

AERZEN

SCREW COMPRESSORS

Aerzen Screw Compressor for Process Gas Technology

Compact system VMY – single-stage
compressor with oil injection for process gases



AERZEN

AERZENER MASCHINENFABRIK
GMBH

V1-030 | 07 | EN

2000

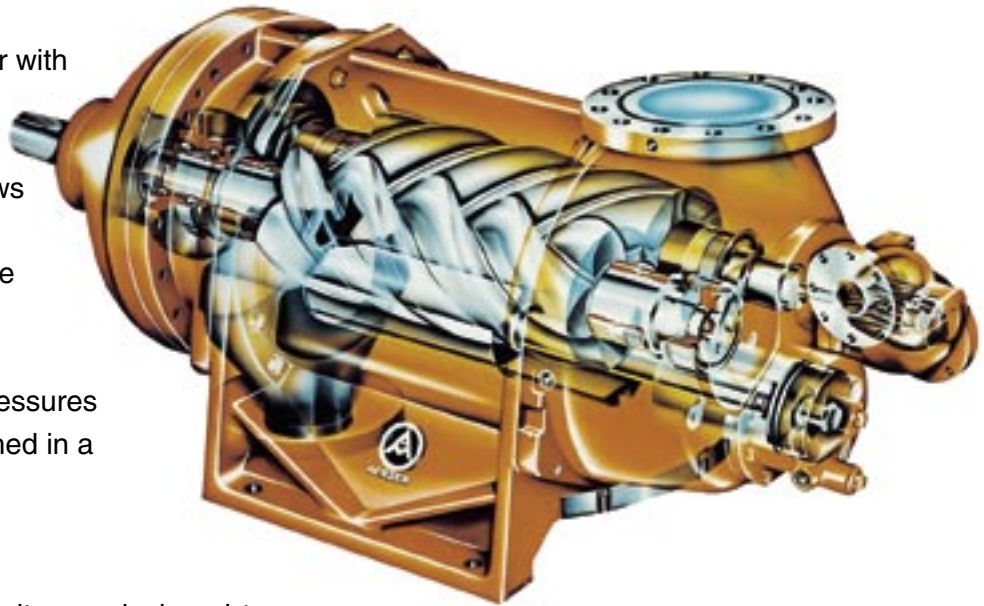
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General

Aerzen VMY-screw compressor with oil injection and integrated volume control have been designed for intake volume flows from 500 m³/h up to 8900 m³/h and for an overpressure - single stage - up to 20 bar.

(Higher pressures on request).

In vacuum operation, intake pressures up to 1 mbar abs. can be reached in a single stage.



Fields of application

The VMY-screw compressor units are designed to suit the requirements of a wide range of applications for the process gas industry. Originally conceived to operate in closed loop refrigeration systems (NH₃, refrigerants, helium), this type of compressor has acquired a strong position in the process market (chemical, petrochemical, power generation industries). Used for the compression of natural gas, inert gases, ammonia, helium, hydrocarbons, HCL, CO₂, mixed - and process gases this compressor type provides an optimal adaptation to the actual case of operation which is also due to its integrated and automatic infinitely adjustable capacity control. The cooling achieved by the oil injection enables the compressor to cope with fluctuations in flow, temperature and pressures.

a) VMY - compressor stage

Sizes

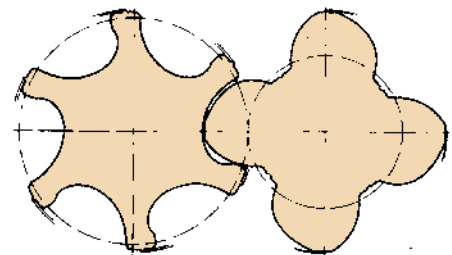
The VMY-screw compressors are available in 12 sizes.

