

» precise **pumps** – smart **solutions**«

micro annular gear pumps



HNP Mikrosysteme

Company



HNP Mikrosysteme was founded in 1998. Today, about 90 employees work at our location in Northern Germany. Here, micro annular gear pumps and dosing systems are created from the idea to design and assembly to final testing and validation. Our products are used worldwide.

We take responsibility for our region, society and the environment and are committed to the further training of young engineers. With our pumps, we make applications more effective and enable our customers' innovations.

Products



We manufacture micro annular gear pumps (mzr®-pumps) for dosing and metering small quantities of liquids. With five series and several sizes of mzr®-pumps, dosing volumes starting at 0.25 µl, flow rates ranging from 1 µl/h to 1.1 l/min as well as pressures from 0 to max. 150 bar can be realized. The range of the liquid viscosity extends from 0.3 to 1,000,000 mPas. Operation in an explosion-proof area is also possible.

Furthermore, we offer customized dosing systems, our own filter series as well as the development of OEM pumps. We are, of course, available for any question during the integration, commissioning and the running process. We offer technical service as well as training. Our specialized sales team will advise you comprehensively, individually and with your application in mind.

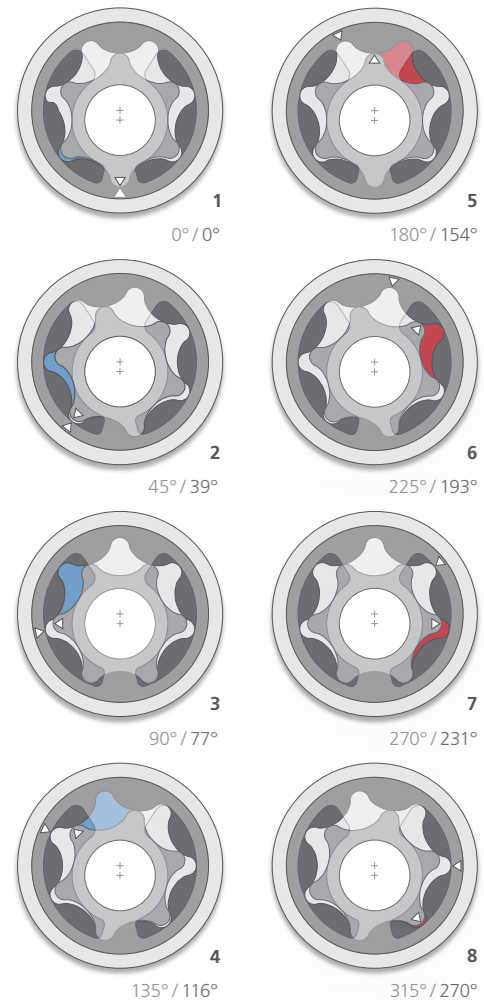
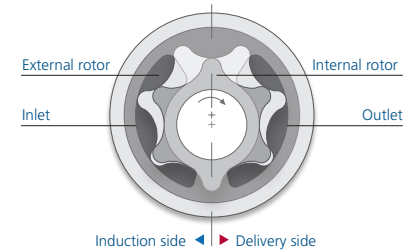
Advantages

- precise dosing
- long service life due to tungsten carbide and ceramic components
- corrosion-resistant materials
- self-priming
- dosing, metering and rinsing
- low dead volume
- compact structure
- low weight
- low pulsation
- low shear stress
- wide dynamic range
- forward and reverse operation

Technology

Micro annular gear pumps are miniaturized rotary positive displacement pumps. They are based on a so-called micro annular gear principle with an externally toothed internal rotor and an internally toothed external rotor. The internal rotor has one tooth less. The resulting chambers have a fixed displacement volume. Tooth ratios of 6/7 and 10/11 are used.

The inner rotor is driven by the shaft. The outer rotor is moved by the inner rotor. The volume of the pumping chambers increases on the induction side and simultaneously decreases on the delivery side of the pump. A kidney-shaped inlet or outlet opening connects several pumping chambers. This results in a homogeneous and low-pulsation flow rate.



