BeaconMedaes
Dual medical air purifiers

HTM - dMED 025, dMED 035, dMED 046, dMED 075, dMED 090, dMED 110, dMED 150, dMED 220, dMED 300

NFPA - dMED 025, dMED 035, dMED 075, dMED 090, dMED 110, dMED 150, dMED 220

Instruction book

BeaconMedaes
Part of the Atlas Copco Group

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Instruction book

Original instructions

This instruction book is valid for CE as well as non-CE labelled machines. It meets the requirements for instructions specified by the applicable European directives as identified in the Declaration of Conformity.

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BeaconMedaes

Part of the Atlas Copco Group

www.beaconmedaes.com

Table of contents

1 Safety precautions. 4
1.1 Safety icons 4
1.2 Safety precautions, general 4
1.3 Safety precautions during installation 5
1.4 Safety precautions during operation 6
1.5 Safety precautions during maintenance or repair 7

2 General description 9
2.1 Introduction 9
2.2 Air flow 11
2.3 Water separator and filters 12
2.4 PD dryer 13
2.5 QDT+ filter 15
2.6 Electrical diagrams 15
2.7 Optional equipment 16

3 Purifier main controller 19
3.1 Interface, icons and menu structure 19
3.2 Purifier controller operation 24
3.3 Service menu 44

4 DIN rail controller 45
4.1 Interface, icons and menu structure 45
4.2 DIN rail controller operation 47

5 Installation 51
5.1 Dimension drawings 51
5.2 Installation proposal 52
5.3 Electrical connections 54
5.4 Purge pressure setting 54
5.5 Pictographs 58

6 Operating instructions. 59

7 Maintenance 65
7.1 Service agreements 65

7.2 Maintenance instructions 65
7.3 Service kits 67
7.4 Storage after installation 67
7.5 Disposal of used material 68

8 Adjustments and servicing procedures. 69
8.1 Servicing the water separator drain 69
8.2 UD+ and PDp+ filter change 70
8.3 Dryer desiccant change 71
8.4 QDT+ filter maintenance 72
8.5 Testing the electronic drain valve 73
8.6 Purge Plug dMED 025 & 035 74
8.7 Purge Plug dMED 045 to 300 75

9 Problem solving. 77

10 Technical data. 80
10.1 Fuse values 80
10.2 Electric cable size 80
10.3 Device settings 80
10.4 Reference conditions and limitations 81
10.5 Technical data 81

11 European Directives. 86
11.1 Instructions for use 86
11.2 Pressure equipment directives 91

1 Safety precautions

1.1 Safety icons

Explanation

	Danger for life
	Warning
	Important note

1.2 Safety precautions, general

General precautions

	All responsibility for any damage or injury resulting from neglecting these precautions, or non-observance of the normal caution and care required for installation, operation, maintenance and repair, even if not expressly stated, will be disclaimed by the manufacturer.

1. The air purifier units are designed for normal indoor use.
2. Installation, operation, maintenance and repair work must only be performed by authorised, trained, specialised personnel.
3. Portable and mobile RF communications equipment can affect the unit. They should be used no closer to any part of the unit, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter (see EN 60601).
4. The operator must employ safe working practices and observe all related work safety requirements and regulations:
   - Wear ear protectors if applicable. People staying in environments or rooms where the sound pressure level reaches or exceeds 90 dB(A) shall wear ear protectors.
   - Never remove or tamper with the safety devices. All regulating and safety devices shall be maintained with due care to ensure that they function properly. They may not be put out of action.
   - Proper protective clothing (face mask, eye protection, overall, disposable gloves and apron) must be worn when installing, servicing or handling this equipment.
   - Danger to health during inspection, cleaning or replacement and danger to the environment: Contaminated filter elements, inlet screens, non-return valves or other components must be disposed of using the hospital procedure for contaminated waste. Drain flasks must be sterilised using hospital equipment and procedures. Any type of particles or liquid within a drain flask or inlet screen must be treated as potentially biologically contaminated. Any moisture drained from vessels or other drain points must be treated as biologically contaminated. Prior to transportation, items will be decontaminated as well as possible and the contamination status shall be stated in a “Declaration of Contamination” form (see annex).

- Immediately upon completion of work, remove any contaminated clothing and wash hands (and, if necessary, contaminated tools) in a 2% glutaraldehyde solution and rinse under running water.
- A checklist / logbook will be made wherein the installer will mark the adherence of the installation to the commissioning chapter of the instruction book.
- A validation of the quality of the air at the outlet should be carried out before the unit is put into operation.

5. If any of the following statements does not comply with the applicable legislation, the stricter of the two shall apply.
6. Installation, operation, maintenance and repair work must only be performed by authorized, trained, specialized personnel.
7. A compressor is not considered capable of producing air of breathing quality. To obtain air of breathing quality, the compressed air must be adequately purified according to the applicable legislation and standards.
8. Before any maintenance, repair work, adjustment or any other non-routine checks, stop the equipment, press the emergency stop button, switch off the voltage and depressurize the equipment. In addition, the power isolating switch must be opened and locked.
9. Never play with compressed air. Do not apply the air to your skin or direct an air stream at people. Never use the air to clean dirt from your clothes. When using the air to clean equipment, do so with extreme caution and wear eye protection.
10. The owner is responsible for maintaining the dryer in safe operating condition. Parts and accessories shall be replaced if unsuitable for safe operation.
11. It is not allowed to walk or stand on the equipment or its components. Protect the equipment against falling objects.

1.3 Safety precautions during installation

1. The equipment must only be lifted using suitable equipment and in accordance with the applicable safety regulations. Loose or pivoting parts must be securely fastened before lifting. It is strictly forbidden to dwell or stay in the risk zone under a lifted load. Lifting acceleration and deceleration must be kept within safe limits. Wear a safety helmet when working in the area of overhead or lifting equipment.
2. Install the equipment where the ambient air is as cool and clean as possible and within the limitations for operation. It shall be protected from rain, snow or other precipitation and the distances to walls shall be respected. Make sure that the environment is not potentially explosive.
   Make sure that the ambient condition limits specified in the limits for operation are not exceeded during the course of the plant lifetime and that they comply with the protection class of the unit.
   Care must be taken to minimize the entry of moisture or any other impurities (e.g. internal combustion engine exhaust, vehicle parking, access areas, hospital waste and disposal systems, vacuum system exhausts, vents from medical gas pipeline systems, anaesthetic gas scavenging systems, ventilation system discharges, chimney outlets and other sources of contamination) at the inlet of the compressor.
3. Any blanking flanges, plugs, caps or desiccant bags must be removed before connecting the pipes.
4. Air hoses must be of correct size and suitable for the working pressure. Never use frayed, damaged or worn hoses. Distribution pipes and connections must be of the correct size and suitable for the working pressure.
5. The air, aspirated by the compressor, must be free of flammable fumes, vapours and particles (e.g. paint solvents) that can lead to internal fire or explosion.

6. Portable and mobile RF communications equipment can affect the unit. They should be used no closer to any part of the unit, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter (See EN 60601).
7. No external force may be exerted on the inlet and outlet piping. The connections must be free of strain.
8. If remote control is installed, the machine must bear a clear sign stating "Danger: This machine is remotely controlled and may start without warning".
   The operator has to make sure that the machine is stopped and that the isolating switch is open and locked before any maintenance or repair. As a further safeguard, persons switching on remotely controlled machines shall take adequate precautions to ensure that there is no one checking or working on the machine. To this end, a suitable notice shall be affixed to the starting equipment.
9. Air-cooled machines must be installed in such a way that an adequate flow of cooling air is available and that the exhausted cooling air does not recirculate to the inlet.
10. The electrical connections must be made in accordance with the applicable codes. The machines must be earthed and protected against short circuits by fuses in all phases. A lockable power isolating switch must be installed near the equipment.
11. On machines with automatic start-stop system or if the automatic restart function after voltage failure is activated, a sign stating "This machine may start without warning" must be affixed near the instrument panel.
12. Never remove or tamper with the safety devices, guards or insulation fitted on the machine.
    Every pressure vessel or auxiliary installed outside the machine to contain air above atmospheric pressure must be protected by a pressure-relieving device or devices as required.
13. Piping or other parts with a temperature in excess of 80˚C (176˚F) and which may be accidentally touched by personnel during normal operation must be guarded or insulated. Other high-temperature piping must be clearly marked.
14. For water-cooled machines, the cooling water system installed outside the machine has to be protected by a safety device with set pressure according to the maximum cooling water inlet pressure.
15. If no safety valve is present in the air net close to the desiccant dryer (e.g. safety valve of compressor), full flow safety valves must be installed on the dryer vessels.
16. If the maximum pressure of the compressor is higher than the design pressure of the dryer, a full flow safety valve must be installed between the compressor and the dryer in order to blow off the excessive pressure in case the safety valve of the dryer should be out of order or blocked.

	Also consult sections General safety precautions, Safety precautions during operation and Safety precautions during maintenance or repair.. These precautions apply to machinery processing or consuming air or inert gas. Processing of any other gas requires additional safety precautions typical to the application which are not included herein. Some precautions are general and cover several machine types and equipment; hence some statements may not apply to your equipment.

1.4 Safety precautions during operation

1. Always be careful when touching any piping or components of the dryer during operation.
2. Use only the correct type and size of hose end fittings and connections. When blowing through a hose or air line, ensure that the open end is held securely. A free end will whip and may cause injury. Make sure that a hose is fully depressurized before disconnecting it.
3. Persons switching on remotely controlled machines shall take adequate precautions to ensure that there is no one checking or working on the machine. To this end, a suitable notice shall be affixed to the remote start equipment.

4. Never operate the equipment in the presence of flammable or toxic fumes, vapours or particles.
5. Never operate the machine below or in excess of its limit ratings.
6. Keep all bodywork closed during operation. Bodywork should be opened for short periods only, e.g. to carry out routine checks. Wear ear protectors when removing a panel.
7. People staying in environments or rooms where the sound pressure level reaches or exceeds 90 dB(A) shall wear ear protectors.
8. Periodically check that:
   - All guards are in place and securely fastened
   - All hoses and/or pipes inside the machine are in good condition, secure and not rubbing
   - There are no leaks
   - All fasteners are tight
   - All electrical leads are secure and in good order
   - Safety valves and other pressure-relief devices are not obstructed by dirt or paint
   - Air outlet valve and air net, i.e. pipes, couplings, manifolds, valves, hoses, etc. are in good condition, free of wear or abuse
9. Do not remove any of, or tamper with, the sound-dampening material.
10. Never remove or tamper with the safety devices, guards or insulations fitted on the machine. Every pressure vessel or auxiliary installed outside the machine to contain air above atmospheric pressure shall be protected by a pressure-relieving device or devices as required. All regulating and safety devices shall be maintained with due care to ensure that they function properly.
11. To safeguard correct operation of the equipment it is recommended to:
    - Monitor the outlet dew point at all occasions.
    - When possible, install a CO sensor/monitor with alarms.
    - The unit must be installed in a network which complies with the legislation Medical Devices Directive 93/42/EC and with the harmonized standard EN ISO 7396-1.

	Also consult sections General safety precautions, Safety precautions during installation and Safety precautions during maintenance or repair.. These precautions apply to machinery processing or consuming air or inert gas. Processing of any other gas requires additional safety precautions typical to the application which are not included herein. Some precautions are general and cover several machine types and equipment; hence some statements may not apply to your equipment.

1.5 Safety precautions during maintenance or repair

1. Always use the correct safety equipment (such as safety glasses, gloves, safety shoes, etc.).
2. Use only the correct tools for maintenance and repair work.
   During use, it is possible that tools will become contaminated with oil or grease. It is therefore important that tools are cleaned and degreased following any maintenance operation, especially if the same tools are subsequently used with an Oxygen System. When the tools come into contact with possible bacteria contaminated parts (e.g. if the bacterial filters were ruptured), they must be sterilised after completion.
3. Use only genuine spare parts.
4. All maintenance work shall only be undertaken when the machine has cooled down and is depressurized.
5. A warning sign bearing a legend such as "Work in progress - do not start" shall be attached to the starting equipment.
6. Persons switching on remotely controlled machines shall take adequate precautions to ensure that there is no one checking or working on the machine. To this end, a suitable notice shall be affixed to the remote starting equipment.
7. Close the dryer air outlet valve before connecting or disconnecting a pipe.

8. Before removing any pressurized component, effectively isolate the machine from all sources of pressure and relieve the entire system of pressure. Before disconnecting any piping, pneumatically isolate the section and slowly bring the pressure to atmospheric pressure. Do not suddenly open any isolating valve that may cause rapid evacuation of any section that may be at high pressure. Open valves slowly and allow sufficient time for the pressure to stabilise.
9. Never use flammable solvents or carbon tetrachloride for cleaning parts. Take safety precautions against toxic vapours of cleaning liquids.
10. Scrupulously observe cleanliness during maintenance and repair. Keep dirt away by covering the parts and exposed openings with a clean cloth, paper or tape.
11. Never weld on, or in any way modify, pressure vessels.
12. Whenever there is an indication or any suspicion that an internal part of a machine is overheated, the machine shall be stopped but no inspection covers shall be opened before sufficient cooling time has elapsed; this to avoid the risk of spontaneous ignition of the oil vapor when air is admitted.
13. Never use a light source with open flame for inspecting the interior of a machine, pressure vessel, etc.
14. Make sure that no tools, loose parts or rags are left in or on the equipment.
15. All regulating and safety devices shall be maintained with due care to ensure that they function properly. They may not be put out of action.
16. Before clearing the machine for use after maintenance or overhaul, check that operating pressures, temperatures and time settings are correct. Check that all control and shut-down devices are fitted and that they function correctly.
17. Protect the motor, electrical and regulating components, etc. to prevent moisture from entering them, e.g. when steam-cleaning.
18. Make sure that all sound-damping material and vibration dampers, e.g. damping material on the bodywork, is in good condition. If damaged, replace it by genuine material from the manufacturer to prevent the sound pressure level from increasing.
19. Never use caustic solvents which can damage materials of the air net, e.g. polycarbonate bowls.
20. **The following safety precautions are stressed when handling desiccant:**
    - Take precautions not to inhale desiccant dust.
    - Check that the working area is adequately ventilated; if required, use breathing protection.
    - Do not overfill the dryer when replacing desiccant.

	Also consult sections General safety precautions, Safety precautions during installation and Safety precautions during operation . These precautions apply to machinery processing or consuming air or inert gas. Processing of any other gas requires additional safety precautions typical to the application which are not included herein. Some precautions are general and cover several machine types and equipment; hence some statements may not apply to your equipment.

2 General description

2.1 Introduction

Description

High quality air is of vital importance to many industries, but nowhere as literally as in the medical sector. The purity of the compressed air for certain hospital applications is crucial. The air drawn from our environment however, especially in cities or industrial areas, is rarely of a sufficient quality for medical purposes.

For this application, BeaconMedæs has designed the dual medical air purifier range. The purifier takes air from any regular compressor and treats it to become ultra clean. It consists of a number of components, which together, after the commissioning certification, produce air with a quality matching the Pharmacopoeia legislation.

The purifier is primarily aimed at the health care sector where applications like breathing air in operating theatres and surgical air to drive surgical tools demand high quality air.

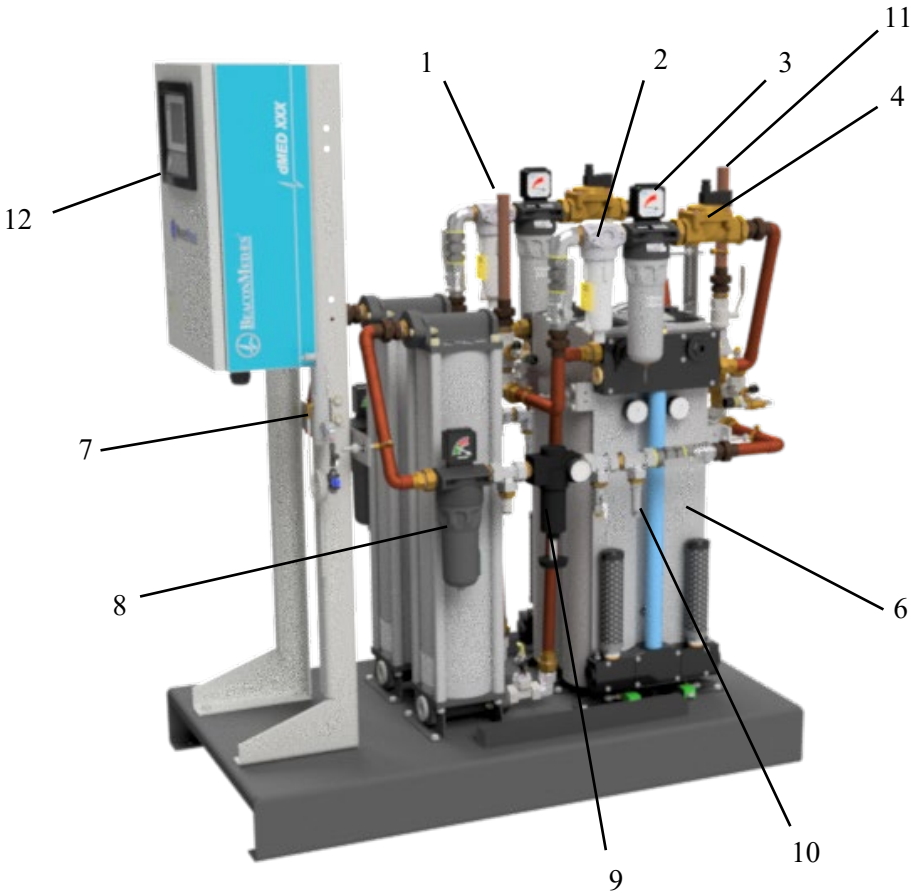
- A purifier consists of 2 independent air treatment units, each consisting of following stages of cleaning:A water separator (WSD) to eliminate free water from the compressed air, thus ensuring good operation of the desiccant dryer.
- A coalescing filter (UD+ filter) to remove contaminating particles and oil droplets.
- A desiccant dryer (PD dryer) to lower the pressure dew point (PDP) to -40 ˚C (-40 ˚F), eliminating the risk of condensation and strongly reducing water-related problems like bacteria growth.
- The QDT+ filter reduces hydrocarbons like oil vapour and smells to harmless levels and converts excessive concentrations of CO into CO_2 where the hopcolite catalyst filter is fitted.
- A particle filter (PDp+ filter) to eliminate particles that may have migrated out of the desiccant dryer.

Both units are controlled by a central controller (ES-MED). This central controller activates one unit and will switch to the other one after a certain amount of time has elapsed. This guarantees a constant delivery of purified air and also ensures service can be performed on one unit whilst the system is still operating. At all times an indication of dew point and pressure can be retrieved from the display.

Key qualities

- Pharmacopoeia compliant:
- The European Pharmacopoeia legislation accurately defines the required quality for breathing air in hospitals, medical theatres and ambulatory centres. BeaconMedæs has adopted this quality level for the purifier range.
- Company certification according to EN ISO 13485:
  Hospital equipment with an influence on patient health must be certified to the Medical Devices Directive (MDD 93/42/CE). This requires that the manufacturer is certified according to EN ISO 13485 and organises strict product follow-up once in the field.

General views



1	Air inlet	7	Dew point sensor (2)
2	Water separator (WSD)	8	PDp+ filter
3	UD+ filter	9	Regulator (1)
4	Inlet Solenoid	10	Relief valve
5	PD dryer	11	Air outlet valve
6	QDT+ filter	12	ES-MED controller

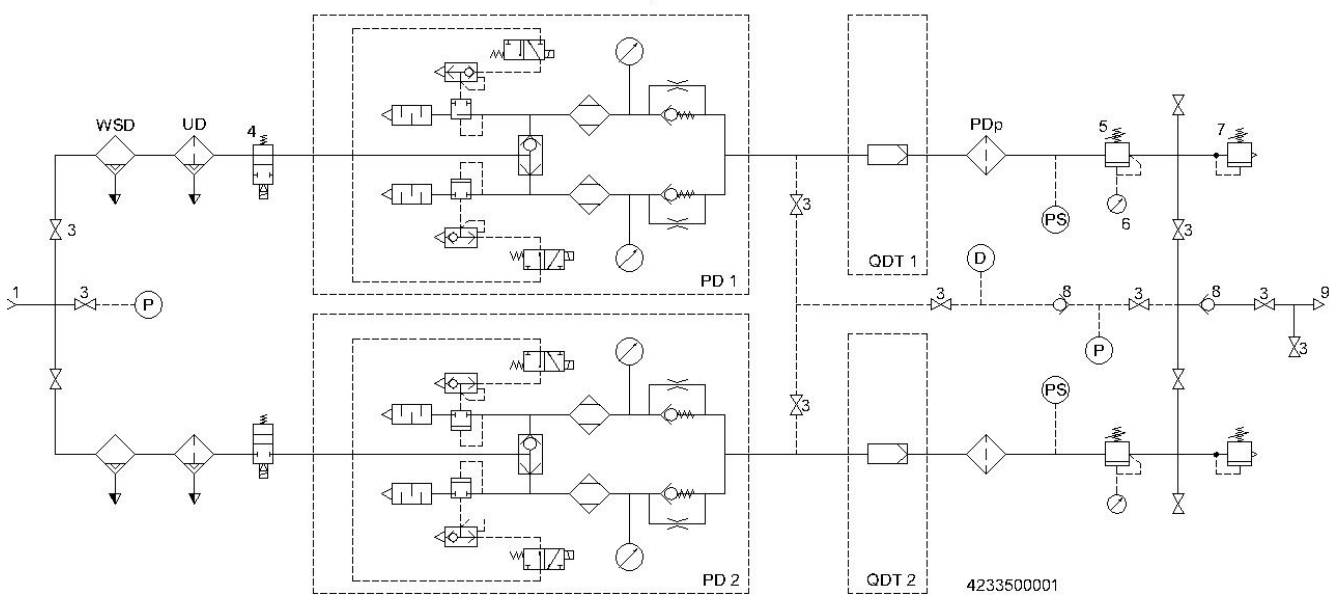
(1) – Regulator is fitted to all HTM models. Regulator is not fitted to NFPA instrument air models.
(2) - Dewpoint sensor
  a. HTM models set to read atmospheric dew point.
  b. NFPA models set to read pressure dew point.

Important

	The dual medical air purifier unit is designed, manufactured and inspected according to the legislation mentioned.
	Always consult the local legislation on this topic, since the specifications of the air quality can be different.
	A purifier unit is considered as an active medical device, relying on a source of electrical energy for its operation.

2.2 Air flow

Flow diagram (example image showing PD3 type dryer)



1	Inlet	P	Pressure transducer
2	Flow restrictor	PS	Pressure switch
3	Ball Valve	WSD	Water trap with automatic drain
4	Solenoid Valve	UD	Filter with liquid trap, automatically drained
5	Pressure regulator	PD	PD Dryer
6	Pressure Gauge	QDT	QDT filter (basic version, only activated carbon)
7	Pressure relief valve		/ QDT+ filter (activated carbon + CO catalyst)
8	Non-return valve	PDp	Dust filter
9	Outlet	D	Dew point sensor

Note – Pressure regulator (5) is only fitted to HTM models, is not present on NFPA instrument air units.

Description

Compressed air enters water trap (WSD), eliminating liquid water from the air. Next, the air flows through UD+ filter, removing contaminating particles and oil mist. The air then enters the PD dryer, eliminating water damp and producing dry air with a pressure dew point of minimum -31 ˚C (-23.8 ˚F). Next is the QDT filter where oil vapour and smells of the dried air are reduced (active carbon) and where the conversion of CO into CO2 takes place (optional catalyst in QDT+). Finally the air flows through the PDp+ filter, hereby eliminating remaining dust particles for absolute purity.

Pressure switch (21) operates as an hardwired alarm in case a failure with the ES-MED controller should occur. Should the ES-MED fail to operate the compressors, resulting in a decrease of the pressure, each compressor will start to operate independently once their outlet pressure reaches a certain critical pressure level (emergency forced local). The pressure switch, installed on the inlet of the purifier, thus linked to the outlet pressure of each compressor will also be triggered at this pressure level, resulting in a Plant fault being transmitted to the building management system.

