



BVG series

Biogas and landfill gas applications

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Biogas and landfill gas compression and treatment stations designed into an easy handling skid composed of an oil-injected rotary screw gas compressor, directly coupled to an electric motor through a flexible coupling, inverter controlled and complete with the following systems:

- **At the suction:** gas tight filter with water separator and automatic condensate drainer equipped with safety level switch.
- **At the discharge:** air-cooled after-cooler with water separator and automatic condensate drainer equipped with safety level switch and a final gas/gas heat exchanger.

HOW IT WORKS

The wet gas is aspired through a suction filter acting also as a water separator with automatic condensate discharge system, then the gas passes through a suction control valve.

All components in contact with the gas are made in stainless steel or duly protected, due to the presence of CO₂ and other aggressive contaminants into the gas.

During the gas compression process, oil is injected inside the rotary screw chamber to perform three main functions: lubrication, sealing and heat absorption. Working in a closed circuit from a gas/oil receiver, oil is pressurized to flow through an oil cooler, then filtered before being injected again into the screw compression chamber. The gas goes instead through the minimum pressure/no-return valve into an air-cooled after cooler and finally through a gas/gas exchanger before to leave the package.

When the (IW) suction gas/water heat exchanger & (OW) discharge gas/water heat exchanger options are required to remove the humidity from the wet-gas before and after the compression, a suitable chiller is needed to produce the right quantity of refrigerated water (3-5°C) to treat the gas (normally the chiller is placed into a safe zone).

Normally a mechanical by-pass valve is used to recirculate the gas in excess into suction to reduce the capacity from the value achieved at minimum speed of the electric motor, down to 0%. Sometimes it is necessary to install a pneumatic controlled by-pass valve to have a more accurate control (in this case a supply of compressed air is necessary). When the system stops the gas is depressurized by blowing it back into the digester or bleeding it out in the atmosphere.

COMMON FEATURES

- Completely automatic by an electronic control system.
- Direct coupled.
- VSD (Variable Speed Drive) by inverter technology.
- Suitable for ATEX Zone 1&2 or no-classified zones.
- Air cooled standard, water cooled system is also available as option.
- For various optional see by page 6.



MAIN CHARACTERISTICS

COMPRESSOR ELEMENT AND TRANSMISSION

The lubricated single-stage oil-injected rotary screw compressor is composed of two rotors: a 5-lobe male and a 6-slot female one with asymmetrical profiles. Rotation of the rotors produces compression of the gas with continuity and without pulsations. The compressor element is driven directly by an electric motor through a flexible elastomer joint: the direct transmission makes possible to drive the compressor element with the best results and maximum reliability. The oil lubricates the rotating mechanical parts and ensures the seal between the rotors.

GAS CIRCUIT

The gas circuit is composed as follows:

- Gas tight suction filter complete with automatic drainer and safety device.
- Stainless steel gas/oil receiver with oil separators.
- Minimum pressure/no-return valve.
- Gas cooler with large exchange surface cooled by separate fans.
- Water separators with automatic condensate drainer and safety device.
- Gas/gas heat exchanger.

OIL CIRCUIT

The oil is kept in circulation exclusively by the differential pressure of the gas between the gas/oil receiver and the compressor element at suction. The circuit is composed as follows:

- Stainless steel gas/oil receiver with high efficiency oil separator cartridge.
- High efficiency type oil filters.
- Thermostatic valve to maintain the right operating temperature.
- Oil cooler with large exchange surface cooled by separate fans.

GAS/OIL COOLING CIRCUIT

The cooling circuit is composed of the oil cooler and by the final compressed gas cooler combined into a single radiator air-cooled by separate axial electric motor fans. Water-cooled oil cooler and final water-cooled gas cooler are also available as option.

MAIN ELECTRIC MOTOR

The electric motor used is from IE1 to IE3 efficiency with F class of insulation and shielded bearings, over a certain size to withstand to class B over temperatures and with a degree of protection IP55. We usually install (Ex nA) motors for ATEX zone 2 and (Ex de) motors for ATEX zone 1. Standard electric motors are used for no-classified zones.