Internal rotor / External rotor

Applications



- Analytical instrumentation
- Diagnostics
- Cell analysis
- Chromatography
- Biochip technology
- Mass spectrometry
- Biotechnology
- In-vitro diagnostics
- Microencapsulation



Life Science

- Fine chemistry
- Pharmaceutical production
- Vaccine production
- Polymer chemistry
- Basic chemistry
- Agrochemical industry
- Petro chemistry
- Food
- Cosmetics
- Metering of liquid gases



Chemistry

- Packaging and filling
- Automotive industry
- Tobacco industry
- Mechanical engineering for medical products
- Liquid color dosing
- Pharmaceutical plant engineering
- Coating
- Additivation
- Polymer handling electrospinning
- Battery production
- Dosing technology
- LOHC metering



Mechanical Engineering

Pump Series

High performance pump series



The high performance pump series is well suited for **challenging dosing tasks** requiring high precision, a middle pressure range, high temperatures and viscosities ranging from 0.3 to 1,000,000 mPas. The pump has a double-sided bearing system and is driven by a powerful DC-servo motor with integrated controller. With a large choice of additional modules such as the fluidic seal module, heating module, heat insulation module or gear modules, the high performance pumps are especially recommended for mechanical and plant engineering. Depending on the pump size, standardized connectors 1/4"-28 UNF, 1/8" NPT or 3/8" NPT are offered.

Hermetic inert pump series



The hermetic and chemically inert series is almost **universally suitable for aggressive liquids** and therefore an innovation in pumping technology. Rotors and functional elements made from nickel-based tungsten carbide or ceramics like zirconia and alumina lend the pumps high chemical resistance and outstanding wear-resistance. With shaft and bearing material of silicon carbide (SiC) and the housing components of alloy C22 (2.4602), the pumps can be used with demanding oxidizing and reducing liquids, acids, bases and solvents. The pumps are designed hermetically and driven by a torsion-proof NdFeB magnetic coupling.

Ex-versions



The high performance series pumps as well as the hermetic inert series pumps can be equipped with drives which have Ex-approval for **use in areas with potential explosion risk** or UL/CSA certification. The approval of the pumps is in compliance with ATEX according to the EU Directive 2014/34/EU.

Low pressure pump series



The pumps of the low pressure pump series are used in analytical instrumentation for precise dosage tasks **at low pressures and for low viscosities**. They are particularly suited for lowest volumes of non-lubricating liquids. Using DC mini motors, the pumps have small dimensions and low power consumption so that they can be easily integrated into OEM applications. The pumps are suitable for metering and dosing de-ionized water, watery solutions, solvents as well as low-viscosity oils and lubricants.

Modular pump series



The modular micro annular gear pumps are suitable for use with **light corrosive liquids**. When equipped with oxide ceramic bearing components, the pump bodies as well as the rotors can be combined from different materials dependent on the liquid to be conveyed. The rotors are available in a zirconia based ceramic and, alternately in nickel-based tungsten carbide. Alloy C22, stainless steel 316 L, aluminium and PEEK™ form the different options for the wetted pump housing. The pump covers applications from analytical instrumentation to chemistry.

