

D/▲LG/▲KIR/▲N[®]

HEATLESS ADSORPTION DRYER

OPERATING INTRUCTIONS

MODEL DA18 - DA3600

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OPERATING INSTRUCTIONS FOR HEATLESS ADSORPTION DRYER DA18-DA3600

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**BEFORE INSTALLING OR USING THE DRYER
PLEASE READ THIS MANUAL CAREFULLY**

1. GENERAL INFORMATION

1.1. Description

The adsorption dryers for compressed air of the serie DA are composed of two adsorption towers, connected to an automatic valve system wich is designed to avoid an eventual loss of pressure in the pipes when passing from the drying position to regeneration position. It will cause disturbances in the automatic control systems. The compressed air flows through one of the two adsorption towers and it flows out of the same having the requested dew point. At the same time, the other adsorption tower is in the regeneration mode, that is, the moisture which has been previosly adsorbed by the load is driven out by the circulation of a small fraction of dry air expanded at the atmospheric pressure. DA desiccant compressed air dryers make up a compact unit mounted onto a frame which is delivered after careful an thorough testing and adjustment in the manufacturing plants.

1.2. Certification

DA heatless desiccant compressed air dryers meet the legislation in force and the following standards:

- 87/404/CE : Pressure vessels
- 89/392/CE: Machine security

2. IMPORTANT REMARKS

DA heatless desiccant compressed air dryers enable you to obtain the results for which they have been designed, provided that :

• **The compressed air flow, pressure and temperature values at the dryer inlet correspond to the nominal values used for the design.**

• **The feeding conduit of the compressed air to be treated is correctly executed and particularly, that when this is very long or is laid outside, it is equipped with a carrier filter which prevents the eventual condensate generated to reach the dryer.**

If the compressed air temperature at the dryer inlet is higher than the nominal value, you will have to install a heat exchanger (end cooler, water or air cooled) which reduces the temperature as required. In the same way, the condensate generated by the said cooling process will have to be eliminated by means of a water separator. The dew point measurements are significant only when the dryer is running under normal operating conditions, that is, as from the moment when it has finished two drying and regeneration cycles in each of the towers that make up the dryer. Before this, the mesured value could be excessively influenced by the initial conditions of the dehydrating agent. If the compressed air comes from a lubricated compressor, the dryer will have to be protected with a deolier. Otherwise, the dryer will eventually adsorb the oil aerosols which will reduce the drying power of the unit and shorten the service life of the adsorbing agent.

3. ACCEPTANCE, INSPECTION AND STORAGE

3.1. Inspection and storage

After the receipt of you adsorption dryer, check whether the packing has been damaged during transport. Inspect the unit carefully. Any inner or outer damages will have to be attributed to the carrier or to the company which supplied that machine to your company.

Each unit is tested in the factory and is delivered ready for immediate operation. Cycle setting is effected before shipment, therefore it should not be reset under any circumstance, unless it is carried out by our after-sales service or in case of prior authorization in writing by the manufacturer, since this would lead to the loss of the guarantee. If the dryer has to be stored before its start-up, it must be stored in a safe place. In the same way, it should be taken into account that the air inlets and outlets must not be open or uncovered, to avoid any eventual contamination of the adsorber load by the air humidity, until its final start up.

3.2. Maintenance

Use the maintenance means suitable for the form and weight of the device. Due to the dryer geometry (small supporting base and high gravity center) it should be transported vertically only by the help of a lift truck. If the dryer has to be lifted or laid horizontally use two hooks supplied on the dryer towers.

If a tower deformation takes place due to falling or knocking when handling, the dryer service has to be stopped.

Consult the supplier in order to get an inspection.

! Crushing danger :
Do not place the dryer in direct or indirect vertical position on the forks of a lift truck, pallet truck or similar without securing its vertical stability using the hooks.

4. LOCATION AND CONNECTIONS

! Several dangers (crushing, explosion, projection, noise...) :
The installation operations described in this chapter are reserved to the staff qualified in the electropneumatic system installation. Respect the procedure indicated not to risk security.

4.1. Location

The unit has to be located on a smooth level floor which can withstand the weight of the dryer. There is no need to provide ground fixation bolts, due to the lack of masses in motion, to the high tilting resistance and to the weight of the equipment itself, which guarantee its stability.

