IMI
Precision Engineering

Engineering
GREAT Solutions

Life Science

Precision fluidic and motion control for the Life Science

IMI NORGREN
IMI BUSCHJOST
IMI FAS

Contents

Engineering GREAT solutions through people, products, innovation and service

IMI Precision Engineering is a world-leader in fluid and motion control. Building close, collaborative relationships with our customers, we gain a deep understanding of their engineering needs and then mobilise our resources and expertise to deliver distinctive products and solutions.

Wherever precision, speed and engineering reliability are essential, our global footprint, problem-solving capability and portfolio of high performance products enables us to deliver GREAT solutions which help customers tackle the world's most demanding engineering challenges.

> **Reliability**
We deliver and support our high quality products through our global service network.

> **High performance products**
Calling on a world-class portfolio of fluid and motion control products including IMI Norgren, IMI Buschjost, IMI FAS, IMI Herion and IMI Maxseal. We can supply these singly, or combined in powerful customised solutions to improve performance and productivity.

> **Partnership & Problem Solving**
We get closer to our customers to understand their exact challenges.

Expertise in the Life Science sector

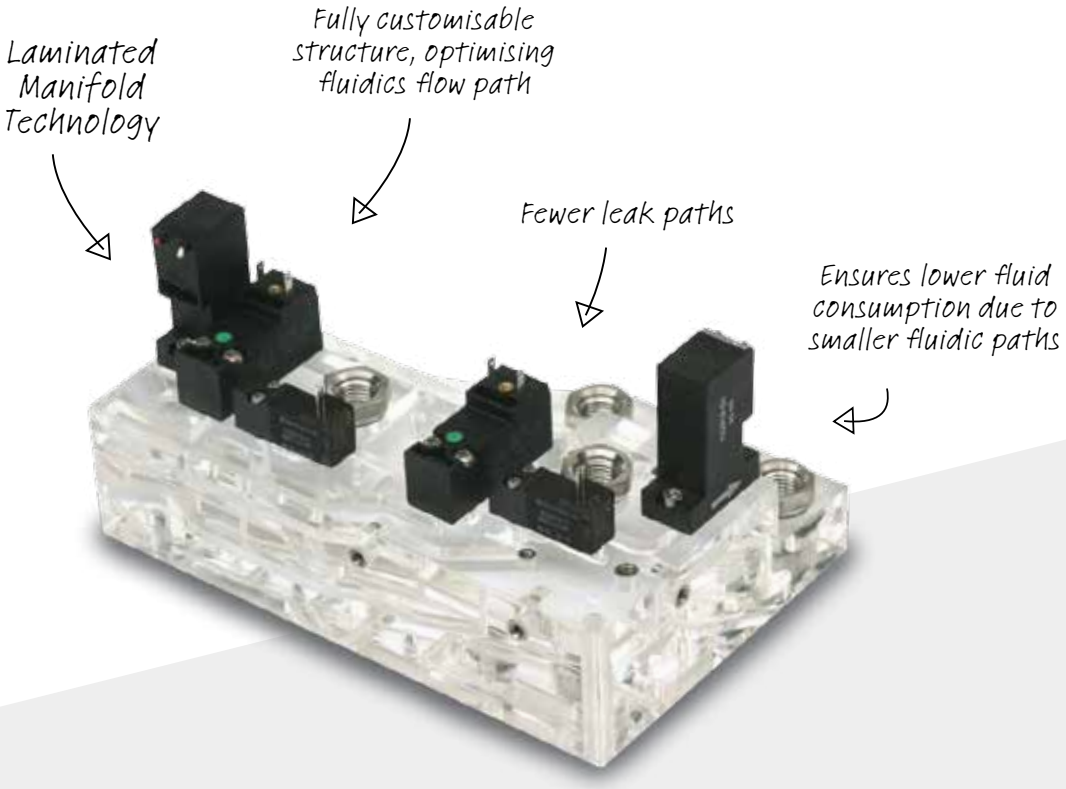
With over thirty years' experience in the life science sector, IMI Precision Engineering is one of the most recognised names in the custom design and manufacture of precision fluidic and motion control components and assemblies for the OEM instrument manufacturer. We are well used to designing for the precise control, repeatability and safety needs of the industry.

Our market-driven product portfolio, designed to meet the demanding performance requirements in medical devices, diagnostic and analytical instrumentation applications, features niche or platform products and technologies, supported by regular new product launches. Renowned in the industry are IMI Precision Engineering's brands, IMI FAS and IMI Norgren, specialising in miniature solenoid valve technology, microfluidics, precision liquid handling solutions and analytical instrument solutions respectively.

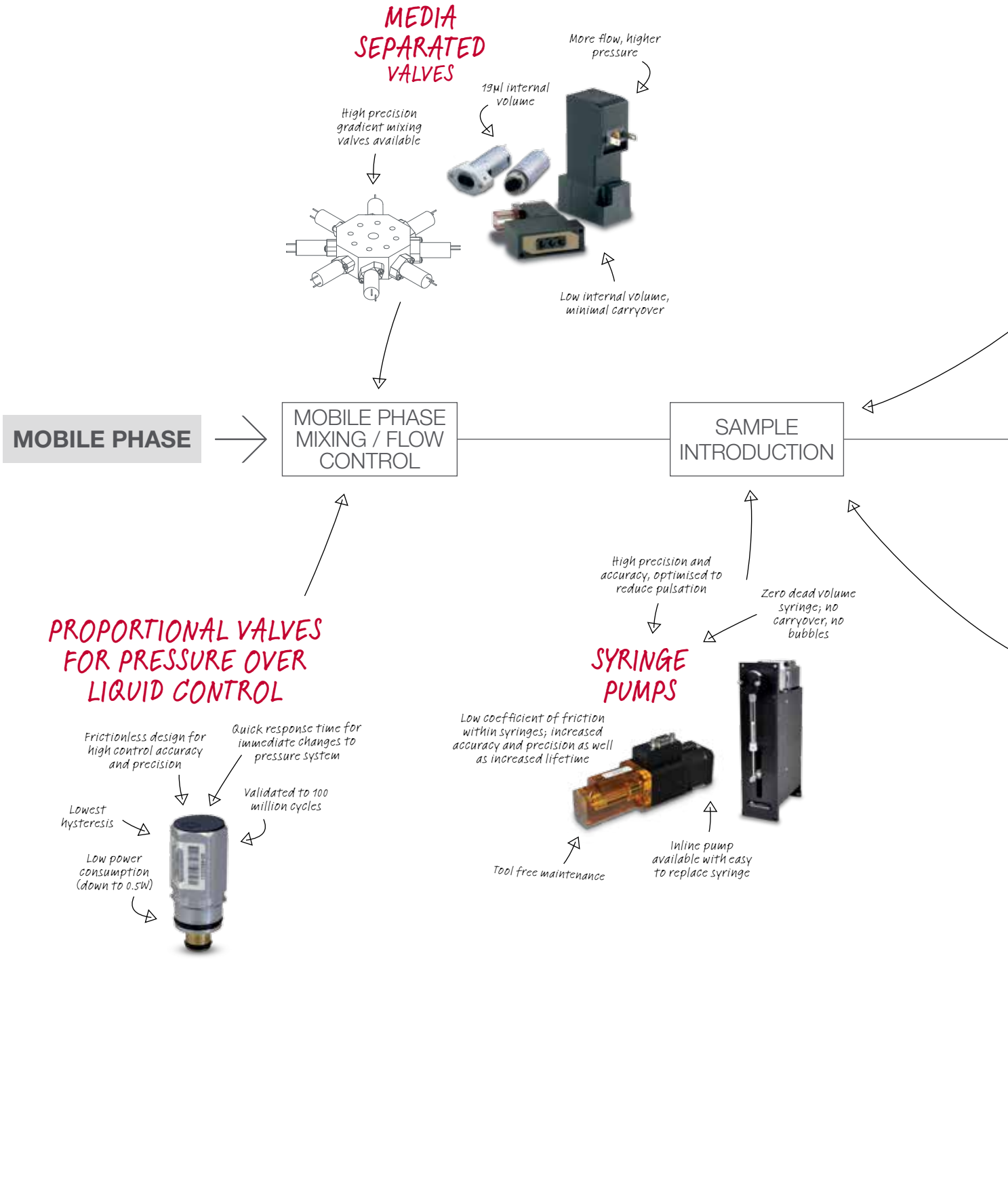
IMI Precision Engineering, Engineers GREAT Solutions, by reducing the size of OEM devices while enhancing accuracy, throughput and fluid control performance. Our components are designed for optimal 'size to performance' ratio with smaller footprints, higher repeatability and lower operating power.

