are filled under pressure or beverages may contain fruit pieces or fibers. Compliance with hygiene regulations is of the upmost importance to ensure the highest possible level of anti-bacteriological safety.

What you can measure (examples):

- water
- milk
- fruit juices
- beer
- liqueur
- wine
- Champagne
- soft drinks
- syrup


28
29
30
31
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Paolo Cavazzini
Technical Director

SIDEL S.p.A.
Parma (Italy)

"International competition in the world where we operate increasingly demands that we find partners who contribute to the success of our products. We are constantly hunting for innovation, quality, safety and sustainability, but it is the technical skills and the passion shown by our partners in the daily challenges that prove to be primary.

The ideal supplier offers a combination of outstanding technology and remarkable customer service. Sidel has found these important values in Endress+Hauser. These values contribute to the success of both companies."

Advantages at a glance

- Excellent measuring stability and repeatability in many different applications:
  – for hot filling
  – for cold filling
  – for fluids containing fruit pieces
  – for non-carbonated or carbonated fluids
- Optimum integration in high-output filling plants (e.g. rotary filling machines) thanks to a compact design
- High level of anti-bacteriological safety due to a design without gaps or dead spaces
- Simple and quick cleaning (SIP or CIP)

Dosimag

Endress+Hauser is your single-source provider for all measuring devices: flow, pressure, temperature, level, registration and analysis
▸ pages 26–27

Liquid foodstuffs

Filling: precisely and without shear forces

In the food industry, one motto stands above all others: absolute cleanliness and hygiene. The materials used for Dosimag and Dosimass fulfil the high requirements for anti-bacteriological safety without ifs and buts. This is achieved in part by a gapless design as well as an FDA-compliant sealing system (Dosimag).

Moreover, the free pipe cross-sectional area without moving parts makes optimum cleaning and a maximum level of product protection possible, e.g. for products with solid components or larger fruit pieces.

What you can measure (examples):

▪ yoghurt ▪ cooking oil ▪ sauces ▪ dairy products ▪ ketchup
▪ mustard ▪ jam ▪ butter ▪ liquid cheese ▪ honey


KST


© Integrated by Dosil

"Dosil – a partner of Synerlink (France) for dosing equipment – has developed a new filling machine integrating Dosimag flowmeters from Endress+Hauser instead of pistons. These fillers are now being used successfully, for example at the biggest yoghurt producer in Algeria.
We are thoroughly convinced of this compact device's measuring accuracy and excellent repeatability. However, the decisive factor for our collaboration with Endress+Hauser has been its competent support during planning, start-up and optimization of our filling machines.
This constructive partnership allowed us to qualify a new high-performance filling system and to further develop our dosing solutions for FFS or FS machines."

Jean-Marc Schneitter
Automation specialist
for filling solutions

DOSIL
Corbeil Essonnes (France)

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▸ pages 26–27

Advantages at a glance

- Two different flow measuring principles that complement each other:
  - Coverage of a multitude of applications
  - Highly flexible system planning
  - Measurement independent of viscosity and density
  - Filling of products in a gentle manner thanks to a lack of shear forces
- Excellent measuring stability and repeatability:
  - for non-conductive and conductive fluids
  - for fluids with a low or high viscosity
- No build-up with oily or greasy fluids thanks to an industry and application-specific design
- High level of anti-bacteriological safety due to a design without gaps or dead spaces
- Simple and quick cleaning (SIP or CIP)


