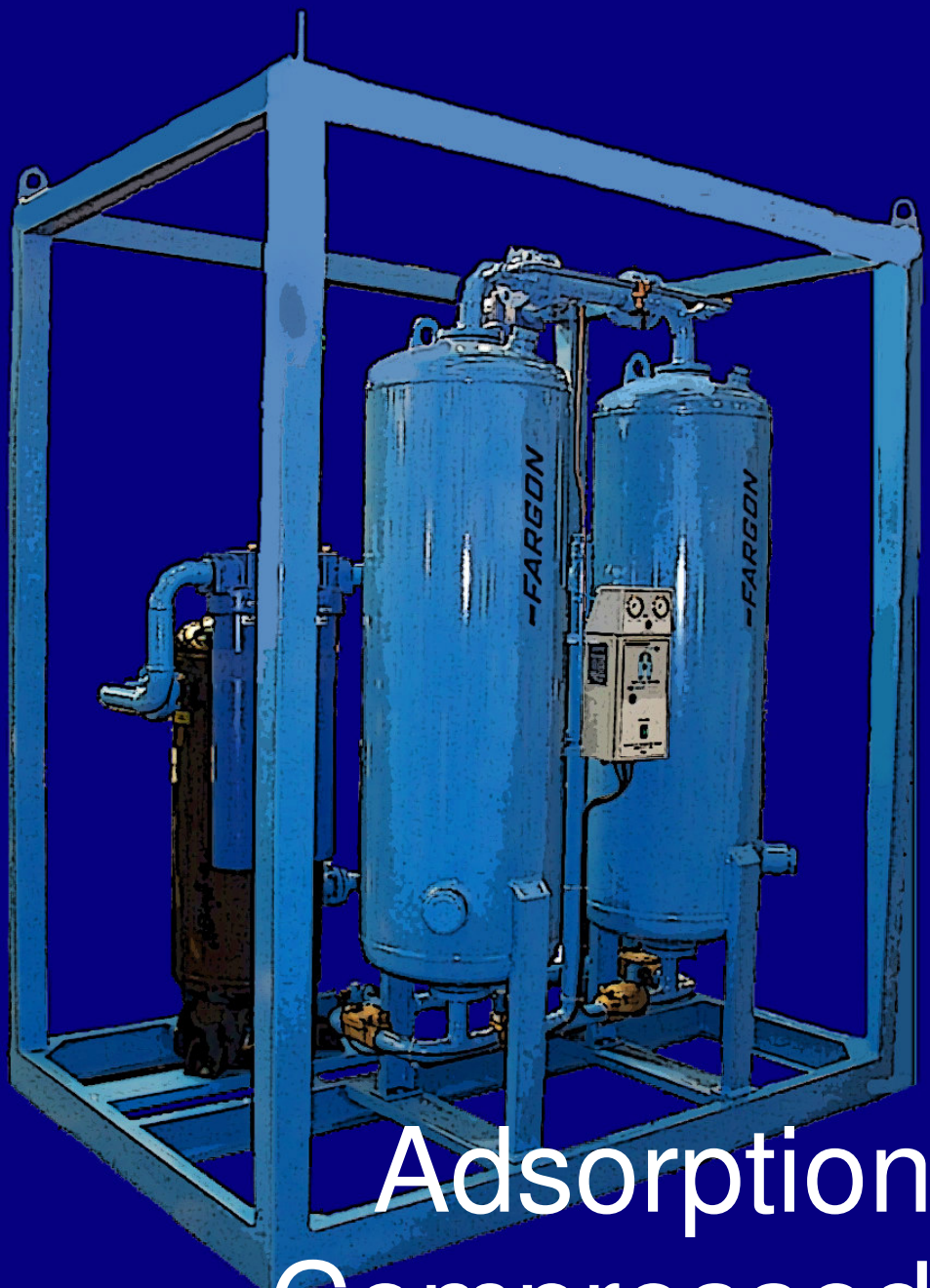
FARGON



Adsorption Compressed Air Dryer

FDA Heavy Duty

Heatless regeneration

Principle of adsorption

Drying with high efficiency and reliability

Some applications require a compressed air with very low moisture content (dew point negative between -5 to -70 °C approximately), not being met by drying systems for cooling (dew point +3 °C). In this case we use a dryer which operates by the principle of adsorption.
Adsorption is a physical process that leads to the fixing of certain gas molecules (in our case water vapor) on the surface of solids materials called adsorption, adsorbents or sorbents. This process is highly efficient, since the materials are easily regenerated adsorption after reaching its saturation (hot or cold).
With regard to compressed air, the adsorption system radically eliminates water vapor in the mixture. With this system you can currently obtain dew points near -100 °C.

The adsorbents are porous products extreme mind, and commonly have specific surfaces 500-1000 square meters per gram. And it is this vast area which creates the fundamental condition for the adsorption phenomenon (which is comparable to the known phenomenon of condensation) which comes into being, ultimately, a surface phenomenon.
Regeneration (also called reactivation) of materials for adsorption is the removal or evaporation of water adsorbed from the same compressed air. This regeneration can be achieved by "washing" of the adsorption material saturated with dry air and warm (drying line FDH), or with pressurized cold and dry air (line FDA).

Technical features

FDA Heavy Duty

Adsorption dryers, high-reliability, designed to operate in severe service conditions.

- Heatless regeneration
- Dew point between -10 to - 65 °C
- Fully automatic operation
- Easy maintenance and low cost (does not require special tools or technical expertise)
- High durability, robust construction, ideal for applications in adverse operating conditions
- Consumption of compressed air for regeneration 15% (at 7 bar, 35°C inlet compressed air)
- Maximum operating pressure 10 bar (up on request)
