LAS-10
Leakage Alarm System
Atmospheric oil mist- and gas detection

Installation, Operation and Maintenance manual
Version 2.05 (2017-02-08)
Index

1. Introduction ........................................................................................................................................... 4
2. Safety instructions ................................................................................................................................. 5
   2.1 Oil leakages .......................................................................................................................................... 5
3. Technical specifications ............................................................................................................................ 6
4. Description ................................................................................................................................................ 7
   4.1 LAS-10 Detector ................................................................................................................................. 7
   4.2 LAS-10 Control Unit ............................................................................................................................ 7
   4.3 LAS-10 USB Interface ........................................................................................................................ 7
   4.4 LAS-10 Power Supply Unit ................................................................................................................ 7
   4.5 LAS-10 Monitor ................................................................................................................................. 8
5. Installation & Commissioning .................................................................................................................. 9
   5.1 Smoke test ........................................................................................................................................... 9
   5.2 Installation .......................................................................................................................................... 10
      5.2.1 LAS-10 Detector .......................................................................................................................... 10
      5.2.2 LAS-10 Control Unit .................................................................................................................... 10
      5.2.3 LAS-10 USB Interface ................................................................................................................ 10
      5.2.4 LAS-10 Power Supply Unit ......................................................................................................... 11
      5.2.5 LAS-10 Monitor ........................................................................................................................... 11
      5.2.6 LAS-10 Monitor ........................................................................................................................... 11
   5.3 Dimensional drawings ....................................................................................................................... 12
      5.3.1 Dimensional drawing - LAS-10 Detector .................................................................................... 12
      5.3.2 Dimensional drawing - LAS-10 Control Unit ............................................................................. 13
      5.3.3 Dimensional drawing - LAS-10 USB Interface .......................................................................... 14
      5.3.4 Dimensional drawing - LAS-10 Power Supply Unit .................................................................. 15
      5.3.5 Dimensional drawing - LAS-10 Monitor 12” ............................................................................ 16
      5.3.6 Dimensional drawing - LAS-10 Monitor 17” ............................................................................ 17
   5.4 Electrical connection drawings .......................................................................................................... 18
      5.4.1 Electrical connection drawing - LAS-10 Detector .................................................................... 18
      5.4.2 Electrical connection drawing - LAS-10 Control Unit ................................................................. 19
      5.4.3 Electrical connection drawing - LAS-10 USB Interface ............................................................... 20
      5.4.4 Electrical connection drawing - LAS-10 Power Supply Unit ...................................................... 21
      5.4.5 Electrical connection drawing - LAS-10 Monitor 12” ................................................................. 22
      5.4.6 Electrical connection drawing - LAS-10 Monitor 17” ................................................................. 23
5.5 Commissioning ................................................................. 24
  5.5.1 Commissioning test (SAT – Site Acceptance Test) procedure ........................................ 24
5.6 Check list, Installation & Commissioning ................................................................. 25

6. Operation ........................................................................................................................................ 28
  6.1 LAS-10 Control unit .................................................................................................................. 28
    6.1.1 Main menu .......................................................................................................................... 28
    6.1.2 Display/LED Test .............................................................................................................. 29
    6.1.3 System setup .................................................................................................................... 29
    6.1.4 Setup Mode ...................................................................................................................... 30
    6.1.5 Control unit flow chart ..................................................................................................... 30
  6.2 LAS-10 Monitor/Sniff-Tec software ....................................................................................... 32
    6.2.1 Overview ......................................................................................................................... 32
    6.2.2 Data tab ............................................................................................................................ 33
    6.2.3 Graph tab ......................................................................................................................... 33
    6.2.4 Data setup tab .................................................................................................................. 34
    6.2.5 Save log tab ...................................................................................................................... 34
    6.2.6 Setup tab .......................................................................................................................... 35
    6.2.7 Contact tab ........................................................................................................................ 36

