PNEUMATECH

PB 3390 S

Instruction book

pneumatech
Pure air . Pure gas

AERO

PNEUMATECH

PB 3390 S

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.

Table of contents

1 Safety precautions

1.1 Safety icons

Explanation

	Danger for life
	Warning
	Important note

1.2 Safety precautions, general

General precautions

1. The dryers are designed for normal indoor use.
2. The operator must employ safe working practices and observe all related work safety requirements and regulations.
3. If any of the following statements does not comply with the applicable legislation, the stricter of the two shall apply.
4. Installation, operation, maintenance and repair work must only be performed by authorized, trained, specialized personnel.
5. The dryer is not considered capable of producing air of breathing quality. For air of breathing quality, the compressed air must be adequately purified according to the applicable legislation and standards.
6. Before any maintenance, repair work, adjustment or any other non-routine checks, stop the dryer, press the emergency stop button, switch off the voltage and depressurize the dryer. In addition, the power isolating switch must be opened and locked. Make sure that the dryer is isolated from the air net by separately installed valves or make sure that it is impossible to start up all compressors connected to the air net by opening and locking their isolating switches.
7. 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.
8. The owner is responsible for maintaining the unit in safe operating condition. Parts and accessories shall be replaced if unsuitable for safe operation.
9. It is not allowed to walk or stand on the dryer components.

1.3 Safety precautions during installation

	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.

Precautions during installation

1. The machine must only be lifted using suitable equipment 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. The unit is designed for indoor use. If the unit is installed outdoors, special precautions must be taken; consult the manufacturer.
3. Install the dryer as level as possible and fix it firmly to the floor.
4. Place the machine where the ambient air is as cool and clean as possible. If necessary, install a suction duct. Never obstruct the air inlet. Care must be taken to minimize the entry of moisture at the inlet air.
5. Any blanking flanges, plugs, caps and desiccant bags must be removed before connecting the pipes.
6. 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.
7. The aspirated air must be free of flammable fumes, vapors and particles, e.g. paint solvents, that can lead to internal fire or explosion.
8. Arrange the air intake so that loose clothing worn by people cannot be sucked in.
9. No external force may be exerted on the air outlet valve; the connected pipe must be free of strain.
10. 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 start equipment.
11. The electrical connections must correspond to 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 dryer.
12. 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.
13. 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.
14. Piping or other parts with a temperature in excess of 80˚C (176˚F) and which may be accidentally touched by personnel in normal operation must be guarded or insulated. Other high-temperature piping must be clearly marked.
15. If the ground is not level or can be subject to variable inclination, consult the manufacturer.
16. If no fire extinguishing system is present in the air net close to the dryer, safety valves must be installed in the vessels of the dryer.
17. Make sure that all piping is installed stress-free.

18. 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 following safety precautions: Safety precautions during operation and Safety precautions during maintenance. 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 machine.

1.4 Safety precautions during operation

	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.

Precautions during operation

1. Never touch 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 machine below or in excess of its limit ratings.
5. People staying in environments or rooms where the sound pressure level reaches or exceeds 90 dB(A) shall wear ear protectors.
6. 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 repair, free of wear or abuse
7. Never operate the machine when there is a risk of taking in flammable or toxic fumes, vapors or particles.
8. Do not remove any of, or tamper with, the sound-damping material.
9. 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.

	Also consult following safety precautions: Safety precautions during installation and Safety precautions during maintenance. 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 machine.

1.5 Safety precautions during maintenance or repair

	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.

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.
3. Use only genuine spare parts.
4. All maintenance work shall only be undertaken when the machine has cooled down.
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 start equipment.
7. Before removing any pressurized component, effectively isolate the machine from all sources of pressure and relieve the entire system of pressure.
8. Never use flammable solvents or carbon tetrachloride for cleaning parts. Take safety precautions against toxic vapors of cleaning liquids.
9. Scrupulously observe cleanliness during maintenance and repair. Keep dirt away by covering the parts and exposed openings with a clean cloth, paper or tape.
10. 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.
11. Never use a light source with open flame for inspecting the interior of a machine, pressure vessel, etc.
12. Make sure that no tools, loose parts or rags are left in or on the machine.
13. 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.
14. 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. If removed, check that the coupling guard of the compressor drive shaft has been reinstalled.
15. Protect the motor, air filter, electrical and regulating components, etc. to prevent moisture from entering them, e.g. when steam-cleaning.
16. Never use caustic solvents which can damage materials of the air net, e.g. polycarbonate bowls.
17. **The following safety precautions are stressed when handling desiccant:**
    - Take precautions not to inhale desiccant dust.

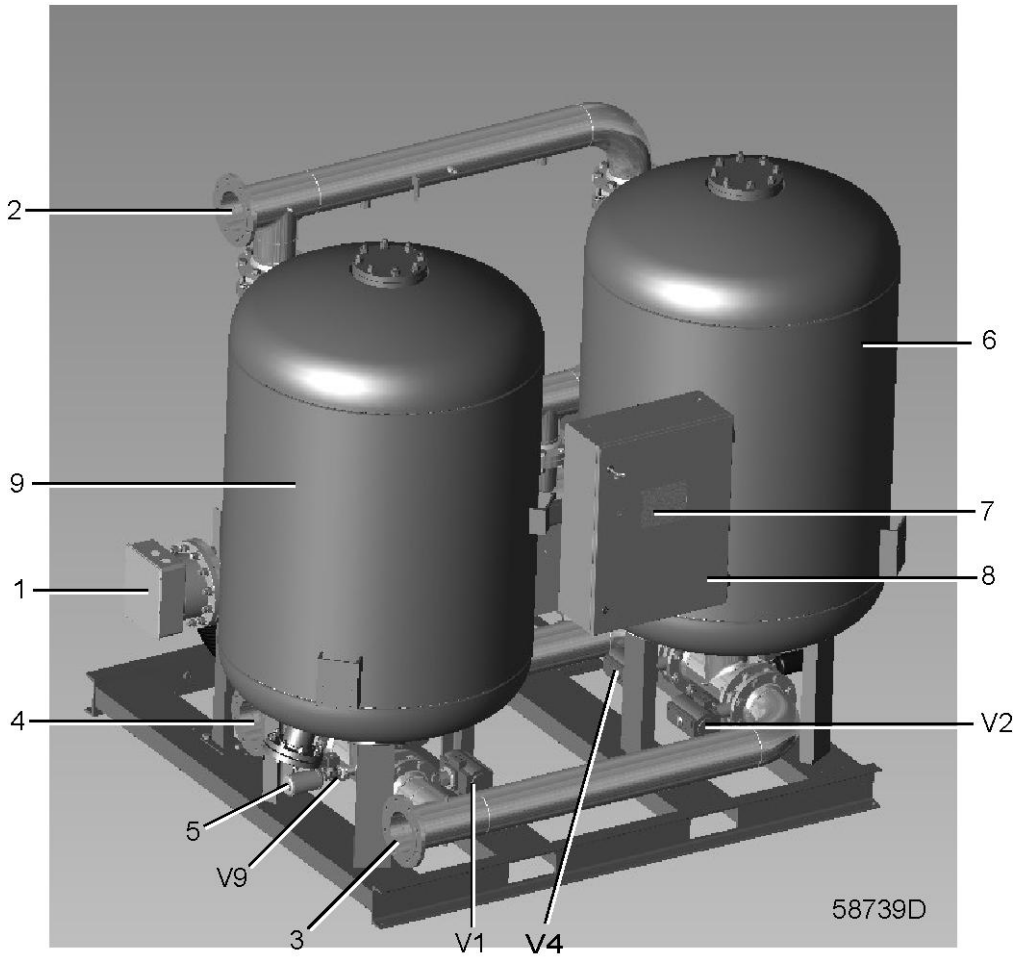
- Check that the working area is adequately ventilated; if required, use breathing protection.
- Do not overfill the dryer when replacing desiccant.

	Also consult following 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 machine. After maintenance or repair, a functional test with depressurized vessels must be performed to check the correct operation of the dryer.

2 General description

2.1 Introduction

Front view

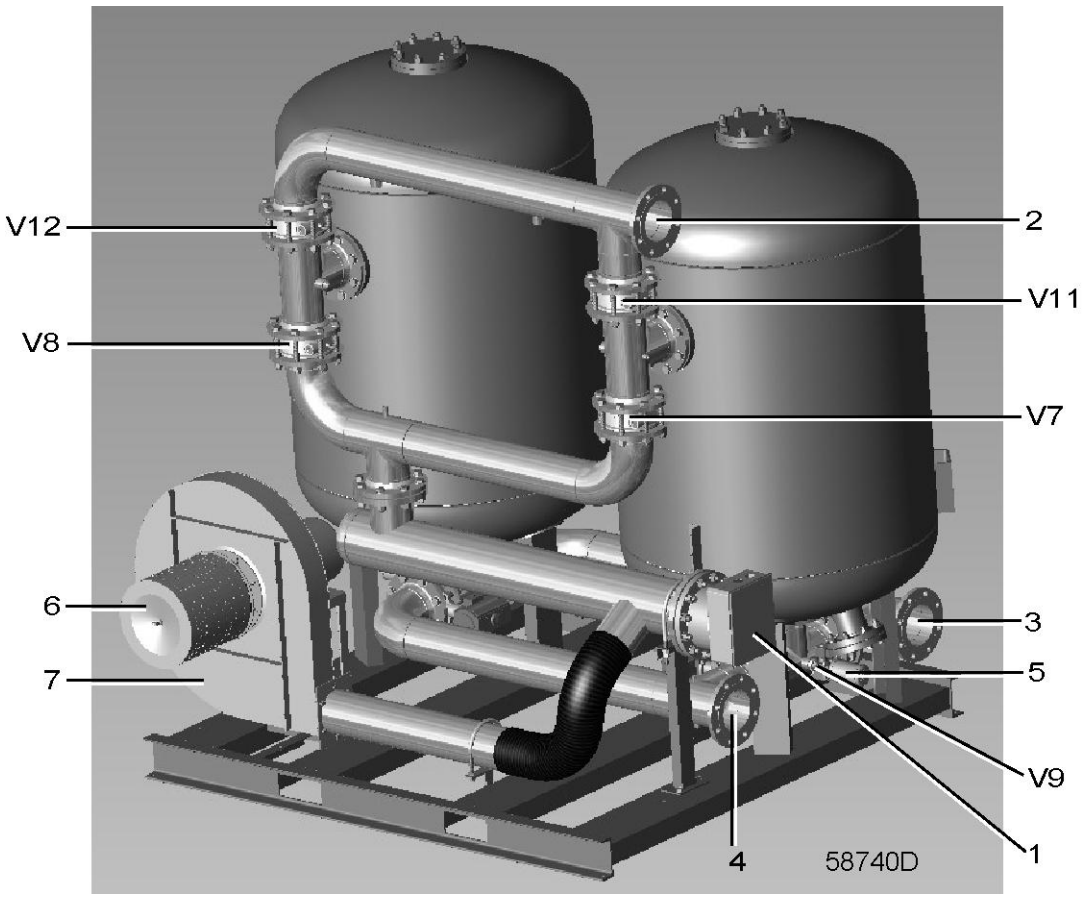


Front view of air dryer

Ref	Name
1	Heater
2	Air outlet
3	Air inlet
4	Regeneration air outlet
5	Blow-off silencer
6	Adsorption tower B
7	Control panel
8	Electrical cubicle
9	Adsorption tower A

Ref	Name
V1	Inlet valve, vessel A
V2	Inlet valve, vessel B
V4	Regeneration valve, vessel B
V9	Blow-off valve, vessel A
V12	Outlet valve, vessel B

Rear view



Rear view of air dryer

Ref	Name
1	Heater
2	Air outlet
3	Air inlet
4	Regeneration air outlet
5	Blow-off silencer
6	Blower filter (optional)
7	Blower
V7	Blower valve, vessel A
V8	Blower valve, vessel B

Ref	Name
V11	Outlet valve, vessel A
V12	Outlet valve, vessel B

Description

The air dryers remove moisture from compressed air by adsorption. The air dryer consists of two drying towers containing desiccant. While one tower adsorbs moisture, the other is regenerating. Every 4 hours, the tower function is reversed.

Due to the dewpoint meter, the cycle time of the towers can be made longer than normal to save energy and to increase the dryer lifetime (see section Dewpoint meter).

The desiccant consists of one layer of Activated Alumina. They produce dewpoints from -40 °C (-40 °F).

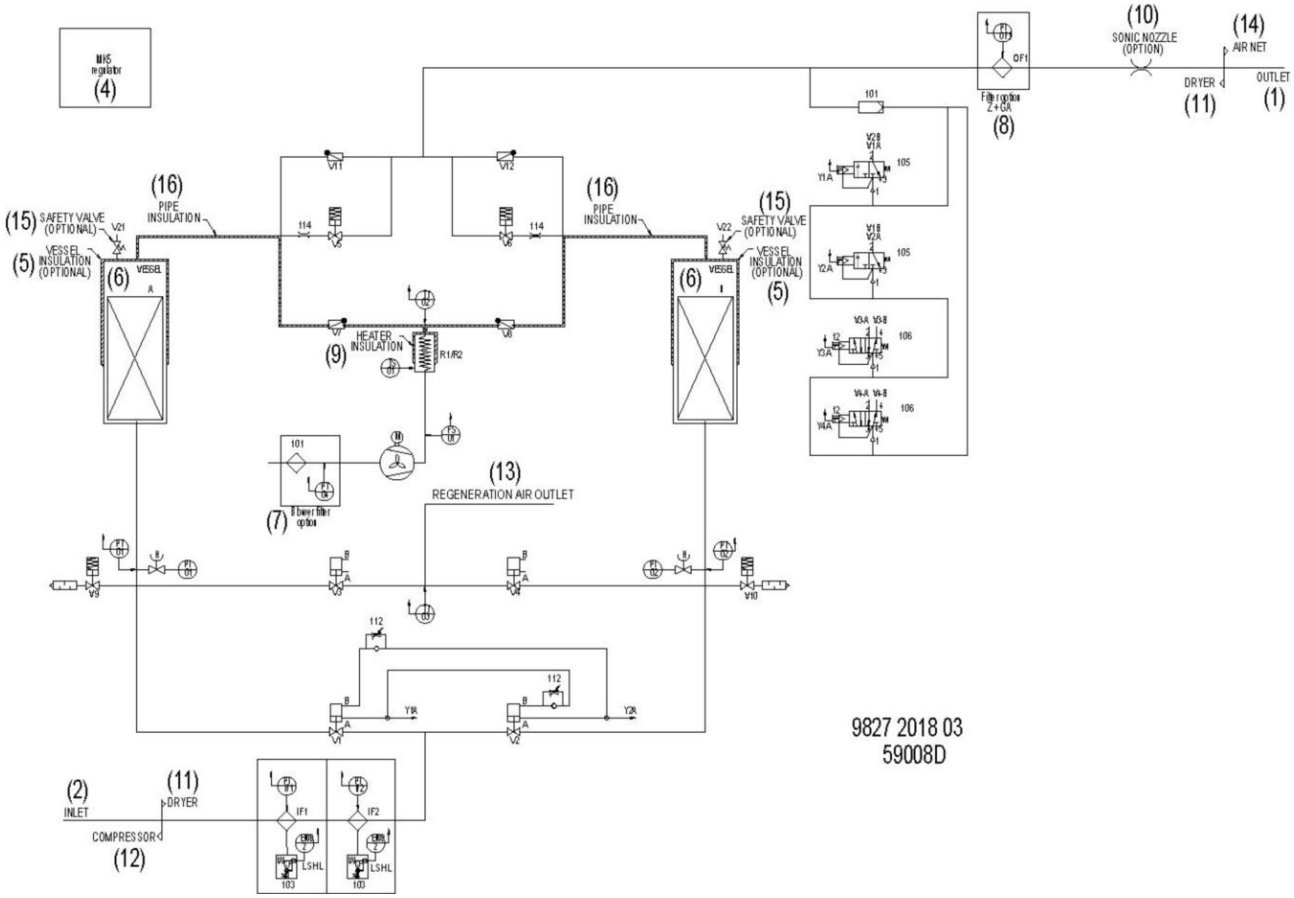
The even round shape of the beads and their vitreous, glossy surface ensure an evenly distributed flow, low pressure drops, low friction and a very low dust emission.

Provided the dryer is maintained properly and in normal operation conditions, the drying beads can adsorb moisture and regenerate time after time during 5 years of continuous operation.

A thermostat controls the regeneration temperature. Alarm functions are included for high regeneration temperature, low working pressure, shifting failure, etc...

2.2 Air circuit

Flow diagram



Flow diagram

Text on figures

Ref	Description
(1)	Outlet
(2)	Inlet
(4)	Regulator
(5)	Vessel insulation, optional
(6)	Vessel
(7)	Blower filter, optional
(8)	Filter, optional
(9)	Heater insulation
(10)	Sonic nozzle, optional
(11)	Dryer side
(12)	Compressor side
(13)	Regeneration air outlet
(14)	Air net side

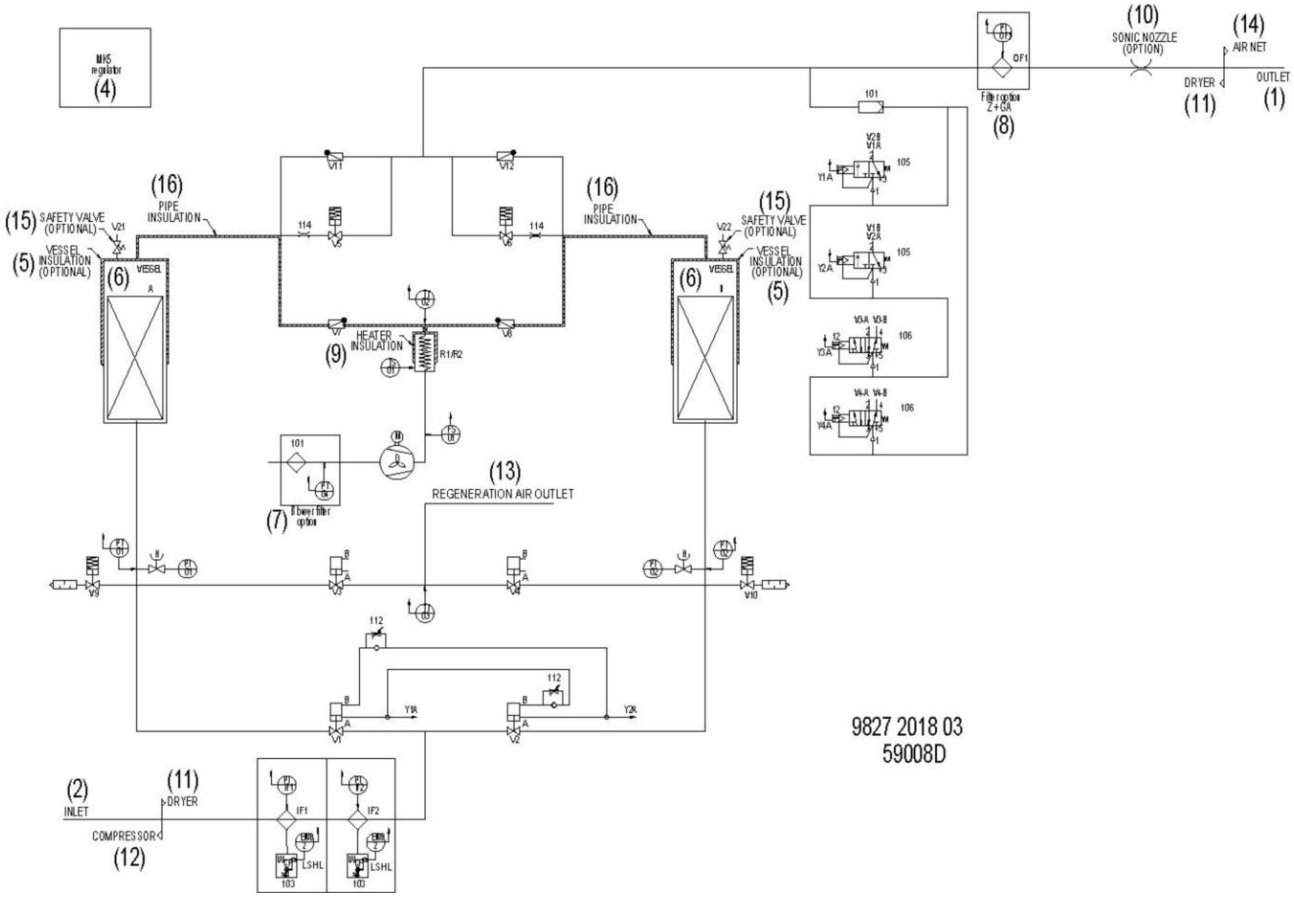
(15)	Safety valve (option)
(16)	

Description

Wet compressed air enters the system and flows to the bottom of one of the towers (A or B) via inlet valve (V1) or (V2). After passing through the desiccant, which adsorbs the moisture contained in the inlet air, the dry compressed air leaves the dryer via outlet valve (V11 or V12). The moisture in the drying tower is removed during regeneration.

