

OIL-FREE COMPRESSOR DUPLEX DK 50 - 4x2V / M

OPERATION MANUAL



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1. WARNINGS

1.1. General warnings

- The installation, operation and maintenance manual is an integral part of the appliance. It is necessary to always keep this document close to the appliance. Strict observance of this manual is a prerequisite for the correct operation of the appliance.
- The safety of operating personnel and failure-free operation of the appliance are ensured only when using the original components of the appliance. Only accessories specified in the technical documentation or approved by the manufacturer must be used.
- When used with non authorized accessories or consumable material, the manufacturer cannot assume responsibility for the safe operation and functionality of the device.
- The Guarantee does not cover damages that originate due to the use of non authorized accessories or consumable material other than those recommended by the manufacturer.
The manufacturer assumes responsibility regarding safety, reliability and function only if
 - The installation, calibration, amendments, extensions and repairs are made by the manufacturer or his representative or a service organization authorized by the manufacturer,
 - The appliance is used in accordance with the installation, operation and maintenance manual.

1.2. General safety warnings

- The manufacturer developed and constructed the appliance so that damage would not occur when the appliance is used for its intended purpose. The manufacturer considers it his obligation to describe the following safety measures in order to avoid further damages.
- When operating the appliance, it is necessary to observe laws and regional regulations valid in the place of usage. In order to ensure safe course of works, the operator and user are responsible for the observation of regulations.
- The original packaging should be kept for the possible return of the unit. Only original packaging guarantees an optimal protection of the appliance during transportation. If it would be necessary to return the appliance during warranty period, the manufacturer is not responsible for damages caused by incorrect packing.
- It is necessary that the user ensures the appliance is safe to use prior to usage.
- The user must familiarize himself with the correct operation of appliance.
- If an undesirable event occurs in the operation of appliance, the user is obliged to immediately inform his supplier to this event.
- This product is not intended for use in areas with the risk of explosion.

1.3. Safety warnings regarding the protection against electric current

- The appliance must only be connected to an appropriate power source that has correct grounding.
- Prior the connecting the compressor, verify whether the mains voltage and frequency specified on the apparatus are in accordance with the local supply.
- Prior to putting into operation, check for possible damages on the appliance and the air connectors. Damaged cables and sockets/plugs must be replaced immediately.
- In the case of a dangerous situation or a technical failure, immediately disconnect the appliance from mains supply.
-
- During all repairs and maintenance:
 - ensure that the mains plug is removed from the power socket
 - pressure pipes must be air vented
 - pressure must be released from pressure tank.
- This appliance can only be installed only by a qualified expert.

2. PRODUCT INFORMATION

2.1. Purpose and use

Oil-free compressor DK50 4x2V/M - DUPLEX with dryer MONZUN serves as the source of dry, clean, oil-free compressed air for driving pneumatic appliances and equipment. With its performance, operational pressures, but also economic operation, it is suitable for the use in large dental laboratories, dental clinics, with another auxiliary device even as the source of compressed air for driving devices for support of respiration, for departments of hospitals, as well as in further areas of medical practice, in food industry, and everywhere clean and dry compressed air is necessary and where compressor with its version, performance and operational pressure meets the given requirements.

The device is construed for environment of interior spaces, where temperature of air is within the scope of +5°C to +35°C, relative humidity does not exceed 80% and absolute humidity of air does not exceed 15 g/m³.

Oil-free compressor DK 50 4x2V - DUPLEX (without dryer) serves as the source of oil-free compressed air for driving pneumatic appliances and equipment.

2.2. Product description

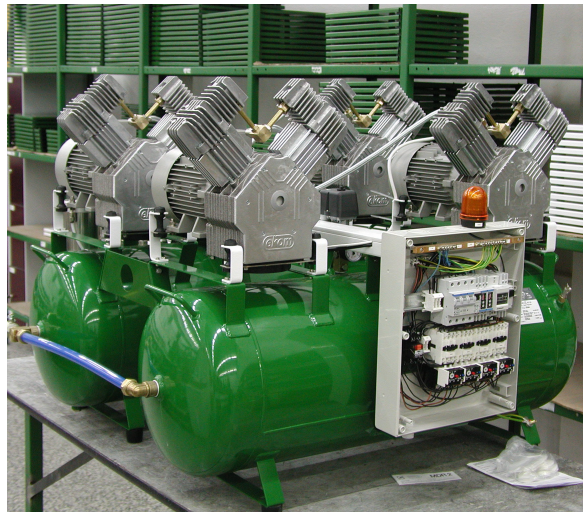
The assembly consists of four oil-free, piston, two-cylinder compressors driven by three-phase electric motors located on two air chambers with fittings for input of compressed air, check valves, pressure meter, safety valves, pressure switch and sludge valves. Air chambers are mechanically connected via stabilizing consoles and at both rounded sides of air chambers are connected by direct pipes. The output of compressed air from entire unit is created by ball valve with internal G3/4" thread.

