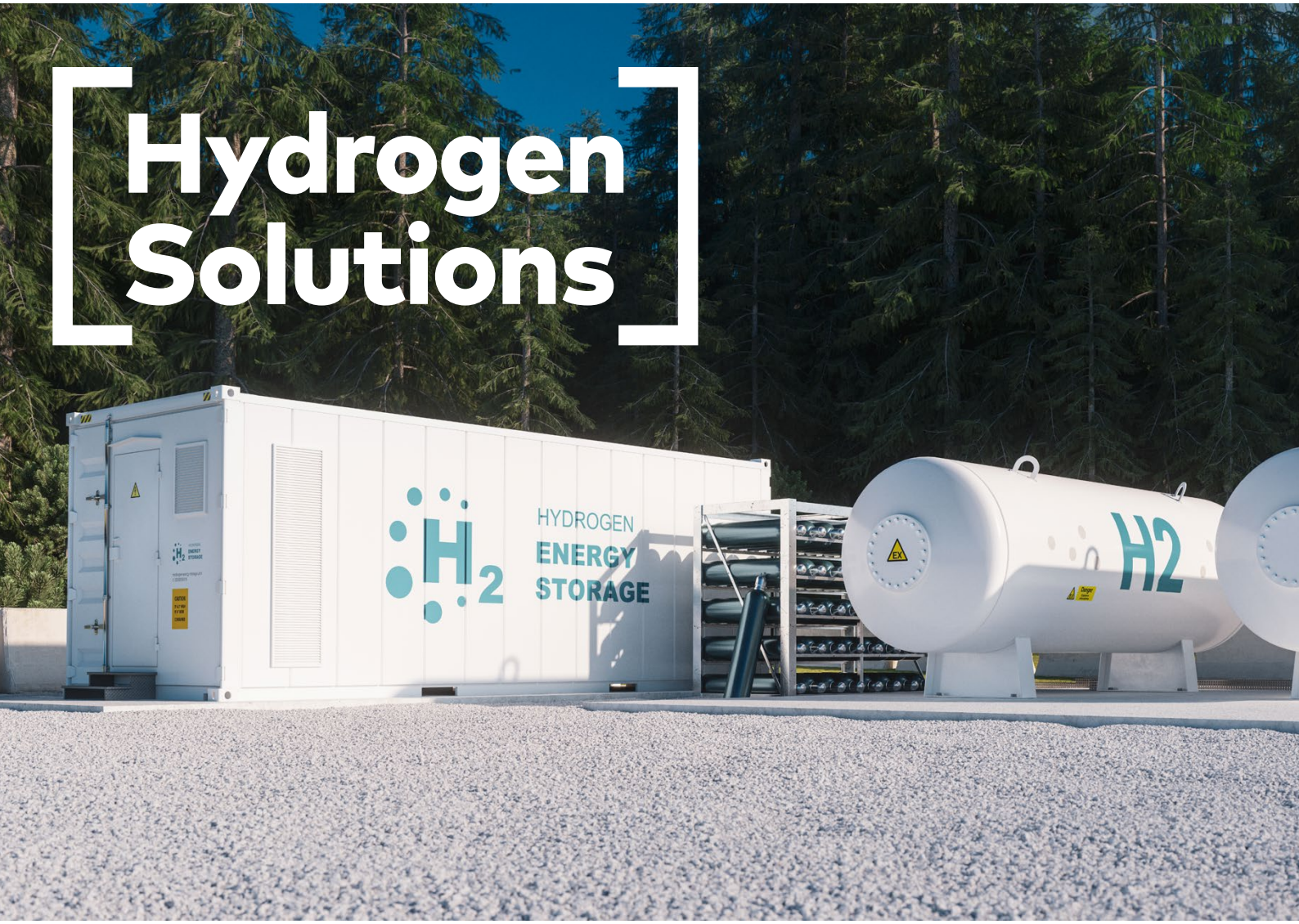
IMI Critical Engineering

# Hydrogen Solutions




- IMI BOPP & REUTHER™
- IMI CCI™
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- IMI FLUID KINETICS™
- IMI INTERATIVA™
- IMI NH™
- IMI ORTON™
- IMI PBM™
- IMI REMOSA™
- IMI STI™
- IMI TH JANSEN™
- IMI THOMPSON VALVES™
- IMI TRUFLO ITALY™
- IMI TRUFLO MARINE™
- IMI TRUFLO RONA™
- IMI Z&J™
- IMI ZIKESCH™

Breakthrough Engineering

## IMI Critical Engineering is a world-leading provider of critical flow control solutions that enable vital energy and process industries to operate safely, cleanly, reliably and more efficiently.

