



HY.REC® PROCESS GAS RECOVERY SYSTEM

ECONOMICAL RECOVERY OF REDUCING ATMOSPHERES

ECONOMICAL RECOVERY OF HYDROGEN AND NITROGEN

HyGear offers a product line of recycling systems to recover hydrogen or nitrogen-hydrogen gas mixtures from the process. The Hy.REC® can be installed in various industries like flat glass and metal production.

The economical viability of any industrial gas recycling system depends on the value of the recovered gas in relation to the energy consumption of the system. The Hy.REC® systems are designed from a perspective of the lowest possible electricity consumption, which results in the highest economical rate of return.

The product line consists of two distinctive technology platforms. The Hy.REC®*mix* to recover the entire mixed gas atmosphere and the Hy.REC®*pure* to recover pure hydrogen from contaminated atmospheres.

Applications

- Flat glass industry
- Metal industry
- Electronics industry
- Food industry
- Chemical industry



KEY BENEFITS

- Significant cost reduction
- Increased atmosphere refreshment rate
- Improved product quality
- Reduced environmental impact
- Low electricity consumption
- Improved reliability of gas supply
- Integration with gas mixing station
- Autonomous and safe operation

MIXED GAS RECOVERY

The Hy.REC[®]*mix* is designed to recover the mixed atmosphere from the tin bath in float glass production. With small changes, it can be tailored to other applications for the recovery of hydrogen-nitrogen gas mixtures as well. In order to be cost effective, HyGear has designed the system on low operating pressure to ensure low electricity consumption.

Mixed atmosphere conditioning

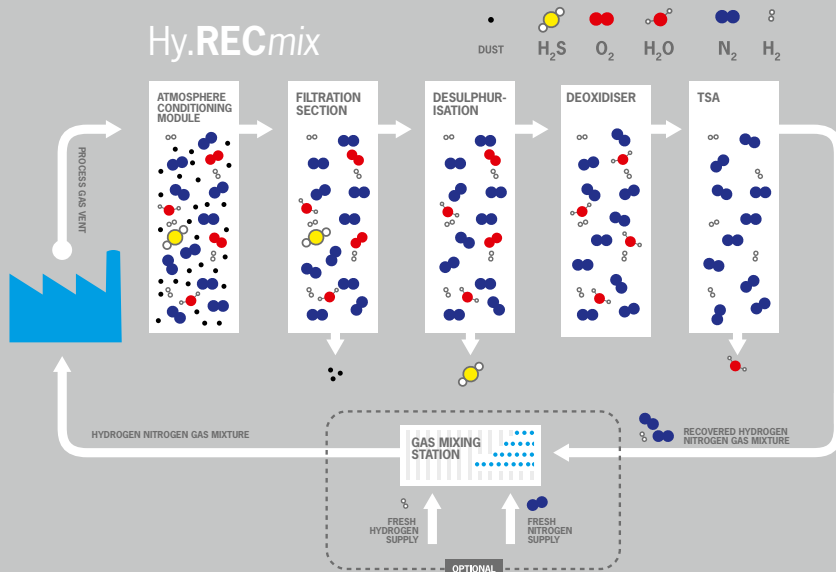
Dust and contaminants complicate pre-processing steps, such as pressurisation and cooling. In the conditioning system advanced technologies are applied that minimise energy losses and safeguard long-term stable operation of the entire system.

Innovative particle filtration

Depending on the size distribution and nature of the contaminants, the Hy.REC[®] contains either a wet or a dry filtration module. Our proprietary Condensation Scrubbing Technology™ (CST) operates at relatively low pressure and, therefore reduces the total utility consumption of the system.

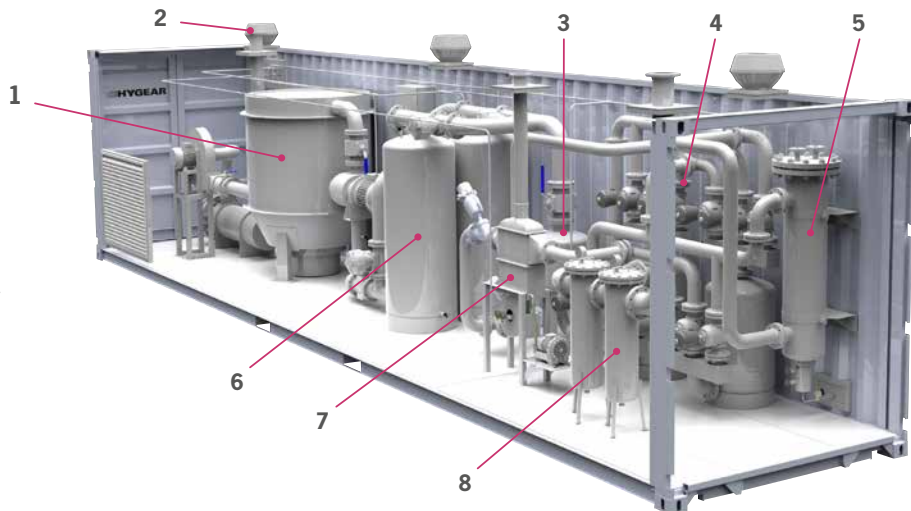
Ultra-low pressure drop TSA

Key part of the integrated post-treatment module is the advanced Temperature Swing Adsorption (TSA) with ultra-low pressure drop to further reduce operational expenses.



HyGear's optional Gas Mixing Station can be integrated to further optimise the plant performance.

