OIL-FREE COMPRESSOR DUPLEX DK50 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. ALERT NOTICES AND SYMBOLS

In the Installation, Operation and Maintenance Manual and on packaging and product, the following labels or symbols are used for important information:

\triangle	Information, instructions and cautions for the prevention of damage to health or materials
A	Caution! Dangerous electrical voltage
[]i	Read the user manual!
CE	CE mark of compliance
@	Compressor is remote-controlled and may start without warning
	Caution! Hot surface
	Earth (ground) connection
\Diamond	Terminal for ground connection
-	Fuse
~	Alternating current
T	Handling mark on package – Fragile, handle with care
<u>tt</u>	Handling mark on package – This way up (vertical position of cargo)
Ţ	Handling mark on package – Protect against moisture
25-22	Handling mark on package – Temperature during storage and transport
2	Handling mark on package – Limited stacking
3	Mark on package – Recyclable material

3. STORAGE AND TRANSPORT

The compressor is shipped in cardboard that protects the appliance from damage during transport.



Caution! For transport, always use the original packaging and secure the compressor in the upright position.



Protect the compressor from humidity and extreme temperatures during transport and storage. A compressor in its original packaging can be stored in a warm, dry and dust-free area. Do not store near any chemical substances.



Keep packaging material if possible. If not, please dispose of the packaging material in an environmentally friendly way and recycle if possible.



Caution! Before moving or transporting the compressor, release all the air pressure from the tank and hoses and drain the condensed water.

4. PRODUCT INFORMATION

4.1. 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.

4.2. 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!

5. TECHNICAL DATA

560 l.min⁻¹ at overpressure 0,5MPa. Compressor performance: 480 l.min⁻¹ at overpressure 0,5MPa. Compressor performance with dryer:

3 x 400 V (±10%) / 50 Hz Rated voltage / frequency: · Rated current: 14,5 A

 Air chamber capacity: 220 lit.

• Working pressure of compressor: 0,6 MPa ÷ 0,8 MPa.

• Safety valve - opening pressure: 1.2 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 grade of comp.: (only for DK50 4x2V/M) atmospheric dew point - 20 °C

 Advised capacity for exchange of cooling air: 2 297 [m3/hod]

6. 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 of dryer AF40P-060S 025200079-000 2 pcs (only for DK50 4x2V/M)

7. 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.

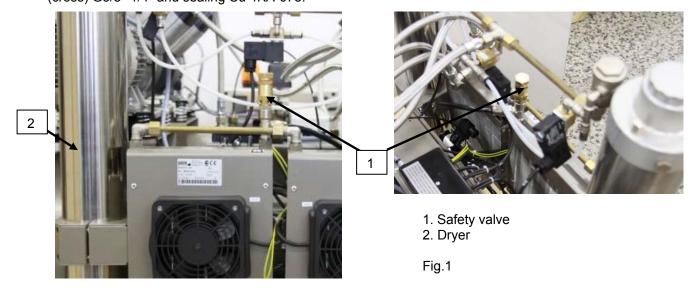
Disassembly of mechanical part:

- 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 \emptyset 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 input solenoide valve. 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.





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!

8. 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 FA5 and FA6 to I position. **Then** switch on switch of pressure switch SP, when all four compressors shall be put into operation, two immediately (M1, M2) and two (M3,M4) after time delay of 1-2 s. (adjusted at KT1). AS main switch, you may still use switch of pressure switch SP. 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 (8 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 0.6 MPa) and switched off by pressure switch SP.

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!

9. PRODUCT MAINTENANCE

The device is construed and produces 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 ofdamage 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!

9.1. Replacement of the input filter and prefilter (Fig. 2)



At regular equipment operation it is necessary to exchange filter placed in the lid of crank box of a compressor in the prescribed time (Tab.1).

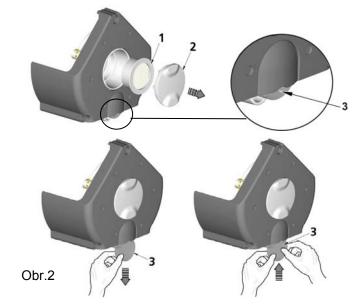
At the lid of the compressors crankcase is an input filter (1) and prefilter (3).