7. Maintenance ..................................................................................................................................... 37
  7.1 Maintenance strategy .................................................................................................................. 37
  7.2 Regular maintenance .................................................................................................................. 37
    7.2.1 DP-filter ............................................................................................................................ 37
  7.3 Periodic maintenance .................................................................................................................. 37
    7.3.1 Sinter-filter ....................................................................................................................... 37
    7.3.2 DP-pipes ............................................................................................................................ 37
    7.3.3 Fan, 24V DC/41W ............................................................................................................ 38
    7.3.4 Detector PCB .................................................................................................................... 38
    7.3.5 Battery, 3V ........................................................................................................................ 38
    7.3.6 Air inlet + filter ................................................................................................................ 38
  7.4 Maintenance/Replacement procedures ..................................................................................... 39
    7.4.1 Detector PCB, D-1020/D-1031 ......................................................................................... 39
    7.4.2 Gas sensor, B-1852 .......................................................................................................... 40
    7.4.3 Sinter-filter, D-2645 ........................................................................................................ 41
    7.4.4 DP pipes, D-3964 ............................................................................................................. 42
7.4.5 DP-filter, D-1009.......................................................... 43
7.4.6 Fan, 24V DC/41W, D-2741........................................... 44
7.4.7 Fuse, 4A/5x20 mm., P-1111......................................... 45
7.4.8 CPU PCB, P-3457......................................................... 46
7.4.9 Interface PCB, P-3451 .................................................. 47
7.4.10 Fuse, 4A/5x20 mm., P-1111....................................... 48
7.4.11 Battery, 3V, D-2870 ................................................... 49
7.4.12 Fuse, 15A/250V, P-1701........................................... 50
7.4.13 Air inlet + filter, P-1703............................................. 51
8. Service ............................................................................ 52
8.1 Check list, Service (every 2/4 years)............................... 52
8.2 Check list, Service (every 6 years)................................. 53
9. Periodic tests .................................................................... 54
9.1 Quarterly test .................................................................. 54
9.2 Annual test ..................................................................... 54
10. Troubleshooting ................................................................ 55
11. Spare parts........................................................................ 56
11.1 Spare part list................................................................. 56
11.2 Spare part assembly - LAS-10 Detector ....................... 57
11.3 Spare part assembly - LAS-10 Control Unit .................. 58
11.4 Spare part assembly - LAS-10 USB Interface ............... 59
11.5 Spare part assembly - LAS-10 Power Supply Unit ....... 60
11.6 Spare part assembly - LAS-10 Monitor 12” ................. 61
11.7 Spare part assembly - LAS-10 Monitor 17” ................. 62
12. Contact information ........................................................... 63
Appendix 1 - Overview ......................................................... 64
Appendix 2 - Data tab............................................................. 65
Appendix 3 - Graph tab........................................................... 66
Appendix 4 - Data setup tab .................................................. 67
Appendix 5 - Save log tab ...................................................... 68
Appendix 6 – Setup tab ......................................................... 69
Appendix 7 – Contact tab ....................................................... 70
Appendix 8 – Group alarms .................................................... 71
Appendix 9 – Serial connection of Control units.................. 72
1. Introduction

DASPOS A/S has specialized in durable fire protection solutions to meet demands within the maritime industry, resulting in the Leakage Alarm System, LAS-10 - an atmospheric oil mist- and gas detection system for the open engine room.

With over 30 years of experience in the maritime industry, we at DASPOS have been heavily involved in all technical aspects of oil mist detection, most notably in the research and development phase of equipment targeting prevention of fires and explosions aboard ships and oil rigs, originating from atmospheric oil mist- and vapors.

Due to improvement in engine designs, engine rooms today often feature substantially higher oil pressures, larger airflows and fewer crew members. Our products have been developed to be one of the most comprehensive fire protection initiatives in the industry. We achieve this by providing a system that includes the following:

- Allows monitoring of up to 48 different areas simultaneously, with individual settings and alarm conditions.
- Suitable for fuel oils (HFO, DO, MGO), hydraulic oils and lubricating oils.
- Detection of both air borne oil mists and hydrocarbon vapors.
- Allows monitoring of very large areas

LAS-10 is both covered by and in compliance with the ISO standard for atmospheric oil mist detectors for ships, BS ISO 16437, being classified as a ‘Point type detector’ and defined as: “employing a point aspirating sampling device or relying on dispersion of oil mist”.

Our mission is to contribute globally with the most efficient marine safety equipment, improving the safety of crew, passengers, ship, cargo, environment, and other assets - and improving business cost efficiency. Our revolutionary and patented Leakage Alarm System will do this by significantly reducing the risk of engine room fires, explosions, and pollution.

DASPOS A/S: “We prevent fire”
2. Safety instructions

To avoid personal injury, damage to property, malfunctions, and/or loss of warranty:

- Handle equipment in accordance with chapters; 2. Safety instructions and 7. Maintenance.
- The Leakage Alarm System may not undergo any modifications without previous agreement with DASPOS A/S.
- Avoid installing any components - LAS-10 Detectors, LAS-10 Control Units, LAS-10 Power Supply Units, LAS-10 USB Interfaces, and/or ECR Monitors - with: excessive vibrations, extreme temperatures, risk of electromagnetic interference, high levels of humidity and water, and/or a risk of complicated maintenance.
- LAS-10 Detectors may under no circumstances be installed in explosive atmospheres (ATEX-areas), without previous agreement with DASPOS A/S.
- Use appropriate PPE (Personal Protective Equipment) and turn off power when working with electrical installations.

2.1 Oil leakages

Leaks from broken pipes or valves, gaskets or seals, welding fractures or the like often occur in high pressure oil systems during initial failure conditions. These conditions can lead to a rapid and comprehensive generation of airborne oil mists and/or hydrocarbon gasses, which - if these leakages are not detected in time - will always result in pollution, explosion, or fire.

This danger arises when 3-10 \( \mu \text{m} \) particles form a mist in the atmosphere of an engine room. When this type of oil vapor reaches the LEL\(^1\), the condition becomes truly hazardous and - if no action is taken - may result in fire and/or explosion. The ignition temperature of this type of oil mist can be extremely low depending on the type of oil being atomized.

