ROTARY VANE COMPRESSORS FOR VEHICLE APPLICATIONS

GANZAIR

THE COMPLETE SOLUTION

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Preamble

The Ganzair vehicle compressors operated in large number of guided transport vehicle, trolley buses, locomotives, mine locomotives, motor-trains, subway cars in Hungary and several European countries. Due to the low noise and vibration levels, and the high lifetime, several well-known manufacturers and vehicle upgrading company chooses our products. We can offer you individual, tailor-made solutions. If you need a personalized, reliable solutions please select the Ganzair Compressor Technologies Ltd. and choose our rotary vane compressors.

The Ganzair brand are equals, tailor-made solutions.
Why choose Ganzair manufactured rotary vane vehicle compressors?

Ganzair is frequently asked this question, because most other manufacturers are offering only piston and screw compressors.

What is a rotary vane compressor?

The rotary vane compressor is a volumetric rotary compressor, consisting of a rotor (with longitudinal slots in which the vanes slide) rotating in a stator (or cylinder). The rotor is offset in the stator (figure 1). While the rotor turns on its axis the vanes are pushed against the stator by centrifugal force.

There is a volume between the adjacent vanes and during rotation this volume passes from a maximum value, corresponding to the maximum exit of the vanes, to a minimum value, at the point where the stator becomes tangential with the rotor, and vice-versa. The volume increases during air intake and progressively decreases during the compression stage, until the delivery ports are uncovered by the vanes (figure 2).

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**Fig. 1**

Centrifugal Force
When the rotor turns, centrifugal force holds the blades against the internal wall of the stator, which ensures perfect sealing of the air.

**Fig. 3**

The rotors are fitted in a stator made from two cylinders which intersect longitudinally and in which the rotors turn with the minimum clearance.
What is a screw compressor?

The screw compressor is a volumetric rotary compressor composed of two parallel rotors with external helical profiles (screws) which enables the two rotors to engage, one into the other. The two rotors are fitted in a stator made from two cylinders which intersect longitudinally and in which the rotors turn with a critical minimum clearance (figure 3). The rotor shafts are supported by roller bearings and generally one rotor drives the other by means of the helical profiles. Sometimes, they are driven by a pair of external gears. During rotation the screw profiles uncover an intake orifice at one end of the stator, through which the air enters and fills the volume between the profiles. On the opposite side the profiles penetrate one into the other, thereby reducing the volume which compresses the air until the delivery ports become uncovered.

Similarities and differences

Most other components required for the operation of the compressor, such as oil cooler, separator, pressure regulating valves, non-return valves, etc., are common for both vane and screw compressors. The difference is in the compressor design adopted by each manufacturer, based on technical, economic and aesthetic considerations. This comparison is limited to the vane and screw air ends, which are the heart of the compressor.

Volumetric efficiency

The relationship between the effective air delivery and the geometric volume is the volumetric efficiency which is effected in the rotor stator unit by the air leakage from the area under pressure towards the intake. It is important that these leakages are kept to an absolute minimum, because the energy required to compress the air which returns to the intake, is a loss. The smaller the internal leakage, the more the volumetric efficiency increases and the required power per measuring unit of delivered air is reduced (specific energy).
Air escape along the stator surface

In vane compressors the vanes are always in contact with the internal surface of the stator (figure 1). The air seal is practically perfect. Because of minimum clearance due to machining tolerances and operation of the set, there is a slight possibility of escape along the surface where the rotor is at a tangent to the stator.
If there is just one vane (figure 4) between the delivery and the intake ports this vane will prevent the air escaping from high to low pressure.
Furthermore the large volume of oil injected into the stator lubricates the moving parts and cools the air during compression, and also seals the clearances between the rotor, stator and end covers. It is along the surface where the rotor touches the stator (tangent point) that the oil, pushed by the air pressure, slips into the space between the delivery ports and the adjacent blade and seals it (figure 5).

This does not happen in a screw compressor. There must be a minimum clearance between the external profile of the rotors and the internal surface of the stator, to allow the rotors to turn without touching the stator walls.

