Scientific Production Closed Joint-stock Company

ELECTROMASH

Electrical explosion-proof and general machines for driving the pump, ventilation and other types of equipment, designed for coal, chimical, petroleum, gas, mining, metallurgical and other industries as well as for energy.

TECHNICAL CATALOGUE

2020

TIRASPOL

CONTENT

ABOUT COMPANY

Scientific Production Joint-Stock company «Electromash» is one of the largest manufacturers of AC electrical explosion-proof and general machines for driving the pump, ventilation and other types of equipment, designed for coal, chimical, petroleum, gas, mining, metallurgical and other industries as well as for energy.

Coal-mining basins, transcontinental gas and oil pipelines, thermal power plants and nuclear plants, small hydroelectric power plants, wind-electric set and energy complexes are equipped with products, manufactured by SP JSC «Electromash».

During more than half century of its history SP JSC «Electromash» delivered significant amount of electrical products to the companies of the Russian Federation, Ukraine, Kazakhstan, Azerbaijan and other CIS countries, and to the variety of countries outside the former Soviet Union: Bulgaria, Romania, Czechia, Iran, Syria, Egypt, Vietnam, Cuba, the United Arab Emirates, Turkey and others.

The accumulated experience over the period of work in electric products market, requirements implementation of the scientific-technological progress in the development of present designs and technologies, introduction of high-quality management system, let us to take into account current market demands and have significant advantages front of our competitors in all directions:

- continuous expansion of the output products through development and introduction of new equipment order fullfilment of complex and unique equipment with full engineering support;

- high quality and reliability of the output products;
- flexible price and discount system, taking into account purchases, forms of payment and etc.;
- flexibile payment and settlement system, which provides along with traditional system of advance payment,credit form of payments and etc.;
- products' delivery speed to any point of the Russian Federation and CIS countries;
- guarantee and post -guarantee service maintenance.

SP JSC «Electromash» carries out a price policy, aimed at establishing the best prices for its customers taking into account the quality of output products, terms of order's fullfilment, service level, conditions and forms of payment.

Principle of SP JSC «Electromash» work - quickly and efficiently, at optimum price-quality ratio for the client, allows our company to be reliable partner in the supply of different types of electrical equipment.

The main purpose of the eterprise is primarily high quality, technological and construction perfection of output products, service maintenance and warranty implementation.

We invite you to mutually beneficial cooperation!

Regular customers of our products:

ЭНЕРГОАТОМ ENERGOATOM

НАСОСЭНЕРГОМАШ

ЛУКОЙЛ НЕФТЯНАЯ КОМПАНИЯ

УРАЛХИМ

ГАЗПРОМ

ННК

Транснефть

РОСАТОМ

РОСНЕФТЬ

УРАЛКАЛИЙ

ГАЗПРОМ НЕФТЬ

БАШНЕФТЬ АКЦИОНЕРНАЯ НЕФТЯНАЯ КОМПАНИЯ

СИБУР

Металлоинвест

ГМС ГРУППА

ЕВРАЗ

НЛМК

- Azerbaijan
- Algeria
- Argentina
- Armenia
- Afghanistan
- Bangladesh
- Belarus
- Bulgaria
- Hungary
- Vietnam
- Guinea
- Germany
- Egypt
- India
- Iraq
- Iran
- Peru
- Cuba
- Turkey
- Yemen
- Kazakhstan
- Cambodia
- Kirghizia
- China

Highlighted in red are the countries where our products were delivered or supplied.

Laos
Mongolia
Nigeria
Nicaragua
the United Arab Emirates
Pakistan

Poland
the Russian Federation
Roumania
North Korea
Syria
Slovakia

Uzbekistan
Ukraine
Finland
the Czech Republic
Estonia
Ethiopia

Our suppliers:

ОВЕН

Диамех

SKF

URB

ВиКонт

Элинар

Mobil

isovolta GROUP

LEINE LINDE

voltRoll

Вибро-Центр

ЭЛЕМЕР

thermik®
brings temperatures under control

НЛМК

ЗАВОД МОЛДАВКАБЕЛЬ
закрытое акционерное общество

ТИК® Научно-производственное предприятие

Sales representatives:

THE RUSSIAN FEDERATION

LLC «Trading house «ElectromashService»
Address: 111123, c. Moscow, Plehanova str., building.4.
Phone: +8(499) 550-09-40
Fax: +8(495) 225-30-54
E-mail: td-ems@ao-electromash.ru

PC «ElectroTermoSvar»
Registered address: 125993, c. Moscow, Gazetnyi str., 5
phone: +7(495) 629-18-26
fax: +7(495) 691-30-27
E-mail: info@electrotermosvar.ru, akgroup@bk.ru
website: www.electrotermosvar.ru

LLC «ElectroTehAliance»
Registered address: Russia, 121353, c.Moscow, Mozhayskoe schosse str., h.45, build.1.
phone/fax: +7(495) 507-99-81 – multiple channel
E-mail: electro-ta@hotmail.com

LCC «Elta»
Registered address: Russia, 600007, c.Vladimir, 16 years of October str., h.33-A
phone/fax: +7 (4922) 53-15-33
E-mail: info@elta.su, elta33@mail.ru
website: www.elta.su

LLC «TH «Electromash» (c. Samara)
Registered address: Russia, 443020, c. Samara, Galaktionovskaya str., h. 11, office 407.
phone: (846) 333-77-50, 333-70-06
E-mail: td-elmash@mail.ru
website: td-elmash.ru

LLC «Electrodvigatel-NK»
HEAD OFFICE is located in c.Novokuznetsk: Technicheskiy proezd str., h. 33, building 2, of. 504
phone/fax: +7(3843) 36-77-65, 33-02-50, 39-62-46
E-mail: elcondor19@mail.ru
website: www.el-dvigatel.ru

LLC "RPA "STRATEGIA»
Registered address: Russia, 630049, c.Novosibirsk, Krasnyi prospekt str., h.220, building 1, of. 413
phone: 8-800-700-75-94
E-mail: npo_strategia@mail.ru

LLC «Techsnabkomplekt»
Registered address: 614016, Perm krai, c.Perm, Krasnoflotskaya str., h.16, flat 50
Post address: 618900, Perm krai, c.Lysva , Balahnina str., h. 90
phone: (34249) 6-80-26, 6-02-89,

KAZAKHSTAN

ESQ
ELCOM STANDARD OF QUALITY

LLC «ESQ»
Address: 050034, Republic of Kazakhstan, c. Alma-Ata, Raiymbek avenue 212 «A», building «4», of.319
phone: +7 (702) 210-88-81
E-mail: kz@elcomspb.ru

UKRAINE

ZZEM

LLC «Zaporozhe Plant of electric machines»
Registered address: Ukraine, 69008, c.Zaporozhe, Zeyskaya str., 3
phone/fax: :+38(061)236-22-39(21)
E-mail: zzem@ukr.net
website: www.zzem.com.ua

THE REPUBLIC OF BELARUS

общество с ограниченной ответственностью
СИЛОВЫЕ МАШИНЫ

LLC «Silovye mashiny»
Address: 220140, c. Minsk, Prityтskii str.,h. 62/2, fl.948
phone: (+375 17) 365-01-81
e-mail: sil-mash@mail.ru

MONGOLIA

ГРУППА КОМПАНИЙ ЭЛКОМ

LLC «Elcom»
Address: 192102, c. St. Petersburg, Vitebskaya Sortirovochnaya str., h.34. lit.Ж
phone/fax: (812) 320-88-81
e-mail: snab15@elcomspb.ru

THE PRIDNESTROVIAN MOLDAVIAN REPUBLIC

ОБЩЕСТВО С ОГРАНИЧЕННОЙ ОТВЕТСТВЕННОСТЬЮ
ЭЛЕКТРОДВИГАТЕЛЬ

LLC «Electrodvigatel»
Registered address: MD-3300, Moldova, c. Tiraspol, K.Tsetkina str., of. 54.
phone/fax: +373(533) 9-16-56, (533) 7-64-09
E-mail: ushakov@idknet.com

LARGE ASYNCHRONOUS EXPLOSION-PROOF ELECTRIC MOTORS

LARGE ASYNCHRONOUS EXPLOSION-PROOF ELECTRIC MOTORS

The explosion-proof electric motors are intended to drive different mechanisms, exploited in places, where according to the manufacturing technology the formation of explosive concentration of gas, vapour, and dust is possible. These are enterprises of fuel and energy complex, mining and processing industries: coal, oil, chemical, gas and others.

Specialization of enterprise in production of explosion-proof electric motors and great experience in their manufacture have allowed to develop in details the construction and manufacturing technology of units, serving as explosion-proof, and to ensure safety maintenance of the electric motors throughout its entire operating life.

Guarantees for security, reliable and easy for use requirements are the following:

- the high level development with current means of automated design;

- the flexibile and effective system of preproduction for all stages;
- the full cycle of necessary researches and tests at launching into manufacture and during serial production,including safety tests in the recognized certification centers of the Russian Federation and Ukraine;
- the advanced test base and own accredited test center;

- new used materials and component parts;
- progressive technological processes, providing the quality and reliability of the construction in general, including both electromechanical parameters and units, providing explosion-proofness: accuracy and cleanliness of mechanical machining, special hydraulic pressure tests of flameproof enclosure elements and others.

The series of large power asynchronous explosion-proof electric motors differed in their purpose depending on mechanisms' types, for driving of which they are designed:

- the electric motors with a squirrel-cage rotor include versions:
- with aluminum cage rotor and they are designed to drive different types of pumps, fans, mixing machines;
- with copper cage rotor and they are designed to drive mechanisms with heavy service and starting conditions, such as coal pumps, conveyers, and also they can be used for different types of mining equipment. Electric motors with copper cage rotor allow 15-20 starts per day, instead of 6-8 for electric motors with aluminum squirrel cage rotor.

The electric motors of output series are interchangeable to early series electric motors and also to similar electric motors of the other manufacturers according to mounting and installation dimensions. Better design, high quality of materials and components used, progressive manufacturing technology provide high reliability of electric motors during operation.

Electric motors allow to work with frequency converter.

In electric motors is realized possibility of stationary bearing temperature and stator winding control with application of special devices **UKT-12, UKVT** in explosion-proof version. These devices are produced on modern electronic base, they provide the maximum accuracy at measuring and inertia lack at temperature changing. Electric motors are equipped with temperature-monitoring devices of bearings and stator winding, providing warning signals and disconnecting in emergency mode, and also long-distance control of built-in heating system (at customer's request).

The nomenclature of large asynchronous explosion-proof electric motors is constantly expanded and updated,new motors are distinguished by higher characteristics and a number of constructive decisions, directed to improving reliability and serviceability:

At customer's request electric motors can be manufactured:

- of different capacities, voltages and network frequency;
- with different installation and connecting dimensions;
- of different direction of rotation;
- with short-circuit rotor winding made of copper and its alloys to improve operational reliability;

- using bearing of high reliability produced by company SKF (Sweden);
- of different climatic modifications;
- of different explosion-protection.

MAIN ADVANTAGES OF ELECTRIC MOTORS OVER ANALOGUES

High technical characteristics and reliability of the motors are ensured through:

- vacuum pressure impregnation technology(HPI) of windings with epoxy compaund, which is the basis of isolation «Monolith-2», the one of the most reliable in international practice;

- insulating materials with heat resistance class «F» and «H», including electrical tapes of the latest developments of «Elmikapor» type made by **Electric Insulation Materials Plant «Elinar»** (Russia), as well as leading world manufacturers: **Von Roll Isola (Switzerland)** and **Isovolta** (Austria);

- bearings of high relibility produced by **SKF**, **URB**;

- dynamic balancing of the rotor and outdoor fan to accuracy class G2,5 and G1, providing lower vibrations, noise level and increasing the operational life on modern balancing equipment of company Diamech.

- stator body of high rigidity with processing places of installation of stator stacks and bearings shields from one device on special boring machines;

- terminal box design using complete insulating boards;

- bearing temperature control devices with warning signals and motor shutdown in case of emergency;

- varnish of stator sheets and application of slot wedges from special magnetic material, reducing losses and increasing energy parameters;

- regreasing without stopping the motor;

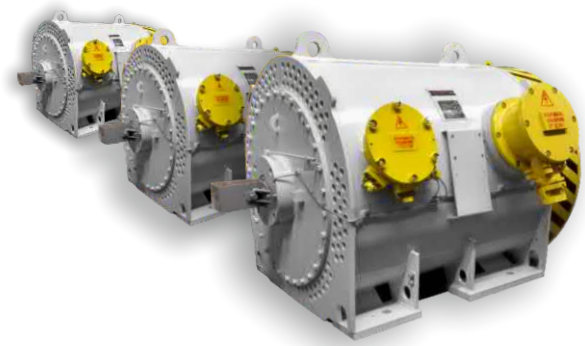
- installation of thermal converters (temperature-monitoring sensors) with 50 and 100 Ohm, with active elements made of copper and platinum produced by **JSC SPC «Navigator», company «OVEN», MF «TESEY» (Russia)** and temperature relay produced by **«Thermik» (Germany)** and by other manufacturers.

- installation of vibtration inverters (vibration-monitoring sensors) produced by **SPC «TIK», LLC «Vicont»** and other producers;

-installation of encoders (rotation rate sensors and direction of rotor shaft) produced by **«Leine & Linde»** (Sweden),**SPE«GiK»** and other producers.

- oil and lubricants of leading world manufacturers: **SKF, Mobil, SHELL.**

- modern test equipment of company Diamech, LLC PIF «Vibrocenter» and others.



LARGE POWER ELECTRIC MOTORS VAO4,VAO7-450-710

Asynchronous three-phase airflow-cooled explosion-proof electric motors VAO4, VAO7 with a squirrel-cage rotor are designed for operation in mines, containing explosive gas and dust as well as in explosive hazard covered areas and outside installations.

Operation mode: continuous S1 from network 50Hz,60Hz. Electric motors allow operation from frequency converters (S8, S9, S10).

Explosion protection configuration:

VAO4	1 Ex d IIC T5 Gb (except acetylene)
VAO7	1 Ex d IIB T4 Gb; PB Ex d I Mb

Climatic construction type:

Mounting configuration:

IM1001,IM3001

Protection degree for:

motor housing and terminal box	IP54 IP55 (made to order)
outdoor fan enclosure	IP20

Cooling method:

IC511	VAO4, VAO7A(M)-560 VAO4, VAO7A(M)-630 VAO4, VAO7M-560-1250 (1600) VAO4, VAO7M-710-1600 (2500)
IC411	VAO4, VAO7A(M)-450

The electric motors VAO7A, VAO7M of 4, 6, 8, 10, 16 poles have the right and the left direction of rotation. The direction of rotation is changed only from rest state. The electric motors VAO7(2 pole), with rotational speed 3000 rpm. have the left direction of rotation, at customer's request motors are manufactured with right or left and with right direction of rotation.

The insulating materials of stator winding at customer's request have heat-resistance class «F» or «H».

At customer's request the electric motors are equipped with temperature control device, **UKT-12 (9 channels),UKT 12 (12 channels)** or **UKVT**.

Main advantages of electric motors VAO4, VAO7A, VAO7M over analogues:

1. Improving the active parts to obtain high energy parameters at lower mass.

2. The application in the motor construction VAO4, VAO7A of cast aluminum squirrel-cage rotor provided a number of advantages over other analogues with welded winding:

Select the best configuration and dimensions of groove , increasing starting moments at relatively small values of starting currents;

Eliminate hard preventive work during operation, put through inspection and restoration of welded joints of the rotor winding;

Improve the motors' safety in operation excluding the possible sparking and overeheating in welded joints.

3. The application in the motor construction VAO4,VAO7M BAO4,BAO7M of squirrel-cage rotor, performed by special technology,provides reliability of work with mechanisms at hard, slow starts and the number of starts per day 15-20 instead of 6-8 starts permissible for analogues with aluminum welded rotor winding, increasing service life by 1,5-2 times in comparison with electric motors with copper squirrel-cage rotor.

4. Exceptional stator housing design of increased rigidity, ensuring a reliable fit of stator pack, as well as lower values of vibration and noise.

5. Application in the terminal boxes high reliable one-pice insulating panel instead of porcelain insulators.

6. Improved ventilation and cooling system of electric motors, provides the maximum heating of active parts working at nominal load, with the exception of local overheating.

7. The possibility of operation of electric motors at adjusting the rotation speed modes as part of adjustable-frequency electric drives.

8. Use of bearing units of explosion-protection of special design without rubbing parts provides reliability during full service life.

9. Electric motors are equipped with temperature control sensors 50M (atcustomer's request 100П, Pt100, 50П) and vibration control sensors (at the customer's request), rotor speed sensors (at customer's request)

10. Equipment of electric motors by modern devices for remote control bearings and stator winding UKT-12 (temperature control at 9 points: 2 - bearings, 6 - winding and iron of stator, 1 - drive mechanism) or at the customer's request UKT-12 (with addition of 3 temperature control points with the mechanism aggregated with the electric motor) explosion-proof version with alarm and motor shutdown control in emergency modes, and information output on PC in real time.

11.Equipping at the customer's request with winding temperature control device and active stator iron device, as well as bearing supports vibration control (UKVT), produced in explosion-proof version and designed for:

- temperature control both of motor (to 9 channels) and of drive mechanism due to the use of 2 three-coordinate sensors 3КДВ;

-light warning signals display beyond the boundaries of given vibration and temperature ranges;

-light warning signals display about breakage or absence of temperature sensors;

-electrical signals display for connecting external alarm and control devices;

- output signal about the state of controlled object through interface converter on display of personal computer (PC).

The electric motors of VAO7 series are interchangeable to VAO,VAO2,VAO4, and also to similar electric motors of the other manufacturers according to mounting and installation dimensions.

At the customer's request the electric motors can be produced with special mounting and installation dimensions or according to mounting configuration IM1002, IM3002, IM2001, IM2002.

TYPE DESIGNATION

BAO X X - XXX XX/XX - XX XXX

- XXX — Climatic construction type
- XX — Number of poles
- XX/XX — Designation of stator core length or power in kilowatt/ voltage in kilovolt
- XXX — axis of rotation height in millimeters (gabarit)
- X — Motor modification: A- a luminum rotor winding (f or VAO7) M- copper rotor winding (f or VAO7)
- X — serial number
- BAO — Motor type (asynchronous explosion-proof airflow-cooled)

TECHNICAL PARAMETERS
OF ELECTRIC MOTORS VAO4-450, VAO7-450, WITH VOLTAGE 3000V, 6000V, FREQUENCY 50; 60Hz

Type designation	Power, kW	Nominal current of stator, A*	Rotational speed, rpm.**	Efficiency factor,%	Power factor, Cos φ	Sliding, %	Starting torque ratio	Maximum torque ratio	Starting current ratio
VAO4-450S-2 VAO7A(M)-450S-2	200	46,2/23,1	3000/3600	93,6	0,89	0,80	1,1	3,1	7,0
VAO4-450M-2 VAO7A(M)-450M-2	250	57,3/28,7		94,3					
VAO4-450LA-2 VAO7A(M)-450LA-2	315	70,1/35,1		95,0	0,91	0,90	1,2		
VAO4-450LB-2 VAO7A(M)-450LB-2	400	87,8/43,9		95,3	0,92				
VAO4-450S-4 VAO7A(M)-450S-4	200	46,0/23,0	1500/1800	94,0	0,89	1,5	1,0	2,5	6,0
VAO4-450M-4 VAO7A(M)-450M-4	250	57,2/28,6		94,5			1,1		
VAO4-450LA-4 VAO7A(M)-450LA-4	315	70,9/35,5		95,0	0,90				
VAO4-450LB-4 VAO7A(M)-450LB-4	400	88,8/44,4		95,3	0,91				
VAO4-450M-6 VAO7A(M)-450M-6	200	49,1/24,6	1000/1200	93,6	0,84	0,8	1,0	2,1	
VAO4-450LA-6 VAO7A(M)-450LA-6	250	64,1/32,0		94,3		0,7			6,5
VAO4-450LB-6 VAO7A(M)-450LB-6	315	80,2/40,0		94,5					
VAO4-450LA-8 VAO7A(M)-450LA-8	200	51,7/25,9	750/900	93,0	0,80	1,1		2,2	6,0
VAO4-450LB-8 VAO7A(M)-450LB-8	250	64,0/32,0		94,1					

**Data for voltage 3000V are indicated in the numerator, data for 6000V are indicated in the denomenator.*
*** Data for frequency 50Hz are indicated in the numerator, data for frequency 60Hz are indicated in the denomenator.*

TECHNICAL PARAMETERS
OF ELECTRIC MOTORS VAO4-450, VAO7-450, WITH VOLTAGE 10000V, FREQUENCY 50; 60Hz

Type designation	Power, kW	Nominal current of stator, A	Rotational speed, rpm.**	Efficiency factor,%	Power factor, Cos φ	Sliding, %	Starting torque ratio	Maximum torque ratio	Starting current ratio
VAO4-450S-2 VAO7A(M)-450S-2	200	13,8	3000 / 3600	93,7	0,89	0,83	0,9	3,1	6,2
VAO4-450M-2 VAO7A(M)-450M-2	250	16,9		94,4	0,90			3,0	6,0
VAO4-450LA-2 VAO7A(M)-450LA-2	315	21,2		94,9	0,91		0,91		
VAO4-450LB-2 VAO7A(M)-450LB-2	400	26,8		95,3			0,96	3,1	6,1
VAO4-450S-4 VAO7A(M)-450S-4	200	13,8	1500 / 1800	94,6	0,88	1,6	0,86		
VAO4-450M-4 VAO7A(M)-450M-4	250	17,2		95,0		1,5	0,90	3,0	6,2
VAO4-450LA-4 VAO7A(M)-450LA-4	315	21,4		95,3	0,89		0,87	2,9	6,0
VAO4-450LB-4 VAO7A(M)-450LB-4	400	27,1		95,5				2,8	5,8
VAO4-450M-6 VAO7A(M)-450M-6	200	14,5	1000 / 1200	94,6	0,84	0,8	1,0	2,5	5,5
VAO4-450LA-6 VAO7A(M)-450LA-6	250	18,1		94,9					5,6
VAO4-450LB-6 VAO7A(M)-450LB-6	315	22,7		95,1					5,5
VAO4-450LA-8 VAO7A(M)-450LA-8	200	15,8	750 / 900	94,6	0,77	1,3		2,4	5,0
VAO4-450LB-8 VAO7A(M)-450LB-8	250	19,4		95,0	0,78			2,2	4,7

Overall dimensions, installation and mounting sizes of the electric motors VAO4-450, VAO7A(M)-450 (3000 V, 6000 V)

Type designation	l_1	l_{10}	l_{12}	l_{30}	l_{34}	d_1	d_{30}	b_1	b_{11}	b_{12}	h_5	h_{31}	h_{34}*	Mass, kg Aluminium**/ Copper***
VAO4-450S-2 VAO7A(M)-450S-2	140	560	325	1460	880	70	835	20	870	130	74,5	930	145/115	2124/2196
VAO4-450M-2 VAO7A(M)-450M-2				1500	920									2280/2352
VAO4-450LA-2 VAO7A(M)-450LA-2		710		1570	990									2580/2664
VAO4-450LB-2 VAO7A(M)-450LB-2				1685	1100									2880/2964
VAO4-450S-4 VAO7A(M)-450S-4	210	630		1585	790	100		28			106			2640/2712
VAO4-450M-4 VAO7A(M)-450M-4		710		1635	860									2880/2952
VAO4-450LA-4 VAO7A(M)-450LA-4				1725	950									3060/3144
VAO4-450LB-4 VAO7A(M)-450LB-4		800	400	1825	1100									3773/3384
VAO4-450M-6 VAO7A(M)-450M-6		710	325	1680	870									2880/2952
VAO4-450LA-6 VAO7A(M)-450LA-6				1800	990									3060/3144
VAO4-450LB-6 VAO7A(M)-450LB-6		800	400	1900	1120									3180/3270
VAO4-450LA-8 VAO7A(M)-450LA-8		710	325	1800	990									3060/3144
VAO4-450LB-8 VAO7A(M)-450LB-8		800	400	1900	1100									3180/3270

* height for IM1001 version is indicated in numerator, for version IM3001-in denominator.

** Mass of the motor with aluminium winding rotor is indicated in the numerator.

*** Mass of the motor with copper winding rotor is indicated in the denominator.

Electric motors with voltage 3000V are manufactured in dimensions of motors with voltage 6000V.

Overall dimensions, insllation and mounting sizes of the electric motors VAO4-450, VAO7A(M)-450 (10000V)

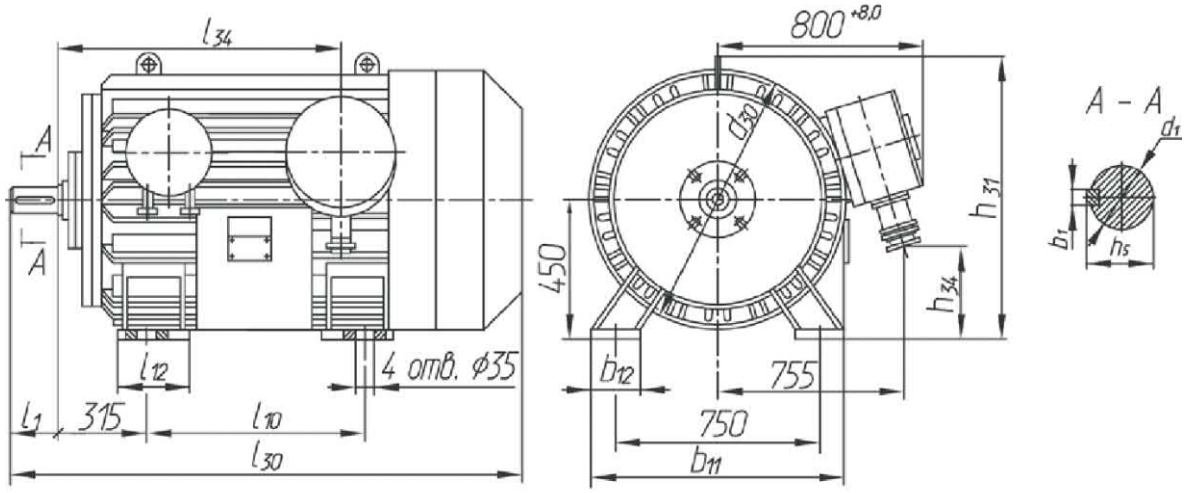
Type designation	l_1	l_{10}	l_{12}	l_{30}	l_{34}	d_1	d_{30}	b_1	b_{11}	b_{12}	h_5	h_{31}	h_{34}*	Mass, kg Alluminium**/ Copper***
VAO4-450S-2 VAO7A(M)-450S-2	140	560	325	1685	1100	70	835	20	870	130	74,5	930	145/115	2880/2952
VAO4-450M-2 VAO7A(M)-450M-2				1745	1160									3000/3072
VAO4-450LA-2 VAO7A(M)-450LA-2		710	400	1785	1200									3120/3204
VAO4-450LB-2 VAO7A(M)-450LB-2				1855	1270									3300/3384
VAO4-450S-4 VAO7A(M)-450S-4	210	630	325	1800	990	100		28			106			3000/3072
VAO4-450M-4 VAO7A(M)-450M-4		710	400	1865	1050									3060/3132
VAO4-450LA-4 VAO7A(M)-450LA-4				1900	1090									3180/3264
VAO4-450LB-4 VAO7A(M)-450LB-4		800		1970	1160									3300/3384
VAO4-450M-6 VAO7A(M)-450M-6		710	325	1800	990									3120/3192
VAO4-450LA-6 VAO7A(M)-450LA-6			400	1860	1050									3240/3324
VAO4-450LB-6 VAO7A(M)-450LB-6		800		1970	1160									3360/3444
VAO4-450LA-8 VAO7A(M)-450LA-8		710	325	1800	990									3180/3264
VAO4-450LB-8 VAO7A(M)-450LB-8		800	400	1900	1090									3300/3384

* height for IM1001 version is indicated in numerator, for version IM3001-in denominator.

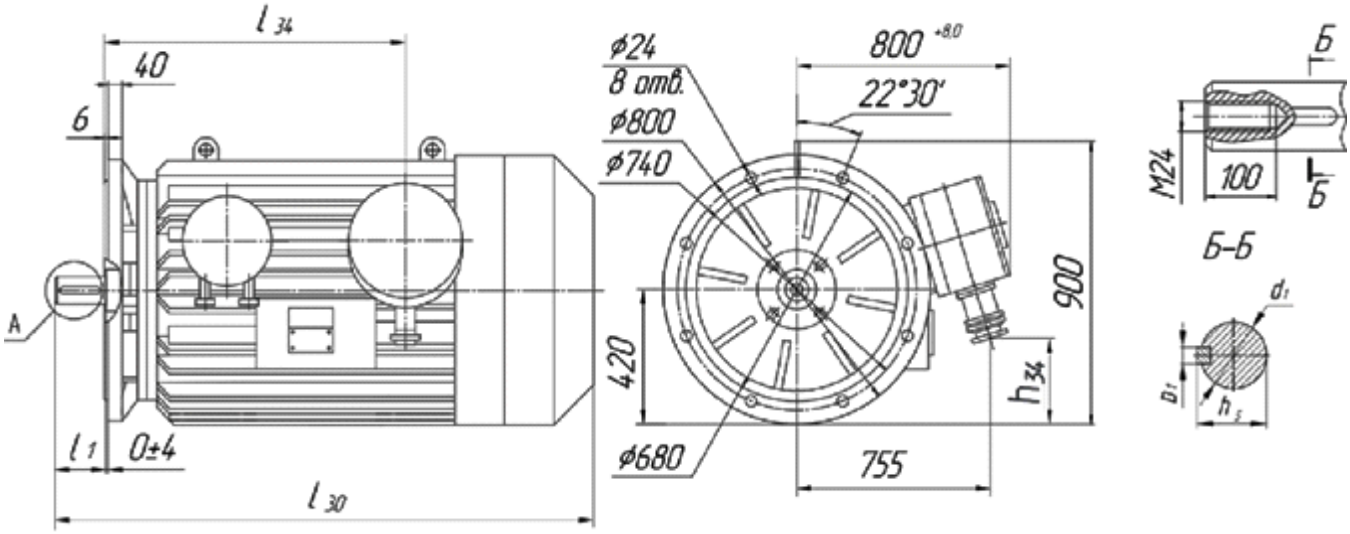
** Mass of the motor with aluminium winding rotor is indicated in the numerator.

*** Mass of the motor with copper winding rotor is indicated in the denominator.

Overall dimensions, installation and mounting sizes of the electric motors VAO4, VAO7A(M)-450-2;4;6;8, with voltage 3000 V, 6000 V, 10000 V IM1001 (on legs)



Overall dimensions, installation and mounting sizes of the electric motors VAO4, VAO7A(M)-450-2;4;6;8, with voltage 3000, 6000, 10000 V IM3001 (flange)



TECHNICAL PARAMETERS
OF ELECTRIC MOTORS VAO4-560, VAO7-560, WITH VOLTAGE 3000V, 6000V, NETWORK FREQUENCY 50; 60Hz

Type designation	Power, kW	Nominal current of stator, A*	Rotational speed, rpm.**	Efficiency factor ,%	Power factor, Cos φ	Sliding, %	Starting current ratio	Maximum torque ratio	Starting current ratio
VAO4-560S-2 VAO7A(M)-560S-2	500	112,7/56,4	3000/3600	94,8	0,9	0,7	1,0	2,7	6,0
VAO4-560M-2 VAO7A(M)-560M-2	630	141,7/70,9		95,1					
VAO4-560LA-2 VAO7A(M)-560LA-2	800	175,2/87,6		95,5	0,92		1,1	2,8	7,0
VAO4-560LB-2 VAO7A(M)-560LB-2	1000	218,1/109,0		95,9					
VAO4-560-1250/6-2 VAO7M-560-1250/6-2	1250	274,0/137,0		96,1		0,6	0,8	2,7	5,6
VAO4-560-1600/6-2 VAO7M-560-1600/6-2	1600	348,0/174,0		96,0			0,8	2,6	5,5
VAO4-560S-4 VAO7A(M)-560S-4	500	112,6/56,3	1500/1800	95,0	0,9	0,9	1,3	2,5	6,5
VAO4-560M-4 VAO7A(M)-560M-4	630	141,1/70,5		95,5					
VAO4-560LA-4 VAO7A(M)-560LA-4	800	178,8/89,4		95,7					
VAO4-560LB-4 VAO7A(M)-560LB-4	1000	222,7/111,3		96,0		0,8			
VAO4-560S-6 VAO7A(M)-560S-6	400	95,6/47,8	1000/1200	94,8	0,85	0,7	1,1	2,2	5,5
VAO4-560M-6 VAO7A(M)-560M-6	500	119,0/59,5		95,2					
VAO4-560LA-6 VAO7A(M)-560LA-6	630	149,8/74,9		95,3					
VAO4-560LB-6 VAO7A(M)-560LB-6	800	189,8/94,9		95,5		0,6			
VAO4-560S-8 VAO7A(M)-560S-8	315	80,0/40,0	750/900	94,7	0,8	0,8	1,0	2,2	
VAO4-560M-8 VAO7A(M)-560M-8	400	101,3/50,6		95,0					
VAO4-560LA-8 VAO7A(M)-560LA-8	500	126,6/63,3		95,2					
VAO4-560LB-8 VAO7A(M)-560LB-8	630	158,9/79,4		95,5		0,7			
VAO4-560M-10 VAO7A(M)-560M-10	250	63,9/32,0	600/720	94,1		1,1		1,9	4,5
VAO4-560S-16 VAO7A(M)-560S-16	200	59,7/29,8	375/450	93,4	0,69	1,29		2,0	4,0

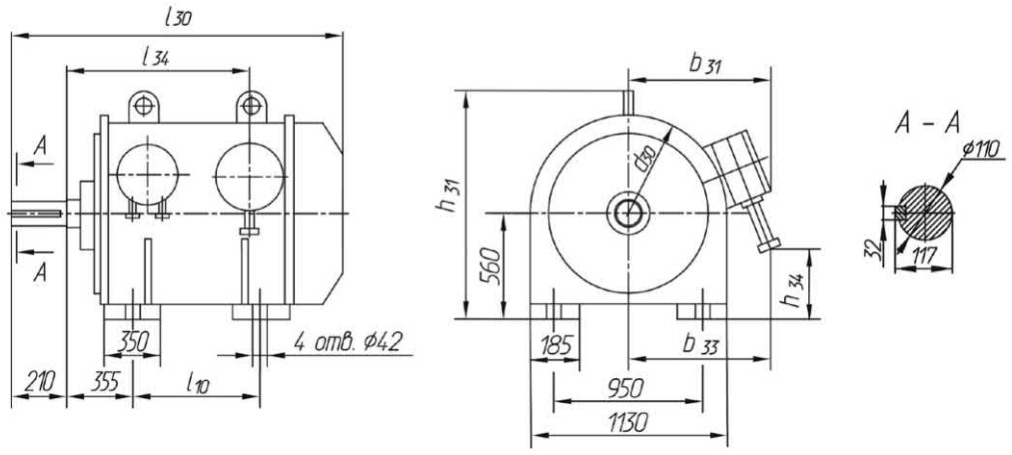
**Data for motors with voltage 3000V are indicated in numerator, with voltage 6000V are indicated in denominator.*
*** Data for motors with frequency 50Hz are indicated in numerator, with frequency 60Hz are indicated in denominator.*
The electric motors with voltage 3000V are manufactured in dimensions of motorrs with voltage 6000V.

TECHNICAL PARAMETERS
OF THE ELECTRIC MOTORS VAO4-560, VAO7-560, WITH VOLTAGE 10000V, NETWORK FREQUENCY 50; 60Hz

Type designation	Power, kW	Nominal current of stator, A	Rotational speed, rpm.**	Efficiency factor,%	Power factor, Cos φ	Sliding, %	Starting torque ratio	Maximum torque ratio	Starting current ratio
VAO4-560S-2 VAO7A(M)-560S-2	500	33,8	3000/3600	94,8	0,90	0,7	1,0	2,7	6,0
VAO4-560M-2 VAO7A(M)-560M-2	630	42,6		95,1					
VAO4-560LA-2 VAO7A(M)-560LA-2	800	52,6		95,5	0,92		1,1	2,8	7,0
VAO4-560LB-2 VAO7A(M)-560LB-2	1000	65,3		95,9					
VAO4-560-1250/10-2 VAO7M-560-1250/10-2	1250	81,7		95,7	0,93	0,65	0,8	2,7	5,8
VAO4-560S-4 VAO7A(M)-560S-4	500	33,8	1500/1800	95,0	0,90	0,9	1,3	2,5	6,5
VAO4-560M-4 VAO7A(M)-560M-4	630	42,6		95,5					
VAO4-560LA- VAO7A(M)-560LA-4	800	53,7		95,7					
VAO4-560LB-4 VAO7A(M)-560LB-4	1000	66,7		96,0		0,8			
VAO4-560S-6 VAO7A(M)-560S-6	400	28,8	1000/1200	94,8	0,85	0,7	1,1	2,2	5,5
VAO4-560M-6 VAO7A(M)-560M-6	500	35,7		95,2					
VAO4-560LA-6 VAO7A(M)-560LA-6	630	45,0		95,3					
VAO4-560LB-6 VAO7A(M)-560LB-6	800	57,1		95,5		0,6			
VAO4-560S-8 VAO7A(M)-560S-8	315	24,0	750/900	94,7	0,80	0,8	1,0	2,2	
VAO4-560M-8 VAO7A(M)-560M-8	400	30,3		95,0					
VAO4-560LA-8 VAO7A(M)-560LA-8	500	38,2		95,2					
VAO4-560LB-8 VAO7A(M)-560LB-8	630	47,7		95,5		0,7			
VAO4-560M-10 VAO7A(M)-560M-10	250	19,2	720	94,1		1,1		1,9	4,5
VAO4-560S-16 VAO7A(M)-560S-16	200	17,8	450	93,4	0,69	1,29		2,0	4,0

Data for motors with frequency 50Hz are indicated in numerator, with frequency 60Hz are indicated in denominator.

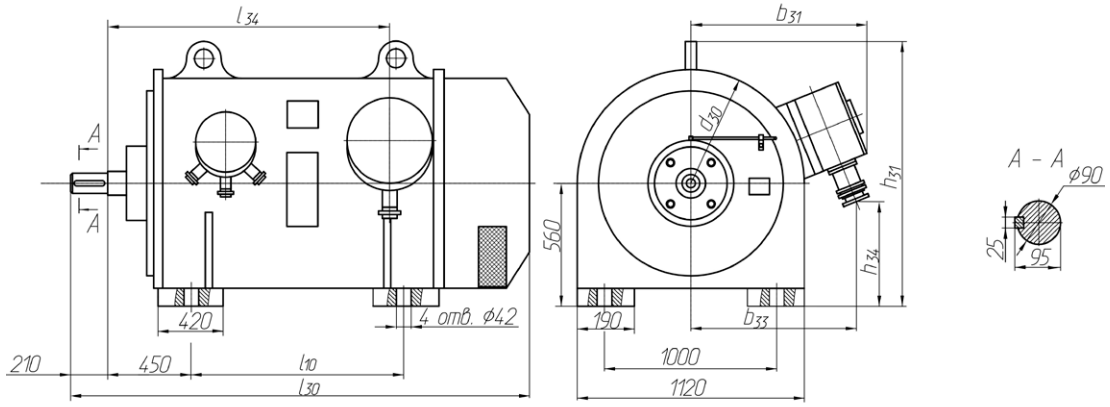
Overall dimensions, installation and mounting sizes of the electric motors VAO4, VAO7A(M)-560-4, 6, 8, 10, 16 WITH VOLTAGE 6000V, 10000V, IM1001 (on legs)



Type designation	Power, V	l_{10}	l_{30}	l_{34}	d_{30}	b_{31}***/ b_{31}****	b_{33}***/ b_{33}****	h_{31}	h_{34}***/ h_{34}****	Mass, kg Aluminium*/ Copper**
VAO4-560S-4 VAO7A(M)-560S-4	6000	630	1675	855	1146	840/1000	780/1005	1240	570/415	3600/3696
VAO4-560M-4 VAO7A(M)-560M-4		710	1745	925						4020/4128
VAO4-560S-4 VAO7A(M)-560S-4	10000	630					840/1005		430/415	3840/3948
VAO4-560LA-4 VAO7A(M)-560LA-4	6000	800	1865	1045	1220	880/1035	810/1035	1280	580/430	4430/4550
VAO4-560M-4 VAO7A(M)-560M-4	10000	710					870/1035		440/430	4680/4800
VAO4-560LB-4 VAO7A(M)-560LB-4	6000	900	2045	1215	1300	920/1065	850/1070	1320	595/445	5520/5652
	10000						910/1070		455/445	
VAO4-560LA-4 VAO7A(M)-560LA-4	10000	800								5400/5412
VAO4-560S-6 VAO7A(M)-560S-6	6000	630	1675	855	1146	840/1000	780/1005	1240	570/415	4080/4176
VAO4-560M-6 VAO7A(M)-560M-6		710	1745	925						4560/4668
VAO4-560S-6 VAO7A(M)-560S-6	10000	630					835/1005		430/415	
VAO4-560LA-6 VAO7A(M)-560LA-6	6000	800	1865	1045	1220	880/1030	810/1035	1280	580/430	5400/5520
VAO4-560M-6 VAO7A(M)-560M-6	10000	710					870/1035		440/430	
VAO4-560LB-6 V7A(M)-560LB-6	6000	900	2045	1215	1300	920/1065	850/1070	1320	595/445	6720/6852
	10000						910/1070		455/445	
VAO4-560LA-6 VAO7A(M)-560LA-6	10000	800								
VAO4-560S-8 VAO7A(M)-560S-8	6000	630	1605	765	1146	840/1000	780/1005	1240	570/415	3400/3495
VAO4-560M-8 VAO7A(M)-560M-8		710	1745	925						4080/4188
VAO4-560S-8 VAO7A(M)-560S-8	10000	630					835/1005		430/415	
VAO4-560LA-8 VAO7A(M)-560LA-8	6000	800	1865	1045	1220	880/1030	810/1035	1280	580/430	5520/5640
VAO4-560M-8 VAO7A(M)-560M-8	10000	710					870/1035		440/430	
VAO4-560LB-8 VAO7A(M)-560LB-8	6000	900	2045	1215	1300	920/1065	850/1070	1320	595/445	6840/6972
	10000						910/1070		455/445	
VAO4-560LA-8 VAO7A(M)-560LA-8	10000	800								
VAO4-560M-10 VAO7A(M)-560M-10	6000	710	1745	925	1146	840/1000	780/1005	1240	570/415	4800/4908
	10000						835/1005		430/415	

* Mass of the motor with aluminium winding rotor is indicated in the numerator.
** Mass of the motor with copper winding rotor is indicated in the denominator.
*** For motors with power terminal box with integral isolation panel
**** For motors with power terminal box with through porcelain insulators
Electric motors with voltage 3000V are manufactured in dimensions of motors with voltage 6000V.

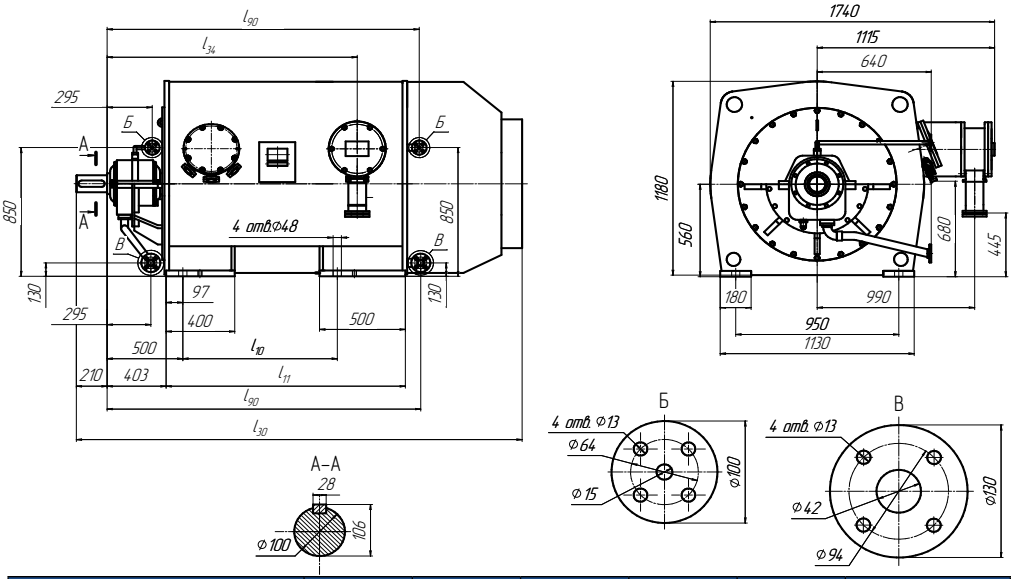
Overall dimensions, installation and mounting sizes of the electric motors VAO4, VAO7A(M)-560-2 WITH VOLTAGE 6000V, 10000V IM1001 (on legs)



Type designation	Power, V	b_{31}	b_{33}	d_{30}	h_{31}	h_{34}	l_{10}	l_{30}	l_{34}	Mass, kg Aluminium* / Copper**
VAO4-560 S-2 VAO7A(M)-560 S-2	6000	840	865	1146	1240	375	630	1930	1005	3360 / 3564
VAO4-560 M-2 VAO7A(M)-560 M-2		880	900	1220	1280	390	710	2050	1120	3794 / 3995
VAO4-560 S-2 VAO7A(M)-560 S-2	10000						630			
VAO4-560 LA-2 VAO7A(M)-560 LA-2	6000	920	935	1300	1320	425	800	2230	1295	4710 / 4938
VAO4-560 M-2 VAO7A(M)-560 M-2	10000						710			
VAO4-560 LB-2 VAO7A(M)-560 LB-2	6000						900	2330	1395	5940 / 6170
	10000									
VAO4-560 LA-2 VAO7A(M)-560 LA-2	10000						800			

** Mass of the motor with aluminium winding rotor is indicated in the numerator.*
*** Mass of the motor with copper winding rotor is indicated in the denominator.*
Electric motors with voltage 3000V are manufactured in dimensions of motors with voltage 6000V.

Overall dimensions, installation and mounting sizes of the electric motors VAO4, VAO7M-560-1250(1600)-2 WITH VOLTAGE 6000V, 10000V IM1001 (on legs)



Type designation	l_{10}	l_{11}	l_{30}	l_{34}	l_{90}	Mass, kg
VAO4-560-1250/6-2 VAO7M-560-1250/6-2	900	1395	2610	1540	1905	5940
VAO4-560-1250/10-2 VAO7M-560-1250/10-2	1000	1495	2710	1640	2005	6120
VAO4-560-1600/6-2 VAO7M-560-1600/6-2						6600

Electric motors with voltage 3000V are manufactured in dimensions of motors with voltage 6000V.

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS VAO4-630-710, VAO7-630-710, WITH VOLTAGE 3000V, 6000V, FREQUENCY NETWORK 50; 60Hz

Type designation	Power, kW	Nominal current of stator, A *	Rotational speed, rpm.**	Efficiency factor,%	Power factor, Cos φ	Sliding, %	Starting torque ratio	Maximum torque ratio	Starting current ratio
VAO4-630S-4 VAO7A(M)-630S-4	1250	278,4/139,2	1500/ 1800	96,0	0,90	0,7	1,1	2,3	6,0
VAO4-630M-4 VAO7A(M)-630M-4	1600	354,0/177,0		96,7					
VAO4-630L-4 VAO7A(M)-630L-4	2000	442,0/221,0		96,8				2,4	
VAO4-630S-6 VAO7A(M)-630S-6	1000	230,4/115,2	1000/ 1200	96,0	0,87		1,0	2,0	4,8
VAO4-630M-6 VAO7A(M)-630M-6	1250	287,3/143,7		96,3					
VAO4-630L-6 VAO7A(M)-630L-6	1600	367,0/183,5		96,5					
VAO4-630S-8 VAO7A(M)-630S-8	800	189,1/94,6	750/900	95,8	0,85	0,8		2,2	5,2
VAO4-630M-8 VAO7A(M)-630M-8	1000	235,8/117,9		96,0					
VAO4-630L-8 VAO7A(M)-630L-8	1250	294,1/147,0		96,2					
VAO4-710-2000/6-2 VAO7M-710-2000/6-2	2000	434,0/217,0	3000/ 3600	96,3	0,92	0,6	0,8	2,5	5,2
VAO4-710-2500/6-2 VAO7M-710-2500/6-2	2500	544,0/272,0		96,5			0,8	2,8	5,8

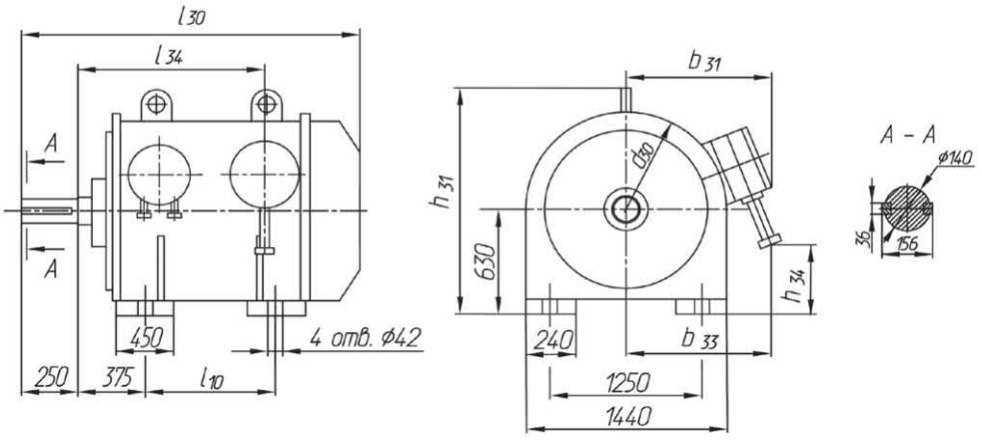
**Data for voltage 3000V are indicated in the numerator, data for 6000V are indicated in the denomenator.*
*** Data for frequency 50Hz are indicated in the numerator, data for frequency 60Hz are indicated in the denomenator.*

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS VAO4-630-710, VAO7-630-710, WITH VOLTAGE 10000V, FREQUENCY NETWORK 50; 60Hz

Type designation	Power, kW	Nominal current of stator, A	Rotational speed, rpm.*	Efficiency factor ,%	Power factor, Cos φ	Sliding, %	Starting torque ratio	Maximum torque ratio	Starting current ratio
VAO4-630S-4 VAO7A(M)-630S-4	1250	83,3	1500/ 1800	96,0	0,90	0,7	1,1	2,3	6,0
VAO4-630M-4 VAO7A(M)-630M-4	1600	106,7		96,7					
VAO4-630L-4 VAO7A(M)-630L-4	2000	132,4							
VAO4-630S-6 VAO7A(M)-630S-6	1000	69,4	1000/ 1200	95,8	0,87		1,0	2,0	4,8
VAO4-630M-6 VAO7A(M)-630M-6	1250	86,2		96,0					
VAO4-630L-6 VAO7A(M)-630L-6	1600	110,3		96,3					
VAO4-630S-8 VAO7A(M)-630S-8	800	56,7	750/900	95,6	0,85	0,9			5,0
VAO4-630M-8 VAO7A(M)-630M-8	1000	70,9		95,8					
VAO4-630L-8 VAO7A(M)-630L-8	1250	88,6		96,0					
VAO4-630M-10 VAO7A(M)-630M-10	630	49,5	720	94,3	0,78	1,1	1,3	2,2	5,9
VAO4-710-1600/10-2 VAO7M-710-1600/10-2	1600	105,0	3600	95,7	0,91	0,65	0,8	2,6	5,4
VAO4-710-2000/10-2 VAO7M-710-2000/10-2	2000	134,0		96,0	0,92	0,60		2,7	5,6
VAO4-710-2500/10-2 VAO7M-710-2500/10-2	2500	162,0		96,2		0,55		2,6	5,3

**Data for frequency 50Hz are indicated in the numerator, data for frequency 60Hz are indicated in the denomenator.*

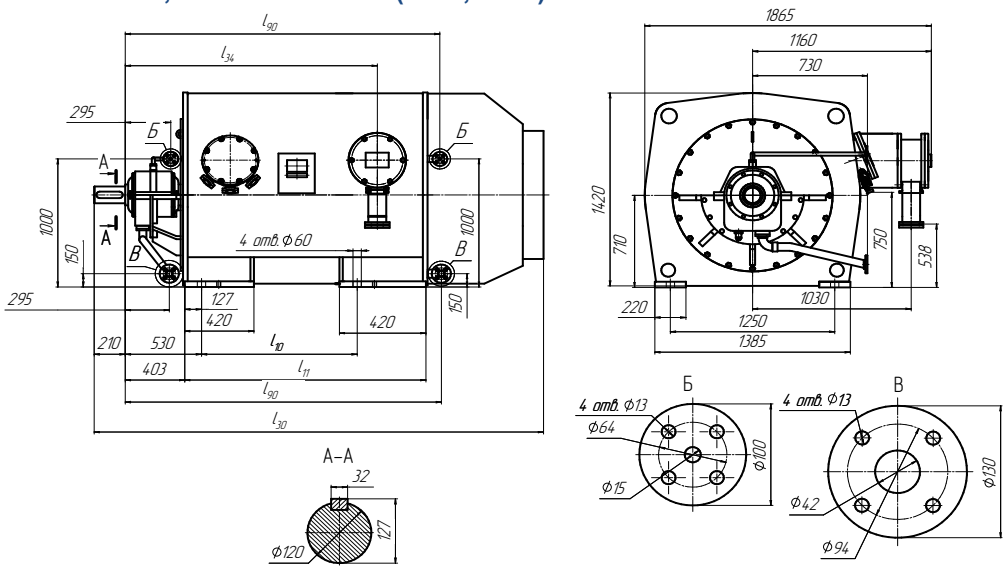
Overall dimensions, installation and mounting sizes of the electric motors VAO4, VAO7A(M)-630 S; M; L WITH VOLTAGE 6000V, 10000V IM1001 (on legs)



Type designation	Power, V	l_{10}	l_{30}	l_{34}	d_1	d_{30}	b_{31}	b_{33}	h_{31}	h_{34}	Mass, kg Aluminium*/Copper**
VAO4-630S-4 VAO7A(M)-630S-4	6000	1000	$2155^{+17,5}$	1280	140	$1450^{+16,0}$	$1000^{+9,0}$	940	$1470^{+12,5}$	700	6700 / 6800
	10000		$2265^{+17,5}$	1390				1000		560	6800 / 6900
VAO4-630M-4 VAO7A(M)-630M-4	6000	1120						940		700	7200 / 7310
	10000		$2475^{+21,0}$	1600				1000		560	7300 / 7410
VAO4-630L-4 VAO7A(M)-630L-4	6000	1250				$1530^{+16,0}$	$1030^{+10,5}$	975	$1510^{+12,5}$	740	8200 / 8320
	10000							1035		600	8300 / 8420
VAO4-630S-6 VAO7A(M)-630S-6	6000	1120	$2265^{+17,5}$	1390		$1450^{+16,0}$	$1000^{+9,0}$	940	$1470^{+12,5}$	700	7200 / 7300
	10000		$2475^{+21,0}$	1600				1000		560	7300 / 7400
VAO4-630M-6 VAO7A(M)-630M-6	6000	1250						940		700	8200 / 8210
	10000							1000		560	8300 / 8310
VAO4-630S-8 VAO7A(M)-630S-8	6000	1120	$2265^{+17,5}$	1390				940		700	7000 / 7100
	10000		$2475^{+21,0}$	1600				1000		560	7100 / 7200
VAO4-630M-8 VAO7A(M)-630M-8	6000	1250						940		700	8000 / 8100
	10000							1000		560	8100 / 8200

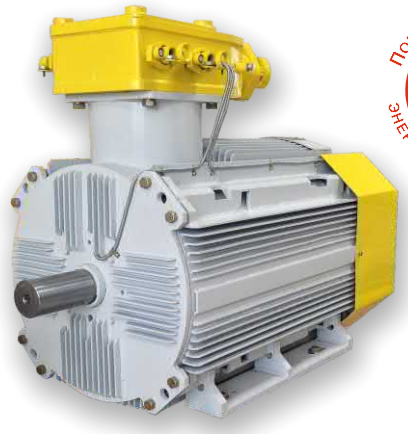
** Mass of the motor with aluminium winding rotor is indicated in the numerator.*
*** Mass of the motor with copper winding rotor is indicated in the denominator.*
Electric motors with voltage 3000V are manufactured in dimensions of motors with voltage 6000V.

Overall dimensions, installation and mounting sizes of the electric motors VAO4, VAO7M-710-1600(2000, 2500)-2



Type designation	l_{10}	l_{11}	l_{30}	l_{34}	l_{90}	Mass, kg
VAO4-710-1600/10-2 VAO7M-710-1600/10-2	1400	1630	2850	1780	2145	7800
VAO4-710-2000/6-2 VAO7M-710-2000/6-2		1760	2980	1910	2275	8640
VAO4-710-2000/10-2 VAO7M-710-2000/10-2						9000
VAO4-710-2500/6-2 VAO7M-710-2500/6-2	1600	1900	3120	2050	2415	10800
VAO4-710-2500/10-2 VAO7M-710-2500/10-2						11400

Electric motors with voltage 3000V are manufactured in dimensions of motors with voltage 6000V.



LOW VOLTAGE ELECTRIC MOTORS VAO7A(M)-250-355

Asynchronous three-phase airflow-cooled explosion-proof electric motors VAO7 with a squirrel-cage rotor are designed for operation in mines, containing explosive gas and dust as well as in explosive hazard covered areas and outside installations.

Operation mode: continuous S1 from network 50 Hz.

Electric motors allow operation from frequency converters (S8, S9, S10).

Explosion protection configuration:

1 Ex d IIB T4 Gb	1 Ex d IIB T5 + H_2 Gb or 1 Ex d IIC T5 Gb (except acetylene)
PB Ex d I Mb	

Climatic construction type:

У1, У2, У5, УХЛ1, УХЛ2, УХЛ4, ХЛ1, ХЛ2, Т2, Т5 and others

Mounting configuration:

IM1001, IM2001, IM3001, IM3011

Protection degree for:

motor housing and terminal box	IP54 IP55 (made to order
outdoor fan enclosure	IP20

Cooling method

IC411	Double-circuit cooling system. The inner contour is closed, the external contour is open with built-in fan located on the motor shaft and colling the outside surface of the motor
IC516	Double-circuit cooling system. The inner contour is closed, the external contour is open with built-in heat exchanger and separately driven fan) - at customer's request

The electric motors VAO7A have the right and the left direction of rotation. The direction of rotation is changed only from rest state.

The insulating materialsof stator winding have heat-resistance class «F».

At the customer's request the electric motors are equipped with temperature control devices **UKT-12** (9 channels), **UKT-12** (9 channels).

Main advantages of electric motors VAO7 over analogues:

1. Improving the active parts to obtain high energy parameters at lower mass.
2. The application in the motor construction VAO7of cast aluminum squirrel-cage rotor provided a number of advantages over other analogues with welded winding:

Select the best configuration and dimensions of groove , increasing starting moments at relatively small values of starting currents;

Select the best configuration and dimensions of groove , increasing starting moments at relatively small values of starting currents;

Improve the motors' safety in operation excluding the possible sparking and overeheating in welded joints.

3. The application in the motor construction VAO7M of copper squirrelcage rotor, performed by special technology,provides reliability of work with mechanisms , at hard, slow starts and the number of starts per day 15-20 instead of 6-8 starts permissible for analogues with aluminum welded rotor winding, increasing service life by 1,5-2 times in comparison with electric motors with aluminium squirrel-cage rotor.

4. Exceptional stator housing design of increased rigidity,ensuring a reliable fit of stator pack, as well as lower values of vibration and noise.

5.Application in the terminal boxes high reliable one-pice insulating panel instead of porcelain insulators.

6. Improved ventilation and cooling system of electric motors, provides the maximum heating of active parts working at nominal load, with the exception of local overheating.

7. The possibility of operation of electric motors at adjusting the rotation speed modes as part of adjustable-frequency electric drives.

8. Use of bearing units of explosion-protection of special design without rubbing parts provides reliability during full service life.

The electric motors are issued with terminal box from the top, and also at customer's request with terminal box from the left or from the right. Motors have the right and left direction of rotation.

The base equipment of motors provides:

- temperature control of stator winding by four-wire thermal converters HCX 50M in quantity of 6 pieces (2 pieces on each phase);
- temperature relay of stator winding;
- temperature ccontrol of bearings by four-wire thermal converters HCX 50M in quantity of 2 pieces (1 piece on each bearing);
- places for vibration sensors installation in quantity of 6 pc. (3 pieces on each bearing unit on three mutually perpendicular planes);
- bearing units replenishing and replacing lubricants;
- connection of two power cables, outer dimeter of which is up to 75 mm.

At customer's request motors are equipped with:

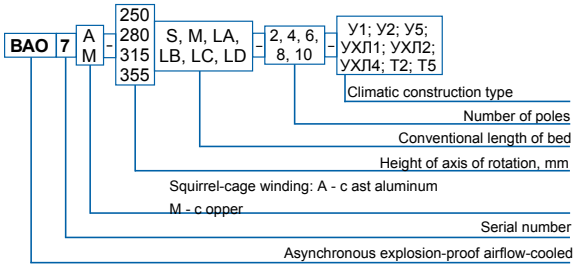
- temperature control of stator winding by four-wire thermal converters HCX 50П, 100П, Pt100 in quantity up to 12 pices;
- PTC-termistors of stator winding (instead of temperature relay);
- four-wire sensors of bearings temperature control with HCX 50П, 100П, Pt100;
- vibration control sensors in quantity up to 6 pieces;
- rotor speed sensors;
- selfregulating anti-condensation heating (instead of temperature relay and PTC-termistors)
- SKF bearings or bearings of the other manufacturers;
- current-isolated bearing unit.

At customer's request electric motors are equipped with adjustable legs with bolt fasteners that allows you to perform an assembly with legs directly on the object of operation (without welding and mechanical operation) with terminal box location from the top, from the left or from the right.

The electric motors of VAO7 series are interchangeable to similar electric motors of the other manufacturers.

At the customer's request the electric motors can be produced with special mounting and installation dimensions or according to mounting configuration IM1002, IM2002, IM3002.

TYPE DESIGNATION



Basic parameters of the electric motors VAO7A(M) 250-280

Type designation	Power, kW	Nominal current of stator, A*	Rotational speed, rpm.**	Efficiency,%	Power factor	Sliding, %	Starting torque ratio	Maximum torque ratio	Starting current ratio
voltage 380/660 V, 660/1140 V, frequency 50Hz, 60Hz									
250(280)S-2	75	136,6/78,6	3000/3600	93,8	0,90	1,0	1,2	3,0	7,0
		77,7/45,0		93,9	0,91				
250(280)M-2	90	162,9/93,8		94,1	0,90	1,0	1,2	3,0	7,0
		93,3/54,0		94,2	0,91				
250(280)LA-2	110	196,3/113,0		94,3		1,0	1,2	3,0	7,0
		113,7/65,8			0,90				
250(280)LB-2	132	234,5/135,0		94,6	0,92	1,0	1,1	2,7	6,5
		134,9/78,1		94,7	0,91				
250(280)LC-2	160	281,4/162,0		94,8	0,92	1,0	1,1	2,8	6,5
		161,8/93,7		94,9					
250(280)LD-2	200	349,1/201,0		95,0		1,0	1,2	3,0	7,0
		202,1/117,0							
250(280)S-4	75	140,2/80,7	1500/1800	94,0	0,87	1,3	1,2	2,7	6,5
		80,1/46,4			0,88				
250(280)M-4	90	167,1/96,2		94,2	0,87	1,3	1,2	2,7	6,5
		95,9/55,5		94,3	0,88				
250(280)LA-4	110	201,5/116,0		94,5		1,3	1,2	2,7	6,3
		116,5/67,5							
250(280)LB-4	132	241,4/139,0		94,7		1,3	1,2	2,6	6,0
		140,3/81,2		94,8	0,87				
250(280)LC-4	160	293,5/169,0		94,9		1,3	1,2	2,6	6,0
		167,2/96,8		95,0	0,89				
250(280)LD-4	200	364,7/210,0		95,1	0,88	1,3	1,3	2,8	6,2
		209,0/121,0		95,2					
250(280)S-6	45	87,0/50,1	1000/1200	93,2	0,84	1,3	1,1	2,5	5,8
		50,8/29,4		92,8	0,83				
250(280)M-6	55	107,5/61,9		93,5		1,3	1,2	2,5	6,0
		61,1/35,4		93,2	0,85				
250(280)LA-6	75	145,0/83,5		93,8	0,84	1,3	1,2	2,5	6,0
		83,1/48,1		93,7					
250(280)LB-6	90	166,6/95,9		94,0	0,85	1,3	1,2	2,5	5,8
		99,3/57,5		94,1	0,84				
250(280)LC-6	110	208,4/120,0		94,3	0,85	1,3	1,2	2,5	5,8
		120,6/69,8							
250(280)LD-6	132	241,4/139,0		94,7		1,3	1,2	2,5	5,8
		142,0/82,2		94,6	0,86				
250(280)S-8	37	73,8/42,5	750/900	92,4	0,82	1,6	1,2	2,4	5,5
		42,5/24,6		92,5					
250(280)M-8	45	88,4/50,9		92,6	0,84	1,6	1,1	2,2	5,3
		51,0/29,5		92,7	0,83				
250(280)LA-8	55	108,0/62,2		93,0		1,6	1,2	2,3	5,5
		61,8/35,8		93,1	0,84				
250(280)LB-8	75	146,9/84,6		93,0	0,83	1,6	1,1	2,2	5,0
		85,0/49,2		93,1					
250(280)LC-8	90	167,6/96,5		93,3		1,6	1,1	2,2	5,0
		101,4/58,7							
250(280)LD-8	110	213,6/123,0		93,5		1,6	1,1	2,2	5,0
		122,8/71,1			0,84				
250(280)S-10	37	75,2/43,3	600/720	91,2	0,82	2,5	1,2	2,5	5,3
		43,4/25,1		91,1					
250(280)M-10	45	91,7/52,8		91,3		2,5	1,2	2,5	5,3
		52,7/30,5		91,0					
250(280)LA-10	55	111,3/64,1		91,3		2,5	1,2	2,5	5,3
		64,3/37,2		91,4					
250(280)LB-10	75	151,6/87,3		91,7		2,5	1,2	2,5	5,3
		86,9/50,3		91,6	0,83				

*** Data for voltage 380/660V are indicated in the numerator, data for 660/1140V are indicated in the denomenator.**
**** Data for 50Hz are indicated in the numerator, data for 60Hz are indicated in the denomenator.**

Overall dimensions, installation and mounting sizes of the electric motors VAO7-250-280

Type designation	Voltage, V	Mounting configuration	L mm max	L1	L2	L3	B	B1	D	H	Mass, kg
250S-2	380/660	IM1001 IM2001 IM3001 IM3011	1225 (1525*) (1300**)	140	-	-	69	18	65	11	790 (840***)
	660/1140										
280S-2	380/660				555	420					805 (855***)
	660/1140										
250M-2	380/660				-	-					820 (870***)
	660/1140										
280M-2	380/660				555	420					835 (885***)
	660/1140										
250LA-2	380/660		1305 (1605*) (1380**)		-	-	79,5	20	75	12	910 (960***)
	660/1140										
280LA-2	380/660				555	420					925 (975***)
	660/1140										
250LB-2	380/660				-	-					920 (970***)
	660/1140										
280LB-2	380/660				555	420					935 (985***)
	660/1140										
250LC-2	380/660				-	-					960 (1010***)
	660/1140										
280LC-2	380/660				555	420					975 (1025***)
	660/1140										
250LD-2	380/660		1385 (1685*) (1460**)		-	-					1045 (1095***)
	660/1140										
280LD-2	380/660				595	457					1065 1015***)
	660/1140										
250S-4	380/660		1145 (1445*) (1520**)		-	-					790 (840***)
	660/1140										
280S-4	380/660				555	420					805 (855***)
	660/1140										
250M-4	380/660				-	-					820 (870***)
	660/1140										
280M-4	380/660				555	420					835 (885***)
	660/1140										
250LA-4	380/660		1255 (1555*) (1330**)	170	-	-	85	22	80	14	880 (930***)
	660/1140										
280LA-4	380/660				555	420					895 (945***)
	660/1140										
250LB-4	380/660				-	-					940 (990***)
	660/1140										
280LB-4	380/660				555	420					955 (1005***)
	660/1140										
250LC-4	380/660		1335 (1635*) (1410**)		-	-					1020 (1070***)
	660/1140										
280LC-4	380/660				555	420					1035 (1085***)
	660/1140										
250LD-4	380/660		1415 (1715*) (1490**)		-	-					1150 (1200***)
	660/1140										
280LD-4	380/660				595	457					1170 (1220***)
	660/1140										
250S-6	380/660		1145 (1445*) (1220**)	140	-	-	79,5	20	75	12	785 (835***)
	660/1140										
280S-6	380/660				555	420					800 (850***)
	660/1140										
250M-6	380/660				-	-					815 (865***)
	660/1140										
280M-6	380/660				555	420					830 (880***)
	660/1140										

* dimensions at cooling method IC516.

** dimensions for motors with version IM3011 and cooling method IC411.

*** Mass of motors at cooling method IC516.

Continuation of the table

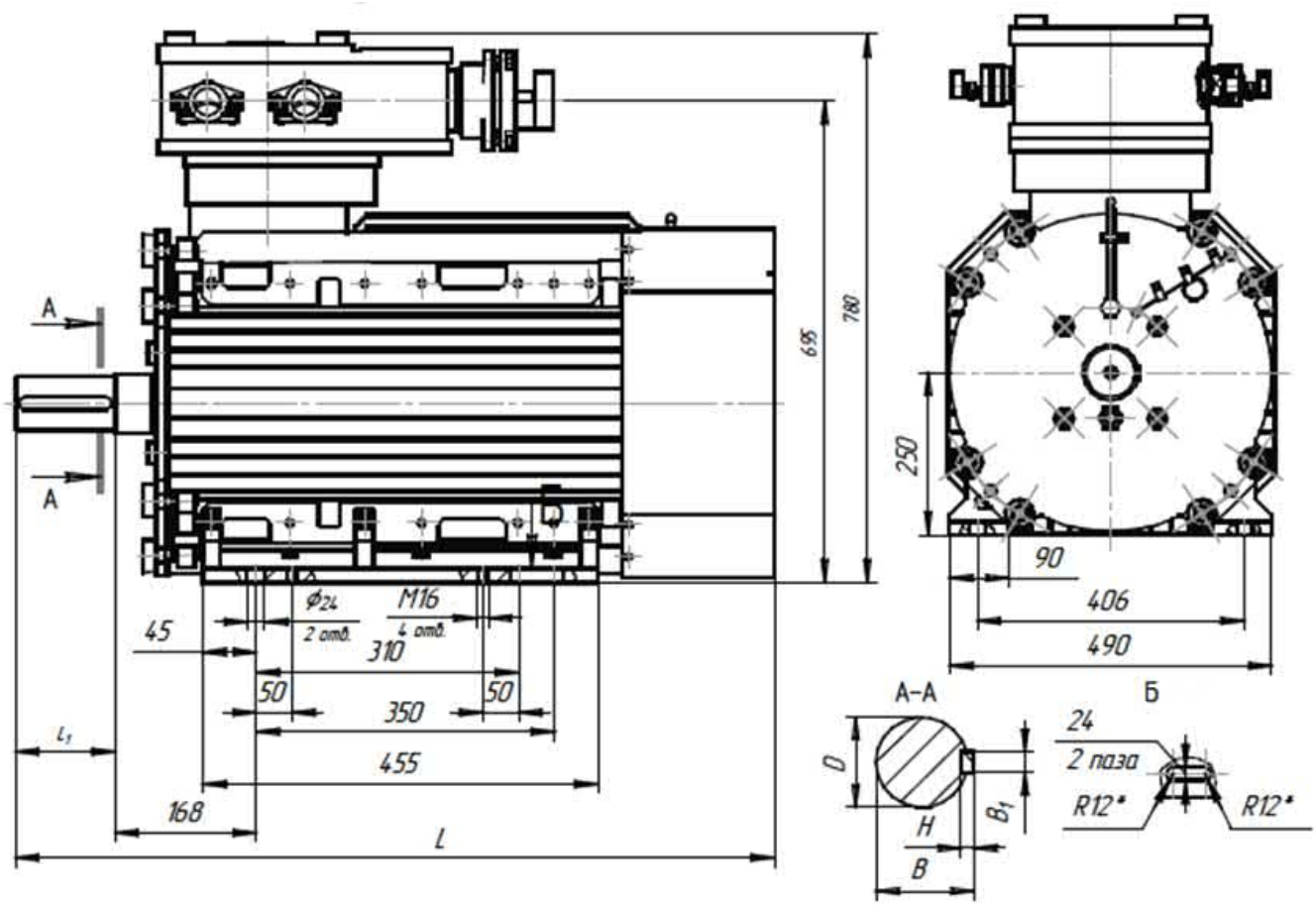
Type designation	Voltage, V	Mounting configuration	L, mm max	L1, mm	L2, mm	L3, mm	B, mm	B1, mm	D, mm	H, mm	Mass, kg
250LA-6	380/660	IM1001 IM2001 IM3001 IM3011	1255 (1555*) (1330**)	170	-	-	85	22	80	14	895 (945***)
	660/1140										
280LA-6	380/660				555	420					910 (960***)
	660/1140										
250LB-6	380/660				-	-					950 (1000***)
	660/1140										
280LB-6	380/660				555	420					965 (1015***)
	660/1140										
250LC-6	380/660		1335 (1635*) (1410**)	170			85	22	80	14	1040 (1090***)
	660/1140										
280LC-6	380/660				555	420					1055 (1105***)
	660/1140										
250LD-6	380/660		1415 (1715*) (1490**)		-	-					1145 (1195***)
	660/1140										
280LD-6	380/660				595	457					1165 (1215***)
	660/1140										
250S-8	380/660		1065 (1365*) (1140**)	140	-	-	79,5	20	75	12	720 (770***)
	660/1140										
280S-8	380/660				555	420					735 (785***)
	660/1140										
250M-8	380/660				-	-					750 (800***)
	660/1140										
280M-8	380/660				555	420					765 (815***)
	660/1140										
250LA-8	380/660		1175 (1475*) (1250**)	170	-	-	85	22	80	14	835 (885***)
	660/1140										
280LA-8	380/660				555	420					850 (900***)
	660/1140										
250LB-8	380/660		1255 (1555*) (1330**)		-	-					935 (985***)
	660/1140										
280LB-8	380/660				555	420					950 (1000***)
	660/1140										
250LC-8	380/660				-	-					1005 (1055***)
	660/1140										
280LC-8	380/660				555	420					1020 (1070***)
	660/1140										
250LD-8	380/660		1415 (1715*) (1490**)		-	-					1155 (1205***)
	660/1140										
280LD-8	380/660				595	457					1175 (1225***)
	660/1140										
250S-10	380/660		1095 (1395*) (1170**)		-	-					760 (810***)
	660/1140										
280S-10	380/660				555	420					775 (825***)
	660/1140										
250M-10	380/660		1175 (1475*) (1250**)		-	-					850 (900***)
	660/1140										
280M-10	380/660				555	420					865 (915***)
	660/1140										
250LA-10	380/660				-	-					895 (945***)
	660/1140										
280LA-10	380/660				555	420					910 (960***)
	660/1140										
250LB-10	380/660		1335 (1635*) (1410**)		-	-					1080 (1130***)
	660/1140										
280LB-10	380/660				555	420					1095 (1145***)
	660/1140										

* dimensions at cooling method IC516.

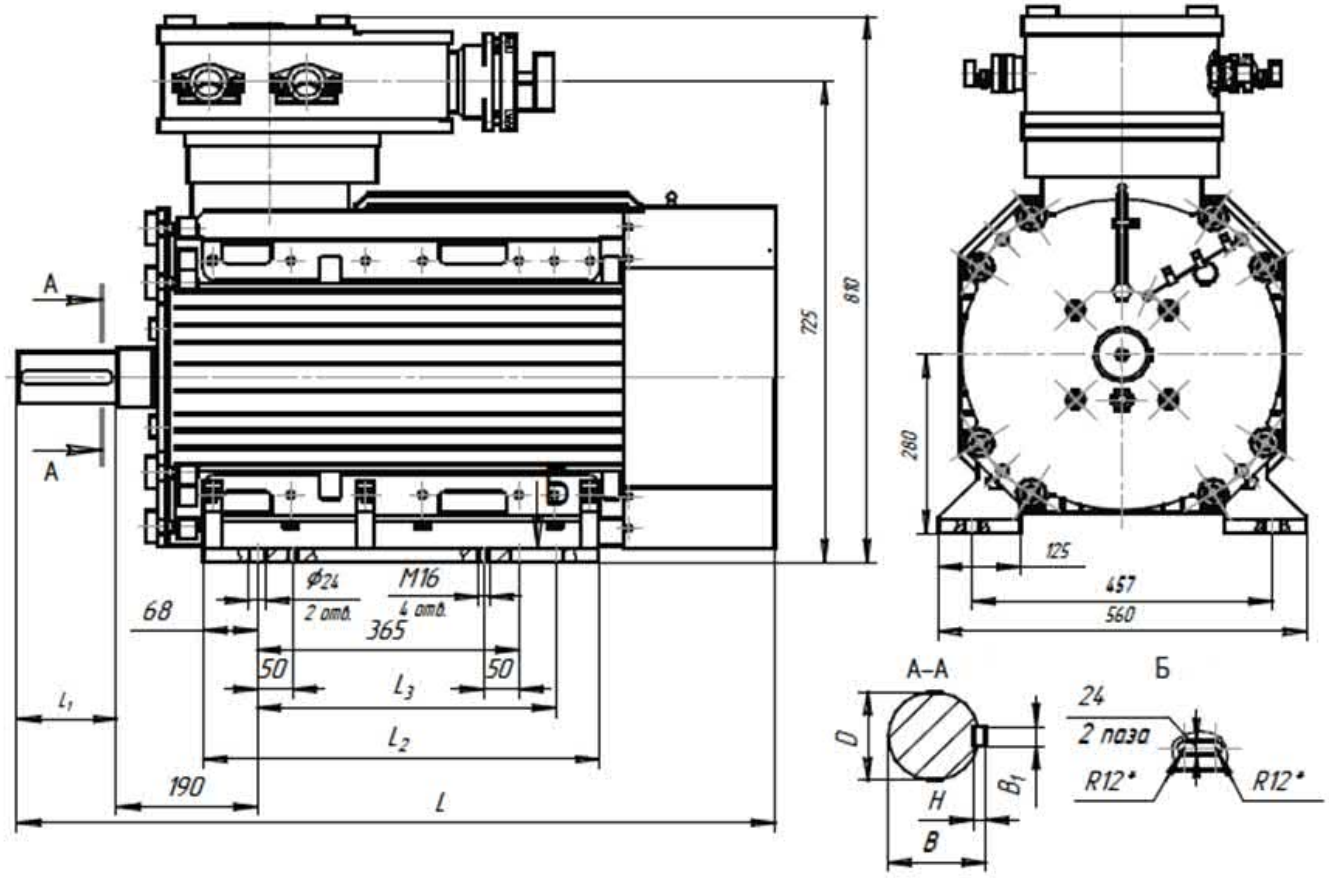
**dimensions for motors with version IM3011 and cooling method IC411.

*** Mass of motors at cooling method IC516.

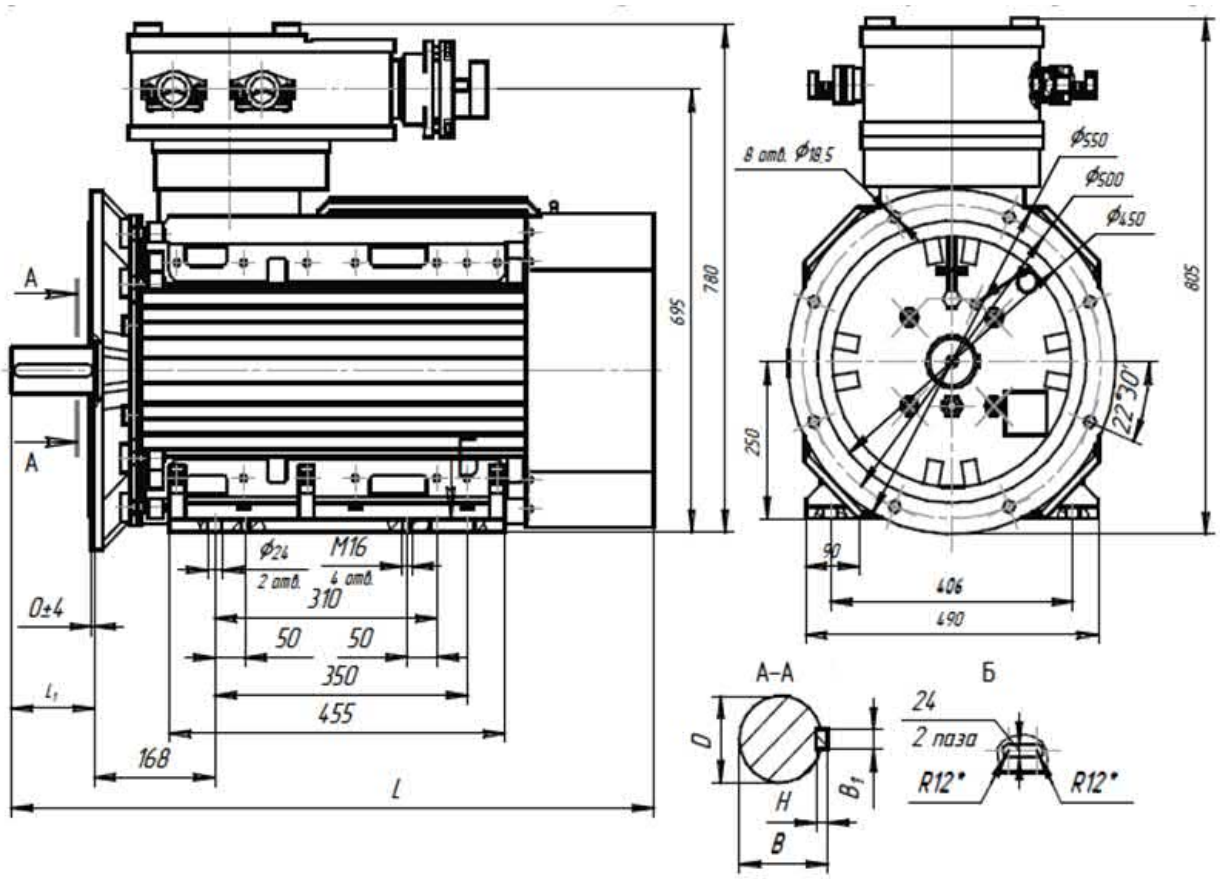
Electric motors VAO7-250 mounting configuration IM1001 (horizontal, on legs)



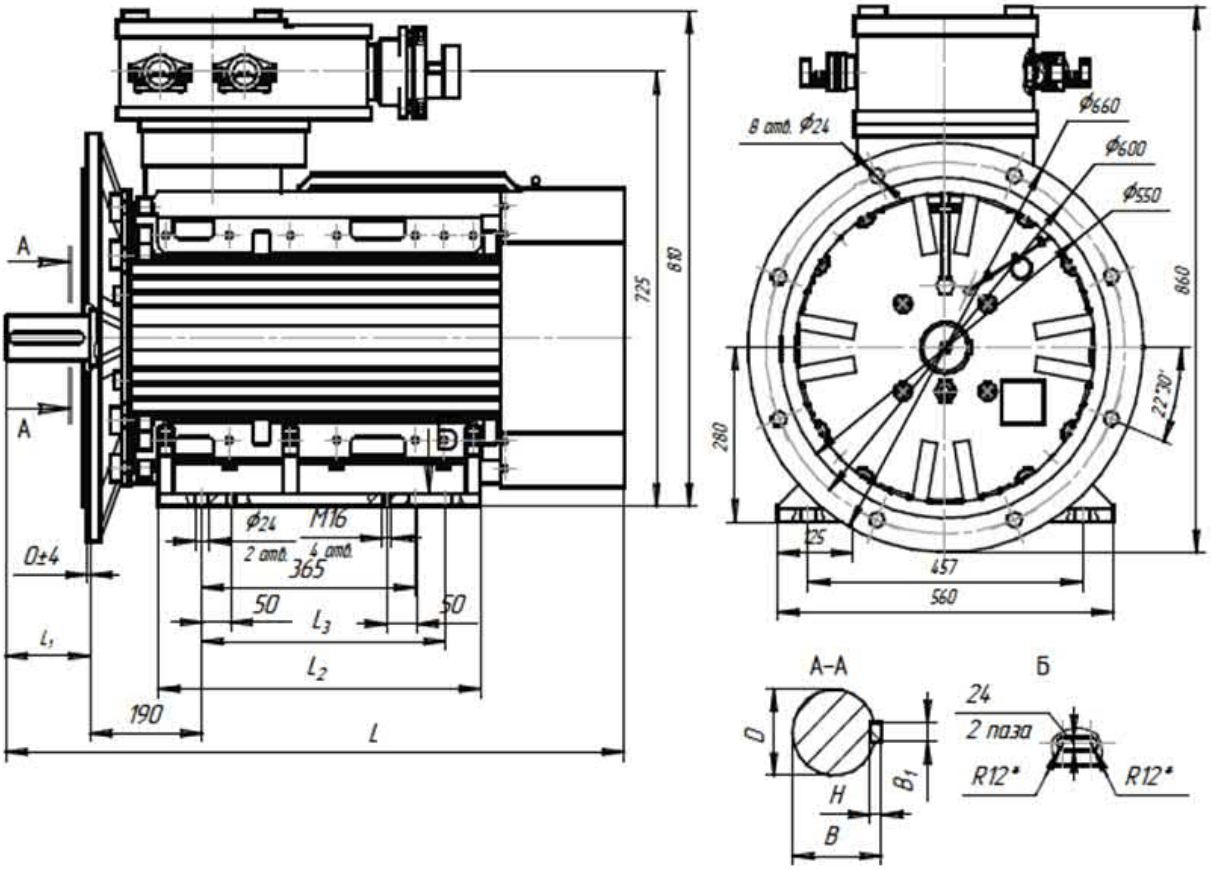
Electric motors VAO7-280 mounting configuration IM1001 (horizontal, on legs)



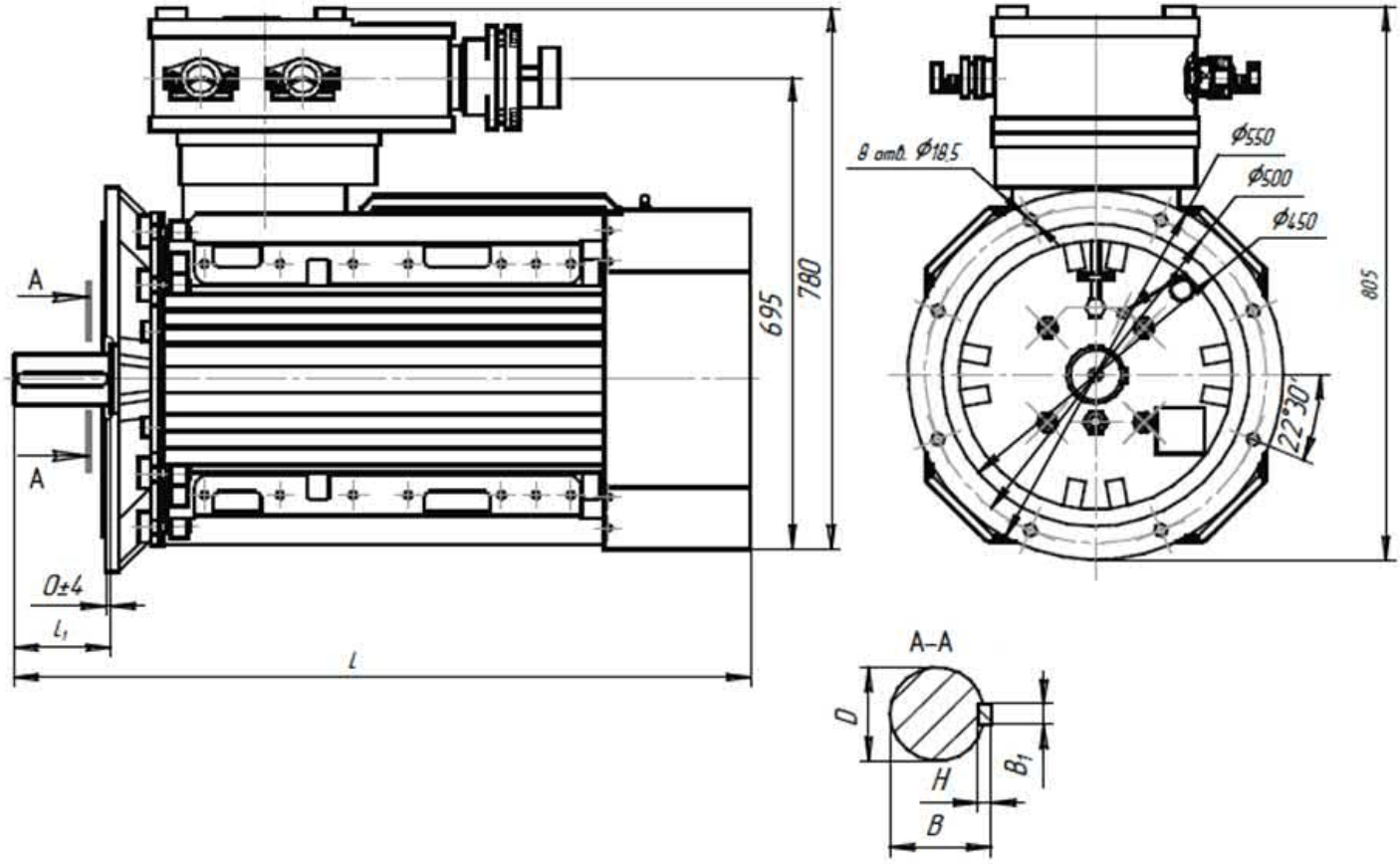
Electric motors VAO7-250 IM2001
(on legs; with flange on the shield, available from the other side)



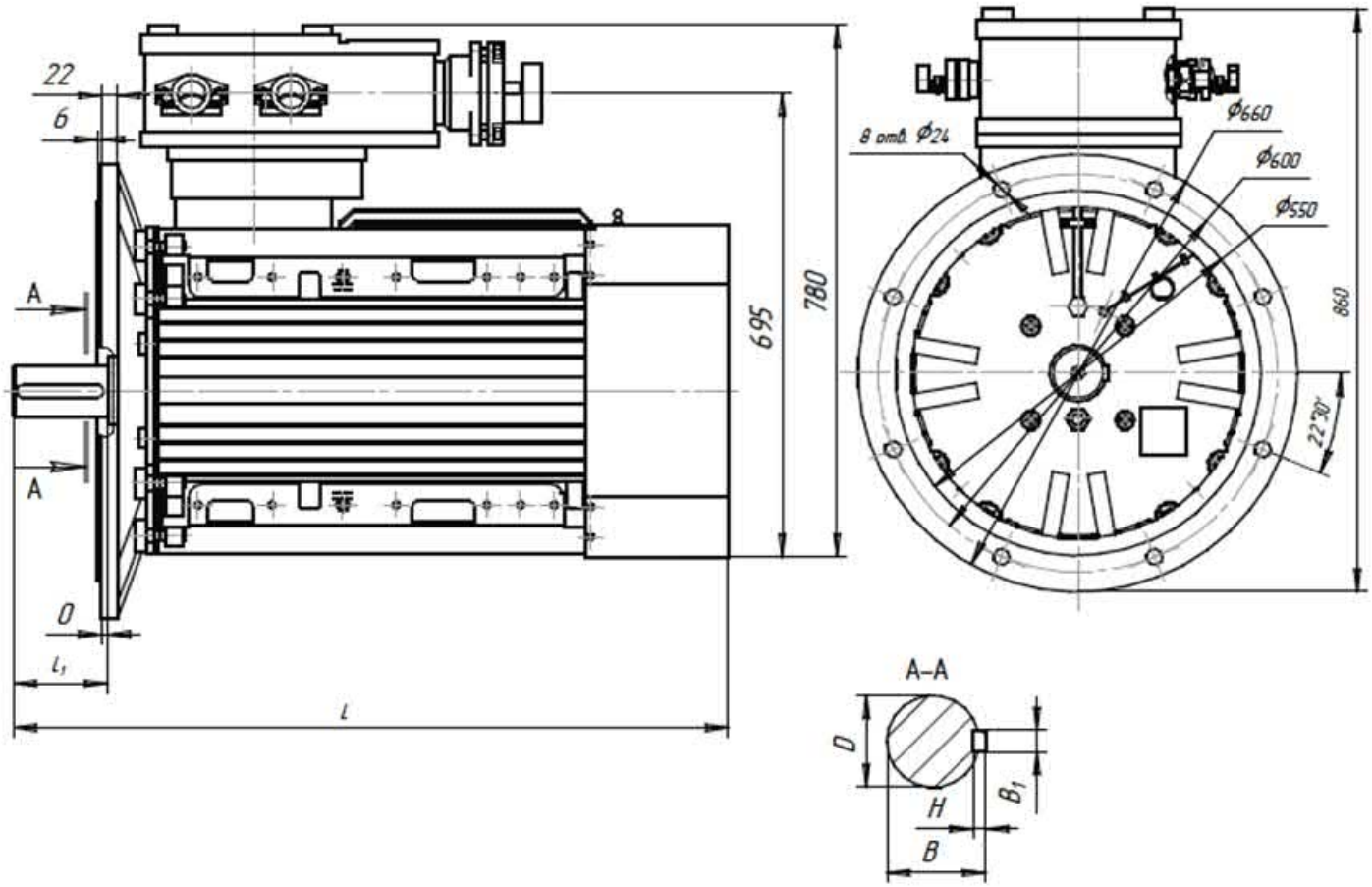
Electric motors VAO7-280 IM2001
(on legs; with flange on the shield, available from the other side)



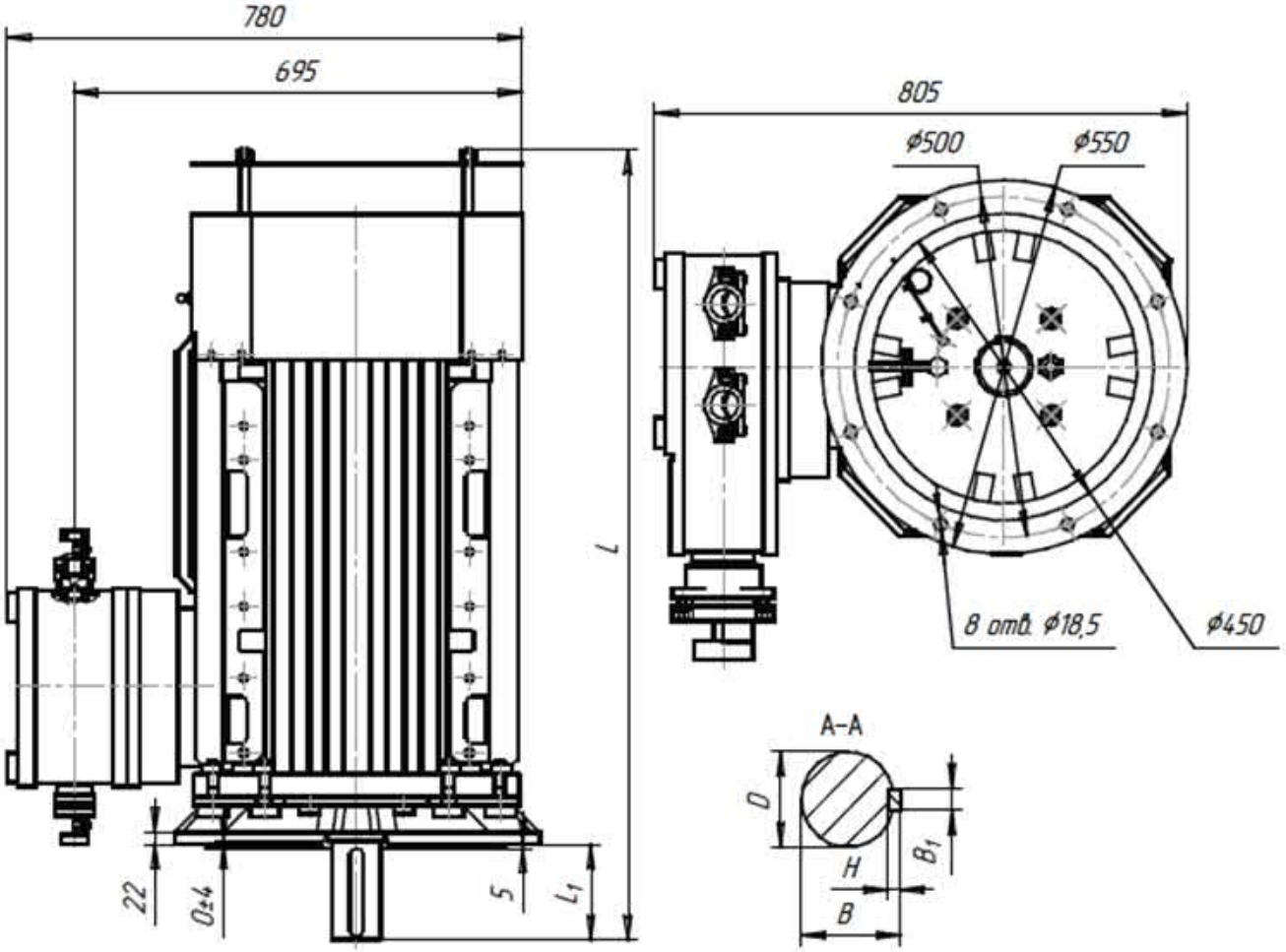
Electric motors VAO7-250 IM3001
(horizontal, with flange on the shield, available from the other side)



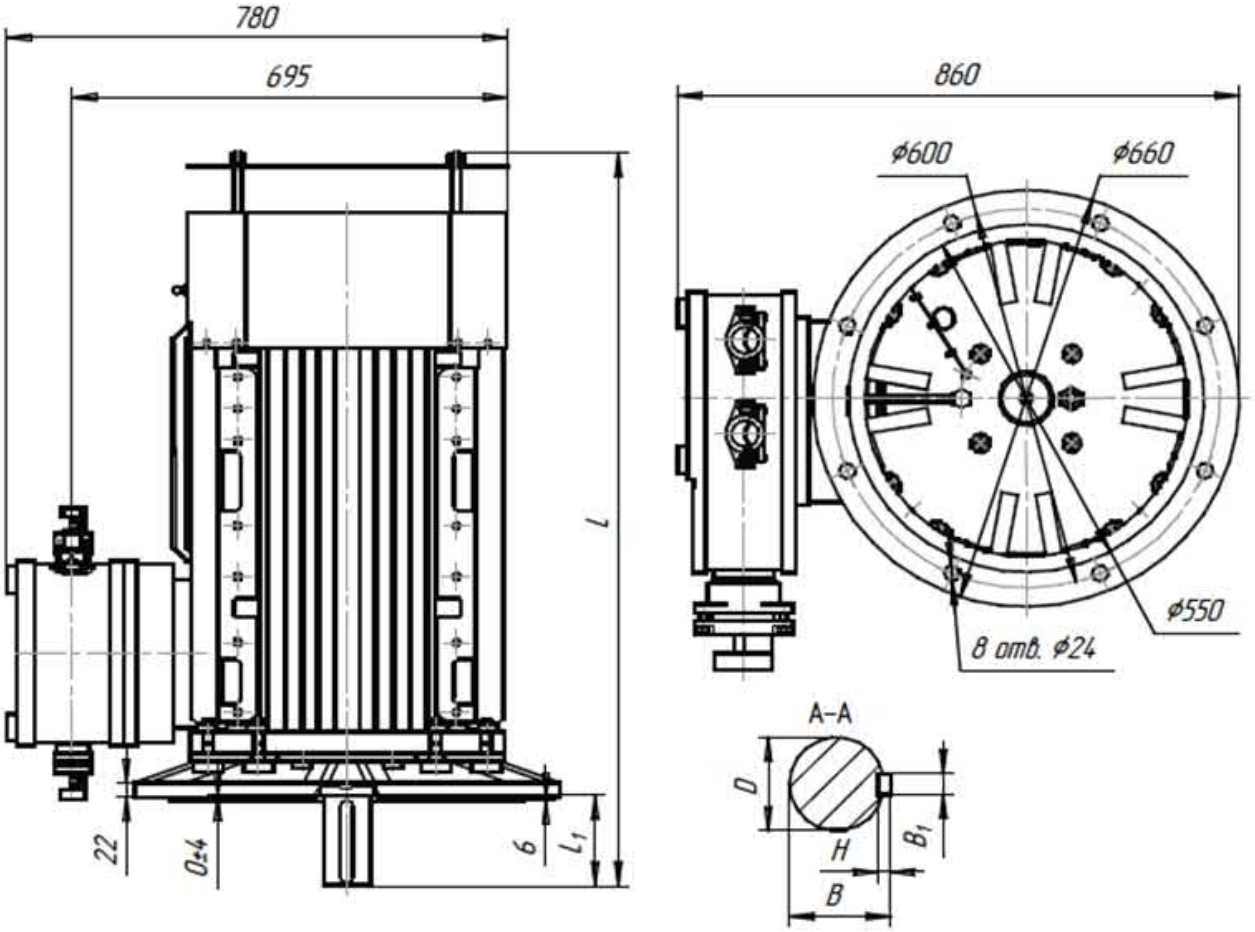
Electric motors VAO7-280 IM3001
(horizontal, with flange on the shield, available from the other side)



Electric motors VAO7-250 IM3011
(vertical, shaft is down, with flange on down shield, available from the other side)



Electric motors VAO7-280 IM3011 (vertical, shaft is down, with flange on down shield, available from the other side)



Electric motors VAO7A(M) 315-355

Basic parameters of the electric motors VAO7A(M) 315-355

Type designation	Power, kW	Nominal current of stator, A*	Rotational speed, rpm.**	Efficiency, %	Power factor	Sliding, %	Starting torque ratio	Maximum torque ratio	Starting current ratio
Voltage 380/660 V, 660/1140 V, frequency 50Hz, 6Hz									
315(355)S-2	250	434,2/250,0	3000/3600	95,1	0,93	1,0	0,8	2,7	5,9
		250,5/145,0		95,0	0,94				
315(355)M-2	315	543,6/313,0		95,2	0,93	1,0	0,8	2,7	5,8
		314,3/182,0		95,3	0,93				
315(355)LA-2	400	675,6/389,0		95,6	0,94	1,0	0,8	2,6	5,8
		395,2/228,8		95,6	0,94				
		80,1/46,4			0,88				
315(355)S-4	250	441,2/254,0	1500/1800	95,8	0,90	1,0	0,9	2,9	6,3
		253,9/147,0		95,8	0,90				
315(355)M-4	315	550,0/317,0		96,0	0,91	1,0	0,9	2,8	6,1
		319,5/185,0		96,0	0,90				
315(355)LA-4	400	696,5/401,0		96,0	0,91	1,0	0,9	2,7	5,8
		400,9/232,1		96,1	0,91				
315(355)S-6	160	286,6/165,0	1000/1200	94,8	0,89	1,2	1,0	2,7	6,0
		169,3/98,0		94,8	0,89				
315(355)M-6	200	363,0/209,0		95,0	0,88	1,2	1,0	2,6	5,7
		209,0/121,0		95,0	0,89				
315(355)LA-6	250	453,3/261,0		95,3	0,88	1,2	1,0	2,6	5,8
		259,1/150,0		95,1	0,89				
315(355)LB-6	315	567,9/327,0		95,4	0,89	1,2	1,0	2,7	6,0
		326,5/189,0		95,4	0,89				
315(355)S-8	132	253,6/146,0	750/900	94,4	0,84	1,3	5,5	2,4	5,5
		144,7/83,8		94,2	0,85				
315(355)M-8	160	303,9/175,0		94,2	0,85	1,3	5,5	2,3	5,5
		174,5/101,0		94,2	0,85				
315(355)LA-8	200	380,4/219,0		94,7	0,84	1,3	5,5	2,4	5,5
		219,4/127,0		94,8	0,84				
315(355)LB-8	250	470,7/271,0		94,8	0,85	1,3	5,5	2,3	5,5
		272,9/158,0		94,9	0,84				
315(355)S-10	90	178,9/103,0	600/720	92,8	0,82	2,5	1,2	2,5	5,3
		104,2/60,3		93,0	0,81				
315(355)M-10	110	218,8/126,0		93,1	0,82	2,5	1,2	2,5	5,3
		125,2/72,5		92,8	0,83				
315(355)LA-10	132	264,0/152,0		93,5	0,81	2,5	1,2	2,5	5,3
		151,1/87,5		93,5	0,82				
315(355)LB-10	160	314,4/181,0		93,5	0,83	2,5	1,2	2,5	5,3
		183,1/106,0		93,7	0,82				
315(355)LC-10	200	396,0/228,0		94,0	0,82	2,5	1,2	2,5	5,3
		226,3/131,0		93,9	0,83				

*** Data for voltage 380/660V are indicated in the numerator, data for 660/1140V are indicated in the denomenator.**

**** Data for 50Hz are indicated in the numerator, data for 60Hz in the denominator**

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS VAO7-315-355

Type designation	Voltage, V	Mounting configuration	L, mm max*	L1	B	B1	D	H	Mass, kg
315S-2	380/660	IM1001 IM2001 IM3001 IM3011	1275 (1675*) (1375**)	140	79,5	20	75	12	1200 (1270***)
	660/1140								
355S-2	380/660								1220 (1290***)
	660/1140								
315M-2	380/660		1375 (1775*) (1475**)						1450 (1520***)
	660/1140								
355M-2	380/660								1470 (1540***)
	660/1140								
315LA-2	380/660		1450 (1850*) (1550**)						1600 (1670***)
	660/1140								
355LA-2	380/660								1620 (1690***)
	660/1140								
315S-4	380/660		1305 (1705*) (1405**)	170	95	25	90	14	1420 (1490***)
	660/1140								
355S-4	380/660								1440 (1510***)
	660/1140								
315M-4	380/660		1405 (1805*) (1505**)						1545 (1615***)
	660/1140								
355M-4	380/660								1565 (1635***)
	660/1140								
315LA-4	380/660		1480 (1880*) (1580**)						1750 (1820***)
	660/1140								
355LA-4	380/660								1770 (1840***)
	660/1140								
315S-6	380/660		1305 (1705*) (1405**)						1300 (1370***)
	660/1140								
355S-6	380/660								1320 (1390***)
	660/1140								
315M-6	380/660		1405 (1805*) (1505**)						1410 (1480***)
	660/1140								
355M-6	380/660								1430 (1500***)
	660/1140								
315LA-6	380/660		1520 (1920*) (1620**)	210	106	28	100	16	1550 (1620***)
	660/1140								
355LA-6	380/660								1570 (1640***)
	660/1140								
315LB-6	380/660		1615 (2015*) (1715**)	210	106	28	100	16	1750 (1820***)
	660/1140								
355LB-6	380/660								1770 (1840***)
	660/1140								
315S-8	380/660		1305 (1705*) (1405**)	170	95	25	90	14	1395 (1465***)
	660/1140								
355S-8	380/660								1415 (1485***)
	660/1140								
315M-8	380/660		1405 (1805*) (1505**)						1485 (1555***)
	660/1140								
355M-8	380/660								1505 (1575***)
	660/1140								
315LA-8	380/660		1520 (1920*) (1620**)	210	106	28	100	16	1710 (1780***)
	660/1140								
355LA-8	380/660								1730 (1800***)
	660/1140								
315LB-8	380/660		1615 (2015*) (1715**)						1900 (1970***)
	660/1140								
355LB-8	380/660								1920 (1990***)
	660/1140								

* dimensions at cooling method IC516.

**dimensions for motors with version IM3011 and cooling method IC411.

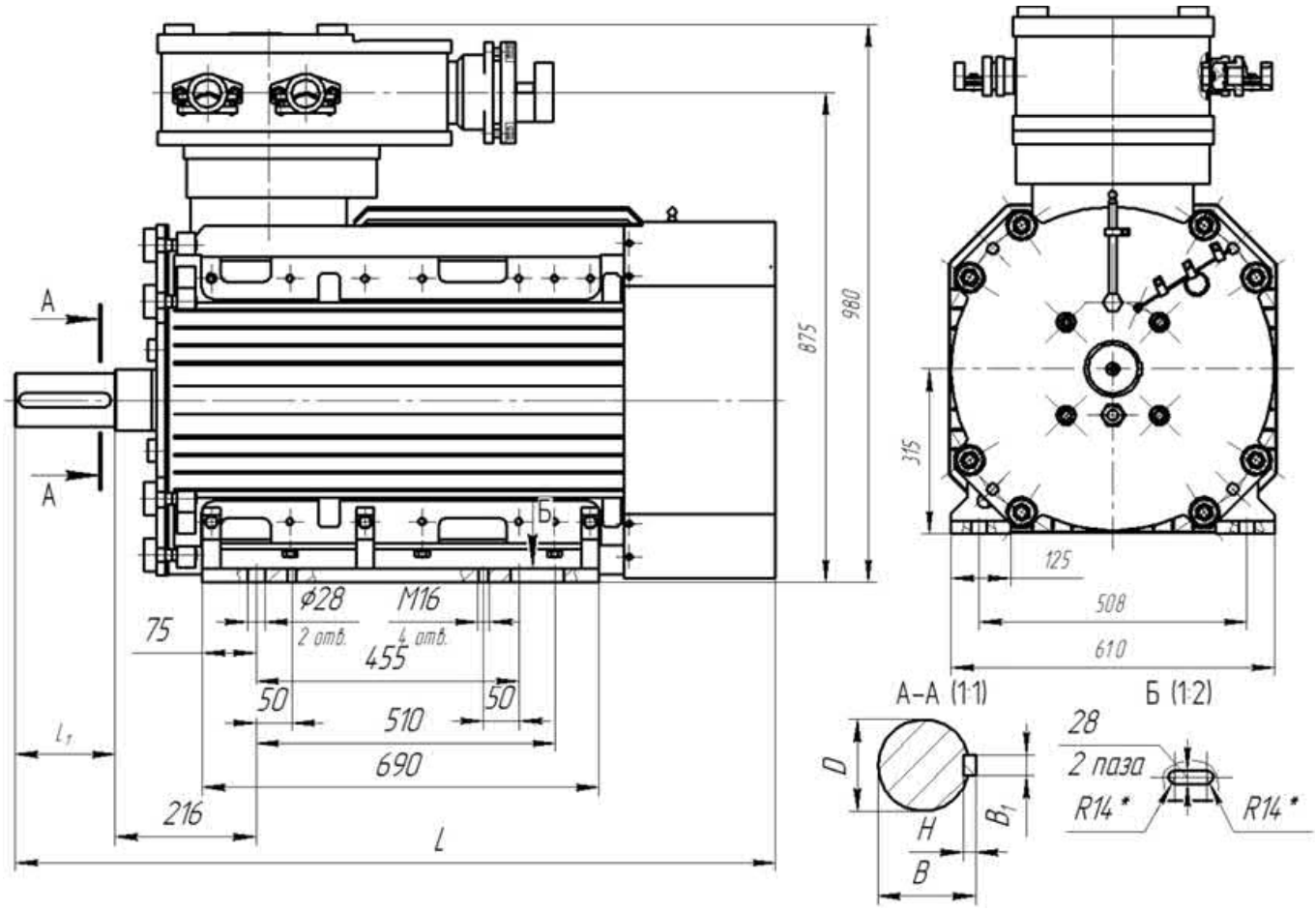
*** Mass of motors at cooling method IC516.

continuation

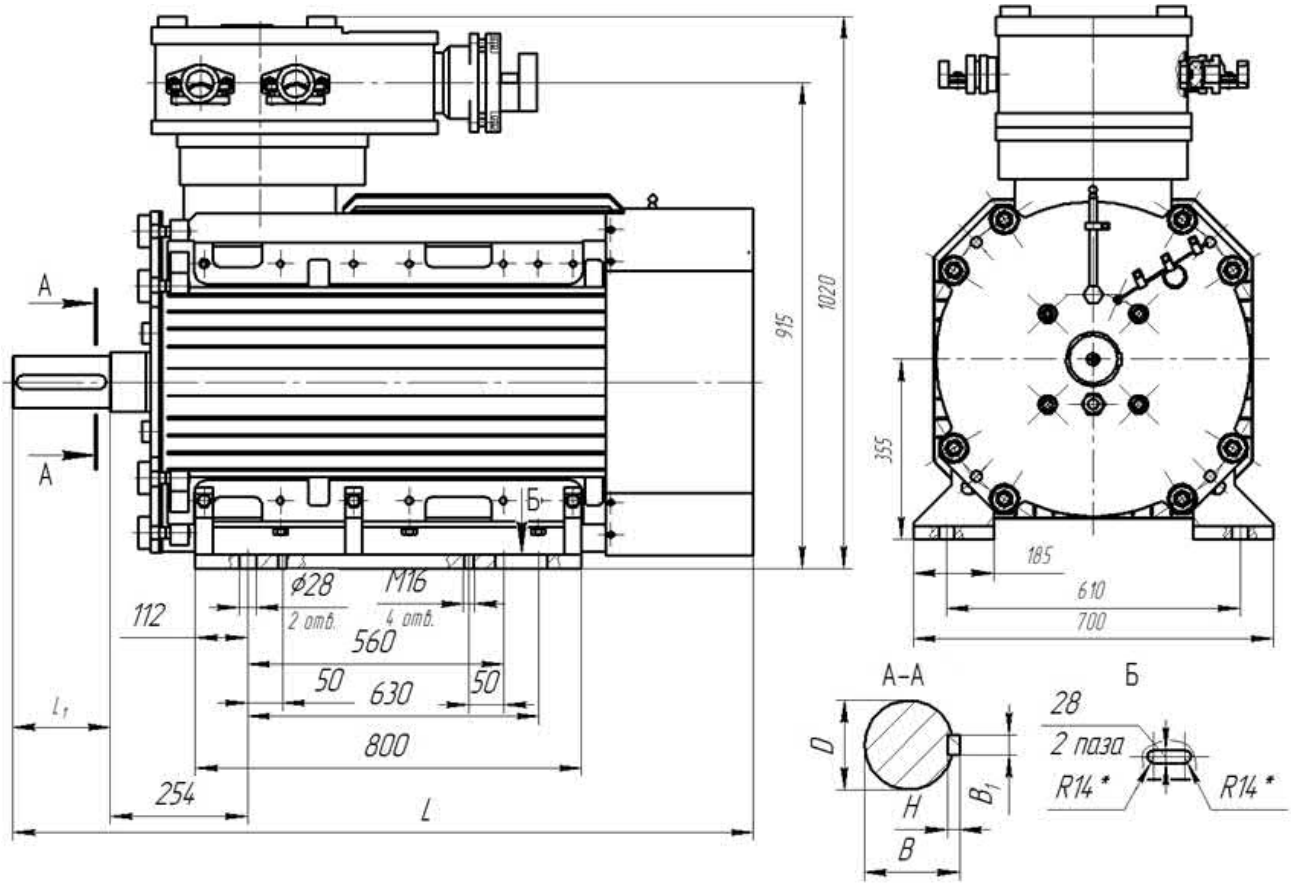
Type designation	Voltage, V	Mounting configuration	L, mm max*	L1	B	B1	D	H	Mass, kg
315S-10	380/660	IM1001 IM2001 IM3001 IM3011	1305 (1705*) (1405**)	170	95	25	90	14	1365 (1435***)
	660/1140								
355S-10	380/660								1385 (1455***)
	660/1140								
315M-10	380/660								1340 (1410***)
	660/1140								
355M-10	380/660								1360 (1430***)
	660/1140								
315LA-10	380/660		1405 (1805*) (1505**)						1520 (1590***)
	660/1140								
355LA-10	380/660								1540 (1610***)
	660/1140								
315LB-10	380/660		1520 (1920*) (2020**)	210	106	28	100	16	1650 (1720***)
	660/1140								
355LB-10	380/660								1670 (1740***)
	660/1140								
315LC-10	380/660		1615 (2015*) (1715**)						1870 (1940***)
	660/1140								
355LC-10	380/660								1890 (1960***)
	660/1140								

* dimensions at cooling method IC516.
**dimensions for motors with version IM3011 and cooling method IC411.
*** Mass of motors at cooling method IC516.

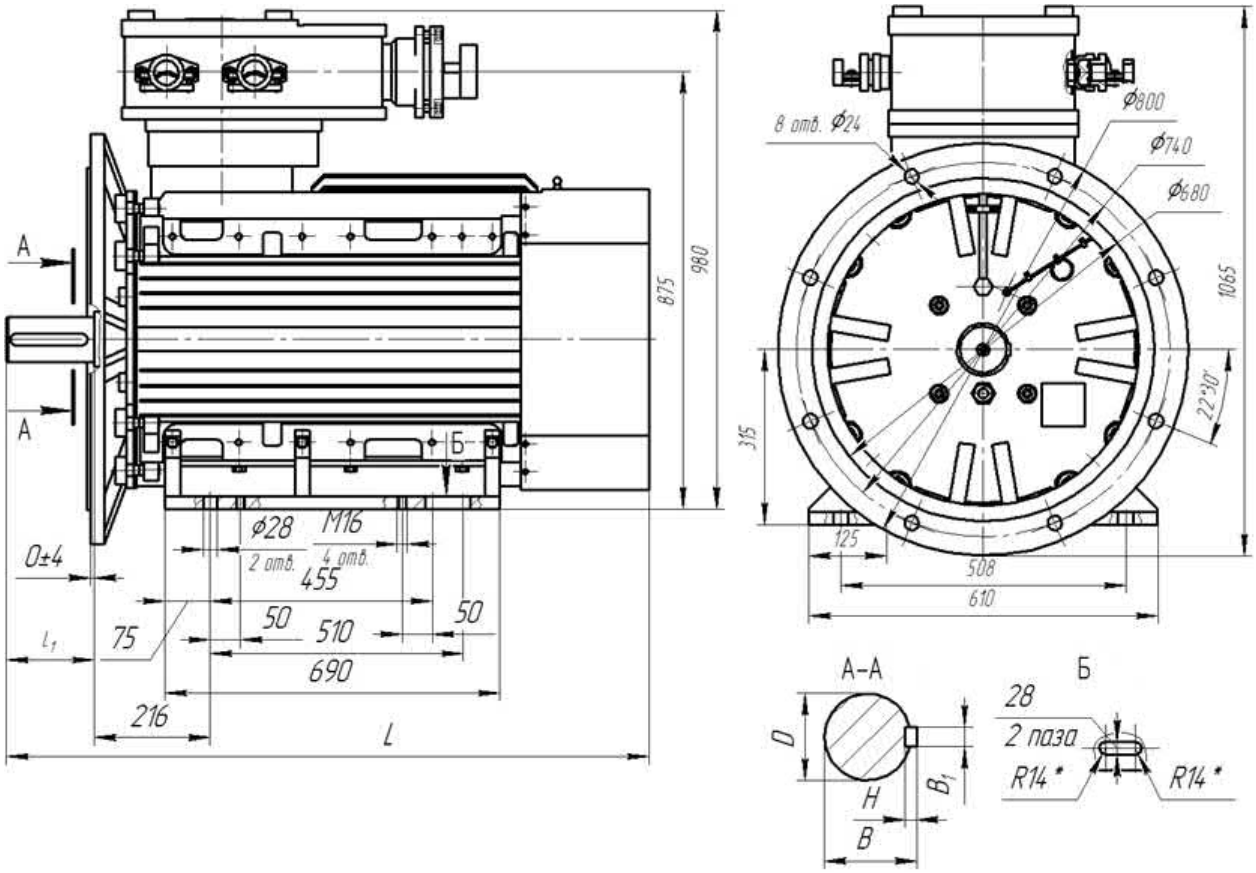
VAO7-315 IM1001 (horizontal, on legs)



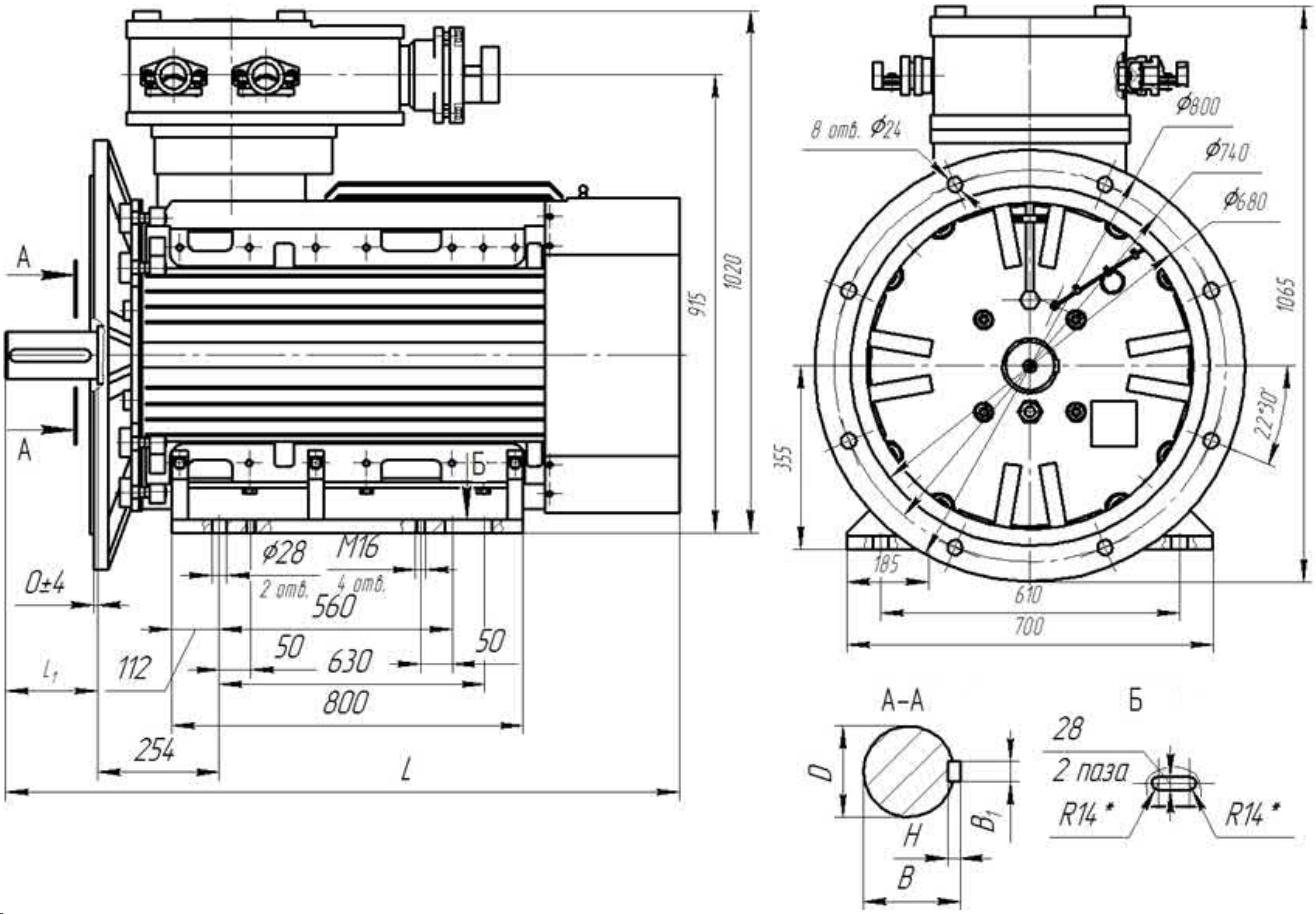
Electric motors VAO7-355 IM1001 (horizontal, on legs)



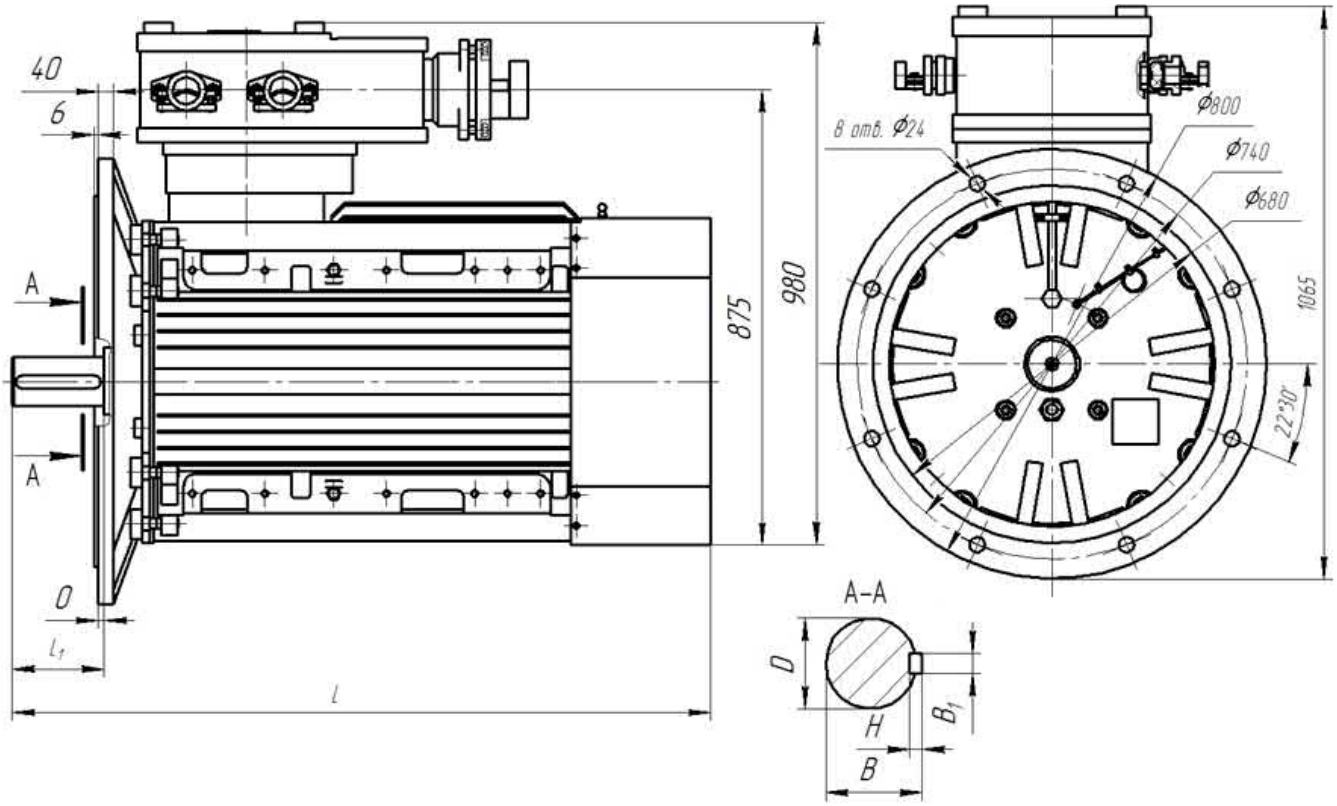
Electric motors VAO7-315 IM2001
(horizontal, on legs, with flange on shield, available from the other side)



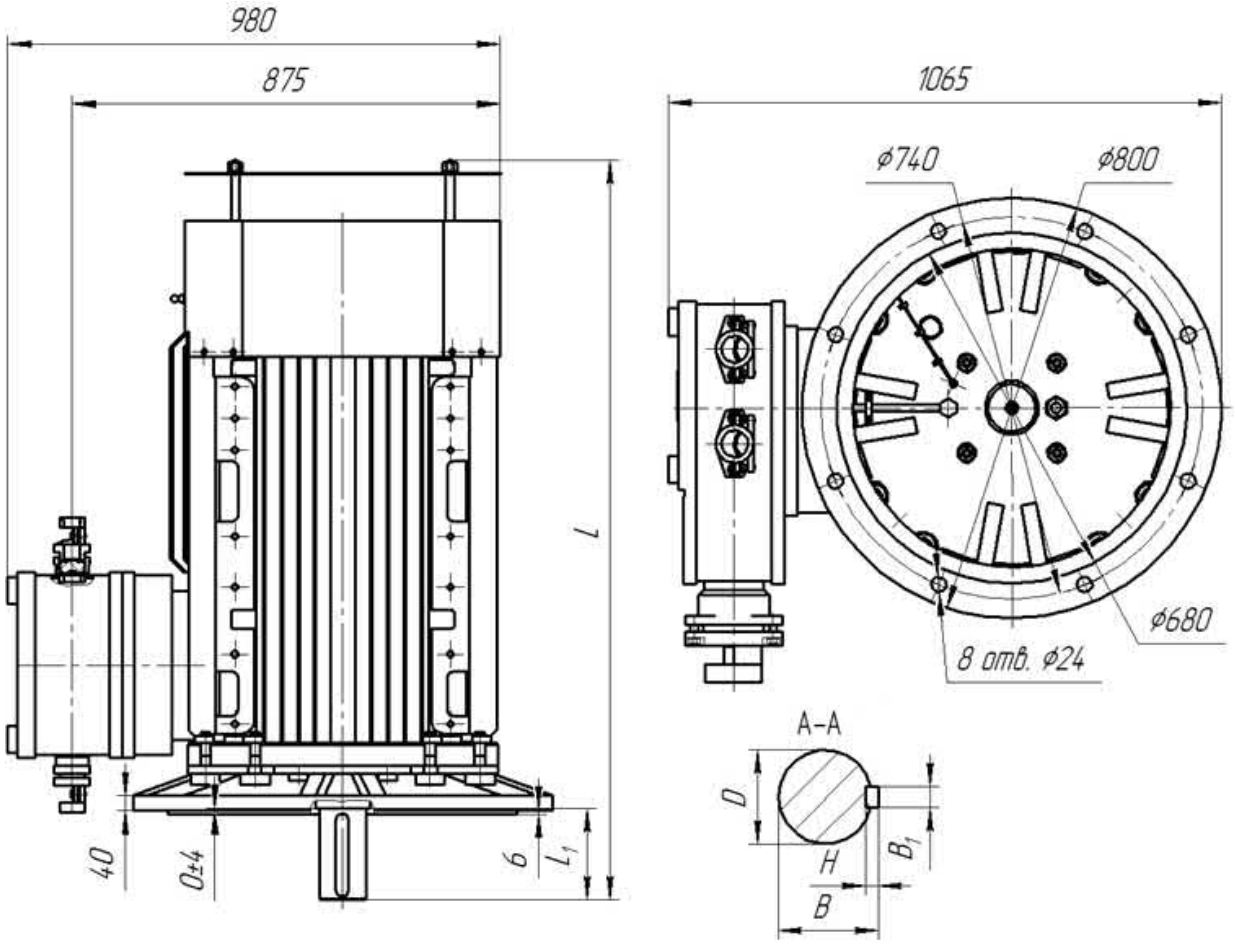
Electric motors VAO7-355 IM2001
(horizontal, on legs, with flange on shield, available from the other side)



Electric motors VAO7-315-355 IM3001
(horizontal, on legs, with flange on shield, available from the other side)



Electric motors VAO7-315-355 IM3011
(vertical, with shaft down, with flange on down shield, atrilaile from the other side)



ELECTRIC MOTORS VAO4K- 450; 560

Asynchronous three-phase airflow-cooled explosion-proof electric motors VAO4K are designed to drive smooth start mechanisms: i.e. undersurface hoisting winches and elevator machines, belt conveyors, as well as for assembly two-motor drives.

Operation mode of the electric motors is continuous S1 from network frequency 50Hz.

For the electric motors VAO4K-450L8 it is possible operation mode S8.

Explosion protection configuration:

PB Ex d I Mb

Climatic construction type:

У1, У2, У5, УХЛ1, УХЛ2, УХЛ4, ХЛ1, ХЛ2, Т2, Т5

Mounting configuration: IM1001.

Protection degree for:

motor housing and terminal box	IP54 (IP55 on order)
outdoor fan enclosure	IP20

Cooling method:

IC411	VAO4K-450
IC511	VAO4K-560

The electric motors have the right and the left direction of rotation. The direction of rotation is changed only from rest state. The insulating materials of stator winding have heat resistance class «F» or «H» -at customer's request.

Main advantages of electric motors VAO4K over analogues:

-an improved design of slip-ring assembly, which prevents the accumulation of conductive dust during operation;

-permanently temperature monitoring using special explosion-proof devices at customer's request;

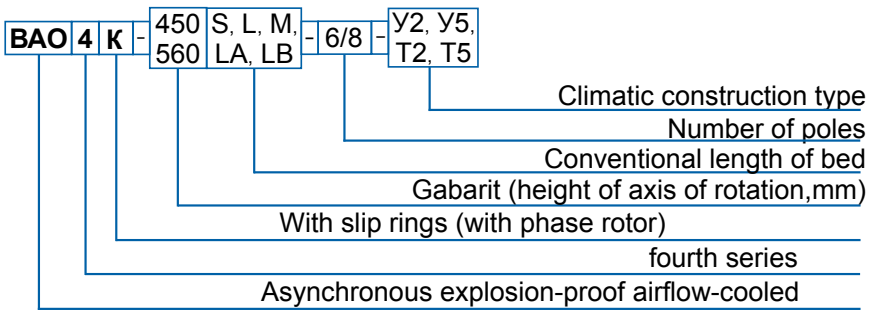
- **UKT-12 (9 channels) device** - bearings (2 points), winding and stator core (6 points), stator housing (1 point) - for all motors' modifications, interface for temperature monitoring from a personal computer.

- **UKT-12** - the possibility of additional temperature control at 4 points.

- **UKVT device** - the possibility of permanent temperature and vibration monitoring (at customer's request) (bearing temperature control 2 - points of winding and stator core - 6 points, mechanism 1 point and bearing units vibration monitoring along three mutually perpendicular axes using three-coordinate vibration sensors type of 3KDV.

At the customer's request the electric motors can be produced with other overall dimensional, installation and mounting sizes and with other mounting configuration.

TYPE DESIGNATION

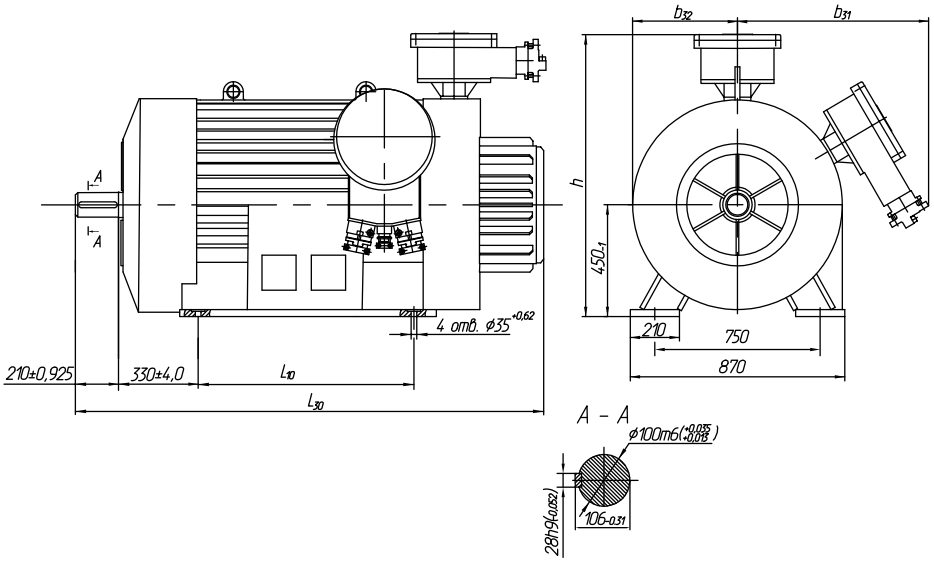


TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS VAO4K-450-560

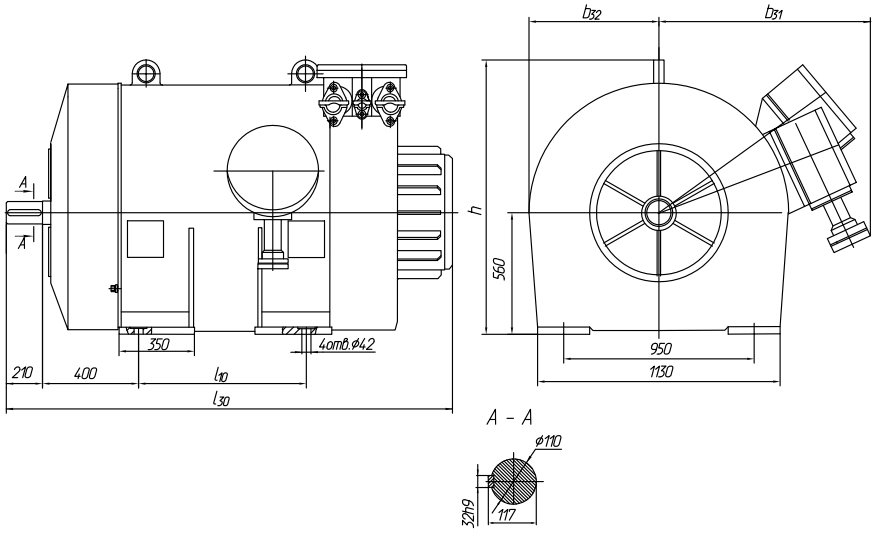
Type designation	Operation mode	Power, kW	Voltage stator/rotor, V	Rotational speed (synch.), rpm.	Efficicency, %	Cos φ	Stator current, A	Rotor current, A	Maximum torque ratio
VAO4K-450S-6	S1	250	380(660) / 498	1000	94,91	0,89	477 / 275	335	2,3
VAO4K-450L-8		280	380(660) / 637	750	95,1	0,85	554 / 319	304	
VAO4K-450L-8	S8	250	380(660) / 640			0,84	488 / 281	268	2,5
VAO4K-560S-6	S1		6000 / 489	1000	93,6	0,86	29	305	2,8
VAO4K-560M-6		315	6000 / 571		94,2		36	328	
VAO4K-560LA-6		400	6000 / 686		94,8	0,87	45	345	
VAO4K-560LB-6		500	6000 / 860		95,3		56	343	

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES

VAO4K-450



VAO4K-560



Type designation	dimensions, mm					Mass, kg
	l_{10}	l_{30}	b_{31}	b_{32}	h	
VAO4K-450S-6	630	$1980^{+15,0}$	$800^{+8,0}$	$424^{+4,0}$	$1135^{+10,5}$	3450
VAO4K-450L-8	800	$2325^{+17,5}$				3800
VAO4K-560S-6	710	$1970^{+15,0}$	$840^{+9,0}$	$560^{+4,5}$	$1240^{+10,5}$	3700
VAO4K-560M-6	800	$2020^{+17,5}$				3900
VAOK4-560LA-6	900	$2130^{+17,5}$	$880^{+9,0}$	$605^{+4,5}$		4600
VAOK4-560LB-6	1000	$2260^{+17,5}$	$920^{+9,0}$	$650^{+4,5}$	$1320^{+12,5}$	5900

ELECTRIC MOTORS VAOV4-450-800

Asynchronous three-phase airflow-cooled vertically mounted explosion-proof electric motors VAOV are designed to drive pumps, including petroleum booster pump.

Operation mode is continuous S1 from frequency network 50 Hz, 60Hz. Electric motors allow operation from frequency converters at operation modes S8, S9, S10.

Explosion protection configuration: 1 Ex d IIB T4 GB.

Climatic construction type:

У1, УХЛ1, ХЛ1

Mounting configuration:

IM4011	VAOV4-560, 630, 710, 800-4,6,8
IM3011	VAOV4-450, 560-2

Protection degree:

motor housing and terminal box	IP54 (IP55 on order)
outdoor fan enclosure	IP22

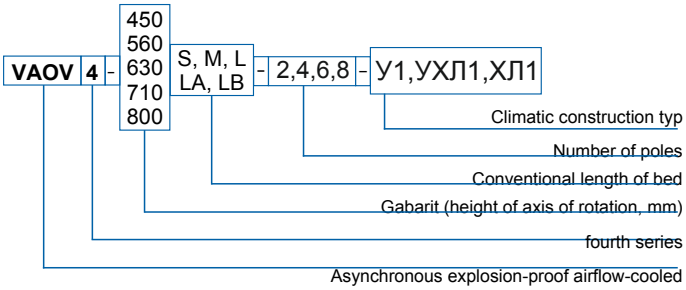
Cooling method:

IC511	VAOV4-560, 630, 710, 800-4,6,8
IC411	VAOV4-450, 560-2

The electric motors have the right direction of rotation. At customer's request - the left or the left and the right direction of rotation .

The insulating materialsof stator winding have heatresistance class «F» or «H» at customer's request.

TYPE DESIGNATION



Main advantages of electric motors VAOV4 over analogues:

1. Improving the active parts to obtain high energy parameters at lower mass.
2. The application in the motor construction VAOV4 of cast aluminum squirrel-cage rotor provided a number of advantages over other analogues with welded winding:

Select the best configuration and dimensions of groove, increasing starting moments at relatively small values of starting currents;

Eliminate hard preventive work during operation, put through inspection and restoration of welded joints of the rotor winding;

Improve the motors' safety in operation excluding the possible sparking and overeheating in welded joints.

3. The application in the motor construction VAOV4 of copper squirrel-cage rotor, performed by special technology,provides reliability of work with mechanisms, at hard, slow starts and the number of starts per day 15-20 instead of 6-8 starts permissible for analogues with aluminum welded rotor winding.

4. Exceptional stator housing design of increased rigidity ensuring a reliable fit of stator pack, as well as lower values of vibration and noise.

5. Improved ventilation and cooling system of electric motors provides the maximum heating of active parts working at nominal load, with the exception of local overheating.

6. The possibility of operation of electric motors at adjusting the rotation speed modes as part of adjustable-frequency electric drives.

7. Use of bearing units of explosion-protection of special design without rubbing parts provides reliability during full service life.

8. Equipping electric motors (at customer's request) with vibration and speed control sensors.

9. The application in the motor construction VAOV4-630, 710, 800 bearing units with lubricant and heating, and consistent cold-resistant lubricant, providing the reliability and trouble free operation of the motors at negative temperatures (up to -60°C).