Oil mist generated by being boiled off can produce particles of 3-10 \( \mu \text{m} \) in diameter. This mist is visible and may be visually identified as blue smoke. The temperature and area of contact surface affects the amount and rate of oil mist generated. At this stage, a temperature as low as 150°C can result in ignition. Possible causes of ignition include heat sources such as heat exchangers, exhaust pipes, turbochargers, electrical contacts, static electricity, faulty wiring, high- and low pressure turbines, and hot surfaces in general.

DASPOS’ Leakage Alarm System, LAS-10 - detects oil droplets of all sizes - as long as they are airborne mists OR hydrocarbon gasses from e.g. fuel oils, hydraulic oils or lubricating oils, as well hydrocarbon gasses in all forms i.e. visible, invisible, odorous as well as odorless.

---

\(^1\) Lower Explosive Level (LEL): The lowest concentration in [%] of a gas or a vapor in air capable of producing a flash fire in presence of an ignition source (arc, flame, heat). At a concentration in air below the LEL, there is not enough fuel to cause an explosion. Concentrations lower than the LEL are “too lean” to explode but may still deflagrate.
### 3. Technical specifications

#### LAS-10 Detector

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection range</td>
<td>0.002 [mg/l]</td>
</tr>
<tr>
<td>Airflow</td>
<td>Up to 600 [m³/h]</td>
</tr>
<tr>
<td>Reaction time (sec.)</td>
<td>5 - 10</td>
</tr>
<tr>
<td>Gas detection</td>
<td>Hydrocarbons</td>
</tr>
<tr>
<td>Material, enclosure</td>
<td>Anodized Aluminium</td>
</tr>
<tr>
<td>Weight</td>
<td>4.90 [kg]</td>
</tr>
<tr>
<td>Dimensions</td>
<td>Ø190 x 235 [mm]</td>
</tr>
<tr>
<td>Power supply (V DC)</td>
<td>30 - 48.0</td>
</tr>
<tr>
<td>Power consumption</td>
<td>45.0 [W]</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-25 - +70 °C</td>
</tr>
<tr>
<td>Operating humidity</td>
<td>0 - 95% [RH]</td>
</tr>
<tr>
<td>Enclosure rating</td>
<td>IP44</td>
</tr>
</tbody>
</table>

#### LAS-10 Control unit

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of interfaces</td>
<td>Max. 12 LAS-10 Detectors</td>
</tr>
<tr>
<td>Material, enclosure</td>
<td>Aluminium</td>
</tr>
<tr>
<td>Weight</td>
<td>2.30 [kg]</td>
</tr>
<tr>
<td>Dimensions</td>
<td>240 x 184 x 81 [mm]</td>
</tr>
<tr>
<td>Power supply</td>
<td>48.0 [V]</td>
</tr>
<tr>
<td>Power consumption</td>
<td>≤ 15.0 [W]</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-20 - +60 °C</td>
</tr>
<tr>
<td>Operating humidity</td>
<td>0 - 95% [RH]</td>
</tr>
<tr>
<td>Enclosure rating</td>
<td>IP66</td>
</tr>
</tbody>
</table>

#### LAS-10 USB Interface

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of interfaces</td>
<td>Maximum 1 LAS-10 Control unit</td>
</tr>
<tr>
<td>Material, enclosure</td>
<td>Aluminium</td>
</tr>
<tr>
<td>Weight</td>
<td>0.15 [kg]</td>
</tr>
<tr>
<td>Dimensions</td>
<td>58 x 89 x 34 [mm]</td>
</tr>
<tr>
<td>Power supply</td>
<td>From LAS-10 Monitor through USB A/B Cable</td>
</tr>
<tr>
<td>Power consumption</td>
<td>≤ 5.0 [W]</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-20 - +50 °C</td>
</tr>
<tr>
<td>Operating humidity</td>
<td>0 - 95% [RH]</td>
</tr>
<tr>
<td>Enclosure rating</td>
<td>IP66</td>
</tr>
</tbody>
</table>

