Kanadevia INOVA

Datasheet Gas upgrading

Membrane Technology

Membrane technology

Future-proof resource economy
A comprehensive, reliable supply of renewable energy and the ability to produce regenerative fuels such as bio-LNG and bio-CNG are key to decarbonisation and energy transition efforts. Whether it's combined with a Kompogas™ plant to create a complete solution or deployed on a standalone basis, biomethane gas upgrading technology completes the range of Kanadevia Inova products enabling energy to be produced from any sort of waste or biomass. In this case it employs an upgrading process to convert raw biogases into high-purity biomethane that can be used as a versatile energy source.

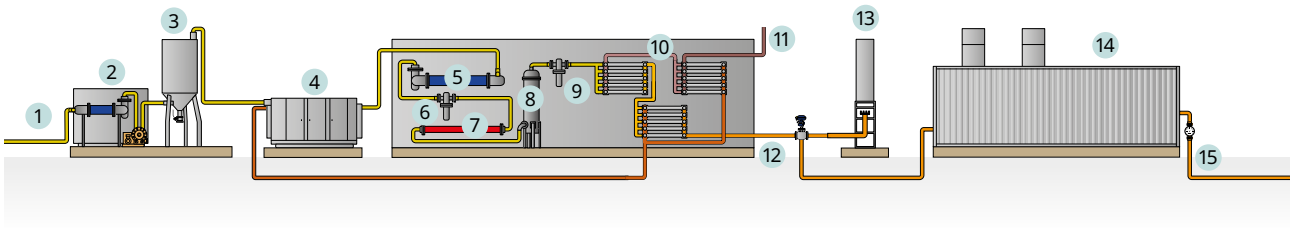
A by-product of the process is carbon dioxide, which can be used to generate additional revenue in the form of gaseous, liquefied or solid carbon dioxide deployed as an industrial product gas – for example in plant breeding, as an extinguishing agent or refrigerant, or as a raw material in the chemical industry.

Our biomethane technology thus makes a major, direct contribution to efforts to increase the use of renewable energy, phase out fossil fuels and decarbonise the society in which we live.

Advantages of biomethane technology
Raw gases from a wide range of different sources are suitable for upgrading: the digestion of municipal green waste, organic household waste or agricultural biomass. Sewage and landfill gas can also be converted into energy. This extends a plant's value chain and promotes the circular economy. Depending on the composition, raw gas pretreatment may be required. Then comes the main process, where the carbon dioxide in the stream of gas is separated from the methane, with the resulting biomethane conditioned to the desired quality parameters.

Technical description
In the first step of the process, the raw gas is pretreated and compressed to operating pressure. After drying, heating and fine purification, the gas is fed into the membrane modules. The carbon dioxide is separated from the methane by selective gas permeation, with the CO_2 passing through the surface of the membranes more quickly than the methane, which is retained in the membranes and removed from the modules as product gas. This is a plug-and-play process technology requiring no additional operating resources such as water or heat.

Schematic of principal setup



Pretreatment
1 Raw gas piping
2 Drying and precompression
3 Desulphurisation
4 Main compressionn

Raw gas upgrading
5 Cooling and drying
6 Coalescence filter
7 Gas heating
8 Activated carbon filter
9 Particle filter
10 Membrane stages
11 CO_2 for further use
12 Methane

Energetic utilisation
13 Safety flare
14 Gas grid injection
15 Gas grid

Biogas upgrading: M-Series

		Model S	Model M	Model L
Max. upgrading capacity	Nm^3/h biogas	500	1,200	2,000

Technical data				
Container		1 x 40’ container		1 x 40’ 1 x 20’
Length of container	mm	12,192	12,192	12,192 6,058
Width of container	mm	2,438	2,438	2,438 2,438
Height of container	mm	2,896	2,896	2,896 2,896
Area of outdoor installation	m x m	14.4 x 6.7	17.0 x 8.0	17.5 x 18.0
Connection RBG	DN	200	300	400
Connection BM	DN	40	50	80

Performance data				
Voltage	V	400		
Frequency	Hz	50/3 ph		
BM quality	Vol.% CH_4	Up to 98.5		
Inlet pressure BG [1)]	mbarg	50–150		
Dew point BM [2)]	°C	≤ −55	≤ −55	≤ −55
Specific power demand of upgrading [3)]	kWh/Nm^3 RBG	0.23–0.27		
Specific power demand of pre-cleaning [3)]	kWh/Nm^3 RBG	0.03		
Heat extraction (60°C–80°C)	kWh/Nm^3 RBG	0.20	0.15	0.15
Max. inlet temperature cooling water	°C	8	8	8
Max. outlet temperature cooling water	°C	2	2	2
Water demand	m^3	n.A.		
Resulting waste water	m^3	n.A.		
Designed for temperatures	°C	−15 to +35		
Condensate [4)]	kg/h	50	120	200

Emissions		
CH_4 slip	%	≤ 0.5
Sound pressure level at 1 m distance	dB(A)	85
Sound pressure level including silencer for compressor	dB(A)	75

[1)]optional increase possible, [2)]@norm conditions, [3)]tolerance of ± 10% according to DIN 1945/VDI 2045/ISO 5389. Electrical consumption depends on operating parameters and environmental conditions, as well as the gas specification. The requirement is specified for an ambient temperature of 15 °C as well as standard gas input parameters (30 °C, atmospheric pressure). [4)]condensate at full load,
Abbreviations: RBG = raw biogas, BG = biogas, BM = biomethane

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