



COMPRESSOR UNITS

**Models: BK5E
BK7E
BK10E**

OPERATION MANUAL



ISO 9001:2008

ATTENTION: YOUR COMPRESSED AIR SYSTEM IS EQUIPPED WITH A ROBUST CONTROLLER MONITORING THE UNIT AND VISUALIZING ITS OPERATIONAL STATE, ALARMS AND MAINTENANCE MESSAGES.

FOLLOW INSTRUCTIONS GIVEN IN THIS MANUAL AS WELL AS IN OPERATING GUIDANCE OF THE ELECTRIC MOTOR, OPERATING MANUAL OF THE CONTROLLER, GUIDANCE ON OPERATION AND MAINTENANCE OF THE AIR DRYER AND GUIDANCE ON OPERATION AND MAINTENANCE OF THE MOISTURE SEPARATOR.

THERE IS INSTALLED ELECTRIC MOTOR WITH EFFICIENCY LEVEL IE2 INSIDE OF AIR COMPRESSOR.

1 PRODUCT GENERAL INFORMATION

The given document contains the technical description of screw-rotor compressor units (hereinafter, the unit) of the models **BK5E**, **BK7E**, **BK10E** and their versions; performance directives and technical information warranted by the manufacturer.

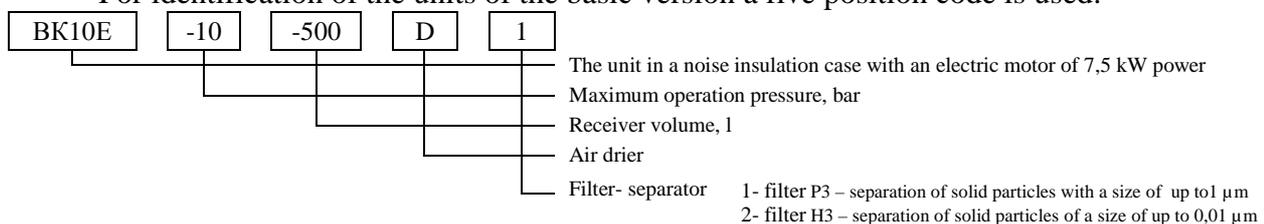
The units are manufactured in accordance with the existing safety rules. Noncompliance with the regulations or improper interference, or the use of unoriginal spare parts leads to the automatic canceling of the guarantee.

ATTENTION: STUDY ATTENTIVELY THIS MANUAL BEFORE ASSEMBLY, STARTING OR ADJUSTMENT OF THE UNIT. IT IS NECESSARY TO STRICTLY FOLLOW INSTRUCTIONS, CONTAINED IN THE GIVEN DOCUMENT SO THAT TO USE THE UNIT'S CHARACTERISTICS OPTIMALLY AND TO REACH ITS RELIABLE OPERATION AS WELL AS TO FOLLOW OPERATION RULES.

ATTENTION: IT IS REQUIRED TO SWITCH THE UNIT OFF THE POWER SUPPLY LINE, TO RELEASE THE PRESSURE BEFORE ANY OPERATIONS WITH THE UNIT.

ATTENTION: SOME INTERNAL PARTS OF THE UNIT MAY BE HEATED UP TO HIGH TEMPERATURES.

For identification of the units of the basic version a five position code is used:



Note – In version BK10E-...-500D (with a drier) the unit is equipped with the filter S3 with a degree of filtering 3 µm.

THE EXAMPLE OF MARKING THE UNIT (WHEN PLACING AN ORDER) WITH THE FOLLOWING PARAMETERS:

The electric motor – 7,5 kW; maximum working pressure – 10 bar; on the receiver with the volume of 500 l; with a drier is the following – BK10E-10-500D.

Indicate the following data when ordering spare parts:

- The model (the version), capacity of the unit, maximum working pressure;
- Serial manufacturer's number;
- Number (or part, assembly code), the precise description of the part and the corresponding number of version.

The manufacturer reserves the right to make alterations in the design of the unit, which may not be reflected in the given document and which are directed to product improvement without prior notice.

2 PURPOSE

2.1 The unit is a complex electro-mechanical product and designed for compressed air production and supply of it to various pneumatic equipment, instruments and tools used in industry and in a car service and for other purposes of a user. The use of the unit allows to considerably save the electrical power, mechanize a labor and increase a work quality.

Operation of the unit in explosion and fire dangerous premises, in the rain and for household objectives is prohibited.

2.2 The unit power supply is carried out from AC three-phase power mains with a voltage of $(400 \pm 10 \%)$ V and a frequency of $(50 \pm 1 \%)$ Hz.

Power supply of the electric motor is performed by mains star-delta connection.

Power supply voltage of control and signaling circuits is AC 24 V.

2.3 Permissible interval of temperatures in the premises is from plus 5 up to plus 40 °C, relative humidity is not higher than 90 %.

2.4 The mode of operation of the unit is continuous running duty.

2.5 Pressure regulation in the receiver is automatic.

3 PERFORMANCE SPECIFICATIONS

3.1 General safety requirements are compliant with EN1012-1, IEC 60204-1.

3.2 Main performance characteristics are given in Table 1.

Table 1

Parameter description	Parameter value					
	BK5E-8	BK5E-8-270	BK5E-8-500D	BK5E-10	BK5E-10-270	BK5E-10-500D
Capacity, l/min, $\pm 10\%$	550			450		
Maximum compressed air pressure, bar	8			10		
Nominal electric motor power, kW	4,0					
Equivalent sound level in a zone at a distance of not less than 1 m from the unit does not exceed, dBA	71					
Protection degree of the electrical equipment of the unit is not lower than	IP22					
Screw block shaft number of revolutions, min^{-1}	3800			3240		
Temperature difference at the inlet and outlet, $^{\circ}\text{C}$	12		7		12	7
Air consumption for cooling and suction, m^3/hour , not more	1500					
Oil content in the compressed air, mg/m^3 , not more	3					
Quantity of transfer heat (reclamation power), kcal/hour	3200					
Altitude above sea level, not more, m	1000					
Overall dimensions, mm, not more:						
length	890	1300	2015	890	1300	2015
width	680	680	680	680	680	680
height	1025	1585	1585	1025	1585	1585
Receiver volume, l, $\pm 5\%$	-	270	500	-	270	500
Mass, netto, kg, not more	205	310	410	205	310	410

Completion of the table 1

Parameter description	Parameter value								
	BK7E-8	BK7E-8-270	BK7E-8-500D	BK7E-10	BK7E-10-270	BK7E-10-500D	BK7E-15	BK7E-15-270	BK7E-15-500D
Capacity, l/min, $\pm 10\%$	800			700			500		
Maximum compressed air pressure, bar	8			10			15		
Nominal electric motor power, kW	5,5								
Equivalent sound level in a zone at a distance of not less than 1 m from the unit does not exceed, dBA	72								
Protection degree of the electrical equipment of the unit is not lower than	IP22								
Screw block shaft number of revolutions, min^{-1}	4795			3730			2850		
Temperature difference at the inlet and outlet, $^{\circ}\text{C}$	12	7		12	7		12	7	
Air consumption for cooling and suction, m^3/hour , not more	2600								
Oil content in the compressed air, mg/m^3 , not more	3								
Quantity of transfer heat (reclamation power), kcal/hour	4700								
Altitude above sea level, not more, m	1000								
Overall dimensions, mm, not more:									
length	890	1300	2015	890	1300	2015	890	1300	2015
width	680	680	705	680	680	705	680	680	705
height	1025	1585	1585	1025	1585	1585	1025	1585	1585
Receiver volume, l, $\pm 5\%$	-	270	500	-	270	500	-	270	500
Mass, netto, kg, not more	215	320	420	215	320	420	215	340	450

Completion of the table 1

Parameter description	Parameter value								
	BK10E-8	BK10E-8-270	BK10E-8-500D	BK10E-10	BK10E-10-270	BK10E-10-500D	BK10E-15	BK10E-15-270	BK10E-15-500D
Capacity, l/min, $\pm 10\%$	1150			1000			700		
Maximum compressed air pressure, bar	8			10			15		
Nominal electric motor power, kW	7,5								
Equivalent sound level in a zone at a distance of not less than 1 m from the unit does not exceed, dBA	72								
Protection degree of the electrical equipment of the unit is not lower than	IP22								
Screw block shaft number of revolutions, min^{-1}	6400			5500			4640		
Temperature difference at the inlet and outlet, $^{\circ}\text{C}$	12	7		12	7		12	7	
Air consumption for cooling and suction, m^3/hour , not more	3800								
Oil content in the compressed air, mg/m^3 , not more	3								
Quantity of transfer heat (reclamation power), kcal/hour	6400								
Altitude above sea level, not more, m	1000								
Overall dimensions, mm, not more:									
length	890	1300	2015	890	1300	2015	890	1300	2015
width	680	680	705	680	680	705	680	680	705
height	1025	1585	1585	1025	1585	1585	1025	1585	1585
Receiver volume, l, $\pm 5\%$	-	270	500	-	270	500	-	270	500
Mass, netto, kg, not more	225	325	430	225	325	430	225	345	460

3.3 Specification of the drive belt is given in Table 2.

Table 2

Code	Description and marking	Quantity, pcs.							
		BK5E-8	BK5E-10	BK7E-8	BK7E-10	BK7E-15	BK10E-8	BK10E-10	BK10E-15
4302104203	Belt XPA-1060	1	1		2	2		2	2
4302104403	Belt XPA-1107			2			2		
Note – Belt drive - one or two streams. Belt profile is A.									

3.4 Specifications of the electrical equipment are given in Table 3.

Table 3

Code	Description and marking	Technical specifications	Q-ty, pcs			Note
			BK5E	BK7E	BK10E	
4043300405	Motor AIR100S2 Y3 IM 2081 CE IE2	4,0 kW, 3000 мин ⁻¹ , 400/690 V, 50 Hz.	1			
4043300505	Motor AIR100L2 Y3 IM 2081 CE IE2	5,5 kW, 3000 мин ⁻¹ , 400/690 V, 50 Hz.		1		
4043300705	Motor AIR112M2 Y3 IM 2081 CE IE2	7,5 kW, 3000 мин ⁻¹ , 400/690 V, 50 Hz.			1	

3.5 Specifications of the screw blocks are given in Table 4.

Table 4

Code	Description and marking	Q-ty, pcs			Note
		BK5E	BK7E	BK10E	
4043300400	Screw blocks LC44	1			
4043300500	Screw blocks B40		1	1	

3.6 Specifications of lubrication material

The nominal oil capacity for the unit is 4,8 l.

It is recommended to use without mixing for filling the lubrication and cooling system of the unit the following grades of unit oil of the mineral type (or similar ones according to the requirements and quality):

ESSO	KUEHLOEL S 46; EXXCOLUB 46;
SHELL	CORENA S46;
CASTROL	943 AW 46;
FUCHS	RENOLIN MR15VG 46;
MOBIL	RARUS 425;
AGIP	DICREA 46;
ARAL	KOWAL M10;
TEXACO	COMPRESSOR OIL EP VDL 46;

ATTENTION: IT IS DOGMATICALLY PROHIBITED TO MIX OILS OF DIFFERENT GRADES AND ORIGIN.

When changing oil it is necessary to remove it from the lubrication system (an oil collector, a screw block, an oil radiator, oil pipelines), and also replacement of the filter oil and the filter-oil separator.