Valid for DK50 4x2V/M

There is mechanically fixed air dryer MONZUN with cooling unit.

New type of the safety valve (PRV) is included into the pneumatic distribution between the compressor aggregates and the dryer.

The safety valve for the air (PRV) is intended for the prevention of pressure increase in the pressure circuit of the compressor over the permissible value, providing for the protection of individual pneumatic parts, above all for the compressor aggregates against an adverse influence of inadequate pressures. The opening pressure of PRV is set to 11 bar.



It is forbidden to deliberately reset the opening pressure on the safety valve; the resetting should always be agreed on with the manufacturer!



The outlets on the safety valve may neither be closed, nor the pressure air exit therethrough limited.

When the pressure in the pressure circuit of the compressor increases to the value of set opening pressure, the PRV automatically starts letting the air from the system through. When the pressure drops, the PRV will close.



The pressure increase in the pressure circuit can only occur due to the increase of flow resistances of the pneumatic distributions or in case of the dryer failure (e.g. non-functional solenoid valves, increased flow resistance of a drying material and similar) and therefore if a repeated opening of the safety valve occurs, it is unavoidable to check the dryer function, possibly to repair it!

3. TECHNICAL DATA

- Compressor performance: 560 l.min⁻¹ at overpressure 0,5MPa.
- Compressor performance with dryer: 480 l.min⁻¹ at overpressure 0,5MPa.
- Rated voltage / frequency: 3 x 400 V (±10%) / 50 Hz
- Rated current: 12,5 A
- Air chamber capacity: 220 lit.
- Working pressure of compressor: 0,5 MPa ÷ 0,7 MPa.
- Safety valve - opening pressure: 0,8 MPa.
- Noise level(dist. 1m, at 480 l.min⁻¹ a 0,5 Mpa): ≤ 73 dB [A]
- Weight of device: 240 kg
- Dimensions and shape: according to picture
- Operation mode: permanent operation – S1
- Version: appliance of B type, class I.
(podľa STN EN 60 601-1)
- Drying gradeú :
(only for DK50 4x2V/M) atmospheric dew point - 20 °C

4. RANGE OF DELIVERY

- | | | |
|--|-------------------------|--------|
| • Compressor unit, type: | DK50 4x2V/M (DK50 4x2V) | 1 pc |
| • Installation, operation, maintenance manual | NP-DK50 4x2V/M | 1 pc |
| • Filtration pad No. of drawing 4KA-292 | | 24 pcs |
| • Prefilter No. of drawing 4KB-565 | | 8 pcs |
| • Filtration pad of dryer AF40P-060S
(only for DK50 4x2V/M) | 025200079-000 | 2 pcs |

5. INSTALLATION AND ASSEMBLY



Remove fixing elements after unpacking the compressor!



The installation can be performed only by an qualified expert trained by producer with corresponding electrotechnical qualification!

Air chambers with compressors and dryer after unpacking and unscrewing of screws from transport pallet are to be placed onto a floor in a room, in which the device shall be operated. Connect distribution of compressed air to the output of ball valve with internal G3/4"thread.

In the case of installation in the room, which has lower entrance than the exterior dimensions of device, it is necessary to proceed as follows:

Disassembly of electric part:

- Release terminal board cover X4, disconnect wires from terminals PE, N, 1, 2,...,5 and release cords from clamps.
- Mechanically release plastic groove from air chamber with engines M3, M4.
- Release wires from terminals of engines M3, M4.

Disassembly of mechanical part:

- Disconnect pressure hoses from engines M3, M4.
- Release cap nuts with cutting ring at both rounded sides of air chambers and disconnect PE interconnecting pipes Ø 22 mm.
- Release screws on connecting consoles at the sides of air chambers and disconnect consoles.

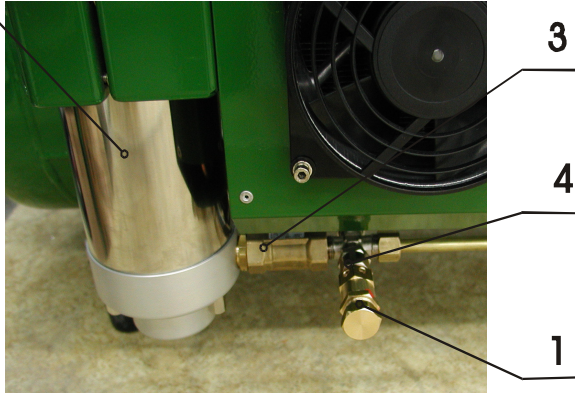
Assembly of the device:

- Separated air chambers should be placed onto the specified place and using the reversal procedure for disassembly, make assembly of mechanical and electric parts.

