Sundyne

Pumps & Compressors for Hydrogen and Carbon Capture Applications

Sundyne Pumps

Sundyne Compressors

ANSIMAG Sealless Pumps

HMD KONTRO Sealless Pumps

Marelli Bombas

PPI Diaphragm Compressors

SUNFLO

Sundyne's Legacy, Innovation and Total Lifecycle Value
to the H_2 and CCUS Industries

A Legacy of Expertise and Innovation:

HMD KONTRO METALLIC SEALLESS MAGNETIC DRIVE PUMPS

HMD Kontro Sealless Pumps 1947

HMD Kontro pioneers the world's first Sealless Magnetic Drive Pump. Sundyne acquires HMD Kontro in 1994.

1954 Marelli Bombas

Marelli Pumps start manufacturing API 610, 1st edition pumps. Sundyne acquires Marelli in 2008.

MARELLI HEAVY DUTY API 610 CENTRIFUGAL PUMPS

PPI Diaphragm Compressors 1961

PPI introduces triple diaphragm compressor construction with elastomeric seals. Sundyne acquires PPI in 2013.

PPI DIAPHRAGM COMPRESSORS

1963 Sundyne Pumps

Sundyne pioneered the inline-mounted design for the world's first high-head, low-flow centrifugal pump.

SUNDYNE HIGH HEAD LOW FLOW PROCESS PUMPS

Sundyne Compressors 1965

Two years later, compressor designs utilizing high-speed pump gearboxes were created with impeller configurations suitable for gases.

LMC LINE MOUNTED CENTRIFUGAL COMPRESSORS

1985 ANSIMAG Sealless Pumps

Ansimag pioneers ETFE lined Magnetic Drive Pumps. Sundyne Acquires Ansimag ten years later.

ANSIMAG ETFE-LINED MAGNETIC DRIVE SEALLESS PUMPS

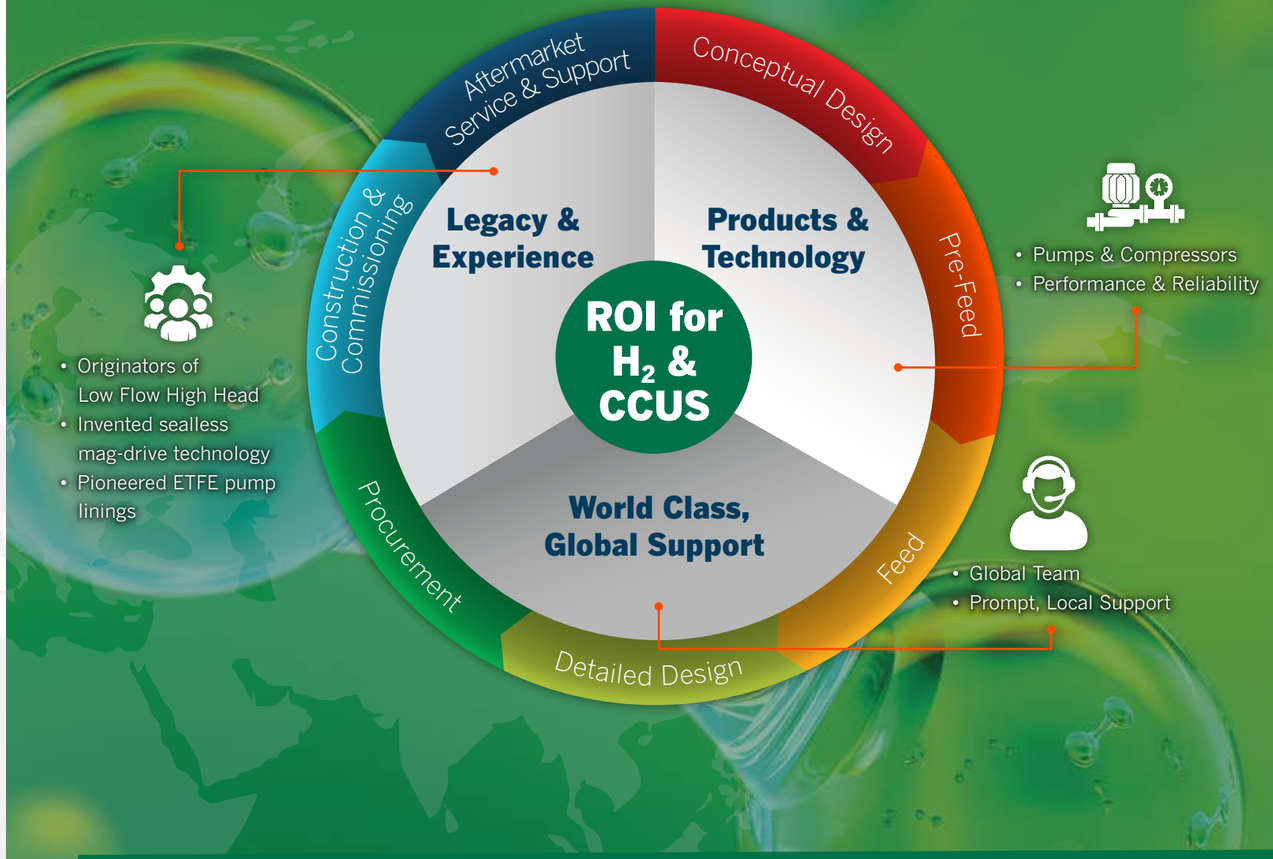
Sundyne Compressors 2002

Sundyne helped write the API-617 spec for integrally geared compressors.

LF MULTI-STAGE CENTRIFUGAL COMPRESSORS

2020 WarburgPincus

Sundyne partners with Warburg Pincus to accelerate growth and enhance business opportunities.



