PARTS, SYSTEMS AND AUTOMATIONS FOR FLUID DISPENSING

# USE AND MAINTENANCE MANUAL

## SDS 1000 SMART DEGASSING SYSTEM


COD.: **DTVI_SDS1000_2438**
REV.: **00**
DATE: **17/09/2024**

**ORIGINAL COPY**
Read carefully before use!

EN

# Summary

# 1 GENERAL INFORMATION

This manual contains information regarding the installation, use, maintenance, and end of life of the component and provides indications for the most suitable behavior for correct operation. This manual has been designed to be simple and as straightforward as possible, with a subdivision into chapters and sub-chapters that allows you to find any information you need quickly. In addition, the manual begins by giving a general description of the contents, then an overview of the component, to arrive at aspects of safety, transport, installation and use and finally to the end of life. If you have any doubts about the interpretation or reading of this document, please contact the manufacturer.

DAV Tech declines any responsibility relating to improper use of the component. Observe the specifications in this manual.

Read this manual before handling the component or performing any action on it.

The manual is an essential safety requirement and must accompany the component throughout its life cycle.

It is the task of the end user to optimize the functionality of the component, always considering the purpose for which it was built.

You are asked to keep this manual, together with the attached documentation, in good condition, legible and complete. In addition, it must be stored in the vicinity of the component or, in any case, in a place accessible and known to all personnel who use the component itself or who must perform maintenance or inspection interventions. If the manual deteriorates or is no longer complete, a copy must be requested from the manufacturer, indicating the code of the manual and the revision.

The manual is intended for personnel who use the component (operators), who perform maintenance on it (maintenance technicians), and for personnel who must perform checks or inspections. The manufacturer is not liable for damage to the component caused by personnel who have not followed the instructions in the manual.

If you have any doubts about the correct interpretation of the information contained in this manual, please contact the manufacturer.

## GUARANTEE

During the design phase, a careful choice of materials and components to be used in the project was made and they were subjected to regular testing before delivery. All elements have been designed and manufactured with an adequate degree of safety, such as to be able to withstand stress greater than those of normal use.

The warranty is valid for a period of 12 months from the date of commissioning and in any case no longer than 15 months from the date of delivery. Work conducted during the warranty period does not extend the warranty period in any way.

The manufacturer is not liable for defects due to normal wear and tear of parts which, by their nature, decay.

## 1.1 Symbology

Below are the symbols that are used to give a greater impact to the importance of the concept you want to give.

**ATTENTION!**
Refers to a warning that could lead to minor damage (minor injuries, damage to the component requiring maintenance work).

**DANGER!**
It refers to a major event that could cause major damage (death, permanent injury, irreversible breakage of the component).

NOTE. Indicate relevant information or insight.

OBLIGATION. It indicates a task that must be performed, related to both the component and the manual.

REFERENCE. Links to an external document that is important to view

In addition, the list of symbols is integrated with that of the personnel responsible for using the component and its function, together with other symbols used within the manual.

**Operator**
A (qualified) person capable of operating the component, adjusting, cleaning, starting, or resetting the component. The operator is not authorized to perform maintenance.

**Mechanical maintenance technician**
Qualified technician able to conduct mechanical, adjustment, maintenance and routine repair work described in this manual. He is not authorized to conduct interventions on electrical systems in the presence of voltage.

**Electrical maintenance technician**
Qualified technician able to conduct electrical, adjustment, maintenance and routine repair work described in this manual. It can work in the presence of voltage on electrical cabinets and junction boxes. He is not authorized to conduct interventions on the mechanical side.

**Manufacturer's technician**
Qualified technician made available by the manufacturer to conduct operations of a complex nature in particular situations, or in any case as agreed with the customer.

## 1.2 Reference standards

The reference standards and directives of this manual are the following:

### Directives

- 2006/42/EC – Machinery Directive;

## 1.3 Declaration of incorporation (Annex II B DIR. 2006/42/EC)

**Manufacturer's name:** **DAV Tech Srl**
**Address:** Via G. Ravizza, 30, .36075, Montecchio Maggiore (VI)

**DECLARES THAT THE ALMOST MACHINE**

**Component:** SDS-1000
**Model:** Smart degassing system
**Serial:**
**Year:** 2024
**Intended use:** Remove air bubbles from the fluidic circuit

**COMPLIES WITH THE INCORPORATION PROVISIONS OF DIRECTIVE 2006/42/EC**

The technical documentation has been drawn up in accordance with Annex VII B, as required by the following:

- Machinery Directive 2006/42/EC of the European Parliament and Council of 17 May 2006

**IT ALSO DECLARES THAT:**

- Undertakings are undertaken to provide, in response to a properly substantiated request from the national authorities, relevant information on this partly completed machine;
- The technical file was prepared by Andrea Grazioli, via Ravizza, 30, Montecchio Maggiore (VI), IT.

**This quasi-machine cannot be used until the machinery on which it will be used is declared compliant with regulation 2006/42/EC.**

Montecchio Maggiore, 17 September 2024

**The legal representative**

**Andrea Grazioli**

## 1.4 Glossary

The following are the most used terms within this manual with their meanings.

| TERM | DEFINITION |
|---|---|
| **Enable** | Term that defines the act of preparing (enabling) an action. The action will be triggered as soon as the criteria are met, which consequently leads to the activation of the enabled action. |
| **Active** | The action that is performed instantaneously when the control is activated. |
| **Human controls** | This defines those commands that, used for manual operations, must be kept activated for the action to be performed. When the command is released, the action stops. |
| **Two-hand controls** | Human-controlled controls require two manual controls to be operated simultaneously to perform an action. |
| **P.P.E.** | Personal protective equipment. They include all the items necessary to ensure the protection of personnel from possible accidental damage (safety shoes, gloves, helmet, and more). |
| **Display** | It is used to display information. It can be in any shape and size, even touch screen. |
| **Manufacturer** | Natural or legal person who designed and manufactured the component covered by this manual. |
| **HP** | High Pressure. An acronym that indicates high pressure. |
| **Icon** | A small image that represents a command, a function or even a document or an operating program, which appears on a computer screen. When selected by the user, it initiates the function or program it symbolizes. |
| **Joystick** | Lever manipulator used in control panels. |
| **N.A.** | Not Applicable, i.e., it indicates that it is a field that does not apply to this manual and that cannot be integrated into the component. |
| **Operator panel** | A control station where the machine control instruments are located |
| **P.I.** | Possible Implementation, i.e., is currently absent from the component described in this manual, but it is possible to make an addition and implement it. |
| **Screen** | Interface system between man and component. Screenshots are the images displayed on the operator panel that allow the user to receive and provide information to the management software. |
| **Push-button panel** | Composition of buttons and selectors that allow you to act directly on the behavior of the component. |
| **Keyboard** | Keyboard only (stand-alone element) or in addition to a display (keys only, no selectors or other) |
| **Touch screen** | Touch screen that allows the user to interact with a graphic interface using their fingers or objects. |

## 1.5 Service and manufacturer contact details

For any reason relating to the use, maintenance or request of spare parts, the customer must contact the manufacturer (or the service center if present) directly, specifying the identification data of the component.

The customer can make use of the technical and commercial support of local agents or importers, who are in direct contact with the company DAV Tech Srl.


| | |
|---|---|
| **Company name** | **DAV Tech Srl** |
| **Postal address** | Via Ravizza, 30, 37065, Montecchio Maggiore (VI) – (IT) |
| **Telephone** | +39 0444 574510 |
| **Fax** | +39 0444 574324 |
| **email** | davtech@davtech.it |
| **Website** | www.davtech.it |

# 2 PRESENTATION AND OPERATION

In this manual we want to deepen the SDS 1000 (Smart Degassing System) component, i.e., a component that detects the passage of air bubbles within the fluidic circuit and removes them. These air bubbles are a problem for volumetric systems, which affect both the count of fluid dosed, altering it, and the quality of the fluid itself.