10. Equipment of the electric motors by temperature control sensor of bearings, oil, winding and stator iron, as well as thermoelectrical heaters with characteristics 50M,100П, Pt100 with 4 wired connection scheme, in quantity according to customer's request.

The electric motors of VAOV4 series are interchangeable to VAOV,VAOV2, and VAOV3, and also to similar electric motors of the other manufacturers.

At the customer's request the electric motors can be produced with special mounting and installation dimensions, of other power, voltage and rotational speed.

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS VAOV4-450 WITH VOLTAGE 3000V, 6000V, FREQUENCY NETWORK 50Hz

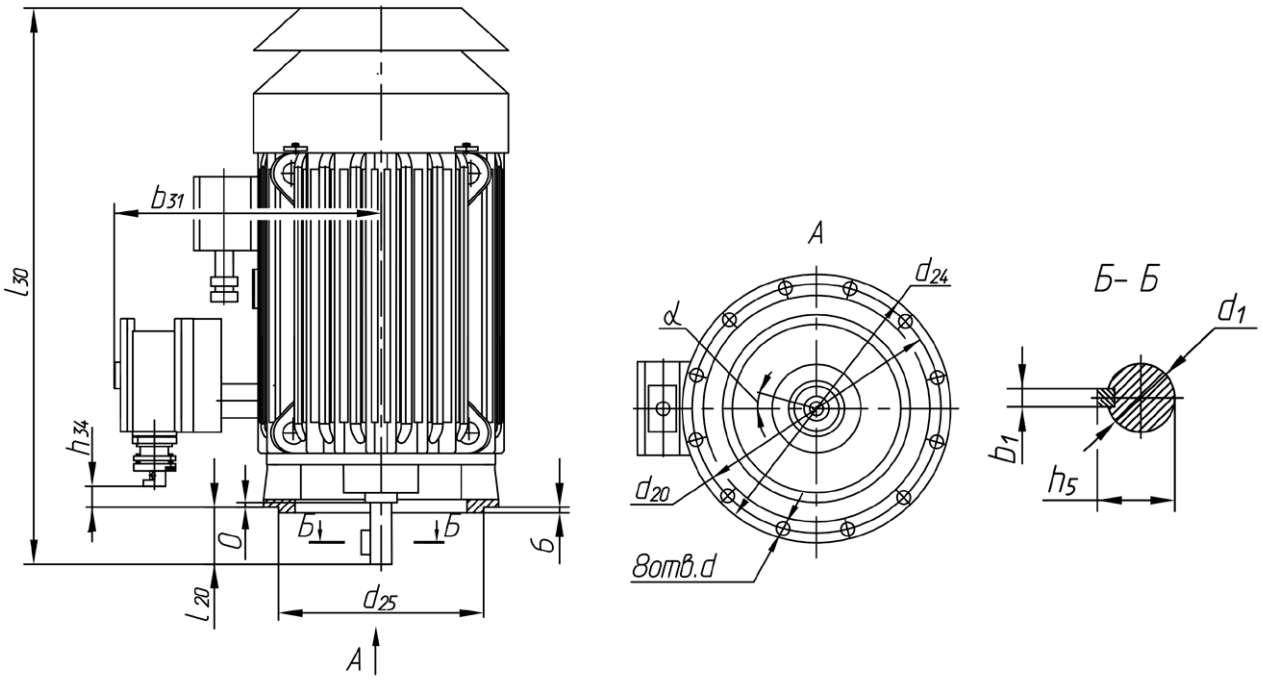
Type designation	Nominal power, kW	Rotational speed (synch.), rpm.	Nominal current, A*	Efficiency, %	Power factor	Nominal sliding %	Initial starting current ratio	Initial starting torque ratio	Maximum torque ratio	Inertia moment, kg*m²	
										of motor	of driving mechanism
VAOV4-450SK-2	160	3000	37,2/18,6	93,2	0,89	0,8	7,0	1,1	3,1	4,0	25
VAOV4-450S-2	200		46,0/23,0	93,6						4,5	30
VAOV4-450M-2	250		58,0/29,0	94,3						5,3	34
VAOV4-450LA-2	315		70,0/35,0	95,0	0,91	0,9		1,2		6,5	38
VAOV4-450LB-2	400		88,0/44,0	95,3	0,92			1,3		8,9	43
VAOV4-450SK-4	160	1500	38,0/19,0	93,2	0,87	1,5	6,0	1,0	2,5	5,7	130
VAOV4-450S-4	200		46,0/23,0	93,7	0,88					6,4	150
VAOV4-450L-4	250		58,0/29,0	94,3				1,1		7,5	175
VAOV4-450M-4	315		72,0/36,0	94,8		1,4				9,1	190
VAOV4-450S-6	160	1000	39,2/19,6	93,3	0,84	0,8		1,0	2,3	10	450
VAOV4-450M-6	200		49,2/24,6	93,6						12	520
VAOV4-450L-6	250		64,0/32,0	94,0						16	740
VAOV4-450S-8	132	750	34,4/17,2	92,2	0,8	1,1	5,3		2,2	15	420
VAOV4-450M-8	160		41,6/20,8	92,7						18	540
VAOV4-450L-8	200		51,8/25,9	93,0						21	730

** Data for motors with voltage 3000V are indicated in numerator, with voltage 6000V -in denominator.*
Electric motors with voltage 3000V are manufactured in dimensions of motors with voltage 6000V.

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS VAOV4-450 WITH VOLTAGE 10000V, FREQUENCY NETWORK 50Hz

Type designation	Nominal power, kW	Rotational speed (synch.), rpm.	Nominal current, A	Efficiency,%	Power factor	Nominal sliding, %	Initial starting current ratio	Initial starting torque ratio	Maximum torque ratio	Inertia moment, kg*m²	
										of motor	of driving mechanism
VAOV4-450SK-2	160	3000	11,2	93,0	0,89	0,8	7,0	1,1	3,1	4,2	25
VAOV4-450S-2	200		13,9	93,6						4,7	30
VAOV4-450M-2	250		17,2	94,3						5,6	34
VAOV4-450LA-2	315		21,0	95,0	0,91	0,9		1,2		6,8	38
VAOV4-450LB-2	400		26,3	95,3						9,3	43
VAOV4-450SK-4	160	1500	11,1	93,4	0,88	1,0	6,6	1,0	2,5	6,0	130
VAOV4-450S-4	200		13,9	93,7	0,89		6,5			6,9	165
VAOV4-450L-4	250		17,2	94,2	0,90					8,0	180
VAOV4-450M-4	315		21,4	94,5						9,4	190
VAOV4-450S-6	160	1000	11,8	93,0	0,83	0,8	6,0		2,3	10,5	450
VAOV4-450M-6	200		14,7	93,6	0,84					12,6	520
VAOV4-450L-6	250		18,2	94,0						16,5	740
VAOV4-450S-8	132	750	10,3	92,5	0,80	1,1	5,8		2,2	16,0	420
VAOV4-450M-8	160		12,4	92,8						19,0	540
VAOV4-450L-8	200		15,5	93,0						22,0	730

OVERALL DIMENSIONS, MOUNTING AND INSTALLATION SIZES OF THE ELECTRIC MOTORS VAOV4-450 WITH VOLTAGE 3000V, 6000V, 10000V IM3011 (flange on shield)



Type designation	b_1	b_{31}	d	d_1	d_{20}	d_{24}	d_{25}	h_5	h_{34}	l_{20}	l_{30}	α	Mass, kg** Alimonium / Copper
VAOV4-450SK-2	20	775	24	70	740	800	680	74,5	40	140	1810	22°30'	2330 (2430*)
VAOV4-450S-2													2370 (2470*)
VAOV4-450M-2											1840		2420 (2520*)
VAOV4-450LA-2											1890		2490 (2590*)
VAOV4-450LB-2											2000		2630 (2730*)
VAOV4-450SK-4	28		28	100	1080	1150	1000	106	35	210	1840		2120 (2220*)
VAOV4-450S-4													2070 (2170*)
VAOV4-450L-4											1970		2480 (2580*)
VAOV4-450M-4													2880 (2980*)
VAOV4-450S-6											1840		2220 (2320*)
VAOV4-450M-6											1970		2320 (2420*)
VAOV4-450L-6													2580 (2680*)
VAOV4-450S-8											1840		2170 (2270*)
VAOV4-450M-8											1970		2270 (2370*)
VAOV4-450L-8													2430 (2530*)

** Electric motors with copper rotor winding.*
*** Allowable deviation of mass upward – 5%. Deviation of mass downwards – is not regulated.*

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS VAOV4-560 W ITH VOLTAGE 3000V, 6000V, FREQUENCY NETWORK 50Hz

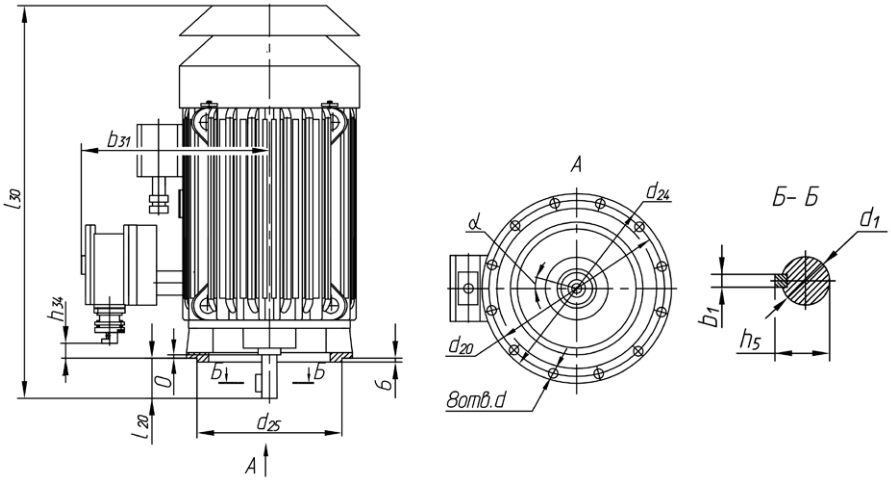
Type designation	Nominal power, kW	Rotational speed (synch.), rpm.	Nominal current, A*	Efficiency,%	Power factor	Nominal sliding, %	Initial starting current ratio	Initial starting torque ratio	Maximum torque ratio	Inertia moment, kg*m²	
										of motor	nof driving mechanism
VAOV4-560S-2	500	3000	112,8/56,4	94,8	0,90	0,7	6,0	1,0	2,7	11	50
VAOV4-560M-2	630		143,4/71,7	95,1	0,89					12	60
VAOV4-560LA-2	800		181,2/90,6	95,5			7,0	1,1	2,8	13	64
VAOV4-560LB-2	1000		218,1/109,0	95,9	0,92					21,5	70
VAOV4-560M-4	400	1500	90,0/45,0	94,8	0,88	0,9	6,5	1,3	2,5	26	380
VAOV4-560MA-4	500		112,6/56,3	95,0	0,90					28	420
BVAOV4-560MH-4	630		141,0/70,5	95,5						32	430
VAOV4-560S-6	315	1000	80,0/40,0	94,6	0,84	0,8	5,5	1,1	2,2	30	1250
VAOV4-560M-6	400		95,6/47,8	94,8						36	1430
VAOV4-560L-6	500		119,0/59,5	95,2						42	1600
VAOV4-560S-8	250	750	64,0/32,0	94,1	0,8	1,0		1,0		34	1120
VAOV4-560M-8	315		80,0/40,0	94,7						43	1640
VAOV4-560L-8	400		101,2/50,6	95,0						52	1950

** Data for motors with voltage 3000V are indicated in numerator, with voltage 6000V -in denominator.*
Electric motors with voltage 3000V are manufactured in dimensions of motors with voltage 6000V.

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS VAOV4-560 W ITH VOLTAGE 10000V, FREQUENCY NETWORK 50Hz

Type designation	Nominal power, kW	Rotational speed (synch.), rpm.	Nominal current, A	Efficicency,%	Power factor	Nominal sliding, %	Initial starting current ratio	Initial starting torque ratio	Maximum torque ratio	Inertia moment, kg*m²	
										of motor	of driving mechanism
VAOV4-560S-2	500	3000	33,7	95,3	0,91	0,7	7,0	1,2	2,8	11,6	50
VAOV4-560M-2	630		42,5	95,5						12,5	60
VAOV4-560LA-2	800		52,5	95,8	0,92					13,4	64
VAOV4-560LB-2	1000		65,3	95,9						21,5	70
VAOV4-560L-4	400	1500	27,8	94,5	0,9	0,9	6,5	1,1	2,5	28	400
VAOV4-560LA-4	500		33,8	95,0						30	420
VAOV4-560LH-4	630		42,6	95,5						34	480
VAOV4-560S-6	315	1000	22,8	94,6	0,84	0,8	5,5		2,2	32	1250
VAOV4-560M-6	400		28,8	94,8						37	1430
VAOV4-560L-6	500		35,7	95,2						43	1600
VAOV4-560S-8	250	750	19,2	94,1	0,8	1,0		1,0		34	1120
VAOV4-560M-8	315		24,0	94,7						43	1640
VAOV4-560L-8	400		30,3	95,0						52	1950

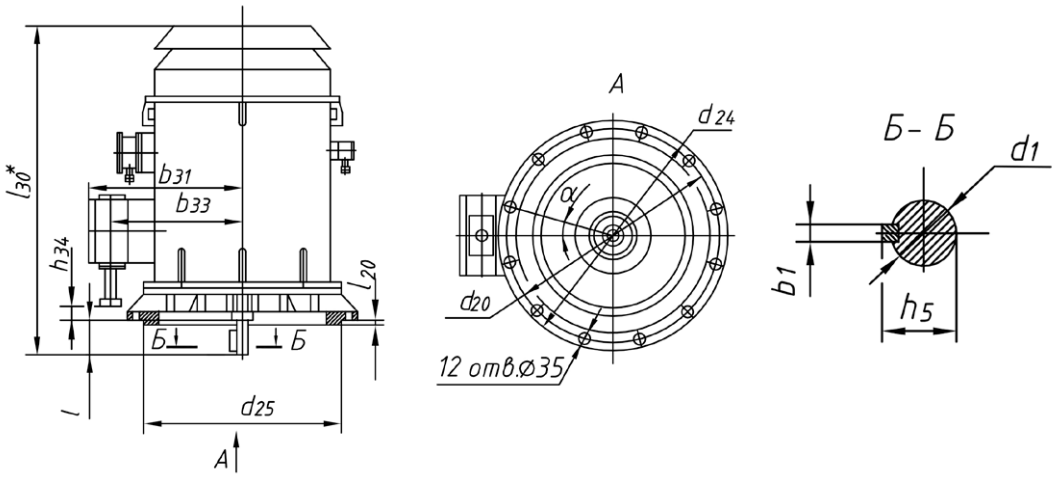
OVERALL DIMENSIONS, MOUNTING AND INSTALLATION SIZES OF THE ELECTRIC MOTORS VAOV4-560-2 W ITH VOLTAGE 3000V, 6000V, 10000V IM3011 (flange on shield)



Type designation	b_1	b_{31}	d	d_1	d_{20}	d_{24}	d_{25}	h_5	h_{34}	l_{20}	$l_{30}\pm5$	α	Mass, kg**
VAOV4-560S-2	20	815	24	70	740	800	680	74,5	40	140	2050	22°30’	3140 (3240*)
VAOV4-560M-2											2150		3710 (3810*)
VAOV4-560LA-2	25	900	28	90	1080	1150	1000	95	45	210	2300		4515 (4615*)
VAOV4-560LB-2													5130 (5230*)

** Electric motors with copper rotor winding.*
*** Allowable deviation of mass upward – 5%. Deviation of mass downwards – is not regulated.*

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS VAOV4-560-4,6,8 W ITH VOLTAGE 3000V, 6000V, 10000V IM4011 (flange on bed)



Type designation	l	l_{20}	l_{30}	b_1	b_{31}	d_{33}	d_1	d_{20}	d_{24}	d_{25}	h_5	h_{34}	α	Mass, kg*** Aluminium / Copper
VAOV4-560M-4	210	12	1960	28	930	780	110	1250	1350	1150	116	0	15	4040 (4240**)
VAOV4-560L-4			2000		930 (1000*)	780 (820*)								4660 (4860**)
VAOV4-560S-6														3780 (3980**)
VAOV4-560S-8														3866(4066**)
VAOV4-560MA-4			2160		970 (1040*)	820 (860*)								4780 (4980**)
VAOV4-560MH-4														5010 (5210**)
VAOV4-560LA-4														4890 (5090**)
VAOV4-560LH-4														5120 (5320**)
VAOV4-560M-6														4190 (4390**)
VAOV4-560L-6														4830 (5030**)
VAOV4-560M-8														4090 (4290**)
VAOV4-560L-8														4720 (4920**)

** Electric motors with voltage 10000V.*
*** Electric motors with copper rotor winding.*
**** Allowable deviation of mass upward – 5%. Deviation of mass downwards – is not regulated.*

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS VAOV4-630 W ITH VOLTAGE 3000V, 6000V, FREQUENCY NETWORK 50Hz

Type designation	Nominal power, kW	Rotational speed (synch.), rpm.	Nominal current A*	Efficiency,%	Power factor	Nominal sliding, %	Initial starting current ratio	Initial starting torque ratio	Maximum torque ratio	Inertia moment, kg*m²	
										of motor	of driving mechanism
VAOV4-630M-4	800	1500	178,8/89,4	95,7	0,90	0,9	6,5	1,3	2,5	34	480
VAOV4-630MA-4	1000		222,8/111,4	96,0						39	530
VAOV4-630S-6	630	1000	149,8/74,9	95,3	0,85	0,6	5,8	1,0	2,2	71	1840
VAOV4-630M-6	800		189,8/94,9	95,5						85	2050
VAOV4-630L-6	1000		230,4/115,2	96,0						93	2200
VAOV4-630S-8	500	750	126,6/63,3	95,2	0,82	0,7	5,0		2,1	75	2400
VAOV4-630M-8	630		158,9/79,4	95,5						91	2750
VAOV4-630L-8	800		189,2/94,6	95,8						110	3200

** Data for motors with voltage 3000V are indicated in numerator, with voltage 6000V -in denominator.*
Electric motors with voltage 3000V are manufactured in dimensions of motors with voltage 6000V.

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS VAOV4-630 W ITH VOLTAGE 10000V, FREQUENCY NETWORK 50Hz

Type designation	Nominal power, kW	Rotational speed (synch.), rpm.	Nominal current, A	Efficiency,%	Power factor	Nominal sliding, %	Initial starting current ratio	Initial starting torque ratio	Maximum torque ratio	Inertia moment, kg*m²	
										of motor	of driving mechanism
VAOV4-630L-4	800	1500	53,8	95,4	0,90	0,6	6,0	1,1	2,5	39	570
VAOV4-630LA-4	1000		66,8	95,8						45	650
VAOV4-630S-6	630	1000	45,0	95,3	0,85		5,8	1,0	2,2	74	1840
VAOV4-630M-6	800		51,7	95,5						87	2050
VAOV4-630L-6	1000		69,4	95,8						95	2200
VAOV4-630S-8	500	750	38,2	95,2	0,82	0,7	5,0		2,1	75	2400
VAOV4-630M-8	630		47,7	95,5						91	2750
VAOV4-630L-8	800		56,7	95,6						110	3200

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS VAOV4-710 W ITH VOLTAGE 3000V, 6000V, FREQUENCY NETWORK 50Hz

Type designation	Nominal power, kW	Rotational speed (synch.), rpm.	Nominal current, A*	Efficiency,%	Power factor	Nominal sliding, %	Initial starting current ratio	Initial starting torque ratio	Maximum torque ratio	Inertia moment, kg*m²	
										of motor	of driving mechanism
VAOV4-710M-4	1250	1500	278,6/139,3	96,0	0,9	0,6	6,0	1,1	2,5	72	750
VAOV4-710M-6		1000	291,4/145,7		0,86	0,5	5,5	1,0	2,1	108	2400
VAOV4-710S-8	1000	750	235,8/117,9		0,82	0,6	5,0			135	3600
VAOV4-710M-8	1250		294,0/147,0	96,2						160	4100

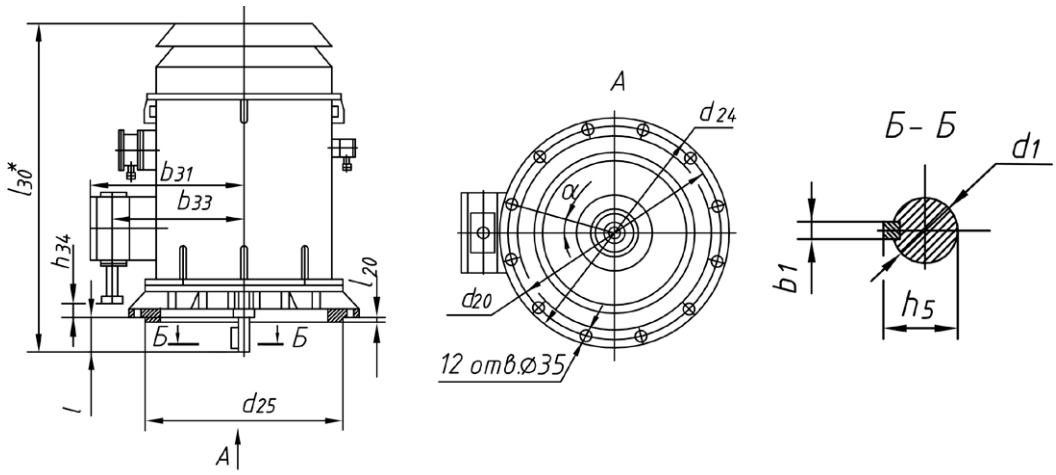
** Data for motors with voltage 3000V are indicated in numerator, with voltage 6000V -in denominator.*
Electric motors with voltage 3000V are manufactured in dimensions of motors with voltage 6000V.

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS VAOV4-710 WITH VOLTAGE 10000V, FREQUENCY NETWORK 50Hz

Type designation	Nominal power, kW	Rotational speed (synch.), rpm.	Nominal current, A	Efficiency,%	Power factor	Nominal sliding, %	Initial starting current ratio	Initial starting torque ratio	Maximum torque ratio	Inertia moment, kg*m²	
										of motor	of driving mechanism
VAOV4-710L-4	1250	1500	83,7	95,9	0,90	0,6	6,0	1,1	2,5	85	800
VAOV4-710L-6		1000	87,5	96,0	0,86	0,5	5,5	1,0	2,1	108	2500
VAOV4-710S-8	1000	750	70,9	95,8	0,82	0,6	5,0			135	3600
VAOV4-710M-8	1250		88,6	96,0						160	4100

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS VAOV4-630-4,6,8 WITH VOLTAGE 3000V, 6000V, 10000V IM4011 (flange on bed)

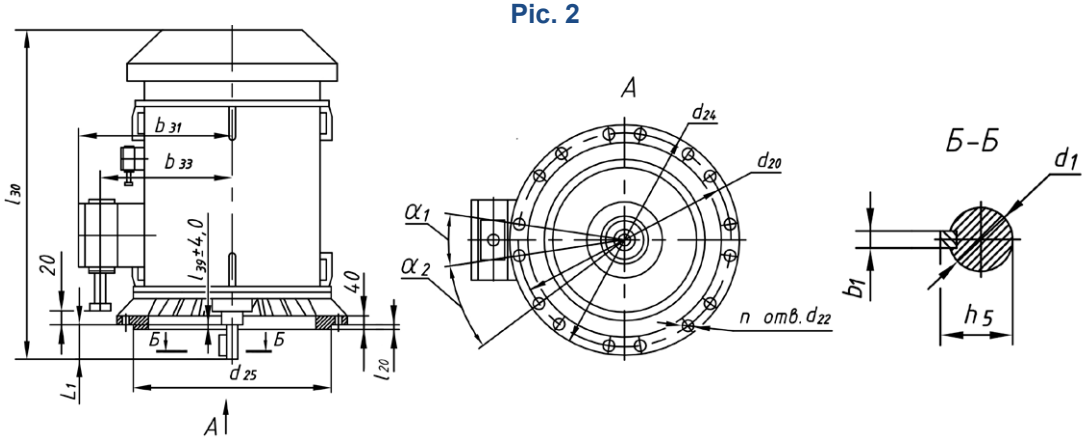
Pic. 1



Type designation	l	l_{20}	l_{30}	b_1	b_{31}	b_{33}	d_1	d_{20}	d_{24}	d_{25}	h_5	h_{34}	α	Mass, kg* ** Aluminium * / Copper**
VAOV4-630M-4	210	16	2160	32	970 (1040 *)	820 (860 *)	120	1400	1500	1290	127	0	15	4900 (5100**)
VAOV4-630L-4					1010 (1080*)	860 (900*)								5840 (6040**)
VAOV4-630S-6			2380											4780 (4980**)
VAOV4-630S-8														4660 (4860**)
VAOV4-630MA-4														6320 (6520**)
VAOV4-630LA-4														6430 (6630**)
VAOV4-630M-6			2500											6250 (6450**)
VAOV4-630L-6														6390 (6590**)
VAOV4-630M-8														6030 (6230**)
VAOV4-630L-8														6260 (6460**)

** Electric motors with voltage 10000V. ** Electric motors are manufactured with copper rotor winding.*
**** Allowable deviation of mass upward – 5%. Deviation of mass downwards – is not regulated.*

Pic. 2



ELECTRIC MOTORS VAOV4-630-4,6,8 WITH LOW OIL BATH

Type designation	b_1	b_{31}	b_{33}	d_1	d_{20}	d_{22}	d_{24}	d_{25}	h_5	l_1	l_{20}	l_{30}	l_{39}	α_1	α_2	n	Mass, kg***
VAOV4-630M-4	36	1165	1016	140	1400	35	1500	1290	148	250	10	2670	0	30°	30°	12	8520(8820**)
VAOV4-630L-4		1245	1100														8570(8870**)
VAOV4-630MA-4		1165	1016														8660(8960**)
VAOV4-630LA-4		1245	1100														8715(9015**)
VAOV4-630M-6		1165 (1245*)	1016 (1100*)														8660(8960**)
VAOV4-630L-6																	8760(9060**)
VAOV4-630L-8																	8810(9110**)

** Electric motors with10kV. ** Electric motors with copper rotor winding.*
**** Allowable deviation of mass upward – 5%. Deviation of mass downwards – is not regulated.*

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS VAOV4-710-4,6,8 WITH VOLTAGE 3000V, 6000V, 10000V IM4011 (flange on bed) Pic. 2

Type designation	b_1	b_{31}	b_{33}	d_1	d_{20}	d_{22}	d_{24}	d_{25}	h_5	L_1	l_{20}	l_{30}	l_{39}	a_1	a_2	n	Mass, kg***
VAOV4-710M-4	36	1165	1016	140	1600	42	1720	1480	148	250	20	2670	0	30°	30°	12	9010(9310**)
VAOV4-710L-4		1245	1100														9260(9560**)
VAOV4-710M-6		1205	1056		1800		1920	1680									10010(10310**)
VAOV4-710L-6		1290	1140														10050(10350**)
VAOV4-710S-8		1205 (1290*)	1056 (1140*)														10030(10330**)
VAOV4-710M-8																	10100(10400**)

* *Electric motors with10kV.*
** *Electric motors with copper rotor winding.*
*** *Allowable deviation of mass upward – 5%. Deviation of mass downwards – is not regulated.*

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS VAOV4-800 W ITH VOLTAGE 3000V, 6000V, FREQUENCY NETWORK 50Hz

Type designation	Nominal power, kW	Rotational speed (synch.), rpm.	Nominal current, A*	Efficiency,%	Power factor	Nominal sliding, %	Initial starting ratio	Initial starting torque ratio	Maximum torque ratio	Inertia moment, kg*m²	
										of motor	of driving mechanism
VAOV4-800S-4	1600	1500	364,0/182,0	96,7	0,9	0,6	5,8	1,1	2,5	80	860
VAOV4-800M-4	2000		452,0/226,0	96,8						104	1100
VAOV4-800L-6	1600	1000	372,0/186,0	96,2	0,86	0,5	5,5	1,0	2,1	120	2700
VAOV4-800LA-6	2000		464,4/232,2	96,4						141	3000

**Data for motors with voltage 3000V are indicated in numerators, for motors with 6000V -in denominator.*
Electric motors with voltage 3000V are manufactured in dimensions of motors with voltage 6000V.

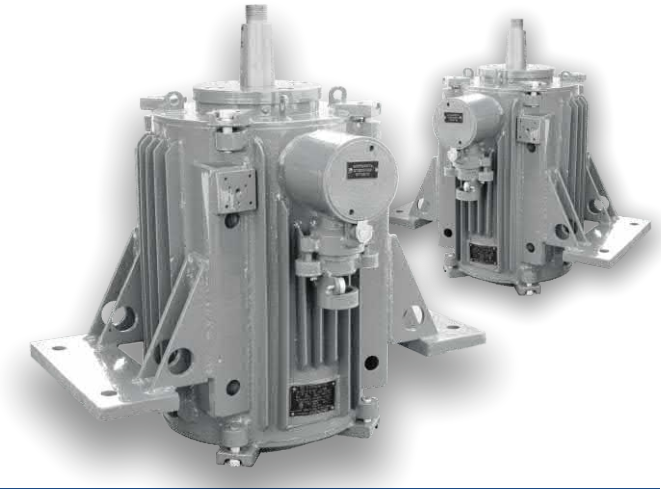
TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS VAOV4-800 W ITH VOLTAGE 10000V, FREQUENCY NETWORK 50Hz

Type designation	Nominal power, kW	Rotational speed (synch), rpm.	Nominal current, A	Efficiency,%	Power factor	Nominal sliding, %	Initial starting ratio	Initial starting torque ratio	Maximum torque ratio	Inertia moment, kg*m²	
										of motor	of driving mechanism
VAOV4-800S-4	1600	1500	109	96,6	0,90	0,6	6,0	1,1	2,5	90	920
VAOV4-800L-4	2000		138	96,7						143	1200
VAOV4-800L-6	1600	1000	112	95,9	0,86	0,5	5,5	1,0	2,1	120	2800
VAOV4-800LB-6	2000		140	96,0						141	3200

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS VAOV4-800-4,6,8 W ITH VOLTAGE 3000V, 6000V, 10000V IM4011 (flange on bed) Pic. 2

Type designation	b_1	b_{31}	b_{33}	d_1	d_{20}	d_{22}	d_{24}	d_{25}	h_5	L_1	l_{20}	l_{30}	l_{39}	a_1	a_2	n	Mass kg***
VAOV4-800S-4	36	1205 (1290*)	1056 (1140*)	140	1800	42	1920	1680	148	250	20	2815	0	22°30'	22°30'	16	10940(11240**)
VAOV4-800M-4		1205	1056														11200(11500**)
VAOV4-800L-4		1290	1140									2925					11340(11640**)
VAOV4-800L-6	45	1205 (1290*)	1056 (1140*)	175	1980	40	2100	1815	185	225		3000	100	11°15'	33°45'		11630(11930**)
VAOV4-800LA-6		1205	1056														12030(12330**)
VAOV4-800LB-6		1290	1140														12500(12800**)

* *Electric motors with10kV.*
** *Electric motors with copper rotor winding.*
*** *Allowable deviation of mass upward – 5%. Deviation of mass downwards – is not regulated.*



Electric motors VASO7

Asynchronous three-phase explosion-proof electric motors of VASO7 type with a squirrel-cage rotor are designed for gearless drive of cooling air blower machines.

Operation mode is continuous S1 from frequency network 50 Hz and 60Hz and allow operation from frequency converters in operation modes S8, S9, S10.

Explosion protection configuration:

VASO7(-12)	1 Ex d IIB T4 Gb, 1 Ex d IIC T4 Gb
VASO7(-14,-24,-32)	1 Ex d IIB T4 Gb, 1 Ex d IIB T4 + H $_2$ T4 Gb

Climatic construction type:

У1, ХЛ1, УХЛ1, Т1

Mounting configuration: see table

Protection degree for:

motor housing and terminal box	IP54
on order	IP55, IP65

Cooling method: IC 411.

The electric motors have the right and the left direction of rotation. The insulating materials of stator winding have heatresistance class «F»., «H» (at customer's order).

Main advantages of electric motors VASO7 over analogues:

1. Improving the active parts to obtain high energy parameters at lower mass.

2. The application in the motor construction of cast aluminum squirrel-cage rotor provided a number of advantages over other analogues with welded winding:

-squirrel-cage rotor provided a number of advantages over other analogues with welded winding;

-eliminate hard preventive work during operation, put through inspection and restoration of welded joints of the rotor winding;

-Improve the motors' safety in operation excluding the possible sparking and overeheating in welded joints.

3. The application of ribbed stator housing provides increased mechanical rigidity, lower values of vibration and noise, as well as more efficient and reliable cooling.

4. The application in the terminal boxes highly reliable and easy-to-use one piece insulation panels instead of individual insulators.

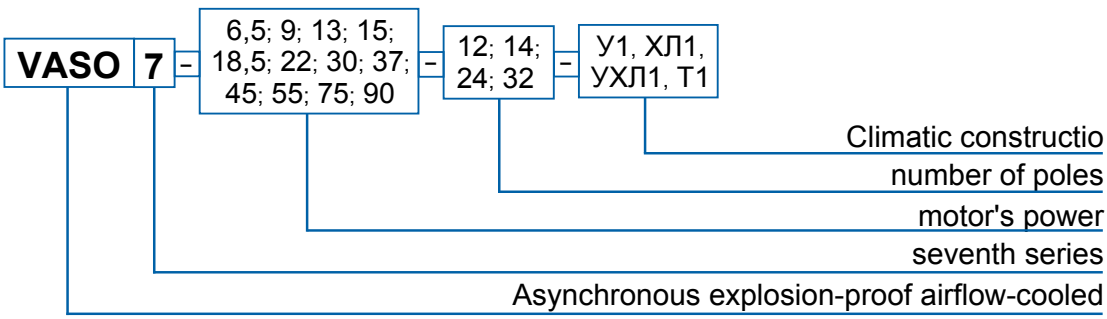
5. The special construction of bearing units using as explosion-protection elements without rubbing parts, and special seals against damp ensures reliable operation during the entire regulatory period.

6. The presence of mounting configurations for use in air conditioning units of various designs and with various fans, manufactured by chemical engineering plants.

7. The possibility of electric motors' operation in modes of speed control as part of frequency-controlled electric drives.

8. The application at customer's request of bearing made by SKF.

9. Equipping electrci motors (at customer's request)with vibration monitoring sensors, temperature of bearing, stator and motor's housing, RTS - thermistors, thermoelectric heaters.



TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS VASO7

Type designation	Power, kW	Voltage, V	Frequency, Hz	Rotational speed rpm.	Sliding, %	Eff.,%	Cos φ	Nom.current,A (380/660V)	initial starting current	initial starting torque	maximum torque ratio	Inertia moment, kg*m^2
VASO7-6,5-12	6,5	380	50(60)	500,0 (600,0)	3,0	83,0	0,73	16,3	3,5	0,9	2,0	0,28
VASO7-9-12	9					87,0		21,6		1,0	2,1	0,45
VASO7-13-12	13					88,0		30,9	4,0			0,63
VASO7-15-12	15					88,5		35,5				0,70
VASO7-18,5-12	18,5	220/380				89,0	0,76	41,6	4,5	1,0	2,1	0,86
VASO7-22-12	22					90,0	0,78	49,5				0,90
VASO7-22-14	22	380/660		428,6 (514,3)	1,5	90,3	0,75	49,4/28,5	5,0	1,1	2,2	5,30
VASO7-30-14	30					91,5		66,4/38,4				6,80
VASO7-37-14	37					92,0	0,76	80,4/46,4				8,80
VASO7-30-24	30			250,0 (300,0)	1,6	89,8	0,65	77,9/45,0	3,8	0,8		23,0
VASO7-37-24	37					90,0		96,1/55,5	3,8			25,2
VASO7-55-24	55					91,5	0,68	134,3/77,5				29,6
VASO7-75-24	75					92,0		182,2/105,2				41,2
VASO7-90-24	90					92,3		218,0/125,8	4,0			54,8
VASO7-30-32	30			187,5 (225,0)		89,0	0,58	88,3/51,8	3,2		2,0	29,6
VASO7-45-32	45					90,0	0,59	128,8/74,1				44,4
VASO7-75-32	75					91,0		212,0/122,0				61,1
VASO7-90-32	90							256/149,0				

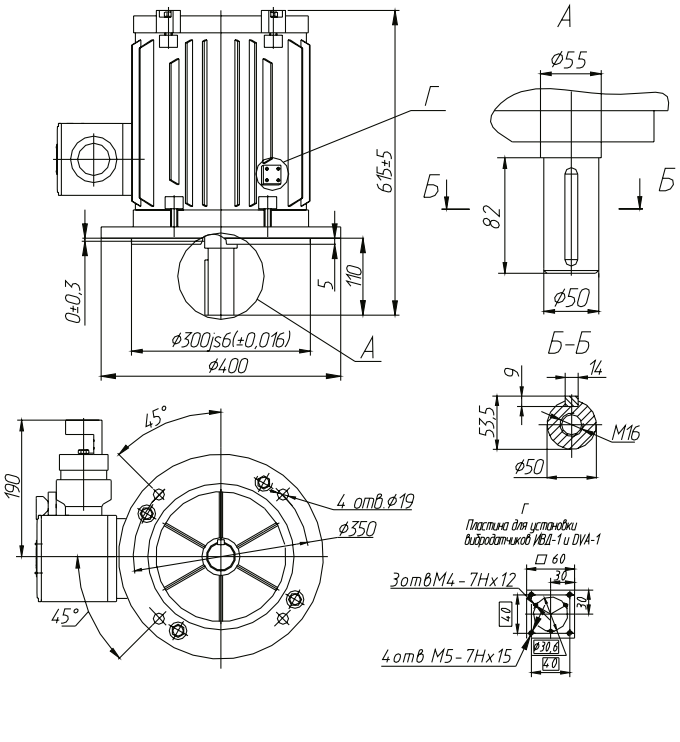
Notice: *Values in brackets are for frequency 60 Hz.*

MOUNTING CONFIGURATION

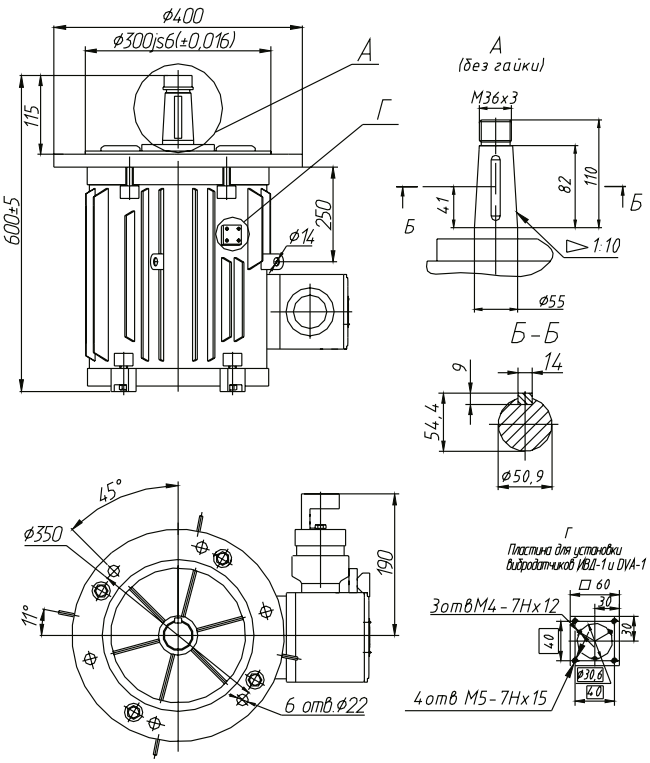
Type designation	Mounting configuration according to GOST 2479	Number of picture	Version of the shaft end
VASO7-6,5-12	IM 3011 (shaft down)	1	Cylindrical according to GOST 12080
	IM 3033 (shaft upward)	2	Conical according to GOST 12081
	IM 9631 (shaft upward)	3	Cylindrical according to GOST 12080
VASO7-9-12 VASO7-13-12 VASO7-15-12	IM 9633 (shaft upward, legs upward)	4	Conical according to GOST 12081
	IM 9631 (shaft upward, legs upward)	5	Cylindrical according to GOST 12080
	IM 9633 (shaft upward, legs down)	6	Conical according to GOST 12081
	IM 3033 (shaft upward, round flange)	7	
	IM 3031 (shaft upward, round flange)	8	Cylindrical according to GOST 12080
	IM 3033 (shaft upward, square flange)	9	Conical according to GOST 12081
	IM 3013 (shaft down,square flange)	10	
VASO7-18,5-12	IM 9633 (shaft upward, legs upward)	11.1	
	IM 9633 (shaft upward, legs down)	11.2	
VASO7-22-12	IM 9631 (shaft upward, legs upward)	12.1	Cylindrical according to GOST 12080
	IM 9631 (shaft upward, legs down)	12.2	
VASO7-22-14 VASO7-30-14 VASO7-37-14	IM 9633	13, 15	Conical according to GOST 12081
VASO7-22-14 VASO7-30-14 VASO7-37-14	IM 9631	14, 16	Cylindrical according to GOST 12080
VASO7-30-24 VASO7-37-24 VASO7-55-24 VASO7-75-24 VASO7-90-24 VASO7-30-32 VASO7-45-32 VASO7-75-32 VASO7-90-32	IM 9633	17	Conical according to GOST 12081
VASO7-30-24 VASO7-37-24 VASO7-55-24 VASO7-75-24 VASO7-90-24 VASO7-30-32 VASO7-45-32 VASO7-75-32 VASO7-90-32	IM 9631	18, 19, 20	Cylindrical according to GOST 12080

At the customer's request the electric motors can be produced with special mounting configuration, mounting and installation dimensions.

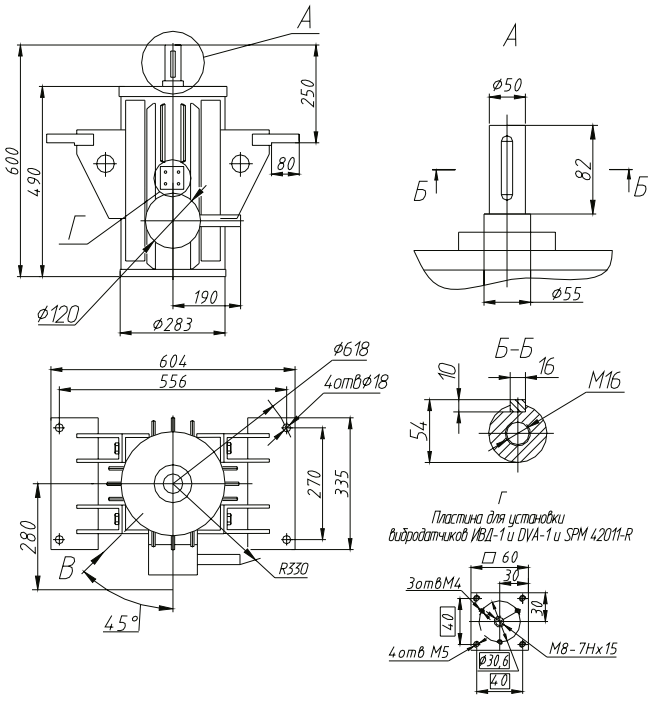
OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES



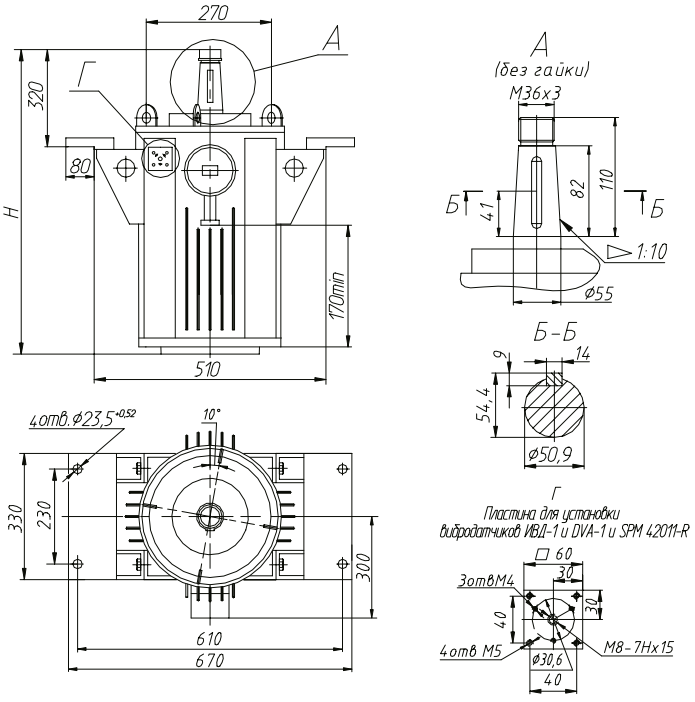
Picture 1



Picture 2



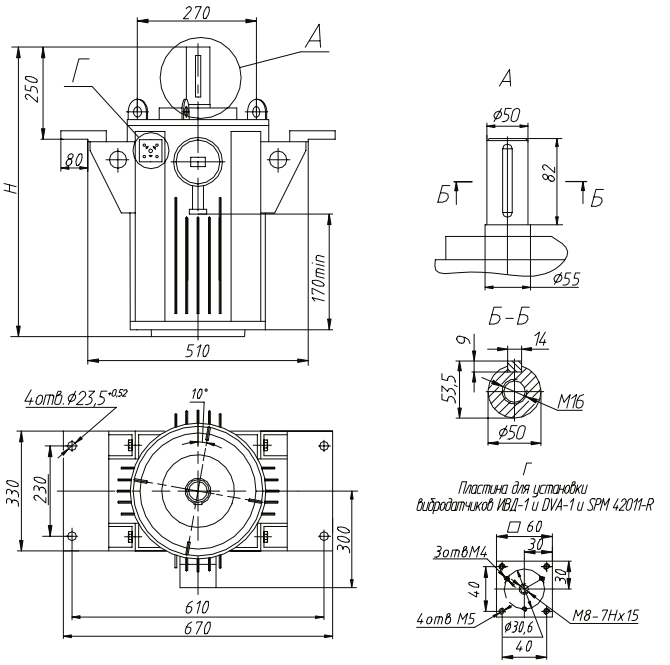
Picture 3



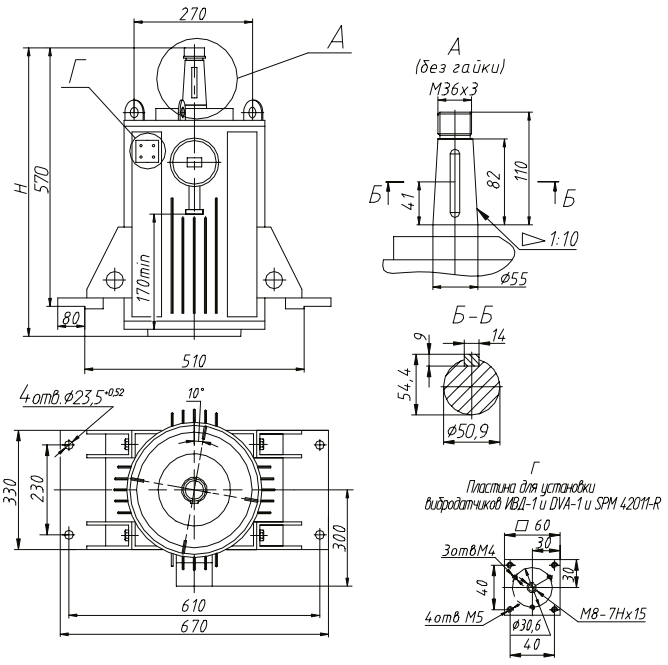
Picture 4

Type designation	H	Mass, kg
VCASO7-9-12	725	230
VASO7-13-12	775	275
VASO7-15-12	775	290

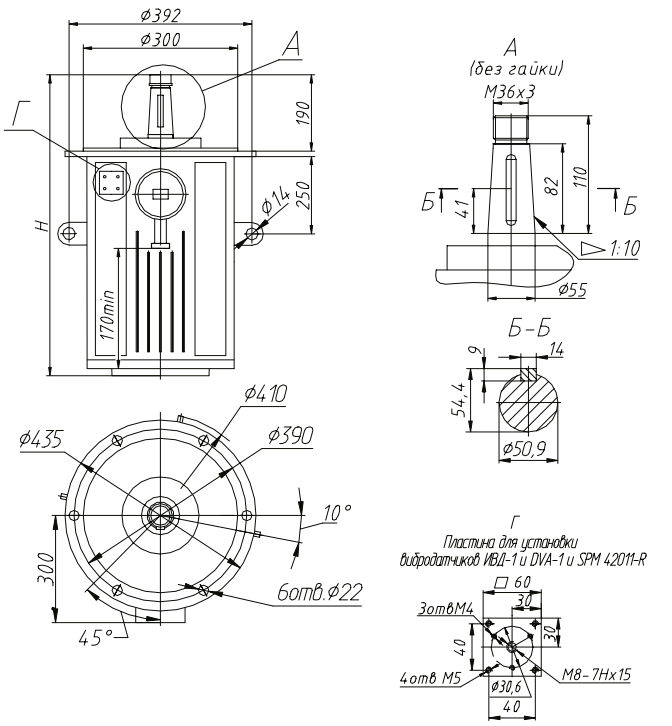
OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES



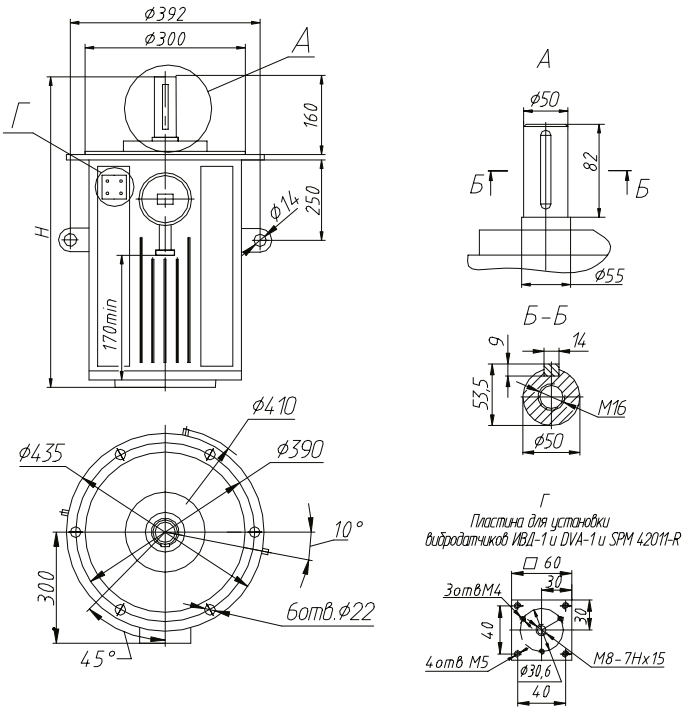
Picture 5



Picture 6

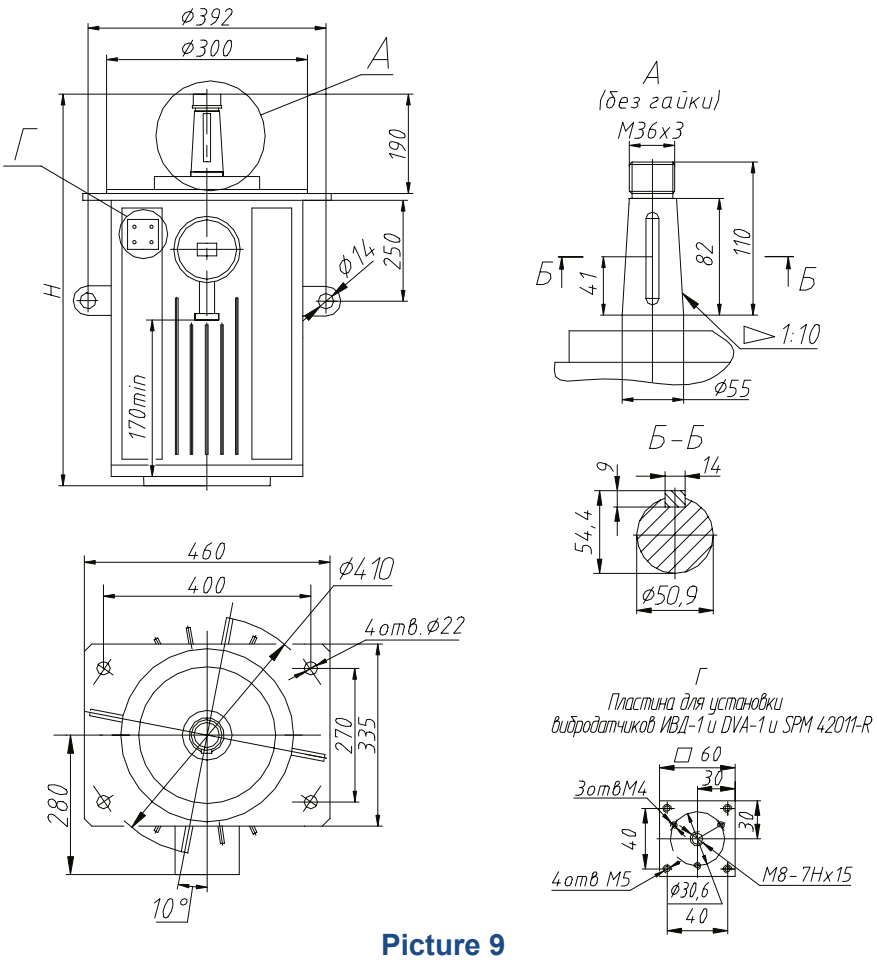


Picture 7

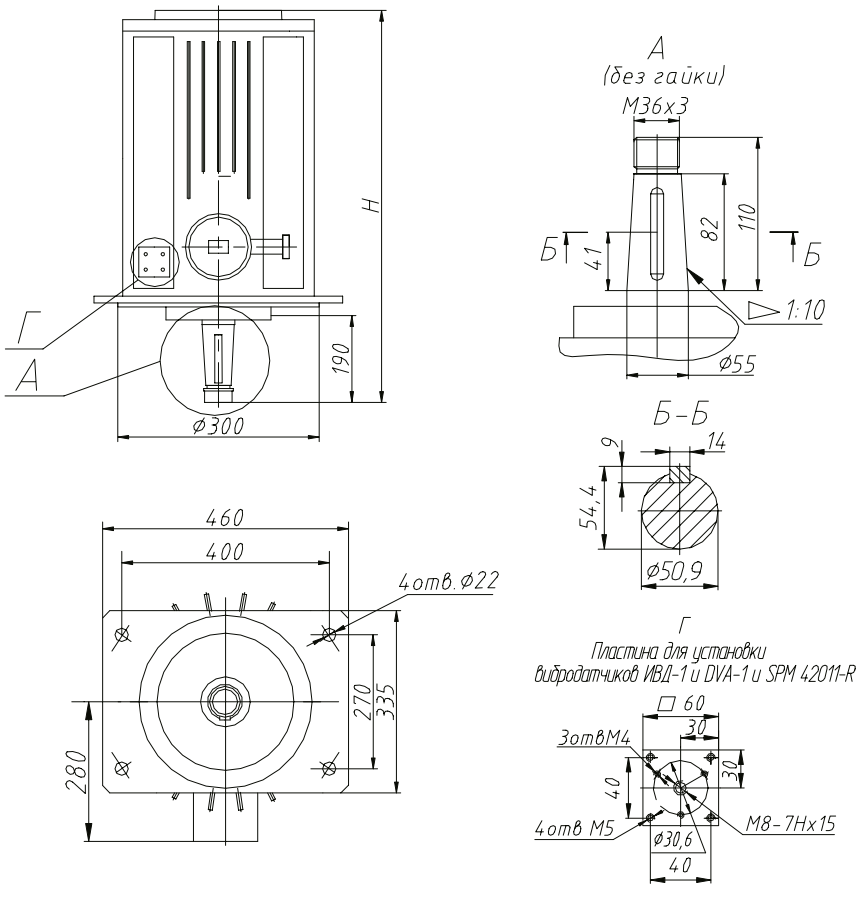


Picture 8

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES

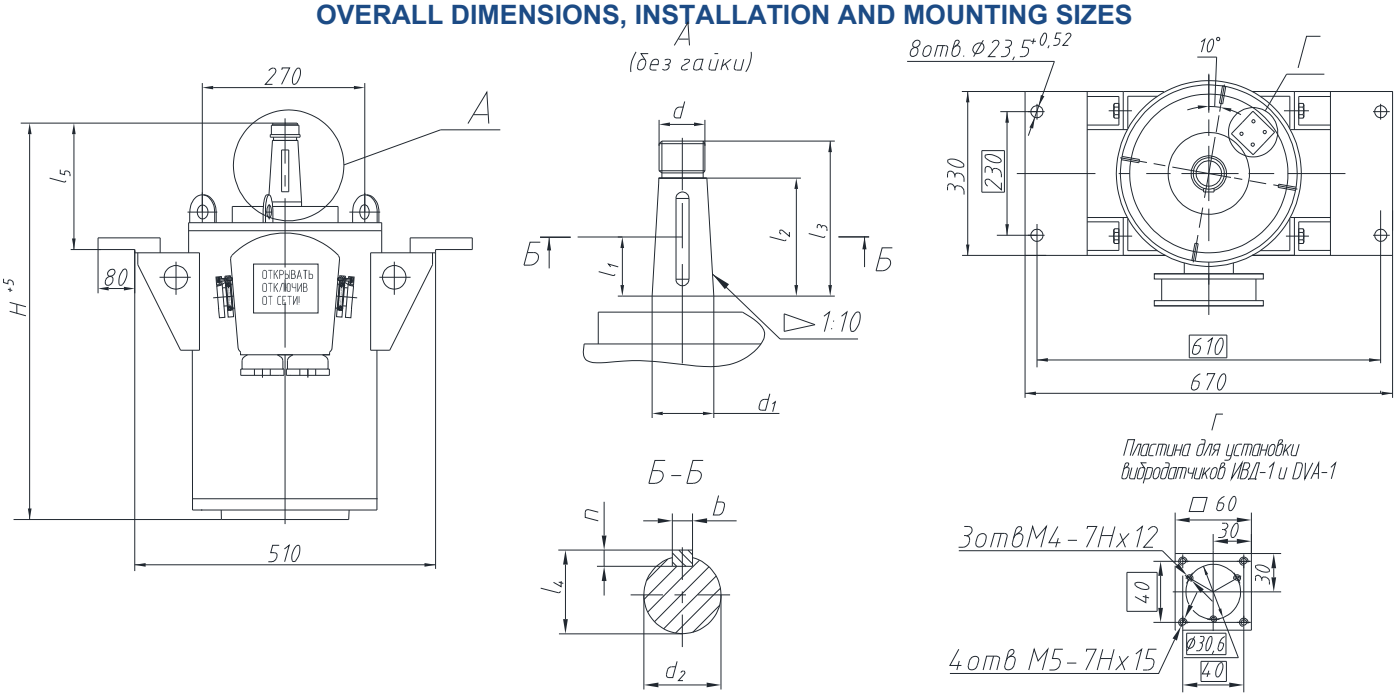


Picture 9



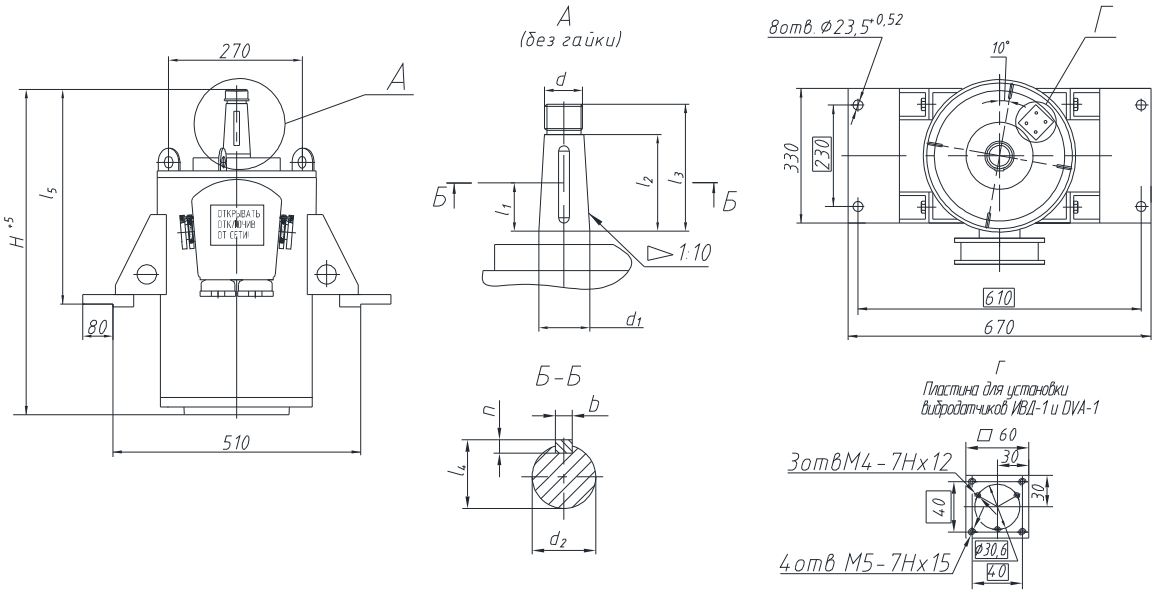
Picture10

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES



Picture 11.1

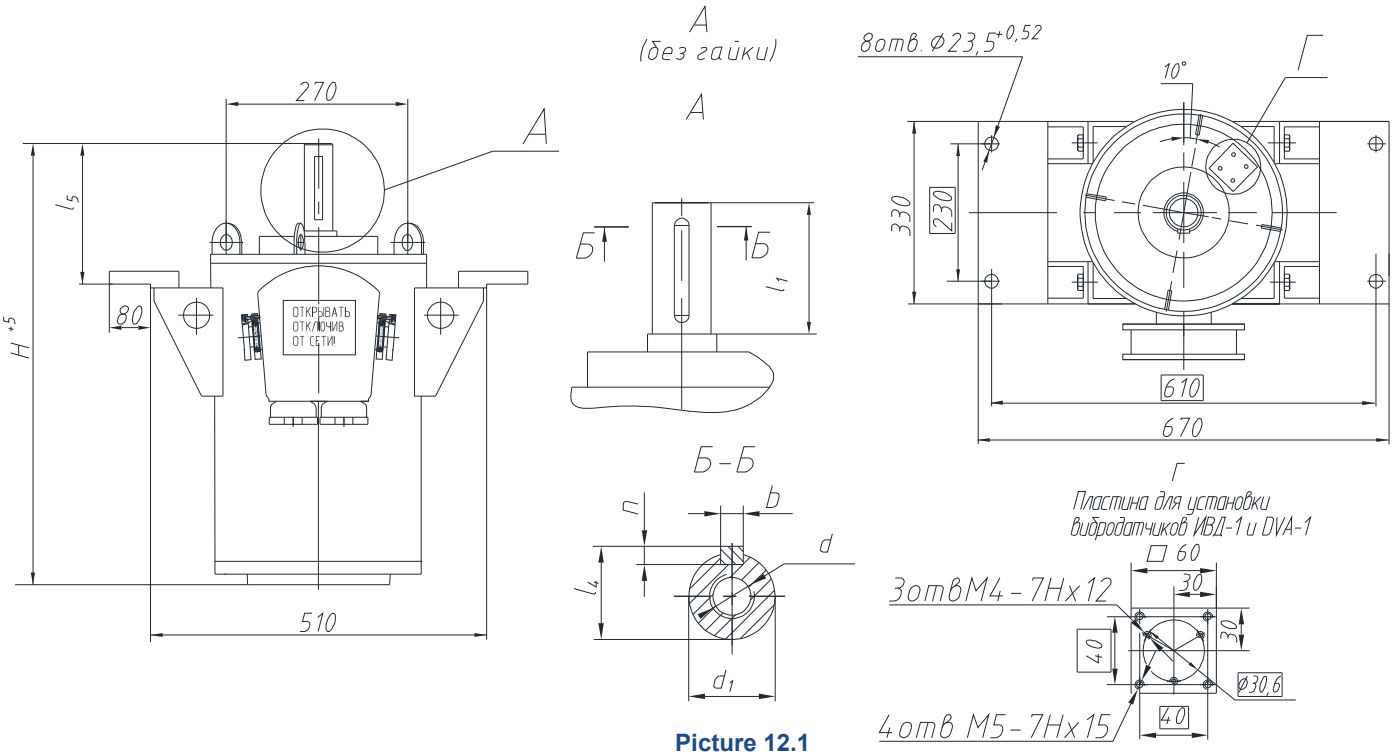
Type designation	Notice	l_1	l_2	l_3	l_4	l_5	H	d	d_1	d_2	h	b	Mass,kg
VASO7-18,5-12	shaft⌀ 90mm	65	130	170	88,5	320	920	M64Ч4	90	83,5	14	22	500
	shaft⌀ 55mm	41	82	110	54,4	260	860	M36Ч3	55	50,9	9	14	495
VASO7-22-12	shaft⌀ 90mm	65	130	170	88,5	320	920	M64Ч4	90	83,5	14	22	510
	shaft⌀ 55mm	41	82	110	54,4	260	860	M36Ч3	55	50,9	9	14	505



Picture 11.2

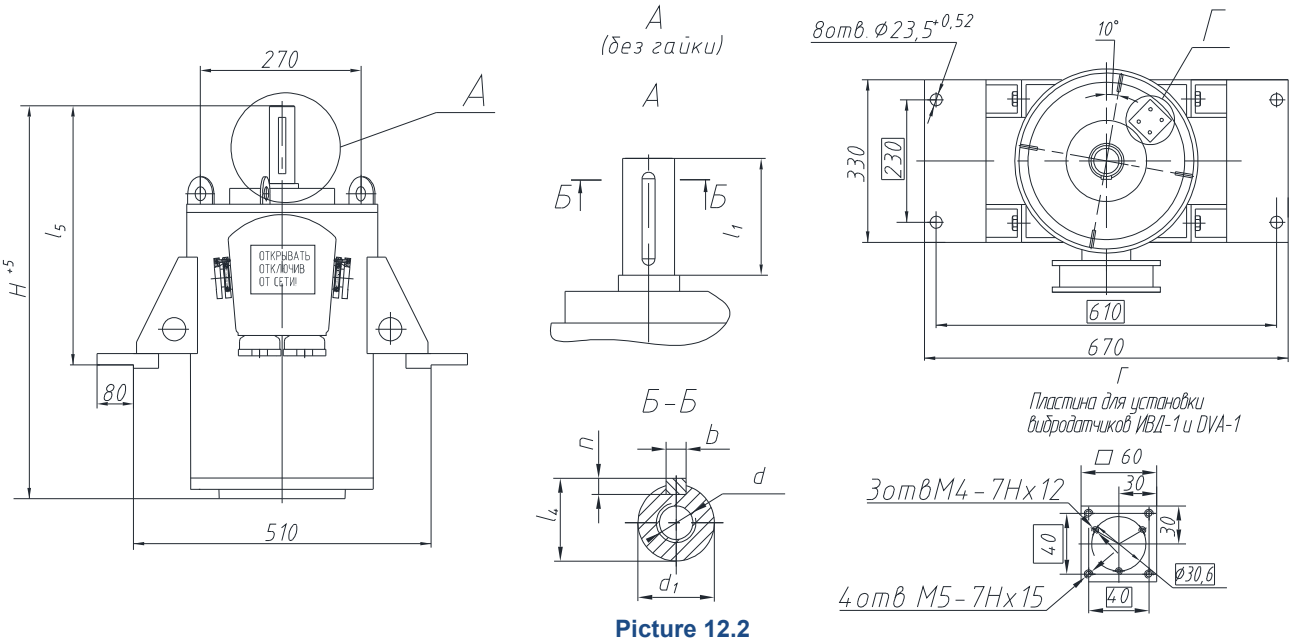
Type designation	Notice	l_1	l_2	l_3	l_4	l_5	H	d	d_1	d_2	h	b	Mass, kg
VASO7-18,5-12	shaft⌀ 90mm	65	130	170	88,5	620	920	M64Ч4	90	83,5	14	22	500
	shaft⌀ 55mm	41	82	110	54,4	560	860	M36Ч3	55	50,9	9	14	495
VASO7-22-12	shaft⌀ 90mm	65	130	170	88,5	620	920	M64Ч4	90	83,5	14	22	510
	shaft⌀ 55mm	41	82	110	54,4	560	860	M36Ч3	55	50,9	9	14	505

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES



Picture 12.1

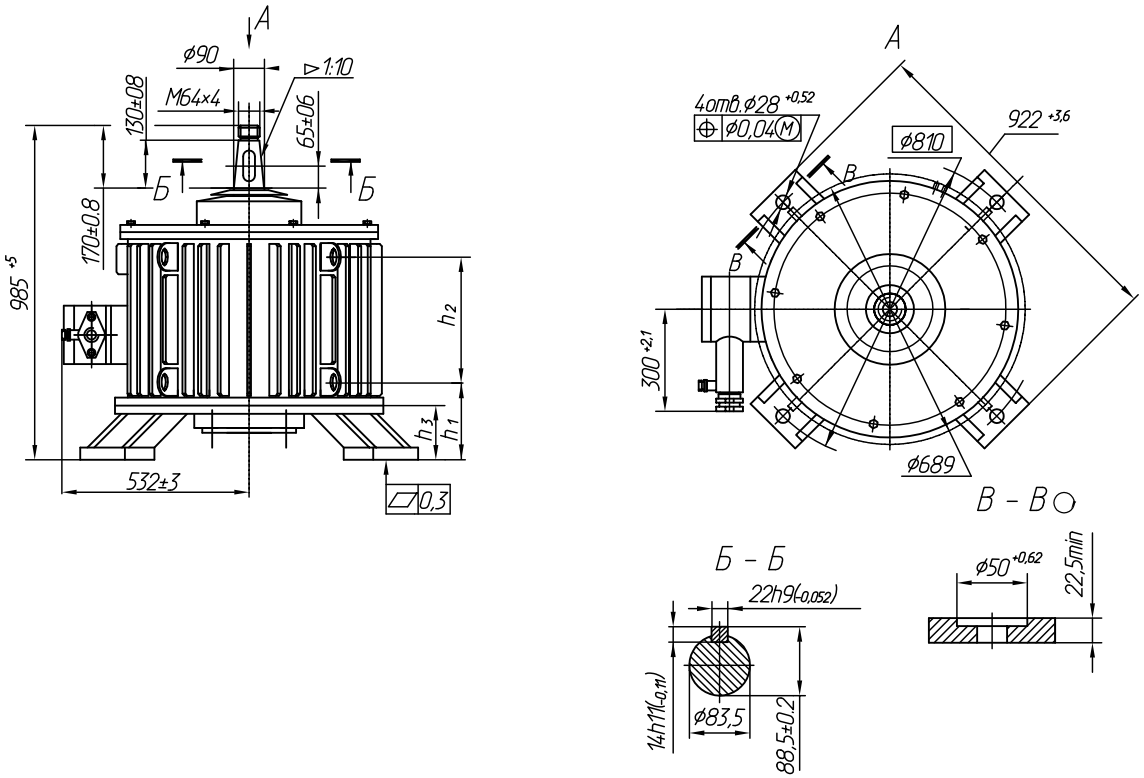
Type designation	Notice	l_1	l_5	H	d	d_1	h	b	Mass,kg
VASO7-18,5-12	shaft⌀ 80mm	130	280	880	M30	80	14	22	495
	shaft⌀ 50mm	82	232	832	M16	50	9	14	490
VASO7-22-12	shaft⌀ 80mm	130	280	880	M30	80	14	22	505
	shaft⌀ 50mm	82	232	832	M16	50	9	14	500



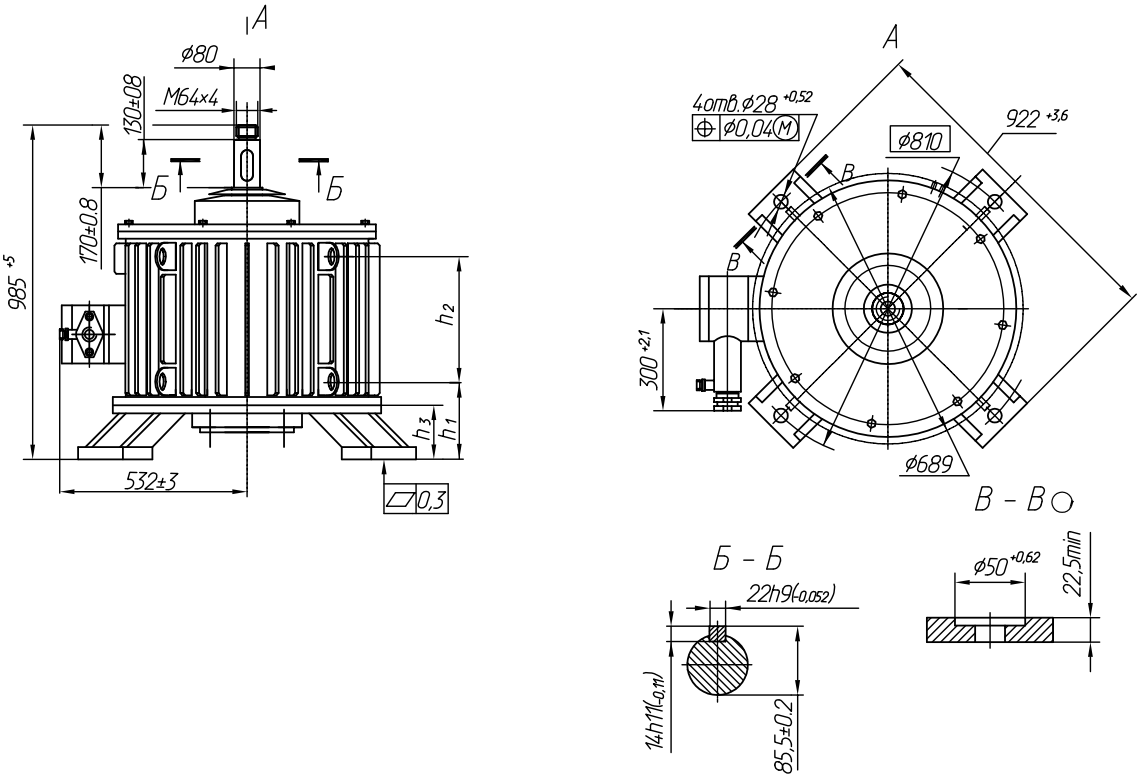
Picture 12.2

Type designation	Notice	l_1	l_5	H	d	d_1	h	b	Mass, kg
VASO7-18,5-12	shaft⌀ 80mm	130	580	880	M30	80	14	22	495
	shaft⌀ 50mm	82	532	832	M16	50	9	14	490
VASO7-22-12	shaft⌀ 80mm	130	580	880	M30	80	14	22	505
	shaft⌀ 50mm	82	532	832	M16	50	9	14	500

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES



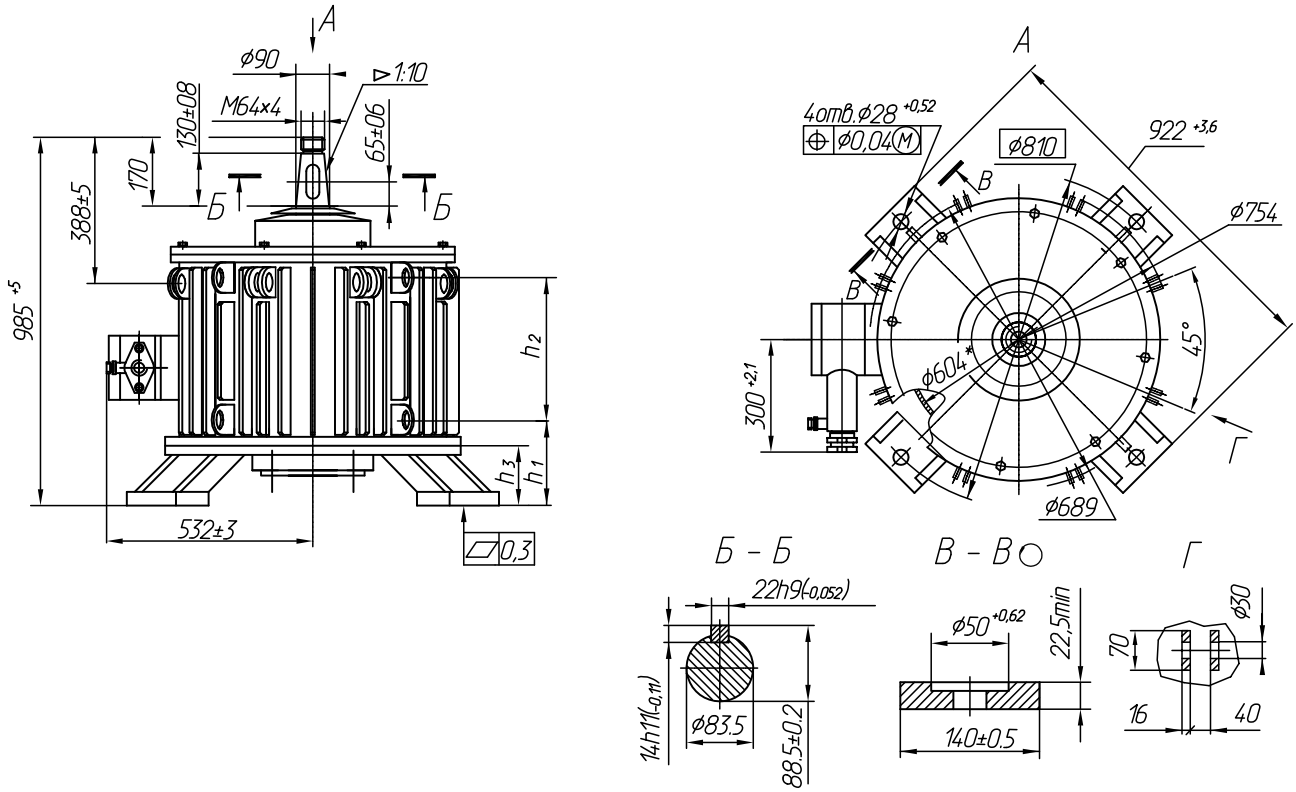
Picture 13



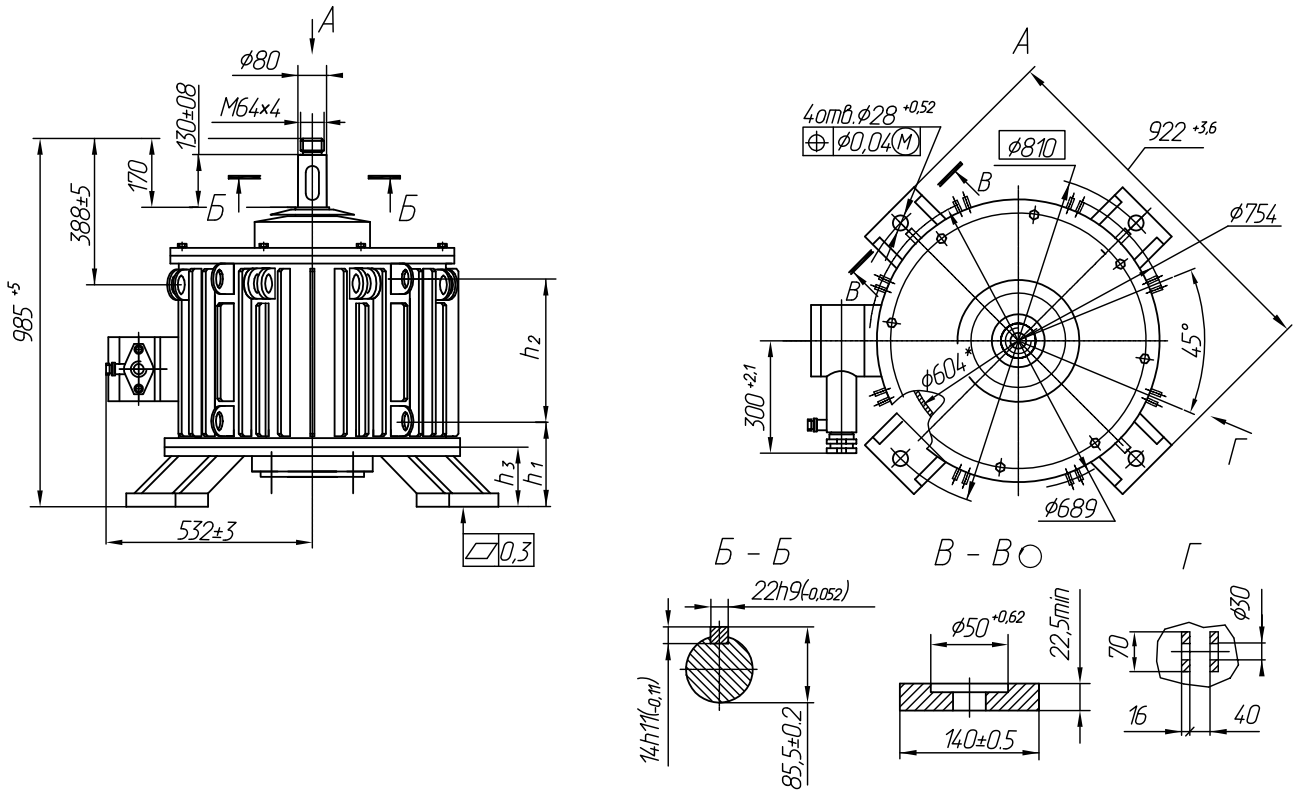
Picture 14

Type designation	h_1 ±2	h_2 ±3	h_3	Mass, kg
VASO7-22-14	268	362	215±1,5	750
VASO7-30-14	208	422	155±2,0	800
VASO7-37-14	138	492	85±2,0	950

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES

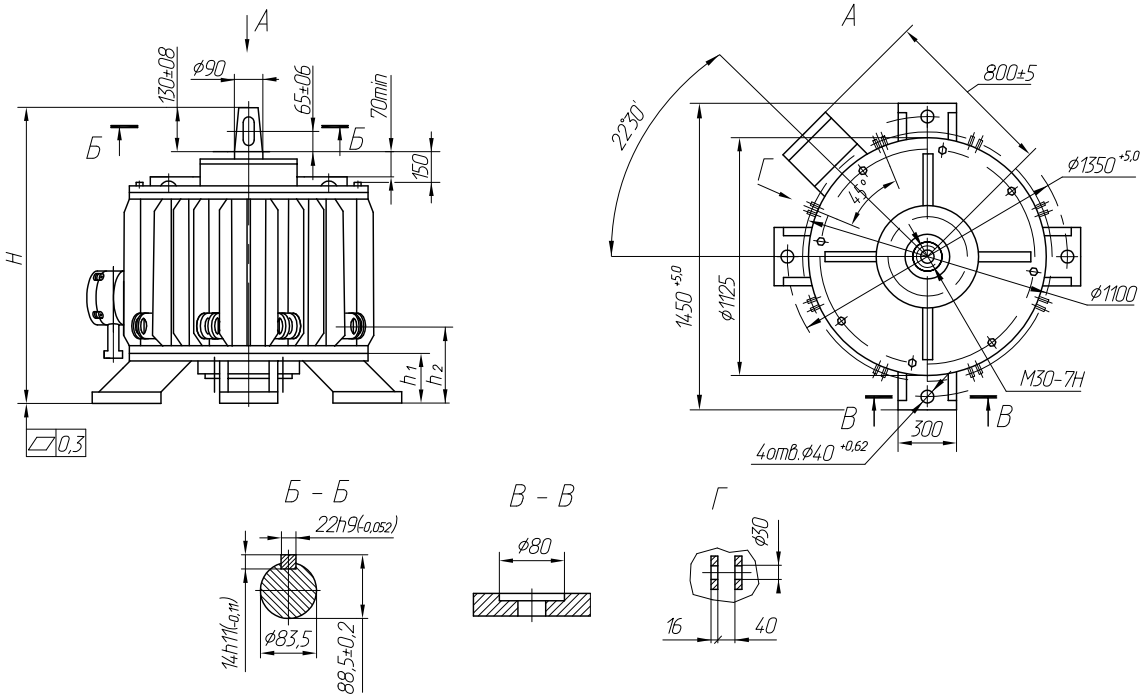


Picture 15

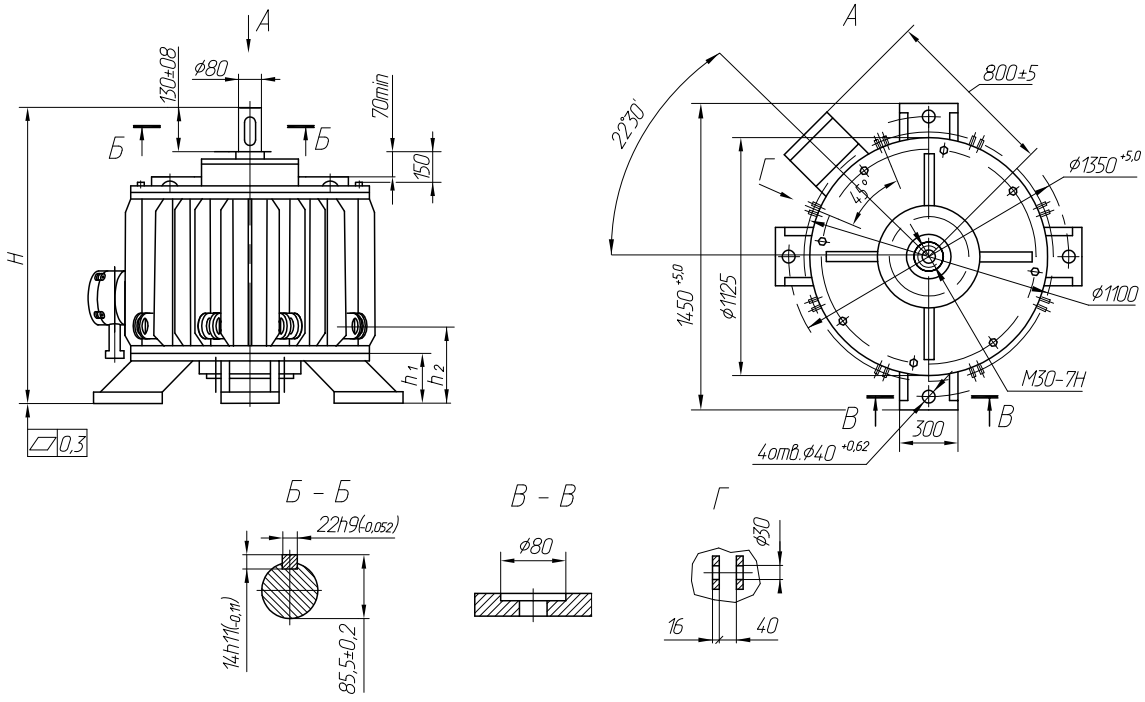


Picture 16

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES



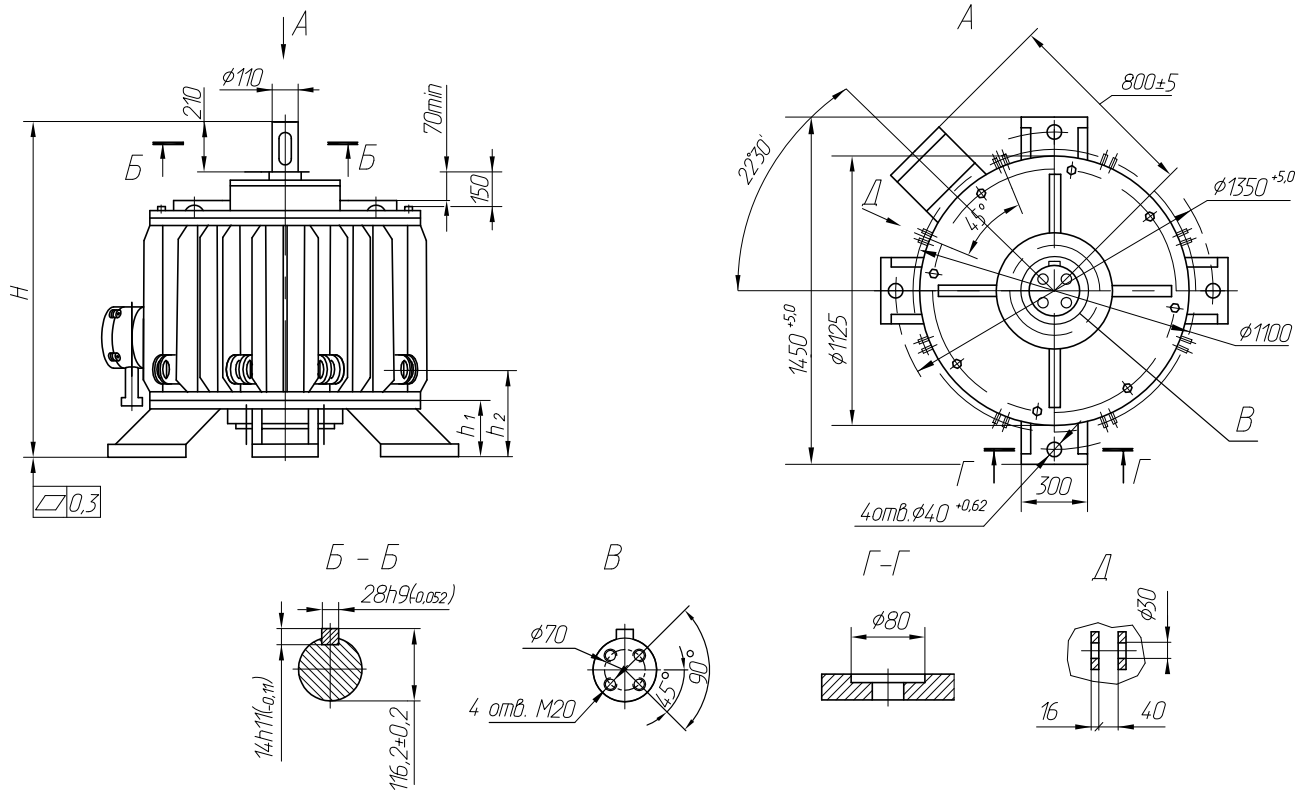
picture 17



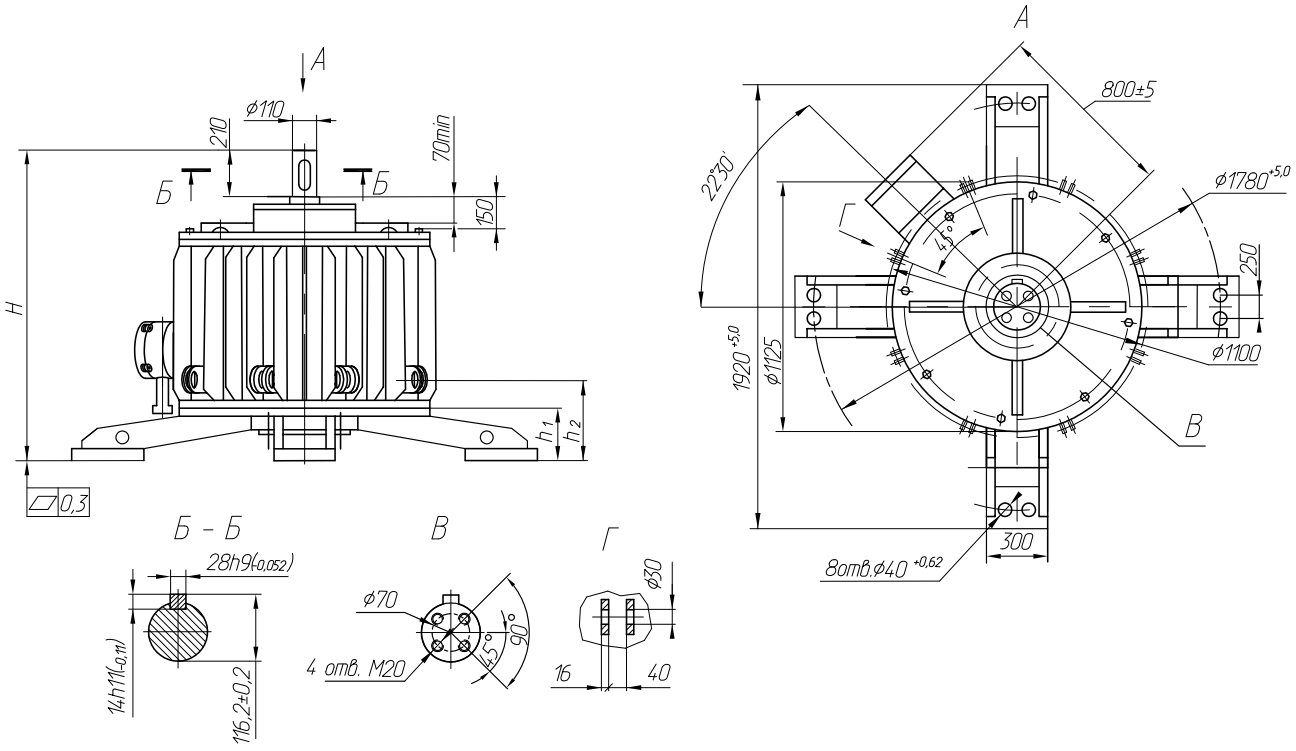
picture 18

Type designation	H for pictures 17, 18	H or pictures 19, 20	h_1	h_2	Mass, kg
VASO7-37-24	$1116^{+4,2}$	$1196^{+4,2}$	345	412	1530
VASO7-55-24	$1266^{+5,0}$	$1346^{+5,0}$	445	512	1620
VASO7-75-24	$1310^{+5,0}$	$1390^{+5,0}$			1700
VASO7-90-24	$1130^{+4,2}$	$1210^{+4,2}$	170	237	1900
VASO7-30-32	$990^{+3,6}$	$1070^{+3,6}$			1570
VASO7-45-32	$1310^{+4,2}$	$1390^{+4,2}$	445	512	1700
VASO7-75-32	$1170^{+4,2}$	$1250^{+4,2}$	170	237	2100
VASO7-90-32	$1170^{+4,2}$	$1250^{+4,2}$			2150

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES



picture 19



picture 20

LARGE ASYNCHRONOUS ELECTRIC MOTORS

FOR GENERAL USE

LARGE ASYNCHRONOUS ELECTRIC MOTORS FOR GENERAL USE

Each type of asynchronous electric motors for general use has a wide range of modifications by power,rotational speed, voltage and design; these electric motors are the basis for electric drive units in different mechanisms for general use. The best construction, high quality of applied materials and components, the progressive production technology supply high technical level, ensure safety, reliability and flexibility in application

During last years SP JSC "Electromash" has renovated and expanded the range of asynchronous electric motors for general use:

- works on extension motors of **DAZO4**, **A4** series are completed and new sizes of these motors are developed: A4-355 and DAZO4-560. The power range from 200 up to 2000 kW with voltage 6000V is mastered and customer's requirements practically in all main drives for general use are satisfied. The production of electric motors with rotational speed 3000 rpm is mastered. At customer's request the motors can be manufactured for other power, voltage, network frequency and mounting configuration - IM1002, IM2001, IM3001 and others, using SKF bearings according to the requirements of the contract;

- a new series of wound rotor motors - AOK4 is improved, thus the power range is enlarged - from 315 up to 630 kW and rotational speed - from 750 up to 1000 rpm. In electric motors AOK4 the design of contact unit has been changed to increase reliability. The console suspension of slip rings was changed for fitting hubs with the shaft, number of brushes is increased from 3 up to 5 per a phase. Brush dust is blown off the contact unit with the fan and collected in dust collector with oil bath;

- vertical double-speed electric motors ASVO of a new generation are mastered for driving vanes in air-cooling devices. The design of double-speed electric motors allows to change rotational speed in the ratio1:2 (downward from nominal), so the optimum water-cooling tower's mode is reached according to climatic conditions and technological loads. The motor start is realized at low speed with the purpose to limit starting currents and creation of sparing conditions for starting equipment. For exception the condense formation during stops, the anti-condensation heating elements are built in the motor

- a new type of motors ADN-630 for driving centrifugal pumps of power range from 800 up to1600 kW and rotational speed 1000rpm. is mastered;

-special vertical electric motors AVSM5 for driving monoblock vertical pumps are mastered;

-production of electric motors of 4AZD type, designed as a drive of stationary pumps, compressors and other high-speed mechanisms with rotational speed 3000 rpm. is mastered.

-production of electric motors of AZO type is mastered with the height of the axis of rotation 250-710 mm, with power from 37 up to 2500 kW on the basis of explosion-proof electric motors VAO.

Production of electric motors of ADCH and ADCHR types, designed for working as a part of variable frequency drive mechanism is mastered.

ELECTRIC MOTORS DAZO4-400-560

Asynchronous three-phase closed airflow-cooled electric motors DAZO4 with a squirrel-cage rotor are designed to drive mechanisms with heavy start conditions, which do not require rotational speed adjustment, and to drive pumps, air blowers, fans, smoke exhausters, and other machines with similar start characteristics, including mechanisms for thermal and nuclear power plants.

The electric motors of DAZO4 type are manufactured with height of the axis of rotation 400, 450, 560mm, power from 200 up to 2000kW, rotational speed from 500 up to 1500 rpm., voltage 3000V, 6000V, 10000V.

At customer's request the electric motors can be manufactured with overall dimensions, installation and mounting sizes, which differ from standard, as well as for other power, voltage, rotational speed and mounting configuration IM1002.

The electric motors DAZO4 can be manufactured both with cast aluminum, and copper rotor winding.

The best construction, high quality of applied materials and components, the progressive production technology supply high technical level, ensure safety, reliability and flexibility in application.

Operation mode is continuous S1 from network frequency 50Hz. These motors allow operation from frequency converters. (S10, S9, S8).

Cooling method: IC611.

Climatic construction type:

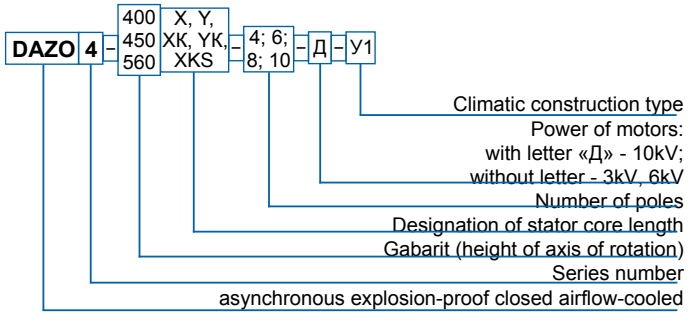
У1, У2, У3, Т1, Т2, УХЛ1, УХЛ2, ХЛ1, ХЛ2, УХЛ4

Mounting configuration: IM1001

Protection degree for:

motors	**IP54 on order IP55**
terminal box	**IP55**
outdoor fan	**IP21**

TYPE DESIGNATION



Main advantages of electric motors DAZO4 over analogues:

1. Improving the active parts to obtain high energy parameters at lower mass.

2. The application in the motor construction of cast aluminum squirrel-cage rotor provided a number of advantages over other analogues with welded winding:

- select the best configuration and dimensions of groove, increasing starting moments at relatively small values of starting currents;
- eliminate hard preventive work during operation, put through inspection and restoration of welded joints of the rotor winding;
- Improve the motors' safety in operation excluding the possible sparking and overeheating in welded joints.

The electric motors DAZO4 are manufactured with a shortcircuited rotor winding made of copper for severe operating conditions (frequent, long starts). These motors provide increase of service life by 1,5-2 times and increased starting torque in comparison with electric motors with aluminum squirrel-cage rotor. Allows 15-20 starts of the electric motor instead of 6-8 starts permissible for analogues with aluminum rotor winding.

3. Improved ventilation and cooling system of electric motors, provides the maximum heating of active parts working at nominal load, with the exception of local overheating.

4. The application of vacuum pressure impregnation technology **(HPI)** of windings with epoxy compaund, which is the basis of isolation **«Monolith-2»**, heat-resistance class **«F»** due to the construction features of the active parts of cooling systems.

5.Using bearing produced by company **SKF** (at customer's request) increases the service life by 1.5 times compared with bearings produced in CIS countries and others.

6. Equipping with temperature control sensors of the bearing units and air temperature control inside of the motor, with HCX 50M, 100П and Pt10, and also, at customer's request, with vibration control sensors,

7. The application in motors DAZO4 fans allows to operate electric motors both with the left and with the right direction of the rotor rotation and eliminates the need for modifying the design when changing the direction of rotation.

8. At customer's request equipment of electric motors by modern devices for remote temperature control like:

- **UKT-12 (9channels)** (temperature control at 9 points: 2 - bearings, 6-winding and iron of stator, 1 - motor housing. information outputon PC in real time);

- **UKT-12** (temperature control at 12 points: 2 points - bearings, 6 points - winding and iron of stator, 1 point -motor housing, 3 points - driven mechanism, information output on PC in real time);
- temperature and vibration monitoring **UKVT**, completed with two three-coordinate vibration sensors of 3KDV type (the possibility to control vibration of bearings support in three coordinates X, У, Z, temperature control in 9 points: 2 points - bearings, 6 points - winding and iron of stator, 1 point - motor housing, information output on PC in real time).

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS DAZO4-400, W ITH VOLTAGE 3000V, 6000V, 100000V

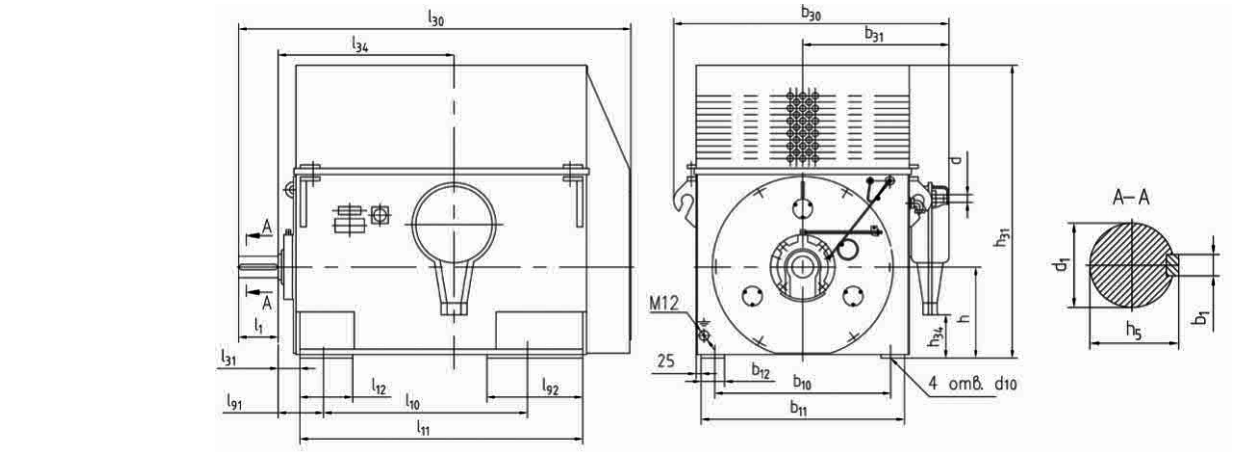
Type designation	Power, kW	Voltage, V*	Rotational speed, rpm.**	Sliding %	stator current, A***	Effic., %	cosφ	Starting torque ratio	Starting current ratio	Maximum torque ratio	Inertia moment kg*m2	
											rotor	permissible of mechanism
DAZO4-400XKS-4	250	3000/6000	1500/1800	1,0	59,8/30,0	93,6	0,85	1,3	7,0	2,8	11	170
DAZO4-400XK-4	315				75,2/37,6	93,7	0,86					
DAZO4-400XK-4Д	250	10000			17,4	94,3	0,88	1,2	6,5	2,5		
DAZO4-400X-4	400	3000/6000			94,0/47,0	94,2	0,87	1,3	7,0	2,8	12	230
DAZO4-400X-4Д	315	10000			21,8	94,7	0,88	1,2	6,5	2,5		
DAZO4-400Y-4	500	3000/6000			116,6/58,3	94,8	0,87	1,5	7,0	2,8	14	280
DAZO4-400YK-4Д	400	10000			27,6	95,0	0,88	1,2	6,5	2,5		
DAZO4-400Y-4Д	500				34,4	95,4					16	350
DAZO4-400XK-6	250	3000/6000	1000/1200		62,2/31,1	93,2	0,83	1,3				300
DAZO4-400XK-6Д	200	10000			14,6	94,2	0,84	1,2	6,0	2,4		
DAZO4-400X-6	315	3000/6000			76,0/38,0	93,9	0,85	1,3	6,5	2,5	19	350
DAZO4-400X-6Д	250	10000			18,2	94,5	0,84	1,2	6,0	2,4		
DAZO4-400Y-6	400	3000/6000			96,2/48,1	94,2	0.85	1,3	6,5	2,5	22	600
DAZO4-400YK-6Д	315	10000			22,5	94,9		1,2	6,0	2,4		
DAZO4-400Y-6Д	400				28,6	95,1					24	720
DAZO4-400X-8	200	3000/6000	750/900		54,0/27,0	92,5	0,77		6,0	2,3	20	500
DAZO4-400X-8Д		10000			15,5	94,3		1,1	5,5			
DAZO4-400Y-8	250	3000/6000			65,4/32,7	93,0	0,79	1,2	6,0	2,4	23	600
DAZO4-400YK-8Д		10000			19,3	94,6		1,1	5,5	2,3	22	
DAZO4-400Y-10	200	3000/6000	600/720	1,1	56,6/28,3	92,0	0,74	1,3	6,0		23	800
DAZO4-400Y-10Д		10000			17,0	91,0	0,72	1,1		2,1		

* *3000V/6000V – s tator phase connection Δ/Y, 10000V – phase connection – Y*
** *Data for frequency 50Hz are indicated in the numerator, for frequency 60Hz are indicated in the denomenator.*
*** *Data for voltage 3kV are indicated in the numerator, data for 6kV are indicated in the denomenator.*

TTECHNICAL PARAMETERS OF THE ELECTRIC MOTORS DAZO4-450, WITH VOLTAGE 3000V, 6000V, 100000V

Type designation	Power kW	Voltage, V*	Rotational speed, rpm.**	Sliding, %	stator current A***	Effic., %	Cos φ	Starting torque ratio	Starting current ratio	Maximum torque ratio	Inertia moment, kg*m²	
											rotor	permissible mechanism
DAZO4-450X-4	630	3000/6000	1500/1800	1,0	146,8/73,4	95,0	0,87	1,2	5,5	2,3	22	300
DAZO4-450X-4Д		10000			43,0		0,89		5,6		24	
DAZO4-450Y-4	800	3000/6000			183,8/91,9	95,2	0,88			2,4	26	350
DAZO4-450Y-4Д		10000			54,4	95,4	0,89		5,8	2,3	27	
DAZO4-450X-6	500	3000/6000	1000/1200		120,2/60,1	94,6	0,85		5,5	2,2	33	750
DAZO4-450X-6Д		10000			35,4	94,7	0,86				36	
DAZO4-450Y-6	630	3000/6000			150,2/75,1	95,0	0,85				39	900
DAZO4-450Y-6Д		10000			44,5		0,86				42	
DAZO4-450X-8	315	3000/6000	750/900		80,6/40,3	94,0	0,80		5,0		37	800
DAZO4-450X-8Д		10000			22,9	94,5	0,84				41	
DAZO4-450YK-8	400	3000/6000			102,0/51,0	94,4	0,80				43	1300
DAZO4-450YK-8Д		10000			29,7		0,82				45	
DAZO4-450Y-8	500	3000/6000			127,2/63,6	94,6	0,80				50	1500
DAZO4-450Y-8Д		10000			36,2	95,0	0,84				52	
DAZO4-450X-10	250	3000/6000	600/720	1,1	66,0/33,0	92,5	0,78	1,3	6,0	2,3	38	
DAZO4-450X-10Д		10000			19,3	93,5	0,80	1,1	4,7	2,1	42	
DAZO4-450Y-10	315	3000/6000			82,0/41,0	93,0		1,3	6,0	2,3	43	
DAZO4-450Y-10Д		10000			24,2	93,8		1,1	4,7	2,1	45	
DAZO4-450X-12	200	3000/6000	500/600	1,2	56,0/28,0	91,7	0,75	1,3	5,5	2,3	47	1330
DAZO4-450X-12Д		10000			15,9	93,2	0,78	1,1	4,5	2,1	50	
DAZO4-450Y-12	250	3000/6000			70,0/35,0	92,2	0,75	1,3	5,5	2,3	52	1625
DAZO4-450Y-12Д		10000			19,8	93,5	0,78	1,1	4,5	2,1	54	

* *3000V/6000V - s tator phase connection Δ/Y, 10000V - phase connection - Y.*
** *Data for frequency 50Hz are indicated in the numerator, for frequency 60Hz are indicated in the denomenator.*
*** *Data for voltage 3kV are indicated in the numerator, data for 6kV are indicated in the denomenator.*



OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS DAZO4-400

Type designation	l_1	l_{10}	l_{11}	l_{12}	l_{30}	l_{31}	l_{34}	l_{91}	l_{92}	b_1	b_{10}	b_{11}	b_{12}	b_{30}	b_{31}	h	h_5	h_{31}	h_{34}	d	d_1	d_{10}	Mass, kg
DAZO4-400XKS-4																							2190
DAZO4-400XK-4		900	1140		1775		740											1180					
DAZO4-400XK-4Д																							2240
DAZO4-400X-4																							2330
DAZO4-400X-4Д																							2380
DAZO4-400Y-4		1000	1240		1875		840											1240					2630
DAZO4-400YK-4Д																							2490
DAZO4-400Y-4Д																							2790
DAZO4-400XK-6																							2220
DAZO4-400XK-6Д		900	1140		1775		740											1180					2270
DAZO4-400X-6	210			270		80		200	330	28	800	940	120	1320	710	400	106		100	M10	100	35	2380
DAZO4-400X-6Д																							2430
DAZO4-400Y-6		1000	1240		1875		840											1240					2650
DAZO4-400YK-6Д																							2600
DAZO4-400Y-6Д																							2830
DAZO4-400X-8		900	1140		1775		740											1180					2340
DAZO4-400X-8Д																							2600
DAZO4-400Y-8																							2610
DAZO4-400YK-8Д		1000	1240		1875		840											1240					2860
DAZO4-400Y-10																							2590
DAZO4-400Y-10Д																							2840

OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS DAZO4-450

Type designation	l_1	l_{10}	l_{11}	l_{12}	l_{31}	l_{34}	l_{30}	l_{91}	l_{92}	b_1	b_{10}	b_{11}	b_{12}	b_{30}	b_{31}	h	h_5	h_{31}	h_{34}	d	d_1	d_{10}	Mass, kg
DAZO4-450X-4		900	1190			1010	1750											1365					2900
DAZO4-450X-4Д		1000	1290			1110	1850											1400					3350
DAZO4-450Y-4																							3300
DAZO4-450Y-4Д		1120	1410			1230	1970																3750
DAZO4-450X-6		900	1190			1010	1750											1365					2950
DAZO4-450X-6Д		1000	1290			1110	1850											1400					3400
DAZO4-450Y-6																							3350
DAZO4-450Y-6Д		1120	1410			1230	1970																3800
DAZO4-450X-8		900	1190			1010	1750											1365					2870
DAZO4-450X-8Д																							3320
DAZO4-450YK-8																							3200
DAZO4-450YK-8Д	210	1000	1290	270	103	1110	1850	224	330	28	900	1040	120	1420	760	450	116	1400	206	M10	110	35	3650
DAZO4-450Y-8																							3470
DAZO4-450Y-8Д		1120	1410			1230	1970																3920
DAZO4-450X-10		900	1190			1010	1750											1365					2770
DAZO4-450X-10Д		1000	1290			1110	1850											1400					3220
DAZO4-450Y-10																							3100
DAZO4-450Y-10Д		1120	1410			1230	1970																3550
DAZO4-450X-12		900	1190			1010	1750											1365					2860
DAZO4-450X-12Д		1000	1290			1110	1850											1400					3310
DAZO4-450Y-12																							3120
DAZO4-450Y-12Д		1120	1410			1230	1970																3570

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS DAZO4-560, W ITH VOLTAGE 3000V, 6000V, 100000V

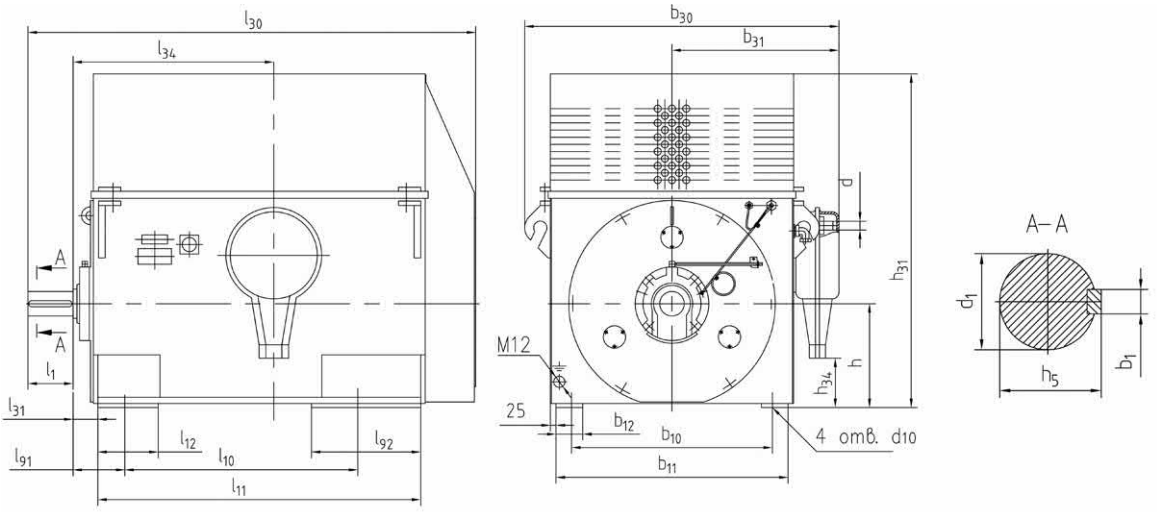
Type designation	Power, kW	Voltage, V*	Rotational speed, rpm.**	Sliding, %	stator current, A***	Effic., %	cosφ	Starting torque ratio	Starting current ratio	Maximum torque ratio	Inertia moment kg*m²	
											rotor	permissible mechanism
DAZO4-560XK-4	1000	3000/6000	1500/1800	1,0	232/115	95,5	0,9	1,1	7.0	2.4	186	2700
DAZO4-560X-4	1250				290,0/145,0		0,87		6,9	2,5		
DAZO4-560X-4Д	1000	10000			70,5	95,5	0,86		6,7	2,4	160	2100
DAZO4-560YK-4	1600	3000/6000			365,0/182,5	95,8	0,88		6,9	2,5	218	3100
DAZO4-560YK-4Д	1250	10000			87,0	95,3	0,87		6,7	2,4	188	2500
DAZO4-560Y-4	2000	3000/6000			455,0/227,5	96,0	0,88		6,9	2,5	225	3400
DAZO4-560Y-4Д	1600	10000			109,5	95,6			6,7	2,4	218	3000
DAZO4-560XK-6	800	3000/6000	1000/1200		191/95.2	95.3	0.84	1,2	6,7	2,2	276	8300
DAZO4-560X-6	1000				238,0/119,0	95,5	0,85	1,3	6,5	2,3		
DAZO4-560X-6Д	800	10000			58,0	94,9	0,84	1,1	6,1	2,2	240	6100
DAZO4-560YK-6	1250	3000/6000			292,0/146,0	95,8	0,86	1,3	6,5	2,3	321	9600
DAZO4-560YK-6Д	1000	10000			71,5	95,2	0,85	1,2	6,2	2,2	280	7300
DAZO4-560Y-6	1600	3000/6000			374,0/187,0	96,0	0,80	1,3	6,5	2,3	377	11000
DAZO4-560Y-6Д	1250	10000			89,0	95,5	0,85	1,2	6,2	2,2	321	8800
DAZO4-560X-8	630	3000/6000	750/900		162,0/81,0	94.7	0,79	1,3	6,0	2,2	349	12300
DAZO4-560X-8Д		10000			49,5		0,78	1,2	5,8	2,1		8400
DAZO4-560YK-8	800	3000/6000			202,0/101,0	95,0	0,80	1,3	6,0	2,2	420	14700
DAZO4-560YK-8Д		10000			61,5	94,7	0,79	1,2	5,8	2,1		11000
DAZO4-560Y-8	1000	3000/6000			253,0/126,5	95,3	0,80	1,3	6,0	2,2	477	16000
DAZO4-560Y-8Д		10000			77,0	95,0	0,79	1,2	5,8	2,1		14000
DAZO4-560XK-10	400	3000/6000	600/720	1,1	105,0/52,5	93,6	0,78		5,9	2,2	300	12800
DAZO4-560XK-10Д		10000			32,5	93,4	0,76		5,8	2,1		7100
DAZO4-560X-10	500	3000/6000			129,0/64,5	94,1	0,79	1,3	6,0	2,3	350	16100
DAZO4-560X-10Д		10000			40,0	93,8	0,77	1,2	5,9	2,2		10000
DAZO4-560YK-10	630	3000/6000			162,0/81,0	94,6	0,79	1,3	6,0	2,3	422	20300
DAZO4-560YK-10Д		10000			49,5	94,3	0,78	1,2	5,9	2,2		14000
DAZO4-560Y-10	800	3000/6000			202,0/101,0	94,9	0,80	1,3	6,0	2,3	480	23900
DAZO4-560Y-10Д		10000			61,5	94,6	0,79	1,2	5,9	2,2		20000
DAZO4-560XK-12	315	3000/6000	500/600	1,2	87,0/43,5	92,9	0,74	1,3	5,5		300	20300
DAZO4-560XK-12Д		10000			27,1	92,6	0,73	1,2	5,2	2,1		9800
DAZO4-560X-12	400	3000/6000			109,0/54,5	93,4	0,75	1,3	5,5	2,2	350	24100
DAZO4-560X-12Д		10000			33,5	93,1	0,74	1,2	5,2	2,1		13000
DAZO4-560YK-12	500	3000/6000			136,0/68,0	93,9	0,75	1,3	5.5	2,2	422	30000
DAZO4-560YK-12Д		10000			41,5	93,6	0,74	1,2	5,2	2,1		19000
DAZO4-560Y-12	630	3000/6000			170,0/85,0	94,4	0,75		5.4	2,2	480	33400
DAZO4-560Y-12Д		10000			51,5	94,1		1,1	5,1	2,1		22500

* *3000V/6000V – stator phase connection Δ/Y, 10000V – phase connection – Y*

** *Data for frequency 50Hz are indicated in the numerator, for frequency 60Hz are indicated in the denomenator.*

*** *Data for voltage 3kV are indicated in the numerator, data for 6kV are indicated in the denomenator.*

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES DAZO4-560



Type designation	l_1	l_{10}	l_{11}	l_{12}	l_{30}	l_{31}	l_{34}	l_{91}	l_{92}	b_1	b_{10}	b_{11}	b_{12}	b_{30}	b_{31}	h	h_5	h_{31}	h_{34}	d	d_1	d_{10}	Mass, kg
DAZO4-560XK-4																							
DAZO4-560X-4		1000	1390		2215		875																4840
DAZO4-560X-4Д																							4520
DAZO4-560YK-4																							5570
DAZO4-560YK-4Д		1250	1635		2460		1125																5200
DAZO4-560Y-4																							6040
DAZO4-560Y-4Д																							5580
DAZO4-560XK-6																							
DAZO4-560X-6		1000	1390		2215		875																4930
DAZO4-560X-6Д																							4610
DAZO4-560YK-6																							5630
DAZO4-560YK-6Д		1250	1635		2460		1125																5310
DAZO4-560Y-6																							5650
DAZO4-560Y-6Д																							5670
DAZO4-560X-8		1000	1390		2215		875																4640
DAZO4-560X-8Д																							4660
DAZO4-560YK-8																							5400
DAZO4-560YK-8Д	250	1250	1635	320	2460	130	1125	250	380	36	1000	1230	170	1615	860	560	148	1645	400	M10	140	42	5420
DAZO4-560Y-8																							5750
DAZO4-560Y-8Д																							5820
DAZO4-560XK-10																							4450
DAZO4-560XK-10Д		1000	1390		2215		875																4490
DAZO4-560X-10																							4500
DAZO4-560X-10Д																							4510
DAZO4-560YK-10																							5300
DAZO4-560YK-10Д		1250	1635		2460		1125																5280
DAZO4-560Y-10																							5620
DAZO4-560Y-10Д																							5650
DAZO4-560XK-12																							4200
DAZO4-560XK-12Д		1000	1390		2215		875																4250
DAZO4-560X-12																							4500
DAZO4-560 X -12Д																							4510
DAZO4-560YK-12																							5250
DAZO4-560YK-12Д		1250	1635		2460		1125																5260
DAZO4-560Y-12																							5600
DAZO4-560Y-12Д																							5610

ELECTRIC MOTORS A4-355-560

Asynchronous three-phase electric motors of A4 type with a squirrel-cage rotor are designed to drive mechanisms with severe starting conditions that do not require rotational speed control, also to drive pumps, airblowers, fans and other mechanisms with similar start characteristics, including mechanisms for thermal and nuclear power plants.

The electric motors A4 are manufactured with height of the axis of rotation 355, 400, 450, 560 power from 200 up to 1000kW, rotational speed from 500 up tp 1500 rpm., supply voltage 3000V, 6000V, 10000V..

At customer's request the electric motors can be manufactured with overall dimensional, installation and mounting sizes, which differ from standard, as well as for other power, voltage, rotational speed and mounting configuration IM1002, IM2001, IM3001, IM3011

The electric motors A4 can be manufactured both with cast aluminum, and copper rotor winding.

The best construction, high quality of applied materials and components, the progressive production technology supply high technical level, ensure safety, reliability and flexibility in application.

Operation mode is continuous S1 from network frequency 50Hz, 60Hz.

Allow operation from frequency converters (S10, S9, S8).

Climatic construction type: У3, УХЛ4.

Mounting configuration:

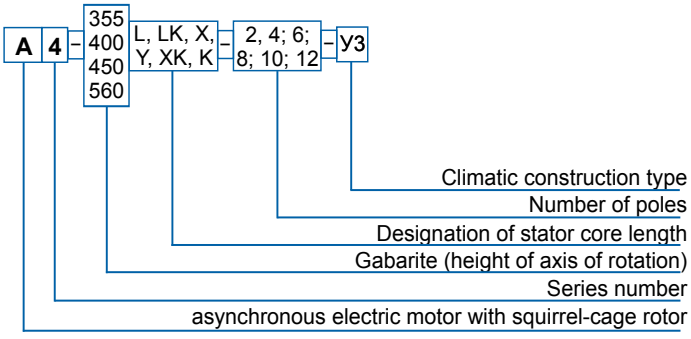
IM1001

Protection degree for:

motors	IP23
terminal box	IP55

Cooling method:IC01.

TYPE DESIGNATION



Main advantages of electric motors A4 over analogues:

1. Improving the active parts to obtain high energy parameters at lower mass.

2. The application in the motor construction of cast squirrel-cage rotor provided a number of advantages over other analogues with welded winding:

- select the best configuration and dimensions of groove, increasing starting moments at relatively small values of starting currents;

-eliminate hard preventive work during operation, put through inspection and restoration of welded joints of the rotor winding;

Improve the motors' safety in operation excluding the possible sparking and overeheating in welded joints.

The electric motors A4 are manufactured with a short circuited rotor winding made of copper for severe operating conditions (frequent, long starts).

These motors allow 15-20 starts of the electric motor instead of 6-8 starts permissible for analogues with aluminum rotor winding.

3. Improved ventilation and cooling system of electric эmotor provides the maximum heating of active parts working at nominal load, with the exception of local overheating.

4. The application of vacuum pressure impregnation technology **(HPI)** of windings with epoxy compaund, which is the basis of isolation **«Monolith-2»**, heat-resistance class "F" due to the construction features of the active parts of cooling systems.

5. Using bearing produced by company **SKF** (at customer's request) increases the service life by 1.5 times.

6. Equipping with temperature control sensors of the bearing units and air temperature control inside внутри of the motor, with НСХ 50М, 100П and Pt10, and also, at customer's request,with vibration control sensors.

7. Equipment of electric motors by modern devices for remote temperature control like:

- **UKT-12 (9 channels)** (temperature control at 9 points: 2 - bearings, 6 - winding and iron of stator, 1 - motor housing. information output on PC in real time);

- **UKT-12** (temperature control at 12 points: 2 points - bearings, 6 points - winding and iron of stator, 4 points - ndriven mechanism, information output on PC in real time);

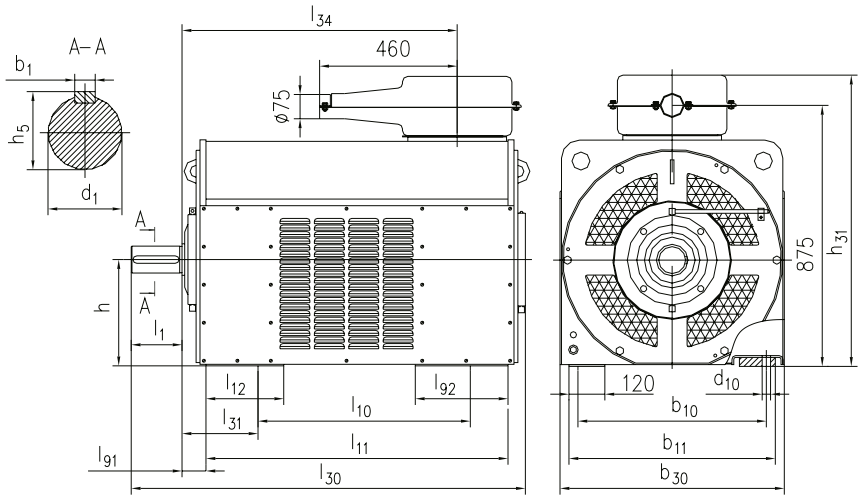
- temperature and vibration monitoring **UKVT**,equipped with two three-coordinate vibration sensors of 3KDV type (the possibility to control vibration of bearings support in three coordinates X, Y, Z, temperature control in 9 points: 2 points - bearings, 6 points - winding and iron of stator, 1 point - motor housing, information output on PC in real time).

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS A4-355

Type designation	Power, kW	Voltage, V*	Rotational speed (synch.), rpm.	Sliding, %	stator current, A***	Effic., %	Cos φ	Starting torque ratio	Starting current ratio	Maximum torque ratio	Inertia moment, kg*m²	
											rotor	permissible mechanism
A4-355LK-4	200	3000/6000	1500/1800	1,0	45,8/22,9	93,2	0,9	0,9	6,0	2,3	5,1	83
A4-355L-4	250				57,2/28,6	93,4			5,7	2,2	5,6	104
A4-355X-4	315				72,0/36,0	93,6					6,5	128
A4-355Y-4	400				90,0/45,0	94,0	0,91				8,1	157
A4-355L-6	200		1000/1200		49,6/24,8	94,0	0,83	1,0	5,4	2,5	3,4	233
A4-355X-6	250				61,4/30,7	94,4			5,2		3,3	287

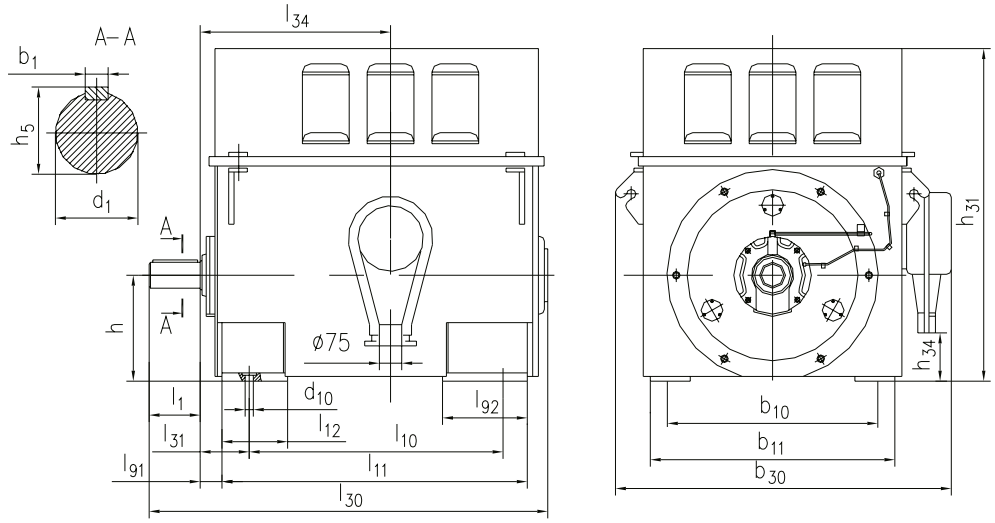
* 3000V/6000V - stator phase connection Δ/Y.
** Data for frequency 50Hz are indicated in the numerator.
*** Data for voltage 3kV are indicated in the numerator, data for 6kV are indicated in the denomenator.

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS A4-355



Type designation	b_1	b_{10}	b_{11}	b_{30}	d_1	d_{10}	h	h_5	h_{31}	l_1	l_{10}	l_{11}	l_{12}	l_{30}	l_{31}	l_{34}	l_{91}	l_{92}	Mass, kg
A4-355LK-4	25	610	700	750	90	28	355	95	975	170	630	950	260	1258	254	860	80	310	1450
A4-355L-4																			
A4-355X-4											710	1020		1328		930			1500
A4-355Y-4											800	1110		1418		1020			1550
A4-355L-6											630	1020		1328		930			1500
A4-355X-6											710	1110		1418		1020			1550

Drawing of motors A4-400, A4-450, A4-560



TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS A4-400, WITH VOLTAGE 3000, 6000, 10000V

Type designation	Power, kW	Voltage, V*	Rotational speed (synch.), rpm. **	Sliding, %	stator current, A***	Effic., %	Cos φ	Starting torque ratio	Starting current ratio	Maximum torque ratio	Inertia moment, kg*m²	
											rotor	дpermissible mechanism
A4-400XKS-4	315	3000/6000	1500/1800	1,0	73,8/36,9	94,4	0,86	1,0	6,0	2,6	8	160
A4-400XK-4	400				93,6/46,8	94,6	0,87					
A4-400X-4	500				115,4/57,7	94,8			6,2		11	195
A4-400Y-4	630				145,0/72,5	95,1	0,88		6,4		14	240
A4-400XK-6	315		1000/1200		76,0/38,0	93,6	0,85		5,7	2,2	16	300
A4-400X-6	400				95,2/47,6	94,0	0,86				19	350
A4-400Y-6	500				120,0/60,0	94,4	0,85		6,0		23,5	535
A4-400X-8	250		750/900		60,4/30,2	93,4	0,84		5,2	2,0	22,5	438
A4-400Y-8	315				76,0/38,0	93,8	0,85		5,0		26,5	502
A4-400X-10	200		600/720	1,1	55,0/27,5	92,0	0,76			1,9	22	842
A4-400Y-10	250				67,6/33,8	92,5	0,77		4,8	1,8	25	1029
A4-400XK-4Д	315	10000	1500/1800	1,0	21,7	94,2	0,89		5,3	2,2	11	170
A4-400X-4Д	400				27,4	94,6					12	230
A4-400YK-4Д	500				34,2	94,9					14	280
A4-400Y-4Д	630				42,9	95,2					16	350
A4-400XK-6Д	250		1000/1200		17,8	94,1	0,86		5,0	2,1		300
A4-400X-6Д	315				23,4	94,5					19	350
A4-400YK-6Д	400				28,4	94,7					22	600
A4-400Y-6Д	500				35,3	95,0					24	720
A4-400X-8Д	250		750/900		19,2	94,2	0,8	0,9	4,5	2,0	20	500
A4-400YK-8Д	315				24,1	94,5					22	600

** Data for frequency 50Hz are indicated in the numerator, for frequency 60Hz are indicated in the denomenator.
*** Data for voltage 3kV are indicated in the numerator, data for 6kV are indicated in the denomenator.

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF MOTORS A4-400

Type designation	b_1	b_{10}	b_{11}	b_{30}	b_{31}	d_1	d_{10}	h	h_5	h_{31}	h_{34}	l_1	l_{10}	l_{11}	l_{12}	l_{30}	l_{31}	l_{34}	l_{91}	l_{92}	Mass, kg
A4-400XK-4	28	800	940	1320	710	100	35	400	106	970	100	210	900	1140	270	1490	200	740	80	330	1910
A4-400X-4																					2070
A4-400Y-4													1000	1240		1590		840			2250
A4-400XK-6													900	1140		1490		740			1960
A4-400X-6																					2110
A4-400Y-6													1000	1240		1590		840			2300
A4-400X-8													900	1140		1490		740			2150
A4-400Y-8													1000	1240		1590		840			2350
A4-400X-10													900	1140		1490		740			2300
A4-400Y-10													1000	1240		1590		840			2350
A4-400XK-4Д													900	1140		1490		740			1900
A4-400X-4Д													1000	1240		1590		840			2030
A4-400YK-4Д																					2250
A4-400Y-4Д														1340		1690		940			2390
A4-400XK-6Д													900	1140		1490		740			1900
A4-400X-6Д													1000	1240		1590		840			2070
A4-400YK-6Д														1340		1690		940			2360
A4-400Y-6Д																					2530
A4-400X-8Д														1240		1590		840			2300
A4-400YK-8Д														1340		1690		940			2820

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS A4-450, WITH VOLTAGE 3000, 6000, 10000V

Type designation	Power, kW	Voltage, V*	Rotational speed (synch.), rpm.**	Sliding, %	current stator, A***	Effic., %	Cos φ	Starting torque ratio	Starting current ratio	Maximum torque ratio	Inertia moment, kg*m²	
											rotor	permissible mechanism
A4-450X-4	800	3000/6000	1500/1800	1,1	185,8/92,9	95,3	0,87	1,0	5,0	2,0	21	300
A4-450Y-4	1000				226,4/113,2	95,5	0,89				28	362
A4-450X-6	630		1000/1200		148,8/74,4	94,7	0,86		4,5	1,9	48	660
A4-450Y-6	800				194,8/97,4	95,2	0,83				53	850
A4-450X-8	400		750/900		105,0/52,5	93,8	0,82	0,9		2,0	41	900
A4-450YK-8	500				126,2/63,1	94,3	0,81		5,0	1,9	49	1355
A4-450Y-8	630				164,0/82,0	94,8	0,78				53	1100
A4-450X-10	315		600/720		80,6/40,3	93,0	0,81	1,0	4,8		47,5	1267
A4-450Y-10	400				101,8/50,9	93,4			4,5	1,8	57,7	1572
A4-450X-12	250		500/600	1,2	66,4/33,2	93,0	0,78		4,6	2,0	47	1624
A4-450Y-12	315				83,4/41,7	93,2					52	2000
A4-450X-4Д	800	10000	1500/1800	1,0	55,7	95,3	0,87	1,0	5,0	2,0	23	300
A4-450Y-4Д	1000				67,9	95,5	0,89				30	362
A4-450X-6Д	630		1000/1200		44,6	94,7	0,86		4,5	1,9	50	660
A4-450Y-6Д	800				58,4	95,2	0,83				55	850
A4-450X-8Д	400		750/900		31,5	93,8	0,82	0,9		2,0	43	900
A4-450YK-8Д	500				37,8	94,3	0,81		5,0	1,9	51	1350
A4-450Y-8Д	630				49,2	94,8	0,78				55	1100
A4-450X-10Д	315		600/720	1,1	24,1	93,0	0,81	1,0	4,8		49,5	1267
A4-450Y-10Д	400				30,5	93,4			4,5	1,8	59,7	1572
A4-450X-12Д	250		500/600	1,2	19,9	93,0	0,78		4,6	2,0	49	1624
A4-450Y-12Д	315				25,0	93,2					54	2000

* 3000V/6000V – stator phase connection Δ/Y, 10000B – phase connection– Y.
** Data for frequency 50Hz are indicated in the numerator, for frequency 60Hz are indicated in the denomenator.
*** Data for voltage 3kV are indicated in the numerator.

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS A4-450

Type designation	b_1	b_{10}	b_{11}	b_{30}	b_{31}	d_1	d_{10}	h	h_5	h_{31}	h_{34}	l_1	l_{10}	l_{11}	l_{12}	l_{30}	l_{31}	l_{34}	l_{91}	l_{92}	Mass, kg
A4-450X-4	28	900	1040	1420	760	110	35	450	116	1210	206	210	900	1190	270	1590	224	1010	103	330	2560
A4-450Y-4													1000	1290		1690		1110			2890
A4-450X-6													900	1190		1590		1010			2600
A4-450Y-6													1000	1290		1690		1110			2940
A4-450X-8													900	1190		1590		1010			2540
A4-450YK-8													1000	1290		1690		1110			2790
A4-450Y-8																					3050
A4-450X-10													900	1190		1590		1010			2450
A4-450Y-10													1000	1290		1690		1110			2690
A4-450X-12													900	1190		1590		1010			2570
A4-450Y-12													1000	1290		1690		1110			2790
A4-450X-4Д													900	1190		1590		1010			2660
A4-450Y-4Д													1000	1290		1690		1110			2990
A4-450X-6Д													900	1190		1590		1010			2700
A4-450Y-6Д													1000	1290		1690		1110			3040
A4-450X-8Д													900	1190		1590		1010			2640
A4-450YK-8Д													1000	1290		1690		1110			2890
A4-450Y-8Д																					3150
A4-450X-10Д													900	1190		1590		1010			2550
A4-450Y-10Д													1000	1290		1690		1110			2790
A4-450X-12Д													900	1190		1590		1010			2670
A4-450Y-12Д													1000	1290		1690		1110			2890

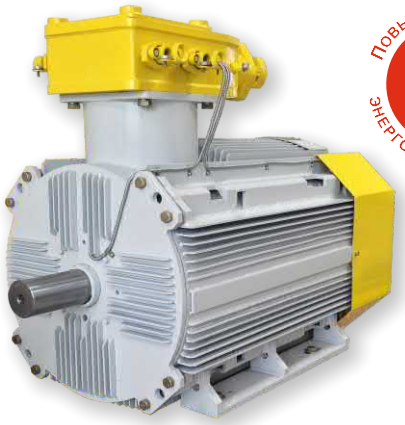
TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS A4-560, WITH VOLTAGE 3000, 6000, 10000V

Motor type	Power kW	Voltage, V*	Rotational speed, rpm.**	Sliding, %	stator current, A***	effic., %	Cos φ	Starting torque ratio	starting current ratio	Maximum torque ratio	Inertia moment kg* m²	
											rotor	permissible mechanism
A4-560X-4	1250	3000/6000	1500/1800	1,0	290,0/145,0	95,5	0,87	1,1	6,9	2,5	186	2700
A4-560YK-4	1600	3000/6000			365,0/182,5	95,8	0,88		6,9	2,5	218	3100
A4-560YK-4Д	1250	10000			87,0	95,3	0,87		6,7	2,4	188	2500
A4-560Y-4	2000	3000/6000			455,0/227,5	96,0	0,88		6,9	2,5	225	3400
A4-560Y-4Д	1600	10000			109,5	95,6			6,7	2,4	218	3000
A4-560X-6	1000	3000/6000	1000/1200		238,0/119,0	95,5	0,85	1,3	6,5	2,3	276	8300
A4-560YK-6	1250	3000/6000			292,0/146,0	95,8	0,86	1,3	6,5	2,3	321	9600
A4-560YK-6Д	1000	10000			71,5	95,2	0,85	1,2	6,2	2,2	280	7300
A4-560Y-6	1600	3000/6000			374,0/187,0	96,0	0,80	1,3	6,5	2,3	377	11000
A4-560Y-6Д	1250	10000			89,0	95,5	0,85	1,2	6,2	2,2	321	8800
A4-560YK-8	800	3000/6000	750/900		202,0/101,0	95,0	0,80	1,3	6,0	2,2	420	14700
A4-560YK-8Д		10000			61,5	94,7	0,79	1,2	5,8	2,1		11000
A4-560Y-8	1000	3000/6000			253,0/126,5	95,3	0,80	1,3	6,0	2,2	477	16000
A4-560Y-8Д		10000			77,0	95,0	0,79	1,2	5,8	2,1		14000
A4-560X-10	500	3000/6000	600/720	1,1	129,0/64,5	94,1	0,79	1,3	6,0	2,3	350	16100
A4-560X-10Д		10000			40,0	93,8	0,77	1,2	5,9	2,2		10000
A4-560YK-10	630	3000/6000			162,0/81,0	94,6	0,79	1,3	6,0	2,3	422	20300
A4-560YK-10Д		10000			49,5	94,3	0,78	1,2	5,9	2,2		14000
A4-560Y-10	800	3000/6000			202,0/101,0	94,9	0,80	1,3	6,0	2,3	480	23900
A4-560Y-10Д		10000			61,5	94,6	0,79	1,2	5,9	2,2		20000
A4-560X-12	400	3000/6000	500/600	1,2	109,0/54,5	93,4	0,75	1,3	5,5	2,2	350	24100
A4-560X-12Д		10000			33,5	93,1	0,74	1,2	5,2	2,1		13000
A4-560YK-12	500	3000/6000			136,0/68,0	93,9	0,75	1,3	5.5	2,2	422	30000
A4-560YK-12Д		10000			41,5	93,6	0,74	1,2	5,2	2,1		19000
A4-560Y-12	630	3000/6000			170,0/85,0	94,4	0,75		5.4	2,2	480	33400
A4-560Y-12Д		10000			51,5	94,1		1,1	5,1	2,1		22500

** Data for frequency 50Hz are indicated in the numerator, for frequency 60Hz are indicated in the denomenator.
*** Data for voltage 3kV are indicated in the numerator, data for 6kV are indicated in the denomenator.

