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JSC "Sumy Frunze NPO"

**RECIPROCATING
COMPRESSORS
AND COMPRESSOR UNIT**



catalog
of products



Joint Stock Company "Sumy Frunze Machine Building Science and Production Association" is one of the oldest enterprises in CIS countries in manufacturing of heavy duty reciprocating compressors. The first super-power compressor with capacity of 10 000 m³/hour for pressure of 300 atmosphere was manufactured by the company in 1933 for Bereznikovskiy chemical plant.

In 1949 it was produced the first heavy duty horizontal compressor 1Г-166/320 and in August 1950 it was completed the manufacturing of 10 compressors which were supplied to Bulgaria, Poland and China for ammonia synthesis process lines. It was developed and mastered the production of the whole series of horizontal reciprocating compressors on bayonet basis for producing chemical fertilizers: 1Г-266/320, 2Г-420/25-320, 3Г-100/200 and others. The compressors 1Г-266/320 for ammonia synthesis plants which have been manufactured for about twenty years were in great demand. They were supplied to the chemical plants in China, Poland, Bulgaria, Hungary, Afghanistan and former USSR. They had sufficiently reliable design, high maintainability and many of them are still in operation.

High speed and more compact opposite compressors substituted low speed horizontal compressors which had the big content of metal and required large area for installation. The first sample of the opposite compressor 50ТГ-130/200 was manufactured and commissioned in 1960 in Rustavskiy chemical plant.

The serial production of the heavy duty opposite compressors with piston force 16, 25 and 40 tons for different branches of industry has been started since 1964.



The field of application of manufactured heavy duty opposite compressors are very diversified:

- hydrogen-bearing and flue gases boosting up to 6.5 MPa in plants for catalytic reforming and hydrofining of diesel fuel;
- hydronitric mixture compression up to 32.5 MPa in plants for ammonia production;
- natural and casing-head gas boosting up to 6 MPa for transportation;
- natural gas boosting from 10 MPa to 42 MPa and its injecting into formation when developing gas condensate fields using cycling process;
- casing-head gas compression at gas lift production;
- ethylene boosting from 1.4 to 28 MPa and from 25 to 250 MPa in plants for production of polyethylene with low density;
- natural gas compression up to 25 MPa in CNG refueling compressor stations;
- air compression up to 20 MPa in plants for separation of air and carbon dioxide for carbamide production.



In the 90th in view of the destruction of the existing in USSR specialization of compressor manufacturing plants, our company enlarged the line of the manufactured compressor equipment owing to mastering the production of compressors on mid-sized and small bases with piston force 2.5, 4.0 and 10 tons as well as on W-base with piston force 1.6 tons.

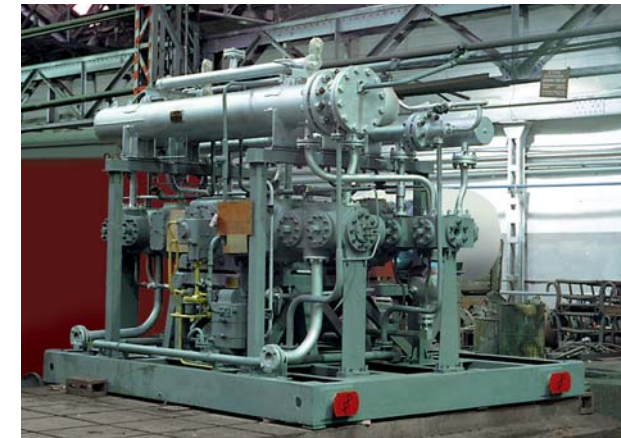
Within the period from 1964 till 2008 the company manufactured more than 1000 compressors of different types, among them:

- on the basis of: M40 – 144 compressors, M25 – 136 compressors, M16 – 500 compressors, M10 – 27 compressors, M4 – 12 compressors, M2.5 – 186 compressors and W1.6 – 60 compressors.

All the compressors produced by the company are easy for maintenance and reliable in operation, as well as are equipped with automatic control system based on advanced programmable micro-processors and have a high value of mean-cycles-between-failures. Compressors are completed with sufficient number of spares and set of special tools for maintenance. Applied design and used materials allow to ensure a safe overhaul life of the compressors that is 30 000 – 40 000 hours.

A distinctive feature of low and mean capacity compressors with piston force up to 10 tons is their full shop readiness, assembly on the common metallic frame with driving electrical motor or gas engine, piping, auxiliary systems, valves and automatic control system. Such compressors are subjected to shop performance tests under operating load with air or natural gas and then these are supplied to the Customers.

The development of new type compressors is supported by experimental optimization of test pieces of the units



by means of state of the art test benches, measurement technique and computer facilities. For this purpose an experimental research complex with test benches and mechanical area was built at the JSC Sumy Frunze NPO for fabrication of experimental units designed for new equipment.

For carrying out the performance tests of new types of the skid mounted compressor units there is a bench for reciprocation compressor testing that allows carrying out the tests with air or natural gas.

Quality management system applied at the company from 1997 is certified for its conformity to International Standard ISO 9001.



Highly professional personnel and up-to-day production facilities in combination with state-of-the-art technologies ensure a high quality and reliability of the produced compressors.

Having more than 110-years production experience JSC Sumy Frunze NPO is able to design and manufacture any type of compressor unit at the Customer's request ensuring the high quality, reliability and conformity to the best word model.





