ODORANT INJECTION SYSTEM
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CHARACTERISTICS

Electronic Control Unit

- **Construction material**: 10/10 mm steel plate
- **Finish**: RAL 7032 grey epoxy powder coat
- **Door**: Lockable with window
- **Installation**: Wall mount
- **Weight**: 22 kg (49 lbs) (medium complexity configuration)
- **Power supply options**: 12Vdc+/-15% - 115 Vac 60Hz - 230 Vac 50Hz
- **Electromagnetic interference**: Consistent with 89/336/CE standard
- **Humidity**: 10% – 90% non-condensing

Input signals

- **Calibration cylinder high level**: Discrete (EExi)
- **Calibration cylinder low level**: Discrete (EExi)
- **Flow Computer alarm signal**: Discrete
- **Flow Computer instantaneous flow rate**: Pulse (max 1 Hz)
- **Flow Computer instantaneous flow rate**: Analog (4-20 mA)

Output signals

- **Injection solenoid valve control (Primary)**: Discrete (12 Vdc EExe)
- **Injection solenoid valve control (Secondary, B.2 only)**: Discrete (12 Vdc EExe)
- **Calibration cylinder refill valve**: Discrete (12 Vdc EExe)
- **Emergency circuit control**: Discrete (12 Vdc EExe)
- **Injected odorant**: Pulse (1 Hz)
- **Distributed gas volume**: Pulse (1 Hz)
- **Injector failure (Primary)**: Discrete
- **Injector failure (Secondary, B.2 only)**: Discrete
- **Emergency circuit enabled**: Discrete (Also indicates that the Dosaodor-D unit is in disabled mode)
- **Odorant tank level**: Discrete
- **Instantaneous odorant concentration**: Analog (4-20 mA)
- **Daily odorant concentration**: Analog (4-20 mA)

Communication ports

One RS-232 serial port is available for local configuration or connected to an GSM/GPRS modem.

Display

Back-lit alphanumeric 4 line by 40 character LCD.

Operative modes

OFF – MANUAL – AUTOMATIC – WASHING all selectable by appropriate function keys.
Operation INJECTOR 1 - INJECTOR 2 - INJECTOR 1-2 (with B.2 option only).

Configuration protection

Keyed switch for configuration mode selection and battery backed memory to maintain internal configuration data in the event of power failure.

Optional integrated printer

Dot matrix, 42 characters/line, allows for a local hard copy of alarms, operating history and reports.
**Pneumatic Panel**

<table>
<thead>
<tr>
<th>Material</th>
<th>20/10 mm stainless steel plate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation</td>
<td>Wall mount</td>
</tr>
<tr>
<td>Weight</td>
<td>25 - 45 kg (55 - 100 lbs) (based on configuration)</td>
</tr>
<tr>
<td>Overpressure relief valve</td>
<td>Stainless steel with following rating options</td>
</tr>
<tr>
<td></td>
<td>14 bar (203 psi) - 38 bar (551 psi) - 60 bar (870 psi)</td>
</tr>
<tr>
<td>Electrical protection</td>
<td>Explosion proof and intrinsically safe</td>
</tr>
<tr>
<td>Material electrical protection</td>
<td>Available for European and North American standards</td>
</tr>
<tr>
<td>Mechanical connections</td>
<td>Odorant inlet and discharge</td>
</tr>
<tr>
<td></td>
<td>DN 1/4” double ferrule fitting for DN 6x1 pipe</td>
</tr>
<tr>
<td></td>
<td>Gas inlet and discharge</td>
</tr>
<tr>
<td></td>
<td>DN 1/4” single ferrule fitting for DN 8x1 pipe</td>
</tr>
<tr>
<td>Maximum working pressure</td>
<td>Supply 100 bar (1450 psi)</td>
</tr>
<tr>
<td></td>
<td>Injection 14 bar (203 psi) - 38 bar (551 psi) - 60 bar (870 psi)</td>
</tr>
<tr>
<td>Odorant flow rate</td>
<td>0.5 - 14.0 l/h (0.89 – 24.97 Pound/h at 6.75 lbs/gal)</td>
</tr>
<tr>
<td>Temperature</td>
<td>Working -10 °C +60 °C</td>
</tr>
</tbody>
</table>

**Calibration cylinder specifications**

The calibration cylinder tank is delivered already installed in the Dosaodor-D pneumatic panel (key 8 - figures 2 and 3). The pneumatic panel has been designed to hold calibration cylinder tank weight.

<table>
<thead>
<tr>
<th>Type</th>
<th>PED Category</th>
<th>Fluid Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dosaodor-D Calibration</td>
<td>Article 3.3 - Cylinder 1”</td>
<td>1</td>
</tr>
<tr>
<td>Cylinder Tank</td>
<td>Cat. II - Cylinders 2”, 3”</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cat. III - Cylinder 4”</td>
<td></td>
</tr>
</tbody>
</table>

**WARNING**

- Maximum Allowable Pressure (PS) : 100 bar (1450 psi)
- Hydrostatic Test Pressure (PT) : 150 bar (2175 psi)
- Maximum working pressure : 14 bar (203 psi) - 38 bar (551 psi) - 60 bar (870 psi)
- Body material : Stainless steel
- Volume : 1.3 and 2 liters
- Connections : 1/4” NPT

**Solenoid valves specifications**

- Maximum working pressure : 14 bar (203 psi) - 38 bar (551 psi) - 60 bar (870 psi)
- Body material : Stainless steel
- Gasket material : FKM
- Valve operation : Electromagnetic
- Power requirements : 12 Vdc

**Pressure stabilizer filter SA/2 specifications**

- Maximum working pressure : 100 bar (1450 psi)
- Body material : Steel
- Gasket material : Nitrile (NBR) rubber

For the operation and maintenance of the pressure stabilizer type SA/2 please see the Instruction Manual D103653X012-SA2-IM.
Product Description

The Dosaodor-D is a computerized system for natural gas that injects odorant proportional to the flow rate of the gas in transit. The system operates by liquid-injection and can be installed in combination with traditional absorption-type devices. The Dosaodor-D system is completely configurable and can also be interfaced with remote monitoring systems. The equipment consists of a pneumatic panel to be installed in the hazardous area and a microprocessor electronic control unit to be installed in the safe area, interconnected by electric cables. The system ensures the dosing rate while keeping the desired odorant concentration level steady with over the entire flow range of the system, even when the latter is extremely variable and extremely low. This particular feature guarantees high safety within the sphere of the natural gas distribution for public use. In fact, by maintaining a constant level of odorant concentration not matter what the gas flow rate, any leakage of gas can clearly be identified decreasing the possibility of accidents. In addition to this, printed reports of the gas volumes, and the quantity of odorant emitted, provides facility managers with the data confirming the correct operation of their systems.

The benefits of this new system are as follows:

- Operational safety
- Reliability
- Low maintenance cost
- User friendly

The system does not involve the use of dosing pumps or other complex devices for the measurement of odorant flow rates. The system uses the differential pressure, which is always present between the upstream and downstream sections of a reduction and metering gas station (min. 1 bar / 14.5 psi), and an electrically controlled injection unit that has been designed and certified in accordance to international standards for electrical equipment in EEx areas where there can be a risk of explosion. The Dosaodor-D utilizes the high-pressure upstream gas as the pneumatic driving fluid in order to inject the odorizing liquid in the downstream pipelines, creating a gas driven pump. The pneumatic panel is made of stainless steel, without a painted finish, or screen printing as odorizing liquids are aggressive.

A procedure has been designed to perform the decontamination of the entire injection circuit. Although the chances are very slight, the need to intervene for system maintenance may arise. A special sampler provides the measurement of the liquid that has been injected and transfers the data to the electronic control unit of any adjustments to be made, ensuring a high level of reliability and overall precision of the system, which is self-monitoring. During the operation of the two-injection devices version, one shut down on a reserve for the other.

The software provides an exchange between the two, to ensure that the same device does not always remain idle. The concentration ratio is ensured by a special microprocessor electronic control unit which receives input, either a digital volume signal from a flow computer/volumetric counter, or from an analog signal 4-20 mA, that compares the concentration level to be maintained, and processes the correct electrical signal to be transmitted to the injection device.

The control unit supplies accurate voltage and current to the various equipment units while containing the separation barriers to comply with the directives applicable to intrinsic safety system installations. It must be installed in the safe area and the standard version operates with 230 V 50 Hz or 12 V dc. In the event of malfunctioning or power outages, the control unit saves the programming data by means of a buffer battery and sends out a signal to activate any emergency devices (it normally restarts operation of the absorption-type emergency system).

The Dosaodor-D system complies with UNI 9463 Italian standards and with relevant European Directives. The following table illustrates the correlation between the type of odorizing liquid used, the maximum odorizing liquid capacity and the maximum flow rate of the gas to be odorized.

### Table 1. Maximum Injection Rate and Maximum Gas Volume

<table>
<thead>
<tr>
<th>l/h</th>
<th>lbs/h (at 6.75 lbs/gal)</th>
<th>40 mg/Sm³ (THT)</th>
<th>10 mg/Sm³ (Mercaptan)</th>
<th>10 mg/Sm³ (Mercaptan)</th>
<th>0.5 lbs/MMSCF (Mercaptan)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>0.89</td>
<td>12,500</td>
<td>50,000</td>
<td>892</td>
<td>1.783</td>
</tr>
<tr>
<td>1</td>
<td>1.78</td>
<td>25,500</td>
<td>100,000</td>
<td>1.783</td>
<td>3.567</td>
</tr>
<tr>
<td>2</td>
<td>3.57</td>
<td>50,000</td>
<td>200,000</td>
<td>3.567</td>
<td>7.133</td>
</tr>
<tr>
<td>4</td>
<td>7.13</td>
<td>100,000</td>
<td>400,000</td>
<td>7.133</td>
<td>14.267</td>
</tr>
<tr>
<td>6</td>
<td>10.68</td>
<td>150,000</td>
<td>600,000</td>
<td>10.698</td>
<td>21.400</td>
</tr>
<tr>
<td>8</td>
<td>14.27</td>
<td>200,000</td>
<td>800,000</td>
<td>14.267</td>
<td>28.534</td>
</tr>
<tr>
<td>10</td>
<td>17.83</td>
<td>250,000</td>
<td>1,000,000</td>
<td>17.834</td>
<td>35.667</td>
</tr>
<tr>
<td>12</td>
<td>21.40</td>
<td>300,000</td>
<td>1,200,000</td>
<td>21.400</td>
<td>42.800</td>
</tr>
<tr>
<td>14</td>
<td>24.97</td>
<td>350,000</td>
<td>1,400,000</td>
<td>24.967</td>
<td>49.934</td>
</tr>
</tbody>
</table>
Dosaodor-D

Overall Dimensions

B1 Single Injector Version

B2 Dual Injector Version

Figure 1. Overall Dimensions
### B1 Version Pneumatic Panel Parts List

**Key Description**

1. Panel
2. Filling solenoid valve
3. Injection solenoid valve
4. Depressurization solenoid valve
5. Pressure stabilizer filter SA/2
6. Pressure stabilizer filter SA/2
7. Ball valve
8. Calibration cylinder tank
9. Level switch
10. Manometer
11. Relief valve
12. Straight fitting
13. Elbow fitting
14. Nipple
15. Tee fitting
16. Cross fitting
17. Cylinder junction box
18. Cable
19. Pipe Ø 6 mm
20. Cable gland
21. Cable gland
22. Joint
23. Junction Box
24. Sheath
25. Label
26. Screw TE M8x20
27. Spacer
28. Screw TCEI M4X40
29. Spacer
30. Straight fitting
31. Nipple
32. Pipe Ø 8 mm
33. Pipe Ø 8 mm
34. Pipe Ø 8 mm
35. Pipe Ø 8 mm
36. Pipe Ø 6 mm
37. Pipe Ø 6 mm
38. Pipe Ø 6 mm
39. Pipe Ø 6 mm

*Figure 2. B1 Version Pneumatic Panel Parts List*
B2 Version Pneumatic Panel Parts List

Key Description

1 Panel
2 Injection solenoid valve
3 Filling solenoid valve
4 Depressurization solenoid valve
5 Pressure stabilizer filter SA/2
6 Pressure stabilizer filter SA/2
7 Ball valve
8 Calibration cylinder tank
9 Level switch
10 Manometer
11 Relief valve
12 Straight fitting
13 Elbow fitting
14 Nipple
15 Tee fitting
16 Cross fitting
17 Cylinder junction box
18 Cable
19 Pipe Ø 6 mm
20 Cable gland
21 Cable gland
22 Joint
23 Junction Box
24 Sheath
25 Label
26 Screw TE M8x20
27 Spacer
28 Screw TCEI M4X40
29 Spacer
30 Straight fitting
31 Nipple
32 Pipe Ø 6 mm
33 Pipe Ø 6 mm
34 Pipe Ø 6 mm
35 Pipe Ø 6 mm
36 Pipe Ø 6 mm
37 Pipe Ø 8 mm
38 Pipe Ø 8 mm
39 Pipe Ø 6 mm
40 Pipe Ø 8 mm
41 Pipe Ø 6 mm
42 Pipe Ø 6 mm
43 Pipe Ø 6 mm

Figure 3. B2 Version Pneumatic Panel Parts List
HAZARDS

⚠️ WARNING

Failure to follow these instructions or to properly install and maintain this equipment could result in an explosion and/or fire causing property damage and personal injury or death.