Specifications of the outlet air can be found in section Reference conditions and limitations.

2.3 Water separator and filters

Overview

Water separator with drain (WSD) (1)

WSD's are general purpose water separators for removal of free water from compressed air.

Centrifugal force created in the cyclone throws free water (droplets) to the wall, from where it flows down to the bottom of the bowl. The water is automatically discharged when a given level is reached. A drain valve is provided for manual draining of the bowl.

UD+ filter (2)

The UD+ filter combines two filtration steps into one, removing oil aerosols to 0.01 mg/m^3 (0.01 ppm) and particles down to 0.01 micron. The filter is equipped with a drain. Typical pressure drop over filter is 0.08 bar (1.16 psi) when dry and 0.2 bar (2.9 psi) when saturated.

The air flow is from inside to outside the filter element.

PDp+ filter (7)

The PDp+ is a high efficiency particle filter for dust protection, removing particles down to 0.01 micron. Pressure drop over filter is 0.08 bar (1.16 psi) when dry.

The air flow is from outside to inside the filter element.

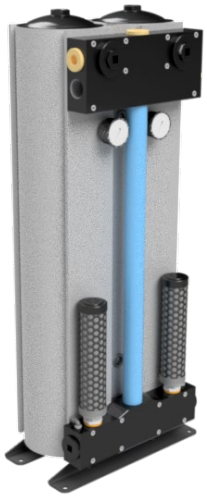
	The UD+ and PDp+ filters are equipped with a differential pressure gauge, indicating the pressure drop over the filter. An electronic water drain (EWD) on the water separator, on the UD+ filter can be provided as option (see section Optional equipment).

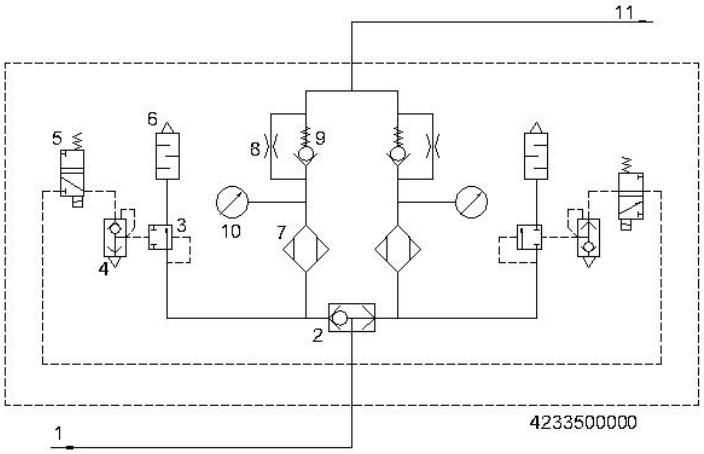
2.4 PD dryer

Description

The construction of the air dryer is simple, reliable and easy to service. A dryer basically consists of two vertical cylinders (towers), containing the adsorption material (desiccant). This desiccant is a very porous grain material, able to adsorb large amounts of water vapour.

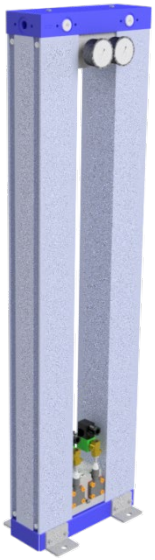
PD3 type dryer (dMED 046, dMED 075, dMED 090, dMED 110, dMED 150, dMED 220, dMED 300)

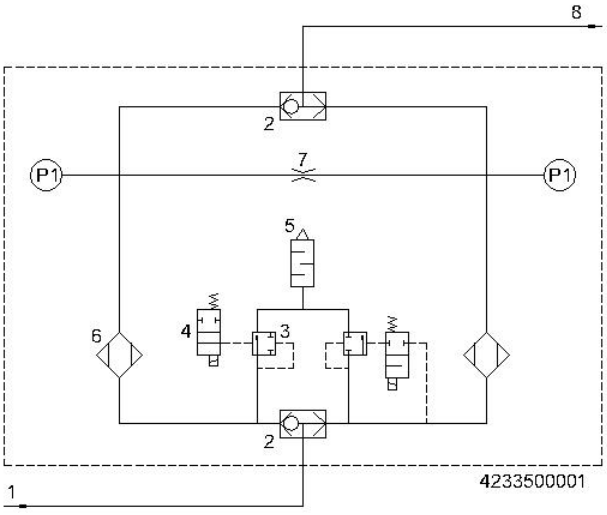




1	Air inlet	7	Desiccant
2	Shuttle Valve	8	Purge nozzle
3	Valve	9	None return valve
4	Quick release valve	10	Pressure gauge
5	Solenoid Valve	11	Air outlet
6	Silencer		

PD1 type dryer (dMED 025, dMED 035)





1	Air inlet	6	Desiccant
2	Shuttle Valve	7	Purge nozzle
3	Valve	8	Air outlet
4	Solenoid Valve	P1	Pressure gauge
5	Silencer		

Operation principle

The operation cycle of the dryer is repetitive and is controlled by a factory-set timer, programmed in the controller.

While the desiccant in one tower dries the compressed air, the desiccant in the second tower is being regenerated. Regeneration of the desiccant is achieved by means of purge air from the drying tower.

The compressed air entering the dryer is led to one of the towers by means of the inlet selector valve. The position of the selector valve depends on the condition (activated or not) of the solenoid valves. While the air flows upwards through the tower, the desiccant adsorbs the water vapour and the compressed air is dried.

The dried air leaves the dryer via the outlet selector valve.

A small portion of the dried air passes a nozzle (8 for PD3, 7 for PD1), expands to atmospheric pressure and flows downwards through the other tower, regenerating (drying) the desiccant.

The regeneration air is released via the solenoid valve and the silencer of the regenerating tower. The solenoid valves are controlled by the controller.

After a pre-set period, the function of the towers is reversed. The fully regenerated tower will now dry the air, while the desiccant in the other tower will be regenerated.

By default, the regeneration timer will restart from the beginning of the cycle in case of a power failure during operation.

Purge control

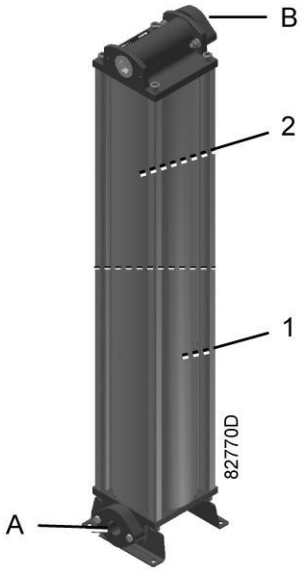
The dryer is equipped with a dew point sensor, extending the drying time and saving compressed air. The regeneration time remains timer controlled.

Operation principle:

The sensor constantly measures the atmospheric dew point of the air leaving the drying tower. While the dew point is measured below the purge saver set point the dryer will continue to supply dry air, but the purging of the regenerating tower will be de-active. Once the dew point rises above the set point the purge cycling function will become active.

2.5 QDT+ filter

Air flow



Reference	Name
A	Air inlet
B	Air outlet
1	Activated carbon
2	Catalyst (optional)

Description

The dried compressed air enters the QDT+ filter

A QDT+ filter contains active carbon, reducing volatile organic compounds (VOC) and hydrocarbons (odours, oil vapours) to harmless levels, and as an option a catalyst material, converting excessive concentrations of CO into CO_2.

Depending on the size of the unit, the QDT+ filter consists of one, two or three cylinders.

2.6 Electrical diagrams

The service diagram can be found in the purifier’s control box.

2.7 Optional equipment

Precautions

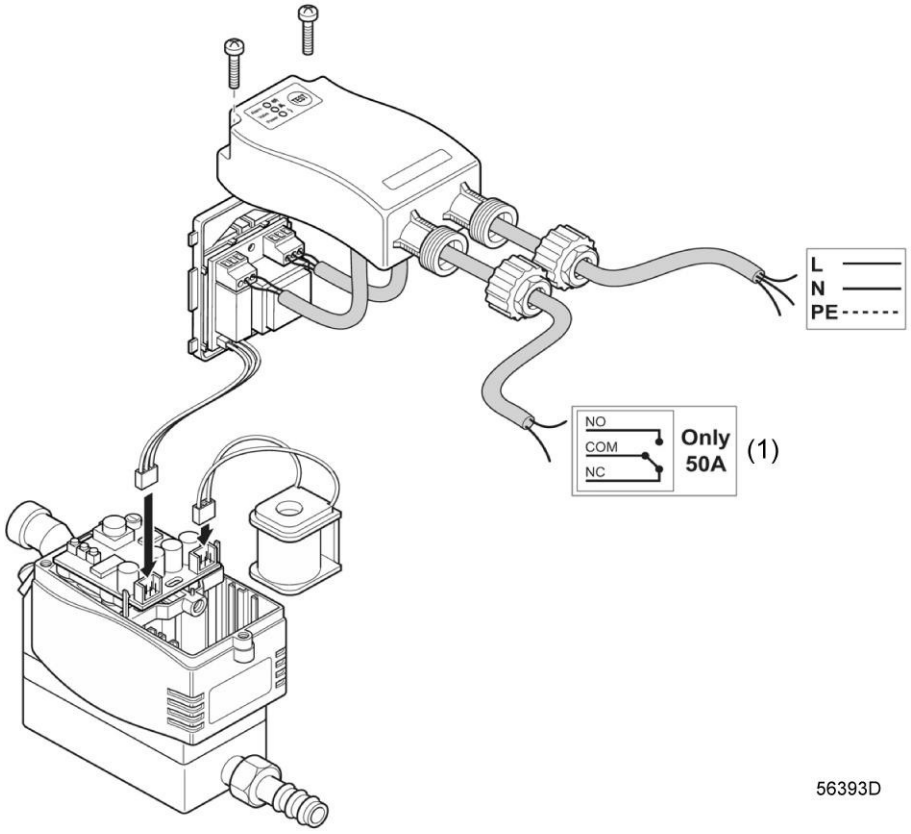
⚠	1. Make sure that all electrical wiring is installed in compliance with the applicable regulations. 2. Installation must always be performed by a qualified technician. 3. Installation must be carried out in compliance with the circuit diagrams and connection drawings provided. Some precautions are general and may not apply to your optional equipment. All responsibility for any damage or injury resulting from neglecting these precautions, or non-observance of the normal caution and care required for installation, operation, maintenance and repair, even if not expressly stated, will be disclaimed by the manufacturer.

Available options

- **Electronic drain (EWD)**

The electronic drain is optional on the WSD and the UD filter.
The electronic drain is a zero-loss, electronically operated drain valve, specially designed to drain oil and water. A sensor detects the liquid level. If the level exceeds a preset value during a fixed programmed time, a solenoid valve is activated, and the condensate is discharged via drain outlet (6). Next, the solenoid valve closes, and condensate is collected again. This way, the loss of air is reduced to a minimum.

If the micro-controller of the EWD registers a malfunction, the automatic drain valve will automatically change to alarm mode, visible on the display (5). This alarm signal can be relayed via a potential-free contact.



EWD electrical connections

Reference	Name	Reference	Name
L	Phase	NO	Normally open contact
N	Neutral	COM	Common
PE	Earthing	NC	Normally closed contact
(1)	Only on EWD 50 A Extra electric wiring to connect the potential-free contacts and an external test button can be provided.		

	Always remove the manual or automatic drain of the water separator (WSD) or the filter (UD+) when installing an EWD. For detailed installation instructions, consult the Instruction Book of the EWD.

- **CO sensor**
  The CO sensor is connected to the purifier's controller and will trigger an alarm when the CO level exceeds 5 ppm.

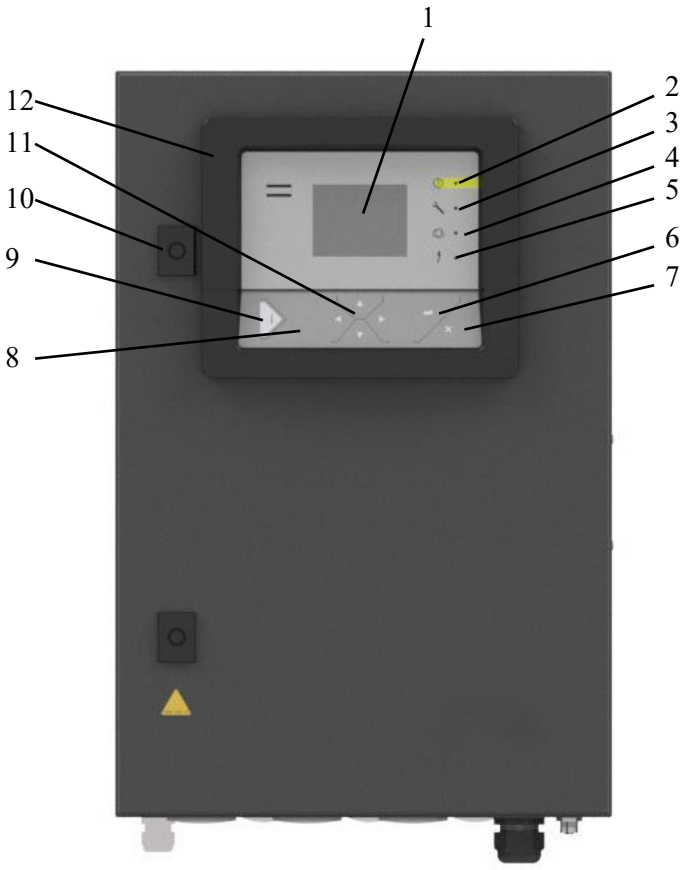
- **CO_2 sensor**

  The CO_2 sensor is connected to the purifier's controller and will trigger an alarm when the CO_2 level exceeds 500 ppm.
- **QDT oil indicator**
  An oil indicator is available as an option to control the purity of the air. The oil indicator is a calibrated measuring instrument, used to detect aerosol-mist levels of oil entrainment that may be present in compressed air systems. Sensitivity of the indicator is limited only by the total number of hours it is allowed to remain on the air supply system. The indicator is sensitive enough to measure a concentration of oil entrainment as low as 0.01 ppm. This sensor will indicate when the activated carbon is saturated and needs to be replaced. The oil indicator has a maximum pressure of 8.75 bar (127 psi).
- **QDT+ filter with CO catalyst**
  A catalyst that converts CO into CO_2 is available as option (QDT+ filter). This option is strongly recommended in polluted areas and makes sure that the air quality will always comply with the Pharmacopoeia.

3 Purifier main controller

3.1 Interface, icons and menu structure

Interface



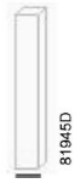
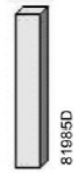
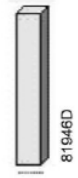
Control panel

An Elektronikon® controller with a graphical display acts as interface to control the dryer.

Item	Designation	Function
1	Display	Shows icons and operating conditions.
2	Warning LED	Is lit when warning is triggered.
3	Service LED	Is lit when a service is needed.
4	Operation LED	Is lit when the purifier is operational
5	Voltage LED	Indicates that the voltage is on.
6	Enter button	Confirm action.
7	Escape button	Go to previous screen or end current action.
8	Stop button	Stop the controller
9	Start button	Start the controller
10	Cubicle lock	Can be opened with a key to open the cubicle.
11	Scroll buttons	Use these buttons to scroll through the menu.
12	Elektronikon® Graphic+	Controls the dryer

Icons

The symbols used in the Compressor overview screen (ES_4 - see paragraph Menu structure) are as follows:

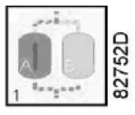
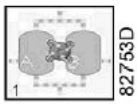
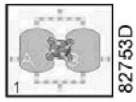
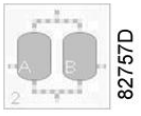
Bar	Status	Description
	Idle compressor	The compressor is idle and ready to be called. The bar graph is blank.
	Lead compressor	The central controller has assigned this compressor to be the next one to run. This is indicated by a full line underneath the blank bar graph.
	Called compressor	This compressor is running. The bar graph is coloured.
	Called compressor, last one called.	This compressor has last started to run. This is indicated by a dotted line underneath the coloured bar graph.

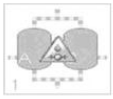
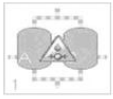
The table below describes the fault icons. More details in section Controller alarms and faults, paragraph Plant fault.

Icon	Status	Description
	No valid compressor	A compressor controller is expected at this CAN address node but not detected.
	No communication	No reply from the connected compressor controller within a pre-defined time.
	Blinking network icon	The emergency forced local function is enabled on the compressor due to the inlet pressure being too low. It will operate independently until this function is reset.
	No Answer	Connected compressor controller is not responding correctly to the commands (e.g. no reaction on a run command).
	Not Available	The compressor is stopped and is counting out the Minimum Stop Time to prevent too many motor starts per hour. During this time the compressor is not available to the ES control algorithm.

Icon	Status	Description
	Compressor Shutdown	Compressor is in Shutdown condition.
	Failed to go on load	The pressure switch at the compressor outlet detects a too low pressure when it should not.
	Overload	The motor draws too much current and the overload has isolated the compressor.
	Element temperature warning	The compressor element outlet temperature is too high
	Aftercooler temperature warning	The compressor aftercooler temperature is too high
	Sensor error	The compressor has a sensor error.
	Local mode	The compressor has either been manually set to local, was forced locally from an ES command, or was forced locally by the Emergency Forced Local backup system.
	Service required	The compressor's running hours have surpassed the predefined interval and maintenance must be carried out.
	Isolated	User has isolated this compressor controller. It will not transmit faults or alarms.

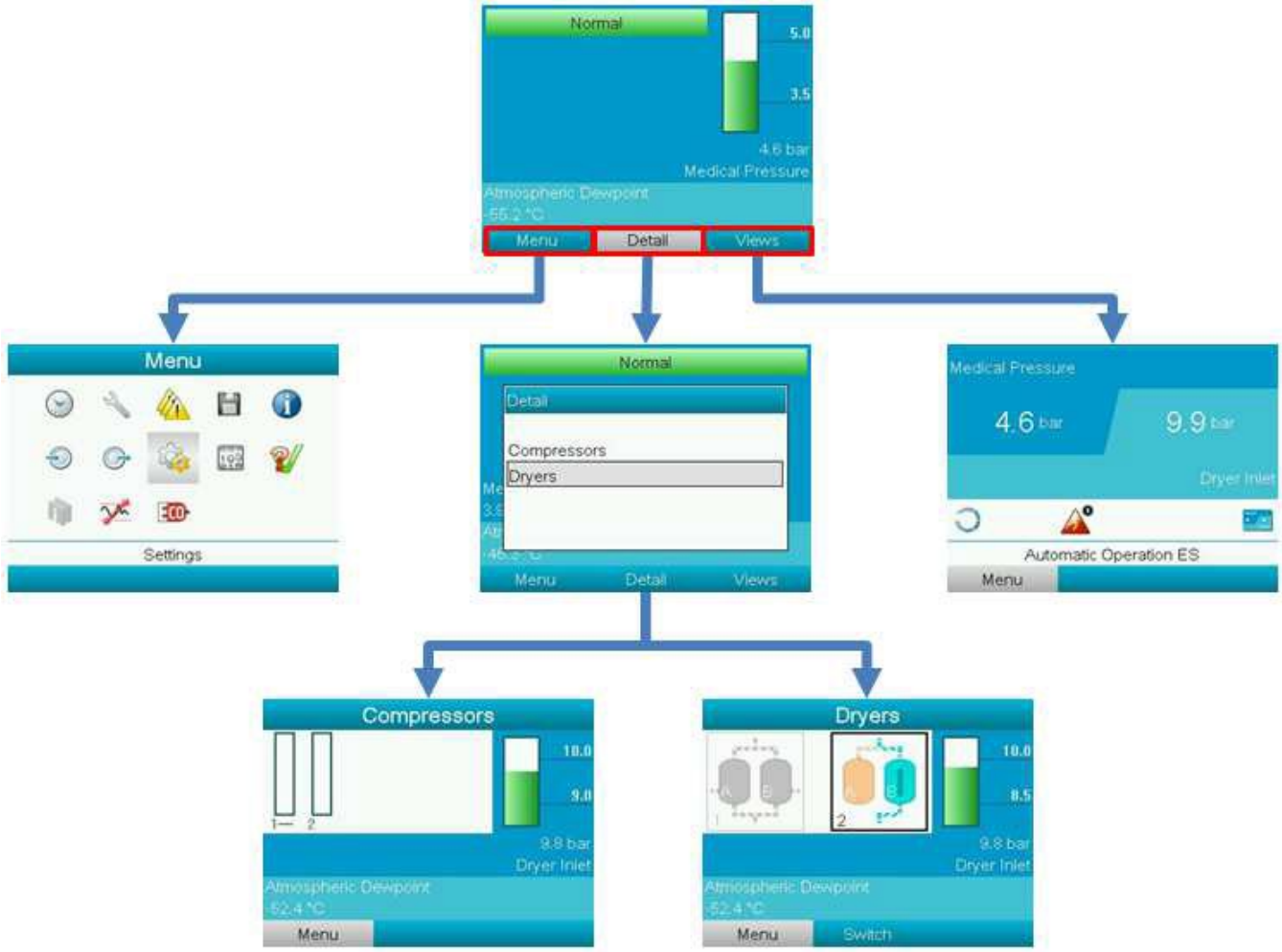
The icons used in the Dryer overview screen (ES_6) are as follows:

Icon	Status	Description
	Dryer is operational	The dryer is delivering conditioned air to the system.
	Dryer is in purge saving	The dryer is in purge saving mode, operating its solenoid valves based on the dew point.
	Dryer is in economy saving	The dryer is in economy mode, operating its solenoid valves based on the working status of all connected compressors.
	Dryer is in standby	The dryer is in standby mode, ready to be switched on.

Icon	Status	Description
	Pressure fault	Dryer outlet pressure too low. Manual reset required.
	Dew point fault	Dew point too high. Manual reset required.
	Pressure and dew point fault	Dryer outlet pressure too low and dew point too high. Manual reset required.
	Service enabled	A service function has been activated.
	Service required	The programmed service interval is reached and maintenance is required.

Menu structure

Downward navigation through the menus is done by pressing the Enter button. Upward navigation through the menu is done by pressing the Escape button on the controller. Specific submenus and commands will be explained in the following chapters.



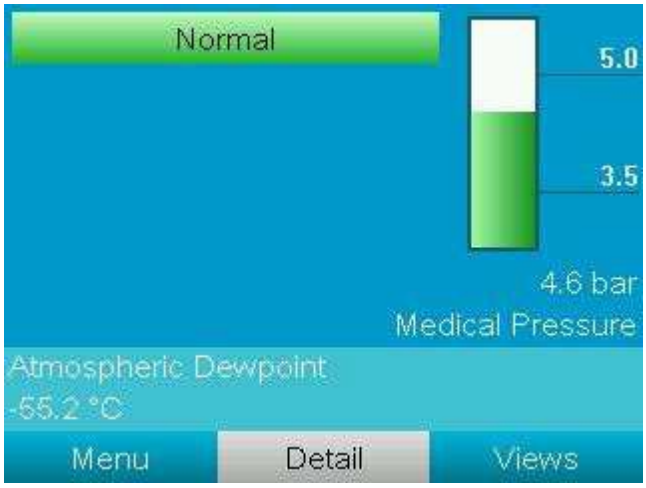
- Starting screen (top): shows the status of the machine, the outlet pressure (medical pressure) and the atmospheric dew point at the outlet of the air plant.
- Main menu (middle left): gives access to the different submenus (see section Central controller operation).
- Details selection screen (middle): after selecting detail the user can choose to see details about the compressors or about the dryers.
- Compressors details screen (bottom left): shows details about the compressors
- Dryers details screen (bottom right): shows details about the dryers
- Views screen: this screen gives the user an overview of the operation of the air plant. The user can choose how this is displayed on the screen (see further).