- Connect to output of ball valve with internal G3/4" thread distribution of compressed air.
- Connect electric supply of required parameters to input terminals of circuit breaker FA1 and bridge of PE and N..

The safety valve is mounted into the pressure circuit of the compressors in front of the inlet solenoid valves of the dryer. In case of an additional assembly (Fig. 1) it is necessary to replace the „T“-piece G3/8" by „X“-piece (cross) G3/8"-1/4" and sealing Cu 4KA-078.

2



1. Safety valve
2. Dryer
3. Solenoid valve - IN
4. Cross G1/2"

Fig.1



For an additional assembly of the safety valve, it is necessary to adhere to the safety measures referred to in the paragraph Product maintenance .



At the connection of device to distribution system TN-S, do not interconnect reset bridges of PE and N !

6. PUTTING THE PRODUCT INTO OPERATION

After assembly and connection of the device to electric mains of 3 x 400V+N+PE, put both circuit breakers FA1 and FA2 to I position. Then switch on switch of pressure switch SP 1, when all four compressors shall be put into operation, two immediately (M1, M2) and two after time delay of 1-2 s. (adjusted at KT1). AS main switch, you may still use switch of pressure switch SP 1. After the first connection of compressor to mains voltage, the pressure in common air chamber shall be increased up to the value of switching off pressure SP 1 (7 bar), when compressors shall be automatically switched off. In further cycles, the compressors work in automatic mode, i.e. according to the consumption of compressed air the compressors are switched on (at 0.5 MPa) and switched off by pressure switch SP1.

After prolonged operation of compressors or when temperature is increased at surface of engines above 40°C, thermal switches ST1 (ST2) shall switch on cooling ventilators EV1 and EV2 (EV3 and EV4) thus cooling of compressor aggregates shall be ensured even during their break. After decreasing temperature in the space around engine under cca 35°C the relevant ventilators shall again switch off. ventilators EV1 and EV2 (EV3 and EV4) are always switched on at the same time with engines of compressors M1 and M2 (M3 and M4).

Such installed compressors do not require any attendance during operation. In next mode, the compressors work automatically.



Pressure switch located on the air chamber has beforehand adjusted pressure value. It is not allowed to change this value by readjusting of pressure switch.



The pressure presetting of safety valve is forbidden!

7. PRODUCT MAINTENANCE

The device is constructed and produced so that its maintenance was minimal. For due and reliable activity of compressor it is however necessary to make works according to the following description.



Prior to starting the works related to the maintenance of compressor, it is necessary to check, whether it is possible to disconnect compressor from appliance, so that there occurred no possibility of damage or endangerment life of a person using the given appliance!

Further, the given works may be executed only by trained employee as follows:



In the case of previous operation of compressor, the head, cylinder, pressure hose between hose and air chamber may be of hot temperature - do not touch the given parts!

7.1. Replacement of the filter elements and pre-filter (Fig. 2)



At regular equipment operation it is necessary to exchange filter elements and pre-filter placed in the cover of compressor aggregate box in the prescribed time (Tab.1) .

- Disconnect the compressor unit from the voltage by switching off main circuit breaker.
- Use an edgeless object to take out the flexible capping of the filtration lining and dirty filter elements and pre-filter (A), (B) from the crank case cover opening.
- Place the new filter elements set (B) into released opening, then the pre-filter (A) (with the smooth side to the crank case) and provide them with the original flexible capping.

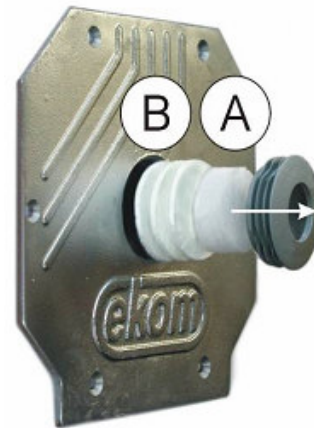


Fig. 2



Before beginning of works performance switch off the main circuit breaker into position "0" and wait for the dryer regeneration to complete – air stops to come out of output solenoid valves.

7.2. Replacement / cleaning of filter in air dryer (Fig.3)



At regular equipment operation it is necessary to exchange the filter element and pre-filter placed in the upper dryer head in the prescribed time (Tab. 1).