Our understanding of the market trends, engineering challenges and regulatory standards gives us the capability to provide a complete, OEM-specific, integrated platform that delivers value.

With an established sales and service network in 75 countries, our dedicated life science sector teams connect around the world to ensure continuity of support for leaders in the life science industry.



Analytical Chromatography



HPLC Case Study

It was due to the strong relationship over many years that our customer, a very successful company in the HPLC market, came to us with a project to develop a sample preparation and cleansing system for their new line of UPLC systems.

To fulfil their requirements, we designed a dual syringe pump solution into a single unit. The solution consisted of a smaller volume syringe for aspirating sample into the sample loop, and a higher pressure syringe system for applying cleansing fluid throughout sample preparation and introducing all fluids to the high pressure area of the instrument.

This solution has added to our world-class portfolio of high pressure syringes for this and other high pressure fluid handling technologies.

We work closely with customers to understand their engineering needs

Speciality coatings for inertness and carryover minimisation

NEEDLES AND PROBES

OEM specific

COLUMN → DETECTION SYSTEM → **WASTE**

Allows simplification of fluidic circuit

SAMPLE INTRODUCTION VALVES

Real time monitoring of the health of the valve

Eliminates cross port leak

Ceramic, PEEK, PTFE and plastic materials available

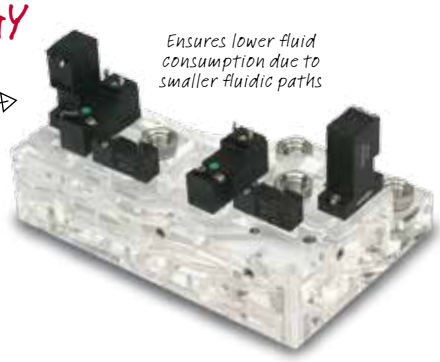
Diagnostic Flow Cytometry

LAMINATED MANIFOLD TECHNOLOGY

Fully customisable structure, optimising fluidics flow path

Fewer leak paths

Ensures lower fluid consumption due to smaller fluidic paths



PROPORTIONAL VALVES FOR PRESSURE OVER LIQUID CONTROL

Frictionless design for high control accuracy and precision

Quick response time for immediate changes to pressure system

Validated to 100 million cycles

Lowest hysteresis

Low power consumption (down to 0.5W)

PRESSURE OVER LIQUID SYSTEM USING PROPORTIONAL VALVE

MEDIA SEPARATED / ISOLATION VALVES

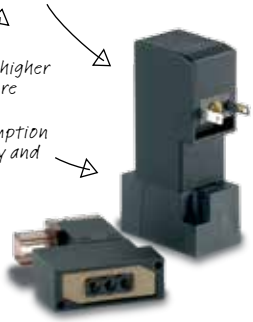
Compact design

Low internal volume

More flow, higher pressure

Low energy consumption (0.4W); less energy and less heat

Patented Double Rocker Mechanism



FLOW INLET

WASH / PREPARATION SYSTEM

SAMPLE HANDLING

SAMPLE AND SHEATH CONTROL

SHEATH FLOW

DETECTION SYSTEM

CELL SORTING

WASTE

Single and multiple point switches available

CUSTOM LIQUID LEVEL SWITCHES

Ultra low level switch available

SYRINGE PUMPS

High precision and accuracy, optimised to reduce pulsation

Zero dead volume syringe; no carryover, no bubbles

Multichannel options available, dispense up to 8 samples at once!

Media separated valves also available for sample handling

Tool free maintenance

Inline pump available with easy to replace syringe

ROTARY VALVE

Allows simplification of fluidic circuit

Ceramic, PEEK, PTFE and plastic materials available

Handles up to 7 Bar fluid pressure

From 3 up to 12 way valves available

HIGH FLOW MEDIA SEPARATED VALVES

Chemical inertness; handles bleach, wash fluids etc.