It is necessary to provide enough clearance around the dryer in order to have access to all its components for any eventual maintenance, repair or replacement works. It is advisable to install the adsorption dryer in a location where the room temperature ranges between 10 and 40°C approximately, as well as where there is a proper room ventilation.

4.2. Compressed air connection

After the location of the equipment, the only assembly work to carry out is the connection of the air inlet and air outlet connections to the corresponding pipes of the adsorption dryer, marked with labels. The humid air comes in through the lower connection, whereas the dry air comes out through the upper connection. The air outlets which have been used for the regeneration are located on the upper side of each tower to be regenerated during the cycle change.

When the unit is equipped with prefilters and afterfilters, the air inlet has to be connected to the prefilter and the dry air outlet to the afterfilter.

4.3. By-pass connection and use

It is advisable to provide the dryer with a by-pass, since it will avoid having to shut down the compressed air supply to the line in case of an eventual repair or maintenance operation in the same.

4.4. Electric connection

Use the connecting terminals supplied on the dryer for mono-phase electrical connection. The electrical connections are in the switch board. **Before carrying out the electric connection, check that the line voltage corresponds to that of the dryer, which is indicated on a label located next to the connecting terminals.**

Connect the cable to the grounding.

4.5. Adsorption agent loading

The adsorption dryer is delivered ready for immediate operation, that is, with the towers duly loaded with adsorbing agent. The adsorption agent is to be replaced totally every 3 years or when the dew-point is higher than required. The desiccant type and quantity is declared on the main label.

5. OPERATION PRINCIPAL

The compressed air which has water inside flows in to one of the towers. The desiccant in the tower adsorbs the water and delivers moisture free air to the outlet of the dryer. Meanwhile 15% of that moisture free air is used to regenerate the desiccant in the second tower. When the second tower is fully regenerated and ready to use than it starts to adsorption process and the first tower which is saturated starts to be regenerated.

The DA series adsorption dryers regenerated without heat by the help of dry air. The regeneration process has a de-adsorption at an atmospheric pressure, therefore it is necessary to decompress the tower to be regenerated before starting the process, and bring it again to the working pressure (pressurization) once it has finished. The de-adsorption stage supplies :

- a) The removal of the water retained in the charge.
- b) The evacuation of this water out of the equipment.

Inside the tower the air flows with an extremely low vapor pressure, obtained by distention until the atmospheric pressure of a fraction of the dry air flow present at the outlet of the dryer. The hygrometric level of this air flow makes possible the read sorption of the water previously adsorbed by the charge, and takes it with it to the outside of the dryer. At the end of the regeneration stage the pressurization starts and lasts until the end of the halfcycle/ During this period, the dry air flow which has been used for the sweep of theregeneration tower accumulates inside of it, progressively increasing its pressure until reaching the working pressure.

All necessary procedures for the operation of the dryer according to the working principle described, are carried out completely automatically by means of an electronic computer controller.

6. DRYER COMPONENTS

6.1. Main Dryer Components

DA heatless desiccant compressed air dryers are mainly composed of :

Two drying towers.

Adsorbing load : DA: Activated alumina.

- Inlet valves : For the compressed air supply to each tower.
- Release valves : Two double-way valves for the release of the compressed
- Regeneration air. These valves are equipped with silencers in order to reduce the noise
- during regeneration.
- Outlet valves : Two one-way outlet valves for the dry compressed air.
- Electric cabinet : It is located in the front part of the dryer and at the center of the two towers.
- Standard built-in pressure gauges.

7. STAR-UP

Once the assembling of the dryer is finished, proceed with the starting-up in the following order of operation.

7.1. Put under voltage

Make the electric connection to the line.

7.2. Starting-up

The dryer is to be pressurized before actuating the starting switch. When the dryer is pressurized than all the valves become normally closed. Actuate the starting switch on the control cabinet door.

7.3. Dryer pressurization

Open very slowly the input valve of compressed air to the to make that the pressurization is gradual and that too high speeds are not reached which could damage the adsorption agent and filter elements.