- Remove dryer plug (1) by unscrewing anti-clockwise.
- Remove the filter (2).
- Clean the screen (3) if necessary. It is possible to check or to change the filling (when dirty or too dusty or the dryer doesn't dry).
- Put a new filter (2).
- Refit dryer plug to the dryer head (4) and tighten it by hand (clockwise).

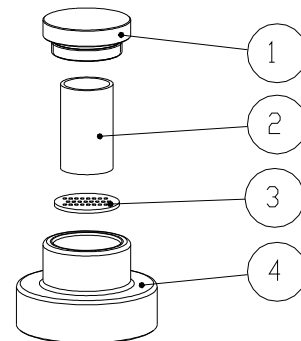


Fig. 3

7.3. Check of safety valve
(Fig. 4)



The safety valve is adjusted to 8 bars by the manufacturer, tested and marked. It must not be readjusted!

- Turn the screw of the safety valve several rotations to left until safety valve puffs.
- Let safety valve freely puff only for a short period of time.
- Turn screw to the right until the limit is reached, the valve must be now be closed.



The safety valve must not be used for depressurising the pressure tank. It could endanger the function of the safety valve.

7.4. Replacement of filter element in filter
(if not part of the product) (Fig. 5)



Prior the intervention to the appliance it is necessary to decrease the pressure of air in air chamber to zero and to disconnect the appliance from mains.

- Loosen lock on filter by pulling it down.
- Slightly turn the cover of filter to left and pull it out.
- Slightly turn the holder of filter to left and pull it out.
- Replace filter, place the new filter back to the body and secure it by holder of filter by slight turning to right. Vessel wash to soap water.
- Place the cover of filter and secure it by turning to right till locking.

7.5. Regulation output pressure air regulator
(if it is part of the product) (Fig. 5)



Setting is necessary to be performed at pressured air tanks and switched-off aggregates (i.e. in operation break, immediately after aggregate switch off).

- Lift the control button of the regulator and rotate. Set the pressure of the output pressure by 0,2 bar more than the demand (following the construction of regulator) for a running compressor and to check it on a manometer.
- After setting the pressure, lock the control button of the regulator turning and pushing.

7.6. Intervals of maintenance

Tab.1

Maintenance range	Figure	Time interval (hour)
Check of safety valve	Fig.4	1 x per annum
Check the bond tightness and checking inspection of equipment	-	2000 hours, or after two years
Check the reverse valves activity, solenoid valves	-	After dryer general overhaul or compressor aggregate, after minimum of 4000h
Change of filter elements and pre-filter	Fig.2	4 x a year
Change of filtration element	Fig.3	1 x per annum
Change of filter element in filter	Fig.5	1 x per 1 year or when the pressure loss exceeds 0,1MPa
Change of adsorbent in dryer	-	After 4000h or after 4 years, or during general dryer overhaul

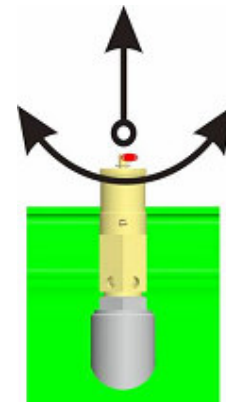


Fig. 4

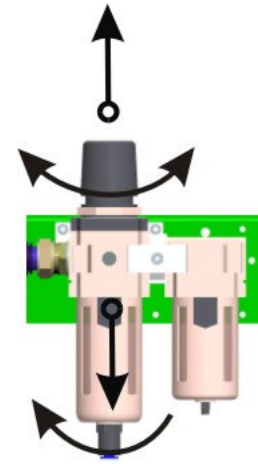


Fig. 5

8. INFORMATION ON REPAIR SERVICE

The guarantee and extended guarantee repairs are to be completed by the manufacturer, or an organization authorized by the manufacturer.

Trained service personnel can only perform the activities connected to the troubleshooting guide!



The manufacturer reserves the right to modify the appliance in a way that will not impact substantially on the operation of the appliance.

9. TROUBLESHOOTING AND SOLVING COMMON PROBLEMS



Prior to repairing the appliance it is necessary to reduce the pressure of the air in the air chamber to zero and disconnect the appliance from the mains supply!

Trained service personnel can only perform the activities connected to the troubleshooting guide!