High flow rate

Large orifice for bulk fluidics handling

PTFE seals

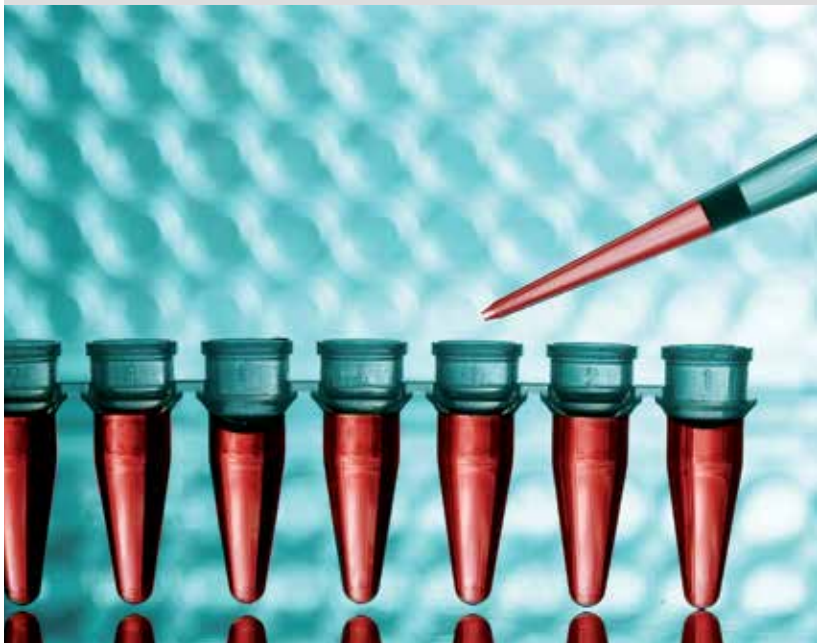
Flow Cytometry Case Study

A customer of ours decided to develop an area of instrumentation that they had not worked on previously – a Flow Cytometer for food analysis.

IMI Precision Engineering was involved from the very beginning to help them design their fluidic circuit; the key requirement being the subtle introduction of sample into a continuously flowing sheath fluid. After working closely with the customer to gain a deeper understanding of their application needs, we were able to design a solution based on a modification of our current syringe pump range.

By introducing a new electronic control system for the V6 syringe pump, we were able to account for the large range of flow rates required by the instrument. The pump was reconfigured to quickly alter between fast flows to slow dispense at speeds less than 1µl/s, up to a lifetime of millions of cycles.

We specialise in designing customised solutions



Diagnostic Immunology / Clinical Chemistry / Liquid Handling Robotics

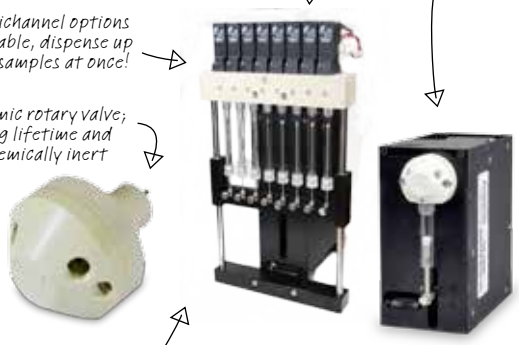
SYRINGE PUMPS

Zero dead volume syringe; no carryover, no bubbles

High precision and accuracy

Multichannel options available, dispense up to 8 samples at once!

Ceramic rotary valve; long lifetime and chemically inert

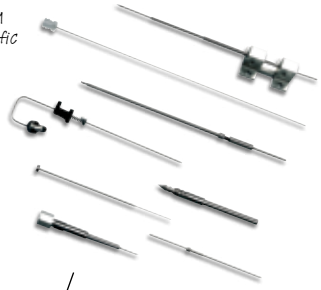


Minimised heat transfer to fluids

NEEDLES AND PROBES

Speciality coatings for inertness and carryover minimisation

OEM specific



DILUENT

SAMPLE / REAGENT HANDLING

MIXING STATION

MANIFOLD OR CARTRIDGE MOUNTING

Less than 0.1W holding power

Integration in to portable devices

NEEDLE WASH STATION

2 WAY MEDIA SEPARATED VALVES

Low internal volume

High cycle lifetime

Reliability

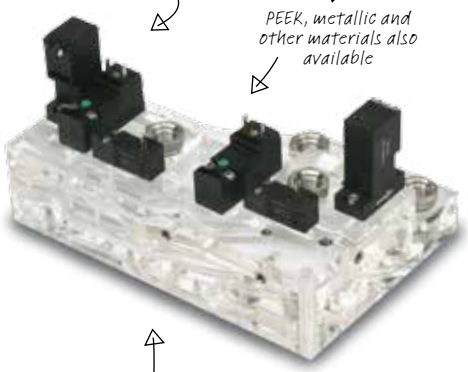
Optimised energy consumption

MANIFOLD TECHNOLOGY

Fully customisable structure, optimising fluidics flow path

Reduces reagent usage

PEEK, metallic and other materials also available



Laminated acrylic structures available allowing for optical analysis

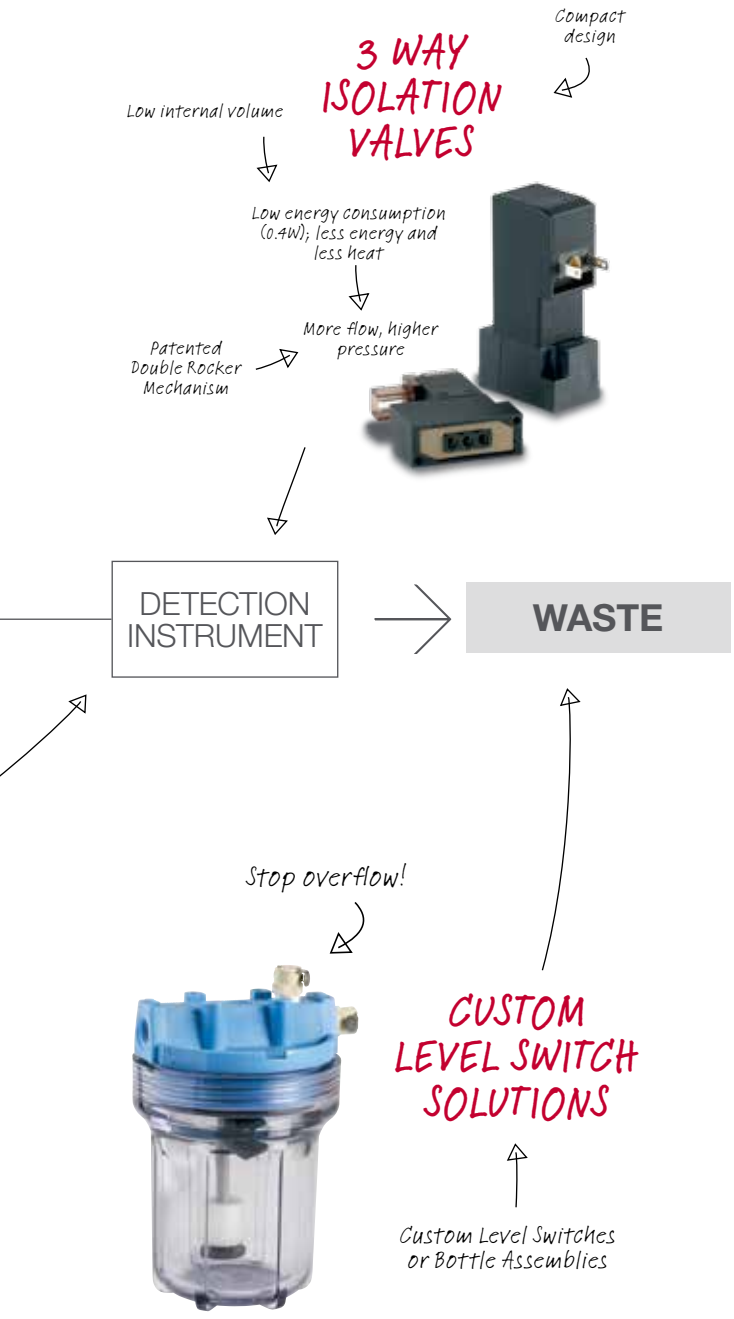
Liquid Handling Case Study

Our customer designed a DNA sample handling and preparation system to generate small droplets of PCR oil-based reagent that has been loaded with DNA content. The bubbles are dispensed into a well plate and sent to a digital PCR system for replication.