In other words, the function of this component is:

**RECOGNIZE THE PRESENCE OF GAS INSIDE THE FLUIDIC CIRCUIT TO REMOVE IT**

Intended use is considered to be the use described in the chapter below, while improper use is considered any other use that is not described in this manual, with products of different material and format from those for which it was built.


Figure 01 – SDS-1000 detail

| No. | DESCRIPTION |
|---|---|
| 01 | Support feet |
| 02 | Fluid inlet |
| 03 | Air inlet |
| 04 | Electrical panel |
| 05 | Fluidic pressure reducer |
| 06 | Display HMI |
| 07 | 3-way electric valve connection |
| 08 | 3-way valve |
| 09 | Fluid outlet (hidden) |
| 10 | Purge Level Sensor |
| 11 | Fluid Purge jar |

Before using a certain type of fluid, it is necessary to check that:

- The viscosity of the fluid is compatible with the characteristics of the component;
- The characteristics of the fluid meet the desired requirements;
- The technical data sheet of the fluid provided by the manufacturer contains all the information regarding the product such as viscosity, applications, drying times, and storage;
- The fluid storage time has not been exceeded;
- The fluid packages are tightly sealed.

If it is necessary to use several fluids with the same component, it must be cleaned thoroughly to prevent residues from the previous machining to affect the machining to be performed.

## SPECIAL VERSIONS

**N.A.**

## OPERATION

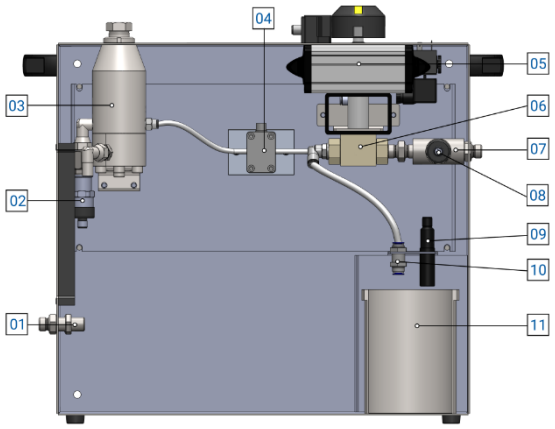



Figure 02 – SDS 1000 internal section

| No. | DESCRIPTION |
|---|---|
| 01 | Fluid inlet |
| 02 | Pressure sensor in |
| 03 | Pressure reducer |
| 04 | Bubble presence sensor |
| 05 | 3-way solenoid valve |
| 06 | Fluidic Path Selector |
| 07 | Fluid output |
| 08 | Pressure sensor out |
| 09 | Purge Level Sensor |
| 10 | Fluidic purge outlet |
| 11 | Fluid Purge jar |

In order to work correctly, this system needs a DAT 090 pressure reducer to reduce the fluidic pressure entering the component to the optimal operating value and an inlet pressure sensor, to be able to define if there are pressure problems (too high or too low), so as to send an alarm signal to the component itself. At this point, you will find the core of the system, i.e., the bubble detection sensor. This sensor checks if there are bubbles inside the controlled pipe with a minimum size of 1/3 of the area of the pipe itself (considering that the diameter of the pipe is equal to 6mm). From here, we move on to the 3-way solenoid valve which, if no bubbles are detected, makes the fluid proceed towards the exit of the component; otherwise, divert the flow of fluid for a few seconds to the jar, so that the air bubble also escapes.

For working pressures, please refer to chapter 2.2.

This component cannot operate autonomously. To work correctly, it must be connected to a power source, which can be a pressure plate pump or similar, and to a dosing system, according to the customer's needs. In addition, this component communicates with the power supply system via the M12 connector (see chapter 5.2.1 Connector No. 5)

**ATTENTION!**
It is recommended that you connect the component to the sources indicated in this manual in chapter 2.2. Connecting it to other sources or products with features not listed in this manual may break them.

This component has been designed to work autonomously, i.e., once the fluidic pressure reducer has been adjusted to reach the desired outlet pressure, the system performs the bubble detection automatically.

It is also equipped with a display to show the status of the component and set the parameters to work correctly and to be able to customize the alarm thresholds according to use.

The following is intended to explain how the SDS 1000 system works.

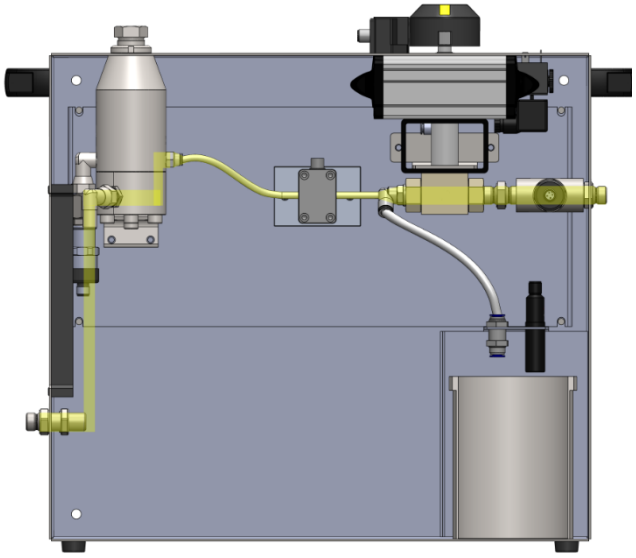


Figure 03 – Normal Work Phase

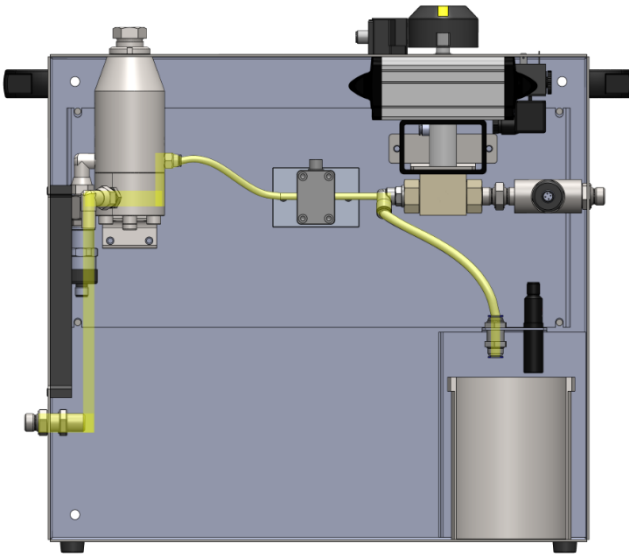
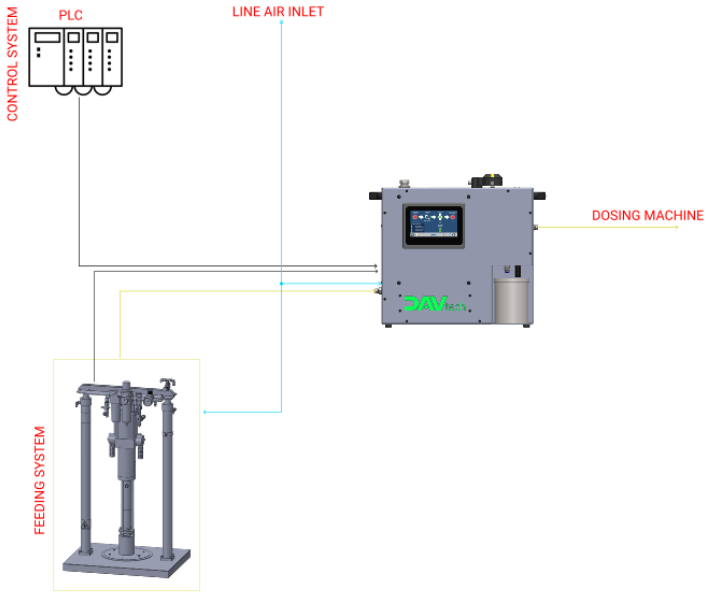


Figure 04 – Purge phase

During the normal working phase, the fluid enters the system with a certain pressure (set externally by the customer), passes through the pressure reducer to bring it to an acceptable working range for the system, continuing up to the bubble detection sensor. In the event that the bubble detection sensor does not detect anything, the fluid proceeds towards the outlet and, therefore, towards the external system; If the sensor detects bubbles, it sends a signal to the system, which sends a command to the 3-way valve that changes the path of the fluid, diverting it to the purge jar. This path remains like this for a few seconds, which can be set from the HMI panel.