Dosimag


Dosimass

Pharmaceutical products

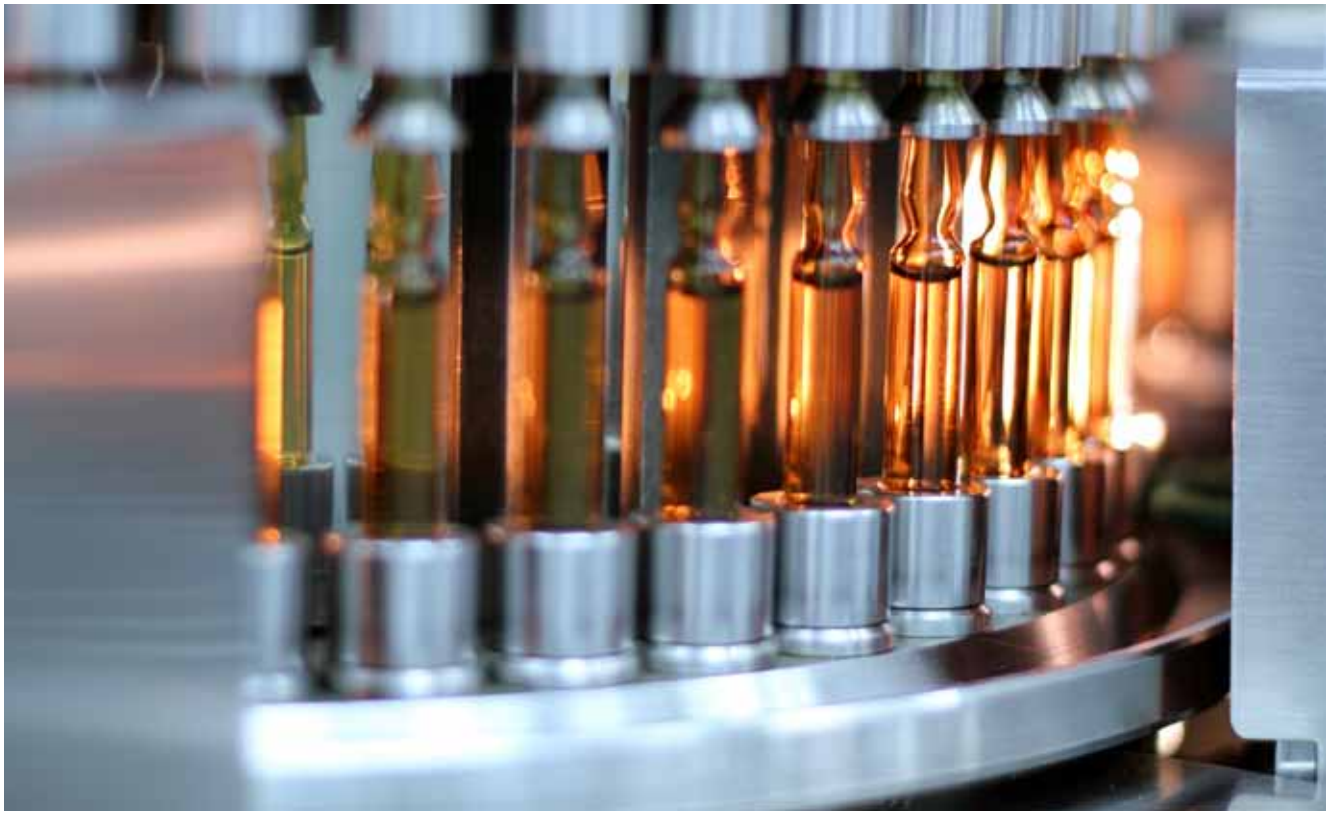
Filling: traceable and sterile

In the pharmaceutical industry, often tiny amounts of expensive active ingredients must be filled with the highest accuracy and repeatability. Moreover, strict regulations for filling in a sterile area must be complied with. All components that come in contact with the medium must therefore be FDA-compliant and meet the stringent demands on surface roughness (R_a max = 0.38 µm). This also means that all product-guiding components must be CIP or SIP cleanable, following batch or product changes.

The requirements regarding traceability are particularly strict, such as the ones of material flow, product quality or the duration of cleaning for a new batch. Since modern flowmeters measure continuously, not only the duration of the cleaning cycle, but also the amount of cleaning agent used, can be verified at any point.