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS A4-560

Motor type	l_1	l_{10}	l_{11}	l_{12}	l_{30}	l_{31}	l_{34}	l_{91}	l_{92}	b_1	b_{10}	b_{11}	b_{30}	b_{31}	h	h_5	h_{31}	h_{34}	d_1	d_{10}	Mass, kg
A4-560X-4	250	1000	1390	320	1910	250	875	130	380	36	1000	1230	1615	860	560	148	1645	400	140	42	4540
A4-560YK-4		1250	1635		2155		1125														5270
A4-560YK-4Д																					4900
A4-560Y-4																					5740
A4-560Y-4Д																					5280
A4-560X-6		1000	1390		1910		875														4630
A4-560YK-6		1250	1635		2155		1125														5330
A4-560YK-6Д																					5010
A4-560Y-6																					5350
A4-560Y-6Д																					5370
A4-560YK-8																					5100
A4-560YK-8Д																					5120
A4-560Y-8																					5450
A4-560Y-8Д																					5520
A4-560X-10		1000	1390		1910		875														4200
A4-560X-10Д																					4210
A4-560YK-10		1250	1635		2155		1125														5000
A4-560YK-10Д																					4980
A4-560Y-10																					5320
A4-560Y-10Д																					5350
A4-560X-12		1000	1390		1910		875														4200
A4-560 X -12Д																					4210
A4-560YK-12		1250	1635		2155		1125														4950
A4-560YK-12Д																					4960
A4-560Y-12																					5300
A4-560Y-12Д																					5310



LOW VOLTAGE ELECTRIC MOTORS AZO-250-355

Asynchronous three-phase airflow-cooled electric motors of AZO type with squirrel-cage rotor are designed to drive pumps, airblowers, smoke exhausters and other mechanisms.

Operation mode: continuous S1 from network frequency 50Hz.
Allow operation from frequency converters (S8, S9, S10).
Climatic construction type:

У1, У2, У5, УХЛ1, УХЛ2, УХЛ4, Т2, Т5

Mounting configuration:

IM1001, IM2001, IM3001,IM3011

Protection degree for:

motor housing and terminal box	**IP54 IP55 (on order)**
outdoor fan enclosure	**IP20**

Cooling method:

IC411	Double-circuit cooling system. The inner contour is closed, the external contour is open with built-in fan located on the motor shaft and colling the outside surface of the motor
IC516	Double-circuit cooling system. The inner contour is closed, the external contour is open with built-in heat exchanger and separately driven fan) - at customer's request

The electric motors AZO allow the right and the left direction of rotation. The direction of rotation is changed only from rest state.

The insulating materialsof stator winding have heat-resistance class «H».

At the customer's request the electric motors are equipped with temperature control devices **UKT-12 (9 channels), UKT12 (12 channels)** or **UKVT**.

Main advantages of electric motors AZO over analogues:

1. Improving the active parts to obtain high energy parameters at lower mass.
2. The application in the motor construction of cast aluminum squirrel-cage rotor provided a number of advantages over other analogues with welded winding:

Select the best configuration and dimensions of groove, increasing starting moments at relatively small values of starting currents;

Eliminate hard preventive work during operation, put through inspection and restoration of welded joints of the rotor winding;

Improve the motors' safety in operation excluding the possible sparking and overeheating in welded joints.

3. The application in the motor construction of copper squirrel-cage rotor, performed by special technology,provides reliability of work with mechanisms, at hard, slow starts and the number of starts per day 15-20 instead of 6-8 starts permissible for analogues with aluminum welded rotor winding, increasing service life by 1,5-2 times in comparison with electric motors with aluminium squirrel-cage rotor.

4. Exceptional stator housing design of increased rigidity,ensuring a reliable fit of stator pack, as well as lower values of vibration and noise.
5. Application in the terminal boxes high reliable one-pice insulating panel instead of porcelain insulators.
6. Improved ventilation and cooling system of electric motors provides the maximum heating of active parts working at nominal load, with the exception of local overheating.

7. The possibility of operation of electric motors at adjusting the rotation speed modes as part of adjustable-frequency electric drives.

Electric motors with terminal box upward, and also at customer's request with terminal box from the left and from the right. Electric motors have the left and the right direction of rotation.

Base equipment of the motors provide:

- stator winding temperature control with four wire thermal converters with HCX 50M in quantity of 6 pieces (2 pieces in each phase);
- temperature relay of stator winding;
- bearing temperature control with four wire thermal converters with with HCX 50M in quantity of 2 pieces (1 piece on each bearing);
- installation places of vibration sensors in quantity of 6 sieces (3 pieces on each bearing unit on three mutually perpendicular planes);
- bearing units replenishing and replacing lubricants;
- connection of two power cables, outer dimeter of which is up to 75 mm.

At customer's request motors are equipeed with:

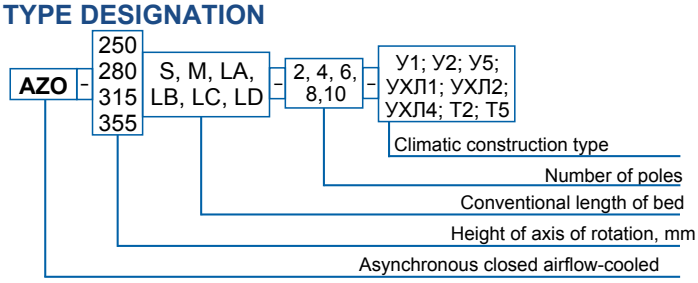
- temperature control of stator winding by four-wire thermal converter with HCX 50П, 100П, Pt100 in quantity up to 12 pieces;
- PTC-termistors Pof stator winding (instead of temperature relay));
- four-wire bearing temperature control sensors with HCX 50П, 100П, Pt100;
- vibration control sensors in quantity up to 6 pieces;
- rotor speed sensors;
- selfregulating anti-condensation heating (instead of temperature relay and PTC-termistors);
- SKF bearings or bearings of the other manufacturers;
- current-isolated bearing unit.

At customer's request electric motors are equipped with adjustable legs with bolt fasteners that allows you to perform an assembly with legs directly on the object of operation (without welding and mechanical operation) with terminal box location from the top, from the left or from the right.

The electric motors of AZO series are interchangeable to similar electric motors of the other manufacturers.

At the customer's request the electric motors can be produced with special mounting and installation dimensions or according to mounting configuration IM1002, IM2002, IM3002.

TYPE DESIGNATION



TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AZO-250(280) WITH VOLTAGE 380/660V, 660/1140V, FREQUENCY NETWORK 50Hz

Type of motor	Power, kW	Nominal stator current, A*	Rotational speed, rpm.**	efficiency ,%	Power factor	Sliding, %	Starting torque ratio	Maximum torque ratio	Starting current ratio
voltage 380/660 V, 660/1140 V, frequency network 50Hz, 60Hz									
250(280)S-2	75	136,6/78,6	3000/3600	93,8	0,90	1,0	1,2	3,0	7,0
		77,7/45,0		93,9	0,91				
250(280)M-2	90	162,9/93,8		94,1	0,90	1,0	1,2	3,0	7,0
		93,3/54,0		94,2	0,91				
250(280)LA-2	110	196,3/113,0		94,3		1,0	1,2	3,0	7,0
		113,7/65,8			0,90				
250(280)LB-2	132	234,5/135,0		94,6	0,92	1,0	1,1	2,7	6,5
		134,9/78,1		94,7	0,91				
250(280)LC-2	160	281,4/162,0		94,8	0,92	1,0	1,1	2,8	6,5
		161,8/93,7		94,9					
250(280)LD-2	200	349,1/201,0		95,0		1,0	1,2	3,0	7,0
		202,1/117,0							
250(280)S-4	75	140,2/80,7	1500/1800	94,0	0,87	1,3	1,2	2,7	6,5
		80,1/46,4			0,88				
250(280)M-4	90	167,1/96,2		94,2	0,87	1,3	1,2	2,7	6,5
		95,9/55,5		94,3	0,88				
250(280)LA-4	110	201,5/116,0		94,5		1,3	1,2	2,7	6,3
		116,5/67,5							
250(280)LB-4	132	241,4/139,0		94,7		1,3	1,2	2,6	6,0
		140,3/81,2		94,8	0,87				
250(280)LC-4	160	293,5/169,0		94,9		1,3	1,2	2,6	6,0
		167,2/96,8		95,0	0,89				
250(280)LD-4	200	364,7/210,0		95,1	0,88	1,3	1,3	2,8	6,2
		209,0/121,0		95,2					
250(280)S-6	45	87,0/50,1	1000/1200	93,2	0,84	1,3	1,1	2,5	5,8
		50,8/29,4		92,8	0,83				
250(280)M-6	55	107,5/61,9		93,5		1,3	1,2	2,5	6,0
		61,1/35,4		93,2	0,85				
250(280)LA-6	75	145,0/83,5		93,8	0,84	1,3	1,2	2,5	6,0
		83,1/48,1		93,7					
250(280)LB-6	90	166,6/95,9		94,0	0,85	1,3	1,2	2,5	5,8
		99,3/57,5		94,1	0,84				
250(280)LC-6	110	208,4/120,0		94,3	0,85	1,3	1,2	2,5	5,8
		120,6/69,8							
250(280)LD-6	132	241,4/139,0		94,7		1,3	1,2	2,5	5,8
		142,0/82,2		94,6	0,86				
250(280)S-8	37	73,8/42,5	750/900	92,4	0,82	1,6	1,2	2,4	5,5
		42,5/24,6		92,5					
250(280)M-8	45	88,4/50,9		92,6	0,84	1,6	1,1	2,2	5,3
		51,0/29,5		92,7	0,83				
250(280)LA-8	55	108,0/62,2		93,0		1,6	1,2	2,3	5,5
		61,8/35,8		93,1	0,84				
250(280)LB-8	75	146,9/84,6		93,0	0,83	1,6	1,1	2,2	5,0
		85,0/49,2		93,1					
250(280)LC-8	90	167,6/96,5		93,3		1,6	1,1	2,2	5,0
		101,4/58,7							
250(280)LD-8	110	213,6/123,0		93,5		1,6	1,1	2,2	5,0
		122,8/71,1			0,84				
250(280)S-10	37	75,2/43,3	600/720	91,2	0,82	2,5	1,2	2,5	5,3
		43,4/25,1		91,1					
250(280)M-10	45	91,7/52,8		91,3		2,5	1,2	2,5	5,3
		52,7/30,5		91,0					
250(280)LA-10	55	111,3/64,1		91,3		2,5	1,2	2,5	5,3
		64,3/37,2		91,4					
250(280)LB-10	75	151,6/87,3		91,7		2,5	1,2	2,5	5,3
		86,9/50,3		91,6	0,83				

*** Data for voltage 380/660V are indicated in the numerator, data for 660/1140V are indicated in the denomenator.**
**** Data for 50Hz are indicated in the numerator, data for 60Hz are indicated in the denomenator.**

OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AZO-250(280)

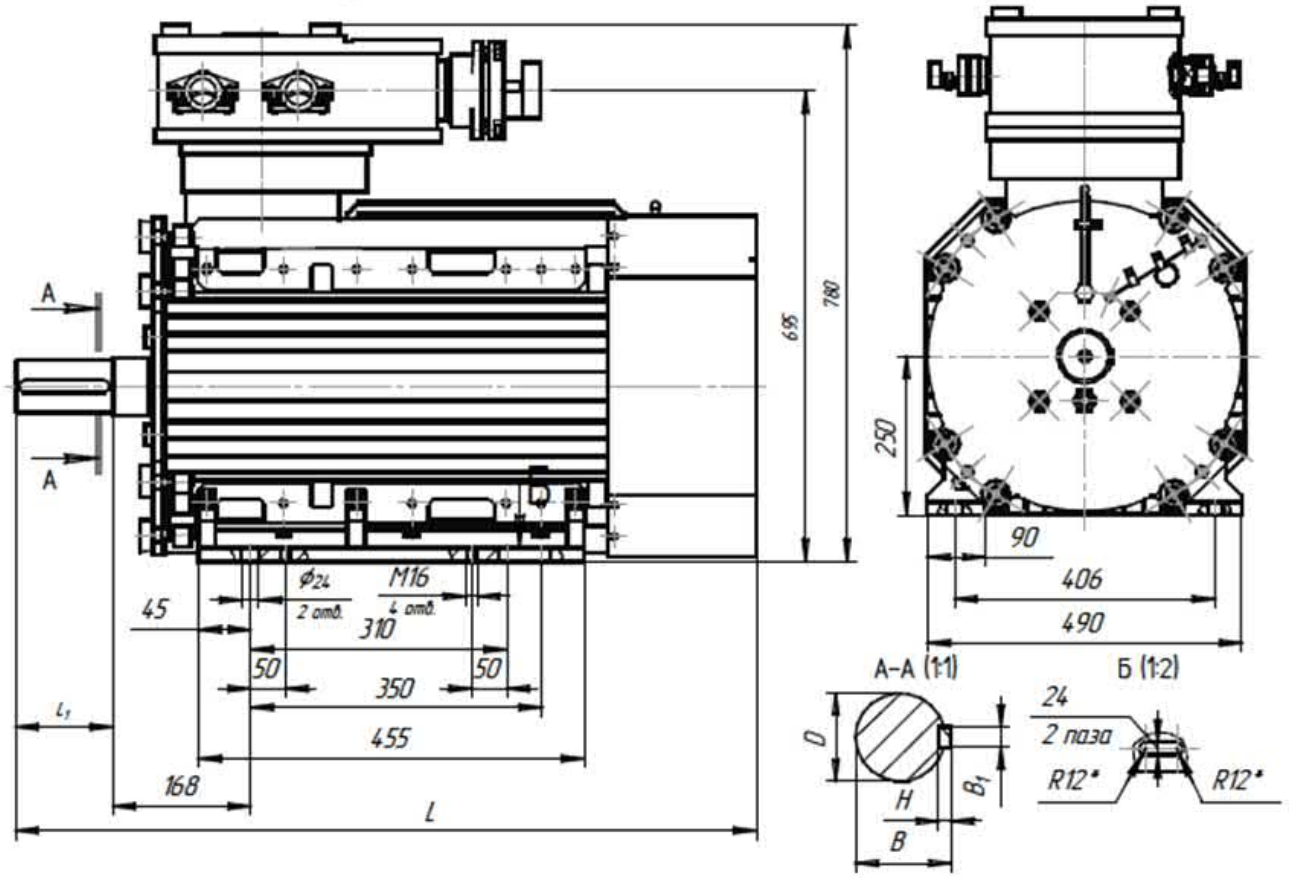
Motor type	Voltage, V	Mounting configuration	L mm max	L1	L2	L3	B	B1	D	H	Mass, kg
250S-2	380/660	IM1001 IM2001 IM3001 IM3011	1225 (1525*) (1300**)	140	-	-	69	18	65	11	790 (840***)
	660/1140										
280S-2	380/660				555	420					805 (855***)
	660/1140										
250M-2	380/660				-	-					820 (870***)
	660/1140										
280M-2	380/660				555	420					835 (885***)
	660/1140										
250LA-2	380/660		1305 (1605*) (1380**)		-	-	79,5	20	75	12	910 (960***)
	660/1140										
280LA-2	380/660				555	420					925 (975***)
	660/1140										
250LB-2	380/660				-	-					920 (970***)
	660/1140										
280LB-2	380/660				555	420					935 (985***)
	660/1140										
250LC-2	380/660				-	-					960 (1010***)
	660/1140										
280LC-2	380/660				555	420					975 (1025***)
	660/1140										
250LD-2	380/660		1385 (1685*) (1460**)		-	-					1045 (1095***)
	660/1140										
280LD-2	380/660				595	457					1065 1015***)
	660/1140										
250S-4	380/660		1145 (1445*) (1520**)		-	-					790 (840***)
	660/1140										
280S-4	380/660				555	420					805 (855***)
	660/1140										
250M-4	380/660				-	-					820 (870***)
	660/1140										
280M-4	380/660				555	420					835 (885***)
	660/1140										
250LA-4	380/660		1255 (1555*) (1330**)	170	-	-	85	22	80	14	880 (930***)
	660/1140										
280LA-4	380/660				555	420					895 (945***)
	660/1140										
250LB-4	380/660				-	-					940 (990***)
	660/1140										
280LB-4	380/660				555	420					955 (1005***)
	660/1140										
250LC-4	380/660		1335 (1635*) (1410**)		-	-					1020 (1070***)
	660/1140										
280LC-4	380/660				555	420					1035 (1085***)
	660/1140										
250LD-4	380/660		1415 (1715*) (1490**)		-	-					1150 (1200***)
	660/1140										
280LD-4	380/660				595	457					1170 (1220***)
	660/1140										
250S-6	380/660		1145 (1445*) (1220**)	140	-	-	79,5	20	75	12	785 (835***)
	660/1140										
280S-6	380/660				555	420					800 (850***)
	660/1140										
250M-6	380/660				-	-					815 (865***)
	660/1140										
280M-6	380/660				555	420					830 (880***)
	660/1140										

continuation of table

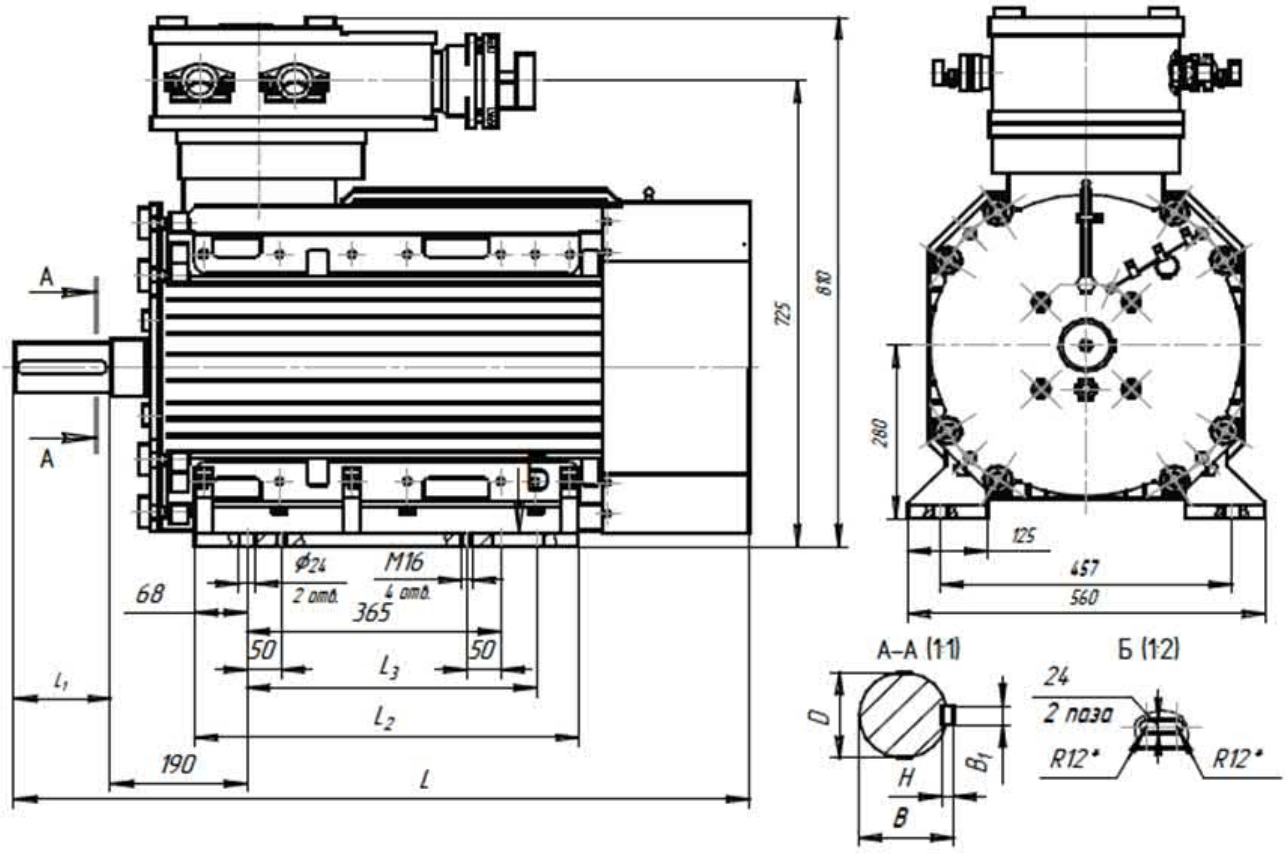
Motor type	Voltage, V	Mounting configuration	L mm max	L1, mm	L2, mm	L3, mm	B, mm	B1, mm	D, mm	H, mm	Mass, kg
250LA-6	380/660	IM1001 IM2001 IM3001 IM3011	1255 (1555*) (1330**)	170	-	-	85	22	80	14	895 (945***)
	660/1140										
280LA-6	380/660				555	420					910 (960***)
	660/1140										
250LB-6	380/660				-	-					950 (1000***)
	660/1140										
280LB-6	380/660				555	420					965 (1015***)
	660/1140										
250LC-6	380/660		1335 (1635*) (1410**)	170			85	22	80	14	1040 (1090***)
	660/1140										
280LC-6	380/660				555	420					1055 (1105***)
	660/1140										
250LD-6	380/660		1415 (1715*) (1490**)		-	-					1145 (1195***)
	660/1140										
280LD-6	380/660				595	457					1165 (1215***)
	660/1140										
250S-8	380/660		1065 (1365*) (1140**)	140	-	-	79,5	20	75	12	720 (770***)
	660/1140										
280S-8	380/660				555	420					735 (785***)
	660/1140										
250M-8	380/660				-	-					750 (800***)
	660/1140										
280M-8	380/660				555	420					765 (815***)
	660/1140										
250LA-8	380/660		1175 (1475*) (1250**)	170	-	-	85	22	80	14	835 (885***)
	660/1140										
280LA-8	380/660				555	420					850 (900***)
	660/1140										
250LB-8	380/660		1255 (1555*) (1330**)		-	-					935 (985***)
	660/1140										
280LB-8	380/660				555	420					950 (1000***)
	660/1140										
250LC-8	380/660				-	-					1005 (1055***)
	660/1140										
280LC-8	380/660				555	420					1020 (1070***)
	660/1140										
250LD-8	380/660		1415 (1715*) (1490**)		-	-					1155 (1205***)
	660/1140										
280LD-8	380/660				595	457					1175 (1225***)
	660/1140										
250S-10	380/660		1095 (1395*) (1170**)		-	-					760 (810***)
	660/1140										
280S-10	380/660				555	420					775 (825***)
	660/1140										
250M-10	380/660		1175 (1475*) (1250**)		-	-					850 (900***)
	660/1140										
280M-10	380/660				555	420					865 (915***)
	660/1140										
250LA-10	380/660				-	-					895 (945***)
	660/1140										
280LA-10	380/660				555	420					910 (960***)
	660/1140										
250LB-10	380/660		1335 (1635*) (1410**)		-	-					1080 (1130***)
	660/1140										
280LB-10	380/660				555	420					1095 (1145***)
	660/1140										

* dimensions at cooling method IC516.
** dimensions for motors with version IM3011 and cooling method IC411.
*** Mass of motors at cooling method IC516.

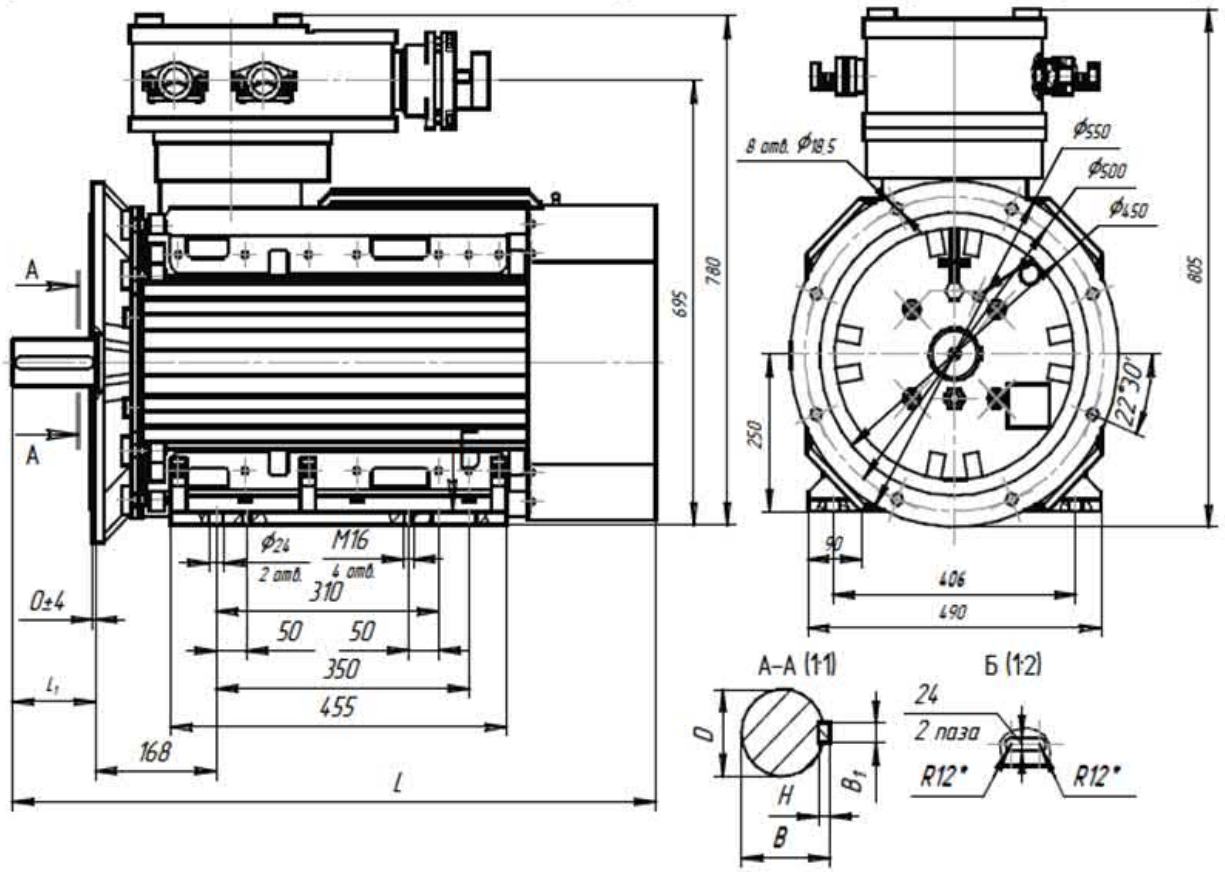
AZO-250 IM1001 (horizontal, on legs)



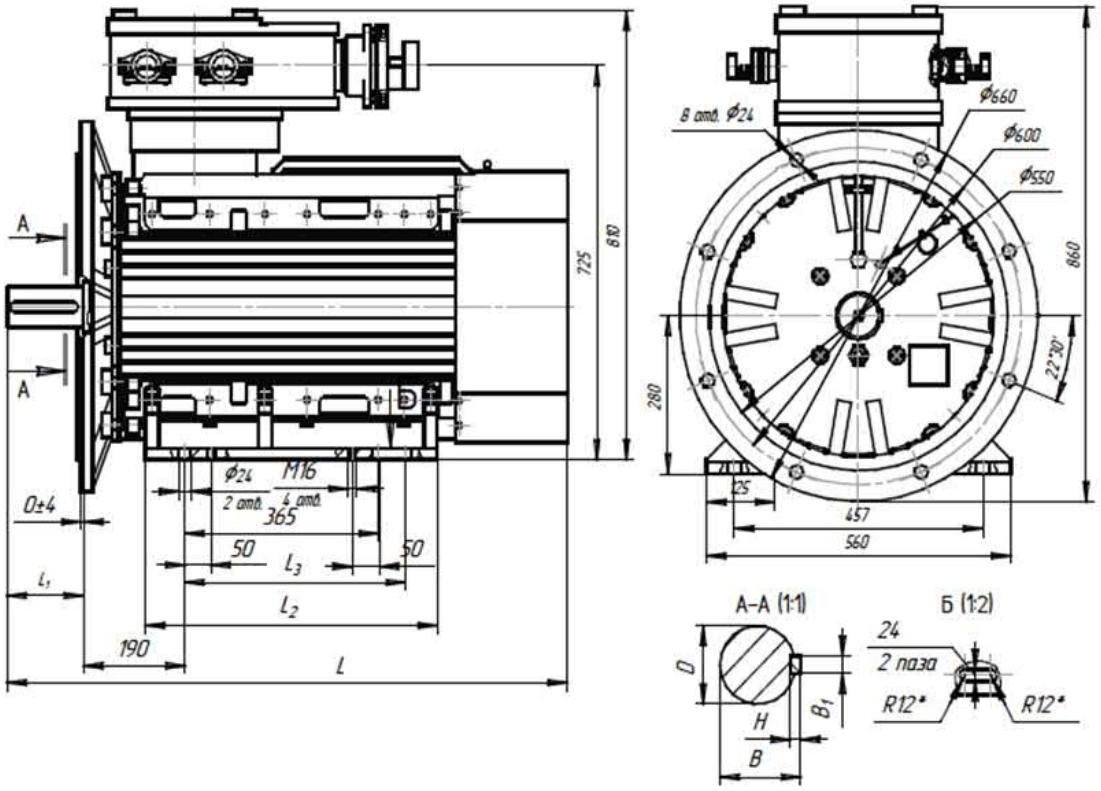
AZO-280 IM1001 (horizontal, on legs)



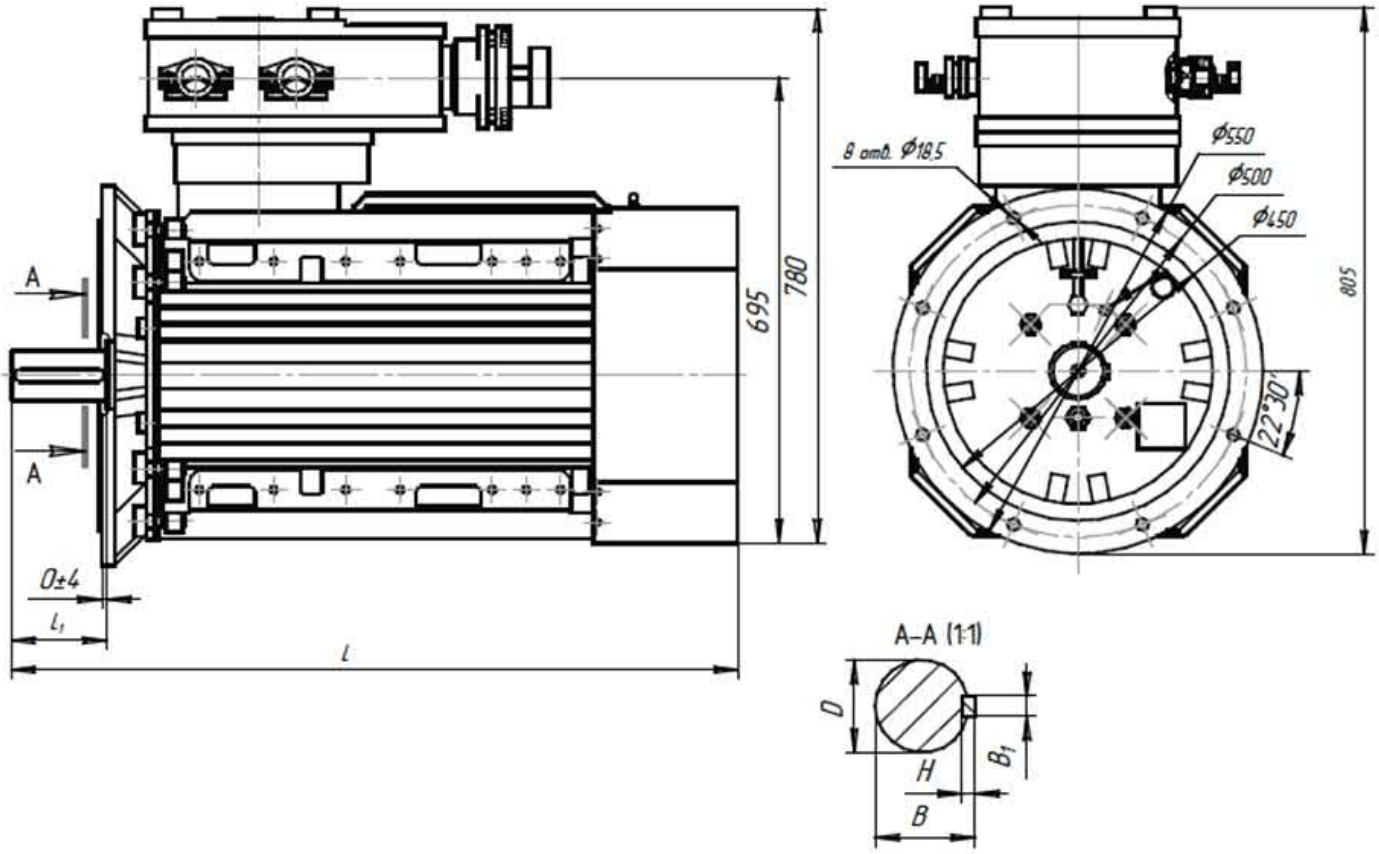
AZO-250 IM2001 (horizontal, on legs, with flange on shield, available from the other side)



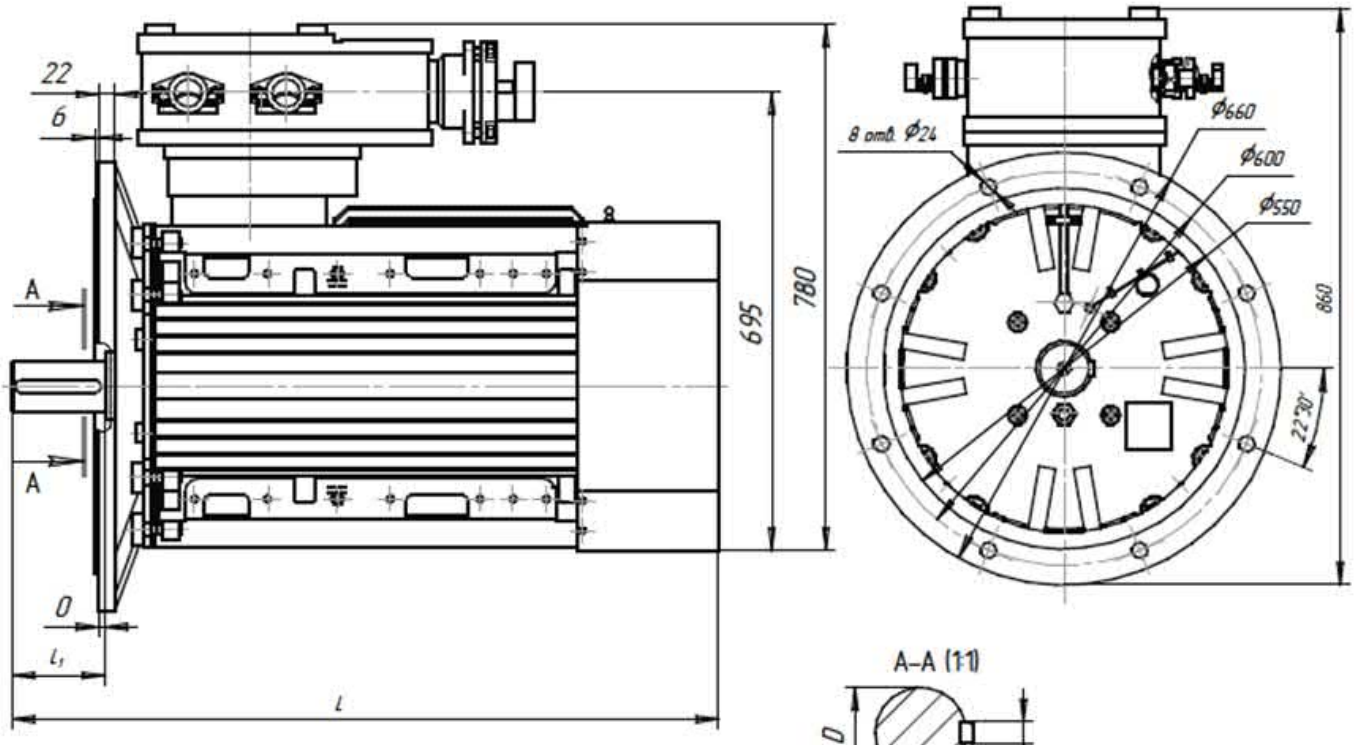
AZO-280 IM2001 (horizontal, on legs, with flange on shield, available from the other side)

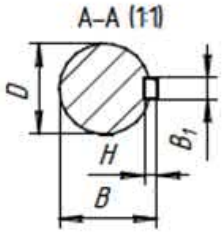


AZO-250 IM3001
(horizontal, with flange on shield, available from the other side)

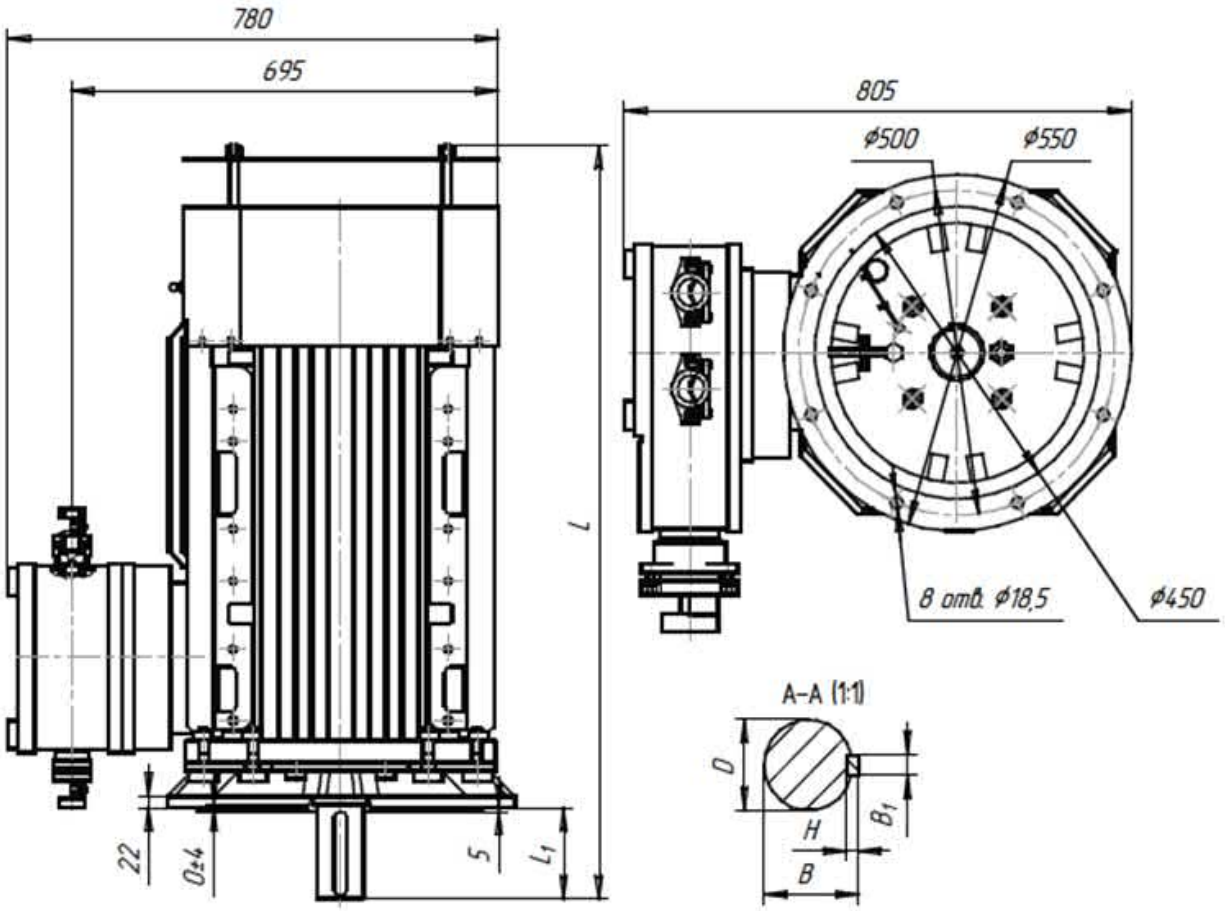


AZO-280 IM3001
(horizontal, with flange on shield, available from the other side)

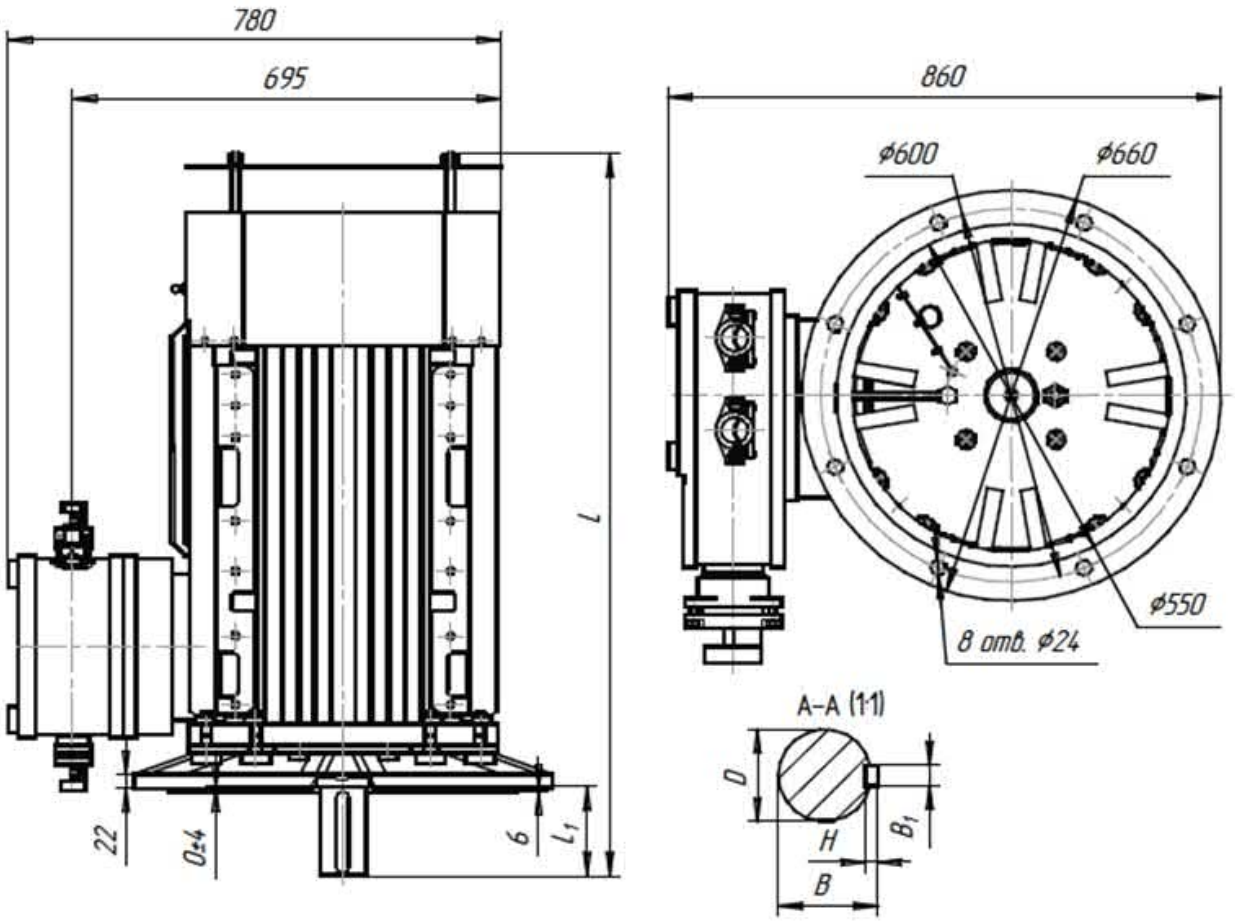




A3O-250 IM3011 (vertical, shaft down, with flange on down shield, available from the other side)



AZO-280 IM3011 (vertical, shaft down, with flange on down shield, available from the other side)



TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AZO-315(355) WITH VOLTAGE 380/660V,660/1140V,FREQUENCY NETWORK 50Hz

Type designation	Power, kW	Nominal stator current, A*	Rotational speed, rpm.**	Efficiency, %	Power factor	Sliding, %	Starting torque ratio	maximum torque ratio	starting current ratio
Voltage 380/660 V, 660/1140 V, frequency network 50Hz, 60Hz									
315(355)S-2	250	434,2/250,0	3000/3600	95,1	0,93	1,0	0,8	2,7	5,9
		250,5/145,0		95,0	0,94				
315(355)M-2	315	543,6/313,0		95,2	0,93	1,0	0,8	2,7	5,8
		314,3/182,0		95,3	0,93				
315(355)LA-2	400	675,6/389,0		95,6	0,94	1,0	0,8	2,6	5,8
		395,2/228,8		95,6	0,94				
		80,1/46,4			0,88				
315(355)S-4	250	441,2/254,0	1500/1800	95,8	0,90	1,0	0,9	2,9	6,3
		253,9/147,0		95,8	0,90				
315(355)M-4	315	550,0/317,0		96,0	0,91	1,0	0,9	2,8	6,1
		319,5/185,0		96,0	0,90				
315(355)LA-4	400	696,5/401,0		96,0	0,91	1,0	0,9	2,7	5,8
		400,9/232,1		96,1	0,91				
315(355)S-6	160	286,6/165,0	1000/1200	94,8	0,89	1,2	1,0	2,7	6,0
		169,3/98,0		94,8	0,89				
315(355)M-6	200	363,0/209,0		95,0	0,88	1,2	1,0	2,6	5,7
		209,0/121,0		95,0	0,89				
315(355)LA-6	250	453,3/261,0		95,3	0,88	1,2	1,0	2,6	5,8
		259,1/150,0		95,1	0,89				
315(355)LB-6	315	567,9/327,0		95,4	0,89	1,2	1,0	2,7	6,0
		326,5/189,0		95,4	0,89				
315(355)S-8	132	253,6/146,0	750/900	94,4	0,84	1,3	5,5	2,4	5,5
		144,7/83,8		94,2	0,85				
315(355)M-8	160	303,9/175,0		94,2	0,85	1,3	5,5	2,3	5,5
		174,5/101,0		94,2	0,85				
315(355)LA-8	200	380,4/219,0		94,7	0,84	1,3	5,5	2,4	5,5
		219,4/127,0		94,8	0,84				
315(355)LB-8	250	470,7/271,0		94,8	0,85	1,3	5,5	2,3	5,5
		272,9/158,0		94,9	0,84				
315(355)S-10	90	178,9/103,0	600/720	92,8	0,82	2,5	1,2	2,5	5,3
		104,2/60,3		93,0	0,81				
315(355)M-10	110	218,8/126,0		93,1	0,82	2,5	1,2	2,5	5,3
		125,2/72,5		92,8	0,83				
315(355)LA-10	132	264,0/152,0		93,5	0,81	2,5	1,2	2,5	5,3
		151,1/87,5		93,5	0,82				
315(355)LB-10	160	314,4/181,0		93,5	0,83	2,5	1,2	2,5	5,3
		183,1/106,0		93,7	0,82				
315(355)LC-10	200	396,0/228,0		94,0	0,82	2,5	1,2	2,5	5,3
		226,3/131,0		93,9	0,83				

*** Data for voltage 380/660V are indicated in the numerator, data for 660/1140V are indicated in the denomenator**

**** Data for 50Hz are indicated in the numerator, data for 60Hz in the denominator**

Overall dimensions, installation and mounting sizes of the electric motors AZO-315-355

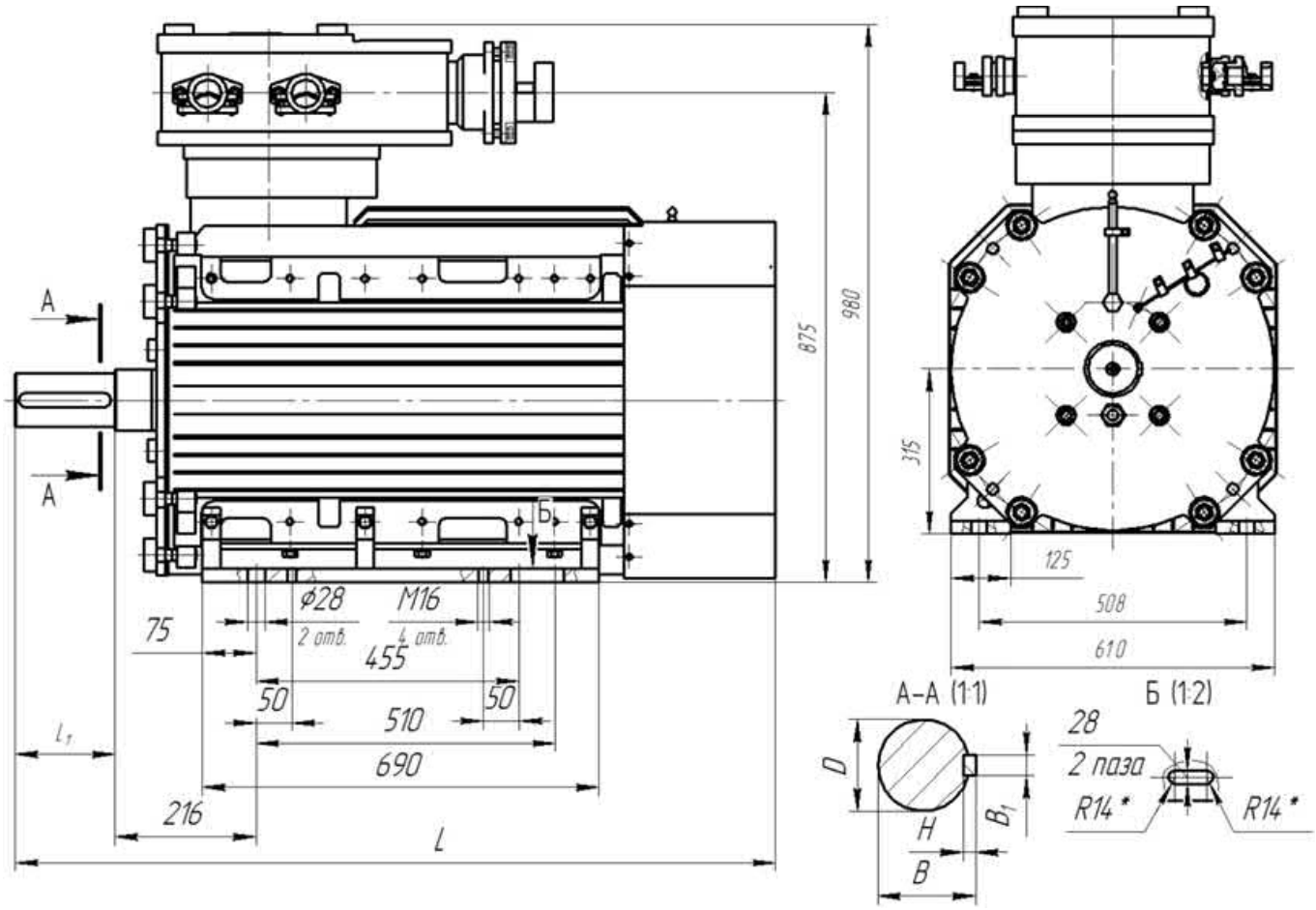
Motor type	Voltage, V	Mounting configuration	L,mm max*	L1	B	B1	D	H	Mass, kg
315S-2	380/660	IM1001 IM2001 IM3001 IM3011	1275 (1675*) (1375**)	140	79,5	20	75	12	1200 (1270***)
	660/1140								
355S-2	380/660								1220 (1290***)
	660/1140								
315M-2	380/660		1375 (1775*) (1475**)						1450 (1520***)
	660/1140								
355M-2	380/660								1470 (1540***)
	660/1140								
315LA-2	380/660		1450 (1850*) (1550**)						1600 (1670***)
	660/1140								
355LA-2	380/660								1620 (1690***)
	660/1140								
315S-4	380/660		1305 (1705*) (1405**)	170	95	25	90	14	1420 (1490***)
	660/1140								
355S-4	380/660								1440 (1510***)
	660/1140								
315M-4	380/660		1405 (1805*) (1505**)						1545 (1615***)
	660/1140								
355M-4	380/660								1565 (1635***)
	660/1140								
315LA-4	380/660		1480 (1880*) (1580**)						1750 (1820***)
	660/1140								
355LA-4	380/660								1770 (1840***)
	660/1140								
315S-6	380/660		1305 (1705*) (1405**)						1300 (1370***)
	660/1140								
355S-6	380/660								1320 (1390***)
	660/1140								
315M-6	380/660		1405 (1805*) (1505**)						1410 (1480***)
	660/1140								
355M-6	380/660								1430 (1500***)
	660/1140								
315LA-6	380/660		1520 (1920*) (1620**)	210	106	28	100	16	1550 (1620***)
	660/1140								
355LA-6	380/660								1570 (1640***)
	660/1140								
315LB-6	380/660		1615 (2015*) (1715**)	210	106	28	100	16	1750 (1820***)
	660/1140								
355LB-6	380/660								1770 (1840***)
	660/1140								
315S-8	380/660		1305 (1705*) (1405**)	170	95	25	90	14	1395 (1465***)
	660/1140								
355S-8	380/660								1415 (1485***)
	660/1140								
315M-8	380/660		1405 (1805*) (1505**)						1485 (1555***)
	660/1140								
355M-8	380/660								1505 (1575***)
	660/1140								
315LA-8	380/660		1520 (1920*) (1620**)	210	106	28	100	16	1710 (1780***)
	660/1140								
355LA-8	380/660								1730 (1800***)
	660/1140								
315LB-8	380/660		1615 (2015*) (1715**)						1900 (1970***)
	660/1140								
355LB-8	380/660								1920 (1990***)
	660/1140								

Continuation

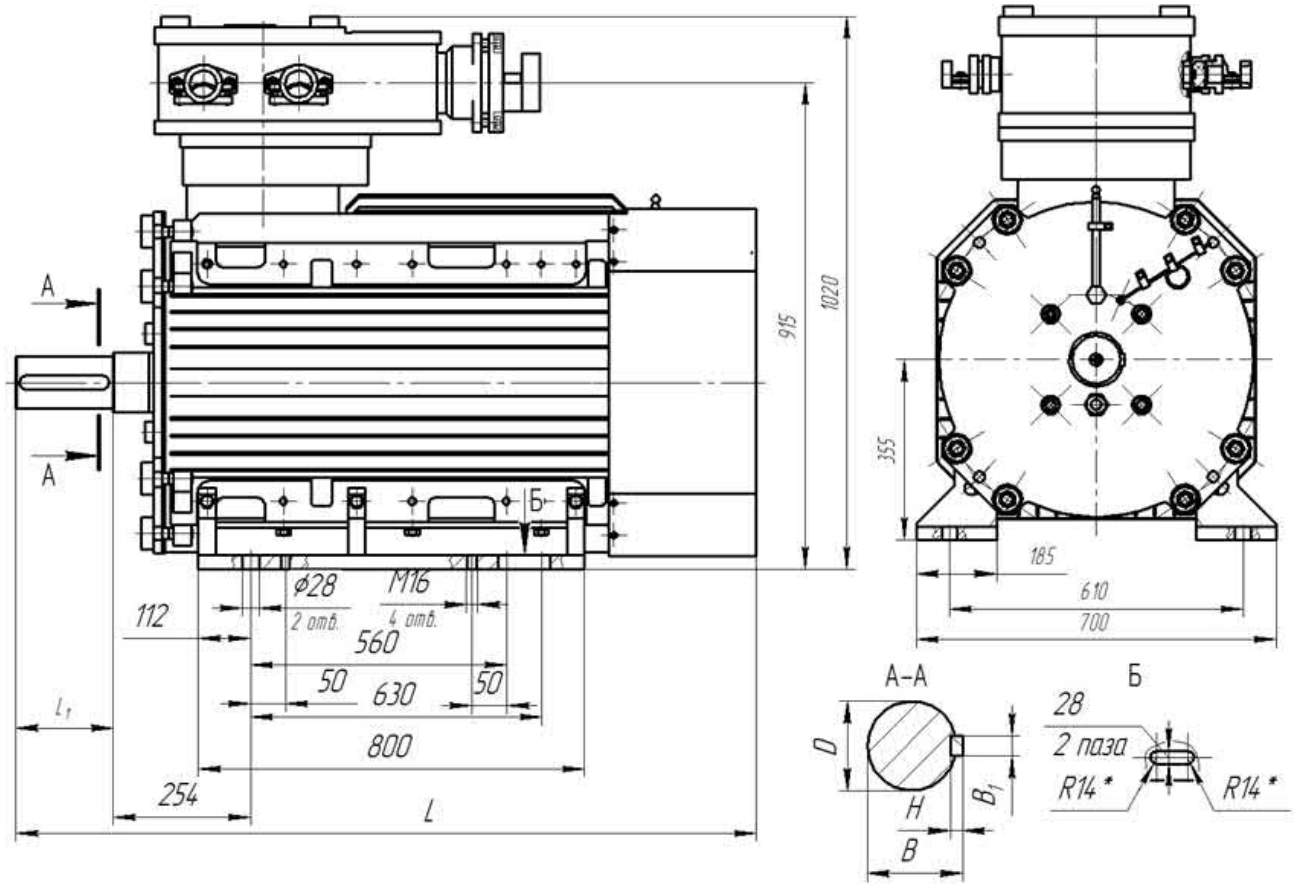
Motor type	Voltage, V	Mounting configuration	L,mm max*	L1	B	B1	D	H	Mass, kg
315S-10	380/660	IM1001 IM2001 IM3001 IM3011	1305 (1705*) (1405**)	170	95	25	90	14	1365 (1435***)
	660/1140								
355S-10	380/660								1385 (1455***)
	660/1140								
315M-10	380/660								1340 (1410***)
	660/1140								
355M-10	380/660								1360 (1430***)
	660/1140								
315LA-10	380/660		1405 (1805*) (1505**)						1520 (1590***)
	660/1140								
355LA-10	380/660								1540 (1610***)
	660/1140								
315LB-10	380/660		1520 (1920*) (2020**)	210	106	28	100	16	1650 (1720***)
	660/1140								
355LB-10	380/660								1670 (1740***)
	660/1140								
315LC-10	380/660		1615 (2015*) (1715**)						1870 (1940***)
	660/1140								
355LC-10	380/660								1890 (1960***)
	660/1140								

* sizes at cooling method IC516.
** dimensions for motors with version IM3011 and cooling method IC411.
***Mass of motors at cooling method IC516.

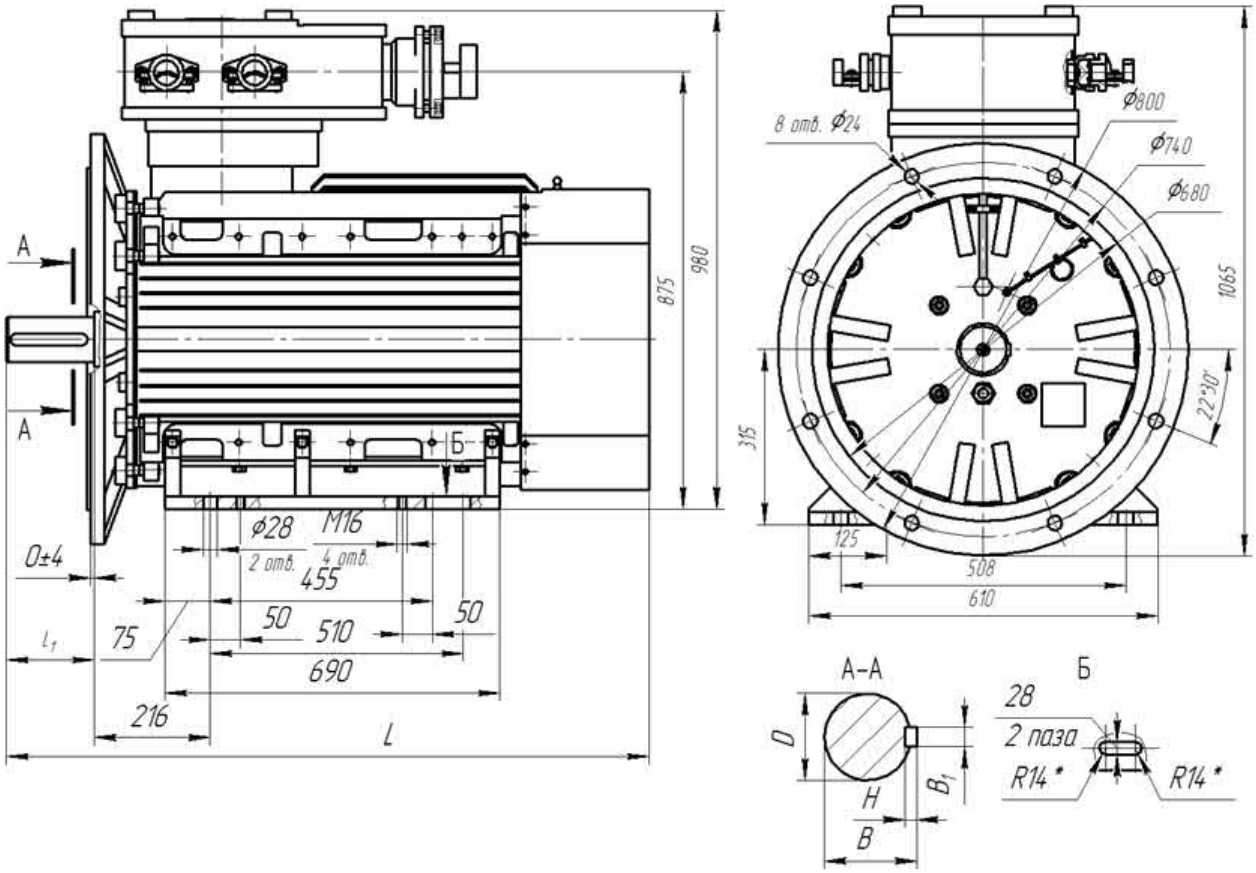
AZO-315 IM1001 (horizontal, on legs)



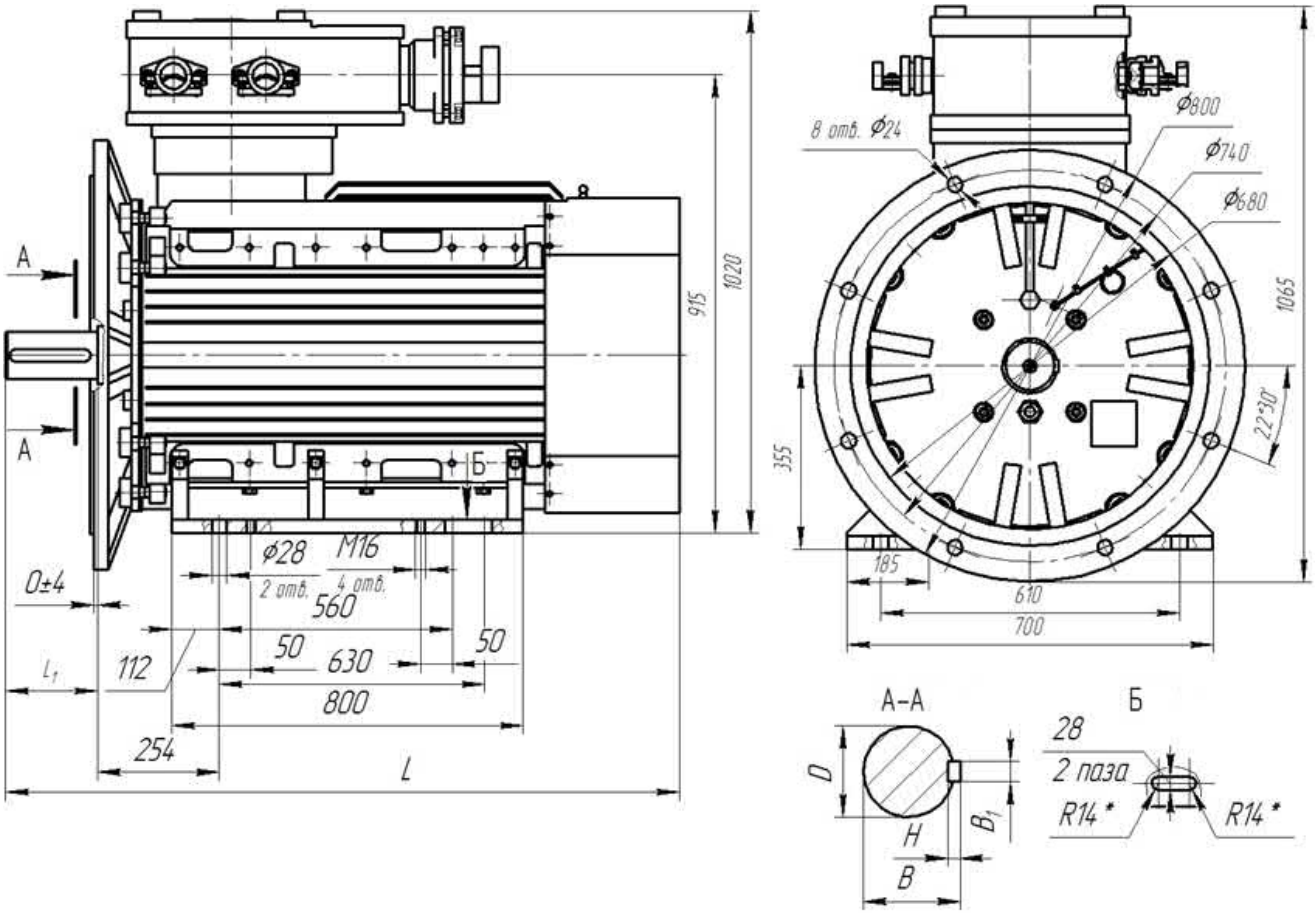
AZO-355 IM1001 (horizontal, on legs)



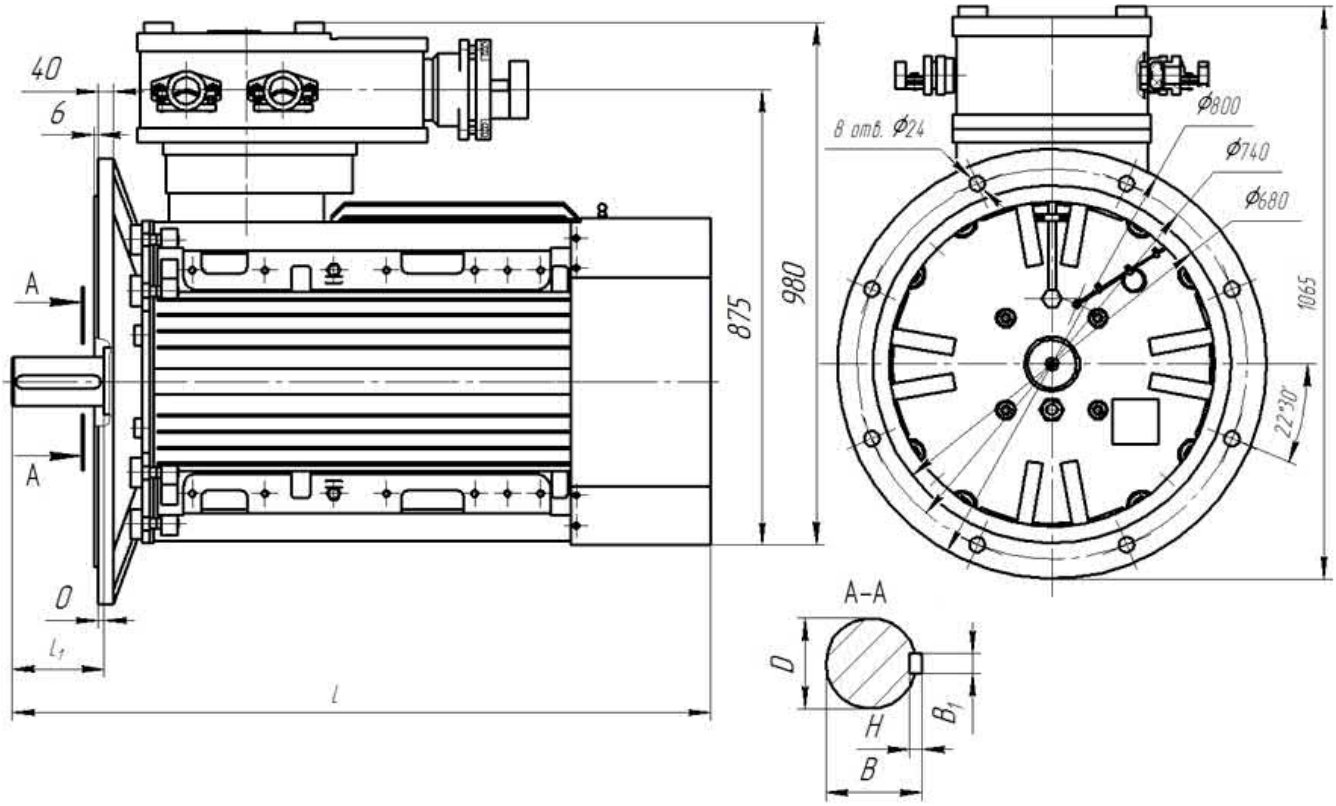
AZO-315 IM2001 (horizontal, on legs, with flange on shield, available from the other side)



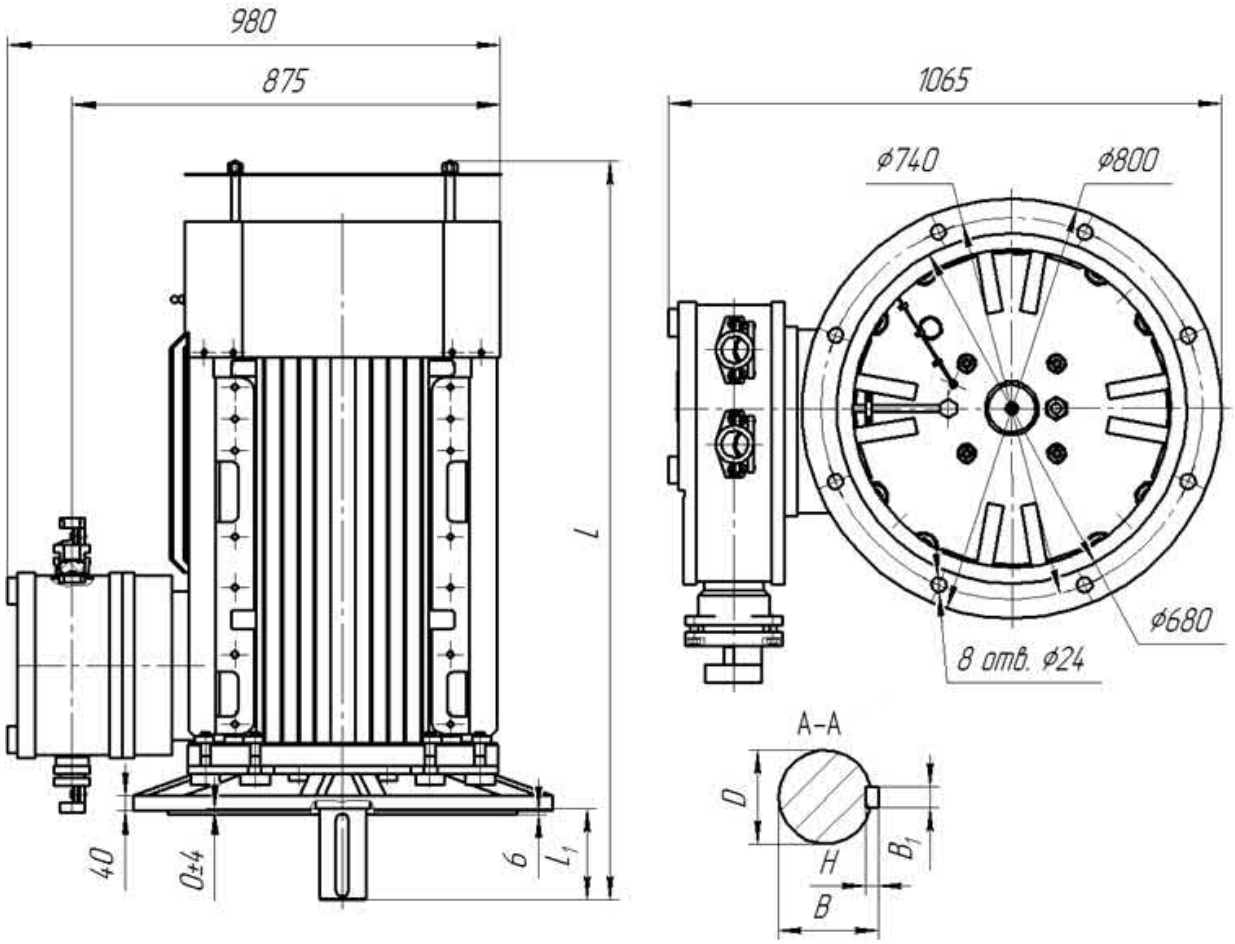
A3O-355 IM2001 (horizontal, on legs, with flange on shield, available from the other side)



AZO-315-355 IM3001 (horizontal, with flange on shield, available from the other side)



AZO-315-355 IM3011 (vertical, shaft down, with flange on down shield, available from the other side)



ASYNCHRONOUS ELECTRIC MOTORS AZOA, AZOM-450-710

Asynchronous three-phase airflow-cooled electric motors AZO for general use with a squirrel-cage rotor are designed to drive pumps, air blowers and other mechanisms.

Operation mode: continuous S1 from network frequency 50Hz.

Allow operation from frequency converter (S8, S9,S10).

Climatic construction type:

У1, У2, У5, УХЛ1, УХЛ2, УХЛ4, ХЛ1, ХЛ2, Т2, Т5

Mounting configuration:

IM1001	IM3001

Protection degree for:

housing and terminal box	IP54 IP55 (on order)
outdoor fan enclosure	IP20

Cooling method:

IC511	A3OA, A3OM-560 A3OA, A3OM-630 A3OA, A3OM-560-1250 (1600) A3OA, A3OM-710-1600 (2500)
IC411	A3OA, A3OM-450

The electric motors AZOA(M) of 4,6,8,10,16 poles have the right and the left direction of rotation. The direction of rotation is changed only from rest state. The electric motors AZO (2 pole), with rotational speed 3000rpm. have the left вращения, а по заказу потребителя изготавливается с правым или левым и правым направлением вращения.

The insulating materials of stator winding have heat-resistance class «F» or «H» at customer's request.

At the customer's request the electric motors are equipped with temperature control devices UKT-9 (9 channels),UKT-12 (12 channels) or UKVT.

Main advantages of electric motors AZOA, AZOM over analogues:

1. Improving the active parts to obtain high energy parameters at lower mass.
2. The application in the motor construction of cast aluminum squirrel-cage rotor provided a number of advantages over other analogues with welded winding:

Select the best configuration and dimensions of groove, increasing starting moments at relatively small values of starting currents;

Eliminate hard preventive work during operation, put through inspection and restoration of welded joints of the rotor winding;

Improve the motors' safety in operation excluding the possible sparking and overeheating in welded joints.

3. The application in the motor construction of copper squirrel cage rotor, performed by special technology,provides reliability of work with mechanisms , at hard, slow starts and the number of starts per day 15-20 instead of 6-8 starts permissible for analogues with aluminum welded rotor winding

4. Exceptional stator housing design of increased rigidity, ensuring a reliable fit of stator pack, as well as lower values of vibration and noise.

5. Application in the terminal boxes high reliable one-pice insulating panel instead of porcelain insulators.

6. Improved ventilation and cooling system of electric motors provides the maximum heating of active parts working at nominal load, with the exception of local overheating.

7. The possibility of operation of electric motors at adjusting the rotation speed modes as part of adjustable-frequency electric drives.

8. Use of bearing units of explosion-protection of special design without rubbing parts provides reliability during full service life.

9. Electric motors are completed with temperature control sensors 50M (at customer's request 100П, Pt100, 50П) and vibration control sensors (at customer's request), and also rotor speed sensors (at customer's request).

10. Equipping motors at the customer's request with bearing and stator winding temperature control device UKT-12 (9 channels) ((temperature control at 9 points: 2 - bearings, 6 - winding and iron of stator, 1 - driving mechanism) with alarm and motor shutdown control in emergency modes, and information output on PC in real time through RS232/RS484. At customer's request UKT-12 (with addition of 3 temperature control points with the mechanism aggregated with the electric motor).

11.Equipping at the customer's request with winding and active control device and active stator iron device, as well as bearing supports vibration control (UKVT), produced in explosion-proof version and designed for:

- temperature control both of motor (to 9 channels) and of drive mechanism to 9 due to the use of 2 three-coordinate sensors;
- bearing's vibration control;
- -light warning signals display beyond the boundaries of given vibration and temperature ranges;
- light warning signals display about breakage or absence of temperature sensors;
- electrical signals display for connecting external alarm and control devices;
- output signal about the state of controlled object through interface converter 5 on display of personal computer (PC).

At the customer's request the electric motors can be produced with special mounting and installation dimensions or according to mounting configuration IM1002,M3002,IM2001,IM2002.

TYPE DESIGNATION

AZO X – XXX –XX – X XXX

- Climatic construction type
- Number of poles
- Designation of stator core length
- axis of rotation height in millimeters (gabarit)
- Motor modification:
  - A- a luminum rotor winding (f or AZOA)
  - M- copper rotor winding (f or AZOM)
- Motor type (asynchronous closed airflow-cooled)

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AZOA-450, AZOM-450, WITH VOLTAGE 3000V, 6000V, FREQUENCY NETWORK 50; 6Hz

Type designation	Power, kW	Nominal stator current, A*	Rotational speed, rpm.**	Efficiency, %	Power factor, Cos φ	Sliding, %	Starting torque ratio	Maximum torque ratio	Starting current ratio
AZOA(M)-450S-2	200	46,2/23,1	3000/3600	93,6	0,89	0,80	1,1	3,1	7,0
AZOA(M)-450M-2	250	57,3/28,7		94,3					
AZOA(M)-450LA-2	315	70,1/35,1		95,0	0,91	0,90	1,2		
AZOA(M)-450LB-2	400	87,8/43,9		95,3	0,92				
AZOA(M)-450S-4	200	46,0/23,0	1500/1800	94,0	0,89	1,5	1,0	2,5	6,0
AZOA(M)-450M-4	250	57,2/28,6		94,5			1,1		
AZOA(M)-450LA-4	315	70,9/35,5		95,0	0,90				
AZOA(M)-450LB-4	400	88,8/44,4		95,3	0,91				
AZOA(M)-450M-6	200	49,1/24,6	1000/1200	93,6	0,84	0,8	1,0	2,1	6,5
AZOA(M)-450LA-6	250	64,1/32,0		94,3		0,7			
AZOA(M)-450LB-6	315	80,2/40,0		94,5					
AZOA(M)-450LA-8	200	51,7/25,9	750/900	93,0	0,80	1,1		2,2	6,0
AZOA(M)-450LB-8	250	64,0/32,0		94,1					

**Data for voltage 3000V are indicated in the numerator, data for 6000V are indicated in the denomenator.*
*** Data for frequency 50Hz are indicated in the numerator, data for frequency 60Hz are indicated in the denomenator.*

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AZOA-450, AZOM-450, WITH VOLTAGE 10000V, FREQUENCY NETWORK 50; 60Hz

Type designation	Power, kW	Nominal stator current, A	Rotational speed, rpm.**	Efficiency, %	Power factor, Cos φ	Sliding, %	Starting torque ratio	Maximum torque ratio	Starting current ratio
AZOA(M)-450S-2	200	13,8	3000 / 3600	93,7	0,89	0,83	0,9	3,1	6,2
AZOA(M)-450M-2	250	16,9		94,4	0,90			3,0	6,0
AZOA(M)-450LA-2	315	21,2		94,9	0,91		0,91		
AZOA(M)-450LB-2	400	26,8		95,3			0,96	3,1	6,1
AZOA(M)-450S-4	200	13,8	1500 / 1800	94,6	0,88	1,6	0,86		
AZOA(M)-450M-4	250	17,2		95,0		1,5	0,90	3,0	6,2
AZOA(M)-450LA-4	315	21,4		95,3	0,89		0,87	2,9	6,0
AZOA(M)-450LB-4	400	27,1		95,5				2,8	5,8
AZOA(M)-450M-6	200	14,5	1000 / 1200	94,6	0,84	0,8	1,0	2,5	5,5
AZOA(M)-450LA-6	250	18,1		94,9					5,6
AZOA(M)-450LB-6	315	22,7		95,1					5,5
AZOA(M)-450LA-8	200	15,8	750 / 900	94,6	0,77	1,3		2,4	5,0
AZOA(M)-450LB-8	250	19,4		95,0	0,78			2,2	4,7

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AZOA-450, AZOM-450-2,4,6,8 (3000 V, 6000 V)

Type designation	l_1	l_{10}	l_{12}	l_{30}	l_{34}	d_1	d_{30}	b_1	b_{11}	b_{12}	h_5	h_{31}	h_{34}*	Mass, kg Aluminum**/ copper***
AZOA (M)-450S-2	140	560	325	1460	880	70	835	20	870	130	74,5	930	145/115	2124/2196
AZOA (M)-450M-2				1500	920									2280/2352
AZOA (M)-450LA-2		710		1570	990									2580/2664
AZOA (M)-450LB-2				1685	1100									2880/2964
AZOA (M)-450S-4	210	630		1585	790	100		28			106			2640/2712
AZOA (M)-450M-4		710		1635	860									2880/2952
AZOA (M)-450LA-4				1725	950									3060/3144
AZOA (M)-450LB-4		800	400	1825	1100									3773/3384
AZOA (M)-450M-6		710	325	1680	870									2880/2952
AZOA (M)-450LA-6				1800	990									3060/3144
AZOA (M)-450LB-6		800	400	1900	1120									3180/3270
AZOA (M)-450LA-8		710	325	1800	990									3060/3144
AZOA (M)-450LB-8		800	400	1900	1100									3180/3270

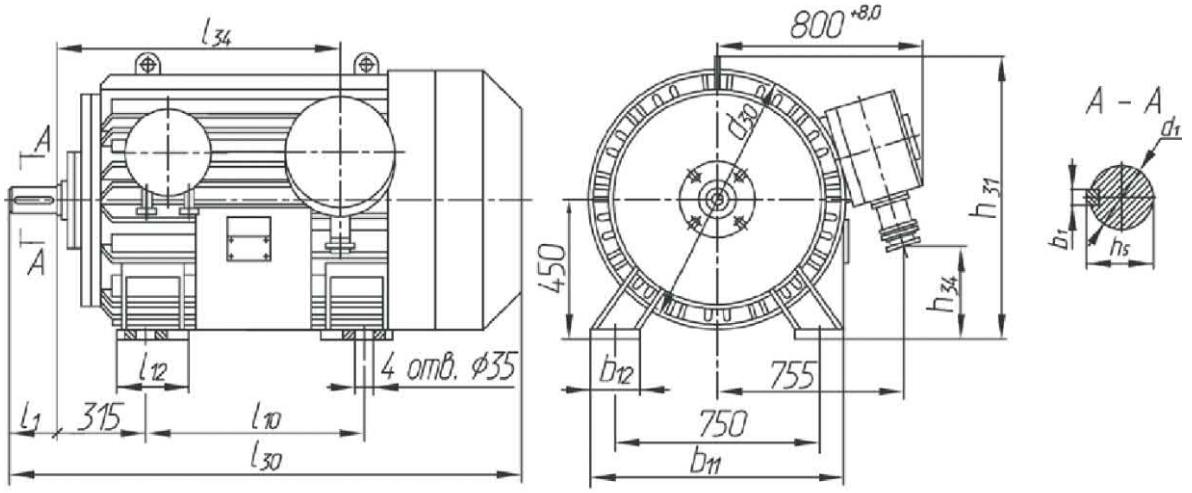
* height for IM1001 version is indicated in numerator, for version IM3001-in denominator.
** Mass of the motor with aluminium winding rotor is indicated in the numerator.
*** Mass of the motor with copper winding rotor is indicated in the denominator.
Electric motors with voltage 3000V are manufactured in dimensions of motors with voltage 6000V.

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AZOA-450,A3OM-450 (10000 V)

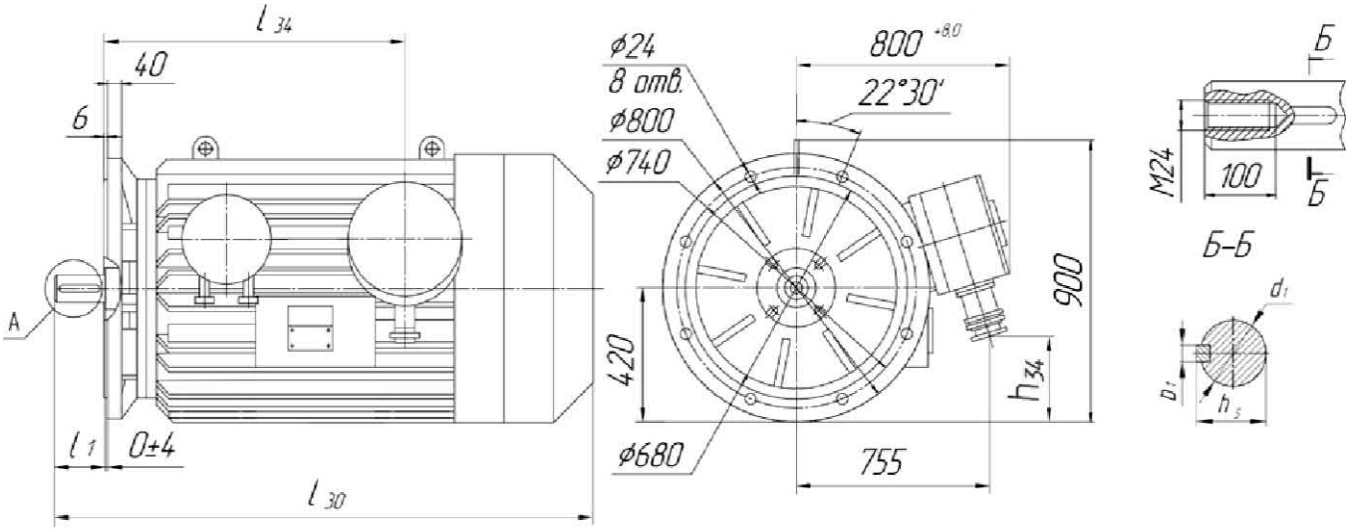
Type designation	l_1	l_{10}	l_{12}	l_{30}	l_{34}	d_1	d_{30}	b_1	b_{11}	b_{12}	h_5	h_{31}	h_{34}*	Mass, kg Aluminum**/ copper***
AZOA(M)-450S-2	140	560	325	1685	1100	70	835	20	870	130	74,5	930	145/115	2880/2952
AZOA(M)-450M-2				1745	1160									3000/3072
AZOA(M)-450LA-2		710	400	1785	1200									3120/3204
AZOA(M)-450LB-2				1855	1270									3300/3384
AZOA(M)-450S-4	210	630	325	1800	990	100		28			106			3000/3072
AZOA(M)-450M-4		710	400	1865	1050									3060/3132
AZOA(M)-450LA-4				1900	1090									3180/3264
AZOA(M)-450LB-4		800		1970	1160									3300/3384
AZOA(M)-450M-6		710	325	1800	990									3120/3192
AZOA(M)-450LA-6			400	1860	1050									3240/3324
AZOA(M)-450LB-6		800		1970	1160									3360/3444
AZOA(M)-450LA-8		710	325	1800	990									3180/3264
AZOA(M)-450LB-8		800	400	1900	1090									3300/3384

* height for IM1001 version is indicated in numerator, for version IM3001 in denominator.
** Mass of the motor with aluminium winding rotor is indicated in the numerator.
*** Mass of the motor with copper winding rotor is indicated in the denominator.

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AZOA(M)-450-2;4;6;8, with voltage 3000 V, 6000 V, 10000 V IM1001 (on legs)



OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AZOA(M)-450-2;4;6;8, with voltage 3000, 6000, 10000 V IM3001 (flange)



TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AZOA-560, AZOM-560, WITH VOLTAGE 3000V, 6000V, FREQUENCY NETWORK 50; 60Hz

Type designation	Power, kW	Nominal stator current, A*	Rotational speed, rpm.**	Efficiency, %	Power factor, Cos φ	Sliding, %	Starting torque ratio	Maximum torque ratio	Starting current ratio
AZOA(M)-560S-2	500	112,7/56,4	3000/3600	94,8	0,9	0,7	1,0	2,7	6,0
AZOA(M)-560M-2	630	141,7/70,9		95,1					
AZOA(M)-560LA-2	800	175,2/87,6		95,5	0,92		1,1	2,8	7,0
AZOA(M)-560LB-2	1000	218,1/109,0		95,9					
AZOA(M)-560-1250/6-2	1250	274,0/137,0		96,1		0,6	0,8	2,7	5,6
AZOA(M)-560-1600/6-2	1600	348,0/174,0		96,0			0,8	2,6	5,5
AZOA(M)-560S-4	500	112,6/56,3	1500/1800	95,0	0,9	0,9	1,3	2,5	6,5
AZOA(M)-560M-4	630	141,1/70,5		95,5					
AZOA(M)-560LA-4	800	178,8/89,4		95,7					
AZOA(M)-560LB-4	1000	222,7/111,3		96,0		0,8			
AZOA(M)-560S-6	400	95,6/47,8	1000/1200	94,8	0,85	0,7	1,1	2,2	5,5
AZOA(M)-560M-6	500	119,0/59,5		95,2					
AZOA(M)-560LA-6	630	149,8/74,9		95,3					
AZOA(M)-560LB-6	800	189,8/94,9		95,5		0,6			
AZOA(M)-560S-8	315	80,0/40,0	750/900	94,7	0,8	0,8	1,0	2,2	
AZOA(M)-560M-8	400	101,3/50,6		95,0					
AZOA(M)-560LA-8	500	126,6/63,3		95,2					
AZOA(M)-560LB-8	630	158,9/79,4		95,5		0,7			
AZOA(M)-560M-10	250	63,9/32,0	600/720	94,1		1,1		1,9	4,5
AZOA(M)-560S-16	200	59,7/29,8	375/450	93,4	0,69	1,29		2,0	4,0

**Data for voltage 3000V are indicated in the numerator, data for 6000V are indicated in the denomenator.*

*** Data for frequency 50Hz are indicated in the numerator, for frequency 60Hz are indicated in the denomenator.*

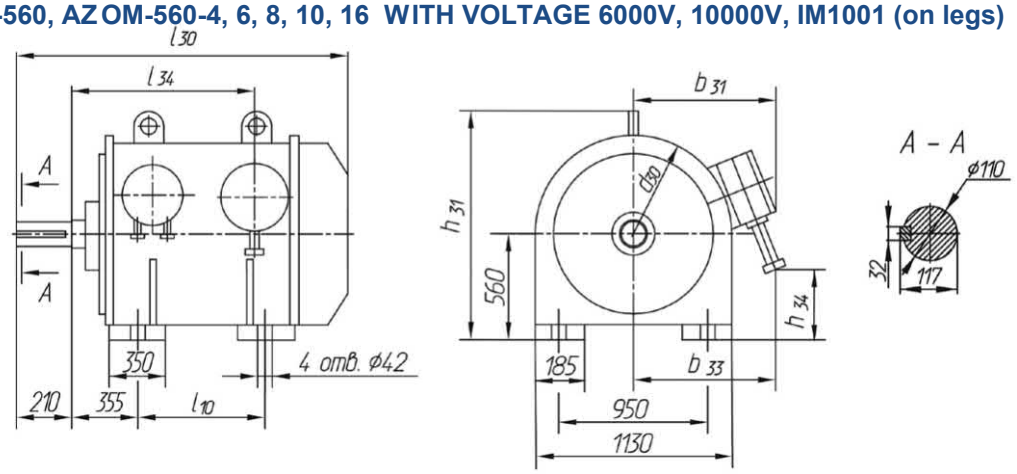
Electric motors with voltage 3000V are manufactured in dimensions of motors with voltage 6000V.

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AZOA-560, AZOM-560, WITH VOLTAGE 10000V, FREQUENCY NETWORK 50; 60Hz

Type designation	Power, kW	Nominal stator current, A	Rotational speed, rpm.**	Efficiency, %	Power factor, Cos φ	Sliding, %	Starting torque ratio	Maximum torque ratio	Starting current ratio
AZOA(M)-560S-2	500	33,8	3000/3600	94,8	0,90	0,7	1,0	2,7	6,0
AZOA(M)-560M-2	630	42,6		95,1					
AZOA(M)-560LA-2	800	52,6		95,5	0,92		1,1	2,8	7,0
AZOA(M)-560LB-2	1000	65,3		95,9					
AZOA(M)-560-1250/10-2	1250	81,7		95,7	0,93	0,65	0,8	2,7	5,8
AZOA(M)-560S-4	500	33,8	1500/1800	95,0	0,90	0,9	1,3	2,5	6,5
AZOA(M)-560M-4	630	42,6		95,5					
AZOA(M)-560LA-4	800	53,7		95,7					
AZOA(M)-560LB-4	1000	66,7		96,0		0,8			
AZOA(M)-560S-6	400	28,8	1000/1200	94,8	0,85	0,7	1,1	2,2	5,5
AZOA(M)-560M-6	500	35,7		95,2					
AZOA(M)-560LA-6	630	45,0		95,3					
AZOA(M)-560LB-6	800	57,1		95,5		0,6			
AZOA(M)-560S-8	315	24,0	750/900	94,7	0,80	0,8	1,0	2,2	
AZOA(M)-560M-8	400	30,3		95,0					
AZOA(M)-560LA-8	500	38,2		95,2					
AZOA(M)-560LB-8	630	47,7		95,5		0,7			
AZOA(M)-560M-10	250	19,2	720	94,1		1,1		1,9	4,5
AZOA(M)-560S-16	200	17,8	450	93,4	0,69	1,29		2,0	4,0

*** Data for frequency 50H are indicated in the numerator, for frequency 60H are indicated in the denomenator.*

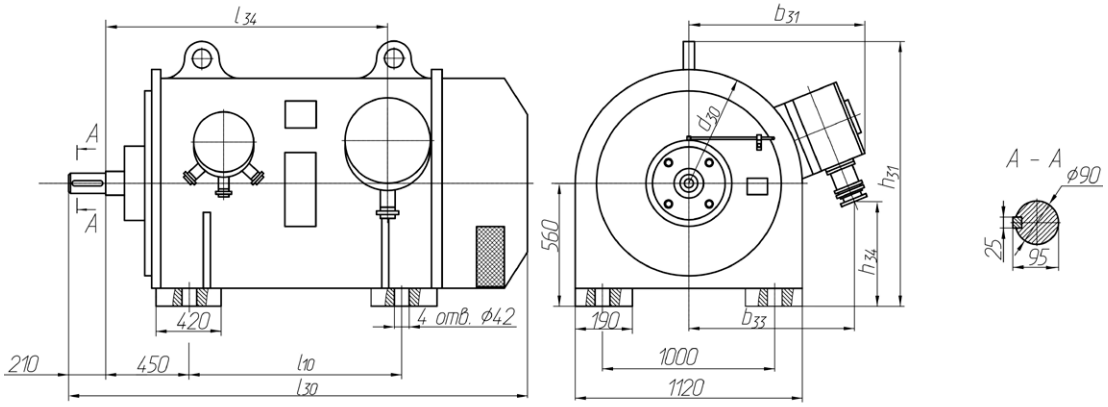
OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AZOA-560, AZOM-560-4, 6, 8, 10, 16 WITH VOLTAGE 6000V, 10000V, IM1001 (on legs)



Type designation	Voltage, V	l_{10}	l_{30}	l_{34}	d_{30}	b_{31}^{***} / b_{31}^{****}	b_{33}^{***} / b_{33}^{****}	h_{31}	h_{34}^{***} / h_{34}^{****}	Mass, kg Aluminum*/Copper**
AZOA(M)-560S-4	6000	630	1675	855	1146	840/1000	780/1005	1240	570/415	3600/3696
AZOA(M)-560M-4		710	1745	925						4020/4128
AZOA(M)-560S-4	10000	630					840/1005		430/415	3840/3948
AZOA(M)-560LA-4	6000	800	1865	1045	1220	880/1035	810/1035	1280	580/430	4430/4550
AZOA(M)-560M-4	10000	710					870/1035		440/430	4680/4800
AZOA(M)-560LB-4	6000	900	2045	1215	1300	920/1065	850/1070	1320	595/445	5520/5652
	10000						910/1070		455/445	
AZOA(M)-560LA-4	10000	800								5400/5412
AZOA(M)-560S-6	6000	630	1675	855	1146	840/1000	780/1005	1240	570/415	4080/4176
AZOA(M)-560M-6		710	1745	925						4560/4668
AZOA(M)-560S-6	10000	630					835/1005		430/415	
AZOA(M)-560LA-6	6000	800	1865	1045	1220	880/1030	810/1035	1280	580/430	5400/5520
AZOA(M)-560M-6	10000	710					870/1035		440/430	
AZOA(M)-560LB-6	6000	900	2045	1215	1300	920/1065	850/1070	1320	595/445	6720/6852
	10000						910/1070		455/445	
AZOA(M)-560LA-6	10000	800								
AZOA(M)-560S-8	6000	630	1605	765	1146	840/1000	780/1005	1240	570/415	3400/3495
AZOA(M)-560M-8		710	1745	925						4080/4188
AZOA(M)-560S-8	10000	630					835/1005		430/415	
AZOA(M)-560LA-8	6000	800	1865	1045	1220	880/1030	810/1035	1280	580/430	5520/5640
AZOA(M)-560M-8	10000	710					870/1035		440/430	
AZOA(M)-560LB-8	6000	900	2045	1215	1300	920/1065	850/1070	1320	595/445	6840/6972
	10000						910/1070		455/445	
AZOA(M)-560LA-8	10000	800								
AZOA(M)-560M-10	6000	710	1745	925	1146	840/1000	780/1005	1240	570/415	4800/4908
	10000						835/1005		430/415	

* Mass of the motor with aluminum rotor winding is indicated in the numerator.
** Mass of the motor with copper rotor winding is indicated in the denominator.
*** For motors with power terminal box with integral isolation panel
**** For motors with power terminal box with through porcelain insulators
Electric motors with voltage 3000V are manufactured in dimensions of motors with voltage 6000V.

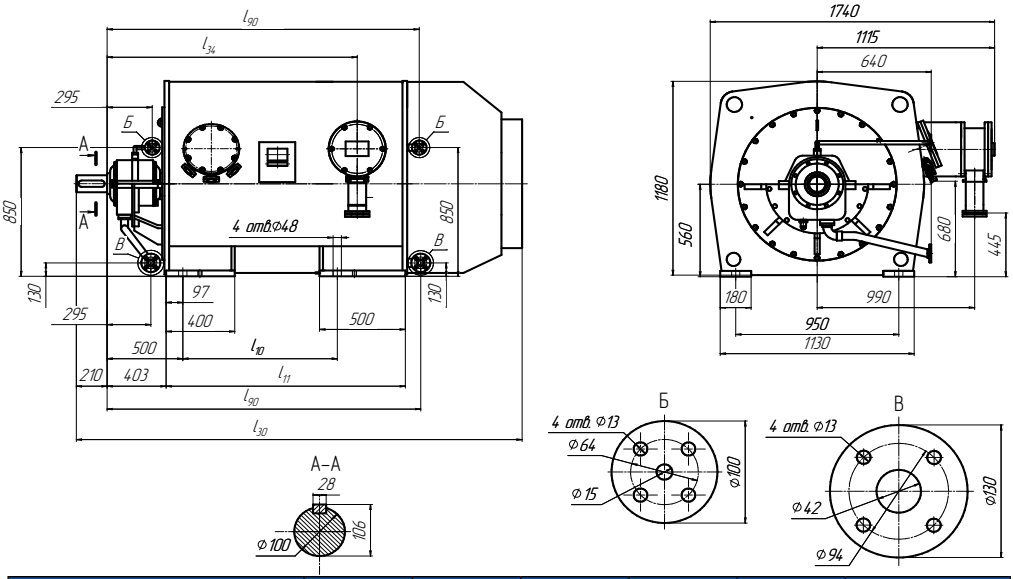
OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AZOA,AZOM-560-2 WITH VOLTAGE 6000V, 10000V IM1001 (on legs)



Type designation	Voltage, V	b_{31}	b_{33}	d_{30}	h_{31}	h_{34}	l_{10}	l_{30}	l_{34}	Mass, kg Aluminum* / copper**
AZOA(M)-560 S-2	6000	840	865	1146	1240	375	630	1930	1005	3360 / 3564
AZOA(M)-560 M-2		880	900	1220	1280	390	710	2050	1120	3794 / 3995
AZOA(M)-560 S-2	10000						630			
AZOA(M)-560 LA-2	6000	920	935	1300	1320	425	800	2230	1295	4710 / 4938
AZOA(M)-560 M-2	10000						710			
AZOA(M)-560 LB-2	6000						900	2330	1395	5940 / 6170
	10000									
AZOA(M)-560 LA-2	10000						800			

** Mass of the motor with aluminum rotor winding is indicated in the numerator.*
*** Mass of the motor with copper rotor winding is indicated in the denominator.*
Electric motors with voltage 3 000V are manufactured in dimensions of motors with voltage 6000V.

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AZOA, AZOM-560-1250(1600)-2 WITH VOLTAGE 6000V, 10000V IM1001 (on legs)



Type designation	l_{10}	l_{11}	l_{30}	l_{34}	l_{90}	Mass, kg
AZOA(M)-560-1250/6-2	900	1395	2610	1540	1905	5940
AZOA(M)-560-1250/10-2	1000	1495	2710	1640	2005	6120
AZOA(M)-560-1600/6-2						6600

Electric motors with voltage 3000V are manufactured in dimensions of motors with voltage 6000V

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AZOA-630-710, AZOM-630-710, WITH VOLTAGE 3000V, 6000V, FREQUENCY NETWORK 50; 60Hz

Type designation	Power, kW	Nominal stator current, A *	Rotational speed, rpm.**	Efficiency, %	Power factor, Cos φ	Sliding, %	Starting torque ratio	Maximum torque ratio	Starting current ratio
AZOA(M)-630S-4	1250	278,4/139,2	1500/ 1800	96,0	0,90	0,7	1,1	2,3	6,0
AZOA(M)-630M-4	1600	354,0/177,0		96,7					
AZOA(M)-630L-4	2000	442,0/221,0		96,8				2,4	
AZOA(M)-630S-6	1000	230,4/115,2	1000/ 1200	96,0	0,87		1,0	2,0	4,8
AZOA(M)-630M-6	1250	287,3/143,7		96,3					
AZOA(M)-630L-6	1600	367,0/183,5		96,5					
AZOA(M)-630S-8	800	189,1/94,6	750/900	95,8	0,85	0,8		2,2	5,2
AZOA(M)-630M-8	1000	235,8/117,9		96,0					
AZOA(M)-630L-8	1250	294,1/147,0		96,2					
AZOA(M)-710-2000/6-2	2000	434,0/217,0	3000/ 3600	96,3	0,92	0,6	0,8	2,5	5,2
AZOA(M)-710-2500/6-2	2500	544,0/272,0		96,5			0,8	2,8	5,8

**Data for voltage 3000V are indicated in the numerator, data for 6000V are indicated in the denomenator.*
*** Data for 50Hz are indicated in the numerator, data for 60Hz are indicated in the denomenator.*

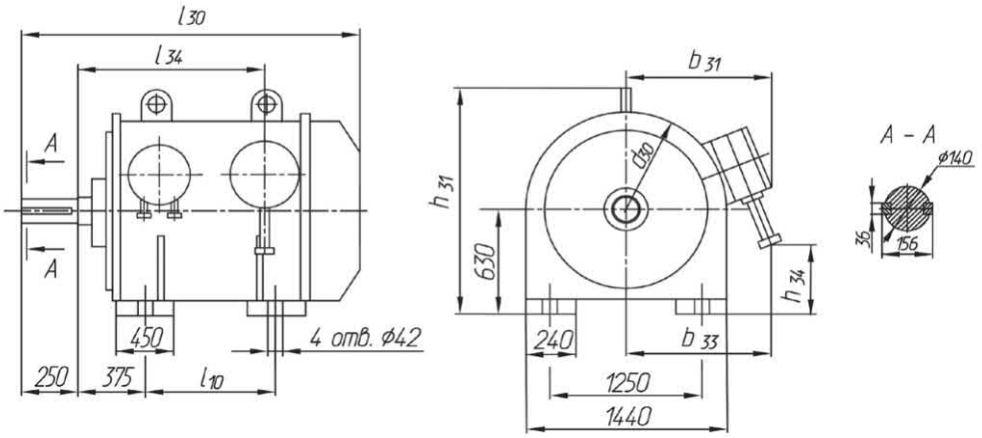
TECHNICAL PARAMETERS OF THE ELECTRIC

MOTORS VAO4-630-710, VAO7-630-710, WITH VOLTAGE 10000V, FREQUENCY NETWORK 50; 60Hz

Type designation	power, kW	Nominal stator current, A	Rotational speed, rpm.*	Efficiency, %	Power factor , Cos φ	Sliding, %	Starting torque ratio	Maximum torque ratio	Starting current ratio
AZOA(M)-630S-4	1250	83,3	1500/ 1800	96,0	0,90	0,7	1,1	2,3	6,0
AZOA(M)-630M-4	1600	106,7		96,7					
AZOA(M)-630L-4	2000	132,4							
AZOA(M)-630S-6	1000	69,4	1000/ 1200	95,8	0,87		1,0	2,0	4,8
AZOA(M)-630M-6	1250	86,2		96,0					
AZOA(M)-630L-6	1600	110,3		96,3					
AZOA(M)-630S-8	800	56,7	750/900	95,6	0,85	0,9			5,0
AZOA(M)-630M-8	1000	70,9		95,8					
AZOA(M)-630L-8	1250	88,6		96,0					
AZOA(M)-630M-10	630	49,5	720	94,3	0,78	1,1	1,3	2,2	5,9
AZOA(M)-710-1600/10-2	1600	105,0	3600	95,7	0,91	0,65	0,8	2,6	5,4
AZOA(M)-710-2000/10-2	2000	134,0		96,0	0,92	0,60		2,7	5,6
AZOA(M)-710-2500/10-2	2500	162,0		96,2		0,55		2,6	5,3

**Data for 50Hz are indicated in the numerator, data for 60Hz are indicated in the denomenator.*

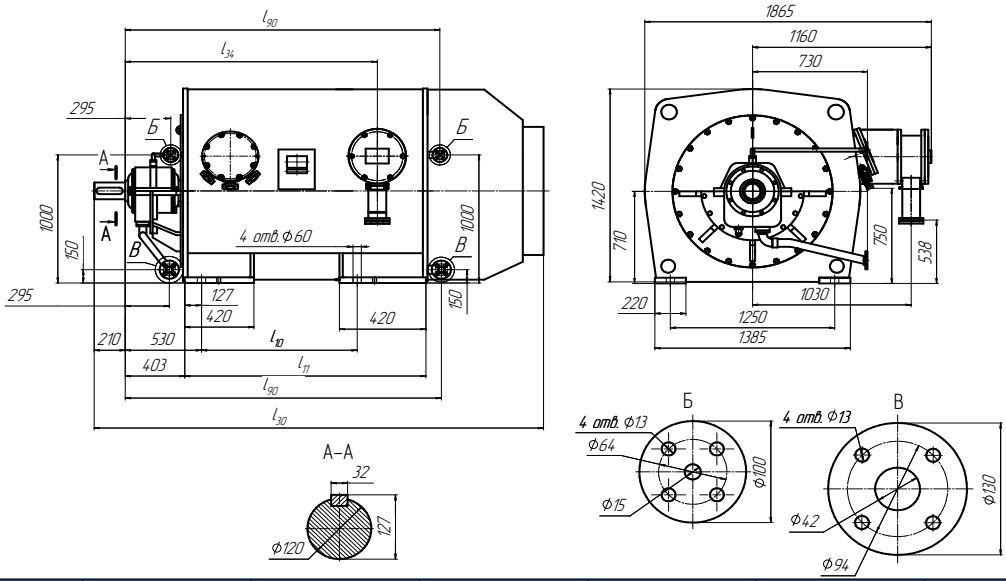
OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AZOA, AZOM-630 S; M; L WITH VOLTAGE 6000V, 10000V IM1001 (on legs)



Type designation	Voltage, V	l_{10}	l_{30}	l_{34}	d_1	d_{30}	b_{31}	b_{33}	h_{31}	h_{34}	Mass, kg Aluminum* / copper**
AZOA(M)-630S-4	6000	1000	$2155^{+17,5}$	1280	140	$1450^{+16,0}$	$1000^{+9,0}$	940	$1470^{+12,5}$	700	6700 / 6800
	10000		$2265^{+17,5}$	1390				1000		560	6800 / 6900
AZOA(M)-630M-4	6000	1120						940		700	7200 / 7310
	10000		$2475^{+21,0}$	1600				1000		560	7300 / 7410
AZOA(M)-630L-4	6000	1250				$1530^{+16,0}$	$1030^{+10,5}$	975	$1510^{+12,5}$	740	8200 / 8320
	10000							1035		600	8300 / 8420
AZOA(M)-630S-6	6000	1120	$2265^{+17,5}$	1390		$1450^{+16,0}$	$1000^{+9,0}$	940	$1470^{+12,5}$	700	7200 / 7300
	10000		$2475^{+21,0}$	1600				1000		560	7300 / 7400
AZOA(M)-630M-6	6000	1250						940		700	8200 / 8210
	10000							1000		560	8300 / 8310
AZOA(M)-630S-8	6000	1120	$2265^{+17,5}$	1390				940		700	7000 / 7100
	10000		$2475^{+21,0}$	1600				1000		560	7100 / 7200
AZOA(M)-630M-8	6000	1250						940		700	8000 / 8100
	10000							1000		560	8100 / 8200

** Mass of the motor with aluminum rotor winding is indicated in the numerator.*
*** Mass of the motor with copaer rotor winding is indicated in the denominator.*
Electric motors with voltage 3 000V are manufactured in dimensions of motors with voltage 6000V..

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AZOA, AZOM-710-1600(2000, 2500)-2



Type designation	l_{10}	l_{11}	l_{30}	l_{34}	l_{90}	Mass, kg
AZOA(M)-710-1600/10-2	1400	1630	2850	1780	2145	7800
AZOA(M)-710-2000/6-2		1760	2980	1910	2275	8640
AZOA(M)-710-2000/10-2						9000
AZOA(M)-710-2500/6-2	1600	1900	3120	2050	2415	10800
AZOA(M)-710-2500/10-2						11400

Electric motors with voltage 3 000V are manufactured in dimensions of motors with voltage 6000V

ELECTRIC MOTORS AOV-450-800

Asynchronous three-phase airflow-cooled vertical electric motors AOV with a squirrel-cage rotor are designed for driving pumps.

Operation mode is continuous S1 from network frequency 50Hz, 60Hz. Allow operation from frequency converter in modes S8, S9, S10.

Climatic construction type:

У1, УХЛ1, ХЛ1

Mounting configuration:

IM4011	AOV4-560, 630, 710, 800-4,6,8
IM3011	AOV4-450, 560-2

Protection degree for:

housing and terminal box	IP54 (IP55 on order)
outdoor fan enclosure	IP22

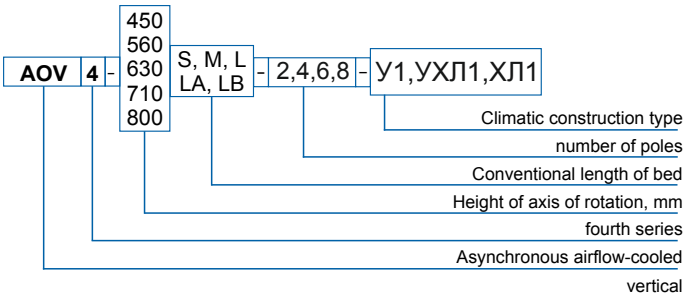
Cooling method:

IC511	AOV4-560, 630, 710, 800-4,6,8
IC411	AOV4-450, 560-2

Electric motors have the right direction of rotation. At customer's request - the left or the right direction of rotation.

The insulating materials of stator winding have heatresistance class «F» or «H» at customer's request.

TYPE DESIGNATION



Main advantages of electric motors AOV over analogues:

1. Improving the active parts to obtain high energy parameters at lower mass.

2. The application in the motor construction AOV of cast aluminum squirrel-cage rotor provided a number of advantages over other analogues with welded winding:

Select the best configuration and dimensions of groove , increasing starting moments at relatively small values of starting currents;

Eliminate hard preventive work during operation, put through inspection and restoration of welded joints of the rotor winding;

Improve the motors' safety in operation excluding the possible sparking and overeheating in welded joints.

3. The application in the motor construction AOV of copper squirrel cage rotor, performed by special technology,provides reliability of work with mechanisms , at hard, slow starts and the number of starts per day 15-20 instead of 6-8 starts permissible for analogues with aluminum welded rotor winding, increasing service life by 1,5-2 times in comparison with electric motors with aluminum squirrel-cage rotor.

4. Exceptional stator housing design of increased rigidity, ensuring a reliable fit of stator pack, as well as lower values of vibration and noise.

5. Improved ventilation and cooling system of electric motors provides the maximum heating of active parts working at nominal load, with the exception of local overheating.

6. The possibility of operation of electric motors at adjusting the rotation speed modes as part of adjustable-frequency electric drives.

7. Use of bearing units of explosion-protection of special design without rubbing parts provides reliability during full service life.

8. Equipping the electric motors(at customer's request) with vibration and speed control sensors.

9. The application in the construction of motors AOV-630, 710, 800 bearing units with liquid lubrication and heating, providing the reliability and trouble free operation of the motors at negative temperatures. (up to -60°C).

10. Equipment of the electric motors by temperature control sensors of bearings,winding and stator iron, as well as thermoelectrical heaters with characteristics 50М, 50П,100П, Pt100 with 4 wired connection scheme, in quantity, according to customer's request.

The electric motors of AOV series are interchangeable to similar electric motors AOV2 and AOV3 of the other manufacturers.

At the customer's request the electric motors can be produced with special mounting and installation dimensions, of other power, voltage and rotational speed.

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AOV-450, WITH VOLTAGE 3000V, 6000V, FREQUENCY NETWORK 50Hz

Type designation	Nominal power, kW	Rotational speed (synch.), rpm.	nominal current, A*	Efficiency, %	Power factor	Nominal sliding, %	Initial starting current ratio	Initial starting torque ratio	Maximum torque ratio	Inertia moment, kg*m²	
										of the motor	of drive mechanism
AOV-450SK-2	160	3000	37,2/18,6	93,2	0,89	0,8	7,0	1,1	3,1	4,0	25
AOV-450S-2	200		46,0/23,0	93,6						4,5	30
AOV-450M-2	250		58,0/29,0	94,3						5,3	34
AOV-450LA-2	315		70,0/35,0	95,0	0,91	0,9		1,2		6,5	38
AOV-450LB-2	400		88,0/44,0	95,3	0,92			1,3		8,9	43
AOV-450SK-4	160	1500	38,0/19,0	93,2	0,87	1,5	6,0	1,0	2,5	5,7	130
AOV-450S-4	200		46,0/23,0	93,7	0,88					6,4	150
AOV-450L-4	250		58,0/29,0	94,3				1,1		7,5	175
AOV-450M-4	315		72,0/36,0	94,8		1,4				9,1	190
AOV-450S-6	160	1000	39,2/19,6	93,3	0,84	0,8		1,0	2,3	10	450
AOV-450M-6	200		49,2/24,6	93,6						12	520
AOV-450L-6	250		64,0/32,0	94,0						16	740
AOV-450S-8	132	750	34,4/17,2	92,2	0,8	1,1	5,3		2,2	15	420
AOV-450M-8	160		41,6/20,8	92,7						18	540
AOV-450L-8	200		51,8/25,9	93,0						21	730

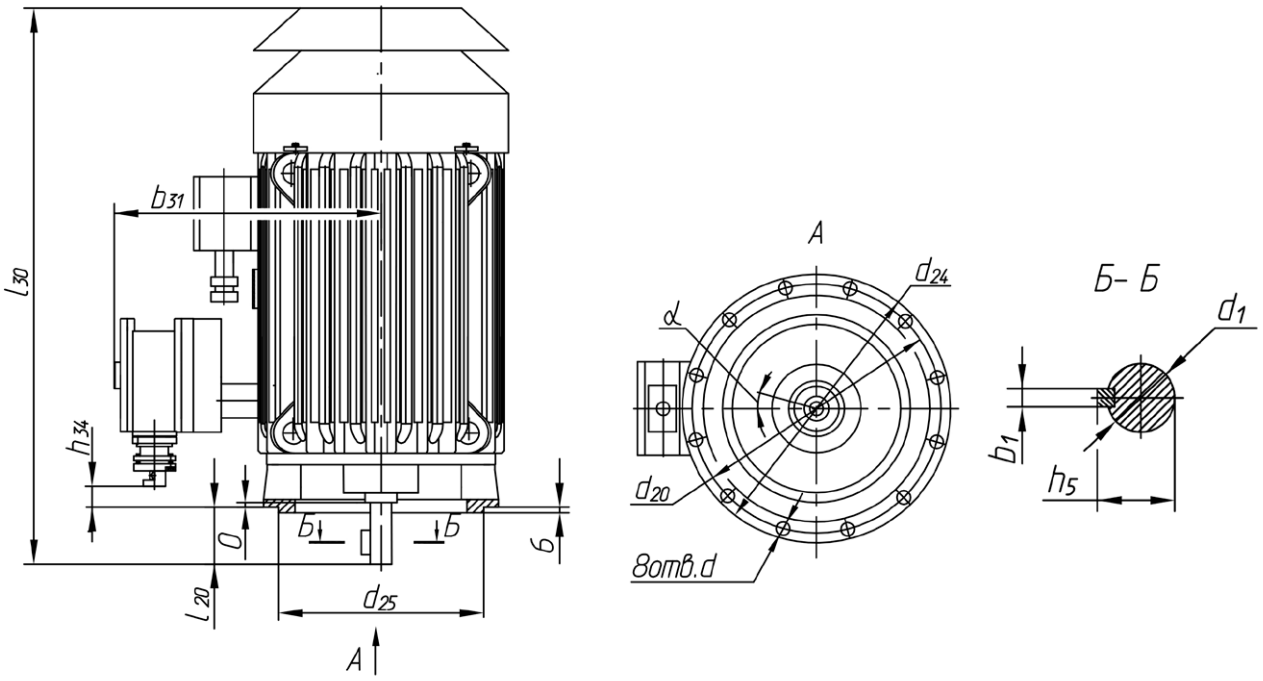
** Data for voltage 3000V are indicated in the numerator, data for 6000V are indicated in the denomenator.*
Electric motors with voltage 3 000V are manufactured in dimensions of motors with voltage 6000V

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AOV-450, WITH VOLTAGE 10000V, FREQUENCY NETWORK 50Hz

Type designation	Nominal power, kW	Rotational speed (synch.), rpm.	Nominal current, A	Efficiency, %	Power factor	Nominal sliding, %	Initial starting current ratio	Initial starting torque ratio	Maximum torque ratio	Inertia moment, kg*m²	
										of the motor	of drive mechanism
AOV-450SK-2	160	3000	11,2	93,0	0,89	0,8	7,0	1,1	3,1	4,2	25
AOV-450S-2	200		13,9	93,6						4,7	30
AOV-450M-2	250		17,2	94,3						5,6	34
AOV-450LA-2	315		21,0	95,0	0,91	0,9		1,2		6,8	38
AOV-450LB-2	400		26,3	95,3						9,3	43
AOV-450SK-4	160	1500	11,1	93,4	0,88	1,0	6,6	1,0	2,5	6,0	130
AOV-450S-4	200		13,9	93,7	0,89		6,5			6,9	165
AOV-450L-4	250		17,2	94,2	0,90					8,0	180
AOV-450M-4	315		21,4	94,5						9,4	190
AOV-450S-6	160	1000	11,8	93,0	0,83	0,8	6,0		2,3	10,5	450
AOV-450M-6	200		14,7	93,6	0,84					12,6	520
AOV-450L-6	250		18,2	94,0						16,5	740
AOV-450S-8	132	750	10,3	92,5	0,80	1,1	5,8		2,2	16,0	420
AOV-450M-8	160		12,4	92,8						19,0	540
AOV-450L-8	200		15,5	93,0						22,0	730

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AOV-450 WITH VOLTAGE 3000V, 6000V, 10000V

IM3011 (flange on shield)



Type designation	b_1	b_{31}	d	d_1	d_{20}	d_{24}	d_{25}	h_5	h_{34}	l_{20}	l_{30}	α	Mass, kg** Aluminum / copper
AOV4-450SK-2	20	775	24	70	740	800	680	74,5	40	140	1810	22°30'	2330 (2430*)
AOV4-450S-2													2370 (2470*)
AOV4-450M-2											1840		2420 (2520*)
AOV4-450LA-2											1890		2490 (2590*)
AOV4-450LB-2											2000		2630 (2730*)
AOV4-450SK-4	28		28	100	1080	1150	1000	106	35	210	1840		2120 (2220*)
AOV4-450S-4													2070 (2170*)
AOV4-450L-4											1970		2480 (2580*)
AOV4-450M-4													2880 (2980*)
AOV4-450S-6											1840		2220 (2320*)
AOV4-450M-6											1970		2320 (2420*)
AOV4-450L-6													2580 (2680*)
AOV4-450S-8											1840		2170 (2270*)
AOV4-450M-8											1970		2270 (2370*)
AOV4-450L-8													2430 (2530*)

** Electric motors with copper rotor winding.*
*** Allowable deviation of mass upward – 5%. Deviation of mass downwards – is not regulated.*

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AOV-560, WITH VOLTAGE 3000V, 6000V, FREQUENCY NETWORK 50Hz

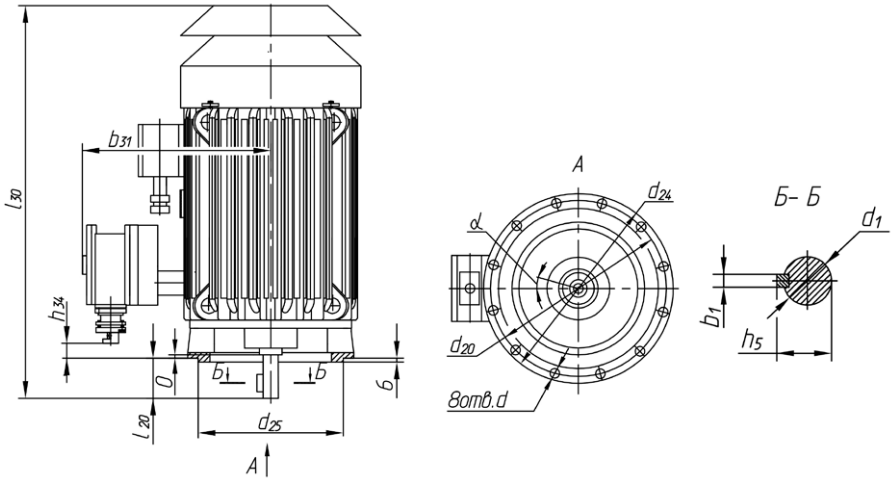
Type designation	Nominal power, kW	Rotation speed (synch), rpm.	Nominal current, A*	Efficiency, %	Power factor	Nominal sliding, %	Initial starting current ratio	Initial starting torque ratio	maximum torque ratio	Inertia moment, kg*m²	
										of the motor	of driving mechanism
AOV-560S-2	500	3000	112,8/56,4	94,8	0,90	0,7	6,0	1,0	2,7	11	50
AOV-560M-2	630		143,4/71,7	95,1	0,89					12	60
AOV-560LA-2	800		181,2/90,6	95,5			7,0	1,1	2,8	13	64
AOV-560LB-2	1000		218,1/109,0	95,9	0,92					21,5	70
AOV-560M-4	400	1500	90,0/45,0	94,8	0,88	0,9	6,5	1,3	2,5	26	380
AOV-560MA-4	500		112,6/56,3	95,0	0,90					28	420
AOV-560MH-4	630		141,0/70,5	95,5						32	430
AOV-560S-6	315	1000	80,0/40,0	94,6	0,84	0,8	5,5	1,1	2,2	30	1250
AOV-560M-6	400		95,6/47,8	94,8						36	1430
AOV-560L-6	500		119,0/59,5	95,2						42	1600
AOV-560S-8	250	750	64,0/32,0	94,1	0,8	1,0		1,0		34	1120
AOV-560M-8	315		80,0/40,0	94,7						43	1640
AOV-560L-8	400		101,2/50,6	95,0						52	1950

** Data for voltage 3000V are indicated in the numerator, data for 6000V are indicated in the denomenator*
Electric motors with voltage 3 000V are manufactured in dimensions of motors with voltage 6000V

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AOV-560, WITH VOLTAGE 10000V, FREQUENCY NETWORK 50Hz

Type designation	Nominal power, kW	Rotational speed (synch.), orpm.	Nominal current, A	Efficiency, %	Power factor	Nominal sliding, %	Initial starting current ratio	Initial starting torque ratio	maximum torque ratio	Inertia moment, kg*m²	
										of the motor	of driving mechanism
AOV-560S-2	500	3000	33,7	95,3	0,91	0,7	7,0	1,2	2,8	11,6	50
AOV-560M-2	630		42,5	95,5						12,5	60
AOV-560LA-2	800		52,5	95,8	0,92					13,4	64
AOV-560LB-2	1000		65,3	95,9						21,5	70
AOV-560L-4	400	1500	27,8	94,5	0,9	0,9	6,5	1,1	2,5	28	400
AOV-560LA-4	500		33,8	95,0						30	420
AOV-560LH-4	630		42,6	95,5						34	480
AOV-560S-6	315	1000	22,8	94,6	0,84	0,8	5,5		2,2	32	1250
AOV-560M-6	400		28,8	94,8						37	1430
AOV-560L-6	500		35,7	95,2						43	1600
AOV-560S-8	250	750	19,2	94,1	0,8	1,0		1,0		34	1120
AOV-560M-8	315		24,0	94,7						43	1640
AOV-560L-8	400		30,3	95,0						52	1950

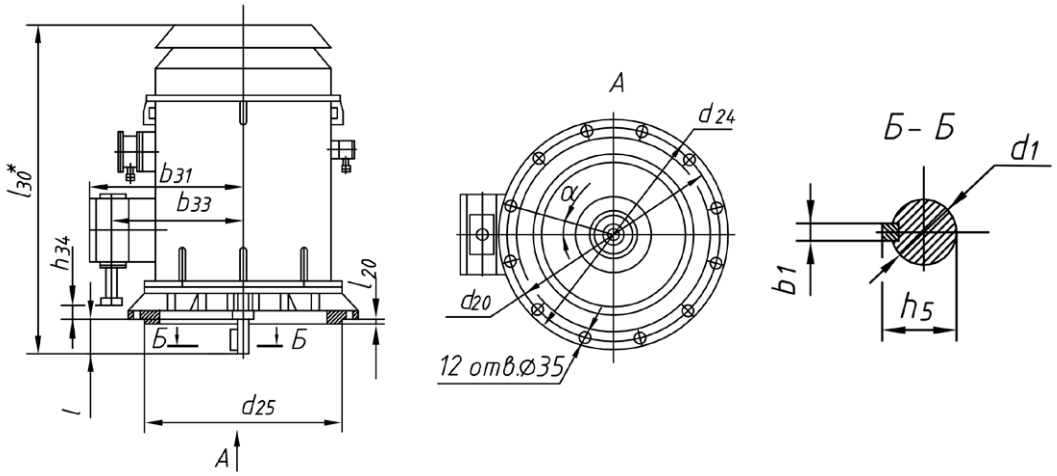
OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AOV-560-2 WITH VOLTAGE 3000V, 6000V, 10000V IM3011 (flange on shield)



Type designation	b_1	b_{31}	d	d_1	d_{20}	d_{24}	d_{25}	h_5	h_{34}	l_{20}	l_{30}±5	α	Mass, kg**
AOV-560S-2	20	815	24	70	740	800	680	74,5	40	140	2050	22°30’	3140 (3240*)
AOV-560M-2											2150		3710 (3810*)
AOV-560LA-2	25	900	28	90	1080	1150	1000	95	45	210	2300		4515 (4615*)
AOV-560LB-2													5130 (5230*)

** Electric motors with copper rotor winding.*
*** Allowable deviation of mass upward – 5%. Deviation of mass downwards – is not regulated.*

OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AOV-560-4,6,8 WITH VOLTAGE 3000V, 6000V, 10000V IM4011 (flange on bed)



Type designation	l	l_{20}	l_{30}	b_1	b_{31}	d_{33}	d_1	d_{20}	d_{24}	d_{25}	h_5	h_{34}	α	Mass, kg***
AOV-560M-4	210	12	1960	28	930	780	110	1250	1350	1150	116	0	15	4040 (4240**)
AOV-560S-6			2000		930 (1000*)	780 (820*)								4660 (4860**)
AOV-560M-6														3780 (3980**)
AOV-560S-8														3866(4066**)
AOV-560M-8			2160		970 (1040*)	820 (860*)								4780 (4980**)
AOV-560MA-4														5010 (5210**)
AOV-560MH-4														4890 (5090**)
AOV-560L-4														5120 (5320**)
AOV-560LA-4														4190 (4390**)
AOV-560LH-4														4830 (5030**)
AOV-560L-6														4090 (4290**)
AOV-560L-8														4720 (4920**)

**Electric motors with voltage 10000V.*
**** Allowalle deviation of mass upward – 5%. Deviation of mass downwards – is not regulated.*

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AOV-630 WITH VOLTAGE 3000V, 6000V, FREQUENCY NETWORK 50Hz

Type designation	Nominal power, kW	Rotational speed (synch.), rpm.	Nominal current, A*	Efficiency, %	Power factor	Nominal sliding, %	Initial starting current ratio	Initial starting torque ratio	Maximum torque ratio	Inertia moment, kg*m²	
										of the motor	of driving mechanism
AOV-630M-4	800	1500	178,8/89,4	95,7	0,90	0,9	6,5	1,3	2,5	34	480
AOV-630MA-4	1000		222,8/111,4	96,0						39	530
AOV-630S-6	630	1000	149,8/74,9	95,3	0,85	0,6	5,8	1,0	2,2	71	1840
AOV-630M-6	800		189,8/94,9	95,5						85	2050
AOV-630L-6	1000		230,4/115,2	96,0						93	2200
AOV-630S-8	500	750	126,6/63,3	95,2	0,82	0,7	5,0		2,1	75	2400
AOV-630M-8	630		158,9/79,4	95,5						91	2750
AOV-630L-8	800		189,2/94,6	95,8						110	3200

** Data for voltage 3000V are indicated in the numerator, data for 6000V are indicated in the denomenator.*
Electric motors with voltage 3000V are manufactured in dimensions of motors with voltage 6000V.

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AOV-630 WITH VOLTAGE 10000V, FREQUENCY NETWORK 50Hz

Type designation	Nominal-power, kW	Rotational speed (synch.), rpm.	Nominal current, A	Efficiency, %	Power factor	Nominal sliding, %	Initial starting current ratio	Initial starting torque ratio	Maximum torque ratio	Inertia moment,kg*m²	
										of the motor	of driving mechanism
AOV-630L-4	800	1500	53,8	95,4	0,90	0,6	6,0	1,1	2,5	39	570
AOV-630LA-4	1000		66,8	95,8						45	650
AOV-630S-6	630	1000	45,0	95,3	0,85		5,8	1,0	2,2	74	1840
AOV-630M-6	800		51,7	95,5						87	2050
AOV-630L-6	1000		69,4	95,8						95	2200
AOV-630S-8	500	750	38,2	95,2	0,82	0,7	5,0		2,1	75	2400
AOV-630M-8	630		47,7	95,5						91	2750
AOV-630L-8	800		56,7	95,6						110	3200

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AOV-710 WITH VOLTAGE 3000V, 6000V, FREQUENCY NETWORK 50Hz

Type designation	Nominal power, kW	Rotational speed (synch.), rpm.	Nominal current, A*	Efficiency, %	Power factor	Nominal sliding, %	Initial starting current ratio	Initial starting torque ratio	Maximum torque ratio	Inertia moment, kg*m²	
										of the motor	of driving mechanism
AOV-710M-4	1250	1500	278,6/139,3	96,0	0,9	0,6	6,0	1,1	2,5	72	750
AOV-710M-6		1000	291,4/145,7		0,86	0,5	5,5	1,0	2,1	108	2400
AOV-710S-8	1000	750	235,8/117,9		0,82	0,6	5,0			135	3600
AOV-710M-8	1250		294,0/147,0	96,2						160	4100

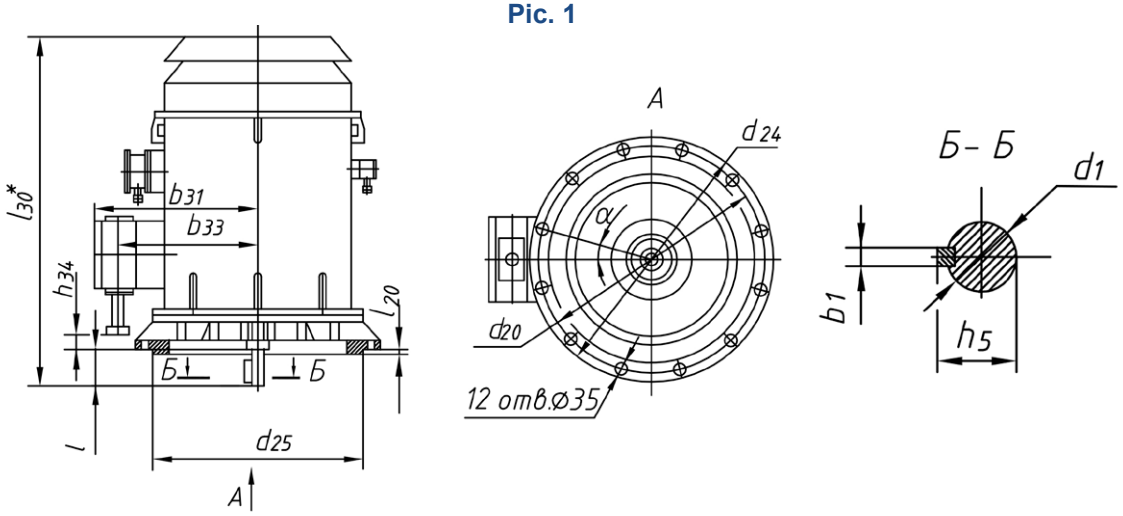
** Data for voltage 3000V are indicated in the numerator, data for 6000V are indicated in the denomenator.*
Electric motors with voltage 3000V are manufactured in dimensions of motors with voltage 6000V.

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AOV-710 WITH VOLTAGE 10000V, FREQUENCY NETWORK 50Hz

Type designation	Nominal power, kW	Rotational speed (synch.), rpm.	Nominal current, A	Efficiency, %	Power factor	Nominal sliding, %	Initial starting current ratio	Initial starting torque ratio	Maximum torque ratio	Inertia moment, kg*m²	
										of the motor	of driving mechanism
AOV-710L-4	1250	1500	83,7	95,9	0,90	0,6	6,0	1,1	2,5	85	800
AOV-710L-6		1000	87,5	96,0	0,86	0,5	5,5	1,0	2,1	108	2500
AOV-710S-8	1000	750	70,9	95,8	0,82	0,6	5,0			135	3600
AOV-710M-8	1250		88,6	96,0						160	4100

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AOV-630-4,6,8 WITH VOLTAGE 3000V, 6000V, 10000V IM4011 (flange on bed)

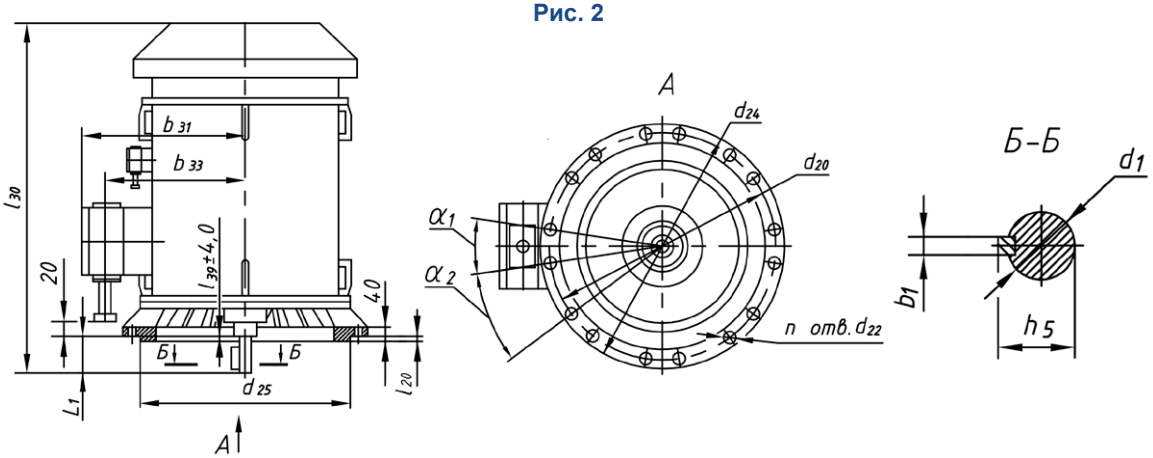
Pic. 1



Type designation	l	l_{20}	l_{30}	b_1	b_{31}	b_{33}	d_1	d_{20}	d_{24}	d_{25}	h_5	h_{34}	α	Mass, kg***
AOV-630M-4	210	16	2160	32	970 (1040 *)	820 (860 *)	120	1400	1500	1290	127	0	15	4900 (5100**)
AOV-630L-4														
AOV-630S-6			2380		1010 (1080*)	860 (900*)								5840 (6040**)
AOV-630S-8														4780 (4980**)
AOV-630L-4														4660 (4860**)
AOV-630MA-4			2500											6320 (6520**)
AOV-630LA-4														6430 (6630**)
AOV-630M-6														6250 (6450**)
AOV-630L-6														6390 (6590**)
AOV-630M-8														6030 (6230**)
AOV-630L-8														6260 (6460**)

** Electric motors with voltage 10000V. ** Electric motors with copper rotor winding.*
***Allowalle deviation of mass upward – 5%. Deviation of mass downwards – is not regulated.*

Рис. 2



ELECTRIC MOTORS AOV-630-4,6,8 WITH OIL BATH

Type designation	b_1	b_{31}	b_{33}	d_1	d_{20}	d_{22}	d_{24}	d_{25}	h_5	l_1	l_{20}	l_{30}	l_{39}	α_1	α_2	n	Mass, kg***
AOV-630M-4	36	1165	1016	140	1400	35	1500	1290	148	250	10	2670	0	30°	30°	12	8520(8820**)
AOV-630L-4		1245	1100														8570(8870**)
AOV-630MA-4		1165	1016														8660(8960**)
AOV-630LA-4		1245	1100														8715(9015**)
AOV-630M-6		1165 (1245*)	1016 (1100*)														8660(8960**)
AOV-630L-6																	8760(9060**)
AOV-630L-8																	8810(9110**)

****Allowable deviation of mass upward -5%. deviation of mass downwards is not regulated.*

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AOV-710-4,6,8 WITH VOLTAGE 3000V, 6000V, 10000V IM4011 (flange on bed)

Pic. 2

Type designation	b_1	b_{31}	b_{33}	d_1	d_{20}	d_{22}	d_{24}	d_{25}	h_5	L_1	l_{20}	l_{30}	l_{39}	a_1	a_2	n	mass, kg***
AOV-710M-4	36	1165	1016	140	1600	42	1720	1480	148	250	20	2670	0	30°	30°	12	9010(9310**)
AOV-710L-4		1245	1100														9260(9560**)
AOV-710M-6		1205	1056		1800		1920	1680									10010(10310**)
AOV-710L-6		1290	1140														10050(10350**)
AOV-710S-8		1205 (1290*)	1056 (1140*)														10030(10330**)
AOV-710M-8																	10100(10400**)

*** Electric motors with copper rotor winding.*
****Allowable deviation of mass upward – 5%. deviation of mass downward is not regulated.*

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AOV-800, WITH VOLTAGE 3000V, 6000V, FREQUENCY NETWORK 50Hz

Type designation	Nominal power, kW	Rotational speed (synch.), rpm.	Nominal current, A*	Efficiency, %	Power factor	Nominal sliding, %	Initial starting current ratio	Initial starting torque ratio	Maximum torque ratio	Inertia moment, kg*m²	
										of the motor	of driving mechanism
AOV-800S-4	1600	1500	364,0/182,0	96,7	0,9	0,6	5,8	1,1	2,5	80	860
AOV-800M-4	2000		452,0/226,0	96,8						104	1100
AOV-800L-6	1600	1000	372,0/186,0	96,2	0,86	0,5	5,5	1,0	2,1	120	2700
AOV-800LA-6	2000		464,4/232,2	96,4						141	3000

** Data for voltage 3000V are indicated in the numerator, data for 6000V are indicated in the denomenator.*
Electric motors with voltage 3000V are manufactured in dimensions of motors with voltage 6000V.