It is, therefore, unavoidable that a certain volume of air escapes from the high pressure to the low pressure area. This can only be limited but never eliminated by high precision machining (figure 6).

Leakage along the side planes

Due to its geometry, the air under pressure in a screw compressor produces axial thrust making the rotors reduce the side clearance at the intake side and increase the clearance at the delivery side, where sealing is most critical (figure 7). The side thrust is borne by roller bearings, preventing the rotors from touching the surface of the end cover.
The air sealing is due to resistance, the quality of the bearings, as well as the machining accuracy of the couplings.
The vane compressor has no axial thrust pushing the rotor against either end cover. It is, therefore, unnecessary to control its axial position by means of bearings or thrust bearings. The rotor is free to move axially and is kept equally spaced from the end covers by means of an oil film which comes out, under pressure, through holes in the end covers, thus preventing contact and providing efficient sealing (figure 8).

'Blow hole'

The 'blow hole' of the screw compressor does not exist in a vane compressor. The 'blow hole' is a hole where the external profiles of the rotors meet at the intersection of the cylinders in which they rotate (figure 9). The air under pressure returns to an area of lower pressure through this hole. This technical problem is typical of the geometry of screw compressors. All screw manufacturers have tried to reduce the effect of the 'blow hole' by analysing and
ROTARY VANE COMPRESSORS FOR VEHICLES

adapting new rotor profiles to create smaller openings at the critical point, but its complete elimination is impossible.

One can partially solve the problem by increasing the rotating speed of the rotors, so that the escape relates to a higher air delivery, but an increase in speed requires an increase of specific energy, higher wear and shorter life of the compressor. It is evident the vane compressor is superior in air sealing and volumetric efficiency. Volumetric efficiency of Ganzair vehicle compressors is approximately 90%.

**Energy consumption**

This is the most important feature of any air compressor. It is measured by the energy required to compress a given volume of air at a certain pressure. Manufacturers are attempting to produce compressors with the lowest possible energy consumption. This means compressor efficiency and low operating costs for the user. In a few years, the energy saving can often be equal to the purchase cost of the compressor. It is important that internal leakages are as small as possible, because the air lost during compression is lost energy. During the compression cycle the air warms and the specific energy required depends on the efficiency of the cooling. In theory, the most efficient method of the reducing energy requirements is when compression occurs at a steady temperature with sufficient cooling. The more efficient the air cooling the lower the power required. Both vane and screw compressors are oil injected and cooling takes place by introducing oil into the stator during the compression stage at a lower temperature than the air temperature. The system is the same for both vane and screw machines. The oil cooling systems can be evaluated by the temperature of the oil: the lower the oil temperature the better the thermodynamic efficiency of the compressor.

**Friction and power loss**

The mechanical losses due to friction and power transmission will increase with the speed of rotation. Screw compressors must run at high speeds to reduce the problem of unavoidable air leakages whilst vane compressors work at comparatively low speeds because there are no sealing problems. This is of great advantage as far as the power absorbed is concerned.
Additionally, screw compressors are often fitted with speed increasing gears or belt transmissions to increase the screw speed compared with the electric motor speed (Figure 10).

![Fig. 10](image)

*Because of low volumetric efficiency, screw compressors are fitted with gears or pulleys to increase rotor speed.*

These gears cause a substantial energy loss because the power absorbed can exceed 5% of the transmitted power.

Vane compressors can work at the same speed as the electric motor. The compressor is connected to the electric motor with a flexible coupling which does not cause any power loss (figure 11).

![Fig. 11](image)

*Rotary vane compressors work at the same speed as electric motors. They are connected to the electric motors through flexible couplings which do not cause any power loss.*

In order to evaluate either a vane or a screw compressor it is important to know the specific energy requirement at a given delivery pressure.
Unfortunately, manufacturers do not usually state the actual power absorbed by the compressor and they usually only quote the rated motor output. This is sometimes lower than the absorbed power because the electric motor is overloaded in comparison with the rated output (service factor).