It must be considered that if the bubble detection sensor continues to detect consecutive bubbles, there may be a problem. For this reason, from the HMI panel, it is possible to set a maximum number of consecutive purges before the system sends an alarm to the operator.



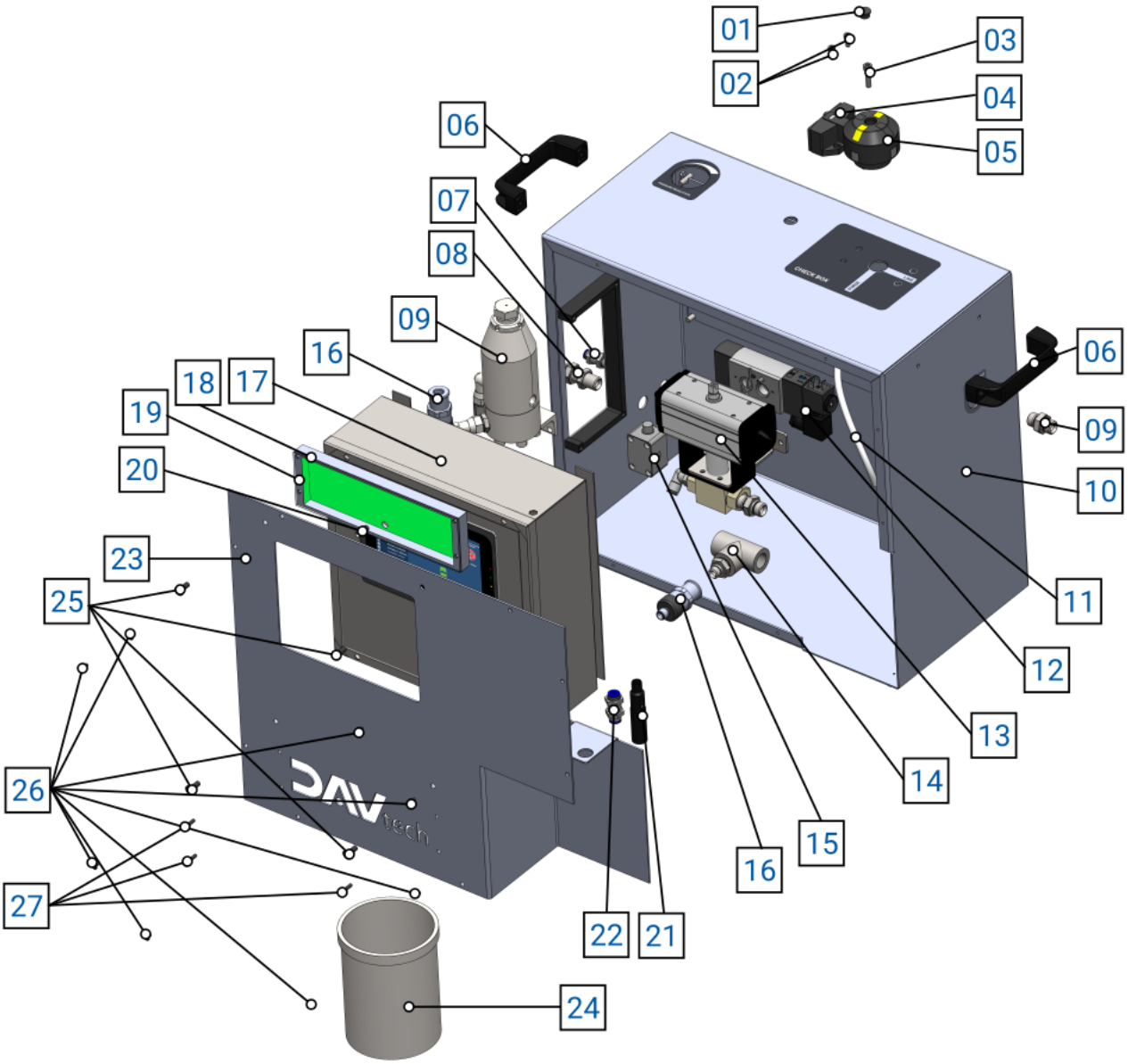

| COLOR | MEANING |
|---|---|
| CYAN | Main Air |
| YELLOW | Product |
| BLACK | Data |
| RED | Notes |

Figure 05 – Connection example

**ATTENTION!**
The incoming air must be filtered and without water (dried), otherwise it risks forming oxide inside the component and wearing it out more quickly.

## 2.1 Exploded

The following is a list of the main elements of the component.



| No. | Description | Var. | Code | Variant details |
|---|---|---|---|---|
| 01 | 3-WAY VALVE SCREW CLOSING CAP | \ | \ | \ |
| 02 | CHECK BOX LOCKING SCREWS | \ | \ | \ |
| 03 | 3-WAY VALVE LOCKING SCREW | \ | \ | \ |
| 04 | CHECK BOX WIRING BLOCK | \ | \ | \ |
| 05 | 3-WAY SYSTEM VISION BLOCK | \ | \ | \ |
| 06 | HANDLE | \ | 6333105_MF117 | \ |
| 07 | 6x4 PNEUMATIC INLET | \ | MJBULS6 | \ |
| 08 | FLUIDIC INLET | \ | ANGG0606P | |
| 09 | FLUIDIC PRESSURE REDUCER | \ | DAT_090 | \ |
| 10 | BUBBLE PURGE BOX | \ | 270922542220D | |
| 11 | 6X4 HIGH PRESSURE HOSE | \ | \ | \ |
| 12 | CONTROL SOLENOID VALVE | \ | \ | \ |
| 13 | 3-WAY VALVE BLOCK | \ | \ | \ |
| 14 | T FOR PRESSURE SENSOR CONNECTION | \ | \ | \ |
| 15 | BUBBLE DETECTION SENSOR | \ | \ | \ |
| 16 | FLUIDIC PRESSURE SENSOR | \ | \ | \ |
| 17 | ELECTRICAL PANEL ASSEMBLY | \ | 270323512220D | \ |
| 18 | LOGO ILLUMINATOR | \ | 270922512220D | \ |
| 19 | OPAL POLYCARBONATE | \ | 191022502220D | \ |
| 20 | BINDER M8 3 PINS | \ | \ | \ |
| 21 | LEVEL SENSOR | \ | CM18-08BPP-KC1 | \ |
| 22 | FLUID OUTLET PURGE | \ | MJBULS8 | \ |
| 23 | BUBBLE PURGE COVER | \ | 270922522220D | \ |
| 24 | JAR 1 KG | \ | \ | \ |
| 25 | ELECTRICAL PANEL SCREWS | | CBSTSE6-16 | \ |
| 26 | COVER SCREWS | \ | CBSKE4-6 | \ |
| 27 | LOGO SCREWS | \ | SETS-M4-20 | \ |

## 2.2 Technical data

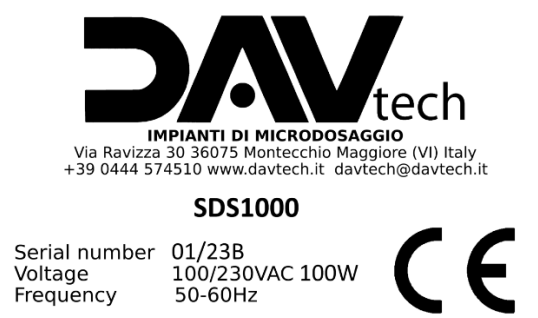
All the technical characteristics concerning the component of this manual are indicated below.