- We are a leader in the valve, actuator and position control technologies required for the hydrogen value chain from production, storage and transportation to end use cases;
- We serve every part of the hydrogen related process including electrolysis, steam methane reforming, coal gasification, hydrogen pipeline for transmission and distribution, hydrogen liquefaction, carrier and regasification, as well as applications in refinery and petrochemical, ammonia and fertiliser, iron and steel and any process where hydrogen is processed or used;
- Our products increase plant efficiency, safety, and reliability;
- Our expertise is in handling critical service conditions under extreme temperature and pressure. We are a trusted partner for the maintenance of customer assets, from parts and field service to upgrades and problem solving.

### IMI BOPP & REUTHER™

IMI Bopp & Reuther designs, manufactures and distributes high-quality safety, control and shut off valves.

### IMI CCI™

IMI CCI is well known for engineering, manufacturing, and servicing critical flow control technology across the power, nuclear, oil and gas, petrochemical and process industry.

### IMI ORTON™

A global leader in the manufacture of triple offset metal-seated valves, double eccentric butterfly valves and concentric rubber-lined valves, for on-off and control service.

### IMI PBM™

IMI PBM manufactures ball valves and specialty valves for both sanitary and industrial applications with creative engineering and quality manufacturing practices.

### IMI REMOSA™

IMI Remosa is the world leader in the design and manufacture of valves and hydraulic actuating systems for critical applications in petrochemical industries.

### IMI STI™

IMI STI is renowned for valve actuation products, including linear and quarter turn actuators, smart and traditional positioners, and related accessories.

### IMI THOMPSON VALVES™

IMI Thomson Valves offers proven solutions for high pressure gas control on the outlet from the compressor, as well as in downstream pressure reduction applications.

### IMI TRUFLO ITALY™

IMI Truflo Italy is a leading provider of specialised ball valves for the oil, gas, chemical and petrochemical industries.

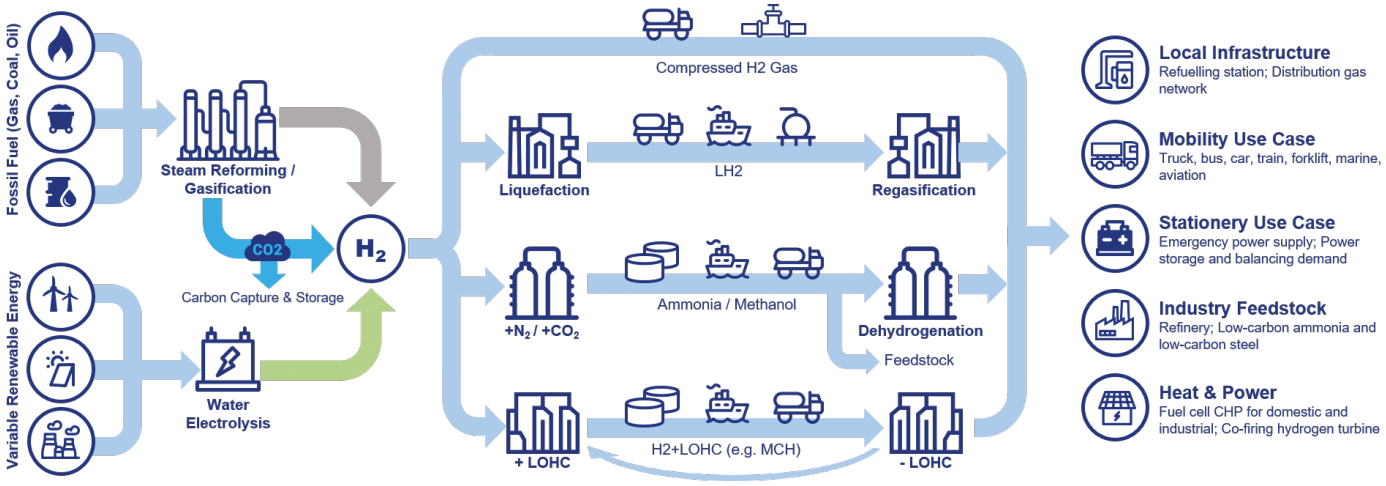
### IMI TRUFLO MARINE™

IMI Truflo Marine has been a specialist in the design and manufacture of high integrity valves, actuators and pressure reducing stations for critical nuclear and naval marine sector.