What you can measure (examples):

- eye drops
- disinfectants
- nasal sprays
- ear drops
- cough syrup
- mouthwash



Lijun Huang
Plant Manager
of Pharmaceutical
Equipment Division

SHINVA MEDICAL
INSTRUMENT Co., Ltd.
Pharma-Tech Division
(China)

"Our automated and patented filling line for soft bags is the most powerful plant currently available on the market. Our products have been installed in many famous pharmaceutical factories at home and abroad. Our automated filling line is equipped with an Endress+Hauser filling mass flowmeter.
Shinva and Endress+Hauser have been collaborating for more than 10 years. The Endress+Hauser mass flowmeter is safe, accurate and stable, thus promoting our own product quality and increasing our market share. We are very satisfied that Endress+Hauser in addition in supplying high-quality products, also provides good service in pre-sales and after-sales. Focusing on delivering perfect products and services is a goal common to both Endress+Hauser and Shinva.
It is our utmost wish that, like the products of the two companies, Endress+Hauser and Shinva will collaborate perfectly, support each other, and rise to every occasion together!"

Advantages at a glance

- Two different flow measuring principles that complement each other:
  - Coverage of a multitude of applications
  - Wide size selection range
  - Measurement independent of viscosity and density
- Fulfils the highest demands for cleanability and sterilization thanks to minimum surface roughness
- Guaranteed traceability:
  - of fluid-wetted materials
  - of our accredited calibration facilities
  - of factory and onsite calibrations or verifications
- Globally recognized Ex approvals such as for filling alcohol-based fluids
- Highest possible accuracy even for tiny filling quantities

Dosimass

Promass 83A
DN 1 to 4 ($^{1}/_{24}$ to $^{1}/_{18}$")

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Personal care products

Filling: when every drop counts

Personal care products are filled into a multitude of bags, bottles, ampoules, tubs or glass containers. Whether creams, liquid soaps, nail polish remover or facial toner: these products come in a variety of different consistencies and contain highly diverse ingredients. This means stringent demands for the flow measuring technology used in such filling plants. The user expects the highest possible level of filling accuracy and repeatability – even for products with high air bubble content such as shower gels.

Accuracy is also a decisive factor when filling very small amounts in order to prevent unwanted product losses in the long term – especially when expensive active ingredients are involved. Ex protection becomes important for cosmetic products containing solvents or alcohol-based substances.

What you can measure (examples):

- shampoo
- shower gel
- hair tonic
- dyes
- deodorants
- sunscreens
- liquid soap
- baby oil
- body lotions

"A winning team should not be changed. Packaging machines delivered worldwide by RONCHI MARIO S.p.A. perform with the highest reliability, accuracy, hygiene and safety. In the early '90s, a long and profitable relationship began with Endress+Hauser, international leader in the production of sophisticated measuring devices equipped with the latest technology.

It is precisely because we have incorporated flowmeters from Endress+Hauser into our machines that RONCHI MARIO has taken the final step to becoming a leader in the packaging industry.

Our collaboration with Endress+Hauser has been anything but an impersonal and detached business relationship. We still continue to face challenges together, exchange ideas and communicate openly, constantly looking for advanced solutions, ready to answer the increasing demands of today's market."

Cesare Ronchi
Managing Director

RONCHI MARIO S.p.A.
Milan (Italy)

Advantages at a glance

- Two different flow measuring principles that complement each other:
  - Coverage of a multitude of applications
  - Highly flexible system planning
  - Measurement independent of viscosity and density
  - Filling of products in a gentle manner thanks to a lack of shear forces
- Excellent measuring stability and repeatability even during extreme conditions, e.g. filling fluids with air pockets
- No buildup with oily or greasy fluids thanks to an industry and application-specific design
- High level of measuring accuracy even for very short filling times