2.3 Regeneration circuit

Flow diagram



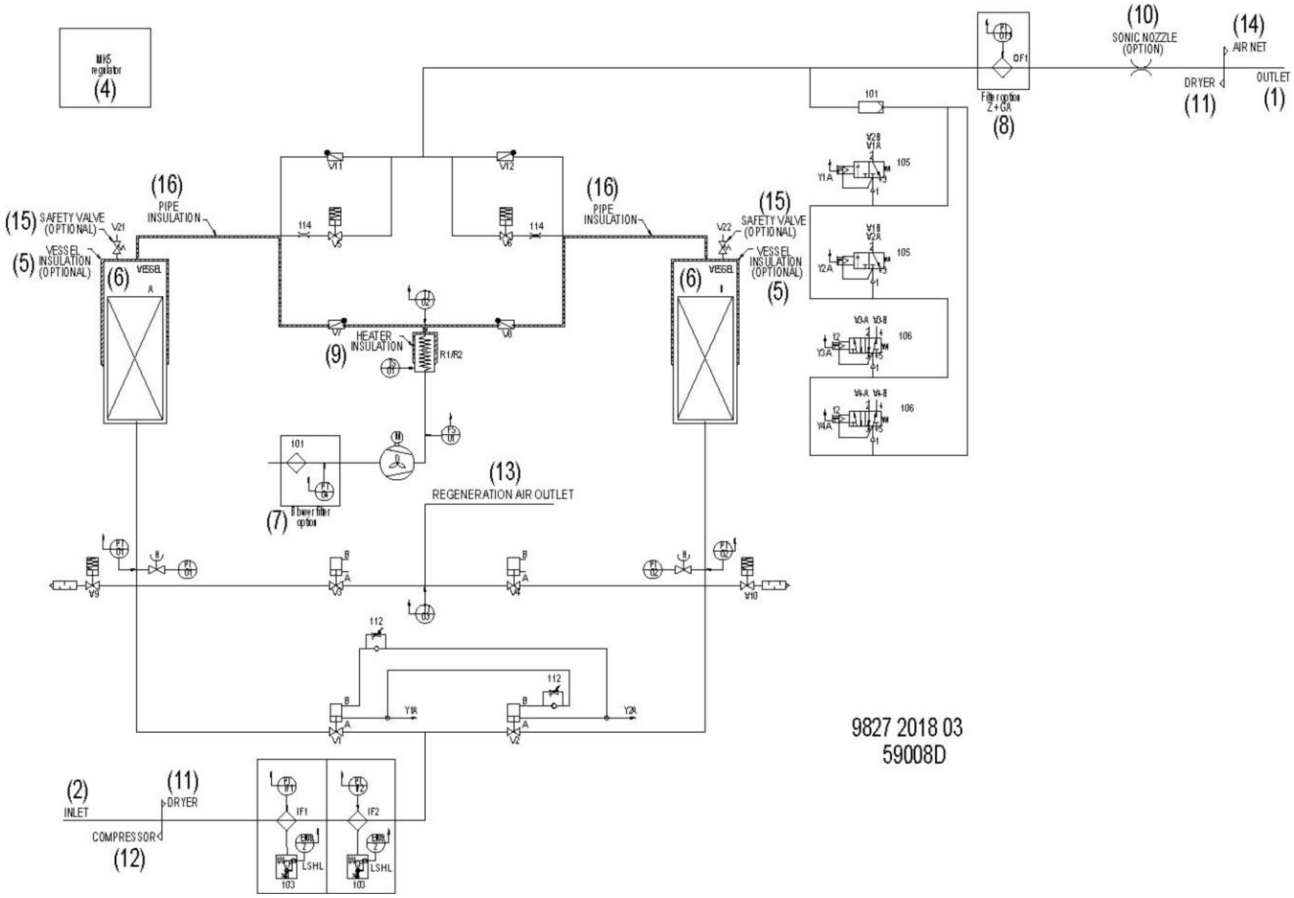
Flow diagram

Description

The wet desiccant beads are dried in the regeneration stage. The tower is depressurized via blow-off valve (V9 or V10). A fan-driven air flow is blown via check valve (V7 or V8) downwards through the desiccant bed, after being heated by electric heaters (R1/R2), and forces the moisture out through regeneration air outlet valve (V3 or V4).

2.4 Cooling and pressure equalization

Flow diagram



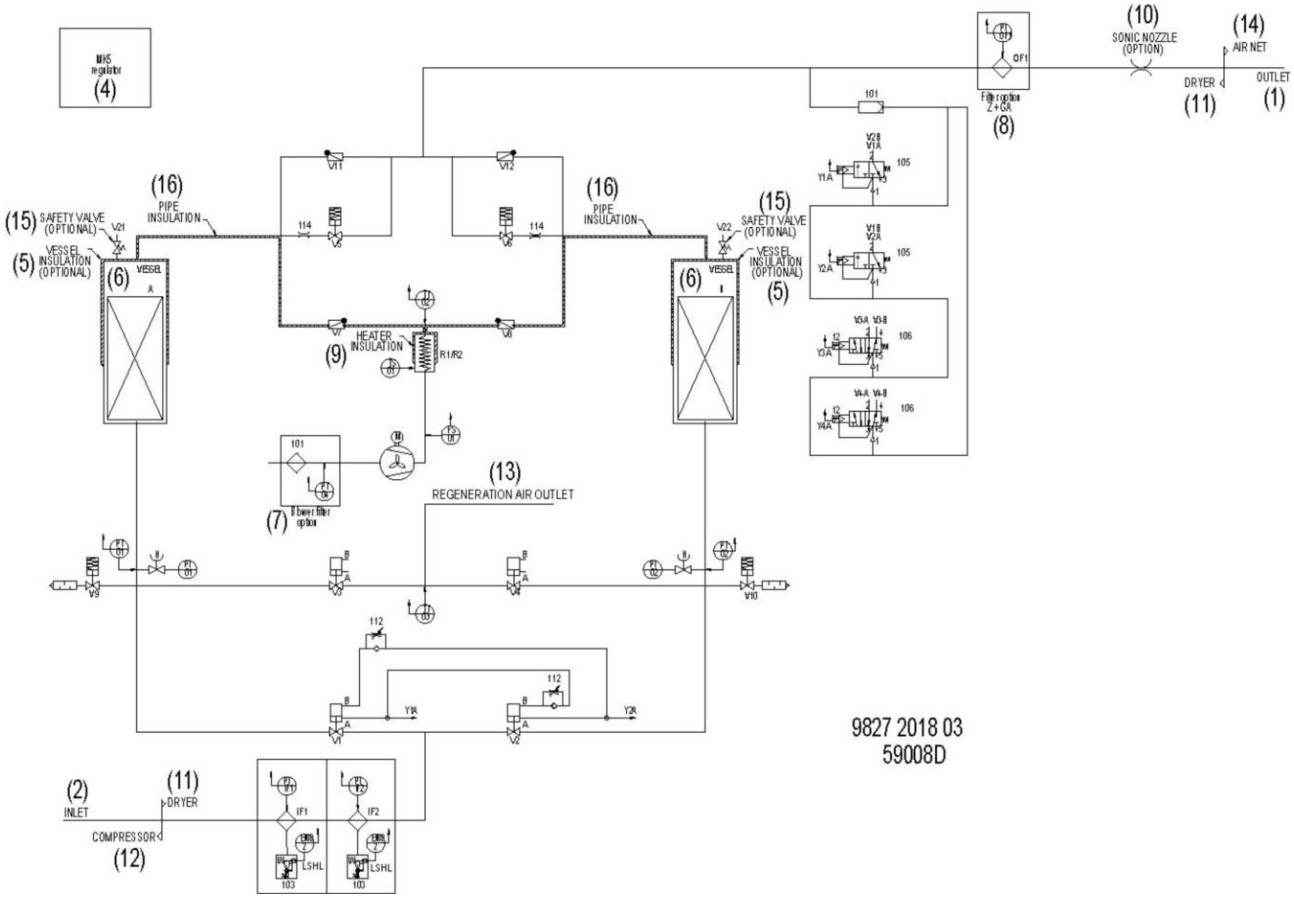
Flow diagram

Description

- After approximately 3 hours of regeneration, the heating elements are switched off. The fan-driven air flow continues through the tower for a few more minutes, cooling the tower and the heating elements (cooling 1 = cooling with blower).
- After the blower has stopped (cooling 2 = blower stopping time), the cooling air valve (V5 or V6) opens and the tower is cooled by dry compressed air for approximately 1 hour (cooling 3 = cooling with dry compressed air).

2.5 Shifting towers

Flow diagram



Flow diagram

Description

After pressure equalization, the dryer will shift towers.

Before shifting towers however, the dryer is in the standby cycle. The equalization valve V5 or V6 is opened to ensure that the pressure in both vessels is equalized. When the actual half cycle time is less than 4 hours, which happens when the regeneration cycle was shorter than 3 hours, the dryer will wait to shift until a cycle of 4 hours is completed. The PDP sensor will monitor the PDP and will only shift towers if the dewpoint rises above -40 °C (-40 °F). The maximum half cycle time is 24 hours to prevent damaging the desiccant.

	As a safety feature, the dryer can only shift towers when the pressure difference between both towers is less than 0.5 bar (7.25 psi).

Depending on the load conditions, this will result in considerable energy savings.

2.6 Operating cycles

Description

The dryer is controlled by an electronic regulator.

The main cycle steps are as follows:

Step	Function of tower A	Function of tower B	
0	Stopped	Stopped	--
1	Shifting	Shifting	--
2	Pressure relief	Adsorbing	5 min
3	Start of blower	Adsorbing	--
4	Heating 1 (see note 1)	Adsorbing	180 min
5	Pre-cooling	Adsorbing	5 min
6	Stopping blower	Adsorbing	60 s
7	Cooling with dry compressed air	Adsorbing	57 min
8	Pressure equalisation	Adsorbing	5 min
9	Waiting	Adsorbing	---
10	Shifting	Shifting	--
11	Adsorbing	Pressure relief	5 min
12	Adsorbing	Start of blower	---
13	Adsorbing	Heating 1 (see note 1)	180 min
14	Adsorbing	Pre-cooling	5 min
15	Adsorbing	Stopping blower	60 s
16	Adsorbing	Cooling with dry compressed air	57 min
17	Adsorbing	Pressure equalisation	5 min
18	Adsorbing	Split flow cooling	10 min
19	Adsorbing	Waiting	---

Note 1	If the desiccant is fully regenerated before the heating cycle has ended, the temperature in the regeneration outlet will rise and the temperature sensor (TT3) will cause the program (regulator) to switch to the next cycle step (i.e. cooling 1 = cooling with blower).

The regulator will display a warning if the operating pressure drops below the minimum setting of 4.5 bar(e) (65.3 psig). When the dryer is restarted (e.g. after a power failure or a shut-down) from a step in which one of the vessels was depressurized, the blow-off valve will open for some time to make sure that the pressure is released. The dryer will continue the cycle, starting from the cycle step where it was stopped or where the power failure or shut-down occurred.

Example:

If the dryer is stopped in step 4 after 60 minutes, it will continue in step 4 for another 120 minutes after restarting.

	For working applications below 4.5 bar(e) (65.3 psig) special provisions are to be taken on the dryer selection (consult the manufacturer).

The display shows which cycle steps the towers are working in, making it easy to monitor the operation. The display can also indicate regeneration temperature, pressure and time settings, as well as the status of valves, temperature switches, optional dewpoint indicator, etc.

2.7 External dryer status indication

Warning

	Stop the compressor and switch off the voltage before connecting external equipment. Consult the Safety precautions.

Potential-free alarm relay

The dryer is equipped with potential-free contacts:

- K01: to indicate that the dryer is running (contacts 62 and 63 on terminal strip 1X7)
- K02: to indicate the PDP status (contacts 64 and 65 on terminal strip 1X7)
- K03: to indicate a shut-down (contacts 66 and 67 on terminal strip 1X7)
- K04: to indicate a general warning (contacts 68 and 69 on terminal strip 1X7)

The contact characteristics (conforming to IEC 947-5-1) of the electromechanical relay module are as follows:

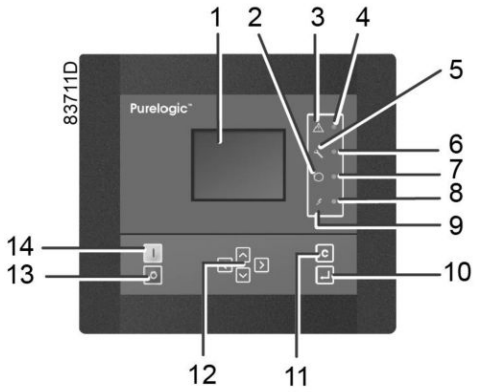
- Rated operating voltage: up to 250V AC
- Rated operating current per 1 million operating cycles

Utilization category	Rated operating current (A)
AC-12 230V AC	4
AC-13 230V AC	1
AC-14 230V AC	1
AC-15 230V AC	1
DC-12 24V DC	5
DC-13 24V DC	1

3 PureLogic™ controller

3.1 General

Controller



General description

The controller automatically controls and protects the dryer, i.e.:

- keeping the pressure dew-point stable
- monitoring pressures, temperatures and digital switches to ensure safe operation, and stopping the dryer whenever necessary
- restarting the dryer when required

In order to control the dryer and to read and modify programmable parameters, the regulator has a control panel provided with:

- LEDs indicating the status of the dryer
- a display indicating the operating conditions or a fault
- keys to control the dryer and to access the data collected by the regulator
- buttons to manually start and stop the dryer

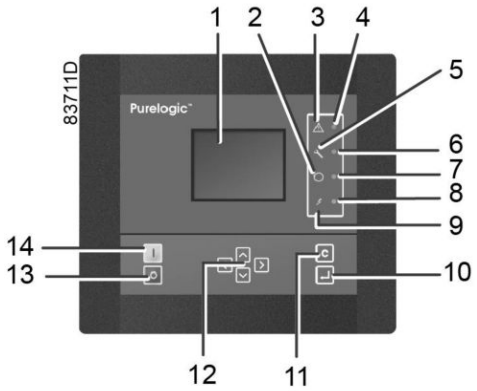
Automatic restart after voltage failure

The regulator has a built-in function to automatically restart the dryer if the voltage is restored after voltage failure.

	Provided the regulator was in the automatic operation mode, the dryer will automatically restart if the supply voltage to the module is restored within a programmed time period. The power recovery time (the period within which the voltage must be restored to have an automatic restart) can be set between 15 and 3600 seconds or to 'Infinite'. If the power recovery time is set to 'Infinite', the dryer will always restart after a voltage failure, no matter how long it takes to restore the voltage. A restart delay can also be programmed, allowing for example the dryer and the compressors to be restarted one after the other.

3.2 Control panel

Controller

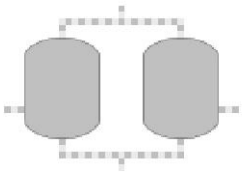
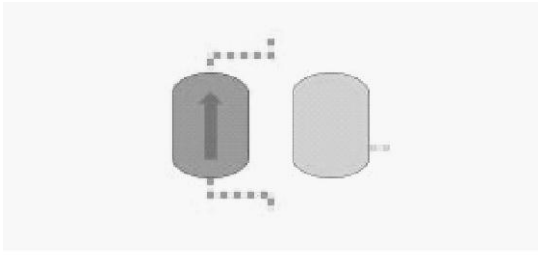
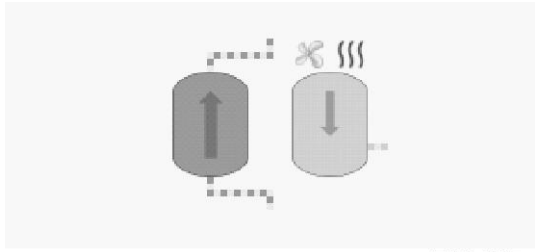
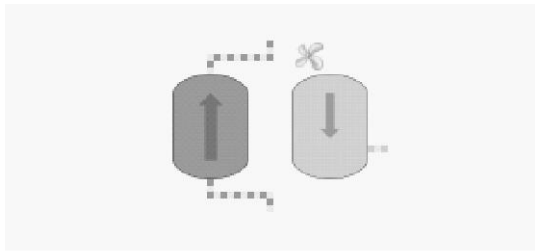
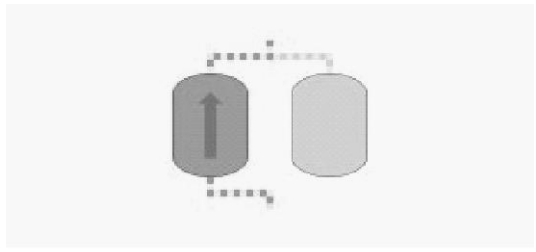


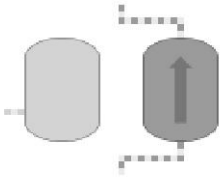
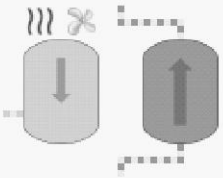
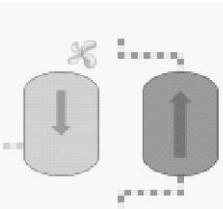
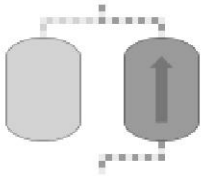
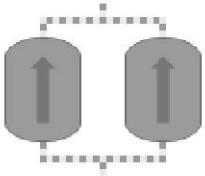
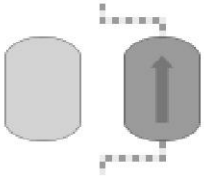
Parts and functions

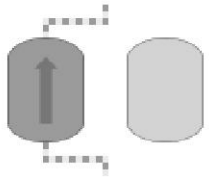
Reference	Designation	Function
1	Display	Shows the dryer operating condition and a number of icons to navigate through the menu.
2	Pictograph	Automatic operation
3	Pictograph	General alarm
4	General alarm LED	Flashes if a shut-down warning condition exists.
5	Pictograph	Service
6	Service LED	Lights up if service is needed
7	Automatic operation LED	Indicates that the regulator is automatically controlling the dryer.
8	Voltage on LED	Indicates that the voltage is switched on.
9	Pictograph	Voltage on
10	Enter key	Key to activate the selected menu or to modify the selected parameter.
11	Escape key	To go to previous screen or to end the current action
12	Scroll keys	Keys to scroll through the menu.
13	Stop button	Button to stop the dryer. LED (7) goes out.
14	Start button	Button to start the dryer. LED (7) lights up indicating that the controller is operative.

3.3 Icons used

Animation

Animation	Description
 59313D	Idle
 59314D	Relief of tower B
 59325D	Blower heating of tower B
 59326D	Blower pre-cooling of tower B
 59316D	Equalizing of tower B Standby of tower B

Animation	Description
 59318D	Relief of tower A
 59330D	Blower heating of tower A
 59328D	Blower pre-cooling of tower A
 59320D	Equalizing of tower A Standby of tower A
 59322D	Shifting: Activating tower A Shifting: Activating tower B
 59323D	Isolating of tower A

Animation	Description
 59331D	Isolating of tower B

Status icons

Name	Icon	Description
Stopped/Running	 57786F	When the dryer is stopped, the icon stands still. When the dryer is running, the icon is rotating.
Machine control mode	 57790F	Local start/stop
	 57791F	Remote start/stop
	 57792F	Network control
Automatic restart after voltage failure	 57793F	Automatic restart after voltage failure is active
Week timer	 57794F	Week timer is active
	 57796F	Shutdown
	 57797F	Warning
Service	 57798F	Service required
Main screen	 59162F	Change main screen

	 82196F	Main chart

Input icons

Icon	Description
 57799F	Pressure
 57800F	Temperature
 57801F	Digital input
 57802F	Special protection

System icons

Icon	Description
 57804F	Dryer
 57805F	Fan
 57806F	Frequency converter
 57807F	Drain
 57808F	Filter
 57809F	Motor
 57810F	Failure expansion module
 57792F	Network problem
 57812F	General alarm

Menu icons

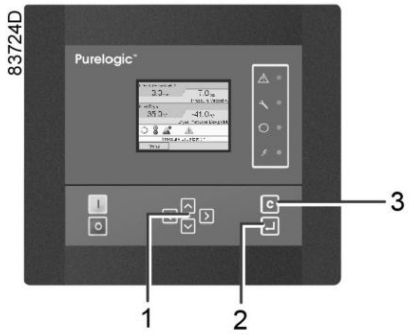
Icon	Description
 57813F	Inputs
 57814F	Outputs
 57812F	Alarms (Warnings, shutdowns)
 57815F	Counters
 58499D	Test
 57817F	Settings
 57798F	Service
 57818F	Event history (saved data)
 57819F	Access key/User password
 57792F	Network
 57820F	Set point
 57867F	Info
 59807D	General settings

Navigation arrows

Icon	Description
 57821F	Up
 57822F	Down

3.4 Main screen

Controller



(1)	Scroll keys
(2)	Enter key
(3)	Escape key

Function

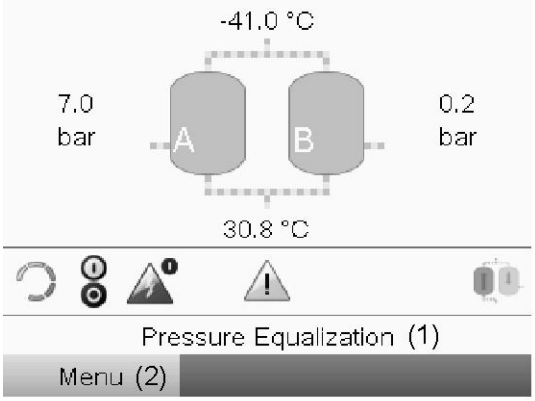
The Main screen shows the status of the dryer operation and is the gateway to all functions implemented in the controller.

The Main screen is shown automatically when the voltage is switched on and one of the keys is pushed. It is switched off automatically after a few minutes when no keys are pushed.

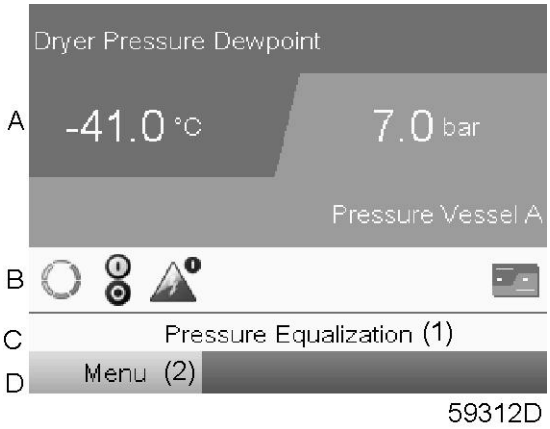
Six different main screens can be choosen:

1. Two value lines
2. Four value lines
3. Chart (High resolution)
4. Chart (Medium resolution)
5. Chart (Low resolution)
6. Dryer animation

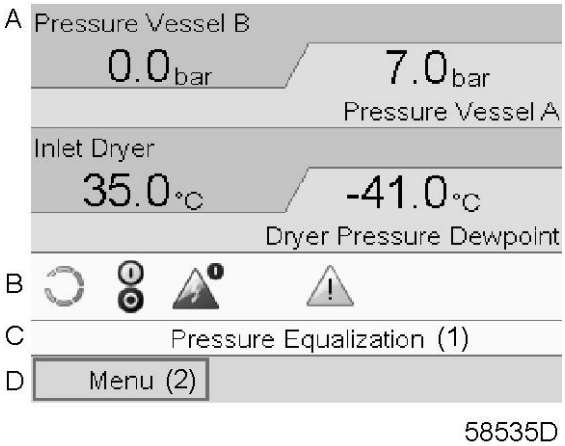
Dryer animation, two and four value views



Dryer animation



Two value lines



Four value lines

Text on figure

(1)	Pressure equalization
(2)	Menu

- **Section A** shows information regarding the dryer operation (e.g. the Pressure in vessels A and B, the Dryer Pressure Dewpoint, the Dryer Inlet temperature).
- **Section B** shows Status icons. Following icon types are shown in this field:
  - Fixed icons
    These icons are always shown in the main screen (e.g. Dryer stopped or running, Dryer status).
  - Optional icons
    These icons are only shown if their corresponding function is activated (e.g. week timer, automatic restart after voltage failure, etc.).
  - Pop up icons
    These icons pop up if an abnormal condition occurs (warnings, shutdowns, service,...).