Odorizing systems should be installed, operated and maintained in accordance with international and national applicable codes and regulations. Only qualified personnel shall install an odorizing system. Installation, operation and maintenance procedures performed by unqualified personnel may result in unsafe operation.

This condition may result in equipment damage or personal injury. If a leak develops in the system, the escaping gas may accumulate and become a fire or explosion hazard. Immediately call qualified service personnel should this arise. Hazards arising from mis-use and mis-operating are:

- Personal injury, equipment damage, or leakage due to escaping gas or bursting of pressure-containing parts may result if the equipment is installed where its capabilities (PS and TS) can be exceeded or where conditions exceed ratings of the adjacent piping or piping connections.
- Physical damage could result in breakage, causing personal injury and property damage due to escaping gas. Installing the equipment where its capabilities, or those of any downstream equipment, can be exceeded may cause personal injury or property damage due to bursting of pressure-containing parts or explosion of accumulated gas.

To avoid above hazards, install the equipment where:

- service conditions are within the capabilities as described in this manual.
- service conditions are within applicable local, federal or national codes or regulations.
- the unit is protected from exposure to physical damage and/or corrosive substances.
- suitable pressure-limiting or pressure-relieving devices have been installed where pressure supply is capable of exceeding the maximum allowable downstream equipment pressure.

HANDLING

Careful, established transport and handling procedures shall be followed to avoid any damage on the pressure containing parts by shocks or anomalous stresses. The equipment is self stiffened and standard lifting devices may be used for handling. Special care must be taken to avoid damaging the pressure accessories installed, including the Dosaodor-D calibration cylinder tank.

PRESERVATION AND STORAGE

All surfaces of the Dosaodor-D pneumatic panel equipment are delivered completely protected (paint or stainless steel material). We recommend to store the equipment indoor, and it is strongly advised to carry out below recommendations. Upon delivery on site, the unit shall be completely inspected for any damage caused by transportation. Repairs should be carried out without delay to avoid paint scaling and rust propagation. Inspection is also advised on the assembled pressure accessories (valves, level indicator, etc.).
INSTALLATION

General Rules

![WARNING]

National safety standards and established rules shall be followed in odorizing system installation and operation, concerning, in particular, electrical works, fire and thunderbolt protection, safety procedures on odorant handling. All means for venting must be provided in the assemblies where pressure equipment is installed. Before installation, check if service conditions are consistent with use limitations.

Where this product is used:

- Provide cathodic protection and electrical isolation to avoid any corrosion
- Natural gas must be filtered by proper filters/separators/scrubbers to avoid any of erosion or abrasion of the pressure containing parts

The Dosaodor-D must be installed in non-seismic area and not undergo the action of fire or thunderbolt.

Positioning Components

Electronic control unit

To be installed in an electrically “Safe” area. Therefore, in natural gas decompression plants, the facilities suited to these purposes are the following:

- Electric power facility, a defined area designed and built to house all electrical devices linked to and controlled by the station. i.e. Flow computers, remote monitoring units, telephones, etc.
- Heating plant, that is, a defined area designed and built to house the boilers needed for the heating of gas. This area must be built and installed according to the specifications for an electrically “Safe area” classification.
- Rooms and storage units located outside the areas defined as “Hazardous areas” according to the actual regulation.

The control unit is enclosed in a solid metal box. However, it is strongly recommended that the installation position provides for protection from rain and direct sunlight using a suitable cover. Use the four brackets supplied with the unit for installing it on the wall. Due to the heavy weight of the unit 12 mm screw anchors are recommended for use with the brackets.

Position the control unit at a height of about 100 - 120 cm (40 - 48 in) from the floor level and ensure that the unit display is at eye level. If possible, leave a gap of at least 50 cm (20 in) on the right side of the unit from walls or any protruding objects, as this space will be required when opening the glass door to access the parts inside.

It is best to install the unit is in the immediate vicinity of the flow computer, to facilitate the connection of the cable receiving signals from the Dosaodor-D during operation.

Ground connections of the electronic control unit and shielded cables to must be connected an equipotential node (obligatory only for the countries members of the EEC).

Pneumatic panel

To be installed in the immediate vicinity of the odorant pick-up point (absorption-type tank or other type of tank).

All of the panel components are resistant to chemical attack from the odorizing liquids, the elements and any conditions specified in the regulations regarding safety and electrical equipment.

![CAUTION]

The injector must be positioned on a pipeline in the downstream section of the station.

It is essential that the distance between the panel and the injector be as minimum as possible, as a short route limits the quantity of odorant subject to pressure thus reducing the chances of micro-leaks of liquid occurring.

The panel can only be installed on a wall.

![CAUTION]

It is very important to check that the lowest point of the tank from which the odorant is picked up (bottom) is located at a height of at least 40 cm (16 in) from floor level, and that the panel is positioned with the lower anchoring brackets resting on the floor.

This is VITAL but NOT SUFFICIENT to ensure the correct operation of the system. In the case of a gas reduction station complete with a volumetric meter, it should be taken into consideration that the max. pressure difference permitted between the odorant tank and the re-admission/detection point of the pressure coming out of the station (upstream the meter) should not exceed 15 mbar (0.22 psi) under max. performance conditions.

In case the above-mentioned condition is not met, the system shall have to be installed according to indications referring to systems complete with venturimetric meter.
Four openings are provided for fastening, and they are located at the endpoints of the support panel.

Two spacing brackets are part of the standard equipment supplied with the panel. They serve for mounting the panel leaving a space between the panel itself and the supporting wall.

**Additional Materials Required**

The following additional materials are required for proper installation of the Dosaodor-D system according to Italian standards and installations rules (not included with the order; cable and pipe lengths depend upon the installation site).

### WARNING

Users of Dosaodor-D should be aware that more detailed and specific national standards and/or codes of practice can exist in the CEN member and other world-wide countries; in particular, in the Countries outside Europe, parts not delivered with the product and necessary for the complete installation (cables, connections, …) shall be in compliance with local regulations concerning fire proof and products to be installed with potential explosive atmosphere.

a) Electrical shielded cable with CEI 20-22-marked flameproof sheathing in the 3 x 1 size to be used for main power supply.

b) Electrical shielded cable with CEI 20-22-marked flameproof sheathing in the 4 x 1 size to be used for signal transmission between the Dosaodor-D control unit and the flow computer.

c) Electrical cable with CEI 20-22-marked flameproof sheathing in the 1 x 4 size (yellow-green) to be used for connecting the control unit and the pneumatic panel with the grounding circuit.

d) Electrical shielded cable with CEI 20-22-marked flameproof sheathing in the 3 x 1 size to be used for connecting the absorption-type system circuit on-off solenoid valve with the terminal black box installed on the pneumatic panel.

e) Electrical shielded cable with CEI 20-22-marked flameproof sheathing in the 6 x 1 size to be used for connecting the terminal black box installed on the pneumatic panel, with the control unit.

f) Electrical shielded cable with CEI 20-22-marked flameproof sheathing in the 3 x 1 size to be used for connecting the sampler junction box, installed on the pneumatic panel, with the control unit.

g) Plastic pipe, complete with the required accessories, to be used for protection of cable “e”.

h) Plastic pipe, complete with the required accessories, to be used for protection of cable “f”.

i) Spiral sheathing in plastic material, complete with the required accessories, to be used for protection of cable “d”.

j) Spiral sheathing in plastic material, complete with the required accessories, to be used for protection of cable “b”.

k) Spiral sheathing in plastic material, complete with the required accessories, to be used for protection of cable “a”.

l) No. 1 stop joint, with respective metal tubing stub, to be used for sealing the cable passage between the gas equipment facility and the facility housing the electronic control unit - referring to pipe “g”.

m) No. 1 stop joint, with respective metal tubing stub, to be used for sealing the cable passage between the gas equipment facility and the facility housing the electronic control unit - referring to pipe “h”.

n) Stainless steel pipe (DN 6 x 4), required for connecting the pneumatic panel to the odorizing tank intakes and the injection point.

o) Stainless steel pipe (DN 8 x 6), required for connecting the pneumatic panel to the drive gas inlet / outlet points.

**Note:** The materials specified above are not included with system orders as quantities are variable and depend on the configuration and positioning of the equipment inside the facility structures.

To complete installation the Dosaodor-D is provided with a kit of accessories needed for a standard system.

For standard installation and installation of the odorization absorption type emergency system, if applicable refer to Figure 4 on page 13.
## Parts List (see figures 4 and 5)

<table>
<thead>
<tr>
<th>Key</th>
<th>Qty</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Connection 3/4&quot; NPT-F</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>Junction fitting (pipe-pipe)</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>Junction fitting (pipe-pipe)</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>Straight fitting DN 1/2&quot; NPT-M</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>Straight fitting DN 1/4&quot; NPT-M</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>Tap NAM 1/2&quot; M-F</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
<td>Nipple 1/2&quot; NPT-M</td>
</tr>
<tr>
<td>8</td>
<td>3</td>
<td>Threaded tee fitting DN 1/2&quot; NPT-F</td>
</tr>
<tr>
<td>9</td>
<td>3</td>
<td>Ball valve DN 1/4&quot; NPT-F</td>
</tr>
<tr>
<td>10</td>
<td>3</td>
<td>Threaded plug DN 1/2&quot; NPT-M</td>
</tr>
<tr>
<td>11</td>
<td>3</td>
<td>Threaded plug DN 1/4&quot; NPT-M</td>
</tr>
<tr>
<td>12</td>
<td>4</td>
<td>Threaded tee fitting 1/4&quot; NPT-F</td>
</tr>
<tr>
<td>13</td>
<td>6</td>
<td>Nipple 1/4&quot; NPT-M x 1/4&quot; NPT-M</td>
</tr>
<tr>
<td>14</td>
<td>4</td>
<td>Straight fitting DN 1/4&quot; NPT-M</td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>Straight fitting DN 1/4&quot; NPT-M</td>
</tr>
<tr>
<td>16</td>
<td>1</td>
<td>Elbow fitting DN 1/8&quot; NPT-M</td>
</tr>
<tr>
<td>17</td>
<td>1</td>
<td>Straight fitting DN 1/8&quot; NPT-M</td>
</tr>
<tr>
<td>18</td>
<td>1</td>
<td>Tap NAM 1/4&quot; M-F</td>
</tr>
<tr>
<td>19</td>
<td>1</td>
<td>Circuit breaker 6 A</td>
</tr>
<tr>
<td>20</td>
<td>1</td>
<td>Tap NAM 1/2&quot; M-F</td>
</tr>
<tr>
<td>21</td>
<td>1</td>
<td>PRX/181 pilot – FKM – setting = 6 bar (87 psi)</td>
</tr>
<tr>
<td>22</td>
<td>1</td>
<td>Relief valve – FKM – 1/4&quot; NPT-M - setting = 7 bar (101.5 psi)</td>
</tr>
<tr>
<td>23</td>
<td>1</td>
<td>Solenoid valve 3-way DN 1/4&quot; NPT-F, Exd</td>
</tr>
<tr>
<td>24</td>
<td>1</td>
<td>Absorption type emergency system activation pneumatic valve</td>
</tr>
<tr>
<td>25</td>
<td>1</td>
<td>Odorant filter</td>
</tr>
<tr>
<td>26</td>
<td>1</td>
<td>Odorant injector</td>
</tr>
<tr>
<td>27</td>
<td>1</td>
<td>Pneumatic panel</td>
</tr>
<tr>
<td>28</td>
<td>1</td>
<td>Electronic control unit - ECU</td>
</tr>
<tr>
<td>29</td>
<td>1</td>
<td>Absorption type odorizer tank</td>
</tr>
</tbody>
</table>
Figure 4. Absorption Type Emergency System Installation Schematic
Odorant Filter (see figure 4, key 25) Dimensions and Connections