Design and principle of operation of the compressor stage

The gas flows through the VMY compressor from top to bottom. The rotors are positioned horizontally in the housing. The gas compression takes place in progressively reduced chambers formed between the lobes of the intermeshing rotors and the cylindrical walls of the compressor housing.

female rotor

male rotor

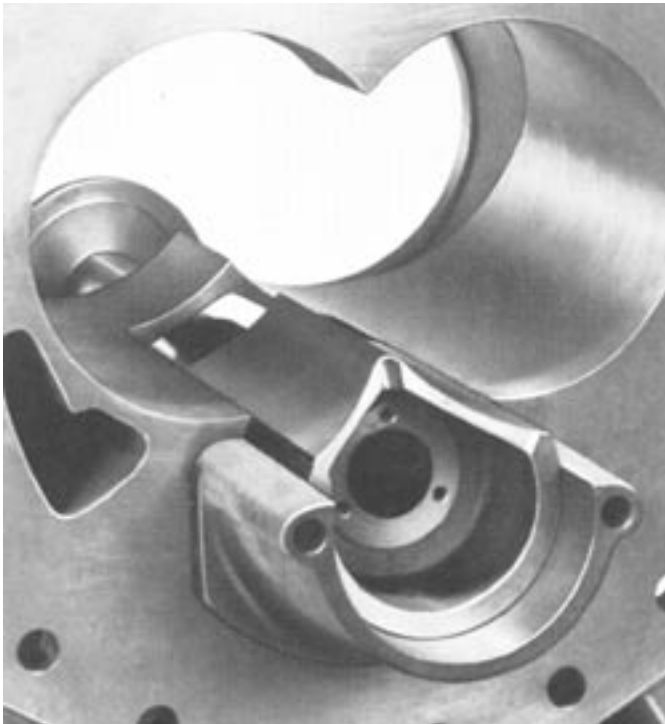


„36“ - series

The male rotor directly drives the female rotor; there are no timing gears. The oil injected into the compression chamber provides ample lubrication and removes most of the heat of compression. The clearances between the rotors and the housing are filled with oil, preventing backflow and thereby improving the volumetric efficiency. Radial loads are handled by sleeve bearings. These are generously dimensioned to deal with the heaviest loads and being located adjacent to the compression chamber their short span prevents rotor deflection under high differential pressures. The rotors are axially located by anti-friction bearings. The high axial loading exerted on the male rotor is greatly reduced by means of a hydraulic compensating piston.

Infinitely variable capacity control

All VMY compressors, as standard production machines, are equipped with a capacity regulator allowing the flow to vary between 100 and 20 %. The slide valve for the capacity control is integrated into the compressor housing and located just below the rotors.



Hydraulically actuated, it slides parallel to the rotors towards the discharge side, uncovering an opening through which a proportionally smaller or larger volume of gas is allowed to flow back, uncompressed, to the inlet. The power required is reduced, determined by the flow rate regulation, which is nearly in proportion to the partial load volume flow. Therefore, energy saving, economic operation is achieved.

Unloaded start

Starting under minimum torque load conditions can be achieved by a controlled „zero flow“ (idle) setting of the capacity regulator.

Lubrication of the entire unit is ensured by a gear-type pump, flanged onto the compressor and driven by the female rotor.

The VMY compressor housing sections and the drive shaft are sealed by means of O-rings and a mechanical seal. Allowing the standard machine to be used up to 25 bar internal static pressure.

The housing cooling is effected by means of ambient air.

b) VMY-package

The gas and the oil injected into the compressor stage are discharged into the oil reservoir where due to the drop in flow speed, most of the oil is separated from the gas. The remaining oil is separated in the enclosed oil/gas separator. Depending on requirements and expenditure oil carryover down to ≤ 1 ppm can be achieved, the standard package is designed for oil carryover down to ≤ 5 ppm. The gear type oil pump mechanically driven by the compressor stage circulates the oil from the reservoir, it is filtered and cooled before it enters the lubrication points, i.e. bearings, mechanical shaft seal and oil injection point, as well as the volume slide, hydraulic control unit. Due to the compressor stage mounted onto the oil reservoir as well as the lateral arrangement of the components (cooler, separator, etc.) a compact installation of the unit can be guaranteed.

All components are mounted on a common base frame. Thereby shortest assembly periods can be guaranteed for the unit at site.

The unit design can be effected acc. to the following guidelines:

- DIN / EURO - standards
- NACE
- AD - regulations
- TEMA - standard
- ASME - standard
- API - guidelines

Control and instrumentation

The monitoring and fuse protection of the operating data are effected via pressure transmitter and resistance thermometer.

