

ISO 9001  
BUREAU VERITAS  
Certification



JSC "SMNPO - Engineering"

**RECIPROCATING  
COMPRESSORS  
AND COMPRESSOR UNIT**



 **FRUNZE**  
ESTABLISHED IN 1896

catalog  
of products



JSC «SMNPO - Engineering» is one of the oldest enterprises in CIS countries in manufacturing of heavy duty reciprocating compressors. The first superpower compressor with capacity of 10 000 m<sup>3</sup>/hour for pressure of 300 atmosphere was manufactured by the company in 1933 for Bereznykovsky chemical plant.

In 1949 it was produced the first heavy duty horizontal compressor 1F-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: 1F-266/320, 2F-420/25-320, 3F-100/200 and others. The compressors 1F-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 50TF-130/200 was manufactured and commissioned in 1960 in Rustavsky 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.

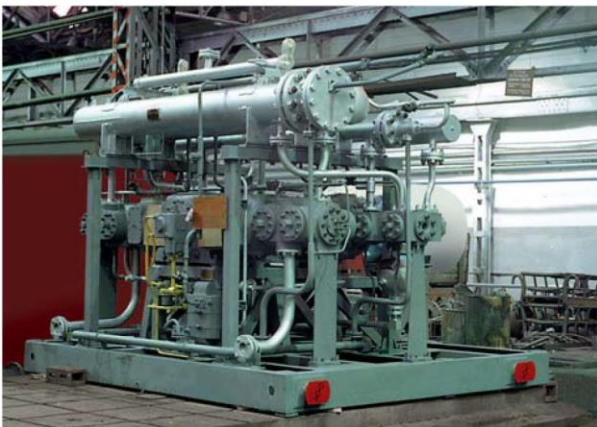
Within the period from 1964 till 2010 the company manufactured more than 1500 compressors of different types, among them:

- on the basis of: M40 - 144 compressors,
- M25 - 136 compressors, M16 - 520 compressors,
- M10 - 40 compressors, M4 - 12 compressors,
- M2.5 - 600 compressors and Ш1.6 - 65 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 «SMNPO - Engineering» 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.

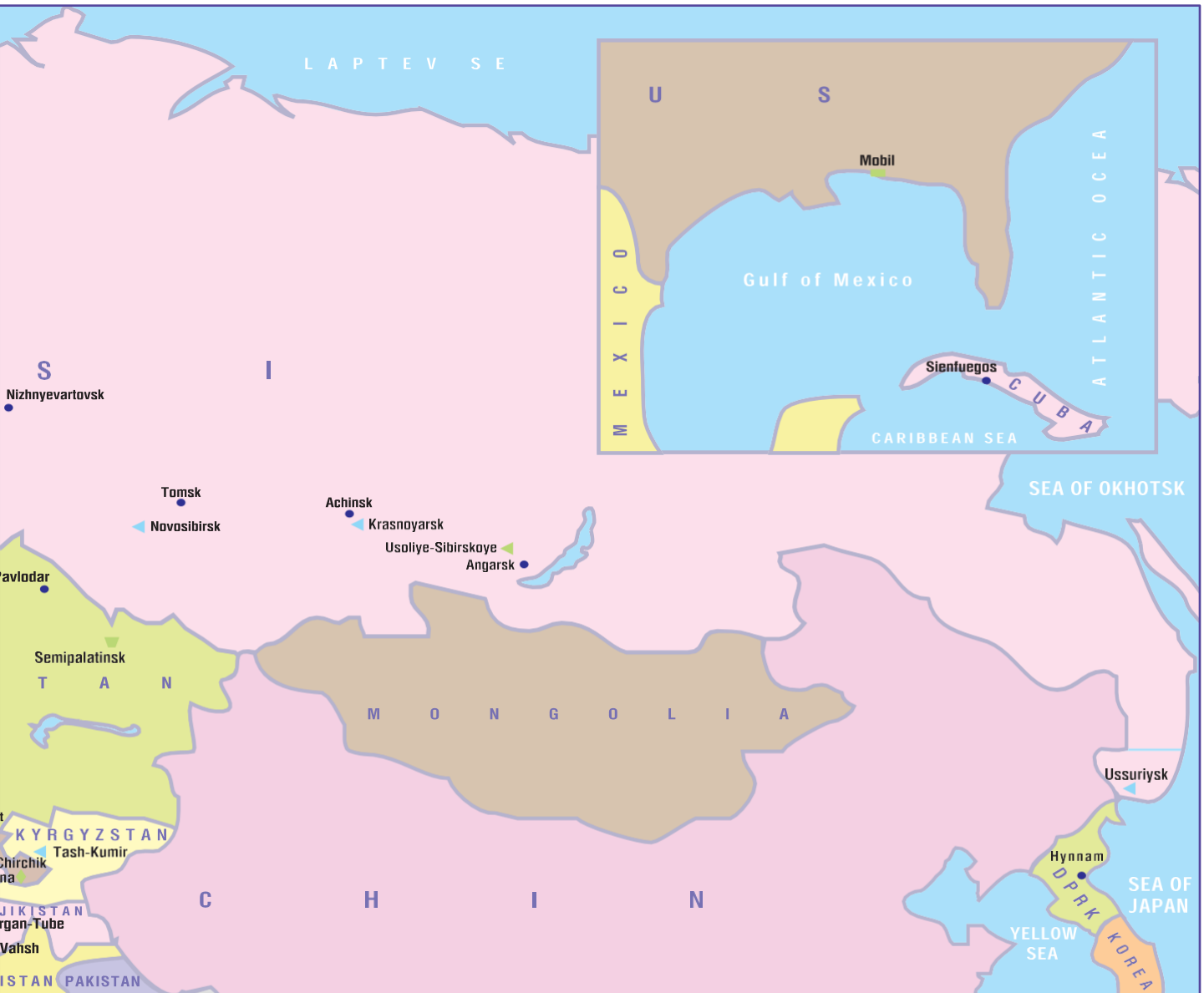
Having more than 120-years production experience JSC «SMNPO - Engineering» is able to design and manufacture any type of compressor unit at the Customer's request ensuring the high quality, reliability and conformity to the best word model.