The broad Sundyne product portfolio of pumps & compressors addresses a wide range of H_2 and CCUS applications. The unique Sundyne combination of technology, expertise and support provides a 360 degree, full lifecycle service that spans everything from project pre-feed to comprehensive 24x7 support utilizing a global network of Authorized Service Centers and aftermarket specialists.

H_2 and CCUS Industries Requiring Pumps and Compressors

Power Generation

Hydrogen can be stored, which makes it an attractive complement for balancing fluctuating & intermittent sources of renewable energy. Hydrogen and ammonia can be used in fuel cells, engines and gas turbines to increase power system flexibility. Hydrogen storage and peak shaving reduce emissions.

Refining

Many refineries are starting to use chemically-transformed hydrogen to produce alternative fuels. Today, most of the hydrogen used in refineries is extracted via steam reforming of natural gas.

Transportation

Fuel Cell technology makes industrial vehicles & long haul buses emission free. The hydrogen (H_2) used in vehicles is produced by extracting hydrogen from water (electrolysis) or from natural gas. Methonal and synthetic fuels from green H_2 are also widely used to power electric vehicles.

Chemical Industry

The Chemical & Petrochemical industries have a long history of processing hydrogen to make hundreds (or thousands) of products that people use every day. Hydrogen is also produced as a byproduct of many chemical processes.

Construction / Industrial

Hydrogen can be blended into existing natural gas networks to heat commercial buildings, or high-rise residential buildings.

CCUS

CO_2 Capture: Power plants can capture CO_2 gas from exhaust, and compress/pressurize it to a supercritical liquid state, where it can be sequestered in underground storage areas.

Amine Scrubbing: Many power plants are designed with amine-based Carbon Capture systems, which saturate CO_2 gas streams with water. Amine (and ammonia-based) carbon capture systems compress CO_2 to a supercritical state for transportation and/or storage.

Acid Gas Removal Units (AGRU) remove inert gasses (such as CO_2, hydrogen sulfide and nitrogen) from unprocessed natural gas prior to sale or use. Different AGRU options include amine sweetening, molecular sieves and membrane systems.

H_2 Production

- **Green Hydrogen** is produced by water electrolysis using electricity generated by renewable sources (solar/wind, etc).
- **Grey Hydrogen** via steam methane reforming. High-temperature steam and catalysts mixed with methane/natural gas produce hydrogen (and a small amount of CO_2).
- **Blue Hydrogen** comes from the same steam methane reforming process, but the resulting CO_2 emissions are captured and stored.

H_2 Transportation and Storage

Hydrogen is the lightest element on earth. The mass of one gallon of gasoline is 2.75 kg, but one gallon of hydrogen has a mass of only 0.00075 kg (at 1 atm pressure and 0°C). To transport hydrogen, it must be pressurized and delivered as a compressed gas or liquefied.

- Trucks/Tube Trailers: Gaseous hydrogen is produced at around 20–30 bar. For short distance and small volume transport, it must be compressed to 180 bar (~2,600 psig) or higher. At that point, it can be loaded into cylinders that are hauled by trucks.
- For higher volumes and longer distances, hydrogen is compressed to even higher levels and transported via pipeline. Today, there are more than 1,600 miles of hydrogen pipelines operating in the United States.

Sundyne Products

	SUNDYNE COMPRESSORS			SUNDYNE PUMPS								
	PPI	Sundyne Compressors	Sundyne Compressors	Sundyne Process Pumps	Sundyne Process Pumps	Sundyne Process Pumps	Marelli Bombas	Marelli Bombas	Marelli Bombas	ANSIMAG	HMD KONTRO	SUNFLO
												
	Diaphragm Compressors with API 618 Option	Fit-for-Purpose Line Mounted Centrifugal Compressors	API 617 Centrifugal Multi-Stage Compressors	API 610 OH3, OH5 Direct Drive Pumps	API 610 OH6 Integrally Geared Pumps	HMP Horizontal Multi-Stage Pumps	General Duty Process ISO Chemical Pumps	API 610 BB1, BB2, BB3 / ISO Centrifugal Pumps	API 610 VS1, VS2, VS4, VS6 / ISO Vertically Suspended Pumps	Ansimag ETFE Lined Magnetic Drive Sealless Pumps	HMD Kontro Metallic Magnetic Drive Sealless Pumps	Sunflo Industrial Grade Pumps
Hydrogen	**Sundyne Compressors**			**Sundyne Pumps**								
Hydrogen Processing	✔	✔	✔		✔		✔				✔	
Hydrogen Refueling	✔										✔	
Ammonia	✔	✔	✔	✔	✔	✔			✔		✔	
Glycol Dehydration							✔				✔	
Electrolyzers	✔	✔	✔				✔	✔	✔	✔	✔	✔
Steam Methane Reforming		✔	✔		✔		✔	✔	✔			✔
Power-to-X	✔				✔		✔	✔	✔		✔	✔
Transportation (Truck/Pipeline)	✔											
CCUS	**Sundyne Compressors**			**Sundyne Pumps**								
CO_2 Capture		✔	✔	✔	✔	✔		✔	✔			
NOx Suppression				✔	✔	✔						✔
Amine Scrubbing		✔	✔	✔		✔		✔		✔	✔	✔
CO_2 Injection			✔			✔	✔	✔	✔			
Storage		✔	✔									
CO_2 Utilization		✔	✔									
Renewables	**Sundyne Compressors**			**Sundyne Pumps**								
Renewable Diesel/Ethanol		✔	✔	✔	✔			✔	✔	✔	✔	
Battery Production	✔									✔	✔	
Lithium Ion Battery Production										✔	✔	
Solar (Circulation Pumps)							✔	✔	✔		✔	

Sundyne Products

Diaphragm Compressors For Environmentally Safe & Leak-Free Processing of H_2 & Critical Gases

Sundyne's PPI diaphragm compressors deliver non-contaminating gas compression, through a leak-tight mechanism with static seals that do not need to be purged or vented. A set of metallic diaphragms isolates the process media from the piston & piston rings to completely eliminate the risk of cross contamination. Sundyne's PPI compressors present zero leakage threat to the atmosphere and zero contamination of the gas, providing an ideal solution for safely handling ultra-pure, corrosive and volatile gases. Built to comply with API 618 standards, these machines are customized to meet the compression ratio & capacity of unique customer applications.