The measuring values are indicated via a display in the control cabinet.

Control devices can be supplied by various well-known manufacturers.

Installation

As there are no reciprocating components and because all oscillating parts are dynamically balanced, there are no imbalances within the machine. Consequently, no particular foundations are required. The installation can either be rigid or flexible. The transmission of both structure borne noise and vibrations is avoided by the installation of anti-vibration mounts. Flexible connections such as bellow expansion joints or expansion loop between the compressor package and the plant piping are required.

Noise

Due to the low rotor tip speed and oil injection, the noise level emitted is of the same magnitude as that of the electric motor. An acoustic hood can be supplied on request.

Quality

Experience in the production of twin shaft positive displacement machines is also reflected in quality assurance. Since 1990, Aerzener Maschinenfabrik counts itself among the manufacturers capable of certifying quality assurance to ISO 9001.

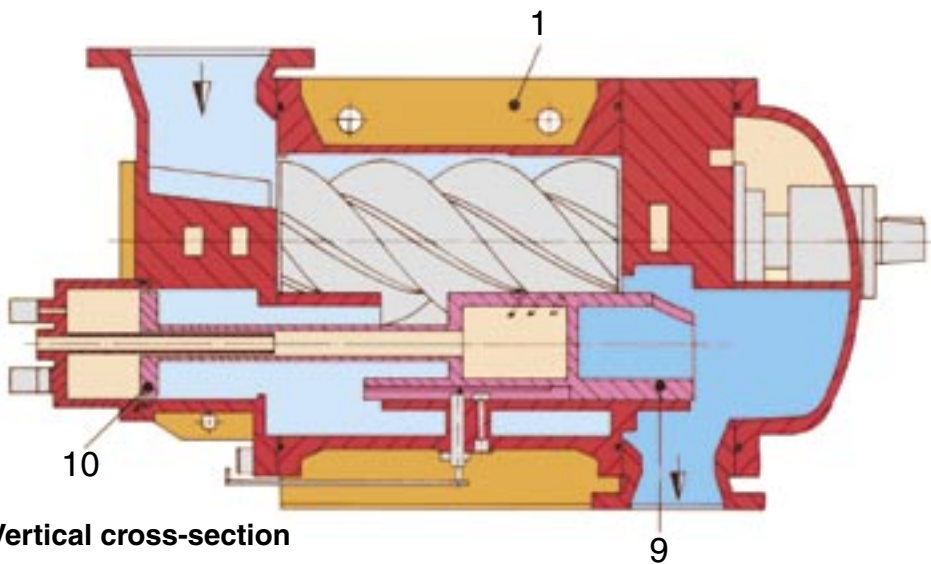
Scope of supply VMY package

- starting strainer
- compressor stage
- oil supply, existing of:
 - oil reservoir, designed as oil separator
 - oil pump
 - double oil filter
 - oil temperature control valve
 - oil cooler water-cooled, alternatively air-cooled
- separate oil separator
- base frame
- control and instrumentation

Options:

- integrated gas cooler
- fine separation ≤ 1 ppm remaining oil content
- acoustic hood
- driving motor