Some compressors are cooled by a fan fitted directly on the compressor shaft, while on others the fan is driven by a separate electric motor. In this case one has to consider the power absorbed by the fan and add it to the compressor required power.

Taking into account the performance of the compressor, e.g. air delivery, power required, etc. one has to be aware that the stated performance might refer to the air end only without the air filters and separation or to the complete unit including all fittings needed for operation of the compressor. The air filter restricts the air inlet and reduces the air flow.

All other fittings downstream of the air end, such as oil separator, non-return valve, after cooler and condensate separator cause a drop of air pressure and the total drop will be significant.

The power required by the compressor will be lower if the delivery pressure refers only to the outlet from the air-end instead of downstream of the complete unit. The average specific energy of Ganzair rotary vane vehicle compressors of the latest generation, including the cooling fan, is 6,3-6,4 kW m³/min. of free air delivered at the delivery pressure of 8bar(g) measured downstream of the moisture separator.

ISO specification 1217 gives a 5% allowance on the declared air delivery, and a 6% allowance on the specific energy.

The specific energy must be clearly stated. It can be calculated dividing the rated output quoted (which could be 15% lower than the absorbed one) by the declared air delivery (which could be 5% higher than the actual output). An unrealistic value might be obtained which could be as much as 20% less than the actual energy required.
The performance of all Ganzair vehicle compressors is the same without any significant differences between the various models. The free air delivery is not affected by the machining accuracy and by the clearances between the fixed and rotating parts.

The vanes, moved by centrifugal force, are constantly in contact with the stator and always seal (figure 12).

Even the axial clearances do not need great accuracy because they are sealed by the oil which is injected under pressure through the rotor planes and side covers (Figure 8).

In a screw compressor the air seal is very sensitive to the accuracy of the machining of the rotor (the rotors should perfectly seal along the contact line). The accuracy of the centre distance, to the clearance between the two rotors and the stator, as well as to the axial clearance which is regulated by the thrust bearings (Figure 6).

For this reason we talk about first choice and second choice screw compressors!

**Reliability and operating life expectancy**

Time does not reduce the performance of a vane compressor. Their rounded edges and abundant lubrication during rotation ensure the vanes slide on an oil film preventing direct contact with the internal surface of the stator. This means there is only negligible wear on the vanes.

The working life of the vanes is practically unlimited: they can operate for over 50,000-60,000 hours (30,000-35,000 at rail application) without wear.
However even a slight wear to the vanes will not affect the seal as the vanes are free to slide in the rotor slots and for this reason they are always in contact with the stator (figure 12).

In a screw compressor the rotors are subject to friction on the flutes, due to the thrust caused by the male rotor on the female rotor.

As the contact between the two rotors occurs along a line (which means a very limited surface) the specific pressure can be so high as to break the lubricating oil film in which case wear is unavoidable! (figure 14).

In a vane compressor there is no axial thrust and therefore no wear on the side surfaces of the rotor against the cover plates (figure 8).

Furthermore, there is no contact between the rotor and the stator. The internal oil pressure prevents the rotor from touching the stator (figure 15).

The same cannot be said for screw compressors. The minimum clearance and the control of the axial thrust depends on the bearing fitted onto the rotor shafts which turn with the minimum clearance.
Should there be a slight wear of relaxation of the bearings, the rotor would be pushed by pressure against the opposite side and touch the stator, with severe consequences (figure 16).

**Simplicity of design**

In a vane compressor the rotor shaft is supported by white metal bearings, which ensure a quiet and longer operating life than roller bearings.

Roller or taper bearings are needed in a screw compressor because the rotors have to operate at high speed with high axial accuracy and a minimum clearance between the rotors, housing, and endplates.