4 COMPLETENESS

4.1 The set of the product supply is given in Table 5

Table 5

Description	Q-ty, pcs				
	BK5E-8, BK5E-10, BK7E-8, BK7E-10, BK7E-15, BK10E-8, BK10E-10, BK10E-15	BK5E-8-270, BK5E-10-270, BK7E-8-270, BK7E-10-270, BK10E-8-270, BK10E-10-270	BK7E-15-270, BK10E-15-270	BK5E-8-500D, BK5E-10-500D, BK7E-8-500D, BK7E-10-500D, BK10E-8-500D, BK10E-10-500D	BK7E-15-500D, BK10E-15-500D
A compressor unit	1				
A compressor unit. An operation manual.	1				
An electric motor. A passport	1				
Controller. User's manual	1				
Vibro supports as a set	4	–			
An air drier. An operation manual	–			1	
Moisture separator. Guidance on operation and maintenance	–			1	
An air receiver P270.11.03. The declaration	–	1	–		
An air receiver P270.15.03. The declaration	–	–	1	–	
An air receiver P500.11.05. The declaration	–	–	–	1	–
An air receiver P500.15.01. The declaration	–	–	–	–	1
A key	2				
A transportation packaging	1				

5 TECHNICAL DESCRIPTION

5.1 DESIGN

The compressor unit is a compact machine for production of compressed air, made in a sound absorption case and consisting of the following main aggregates, assemblies and parts: a screw block; a suction valve; an electrical motor with a fan; an oil radiator; an oil collector; a block of oil separator with a filter and a minimum pressure valve; an oil filter; a thermostatic regulator; an air filter; a cabinet with electrical equipment and protection devices; a control panel with controls, programmable controller and signaling devices, mounted on it.

The general view of the unit **BK5E-...., BK7E-...., BK10E-....** is shown at Figure 1, **BK5E-....-270, BK7E-....-270, BK10E-....-270** – at Figure 3, **BK5E-....-500D, BK7E-....-500D, BK10E-....-500D** – at Figure 5; connection and mounting dimensions of the unit **BK5E-...., BK7E-...., BK10E-....** are shown at Figure 2, **BK5E-....-270, BK7E-....-270, BK10E-....-270** – at Figure 4, **BK5E-....-500D, BK7E-....-500D, BK10E-....-500D** – at Figure 6; the functional chart of the compressor unit is shown at Figure 7; the schematic electrical diagram is shown at Figure 9.

1 - The screw blocks applied in unit installations, are resulted in table 4 (see fig. 1 either 3, or 5). In the case of the screw block are located: screw group, carrying channels for air and oils, connecting flanges.

2 - An air suction valve (refer to Figure 1 or 3, or 5) performs a function of air supply into a compression chamber and prevention of compressed air and oil emission at the moment of the unit shut-

down under any air supply pressure. The changeover of the suction valve into "Charging" or "Idle run" modes is done by solenoid valve controlled by a programmable logic controller (PLC) from a pressure transducer signal.

On reaching the maximum working pressure the idle run valve opens, releasing the air being sucked by the unit. The unit continues to operate in the idle run mode, when there is no air consumption, what mitigates its transition into "Operation", when there is a corresponding pressure transducer signal.

3 - An electric motor (refer to Figure 1 or 3, or 5) is designed for the screw block drive.

4 - An air-oil radiator (refer to Figure 1 or 3, or 5) is a double-section of a combined type performs the functions of oil cooling and a preliminary air cooling at the outlet of the unit. The radiator is cooled by an air flow, passing through it, which is boosted by a fan, mounted on the second shaft of the electrical motor of the unit drive.

5 - An oil collector (refer to Figures 1 or 3, or 5) performs the following functions:

- serves as a reservoir for the lubrication system oil. There are an oil filler, an oil removal cock, an inspection window of the oil level control, a relief valve on it;

- serves as a case, on which the oil separation block, consisting of a filter-oil separator, an oil filter, a thermostatic regulator, a valve of a minimum pressure are mounted.

The oil filler is mounted on the oil collector case and is closed by a plug. The oil level is controlled with the help of the inspection window-oil indicator, located under the oil filler. The oil level at the non-operating (cold) compressor unit always should be between the lower and upper faces of the inspection window.

The cock of removal (drain) of oil is located in the lower portion of the oil collector case and is designed for oil drain during oil change. The oil removal cock also allows to conduct regular checks of availability of moisture condensate in the oil and its removal.

ATTENTION: IT IS ALLOWED TO UNSCREW THE PLUG AND TO DRAIN THE OIL ONLY UNDER CONDITION, THAT THERE IS NO PRESSURE INSIDE THE OIL COLLECTOR CASE AND WHEN THE UNIT IS SHUT DOWN.

6 - The pneumatic relief valve (refer to Figures 3 or 5) protects the oil collector case and the air receiver case from overpressure, because of: "clogging" of the filter-separator; the minimum pressure valve failure; the pressure transducer failure, etc.

7 - The minimum pressure valve (refer to 1 or 3, or 5), mounted in the pressure line, is intended for maintaining the minimum pressure within the limits from 2...4 bar inside the unit until the pressure in the distribution line does not equalize the pressure inside the unit. At the same time this valve serves as a non-return valve, locking the unit from the distribution network during its shut down or idle run operation.

8 - The thermostatic regulator (refer to Figures 1 or 3, or 5) consists of a latch plunger and a temperature-sensitive, glycerine element, changing its volume depending upon the oil temperature, and it is mounted in the case, where the oil filter is installed.

On reaching the working oil temperature higher than plus 71°C the temperature-sensitive element expands upon effect of which the latch plunger opens the conduit for oil intake into the radiator. The main function of the thermostatic regulator is maintaining of the minimum temperature of boosted oil (not lower than 71°C), so that to avoid condensate formation in the oil due to the moisture available in the air being sucked, what can lead to a change of its lubrication properties and to an increase of oil percentage in the compressed air.

9 - An indecomposable oil filter (refer to Figures 1 or 3, or 5) is manufactured in a metal case. It is located at the beginning of the lubrication circuit and prevents an ingress of solid particles on to the working surfaces of the screws and bearings. Its replacement is required after working-out of the number of hours given in section "Maintenance" and the frequency of replacement depends directly upon maintenance of the air filter and upon oil quality.

10 - An inlet air filter is of an open type (refer to Figures 1 or 3, or 5). The function of the air filter is prevention of contaminants ingress into the screw group zone and into the lubrication system. The poor maintenance of the air filter leads to a decrease of the screw block service life.

11 - A filter – oil separator (a separator) (refer to Figures 1 or 3, or 5) finishes the operation of oil separation from compressed air and ensures residual percentage of oil in compressed air not more than 3 mg/m³. The filter-separator efficiency depends upon the oil quality and its working temperature.

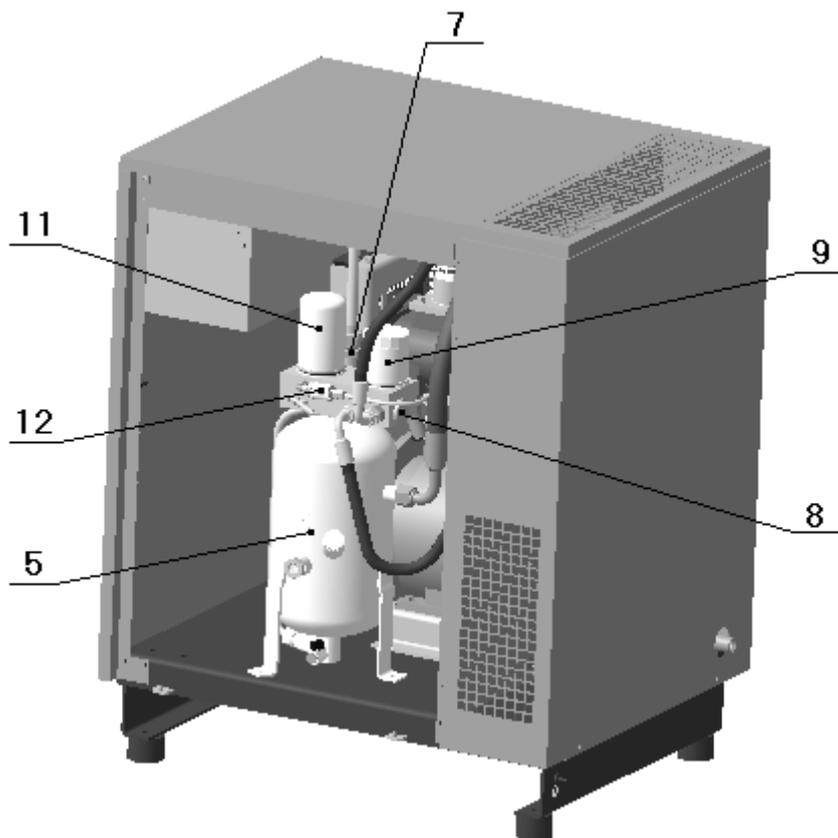
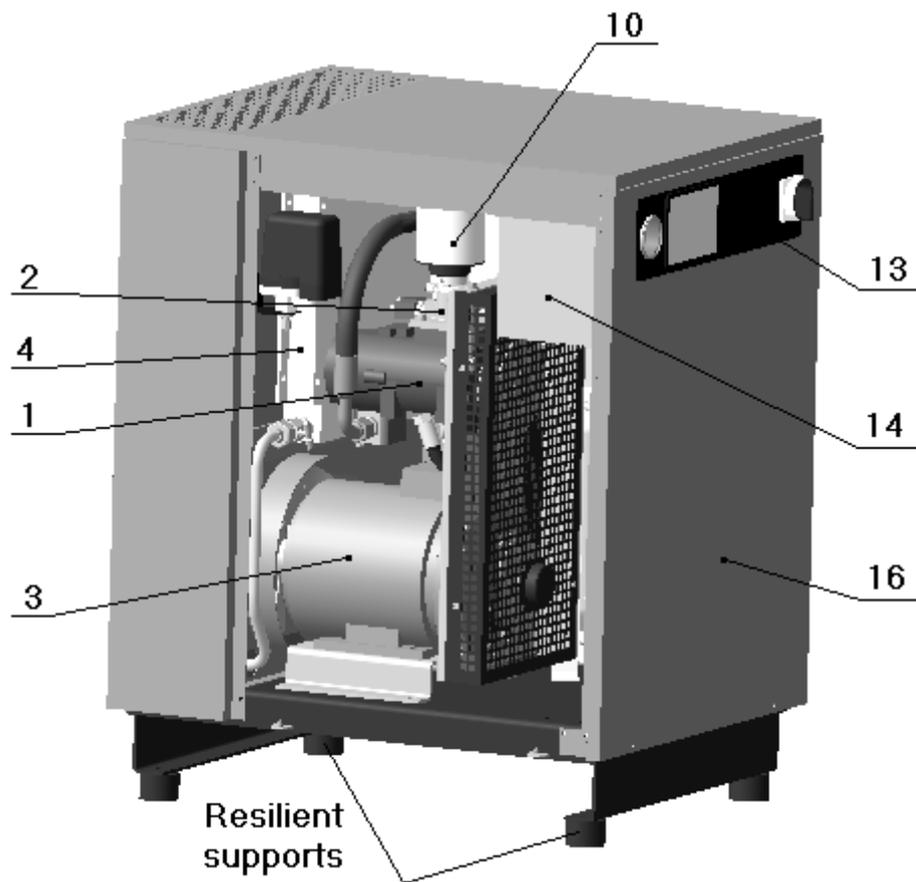
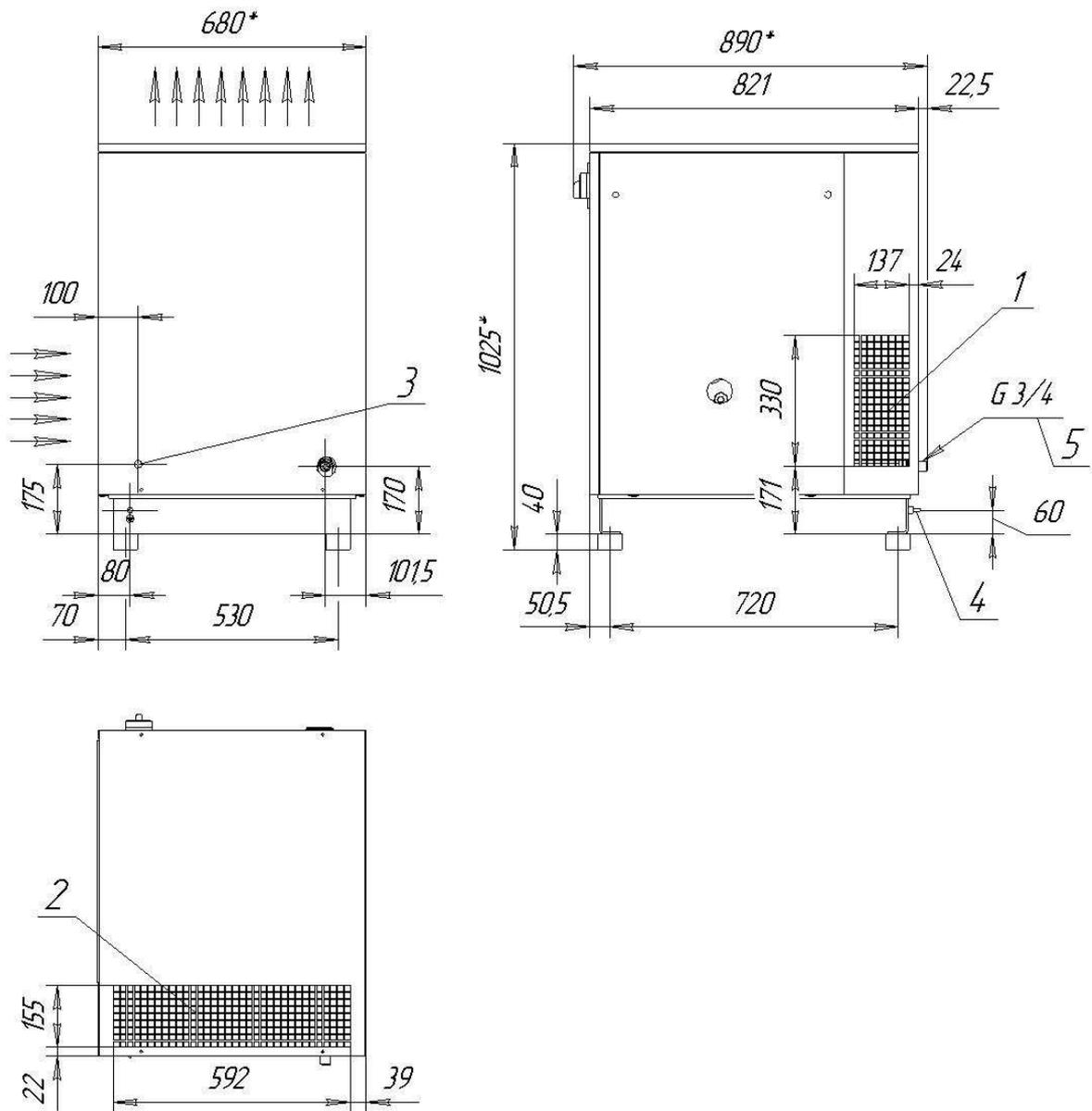