| SPECIFICATIONS | | |
|---|---|---|
| **Description** | **UdM** | **Values** |
| General features | | |
| Model | \ | SDS-1000 |
| Drive type | \ | Electric |
| Materials used in contact with the fluid | \ | Stainless steel<br>Galvanized steel<br>Nickel-plated brass<br>PTFE<br>Polyamide |
| Ionizing radiation | Sv | Not allowed |
| Electrical Characteristics | | |
| Input | W | 100 |
| Type of power supply | V | 100 – 230V ± 10% |
| Frequency | Hz | 50 – 60 |
| Pneumatic characteristics | | |
| Pneumatic tube section | mm | 6x4 |
| Maximum Pneumatic Inlet Pressure | bar | 5.5 ÷ 8 |
| Fluid characteristics | | |
| Fluid inlet thread | \ | 3/8" GAS |
| Fluid outlet thread | \ | 1/2" GAS |
| Maximum fluid pressure | bar | 300 |
| Fluidic outlet pressure adjustment range | bar | 10 ÷ 40 |

**ATTENTION!**
Adjusting the fluidic inlet pressure higher than indicated may lead to rupture of the component's internal piping.

| ENVIRONMENTAL CHARACTERISTICS | | |
|---|---|---|
| **Description** | **UdM** | **Values** |
| Working Ambient Temperature | °C | 5 ÷ 45 |
| Storage Ambient Temperature | °C | -20 ÷ 55 |
| Permissible non-condensing humidity | % | 5 ÷ 90 |

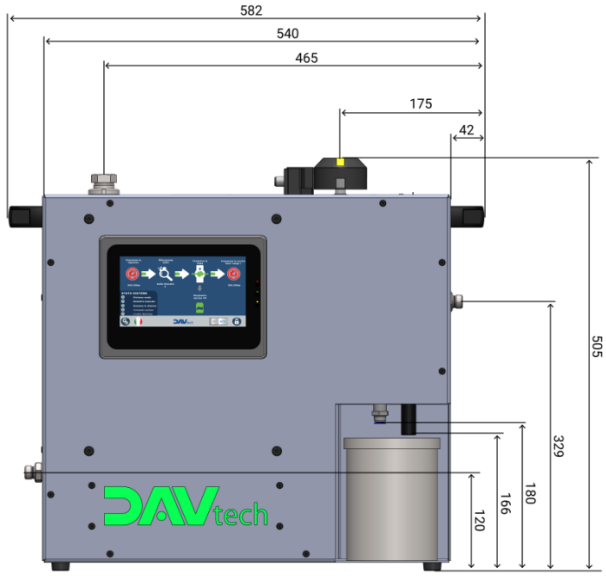
| USABLE FLUIDS |
|---|
| Grease |
| Various medium-high viscosity products (contact the manufacturer for more information) |




**Example of a CE plate on the component with the relevant data**

| DIMENSIONAL AND WEIGHT CHARACTERISTICS | | |
|---|---|---|
| **Description** | **UdM** | **Value** |
| Component length (min ÷ max) | mm | 582 |
| Component depth (min ÷ max) | mm | 255 |
| Component height (min ÷ max) | mm | 505 |
| Component weight | kg | 25 |

## Component





You can request the 3D of the component in the desired version from the manufacturer without any obligation.

# 3 SAFETY

The following is a list of warnings regarding the component covered by this manual. Please read carefully before proceeding to the next chapters.

**DANGER!**
Before operating the component or performing any action on it, read this manual carefully.

**DANGER!**
Do not use the component while under the influence of drugs or other substances that may impair attention and reaction ability.

**DANGER!**
Operators must only perform operations or interventions that are within the competence of the role and qualification assigned.

**FIRE/EXPLOSION HAZARD!**
This component is not designed to work in an ATEX environment.

**DANGER!**
Be very careful when servicing the component, especially when disassembling components that have pressure springs inside.

**ATTENTION!**
Modifications to the component must not be made to achieve performance other than that for which it was designed and built, unless authorized by the manufacturer.

**ATTENTION!**
Avoid introducing foreign bodies, even small ones, into the pneumatic system, which could cause the system to malfunction and compromise the safety of the machine.

The component may only be used by trained and authorized operators and for the sole purpose for which it was designed and manufactured.

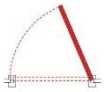
The component is manufactured in compliance with the technical safety standards in force at the time of its construction.

## 3.1 Machine safety devices

**ATTENTION!**
The replacement of component safety components is reserved exclusively for the manufacturer's technicians. This must be done in accordance with the manufacturing specifications of the component.

The safety devices must be kept in working order. Use only original spare parts when replacing safety components.

The safety devices of the component are all those components (both mechanical and electrical) installed to ensure that personnel can work safely and in compliance with the regulations in force at the time of construction. Despite this, staff are required to maintain an appropriate level of attention while in the vicinity of the component. The symbols used for some of the safety devices are listed below.

| Symbol | Meaning | Presence |
|---|---|---|
|  | **Emergency button:** It is a button that, when pressed, removes power from the motors, securing the work area | NO |
|  | **Fixed guards:** These are devices that are designed to be static, for example doors that need a key to be opened. They typically do not need to be connected to alarms or lock component functions as they can only be accessed via key or another unlocking device. | NO |
|  | **Interlocked movable guards:** These are devices that are used to protect the operator while they are closed. If they are opened while the component is running, an alarm is triggered and the torque is removed from the motors. | NO |
|  | **Safety labels:** These are labels placed in places where there is a danger and caution is recommended. | NO |
|  | **Valve air interceptor:** it is a device capable of maintaining air in a certain place even if there is no line air | NO |
|  | **Pneumatic disconnector:** This is a device used to regulate the pressure of the incoming air and, if necessary, remove it (in case of interventions or problems) | NO |
|  | **Electrical disconnector:** It is positioned just outside the electrical panel and is used to remove the torque from the motors and the voltage from the entire component | NO |
|  | **Beacons:** This is a device that indicates the status of the component. It is indicated in this chapter because it is also used to indicate alarm states. | YES |
|  | **Acoustic signals:** These are devices that are used to alert personnel of a particular event (it can be an error or even the end of the cycle, depending on the settings) | YES |

### 3.1.1 Signaling devices (light and sound)

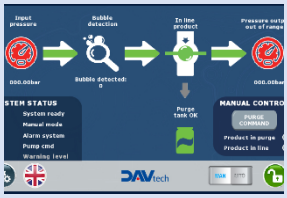
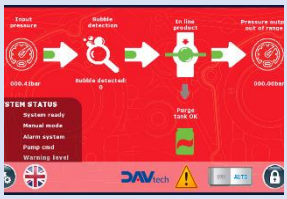
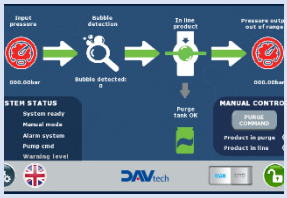
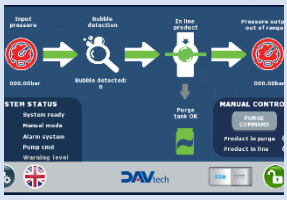
These are those devices that signal certain states of the component to the staff. These reports can be made in two ways:

- Luminous: through indications of lights of various colors positioned in such a way as to be visible even from a distance;
- Acoustic: by means of sound indications.

In this component there is a type of luminous device and a type of acoustic type device, namely:

- An illuminated inscription, located on the front of the component and bearing the manufacturer's inscription;
- An audible alarm in case of alarms.

The indications are given below.

| LIGHT INDICATION | SCREEN | OTHER | MEANING |
|---|---|---|---|
|  |  | | **SYSTEM READY** |
|  |  |  | **SYSTEM IN ALARM** |
|  |  | | **SYSTEM IN MANUAL MODE** |
|  |  |  | **PURGE JAR FULL** |

## 3.2 Free useful spaces

N.A.

## 3.3 Risk areas and residual risk

N.A.

# 4 TRANSPORT AND HANDLING

Once you have received the goods, you must check that the packaging is intact and that there is an exact correspondence with the material ordered.

**ATTENTION!**
The original configuration of the component must not be changed. The manufacturer is not liable for damage caused by inappropriate use of the component.