If the two screws touch or make contact with the stator, the compressor will seize (figure 17).
In a vane compressor the rotor diameter is smaller than the stator diameter, and therefore an increase of the clearance between shaft and bearings is of no importance. During rotations the vanes follow the cylinder profile and can never jam (figure 18). Lubrication of the bearings is ensured by the oil pushed under pressure, without any mechanical circulating pump and without risk of pump failure. It can be said that lubrication is proportional to the air pressure and consequently to the radial loads generated by the same: the higher the air pressure the more oil will be injected and the higher the oil pressure.

**Machining**

The machining of the rotors for screw compressors must be carried out with special and expensive machine tools.

Machining of any part of the vane compressor can be performed with quality machine tools to ensure accuracy and interchangeability of the parts. Any component can be replaced without changing the part to which it is adjacent.

It is not the same for screw compressors: the rotors are a 'matched pair'.

**Repair costs**

In screw compressors the wearing parts are normally the rotors, four or more roller bearings, the gear box and bearings and sometimes even the stator. When, due to the inevitable wear of the bearings, the rotors touch the cylinders in which they rotate, the air end usually requires replacement.

**Proven design!**

The design of Ganzair vehicle compressors is the result of more than 15 years experience in the field of rotary vane compressors and has resulted in the continuing improvement of both the performance and operation of the compressors.

Ganzair vehicle compressors distinguish themselves by their design, the main features of which are their modern compact design and quite operation.

In Ganzair vehicle compressors all main components, such as oil chamber, separator, air filter, non return and pressure regulating valve, are an integral part of the machine and make up a single unit.
Product quality

Quality is ensured by the use of the best possible materials, irrespective of cost. The rotor is made from spheroidal cast iron; the stator from meehanite cast iron and the vanes from special cast iron to ensure long operating life and stability. The vanes are lightened by deep parallel holes and a curved surface to ease their sliding in the stator slots and are real mechanical 'jewels'. The accessories are high quality: the dry air filter with paper element; the oil separator made from borosilicate fibres; oil and compressed air radiators made from alluminium; the coupling is flexible with rubber elements and all O-rings are made from viton. The machining is carried out with modern and precise production tools (mainly numerically controlled machines), and accurate dimensional checks are made of all components before assembly. The strict tests of every finished compressor is to ensure consistently high product quality.

Performance of Ganzair vehicle compressors

The required power for a given unit of delivered air in Ganzair vehicle rotary compressors is amongst the lowest that can be found in any modern screw or vane compressor. This is due to the continuos improvements of the rotor/stator unit. Ganzair vehicle compressors have reached a power requirement of 6,3-6,4 kW for each m³/min. of free air delivered at the delivery pressure of 8 bar (a). If the compressor is tested without cooling fan and intake filter, as many compressor manufacturers do, the power consumption is reduced to 6,15-6,25 kW for each m³/min. Special attention has been paid to the size of the air treatment equipment downstream of the compressor, such as oil separator, non-return valve, air final cooler, condensate separator and relevant connecting pipe, which is required for the final treatment of the compressed air. The higher the pressure drop the higher the energy consumption.

In Ganzair Vehicle Compressors all fittings are an integral part of the compressor. The total pressure drop from these fittings is only 0,3-0,4 bar. The power required to compensate for this pressure drop does not exceed 3% of the total power requirement. This is not achieved in most other makes of compressor.

Oil separation

In Ganzair vehicle compressors the oil separation occurs in several stages and gives an exceptionally low oil carryover.

The primary separation occurs in the oil chamber, at the outlet of the rotor/stator unit, along a labyrinth made by the external fins of the stator and the internal fins of the oil chamber. Secondary separation occurs at the inlet of the final separator, before the separator elements, by expanding and changing the direction of the air flow. The final separation is effected through the filters themselves, removing the remaining oil vapour from the air.

Due to this unique separation system which is not found in other makes of compressor and the size and material of the filters, the oil quantity carried over by the compressed air varies from 1 to 3 ppm (parts per million by weight).

By installing final oil removing filters Ganzair vehicle rotary vane compressors are used in oil-free applications.
Why choose Ganzair manufacture rotary vane vehicle compressors?