LEGEND OF COMPRESSOR MODEL

- | | | | |
|--------------------------|-----------------------|-------------------------|-----------------------------|
| ▼ - 6ГШ1,6-4,5/1,3-6 | ■ - 4ГМ10-40/3-22С | ▶ - 4М16-12,5/17-281 | ■ - 4М25-117/200 |
| ▼ - 2ГМ2,5-2/25-38,5С | ■ - 4ГМ10-55/71 | ▶ - 4М16-22,4/23-64С | ■ - 4М25-76/35-56 |
| ▼ - 2ГМ2,5-4/1,1-71С | ■ - 4ГМ10-55/71С | ▶ - 4М16-22,4/23-64СМ1Т | ■ - 6ГМ25-120/14-38 |
| ▼ - 2ГМ2,5-5/1,7-71С | ■ - ГПА-П-0,5/4-46С | ▶ - 4М16-45/35-55С | ■ - 6ГМ25-140/35-56 |
| ▼ - 2ГМ2,5-2200/20-55С | ▲ - 2ГМ16-19/14-56С | ▶ - 4М16-56/15-30С | ■ - 6ГМ25-180/3-75 |
| ▲ - 4ГМ2,5-1,6/7,8-161С | ▲ - 2ГМ16-24/40-60М1 | ▶ - 4М16-56/15-30СМ1Т | ■ - 6ГМ25-210/3-56М2 |
| ▲ - 4ГМ2,5-25/7 | ▲ - 2ГМ16-24/40-60С | ▶ - 4М16-100/200М1 | ■ - 6ГМ25-210/4-60 |
| ▲ - 4ГМ2,5-30/9С | ▲ - 2ГМ16-30/35-50С | ▶ - 6ВМ16-112/1,6-200 | ■ - 6ГМ25-210/3-56 |
| ▲ - 4ГМ2,5-2200/9-32С | ▲ - 2ГМ16-31/24-36С | ▶ - 6ВМ16-140/200 | ■ - ГПА-5000-6М25-125/38-56 |
| ▲ - АКГТ4ГМ2,5-2,3/9-33С | ▲ - 2М16-20/42-60С | ▶ - 6В(Г)М16-150/200 | ■ - 4ГМ40-35/23-325 |
| ● - 2ВМ4-10/201 | ▲ - 2М16-20/42-60СМ1Т | ▶ - 6ГМ16-145/200М | ■ - 4М40-680/22-320 |
| ● - 2ГМ4-10,6/15-24С | ▲ - 4ГМ16-14/14-281 | ▶ - 6ГМ16 - 145/30 | ■ - 4М40М-1,12/250-2500 |
| ● - 2ГМ4-19/1,5-13 | ▲ - 4ГМ16-14/15-104М1 | ▶ - 6ГМ16 - 2,2/30-200 | ■ - 6ГМ40-16/100-420 |
| ● - 4ВМ4-46/9 | ▲ - 4ГМ16-25/18-65С | ▶ - 4ГМ25-36/16-170 | ■ - 6М40-320/200 |
| ■ - 2ГМ10-4/40-120С | ▲ - 4ГМ16-40/22-46С | ▶ - 4ГМ25-36/19-145 | ■ - 6М40-320/320 |
| ■ - 2ГМ10-25/1,05-70 | ▲ - 4ГМ16-50/40-60С | ▶ - 4ГМ25-80/11-35С | ■ - 6М40-450/22,5 |
| ■ - 4ВМ10-55/71Н | ▲ - 4ГМ16-70/1,8-18С | ▶ - 4ГМ25-80/12-31С | ■ - 6М40-530/22,5 |

MODELS OF COMPRESSORS DELIVERED TO CITIES MARKED AS ●

- | | | | |
|------------------|---------------------|--------------------|----------------|
| ◆ - Avdeyevka | ◆ - Leuna | ▲ - Pavlodar | ▲ - Sienfuegos |
| ▲ - Angarsk | ▲ - Mazheikiay | ▲ - Perm | ▲ - Tissay |
| ▲ - Achinsk | ▲ - Mary | ▲ - Plevn | ▲ - Toliatti |
| ▲ - Baku | ▲ - Mosy | ▲ - Rovno | ▲ - Toms |
| ▲ - Burgas | ▲ - Moscow | ▲ - Rustavi | ▲ - Ufa |
| ▲ - Volgograd | ▲ - Navoi | ▲ - Ryazan | ▲ - Kherson |
| ▲ - Groznyy | ▲ - Nadvornaya | ▲ - St. Petersburg | ▲ - Hynnam |
| ▲ - Ionava | ▲ - Nebit-Dag | ▲ - Salavat | ▲ - Cherkassy |
| ▲ - Kiev | ▲ - Nizhnyevartovsk | ▲ - Samara | ▲ - Chimkent |
| ▲ - Kohtla-Yarve | ▲ - Novgorod | ▲ - Saratov | ▲ - Saratov |
| ▲ - Craiova | ▲ - Novomoskovsk | ▲ - Skopje | ▲ - Sumgait |
| ▲ - Kremenchug | ▲ - Novopolotsk | ▲ - Noviy Urengoy | ▲ - Sumy |
| ▲ - Kstovo | ▲ - Noviy Urengoy | ▲ - Omsk | ▲ - Surgut |
| ▲ - Kurgan-Tube | ▲ - Orenburg | ▲ - Syzran | ▲ - Syzran |
| ● - Lisichansk | | | |

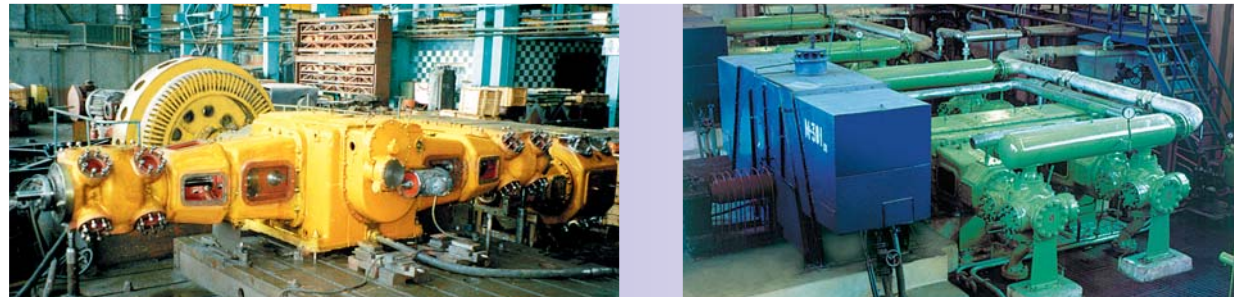
6 COMPRESSORS FOR OIL REFINING INDUSTRY

These compressors are designed for boosting of hydrogen-bearing and flue gases as well as process hydrogen in the plants for catalytic reforming and hydrofining of diesel fuels.

The compressors are designed as reciprocating, horizontal, one and two stage machines on opposite bases 2M2.5; 2M4; 2M10; 4M10; 2M16; 4M16 and 4M25

with dry-type cylinders and sealing glands. As a drive it is used asynchronous or synchronous electric motor.