Figure 5. Injection Pressure > 6 bar (87 psi) Connection Schematic Detail (required only when the absorption type system is included)

Figure 6. Odorant Filter Dimensions and Connections
Electrical Power Lines

For the installation of the electrical lines of the system, please follow the indications provided for in “Dosaodor-D Electric System Design” available on request and provisions below:

- It is required to install two cable protection pipes, one connecting the terminal black box with the control unit, and the other connecting the junction box for the injected volume control device with the control unit. This procedure is essential, as the cables that they protect are classified under different typologies of electrical protection. More specifically, the cable path for the connection of the terminal black box contains cables that are part of an EExe-certified circuit, whereas the path for the connection of the injected volume control device contains cables that are part of an EExi-certified circuit and thus they cannot be present in the same cable path.

- The use of a spiral sheathing in plastic material suitable for protecting the passage of the connection cables, is sufficient for the connection of the explosion-proof valves in the system. This solution has been made possible due to the special EEExd certified sealing couplings, adapted to the creation of EEExe circuits, and have been used on the inlet side of the valves.

- All metal structures installed must be grounded. The pneumatic panel and electronic control unit must be connected to the grounding system of the station using a yellow/green wire of at least 4 mm².

- Be especially careful in ensuring that the passage of the cable paths from the “Hazardous area” to the “Safe area” is carried out properly. For this purpose, it is advisable to use a “Y”-sealing coupling (stop joints) mounted on a metal tubing stub, which must be long enough to ensure that it completely crosses through the wall dividing the rooms. It must also be “walled” using cement and in a way that ensures the separation of air between the rooms. When the cable connections have been completed, the coupling must be filled with a specific resin used for such purposes in order to ensure that it is perfectly sealed.

- A sleeve and/or spiral sheathing in plastic material can be used to protect cables for the transfer of signals between the flow computer and the electronic control unit, as long as this installation is carried out insuring a tightness equal to at least IP 44.

Pneumatic Lines

The pneumatic connections between the Dosaodor-D panel, the gas line, and the odorant tank should be carried out using stainless steel piping only, with diameters of 8x6 and 6x4 mm, respectively.

**CAUTION**

During installation operations, be especially careful that the odorant-pickup tank base is installed at least 40 cm (16 in) higher than the odorant entry point of the Dosaodor-D panel. This ensures that the control device fills up.

**WARNING**

The pipeline connecting the Dosaodor-D panel with the odorant tank should not be installed in a manner permitting the creation of any air/gas pockets. Therefore, it is recommended to have it installed completely straight and with a grade that is as constant as possible with no sequences of upward and downward inclines.

Pneumatic Connections

Teflon tape or pipe sealing compound for threads should be used on all connector pipe fittings to prevent odorant leakage.

It is advisable to use a drainage valve, if present, on the bottom of the absorption-type odorization tank, to collect any liquid from the tank itself. If a drainage valve is not present, it is possible to make the connection with the lower opening on the level indicator (drainage).

Refer to the explanatory drawings on the following pages for carrying out these connections.

Be careful with the type of system you are working on, connections are different depending on the type of measurement used in the reduction system (VOLUMETRIC/VENTURIMETRIC measure).

The first drawings represent a typical reduction and measurement system equipped with only one tank for absorption-type odorization.

The subsequent drawings show a reduction and measurement system equipped with a storage tank, absorption-type tank, and systems with suction tank only, without absorption-type odorization.
Figure 7. Dosador-D B1 Version Electric Connections Schematic
Figure 8. Dosaodor-D B2 Version Electric Connections Schematic
Figure 9. Absorption Type Emergency Tank Connection Schematic Using a Volumetric Meter
Figure 10. Absorption Type Emergency Tank Connection Schematic Using an Orifice (Venturimetric) Meter
Figure 11. Absorption Type Emergency Tank with Storage Tank Connection Schematic Using Volumetric Meter
Figure 12. Absorption Type Emergency Tank with Storage Tank Connection Schematic Using an Orifice (Venturimetric) Meter.
Figure 13. Storage Tank Without Absorption Type Emergency Tank Connection Schematic
User Available Signals

As shown on the electrical circuit diagram for the connections with external devices, and below figures, there are several electrical contacts available on the electronic control unit terminal board, to be used for the interface with external devices such as systems for remote data transmission, remote monitoring and remote surveillance. The signals do not have a typology that is homogeneous. There are two different typologies:

Open Collector digital output signals with a grounded-base opto-isolated connection corresponding to the installed cards:

Use of Internal power supply

In the case the user needs to acquire signals using the internal power generator of the Dosaodor-D, the connection schematic is the following:

Legend:
1 Dosaodor-D power supply
2 Relay suitable for 12V
x + Connection on the M4 slot (ref. 1 to 8)
y - Connection on the M4 slot (ref. 9 to 16)

Figure 14. Internal Supply Connections

Here follow the electrical specifications of the contacts:
- Maximum voltage applicable : 30 V DC
- Maximum current applicable : 200 mA
- Duration of the pulse (closing) : 1 second

The signals included in this category are:
- Gas volume supplied (weight of programmable pulse) Terminals 1 & 2 of M4
- Volume of odorant injected (weight of programmable pulse) Terminals 2 & 10 of M4
- Injector 1 alarm (Normally Open contact) Terminals 3 & 11 of M4
- Injector 2 alarm (Normally Open contact) Terminals 4 & 12 of M4
- Dosaodor-D – disabled (Normally Closed contact) Terminals 5 & 13 of M4
- Odorant low level in Suction Tank (N.A.) Terminals 6 & 14 of M4
- GCU Command – Pulse Signal to GCU Relay Terminals 7 & 15 of M4
- Control Run/Wait of Dosaodor-D SLAVE (Open = Run) Terminals 8 & 16 of M4

Analog output signals:

The electrical specifications of the analog output signals are:
- Range : 4 – 20 mA
- Configuration : Source 12 Vdc (output supply 12 Vdc)
- Maximum accept. load : 300 Ohm

The signals included in this category are:
- Instantaneous concentration 0-100 mg/m³ (0-10 lb/MMCF) Terminals 1 & 3 of M1
- Average Day concentration 0-100 mg/m³ (0-10 lb/MMCF) Terminals 2 & 4 of M1
Figure 15. Electrical Connections Schematic

INPUT SUPPLY FROM UPS
+12 V dc - POSITIVE
-0 V dc - NEGATIVE

ANALOG INPUT 4-20 mA - GAS FLOWRATE
Connection for PASSIVE Signal Trans.
Connection for ACTIVE Signal Trans.

DIGITAL INPUT
1(+) / 3(-) LF Pulse - GAS VOLUME
3(+) Hi Odorant Level - to Barrier 1030D (1)
4(+) LOW Odorant Level - to Barrier 1030D (5)
5(+) / 15(+) Gas Flow Computer Alarm
6(+) / 16(+) LOW Diff. Pressure - From GCU
7(+) / 17(+) HI Diff. Pressure - From GCU
8(+) / 19(+) Dp Analog Input Signal - Enabled
9(+) / 11(+) Close = Select DOSAODOR as SLAVE
10(+) / 20(+) Close = Set Slave DOSAODOR on Wait
11(+) / 12(+) 24 Vdc Supply for Barrier 1030D (3+) / (2,4,6-)

DIGITAL OUTPUT - USER
1(+) / 5(-) Pulse - Gas Volume
2(+) / 6(-) Pulse - Odorant Volume
3(+) / 11(+) Alarm Injector N°1
4(+) / 7(+) Alarm Injector N°2
5(+) / 13(+) DOSAODOR - Excluded - Normally Closed
6(+) / 14(+) Tank Low Odorant Level Tank
7(+) / 15(+) Control GCU
8(+) / 16(+) Control Slave DOSAODOR, Open = Run

OUTPUT COMMAND FOR DOSAODOR PANEL
1(+) / 5(-) Control Adsorber System - JB(1 / 2)
2(+) / 6(-) Control Reloding Cylinder - JB(3 / 4)
3(+) / 7(+) Control Injector N° 1 - JB(5 / 6)
4(+) / 8(+) Control Injector N° 2 - JB(7 / 8)

POWER SUPPLY
1(+) / 5(-) Input Isolate Supply for User Output
2(+) / 6(-) Input 12V dc from UPS
3(+) / 7(+) Out 12V dc for Keyboard board!
4(+) / 8(+) Input 12V dc from Main Power Supply
STARTUP / PROGRAMMING

Preliminary Checks

Upon delivery on site the equipment must be inspected for damages occurred during transportation.

As a minimum, the following points must be inspected:

- Integrity of connections and equipment sealing
- Status of painted surfaces. If paint is damaged any touch-ups must be carried out in accordance with the project coating specification
- Visual check of critical areas such as pipe plugs, level gauge connection, etc

Any damage shall be reported to the project team and to the vendor in order to agree and coordinate any repair work.

The pneumatic panel has been subject to a hydrostatic test at the factory according to applicable codes and thoroughly inspected for leakage during that test. However, handling during transportation or moving into place may have loosened gasket seals therefore it is recommended to recheck all bolted connections prior to start up.

Equipment operating at high pressure should be warmed up slowly and uniformly before applying full pressure.

Calibration of the cylinder tank is particularly sensitive to very rapid pressure increase. Pressure should be increased in stages of approximately 10% of operating pressure up to the operating value. In case of leakage or other issues, the procedure should be immediately stopped and the problem investigated and solved before a new startup.

Before startup and after the initial startup, at normal operating pressure and temperature, it is recommended to inspect all gasketed joints for tightness.

Before switching on the electronic control unit, it is necessary to define and set the Gas Volume/Gas Delivery signal type.

The control unit can acquire a BF pulse Gas Volume signal (Standard Configuration) or an Analog Gas Instantaneous Delivery signal 4-20 mA (to be configured).