PPI by Sundyne

Applications:

- Hydrogen
- Fluorine
- Hazardous gases
- Corrosive gases
- Fuel Cells
- Electrolyzers
- CO_2
- Silicon Manufacturing
- Gases in food industry

Performance Characteristics:

	Product	Pressure	Temperature
	**9000 Series**	8,000 psi (550 bar)	450°F (232°C)
	**7000 Series**	8,000psi (550 bar)	450°F (232°C)
	**4000 Series**	16,750 psi (1,155 bar)	450°F (232°C)
	**2000 Series**	15,000 psi (1,035 bar)	475°F (246°C)

Every PPI compressor is designed and tested in the factory to meet each customer's specific service & operating parameters. **PPI's 8000 hours of service** interval (MTBO) vastly exceeds any other diaphragm compressor.

- **High Compression Ratio:** PPI diaphragm compressors are designed to meet the pressures required by mobility applications and industrial de-carbonization projects
- **Product Purity:** PPI compressors feature triple diaphragm sets which ensure that the process gas is isolated from the hydraulic oil, providing absolute process purity
- **Environmental Safety:** The static seals in PPI compressors ensure zero leakage of process gas to the atmosphere
- **Leak Detection System:** Sundyne PPI originated the O-ring seal system for leak detection that has become the industry standard

API 617, 618 Centrifugal Compressors for H_2 and CCUS Applications

Compressors are the heart of H_2 Processing and CCUS applications – because their reliability directly impacts productivity & efficiency. NACE- compliant Sundyne compressors handle the most difficult gas processing conditions. Sundyne compressors can be built specifically to meet API standards, and each is designed to provide pulsation & vibration free operation while delivering oil-free gas compression with zero emissions.

Performance Characteristics:

	Product	Flow	Pressure	Max Speed	Temperature
Single-Stage Centrifugal Compressors					
	**Sundyne LMC** Line Mounted Vertical Integrally Geared Compressors	3,550 acfm (6,000 m³/hr)	1,450 psi (100 bar)	34,200 rpm	-200 to 500°F (-130 to 260°C)
	**Sundyne BMC** Base Mounted Integrally Geared Compressors	3,550 acfm (6,000 m³/hr)	1,450 psi (100 bar)	34,200 rpm	-200 to 500°F (-130 to 260°C)
Multi-Stage Centrifugal Compressors					
	**LF 2000** API 617 ISO 10439 Integrally Geared Multi-Stage (1-6) Compressors	10,000 acfm (17,000 am³/hr)	5,000 psi (350 bar)	42,000 rpm (60 Hz), 42,000 rpm (50 Hz)	-200 to 500°F (-130 to 260°C)

Sundyne horizontally configured compressors are ideal for skid packaging, due to their small footprint & unique modular baseplate. Sundyne multi-stage compressors can provide 1-6 stages of centrifugal compressors on a single gearbox – saving valuable space while also reducing energy costs. Sundyne gas compressors provide the performance envelope, the feature set, the reliability ratings and the uncompromising efficiency needed to address the Best Efficiency Point (BEP) for any process gas application. They are designed to run continuously for 5 years without the need for costly maintenance or overhauls.

Sundyne Compressors

Single- & Multi-Stage Compressor Applications

- Hydrogen Processing
- CO_2 Capture
- AGRU
- Amine Scrubbing
- Mole sieve dehydration
- Regeneration of the demethanizer
- Waste gas
- Specialty chemical production
- LNG & NGL
- Ammonia

Sundyne Products

ANSIMAG Sealless Magnetic Drive ETFE Lined Pumps for Safe Chemical Processing

ANSIMAG sealless magnetic drive pumps are specifically designed for chemical processing applications. All wetted parts are molded fluoropolymer materials combined with SiC (Silicon Carbide) bearings that safely handle a wide range of corrosives and solvents (up to 250°F/121°C) without corrosion. A patented, fully Encapsulated Mag Drive hermetically seals the inner magnets to isolate them from process fluid and maintain magnet integrity for the life of the unit. A fiber reinforced vinyl ester shell delivers unprecedented reliability.

ANSIMAG by Sundyne

Water Transfer and pH Control:

- Sodium hypochlorite
- Sodium hydroxide
- Sulfuric acid
- Ferric Chloride

Battery Manufacturing:

- Sulfuric acid
- Potassium hydroxide
- NMP

Other Industries:

- Chemical Processing
- Mining
- Pulp & Paper

Performance Characteristics:

	Product	Flow	Head	Pressure	Temperature
	**ANSIMAG K+**	Up to 675 gpm (153 m³/hr)	Up to 320 ft (97 m)	285 psi (19.6 bar)	-20 to 250°F (-29 to 121°C)
	**ANSIMAG KF**	1,470 gpm (334 m³/hr)	520 ft (110 m)	350 psi (24 bar)	-20 to 250°F (-29 to 121°C)
	**ANSIMAG KV** Vertical	325 gpm (74 m³/hr)	325 ft (69 m)	285 psi (19.6 bar)	-20 to 250°F (-29 to 121°C)
	**ANSIMAG ALI** ISO Design	285 gpm (65 m³/hr)	150 ft (32 m)	285 psi (19.6 bar)	-20 to 250°F (-29 to 121°C)
	**ANSIMAG KM**	147 gpm (33 m³/hr)	140 ft (30 m)	150 psi (10.3 bar)	-20 to 250°F (-29 to 121°C)

ANSIMAG pumps are more energy-efficient than mechanically sealed pumps. An innovative rear casing generates no eddy currents thus eliminating heat generation and reducing energy costs. Because ANSIMAG pumps do not have seals – there are no leaks, no emissions and no costs related to seal maintenance.