#### LAS-10 Power supply unit

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>1000 [W]</td>
</tr>
<tr>
<td>Number of interfaces</td>
<td>Max. 1 LAS-10 Control unit</td>
</tr>
<tr>
<td>Weight</td>
<td>8.2 [kg]</td>
</tr>
<tr>
<td>Material, enclosure</td>
<td>Steel</td>
</tr>
<tr>
<td>Dimensions</td>
<td>300 x 423 x 157 [mm]</td>
</tr>
<tr>
<td>Power supply, input/output</td>
<td>110-230 [V AC] / 48 [V DC]</td>
</tr>
<tr>
<td>Power consumption</td>
<td>≤ 7 - 9% of load [W]</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-20 - +50 °C</td>
</tr>
<tr>
<td>Operating humidity</td>
<td>0 - 95% [RH]</td>
</tr>
<tr>
<td>Enclosure rating</td>
<td>IP44</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>3000 [W]</td>
</tr>
<tr>
<td>Number of interfaces</td>
<td>Max. 3 LAS-10 Control unit</td>
</tr>
<tr>
<td>Weight</td>
<td>10.0 [kg]</td>
</tr>
<tr>
<td>Material, enclosure</td>
<td>Steel</td>
</tr>
<tr>
<td>Dimensions</td>
<td>300 x 423 x 157 [mm]</td>
</tr>
<tr>
<td>Power supply, input/output</td>
<td>110-230 [V AC] / 48 [V DC]</td>
</tr>
<tr>
<td>Power consumption</td>
<td>≤ 7 - 9% of load [W]</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-20 - +50 °C</td>
</tr>
<tr>
<td>Operating humidity</td>
<td>0 - 95% [RH]</td>
</tr>
<tr>
<td>Enclosure rating</td>
<td>IP44</td>
</tr>
</tbody>
</table>

#### LAS-10 Monitor

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display size</td>
<td>12” (4:3)</td>
</tr>
<tr>
<td>Weight</td>
<td>2.90 [kg]</td>
</tr>
<tr>
<td>Dimensions</td>
<td>343 x 269 x 33 [mm]</td>
</tr>
<tr>
<td>Power consumption</td>
<td>≤ 5,0 [W]</td>
</tr>
<tr>
<td>Material, enclosure</td>
<td>Steel</td>
</tr>
<tr>
<td>Number of Interface</td>
<td>Max. 4 USB Interfaces</td>
</tr>
<tr>
<td>Operating system support</td>
<td>Windows 7</td>
</tr>
<tr>
<td>Daspos software</td>
<td>Sniff-tec’, ‘Coordinate picker’</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>0 - 50 °C</td>
</tr>
<tr>
<td>Operating humidity</td>
<td>0 - 95% [RH]</td>
</tr>
<tr>
<td>Enclosure rating</td>
<td>IP23</td>
</tr>
</tbody>
</table>
4. Description

4.1 LAS-10 Detector
The LAS-10 Detector consists of an aluminum housing containing a sealed enclosure for the Detector PCB. Air inlets in the housing allow air to be drawn into the Detector by the Fan, pass the Sinter-filter (covering the Gas sensor) and through the replaceable DP-filter, creating a differential pressure monitored by a pressure sensor. The Fan is safely shielded behind a Protective grid, and the Detector is connected to the system through the Power/Communication plug and a Detector cable. Both Gas sensor and pressure sensor are located on the Detector PCB.

4.2 LAS-10 Control Unit
The LAS-10 Control Unit consists of an aluminum housing containing a sealed enclosure for the CPU PCB (Control unit cover) and the Interface PCB (Control unit terminals), and it is fitted with EMC cable glands. The front of the Control unit cover/CPU PCB, contains an LED display, and electronic foil makes it possible to navigate through the menu. LEDs for 'Power', 'Alarm', and 'Filter', as well as one LED for each of the Detectors, indicate the status of the whole system. The presence of oil- or hydrocarbon polluted air in the atmosphere surrounding the Detector will increase either the aforementioned differential pressure or the Gas sensor output; if these values exceed the predetermined alarm value settings, the system will activate the alarm relay. The system also has various built-in fault monitoring abilities that can activate the fault relay. See chapter: 10. Troubleshooting for an in-depth description.

4.3 LAS-10 USB Interface
The LAS-10 USB Interface consists of an aluminum housing containing a sealed enclosure for the USB PCB and it is fitted with an EMC cable gland. The USB Interface acts as a link between the LAS-10 Control Unit and the LAS-10 Monitor, by converting the RS232 serial protocol in the Control unit into a USB serial protocol used by the Sniff-Tec software in the Monitor. The USB Interface also acts as galvanic separation, which works with the ferrites on the USB A/B Cable to reduce noise.

4.4 LAS-10 Power Supply Unit
The LAS-10 Power Supply Unit consists of a mechanically ventilated steel cabinet fitted with a switch mode power supply, fuses, and terminals for electrical connection of both the 230V AC main power supply as well as the 48V DC Control unit power supply. The switch mode power supply is fitted with a thermal fuse that will automatically reduce available capacity as well as warn the crew by shutting down the LAS-10 Control Unit, in case of a mechanical ventilation failure causing internal temperatures to exceed 50° C over a longer period of time. If the internal temperature exceeds 70° C, it will cause the switch mode power supply to shut down and restart when the temperature has reached ambient temperature (15 - 45° C).
4.5 LAS-10 Monitor

The LAS-10 Monitor is a normal MS Windows® operated touch panel PC. The Monitor is equipped with the DASPOS Sniff-Tec software, providing the user with the most advanced options in our entire product portfolio, in terms of monitoring and control of the LAS-10 System. The LAS-10 Monitor is also fitted with a USB Socket allowing data to be extracted for data analysis, troubleshooting, etc.
5. Installation & Commissioning

5.1 Smoke test
Installing the Leakage Alarm System LAS-10 requires some preparation.

The first step is to determine suitable positions for the LAS-10 Detectors. Based on commonly known risk assessment in the maritime industry, the potential sources of oil leakages comprise the following machinery:

- Main machinery such as: main engines, aux. engines, emergency generators, harbor generators and gas turbines.
- Oil treatment facilities such as: fuel oil purifiers, lube oil purifiers, heat exchangers, filters, and transfer/booster pumps.
- Machinery fitted with oil/gas fired burners such as: boilers and incinerators.