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AOV-800, WITH VOLTAGE 10000V, FREQUENCY NETWORK 50Hz

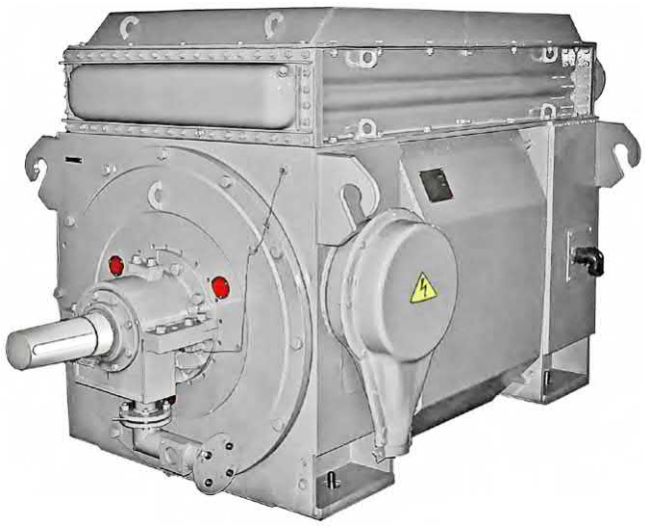
Type designation	Nominal power, kW	Rotational speed (synch.), rpm.	Nominal current, A*	Efficiency, %	Power factor	Nominal sliding, %	Initial starting current ratio	Initial starting torque ratio	Maximum torque ratio	Inertia moment, kg*m²	
										of the motor	of driving mechanism
AOV-800S-4	1600	1500	109	96,6	0,90	0,6	6,0	1,1	2,5	90	920
AOV-800L-4	2000		138	96,7						143	1200
AOV-800L-6	1600	1000	112	95,9	0,86	0,5	5,5	1,0	2,1	120	2800
AOV-800LB-6	2000		140	96,0						141	3200

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AOV-800-4,6,8 WITH VOLTAGE 3000V, 6000V, 10000V IM4011 (flange on bed)

Pic. 2

Type designation	b_1	b_{31}	b_{33}	d_1	d_{20}	d_{22}	d_{24}	d_{25}	h_5	L_1	l_{20}	l_{30}	l_{39}	a_1	a_2	n	Mass, kg***
AOV-800S-4	36	1205 (1290*)	1056 (1140*)	140	1800	42	1920	1680	148	250	20	2815	0	22°30’	22°30’	16	10940(11240**)
AOV-800M-4		1205	1056														11200(11500**)
AOV-800L-4		1290	1140									2925					11340(11640**)
AOV-800L-6	45	1205 (1290*)	1056 (1140*)	175	1980	40	2100	1815	185	225		3000	100	11°15’	33°45’		11630(11930**)
AOV-800LA-6		1205	1056														12030(12330**)
AOV-800LB-6		1290	1140														12500(12800**)

*** Electric motors with copper rotor winding.*
****Allowable deviation of mass upward – 5%. deviation of mass downward is not regulated.*



ELECTRIC MOTORS AZD-400-560

Asynchronous three-phase closed airflow-cooled electric motors AZD with a squirrel-cage rotor are designed to drive pumps, as well other mechanisms.

The electric motors of AZD type are manufactured with height of the axis of rotation 400, 450, 560mm, power from 200 up to 2000kW, rotational speed from 500 up to 1500 rpm., supply voltage 3000V, 6000V, 10000V.

The electric motors of AZD type can be manufactured both with cast aluminum, and copper rotor winding.

The best construction, high quality of applied materials and components, the progressive production technology supply high technical level, ensure safety, reliability and flexibility in application.

Operation mode is continuous S1 from network frequency 50Hz, 60Hz.

Allow operation from frequency converter (S10, S9, S8).

Climatic construction type:

У1, У2, Т1, Т2, УХЛ1, УХЛ2, УХЛ4, ХЛ1, ХЛ2

Mounting configuration:

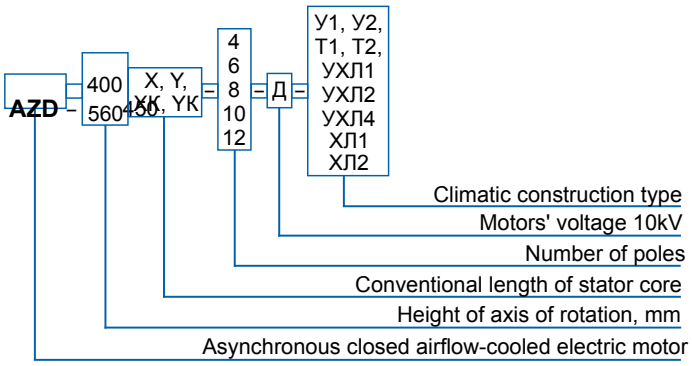
IM1001

Protection degree for:

electric motors	IP21, IP23, IP44, IP54, IP55
terminal box	IP55

Cooling method: IC8A1W7

TYPE DESIGNATION



Main advantages of electric motors AZD over analogues:

1. Improving the active parts to obtain high energy parameters at lower mass.
2. The application in the motor construction of cast aluminum squirrel-cage rotor provided a number of advantages over other analogues with welded winding:

- Select the best configuration and dimensions of groove, increasing starting moments at relatively small values of starting currents;
- Eliminate hard preventive work during operation, put through inspection and restoration of welded joints of the rotor winding;
- Improve the motors' safety in operation excluding the possible sparking and overeheating in welded joints.

The electric motors AZD are manufactured with a shortcircuited rotor winding made of copper for severe operation conditions (frequent, long starts). These motors provide increase of service life by 1,5-2 times and increased starting torque in comparison with electric motors with aluminum squirrel-cage rotor. Allow 15-20 starts of the electric motor instead of 6-8 starts permissible for analogues with aluminum rotor winding.

3. Improved ventilation and cooling system of electric motor provides the maximum heating of active parts working at nominal load, with the exception of local overheating.

4. The application of vacuum pressure impregnation technology (HPI) of windings with epoxy compaund, which is the basis of isolation «Monolith-2», heat-resistance class "F" due to the construction features of the active parts of cooling systems.

5.Using bearing produced by company SKF (at customer's request) increases the service life by 1.5 times compared with bearings produced in CIS countries and others.

6. Equipping with temperature control sensors of the units and air temperature control inside of the motor, with HCX 50M, 100П and Pt100, and also, at customer's request, with vibration control sensors.

7. The application in motors AZD fans of new desing allows to operate electric motors both with the left and with the right direction of the rotor rotation and eliminates the need for modifying the design when changing the direction of rotation.

8. Equipment of electric motors with modern devices for remote temperature control:

- **UKT-12 (9 channels)** (temperature control at 9 points: 2 - bearings, 6 points - winding and iron of stator, 1 point - driving mechanism, information output on PC in real time);
- **UKT-12** (temperature control at 12 points: 2 points - bearings, 6 points - winding and iron of stator, 1 point -motor housing, 3 points - driven mechanism, information output on PC in real time.);
- -temperature and vibration monitoring device UKVT, complete with two three-coordinate vibration sensors of 3KDV type (the possibility to control vibration of bearings support in three coordinates X, У, Z, temperature control in 9 points: 2 points - bearings, 6 points - winding and iron of stator, 1 point - motor housing, information output on PC in real time).

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AZD-400, WITH VOLTAGE 3000V, 6000V, 100000V

Type designation	Power, kW	Voltage,V	Rotational speed, rpm.	Sliding, %	Stator current A***	Effic., %	cosφ	Starting torque ratio	Starting current ratio	Maximum torque ratio	Inertia moment kg*m2	
											of rotor	allowable
AZD-400XKS-4	250	3000/6000	1500/1800	1,0	59.8/30.0	96.6	0.85	1,3	7,0	2,8	11	170
AZD-400XK-4	315				75,2/37,6	93,7	0,86					
AZD-400XK-4Д	250	10000			17,4	94,3	0,88	1,2	6,5	2,5		
AZD-400X-4	400	3000/6000			94,0/47,0	94,2	0,87	1,3	7,0	2,8	12	230
AZD-400X-4Д	315	10000			21,8	94,7	0,88	1,2	6,5	2,5		
AZD-400Y-4	500	3000/6000			116,6/58,3	94,8	0,87	1,5	7,0	2,8	14	280
AZD-400YK-4Д	400	10000			27,6	95,0	0.88	1,2	6,5	2,5		
AZD400Y-4Д	500				34,4	95,4					16	350
AZD-400XK-6	250	3000/6000	1000/1200		62,2/31,1	93,2	0,83	1,3				300
AZD-400XK-6Д	200	10000			14,6	94,2	0,84	1,2	6,0	2,4		
AZD-400X-6	315	3000/6000			76,0/38,0	93,9	0,85	1,3	6,5	2,5	19	350
AZD-400X-6Д	250	10000			18,2	94,5	0,84	1,2	6,0	2,4		
AZD-400Y-6	400	3000/6000			96,2/48,1	94,2	0.85	1,3	6,5	2,5	22	600
AZD-400YK-6Д	315	10000			22,5	94,9		1,2	6,0	2,4		
AZD-400Y-6Д	400				28,6	95,1					24	720
AZD-400X-8	200	3000/6000	750/900		54,0/27,0	92,5	0,77		6,0	2,3	20	500
AZD-400X-8Д		10000			15,5	94,3	0,79	1,1	5,5			
AZD-400Y-8	250	3000/6000			65,4/32,7	93,0		1,2	6,0	2,4	23	600
AZD-400YK-8Д		10000			19,3	94,6		1,1	5,5	2,3	22	
AZD-400Y-10	200	3000/6000	600/720	1,1	56,6/28,3	92,0	0,74	1,3	6,0		23	800
AZD-400Y-10Д		10000			17,0	91,0	0,72	1,1		2,1		

* *3000V/6000V – stator phase connection Δ/Y., 10000V - phase connection - Y.*
** *Data for frequency 50Hz are indicated in the numerator, for frequency 60Hz are indicated in the denomenator.*
*** *Data for voltage 3000V are indicated in the numerator, data for 6000V are indicated in the denomenator.*

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AZD-400

Type designation	l_1	l_{10}	l_{11}	l_{12}	l_{30}	l_{31}	l_{34}	l_{91}	l_{92}	b_1	b_{10}	b_{11}	b_{12}	b_{30}	b_{31}	h	h_5	h_{31}	h_{34}	d	d_1	d_{10}	Mass, kg
DAZO4-400XKS-4	210	900	1140	270	1490	80	740	200	330	28	800	940	120	1320	710	400	106	1180	100	M10	100	35	2190
DAZO4-400XK-4																							
DAZO4-400XK-4Д																							2240
DAZO4-400X-4																							2330
DAZO4-400X-4Д		1000	1240		1590		840											1240					2380
DAZO4-400Y-4																							2630
DAZO4-400YK-4Д																							2490
DAZO4-400Y-4Д																							2790
DAZO4-400XK-6		900	1140		1490		740											1180					2220
DAZO4-400XK-6Д																							2270
DAZO4-400X-6																							2380
DAZO4-400X-6Д		1000	1240		1590		840											1240					2430
DAZO4-400Y-6																							2650
DAZO4-400YK-6Д																							2600
DAZO4-400Y-6Д																							2830
DAZO4-400X-8		900	1140		1490		740											1180					2340
DAZO4-400X-8Д		1000	1240		1590		840											1240					2600
DAZO4-400Y-8																							2610
DAZO4-400YK-8Д																							2860
DAZO4-400Y-10																							2590
DAZO4-400Y-10Д																							2840

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AZD-450, WITH VOLTAGE 3000V, 6000V, 100000V

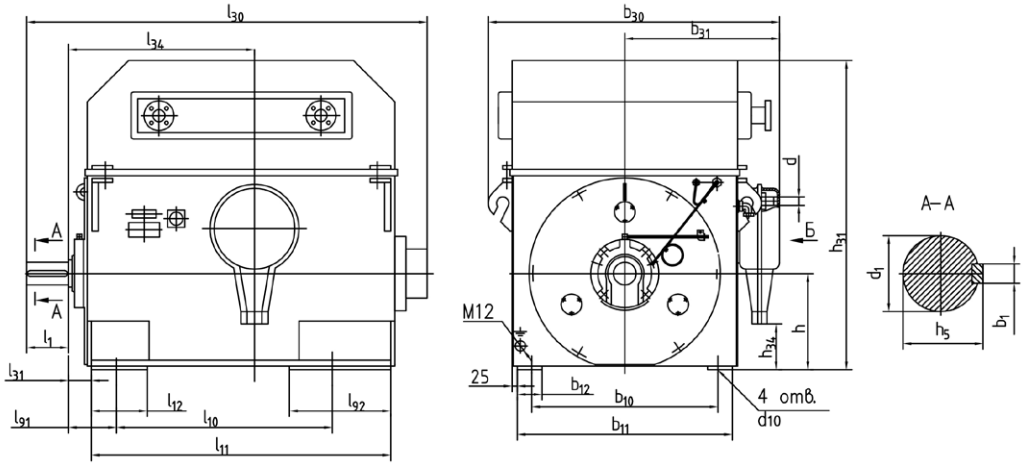
Type designtion	Power, kW	Voltage, V*	Rotational speed, rpm.**	Sliding, %	Stator current, A***	Effi., %	Cos φ	Starting torque ratio	Starting current ratio	Maximum torque. ratio	Inertia moment, kg*m²	
											of rotor	allowable of mechanism
AZD-450X-4	630	3000/6000	1500/1800	1,0	146,8/73,4	95,0	0,87	1,2	5,5	2,3	22	300
AZD-450X-4Д		10000			43,0		0,89		5,6		24	
AZD-450Y-4	800	3000/6000			183,8/91,9	95,2	0,88			2,4	26	350
AZD-450Y-4Д		10000			54,4	95,4	0,89		5,8	2,3	27	
AZD-450X-6	500	3000/6000	1000/1200		120,2/60,1	94,6	0,85		5,5	2,2	33	750
AZD-450X-6Д		10000			35,4	94,7	0,86				36	
AZD-450Y-6	630	3000/6000			150,2/75,1	95,0	0,85				39	900
AZD-450Y-6Д		10000			44,5		0,86				42	
AZD-450X-8	315	3000/6000	750/900		80,6/40,3	94,0	0,80		5,0		37	800
AZD-450X-8Д		10000			22,9	94,5	0,84				41	
AZD-450YK-8	400	3000/6000			102,0/51,0	94,4	0,80				43	1300
AZD-450YK-8Д		10000			29,7		0,82				45	
AZD-450Y-8	500	3000/6000			127,2/63,6	94,6	0,80				50	1500
AZD-450Y-8Д		10000			36,2	95,0	0,84				52	
AZD-450X-10	250	3000/6000	600/720	1,1	66,0/33,0	92,5	0,78	1,3	6,0	2,3	38	
AZD-450X-10Д		10000			19,3	93,5	0,80	1,1	4,7	2,1	42	
AZD-450Y-10	315	3000/6000			82,0/41,0	93,0		1,3	6,0	2,3	43	
AZD-450Y-10Д		10000			24,2	93,8		1,1	4,7	2,1	45	
AZD-450X-12	200	3000/6000	500/600	1,2	56,0/28,0	91,7	0,75	1,3	5,5	2,3	47	1330
AZD-450X-12Д		10000			15,9	93,2	0,78	1,1	4,5	2,1	50	
AZD-450Y-12	250	3000/6000			70,0/35,0	92,2	0,75	1,3	5,5	2,3	52	1625
AZD-450Y-12Д		10000			19,8	93,5	0,78	1,1	4,5	2,1	54	

** 3000V/6000V – stator phase connection Δ/Y., 10000V - phase connection - Y.*
*** Data for frequency 50Hz are indicated in the numerator, for frequency 60Hz are indicated in the denomenator.*
****Data for voltage 3000V are indicated in the numerator, data for 6000V are indicated in the denomenator.*

OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AZD-450

Type designation	l_1	l_{10}	l_{11}	l_{12}	l_{31}	l_{34}	l_{30}	l_{91}	l_{92}	b_1	b_{10}	b_{11}	b_{12}	b_{30}	b_{31}	h	h_5	h_{31}	h_{34}	d	d_1	d_{10}	Mass, kg
AZD-450X-4	210	900	1190	270	103	1010	1590	224	330	28	900	1040	120	1420	760	450	116	1365	206	M10	110	35	2900
AZD-450X-4Д		1000	1290			1110	1690											1400					3350
AZD-450Y-4																							3300
AZD-450Y-4Д		1120	1410			1230	1810																3750
AZD-450X-6		900	1190			1010	1590											1365					2950
AZD-450X-6Д		1000	1290			1110	1690											1400					3400
AZD-450Y-6																							3350
AZD-450Y-6Д		1120	1410			1230	1810																3800
AZD-450X-8		900	1190			1010	1590											1365					2870
AZD-450X-8Д		1000	1290			1110	1690											1400					3320
AZD-450YK-8																							3200
AZD-450YK-8Д																							3650
AZD-450Y-8																							3470
AZD-450Y-8Д		1120	1410			1230	1810																3920
AZD-450X-10		900	1190			1010	1590											1365					2770
AZD-450X-10Д		1000	1290			1110	1690											1400					3220
AZD-450Y-10																							3100
AZD-450Y-10Д		1120	1410			1230	1810																3550
AZD-450X-12		900	1190			1010	1590											1365					2860
AZD-450X-12Д		1000	1290			1110	1690											1400					3310
AZD-450Y-12																							3120
AZD-450Y-12Д		1120	1410			1230	1810																3570

DRAWING OF MOTORS AZD-400, 450, 560

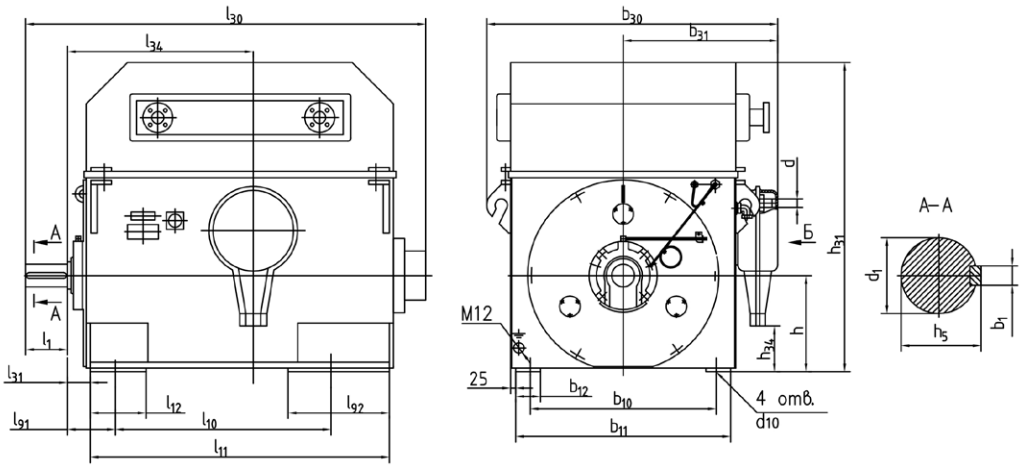


TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AZD-560

Type designation	Power, kW	Voltage, V*	Rotational speed, rpm.**	Sliding, %	Stator current, A***	Effic. %	Cos φ	Starting torque ratio	Starting current ratio	maximum torque ratio	inertia moment kg*m²	
											of rotor	allowable of mechanism
AZD-560XK-4	1000	3000/6000	1500/1800	1,0	232/115	95,5	0,9	1,1	7,0	2,4	186	2700
AZD -560X-4	1250				290,0/145,0		0,87		6,9	2,5		
AZD -560X-4Д	1000	10000			70,5	95,5	0,86		6,7	2,4	160	2100
AZD -560YK-4	1600	3000/6000			365,0/182,5	95,8	0,88		6,9	2,5	218	3100
AZD -560YK-4Д	1250	10000			87,0	95,3	0,87		6,7	2,4	188	2500
AZD -560Y-4	2000	3000/6000			455,0/227,5	96,0	0,88		6,9	2,5	225	3400
AZD -560Y-4Д	1600	10000			109,5	95,6			6,7	2,4	218	3000
AZD -560XK-6	800	3000/6000	1000/1200		191/95.2	95.3	0.84	1,2	6,7	2,2	276	8300
AZD -560X-6	1000				238,0/119,0	95,5	0,85	1,3	6,5	2,3		
AZD -560X-6Д	800	10000			58,0	94,9	0,84	1,1	6,1	2,2	240	6100
AZD -560YK-6	1250	3000/6000			292,0/146,0	95,8	0,86	1,3	6,5	2,3	321	9600
AZD -560YK-6Д	1000	10000			71,5	95,2	0,85	1,2	6,2	2,2	280	7300
AZD -560Y-6	1600	3000/6000			374,0/187,0	96,0	0,80	1,3	6,5	2,3	377	11000
AZD -560Y-6Д	1250	10000			89,0	95,5	0,85	1,2	6,2	2,2	321	8800
AZD -560X-8	630	3000/6000	750/900		162,0/81,0	94.7	0,79	1,3	6,0	2,2	349	12300
AZD -560X-8Д		10000			49,5		0,78	1,2	5,8	2,1		8400
AZD -560YK-8	800	3000/6000			202,0/101,0	95,0	0,80	1,3	6,0	2,2	420	14700
AZD -560YK-8Д		10000			61,5	94,7	0,79	1,2	5,8	2,1		11000
AZD -560Y-8	1000	3000/6000			253,0/126,5	95,3	0,80	1,3	6,0	2,2	477	16000
AZD -560Y-8Д		10000			77,0	95,0	0,79	1,2	5,8	2,1		14000
AZD -560XK-10	400	3000/6000	600/720	1,1	105,0/52,5	93,6	0,78		5,9	2,2	300	12800
AZD -560XK-10Д		10000			32,5	93,4	0,76		5,8	2,1		7100
AZD -560X-10	500	3000/6000			129,0/64,5	94,1	0,79	1,3	6,0	2,3	350	16100
AZD -560X-10Д		10000			40,0	93,8	0,77	1,2	5,9	2,2		10000
AZD -560YK-10	630	3000/6000			162,0/81,0	94,6	0,79	1,3	6,0	2,3	422	20300
AZD -560YK-10Д		10000			49,5	94,3	0,78	1,2	5,9	2,2		14000
AZD -560Y-10	800	3000/6000			202,0/101,0	94,9	0,80	1,3	6,0	2,3	480	23900
AZD -560Y-10Д		10000			61,5	94,6	0,79	1,2	5,9	2,2		20000
AZD -560XK-12	315	3000/6000	500/600	1,2	87,0/43,5	92,9	0,74	1,3	5,5		300	20300
AZD -560XK-12Д		10000			27,1	92,6	0,73	1,2	5,2	2,1		9800
AZD -560X-12	400	3000/6000			109,0/54,5	93,4	0,75	1,3	5,5	2,2	350	24100
AZD -560X-12Д		10000			33,5	93,1	0,74	1,2	5,2	2,1		13000
AZD -560YK-12	500	3000/6000			136,0/68,0	93,9	0,75	1,3	5.5	2,2	422	30000
AZD -560YK-12Д		10000			41,5	93,6	0,74	1,2	5,2	2,1		19000
AZD -560Y-12	630	3000/6000			170,0/85,0	94,4	0,75		5.4	2,2	480	33400
AZD -560Y-12Д		10000			51,5	94,1		1,1	5,1	2,1		22500

* *3000V/6000V – stator phase connection Δ/Y., 10000V - phase connection - Y..*
** *Data for freq0ency 50HV are indicated in the nu/erator, for freq0ency 60HV are indicated in the denomenator.*
**66 ata for voltage 3000V are indicated in the nu/erator, data for 6000V are indicated in the denomenator.*

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AZD-560



Type designation	l_1	l_{10}	l_{11}	l_{12}	l_{30}	l_{31}	l_{34}	l_{91}	l_{92}	b_1	b_{10}	b_{11}	b_{12}	b_{30}	b_{31}	h	h_5	h_{31}	h_{34}	d	d_1	d_{10}	Mass kg
AZD-560XK-4																							
AZD-560X-4		1000	1390		1910		875																4840
AZD-560X-4Д																							4520
AZD-560YK-4																							5570
AZD-560YK-4Д		1250	1635		2155		1125																5200
AZD-560Y-4																							6040
AZD-560Y-4Д																							5580
AZD-560XK-6																							4930
AZD-560X-6		1000	1390		1910		875																
AZD-560X-6Д																							4610
AZD-560YK-6																							5630
AZD-560YK-6Д		1250	1635		2155		1125																5310
AZD-560Y-6																							5650
AZD-560Y-6Д																							5670
AZD-560X-8		1000	1390		1910		875																4640
AZD-560X-8Д																							4660
AZD-560YK-8																							5400
AZD-560YK-8Д	250	1250	1635	320	2155	130	1125	250	380	36	1000	1230	170	1615	860	560	148	1645	400	M10	140	42	5420
AZD-560Y-8																							5750
AZD-560Y-8Д																							5820
AZD-560XK-10																							4450
AZD-560XK-10Д		1000	1390		1910		875																4490
AZD-560X-10																							4500
AZD-560X-10Д																							4510
AZD-560YK-10																							5300
AZD-560YK-10Д		1250	1635		2155		1125																5280
AZD-560Y-10																							5620
AZD-560Y-10Д																							5650
AZD-560XK-12																							4200
AZD-560XK-12Д		1000	1390		1910		875																4250
AZD-560X-12																							4500
AZD-560 X -12Д																							4510
AZD-560YK-12																							5250
AZD-560YK-12Д		1250	1635		2155		1125																5260
AZD-560Y-12																							5600
AZD-560Y-12Д																							5610

ELECTRIC MOTORS ADN-630

Asynchronous three-phase electric motors of ADN type with a squirrel cage rotor are designed to drive mechanisms((pumps, fgans,and others).

Nominal operation mode is continuous S1.

The electric motors are designed to operate from AC, 50Hz 6000V and 10000V.

Allow operation from frequency converters in modes S8, S9, S10.

Climatic construction type: У3, УХЛ4.

Mounting configuration: IM1001

Cooling method: IC01.

Direction of rotation: left and right.

Environmental protection degree for:

the motors	**IP21**
terminal box	**IP55**

ДThe electric motors are manufactured with rolling bearings.

The lubrication of bearings is consistent.

The insulating materials of stator winding have heat resistance class «F». The insulation of stator winding is thermoset type «Monolith-2».

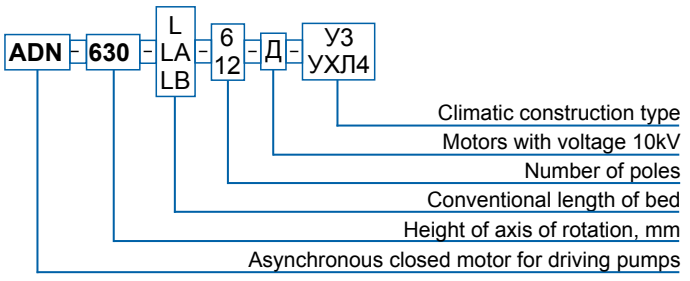
The electric motors can be produced both with copper, and with aluminum rotor winding.

The best construction, high quality of applied materials and components, the progressive production technology supply high technical level, ensure safety, reliability and flexibility in application.

At customer's request the electric motors can be manufactured with overall dimensional, installation and mounting sizes, which differ from standard, as well as for other power, voltage, rotational speed and mounting configuration

The electric motors can be delivered with base plates with dimensional and mounting sizes of replaceable electric motors of SDN type.

TYPE DESIGNATION



Main advantages of electric motors ADN-630 over analogues:

1. Improving the active parts to obtain high energy parameters at lower mass.

2. The application in the motor construction of cast of aluminum squirrel-cage rotor provided a number of advantages over other analogues with welded winding:

- Select the best configuration and dimensions of groove, increasing starting moments at relatively small values of starting currents;
- Eliminate hard preventive work during operation, put through inspection and restoration of welded joints of the rotor winding
- Improve the motors' safety in operation excluding the possible sparking and overeheating in welded joints.

The electric motors ADN-630 are manufactured with a short-circuited rotor winding made of copper for severe operation conditions (frequent, long starts). These motors provide increase of service life by 1,5-2 times and increased starting torque in comparison with electric motors with aluminum squirrel-cage rotor. Allow 15-20 starts of the electric motor instead of 6-8 starts permissible for analogues with aluminum rotor winding.

3. Improved ventilation and cooling system of electric motor provides the maximum heating of active parts working at nominal load, with the exception of local overheating.

4. The application of vacuum pressure impregnation technology (HPI) of windings with epoxy compaund, which is the basis of isolation «Monolith-2», heat-resistance class "F" due to the construction features of the active parts of cooling systems.

5.Using bearing produced by company SKF (at customer's request) increases the service life by 1.5 times compared with bearings produced in CIS countries and others.

6. Equipping with temperature control sensors of the bearing units and air temperature control inside of the motor, with НСХ,50М, 100П and Pt100, and also, at customer's request, with vibration control sensors.

7. The application in motors ADN-630 fans of new desing0 allows to operate electric motors both with the left and with the right direction of the rotor rotation and eliminates the need for modifying the design when changing the direction of rotation.

8. Equipment of electric motors with modern devices for, remote temperature control:

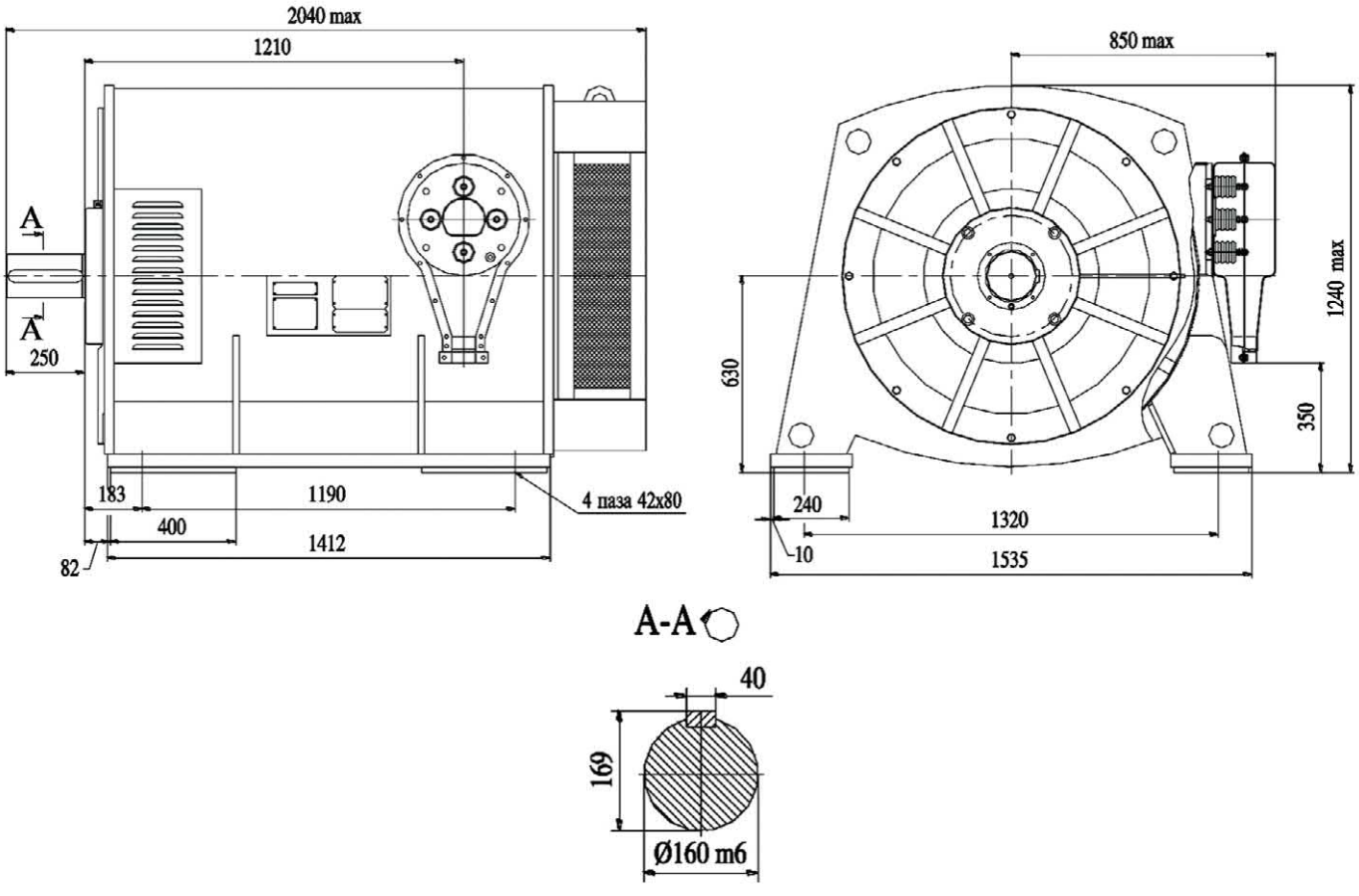
- **UKT-12 (9 channels)** (temperature control at 9 points: 2 - bearings,6-winding and iron of stator, 1 - motor housing); information output on PC in real time.);

- **UKT-12** temperature control at 12 points: 2 points - bearings, 6 points - winding and iron of stator, 1 point -motor housing, 3 points - driven mechanism, information output on PC in real time.);
- temperature and vibration monitoring UKVT, complete with two three-coordinate vibration sensors of 3KDV type (the possibility to control vibration of bearings support in three coordinates X, У, Z, temperature control in 9 points: 2 points - bearings, 6 points - winding and iron of stator, 1 point - motor housing, information output on PC in real time).

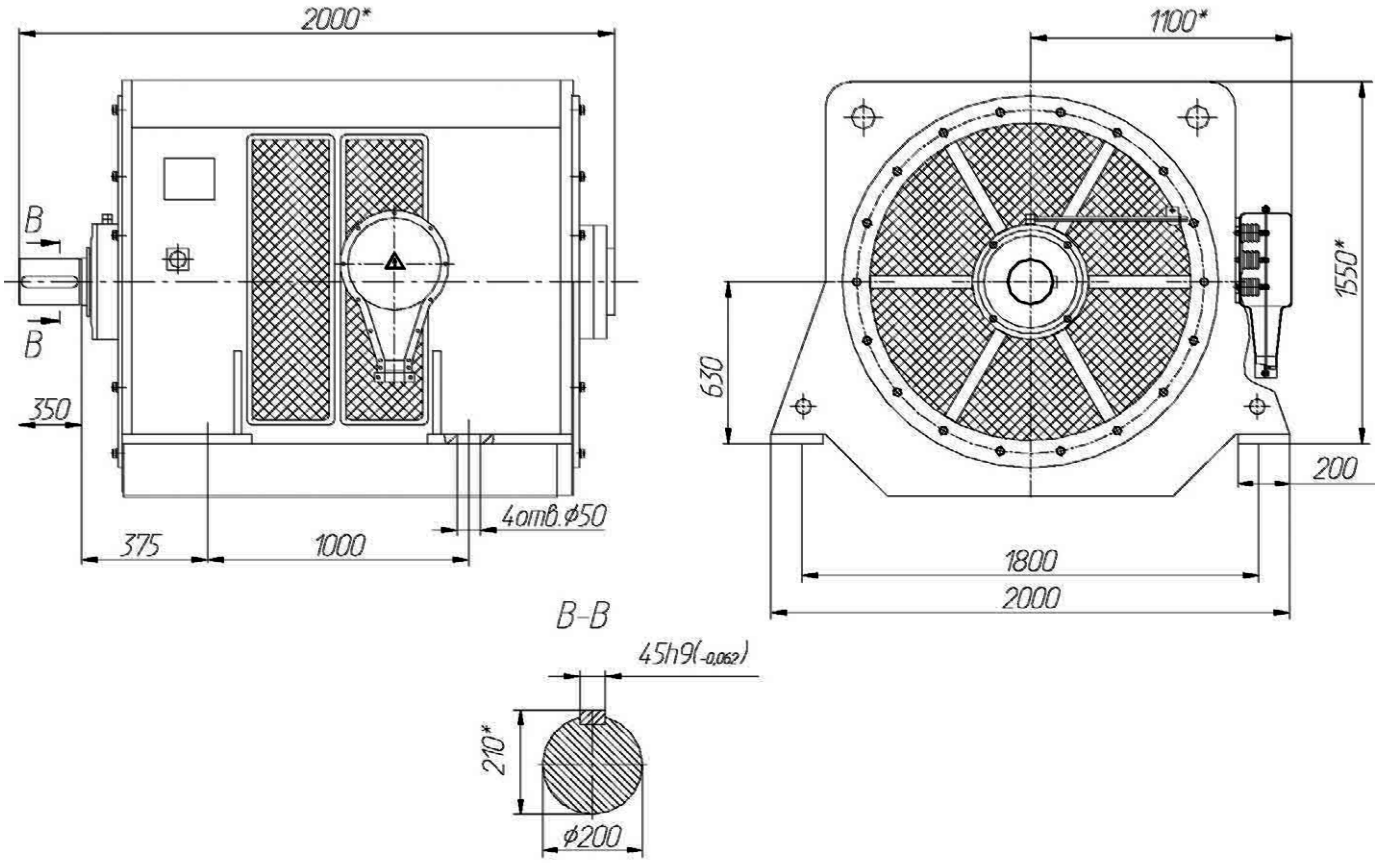
TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS ADN-630

Type designation	Power,kW	Voltage,V	Rotational speed (synch.), rpm.	Effic.,%	Cos φ	Inertia moment kgr*m²	Mass,kg
ADN-630L-6	1600	6000	1000	96,2	0,86	85	5800
ADN-630L-6Д		10000		96,0		104	6000
ADN-630LA-6	2000	6000		96,4		121	7850
ADN-630LA-6Д		10000		96,2		163	8000
ADN-630LB-6	2500	6000		96,5	0,87	180	8500
ADN-630LB-6Д		10000		96,4		195	8850
ADN-630L-12	1000	6000	500	95,5	0,78	206	7700
ADN-630L-12Д		10000		95,3		215	7900
ADN-630LA-12	1250	6000		95,8		247	8150
ADN-630LA-12Д		10000		95,6		260	8300
ADN-630LA-12	1600	6000		96,2	0,79	280	8500
ADN-630LA-12Д		10000		96,0	0,79	295	8750
ADN-630L-16	500	6000	375	94,5	0,78	390	5900
ADN-630L-16		10000		94,1	0,78		6100

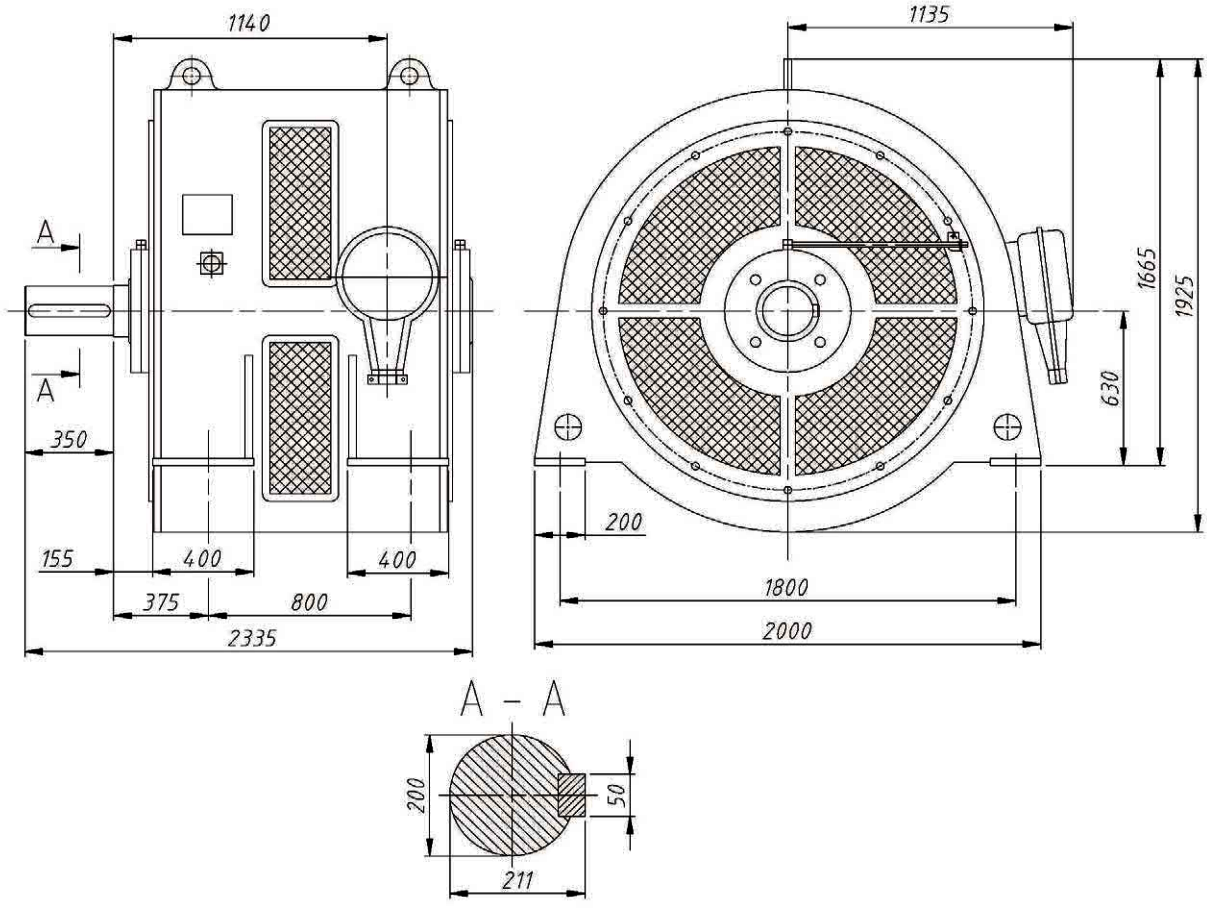
OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS ADN-630L-6

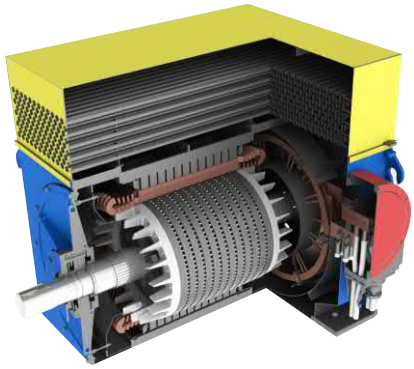


OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS ADN-630L-12



OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS ADN-630L-16





ELECTRIC MOTORS ADCH and ADCHR-160-355; 400-800

The electric motors ADCH, ADCHR are designed for operation as part of a variable frequency drive mechanisms.
The electric motors can be produced in accordance with parameters, indicated in table.

Parameter	Unit of measurement	value
Power	kW	**7.5, 11, 15, 18.5, 22, 30, 37, 45, 55, 75, 90, 110, 132, 160, 200, 250, 315, 400, 500, 630, 800, 1000, 1200, 1250, 1600, 2000, 2500**
Voltage	V	**380, 660, 690, 1140, 3000, 6000, 6600, 10000, 11000**
Rotational speed	rpm.	**375, 500, 600, 750, 1000, 1500, 3000**
operation mode	-	**S1, S2, S3, S4, S5, S6, S7 S8, S9**
Cooling method	Self-ventilated (speed frequency control from 20% up to 100% from nominal)	**IC01** (single-circuit open-curcuit self-ventilated cooling system). **IC411** (double-circuit cooling system. Internal circuit is closed, external circuit is open with a built-in fan located on the motor shaft and cooling the outer surface of the machine). **IC511, IC611** (double-circuit cooling system. Internal circuit is closed, external circuit is open with built-in heat-exchanger and fan located on the motor shaft and cooling the outer surface of the machine).
	Force-ventilated (speed frequency control from 0% up to 100% from nominal)	**IC05** (single-circuit open-curcuit cooling system with built-in free fan) **IC416** (double-circuit cooling system. Internal circuit is closed, external circuit is open with a built-in free fan located on the motor shaft and cooling the outer surface of the machine). **IC516** (double-circuit cooling system. Internal circuit is closed, external circuit is open with built-in heat-exchanger and free fan).
Mounting configuration	**horizontal**	**IM1001, IM2001, IM3001, IM4001**
	vertical	**IM3011, IM4011**
Climatic construction type	-	**У1, У2, У3, УХЛ1, УХЛ2, УХЛ4, Т1, Т2, Т3**
Environmental protection degree	-	**IP20, IP21, IP23, IP44, IP54, IP55**
Motor equipment (at customer's request)	**with temperature control sensors**	**50М, 100П, Pt100**
	with vibration control sensors	**according to the order**
	with encoders	**according to the order**
	with bearings	**SKF, URB**

Main advantages of electric motors ADCH and ADCHR over analogues:

- Improved balancing of rotors, increased rigidity of electric motor housings, which provides vibration and increases the service life of both the electric motor and the driven mechanisms.
- use winding with a special insulation system designed to work with power sources that produce rectangular voltage pulses, that increases resistance to increasing voltage.
- production of electric motors both with self-ventilation and forced ventilation systems.

Equipment of electric motors at customer's request with modern devices for remote temperature control:

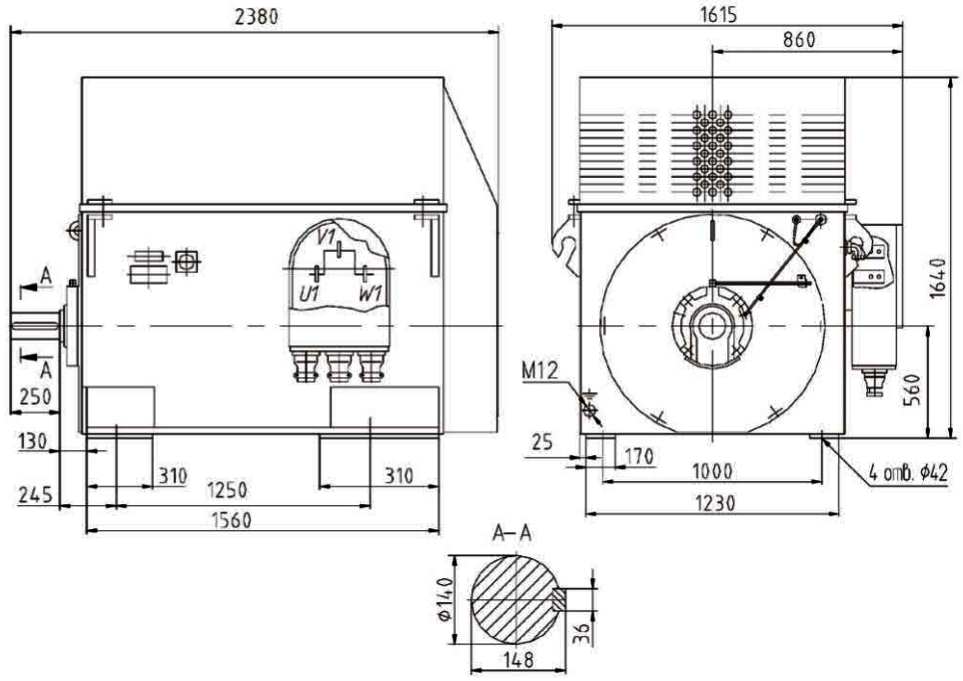
- **UKT-12 (9 channels)** (temperature control at 9 points: 2 - bearings, 6 - winding and iron of stator, 1 - mechanism), information output on PC in real time.
- **UKT-12** ((temperature control at 12 points: 2 points - bearings, 6 points - winding and iron of stator, 1 point -motor housing, 3 points - driven mechanism, information output on PC in real time.); - as well as temperature and vibration monitoring device UKVT, complete with two three coordinate vibration sensors of 3KDV type (the possibility to control vibration of bearings support in three coordinates X,У,Z, temperature control in 9 points: 2 points - bearings, 6 points - winding and iron of stator, 1 point - motor housing, information output on PC in real time).

- equipment of electric motors (at customer's request) with sensors for monitoring rotational speed and rotor position (encoders).

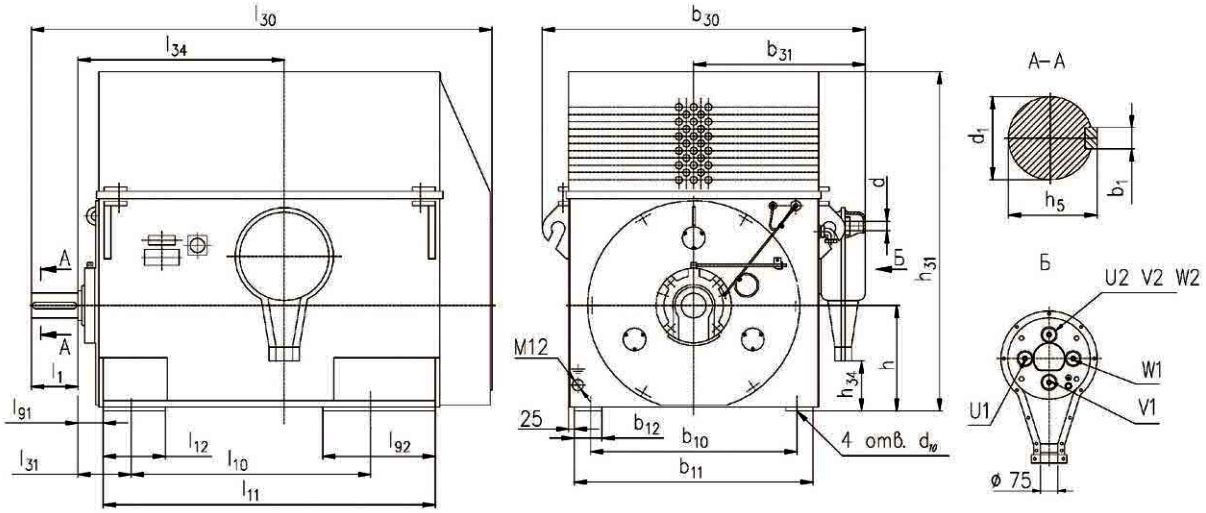
TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS ADCH and ADCHR (put on production)

Type designation	power, kW	Voltage, V	Rotational speed rpm.	Stator current, A	Efficiency, %	Cos φ	Maximum torque ratio
ADCH-560YK-6	1400	690	1000	1380	96,5	0,88	2,5
ADCH-560X-6	900			893	95,8		2,0
ADCH-560Y-8	1000		750	1028	95,8	0,85	
ADCH-630Y-8	1200			1282	96,0		
ADCHR-630-500-0,69	630		500	677	95,6	0,81	2,2
ADCHR-630-600-0,69	630		600	692	95,2	0,80	
ADCHR-1250-1000-0,69	1250		1000	1230	96,4	0,88	2,0
ADCHR-630M-16	450		375	511	94,4	0,78	2,2
ADCHR-560S-16	300			338	94,0	0,79	

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS ADCH-560YK-6



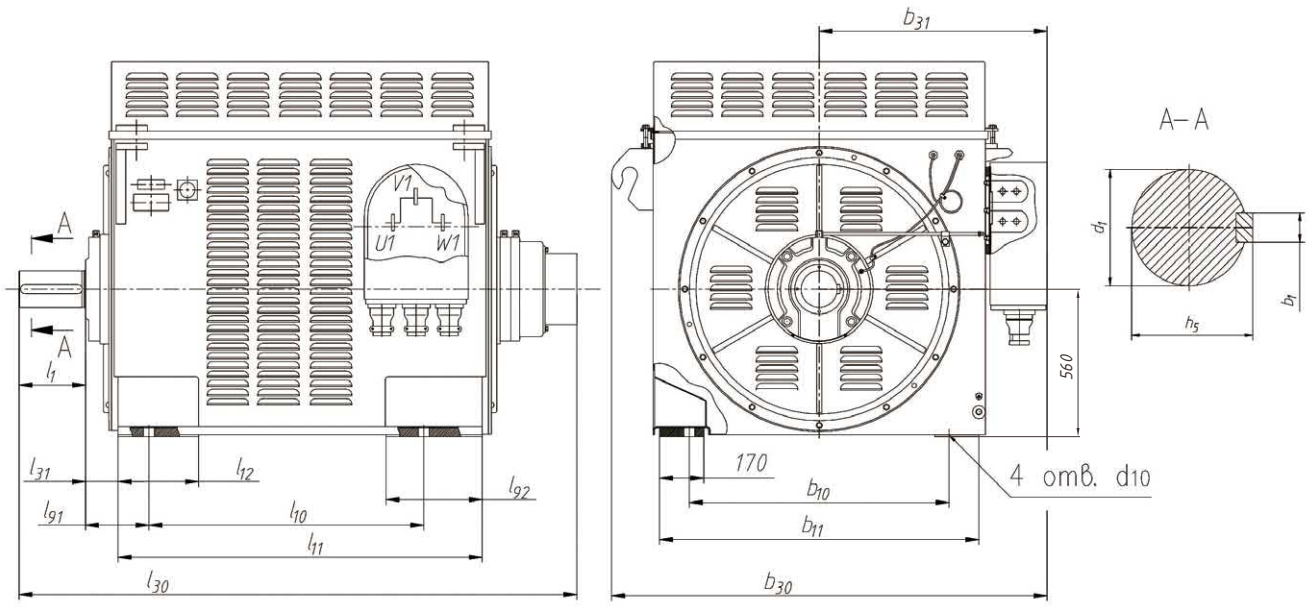
OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS ADCH-560X-6



dimensions in mm

Type designation	b_1	b_{10}	b_{11}	b_{12}	b_{30}	b_{31}	d	d_1	d_{10}	h	h_5	h_{31}	h_{34}	l_1	l_{10}	l_{11}	l_{12}	l_{30}	l_{31}	l_{34}	l_{91}	l_{92}
ADCH-560X-6	36	1000	1230	170	1615	875	M10	140	42	560	148	1865	370	250	1000	1370	310	2190	250	900	130	370

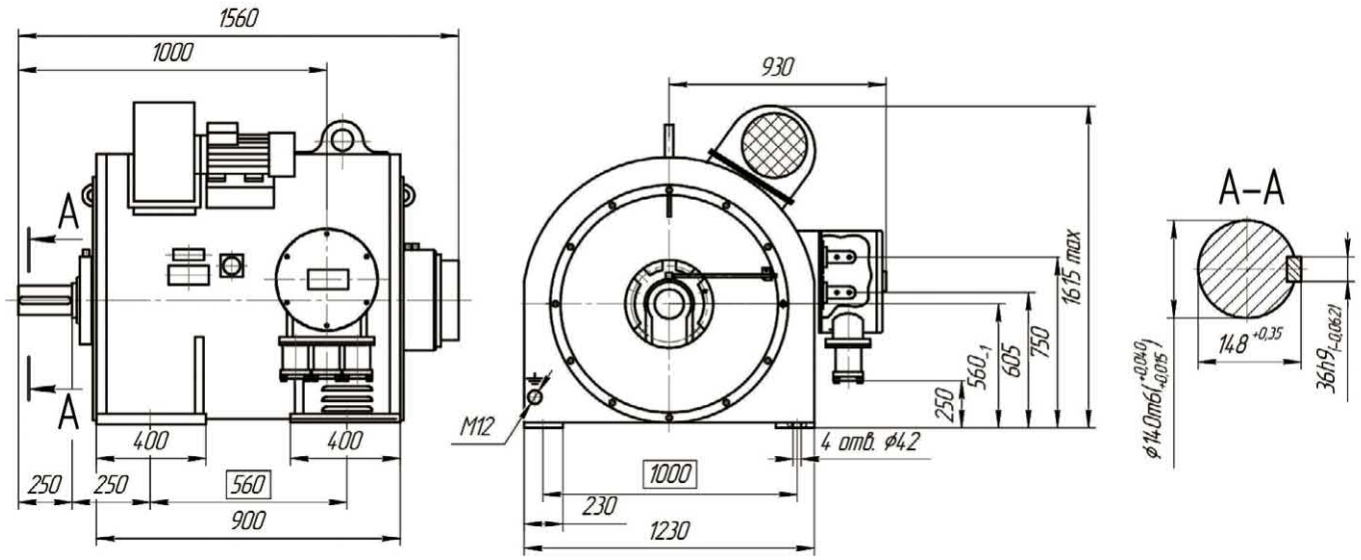
OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS ADCH-560Y-8



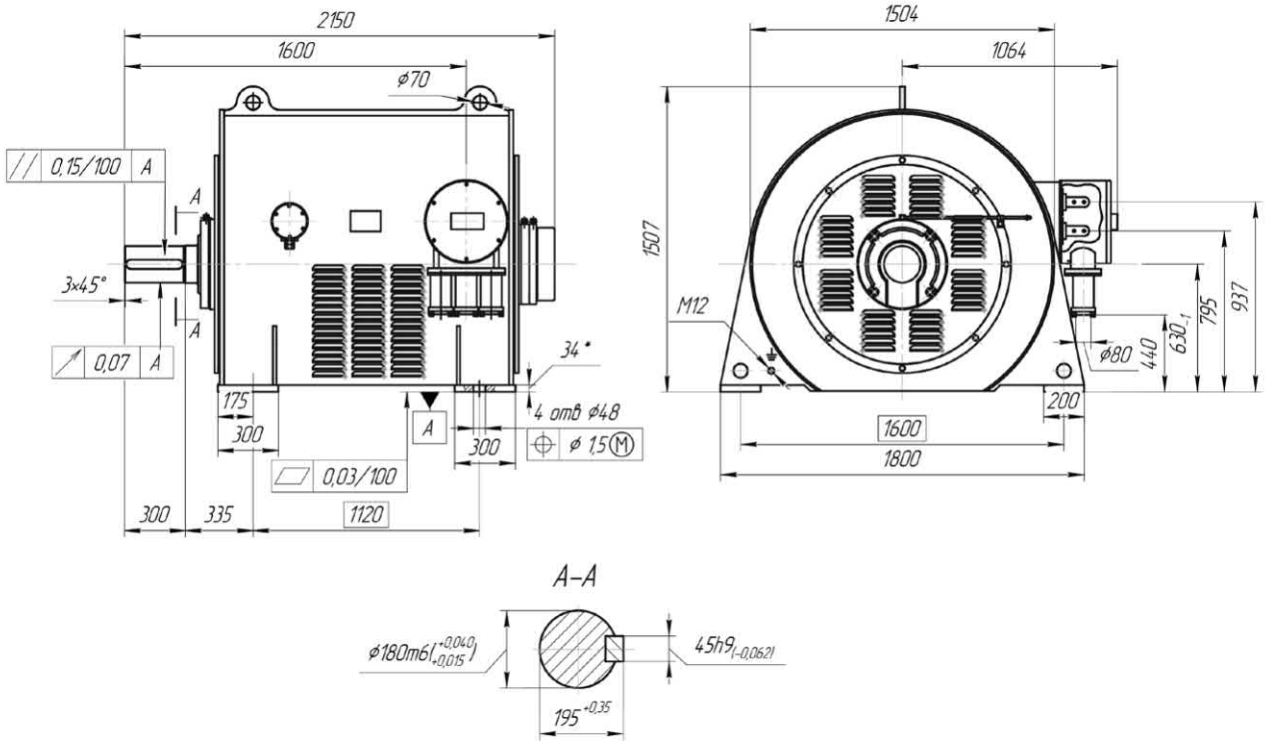
dimensions in mm

Type designation	b_1	b_{10}	b_{11}	b_{30}	b_{31}	d_1	d_{10}	h	h_5	h_{31}	l_1	l_{10}	l_{11}	l_{12}	l_{30}	l_{31}	l_{91}	l_{92}
АДЧ-560Y -8	36	1000	1230	1650	900	140	42	560	148	1400	250	1250	1636	310	2380	130	250	370

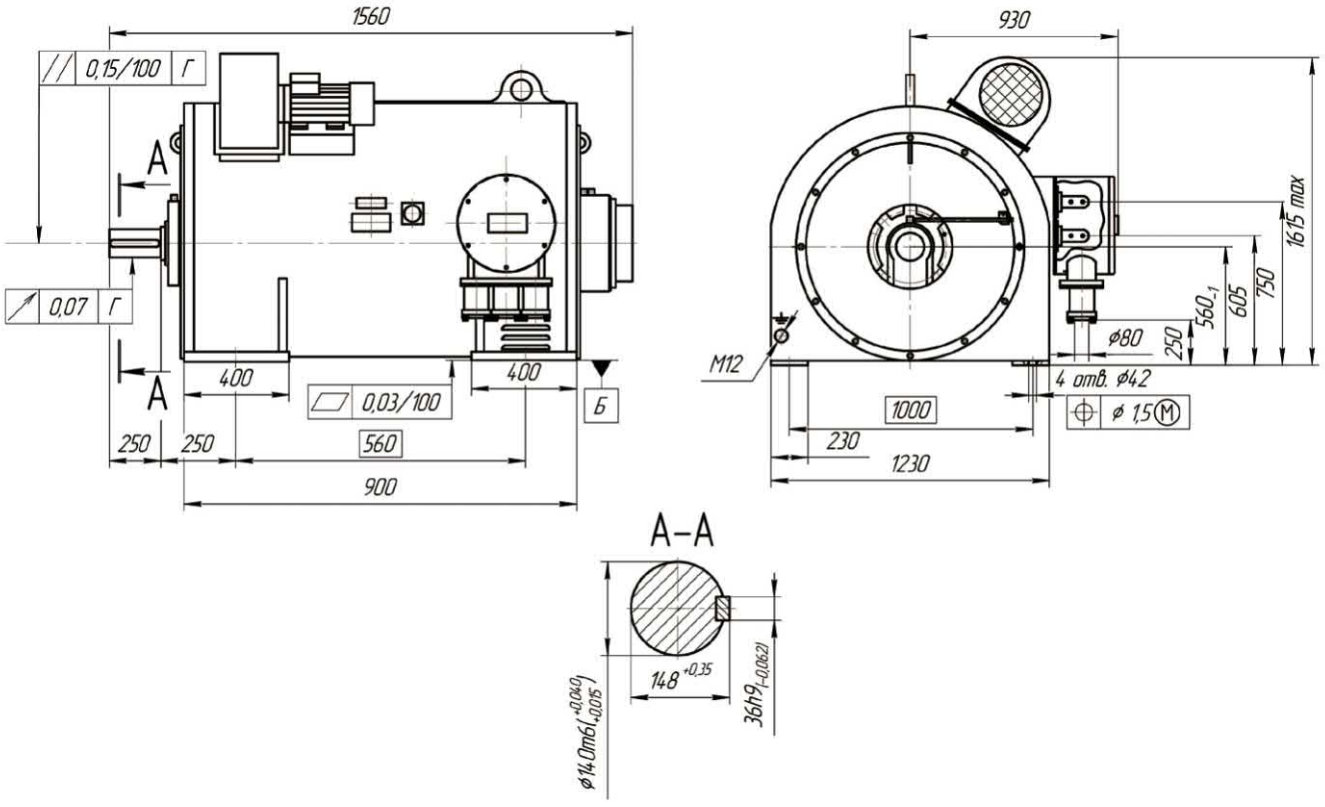
OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS ADCHR-560S-16



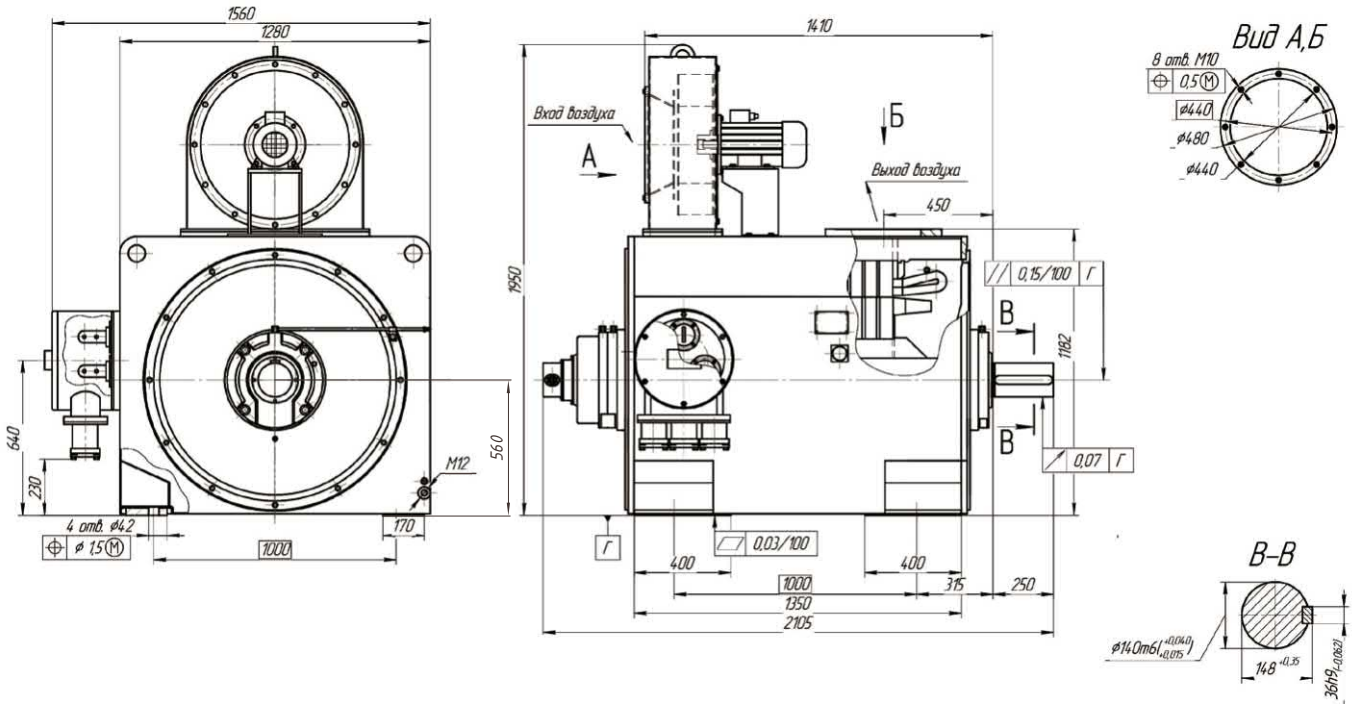
OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS ADCH-630Y-8



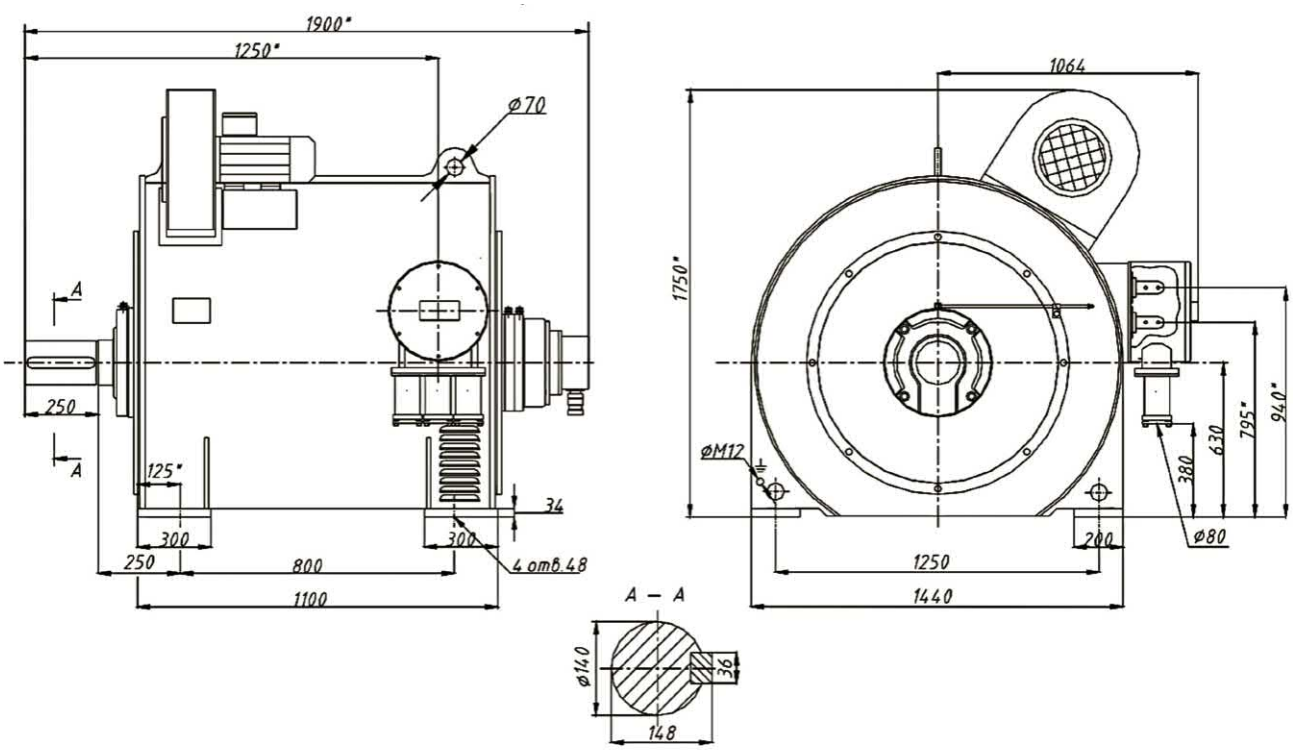
OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS ADCHR-630-500(600)-0,69

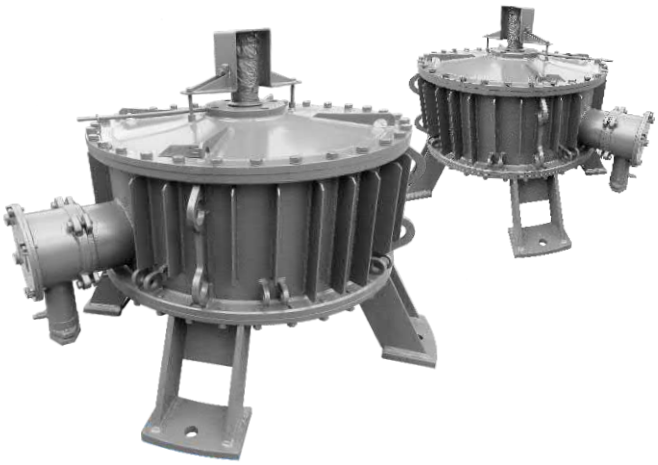


OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS ADCHR-1250-1000-0,69



OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS ADCHR-630M-16





ELECTRIC MOTORS ASVO

Asynchronous three-phase special airflow-cooled vertical double-speed electric motors of ASVO type with a squirrel-cage rotor are designed for gearless drive of air cooler unit.

Operation mode is continuous S1 from network frequency 50Hz, 60Hz and allow operation from frequency converter in modes S8, S9, S10.

Climatic construction type: У1, ХЛ1, УХЛ1, Т1.

Protection degree:
IP54 (IP55, IP65 at customer's request).

Mounting configuration: see table.

Cooling method: IC411.

The electric motors have the right and the left direction of rotation. The insulating materials of stator winding have heatresistance class «F», «H» (at customer's request).

Main advantages of electric motors ASVO over analogues:

1. Improving the active parts to obtain high energy parameters at lower mass.

2. The application in the motor construction of cast aluminum squirrel-cage rotor provided a number of advantages over other analogues with welded winding:

Select the best configuration and dimensions of groove , increasing starting moments at relatively small values of starting currents;

Eliminate hard preventive work during operation, put through inspection and restoration of welded joints of the rotor winding;

Improve the motors' safety in operation excluding the possible sparking and overeheating in welded joints.

3.

The application of ribbed stator housing provides increased mechanical rigidity, lower values of vibration and noise, as well as more efficient and reliable cooling.

4. The application in the terminal boxes of highly reliable and easy-to-use one piece insulation panels instead of individual insulators.

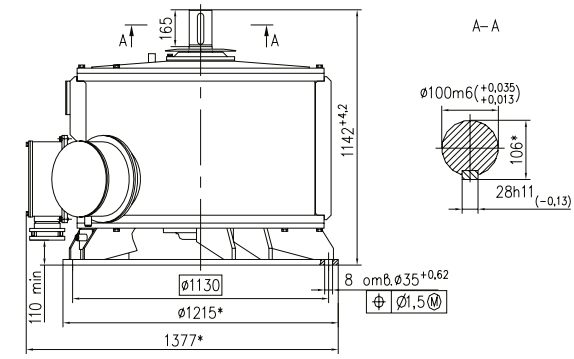
5. The special construction of bearing units using special-seals against damp ensures reliable operation during the entire regulatory period.

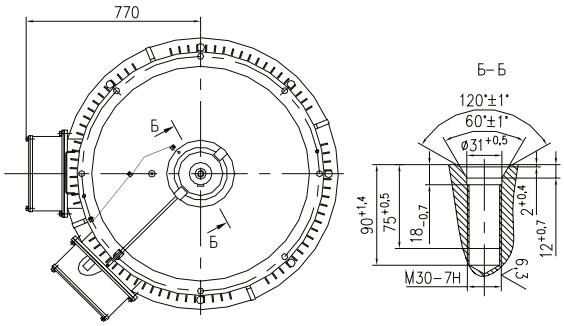
6. The presence of mounting configurations for use in air conditioning units of various designs and with various fans, manufactured by chemical engineering plants

7. The possibility of electric motors' operation in modes of speed control as part of frequency-controlled electric drives.

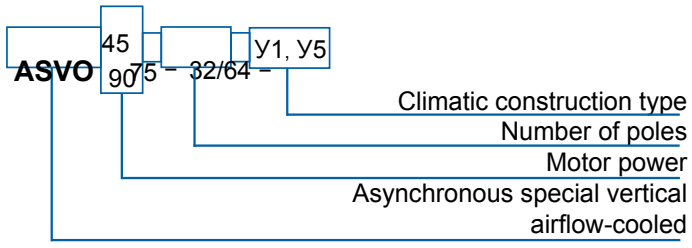
8. Application, at customer's request, SKF bearings.

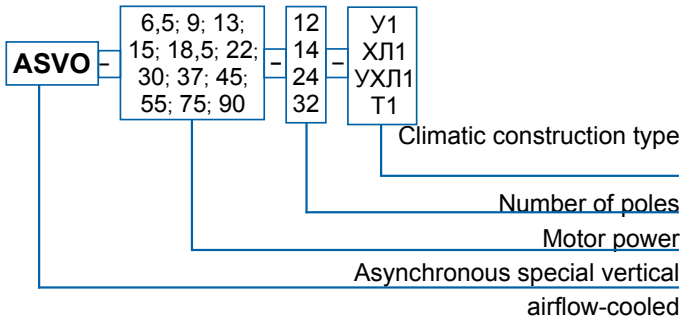
9. Completing the electric motors (at customer's request) with vibration monitoring sensors, temperature of bearing, stator and motor's housing, RTS - thermistors, thermoelectric heaters.





TYPE DESIGNATION





TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS ASVO (double-speed 32/64 poles, IM 9631)

Type designation	Power, kW	Voltage, V	Rotational speed (synch.) rpm.	Effic., %	Cos φ	Stator current, A	Starting torque ratio	Starting current ratio	Maximum torque ratio	Mass, kg
ASVO-45-32/64	45/6	380	187,5/93,5	89/77	0,66/0,32	115/38	1,0/0,5	3,7/1,7	2,1	2000
ASVO-75-32/64	75/9,4			89/74		192/62				2200
ASVO-90-32/64	90/11,3			91,3/75		227/74				2400

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS ASVO

Type designation	Power, kW	Voltage, V	Frequency Hz	Rotational speed rpm.	Sliding,- %	Effic.,%	Cos φ	Nom.current, A (380/660V)	Starting			Inertia moment, kg*m^2
									Starting torque ratio	initial current ratio	maximum torque ratio	
ASVO-6,5-12	6,5	380	50(60)	500,0 (600,0)	3,0	83,0	0,73	16,3	3,5	0,9	2,0	0,28
ASVO-9-12	9					87,0		21,6		1,0	2,1	0,45
ASVO-13-12	13					88,0		30,9	4,0			0,63
ASVO-15-12	15					88,5		35,5				0,70
ASVO-18,5-12	18,5	220/380				89,0	0,76	41,6	4,5	1,0	2,1	0,86
ASVO-22-12	22					90,0	0,78	49,5				0,90
ASVO-22-14	22	380/660		428,6 (514,3)	1,5	90,3	0,75	49,4/28,5	5,0	1,1	2,2	5,30
ASVO-30-14	30					91,5		66,4/38,4				6,80
ASVO-37-14	37					92,0	0,76	80,4/46,4				8,80
ASVO-30-24	30			250,0 (300,0)	1,6	89,8	0,65	77,9/45,0	3,8	0,8		23,0
ASVO-37-24	37					90,0		96,1/55,5	3,8			25,2
ASVO-55-24	55					91,5	0,68	134,3/77,5				29,6
ASVO-75-24	75					92,0		182,2/105,2				41,2
ASVO-90-24	90					92,3		218,0/125,8	4,0			54,8
ASVO-30-32	30			187,5 (225,0)		89,0	0,58	88,3/51,8	3,2		2,0	29,6
ASVO-45-32	45					90,0	0,59	128,8/74,1				44,4
ASVO-75-32SV	75					91,0		212,0/122,0				61,1
ASVO-90-32	90							256/149,0				

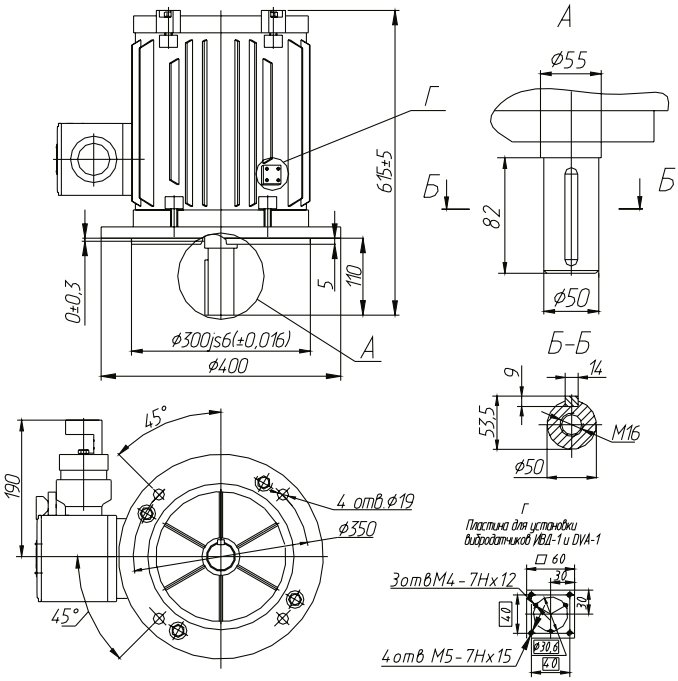
Note: Values in parenthesis are indicated for frequency 60Hz.

MOUNTING CONFIGURATION

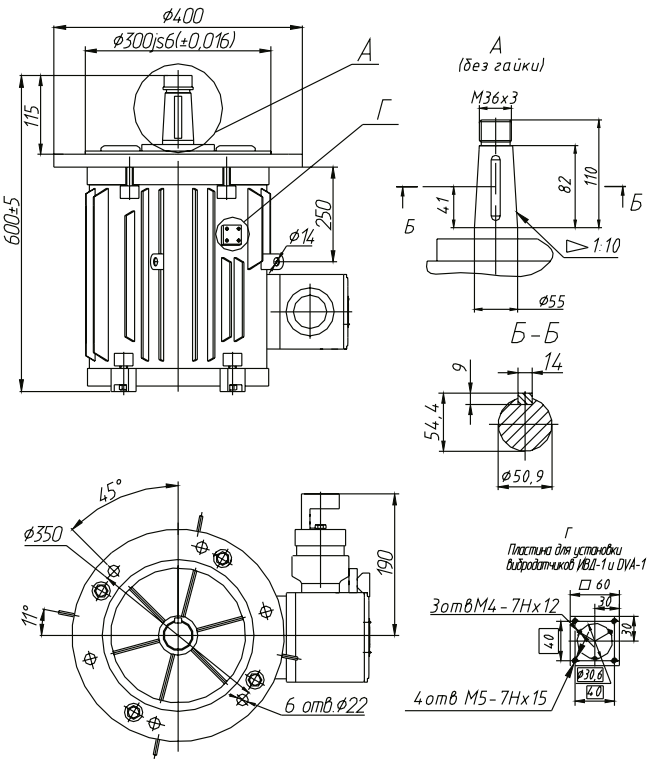
		Number of picture	Version of the shaft end
ASVO-6,5-12	IM 3011 (shaft down)	1	Cylindrical according to GOST 12080
	IM 3033 (shaft upward)	2	Conical according to GOST 12081
	IM 9631 (shaft upward))	3	Cylindrical according to GOST 12080
ASVO-9-12 ASVO-13-12 ASVO- 15-12	IM 9633 (shaft upward, legs upward)	4	Conical according to GOST 12081
	IM 9631 (shaft upward, legs upward)	5	Cylindrical according to GOST12080
	IM 9633 (shaft upward, legs downward))	6	Conical according to GOST 12081
	IM 3033 (shaft upward, round flange)	7	
	IM 3031 (shaft upward, round flange)	8	Cylindrical according to GOST 12080
	IM 3033 (shaft upward, square flange)	9	Conical according to GOST 12081
	IM 3013 (shaft downward, square flange)	10	
ASVO-18,5-12	IM 9633 (shaft upward,legs upward	11.1	
	IM 9633 (shaft upward, legs upward	11.2	
ASVO-22-12	IM 9631 (shaft upward, legs upward)	12.1	Cylindrical according to GOST 12080
	IM 9631 (shaft upward, legs downward)	12.2	
ASVO-22-14 ASVO-30-14 ASVO-37-14	IM 9633	13, 15	Conical according to GOST 12081
ASVO-22-14 ASVO-30-14 ASVO-37-14	IM 9631	14, 16	Cylindrical according to GOST 12080
ASVO-30-24 ASVO-37-24 ASVO-55-24 ASVO-75-24 ASVO-90-24 ASVO-30-32 ASVO-45-32 ASVO-75-32 ASVO-90-32	IM 9633	17	Conical according to GOST 12081
ASVO-30-24 ASVO-37-24 ASVO-55-24 ASVO-75-24 ASVO-90-24 ASVO-30-32 ASVO-45-32 ASVO-75-32 ASVO-90-32	IM 9631	18, 19, 20	Cylindrical according to GOST 12080

At customer's request motors can be manufactured of different mounting configurations, different mounting and installation sizes.

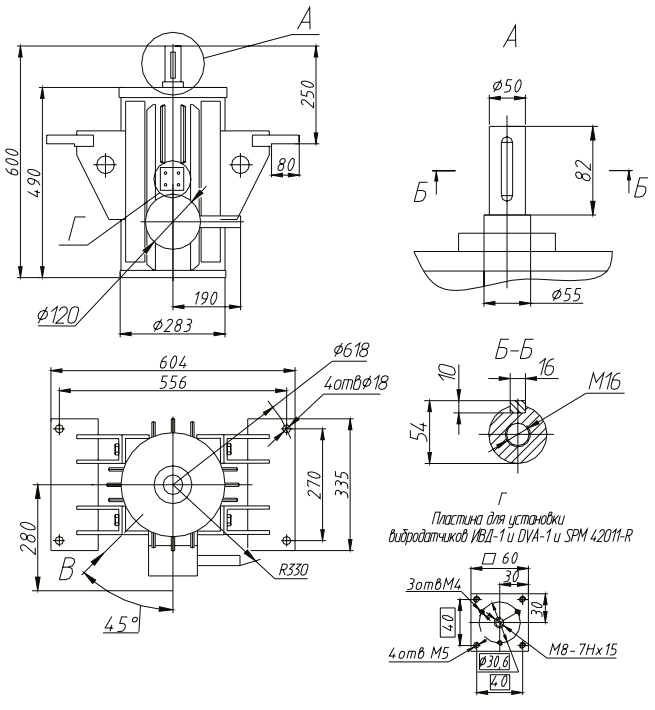
OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES



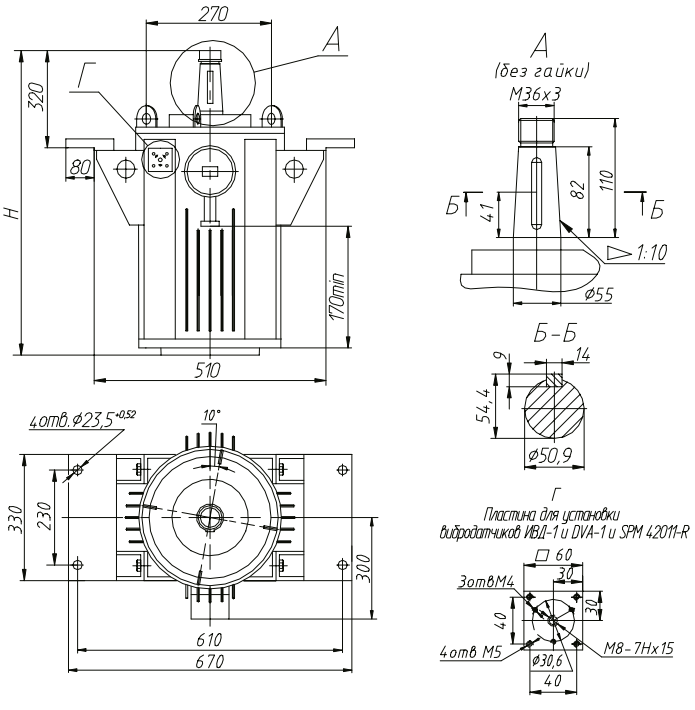
Picture 1



Picture 2



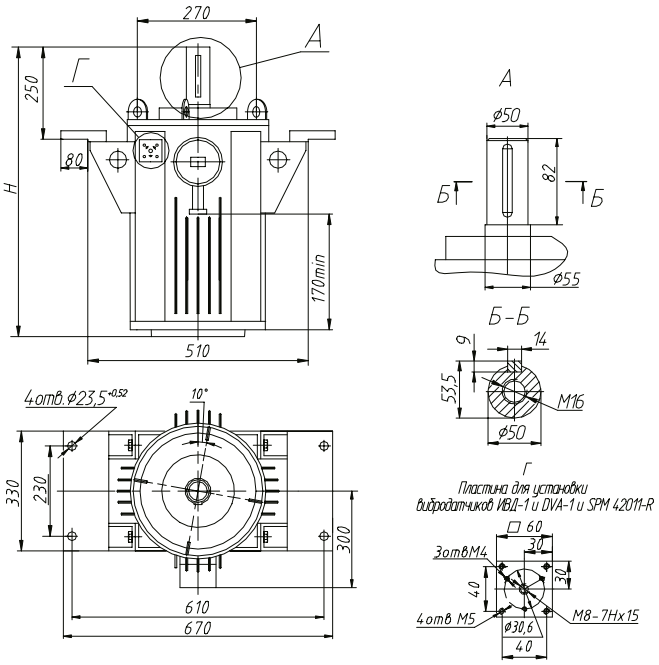
Picture 3



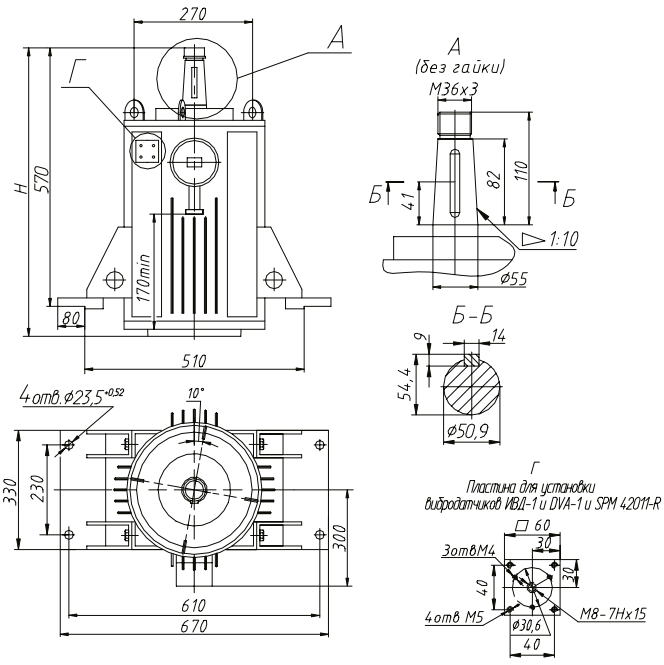
Picture 4

Type designation	H	Mass, kg
ASVO-9-12	725	230
ASVO-13-12	775	275
ASVO-15-12	775	290

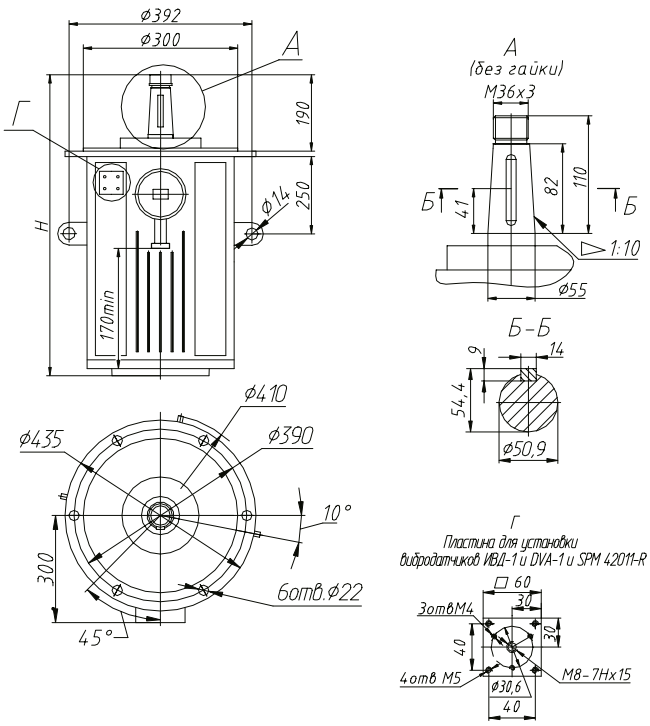
OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES



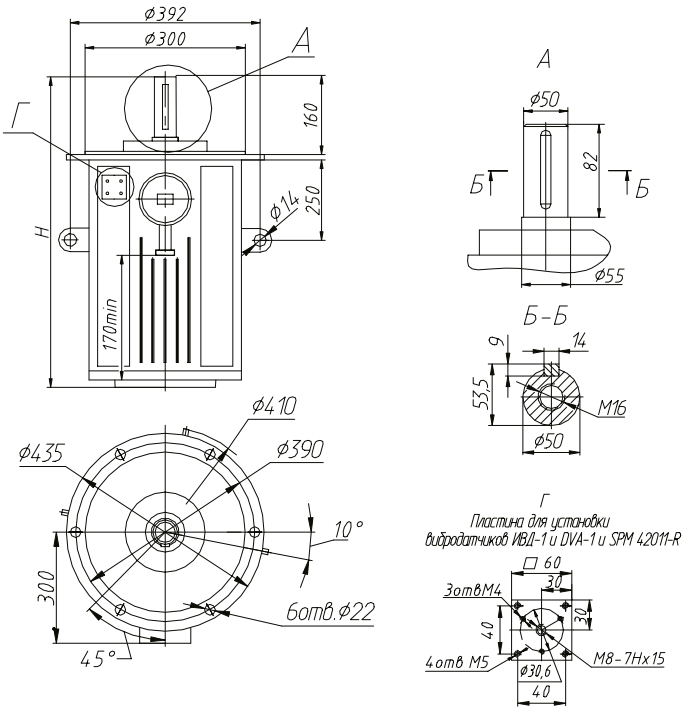
Picture 5



Picture 6

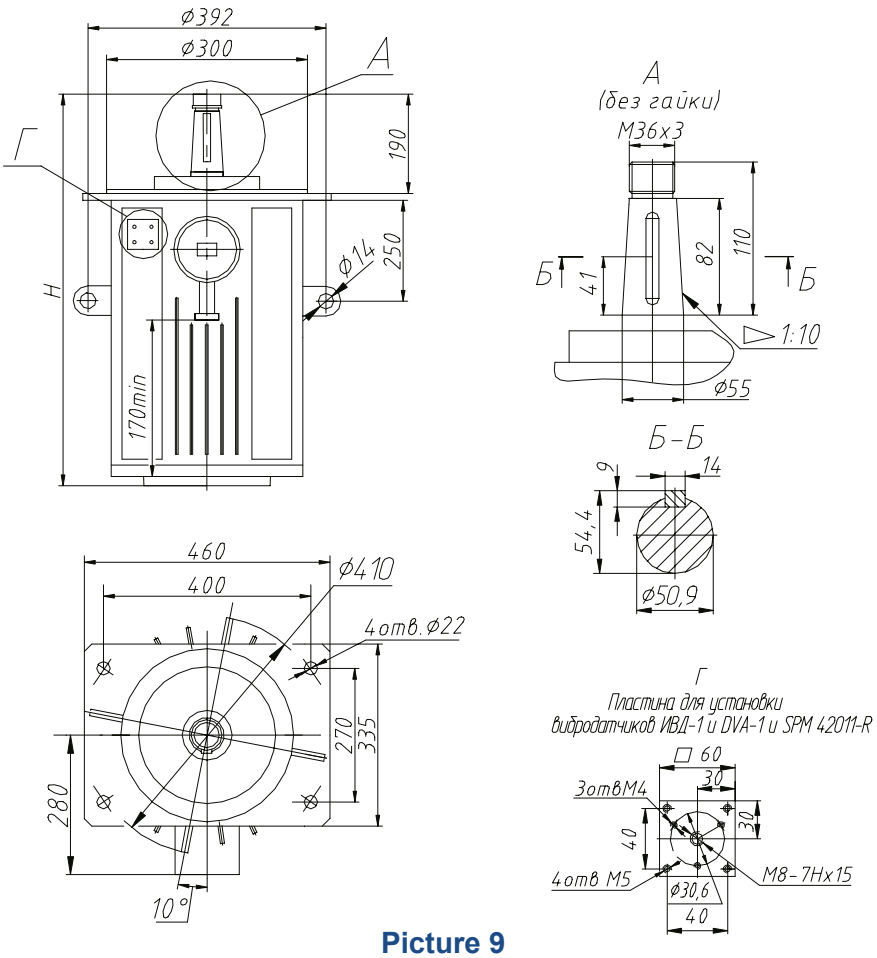


Picture7

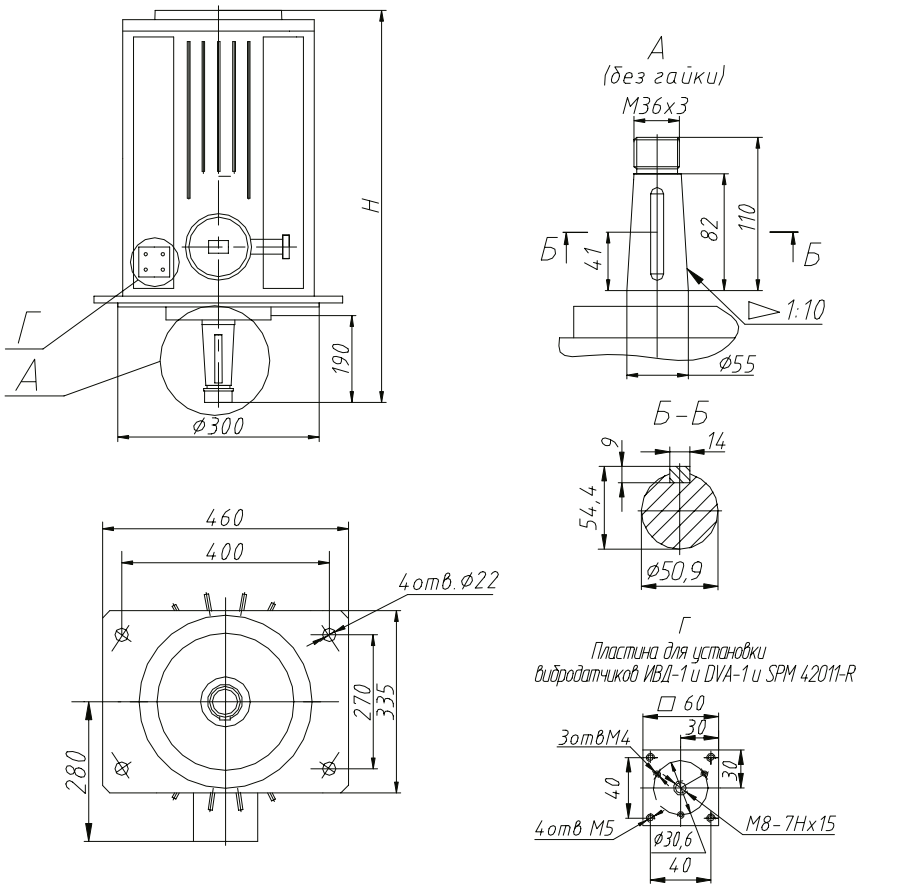


Picture 8

OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES

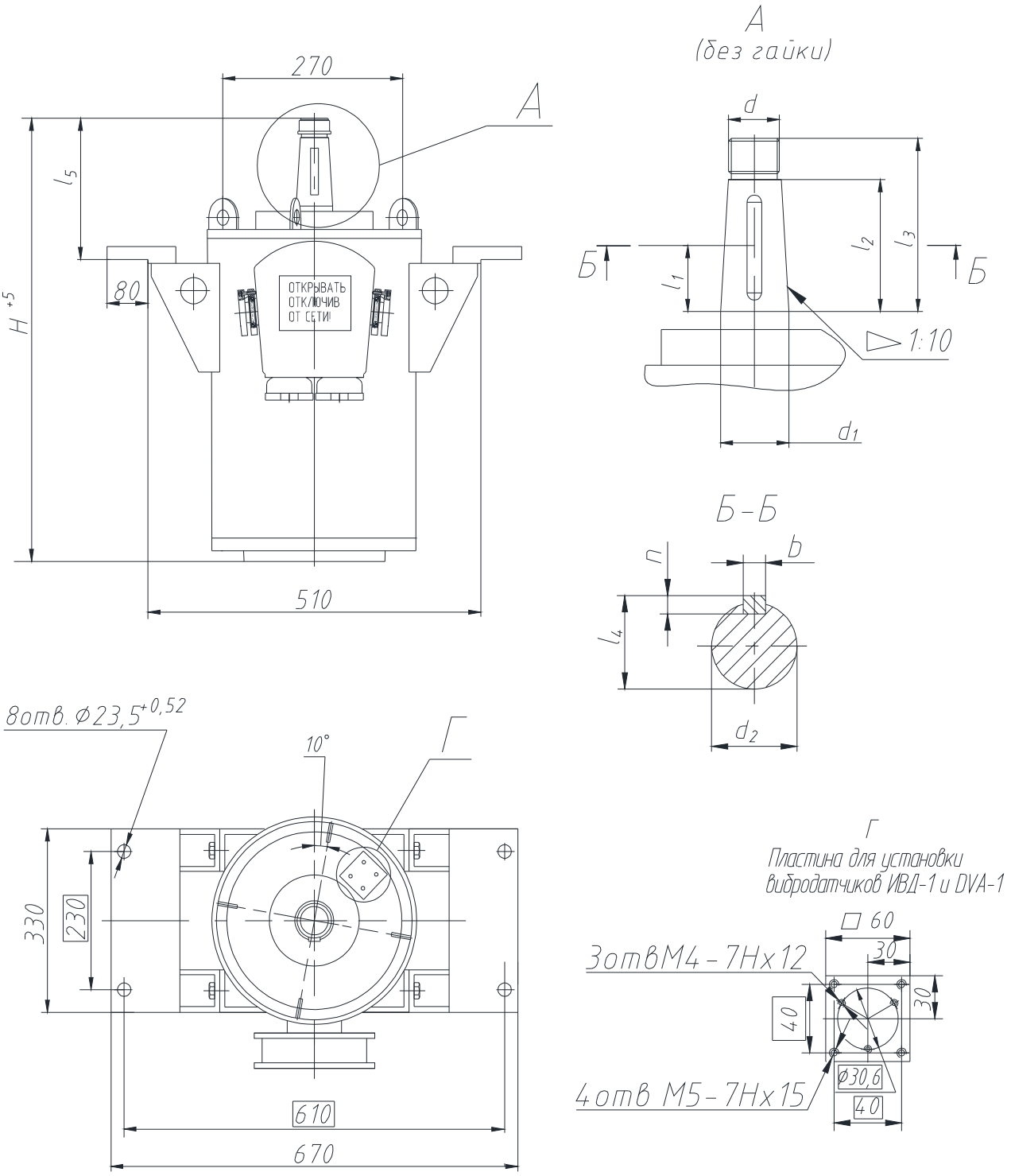


Picture 9



picture 10

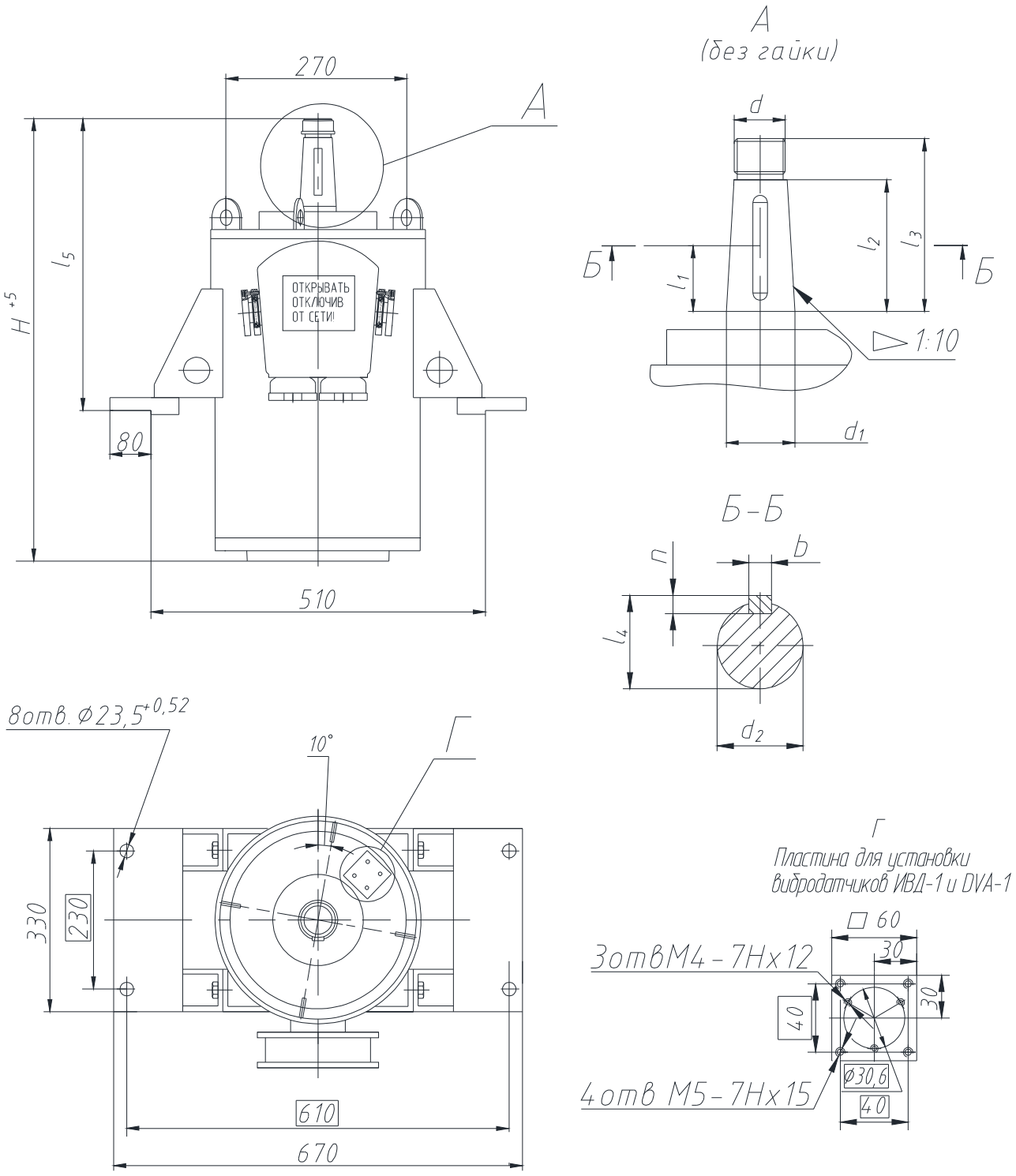
OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES



Picture 11.1

Type designation	Note	l_1	l_2	l_3	l_4	l_5	H	d	d_1	d_2	h	b	Mass, kg
ASVO-18,5-12	shaftØ 90mm	65	130	170	88,5	320	920	M64Ч4	90	83,5	14	22	500
	shaftØ 55mm	41	82	110	54,4	260	860	M36Ч3	55	50,9	9	14	495
ASVO-22-12	shaftØ 90mm	65	130	170	88,5	320	920	M64Ч4	90	83,5	14	22	510
	shaftØ 55mm	41	82	110	54,4	260	860	M36Ч3	55	50,9	9	14	505

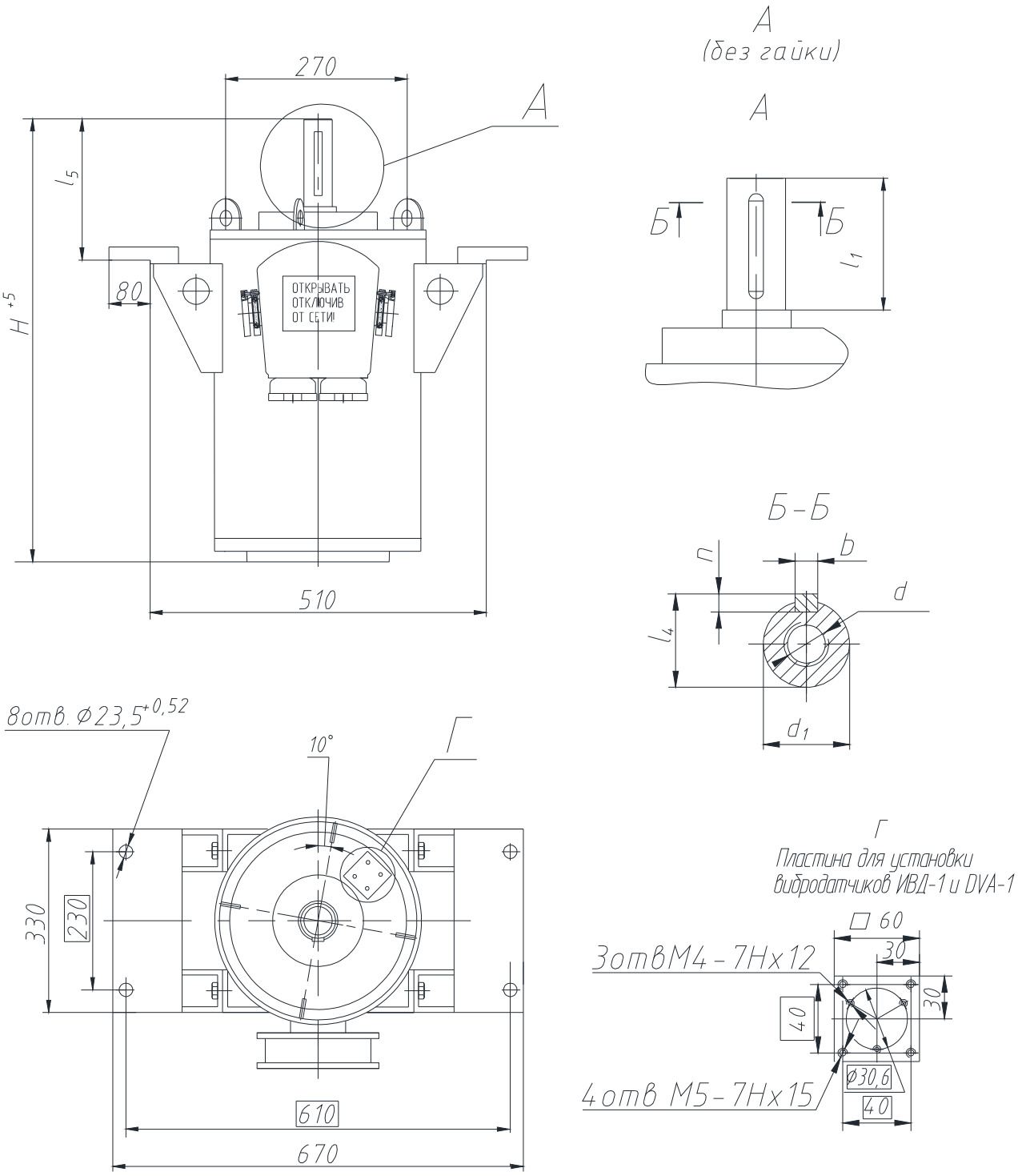
OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES



Picture 11.2

Type designation	Note	l_1	l_2	l_3	l_4	l_5	H	d	d_1	d_2	h	b	Mass, kg
ASVO-18,5-12	shaft⌀ 90mm	65	130	170	88,5	620	920	M64Ч4	90	83,5	14	22	500
	shaft⌀ 55mm	41	82	110	54,4	560	860	M36Ч3	55	50,9	9	14	495
ASVO-22-12	shaft⌀ 90mm	65	130	170	88,5	620	920	M64Ч4	90	83,5	14	22	510
	shaft⌀ 55mm	41	82	110	54,4	560	860	M36Ч3	55	50,9	9	14	505

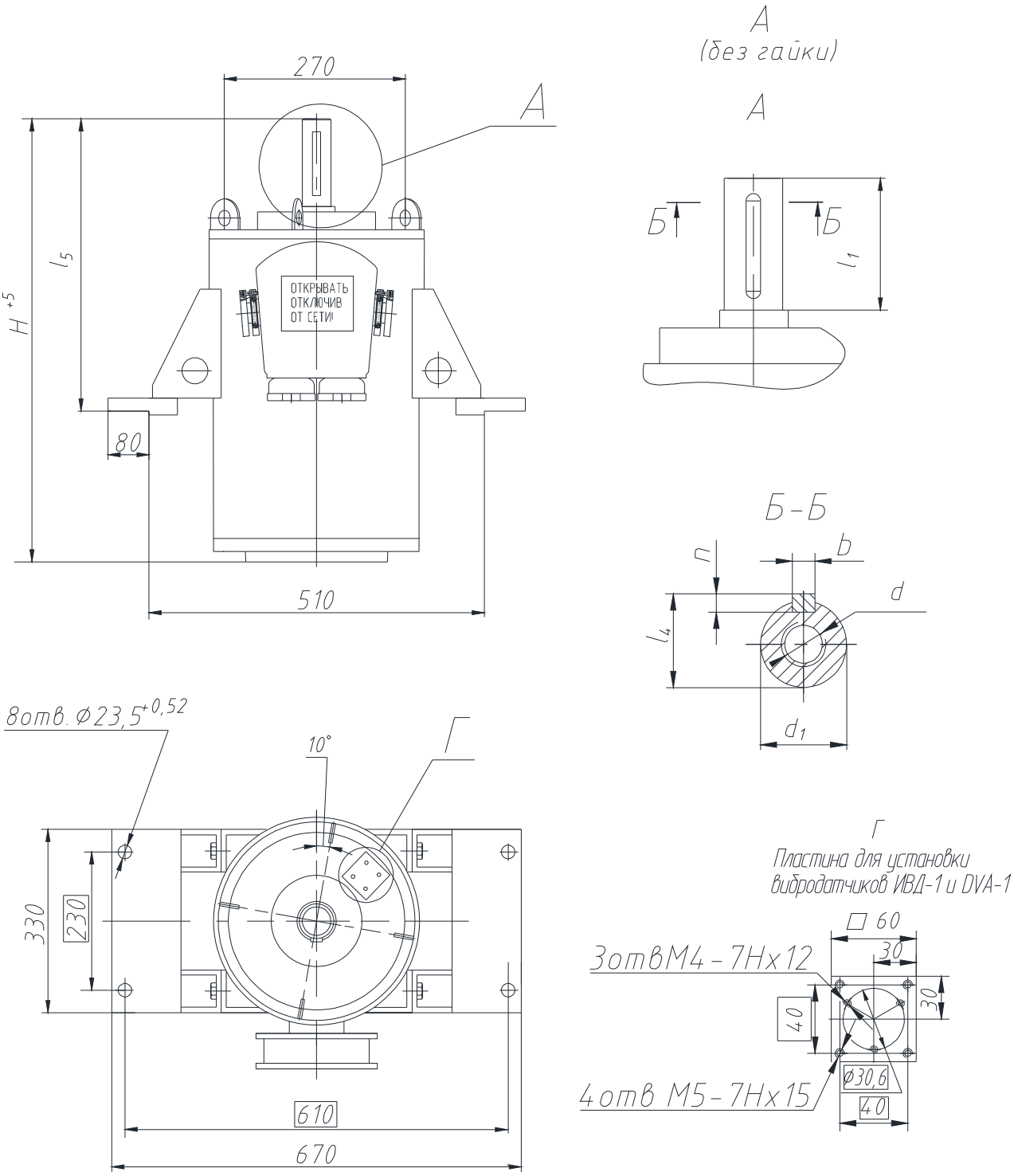
OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES



Picture 12.1

Type designation	Note	l_1	l_5	H	d	d_1	h	b	mass, kg
ASVO-18,5-12	shaftØ 80mm	130	280	880	M30	80	14	22	495
	shaftØ 50mm	82	232	832	M16	50	9	14	490
ASVO-22-12	shaftØ 80mm	130	280	880	M30	80	14	22	505
	shaftØ 50mm	82	232	832	M16	50	9	14	500

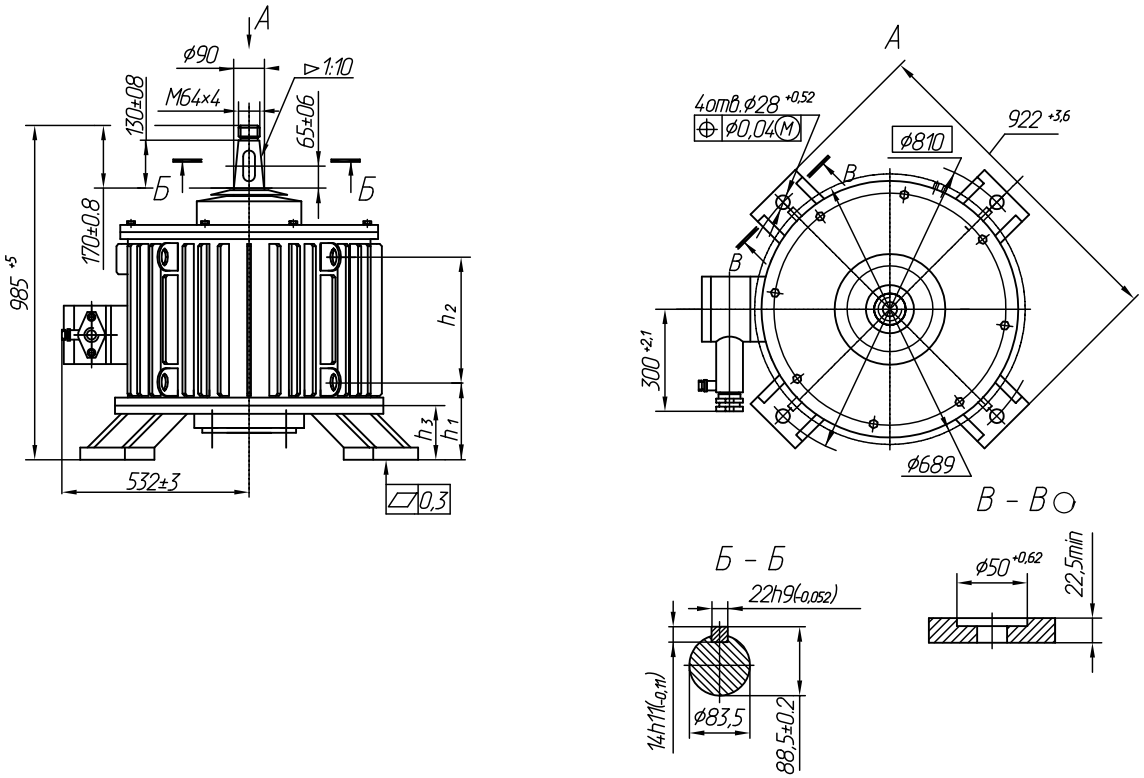
OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES



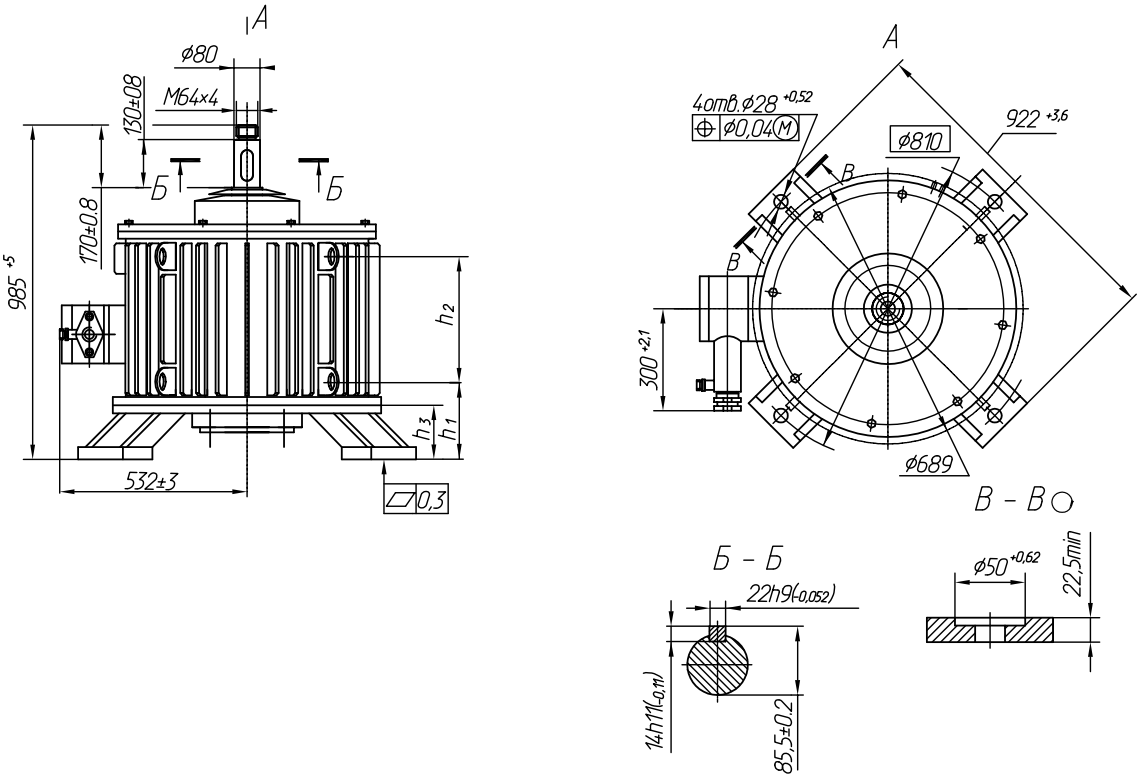
Picture 12.2

type designation	Note	l_1	l_5	H	d	d_1	h	b	mass, kg
ASVO-18,5-12	shaftØ 80mm	130	580	880	M30	80	14	22	495
	shaftØ 50mm	82	532	832	M16	50	9	14	490
ASVO-22-12	shaftØ 80mm	130	580	880	M30	80	14	22	505
	shaftØ 50mm	82	532	832	M16	50	9	14	500

OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES



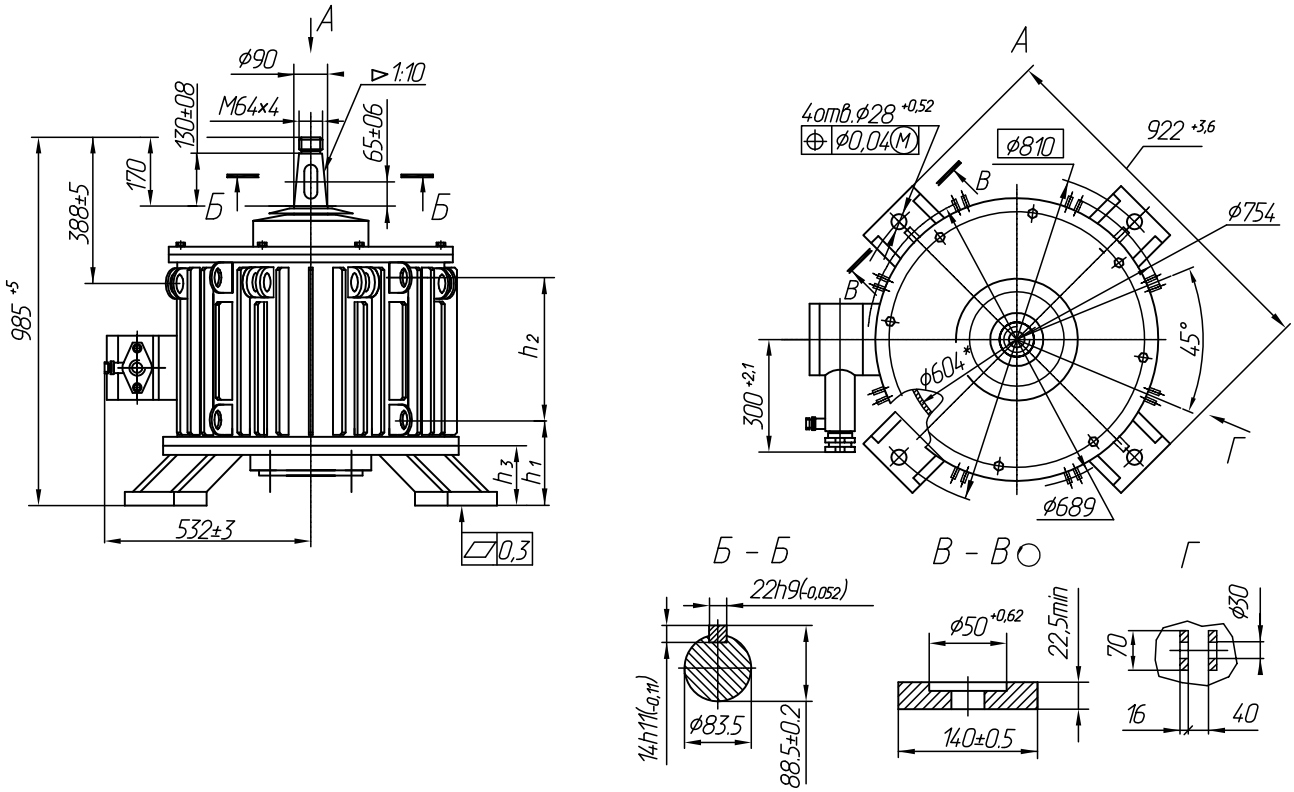
Picture 13



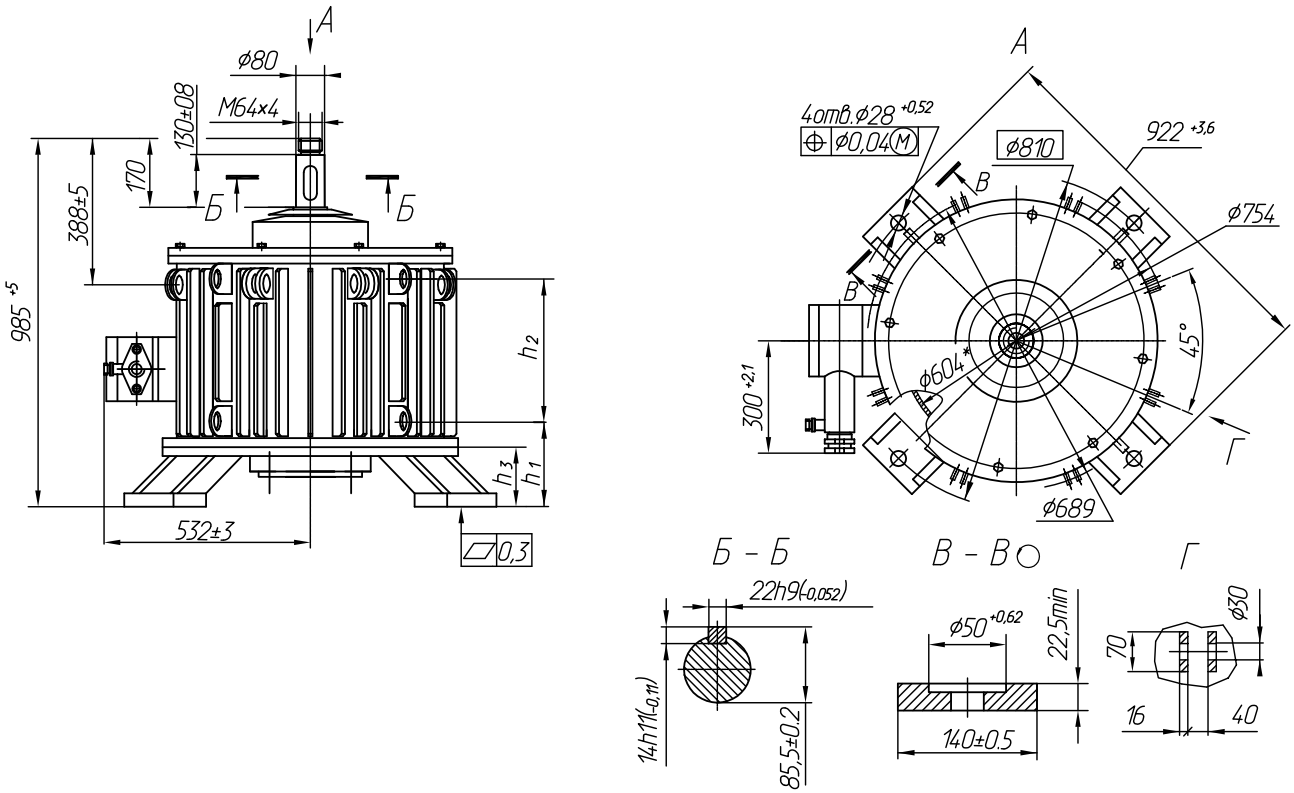
Picture 14

Type designation	h_1 ±2	h_2 ±3	h_3	mass, kg
ASVO-22-14	268	362	215±1,5	750
ASVO-30-14	208	422	155±2,0	800
ASVO-37-14	138	492	85±2,0	950

OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES

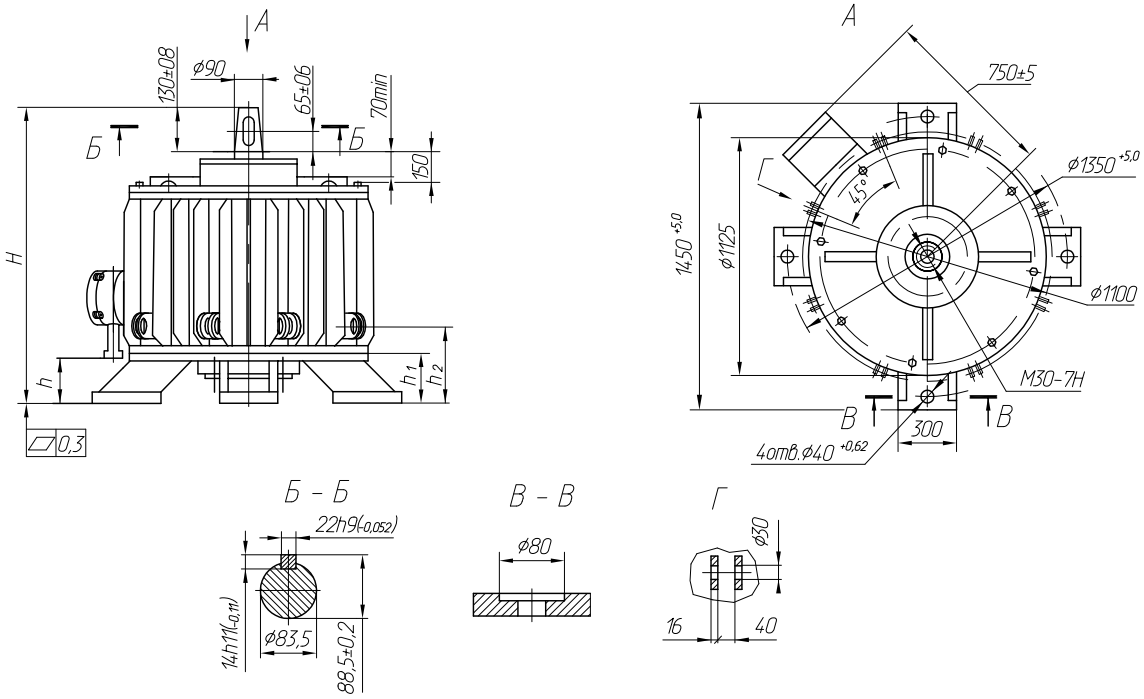


Picture 15

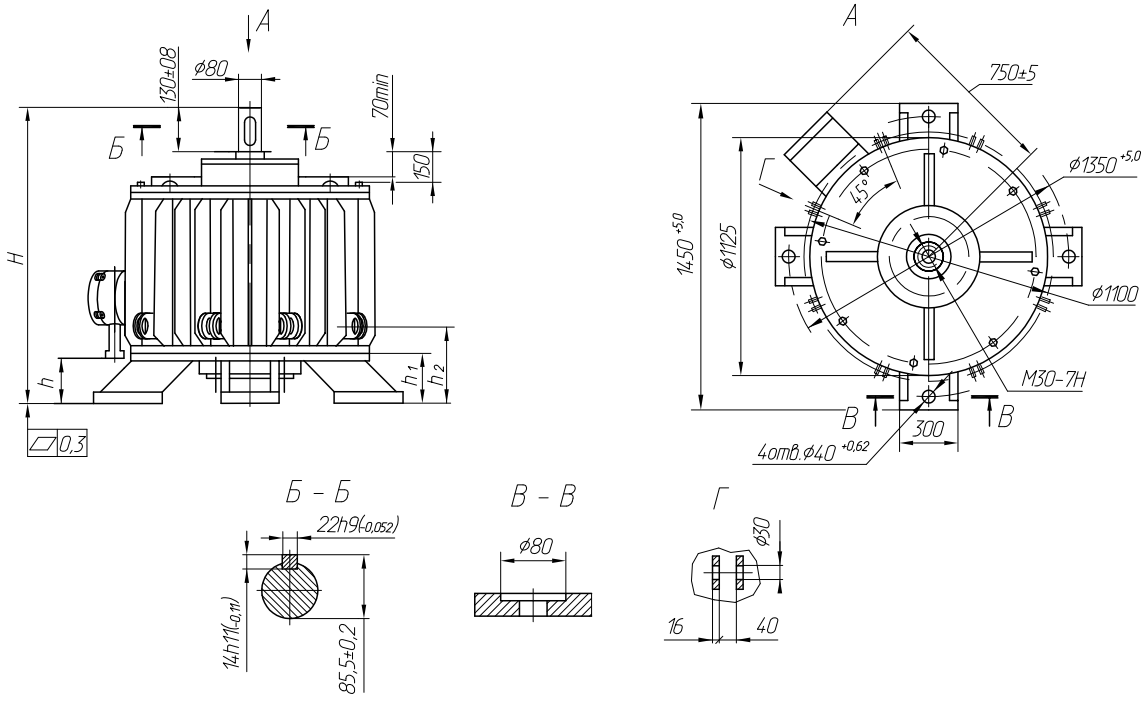


Picture 16

OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES



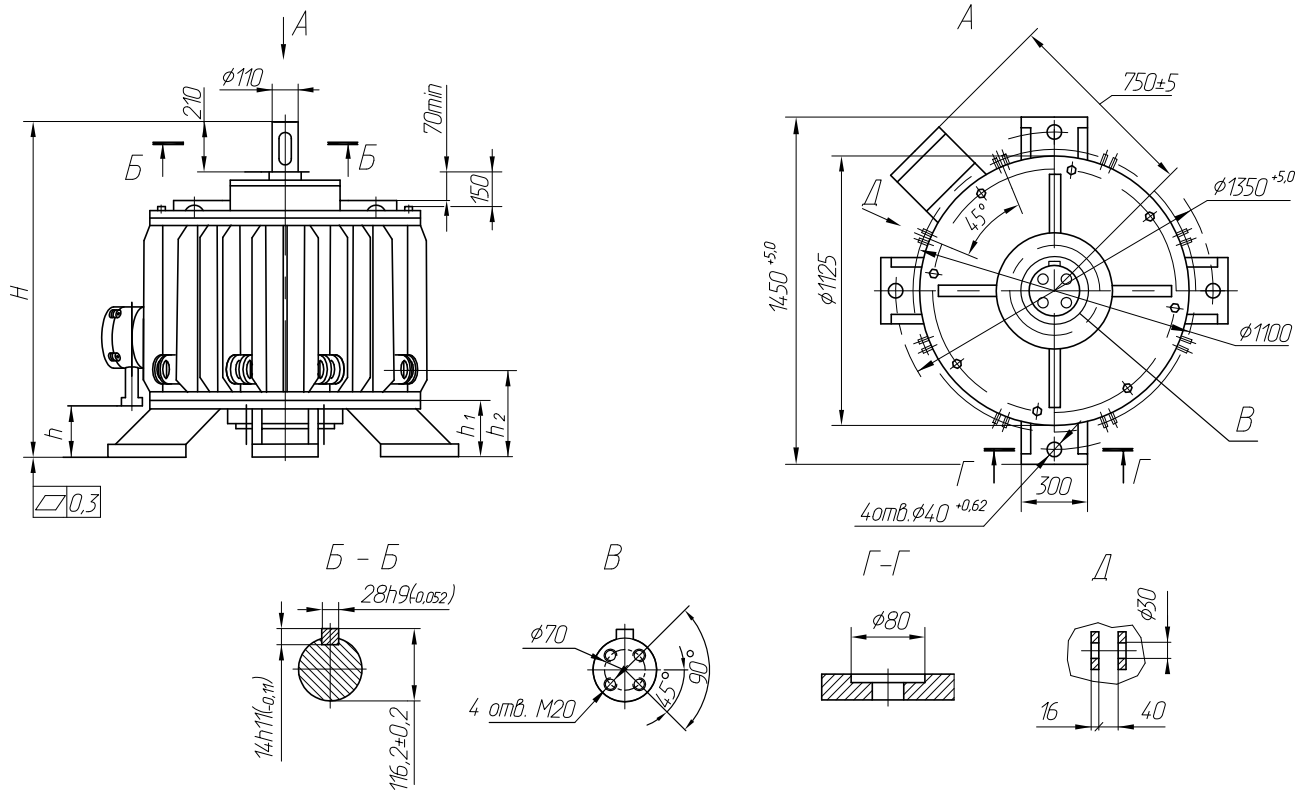
Picture 17



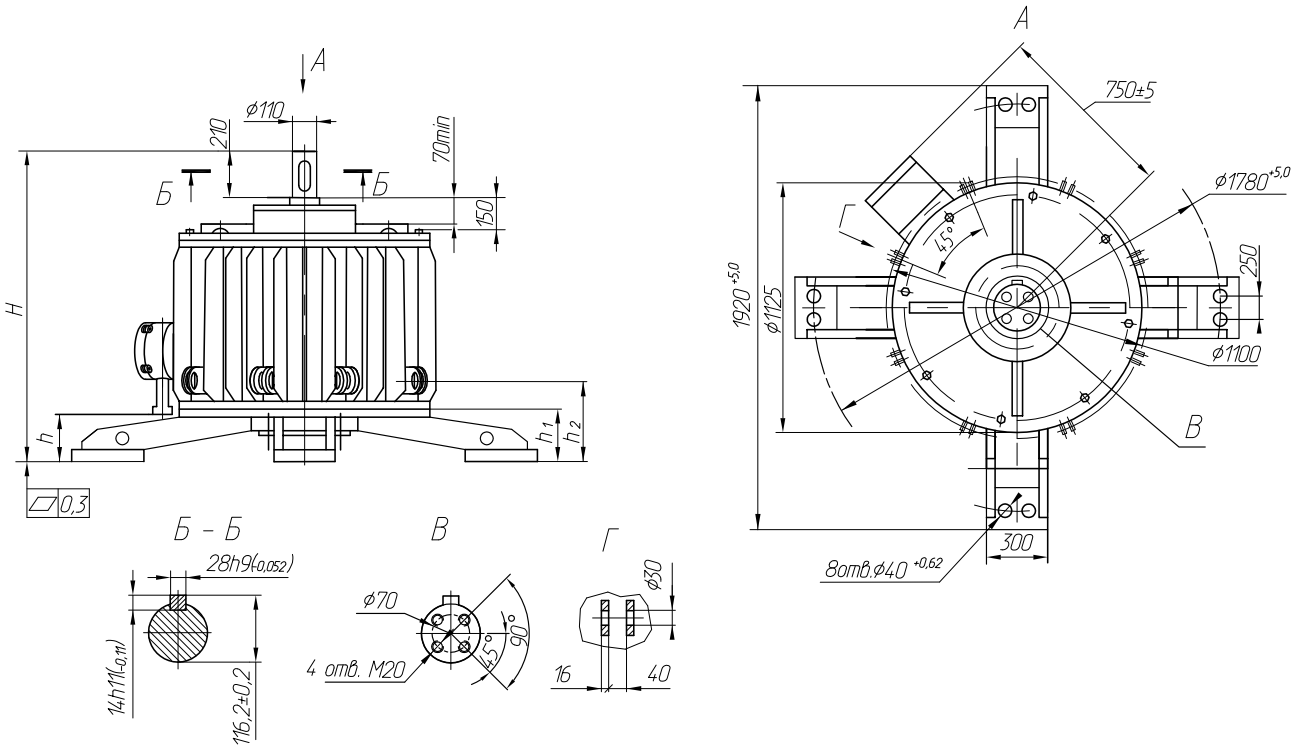
Picture 18

Type designation	H for pic. 17, 18	H for pic. 19, 20	h_1	h_2	mass, kg
ASVO-37-24	$1116^{+4,2}$	$1196^{+4,2}$	345	412	1530
ASVO-55-24	$1266^{+5,0}$	$1346^{+5,0}$	445	512	1620
ASVO-75-24	$1310^{+5,0}$	$1390^{+5,0}$			1700
ASVO-90-24	$1130^{+4,2}$	$1210^{+4,2}$	170	237	1900
ASVO-30-32	$990^{+3,6}$	$1070^{+3,6}$			1570
ASVO-45-32	$1310^{+4,2}$	$1390^{+4,2}$	445	512	1700
ASVO-75-32	$1170^{+4,2}$	$1250^{+4,2}$	170	237	2100
ASVO-90-32	$1170^{+4,2}$	$1250^{+4,2}$			2150

OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES



Picture 19



Picture 20

ELECTRIC MOTORS AVSM5

Asynchronous three-phases special vertical monoblock electric motors AVSM5 with a squirrelcage rotor are designed to drive monoblock vertical pumps type OPV (OV2) 110 MBK.

Operation mode s continuous S1 from network frequency 50Hz, 60Hz.

Climatic construction type: У4.

Mounting configuration: IM3001.

Cooling method: IC8A1W7.

Protection degree for:

housing	**IP44**
terminal box	**IP55**

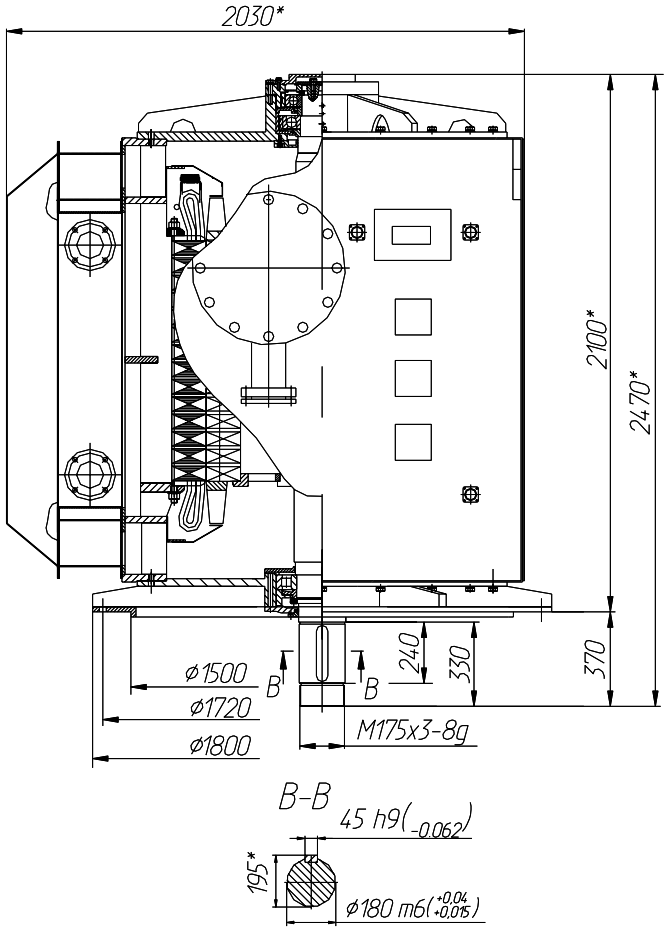
The electric motors allow the right or the left direction of rotation.

The insulating materials of stator winding have heatresistance class «F».

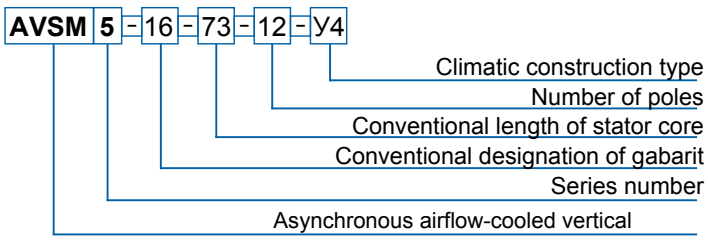
TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AVSM5

Parameter	Value
Power, kW	1250
Volatge, V	6000
Stator current, A	158
Rotational speed (synchronous), rpm.	500
Power factor, p.u.	0,77
Efficiency, %	95
Maximum running torque ratio	1,8
Starting running torque ratio	1,0
Starting current ratio	6,0
Mass, kg	9800^{+150}

OVERALL DIMENSIONAL, INSTALLATION AND MOUNTING SIZES



TYPE DESIGNATION



ELECTRIC MOTORS AOK2 and AOK4-450;560

Asynchronous three-phase airflow-cooled electric motors AOK4 with a squirrel-cage rotor are designed for the main drive of presses, belt conveyors and also for equipping dual-motor drives.

Operation mode is continuous S1 from network frequency 50Hz.

Climatic construction type:

У1, У2, У5, УХЛ1, УХЛ2, УХЛ4, ХЛ1, ХЛ2, Т2, Т5

Mounting configuration: IM1001.

Protection degree for:

housing and terminal box	IP54 (IP55 on order)
outdoor fan enclosure	IP20

Cooling method:

IC411	AOK2-450
IC511	AOK2-560

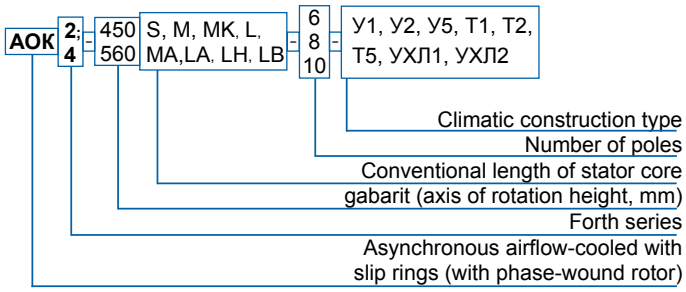
The electric motors allow the right and the left direction of rotation. Changing of rotatiuon direction is made only from rest state. The insulating materials of stator winding have heat-resistance class «F» or «H» -at customer's request.