Tab. 2

TROUBLE	POSSIBLE CAUSE	WAY OF TROUBLE REMOVAL
No compressor aggregate starts running	Network voltage is missing	The main circuit breaker in the distribution is turned off
	Disconnected electric energy supply	Check the voltage in network
		Released terminal in distribution box - fasten
	Check the main electric supply – change the damaged one	
The pressure switch does not switch	Check the terminal and functioning of pressure switch – change the damaged one	
Some of the aggregates do not start running (the signal light is on)	Discontinued electric energy supply to the engine	Check the network voltage
		Check the functions ,contactor, time relay (3 and more aggregates), thermal relay (3 aggregates on top of another) – change the damaged ones
		Released terminal on terminal board of the engine- fasten the terminal, change damaged or broken ones
	Discontinues engine winding, damaged thermal protection	Change the motor
	Seized piston or other moveable part (mechanic damage of movable parts)	Change the damaged parts
Compressor aggregates are switched often also without air consumption	Air leakage from pneumatic distribution	Check the pneumatic distribution – tighten the released bond
	Untightness of reverse valves	Check and clean the reverse valves- change the damaged one
	After finished regeneration leakage through solenoid valves	Clean or change the damaged one
	Untightness of pressure switch and safety valve	Check functioning and clean them– change the damaged ones
Performance of some compressor aggregates is lowered, cycle of operation is	Untightness on compressor aggregate	Check the aggregate bond tightness – tighten released bond
	Worn piston ring	Change the worn piston rings
	Damaged sealing material between head of cylinder and valve board	Change the seal , - tighten

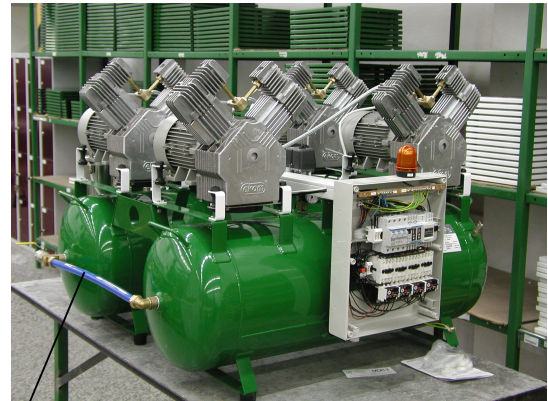
prolonged	Dirty entry lining	Wash the dirty lining and exchange for new ones	
Some of compressor aggregates is noisy (rattling, metal noises)	Damaged piston pin bearing, small end, motor bearing	Exchange the damaged matrix	
	Released (cracked) rubber suspension spring	Exchange the damaged spring by a new one	
High outdoor air quality compressor (overheating)	Insufficient aeration of the room with compressor	Provide suitable surrounding conditions	
	The cooling valves of compressor aggregates or cooler do not work	False blowers - exchange False thermal switch- exchange	
The drying element does not dry	Low service pressure	Lower the air consumption, check the source capacity, bond tightness of joints, appliance condition	
	Non-functional solenoid valve	Repair or change the valve	
	Blocked / wrong jet of regeneration air	Clean the jet or use the right size of jet (e.g. after decreasing number of aggregates in the rack or after compressor extent by rack with further aggregates)	
	Non-functional cooler blower	Exchange the blower	
	False time switch-over relay	Check the time relay setting or change the relay	
	White liquid is released from chambers		Exchange the drying substance and bottom slab filter
			Re-seal or check tightness (under operation to pressure)
Dirty filters in dryer	Change inlet and outlet filter in chamber, eventually drying substance while it is decay or is dusty		
Drying unit is noisy or produces annoying noise	False solenoid valve	Change the valve	
	Damaged damping substance in the condensate tank	Change the damping substance of the tank	
	Damaged pressure hose	Change pressure hose	

After troubleshooting and re-assembly of the dryer, it is necessary to release received condensate from air tanks, dry the air tanks and perform dryer regeneration, the best option is a continuous compressor operation at pressure of around 0,6-0,7 MPa for at least 1 hour and perform air drying control.