To configure an Analog Instantaneous Delivery signal proceed as follows:

- Remove the metal protection on the signal acquisition card located on the back of the cabin of the electronic control unit;
- Set the S1 micro-switch according to the following table:

  1= OFF Gas Volume pulse input  
  1= ON Analog Gas Instantaneous Delivery signal 4-20 mA
- Second switch is used for control “Zero Gas Flow rate” function
  2= OFF Function disabled
  2= ON Function enabled - if the system detect, for 2 consecutive hours, 0 Gas Flowrate automatically open the emergency system valve. Opening function is show with flashing Led “ALARM Emergency system ON”
- Third switch is used to define the presence of the Gas Compressor Unit (GCU) which is an external device used to generate Storage Hi Pressure.
  3= OFF GCU not present  
  3= ON GCU Present – Dosaodor-D generate command for control GCU function
- Fourth switch is used to define the presence of the Communication Modem on COM1
  4= OFF MODEM not present
  4= ON MODEM Present – Dosaodor-D configure Modem in accordance with Modem Type programmed in Loc. 09
- Mount back the metal protection on the signal acquisition card.

Check all of the electrical and pneumatic connections for proper conformity throughout the entire system, using the diagrams and drawings as specified.

Check that all valves for connection between the pneumatic panel and remaining part of the station are perfectly closed as it is only possible to proceed with switching on the control unit only under these conditions.

Control Unit Power-on

If all of the preliminary checks described in the preceding section have been carried out, the system can be switched on.

Set the key switch to PROG-ON.

Raise the magnetic thermal switch, which is located next to the electronic control unit, while keeping the Alarm Reset key pressed. This procedure switches on the control unit and perform a complete reset on the memory.

The control unit is normally configured to operate at 230 V 50 Hz voltage. In case the system needs a 150 V voltage supply, the position of the selection jumper located inside the power supply, placed on the back of the cabin, must be modified.

If the preliminary steps described above have been strictly followed, these indicators will switch on:

- Indicator - DISABLED red
- Indicator - INJECTOR 1 green
- Indicator - ALARM - EMERGENCY SYSTEM ON red
- Indicator – AC LINE green
The display will be lit and the first Programming page appears identified by LOC:00.

The displayed texts are in ENGLISH. To switch to other Languages you only need to press the ENT key.

If any other indicators light up besides those mentioned above, the following procedures must be performed:

- Insert and set the Programming enabling key to the PROGRAMMING - ON position
- Press the ALARM RESET key
- Set the key back to the PROGRAMMING-OFF position

If the FLOW - COMPUTER ALARM indicator is still lit after having performed the procedures described above, you must check the flow computer status and/or the control unit and the computer for proper wiring.

After verifying that the above procedures are met you may proceed with programming the remaining data required for the correct operation of the system.

If you only want to Reset the Totalized Data and not change the Programmed Configuration Data, proceed as follows:

- Remove the Power Supply
- Set the key switch to PROG-ON.
- Raise the magnetic thermal switch, which is located next to the electronic control unit, (supply the main Power), while keeping the ENT key pressed. This procedure switches on the control unit and performs a complete Reset on the Totalized Data (Day and Month).

Programming Sequence

The following are the procedures to be performed for displaying / modifying the programming data required for operation of the system:

a) Press the LOC key to activate the memory Location selection to be displayed. The symbol Loc:** will appear on the far left of the first line, indicating that the cycle is in the phase of selecting a new location.

b) Enter the specific location number (see table in the following section). Each location must be expressed with two characters. Enter the numbers 01 to call up location no. 1. The keys pressed will replace the "***" symbols appearing after the letter "L". In case of any errors in entering the numbers simply press the "CLR" key to delete them.

c) As an alternative to the procedure outlined above, it is also possible to scroll forward or backward by one location at a time through the contents of the display by simply pressing the Up / Down arrow keys.

d) A "*" symbol will appear on the far right of the appropriate line on the display if the displayed parameter is enabled for programming. It can be modified as follows:
- ensure that the programming key is positioned on PROGRAMMING - ON and then press the ENT key.
- All digits expressing the setting take on the value of "." and the star positioned on the far right, changes to an "i" to indicate the "enter" mode.

e) At this point, enter the new setting to be programmed. The numbers entered will automatically be transferred from the right to left. Any number occurring in entering the setting can be deleted by simply pressing the CLR key once for each character to be deleted.

f) Press the ENT key to confirm the setting. The value shall be re-written by replacing the "." limit characters with "0". The indicator "i" replaced with the "*" symbol.

CAUTION

Parameters belonging to Locations from Loc:00 to Loc:09 are the programmable data for the user. The others cannot be modified. Thus, such data do not show the "***" indicator.

g) The first data of Location Loc:00 has a special function. It is used to select the language in which the messages displayed will appear. To change the language used, after having enabled the programming mode by turning the access key, simply press the ENT key. At this point, the messages in the new language entered in the memory will be activated (Display + Printer + Data)

h) The PRN key opens a menu used to select the report type you want to print. Press the key to start printing:


Note: Printing is possible ONLY provided that a "Printer Interval" is programmed in LOC:03 different from 00:00
Programmed / Displayed Data Table

Data identification code numbers on the system
-Dosaodor-D Rev. 4.17

Language - ENGLISH (International Standards Units)

Programmed Data: from Loc:00 to Loc:06 & Loc:09

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Loc:00 Dosaodor-D Rev. 4.17</td>
<td>The active Page Location (Loc) is displayed together with the Software version installed in the control unit memory.</td>
</tr>
<tr>
<td>b) Language Messages</td>
<td>ENGLISH</td>
</tr>
<tr>
<td>c) Date</td>
<td>Day/Month/Year 04/10/02</td>
</tr>
<tr>
<td>d) Time</td>
<td>Hour:Minute:Second 15:20:30</td>
</tr>
</tbody>
</table>

a) Loc:02 Dosaodor-D Rev. 4.17

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Specific Volume Inject. n1 g/s 01.00</td>
</tr>
<tr>
<td>b) Specific Volume Inject. n2 g/s 01.00</td>
</tr>
<tr>
<td>c) Check Cylinder Od. Volume g 0062.0</td>
</tr>
</tbody>
</table>

The system is set to receive max. one pulse per second. Therefore the possible flow computer shall be programmed adequately to meet this condition.

In the case the control unit is set to acquire an analog signal of 4-20 mA for Gas Instantaneous Delivery instead of pulse Volume, set a value in this location that corresponds the min. value of the equipment.

This value is calculated according to the max. gas delivery of the station, while taking into consideration that the equipment can integrate a max. quantity of gas per second equal to the set value.

c) Gas Delivery (Manual)
Gas Delivery simulated by the equipment in case MANUAL mode is selected (constant dosing).

Loc:03 Dosaodor-D Rev. 4.17

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Volume for Switch I1 ↔ I2 g/s 00002000</td>
</tr>
<tr>
<td>b) User Code Number 00000000</td>
</tr>
<tr>
<td>c) Printer Interval Hour:Minute 00:00</td>
</tr>
</tbody>
</table>

a) Programmed Odorizing Rate
Odorizing concentration that you intend to inject; it is expressed in Odorizing mg each m³ of transited Gas.

b) Gas Volume Inlet
"Weight" of the gas volume pulse accessing the system. Enter the number of gas m³ each received pulse.

The system is set to receive max. one pulse per second. Therefore the possible flow computer shall be programmed adequately to meet this condition.

In the case the control unit is set to acquire an analog signal of 4-20 mA for Gas Instantaneous Delivery instead of pulse Volume, set a value in this location that corresponds the min. value of the equipment.

This value is calculated according to the max. gas delivery of the station, while taking into consideration that the equipment can integrate a max. quantity of gas per second equal to the set value.

c) Gas Delivery (Manual)
Gas Delivery simulated by the equipment in case MANUAL mode is selected (constant dosing).

Loc:02 Dosaodor-D Rev. 4.17

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Specific Volume Inject. n1 g/s 01.00</td>
</tr>
<tr>
<td>b) Specific Volume Inject. n2 g/s 01.00</td>
</tr>
<tr>
<td>c) Check Cylinder Od. Volume g 0062.0</td>
</tr>
</tbody>
</table>

a) Specific Volume – Injector No.1
Enter the value written on the label of the pneumatic panel, that indicates the max. delivery of Injector No. 1 expressed in odorizing grams per opening second.

b) Specific Volume – Injector No.2
Enter the value written on the label of the pneumatic panel, that indicates the max. delivery of Injector No. 2 expressed in odorizing grams per opening second.

c) Odorizing Volume in the Control Cylinder
Enter the value written on the label of the pneumatic panel ad multiply it by the specific weight of the used odorant (THT=1 – Mercaptani=0.8).

Loc:01 Dosaodor-D Rev. 4.17

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Odorizing Concentration mg/m³ 40</td>
</tr>
<tr>
<td>b) Gas Volume Input Pulse=m³ 0010.00</td>
</tr>
<tr>
<td>c) Gas Flowrate (Manual Set) m³/h 0001000</td>
</tr>
</tbody>
</table>

a) Programmed Odorizing Rate
Odorizing concentration that you intend to inject; it is expressed in Odorizing mg each m³ of transited Gas.

b) Gas Volume Inlet
"Weight" of the gas volume pulse accessing the system. Enter the number of gas m³ each received pulse.

The system is set to receive max. one pulse per second. Therefore the possible flow computer shall be programmed adequately to meet this condition.

In the case the control unit is set to acquire an analog signal of 4-20 mA for Gas Instantaneous Delivery instead of pulse Volume, set a value in this location that corresponds the min. value of the equipment.

This value is calculated according to the max. gas delivery of the station, while taking into consideration that the equipment can integrate a max. quantity of gas per second equal to the set value.

c) Gas Delivery (Manual)
Gas Delivery simulated by the equipment in case MANUAL mode is selected (constant dosing).

Loc:02 Dosaodor-D Rev. 4.17

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Specific Volume Inject. n1 g/s 01.00</td>
</tr>
<tr>
<td>b) Specific Volume Inject. n2 g/s 01.00</td>
</tr>
<tr>
<td>c) Check Cylinder Od. Volume g 0062.0</td>
</tr>
</tbody>
</table>

a) Specific Volume – Injector No.1
Enter the value written on the label of the pneumatic panel, that indicates the max. delivery of Injector No. 1 expressed in odorizing grams per opening second.

b) Specific Volume – Injector No.2
Enter the value written on the label of the pneumatic panel, that indicates the max. delivery of Injector No. 2 expressed in odorizing grams per opening second.

c) Odorizing Volume in the Control Cylinder
Enter the value written on the label of the pneumatic panel ad multiply it by the specific weight of the used odorant (THT=1 – Mercaptani=0.8).

Loc:03 Dosaodor-D Rev. 4.17

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Volume for Switch I1 ↔ I2 g/s 00002000</td>
</tr>
<tr>
<td>b) User Code Number 00000000</td>
</tr>
<tr>
<td>c) Printer Interval Hour:Minute 00:00</td>
</tr>
</tbody>
</table>

a) Volume for Injector Exchange
Used in version Dosaodor-D B2 (dual injector) to set the grams of injected odorant after which the operating injector is automatically exchanged. The exchange will take place only if the Injector 1-2 operation mode is selected.

b) REMI System Code
Enter a numerical value to identify the system. This number is indicated both on the daily reports and the header of the data transmitted via serial port.

c) Printer Interval
Enter the value for periodical printing. If you enter "00:00" ALL printing functions are disabled.
**a) Odorant Volume in Pickup Tank**

Enter the liters of odorant in the tank which is connected to the system detected by reading the indicator level (which is normally installed).

After each injection, the quantity inserted in the pipe is subtracted. This is used to generate the alarm signal for low odorant level. This value must be updated each time that the tank is refilled.

**b) Low Odorant Level in the Tank**

Enter the odorant quantity expressed in liters, under which the alarm contact is closed indicating that there is low odorant level in the tank.

The contact opens when a higher or equal “Odorant Volume in Tank” is inserted according to the selected alarm value (to be used to send a signal through User remote control system).