Other relevant areas of application include machinery/equipment experiencing high oil temperatures and/or pressures. The size and layout of each individual engine room influences the number of detectors installed.

The next step is to verify air movements. Per IMO Circ. 1086 – ‘Code of Practice for Atmospheric Oil Mist Detectors’, a smoke test to determine the positioning of detectors is recommended.

During the smoke test, non-hazardous smoke will be released from a smoke generator near and around critical machinery/equipment experiencing high oil temperatures and/or pressure. All airflow is monitored visually, and a report based on these results generated with recommendations on detector positions, incl. positions for Control unit(s), Power supply unit(s), USB Interface(s), Monitor, and cables. In general, air will move towards ventilation extractors and turbo chargers, and detectors should therefore be positioned as close to the machinery/potential oil leakage sources as possible. Likewise, detectors should not be installed next to ventilation blowers, as this will prevent any oil mist clouds from being sucked into the unit.

Prerequisites
It is of utmost importance that DASPOS engineers are assisted by the C/E (Chief Engineer) in retrieving any necessary work-permits/approvals in time, as smoke detectors/HI-Fog systems must be set in manual mode during the smoke test. If required, C/E must obtain an advance approval from the Head Office in compliance with internal policy.

During the smoke test
During the smoke test, engines are expected to run at min. 50% load (locally in the area being tested) with all engine room ventilation ON, to create a realistic image of air flow and atmospheric background pollution.
5.2 Installation

Be sure to install ANY DASPOS equipment in compliance with 2. Safety instructions! Always check your installation against 5.6 Check list, Installation & Commissioning.

5.2.1 LAS-10 Detector

The Detector is designed for mounting in the engine room and should be located as close to the relevant machinery/potential oil leakages as possible. To ensure accessibility during e.g. maintenance, mount the Detector in or next to high traffic areas and at reasonable height where possible.

For more details on how to install and connect the LAS-10 Detector, please see:
5.3.1 Dimensional drawing - LAS-10 Detector and 5.4.1 Electrical connection drawing – LAS-10 Detector.

5.2.3 LAS-10 Control Unit

The Control unit is designed for mounting outside of the engine room, but as close to the detectors as possible, preferably at a maximum distance of 250 m. (cable length). In the interest of crew familiarization and accessibility, be sure to mount the Control unit in or next to high traffic areas such as switchboard rooms, engine control rooms, stairways or the like.

Select the position of the Control unit for optimum visibility of the display, with sufficient space around the Control unit to allow fitting glands and cables as well as to facilitate easy access.

For more details on how to install and connect the LAS-10 Control Unit, please see:
5.3.2 Dimensional drawing - LAS-10 Control Unit and 5.4.2 Electrical connection drawing – LAS-10 Control Unit as well as Appendix 9 – Serial connection of Control units.

5.2.4 LAS-10 USB Interface

The USB interface is designed for mounting inside the engine control room as close to the LAS-10 Monitor as possible, preferably at a distance of no more than 2,0 m. (cable length).

Allow sufficient space around the USB Interface to allow fitting gland and cable as well as to facilitate easy access.

For more details on how to install and connect the LAS-10 USB Interface, please see:
5.3.3 Dimensional drawing - LAS-10 USB Interface and 5.4.3 Electrical connection drawing – LAS-10 USB Interface.
5.2.5 LAS-10 Power Supply Unit
The Power supply unit is designed for mounting outside the engine room as close to the Control unit as possible. To ensure accessibility, mount the Power supply unit in or next to high traffic areas such as switchboard rooms, engine control rooms, stairways or the like. Allow sufficient space around the Power supply unit to allow fitting glands and cables, secure proper ventilation of the cabinet, and to facilitate easy access.

For more details on how to install and connect the LAS-10 Power Supply Unit, please see:
5.3.4 Dimensional drawing - LAS-10 Power Supply Unit and 5.4.4 Electrical connection drawing – LAS-10 Power Supply Unit.

5.2.6 LAS-10 Monitor
The Monitor (12”/17”) is designed for mounting inside the engine control room as close as possible to the watchkeeping engineer/daily work station. Select the position of the Monitor to ensure optimum screen visibility and sufficient space around the Monitor, to allow for the installation of plugs and cables and to facilitate easy access.

The Monitor is a touch screen which requires a position within reach of the watchkeeping engineer/daily workstation.