SAFETY DEVICES AND GAUGES:

- Suction pressure gauge.
- Pressure/Vacuum switch at suction.
- Temperature sensors at the compressor's gas/oil mixture discharge.
- Pressure switch on oil receiver for high pressure.
- Stainless steel conveyed safety valve on the oil receiver .
- EMC filter inverter on-board protection.
- Oil pressure gauge.
- Temperature gauge on the final dis-charge pipe.
- High water level switch on suction filter separator.
- High water level switch on discharge separator.

CAPACITY AND PRESSURE REGULATION

A reliable and proven frequency converter (Inverter technology) controls the capacity precisely in accordance to the gas demand. This means that the rotation speed of the compressor block is matched exactly to the requirement and the result is the constant pressure on the network all time. This feature minimize the power consumption and reduces the wear and tear on the compressor also. With a speed range of the compressor block from 100% down to 50%, the BVG gas compression stations feature the market widest turn-down range and quickest adaptation to the gas demand changes.

ELECTRIC & ELECTRONIC CONTROL PANEL

All various CE&UL switches and protection devices are fitted into a special control panel that is supplied separately by the compressor station.

The S1-20 electronic control system is also fitted into the panel and it is capable of processing the requested pressure, temperature and signals in real time as well as the functional parameters by means of transducers inside the station and in combination with the inverter. Regulation of the off-load/loaded operation with timed automatic stopping for greater operating economy. A correct program of the operations guarantees the constant gas flow requested without any pressure jumps.

The electronic system makes possible to:

- Control the operating conditions of the main components of the compression station.
- Change the programmed working conditions.
- Determine any maintenance work in an automatic manner, as regards the environmental and operating conditions of the station.

By a luminous monitor of the electronic panel S1-20 and the Inverter Keypad on the control board panel, it is possible to display the working conditions of the machine and the triggering of any of the alarm and blocking devices provided, more specifically:

- Display indicating the working pressure.
- Display indicating the working temperature.
- Symbol LEDs.
- Failure and status messages.
- Maintenance messages.
- Main and auxiliary switches.
- Start button.
- Programmed stop button.
- Emergency stop button.
- IP55 enclosure with ventilating fan and heaters.
- Operating motor frequency.
- Current absorbed.
- Power absorbed.
- Motor speed.
- Operating frequency.
- Many more functions selecting the pa-rameters requested
- Inlet water temperature (chiller display).
- Outlet water temperature (chiller display).
- Many more functions selecting the pa-rameters requested.