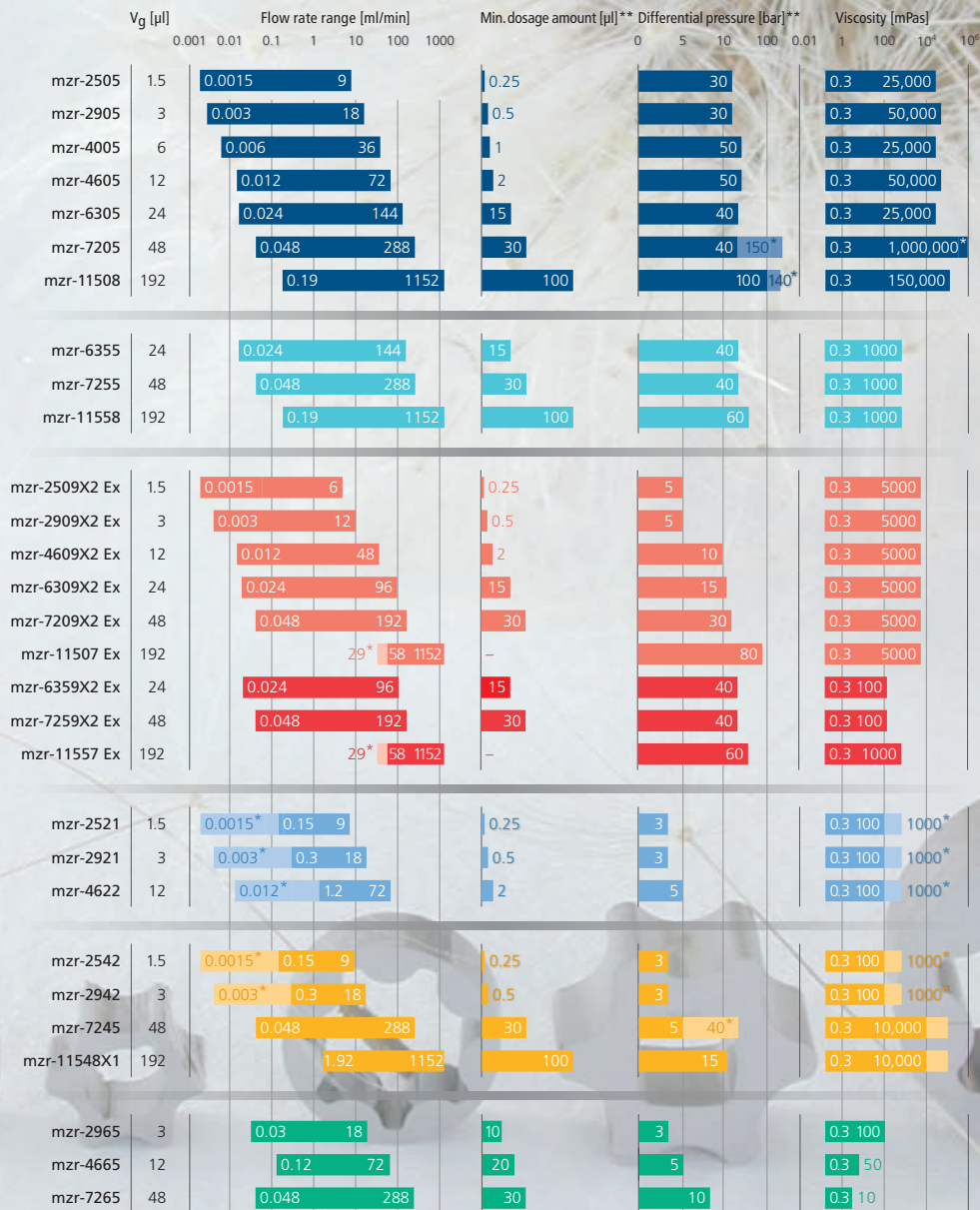
Magnetic hermetic pump series



The pumps of the magnetic hermetic series are qualified to **handle crystallizing, air or moisture-sensitive liquids** because the pump has no shaft seal. This feature is made possible thanks to a liquid-separating cup surrounding the magnetic drive. The compact dimension of the pump is realized using a completely new product design and optimal coordination with an integrated motion controller. The pump can be used in all areas where leak-free operation and long service life as well as low energy consumption are important requirements.

Technical Data

Technical Data



V_g = Displacement volume

* with additional equipment such as high-resolution encoder, gear box, special drive

** depending on liquid and viscosity

Even if single parameters are within the indicated performance range of technical data, certain parameter combinations may not be achievable. Single parameters may exceed their indicated performance range under adequate circumstances. For detailed evaluation please contact HNP Mikrosysteme. Actual performance may vary. Specifications are subject to change without notice.

Filterserie F-MI



[F-MI0]

- Leervolumen: 0,3 ml
- Filterfläche: 1,3 cm²
- Anschlüsse**: 1/4"-28 UNF



[F-MI1]

- Leervolumen*: 7,5 - 11 ml
- Filterfläche: 9,5 cm²
- Anschlüsse**: 1/8" NPT



[F-MI2]

- Leervolumen*: 20 - 30 ml
- Filterfläche*: 61 - 72 cm²
- Anschlüsse**: 1/8" NPT



[F-MI3]

- Leervolumen*: 65 - 84 ml
- Filterfläche*: 135 - 150 cm²
- Anschlüsse**: 3/8" NPT



[F-MI4]

- Leervolumen: 195 ml
- Filterfläche*: 407 - 450 cm²
- Anschlüsse**: G 1/2"

* abhängig von Bauform, Größe und Ausstattung
 ** weitere Anschlusstypen auf Anfrage

Filterserie F-MI

Flüssigkeiten und Gase effizient filtern

Die **Filterserie F-MI von HNP Mikrosysteme** kommt in einer Vielzahl von Anwendungen im Bereich Life Science, Maschinenbau, Chemie, Pharma und Food zum Einsatz.