Notice that the manometer of one of the dryer tower shows an immediate gradual increase of pressure, while the manometer of the other tower makes it slowly. When one tower reaches to nominal working pressure it stays pressurised until it is saturated. After a while the purge flow valve will switch of the purge flow and the second tower will start to be pressurised until the nominal working pressure. Once it is fully pressurised than the first tower will be depressurised automatically. Also according to the program position, the following situation will be shown:

7.4. Checkings

It is advisable to follow closely the development of the first cycle in order to check that all the operations are made correctly. For that purpose, base in the sequences pointed out in chapter 5 "Working Principle" The programming diagram presented in chapter 8 shows the interval of time between two consecutive operations, what allows to space out the inspection visits in order to be present at every operation and to observe the position of the valves and the pressure gauge indications.

7.5. Dryer Stop

Pacing the switch in the stop position, the control system will stop immediately. The air flow will continue to pass through and that will result in over saturation of the desiccant. In order not to have that problem, the compressed air inlet should be stopped first and then the dryer should be switched off.

8. DRYER PROGRAMMING

The complete drying and regeneration cycle of the adsorption dryer is :

Work half-cycle : 240 seconds

Regeneration half-cycle :180 seconds

Pressurisation after Regeneration: 60 seconds

Total cycle time 8 minutes

9. OPERATION AND CONTROL

Observing electronic computer controller and the pressure gauges it is possible to know the exact working situation of the dryer.

9.1. Result Checking

As regards the dew point checking, you will have to wait until 10 complete cycles have been carried out after the last start up. After this, you will be able to measure the dew point of the compressed air coming out of the dryer, which will have to be equivalent or lower (higher absolute value) than the value set for this dryer.

9.2 Normal Operating Conditions

Conditions of the compressed air supply :

MODEL	CAPACITY (m ³ /h)
DA18	18
DA 36	36
DA55	55
DA75	75
DA100	100
DA130	130
DA160	160
DA185	185
DA250	246
DA300	308
DA360	360
DA440	440
DA575	575
DA620	616
DA750	750
DA850	850
DA1000	986
DA1250	1232
DA1500	1500
DA1800	1800
DA2200	2200
DA2700	2700
DA3200	3200
DA3600	3600

FOR ALL MODELS	
Working pressure (bar)	7 bar
Max. working pressure (bar)	16 bar
Pressure dew point	- 40°C
Max. working temperature (°C)	50°C
Inlet temperature (°C)	35°C
Max. Inlet temperature (°C)	50°C
Ambient Temperature (°C)	25°C
Relative Humidity (%)	100%
Regeneration Rate (%)	15% of the full flow
Voltage (V)	230/1/50-60
Electric protection (IP)	IP-55

**- For special requirements,
please contact technical department**

10. PRECAUTIONS

- ! **Do NOT disconnect the polyamide pilot piping without checking there is no air pressure.**
- **Do NOT manipulate the exhaust silencers without checking there is no air pressure. Do NOT manipulate the switchboard without taking the necessary precautions, as the supply voltage is 230V.**
- ! **Water in liquid state shall not reach an adsorption dryer.**
- **The water is not retained by the adsorbent substance and overheating higher than 6°C of the air at the outlet would take place.**

11. MAINTENANCE

11.1. Periodic checkings

Every day

It is advised to control periodically the dryer operation against any valve or power failures. It will be enough to check every day that the operations are carried out correctly at least in one half-cycle.

Every 15 days

Check by reading that the working pressure in the tower in the drying stage is the one in the line, and the one in the tower in the regeneration stage is zero.

Every month

Clean every month the silencers installed in the two towers at the outlet of the regeneration air.