### IMI Z&J™

IMI Z&J is known globally for custom-engineered, high-temperature valves for the process industries focused on petrochemicals, refining and iron & steel industry.

# Our Expertise in the Hydrogen Value Chain




Hydrogen's unique properties make it a powerful enabler for the energy transition from fossils to renewables and the decarbonisation of various end-uses. The growth of hydrogen in the energy mix is being driven by:

1. the cost down of renewables power that makes hydrogen a perfect solution of power-to-X;
2. the emergence of fuel cell technology that has unlocked the potential of diverse use cases; and
3. the urgency of mitigating global warming caused by greenhouse gas emissions.

IMI Critical Engineering plays a key role in all aspects of the hydrogen value chain. Our control and isolation valve solutions cover the entire process from hydrogen production, transportation and storage to utilisation. Applications include steam methane reforming (SMR), partial oxidation (POX), auto-thermal reforming (ATR), pressure swing absorption (PSA), coal gasification, carbon capture, utilisation & storage (CCUS), propane de-hydrogenation (PDH), hydrogen carrier hydrogenation & dehydrogenation, hydrogen liquefaction and liquid hydrogen carrier, gas purification, compressor anti-surge, safety relief, etc.

Apart from what we can offer with the existing portfolio, we work closely with our customers in the hydrogen sector to help tackle the most challenging industrial problems. Some examples of where we are focusing on include how to improve efficiency of electrolysis, and carbon capture and utilisation; how to effectively store and transport hydrogen with different carrier technologies, how hydrogen or ammonia can be better utilised as fuel for industrial heating, and power or propulsion of transportation. By leveraging our engineering expertise in fluid handling in critical service we are always striving to create value for our customers in the hydrogen value chain.

## Key Applications

- Gas Dehydrogenation
- Gas to Flare
- Choke
- Ammine and Gas Scrubbing
- Antisurge Valves
- Pump Recirculation
- On-Off Valves
- HIPPS Systems
- Safety Valves
- BOP Valves
- Underground Injection / Withdraw
- PDH / Catofin®
- Power Generation
- Pipeline and Distribution
- Hydrogen and Oxygen Gas / Liquid

# Key products

## 840 Series

1" - 20" | 150# - 2500#

Tight Shutoff | Easy Maintenance | Flexible Trim Design

IMI CCI's 840 Series valves have a cage-guided construction that reduces plug vibration, and provides stable performance throughout travel.

## DRAG® Compressor Recycle Anti-Surge Valve

4" - 42" | 150# -2500#

<1 Sec stroke time | Precise control | Quick Change Trim | Class VI, V Shutoff

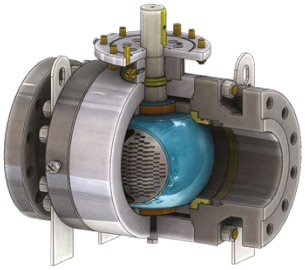
IMI CCI DRAG® flow control technology with reliable fast stroking actuation. The DRAG® disk stack controls flow velocity to provide low noise and exceptional reliability.

## dBX Shield™

2" - 36" | 150# - 2500#

Low Noise | Low Vibration | High Rangeability

Our dBX Shield Rotary DRAG® control valve combines premium DRAG® flow control technology into a ball valve. With high rangeability required on the main feed gas line, this valve can simplify the pipe layout and start-up sequence, while reducing the number of valves used.

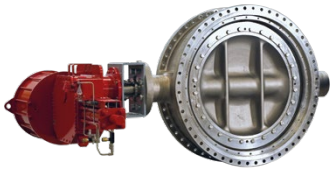


## MV Butterfly Valve

2" - 160" | 150# - 1500# | -425°F (-253°C) to 1200°F (649°C)

Triple Offset | Torque Seated | Zero Leakage | Bi-Directional | SIL 3

The IMI Orton MV design provides a long term and reliable solution for industrial applications of all types under extreme temperature and pressure, and can easily be automated for emergency shutdown applications, including HIPPS. Vacuum jacketed option makes it ideal for liquid hydrogen service.