  To call up more information about the icons shown, select the icon using the scroll keys and press the enter key.
- **Section C** is called the Status bar.
  This bar shows the text that corresponds to the selected icon. When the menu button is selected, this text shows the operational state of the dryer.
- **Section D** shows the Action buttons. These buttons are used:
  - to call-up or program settings.
  - to reset a service message.
  - to have access to all data collected by the regulator.

  The function of the buttons depends on the displayed menu. The most common functions are:

Designation	Function
Menu	To go to the menu
Modify	To modify programmable settings
Reset	To reset a timer or message

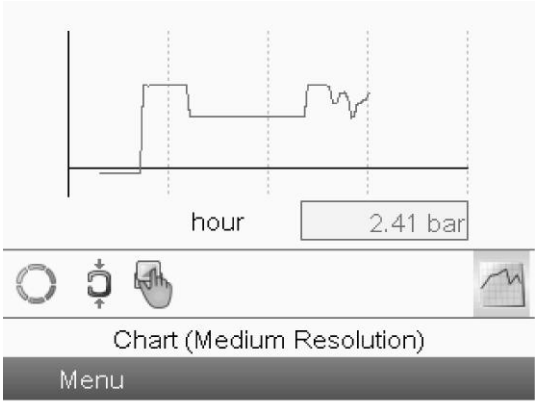
To activate an action button, highlight the button by using the Scroll keys and press the Enter key.
To go back to the previous menu, press the Escape key.

Chart views

59166D

When the Chart (High Resolution) is selected, a chart showing the value of a parameter selected in the Inputs menu per minute is shown on the main screen. Each point in the chart is 1 second. The screen shows 4 minutes.

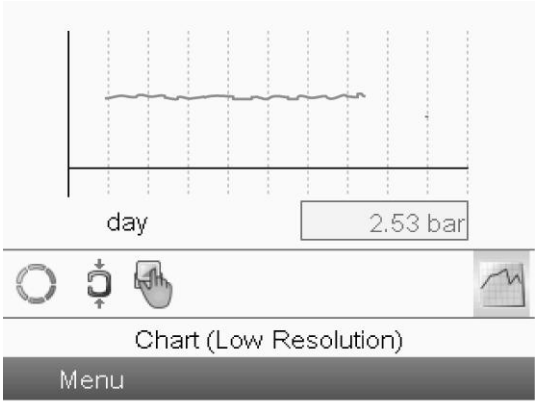
The switch button (icon) for selecting other screens is changed into a small Chart and is highlighted (active).



59167D

When the Chart (Medium Resolution) is selected, a chart showing the parameter per hour is shown on the main screen. Each point is the average of 1 minute. The screen shows 4 hours.

The switch button (icon) for selecting other screens is changed into a small Chart and is highlighted (active).



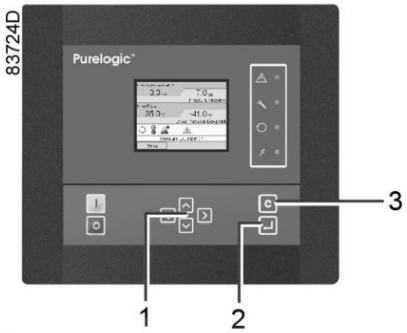
59168D

When the Chart (Low Resolution) is selected, a chart showing the parameter per day is shown on the main screen. Each point is the average of 1 hour. The screen shows 10 days.

The switch button (icon) for selecting other screens is changed into a small Chart and is highlighted (active).

3.5 Calling up menus

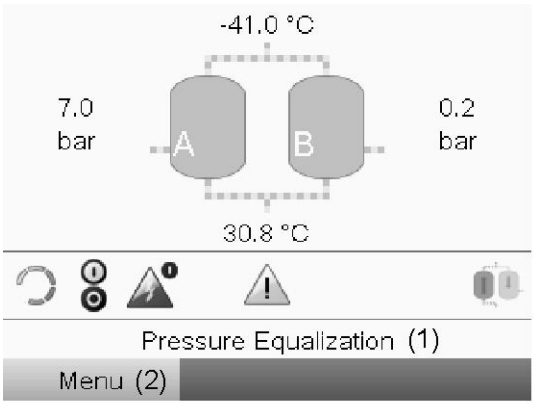
Controller



(1)	Scroll keys
(2)	Enter key
(3)	Escape key

Description

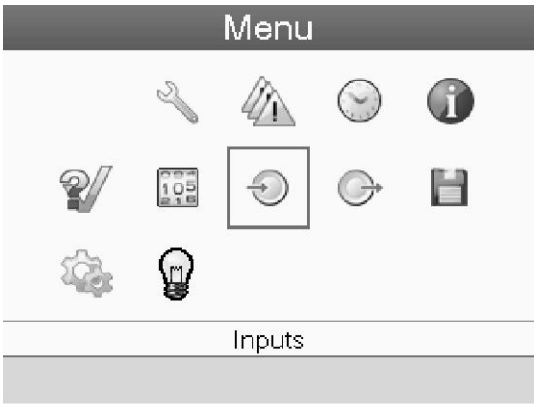
When the voltage is switched on, the main screen is shown automatically (see section Main screen):



59307D

(1)	Pressure equalization
(2)	Menu

- To go to the Menu screen, highlight the Menu button (2), using the Scroll keys.
- Press the Enter key to select the menu. Following screen appears:

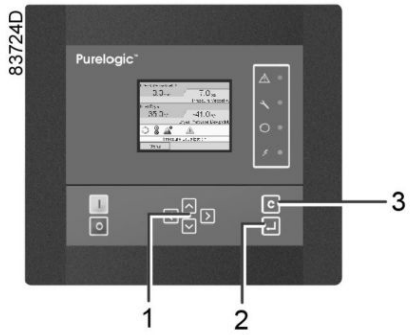


58536D

- The screen shows a number of icons. Each icon indicates a menu item. By default, the Inputs icon is selected. The status bar shows the name of the menu that corresponds with the selected icon.
- Use the Scroll keys to select an icon.
- Press the Enter key (2) to open the menu or press the Escape key (3) to return to the Main screen.

3.6 Inputs menu

Controller



(1)	Scroll keys
(2)	Enter key
(3)	Escape key

Menu icon, Inputs

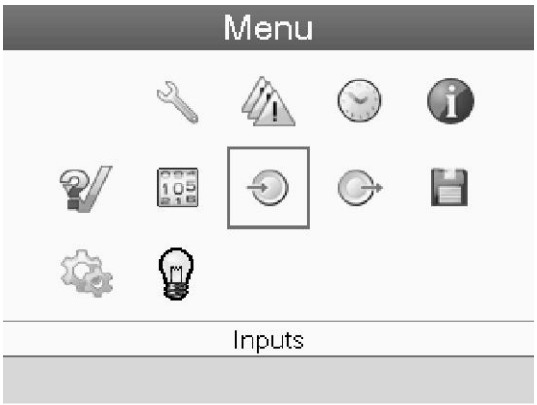
Function

To call up information regarding the actually measured data and the status of some inputs such as the Vessel Pressure.

Procedure

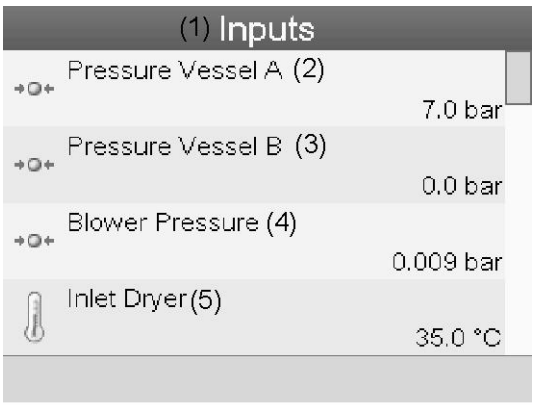
Starting from the main screen (see Main screen),

- Move the cursor to the action button Menu and press the Enter key. Following screen appears:



58536D

- Press the Enter key. A screen similar to the one below appears:



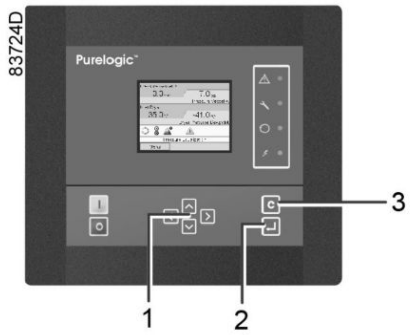
Text on figure

(1)	Inputs
(2)	Pressure vessel A
(3)	Pressure vessel B
(4)	Blower pressure
(5)	Inlet dryer

- The screen shows the first items of a list of all inputs with their corresponding icons and readings. Use the scroll button to see the other items in the list.
- If an input is in warning or shutdown, the original icon is replaced by the warning or shutdown icon respectively.

3.7 Outputs menu

Controller



(1)	Scroll keys
(2)	Enter key
(3)	Escape key

Menu icon, Outputs

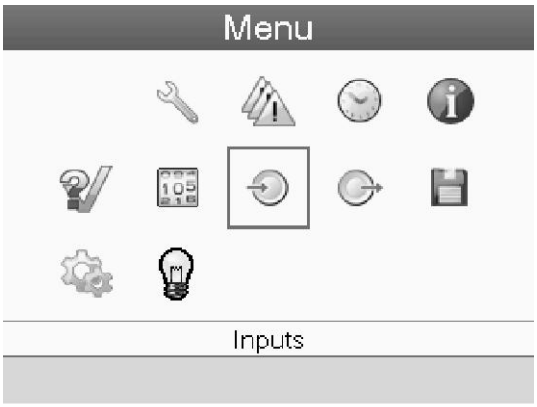
Function

To call up information regarding the actual status of some outputs such as the Dryer motor, PDP alarm, General shut-down, etc.

Procedure

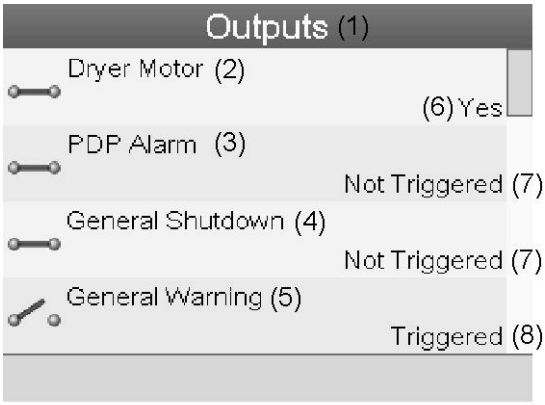
Starting from the Main screen (see Main screen),

- Move the cursor to the action button Menu and press the Enter key. Following screen appears:



58536D

- Move the cursor to the Outputs icon using the Scroll keys.
- Press the Enter key. A screen similar to the one below appears:



58539D

Text on figure

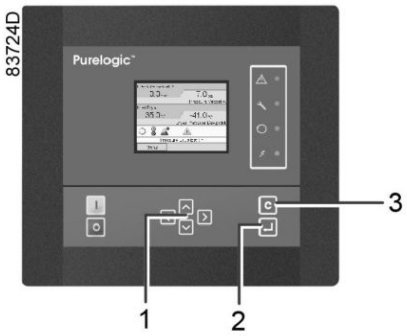
(1)	Outputs
(2)	Dryer motor (means the dryer is operating)
(3)	PDP alarm
(4)	General shut-down
(5)	General warning
(6)	Yes

(7)	Not triggered
(8)	Triggered

- The screen shows the first items of a list of all outputs with their corresponding icons and readings. Use the scroll button to see the other items in the list.

3.8 Counters

Controller



(1)	Scroll keys
(2)	Enter key
(3)	Escape key

Menu icon, Counters

Function

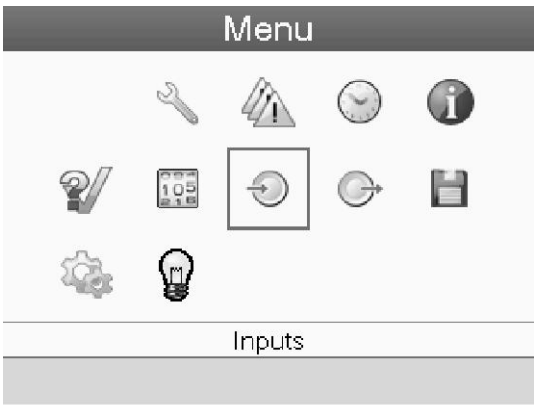
To call up:

- The running hours
- The number of dryer starts
- The number of hours that the regulator has been powered
- The operational state timers

Procedure

Starting from the Main screen (see Main screen),

- Move the cursor to the action button Menu and press the Enter key. Following screen appears:



58536D

- Using the Scroll keys, move the cursor to the Counters icon (see above, section Menu icon).
- Press the Enter key. Following screen appears:

58540D

Text on figure

(1)	Counters
(2)	Running hours dryer
(3)	Loaded hours dryer
(4)	Actual state time
(5)	Programmed state time
(6)	Reset

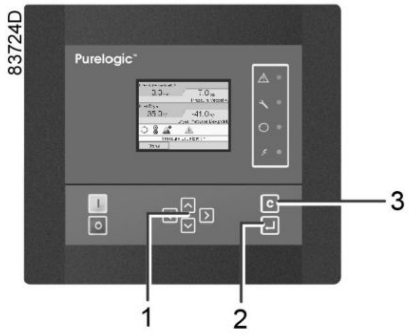
The screen shows a list of all counters with their actual readings. A number of counters keep track of the state of the dryer:

- **Running hours:** counts the operation hours of the dryer.
- **Loaded hours:** the same as running hours, but shows to which time interval the energy counters refer to; this counter is also reset when the energy counters are reset.
- **Actual state time:** shows how long the dryer's current state has been active.
- **Programmed state time:** shows how long (at most) the current state should be active.
- **Actual half cycle time:** shows how long the adsorbing vessel has been adsorbing (since last vessel shift).
- **Programmed half cycle time:** shows how long the half cycle should take; minimum value if PDP control is not active, maximum value if PDP is active.
- **Regeneration cycles vessel A:** integer that counts how many cycles vessel A has performed.
- **Regeneration cycles vessel B:** integer that counts how many cycles vessel B has performed.

- **Standby time:** shows how long the dryer has been in standby mode since the last reset of the energy counters. This counter will not be reset when the standby state has ended and a vessel switch is performed. The next time the dryer is in the standby state, it resumes at the previous value. The counter is automatically reset when the energy counters are reset.
- **Energy saving PDP sensor:** shows how much energy is saved (in %) by having the PDP sensor since the energy counters have been reset, so it equals StandbyTime/LoadedTime.
- **Average heating power:** shows the 24/24h average of heating power consumed since the last reset of the energy counters. This timer equals the (Heater Contactor Time x Heater Power) / (Loaded Time). The Heater Contactor Time is an internal timer and can not be called up on the screen. The Heater Contactor Time is reset when the energy counters are reset.
- **Module hours:** shows how long the controller has been active. This timer can not be reset, not even when downloading new controller software.

3.9 Event history menu

Controller



(1)	Scroll keys
(2)	Enter key
(3)	Escape key

Menu icon, Event History

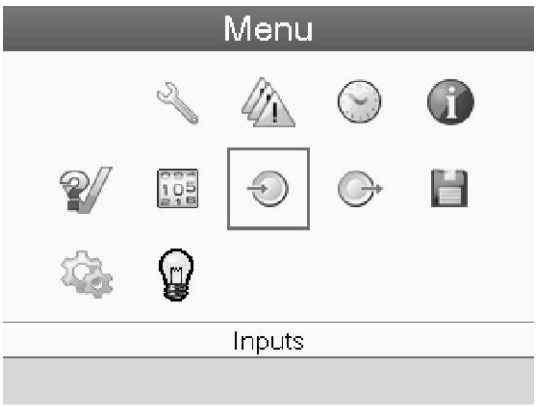
Function

To call up the last shut-down and last emergency stop data.

Procedure

Starting from the Main screen (see Main screen),

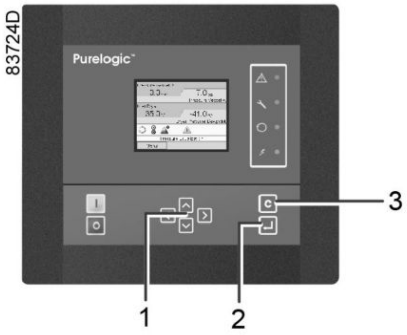
- Move the cursor to the action button Menu and press the Enter key. Following screen appears:



- Using the Scroll keys, move the cursor to the Event History icon (see above, section Menu icon).
- The list of last shut-down and emergency stop cases is shown.
- Scroll through the items to select the desired shut-down or emergency stop event.
- Press the Enter key to find the date, time and other data reflecting the status of the dryer when that shut-down or emergency stop occurred.

3.10 Test menu

Controller



Menu icon, Test

Function

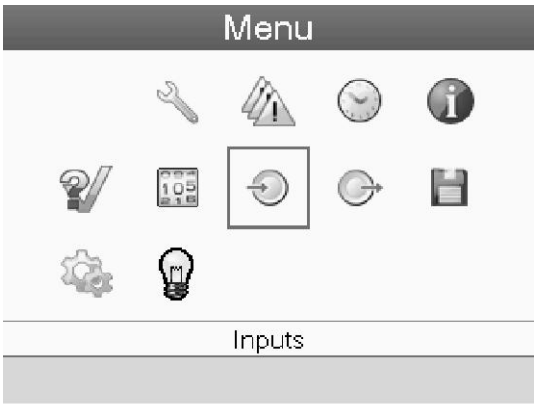
- To depressurize the vessels and to test the output contacts.

	• The vessels can only be depressurized when the dryer is stopped (off state). • The test procedure will be stopped as soon as another menu is selected on the regulator.

Procedure

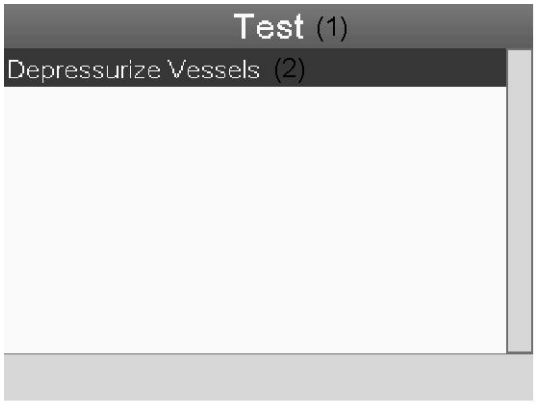
Starting from the Main screen (see Main screen):

- Move the cursor to the action button Menu and press the enter key (2); following screen appears:



58536D

- Using the scroll keys (1), move the cursor to the test icon (see above, section Menu icon).
- Press the enter key (2); following screen appears:



58541D

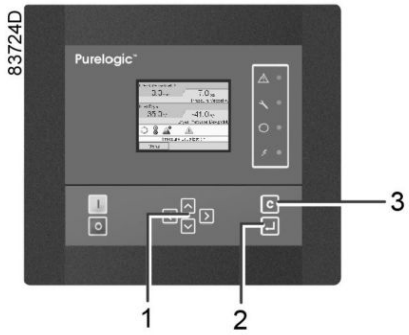
Text on figure

(1)	Test
(2)	Depressurize vessels

- A red selection bar is covering the item Depressurize vessels; press the Enter key to depressurize the vessels.

3.11 Service menu

Controller



(1)	Scroll keys
(2)	Enter key
(3)	Escape key

Menu icon, Service

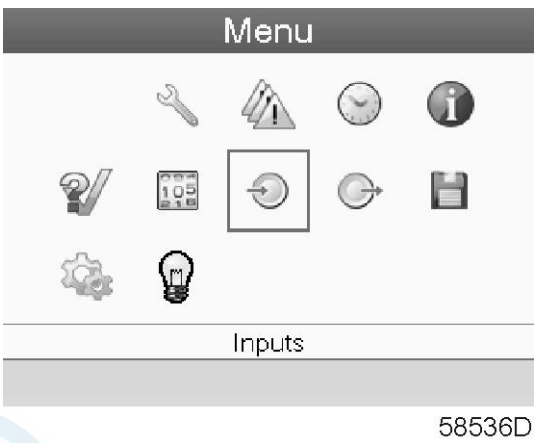
Function

- To reset the service plans which are carried out.
- To check when the next service plans are to be carried out.
- To find out which service plans were carried out in the past.
- To modify the programmed service intervals.

Procedure

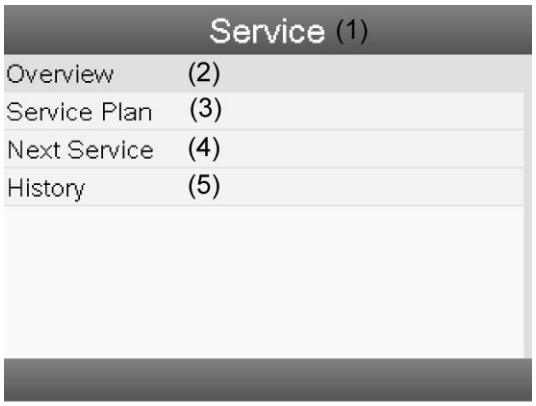
Starting from the Main screen (see Main screen),

- Move the cursor to the action button Menu and press the Enter key. Following screen appears:



- Using the Scroll keys, move the cursor to the Service icon (see above, section Menu icon).