Main advantages of electric motors AOK2 and AOK4 over analogues:

- improved design of slip rings assembly, which prevents the accumulation of electrically conductive dust during operation;
- permanent temperature control with application special devices:
  - **UKT-12 device (9 channels)** - bearingsи (2 points), winding and iron of stator (6 points), driven mechanism (1 point). interface for temperature monitoring from a personal computer.
  - **UKT-12** device - possibility of additional temperature control of the mechanism in 4 points.
  - **UKVT device** - permanent temperature and vibration control (of bearing temperature control 2-points, of winding and stator core - 6 points, of mechanism 1 - point, of vibration bearing units on mutually perpendicular axis using three-coordinate vibration sensors of 3KDV type).

At the customer's request the electric motors can be produced with special mounting and installation dimensions, of other power, voltage and rotational speed.

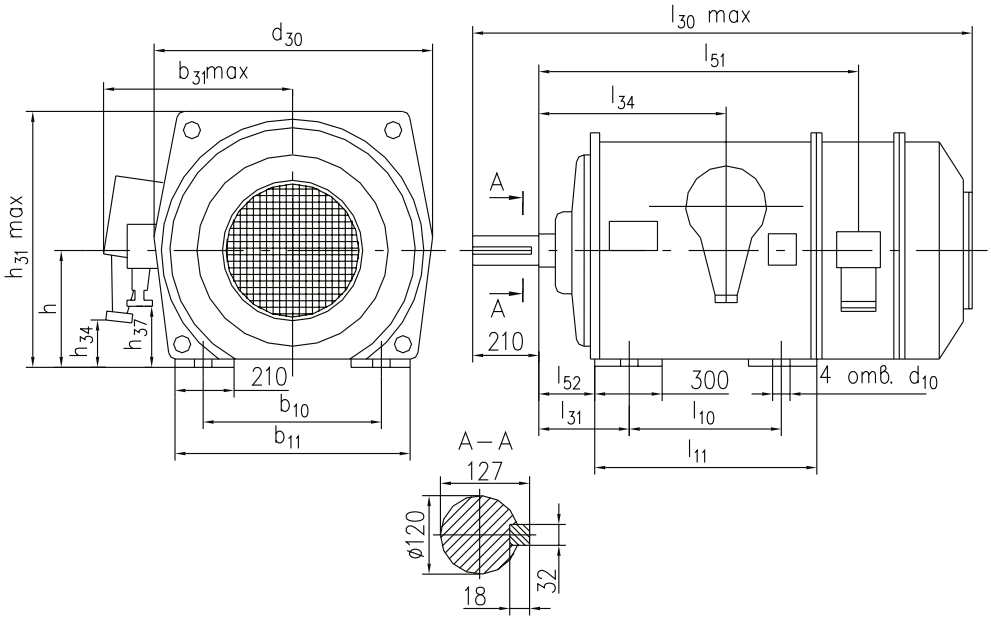
TYPE DESIGNATION



TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AOK2 and AOK4

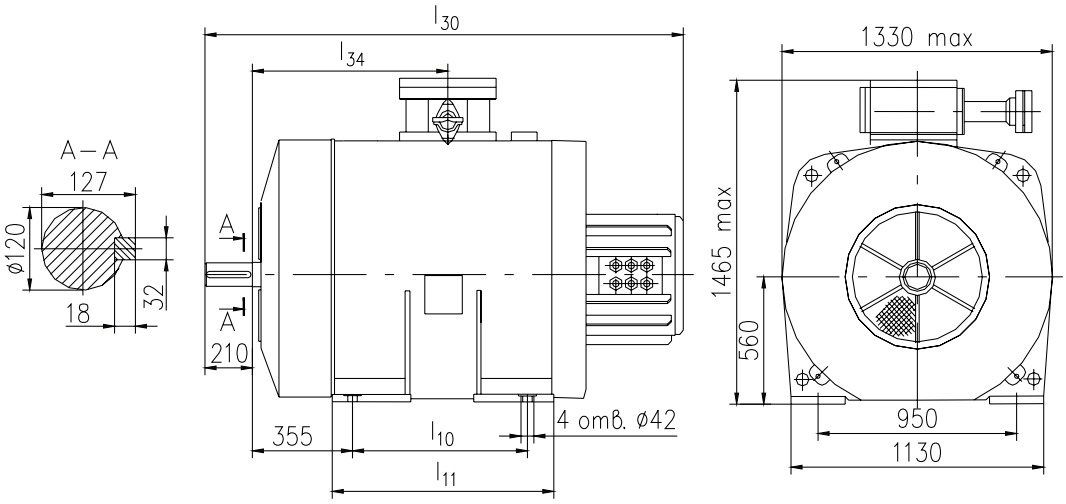
Type designation	Power, kW	Voltage, V		Rotational speed (synch.), rpm.	current, A		Effic., %	Cos φ	Maximum torque ratio
		stator	rotor		stator	rotor			
AOK2-560MK-10	200	6000	510	600	26,5	250	91,2	0,80	2,2
AOK2-630L-10	500		865		61,0	360	93,4	0,82	2,0
AOK4-560MA-6	400		696	1000	46,3	360	94,5	0,85	2,5
AOK4-560LA-6	500		860		59,8	343	94,7		2,4
AOK4-560LB-6	560		994		66,7	346	95,0	0,88	2,5
AOK4-560LH-6	630		995		72,3	396,6	95,3		2,4
AOK4-560MA-8	315		598	750	38,0	327	94,1	0,81	2,2
AOK4-560LA-8	400		707		49,8	362,6	94,2	0,82	2,1
AOK4-560LH-8	500		884		62,2	364	94,4	0,81	2,2

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AOK2-560



Type designation	b_{10}	b_{11}	b_{31}	d_{10}	d_{30}	h	h_{31}	h_{34}	h_{37}	l_{10}	l_{11}	l_{30}	l_{31}	l_{34}	l_{51}	l_{52}	mass, kg
AOK2-560MK-10	1000	1140	845	42	1270	560	1195	320	315	900	1150	2310	355	805	1660	185	3350
AOK2-630L-10	1120	1270	915	48	1410	630	1335	330	385	1120	1350	2530	375	1040	1900	190	5270

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AOK4-560

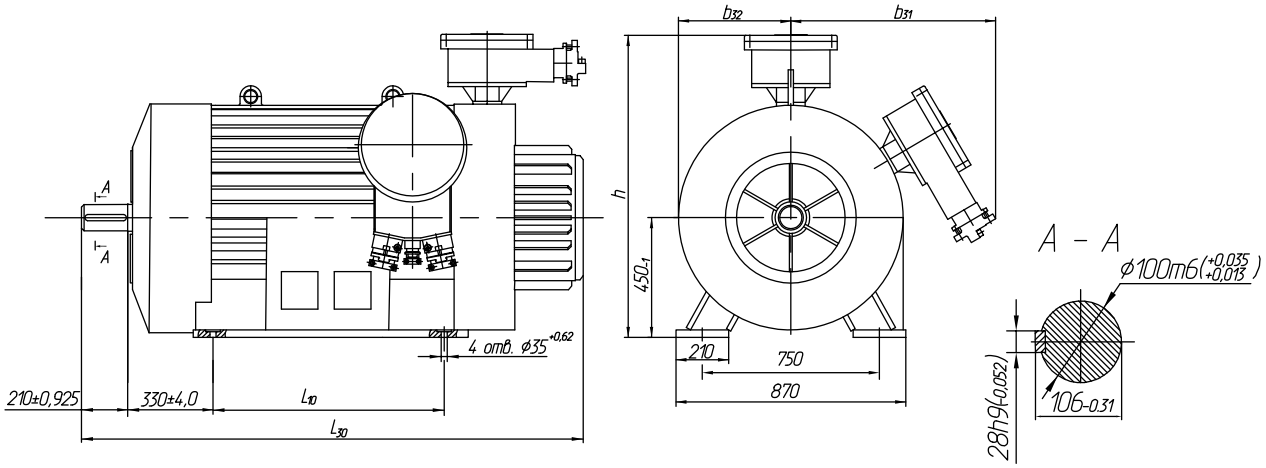


Type designation	l_{10}	l_{11}	l_{30}	l_{31}	l_{34}	mass, kg
AOK4-560MA-6	900	1125	2150	355	1050	3800
AOK4-560LA-6	1000	1255	2300	355	1180	4200
AOK4-560LB-6		1315	2350	355	1240	4450
AOK4-560LH-6		1375	2450	355	1300	4700
AOK4-560MA-8	900	1125	2150	355	1050	3850
AOK4-560LA-8	1000	1255	2300	355	1180	4050
AOK4-560LH-8		1375	2450	355	1300	4550

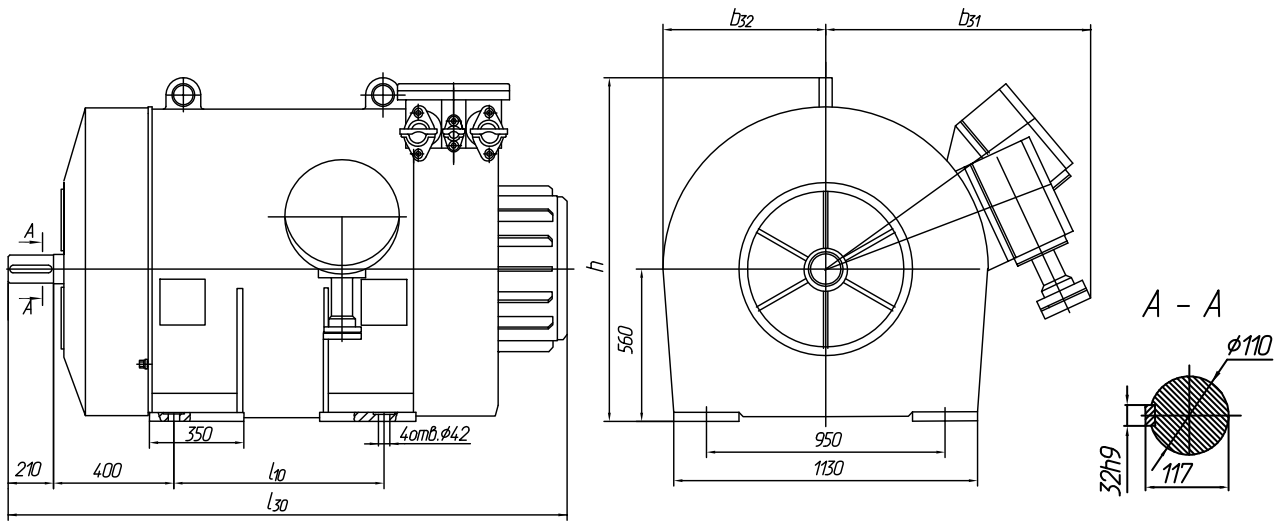
TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AOK2-450-560

Type designation	Operation mode	Power, kW	Voltage stator/rotor, V	Rotational speed (synch.), rpm.	Effic.,%	Cos φ	Stator current, A	Rotor current, A	Maximum torque ratio
AOK2-450S-6	S1	250	380(660) / 498	1000	94,91	0,89	477 / 275	335	2,3
AOK2-450L-8		280	380(660) / 637	750	95,1	0,85	554 / 319	304	
AOK2-450L-8	S8	250	380(660) / 640			0,84	488 / 281	268	2,5
AOK2-560S-6	S1		6000 / 489	1000	93,6	0,86	29	305	2,8
AOK2-560M-6		315	6000 / 571		94,2		36	328	
AOK2-560LA-6		400	6000 / 686		94,8	0,87	45	345	
AOK2-560LB-6		500	6000 / 860		95,3		56	343	

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AOK2-450



AOK2-560



Type designation	sizes, mm					mass, kg
	l_{10}	l_{30}	b_{31}	b_{32}	h	
AOK2-450S-6	630	$1980^{+15,0}$	$800^{+8,0}$	$424^{+4,0}$	$1135^{+10,5}$	3450
AOK2-450L-8	800	$2325^{+17,5}$				3800
AOK2-560S-6	710	$1970^{+15,0}$	$840^{+9,0}$	$560^{+4,5}$	$1240^{+10,5}$	3700
AOK2-560M-6	800	$2020^{+17,5}$				3900
AOK2-560LA-6	900	$2130^{+17,5}$	$880^{+9,0}$	$605^{+4,5}$		4600
AOK2-560LB-6	1000	$2260^{+17,5}$	$920^{+9,0}$	$650^{+4,5}$	$1320^{+12,5}$	5900

ELECTRIC MOTORS AKSB

Asynchronous three-phase special electric motors AKSB with a wound rotor are designed to drive well ring pumps and drill winches with speed control according to scheme of machine valve or valve cascade with rotational speed decrease 1:2.

Operation mode is continuous S1 from network frequency 50Hz. **Climatic construction type:** УХЛ2

Mounting configuration IM1001.

Cooling method: IC01.

Protection degree for:

motor	**IP23**
slip rings and terminal box	**IP44**

The electric motors allow the right and the left direction of rotation. The insulating materials of stator winding have heatresistance class "F" .

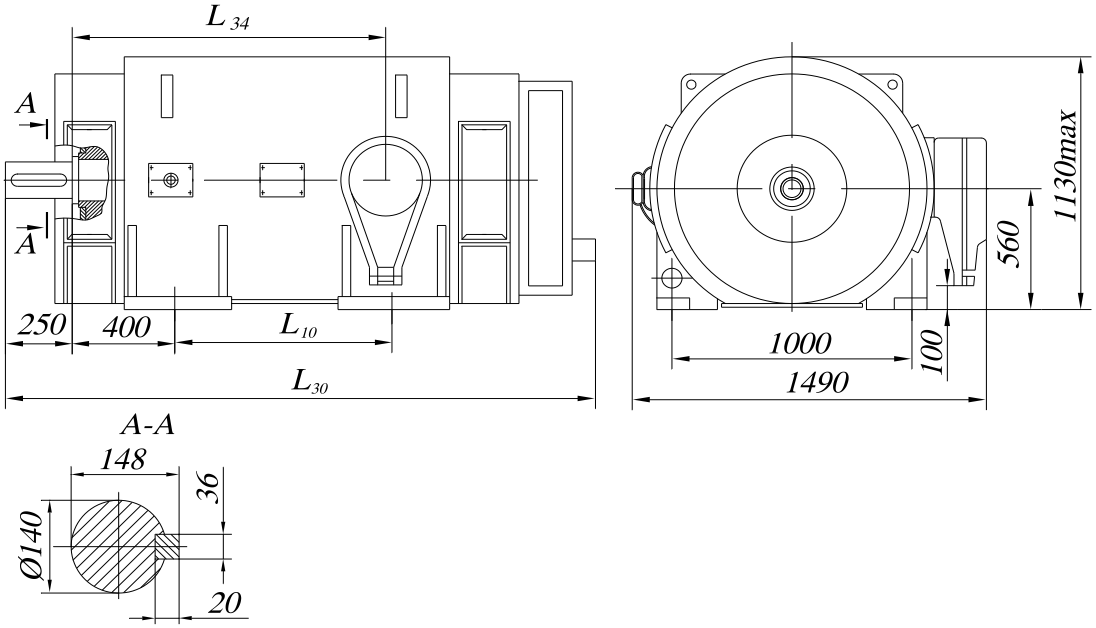
TYPE DESIGNATION

AKSB	asynchronous with slip rings special for drilling installation
15	conventional designation of gabarit
44, 54, 69	stator core length,cm
6	number of poles
6	voltage, кV
УХЛ2	climatic construction type

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AKSB

Type designation	power, kW	Voltage, V		Rotational speed (synch), rpm.	Current, A		Effic., %	Cos φ	Maximum torque ratio
		stator	rotor		stator	rotor			
АКСБ-15-44-6-6	630/315	6000	780	1000/500	75,3	550	94,7	0,85	1,8
АКСБ-15-54-6-6	800/400	6000	950	1000/500	94,0	580	94,9	0,86	1,8
АКСБ-15-69-6-6	1000/500	6000	1130	1000/500	116,5	580	95,3	0,87	1,8

OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS АКСБ



Motor type	L_{10}	L_{30}	L_{34}	mass, kg
AKSB15-44-6-6 УХЛ2	630	2510	1320	4950
AKSB15-54-6-6 УХЛ2	710			
AKSB15-69-6-6 УХЛ2	900			

ASYNCHRONOUS EXPLOSION-PROOF ELECTRIC MOTORS OF SMALL AND MEDIUM POWER

ASYNCHRONOUS EXPLOSION-PROOF ELECTRIC MOTORS OF SMALL AND MEDIUM POWER

SP JSC "Electromash" for many years is a traditional manufacturer of explosion-proof electric motors and produces a whole range of low and medium power electric motors AIM-M, AIM-MT, AIM-L, AIMA-M, AIMA-L, AIMA-MB, AIU, AIU-M, AIU-MP.

The best construction, reliable explosion-proof means, high quality of applied materials and components, the progressive production technology supply high technical level, ensure safety, reliability and flexibility in application.

The explosion-proof electric motors of small and medium power produced by "Electromash" are interchangeable with explosion-proof electric motors V, VA, VAR, AVR, AIM, AIU, VAIU, VRP and others produced in CIS countries by its purpose and dimensional sizes.

Electric motors are designed to drive stationary machines and mechanisms in explosive industries. Electric motors can be operated both in the premises and in outdoor installations where explosive mixture can be formed, classified in categories I, IIA, IIB, IIC.

Electric motors AIM-M, AIM-MT, AIM-L are explosion-proof electric – designed for operation as part of indoor and outdoor installations in potentially explosive areas.

Electric motors AIU, AIU-M, AIU-MP are explosion-proof mine motors, designed to work in underground mines and their surface structures, dangerous for the concentration of mine gas and combustible dust.

Electric motors AIM-MB are explosion-proof electric motors designed to drive axial fans in hazardous areas of premises and outdoor installations.

Electric motors AIMA-M, AIMA-L are explosion-proof motors, designed to drive isolation valves. The operation mode of the motors is intermittent (S3), PV = 25% (operation cycle is 10 minutes, of which 2.5 minutes is operation,7,5 minutes is a pause). In agreement with the manufacturer, it is allowed motor operation in other modes.

Type of explosion protection of the motor housing (bed and bearing shields) AIM-M, AIM-MT AIMA-M, AIMA-L, AIM-MB - “ flameproof enclosure”, terminal boxes - “flameproof enclosure” and “enhanced reliability against explosion”.

Type of explosion protection of the AIU, AIU-M, AIU-MP electric motor housing, including the case of the terminal box - “flameproof enclosure”.

The motors are manufactured with rated voltage 220, 380, 660, 1140 V and network frequency 50 Hz.

At the request of the customer, motors can be manufactured for other capacities, voltages, frequency and with other mounting dimensions.

ELECTRIC MOTOR AIM-ME

Electric motors **AIM-ME** are designed for drive mechanisms in explosive areas and external plants, and also in mines, gas and dust-hazardous.

Operation mode: continuous, S1, allow operation from frequency converter (modes S8, S9, S10)

Climatic construction type:

У1, У2, У5, УХЛ2, УХЛ4, Т2, Т5

Explosion protection configuration

1 Ex d IIB T4 Gb

Mounting configuration

IM1001, IM2001, IM3001, IM3011

Protection degree for

motor housing and terminal box	IP54 IP55 (on order)
outdoor fan enclosure	IP20

Cooling method:

IC411	cooling system is double-circuit. inner circuit - closed, external circuit- open with built-in fan located on the motor shaft cooling the external motor's surface
IC516	cooling system is double-circuit. inner circuit - closed, external circuit - open with built-in heat exchanger and self-dependent fan -at customer's request

Motors are manufactured with terminal box from above, and also, at customer's request, with terminal box at the left or at the right. Motors have the left and the right rotation direction.

Basic equipment of motors provides:

- stator winding insulation class – «H»;
- stator winding temperature control with four wire thermal converters with HCX 50M in quantity of 6 pieces (2 pieces on each phase);
- temperature relay of stator winding;
- temperature ccontrol of bearings by four-wire thermal converters with HCX 50M in quantity of 2 pieces (1 piece on each bearing);

- places for vibration sensors installation in quantity of 6 pieces (3 pices on each bearing unit on three mutually perpendicular planes);

- bearing units replenishing and replacing lubricants;

- connection of two power cables, outer dimeter of . which is up to 45 mm for motors with180-225 mm height of axis of rotation.

At customer's request motors are equipped with:

- temperature control of stator winding by four-wire thermal converters with HCX 50П, 100П, Pt100 in quantity up to 12 pices for motors with 250-355 mm height of axis of rotation and up to 6 pieces – for motors with 180-225 mm height of axis of rotation.
- TC-termistors of stator winding (instead of tempe rature relay);
- four-wire bearing temperature control sensors with HCX 50П, 100П, Pt100;
- vibration control sensors in quantity up to 6 pieces;

- rotor speed sensors;
- selfregulating anti-condensation heating (instead of temperature relay and PTC-termistors)

- SKF bearings or bearings of the other manufacturers

- current-isolated bearing unit.

Table 1. Basic parameters of the electric motors AIM-ME 180-225

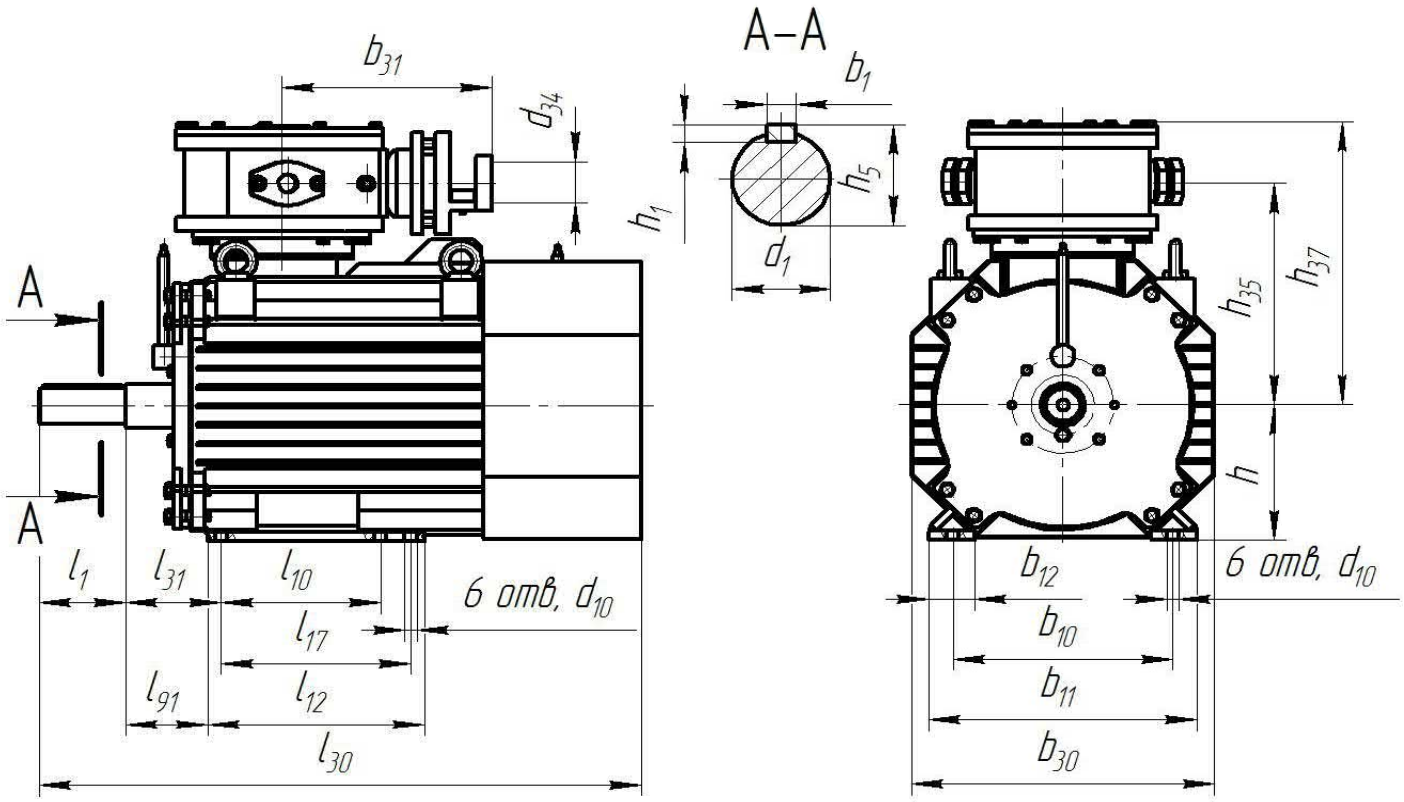
Type designation	Power, kW	Nominal stator current, A*	Rotational speed, rpm.*	Efficiency, %	Power factor	Sliding, %	Starting torque ratio	Maximum torque ratio	Starting current ratio
voltage 380/660 V, 660/1140 V, network frequency 50Hz, 60Hz									
180S-2	22	39,5/22,8	3000/3600	91,3	0,92	1,5	1,5	3,0	7,1
		22,8/13,2		91,4	0,92				
180M-2	30	53,0/30,6		92,0	0,93	1,7	1,4	2,8	6,8
		30,8/17,8		92,0	0,93				
180S-4	22	41,2/23,8	1500/1800	92,1	0,87	1,6	1,9	2,8	7,2
		23,7/13,7		92,1	0,88				
180M-4	30	55,5/32,1		92,8	0,88	1,6	2,0	2,8	7,3
		32,0/18,5		92,6	0,88				
180M-6	18,5	37,2/21,5	1000/1200	90,3	0,83	1,9	1,9	2,9	6,4
		21,6/12,5		90,3	0,83				
180M-8	15	32,9/19,0	750/900	88,4	0,78	2,5	1,5	2,3	4,7
		18,9/10,9		88,6	0,78				
200M-2	37	65,8/38,0	3000/3600	92,6	0,92	1,5	1,3	2,8	6,8
		37,9/21,9		92,5	0,92				
200L-2	45	78,9/45,6		92,9	0,93	1,5	1,4	2,8	6,8
		45,7/26,4		93,1	0,93				
200M-4	37	69,2/40,0	1500/1800	93,0	0,87	1,4	1,9	2,7	6,9
		39,8/23,0		92,9	0,87				
200L-4	45	83,2/48,1		93,5	0,87	1,3	2,0	2,8	7,0
		48,2/27,9		93,4	0,87				
200M-6	22	41,7/24,1	1000/1200	91,6	0,87	1,8	1,7	2,6	6,5
		23,9/13,8		91,4	0,88				
200L-6	30	56,4/32,6		91,9	0,87	1,7	1,9	2,8	6,7
		32,9/19,0		91,8	0,87				
200M-8	18,5	38,2/22,1	750/900	90,6	0,81	2,0	1,7	2,4	5,4
		22,1/12,8		90,5	0,81				
200L-8	22	45,3/26,2		90,8	0,81	2,0	1,7	2,4	5,5
		26,4/15,3		90,8	0,80				
225M-2	55	97,8/56,5	3000/3600	95,4	0,89	1,2	1,3	4,3	7,5
		56,3/32,5		95,5	0,89				
225M-4	55	100,7/58,2	1500/1800	93,6	0,88	1,3	1,5	3,1	7,4
		57,8/33,4		93,7	0,89				
225M-6	37	69,7/40,3	1000/1200	92,3	0,87	1,6	1,4	3,0	6,9
		40,8/23,6		92,4	0,86				
225M-8	30	60,4/34,9	750/900	91,0	0,82	1,9	1,2	2,5	5,5
		34,9/20,2		91,1	0,82				

*** in numerator– voltage 380/660V, in denominator – for 660/1140V;**

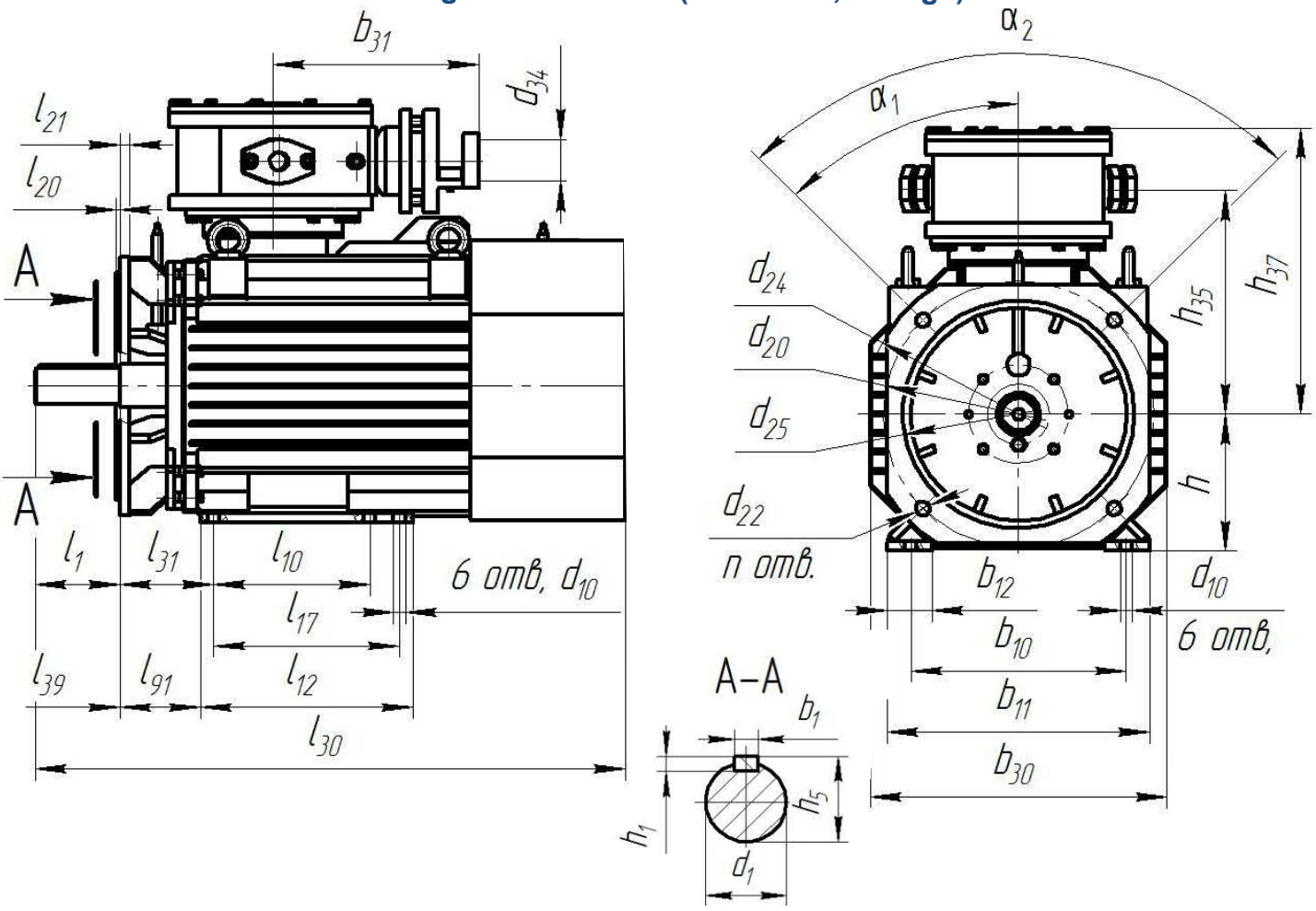
****in denominator for 50Hz, in denominator– for 60Hz.**

Table 2. size values of the electric motors AIM-ME180-225

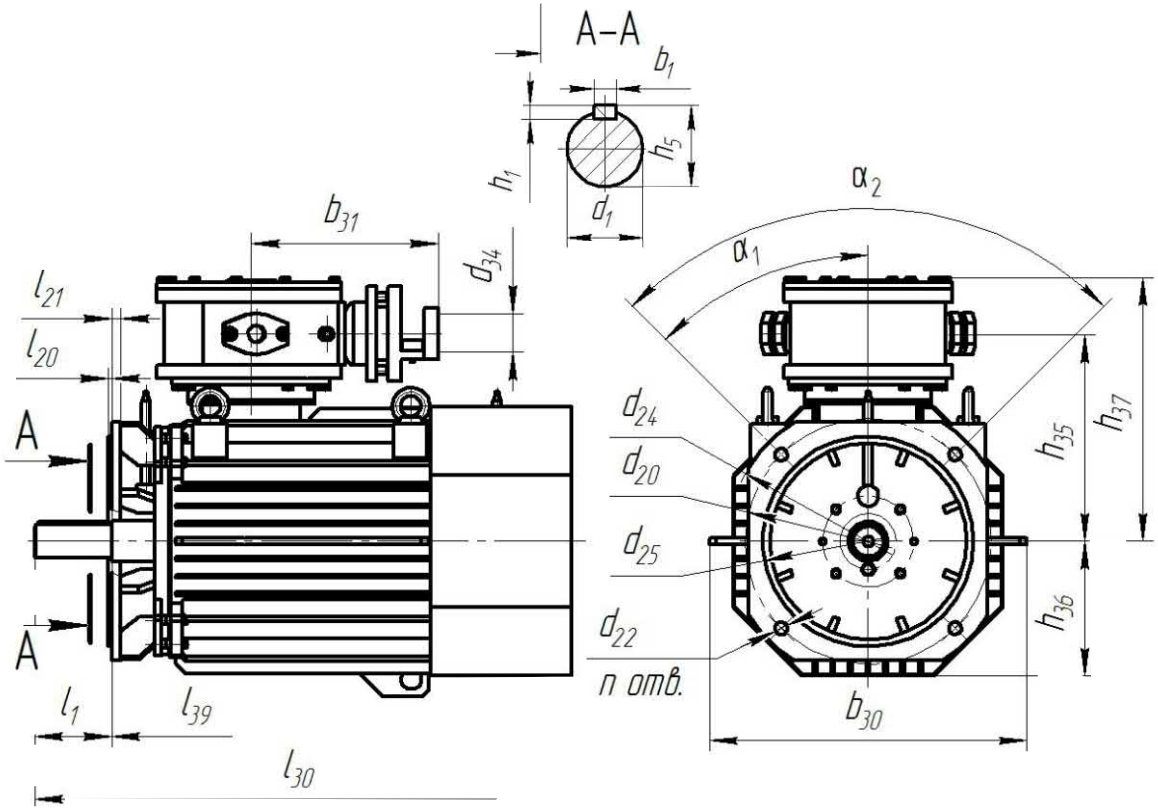
Type designation	l_1, mm	l_{10}, mm	l_{12}, mm	l_{17}, mm	l_{20}, mm	l_{21}, mm	l_{30}, mm	l_{31}, mm	l_{39}, mm	l_{91}, mm	b_1, mm	b_{10}, mm	b_{11}, mm	b_{12}, mm	b_{30}, mm	b_{31}, mm	h, mm	h_1, mm	h_5, mm	h_{35}, mm	h_{36}, mm	h_{37}, mm	d_1, mm	d_{10}, mm	d_{20}, mm	d_{22}, mm	d_{24}, mm	d_{25}, mm	d_{34}, mm	n, pc.	α_1, °	α_2, °	mass, kg
Picture 1. Electric motors with mounting configuration IM1001 (horizontal, on legs)																																	
180S-2	110	203	275	241	-	-	750	121	-	104	14	279	340	60	385	270	180	9	51,5	295	-	380	48	15	-	-	-	-	45*2	-	-	-	260
180M-2							795																										275
180S-4							750				16							10	59,0				55										285
180M-4							795																										298
180M-6																																	272
180M-8																																	292
200M-2							840																										390
200L-2																																	430
200M-4	140	267	350	305			870	133		110	18	318	382	60	440		200	11	64,0	320		405	60	19										460
200L-4							945																										475
200M-6																																	370
200L-6							870																										400
200M-8																																	370
200L-8																																	400
225M-2	110	286	370	311			840	149		120	16	356	430	70			225	10	59,0				55											465
225M-4																																	469
225M-6	140						945				18							11	69,0				65										432
225M-8																																	428
Picture 2. Electric motors with mounting configuration IM2001 (horizontal, on legs, with flange on shield, available from the other side)																																	
180S-2	110	203	275	241	5	13	750	121	0	104	14	279	340	60	385	270	180	9	51,5	295	-	380	48	15	350	19	400	300	45*2	4	45	90	260
180M-2							795																										275
180S-4							750				16							10	59,0				55										285
180M-4							795																										298
180M-6																																	272
180M-8																																	292
200M-2							840																										390
200L-2																																	430
200M-4	140	267	350	305		18	870	133		110	18	318	382	60	440		200	11	64,0	320		405	60	19	400		450	350		8	22,5		460
200L-4							945																										475
200M-6																																	370
200L-6							870																										400
200M-8																																	370
200L-8																																	400
225M-2	110	286	370	311			840	149		120	16	356	430	70			225	10	59,0				55		500		550	450					465
225M-4																																	469
225M-6	140						945				18							11	69,0				65										432
225M-8																																	428
Picture 3. Electric motors with mounting configuration IM3001 (horizontal, with flange on shield, available from the other side)																																	
180S-2	110	-	-	-	5	13	750	-	0	-	14	-	-	-	455	270	-	9	51,5	295	195	380	48	-	350	19	400	300	45*2	4	45	90	260
180M-2							795																										275
180S-4							750				16							10	59,0				55										285
180M-4							795																										298
180M-6																																	272
180M-8																																	292
200M-2						18	840								505					320	220	405								8	22,5	45	390
200L-2																																	430
200M-4	140						870				18							11	64,0				60		400		450	350					460
200L-4							945																										475
200M-6																																	370
200L-6							870																										400
200M-8																																	370
200L-8																																	400
225M-2	110						840				16							10	59,0		250		55		500		550	450					465
225M-4																																	469
225M-6	140						945				18							11	69,0				65										432
225M-8																																	428
Picture 4. Electric motors with mounting configuration IM3011 (vertical, with shaft down, with flange on down shield, available from the other side)																																	
180S-2	110	-	-	-	5	13	830	-	0	-	14	-	-	-	455	270	-	9	51,5	295	195	380	48	-	350	19	400	300	45*2	4	45	90	260
180M-2							875																										275
180S-4							830				16							10	59,0				55										285
180M-4							875																										298
180M-6																																	272
180M-8																																	292
200M-2						18	920								505					320	220	405								8	22,5	45	390
200L-2																																	430
200M-4	140						950				18							11	64,0				60		400		450	350					460
200L-4							1025																										475
200M-6																																	370
200L-6							950																										400
200M-8																																	370
200L-8																																	400
225M-2	110						920				16							10	59,0		250		55		500		550	450					465
225M-4																																	469
225M-6	140						1025				18							11	69,0				65										432
225M-8																																	428



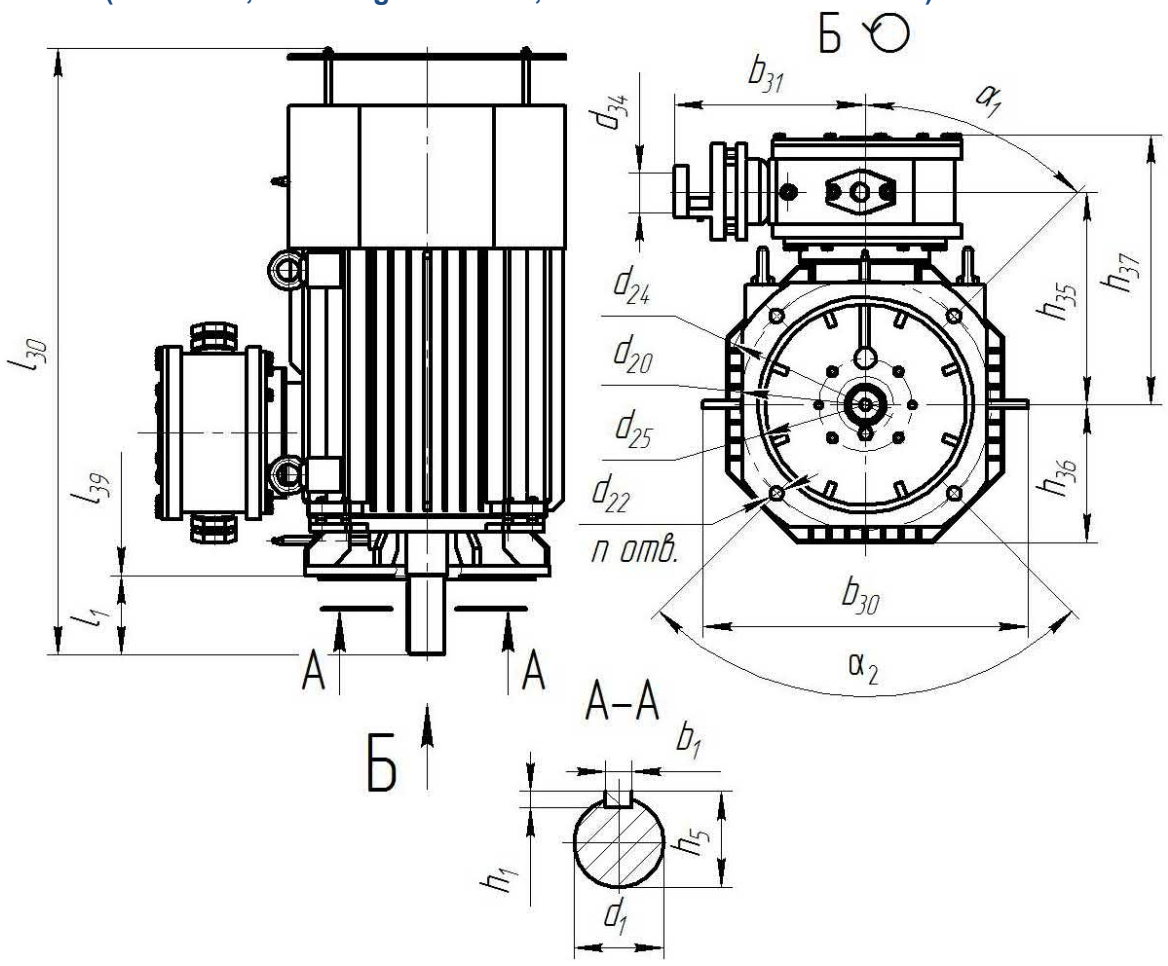
Picture 1. Electric motors AIM-ME 180-225 with mounting configuration IM1001 (horizontal, on legs)



Picture 2. Electric motors AIM-ME 180-225 with mounting configuration IM2001 (horizontal, on legs, with flange on shield, available from the other side)



Picture 3. Electric motors AIM-ME 180-225 with mounting configuration IM3001 (horizontal, with flange on shield, available from the other side)



Picture 4. Electric motors AIM-ME 180-225 with mounting configuration IM3011 (vertical, shaft down, with flange on down shield, available from the other side)



ELECTRIC MOTORS AIM-M 63-160

Asynchronous three-phase explosion-proof electric motors AIM-M with a squirrel-cage rotor are designed to operate in explosive areas and external plants.

Supply voltage: 220, 380, 660V.
Nominal operation mode: is continuous S1, 50Hz and 60Hz at customer's request.
Motors allow operation in modes S2, S3, S6, S8, S9, S10.

Explosion protection configuration:

For deliveries to the countries of the European Union	
AIM-M 63, 71, 80	1Ex d IIB T5 Gb 1Ex d e IIB T5 Gb 1Ex d IIC T4 Gb
AIM-M 90, 100, 112, 132, 160	1Ex d IIB T4 Gb 1Ex d e IIB T4 Gb 1Ex d IIC T4 Gb
For deliveries to Ukraine	
AIM-M 63, 71, 80	1Ex d IIB T5 Gb, 1Ex d e IIB T5 Gb, 1Ex d IIC T4 Gb
AIM-M 90, 100, 112, 132, 160	1Ex d IIB T4 Gb, 1Ex d IIC T4 Gb, 1Ex d e IIB T4 Gb

Climatic construction type:

У1.5, У2.5, У3, УХЛ1.5, УХЛ2.5, Т1.5, Т2.5, ОМ2.5

Mounting configuration:

AIM-M 63, 71, 80	IM1281, M9881, IM4481, IM1081, IM2081, IM3081
AIM-M 90, 100, 112, 132, 160	IM1081, IM2081, IM3081

Protection degree for:

motor housing and terminal box	IP54 (IP55 at customer's request)
outdoor fan enclosure	IP20

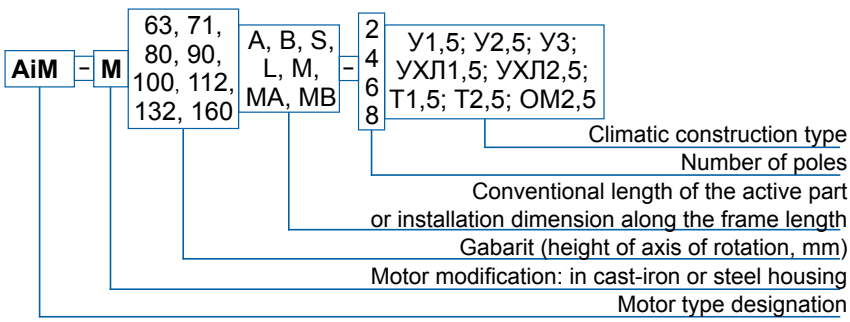
Cooling method: IC411.

Electric motors operate in any direction of rotation. Heat resistance class of winding insulation: “B” - for dimensions 63-80, “F” - for dimensions 90-160.

Main advantages of electric motors AIM-M over analogues:

- reduction in mass within limits 25-40% by design improvement;
- high operation reliability by means of high technological level of magnet-insulating works.

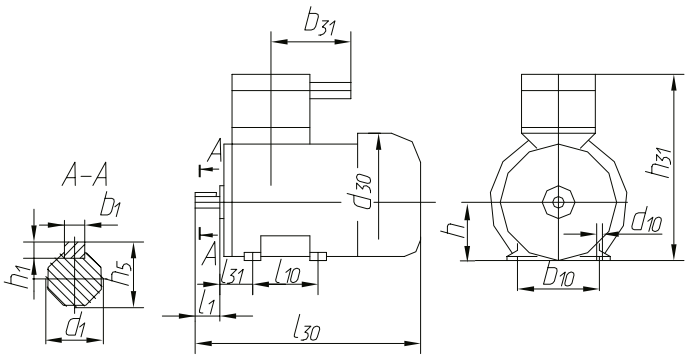
TYPE DESIGNATION



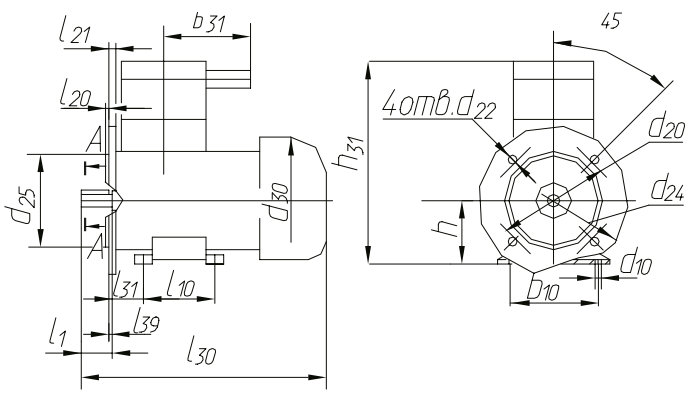
TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AIM-M 63-160 WITH VOLTAGE 380V

Type designation	Power, kW	Nominal current at 380V, A	$I_n / I_н$	Mp / MN	Mmax / $M_н$	Effic., %	Cos φ	Inertia moment, H*m²	mass, kg
3000 rpm.									
AIM-M 63A-2	0,37	0,9	5,0	2,6	2,6	73,2	0,84	0,0055	14,0
AIM-M 63B-2	0,55	1,3	5,9	2,8		76,2	0,85	0,0073	14,5
AIM-M 71A-2	0,75	1,7		2,7		78,2	0,86	0,0108	17,5
AIM-M 71B-2	1,1	2,4	5,3	2,6	2,7	80,0	0,87	0,0123	18,5
AIM-M 80A-2	1,5	3,1	6,0	2,3	2,5	81,0	0,90	0,022	24,5
AIM-M 80B-2	2,2	4,4				83,0	0,91	0,0295	28,0
AIM-M 90L-2	3,0	6,4		2,0	2,4	82,5	0,87	0,049	45,0
AIM-M 100S-2	4,0	8,3	6,7	2,1	2,5	84,0		0,0735	47,0
AIM-M 100L-2	5,5	10,9				85,0	0,88	0,098	53,0
AIM-M 112M-2	7,5	15,0	7,0	2,2	2,8	86,0	0,87	0,147	68,0
AIM-M 132M-2	11,0	21,0	6,5	1,9	2,9	86,5	0,89	0,3675	96,0
AIM-M 160S-2	15,0	28,6	6,0	1,4	2,5	89,5		0,735	124,0
AIM-M 160M-2	18,5	35,7	7,2	1,6	2,6		0,90	0,8825	134,0
1500 rpm.									
AIM-M 63A-4	0,25	0,7	4,1	2,2	2,3	68,0	0,73	0,0073	14,0
AIM-M 63B-4	0,37	1,0				71,2	0,77	0,0098	14,5
AIM-M 71A-4	0,55	1,4				74,4		0,0155	17,5
AIM-M 71B-4	0,75	1,9	4,4	2,0		76,2	0,78	0,0228	18,5
AIM-M 80A-4	1,1	2,6	5,1	1,8		79,0	0,81	0,0318	24,5
AIM-M 80B-4	1,5	3,6				80,3	0,80	0,044	28,0
AIM-M 90L-4	2,2	5,2	6,0	2,0	2,6	80,0		0,0735	45,0
AIM-M 100S-4	3,0	7,0	5,8	1,9	2,5	81,5		0,1225	48,0
AIM-M 100L-4	4,0	8,7		2,0		84,0	0,82	0,1518	56,0
AIM-M 112M-4	5,5	11,6	7,0	2,2	2,8	85,5	0,84	0,2453	70,0
AIM-M 132S-4	7,5	15,0	6,5	2,1		87,0	0,85	0,585	90,0
AIM-M 132M-4	11,0	21,5		2,4	3,0	88,5	0,86	0,735	101,0
AIM-M 160S-4	15,0	30,7		1,5	2,3		0,84	1,42	130,0
AIM-M 160M-4	18,5	37,0		1,9	2,6	89,5	0,85	1,74	140,0
1000 rpm.									
AIM-M 71A-6	0,37	1,1	3,6	1,8	2,0	67,0	0,67	0,0223	17,5
AIM-M 71B-6	0,55	1,6			1,8	68,0	0,70	0,027	18,5
AIM-M 80A-6	0,75	2,1	4,5			72,1	0,74	0,044	24,5
AIM-M 80B-6	1,1	3,0				74,2	0,75	0,0588	28,0
AIM-M 90L-6	1,5	4,1		2,1	2,3	76,5	0,72	0,075	45,0
AIM-M 100L-6	2,2	5,5	5,5	1,8	2,4	80,0	0,73	0,1963	53,0
AIM-M 112MA-6	3,0	7,2	6,0	2,0	2,7	79,0	0,78	0,27	61,0
AIM-M 112MB-6	4,0	9,3	6,6			80,0		0,3425	68,0
AIM-M 132S-6	5,5	12,0	6,5	2,2		84,0	0,8,0	0,8325	96,0
AIM-M 132M-6	7,5	16,0				85,0	0,81	1,005	106,0
AIM-M 160S-6	11,0	23,0	6,2	1,6	2,1	87,5	0,83	2,55	136,0
AIM-M 160M-6	15,0	34,6	6,0	2,0	2,5	88,0	0,75	3,2	146,0
750 rpm.									
AIM-M 112MA8	2,2	5,9	4,9	1,9	2,4	75,0	0,70	0,30	61,0
AIM-M 112MB8	3,0	8,0				78,0		0,3425	68,0
AIM-M 132S8	4,0	10,5		2,0	2,6	80,0		0,755	96,0
AIM-M 132M8	5,5	14,5			2,1	82,0	0,72	0,8325	106,0
AIM-M 160S8	7,5	17,5	5,5	1,2	1,8	85,5	0,76	2,55	136,0
AIM-M 160M8	11,0	26,6		1,3	1,9	86,0	0,73	3,2	146,0

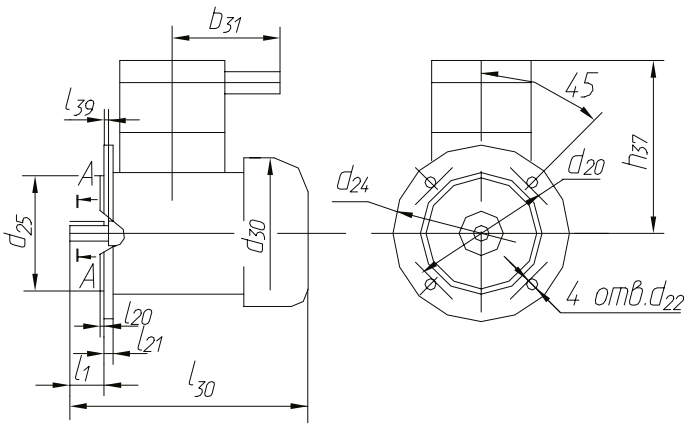
OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIM-M



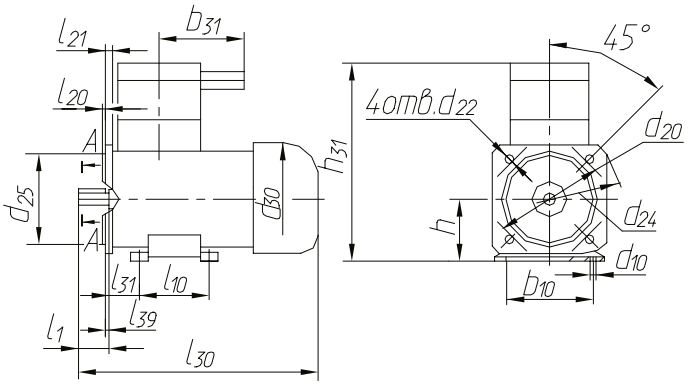
Picture 1



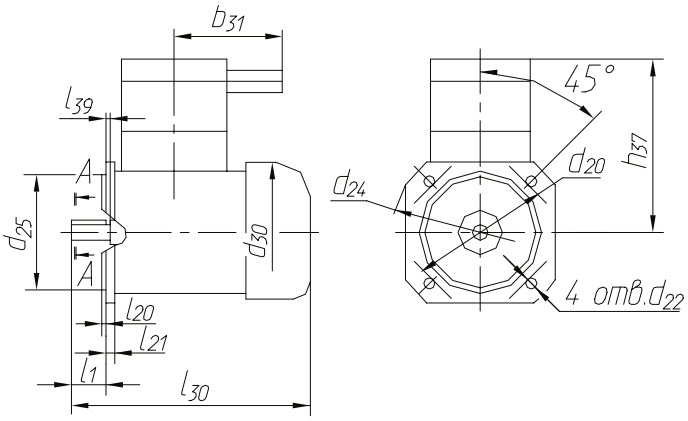
Picture 2



Picture 3



Picture 4



Picture 5

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIM-M

Type designation	Mounting configuration	№ pic.	dimensions, mm, not more *						installation and mounting sizes, mm															
			d_{30}	h_{31}	h_{37}	l_{30}	b_{31}	d_{24}	b_1	b_{10}	d_1	d_{10}	d_{20}	d_{22}	d_{25}	h	h_1	h_5	l_1	l_{10}	l_{20}	l_{21}	l_{31}	l_{39}
AIM-M 63	IM1081/IM1281	1	155	214/218	-	275	130	-	5	100	14	7	-	-	-	63	5	16,0	30	80	-	-	40	-
	IM2081/IM9881	2/4						160					130	10	110						3,5	10		0
	IM3081/IM4481	3/5		-	151/155					-		-				-				-			-	
AIM-M 71	IM1081/IM1281	1	170	229/233	-	305		-	6	112	19	7	-	-	-	71	6	21,5	40	90	-	-	45	-
	IM2081/IM9881	2/4						200					165	12	130						3,5	12		0
	IM3081/IM4481	3/5		-	158/162					-		-				-				-			-	
AIM-M 80	IM1081/IM1281	1	190	247/250	-	350		-		125	22	10	-	-	-	80		24,5	50	100	-	-	50	-
	IM2081/IM9881	2/4						200					165	12	130						3,5	12		0
	IM3081/IM4481	3/5		-	167/170					-		-				-				-			-	
AIM-M 90	IM1081	1	210	285/290	-	410		-	8	140	24	10	-	-	-	90	7	27,0		125	-	-	56	-
	IM2081	2						250					215	15	180						4,0	14		0
	IM3081	3		-	195/200					-		-				-				-			-	
AIM-M 100L	IM1081	1	232	305/310	-	460		-		160	28	12	-	-	-	100		31,0	60	140	-	-	63	-
	IM2081	2						250					215	15	180						4,0	14		0
	IM3081	3		-	205/210					-		-				-				-			-	
AIM-M 100S	IM1081	1		305/310	-	425		-		160		12	-	-	-	100		31,0		112	-	-	63	-
	IM2081	2						250					215	15	180						4,0	14		0
	IM3081	3		-	205/210					-		-				-				-			-	
AIM-M 112M	IM1081	1	260	347/352	-	485	195/190	-		190	32	12	-	-	-	112	8	35,0	80	140	-	-	70	-
	IM2081	2						300					265	15	230						4,0	16		0
	IM3081	3		-	235/240					-		-				-				-			-	
AIM-M 132S	IM1081	1	302	387/392	-	487		-	10	216	38	12	-	-	-	132		41,0		140	-	-	89	-
	IM2081	2						350					300	19	250						5,0	18		0
	IM3081	3		-	255/260					-		-				-				-			-	
AIM-M132M	IM1081	1		387/392	-	532		-		216		12		-	-	132		41,0		178	-	-	89	-
	IM2081	2						350					300	19	250						5,0	18		0
	IM3081	3		-	255/260					-		-				-				-			-	
AIM-M 160S2	IM1081	1	340	460/470	-	585		-		254	42	15	-	-	-	160	8	45,0	110	178	-	-	108	-
	IM2081	2						350	12				300	19	250						5,0	16		0
	IM3081	3		-	300/310					-		-				-				-			-	
AIM-M 160S 4,6,8	IM1081	1		460/470	-		195/190	-		254	48	15	-	-	-	160	9	51,5		178	-	-	108	-
	IM2081	2						350	14				300	19	250						5.0	16		0
	IM3081	3		-	300/310					-		-				-				-			-	
AIM-M 160M2	IM1081	1		460/470	-	645		-		254	42	15	-	-	-	160	8	45,0		210	-	-	108	-
	IM2081	2						350	12				300	19	250						5.0	16		0
	IM3081	3		-	300/310					-		-				-				-			-	
AIM-M 160M 4,6,8	IM1081	1		460/470	-			-		254	48	15	-	-	-	160	9	51.5		210	-	-	108	-
	IM2081	2						350	14				300	19	250						5.0	16		0
	IM3081	3		-	300/310					-		-				-				-			-	

Note:
** The numerator shows the data for motors with a terminal box of the type of explosion protection "e", in the denominator - type of explosion protection "d".*

ELECTRIC MOTORS AIM-M 225

Asynchronous three-phase explosion-proof electric motors AIM-M with a squirrel-cage rotor are designed to operate in explosive areas and external plants.
Gabarit (height of axis of rotation) of motors: 225 mm.
Motor's power: from 22 kW up to 75 kW
Supply voltage: 380/660V; 660/1140V.
Phase connection of stator winding: star/triangle for all voltage combinations.
Current frequency - 50Hz. at customer's request - 60Hz.
Number of poles of motors - 2, 4, 6, 8.
Synchronous shaft rotational speed: 750, 1000, 1500 and 3000 rpm.

Electric motors are designed for continuous operation mode S1 and allow operation in modes S2, S3, S6,S8, S9, S10 according to GOST IEC60034-1-2014. Starting of electric motors is performed by direct connection to the full voltage of the network.
Climatic construction type:

У1, У2, У5, Т2, Т5, УХЛ1, ХЛ1

The maximum permissible sound power levels of sounds of the electric motors operating without load at network frequency 50Hz corresponds to class 1 according to GOST IEC 60034-9-2014.
The maximum mean square value of vibration speed corresponds to GOST IEC 60034-14-2014:
Operation conditions:
- height above the sea level is up to 1000m;
- regarding environmental factors - M1 according to GOST 17516.1.

The motor is connected to the drive mechanism by means of gear or elastic sleeve-finger couplings

The motor start is direct, it provides both at the rated voltage and at the voltage loss during the start period -up to 0.8Unom.
Mounting configuration according toT GOST 2479:

IM1081, IM4081, IM9781	
Protection degree according to GOST 17494:	
of the motor housing	IP54 (IP55 at customer's request)
of terminal box	IP55
of outdoor fan enclosure	IP20

Explosion-protection configuration: 1Ex d IIB T5 Gb, 1Ex d IIC T5 Gb.
Cooling method: IC411
Construction: The bed and bearing shields are made of steel.
The rotor is short-circuited, covered with aluminum.
Electric motors are manufactured with one protruding cylindrical end of the shaft.
Motors are manufactured with rolling bearings of accuracy class not lower than 6 in accordance with GOST 7242. Lubrication of bearings is consistent
The construction of the bearing units provides for the periodic replenishment of lubricant through the built-in box lubricator.
At customer's request the electric motors are equipped with bearings produced by SKF (Sweden).

The electric motors AIM-M 225M-2,4,6,8 have «mesh» stator winding.
The electric motors AIM-M 225MH-2,4,6,8 and AIM-M 225SA, SB, M, L-C-4 have stator winding of rigid bobbins.
The insulating materials of stator winding have heat-resistance class «F». (temperature index 155ºC) according to GOST 8865-93. At customer's request it is possible to produce stator winding using insulating materials of heat-resistance class «H (temperature index 180ºC) according to GOST 8865-93.

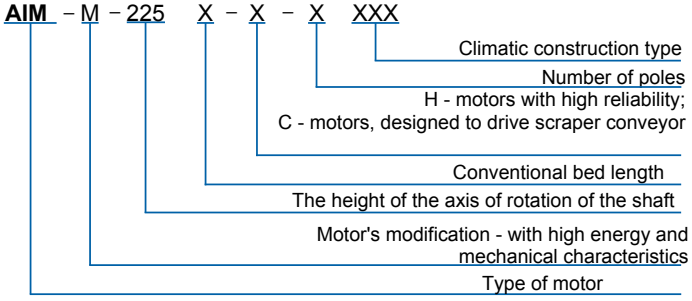
To protect against overheating, the electric motors are equipped with at least two differential temperature relays built into the stator winding, the output ends of which are brought into the power terminal box. At customer's request, to control the temperature of the bearing units and the motor housing, it is possible to complete the motors with temperature control sensors (thermal converters) with rated resistance 50 Ohm, 100 Ohm types ТС044-50М, 100М, 50П, 100П.

Six output ends of the stator winding are brought into the terminal box of the electric motor.Switching the stator winding connection scheme (Δ-Y) is performed in the power terminal box by reinstalling the metal jumpers (plates). The terminal box provides flexible and armored power cable entry with an outer diameter up to 48mm. and control cable with outer diameter up to 24mm through separate tubes. The terminal boxes of the AIM-M 225SA, SB, M, LC-4 motors are equipped with two tubes for the input of power cables.

Electric motors are manufactured with the location of the terminal box on the right viewed from the side of the working end of the shaft. At customer' request the electric motors are manufactured with the location of the terminal box on the left, from the top of stator housing, viewed from the side of the working end of the shaft. On electric motors with mounting configuration IM4081 the location of power terminal box (from the left to the right) is changed by turning the motor 180ºC relative to the axis of rotation of the rotor of the electric motor.
There are clamps for connecting the earthing on the motor frame and inside the terminal box.
For cooling the electric motor, external fan is provided, mounted on the shaft and protected by housing. Cooling method of electric motors is IC411 (blown with self-ventilation).

At customer's request, the electric motors can be manufactured with forced ventilation system.
Electric motors operate in any direction of rotation. The change of rotation direction is made after a complete stop of the electric motor, by switching phases.

TYPE DESIGNATION



At order and in the documents the designation of the electric motor consists of the name, reference designation, explosion protection configuration, rated power, rated voltage and frequency of the network, synchronous rotational speed, location of the terminal box, and other requirements.

Example: AIM-M 225M-4 У2 1 Ex d IIB T4 Gb
А - asynchronous;
И - InterElectro;
М - with high energy and mechanical characteristics;
225 - The height of the axis of rotation;
М - Conventional bed length;
4 - Number of poles;
У2 - Climatic construction type;
1Ex d IIB T4 Gb - explosion protection configuration

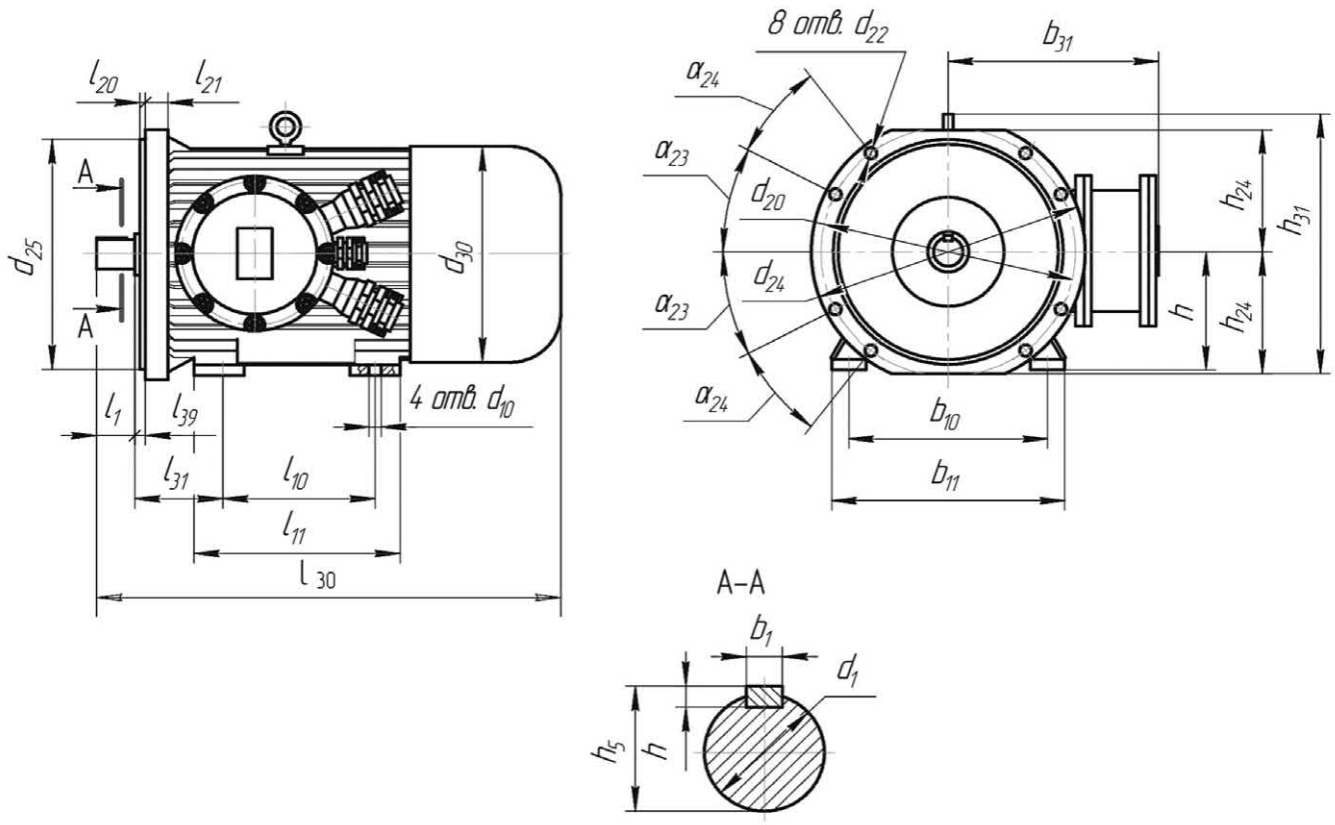
TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AIM-M 225 WITH VOLTAGE 380/660V, 660/1140V

Type designation	Power, kW	Voltage, V	Rotational speed rpm.	Sliding, %	Effic., %	Cos φ	Nom. current, A	M_{max}/M_n	M_{start}/M_n	M_{min}/M_n	I_{start}/I_n	mass, kg
AIM-M225M-2	55,0	380/660	3000	2,0	92,3	0,91	99/57	3,0	1,5	1,1	7,5	415
		660/1140					57/33					
AIM-M 225M-4	55,0	380/660	1500	1,5	93,0	0,90	100/58	2,8			7,0	419
		660/1140					58/33					
AIM-M 225M-6	37,0	380/660	1000	1,8	91,4	0,87	72/41	2,5	1,2	1,0	6,5	382
		660/1140					41/24					
AIM-M 225M-8	30,0	380/660	750	2,0	90,7	0,83	60/35	2,3			6,0	378
		660/1140					35/20					
AIM-M 225MH-2	55,0	380/660	3000	2,0	92,1	0,90	101/58	3,2	1,5	1,1	7,5	415
		660/1140					58/34					
AIM-M 225MH-4	55,0	380/660	1500	1,5	92,7	0,89	101/58	2,9			7,0	419
		660/1140					58/34					
AIM-M 225MH-6	37,0	380/660	1000	1,8	91,2	0,86	72/41	2,6	1,3	1,0	6,5	382
		660/1140					41/24					
AIM-M 225MH-8	30,0	380/660	750	2,0	90,5	0,82	61/35	2,4			6,0	378
		660/1140					35/20					
AIM-M 225SA-C-4	22,0	380/660	1500	2,0	91,0	0,86	43/25	3,1	3,0	1,5	7,5	356
		660/1140					25/14					
AIM-M 225SB-C-4	37,0	380/660		2,0	92,0		71/41					402
		660/1140					41/24					
AIM-M 225M-C-4	55,0	380/660		1,6	92,5	0,87	104/60					525
		660/1140					60/35					
AIM-M 225L-C-4	75,0	380/660		1,4	93,0		141/81	3,0	2,8			545
		660/1140					81/47					

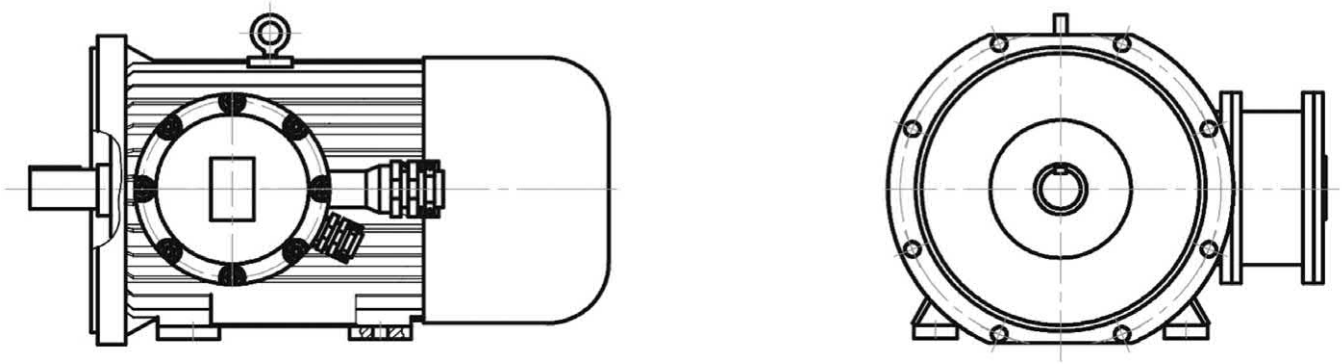
OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIM-M225

Type designation	Mounting configuration	№ pic.	l_1	l_{10}	l_{11}	l_{20}	l_{21}	l_{30}	l_{31}	l_{39}	b_1	b_{10}	b_{11}	b_{31}	h	h_1	h_5	h_{24}	h_{31}	d_1	d_{10}	d_{20}	d_{22}	d_{24}	d_{25}	d_{30}	α_{23},°	α_{24},°
AIM-M 225M, MH-2	IM1081	2	110	311	407	-	-	910	149	-	16	356	430	445	225	10	59	-	510	55	19	-	-	-	-	490	-	-
	IM9781					5	22			0								255				500	19	550	450		22,5	45
	IM3081			-	-				-			-	-		-				-		-							
AIM-M 225M, MH-4	IM1081		140	311	407	-	-	940	149	-	18	356	430		225	11	69	-	510	65	19	-	-	-	-		-	-
	IM9781					5	22			0								255				500	19	550	450		22,5	45
	IM3081			-	-				-			-	-		-				-		-							
AIM-M 225M, MH-6	IM1081			311	407	-	-		149	-		356	430		225			-	510		19	-	-	-	-		-	-
	IM9781					5	22			0								255				500	19	550	450		22,5	45
	IM3081			-	-				-			-	-		-				-		-							
AIM-M 225M, MH-8	IM1081			311	407	-	-		149	-		356	430		225			-	510		19	-	-	-	-		-	-
	IM9781					5	22			0								255				500	19	550	450		22,5	45
	IM3081			-	-				-			-	-		-				-		-							
AIM-M 225SA-C-4	IM1081	1	76	286	382	-	-	800	149	-		356	430		225			-	510		24	-	-	-	-		-	-
	IM9781					5	51			15,5								240				520	24	560	470		27,5	25
	IM4081			-					-			-	-		-				-		-							
AIM-M 225SB-C-4	IM1081			286	382	-	-		149	-		356	430		225			-	510		24	-	-	-	-		-	-
	IM9781					5	51			15,5								240				520	24	560	470		27,5	25
	IM4081			-					-			-	-		-				-		-							
AIM-M 225M-C-4	IM1081			311	407	-	-	920	168	-		406	490		225		64	-	510	60	24	-	-	-	-		-	-
	IM9781					5	51			15,5								240				520	24	560	470		27,5	25
	IM4081			-	-				-			-			-				-		-							
AIM-M 225L-C-4	IM1081			311	407	-	-		168	-		406	490		225			-	510		24	-	-	-	-		-	-
	IM9781					5	51			15,5								240				520	24	560	470		27,5	25
	IM4081			-	-				-			-			-				-		-							

OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIM-M 225



Picture 1



Picture 2

ELECTRIC MOTORS AIM-MT 80-200

Asynchronous three-phase explosion-proof electric motors AIM-MT with a squirrel-cage rotor are designed for indoor and outdoor installations in potentially explosive areas to drive fans, pumps and other stationary mechanisms and machines used in the refining, gas, coal and other industries.

Supply voltage is 380, 660, 1140V, frequency 50Hz.

At customer's request the electric motors can be produced with frequency 60Hz.

Nominal operation mod: econtinuous S1, allow operation in modes S2, S3, S6, S8, S9, S10.

Explosion-protection configuration:

1Ex d IIB T5 Gb	1Ex d IIC T5 Gb

Climatic construction type:

У1.5, У2.5, УХЛ1.5, УХЛ2.5, Т1.5, Т2.5, ОМ2.5

Mounting configuration:

IM1081, IM2081, IM3081

Protection degree for:

the housing and terminal box	IP54 (IP55 at customer's request)
outdoor fan enclosure	IP20

Cooling method: IC411

Electric motors operate in any direction of shaft rotation (right and left).

Winding insulation heat resistance class:

«F» temperature index 155ºC	дfor gabarits 80-100, at customer's request can be manufactured with class «H»
«H» temperature index 180ºC	for gabarits 112-200

Operation conditions:

-height above the sea level is up to 1000m;

- regarding environmental factors M1 accprding to GOST 17516.1.

Start-up of electric motors is performed by direct connection to the full voltage of the network.

Construction:

The housing of electric motors, including housing of the terminal box, is made of steel. The terminal box is located on top and allows to turn around its body with fixation through 60 degrees.

Terminal box:

- for gabarits **80-90** - with one cable entry;

- for gabarits **100-180** - with two cable coupling sleeves, which allows connection to the motor cables with copper cores in a rubber or plastic cover. The power cable connection is provided through one cable coupling sleeve, and the temperature protection cable through the second;

- for gabarits **80-132** - there are three pass-through power terminals for connecting the cable, two additional ones for connecting thermal protection, one zero point insulator for switching the winding from a “triangle” to a “star”;

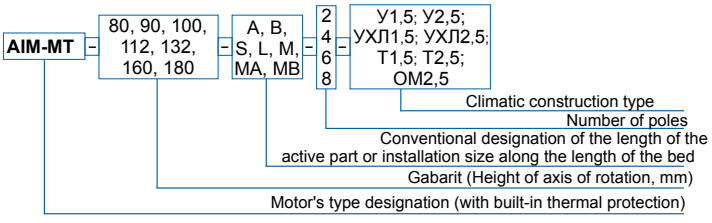
- for gabarits **160-180** - there are six pass-through power clamps for connecting cables, two pass-through and one support clamp for connecting thermal protection.

The electric motors are fully interchangeable to explosion-proof electric motors of V, VA, AIM series, produced in CIS countries by its purpose and installation and mounting sizes.

The electric motors allow operation from frequency converters in drives of fans, dynamic pumps and other devices that create torque on the shaft with a quadratic dependence on the frequency M-n2.

The frequency control range (n) is possible from 20% to 120% of the $n_{nominal}$, while in the range from 100% to 120% of the $n_{nominal}$. the power generated on the motor shaft should not exceed the nominal value.

TYPE DESIGNATION



TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AIM-MT 80-200, WITH VOLTAGE 380/660 V

Type designation	Power, kW	Nom. current Un=380/660V, A	In / Iн	Mn / Mн	Mmax / Mн	Effic., %	Cos φ	Inertia moment, H*m²	mass (IIB/IIC) IM1081, kg
3000 rpm.									
AIM-MT 80A2	1,5	3,1/1,8	6,0	2,3	2,5	81,0	0,90	0,0220	26,3/27,3
AIM-MT 80B2	2,2	4,4/2,6	6,0	2,3	2,5	81,0	0,90	0,0295	29,0/30,0
AIM-MT 90L2	3,0	6,4/3,5	6,0	2,0	2,4	82,5	0,90	0,0490	52,0/54,0
AIM-MT 100S2	4,0	8,3/4,6	6,7	2,1	2,5	84,5	0,90	0,0735	50,0/54,0
AIM-MT 100L2	5,5	10,9/6,3	6,7	2,1	2,5	85,3	0,90	0,0980	55,0/59,0
AIM-MT 112M2	7,5	15,0/8,6	7,0	2,2	2,8	86,5	0,88	0,1470	75,0/80,0
AIM-MT 132M2	11,0	21,0/12.5	6,5	1,9	2,9	87,0	0,89	0,3675	109,0/114
AIM-MT 160S2	15,0	28,6/16,2	6,0	1,8	3,0	90,0	0,90	0,6860	147,0/150
AIM-MT 160M2	18,5	34,0/19,6	6,0	1,8	3,0	90,8	0,91	0,0800	167,0/170
AIM-MT 180S2	22,0	39,9/23,1	7,4	1,4	3,2	91,8	0,91	0,8800	210,0
AIM-MT 180M2	30,0	54,0/31,2	7,4	1,5	3,1	92,5	0,91	1,0500	225,0
AIM-MT 200M2	37,0	66,2/38,2	7,3	1,3	3,1	93,0	0,91	1,2100	340,0
AIM-MT 200L2	45,0	80,2/46,3	7,5	1,3	3,1	93,5	0,91	1,3600	380,0
1500 rpm.									
AIM-MT 80A4	1,1	2,6/1,5	5,1	1,8	2,3	79,0	0,81	0,0318	28,3/29,3
AIM-MT 80B4	1,5	3,6/2,0	5,1	1,8	2,3	80,3	0,80	0,0440	31,0/32,0
AIM-MT 90L4	2,2	5,2/2,8	6,0	2,0	2,6	80,0	0,80	0,0735	52,0/54,0
AIM-MT 100S4	3,0	7,0/3,8	5,8	1,9	2,5	81,5	0,80	0,1225	51,0/55,0
AIM-MT 100L4	4,0	8,7/4,9	5,8	2,0	2,5	84,0	0,82	0,1518	58,0/62,0
AIM-MT 112M4	5,5	11,6/6,6	7,0	2,2	2,8	85,5	0,84	0,2453	75,0/80,0
AIM-MT 132S4	7,5	15,0/8,9	6,5	2,1	2,8	87,0	0,85	0,5850	93,0/98,0
AIM-MT 132M4	11,0	21,5/12,8	6,5	2,4	3,0	88,5	0,86	0,7350	109,0/114
AIM-MT 160S4	15,0	29,4/17,0	6,5	2,2	2,6	91,0	0,85	1,2300	147,0/150
AIM-MT 160M4	18,5	35,6/20,5	6,5	2,2	2,6	91,6	0,86	1,4400	167,0/170
AIM-MT 180S4	22,0	40,9/23,6	6,3	1,6	2,9	92,7	0,88	1,5300	235,0
AIM-MT 180M4	30,0	55,4/32,0	6,3	1,6	2,9	93,2	0,88	1,8700	248,0
AIM-MT 200M4	37,0	67,4/38,9	7,5	1,5	2,7	93,4	0,87	2,1200	410,0
AIM-MT 200L4	45,0	81,8/47,2	7,5	1,6	2,9	93,8	0,87	2,5500	425,0
1000 rpm.									
AIM-MT 80A6	0,75	2,1/1,2	4,5	1,8	2,0	72,1	0,74	0,0440	26,3/27,3
AIM-MT 80B6	1,1	3,0/1,7	4,5	1,8	2,0	74,2	0,75	0,0588	29,0/30,0
AIM-MT 90L6	1,5	4,1/2,4	4,5	2,1	2,3	76,5	0,72	0,0750	52,0/54,0
AIM-MT 100L6	2,2	5,5/3,3	5,5	1,8	2,4	80,0	0,73	0,1963	55,0/59,0
AIM-MT112MA6	3,0	7,2/4,2	6,0	2,0	2,7	79,0	0,78	0,2700	75,0/80,0
AIM-MT112MB6	4,0	9,3/5,5	6,6	2,0	2,7	80,0	0,78	0,3425	75,0/80,0
AIM-MT 132S6	5,5	12,0/7,5	6,5	2,2	2,7	84,0	0,80	0,8325	93,0/98,0
AIM-MT 132M6	7,5	16,0/9,8	6,5	2,2	2,7	85,0	0,81	1,0050	109,0/114
AIM-MT 160S6	11,0	22,4/13,0	5,7	1,6	2,5	89,0	0,84	1,2200	147,0/150
AIM-MT 160M6	15,0	30,1/17,4	5,7	1,6	2,5	90,0	0,84	1,6900	167,0/170
AIM-MT 180M6	18,5	36,6/21,1	5,2	1,4	2,3	90,2	0,85	1,7600	222,0
AIM-MT 200M6	22,0	42,3/24,4	6,5	1,5	2,8	91,6	0,86	2,2700	320,0
AIM-MT 200L6	30,0	56,8/32,8	6,5	1,6	2,8	92,0	0,87	2,7400	350,0

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AIM-MT 80-200, with voltage 380/660 V

Type designation	Power, kW	Nom. current Un=380/660V, A	In / Iн	Mn / Mн	Mmax / Mн	Effic., %	Cos φ	Inertia moment, H*m²	mass (IIB/IIC) IM1081, kg
750 rpm.									
AIM-MT112MA8	2,2	5,9/3,5	4,9	1,9	2,4	75,0	0,70	0,3000	75,0/80,0
AIM-MT112MB8	3,0	8,0/4,8	4,9	1,9	2,1	78,0	0,70	0,3425	75,0/80,0
AIM-MT 132S8	4,0	10,5/6,3	4,9	2,0	2,6	80,0	0,70	0,7550	93,0/98,0
AIM-MT 132M8	5,5	14,5/8,2	4,9	2,0	2,1	82,0	0,72	0,8325	109,0/114
AIM-MT 160S8	7,5	16,4/9,5	4,5	1,5	2,1	86,0	0,80	1,2300	147,0/150
AIM-MT 160M8	11,0	23,8/13,7	5,2	1,5	2,1	87,0	0,80	1,7000	167,0/170
AIM-MT 180M8	15,0	32,0/18,5	4,8	1,4	2,3	88,5	0,80	1,9100	242,0
AIM-MT 200M8	18,5	38,5/22,0	5,8	1,4	2,6	91,0	0,80	2,1400	320,0
AIM-MT 200L8	22,0	45,6/23,3	5,5	1,4	2,6	91,4	0,80	2,7700	350,0

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AIM-MT 80-200, with voltage 660/1140 V

Type designation	Power, kW	Nom. current Un=380/660V, A	In / Iн	Mn / Mн	Mmax / Mн	Effic., %	Cos φ	Inertia moment, H*m²	mass (IIB/IIC) IM1081, kg
3000 rpm.									
AIM-MT 80A2	1,5	1,8/1,0	6,0	2,3	2,5	81,0	0,90	0,0220	26,3/27,3
AIM-MT 80B2	2,2	2,6/1,5	6,0	2,3	2,5	81,0	0,90	0,0295	29,0/30,0
AIM-MT 90L2	3,0	3,5/2,0	5,8	1,8	2,3	82,5	0,90	0,0490	52,0/54,0
AIM-MT100S2	4,0	4,6/2,7	6,6	2,1	2,5	84,5	0,90	0,0735	50,0/54,0
AIM-MT100L2	5,5	6,3/3,6	6,0	2,1	2,5	85,3	0,90	0,0980	55,0/59,0
AIM-MT 112M2	7,5	8,6/4,9	7,0	1,8	2,8	86,5	0,88	0,1470	75,0/80,0
AIM-MT 132M2	11,0	12,5/7,2	6,5	1,7	2,8	87,0	0,89	0,3675	109,0/114
AIM-MT 160S2	15,0	16,2/9,4	6,0	1,8	3,0	90,0	0,90	0,6900	147,0/150
AIM-MT 160M2	18,5	19,6/11,3	6,0	1,8	3,0	90,8	0,91	0,0800	167,0/170
AIM-MT 180S2	22,0	23,1/13,3	7,4	1,4	3,2	91,8	0,91	0,8800	210,0
AIM-MT 180M2	30,0	31,2/18,0	7,4	1,5	3,1	92,5	0,91	1,0500	225,0
AIM-MT 200M2	37,0	38,2/22,1	6,8	1,3	3,1	93,0	0,91	1,2100	340,0
AIM-MT 200L2	45,0	46,3/26,7	6,8	1,3	3,1	93,5	0,91	1,3600	380,0
1500 rpm.									
AIM-MT 80A4	1,1	1,5/0,87	5,1	1,8	2,3	79,0	0,81	0,0318	28,3/29,3
AIM-MT 80B4	1,5	2,0/1,1	5,1	1,8	2,3	80,3	0,80	0,0440	31,0/32,0
AIM-MT 90L4	2,2	2,8/1,6	6,0	1,8	2,2	82,5	0,88	0,0735	52,0/54,0
AIM-MT 100S4	3,0	3,8/2,2	5,8	2,0	2,4	80,5	0,87	0,1225	51,0/55,0
AIM-MT 100L4	4,0	4,9/2,8	6,0	2,1	2,6	83,0	0,87	0,1518	58,0/62,0
AIM-MT 112M4	5,5	6,6/3,8	6,5	2,0	2,6	84,4	0,87	0,2453	75,0/80,0
AIM-MT 132S4	7,5	8,9/5,1	6,5	2,1	2,8	87,2	0,85	0,5850	93,0/98,0
AIM-MT 132M4	11,0	12,8/7,4	6,5	2,4	2,8	88,5	0,85	0,7350	109,0/114
AIM-MT 160S4	15,0	17,0/9,8	6,5	2,2	2,6	91,0	0,85	1,2300	147,0/150
AIM-MT 160M4	18,5	20,5/11,8	6,5	2,2	2,6	91,6	0,86	1,4400	167,0/170
AIM-MT 180S4	22,0	23,6/13,6	6,3	1,6	2,9	92,7	0,88	1,5300	235,0
AIM-MT 180M4	30,0	32,0/18,5	6,3	1,6	2,9	93,2	0,88	1,8700	248,0
AIM-MT 200M4	37,0	39,8/23,0	6,0	1,5	2,7	93,4	0,87	2,1200	410,0
AIM-MT 200L4	45,0	48,2/27,8	6,3	1,6	2,9	93,8	0,87	2,5500	425,0

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AIM-MT 80-200, with voltage 660/1140 V

Type designation	Power, kW	Nom. current Un=380/660V, A	In / Iн	Mn / Mн	Mmax / Mн	Effic., %	Cos φ	Inertia moment, H*m²	mass (IIB/IIC) IM1081, kg
1000 rpm.									
AIM-MT 80A6	0,75	1,2/0,7	4,5	1,8	2,0	72,1	0,74	0,0440	26,3/27,3
AIM-MT 80B6	1,1	1,7/0,95	4,5	1,8	2,0	74,2	0,75	0,0588	29,0/30,0
AIM-MT 90L6	1,5	2,4/1,4	4,2	1,7	2,2	75,0	0,75	0,0750	52,0/54,0
AIM-MT 100L6	2,2	3,3/1,9	4,5	1,7	2,2	78,0	0,76	0,1963	55,0/59,0
AIM-MT112MA6	3,0	4,2/2,4	5,8	2,0	2,4	79,0	0,80	0,2700	75,0/80,0
AIM-MT112MB6	4,0	5,5/3,2	5,8	2,0	2,4	80,3	0,80	0,3425	75,0/80,0
AIM-MT 132S6	5,5	7,5/4,3	6,2	2,0	2,8	83,0	0,80	0,8325	93,0/98,0
AIM-MT 132M6	7,5	9,8/5,7	6,2	2,0	2,8	84,0	0,80	1,0050	109,0/114
AIM-MT 160S6	11,0	13,0/7,5	5,7	1,6	2,5	89,0	0,84	1,2200	147,0/150
AIM-MT 160M6	15,0	17,4/10,0	5,7	1,6	2,5	90,0	0,84	1,6900	167,0/170
AIM-MT 180M6	18,5	21,1/12,2	5,2	1,4	2,3	90,2	0,85	1,7600	222,0
AIM-MT 200M6	22,0	24,4/14,1	6,5	1,5	2,8	91,6	0,86	2,2700	320,0
AIM-MT 200L6	30,0	32,8/18,9	6,5	1,6	2,8	92,0	0,87	2,7400	350,0
750 rpm.									
AIM-MT112MA8	2,2	3,5/2,0	4,9	1,9	2,4	75,0	0,70	0,3000	75,0/80,0
AIM-MT112MB8	3,0	4,8/2,8	4,9	1,9	2,1	78,0	0,70	0,3425	75,0/80,0
AIM-MT 132S8	4,0	6,3/3,7	4,9	2,0	2,6	80,0	0,70	0,7550	93,0/98,0
AIM-MT 132M8	5,5	8,2/4,7	4,9	2,0	2,1	82,0	0,72	0,8325	109,0/114
AIM-MT 160S8	7,5	9,5/5,5	4,5	1,5	2,1	86,0	0,80	1,2300	147,0/150
AIM-MT 160M8	11,0	13,7/7,9	5,2	1,5	2,1	87,0	0,80	1,7000	167,0/170
AIM-MT 180M8	15,0	18,5/10,7	4,8	1,4	2,3	88,5	0,80	1,9100	242,0
AIM-MT 200M8	18,5	22,2/12,8	5,8	1,4	2,6	91,0	0,80	2,1400	320,0
AIM-MT 200L8	22,0	26,3/15,2	5,8	1,4	2,6	91,4	0,80	2,7700	350,0

Mass of motors:

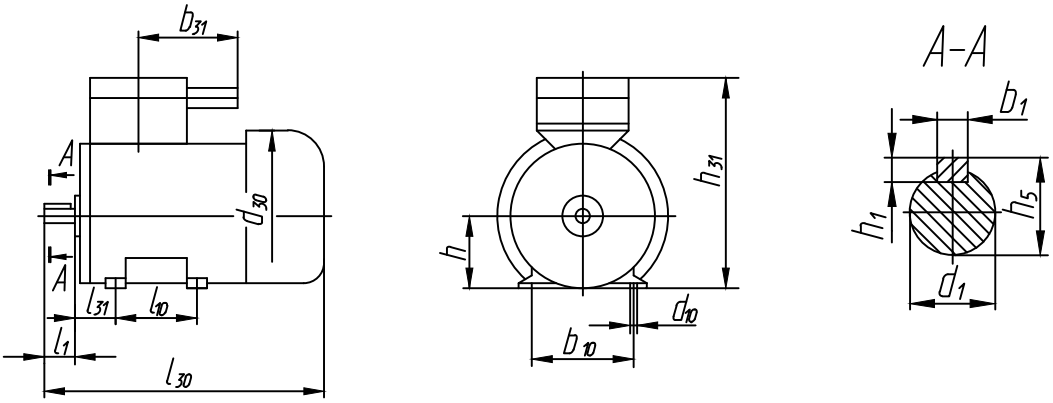
- with mounting configuration IM2081 - 4% of mass IM1081,

- with mounting configuration IM3081 - 1-2% of mass IM1081.

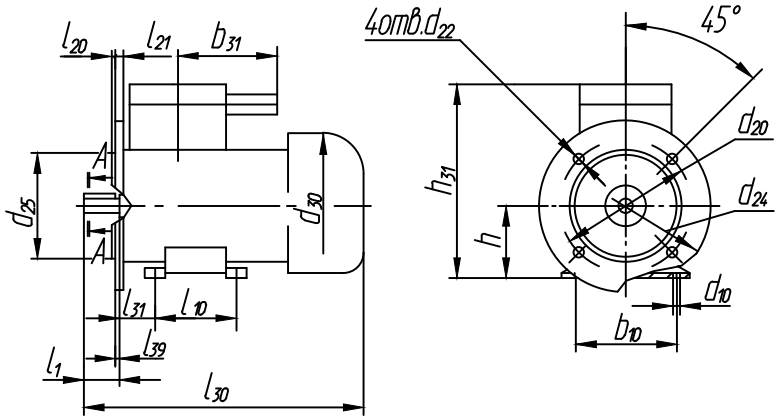
OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIM-MT 80-180

Type designation	Mounting configuration	№ pic.	dimensions, mm, not more						installation and mounting sizes, mm															
			d_{30}	h_{31}	h_{37}	l_{30}	b_{31}	d_{24}	b_1	b_{10}	d_1	d_{10}	d_{20}	d_{22}	d_{25}	h	h_1	h_5	l_1	l_{10}	l_{20}	l_{21}	l_{31}	l_{39}
AIM-MT 80	IM1081	1	190	328	-	350	198	-	6	125	22	10	-	-	-	80	6	24,5	50	100	-	-	50	-
	IM2081	2						200					165	12	130						3,5	12		0
	IM3081	3		-	248					-		-				-				-			-	
AIM-MT 90	IM1081	1	210	344	-	410		-	8	140	24	10	-	-	-	90	7	27,0	50	125	-	-	56	-
	IM2081	2						250					215	15	180						4,0	14		0
	IM3081	3		-	254					-		-				-				-			-	
AIM-MT 100L	IM1081	1	232	387	-	460	215	-		160	28	12	-	-	-	100		31,0	60	140	-	-	63	-
	IM2081	2						250					215	15	180						4,0	14		0
	IM3081	3		-	275					-		-				-				-			-	
AIM-MT 100S	IM1081	1		387	-	425		-		160		12	-	-	-	100				140	-	-	63	-
	IM2081	2						250					215	15	180						4,0	14		0
	IM3081	3		-	275					-		-				-				-			-	
AIM-MT 112M	IM1081	1	260	387	-	486		-		190	32	12	-	-	-	112		35,0		140	-	-	70	-
	IM2081	2						300					265	15	230						4,0	16		0
	IM3081	3		-	275					-		-				-				-			-	
AIM-MT 132S	IM1081	1	302	425	-	487		-	10	216	38	12	-	-	-	132	8	41,0	80	140	-	-	89	-
	IM2081	2						350					300	19	250						5,0	18		0
	IM3081	3		-	293					-		-				-				-			-	
AIM-MT 132M	IM1081	1		425	-	532		-		216		12	-	-	-	132				178	-	-	89	-
	IM2081	2						350					300	19	250						5,0	18		0
	IM3081	3		-	293					-		-				-				-			-	
AIM-MT 160S2	IM1081	1	340	495	-	585	280	-	12	254	42	15	-	-	-	160		45,0	110	178	-	-	108	-
	IM2081	2						350					300	19	250						5,0	16		0
	IM3081	3		-	335					-		-				-				-			-	
AIM-MT 160S 4,6,8	IM1081	1		495	-			-	14	254	48	15	-	-	-	160	9	51,5		178	-	-	108	-
	IM2081	2						350					300	19	250						5	16		0
	IM3081	3		-	335					-		-				-				-			-	
AIM-MT 160M2	IM1081	1		495	-	645		-	12	254	42	15	-	-	-	160	8	45,0		210	-	-	108	-
	IM2081	2						350					300	19	250						5	16		0
	IM3081	3		-	335					-		-				-				-			-	
AIM-MT 160M 4,6,8	IM1081	1		495	-			-	4	254	48	15	-	-	-	160	9	51,5		210	-	-	108	-
	IM2081	2						350					300	19	250						5	16		0
	IM3081	3		-	335					-		-				-				-			-	
AIM-MT 180S2	IM1081	1	366	565	-	712	280	-	14	279	48	15	-	-	-	180	9	51,5		203	-	-	121	-
	IM2081	2						400					350	19	300						5,0	15		0
	IM3081	3		-	385					-		-				-				-			-	
AIM-MT 180S4	IM1081	1		565	-			-	16	279	55	15	-	-	-	180	10	59,5		203	-	-	121	-
	IM2081	2						400					350	19	300						5,0	15		0
	IM3081	3		-	385					-		-				-				-			-	
AIM-MT 180M2	IM1081	1		565	-	757		-	14	279	48	15	-	-	-	180	9	51,5		241	-	-	121	-
	IM2081	2						400					350	19	300						5,0	15		0
	IM3081	3		-	385					-		-				-				-			-	
AIM-MT 180M 4,6,8	IM1081	1		565	-			-	16	279	55	15	-	-	-	180	10	59,5		241	-	-	121	-
	IM2081	2						400					350	19	300						5,0	15		0
	IM3081	3		-	385					-		-				-				-			-	

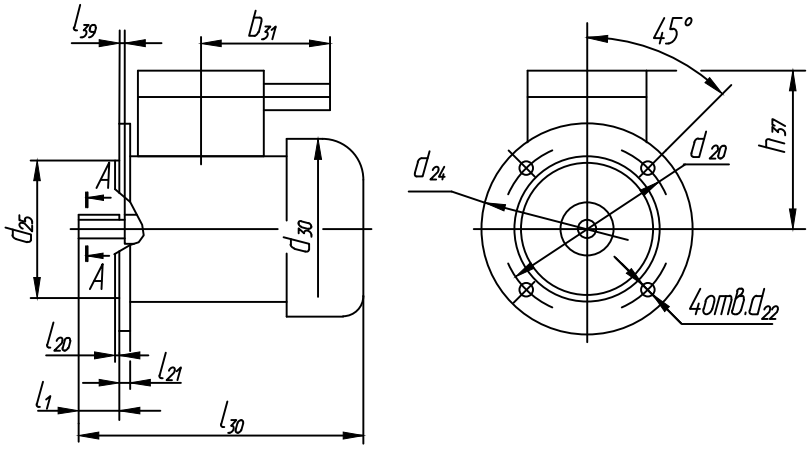
OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIM-MT 80-180



Picture 1



Picture 2

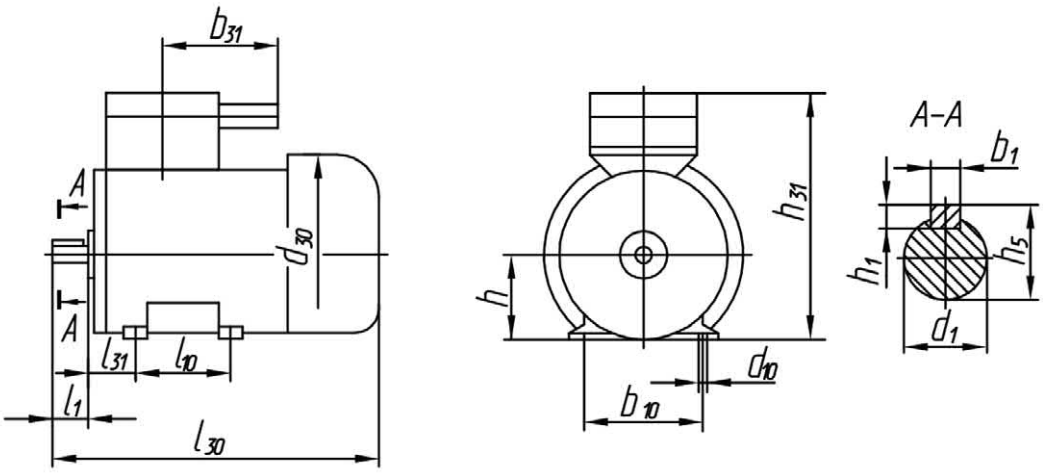


Picture3

OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIM-MT 200

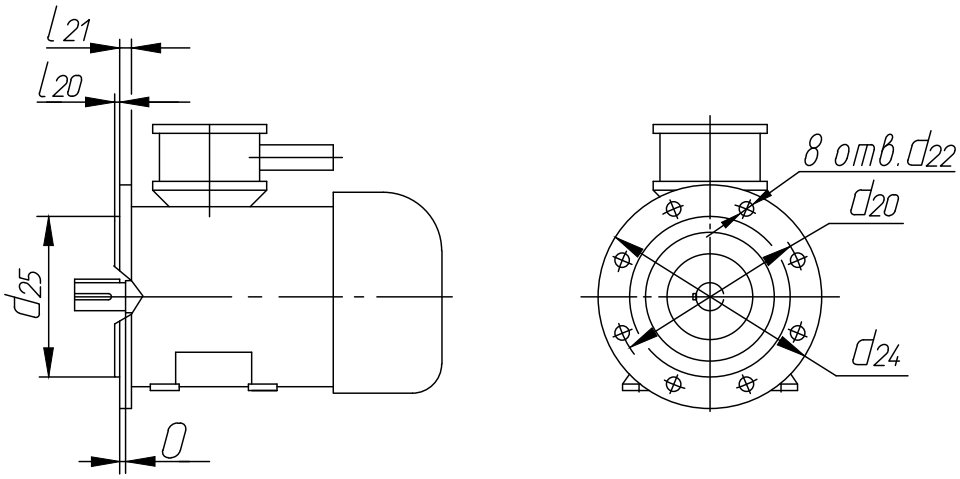
Type designation	Mounting configuration	№ pic.	dimensions, mm, not more*						installation and mounting sizes, mm																
			d_{30}	h_{31}	h_{37}	l_{30}	b_{31}	d_{24}	b_1	b_{10}	d_1	d_{10}	d_{20}	d_{22}	d_{25}	h	h_1	h_s	l_1	l_{10}	l_{20}	l_{21}	l_{31}	l_{39}
AIM-MT 200M-2	IM1081	4	470	630	-	935	270	-	16	318	55	19	-	-	-	200	10	59,5	110	267	-	-	133	-
	IM2081	5						450					400	19	350						5,0	15		0
	IM3081	6		-	430					-		-				-				-			-	
AIM-MT 200L-2	IM1081	4		630	-	985		-	16	318	55	19	-	-	-	200	10			305	-	-	133	-
	IM2081	5						450					400	19	350						5,0	15		0
	IM3081	6		-	430					-		-				-				-			-	
AIM-MT 200M-4	IM1081	4		630	-	1015		-	18	318	60	19	-	-	-	200	11			267	-	-	133	-
	IM2081	5						450					400	19	350						5,0	15		0
	IM3081	6		-	430					-		-				-				-			-	
AIM-MT 200L-4	IM1081	4		630	-	1035		-	18	318	60	19	-	-	-	200	11	64,0		305	-	-	133	-
	IM2081	5						450					400	19	350						5,0	15		0
	IM3081	6		-	430					-		-				-				-			-	
AIM-MT 200M-6	IM1081	4	470	630	-	875	270	-	18	318	60	19	-	-	-	200	11		140	267	-	-	133	-
	IM2081	5						450					400	19	350						5,0	15		0
	IM3081	6		-	430					-		-				-				-			-	
AIM-MT 200L-6	IM1081	4		630	-	915		-	18	318	60	19	-	-	-	200	11			305	-	-	133	-
	IM2081	5						450					400	19	350						5,0	15		0
	IM3081	6		-	430					-		-				-				-			-	
AИМ-MT 200M-8	IM1081	4		630	-	875		-	18	318	60	19	-	-	-	200	11	64,0		267	-	-	133	-
	IM2081	5						450					400	19	350						5,0	15		0
	IM3081	6		-	430					-		-				-				-			-	
AIM-MT 200L-8	IM1081	4		630	-	915		-	18	318	60	19	-	-	-	200	11			305	-	-	133	-
	IM2081	5						450					400	19	350						5,0	15		0
	IM3081	6		-	430					-		-				-				-			-	

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIM-MT 200

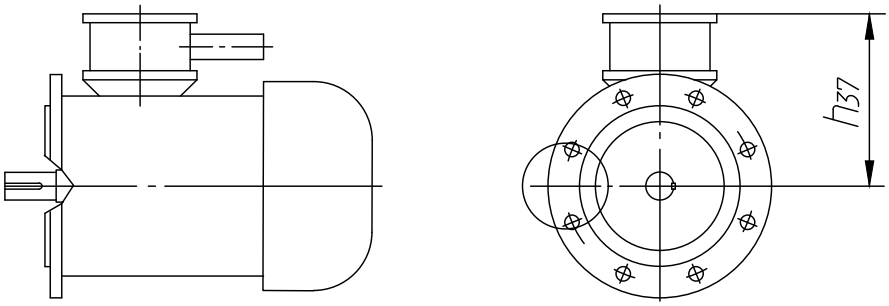


picture 4

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIM-MT 200



Picture 5



Picture 6

Climatic construction type:

У1.5, У2.5, У3, УХЛ1.5, УХЛ2.5, Т1.5, Т2.5, ОМ2.5

Mounting configuration:

IM1081, IM2081, IM3081

Protection degree for:

the housing and terminal box	IP54 (IP55 at customer's request)
outdoor fan enclosure	IP20

Cooling method: IC411.

ELECTRIC MOTORS AIM-L 63-80

Asynchronous three-phase explosion-proof electric motors AIM-L with a squirrel-cage rotor are designed to operate in explosive areas of premises and outdoor installations.
Supply voltage: 220, 380, 660V, frequency 50Hz. At customer's request the electric motors can be produced with frequency 60Hz.
Nominal operation mode: continuous S1. Motors allow operation in modes S2, S3, S6, S8, S9, S10.
Explosion-protection configuration:

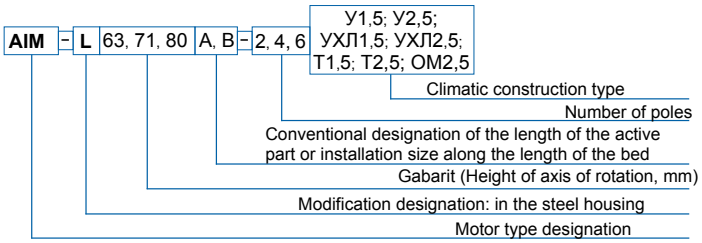
For deliveries to the countries of the Eurasian Economic Union	
1Ex d IIB T4 Gb, 1Ex d e IIB T4 Gb,	
For deliveries to Ukraine	
1Ex d IIB T4	1Ex d e IIB T4

Electric motors operate in any direction of rotation. Heat resistance class of winding insulation is “B”.

Main advantages of electric motors AIM-L over AIM-M:

- 25% weight reduction due to the use of light alloys instead of ferrous metals.

TYPE DESIGNATION

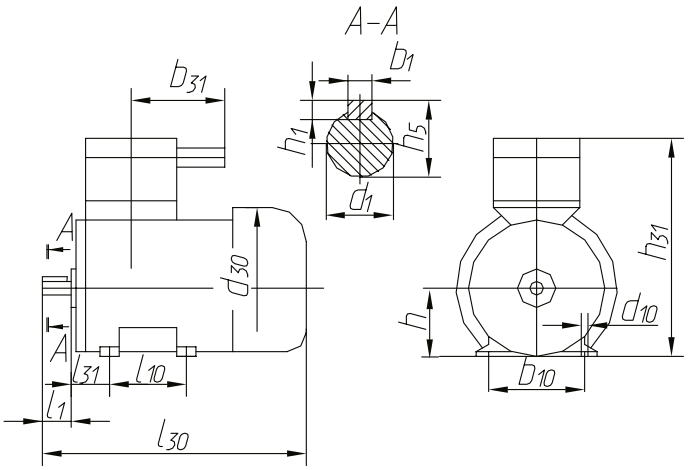


TECHNICAL PARAMETERS OF THE ELECTRIC MOTOTRS AIM-L

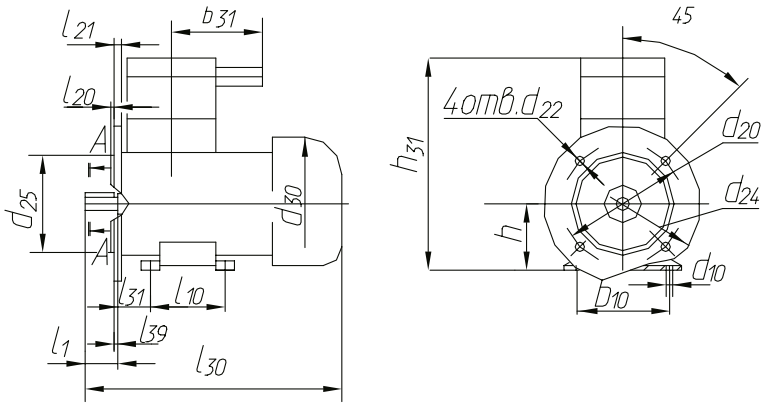
Type designation	Power, kW	Nom.current U_n=380V, A	$I_n/I_н$	$M_n/M_н$	$M_{max}/M_н$	Effic., %	Cos φ	Inertia moment, H*m²	mass, kg
3000 rpm.									
AIM-L 63A-2	0,37	0,9	5,0	2,6	2,6	73,2	0,84	0,0055	10,0
AIM-L 63B-2	0,55	1,3	5,9	2,8		76,2	0,85	0,0073	10,5
AIM-L 71A-2	0,75	1,7		2,7		78,2	0,86	0,0108	13,0
AIM-L 71B-2	1,1	2,4	5,3	2,6	2,7	80,0	0,87	0,0123	13,5
AIM-L 80A-2	1,5	3,1	6,0	2,3	2,5	81,0	0,90	0,0220	19,0
AIM-L 80B-2	2,2	4,4				83,0	0,91	0,0295	20,0
1500 rpm.									
AIM-L 63A-4	0,25	0,7	4,1	2,2	2,3	68,0	0,73	0,0073	10,0
AIM-L 63B-4	0,37	1,0				69,0	0,75	0,0098	10,5
AIM-L 71A-4	0,55	1,4				74,4		0,0155	13,5
AIM-L 71B-4	0,75	1,9	4,4	2,0		76,2	0,78	0,0228	14,0
AIM-L 80A-4	1,1	2,6	5,1	1,8		79,0	0,81	0,0318	20,0
AIM-L 80B-4	1,5	3,6				80,3	0,80	0,0440	21,0
1000 rpm.									
AIM-L 71A-6	0,37	1,1	3,6	1,8	2,0	67,0	0,67	0,0223	13,0
AIM-L 71B-6	0,55	1,6				71,0	0,75	0,0270	13,5
AIM-L 80A-6	0,75	2,1	4,5			72,1	0,74	0,044	19,0
AIM-L 80B-6	1,1	3,0				74,2	0,75	0,0588	20,0

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIM-L

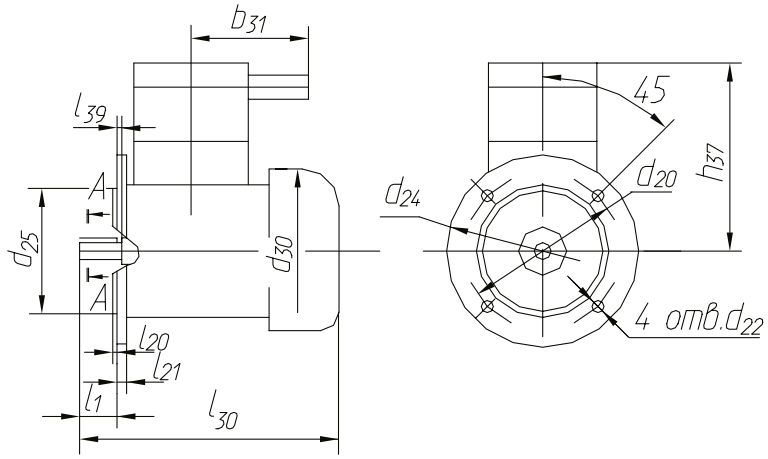
Type designation	Mounting configuration	№ pic.	dimensions, mm, not more						installation and mounting sizes, mm															
			d_{30}	h_{31}	h_{37}	l_{30}	b_{31}	d_{24}	b_1	b_{10}	d_1	d_{10}	d_{20}	d_{22}	d_{25}	h	h_1	h_5	l_1	l_{10}	l_{20}	l_{21}	l_{31}	l_{39}
AIM-L 63	IM1081	1	155	214	-	275	145	-	5	100	14	7	-	-	-	63	5	16,0	30	80	-	-	40	-
	IM2081	2						160					130	10	110						3,5	10		0
	IM3081	3		-	151					-		-				-				-			-	
AIM-L 71	IM1081	1	170	245	-	305		-	6	112	19	7	-	-	-	71	6	21,5	40	90	-	-	45	-
	IM2081	2						200					165	12	130						3,5	12		0
	IM3081	3		-	174					-		-				-				-			-	
AIM-L 80	IM1081	1	200	247	-	350		-		125	22	10	-	-	-	80		24,5	50	100	-	-	50	-
	IM2081	2						200					165	12	130						3,5	12		0
	IM3081	3		-	162					-		-				-				-			-	



Picture 1



picture 2



picture 3

Explosion-protection configuration:

1Ex d IIB T4 Gb, 1Ex d e IIB T4 Gb, 1Ex d IIC T4 Gb

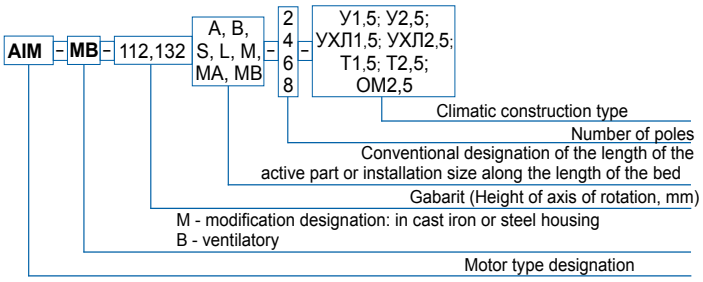
Climatic construction type:

У1.5, У2.5, У3, УХЛ1.5, УХЛ2.5, Т1.5, Т2.5, ОМ2.5

Mounting configuration: IM3081
Protection degree: IP54 (IP55 at customer's request).
Cooling method: IC411.

Electric motors operate in any direction of rotation. Heat resistance class of winding insulation is “F”.

TYPE DESIGNATION



ELECTRIC MOTORS AIM-MB 112; 132

Asynchronous three-phase explosion-proof electric motors AIM-MB with a squirrel-cage rotor are designed to drive axial fans in explosion-hazardous areas of premises and outdoor installations. **Supply voltage** 220, 380, 660V. Frequency 50Hz. At customer's request the electric motors can be produced with frequency 60Hz.

Nominal operation mode: continuous S1, S8, S9, S10 provided that the air flow from the axial fan will blow the motor constantly.

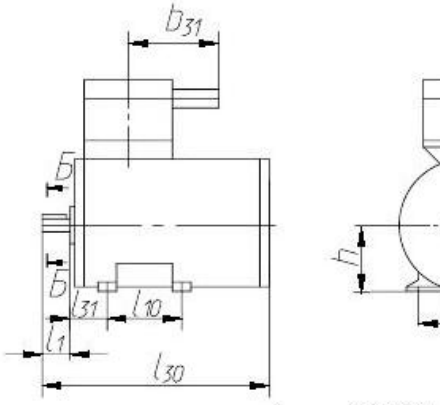
TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AIM-MB

Type designation	Power, kW	Nom.current Un=380V, A	In / Iн	Mn / Mн	Mmax / Mн	Effic., %	Cos φ	Inertia moment, H*m²	mass, kg
3000 rpm.									
AIM-MB 112M-2	7,5	15,0	7,0	2,2	2,8	86,0	0,87	0,147	65
AIM-MB 132M-2	11,0	21,5	6,5	1,9	2,9	86,5	0,89	0,3675	93
1500 rpm.									
AIM-MB 112M-4	5,5	11,6	7,0	2,2	2,8	85,5	0,84	0,2453	67
AIM-MB 132S-4	7,5	15,0	6,5	2,1		87,0	0,85	0,585	87
AIM-MB 132M-4	11,0	21,5		2,4	3,0	88,5	0,86	0,735	98
1000 rpm.									
AIM-MB 112MA-6	3,0	7,0	6,0	2,0	2,7	79,0	0,78	0,27	58
AIM-MB 112MB-6	4,0	9,3	6,6			80,0		0,3425	65
AIM-MB 132S-6	5,5	12,0	6,5	2,2		84,0	0,80	0,8325	93
AIM-MB 132M-6	7,5	16,0				85,0	0,81	1,0050	103
750 rpm.									
AIM-MB 112MA-8	2,2	5,9	4,9	1,9	2,4	75,0	0,7	0,3	58
AIM-MB 112MB-8	3,0	8,0				78,0		0,3425	65
AIM-MB 132S-8	4,0	10,5		2,0	2,6	80,0		0,7550	93
AIM-MB 132M-8	5,5	14,5			2,1	82,0	0,72	0,8325	103

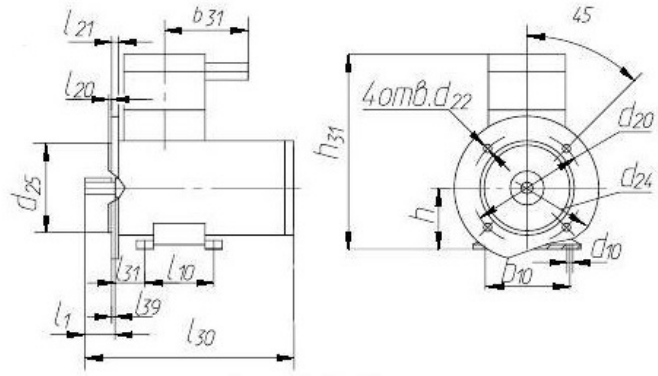
OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIM-MB

Type designation	Mounting configuration	dimensions, mm, not more				instalation and mounting sizes, mm																
		h_{31}	l_{30}	b_{31}	h_{37}	l_1	l_{10}	l_{20}	l_{21}	l_{31}	l_{39}	b_1	b_{10}	d_1	d_{10}	d_{20}	d_{22}	d_{24}	d_{25}	h	h_1	h_5
AIM-MB 112M-2, 4 AIM-MB 112MA, AIM-MB 112MB-6, 8	IM1081	347	430	195		80	140	4,0	16	70	-	8	190	32	12	265	15	300	230	112	8	35,0
	IM2081	352									0											
AIM-MB 132S-4, 6, 8	IM1081	387						5,0	18	89	-	10	216	38		300	19	350	250	132		41,0
	IM2081	392									0											
AIM-MB 132M-2, 4, 6, 8	IM1081	387	475				178				-							350				
	IM2081	392									0											
AIM-MB 112M-2, 4	IM3081		465	195	235			4	16		0	8		32		265	15	300	230			35
AIM-MB 112MA, AIM-MB 112 MB-6, 8																						
AIM-MB 132M-2, 4			510		255			5	18			10		38		300	19	350	250			41
AIM-MB 132S-4			465																			

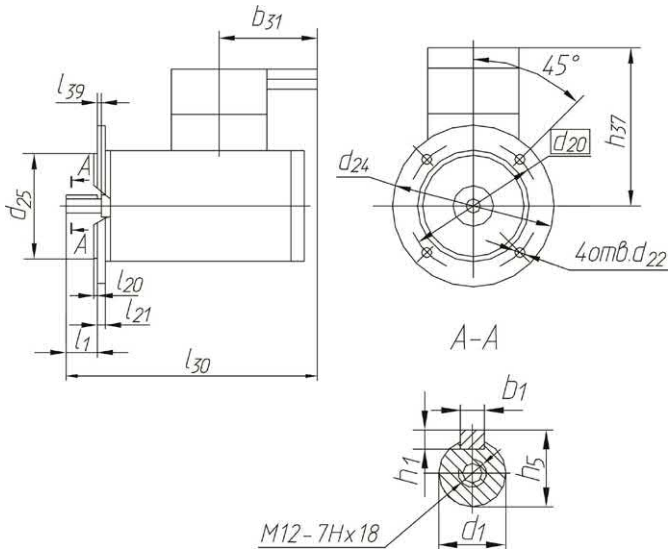
OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIM-MB



Picture 1 (IM1081)



Picture 2 (IM2081)



Picture 3 (IM3081)

ELECTRIC MOTORS AIMA-M 63-80;100;132

Asynchronous three-phase explosion-proof electric motors AIMA-M with a squirrel-cage rotor are designed to drive valves in explosion hazardous areas and outdoor installations.

Supply voltage: 220, 380, 660V, frequency 50Hz. At customer's request the electric motors can be produced with frequency 60Hz.

Nominal operation mode: for motors AIMA-M100LB - S3 with cyclic duration factor- 20%, for other motors - S3 with cyclic duration factor-25%.

Explosion-protection configuration:

1Ex d IIB T4	2Ex d e IIB T4

Climatic construction type:

У1.5, УХЛ1.5, УХЛ2.5, Т1.5, М1

Mounting configuration:

AIMA-M 63, 71, 80	IM4481, IM3081
AIMA-M 100, 132	IM3081

Protection degree: IP54 (IP55 at customer's request).

Cooling method: IC041.

Electric motors operate in any direction of rotation.

Heat resistance class of winding insulation:

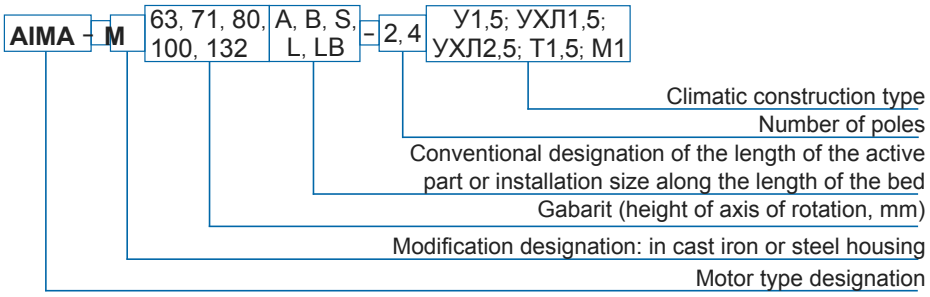
«B»	for gabarits 63-80
«F»	for gabarits 100, 132

Main advantages of electric motors AIM-M over analogues:

- these motors are of special purpose and are used in electric drives of shutoff valves;

- motors are designed without external fan, which eliminates the possible jamming of the electric motor and ensures that operation of the electric drive valve during cold periods of the year.

TYPE DESIGNATION

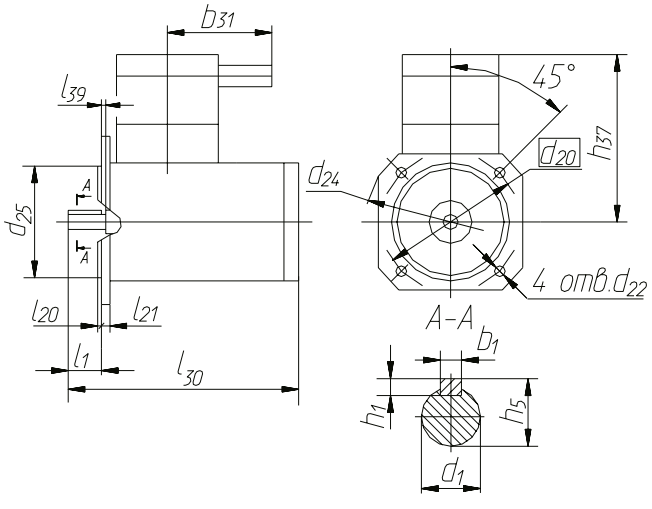


TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AIMA-M

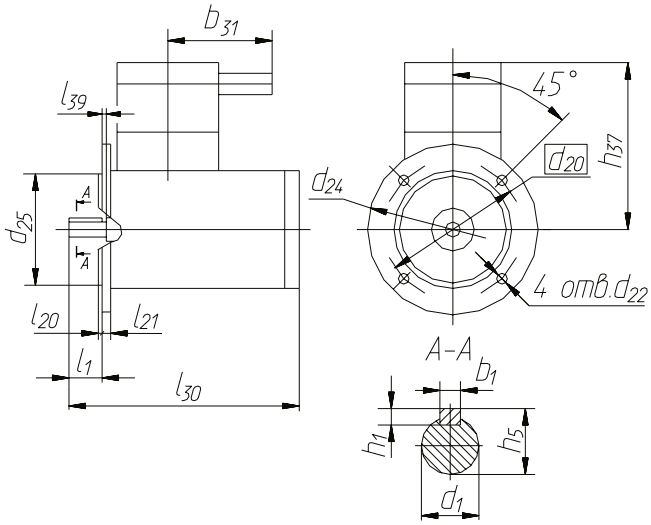
Type designation	Power, kW	Nominal current U_n=380V, A	$I_n/I_н$	$M_n/M_н$	$M_{max}/M_н$	Effic., %	Cos φ	Inertia moment , H*m²	mass, kg
3000 rpm.									
AIMA-M 63A-2	0,37	0,9	5,9	2,6	2,6	73,2	0,84	0,0043	13,5
AIMA-M 63B-2	0,55	1,3				75,2	0,85	0,006	14
AIMA-M 71A-2	0,75	1,7		2,7		78,2	0,86	0,0085	17
AIMA-M 71B-2	1,1	2,4			2,7	80,0		0,011	18,5
AIMA-M 80A-2	1,5	3,1	7,0	2,3		81,0	0,90	0,0175	24
AIMA-M 80B-2	2,2	4,4	7,2	1,9	2,5	82,0	0,85	0,023	27
AIMA-M 100S-2	4,0	8,3		2,0			0,87	0,0685	45
AIMA-M 100L-2	5,5	10,9	8,0	2,2			0,84	0,093	51
AIMA-M 132M-2	11,0	21,0	6,5		3,2	86,5	0,89	0,3675	93
1500 rpm.									
AIMA-M 63A-4	0,25	0,7	5,0	2,0	2,3	70,0	0,70	0,006	13,5
AIMA-M 63B-4	0,37	1,0				71,2	0,77	0,008	14
AIMA-M 71A-4	0,55	1,4				74,5		0,0128	17
AIMA-M 71B-4	0,75	1,9				76,2	0,78	0,0158	18,5
AIMA-M 80A-4	1,1	2,6	5,5	1,8		79,0	0,81	0,0275	24
AIMA-M 80B-4	1,5	3,6				80,3	0,8	0,0333	27
AIMA-M 100S-4	3,0	7,0	5,8	1,9	2,5	81,5		0,1175	46
AIMA-M 100L-4	4,0	9,3		2,0		80,0	0,82	0,1468	50
AIMA-M 100LB-4	5,5	12,0	6,3		2,4	82,0	0,85	0,1468	56
AIMA-M 132S-4	7,5	14,9	6,5	2,3	3,2	87,0		0,585	90
AIMA-M 132M-4	11,0	21,6		2,6		88,5	0,86	0,735	101

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIMA-M

Type designation	mounting configuration	№ pic.	dimensions, mm, no more			installation and mounting sizes, mm											
			l_{30}	b_{31}	h_{37}	l_1	l_{20}	l_{21}	l_{39}	b_1	d_1	d_{20}	d_{22}	d_{24}	d_{25}	h_1	h_5
AIMA-M 63	IM1281/ IM3081	1/2	240	145	152	30	-	10	0	5	14	130	10	160	110	5	16
AIMA-M 71			265		160	40	3,5	12		6	19	165	12	200	130	6	21,5
AIMA-M 80			315		170	50					22						24,5
AIMA-M 100S, L-4	IM3081	2	370		205	60	4	14		8	28	215	15	250	180	7	31
AIMA-M 100L-2, LB-4			410														
AIMA-M 132M			427	134	260	80	5	18		10	38	300	19	350	250	8	41
AIMA-M 132S			472														



Picture 1



Picture 2

Supply voltage: 220, 380, 660, frequency 50Hz. At customer's request the electric motors can be produced with frequency 60Hz.
Nominal operation mode: S3 with cyclic duration factor-25%.

Explosion-protection configuration:

1Ex d IIB T4	2Ex d e IIB T4

Climatic construction type:

У1.5, УХЛ1.5, УХЛ2.5, Т1.5, М1

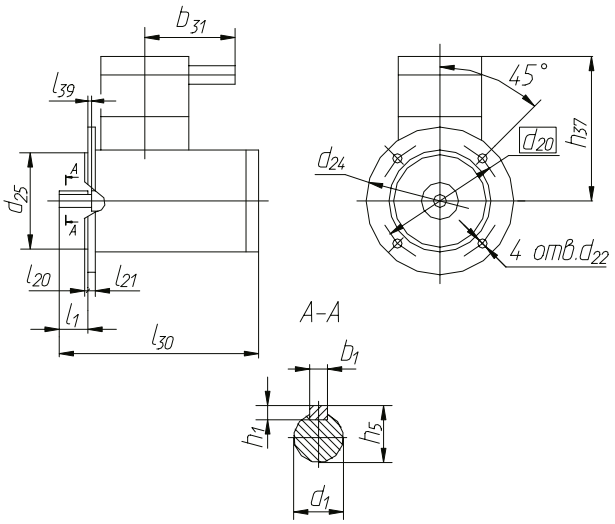
Mounting configuration: IM3081.
Protection degree: IP54 (IP55 at customer's request).
Cooling method: IC041.
Electric motors operate in any direction of rotation. Heat resistance class of winding insulation is “B”.

ELECTRIC MOTORS AIMA-L

Asynchronous three-phase explosion-proof electric motors AIMA-L with a squirrel-cage rotor are designed to drive valves in explosion hazardous areas and outdoor installations.

Main advantage of the electric motor AIMA-L over AIMA-M:

- 25% weight reduction due to the use of light alloys instead of ferrous metals.



TYPE DESIGNATION

AIMA – Л 63, 71, 80 А В – 2 4 У1,5; УХЛ1,5; УХЛ2,5; Т1,5; М1

- Climatic construction type
- Number of poles
- Conventional designation of the length of the active part or installation size along the length
- Gabarit (height of axis of rotation, mm
- Modification designation: in aluminum
- Motor type designation

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AIMA-Л

Type designation	power, kW	Nominal current U_n=380V, A	$I_n/I_н$	$M_n/M_н$	$M_{max}/M_н$	Effic., %	Cos φ	Inertia moment, H*m²	mass, kg
3000 rpm.									
AIMA-L 63A-2	0,37	0,9	5,9	2,6	2,6	73,2	0,84	0,0043	9,5
AIMA-L 63B-2	0,55	1,3				75,2	0,85	0,0060	10,0
AIMA-L 71A-2	0,75	1,7		2,7		78,2	0,86	0,0085	12,5
AIMA-L 71B-2	1,1	2,4			2,7	80,0		0,0110	13,0
AIMA-L 80A-2	1,5	3,1	7,0	2,3		81,0	0,90	0,0175	18,5
AIMA-L 80B-2	2,2	4,4	7,2	1,9	2,5	82,0	0,85	0,0230	19,5
1500 rpm.									
AIMA-L 63A-4	0,25	0,7	5,0	2,0	2,3	70,0	0,70	0,0060	9,5
AIMA-L 63B-4	0,37	1,0				71,2	0,77	0,0080	10,0
AIMA-L 71A-4	0,55	1,4				74,5		0,0128	13,0
AIMA-L 71B-4	0,75	1,9				76,2	0,78	0,0158	13,5
AIMA-L 80A-4	1,1	2,6	5,5	1,8		79,0	0,81	0,0275	19,5
AIMA-L 80B-4	1,5	3,6				80,3	0,80	0,0333	20,5

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIMA-L

Type designation	Mounting configuration	dimensions,mm, not more			installation and mounting sizes, mm											
		l_{30}	b_{31}	h_{37}	l_1	l_{20}	l_{21}	l_{39}	b_1	d_1	d_{20}	d_{22}	d_{24}	d_{25}	h_1	h_5
AIMA-L 63	IM3081	235	130	165	30	-	10	0	5	14	130	10	160	110	5	16,0
AIMA-L 71		265		175	40	3,5	12		6	19	165	12	200	130	6	21,5
AIMA-L 80		325		188	50					22						24,5

ELECTRIC MOTORS AIU-ME

Electric motors **AIU-ME** are designed for driving mechanism in hazardous areas of premises and outdoor installations,as well as in mines, hazardous for gas and dust.

Operation mode: continuous, S1, allow operation from frequency converter (in modes S8, S9, S10)

Climatic construction type:

У1, У2, У5, УХЛ2, УХЛ4, Т2, Т5

Explosion-protection configuration:

PB Ex d I Mb

Mounting configuration:

IM1001, IM2001, IM3001, IM3011

Protection degree for:

motor housing and terminal box	IP54 IP55 (on order)
outdoor fan enclosure	IP20

Cooling method:

ICA0141	double-circuit cooling system. Internal circuit is closed, external circuit is open with a built-in fan located on the motor shaft and cooling the outer surface of the machine
ICA516	double-circuit cooling system. Internal circuit is closed, external circuit is open with built-in heat-exchanger and free fan)at customer's request

These motors are manufactured with terminal box from top and also at customer's request with terminal box from the left and from the right. Motors have the right and the left direction of rotation.

The base equipment of motors provides:

- кstator winding insulation class – «H»
- stator winding temperature control with four wire thermal converters with HCX 50M in quantity of 6 pieces (2 pieces on each phase);
- temperature relay of stator winding;
- temperature ccontrol of bearings by four-wire thermal converters with HCX 50M in quantity of 2 pieces (1 piece on each bearing);
- places for vibration sensors installation in quantity of 6 pieces (3 pices on each bearing unit on three mutually perpendicular planes);
- bearing units replenishing and replacing lubricants;
- connection of two power cables, outer dimeter of which is up to 45 mm for motors with180-225 mm height of axis of rotation.

At customer's request motors are equipped with

- temperature control of stator winding sensors by four-wire thermal converters with HCX 50П, 100П, Pt100 in quantity up to 12 pices for motors with 250-355 mm height of axis of rotation and up to 6 pieces – for motors with 180-225 mm height of axis of rotat
- TC-termistors of stator winding (instead of temperature relay);
- four-wire bearing temperature control sensors with HCX 50П, 100П, Pt100
- vibration control sensors in quantity up to 6 pieces;
- rotor speed sensors;
- selfregulating anti-condensation heating (instead of temperature relay and PTC-termistors);
- SKF bearings or bearings of the other manufacturers
- current-isolated bearing unit.