Every year

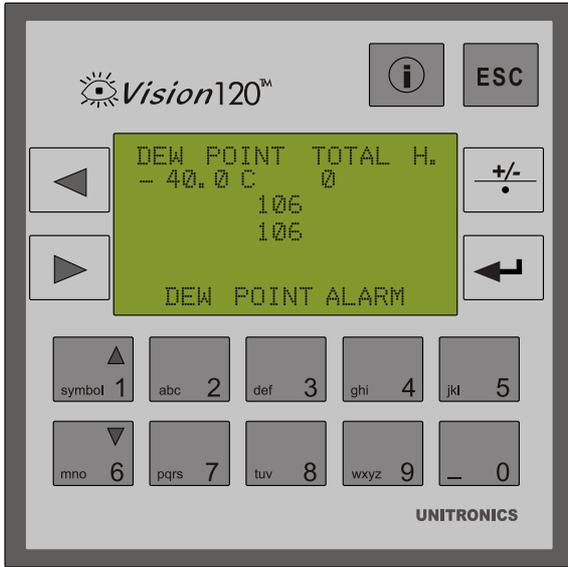
Clean inlet and outlet wire-mesh tubes that are inserted in the inlet and outlet connections of the tower. Due to the damages on the granules during the time the Small desiccant dust may block these mesh tubes and will cause an increase in the pressure drop across the dryer.

11.2. Replacement of the adsorbing agent

The ageing of the adsorbing agent is shown by the progressive worsening of the dew point, even though the regeneration processes are carried out correctly. In this case the full adsorbing agent load has to be replaced.

When there is not any dew point measuring device available, it is advisable to replace the adsorbent agent every 3 years.

12. PLC on DA DRYERS WITH DEWPOINT SENSOR



(Pic.1)

MAIN SCREEN OF PLC

DEW POINT -40.0C (The pressure dewpoint reading)
 TOTAL H. 0 (Total run time)
 VARIABLE TIME SET
 106 PROGRAM TIME SET
 106 PURGE TIME SET

DEW POINT ALARM (Alarm)

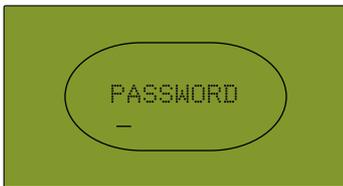


Use when entering into the system

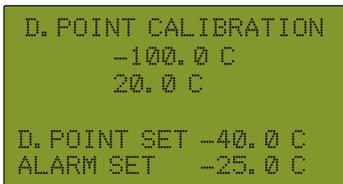


Use to return to the main screen

Use  button to enter the password to enter main MENU (Password: 1112)



MAIN MENU SETTINGS



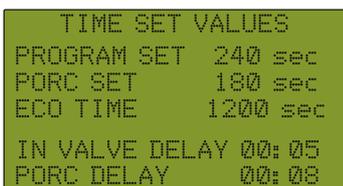
Use  button to change the factory settings and use (enter)  button to complete the setting.

D.POINT CALIBRATION (Factory set value)
 -100.0 C
 20.0 C
 D.POINT SET -40.0 C (Factory set value)
 ALARM SET -25.0 C (Factory set value)



Use  button to enter the SERVICE SETTING

Use  button to change the factory settings and use (enter)  button to complete the setting.



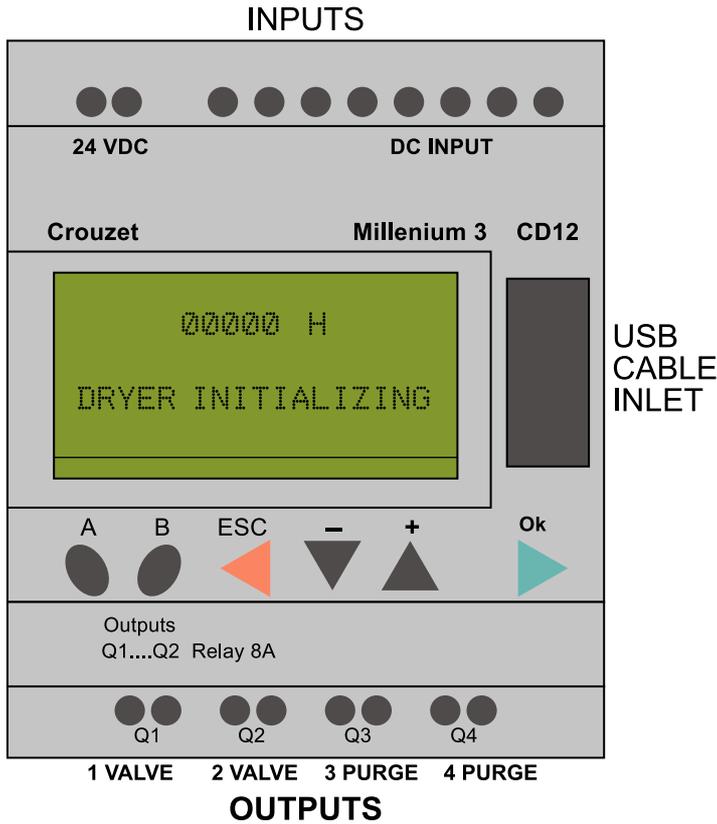
Use  button to enter the TIME SET VALUES

Use  button to change the factory settings and use (enter)  button to complete the setting.