BVG series

Main features

STAINLESS STEEL PIPING

FIRST OIL SEPARATION

GAS/REFRIGERATED WATER
(BV) CHILLER

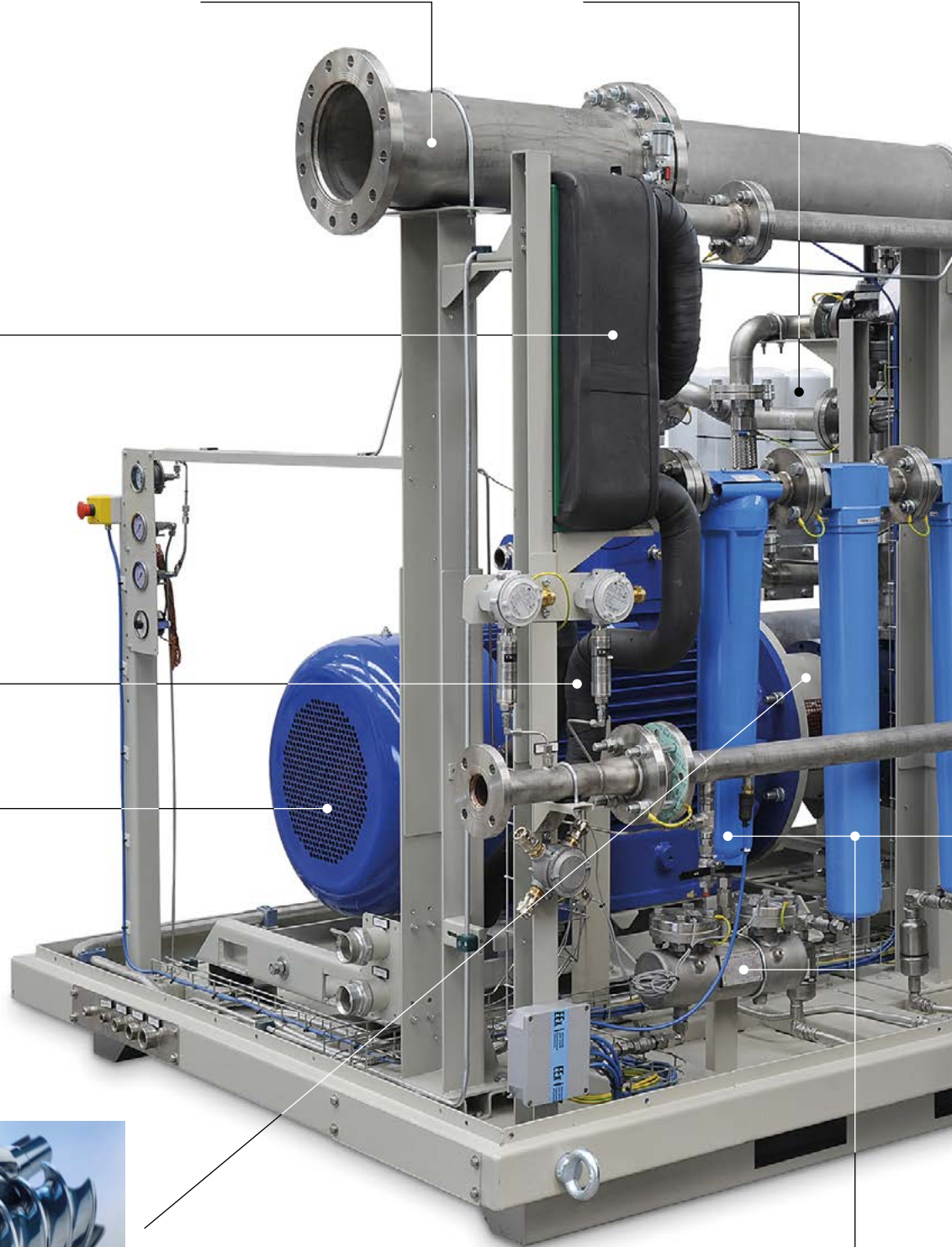
HEAT EXCHANGER
FOR GAS COOLING
BY WATER

WATER CIRCUIT

VARIABLE SPEED DRIVEN
THROUGH INVERTER

SCREW BLOCK

FINE OIL FILTRATION
& CONDENSATE DRAINER



COMBINED GAS/OIL COOLER
COOLING BY AIR



GAS/GAS HEAT EXCHANGER TO CONTROL
OUTLET GAS TEMPERATURE

Extra features

LOUVRES
For internal temperature control



PLC



WEATHER PROOF CANOPY



BVG series

Options available

(OF) OPEN FRAME (STANDARD VERSION)

Open frame version suitable for indoor installation.

(S) SILENCED & (SS) SUPER SILENCED

Sound proof enclosure, suitable for indoor installation (no weather proof) with a noise level from 70dB to 80dB at 1m.

(WP) WEATHER PROOF

The compressor station is designed and built for an ambient temperature from -20°C to 40°C. Electric oil heaters thermostatically controlled keep the internal temperature above 5°C in presence of cold climate.

(CF) FINE FILTRATION

When the quality of the standard compressed gas is not acceptable with the residual content of oil, the compressed gas goes through a set of high efficiency coalescent type filters which reduce the residual amount of oil content into the gas down to (0,01mg/m³).

(CH) WATER CHILLER

Adicomp proposes chillers with this characteristics:

- Generous operating limits.
- a robust construction with high ambient temperature limits.
- An extensive range of accessories which allows them to be personalized to all individual applications.
- A fully packaged and easy to use solution, with integrated pump and tank.