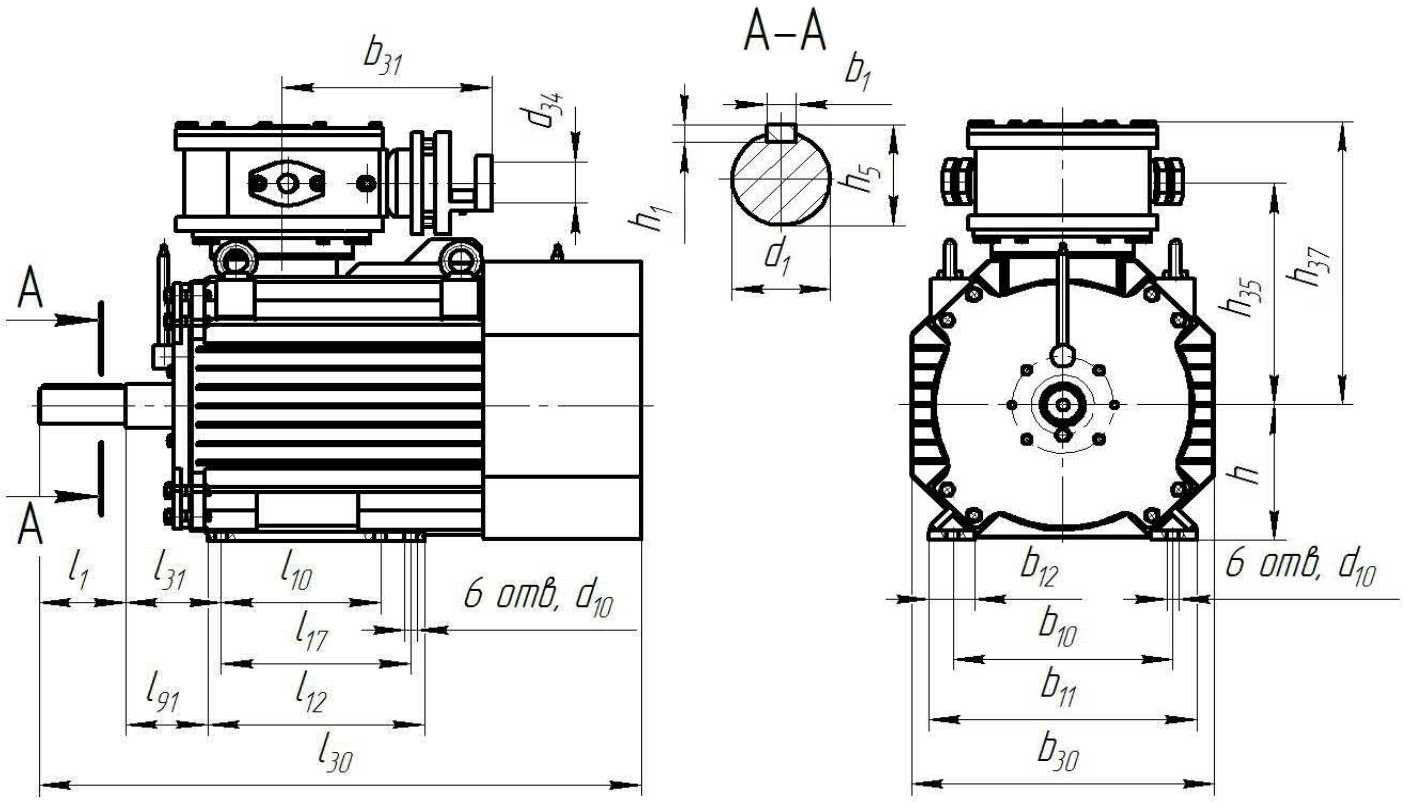
Table 1. Basic parameters of the motors AIU-ME 180-225

Type designation	Power, kW	Nominal stator current, A*	Rotational speed, rpm.**	efficiency factor, %	power factor	Sliding, %	starting torque ratio	maximum torque ratio	starting current ratio
voltage 380/660 V, 660/1140 V, network frequenmcy 50Hz, 60Hz									
180S-2	22	39,5/22,8	3000/3600	91,3	0,92	1,5	1,5	3,0	7,1
		22,8/13,2		91,4	0,92				
180M-2	30	53,0/30,6		92,0	0,93	1,7	1,4	2,8	6,8
		30,8/17,8		92,0	0,93				
180S-4	22	41,2/23,8	1500/1800	92,1	0,87	1,6	1,9	2,8	7,2
		23,7/13,7		92,1	0,88				
180M-4	30	55,5/32,1		92,8	0,88	1,6	2,0	2,8	7,3
		32,0/18,5		92,6	0,88				
180M-6	18,5	37,2/21,5	1000/1200	90,3	0,83	1,9	1,9	2,9	6,4
		21,6/12,5		90,3	0,83				
180M-8	15	32,9/19,0	750/900	88,4	0,78	2,5	1,5	2,3	4,7
		18,9/10,9		88,6	0,78				
200M-2	37	65,8/38,0	3000/3600	92,6	0,92	1,5	1,3	2,8	6,8
		37,9/21,9		92,5	0,92				
200L-2	45	78,9/45,6		92,9	0,93	1,5	1,4	2,8	6,8
		45,7/26,4		93,1	0,93				
200M-4	37	69,2/40,0	1500/1800	93,0	0,87	1,4	1,9	2,7	6,9
		39,8/23,0		92,9	0,87				
200L-4	45	83,2/48,1		93,5	0,87	1,3	2,0	2,8	7,0
		48,2/27,9		93,4	0,87				
200M-6	22	41,7/24,1	1000/1200	91,6	0,87	1,8	1,7	2,6	6,5
		23,9/13,8		91,4	0,88				
200L-6	30	56,4/32,6		91,9	0,87	1,7	1,9	2,8	6,7
		32,9/19,0		91,8	0,87				
200M-8	18,5	38,2/22,1	750/900	90,6	0,81	2,0	1,7	2,4	5,4
		22,1/12,8		90,5	0,81				
200L-8	22	45,3/26,2		90,8	0,81	2,0	1,7	2,4	5,5
		26,4/15,3		90,8	0,80				
225M-2	55	97,8/56,5	3000/3600	95,4	0,89	1,2	1,3	4,3	7,5
		56,3/32,5		95,5	0,89				
225M-4	55	100,7/58,2	1500/1800	93,6	0,88	1,3	1,5	3,1	7,4
		57,8/33,4		93,7	0,89				
225M-6	37	69,7/40,3	1000/1200	92,3	0,87	1,6	1,4	3,0	6,9
		40,8/23,6		92,4	0,86				
225M-8	30	60,4/34,9	750/900	91,0	0,82	1,9	1,2	2,5	5,5
		34,9/20,2		91,1	0,82				

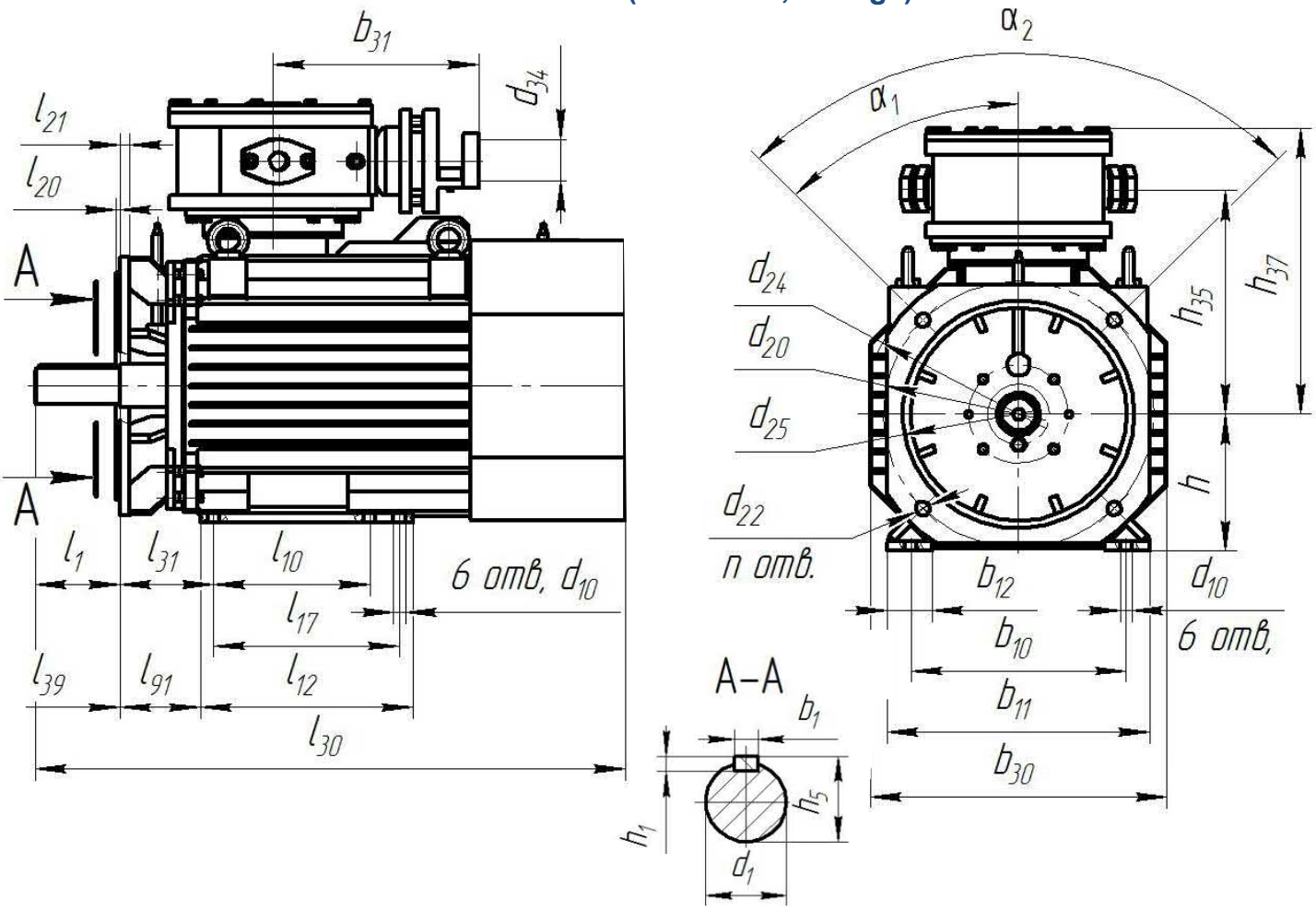
* data for motors with voltage 380/660V are indicated in numerator, data for motors with voltage 660/1140V are indicated in denominator;
**data for motors with 50Hz are indicated in numerator, data for motors with voltage 60Hz are indicated in denominator;

table 2. values of the electric motors dimension AIU-ME 180-225

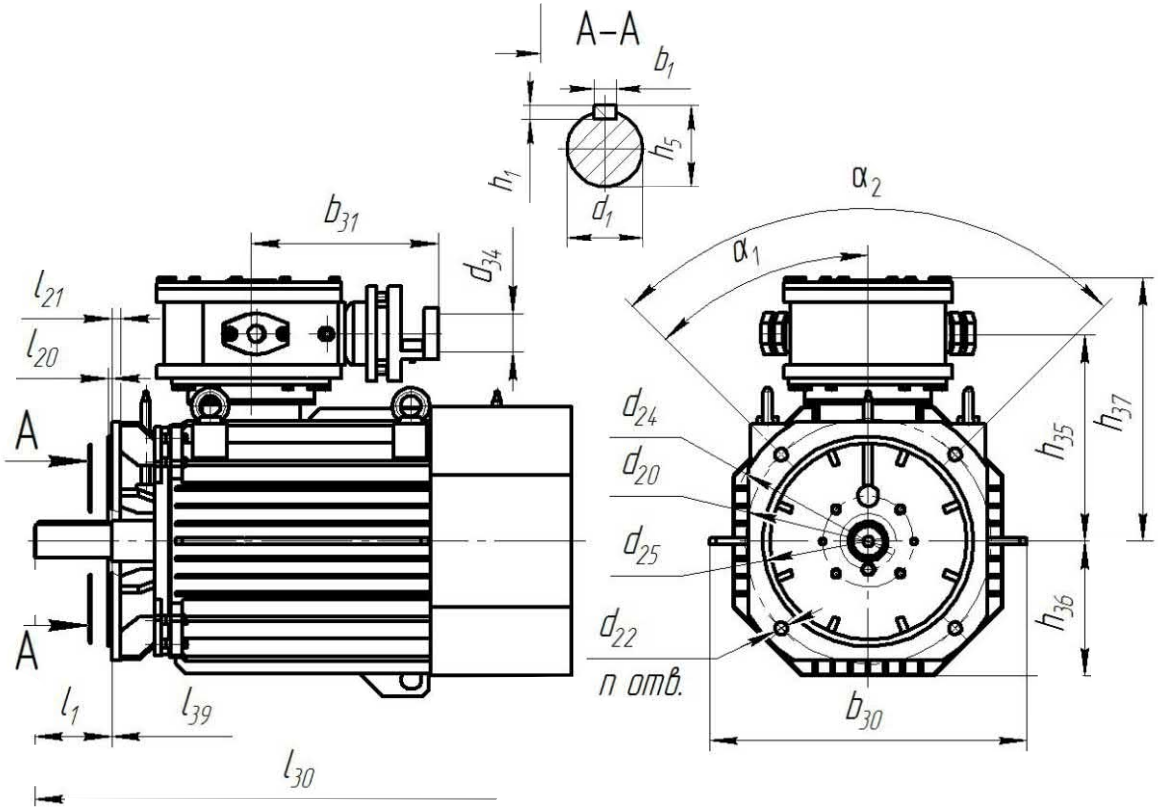
motor type	l_1, mm	l_{10}, mm	l_{12}, mm	l_{17}, mm	l_{20}, mm	l_{21}, mm	l_{30}, mm	l_{31}, mm	l_{39}, mm	l_{91}, mm	b_1, mm	b_{10}, mm	b_{11}, mm	b_{12}, mm	b_{30}, mm	b_{31}, mm	h, mm	h_1, mm	h_5, mm	h_{35}, mm	h_{36}, mm	h_{37}, mm	d_1, mm	d_{10}, mm	d_{20}, mm	d_{22}, mm	d_{24}, mm	d_{25}, mm	d_{34}, mm	n, pc.	α_1, °	α_2, °	masss, kg
picture 1. motors with mounting configuration IM1001 (horizontal, on legs)																																	
180S-2	110	203	275	241	-	-	750	121	-	104	14	279	340	60	385	270	180	9	51,5	295	-	380	48	15	-	-	-	-	45*2	-	-	-	260
180M-2							795																										275
180S-4							750				16							10	59,0				55										285
180M-4							795																										298
180M-6																																	272
180M-8																																	292
200M-2		267	350	305			840								440		200			320		405		19									390
200L-2																																	430
200M-4	140						870				18	318	382	60				11	64,0				60										460
200L-4							945																										475
200M-6																																	370
200L-6							870																										400
200M-8																																	370
200L-8																																	400
225M-2	110	286	370	311			840	149		120	16	356	430	70		225		10	59,0				55										465
225M-4																																	469
225M-6	140						945				18							11	69,0				65										432
225M-8																																	428
picture 2. motors with mounting configuration IM2001 (horizontal, with legs, with flange on shield from the available side)																																	
180S-2	110	203	275	241	5	13	750	121	0	104	14	279	340	60	385	270	180	9	51,5	295	-	380	48	15	350	19	400	300	45*2	4	45	90	260
180M-2							795																										275
180S-4							750				16							10	59,0				55										285
180M-4							795																										298
180M-6																																	272
180M-8																																	292
200M-2		267	350	305		18	840	133		110		318	382	60	440		200			320		405	60	19	400		450	350		8	22,5	45	390
200L-2																																	430
200M-4	140						870				18							11	64,0				60										460
200L-4							945																										475
200M-6																																	370
200L-6							870																										400
200M-8																																	370
200L-8																																	400
225M-2	110	286	370	311			840	149		120	16	356	430	70		225		10	59,0				55		500		550	450					465
225M-4																																	469
225M-6	140						945				18							11	69,0				65										432
225M-8																																	428
picture 3. motors with mounting configuration IM3001 (horizontal, with flange on shield from the available side)																																	
180S-2	110	-	-	-	5	13	750	-	0	-	14	-	-	-	455	270	-	9	51,5	295	195	380	48	-	350	19	400	300	45*2	4	45	90	260
180M-2							795																										275
180S-4							750				16							10	59,0				55										285
180M-4							795																										298
180M-6																																	272
180M-8																																	292
200M-2						18	840								505					320	220	405	60		400		450	350		8	22,5	45	390
200L-2																																	430
200M-4	140						870				18							11	64,0				60										460
200L-4							945																										475
200M-6																																	370
200L-6							870																										400
200M-8																																	370
200L-8																																	400
225M-2	110						840				16							10	59,0				55										465
225M-4																																	469
225M-6	140						945				18							11	69,0		250		65		500		550	450					432
225M-8																																	428
picture4. motors with mounting configuration IM3011 (vertical, with shaft down, with flange on down shield, available from the other side)																																	
180S-2	110	-	-	-	5	13	830	-	0	-	14	-	-	-	455	270	-	9	51,5	295	195	380	48	-	350	19	400	300	45*2	4	45	90	260
180M-2							875																										275
180S-4							830				16							10	59,0				55										285
180M-4							875																										298
180M-6																																	272
180M-8																																	292
200M-2						18	920								505					320	220	405	60		400		450	350		8	22,5	45	390
200L-2																																	430
200M-4	140						950				18							11	64,0				60										460
200L-4							1025																										475
200M-6																																	370
200L-6							950																										400
200M-8																																	370
200L-8																																	400
225M-2	110						920				16							10	59,0				55										465
225M-4																																	469
225M-6	140						1025				18							11	69,0		250		65		500		550	450					432
225M-8																																	428



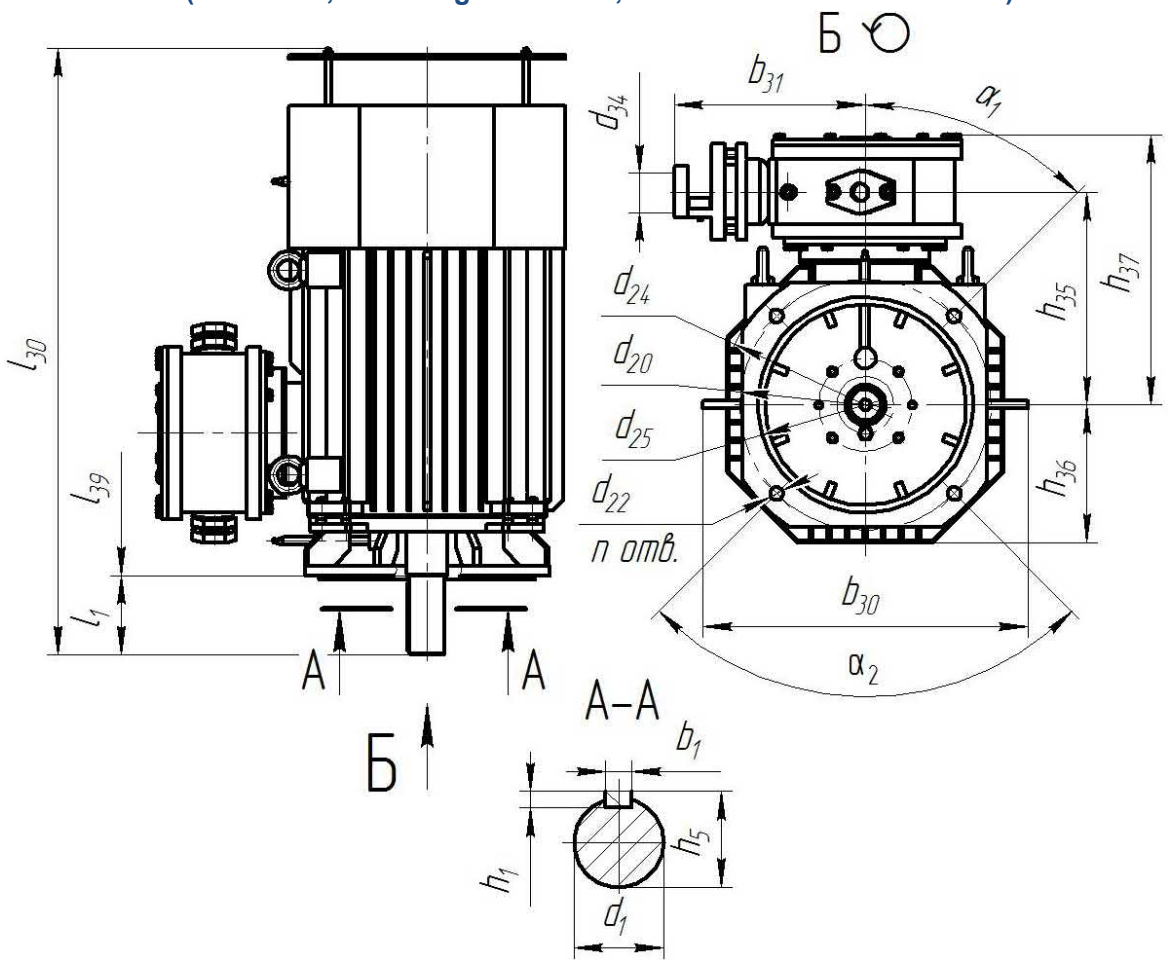
picture 1. motors AIU-ME 180-225 with mounting configuration IM1001 (horizontal, on legs)



picture 2. motors AIU-ME 180-225 with mounting configuration IM2001 (horizontal, on legs, with flange on shield, available from the other side)



picture 3. motors AIU-ME 180-225 with mounting configuration IM3001 (horizontal, with flange on shield, available from the other side)



picture 4. motors AIU-ME 180-225 with mounting configuration IM3011 (vertical, shaft down, with flange on down shield, available from the other side)

ASYNCHRONOUS EXPLOSION-PROOF MINE ELECTRIC MOTORS AIU 63-160, AIU-M 80-200, AIU-MP 160-200

Asynchronous three-phase explosion-proof elecrtric motors AIU, AIU-M and AIU-MP with a squirrel cage rotor are designed for operation in underground mines of coal and slate mines, as well as in premises and external installations with a dangerous content of methane and coal dust.

The electric motors AIU, AIU-M and AIU-MP are designed to drive stationary machines of continuous action, pumps, fans and other mechanisms.

The electric motors AIU-MP are also designed to drive scraper and belt conveyors, crushers, drilling machines and other mechanisms.

motor's gabarit (height of axis of rotation) :

AIU	63- 160 mm
AIU-M	80 -200 mm
AIU-MP	160 - 200 mm

Motors power:

AIU	from 0,25 to 18,5 kW
AIU-M	from 0,75 to 45 kW
AIU-MP	from 7,5 to 45 kW

Suplly voltage:

220/380V; 380/660V; 660/1140V

Connection phase of stator winding: triangle/star for all voltages.
Current frequency - 50Hz. At customer's request - 60Hz.
Number of motor poles - 2, 4, 6, 8.

Synchronous shaft rotational speeds, rpm.:

750, 1000, 1500, 3000

Shaft rotation direction: left and right.
Rolling bearings according to GOST 7242.
Operation mode - continuous S1, and allow operation in modes for motors AIU, AIU-M: S2, S3, S6, for motors AIU-MP: S2, S3, S4,S6,S8, S9, S10.according to GOST 52776.
Climatic construction type according:

У1.5, У2.5, УХЛ1.5, УХЛ2.5, Т1.5, Т2.5, ОМ2.5

Explosion-protection degree:

for deliveries to countries of Eurasian Economic Union	PB Ex d I Mb
for deliveries to Ukraine	Ex d I Mb

Mounting configuration according to GOST 2479:

80-180	IM1081, IM2081, IM3081
200	IM1001, IM2001, IM3001

Protection degree for

housing and terminal box	IP54 (IP55 at customer's request)
outdoor fan enclosure	IP20 according to GOST IEC 60034-5-2011

Cooling mehtod: IC411.
Construction: Construction: frame and bearing shields made of steel, squirrel cage rotor, filled with aluminum, closed boll bearings are used.
Winding insulation heat resistance class according to GOST 8865- 93:

- **not lower than «B»** (temperature index 130ºC) - for motors AIU63- 80 габарита;
- **not lower than «F»** (temperature index 155ºC) - for motors AIU90- 160, AIUM 80-100;
- not lower than **«H»** (temperature index 180ºC) - for motors AIU-M112-200, AIU-МП 160-200.

At the customer's request, it is possible to manufacture electric motors from 63 to 100 gabarit with winding insulation heat resistance class “H”.

To protect against overheating the stator windings, the AIU-M and AIU-MP electric motors have built-in temperature protection with two sensors 501.140.02 «Thermik» or DTR-212 in each phase of stator winding.

- **for motors with height of axis of rotation 80-100mm** sensors are adjusted to trip point of 150ºC for insulation class «F».- sensors are adjusted to trip point of 160ºC for insulation class «H» for motors with height of axis of rotation 112-200mm

According to overall dimensional, installation and mounting sizes the electric motors are interchangeable:

- AIU 63-160 and AIU-M 80-200 - with motors of AIU, VAIU made of LLC "Electric" machine factory» Novaya Kahovka;
- AIU-MP 160-200- with motors of VRP, VRPV manufactured by LLC «Electrodvigatel» («Kuzbasselectromotor») c.Kemerovo and AIU, VAIU with increased flange manufactured by LLC«Electric machine factory» Novaya Kahovka.

TYPE DESIGNATION

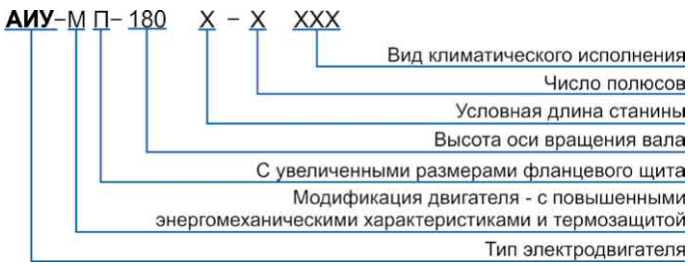


Table 1

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AIU 63-160 nominal voltage U_H=380/660 V

Type designation	nominal power, kW	Nominal current, A	Iп/Iн	Mп/Mн	Mmax/Mн	inertia moment of rotor H·m²	efficiency, %	cos φ, p.u.	nominal sliding, p.u.	mass, kg
two pole (3000 rpm.)										
AIU 63A	0,37	0,9/0,5	5,0	2,6	2,6	0,0055	73,2	0,84	10,0	16,0
AIU 63B	0,55	1,3/0,74	5,9	2,8		0,0073				16,5
AIU 71A	0,75	1,7/1,0		2,7		0,0108	78,2	0,86	7,0	19,5
AIU 71B	1,1	2,4/1,4	5,3	2,6	2,7	0,0123				20,5
AIU 80A	1,5	3,1/1,8	6,0	2,3	2,5	0,0220	81,0	0,90		28,0
AIU 80B	2,2	4,4/2,6				0,0295				29,0
AIU 90L	3,0	6,4/3,5		2,0	2,4	0,0490	82,5		5,5	52,0
AIU 100S	4,0	8,3/4,6	6,7	2,1	2,5	0,0735	84,5			53,0
AIU 100L	5,5	10,9/6,3				0,0980	85,3			60,0
AIU 112M	7,5	15,0/8,6	7,0	2,2	2,8	0,1470	86,5	0,88	4,0	75,0
AIU 132M	11,0	21,0/12,5	6,5	1,9	2,9	0,3675	87,0	0,89	3,3	103,0
AIU160S	15,0	28,6/16,6	6,0	1,4	2,5	0,7350	88,0		1,7	132,0
AIU 160M	18,5	35,7/20,3	7,2	1,6	2,6	0,8825		0,90		142,0
four pole (1500 rpm.)										
AIU 63A	0,25	0,7/0,4	4,1	2,2	2,3	0,0073	68,0	0,73	10	16,0
AIU 63B	0,37	1,0/0,7				0,0098	71,2	0,77		16,5
AIU 71A	0,55	1,4/0,9				0,0155	74,4		7,0	19,5
AIU 71B	0,75	1,9/1,1	4,4	2,0		0,0228	76,2	0,78		20,5
AIU 80A	1,1	2,6/1,5	5,1	1,8		0,0318	79,0	0,81		28,0
AIU 80B	1,5	3,6/2,0				0,0440	80,3	0,80		29,0
AIU 90L	2,2	5,2/2,8	6,0	2,0	2,6	0,0735	80,0			52,0
AIU 100S	3,0	7,0/3,8	5,8	1,9	2,5	0,1225	81,5		5,5	53,0
AIU 100L	4,0	8,7/4,9		2,0		0,1518	84,0	0,82		60,0
AIU 112M	5,5	11,6/6,6	7,0	2,2	2,8	0,2453	85,5	0,84	4,0	77,0
AIU 132S	7,5	15,0/8,9	6,5	2,1	2,8	0,5850	87,0	0,85	3,3	97,0
AIU 132M	11,0	21,5/12,8		2,4	3,0	0,7350	88,5	0,86		109,0
AIU 160S	15,0	30,7/17,2		1,5	2,3	1,4200		0,84	2,2	138,0
AIU 160M	18,5	37,0/21,0		1,9	2,6	1,7400	89,5	0,85		148,0
six pole (1000 rpm.)										
AIU 71A	0,37	1,1/0,63	3,6	1,8	2,0	0,0223	67,0	0,67	11,0	19,5
AIU 71B	0,55	1,6/0,9			1,8	0,0270	68,0	0,70		20,5
AIU 80A	0,75	2,1/1,2	4,5			0,0440	72,1	0,74	7,5	28,0
AIU 80B	1,1	3,0/1,7				0,0588	74,2	0,75		29,0
AIU 90L	1,5	4,1/2,4	4,5	2,1	2,3	0,0750	76,5	0,72	7,0	52,0
AIU 100L	2,2	5,5/3,3	5,5	1,8	2,4	0,1963	80,0	0,73		60,0
AIU 112MA	3,0	7,2/4,2	6,0	2,0	2,7	0,2700	79,0	0,78	5,0	77,0
AIU 112MB	4,0	9,3/5,5	6,6			0,3425	80,0		4,5	
AIU 132S	5,5	12,0/7,5	6,5	2,2		0,8325	84,0	0,80	4,0	103,0
AIU 132M	7,5	16,0/9,8	6,5			1,0050	85,0	0,81		113,0
AIU 160S	11,0	23,0/13,2	6,2	1,6	2,1	2,5500	87,5	0,83	2,4	144,0
AIU 160M	15,0	34,6/17,8	6,0	2,0	2,5	3,2000	88,0	0,75	2,7	154,0
eight pole (750 rpm.)										
AIU 100L	1,5	4,7/2,8	4,0	1,6	2,0	0,1958	74,0	0,65	7,0	60,0
AIU 112MA	2,2	5,9/3,5	4,9	1,9	2,4	0,3000	75,0	0,70	6,7	77,0
AIU 112MB	3,0	8,0/4,8				0,3425	78,0			
AIU 132S	4,0	10,5/6,3		2,0	2,6	0,7550	80,0		5,3	103,0
AIU 132M	5,5	14,5/8,2			2,1	0,8325	82,0	0,72		113,0
AIU 160S	7,5	17,5/9,7	5,5	1,2	1,8	2,5500	85,0	0,76	2,5	144,0
AIU 160M	11,0	26,6/14,0		1,0	1,9	3,2000	86,0	0,73	2,7	154,0

Table 2
TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AIU 63-160 nominal voltage U_H=660/1140V

type designation	nominal power, kW	Nominal current A	Iп/Iн	Mп/Mн	Mmax/Mн	inertia moment of rotor, H·m²	efficiency, %	cos φ, p.u.	nominal sliding, p.u.	Mass, kg
two pole (3000 rpm.)										
AIU 80A	1,5	1,8/1,0	6,0	2,3	2,5	0,0220	81,0		7,0	28,0
AIU 80B	2,2	2,6/1,5				0,0295				29,0
AIU 90L	3,0	3,5/2,0	5,8	1,8	2,3	0,0490	82,5	0,90		52,0
AIU 100S	4,0	4,6/2,7	6,6	1,9	2,6	0,0735	84,5		5,5	53,0
AIU 100L	5,5	6,3/3,6	6,0	2,0		0,0980	85,3			60,0
AIU 112M	7,5	8,6/4,9	7,0	1,8	2,8	0,1470	86,5	0,88	4,0	75,0
AIU 132M	11,0	12,5/7,2		1,7		0,3675	87,0	0,89	3,3	103,0
AIU 160S	15,0	16,6/9,6	7,5	1,7		0,7350	88,0		1,7	132,0
AIU 160M	18,5	20,3/11,7		1,8	3,0	0,8825	89,0	0,90		142,0
four pole (1500 rpm.)										
AIU 80A	1,1	1,5/0,87	5,1	1,8	2,3	0,0318	79,0	0,80	7,0	28,0
AIU 80B	1,5	2,0/1,1				0,0440	80,3			29,0
AIU 90L	2,2	2,8/1,6	5,0		2,2	0,0735	82,5	0,88		52,0
AIU 100S	3,0	3,8/2,2	5,8	2,0	2,4	0,1225	80,5	0,87	5,5	53,0
AIU 100L	4,0	4,9/2,8	6,0	2,1	2,6	0,1518	83,0			60,0
AIU 112M	5,5	6,6/3,8	6,5	2,0		0,2453	84,4		4,0	77,0
AIU 132S	7,5	8,9/5,1	6,5	2,1	2,8	0,5850	87,2	0,85	3,3	97,0
AIU 132M	11,0	12,8/7,4				0,7350	88,5			109,0
AIU 160S	15,0	17,2/9,9	6,0	1,4	2,2	1,4200	89,0	0,86	2,2	138,0
AIU 160M	18,5	21,0/12,1		1,6	2,4	1,7400	80,0			148,0
six pole (1000 rpm.)										
AIU 80A	0,75	1,2/0,7	4,5	1,8	1,8	0,0440	72,1	0,74	7,5	28,0
AIU 80B	1,1	1,7/0,95				0,0588	74,2	0,75		29,0
AIU 90L	1,5	2,4/1,4	4,2	2,1	2,2	0,0750	75,0		7,0	52,0
AIU 100L	2,2	3,3/1,9	4,5	1,8		0,1963	78,0	0,76		60,0
AIU 112MA	3,0	4,2/2,4	5,8	2,0	2,4	0,2700	79,0	0,80	5,0	77,0
AIU 112MB	4,0	5,5/3,2				0,3425	80,3		4,5	
AIU 132S	5,5	7,5/4,3	6,2		2,8	0,8325	83,0		4,0	103,0
AIU 132M	7,5	9,8/5,7				1,0050	84,0			113,0
AIU 160S	11,0	13,2/7,6	6,1	1,6	2,4	2,5500	87,0	0,84	2,4	144,0
AIU 160M	15,0	17,8/10,3	6,2		2,5	3,2000	88,0		2,7	154,0
eight pole (750 rpm.)										
AIU 100L	1,5	2,8/1,6	4,0	1,6	2,2	0,1958	74,0	0,65	7,0	60,0
AIU 112MA	2,2	3,5/2,0	4,8	1,9	2,4	0,3000	76,0	0,70	6,7	77,0
AIU 112MB	3,0	4,8/2,8				0,3425	78,5			
AIU 132S	4,0	6,3/3,7		1,8	2,4	0,7550	79,0		5,3	103,0
AIU 132M	5,5	8,2/4,7		1,7	2,2	0,8325	81,5	0,72		113,0
AIU 160S	7,5	9,7/5,6	5,0	1,2	2,0	2,5500	85,0	0,80	2,5	144,0
AIU 160M	11,0	14,0/8,1		1,0		3,2000	86,0		2,7	154,0

Table 3

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AIU-M 80-200 nominal voltage Uн=380/660 V

Type designation	nominal power, kW	nominal current, A	Iп/Iн	Mп/Mн	Mmax/Mн	inertia moment of rotor H·m²	effic., %	cos φ, o.e.	nominal sliding, p.u.	mass,kg
two pole (3000 rpm.)										
AIU-M 80A	1,5	3,1/1,8	6,0	2,3	2,5	0,0220	81,0	0,90	7,0	30,0
AIU-M 80B	2,2	4,4/2,6	6,0	2,3	2,5	0,0295	81,0	0,90		31,0
AIU-M 90L	3,0	6,4/3,5	6,0	2,0	2,4	0,0490	82,5	0,90	5,5	52,0
AIU-M 100S	4,0	8,3/4,6	6,7	2,1	2,5	0,0735	84,5	0,90		56,0
AIU-M 100L	5,5	10,9/6,3	6,7	2,1	2,5	0,0980	85,3	0,90		63,0
AIU-M 112M	7,5	15,0/8,6	7,0	2,2	2,8	0,1470	86,5	0,88	4,0	80,0
AIU-M 132M	11,0	21,0/12.5	6,5	1,9	2,9	0,3675	87,0	0,89	3,3	114,0
AIU-M 160S	15,0	28,6/16,2	6,0	1,8	3,0	0,6860	90,0	0,90	1,7	154,0
AIU-M 160M	18,5	34,0/19,6	6,0	1,8	3,0	0,0800	90,8	0,91		174,0
AIU-M 180S	22,0	39,9/23,1	7,4	1,4	3,2	0,8800	91,8	0,91	1,6	207,0
AIU-M 180M	30,0	54,0/31,2	7,4	1,5	3,1	1,0500	92,5	0,91		222,0
AIU-M 200M	37,0	66,2/38,2	7,3	1,3	3,1	1,2100	93,0	0,91	1,5	340,0
AIU-M 200L	45,0	80,2/46,3	7,5	1,3	3,1	1,3600	93,5	0,91		380,0
four pole (1500 rpm.)										
AIU-M 80A	1,1	2,6/1,5	5,1	1,8	2,3	0,0318	79,0	0,81	7,0	30,0
AIU-M 80B	1,5	3,6/2,0	5,1	1,8	2,3	0,0440	80,3	0,80		31,0
AIU-M 90L	2,2	5,2/2,8	6,0	2,0	2,6	0,0735	80,0	0,80		52,0
AIU-M 100S	3,0	7,0/3,8	5,8	1,9	2,5	0,1225	81,5	0,80	5,5	56,0
AIU-M 100L	4,0	8,7/4,9	5,8	2,0	2,5	0,1518	84,0	0,82		63,0
AIU-M 112M	5,5	11,6/6,6	7,0	2,2	2,8	0,2453	85,5	0,84	4,0	80,0
AIU-M 132S	7,5	15,0/8,9	6,5	2,1	2,8	0,5850	87,0	0,85	3,3	98,0
AIU-M 132M	11,0	21,5/12,8	6,5	2,4	3,0	0,7350	88,5	0,86		114,0
AIU-M 160S	15,0	29,4/17,0	6,5	2,2	2,6	1,2300	91,0	0,85	2,2	154,0
AIU-M 160M	18,5	35,6/20,5	6,5	2,2	2,6	1,4400	91,6	0,86		174,0
AIU-M 180S	22,0	40,9/23,6	6,3	1,6	2,9	1,5300	92,7	0,88	2,0	207,0
AIU-M 180M	30,0	55,4/32,0	6,3	1,6	2,9	1,8700	93,2	0,88		222,0
AIU-M 200M	37,0	67,4/38,9	7,5	1,5	2,7	2,1200	93,4	0,87		410,0
AIU-M 200L	45,0	81,8/47,2	7,5	1,6	2,9	2,5500	93,8	0,87		425,0
six pole (1000 rpm.)										
AIU-M 80A	0,75	2,1/1,2	4,5	1,8	2,0	0,0440	72,1	0,74	7,5	30,0
AIU-M 80B	1,1	3,0/1,7	4,5	1,8	2,0	0,0588	74,2	0,75		31,0
AIU-M 90L	1,5	4,1/2,4	4,5	2,1	2,3	0,0750	76,5	0,72	7,0	52,0
AIU-M 100L	2,2	5,5/3,3	5,5	1,8	2,4	0,1963	80,0	0,73		63,0
AIU-M112MA	3,0	7,2/4,2	6,0	2,0	2,7	0,2700	79,0	0,78	5,0	80,0
AIU-M112MB	4,0	9,3/5,5	6,6	2,0	2,7	0,3425	80,0	0,78	4,5	80,0
AIU-M 132S	5,5	12,0/7,5	6,5	2,2	2,7	0,8325	84,0	0,80	4,0	98,0
AIU-M 132M	7,5	16,0/9,8	6,5	2,2	2,7	1,0050	85,0	0,81		114,0
AIU-M 160S	11,0	22,4/13,0	5,7	1,6	2,5	1,2200	89,0	0,84	2,4	154,0
AIU-M 160M	15,0	30,1/17,4	5,7	1,6	2,5	1,6900	90,0	0,84	2,7	174,0
AIU-M 180M	18,5	36,6/21,1	5,2	1,4	2,3	1,7600	90,2	0,85	3,0	222,0
AIU-M 200M	22,0	42,3/24,4	6,5	1,5	2,8	2,2700	91,6	0,86	2,0	320,0
AIU-M 200L	30,0	56,8/32,8	6,5	1,6	2,8	2,7400	92,0	0,87		350,0

Continuation of table 3

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AIU-M
80-200 nominal voltage Uн=380/660 V

Type designation	Nominal power, kW	Nominal current, A	Iп/Iн	Mп/Mн	Mmax/Mн	Inertia moment of rotor, H·m²	efficiency, %	cos φ, p.u.	nominal sliding, p.u.	mass, kg
eight pole (750 rpm.)										
AIU-M112MA	2,2	5,9/3,5	4,9	1,9	2,4	0,3000	75,0	0,70	6,7	80,0
AIU-M112MB	3,0	8,0/4,8	4,9	1,9	2,1	0,3425	78,0	0,70		80,0
AIU-M 132S	4,0	10,5/6,3	4,9	2,0	2,6	0,7550	80,0	0,70	5,3	98,0
AIU-M 132M	5,5	14,5/8,2	4,9	2,0	2,1	0,8325	82,0	0,72		114,0
AIU-M 160S	7,5	16,4/9,5	4,5	1,5	2,1	1,2300	86,0	0,80	2,5	154,0
AIU-M 160M	11,0	23,8/13,7	5,2	1,5	2,1	1,7000	87,0	0,80	2,7	174,0
AIU-M 180M	15,0	32,0/18,5	4,8	1,4	2,3	1,9100	88,5	0,80	3,7	222,0
AIU-M 200M	18,5	38,5/22,0	5,8	1,4	2,6	2,1400	91,0	0,80	2,0	320,0
AIU-M 200L	22,0	45,6/23,3	5,5	1,4	2,6	2,7700	91,4	0,80		350,0

Table 4

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AIU-M
80-200 nominal voltage Uн=660/1140 V

Type designation	Nominal power, kW	Nominal current, A	Iп/Iн	Mп/Mн	Mmax/Mн	Inertia moment of rotor, H·m²	efficiency, %	cos φ, p.u.	nominal sliding, p.u.	mass, kg
two pole (3000 rpm.)										
AIU-M 80A	1,5	1,8/1,0	6,0	2,3	2,5	0,0220	81,0	0,90	7,0	30,0
AIU-M 80B	2,2	2,6/1,5	6,0	2,3	2,5	0,0295	81,0	0,90		31,0
AIU-M 90L	3,0	3,5/2,0	5,8	1,8	2,3	0,0490	82,5	0,90	5,5	52,0
AIU-M 100S	4,0	4,6/2,7	6,6	2,1	2,5	0,0735	84,5	0,90		56,0
AIU-M 100L	5,5	6,3/3,6	6,0	2,1	2,5	0,0980	85,3	0,90		63,0
AIU-M 112M	7,5	8,6/4,9	7,0	1,8	2,8	0,1470	86,5	0,88	4,0	80,0
AIU-M 132M	11,0	12,5/7,2	6,5	1,7	2,8	0,3675	87,0	0,89	3,3	114,0
AIU-M 160S	15,0	16,2/9,4	6,0	1,8	3,0	0,6900	90,0	0,90	1,7	154,0
AIU-M 160M	18,5	19,6/11,3	6,0	1,8	3,0	0,0800	90,8	0,91		174,0
AIU-M 180S	22,0	23,1/13,3	7,4	1,4	3,2	0,8800	91,8	0,91	1,6	207,0
AIU-M 180M	30,0	31,2/18,0	7,4	1,5	3,1	1,0500	92,5	0,91		222,0
AIU-M 200M	37,0	38,2/22,1	6,8	1,3	3,1	1,2100	93,0	0,91	1,5	340,0
AIU-M 200L	45,0	46,3/26,7	6,8	1,3	3,1	1,3600	93,5	0,91		380,0
four pole (1500 rpm.)										
AIU-M 80A4	1,1	1,5/0,87	5,1	1,8	2,3	0,0318	79,0	0,81	7,0	30,0
AIU-M 80B4	1,5	2,0/1,1	5,1	1,8	2,3	0,0440	80,3	0,80		31,0
AIU-M 90L4	2,2	2,8/1,6	6,0	1,8	2,2	0,0735	82,5	0,88		52,0
AV-M 100S4	3,0	3,8/2,2	5,8	2,0	2,4	0,1225	80,5	0,87	5,5	56,0
AIU-M 100L4	4,0	4,9/2,8	6,0	2,1	2,6	0,1518	83,0	0,87		63,0
AIU-M 112M	5,5	6,6/3,8	6,5	2,0	2,6	0,2453	84,4	0,87	4,0	80,0
AIU-M 132S	7,5	8,9/5,1	6,5	2,1	2,8	0,5850	87,2	0,85	3,3	98,0
AIU-M 132M	11,0	12,8/7,4	6,5	2,4	2,8	0,7350	88,5	0,85		114,0
AIU-M 160S	15,0	17,0/9,8	6,5	2,2	2,6	1,2300	91,0	0,85	2,2	154,0
AIU-M 160M	18,5	20,5/11,8	6,5	2,2	2,6	1,4400	91,6	0,86		174,0
AIU-M 180S	22,0	23,6/13,6	6,3	1,6	2,9	1,5300	92,7	0,88	2,0	207,0
AIU-M 180M	30,0	32,0/18,5	6,3	1,6	2,9	1,8700	93,2	0,88		222,0
AIU-M 200M	37,0	39,8/23,0	6,0	1,5	2,7	2,1200	93,4	0,87		410,0
AIU-M 200L	45,0	48,2/27,8	6,3	1,6	2,9	2,5500	93,8	0,87		425,0

continuation of table 4

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AIU-M
80-200 nominal voltage Uн=660/1140V

Type designation	nominal power, kW	rated current, A	Iп/Iн	Mп/Mн	Mmax/Mн	inertia moment of rotor, H·m²	effic., %	cos φ, p.u.	nominal sliding, p.u.	mass, kg
six pole (1000 rpm.)										
AIU-M 80A	0,75	1,2/0,7	4,5	1,8	2,0	0,0440	72,1	0,74	7,5	30,0
AIU-M 80B	1,1	1,7/0,95	4,5	1,8	2,0	0,0588	74,2	0,75		31,0
AIU-M 90L	1,5	2,4/1,4	4,2	1,7	2,2	0,0750	75,0	0,75	7,0	52,0
AIU-M 100L	2,2	3,3/1,9	4,5	1,7	2,2	0,1963	78,0	0,76		63,0
AIU-M112MA	3,0	4,2/2,4	5,8	2,0	2,4	0,2700	79,0	0,80	5,0	80,0
AIU-M112MB	4,0	5,5/3,2	5,8	2,0	2,4	0,3425	80,3	0,80	4,5	80,0
AIU-M 132S	5,5	7,5/4,3	6,2	2,0	2,8	0,8325	83,0	0,80	4,0	98,0
AIU-M 132M	7,5	9,8/5,7	6,2	2,0	2,8	1,0050	84,0	0,80		114,0
AV-M 160S	11,0	13,0/7,5	5,7	1,6	2,5	1,2200	89,0	0,84	2,4	154,0
AIU-M 160M	15,0	17,4/10,0	5,7	1,6	2,5	1,6900	90,0	0,84	2,7	174,0
AIU-M 180M	18,5	21,1/12,2	5,2	1,4	2,3	1,7600	90,2	0,85	3,0	222,0
AIU-M 200M	22,0	24,4/14,1	6,5	1,5	2,8	2,2700	91,6	0,86	2,0	320,0
AIU-M 200L	30,0	32,8/18,9	6,5	1,6	2,8	2,7400	92,0	0,87		350,0
eight pole (750 rpm.)										
AIU-M112MA	2,2	3,5/2,0	4,9	1,9	2,4	0,3000	75,0	0,70	6,7	80,0
AIU-M112MB	3,0	4,8/2,8	4,9	1,9	2,1	0,3425	78,0	0,70	5,3	80,0
AIU-M 132S	4,0	6,3/3,7	4,9	2,0	2,6	0,7550	80,0	0,70		98,0
AIU-M 132M	5,5	8,2/4,7	4,9	2,0	2,1	0,8325	82,0	0,72		114,0
AIU-M 160S	7,5	9,5/5,5	4,5	1,5	2,1	1,2300	86,0	0,80	2,5	154,0
AIU-M 160M	11,0	13,7/7,9	5,2	1,5	2,1	1,7000	87,0	0,80	2,7	174,0
AIU-M 180M	15,0	18,5/10,7	4,8	1,4	2,3	1,9100	88,5	0,80	3,7	222,0
AIU-M 200M	18,5	22,2/12,8	5,8	1,4	2,6	2,1400	91,0	0,80	2,0	320,0
AV-M 200L	22,0	26,3/15,2	5,8	1,4	2,6	2,7700	91,4	0,80		350,0

Table 5

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AIU-MP
160-200 rated voltage Uн=380/660 V

Type designation	rated power, kW	rated current, A	Iп/Iн	Mп/Mн	Mmax/Mн	inertia moment of rotor, H·m²	effic., %	cos φ, p.u.	nominal sliding, p.u.	mass, kg
two pole (3000 rpm.)										
AIU-MP160S	15,0	28,1/16,2	7,5	2,2	3,0	0,7350	90,0	0,90	1,7	157,0
AIU-MP160M	18,5	34,0/19,6	7,5	2,3	3,1	0,8624	90,8	0,91		177,0
AIU-MP180S	22,0	40,4/23,3	7,4	1,8	3,0	0,9310	91,7	0,90	1,6	217,0
AIU-MP180M	30,0	54,0/31,2	7,4	1,8	3,0	1,1270	92,5	0,91		232,0
AIU-MP200M	37,0	66,2/38,2	7,3	1,8	3,1	1,3230	93,0	0,91	1,5	340,0
AIU-MP200L	45,0	80,2/46,3	7,5	1,8	3,1	1,5484	93,5	0,91		380,0
four pole(1500 rpm.)										
AIU-MP160S	15,0	29,4/17,0	6,0	2,3	2,6	1,2740	91,0	0,85	2,2	157,0
AIU-MP160M	18,5	35,6/20,5	6,2	2,3	2,6	1,5778	91,6	0,86		177,0
AIU-MP180S	22,0	41,6/24,0	7,0	2,2	2,7	1,6758	92,3	0,87	2,0	217,0
AIU-MP180M	30,0	56,2/32,4	7,0	2,2	2,7	2,1168	93,0	0,87		232,0
AIU-MP200M	37,0	68,9/39,8	7,5	2,8	3,0	2,3618	93,4	0,87		410,0
AIU-MP200L	45,0	83,6/48,2	7,5	2,8	3,0	2,8518	93,8	0,87		425,0
six pole (1000 rpm.)										
AIU-MP160S	11,0	22,4/13,0	5,8	1,8	2,7	1,3524	89,5	0,83	2,4	157,0
AIU-MP160M	15,0	30,1/17,3	5,8	1,8	2,7	1,7738	90,5	0,84	2,7	177,0
AIU-MP180M	18,5	36,6/21,5	6,0	2,0	2,8	2,0090	90,8	0,83	3,0	232,0
AIU-MP200M	22,0	42,3/24,4	6,5	2,0	2,8	2,5578	91,6	0,86	2,0	320,0
AIU-MP200L	30,0	56,8/32,8	6,5	2,0	2,8	3,0968	92,0	0,87		350,0

Continuation of table 5

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AIU-MP
160-200 rated voltage Uн=380/660 V

Type designation	rated power, kW	rated current, A	Iп/Iн	Mп/Mн	Mmax/Mн	inertia moment of rotor, H·m²	effic., %	cos φ, p.u.	nominal sliding, p.u.	mass, kg
eight pole (750 rpm.)										
AIU-MP160S8	7,5	16,4/9,5	5,2	1,6	2,3	1,3622	86,5	0,80	2,5	157,0
AIU-MP160M8	11,0	23,8/13,7	5,2	1,6	2,3	1,7836	87,5	0,80	2,7	177,0
AIU-MP180M8	15,0	32,0/18,5	4,8	1,8	2,3	2,2246	88,7	0,80	3,7	232,0
AIU-MP200M8	18,5	38,5/22,2	5,8	1,8	2,6	2,7048	91,0	0,80	2,0	320,0
AIU-MP200L8	22,0	45,6/26,3	5,8	1,8	2,6	3.0772	91,4	0,80		350,0

Table 6

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AIU-MP
160-200 rated voltage Uн=660/1140 V

Type designation	rated power, kW	rated current, A	Iп/Iн	Mп/Mн	Mmax/Mн	inertia moment of rotor, H·m²	effic., %	cos φ, p.u.	nominal csliding, p.u.	mass, kg
two pole (3000 rpm.)										
AIU-MP160S	15,0	16,2/9,4	7,5	2,2	3,0	0,7350	90,0	0,90	1,7	157,0
AIU-MP160M	18,5	19,6/11,3	7,5	2,3	3,1	0,8624	90,8	0,91		177,0
AIU-MP180S	22,0	23,3/13,5	7,4	1,8	3,0	0,9310	91,7	0,90	1,6	217,0
AIU-MP180M	30,0	31,2/18,0	7,4	1,9	3,0	1,1270	92,5	0,91		232,0
AIU-MP200M	37,0	38,2/22,1	7,3	1,8	3,1	1,3230	93,0	0,91	1,5	340,0
AIU-MP200L	45,0	46,3/26,7	7,5	1,9	3,2	1,5484	93,5	0,91		380,0
four pole (1500 rpm.)										
AIU-MP160S	15,0	17,0/9,8	6,0	2,3	2,6	1,2740	91,0	0,85	2,2	157,0
AIU-MP160M	18,5	20,5/11,8	6,2	2,3	2,6	1,5778	91,6	0,86		177,0
AIU-MP180S	22,0	24,0/13,9	7,0	2,2	2,7	1,6758	92,3	0,87	2,0	217,0
AIU-MP180M	30,0	32,4/18,7	7,0	2,2	2,7	2,1168	93,0	0,87		232,0
AIU-MP200M	37,0	39,8/23,0	7,5	2,8	3,0	2,3618	93,4	0,87		410,0
AIU-MP200L	45,0	48,2/27,8	7,5	2,8	3,0	2,8518	93,8	0,87		425,0
six pole (1000 rpm.)										
AIU-MP160S	11,0	13,0/7,5	5,8	1,8	2,7	1,3524	89,5	0,83	2,4	157,0
AIU-MP160M	15,0	17,3/10,0	5,8	1,8	2,7	1,7738	90,5	0,84	2,7	177,0
AIU-MP180M	18,5	21,5/12,4	6,0	2,0	2,8	2,0090	90,8	0,83	3,0	232,0
AIU-MP200M	22,0	24,4/14,1	6,5	2,0	2,8	2,5578	91,6	0,86	2,0	320,0
AIU-MP200L	30,0	32,8/18,9	6,5	2,0	2,8	3,0968	92,0	0,87		350,0
eight pole (750 rpm.)										
AIU-MP160S	7,5	9,5/5,5	5,2	1,6	2,3	1,3622	86,5	0,80	2,5	157,0
AIU-MP160M	11,0	13,7/7,9	5,2	1,6	2,3	1,7836	87,5	0,80	2,7	177,0
AIU-MP180M	15,0	18,5/10,7	4,8	1,8	2,3	2,2246	88,7	0,80	3,7	232,0
AIU-MP200M	18,5	22,2/12,8	5,8	1,8	2,6	2,7048	91,0	0,80	2,0	320,0
AIU-MP200L	22,0	26,3/15,2	5,8	1,8	2,6	3.0772	91,4	0,80		350,0

Mass of motors:

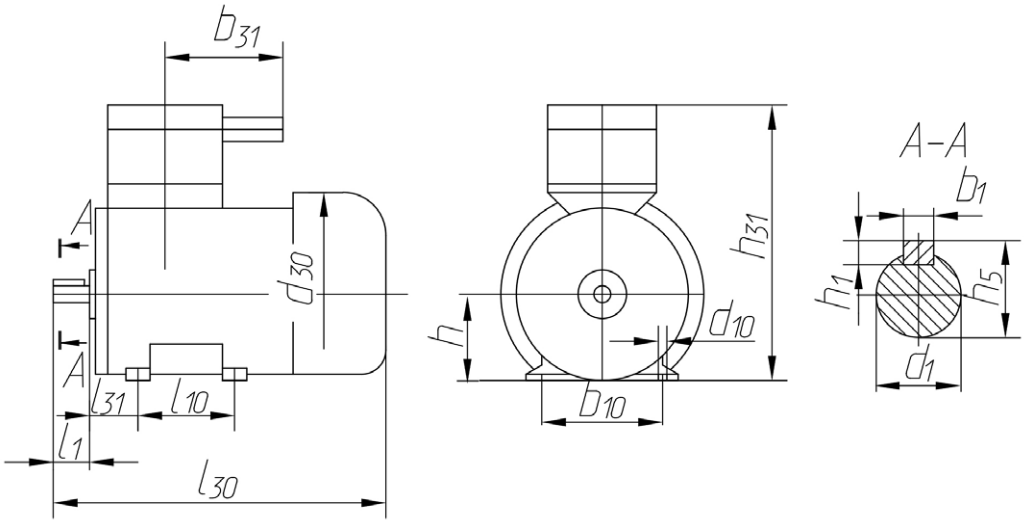
- mounting configuration IM2081 - 4% from mass IM1081,

- mounting configuration IM3081 - 1-2% from mass IM1081.

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIU 63-160

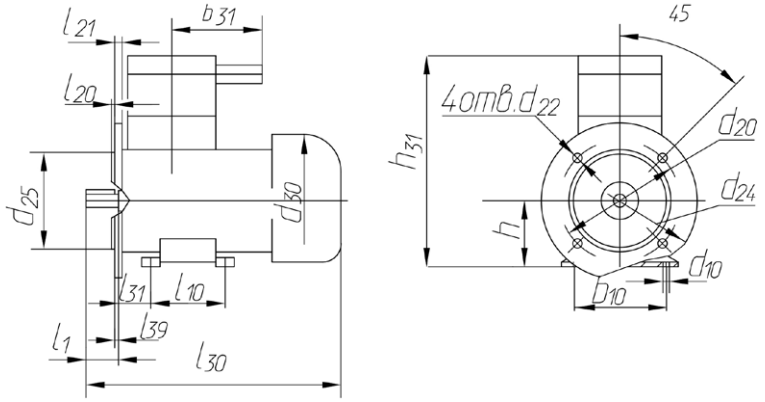
Type designation	mounting configuration	№ pic.	dimensions, mm, not more						installation and mounting sizes, mm																
			d_{30}	h_{31}	h_{37}	l_{30}	b_{31}	d_{24}	b_1	b_{10}	d_1	d_{10}	d_{20}	d_{22}	d_{25}	h	h_1	h_5	l_1	l_{10}	l_{20}	l_{21}	l_{31}	l_{39}
AIU 63	IM1081/IM1281	1	155	225	-	275	190	-	5	100	14	7	-	-	-	63	5	16,0	30	80	-	-	40	-
	IM2081/IM9881	2/4						160					130	10	110						3,5	10		0
	IM3081/IM4481	3/5		-	162					-		-				-				-			-	
AIU 71	IM1081/IM1281	1	170	240	-	305		-	6	112	19	7	-	-	-	71	6	21,5	40	90	-	-	45	-
	IM2081/IM9881	2/4						200					165	12	130						3,5	12		0
	IM3081/IM4481	3/5		-	170					-		-				-				-			-	
AIU 80	IM1081/IM1281	1	190	255	-	350		-		125	22	10	-	-	-	80		24,5	50	100	-	-	50	-
	IM2081/IM9881	2/4						200					165	12	130						3,5	12		0
	IM3081/IM4481	3/5		-	175					-		-				-				-			-	
AIU 90L	IM1081	1	210	300	-	410		-	8	140	24	10	-	-	-	90	7	27,0		125	-	-	56	-
	IM2081	2						250					215	15	180						4,0	14		0
	IM3081	3		-	210					-		-				-				-			-	
AIU 100L	IM1081	1	232	320	-	460		-		160	28	12	-	-	-	100		31,0	60	140	-	-	63	-
	IM2081	2						250					215	15	180						4,0	14		0
	IM3081	3		-	220					-		-				-				-			-	
AIU 100S	IM1081	1		320	-	425		-		160		12	-	-	-	100				112	-	-	63	-
	IM2081	2						250					215	15	180						4,0	14		0
	IM3081	3		-	220					-		-				-				-			-	
AIU 112	IM1081	1	260	362	-	480	215	-		190	32	12	-	-	-	112	8	35,0	80	140	-	-	70	-
	IM2081	2						300					265	15	230						4,0	16		0
	IM3081	3		-	250					-		-				-				-			-	
AIU 132S	IM1081	1	302	412	-	487		-	10	216	38	12	-	-	-	132		41,0		140	-	-	89	-
	IM2081	2						350					300	19	250						5,0	18		0
	IM3081	3		-	280							-				-				-			-	
AIU 132M	IM1081	1		412	-	532		-		216		12	-	-	-	132				178	-	-	89	-
	IM2081	2						350					300	19	250						5,0	18		0
	IM3081	3		-	280					-		-				-				-			-	
AIU 160S	IM1081	1	340	460	-	585		-	12	254	42	15	-	-	-	160		45,0	110	178	-	-	108	-
	IM2081	2						350					300	19	250						5,0	16		0
	IM3081	3		-	300					-		-				-				-			-	
AIU 160M	IM1081	1		460	-	645		-	14	254	48	15	-	-	-	160	9	51,5		210	-	-	108	-
	IM2081	2						350		-			300	19	250						5,0	16		0
	IM3081	3		-	300							-				-				-			-	

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIU 63-160

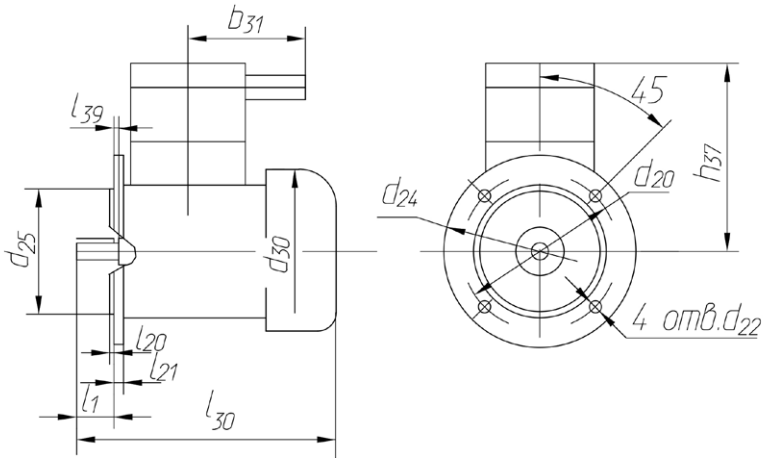


picture 1

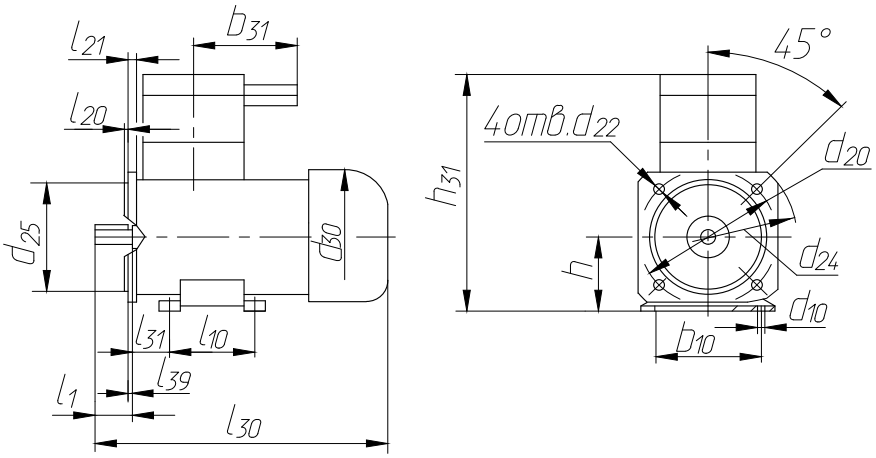
OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIU 63-160



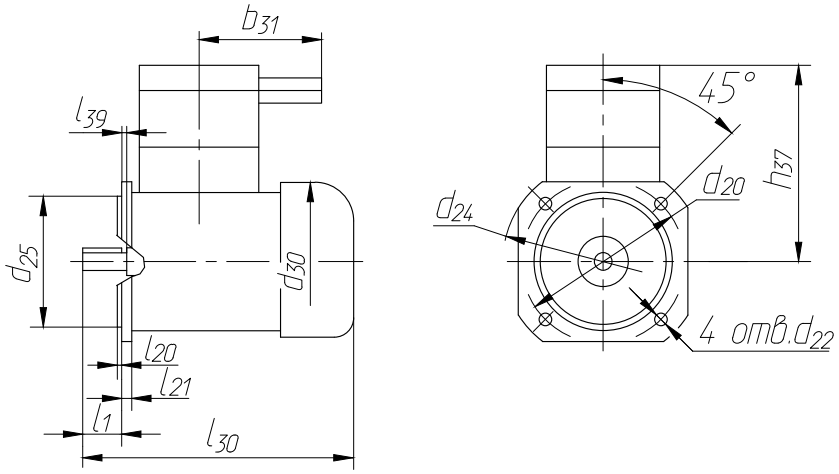
picture 2



picture 3

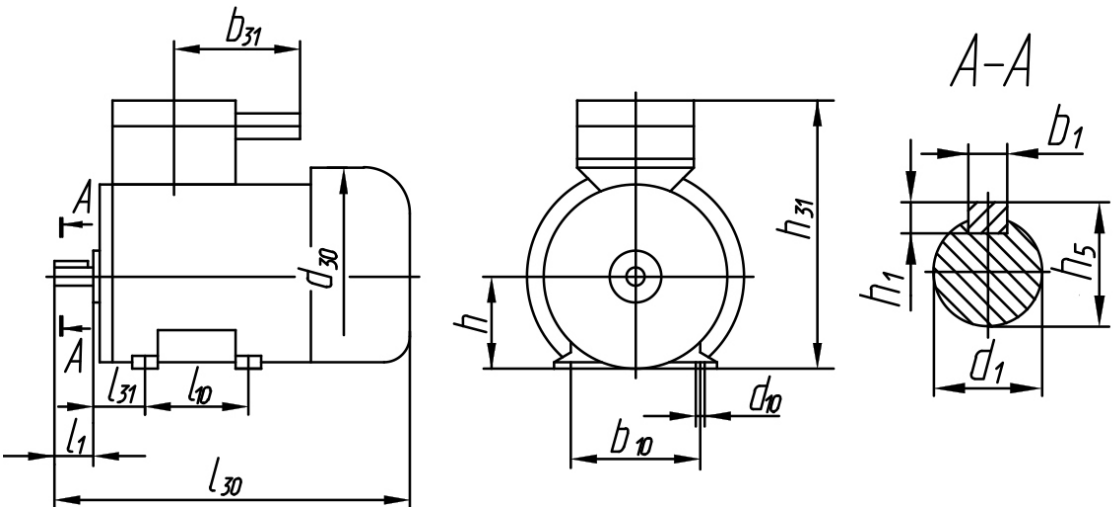


picture 4

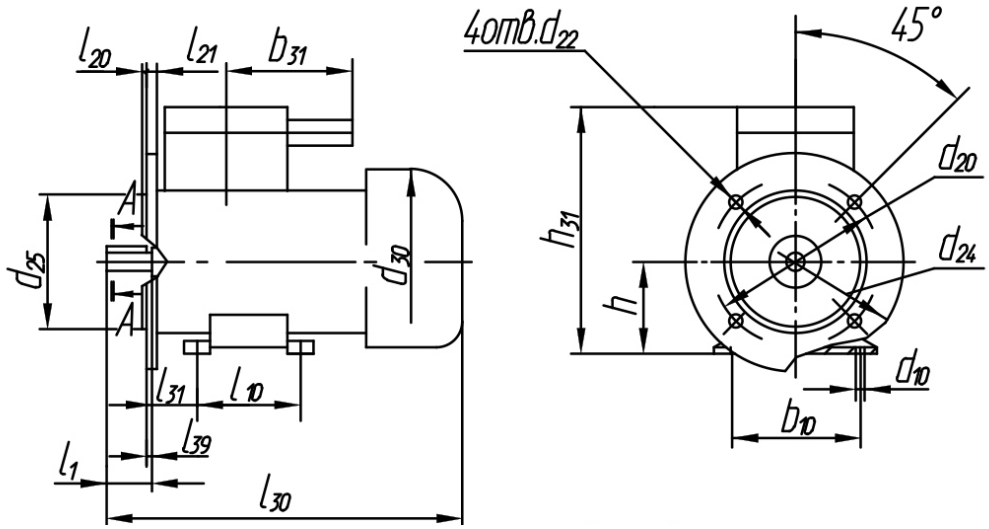


picture 5

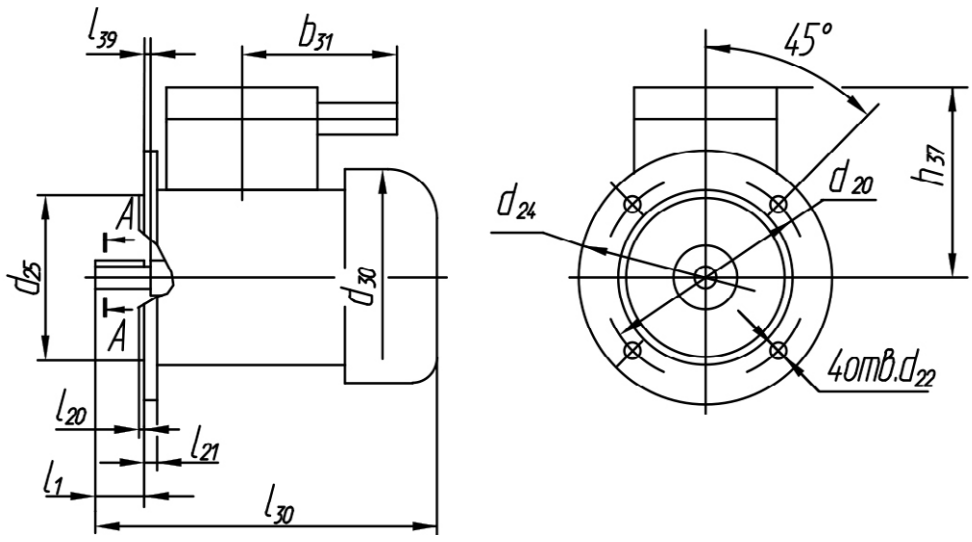
OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIU-M 80-180



Picture 1



picture 2



picture 3

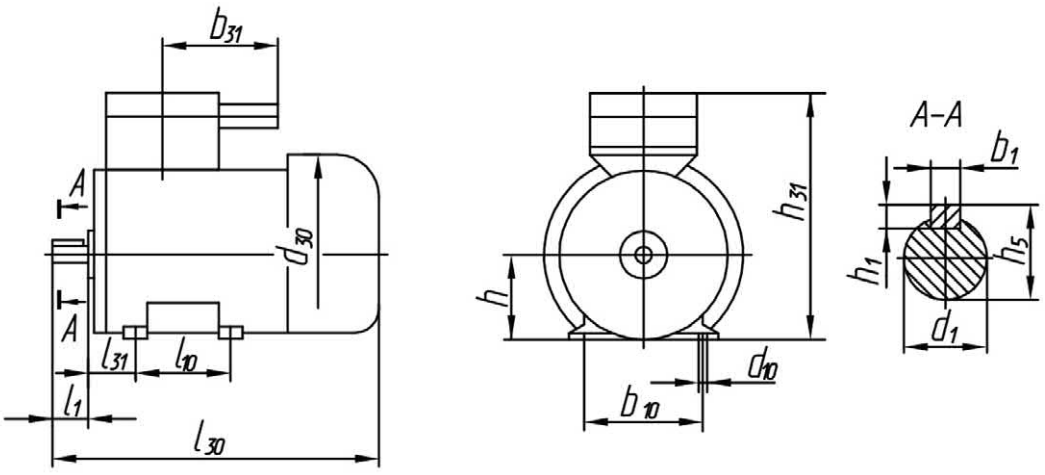
OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIU-M 80-180

Type designation	mounting configuration	№ pic.	dimensions, mm, not more						instalation and mounting sizes, mm																
			d_{30}	h_{31}	h_{37}	l_{30}	b_{31}	d_{24}	b_1	b_{10}	d_1	d_{10}	d_{20}	d_{22}	d_{25}	h	h_1	h_5	l_1	l_{10}	l_{20}	l_{21}	l_{31}	l_{39}
AIU-M80	IM1081	1	190	328	-	350	198	-	6	125	22	10	-	-	-	80	6	25	50	100	-	-	50	-
	IM2081	2						200					165	12	130						3,5	12		0
	IM3081	3		-	248					-		-				-				-			-	
AIU-M90	IM1081	1	210	344	-	410		-	8	140	24	10	-	-	-	90	7	27		125	-	-	56	-
	IM2081	2						250					215	15	180						4	14		0
	IM3081	3		-	254					-		-				-				-			-	
AIU-M100L	IM1081	1	232	387	-	460	215	-		160	28	12	-	-	-	100		31	60	140	-	-	63	-
	IM2081	2						250					215	15	180						4	14		0
	IM3081	3		-	275					-		-				-				-			-	
AIU-M100S	IM1081	1		387	-	425		-		160		12	-	-	-	100		31		140	-	-	63	-
	IM2081	2						250					215	15	180						4	14		0
	IM3081	3		-	275					-		-				-				-			-	
AIU-M112M	IM1081	1	260	387	-	486		-		190	32	12	-	-	-	112		35		140	-	-	70	-
	IM2081	2						300					265	15	230						4	16		0
	IM3081	3		-	275					-		-				-				-			-	
AIU-M132S	IM1081	1	302	425	-	487		-	10	216	38	12	-	-	-	132	8	41	80	140	-	-	89	-
	IM2081	2						350					300	19	250						5	18		0
	IM3081	3		-	293					-		-				-				-			-	
AIU-M132M	IM1081	1		425	-	532		-		216		12	-	-	-	132				178	-	-	89	-
	IM2081	2						350					300	19	250						5	18		0
	IM3081	3		-	293					-		-				-				-			-	
AIU-M160S2	IM1081	1	340	495	-	585	280	-	12	254	42	15	-	-	-	160		45	110	178	-	-	108	-
	IM2081	2						350					300	19	250						5	16		0
	IM3081	3		-	335					-		-				-				-			-	
AIU-M160S 4,6,8	IM1081	1		495	-			-	14	254	48	15	-	-	-	160	9	52		178	-	-	108	-
	IM2081	2						350					300	19	250						5	16		0
	IM3081	3		-	335					-		-				-				-				
AIU-M160M2	IM1081	1		495	-	645		-	12	254	42	15	-	-	-	160	8	45		210	-	-	108	-
	IM2081	2						350					300	19	250						5	16		0
	IM3081	3		-	335					-		-				-				-			-	
AIU-M160M 4,6,8	IM1081	1		495	-			-	14	254	48	15	-	-	-	160	9	52		210	-	-	108	-
	IM2081	2						350					300	19	250						5	16		0
	IM3081	3		-	335					-		-				-				-			-	
AIU-M180S2	IM1081	1	366	565	-	712	280	-	14	279	48	15	-	-	-	180	9	52	110	203	-	-	121	-
	IM2081	2						400					350	19	300						5	15		0
	IM3081	3		-	385					-		-								-			-	
AIU-M180S4	IM1081	1		565	-			-	16	279	55	15	-	-	-	180	10	60		203	-	-	121	-
	IM2081	2						400					350	19	300						5	15		0
	IM3081	3		-	385					-		-								-			-	
AIU-M180M2	IM1081	1		565	-	757		-	14	279	48	15	-	-	-	180	9	52		241	-	-	121	-
	IM2081	2						400					350	19	300						5	15		0
	IM3081	3		-	385					-		-								-			-	
AIU-M180M 4,6,8	IM1081	1		565	-			-	16	279	55	15	-	-	-	180	10	60		241	-	-	121	-
	IM2081	2						400					350	19	300						5	15		0
	IM3081	3		-	385					-		-								-			-	

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIU-M 200

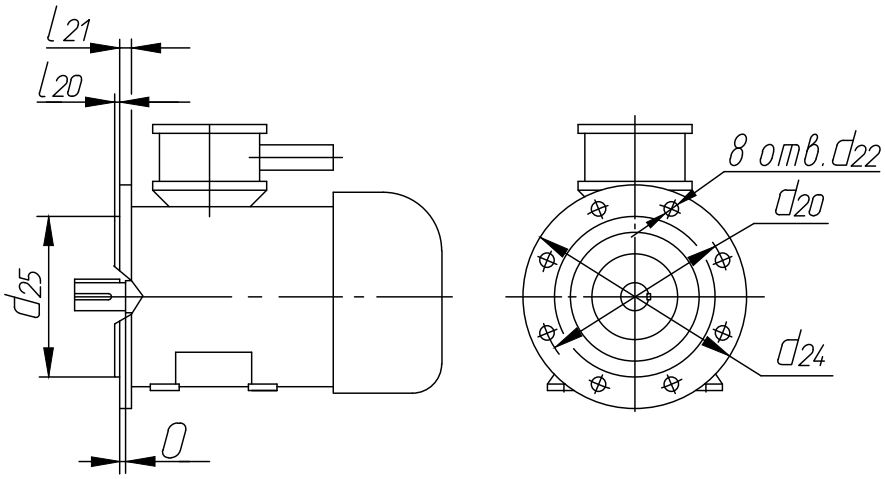
Type designation	mounting configuration	№ pic.	dimensions, mm, not more						installation and mounting sizes, mm															
			d_{30}	h_{31}	h_{37}	l_{30}	b_{31}	d_{24}	b_1	b_{10}	d_1	d_{10}	d_{20}	d_{22}	d_{25}	h	h_1	h_s	l_1	l_{10}	l_{20}	l_{21}	l_{31}	l_{39}
AIU-M 200M-2	IM1081	4	470	630	-	935	270	-	16	318	55	19	-	-	-	200	10	59,5	110	267	-	-	133	-
	IM2081	5						450					400	19	350						5,0	15		0
	IM3081	6		-	430					-		-				-				-			-	
AIU-M 200L-2	IM1081	4		630	-	985		-	16	318	55	19	-	-	-	200	10			305	-	-	133	-
	IM2081	5						450					400	19	350						5,0	15		0
	IM3081	6		-	430					-		-				-				-			-	
AIU-M 200M-4	IM1081	4		630	-	1015		-	18	318	60	19	-	-	-	200	11			267	-	-	133	-
	IM2081	5						450					400	19	350						5,0	15		0
	IM3081	6		-	430					-		-				-				-			-	
AIU-M 200L-4	IM1081	4		630	-	1035		-	18	318	60	19	-	-	-	200	11	64,0		305	-	-	133	-
	IM2081	5						450					400	19	350						5,0	15		0
	IM3081	6		-	430					-		-				-				-			-	
AIU-M 200M-6	IM1081	4	470	630	-	875	270	-	18	318	60	19	-	-	-	200	11		140	267	-	-	133	-
	IM2081	5						450					400	19	350						5,0	15		0
	IM3081	6		-	430					-		-				-				-			-	
AIU-M 200L-6	IM1081	4		630	-	915		-	18	318	60	19	-	-	-	200	11			305	-	-	133	-
	IM2081	5						450					400	19	350						5,0	15		0
	IM3081	6		-	430					-		-				-				-			-	
AIU-M 200M-8	IM1081	4		630	-	875		-	18	318	60	19	-	-	-	200	11	64,0		267	-	-	133	-
	IM2081	5						450					400	19	350						5,0	15		0
	IM3081	6		-	430					-		-				-				-			-	
AIU-M 200L-8	IM1081	4		630	-	915		-	18	318	60	19	-	-	-	200	11			305	-	-	133	-
	IM2081	5						450					400	19	350						5,0	15		0
	IM3081	6		-	430					-		-				-				-			-	

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIU-M 200

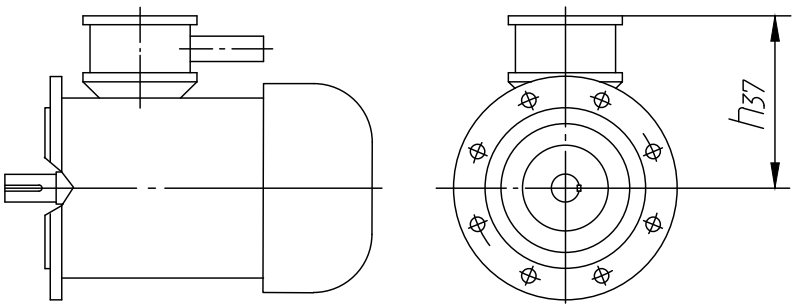


Picture 4

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIU-M 200



Picture 5

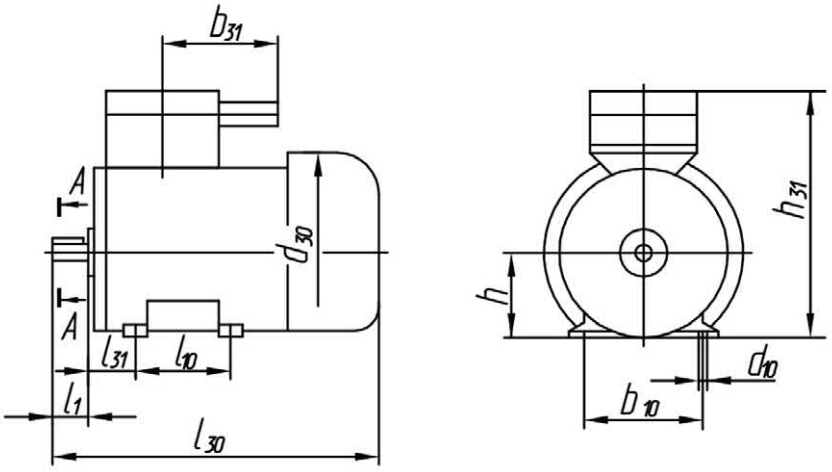


Picture 6

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIU-MP 160, 180

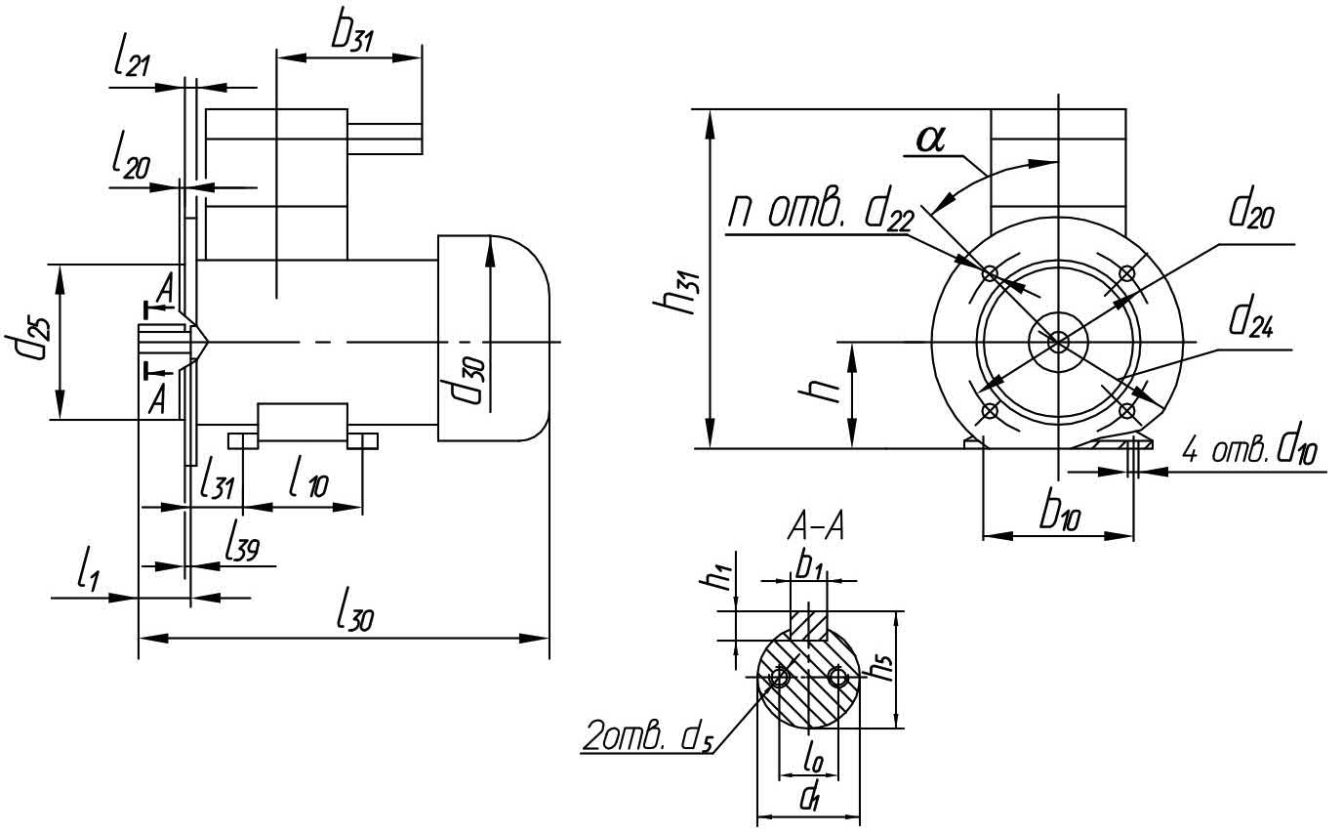
Type designation	mounting configuration	№ pic.	dimensions, mm, not more						installation and mounting sizes, mm																				
			d_{30}	h_{31}	h_{37}	l_{30}	b_{31}	d_{24}	b_1	b_{10}	d_1	d_{10}	d_{20}	d_{22}	d_{25}	h	h_1	h_5	l_1	l_{10}	l_{20}	l_{21}	l_{31}	l_{39}	l_0	d_s	α	n
AIU-MP160S2	IM1081	1	340	495	-	585	280	-	12	254	42	15	-	-	-	160	8	45	110	178	-	-	108	-	26	M8	-	-
	IM2081	2						400					350	19	300						5	16		0			45°	4
	IM3081	3		-	335					-		-				-				-			-					
AIU-MP160S 4,6,8	IM1081	1		495	-			-	14	254	48	15	-	-	-	160	9	52		178	-	-	108	-	32		-	-
	IM2081	2						400					350	19	300						5	16		0			45°	4
	IM3081	3		-	335					-		-				-				-								
AIU-MP 160M2	IM1081	1		495	-	645		-	12	254	42	15	-	-	-	160	8	45		210	-	-	108	-	26		-	-
	IM2081	2						400					350	19	300						5	16		0			45°	4
	IM3081	3		-	335					-		-				-				-			-					
AIU-MP 160M 4,6,8	IM1081	1		495	-			-	14	254	48	15	-	-	-	160	9	52		210	-	-	108	-	32		-	-
	IM2081	2						400					350	19	300						5	16		0			45°	4
	IM3081	3		-	335					-		-				-				-			-					
AIU-MP 180S2	IM1081	1	366	565	-	712	280	-	14	279	48	15	-	-	-	180	9	52	110	203	-	-	121	-	32		-	-
	IM2081	2						450					400	19	350						5	15		0			22°30'	8
	IM3081	3		-	385					-		-								-			-					
AIU-MP180S4	IM1081	1		565	-			-	16	279	55	15	-	-	-	180	10	60		203	-	-	121	-			-	-
	IM2081	2						450					400	19	350						5	15		0			22°30'	8
	IM3081	3		-	385					-		-								-			-					
AIU-MP 180M2	IM1081	1		565	-	757		-	14	279	48	15	-	-	-	180	9	52		241	-	-	121	-			-	-
	IM2081	2						450					400	19	350						5	15		0			22°30'	8
	IM3081	3		-	385					-		-								-			-					
AIU-MP 180M 4,6,8	IM1081	1		565	-			-	16	279	55	15	-	-	-	180	10	60		241	-	-	121	-			-	-
	IM2081	2						450					400	19	350						5	15		0			22°30'	8
	IM3081	3		-	385					-		-								-			-					

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIU-MP 160, 180

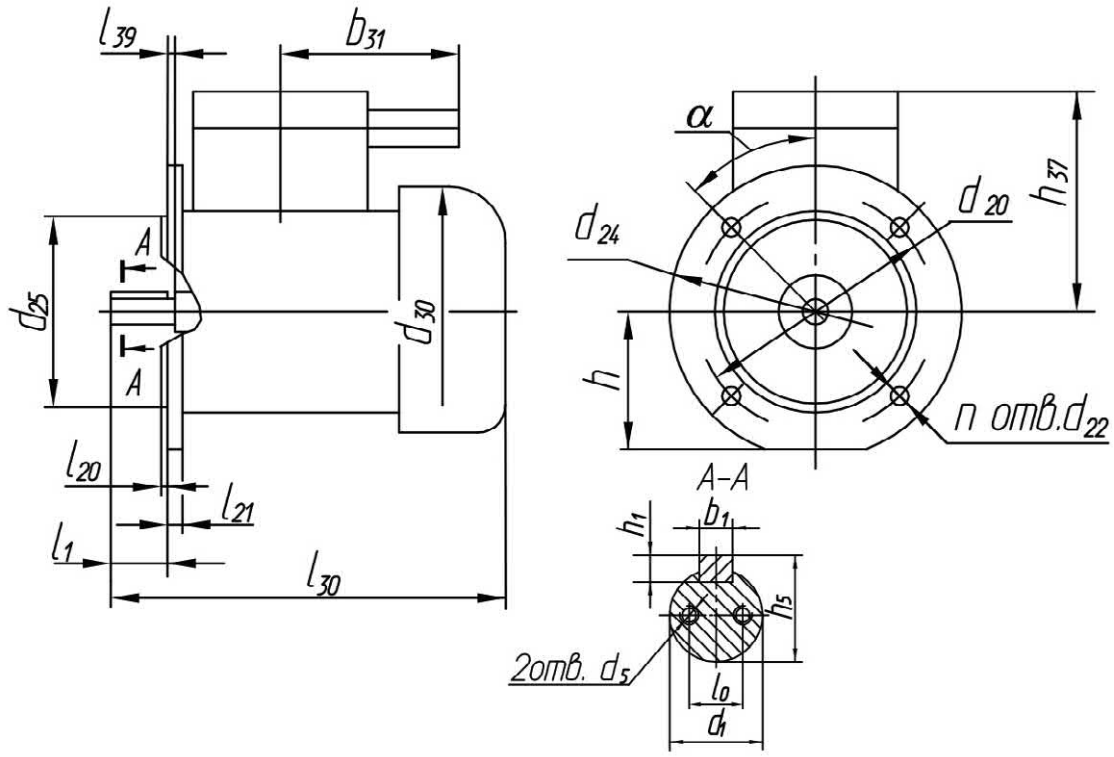


Picture 1

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIU-MP 160, 180



picture 2

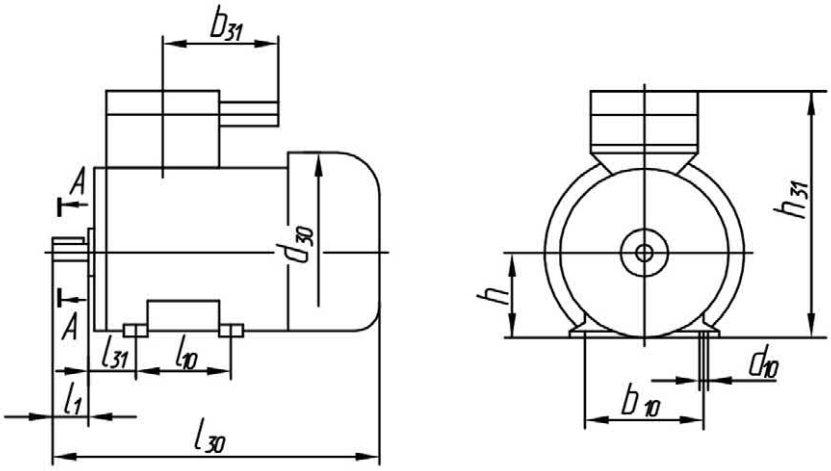


picture 3

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIU-MP 200

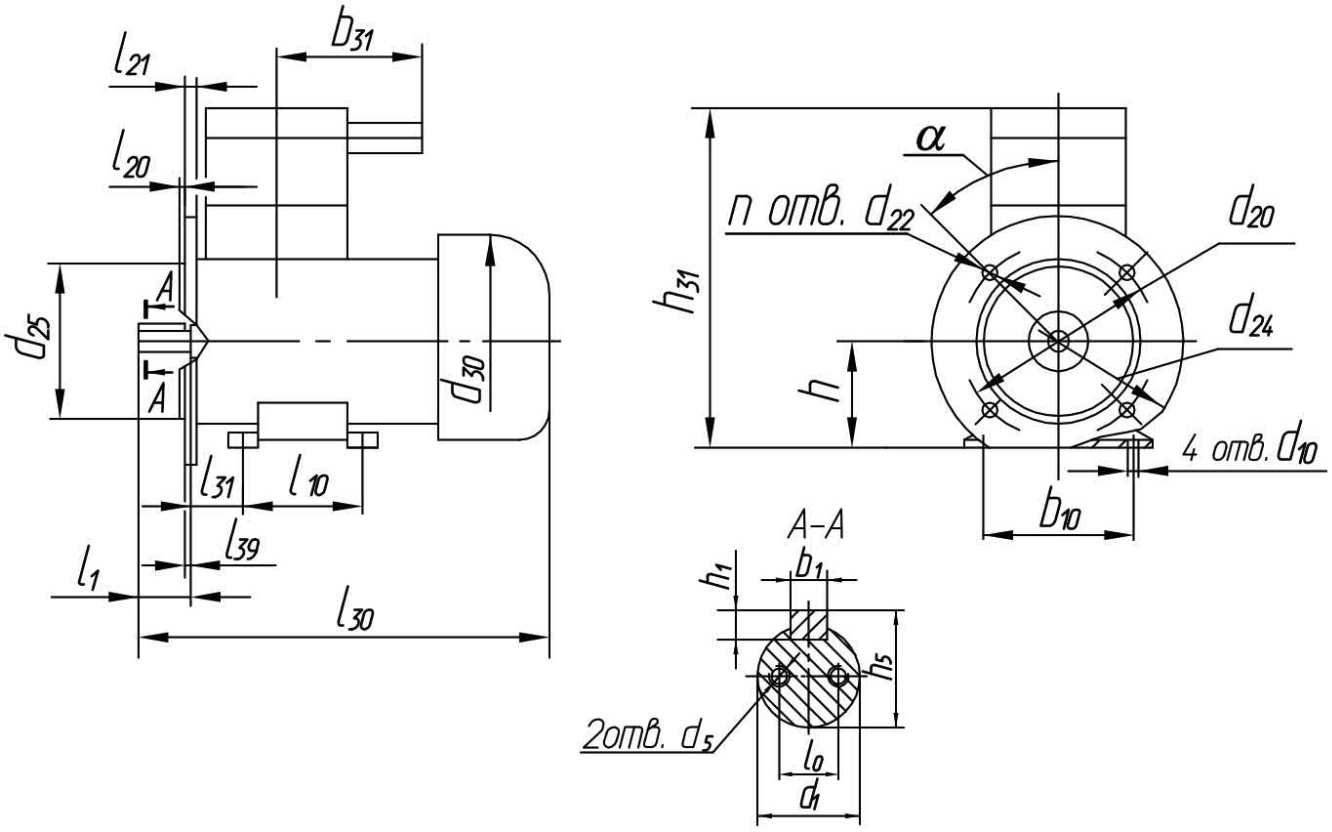
Type designation	mounting configuration	№ pic.	dimensions, mm, not more*						instalation nd mounting sizes, mm																				
			d_{30}	h_{31}	h_{37}	l_{30}	b_{31}	d_{24}	b_1	b_{10}	d_1	d_{10}	d_{20}	d_{22}	d_{25}	h	h_1	h_s	l_1	l_{10}	l_{20}	l_{21}	l_{31}	l_{39}	l_0	d_s	α	n
AIU-MP 200M-2	IM1081	1	430	605	-	935	280	-	16	318	55	15	-	-	-	200	10	59,0	110	267	-	-	133	-	36	M12	-	-
	IM2081	4						550					500	19	450						5,0	15		0			22°30'	8
	IM3081	5		-	405					-		-				-				-			-					
AIU-MP 200L-2	IM1081	1		605	-	985		-	16	318	55	15	-	-	-	200	10			305	-	-	133	-			-	-
	IM2081	4						550					500	19	450						5,0	15		0			22°30'	8
	IM3081	5		-	405					-		-				-				-			-					
AIU-MP 200M-4	IM1081	1		605	-	1015		-	18	318	60	15	-	-	-	200	11	64,0	140	267	-	-	133	-			-	-
	IM2081	4			405			550					500	19	450						5,0	15		0			22°30'	8
	IM3081	5		-						-		-				-				-			-					
AIU-MP 200L-4	IM1081	1		605	-	1035		-	18	318	60	15	-	-	-	200	11			305	-	-	133	-			-	-
	IM2081	4						550					500	19	450						5,0	15		0			22°30'	8
	IM3081	5		-	405					-		-				-				-			-					
AIU-MP 200M-6	IM1081	1	430	605	-	875	280	-	18	318	60	15	-	-	-	200	11			267	-	-	133	-			-	-
	IM2081	4						550					500	19	450						5,0	15		0			22°30'	8
	IM3081	5		-	405					-		-				-				-			-					
AIU-MP 200L-6	IM1081	1		605	-	915		-	18	318	60	15	-	-	-	200	11	59,5		305	-	-	133	-			-	-
	IM2081	4						550					500	19	450						5,0	15		0			22°30'	8
	IM3081	5		-	405					-		-				-				-			-					
AIU-MP 200M-8	IM1081	1		605	-	875		-	18	318	60	15	-	-	-	200	11	64,0		267	-	-	133	-			-	-
	IM2081	4						550					500	19	450						5,0	15		0			22°30'	8
	IM3081	5		-	405					-		-				-				-			-					
AIU-MP 200L-8	IM1081	1		605	-	915		-	18	318	60	15	-	-	-	200	11			305	-	-	133	-			-	-
	IM2081	4						550				-	500	19	450						5,0	15		0			22°30'	8
	IM3081	5		-	405					-						-				-			-					

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIU-MP 200

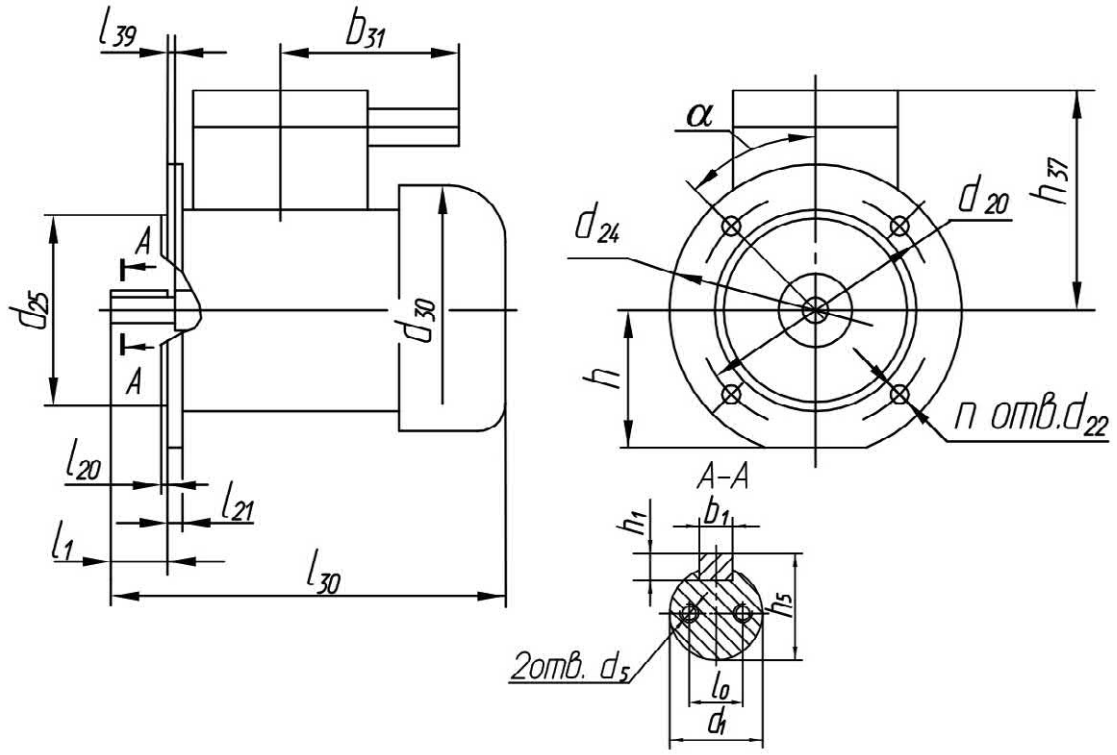


Picture 1

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIU-MP 200



picture 4



picture 5

ELECTRIC MOTORS AIU-M 2255

Asynchronous three-phase explosion-proof electric motors AIU-M 225 with a squirrel-cage rotor are designed for operation in underground mines of coal and slate mines, as well as in areas and external installations with a dangerous content of methane and coal dust.

Electric motors are designed to drive stationary machines of continuous action, pumps, fans, scraper and belt conveyors, screens, crushers, drilling machines and other mechanisms.

Main characteristics:

Gabarit (height of axis of rotation) of the electric motors AIU-M 225mm.

Power of motors from 22 kW up to 75 kW.

Voltage 380/660V; 660/1140V.

The phases connection of the stator winding - star/triangle for all voltages.

Current frequency - 50 Hz. At customer's request - 60Hz.

Number of motor poles - 2, 4, 6, 8.

Synchronous rotational speed of the shaft: 750, 1000, 1500 and 3000 rpm.

Electric motors are designed for continuous operation S1 and allow operation in modes S2, S3, S6, S8, S9, S10 according to GOST 52776. Run-up of the electric motors is performed by direct switching on the full voltage of the network.

Climatic construction type of the motors according to GOST15150:

У1, У2, У5, Т2, Т5, УХЛ1, ХЛ1

The maximum allowable sound power levels of the electric motors sound operating without load at a frequency of 50Hz, correspond to class 1 according to GOST IEC 60034-9-2014.

The maximum root mean square value of vibration speed should correspond to GOST IEC 60034-14-2014:

Operation conditions:

- height above the sea level up to 1000m;
- regarding environmental factors -M1 according to GOST 17516.1.

The motor is connected to the drive mechanism by means of gear or elastic sleeve-finger couplings.

The motor start is direct, it provides both at the rated voltage and when the voltage drops during the start period -up to 0.8Unom.

Mounting configuration according to GOST 2479:

IM1081, IM4081, IM9781

Protection degree according to GOST IEC 60034-5-2011:

of the motor housing	IP54 (IP55 at customer's request)
of terminal box	IP55
of outdoor fan enclosure	IP20

Explosion-protection configuration:

For deliveries to countries of Eurasian Economic Union	
AIU-M225	PB Ex d I Mb

Cooling method: IC411.

Construction:

The bed and bearing shields are made of steel.

The rotor is short-circuited, covered with aluminum. Electric motors are manufactured with one protruding cylindrical end of the shaft.

Motors are manufactured with rolling bearings of accuracy class not lower than 6 in accordance with GOST 7242. Lubrication of bearings is consistent.The design of the bearing units provides for the periodic replenishment of lubricant through the built-in box lubricator.

At customer's request the electric motors are completed with bearings produced by SKF (Sweden).

The electric motors AIU-M225M-2,4,6,8 have «mesh» stator winding.

The electric motors AIU-M225MH-2,4,6,8 and AIU(AIM)-M225SA, SB, M, L-C-4 have stator winding of rigid bobbins.

The insulating materials of stator winding have heat-resistance class «F». (temperature index 155ºC) according to GOST 8865-93. At customer's request it is possible to produce stator winding using insulating materials of heat-resistance class «H (temperature index 180ºC) according to GOST 8865-93.

To protect against overheating, the electric motors are equipped with at least two differential temperature relays built into the stator winding, the output ends of which are brought into the power terminal box of DTR-212. At customer's request, to control the temperature of the bearing units and the motor housing, it is possible to complete the motors with temperature control sensors (thermal converters) with rated resistance 50 Ohm, 100 Ohm types ТС044-50М, 100М, 50П, 100П.

Six output ends of the stator winding are brought into the terminal box of the electric motor. Switching the stator winding connection scheme (Δ-Y) is performed in the power terminal box by reinstalling the metal jumpers (plates). The terminal box provides flexible and armored power cable entry with an outer diameter up to 48mm. and control cable with outer diameter up to 24mm through separate tubes. The terminal boxes of the AIU-M 225SA, SB, M, L-C-4 motors are equipped with two tubes for the input of power cables.

Electric motors are manufactured with the location of the terminal box on the right viewed from the side of the working end of the shaft. At customer' request the electric motors are manufactured with the location of the terminal box on the left, from the to of the stator housing, viewed from the side of the working end of the shaft. On electric motors with mounting configuration IM4081 the location of power terminal box (from the left to the right) is changed by turning the motor 180ºC relative to the axis of rotation of the rotor of the electric motor.

There are clamps for connecting the earthing on the motor frame and inside the terminal box.

For cooling the electric motor, external fan is provided, mounted on the shaft and protected by housing. Cooling method of electric motors is ICA0141 (blown with self-ventilation).

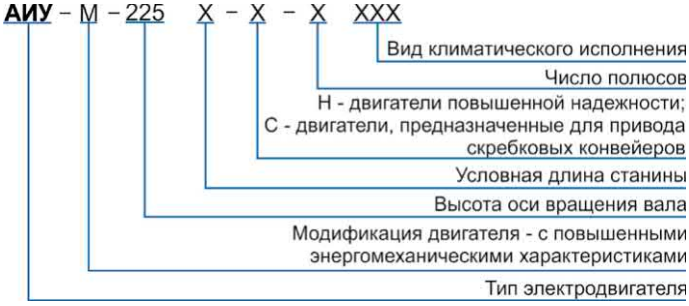
At customer's request, the electric motors can be manufactured with forced ventilation system.

Electric motors operate in any direction of rotation. The change of rotation direction is made after a complete stop of the electric motor, by switching phases.

Standartization requirements

The electric motors are interchangeable with motors AIU(AIM)-225 manufactured by LLC«Electric machine factory» and 2VRP 225 manufactured by LLC «Electrodvigatel» according to overall dimensional, installation and mounting sizes.

TYPE DESIGNATION



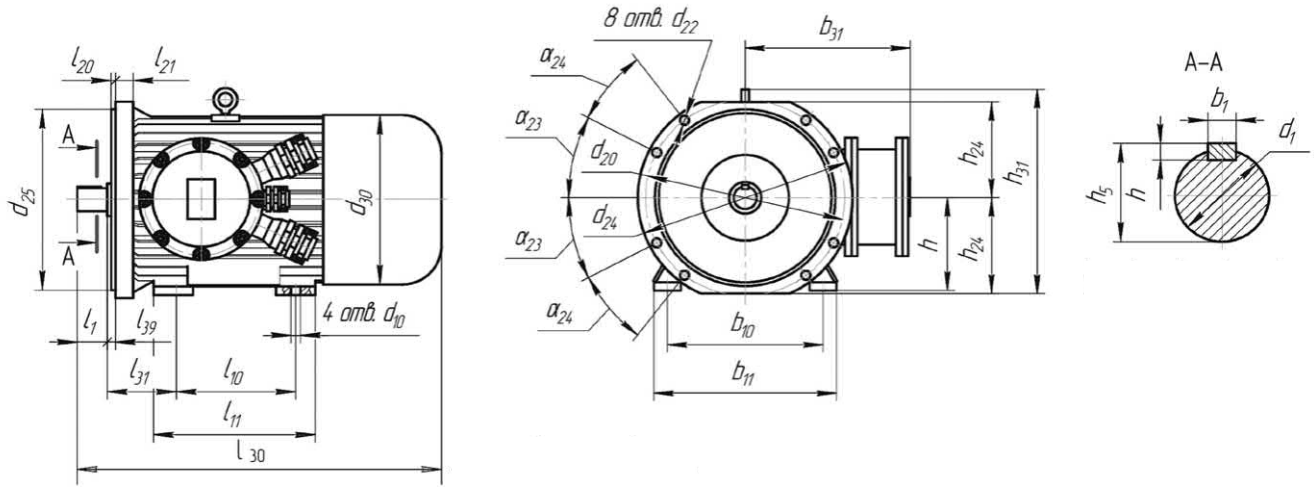
TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AIU-M 225

Type designation	power, kW	voltage, V	Rotational speed, rpm.	sliding, %	effic., %	Cos φ	rated current, A	$M_{макс}/M_н$	$M_{пуск}/M_н$	$M_{мин}/M_н$	$I_{пуск}/I_н$	mass, kg
AIU-M 225M-2	55,0	380/660	3000	2,0	92,3	0,91	99/57	3,0	1,5	1,1	7,5	415
		660/1140					57/33					
AIU-M 225M-4	55,0	380/660	1500	1,5	93,0	0,90	100/58	2,8			7,0	419
		660/1140					58/33					
AIU-M 225M-6	37,0	380/660	1000	1,8	91,4	0,87	72/41	2,5	1,2	1,0	6,5	382
		660/1140					41/24					
AIU-M 225M-8	30,0	380/660	750	2,0	90,7	0,83	60/35	2,3			6,0	378
		660/1140					35/20					
AIU-M 225MH-2	55,0	380/660	3000	2,0	92,1	0,90	101/58	3,2	1,5	1,1	7,5	415
		660/1140					58/34					
AIU-M 225MH-4	55,0	380/660	1500	1,5	92,7	0,89	101/58	2,9			7,0	419
		660/1140					58/34					
AIU-M 225MH-6	37,0	380/660	1000	1,8	91,2	0,86	72/41	2,6	1,3	1,0	6,5	382
		660/1140					41/24					
AIU-M 225MH-8	30,0	380/660	750	2,0	90,5	0,82	61/35	2,4			6,0	378
		660/1140					35/20					
AIU-M 225SA-C-4	22,0	380/660	1500	2,0	91,0	0,86	43/25	3,1	3,0	1,5	7,5	356
		660/1140					25/14					
AIU-M 225SB-C-4	37,0	380/660		2,0	92,0		71/41					402
		660/1140					41/24					
AIU-M 225M-C-4	55,0	380/660		1,6	92,5	0,87	104/60					525
		660/1140					60/35					
AIU-M 225L-C-4	75,0	380/660		1,4	93,0		141/81	3,0	2,8			545
		660/1140					81/47					

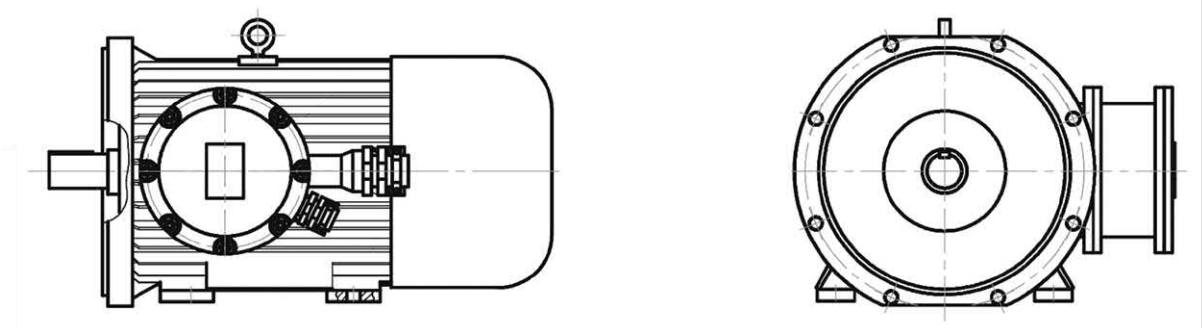
OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIU-M 225

type designation	mounting configuration	№ pic.	l_1	l_{10}	l_{11}	l_{20}	l_{21}	l_{30}	l_{31}	l_{39}	b_1	b_{10}	b_{11}	b_{31}	h	h_1	h_5	h_{24}	h_{31}	d_1	d_{10}	d_{20}	d_{22}	d_{24}	d_{25}	d_{30}	α_{23}	α_{24}°
AIU-M 225M, MH-2	IM1081	2	110	311	407	-	-	910	149	-	16	356	430	445	225	10	59	-	510	55	19	-	-	-	-	490	-	-
	IM9781					5	22			0								255				500	19	550	450		22,5	45,0
	IM3081					-	-		-			-	-		-				-		-							
AIU-M 225M, MH-4	IM1081		140	311	407	-	-	940	149	-	18	356	430		225	11	69	-	510	65	19	-	-	-	-		-	-
	IM9781					5	22			0								255				500	19	550	450		22,5	45,0
	IM3081					-	-		-			-	-		-				-		-							
AIU-M 225M, MH-6	IM1081			311	407	-	-		149	-		356	430		225			-	510		19	-	-	-	-		-	-
	IM9781					5	22			0								255				500	19	550	450		22,5	45,0
	IM3081					-	-		-			-	-		-				-		-							
AIU-M 225M, MH-8	IM1081			311	407	-	-		149	-		356	430		225			-	510		19	-	-	-	-		-	-
	IM9781					5	22			0								255				500	19	550	450		22,5	45,0
	IM3081					-	-		-			-	-		-				-		-							
AIU-M 225SA-C-4	IM1081	1	76	286	382	-	-	800	149	-		356	430		225			-	510		24	-	-	-	-		-	-
	IM9781					5	51			15,5								240				520	24	560	470		27,5	25,0
	IM4081			-					-			-	-		-				-		-							
AIU-M 225SB-C-4	IM1081			286	382	-	-		149	-		356	430		225		64	-	510	60	24	-	-	-	-		-	-
	IM9781					5	51			15,5								240				520	24	560	470		27,5	25,0
	IM4081			-					-			-	-		-				-		-							
AIU-M 225M-C-4	IM1081			311	407	-	-	920	168	-		406	490		225			-	510		24	-	-	-	-		-	-
	IM9781					5	51			15,5								240				520	24	560	470		27,5	25,0
	IM4081			-	-				-			-			-				-		-							
AIU-M 225L-C-4	IM1081			311	407	-	-		168	-		406	490		225			-	510		24	-	-	-	-		-	-
	IM9781					5	51			15,5								240				520	24	560	470		27,5	25,0

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AIU-M 225



picture 1



picture 2

ASYNCHRONOUS GENERAL ELECTRIC MOTORS OF SMALL AND MEDIUM POWER

ASYNCHRONOUS GENERAL INDUSTRIAL ELECTRIC MOTORS AZO, AZOK OF SMALL AND MEDIUM POWER

The nomenclature of asynchronous general industrial and special electric motors of small and medium power includes three-phase electric motors AZO and single-phase condenser electric motors AZOK.

Asynchronous three-phase electric motors AZO with a squirrel-cage rotor are designed for use in various industries and agriculture: to drive machines, pumps, compressors, fans, mills, food choppers, transport mechanisms, etc.

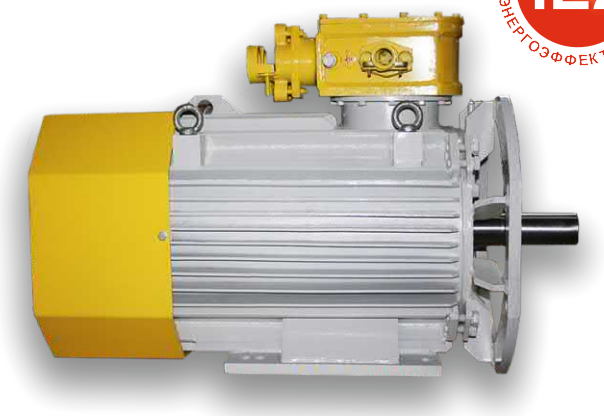
Electric motors AZO according to its purpose, installation and connecting dimensions are completely interchangeable with general industrial motors 4A, 5A, AIR, 2AI, 4AM, produced by enterprises of Russia and Ukraine.

Electric motors AZO are manufactured using structural materials and technology used in the manufacture of explosion-proof electric motors, which ensures high reliability of operation of these electric motors.

Electric motors are manufactured with rated voltage 220; 380 and 660V and power supply frequency 50Hz. At the customer's request, the electric motors can be manufactured with other voltages and at a frequency of 60 Hz. The electric motors are manufactured with three, and at customer's request with six output ends. The connection of the winding is "triangle" or "star".

In terms of design, the electric motors AZO can be manufactured in aluminum, steel or cast iron housing.

The electric motors AZOK - are asynchronous single-phase motors, designed to work from the network 50Hz, with voltage 220V. Electric motors are completed with condensers. In terms of installation and connection dimensions, degree of protection and constructive design, the AZOK electric motors correspond to AZO motors.



ELECTRIC MOTORS AZO-ME

Electric motors **AZO-ME** are designed for drive mechanism in indoor and outdoor instalations, which do not contain explosive and inflammable gases and dust.

Operation mode: continuous, S1, allow operation from frequency converter (in modes S8, S9, S10)

Climatic construction type:

У1, У2, У5, УХЛ2, УХЛ4, Т2, Т5

Mounting configuration:

IM1001, IM2001, IM3001, IM3011

Protection degree for:

housing and terminal box	IP54 IP55 (on order)
outdoor fan enclosure	IP20

Cooling method:

IC411	double-circuit cooling system. Internal circuit is closed, external circuit is open with a built-in fan located on the motor shaft and cooling the outer surface of the machine
IC516	double-circuit cooling system. Internal circuit is closed, external circuit is open with built-in heat-exchanger and free fan)at customer's request

These motors are manufactured with terminal box from top and also at customer's request with terminal box from the left and from the right. Motors have the right and the left direction of rotation.

The base equipment of motors provides:

- кstator winding insulation class – «H»
- stator winding temperature control with four wire четырехпроводными термопреобразователями с НСХ 50М в количестве 6 штук (по 2 штуки на фазу);
- temperature ccontrol of bearings by four-wire thermal converters with НСХ 50М in quantity of 2 pieces (1 piece on each bearing);
- places for vibration sensors installation in quantity of 6 pieces (3 pices on each bearing unit on three mutually perpendicular planes);
- bearing units replenishing and replacing lubricants;
- connection of two power cables, outer dimeter of which is up to 45 mm for motors with180-225 mm height of axis of rotation.

At customer's request motors are equipped with

- temperature control of stator winding sensors by four-wire thermal converters with НСХ 50П, 100П, Pt100 in quantity up to 12 pices for motors with 250-355 mm height of axis of rotation and up to 6 pieces – for motors with 180-225 mm height of axis of rotat
- TC-termistors of stator winding (instead of temperature relay);
- four-wire bearing temperature control sensors with НСХ 50П, 100П, Pt100
- vibration control sensors in quantity up to 6 pieces;
- otor speed sensors;
- selfregulating anti-condensation heating (instead of temperature relay and PTC-termistors);
- SKF bearings or bearings of the other manufacturers
- current-isolated bearing unit.

Table 1. Basic parameters of the electric motors AZO-ME 180-225

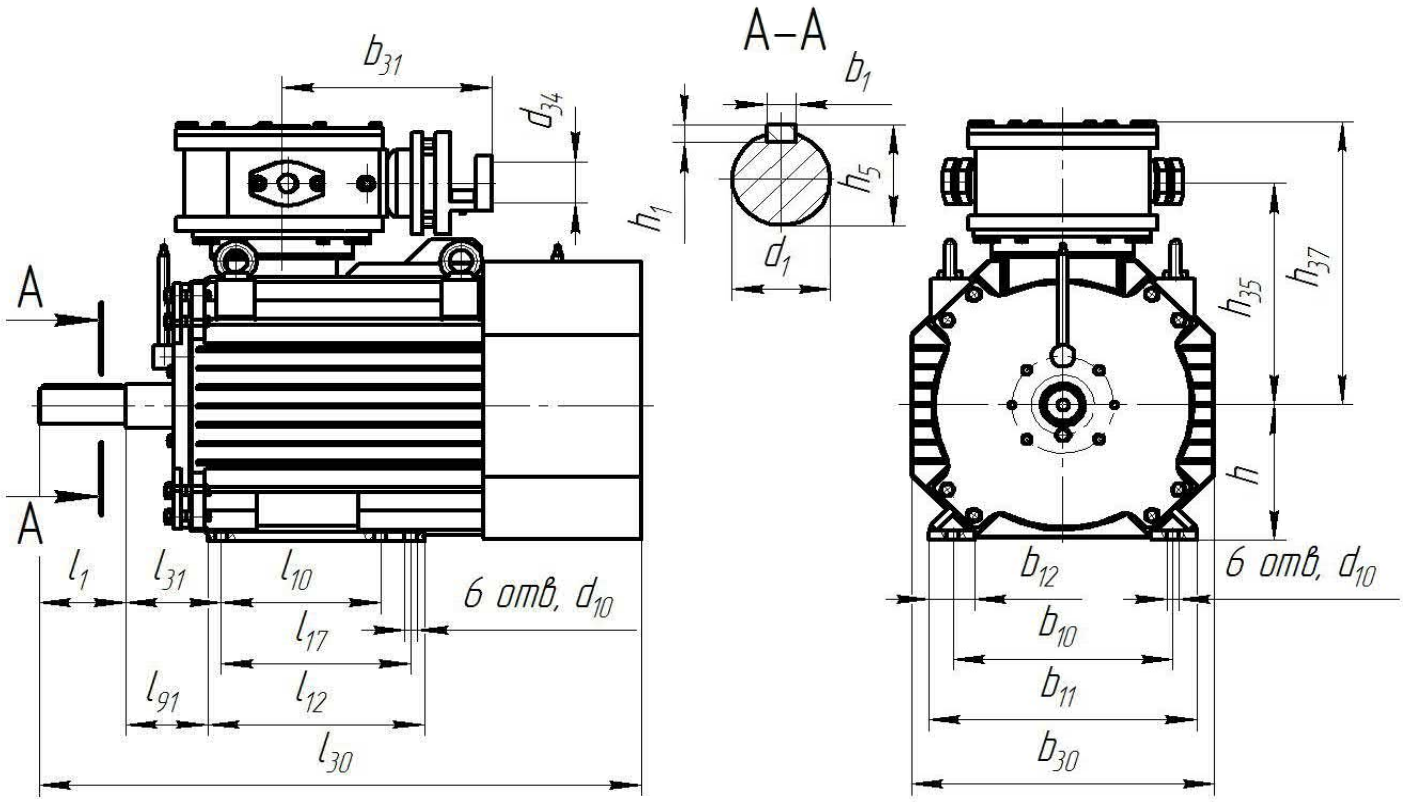
Type designation	power, kW	Rated current of stator, A*	rotational speed, rpm.**	efficiency, %	power factor	sliding, %	starting torque ratio	maximum torque ratio	starting current ratio
voltage 380/660 V 660/1140 V, network frequency 50Hz, 60Hz									
180S-2	22	39,5/22,8	3000/3600	91,3	0,92	1,5	1,5	3,0	7,1
		22,8/13,2		91,4	0,92				
180M-2	30	53,0/30,6		92,0	0,93	1,7	1,4	2,8	6,8
		30,8/17,8		92,0	0,93				
180S-4	22	41,2/23,8	1500/1800	92,1	0,87	1,6	1,9	2,8	7,2
		23,7/13,7		92,1	0,88				
180M-4	30	55,5/32,1		92,8	0,88	1,6	2,0	2,8	7,3
		32,0/18,5		92,6	0,88				
180M-6	18,5	37,2/21,5	1000/1200	90,3	0,83	1,9	1,9	2,9	6,4
		21,6/12,5		90,3	0,83				
180M-8	15	32,9/19,0	750/900	88,4	0,78	2,5	1,5	2,3	4,7
		18,9/10,9		88,6	0,78				
200M-2	37	65,8/38,0	3000/3600	92,6	0,92	1,5	1,3	2,8	6,8
		37,9/21,9		92,5	0,92				
200L-2	45	78,9/45,6		92,9	0,93	1,5	1,4	2,8	6,8
		45,7/26,4		93,1	0,93				
200M-4	37	69,2/40,0	1500/1800	93,0	0,87	1,4	1,9	2,7	6,9
		39,8/23,0		92,9	0,87				
200L-4	45	83,2/48,1		93,5	0,87	1,3	2,0	2,8	7,0
		48,2/27,9		93,4	0,87				
200M-6	22	41,7/24,1	1000/1200	91,6	0,87	1,8	1,7	2,6	6,5
		23,9/13,8		91,4	0,88				
200L-6	30	56,4/32,6		91,9	0,87	1,7	1,9	2,8	6,7
		32,9/19,0		91,8	0,87				
200M-8	18,5	38,2/22,1	750/900	90,6	0,81	2,0	1,7	2,4	5,4
		22,1/12,8		90,5	0,81				
200L-8	22	45,3/26,2		90,8	0,81	2,0	1,7	2,4	5,5
		26,4/15,3		90,8	0,80				
225M-2	55	97,8/56,5	3000/3600	95,4	0,89	1,2	1,3	4,3	7,5
		56,3/32,5		95,5	0,89				
225M-4	55	100,7/58,2	1500/1800	93,6	0,88	1,3	1,5	3,1	7,4
		57,8/33,4		93,7	0,89				
225M-6	37	69,7/40,3	1000/1200	92,3	0,87	1,6	1,4	3,0	6,9
		40,8/23,6		92,4	0,86				
225M-8	30	60,4/34,9	750/900	91,0	0,82	1,9	1,2	2,5	5,5
		34,9/20,2		91,1	0,82				

*** in numerator– voltage 380/660V, in denominator – for 660/1140V;**

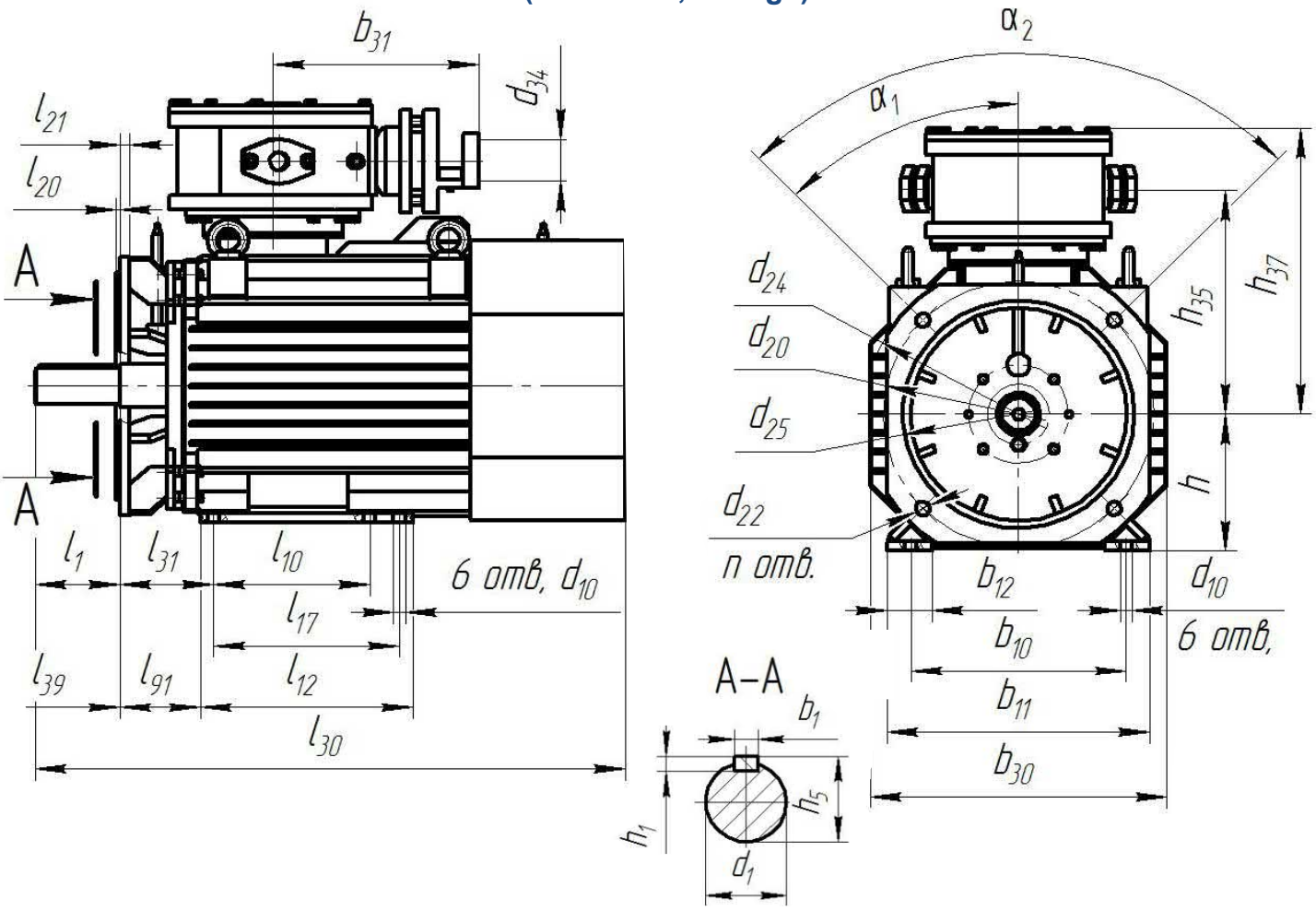
****in denominator for 50Hz, in denominator– for 60Hz.**

Table 2. dimensions value of the electric motors AZO-ME 180-225

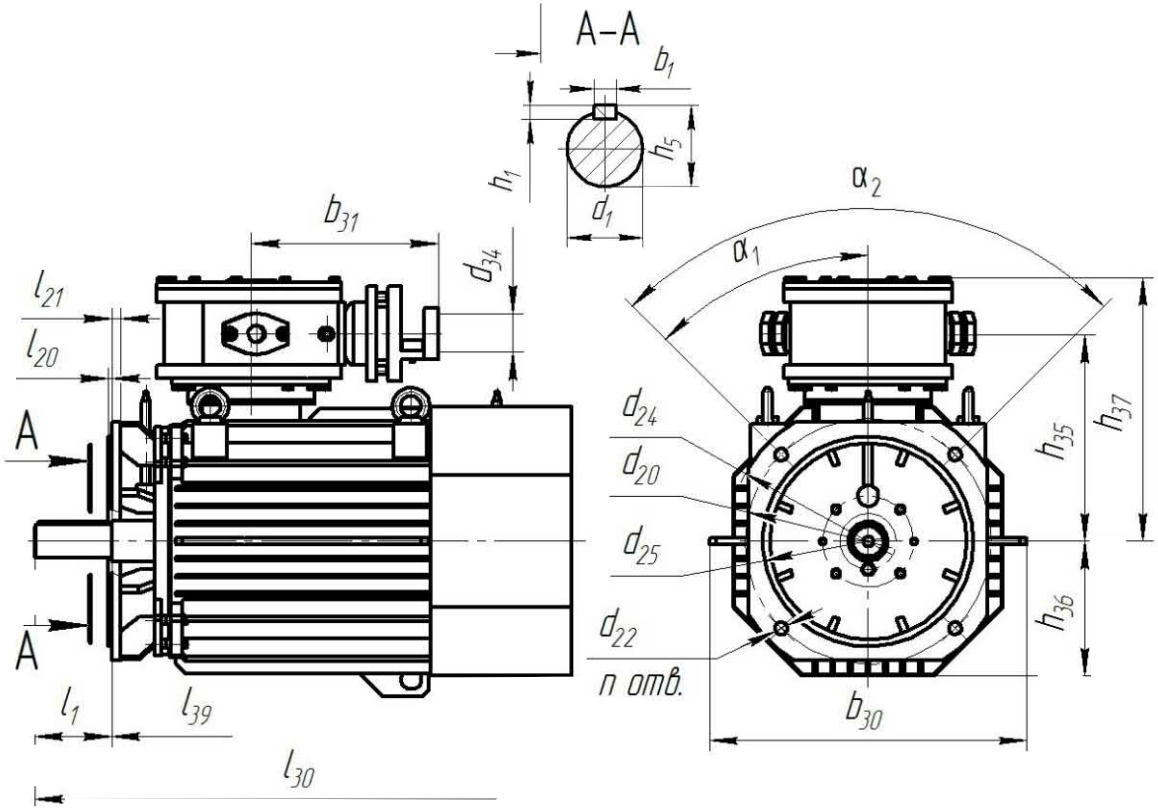
Type designation	l_1, mm	l_{10}, mm	l_{12}, mm	l_{17}, mm	l_{20}, mm	l_{21}, mm	l_{30}, mm	l_{31}, mm	l_{39}, mm	l_{91}, M	b_1, mm	b_{10}, mm	b_{11}, mm	b_{12}, mm	b_{30}, mm	b_{31}, mm	h, mm	h_1, mm	h_5, mm	h_{35}, mm	h_{36}, mm	h_{37}, mm	d_1, mm	d_{10}, mm	d_{20}, mm	d_{22}, mm	d_{24}, mm	d_{25}, mm	d_{34}, mm	n, pc.	α_1, °	α_2, °	mass kg
picture1. motors with mounting configuration IM1001 (horizontal, on legs)																																	
180S-2	110	203	275	241	-	-	750	121	-	104	14	279	340	60	385	270	180	9	51,5	295	-	380	48	15	-	-	-	-	45*2	-	-	-	260
180M-2							795																										275
180S-4							750				16							10	59,0				55										285
180M-4							795																										298
180M-6																																	272
180M-8																																	292
200M-2							840																										390
200L-2																																	430
200M-4	140	267	350	305			870	133		110	18	318	382	60	440		200	11	64,0	320		405	60	19										460
200L-4							945																										475
200M-6																																	370
200L-6							870																										400
200M-8																																	370
200L-8																																	400
225M-2	110	286	370	311			840	149		120	16	356	430	70		270	225	10	59,0				55											465
225M-4																																	469
225M-6	140						945				18							11	69,0				65											432
225M-8																																	428
picture2. motors with mounting configuration IM2001 (horizontal, on legs, with flange on shield, available from the other side)																																	
180S-2	110	203	275	241	5	13	750	121	0	104	14	279	340	60	385	270	180	9	51,5	295	-	380	48	15	350	19	400	300	45*2	4	45	90	260
180M-2							795																										275
180S-4							750				16							10	59,0				55										285
180M-4							795																										298
180M-6																																	272
180M-8																																	292
200M-2							840																										390
200L-2																																	430
200M-4	140	267	350	305		18	870	133		110	18	318	382	60	440		200	11	64,0	320		405	60	19						8	22,5		460
200L-4							945																										475
200M-6																																	370
200L-6							870																										400
200M-8																																	370
200L-8																																	400
225M-2	110	286	370	311			840	149		120	16	356	430	70		270	225	10	59,0				55		500		550	450					465
225M-4																																	469
225M-6	140						945				18							11	69,0				65										432
225M-8																																	428
picture 3. motors with mounting configuration IM3001 (horizontal, with flange on shield, available from the other side)																																	
180S-2	110	-	-	-	5	13	750	-	0	-	14	-	-	-	455	270	-	9	51,5	295	195	380	48	-	350	19	400	300	45*2	4	45	90	260
180M-2							795																										275
180S-4							750				16							10	59,0				55										285
180M-4							795																										298
180M-6																																	272
180M-8																																	292
200M-2							840																										390
200L-2																																	430
200M-4	140					18	870				18				505			11	64,0	320	220	405	60		400		450	350		8	22,5		460
200L-4							945																										475
200M-6																																	370
200L-6							870																										400
200M-8																																	370
200L-8																																	400
225M-2	110						840				16							10	59,0		250		55		500		550	450					465
225M-4																																	469
225M-6	140						945				18							11	69,0				65										432
225M-8																																	428
picture4. motors with mounting configuration IM3011 (vertical, shaft down, with flange on down shaft, available from the other side)																																	
180S-2	110	-	-	-	5	13	830	-	0	-	14	-	-	-	455	270	-	9	51,5	295	195	380	48	-	350	19	400	300	45*2	4	45	90	260
180M-2							875																										275
180S-4							830				16							10	59,0				55										285
180M-4							875																										298
180M-6																																	272
180M-8																																	292
200M-2							920																										390
200L-2																																	430
200M-4	140					18	950				18				505			11	64,0	320	220	405	60		400		450	350		8	22,5		460
200L-4							1025																										475
200M-6																																	370
200L-6							950																										400
200M-8																																	370
200L-8																																	400
225M-2	110						920				16							10	59,0		250		55		500		550	450					465
225M-4																																	469
225M-6	140						1025				18							11	69,0				65										432
225M-8																																	428



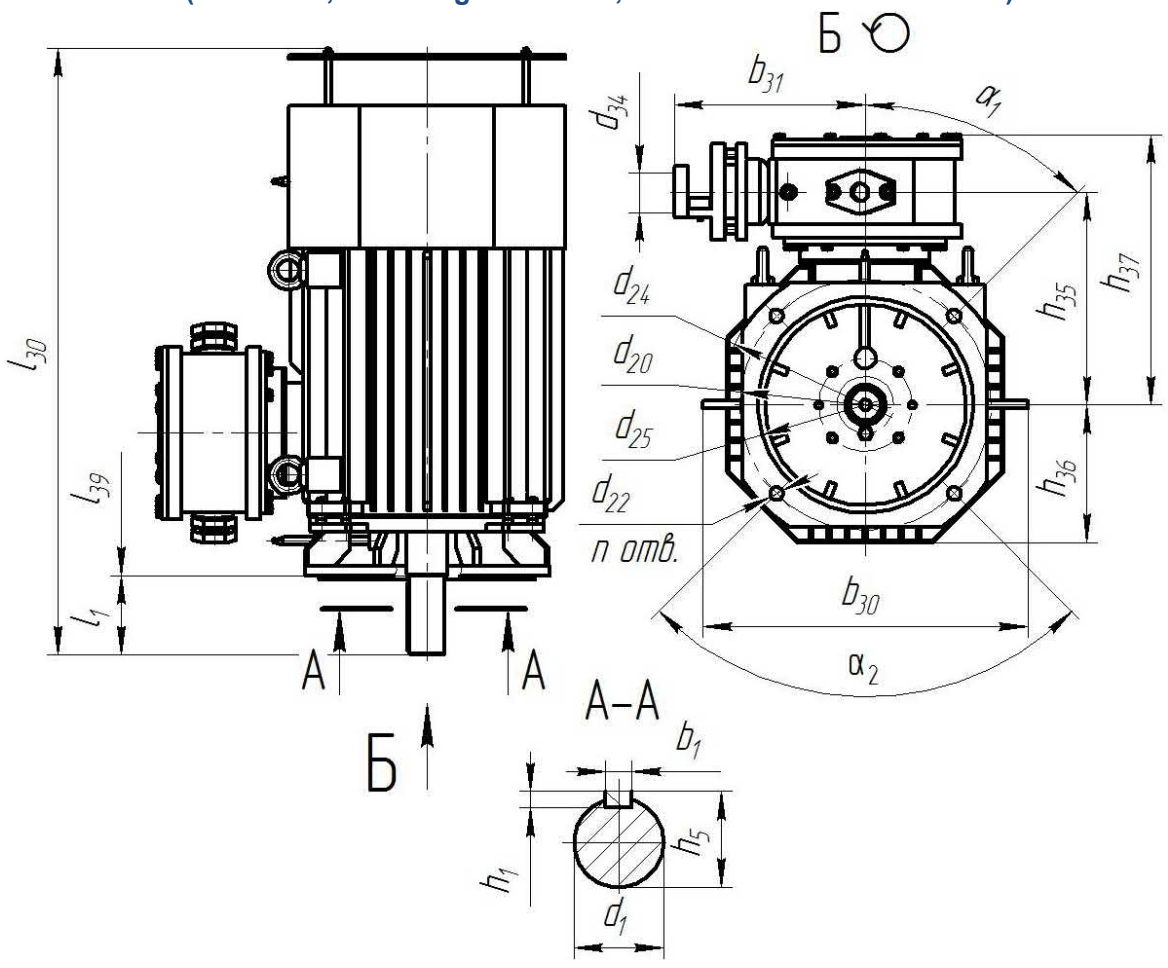
Picture 1. electric motors AZO-ME 180-225 IM1001 (horizontal, on legs)



picture 2. electric motors AZO-ME 180-225 IM2001 (horizontal, on legs, with flange on shield, available from the other side)



picture 3. electric motors AZO-ME 180-225 IM3001
(horizontal, with flange on shield, available from the other side)



picture 4. electric motors AZO-ME 180-225 IM3011
(vertical, shaft down, with flange on down shield, available from the other side)

ELECTRIC MOTORS AZO 63-200

Asynchronous three-phase electric motors of AZO type with a squirrel-cage rotor are designed to drive machines and mechanisms of general industrial application.

Electric motors are designed for continuous operation mode S1, allow operation in modes S2, S3, S6, S8,S9,S10. Run-up of the electric motor is performed by direct switching on the full voltage of 380V.

Insulation heat-resistance class:

«B»	for dimensions 63, 71, 80
«F»	for dimensions 90, 100, 112, 132, 160
«H»	for dimensions 180, 200

Operation conditions:

- - height above the sea level is up to 1000m;
- regarding environmental factors -M1.

Mounting configuration:

IM1081, IM2081, IM3081

Protection degree for:

housing and terminal box	IP54 (IP55 At customer's request)
outdoor fan enclosure	IP20

Cooling method:

IC411

Climatic construction type:

У2, УХЛ2, Т2

Construction:

-frame and bearing shields made of steel,

- squirrel cage rotor, filled with aluminum,

-closed boll bearings are used.

- stator winding is made of round copper enamelled wire

To connect the motors to the network is provided by:

- aluminum terminal box for dimensions **63-160** (allow turn to 90°);

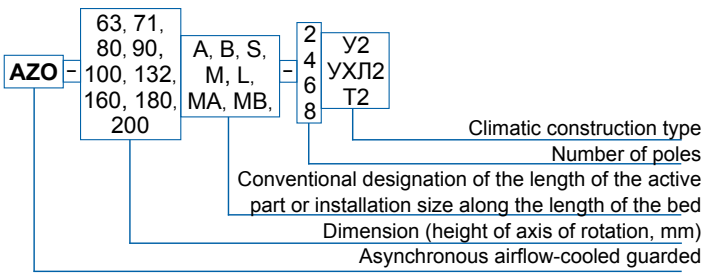
- steel terminal box with two cable inputs and built-in thermal protection for dimensions **180-200**

The electric motors are manufactured with one cylindrical protruding end pof the shaft

The electric motors operate in any direction of rotation.

Main advantages of the electric motors AZO over analogues consists of their manufacture according to the technology of explosion-proof electric motors, which ensures high quality and increased operational reliability.