Replacing of the input filter:

- Hand pull the rubber stopper (2).
- · Remove used and dirty filter.
- Input new filter and set rubber stopper.

Replacing of the prefilter:

- Hand pull prefilter (3).
- Replace old prefilter with new.





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.

9.2. 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 anticlockwise.
- Remove the filter (2).
- Clean the screen (3) if neccessary. It is possible to check or to change the filling (when dirty or to 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).

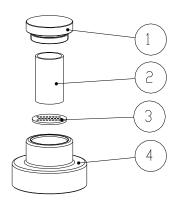


Fig. 3

9.3. Check of safety valve (Fig. 4)



The safety valve is set to the maximum permitted pressure by the manufacturer. 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.

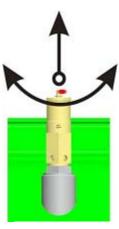


Fig. 4

9.4. 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.

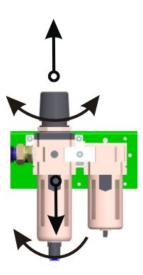


Fig. 5

9.5. 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).

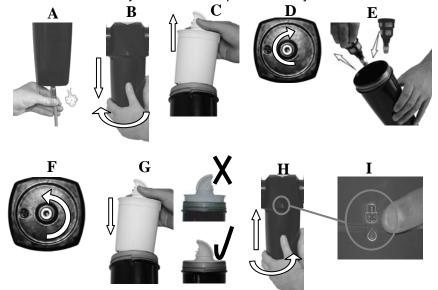
- Lift the control button of the regulator and rotate. Set the pressure of the output pressure by 0,2 bar more than the demand (following the construction of regulator) for a running compressor and to check it on a manometer.
- After setting the pressure, lock the control button of the regulator turning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

9.6. Replacement of the buoy in the water separator

(Fig.6)

During regular operation of drier is necessary to change the buoy in the water separator.

- A) Release pressure.
- B) Dismount separator container.
- C) Pull out condenser separator
- D) Release nut of the buoy placed in the bottom part of the container.
- E) Pull out worn buoy of the separator and replace it for the new one.
- F) Secure the buoy with the nut in bottom part of the container.
- G) Place the condenser separator back as shown in the picture.
- H) Container of the separator insert back and screw in.
- I) The container is definitely secured in the point of the symbol.



Water separator	Order number	Buoy	Order number
WS010BBFX	025200119	EF1	025200146

9.7. Intervals of maintenance

Notice!

Fig. 6

The operating entity is obliged to ensure that all tests of the equipment are carried out repeatedly at least once within every 24 months (EN 62353) or in intervals as specified by the applicable national legal regulations. A report must be prepared on the results of the tests (e.g.: according to EN 62353, Annex G), including the measurement methods used.

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	
Replacement of the input filter and prefilter	Fig.2	1 x 2 years or after 5000 hours	
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	
Replacement of the buoy in the water separator	Fig.6	1 x year	
Change of adsorbent in dryer	-	After 4000h or after 4 years, or during general dryer overhaul	

Perform "Repeated Test" according to EN 62353	-	1 x 2 years
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10. 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.

11. 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
	Network voltage is missing	The main circuit breaker in the distribution is turned off
		Check the voltage in network
No compressor aggregate starts	Disconnected electric energy supply	Released terminal in distribution box - fasten
running		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
		Check the network voltage
Corres of the	Discontinued electric energy supply to the engine	Check the functions ,contactor, time relay (3 and more aggregates), thermal relay (3 aggregates on top of another) – change the damaged ones
Some of the aggregates do not start running (the signal light is on)		Released terminal on terminal board of the engine- fasten the terminal, change damaged or broken ones
signal light is on)	Discontinues engine winding, damaged thermal protection	Change the motor
	Seized piston or other moveable part (mechanic damage of movable parts)	Change the damaged parts
	Air leakage from pneumatic distribution	Check the pneumatic distribution – tighten the released bond
Compressor aggregates are	Untightness of reverse valves	Check and clean the reverse valves- change the damaged one
switched often also without air consumption	After finished regeneration leakage through solenoid valves	Clean or change the damaged one
Consumption	Untightness of pressure switch and safety valve	Check functioning and clean them- change the damaged ones
Performance of some	Untightness on compressor aggregate	Check the aggregate bond tightness – tighten released bond
compressor	Worn piston ring	Change the worn piston rings
aggregates is lowered, cycle of operation is	Damaged sealing material between head of cylinder and valve board	Change the seal ,- tighten
prolonged	Contaminated input filter and prefilter	Replace contaminated filters with the new ones