**c) Odorant Specific Weight**

Enter the value corresponding to the type of liquid used. This is used for conversions between injected milligrams and liters coming from the tank (THT=1.00 - Mercaptani=0.80)

---

**Loc:05 Dosaodor-D Rev. 4.17**

| a) Pulse Output Odorant | Imp.=g | 001 |
| b) Pulse Output Gas | Imp.=m³ | 0010 |
| c) Contractual Hour Day End | 0-23 | 00000000 |

---

**a) Pulse Output Odorant**

Used to set the quantity of grams of injected odorant that activates the output pulse. This is used to remotely count the odorant quantity injected into the system.

**b) Pulse Output Gas**

Used to set the quantity of cubic meters of gas totalized by the system to remotely activate the output pulse.

**c) Contractual Hour Day End 0-23**

Used to set the end of Fiscal Day.

**Example:**

If you set 06, the system calculates the Gas/Odorant Day/ Month volume between 06:00:00 of present Day to 05:59:59 of last Day; date used is equal to Start Day. Set hour will be used on Display / Printer / Storage data.

---

**Loc:06 Dosaodor-D Rev. 4.17**

| a) Max Reloading Time | sec | 300 |
| b) F.S. Gas Flowrate (4 – 20 mA) | m³ | 00000000 |

---

**a) Max Reloading Time**

Used to set the maximal cylinder reloading time; when Dosaodor-D starts odorant cylinder refilling at the same time the internal Reloading Timer is reset. If after programming the Dosaodor-D set value it does not detect the High Odorant cylinder level, the Reloading Alarm is activated and the Disable Mode switched on.

**b) F.S. Gas Flowrate (4 - 20 mA)**

Enter the gas flowrate corresponding to the Full Scale value (20 mA) of the analog input (the exact value, can be found by checking the flowrate on the measuring equipment E.g.: Flow computer).

---

**Loc:09 Dosaodor-D Rev. 4.17 Sw4=ON**

| a) Password for Remote Program | **** |
| b) Installed Modem Type | 0-4 |
| c) 0=No Modem 1= 2156-92=TC35 3=USER 4=USER |

---

**a) Password for Remote Program**

Enter the four numbers Password, this value is used to bypass the security key switch during serial connection. If you enter, by serial connection protocol code 10, the correct password, Dosaodor-D permit changes of the Work Status, Injector Select, and Programmed Dates. The security bypass remains active for 15 seconds after the last correct communication messages. The password value is only show during the insertion procedure, after this is impossible to check the value programmed. If the password is missed you must Re-insert a new one.

**b) Installed Modem Type**

Used to set the type of modem installed inside of Dosaodor-D Electronic Control Unit on COM1

One of the following options can be selected:

0 = No Modem - No Modem is installed inside of ECU
1= 2156-92 – Telephone Line Modem "MICROTEL 2156" is Installed inside of ECU
2=TC35 - GSM/GPRS Radio Modem is Installed inside of ECU

Selection is active ONLY if Switch N°4 is in ON Position, check the current position on Right-Top Display.

When the modem selection is changed the ECU sends a new configuration command to the Modem, during this Time (8 seconds) Keyboards & Display are deactivated.
Processed Data: from Loc:10 to Loc:15

<table>
<thead>
<tr>
<th>Loc:10 Dosaodor-D Rev. 4.17</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Current Gas Flowrate m³/h</td>
</tr>
<tr>
<td>b) Injector #1 Time Open ds</td>
</tr>
<tr>
<td>c) Injector #2 Time Open ds</td>
</tr>
</tbody>
</table>

**a) Current Gas Flowrate**
The instantaneous gas flowrate currently detected by the system is displayed. In case of MANUAL mode, the gas flowrate shall be indicated under Loc:01 c).

*Note: If the gas volume detection through the input pulse is enabled (standard mode), the value indicated corresponds to the average value between two subsequent BF pulses. In certain cases the displayed value is different from the one indicated on the Flow Computer by +/- 10%, this value is not used for dosing this configuration, it is only used as an indicator for the operator who can check for correct pulse acquisition.*

**b) Injector #1 Time Open**
The opening time of injector 1 used by the system to inject the correct odorant quantity is displayed. The value ranges from 01 to 10 tenths of second. This value will indicate the percentage the system is working at. (01 less or equal to 10%, 10 higher than 90% and less or equal to 100%).

**c) Injector #2 Time Open**
The opening time of injector 2 used by the system to inject the correct odorant quantity is displayed. The value ranges from 01 to 10 tenths of a second. This value will indicate the percentage the system is working at. (01 less or equal to 10%, 10 higher than 90% and less or equal to 100%).

*Note: This value is modified only for Dosaodor-D B.2 version with dual injectors.*

<table>
<thead>
<tr>
<th>Loc:11 Dosaodor-D Rev. 4.17</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Current Day Gas Volume m³</td>
</tr>
<tr>
<td>b) Current Day Odorant Vol. g</td>
</tr>
<tr>
<td>c) Current Day Aver. Conc. mg/m³</td>
</tr>
</tbody>
</table>

**a) Current Day Gas Volume**
The gas volume achieved between “Contractual Hour Day End” and the current time is displayed.

**b) Current Day Odorant Volume**
The odorant volume achieved between “Contractual Hour Day End” and the current time is displayed.

<table>
<thead>
<tr>
<th>Loc:12 Dosaodor-D Rev. 4.17</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Previous Day Gas Volume m³</td>
</tr>
<tr>
<td>b) Previous Day Odorant Vol. g</td>
</tr>
<tr>
<td>c) Previous Day Aver. Conc. mg/m³</td>
</tr>
</tbody>
</table>

**a) Previous Day Gas Volume**
The gas volume achieved between two “Contractual Hours Day End” of the previous day (yesterday) is displayed.

**b) Previous Day Odorant Volume**
The odorant volume achieved between two “Contractual Hours Day End” of the previous day (yesterday) is displayed.

**c) Previous Day Average Concentration**
The average concentration of odorant in the gas is displayed (ratio between the quantity of odorant injected and the volume of transited gas) calculated between two “Contractual Hours Day End” of the previous day (yesterday).

<table>
<thead>
<tr>
<th>Loc:13 Dosaodor-D Rev. 4.17</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Current Month Gas Volume m³</td>
</tr>
<tr>
<td>b) Current Month Odorant Vol. g</td>
</tr>
<tr>
<td>c) Current Month Aver. Conc. mg/m³</td>
</tr>
</tbody>
</table>

**a) Current Month Gas Volume**
The gas volume achieved between “Contractual Hour Day End” of the first day of the current month and the current time is displayed.

**b) Current Month Odorant Volume**
The odorant volume achieved between “Contractual Hour Day End” of the first day of the current month and the current time is displayed.

**c) Current Month Average Concentration**
The average concentration of odorant in the gas is displayed (ratio between the quantity of odorant injected and the volume of transited gas) calculated between “Contractual Hour Day End” of the first day of the current month and current time.
a) Previous Month Gas Volume

The gas volume achieved between “Contractual Hour Day End” of the first day and “Contractual Hour Day End” of the last day of the previous month is displayed.

b) Previous Month Odorant Volume

The odorant volume achieved between “Contractual Hour Day End” of the first day and “Contractual Hour Day End” of the last day of the previous month is displayed.

c) Previous Month Average Concentration

The average concentration of odorant in the gas is displayed (ratio between the quantity of odorant injected and the volume of transited gas) calculated between “Contractual Hour Day End” of the first day and “Contractual Hour Day End” of the last day of the previous month.

a) Odorant Cylinder Volume Used

Indicates the quantity of odorant theoretically collected from the control cylinder (sampler) which is installed on the Dosaodor-D pneumatic panel.

* This value is indicated in letters “H” / “L” / “R” meaning: “H” Dosaodor-D detect High Level inside of Control Cylinder “L” Dosaodor-D detect Low Level inside of Control Cylinder “R” Dosaodor-D has Recharging Control Cylinder valve Open

b) Remaining Value for Switch Injector 1 ↔ Injector 2

Indicates the odorant value to be injected prior to the automatic exchange between Injector 1 and 2 takes place. The exchange takes place only if the Injector 1-2 mode has been selected on Dosaodor-D B.2 (dual injectors).

c) Current Odorant Concentration

Indicates the instantaneous concentration of odorant in the gas (ratio between the quantity of injected odorant and the volume of transited gas). It is calculated considering the volume of odorant inserted with the last 10 injections and relevant gas volumes integrated in the same period. This value is updated each 10 seconds and is used to generate the analog output signal 4-20 mA (range 0-100 mg/m³)

Print Menu: Loc:20
(it can be open also by pressing PRN Key)

a) 1) PRINTING Programmed Data

By pressing the “1” key, the data programmed in Dosaodor-D are printed.

Date: xx/xx/xx Time: xx:xx Code: xxxxxxxx

PROGRAMMED DATA
Software Version 4.17
Programmed Date xx/xx/xx
Programmed Time xx:xx:xx
Odorizing Concentration mg/m³ 40
Gas Volume Input 1 Pulse=m³ 0010.00
Gas Flowrate (Manual Set) m³/h 0001000
Specific Volume Inject. N1 m³/h 01.00
Specific Volume Inject. N2 m³/h 01.00
Check Cylinder Od. Volume g 0062.0
Volume of Switch I1 ↔ I2 g 0002000
User Code Number 00000000
Printer Interval Hour:Minute 00:00
Odarize Volume in the Tank l 0100
Low Odorant Level Tank l 000
Odorant Specific Weight kg/l 1.00
Pulse Output Odorize Imp.=g 001
Pulse Output Gas Imp.=m³ 0010
Contractual Hour Day End 0-23 00
F.S. Flowrate Gas (4 – 20 mA) m³ 00000000
Installed Modem Type No - Modem

b) 2) PRINTING Daily Report

By pressing key “2”, the daily report is printed. The format is identical to the one used for the Automatic Report of the End of the Day. The only difference is in the printed values, which are updated at the time of printing and not at the end of the “Contractual Hour Day End”.

Date: xx/xx/xx Time: xx:xx Code: xxxxxxxx

PRINT BY OPERATOR
DAILY REPORT OF ............... : xx/xx/xx
DAILY DIAGNOSTIC ............... : xxxxxxxx
Present Day Gas Volume m³ 00000000
Present Day Odorant Volume g 00000000
Present Day Aver. Conc. mg/m³ 000.1
PARTIAL MONTHLY REPORT OF: xx/xx
Present Month Gas Volume m³ 00000000
Present Month Odorant Vol. g 00000000
Present Month Aver.Conc. mg/m³ 000.1
DAILY DIAGNOSTIC

Daily event type list. The codes are visible only on the remote control software DosaLink.