Figure 1 – The general view of the compressor unit BK5E-..., BK7E-..., BK10E-...



- 1 – an air intake;**
- 2 – a warm air emission;**
- 3 – a power supply network cable;**
- 4 – a grounding bolt;**
- 5 – a compressed air outlet.**

Note - * Reference dimensions.

Figure 2 – Connection and mounting dimensions of the compressor unit BK5E-..., BK7E-..., BK10E-...

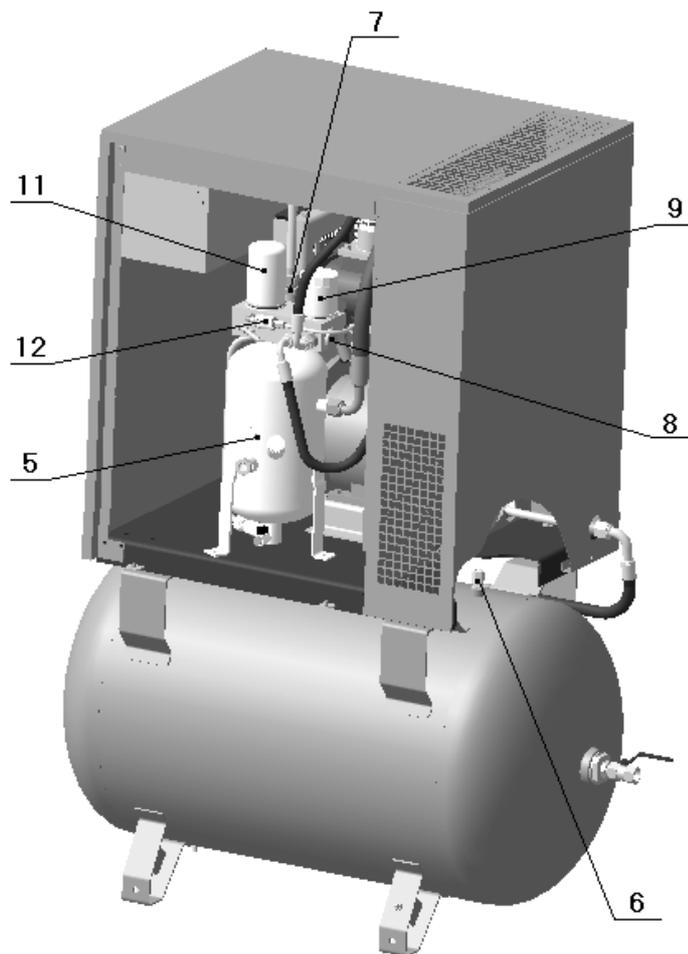
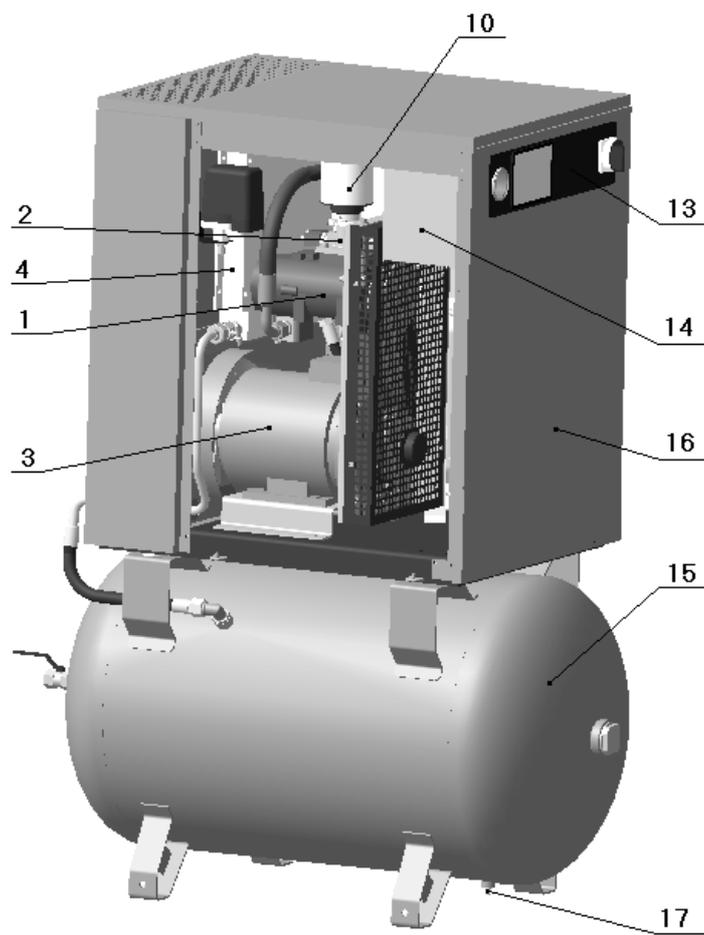
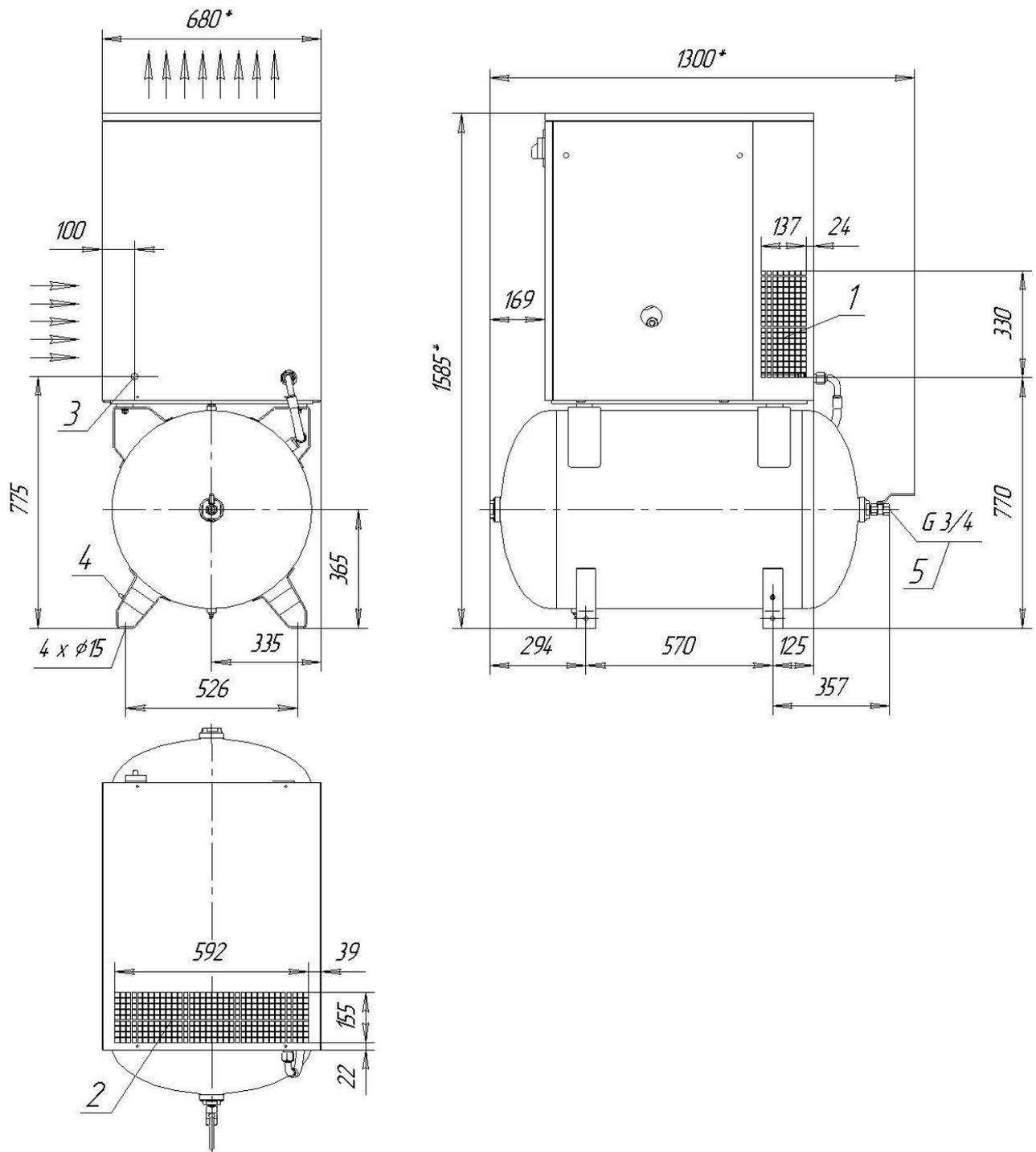


Figure 3 – The general view of the compressor unit BK5E-...-270, BK7E-...-270, BK10E-...-270



- 1 – an air intake;**
- 2 – a warm air emission;**
- 3 – a power supply network cable;**
- 4 – a grounding bolt;**
- 5 – a compressed air outlet.**

Note - * Reference dimensions.