- Epoxy paint for high durability
- Designed and manufactured in Brazil to operate in tropical conditions
- Automation controlled by PLC or PLC with integrated HMI and can be adjusted at the installation site in accordance with the conditions of operation.
- Several configurations of filters coupled to the dryer ensures complete treatment of compressed air (removal of water / oil and solid particles) and also to removal of odors, bacteria and viruses
- Pressure Vessels constructed in accordance with ASME sec. VIII-div.1 / NR 13 (where applicable) with over-thickness corrosion 1.6 mm or ≥ 3 mm on request
- Directional Valves rugged construction for heavy duty applications
- Purge mufflers Fargon developed specifically to operate with adsorption dryer, built entirely of steel, durable, washable
- Dryers individually tested in our factory.
- Welder and welding process qualified
- Assurance permanent technical assistance
- Adsorption materials: activated alumina (standard) / molecular sieve (optional)

ISO 8573 applications class 1.1.1, 1.2.1, 1.3.1 and others on request

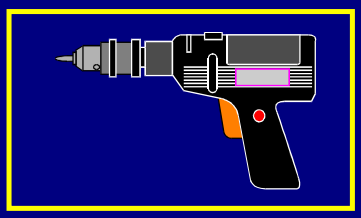
Optional items

The FDA allows custom configuration of various items required by the client, among them we highlight:

- Automation controlled by cyclic-time relay
- Dewpoint meter integrated with local display and output 4-20 mA

- Stainless steel Manometers / Pressure Transmitters / Differential Pressure Transmitters
- Weatherproof electrical Installation IP-65 or classificated area
- Air or water pre-cooling
- Skid external protection, portable system
- System Energy saving DRY ENERGY controlled by PLC integrated to the dewpoint meter
- Supervision system remotely via serial port or GPS, performed in line with customer needs
- Radiograph welds (full or partial) / ultrasound / heat treatment
- Vessels manufactured according to standard N-253 Petrobras
- Supply of safety valve as default by client

obs: to meet pressure vessels standards, every pressure vessel must contain a safety valve. So if it is not provided by Fargon should be installed by the customer before starting the dryer.