- Press the Enter key. Following screen appears:



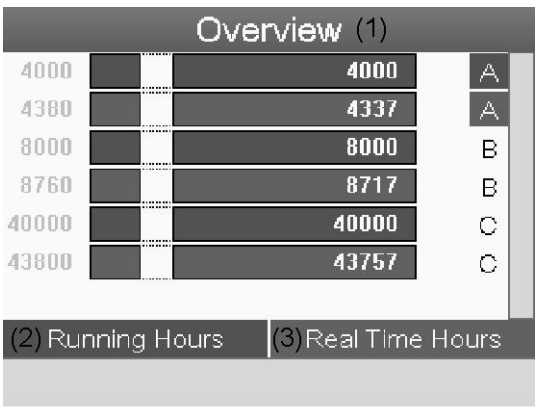
57847F_1

Text on figure

(1)	Service
(2)	Overview
(3)	Service plan
(4)	Next service
(5)	History

- Scroll through the items to select the desired item and press the Enter key to see the details as explained below.

Overview



58542D

Text on figure

(1)	Overview
(2)	Running Hours (green)
(3)	Real Time hours (blue)

Example for service level (A):

The figures at the left are the programmed service intervals. For Service interval A, the programmed number of running hours is 4000 hours (upper row, green) and the programmed number of real time hours is 4380 hours, which corresponds to six months (second row, blue). This means that the controller will launch a service

warning when either 4000 running hours or 4380 real hours are reached, whichever comes first. Note that the real time hours counter keeps counting, also when the controller is not powered.

The figures within the bars are the number of hours to go till the next service intervention. In the example above, the dryer was just started up, which means it still has 4000 running hours or 4337 hours to go before the next Service intervention.

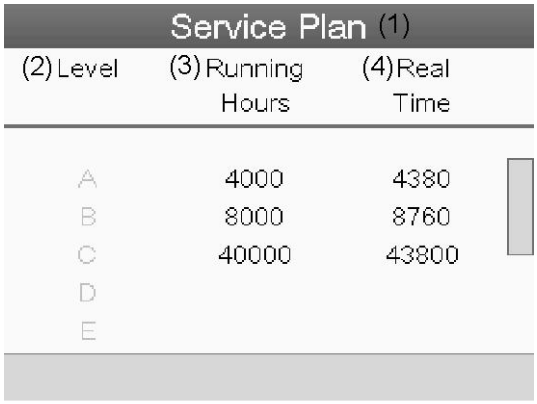
Service plans

A number of service operations are grouped (called Level A, Level B, etc...). Each level stands for a number of service actions to be carried out at the time intervals programmed in the controller.

When a service plan interval is reached, a message will appear on the screen.

After carrying out the service actions related to the indicated levels, the timers must be reset.

From the Service menu above, select Service plan (3) and press Enter. Following screen appears:

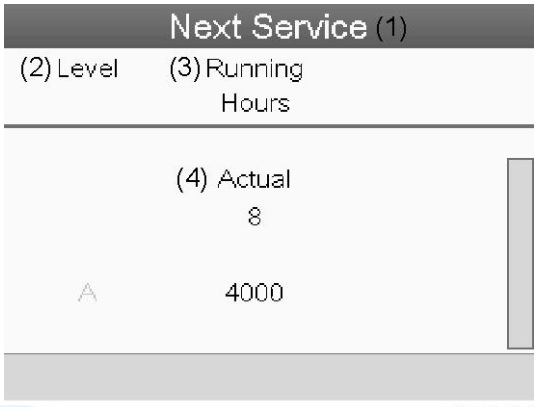


58543D

Text on figure

(1)	Service plan
(2)	Level
(3)	Running hours
(4)	Real time

Next Service



58544D

Text on figure

(1)	Next service
(2)	Level
(3)	Running hours
(4)	Actual

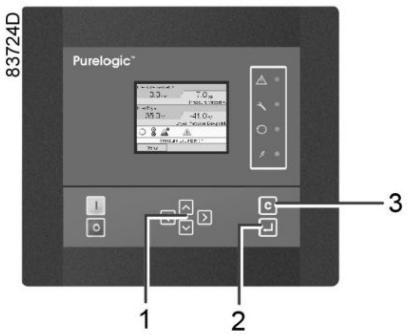
In the example above, the A Service level is programmed at 4000 running hours, of which 8 hours have passed.

History

The History screen shows a list of all service actions done in the past, sorted by date. The date at the top is the most recent service action. To see the details of a completed service action (e.g. Service level, Running hours or Real time hours), use the Scroll keys to select the desired action and press the Enter key.

3.12 Protections menu

Controller



Menu icon, Protections

Function

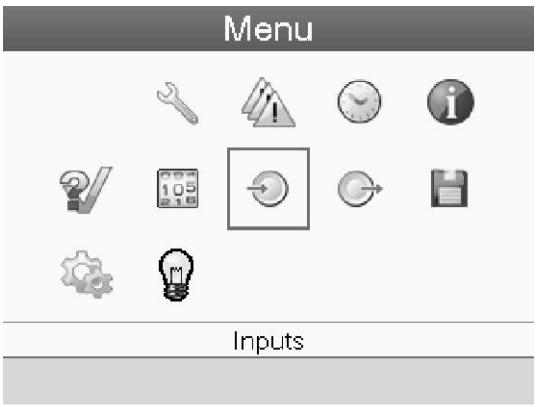
To call-up the protections.

	Before resetting a warning or shut down message, always remedy the problem. Frequently resetting these messages without remedying may damage the dryer.

Procedure

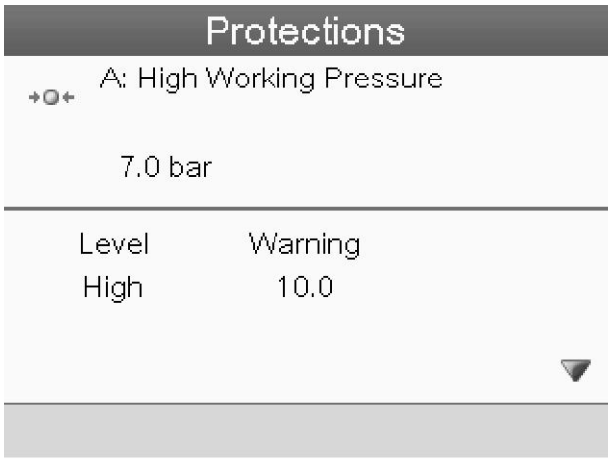
Starting from the Main screen (see Main screen):

- Move the cursor to the action button Menu and press the enter key (2). Following screen appears:



58536D

- Using the scroll keys (1), move the cursor to the protections icon (see above, section Menu icon).
- Press the enter key (2). Following screen appears:

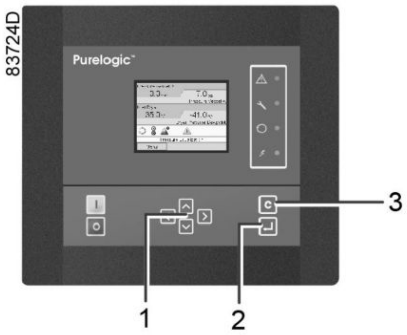


58545D

- The screen shows a list of all shut-down and shut-down warning settings and the actual reading. Active alarms are highlighted in yellow. In case of a shut-down, the protection can be reset after remedying.

3.13 Week timer menu

Controller



(1)	Scroll keys
(2)	Enter key
(3)	Escape key

Menu icon, Week timer

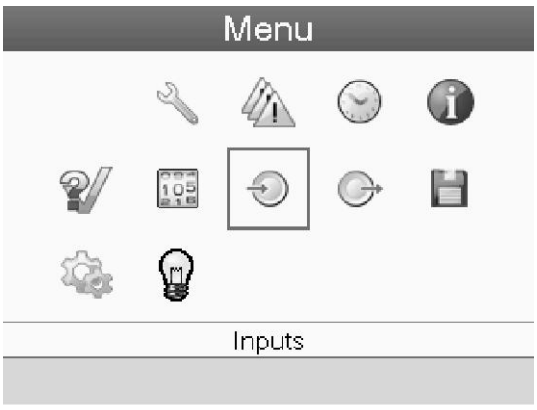
Function

- To program time-based start/stop commands for the dryer.
- To program time-based change-over commands for the net pressure band.
- Four different week schemes can be programmed.
- A week cycle can be programmed; a week cycle is a sequence of 10 weeks. For each week in the cycle, one of the four programmed week schemes can be chosen.

Procedure

Starting from the Main screen (see Main screen),

- Move the cursor to the action button Menu and press the Enter key. Use the Scroll buttons to select the Timer icon.



58536D

- Press the Enter key on the controller. Following screen appears:

58497D

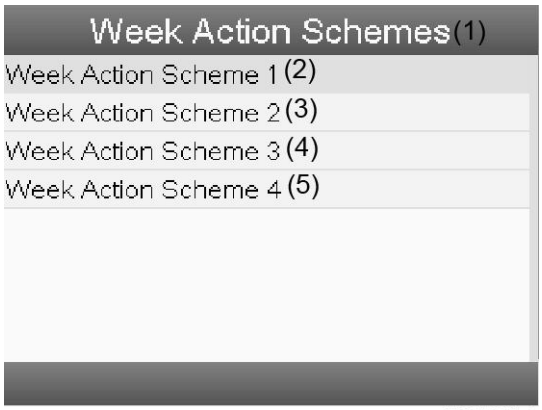
Text on figure

(1)	Week Timer
(2)	Week Action Schemes
(3)	Week Cycle
(4)	Status
(5)	Week 1
(6)	Remaining Running Time

The first item in this list is highlighted in red. Select the item requested and press the Enter key on the controller to modify.

Programming week schemes

- Select Week action schemes and press Enter. A new window opens. The first item in the list is highlighted in red. Press the Enter key on the controller to modify Week Action Scheme 1.

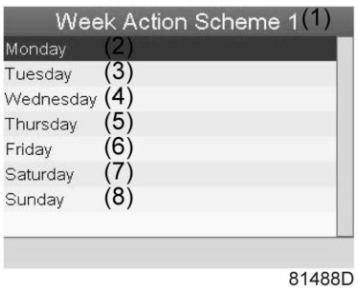


58498D

Text on figure

(1)	Week Action Schemes
(2)	Week Action Scheme 1
(3)	Week Action Scheme 2
(4)	Week Action Scheme 3
(5)	Week Action Scheme 4

- A weekly list is shown. Monday is automatically selected and highlighted in red. Press the Enter key on the controller to set an action for this day.

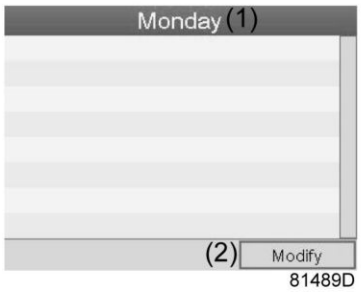


81488D

Text on figure

(1)	Week Action Scheme 1
(2)	Monday
(3)	Tuesday
(4)	Wednesday
(5)	Thursday
(6)	Friday
(7)	Saturday
(8)	Sunday

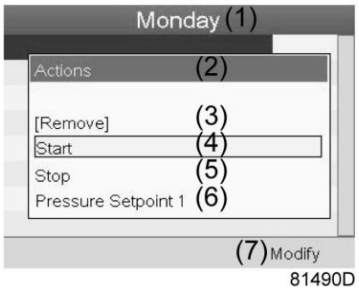
- A new window opens. The Modify action button is selected. Press the Enter button on the controller to create an action.



Text on figure

(1)	Monday
(2)	Modify

- A new pop-up window opens. Select an action from this list by using the Scroll keys on the controller. When ready press the Enter key to confirm.

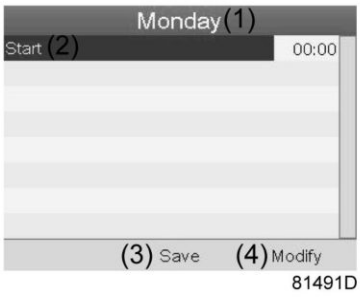


Text on figure

(1)	Monday
(2)	Actions
(3)	Remove
(4)	Start
(5)	Stop
(6)	Pressure Set point 1

(7)	Modify

- A new window opens. The action is now visible in the first day of the week.



Text on figure

(1)	Monday
(2)	Start
(3)	Save
(4)	Modify

- To adjust the time, use the Scroll keys on the controller and press the Enter key to confirm.

Text on figure

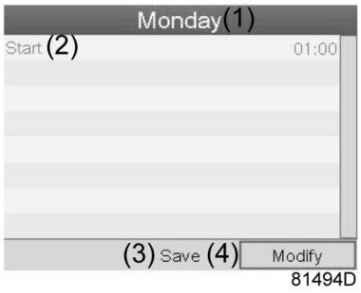
(1)	Monday
(2)	Start
(3)	Save
(4)	Modify

- A pop-up window opens. Use the ↑ or ↓ key of Scroll keys to modify the values of the hours. Use the ← or → Scroll keys to modify the minutes.

Text on figure

(1)	Monday
(2)	Time
(3)	Save
(4)	Modify

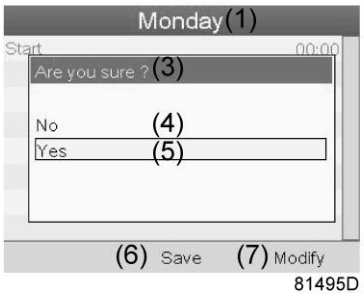
- Press the Escape key on the controller. The action button Modify is selected. Use the Scroll keys to select the action Save.



Text on figure

(1)	Monday
(2)	Start
(3)	Save
(4)	Modify

- A new pop-up window opens. Use the Scroll keys on the controller to select the correct actions. Press the Enter key to confirm.



Text on figure

(1)	Monday
(3)	Are you sure?
(4)	No
(5)	Yes
(6)	Save
(7)	Modify

Press the Escape key to leave this window.

- The action is shown below the day the action is planned.

Text on figure

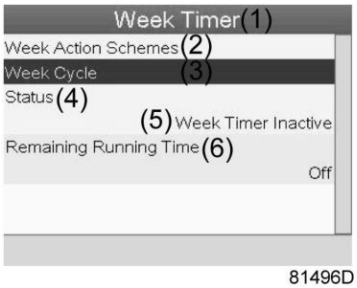
(1)	Week Action Scheme 1
(2)	Monday - Start
(3)	Tuesday
(4)	Wednesday
(5)	Thursday
(6)	Friday
(7)	Saturday
(8)	Sunday

Press the Escape key on the controller to leave this screen.

Programming the week cycle

A week cycle is a sequence of 10 weeks. For each week in the cycle, one of the four programmed week schemes can be chosen.

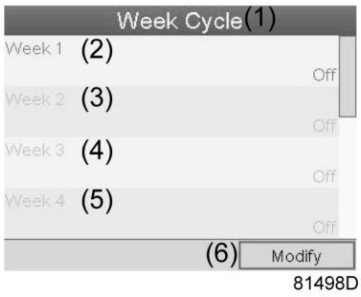
- Select Week Cycle from the main Week Timer menu list.



Text on figure

(1)	Week Timer
(2)	Week Action Schemes
(3)	Week Cycle
(4)	Status
(5)	Week Timer Inactive
(6)	Remaining Running Time

- A list of 10 weeks is shown.

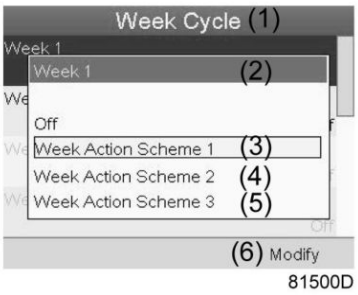


Text on figure

(1)	Week Cycle
(2)	Week 1
(3)	Week 2
(4)	Week 3
(5)	Week 4
(6)	Modify

Press twice the Enter key on the controller to modify the first week.

- A new window opens. Select the action, example: Week Action Scheme 1



Text on figure

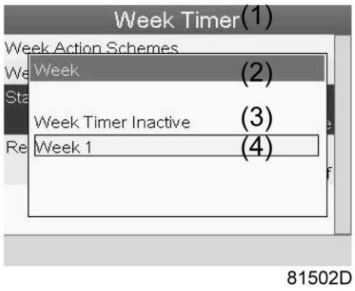
(1)	Week Cycle
(2)	Week 1
(3)	Week Action Scheme 1
(4)	Week Action Scheme 2
(5)	Week Action Scheme 3
(6)	Modify

- Check the status of the Week Timer
  Use the Escape key on the controller to go back to the main Week Timer menu. Select the status of the Week Timer.

Text on figure

(1)	Week Timer
(2)	Week Action Schemes
(3)	Week Cycle
(4)	Status
(5)	Week Timer Inactive
(6)	Remaining Running Time

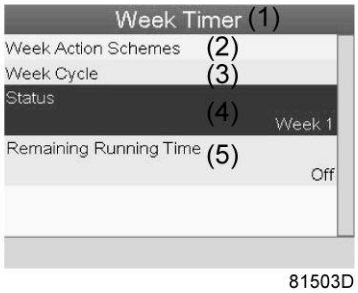
- A new window opens. Select Week 1 to set the Week Timer active.



Text on figure

(1)	Week Timer
(2)	Week
(3)	Week Timer Inactive
(4)	Week 1

- Press the Escape key on the controller to leave this window. The status shows that week 1 is active.



Text on figure

(1)	Week Timer
(2)	Week Action Schemes
(3)	Week Cycle
(4)	Status
(5)	Remaining Running Time

- Press the Escape key on the controller to go to the main Week Timer menu. Select Remaining Running Time from the list and press the Enter key on the controller to Modify.

81504D

Text on figure

(1)	Week Timer
(2)	Week Action Schemes
(3)	Week Cycle
(4)	Status
(5)	Remaining Running Time

- This timer is used when the week timer is set and for certain reasons the dryer must continue working. The remaining running time, for example 1 hour, can be set in this screen. This timer is prior to the Week Timer action.

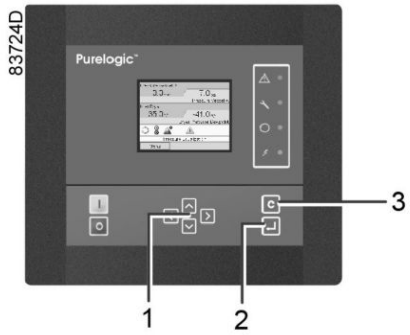
81505D

Text on figure

(1)	Week Timer
(2)	Week action schemes
(3)	Remaining Running Time

3.14 Info menu

Controller



(1)	Scroll keys
(2)	Enter key
(3)	Escape key

Menu icon, Info

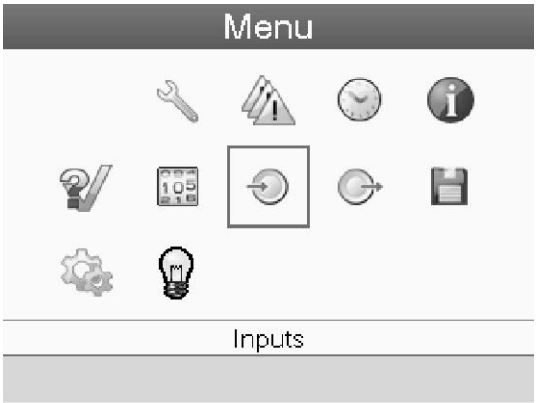
Function

To show the Pneumatech internet address.

Procedure

Starting from the Main screen (see Main screen),

- Move the cursor to the action button Menu and press the Enter key. Following screen appears:

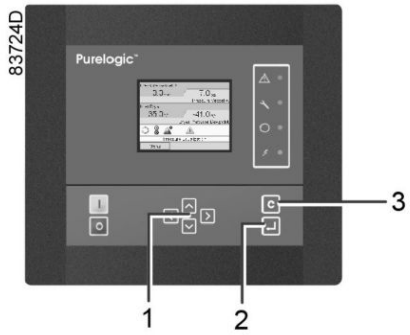


58536D

- Using the Scroll keys, move the cursor to the Info icon (see above, section Menu icon).
- Press the Enter key. The Pneumatech internet address appears on the screen.

3.15 Modifying settings

Controller



(1)	Enter key
(2)	Escape key
(3)	Scroll keys

Menu icon, Settings

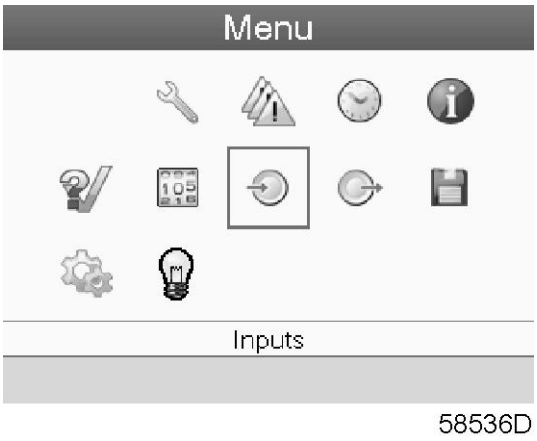
Function

To display and modify a number of settings (e.g. Time, Date, Date format, Language, units ...).

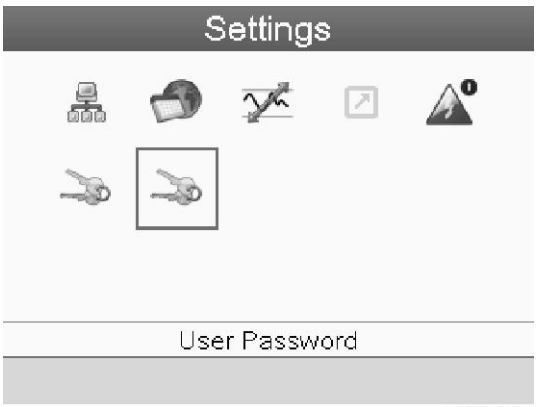
Procedure

Starting from the Main screen (see Main screen),

- Move the cursor to the action button Menu and press the Enter key. Following screen appears:



- Using the Scroll keys, move the cursor to the Settings icon (see above, section menu icon).
- Press the Enter key. Following screen appears:



58546D

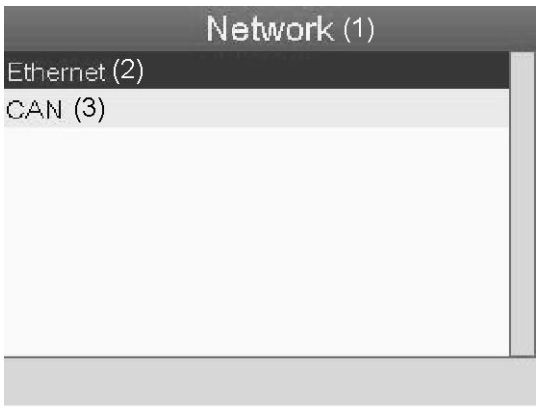
- The screen shows a number of icons:

Icon	Function
 57792F	Network settings
 58470D	General settings
 57820F	Regulation settings
 57793F	Automatic restart after voltage failure settings
 57819F	Access key
 57819F	User password

- Move the cursor to the icon of the function to be modified and press the Enter key.