The compressors are equipped with capacity control system and automatic devices providing control, protection and shut-down of the compressors in case of emergency operating conditions.



SPECIFICATION

| Compressor model, compressed medium | Capacity | | Abs. pressure, MPa | | Consumed power, kW | Weight, t (without electric motor) | Overall dimensions, m | | |
|--|---------------------|------------------------------|--------------------|-----------------|--------------------|------------------------------------|-----------------------|-------|------|
| | m ³ /min | standart m ³ /min | suction | discharge | | | L | W | H |
| 2FM2.5-6.2/38-46C Hydrogen bearing gas | 6.2 | 166.7 | 3.82 | 4.61 | 92.5 | 9* | 5.2 | 2.95 | 1.85 |
| 2FM2.5-2/25-38.5C Hydrogen bearing gas | 2 | 37.1 | 2.45 | 3.76 | 44.1 | 8.2* | 5.0 | 3.1 | 1.82 |
| 2FM4-10.6/15-24C Hydrogen bearing gas | 10.6 | 138 | 1.55 | 2.4 | 145 | 9 | 1.97 | 3.75 | 2.06 |
| 2FM10-26/14-22C Hydrogen bearing gas | 26 | 366.7 | 1.37 | 2.16 | 380 | 19.5 | 6.9 | 4.45 | 3.27 |
| 2FM10-3.3/100-130C Hydrogen bearing gas | 3.3 | 333 | 9.8 | 12.74 | 200 | 19 | 6.75 | 4.76 | 3.27 |
| 2FM10 $\frac{6.8/4-14}{4.8/12-35}$ C Hydrogen bearing gas | 6.8 4.8 | 25 50 | 0.392 1.274 | 1.372 3.43 | 230 | 21 | 6.75 | 4.37 | 2.78 |
| 2FM16-24/40-60C Hydrogen bearing gas | 24.24- 23.94 | 818- 647 | 3.92- 3.14 | 5.8- 4.82 | 895- 779 | 16 | 6.3 | 9.44 | 5.45 |
| Flue gas | 25.56- 21.12 | 873- 143 | 3.92- 0.785 | 4.82- 1.85 | 643- 396 | | | | |
| 2FM16-19/14-56C Hydrogen bearing gas | 19 | 233- 217 | 1.3- 2.2 | 5.5 | 775- 690 | 27 | 6.25 | 13.46 | 4.45 |
| 2FM16-30/35-50C Hydrogen bearing gas | 30- 28.32 | 898- 797 | 3.43 | 4.9 | 871 | 19 | 8.53 | 8.1 | 4.55 |
| 4FM16-50/40-60C Hydrogen bearing gas | 50.4 | 1700 | 3.92 | 5.8 | 1863 | 30 | 10.43 | 8.17 | 5.2 |
| Flue gas | 43.8 | 296 | 0.785 | 1.85 | 825 | | | | |
| 4FM16-25/18-65C Hydrogen bearing gas | 23.9- 25.6 | 360- 378 | 1.77- 2.26 | 6.2 | 1478 | 37 | 10.9 | 8.48 | 5.2 |
| 4FM16-70/15-30C Hydrogen bearing gas | 67.8- 72.0 | 760- 911 | 1.47- 1.47 | 2.94- 2.94 | 1726- 1740 | 31 | 10.43 | 8.26 | 5.2 |
| Flue gas | 71.4- 70.8 | 483- 479 | 0.785- 0.785 | 1.765- 1.765 | 1178- 1186 | | | | |
| 4FM16-22/17-37C Process hydrogen | 23 | 345 | 1.6 | 3.6 | 722 | 26 | 8.4 | 8.89 | 5.03 |
| Nitrogen | 26 | 182 | 0.9 | 2.7 | 517 | | | | |
| 4FM25-80/12-31C Hydrogen | 93.36 | 783 | 1.2 | 3.2 | 2640 | 50 | 14 | 12 | 5.2 |
| 4FM25-36/16-170M1 Hydrogen | 34.2 | 480 | 1.57 | 16.7 | 3130 | 75 | 13.1 | 11.3 | 7.8 |

Notes:

*weight of compressor with electric motor and compressor frame.
Overall dimensions are given with drive, intra-stage devices and piping.

7 COMPRESSORS FOR COMPRESSION OF NATURAL AND CASING-HEAD GAS

These compressors are designed for compression of natural and casing-head gas.

The compressors are of reciprocating type on opposite bases 2M2.5; 4M2.5; 2M4; 2M10; 4M10 and 6M25.

The reciprocating mechanism is lubricated by oil circulated under pressure being produced by gear-type pump. The cylinders and rod sealing devices are forced

lubricated under pressure being produced by multi-plunger pump.

The cylinders are forced cooled by fluid through closed loop.

Intra stages the gas is cooled by water through closed loop discharged under pressure.

Automatic monitoring, control and protection system ensures monitoring of main parameters, alarm and emergency signaling as well as blocking of driving electric motor.