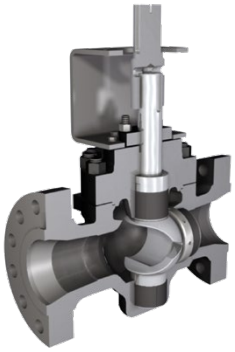


## C-Rex™

1" - 40" | 150# - 2500# | -320°F (-196°C) to 1200°F (649°C)

Cavity Free | In-Line Maintenance | Double Eccentric | Bi-Directional

The IMI Truflo C-Rex™ valve is engineered for excellence in the most demanding services; high cycle switching applications, emergency shutdown, solid/slurry media, high temperature, and cryogenic. The simple and robust, top entry design has fewer parts and allows for in-line maintenance to reduce downtime.

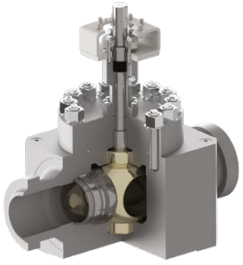


## O-Rex™

1" - 40" | 150# - 4500# | API 6A to 15000 | -320°F (-196°C) to 1200°F (649°C)

Cavity Free | In-Line Maintenance | Double Eccentric | Bi-Directional | Piggable

The IMI Truflo O-Rex™ valve is engineered for excellence in the most demanding services; high cycle switching applications, emergency shutdown, solid/slurry media, high temperature, and cryogenic. The simple and robust, top entry design has fewer parts and allows for in-line maintenance to reduce downtime.



## Double Block and Bleed Valve

1/2" - 4" | 150# - 2500# | -320°F (-196°C) to 800°F (427°C)

Quarter Turn | Welded or Bolted Body | Bleed or Gauge Ports | Double Positive Isolation

IMI PBM's Double Block and Bleed valves combine positive isolation of media with complete configuration flexibility. Single and double block & bleed valves offer safer fugitive emission capabilities, and a more reliable solution to traditional piping configurations.

## Transmitter Isolation Valve

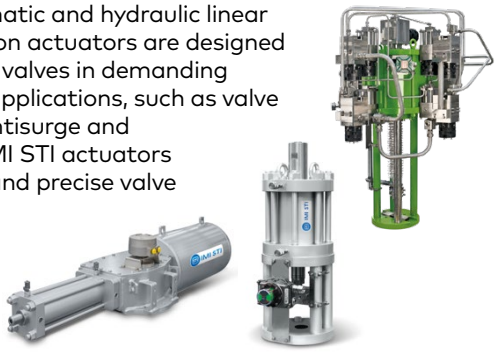
1"x2", 1"x3", 2.5"x3" | 150# - 600# | < 800°F (427°C)

Minimal Dead Space | Positive Shut-off | In-place Calibration

The IMI PBM Transmitter Isolation Valve (TIV) achieves positive isolation of a transmitter from the process media. Incorporating flush/drain/calibration technology to safely flush and calibrate; maintaining transmitter reliability without process interruption.

## Pneumatic and Hydraulic Actuation

IMI STI's pneumatic and hydraulic linear and rotary piston actuators are designed to drive control valves in demanding severe service applications, such as valve compressors antisurge and many others. IMI STI actuators grant smooth and precise valve operation without any maintenance for the whole operating life.



## Control Systems

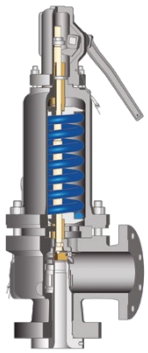
IMI STI actuators are designed with a patented "plug-in" connection system to allow for a wide range of customer-tailored accessories and control systems to meet the most demanding and critical operating conditions for compressor anti-surge applicatoin that requires high performance, fast operation with a high level accuracy, and precision positioning.

## Safety Relief Valve

1" - 8" | 50# - 2500# | -450°F (-268°C) to 1000°F (538°C) | Set pressure 0.5 barg up to 414 barg

High Flow | Designed to API 526 | Manufactured to ASME VIII and PED

The Si 8 series is part of the IMI Bopp & Reuther High Flow application category and the required capacity is usually the most important criteria for selection. One-trim design for vapours, gases, steam, liquids and two-phase applications.