(IW) SUCTION GAS/WATER HEAT EXCHANGER

When the presence of the water (humidity) into the biogas is high and the presence of H₂S is above 1000mg/m³, it is recommended to install at suction a gas/refrigerated-water heat exchanger capable to bring the gas temperature down to about 5°C.

(OW) DISCHARGE GAS/WATER HEAT EXCHANGER

At outlet side this option consists in a further cooling of the gas, downstream of the after-cooler, by a stainless steel compressed gas/refrigerated water heat exchanger, a water separator and an automatic drainer. This option brings the compressed gas dew-point temperature in pressure down to about 5°C such eliminating most of the water content and allowing the coalescent filter to work at the best.

(HR) HEAT RECOVERING

Almost all the heat generated by a rotary screw compressor can be recovered and used to reduce energy general costs. Our recovering system consists in a water/oil heat exchanger capable to transfer the heat from the compressor oil to sanitary, central heating or industrial process water, recovering up to 80% of the compressor's heat energy.

(SR) SILOXANE REMOVAL SYSTEM

If the content of siloxanes (SiO) is high in the biogas or better in the landfill gas, they must be removed completely before feeding bio-methane into upstream grid. Adicomp uses to install twin stainless steel columns that contain active carbons suitable for removing siloxanes, both complete with pressure gauges and conveyed type gas safety valves. Four valves are also present to switch manually the duty of the columns and for the depressurization of the system.

(CC) ACTIVE CARBON COLUMN (OIL REMOVAL)

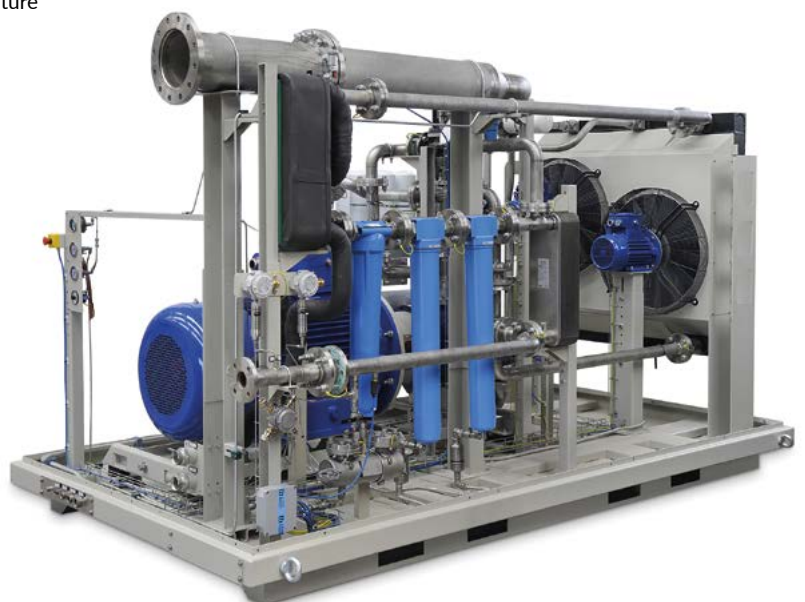
If the filtration at low constant temperature is still not acceptable to give sufficient assurance about the purity of the gas from oil contamination Adicomp can propose an adequately sized active carbon column to be placed downstream the gas/gas heat exchanger that also absorbs the oil aerosol. It also becomes a safety device.

(MB) MODBUS & (PB) PROFIBUS REMOTE CONTROL SYSTEMS

Every Adicomp compressor can be connected through a Modbus or a Profibus gateway for data transmission. Modbus and Profibus added to the S1-20 main controller, can perform the following operations:

- Read any parameter inside the table from P01 to P10.
- Write on any settable parameter inside the table from P01 to P10.
- 3 working inputs (start - stop - reset).
- "Get", "Set", "Cmd" commands to manage both the information and functions.

As option an I/O Box provides additional general purpose I/O (input/output) connections, in particular n°8 digital and n°4 analog inputs.