LEGEND OF COMPRESSOR MODEL

- |                                     |                       |                                 |                             |
|-------------------------------------|-----------------------|---------------------------------|-----------------------------|
| ▼ - 6ГШ1.6-4.5/1.3-6                | ■ - 2ГМ10-25/1.05-70  | ▲ - 4ГМ16-70/1.8-18С            | ■ - 4М25-117/200            |
| ▼ - 2ГМ2.5-2/25-38.5С               | ■ - 4ВМ10-55/71Н      | ▲ - 4М16-12.5/17-281            | ■ - 4М25-76/35-56           |
| ▼ - 2ГМ2.5-4/1.1-71С                | ■ - 4ГМ10-40/3-22С    | ▲ - 4М16-22.4/23-64С            | ■ - 6ГМ25-120/14-38         |
| ▼ - 2ГМ2.5-5/1.7-71С                | ■ - 4ГМ10-55/71       | ▲ - 4М16-22.4/23-64СМ1Т         | ■ - 6ГМ25-140/35-56         |
| ▼ - 2ГМ2.5-2200/20-55С              | ■ - 4ГМ10-55/71С      | ▲ - 4М16-45/35-55С              | ■ - 6ГМ25-180/3-75          |
| ▲ - 4ГМ2.5-1.6/7.8-161С             | ■ - ГПА-П-0.5/4-46С   | ▲ - 4М16-56/15-30С              | ■ - 6ГМ25-210/3-56М2        |
| ▲ - 4ГМ2.5-25/7                     | ▲ - 2ГМ16-19/14-56С   | ▲ - 4М16-56/15-30СМ1Т           | ■ - 6ГМ25-210/4-60          |
| ▲ - 4ГМ2.5-30/9С                    | ▲ - 2ГМ16-24/40-60М1  | ▲ - 4М16-100/200М1              | ■ - 6ГМ25-210/3-56          |
| ▲ - 4ГМ2.5-2200/9-32С               | ▲ - 2ГМ16-24/40-60С   | ▲ - 6ВМ16-112/1.6-200           | ■ - ГПА-5000-6М25-125/38-56 |
| ▲ - АКТГ4ГМ2.5-2.3/9-33С            | ▲ - 2ГМ16-30/35-50С   | ▲ - 6ВМ16-140/200               | ■ - 4ГМ40-35/23-325         |
| ● - 2ВМ4-10/201                     | ▲ - 2ГМ16-31/24-36С   | ▲ - 6В(Г)М16-150/200            | ■ - 4М40-680/22-320         |
| ● - 2ГМ4-10.6/15-24С                | ▲ - 2М16-20/42-60С    | ▲ - 6ГМ16-145/200М              | ■ - 4М40М-1.12/250-2500     |
| ● - 2ГМ4-19/1.5-13                  | ▲ - 2М16-20/42-60СМ1Т | ▲ - 6ГМ16 - 145/30 - 2,2/30-200 | ■ - 6ГМ40-16/100-420        |
| ● - 4ВМ4-46/9                       | ▲ - 4ГМ16-14/14-281   | ■ - 4ГМ25-36/16-170             | ■ - 6М40-320/200            |
| ■ - 2ГМ10-4/40-120С                 | ▲ - 4ГМ16-14/15-104М1 | ■ - 4ГМ25-36/19-145             | ■ - 6М40-320/320            |
| ■ - 2ГМ10-12/7-26С                  | ▲ - 4ГМ16-25/18-65С   | ■ - 4ГМ25-80/11-35С             | ■ - 6М40-450/22.5           |
| ■ - 2ГМ10-14/10-33С                 | ▲ - 4ГМ16-40/22-46С   | ■ - 4ГМ25-80/12-31С             | ■ - 6М40-530/22.5           |
| ■ - 2ГМ10-П-18/9-26 with gas engine | ▲ - 4ГМ16-50/40-60С   |                                 |                             |