<table>
<thead>
<tr>
<th>CODE</th>
<th>DIAGNOSTIC DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>DOSAODOR RUNNING</td>
</tr>
<tr>
<td>1</td>
<td>DOSAODOR MANUAL</td>
</tr>
<tr>
<td>2</td>
<td>DOSAODOR EXCLUDED</td>
</tr>
<tr>
<td>3</td>
<td>DOSAODOR WASHING</td>
</tr>
<tr>
<td>8</td>
<td>ALARM COMMUNICATION BOARD*</td>
</tr>
<tr>
<td>16</td>
<td>ALARM ODORANT RELOADING</td>
</tr>
<tr>
<td>32</td>
<td>ALARM GAS FLOW COMPUTER</td>
</tr>
<tr>
<td>64</td>
<td>ALARM HI GAS FLOW RATE</td>
</tr>
<tr>
<td>128</td>
<td>ALARM INJECT.N. - 1</td>
</tr>
<tr>
<td>256</td>
<td>ALARM INJECT.N. - 2</td>
</tr>
<tr>
<td>512</td>
<td>ALARM ANALOG INPUT</td>
</tr>
<tr>
<td>1024</td>
<td>DOSAODOR RESET</td>
</tr>
<tr>
<td>2048</td>
<td>ACTUAL ALARM RESET</td>
</tr>
<tr>
<td>4096</td>
<td>TOTALIZER RESET</td>
</tr>
<tr>
<td>8192</td>
<td>MEMORY DATA RESET</td>
</tr>
<tr>
<td>16384</td>
<td>ALARM PRINTER ERROR</td>
</tr>
<tr>
<td>32768</td>
<td>MEMORY EVENT RESET</td>
</tr>
<tr>
<td>65536</td>
<td>POWER SUPPLY ON</td>
</tr>
<tr>
<td>131072</td>
<td>POWER SUPPLY OFF</td>
</tr>
<tr>
<td>262144</td>
<td>ALARM LOW ODORANT LEVEL</td>
</tr>
<tr>
<td>524288</td>
<td>ALARM HF PULSE INPUT</td>
</tr>
<tr>
<td>1048576</td>
<td>ALARM LOW Q - START</td>
</tr>
<tr>
<td>2097152</td>
<td>ALARM LOW Q - STOP</td>
</tr>
<tr>
<td>4194304</td>
<td>ALL. GAS COMPRESSOR UNIT</td>
</tr>
<tr>
<td>8388608</td>
<td>ALARM LOW ODORANT LEVEL</td>
</tr>
<tr>
<td>16777216</td>
<td>DOSAODOR SLAVE - SET</td>
</tr>
<tr>
<td>33554432</td>
<td>DOSAODOR SLAVE - WAITING*</td>
</tr>
<tr>
<td>67108864</td>
<td>DOSAODOR SLAVE - START</td>
</tr>
<tr>
<td>134217728</td>
<td>BEGIN 220V ALARM</td>
</tr>
<tr>
<td>268435456</td>
<td>END 220V ALARM</td>
</tr>
<tr>
<td>316</td>
<td>3) PRINTING Event Report</td>
</tr>
</tbody>
</table>

By pressing the “3” key, the event report is printed. This report records the last 30 operations/alarms occurred in the system, completed with Date and Time. These are the possible messages:

<table>
<thead>
<tr>
<th>DATE</th>
<th>TIME</th>
<th>EVENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>xx/xx/xx</td>
<td>xxxx</td>
<td>DOSAODOR EXCLUDED</td>
</tr>
<tr>
<td>xx/xx/xx</td>
<td>xxxx</td>
<td>DOSAODOR RUNNING</td>
</tr>
<tr>
<td>xx/xx/xx</td>
<td>xxxx</td>
<td>DOSAODOR MANUAL</td>
</tr>
<tr>
<td>xx/xx/xx</td>
<td>xxxx</td>
<td>DOSAODOR WASHING</td>
</tr>
<tr>
<td>xx/xx/xx</td>
<td>xxxx</td>
<td>ACTUAL ALARM RESET</td>
</tr>
<tr>
<td>xx/xx/xx</td>
<td>xxxx</td>
<td>TOTALIZER RESET</td>
</tr>
<tr>
<td>xx/xx/xx</td>
<td>xxxx</td>
<td>MEMORY DATA RESET</td>
</tr>
<tr>
<td>xx/xx/xx</td>
<td>xxxx</td>
<td>ALARM INJECT. N. 1</td>
</tr>
<tr>
<td>xx/xx/xx</td>
<td>xxxx</td>
<td>ALARM INJECT. N. 2</td>
</tr>
<tr>
<td>xx/xx/xx</td>
<td>xxxx</td>
<td>ALARM ODORANT RELOADING</td>
</tr>
<tr>
<td>xx/xx/xx</td>
<td>xxxx</td>
<td>ALARM HI GAS FLOW RATE</td>
</tr>
<tr>
<td>xx/xx/xx</td>
<td>xxxx</td>
<td>ALARM GAS FLOW COMPUTER</td>
</tr>
<tr>
<td>xx/xx/xx</td>
<td>xxxx</td>
<td>ALARM ANALOG INPUT</td>
</tr>
<tr>
<td>xx/xx/xx</td>
<td>xxxx</td>
<td>ALARM LOW ODORANT LEVEL</td>
</tr>
<tr>
<td>xx/xx/xx</td>
<td>xxxx</td>
<td>ALARM COMMUNICATION BOARD</td>
</tr>
<tr>
<td>xx/xx/xx</td>
<td>xxxx</td>
<td>ALARM PRINTER ERROR</td>
</tr>
<tr>
<td>xx/xx/xx</td>
<td>xxxx</td>
<td>ALARM HF PULSE INPUT</td>
</tr>
<tr>
<td>xx/xx/xx</td>
<td>xxxx</td>
<td>Q &gt; 0 EMERGENCY SYS. ON</td>
</tr>
<tr>
<td>xx/xx/xx</td>
<td>xxxx</td>
<td>Q &gt; 0 EMERGENCY SYS. OFF</td>
</tr>
<tr>
<td>xx/xx/xx</td>
<td>xxxx</td>
<td>POWER SUPPLY ON</td>
</tr>
<tr>
<td>xx/xx/xx</td>
<td>xxxx</td>
<td>POWER SUPPLY OFF</td>
</tr>
<tr>
<td>xx/xx/xx</td>
<td>xxxx</td>
<td>ALL. GAS COMPRESSOR UNIT</td>
</tr>
<tr>
<td>xx/xx/xx</td>
<td>xxxx</td>
<td>DOSAODOR MASTER – SET</td>
</tr>
<tr>
<td>xx/xx/xx</td>
<td>xxxx</td>
<td>DOSAODOR SLAVE – SET</td>
</tr>
<tr>
<td>xx/xx/xx</td>
<td>xxxx</td>
<td>DOSAODOR SLAVE – WAITING</td>
</tr>
<tr>
<td>xx/xx/xx</td>
<td>xxxx</td>
<td>DOSAODOR SLAVE – START</td>
</tr>
</tbody>
</table>

Programming Example

The following represents an example for programming including explanatory notes. See paragraph “Programming Sequence” (Pag. 26) for an explanation of how to enter and modify data.

Loc:00

a) Language Messages

Press Enter until the message REQUIRED appears.

b) Date Day/Month/Year (Month/Day/Year)

Enter the current date in the format Day/Month/Year (Month/Day/Year if you are selected ENG.U.S. Language).

c) Time Hour/Minute/Second

Enter the current date in the format Hour/Minute/Second

Loc:01

a) Odorant rate Prog. mg/m³ (lb/MMCF)

Enter the odorant concentration value to be kept approximately.

- 40 mg/m³ (2.490 lb/MMCF) in case of THT
- 10 mg/m³ (0.622 lb/MMCF) in case of Mercaptan
- 7 mg/m³ (0.436 lb/MMCF) in case of Spotleak 2323

b) Gas Volume input – 1 Pulse = m³ (1 Pulse = MCF)

(provided that Gas Volume is detected through Pulse input)

Enter the “weight” of the input pulse, representing the number of Sm³ (MCF) correspond to one received pulse.

WARNING

The Dosaodor-D control unit can detect pulse signals without voltage (ON/OFF) with a frequency no higher than 1 Hz (one pulse/second). Therefore it is necessary to check the programming of the flow computer.

Volumetric Measure
(with meter connected to BF sender)

Follow the parameters below to calculate the “weight” of the pulse:

- BF pulse weight of the Biggest Meter
  [1 pulse = m³] = Pulse ON
- (BF pulse weight of the Biggest Meter
  [1 pulse = MCF] = Pulse ON)
- Max. measured gas pressure [bar] (PSIG) = Pmax
- C = (Pulse IN x (Pmax + 1)) * 1.2
**Volumetric Measure**  
(with meter connected to HF Emitter)

Follow the parameters below to calculate the "weight" of the pulse:

- Max. flowrate of the Biggest Meter = Q_max
- Max. measured gas pressure [bar] (PSIG) = P_max
- \[ C = \frac{Q_{max} \times (P_{max} + 1)}{1200} \] (one integration of volume each 3 seconds is considered)

**Venturimetric Measure**

Follow the parameters below to calculate the "weight" of the pulse:

- Max. flowrate of the station [Sm³/h] (MCF) = Q_max
- \[ C = \frac{Q_{max}}{1200} \] (one integration of volume each 3 seconds is considered)

The value to be set in the Dosaodor-D control unit must be higher or equal to C" value calculated as above (it is usually rounded to higher tenths. E.g.: 1.00 or 10.00 or 100.00)

The pulse coming of the flow computer MUST HAVE the same "weight" set in the Dosaodor-D control unit. Not all computers require the same parameters, since some express the output pulse as 1 pulse = m³ (MMCF) and others 1 m³ (MCF) = pulses.

On the FLOWTI T502/3/4/5 computer series it is necessary to program the location called OUT 1m³ = PULSE x.xxx (Attention! It is necessary to enter the corresponding number of calculated "C" value.

**Example:**

\[ C = 10.00; \text{OUT 1m³} = \text{PULSE 0.100} \]

If the Gas Flowrate is detected via analog input

Enter the max. gas volume that can be supplied by the station within 3 seconds.

**Example:**

Max. Station Flowrate = 20,000 Sm³/h (706 MCF/h)  
Computer: \(Q_{max} / 3600 / 3 = 20,000 / 1200 = 16.666\)  
Computer: \(Q_{max} / 3600 / 3 = 706 / 1200 = 0.5883\)  
Enter an integer greater than the calculated value:  
1 Pulse = m³ 20.0 (1 Pulse = MCF 0.600)

**c) Gas Flowrate (Manual) m³/h**

It is advisable to enter a value lower than the average flowrate of the station and, in case of need, enter the desired value. In case the MANUAL mode is mistakenly switched on, a low gas flowrate value reduces the odorant injection (usually this situation does not cause any particular problem, provided that it does not last too long).

To correctly calculate this value, it is recommended to set the daily average gas flowrate supplied by the station.

**Example:**

Daily volume of the period = 204000 Sm³/g (7201 MCF/Day)  
Divide this value by the 24 hours of the day to calculate the average hour flowrate to be set:  
204000/24 = 8500 Sm³/h (7201/24 = 300 MCF/h)

**Loc:02**

a) **Specific Volume Inject. n1 g/s (lb/s)**

Enter the specific volume of Injector No. 1. This value is indicated on the identification plate located on the pneumatic panel of the system. This value is automatically re-calculated by the system after each emptying cycle of the odorant contained in the control cylinder.

After approx. 7 operating days, this location takes a characteristic value, that depends on the system, since it depends of the variables identifying each type of installation. Keep this value constantly monitored. If it decreases, it means that the injection valve is getting dirty. If it increases, it means that the filling control valves are not perfectly tight. In any of these cases, it is better to schedule a maintenance intervention on the system.

b) **Specific Volume Inject. n2 g/s (lb/s)**  
**(only on dual injector version)**

Enter the specific volume of Injector No. 2. This value is indicated on the identification plate located on the pneumatic panel of the system. This value is automatically re-calculated by the system after each emptying cycle of the odorant contained in the control cylinder.

After approx. 7 operating days, this location takes a characteristic value, that depends on the system, since it depends of the variables identifying each type of installation. Keep this value constantly monitored. If it decreases, it means that the injection valve is getting dirty. If it increases, it means that the filling control valves are not perfectly tight. In any of these cases, it is better to schedule a maintenance intervention on the system.

c) **Odorant Volume in the Control Cylinder g (lb)**

This location indicates the odorant volume used by the control device to compare the liquid actually injected with the theoretically injected liquid. This value is indicated on the identification plate located on the pneumatic panel, and should be multiplied by the specific weight of the odorant used. THT = 1kg/dm³ (8.345 lb/gallon)  
Mercaptan = 0.8 kg/dm³ (6.676 lb/gallon)

**Loc:03**

a) **Volume for |1↔2| exchange g (lb)**

In the case of No. 2 Injectors installed on a type Dosaodor-D B2, this location should include the volume that each injector has to inject before the automatic exchange between “operating/rest” cycle takes place.
b) System Code Number

Set an 8-digit number identifying the system/user. This number should be specified at the beginning of each daily report to identify the system and is used for identification during remote serial connection.