Figure 4 – Connection and mounting dimensions of the compressor unit
BK5E-...-270, BK7E-...-270, BK10E-...-270

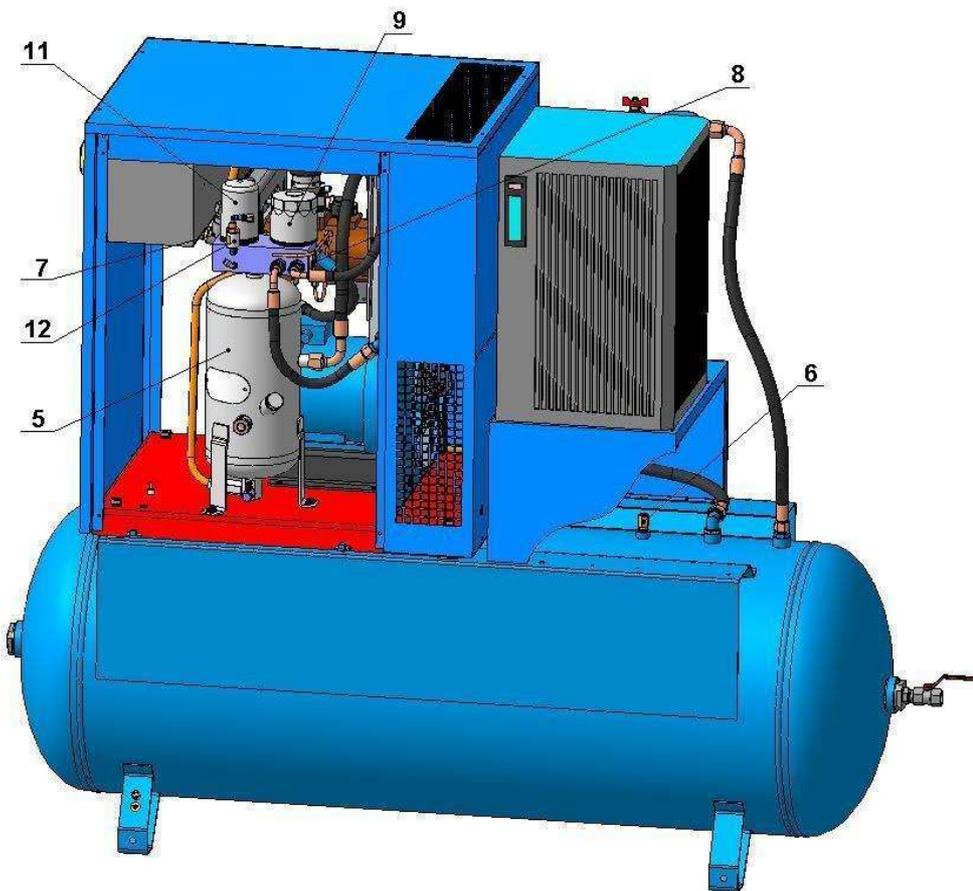
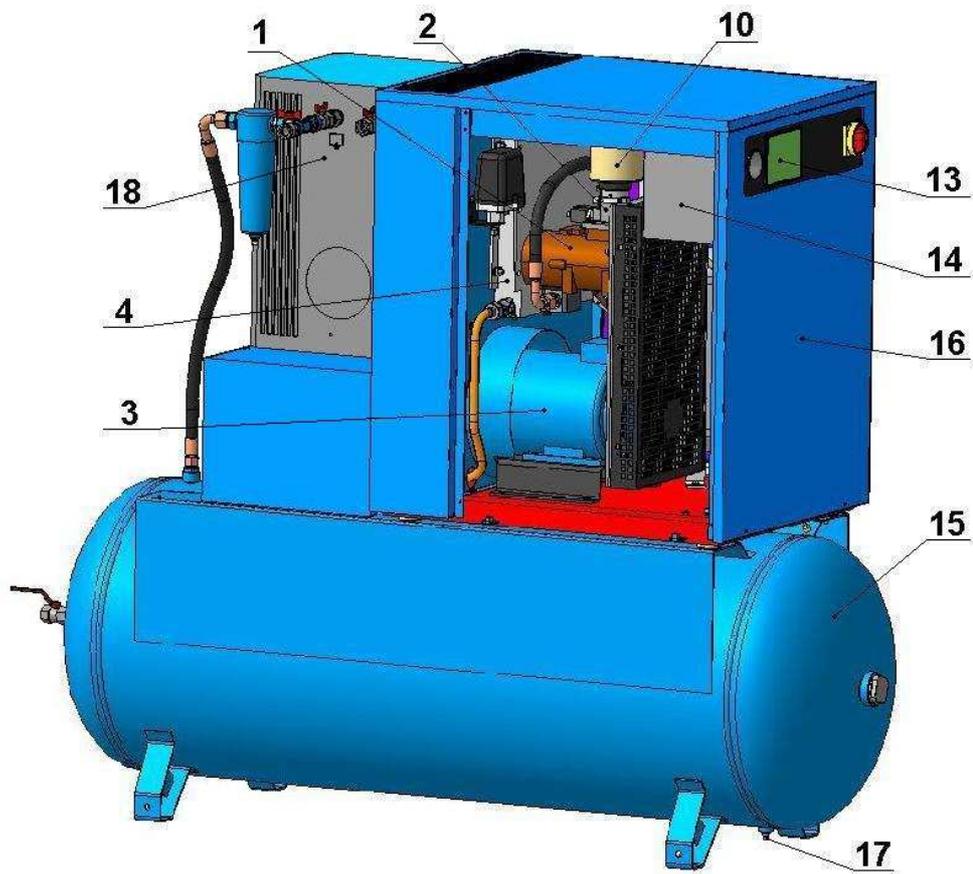
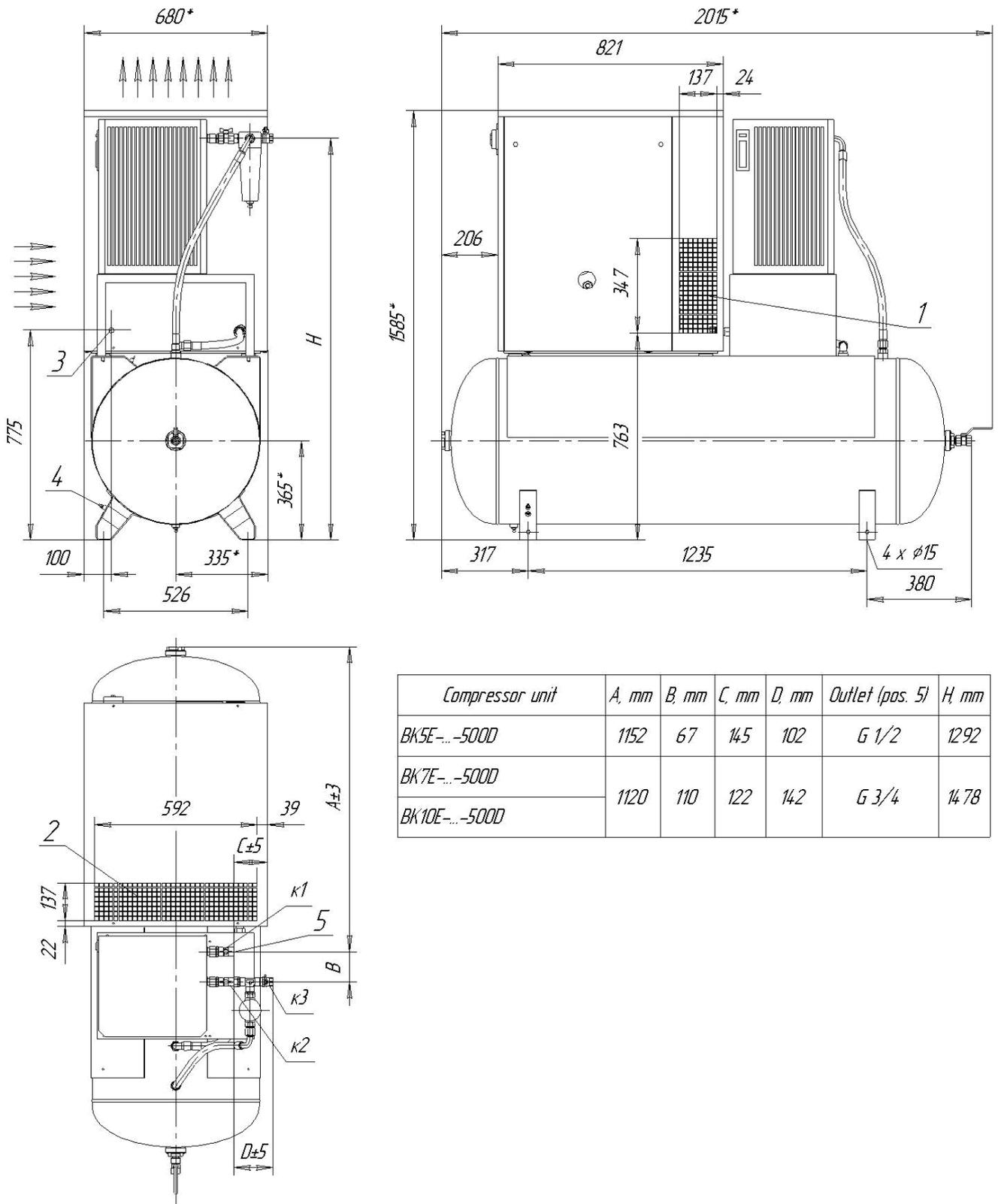


Figure 5 – The general view of the compressor unit BK5E-....-500D, BK7E-....-500D, BK10E-....-500D



Compressor unit	A, mm	B, mm	C, mm	D, mm	Outlet (pos. 5)	H, mm
BK5E...-500D	1152	67	145	102	G 1/2	1292
BK7E...-500D	1120	110	122	142	G 3/4	1478
BK10E...-500D						

- 1** – an air intake;
- 2** – a warm air emission;
- 3** – a power supply network cable;
- 4** – a grounding bolt;
- 5** – a compressed air outlet;
- k1, k2, k3** – ball cocks of air drier.