ANSIMAG Benefits Specific to H_2 Applications:

- **Zero Leakage** – Sealless design and a single, fully-contained O-ring eliminates possible leakage.
- **Chemically Resistant Lining** – Carbon Fiber reinforced ETFE is resistant to most chemicals.
- **Secondary Containment** – Lined Fiber/Epoxy containment shell offers unsurpassed pressure handling capability.
- **Corrosion Protection** – Powder Coat exterior is more durable and chemically resistant than Epoxy based paints.
- **Durable Construction** – Ductile iron exterior is designed for heavy-duty chemical applications.
- **Magnetic Drive** – Hermetically seals the inner magnets, isolating them from the process fluid.
- **Fully-Encapsulated Inner Drive** – Provides unsurpassed resistance to chemical attack.
- **Easy Service** – Only 9 wetted parts and a back pull-out design enables service without breaking the wet end.
- **Small Footprint** – Close coupled design offers quiet operation.

HMD Kontro Sealless Magnetic Drive Pumps meet all ISO and ASME Pump Standards

Since pioneering the first magnetic drive pump in 1947, HMD Kontro has been at the forefront of sealless pump engineering and manufacturing. For the safe and efficient transfer of toxic, corrosive, carcinogenic, aggressive and high temperature liquids, a wide range of HMD Kontro Sealless Magnetic Drive Pumps are available in Stainless Steel and other metallurgies including Alloy 20 and Alloy C276, to meet a variety of chemical processing needs. Pumps designed to ASME and ISO standards include:

Performance Characteristics:

	Product	Flow	Head	Pressure	Temperature
	**GTA/GTI** Horizontal Metallic Sealless General Transfer	Up to 115 gpm (26 m³/hr)	Up to 125 ft (38 m)	275 psi (18.9 bar)	-40 to 500°F (-40 to 260°C)
	**CSA/CSI** Chemical Service	Up to 340 gpm (77 m³/hr)	Up to 296 ft (90 m)	275 psi (18.9 bar)	-40 to 500°F (-40 to 260°C)
	**GSA/GSI** Horizontal Metallic Sealless Engineered General Service	Up to 1420 gpm (320 m³/hr)	Up to 485 ft (150 m)	275 psi (18.9 bar)	-40 to 600°F (-40 to 315°C)
	**HPGS** High Pressure General Service	Up to 317 gpm (72 m³/hr)	Up to 305 ft (93 m)	2,680 psi (185 bar)	-40 to 500°F (-40 to 260°C)
	**SPGS** Horizontal Metallic Sealless Self-Priming	Up to 200 gpm (45 m³/hr)	Up to 170 ft (52 m)	145 psi (10 bar)	-40 to 248°F (-40 to 120°C)

Pumping toxic chemicals presents health & safety risks to personnel and the environment. HMD sealless pumps are designed to handle hazardous, toxic, corrosive and aggressive liquids with zero leaks or emissions. HMD pumps are easy to maintain, have fewer working parts, no potential leak paths and no seal support systems to maintain. Maintenance is simple, and lifecycle costs are lower than mechanical sealed pumps. HMD pumps meet all industrial regulations, including ISO, API, ASME, ANSI, DIN and ATEX.

HMD Kontro Pumps are Specifically Designed for H_2 Applications:

- **Total Product Containment** – no leaks or emissions improving operator safety and environmental protection.
- **No seals or seal support systems to replace or maintain** – reduces total lifecycle costs.
- **High efficiency hydraulics** – covers a wide range of duty requirements.
- **Maximized component interchangeability** – minimizes parts inventory.
- **Small footprint** – close-coupled options available across all CPI pump ranges.
- **Easy to install, commission, operate and maintain** with no requirements for special tools.
- **Secondary Control & Containment options available** for enhanced protection in highly hazardous applications.
- **High corrosion resistance with standard 316SS construction with alternative metallurgies** available on request to meet specific application needs.
- **Robust construction and fully encapsulated magnets** ensuring longevity in extreme pumping environments.
- **Compliance to industry standards** including ASME B73.3, ISO 2858 and IECEx.
- **Zeroloss Shell option available for selected pump ranges** to increase efficiency and reduce running costs.
- **Customized solutions available** to meet specific application needs for MAWP, materials and duty requirements.

HMD Kontro Sealless Pumps by Sundyne

Water Transfer and pH Control:

- Sodium hypochlorite
- Sodium hydroxide
- Sulfuric acid
- Ferric Chloride

Green Hydrogen Electrolyzers:

- Potassium hydroxide

Battery Manufacturing:

- Sulfuric acid
- Potassium hydroxide
- NMP

Other Industries:

- Chemical Processing
- Mining
- Pulp & Paper

Sundyne Products

Sundyne API 610 and API 685 Direct Drive Pumps Save Space & Bring Unprecedented Reliability to H_2 and CCUS Processing Applications

Sundyne direct drive pumps are known for their reliability and space saving design. The direct drive family of vertical inline, single stage, overhung pumps features a close coupled design (OH5) or a separate bearing bracket (OH3) with a flexible shaft coupling to accommodate multiple motor options. Each direct drive pump is designed specifically to handle H_2 and CCUS applications at their best efficiency point, in a manner that maximizes reliability and enhances tolerance to normal system variations.

