Life Science
Precision Fluid and Motion Control

IMI
Breakthrough Engineering for a Better World

Norgren is part of global engineering organisation IMI plc. IMI is at the forefront of delivering the solutions we need in a changing world and is focused on creating tremendous value by solving key industry problems in attractive markets and employing the best.

Norgren has a proud history of creating innovative engineering solutions in precise motion control and fluid technology, and we collaborate with our customers across more than 50 countries in critical areas such as Factory Automation, Material Handling, Rail, Energy, Process Control, Life Science and Commercial Vehicles.

From improving speed, productivity, reliability and efficiency of equipment, to generating significant energy and cost savings, or lowering total cost of ownership across many industries, Norgren’s high-quality solutions are designed to help customers pursue progress, achieve new goals and overcome problems.

With market-leading industry expertise, we offer the capability, resources, engineering intelligence and global support infrastructure to tackle the largest project demands.

Our world-class portfolio of fluid and motion control products include Norgren, Bimba, Buschjost, FAS, Herion, Kloehn and Maxseal. Supplied either individually or combined into powerful customised solutions to meet customer needs.

Breakthrough engineering you can count on.
Expertise in the Life Science sector

With over thirty years’ experience in the life science sector, Norgren 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. Specialising in miniature solenoid valve technology, microfluidics, precision liquid handling solutions and analytical instrument solutions, our FAS and Norgren products are renowned in the industry.

Norgren delivers breakthrough engineering, 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.

Laminated Manifold Technology

- Fewer leak paths
- Ensures lower fluid consumption due to smaller fluidic paths
- Fully customisable structure, optimising fluidics flow path

Find out more norgren.com
Analytical Chromatography

MOBILE PHASE

SAMPLE INTRODUCTION

Media Separated Valves
- High precision gradient mixing valves available
- 19µl internal volume
- Low heat generation
- Low internal volume, minimal carryover

MOBILE PHASE MIXING / FLOW CONTROL
- More flow, higher pressure

Proportional Valves
- Low flow proportional valve
- Orifice 0.05 mm
- Cleaned for analytical applications
- Precision control down to ml/min range
- High stability in closed loop control systems

Pumps
- High precision and accuracy, optimised to reduce pulsation
- Zero dead volume syringe; no carryover, no bubbles
- Low coefficient of friction within syringes; increased accuracy and precision as well as increased lifetime
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.
Diagnostic Flow Cytometry

Laminated Manifold Technology

- Fully customisable structure, optimising fluidics flow path
- Ensures lower fluid consumption due to smaller fluidic paths

Solenoid Valves for Air Over Liquid Dispense

- 0.8 W
- Up to kv 0.26
- Single fixation screw
- Captive seal
- Footprint 6.5 mm
- Solder free / direct connection to PCB
- Fewer leak paths
- Polymer and glass bonding

Media Separated / Isolation Valves

- Low internal volume
- More flow, higher pressure
- Low energy consumption (0.4W), less energy and less heat

FLOW INLET

WASH / PREPARATION SYSTEM

SAMPLE HANDLING

SAMPLE AND SHEATH CONTROL

DETECTION SYSTEM

CELL SORTING

WASTE
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.

Norgren 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, with a lifetime of millions of cycles.

We specialise in designing customised solutions

- Custom Liquid Level Switches
  - Ultra low level switch available

- Syringe Pumps
  - Media separated valves also available for sample handling
  - Inline pump available with easy to replace syringe
  - Tool free maintenance
  - Multichannel options available, dispense up to 8 samples at once!

- Rotary Valve
  - 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
  - Large orifice for bulk fluidics handling
  - PTFE seals
  - High flow rate
  - Single and multiple point switches available
  - Chemical inertness, handles bleach, wash fluids etc.
Diagnostic Immunology / Clinical Chemistry / Liquid Handling Robotics

Syringe Pumps
- Fully customisable structure, optimising fluidics flow path
- Zero dead volume syringe, no carryover, no bubbles
- Multichannel options available, dispense up to 8 samples at once!
- Ceramic rotary valve, long lifetime and chemically inert
- New Cadent™ 3 Syringe Pump with premier flow stability, smart diagnostics, and customizability

Needles and Probes
- Speciality coatings for inertness and carryover minimisation
- OEM specific

Manifold or Cartridge Mounting
- Reductions reagent usage
- Less than 0.1W holding power
- Integration in to portable devices
- Optimised energy consumption
- High cycle lifetime
- PEEK, metallic and other materials also available

DILUENT → SAMPLE / REAGENT HANDLING → MIXING STATION

SAMPLE / REAGENT HANDLING
- Minimised heat transfer to fluids

NEEDLE WASH STATION
- Low internal volume

2 Way Media Separated Valves
- Reduced reagent usage
- Fully customisable structure, optimising fluidics flow path

Manifold Technology
- Reduces reagent usage
- Laminated acrylic structures available allowing for optical analysis

Diagnostic Immunology / Clinical Chemistry / Liquid Handling Robotics
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.
Medical Device
Anaesthesia