The solution is a unique design that incorporates 11-Chipsol valves, 2-MS valves, a Flatprop and an array of sensors, fittings and PCBs. All of these components are mounted onto a 5-layer acrylic manifold with two discrete integrated pressure chambers. The unit allows the direct interface of the customer's disposable – the bottle with PCR reagent – into the manifold.

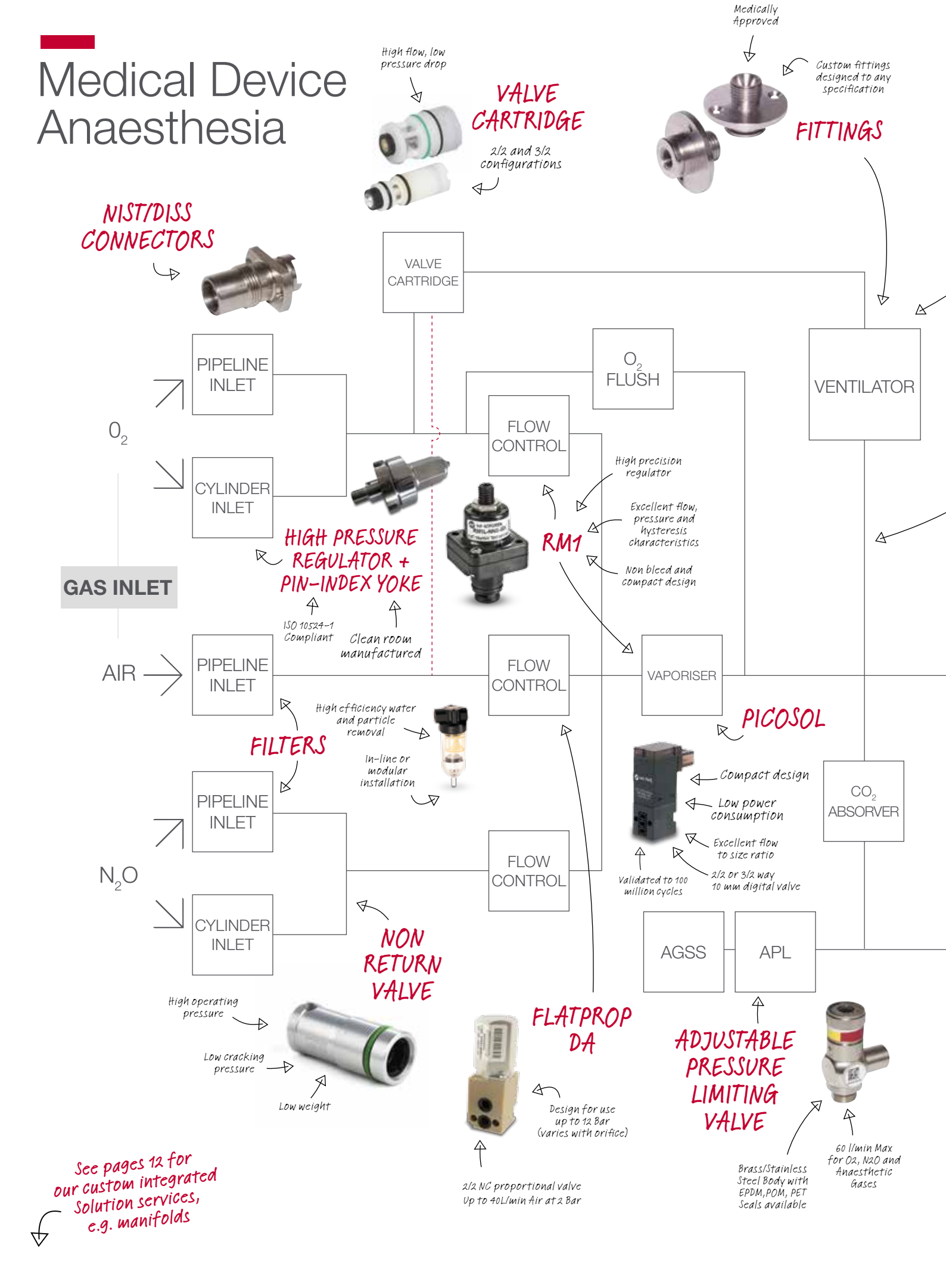
This unit uses an air-over-liquid system, supplying the necessary means to pull the PCR reagent out of the bottle and redirect to a separate dispense head. The dispense head then auto-fills the small well plates that are loaded into the PCR system.

This assembly creates advantage by reducing instrument production time and inventory management, reducing field service warranty claims and improving operational efficiencies.