Dosimag

Dosimass

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Household chemicals

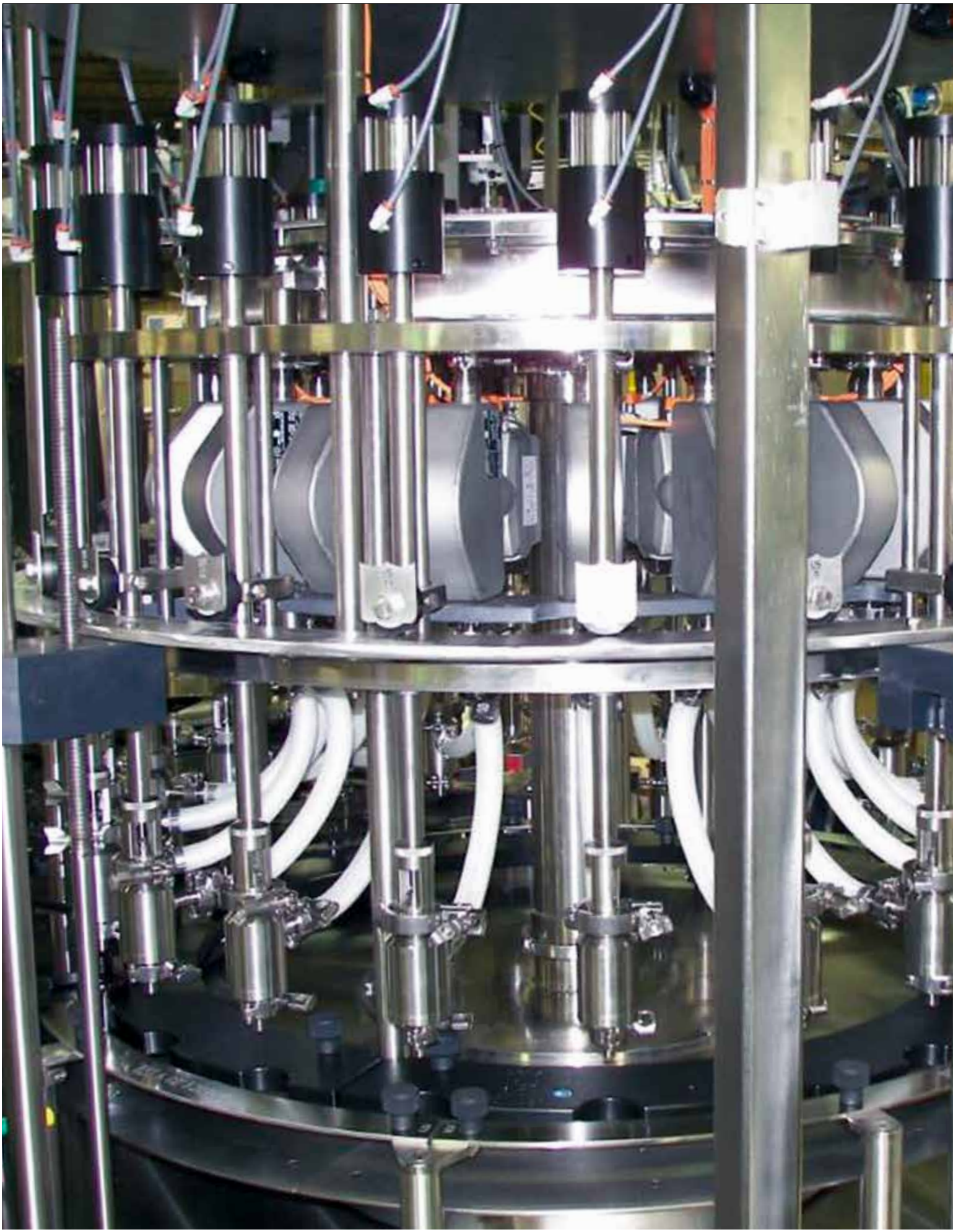
Filling: with the highest level of process safety

Chemicals used in household or recreational products generally have highly diverse characteristics. They can have high or low viscosity and be chemically extremely aggressive. Additionally, certain chemicals can develop flammable vapors which may only be filled in an Ex protected area. Therefore, safety is top priority in these cases.

Whether solvents, acids or alcohol-based cleaning products: Dosimag and Dosimass are made from highly resistant materials and can be used at any point in an Ex zone 2.