Die Verwendung von Filtern ist in der Mikrofluidik eine Frage der Reinheit bzw. der Partikelgrößenbegrenzung in den eingesetzten Medien. Oft geht es um Prozesse auf molekularer Ebene, die keine Verunreinigungen tolerieren. Filter halten Fremdpartikel, Fasern und im größten Fall Späne von den nachgeschalteten Geräten und mikrofluidischen Strukturen fern.

Die **Filterserie F-MI0 bis F-MI4** beinhaltet drei verschiedene Bauformen in fünf Baugrößen. Es gibt eine breite Auswahl an medienbeständigen und zertifizierten Werkstoffen. Filterfeinheiten von 3, 10, 25, 40, 50 und 100 µm sind verfügbar. Unsere Experten beraten Sie gern zur richtigen Auswahl eines Filters aus dieser Variantenvielfalt, entsprechend der Eigenschaften und Anforderungen Ihres Prozesses.

Funktion

- garantiert Reinheit im Produktionsprozess
- schützt das Endprodukt vor Kontamination
- schützt die sensible Peripherie vor Partikeln
- sichert die Funktionsfähigkeit der Anlage

Materialien

- korrosionsbeständige Werkstoffe Edelstahl 316L oder Alloy C22
- medienbeständige und zertifizierte Dichtungswerkstoffe FKM, FFKM oder EPDM

Vorteile im Überblick

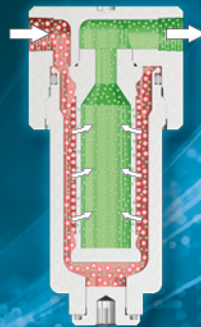
- hohe Filterleistung im Verhältnis zum Leervolumen aufgrund großer Filterfläche
- leistungsfähige Filterelemente für geringe Druckverluste auch bei höheren Volumenströmen und Viskositäten
- Variantenvielfalt durch verschiedene Gehäuseformen (T-Filter, gerade Filter, Ansaugfilter) und Gehäusewerkstoffe, Filterfeinheiten und Dichtungswerkstoffe
- rein metallische Filterelemente
- geeignet für Lebensmittel- und pharmazeutische Industrie: FDA-konforme Dichtungswerkstoffe, Oberflächenrauheit ≤ Ra 0,8 und auf Wunsch Hygieneverschraubungen
- benutzerfreundlich und wirtschaftlich: Filterelemente können gereinigt und getauscht werden
- optional integrierbare Filterüberwachung und elektrische Heizelemente
- fachgerechte Beratung und Auslegung durch unsere Experten



Filteraufbau Beispiel F-MI2-T



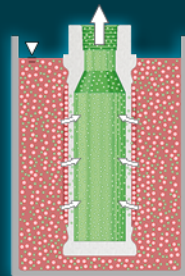
Funktionsprinzip der Bauformen



T-Filter



gerader Filter



Ansaugfilter

Filterzubehör

Filterüberwachung

Beim Einsatz eines Filters in einem Pumpensystem wird dieser möglichst unmittelbar vor der Pumpe angeordnet. Die Filterüberwachung erfolgt mit Hilfe eines Saugdrucksensors. Der gemessene Druck zeigt den Druckverlust der gesamten Saugleitung vor der Pumpe und erlaubt Rückschlüsse auf den Zustand des Filterelements. Wartung und Reinigung können bedarfsorientiert durchgeführt und unnötige Stillstandszeiten vermieden werden. Eine sichere Medienversorgung wird gewährleistet.

Neben einfachen Drucksensoren mit Analogausgang sind Druckschalter mit Digitalanzeige, LED-Anzeigen oder konfigurierbaren Ausgangssignalen verfügbar. Druckschalter geben Rückmeldung, wenn eine definierte Druckschwelle erreicht ist. Sie sind mittels IO-Link-Schnittstelle anwendungsspezifisch konfigurierbar.



Elektrische Zusatzheizung

Für die größeren Filter ist ein elektrisches Heizmodul verfügbar. Bestehend aus einer Heizmanschette und einem Thermoelement verhindert es den Abfall der Medientemperatur und sorgt somit für einen stabilen Produktionsprozess.