13. SMART RELAY ON DRYER / MILLENIUM-3 CD12

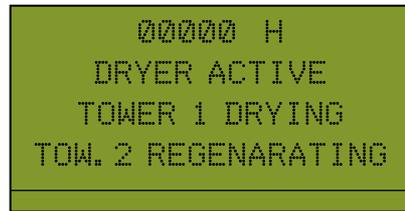
To download a software to your Smart Relay:

- 1) Open CROUZET LOGIC Software - M3
- 2) Go to the "OPEN EXISTING PROGRAM" tab
- 3) Select "MILLENIUM 3 CD12"
- 4) Then connect the special USB cable



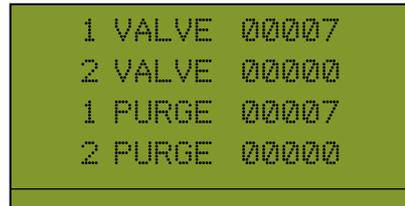
MAIN MENU :

- The total run time of dryer.
- Dryer is active
- The tower that makes drying
- The tower that makes regeneration

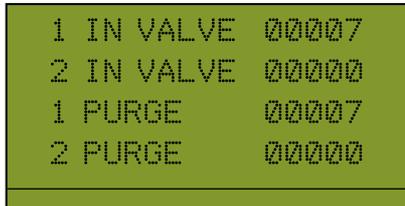


TIME SETTING :

Use the **B** button to see the time settings



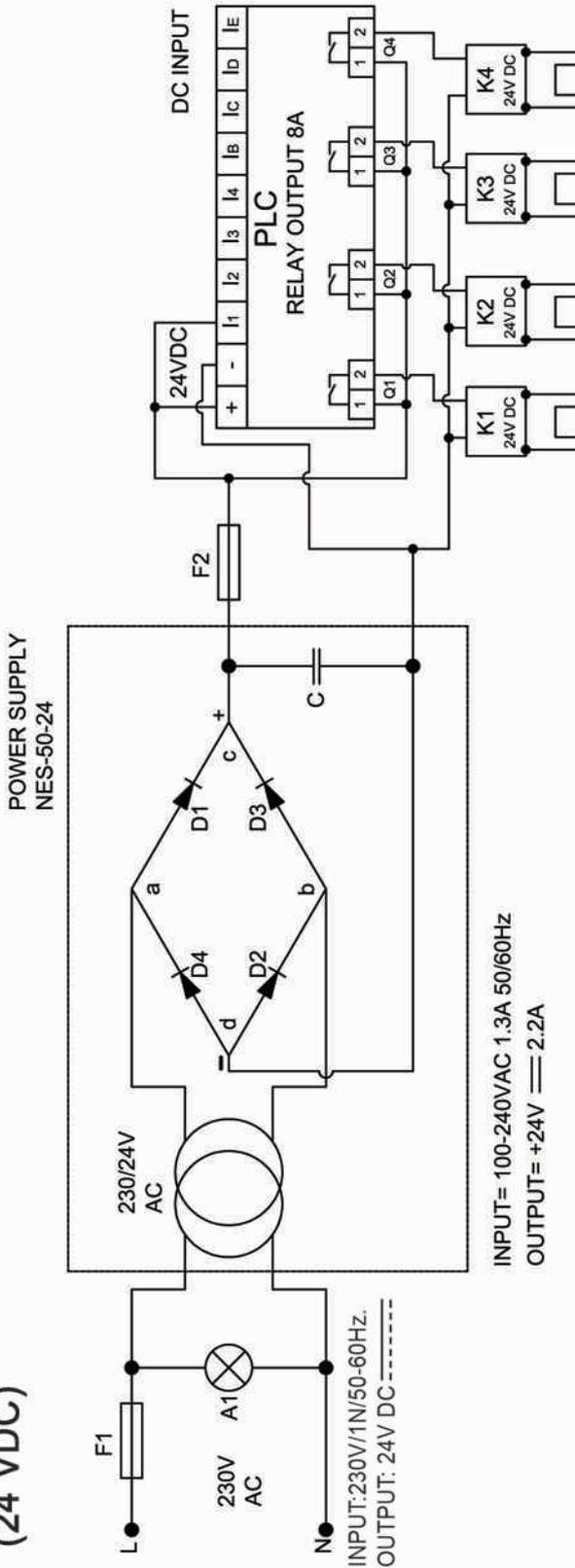
Use the **A** button to change the time settings and use + - buttons to enter the new set. And use the ok button to save the setting.