What you can measure (examples):

▪ paints ▪ cleaning products ▪ disinfectants ▪ lubrication oils ▪ engine oils ▪ liquid fertilizers ▪ care products ▪ dishwasher detergents ▪ floor cleaners ▪ glue ▪ de-icing sprays



"Over the years, the liquid bottling industry has moved from mechanical fillers and weigh-scale fillers using load cell technology to flowmeter-based fillers.

To meet the demand for new and upgraded liquid filling machines, US BOTTLERS uses electromagnetic and Coriolis flowmeters from Endress+Hauser on all its filling machines. These families of flowmeters were selected after significant research and rigorous comparison with competitive products on a variety of attributes.

The accuracy of flowmeters currently in use is better than any previous sensor technology for liquid filling, making our machines among the most accurate on the market.

Every one of our fillers equipped with Endress+Hauser's flowmeters not only meets all of our quoted accuracy guarantees, but is as good as any filler we've produced in the history of our company. And – probably more important – many customers that have purchased a flowmeter-based filler have come back for repeat orders since improved liquid measurement is a large part of overall customer satisfaction."

Tom Risser
President & CEO

US BOTTLERS
Charlotte, N.C.
(USA)

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▸ pages 26–27

Advantages at a glance

- Two different flow measuring principles that complement each other:
  – Coverage of a multitude of applications, particularly for oil or alcohol-based fluids
  – Flexible system planning
- High resistance since fluid-wetted parts are made of acid and alkali-resistant materials
- Globally recognized Ex approvals, e.g. for filling solvents
- High measuring accuracy even for filling non-conductive fluids such as alcohol

Dosimag

Dosimass

Seamless system integration

Dosimag and Dosimass fit everywhere

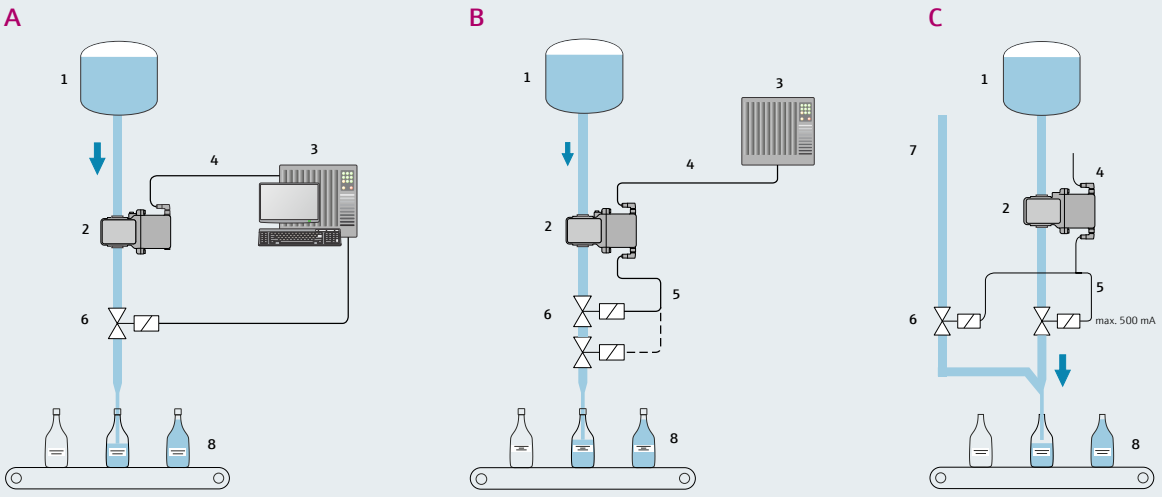
Whether in large or small-scale plants: Dosimag and Dosimass provide different possibilities for optimum integration in existing control systems (PLCs) of filling plants. With the newly integrated Batching Function, closing valves can be controlled directly – that is without a detour through the control system. This allows to achieve the shortest possible filling cycles at the highest possible repeatability.