**ATTENTION!**
If the packaging is not intact, contact the manufacturer immediately, also sending photos of the condition of the packaging. Do not open it until you have notified the manufacturer.

# 5 INSTALLATION

The customer conducts the installation of the component. If necessary, you can contact the manufacturer to have a specialist technician help you.

The component has been designed to be able to work in a dosing line, i.e., it must be installed between the feeding system (pressure plate pumps) and the dosing system; therefore, the component cannot operate autonomously.

It is recommended to conduct the installation of the component as close as possible to the dosing system to reduce the length of the hose and the pressure drop.

In addition, the component has been designed to be installed in two ways:

- Placed on a table (or on the floor), by means of special feet (No.01 chapter 2 Figure 01);
- Mounted on the wall by means of special brackets, fixed by means of special screws (chapter 5.1)

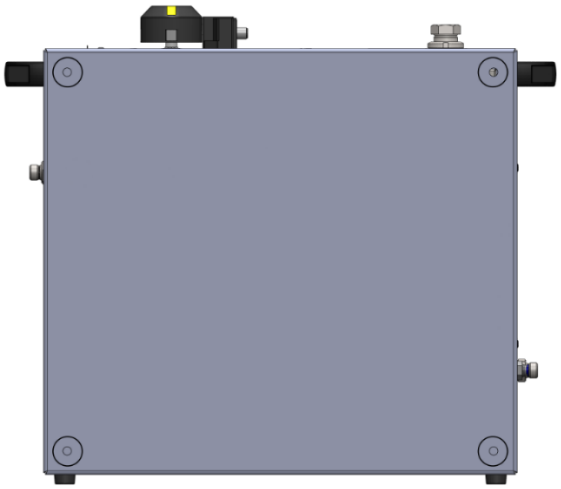
It is recommended that you perform a component check before beginning the installation. If it is damaged, please contact the manufacturer.

**ATTENTION!**
Please remove the packaging with the utmost care. If damage is caused to the component, the manufacturer is not liable.

Dispose of the packaging correctly, considering the different nature of the components and following the regulations in force in the country.

## 5.1 Positioning

For positioning, the component was designed to be placed on the ground, or in any case on a surface parallel to the ground. To install it on a surface perpendicular to the ground, the four M6 threaded holes on the back of the component must be used, fixing special brackets on them and then fixing them to the wall.



## 5.2 Connections

In this chapter, we want to explain the connection method that must be used for the component. The following types of connection are provided:

- Electrical connection;
- Pneumatic connection;
- Fluid connection

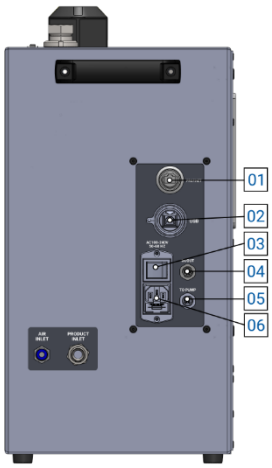
### 5.2.1 Electric

| **Authorized personnel** |  | **PPE to wear** |      |
|---|---|---|---|
| Component status | Component and electrical panel installed, with cable with outgoing industrial socket | | |
| Power Values | See chapter 2.2 | | |
| Necessary preparations | Electrical system with industrial socket and correct power supply | | |
| Materials needed | N.A. | | |
| Equipment needed | N.A. | | |

The customer must do the electricity connection.

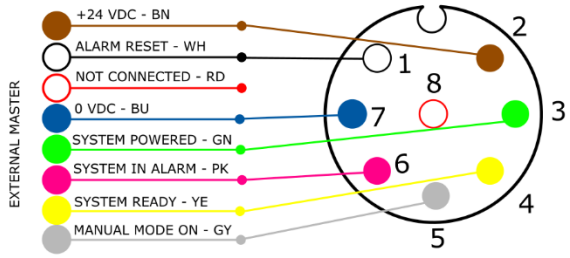
The electrical connection must only be made after positioning (or wall fixing) and at the end of the assembly of all the parts that make up the component.

On the side of the inputs of the component there is a panel with a series of electrical connections that are to be made according to the use that is made of this component. In particular:



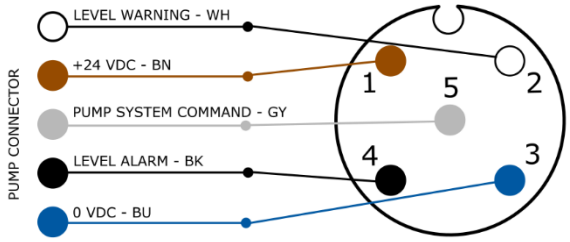

| No. | DESCRIPTION |
|---|---|
| 01 | PROFINET input |
| 02 | USB input |
| 03 | Power Button |
| 04 | Input/output connector (M12 8-pin) |
| 05 | Pressure plate pump connector |
| 06 | Electrical socket connector |

Of these connections, it must be considered that connector 01 is necessary in case you want to connect the component to the customer line, so that you can control it remotely, while connector 02 is necessary in the case of connection for remote assistance. Below we want to put the connection diagram for connectors 04 and 05:




Connector No. 04

Through connector no.04, the system communicates with an external master, providing component status signals and, in the event of an alarm, allows the reset of anomalies in progress remotely. The signals are exchanged via free contacts, just supply the respective power pins (2 and 7) with a voltage of 12-24 VDC




Connector No. 05

With this connector, the component receives signals and controls a power supply system connected to the input

It is recommended that cables 5 and 3 of connector No.5 (Pump Connector) be connected to the solenoid valve coil that controls the air of the pumping unit of the pressure plate pump (or the power system used) to disable the system in the event of an alarm.

**DANGER!**
If you do not follow the information note above, the system will not be able to block the flow of product entering the system.

**ATTENTION!**
Connect No.04 and No.05 only with the voltages shown in the respective figures. Connecting voltages other than those indicated leads to the breakdown of the system.

**ATTENTION!**
Connect the voltages only to the pins indicated and in the way indicated. Making power connections on different pins, or inverting the voltages (for example, connecting 0VDC to 24VDC and vice versa) leads to the breakdown of the system.

## 5.2.2 Pneumatic

| **Authorized personnel** |  **PPE to wear**      |
|---|---|
| Component status | Component installed and shut down |
| Power Values | See chapter 2.2 |
| Necessary preparations | Working pneumatic air system |
| Materials needed | Tube Ø6x4 |
| Equipment needed | N.A. |

Pneumatic connection is the responsibility of the customer.

To connect the air system, the hose of the size specified in chapter 2.2 must be brought to the pneumatic inlet of the component (No. 03, Figure 01, chapter 2).

## 5.2.3 Fluidic

| **Authorized personnel** |  **PPE to wear**      |
|---|---|
| Component status | Component installed and shut down |
| Necessary preparations | Feeding and dosing system |
| Materials needed | High pressure hose (with ferrule connection) |
| Equipment needed | Dedicated fixing key |

The fluidic connection is the responsibility of the customer.

To connect the component to the dosing system, two pipes with connections of the section shown in chapter 2.2 (one for the inlet and one for the outlet) must be taken and the inlet must be connected as indicated in No. 01 Figure 02 chapter 02, and the outlet as indicated in No. 07, Figure 02, chapter 02.

**ATTENTION!**
Make sure the hose is tightened, otherwise there is a risk of fluid leaking from the fitting.

## 5.3 Commissioning

The commissioning of the component is conducted once the positioning and connection of the connections has been completed. Before commissioning the component, the following checks must be conducted:

- Verify that the component placement has been done correctly;
- Check that the connections have been connected correctly;
- Check that the component is free of dirt or residues of various kinds;

**ATTENTION!**
If even one of the above points does not comply, commissioning must not be conducted. Commissioning should only be conducted when all points have been successfully completed.