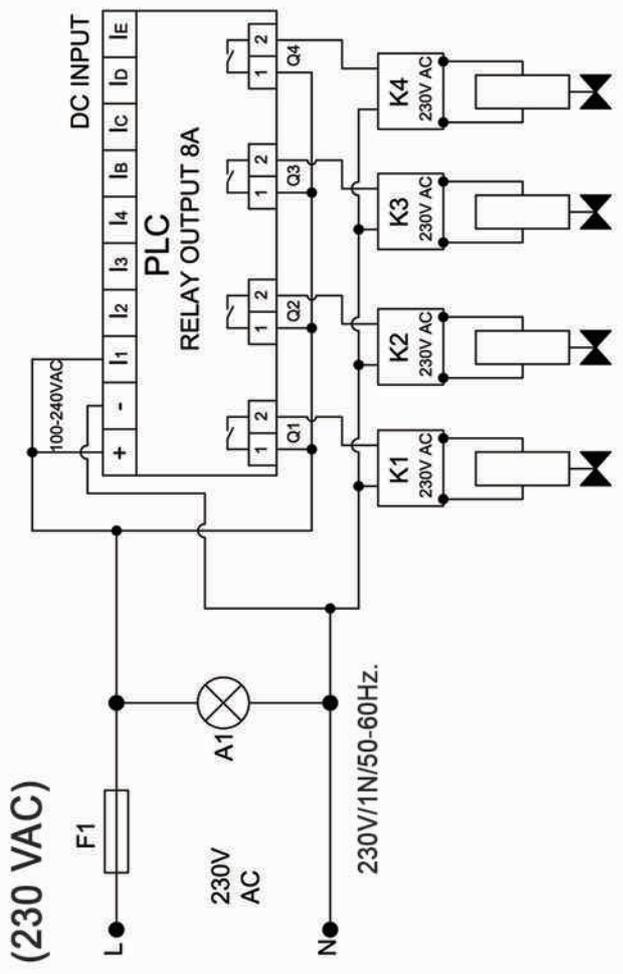
Use ESC or wait 6 sec. the screen will turn back automatically to main menu

DA18-DA3600 ELECTRICAL DIAGRAM (24 VDC)

14. ELECTRICAL DIAGRAM & DRAWINGS



- A1: POWER - IN LAMP
- F1: POWER FUSE
- F2: 24VDC POWER-IN FUSE
- I1: PROGRAMME INLET
- K1: INLET VALVE FOR FIRST TANK
- K2: INLET VALVE FOR SECOND TANK
- K3: SECOND TANK DRAIN
- K4: FIRST TANK DRAIN
- Q1: K1 RELAY 24VDC
- Q2: K2 RELAY 24VDC
- Q3: K3 RELAY 24VDC
- Q4: K4 RELAY 24 VDC



- A1: POWER - IN LAMP
- F1: POWER FUSE
- F2: 24VDC POWER-IN FUSE
- I1: PROGRAMME INLET
- K1: INLET VALVE FOR FIRST TANK
- K2: INLET VALVE FOR SECOND TANK
- K3: SECOND TANK DRAIN
- K4: FIRST TANK DRAIN
- Q1: K1 RELAY 230 VAC
- Q2: K2 RELAY 230 VAC
- Q3: K3 RELAY 230 VAC
- Q4: K4 RELAY 230 VAC