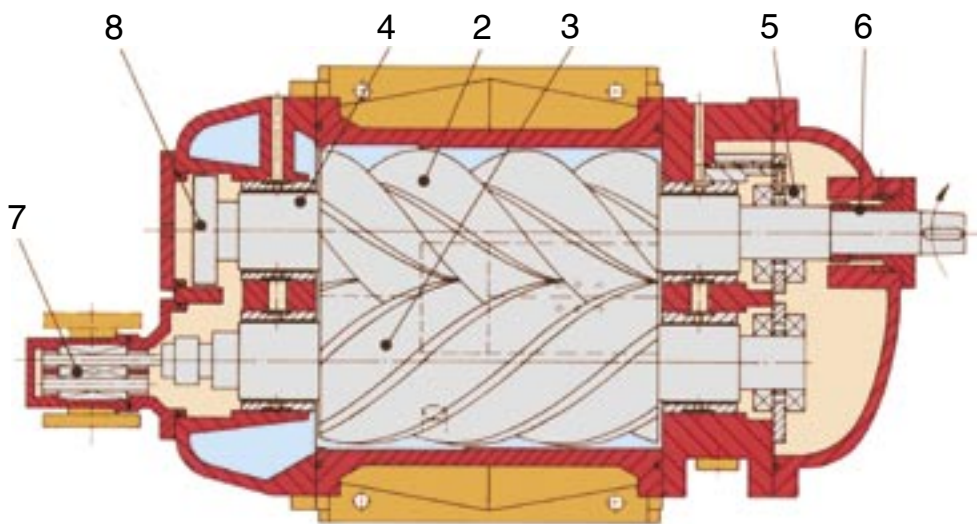
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|--|---|---|
|  | | |
| <h1>CERTIFICATE</h1> | | |
| DNV ZERTIFIZIERUNG UND UMWELTGUTACHTER GMBH certifies that the company | | |
|  | | |
| Aerzener Maschinenfabrik GmbH at the site Reherweg 28 D-31855 Aerzen has established a quality system in conformity with EN ISO 9001 : 2000 This Certificate is valid for: development, production, sale, assembly and maintenance of: Rotary Piston Blowers (Roots Type) Screw Compressors Rotary Piston Gas Meters | | |
| <small>Further clarifications regarding the scope of this certificate and the applicability of ISO 9001 : 2000 requirements may be obtained by consulting the certifier company.</small> | | |
| This Certificate is valid until: 2005-02-28 | | |
| Certificate-Registration-No.: CERT-11687-2002-AQ-ESN-TGA | | |
| Essen, 2002-03-12  M. Fröhlich Manager |  TGA-ZM-004/02-00 | Essen, 2002-03-12  K. Herzog Lead Auditor |
| <small>This Certificate is only valid in connection with the original Certificate CERT-11687-21-02-AQ-ESN-103 Seite 38 / 6 E. 4 PRJ/2006-99-CRT-ESN</small> | | |



Vertical cross-section

Main components

- 1 Cylinder
- 2 Male rotor
- 3 Female rotor
- 4 Radial bearing
- 5 Axial bearing
- 6 Mechanical seal
- 7 Oil pump
- 8 Balancing piston
- 9 Capacity control slide valve
- 10 Hydraulic piston