MODELS OF COMPRESSORS DELIVERED TO CITIES MARKED AS •

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

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.



## TECHNICAL DATA

Compressor model, compressed medium	Capacity		Abs. pressure, MPa		Consumed power, kW	Weight, t (without electric motor)	Overall dimensions, m		
	m <sup>3</sup> /min	standart m <sup>3</sup> /min	suction	discharge			L	W	H
2/Ä2.5-6.2/38-46— Hydrogen bearing gas	6.2	166.7	3.82	4.61	92.5	9*1	5.2	2.95	1.85
2/Ä2.5-2/25-38.5— Hydrogen bearing gas	2	37.1	2.45	3.76	44.1	8.2*1	5.0	3.1	1.82
2/Ä4-10.6/15-24— Hydrogen bearing gas	10.6	138	1.55	2.4	145	9	1.97	3.75	2.06
2/Ä10-26/14-22— Hydrogen bearing gas	26	366.7	1.37	2.16	380	19.5	6.9	4.45	3.27
2/Ä10-3.3/100-130— Hydrogen bearing gas	3.3	333	9.8	12.74	200	19	6.75	4.76	3.27
2/Ä10-6.8/4-14— 4.8/12-35— 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
2/Ä16-24/40-60— Hydrogen bearing gas Flue gas	24.24- 23.94 25.56- 21.12	818- 647 873- 143	3.92- 3.14 3.92- 0.785	5.8- 4.82 4.82- 1.85	895- 779 643- 396	16	6.3	9.44	5.45
2/Ä16-19/14-56— Hydrogen bearing gas	19	233- 217	1.3- 2.2	5.5	775- 690	27	6.25	13.46	4.45
2/Ä16-32/35-50— Hydrogen bearing gas	32	105	3.5	5.0	839	13.7	3.8	6.04	3.2
4/Ä16-50/40-60— Hydrogen bearing gas Flue gas	50.4 43.8	1700 296	3.92 0.785	5.8 1.85	1863 825	30	10.43	8.17	5.2
4/Ä16-25/18-65— Hydrogen bearing gas	23.9- 25.6	360- 378	1.77- 2.26	6.2	1478	37	10.9	8.48	5.2
4/Ä16-70/15-30— Hydrogen bearing gas Flue gas	67.8- 72.0 71.4- 70.8	760- 911 483- 479	1.47- 1.47 0.785- 0.785	2.94- 2.94 1.765- 1.765	1726- 1740 1178- 1186	31	10.43	8.26	5.2
4/Ä16-61/7.0-26— Hydrogen bearing gas	61	283.3- 291.6*	0.54- 0.7*	2.2- 2.6*	1030- 1069*	48.8	9.2	9	5.23
4/Ä16-42/5-26— Hydrogen bearing gas	42	91.6- 196.6*	0.5	2.6	430- 866*	53*1	8.4	6.7	4.7
2/Ä16-34.3/18-26— Hydrogen bearing gas	34.3	75- 550*	1.8	2.6	125- 485*	26.5*1	7.7	6.03	4.7
4/Ä16-216/1.2-7— Hydrogen bearing gas	216	78.3- 233.3	0.12	0.7	516- 1165*	79.7*1	8.9	6.9	4.9
4/Ä16-22/17-37— Process hydrogen Nitrogen	23 26	345 182	1.6 0.9	3.6 2.7	722 517	26	8.4	8.89	5.03
4/Ä25-80/12-31— Hydrogen	93.36	783	1.2	3.2	2640	50	14	12	5.2
4/Ä25-36/16-170Ä1 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. \*1 weight depending on the mode.