Note – * Reference dimensions.

Figure 6 – Connection and mounting dimensions of the compressor unit BK5E-...-500D, BK7E-...-500D, BK10E-...-500D

12 - Oil return control device (refer to Fig. 1 or 3, or 5) is designed for oil level control at the block of oil return from the oil separator. Oil separated by the Oil Separator is delivered back to the lubrication system of the unit. The oil return control device is designed to monitor air and oil return flows.

13 - A control panel (refer to Fig. 1 or 3, or 5). The following operation controls, instrumentation and signaling equipment are located on the front of the panel (Fig. 8):

- 1 – electronic controller** is designed to control and monitor all functions of the compressor;
- 2 – input switch** is designed to connect the compressor to the mains, its emergency switching-off;
- 3 – air manometer** is designed to monitor air pressure at the output from the compressor;

14 - A cabinet with an electrical equipment (refer to Figures 1 or 3, or 5) is an enclosed type case with the installed panel, at which start control and protection devices are mounted (refer to Figure 10 for a block diagram), access to which is realized by dismantling of the top case panel and the cabinet cover.

ATTENTION: IT IS ALLOWED TO OPEN THE CABINET AFTER DISCONNECTING THE UNIT FROM THE POWER SUPPLY NETWORK ONLY.

15 - An air receiver (refer to Figures 3 or 5) is designed compressed air collection, elimination of pressure fluctuations, preliminary separation of condensate and oil. The receiver is also the case, on which the aggregates of the compressor unit are mounted.

16 - A case of a sound absorption make (refer to Figures 1 or 3, or 5) serves for a noise level reduction in a working zone of the unit.

17 - A condensate catcher (refer to Figures 3 or 5) serves for removal of condensate and oil, collected in the receiver.

18 - A drier (refer to Figure 5) is designed for separation of moisture, contained in compressed air.

Description, functional circuit, operational procedure, maintenance service and repair of air drier are presented in the Operational and maintenance service manual for the air drier.

Air consumption in normal operating conditions occurs by connection of consumer's pneumatic line to cock k1 of the air drier (refer to Figure 6). Cocks k1 and k2 are opened, cock k3 is closed.

When there is a necessity to carry out repairs or maintenance functions without dismantling the unit and without the outage of the unit plant from pneumatic line, the installation is reconnected to cock k3. In this case cocks k1 and k2 are closed, and cock k3 is opened. Thus, air goes in pneumatic line, passing by the air drier.

ATTENTION: NEVER DRAIN CONDENSATE AND OIL FROM THE RECEIVER UNDER PRESSURE. RELEASE PRESSURE AND TURN OFF THE UNIT BEFORE MAINTENANCE OPERATIONS.

5.2 The compressor unit protection devices

The following protection devices are used in the unit, which control its most essential assemblies, indicating the possible failures:

1. A relief valve installed on the air receiver;
2. A relief valve installed on the oil collector;
3. Fuses FU1- FU5 (refer to Figure 10) of the control and signaling circuits protection;
4. An automatic switch serves for protection of the power supply circuits from a short circuit;
5. A voltage control block is the protection from loss and asymmetry of phases, incorrect phase sequence, voltage control by phases;
6. A thermal protection relay of the electric motor of the unit drive from overloads, at actuation of which the unit is shut down and its starting is locked, is mounted on the wiring plate;
7. A programmable controller controlling temperature, pressure and automation of the unit.
8. A lockout of a spontaneous unit starting is envisaged in the electrical equipment in case of:
 - a supply voltage recovery after de-energization;
 - a reduction of the ambient air temperature lower than plus 5 °C;
 - an increase of the oil temperature higher than the permissible level of plus 100 °C;
 - an actuation of a thermal relay;
 - an overpressure.

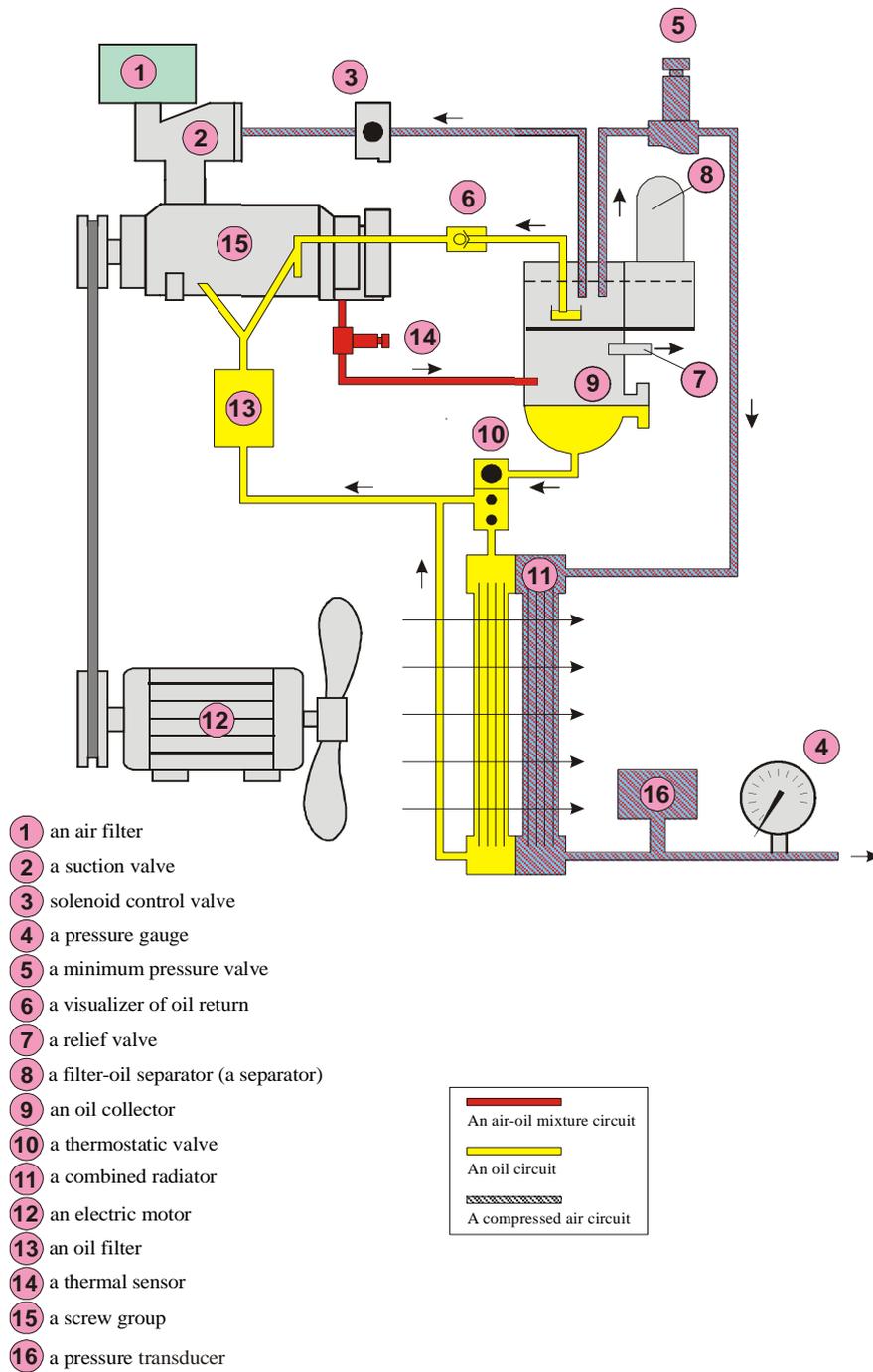


Figure 7 – Functional circuit diagram of the compressor unit BK5E, BK7E, BK10E

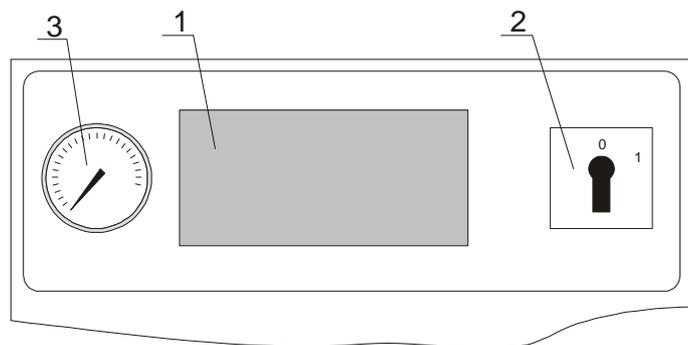
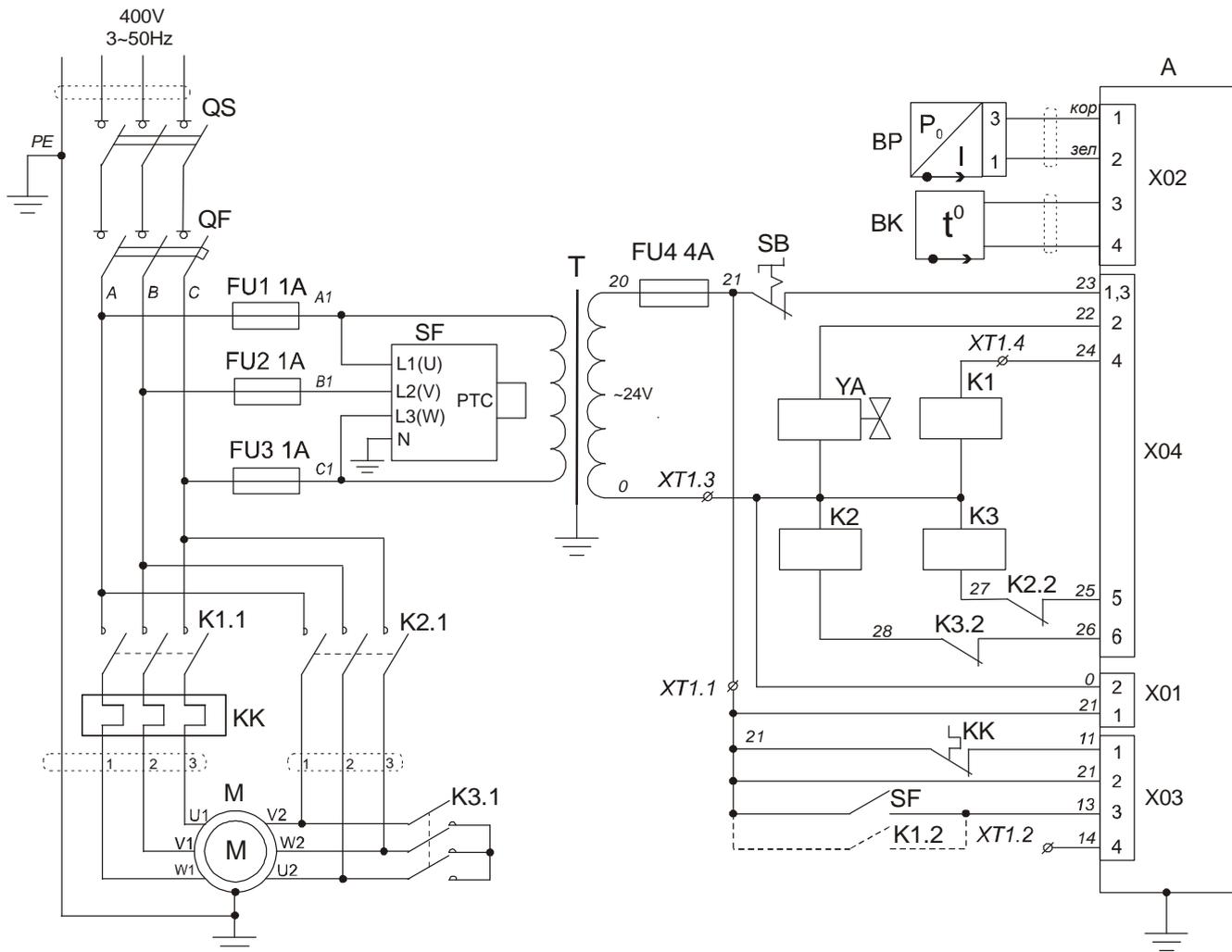


Figure 8



BK5E, BK7E, BK10E 11.09.

