



Pressure Swing Adsorption (PSA) Systems  
for Ultra-Pure Hydrogen Recovery

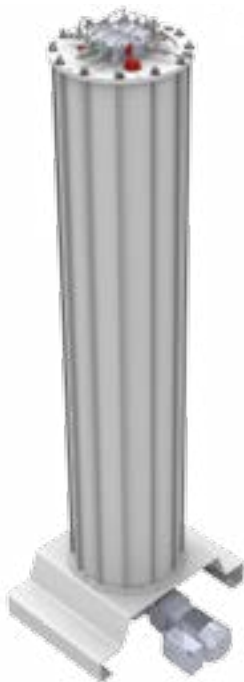
Xebec's H-Series features the most compact, economical and reliable PSA systems available today, efficiently purifying hydrogen — containing reformat, petrochemical process gas streams, and refinery off-gas streams to pure and ultra-pure hydrogen. The H-Series units have minimal pressure drop; remarkable uptime performance; are simple to install and operate; and occupy a fraction of the footprint of conventional systems.

### Technology

Steam reforming and other hydrogen-containing off-gas streams typically contain gases such as water vapour, carbon dioxide, carbon monoxide, methane, nitrogen and other trace gases. Xebec's PSA H-Series remove these contaminants in the adsorber bed at feed pressure. Virtually pure hydrogen passes through the bed with minimal loss in pressure. The impurities are desorbed from the bed as the pressure is reduced to the PSA exhaust pressure. This PSA process is completely reversible and repeats to provide continuous flows, splitting the mixed-feed flow into purified product and exhaust flows. The exhaust gas is typically used as the primary fuel input to the hydrogen-generating reforming process or other fuel, making it a very efficient, integrated process.

### H-3300 with G1 Rotary Valve

- For low throughput fuelling needs like hydrogen refuelling stations
- Max operating pressure of 175 psig/12 barg
- Feed flow capacity from 2 to 28 scfm/3 to 45 Nm<sup>3</sup>/h



G1 Rotary Valve



H-3100



H-3200 MODELS

## Specialists in Low to Medium Flow Rate

### Proprietary PSA Advantages:

- ✓ **Compact**  
Fast PSA cycle allows adsorber vessels to be 5-15 times smaller than a conventional PSA
- ✓ **Skid Mounted, Pre-loaded with Adsorbents**  
Unlike conventional PSAs, field-erection and adsorbent loading are not required for installation.
- ✓ **Highly Reliable Rotary Valves (typically <1 RPM)**  
Long seal wear life, with 5-year intervals between servicing
- ✓ **Advanced PSA Adsorption Bed Design**  
Triple equalization PSA cycle, mechanically set to ensure the optimal cycle design
- ✓ **Single Input for Rotary Valve and PSA Cycle Speed**  
Simple to operate and requires minimal signals
- ✓ **Optimal Process Cycle Design**  
Gradual gas flow changes result in very long adsorbent life



H-3200



CRN



PED

GB



CE

### Applications

- Hydrogen Fuel Cells
- Petroleum Refineries
- Chemical Plants
- Metal Production
- Edible Oils
- Steam Reformer
- Ethylene Off-gas
- Methanol Off-gas
- Syngas
- Coke Oven Gas

### Service and Support

- Global engineering and design experience for specific requirements and codes
- System feasibility and optimization studies
- PSA only or full gas treatment engineering and procurement solutions
- Short delivery times to meet tight project schedules
- Supervision on installation and commissioning
- Technical training programs for integrators and operators
- Product and engineering support throughout the life of the unit/plant