Modifying network settings

- Select the network settings icon as described above and press the Enter button (2). Following screen appears:

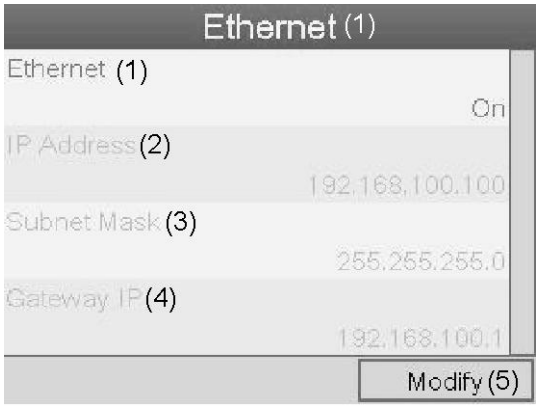


82089D

Text on figure

(1)	Network
(2)	Ethernet
(3)	CAN

- A red selection bar is covering the first item (Ethernet). Use the ↓ key of the Scroll keys to select the setting to be modified and press the Enter key. Following screen appears:



82090D

Screen for Ethernet settings

Text on figure

(1)	Ethernet
(2)	IP Address
(3)	Subnet mask
(4)	Gateway IP
(5)	Modify

Screen for CAN settings

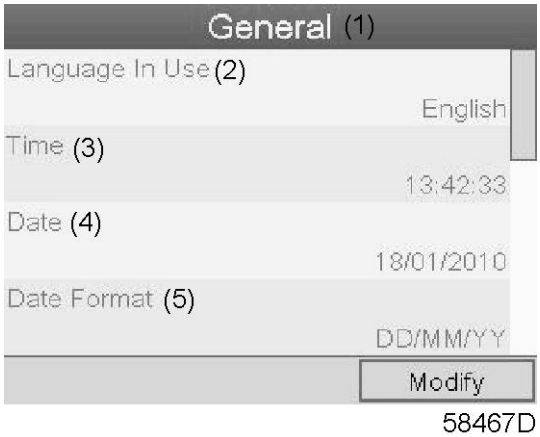
Text on figure

(1)	CAN
(2)	CAN Address
(3)	Communication profile
(4)	Modify

- Press the Enter button; a red selection bar is covering the first item (Ethernet).
- Using the Scroll keys, move the cursor to the setting to be modified (e.g. Ethernet) and press the Enter button (2).
- A pop-up screen appears. Use the ↑ or ↓ key to select the required parameter and press the Enter key to confirm.

General settings

- Select the General settings icon as described above and press the Enter button (2). Following screen appears:



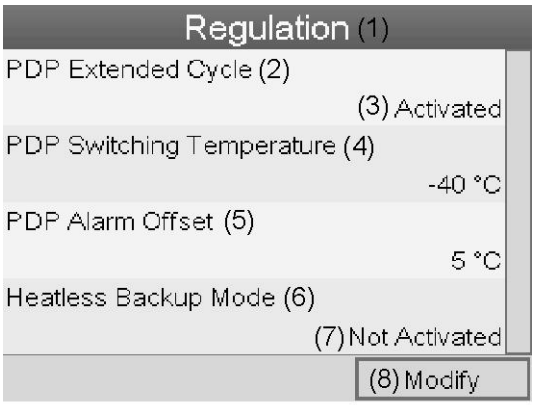
Text on figure

(1)	General
(2)	Language in use
(3)	Time
(4)	Date
(5)	Date format

- The screen shows the first items of a list of all settings. Use the scroll button to see the other items in the list.
- Press the Enter button (2); a red selection bar is covering the first item (Language in use).
  Use the ↓ key of the Scroll keys to select the setting to be modified and press the Enter key.
- A pop-up screen appears. Use the ↑ or ↓ key to select the required parameter and press the Enter key to confirm.

Regulation settings

- Select the Regulation icon as described above and press the Enter button (2). Following screen appears:



58547D

Text on figure

(1)	Regulation
(2)	PDP extended cycle
(3)	Activated
(4)	PDP switching temperature
(5)	PDP Alarm offset
(6)	
(7)	Not activated
(8)	Modify

- The screen shows the list of all settings.
- Press the Enter button (2); a red selection bar is covering the first item (PDP extended cycle).
  Use the ↓ key of the Scroll keys to select the setting to be modified and press the Enter key.
- A pop-up screen appears. Use the ↑ or ↓ key to select the required parameter and press the Enter key to confirm.

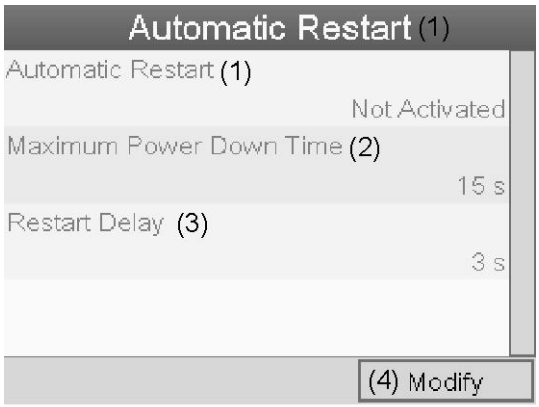
Regulation settings:

- **PDP extended cycle:** the cycle is lengthened by putting the vessel in waiting mode (standby) if PDP is low enough after regeneration and cooling.

- **PDP switching temperature:** the PDP should not increase to this setting before the vessels are switched when the dryer is in standby mode.
- **PDP alarm offset:** the PDP alarm is active when: PDP > PDP_switching_temperature + PDP_alarm_offset. In that way, the alarm threshold can be set independently of the switching threshold.

Automatic restart

- Select the Automatic restart settings icon as described above and press the Enter button (2). Following screen appears:



58508D

Text on figure

(1)	Automatic restart
(2)	Maximum power down time
(3)	Restart delay
(4)	Modify

- The screen shows the list of all settings.
- Press the Enter button (2); a red selection bar is covering the first item (Automatic restart). Use the ↓ key of the Scroll keys to select the setting to be modified and press the Enter key.
- A pop-up screen appears. Use the ↑ or ↓ key to select the required parameter and press the Enter key to confirm.

Access key

Different security levels are programmed in the regulator (e.g. user, service technician, etc). This menu item is used to change the security level. Scroll to the correct icon using the scroll key. Press the Enter button. Press the Enter button again to modify the security level. Press the Enter button again, a pop-up menu appears. Use the scroll keys to enter the password of the new security level. Press the Enter key to confirm the change.

User password

If the password option is activated, it is impossible for not authorized persons to modify any setting.

- Using the Scroll keys, move the cursor to the Password icon.
- Press the Enter key.
- Select the Modify button using the Scroll keys and press the Enter key. Next, modify the password as required.

3.16 Web server

The controllers have a built-in web server that allows direct connection to a PC via a local area network (LAN). This allows to consult certain data and settings via the PC instead of via the display of the controller.

Getting started

Make sure you are logged in as administrator.

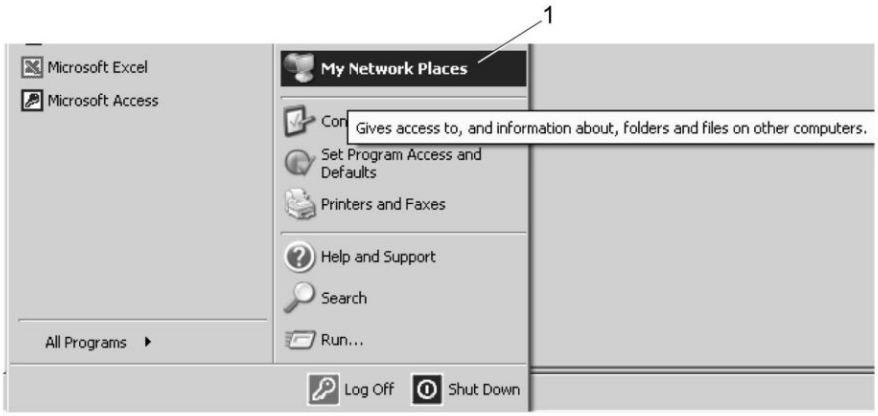
- Use the internal network card from your computer or a USB to LAN adapter (see picture below).

USB to LAN adapter

- Use a UTP cable (CAT 5e) to connect to the controller (see picture below).

Configuration of the network card

- Go to My Network places (1).

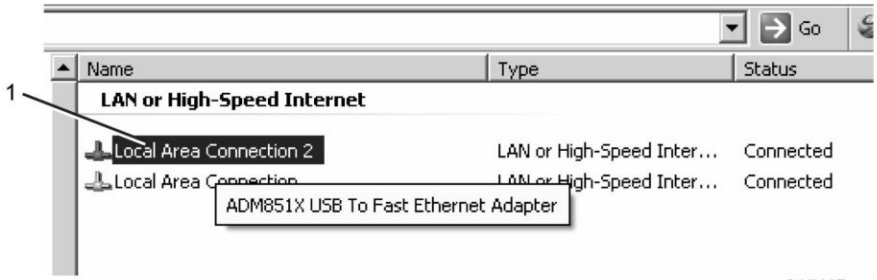


81509D

- Click on View Network connections (1).

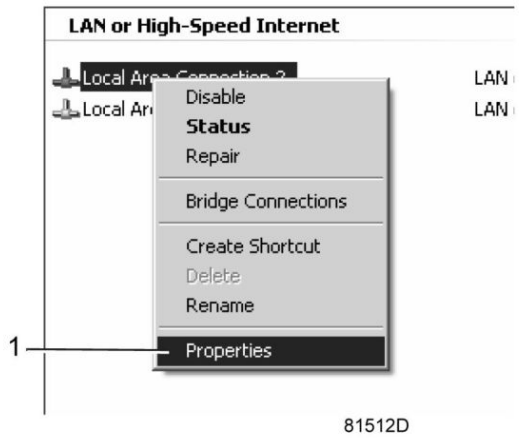
81510D

- Select the Local Area connection (1), which is connected to the controller.



81511D

- Click with the right button and select properties (1).



- Use the checkbox Internet Protocol (TCP/IP) (1) (see picture). To avoid conflicts, de-select other properties if they are selected. After selecting TCP/IP, click on the Properties button (2) to change the settings.

- Use the following settings:
  - IP Address 192.168.100.200
  - Subnetmask 255.255.255.0

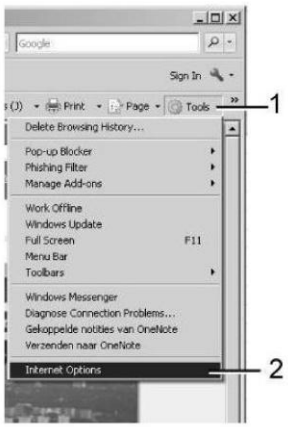
  Click OK and close network connections.

Configuration of the web server

Configure the web interface

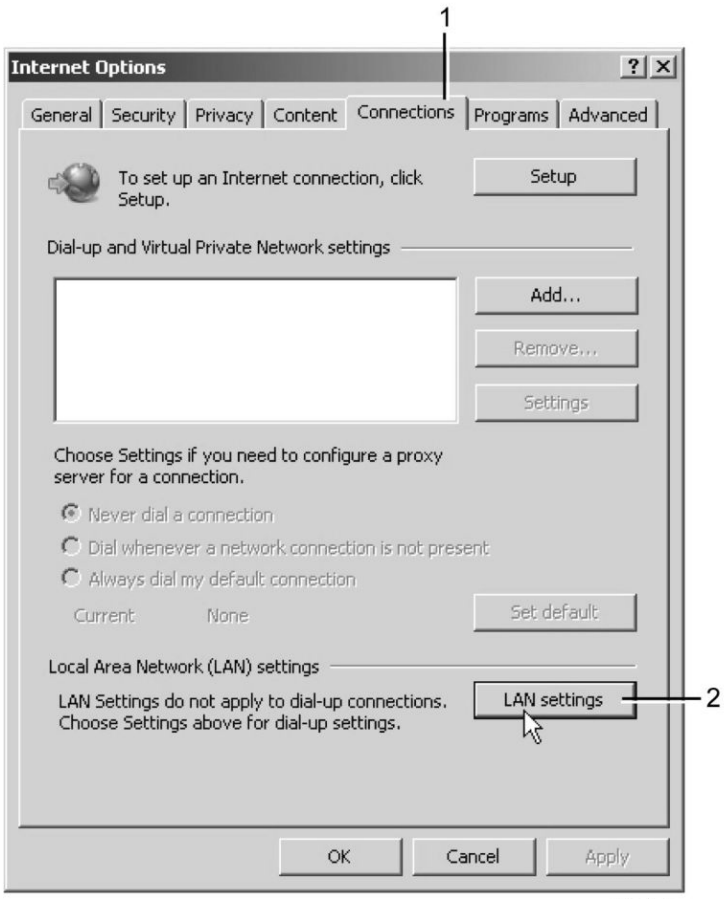
	The internal web server is designed and tested for Microsoft® Internet Explorer 6, 7 and 8. Other web browsers like Opera and Firefox do not support this internal web server. When using Opera or Firefox, a redirect page opens. Click on the hyperlink to connect to the download server from Microsoft® to download the latest version of Internet Explorer, and install this software.

- When using Internet Explorer:
  Open Internet Explorer and click on Tools - Internet options (2).



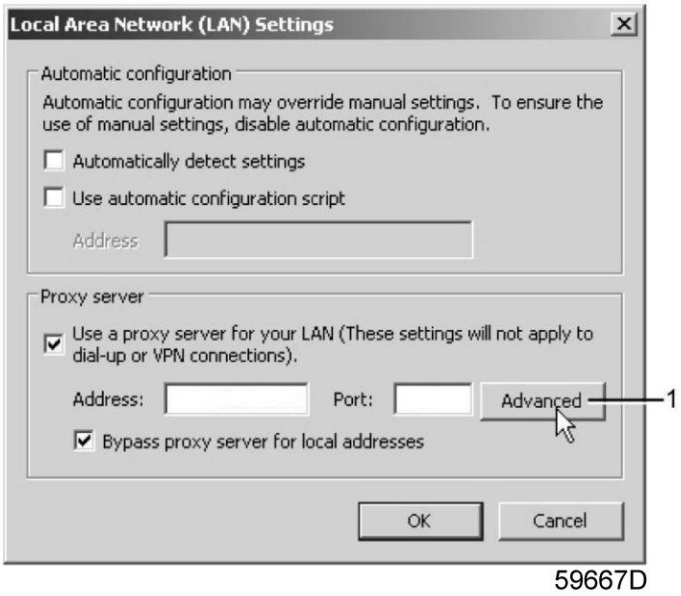
59666D

- Click on the Connections tab (1) and then click on the LAN settings button (2).

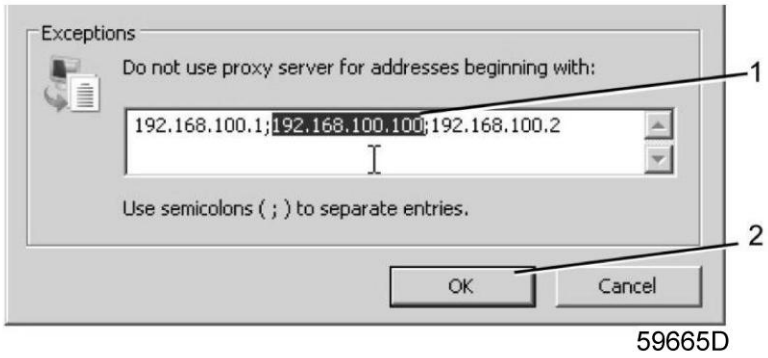


81517D

- In the Proxy server Group box, click on the Advanced button (1).



- In the Exceptions Group box, enter the IP address of your controller. Multiple IP addresses can be given but they must be separated with semicolons (;).
  Example: Suppose that you already added two IP addresses (192.168.100.1 and 192.168.100.2). Now you add 192.168.100.100 and separate the 3 IP addresses by putting semicolons between them (1) (see picture). Click OK (2) to close the window.



Viewing the controller data

- Open your browser and type the IP address of the controller you want to view in your browser (in this example http://192.168.100.100). The interface opens and shows the dryer data.

Navigation and options

- The banner shows the compressor type and the language selector. In this example, three languages are installed on the controller.

- On the left side of the interface the navigation menu can be found.
  If a license for ESi is foreseen, the menu contains 3 buttons.
  - Dryer: shows all dryer settings.
  - ES: shows the ESi status (if a license is provided).
  - Preferences: allows to change temperature and pressure unit.

Dryer settings

All settings can be hidden or shown. Put a mark for each setting. Only the machine status is fixed and can not be removed from the main screen.

- Analog inputs (the units of measure can be changed in the preference button from the navigation menu).
- Counters: give an overview of all actual counters from controller and dryer.
- Info status: the machine status is always shown on the web interface.
- Digital inputs: gives an overview of all digital inputs and their status.
- Digital outputs: shows a list of all digital outputs and their status.
- Special protections: give an overview of all special protections of the compressor.
- Service plan: shows all levels of the service plan and status. This screen only shows the running hours. It is also possible to show the actual status of the service interval.
- ES screen controller: if an ESi license is provided, the button ES is shown in the navigation menu. At the left all compressors in the ES and at the right the ES status is shown.

3.17 Programmable settings

Description

The regulation and safety devices are factory-adjusted to obtain optimum performance of the dryer. No adjustments are required.

3.18 Settings

Heater outlet temperature (TT02)

Heater	Unit	On	Off
Heater R1	˚C	180	195
Heater R1	˚F	356	383

Maximum regeneration air outlet temperature (TT06 and TT07)

During first heating phase		
Pressure dewpoint, -40 ˚C variant	˚C	115
Pressure dewpoint, -40 ˚F variant	˚F	239

Protection settings PB 3390 S (-40 °C/ -40 °F and HIT)

	Unit	Setting -40 °C/-40 °F version	Setting High inlet temperature version
High vessel pressure, warning	bar	10	10
High vessel pressure, warning	psi	145.04	145.04
Delay at signal	s	5	5
Low inlet pressure, warning	bar	4.5	4.5
Low inlet pressure, warning	psi	65.27	65.27
Delay at signal	s	0	0
High regeneration pressure, warning	bar	0.3	0.3
High regeneration pressure, warning	psi	4.35	4.35
Delay at signal	s	5	5
Failed to blow off pressure, warning	bar	0.3	0.3
Failed to blow off pressure, warning	psi	4.35	4.35
Delay at signal	s	300	300
Failed to pressurize (delta P), warning	bar	0.5	0.5
Failed to pressurize (delta P), warning	psi	7.25	7.25
Delay at signal	s	180	180
Low inlet temperature, warning	°C	1	1
Low inlet temperature, warning	°F	33.8	33.8
Delay at signal	s	60	60
High inlet temperature, warning	°C	45	45
High inlet temperature, warning	°F	113.0	113.0
Delay at signal	s	300	300
Low heating temp, warning	°C	120	120
Low heating temp, warning	°F	248.0	248.0
Delay at signal	s	600	600
High heating temp, warning	°C	200	200
High heating temp, warning	°F	392.0	392.0
Delay at signal	s	10	10
High heating temp, shutdown	°C	225	225
High heating temp, shutdown	°F	437.0	437.0
Delay at signal	s	10	10
High regeneration outlet, warning	°C	120	120
High regeneration outlet, warning	°F	248.0	248.0

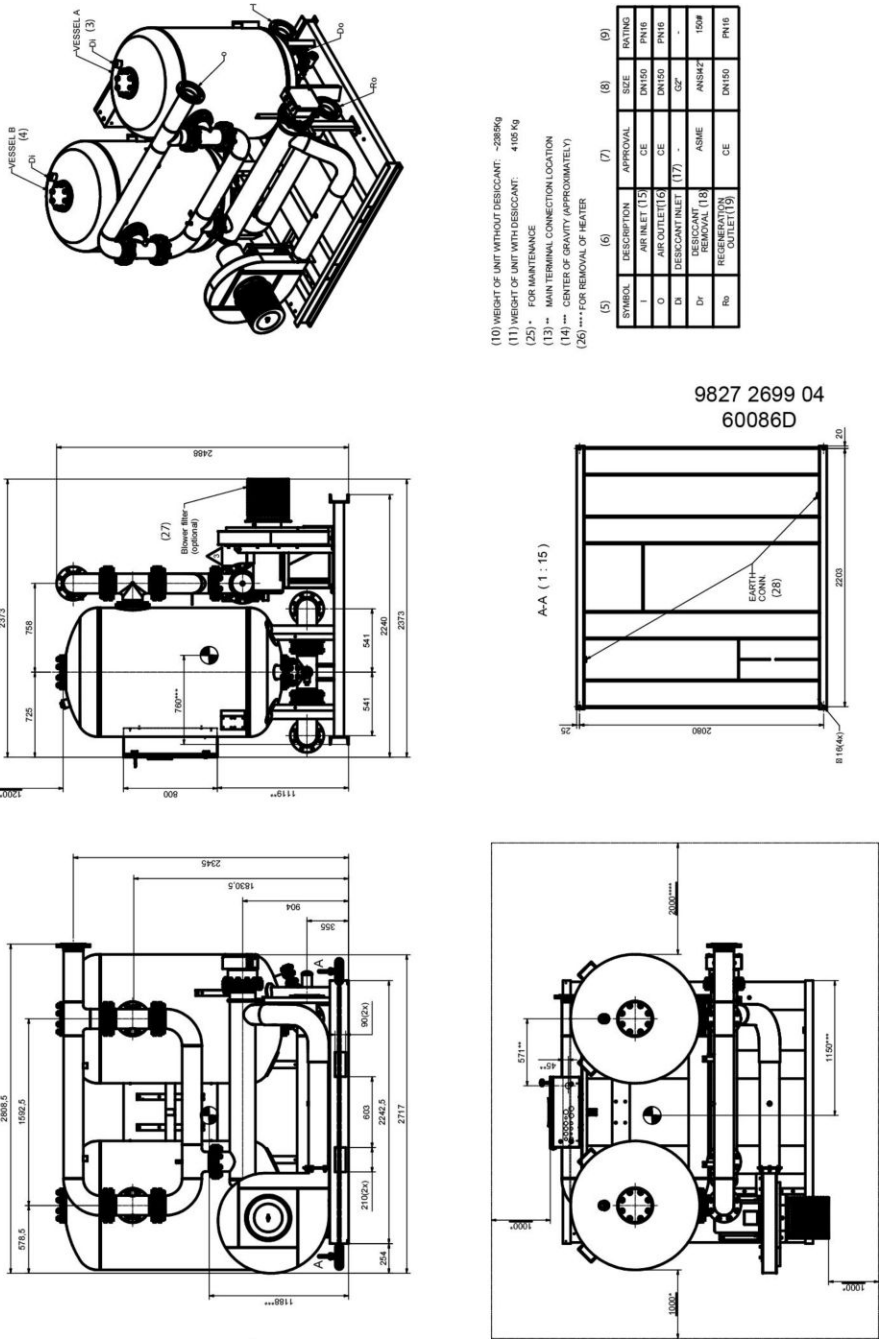
	Unit	Setting -40 °C/-40 °F version	Setting High inlet temperature version
Delay at signal	s	30	30
High dewpoint, warning	°C	-40	-40
High dewpoint, warning	°F	-40.0	-40.0
Delay at signal	s	0	0

	On PB 3390 S, the blower flow is controlled by a flow switch: • If no flow is detected (flow switch contact open) 60 seconds after starting, the dryer will shutdown. • If no flow is detected for more than 1 second during the heating cycle, the dryer will shut down.