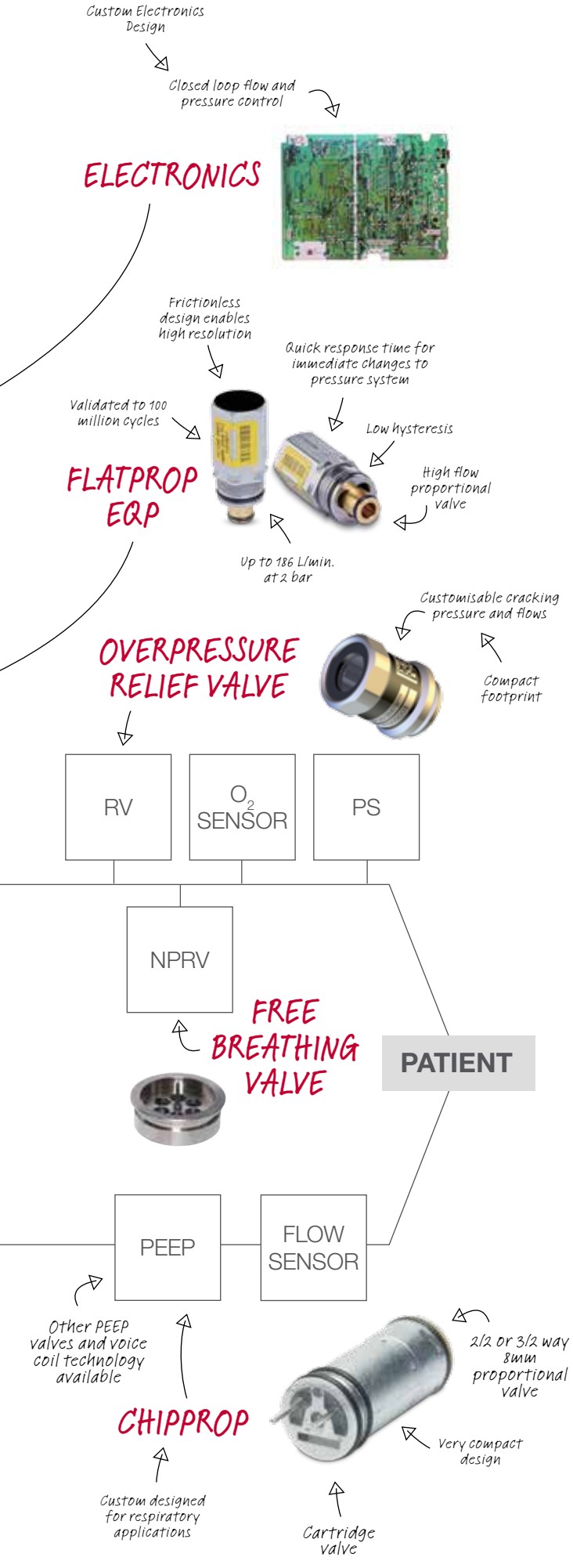


We improve operational efficiency

Medical Device Anaesthesia



See pages 12 for our custom integrated solution services, e.g. manifolds



Anaesthesia Case Study

A customer of ours wanted to look at anaesthesia machine design from the point of view of the anaesthesiologist. They wanted to build expertise into a machine that had maximum functionality, comfort and control.

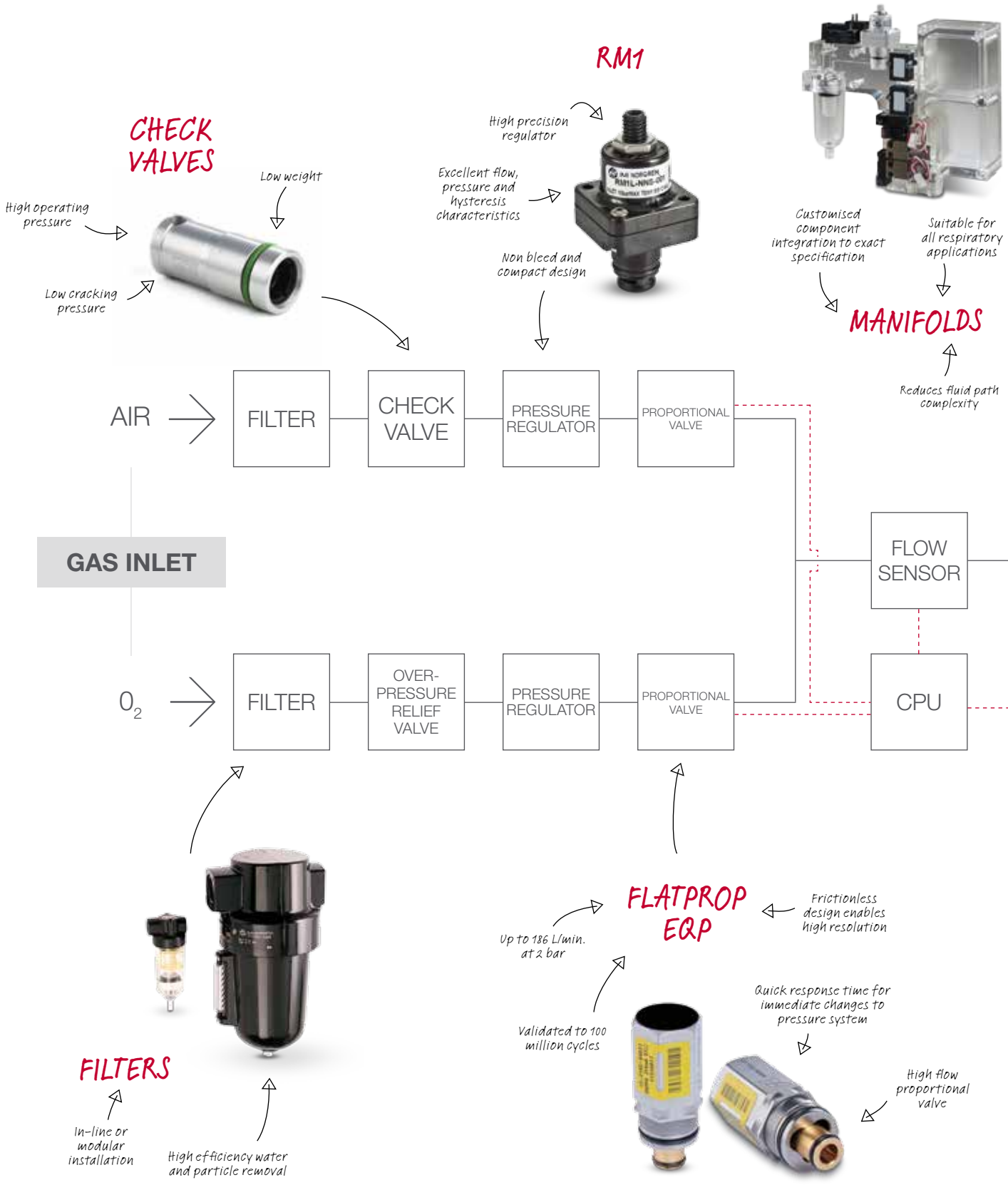
Our expertise in VRA allowed us to rapidly supply 20 unique components from our facilities around the globe and then work in partnership with our customer to create the final design in Europe.

Most parts were derived from standard products but configured, tuned or applied to our customer's highly specific functional requirements. For simpler installation and a smaller footprint, many products were designed for integration into sub-assembly manifolds. Additionally, to reduce waste from discarded anesthesia gas bottles that were not completely exhausted, We suggested a modified pressure regulator that allowed the gases to continue to flow at a lower pressure, maximising gas used.

With the best size to performance ratio for proportional valve technology on the market and capabilities to provide a complete integrated platform. Our experience providing market leading fluidic control technology for the VRA market gives our customers competitive advantage.