- Long lifetime
- Main overhaul 50,000-60,000 hours run (at railvay application 30,000-40,000 hours run)
- Good volumetric efficiency (approx. 90%)!
- Minimal efficiency loss
- Low noise level (70-75dB(A) without sound insulation. With sound insulation smaller as 50 dB(A)!
- Low vibration
- No axial force (friction bearing or white metal bearings)
- Compact design
- Low working temperature and pressured air temperature (70-80°C)
- Low oil carryover 1-3 ppm (parts per million by weight)
- Simple maintenance
- Energy-saving (low energy cost)
- Air delivery from 210 l/min- 13500 l/min
- Power from 3kW to 110 kW
- Operating pressure from 6bar(g) to 13 bar(g)
ROTARY VANE COMPRESSORS FOR VEHICLES

APPLICATIONS

BUDAPEST PUBLIC TRANSPORT COMPANY
SUBURBAN RAILWAYS DIVISION

Technical data:
- Air end type: MC80E
- Motor shaft power: 7.5 kW
- Max. pressure: 10.5 bar
- Working pressure: 9.5 bar
- Rotation speed: 2000 1/min
- Air delivery: 1000 liter/min
- Ambient temperature: -25°C - +40°C
- Outlet air temperature: +70-80°C
- Noise level: 80 dBA
- Drive: DC motor with V-belt drive
Technical data:
- Air end type: MC80B
- Motor shaft power: 4 kW
- Max. pressure: 10.5 bar
- Working pressure: 9.0 bar
- Rotation speed: 1425 1/min
- Air delivery: 530 liter/min
- Ambient temperature: -25°C - +40°C
- Outlet air temperature: +70-80°C
- Noise level: 72 dBA
- Drive: DC motor with direct drive
Technical data:

- Air end type: MC80B H
- Motor shaft power: 4 kW
- Max. pressure: 10.5 bar
- Working pressure: 8.2 bar
- Rotation speed: 1425 1/min
- Min. rotation speed: 1200 1/min
- Air delivery: 530 liter/min
- Ambient temperature: -25°C - +40°C
- Outlet air temperature: +70°C - +80°C
- Noise level: 80 dB(A)
- Drive: DC motor with direct drive
HUNGARIAN STATE RAILWAYS
M43 – M47 TYPES
SHUNTING LOCOMOTIVES

BRQ11/8/1 VHH

Technical data:
- Air end type: MC86A
- Motor shaft power: 11 kW
- Max. pressure: 10,5 bar
- Working pressure: 8.0bar
- Rotation speed: 2200 l/min
- Air delivery: 1450 liter/min
- Ambient temperature: -25°C - +40°C
- Outlet air temperature: +70-80°C
- Noise level: 82 dBA
- Drive: Hydraulic drive
SERBIAN ELECTRICITY WORK’S MINE RAILWAY KOLUBARA MINE

BRQ7,5/8/1 VEH

Technical data:
- Air end type: MC86C
- Motor shaft power: 7.5 kW
- Working pressure: 8.0 bar
- Rotation speed: 1425 1/min
- Air delivery: 1000 liter/min
- Ambient temperature: -25°C - +40°C
- Outlet air temperature: +70-80°C
- Noise level: 72dBA

Power Drive 7.5
- DC/DC – DC/AC Inverter 1200V DC/3x400V AC
- Max. working offset +* 200V DC
- Cutoff voltage 4400V DC
Technical data:
- Air end type: MC86C
- Compressor shaft power: 8.5 kW
- Motor shaft power: 11 kW
- Max. pressure: 10.5 bar
- Working pressure: 10.0 bar
- Rotation speed: 1425 1/min
- Air delivery: 1100 liter/min
- Ambient temperature: -25°C - +40°C
- Outlet air temperature: +70-80°C
- Noise level: 72dBA
Technical data:
- Air end type: MC80C
- Motor shaft power: 5,5kW
- Max. pressure: 10,5 bar
- Working pressure: 9.0 bar
- Rotation speed: 1410 1/min
- Air delivery: 580 liter/min
- Ambient temperature: -25°C - +40°C
- Outlet air temperature: +70-80°C
- Noise level: 72dBA
LITHUANIAN AND LATVIAN RAILWAYS
2M62U LOCOMOTIVES