4 Installation

4.1 Dimension drawings

Dimension drawings and installation proposals PB



Dimensions PB 3390 S

Text on figures

Reference	Description
(1)	Inlet
(2)	Outlet
(3)	Vessel A
(4)	Vessel B
(5)	Symbol
(6)	Description
(7)	Approval
(8)	Size
(9)	Rating
(10)	Weight of the unit without desiccant
(11)	Weight of the unit with desiccant
(12)	For dismantling and filling desiccant
(13)	Main terminal connection location
(14)	Center of gravity (approximately)
(15)	Air inlet
(16)	Air outlet
(17)	Desiccant inlet
(18)	Desiccant removal
(19)	Regeneration outlet
(21)	Optional blower filter
(22)	For removal of heater
(23)	Water inlet
(24)	Water outlet
(25)	For maintenance
(26)	For removal of heater
(27)	Blower filter (optional)
(28)	Earth connection

4.2 Inspection after shipment

Shipping precautions, ex factory

Special procedures are followed when packaging equipment. Their aim is to prevent corrosion during shipment. These procedures apply to all dryer units.

Dryer units

The complete dryer unit is enclosed in a plastic cover and placed on a pallet or in a crate. Lifting marks are painted on the crates.

The flanges which connect the dryer to the compressor are covered with a plastic cover.

Once implemented, these precautions will protect the dryer for a period of at least one year. The precautions remain valid providing there has been no rough handling during transport, and that the equipment has not been subjected to unfavourable ambient conditions (excessive humidity, heat or cold).

It is imperative to inspect the dryer immediately after arrival. Check the shipping documents to determine how long the unit has been underway since leaving the factory.

Inspection after shipment

Always inspect the equipment immediately after shipment. Verify the mode of transport as well as the length of time that the equipment has been underway. The purpose of such an interim inspection is to ensure that the equipment will reach its final destination in perfect condition.

A brief inspection entails checking the crate or container for damage. Check that no moisture has penetrated the packaging material and that the contents have not moved inside the box or container.

If transport damage is encountered, a damage claim must be submitted immediately - directly with the carrier. Also send a copy of the damage claim report to the manufacturer, Supply Department. Do this without delay.

Inspecting dryer units

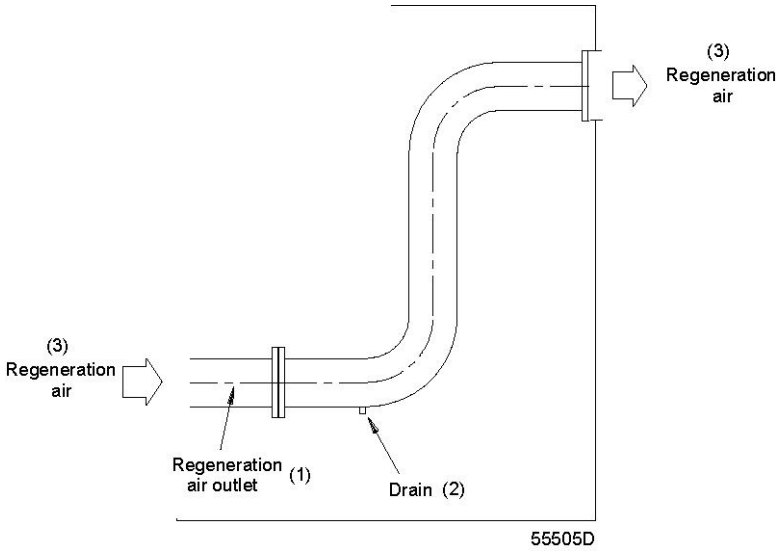
- Dismount the top part and the sides of the crate. Take the plastic cover off the unit.
- Check the equipment inside.
- Rectify any possible fault conditions that you may find.

4.3 Installation instructions

Attention

	When installing the piping, make sure that all pipes are clean.
	All connections to the dryer must be mounted stress-free. If necessary, additional flexible connections and supports must be used.
	Make sure the dryer is protected against overpressure by safety valves capable of blowing off the total volume flow of all connected compressors. The safety valves must be installed as close as possible to the dryer without any obstruction in between.
	Before switching on the main power supply, check the voltage requirements in the technical specifications or on the dryer data plate.
	Precautions must be taken when a compressor starts against an empty air net or when working at a discharge air pressure that is too low. It is highly recommended to install an (optional) sonic nozzle downstream of the dryer (see section Limitations and nominal conditions).
	The temperature of the regeneration outlet air can rise up to 160 ˚C (320 ˚F); take care that the hot air is never pointed to personnel or inflammable objects.
	Adequate protection must be provided to protect personnel from touching the hot surfaces of the dryer.

Instructions

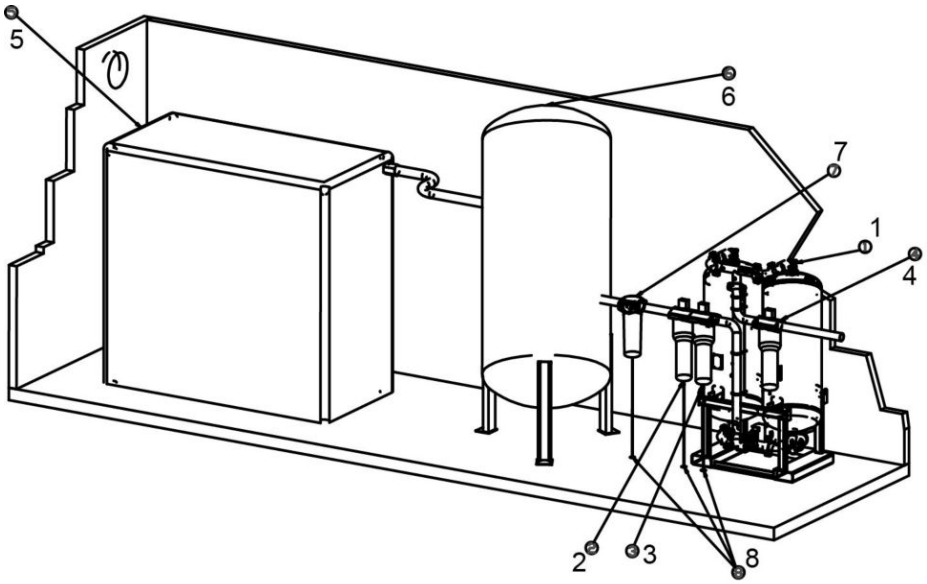


(1)	Regeneration air outlet
(2)	Drain
(3)	Regeneration air

1. Install the dryer where the ambient air is as clean as possible and where the temperature of the air will never exceed the limits (see section Limitations and nominal conditions). Adequate ventilation must be provided to avoid temperature increases and moisture collection during regeneration. It is recommended to lead the regeneration air outdoors.
   If it is desirable to lead the regeneration outlet air via a pipe to another location, it is important to take into consideration the maximum allowable pressure drop. If the length of the additional pipe exceeds 3 m (9.8 ft), the diameter must be 1.5 times larger than the original regeneration pipe. For longer pipe installations, consult the manufacturer.
   If the pipe is led upwards, provide a drain hole at the lowest point to remove condensate water and prevent water lock.
   Depending on the environmental conditions, a large amount of free water may leave the regeneration outlet. Therefore, install a drain pipe to lead the water to a sewer.
   Make sure that the regeneration air pipe is separated from the blower inlet to avoid that moisture is taken into the dryer via the blower.
2. Check that the air intake of compressor and dryer is positioned so that volatile gases or other flammable elements cannot be taken in to avoid concentration of these elements in the desiccant beads.
3. Enough space must be provided around dryer and filters to allow maintenance and filter replacement. The minimum distance between the top of the dryer and the ceiling must allow disassembly of the dryer heating elements and desiccant filling (see section Dimension drawings).
4. If the air from the compressor contains oil drops or oil vapor, a de-oiling filter should be installed upstream of the dryer. The filter should be fitted with an automatic drain for condensate water and oil. If there is no automatic drain, the filter should be emptied several times a day manually. An optional dust filter may be installed downstream of the de-oiling filter and upstream of the dryer.
   It is recommended to install a dust filter downstream of the dryer, as the drying medium can release a small amount of dust, see section Filter option.
5. Take care that no water droplets or free water enter the dryer. For this purpose, it is recommended to install an optional water separator (WSD) and/or an air receiver in between the compressor and the dryer. If an air receiver is installed, a drain must be provided in the bottom of the receiver.

6. Connect the compressed air lines to the dryer INLET and OUTLET. Blow any welding wastes and other impurities from the lines before connecting them. A by-pass line is often a useful addition to the equipment.
7. Connect the dryer to the mains supply via an isolation switch. Check that the primary side of the transformer corresponds with the supply voltage. Check that the electrical installation corresponds to the local codes. The dryer must be earthed and protected against short circuit by fuses of the inert type in all phases.
8. Check the rotation direction of the blower; air must be sucked in via the inlet strainer. If the rotation direction is wrong, switch off the voltage and reverse two electric input connections.
9. After replacement of the drying medium, the amount of dust released can increase. Therefore, it is recommended to replace the (optional) dust filter one week after replacing the desiccant. The sensor of the dewpoint meter should be put offline for at least 24 hours by means of the shut-off valve.
10. If two dryers should be connected in parallel (which is not recommended), measures must be taken to ensure an equal distribution of the air flow between the dryers.
11. During regeneration, the surface temperature of the tower will be high. Special precautions must be taken to protect personnel from touching the hot surface.
12. Make sure that the dryer is protected against overpressure from the air net by means of safety valves. Obstructions such as manual valves and/or check valves between the safety valves and the dryer are not allowed. The optional safety valves on the PB can only relieve flow caused by pressure increase due to temperature increase in the vessels.
13. If there is the possibility that the total compressed air flow exceeds the dryer capacity, it is recommended to install an optional sonic nozzle to prevent desiccant from being damaged by too high an air velocity.
14. If there is a risk that the net pressure can drop below 4.5 bar (65.3 psi), it is recommended to install a sonic nozzle to prevent desiccant from being damaged owing to high air velocity when starting up the compressor(s).

Installation proposal



58621D_4

- It is required to install pressure relief valves on each vessel of the dryer if there are ball valves installed at the inlet and the outlet of the dryer to isolate the dryers from the air net.
- The dryer unit (1) must be installed on a level floor suitable for taking the weight of the dryer. Check the dimension drawings for the required free space around and above the dryer.
- On both inlet filters a drain tube must be installed. 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 the manufacturer).

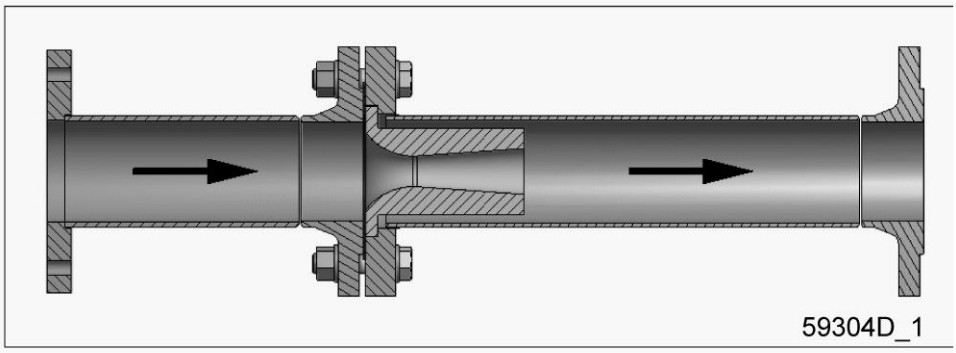
- A general purpose filter (2) is installed in the dryer inlet. The filter removes particles down to 1 micron with a maximum oil carry-over of 0.5 ppm. A high efficiency filter (3) is installed downstream of the general purpose filter. The filter removes particles down to 0.01 micron and maximum oil carry-over of 0.01 ppm.
- A particle filter (4) is installed in the dryer outlet. The filter removes particles down to 1 micron. If oil vapor and odors are undesirable, a carbon filter must be installed downstream of the particle filter. Center of gravity (approximately)
- For service reasoning it is advised to:
  - Install a manual valve in front of the dryer to block the incoming compressed air if it is impossible to disconnect the supply voltage of the feeding compressor(s).
  - Install a manual valve or minimum pressure valve after the dryer if it is impossible to depressurize the entire customer air net or if this net is also fed by other compressors which cannot be disconnected from their power supply.
  - Install by-pass pipes and valves over each filter in order to isolate the filters during service operations without disturbing the compressed air delivery. By-pass filters are also recommended to guarantee air purity during service. These kits can be ordered through the custom design department.
  - Install by-pass valves and pipe over the dryer and filters if the air supply must always be guaranteed. If the dewpoint and/or air purity must also remain guaranteed a second dryer must also be installed.
- The installation sequence is Compressor (5) -vessel (6) -dryer. For the dryer there is no extra ventilation needed.
- Water separator (7) : High-efficiency water separator removes 90% in the compressor air when by-passing the dryer. If the WSD is not mounted in the compressor, a WSD needs to be added in the installation downstream of the vessel.

Mechanical connections for standard PB dryers

The table below gives an overview of the mechanical connections of the inlet pipe, the outlet pipe and the regeneration outlet pipe.

Dryer type	Pipe	Connection
PB 3390 S	Inlet	DIN DN150 PN16
	Outlet	DIN DN150 PN16
	Regeneration	DIN DN150 PN16

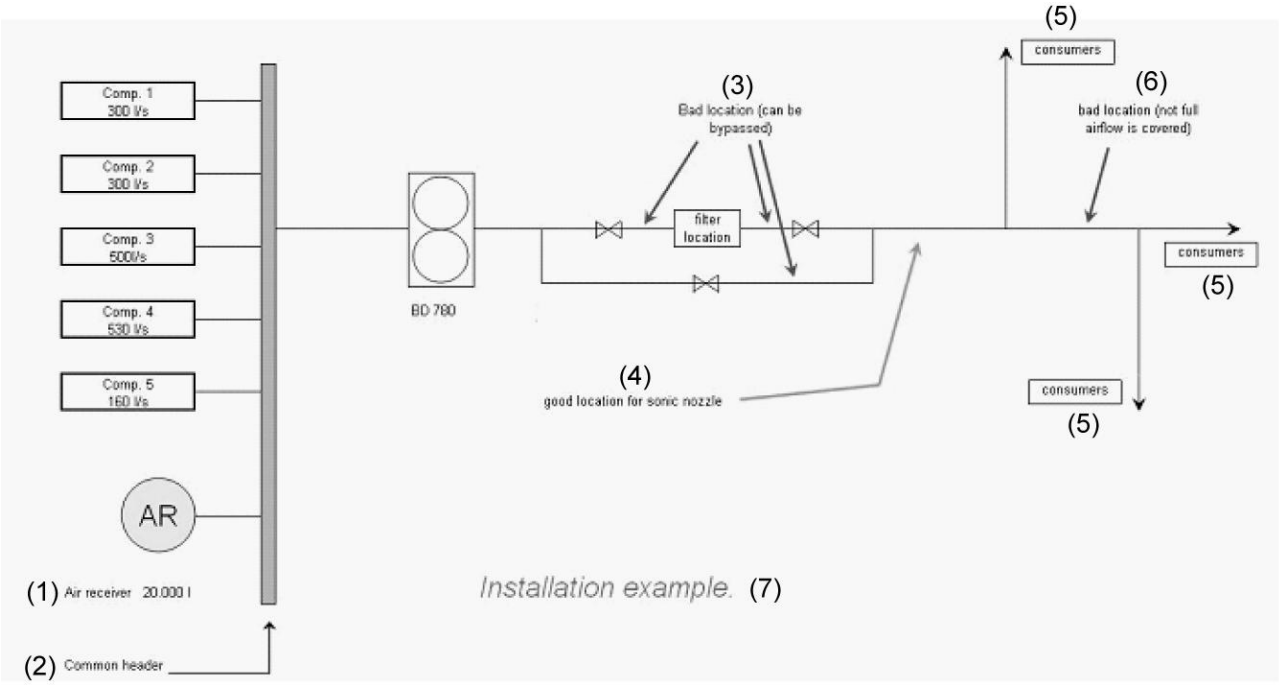
Installation of the optional sonic nozzle



In general, some guidelines need to be respected in order to guarantee a proper functioning of the sonic nozzle. Not following these instructions will either generate a bigger pressure drop over the nozzle or will not protect the dryer as it is supposed to do.

- This sonic nozzle is to be installed at the outlet of the dryer. This nozzle needs to be installed before the first branch in the compressed air piping, but preferably as close to the dryer as possible.
- One nozzle has to be installed per dryer that you have in the compressor installation.
- The sonic nozzle must have the full dryer flow. A bypass over the sonic nozzle is not allowed.
- Only select the sonic nozzle based on the relevant spare part list. No other combinations are allowed, except with special approval from the manufacturer.
- Handle the nozzle with care. Do not damage the inner surface with tooling. If this happens, then a higher pressure drop over the nozzle will be generated.

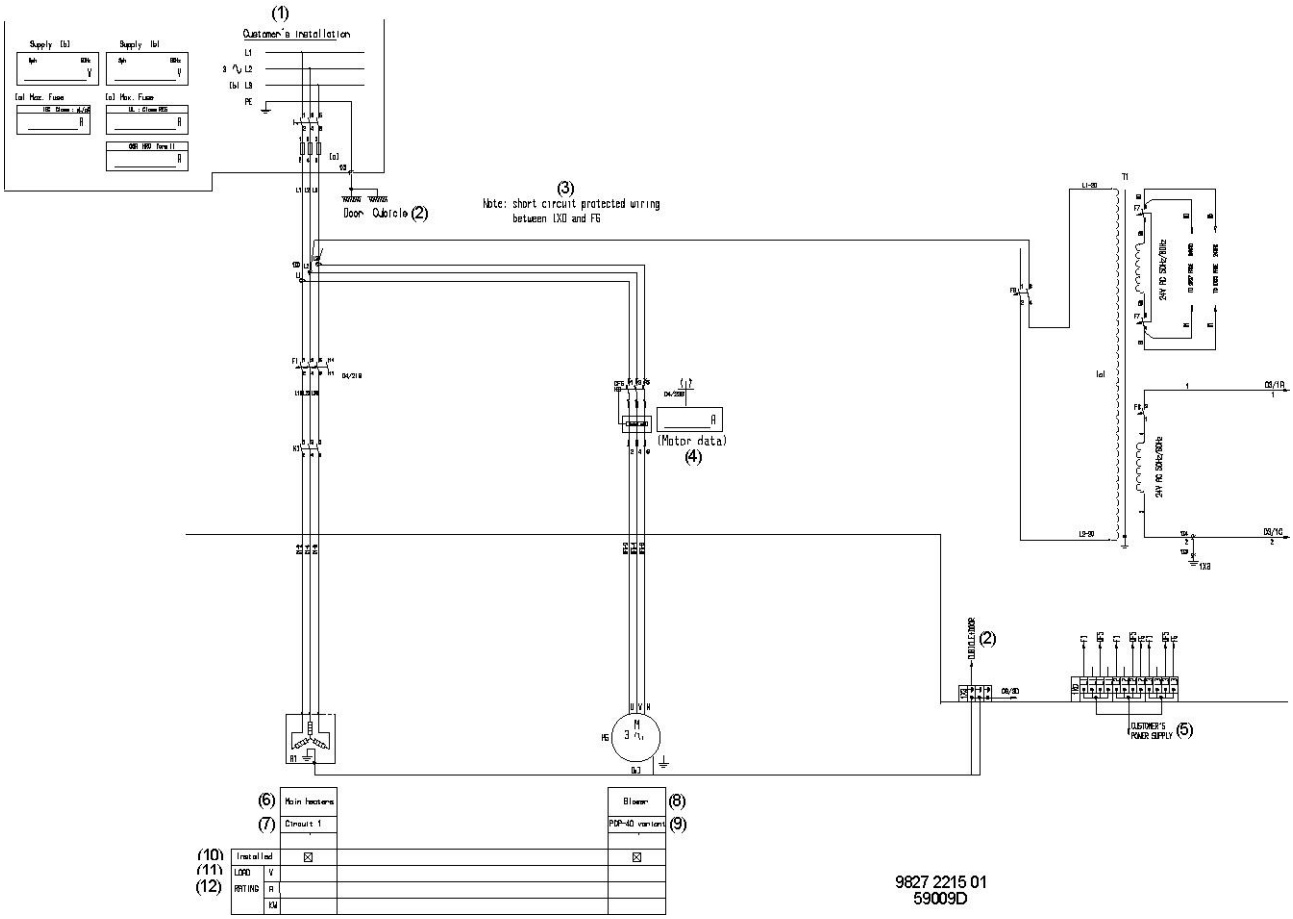
Below you can find a schematic drawing to illustrate the best location to install the sonic nozzle.