Filterserie F-MI0 - F-MI4

Leervolumen:	0,3 ... 195 ml
Filterfeinheiten:	3 ... 100 µm
Max. Systemdruck:	140 ... 200 bar
Max. Differenzdruck:	5 ... 20 bar
Medientemperatur:	-200 ... +275 °C
Höhe:	21,5 ... 174 mm
Gewicht:	2 ... 3.100 g
Durchmesser:	6,5 ... 80 mm

System Solutions

Drive Technology

We supply our pumps with regulated precision motors and pay attention to a compact design. Depending on requirements with regard to discrete or continuous dosing as well as the required performance, other drive options such as stepper motors or three phase AC motors are available.

Controller

The range includes controller modules, such as cabinet control units as well as controllers with a graphical user interface. The graphical user interface facilitates handling by direct input of dosing quantity and speed as well as dosing duration and number of repetitions. For continuous feeding, the volume flow and duration are set. Further functions are, for example, the restart procedure and a graphical data analysis.

The mizr-Touch Control is designed for a single pump application. For the control of a larger number of pumps, the Display Control is the right choice.

Two programs provide support to operate the pumps. Our own control program mizr®-pump controller is available for laboratory and test operations. Alternatively, using the software »Motion Manager« which runs under Microsoft Windows®, all drive parameters can be set and saved.

Supplementary Modules

Depending on pump series, there are supplementary modules which increase the application range of the pumps. For metering air and moisture-sensitive liquids as well as for vacuum applications, a fluidic seal module is available. With the use of a heat insulation module, cold and hot liquids of -20 up to 200° Celsius may be delivered. Active heating of the pump head to maintain the liquid temperature is made possible using the heating module.

Dosing Systems

We designed compact dosing systems for a variety of applications. The Modular Dosing System MoDoS® is a tailor-made pump system for continuous production processes in fine chemistry. The Micro Dispense Module µDispense® is used for a process-safe liquid handling in analytical instrumentation. LiquiDoS® is a very compact and versatile dosing system for analysis, research and development. The flexible smartDoS® dosing and filling system is primarily used in mechanical engineering and the cosmetics sector.

The heart of each dosing system is a self-priming micro annular gear pump. Other possible components include flow meters and controllers, pressure sensors, controls, filters, valves, shut-off elements, screw-in fittings, adapters, hoses, pipes, dosing needles, cabinets, reservoirs and more.

All systems are delivered ready-to-use and are configured according to customer specifications. You can rely on our many years of experience in the selection and configuration of components.

Our sales team, consists of chemists, physicists, biochemists, electrical and mechanical engineers, will provide you with comprehensive advice. We offer metering and dosing tests as well as on-site support during commissioning.



You can find all videos on our YouTube channel.



Dosing Systems



The Micro Dispense Module **μDispense®** is used for process-safe liquid handling in analytical devices. The size corresponds to half the syringe pump format. Due to interface compatibility, existing syringe pumps can be replaced by **μDispense®**.



Advantages

- continuous and reversible flow rate
- high flow rates during rinsing
- modular design
- low noise level
- long service life
- low pulsation

Applications

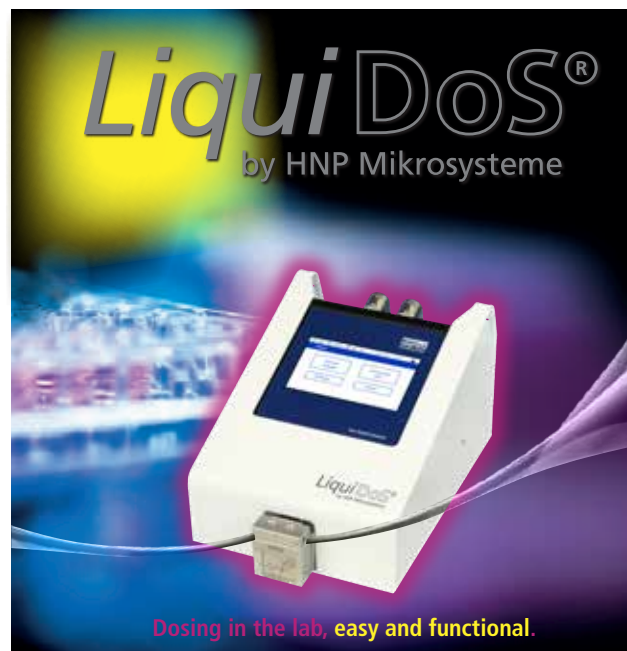
- Analytical instrumentation
- Biotechnology
- Laboratory automation
- Flow cytometry
- Chromatography
- In-vitro diagnostics

Typical liquids

- Organic and inorganic solvents
- Water solutions
- Buffer solutions
- Nutrient media

Components

- Micro annular gear pump
- Filter and valve
- Mounting block
- Flow sensor
- Cabinet



LiquiDoS® is the comfortable and versatile dosing system for analysis, research and development. The graphical user interface allows easy programming, reproducible results and a fast change between manual and automated dosing tasks.