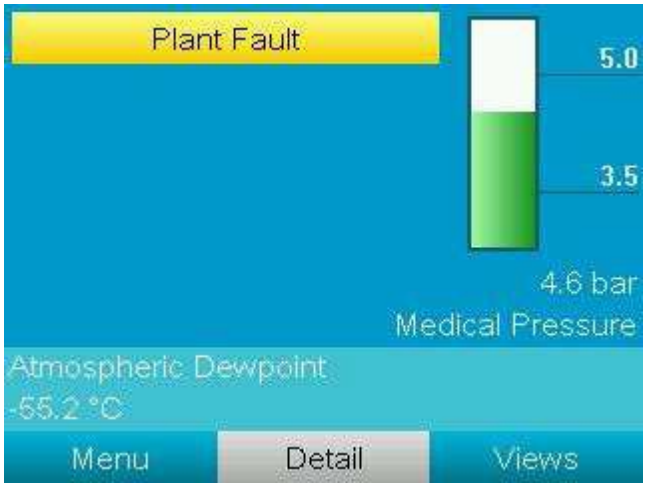
3.2 Purifier controller operation

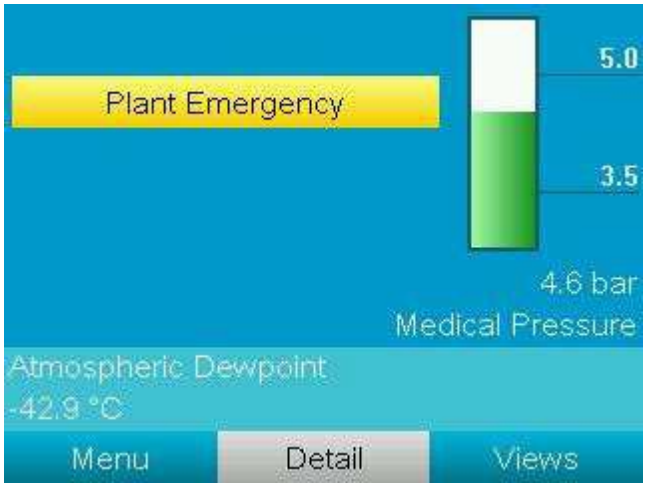
Main screen

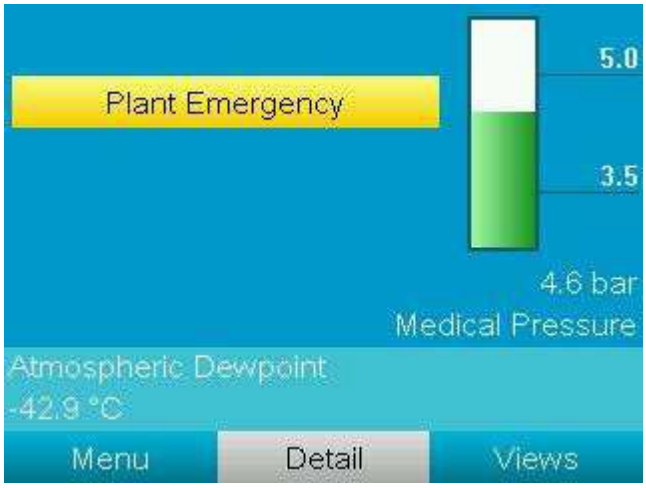
On the main screen the status of the air plant is shown. This means the most important measurements of the compressed air at the outlet (pressure level and atmospheric dew point) and any possible alarms are shown.

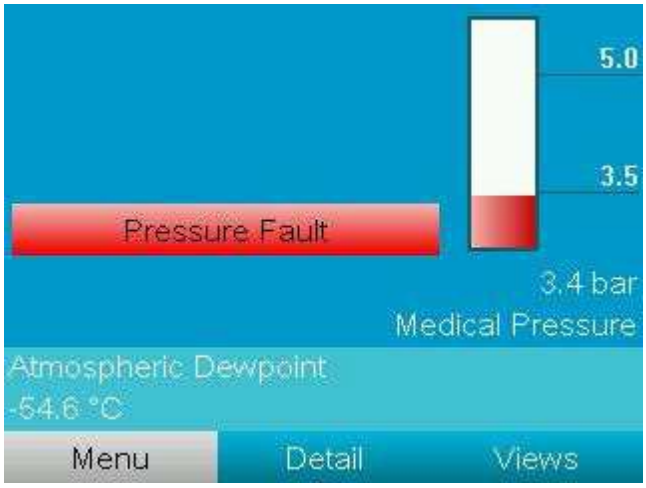
On the figure below the different statuses/alarms can be seen from left to right: normal operation, operating alarm triggered and emergency operating triggered.











The alarms can mean the following:

Plant fault:

This alarm indicates something in the system is not right and should be looked at (Warning – action required but not immediate).

A Plant Fault is caused by the following:

- Failing transducer (dew point or pressure)
- Failed dryer
- Failed compressor
- Compressor communication error
- Inlet pressure too high or too low
- · All compressors in load (LAG alarm)

Plant emergency:

This alarm indicates an unwanted situation which should be rectified as quickly as possible. It is caused by the dew point, which is measured at the outlet, being too high.

Reserve fault:

This alarm indicates that the back-up cylinder supply pressure is too low.

Pressure fault:

This alarm indicates a problem with the medical outlet pressure being too high or too low.

Views screen

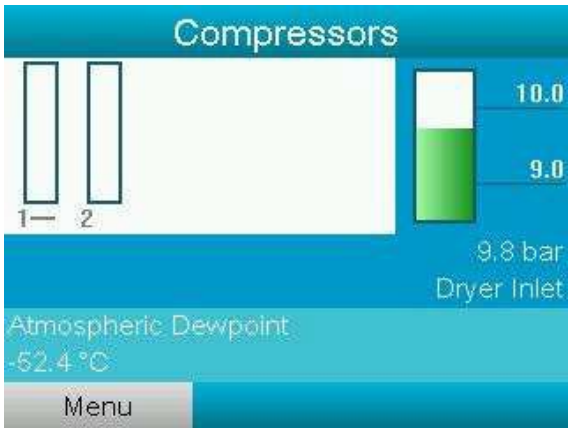
In the views screen the most important inputs of the sensors are visible on the screen. How this is displayed can be chosen by the user.

Compressors detail screen

In the compressors screen the status of the compressors is visible. You can see each compressor and whether it is stand-by, in load or in unload. A compressor in load has a full

bar, in unload a partially filled bar and when in stand-by an empty bar. It is also visible which compressor is the next to be called or stopped by the controller (see Icons section).

On the image below there are 2 compressors connected to the controller. Both are in stand-by and the next compressor to be started is compressor 1.

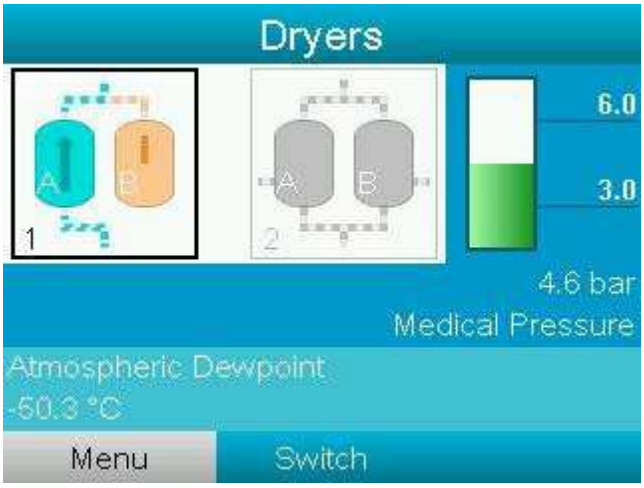


Also alarms of compressors are shown.

Dryers detail screen

In the dryers detail screen the status of the 2 dryers is visible. You can see which dryer is active and if there is a fault on the dryer(s).

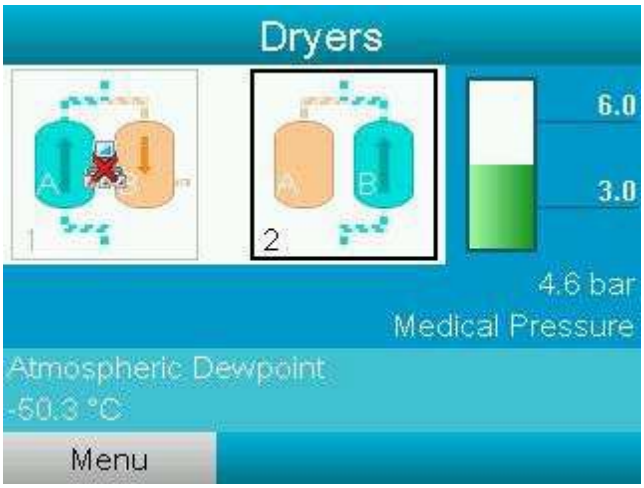
In the image below dryer 1 is active and dryer 2 is stand-by while both are without any faults.



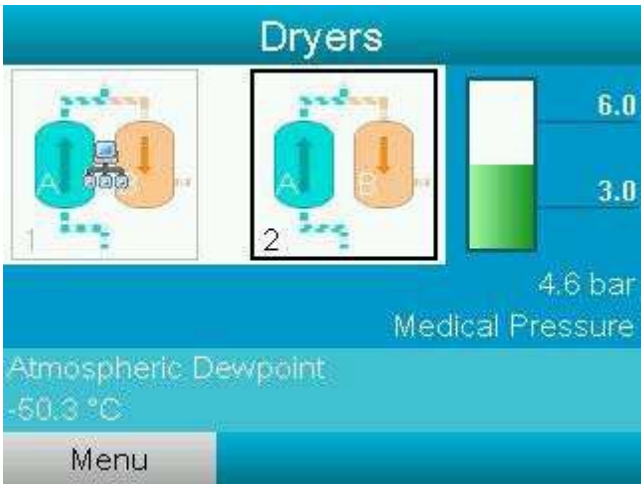
The user can also choose to manually switch to the other dryer. This can be done by selecting Switch on the bottom bar and then selecting Yes.

Some of the faults that can occur on a dryer are the following:

There is no CAN connection between the main controller and one of the dryers. In this case the controller will switch automatically to the other dryer.

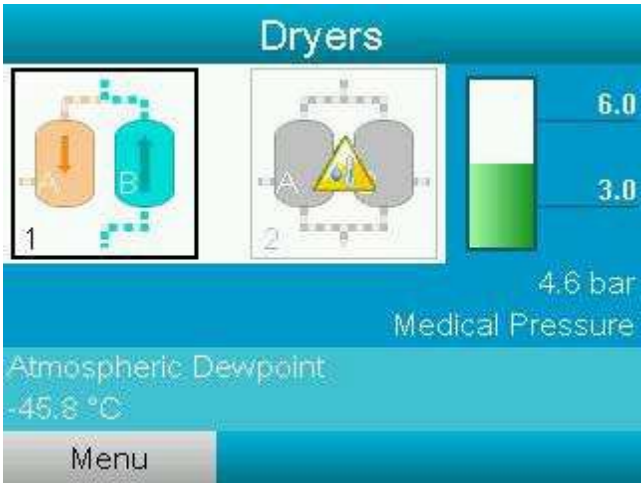


The dryer is in EFL (emergency forced local). This occurs when the outlet pressure of the dryer becomes too low. In this case the unit will switch automatically to the other dryer.



When the dryer is switched into local control the same screen is visible.

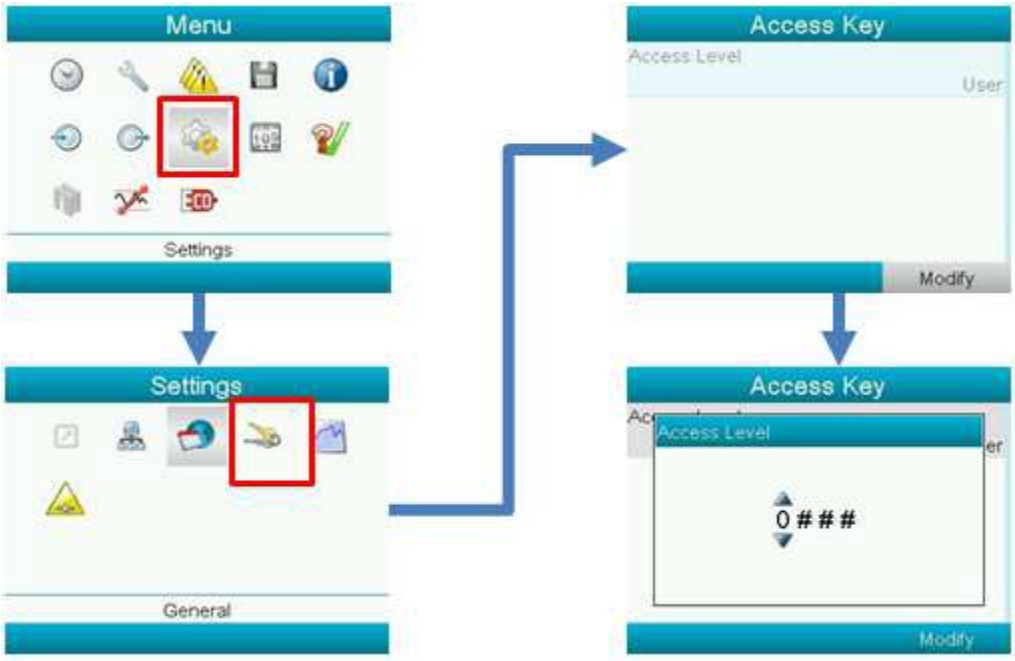
The dew point at the dryer outlet is too high. In this case the unit will switch automatically to the other dryer.



In all these cases the cause of the fault will have to be solved before the error will disappear on the screen. This has to be done by resetting manually on the controller of the dryer (see Din rail controller).

Gaining full access

To get full access to the features and settings of the main controller the user must submit a password into the controller. This can be done by going to the main menu, settings, access key. There select Modify and submit the password <2801>. See the screenshots below for the procedure.



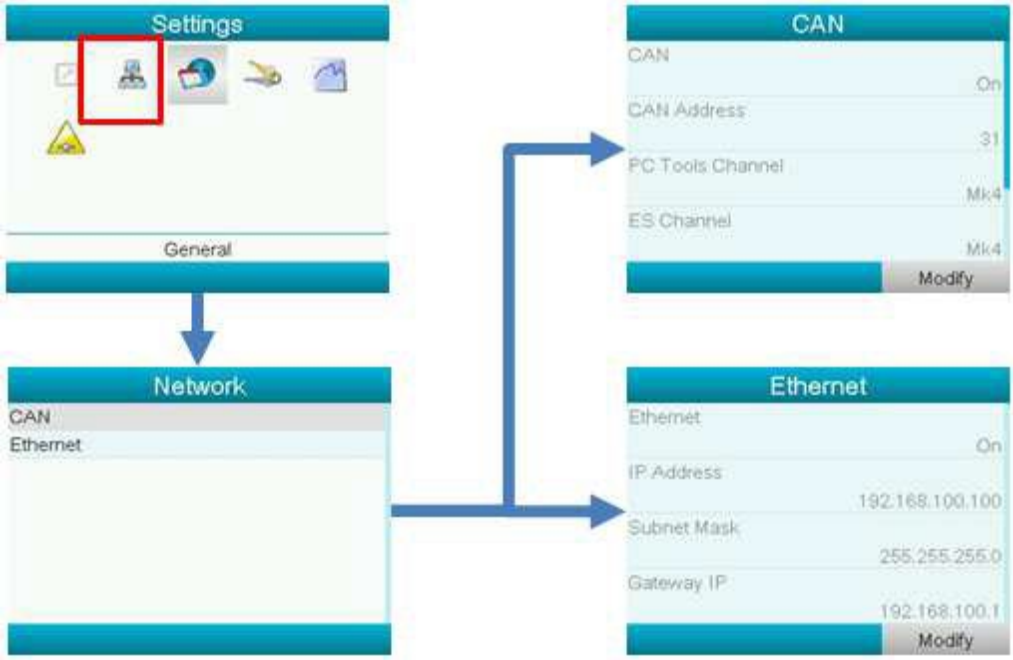
After giving in the access code, the user has full access. When no key is pressed during several minutes, full access disappears and needs to be re-entered if required.

Settings

This part will discuss all the available items in the Settings submenu which can be accessed in through the main menu.

CAN settings

For proper working the CAN settings need to be defined. To verify, the following steps can be followed after entering the Settings submenu and then selecting Network and CAN:



The CAN address should be set to 30. The CAN settings of the compressors and dryers are set on their controller (see DIN rail controller).

Communication profile should be set to Mk4.

When selecting Ethernet in the Network submenu (see picture above) it is possible to set a custom IP address, gateway and subnet mask. After connecting an ethernet cable between your network and the controller, the plant can be monitored on-line when browsing to the set IP address.

Setting the unit of pressure

In the Settings - General submenu (full access needed, see above), navigate to <Pressure Unit> and select the desired pressure unit.

Remote control

In the Settings – Remote Control submenu (full access needed, see above), the user can adapt the Can communication timeout. Normally this setting does not need to be changed. Please contact your local customer centre.

Main Chart

To change the settings of the main chart (available as an optional background for the Views screen, see above), go to the following menu:

Alarm Settings

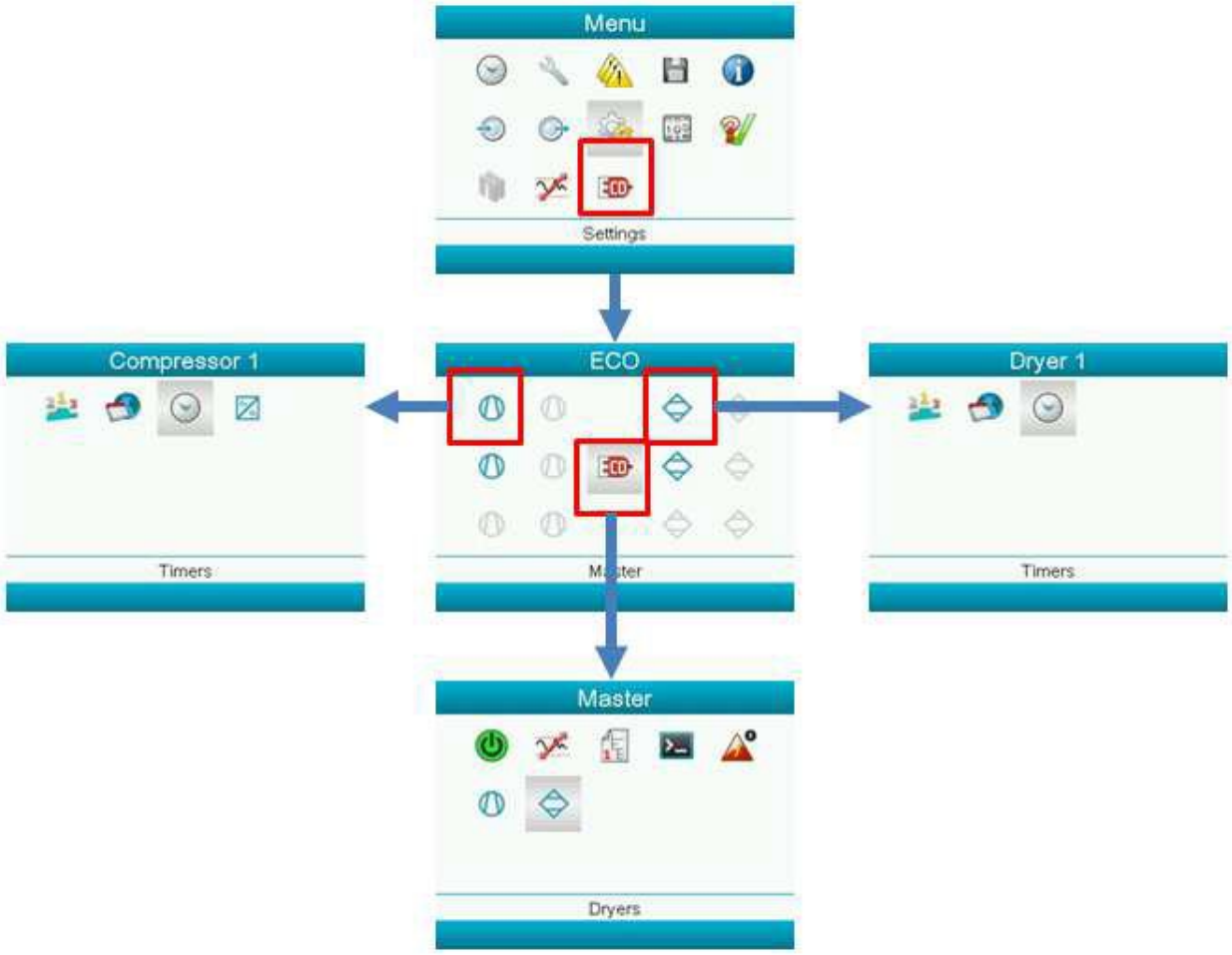
To change the set points of the medical air and/or surgical air and their alarm settings, the user can go the Alarm Settings screen (see picture below). Here the user can also choose whether one or both of the outlet measurements is used. If for instance only surgical air is needed, the medical air (and it's alarm) can be deactivated here.

The following settings are available:

- Setpoint Medical air
- Disable Plant Fault output: Yes - No
- Backup unit in operation: Activated – Deactivated

ECO Menu

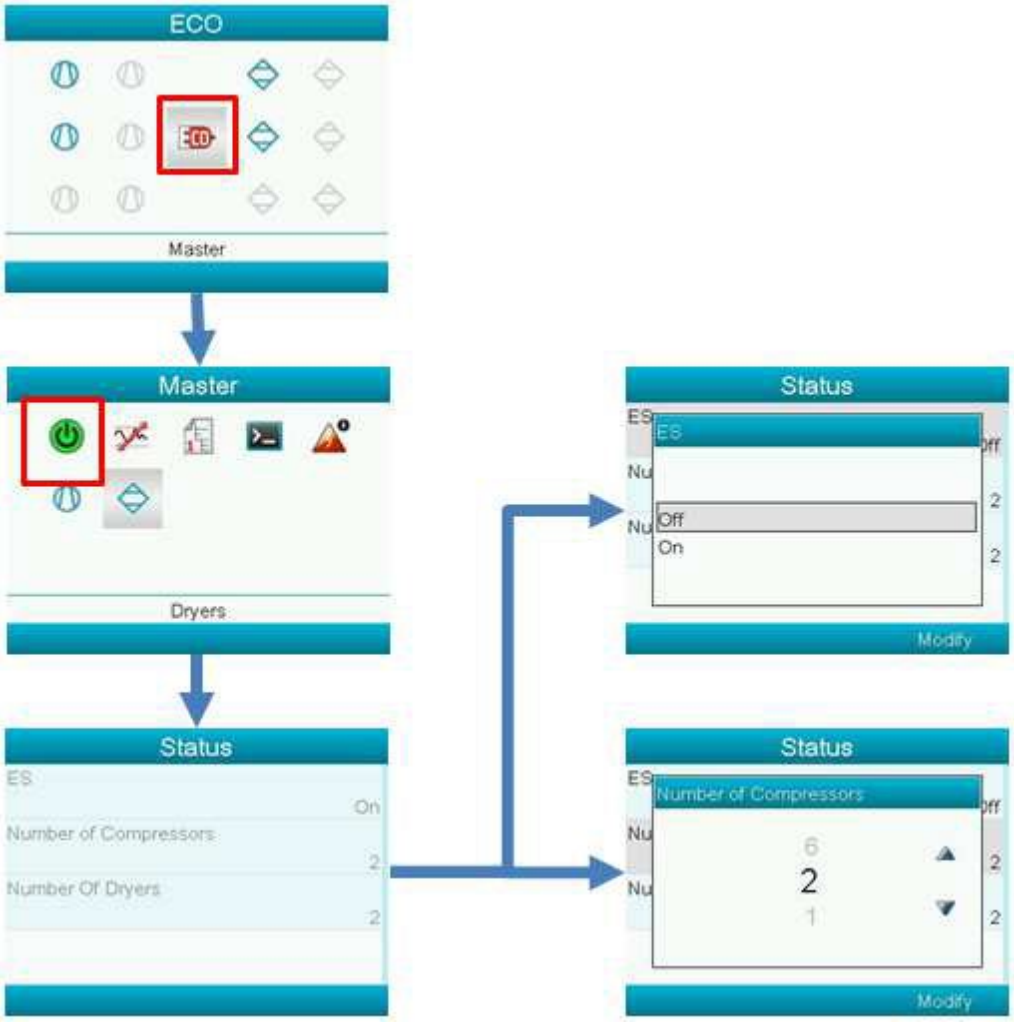
The ECO menu is the most important menu in the software, controlling the parameters of the network and functioning of the entire air plant. Its main structure looks like this:



The ECO menu is accessed through the main menu. Before the user can access the ECO menu the password for full access has to be entered (see above). In the ECO menu all the different compressors are shown on the left, the dryers on the right and in the middle is a shortcut to the master ECO screen, with the general settings of the ECO. Selecting one of the compressors or the dryers will take you to the Compressor or dryer page where specific information or settings can be seen or chosen for that component (see further).