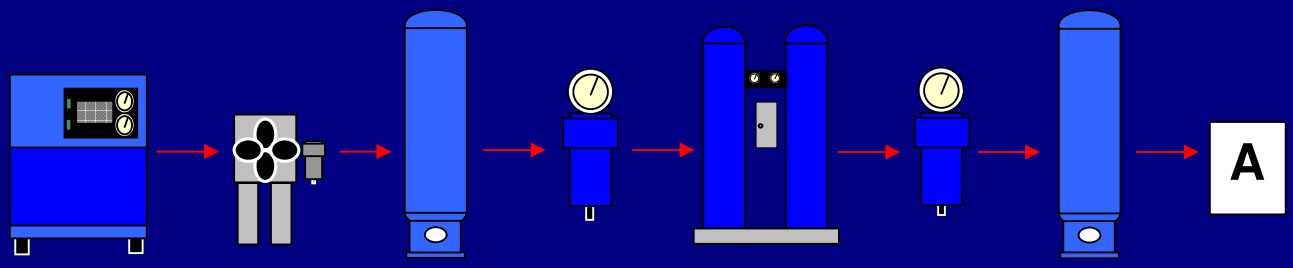


Typical applications

- **INSTRUMENTATION**
- **PAINTING**
- **AIR PROCESS, PNEUMATIC TRANSPORT AND TRANSFORMERS MAINTENANCE**
- **LIQUEFIED GASES / COLD CHAMBERS / CRYOGENICS**
- **METALLURGICAL PROCESSES AND THERMAL TREATMENTS**
- **PROTECTION OF SYSTEMS, MACHINE AND PNEUMATIC TOOLS**
- **MANUFACTURE OF FILMS, CONDUCTORS, OPTICAL FIBER AND PRINTED CIRCUITS**
- **TESTS IN REFRIGERATION COMPONENTS**
- **GENERATION OF OXYGEN AND NITROGEN FROM COMPRESSED AIR**
- **PREPARATION AND MAINTENANCE OF DUCTS FOR TRANSPORT OF GASES (LPG, CNG, ETC)**

Illustrating lay out of the installation

Drying with high efficiency and reliability



Operating principle

How operates the adsorption dryer

Operation cycle

- The compressed air passes through three distinct stages during the process of drying and filtration:
- First goes through a coalescing filter for removal of oil and condensate from the compressor. This filter also removes particulate matter (rust / corrosion) dragged the pipe by compressed air with an efficiency up to 99,9999%. Optionally, the dryer is provided with a condensate splitter at the entrance (if the compressor is oil-free).
- Then the compressed air passes through an adsorption column, where water vapor is removed by adsorption (while the other column is reactivated) by the values of the project.
- In the last stage is dry compressed air passes through an output filter that removes any solid particles from the adsorption material.

Reactivation cycle

For the recovery of the adsorption column that is saturated, we use a small percentage of cold dry air.

- For this revival, also known as recovery or regeneration of the adsorption, we use about 15% of the dry and filtered air (depending on the conditions of pressure and temperature and dew point desired) when they exit the dryer, is diverted to a secondary line and then through the adsorption column that is saturated in counter flow, thereby removing the moisture, which is then eliminated into the atmosphere.
- This reactivation materials confers an adsorption carried life of 2 to 5 years of operation approximately.

Pre and post filtration

The essential complement to the dryer

Fargon adsorption dryers are supplied complete with inlet and outlet filters, thus providing a total treatment for compressed air (removal of oil, water, water vapor and solid particles) and if necessary smells of oil and hydrocarbons.

Pre-filter: the input filter (the type coalescing) ensures the removal of condensed water and oil flow of compressed air, thus ensuring optimal performance of an adsorption column. In cases of heavy contamination of oil, we recommend the installation of two input filters to ensure an oil-free air.