- A - controller Airmaster P1
- BK - oil-air temperature sensor
- BP - air pressure sensor
- FU1-FU4 - fuses
- K1-K3 - magnetic contactor, $U_c=24VAC$
- KK - thermal relay of the compressor
- M - electric motor of the compressor, 4,0kW, 5,5kW, 7,5kW, 11kW
- QF - circuit breaker, 10A, 16A, 16..20A, 40A
- QS - rotary switch
- SB - emergency STOP button
- SF - voltage control unit
- T - transformer, 0,1kVA - 400/24V
- XT1 - terminal block for remote control connection
- YA - solenoid valve, 24VAC

Figure 9 – Schematic electrical diagram of BK5E, BK7E, BK10E

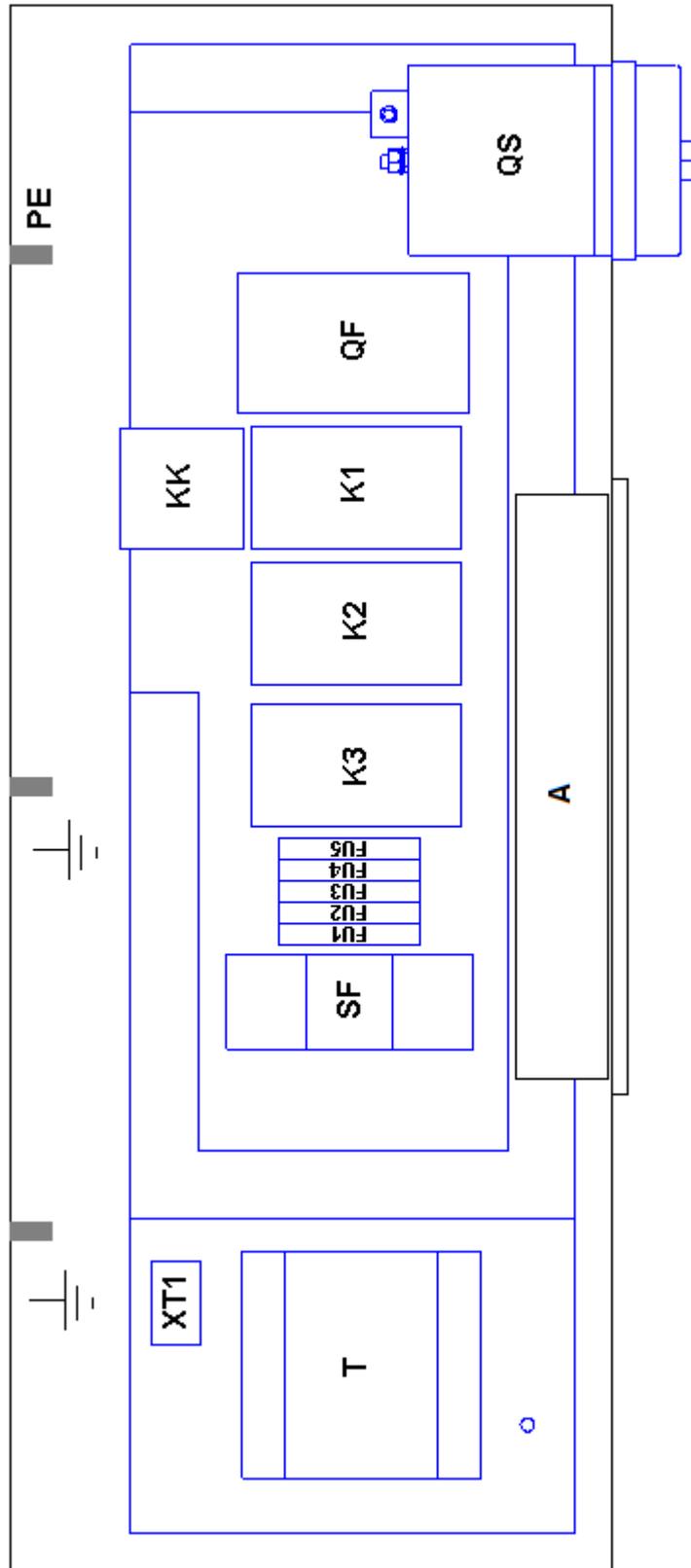


Figure 10 – Block-diagram of the wiring plate of BK5E, BK7E, BK10E

ATTENTION:

THE UNIT IS STOPPED IN CASE OF EMERGENCY (ACTIVATION OF PROTECTION).

TO RESET THE UNIT FIND OUT THE REASON OF EMERGENCY AND MAKE THE FOLLOWING CHECKS:

1) VOLTAGE, ALTERNATION OF THREE PHASES OF THE MAINS (IF POWER SUPPLY DEVIATION SIGNAL HAS BEEN RECEIVED);

2) MOTOR THERMO CONTACTOR IS ACTIVATED:

- LET THE THERMO PROTECTION RESET AUTOMATICALLY;

- PRESS BUTTON "RESET";

- TURN ON THE UNIT;

3) IF UNIT THERMO CONTACTOR IS ACTIVATED VERIFY:

- OIL LEVEL AND OIL SPECIFICATIONS;

- PURITY OF THE COOLER;

- AMBIENT TEMPERATURE;

- FILTER LOADING;

- WHEN THE TEMPERATURE DROPS TO 97 °C PRESS BUTTON "RESET" AND TURN ON THE UNIT.

If all requirements are satisfied, then in case of a repeated actuation of the protection it is necessary to address the manufacturer or the service firm;

Control of the screw block shaft rotation direction (indicated by an arrow on the screw block case) is carried out by a specialist directly during assembly and commissioning of the unit. The voltage control relay locks the unit starting in cases of incorrect phases connection or operation in the power supply network with inadmissible voltage.

5.3 MODE OF OPERATION

The air being sucked from the atmosphere passes through the air filter, the suction valve and reaches the screw pair, where it is mixed with the oil and compressed. The mixture air-oil under pressure enters the oil collector, where the first rough separation takes place. The oil being the heavier fraction precipitates partially and runs down into the bottom part of the oil collector case.

Further, the mixture air-oil enters into the filter-separator, where the final separation of the mixture into oil and air takes place.

The oil comes into the radiator via the oil pipeline, cools, filtered through the oil filter and enters a zone of the screw pair again (refer to Figure 7). The oil functions are in the cooling of the compression product, lubrication of bearings and sealing of the bearing surfaces of the screws.

The air, purified from oil residues in the filter-separator, is cooled passing through the air circuit of the radiator (refer to Figure 7) and comes to the outlet of the unit at a sufficiently low temperature and with insignificant residue of water and oil particles.

6 SAFETY PRECAUTIONS

6.1 Assembly and commissioning of the compressor unit should be carried out by the qualified personnel, having the corresponding permit for servicing electrical installations with the voltage of up to 1000 V. The persons acquainted with a design and operating instructions of the unit and instructed in safety rules and first-aid dressing are allowed to operate it.

6.2 The unit should be placed on to the horizontal floor surface in a stable position.

6.3 Prevent exposure of the unit to atmospheric precipitation.

6.4 Ensure a good ventilation (airing) in the premises, where the unit is located, seeing that the ambient temperature is maintained between plus 5 and plus 40 °C. When the temperature is lower than plus 5 °C condensate generation increases, reducing the oil quality. Start of the unit at the temperature lower than plus 5 °C is locked.

6.5 The air drawn in by the unit should not contain dust, vapors of any kind, explosive and inflammable gases, dispersed solvents and dies, toxic smokes of any kind.

6.6 The unit is intended for compression only atmospheric air, use of installation for compression of other gases is not supposed.

6.7 The compressed air produced by the unit can not be used for pharmaceutical, food or sanitary purposes without a subsequent special filtration.

6.8 The use of the compressed air for different purposes of a user is stipulated by knowledge and observance of the norms, envisaged in each of such cases.

6.9 It is necessary to make use of pneumatic fittings and flexible pipelines of the corresponding dimensions and characteristics (pressure and temperature), when connecting the unit to a distribution line or to an actuation mechanism.

6.10 The compressed air is a power flow and, therefore, it is potentially dangerous. The pipelines containing the compressed air should be in sound condition and adequately connected. Prior to putting flexible pipelines under pressure it is necessary to make sure, that their ends are securely fixed.

6.11 It is necessary to use only recommended means for relocation of the unit (completely shut down).

6.12 Prior to the beginning of work it is necessary to check:

- correctness of connection to a power line and grounding connection;
- integrity and working order of the relief valve, operation and control elements.

6.13 For technical checks follow this manual and "Operation manual of the vessel working under pressure".

6.14 On finishing repair works install assemblies and parts into their places, observing the same precautions as during the first start.

6.15 Handling works should be carried out in accordance with the transport marking on the packaging.

6.16 Recycling of the used oil, the used filters and a condensate should be carried out with observance of norms of preservation of the environment.

6.17 Preventive fire-fighting regulations should be observed during operation of the unit.

6.18 There is no danger of an oil deposit formation in the unit, if the operation rules and maintenance instructions, given in this manual, are observed.

IT IS PROHIBITED:

- TO START OPERATION WITHOUT KNOWLEDGE OF THE GIVEN OPERATION MANUAL;

- TO OPERATE THE UNIT WITHOUT GROUNDING;

- TO OPERATE THE UNIT WITH FAULTY OR SHUT DOWN PROTECTION DEVICES;

- TO INTRODUCE ANY CHANGES INTO AN ELECTRICAL OR A PNEUMATIC CIRCUITS OF THE UNIT OR INTO THEIR ADJUSTMENT. IN PARTICULAR, TO CHANGE THE VALUE OF A MAXIMUM COMPRESSED AIR PRESSURE AND ADJUSTMENT OF THE RELIEF VALVE;

-TO START THE UNIT, WHEN THE COMPRESSOR UNIT WALLS OF THE CASE ARE REMOVED;

- TO TOUCH HIGHLY HEATED PARTS (THE CASE OF THE SCREW BLOCK, THE RADIATOR, THE PARTS OF THE DISCHARGE AIR PIPELINE AND OIL PIPELINES, THE ELECTRIC MOTOR COOLING FINS) IMMEDIATELY AFTER SHUTTING DOWN THE UNIT;

- TO TOUCH THE UNIT BY THE WET HANDS;

-TO DIRECT A COMPRESSED AIR STREAM TO YOURSELF OR NEIGHBORING PEOPLE;

-TO ALLOW UNAUTHORIZED PERSONS INTO A WORKING ZONE;

--TO CARRY OUT PAINTING WORKS IN UNVENTILATED PREMISES OR NEAR AN OPEN FLAME;

-TO STORE KEROSENE, PETROLEUM AND OTHER HIGHLY INFLAMMABLE LIQUIDS IN THE PLACE OF THE UNIT LOCATION;

-TO LEAVE THE HOOKED UP UNIT UNATTENDED;

-TO CARRY OUT REPAIR OF THE HOOKED UP UNIT AND WITHOUT RELEASING THE PRESSURE IN THE RECEIVER, OIL COLLECTOR;

-TO TRANSPORT THE UNIT UNDER PRESSURE.