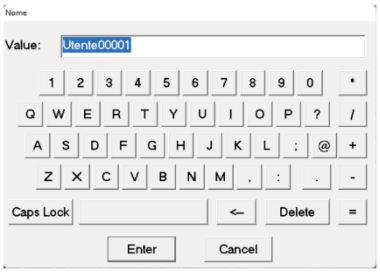
# 6 SOFTWARE

In this chapter we want to deepen the software part of the component, we want to see both the operator terminal and the screens that are displayed and how to change screens.

The operator terminal is a touch screen and is used to display the current screen, change screens, check the status of values within the component. The software starts automatically as soon as the component is powered.

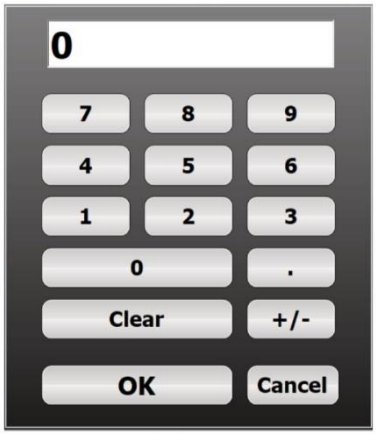
This symbol appears on any screen when an alarm arises. By pressing on this symbol, you can access the ALARMS and SIGNALS screen, and you can view the alarm and, if necessary, reset it.

By pressing on any interactive field on a screen, the numeric keypad appears to help the operator fill in the field itself. Keypads can be of two types:




**Alphanumeric keypad:** appears in case you need to enter texts as well as numbers. It is typically used to enter username, password, recipe name, or similar fields. Some keys are:

- CAPS LOCK: Select lowercase/uppercase character;
- BACK: delete the last character inserted;
- CLEAR: Clear all values in the field;
- OK (ENTER): confirm the characters entered and close the keypad;
- CANCEL: Close the keypad without making any changes.




**Numeric keypad:** appears if you only need to enter numbers. It is typically used to enter passwords or similar fields. Some keys are:

- +/-: converts values from positive to negative;
- CLEAR: Clears all typed values;
- OK: Confirms the entered heats and closes the keypad;
- CANCEL: Closes the keypad without making any changes.

The list of messages (if any) and alarms that may appear for this system are given in chapter 9

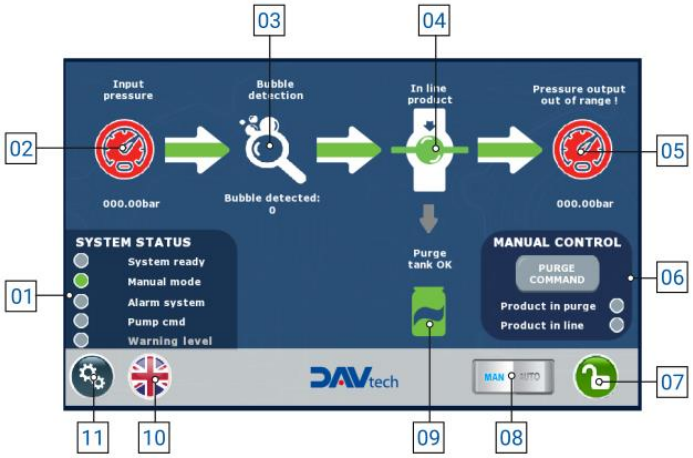
In the event of alarms in progress, the ALARMS AND SIGNALS screen appears immediately when the program is switched on, accompanied by an intermittent sound.

**TO ACCESS THE SETTINGS MENU, YOU MUST USE THE FOLLOWING CREDENTIALS:**

**USERNAME:** dav **PASSWORD:** dav

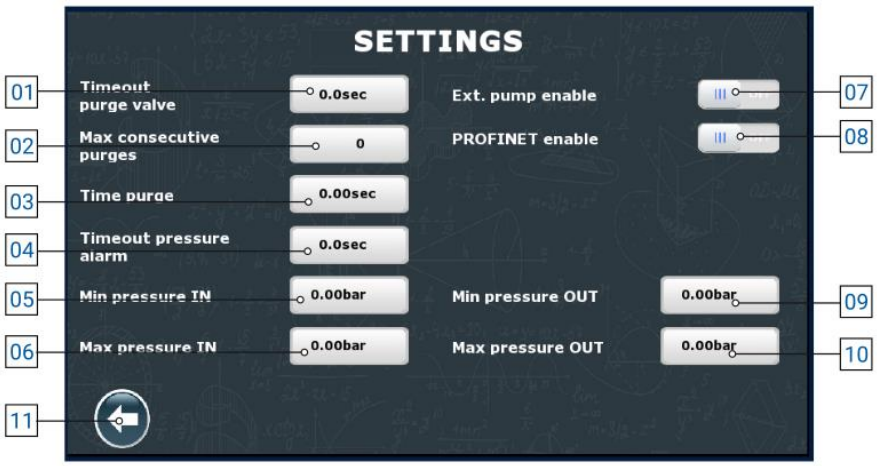
**Access and modification of the parameters in the menu is allowed only with the prior authorization of the manufacturer's technicians**

## 6.1 HOME screen




1) Menu indicating the **status of the component**, i.e.:
   a) **System ready**: The component is ready to perform the recognition and purging of bubbles from the system;
   b) **Manual mode**: The system has been set to manual mode;
   c) **System in alarm**: The system is in alarm, you must verify and resolve each alarm before proceeding;
   d) **Pump control**: Activated only if the system supply pump is connected and indicates whether the pump is correctly supplied;
   e) **Warning level**: Activated only if the system supply pump is connected and indicates whether the pump product level is running low.
2) **Inlet pressure:** this is the pressure regulated by the pressure reducer. This indicator can have two states, namely:
   a) **Red,** if the inlet pressure is lower or higher than the value set in the system;
   b) **Green,** if the inlet pressure is within the set parameters.
3) **Bubble detection:** This indicator can have two states, namely:
   a) **White,** if no bubbles have been detected in the fluidic circuit;
   b) **Green,** if bubbles have been detected within the fluidic circuit.
4) **In-line Product:** This indicator indicates the status of the 3-way valve and has two statuses, namely:
   a) **In-line product, green color:** Indicates that the fluid is continuing towards the outlet and, therefore, towards the dosing plant;
   b) **Purge product, red color:** indicates that the fluid is going to the purge system because bubbles have been detected.
5) **Outlet Pressure:** This indicator has two states, namely:
   a) **Red,** if the pressure goes out of range, either lower or higher, and the system sends a pressure alarm;
   b) **Green,** if the pressure is within the set ranges
6) Menu indicating the status of the **manual control**, i.e., whether the 3-way valve has been commanded to perform a purge (purge product) or to continue to the dosing system (in-line product);
7) Button that allows you to **lock or unlock** the use of the various component controls;
8) Selector that allows you to choose whether to put the component in **manual** or **automatic mode;**
9) **Purge Vessel:** This indicator can have two states, namely:
   a) **Red,** if the purge jar has reached the maximum product level;
   b) **Green,** if the purge jar still has space to hold the product;
10) Button to perform **language switching;**
11) Button to access the **settings menu** (chapter 6.2)

## 6.2 SETTINGS MENU screen




1) **Purge Valve Timeout:** Indicates the maximum time for which the three-way valve can no longer communicate with the system before sending an alarm;
2) **Maximum Consecutive Purges:** Indicates the maximum value of consecutive purges the system can perform before sending an alarm of too many bubbles in the fluid;
3) **Purge Time:** Indicates the time the 3-way valve remains in purge mode when the system detects a bubble;
4) **Pressure alarm timeout:** Indicates the maximum time for which the system allows the inlet pressure to be below the set threshold before sending an alarm signal (some pressure drops are due to the exchange of the pressure plate pump);
5) **Minimum pressure IN:** Minimum acceptable inlet pressure of the system;
6) **Maximum pressure IN:** Maximum acceptable inlet pressure of the system;
7) **Pump enablement:** Selector that allows you to enable or not the reading of the signals of the pressure plate pump (to be enabled if the appropriate connector is used);
8) **Profinet enable:** Selector that allows the system to communicate in profinet (if the appropriate cable is connected);
9) **Minimum pressure OUT:** Indicates the minimum pressure you want to have at the outlet below which the system sends an alarm signal;
10) **Maximum pressure OUT:** Indicates the maximum pressure you want to have at the outlet above which the system sends an alarm signal;
11) **Back:** Go back to the previous menu, see chapter 6.1

# 7 PROCEDURE

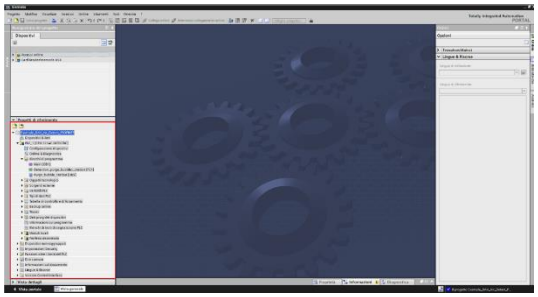
In this chapter we want to explain the main configurations that can be used on the component covered by this manual. In particular, we want to explain in detail:

- How to configure the system for communication via PROFINET;
- How to perform the first boot of the component;
- How to adjust the pressure reducer.