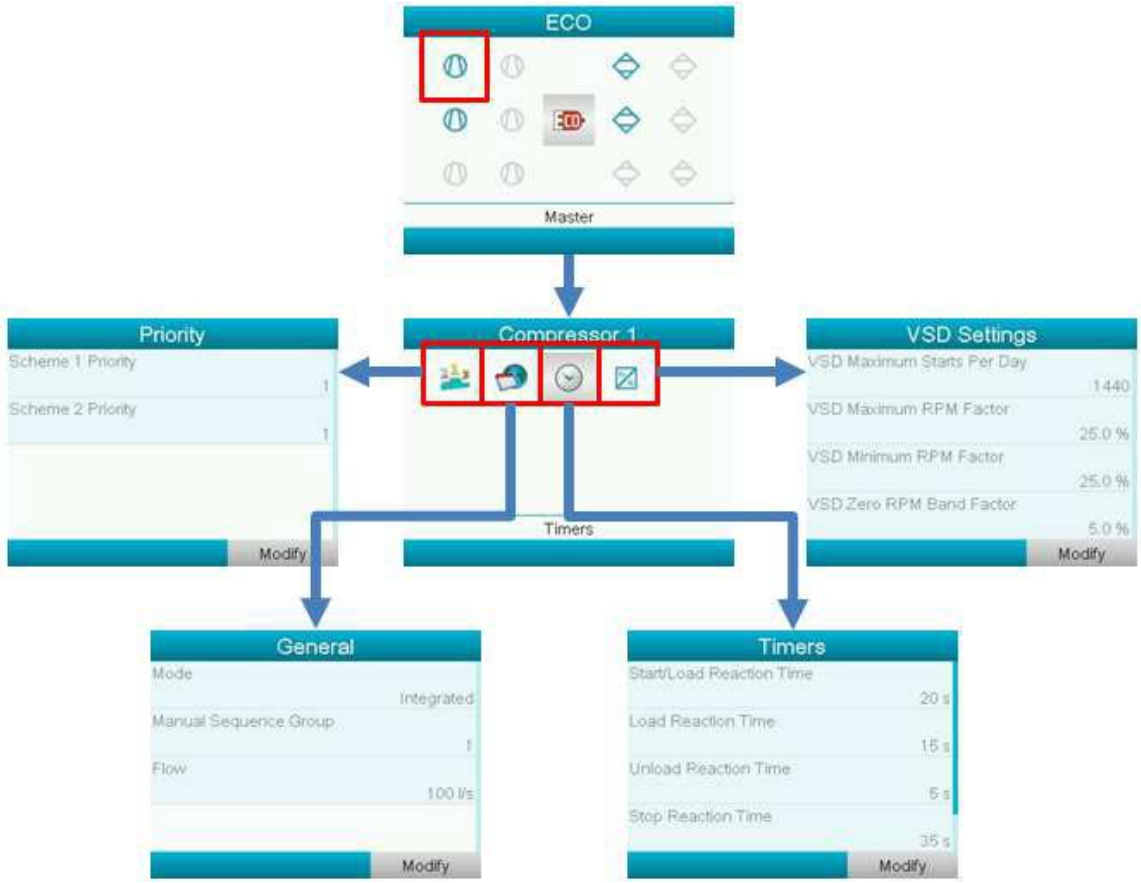
Selecting the amount of compressors

To set the quantity of compressors refer to the following procedure, which can only be done when the ECO is not running. Note: although the number of dryers is shown, this cannot be adjusted in the menu. This can only be selected when downloading the controller program.



ECO Compressor menu

In the compressor menu the user can see and adapt some settings of the compressor.



The different icons on the Compressor screen lead to the following submenu's (left to right):

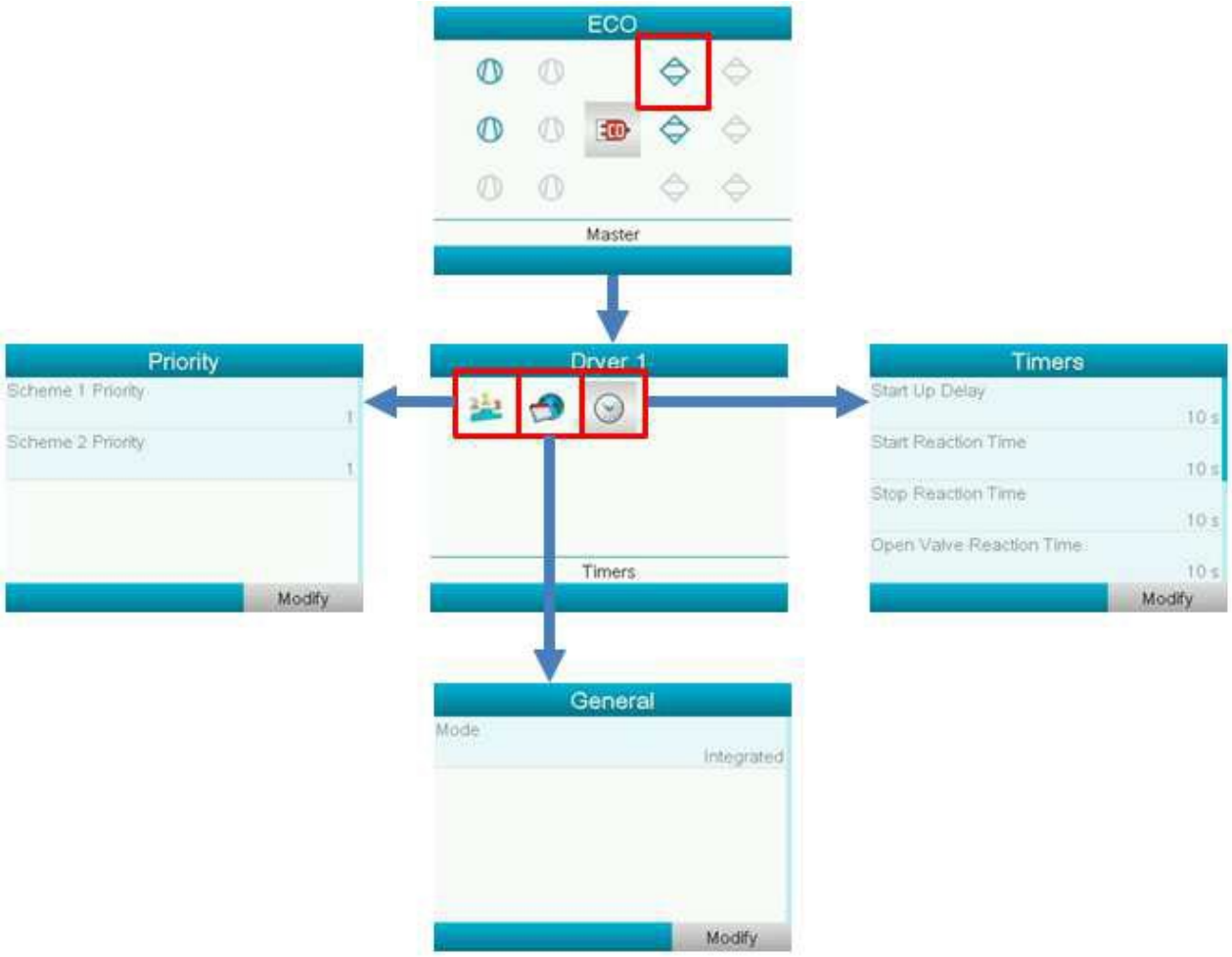
Priority: here the user can select a priority scheme for the compressor

General: here the user can select whether the compressor is integrated or not (for normal ECO operation, this should be set to integrated)

Timers: specific timer settings for the compressor. These normally shouldn't be changed. VSD settings: specific settings for a VSD compressor

ECO Dryer menu

In the dryer menu the user can see and adapt some settings of the dryer.



The different icons on the Dryer screen lead to the following submenu's (left to right):

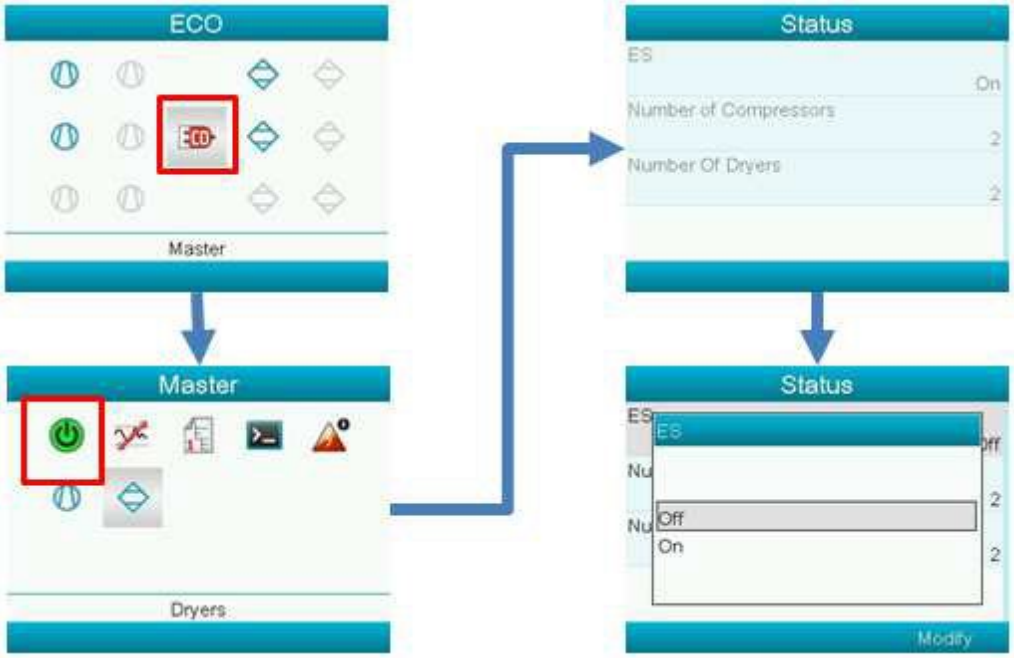
Priority: here the user can select a priority scheme for the dryer.

General: here the user can select whether the dryer is integrated or not (for normal ECO operation, this should be set to integrated)

Timers: specific timer settings for the dryer. These normally shouldn't be changed.

Starting and stopping the ECO

To start and stop the ECO select the following icon:



Make sure all the settings are correct before starting the ECO. It is only possible to change the settings when the ECO is turned off. Also make sure to already set up the CAN address, and CAN is enabled (see further on how to do this).

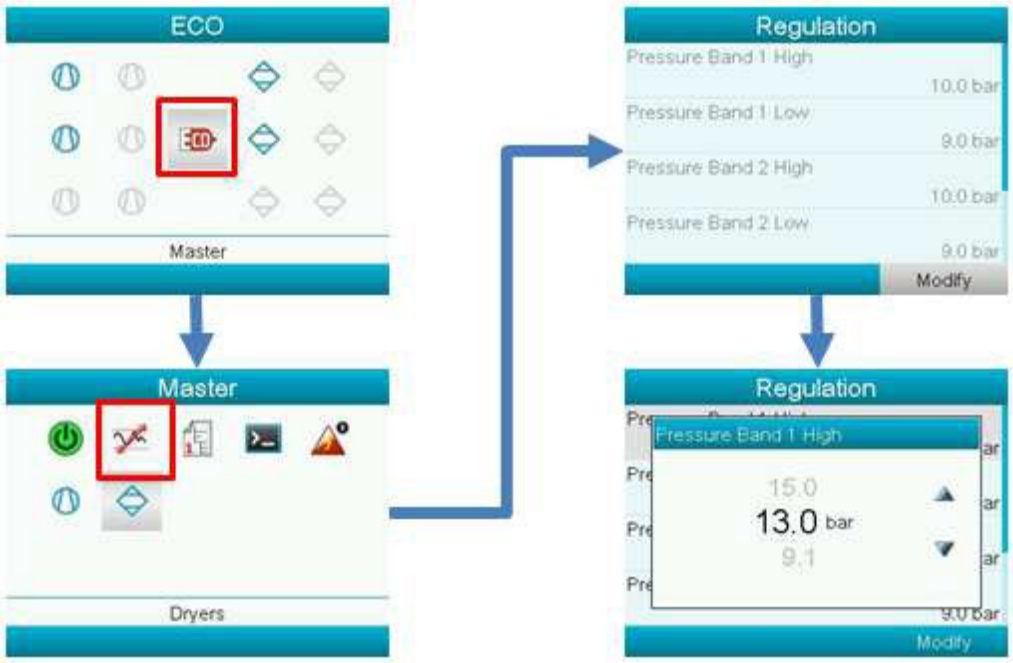
When the ECO is in running state, Local mode has to be turned on first to be able to stop the ECO. Local mode can be switched on and off in ECO Master - Commands submenu (see below). Then navigate to the Details Dryers or Details Compressors screen via the main screen and select their commands and ECO Local. Then can be navigated to the ECO Master menu and can the ECO be switched of via the Status icon.

ECO Master Menu

In the following section the remaining icons in the ECO Master menu will be discussed.

Regulation

In the Regulation submenu the user can adapt the pressure bands (minimum and maximum value) the ECO is using to regulate the compressors.



Action Scheme

Here the user can select an action scheme to be used (action scheme 1 or 2). This is normally not used.

Commands

In the Commands submenu the user can turn the Local mode of the ECO on or off.

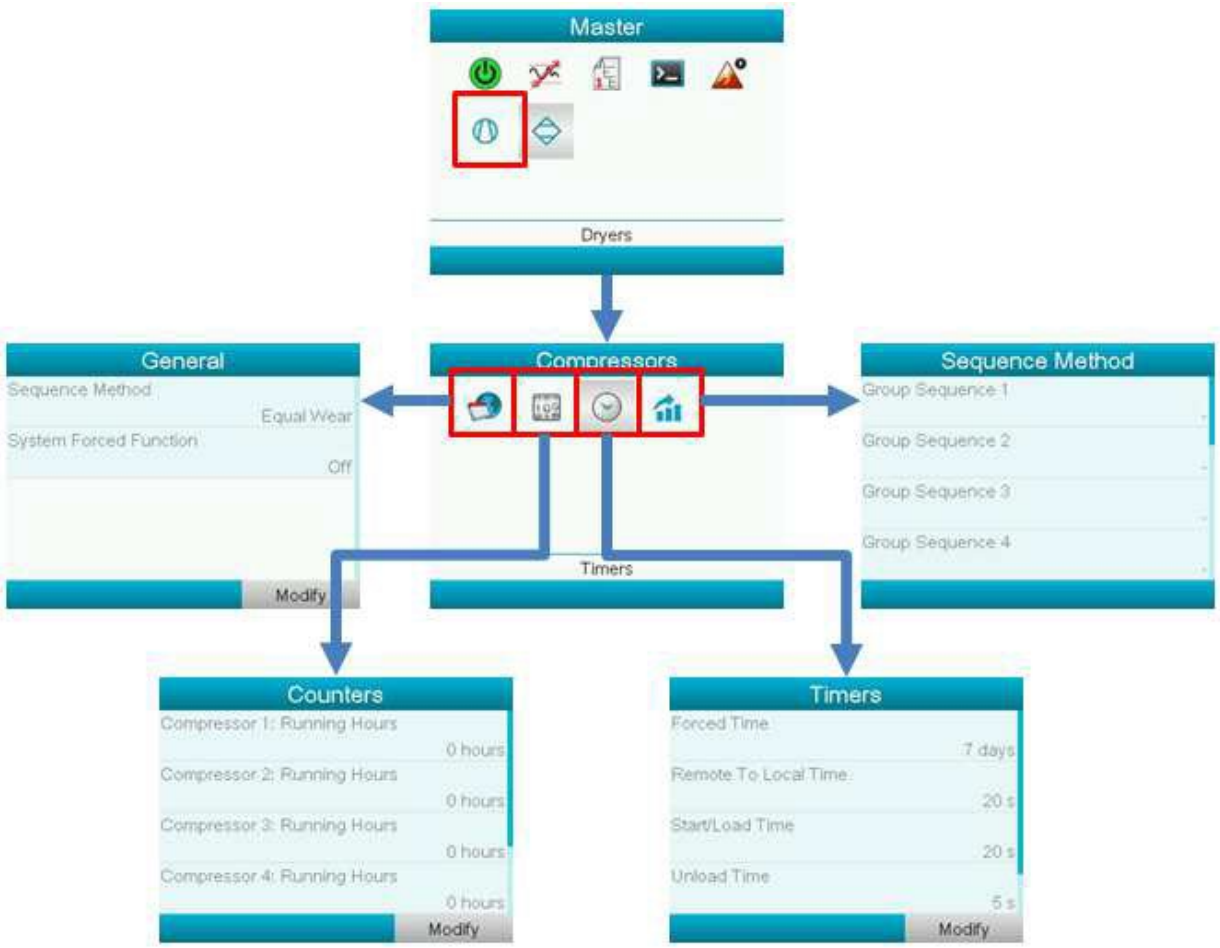
Local mode has to be turned on in order to turn the ECO off when it is in running state.

Automatic Restart

In the Automatic Restart submenu the settings for the ARAF (automatic restart after power failure) can be adapted. Normally these settings should not be changed.

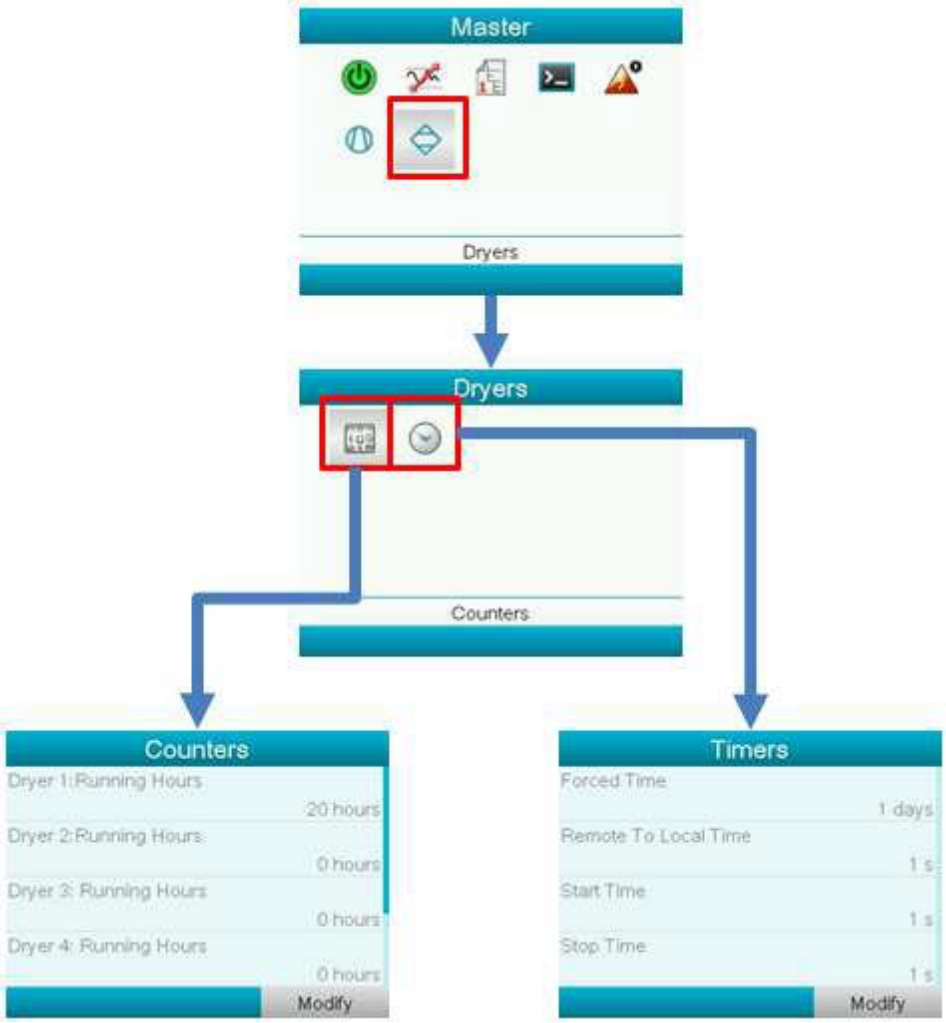
Compressors

In the Compressors submenu some general settings for the connected compressors can be seen (see picture below). Normally these settings should not be changed. Please contact your local customer centre.



Dryers

In the Dryers submenu some general settings for the connected compressors can be seen (see picture below). Normally these settings should not be changed. Please contact your local customer centre.



Main Menu

Week timer

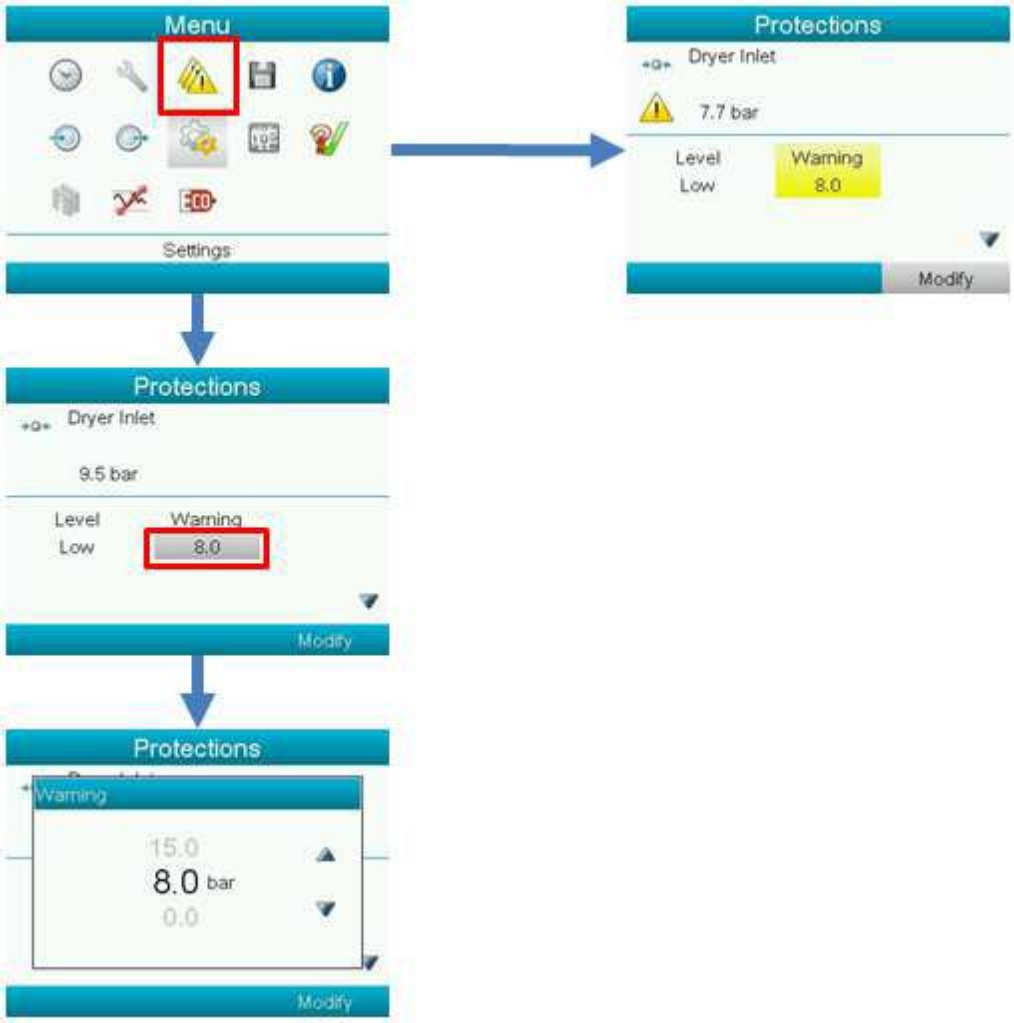
In the week timer submenu the user can activate a week timer and adapt its settings.