- TO CARRY OUT A MECHANICAL TREATMENT OR WELDING OF THE RECEIVER. IN CASE OF DEFECTS OR INADMISSIBLE CORROSION IT IS NECESSARY TO COMPLETELY REPLACE IT OR TO CARRY OUT A SPECIAL TECHNICAL CERTIFICATION, BECAUSE IT COMES WITHIN SPECIAL NORMS OF SAFETY;
 - TO OPERATE THE UNIT WITHOUT A REGULAR TECHNICAL MAINTENANCE.
- ATTENTION: MARKING APPLIED HAS THE FOLLOWING MEANING:



– Dangerously! Electric shock



– Dangerously! Under pressure



– Operating staff should read instructions meant for it



– Do not open the cock until the air hose is not connected



– The equipment has a remote control and can be started without warning



– Start/stop device

7 USER'S MANUAL

7.1 PREPARATION TO WORK

7.1.1 General instructions

- Free the unit from the pallet and packaging and make sure that there are no damages or defects and in case of finding them address the carrier immediately.
- Check availability of the manual and completeness of its corresponding sections filling, availability of a selling date mark and a stamp of a seller.
- Remove the side walls.
- Visually control lack of oil leakages.
- Check the oil level through the inspection window of the oil level indicator.

It is recommended to buy the oil used in the unit for its further replenishment and change as well as spare parts, required for technical maintenance (an oil filter, an air filter, a filter-separator, a set of belts).

7.1.2 Location and assembly

Handling of the unit on the pallet is to carry out with the help of a loader having a length of the “forks” of not less than 900 mm or by other lift trucks.

There is no necessity to envisage a special base or a foundation, it is quite enough to locate the unit on the even horizontal surface. It is recommended to place four standard rubber-metal supports under the receiver supports.

The premises, where the unit will be located, should be a good-sized, well ventilated, protected from atmospheric precipitations.

The unit consumes a large quantity of air, required for its internal ventilation, therefore, an increase of dust content in the air will lead to a disturbance of its normal operation. A part of dust is sucked through the air filter causing its rapid clogging and the other part precipitates on various assemblies, including the air-oil radiator complicating a heat exchange. Thus, the premises cleaning is one of the determining factors of ensuring a normal operation of the equipment, allowing to avoid considerable expenses for its maintenance.

ATTENTION: IN CASE, IF THE AIR IS POLLUTED WITH ORGANIC OR MINERAL DUST, OR WITH CORRODING CHEMICAL VAPORS, IT IS NECESSARY TO PROVIDE A PURIFIED AIR SUPPLY TO THE UNIT.

To ease the access to the unit during the maintenance works and to create of a sufficient air exchange, it is necessary to create around it a sufficient space.

It is necessary that the premises has access for external air near the floor and the ceiling, so that to provide for a natural air exchange. If this is not possible, it is necessary to install fans or air funnels, which will guarantee the required air exchange.

After choosing the place of location, it is necessary to make sure that:

- The unit is placed horizontally;
- There is a free access for maintenance;
- there is a free access for a technical maintenance.

7.1.3 The ambient temperature

The ambient temperature should not be lower than plus 5 °C and higher than plus 40 °C, so that the unit functions normally. The work at lower temperature leads to condensate entering the oil and to reduction of its lubrication properties, which cause reduction of service life of the screw group and create conditions for its failure.

The operation of the equipment at the temperatures exceeding the maximum value does not ensure a normal heat exchange and oil cooling in the system, what increases the oil temperature and causes actuation of a thermal protection, which locks the operation of the unit. The operational temperature is defined at the operating unit and is indicated at LED of the controller.

ATTENTION: EQUIPMENT HAS REMOTE CONTROL AND CAN BE STARTED WITHOUT WARNING.

7.1.4 Electric power supply

Permissible voltage fluctuations in power supply mains should correspond to the data specified in the present operation manual.

An electrical power line should correspond to all safety norms and have a wire section corresponding to a consumed power. All electrical connections should be done by a technical specialist.

Connection of the unit plant to power line should be carried by stationary way. The unit plant is equipped by switch for maintenance functions and preventive repair.

The unit should be properly grounded. Connect protective wire of power supply cable to PE terminal (electric cabinet) in accordance with IEC 60204-1 requirements.

In accordance with IEC 60204-1 the power supply system should be equipped with circuit breakers.

Grounding connection is performed by the following conductors: (Table 6):

Table 6

Minimum cross-section of outer protective copper conductor, mm ²	BK5E	BK7E	BK10E
	1,5	2,5	4,0

Inclusion in a network line is necessary (before installation) devices of protection against short circuit, according to ECB (Emergency Circuit Breaker) – the automatic switch (Table 7).

Table 7

Automatic switch	BK5E	BK7E	BK10E
	C10A	C16A	C25A

7.1.5 The pipelines

Diameter of the supply pipelines should not be less than the outlet opening. A sliding shutter should be installed at a discharge connecting it to the unit by a triple branch pipe and a hose so that there is a possibility of disconnecting the unit from the network pipeline in case of repair or maintenance.

7.1.6 Recycling of the emitted thermal power

Installation of thermal power receiving-transmitting systems (hot ventilation air) is possible for heating premises and other purposes.

It is important that the section of a receiver carrying out heat removal is larger than the working area of the radiator, it is also necessary to equip such a equipment with a system of forced suction (a fan) to ensure a constant flow.

It is necessary to envisage dismantling of the radiator enclosure for maintenance purposes during assembly of the heat receiver.

All operations of installation and commissioning should be done by a specialist responsible for servicing the unit.

7.2 OPERATION PROCEDURE

7.2.1 The first start

Turn the general switch into "I"- position. Air pressure and screw temperature are displayed on the controller. Press the START button to switch the compressor on. If the compressor does not start upon pressing the START button, perform troubleshooting operations and follow the instructions provided in the relevant section of the manual.

Let the compressor operate with a fully open outlet air valve with disconnected consuming units within several minutes after the first start-up, i.e. without load.

ATTENTION: BEFORE THE FIRST START-UP:

- STUDY THE SYSTEMS AND THE COMPONENTS OF THE UNIT;
- VERIFY THAT THE SCREW ROTATES IN THE DIRECTION IDENTIFIED ON THE SCREW ENCLOSURE AND THE AIR FLOW IS DIRECTED UPWARDS. IN CASE OF WRONG DIRECTION OF THE SCREW CHANGE PHASES OF THE POWER CABLE;
- VERIFY THAT THE UNIT IS PROPERLY VENTILATED;
- ENSURE THAT ALL COMPONENTS ARE PROPERLY FIXED.

7.2.2 Control and monitoring in the process of operation

On reaching the preset maximum pressure the controller issues a control signal for opening the pressure relief valve and the unit automatically switches over to idle run mode, thereat the suction valve is closed and the unit is unloaded. On reducing the pressure up to the preset minimum the controller issues a control signal for closing the pressure relief valve and opening the suction valve, thereat the pressure increases.

In automatic mode apart from operation in the idle run and under the load modes a temporary shut down of the unit is envisaged in case of air consumption termination on the part of a consumer, which is called mode of "STANDBY". The standby state is activated only in that case, if the unit idle runs for more than 5 minutes. The unit remains in this state until the pressure does not decrease below the minimum value of $P_{max} - 2$ bar. Then the unit is started automatically and so on.

ATTENTION: AFTER PRESSING THE BUTTON "STOP" THE UNIT SWITCHES OVER INTO "IDLE RUN" MODE AND IT IS SWITCHED OFF AUTOMATICALLY AFTER SOME PERIOD OF TIME (20 SEC).

The restart is done by pressing the button "START".

The unit is switched off manually:

- by pressing the button "STOP";
- and after shut down of the electric motor by turning the input switch into position "0".
- the restart of the unit is allowed not earlier than 2 minutes after the shut down.

ATTENTION: USE THE BUTTON "EMERGENCY STOP" ONLY IN EXTREME CASES.

8 MAINTENANCE

The correct maintenance is one of the main conditions of a long run of the unit.

The maintenance of the unit lies in constant control of operation of its mechanisms, checking its technical condition, cleaning, etc.

The maintenance of the unit is subdivided into:

- a shift-time maintenance (ST);
- a routine maintenance carried out after 500 hours of operation (M).

8.1 The shift-time maintenance

1 Connect the unit to the power supply line.

- turn the input switch into position "I" (On).

2 Switch on the unit.

On the operating unit:

- check, whether there are any unwanted noises and hammering. In case of their detection switch off the unit until identification of the cause and removing the malfunctioning;
- check the readings and operation of the devices and apparatus;
- check the tightness of the air ducts and their connection;
- check the oil separation in the visualizer of oil return.

3 After switching off the unit:

- release the excessive pressure in the receiver;
- drain the condensate from the receiver and filters-moisture separators;
- inspect the unit, check whether there are no oil leakages from the connections. On detection, remove it.

4 After the first 50 hours of operation:

- carry out general supervision (oil, an air filter, condition of the radiator, strength of fixing assemblies and aggregates, tension of belts, etc.).

8.2 The routine maintenance

ATTENTION: IN CASE OF INTERFERENCE (MAINTENANCE OR UNSCHEDULED REPAIR) IT IS NECESSARY TO DISCONNECT ELECTRICAL POWER SUPPLY OF THE UNIT WITH THE HELP OF THE COMMON INPUT SWITCH AND TO CLOSE THE AIR CIRCUIT WITH THE HELP OF THE COCK, AND ALSO TO EXCLUDE AN OPPORTUNITY OF THE NON-AUTHORIZED START-UP OF UNIT.

Prior to maintenance it is necessary to make sure that:

- the input switch is in position "0" "Off";

- the unit and the receiver are discharged, according to the readings of the pressure gauges the pressure equals to "0".

It is recommended to carry out maintenance after each 500 hours of the unit operation. It includes all operations of ST maintenance and the following:

- pay special attention to possible oil losses and formation of deposits, caused by dust and oil, if necessary, clean;
- clean (by compressed air blowing) the radiator from dust and dirt;
- check the cleanliness of oil, lack of its intensive darkening;
- maintenance service of the electroequipment of unit installation.

ATTENTION: THE FIRST CHANGE OF OIL SHOULD BE DONE AFTER 500 HOURS OF OPERATION (RUNNING).

To change the oil it is required:

- to switch on the unit to heat the oil up to temperature more than 80 °C. For acceleration of heating of oil it is possible to remove the right lateral wall;
- to switch off the unit. To wait 3-4 minutes;
- to remove the right hand wall of the unit (if it is not removed);
- to unscrew the plug and open the oil drain cock slowly, all oil will drain into the prepared tank;
- dismantle the oil filter, to place the new filter;
- to turn the pulley of the screw block by hand for 3-5 turns in the direction indicated by the arrow at the end surface of the screw block;
- to close the cock and fill the oil through the oil fill up to its lower edge, to screw up the plug;
- To switch on the unit and leave it in operating state for 1-2 min. after reaching the temperature of oil 70 °C, then to switch the unit off and to check the oil level and, if necessary, to refill;
- To install the wall into its place.