## 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 and air.

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



### TECHNICAL DATA

Compressor model, compressed medium	Capacity		Abs. pressure, MPa		Consumed power, kW	Weight, t (without electric motor)	Overall dimensions, m		
	m <sup>3</sup> /min	standart m <sup>3</sup> /min	suction	discharge			L	W	H
6/Ä25-210/4-60M Natural gas, casing-head gas	209.4	470	0.1- 0.35	5.90	3810	119.0	17.1	12.7	5.7
6/Ä25-180/3-75 Natural gas, casing-head gas	180.0	400	0.24	7.35	3810	119.0	17.1	12.7	5.7
2/Ä2.5-2200/20-55 Natural gas	1.8	36.7	2.00	5.50	50	6.7 <sup>*3</sup>	4.3	2.6	1.8
2/Ä4-19/1.5-13 Natural gas	19	34	0.05- 0.1	1.2	250	10.1 <sup>*3</sup>	6.2	3.79	2.3
2/Ä10-4/40-120— Casing-head gas	4	171	4.1- 4.6	12.1	375	27.6 <sup>*3</sup>	4.87 <sup>*4</sup>	6.87 <sup>*4</sup>	2.2 <sup>*4</sup>
4/Ä2.5-2200/9-32 <sup>*1</sup> Natural gas	2.1- 3.84 <sup>*2</sup>	34.3- 44.2 <sup>*2</sup>	0.9- 1.8 <sup>*2</sup>	2.17- 2.7 <sup>*2</sup>	48 (max)	9.9 <sup>*3</sup>	6.3	3.02	2.23
4/Ä10-40/3-22— Natural gas	40	112	0.2	2.1-	710	36.2	8.19	11.78	4.2
4/Ä10-48/2-57— <sup>*5</sup> Natural gas	48	38- 87.4	0.2	5.7	870	27.5	32.55	13.26	7.58
6/Ä40-16/100-420 Natural gas, casing-head gas	16.3	1470	9.90	41.30	6080	180.5	23.3	18.0	6.0
6/Ш1.6-4.5/1.3-6 Natural gas	4.5	6	0.03- 0.35	0.5	36	1.8	3.08	1.42	1.34

Notes:

<sup>\*1</sup> - multi-mode compressor unit. It is re-equipped for operation with parameters P<sub>suc</sub>=0.2 - 0.3 MPa, P<sub>discharge</sub>=0.665 - 1.05 MPa; <sup>\*2</sup> - depending on operating conditions; <sup>\*3</sup> - weight of compressor with electric motor and compressor frame; <sup>\*4</sup> - overall dimensions of compressor unit without external utilities; <sup>\*5</sup> - Modular-type compressor unit of high shop readiness is a component of compressor station. The compressor unit is located in easy - to - assemble shed. Air temperature under shed is not less +5°C. Overall dimensions are given with drive, intra-stage devices and piping.

Compressors are reciprocating on 4Ä2.5; 2Ä10 and 2Ä10<sub>z</sub> opposite bases.

They are designed to compress natural gas and supply it as fuel to gas turbine engines of turbo-compressor units.

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.

Compressors can be manufactured without lubrication of cylinders and rod sealing devices.

The cylinders are forced cooled by fluid through closed loop.