### H-3100

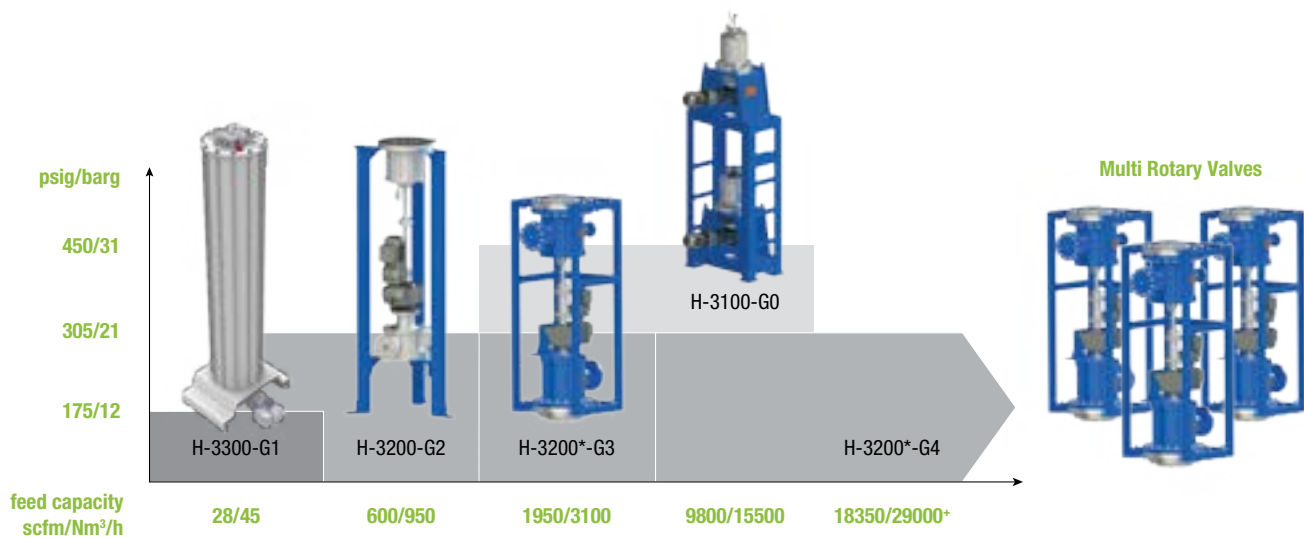
When it comes to lowest cost of ownership, the H-3100 has no match. The most compact, economical and reliable PSA system available today, the H-3100 has proven itself globally. Recommended for medium throughput fueling needs where operating feed flows are up to 9800 scfm/15500 Nm<sup>3</sup>/h with higher operating pressures, up to 450 psig (31 barg).

### H-3200

Best of breed in its capacity range, the H-3200 is configurable for a range of sizes and markets. The G2 is recommended for small through medium throughput fueling needs where operating feed flows are up to 600 scfm/950 Nm<sup>3</sup>/h with operating pressures up to 305 psig (21 barg). The H-3200 easily handles higher throughput fueling needs with G3 or G4 rotary valves where operating feed flows are up to 19000 scfm/30,000+ Nm<sup>3</sup>/h through a multi-valve configuration.

### H-3300

Due to its unique rotating bed design, many of the high maintenance, high cost rest-of-plant components necessary for conventional PSA systems have been eliminated while maintaining a footprint unrivalled by anything in its category. The H-3300 is designed to be tightly integrated with reformer systems, including those designed for hydrogen refuelling stations. Recommended for low throughput fueling needs where operating feed flows are from 2 up to 28 scfm/3 to 45 Nm<sup>3</sup>/h with operating pressures up to 175 psig (12 barg).



\*H-3200 process & PSA cycle are common but equipment sizing varies.