SPECIFICATION

| Compressor model, compressed medium | Capacity | | Abs. pressure, MPa | | Consumed power, kW | Weight, t (without electric motor) | Overall dimensions, m | | |
|--|------------------------|------------------------------|-----------------------|------------------------|--------------------|------------------------------------|-----------------------|--------------------|-------------------|
| | m ³ /min | standart m ³ /min | suction | discharge | | | L | W | H |
| 6FM25-210/4-60M Natural gas, casing-head gas | 209.4 | 470 | 0.1-0.35 | 5.90 | 3810 | 119.0 | 17.1 | 12.7 | 5.7 |
| 6FM25-180/3-75 Natural gas, casing-head gas | 180.0 | 400 | 0.24 | 7.35 | 3810 | 119.0 | 17.1 | 12.7 | 5.7 |
| 2FM2.5-2200/20-55 Natural gas | 1.8 | 36.7 | 2.00 | 5.50 | 50 | 6.7 ^{*3} | 4.3 | 2.6 | 1.8 |
| 2FM4-19/1.5-13 Natural gas | 19 | 34 | 0.05-0.1 | 1.2 | 250 | 10.1 ^{*3} | 6.2 | 3.79 | 2.3 |
| 2FM10-4/40-120C Casing-head gas | 4 | 171 | 4.1-4.6 | 12.1 | 375 | 27.6 ^{*3} | 4.87 ^{*4} | 6.87 ^{*4} | 2.2 ^{*4} |
| 4FM2.5-2200/9-32 ^{*1} Natural gas | 2.1-3.84 ^{*2} | 34.3-44.2 ^{*2} | 0.9-1.8 ^{*2} | 2.17-2.7 ^{*2} | 48 (max) | 9.9 ^{*3} | 6.3 | 3.02 | 2.23 |
| 2FM10-14/10-33C Natural gas | 14 | 186.5 | 1.0-1.2 | 3.3 | 445 | 25 | 10 | 6.5 | 3.6 |
| 4FM10-40/3-22C Natural gas | 40 | 112 | 0.2 | 2.1-2.6 | 710 | 36.2 | 8.19 | 11.78 | 4.2 |
| 6FM40-16/100-420 Natural gas | 16.3 | 1470 | 9.90 | 41.30 | 6080 | 180.5 | 23.3 | 18.0 | 6.0 |
| 6FLW1.6-4.5/1.3-6 Natural gas | 4.5 | 6 | 0.03-0.35 | 0.5 | 36 | 1.8 | 3.08 | 1.42 | 1.34 |
| AKTГ 4FM2.5-2.3/9-33C ^{*5} Natural gas | 2.3 | 19.05-25.9 | 0.8 | 2.5-3.2 | 72 | 8.37 ^{*3} | 6.3 | 3.02 | 2.2 |

Notes:

^{*1} – multi-mode compressor unit. It is re-equipped for operation with parameters $P_{suc}=0.2-0.3$ MPa, $P_{discharge}=0.665-1.05$ MPa; ^{*2} – depending on operating conditions; ^{*3} – weight of compressor with electric motor and compressor frame; ^{*4} – overall dimensions of compressor unit without external utilities; ^{*5} – special compressor unit. It is supplied only as a part of electric power station.
Overall dimensions are given with drive, intra-stage devices and piping.

COMPRESSORS FOR CNG VEHICLE REFUELING COMPRESSOR STATIONS

As a part of CNG vehicle refueling compressor stations these compressors are designed for compression of natural gas and refueling of vehicles with this gas.

Design:

- reciprocating on opposite base 4FM2.5 and 4FM2.5Y;
 - reciprocating on W-base 6FШ1.6.
- Lubrication system:
- opposite compressors: the reciprocating mechanism is lubricated by oil circulated under pressure; the cylinders and rod seals are forced lubricated under

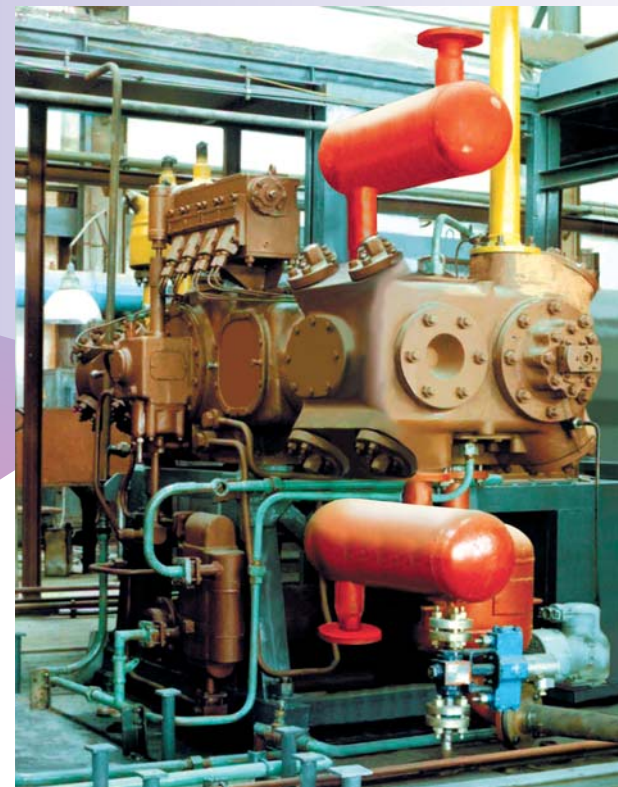
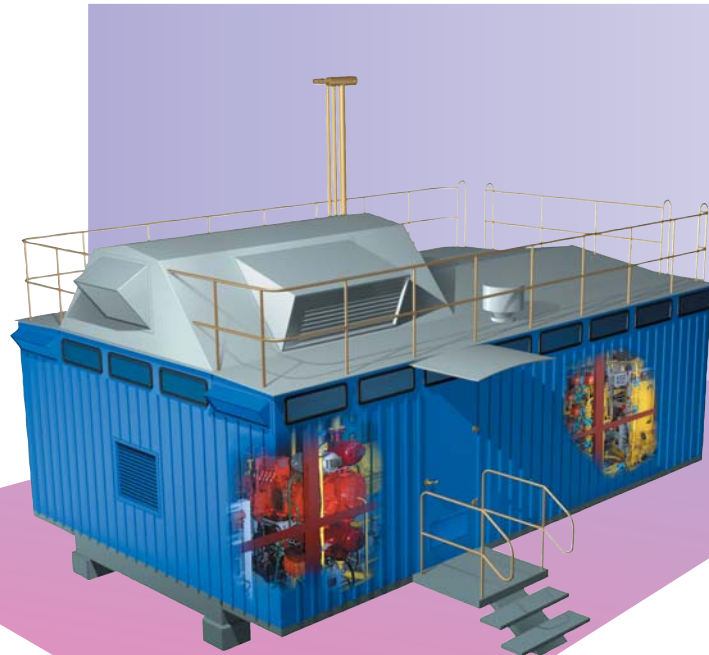
pressure being produced by plunger pump;

- compressor on W-base: reciprocating mechanism is lubricated by oil spraying; cylinders are not lubricated.

Intra stages the gas is cooled in air cooler being integrated in CNG vehicle refueling compressor stations.

The oil is also cooled by air cooler through intermediate heat transfer agent (antifreezing agent).

The control system of CNG vehicle refueling compressor stations ensures the monitoring of parameters and control of the compressors.