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

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



### TECHNICAL DATA

Compressor type, compressed medium	Capacity, m <sup>3</sup> /min		Pressure abs., MPa		Consumed power, kW	Weight, t (without electric motor)	Overall dimensions, m		
	m <sup>3</sup> /min	standard m <sup>3</sup> /min	suction	discharge			L	W	H
2/Ä10 <sub>z</sub> -œ-18/9-26* Fuel gas	18	52-303	0.7-1.6	2.6	190-416	9.3	27.3	23.7	7.58
2/Ä10-14/10-33C Fuel gas	14	130-180	1.0-1.2	3.3	444	30.0	10	6.5	3.59
2/Ä10-12/7-26C Fuel gas	12	52-303	0.6-0.8	2.6	273	26.0	9.0	5.45	3.78
4/Ä2.5-2.3/9-33C Fuel gas	2.3	19.05-25.9	0.8	2.5-3.2	72	8.37	6.3	3.02	2.2

Notes: \*1 Modular-type compressor unit 2/Ä10<sub>z</sub>-œ-18/9-26 is located in easy - to - assemble shed. Air temperature under shed is not less +5°C.  
2/Ä10<sub>z</sub>-œ-18/9-26 is a reciprocating horizontal two-row one stage compressor on high-speed opposite base 2Ä10<sub>z</sub> (1000 rpm).  
Drive - gas-reciprocating driver /œ 10 of power 500 kW on gas engine 292/f base, equipped with standard systems in modular design.



## COMPRESSORS FOR LIQUEFIED GASES

9

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

Design:

reciprocating on opposite base 4/M2.5 and 4/M2.5Y;

reciprocating on opposite base 4/Ä2.5Y.

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 process unit of CNG vehicle refueling compressor stations.

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

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



### TECHNICAL DATA

Compressor model	Capacity standard m <sup>3</sup> /hour	Rotational speed, rpm	Suction pressure, MPa g	Discharge pressure, MPa g	Drive power, kW	Weight*, t
4/Ä2.5-1.8/5-251	440-720	750	0.3°0.5	25	132	4.40
4/Ä2.5-1.2/10-251	480-1040	750	0.5°1.1	25	132	4.45
4/Ä2.5Y-3.4/2.8-251	300-550	1000	0.05°0.3	25	132	3.84
4/Ä2.5Y-2.25/6-251	440-720	1000	0.3°0.6	25	160	3.93
4/Ä2.5Y-1.3/11-251	600-1000	1000	0.6°1.2	25	160	4.12
4/Ä2.5Y-1.1/16-251	800-1380	1000	1.2°1.7	25	200	4.2
6/Ш1.6-1.0/3.5-251	50-220	1000	0.05°0.6	25	45	1.85

Notes:

\*weight of compressor mounted on the frame.

## COMPRESSORS FOR POLYETHYLENE PRODUCTION

10

Reciprocating compressors

**6-√M16-150/200** and **2-√M4-10/201** are designed to compress air and nitrogen in the high pressure separation units;

**6√M16-145/200** are designed to compress hydrogen and nitrogen in the liquefaction units and are used in the aerospace industry;

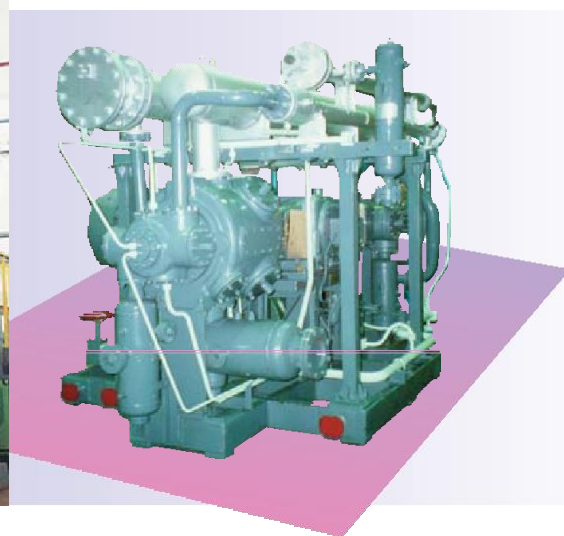
**4-√M10-55/71** are designed to compress air and nitrogen in the medium pressure separation units;

**4√M10-55/71C** and **4√M 2.5-1.6/7.8-161C** are designed to compress dry nitrogen and are used in the liquefaction units;