Technical data

BVG in accordance to ATEX95 or EN1127-1:2001 no-class. zones.

Standard version is suitable for classified zones 1&2, indoor (OF) or outdoor installation with silenced and weather proof (WP) and safety features in accordance with ATEX standards.

BVG 3.0kW - 15kW

SPECIFICATION/MODEL	U.M.	BVG4.0-6.0AD INV	BVG5.5-6.0AD INV	BVG7.5-6.0AG INV	BVG9.0-6.0AG INV	BVG11-6.0BD INV	BVG15-6.0CD INV
Suction pressure	mbar	25 < 100	25 < 100	25 < 100	25 < 100	25 < 100	25 < 100
Free Gas Delivery (min/max)	m3/h	0 < 22 < 32	0 < 22 < 48	0 < 32 < 66	0 < 35 < 80	0 < 48 < 92	0 < 48 < 132
Power absorbed	kW	2.7 < 3.7	2.9 < 5.5	4.1 < 7.5	5.2 < 9.0	6.1 < 10.9	8.7 < 15.0
Dimensions	cm	130x75x128	130x75x128	170x96x150	170x96x150	170x96x150	170x96x150

BVG 18.5kW - 75kW

SPECIFICATION/MODEL	U.M.	BVG18.5-6.0CG INV	BVG22- 6.0CG INV	BVG30- 6.0HD INV	BVG37- 6.0DD INV	BVG45- 6.0DG INV	BVG55- 6.0MG INV	BVG75- 6.0MD INV
Suction pressure	mbar	25 < 100	25 < 100	25 < 100	25 < 100	25 < 100	25 < 100	25 < 100
Free Gas Delivery (min/max)	m3/h	0 < 82 < 166	0 < 93 < 197	0 < 177 < 241	0 < 186 < 330	0 < 200 < 403	0 < 255 < 526	0 < 387 < 709
Operating pressure	bar(g)	5.5 - 6.0	5.5 - 6.0	5.5 - 6.0	5.5 - 6.0	5.5 - 6.0	5.5 - 6.0	5.5 - 6.0
Power absorbed	kW	10.0 < 18.5	11.5 < 22.0	14.0 < 27.5	24.4 < 37.0	23.4 < 45.0	28.6 < 55.0	44.7 < 75.0
Dimensions	cm	200x120x185	200x120x185	220x120x185	300x150x210	300x150x210	300x150x210	300x150x210

BVG 90kW - 315kW

SPECIFICATION/MODEL	U.M.	BVG90- 6.0EG INV	BVG110- 6.0ED INV	BVG132- 6.0EG INV	BVG160- 6.0ND INV	BVG200- 6.0ND INV	BVG250- 6.0NG INV	BVG315- 6.0NG INV
Suction pressure	mbar	25 < 100	25 < 100	25 < 100	25 < 100	25 < 100	25 < 100	25 < 100
Free Gas Delivery (min/max)	m3/h	0 < 404 < 841	0 < 647 < 1078	0 < 647 < 1204	0 < 662 < 1535	0 < 662 < 1885	0 < 1065 < 2350	0 < 1400 < 2850
Operating pressure	bar(g)	5.5 - 6.0	5.5 - 6.0	5.5 - 6.0	5.5 - 6.0	5.5 - 6.0	5.5 - 6.0	5.5 - 6.0
Power absorbed	kW	47.0 < 90.0	69.0 < 110.0	75.0 < 132.0	75.0 < 160.0	75.0 < 200.0	115.0 < 250.0	162.0 < 315.0
Dimensions	cm	360x224x224	360x200x224	360x200x224	360x200x224	420x235x300	420x235x300	420x235x300

Electric motors (Ex nA) anti-spark type are de-rated of 20% for safety reasons when they work under inverter in ATEX zone 2. In case of BGR104 German standards, electric main motors installed are normally rated and no-ATEX version.

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ADVANCED AIR & GAS SOLUTIONS



ISO 9001
ISO 14001
OHSAS 18001

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