Market leading technology for VRA

Medical Device Ventilator

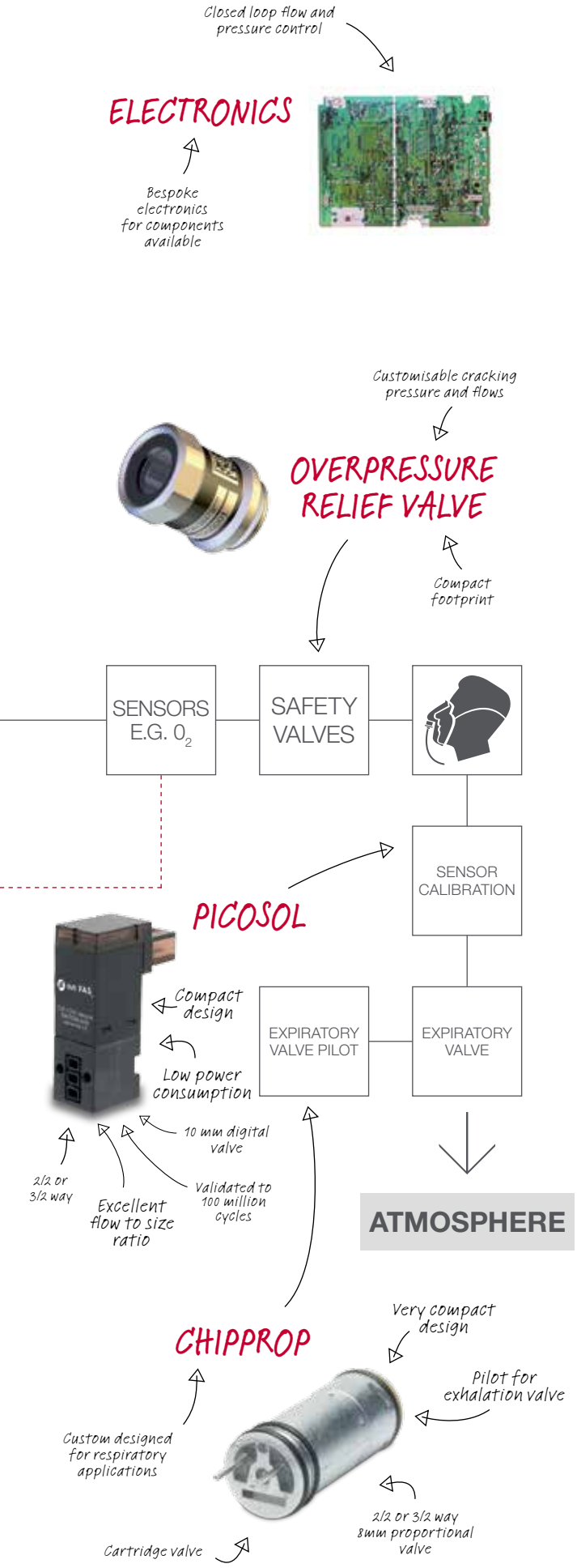


Integrated Solutions

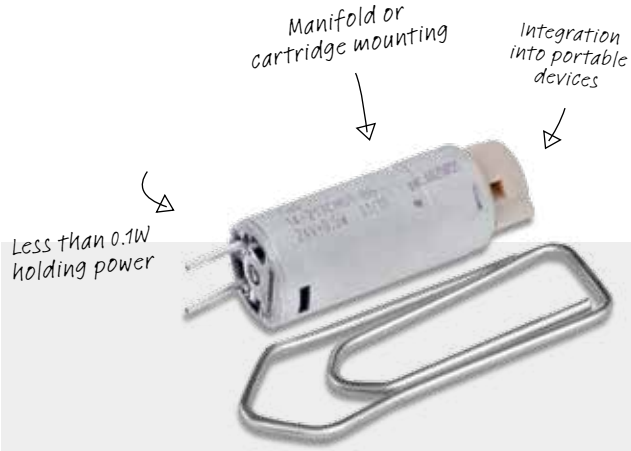
Our highly experienced engineering and production teams design and manufacture custom manifolds from Aluminum, Brass, Stainless Steel and a wide range of plastics, from Teflon to Acrylics. Our engineers incorporate the latest techniques and technologies to ensure the best design for your application - whether your unique application requires a simple machined manifold or full integration of a complex fluidic circuit in a multi-layered, multi-channel manifold.

Typical manifold or integrated solution benefits include:

- Reduce overall solution footprint and weight
- Eliminate potential leak paths
- Integrate multiple discrete components such as fittings, valves, pressure regulators, check valves, restrictors, filters, pressure and flow sensors
- Incorporate complex pneumatic and/or fluidic circuits directly into the manifold
- Allow for the maximum number of components on a given manifold face (high density of fluid circuits)
- Consistently maintain the exact fluidic volume between discrete components
- Eliminate potential dead spaces within the fluidic pathway (elimination of dead/static volumes)
- Improve reliability, reduce overall costs, and improve operational efficiency



Media separated valves and Acrylic manifold solutions

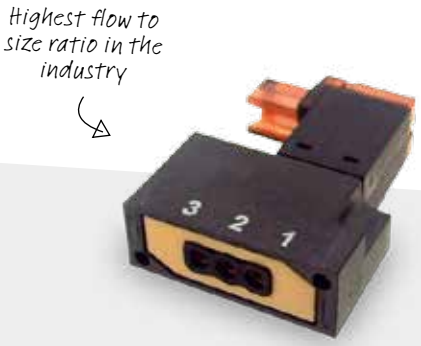


IMI FAS 8mm Chipsol MS

- 2/2 NC media separated solenoid valve
- Manifold or cartridge mount available
- Orifice size: 0.8mm
- Pressure rating: 0 to 2 Bar (Vacuum version available)
- Materials: PEEK body, FFPM or EPDM seals
- Power consumption: 0.5W
- Virtually no unswept volume

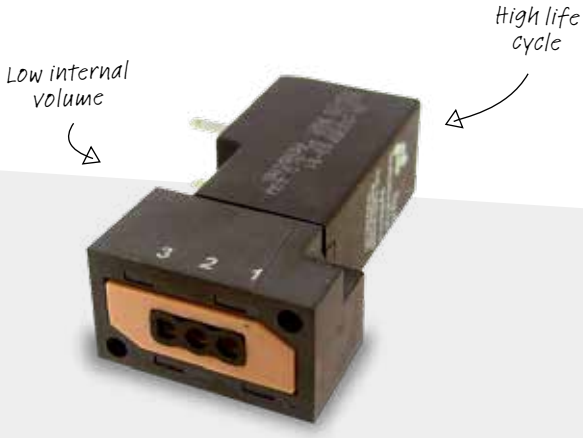
IMI FAS 10mm Picosol MS

- 3/2 media separated solenoid valve
- Manifold mount
- Orifice size: 1.2mm
- kv: 0.65
- Pressure rating: -0.95 to 2.2 Bar
- Materials: PEEK body, FFPM, FPM or EPDM seals
- Low internal volume
- Low power consumption
- Low internal / unswept volume