TYPE DESIGNATION



TECHNICAL PARAMEETRS OF THE ELECTRIC MOTORS AZO

Type designation	power, kW	rated current Un=380V A	$I_п/I_н$	$M_п/M_н$	M max/M н	КПД,%	Cos φ	Inertia moment, $H*m^2$	mass, kg
3000 rpm.									
AZO 63A-2	0,37	0,9	5,0	2,6	2,6	73,2	0,84	0,0055	9,0
AZO 63B-2	0,55	1,3	5,9	2,8		76,2	0,85	0,0073	9,5
AZO 71A-2	0,75	1,7		2,7		78,2	0,86	0,0108	12,0
AZO 71B-2	1,1	2,4	5,3	2,6	2,7	80,0	0,87	0,0123	13,5
AZO 80A-2	1,5	3,1	6,0	2,3	2,5	81,0	0,90	0,022	21,0
AZO 80B-2	2,2	4,4				83,0	0,91	0,0295	24,5
AZO 90L-2	3,0	6,4		2,0	2,4	82,5	0,87	0,049	30,0
AZO 100S-2	4,0	8,3	6,7	2,1	2,5	84,0		0,0735	37,0
AZO 100L-2	5,5	10,9				85,0	0,88	0,098	43,0
AZO 112M-2	7,5	15,0	7,0	2,2	2,8	86,0	0,87	0,147	49,0
AZO 132M-2	11	21,0	6,5	1,9	2,9	86,5	0,89	0,3675	82,0
AZO 160S-2	15	28,6	6,0	1,4	2,5	89,5		0,735	108,0
AZO 160M-2	18,5	35,0	7,2	1,6	2,6	90,0	0,90	0,800	118,0
AZO 180S-2	22	39,9	7,4	1,4	3,2	92,5	0,91	0,8800	207,0
AZO 180M-2	30	54,0	7,4	1,5				1,0500	222,0
AZO 200M-2	37,0	66,2	7,3	1,3	3,1	93,0	0,91	1,2100	335,0
AZO 200L-2	45,0	80,2	7,5	1,3	3,1	93,5	0,91	1,3600	375,0
1500 rpm.									
AZO 63A-4	0,3	0,7	4,1	2,2	2,3	68,0	0,73	0,0073	9,0
AZO 63B-4	0,4	1,0				71,2	0,77	0,0098	9,5
AZO 71A-4	0,6	1,4				74,4		0,0155	12,5
AZO 71B-4	0,8	1,9	4,4	2,0		76,2	0,78	0,0228	13,5
AZO 80A-4	1,1	2,6	5,1	1,8		79,0	0,81	0,0318	21,0
AZO 80B-4	1,5	3,6				80,3	0,80	0,044	24,5
AZO 90L-4	2,2	5,2	6,0	2,0	2,6	81,0		0,0735	30,0
AZO 100S-4	3,0	7,0	5,8	1,9	2,5	81,5		0,1225	38,0
AZO 100L-4	4,0	8,7		2,0		84,0	0,82	0,1518	46,0
AZO 112M-4	5,5	11,6	7,0	2,2	2,8	85,5	0,84	0,2453	51,0
AZO 132S-4	7,5	15,0	6,5	2,1		87,0	0,85	0,585	76,0
AZO 132M-4	11	21,5		2,4	3,0	88,5	0,86	0,735	87,0
AZO 160S-4	15	30,1		1,5	2,3	90,0	0,84	1,420	114,0
AZO 160M-4	18,5	36,6		1,9	2,6	90,5	0,85	1,740	124,0
AZO 180S-4	22	40,9	6,3	1,6	2,9	93,2	0,88	1,5300	124,0
AZO 180M-4	30	55,4	6,3					1,8700	124,0
AZO 200M-4	37,0	67,4	7,5	1,5	2,7	93,4	0,87	2,1200	405,0
AZO 200L-4	45,0	81,8	7,5	1,6	2,9	93,8	0,87	2,5500	420,0
1000 rpm.									
AZO 71A-6	0,37	1,1	3,6	1,8	2,0	70,0	0,73	0,0223	12,5
AZO 71B-6	0,55	1,6				71,0	0,75	0,027	13,5
AZO 80A-6	0,75	2,1	4,5			72,1	0,74	0,044	21,0
AZO 80B-6	1,1	3,0				74,2	0,75	0,0588	25,5
AZO 90L-6	1,5	4,1		2,1	2,3	76,5	0,72	0,075	30,0
AZO 100L-6	2,2	5,5	5,5	1,8	2,4	80,0	0,73	0,1963	37,0
AZO 112MA-6	3,0	7,2	6,0	2,0	2,7	79,0	0,78	0,270	45,0
AZO 112MB-6	4,0	9,3	6,6	2,2		80,0		0,3425	52,0
AZO 132S-6	5,5	12,0	6,5			84,0	0,8	0,8325	82,0
AZO 132M-6	7,5	16,0				85,0	0,81	1,005	93,0
AZO 160S-6	11	22,9	6,2	1,6	2,1	88,0	0,83	1,2200	120,0
AZO 160M-6	15	30,1	6	2,0	2,5		0,86	1,6900	130,0
AZO 180M-6	18,5	36,6	5,2	1,4	2,3	90,2	0,85	1,7600	218,0
AZO 200M-6	22,0	42,3	6,5	1,5	2,8	91,6	0,86	2,2700	315,0
AZO 200L-6	30,0	56,8	6,5	1,6	2,8	92,0	0,87	2,7400	345,0

Type designation	Power, kW	rated current Un=380V, A	$I_п / I_н$	$M_п / M_н$	M max/M н	КПД,%	Cos φ	Inertia moment, H*m²	mass, kg
750 rpm.									
AZO 100L-8	1,5	4,7	4,0	1,6	2,0	74,0	0,65	0,1958	39,0
AZO 112MA-8	2,2	5,9	4,9	1,9	2,4	75,0	0,70	0,300	45,0
AZO 112MB-8	3,0	8,0				78,0		0,3425	52,0
AZO 132S-8	4,0	10,5		2,0	2,6	80,0		0,755	82,0
AZO 132M-8	5,5	14,5			2,1	82,0	0,72	0,8325	93,0
AZO 160S-8	7,5	17,5	5,5		2,5	86,0	0,76	1,2300	120,0
AZO 160M-8	11	25,3					0,77	1,7000	130,0
AZO 180M-8	15	32,0	4,8	1,4	2,3	88,5	0,80	1,9100	222,0
AZO 200M-8	18,5	22,2	5,8	1,4	2,6	91,0	0,80	2,1400	315,0
AZO 200L-8	22,0	26,3	5,8	1,4	2,6	91,4	0,80	2,7700	345,0

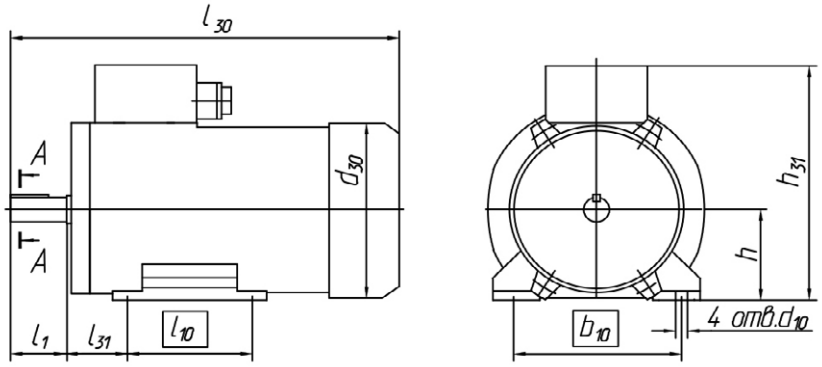
OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AZO 63-180

Type designation	mounting configuration	№ pic.	Гdimensions, mm, not more						installation and mounting sizes, mm														
			d_{30}	h_{31}	h_{37}	l_{30}	b_{31}	d_{24}	b_1	b_{10}	d_1	d_{10}	d_{20}	d_{22}	d_{25}	h	h_1	h_5	l_1	l_{10}	l_{20}	l_{21}	l_{31}	l_{39}
AZO 63	IM1081	1	155	214	-	275	130	-	5	100	14	7	-	-	-	63	5	16,0	30	80	-	-	40	-
	IM2081	2						160					130	10	110						3,5	10		0
	IM3081	3		-	151					-		-				-				-			-	
AZO 71	IM1081	1	170	229	-	305		-	6	112	19	7	-	-	-	71	6	21,5	40	90	-	-	45	-
	IM2081	2						200					165	12	130						3,5	12		0
	IM3081	3		-	158					-		-				-				-			-	
AZO 80	IM1081	1	190	247	-	350		-		125	22	10	-	-	-	80		24,5	50	100	-	-	50	-
	IM2081	2						200					165	12	130						3,5	12		0
	IM3081	3		-	167					-		-				-				-			-	
AZO 90	IM1081	1	210	285	-	410		-	8	140	24	10	-	-	-	90	7	27,0		125	-	-	56	-
	IM2081	2						250					215	15	180						4,0	14		0
	IM3081	3		-	195					-		-				-				-			-	
AZO 100L	IM1081	1	232	305	-	460		-		160	28	12	-	-	-	100		31,0	60	140	-	-	63	-
	IM2081	2						250					215	15	180						4,0	14		0
	IM3081	3		-	205					-		-				-				-			-	
AZO 100S	IM1081	1		305	-	410		-		160		12	-	-	-	100		31,0		112	-	-	63	-
	IM2081	2						250					215	15	180						4,0	14		0
	IM3081	3		-	205					-		-				-				-			-	
AZO 112M	IM1081	1	260	347	-	485	190	-		190	32	12	-	-	-	112		35,0		140	-	-	70	-
	IM2081	2						300					265	15	230						4,0	16		0
	IM3081	3		-	235					-		-				-				-			-	
AZO 132S	IM1081	1	302	387	-	487		-	10	216	38	12	-	-	-	132	8	41,0	80	140	-	-	89	-
	IM2081	2						350					300	19	250						5,0	18		0
	IM3081	3		-	255					-		-				-				-			-	
AZO 132M	IM1081	1		387	-	532		-		216		12	-	-	-	132				178	-	-	89	-
	IM2081	2						350					300	19	250						5,0	18		0
	IM3081	3		-	255					-		-				-				-			-	
AZO 160S2	IM1081	1	340	460	-	585		-	12	254	42	15	-	-	-	160	9	45,0	110	178	-	-	108	-
	IM2081	2						350					300	19	250						5,0	40		0
	IM3081	3		-	300					-		-				-				-			-	
AZO 160S 4,6,8	IM1081	1		460	-			-	14	254	48	15	-	-	-	160		51,5		178	-	-	108	-
	IM2081	2						350					300	19	250						5	40		0
	IM3081	3		-	300					-		-				-				-			-	

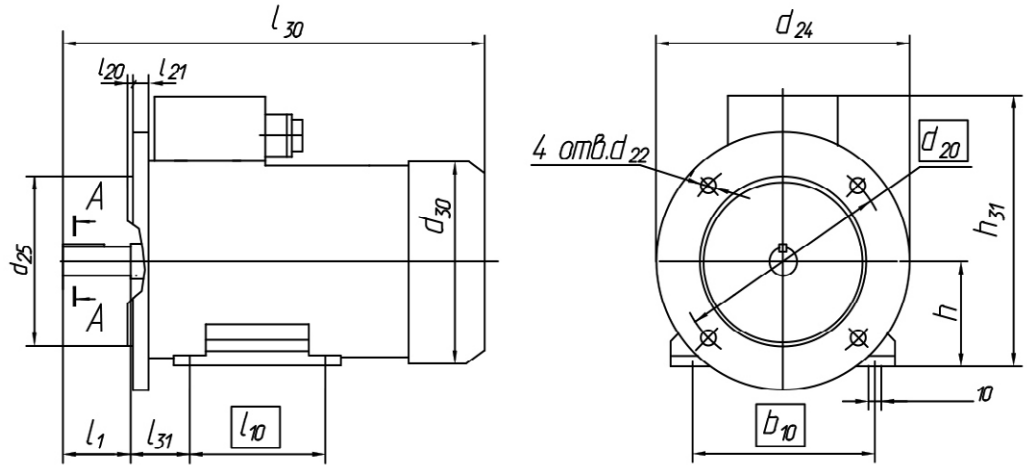
OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AZO 63-180 (continuation of table)

type designation	mounting configuration	№ pic.	dimensions, mm, not more						installation and mounting sizes mm																
			d_{30}	h_{31}	h_{37}	l_{30}	b_{31}	d_{24}	b_1	b_{10}	d_1	d_{10}	d_{20}	d_{22}	d_{25}	h	h_1	h_5	l_1	l_{10}	l_{20}	l_{21}	l_{31}	l_{39}
AZO 160M2	IM1081	1	340	460	-	645	190	-	12	254	42	15	-	-	-	160	8	45,0	110	210	-	-	108	-
	IM2081	2						350					300	19	250						5	40		0
	IM3081	3		-	300					-		-				-				-			-	
AZO 160M 4,6,8	IM1081	1		460	-			-	14	254	48	15	-	-	-	160	9	51,5		210	-	-	108	-
	IM2081	2						350					300	19	250						5	40		0
	IM3081	3		-	300					-		-				-				-			-	
AZO 180S2	IM1081	1	366	565	-	712	280	-	14	279		15	-	-	-	180				203	-	-	121	-
	IM2081	2						400					350	19	300						5,0	15		0
	IM3081	3		-	385					-		-				-				-			-	
AZO 180S4	IM1081	1		565	-			-	16	279	55	15	-	-	-	180	10	59,5		203	-	-	121	-
	IM2081	2						400					350	19	300						5,0	15		0
	IM3081	3		-	385					-		-				-				-			-	
AZO 180M2	IM1081	1		565	-	757		-	14	279	48	15	-	-	-	180	9	51,5		241	-	-	121	-
	IM2081	2						400					350	19	300						5,0	15		0
	IM3081	3		-	385					-		-				-				-			-	
AZO 180M 4,6,8	IM1081	1		565	-			-	16	279	55	15	-	-	-	180	10	59,5		241	-	-	121	-
	IM2081	2						400					350	19	300						5,0	15		0
	IM3081	3		-	385					-		-				-				-			-	

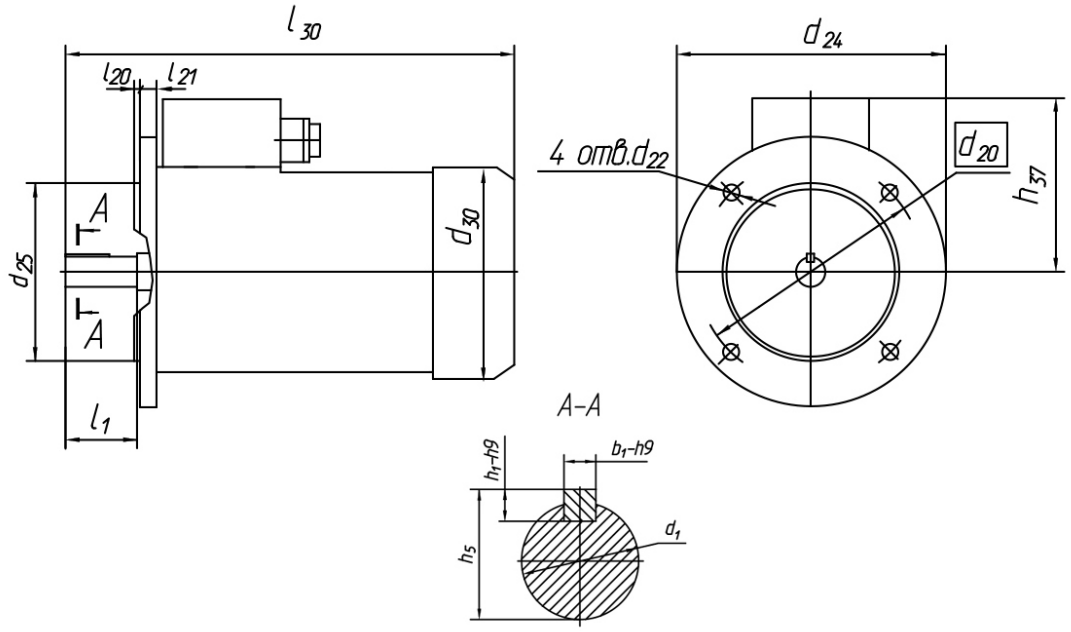
OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AZO 63-180



Picture 1



picture 2

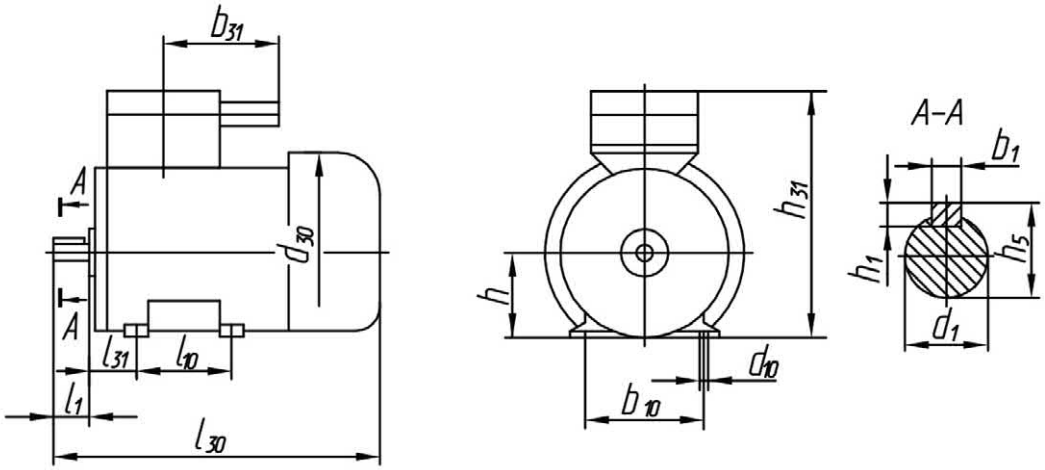


Picture 3

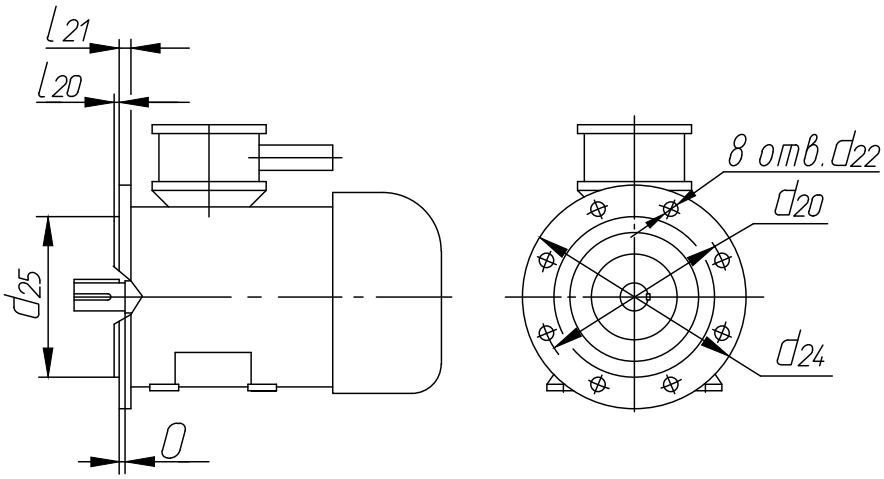
OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AZO 200

Type designation	mounting configuration	№ pic.	dimensions, mm, not more						installation and mounting sizes, mm																				mass, kg
			d_{30}	h_{31}	h_{37}	l_{30}	b_{31}	d_{24}	b_1	b_{10}	d_1	d_{10}	d_{20}	d_{22}	d_{25}	h	h_1	h_s	l_1	l_{10}	l_{20}	l_{21}	l_{31}	l_{39}	l_0	d_s	α	n	
AZO 200M2	IM1081	1	430	605	-	935	280	-	16	318	55	15	-	-	-	200	10	59,0	110	267	-	-	133	-	36	M12	-	-	255
	IM2081	2						450					400	19	350						5,0	15		0			22°30`	8	280
	IM3081	3		-	405					-		-				-				-			-						270
AZO 200L2	IM1081	1		605	-	985		-	16	318	55	15	-	-	-	200	10	59,0		305	-	-	133	-			-	-	265
	IM2081	2						450					400	19	350						5,0	15		0			22°30`	8	290
	IM3081	3		-	405					-		-				-				-			-						280
AZO 200M4	IM1081	1		605	-	1015		-	18	318	60	15	-	-	-	200	11	64,0		267	-	-	133	-			-	-	260
	IM2081	2			405			450					400	19	350						5,0	15		0			22°30`	8	285
	IM3081	3		-						-		-				-				-			-						275
AZO 200L4	IM1081	1		605	-	1035		-	18	318	60	15	-	-	-	200	11	64,0		305	-	-	133	-			-	-	280
	IM2081	2						450					400	19	350						5,0	15		0			22°30`	8	305
	IM3081	3		-	405					-		-				-				-			-						295
AZO 200M6	IM1081	1	430	605	-	875	280	-	18	318	60	15	-	-	-	200	11	64,0	140	267	-	-	133	-	36	M12	-	-	260
	IM2081	2						450					400	19	350						5,0	15		0			22°30`	8	285
	IM3081	3		-	405					-		-				-				-			-						275
AZO 200L6	IM1081	1		605	-	915		-	18	318	60	15	-	-	-	200	11	59,5		305	-	-	133	-			-	-	280
	IM2081	2						450					400	19	350						5,0	15		0			22°30`	8	305
	IM3081	3		-	405					-		-				-				-			-						295
AZO 200M8	IM1081	1		605	-	875		-	18	318	60	15	-	-	-	200	11	64,0		267	-	-	133	-			-	-	260
	IM2081	2						450					400	19	350						5,0	15		0			22°30`	8	285
	IM3081	3		-	405					-		-				-				-			-						275
AZO 200L8	IM1081	1		605	-	915		-	18	318	60	15	-	-	-	200	11	64,0		305	-	-	133	-			-	-	280
	IM2081	2						450					400	19	350						5,0	15		0			22°30`	8	305
	IM3081	3		-	405					-		-				-				-			-						295

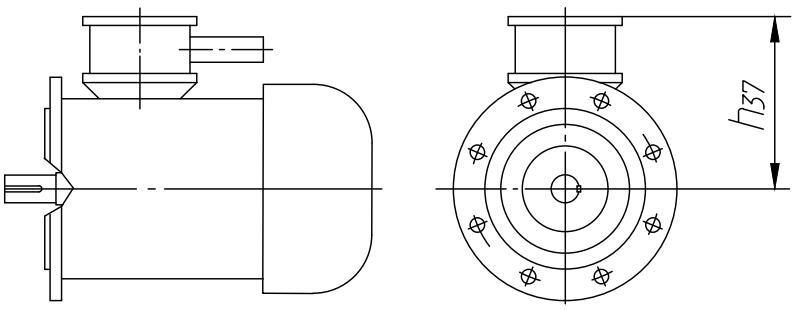
OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AZO 200



Picture 1



picture 2



picture 3

ELECTRIC MOTORS AZO 225

Asynchronous three-phase electric motors AZO with a squirrel-cage rotor are designed to drive machines and mechanisms of general industrial application.

Main characteristics:

Dimension (height of axis of ro)t atioofn the motors:
225mm.
Motor power: from 22 kW up to 75 kW.
Voltage: 380/660V; 660/1140V.
The phases connection of the stator winding - star/triangle voltages.

Current frequency - 50 Hz. At customer's request - 60Hz.

Number of motor poles - 2, 4, 6, 8.

Synchronous rotational speed of the shaft: 750, 1000, 1500 3000 rpm.

Electric motors are designed for continuous operation S1 and allow operation in modes S2, S3, S6, S8, S9, S10.

Run-up of the electric motors is performed by direct switching on the full voltage of the network.

Climatic construction type according to GOST15150:

У1, У2, У5, Т2, Т5, УХЛ1, ХЛ1

The maximum allowable sound power levels of the electric motors sound operating without load at a frequency of 50Hz, correspond to class 1 according to GOST IEC 60034-9-2014.

The maximum root mean square value of vibration speed should correspond to GOST IEC 60034-14-2014:

The nominal values of the basic parameters of electric motors are shown in Table 1.

Overall dimensions, installation and mounting sizes of the electric motors are shown on pictures 1, 2 and in the table 2.

Operation conditions:

- height above the sea level is up to 1000m;
- regarding environmental factors -M1 according to GOST 17516.1.

The motor is connected to the drive mechanism by means of gear or elastic sleeve-finger couplings.

The motor start is direct, it provides both at the rated voltage and when the voltage drops during the start period -up to 0.8Unom.

Mounting configuration according to GOST 2479:

IM1081, IM4081, IM9781

Protection degree according to GOST IEC 60034-5-2011:

of the motor housing	**IP54 (IP55 at customer's request)**
of the terminal box	**IP55**
the outdoor fan enclosure	**IP20**

Cooling method: IC411

Construction:

The bed and bearing shields are made of steel.

The rotor is short-circuited, covered with aluminum.

Electric motors are manufactured with one cylindrical protruding shaft end.

Motors are manufactured with rolling bearings of accuracy class not lower than 6 in accordance with GOST7242. Lubrication of bearings is consistent.The design of the bearing units provides for the periodic replenishment of lubricant through the built-in box lubricator.

At customer's request the electric motors are equipped with bearings produced by SKF (Sweden).

The electric motors A ZO-M225M-2,4,6,8 have «mesh» stator winding.

The electric motors AZO-M225MH-2,4,6,8 and AZO-M225SA, SB, M, L-C-4 have stator winding of rigid bobbins.

The insulating materials of stator winding have heatresistance class «F». (temperature index 155ºC) according to GOST 8865-93.

At customer's request it is possible to produce stator winding using insulating materials of heat-resistance class «H (temperature index 180ºC) according to GOST 8865-93.

To protect against overheating, the electric motors are equipped with at least two differential temperature relays built into the stator winding, the output ends of which are brought into the power terminal box. At customer's request, to control the temperature of the bearing units and the motor housing, it is possible to complete the motors with temperature control sensors (thermal converters) with rated resistance 50 Ohm, 100 Ohm types ТС044-50М, 100М, 50П, 100П.

Six output ends of the stator winding are brought into the terminal box of the electric motor. Switching the stator winding connection scheme (Δ-Y) is performed in the power terminal box by reinstalling the metal jumpers (plates). The terminal box provides flexible and armored power cable entry with an outer diameter up to 48mm. and control cable with outer diameter up to 24mm through separate tubes. The terminal boxes of the AZO-M 225SA, SB, M, L-C-4 motors are equipped with two tubes for the input of power cables.

Electric motors are manufactured with the location of the terminal box on the right viewed from the side of the working end of the shaft.

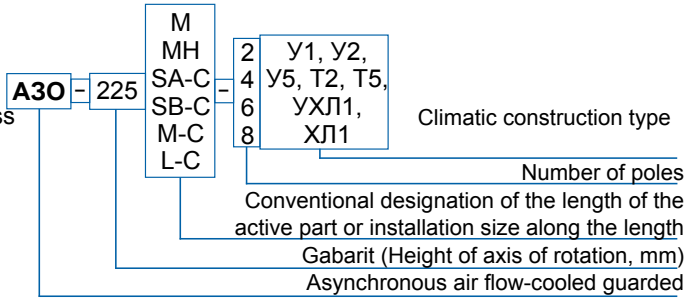
At customer' request the electric motors are manufactured with the location of the terminal box on the left, from the to of the stator housing, viewed from the side of the working end of the shaft. On electric motors with mounting configuration IM4081 the location of power terminal box (from the left to the right) is changed by turning the motor 180ºC relative to the axis of rotation of the rotor of the electric motor.

Cooling method of electric motors is ICA0141 (blown with self-ventilation).

At customer's request, the electric motors can be manufactured with forced ventilation system.

Electric motors operate both right and left direction of rotation. The change of rotation direction is made after a complete stop of the electric motor, by switching phases.

TYPE DESIGNATION



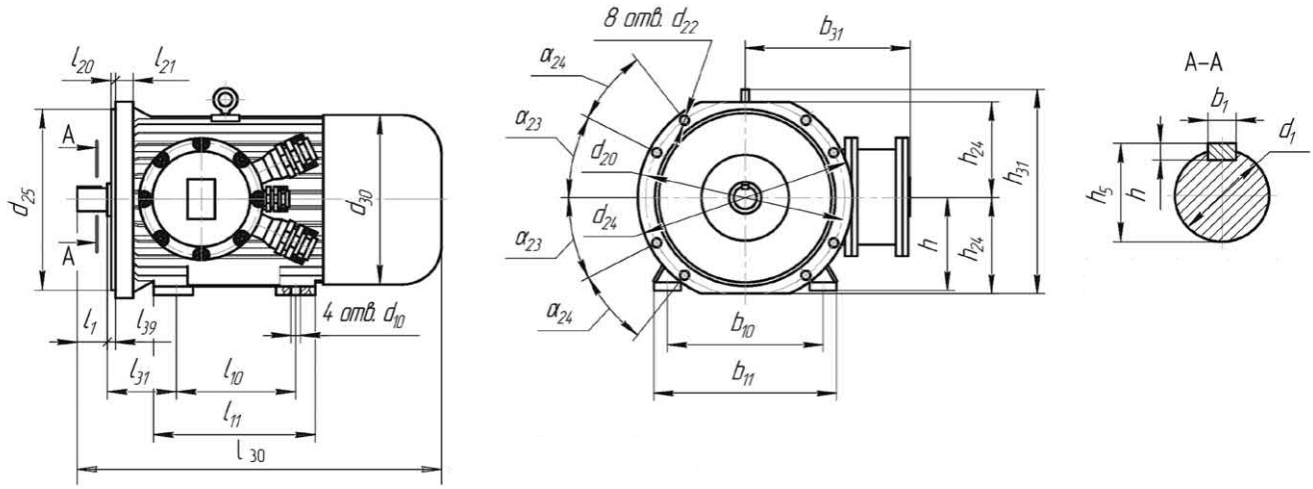
TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AZO 225

Type designation	power, kW	VOLTAGE, V	Rotational speed, rpm.	sliding, %	efficiency, %	Cos φ	rated current A	$M_{макс}/M_{н}$	$M_{пуск}/M_{н}$	$M_{мин}/M_{н}$	$I_{пуск}/I_{н}$	mass, kg
AZO 225M-2	55,0	380/660	3000	2,0	92,3	0,91	99/57	3,0	1,5	1,1	7,5	415
		660/1140					57/33					
AZO 225M-4	55,0	380/660	1500	1,5	93,0	0,90	100/58	2,8			7,0	419
		660/1140					58/33					
AZO 225M-6	37,0	380/660	1000	1,8	91,4	0,87	72/41	2,5	1,2	1,0	6,5	382
		660/1140					41/24					
AZO 225M-8	30,0	380/660	750	2,0	90,7	0,83	60/35	2,3			6,0	378
		660/1140					35/20					
AZO 225MH-2	55,0	380/660	3000	2,0	92,1	0.90	101/58	3,2	1,5	1,1	7,5	415
		660/1140					58/34					
AZO 225MH-4	55,0	380/660	1500	1,5	92,7	0,89	101/58	2,9			7,0	419
		660/1140					58/34					
AZO 225MH-6	37,0	380/660	1000	1,8	91,2	0,86	72/41	2,6	1,3	1,0	6,5	382
		660/1140					41/24					
AZO 225MH-8	30,0	380/660	750	2,0	90,5	0,82	61/35	2,4			6,0	378
		660/1140					35/20					
AZO 225SA-C-4	22,0	380/660	1500	2,0	91,0	0,86	43/25	3,1	3,0	1,5	7,5	356
		660/1140					25/14					
AZO 225SB-C-4	37,0	380/660		2,0	92,0		71/41					402
		660/1140					41/24					
AZO 225M-C-4	55,0	380/660		1,6	92,5	0,87	104/60					525
		660/1140					60/35					
AZO 225L-C-4	75,0	380/660		1,4	93,0		141/81	3,0	2,8			545
		660/1140					81/47					

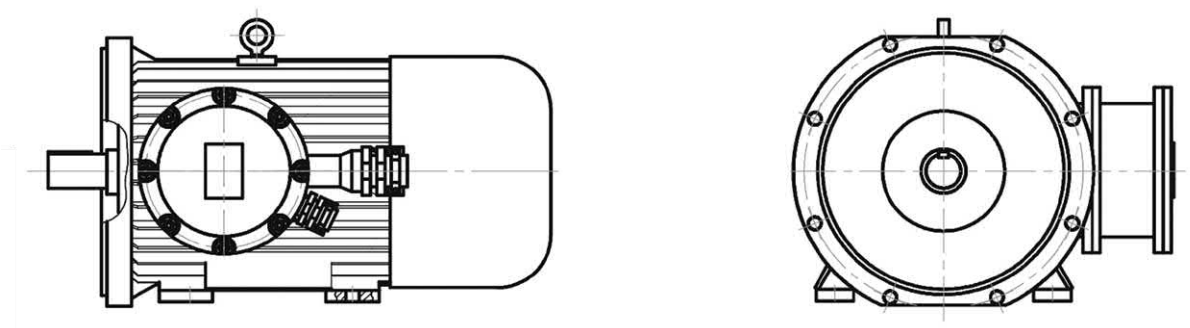
OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AZO 225

Type designation	mounting configuration	№ pic.	l_1	l_{10}	l_{11}	l_{20}	l_{21}	l_{30}	l_{31}	l_{39}	b_1	b_{10}	b_{11}	b_{31}	h	h_1	h_5	h_{24}	h_{31}	d_1	d_{10}	d_{20}	d_{22}	d_{24}	d_{25}	d_{30}	α_{23}	α_{24}°
AZO 225M, MH-2	IM1081	2	110	311	407	-	-	910	149	-	16	356	430	445	225	10	59	-	510	55	19	-	-	-	-	490	-	-
	IM9781					5	22			0								255				500	19	550	450		22,5	45,0
	IM3081			-	-				-			-	-		-				-		-							
AZO 225M, MH-4	IM1081		140	311	407	-	-	940	149	-	18	356	430		225	11	69	-	510	65	19	-	-	-	-		-	-
	IM9781					5	22			0								255				500	19	550	450		22,5	45,0
	IM3081			-	-				-			-	-		-				-		-							
AZO 225M, MH-6	IM1081			311	407	-	-		149	-		356	430		225			-	510		19	-	-	-	-		-	-
	IM9781					5	22			0								255				500	19	550	450		22,5	45,0
	IM3081			-	-				-			-	-		-				-		-							
AZO 225M, MH-8	IM1081			311	407	-	-		149	-		356	430		225			-	510		19	-	-	-	-		-	-
	IM9781					5	22			0								255				500	19	550	450		22,5	45,0
	IM3081			-	-				-			-	-		-				-		-							
AZO 225SA-C-4	IM1081	1	76	286	382	-	-	800	149	-		356	430		225		64	-	510	60	24	-	-	-	-		-	-
	IM9781					5	51			15,5								240				520	24	560	470		27,5	25,0
	IM4081			-					-			-	-		-				-		-							
AZO 225SB-C-4	IM1081			286	382	-	-		149	-		356	430		225			-	510		24	-	-	-	-		-	-
	IM9781					5	51			15,5								240				520	24	560	470		27,5	25,0
	IM4081			-					-			-	-		-				-		-							
AZO 225M-C-4	IM1081			311	407	-	-	920	168	-		406	490		225			-	510		24	-	-	-	-		-	-
	IM9781					5	51			15,5								240				520	24	560	470		27,5	25,0
	IM4081			-	-				-			-			-				-		-							
AZO 225L-C-4	IM1081			311	407	-	-		168	-		406	490		225			-	510		24	-	-	-	-		-	-
	IM9781					5	51			15,5								240				520	24	560	470		27,5	25,0
	IM4081			-	-				-			-			-				-		-							

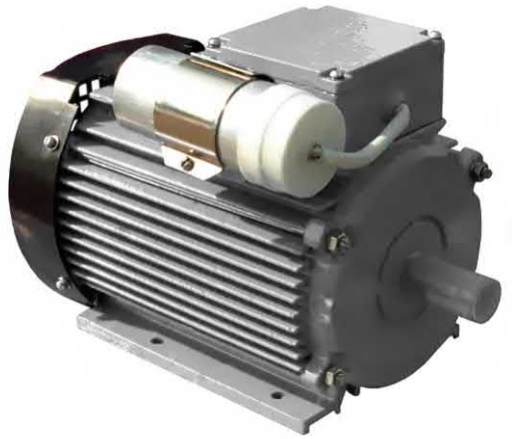
OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AZO 225



Picture 1



Picture 2



ELECTRIC MOTORS AZOK

Asynchronous single-phase condenser electric motors AZOK with a squirrel-cage rotor are designed to drive different devices and mechanisms.

Nominal operation mode: continuous S1.

Electric motors allow operation in modes S2, S3.

Supply voltage 220 V.

Frequency 50Hz.

Вид климатического исполнения:

У2, УХЛ2, Т2

Конструктивное исполнение по способу монтажа:

АЗОК 71	IM1081, IM2081, IM3081
АЗОК 80	IM1081, IM2081, IM3081, IM1281, IM3581

Степень защиты:

корпуса и коробки выводов	IP54 (IP55 по заказу потребителя)
кожуха наружного вентилятора	IP20

Способ охлаждения:

ICA 411 according to GOST R MEK 60034-6-2012

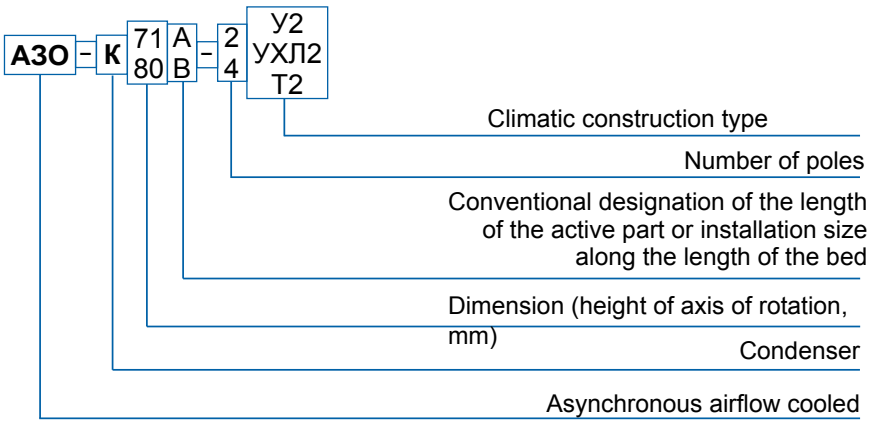
Heat-resistance class «B».

Main advantages of electric motors AZOK over analogues is manufacture of them accirding to explosion proof motors technology, this ncreases high quality and operational reliability.

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS AZOK

Type designation	power, kW	rated current Un=220V, A	Cos φ	effic. ,%	In/Iн	Mn/Mн	Mмах/Mн	capacity of condenser, μF		inertia moment, H*m2	mass, kg
								operation	start up		
3000 rpm.											
AZOK 71A2	0,55	3,8	0,96	70,0	5,6	0,5	1,8	10	-	0,0108	12
AZOK 71B2	0,75	5,1	0,98	72,0				20	-	0,0123	
AZOK 80A2	1,1	7,5	0,93						80	0,022	21
AZOK 80B2	1,5	10	0,96	70,0					125	0,0295	
1500 rpm.											
AZOK 71A4	0,37	2,5	0,90	60,0	6,2	0,5	1,8	10	-	0,0155	12
AZOK 71B4	0,55	5,2	0,80		5,6			20	-	0,0228	
AZOK 80A4	0,75	6,3	0,90		5,0	0,6			40	0,0318	21
AZOK 80B4	1,1	10,5	0,80					30	80	0,044	

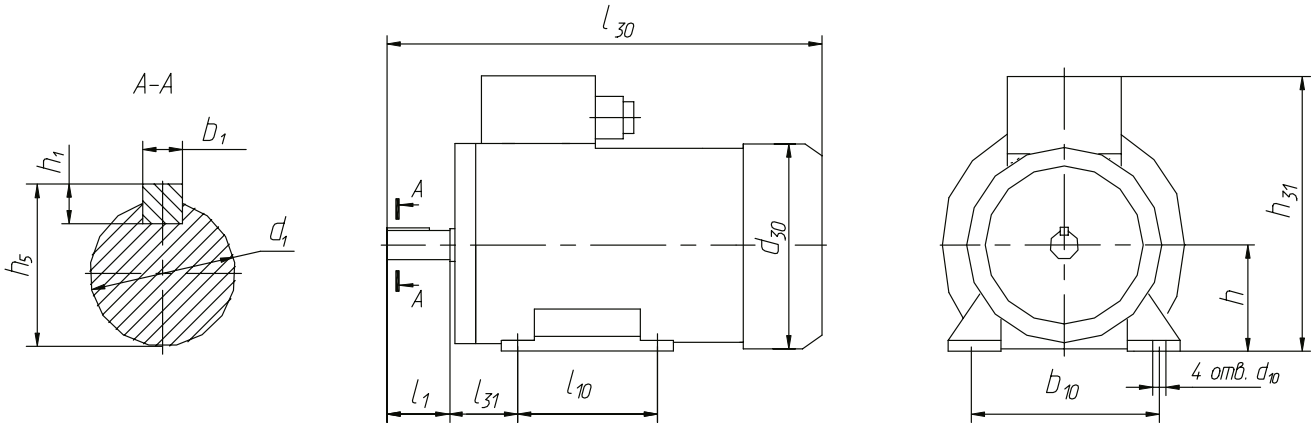
TYPE DESIGNATION



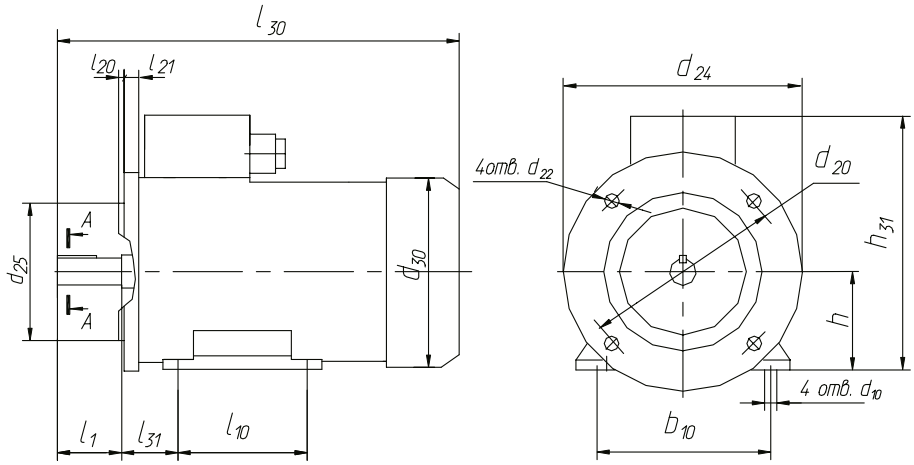
OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AZOK

Type designation	mounting configuration	№ pic.	dimensions, mm, not more					instalation and mounting sizes, mm													
			d_{30}	h_{31}	h_{37}	l_{30}	d_{24}	b_1	b_{10}	d_1	d_{10}	d_{20}	d_{22}	d_{25}	h	h_1	h_5	l_1	l_{10}	l_{20}	l_{21}	l_{39}
AZOK 71	IM1081	1	158	182	-	284	-	6	112	19	7	-	-	-	71	6	22	40	90	-	-	45
	IM2081	2					200					165	12	130						4	12	
	IM3081	3		-	111				-		-				-				-			-
AZOK 80	IM1081	1	190	207	-	328	-		125	22	10	-	-	-	80		25	50	100	-	-	50
	IM1281																					
	IM2081	2					200					165	12	130						4	12	
	IM3081	3		-	127				-		-				-				-			-
	IM3581																					

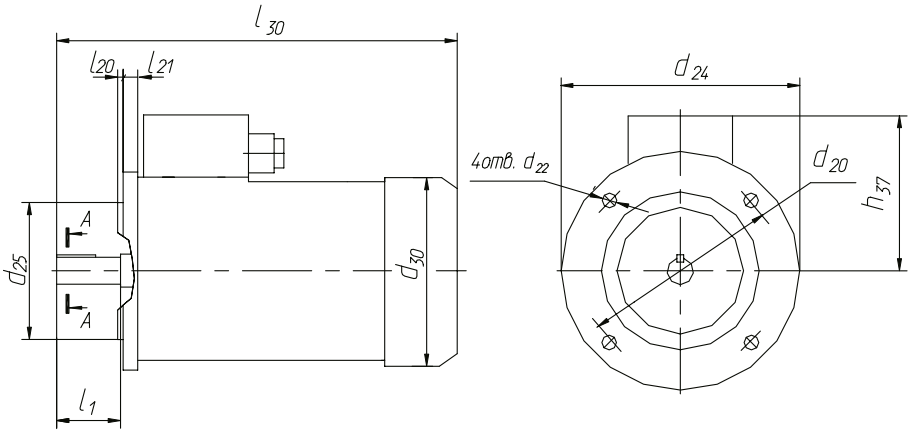
OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS AZOK



Picture 1



Picture 2



Picture 3

SYNCHRONOUS ELECTRIC MOTORS

SYNCHRONOUS ELECTRIC MOTORS

Synchronous electric motors are designed to operate at enterprises of fuel and energy complex, processing and extractive industry, ore mining and processing, coal, oil, chemical, pulp and paper and so on to drive mechanisms, that do not require speed control, frequent starts and these motors are presented by:

- 4SDM - to drive ball and rod mills;
- SDKP2 and SDK2 - to drive reciprocating compressor;
- SDNZ2 and SDS32 to drive pumps, fans, chipping machines and other mechanisms.

Synchronous electric motors are equipped with thyristor exciters(analog TE, VTE or VTM) and matching transformers TSZV.

The design of the motors is developed taking into account the real working conditions of electrical equipment and along with the modern level of production technology ensures their high operational reliability

The stators windings and winding of poles of synchronous electric machines are manufactured with moistureresistant thermosetting insulation of "Monolith-2" type with heat resistance class "F".

The electric motors have built-in resistance thermal converters of TCM type to control the thermal state of the windings, the stator core and bearings.

At the customer's request, on the basis of the above mentioned machines, the electric motors can be manufactured of other power, voltage or network frequency, as well as with other installation and mounting dimensions for the existing foundation, using bearings of increased reliability produced by SKF (Sweden).

The electric motors with power 6kV have the right and the left direction of rotation. The rotation direction is changed only from rest.

The electric motors with power 10kV have the right direction of rotation. The insulating materials of stator winding have heat-resistance class «F».

By agreement with the customer, the electric motors are developed and manufactured with the parameters of power, voltage, rotational speed, as well as installation and mounting dimensions different from those presented in this technical catalog, with reference to specific objects of power complexes.

ELECTRIC MOTORS 4SDM

Synchronous electric motors 4SDM are designed to drive mechanisms, that have high starting characteristics and do not require frequency adjusting (ball and rod mills, pumps and so on).

Operation mode: is continuous S1 with frequency from network 50Hz or 60Hz.
Climatic construction type: УХЛ4 and О4.
Mounting configuration: IM7311.
Protection degree for:housing and terminal box IP11.
Cooling method:ICA01.

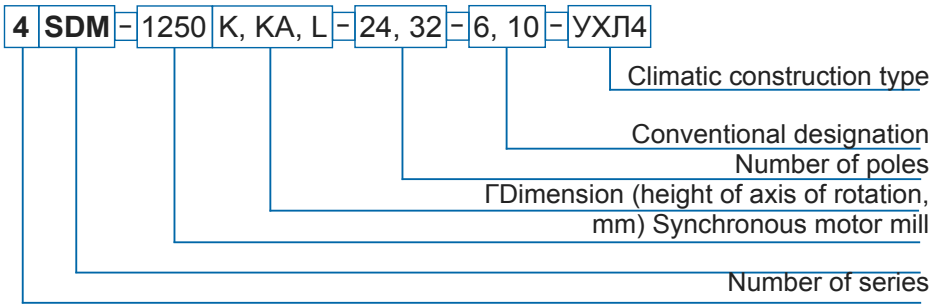
Main advantages of the electric motors 4SDM over analogues:

- - technology of vacuum pressure impregnation (VPI) of the windings with epoxy compound, which is the basis of the insulation “Monolith-2” with heat resistance class “F”.

- - the original design of the rotor winding, which provides increased reliability;

- significant reduction of mass (up to 20%).

TYPE DESIGNATION



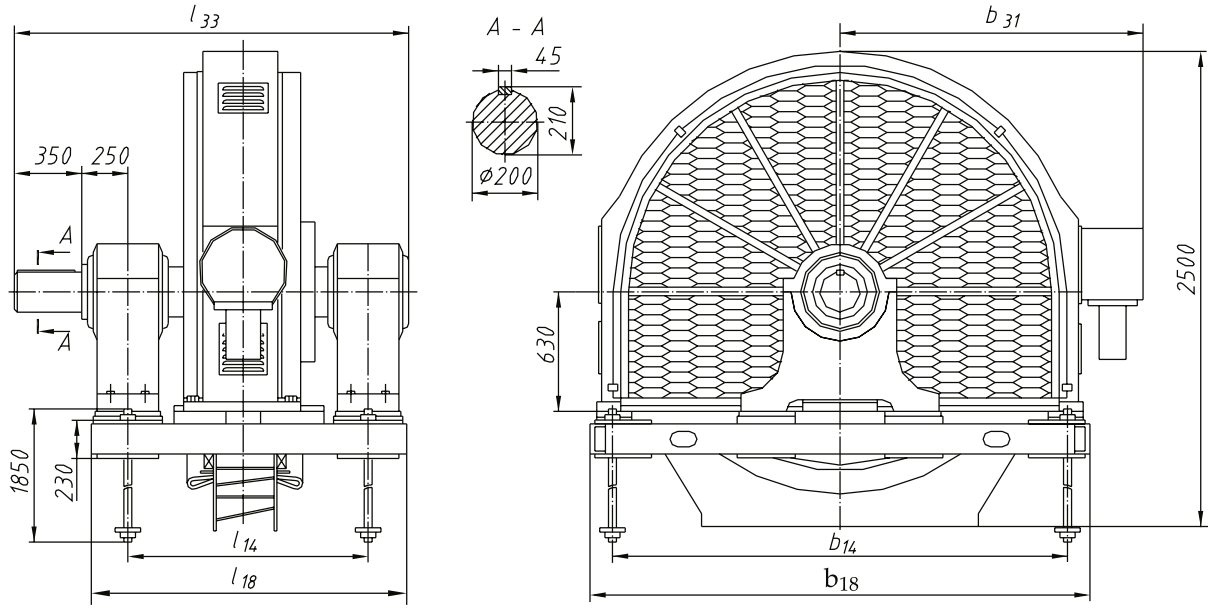
TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS 4SDM

Type designation	power,kW	Voltage, V	Rotational speed, rpm.	frequency, Hz	starting characteristics			Maximum torque ratio	flywheel moment of rotor, kgf*m2	efficiency, %	mass, kg
					Starting torque ratio	Pull-in torque ratio	Starting current ratio				
4SDM-1250K 32-6 УХЛ4	400	6000	187,5	50	1,35	1,5	7,0	2,2	6000	93,1	7800
4SDM-1250K 32-6 О4			225	60	1,1	1,3	7,0	2,0			
4SDM-1250KA 24-6 УХЛ4	500		250	50	0,6	1,0	7,0	2,05	5880	94,3	7100
4SDM-1250K 24-10 УХЛ4		10000			1,1	1,3	7,0	2,0		93,3	7816
4SDM-1250K 24-6 УХЛ4	630	6000			1,35	1,5	6,5	2,1		94,5	7600
4SDM-1250L 24-10 УХЛ4		10000			1,1	1,3	6,4	2,2		93,2	8450

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS 4SDM

Type designation	l_{14}	l_{18}	l_{33}	b_{14}	b_{18}	b_{31}
4SDM-1250K-32-6 УХЛ4	1250	1630	2360	2360	2600	1460
4SDM-1250K-32-6 О4						
4SDM-1250KA-24-6 УХЛ4						
4SDM-1250K-24-10 УХЛ4	1550	1930	2375			1615
4SDM-1250K-24-6 УХЛ4	1250	1630	2360			1460
4SDM-1250L-24-10 УХЛ4	1600	1930	2375	2460	3100	1615

drawings of motors 4SDM



ELECTRIC MOTORS SDKP2

Synchronous electric motors SDKP2 blown up under the pressure are designed to drive reciprocating compressor in explosive areas.

Operation mode is continuous S1 from network frequency 50Hz and 60Hz.

Explosion protection configuration:

1Ex px IIB T5 Gb X	1Ex px IIC T5 Gb X

Climatic construction type: УХЛ4.

Protection degree for:

motor	IP44
terminal box	IP55

Mounting configuration:

of motors 500, 800 and 1000 kW	IM 5710
of motors 1250 and 1600 kW	IM 7125

Cooling method: ICW37A81.

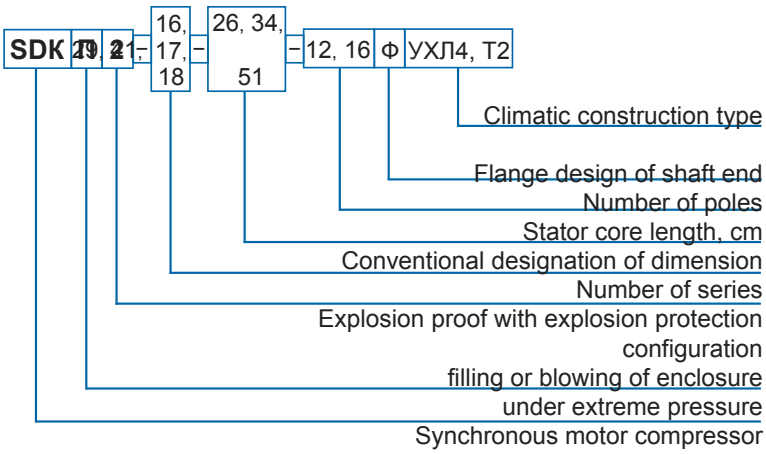
The electric motors have the left direction of rotation. The insulation of stator and rotor winding have heat-resistance class «F».

By agreement with the customer, the electric motors are developed and manufactured with the parameters of power, voltage, rotational speed, as well as installation and mounting dimensions different from those presented in this technical catalog, with reference to specific objects of power complexes.

Main advantages of the electric motors SDKP2 over analogues:

- technology of vacuum pressure impregnation (VPI) of the windings with epoxy compound, which is the basis of the insulation “Monolith-2” with heat resistance class “F”.
- the original design of the rotor winding, which provides increased reliability;
- reduction of mass (up to 5%).

TYPE DESIGNATION

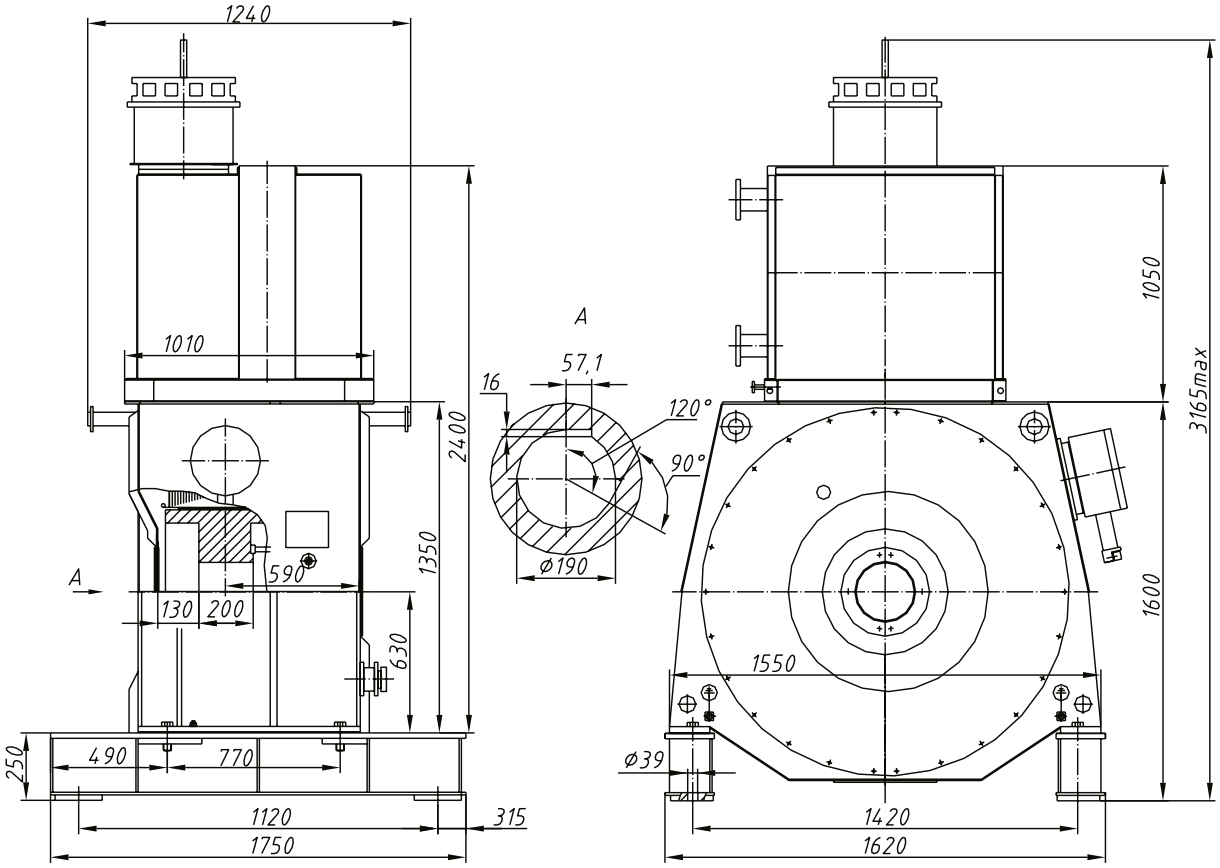


TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS SDKP2

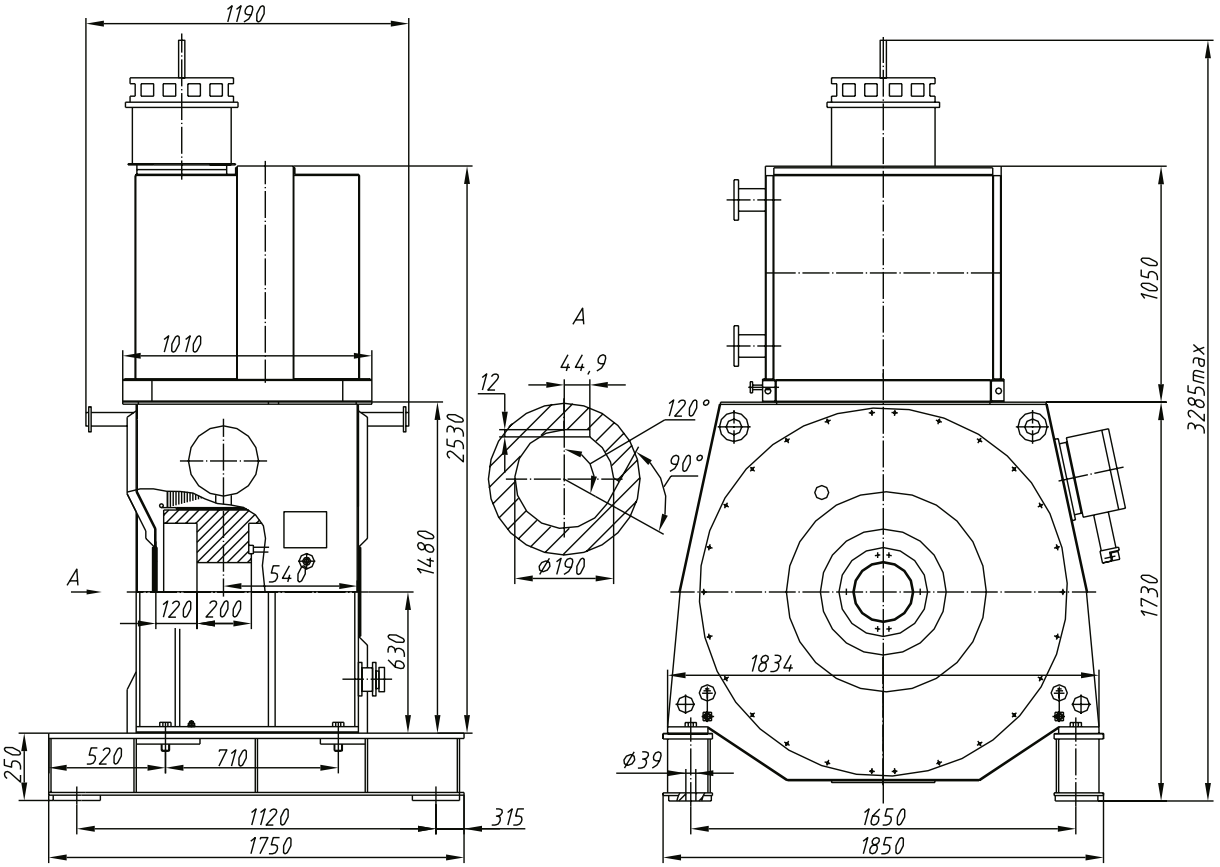
Type designation	Power, kW	Voltage, V	Frequency, Hz	rotational speed, rpm.	Starting characteristics			Maximum torque ratio	Flywheel moment of rotor kgf*m2	effic., %	mass, kg
					Starting , torque ratio	Pull-in torque ratio	Starting current ratio				
SDKP2-16-29-10УХЛ4	500	6000	50	600	1,0	1,1	5,3	2,0	1100	94,6	5000
SDKP2-17-29-12УХЛ4	710			500	0,85	0,95	5,0		1300	94,0	5400
SDKP2-18-26-16УХЛ4	800			375	0,60	1,0	4,5		3000	93,8	8000
SDKP2-18-34-16УХЛ4	1000				0,65	1,1	5,0		3200	94,6	9200
SDKP2-18-41-16ФУХЛ4	1250				0,75			2,1	4000	94,8	11800
SDKP2-18-51-16ФУХЛ4	1600						5,5		4900	95,5	14100

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES

SDKP2-16-29-10

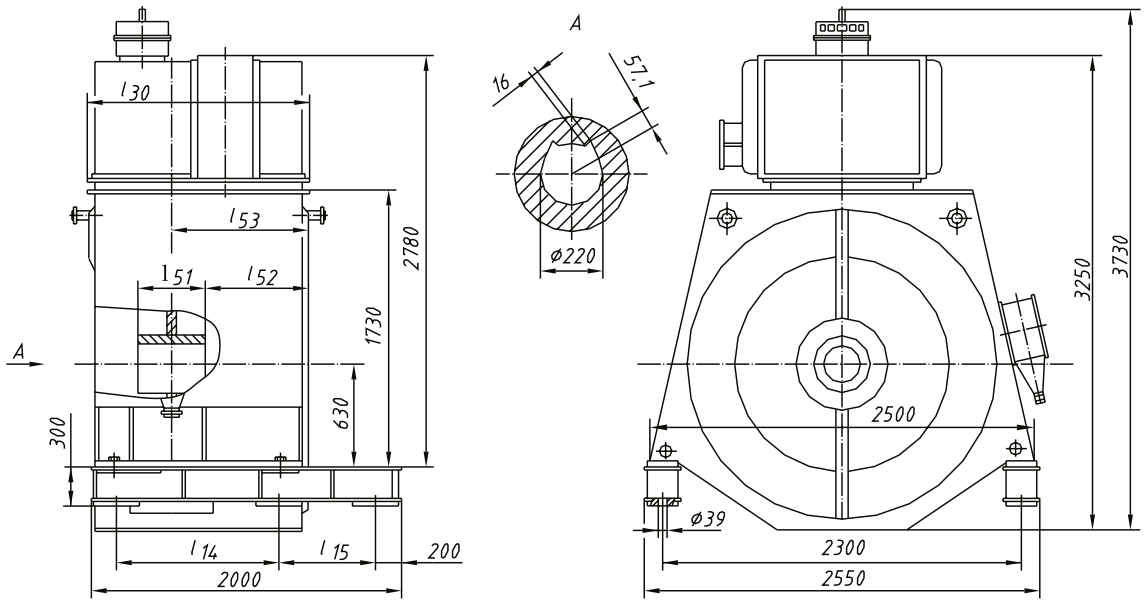


SDKP2-17-29-12



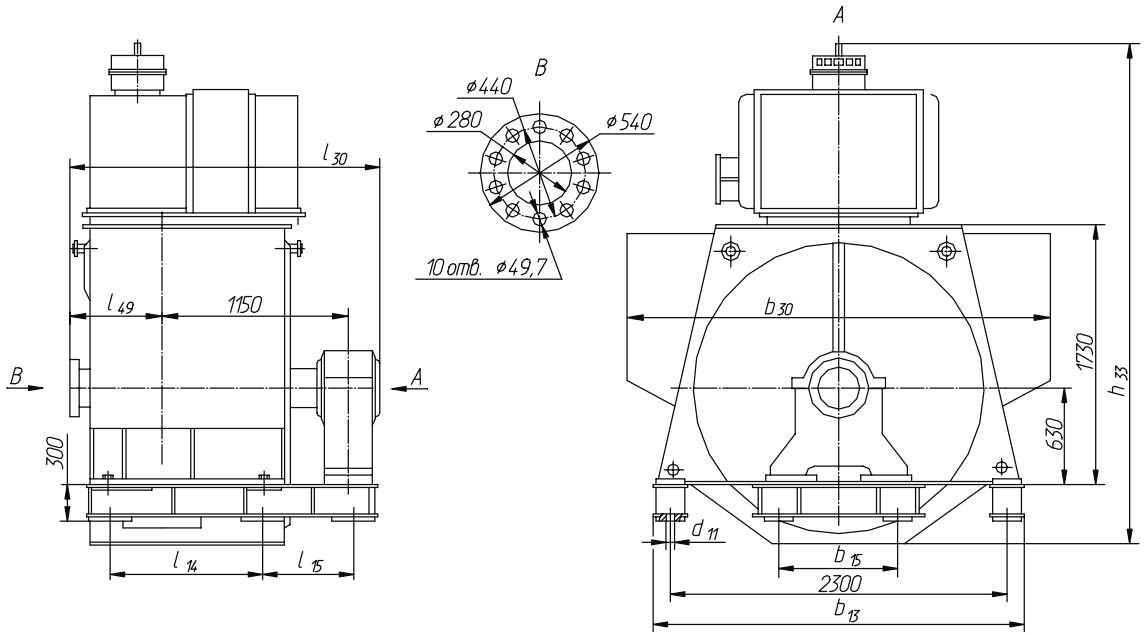
OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES

SDKP2-18-26, 34



Type designation	l_{14}	l_{15}	l_{30}	l_{51}	l_{52}	l_{53}
SDKP2-18-26-16 УХЛ4	920	580	1260	250	595	720
SDKP2-18-34-16 УХЛ4	1000	600	1340	350	585	760

SDKP2-18-41, 51



type designation	l_{14}	l_{15}	l_{30}	l_{49}	b_{13}	b_{15}	b_{30}	h_{33}	d_{11}
SDKP2-18-41-16Ф УХЛ4	1000	500	1900	530	2550	800	2500	3730	39
SDKP2-18-51-16Ф УХЛ4	1120	580	2340	950	2540	1000	3500	2900	48

Operation mode is continuous S1 from network frequency 50Hz.

Climatic construction type: УХЛ4 .

Mounting configuration: IM5710.

Protection degree for:

housing	IP11
terminal box	IP44

Cooling method:IC01.

The electric motors have the left direction of rotation. The insulation of stator and rotor winding have heat-resistance class «F».

By agreement with the customer, the electric motors are developed and manufactured with the parameters of power, voltage, rotational speed, as well as installation and mounting dimensions different from those presented in this technical catalog, with reference to specific objects of power complexes.

ELECTRIC MOTORS SDK2

Synchronous electric motor SDK2 is designed to drive mechanisms, that do not require speed control (compressors, fans and others).

TYPE DESIGNATION

SDK **2** – 16 – 24 – 12 К УХЛ4

- УХЛ4 — Climatic construction type
- К — Cantilever-design
- 12 — Number of poles
- 24 — Stator core length,cm
- 16 — Conventional designation of dimension
- **2** — Number of series
- **SDK** — Synchronous motor compressor

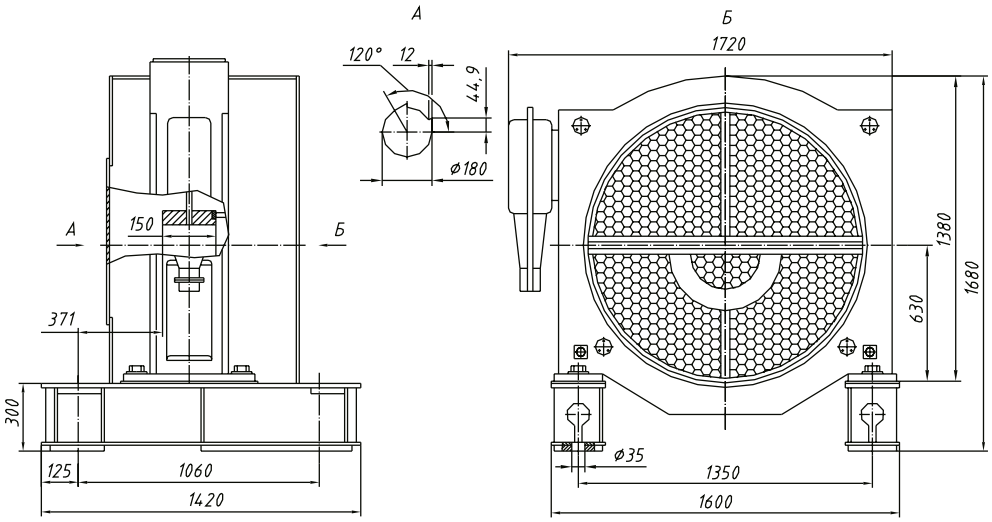
Main advantages of the electric motors SDK2 over analogues:

- technology of vacuum pressure impregnation (VPI) of the windings with epoxy compound, which is the basis of the insulation "Monolith- with heat resistance class"
- the original design of the rotor winding, which provides increased reliability;
- reduction of mass (up to 5%).

TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS SDK2

Type designation	Power, kW	Voltage, V	Rotational speed, rpm.	frequency,Hz	Starting characteristics			Maximum torque ratio	Flywheel of rotor, kgf*m2й	effic., %	mass, kg
					Starting torque ratio	Pull-in torque ratio	starting current ratio				
SDK2-16-24-12КУХЛ4	315	6000	500	50	1,3	1,15	7	2,4	550	93,8	3075

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES



ELECTRIC MOTORS SDNZ and SDSZ

Synchronous electric motors SDNZ and SDSZ are designed to drive mechanisms, that do not require rotational speed control (fans, pumps, chippinf machines and others).

Operation mode is continuous S1 from network frequency 50Hz.

Climatic construction type:УХЛ4.

Mounting configuration:IM7311.

Protection degree for:

housing	IP44
terminal box	IP55

Coolingmethod:ICA01 or ICW37A81.

The insulating materials of stator winding have heatresistance class «F».

By agreement with the customer, the electric motors are developed and manufactured with the parameters of power, voltage, rotational speed, as well as installation and mounting dimensions different from those presented in this technical catalog, with reference to specific objects of power complexes.

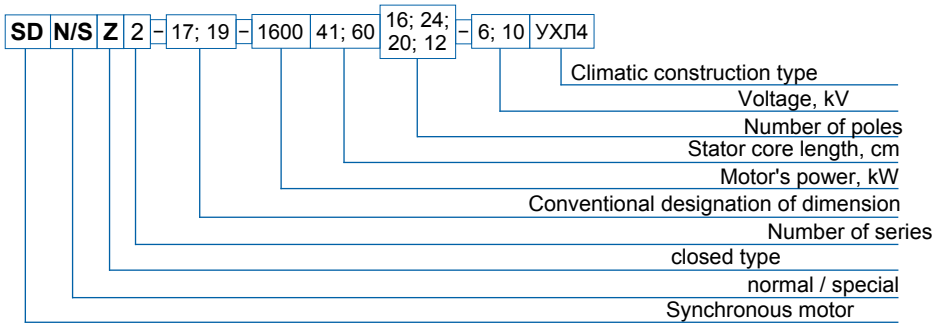
Main advantages of electric motors SDNZ and SDSZ over analogues:

- technology of vacuum pressure impregnation (VPI) of the windings with epoxy compound, which is the basis of the insulation "Monolith-2" with heat resistance class "F".

the original design of the rotor winding, which provides increased reliability;

- reduction of mass (up to 5%).

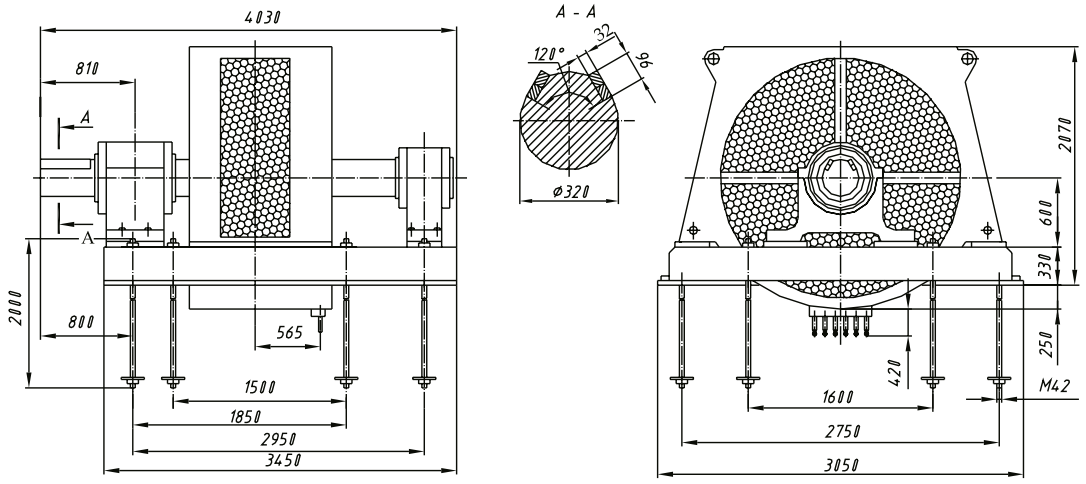
TYPE DESIGNATION



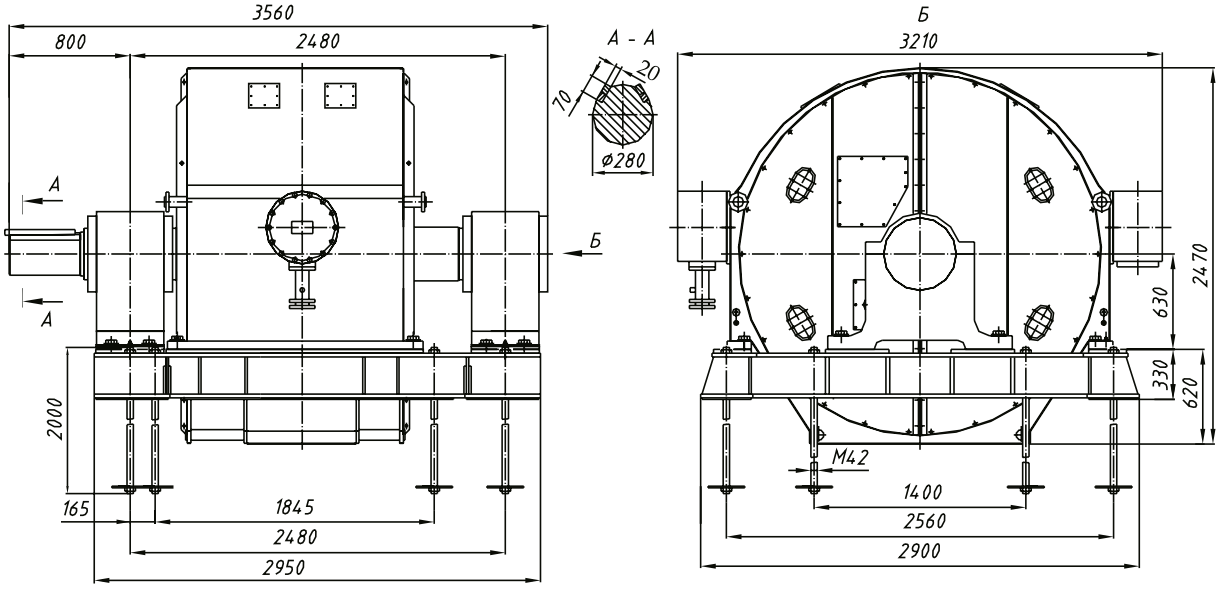
TECHNICAL PARAMETERS OF THE ELECTRIC MOTORS SDNZ and SDSZ

type designation	power, kW	Voltage, V	Rotational speed, rpm.	frequency, Hz	Starting characteristics			Maximum torque ratio	Flywheel of rotor, $kgf*m^2$	effic., %	mass, kg
					Starting torque ratio	pull-in torque ratio	Starting current ratio				
SDSZ2-17-41-16-6УХЛ4	1600	6000	375	50	1,0	1,45	7,0	2,2	6200	95,5	19000
SDNZ2-19-60-24-10УХЛ4		10000	250		1,4	1,4	7,5	2,3	5000	95,1	20000
SDNZ2-1600-20-6УХЛ4		6000	300		1,0	1,1	6,2	2,0	4300	95,4	17500
SDNZ2-1600-12-6УХЛ4			500		1,1	1,25	6,0	2,2	4000		13000

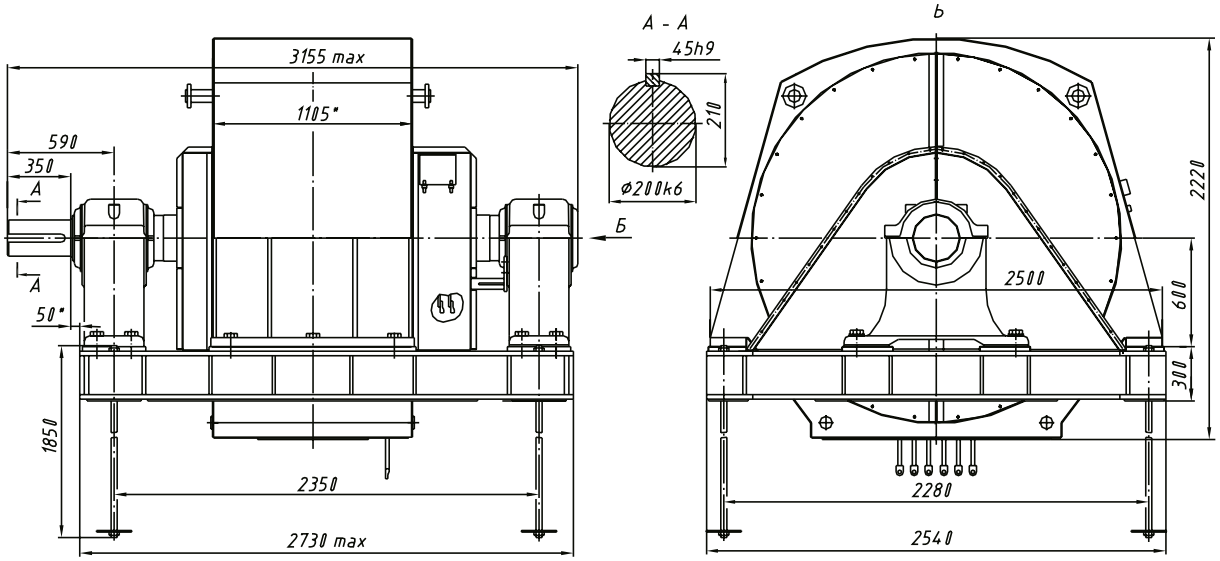
OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS SDSZ2-17-41-16



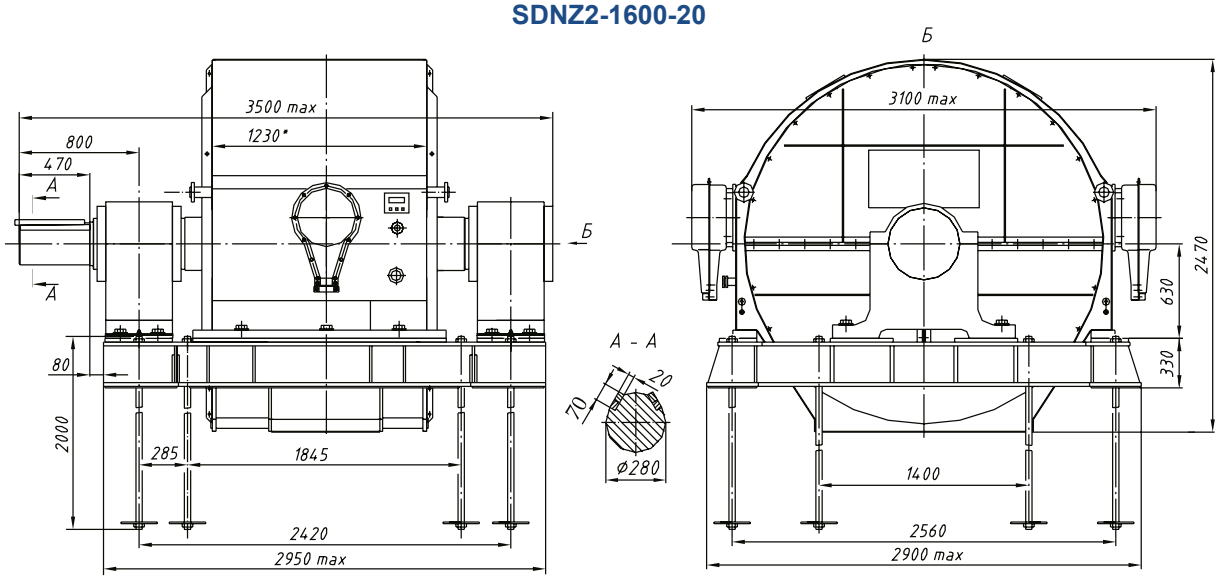
OVERALL DIMENSIONS, INSTALATION AND MOUNTING SIZES OF THE ELECTRIC MOTORS SDNZ2-19-60-24



SDNZ2-1600-12



SDNZ2-1600-20



GENERATORS

GENERATORS

Generators are represented by synchronous electric machines driven by internal combustion engines, as well as synchronous and asynchronous electric machines driven by hydraulic turbines — hydrogenerators.

- synchronous generators SGSB, BSGS, SGS with power from 400 up to 2000 kW are designed for the completing the electric units driven by internal combustion engines operating on diesel or gas fuel, and used as the main sources of electrical energy, and emergency or reserve at enterprises and other facilities where power interruption is unacceptable;

- synchronous hydrogenerators SG, SGS, VGS with power from 450 up to 1600 kW are designed for installation in small water power plant with rotational speed of hydraulic turbines from 150 up to 1000 rpm.;

Synchronous generators and hydrogenerators are manufactured with static or brushless excitation system at customer's request.

BThe delivery set of synchronous generators (hydrogenerators), along with the electric machine, includes cabinet with excitation system, protection and control.The power of the thyristor converter, providing generator excitation, is carried out from the additional winding, laid in the stator slots.

At the customer's request, the drive engine (turbine) control elements are built into the control cabinet.

At the customer's request generators with power 0,4 kV are additional completed with generator circuit-breaker and feeders to connect the load.

By agreement with the customer, the generators are developed and manufactured with the parameters of power, voltage, rotational speed, as well as installation and mounting dimensions different from those presented in this technical catalogue, with reference to specific objects of power complexes.

SYNCHRONOUS GENERATORS FOR ELECTRIC POWER STATIONS WITH THE EXPLOSION MOTOR DRIVE

GENERATORS SGSB

Synchronous generators SGCB with brushless excitation system are installed on electric power stations as primary, reserve and emergency three-phase, 50Hz electric power sources with the explosion engine drive.

The generators are equipped with exciting devices UVGS, UVGS-BD or purchased regulating device of AVR type. The generators with voltage 0,4kV are delivered additional with low voltage device UKN or cabinet generator circuit-breaker SHGV.

Operation mode: continuous S1.

Climatic construction type: УХЛ4, О4.

Mounting configuration:

of synchronous machine	IM1101, IM1305 IM7115, IM7311
brushless exciter	IM1101, IM1305 IM7111, IM7311

Protection degree for:

synchronous machine	IP21, IP23, IP11, IP44
brushless exciter	IP21, IP23, IP11
devices UVGS and UKN	IP21

Cooling method:

for generators	ICA01, ICW37A81
for devices UVGS and UKN	natural air

Generators have the left direction of rotation.

Insulation of stator and rotor winding and exciter corresponds to heat-resistance class «F».

UVGS device is made in the form of one-sided operation cabinet;

UKN device is made in the form of three-section cabinet of one-sided operation;

SHGV device - is in the form of one section cabinet.

UVGS-BD device is made in the form of unit assembled on the basis of the EUROMECHANICA structural elements, built-in the station control cabinet, automated in third grade.

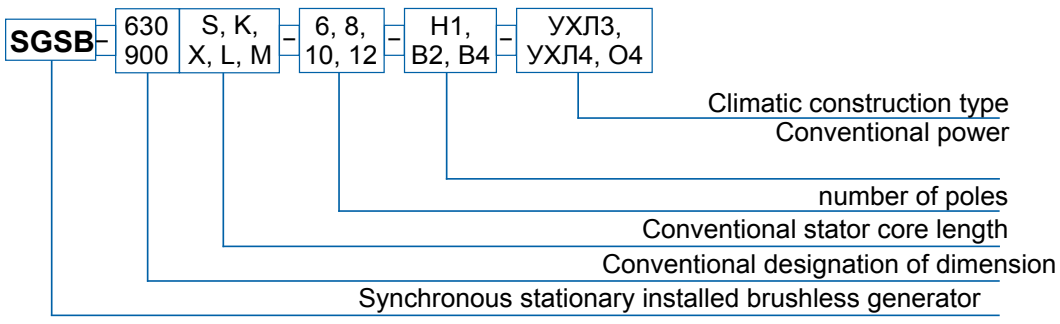
UVGS devices provide:

- initial excitation of the synchronous generator;
- statism of the external characteristics of the generator on reactive current in the range from 0 to 8% at the nominal power factor;
- measurement of electrical and thermal characteristics of generator;
- generator protection against overvoltage, loss of excitation, short circuit in the rotor and reverse power flow;
- control and alarm in case of breakages and emergency parameters of the generator and drive motor;
- switching on the generator for parallel operation using the method of self-synchronization, manual exact synchronization or exact automatic synchronization (for generators equipped with the UVGSM-2 device, automated by the 2nd degree), or a purchase control system of the SUDG type.

Main advantages of SGSB generators over analogues:

- technology of vacuum pressure impregnation (VPI) of the windings with epoxy compound, which is the basis of the insulation “Monolith-2”.
-the original design of the rotor winding, which provides increased reliability;
-significant reduction of mass (up to 5%).

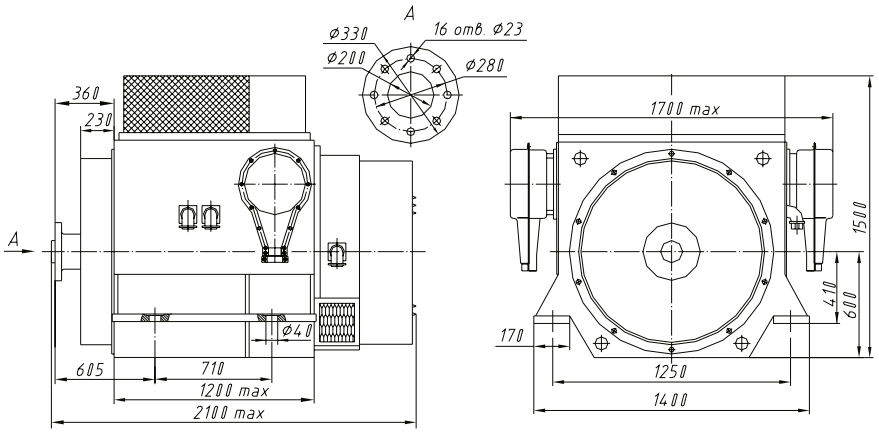
TYPE DESIGNATION



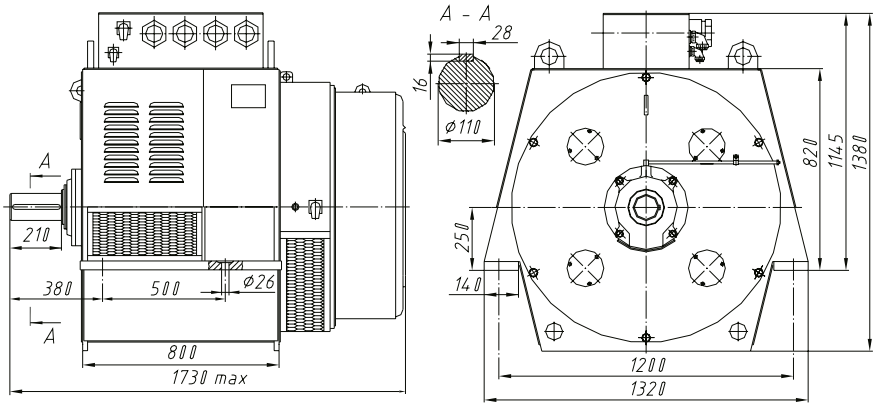
TECHNICAL PARAMETERS OF SGSB

Type designation	Power, kW/kVA	Voltage, V	Rotational speed, rpm.	efficiency, %	Flywheel rotor, kgf*m²	mass, kg
SGSB 630S-6 H1 with UVGS-11-400-0,4 and UKN-400 (or SHGV-400)	400/500	400	1000	94,3	230	3100 165 450 (150)
SGSB 630L-8 H1 УХЛ4 with UVGSM-1-800-0,4 and UKN-N-800 (or SHGV-800) or UVGS-BD-0,4	800/1000		750	95,2		5200 175 450 (200) 18
SGSB 630L-8 B2 УХЛ4 with UVGSM-1(2)-6,3 УХЛ4 or UVGS-BD-6,3		6300			550	5500 175 18
SGSB 630M-6 H1 УХЛ4 with UVGSM-1-1000-0,4 and UKN-N-1000 (or SHGV-1000)	1000/1250	400	1000	96,0	500	4900 175 450 (150)
SGSB 630M-6 B2 УХЛ4 with UVGSM-1-1000-6,3 УХЛ4 or UVGS-BD-6,3		6300		95,9		5100 175 18
SGSB 900K-12 H1 УХЛ4 with UVGSM1-1000-0,4 and UKN-N-1000 (or SHGV-1000)		400	500	95,4	2010	7400 175 450 (150)
SGSB 900K-12 B2 УХЛ4 with UVGSM-1-1000-6,3 or UVGS-BD-6,3		6300		95,2		7200 175 18
SGSB 900K-12 B4 УХЛ4 with UVGSM-1-1000-10,5 or UVGS-BD-10,5		10500			2050	7400 175 18
SGSB 900L-8B4 УХЛ3 with UVGS-K-1600-10,5 УХЛ3	1600/2000	10500	750	95,5	2100	11500 210
SGSB 900X-10 B2 УХЛ4 with UVGSM-1-2000-6,3 or UVGS-BD-6,3	2000/2500	6300	600	96,1	2335	11800 175 18

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF SGSB-630L, M

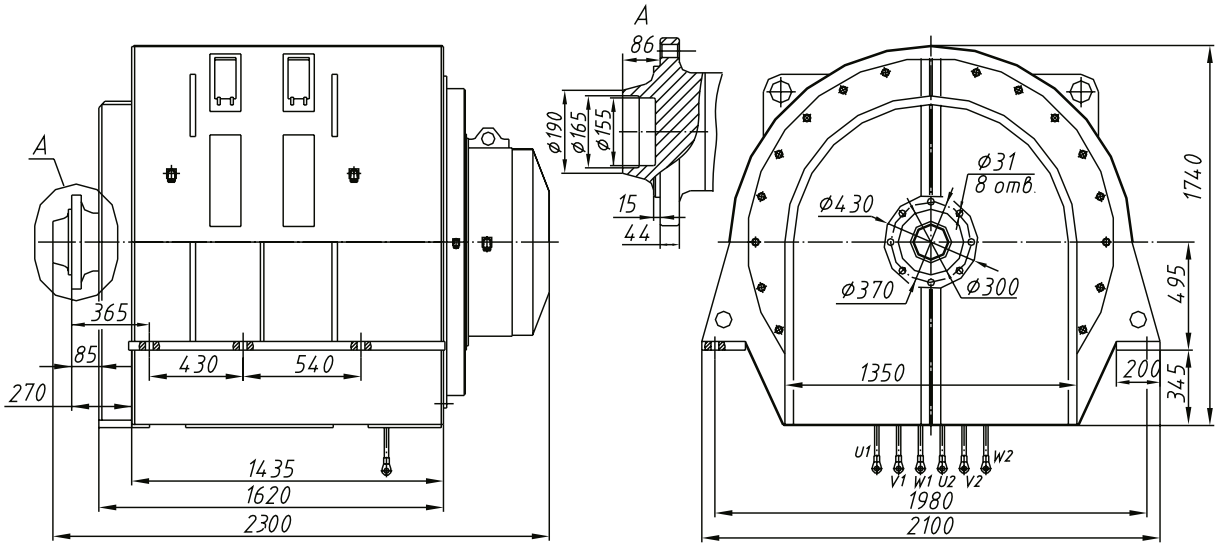


SGSB-630S

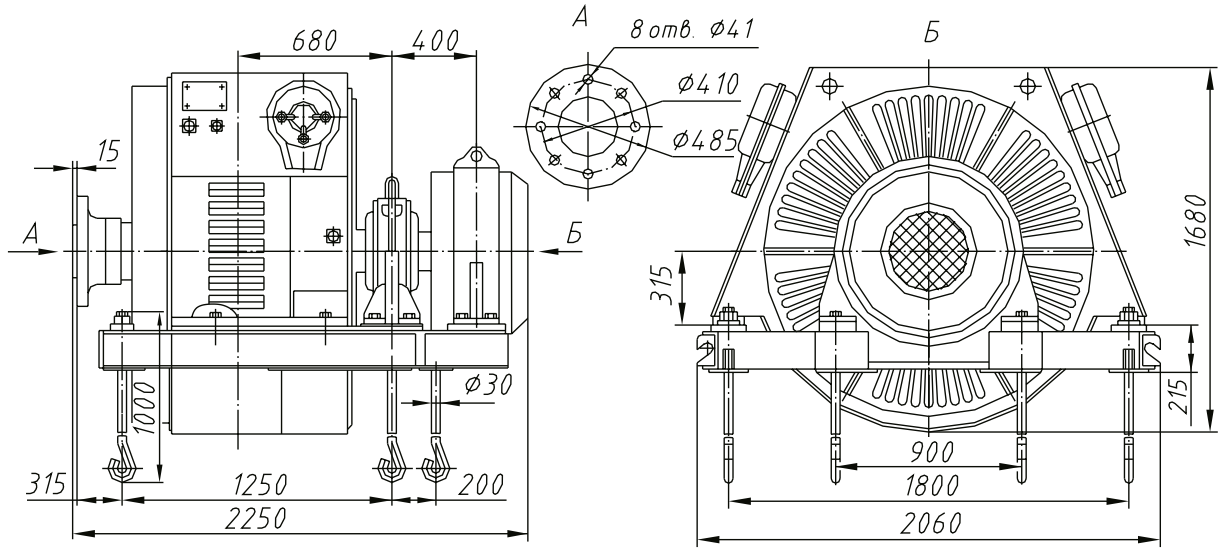


OVERALL DIMENSIONAL, INSTALLATION AND MOUNTING SIZES OF

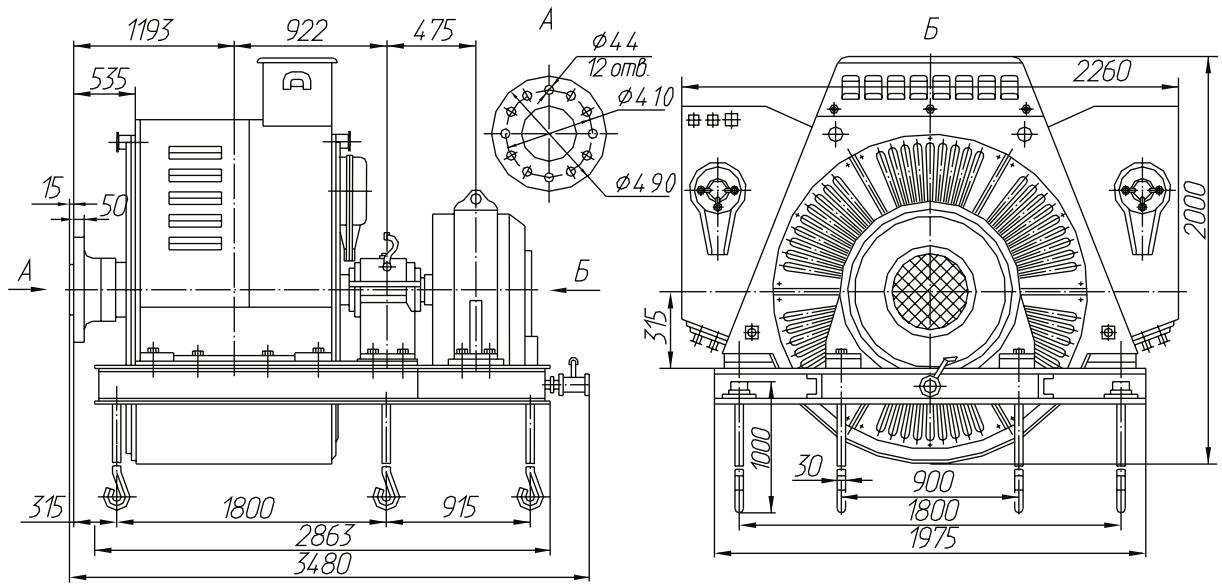
SGSB-900L



SGSB-900K



SGSB-900X



GENERATORS BSGS

Synchronous generators of BSGS type with brushless excitation system are installed in power stations as primary, reserve or emergency three-phase, 50 Hz electric power sources with gas turbine drive (BSGS630M-6H1) or explosion engine drive(BSGS900K- 8B2).

Generators are deliver edwith UVGS-D, UVGS-DZA exciting devices.

Generators with power 4kV are additionally equipped with the low-voltage device UKN-ZA.

Operation mode is continuous S1.

Climatic construction type:УХЛ3, Т3.

Mounting configuration:

of generators with power 1000 kW	IM1101
of generators with power 2000 kW	IM7311

Protection degree for:

generators	IP23
exciting devices	IP21

Cooling method:

of generators	ICA01
UBGS and UKN devices	natural aerial

The generator has the left direction of rotation. The insulating materials of stator, rotor and exciter have heatresistance class «F».

UVGS device is made in the form of one-sided operation cabinet;

UKN device is made in the form of three-section cabinet;

UVGS devices provide:

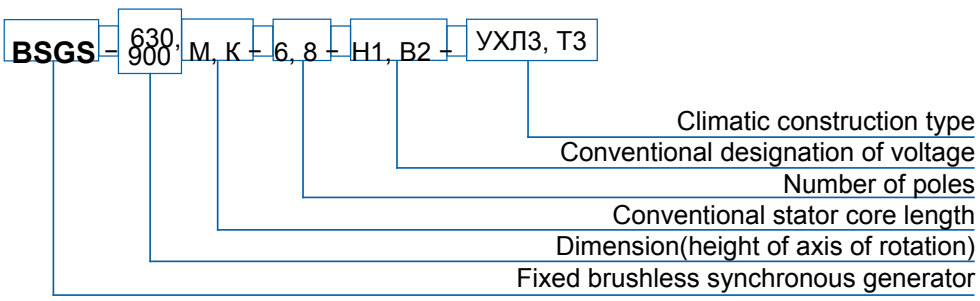
- initial excitation of the synchronous generator;
-statism of the external characteristics of the generator on reactive current in the range from 0 to 3% at the nominal power factor;
- measurement of electrical and thermal characteristics of generator
- generator protection against overvoltage, loss of excitation, short circuit in the rotor and reverse power flow;

- control and alarm in case of breakages and emergency parameters of the generator and drive motor;
- switching on the generator for parallel operation using the method of manual exact synchronization and exact automatic synchronization with the help of automatic device of exact synchronization UTS-3 (for UVGS-DZA);
- interface with automatic control system on third degree with the help of detector elements (for UVGS-DZA).

Main advantages of generators BSGS over analogues:

- technology of vacuum pressure impregnation (VPI) of the windings with epoxy compound, which is the basis of the insulation
“Monolith-2”.
-the original design of the rotor winding, which provides increased reliability;
- significant reduction of mass (up to 5%).

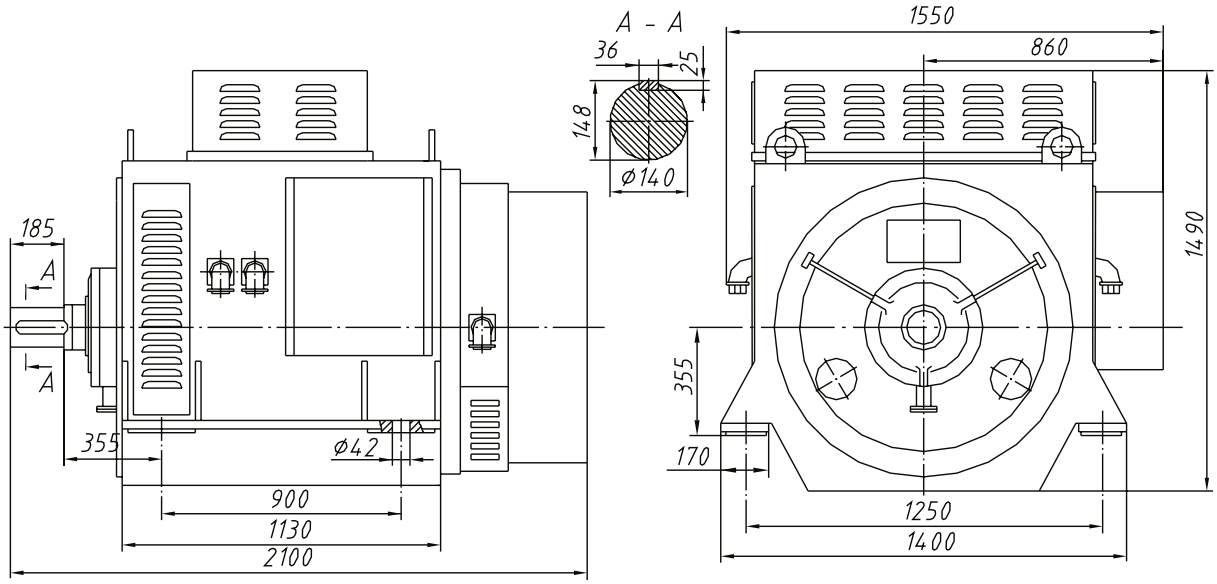
TYPE DESIGNATION



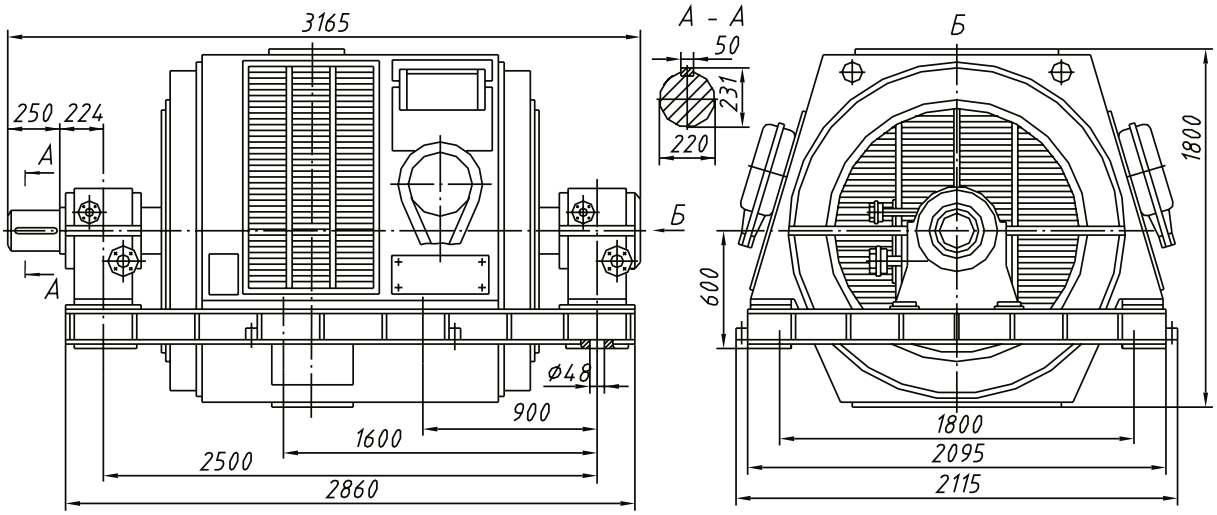
TECHNICAL PARAMETERS OF BSGS

Type designation	Power, kW/kVA	Voltage, V	Rotational speed, rpm.	effic., %	Flywheel rotor, kgf*m²	mass, kg
BSGS 630M-6H1 with UVGS-D-ZA-1000-0,4 and UKN-ZA-1000	1000/1250	400	1000	96	465	5250 250 600
BSGS 900K-8B2 with UVGS-D-2000-6,3	2000/2500	6300	750	96,3	2380	14 000 250

BSGS-630



BSGS-900K



GENERATORS SGS

Synchronous generators SGS with static excitation system are designed to equip gas-diesel and gas electric power units, installed in power plants as basic, reserve and emergency three-phase, 50Hz, electric energy sources.

The generators are delivered with exciting devices UVGS-S for gas-diesel power units and UVGS-SG or SHKU for gas power unit, generators with power 0,4kV are additionally equipped with low-voltage devices UKN or SHGV.

Operation mode: is continuous S1.
Climatic construction type: УХЛ4, О4.
Mounting configuration: IM1305
Protection degree:

generator housing and terminal box	**IP21 (from side of drive motor - IP00)**
exciting devices	**IP21**

Cooling method:

generators	**ICA01**
devices UVGS, UKN, SHGN, SHKU	**natural aerial**

The generator has the left direction of rotation. The insulating materials of stator, rotor and exciter have heatresistance class «F».

UVGS-S, UVGS-S-G, SHGV devices are made in the form of single-section one-sided operation cabinet; but UVGS has excitation and control system, and SHGV-generating station circuit break;

UKN device is made as a three-section cabinet;

SHKU - is made of two sections, from the left is generating station circuit break, from the right is excitation and control system.

UVGS with SHGV or UKN and SHKU devices provide:

- initial excitation of the synchronous generator;

- statism of the external characteristics of the generator on reactive current in the range from 0 to 3% at the nominal power factor;

- measurement od electrical and thermal characteristics of generator

- generator protection against overvoltage, loss of excitation, short circuit in the rotor and reverse power flow;

- control and alarm in case of breakages and emergency parameters of the generator and drive motor;

- switching on the generator for parallel operation using the method of manual exact synchronization;
- control of start, stop and gas valves of the drive engine.

Main advantages of generators SGS over analogues:

- technology of vacuum pressure impregnation (VPI) of the windings with epoxy compound, which is the basis of the insulation “Monolith-2”.
-the original design of the rotor winding, which provides increased reliability;
- significant reduction of mass (up to 5).

TYPE DESIGNATION

SGS – 900 (800) F, E, M – 10, 12 – Н1, В2 – УХЛ4, О4

- УХЛ4, О4 — Climatic construction type
- 10, 12 — Conventional designation of voltage
- Н1, В2 — Number of poles
- E, M — Conventional stator core length
- F — Dimension (height of axis of rotation
- 900 (800) — Synchronous generator brushless with static excitation system

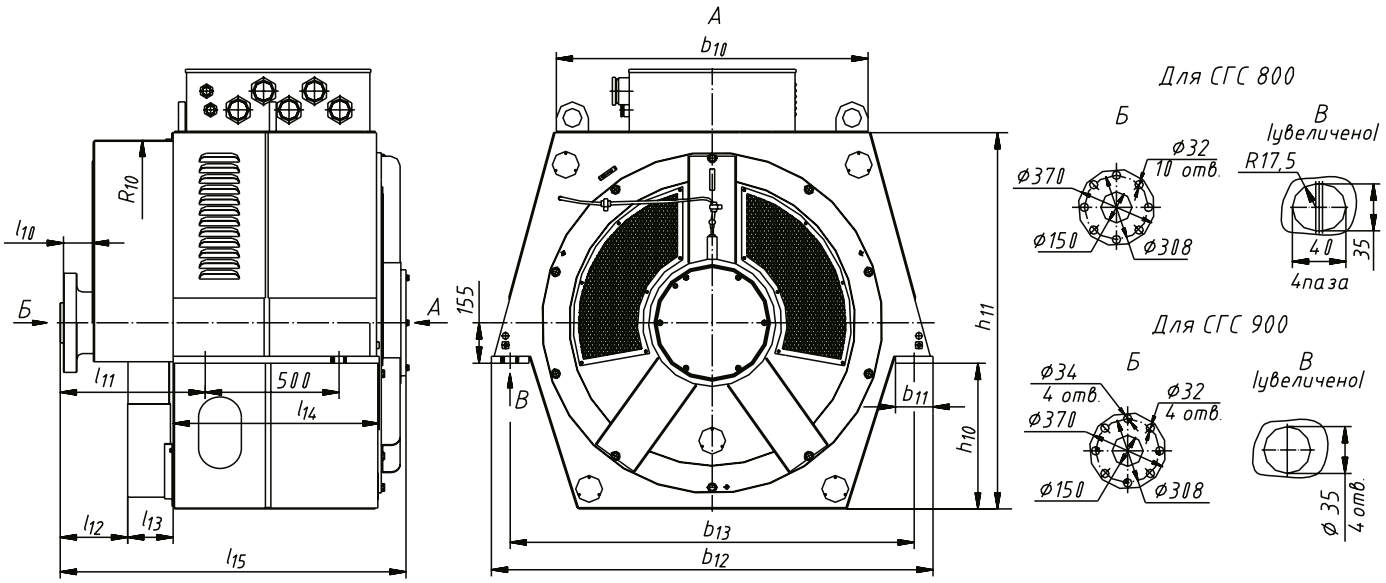
TECHNICAL PARAMETERS OF SGS

Type designation	Power, kW/kVA	Voltage, V	Rotational speed, rpm.	Effic., %	Rotor flywheel moment, kgf*m²	mass, kg
SGS-900M-10H1 with UVGS-SG-500-0,4 and UKN-500	500/625	400	600	94,3	1120	5150 150, 450
SGS-900F-10H1 with UVGS-SG-630-0,4 and UKN-630 or SHGV-630	630/727			94,6	1160	5400 150, 450 145
SGS-900E-10H1 with UVGS-S-800-0,4 and UKN-N 800 or SHGV-800	800/1000			94,8	1180	5600 150, 450 155
SGS-900F-12B2 with UVGS-S-500-6,3	500/625	6300	500	94,1	1080	4760 150
SGS-900F-12H1 with UVGS-SG-500-0,4 and UKN-500 or SHGV		400			1040	4400 150 450,145
SGS 800M-10H1 with UVGS-SG-500-0,4 and SHGV-500 or SHKU-500			600	94,5	950	4200 150, 200 350
SGS-800F-10H1 with UVGS-SG-630-0,4 and UKN-630 or SHGV	630/787			94,7	1000	4500 150, 390 205

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF GENERATORS SGS

Type designation	l_{10}	l_{11}	l_{12}	l_{13}	l_{14}	l_{15}	b_{10}	b_{11}	b_{12}	b_{13}	h_{10}	h_{11}	R_{10}
SGS-800M-10H1	120	530	240	175	760	1300	1175	140	1650	1520	544	1400	682
SGS-800F-10H1					820	1360							
SGS-900M-10H1 SGS-900F-10H1 SGS-900E-10H1 SGS-900F-12H1 SGS-900F-12B2	110	630	340	200	780	1435	1185	150	1910	1750	680	1695	793

DRAWING OF GENERATORS SGS



HYDROGENERATORS

SYNCHRONOUS HYDROGENERATORS VGS

Synchronous hydrogenerators SG, SGS, VGS with static or brushless exciting system are designed to operate with water turbine of horizontal or vertical construction, and as a source of three-phase AC, 50Hz.

Hydrogenerators are delivered together with control and excitation cabinets.

Operation mode: is continuous S1.

Climatic construction type: УХЛ4.

Mounting configuration:

IM1101, IM7311, IM8411 (vertical)

Protection degree: IP21.

Cooling method: ICA01.

Main advantages of hydrogenerators over analogues:

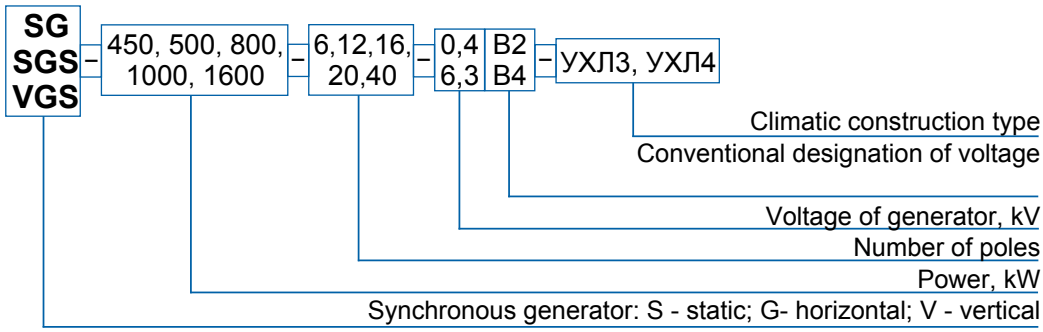
- technology of vacuum pressure impregnation (VPI) of the windings with epoxy compound, which is the basis of the insulation “Monolith-2”.

-the original design of the rotor winding, which provides increased reliability;

- reduction of mass (up to 5).

SYNCHRONOUS HYDROGENERATORS SG,SGS

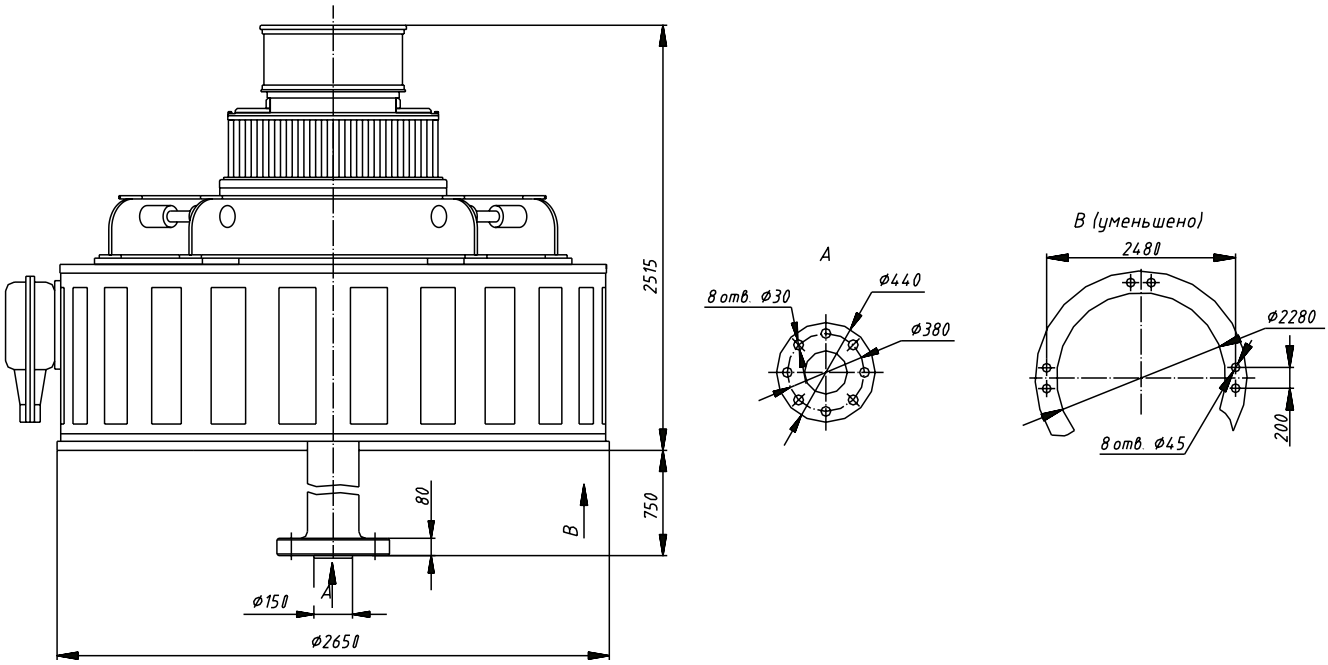
TYPE DESIGNATION



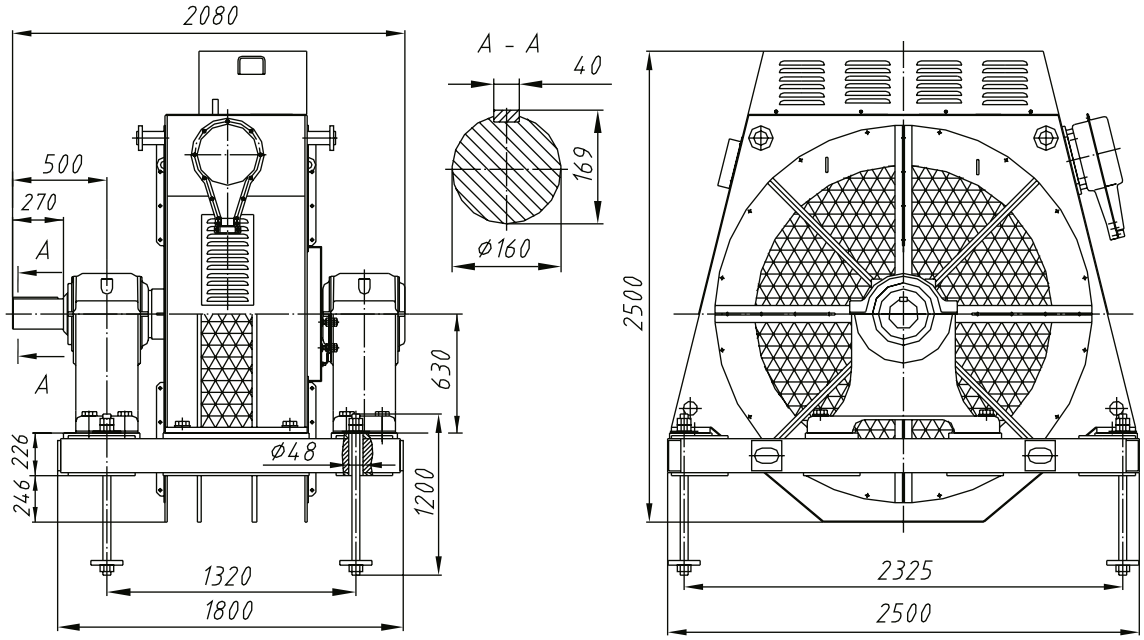
TECHNICAL PARAMETERS OF HYDROGENERATORS VGS, SG, SGS

Type designation	power, кW/кVA	Voltage, V	Rotational speed, rpm.	efficiency, %	mass, kg
VGS-450-40-0,4 УХЛ4 with SHKU-450-0,4 УХЛ4	450	400	150	93,2	13000 450
SGS-500-20-6,3 УХЛ4 with UVGG-500-6,3 УХЛ4	500	6300	300	93,6	6900 220
SG-630-12В2 УХЛ3 with UVGG-630-6,3 УХЛ4	630	6300	500	95,0	5900 220
SG-800-16В2 УХЛ3 with UVGG-800 УХЛ4	800	6300	375	96,0	6300 220
SG-1000-6В4 УХЛ3 с UVGG-S-1000-10,5 УХЛ4	1000	10500	1000	96,2	7200 220
SG-1600-6В2 УХЛ3 with UVGG-1600 УХЛ4	1600	6300		96,0	10500 220

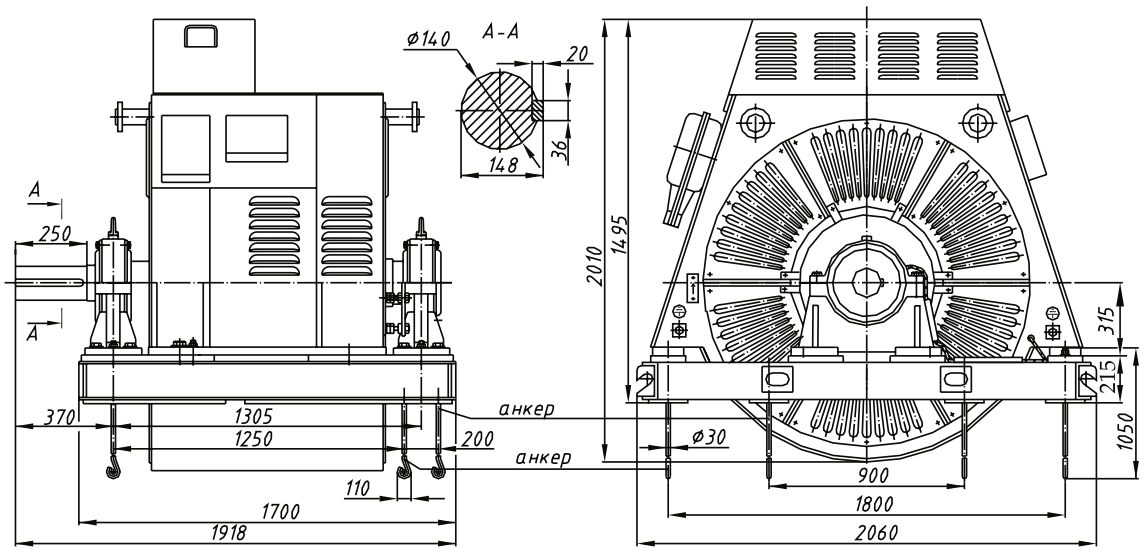
OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES VGS-450



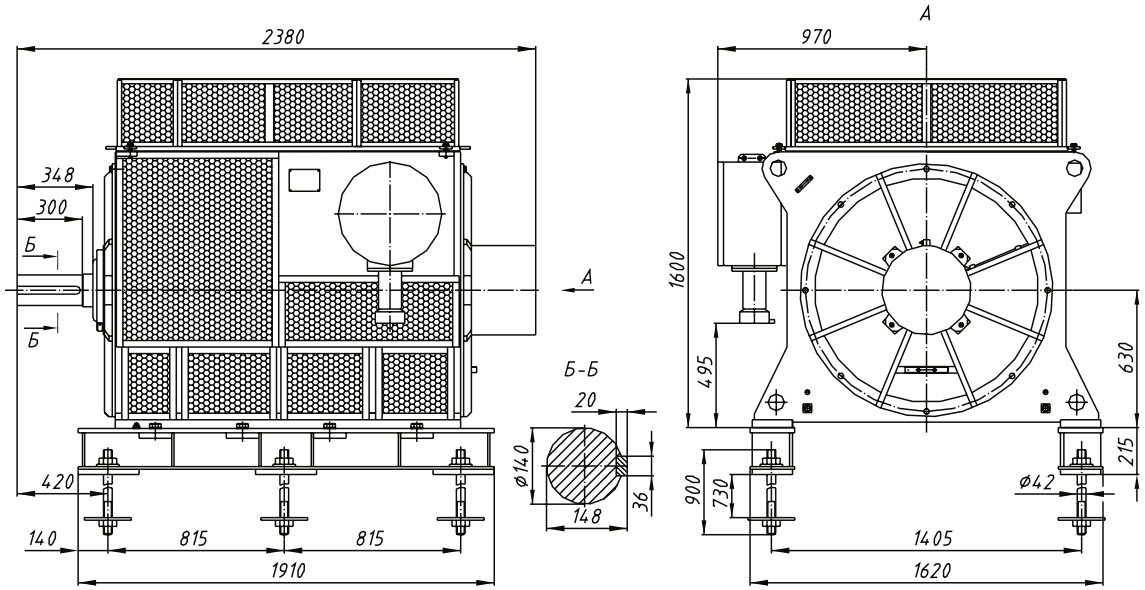
SGS-500



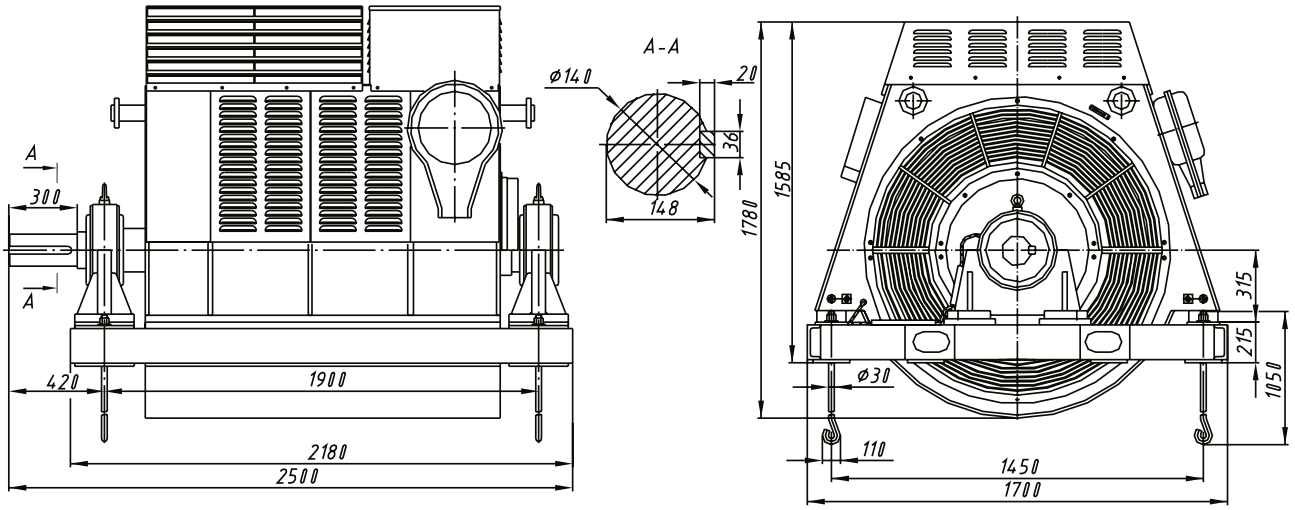
SG-630



SG-1000



SG-1600



SYNCHRONOUS GENERATORS SGD2, SGD2M

Synchronous generators SGD2, SGD2M with static excitation system are designed at power plants as main, reserve and emergency three-phase, 50 Hz, electric power sources with the explosion engine drive.

These generators are delivered with exciting device KUVM; generators with voltage 0,4kV are additionally equipped with open panel SHCHO.

Climatic construction type: УХЛ4, О4.

Mounting configuration: IM7115.

Protection degree for:

generators	IP11
terminal box	IP21
exciting devices KUVM and SHCHO	IP00 (from the service side - IP20)
UVGS-SN and UKN-N	IP21

Cooling method:

generators	ICA01
exciting devices and panels	natural aerial

Main advantages of generators SGD2, SGD2M over analogues:

- windings of stators and poles of electrical machines are manufactured with moisture-resistant thermosetting insulation "Monolith-2". Insulation of windings corresponds to heat resistance class “F” using class “B”.

-the original design of the rotor winding, which provides increased reliability;

- reduction of mass (up to 5%).

Designation of generators at their order must consist of the generator name, type designation, its rated power, nominal voltage, rotational speed and type designation of exciting and distribution devices supplied with the generator: "Generator SGD2-17-44-16 УХЛ4 800kW, 400V, 375 rpm with KUV M-0,4-800 and SHCHO1-800 ".

KUVM devices are designed as a double-side serviced panel; open panels SHCHO - as a double-section panel.

KUVM devices provide:

-initial excitation of the synchronous generator;

-statism of the external characteristics of the generator on reactive current in the range from 0 to 3% at the nominal power factor;

- measurement od electrical characteristics of generator;

- control and alarm in case of breakages and emergency parameters of the generator and drive motor;

- control of start, stop of the drive engine.

-control of the ignition charge of the drive engine fuel.

TYPE DESIGNATION

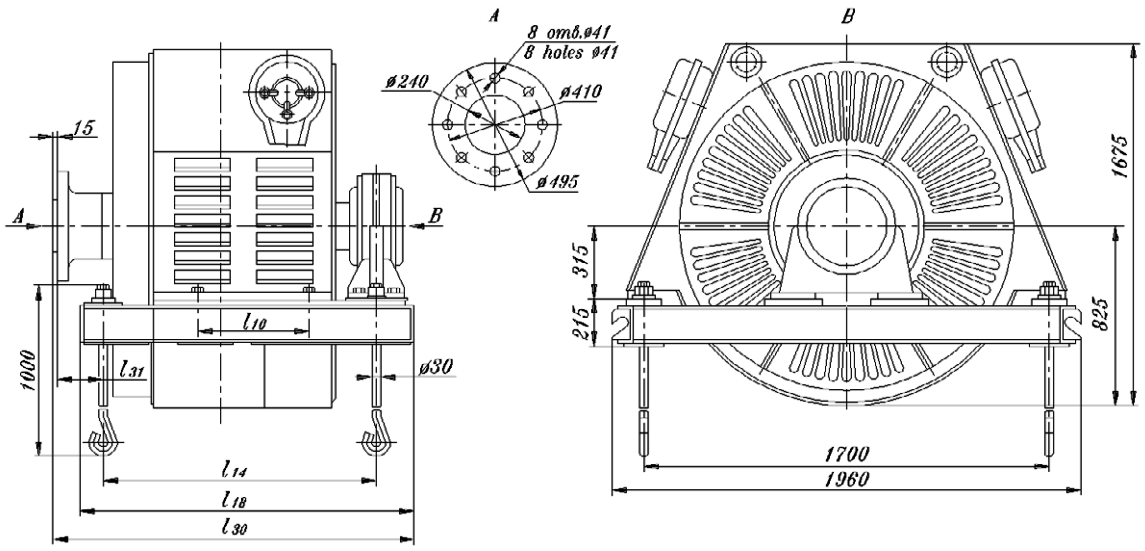
SGD 2 M – 17 – 36, 44, 50 – 16 УВ – УХЛ4, О4

- Climatic construction type and category of placement
- Reinforced flange design of shaft
- number of poles
- Stator core length, cm
- Conventional dimension
- version «updated»
- series number
- Synchronous diesel generator

TECHNICAL PARAMETERS OF SGD2 and SGD2M

Type designation	Power, kW/kVA	Voltage, V	Rotational speed, rpm.	efficiency, %	Rotor flywheel moment, kgf*m2	mass, kg
SGD2 17-36-16УВ УХЛ4 with KUV M-0,4-630 and SHCHO1-630	630/790	400	375	93,8	1675	5400 260 920
SGD2M-17-36-16УВ УХЛ4 with KUV M-6,3-630		6 300		93,7	1595	5280 260
SGD2-17-44-16 УХЛ4 with KUV M-0,4-800 and SHCHO1 – 800	800/1000	400		94,1	2048	6100 260 920
SGD2M-17-44-16 УХЛ4 with KUV M-6,3-800		6 300		94,0	1948	5900 260
SGD2-17-50-16 O4 with KUV M-0,4-800 and SHCHO1 – 800		400		95,4	2176	6830 250 920
SGD2M-17-50-16 O4 with KUV M-6,3-800		6 300		94,5	2048	6850 250

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES



Type designation	dimensions, mm				
	l_{10}	l_{14}	l_{18}	l_{30}	l_{31}
SGD2-17-36-16УВ УХЛ4 SGD2M-17-36-16УВ УХЛ4	450	1120	1360	1605	335
SGD2-17-44-16 УХЛ4 SGD2M-17-44-16 УХЛ4	550	1250	1450	1645	250
SGD2-17-50-16 O4 SGD2M-17-50-16 O4	560	1250	1490	1705	315

ИНДУКТОРНЫЕ МАШИНЫ

INDUCTOR MACHINES

In the nomenclature of SP JSC "Electromash" inductor electrical machines are presented by:

- slow-speed generators for hydroelectric and wind energy power plants, with power from 37 kW up to 350 kW, voltage 400V and 690V and rotational speed 273, 375, 428 rpm.;
- valve regulated motors, designed for pumps,compressors, fans, conveyors as traction electric motors of vehicles, etc., where smooth control of rotational speed over a wide range is required with constant torque and minimal fluctuation (power 500kW, voltage 380V, rotational speed 3000 rpm. and 6000 rpm.);

- motor-generator with power 500kW, voltage 380V, rotational speed 3000 rpm, designed for using as part of motor-generator unit of standard electromechanical energy storage for metro, suburban trains, heavy dump trucks, electrical substations of cities and factories.

Production has been mastered and the expansion of the range of adjustable electric drives based on inductor valve machines continues. The basis of such drives is based on new opportunities in the field of power electronics, hardware components, microprocessor technology and software management. This is technique, which is today called the product of high technology. The introduction of adjustable electric drives confirms their high energy-saving and resource-saving efficiency.

The high efficiency of application of an adjustable electric drive to optimize the operation of various technological systems with mechanisms operating in variable modes has been confirmed by world experience. As a rule, in most technological systems of energy, industry, public utilities and other industries, electric motors are installed for maximum equipment output, while peak hours, i.e. equipment operation with maximum output, is only 10-15% of the total equipment operation time.

At the same time, in the general structure of power consumption in the national economy of Russia, the share of such electric motors accounts for about 40% of electricity.

As a result, electric motors operating at constant rotational speed consume up to 50% more electricity than is required to ensure an optimal technological process.

The application of adjustable electric drive allows you to optimize the operation of electric motors, technological systems with mechanisms operating in variable modes. In the whole country, the introduction of adjustable electric drive in the energy, industry, housing service, railway transport and other industries will provide an annual savings of 35-40 billion kW / h of electricity.

It is much more profitable to integrate energy-saving equipment than to introduce new power to get the same number of kilowatts / hours, the savings for which it will provide.

The economic effect is 7% only from saving energy at adjustable drive.

The main reasons for the effectiveness of adjustable drive is the increased reliability of the equipment, its service life and the overhaul period. This effect is achieved due to “gentle” operation modes that provide regulation.

In recent years, more progressive direction of work on the adjustable electric drives creation - drives based on valve electric motors(with permanent magnets and inductor) - has been intensively developing around the world.

The main advantages of inductor machines over analogues:

- simple design;
- high reliability of the rotor due to the absence of any windings on it;
- contactless, smooth, dual-zone method of the rotational speed regulation widely at constant running torque.
- the minimum amount of maintenance during operation;
- significant reduction in mass and dimensions.

HYDROGENERATORS INDUCTOR SYNCHRONOUS SGI

Synchronous generators SGI of capsular version are designed for operation at power stations as a source of three-phase alternating-current,50Hz, using the potential of small rivers, channels driven by turbine mounted directly on the generator shaft.

The capsule of installation is double-casing. The generator itself is hermetically built in the inner case, and the energy carrier (water) flows between the shells of the cases.

The generators are designed to operate parallel with electrical circuit, what is provided by the generator control.

The generators are equipped with guide unit wheel, turbine wheel, inlet cowl and control board SHCHUI. The blades of the guide unit and the turbine (their number and adjustment angles) are selected and installed by the designer of the hydraulic facility depending on the specific object.

Operation mode: continuous S1.
Climatic construction type:У3.
Mounting configuration:IM9001.
Protection degree:

hydrogenerator	IP23
SHCHUI	IP21 (from the floor side IP00)

Cooling method:

hydrogenerator	ICA01
SHCHUI	natural aerial

The generators allow the left and the right rotatio.

SHCHUI boards are designed as two-section one-sided operation cabinet; and provide control, monitoring and protection of generator circuits, including:

- switching-on the generator an dauxiliary circuits of hydroelectric power plant control;

generator protection against short-circuit currents on the tires after the generator circuit breaker;

- generator protection against reverse power flow;
- generator protection against overcurrent;
- short-circuit currents protection of its own needs;

- installation protection at overvoltage and frequency above the limits;
- measurement of the insulation resistance of the excitation circuit and protection (shutdown) of the installation while reducing the insulation resistance below the set value;
- temperature measurement of the generator components from the sensors installed on it.

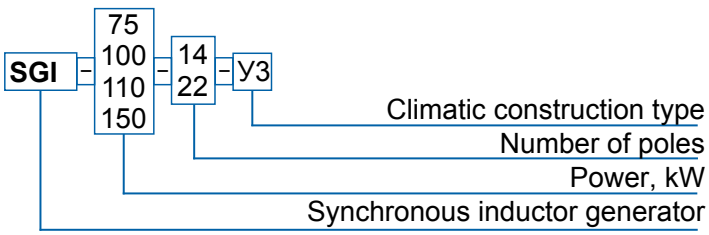
The main advantages of inductor generators over generators of traditional version:

- compact, low-speed generator, using the potential of small rivers, canals with existing heads from 3 to 12 meters and water consumption from 1.5 to 4 m³ per second;
- recovery time reduction of hydroelectric power plants or building new ones at minimum financial expenses;

- technology of vacuum pressure impregnation (VPI) of the windings with epoxy compound, which is the basis of the insulation “Monolith-2”.
- simple design;
- high reliability of the rotor at overspeed, that is higher than the nominal ones, due to the absence of any windings on it;
- - high energetic and service indicators;

- good adjustment properties, working efficiency at increased temperatures and humidity;
- significant reduction of mass and dimensions;
- the possibility to manufacture generators in sealed capsule to ensure operability in case of possible flooding of the hydroelectric power plants during high water.

TYPE DESIGNATION

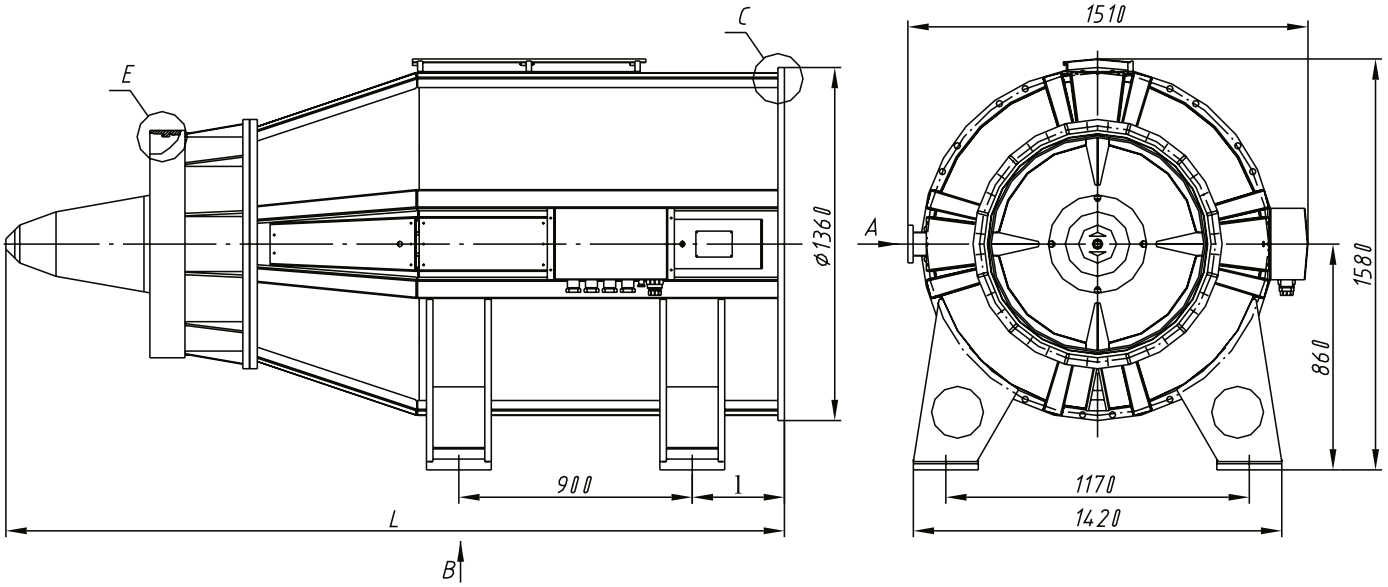


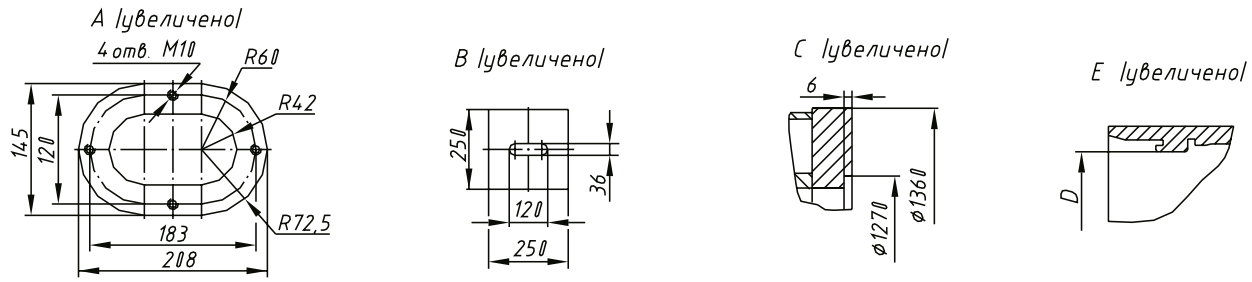
TECHNICAL PARAMETERS OF GENERATORS SGI

Type designation	power, кW/кVA	Voltage, V	Rotational speed, rpm.	Diameter of turbines, mm	efficiency, %	mass, kg
SGI-75-22 У3 with SHCHUI-75 У3	75	400	273	1000	92,0	4300 195
SGI-110-22 У3 with SHCHUI-110 У3	110				93,0	5400 198
SGI-100-14 У3 with SHCHUI 100 У3	100		428		93,3	4300 195
SGI-150-14 У3 with SHCHUI-150 У3	150				95,5	5400 198
SGI2-100-14 У3 with SHCHUI-100 У3	100			820	93,3	5000 198

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES

type designation	Dimensions, mm		
	D	L	l
SGI2-100-14 У3	820	2960	354
SGI-100-14 У3	1000	2950	
SGI-150-14 У3		3240	644
SGI-75-22 У3		2950	354
SGI-110-22 У3		3240	644





HYDROGENERATORS SYNCHRONOUS INDUCTOR SGI-BK

Generators SGI-BK of capsuleless version are designed on the basis of generators SGI, have similar energetic parameters, are equipped with excitation control and protection board of SHCHUI type.

These generators are designed at power stations as a source of three-phase alternating-current, 50Hz, with constant frequency and voltage measures to transfer it to the network 3x0,4kV, on stationary hydroelectric power plants, using the potential of small rivers, channels driven by turbine

Generators can be manufactured for autonomous operation with stable frequency and voltage parameters, both for hydropower and wind power plants, as well as, on customer's request, with varying parameters of output voltage and frequency.

In this case, changing the rotational speed from nominal downward or upward will lead to proportional decrease and, accordingly, to the frequency network and the generator output voltage increase.

Operation mode is continuous S1.

Climatic construction type:У3.

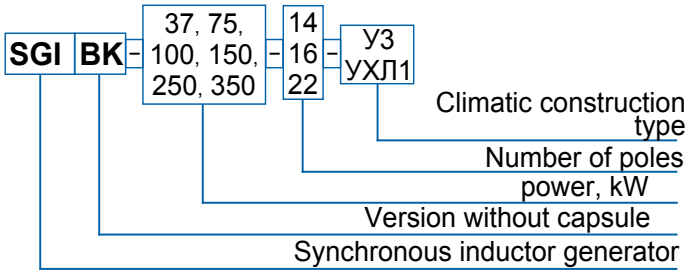
Mounting configuration:IM1001.

Protection degree:

generator	**IP21**
terminal box	**IP42**

Coolingmethod:ICA 01.

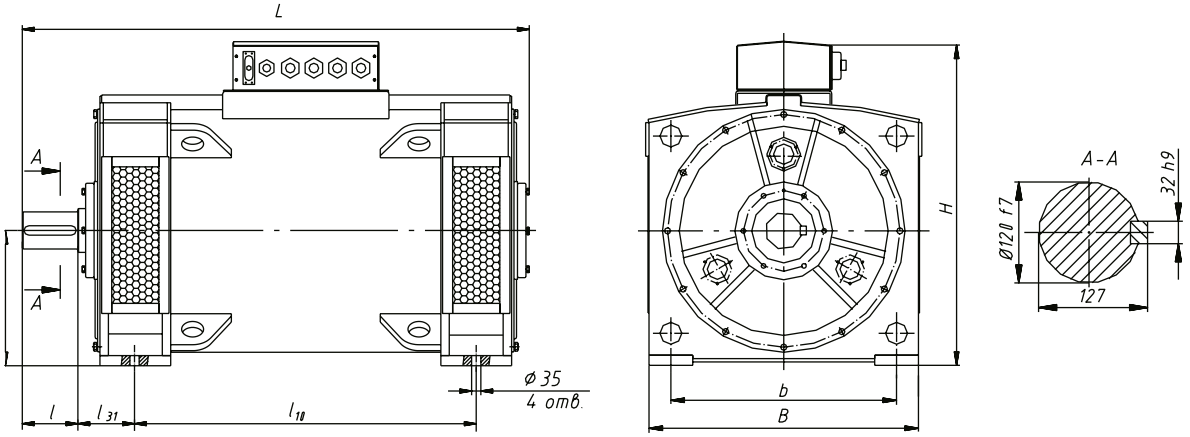
TYPE DESIGNATION



TECHNICAL PARAMETERS OF GENERATORS SGI-BK

Type designation	power, kW	Voltage, V	Rotational speed, rpm.	efficiency, %	mass, kg
SGI-BK 37-22 У3	37	400	273	93,0	1600
SGI-BK 75-22 У3	75			92,0	2800
SGI-BK 100-14 У3	100		428	93,3	2800
SGI-BK 150-14 У3	150			95,5	3400
SGI-BK 250-16 УХЛ1	250		375	93,6	3550
SGI-BK 350-16 УХЛ1	350	690		94,0	4750

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES



Type designation	L	l	l 10	l 31	B	b	H	h
SGI-BK-37-22У3	1110	165	630	200	800	686	970	400
SGI-BK-75-22У3	1525		1010					
SGI-BK-100-14У3								
SGI-BK-150-14У3	1835		1400					
SGI-BK-250-16УХЛ1	1650	210	1140	315	1915	1400	1300	560
SGI-BK-350-16УХЛ1	1730		1210					

WIND POWER GENERATOR SYNCHRONOUS INDUCTOR SGI

Synchronous inductor generators SGI are designed to equip wind electrical turbo-generator installation TG. These electric machines are distinguished by its simple design, absence of rotational windings, and then, sliding contacts, that ensures high reliability in operation. Generators allow operation in continuous mode (S1) both in network of infinite power, and in local area network together with diesel-power generators or on autonomous overload.

The construction of generators and excitation system provide operation without damages and permanent distortions at:

- 10% current overload at rated voltage during an hour;

25% current overload at rated voltage during 2 minutes;

- sustained three-phase short-circuit failure during 5 seconds;
- with short-circuit current shock from idle at voltage equal to 105% of the nominal;

- increasing the rotational speed by 150% above the nominal for a long time, at operation without load and excitation.

Taking into account unique construction of wind installation (the location of generators on blades) the generators are subject to significant overload - up to 13g longtime and up to16g short-time (up to 5 minute), at the same time, they remain functional.

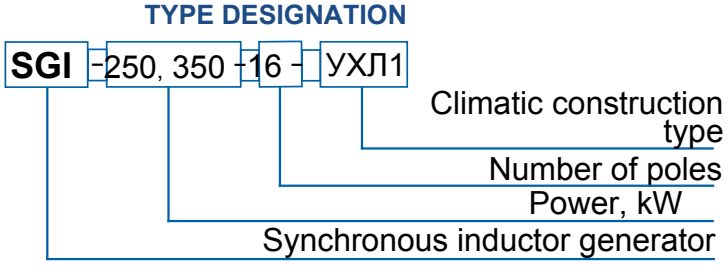
SGI generators have built-in temperature sensors of stator, exciting coils and bearings. The temperature range, at which generator is functional, is from -40 up to +40°C, atmosphere pressure is - from 630 to 800 mm of mercury. The upper limit value of atmosphere relative humidity for generators is 100%, for exciting system is 98%.