SPECIFICATION

| Compressor model | Capacity standard m ³ /hour | Rotational speed, rpm | Suction pressure, MPa g | Discharge pressure, MPa g | Drive power, kW | Weight, t |
|---------------------|--|-----------------------|-------------------------|---------------------------|-----------------|-----------|
| 4FM2.5-1.8/5-251 | 440-720 | 750 | 0.3÷0.5 | 25 | 132 | 4.40 |
| 4FM2.5-1.2/10-251 | 480-1040 | 750 | 0.5÷1.1 | 25 | 132 | 4.45 |
| 4FM2.5Y-3.4/2.8-251 | 300-550 | 1000 | 0.05÷0.3 | 25 | 132 | 3.90 |
| 4FM2.5Y-2.3/6-251 | 440-720 | 1000 | 0.3÷0.6 | 25 | 132 | 3.90 |
| 4FM2.5Y-1.3/11-251 | 600-1000 | 1000 | 0.6÷1.2 | 25 | 132 | 3.92 |
| 4FM2.5-1.1/16-251 | 800-1000 | 750 | 1.2÷1.7 | 25 | 132 | 4.45 |
| 6FШ1.6-1.0/3.5-251 | 50-190 | 1000 | 0.05÷0.6 | 25 | 45 | 1.85 |
| 4FШ1.6-0.08/51-251 | 150-530 | 1000 | 2.5÷7.5 | 25 | 30 | 1.70 |

Notes:

*weight of compressor with electric motor mounted on the common frame.

Intra-stage devices, coolers and piping are the parts of CNG vehicle refueling compressor stations.

COMPRESSORS FOR LIQUEFIED GASES

Reciprocating compressors

6B(Г)M16-150/200 and **2BM4-10/201** are designed to compress air and nitrogen in the high pressure separation units;

6FM16-145/200 are designed to compress hydrogen and nitrogen in the liquefaction units and are used in the aerospace industry;

4B(Г)M10-55/71 are designed to compress air and nitrogen in the medium pressure separation units;

4FM10-55/71C and **4FM 2.5-1.6/7.8-161C** are designed to compress dry nitrogen and are used in the liquefaction units;

4FM 2.5-25/9C are designed to compress dry nitrogen in the argon production units;

2FM 2.5-4/1.1-71C and **2FM 2.5-5/1.7-71C** are designed to compress and inject gas into carbon dioxide bottles.

Induction or synchronous motors are used as compressor drive. Liquid is used for cooling.



SPECIFICATION

| Compressor model, compressed medium | Capacity | | Abs. pressure, MPa | | Consumed power, kW | Weight, t (without electric motor) | Overall dimensions, m | | |
|--|---------------------|------------------------------|--------------------|--------------|--------------------|------------------------------------|-----------------------|-------|------|
| | m ³ /min | standart m ³ /min | suction | discharge | | | L | W | H |
| 6BM16-150/200 Air | 150 | | 0.094-0.098 | 19.7 | 2000 | 84 | 14.5 | 10.8 | 4.52 |
| 6FM16-150/200 Nitrogen | 150 | | 0.1-0.104 | 19.7 | 2000 | 84.5 | 14.5 | 10.8 | 4.52 |
| 6FM16-145/200M Nitrogen Hydrogen | 154.8 142 | | 0.102 0.102 | 19.7 19.7 | 2000 1870 | 96.5 | 15 | 11.22 | 4.52 |
| 4BM10-55/71H Air | 55 | | 0.094-0.098 | 6.97 | 610 | 31 | 8.5 | 7.5 | 4.2 |
| 4FM10-55/71 Nitrogen | 55 | | 0.1-0.104 | 6.97 | 610 | 31 | 8.5 | 7.5 | 4.2 |
| 4FM10-55/71C Dry nitrogen | 53.6 | | 0.104 | 6.97 | 613 | 30 | 8.5 | 8.7 | 4.15 |
| 4FM2.5-25/9C Dry nitrogen | 26 | | 0.102 | 0.88 | 160 | 11* | 4.3 | 3.15 | 2.9 |
| 2FM2.5-1.6/7.8-161 Dry nitrogen | 1.62 | | 0.687-0.844 | 15.8 | 101 | 9.6* | 3.24 | 5.3 | 2.25 |
| 2FM2.5-4/1.1-71C Carbonic gas | 3.5 | (3.6-4.8) | 0.102 | 6.97 | 55 | 6.5* | 2.65 | 5.05 | 2.4 |
| 2FM2.5-5/1.7-71C Carbonic gas | 3.5 | (5.9-8.9) | 0.17 | 6.97 | 80 | 6.5* | 2.65 | 5.05 | 2.4 |
| 2BM4-10/201 Air | 10.2 | | 0.094-0.098 | 19.7 | 160 | 9* | 1.85 | 4.6 | 2.55 |

Notes:

*weight of compressor with electric motor and compressor frame.

Overall dimensions are given with drive, intra-stage devices and piping.

COMPRESSORS FOR POLYETHYLENE PRODUCTION

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These are designed to compress a polyethylene in "Polymir" type processing lines for low density polyethylene production applying a method of high pressure.