IMI FAS 15mm Microsol MS

- 2/2, 3/2 media separated solenoid valve
- Manifold mount
- Orifice size: 1.6mm
- Kv: 0.8
- Pressure rating: -0.95 to 2.2 Bar
- Materials: PEEK body, FFPM, FPM or EPDM seals
- Low internal volume
- Low power consumption
- Low internal / unswept volume



IMI Buschjost 82080

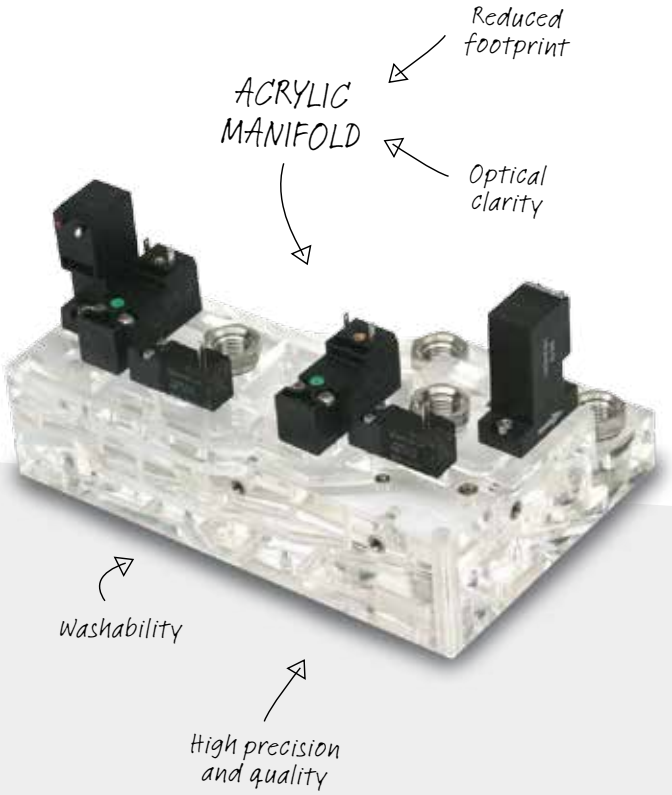
- 2/2 media separated solenoid valve
- Orifice size: 3mm to 8mm
- Pressure rating: 0 to 7 Bar
- Materials: PVDF body, EPDM seal, PTFE bellows
- Various mounting options available

Custom Level Switches

- Various float options include: Pressure, Temperature, Compatibility, Actuation Points, Mounting, etc.
- Proven Reed Switch Technology
- Custom and simple to implement complete bottle & switch solutions

Laminated Manifold Technology

- Multi-layered designs
- Custom geometries and volumes
- Complex three dimensional flow paths
- Thermal or solvent bonded
- Flame and vapour polishing



Non-Media Separated Valves and other manifold technology

Manifold Technologies

- Robust, compact designs
- Aluminium, stainless steel, brass, engineered plastics
- Burr-free intersections
- NPT straight thread and flat bottom ports
- Uniform channels

IMI FAS low flow proportional valves

IMI FAS 16mm Flatprop DA

- 2/2 NC proportional valve
- Suitable for medical applications
- Up to 40l/min Air at 2 Bar
- Design for use up to 12 Bar (varies with orifice)

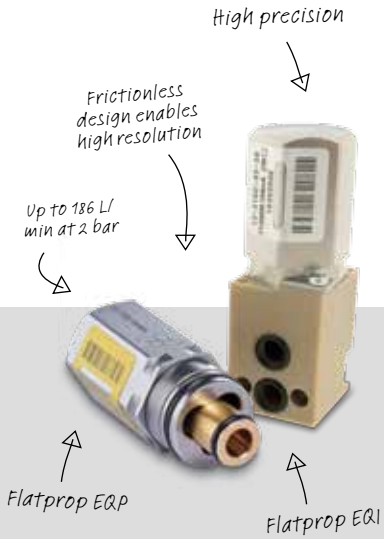
IMI FAS 16mm FASPROP Low flow proportional valve

- 2/2 NC proportional valve
- Suitable for analytical clean applications
- Materials: body - stainless steel, seal - FPM, FFPM
- High precision proportional control down to ml/min range
- Design for use up to 12 Bar (varies with orifice). Orifice sizes down to 0.05 mm.
- Built-in filter

IMI FAS high flow proportional valves

IMI FAS 16mm Flatprop EQI / EQP

- 2/2 NC proportional valve pressure compensated
- From 120 to 186 l/min Oxygen at 2 Bar
- Pressure rating: 0 to 7 Bar
- Materials: stainless steel body, FPM or NBR seals
- Power consumption: 2.5W at 20°C
- Validated to 100 million cycles
- Suitable for medical applications



IMI FAS on/off cartridge valves

IMI FAS 8mm Chipsol

- 2/2 or 3/2, NC or NO direct acting valve
- Orifice size: 0.5mm to 1mm
- Pressure rating: 0 to 8 Bar
- Materials: PPS and stainless steel body, HNBR Seal
- Power consumption: 0.5W

IMI FAS on/off valves

- Excellent flow to size ratio
- Low power consumption
- Validated to 100 million cycles
- Manifold mount

IMI FAS 10mm Picosol

- 2/2 or 3/2, NC or NO valve
- Orifice size: 0.6 to 2 mm
- Flow: 5 to 32 l/min at 2 BAR
- Pressure rating: 0 to 10 Bar