Sundyne Pumps

Common Sundyne OH3 and OH5 Pump Applications in H_2 and CCUS Processing

- Hydrogen Processing
- Hydrogen Refueling
- Ammonia
- Glycol Dehydration
- Electrolyzers
- Steam Methane Reforming
- Power-to-X
- Transportation (Truck/Pipeline)
- CO_2 Capture
- NOx Suppression
- Amine Scrubbing
- CO_2 Injection
- Storage
- CO_2 Utilization

Performance Characteristics:

	Product	Flow	Head	Pressure	Temperature
	**LMV 803Lr** Ultra-Low NPSH Direct Drive Centrifugal Pump	Up to 800 gpm (182 m^3/hr)	1,080 ft (268 m)	400 psi (28 bar)	-200 to 400°F (-129 to 204°C)
	**801 CS** Cartridge Seal Direct Drive Pump	Up to 380 gpm (86 m^3/hr)	720 ft (220 m)	875 psi (60 bar)	-40 to 300°F (-40 to 149°C)
	**LMV 801** Direct Drive Pump	Up to 380 gpm (86 m^3/hr)	720 ft (220 m)	1000 psi (69 bar)	-200 to 650°F (-130 to 340°C)
	**LMV-801S** Vertical OH4-style Low-Flow Metallic Sealless API 685	Up to 380 gpm (86 m^3/hr)	720 ft (220 m)	580 psi (40 bar)*	-148 to 400°F (-100 to 205°C)

** Higher pressures available on request*

Each pump in the series features a single-stage centrifugal design with single, double or tandem seal arrangements as well as select API 682 cartridge seal configurations for reliable service in the most difficult applications. In the LMV-801S, Sundyne has combined the industry-leading hydraulics of the Sundyne direct-drive pumps with HMD Kontro magnetic drive technology to offer sealless magnetic drive pumps that comply with both API-685 and API-610 standards. These pumps are engineered to eliminate product emissions and improve personnel safety without compromising performance and industry leading reliability.

Sundyne Heavy Duty Single & Multi Stage Integrally Geared API Pumps

Sundyne API 610, OH6 Integrally Geared Pumps are engineered for critical high-head, low-flow, heavy-duty services required in the hydrocarbon processing industries. Sundyne's unique design optimizes efficiency, curve shape, NPSH, runout horsepower and radial loading to provide economical & reliable operation through various combinations of impeller, diffuser and inducer geometry. Available in vertical or base-mounted configurations, Sundyne's single-stage integrally-geared pumps offer multi-stage performance from a single-stage unit.

Performance Characteristics:

	Product	Flow	Head	Pressure	Temperature
Single-Stage Integrally Geared					
	**LMV 3XX OH6** Integrally Geared Pump	Up to 1,040 gpm (236 m^3/hr)	6,300 ft (1,921 m)	1000 psi (69 bar)	-200 to 650°F (-130 to 340°C)
	**BMP 338** Integrally Geared Pump	Up to 1,100 gpm (250 m^3/hr)	2800 ft (854 m)	500 psi (34 bar)	200 to 650°F (-130 to 340°C)
Multi-Stage Integrally Geared					
	**HMP 7000** Multi-Stage Integrally Geared Pump	Up to 1800 gpm (410 m^3/hr)	14,500 ft (4,420 m)	1000 psi (69 bar)	-200 to 500°F (-130 to 260°C)

Sundyne API 610 heavy duty multi-stage integrally-geared pumps are engineered for extremely high-head services, such as processing **fertilizer**, **PTA** and **urea**. Unlike conventional multi-stage pumps, Sundyne computer tailored hydraulics place the B.E.P. at the rated point – resulting in optimum efficiency, minimum recirculation and minimum vibration. An added benefit is reduced end-of-curve horsepower, allowing for reduced driver sizing and a smaller footprint.

Sundyne Pumps

Single–Stage Pump Applications

- Acid feed
- Acid recirculation
- Olefin charge
- De-propanizer charge
- Polypropylene feed
- Reflux pumps
- Overhead
- Sour water
- Wash down
- Bottoms pumps

Multi-Stage Pump Applications

- Fertilizer
- PTA-Purified Terephthalic Acid
- Urea

Sundyne Products

Marelli Heavy Duty API 610 and ISO Process Pumps

Process engineers utilize Marelli heavy duty API pumps for H_2 and CCUS applications requiring high-pressure and/or high flow. The pumps are efficiently designed to save energy and meet exacting API 610 and ISO 13709 standards for overhung, between-bearings and vertically-suspended centrifugal pumps. Marelli multi-stage pumps are capable of reaching flow rates as high as 66,000 gpm (15,000 m³/hr) with high pressures.

Marelli Bombas by Sundyne

Applications

- Hydrocracking
- Topping
- Gas Condensate
- HDS
- Merox LPG
- Amine
- Sour Water Stripper
- Coker
- Tank Farms
- Fertilizers
- Oil fields and terminals
- Synfuels
- Raw Water Intake
- Desalination
- Reverse osmosis
- Condensate Extraction
- Boiler Feed Water
- Cooling Towers
- Irrigation
- Water Transfer

Performance Characteristics:

	Product	Flow	Head	Pressure	Temperature
	**API 610 OH2** Horizontal Single or Double Volute Centrifugal Pump Centerline Mounted	Up to 7,000 gpm (1,280 m³/hr)	1,200 ft (265 m)	551 psi (38 bar)	-238 to 842°F (-150 to 450°C)
	**API 610 BB1** Centrifugal Pump Axially Split Case 1 or 2 stages	Up to 27,298 gpm (4,905 m³/hr)	600 ft (200 m)	130 psi (9 bar)	-22 to 302°F (-30 to 150°C)
	**API 610 BB2** Centrifugal Pump Radially Split Case 1 or 2 stages	Up to 13,208 gpm (2,300 m³/hr)	1,640 ft (350 m)	290 psi (20 bar)	-22 to 752°F (-30 to 400°C)
	**API 610 BB3** Multi-stage Centrifugal Pumps	Up to 2,460 gpm (600 m³/hr)	4,260 ft (1,300 m)	232 psi (16 bar)	-40 to 410°F (-40 to 210°C)
	**ND Model** ISO 5199/2858	Up to 5,468 gpm (1000 m³/hr)	680 ft (150 m)	290 psi (20 bar)	-58 to 480°F (-50 to 250°C)
	**API 610 VS1, VS2, VS4, VS6** Vertically Suspended, Single/Double Volute Single or Multistage Centrifugal Pumps	Up to 13,280 gpm (2,400 m³/hr)	1,640 ft (350 m)	290 psi (20 bar)	-22 to 752°F (-30 to 400°C)

Originally manufactured under the Marelli Bombas brand in Spain, these pumps feature rugged and low vibration balanced rotor designs. The global installed base of Marelli pumps is more than 10,000 units, and many have been running for decades.

Marelli Pumps are Well-Suited to H_2 and CCUS Applications:

- Designed for higher efficiency, with a wide variety of hydraulics to match exact duty points.
- Highly maintainable and replaceable wear rings to reduce overall life cycle costs.
- Multiple impeller options in each hydraulic pump casing for maximum efficiency.
- Labyrinth bearing seals to avoid external contamination and to maximize seal life.
- Wide variety of instrumentation options for monitoring key operational parameters.

Fit-for-Purpose, Industrial Grade Pumps Offer the "Right Pump at the Right Price" for H_2 and CCUS CPI Applications

API specifications define safety & reliability standards for process pumps – mostly those used in refineries and petrochemical plants. Pumps adhering to these specifications are more expensive than other pumps, because they're designed for supreme quality and redundancy in many cases. Not every application requires this level of redundancy, packaging & documentation – and full adherence to API standards can result in a pump that is "over spec'd" for the application. How do operators address the needs for highly reliable, high pressure pumps, without having to pay for all the "bells & whistles" that come with an API pump? The answer is Industrial Grade Pumps.

Performance Characteristics:

	Product	Flow	Head	Pressure	Temperature
	**Sunflo P 3400** Industrial Grade Pump	Up to 550 gpm (125 m³/hr)	Up to 5,280 ft (1,609 m)	350 psi (24 bar)	-50 to 350°F (-46 to 177°C)
	**Sunflo P 3000** Industrial Grade Pump	Up to 500 gpm (114 m³/hr)	Up to 4,200 ft (1,280 m)	350 psi (24 bar)	-50 to 350°F (-46 to 177°C)
	**ANSIMAG KM**	147 gpm (33 m³/hr)	140 ft (30 m)	225 psi (15.5 bar)	-20 to 250°F (-29 to 121°C)
	**SundWASH** High Pressure Wash-down System	Up to 50 wands @7 gpm each (50 X 1.6 m³/hr)		900 psi (62 bar)	

All of the pumps in Sundyne's Industrial, Fit-for-Purpose family leverage Sundyne's field-proven high pressure impeller technology that is optimized to deliver high head. Each pump leverages the legacy of Sundyne's heavy duty API integrally geared pumps to create industrial grade pumps that save energy through efficient high-pressure pumping. The impellers on all of the Sunflo pumps feature unique suction inducer technology, which is optimized to deliver low NPSH and eliminate pump cavitation. These pumps all feature compact footprints, and are readily available for less than the cost of API 610 pumps.

SUNFLO® by Sundyne

ANSIMAG by Sundyne

Applications

- Boiler Feed pumps
- Condensate pumps
- Wash water pumps
- Cleaning Systems
- Dust Suppression
- NOx Suppression
- Water Treatment
- pH Control & Disinfection
- EV Battery Production
- Freeze Drier Coolant
- Vaccine Production

Environmentally Safe & Leak-Free Processing of Critical Gases and Liquids

Sundyne collaborates with customers to manufacture customized systems that are optimized for the pressure, molecular weight, heat, corrosion and velocity of each customer's application. Sundyne's engineers ensure that all working components are designed, manufactured & tested to minimize wear, eliminate leaks and reduce corrosive effects.

For Diaphragm Compressors:

All Sundyne compressors are designed to deliver higher purity gas compression. Diaphragm compressors are the preferred design when it comes to handling Hydrogen, for the following reasons:

- **Product Purity:** The diaphragm acts as a secure border between the process gas (hydrogen) and the compressor's hydraulic fluids. PPI compressors feature triple diaphragm sets which ensure absolute process purity. This is critical for H_2 applications (such as fuel cells), because even the slightest contamination can ruin the process.
- **Environmental Safety:** The static seals in Sundyne compressors ensure zero leakage of process gas to the atmosphere, and Sundyne's leak detection systems immediately detect potential failures. Sundyne compressors are designed to meet API standards and they also meet the various requirements for explosion-proof environments.

For Pumps:

While pumps utilizing mechanical seals play a key role in many applications, it's no secret that almost 85% of pump failures start with seal leaks that cause problems elsewhere in the pump. Sealless pumps eliminate the seal and associated support systems, providing an economical, reliable and leak-free solution for handling toxic or hazardous liquids.

Sundyne's Magnetic Drive Sealless Pumps offer the following 10 advantages:

1. No seals & no seal support systems
2. Complete fluid containment
3. Zero product emissions
4. Reduced installation costs
5. Reduced maintenance costs
6. Longer MTBF intervals
7. Maintenance time/skills can be used elsewhere
8. No EPA monitoring/documentation
9. Improved operator safety
10. Protection for the environment

What are the Benefits of Sealless Pumps?