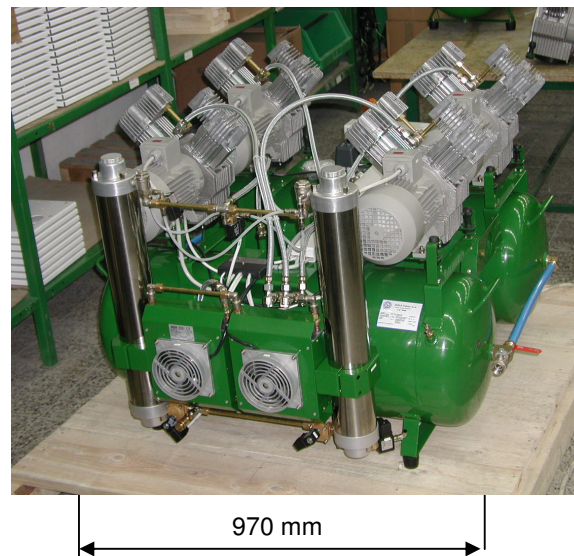
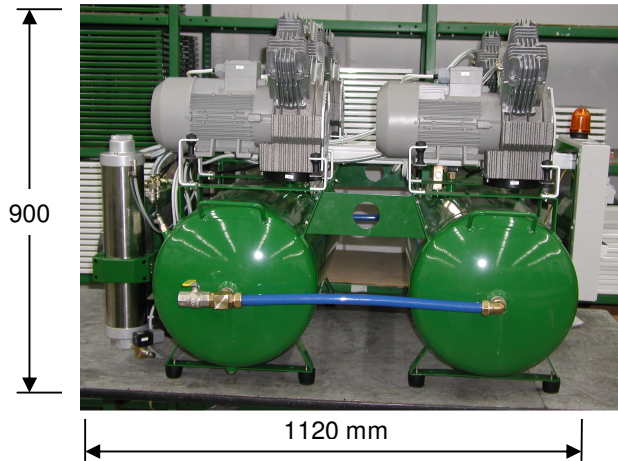


Physical features of dryer adsorbent are changing during usage and its exchange is necessary according to service interval Tab. 1. At the same time we suggest adsorbent exchange during the dryer general overhaul.