IMI FAS 15mm Microsol

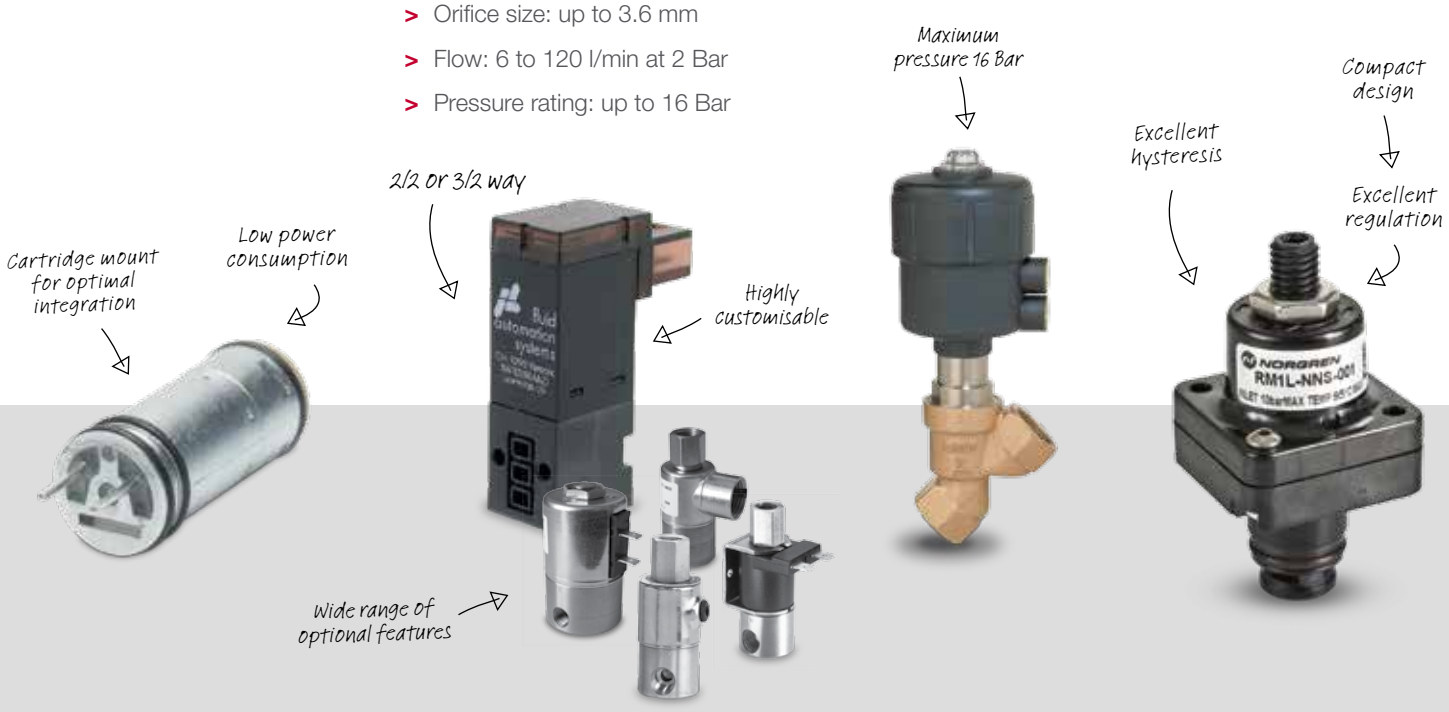
- 2/2 or 3/2, NC or NO valve
- Orifice size: up to 3.6 mm
- Flow: 6 to 120 l/min at 2 Bar
- Pressure rating: up to 16 Bar

IMI Buschjost angle seat valves

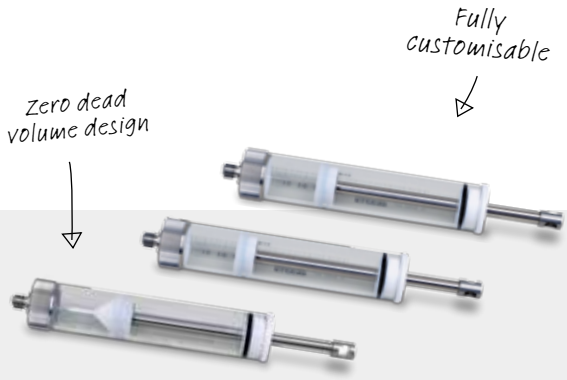
- 84500 and 84520 series
- Pressure actuated valves featuring high flow rate and flexibility
- Suitable for neutral or aggressive gases and liquids

RM1 Pressure Regulator

- Cleaned for Oxygen use
- Maximum inlet pressure: 10 Bar
- Maximum outlet pressure: 4 Bar
- Maximum flow: 400l/min
- Base mounting
- Excellent hysteresis characteristics



Pumps and Accessories



Syringes

- 30mm and 60mm stroke lengths
- 10µl up to 50ml internal volume
- Zero dead volume design available
- Wetted materials: Borosilicate Glass, PTFE and PCTFE (UHMW optional)
- Fully customisable for various shapes and sizes
- High pressure syringes available

V3

- 30mm stroke pump
- 6k or 12k resolutions available
- 50µl to 5ml syringe volumes
- Rotary valves up to 6 way
- Flow rate 10µl/min up to 400ml/min
- Up to 267N pump Force

V6

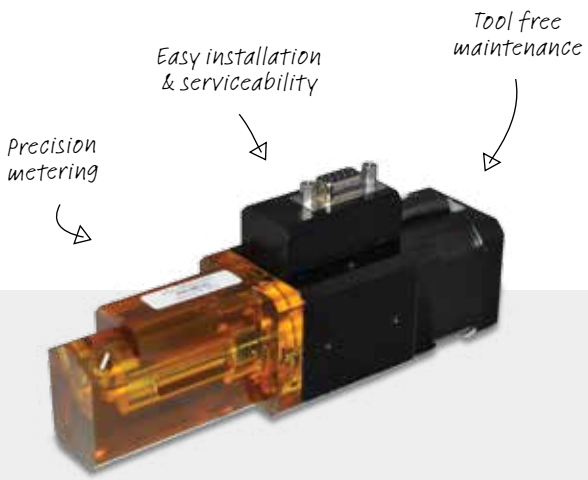
- 60mm stroke pump
- 12k, 24k or 48k resolutions available
- 10µl to 50ml syringe volumes
- 3/2 solenoid valve or Ceramic, PEEK and PTFE rotary valves up to 12 way
- Flow rate 0.25µl/min up to 2500ml/min
- Up to 667N pump force

Multichannel

- 60mm stroke pump
- Up to 8 syringes on a single pump
- 24k or 48k resolutions available
- 2.5µl to 5ml syringe volumes
- 3/2 solenoid valve options available
- Flow rate 1.25µl/min up to 125ml/min
- Up to 667N pump force spread across all channels

Inline

- 30mm stroke syringe. Tool free replacement syringe with removable manifold for easy maintenance
- Self aligning syringe
- 5k or 20k half step resolutions available
- 50µl to 1ml syringe volume
- 3/2 solenoid valve option available
- Flow rate 7.5µl/min up to 150ml/min
- Up to 347N pump force



Rotary Valves

- 2 way up to 12 way
- Distribution, non-distribution and loop valve configurations
- PTFE, plastic or ceramic material valves
- Standalone rotary valve driver available

IMI Precision Engineering operates four global centres of technical excellence and a sales and service network in 75 countries, as well as manufacturing capability in the USA, Germany, China, UK, Switzerland, Czech Republic, Mexico and Brazil.

For information on all IMI Precision Engineering companies visit **www.imi-precision.com**

Supported by distributors worldwide

z7915BR us/06/15

IMI
Precision Engineering

For further information, scan this QR code or visit
www.imi-precision.com