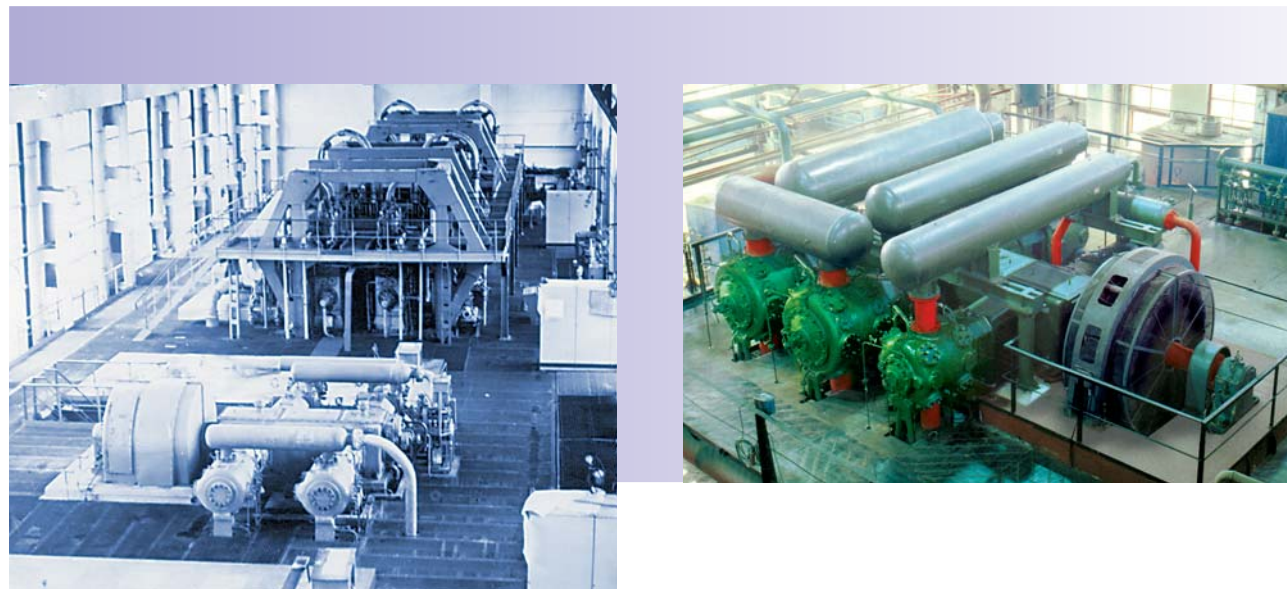
Fresh ethylene compressors (LP compressors) are made on the opposite base 4M16 with three stages and electric drive that ensures smooth adjustment of capacity by changing the rotational speed from 100 to 320 rpm/min.

Reaction pressure compressors (HP compressors) are made on the opposite base 4M40 with hydro mechanical transmission of motion from cranking mechanism to actuating elements of cylinder of both stages.

Reciprocating mechanism is lubricated by oil circulated under pressure being produced by pump.

Cylinders and sealing devices of the rods are force lubricated under pressure being produced by multi-plunger pump. These are cooled by water with close discharge.

Automatic monitoring, control and protection system ensures a remote programmed start up and shutdown of the compressor, warning and alarm signaling, as well as blocking of driving electric motor on parameters deviation from the set values.



SPECIFICATION

| Compressor model, compressed medium | Capacity | | Abs. pressure, MPa | | Consumed power, kW | Weight, t (without electric motor) | Overall dimensions, m | | |
|--|---------------------|------------------------------|--------------------|-----------|-----------------------|---------------------------------------|-----------------------|------|------|
| | m ³ /min | standart m ³ /min | suction | discharge | | | L | W | H |
| 4FM16-12.5/17-281 Ethylene | 11.70 | 134 | 1.13 | 31.3 | 870 | 81.0 | 31.2 | 12.7 | 5.95 |
| 4FM16-14/14-281 Ethylene | 13.86 | 164 | 1.37 | 27.50 | 1150 | 66.0 | 21.4 | 11.7 | 6.2 |
| 4FM40-1.2/250-2500 Ethylene | 1.21 | 260 | 24.5 | 245.00 | 4300 | 191.0 | 31.8 | 19.2 | 8.1 |

Notes: Overall dimensions are given with drive, intra-stage devices and piping.

COMPRESSORS FOR MINERAL FERTILIZERS PRODUCTION

11

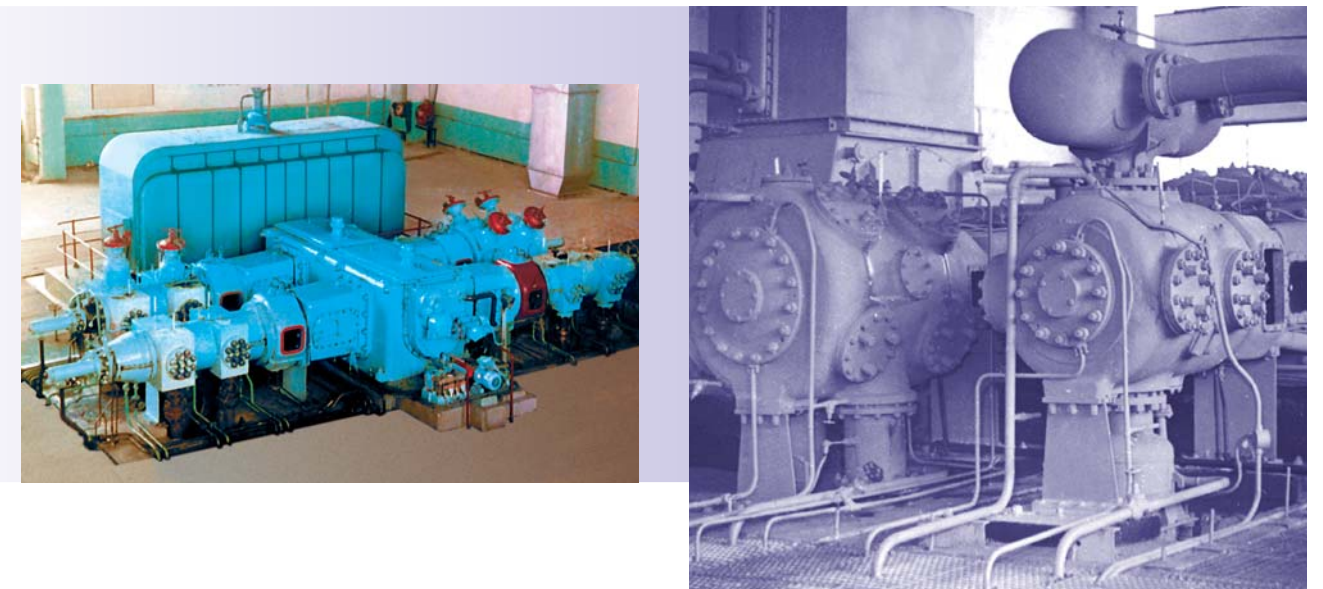
Compressor **4FM40-35/23-325** is design for compression of nitrogen and nitrogen-hydrogen mixture. The compressor is integrated into process lines of big-volume ammonia production with the capacity of 200 000 tpa.

Compressor **4FM16-100/200M1** is design for carbonic gas compression in carbamide production process lines.

Compressors are accomplished as horizontal, reciprocating, with four, five, six stages on opposite bases 4M16 and 4M40.