These operations should be carried out by a qualified specialist.

ATTENTION: IT IS NECESSARY TO USE HIGH QUALITY OIL FOR SCREW-TYPE COMPRESSORS WITH THE VISCOSITY OF 46 CST AT 40 °C, THE POUR POINT AT LEAST (-8 –10) °C, INFLAMMATION POINT SHOULD BE HIGHER THAN 200 °C. NEVER MIX OILS OF DIFFERENT GRADES. REFER TO SECTION 3 OF THIS MANUAL FOR RECOMMENDATIONS OF OIL USE.

After each 2000 hours of operation:

- replace the air filter;
- control and adjust the tension of the belts;
- control the tightness of pipelines.

After each 4000 hours of operation, but not less than once in a year:

- replace the filtering element of the oil separating filter-separator;
- control the relief valves;
- change the oil;
- replace the oil filter;
- clean the radiator;
- control the condition of the belts, if necessary, replace them;
- control the condition of the receiver;

ATTENTION: IN CONDITIONS OF DUSTY PREMISES THE MAINTENANCE OPERATIONS SHOULD BE CARRIED MORE OFTEN. IN PARTICULAR, THE RADIATOR SHOULD BE CLEANED MORE OFTEN.

THE LIST OF REPLACEBLE SPARE PARTS USED DURING MAINTENANCE:

Code	Description	Applicability		
		BK5E	BK7E	BK10E
4052202003	An oil filter, pcs.	1		
4092100100	An air filter, pcs.	1		
4060400100	A filter-oil separator, pcs	1		
4081000201	Filter element of moisture separator, pcs *	1		-
4081000301	Filter element of moisture separator, pcs *	-		1
Ref to item.3.6	Oil, kg (l)	4,2 (4,8)		
Ref to item.3.3	Belts, pcs	2		
Note – * For D models.				

The oil removal cock

The oil removal cock is situated in the lower part of the oil collector and is designed for oil change in accordance with a maintenance interval. Drain of condensate is made through the oil removal cock (in case of necessity). All operations and actions with the given cock should be done, when there is no pressure inside the oil collector case and when the unit is shut down.

The oil level

The oil level is controlled visually (refer to Figure 11). The maximum level of the oil is the upper edge of the inspection window of the oil level indicator, the minimum is the lower edge (on the cold unit).

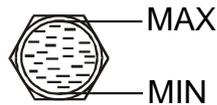


Figure 11

THE AIR FILTER REPLACEMENT (after each 2000 hours)

Untimely servicing of the filter leads to a reduction of the service life of the screw block.

OIL CHANGE (after each 4000 hours), but not less than once in a year. The first change after 500 hours of operation.

The oil filler is located directly on the oil collector case and is closed by a special plug (Figure 12). Access to the plug of the oil filler is permitted only, when there is no pressure inside the unit.

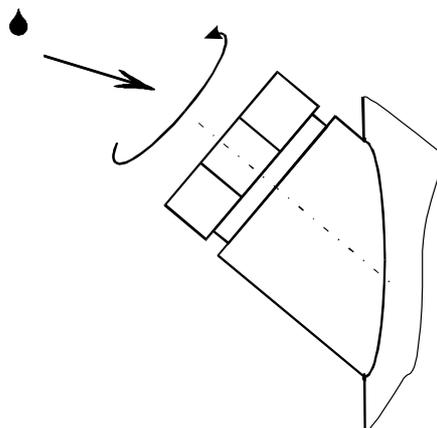


Figure 12

REPLACEMENT OF THE FILTER-OIL SEPARATOR (after each 4000 hours), but not less than once in a year

REPLACEMENT OF THE OIL FILTER (after each 4000 hours), but not less than once in a year. The first change after 500 hours of operation.

BELT REPLACEMENT (after each 4000 hours)

After the first 50 hours and later on after each 2000 hours it is necessary to control the belt tension and, if necessary, to tighten them with the help of a special belt tension regulator.

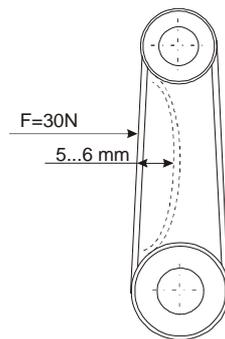
To replace the belts it is necessary:

- a) replace the side walls of the unit and the protective enclosure;
- b) loosen (unscrew by $1\div 2$ turns) 2 bolts and 2 nuts securing the plate with the screw block;
- c) replace the plate with the screw block downwards evenly with the help of the tensioner screws;
- d) remove the belts;
- e) wipe the pulleys with cleaning waste and put the new belts;
- f) evenly replace the plate with the screw block upwards until the required belt tension with the help of tensioner screws;
- g) fix the plate by tightening bolts and nuts;
- h) install the enclosure and side walls to their places.

Belt tension

The belt tension is carried out in accordance with the items a, b, f, g, h of this section.

Power is transferred due to frictional forces where the belt contacts the pulleys. To ensure normal operation keep contact surfaces clean, the belt must be duly tightened.



The tension of the belt should be controlled after installation and regularly during operation of the product, in particular, after outages for a week and more. Belt deflection should be defined with the help of a force gauge, a cord and a ruler.

9 TRANSPORTATION AND STORAGE

9.1 TRANSPORTATION

Transportation of the unit should be carried out at the temperature from minus 25 up to plus 55 °C and only in the enclosed transport. The unit should be secured on the pallet and protected by a transportation packaging.

Packaging of the compressor units is done with the account of supply conditions and depending upon designation.

It is necessary to check the mass and overall dimensions of the unit in this operation manual so that to relocate it and to lift the unit with the catch of the pallet as low as it is possible from the floor.

In case of transportation of the unit with the help of a loader, it is necessary that the forks of the loader are placed as wide as it is possible to avoid a fall-down of the unit.

9.2 STORAGE

For storage the packed units should be placed into a premises and they should not be exposed to adverse weather conditions.

The unit should be stored in areas at a temperature from minus 25 up to plus 55 °C and relative humidity of not more than 80 %.

The content of dust, acid and alkali vapors, aggressive gases and other harmful impurities in the premises of storing the unit is not permitted.

ATTENTION: AFTER LONG PERIODS OF STORAGE OR IN THE PRESENCE OF OBVIOUS SIGNS OF MOISTURE (CONDENSATE) CHECK THE CONDITION OF THE PACKAGING AND REMOVE THE CONDENSATE.

9.3 PUTTING OUT OF SERVICE

At the expiration of operational life you should:

- 1) Stop the unit plant.
- 2) Switch-off the power supply and disconnect the line.
- 3) Release excessive pressure from aerial network and the part of the network that is connected to the installation. Disconnect the plant from aerial network.
- 4) Drain oil.
- 5) Dismantle oil filter and filter-oil separator.
- 6) Hand over drained oil and oil filter to specialized centre for waste recycling.
- 7) Pass the installation to authorized utilization enterprise.

ATTENTION: FOR OPERATIONS WITH AIR DRIER. THE AIR DRIER CONTAINS COOLING AGENT AND OIL IN AIRTIGHT CIRCUIT. THAT'S WHY THESE COMPONENTS SHOULD BE DISMANTLED AND UTILIZED BY ORGANIZATION (OR PERSON) LICENSED TO CARRY SUCH OPERATIONS.

10 FAILURES AND TROUBLESHOOTING

STATE (FAILURE)	POSSIBLE CAUSES	REMEDY
The unit won't start	-No power supply. -activation of the circuit breaker or fuses in the control and alarm loop.	- Check the mains. - Check QS circuit breaker or FU fuses.
	No phase or burned fuse of control circuit.	Check and replace fuses, if necessary.
	Wrong phase distribution	Change phases.
	activation of thermal protection switch of the electric motor.	Check: - operating state of the motor; - belt tension; - air temperature in the electric box
	the screw is overheated (100 °C)	Check oil level, filters, thermostat, radiator.
	the screw is overheated (97 °C)	Check oil level, filters, thermostat, radiator.
	Temperature transducer failure.	Check connectors, replace if necessary.
	The temperature of the screw is under the set level (5 °C)	Check ambient temperature, ensure that the compressor room is heated properly.
Difficult start-up of the unit.	Bad quality of oil.	Replace oil and oil filter.
No air delivery through the air filter	-Air filter clogged. -Control valve does not function.	- Replace or clean. - Check control valve.
Oil overconsumed.	-Air-oil separation failure. - oil pipeline leakage.	check oil separator, oil return pipeline. Replace if necessary.
	Oil overheated (over 97 °C).	Ensure proper ventilation of the room and proper air inlet.
Air discharged from the protection valve.	- Protection valve failure. - Wrong pressure settings. -Idle operation valve failure. -Clogged filter.	-Replace. - Adjust (contact the manufacturer) P_{MAX} in accordance with the manual. - Replace. - Replace.

11 DATA ON PRECIOUS METAL CONTENT

11.1 Silver alloy – BK5E, BK7E – 4,9 g, BK10E – 5,9 g.

12 THE MANUFACTURER'S WARRANTY

12.1 The manufacturer guarantees the correspondence of the unit to indices, given in this operation manual providing that a user observes the rules of operation, storage and transportation.

12.2 The guaranteed service life is 12 months from the day of selling the unit with the mark in the operation manual, but not more than 18 months from the date of manufacture.

After-sales commitments do not apply to replaceable spare parts, replacement of which during the warranty period is envisaged by a schedule of maintenance.

12.3 When buying the unit demand an accurate and exact filling of the columns of section 13 of the given operation manual:

- date of selling;
- requisites of a Seller;
- a seal (a stamp) of a trading organization.

12.4 A Buyer forfeits the right for after-sales service in cases:

- loss of the operation manual;
- unfilled completely section 13 of the given operation manual;
- availability of mechanical and other damages due to violation of the requirements to operation, the rules of transportation and storage.

12.5 On the subjects of after-sales service, purchase of replacement and spare parts approach a dealer of the manufacturer (A seller).

When approaching, it is necessary to indicate the brand and the serial number of the compressor unit, running hours, operation conditions, the external manifestation of the failure, the supposed cause.

Name of the manufacturer: **JSC «REMEZA»**

**Republic of Belarus, 247672, t. Rogatchev, 62 Pushkina street,
tel. (02339)-34394; fax (02339) -34320.**

13 Acceptance and packaging certificate

The compressor unit _____ Serial № _____,
capacity _____ l / min,
working pressure, max. _____ bar,

is completed with:

the screw block _____ **Serial №** _____;
the electric motor _____ **Serial №** _____;
the radiator _____ **Serial №** _____;
the filter-oil separator (the separator) _____
the receiver _____ l., **Serial №** _____;
the filters-moisture separator _____;
the air drier _____ **Serial №** _____;

In a state of supply the unit has been filled with unit oil of the grade:

corresponds to the requirements technical documentation and is found ready for operation.

Packaging was done by _____

Manufacture date " ____ " _____ 20 ____ y.

QCD mark _____ **Seal**

Pre-purchase preparation was done:

Date of sale " ____ " _____ 20 ____ y.

Seller's requisites _____ **Seal**