- Significantly cheaper installation costs
- Compact footprint with no alignment issues
- No seal support system and utilities
- Less instrumentation
- Higher MTBF
- Less maintenance & lower total cost of ownership
- No product leakage
- Zero environmental impact

100% Leak Free Handling of Critical Gasses & Liquids Ensures Product Purity and Enhances Safety without Compromising on Performance

The Value of Engineered Solutions

Sundyne's engineers have learned a lot over the last 60 years – providing pumps & compressors to thousands of customers in the process industries. Today, this expertise is applied to pump & compressor designs that are specifically tailored to each customer's application, delivering unmatched performance & reliability.

Consultative Selling Approach:

- Sundyne listens carefully to customers
- Identify pain points
- Customized solutions – tailored to each application's flow, head, temperature and corrosion resistance requirements

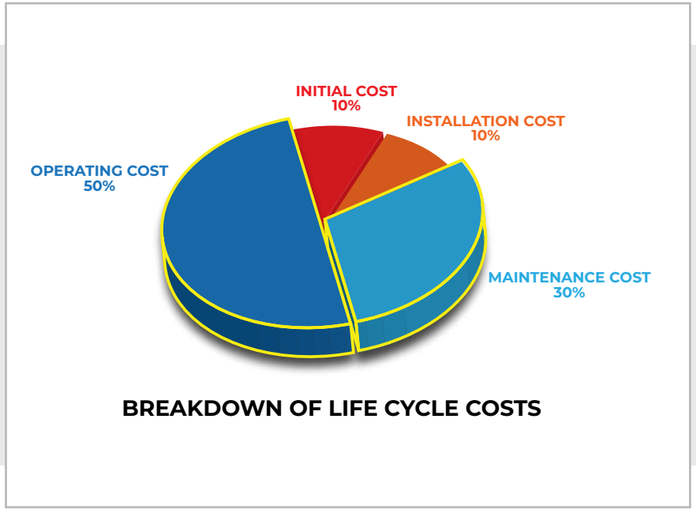
Comprehensive Portfolio to Address any H_2 and CCUS Application:

- Pumps & compressors
- Diaphragm and/or Centrifugal Compressors
- Industry's widest range of sealless pumps (including HMD & ANSIMAG)
- Sealed pumps in single, double, tandem or cartridge seal configurations
- Metal or ETFE materials of construction
- Sized to deliver any flow or head requirements
- Compact footprints

Sundyne equipment is manufactured to specific customer requirements to deliver optimized performance and longer MTBM.

Uncompromising Reliability:

- Sized specifically to run at BEP
- Corrosion resistant materials of construction
- Secondary containment options
- Less maintenance & significantly longer MTBM intervals
- Most maintenance can be done by one person, with one wrench in less than one hour



BREAKDOWN OF LIFE CYCLE COSTS

Efficiency Minimizes Total Cost of Ownership:

- Efficient designs enable smaller motors to be specified
- > 50% of lifecycle costs are operating costs
- > 30% of lifecycle costs are maintenance costs

Precision Manufacturing:

- Made in the USA, UK, France and Spain
- Short delivery times
- Comprehensive testing – ensures no surprises and limited adjustments once deployed

Performance Tailored to Your Process

When it comes to handling H_2 and CO_2, Sundyne's engineered solutions set the standards for reliability, efficiency and safety – resulting in lower total lifecycle costs and uncompromising performance.

ESG for the Processing Industries

ESG (Environmental Social & Corporate Governance) Practices are Vital to Every Industry

Everyone understands the need for safety, sustainability and the responsibility that comes with being an environmental steward. Sundyne's technology plays a central role in hundreds of applications that impact the environment on a daily basis, and Sundyne's ES&G commitment is stronger than ever.

Sundyne pumps & compressors are used in sustainable applications that help the environment, such as:

Cleaner Power

- Fuel Gas Boost
- Amine scrubbing
- CO_2 CCUS
- NOx reduction
- Hydrogen blending

Hydrogen Powered Vehicles

Production, storage, transport & compress Hydrogen to levels required by industrial vehicles

Renewable Diesel

Sundyne Pumps and Compressors move the feedstocks needed for green diesel refining.

Electric Vehicle Batteries

Sundyne Sealless Pumps handle the polymers used to coat the electrodes on Lithium Ion Battery cells

Vaccines & Biologics

- Handle the chemical catalysts used in thousands of pharmaceutical processes
- Pump coolants to freeze driers that store COVID-19 vaccines

Sustainable Agricultural

Optimize the efficiency of:

- Fertilizer production
- Urea production

Sundyne's ESG efforts go far beyond these high-profile examples.

They're also found in everyday items such as:

- **Energy Efficiency** – The Sundyne legacy of highly engineered and efficient hydraulic designs results in low pump and compressor life cycle cost and energy savings.
- **Chemical Security** – Sundyne Sealless pumps eliminate leaks, and all of its products are available in materials of construction that can resist corrosion of chemical attack.
- **Employee Health & Safety** – Sundyne's track record for handling harsh chemicals in a safe manner dates back more than 60 years.
- **Uncompromising Reliability** – Sundyne's pumps & compressors do their part to prevent unplanned plant downtime, as each product is designed to run for years in a safe & reliable manner.

Sundyne's uncompromising reliability is not just a function of superior design. It's also delivered by high-touch services at commissioning, through planned turnarounds, and at every step of the way to ensure reliable day-to-day operation for years. With manufacturing operations and Authorized Service Centers (ASC) around the globe, Sundyne provides prompt & local support to keep customers up-and-running.