Batch control via PLC (A)

- The flowmeter supplies impulses proportional to the quantity
- Plant control system (PLC):
  - processes the delivered impulses
  - controls the filling process or closing valve
  - compensates for the after-run quantity
  - determines the desired filling quantity
- Closing valve: is controlled by the PLC

Batch control via flowmeter (B, C)

- Flowmeter:
  - features an integrated batching function
  - directly controls the closing valve
  - simultaneous control of two valves possible, e.g. for two-stage filling processes (B) or for controlling the air supply (C) during purging of the measuring tube
- Plant control system (PLC):
  - transmits the amount to be filled to the flowmeter
  - controls the entire filling plant
  - releases the filling process
  - determines filling parameters (e.g. target quantity)
  - communicates with the flowmeter via the Modbus RS485



1 Supply container, 2 Flowmeter (Dosimag, Dosimass), 3 Plant control system (PLC), 4 Modbus connection with the PLC, 5 Connection cable (Batching output), 6 Closing valve (max. 500 mA), 7 Air supply, 8 Container

Single-source dosing solutions

Are you planning a new filling plant or do you want to modernize an existing system? Endress+Hauser supports you with customized software solutions, components and measuring devices.

FieldCare/DeviceCare – operation made easy
Dosimag and Dosimass can be delivered pre-configured based on your process conditions. If you nonetheless want to parametrize your device on-site, e.g. for start-up or more complex measuring tasks, you can, as always, count on the tried-and-tested FieldCare service and configuration program from Endress+Hauser. FieldCare offers extensive possibilities for supporting your measuring points.

Everything from a single source

The right products for your filling plant

All measuring devices presented here for pressure, temperature, level or conductivity come with a 3A approval or have been EHEDG tested. These stainless-steel measuring devices have been tried and tested in the food and beverage industry for years.

Our measurement technology (examples from the Endress+Hauser portfolio)

Pressure

The process-optimized Cerabar pressure transmitters feature a certified hygienic design, small, flush-mounted process connections and can safely be used in condensing applications.
The compact Cerabar T with a metallic measuring membrane as well as the Cerabar M with an oil-free, condensate-proof ceramic measuring cell are only two exemplary devices that ensure highest possible process flexibility, accuracy and safety.

- High level of plant availability thanks to an integrated fracture detection of the ceramic membrane
- High reproducibility and long-term stability
- SIP and CIP cleanable

Cerabar T
PMP135

Cerabar M
PMC51

Temperature

The iTHERM TM411 and Easytemp TMR35 resistance thermometers fulfil all requirements of modern filling plants. The exceptionally fast response times make it possible to control your filling process precisely, safely and profitably:

- For containers and pipes
- −50 to +200 °C (−58 to +392 °F)
- Available with various process connections
- Max. 10 to 50 bars (145 to 725 psi) depending on the connection and insertion length

iTHERM
TM411

Easytemp
TMR35

Point level switches

Liquiphant FTL31 and FTL33 are limit switches that can be used universally for all liquids even in cases of build-up, turbulences or air bubbles. Measurement is independent of the electrical characteristics fluid's.

- For measurement in storage tanks, vessels with agitator and pipes
- −40 to +150 °C (−40 to +302 °F)
- SIP and CIP cleanable (FTL33)
- For process pressures up to 40 bars
- Compact design for installation in difficult to reach or narrow spaces
- IP69K degree of protection (FTL33)

FTL31

FTL33

Level measuring devices

With Liquicap M and Prosonic S, you can continuously measure the level of all liquids even in case of build-up formation. Thanks to their compact design, both devices are suitable for use in small containers:

Liquicap M:

- FDA-listed, corrosion-resistant materials
- −80 to +200 °C (−112 to +392 °F)

Prosonic S:

- Suitable for pastes and bulk solids
- Reduced build-up formation thanks to the self-cleaning effect of the sensors

Liquicap M

Prosonic S

Data management

The Memograph M RSG45 Advanced Data Manager is a powerful system for reliable acquisition, recording and archiving of analog, digital and HART input signals as well as calculated values. Memograph M supports all conventional fieldbuses for seamless system integration.