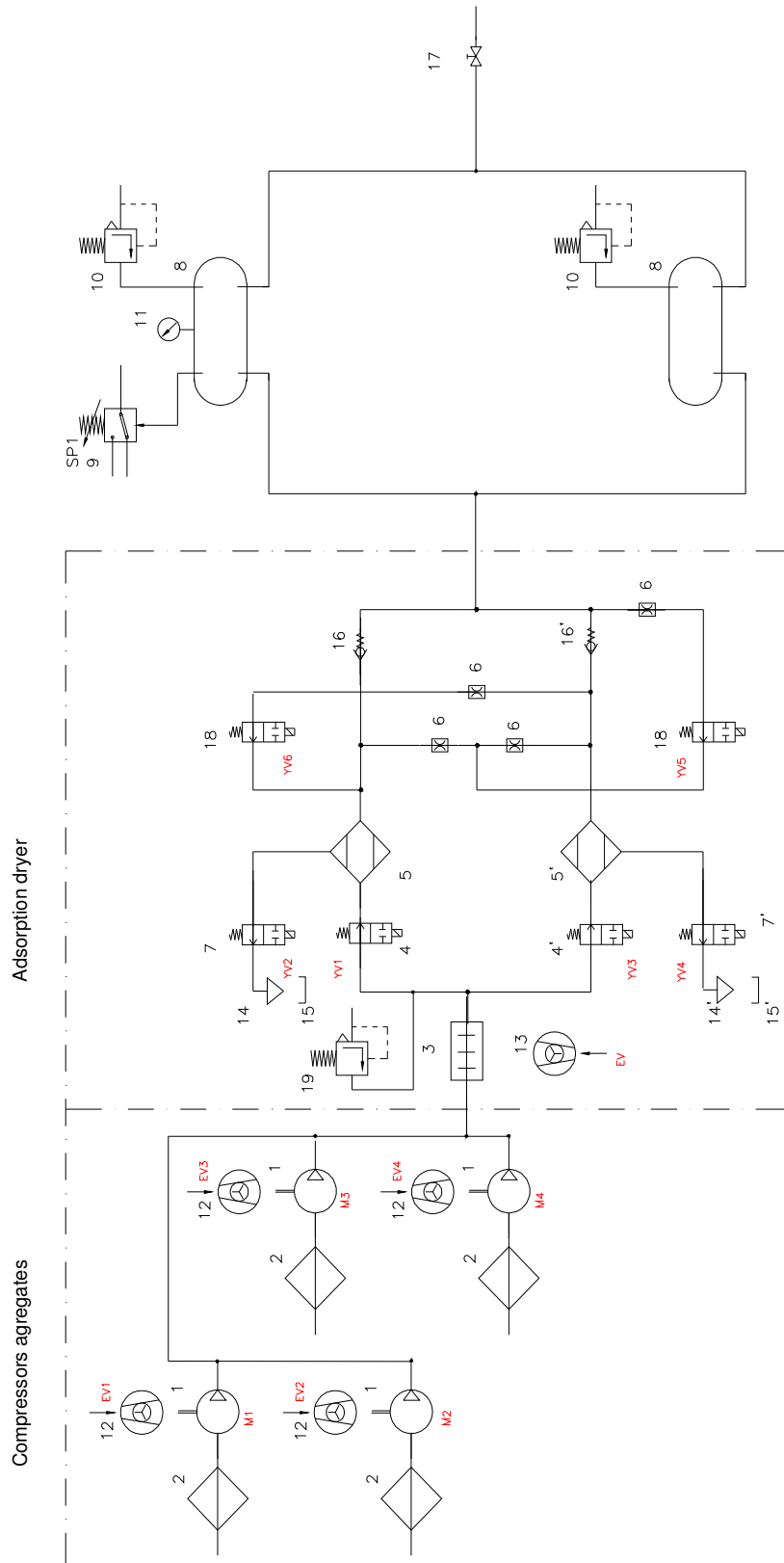
10. ENCLOSURES



Connecting pipe



11. PNEUMATIC SCHEMA



- LEGEND
- 1. COMPRESSORS M1-M4
 - 2. FILTER ELEMENT
 - 3. COOLER
 - 4. SOLENOID INLET VALVE
 - 5. ADSORPTION AIR DRYER
 - 6. JET
 - 7. SOLENOID OUTLET VALVE
 - 8. AIR TANK
 - 9. PRESSURE SWITCH
 - 10. SAFETY VALVE
 - 11. MANOMETER
 - 12. FAN OF COMPRESSOR
EV1 – EV4
 - 13. FAN OF DRYER - EV
 - 14. OUTLET OF CONDENSED LIQUID
 - 15. DRAIN VESSEL
 - 16. RETURN VALVE
 - 17. OUTLET VALVE
 - 18. SOLENOID VALVE OF
REGENERATION
 - 19. RELIEF VALVE

12. LIST OF COMPONENTS

Designation	Name	Type	pcs
BOX1	Electric box	DOMINO, typ 673.4036B	1
FA1	Breaker	C /16A / 3	1
FA2	Breaker	B / 6A / 1	1
KM1-KM4	Contacteur tape	C9, 230V	4
FA3-FA6	Thermo relay	T17, 400V, 4,3A	4
HA1	Optic lamp	typ 210 300 00, Werma	1
PH1	Counter - M1-M4	230V, 50Hz	1
KT1	Time relay - motors	MCR 230	1
KT2	Time relay - dryer	MCR 230	1
KT3,KT4	Time relay - regeneration	MCR 230	2
KA1	Relay	PT570730, 4p,230V/6A	1
X4	Terminal board	typ 6336.30	1
M1;M2	Electromotors 1	1LA7090, 1,1kW, 400V, 50 Hz	2
M3;M4	Electromotors 2	1LA7090, 1,1kW, 400V, 50 Hz	2
EV1-EV4	Fans	typ 3140, 230V/50Hz	4
EV5-EV6	Fans - dryer	typ 3140, 230V/50Hz	2
SP1	Pressure switch	MDR 2/11, 230V	1
ST1;ST2	Thermo switch	TH63	2
YV1;YV3	Solenoid valve of dryer – IN	EV250B-12BD G 12E NO	2
YV2;YV4	Solenoid valve of dryer – OUT	DAN, 2/2, NO, 1/8"	2
YV5;YV6	Solenoid valve of dryer - regeneration	D211, DN2, 1/8", 230V/50Hz	2

13. GUARANTEE

Certificate:


The Product is manufactured according to production documentation and approved technical conditions. The product is complete and meets all prescribed conditions.

Guarantee:

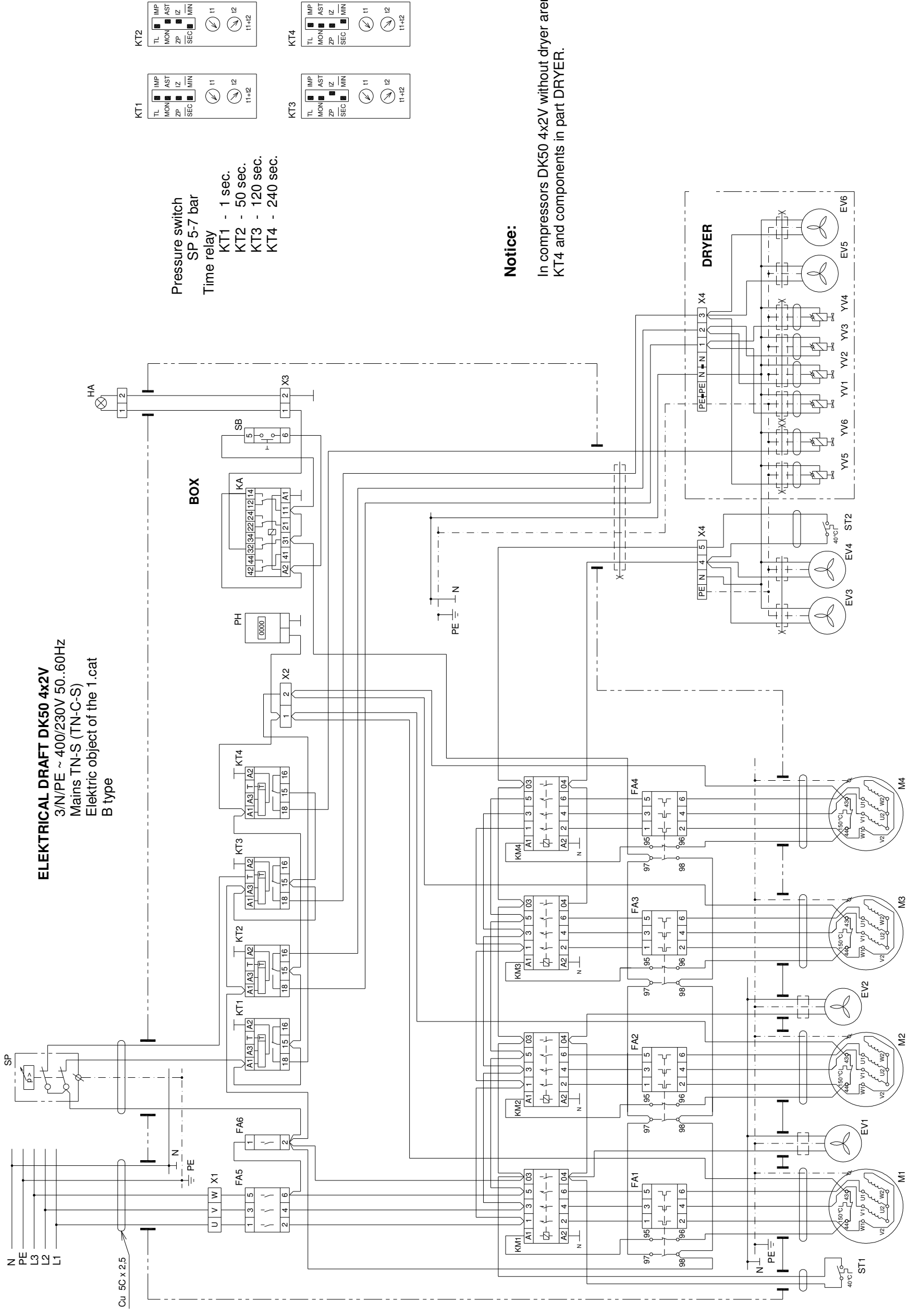
The Manufacturer provides a guarantee of the product, in duration of 24 months from the selling date, when the terms of guarantee document are followed.

- in case of the claim for guarantee repairment a correct fulfilled guarantee document and certificate of quality and completeness of product must be submitted together with the product itself.
- at the guarantee period all failures appeared on the product due to production fault will be removed without any payment.
- the guarantee does not apply to the product damaged during transportation or during incorrect storage.
- the guarantee does not apply to the failures due to wrong operation.
- the guarantee does not apply to the failures due to use of product for any other purposes than are described in the directions for use or as has been understood with the manufacturer.
- the guarantee does not apply to the product when an intervention or arbitrary correction has been made.
- the guarantee does not apply to the product with any completeness which should be discovered during the sale.

OIL – LESS COMPRESSOR	
Type: DUPLEX DK50 - 4x2V/M	Ser.No. :
Date:	Sign.:

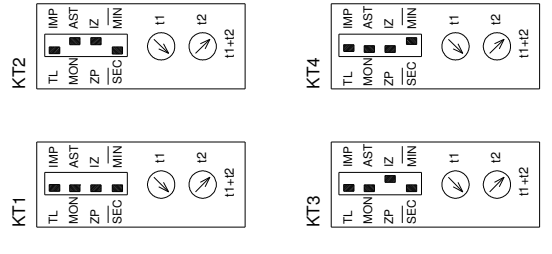
<p>Manufacturer:</p> <p>EKOM spol. s r.o. Priemyselná 5031/18 SK-921 01 Piešťany Slovak republic</p>	
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ELEKTRICAL DRAFT DK50 4x2V
 3/N/PE ~ 400/230V 50..60Hz
 Mains TN-S (TN-C-S)
 Electric object of the 1.cat
 B type

Pressure switch
 SP 5-7 bar
 Time relay
 KT1 - 1 sec.
 KT2 - 50 sec.
 KT3 - 120 sec.
 KT4 - 240 sec.



Notice:

In compressors DK50 4x2V without dryer aren't used KT2, KT3, KT4 and components in part DRYER.