## HP Regulators and Filters

Port Size: G3/8 | SFX 3/8 | NPT 3/8

Maximum inlet pressure: 1000 bar | Regulating pressure range: 0 to 700 bar

IMI Thompson's D973 and J50 series high pressure regulators offers proven solutions for high pressure gas control on the outlet from the compressor, as well as in downstream pressure reduction applications such as in the dispenser. Our filters provide protection against particle ingress and are suitable for use in high low systems with a tolerance to high differential pressures.

## Side-entry and Top-entry Ball Valve

1/2" - 60" | 150# - 4500# | -320°F (-196°C) to 1200°F (649°C)

SPE/DPE | DB&B | SIL3

IMI Truflo trunnion mounted, side & top entry high performance ball valves are engineered to meet international standards like API 6A, API 6D, ASME B16.34, ISO 17292 and others on request. A perfect solution for natural gas and hydrogen gas transmission pipeline.

## Air Reducing Manifold / Block

Max inlet working pressure 320 bar

IMI Truflo Marine's air reducing product ranges are specified worldwide for their unique features. Our shock-tested, energy-efficient and space-saving designs offer significant financial and technical advantages both in the shipyard and at sea. Applications include hydrogen, nitrogen, oxygen reducing stations, gg & dg air start, emergency supply, stop valve block, diver air.

## Cryogenic Ball Valves

1/2" - 6" | -320°F (-196°C) to 400°F (204°C) standard | Down to -423°F (-253°C) - consult IMI PBM

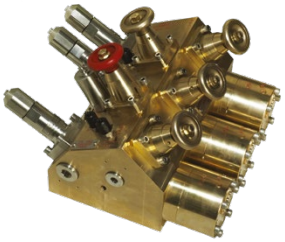
MSS SP-134 Leakage Criteria | API 607 Fire Tested

IMI PBM cryogenic ball valves offer superior reliability and leak performance in the most severe cryogenic applications such as aerospace, air separation and LNG. Available extended weld end valves are designed to be installed without disassembly, saving time, money and minimising fabrication errors. Special Divertor designs allow for increased safety switching with minimal pressure drop.

## Air Independent Propulsion

Max inlet working pressure 320 bar

IMI Truflo Marine's AIP product ranges are specified worldwide for their unique features. Our shock-tested, energy-efficient and space-saving designs offer significant financial and technical advantages both in the shipyard and at sea. Products cover fuel cell distribution station, fuel cell regulating valve, hull isolating refuelling valve. Applications covers hydrogen, nitrogen, oxygen.

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Critical Engineering
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IMI

# Aftermarket Service and Support

## Your trusted partner over the valve lifecycle

Having chosen world-class components, looking after them properly will help operators achieve higher productivity, safety and profitability. IMI Critical is a trusted partner for a wide range of Engineering Procurement Companies (EPCs) and operators, and offers a full range of aftermarket services, including:

- parts, spares and field service
- commissioning, installation and testing of new valves
- managing planned plant outages
- improving plant performance
- upgrades to latest technology available today

Our team of experts includes our renowned Valve Doctors® as well as application engineers with specialist knowledge of a wide range of applications and the most advanced valve technologies.

## Process flow problems? Call an IMI Critical Valve Doctor®

Valve Doctors® are IMI Critical's recognised team of problem solving experts. They love nothing more than to solve a difficult process flow problem, and help customers to optimise plant performance in some of the most demanding industrial processes around the world.

Today, IMI Critical has over 80 Valve Doctors® worldwide. They who combine advanced engineering and technical expertise with industry and application knowledge. As they are in high demand from customers, Valve Doctors® carry out over 1,500 customer visits annually to power, nuclear, oil & gas, and petrochemical plants.

IMI VALVE DOCTOR

To be certified as a Valve Doctor®, engineers undertake a rigorous training programme which can take up to seven years to complete. "It is widely acknowledged as the highest level of application engineering in the severe service industry," says Chris Peterson, IMI Critical's Valve Doctor® Programme Chairman, Global Director of Advanced Engineering Services. The programme covers valve design, plant operation, system layout and control system integration. Training is delivered through traditional classroom tuition, interactive training sessions, online training modules, "hands on" laboratory sessions, and mentoring from an accredited Valve Doctor®.

The Valve Doctor® programme's dedication to developing the next generation of technical experts has helped IMI Critical to attract and retain some of the best engineers in the business.

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