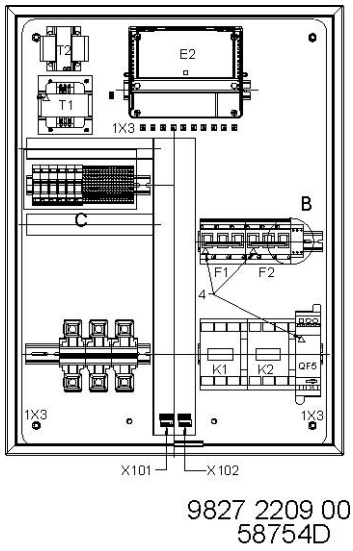
Reference	Description
(1)	Air receiver
(2)	Common header
(3)	Bad location (can be bypassed)
(4)	Good location for the sonic nozzle
(5)	Consumer
(6)	Bad location (not the full air flow is covered)
(7)	Installation example

4.4 Electrical cable size and maximum fuses

Electrical diagram and cubicles



Electrical diagram



Cubicle

Text on figures

(1)	Customer's installation
(2)	Cubicle + door
(3)	Note: short circuit protected wiring between 1X0 and F1
(4)	Motor data
(5)	Customer's power supply
(6)	Main heaters
(7)	Circuit 1
(8)	Blower
(9)	PDP -40 variant
(10)	Installed
(11)	Load
(12)	Rating

Part	**Function**
DP	Data plate
E1	Controller
E2	IO2 Digital - analog in + out
F1	Circuit breaker, heater circuit 1
F6	Fuse, transformer 1
F7	Fuse, controller
F8	Fuse, control circuit
K1	Contactor, heater circuit 1
QF1	Circuit breaker with integrated contactor, heater circuit 1
S3	Emergency stop
TS1	Overheating switch
T1	Transformer
1X0	Terminal strip, supply
1X3	Terminal strip, earth

Remarks

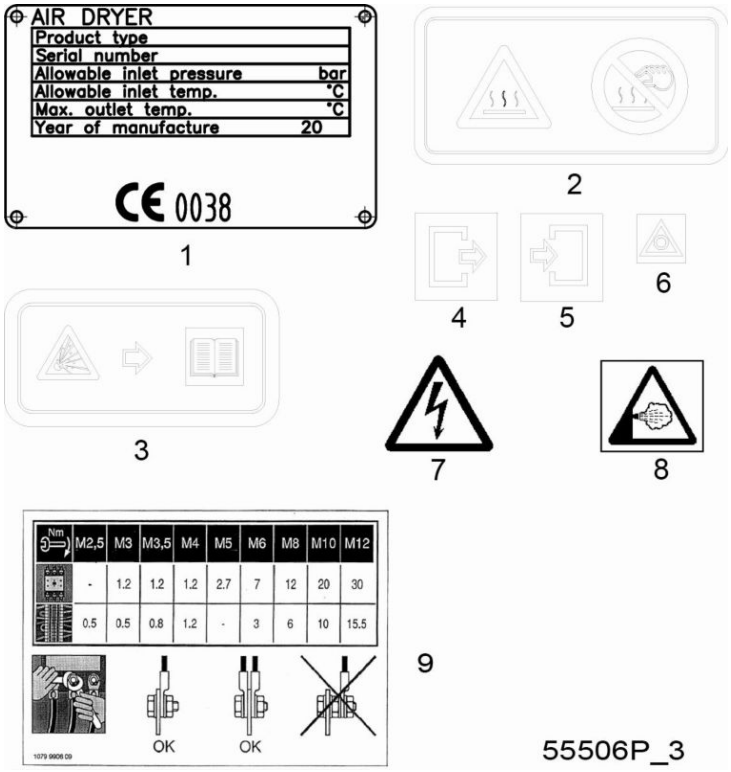
	The size is valid for: • IEC: multicore copper cable PVC 70 °C installed in free air according to IEC60364-5-52 table A52.10
	Local regulations remain applicable if they are stricter than the values proposed below.
	The voltage drop must not exceed 5 % of the nominal voltage. It may be necessary to use cables with a larger size than those stated to comply with this requirement.

Cable size for IEC dryers

PB	Supply voltage [V]	Cable sections at 30 °C (86 °F) Ambient	Cable sections at 40 °C (104 °F) Ambient	Cable sections at 55 °C (131 °F) Ambient
3390 S	400	3x 25 mm^2 + 16 mm^2	3x 35 mm^2 + 16 mm^2	3x 70 mm^2 + 16 mm^2
3390 S	440–460	3x 25 mm^2 + 16 mm^2	3x 35 mm^2 + 16 mm^2	3x 70 mm^2 + 16 mm^2

4.5 Pictographs

Explanation of pictographs



1. Data plate
2. Warning, heated surface
3. Warning, explosion danger if pressurised (see section 4)
4. Air outlet
5. Air inlet
6. Emergency stop
7. Warning, under tension
8. Warning, exhaust
9. Tightening torques

5 Operating instructions

5.1 Warnings

	The operator must apply all relevant safety precautions. Safety valves are not included in the scope of supply. Make sure that the air net is protected by a safety valve of the correct size and opening pressure.

5.2 Initial start-up

Description

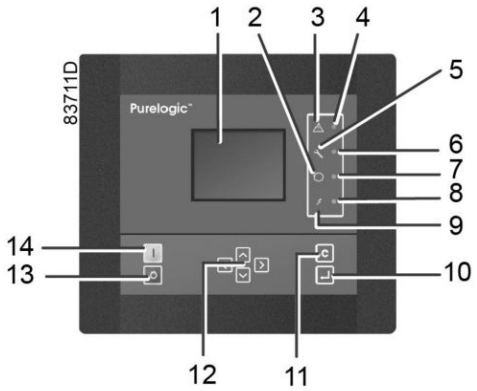
To start up the dryer for the first time or after a long period of standstill, proceed as follows:

1. Open the dryer bypass valves, if installed.
2. Close the air supply towards the PDP-sensor and unplug the PDP-sensor.
3. Cut off the air supply from the compressor towards the dryer by closing the external inlet valve.
4. Close the external outlet valve, if installed.
5. Start the compressor and wait for pressure.
6. Slowly open the external inlet valve.
7. Check the connections of the dryer for air leaks and repair if necessary.
8. Switch on the voltage to the dryer.
9. Switch on the dryer.
10. Let the dryer operate for several hours with the external outlet valve closed.
11. Gradually open the external outlet valve, keeping the pressure inside the dryer above 4.5 bar (65.3 psi).
12. As required, close the bypass valves of the dryer.
13. Press the stop button 0 and switch off the voltage to the dryer.
14. Plug the PDP-sensor.
15. Open the air supply towards the PDP-sensor.

	• At initial start-up, dust can be released. It is recommended to replace the cartridges of the silencers after approximately one week of operation. • An optional Sonic nozzle is available to avoid damaging of the desiccant at start up.

5.3 Starting

Control panel



Reference	Designation	Function
1	Display	Shows the dryer operating condition and a number of icons to navigate through the menu.
2	Pictograph	Automatic operation
3	Pictograph	General alarm
4	General alarm LED	Flashes if a shut-down warning condition exists.
5	Pictograph	Service
6	Service LED	Lights up if service is needed
7	Automatic operation LED	Indicates that the regulator is automatically controlling the dryer.
8	Voltage on LED	Indicates that the voltage is switched on.
9	Pictograph	Voltage on
10	Enter key	Key to select the parameter indicated by the horizontal arrow. Only the parameters followed by an arrow pointing to the right can be modified.
11	Escape key	To go to previous screen or to end the current action
12	Scroll keys	Keys to scroll through the menu.
13	Stop button	Button to stop the dryer. LED (7) goes out.
14	Start button	Button to start the dryer. LED (7) lights up indicating that the controller is operative.

Procedure

	Operating the dryer below the acceptable working pressure or starting the dryer against an empty air net can result in broken or shattered desiccant beads. These shattered desiccant beads will enter and spread out in the customer's air net, possibly resulting in considerable damage to machines or production processes connected to the air net. In cases where automatic start-up against an empty air net cannot be avoided or ruled out, a sonic nozzle must be installed (see section Sonic nozzle).
	The dewpoint of the air leaving the dryer will be higher than normal after starting. If the air net is to remain dry, run the dryer for approximately 8 hours (complete cycle for both towers) with the outlet valve (towards the air net) closed to make sure that the desiccant is properly regenerated.

Step	Action
–	Switch on the voltage (customer's installation). The control panel shows that the dryer is stopped.
–	While the dryer outlet valve (customer's installation) is closed, open the air inlet valve (customer's installation) slowly and wait until the dryer has pressurized. If an optional Sonic nozzle is installed, the dryer is protected from excessive volumetric flow through the desiccant.
–	Check for leakage.
–	Start the dryer by pressing the start button on the control panel.
–	Open the dryer air outlet valve slowly (customer's installation) to avoid too high air speed through the dryer during start-up, or install a sonic nozzle.
–	Close the by-pass valve (if provided).
–	If a dewpoint meter is installed (see also section Dewpoint meter): • it is recommended to run the dryer a complete cycle before opening the valve to the dewpoint meter • the dryer must run in a fixed cycle for 1 day before switching over to "PDP control" (dewpoint meter control)

	The maximum number of motor starts for the blower motor is 2 per hour. Exceeding the maximum number of motor starts may cause the thermic protection to trip and will eventually cause damage to the motor.

5.4 During operation

Description

At regular intervals, check the PDP temperature. If the PDP temperature is too high, let the dryer regenerate (by closing the outlet valve).

5.5 Stopping

Procedure

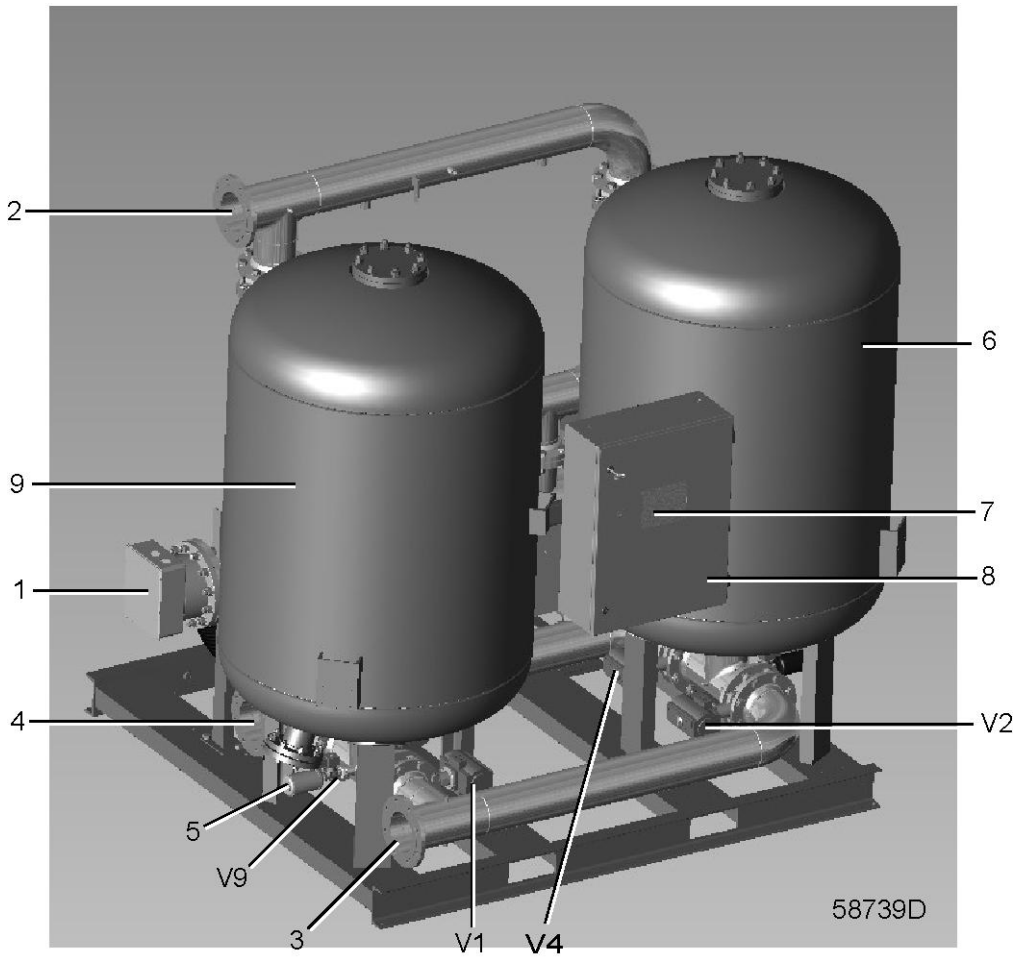
To stop the dryer proceed as follows:

1. If installed and if necessary, open the bypass valves of the dryer so that the application will still receive compressed air.
2. Close the external inlet valve between the compressor and the dryer and the external outlet valve between the dryer and the dry air consumer.
3. Switch the dryer off.

	• If the dryer is stopped for a longer period, close the inlet and outlet valves to avoid moisture from entering the dryer. • Ensure that the desiccant is well generated before stopping.
	The maximum number of motor starts for the blower motor is 2 per hour. Exceeding the maximum number of motor starts may cause the thermic protection to trip and will eventually cause damage to the motor.

5.6 Remote start/stop

Procedure



Front view

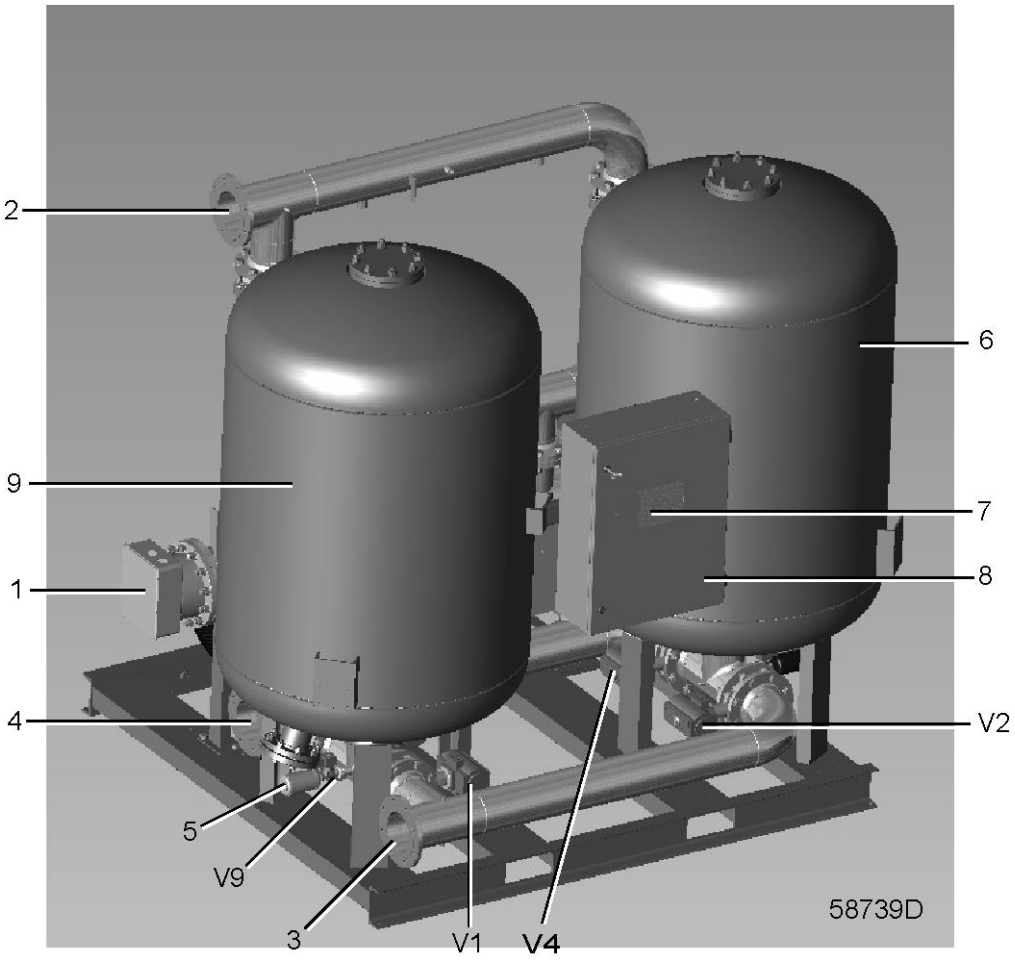
	A remotely controlled unit should bear an obvious sign, as described in the safety precautions.

The dryer can be started and stopped from a remote location by means of a digital switch S2 (customer's installation).

1. Stop the dryer (see section Stopping).
2. Switch off the voltage to the dryer.
3. Connect a digital switch (customer's installation) inside the cubicle ((S2) see sheet 4 of Service Diagram 9827 2118 00). The switch should be of the Normally Open type.
4. Close the cubicle door, switch on the voltage to the dryer.
5. Change the setting from Local Control to Remote Control. Note that activating the Remote Control feature will disable the Start/Stop buttons on the control panel.
6. To start the dryer, close switch (S2). To stop the dryer, open switch (S2).

5.7 Emergency stop

Procedure



Front view

In case of an emergency stop, the 24V AC control circuit of the electronic regulator remains powered, and the control panel will indicate an emergency stop shut-down.

To clear the shut-down:

- unlock the emergency stop button,
- reset the shut-down on the control panel.

5.8 Voltage failure

Procedure

In the event of a voltage failure, the regeneration valves (V3 and V4) as well as the blow-off valves (V5 and V6) will automatically close. All the other valves will remain in their current position. As a consequence, the flow path through the dryer remains unchanged.

The memory of the controller is retained so that all the operating parameters can be restored after the voltage failure. Before restoring any parameters, the controller will start up a special procedure to ensure that no working parameters have changed during the time that the voltage was down. If the option "Automatic Restart" is activated in the controller, the unit will automatically restart after verifying these parameters. No human intervention is necessary.

5.9 Dismantling

Description

Before dismantling, the responsible operating department must de-commission the system and ensure that it is de-pressurized.

Dismantle the product according to local legislation.

6 Maintenance

6.1 Preventive maintenance schedule

Warning

	While servicing the blower, do not, under any circumstances, reversely pressurize the blower, as this can lead to explosion.
	Before starting any maintenance or repair, press the stop button, wait until the dryer has stopped, press the emergency stop button, switch off the voltage by means of the isolating switch (customer's installation) and depressurize the dryer. Safeguard against unintentional switch-on. Apply all relevant safety precautions, including those mentioned in this book. Filters and valves between the compressor, dryer and air consumers may require other maintenance than stated below. Refer to the appropriate manual for more information.

Warranty-Product Liability

Use only authorized parts at the correct intervals (check with your local Pneumatech Customer Centre). Any damage or malfunction caused by the use of unauthorized parts or unqualified personnel is not covered by Warranty or Product Liability. In the event of any extended warranty, the end user must ensure that all required maintenance actions are performed when indicated on the Purelogic^{TM} display (see table below) or, alternatively, use a Pneumatech Service agreement.

Schedule

A number of service operations are grouped by means of service plans. If the programmed service interval is reached, a message will appear on the display of the regulator to carry out these service actions (see section Service plan)

The following checks should be carried out regularly to ensure safe operation and long service life. Depending on the environmental and working conditions of the compressor, the local Pneumatech Customer Centre may overrule the standard maintenance schedule; always check if in doubt.

Period	Running hours	Service plan	Action
Daily	-	-	• Check for possible leaks. • Check the display of the regulator for possible alarms. • Check the air inlet of the blower, remove any object obstructing the air flow. • Drain condensate water and oil from the prefilters. • Check that the compressed air temperature does not exceed the limits (see section Limitations and nominal conditions). • Check that dryer discharge pressure does not drop below the minimum allowed pressure of 4.5 bar (65.3 psi) below the nominal pressure the dryer is sized for. • Check that the dryer shifts towers and that the regeneration air is blown out through one of the regeneration valves during regeneration and cooling. • Check the PDP temperature. • Check that the dryer outlet is free.
Weekly	-	-	• Check the operation of the automatic drains. • Check solenoid valves for possible leaks. • Check the pilot air filter for dust • Check the pressure drop over the compressed air filter and the blower filter.
Monthly			• Check that the regenerating tower heats up. • Clean the filter of the blower inlet (optional). • Check the functionality of the overheating switch
Every 6 months			Check the gaskets for possible leaks, replace if necessary.
Annually	8000	A	• Check all dryer components. Replace worn-out parts. • Replace blow-off valves. • Check and clean the limit switches. • Service the Electronic Water Drains of the inlet filters. • Clean or replace the silencers. • Measure the heating element current consumption. • Replace filter cartridges of pre- and afterfilters. • Replace filter cartridge of PDP sensor and have PDP sensor re-calibrated. • Measure the dewpoint. • Have the condition of the desiccant checked. • Clean blower inlet filter, if installed. • Inspect seats of check valves; replace if necessary. • Check the functionality of the overheating switch.
Every 5 years	40000	C	• Replace desiccant (depending on the working conditions). • Replace the solenoid valves. • On -40 °C (40 °F) variants, replace butterfly valves. • Service the actuators of the butterfly valves using the service kit from the manufacturer.

6.2 Service kits

Service kits

Pneumatech Customer Centres will be glad to provide you with a wide range of service kits. Service kits comprise all parts needed for servicing components and offer the benefits of genuine Pneumatech parts while keeping the maintenance budget low. All service kits are mentioned in the relevant Parts Lists.

6.3 Service agreements

Pneumatech Customer Centres 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 agree on a tailor-made service agreement. It will ensure optimum operational efficiency, minimize downtime and reduce the total life cycle costs.

6.4 Service plan

A number of service operations are grouped (called Level A, Level B, Level C, ...). Each level stands for a number of service actions to be carried out at the time intervals programmed in the controller.

When reaching a level, a message will appear on the screen. After carrying out all service actions, the interval timers are to be reset using the key "Reset" in menu "Service". Consult your Customer Centre.