# Remarkable Uptime Performance



**XEBEC 3200-G4 IN USA**  
Ethylene cracker off-gas



**XEBEC 3100-G0 IN CENTRAL USA**



**XEBEC 3200-G2 IN JAPAN**  
Hydrogen Plant in Tokyo



**XEBEC 3100 IN BRAZIL**  
Ethylene cracker off-gas hydrogen re-used in polyethylene production



**XEBEC 3200-G2 IN KOREA**



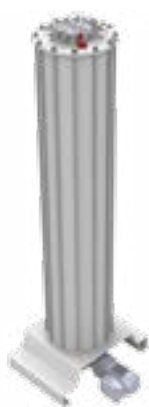
**XEBEC CONTAINERIZED 3200 IN ITALY**



**XEBEC 3200-G2 IN RUSSIA**



G0 Rotary



G1 Rotary Valve



G2 Rotary Valve



G3 & G4 Rotary Valve

## Specifications

H-series Frame Size	Vessel Outside Diameter	Rotary Valve / # of Beds	Config	Max Op. Pressure		Feed Flow Capacity <sup>1</sup>		Dimensions <sup>1,3</sup>						Weight <sup>2</sup>	
				PSIG	BARG	SCFM	Nm <sup>3</sup> /hr	Width		Depth		Height		lbs	kgs
								ft	m	ft	m	ft	m		
H-3100	14"	G0-6 BED	multi-valve/ multi-plant	450	31	750	1200	10.5	3.2	9.0	2.7	12.0	3.6	15000	6800
H-3100	16"	G0-6 BED		450	31	1000	1600	10.7	3.3	9.1	2.8	12.0	3.6	16000	7300
H-3100	18"	G0-6 BED		450	31	1250	2000	10.9	3.3	9.3	2.8	12.0	3.6	17000	7700
H-3100	20"	G0-6 BED		450	31	1600	2550	11.1	3.4	9.5	2.9	12.0	3.6	19000	8600
H-3100	24"	G0-6 BED		450	31	2300	3700	11.6	3.5	10.0	3.0	12.0	3.6	21000	9500
H-3100	30"	G0-6 BED		450	31	3800	6000	12.6	3.8	11.0	3.3	12.0	3.6	24000	11000
H-3100	36"	G0-6 BED		450	31	5350	8500	13.6	4.1	12.0	3.6	16.2	4.9	28000	12700
H-3100	42"	G0-6 BED		450	31	7400	11700	14.6	4.4	13.0	4.0	16.2	4.9	32000	14500
H-3100	48"	G0-6 BED		450	31	9800	15500	15.6	4.7	14.0	4.3	16.2	4.9	36000	16300
H-3200	2"	G2-9 BED		multi-plant	305	21	15	25	4.7	1.4	3.7	1.1	7.6	2.3	3850
H-3200	4"	G2-9 BED	305		21	65	100	4.7	1.4	3.7	1.1	7.6	2.3	3900	1800
H-3200	6"	G2-9 BED	305		21	145	230	4.7	1.4	3.7	1.1	7.6	2.3	4550	2050
H-3200	8"	G2-9 BED	305		21	275	430	5.3	1.6	5.3	1.6	9.5	2.9	4900	2200
H-3200	10"	G2-9 BED	305		21	420	670	5.5	1.7	5.3	1.6	9.5	2.9	5100	2300
H-3200	12"	G2-9 BED	305		21	600	950	6.3	1.9	5.8	1.8	9.5	2.9	5400	2450
H-3200	14"	G3-9 BED	multi-valve/ multi-plant	305	21	900	1450	18.4	5.6	8.4	2.6	13.6	4.1	18500	8400
H-3200	16"	G3-9 BED		305	21	1200	1950	18.6	5.6	8.5	2.6	13.6	4.1	20000	9100
H-3200	18"	G3-9 BED		305	21	1600	2550	18.8	5.7	8.8	2.7	13.6	4.1	21500	9800
H-3200	20"	G3-9 BED		305	21	1950	3100	19.0	5.8	9.0	2.7	13.6	4.1	23000	10500
H-3200	24"	G4-9 BED	multi-valve/ multi-plant	305	21	2800	4500	21.0	6.4	10.5	3.2	14.0	4.3	28000	12700
H-3200	30"	G4-9 BED		305	21	4500	7100	23.5	7.2	12.0	3.6	14.0	4.3	32500	14750
H-3200	36"	G4-9 BED		305	21	6650	10500	27.0	8.2	13.5	4.1	18.3	5.6	37000	16800
H-3200	42"	G4-9 BED		305	21	8850	14000	30.0	9.1	15.0	4.6	18.3	5.6	41500	18850
H-3200	48"	G4-9 BED		305	21	11700	18500	33.0	10.1	16.5	5.0	18.3	5.6	46000	20900
H-3200	54"	G4-9 BED		305	21	14900	23500	37.0	11.3	18.0	5.5	18.3	5.6	52000	23600
H-3200	60"	G4-9 BED		305	21	18350	29000	42.0	12.8	19.5	5.9	18.3	5.6	57000	25900
H-3300	3"	G1-9 BED		single unit	175	12	28	45	2.6	0.9	2.8	0.9	7.3	2.2	1500

<sup>1</sup> Specifications listed above are typical values. Each PSA will be sized individually to customer process requirements.

<sup>2</sup> Weight = empty

<sup>3</sup> Dimensions don't include surge tanks which are sized based on customer process data.