For more details on how to install and connect the LAS-10 Monitor, please see:
5.3.5 Dimensional drawing - LAS-10 Monitor 12” and 5.3.6 Dimensional drawing - LAS-10 Monitor 17” and 5.4.5 Electrical connection drawing - LAS-10 Monitor 12” and 5.4.6 Electrical connection drawing - LAS-10 Monitor 17”.
5.3 Dimensional drawings

5.3.1 Dimensional drawing - LAS-10 Detector

- Mount with 2x 116 mm. wire.
- Mount with 1x 156 mm. wire.
- Mount with 1x 68 mm. wire.

Applicable welding methods: MMA (Stick welding) / MIG / MAG

- Ø 190 x 235 [mm] External dimensions (w x h x d)
- Anodized aluminium Material, enclosure
- IP44 IP rating
- LAS-10 Detector - 10024.90 [kg] Total weight
- 600,00 Min. 3x M6 Eye Bolt
- 200,00 Min. 235,00
- 190,00 Ø
- 200,00 Min.
- 600,00 Min.

Designed by Checked by Approved by
5.3.2 Dimensional drawing - LAS-10 Control Unit

DIMENSIONAL DRAWING

LAS-10 Control Unit - 20022,30 [kg] Total weight
240 x 184 x 81 [mm] External dimensions (w x h x d)

Aluminium Material, enclosure

IP66 IP rating

Mount with 4x M4x30 mm. cap screws, 4x M4 washers and 4x M4 nuts.

150,00 Min.

Applicable welding methods:
MMA(Stick welding)/MIG/MAG

159,00

700,00 Min.

150,00 Min.

225,00

123,00

7,50

16,00
5.3.3 Dimensional drawing - LAS-10 USB Interface

Mount with 3x M4x30 mm cap screws + 2x M4 nuts

External dimensions (w x h x d)
Aluminium Material, enclosure
IP66 IP rating

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>89.00</td>
</tr>
<tr>
<td>Dimensions</td>
<td>58 x 89 x 34 mm</td>
</tr>
</tbody>
</table>

"We prevent fire"
5.3.4 Dimensional drawing - LAS-10 Power Supply Unit
5.3.5 Dimensional drawing - LAS-10 Monitor 12”
5.3.6 Dimensional drawing - LAS-10 Monitor 17”

**Technical Specifications**

- **External Dimensions (w x h x d):** 442 x 354 x 58 [mm]
- **Weight:** 442,00 [kg]
- **Material:** Steel
- **Enclosure:** IP20
- **Mounting Standard:** VESA 75/100

**Mounting Instructions**

- **VESA Mounting:** Use mounting holes as shown on the right.
- **Mount Bracket:** With 4x M4x8,5 mm cap screws.

**Panel Mounting**

- Use panel corresponding to the above indicated dimensions.
- Mount Monitor with 11 x panel mounting clips.
5.4 Electrical connection drawings

5.4.1 Electrical connection drawing - LAS-10 Detector

Power/Communication plug, 5-pole

Mount with small cable lugs

LAS-10 Detector

Calibration

Potentiometer: 'P4' - ΔP = 1%
With no 'DP-filter' and no 'Fan, 24VDC/41W'

Potentiometer: 'P5' - ΔP = 100%
With a blocked 'DP-filter'

35 - 40,0 mm.

Screen

Make sure to align tongue and groove, see view below

Mount with small cable lugs

Fuse, 4A/5x20 mm.

Calibration
5.4.2 Electrical connection drawing - LAS-10 Control Unit

Also see Appendix 9 - Serial connection of Control units
5.4.3 Electrical connection drawing - LAS-10 USB Interface
5.4.4 Electrical connection drawing - LAS-10 Power Supply Unit

Mount with 1x M6x20 mm bolt and 1x M6 nut.

Fuses, 15A/250V

Mount with 1x M6x20 mm bolt and 1x M6 nut.
5.4.5 Electrical connection drawing - LAS-10 Monitor 12”
5.4.6 Electrical connection drawing - LAS-10 Monitor 17”

Power supply: 12V DC

ON/OFF

USB A/B Cable

USB Socket

(USB-B Male)