Post-filter: the output filter (like paper or sintered) ensures that any particles of material detached adsorption are not charged for installation, thus preventing its abrasiveness can affect the operation of pneumatic components of the system.

Accessories: Visual saturation indicator of the filter element or differential pressure gauge
Manual drain manual or automatic drain (float type or electronic timer)
Optional: charcoal filter to remove odors of oil and hydrocarbons (food applications)
sterilizing filter to remove bacteria and viruses (pharmaceutical applications)

Depending the configuration of filters used is possible to remove oil / condensate water until 0.008 ppm and particulates until 0.01 micron, and the removal of odors of oil.

FDA Heavy Duty

Adsorção with heat less regeneration

TABLE OF SELECTION

Model	Capacity at pression 7 bar tinlet emper. 38°C PO = -20/-40°C		Inlet / outlet conections R- Threaded F-flange	Dimensions / weight (approximate) (without inlet/outlet filters) (mm / kg)				Eletric Consumption	Regeneration compressed air consumption
	scfm	Nm³/h		Length	Width	Height	Weight	W	
FDA 0150 HD	59	100	½" R	400	400	1750	145	50	15%
FDA 0250 HD	80	136	¾" R	450	450	1800	240	50	15%
FDA 0300 HD	109	185	¾" R	500	450	1700	255	50	15%
FDA 0400 HD	135	230	1" R	600	500	2100	270	50	15%
FDA 0500 HD	180	306	1.1/2" R	650	650	2100	410	100	15%
FDA 0600 HD	235	400	1.1/2" R	650	650	2400	450	100	15%
FDA 0900 HD	320	544	1.1/2" R	800	730	2140	480	100	15%
FDA 1200 HD	411	700	1.1/2" R	800	730	2400	520	100	15%
FDA 1400 HD	500	850	2" R	900	730	2700	670	100	15%
FDA 1600 HD	588	1000	2" R	980	800	2600	750	100	15%
FDA 2000 HD	758	1290	2.1/2" R	1415	900	2600	1100	100	15%
FDA 2800 HD	947	1610	3" F	1600	1350	2800	1500	100	15%
FDA 3800 HD	1205	2050	3" F	1900	1500	2900	1800	100	15%
FDA 4800 HD	1517	2580	4" F	2000	1650	3000	2100	100	15%
FDA 6500 HD	2000	3400	4" F	2200	1750	3200	2900	100	15%
FDA 7200 HD	2500	4250	4" F	2450	1900	3200	3500	100	15%
FDA 8400 HD	3000	5100	4" F	2850	2100	3300	4300	100	15%
FDA 14000 HD	3500	5950	6" F	3100	2300	3500	5200	100	15%

Obs: The flow rate above in Nm³/h-scfm was calculated for 7 bar operation pressure, 38°C compressed air temperature and dew point -20°C/-40°C. To select a dryer for another pressure, temperatures and dew point conditions, use the correction table bellow.

To select the ideal model for your needs, use the form below
FORMULA: Flow tabulated = Q X factor F1 X Factor F2