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

**2√M 2.5-4/1.1-71C** and **2√M 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.



### TECHNICAL DATA

Compressor model, compressed medium	Capacity		Abs. pressure, MPa		Consumed power, kW	Weight, t (without electric motor)	Overall dimensions, m		
	m <sup>3</sup> /min	standart m <sup>3</sup> /min	suction	discharge			L	W	H
6-√A16-150/200 Air	150		0.094-0.098	19.7	2000	84	14.5	10.8	4.52
6/√A16-150/200 Nitrogen	150		0.1-0.104	19.7	2000	84.5	14.5	10.8	4.52
6/√A16-145/200M Nitrogen Hydrogen	154.8 142		0.102 0.102	19.7 19.7	2000 1870	96.5	15	11.22	4.52
4-√A10-55/71O Air	55		0.094-0.098	6.97	610	31	8.5	7.5	4.2
4/√A10-55/71 Nitrogen	55		0.1-0.104	6.97	610	31	8.5	7.5	4.2
4/√A10-55/71C Dry nitrogen	53.6		0.104	6.97	613	30	8.5	8.7	4.15
4/√A2.5-25/9C Dry nitrogen	26		0.102	0.88	160	11*	4.3	3.15	2.9
2/√A2.5-1.6/7.8-161 Dry nitrogen	1.62		0.687-0.844	15.8	101	9.6*	3.24	5.3	2.25
2/√A2.5-4/1.1-71C Carbonic gas	3.5	(3.6-4.8)	0.102	6.97	55	6.5*	2.65	5.05	2.4
2/√A2.5-5/1.7-71C Carbonic gas	3.5	(5.9-8.9)	0.17	6.97	80	6.5*	2.65	5.05	2.4
2-√A4-10/201 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 MINERAL FERTILIZERS PRODUCTION

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

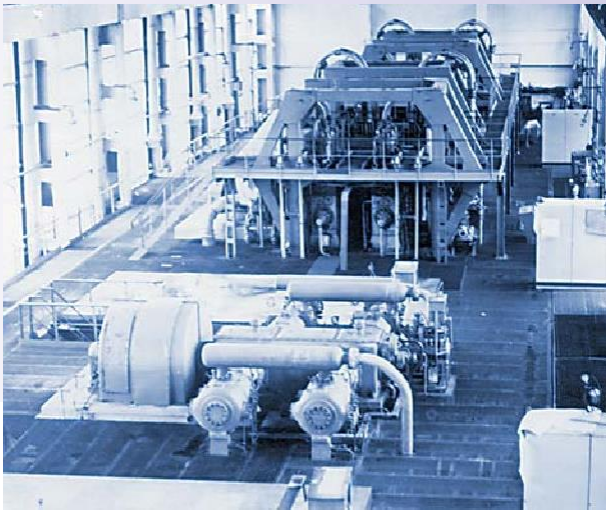
Fresh ethylene compressors (LP compressors) are made on the opposite base 4M16 with three stages and electric drive that ensures smooth adjustment of capacity by changing the rotational speed from 100 to 320 rpm/min.

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 shut-down of the compressor, warning and alarm signaling, as well as blocking of driving electric motor on parameters deviation from the set values.



### TECHNICAL DATA

Compressor model, compressed medium	Capacity		Abs. pressure, MPa		Consumed power, kW	Weight, t (without electric motor)	Overall dimensions, m		
	m <sup>3</sup> /min	standart m <sup>3</sup> /min	suction	discharge			L	W	H
4/Å16-12.5/17-281 Ethylene	11.70	134	1.13	31.3	870	81.0	31.2	12.7	5.95
4/Å16-14/14-281 Ethylene	13.86	164	1.37	27.50	1150	66.0	21.4	11.7	6.2
4/Å40-1.2/250-2500 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.

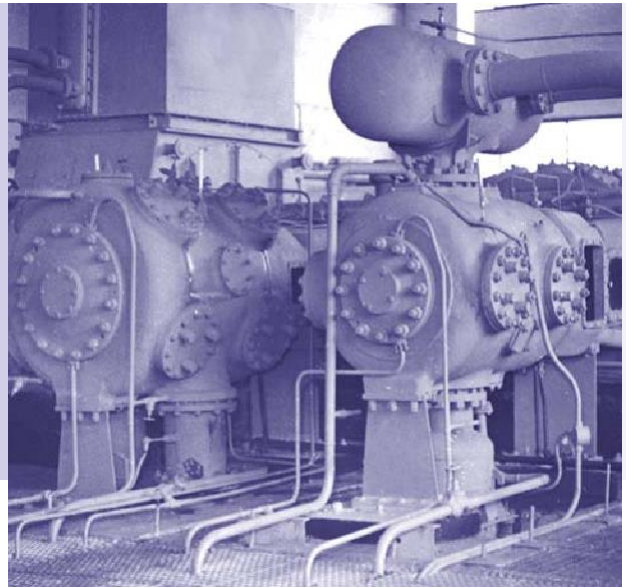
Compressor **4VM40-35/23-325** is design for compression of nitrogen and nitrogen-hydrogen mixture. The compressor is integrated into process lines of big-volume ammonia production with the capacity of 200 000 tpa.