Resetting the alarm(s)

In general, no alarms on the unit should be reset. This means that in case the value or reason for an alarm condition reverts back to the normal state, the alarm should be reset/disabled automatically. If the plant reverts from an alarm condition to the normal state, this will be written in the log.

In case a dryer fails on dew point (regular fault or pre-alarm), this will fail the dryer and cause an operating alarm. This operating alarm will stay active until the dryer has been manually reset (see instruction book of the dryer on how to do this).

When an alarm is triggered on the unit the user can go to the Protections Submenu to see what is causing the alarm (see example on the right in the picture below).



To adapt the limit at which a warning is activated, scroll down to the value that needs adaptation, select modify and change the value to the desired setting. For the alarm settings on the medical outlet pressure this is done in The Alarm Settings submenu (see above).

Viewing information about the Purifier's controller

Through the following submenu (and pressing <More>), information regarding MAC address, software, IP settings, etc. can be viewed.

Viewing the amount of module hours

Through the Counters submenu, the amount of hours that the central controller was powered (Module hours) and other counters can be viewed.

Regulation

The regulation shortcut in the main screen leads to the same submenu as the regulation shortcut in the Settings menu (see above).

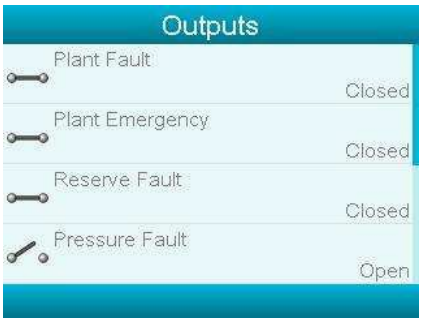
In normal circumstances these settings should not be changed. Please contact your local customer centre.

Viewing the input & output status

The direct inputs of the purifier's controller are visible in the Inputs submenu and are the following:

- Dryer inlet pressure
- Medical/Line pressure
- Atmospheric dew point at the outlet (Pressure dew point for NFPA models)
- Reserve manifold low pressure

The outputs are the alarms that are potential-free transmitted to the hospital control room. “Closed” corresponds to “active”. In the Outputs submenu the outputs can be viewed in real time:



Event history

When an alarm is triggered, the full situation (inputs, outputs, time stamp) is logged into the event history.

To take a look, select the following icon in the Menu:

The event history keeps track of the last 30 events. Service menu

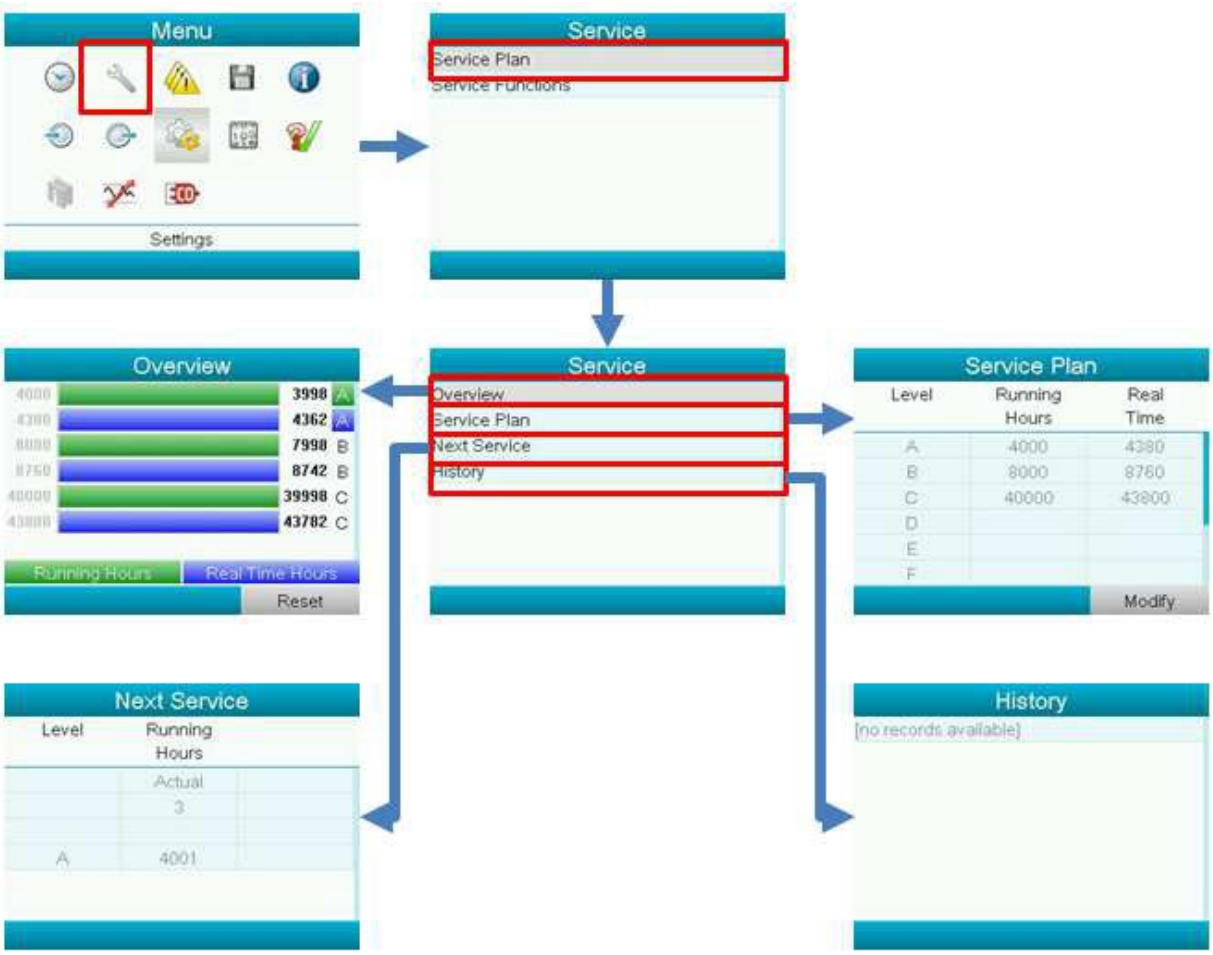
Description

In the Service submenu following screens can be found:

3.1.7. Service Plan

Overview

In the Overview submenu can be seen how many running hours are left before the next service should be performed for each type of service plan.



Service Plan

The Service Plan submenu gives an overview of the different types of service that should be performed on the machine (A, B or C) and the time intervals of these.

Next Service

The Next Service submenu gives an overview of which type of service will have to be performed the next time (A, B or C), how many hours have passed since the last service and how many running hours are in between the last and the next service.

History

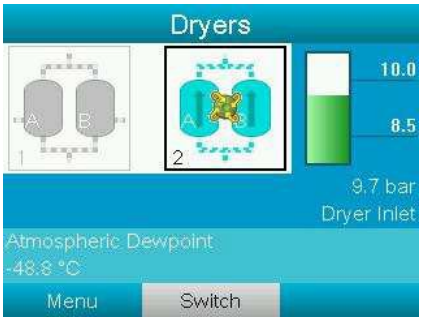
In the History submenu records can be seen when service previously was performed.

3.3 Service Functions

Activate Service

This function is to activate service mode on the stand-by dryer. When activated this dryer will not be put operational by the controller, a service-icon will be visible on the controller of the dryer and it will display a blue led on the controller.

If the active dryer needs to be serviced, go to the Details Dryer screen and switch the active dryer first (see above). If the active dryer is in purge control, ECO will not switch to the other dryer.



If the service function is activated, it will not be possible to switch dryers (either manual or automatic).

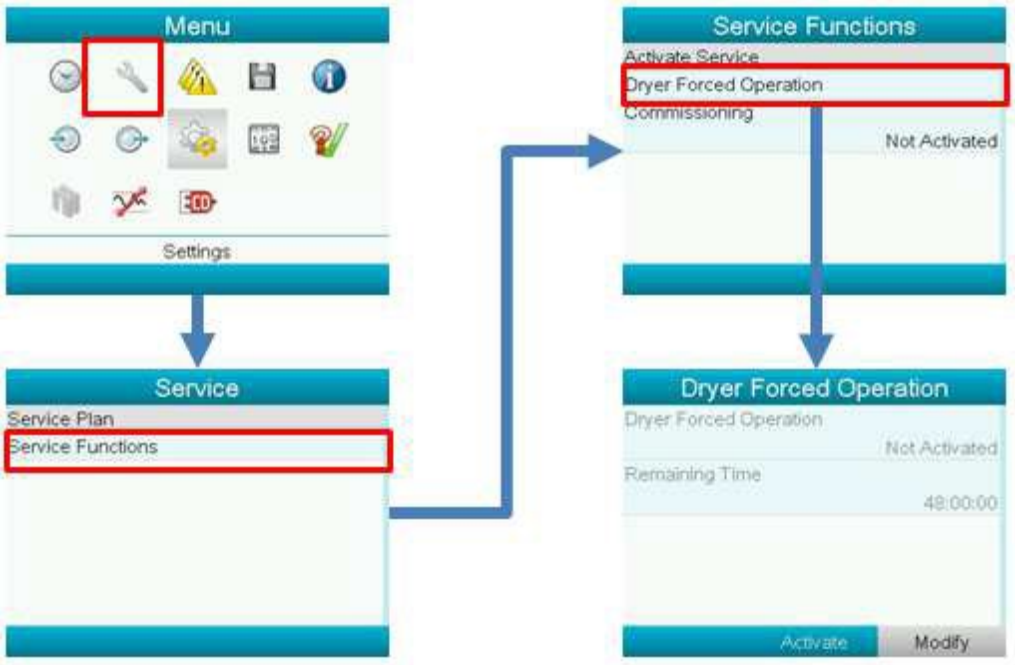
Commissioning

This function is for drying both dryers before putting it into operation.

When activated:

Dryer 1 and 2 will be both enabled and work like in normal operation (regeneration – pressurisation cycle)

A message of service mode icon is shown on both dryers in the dryer overview page. This function will automatically be disabled after 72h.



Dryer Forced Operation

This function forces one dryer to work independent of a dew point or dryer pressure alarm (disables automatic switchover function).

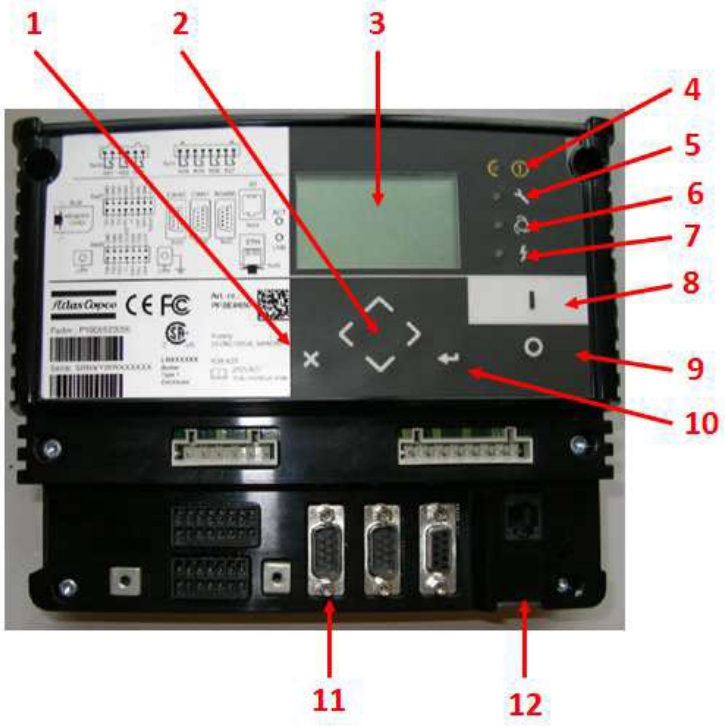
The switch button is available to enable switchover to the other dryer if preferred.

This function will be disabled automatically after 6h. Afterwards, the dryer will revert to its normal operation.

4 DIN Rail Controller

4.1 Interface Icons and menu structure

Interface



Item	Designation	Function
1	*Escape button*	*Go to the previous screen or end current action.*
2	*Scroll buttons*	*Use these buttons to scroll through the menu.*
3	*Display*	*Shows icons and operating conditioning.*
4	*Warning LED*	*Is lit when warning is triggered.*
5	*Service LED*	*Is lit when a service is needed.*
6	*Operation LED*	*Is lit when the dryer is operational.*
7	*Voltage LED*	*Indicates the voltage is turned on.*
8	*Start button*	*Start the dryer*
9	*Stop button*	*Stop the dryer*
10	*Enter button*	*Confirm action.*
11	*CAN2 connection*	*Required CAN connection to connect to the main controller*
12	*Ethernet port*	*Port for software download, external monitoring,…*

Icons

Name	Icon	Description
Stopped / Running		When the dryer is stopped, the icon stands still. When the dryer is running, the icon is rotating.
Machine control mode		*Network control*
		Remote control
EFL triggered		Is lit when warning is triggered.
Running hours		Indicates the number of hours the controller has been powered up
Service		Service required
Purge saving activated		Indicates the dryer is saving purge

Menu structure

Scroll buttons (2) can be used to scroll through all screens. The screens are divided into register screens, measured data screens, digital input screens (numbered as <d.in>, <d.1>, ...), parameter screens (numbered as <P.1>, <P.2>, ...), and test screens (numbered as

<t.1>,...).

During scrolling, the numbers of the screens appear consecutively. For most screens, the unit of measurement and the related pictograph are shown together with the screen number.

Scrolling through the screen, the following items can be seen:

Main screen (top right): shows the running hours, whether it's running, and its operation mode

Going down:

d1 – Shows the service timer reading (hrs or x 1000hrs)

d2 – Shows the dryers running hours

d3 – Shows the actual program version

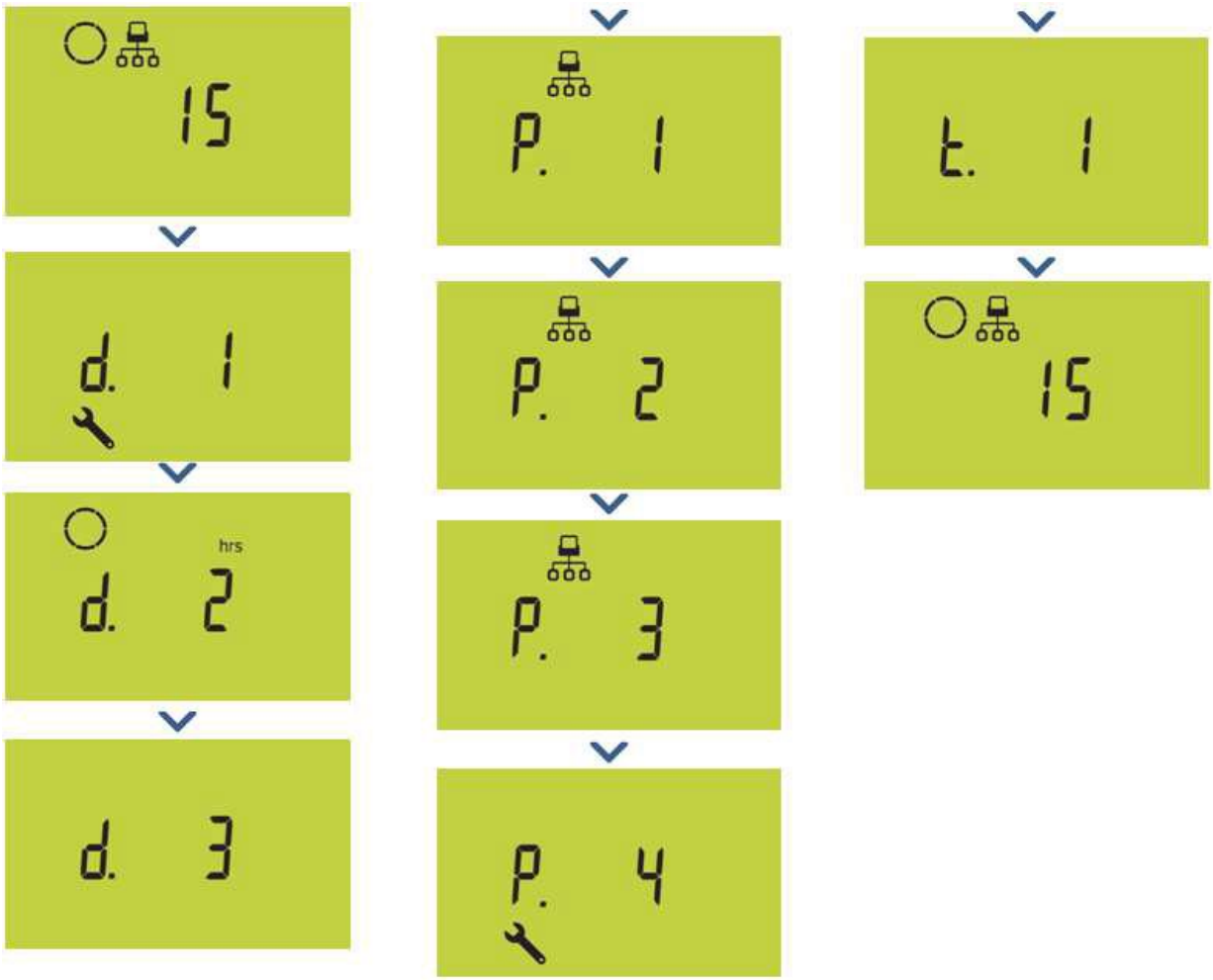
P1 – Selection between local, remote or LAN

P2 – Setting a node ID for CAN control

P3 – Settings for IP, gateway and subnet mask

P4 – Modifying the service timer

t1 – Tests the display, showing all possible icons

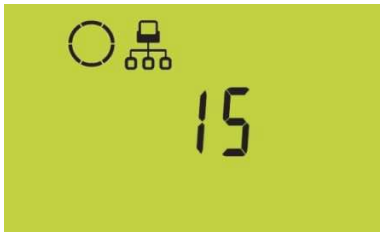


4.2 DIN Rail Controller Operation

Main Screen

The main screen shows the dryers module hours, whether it is running or not (spinning circle) and in what state it is operating (LAN, remote or local).

On the figure below, the dryer is running in LAN operation and has been powered up for 15 hours.



Digital input screens

Cycling through the digital input screens, the following information is displayed:

<d.1>	Service timer reading
<d.2>	Running hours
<d.3>	Actual program version

Parameter screens

<P.1>	Selection between local, remote or LAN
<P.2>	Setting a node ID for CAN control
<P.3>	Settings for IP, gateway and subnet mask
<P.4>	Modifying the service timer

Test screen

<t.1>	Display test

Setting of correct CAN address

To ensure the dryer can be operated by the main controller, it needs to be attributed the right CAN address.

To change the CAN address, scroll down to <P.2> and press enter. Depending if CAN is already enabled or not, you will see “On” or “OFF”. Push down again until you see a number between 1 and 31. Push enter again, and change the CAN address by pushing up or down, to the following:

- For dryer number one, this CAN address needs to be set to 11.
- For the second one, this needs to be set to 12.

Note: If CAN is already enabled, you need to disable it first before you are able to change CAN address.

Enabling CAN for LAN operation

After changing the CAN address, CAN has to be enabled to ensure communication with the

Main controller.

To enable CAN, scroll down to <P.2> and press enter. You'll either see "On" or "OFF".

If it's on "On" CAN is already enabled.

If not, press enter and afterwards up or down to change "OFF" to "On". Confirm by pressing enter.

Putting the dryer in LAN operation

As a final step of being able to control the dryer through the main controller, it has to be set put in LAN operation.

To change the dryers operation, scroll down to <P.1> and press enter. By default you will see the text "Loc". Press enter again, and by pressing up or down, change this value to "Lan".

Confirm by pressing enter.

Starting and stopping a dryer in local operation

When a dryer is in LAN operation, it will be started and stopped by the main controller. However, by putting it in local operation, you can manually start and stop the dryer.

To do this, scroll down to <P.1> and press enter and adjust the onscreen text to "Loc".

After putting the dryer in local operation, you can start it with the "I" button, and stop it with the "O" one.

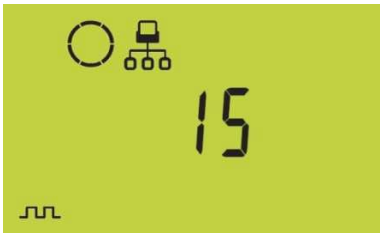
Resetting a dryer operating in EFL operation

When the pressure switch of the dryer has been tripped by a too low pressure reading, this will force the dryer in "Emergency forced local" operation. This operation will open the inlet solenoid of the dryer and will start to normal pressurisation/equalisation cycle, until this "alarm" operation has been reset.

To reset a dryer operating in EFL, push the Escape (X) button.

A dryer operating in EFL can be observed by the following:

- Blinking LAN symbol
- Blinking EFL triggered symbol
- Warning LED lit



Resetting the service timer

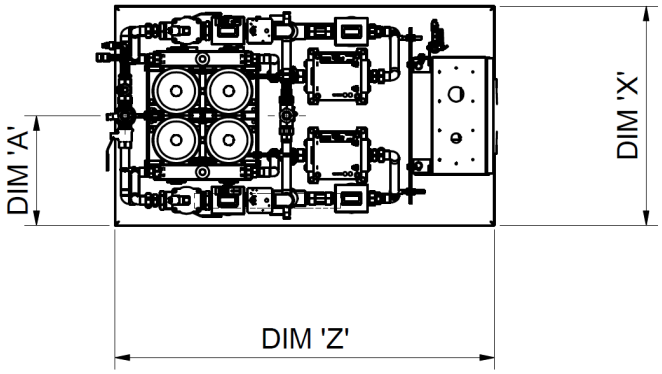
The <d.1> screen shows the amount of running hours since the previous service. This timer needs to be reset after service has been performed.

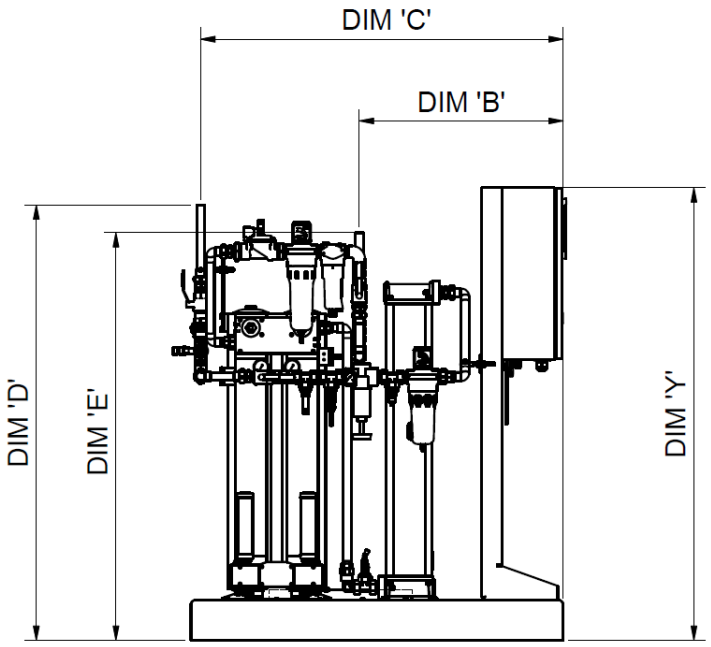
Scroll to register screen <d.1> and press Enter button.