Advantages

- gentle and bubble-free delivery
- reproducible dosing results
- fast media change
- effective use of reagents
- operation via touch display

Applications

- Research and development
- Analytical instrumentation
- Microreaction technology
- Diagnostics
- Laboratory automation

Typical liquids

- Organic and inorganic solvents
- Water solutions
- Low viscosity oils
- Buffer solutions
- Nutrient media

Components

- Micro annular gear pump
- Filter and valve
- Mounting block
- Control system
mzr-Touch Control
- Component carrier

Dosing Systems



smartDoS® is a flexible dosing and filling system for industrial production. It is suitable for the ergonomic design of manual workstations for small batches and pilot series; on the other hand, it can be integrated mechanically and in terms of control technology and is suitable for automated production processes.



Advantages

- variable dosing dynamic
- wide viscosity range
- gentle, bubble-free dosing
- cost and time saving
- easy emptying and rinsing
- signal exchange with PLC

Applications

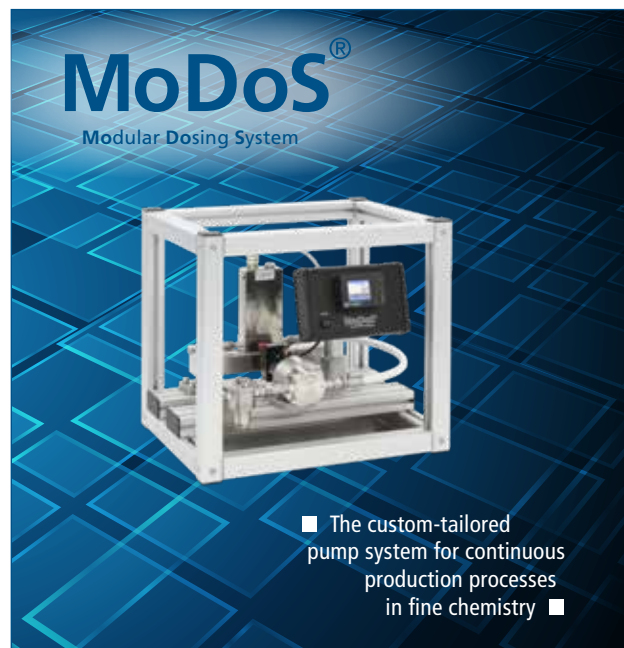
- Dosing in cosmetics
- Filling in the pharmaceutical sector
- Ink and color dosing
- Bubble-free filling of oil dampers
- Microencapsulation

Typical liquids

- Oils, greases, silicones, waxes
- Adhesives, coatings
- Colorants, flavors
- Gels, pastes, emulsions
- Additives in Food & Pharma

Components

- Micro annular gear pump
- Filter
- Reservoir
- m3r-Touch Control
- Hand or foot switch
- Shut-off element
- Dosing needle



MoDoS® is synonym for a design concept, forming the base for the development of a customized pump module. We provide detailed advice on the selection and integration of components. You will receive a tested and ready-to-use dosing system. The selection of sensors is based on the process parameters. We use different flow sensors, based on various thermal principles or on the Coriolis principle.

Advantages

- high process stability
- chemically resistant materials
- media change for flexible use
- stand-alone operation or integration into process control system
- open design with easy access to components
- customized configuration

Applications

- Flow chemistry
- Fine chemistry
- Pharmaceutical production
- Miniplant technology
- Dosing and filling

Typical Liquids

- Acids and bases
- Organometallic compounds, butyl lithium
- Catalysts, Organic reagents
- Ammonia, pure or in solution
- API and vaccines
- Solutions of radioactive isotopes

Components

- Micro annular gear pump
- Sensors for flow, pressure, temperature
- Display Control
- Filter, valves
- Frames, hoses, pipes, fittings

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