6.5 Filling instructions

Replacing desiccant

	Safety glasses, gloves and a dust mask must be worn during the filling procedure as dust may be produced.
	Do NOT overfill dryer.
	When replacing desiccant, make sure that the desiccant is disposed of according to the local regulations. When replacing the desiccant, never use an ejector or similar equipment as this might shatter the beads. The beads must be gravity-fed into the tower. After replacing the drying medium, the amount of dust released can increase. Therefore, it is recommended to replace the dust filter downstream of the dryer one week after replacing the desiccant.

Emptying

1. Let the dryer program run to the pressure equalization step.
2. Stop the dryer when the pressure is equalized in both towers.

3. Shut off the power supply.
4. Close the pilot air valve. Isolate the dryer from the air net by closing the air inlet and outlet valves. Depressurize the towers.
5. Install a suitable collector underneath the plug for emptying; note that the desiccant may be very hot (150 ˚C/302 ˚F).
6. Remove the plugs or flanges and let the desiccant pour out into the collector. A vacuum cleaner may be used to speed up the process and control dust.

Filling

1. Once the vessels are empty, refit the plugs or flanges.
2. Fit a large funnel to the filling hole of one of the drying towers; the size of the narrow part should be 35-40 mm/1.4-1.6 in.
3. Gently pour the correct amount of desiccant into the tower. Use a vacuum cleaner to control dust escaping from the filling hole.
4. Repeat steps 2 and 3 for the other tower; the amounts of desiccant must be equal in both towers.
5. Do not use any mechanical or pneumatic means for filling; this may destroy the desiccant.
6. Refit the filling plugs or flanges (1). Close the pilot air valve; the dryer is now ready to be started.

Desiccant

Desiccant can be ordered in following quantities:

Desiccant type	Quantity	Ordering number
Activated Alumina	105 kg (231 lb)	1617 6034 05
Activated Alumina	145 kg (320 lb)	1617 6034 06
Activated Alumina	1000 kg (2205 lb)	2906 7511 00

Amount of desiccant for single vessel:

Dryer	Activated alumina
PB 3390 S	850 kg (1874 lb)

6.6 Precautions before storage

Dryer units stored after operation

If the unit will not be started again for a period of up to 6 months:

- Put the correct number of VCI-plates (Volatile Corrosion Inhibitor) in the cubicle. (1 VCI plate/25L volume, part number VCI-plate 0018 9732 01)
- Close the door of the cubicle. Cover the unit with plastic sheeting to reach down just over the dryer.
- Store the unit in a clean, dry, well ventilated warehouse. Stand the unit upright in its crate or on the pallet. The dryer unit is now ready for storage for maximum 6 months. The storage period remains valid provided that the ambient conditions remain normal (meaning no excesses of heat, cold or high humidity). If the unit is to be stored for a period longer than 6 months then repeat the storage maintenance procedures once every subsequent 6 months.
- Follow installation checklist before starting.

Transportation

The purpose of these procedures is to ensure continued protection against corrosion or other damage during transportation.

These instructions also apply to units which (in exceptional cases) are to be returned to the manufacturer.

Dryer units

- Carry out the storage instructions.
- Place the original plastic cover over the unit, or cover it up with plastic sheeting secured with adhesive tape.
- Place the unit in its original crate. Failing this, construct a wooden crate strong and safe enough to withstand routine handling by fork lift or slings and crane.
- Apply the shipping data to the crate, using indelible ink. Apply the markings on both sides. If the original crate is used, delete the old markings.
- Where applicable be sure to include the requisite customs- and transport documents, for shipment with the unit.

Inlet / outlet flanges

When storing the dryer, it is advisable to cover inlet and outlet flanges with tape (preferably humidity adsorbing).

Inlet, pressure relief, regeneration and check valves

Until further notice, no special precautions should be taken on the inlet valve, pressure relief valves, regeneration air valves and/or check valves.

Pressure dewpoint sensor

When a pressure dewpoint sensor is installed, make sure that inlet and outlet valves to the sensor block housing are closed. This to avoid any contamination of the dewpoint sensor while the dryer is not used. Doing so will result in a faster response time.

Also keep in mind that the dewpoint sensor is only calibrated for one year (certificate).

When the dryer is put into storage for more than one year, then the dewpoint sensor has to be recalibrated.

Desiccant

- When ordering the desiccant, you will receive the required / ordered quantity either in bags or in barrels, depending on the quantity and/or type that has been ordered.
- Both these adsorbing materials are used for “drying” the compressed air, but this does not mean that these can withstand free water. In fact, when these adsorbers come in contact with water, they will pulverize and turn into dust (which leads to a decreased adsorbing capacity and the dryer will loose its functionality).
- When storing desiccants of these types, make sure that they are stored in a dry place, preferably indoors (closed room). Also, keep bags and/or barrels closed until you will use the desiccant to renew the charge of the dryer or fill them up at commissioning.

7 Optional equipment

7.1 Precautions for optional equipment

Warning

	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.

Precautions

1. Make sure that all electrical wiring has been installed in compliance with the valid 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.

Note

	Some precautions are general and may not apply to your optional equipment.

7.2 Options

PDP sensor

Sensor mounted in external stainless steel housing with integrated dust filter. The sensor is used to monitor the air dewpoint and extend the adsorption cycle when the dryer is not 100% continuously loaded.

The air inlet side of the housing is connected to the outlet pipe of the dryer with a tube and can be disconnected by a manual ball valve. The air outlet side of the housing is connected to a needle valve to control the flow through the PDP sensor after which the air is silently expanded in a tubular silencer.

Sonic nozzle

Why and when to be used?

Excessively high air velocity (e.g. due to low inlet pressure) may cause the desiccant to float in the vessels.

The desiccant beads scrape against each other, creating additional dust. High-speed flow occurs when a compressor starts against an empty air net or when working at a discharge air pressure that is too low. A high volume of compressed air output can result in a pressure drop, which in turn increases the speed. Therefore, it is recommended to protect the drying medium against excessive volumetric flow through the desiccant by installing a sonic nozzle.

For installation and adjustment, refer to the instruction delivered with the sonic nozzle.

Below, a list of all possible situations can be found where the dryer becomes overloaded and where damage to the desiccant beads might appear:

- Compressor installations where air receiver(s) are installed between the compressor(s) and the dryer
- Compressor installations where multiple compressors / dryers are used, where you don't have a one-to-one setup
- Compressed air applications where air is used at low air pressure after the dryer
- Compressor installations where we have regular starts and stops of the dryer
- Compressed air applications with "high" fluctuating air demands
- Compressor installations with a wrong selection of the dryer (too high airflow or too low working pressure)
- Compressor installations with standby compressor(s) and no standby dryer and where the dryer sizing has been done based on the standard load.
  - Extra compressor can be started to take peak loads
  - Change over from one compressor to another with some overlap

Of course, this list is not complete and might need to be adapted when new situations appear.

Part numbers

Part numbers have been created for the sonic nozzle, based on:

- the size of the dryer
- the fact that correction factors for pressure, temperature and dewpoint variant have been applied when selecting the dryer

When the correction factors have not been applied when selecting the dryer, then this will result in a higher pressure drop over the sonic nozzle.

Part numbers for the sonic nozzle that you need to select, can be found in the ASL.

Vessel insulation

Insulation of hot piping and both vessels for increased energy savings and touch protection.

Blower inlet filter

In dusty environments or if small particles can be sucked in by the blower, the dryer can be protected by a blower inlet filter.

Filter option

To protect the desiccant from contaminating fluids or particles, an inlet filter (PF C for Z compressors, PF G and PF C combination for G compressors) can be mounted upstream of the dryer. On the outlet side of the dryer, a particle filter of the PF S type can be mounted to prevent dust particles, emerging from the desiccant bed, from entering the air net.

The filter option consists of a PF C (Z compressors) or PF G and PF C (G compressors) inlet filter, a PF S outlet filter, as well as all the relevant piping and instructions.

The filter element of a PF S outlet filter should be replaced one week after initial start-up or replacement of the desiccant.

In case an extra after-filter is installed by the customer, it is important to mount it always downstream of the PF S particle filter.

High ambient temperature execution

In hot environments up to 55°C (131°F) it is required to increase the size of the power wiring and to cool the control cabinet to ensure reliable operation.

A vortex cooler is installed inside of the control cabinet including all connections and wiring. The pilot air filter assembly is also adapted to feed the vortex cooler.

High inlet temperature execution

At higher inlet temperatures, especially with lower relative humidity, molecular sieves desiccant has a better adsorption capacity than silicagel.

The top layer of silicagel is replaced with molecular sieves and high performance valves are installed installed in the regeneration circuit to handle the higher temperatures.

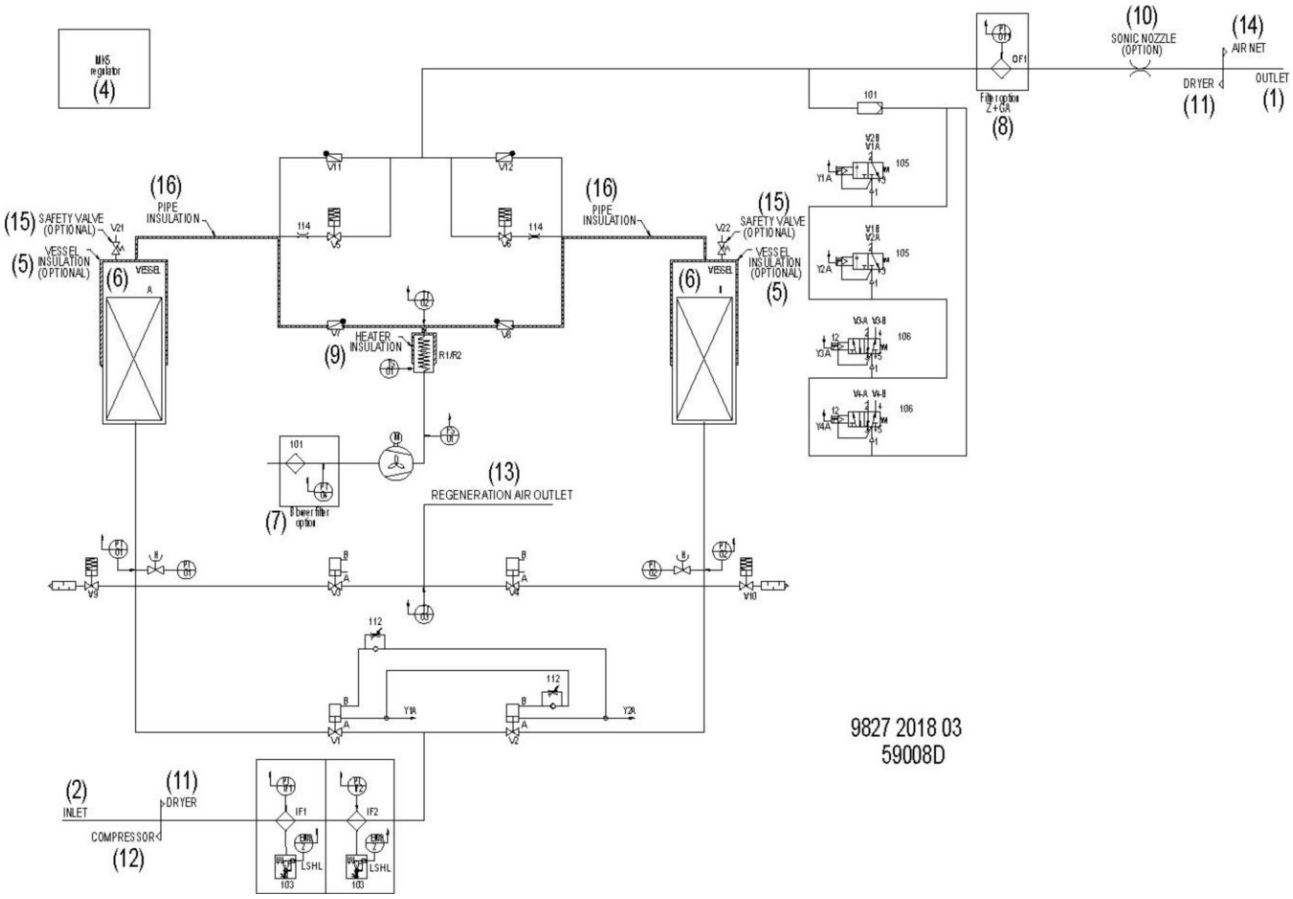
Safety valve

To relieve the overpressure in the vessel when it becomes too high because of fire in the neighbourhood of the dryer.

8 Problem solving

8.1 Faults and remedies

Flow diagram



Flow diagram

Problem solving table

Condition	Fault	Remedy
Poor dewpoint	Free water in compressed air inlet	Check that condensate separators and drains upstream of the dryer are operative
	Temperature of compressed air too high	Clean compressor aftercooler
	Working pressure low	Check pressure drop in filter, etc.
	Poor regeneration	See condition Regeneration temperature too low
	Dryer fails to shift	See condition Dryer fails to shift

Condition	Fault	Remedy
	Poor desiccant (older than 5 years, or oil in desiccant)	Replace desiccant
Dryer fails to shift	Pilot air missing	Check for pressure in the operating lines. Clean pilot air filter (13)
	Solenoid valves Y1 or Y2 do not open	Check and replace defective parts
	Leaking actuators	Replace seals or replace actuator
Pressure in both towers after shift	Blow-off valve(s) (Y6 or Y7) out of order	Clean. Replace as necessary
	Silencer (17 or 18) clogged	Clean. Replace as necessary
	Inlet valve (3) leaks	Disassemble and check. Replace seal
	Pressure sensor PT1 and/or PT2 malfunctioning	Compare values with manometers PI01 and PI02, replace as necessary
	Leaking cooling air valves (V5, V6)	Clean seals or replace valve
	Leaking check valve, air outlet	Disassemble and check.
Unusually large flow through regeneration valve(s) (4 or 5) during regeneration	Inlet valve leaks	Disassemble and check. Replace seals
	Leaking cooling air valve (V5, V6)	Clean seals or replace valve
	No or wrong nozzle installed	Check and replace as necessary
Heating temperature too low	One of the connectors of the heating element burnt off	Check. Replace
	A heating element burnt out	Replace
	Too much regeneration air	Cooling air valve leaking. Correct as necessary
	Pressure > 1.5 bar (21.76 psi) in the regenerating tower	Check blow-off valves
Heating temperature too high during heating with blower	Too little regeneration air	Check pressure sensor and control valves (V3 and V4)
	Pulverization of desiccant causing pressure drops	Check. Replace
	Blower inlet blocked	Clean blower inlet If installed, replace optional inlet filter
Excessive desiccant dust in outlet pipe or filter	Check working pressure and air flow	Adjust settings
	Frequently starting and stopping of the compressor causing large fluctuations of the air pressure	Install a sonic nozzle
Regeneration temperature too low after 3 hours of heating with blower	Dryer overloaded	Check the flow of the dryer and correct as necessary Check the water separation before the dryer and correct as necessary
	Blower flow restricted	Check for regeneration outlet flow restriction Check for blower inlet restriction
High PDP after tower shift	Cooling air flow too low	

Condition	Fault	Remedy
Blower does not start	Circuit breaker tripped	Motor overloaded. Check max current at full speed Motor overloaded. Maximum allowable starts is 2 starts per hour. Wait 60 minutes before restarting to cool down the motor
	Motor damaged	Check motor. Maximum allowable starts is 2 starts per hour
	Contactor damaged	Check contactor
Shutdown alarms on blower flow switch	Blower flow blocked	Check valve positions and check that air is coming out of the regeneration outlet
	Flow switch damaged	Check flow switch
	Flow switch not deep enough in socket	Full thread of switch must be inside socket

9 Technical data

9.1 Limitations and nominal conditions

Nominal conditions

Compressed air inlet pressure	bar(e)	7
Compressed air inlet pressure	psi	101.53
Compressed air inlet temperature	˚C	35
Compressed air inlet temperature	˚F	95
Inlet relative vapor pressure	%	100
Pressure dewpoint -40 ˚C variant	˚C	-40
Pressure dewpoint -40 ˚F variant	˚F	-40

Limitations

	Unit	PB 3390S
Maximum compressed air inlet pressure	bar(e)	10
Maximum compressed air inlet pressure	psi	145.0
Minimum compressed air inlet pressure	bar(e)	4.5
Minimum compressed air inlet pressure	psi	65.3
Minimum ambient air temperature	˚C	1
Minimum ambient air temperature	˚F	33.8
Maximum ambient air temperature	˚C	40
Maximum ambient air temperature	˚F	104
Min.-max. compressed air inlet temperature	˚C	1 - 45
Min.-max. compressed air inlet temperature	˚F	33.8 - 113
Min.-max. compressed air inlet temperature for dryers designed for high inlet temperature	˚C	1 - 55

	Unit	PB 3390S
Min.-max. compressed air inlet temperature for dryers designed for high inlet temperature	°F	33.8 - 131

9.2 Specific data

PB 3390 S

	Unit	PB 3390 S
Volume flow at dryer inlet	l/s	1600
Volume flow at dryer inlet	cfm	3390
Pressure drop over dryer	bar	0.10
Pressure drop over dryer	psi	1.45
Electric power consumption, average	kW	
Electric power consumption, average	hp	
Recommended filter size	PF C/S/G	4_F
Amount of desiccant per tower		See section Filling instructions

10 Instructions for use of air dryer

For PB dryers

1. This dryer vessel can contain pressurized air; this can be potentially dangerous if the equipment is misused.
2. This vessel must only be used as a compressed air vessel and must be operated within the limits specified on the data plate.
3. No alterations must be made to this vessel by welding, drilling or any other mechanical method without the written permission of the manufacturer.
4. The pressure and temperature of this vessel must be clearly indicated.
5. 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: for M12 bolts 73 Nm (53.84 Ibf.ft) +/-18 Nm (+/-13.28 Ibf.ft), for M16 bolts 185 Nm (136.40 lbf.ft) +/-45 Nm (+/-33.19 lbf.ft), for M20 bolts 333 Nm (245.52 lbf.ft) +/-83 Nm (+/- 61.20 lbf.ft)

Guidelines for inspection

On the Declaration of Conformity / Declaration by the Manufacturer the harmonized and/or other standards that have been used for the design are shown and/or referred to. The Declaration of Conformity / Declaration by the Manufacturer is part of the documentation that is supplied with this dryer.

Local legal requirements and/or use outside the limits and/or conditions as specified by the manufacturer may require other inspection periods as mentioned below.

Pressure equipment

The following tables A and B contain the necessary information for the inspection of all pressure equipment of category ll and higher according to the Pressure Equipment Directive 97/23/EC.

Design criteria for pressure equipment

Table A

Dryer Type	Construction Drawing no. Vessel left	Construction Drawing no. Vessel right	Design Pressure Bar(e)	Vessel Diameter (mm)	Vessel Internal Volume (Liter)
PB 3390 S	1624 8677 00	1624 8382 00	10	1100	1330

Table B

Dryer Type	Min. and Max. Design Temperature	PED Category	Number Of Cycles (1)	Min. Wall Thickness of Shell (2)	Min. Wall Thickness of Head (2)
PB 3390 S	-10 to 250 °C (14 to 482 °F)	IV	22000	7.5	6.25

1. The number of cycles refers to the number of cycles from 0 bar (e) to maximum pressure.
2. The minimum wall thickness refers to the minimum required thickness according to design calculations and is expressed in millimeter.

Recommendation by the manufacturer for the re-inspection time

Following actions are to be executed by the user of the equipment or by Pneumatech personnel, unless stated different in national legislation of the country in which the equipment is operated. The stated time interval has as reference the day of start-up of the unit.

Every 6 months:

- Visual check of vessel material on outside (exposed) for traces of strong corrosion; consult manufacturer if necessary.

Every 5 years, during the desiccant change, following inspections are to be carried out:

- inspection of outside and inside of the material for excessive and local corrosion, fissures, leaks, damage; consult manufacturer if necessary.
- inspection of strainers inside the vessels. To be replaced if necessary.

Every 10 years:

- hydrostatic test according to test pressure on data plate; consult manufacturer if necessary.

11 Documentation

Declaration of conformity

Typical example of a Declaration of Conformity document

1 **EC DECLARATION OF CONFORMITY**

2 We, (1) ....., declare under our sole responsibility, that the product
3 Machine name
4 Machine type
5 Serial number

6 Which falls under the provisions of article 12.2 of the EC Directive 2006/42/EC on the approximation of the laws of the Member States relating to machinery, is in conformity with the relevant Essential Health and Safety Requirements of this directive.

The machinery complies also with the requirements of the following directives and their amendments as indicated.

7

	Directive on the approximation of laws of the Member States relating to		Harmonized and/or Technical Standards used	Att' mnt
a.	Pressure equipment	97/23/EC		
b.	Machinery safety	2006/42/EC	EN ISO 12100 – 1 EN ISO 12100 – 2 EN 1012 – 1	
c.	Simple pressure vessel	2009/105/EC		
d.	Electromagnetic compatibility	2004/108/EC	EN 61000-6-2 EN 61000-6-4	
e.	Low voltage equipment	2006/95/EC	EN 60034 EN 60204-1 EN 60439	
f.	Outdoor noise emission	2000/14/EC		
g.	Equipment and protective systems in potentially explosive atmospheres	94/9/EC		
h.	Medical devices General	93/42/EEC	EN ISO 13845 EN ISO 14971 EN 737-3	
i.				

8.a The harmonized and the technical standards used are identified in the attachments hereafter

8.b *(Product company)* is authorized to compile the technical file.

9
10

	Conformity of the specification to the directives	Conformity of the product to the specification and by implication to the directives
11 12 Issued by	Product engineering	Manufacturing
13 14 Name		
15 Signature		
16 Date		

81679D

No. 2920 1840 00 / 2014 - 07

pneumatech
Pure air . Pure gas

	ДАТА	ВИД РАБОТ	СЛЕДУЮЩИЕ РАБОТЫ	ИСПОЛНИТЕЛЬ
1		ТО по плану Ремонт	Не позднее	
2		ТО по плану Ремонт	Не позднее	
3		ТО по плану Ремонт	Не позднее	
4		ТО по плану Ремонт	Не позднее	
5		ТО по плану Ремонт	Не позднее	
6		ТО по плану Ремонт	Не позднее	
7		ТО по плану Ремонт	Не позднее	
8		ТО по плану Ремонт	Не позднее	