- Free selection of various display types and process images
- HART inputs for using all HART values of the sensors
- Integrated web server for fast device configuration and display of measured value
- Various software packages:
  - For simultaneous management of up to four batches
  - For calculating mass and energy flows
  - For remote alarm messages via e-mail or text

Memograph M
RSG45

Process display units

Using the RIA15 process display unit – featuring two-wire technology (4–20 mA or HART) – allows you to read off and check process-critical measuring values directly on site especially when it comes to devices that are difficult to read due to their installation location:

- For panel installation or installation in the field (field housing)
- Alternating display of up to 4 measured values (with HART)
- Quick process overview thanks to a bar graph display
- Background lighting for use in dark environments
- No external power supply necessary

Process display unit
RIA15

Conductivity (analysis)

The Condumax CLS16D and Indumax CLS54D conductivity sensors meet all requirements of a modern filling plant thanks to their certified, hygienic design. Their Memosens technology ensures easy handling and the greatest process safety:

- CIP and SIP cleanable
- Available with various hygienic process connections
- Recording of sensor-specific data for easy traceability and preventive maintenance
- Simple connection to the Liquiline multi-channel transmitter via “plug & play”

Condumax
CLS16D

Indumax
CLS54D

Liquiline
(display)

Technical data

Dosimag (electromagnetic flowmeter)	
Measured variable	Volume flow (independent of density, pressure, temperature and viscosity)
Diameter	DN 4 (5/32"), 8 (5/16"), 12 (½"), 15 (½") DN 25 (1")
Filling time (recommended)	≥ 0.5 s
Filling quantity (recommended)	≥ 10 ml (0.33 US oz) with DN 4 (5/32")
Repeatability	Filling time ≥ 1.5 s: σ ≤ 0.4% Filling time ≥ 3.0 s: σ ≤ 0.2% Filling time ≥ 5.0 s: σ ≤ 0.1%
Accuracy	±0.25% o.r. for v = 1 to 4 m/s
Ambient temperature	–20 to +60 °C (–4 to +140 °F)
Process temperature	–20 to +130 °C (–4 to +266 °F)
Cleaning temperature (CIP/SIP)	+150 °C (+302 °F) for 60 min

Dosimass (Coriolis flowmeter)	
Measured variable	Direct mass flow measurement (independent of electrical conductivity, density, pressure, temperature and viscosity)
Diameter	DN 8 (3/8"), 15 (½"), 25 (1")
Filling time (recommended)	≥ 0.25 s
Filling quantity (recommended)	≥ 20 g (0.7 US oz) with DN 8 (3/8")
Repeatability	Filling time ≥ 0.75 s: σ ≤ 0.2% Filling time ≥ 1.5 s: σ ≤ 0.1% Filling time ≥ 3.0 s: σ ≤ 0.05%
Accuracy	±0.15% o.r. to v = 1 to 4 m/s
Ambient temperature	–20 to +60 °C (–4 to +140 °F)
Process temperature	–20 to +125 °C (–4 to +257 °F)
Cleaning temperature (CIP/SIP)	+150 °C (+302 °F) for 60 min

Subject to modification

Dosimag and Dosimass – Your advantages

- Compact, space-saving design
- Optimal integration within existing systems:
  - Various process connections
  - Integrated batching function for controlling valves directly
- Precise filling of smallest quantities
- Shortest possible filling cycles with high repeatability
- SIP and CIP cleanable up to +150 °C (+302 °F)
- 3A approvals
- EHEDG-tested (Dosimag)
- Self-emptying measuring tubes (free cross-section)
- Maintenance-free, no moving parts
- Self-monitoring and diagnostics function

Save big with Dosimag and Dosimass

An example:
A company in the cosmetics industry has installed a new bottling system with state-of-art flow metering technology and has succeeded in saving 2 grams of a certain product per filled bottle. The system can fill 180 bottles a minute. Assuming an average of 16 working hours per day, a five-day week and fortyfive working weeks a year, this adds up to annual savings of 77 760 kilograms.
If, say, the quantity per bottle were 250 grams these product savings would suffice to fill an additional 311 040 bottles, which would then be available in the main-street stores!

www.addresses.endress.com

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