(USB-B Female)
### 5.5 Commissioning

#### 5.5.1 Commissioning test (SAT – Site Acceptance Test) procedure

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Sensors:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Install a fuse in the fuse holder for each Detector channel in the Control unit one by one, while monitoring the Control unit display.</td>
</tr>
<tr>
<td></td>
<td><strong>Alarm:</strong></td>
</tr>
<tr>
<td></td>
<td>2. Decrease open area of filter until an alarm is triggered.</td>
</tr>
<tr>
<td></td>
<td>3. Expose gas sensor to any kind of gas/F.O. (Hydrocarbon) until an alarm is triggered.</td>
</tr>
<tr>
<td></td>
<td><strong>Fault:</strong></td>
</tr>
<tr>
<td></td>
<td>4. Remove DP-filter from Detector.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Input [V]:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5. Measure input voltage on Detector PCB - connector K1, terminal 1 + 2.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Sensors:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Sensors are OK, if:</td>
</tr>
<tr>
<td></td>
<td>- Oil level is showing an output of 5-10%.</td>
</tr>
<tr>
<td></td>
<td>- Gas level is showing an output with a warm-up period of approx. 5 minutes (output increasing initially, then decreasing).</td>
</tr>
<tr>
<td></td>
<td><strong>Alarm:</strong></td>
</tr>
<tr>
<td></td>
<td>2. The Control unit/Monitor shows an ‘Oil alarm’.</td>
</tr>
<tr>
<td></td>
<td>3. The Control unit/Monitor shows an ‘Gas alarm’.</td>
</tr>
<tr>
<td></td>
<td><strong>Fault:</strong></td>
</tr>
<tr>
<td></td>
<td>4. The Control unit/Control panel shows a ‘Fault’. Must occur within &lt; 60 sec.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Input [V]:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5. The input voltage on the Detector is min. 30,0[V DC].</td>
</tr>
</tbody>
</table>
5.6 Check list, Installation & Commissioning

Technical installations

☐ Check and approve or determine positions for UPS, Power supply unit, Monitor, USB interfaces, and Control units (incl. welds on brackets). Retrieve approval from C/E.

☐ Check and approve or determine positions for detectors by carrying out a smoke test (incl. welds on brackets).

☐ Check and approve cabling in terms of type, numbers, penetrations, cable ties (metal cable ties for every 1 meter).

☐ Power supply unit
- Connect 220V from UPS source advised by Electrical Officer.
- Install 1 x 48V power cable for each Control unit.
- Check that fan and air inlets are installed and functional.

☐ Monitor
- Mount Monitor so it is clearly visible from watch keeping engineer work station.
- Connect 220V power cable to UPS source.
- Install USB cable for data extraction, and connect to Monitor.
- Connect 1 x USB A/B cable for each USB interface. **Wait until commissioning.**

☐ USB Interfaces
- Install 1 x USB interface for every Control unit, no longer than 2 m. (cable length) from Monitor.
- Connect data cable from Control units (Rx → Tx), (Tx → Rx), (0V → 0V).
- Connect USB A/B cable.

☐ Control units
- Connect 48V Power cable from PSU cabinet (4mm²).
- Connect detector cables and ensure that all cables are fitted with the actual detector number, that all screens are firmly connected to the EMC glands, and that each wire is fitted with cable shoes.
- Connect data cable from USB interface.
- Connect alarm/fault cable from designated alarm cabinet or Control unit (white pair: Alarm; blue pair: Fault).
- Remove paper from battery on the back of the Control unit cover.

☐ Detectors
- Mount detectors on brackets within easy reach for maintenance but at a safe height when near access ways, and in accordance with smoke test results and local conditions.
- Mark each detector with a designated number visible from access ways.
- Install detector plug on cable, leaving 1 meter of spare cable rolled up in a ‘service loop’ and connect to detector.
Commissioning

- **Control units**
  - Set Detector numbers for 1-12/13-24/25-36/37-48
  - Set Baud rate to 19200.
  - Set protocol.
  - Set Alarm relay to NC/ R-NC where applicable.
  - Set Fault relay to NC/ R-NC where applicable.

- **Monitor/Sniff-Tec**
  - **Contact tab**
    - Upload CFG file with Overview to DASPOS folder in Log files.
    - Upload Overview JPEG File to DASPOS folder in Log files.
    - Edit Overview Text File in Log files, so detector coordinates and engine room layout match.
  - **Setup tab**
    - Configure number and names of masters, incl. number of Detectors on each master.
    - Select COM port.
    - Set Baud speed to 19200.
    - Press Connect.
    - Set time on the Monitor and synchronize with Control units at the very end of the Commissioning. (See 6.2.6 Setup tab)

- **Data Setup tab**
  - Configure names of detectors.
  - Set ‘Oil alarm high’ to 5%.
  - Set ‘Filter fault high’ to 65%.
  - Set ‘Gas alarm high’ to e.g. 20% (30% in F.O. purifier room) Monitor these levels over a couple of days and adjust if needed!

Test

- **Detectors**
  - Follow and document test procedure in Doc. DP013. (See 5.5 Commissioning test (SAT – Site Acceptance Test) procedure)
  - Calibrate ‘Oil level’ on Potentiometer P4 on the Detector PCB, if the reading does not show 1% with no filter installed.
    (See 5.4.1 Electrical connection drawing – LAS-10 Detector)
  - Calibrate ‘Oil level’ on Potentiometer P5 on the Detector PCB, if the reading does not show 100% with a blocked filter installed.
    (See 5.4.1 Electrical connection drawing – LAS-10 Detector)

- **Alarm/Fault**
  - Check if alarms and faults on detectors are transmitted to the alarm cabinet.
Handover/Documentation

☐ Penetrations
  - Show documentation (pictures) of penetrations to Safety Officer and retrieve signature of approval.