Example:

If you set 06 the system will calculate the Fiscal Daily between 06:00:00 of Present Day to 05:59:59 of Last Day. Fiscal Date is equal of Start Day.

Loc:06

a) Max. Reloading Time sec

In function of the type of Dosaodor-D Type (Maximal Capacity) a maximal cylinder reloading time must be programmed. Model 0,5 to 6,0 l/h can be programmed at 300 s, for model 8 to 10 l/h you can be programmed at 400 s, model 12 to 14 l/h can be programmed at 500 s.

b) Full Scale Gas Flowrate (20 mA) = m³ (MCF/h)

Appears only if gas flowrate is detected through analog signal 4-20 mA (see paragraph “Preliminary Checks” on page 27). Set the gas flowrate value corresponding to the electrical Full Sale (20 mA) that can be detected on the computer or gas flowrate transmitter.

Loc:09

c) Password for Remote Program

Insert four numbers for Bypass Key Switch during Serial Connection.

d) Installed Modem Type 0-2

(0=No Modem 1=2156 2=TC35)

Insert Type of Modem Installed in Dosaodor-D Controller

0=No Modem, 1=Line Telephone Modem Model MICROTEL 2156, 2=GSM/GPRS Modem

STARTUP

Additional Materials Required for Cleanup

In order to proceed with starting up the system, at least half a liter of a liquid capable of neutralizing the effect of the odorant used is required.

Normally, the liquid most frequently used is a mixture of sodium hypochlorite (bleach) with denatured alcohol and a small amount of “fragranced” liquid soap.

Preliminary Operations and Leakage Test (see figure 4)

Before starting-up the system, according to best practices, it is strongly recommended for safety reasons to check all pneumatic connections have been carried out correctly
and that the complete system (pipes, pipe connections and equipment) is pressure tight and free from leaks.

In case of effective National regulations, above recommendation shall be mandatory.

Proceed as follows for these checks: (use the diagram from figure 4 as a reference)

- Close the odorant input valve installed at the base of the pickup tank.
- Open the three gas on/off valves installed on the main gas line (Upstream station, downstream regulators / upstream measurement, upstream solenoid valve key 23)
- Using a suitable spray, check for any gas leaks (check ALL fittings)
- Proceed by switching on the electronic control unit, as indicated in paragraph “Control Unit Power-on” on page 28. With this procedure, solenoid valves 8 and 10 will open automatically and will remain open for no longer than 2 minutes. After this interval, the valves will close, activating the control unit alarm with a signal indicating odorant recharge failure
- Check the section of line connecting the pneumatic panel with the odorant tank, including odorant filter for any gas leaks. If no leaks are detected, proceed with priming the entire system.

Pneumatic Panel Startup
(see figure 2, 3 and 4)

Preparation procedures for the pneumatic panel (key 27) are simple and do not involve any special operations. See the following procedures:

- Open the four on/off gas valves installed on the main gas line (Upstream filters, Downstream regulators, Odorant injection, High-pressure gas supply to the panel)
- Open the two on/off odorant valves installed on the pneumatic panel
- Open the on/off odorant valve (key 7) installed at the base of the odorant storage tank
- Switch on the electronic control unit (key 28)
- Set the key to “Prog.-ON”
- Press the WASHING push-button located in the “SYSTEM” section of the control unit
- Check the programmed data for accuracy
- Eliminate any alarms present by pressing the Red ALARM RESET - button
- Press the “PUSH” button until the section of the line joining the pneumatic panel and the injection point are completely drained. Keep the button pressed approx. 12 seconds for each meter of pipeline installed (DN 6 x 4 mm).

Once the priming / drainage phase is completed, the system is ready for operation. Check Loc. 11 and verify the flow computer is transmitting the gas volumes correctly. The Dosaodor control unit counter should increase correctly corresponding to the volume computer counter.

Check the programmed data, carefully focusing on the values entered for Locations from Loc:00 to Loc:05.

Switch off the Dosaodor-D control unit. Verify the key is on the “PROGRAMMING-ON” setting. Press ENT and keep it pressed to switch on the control unit. (This procedure sets all the internal counters to zero).

Press the AUTOMATIC button located in the SYSTEM section and set the key to Prog.-OFF. The system will start dosing the odorant proportionally to the flow rate of the gas in transit.

Operation (see figures 2, 3 and 4)

See diagram in figure 4 for Dosaodor-D operation, the diagram from figure 4 is taken as a reference. The diagram shows the entire odorization “chain”, recharging by means of transportable tanks, the absorption-type emergency tank and the injection system.

This section only refers to the injection system and not the absorption type emergency tank devices.

Preliminary verifications:

- By means of the slaved pneumatic valve (key 24), which is controlled by the solenoid valve (key 23) located on the downstream section of the absorption-type tank odorizer, the Dosaodor-D control unit can activate or deactivate the operation of the traditional absorption-type emergency tank circuit in the event of malfunctioning or power drop.
- The liquid to be injected is collected through the bottom absorption-type odorizer valve. If the latter is not present, collection takes place through the lower part of the tank level indicator.
- Pressure intakes to drive the injection liquid are created through the utilization of intakes that are always present on the REMI (reducing and metering) stations, taking measures to double them by inserting a tee-pipe coupling and a second needle valve to maintain the existing intakes functional.

The pressure collected upstream from the primary reduction unit is sent to a pressure regulator, Mod. SA/2 (key 6). This regulator reduces the inlet pressure level from a maximum of 75 bar (1087.8 psi) to a set value equal to the station output pressure increased by 3 bar (43.5 psi).

This pressure is sent to a second regulator, Mod. SA/2 (key 5), where it is reduced to a level equal to the station downstream pressure increased by 0.6 bar (8.7 psi). Therefore, whatever downstream pressure level exists, the pressure output from this regulator will be greater by 0.6 bar (8.7 psi), ensuring a steady pressure differential, which permits proper injection of the odorant.

In addition to the double pressure regulator, the regulation circuit also has a relief valve (key 11), set and capable of guaranteeing safe conditions should both regulators undergo malfunctioning at the same time. This pressure is intercepted by the three-way solenoid valve (key 4) which under non-working conditions, provides for pressurizing the volume sampler (key 8) in which a certain odorant volume is found. A control pressure-gauge (key 10) is located on the sampler.
When the injector (key 26) is set to operate, the odorizing liquid is introduced into the station downstream pipe and its volume will be replaced by an equal amount of natural gas.

Once the quantity set and controlled by means of the sampler has been injected, the injection phase is terminated and the solenoid valves (key 3 and 4) open.

Then the overpressure of 0.6 bar (8.7 psi) existing inside the sampler is discharged into the main pipe downstream of the regulation point, but upstream of the measurement point where the quantity of gas is measured regularly (this operation cannot be carried out in stations equipped with a venturimetric gauge in case of relief valve or pressure loss by the measuring assembly, consisting of pipe + counter + valves). In this case some gas shall be consumed, that cannot be measured. The quantity should be around 1 Sm³ each 10 liters (35 Scfh each 10 liters) of odorant. (for the connection see diagram of figure 4).

At this point, the sampler (key 8) and the odorizer have the same pressure level. The odorizing liquid found inside the absorption-type odorizer, which in this mode functions exclusively as a storage tank, flows freely through the filter (key 25) and fills the sampler tank (key 8). The volume of gas inside the sampler then flows through the solenoid valve (key 3) and is then introduced into the main pipe upstream from the measurement point.

During the sampler (key 8) refilling phase there is a gradual emptying of the absorption-type tank (key 29). The volume of liquid removed, is replaced with equal volumes of gas coming from the upstream branch of the odorizer itself. Once the established volume has been loaded, the two solenoid valves (key 3 and 4) return to their non-working positions, the sampler is pressurized once again and the system resumes injection of the quantities calculated.

An analysis of the process explained above, indicates that the Dosaodor-D system does not “CONSUME” gas and that ALL of the gas collected upstream from the pressure reduction unit is re-introduced downstream from it, but upstream from the measurement unit.

**Solenoid Injection Valve Setting Verification**

Start the Dosaodor-D in AUTOMATIC with a gas flow at least 50% of the nominal.

**Note:** If the gas flow rate available is less than this value, the process can be completed later.

Check the recorded data on the position LOC:002: if the value is lower than the specific volume indicated on the label proceed by loosening the adjusting screw of the solenoid injection valve EV2 by degrees. In general a preliminary calibration is already set in the factory, an adjustment of approximately half a turn should be sufficient.

After using some of the sampling cylinder charging, re-check the value of the specific volume and compare it to the value indicated on the label. If the range is ±5%, the procedure can be considered completed. Otherwise, proceed with a further adjustment of the solenoid injection valve adjusting screw.

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### MAINTENANCE

#### Procedures and Recommended Timing for Routine or Extraordinary Maintenance Operations

The Dosaodor-D system, has been manufactured with the state-of-the-art technology and materials currently available.

![WARNING]

**WARNING**

At regular intervals the Dosaodor-D’s equipment condition should be inspected. Specific procedures are prepared by the service provider or end-user according national and applicable codes and regulations. The frequency of inspection/checks and replacement of part depends upon the severity of service conditions, applicable codes and national standards/rules. If any odorant liquid or gas leakage or gas escaping occurs, safety procedures shall be applied to shut-down the odorizing system. For shutting down the Dosaodor-D when required, slowly reduce the pressure in the system to avoid any possible damage. Never open the equipment before the pressure has been completely released.

**Routine Maintenance (see figures 2, 3 and 4)**

For routine maintenance operations, a Dosaodor-D maintenance kit is required. This kit includes all spare parts to be replaced in the system to renew it and keep it in compliance with the functional specifications for which it as been originally designed.

**Note:** To clean the pneumatic panel non-aggressive liquids must be used.

These are the operations to be carried out:

- Wash by means of Natural Gas
- Close all valves on the pneumatic panel (key 27)
- Close the needle valve located on the pipe detecting the odorizing pressure (low pressure branch)
- Close the odorant outlet valve located on the tank from which the odorant is collected.
- Cut off the power supply to the electronic control unit
- De-pressurize the panel by loosening the joint located in the upper left part of the control cylinder
- Replace all rubber parts inside the two pressure Filter-Regulators model SA/2 (key 5 and 6)
- Fully replace the two-way injection solenoid valve (key 3) located on the top left of the pneumatic panel
- Replace the moving assembly located inside the three-way solenoid valve (key 4) that is used to control opening/closing of the leaking circuit.
The moving assembly of the three-way solenoid valve is slightly different from the two-way valve, in fact it has an additional pad on the upper part.

- Replace the filtering cartridge located inside the filtering assembly (key 25)
- Restart the system.

Maintenance Repairs

To be carried out in the case when the system stops injecting the required quantity of odorant. This situation is detected by the control unit, which also prints out the cause of the problem.

To perform maintenance operations specifically trained staff is required. Only qualified personnel should perform mechanical/pneumatic interventions, and be well informed of all instructions related to safety operations, to be met during any intervention on systems with flammable agents and/or odorizing liquids.

Washing by means of Natural Gas

The WASHING operation must be completed before performing any maintenance on the Dosaodor-D odorizing system. This operation drains out all the odorizing liquid present in the injection system to facilitate the parts dismantling of some parts by the operators. The odorant inside the Dosaodor-D system is placed inside the container. Only a min. quantity is injected into the line.