- The reading (e.g. 4000) will appear.
- Press Enter button, the icon will flash indicating that resetting is possible
- Press Enter button again to reset the timer to <0.000> or press the Escape button to cancel the operation.

5 Installation

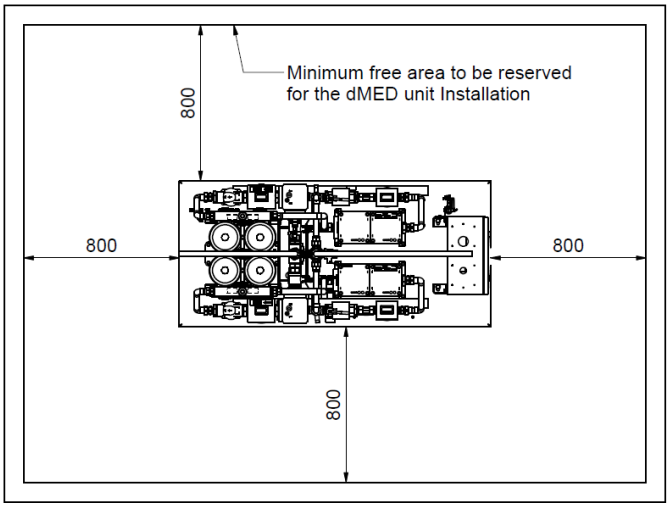
5.1 Dimension drawings

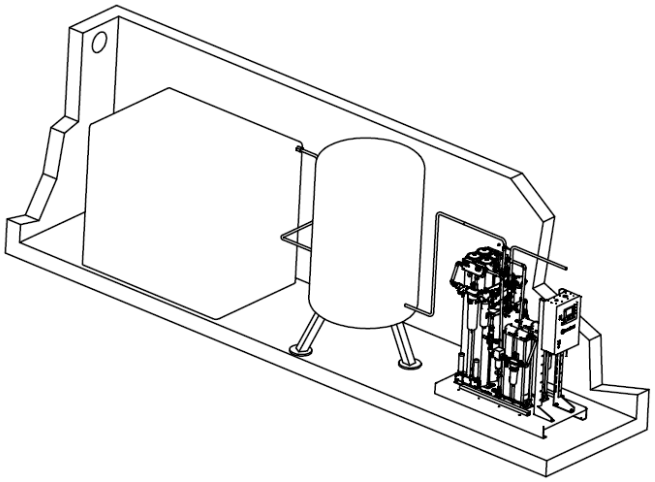




MODEL	DIM 'X'	DIM 'Y'	DIM 'Z'	DIM 'A'	DIM 'B'	DIM 'C'	DIM 'D'	DIM 'E'
dMED 025	750	1578	1300	375	712	1226	1382	1469
dMED 035	750	1602	1300	375	728	1225	1372	1481
dMED 045	750	1580	1300	375	715	1260	1043	1038
dMED 075	750	1578	1300	375	713	1272	1240	1325
dMED 090	750	1580	1300	375	715	1245	1405	1454
dMED 110	750	1685	1300	375	706	1271	1444	1685
dMED 150	750	1904	1600	375	896	1006	1877	1695
dMED 220	1080	1574	1900	540	1156	1278	1484	1063
dMED 300	1080	1850	1900	540	1139	1290	1852	1068

5.2 Installation proposal





Notes:

- All pipes should be installed stress-free to the compressor unit.
- for more information concerning air nets, cooling systems, etc refer to the compressor installation manual.
- For dimensions and air flow directions refer to the AHB dimension drawings.

The dMED unit (1) must be installed on a level floor suitable for taking the weight of the dryer. There must be a free space of 800mm around the unit.

Make sure that only clean parts come in contact with the outlet of the dMED unit. If not, this may have an effect on the delivered air quality of the dMED unit. This is also applicable for piping and other parts that are installed after the dMED unit.

Details about the special requirements concerning the degree of cleanliness can be found in EN7396-1 and the herein mentioned standards and regulations.

Make sure that the air delivered to the dMED unit does not exceed the limitations mentioned in this instruction book.

2 high efficiency water separators (4) are present in the dMED unit to remove 90% of the water in the compressed air. Each water separator is followed by inlet filters: a UD filter (5) for particle removal down to 1micron with a maximum oil carryover of 0.1ppm).

At the outlet of each hoc unit a high efficiency PDp filter (6) is placed for the removal of particles down to 0.01μm.

drain tube (8) must be installed on all water separators and inlet filters. The drain pipes to the drain collector must not dip into the water. For draining of pure condensate water, install an oil/water separator.

Consult Atlas Copco customer center.
The preferred and recommended installation sequence is compressor(s) (3) - vessel(s) (2) - dMED unit (1).

The compressor intake has to be located in an area where there is minimal contamination from internal combustion engine exhaust, vacuum systems, anaesthetic gas scavenging systems, ventilation systems discharge and other contaminants (see EN 7396-1 for details).

Check that the correct startup procedure is followed. This procedure is described in detail in the instruction book.

A detailed log has to be kept of when and by who service was performed.

Example of compressor room

Reference	Description
(1)	Minimum free area to be reserved for the medical air unit installation

- Install the equipment on a level floor, suitable for taking its weight. Provide enough space (approximately 800 mm (31.5 in)) around the air treatment unit for installation and maintenance operations.
- Make sure that only clean parts come in contact with the outlet of the air treatment unit. If this is not the case, this may have an effect on the quality of the air delivered by the unit. This is also applicable for piping and other parts installed after the unit.
- Details about the special requirements concerning the degree of cleanliness can be found in EN 7396-1 and the herein mentioned standards and regulations.
- Make sure that the air delivered to the air treatment unit is within the allowed limitations. See section Reference conditions and limitations.
- The water separator (4) is followed by a general purpose UD+ filter (5).Install a drain pipe (8) on the water separator and the filters. The drain pipes (8) to the drain collector must not dip into the water.
- If the drain pipes are connected to a drain system, it is advised to place a non-return valve after the filters and the water separator to prevent liquid from being pushed into the dryer.
- A high efficiency PDp+ filter is placed at the outlet for the removal of particles down to 0.01µm. For draining of pure condense water, install an oil/water separator. Consult your Customer Centre.

General recommendations

⚠	The installation of the purifier unit can only be done by trained and certified Atlas Copco service personnel.
	The preferred and recommended installation sequence is compressor(s) (3), vessel (2) and purifier unit. It may be required to install an additional dew point sensor downstream the unit. Consult Atlas Copco before operating the unit. The purifier does not require extra ventilation.
	The power cable must be connected by a qualified electrician. Check that the electrical installation corresponds to the applicable codes. Before switching on the main power supply, check the voltage requirements in the technical specifications or on the data plate of the unit. The purifier unit must be earthed and protected against short circuits using fuses of the inert type. An isolating switch must be installed near the unit.
	Follow the correct start-up procedure. See section Operating instructions.
	In almost all cases the purifier will be put in parallel with another similar unit. Ensure that the air flow cannot go from one pipeline to the other lines and put the proper pressure reducing valves after the entire purifier unit before delivering the air to the user.
	Positioning: Place the unit at a location where the temperature and the concentration of certain gases, which are present in the ambient air, never exceed the limits. See also section Reference conditions and limitations. If not the quality of the outlet air is not guaranteed as stated in the part Technical Data.
	Piping: • All valves, couplings and pipes used/installed after the unit must be free from oil and grease (hydrocarbon contamination below 550 mg/m^2) and dust (particles size below 50 micrometer). • All connections to the unit must be mounted stress-free. Pay extra attention when connecting the compressed air lines to the unit's inlet and outlet.

	Verification: Before the installation is going to be used, a validation of the air quality according pharmacopoeia must be done. These records must be kept by the user at all times.

5.3 Electrical connections

General

The electrical wiring must comply with the local regulations. The air treatment unit must be earthed and protected by fuses against short-circuiting. Consult the electric diagram delivered with the unit.
Before switching on the main power supply, check the voltage requirements in the technical specifications or on the unit's data plate.

Installation

The dryer can be connected to a 230V AC power supply. For the way of connecting, please see the service diagrams 2212 0215 09. The purifier has 2 power supply connections.

5.4 Purge Pressure setting

The purge orifices are specific for the size and the operating pressure of the air treatment unit.

If the operating pressure is different from the pressure for which the dryer was ordered, the purge orifice may have to be adapted.

Purge orifice PD3 type

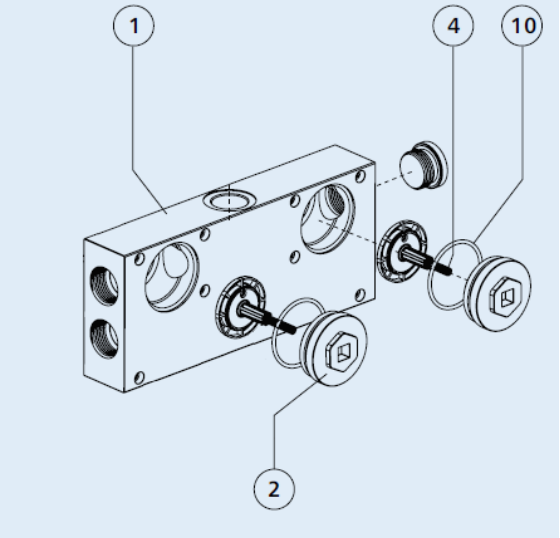
- Reference figure 4.13 and the Purge Plug Identification Table.
- Each dryer is pre-set with the correctly sized purge valve for an operating pressure of 7 barg (100 psig) at point of order.
- The lettering (A through S), located on the purge valve body, indicates the orifice size selected to suit the operating pressure of the dryer per the chart below.
- If the inlet pressure to the dryer will be different than the pre-set orifice size, the purge valve can be adjusted.
- Most dryers use a single orifice purge valve represented by the Blue and Green single letter references in the table below.
- Larger dryers may require a two or three hole purge valve as represented by the Red and Yellow two and three letter references.
- To select the correct orifice size, locate the appropriate dryer model at the left side of the table and then the operating pressure
- at the top.
- Make sure that the correct valve body (1, 2 or 3 hole) and orifice disc (01, 02, 03 or 04) has been supplied with the dryer. The
- discs have the number (01, 02, 03 or 04) stamped out at the top.

Purge Plug Identification

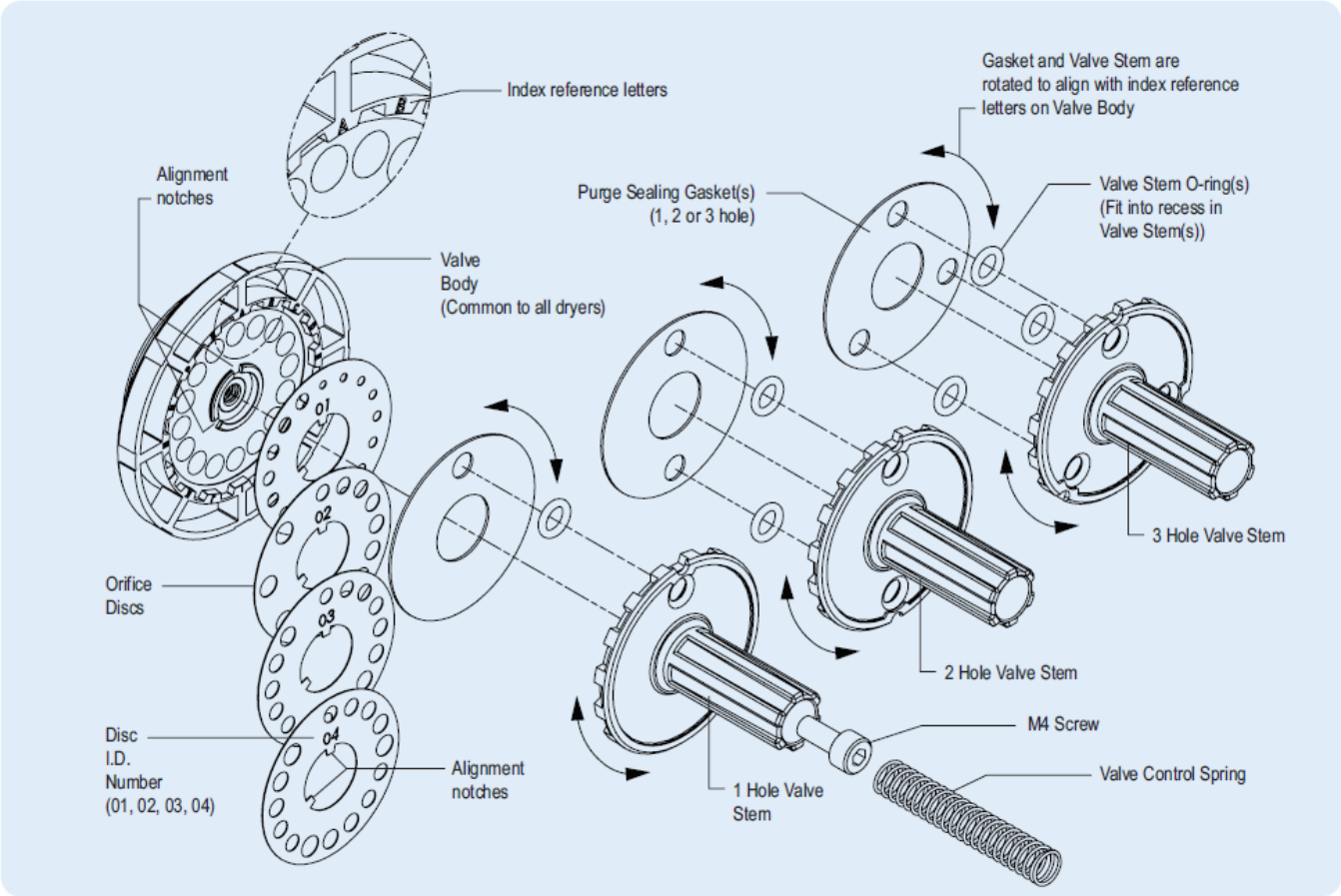
Operating pressure	4	5	6	7	8	9	10	11	12	13
Dryer										
PD0046	M	K	I	H	G	F	E	E	E	D
PD0056	P	M	L	K	J	I	H	G	F	F
PD0075	B	S	P	M	L	L	K	I	I	H
PD0090	C	A	P	P	N	L	K	J	I	H
PD0110	I	E	C	A	P	M	K	K	J	I
PD0150	CK	M	G	F	C	B	A	S	S	P
PD0180	EM	CK	P	I	G	E	C	B	A	A
PD0220	AFK	FN	DL	P	K	H	F	E	D	C
PD0300	DIN	CHM	AFK	GP	DL	CK	BJ	M	I	H
PD0360	EJP	DIN	CHM	AFK	AFK	GP	EM	DL	BJ	AI
HYG-BLEED	1.5	1.25	1.25	1	1	0.75	0.75	0.75	0.75	0.5

Disc
01
02
03
04

Figure 4.13 Purge valve assembly



Item	Description
1	Inlet/outlet manifold
2	Purge orifice service cap
4	Valve control spring
10	Manifold service cap o-ring



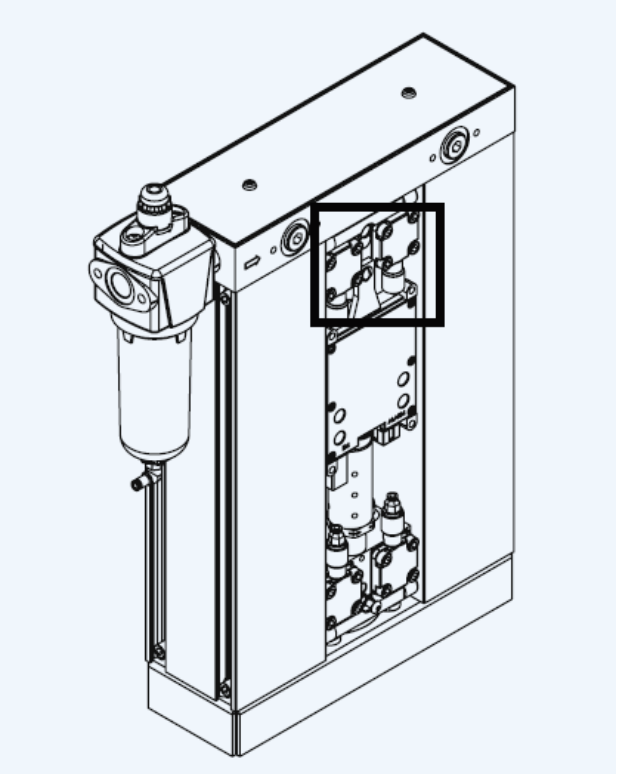
- Reference figure 4.13 and the Purge Plug Identification Table on Page 20.
- Once the correct purge body (1, 2 or 3 hole) and orifice disc (01, 02, 03 or 04) has been selected per the instructions on Page 20, the purge valve may be assembled.
- The index letters located on the purge valve body correspond with the selected orifice sizes per the Table on Page 20.
- Place the appropriate orifice disc onto the valve body, taking care to align the notches. The disc will only fit in one position.
- Place the valve stem O-ring(s) into their corresponding recesses on the back of the valve stem.
- Align the holes in the purge sealing gasket with the corresponding holes in the valve stem.
- Rotate the valve stem assembly so that the correct orifice letters align with the notches corresponding to the holes (1, 2 or 3) in the valve stem.
- Press the assembly together and fasten with the M4 screw.
- Double check to make sure that the open orifice holes correspond with the correct orifice selection as identified earlier

Purge orifice PD1 type

- Remove purge plug securing screw from the upper valve block.
- Remove purge plug.
- Replace with appropriate purge plug according to inlet pressure.

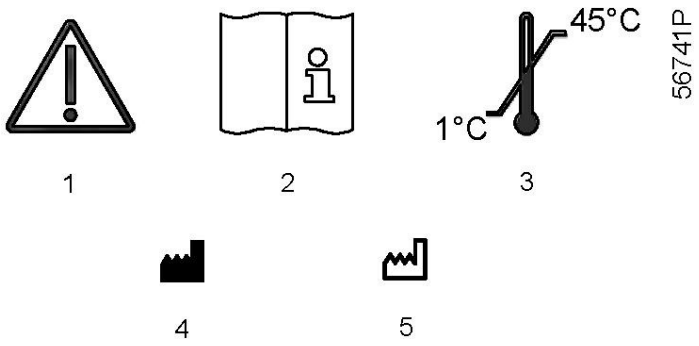
Purge orifice selections:

Model	Inlet Pressure			
	7 bar	8 bar	10 bar	13 bar
dMED025	PPK015	PPK014	PPK011	PPK010
dMED035	PPK020	PPK018	PPK016	PPK014



5.5 Pictographs

Pictographs on the data plate



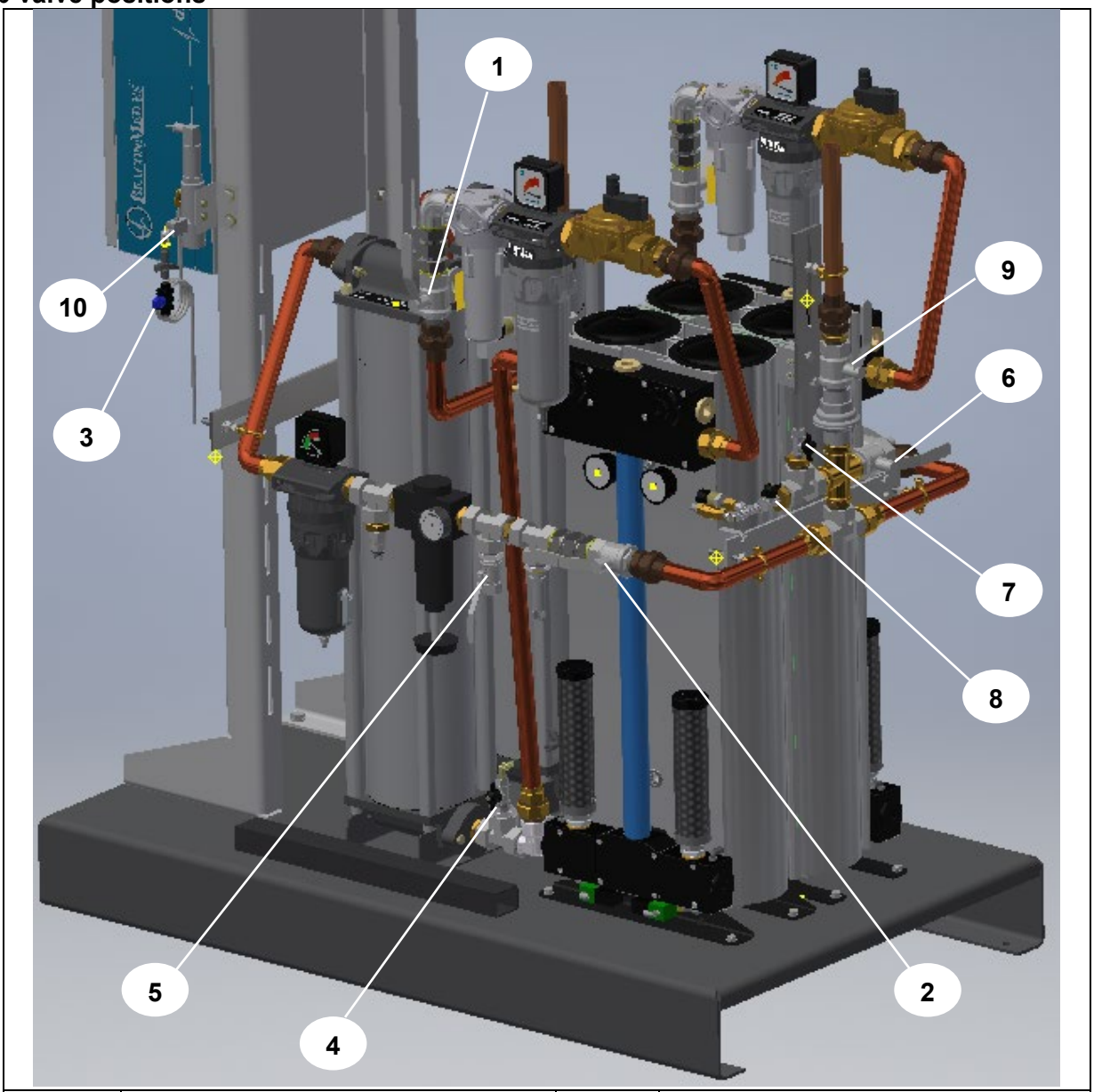
Reference	Name
1	Caution, consult accompanying documents
2	Consult instructions for use
3	Temperature limitation
4	Manufacturer
5	Date of manufacture

6 Operating instructions

Safety

⚠	Always observe all relevant safety instructions.

Startup valve positions



1	Inlet Valve (Closed)	2	Outlet Valve (Open)
3	DP sensor valve (Closed)	4	2 x Link valve (Open)
5	Drain Valve (Closed)	6	Full flow test point valve (Closed)
7	Sampling point Valve (Closed)	8	Sensor maintenance valve (Open)
9	Line Valve (Closed)	10	PD flow control valve (Leave as set)

Note – Item 3 (PD sensor valve) is for diagnostics only. When closed the dew point reading is taken from line. By opening this valve, you can read the dewpoint between the dryer column and QDT filter. This allow you to determine if a dew point fault is due to the dryer column not performing or the QDT has become saturated.