Compressor **4VM16-100/200M1** 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.



#### TECHNICAL DATA

Compressor model, compressed medium	Capacity		Abs. pressure, MPa		Consumed power, kW	Weight, t (without electric motor)	Overall dimensions, m		
	m <sup>3</sup> /min	standart m <sup>3</sup> /min	suction	discharge			L	W	H
4/Å16-100/200M1 Carbonic gas	101.4		0.099	19.70	1130	80.7	13.1	11.0	8.1
4/Å40-35/23-325 Nitrogen-hydrogen mixture	35.5	685	2.250	31.88	4851	163.7	18.5	15.8	8.1
6/Å40-260/237C 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:

↳ Y 5/9 - modular, nosed over, on slide rails, movable;

↳ 4M2.5-18/9 and 4M2.5-20/8 - modular, stationary, skid-mounted.

↳ 4(J)A10-55/71 - modular. It is applied in chemical industry for compression of ambient air in air separation plant or in nitrogen liquation plants.

Compressors are accomplished as reciprocating, two-staged compressors on opposite base 4M2.5 and on W-type base 6W1.6.

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.



### TECHNICAL DATA

Compressor model	Capacity, m <sup>3</sup> /min	Abs. pressure, MPa		Consumed power, kW	Weight, t	Overall dimensions, m		
		suction	discharge			L	W	H
↳ Y-5/9	5.0	Atm.	0.88	30	3.4	4.58	1.96	2.20
4M2.5-18/9	18.0	Atm.	0.88	132	11.5	4.98	2.00	2.85
4M2.5-20/8	20.0	Atm.	0.79	132	11.5	4.98	2.00	2.85
4(J)A10-55/71	55	0.096	6.38	615	29.6*	8.5	7.5	4.15

Notes:

\*weight of compressor unit without engine.

## COMPRESSOR

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### FOR BIOGAS COMPRESSION 2FM10-25/1.05-70

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.

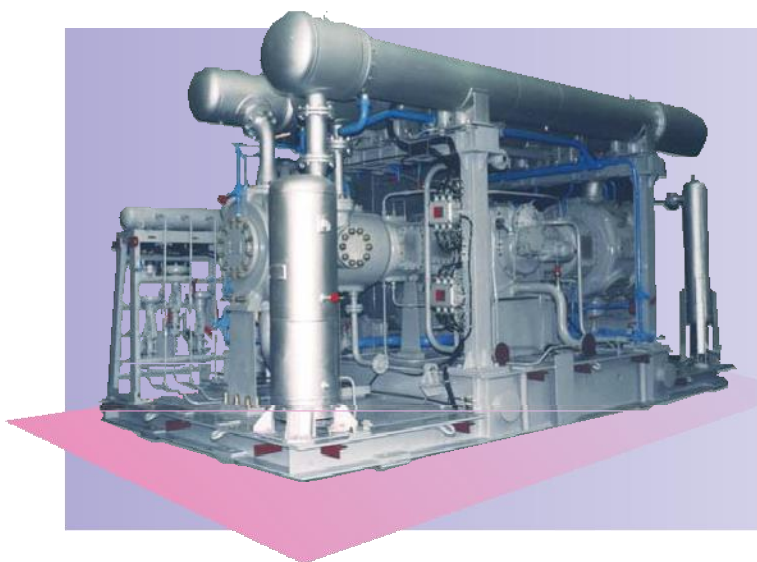
The compressor is of horizontal type on the opposite base 2M10 with has three stages.

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.



#### TECHNICAL DATA

Capacity, m <sup>3</sup> /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 WITH GAS ENGINE ГПА-П-0.5/4-46С

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.

4/M10/4-46C 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.

6/∅25/34-2 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.



### TECHNICAL DATA

Capacity, ths m <sup>3</sup> /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.

The logo for FRUNZE, featuring a red square icon with a white stylized symbol on the left, followed by the word "FRUNZE" in bold, red, uppercase letters.

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