Operation time of generators to failure is not less than 9000 hours, total service life - is not less than 20 years.

Current frequency: 50 Hz.

Ptotection degree: IP54.

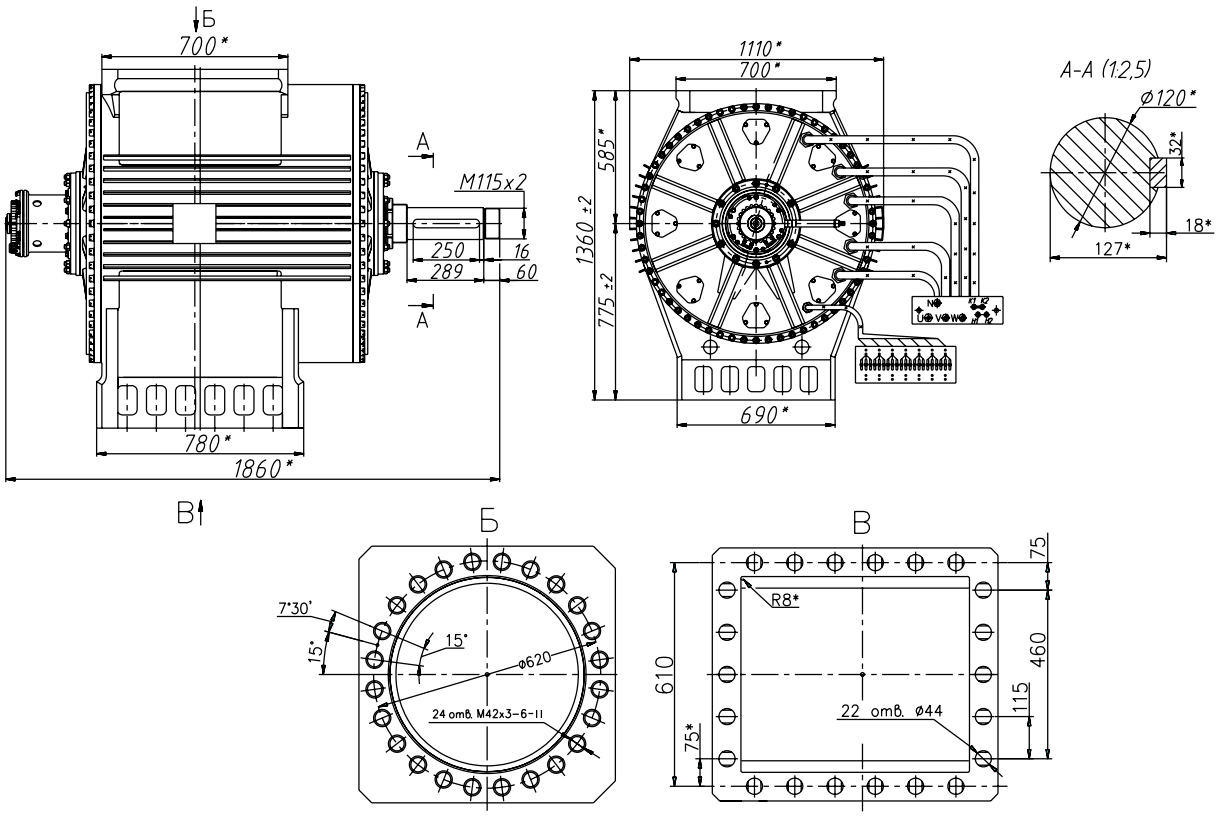
TYPE DESIGNATION



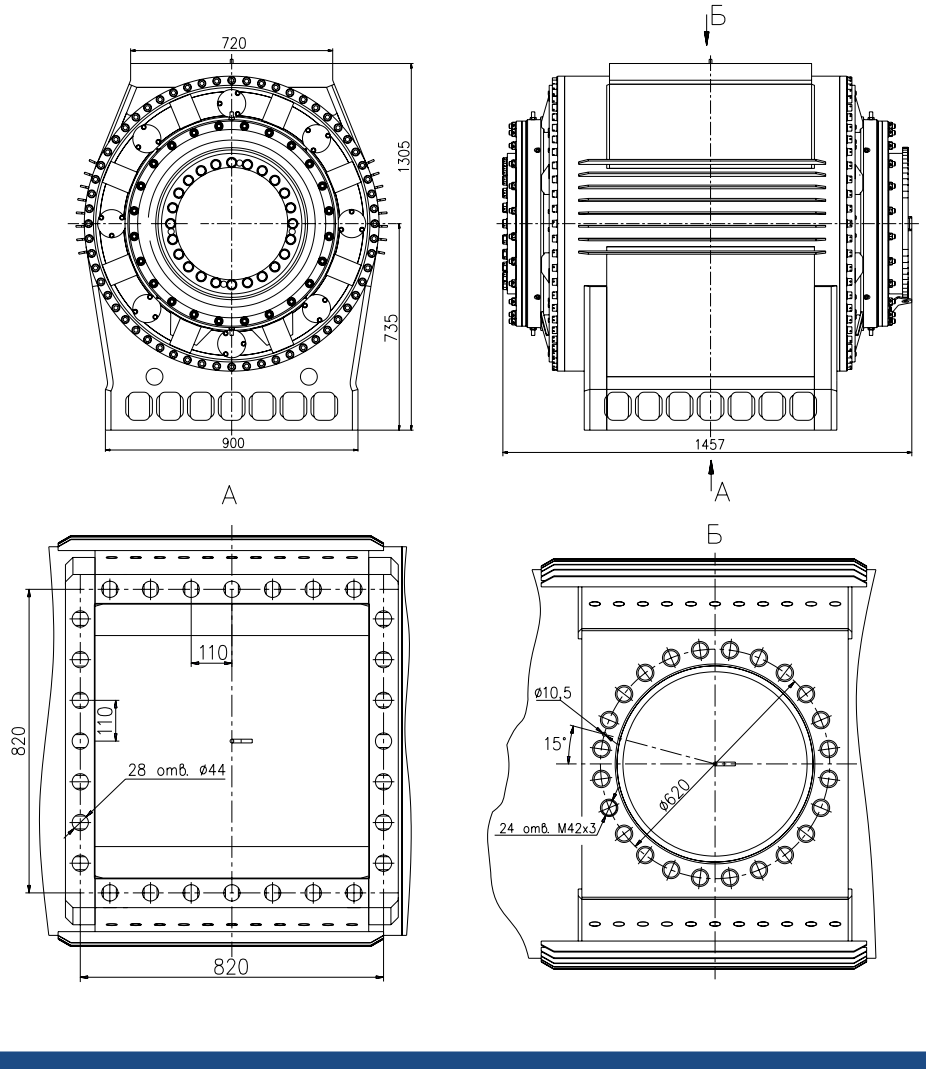
TECHNICAL PARAMETERS OF WIND GENERATORS SGI

type designation	power, кW/кVA	Voltage, V	Rotational speed, rpm.	efficiency,%	Cos φ	mass, kg
SGI-250-16 УХЛ1	250/263	400	375	93,6	0,95	3550
SGI-350-16 УХЛ1	350/368	690		94,0		4750

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES OF SGI-250



SGI-350



VALVE INDUCTOR OF ELECTRIC MOTORS DVI

Valve inductor electric motor DVI is designed for operation as part of valve-inductor drive with rotational speed control system for testing hydraulic units, individual pumps and assemblies with power from 5 to 500 kW with change in motor speed from 300 to 3000 rpm.

Operation mode:is continuous S1.
Climatic construction type: У3.
Mounting configuration: IM1002.
Protection degree:IP54.
Cooling method:ICA 0141.
Rotation direction: reversive.

The motor can be manufactured in explosion-proof version. Insulation of windings is thermosetting, moisture resistant, corresponds to the heat resistance class “F”. The motor has built-in thermal monitoring sensors for measuring the temperature of the armature windings, excitation and bearings.

The electrical drive system provides:

- rotation - continuous operation with given frequency with nominal moment;
- smooth speed control in given range at the resistance moment on the motor shaft, not exceeding the nominal moment.

The electric drive includes the "Universal-500 (VI)" automatic control unit, assembled from the "Universal-160 (V)" three modules and equipped with special software and sensors for controlling the motor.

Field of application:

- automated adjustable electric drives in machine tool industry,

- traction motor of vehicles;
-high-speed electric pumps and compressors for the oil and gas industry.

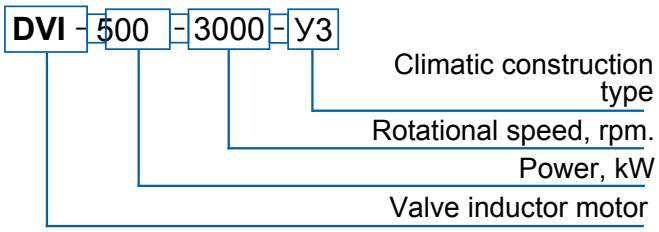
Main advantages of electric motors DVI over analogues:

- simple design;
- high reliability of the product;
- -non-contact, smooth, dual-zone method of rotational speed regulating over a wide range with constant torque;

- high dynamic characteristics;
- minimum fluctuations of running torque;
-minimum amount of maintenance during operation;

- significant reduction in mass and dimensions.

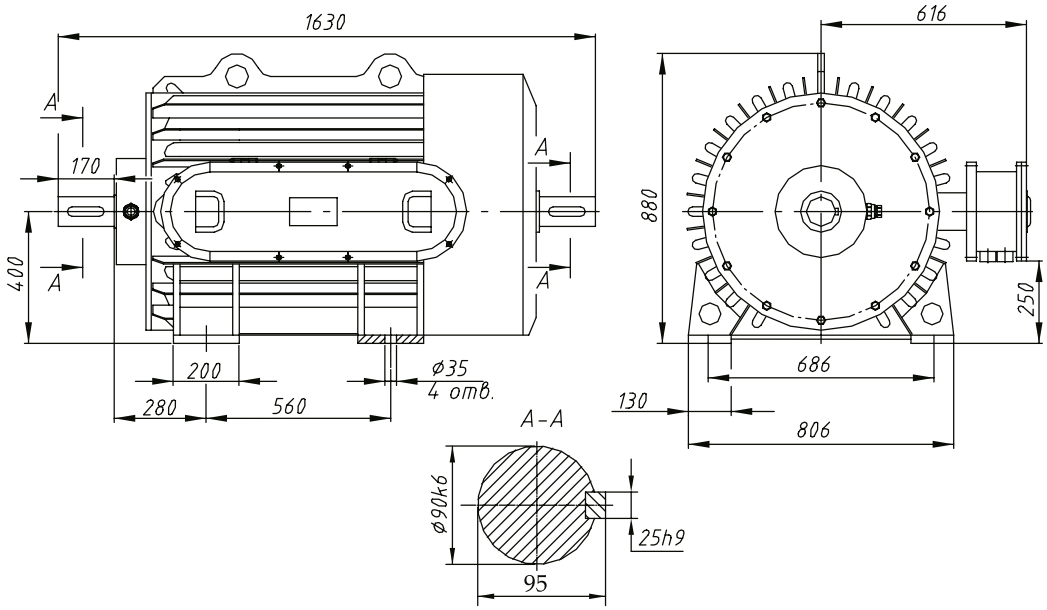
TYPE DESIGNATION



TECHNICAL PARAMETERS OF ELECTRIC MOTORS DVI

Type designation	power, kW	Voltage, V	Rotational speed, rpm.	efficiency, %	mass, kg
ДВИ-500/3000 У3	500	380	3000	96,0	2400

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES



VALVE INDUCTOR MOTOR-GENERATORS DGVI

Vertical valve-inductor motor-generator DGVI is designed to operate as part of energy-saving equipment (electromechanical energy storage devices EMNE) at substations of the metro and with voltage guarantee during acceleration and recovery of electricity during electric train braking.

Peak voltage and current overloads on the electrical equipment of the substation are removed and, thus, conditions are created to increase the service life of electrical equipment and turnaround time.

Operation time: is intercalar y S8 of motor and generator condition with a periodic cycle of 1.5-3 (from 20 up to 40 starts per hour).
Mounting configuration: УХЛ4.
Mounting configuration: IM3011
Protection degree: IP44.
Cooling method:IC 0141.
Rotation direction: reversive.

Range of optimum frequencies of rotation: from 2000 up to 3300 rpm. At the same time, the supported voltage should be 825V, tolerance ± 10%.

The motor has built-in thermal monitoring sensors for measuring the temperature of the armature windings, excitation and bearings.

The electrical drive system provides:

- rotation - continuous operation with given frequency with nominal moment;
- smooth speed control in given range at the resistance moment on the motor shaft, not exceeding the nominal moment.

The electric drive includes the "Universal-500 (VI)" automatic control unit, assembled from the "Universal-160 (V)" three modules and equipped with special software and sensors for controlling the motor.

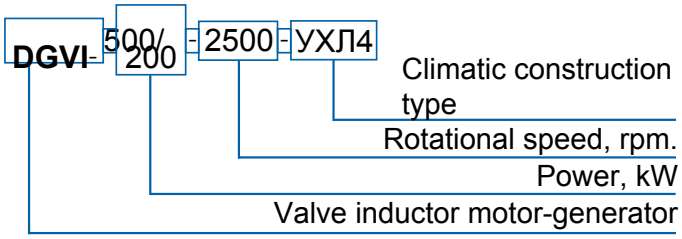
Field of application of electromechanic energy storage:

- - urban trolleybuses, trams, subyrban trains (braking energy recovery during descent and voltage grading in the traction network);
- electric substations of cities and factories (to cover the peaks of energy consumption and voltage grading in the network);
- - lifting equipment (energy recovery descent cargo with its subsequent impact when lifting);
- largedump trucks “BELAZ” (recovery of braking energy and energy on the descent with its subsequent transfer when starting and moving up, which eliminates overload in diesel generator circuits, as well as increasing its life, reducing exhaust emissions into the atmosphere, reducing fuel consumption).

Main advantages of electric motors DGVI over analogues:

- high energetic parameters;
- simple design;
- high reliability of the product;
- minimal volume of maintenance during operation;
- significant reduction in mass and dimensions.

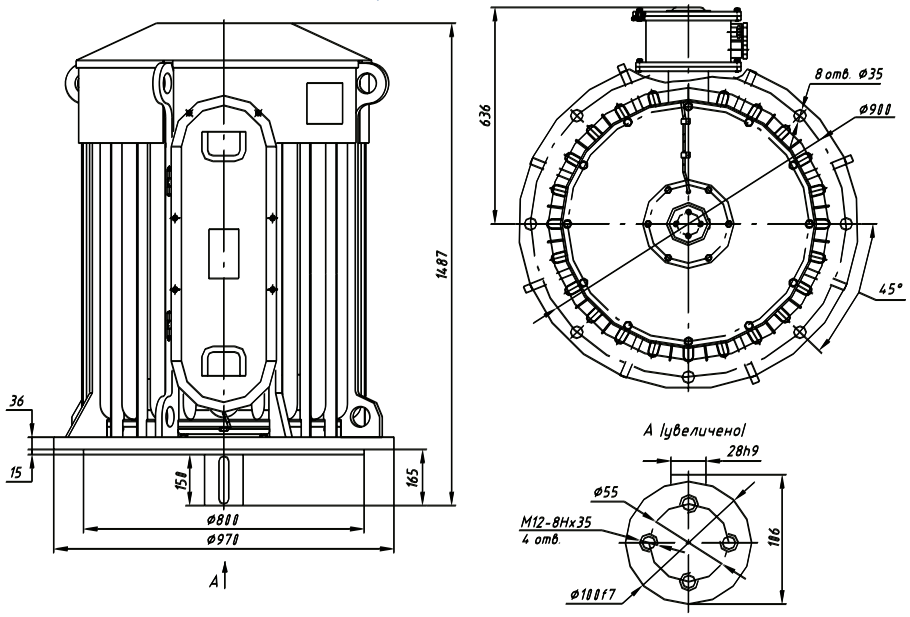
TYPE DESIGNATION



TECHNICAL PARAMETERS OF THE MOTORS DGVI

Type designation	power, kW Motor / generator	VOLTAGE, V	Rotational speed, rpm.	Phase current, A motor / generator	efficiency, %	mass, kg
DGVI-500/200-2500 УХЛ4	500/200	380	2500	180/60	96,0	2400

OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES



Fields of application:

-automated adjustable electric drive in machine tool building;

- -high-speed electric pumps and compressors for the oil and gas industry.
- electric transport;
- crane motors.

Main advantages of generators NUSGI over analogues:

-- simple design;
- high reliability of the product;
- significant reduction of mass and dimensions;
- minimum amount of maintenance during operation.

SYNCHRONOUS INDUCTOR GENERATOR NUSGI

Synchronous inductor generator NUSGI is designed for use as a load device when conducting tests of adjustable electric drives at rotational frequencies: 3000 rpm. in the power range of 16-200 kW, 6000 rpm. in the power range of 45-500 kW.

The electrical drive system provides:

- rotation - continuous operation with given frequency with nominal moment;
- smooth speed control in given range at the resistance moment on the motor shaft, not exceeding the nominal moment.

Climatic construction type: У3.
Mounting configuration:

IM1002	IM1001

Protection degree: IP43.
Cooling method: ICA 0141.
Rotation direction: reversive.

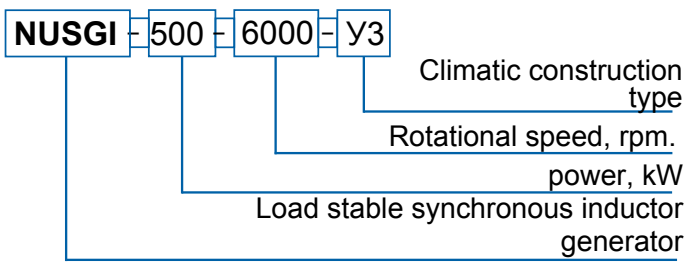
The generator can be manufactured in explosion-proof version. Insulation of windings is thermosetting, moisture resistant, corresponds to the heat resistance class “F”. The motor has built-in thermal monitoring sensors for measuring the temperature of the armature windings, excitation and bearings.

The generator works in the motor mode, while providing:

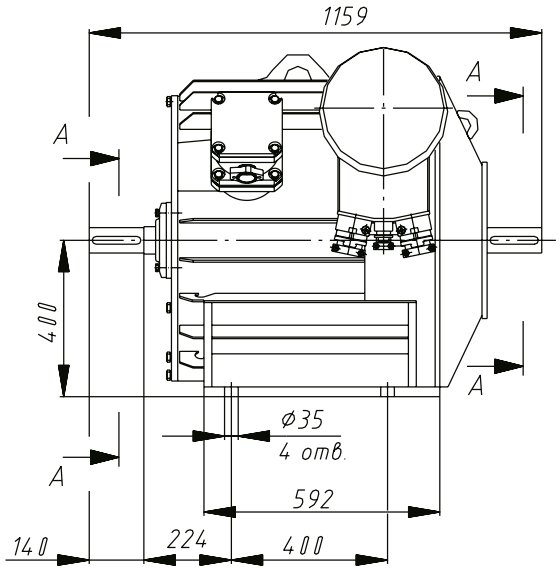
- non-contact, smooth, dual-zone method of rotational speed regulating over a wide range with constant torque;

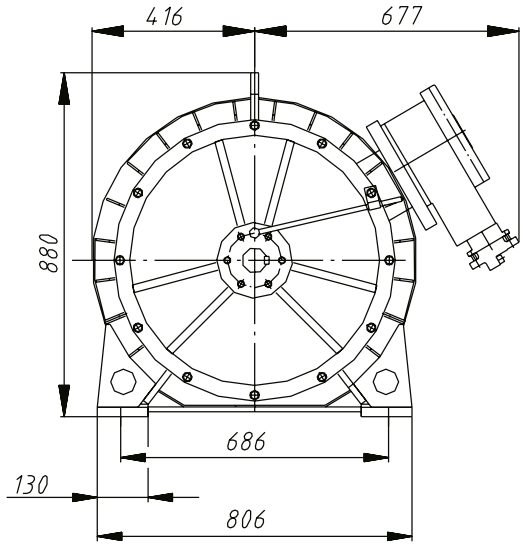
- high dynamic parameters;
- minimum fluctuations of running torque;
- minimum amount of maintenance during operation;

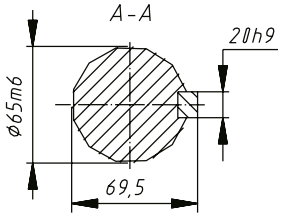
TYPE DESIGNATION



OVERALL DIMENSIONS, INSTALLATION AND MOUNTING SIZES







TECHNICAL PARAMETERS OF GENERATORS NUSGI

TYPE DESIGNATION	Power,kW	Voltage, V	Rotational speed of the shaft, rpm.	Stator current, A	Efficiency, %	mass, kg
NUSGI-500/6000 У3	500	380	6000	690	95,0	1900

VOLTAGE STABILIZERS

AND CURRENT TRANSFORMERS

VOLTAGE STABILIZERS AND CURRENT TRANSFORMERS

SP JSC "Electromash" is a large manufacturer of industrial and household voltage regulators in singleand three-phase versions with power range from 0,63 up to 200 kVA of STS, SDO and SDT.

The stabilisers are used to normalize supply voltage with accuracy from ±1 up to 6% at changing the supply voltage up to ±30% from its nominal value.

The stabilisers are used to normalize feeding for the expensive equipment, of local and foreign production: NC machine tools, computer, medical equipmant, powerful television and radio complexes, for the energy saving of cottages.

The reinforced design of stabilizers STS and special manufacturing technology allows to use them in areas with raised seismicity and on nucler power plants.

In its new developments the enterprise leads work at power increse, improvement of characteristics for all types of stabilizers.

The enterprise has many years experience in manufacture of dry low-voltage three-phase transformers with power from 16 up to 300kVA, used to power thyristor converters, exciting devices with control systems and automatic control of synchronous electric motors, feeding electric furnaces.

THREE-PHASE VOLTAGE STABILIZERS STS-3S-M1

Three-phase voltage stabilizers STS-3S-M1 are designed to automatically stabilize the power supply voltage with special requirements for the quality of the supply voltage (machine tools with numerical control, teleradio complexes, medical computer centers, etc.).

Stabilizers with an input line voltage 380V are automatically stabilized at the same time line (380V) and phase (220V) voltage when powered from four-wire network, with both deadground and isolated neutral.

Operation mode: continuous.
Climatic construction type: УХЛ3.1.
Protection degree: IP20.
Coolingmethod: forced
Protection class against electric shock stabilisers: 01 according to GOST 12.2.007.0.

Operation conditions:

The environment must be non-explosive, do not contain aggressive vapors, gases and conductive dust in concentrations that destroy metals and insulation, and reduce the parameters of stabilizers in unacceptable limits.

In terms of the impact of mechanical environmental factors, the stabilizers correspond to the group of operating conditions M1 according to GOST 17516.1.

Design:

Stabilizer consists of the following parts:
- ATRPN (autotransformer, adjustable voltage redistribution)
- control panel;
- panel with fans;
- protective cover;
- devices for lifting and moving.

ATRPN is the main component of the stabilizer. Control unit, terminal blocks for connecting the stabilizer to the network and the load, devices for lifting are directly attached to its beams.

ATRPN is two three-phase autotransformers α and β connected in series to star, located on magnetic conductors. The cores of each phase of both magnetic cores are divided into 2 half-cores, on which the biasing semi-windings are located.

Autotransformers α and β have different transformation ratios and form a regulator operating on the principle of voltage redistribution between the windings.

The redistribution of voltage is carried out by local magnetization of the α and β rods of autotransformers with the help of bias half winding.

ATRPN windings are made of insulated copper wire with insulation of heat resistance class not lower than B according to GOST 8865 and have axial ventilation channels for better cooling.

On the front panel of the stabilizer there is a circuit breaker for protection against short-circuit currents and overcurrent.

A digital multimeter DMK-22 is installed on the front panel of the stabilizer, which allows you to visually monitor the load power (full, active, reactive), line and phase voltages and currents, as well as display the instrument readings on a personal computer using RS-485 interface.

Electrothermal relays are introduced into the windings of the ATRPN, which turn on the fans when the temperature exceeds 70 ° C.

An individual spare parts kit is supplied with each stabilizer.

Network and loads are connected by bolting on the side terminal panels. External cables are supplied from the floor side under the cover. Lifting and moving the stabilizer is carried out using eyebolts.

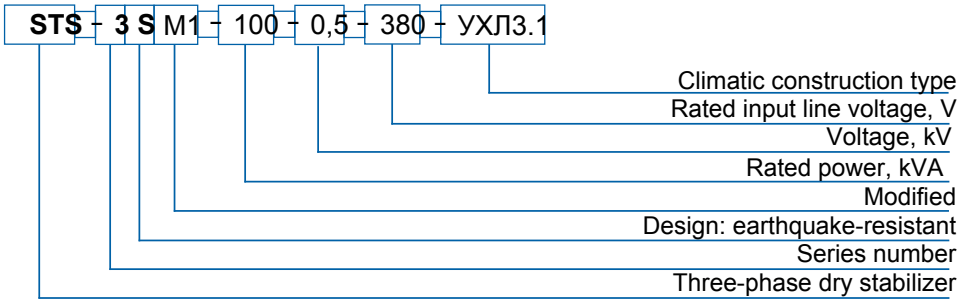
TECHNICAL PARAMETERS AND DIMENSIONS OF STABILIZERS STS-3S-M1

Rated power of stabilizer, kVA	100
Rated input voltage, V	380
Rated output stabilized voltage, simultaneously: - line, V - phase, V	 380 220
Input voltage range (0,8-1,15) Unom, V	304-437
Accuracy stabilization, %	±1
Efficiency, %	95_{-2}
Power factor, cos φ	$0,95_{-0,02}$
Recovery time at active loading in the symmetric mode, with: - at drop -rise of line load from 0 up to 100% from rated; - at step changing of supply voltage from 0,8 up to 1,15 Unom and from 1,15 up to 0,8 Unom	 0,2 0,45
Overall dimensions LxBxH, mm, not more	980x510x945
Mass, kg, not more	440

Main advantages of stabilizers STS-3S-M1:

- simultaneous stabilization of line and phase voltage;
- smooth adjustment;
- high setting accuracy;
- high life cycle;
- stabilizers are designed for rated load power over the entire range of input voltage;
- protection against short circuit currents and overcurrent;
- DMK digital multimeter that allows you to visually monitor the load power (full, active, reactive), line voltages and currents, as well as the ability to display the instrument reading on a personal computer using the RS-485 interface.

TYPE DESIGNATION



THREE-PHASE VOLTAGE STABILIZERS STS-3S, STS-3U, STS-3S-M

Three-phase voltage stabilizers STS-3S, STS-3U, STS-3S-M are designed to provide stabilized voltage to consumers with special requirements for the quality of the supply voltage (machine tools with numerical program control, teleradio complexes, medical computer centers, etc.).

Stabilizers with input line voltage 380V automatically regulate simultaneously the line and the phase voltage at operation from four wire TN-S AC as with dead-grounded as with insulated neutral.

Stabilizers with input line voltage 220V regulate the line output voltage 220V.

Operation mode: continuous.

Input voltage changing range: (0,8… 1,15)U1nom

Accuracy of stabilization of the output voltage in a symmetric mode:

± 1% in the range of input voltag efrom 0,85 up to1,1 U1nom;

± 5% in the range of input voltage from 0,8 up to 0,85 U1nom and from 1,1 up to 1,15 U1nom.

Accuracy of stabilization of the output voltage in a nonsymmetric mode:

±3% in the range of input voltage from 0,85 up to 1,1 U1nom.

Climatic construction type:

STS and STS-3S-M	У3, Т3
STS-3U	УХЛ

Protection degree:

STS-3S	IP10, IP44
STS-3S-M	IP20, IP21
STS-3U	IP10
from the floor side (except for STS-3S, IP44)	IP00

Cooling method: aerial natural (for IP54 - forced cooling).

Class of protection against electric shock stabilizers is O1 according GOST 12.2.007.0.

The enhanced design of stabilizers allows them to be operated in areas of increased seismic activity, including at nuclear power plants (with power up to 100 kVA inclusive and in addition to STS-3U).

An additional overvoltage limiting unit is installed in the STS-3U stabilizers.

Operation conditions:

Stabilizers are resistant to temperature changes from the maximum operating temperature to the lowest ambient temperature and in reverse order.

The environment must be non-explosive, do not contain aggressive vapors, gases and conductive dust in concentrations that destroy metals and insulation, and reduce the parameters of stabilizers in unacceptable limits.

In terms of the impact of mechanical environmental factors, the stabilizers correspond to the group of operating conditions M1 according to GOST 17516.1

Under the terms of seismic resistance, stabilizers supplied at nuclear power plants withstand the maximum calculated earthquake with an intensity of 9 points MSK-64 when installed above the zero point of 20 m in the frequency range from 1 to 31.5 Hz.

Design:

Stabilizer consists of the following parts:

-ATRPN(autotransformer, adjustable voltage redistribution)
- control panel;
- panel with fans;
- protective cover;
- devices for lifting and moving.

The structure of STS-3U stabilizers additionally includes an overvoltage limiting device and an overvoltage protection unit.

ATRNP is the main component of the stabilizer. Control unit, terminal blocks for connecting the stabilizer to the network and the load, devices for lifting are directly attached to its beams.

An additional front welded frame is introducedIn in the STS-3S-M stabilizer, to which the side walls of the L-shaped form are attached. The design has an increased mechanical stiffness during movement and transportation.

ATRNP is two three-phase autotransformers α and β connected in series to star, located on magnetic conductors. The cores of each phase of both magnetic cores are divided into 2 half-cores, on which the biasing semi-windings are located.

Autotransformers α and β have different transformation ratios and form a regulator operating on the principle of voltage redistribution between the windings. The redistribution of voltage is carried out by local magnetization of the α and β rods of autotransformers with the help of bias half winding.

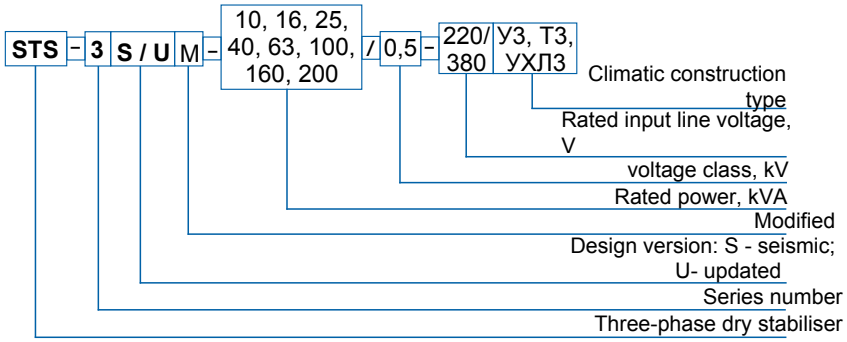
ATRPN windings are made of insulated copper wire with insulation of heat resistance class not lower than B according to GOST 8865 and have axial ventilation channels for better cooling.

The stabilizers have a light alarm on the presence of input voltage and test sockets for connecting a voltmeter that controls the input and output voltages.

Main advantages of stabilisers STS-3S, STS-3U, STS-3S-M over analogues:

- simultaneous stabilization of line and phase voltage;
- smooth adjustment;
- high setting accuracy;
-high load capacity;
- strenghtened design and possibility to operate on nuclear power plants (STS-3S, STS-3S-M);
- - almost momentary trimming of output voltage (STS-3U);
- protection arising from the input network and during load drop (STS- 3U);
- high life cycle;
- stabilizers are designed for rated load power over the entire range of input voltage.

TYPE DESIGNATION



DISTORTION POWER FACTOR OF SINUSOID OF OUTPUT VOLTAGE IN SYMMETRIC AND NON SYMMETRIC MODES DEPENDING ON TYPE OF LOADING

OPERATION MODE	Type of load	Наименование параметра	
		Output stabilized voltage	Sinusoidal distortion coefficient of the output voltage curve,%, not more than
symmetric	$\cos \varphi_2$ = 1,0 (active)	line	5,0
		phase	6,5
	$\cos \varphi_2$= 0,7 (active-inductive)	line	
		phase	8,0
nonsymmetric	$\cos \varphi_2$ = 1,0 (active)	line	
		phase	10,0
	$\cos \varphi_2$= 0,7 (active-inductive)	line	
		phase	

TECHNICAL PARAMETERS AND OVERALL DIMENSIONS OF STABILISERS STS-3S

Type of stabilisers	Rated power, kVA	Rated input line voltage, V	Rated output stabilised voltage, V			efficiency, $\%_{-2}$	Reset time of line load release/surge from 0 up to 100%	Protection degree of case	Dimensions, mm			Mass kg, not more
			simultaneously		line				L	H	B	
			line	phase								
STS-3S-10/0,5	10	380	380	220	-	95,5	0,10	IP10	690	580	365	135
		220	-	-	220							
STS-3S-16/0,5	16	380	380	220	-	96,5	0,15					170
		220	-	-	220							
STS-3S-25/0,5	25	380	380	220	-				790	740	435	243
		220	-	-	220							
STS-3S-40/0,5	40	380	380	220	-	97,0	0,20					285
		220	-	-	220							
STS-3S-63/0,5	63	380	380	220	-	97,5			990	895	520	437
STS-3S-M-63/0,5								IP20	985	960	500	417
		220	-	-	220			IP21 IP31	1010	1055	530	430
STS-3S-100/0,5	100	380	380	220	-	98,0		IP10	990	895	520	530
								IP44	1400	1500	814	670
STS-3S-M-100/0,5								IP20	985	960	500	517
		220	-	-	220			IP21 IP31	1010	1055	530	535
STS-3S-160/0,5	160	380	380	220	-			IP10	1180	940	640	840
STS-3S-200/0,5	200									970		920
STS-3U-16/0,5	16					96,5			790	740	435	172
STS-3U-25/0,5	25											249
STS-3U-40/0,5	40					97,0						285
STS-3U-63/0,5	63					97,5			990	895	520	437
STS-3U-100/0,5	100					98,0						530

THREE-PHASE VOLTAGE STABILIZERS STS-S

Three-phase voltage stabilisers STS-S are designed for automatic voltage stabilization the stationary and adjustable objects in communication systems, radio engineering systems, including special equipment.

Stabilisers are reffered to contactless continuouslyvariable voltage stabilisers. Output voltage stabilization is achieved at the cost of changes in the transformation ratio of the main actuator of the stabilizer - autotransformer(ATRPN).

Stabilizers are included in a three-phase AC network with frequency of 50 or 60 Hz with voltage of 220 or 380V.

Operation mode: continuous.

Input voltage changing range: (0,8…1,15)U1nom

Accuracy of stabilization of the output voltage in a symmetric mode:

- at symmetric input voltage ±2,5%;
- at nonsymmetric input voltage ±3%.

recovery time of the output voltage:

- 0,45 seconds at step change of input voltage from 1,1 to 0,8 U1nom;
- 0,2 seconds at load drop/rise from 0 to 100% of rated.

Climatic construction type: У2.

Protection degree: IP20, from floor side - IP00 according to GOST14254-2015.

Protection class of electric shock: 01 according GOST 12.2.007.0.

Cooling method: aerial natural.

Stabilizers are resistant to temperature changes from the maximum operating temperature to the lowest ambient temperature and in reverse order.

In terms of the impact of mechanical environmental factors, the stabilizers correspond to the group of operating conditions M1 according to GOST 17516.1

Stabilizers withstand load rise by 10% over the rated during an hour saving parameters.

Design:

Stabilizer consists of the following parts:

-ATRPN(autotransformer, adjustable voltage redistribution)

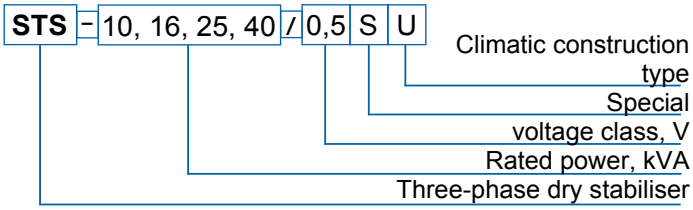
- control panel;
- instrument control board with alarm block;
- interference elimination;
- power connectros for network connection and load;
- protective cover and devices for lifting and moving.

ATRNP is two three-phase autotransformers α and β connected in series to star, located on magnetic conductors. ATRPN windings are made of insulated copper wire with insulation of heat resistance class not lower than B according to GOST 8865 and have axial ventilation channels for better cooling.

Main advantages of stabilisers STS-3S, STS-3U, STS-3S-M over analogues:

- simultaneous stabilization of line and phase voltage;
- smooth adjustment;
- high setting accuracy;
-high load capacity;
- shock resistance of construction;
- connection of supply voltage 220 and 380v (two inputs);
- alarm system for output voltage overshoot;
- filters for a significant reduction in radio interference;
- high life cycle;

TYPE DESIGNATION



TECHNICAL PARAMETERS AND OVERALL DIMENSIONS OF STABILISERS STS-S

Type designation	rated power, кVA	rated line input voltage V	rated output cstabilized voltage,V	Effic., %	Cos φ	dimensions, mm			mass, kg, not more
						L	B	H	
STS-6,3/0,5	6,3	220 and 380	220 or 380	90	0,87	795	380	555	155
STS-10/0,5	10,0					795	415	560	193
STS-16/0,5	16,0					835	495	625	280
STS-25/0,5	25,0					915	545	744	398
STS-40/0,5	40,0					985	570	798	500

SINGLE PHASE DISCRETE VOLTAGE STABILIZERS SDO

Single phase discrete voltage stabilisers SDO, SDO-R, SDO-M, SDO-N are designed to automatically stabilize voltage: personal computers, copying-and-duplicating, medical and household appliances, audio and video equipment, etc.

Stabilizers are connected to AC network with frequency of 50 Hz and voltage of 220V.

Operation mode: continuous.

Range of input voltage change: (0,7…,15)U1rated.

Accuracy stabilization of output voltage: not more ±6% in the whole range of input voltage.For stabilizers SDO-M the accuracy stabilization is not more ±3%.

Recovery time of output voltage load release/surge from 0 up to 100% and at step change of input voltage from 0,7 up to 1,15Urated and reverse:

- not more 0,1 c – for SDO, SDO-R;
- not more 0,15 c - for SDO-N;
- not more 0,3 c- for SDO-M.

Climatic construction type: УХЛ 4.2.

Protection degree:IP10 according to GOST 14254-2015

Coolingmethod:aerial natural.

Protection class against electric shock: 1 according to GOST 12.2.007.0.

The class of heat resistance of the windings insulation of the the stabilizer: not lower than B according to GOST 8865.

Corrected sound power level not more than 60 dB.

Stabilizers are resistant to the temperature changes from the maximum working to the lowest temperature value of the medium during operation and vice versa.

In terms of the impact of mechanical external factors, the stabilizers correspond to the group of operating conditions M2 according to GOST 17516.1M2.

The distortion power factor of sinusoid of the output voltage curve introduced by the stabilizer is not more than 1%..

Stabilisers SDO, SDO-R, SDO-M have light indication of the presence of input voltage and the occurrence of emergency mode. The “Alarm” indicator lights up when:

-valuues of input voltage are less than 0,75…0,7Unom and more than 1,15…1,2Unom;

- at break-down of stabilizer;
- at high voltage surge at the output of stabilizer

Stabilizers SDO-H have light indication:

- level of input voltage;
- level of power load;
- stabilized output voltage operation;
- unstabilized output voltage operation

Design:

Stabilizer consists of the following parts:

- power distribution transformer(SDO-R) or

autotransformer (SDO, SDO-H);

- capasitive filter unit; power control;
- protection and indication system (SDO-H);
- protective cover.

On front panel of stabilizer are placed:

automatic circuit breaker, light-emitting-diode indicator «Network», «Alarm» (SDO, SDO-R), light-emitting-diode indicators of input voltage, load power, operation modes of stabilizers (SDO-H).

Main advantages of stabilizers SDO, SDO-R, SDO-H, SDO-M over analogues:

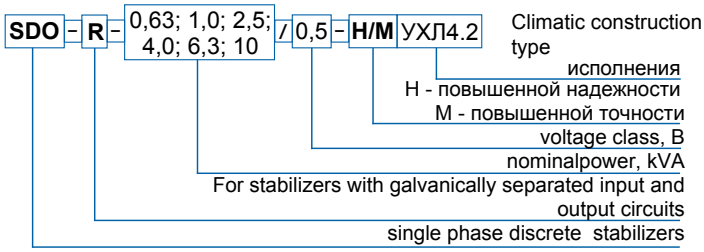
- providing an undistorted shape of the output voltage curve;

- galvanic isolation of the load from the supply network, increased security (SDO-R)
- ensuring work in the entire range of loads from idle to maximum;

- mode «bypass line» (SDO-H);
- light-emitting-diode indicaton (SDO-H)and sound warning;

- automatic shutdown of an output at short circuit or overload at the output of the stabilizer SDO-H);
- automatic shutdown of the output at high and low voltages, followed by automatic switching on of the load (SDO-10H).

TYPE DESIGNATION



TECHNICAL PARAMETERS AND OVERALL DIMENSIONS OF STABILIZERS SDO

type designation	rated output power, кВА	rated voltage, V Cos φ mm, not more		КПД %, not less		dimensions, mm			mass, kg, not more
		input	output			L	B	H	
SDO-P-0,63/0,5	0,63	220	220	90	0,97-0,02	405	200	335	20
SDO-P-1,0/0,5	1,0								24
SDO-1,0/0,5									18
SDO-1,0/0,5 M									
SDO-2,5/0,5	2,5								24
SDO-2,5/0,5 M									
SDO-4,0/0,5 M	4,0					340	240	575	45
SDO-4,0/0,5 H				94		270	300	530	40
SDO-6,3/0,5 H	6,3					270	275	570	50
SDO-10,0/0,5H	10,0					330			

SPECIAL THREE-PHASE TRANSFORMERS TSV, TSZV, TCP

Special three-phase transformers TSV, TSZV, TCP are designed:

- TSV and TSZV - to power supply to thyristor exciting devices of synchronous machines;

- ТСП - to feed power to thyristor converters.

Transformers can also be used as electrical energy converters that do not depend on working conditions, or do not require power, do not require special operating conditions, load characteristics, or operating mode.

Operation mode: continuous.

Cooling method: aerial natural.

Climatic construction type: У3 and Т3.

Protection degree:

TSV and TSP	**IP00**
TSZV	**IP10, IP21, protection degree from the floor side - IP00 according to GOST 14254-2015**

Protection class against electric shock: 01 to GOST 12.2.007.0.

Operation conditions:

The environment must be non-explosive, do not contain aggressive vapors, gases and conductive dust in concentrations that destroy metals and insulation, and reduce the parameters of transformers in unacceptable limits.

In terms of the impact of mechanical environmental factors, the transformers correspond to the group of operating conditions M1 according to GOST 17516.1

Design:

Transformers consist of the following main parts: magnetic conductor, windings, taps, casing (only for TSZV).

Magnetic conductor of rod type is made of electrotechnical steel with isolation covering.

The rods are pressed by wedging with windings, yoke- by yoke beams.

On the upper yoke beams there are devices for lifting.

Magnetic core is made without open stud.

The windings are made in the form of multilayer cylindrical coils with axial ventilation channels and of copper wires with insulation of heat resistance class not lower than "B" according to GOST 8865.

The terminals of TSV and TSP transformers are located in the upper side of the wide side of the transformer. The TSZV type transformer terminals are located in the lower side of the wide side of the transformer.

Transformer housing type TSZV is frameless, mounted, has ventilation holes for better cooling.

Main technical parameters:

Transformers TSV and TSZV to provide forcing excitation of synchronous machines with a short-time reduction of the network voltage allow an overload current of 1.4 nominal multiplicity within 1 min., the cyclical overload - 2 times per day.

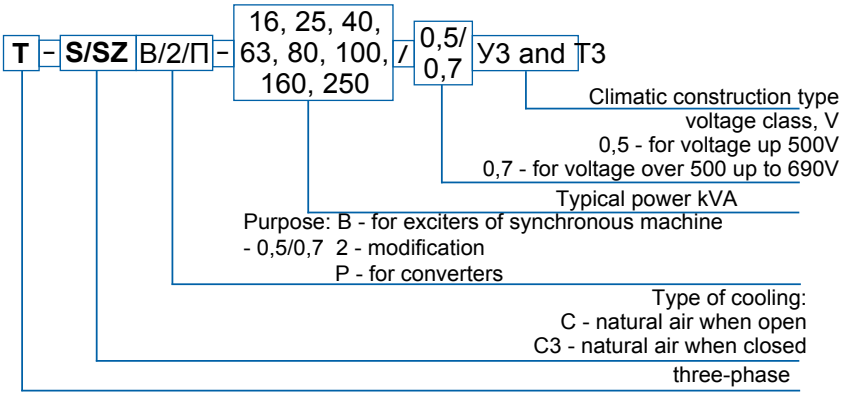
Cyclic overloads for transformers of the TSP series are not provided.

Transformers provide operation for short-term (up to 1 min) voltage deviation by 10% above the nominal while maintaining the rated currents.

Main advantages of transformers TSV, TSZV, TSP over analogues:

- simple design;
- high reliability.

TYPE DESIGNATION



TECHNICAL PARAMETERS OF TRANSFORMERS TSV, TSZV, TSP

Type of transformers	Обмотка сетевая			Обмотка вентильная		No-load current, A,+30%	Idling loss kW, +15%	Short-circuit loss kW, +10%	Short-circuit voltage, %	Conventional designation of scheme and phase displacement group
	Rated power, kVA	Rated. voltage, V	Rated current, A	Rated voltage, V	Rated current, A					
TSV-16	18	380	27,4	100 58	104 180	1,8	0,125	0,55	4,5	У/Ун-0 У/Д-11
		400	26							
		415	25							
		440	23,7							
	23	380	35	115 66,5	116 200,7	1,9	0,13	0,76	5,8	У/Ун-0 У/Д-11
		400	33,2							
		415	32,1							
		440	30,2							
TSV-25	30	380	45,6	160 92,5	108,4 187,5	2	0,18	0,65	4,2	У/Ун-0 У/Д-11
		400	43,3							
		415	41,8							
		440	39,4							
	32	380	48,7	160 92,5	116 187,5			0,8	5	У/Ун-0 У/Д-11
		400	46,3							
		415	44,5							
		440	42							
TSZV2-40	51,2	380	78	160 92,5	185,5 320,5	1,8	0,28	1,1	4,8	У/Ун-0 У/Д-11
TSZV-40		400	74			3,1		1,05	3,6	
		415	71,3							
		440	67,5							
		660	45							
TSP-63	50	380	76	36x2*	401x2*	4	0,36	1,5	5,2	У/Ун-0 У/Д-11
TSZV2-63	73,9	380	112,2	230 133	185 320	2	0,38	1,45	4,3	У/Ун-0 У/Д -11
TSZV-63		400	107			3,6		1,27	3,6	
		415	103							
		440	97							
		660	64,5							
TSZV2-100	104,4	380	159	230 133	262 453	3	0,55	2	4	У/Ун-0 У/Д-11
TSZV-100		400	151							
		415	145							
		440	137			5		1,7	3,3	
		660	91,5							
TSZV2-100	112,3	380	170,8	350 202	185 320	3	0,55	2,2	4,2	У/Ун-0 У/Д-11
TSZV-100		400	162			5		1,8	3,5	
		415	157							
		440	148							
		660	98,5							
TSZV-160	158,9	380	241,7	350 202	262 453	5,5	0,67	2,4	3	У/Ун-0 У/Д-11
		400	229							
		415	221							
		440	208							
		660	139							
	160	380	243,1	570 329	162,1 280			2,29	3,9	У/Ун-0 У/Д-11
	165		251	350	273	5,3	0,6	1,7	7,5	Ун/Ун-0
	171		260	570	173			1,8	8	
TSZV-250	300	380	456	230	753	6,75	1,02	4,1	4,5	У/Ун-0
		400	433							
		415	417							

* two windings.
* windings voltages are line.
* Transformers can be manufactured for other voltages in the given power range.

OVERALL DIMENSIONS OF TRANSFORMERS TSV, TSZV, TSP

Type of transformer	Rated power, kVA	Габаритные размеры, мм			mass, kg not more
		length, L	width, B	height, H	
TSV-16	18	530	260	490	110
	23				120
TSV-25	30	590	280	530	145
	32				150
TSP-63	50	735	400	725	360
TSZV-40	51,2	770	360	665	260
TSZV2-40		780	370	675	295
TSZV-63	73,9	860	385	705	350
TSZV2-63		870	400	745	410
TSZV-100	104,4	950	415	770	450
	112,3				465
TSZV2-100	104,4	960	420	815	525
	112,3				530
TSZV-160	158,9	980	435	885	625
	160				655
	165	1020	445	770	554
	171				574
TSZV-250	300	1105	520	940	936

REFERENCE DATA

General information

Notations

Base standarts

Efficiency classes of motors (IE)

About 60% of the electricity consumed in the industry is spent on the electric drive of working machines. In this case, the main consumers of electricity are AC motors.

The share of energy consumption of asynchronous motors is 50 ... 80%, synchronous motors 6 ... 8% depending on the structure of production and the nature of technological processes.The total efficiency of electric motors is about 70%, so the level of their energy efficiency plays a significant role in solving the problem of energy saving.

In the development and production of electric motors was introduced the standard GOST IEC 60034-30.1—2016, based on the international standard IEC 60034-30: 2008 [4], (IE means "International Energy Efficiency Class"), and established four energy efficiency classes IE1, IE2, IE3 and IE4:

IE1 – normal (standart),

IE2 – higher,

IE3 – premium,

IE4 – super premium.

standard value of efficiency factor. %, for Energy Efficiency class IE1 at frequency 50 Hz

P" kW	Number of poles/synchronous rotational speed, rpm.			
	2/3000	4/1500	6/1000	8/750
0.12	45,0	50.0	38.3	31.0
0.10	52.8	57.0	45.5	38.0
0,20	54,6	58.5	47.6	39.7
0.25	58.2	61.5	52,1	43.4
0.37	63.9	66.0	59.7	49.7
0.40	64.9	66.8	51.1	50.9
0.55	69.0	70.0	65.8	56.161.2
0.75	72.1	72.1	70.0	66.5
1.1	75.0	75.0	72.9	70.2
1.5	77.2	77.2	75.2	74.2
2.2	79.7	79.7	77.7	77.0
3	81,5	81.5	79.7	79.2
4	83.1	83.1	81.4	81.4
5.5	84.7	84.7	83.1	83.1
7.5	86.0	86.0	84.7	85.0
11	87.6	87.6	86.4	86.2
15	88.7	88.7	87.7	86.9
18.5	89.3	89.3	88.6	87.4
22	89.9	89.9	89.2	88.3
30	90.7	90.7	90.2	88.8
37	91.2	91.2	90.8	89.2
45	91.7	91.7	91.4	89.7
55	92.1	92.1	91.9	90,3
75	92.7	92.7	92.6	90.7
90	93.0	93.0	92.9	91.1
110	93.3	93.3	93.3	91.5
132	93.5	93.5	93.5	91.9
160	93.8	93.8	93.8	92.5
200	94.0	94.0	94.0	92.5
250	94,0	94.0	94.0	92.5
315	94.0	94.0	94.0	92.5
355	94.0	94.0	94.0	92.5
400	94,0	94,0	94.0	92.5
450	94,0	94,0	94.0	92,5
from 500 to 1000	94.0	94.0	94.0	92.5

standard value of efficiency factor %. for Energy Efficiency class IE2 at frequency 50 Hz

P″ kW	Number of poles/synchronous rotational speed, rpm.			
	2/3000	4/1500	6/1000	8/750
0.12	53.6	59.1	50,6	39,8
0,18	60.4	64.7	56,6	45,9
0,20	61.9	65.9	58,2	47,4
0,25	64.8	68.5	61.6	50,6
0.37	69.5	72.7	67,6	56,1
0.40	70.4	73.5	68.8	57.2
0.55	74.1	77.1	73.1	61.7
0.75	77.4	79.6	75.9	66.2
1.1	79.6	81.4	78.1	70.8
1.5	81.3	82.8	79.8	74.1
2.2	83.2	84.3	81.8	77.6
3	84.6	85.5	83.3	80.0
4	85.8	86.6	84.6	81.9
5.5	87.0	87.7	86.0	83.8
7.5	88.1	88.7	87.2	85.3
11	89.4	89.8	88.7	86.9
15	90.3	90.6	89.7	88.0
18.5	90.9	91.2	90.4	88.6
22	91.3	91.6	90.9	89.1
30	92.0	92.3	91.7	89.8
37	92.5	92.7	92.2	90.3
45	92.9	93.1	92.7	90.7
55	93.2	93.5	93.1	91.0
75	93.8	94.0	93.7	91.6
90	94.1	94.2	94.0	91.9
110	94.3	94.5	94.3	92.3
132	94.6	94.7	94.6	92.6
160	94.8	94.9	94.8	93.0
from 200 to 1000	95.0	95.1	95.0	93.5

standard value of efficiency factor %. for Energy Efficiency class IE3 at frequency 50 Hz

P" kW	Number of poles / synchronous rotational speed, rpm.			
	2/3000	4/1500	6/1000	в /750
0.12	60.8	64.8	57.7	50.7
0.18	65.9	69.9	63.9	58.7
0.20	67.2	71.1	65.4	60,6
0,25	69.7	73.5	68.6	64.1
0.37	73,8	77.3	73.5	69.3
0.40	74.6	78.0	74.4	70.1
0.55	77.8	80.8	77.2	73,0
0.75	80.7	82.5	78.9	75.0
1.1	82.7	84.1	81.0	77.7
1.5	84.2	85.3	82,5	79.7
22	85.9	86,7	84.3	81.9
3	87.1	87.7	85.6	83.5
4	88.1	88.6	86.8	84.8
5.5	89.2	89.6	88.0	86.2
7.5	90.1	90.4	89.1	87.3
11	91.2	91.4	90.3	88.6
15	91.9	92.1	91.2	89.6
18.5	92.4	92.6	91.7	90.1
22	92.7	93.0	92.2	90.6
30	93.3	93.6	92.9	91.3
37	93.7	93.9	93.3	91.8
45	94.0	94.2	93.7	92.2
55	94.3	94.6	94.1	92.5
75	94.7	95.0	94.6	93.1
90	95.0	95.2	94.9	93.4
110	95.2	95.4	95.1	93.7
132	95.4	95.6	95.4	94.0
160	95.6	95.8	95.6	94.3
from 200 to 1000	95.8	96.0	95.8	94.6

standard value of efficiency factor %. for Energy Efficiency class 50 Hz

P″ kW	Number of poles/ synchronous rotational speed, rpm.			
	2/3000	4/1500	6/1000	8/750
0.12	66.5	69.8	64.9	62.3
0.18	70.8	74.7	70.1	67.2
0.20	71.9	75.8	71.4	68.4
0,25	74.3	77.9	74.1	70.8
0.37	78.1	81.1	78.0	74.3
0.40	78.9	81.7	78.7	74.9
0,55	81.5	83.9	80.9	77.0
0.75	83.5	85.7	82.7	78.4
1.1	85.2	87,2	84.5	80.8
1.5	86.5	88.2	85.9	62.6
2.2	88.0	89.5	87.4	84.5
3	89.1	90.4	88.6	85.9
4	90.0	91.1	89.5	87,1
5.5	90.9	91.9	90.5	88.3
7.5	91.7	92.6	91.3	89.3
11	92.6	93.3	92.3	90.4
15	93.3	93.9	92.9	91.2
18.5	93.7	94,2	93.4	91.7
22	94.0	94.5	93.7	92.1
30	94.5	94.9	94.2	92.7
37	94.8	95.2	94.5	93.1
45	95,0	95.4	94.8	93.4
55	95.3	95.7	95.1	93.7
75	95.6	96.0	95.4	94.2
90	95.8	96,1	95.6	94.4
110	96.0	96.3	95.8	94.7
132	96.2	96.4	96.0	94.9
160	96.3	96.6	96.2	95.1
200	96.5	96,7	96.3	95.4
250	96.5	96.7	96.5	95.4
from 315 to1000	96.5	96,7	96.6	95.4

Paint coatings of production of SP JSC «Electromash»

base color		
	RAL7037	dusty-grey
colors at customer's request		
	RAL7035	light-grey
	RAL3020	transport red
	RAL1023	transport yellow
	RAL5012	blue
	RAL9005	black amber

At customer's request it is possibile to use different paint coatings.

table of paint RAL

1000	1001	1002	1003	1004	1005	1006	1007
1011	1012	1013	1014	1015	1016	1017	1018
1019	1020	1021	1023	1024	1027	1028	1032
1033	1034	2000	2001	2002	2003	2004	2008
2009	2010	2011	2012	3000	3001	3002	3003
3004	3005	3007	3009	3011	3012	3013	3014
3015	3016	3017	3018	3020	3022	3027	3031
4001	4002	4003	4004	4005	4006	4007	4008
4009	5000	5001	5002	5003	5004	5005	5007
5008	5009	5010	5011	5012	5013	5014	5015
5017	5018	5019	5020	5021	5022	5023	5024
6000	6001	6002	6003	6004	6005	6006	6007
6008	6009	6010	6011	6012	6013	6014	6015
6016	6017	6018	6019	6020	6021	6022	6024
6025	6026	6027	6028	6029	6032	6033	6034
7000	7001	7001	7002	7003	7004	7005	7006
7008	7009	7010	7011	7012	7013	7015	7016
7021	7022	7023	7024	7026	7030	7031	7032
7033	7034	7035	7036	7037	7038	7039	7040
7042	7043	7044	8000	8001	8002	8003	8004
8007	8008	8011	8012	8014	8015	8016	8017
8019	8022	8023	8024	8025	8028	9001	9002
9003	9004	9005	9010	9011	9016	9017	9018

CLIMATIC MODIFICATION OF THE ELECTRIC MOTORS

The electric motors have modifications for operation in macroclimatic areas with temperate (У), tropical (Т), moderately cold (УХЛ) and cold (ХЛ) climate in conditions determined by the categories of location:

1. Outdoor;
2. Under cover in the absence of direct exposure to solar radiation and precipitation;
3. In the closed premises without artificial regulation of climatic conditions;
4. In the closed premises with artificial regulation of climatic conditions;
5. For use in premises (volumes) with high humidity (for example, in unheated and unventilated underground areas, including mines).

Table 1 indicates the values of climatic factors - temperature and humidity for the abovementioned conditions, regulated by GOST 15150.

Climatic construction type	Working air temperature value during operation, °C		relative air humidity	
	upper value	lower value	annual average values	upper value
У1	+40	-40	75% at 15ºC	100% at 25ºC
У2		-45		
У3	+35	-5		98% at 25ºC
У5		-5	80% at 27°C	100% at 35°C
Т2	+50	-10		
Т5	+35	+1		
ХЛ1	+40	-60	85% at -6°C	100% at 25°C
УХЛ1			75% at 15ºC	100% at 25ºC
УХЛ4	+35	+1	60% at 20°C	80% at 25°C

SERVICE-FACTOR

In accordance with GOST 31606-2012, the electric motors of the main (basic) version may have a service factor equal to 1.1 or 1.15, i.e. to allow prolonged overload by 10 and 15%, respectively, at rated voltages and frequencies. In this case, the temperature rise of the motor windings will be no more than permissible by 10%.

Environmental temperature. Height above the sea level.

The electric motors can work for along time at an ambient temperature exceeding the maximum operating one. In this case in order to avoid unacceptable overheating of the winding temperature, the power delivered by the motor must be reduced to the folowing values:

Environmental temperature, °C	40	45	50	55	60
Output power, %%	100	96	92	87	82

The electric motors, that have service-factor 1,15, allow long time operation at rated voltages and frequencies at environmental temperature up to + 50°C.

According to GOST IEC 60034-1-2014 the electric motors carry 1,5-fold current overloading during 2 minutes.

The electric motors are designed to operate at altitudes up to 1000m above sea level. The electric motors can be used at altitudes above 1000m above sea level, and their power output should be reduced to the following values:

Height above the sea level, m	1000	1500	2000	2500	3000	3500	4000	4300
Output power, %	100	98	95	92	88	84	80	74

COOLING METHODS. HEAT-RESISTANCE CLASS OF INSULATION

Cooling methods. Conventional designation of cooling methods of rotational electric machines are established in GOST R MEK 60034-6-2012. The designation of cooling methods of machines must consist of Latin letters. IC (International Cooling) and one letter and two numbers group.

Cooling – the process by which heat resulting from losses in a motor is transferred to the primary refrigerant, increasing its temperature. The heated primary refrigerant may be replaced with newer refrigerant with lower temperature (single-circuit cooling) or cooled with secondary refrigerant in a specific chiller (double-circuit cooling). Each cooling circuit is designated by one letter and two characteristic digits.

Conventional designation of refrigerant

Type of refrigerant	name of refrigerant	Conventional designation of refrigerar
gas	air	A
	hydrogen	H
	nitrogen	N
	carbon dioxide	C
	freon	Fr
liquid	water	W
	oil	U
	kerosene	Kr

The circuit device for circulating the refrigerant is designated by the first characteristic number (from 0 to 9), for example:
0 - free circulation (the refrigerant freely enters the machine from the environment and freely returns to this environment);

1 - ventilation using an inlet pipe or inlet channel (the refrigerant enters the machine not from the environment, but from another source through the inlet pipe or channel and then freely returns to the environment);
4 - cooling the external surface of the machine using the environment (the primary refrigerant circulates in a closed circuit and transfers its heat to the secondary refrigerant, which is the environment surrounding the machine. To increase the heat transfer coefficient, the surface can be ribbed)

Transfering method of refrigerant is designated by the second characteristic number(from 0 to 9), for example:
0 - free convection (the movement of the refrigerant is due to the temperature difference, the ventilating effect of the rotor is low);

1 - self-ventilation (the movement of the refrigerant is carried out either due to the ventilating action of the rotor, or using a special device mounted on the rotor shaft of the machine).

If the machine has two or more cooling circuits, the designation should indicate the characteristics of all cooling circuits, starting with the characteristics of the circuit with the secondary refrigerant (with a lower temperature).
If air is in all the refrigeration circuits of machine, then it is allowed gap indicating the type of refrigerant.

The full designation of the cooling methods of the electric machine must contain letters IC and group of one (two) letters and two numbers.

Simple designation applies to a small number of the most used types of rotating machines, cooled by air. In a simplified system, the cooling method is designated by the letters IC with two characteristic numbers. The first letter indicates the cooling system device, the second - the method of supplying energy for the circulation of the refrigerant. If the supply of energy required to circulate the refrigerant corresponds to the second characteristic letter 1 (self-ventilation device mounted on the shaft), then only the first characteristic letter can be stamped.

Examples of designations for cooling methods:
- ICA01 - protected machine with self-ventilation: the fan is located on the shaft of the machine.Simple designation is – IC01 or ICO (refrigerant designation is missed out - air (A) and for self-ventilation - the second characteristic number(1));;

- ICA0141 - closed machine with ribbed or smooth bed, blown by an external fan located on the shaft of the machine;

- IC0041 - closed machine with natural air cooling without external fan, heat is transferred to the external environment through the case. Circuit with secondary refrigerant - 00 (free circulation, free convection); primary refrigerant circuit - 41 (cooling the external surface using the environment, self-ventilation inside the case).

PROTECTION DEGREE OF ELECTRIC EQUIPMENT

In accordance with MEC 70-1, all electrical devices must comply with certain degree of dust and moisture protection in accordance with IP (International / Ingress Protection).
The IP system - is a system for classifying the protection degrees of electric equipment (electrical enclosure equipment) against the penetration of solid objects and water in accordance with the international standard IEC 60529 (DIN 40050, GOST 14254-2015).
The protection degree ia a method of protection that is checked by standard test methods, which is provided by the enclosure from access to dangerous current-carrying mechanical parts ingress of external solid objects and (or) water into the enclosure . Within the system, both safety aspects contact with current -carrying parts and adverse effects, affecting the operation of electrical equipment are identified.
The marking of the protection degree of the electrical equipment enclosure is carried out using an international protection mark (IP) and two numbers, the first of which means protection against ingress of solid objects, the second -against the ingress of water(for example – IP65). The minimum class of protection against possibile contact with fingers with current-carrying parts IP20. The maximum protection for this classification is IP68: a dustproof device that can withstand prolonged immersion in water.

Possible code values IP

	IP x0	IP x1	IP x2	IP x3	IP x4	IP x5	IP x6	IP x7	IP x8
IP 0x	IP 00								
IP 1x	IP 10	IP 11	IP 12						
IP 2x	IP 20	IP 21	IP 22	IP 23					
IP 3x	IP 30	IP 31	IP 32	IP 33	IP 34				
IP 4x	IP 40	IP 41	IP 42	IP43	IP 44				
IP 5x	IP 50				IP 54	IP 55			
IP 6x	IP 60					IP 65	IP 66	IP 67	IP 68

It is possibile the existence of only the above combinations, since an increase in one of the operation indicators leads to an increasein the other (for example, a product that can be temporarily immersed in water is naturally protected enough to completely avoid dust, therefore the existence of protection degree, for example, IP27 is impossible).

Table of protection degrees values of IP (dust and water protection degree).

the first number	summary	Definition
От соприкосновения и попадания твердых посторонних сил		
0	no protection	No special protection
1	protection against solid bodies with sizes >50 mm	Protection against penetration into the enclosure of a large portion of the surface of the human body, for example, hands, and solid bodies with size > 50 mm
2	protection against solid bodies with sizes >12 mm	Protection against penetration of the shell of fingers or objects longer than 80 mm and solid bodies with size> 12 mm
3	protection against solid bodies with sizes >2,5 mm	Protection against penetration of tools and wires inside the shell etc. with a diameter or thickness> 2.5 mm and solids with size> 2.5 mm
4	protection against solid bodies with sizes >1 mm	Protection against penetration of wire and solid bodies with size> 1 mm
5	protection against dust	Penetration into the enclosure dust is not completely prevented. However, dust cannot penetrate sufficiently. for product disruption
6	dustproof	Penetration of dust is completely prevented.

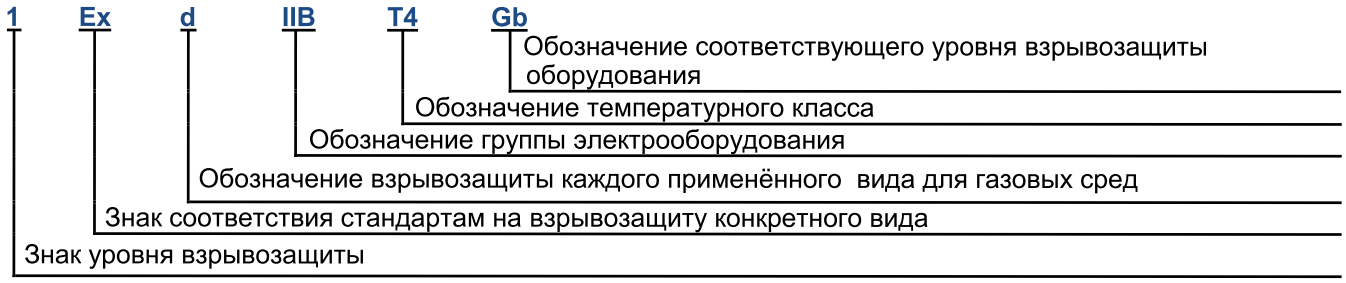
Against penetration of water		
0	no protection	no special protection
1	protection against water drops	Water drops vertically falling on the shell should not have a harmful effect on the product
2	protection against water drops at decline up to 15°	Water drops vertically falling on the enclosure should not have a harmful effect on the product when its enclosure is inclined at any angle up to 15 ° relative to the normal position.
3	splash protection	Rain falling on the enclosure at angle of 60 ° from vertical should not have a harmful effect on the product
4	splash protection	Water sprayed onto the casing in any direction should not have a harmful effect on the product.
5	protection against water jets	A water jet discharged in any direction on the enclosure should not have a harmful effect on the product.
6	water wave protection	Water should not fall inside the enclosure in amount sufficient to damage the product.
7	Protection when immersed in water	Water should not penetrate into the enclosure, immersed in water, under certain conditions of pressure and time in an amount sufficient to damage the product.
8	Longer immersion protection	Products are suitable for long immersion in water.

TYPE OF EXPLOSION-PROOF PROTECTION

Type of explosionproof protection	Mark	Diagram	Basic application	Standard	zone
Flameproof enclosure. The spread of explosions to the outside is excluded.	**Ex d**		Terminal and connecting boxes, switching devices, lamps, control stations, switchgears, starters, electric motors, heating elements, control cabinets, IT equipment. The equipment is intended for the category of explosive mixture I for work in mines and mines, where there is a danger of explosion of mine methane and mixture II for working under conditions of possible formation of industrial explosive mixtures of gases and dust (according to the latest classification, category III is for dust). Equipment for group II is divided into three subgroups: IIA, IIB, IIC.	GOST IEC 60079-1-2011	zone 1, zone 2
increased safety e. Elimination of spark or high temperature, arc discharges	**Ex e**		Terminal and connecting boxes, lamps, control stations, switchgear, heating elements	GOST 31610.7-2017	Zone 1 partially), zone 2
Intrinsically safe circuit. Spark energy or high temperature limitation	**Ex ia Ex ib Ex ic**		Measuring and regulating technology, communication technology, sensors, drives, accumulator lanterns. The equipment is intended for the category of explosive mixture I for work in mines and mines, where there is a danger of explosion of mine methane and mixture II for working under conditions of possible formation of industrial explosive mixtures of gases and dust (according to the latest classification, category III is for dust). Equipment labeled ia, ib, ic, for group II is divided into three subgroups: IIA, IIB, IIC	GOST 31610.11-2014	zone 0 – ia zone 1 0 ia, ib zone 2 – ia, ib, ic
Filling or blowing. Ex - the atmosphere is isolated from the source of ignition	**Ex p**		High-current distribution cabinets, highly integrated IT equipment, analyzer instruments, heavy-duty electric motors. It is subdivided into three types: px, py, pz	GOST IEC 60079-2-2011	zone 1, zone 2

Ex-Маркировка взрывозащищённого оборудования по IEC 60079-0-2011 MOD

Взрывоопасные среды. Часть 0. Оборудование. Общие требования



Наименование	Обозначение	Описание	Примечание
Знак уровня взрывозащиты	РП	- для рудничного электрооборудования повышенной надёжности против взрыва	Для электрооборудования группы I
	РВ	- для взрывобезопасного рудничного оборудования	
	РО	- для особовзрывобезопасного рудничного оборудования	
	2	- для электрооборудования повышенной надёжности против взрыва (зона, в которой маловероятно присутствие взрывоопасной газовой смеси в нормальных условиях эксплуатации, а если она возникает, то редко, и существует непродолжительное время)	Для электрооборудования группы II
	1	- для взрывобезопасного оборудования (зона, в которой существует вероятность присутствия взрывоопасной газовой смеси в нормальных условиях эксплуатации)	
	0	- для особовзрывобезопасного оборудования (зона, в которой взрывоопасная газовая смесь присутствует постоянно или в течение длительных периодов времени)	
Знак Ex	Ex	- указывает, что электрообрудование соответствует одному стандарту или стандартам на врзрывозащиту конкретного вида	
Обозначение взрывозащиты каждого применённого вида для газовых сред	d	- взрывонепроницаемая оболочка (для уровня взрывозащиты оборудования Mb или Gb)	
	e	- повышенная защита вида «e» (для уровня взрывозащиты оборудования Mc или Gb)	
	ia	- искробезопасность (для уровня взрывозащиты оборудования Ma или Ga)	
	ib	- искробезопасность (для уровня взрывозащиты оборудования Mb или Gb)	
	px	- заполнение или продувка оболочки под избыточным давлением (для уровня взрывозащиты оборудования Mb или Gb)	
Обозначение группы электро-оборудования	I	- для электрооборудования, предназначенного для применения в подземных выработках шахт и их наземных строениях, опасных по рудничному газу и (или) горючей пыли	
	II	- для электрооборудования, предназначенного для применения во взрывоопасных газовых средах (кроме подземных выработок шахт и их наземных строений, опасных по рудничному газу)	Если электрооборудование предназначено для применения только с определённым газом, то в круглых скобках указывают химическую формулу или название газа. Если электрооборудование, отнесённое к определённой группе, также предназначено и для применения во взрывоопасной газовой среде, содержащей только один газ, сразу за обозначением группы должна быть указана химическая формула этого газа, при этом оба знака должны быть разделены знаком «+»:
	подгруппа IIA для пропана		

Наименование	Обозначение	Описание	Примечание
	подгруппа **IIB** для этилена		Например, «IIB + H_2» Электрооборудование, имеющее маркировку IIB, пригодно также для применения в местах, где требуется электрооборудование подгруппы IIA. Подобным образом электрооборудование с маркировкой IIC пригодно для применения в местах. где требуется электрооборудование подгруппы IIA или IIB
	подгруппа **IIC** для водорода		
Обозначение температурного класса	**T1**	- максимальная температура поверхности **450 °C**	Максимальная температура поверхности электрооборудования должна быть не более: - температуры заданного температурного класса; - или заданной максимальной температуры поверхности - или, если это более приемлемо, температуры самовоспламенения конкретного газа, для использования в среде которого электрооборудование предназначено Для различных температур окружающей среды и разных внешних источников нагревания или охлаждения может быть определён более чем один температурный класс
	T2	- максимальная температура поверхности **300 °C**	
	T3	- максимальная температура поверхности **200 °C**	
	T4	- максимальная температура поверхности **135 °C**	
	T5	- максимальная температура поверхности **100 °C**	
	T6	- максимальная температура поверхности **85 °C**	
Обозначение соответствующего уровня взрывозащиты оборудования	**Mb**	- для рудничного электрооборудования дополнительное обозначение уровня взрывозащиты - взрывобезопасный PB - уровень в/з, присваиваемый оборудованию для установки в шахтах, опасных по рудничному газу. с уровнем в/з «высокий», характеризующемуся надёжной защищённостью и малой вероятностью стать источником воспламенения в нормальном режиме эксплуатации или при предполагаемых неисправностях в течение времени от момента выброса газа до момента отключения питания электрической энергией. В оборудовании с уровнем в/з Mb в/з обеспечена как при нормальном режиме работы, так и при признанных вероятных повреждениях, определяемых условиями эксплуатации, кроме повреждений средств взрывозащиты	Уровень взрывозащиты оборудования - уровень присваиваемый оборудованию в зависимости от опасности стать источником воспламенения и условий применения во взрывоопасных газовых средах, взрывоопасных пылевых средах, а также в шахтах, опасных по рудничному газу
Обозначение соответствующего уровня взрывозащиты оборудования	**Gb**	- для электрооборудования дополнительное обозначение уровня взрывозащиты – взрывобезопасный 1 – уровень в/з, присваиваемый оборудованию для в/з газовых сред с уровнем в/з «высокий», не являющемуся источником воспламенения в нормальном режиме эксплуатации или при предполагаемых неисправностях и характеризующемуся малой вероятностью стать источником воспламенения в течение времени от момента возникновения в/з среды до момента отключения питания электрической энергией. В оборудовании с уровнем в/з Gb в/з обеспечена как при нормальном режиме работы, так и при признанных вероятных повреждениях, определяемых условиями эксплуатации, кроме повреждений средств взрывозащиты	

Terms and definitions according to GOST R MEK 60050-426-2011

«International Electrotechnical Vocabulary. Part 426 Equipment for explosive atmosphere»

Equipment for explosive atmosphere: electrical equipment, the design of which eliminates the possibility of ignition of the surrounding explosive atmosphere in the specified conditions

Type of explosion protection: special measures, provided for equipment to prevent inflammation of the surrounding explosive atmosphere.

Equipment group: Classification system of equipment in regard to explosive gas environment, for application of which it is designated.
Two equipment groups are identified:
the Ist group– electric equipment, designed to use in mines, gas-hazardous.
the IInd group– electric equipment, designed for application in explosive gas environments. the IInd group can be divided in two subgroups.

Maximum surface temperature: the greatest temperature, arising at most severe operational conditions of one part or surface of electric equipment.
Notice – The most severe operational conditions include overloads and damages (within the limits of the regulated deviations), set in standard for explosion protection of a specific type.

Temperature class: Classification system of equipment at maximum surface temperature, related to specific explosive environment for application of which it is designed.

Explosive environment: the environment, consisting under atmospheric conditions of a mixture of air and combustible substances in the form of gas, vapor, dust, fibers or volatile particles, in which, after inflamation, self-sustaining flame propagation occurs.

Explosion-proof gas environment: the environment, consisting under atmospheric conditions of a mixture of air and combustible substances in the form of gas, vapor or fog, in which, after inflamation, self-sustaining flame propagation occurs.

Safe experimental maximum gap clearance: maximum gap clearance of connection with width 25 mm, which prevents the explosion from spreading at 10 tests.

Explosion: sharp pressure and temperature increase of mixture due to oxidation or similar exothermic reactions.

Mine gas: a mixture of combustible gases naturally formed in the mine.

Explosion hazardous zone: the part of closed or open area, in which exists or can form explosion-proof environment in volume, which requires special protective measures at building, production, mounting and equipment operating.

zone 0: area, in which an explosive gas atmosphere is present continuously or for a long time.

zone 1: area, in which there is presence of an explosive gas environment under normal operating conditions.

zone 2: area, in which the presence of an explosive gas environment under normal operating conditions is unlikely, but if it does occur, it is rare and will last a very short time.

equipment enclosure for explosive environment: a set of walls that surround current-carrying parts of electrical equipment, including doors, covers, cable entries, rods, control rollers and shafts.

Electric gap clearance: minimum distance, measured by air between two conductive parts Notice – distance is measured only betweeen non-conductive parts. this definition does not refer to insulated or covered with insulating compound parts.

Leakage distance: minimum distance between two conductive parts, measured along surface of insulated material.

Flameproof enclosure «d»: type of equipment explosion-proof, in which its parts inflame an explosive gas environment and are enclosed in a casing withstanding the explosion pressure of an explosive mixture inside and prevent the explosion from spreading into the surrounding explosive gas environment.

Flameproof joint: joint of surfaces of two parts of the shell or joint of the shells, designed in such a way that it prevents the propagation of an internal explosion into the explosive gas environment surrounding the shell.

Gap clearance of flameproof joint: distance between corresponding surfaces of flameproof joint, measured after assembly equipment shell.
Notice – in case of cylindrical surfaces forming cylindrical joints, the gap is the difference between the diameters of the hole and the cylindrical component (diametric gap).

volume of flameproof enclosure: total internal volume of shell.
Notices – 1 If the shell contains built-in elements necessary for operation, then the remaining free volume is taken as the shell volume.

HEIGHT OF AXIS OF ROTATION

Nominal height of the axis of rotation. The height from the axis of rotation of the machine *h* is considered the distance from the axis of rotation up to reference plane of the machine (pic. 1, a, 6).

The thickness of the levelling shims used when installing the machine is not included in the height of the axis of rotation. Distance shims are taken into account the height of the axis of rotation, if they are part of the machine.

The nominal values and maximum deviations of the height of the axis of rotation of electrical rotating machines and nonelectrics directly connected with them are regulated by GOST 13267-73. The nominal heights of the axis of rotation should be chosen from the rows of the preferred numbers R5, R10, R20 according to GOST 8032-84 and agreed with those specified in GOST 13267-73. It is allowed to use the zero height of the rotation axis. When choosing the heights of the axis of rotation, you should prefer the row R5 to the row R10, the row R10 to the row R20.

For flange-shaped machines, built-in machines and other special types of fasteners (on raised legs or without legs) establish the conventional height of the axis of rotation h` - the distance from the axis of rotation to the conventional reference plane of the machine (pic. 2, a, b).

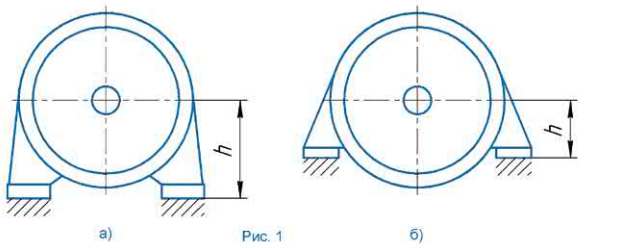


Рис. 1

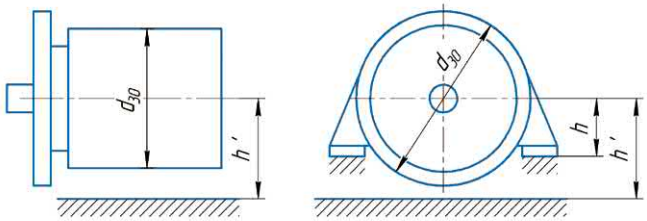


Рис. 2

For machines of flange version without legs (groups IM3 and IM4 according to GOST 2479), which are structural modifications of the basic version of machines with legs (group IM2, versions IM10 and IM12), the relative height of the axis of rotation is the height of the axis of rotation of the main version.

For machines of flange version without legs (groups IM3 and IM4 according to GOST 2479). built-in machines, machines of other special types of attachments without legs, as well as machines with raised legs (versions IM11 and IM13). nonconstructive modifications of machines of basic design with legs, h is assumed to be (0.51 ... 0.54) d^{30} where d^{30} is the diameter of the largest circle, into which the machine body fits.

The calculated conditional height of the axis of rotation is rounded to the nearest smaller value of the nominal height of the axis of rotation.

Limit deviations. Deviations from the nominal height of the axis of rotation of electric machines shall not exceed those indicated in the table.

Limit deviations of axis of rotation, mm

rated height of axis of rotation	Limit deviations for accuracy	
	normal and increased	high
up to 50	-0,4	-0,2
Св. 50 » 71	-0,5	-0,3
» 71 » 250	-0,5	-0,3
» 250 » 630	-1,0	-
» 630 »1000	-1,5	-
» 1000	-2,0	-
Note. Limit deviations are also referred to non-electric machines (except non-electric motors), gearboxes and mechanisms of the propeller shafts of ships.		

Deviations from parallelism of the axis of rotation. The tolerance of parallelism of the axis of rotation of the shaft relative to the support plane of the machine, having a protruding end of the shaft, shall not exceed the following values per 100 mm shaft length:0.15; 0.07; 0.05 mm for normal, high and high accuracy, respectively.

The value of the deviation from parallelism, calculated on the full length of the machine shaft, must not exceed the absolute values of the limit deviations specified in the tab.1.

The requirements of parallelism of the axis of rotation do not apply to machines of the flange version of the groups IM3 and IM4 according to GOST 2479.

The height of the axis of rotation of the shaft relative to the support plane of the machine is measured from the middle of the length of the protruding end of the shaft.

The deviation from parallelism of the axis of rotation of the shaft relative to the reference plane of the machine measures how the difference in distance from the reference plane to the generator shaft measured by the indicator at two points of the protruding end of the shaft and referred to 100 mm of the shaft length.

If the machine has a tapered shaft end, measurements are made using a ring having an outer cylindrical surface.

Basic rules for connecting machines. The connection of machines installed on common basis should be done with the following:

- the difference in the heights of the axis of rotation of the connectable machines should be eliminated with adjustable shims;
- when connecting several machines, you should install machines that have a positive axis rotation height tolerance.

DESIGNATION OF MOUNTING CONFIGURATION

Under the design of the motor we understand the location of the components of the machine relative to the fastening elements (bearings and end shaft), and the method of installation - is the spatial position of the machine at the installation site.

The structure of the conventional structural design and mounting configuration of the motors is established by GOST 2479-79. The conventional designation consists of latin letter sIM (International Mounting,t o Publication MEC 34-7-72) or M (for constructive design, not mentioned in Publication MEC 34-7-72. but established by GOST 2479-79) and following 4 numbers.

Characteristic numbers conventionally specifies:

- constructive design (one number - 1-st);
- mounting configuration and direction of the shaft end (two numbers: 2-nd and 3-rd);
- quantity and version of shafts ends (one number - 4-th).

The following conventional values for electrical machines design are established (1st number):

1 - machines on legs with bearing shields; with attached gearbox;
2 - machines on legs with bearing shields, with flange on bearing shield (or shields);
3 - machines without legs with bearing shields, with flange on one bearing shield (or shields); with header flange;

4 - machines without legs with bearing shields, with flange on bed;
5 - machines without bearing shields;
6 - machines on legs with bearing shields and with pedestal bearings;
7 - machines on legs with pedestal bearings (without bearing shields);
8 - machines with vertical shaft, except of machines from IM1 to IM4;
9 - machines of special version according to the method of installation.

The designation of the mounting method (2nd number, values from 0 to 7) and the direction of the shaft end (3rd number, values from 0 to 9) is set in accordance with GOST 2479 for each of the groups of electrical machines from IM1 to IM9 and reflects the spatial position of the housing and the shaft of the machine and the design features of the housing attachment.

For example, the number 0 in the designation of the installation method of the group IM1 (version IM10) characterizes machines with two bearing shields on the legs, the number 1 (version IM11) is the same on raised legs, etc. On machines with raised legs, the height of the axis of rotation may be zero or have a negative value, i.e., the plane of the legs may be at or above the center line.

In the presence of attached gearbox, its output shaft can be parallel (version IM16) or perpendicular (version IM17) to the machine shaft axis, which is also reflected by the second number of the designation.

The motors on the legs and with the flange (first number 2 - version IM2) have two types of flanges: a large diameter flange, accessible from the back side, with fastening holes without a thread (the second number 0 - IM20 version) and a small diameter flange, inaccessible from the reverse sides, with fastening holes threaded (second number 1 - version IM21).

The number 8 in the designation of the direction of the end of the shaft means that the machine can work in any direction of the shaft end; the number 9 indicates the direction of the the shaft end, not determined by the numbers from 0 to 8. The direction of the shaft end in this case is indicated in the technical documentation.

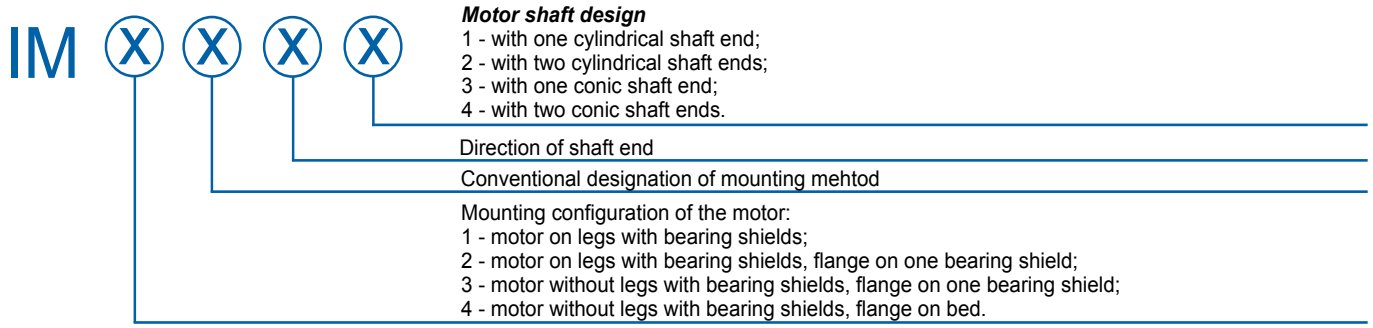
The following designation of the shaft ends versions of electrical machines are established (4th number):

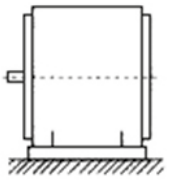
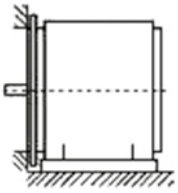
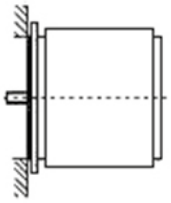
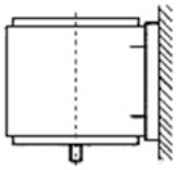
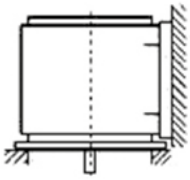
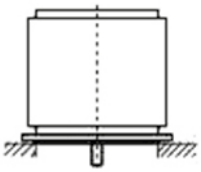
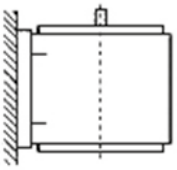
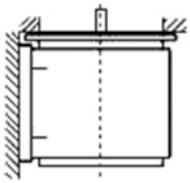
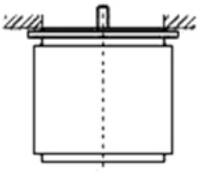
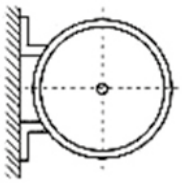
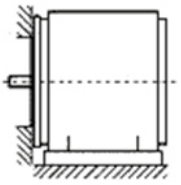
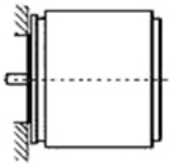
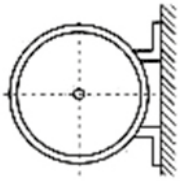
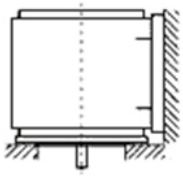
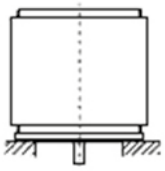
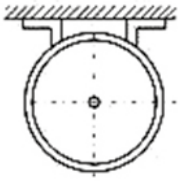
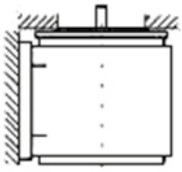
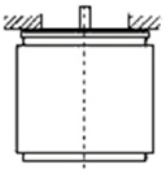
0 - without shaft end:
1 - with one cylindrical shaft end;
2 - with two cylindrical shaft ends;
3 - with one conic shaft end;
4 - with two conic shaft ends;
5 - with one flange shaft end;
6 - with two flange shaft ends;
7 - with flange shaft end on side D (drive side) and cylindrical shaft end on side N (opposite to side D);
9 - other shaft ends versions

Under the end of the shaft we understand the part of the shaft protruding beyond the outer bearing.

Example of designation: IM1081 – the machine on the legs with two bearing shields with one cylindrical end of the shaft, can work at any direction of the shaft end.

Decoding of mounting configuration



IM 1081 IM 1001 (IM B3) 	IM 2081 IM 2001 (IM B35) 	IM 3081 IM 4081 IM 3001 IM 4001 (IM B5) 
IM 1081 IM 1011 (IM V5) 	IM 2081 IM 2011 (IM V15) 	IM 3081 IM 4081 IM 4011 IM 3011 (IM V1) 
IM 1081 IM 1031 (IM V6) 	IM 2081 IM 2031 (IM V35) 	IM 3081 IM 4081 IM 3031 IM 4031 (IM V3) 
IM 1081 IM 1051 (IM B6) 	IM 2181 IM 2101 (IM B34) 	IM 3681 IM 4681 IM 4601 IM 3601 (IM B14) 
IM 1081 IM 1061 (IM B7) 	IM 2181 IM 2111 (IM V17) 	IM 3611 IM 4611 IM 3681 IM 4681 (IM V18) 
IM 1081 IM 1071 (IM B8) 	IM 2181 IM 2131 (IM V37) 	IM 3631 IM 4631 IM 3681 IM 4681 (IM V19) 

standard modes

There are following standard modes (pic. 1-10).

Continuous mode (standard mode S1) - operation mode with constant load and duration sufficient to achieve thermal equilibrium, pic. 1 (N - operation at constant load; Omax maximum temperature reached).

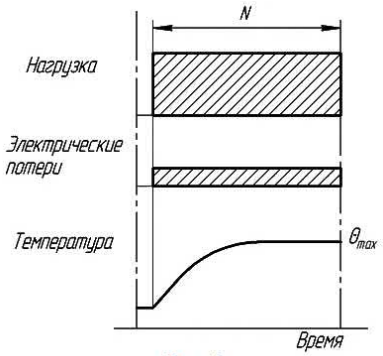


Рис. 1

Short-term mode (typical mode S2) – operation mode with constant load for a certain time, insufficient to achieve thermal equilibrium, followed by rest state for a time sufficient for the machine temperature to equal the temperature of the cooling atmosphere with an accuracy of 2K pic. 2 (N - operation at constant load; Omax - maximum temperature reached during the cycle).

In accordance with GOST IEC 60034-1-2014 (GOST 183 - for deliveries to Ukraine), the period duration of constant nominal load is 10, 30, 60 and 90 minutes.

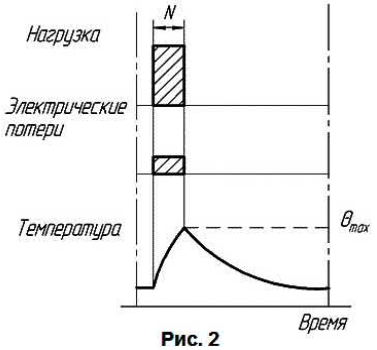


Рис. 2

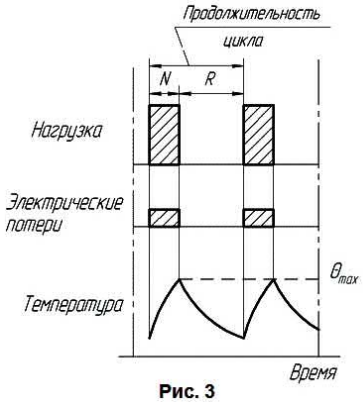


Рис. 3

Intermittent periodic mode (typical mode S3)- a sequence of identical work cycles, each of which consists of work period with a constant load and rest period,pic 3 (N - operation at constant load; R - rest state; Omax - maximum temperature reached during the cycle).

In this mode, the cycle of operation is such that the starting current does not have a noticeable effect on the temperature rise.The cycle duration is not enough to reach thermal equilibrium.

Duration factor(DF). %: DF = 100N (N + R).
In accordance with GOST IEC 60034-1-2014 (GOST 183 - for deliveries to Ukraine) the duration factor (DF) is 15, 25, 40 and 60%: the duration of one cycle is assumed to be 10 minutes.

Intermittent periodic mode with start (standard condition S4)
– a sequence of identical work cycles,each of which consists of start-up period, a period of operation, fast braking period with constant load and a rest period, pic. 4 (D - start; V - work under constant load; K - rest state; Omax - maximum temperature reached during the cycle).

Duration factor, %: DF = 100 (D+N)) / (D+N+R)
In accordance with GOST IEC 60034-1-2014 (GOST 183 - for deliveries to Ukraine) the duration factor (DF) is 15, 25, 40 and 60%; the number of inclusions per hour is 30, 60, 120 240 with the coefficient of inertia F1 equal to 1.2; 1.6; 2.0; 2.5; 4.0; 6.0 and 10.

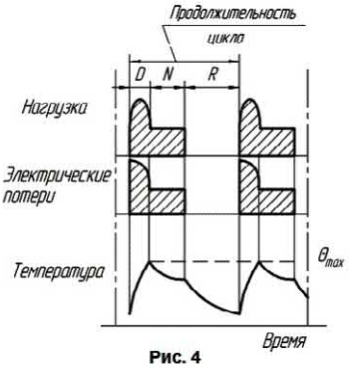


Рис. 4

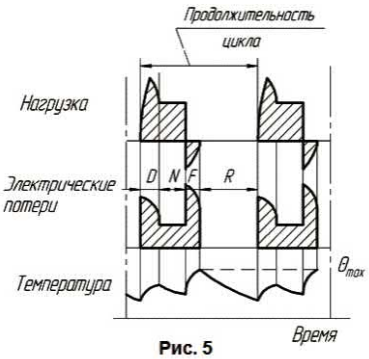


Рис. 5

Intermittent periodic mode with electric braking (standard condition S5) – a sequence of identical work cycles, each of which consists of a start-up period, a period of operation with a constant load, a period of rapid electrical braking and a rest period, pic. 5 (D - start; V - work under constant load: K - state of rest; Omax - maximum temperature reached during the cycle; F - electric braking). Cycle time is insufficient to achieve thermal balance.

Duration factor, %: DF = 100 (D+N+F) / (D+N+F+R).
In accordance with GOST IEC 60034-1-2014 (GOST 183 - for deliveries to Ukraine) the duration factor (DF) is 15, 25, 40 and 60%; number of starts per hour 30, 60, 120 and 240 at inertia coefficient F1 equal to 1.2; 1.6; 2.0; 2.5 and 4.0.

Continuous periodic mode with short-load load (standard condition S6) – a sequence of identical work cycles, each of which consists of a period of work with a constant load and a period of idling, pic. 6 (N - work at constant load; V - idling; Omax - maximum temperature reached during the cycle). The period of rest is absent.

Cycle time is insufficient to achieve thermal balance. cyclic duration factor, %: DF = 100 / (N+V).
In accordance with GOST IEC 60034-1-2014 (GOST 183 - for deliveries to Ukraine) cyclic duration factor (DF) 15, 25, 40 and 60%; the duration of one cycle is taken equal to 10 minutes.

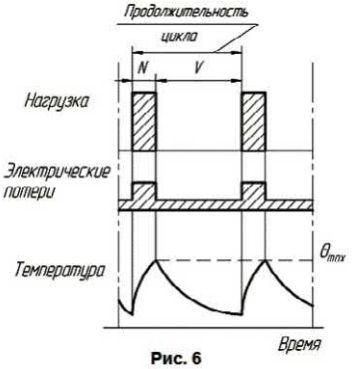


Рис. 6

Continuous periodic mode with short-load load (standard condition S7)- a sequence of identical work cycles, each of which consists of a start-up period, a period of operation with a constant load and a period of electric braking, pic. 7 (D - start; N - work at constant load; F - electric braking; Omax - maximum temperature reached during the cycle). The period of rest is absent. Cycle time is insufficient to achieve thermal balance. The cyclic duration factor DF = 100%.

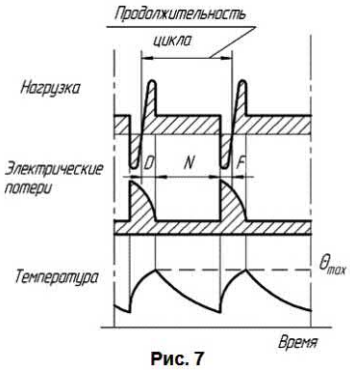


Рис. 7

In accordance with GOST IEC 60034-1-2014 (GOST 183 - for deliveries to Ukraine) the number of reverses when electric braking per hour is 30, 60, 120 and 240 with inertia coefficient F1 equal to 1.2; 1.6; 2.0; 2.5 and 4.0.

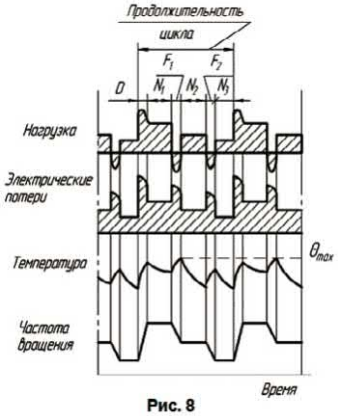


Рис. 8

Continuous periodic mode with interdependent changes in load and speed (typical mode S8) -
– a sequence of identical work cycles, each of which consists of a period of work with a constant load corresponding to a given frequency of rotation, followed by a period or several periods of work with other constant loads, corresponding to different rotational frequencies (which are achieved, for example, by changing the number of poles in the case of asynchronous motors), pic. 8 (F1, F2 - electric braking; D - start; N1, N2, N3 - work at constant loads; Omax - maximum temperature reached during the cycle). The period of rest is absent.Cycle time is insufficient to achieve thermal balance.The cyclic duration factor DF= 100 (F1+ N2) / (D+ N1+ F1+N2+F2+ N3); DF = 100 (F2+ N3) / (D+ N1+ F1+N2+F2+ N3). In accordance with GOST IEC 60034-1-2014 (GOST 183 - for deliveries to Ukraine) number of cycles per hour 30, 60, 120 and 240 with inertia coefficient F1 equal to 1,2; 1,6; 2.0; 2,5 and 4.0.

The mode with non-periodic and changes in both load and speed (typical mode S9) – is the mode of operation in which the load and frequency of rotation usually change non-periodically within the allowable working range, pic. 9 (D - start; L - work at variable load; F - electric braking; R - state of rest; S - work at overload; Cp - full load;Omax - maximum temperature reached during the cycle). This mode often includes overloads, which can significantly exceed the total load.

For a typical S9 mode, values corresponding to full load should be considered as the basis for determining overload.

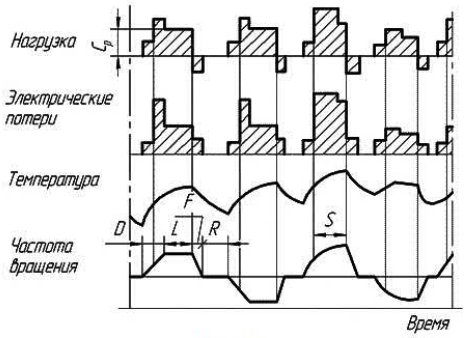


Рис. 9

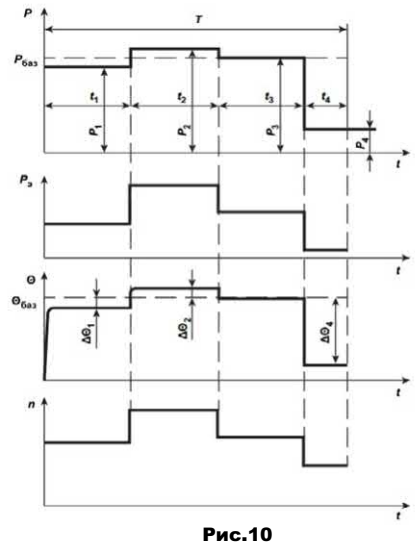


Рис.10

Mode of operation of the motor with discrete constant loads and speeds (typical mode S10)
Mode consisting of a limited number of discrete loads (or equivalent loads) and, if possible, rotational speeds, with each load / speed combination being saved for a sufficient time for the machine to reach a practically steady thermal state (see Pic. 10).The minimum load during a work cycle may be zero (idle, rest or de-energized).

P – load; $P_{баз}$ – base load according to typical mode S1;
$P_{1, 2,...i}$ – constant part of the load within one load cycle;
Pэ– electric losses; O– temperature;
$\Theta_{баз}$ — temperature at base load Pbase; t — time;
$t_{1, 2, 3, 4}$ — working time with constant load inside the load cycle;
$\Delta\Theta_{1,2,...i}$ — the difference between the temperature rise of the windings at each of the various loads within one cycle and the temperature rise at the base load in mode S1; n is the rotation frequency.

ALLOWABLE NOISE LEVELS

In accordance with GOST 11929-87 the following terms are used in determining the noise level.
Noise level – general notion of day values: sound pressure level, sound level, sound power level, corrected sound power level.

Directivity – the difference between the sound pressure level in the frequency bands (or sound level) at a point on the measuring surface in a given direction from the source and the average sound pressure level in the frequency bands (or average sound level) at the same point with uniform radiation in all directions of the source is the same sound power.

Measuring surface – conventional surface on which the measuring points are located.
Tonal noise – noise, the spectrum of which there are audible discrete tones. Noise is considered tonal if, at frequencies above 300 Hz, the sound pressure level in one one-third octave band exceeds sound pressure levels in adjacent frequency bands by at least 10 dB.
Free sound field – sound field in a homogeneous isotropic medium in which the influence of the bounding surfaces is negligible.

Sound reflecting plane – horisontal plane (floor or part of the floor), limited below the space enclosed in the measuring surface, and having a sound absorption coefficient not more than 0.06.

GOST 12.2 007.0-75 establishes general safety requirements that prevent or reduce to an acceptable level human exposure: noise and ultrasound; vibrations.

Noise characteristics of noise sources and noise characteristics of people's locations, as well as methods for their measurement are set by GOST 23941-2002.

List of noise characteristics of noise sources:

- corrected sound power level LPA, dB (A);
- sound power level in frequency bands L_P, dB;
- sound level at control points L_A, dB (A);
-sound pressure level in frequency bands at test points Li, dB (A);
- maximum radiation directionality of noise in octave frequency bands G_{Amax}, dB(A);
- м- maximum radiation directivity of noise G_{Amax}, dB(A).

Acoustic values (or permissible noise levels) can be expressed in terms of sound power or sound pressure. The use of sound power level, which can be regulated independently of the measuring surface area and environmental conditions, avoids the complications associated with the measurement of sound pressure, which requires the determination of additional data. Sound power levels are determined by measuring the radiated energy and provide advantages when conducting acoustic analysis in the design evaluation. In accordance with GOST 23941-2002, methods for determining the noise characteristics of noise sources are established: accurate (in a reverberation chamber, in echo-free chamber, with sound reflecting or sound absorbing floor) technical (in the reverberation room, in the free sound field above the sound reflecting plane) and approximate.

The list of noise characteristics of the locations of people:

- volume level L_A, dB (A);
- sound pressure level in recoil bands $L_{i,}$ дБ (A);
- equivalent sound levels $L_{equivalent,}$ dB (A);
- sound level L_{AI}, dB (A), for impulse noises.

Methods for determining the noise characteristics of the locations of people are established: **preliminary and control.**

Preliminary method is used for approximate noise estimation. For constant noise, the sound level and the nature of the noise spectrum are determined.

The control method is used to compare noise with norms. For constant noise, sound pressure levels are determined in octave frequency bands L_i, dB (A), and sound levels L_A dB.

For inconsistent noise, the equivalent sound level is L_{aeq}, dB (A). For impulse noise, L_{Ai} dB (A) is determined.

The sound level, dB (A), is measured by a sound level meter when the characteristic A is switched on and, in the absence of bandpass filters, or calculated by summing the sound pressure levels in all frequency bands.

The noise level is due to the main parameters of the asynchronous motor. Aerodynamic noise depends mainly on the peripheral speed of the fan blades, that is, on the frequency of rotation and the diameter of the fan. The dimensions of the fan are based on the losses determined by induction and line current load.

Magnetic noise depends on induction and line current load, causing magnetic forces, and on the geometric dimensions (diameter and height of the backrest of the stator), characterizing the rigidity of the stator.

Bearing noise depends on the dimensions of the bearing, which are selected according to the mass of the rotor, rotational speed, induction in the air gap.

Methods for determining the noise characteristics of rotating electrical machines with a capacity of more than 10 W are set by GOST 11929-87.

In accordance with this standard, the following noise characteristics are determined:

a) sound power level in the octave frequency bands L_P;

b) corrected sound power level L_{PA};

в) the average sound level at a distance of 1m from the outer contour of the machine above the acoustic reflecting plane L_{dlA};

d) the average sound pressure level at a distance of 1m from the outer contour of the machine above the sound reflecting plane in the octave frequency bands $L_{dl;}$

д) directivity index G.

The characteristics of items a and g are determined in octave bands with geometric average frequencies from 63 to 8000 Hz (i.e. in the frequency range 45-11200 Hz).

In case of acceptance tests, the characteristic is determined according to clause c or b (the latter, in the case of a statement of specifications on machines of a particular type).

In the acceptance and type tests. r, in addition to the characteristics of item. a and b, the characteristic is determined by the item d. Also check for tonal noise if

$$L_{PA} \geq 93 \text{ дБ (А) или } \overline{L}_{dlA} \geq 80 \text{ дБ (А).}$$

Apply equipment to measurements according to GOST 23941-2002. The noise characteristics of the machines in accordance with GOST 23941-2002 are determined by one of the following methods: exact according to GOST ISO 3745-2014 (in a reverberation chamber, in a muffled chamber — with a sound reflecting or sound-absorbing floor), (in a reverberation room according to GOST 12.1.027-80 in a free sound field above the sound reflecting plane) and approximate (in the open area above the sound reflecting plane, in rooms of more than 70 m3).

For airborne noise emitted by rotating electric machines of normal performance, depending on their power and rotational speed, the maximum permissible levels are set in accordance with GOST IEC 60034-9-2014

Lw, sound power corrected by characteristic A, in decibels, dB (A), and also measurement methods and test conditions.

Since the standard is based on the noise levels of machines of leading companies, it reflects in a certain sense the achieved constructive-technological level, and not noise requirements from the point of view of workplace health and safety

Maximum permissible level Lw, of sound power, corrected by characteristic A

range of rated power, kW	Sound power level dB (A), at rotational frequency, rpm.											
	Cooling method and protection degree 1 and 2											
	up to 960		over 960 to 1320		over 1320 to 1900		over 1900 to 2360		over 2360 to3150		over 3150 to 3750	
	1	2	1	2	1	2	1	2	1	2	1	2
from 1 to 1,1	73	73	76	76	77	78	79	81	81	84	82	88
over1,1 » 2,2	74	74	78	78	81	82	83	85	85	88	86	91
» 2,2 » 5,5	77	78	81	82	85	86	86	90	89	93	93	95
» 5,5 » 11	81	82	85	85	88	90	90	93	93	97	97	98
» 11 » 22	84	86	88	88	91	94	93	97	96	100	97	100
» 22 » 37	87	90	91	91	94	98	96	100	99	102	101	102
» 37 » 55	90	93	94	94	97	100	98	102	101	104	103	104
» 55 » 110	93	96	97	98	100	103	101	104	103	106	105	106
» 110» 220	97	99	100	102	103	106	103	107	105	109	107	110
» 220 »550	99	102	103	105	106	108	106	109	107	111	110	113
» 550 »1100	101	105	106	108	108	111	108	111	109	112	111	116
» 1100» 2200	103	107	108	110	109	И3	109	И3	110	113	112	118
» 2200 » 5500	105	109	110	112	110	115	111	115	112	115	114	120

Note:Condition 1: Cooling method IC01, IC11, IC21 according GOST 20459; Protection degree IP22 or IP23 according to GOST IEC 60034-5-2011. Condition 2: Cooling method IC411, IC5 11, IC611 according to GOST 20459; Protection degree IP44-IP55 according to GOST IEC 60034-5-2011.

The permissible noise level values shown in the table take into account the existing difference between machines with different cooling systems and types of enclosures. Measurement of the sound level and the calculation of the sound power level emitted by the machine should be carried out by a technical method in a free sound field above the sound reflecting plane according to GOST 11929.

A machine is considered to meet the requirements of the standard if, during testing, the noise level, expressed in the form of sound power, does not exceed the values given in the table and based on the results of measurements made at idle speed of the machine

In most cases, the increase in the noise level of loaded machine compared to the noise level of machine operating at idle should not, obviously, exceed 3 dB (A).

classes: 1, 2, 3, 4. Depending on the requirements for noise level, electrical machines are divided into

Electric machines of normal design without special electrical, mechanical and acoustic modifications designed to reduce the noise level should have permissible values of noise levels not exceeding the values of class 1 given in the table.

The permissible noise levels of machines of classes 2 and 3 must be below the permissible noise levels of machines of class 1, respectively, by 5 and 10 dB (A)

Permissible values of noise levels of machines of class 4 are set by agreement between the manufacturer and the customer and must be lower than the permissible values of the noise level of machines of class 1 by at least 15 dB (A).

Asynchronous motors for general industrial use must meet the requirements of classes 2 or 3.

It is allowed as a standardized characteristic of the noise level in the technical conditions and other regulatory and technical documentation for machines of specific types to make the corresponding acceptable value of the average sound level Lp dB (A), calculated by the formula

$$\overline{L}_p = L_w - 10lg(S/S_0),$$

where, Lw – permissible power sound level value on table 1; S – measuring area according to GOST 11929, m²; S⁰=1 m².

ACCEPTABLE VIBRATION LEVELS

The conditions and procedure for testing, as well as the permissible level of vibration of electric rotating machines with a height of the axis of rotation of 56 mm and more are set by GOST IEC 60034-14-2014. The standard applies to electric machines of direct and three-phase current with a nominal speed of rotation from 100 to 6000 rpm. inclusive. It is assumed that the measurements are carried out on a separate machine in the test room, in which the appropriate conditions are maintained.

The criterion adopted for estimating the intensity of vibration of machines with a rotational speed of 600 rpm and higher is **the mean square value of the vibration velocity Ve, mm/s.** Where *Ve* is the mean square value of the vibration velocity obtained by spectral analysis for the j-th filter band (j = 1,2, ..., n). In this case, the first and nth filter bands should include the lower and upper frequency frequencies of the specified frequency band, respectively.

The standard establishes the location of the vibration measurement points. The vibration intensity of the machine is characterized by the maximum values from those measured at the prescribed points.

Installation of the machine. The vibration of a rotating electric machine largely depends on the method of its installation, and therefore it is desirable to measure the vibration in conditions close to the actual conditions of its installation and operation. However, for an objective assessment of the vibration and the quality of the balancing measurement

carry out on a separate machine, under precisely defined conditions, so that you can reproduce the measurements and compare the results.
Measurements are carried out on the machine in a freely suspended or rigidly fixed state in accordance with the requirements of GOST IEC 60034-14-2014.

MAXIMUM ALLOWABLE VALUES OF VIBRATION DISPLACEMENT, VIBRATION SPEED AND VIBRATION ACCELERATION FOR DIFFERENT HEIGHTS OF AXIS OF ROTATION

Category of machine	Fastening	height of axis of rotation, mm								
		56 < H <132			132 < H < 280			H > 280		
		vibration desplacement, mcm	vibration speed, mm/s	vibration acceleration,m/s2	vibration displacement, mcm,	vibration speed, mm/s	vibration speed, mm/s²	vibration displacement, mcm,	vibration speed, mm/s	vibration speed, mm/s
A	flexibile suspension	25	1,6	2,5	35	2,2	3,5	45	2,8	4,4
	rigid	21	1,3	2,0	29	1,8	2,8	37	2,3	3,6
B	flexibile suspension	11	0,7	1,1	18	1,1	1,7	29	1,8	2,8
	rigid	-	-	-	14	0,9	1,4	24	1,5	2,4

Category «A» - machines without special vibration requirements.
Category «B» - machines with special vibration requirements. Rigid fastening is not used for machines with height of axis of rotation less than 132 mm.
The boundary frequencies for the transition from vibration velocity to vibration displacement and from vibration velocity to vibration acceleration are 10 and 250 Hz, respectively.

Reducing the vibration level is achieved by increasing the accuracy of mechanical operation, using high-precision bearings, by increasing the level of dynamic balancing of the rotor and the fan.

CLASSIFICATION OF ELECTRICAL INSULATION BY HEAT RESISTANCE

Heat resistance classes. Since for electrical products the dominant factor of deterioration of electrical insulating materials and insulation systems is temperature, heat resistance classes have been adopted to assess the resistance of electrical insulation to the effects of temperature.

Heat resistance classes and their corresponding temperatures are given in tab.

ODesignation of heat resistance classes	Y	A	E	B	F	H	200	220	250
temperature, °C	90	105	120	130	155	180	200	220	250

The heat resistance class of electrical product reflects the maximum operating temperature characteristic of this product at rated load and other conditions.

Insulation at this maximum temperature must have heat resistance not less than the temperature corresponding to the heat resistance class of electrical products.

The given temperatures are the actual temperature of the insulation, but not the excess temperature of the electrical product. The standards for electrical products usually normalize the magnitude of the excess temperature, rather than the actual temperature. When developing standards, setting measurement methods and permissible temperature overruns should take into account such factors as construction, temperature conductivity and insulation thickness, accessibility of isolated parts, ventilation method, load characteristics, etc.

The basis for establishing rational insulation temperature limits is only experience or relevant tests (see GOST 8865-93).

RESISTANCE TO MECHANICAL EXTERNAL EXPOSURE FACTORS

General technical requirements for the resistance of electrical products to the effects of mechanical external influencing factors (hereinafter - mechanical EIF) are established by GOST 17516.1-90. If there are no other requirements, then mechanical MEIF are considered attached to the product in the places of its fastening. General requirements are reduced to the fact that the products must maintain the established parameters in the process and / or after exposure to mechanical EIF.

Methods of testing products for compliance with the requirements for resistance (stability and / or strength) to the effects of mechanical environmental factors are established by GOST 16962.2-90.

Electrical products are developed according to unified (for use in various types of equipment) or specific (for a certain type of equipment) groups in terms of resistance to mechanical effects of EIF (hereinafter - the group of mechanical performance)

Each of the 47 groups of mechanical performance (designation from M1 to M47) is characterized by such mechanical EIF, sinusoidal vibration (frequency range, maximum acceleration amplitude), single and multiple impact shocks (peak shock acceleration, impact acceleration duration).

Testing when exposed to sinusoidal vibration is carried out in order to verify the ability of the product to perform its functions (vibration tests) or to resist the destructive effect of vibration tests), while maintaining its parameters within the established values at or after its impact.

Groups of motor operating conditions in terms of the impact of mechanical environmental factors are selected from the range: M1 - M47 according to GOST 17516.1.

Structural design category	Синусоидальная вибрация			Удары многократного действия		
	FREQUENCY RANGE, Hz	Maximum amplitude of acceleration, m/s² (g)	severity according to table 2 GOST17516.1	shock acceleration peak value, m/s² (g)	Shock Acceleration Duration, ms	severity according to table 2 GOST 17516.1
M1	0,5-35	5 (0,5)	1	-	-	-
M2	0,5-100	5 (0,5)	9	-	-	-
M3	0,5-35	5 (0,5)	1	30 (3)*, **	2-20	1
M4	0,5-100	5 (0,5)	9	30(3)**, ***	2-20	1
M5	0,5-100	20 (2)	11*5	-	-	-
M6	0,5-100	10(1)	10a*6	-	-	-
M7	0,5-100	10 (1)	10a*6	30(3)**, ***	2-20	1
M8	0,5-55	10 (1)	2	-	-	-
M9	0,5-100	20 (2)*7	11a	150 (15)	2-20	4
M10	0,5-100	20 (2)*7	11a	750 (75)	2-6	7

** For products for elevators with a feasibility study, in agreement with the customer, set blows of a single (instead of multiple) action with the same acceleration.*

*** Meets operational requirements at 40 m·s2 (4 g).*

**** With feasibility study, product standards may establish other requirements for this impact.*

**4 If there are no nodes or parts in ground-based stationary complete products with resonant frequencies in the range of (0.5-100) Hz, the products are made according to the group M6 or M7, respectively.*

**6 For use on machines and in the installation of electric motors in accordance with Enclosure 5 (Table 6), the degree of rigidity is allowed 10.*

FIELD OF APPLICATION

M1	Directly on building constructions (for example, on walls, ceilings, foundations, floors of columns, farms) of enterprises, trading floors, etc. with external sources that create vibrations with a frequency of not more than 35 Hz, and without sources of shock effects located in the same room: -onroad-buildingmachines(except vibration); -on tractors; -in the places of installation of electric motors in the chemical, petrochemical and refining industries: no more than 110 kW on mixers and reactors; more than 110 kW -on pumps,ball mills,crushers and fans:of any power-on blower and dryer drums; - in places of installation of electric motors of elevators in the chemical, petrochemical and oil refining industries, in coal and shale mines.
M2	Directly on building structures (for example, on walls, ceilings, foundations, ceilings, columns, trusses) of enterprises, trading floors, etc. without impact sources located in the same room (except for places belonging to the groups M1, M6, M13, M39); - in land-based stationary complete products or on intermediate structures (for example, in cabinets, on boards, panels, consoles, on pipelines, fittings) exposed to impacts in the group M39 and not having sources of impact effects; - in the places of installation of electric motors and generators in the metallurgical industry; - in the places of installation of electric motors in the chemical, petrochemical and oil refining industries; 110 kW power output on pumps, crystallizers, flotation and jigging machines, ball mills and scraper conveyors; any power - on the blower; - Electric motors with a capacity of more than 110 kW on compressors.
M3	Directly on building structures (for example, on walls, ceilings, foundations, ceilings, columns, trusses) of enterprises, trading floors, etc. with external sources that create vibrations with a frequency of not more than 35 Hz, and with sources of shock effects located in the same premises; - on cranes - with external sources that create vibrations with a frequency of not more than 35 Hz; - on elevators; - on ships with their own energy installations (except for places belonging to the group M46).
M4	Directly on building structures (for example, on walls, ceilings, foundations, ceilings, columns, trusses) of enterprises, trading floors, etc. with impact sources located in the same room; - in land-based stationary complete products or on intermediate structures (for example, in cabinets, on boards, panels, consoles, on pipelines, fittings) exposed to impacts in groups M39 (and having sources of shock loads) or M40; -on cranes - with external sources that create vibrations with a frequency of not more than 55 Hz; - on the cases of roller conveyors and pressure screws of the rolling equipment.
M5	In the ground stationary complete products (for example, in cabinets, on boards, panels, consoles) installed directly on the foundation of turbogenerators with a capacity of 2500 kW and more and without sources of shock loads * 4; - in turbogenerators with a capacity of 2500 kW and more, or in reactors with a capacity of 2500 kW · A and above as built-in elements; - in the places of installation of electric motors on vibrators in the chemical, petrochemical and oil refining industries; - in the places of installation of electric motors in mines, on shearers, shunting and scraper winches, strugues, scraper conveyors, pushers, mobile pumps and fans of local ventilation; - products used according to the requirements for unified groups (enclosure 4, Table 8).

M6	Directly on building structures (walls, ceilings, ceilings, columns, trusses, foundations) near high-power machines with rotating parts, for example, in buildings of machine halls of power plants with turbogenerators with a capacity of 2500 kW and more, including land-based complete products from sources shock loads (except for places belonging to the M5 group); - in transformers of 2500 kV and above as built-in elements; - on metal-cutting and woodworking high-speed machines; - in the places of installation of electric motors in coal and slate mines on height compensators; -in the places of installation of electric motors in the chemical, petrochemical and refining industries: 110 kW or less on fans; any power - on centrifuges, filter presses, electric latches, winches and vacuum filters; - in the places of installation of electric motors in mines: with a capacity of more than 110 kW at coal pumps; any capacity - on tippers, self-propelled cars, loaders and enrichment machines; - in the places of installation of electric motors of any power at the feeders, belt conveyors in the chemical, petrochemical and refining industries, in open and underground mining operations; - products used according to the requirements for unified groups (enclosure 4, Table 8)
M7	Directly on building structures (walls, ceilings, columns, trusses, foundations) near powerful machines with rotating parts (for example, in buildings of machine rooms of power stations with 2.5 MW and higher turbine generators), and with sources of impact effects of insignificant level, located in the same room; - in land-based stationary complete products or on intermediate structures (for example, in cabinets, on boards, panels, consoles, on pipelines, fittings) exposed to impacts in the M2 group (and having sources of low-impact impact effects) or M4.
M8	On metal-cutting and woodworking machines, not belonging to the group M6.
M9	on press.
M10	on press.

ADDITIONAL SOURCES

1. GOST12.1.004-91. Occupational safety standards system. Fire safety. General requirements.
2. GOST 12.2.003-91. Occupational safety standards system. Industrial equipment. General safety requirements.

3. GOST 8865-93 (MEK 85-84). Electrical insulation systems. Evaluation of heat resistance and classification.
4. GOST 11929-87. Rotating electrical machinery. General test methods. Noise levels determinations
5. GOST 12126-86.Small power electric machines. Installation and mounting dimensions
6. GOST 12139-84. Electric rotary machines. Ranges of rated output, voltages and frequencies
7. GOST14254-96 (MEK 529-89). Electrotechnical products. Degrees of protection provided by enclosures
8. GOST 15543.1-89. Electrical and other industrial products. General requirements for resistance to environment climatic factors

9. GOST 16264.0-85. Small power electric machines. Motors. General specifications
10. GOST 16264.1-2016. Induction motors. General specifications
11. GOST IEC 60034-9-2014. Rotating electrical machines. Permissible noise limits.
12. GOST 16962.2-90. Electrical articles.Test methods as to environment mechanical factors stability.

13. GOST IEC 60034-5-2011.Rotating electrical machines. Classification of protection degrees provided by the integral design of rotating electrical machines.
14. GOST 17516.1-90. Electrical products. General requirement for environment mechanical stability

15. GOST R MEK 60034-6-2012. Rotating electrical machines. Cooling methods. Designations
16. GOST IEC 60034-14-2014. Rotating electrical machines.Mechanical vibration of certain machines with shaft heights 56 mm and higher. Measurement, evaluation and limits of vibration severity.
17. GOST 27471-87. Electrical rotating machinery. Terms and definitions
18. GOST IEC 60034-1-2014. Rotating electrical machines. Rating and operation characteristics
19. GOST 28327-89 (МЭК 34-12-80). Rotating electrical machines. Starting perfomances of single-speed three-phase cage induction motors for voltages to 660 V inclusive
20. GOST 31606-2012. Rotating electrical machines. Asynchronous motors of power from 0,12 to 400 kW inclusive. General technical requirements
21. GOST 28596-90 (МЭК 196-65). Standard frequencies.
22. GOST 29322-2014. Standard voltages.

Configuration data sheets

FOR ORDERING ELECTRIC MOTORS

QUESTIONNAIRE FOR ORDERING ELECTRIC MOTORS

The questionnaire must be signed, date and stamped. The questionnaire drawn up by the Customer is a legal document in resolving disputes regarding the delivery and complaint.
The completed questionnaire must be sent via E-mail: elmash@ao-electromash.ru
or fax +373(533) 78-479, 78-480

№ п/п	Questions	Answers
1	Name and address of the organization or enterprise that orders the product or enters into a contract	
2	Name and address of the organization or enterprise for which the product is ordered	
3	Type and quantity of ordered products and the required delivery time	
4	Operation mode: continuous, intermittent (indicate PV,%), short-term	
5	Power at continuous operation, kW	
6	Nominal line voltage at the terminals of the product, V	
7	The number of phases and the method of their connection	
8	Number of power outlets in the terminal box	
9	Synchronous speed, rpm, and the direction of rotation of the shaft, as viewed from the side of the working mechanism	
10	network frequency, Hz	
11	Power factor	
12	Permissible current rate at motor start	
13	Required maximum torque (static overload) in fractions of the nominal motor torque	
14	The desired method of starting the motor: directly from the network, through a reactor or autotransformer, the number of starts per day / year. Note: The reactor and autotransformer are not included in the delivery.	
15	Climatic category. Environmental characteristics, humid (% humidity), dusty (nature and dust content, mg / cm3), explosive (room class), cooling air temperature	
16	Modification: 1) according to protection degree (IP ...) 2) according to mounting configuration (IM…)	
17	For explosion-proof motorstype and level of explosion-protection (marking)	
18	Axial forces transmitted by the working mechanism, their direction and size (if any)	
19	Number and type of bearing supports: one (two) support, switchboard, stand, slide (rolling), on grease (liquid with forced lubrication or in an oil bath) lubricant	
20	Ventilation system: with self-ventilation, with forced ventilation from an outside fan, with a water air cooler or other. Air supply: from the engine room, from the foundation pit, through special air ducts. Air outlet: to the engine room, to the foundation pit, through special air ducts. Note: Motor driven fans and air ducts are not included.	

21	The method of connection with the working mechanism: 1) coupling (specify type) 2) pulley (indicate the size of the pulley and the direction of the belt tension - top, bottom or sideways 3) gearbox (specify gear ratio) 4) flanged shaft end (specify dimensions) 5) without shaft, with nozzle of the rotor of the synchronous machine on the shaft of the working mechanism (couplings, pulleys, gearbox are not included in the delivery)	
22	The name of the driven mechanism. Manufacturing factory of the mechanism..	
23	power of the mechanism on the shaft, kW	
24	The initial moment of resistance, reduced to the motor shaft, in fractions of the nominal motor torque or kg * m²	
25	Curve of the moment of resistance at start-up (reduced to the motor shaft) depending on the speed of rotation or static moment of resistance for the entire period of start-up in fractions of the nominal moment of the motor or kg * m²	
26	Flywheel moment kg*m (reduced to the motor shaft) of the drive mechanism with an additional flywheel, pulleys, gear, etc., if any.	
27	When ordering the motor to drive the compressor, you must attach a tangential force diagram for all modes of operation. Note: Calculation of the shaft for torsional vibrations is made by the customer, for which the manufacturer of the motor produces a drawing of the shaft with an indication of the size and location of the flywheel mass.	
28	Delivery completeness	
29	Additional technical requirements and design features of the product	
30	Position and signature of the responsible person who filled out the questionnaire. Full legal address of the client company and bank details.	

QUESTIONNAIRE FOR ORDERING ELECTRIC MOTORS VASO7,ASVO

The questionnaire must be signed, date and stamped. The questionnaire drawn up by the Customer is a legal document in resolving disputes regarding the delivery and complaint.

The completed questionnaire must be sent via E-mail: elmash@ao-electromash.ru

or fax +373(533) 78-479, 78-480

Позиция	Описание требуемых характеристик																											
Мощность, кВт	6,5	9	13	15	18,5	22	другая ___	22	30	37	другая ___	30	37	55	75	90	другая___	30	45	75	90	другая___						
Количество полюсов	12							14				24						32										
Напряжение, В	380							380/660																				
Частота сети, Гц	☐ ~50																	☐ ~60										
Климатическое исполнение	☐ У1 (от -45°С до +40°С)							☐ УХЛ1 (от -60°С до +40°С)							☐ ХЛ1 (от -60°С до +40°С)			☐ Т1 (от -10°С до +50°С)										
Исполнение по взрывозащите	☐ 1 Ex d IIB T4 Gb ☐ 1 EX d IIB+H_2 T4 Gb (аналог 1 Ex d IIC T4 Gb) кроме ацетилена - только для BACO-14,24,32 ☐ 1 Ex d IIC T4 Gb - только для BACO7-12																											
Степень защиты	☐ стандартная (IP54)							☐ другая IP_____																				
Класс изоляции	☐ стандартный (F)							☐ другой _____																				
Режим работы	☐ стандартный (S1)							☐ другой ____ , диапазон регулирования частоты сети от_____ до _____Гц																				
Подшипники	☐ стандартные			☐ SKF				другой _____																				
Тип смазки	☐ стандартная			☐ SKF				другой _____																				
Тепловой контроль (Тепловая защита) двигателя	статор	☐ нет ☐ термопреобразователь 50М или ☐ 100П или ☐ Pt100 ☐ PTC термистор ☐ биметаллическое реле ☐ другое_____																										
	подшип-никовые узлы	☐ нет ☐ термопреобразователи 50М или ☐ 100П или ☐ Pt100 ☐ PTC термисторы ☐ биметаллические реле ☐ другое_____																										
	корпус статора	☐ нет ☐ термопреобразователь 50М или ☐ 100П или ☐ Pt100 ☐ PTC термистор ☐ биметаллическое реле ☐ другое_____																										

Наличие гнезд под установку термопреобразователей для измерения температуры подшипников: ☐ да ☐ нет

Наличие гнезда под установку термопреобразователя для измерения температуры корпуса статора: ☐ да ☐ нет

Наличие антиконденсатного обогрева: ☐ да ☐ нет

Площадки под установку датчиков вибрации: ☐ да ☐ нет количество площадок_____

Расположение плоскости площадок под установку датчика вибрации относительно оси вала: ☐ параллельно ☐ перпендикулярно

Тип датчика (датчиков) вибрации: ☐ ИВД-1 ☐ DVA-1 ☐ SPM 42011-R ☐ другой_____ **Количество:** _____

Поставка в комплекте с датчиком (датчиками) вибрации: ☐ да ☐ нет ☐ только площадка (площадки)

Требуемая длина соединительного кабеля питания датчика вибрации: _____ м

Тип ЛКП: ☐ стандартное исполнение(эмаль алкидно-уретановая RAL7037) ☐ Tikkurila ☐ другое_____

Цвет ЛКП: _____

Расположение лап (для BACO7-12) ☐ сверху ☐ снизу	Наличие магнито-жидкостного герметизатора ☐ Да ☐ Нет
Наличие устройства противовращения ☐ Да ☐ Нет	Направление вращения ☐ левое ☐ правое ☐ левое и правое

Варианты исполнений по способу монтажа	☐ IM3011 ☐ IM3033 ☐ IM3013 ☐ IM3031 ☐ IM9631 ☐ IM9633 ☐ IM3231
	☐ Другое_____

Габаритный чертеж (согласно технического каталога): Рисунок ☐ Страница ☐

Дополнительные требования: _____

Position and signature of the responsible person who filled out the questionnaire. Full legal address of the client company and bank details.	

QUESTIONNAIRE FOR ORDERING GENERATORS AND HYDROGENERATORS

The questionnaire must be signed, date and stamped. The questionnaire drawn up by the Customer is a legal document in resolving disputes regarding the delivery and complaint.
The completed questionnaire must be sent via E-mail: elmash@ao-electromash.ru
or fax +373(533) 78-479, 78-48

№ п/п	Questions	Answers
1	Name and address of the organization or enterprise that orders the product or enters into a contract	
2	Name and address of the organization or enterprise for which the product is ordered	
3	Type and quantity of products ordered and the required delivery time	
4	Operation mode: continuous, intermittent (indicate PV,%), short-term	
5	Power in continuous operation, kW	
6	Nominal line voltage at the terminals of the product, V	
7	The number of phases and the method of their connection	
8	Number of power outlets in the terminal box	
9	Synchronous speed, rpm, and the direction of rotation of the shaft, as viewed from the side of the working mechanism	
10	Overspeed, rpm. during some period long (minutes)	
11	network frequency, Hz	
12	power factor	
13	Climatic category. Environmental characteristics, humid (% humidity), dusty (nature and dust content, mg / cm3), explosive (room class), cooling air temperature	
14	Modification: 1) open, closed (protection degree IP ...) 2) reverse, non-reversible 3) with horizontal or vertical location of the shaft	
15	Axial forces transmitted by the working mechanism, their direction and size (if any)	
16	Number and type of bearing supports: one (two) support, switchboard, stand, slide (rolling), on grease (liquid with forced lubrication or in an oil bath) lubricant	
17	Ventilation system: with self-ventilation, with forced ventilation from an outside fan, with a water air cooler or other. Air supply: from the engine room, from the foundation pit, through special air ducts. Air outlet: to the engine room, to the foundation pit, through special air ducts. Note: Motor driven fans and air ducts are not included.	
18	The method of connection with the working mechanism: 1) coupling (specify type) 2) pulley (indicate the size of the pulley and the direction of the belt tension - top, bottom or sideways 3) gearbox (specify gear ratio) 4) flanged shaft end (specify dimensions) 5) without shaft, with nozzle of the rotor of the synchronous machine on the shaft of the working mechanism (couplings, pulleys, gearbox are not included in delivery	
19	The name of driven mechanism. Manufacturing factory of the mechanism.	
20	Power of mechanism on the shaft, kW	

21	Delivery completeness:	
22	Additional technical requirements and design features of the product: Mode of operation (autonomous, parallel with generators of comparable power, to a network of unlimited power, auxiliary stations automated in 1 or 2 degrees). The need for protection: - on overload (10%, 25% to I nom.); - overvoltage (over 1,1…1,15Unom.); - reverse power flow; - loss of excitation; - overspeed (over 10..20%); - overheating of windings and bearings (8 channels); - to reduce the insulation resistance of the excitation winding (below 30, 50, 500 kOhm); - to low water level; - to turn on the valve; - to turn on forced ventilation; - pressure drive oil; - on drive temperature; The need to control the shutter. The need to display the speed	
23	Additional technical characteristics and design features of the	
24	For excitation systems: - static excitation system; - the brushless excitation system.	
25	The need for synchronization devices: - manual accurate; - automatic accurate; - self-synchronization with slip 1,2,3,5%.	
26	The need for completing generators (0.4 kV) NKU (generator switches and feeder load sharing devices or their own needs for currents 25,100,250A)	
27	Position and signature of the responsible person who filled out the questionnaire. Full legal address of the client company and bank details.	

QUESTIONNAIRE FOR ORDERING VOLTAGE STABILIZERS

The questionnaire must be signed, date and stamped. The questionnaire drawn up by the Customer is a legal document in resolving disputes regarding the delivery and complaint.
The completed questionnaire must be sent via E-mail: elmash@ao-electromash.ru
or fax +373(533) 78-479, 78-480

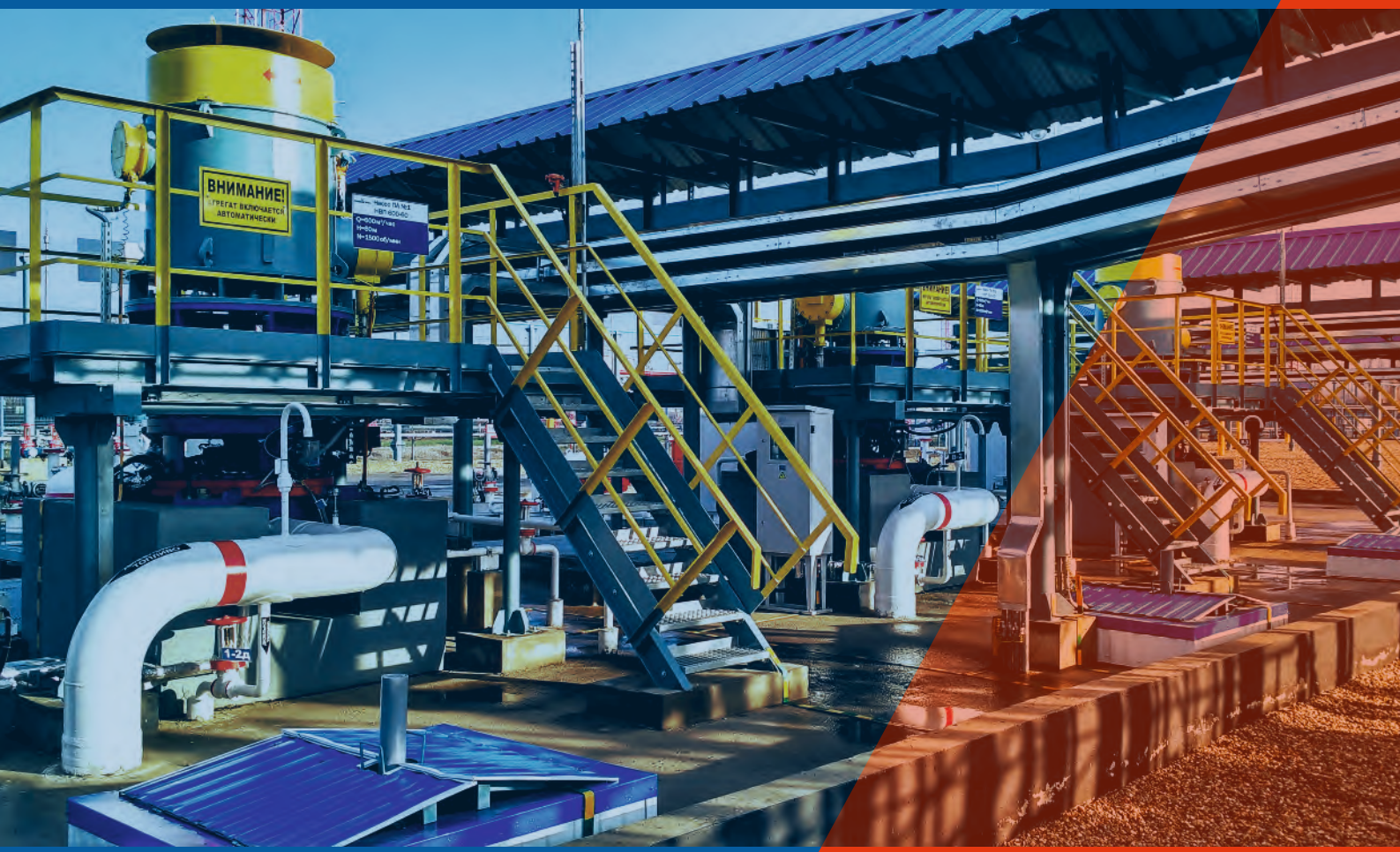
№ п/п	Questions	Answers
1	Name and address of the organization or enterprise that orders the voltage stabilizer or enters into a contract	
2	Name and address of the organization or enterprise for which the voltage stabilizer is ordered	
3	Type of voltage stabilizer	
4	Rated power, kVA	
5	Quantity of phases	
6	Nominal input voltage U1nom, V	
7	Input voltage range, V	
8	Nominal output stabilized voltage U2nom, V	
9	Accuracy of output voltage stabilization, V	
10	Climatic and placement category	
11	The nature of the load, which requires a stabilized voltage	
12	Operation location of stabilizer	
13	Quantity of ordered products	
14	Required delivery times	
15	Additional technical requirements and design features of the product	
16	Position and signature of the responsible person who filled out the questionnaire. Full legal address of the client company and bank details.	

QUESTIONNAIRE FOR ORDERING CURRENT TRANSFORMER

The questionnaire must be signed. The questionnaire issued by the customer is a legal document in the resolution of disputes over delivery and complaint.
The completed questionnaire must be sent via E-mail: elmash@ao-electromash.ru
or fax +373(533) 78-479, 78-480

№ п/п	Questions	Answers
1	Name and address of the organization or enterprise that orders the transformer or enters into a contract	
2	Name and address of the organization or enterprise for which the transformer is ordered	
3	Type of transformer	
4	Rated power, kVA	
5	Quantity of phases	
6	Winding circuit	
7	Nominal input voltage U1nom, V	
8	Nominal output stabilized voltage U2nom, V	
9	Climatic and placement category	
10	Operation location of transformer	
11	Quantity of ordered products	
12	Required delivery times	
13	Additional technical requirements and design features of the product	
14	Position and signature of the responsible person who filled out the questionnaire.	

WE INVITE YOU TO MUTUALLY PROFITABLE COOPERATION



- ASYNCHRONUS EXPLOSION-PROOF ELECTRIC MOTORS OF SMALL AND MEDIUM POWER
- ASYNCHRONUS GENERAL ELECTRIC MOTORS OF SMALL AND MEDIUM POWER
- LARGE ASYNCHRONUS ELECTRIC MOTORS FOR GENERAL USE
- LARGE ASYNCHRONUS EXPLOSION-PROOF ELECTRIC MOTORS
- VOLTAGE STABILIZERS AND VOLTAGE TRANSFORMERS
- SYNCHRONUS ELECTRIC MOTORS ELECTRIC
- INDUCTOR ELECTRIC MACHINES
- GENERATORS

MD-3300, Moldova,
Pridnestrovie, Tiraspol,
Sakriera str.,1
elmash@ao-electromash.ru
Tel: + 373 533 78 408
+ 373 533 78 533
Fax: + 373 533 78 479
+ 373 533 78-480
www.ao-electromash.ru