- High flow, low pressure drop
- 2/2 and 3/2 configurations
- Medically Approved
- Custom fittings designed to any specification
- 2/2 NC proportional valve
- Low weight
- Design for use up to 12 Bar (varies with orifice)
- 60 l/min Max for O2, N2O and Anaesthetic Gases
- Adjustable Pressure Limiting Valve
- Brass/Stainless Steel Body with EPDM,POM, PET Seals available
- ISO 10524-1 Compliant
- Clean room manufactured
- Non bleed and compact design
- High precision regulator
- Excellent flow, pressure and hysteresis characteristics
- Non bleed and compact design
- High efficiency water and particle removal
- Excellent flow to size ratio
- Low power consumption
- Validated to 100 million cycles
- In-line or modular installation
- Compact design
- Low weight
- Low operating pressure
- Low cracking pressure
- NIST/DISS Connectors
- PICOSOL
- Valve Cartridge
- Fittings
- Filters
- GAS INLET
- O2
- AIR
- N2O
- CYLINDER INLET
- FLATPROP DA
- AGSS
- APL
- CO2 ABSORVER
- VENTILATOR
- PROPILE INLET
- FLow CONTROL
- Valve Cartridge
- Fittings
- GAS INLET
- O2
- AIR
- N2O
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.
Medical Device Ventilator

**Check Valves**
- High operating pressure
- Low cracking pressure
- Low weight

**RM1**
- High precision regulator
- Excellent flow, pressure and hysteresis characteristics
- Non bleed and compact design

**Manifolds**
- Customised component integration to exact specification
- Suitable for all respiratory applications
- Reduces fluid path complexity

**Filters**
- In-line or modular installation
- High efficiency water and particle removal

**FLATPROP EQP**
- Frictionless design enables high resolution
- Up to 186 L/min. at 2 bar
- Validated to 100 million cycles

**GAS INLET**

**AIR**

**FLOW SENSOR**

**CPU**

**02**

**FLOW SENSOR**

**CPUN**

**FLOW SENSOR**

**CPU**
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 manifold solutions

FAS 8 mm CHIPSOL MS

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

FAS 10 mm PICOSOL MS

- 3/2 media separated solenoid valve
- Manifold mount
- Orifice size: 1.2 mm
- 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

FAS 15 mm MICROSOL MS-E

- 2/2, 3/2 media separated solenoid valve
- Manifold mount
- Orifice size: 1.6 mm
- kv: 0.6
- 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
Buschjost 82080
» 2/2 media separated solenoid valve
» Orifice size: 3 mm to 8 mm
» 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, diffusion and 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

FAS low flow proportional valves

FAS 16 mm 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)

FAS 16 mm 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

FAS high flow proportional valves

FAS 16 mm 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
FAS on/off cartridge valves

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

FAS on/off valves
- Excellent flow to size ratio
- Low power consumption
- Validated to 100 million cycles
- Manifold mount

FAS 6.5mm FLEXISOL
- 2/2 or 3/2, NC or NO valve
- Orifice size: 0.8 and 0.9 mm
- Flow: up to 3.5 l/min at 1.5 Bar
- Pressure range: 0 to 2.5 Bar
- One single screw, direct connection without soldering

FAS 10 mm 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

FAS 15 mm MICROSOL MS-E
- 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

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
» 30 mm and 60 mm stroke lengths
» 10µl up to 50 ml 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

Cadent™ 3
» 30 mm stroke pump
» 6k, 12k, or 24k resolutions available
» 50µl to 5 ml syringe volumes
» Rotary valves up to 12 way in PTFE and PEEK
» 3/2 solenoid valve option available
» Flow rate 0.008µL/min up to 500 ml/min
» Up to 267N pump force

Cadent™ 6
» 60 mm stroke pump
» 12k, 24k or 48k resolutions available
» 10µl to 50 ml syringe volumes
» Ceramic, PEEK and PTFE rotary valves up to 12 way
» Flow rate 2.8µl/min up to 2.5 ml/min
» Up to 308N pump force

Unmatched Flow Stability
Flexible Configurations
Versatility
Programmable, maintenance-free, precision syringe pump
Exceptional precision, accuracy and lifetime performance
Fully customisable
Smart Diagnostics
Zero dead volume design
**Inline Pump IP 4000**
- Dispense volume: 100 μl, 500 μl, 1ml
- Accuracy: ± 0.5% at full dispense
- Precision: 1% CV @ 2% dispense
- Compact design
- High Reliability (2 million life cycle)
- Operating pressure: 100 psig
- Seal Wash Option
- RoHS certified

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

**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

**Ceramic, PEEK, PTFE and plastic materials available**

**Dispenses up to 8 samples simultaneously**

**Simplifies fluidic circuits**

**Customisable solenoid manifold for intelligent fluid pathway**

**Compact size and optimum weight**

**High chemical compatibility**
Pinch Valves

What Is A Pinch Valve?