Synchronous electric motor is used as driver. Reciprocating mechanism lubrication is of circulation type. Cylinders and rod seals are forced lubricated with pressure being produced by plunger pump. The unit is cooled by water.

Automatic monitoring, control and protection system ensures a remote programmed start up and shutdown of the compressor.



SPECIFICATION

| Compressor model, compressed medium | Capacity | | Abs. pressure, MPa | | Consumed power, kW | Weight, t (without electric motor) | Overall dimensions, m | | |
|--|---------------------|------------------------------|--------------------|-----------|-----------------------|---------------------------------------|-----------------------|------|------|
| | m ³ /min | standart m ³ /min | suction | discharge | | | L | W | H |
| 4FM16-100/200M1 Carbonic gas | 101.4 | | 0.099 | 19.70 | 1130 | 80.7 | 13.1 | 11.0 | 8.1 |
| 4FM40-35/23-325 Nitrogen-hydrogen mixture | 35.5 | 685 | 2.250 | 31.88 | 4851 | 163.7 | 18.5 | 15.8 | 8.1 |
| 6FM40-260/237C Carbonic gas | 260 | 535 | 0.125 | 23.7 | 4786 | 260.9 | 14.5 | 27.3 | 8.57 |

Notes: Overall dimensions are given with drive, intra-stage devices and piping.

Air compressors are designed for compressing the air of general application.

Accomplishment:

- BKY 5/9 – modular, nosed over, on slide rails, movable;
- 4M2.5-18/9 and 4BM2.5-20/8 – modular, stationary, skid-mounted.

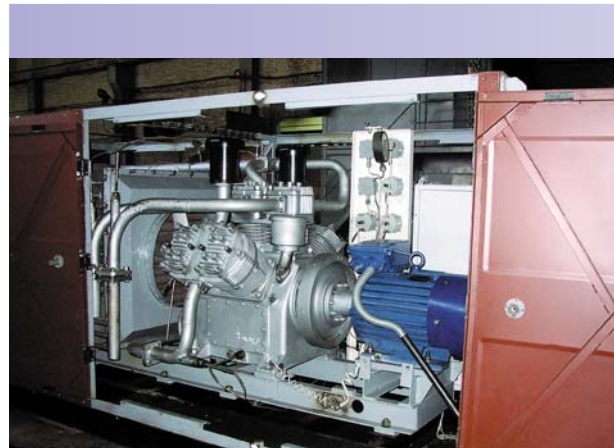
Compressors are accomplished as reciprocating, two-staged compressors on opposite base 4M2.5 and on W-type base 6Ш1.6.

The reciprocating mechanism is lubricated by oil circulated under pressure from gear-type pump.

The cylinders and rod sealing devices are forced lubricated under pressure being produced by multi-plunger pump.

Opposite compressors have water cooling system with open discharge, W-type and special compressors are air cooled.

Compressor automatic control and protection system provides monitoring main parameters, alarm and emergency signaling and blocking of the driver.



SPECIFICATION

| Compressor model | Capacity, m ³ /min | Abs. pressure, MPa | | Consumed power, kW | Weight, t | Overall dimensions, m | | |
|--------------------------------|-------------------------------|--------------------|-----------|--------------------|-----------|-----------------------|------|------|
| | | suction | discharge | | | L | W | H |
| General industrial application | | | | | | | | |
| BKY-5/9 | 5.0 | Atm. | 0.88 | 30 | 3.4 | 4.58 | 1.96 | 2.20 |
| 4BM2.5-18/9 | 18.0 | Atm. | 0.88 | 132 | 11.5 | 4.98 | 2.00 | 2.85 |
| 4BM2.5-20/8 | 20.0 | Atm. | 0.79 | 132 | 11.5 | 4.98 | 2.00 | 2.85 |

Mobile Compressor Units are designed for feeding purified and dried air compressed up to 40 MPa.

The Unit has been developed on the basis of YKC-400B-П4 compressor station and consists of reciprocating compressor, diesel engine or electric motor driver, intra-stage equipment, drying system, piping and control system.

All the equipment is mounted on either a two-axle skid or on a track type logger tractor. The equipment is protected against precipitations by metal casing with panels and doors that could be opened.

Mobile air compressor units are entirely independent. They can be transported by truck, by railway, by sea and by air.

High reliability and durability, simple control and service of all systems make them indispensable under the field conditions.



SPECIFICATION

| Compressor model, compressed medium | Capacity, m ³ /min | Abs. pressure, MPa | | Consumed power, kW | Weight, t (without electric motor) | Overall dimensions, m | | |
|-------------------------------------|-------------------------------|--------------------|-----------|--------------------|------------------------------------|-----------------------|-----|------|
| | | suction | discharge | | | L | W | H |
| YKC-400B-П4М Air | 2.3 | Atm. | 40.0 | 55.0 | 6.0 | 5.0 | 2.4 | 2.45 |
| YKC-400B-П4Э Air | 2.3 | Atm. | 40.0 | 55.0 | 6.0 | 5.0 | 2.4 | 2.45 |

Notes: E – electrical drive.



COMPRESSOR

14 FOR BIOGAS COMPRESSION 2ГМ10-25/1.05-70

The compressor is designed for compression of biogas being generated at the landfills and its supply to the biogas treatment unit.

The compression unit consists of opposite piston compressor with electric motor drive, intra-stage apparatuses, gas piping, auxiliary systems, shut-off, control and safety valves. All these components are skid-mounted on the common frame.

The compression unit is installed out-of-doors under a shelter. It operates under the ambient temperature range of 0°C +40°C.