WHAT'S INSIDE



1. Filtration
2. Ventilation fans
3. Deoxidiser
4. TSA
5. Condensor
6. Desulphurisation
7. Regeneration heater
8. Product gas filters

HYDROGEN GAS RECOVERY

Hydrocarbon removal section

The low pressure feed flow is pressurized to a minimum required level and subsequently cooled to condense higher hydrocarbons from the spent atmosphere.

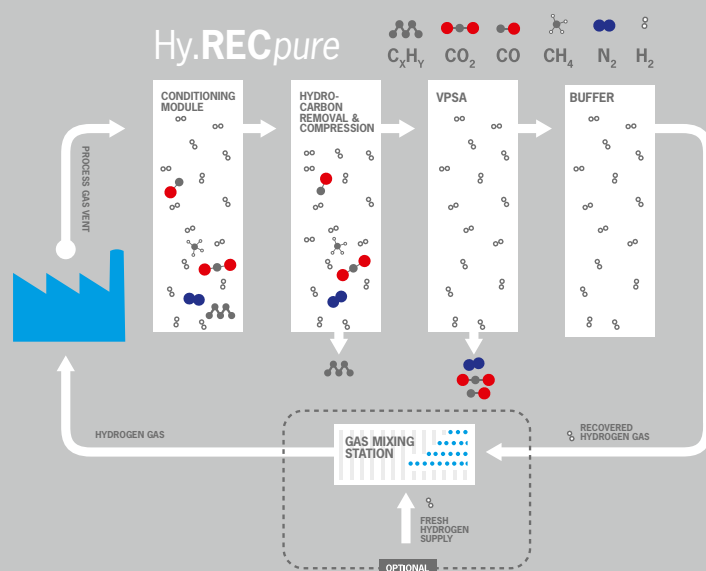
Low pressure VPSA technology

By applying vacuum, the pre-pressure can be kept at a minimum, which results in the overall reduction of electricity consumption.

Efficiency optimisation by integrated gas polishing

The VPSA technology is flexible towards the hydrogen purity, and levels up to 6.0 (99.9999%) purity can be reached. To overcome yield decreases for higher purities, an integrated catalytic polishing system can be included.

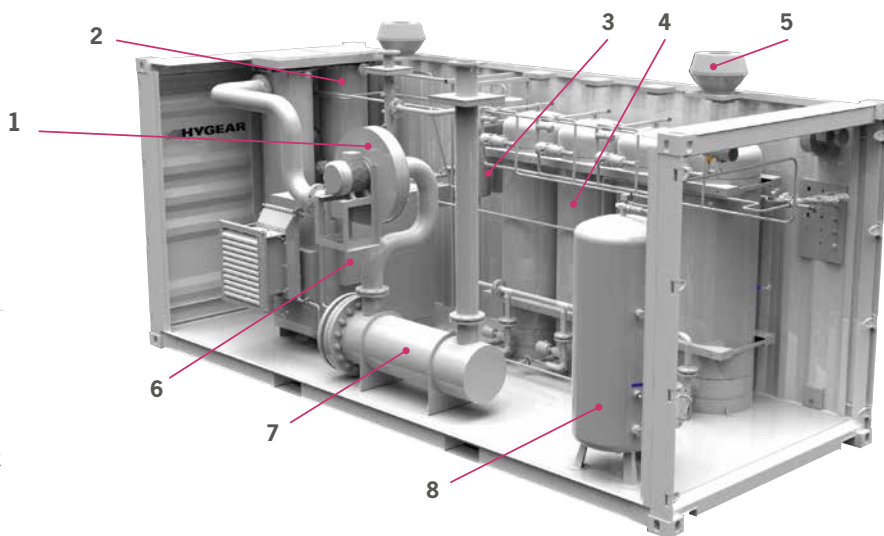
The Hy.REC[®]pure product recovers pure hydrogen from hydrogen containing mixtures as can be found in the metal treatment industry. The complexity is that most mixed atmospheres are extracted from the process at lower pressure while gas purification usually requires a larger pressure differential. HyGear's proprietary low pressure vacuum pressure swing adsorption (VPSA) technology minimises the need for compression.



HyGear's optional Gas Mixing Station can be integrated to further optimise the plant performance.

WHAT'S INSIDE

1. Blower
2. Hydrocarbon condensor
3. Oil circuit
4. VPSA
5. Ventilation fans
6. Compressor
7. Heat Exchanger
8. Hydrogen buffer tank



SPECIFICATIONS

MODEL	Hy.REC [®] <i>mix</i>	Hy.REC [®] <i>pure</i>
INPUT		
Flow	700 Nm ³ /h	140 Nm ³ /h
Temperature	Up to 450 °C	Up to 450 °C
Pressure	Atmospheric	Atmospheric
OUTPUT		
Recovery	Min. 99%	Min. 90%
Purity	Max 5% H ₂ , N ₂ balance	Max 6.0
Pressure	0,1 - 3 bar(g)	Max. 6 bar(g)
Temperature	Ambient	Ambient
Dewpoint	-58° C	-60° C
Total impurities	Max. 5 ppmv	1 ppmv
CONSUMPTION		
Nitrogen	Max. 0,2 Nm ³ /h	-
Natural Gas	14 Nm ³ /day	-
Cooling water	120 L/min	150 L/min
Instrument air	Max. 3 Nm ³ /h	Max. 3 Nm ³ /h
Electricity	45 kW	25 kW
DIMENSIONS		
Size	40 ft	40 ft
Weight	20.000 kg	25.000 kg

All data and values are indicative and based on nominal and non-frost conditions.

Values might differ due to local circumstances and feedstock characteristics.

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