## 7.1 PROFINET configuration

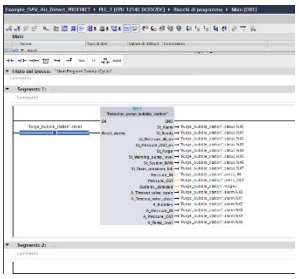
The bubble detection and purge system can be connected via PROFINET to communicate with a PLC or an external line to provide process data, such as pressure values, number of purges performed, alarm states. The program used to perform the configuration is TIA Portal v17.

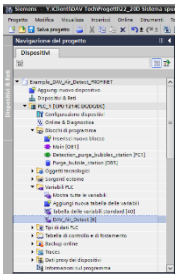
**01**



- Open TIA Portal V.17;
- Make sure you are in offline mode;
- Open the sample in the "Reference Projects" section;
- The .gsd file necessary for communication with the component is automatically installed.

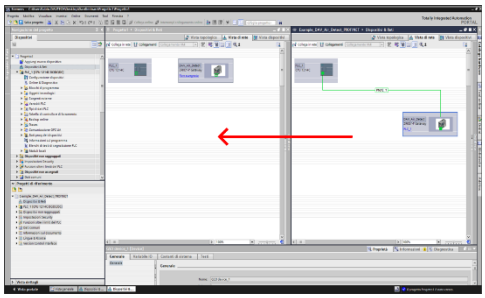
**02**





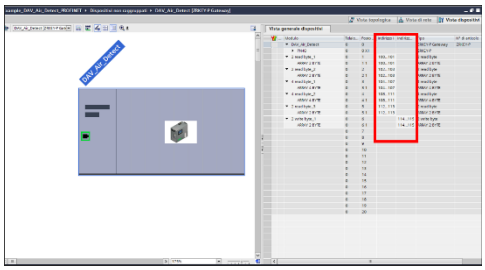
- Copy the HR function "Detection_purge_bubble_station"
- Copy the "DAV_Air_Detect" variable table

**03**



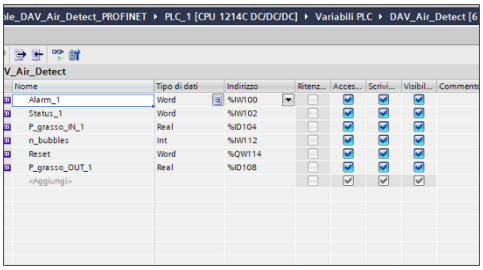
- Copy the GSD device "DAV_Air_Detect" to your Devices & Networks section and assign the desired IP address

## 04



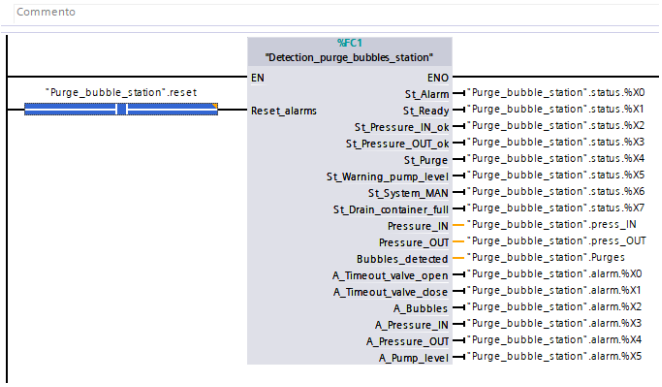
- Set the INPUT and OUTPUT addresses you want to have in your project

## 05




- Update the "DAV_Air_Detect" variable table with the new INPUT and OUTPUT addresses;
- Fill in the Hardware and Software configuration and load it into your device;
- Activate the online mode of TIA Portal;
- Verify proper communication with the devices.

Below we want to give a brief description of the commands set by PLC of the bubble detection station.




| CATEGORY | DESCRIPTION |
|---|---|
| System Status | Alarm |
| System Status | Ready |
| System Status | Inlet pressure OK |
| System Status | Outlet pressure OK |
| System Status | Purge system |
| System Status | Pump warning level |
| System Status | System in mod. manual |
| System Status | Purge jar full |
| Process data | Pressure prod. Entrance |
| Process data | Pressure prod. Exit |
| Process data | Number of purges conducted |
| Alarm | Valve opening timeout |
| Alarm | Valve closing timeout |
| Alarm | High presence of bubbles |
| Alarm | Inlet pressure out of range |
| Alarm | Outlet pressure out of range |
| Alarm | End of product |
| Alarm Reset | Alarm reset command |

## 7.2 First start

In this section, we want to explain how to perform the first boot of the component.

**ATTENTION!**
At the beginning of this phase, the supply system must be connected (fluidically), while the component outlet (i.e. to the dosing system) must not be connected. In addition, the fuel system must be turned off or depressurized

1. Remove pressure from the fluidic circuit entering the component by acting on the fuel system;
2. Place a container in the purge station (No. 11 Figure 01 chapter 2);
3. Place a container at the fluidic outlet of the component (No. 07 Figure 02 chapter 2);
4. Switch on the component using the switch provided (No. 03 chapter 5.2.1);
5. Reset any alarm;
6. Press the control release button (No. 07 chapter 6.1) and enter the credentials;
7. Turn selector No. 08 chapter 6.1 to "Manual" mode;
8. Press button No. 06 chapter 6.1 in such a way as to turn the 3-way valve to purge mode;
9. Make sure that the pressure reducer is completely closed by turning the nut counterclockwise (see chapter 7.3)
10. Turn on the fluidic power system;
11. Increase the fluidic pressure of the fuel system within the limits given in chapter 2.2;
12. Adjust the pressure of the component using the pressure reducer (a 27mm wrench is required). During this step, check the pressure via HMI display constantly;

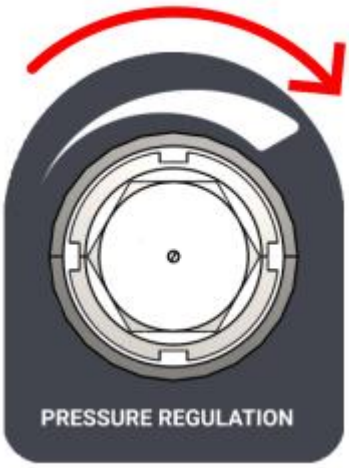
If you go beyond the threshold you want to set, you must drop below that threshold and then increase until you reach the desired value. This is to avoid errors of deviation from the set value.

**ATTENTION!**
The fluidic inlet pressure must not exceed the values given in chapter 2.2

13. Once the desired pressure has been reached, the regulator must be locked by means of a special ring nut;
14. Perform a generous purging of product to remove any air bubbles in the circuit;
15. When the fluid comes out without interruption, i.e., in a linear way, press the button of the 3-way valve to make the fluid exit go towards the dosing plant (i.e., in the "product in line" position);
16. Continue to dispense until you see a linear flow of fluid, i.e., without air inside;
17. Remove the fluidic pressure from the fuel system, to prevent further fluid from arriving;
18. Make the connections of the output circuit or to the dosing system;
19. Increase the fluidic pressure to the previously set value

## 7.3 Pressure reducer adjustment

In this section we want to explain how to adjust the pressure reducer. This adjustment is essential to have the desired fluidic pressure at the outlet, as well as to prevent the component system from being damaged. Care should be taken to stay within the parameters set out in chapter 2.2.