A pinch valve is a type of control valve, which uses a pinching effect on a flexible tube to control fluid flow. The pinching (compression) can be accomplished using mechanical clamping mechanisms and can be pneumatically or electrically actuated.

Why Use Pinch Valves?

Industry leaders looking for a low-maintenance and more cost-effective solutions for controlling liquids, gases, slurries and powders (incl. corrosive media) in a pipeline are turning to pinch valves over traditional valves (diaphragm valves, ball valves, butterfly valves, needle valves, etc.)

Unlike traditional valves, pinch valves feature a straight-through flow, very little pressure drop over the valve, and full shut-off of media in the tube, making it the most practical and efficient solution for various ON/OFF flow control applications.

Markets & Applications

» Biotechnology
» Pharmaceuticals
» Medical Devices
» Diagnostics
» Bioreactors
» Bioprocessing single use technology
» Process equipment
» Food and beverage
» Filtration, TFF (Tangential Flow Filtration)
» Dispensing, filling and mixing: Resin, glue, epoxy, adhesive, paint, slurries, and other media
» Chromatography - analyzers
» Chemical processing equipment

Advantages of Pinch Valves

» Compact, lightweight design
» Easy cleaning (just throw away the tubing)
» Simple operation
» Eliminates media contamination
» Linear flow
» Quick tubing change-out
» Long performance and reliability
» Easy valve exchange
» Maximize productivity
» Reduced valve costs
» Valve body not affected by corrosive fluids
» Requires very low maintenance
Breakthrough Engineering for a Better World
PE900 Series
Proportional Pinch Valve Electric System

What Is A Pinch Valve?

See below for pressure curves representing 2-way (ON/OFF) control versus proportional control. If you need the option to vary or hold flow or pressure in your system a proportional valve allows you flexibility to adjust the valve opening from full open to closed or anywhere in between.

Features and Benefits

Complete System Features & Key Specifications:

» Provides a robust solution for accurate closed loop proportional control and precision fluid management
» Dependable, compact and cost-effective solution
» Pinch head designed for wash down and clean rooms
» Controls high media/fluid pressures up to 75 psig (5.2 barg)
» Flexible tubing sizes from 0.063” to 1.625” O.D.
» Recommended Tubing Durometer up to 75 Shore A
» Tube Materials: C-Flex, Pharmed, Polyurethane, PVC, Tygon, Pharma, Silicone, Braid Reinforced
» Pinch Force range from 5 Lbs to 100 Lbs
» Standard Power: 24 VDC, up to 4 Amps
» Input Command Signal: 0-10 VDC and 4-20 mA
» Repeatability ≤ 0.1% of actuator stroke (6σ level)
» Accuracy = as low as 0.00025” per linear position move

Pinch Valve Benefits:

» Designed for Bio-Pharma, Bio-Processing, Food and Beverage, Industrial applications where sterility and wash down procedures are needed
» Offers reliability and performance when working with hard or larger diameter tubing that require stronger pinch forces
» Provides a robust solution for accurate closed loop proportional control and precision fluid management.
» Dependable, compact and cost-effective solution
» Specifically designed for disposable tubing
» Each model contains an easy snap-in tube slot for quick loading and unloading procedures

Motor/Controller Benefits:

» Can run independent or as part of a closed loop system
» Optimized software for easy set-up and testing
» RoHS/CE Complaint
» High resolution encoder feedback
» DIN rail mountable (Controller Only)
» Noise Level 50 dbA Maximum
VERSAGRIP®
Solenoid Pinch Valves

Features & Benefits

» Supports average tubing durometer up to 60 Shore A and 15 psig/1 barg media pressure
» Compact design with low operational noise
» Average actuation speeds of 80 milliseconds or less without tube loaded
» Seals prevent liquid penetration supporting easy cleaning or sterilization procedures
» 3 million MTBF* or 18 month warranty*
» Optimized performance when used with solenoid controller, utilizing Pulse-Width Modulation (PWM) for power and heat management

* MTBF based on 50% duty cycle testing carried out at 20 degrees ambient C using 60 Shore A tubing. Duty cycle is defined as On Time/(On Time + Off Time).

900-Series
Pneumatic Pinch Valves

Features & Benefits

» Support tubing durometer up to 85 Shore A and 75 psig/5.2 barg media pressure
» Offer reliability and performance when working with larger diameter or hard tubing that requires stronger pinch forces
» Flexible tubing sizes from 0.094” to 1.625” O.D.
» Pinched head designed for washdown and clean rooms
» Offered in Black Anodized Aluminum or 316L Stainless Steel
Norgren operates four global centres of technical excellence and a sales and service network in 50 countries, as well as manufacturing capability in Brazil, China, Czech Republic, Germany, India, Mexico, UK and the USA.

For information on all Norgren companies visit

www.norgren.com

Supported by distributors worldwide.

Norgren Inc.
72 Spring Ln
Farmington
CT 06032
United States

Tel 860.677.0272
Email farmingtontechnical@imi-precision.com

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