Follows this procedure:

a) Set the key switch to PROGRAMMING - ON.
b) Set the selector switch to WASHING.
c) Close the “Low Pressure” inlet/outlet valve
d) Verify that ALL other valves are open
Press and simultaneously release the PUSH and ALARM RESET buttons at least 10 times, alternating pauses of 2 seconds between both positions. (This way the odorizing liquid – in the level gauge - is reinjected into the main tank)

Note: To facilitate the cleaning operation of delivery piping, open the solenoid injection valve adjusting screw, mark and record the operating position of the valve to avoid having to recheck its previous setting.

e) Open the “Low Pressure” inlet/outlet valve
f) Set the selector switch to INJECTOR - 1
g) Press the PUSH button and keep it pressed in. Set the key switch to PROGRAMMING – OFF and maintain this position for at least 60 seconds. (This way the odorizing liquid – in the delivery pipes – is reinjected into the gas pipe)
h) Set the key switch to PROGRAMMING - ON.
i) If you have the second injector, set the selector switch to INJECTOR - 2, and repeat the instructions described above.
j) Set the selector switch to EXCLUDED.
k) Set the key switch to PROGRAMMING - OFF.

At this point all the system valves must be closed and maintenance operations can be performed on the applicable parts. After completing all operations, restart the system by reopening the system valves, set the key switch to PROGRAMMING - ON, set the selector switch to AUTOMATIC, press the ALARM RESET button and then set the key switch to PROGRAMMING - OFF.

Filtering Cartridge Maintenance

(see figures 2 and 3 - key 25)

Before replacing the filtering cartridge of odorant filter (Key 25 - Figure 4), all devices mounted on the pneumatic panel must be drained of any odorizing liquid they may contain.

To do this, follow the instructions reported in paragraph “Washing Cycle by Means of Natural Gas” section.

After completing the washing operation by gas, close all on-off valves of the system and proceed as follows:

a) Slowly loosen the fitting located on the upper part of the filter (key 25A).
b) Remove the connection on the upper intake of the odorant filter (key 25).
c) Unscrew and remove the upper closing cap (key 25A) of the odorant filter (key 25).
d) Remove the cartridge filter (key 25F) by means of a small screwdriver.
e) Remove the O-rings (keys 25K and 25B).
f) Reinsert the new cartridge filter (key 25F) and O-rings (keys 25K and 25B) and place back the closing cap (key 25A).
g) Open all valves and make sure that there are no gas leaks (e.g. by foam, spray).
h) Restart the system.

Relief Valve Verification and Setting

(see figures 2 and 3)

The relief valve can be inspected and calibrated without being removed from its position. Follows this procedure:

a) Set the key switch of the control unit to PROGRAMMING - ON.
b) Set the selector switch of the control unit to WASHING.
c) Close the “Low Pressure” inlet/outlet valve.
d) Close the odorant inlet valve (key 7) located in the lower part of the panel.
e) Verify ALL other valves are open.

Keep the ALARM RESET button pressed and press and release the PUSH button leaving two seconds pause between pressing and releasing action until when the pressure indicated on the cylinder manometer reaches the following values:

- 14 bar (203 psi) for Dosaodor-D systems
- 38 bar (551.2 psi) for Dosaodor-D/AP systems (High Pressure)

Verify during the operation no gas leaks from the relief valve (key 11) draining silencer. Should this happen, increase the triggering values as described hereunder.

After reaching the required calibration pressure, proceed as follows:

a) Remove the draining silencer located on the outlet side of the relief valve (key 11).
b) Insert a wrench for 3 mm hexagonal cap screws into the gas exhaust hole until the regulation plate is reached.
c) Rotate counter clockwise the regulation plate until the gas starts to evacuate.
d) Mount back the silencer on the relief valve.
e) Open all the system valves.
f) Set the key switch to PROGRAMMING- ON.
g) Set the selector switch to AUTOMATIC.
h) Press the ALARM RESET button.
i) Set the key switch to PROGRAMMING - OFF.

**ACTIVATION OF THE MODBUS COMMUNICATION PROTOCOL ON THE ELECTRONIC CONTROL UNIT**

This technical note describes the procedures to adopt to activate and configure the MODBUS communication protocol on the serial port/s on the Dosaodor-D Electronic Control Unit. installed with control Software Rev. 3.00 or equivalent.

The MODBUS communication can be activated both on the Communication Port positioned on the Front of the ECU (COM Port 1) or on the internal one which is normally dedicated to the connection of an external RTU (COM Port 2).

In order to perform the operations for the configuration, it is necessary to have the following material:

- DosaLink Communication/Configuration software for odorization systems.
- Serial cable 9 Poles Male/Female with “Straight” execution (NOT crossed). The “Straight” cable is a cable whose connections are NOT crossed, the signals used in the communication between the PC and the ECU are outlined in Table 1.
- Screwdriver with appropriate point to remove the screws to blocking the metal protection of the electronic board for connecting the signal cables. (Terminal block board placed at the bottom of the cabinet containing the ECU).

In order to activate the MODBUS communication on the Dosaodor-D ECU. 1 follow the steps below:

a) Activate of the Default communication parameters on the Front Serial Port of the ECU (Dip Switch 4 in OFF position) –> DosaLink Protocol, Communication Parameters 19200,N,8,1 to allow the serial connection with DosaLink software.
b) Connect the “Straight” Serial Cable between the ECU (COM Port 1) and the PC Serial Port.
c) Startup and Configuration the DosaLink Software.
d) Define the Serial Port of the ECU on which the MODBUS Communication is activated.
e) Define the MODBUS Communication parameters.

**Table 2. Signals Used**

<table>
<thead>
<tr>
<th>PIN on DB-9 MALE</th>
<th>Function / Notes</th>
<th>PIN on DB-9 FEMALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Tx</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Rx</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>DTR</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Ground Signal</td>
<td>5</td>
</tr>
</tbody>
</table>

The remaining signals ARE NOT used.
Preliminary Operations

a) Select the location of Display 09 on the ECU and verify the position of the Dip Switch 4 indicated in the top left of the display with the caption Sw.4=ON/OFF.

b) If the position of the Dip Switch 4 is ON, it is necessary to change it to OFF following below procedures:
   - Switch off the ECU (Disconnect the primary power and any power supply coming from the back-up power supply system if present)
   - Using the appropriate screwdriver remove the four screws used to block the metal protection of the electronic board connecting the signal cables (terminal block board placed at the bottom of the cabinet containing the ECU)
   - Once the metal protection has been removed, move the Dip Switch 4 to the OFF position (Downwards) then switch on the ECU again

f) Connect a “Straight” Serial Cable Male-Female between the serial port of the PC and the serial port placed at the bottom right of the Front Panel of the ECU (COM Port 1). If the PC does not have a dedicated serial port use an USB / Rs-232 adapter and proceed with the installation of the drivers necessary for correct operation.

g) Check the PC for the “Number” of the serial port “COM” being used for the connection; in order to do this, go to “Devices Setup” in Windows, expand the item “COM – LPT Port”, then verify the “Number/Name” of the serial ports available on the system.

h) Launch the DosaLink software, check that the Station in operation is already present in the grid (the User Code - Number must be identical to that at loc:03 of the ECU to connect), if not it will be necessary to insert a new Station following the instructions in the DosaLink software manual.

i) Check that the type of connection selected on the column “Modem Number” is “COM X - 19200”, where X stands for the “Number” of the PC serial port on which the serial cable has been connected; if not, it is necessary to open the archive of the stations, select the station to modify, push the button “Edit”, then update the item “Connection Type” stating the communication port required. In order to “open” the station archive display, click on the second icon on the upper left part of the DosaLink display, then proceed with the update of the “Connection Type”.

The following image shows a CORRECT configuration permitting communication between the Station “DEMO_2” and the “User Code” 00000002, through the PC Serial Port COM 1.

CAUTION

When using an USB/Rs-232 converter it is possible that a high COM port “Number” (above 5) was assigned to it; in this case it is necessary to modify the allocation in field 1 – 5; in order to do this verify the functions included in the installation driver of the converter itself.
ECU Connections and Configuration

The first operation is to create a connection between the DosaLink Software and the ECU; in order to do this proceed as follows:

a) Click on the first icon on the left “Interface” placed at the top of the DosaLink display, then from the menu “Line Function” click on “Connection”.

b) If the serial cable has been connected to the right serial port and if the configuration is correct, the DosaLink Software detects the Configuration present on the ECU. This operation is highlighted by the progress of the Blue scroll bar placed in the centre of the screen.
c) Once the configuration has been detected, select “Station” then “Configuration” for the menu, the mask below will open up.

d) From the left display select the “Serial Port” of the ECU on which you want to activate the MODBUS communication (COM Port 1 = Serial Port placed on the Front Panel, COM Port 2 = Serial Port placed inside the ECU on the KEY board placed on the turning front port). Normally “COM Port 1” is used for connecting the DosaLink Software while “COM Port 2” is used for connecting external devices like the RTU (Remote Terminal Unit).

e) This manual describes the configuration of “COM Port 2”; for the configuration of the serial port installed on the ECU front panel. The same operations can be used for “COM Port 1”.

![Menu of configuration](image)

Data of reading

Immediate

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data of reading</td>
<td>Event</td>
</tr>
<tr>
<td>Configuration</td>
<td>Programmed data</td>
</tr>
<tr>
<td>Serial Port</td>
<td>COM Port 1</td>
</tr>
<tr>
<td>User Modem</td>
<td>COM Port 2</td>
</tr>
<tr>
<td>MODBUS</td>
<td>MODBUS COM Port 1</td>
</tr>
<tr>
<td>MODBUS COM Port 2</td>
<td>Supported Function</td>
</tr>
</tbody>
</table>

f) Once the ECU Serial Port to be configured has been selected (COM Port 1 / COM Port 2), the right part of the screen will display the configuration parameters currently in use; double click on the row of the parameter in order to open the “Edit” window, then proceed with the programming of the new value.

The communication speed and the format of the data transmitted/received MUST be configured with the same values on both the Dosaodor-D ECU and the associated communication unit, Ex. RTU. In order to enable the MODBUS protocol it is necessary to select the “Protocol Type” item and select the item 1=MODBUS, then press “Save”.

Now the new parameter variation will be included in the “Archive” column.

If the MODBUS communication is activated on “COM Port 1”, in order to communicate with the DosaLink Software it is necessary to move the Dip Switch 4 to the OFF position (the Port is configured to work in Default mode - Protocol DosaLink, 19200, N, 8, 1); by repositioning the Dip-Switch 4 to the ON Position, the Programmed communication mode is activated.
g) When the RTU is connected with the serial cable, under “Modem Type” select 0 = Empty (None)

h) Once the Configuration of the Serial Port is completed, send the new data to the ECU by pressing on the Button “WRITE Show Data” placed at the bottom of the right display.

i) Once the configuration of the Serial Port is completed proceed with the configuration of the MODBUS protocol specific parameters; by selecting in the left display “MODBUS COM Port 1” or “MODBUS COM Port 2” depending on the serial port to be configured.

j) The MODBUS parameters need to be configured identically on both the ECU of the Dosaodor-D and on the RTU, both devices must use the same language in order to communicate.

k) Once the Configuration phase of the Modbus Parameters is completed, send the new data to the ECU by pressing on the button “WRITE Show Data” placed at the bottom of the right display.
MODBUS Communication Activation

Once the configurations described item 3) have been completed, to activate the MODBUS the following operations must be performed:

a) If the Modbus Communication has been activated on the Serial Port “COM Port 2” of the ECU (Serial Port situated inside the ECU), no action is required as once the ECU receives the new configuration it is activated within a few seconds.

b) If the Modbus Communication has been activated on the Serial Port “COM Port 1” of the ECU (Serial Port situated on the front of the ECU), in order to activate the new configuration move the Dip Switch 4 to the ON position. (See paragraph “Preliminary Operations” item b).