Initial startup

To start up the air treatment unit for the first time or after a long period of standstill, proceed as follows:

1. Close the air supply from the compressor towards the unit by closing the inlet valve.
2. Close the outlet valve.
3. Remove the silencers of the dryer to prevent them from getting clogged by dust from the new desiccant. Wear a dust mask, safety glasses and ear protection. (This is only required at initial startup or after the desiccant was replaced).
4. the co Start the compressors by starting the ECO on the main controller.
5. Slowly open the inlet valve of the air treatment unit.
6. Check all connections for air leaks and remedy if necessary.
7. Let the unit operate for several hours with the external outlet valve closed.
8. In case the silencers were removed, refit the silencers.
9. Check the dew point downstream of the purifier unit. When the atmospheric dew point on HTM models has reached -40 ˚C to -45 ˚C (-40 ˚F to -49 ˚F) or pressure dew point on NFPA models has reached -25 ˚C to -30 ˚C (-13 ˚F to -22 ˚F), open the external outlet valve and set the flow according to the specification of the unit (see section Technical data). Make sure that the air flow does not exceed the specified flow and check what is the highest temperature the ambient air will have. **This flow must not be directed into the air net but needs to be blown off via another way!** The initial dew point of the air leaving the unit will be higher than normal after starting. Since the air needs to be according to Pharmacopoeia regulations, it is necessary to run the dryer for minimum 24 hours with the outlet air blown off to make sure that the pipes are not contaminated.
10. When the atmospheric dew point for HTM models has reached -48 ˚C (-54 ˚F) or for NFPA reached -32 °C (-256 °F), it is necessary to perform a validation of the air quality according Pharmacopoeia. When the quality of the air is confirmed, change over from blow off circuit to the air system by switching these valves. The records of these tests must be kept by the user at all times.
11. Gradually open the external outlet valve.

	At initial startup, and specially when the dryer is loaded from the beginning, it can take a long time before the dew point is reached. It is therefore recommended to operate the dryer for a number of days with the outlet valve closed.

	• All valves, couplings and pipes used/installed after the unit must be free from oil and grease (hydrocarbon contamination below 550 mg/m^2) and dust (particles size below 50 micrometer). • For the location of the external inlet valve and external outlet valve(customer's installation), see section Installation proposal. • Before starting the unit make sure that all pipes are connected and that items in drains or pipes for protection during transport are removed.

Normal start

If the dryer has not been used for more than 3 months, refer to section Initial startup. In all other cases, proceed as follows:

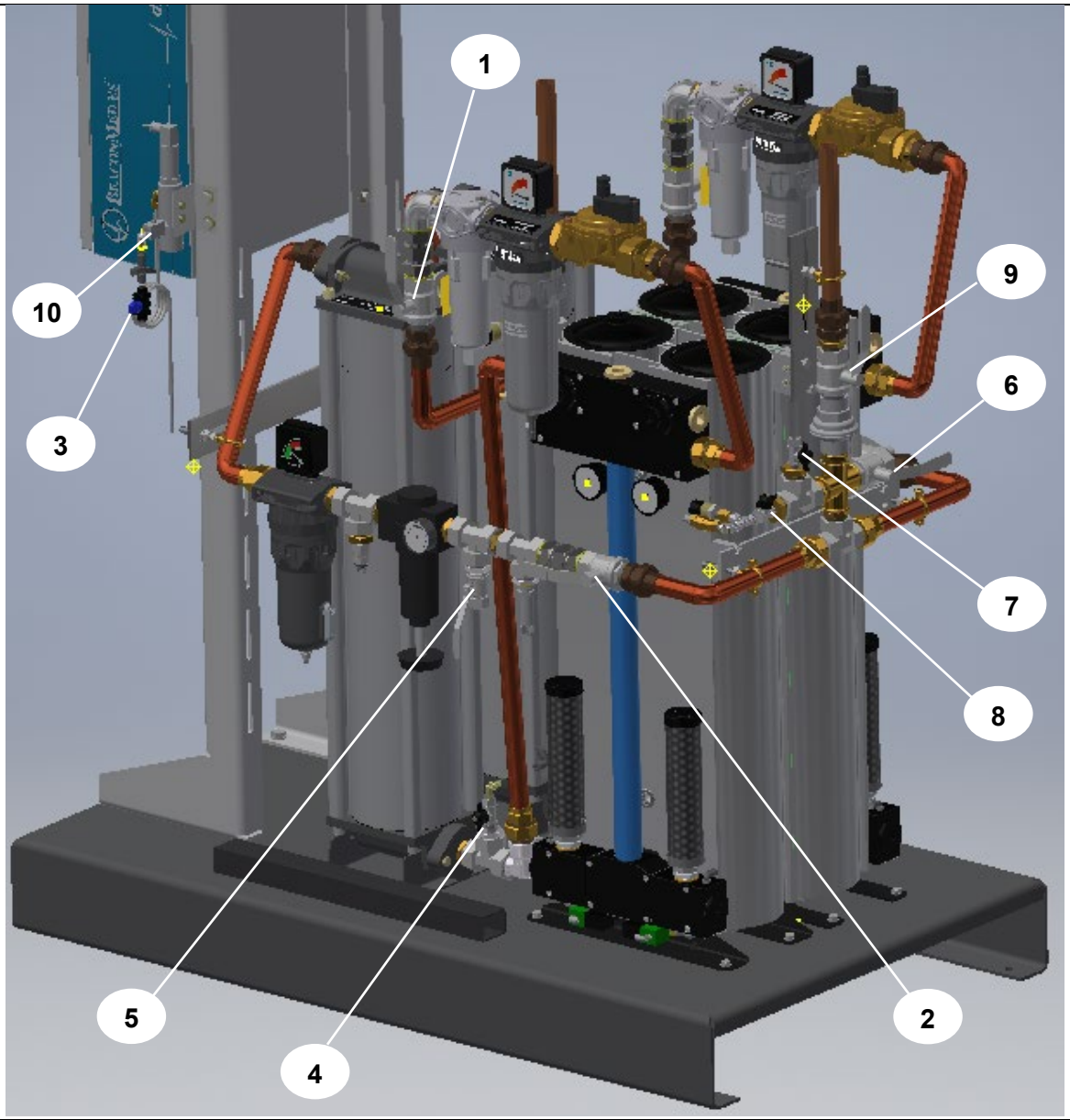
If the dryer has not been used for more than 3 months, refer to section Initial start-up. In all other cases, proceed as follows:

1. Cut off the air supply from the compressor towards the dryer by closing the inlet valves.
2. Close the outlet valves between the dryer and the air consumer.
3. Start the compressors and slowly open the inlet valve.
4. Ensure the dryer is powered on.
5. Gradually open the air outlet valves.

	Close the external inlet valve in case the compressor needs to be restarted. The high air speed in the startup phase of the compressor may damage the desiccant.

	• All valves, couplings and pipes used/installed after the unit must be free from oil and grease (hydrocarbon contamination below 550 mg/m^2) and dust (particles size below 50 micrometer). • For the location of the external inlet valve and external outlet valve(customer's installation), see section Installation proposal.

Normal Running valve position



1	Inlet Valve (Open)	2	Outlet Valve (Open)
3	DP sensor valve (Closed)	4	2 x Link valve (Open)
5	Drain Valve (Closed)	6	Full flow test point valve (Closed)
7	Sampling point Valve (Closed)	8	Sensor maintenance valve (Open)
9	Line Valve (Open)	10	PD flow control valve (Leave as set)

During operation

- At regular intervals, check the status of the dryer on the dryer controller display. If the warning/alarm LED is alight, consult section Problem solving.
- Check the dew point regularly.
  If the dew point is too high, consult section Problem solving.
- Regularly check the differential pressure gauge of the filters. Replace the filter cartridge if the pressure drop is too high.

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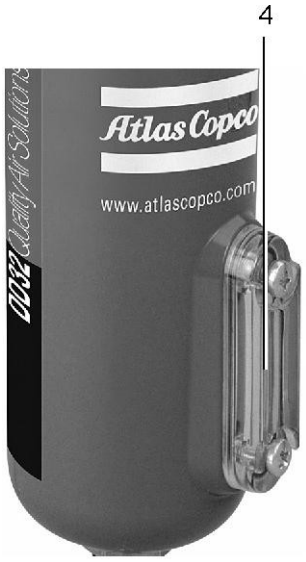
- Regularly check the sight glass on the filters. Water in the sight glass means the automatic drain is inoperative.



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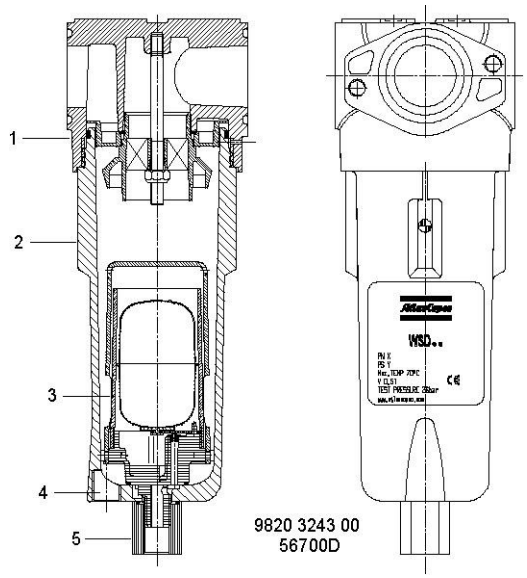
- Regularly check that water is discharged via the drain outlet of the water separator.



In case of EWD (optional): Check that no alarm is displayed on the service panel of the EWD (5) and that oil/water aerosols and/or solid particles are discharged via drain outlet (6). The amount depends on the operating conditions.

Stopping

To stop the air treatment unit, proceed as follows:

1. Close the inlet valve (between the air receiver and the purifier) and the outlet valve (between the purifier and the air net).
2. Let the unit operate for a period without consumption, to depressurize the vessels.
3. Stop the air treatment unit.

	If the air treatment unit is stopped for a longer period, keep the external inlet and outlet valve closed to avoid moisture from entering the unit. Under no circumstances must compressed air be allowed to flow through the unit when the electrical power is switched off. This will result in terminal failure of the desiccant material, causing regeneration will no longer be possible.

7 Maintenance

7.1 Service agreements

Description

Since all service and maintenance has to be done by properly certified and trained service personnel, it is strongly advised to consider a service agreement. Atlas Copco Customer Centers have a range of service agreements to suit your needs:

- An Inspection Plan
- A Preventive Maintenance Plan
- A Total Responsibility Plan

Contact your Customer Centre to set up a tailor-made service agreement. It will ensure optimum operational efficiency, minimize downtime and reduce the total life cycle costs.

7.2 Maintenance instructions

General

The dryer and the QDT+ filter do not need any specific maintenance except for the desiccant and activated carbon, and catalyst replacement (for QDT+).

However, the scheduled performance and service life may decrease if liquid water or particles enter the unit. Therefore, correct maintenance of the water separator and the filters is crucial.

Safety precautions

	Maintenance must be done by trained and certified service personnel. Use only authorized genuine parts. Check the correct operation after maintenance.

Before carrying out any maintenance or corrective activity, apply the following recommendations and safety precautions:

- Stop the unit and switch off the power.
- Disconnect all pressure sources and vent the internal pressure of the system before dismantling any pressurized component.
- Use genuine spare parts only. Consult the Spare Parts List for part numbers. For preventive maintenance, dedicated Service kits are available.
- Check for correct operation after maintenance.

Warranty-Product Liability

Use only authorized parts. Any damage or malfunction caused by the use of unauthorized parts is not covered by Warranty or Product Liability.

Any damage or malfunction caused by bad maintenance is not covered by Warranty or Product Liability.

Service kits

For overhauling or carrying out preventive maintenance, service kits are available for the desiccant and the filters (see section Service kits).

Preventive maintenance schedule

	Carry out following operations at the interval (period or running hours) which comes first. The longer interval checks must also include the shorter interval checks.
	The local Customer Centre may overrule the maintenance schedule depending on the environmental and working conditions of the unit.

Period (1)	Running hours (1)	Operation
Daily	--	• Check that the compressed air temperature does not exceed the limits. • Check for alarms on the displays. • Check working state of the unit. • If options are installed, check their operation. • On filters with automatic drain valve, check the sight glass at regular intervals. A liquid level indicates malfunction of the automatic drain valve. Replace the part if cleaning does not correct the problem. Filter elements need to be replaced when the pressure drop reaches 0.35 bar (5.08 psi).
Weekly	--	• Check for water or air leaks and abnormal noise. • Check the pressure drop over the filters. • Check if all drains are working properly. • Check the filter of the pressure dew point sensor for dust and clean if necessary.
Monthly	--	Verify air quality delivered by the unit at regular intervals to guarantee correct usage in correspondence to the applicable legislation. Records of these measurements must be kept by the user.
Every 6 months	4000	• Check for air leaks. • Service the automatic drain assembly of the water separator (WSD). • Check the elements of the filters. Replace if necessary. • Check for damaged wiring or loose connections.
yearly	4000	• Replace the elements of the filters or when the pressure drop reaches approximately 0.35 bar (5.08 psi). For the correct filter kit number, consult the spare parts list. • Service the WSD separator. • Replace the dryer column silencers. • Gas sensors (option) need to be calibrated (Consult ECB AII 0290). • Exchange the dew point sensor. The certificate is valid only one year. Contact the supplier of your equipment for re-calibration of the PDP sensor. Consult ECB AII 0298. • QDT filter: replace the active carbon • Or QDT+ filter: replace the active carbon and the catalyst
Every 4 years	16000	Service the dryer manifold and purge orifice.
Every 5 years	20000	Replace the desiccant.

(1) whichever comes first

(2) Replace the filter elements also when the pressure drop reaches 0.35 bar (5.08 psi).

	The lifetime of the desiccant is related to the operating conditions. The scheduled lifetime is only valid when operating in reference working conditions. If the desiccant becomes contaminated due to more severe operating conditions, it will have to be replaced earlier. It is recommended to have the desiccant replaced by a qualified service technician.

Check periodically that:

- All safety equipment is in good working order
- All hoses, cables, wiring, pipes are in good condition, secure and not rubbing
- There are no leaks
- All fasteners are tight
- All electrical leads are secure and in good order
- Air outlet valves and manifold, hoses, couplings, … are in good shape and free of wear or abuse

7.3 Service kits

Service kits

Service kits are available, offering the benefits of genuine parts while keeping the maintenance budget low. The kits comprise all parts needed for servicing.

A complete survey of available service kits is given in the Spare Parts Book.

Warning

	The service kits must be installed by trained and certified personnel.

7.4 Storage after installation

Procedure

When the desiccant is in good shape, stop the unit and keep all valves closed to avoid moisture from entering the unit.

	Keep the air treatment unit and its spare parts away from materials which easily oxidise (e.g. peroxides, chlorates, acids, …). Spare parts must be stored in dry, cool and closed containers.
	Although the unit does not contain hazardous substances, it must be handled with care under any condition.

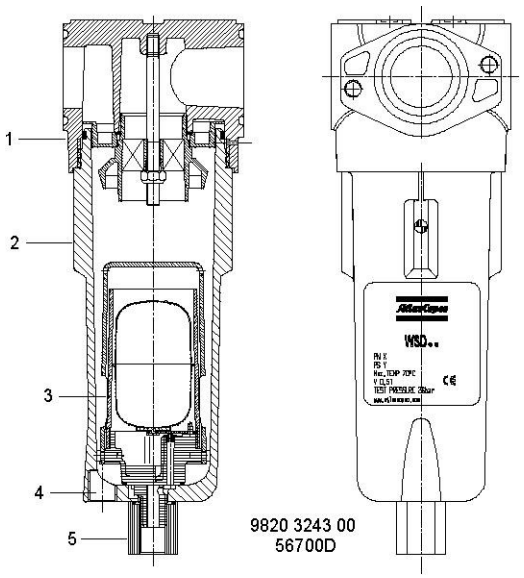
7.5 Disposal of used material

Used filters or any other used material (e.g. desiccant, lubricants, cleaning rags, machine parts, etc.) must be disposed of in an environmentally friendly and safe manner, and in line with the local recommendations and environmental legislation.

8 Adjustments and servicing procedures

8.1 Servicing the water separator drain

Water separator drain (WSD)



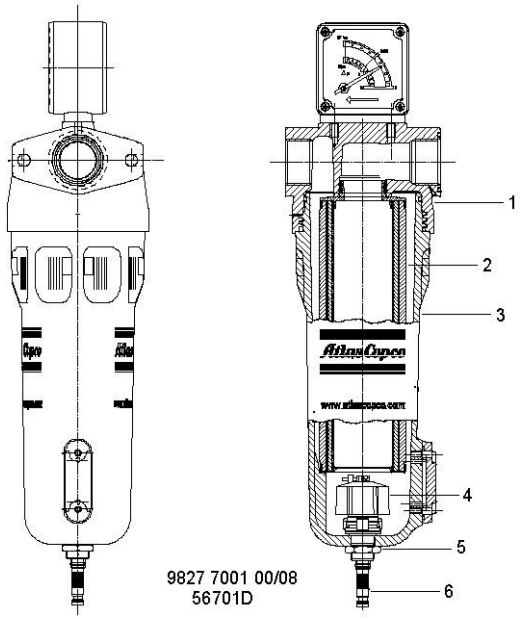
Procedure

Once every six months, service the automatic drain assembly:

1. Isolate the water separator from the air net by closing the external inlet and outlet valve of the unit (customer's installation).
2. Depressurize the separator by opening the manual drain valve on connection (4).
3. Unscrew the bowl (2). A whistling noise will warn you if the bowl is not fully depressurized. If this occurs, the bowl should be screwed back and the venting should be repeated.
4. Remove the drain valve (3) by unscrewing the retaining nut (5) underneath the bowl.
5. Check for clogging of the drain hole. Clean as required. Inspect the drain valve assembly.
6. Reinstall the drain valve in the bowl using the retaining nut.
7. Apply a small amount of water based lubricant (supplied in the cleaning kit) on the O-ring and on the thread of the bowl. Screw the bowl completely on the separator head (1).
8. Re-pressurise and check for leaks.

8.2 UD+ and PDp+ filter change

Filter



Procedure

Following procedure is valid for the UD+ and PDp+ filters:

1. Isolate the filter from the air net by closing the external inlet and outlet valve of the unit (customer's installation).
2. Depressurize the filter by turning the connection nipple (6) of the automatic drain valve anti-clockwise.
3. Unscrew the bowl (3). A whistling noise will warn you if the bowl is not fully depressurized. If this occurs, the bowl should be screwed back and the venting should be repeated.
4. Discard the filter element (2).
5. Remove the drain valve (4) by unscrewing the retaining nut (5) underneath the bowl.
6. Remove the O-ring from the bowl and clean the bowl. Position a new O-ring on the bowl.
7. Remove the O-ring from the drain valve and position a new O-ring on the drain valve. The latter is supplied with each new filter kit.
8. Reinstall the drain valve in the bowl using the retaining nut.
9. Reposition the new filter element with the new O-rings. Apply a small amount of water based lubricant (supplied in the cleaning kit) on the O-ring and on the thread of the bowl.
10. Screw the bowl completely on the filter head (1).

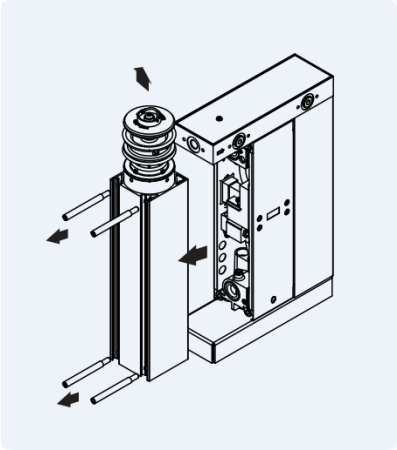
Warning

	To ensure that the unit always produces pharmacopoeia compliant air, only dedicated and genuine spare parts must be used. Consult the spare parts list for part number information.
	The installation and maintenance must be done by trained and certified personnel.

8.3 Dryer unit desiccant cartridge change

	Ensure shutdown and start up procedures are followed prior to carrying out any maintenance work on the dryer

Desiccant cartridge for dMED 25 & dMED 35 dryer



1. Remove prefiltration and hoses.
2. Unscrew four bolts ¾ turn on the opposite tower to aid desiccant changeout process.
3. Unscrew the four pressure housing retaining bolts and slide out the pressure housing.
4. Remove banjo fixing bolt using hex key.
5. Extract end cap and banjo assembly from pressure housing.
6. Using banjo fixing bolt, retract the cartridge from pressure housing.
7. Replace with new cartridge supplied as part of the cartridge service kit.
8. Ensure O-ring seals are in place when installing cartridge and assembly in pressure housing.
9. Follow above steps in reverse to finish installing new cartridge into the dryer.
10. Repeat steps 1 – 10 for the second pressure housing.
11. Ensure the dryer is leak-free before operating pressure is applied to the dryer.
12. Follow start up procedure as stated in the operations section of this manual.

Desiccant cartridge for dMED 45 - dMED 300 dryer

Maintenance information leaflet is provided with each desiccant cartridge replacement kit showing how to carry out the change out.

Warning

	To ensure that the unit always produces pharmacopoeia compliant air, only dedicated and genuine spare parts must be used.
	The installation and maintenance must be done by trained and certified personnel.

Pharmacopoeia compliance

	When replacing desiccant, make sure that the desiccant is disposed of according to the local regulations. Consult the parts list for part numbers.

	After carrying out any maintenance or repair work, Pharmacopoeia testing must be done by a local testing company to assure reliable and correct operation of the unit.

8.4 QDT+ filter maintenance

Service

	Change the QDT+ filter element yearly or every 4000 hours, whichever comes first. Its pressure drop will not increase during its useful life. Nevertheless, the adsorption element must be changed earlier at the first signs of oil vapour and odour.

Procedure

1. Isolate the filters from the air net.
2. Depressurize the QDT+ filter by means of the U+ filter drain.
3. Uncouple the pipe at the inlet with the flange.
4. Unscrew the head.
5. Remove the spring and the perforated plate.
6. Remove the filter bag(s).
7. Clean the extrusion and heads with a dry clean cloth.
8. Place a new filter bag inside the extrusion. The label “This side up” must be at the top of the bag.
9. Replace the o-ring in the head (and between the heads).
10. Reposition the perforated plate and spring.
11. Screw the head completely on the extrusion.
12. Torque the bolts with 40 Nm.
13. Connect the head and flange at the inlet of the filter. Replace the o-ring between the flange and the head.
14. Slowly pressurize the filters.
15. Check for leaks.

A small amount of water based lubricant (supplied in the cleaning kit) may be applied to screw threads and

o-rings to facilitate the assembly.

Traceability

The catalyst and activated carbon bags are labeled with production date, batch number and part number.

Warning

	To ensure that the unit always produces pharmacopoeia compliant air, only dedicated and genuine spare parts must be used.
	The installation and maintenance must be done by trained and certified personnel.

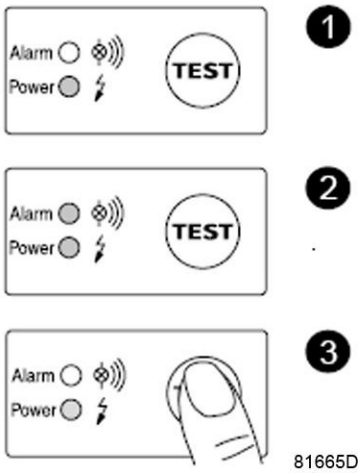
Note

	When replacing the activated carbon and catalyst, make sure that the activated carbon and catalyst are disposed of according to the local regulations.

8.5 Testing the electronic drain valve

Testing

The EWD is available as option.



Control buttons of EWD 32

Functional test

Briefly press the TEST button and check that the valve opens for condensate discharge.

Checking the alarm signal

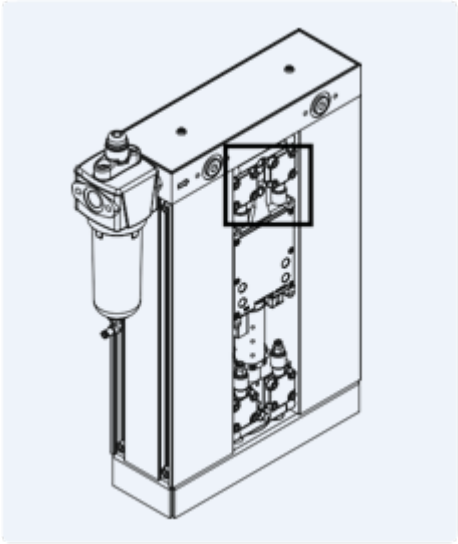
- Close the condensate inlet.
- Press the TEST button for at least 1 minute.
- Check that the alarm LED (red) flashes.
- Check that the alarm signal is being relayed (if connected). Release the TEST button and reopen the condensate inlet after the test.