If you turn clockwise, you increase the pressure inside the pressure reducer; therefore, you go from a lower pressure to a higher one.


If you turn counterclockwise, you decrease the pressure inside the pressure reducer; therefore, you go from a higher pressure to a lower one.

# 8 MAINTENANCE

Maintenance interventions are all those activities that must be performed on the component which, if conducted correctly, allows it to have a longer life. In general, maintenance is divided into two groups:

- **Ordinary maintenance**, which are interventions on a regular basis or that can be conducted by the customer's staff, are the most important activities as they allow the component to be kept in good working condition;

**ATTENTION!**
Ordinary maintenance must be conducted in the manner and timing indicated in the following chapters.

- **Extraordinary maintenance**, i.e., all those interventions that are not regularly conducted or that have not been planned, or interventions that cannot be conducted by the Customer. They can also arise from the lack of routine maintenance.

**ATTENTION!**
Extraordinary maintenance work must be conducted together with the manufacturer's specialized technicians.

Regarding attendance, it must be considered that:

- **When necessary:** Operation to be conducted when the need to be conducted is seen;
- **Each component start or job end:** Indicates a daily period, in general. This can imply every 24 hours (i.e., at the beginning of the shift of every day, or the end of the shift of every day), or even more frequently, depending on the application;
- **Long pause:** Indicates a period greater than an hour;
- **Each drum change:** Indicates each time the fuel system (tank, drum, cartridge or other) is changed;
- **Each mixer disassembly:** Indicates that each time the mixer is replaced, a certain operation must be performed;
- **Weekly:** Indicates a period equal to seven calendar days;
- **Monthly:** Indicates a period equal to one calendar month;
- **Semi-annual:** Indicates a period equal to six calendar months;
- **Yearly:** Indicates a period equal to one calendar year.

**ATTENTION!**
The times given below are indicative as they depend on how the component is used. Follow the variations suggested by the technicians.

| Assigned | Description | Frequency | Chapter |
|---|---|---|---|
|  | Perform a surface cleaning of the component | Each component start or end of work | \ |
| | Perform a leak check from the pneumatic and/or fluidic circuit | Each component start or end of work | \ |
| | Check and change the container used to purge grease during system operation | Each component start or end of work | \ |
| | Clean the level sensor with a cloth | Weekly | \ |

# 9 SYSTEM MESSAGES

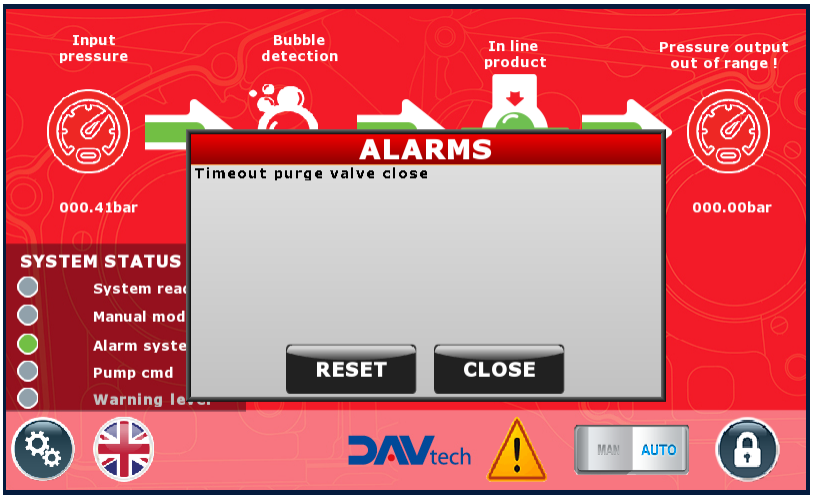
In this chapter, the two types of messaging that are present within the component are explored and listed. There are two types:

- **Alarm:** A warning from the component to the operator indicating a problem, which can be electrical, pneumatic, or generic in nature;
- **Mechanical problem:** This part deals with defects that may exist on a mechanical level.

This chapter lists all the messages that the system produces, with their explanation, and all the alarms that the system emits, with their explanation and method of resolution of the specific alarm.

In general, to remove an alarm, you must:

- Identify the alarm (if there is more than one alarm, identify only one);
- Resolve the cause of the alarm, as indicated in the next chapter;
- From the operator terminal, access the alarm screen by pressing on the yellow triangle symbol. A screen like the figure below opens;
- Reset the specific alarm;



## 9.1 Alarms

| ALARM | CAUSE | SOLUTION |
|---|---|---|
| **Valve opening/closing timeout alarm** | 3-way valve fails to reach the commanded position | Check that the connector mounted on the check box located on top of the component is properly connected and powered. |
| | | Check that there are no foreign objects preventing it from working properly |
| | | Check the inlet air pressure |
| **Bubble alarm** | The bubble presence sensor has performed the maximum number of consecutive purges set by the system | Check that there is no air intake in the pressurization system at the product inlet |
| | | Check that priming is done as per the manual by doing an adequate purge before powering the circuit |
| | Damaged bubble sensor | Replace the sensor |
| **Out of range inlet grease pressure alarm** | The grease pressure is below (or above) the set threshold | Check the correct operation of the pressure reducer |
| | | Check the fuel system for proper operation |
| | | Check that there are no leaks in the circuit |
| | Damaged pressure sensor | Replace sensor |
| **Output grease pressure alarm out of range** | The grease pressure is below (or above) the set threshold | Check that the product inside the system exceeds the pneumatic threshold |
| | | Check the correct operation of the pressure reducer |
| | | Check that no piping has been damaged within the system |
| | Damaged pressure sensor | Replace sensor |
| **End-of-product alarm** | The product in the feed has reached the minimum level set | Replace (or top up) the barrel |
| | | Make sure the product level sensor is working properly |
| **Full Jar Alarm** | The purge circuit container has reached the maximum level | Replace the container |
| | Level sensor malfunction | Clean the level sensor |
| | | Adjust or replace the sensor |

## 9.2 Mechanical problem

| DEFECT | CAUSE | SOLUTION |
|---|---|---|
| **The outlet pressure is the same as that of the fuel system** | The pressure regulator does not work properly | Shut down the system until the pressure reducer is replaced |
| **The outlet pressure is not stable** | Little pressure difference between power supply and pressure reducer | Increase the fluidic pressure of the fuel system |
| **Fluid leaks from the protective box** | Broken internal piping | Block the system until the tubes are replaced |
| | Disconnected internal piping | Open the case and connect the hose, if possible. |
| | Incorrect power system management | Use connector No.5 chap. 5.2.1 to control the system automatically |
| **Even if the valve has switched, the product flows to the wrong outlet** | Probable obstruction of the valve that does not allow mechanical switching | Stop the system until the valve is unblocked. |
| **Presence of bubbles inside the dosing system** | The bubble detection sensor is not working properly | Lock the system until the sensor is replaced |

# 10 END OF LIFE

End-of-life refers to all those activities that put the component out of service. End-of-life activities can be:

- **Storage,** i.e., when the component is placed inside the warehouse for an unspecified period waiting for a third party to buy the component;
- **Dismantling,** i.e., when the component has reached the end of work period, whether it is due to age, obsolescence or faults that cannot be repaired, or that it is possible to repair but it is worth buying a new component.

If installation is not planned soon, the component can remain packaged and must be stored in a sheltered and preferably closed place. The ambient temperatures to be observed are given in chapter 2.2.

On the other hand, for the dismantling and consequent scraping of the component or its parts, the different nature of the various components must be considered, and a differentiated scrapping must be conducted. We recommend that you commission specialist companies for this purpose and must always observe the applicable laws on waste disposal.