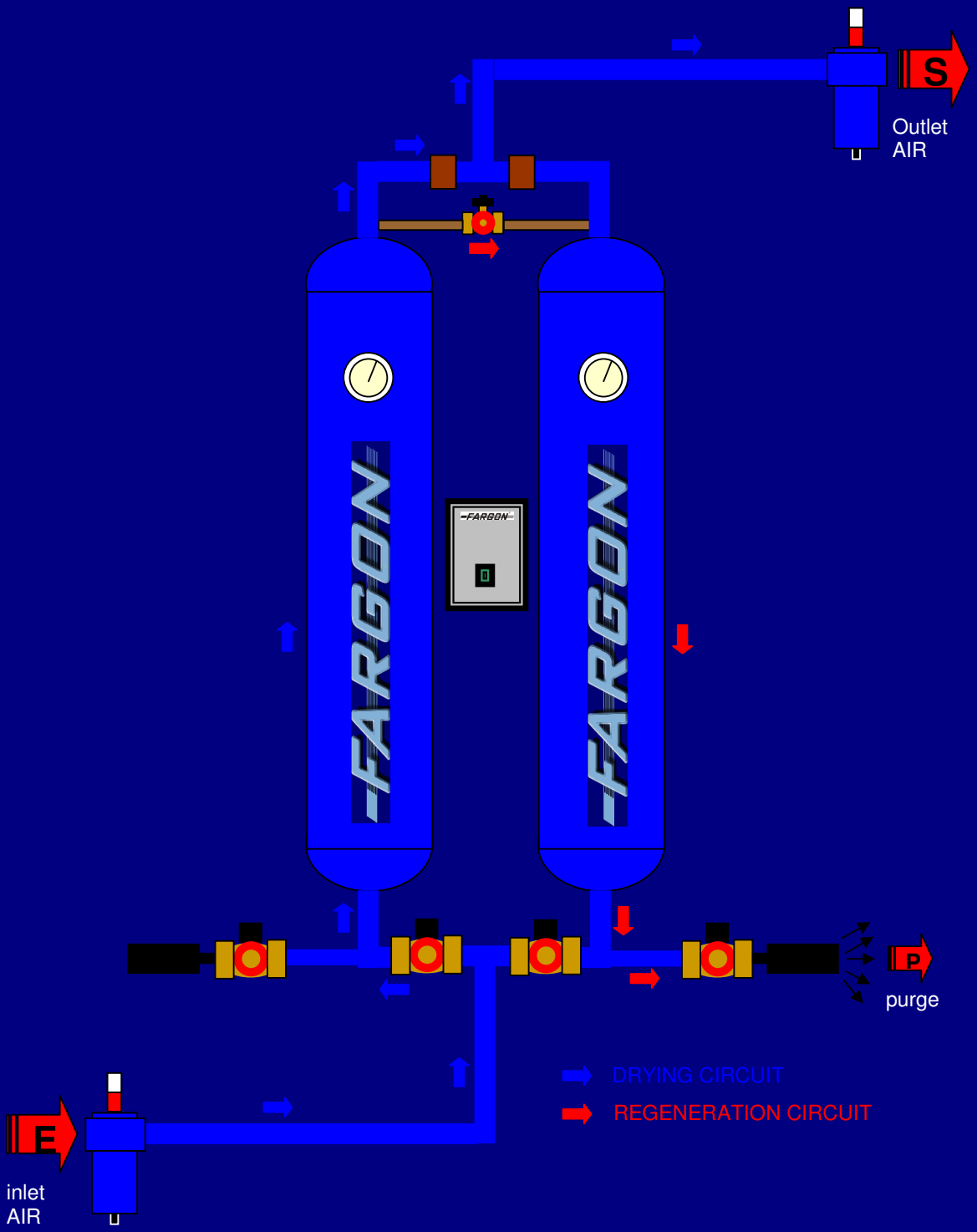
Q	Flow of compressed air to be treated (Nm³/h or scfm)								
F1	Working pressure (bar)	4	5	6	7	8	9	10	
	Working pressure correction factor	1,58	1,34	1,14	1	0,88	0,8	0,72	
F2	Inlet compressed air temperature (°C)	30	35	38	40	45	50		
	Inlet Temperature correction factor	0,64	1	1	1,11	1,43	1,88		
		Flow tabulated = Q x F1 x F2							
		Dryer model selected							

obs: to dew points -10/-20°C or below -40°C, on request

Example: flow to be treated 70 Nm³/h, pressure 6 bar, temperature 45°C, dew point -40°C
Flow tabulated = 70 Nm³/h X 1.14 X 1.43 = 114.11 Nm³/h
Dryer selected **FDA 0250 HD**

FDA Heavy Duty

Heatless regeneration – operation flow



FARGON®
AIR TREATMENT SINCE 1963

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