BR45/10/2 VHH

Technical data:
- Air end type: M135C
- Motor shaft power: 42kW
- Max. pressure: 10.5 bar
- Working pressure: 10.0 bar
- Rotation speed: 1350-1550 1/min
- Air delivery: 5300 liter/min
- Ambient temperature: -25°C - +40°C
- Outlet air temperature: +70-80°C
- Noise level: 74dBA
- Drive: Hydraulic drive
TRANSMASHOLDING  
LITHUANIAN RAILWAYS  
TEP70 TYPE LOCOMOTIVE  

BR45/9/5500 E

Technical data:

- Air-end type: M135D H
- Compressor shaft power: 42.5 kW
- Motor shaft power: 45.0 kW
- Max. pressure: 10.5 bar
- Working pressure: 9 bar
- Rotor speed: 1470 1/min
- Air delivery: 5600 liter/min
- Ambient temperature: -35°C - +40°C
- Outlet air temperature: +70°C - +80°C
- Noise level: 75 dB(A)
- Drive: asynchronous motor
RUSSIA, KUSBASS REGION SIBERIA
JSC "SHADRINSK AUTO AGGREGAT PLANT"
TEM2 LOCOMOTIVES

BE45/9/1 E

Technical data:
- Air-end type: M135D
- Compressor shaft power: 42.5 kW
- Motor shaft power: 45.0 kW
- Max. pressure: 10.5 bar
- Working pressure: 9 bar
- Rotor speed: 1470 1/min
- Air delivery: 5600 liter/min
- Ambient temperature: -35°C - +40°C
- Outlet air temperature: +70°C - +80°C
- Noise level: 75 dB(A)
- Drive: asynchronous motor
RUSSIA, KUSBASS REGION SIBERIA
JSC "SHADRINSK AUTO AGGREGAT PLANT"
TGM4 LOCOMOTIVES

BE45/9/1 E

Technical data:

- Air-end type: M111h
- Motor shaft power: 30 kW
- Max. pressure: 10,5 bar
- Working pressure: 9 bar
- Rotor speer: 1465 1/min
- Air delivery: 3400 liter/min
- Ambient temperature: -35°C - +40°C
- Outlet air temperature: +70-80°C
- Noise level: 75 dB(A)
- Drive: asynchronous motor
STATE FOREST RAILWAY OF LILAFÜRED
SEDULITAS-PRO ENGINEERING OFFICE LLC.
MK48 HYBRID LOCOMOTIVE

"THE WORLD'S FIRST HYBRID NARROW GAUGE LOCOMOTIVE!"
BRQ4/10/35 TFH

Technical data:

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HUNGARIAN STATE RAILWAYS
STADLER FLIRT MOTOR-TRAIN

BRL7,5/10/3 ETF

Technical data:

- Air-end type: M80F HH
- Compressor shaft power: 6,9 kW
- Motor shaft power: 7,5 kW
- Max. pressure: 12,6 bar
- Working pressure: 10 bar
- Rotor speed: 1450 1/min
- Air delivery: 840 liter/min
- Ambient temperature: -25°C - +40°C
- Outlet air temperature: +30-45°C
- Noise level: 58 dB(A)
- Drive: asynchronous motor
RAABERBAHN AG.