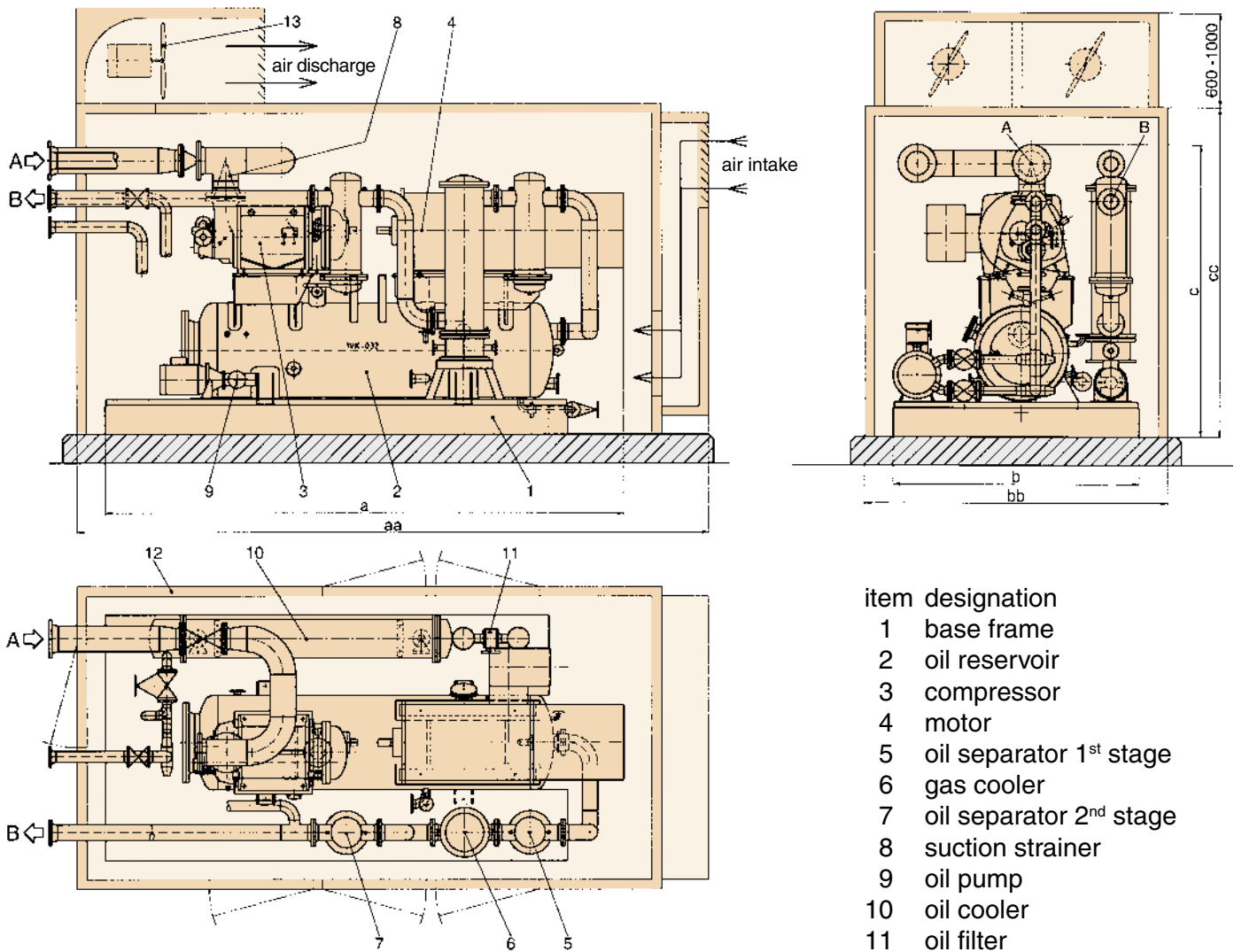
Horizontal cross-section

Intake volume flows Q_1 (m³/h)

| Operating pressure [bar] | | VMY 236 | | | VMY 336 | | | VMY 436 | | | VMY 536 | | |
|--------------------------|---------------------------|---------|-----|-----|---------|------|------|---------|------|------|---------|------|------|
| | | B | M | H | B | M | H | B | M | H | B | M | H |
| 8 | Q_1 [m ³ /h] | 1045 | 800 | 595 | 2170 | 1635 | 1240 | 4150 | 3150 | 2420 | 8910 | 6620 | 5185 |
| 16 | Q_1 [m ³ /h] | - | 780 | 575 | - | 1575 | 1195 | - | 3050 | 2355 | - | 6400 | 5025 |
| 20 | Q_1 [m ³ /h] | - | - | 565 | - | - | 1180 | - | - | 2355 | - | - | 4950 |