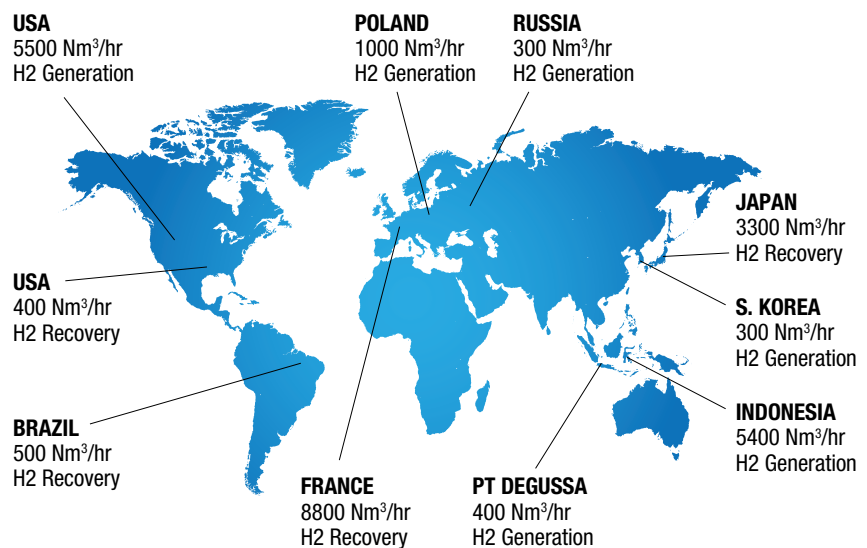
## Technical Data

Available Design Standards	North America ASME, NFPA, NEC, CSA	Europe PED, ATEX, IEC	Process Gas Humidity	0 to 100 % R.H.
Available Materials of Construction	Carbon Steel Stainless Steel		Acceptable Level of Contaminants	up to 50 ppmv H <sub>2</sub> S
Available Voltages	120V/1ph/60Hz 240V/1ph/50Hz or 60Hz		Range of Product Purity	up to 99.9999 % H <sub>2</sub>
Power Consumption	1/3 HP	1/4 kW	Typical Recovery (Recovery depends strongly on composition of feed gas and desired product purity)	88 % at 99.995 % product purity
Operating Ambient Temperature (Lower temperatures are permissible with Cold Weather Package option)	40 to 104 °F	4-40 °C	Turndown	40 to 100 %
Process Gas Temperature	40 to 140 °F	4-60 °C	Availability	>99 %

## Servicing

- ✓ Design cyclic life: 15 years
- ✓ Recommended service inspection interval: 2.5 years
- ✓ Minimum seal life expectancy: 5 years

## Selected Projects From Over 200 Global Installations





A world powered by clean energy

## About Xebec

Xebec specializes in clean air and gas. With over 50 years of experience in adsorption technology, Xebec has supplied more than 9000 adsorption systems to more than 1500 customers worldwide.

This solid foundation of expertise and experience has led Xebec's evolution into renewable energy—developing products, systems and technology solutions for environmentally-responsible purification, generation, dehydration, separation and filtration equipment.

Today, Xebec designs, engineers and manufactures innovative products that transform raw gases into marketable sources of clean energy for the natural gas, field gas, biogas, helium, hydrogen and compressed air markets.



## Customer Commitment. Quality Focus.

Committed to first class customer service, Xebec stands behind the service, spare parts and technical support needed to keep your equipment up and running at maximum performance.

## Xebec and You... End to End

Whatever your needs—for compressed air or gas dehydration and filtration, purification, gas generation, Xebec can offer a solution.

### Professional Services

- 3D and Adsorption Modelling
- Basic and Detailed Engineering
- Custom Adsorption Design and Fabrication
- Electrical Design and Engineering
- Full Turnkey Solutions
- Mechanical and Piping Design
- Process Control and Automation
- Process Engineering
- Process/Product Development Services (Contract R&D)
- Process Simulation and Modelling
- Project Management

### Aftermarket Services **AMX**SOLUTIONS

- 7/24 Troubleshooting Support
- Custom Service/Maintenance Contracts
- Desiccants
- Parts—Filters, Separators, Elements, Drains, Hygrometers, Probes, Probe Recalibration
- Training—Workshops, Webinars, Certification

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