- Free Site Audit
- Establish Running Parameters
- Perform Equipment Health Checks
- Upgrade Options
- Optimize Stock Holding

Site Surveys

- Insure High Quality Standards
- Access to Repair Specialists
- Warranty Protection
- 24-Hour Support
- Peace of mind
- Site-specific Critical Spares Recommendations

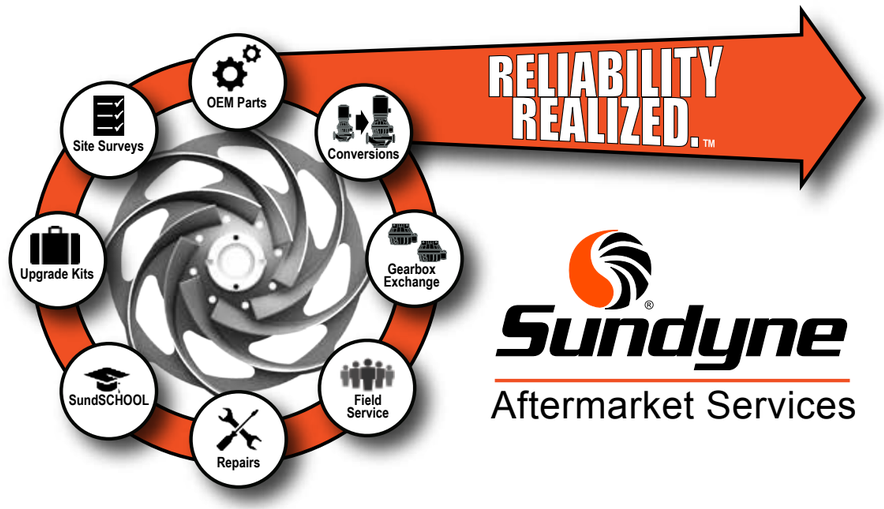
OEM Parts

- Improve MTBR
- Process Changes
- Seal Arrangements
- Sealed to Sealless
- Nikkiso to Sundyne

Conversions

- Reduced Inventory
- Maximize Resources
- MRO Savings
- Fast & Easy, Upgrade
- Sundyne Gearbox Re-Rate
- Extended Warranty

Gearbox Exchange



Sundyne®
Aftermarket Services

Field Service

- Troubleshooting
- Site Survey
- Service Agreements
- New Unit Commissioning
- Best Practices
- Extend Unit Life
- Maximize Up Time

Repairs

- Global Coverage, Local Support
- Overhaul & Repair
- Authorized Repair Specialists
- Authorized Service Centers

Upgrade Kits

- Sundyne 3XX Gearbox
- RAK (Reliability Assurance Kit)
- Zeroloss Shell upgrade for HMD Kontro sealless pumps
- Secondary Control / Containment upgrade for HMD Kontro sealless pumps
- Modular Bearing Housing upgrade for HMD Kontro sealless pumps

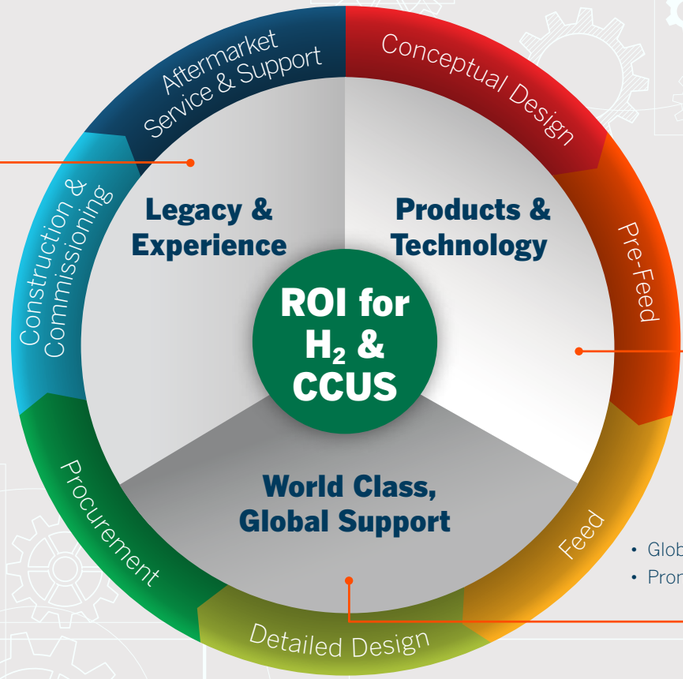
SundSCHOOL

- Maintenance & Operations Arvada, CO USA Factory
- Maintenance & Operations Dijon, France Factory
- On-Site Maintenance & Operations School

Sundyne's Value Proposition for Hydrogen & CCUS Applications

For decades, Sundyne has worked extensively with many of the world's largest power plants, refineries and manufacturers that use hydrogen as part of their process. During this time, Sundyne has pioneered many of the technologies that are commonplace today. Sundyne's commitment to the hydrogen processing and CCUS markets is stronger than ever, through a unique combination of technology, support and expertise that provides a **total product lifecycle, 360° service**, from the pre-feed process – to comprehensive 24X7 aftermarket support.

Total Product Lifecycle, 360° Service



- Originators of Low Flow High Head
- Invented sealless mag-drive technology
- Pioneered ETFE pump linings

- Pumps & Compressors
- Performance & Reliability

- Global Team
- Prompt, Local Support

When it comes to Hydrogen, CCUS and Renewable applications, Sundyne is the **Safer, Better, Best** choice.

Safer for Operations
Better for the Environment
Best Total Lifecycle Value

For more information please visit www.sundyne.com and fill out the Contact Me form. A Sundyne representative will contact you.

Sundyne®

Sundyne Headquarters:
Sundyne, LLC
14845 West 64th Avenue
Arvada, Colorado 80007 USA

marketing@sundyne.com
Phone: 1 303 425 0800
Fax: 1 303 425 0896
www.sundyne.com

Dijon, France
Eastbourne East Sussex, UK
Madrid/Toledo, Spain
Tokyo, Japan
Pune, India