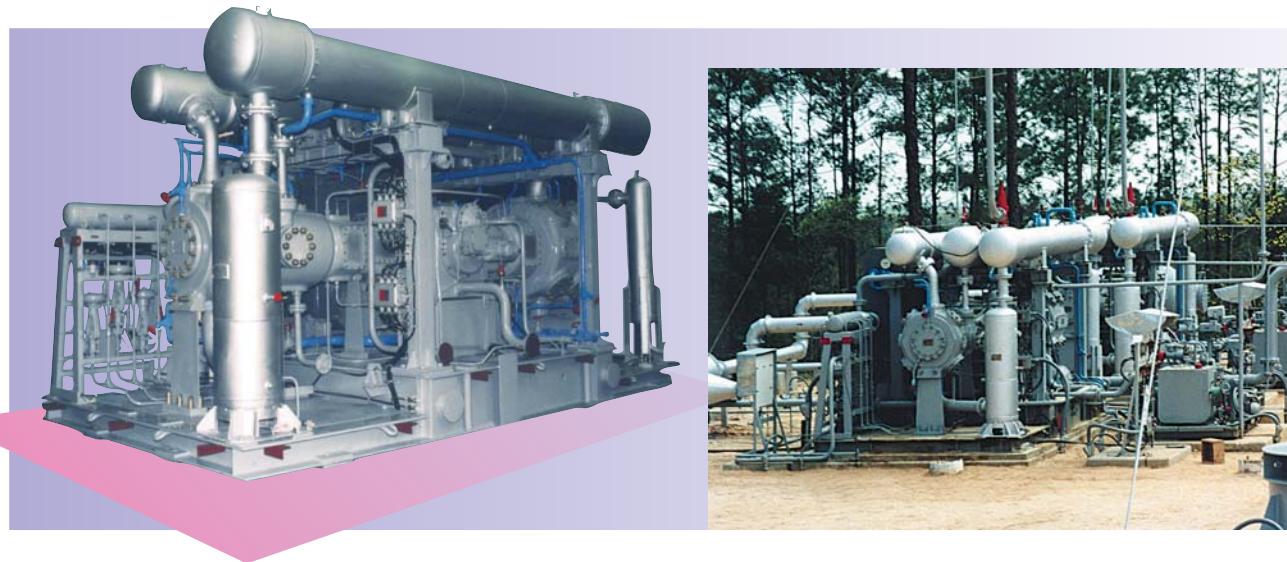
The compressor is of horizontal type on the opposite base 2M10 with has three stages.

Synchronous compressor explosion-proof electric motor is used as a driver.

The reciprocating mechanism is lubricated by oil circulated under pressure. The cylinders and rod sealing devices are forced lubricated under pressure.

Gas and oil cooling system is of closed type with forced discharge and with water being used as the cooling agent.

Compressor automatic control and protection system provides monitoring main parameters, alarm and emergency signaling and blocking as per the limit values of critical parameters.



SPECIFICATION

| Capacity, m ³ /min | Absolute pressure, MPa | | Consumed power, kWt | Weight, t (without electric motor) | Overall dimensions, m* | | |
|-------------------------------|------------------------|-----------|---------------------|------------------------------------|------------------------|------|-----|
| | suction | discharge | | | L | W | H |
| 25 | 0.105 | 1.0 | 330 | 28.5 | 3.04 | 7.52 | 3.1 |

Notes: *data are given with drive, intra-stage devices and piping.

TURBOCOMPRESSOR PACKAGE

15 WITH GAS ENGINE ГПА-П-0.5/4-46C

It is designed to force out a natural gas from the marginal wells with low pressure and it subsequent feed into the gas main.

Package is designed as reciprocating compressor mounted on the same skid with gas engine. Intra-stage devices and compressor lubrication system is mounted on the foundation close to compressor unit. Cooling system facilities common for compressor and engine are installed outside the compressor shop.

4ГМ10/4-46C is a horizontal four-row two stage compressor on the opposite base 4M10.

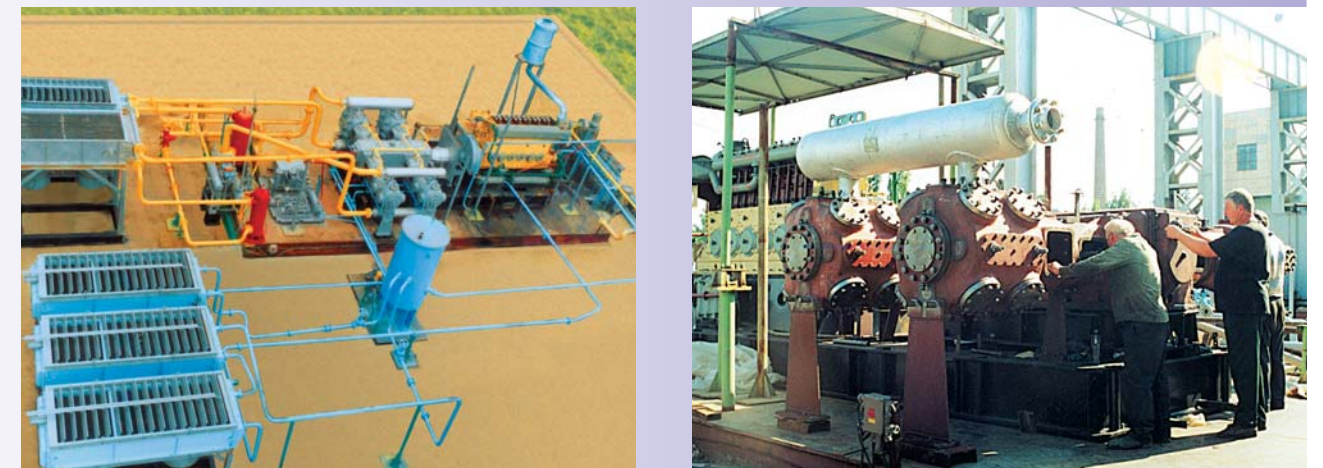
The compressor motion mechanism is lubricated by oil circulated under pressure being produced by gear pump,

whereas the cylinders and rod seals are oil free do not need lubrication.

Cooling system of the package consists of two loops; antifreeze passed through air cooler is fed into the units to be cooled.

6ГЧН25/34-2 gas engine is used as drive.

The automated control system ensures an information collection and processing, monitoring of main parameters, control of technological process, warning and alarm signaling.



SPECIFICATION

| Capacity, ths m ³ /day | Absolute pressure, MPa | | Consumed power, kWt | Weight, t* | Overall dimensions, m* | | |
|-----------------------------------|------------------------|-----------|---------------------|------------|------------------------|-----|-----|
| | suction | discharge | | | L | W | H |
| 98÷210 | 4÷21 | 46 | 431÷245 | 56 | 9.45 | 7.4 | 3.8 |

Notes: *data are given with drive, intra-stage devices and piping.

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