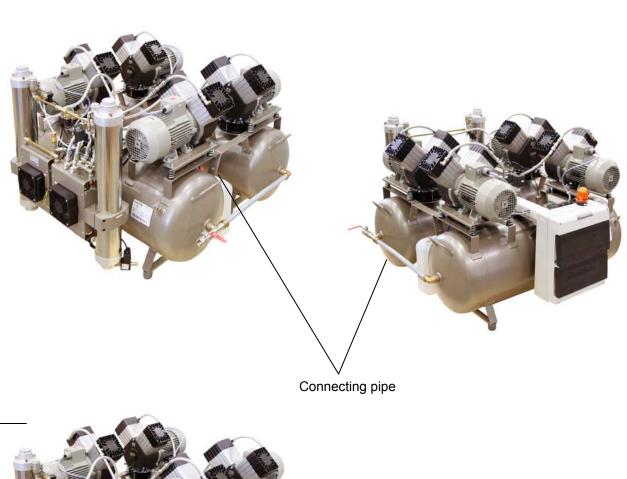
Some of compressor aggregates is noisy	Damaged piston pin bearing, small end, motor bearing	Exchange the damaged matrix	
(rattling, metal noises)	Released (cracked) rubber suspension spring	Exchange the damaged spring by a new one	
High outdoor air quality compressor	Insufficient aeration of the room with compressor	Provide suitable surrounding conditions	
(overheating)	The cooling valves of compressor	False blowers - exchange	
`	aggregates or cooler do not work	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 of 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 of 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	False solenoid valve	Change the valve	
produces annoying noise	Damaged damping substance in the condensate tank	Change the damping substance of the tank	
	Damaged pressure hose	Change pressure hose	

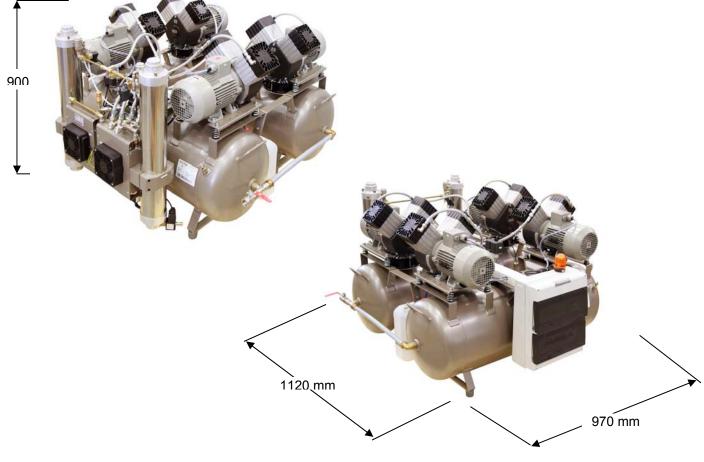
After troubleshooting and re-assembly of the dryer, it is necessary to release received condensate from air tanks, dry the air tanks and perform dryer regeneration, the best option is a continuous compressor operation at pressure of around 0,7 MPa for at least 1 hour and perform air drying control.