Intake volume flows at 20 °C, 1,0 bar, 2950 rpm, air

Dimensions and connection points data

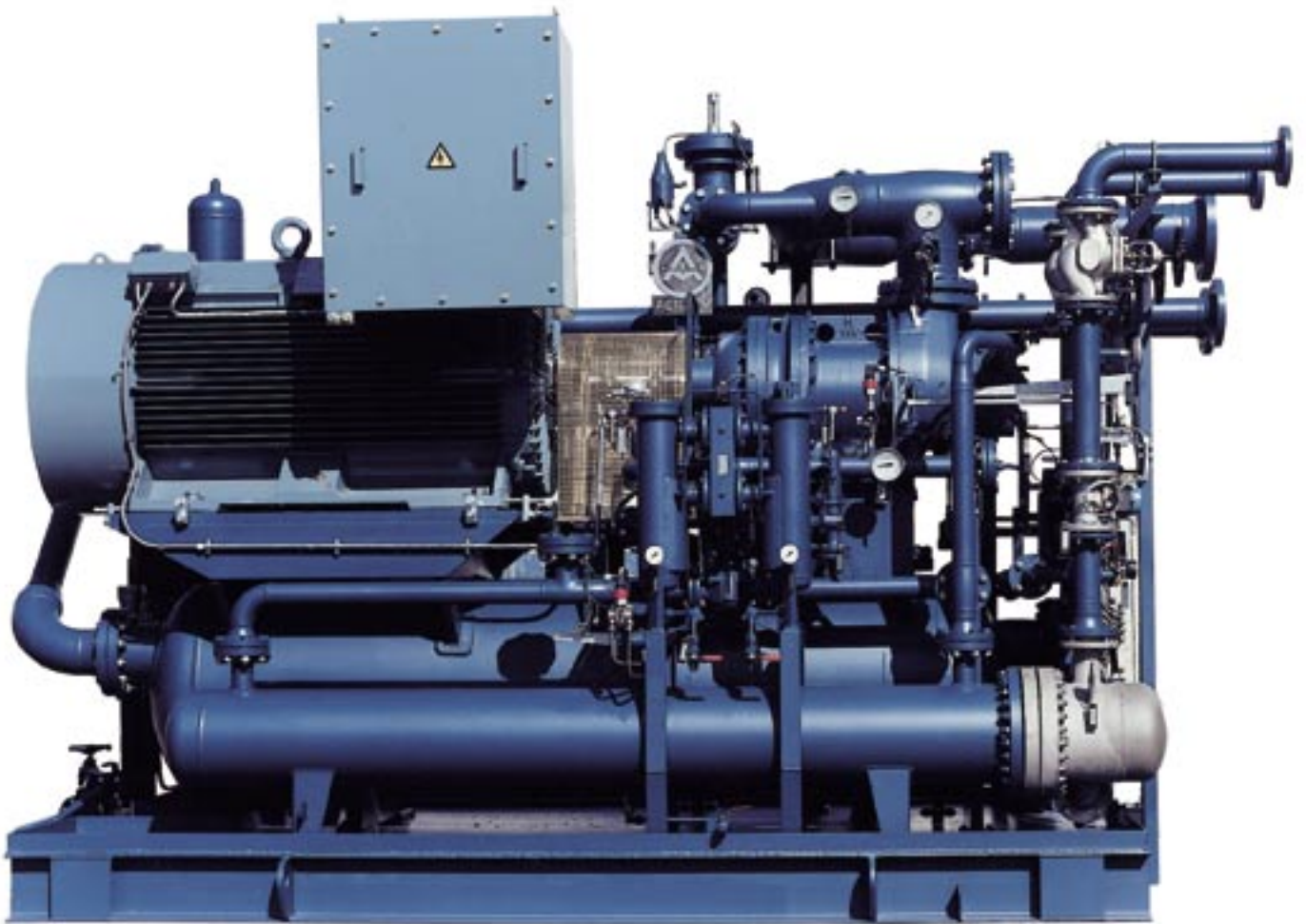


- item designation
- 1 base frame
 - 2 oil reservoir
 - 3 compressor
 - 4 motor
 - 5 oil separator 1st stage
 - 6 gas cooler
 - 7 oil separator 2nd stage
 - 8 suction strainer
 - 9 oil pump
 - 10 oil cooler
 - 11 oil filter
 - 12 acoustic hood
 - 13 ventilation fans

Dimensions not binding !

| Type | a | b | c | aa | bb | cc | Gas intake | Gas discharge | Weight* [kg] |
|---------|------|-------------|------|------|-------------|------|------------|---------------|--------------|
| VMY 236 | 4000 | 1500 - 2100 | 2400 | 5000 | 2100 - 2800 | 2800 | DN 150 | DN 80 | 6000 |
| VMY 336 | 4500 | 1500 - 2200 | 2700 | 5000 | 2100 - 2800 | 3100 | DN 200 | DN 100 | 8000 |
| VMY 436 | 5000 | 1800 - 2300 | 3000 | 6000 | 2500 - 2900 | 3500 | DN 250 | DN 150 | 11000 |
| VMY 536 | 5500 | 2000 - 2600 | 3300 | 6000 | 2500 - 3200 | 3600 | DN 300 | DN 200 | 14000 |

* without acoustic hood, without motor



VMY 336 H - compression of nitrogen, design acc. to ASME - standard



VMY 336 M - compression of natural gas

A good address, everywhere

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