STADLER FLIRT MOTOR-TRAIN

BRL7,5/10/3 ETF

Technical data:

- Air-end type: M80F HH
- Compressor shaft power: 6,9 kW
- Motor shaft power: 7,5 kW
- Max. pressure: 12,6 bar
- Working pressure: 10 bar
- Rotor speed: 1450 1/min
- Air delivery: 840 liter/min
- Ambient temperature: -25°C - +40°C
- Outlet air temperature: +30-45°C
- Noise level: 58 dB(A)
- Drive: asynchronous motor
ROTARY VANE COMPRESSORS FOR VEHICLES

TROLLEYBUS APPLICATIONS

SOLARIS BUS, IKARUS, BELKOMMUNMASH, MAZ IRISBUS, SKODA, VOLVO, MERCEDES …

BRQ4/10/35 TFH
BRQ4/10/35 TFH
BRQ5,5/10/35 TFH
BRQ5,5/13/35 TFH
BRQ3/9/1 TFH

Technical data:
- Air end type: MC80A – MC80B
- Motor shaft power: 3 – 5.5 kW
- Max. pressure: 8.2 – 12.6 bar
- Working pressure: 8.0 – 12.6
- Rotation speed: 1450 1/min
- Air delivery: 380 -530 liter/min
- Ambient temperature: -35°C - +55°C
- Outlet air temperature: +30°C - + 50°C
- Noise level: 72dBA
Technical data:

- Air-end type: MC80B H
- Motor shaft power: 4 kW
- Max. pressure: 10.5 bar
- Working pressure: 9.5 bar
- Rotor speed: 1425 1/min
- Air delivery: 530 liter/min
- Ambient temperature: -25°C - +40°C
- Outlet air temperature: +70°C - +80°C
- Noise level: 73 dB(A)
- Drive: EHL 160M4 typ. DC motor with direct drive
BUDAPEST PUBLIC TRANSPORT COMPANY
IKARUS 412T TROLLEYBUS

BRQ4/10/35 TFH

Technical data:

- Air-end type : MC80B
- Motor shaft power: 4 kW
- Max. pressure: 10,5 bar
- Working pressure: 10 bar
- Rotor speed: 1450 1/min
- Air delivery: 530 liter/min
- Ambient temperature: -25°C - +50°C
- Outlet air temperature: +70°C - +80°C
- Noise level: 72 dB(A)
- Drive: asynchronous motor
BUDAPEST PUBLIC TRANSPORT COMPANY
IKARUS 435T TROLLEYBUS

BRQ4/10/35 TFH

Technical data:

- Air-end type: MC80B
- Motor shaft power: 4 kW
- Max. pressure: 10.5 bar
- Working pressure: 10 bar
- Rotor speed: 1450 1/min
- Air delivery: 530 liter/min
- Ambient temperature: -25°C - +50°C
- Outlet air temperature: +70°C - +80°C
- Noise level: 72 dB(A)
- Drive: asynchronous motor
Technical data:

- Air-end type: MC80B
- Motor shaft power: 4 kW
- Max. pressure: 10.5 bar
- Working pressure: 10 bar
- Rotor speed: 1450 1/min
- Air delivery: 530 liter/min
- Ambient temperature: -25°C - +50°C
- Outlet air temperature: +70°C - +80°C
- Noise level: 72 dB(A)
- Drive: asynchronous motor
PUBLIC TRANSPORT COMPANY OF DEBRECEN
GANZ-MAZ 103T TROLLIBUS

BRQ4/10/35 TFH

Technical data:

- Air-end type: MC80B
- Motor shaft power: 4 kW
- Max. pressure: 10.5 bar
- Working pressure: 10 bar
- Rotor speed: 1450 1/min
- Air delivery: 530 liter/min
- Ambient temperature: -25°C - +50°C
- Outlet air temperature: +70°C - +80°C
- Noise level: 72 dB(A)
- Drive: asynchronous motor
Technical data:

- Air-end type : MC80B
- Motor shaft power: 4 kW
- Max. pressure: 10,5 bar
- Working pressure: 10 bar
- Rotor speed: 1450 1/min
- Air delivery: 530 liter/min
- Ambient temperature: -25°C - +50°C
- Outlet air temperature: +70°C - +80°C
- Noise level: 72 dB(A)
- Drive: asynchronous motor
Rotary vane compressors for vehicles

Public Transport Company of Bucharest

Ikarus-Astra 415T Trollibus

BRQ5,5/13/35 TH

Technical data:

- Air-end type: MC80B HH
- Motor shaft power: 5,5 kW
- Max. pressure: 12,6 bar
- Working pressure: 12,6 bar
- Rotor speed: 1425 1/min
- Air delivery: 490 liter/min
- Ambient temperature: -25°C - +50°C
- Outlet air temperature: +70°C - +80°C
- Noise level: 72 dB(A)
- Drive: asynchronous motor
ATAC - PUBLIC TRANSPORT COMPANY OF ROMA ITALY

GANZ-SOLARIS 18T HYBRID TROLLIBUS

BRQ5,5/10/35 TFH

Technical data:
- Air-end type: MC80B HH
- Motor shaft power: 5,5 kW
- Max. pressure: 12,6 bar
- Working pressure: 12,6 bar
- Rotor speed: 1425 1/min
- Air delivery: 490 liter/min
- Ambient temperature: -25°C - +50°C
- Outlet air temperature: +70°C - +80°C
- Noise level: 72 dB(A)
- Drive: asynchronous motor
PUBLIC TRANSPORT COMPANY OF NAPOLY
ITALY

GANZ-SOLARIS 18T HYBRID TROLLIBUS

BRQ5,5/10/35 TFH

Technical data:

- Air-end type: MC80B HH
- Motor shaft power: 5,5 kW
- Max. pressure: 12,6 bar
- Working pressure: 12,6 bar
- Rotor speed: 1425 1/min
- Air delivery: 490 liter/min
- Ambient temperature: -25°C - +50°C
- Outlet air temperature: +70°C - +80°C
- Noise level: 72 dB(A)
- Drive: asynchronous motor
PUBLIC TRANSPORT COMPANY OF LANDSKRONA
SWEDEN

GANZ-SOLARIS 18T TROLLIBUS

BRQ5,5/10/35 TFH

Technical data:

- Air-end type: MC80B HH
- Motor shaft power: 5,5 kW
- Max. pressure: 12,6 bar
- Working pressure: 12,6 bar
- Rotor speed: 1425 1/min
- Air delivery: 490 liter/min
- Ambient temperature: -25°C - +50°C
- Outlet air temperature: +70°C - +80°C
- Noise level: 72 dB(A)
- Drive: asynchronous motor
PUBLIC TRANSPORT COMPANY OF LRIGA LATVIA
GANZ-SOLARIS 18T TROLLIBUS

BRQ5,5/10/35 TFH

Technical data:

- Air-end type: MC80B HH
- Motor shaft power: 5,5 kW
- Max. pressure: 12,6 bar
- Working pressure: 12,6 bar
- Rotor speed: 1425 1/min
- Air delivery: 490 liter/min
- Ambient temperature: -25°C - +50°C
- Outlet air temperature: +70°C - +80°C
- Noise level: 72 dB(A)
- Drive: asynchronous motor
ROTARY VANE COMPRESSORS FOR VEHICLES

PUBLIC TRANSPORT COMPANY OF SZEGED
HUNGARY

ARC-SKODA TROLLEYBUS

BRQ5,5/10/35 TFH

Technical data:

- Air-end type: MC80B HH
- Motor shaft power: 5,5 kW
- Max. pressure: 12,6 bar
- Working pressure: 12,6 bar
- Rotor speed: 1425 1/min
- Air delivery: 490 liter/min
- Ambient temperature: -25°C - +50°C
- Outlet air temperature: +70°C - +80°C
- Noise level: 72 dB(A)
- Drive: asynchronous motor
E-BUSZ APPLICATION
EVOPRO MODULO ELECTRICAL BUS

BRQ3/12/210 E

Technical data:

- Air-end type: M65C
- Motor shaft power: 3 kW
- Max. pressure: 12,6 bar
- Max. working pressure: 12 bar
- Rotor speed: 1440 1/min
- Air delivery at 12 bar: 210 liter/min
- Ambient temperature: -20°C - +50°C
- Outlet air temperature: +70°C - +80°C
- Noise level: 68 dB(A)
- Drive: asynchronous motor