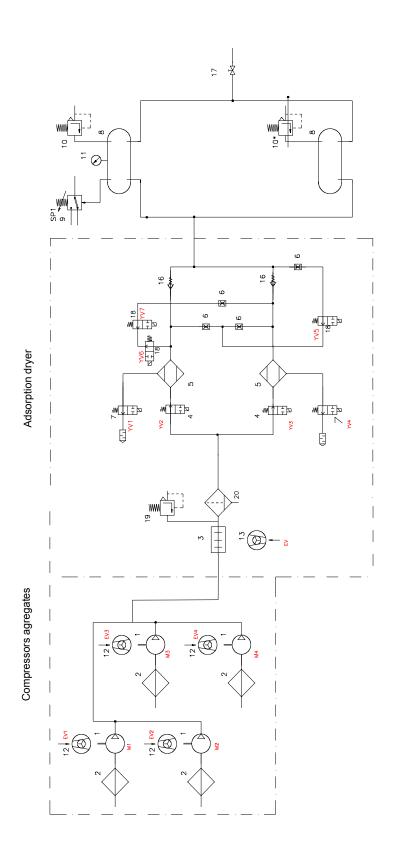
Physical features of dryer adsorbent are changing during usage and its exchange is necessary according to service interval Tab. 1. At the same time we suggest adsorbent exchange during the dryer general overhaul.

12. ENCLOSURES





13. PNEUMATIC SCHEMA



LEGEND

- 1. COMPRESSORS M1-M4
- 2. FILTER ELEMENT
- 3. COOLER
- 4. INPUT SOLENOID 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. -
- 15. -
- 16. RETURN VALVE
- 17. OUTLET VALVE
- 18. SOLENOID. VALVE OF REGENERATION
- 19. RELIEF VALVE
- 20. WATER SEPARATOR

14. LIST OF COMPONENTS

Designation	Name	Туре	pcs
вох	Electric box	DOMINO	1
FA5	Breaker	C / 25A / 3	1
FA6	Breaker	B / 4A / 1	1
KM1-KM4	Contactor tape	C9, 230V	4
FA1-FA4	Thermo relay	6,3A	4
SB	Push base	MTX-10-TB / 230V	1
HA	Optic lamp	typ 210 300 00	1
PH	Counter - M1-M4	230V, 50Hz	1
KT1	Time relay - motors	MCR	1
KT2	Time relay - dryer	MCR	1
KT3, KT4	Time relay - regeneration	MCR	2
KA	Relay	4p,230V/6A	1
X1	Terminal board U, V, W	RSDPS10	3
X2, X3	Terminal board	RSDPS10	4
X4	Terminal board	typ 6336.30 11pol.	1
M1, M2	Electromotors 1	1,5kW, 400V, 50 Hz	2
M3, M4	Electromotors 2	1,5kW, 400V, 50 Hz	2
EV1-EV4	Fans	4715MS	4
EV5-EV6	Fans - dryer	4715MS	2
SP	Pressure switch	MDR 2/11, 230V	1
ST1, ST2	Thermo switch	RH 2452	2
YV2;YV3	Solenoid valve of dryer – IN	EV250B-12BD G 12E NO	2
YV1;YV4	Solenoid valve of dryer – OUT	21M0AV25	2
YV5	Solenoid valve of dryer - regeneration	EV210A, NC	3
YV6,YV7			

15. RANGE OF DELIVERY

DK50 4x2V/M DK50 4x2V Installation, operation, maintenance manual Filter element of dryer	NP-DK50 nx2V/M AF40P-060S	1x 1x 1x 1x 1x 2x
Packing of basic equipment checked by		
Date of production		
Signature		

3/N/PE ~ 400/230V 50..60Hz Mains TN-S (TN-C-S) Elektric object of the 1.cat B type 1 2 Cu 5G x 2,5 BOX Pressure switch BOX SP 6-8 bar Time relay MCR-08 \bigcirc t \mathcal{O}^{t} KT1 - 1 sec. () a a t x a 1 KT2 KT2 KT2 IB 15 16 KT2 - 50 sec. A1 T A2 T 18 15 16 KT3 - 120 sec. 1 1 1 KT4 - 240 sec. 18 | 15 | 16 Ø t (x) a o a txa Notice: In compressor DK50 4x2V without dryer aren't used components in part DRYER. 中一个个十 中个个个十 A2 2 4 6 04 N A2 2 4 6 04 N A2 2 4 6 04 A2 2 4 6 04 N 95 1 3 5 95 1 3 5 96 2 4 6 PE N 4 5 X4 DRYER YV5 YV6 YV7 YV1 YV2 YV3 YV4

ELEKTRICAL DRAFT DK50 4x2V

DK50 4 x 2V

ELEKTRICKÁ SCHÉMA