8.6 Purge plug identification/changeout dMED 25 & 35

	Ensure shutdown and start up procedures are followed prior to carrying out any purge plug changeout

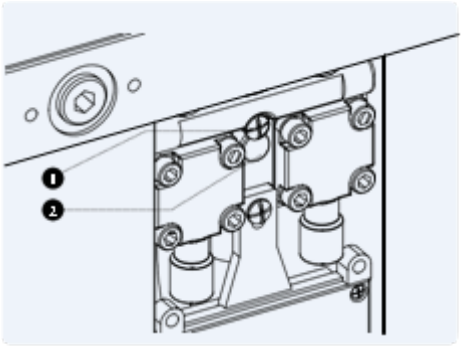
Purge Plug Identification

Model	Operating Pressure (barg)												
	4	5	6	7	8	9	10	11	12	13	14	15	16
dMED025	PPK020	PPK018	PPK016	PPK015	PPK014	PPK014	PPK013	PPK013	PPK013	PPK012	PPK012	PPK012	PPK012
dMED035	PPK028	PPK023	PPK021	PPK020	PPK018	PPK018	PPK016	PPK015	PPK015	PPK014	PPK014	PPK014	PPK014



- Remove dryer front panel.
- Remove purge plug securing screw from the upper valve block.
- Remove purge plug.
- Replace with appropriate purge plug according to inlet pressure. Refer to table above.
- Grease purge plug O-ring to ensure ease of fit

1. Securing screw
2. Purge plug



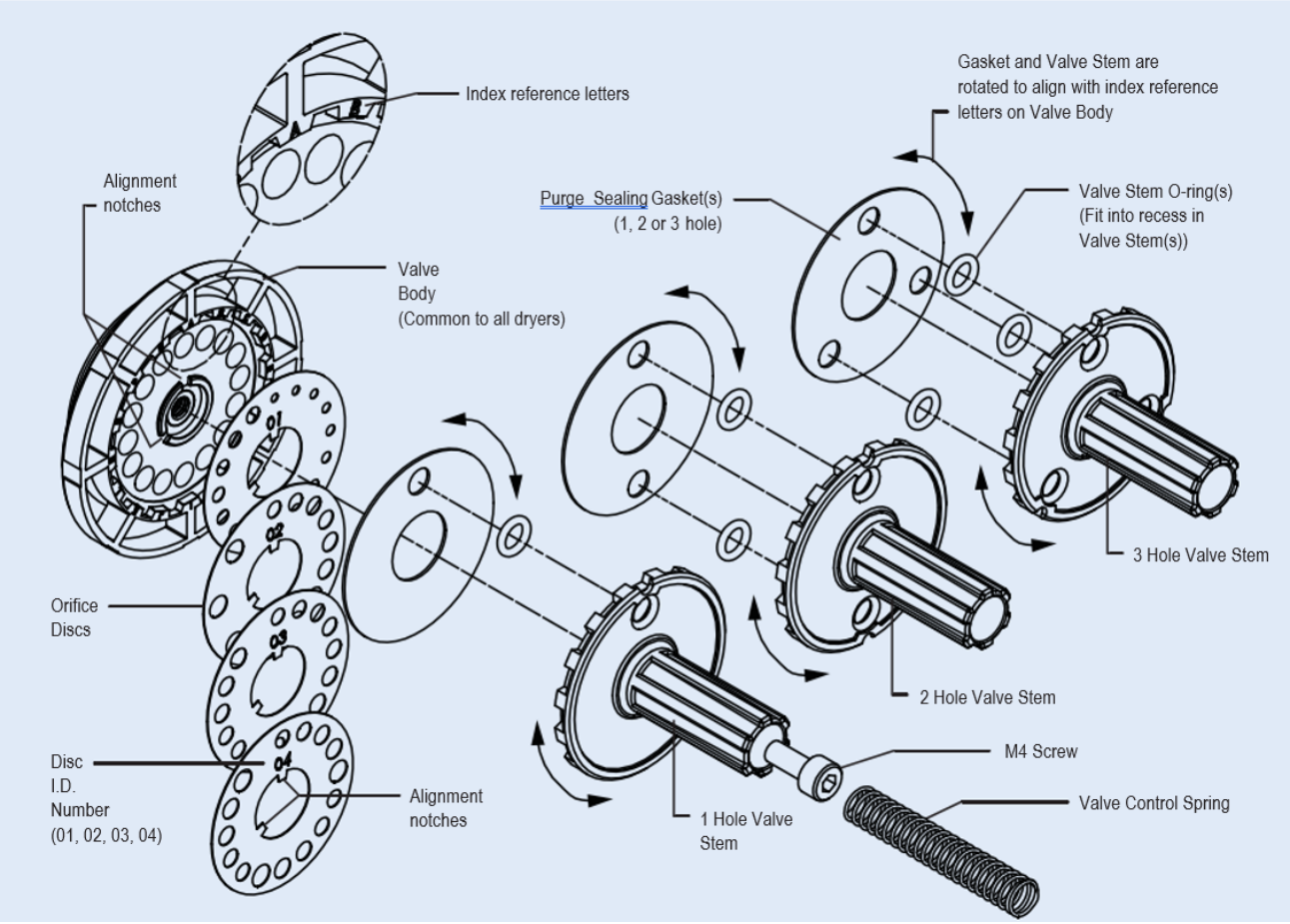
8.7 Purge orifice identification/changeout dMED 45 - 300

- Reference figure page 79 and the Purge Plug Identification Table.
- The lettering (A through S), located on the purge valve body, indicates the orifice size selected to suit the operating pressure of the dryer per the chart below.
- If the inlet pressure to the dryer will be different than the pre-set orifice size, the purge valve can be adjusted.
- Most dryers use a single orifice purge valve represented by the Blue and Green single letter references in the table below.
- Larger dryers may require a two or three hole purge valve as represented by the Red and Yellow two and three letter references.
- To select the correct orifice size, locate the appropriate dryer model at the left side of the table and then the operating pressure at the top.
- Make sure that the correct valve body (1, 2 or 3 hole) and orifice disc (01, 02, 03 or 04) has been supplied with the dryer. The discs have the number (01, 02, 03 or 04) stamped out at the top.

Purge Plug Identification

Operating pressure	4	5	6	7	8	9	10	11	12	13
Dryer										
MED/BAP 21	M	K	I	H	G	F	E	E	E	D
MED/BAP 35	B	S	P	M	L	L	K	I	I	H
MED/BAP 42	C	A	P	P	N	L	K	J	I	H
MED/BAP 52	I	E	C	A	P	M	K	K	J	I
MED/BAP 71	CK	M	G	F	C	B	A	S	S	P
MED/BAP 104	AFK	FN	DL	P	K	H	F	E	D	C
MED/BAP 142	DIN	CHM	AFK	GP	DL	CK	BJ	M	I	H
HYG-BLEED	**1.5**	**1.25**	**1.25**	**1**	**1**	**0.75**	**0.75**	**0.75**	**0.75**	**0.5**

Disc
01
02
03
04



- Reference figure above and the Purge Plug Identification Table on page 78.
- Once the correct purge body (1, 2 or 3 hole) and orifice disc (01, 02, 03 or 04) has been selected per the instructions on Page 78, the purge valve may be assembled.
- The index letters located on the purge valve body correspond with the selected orifice sizes per the Table on Page 78.
- Place the appropriate orifice disc onto the valve body, taking care to align the notches. The disc will only fit in one position. Place the valve stem O-ring(s) into their corresponding recesses on the back of the valve stem.
- Align the holes in the purge sealing gasket with the corresponding holes in the valve stem.
- Rotate the valve stem assembly so that the correct orifice letters align with the notches corresponding to the holes (1, 2 or 3) in the valve stem.
- Press the assembly together and fasten with the M4 screw.
- Double check to make sure that the open orifice holes correspond with the correct orifice selection as identified earlier.

9 Problem solving

Air inlet and outlet valve

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	Use only authorised genuine parts. Any damage or malfunction caused by the use of unauthorised parts is not covered by Warranty or Product Liability. Apply all relevant Safety precautions during maintenance or repair.
	All valves, couplings and pipes used/installed after the unit must be free from oil and grease (hydrocarbon contamination < 550 mg/m^2) and dust (particles size < 50 micrometer).
	Before carrying out any maintenance or repair work on the purifier unit: make sure that the tower or unit is not active or under pressure and switch off the voltage. Open the isolating switch to prevent an accidental start. Close air inlet and outlet valve (2) of the unit.
	The air inlet and outlet valve (2) can be locked during maintenance or repair work as follows: • Close the valve. • Using a wrench, remove the screw fixing the handle. • Lift the handle and turn it until the slot of the handle fits over the blocking edge on the valve body. • Fit the screw.

Faults and remedies, PD dryer unit

Condition	Fault	Remedy
The dryer produces a lot of noise	Check the silencers and their fixation	Replace the silencers if necessary or correct its fixation
Insufficient air leaves the dryer	Too much purge air escapes	Check the condition of the solenoid valve and replace it if necessary
Connection tubing	Tubing obstructed, ruptured or leaking	Check/clean piping and connections, replace worn parts
Instruction book missing or unreadable		Replace (contact your supplier)
Data label	Not present or unreadable	Clean or replace (contact your supplier)

Faults and remedies, water separator (WSD)

For all references below, consult section Servicing the water separator drain.

Condition	Fault	Remedy
Condensate is not discharged from the separator	Discharge pipe clogged	Check and correct as necessary
	Drain valve of separator malfunctioning	Remove drain valve assembly, clean and check
	For separator with EWD (electronic water drain): EWD malfunctioning	Consult Atlas Copco

Faults and remedies, filters

For all references below, consult section UD+ and PDp+ filter change.

Condition	Fault	Remedy
The filter produces a whistling noise	Filter bowl not correctly mounted	Fit the filter bowl correctly
Bad filtration	Filter element damaged Water in sightglass	Replace Check functioning of water separator (WSD)
Insufficient air leaves the filter	Filter clogged	Clean the filter bowl and replace the filter element

QDT filter

Condition	Fault	Remedy
Bad filtration	Activated carbon lifetime exceeded	Replace the activated carbon at the indicated intervals
	Wet air from dryer in activated carbon	Check proper functioning of the dryer
	Activated carbon not compressed	Check if spring is (properly) fitted
Too high CO concentration at outlet	Wet air from the dryer	Check proper functioning of the dryer Replace the desiccant at indicated intervals
	Too much CO at inlet	Check proper working conditions

Faults and remedies, ancillaries

Condition	Fault	Remedy
Inlet solenoid completely or partially closed/opened	• Electrical fault • Mechanical fault	• Check wiring • Replace defective parts
Pressure sensors: malfunctioning	Mechanical defect (e.g. diaphragm ruptured)	Replace defective parts

Pressure sensors: error signal (no measurement)	• Electric connection interrupted • Mechanical damage (e.g. too high mounting torque) • Connection plugs not connected • Crack due to incorrect mounting • Internal defect • No supply voltage	• Check connections • Check sensors
Pressure sensors: too high or too low indication	• Condense on connection plugs • Faulty supply signal • Clogging or contamination • Sensor internally defect • Deviation due to ageing • Deviation due to incorrect production	• Check sensors • Replace defective parts
Pressure regulator: wrong outlet pressure	Wrong setting	• Check gauge of pressure regulator • Adjust pressure
Dew point sensor malfunctioning	No direct feedback of dew point	Replace defective parts
Dew point sensor: no measurement (error signal)	No direct feedback of dew point	• Check connections • Check sensors
Dew point sensor: incorrect measurement	Dew point alarm generated too early or too late	• Check sensors • Replace defective parts

Faults and remedies, controller

Condition	Fault	Remedy
Doesn't read in pressure or dew point	Software fault	• Reprogram the controller • Check wiring
Doesn’t issue alarm(s) when it should	• Software fault • Connection fault between the controller and the control room display	• Reprogram the controller • Check wiring
Doesn't issue service warnings when it should	Software fault	Reprogram the controller
Keeps exhaust valves closed (for purge of dryer)	• Software fault • Communication fault	• Reprogram the controller • Check wiring • Check solenoid

10 Technical data

10.1 Fuse values

Attention

	The indicated fuse value is the maximum value. The cable size used may specify fuses of a lower value.

Values

	Frequency	Voltage	Fuse specification	Maximum fuse value
IEC	50 Hz	230 V	gL/gG	2 A
CSA/UL	60 Hz	115 V	CSA HRC/UL RK5	2 A
CSA/UL	60 Hz	230 V	CSA HRC/UL RK5	2 A

10.2 Electric cable size

Attention

	Local regulations remain applicable if they are stricter than the values proposed below. The voltage drop must not exceed 5% of the nominal voltage. It may be necessary to use cables of a larger size than those stated to comply with this requirement.

	Frequency	Voltage	Minimum cable size
IEC	50 Hz	230 V	3 x 1.5 mm²
CSA/UL	60 Hz	115 V	3 x AWG14
CSA/UL	60 Hz	230 V	3 x AWG14

10.3 Device settings

Regulating and safety devices

The regulating and safety devices are factory-adjusted to obtain optimum performance of the dryer. Do not alter the setting of any of the devices.

10.4 Reference conditions and limitations

Reference conditions

	Units	
Compressed air inlet pressure	bar(e)	See Technical data
Compressed air inlet pressure	psig	See Technical data
Compressed air inlet temperature	˚C	35
Compressed air inlet temperature	˚F	95
Ambient temperature	˚C	5 to 50
Ambient temperature	˚F	41 to 122
Inlet relative air humidity	%	95
Pressure dew point	°C	-40
Pressure dew point	°F	-40

Limitations

	Units	
Maximum compressed air inlet pressure	bar(e)	14
Maximum compressed air inlet pressure	psig	203
Minimum compressed air inlet pressure	bar(e)	4
Minimum compressed air inlet pressure	psig	58
Maximum concentration of contaminants:		
O_2 concentration	%	20 < x < 22
CO_2 concentration	ppm	700
SO_2 concentration	ppm	5
NO_x concentration	ppm	5
Water vapour amount	%	100
Oil vapour amount	mg/m^3	3

10.5 Technical data

Data at 7 bar inlet pressure

	Unit	dMED 025	dMED 035	dMED 045	dMED 075	dMED 090
Volume flow at dryer inlet	l/min	710	990	1220	2120	2550
Volume flow at dryer inlet	cfm	25.5	36	44.5	74.2	89
Pressure drop over dryer	mbar	646	926	722	757	644
Pressure drop over dryer	psi	9,37	13,4	10,47	10.98	9.34
Time of half a cycle	s	154	154	154	154	154
Regeneration time	s	120	120	120	120	120

	Unit	dMED 025	dMED 035	dMED 045	dMED 075	dMED 090
Pressurization time	s	34	34	34	34	34
Installed power	W	340	340	340	340	340
Net mass	kg	220	240	280	320	360
Net mass	lb	485	529	617	703	794
Air quality (Pharmacopeia)						
• O_2 concentration	%			20<X< 22		
• CO_2 concentration	ppm			500		
• CO concentration	ppm			5		
• SO_2 concentration	ppm			1		
• NO_x concentration	ppm			2		
• Pressure dew point	°C			-31		
• Pressure dew point	°F			-23.8		
• Oil vapour	mg/m³			0.1		
• Taste and odour				free		

	Unit	dMED 110	dMED 150	dMED 220	dMED 300
Volume flow at dryer inlet	l/min	3110	4250	6230	8500
Volume flow at dryer inlet	cfm	137.7	169.5	211.9	307.2
Pressure drop over dryer	mbar	724	764	1105	1475
Pressure drop over dryer	psi	9,57	10,15	11,89	11,60
Time of half a cycle	s	154	154	154	154
Regeneration time	s	120	120	120	120
Pressurization time	s	34	34	34	34
Installed power	W	340	340	340	340
Net mass	kg	450	510	650	760
Net mass	lb	992	1124	1433	1675
Air quality (Pharmacopeia)					
• O_2 concentration	%			20<X<22	
• CO_2 concentration	ppm			500	
• CO concentration	ppm			5	
• SO_2 concentration	ppm			1	
• NO_x concentration	ppm			2	
• Pressure dew point	°C			-31	
• Pressure dew point	°F			-23.8	
• Oil vapour	mg/m³			0.1	
• Taste and odour				free	

Data at 10 bar inlet pressure

	Unit	dMED 025	dMED 035	dMED 045	dMED 075	dMED 090
Volume flow at dryer inlet	l/min	960	1360	1760	2920	3480
Volume flow at dryer inlet	cfm	33.9	48.7	61.4	103.8	122.9
Pressure drop over dryer	mbar	646	926	722	757	644
Pressure drop over dryer	psi	9,37	13,4	10,47	10.98	9.34
Time of half a cycle	s	154	154	154	154	154
Regeneration time	s	120	120	120	120	120
Pressurization time	s	34	34	34	34	34
Installed power	W	340	340	340	340	340
Net mass	kg	220	240	280	320	360
Net mass	lb	485	529	617	703	794
Air quality (Pharmacopeia)						
• O_2 concentration	%			20<X< 22		
• CO_2 concentration	ppm			500		
• CO concentration	ppm			5		
• SO_2 concentration	ppm			1		
• NO_x concentration	ppm			2		
• Pressure dew point	°C			-31		
• Pressure dew point	°F			-23.8		
• Oil vapour	mg/m³			0.1		
• Taste and odour				free		

	Unit	dMED 110	dMED 150	dMED 220	dMED 300
Volume flow at dryer inlet	l/min	4280	5830	8520	11640
Volume flow at dryer inlet	cfm	150.4	192.8	300.8	411
Pressure drop over dryer	mbar	660	700	820	800
Pressure drop over dryer	psi	9,57	10,15	11,89	11,60
Time of half a cycle	s	154	154	154	154
Regeneration time	s	120	120	120	120
Pressurization time	s	34	34	34	34
Installed power	W	340	340	340	340
Net mass	kg	450	510	650	760
Net mass	lb	992	1124	1433	1675
Air quality (Pharmacopeia)					
• O_2 concentration	%			20<X< 22	
• CO_2 concentration	ppm			500	
• CO concentration	ppm			5	

• SO_2 concentration	ppm			1	
• NO_x concentration	ppm			2	
• Pressure dew point	°C			-31	
• Pressure dew point	°F			-23.8	
• Oil vapour	mg/m³			0.1	
• Taste and odour				free	

Data at 13 bar inlet pressure

	Unit	dMED 025	dMED 035	dMED 045	dMED 075	dMED 090
Volume flow at dryer inlet	l/min	1246	1727	2237	3710	4474
Volume flow at dryer inlet	cfm	44.5	61.4	78.4	131.4	159
Pressure drop over dryer	mbar	646	926	722	757	644
Pressure drop over dryer	psi	9,37	13,4	10,47	10.98	9.34
Time of half a cycle	s	154	154	154	154	154
Regeneration time	s	120	120	120	120	120
Pressurization time	s	34	34	34	34	34
Installed power	V	340	340	340	340	340
Net mass	kg	220	240	280	320	360
Net mass	lb	485	529	617	703	794
Air quality (Pharmacopeia)						
• O_2 concentration	%			20<X< 22		
• CO_2 concentration	ppm			500		
• CO concentration	ppm			5		
• SO_2 concentration	ppm			1		
• NO_x concentration	ppm			2		
• Pressure dew point	°C			-31		
• Pressure dew point	°F			-23.8		
• Oil vapour	mg/m³			0.1		
• Taste and odour				free		

	Unit	dMED 110	dMED 150	dMED 220	dMED 300
Volume flow at dryer inlet	l/min	5465	7447	10902	14866
Volume flow at dryer inlet	cfm	192.8	262.7	385.6	525.5
Pressure drop over dryer	mbar	646	926	722	757
Pressure drop over dryer	psi	9,37	13,4	10,47	10.98
Time of half a cycle	s	154	154	154	154
Regeneration time	s	120	120	120	120
Pressurization time	s	34	34	34	34
Installed power	W	340	340	340	340

Net mass	kg	450	510	650	760
Net mass	lb	992	1124	1433	1675
Air quality (Pharmacopeia)					
• O_2 concentration	%			20<X< 22	
• CO_2 concentration	ppm			500	
• CO concentration	ppm			5	
• SO_2 concentration	ppm			1	
• NO_x concentration	ppm			2	
• Pressure dew point	°C			-31	
• Pressure dew point	°F			-23.8	
• Oil vapour	mg/m³			0.1	
• Taste and odour				free	

Remark

When the actual inlet pressure or inlet temperature differs from the reference condition, the volume flow will be different. Consult your supplier.

11 European Directives

11.1 Instructions for Use

Instructions

	Description
1	The dryers can contain pressurized air. This can be potentially dangerous if the equipment is misused.
2	The towers of the dryer consist of an extruded profile, which must only be used as a compressed air vessel and must be operated within the limits specified. See section Pressure equipment directives, table A.
3	No alterations must be made to the vessels by welding, drilling or other mechanical methods without the written permission of the manufacturer.
4	The design pressure and temperature of this pressure bearing part must be clearly indicated on the data label.
5	If installed, the safety valve must correspond with pressure surges of 1.1 times the maximum allowable operating pressure. This should guarantee that the pressure will not permanently exceed the maximum allowable operating pressure of the vessel.
6	Original bolts have to be used after opening for inspection. The maximum torque has to be taken into consideration (see table below).

Maximum bolt torque

Thread size	Tightening torque (Nm)	Allowed deviation (Nm)
M3	1	0.3
M4	2.4	0.6
M5	5	1.2
M6	8	2.1
M8	20	5
M10	41	10
M12	73	18
M14	115	29
M16	185	46
M18	238	60
M20	335	84

11.2 Pressure equipment directives

Components are subject to Pressure Equipment Directive 2014/68/EU.

Parts of article 4.3 of 2014/68/EU are subject to Sound Engineering Practice (SEP).

Parts of category I according to 2014/68/EU are integrated into the machine and fall under the exclusion of article I, section 2-(f)-(i).

Below table contain the necessary information for the inspection of all pressure equipment of category I according Pressure Equipment Directive 2014/68/EU.

DRYER TYPE	DESIGN PRESSURE (BARG)	DESIGN TEMPERATURE (°C)	PED CATEGORY	MODULE	EXTRUSION WALL THICKNESS (mm)	EXTRUSION INTERNAL DIAMETER (mm)	VOLUME (Litres)
PD025	16	5 to 50°C	CAT I	A	3	86	11
PD035	16	5 to 50°C	CAT II	D1	3	86	15.8
PD0046	13	5 to 50°C	CAT II	D1	7	149	22.2
PD0056	13	5 to 50°C	CAT II	D1	7	149	25.2
PD0075	13	5 to 50°C	CAT II	D1	7	149	31.4
PD0090	13	5 to 50°C	CAT II	D1	7	149	35.9
PD0110	13	5 to 50°C	CAT II	D1	7	149	44.6
PD0150	13	5 to 50°C	CAT II	D1	7	149	56.8
PD0180	13	5 to 50°C	CAT II	D1	7	149	66
PD0220	13	5 to 50°C	CAT III	B1+D	7	149	88.6
PD0300	13	5 to 50°C	CAT III	B1+D	7	149	113
PD0360	13	5 to 50°C	CAT III	B1+D	7	149	131.5

Recommendation of the manufacturer for the re-inspection time

Following actions are to be executed by authorized service personnel, unless stated differently in the applicable legislation. The stated time interval has as reference the day of start-up of the unit.

- Every 6 months: visual check of the vessel material on the outside (exposed) for traces of strong corrosion. Consult the service department of your supplier if necessary.
- Every 5 years: when replacing the desiccant, following inspections are to be carried out:
  - Inspection of outside and inside of the material for excessive and local corrosion,
  - Inspection of outside and inside of the material for fissures, leaks, damage. Consult the service department of your supplier if necessary.
- Every 10 years: hydrostatic test according to the Pressure Equipment Directive 2014/68/EU. Consult the service department of your supplier if necessary.

12 Medical Device Directives

Components subject to 93/42/EC Medical Devices Directive

All components are designed, manufactured and inspected according to the European Directive 93/42/EC annex II and art. 11 par. 3.

Overall rating

The purifier unit conform to the Medical Devices Directive 93/42/EC category IIb.