☐ Training
  - Advise Chief Engineer/Staff Chief Engineer to participate in training session in the ECR (Engine Control Room); participation is mandatory for Engine Officers and Safety Officer.
  - Carry out training in compliance with DASPOS Training program DP015.

☐ DP013
  - Fill out document, obtained signature and stamp from Chief Engineer/Staff Chief Engineer and send copy to info@daspos.com.

☐ Data
  - Copy DASPOS folder from Log files in Sniff-Tec and hand over to DASPOS Project Manager.
6. Operation

6.1 LAS-10 Control unit

The Leakage Alarm System is operated from the Control unit. The keys, ↑(Up), →(Right), ↓(Down), ←(Left) and OK in the electronic foil on the Control unit cover, allow the user to navigate through the menus shown in 6.1.5 Control unit flow sheet and provide access to the features described below.

On the front of the control unit, LEDs also show the status of each Detector channel, as well as the system in general, and are read as follows:

<table>
<thead>
<tr>
<th>Channel status</th>
<th>Active LED’s</th>
<th>State of channel LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Power</td>
<td>Off</td>
</tr>
<tr>
<td>Normal</td>
<td>Power</td>
<td>Off</td>
</tr>
<tr>
<td>Inhibited</td>
<td>Power + Channel LED</td>
<td>Short flashes</td>
</tr>
<tr>
<td>Alarm</td>
<td>Alarm + Channel LED</td>
<td>Long flashes</td>
</tr>
<tr>
<td>Fault</td>
<td>Channel LED</td>
<td>Long flashes</td>
</tr>
<tr>
<td>Filterchange</td>
<td>Filter + Channel LED</td>
<td>Long flashes</td>
</tr>
</tbody>
</table>

6.1.1 Main menu

In the Main menu, the values of oil and gas levels for each Detector are shown directly on the Control unit display and are read as follows:

![Control unit LED's](image)

All values are shown in [%]. Oil levels = [% of a fully clogged DP-filter]; Gas levels = [% of LEL\(^2\)].

To view the current alarm level, simply press and hold OK, and they will appear in the display to the right.

\(^2\) Lower Explosive Level (LEL): The lowest concentration in [%] of a gas or a vapor in air capable of producing a flash of fire in presence of an ignition source (arc, flame, heat). At a concentration in air below the LEL, there is not enough fuel to continue an explosion. Concentrations lower than the LEL are too lean to explode but may still deflagrate.
• The **Inhibit function** is intended to prevent the Leakage Alarm System from reacting to predictable changes in the engine room atmosphere, such as e.g. inspection, repair, or maintenance of engines; separators or other oil treatment facilities; or machinery that would generate a release of hydrocarbons or airborne oil-droplets, aerosols, mists or dust.

To inhibit one or more Detectors, see **6.1.5 Control unit flow sheet** or do the following:

Go to the desired channel and press [→], press [OK] to inhibit the oil detection, the press [→] and [OK] to inhibit the gas detection. The Detector is now inhibited.

**Always remember to deactivate the inhibit function again!**

After two hours, the system will automatically produce an Inhibit Time Out fault.

The Setup Mode is also accessed through the Main menu.

**6.1.2 Display/LED Test**

In the Display/LED test menu, the user can adjust the contrast and the LED backlight of the Control unit display, as well as test if all LEDs in the CPU PCB is working correctly.

It is also through the Display/LED Test menu that the System Setup is accessed.

**6.1.3 System setup**

In the System Setup menu, the user can adjust some basic system settings, depending on which interfaces the Control unit is connected to;

**Serial baud rates:** The speed of data communication. Must have the same value in the Control Unit and in the Monitor. If the speed is changed in the Control Unit, it must be reset on the Reset button on the CPU PCB.

Options: 2400, 4800, 9600 and 19200.

**Serial bus protocol:** Is the protocol requested by the interfaces.

Options: Slave, Master, CCTV, NMEA

**LAS-10 Box no.:** Are the numbers assigned to the 12 Detector channels on the Control unit.


**Relay NO/NC:** Is the programmable definition of the different alarm relays.

Options: NO, NC, R-NO (Repeated every minute), R-NC (Repeated every minute).
6.1.4 Setup Mode
In the Setup Mode, the user can adjust the alarm- and fault settings independently for each of the Detector channels. The user can also switch the oil- and gas alarm completely off independently of each other for each of the Detectors as well as group the 12 channels in up to 8 group relays for both oil- and gas alarms, see: Appendix 8 – Group alarms.

Following alarm- and fault settings can be adjusted from the Setup Mode:

<table>
<thead>
<tr>
<th>Alarm Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil mist alarm HIGH</td>
<td>The threshold for the presence of oil, and the maximum allowable differential pressure increase across the DP-filter/hour.</td>
</tr>
<tr>
<td>Mesh fault HIGH</td>
<td>The maximum allowable differential pressure across the DP-filter.</td>
</tr>
<tr>
<td>Gas alarm HIGH</td>
<td>The threshold for the presence of Hydrocarbons.</td>
</tr>
</tbody>
</table>

![Oil detection graph](image)

![Gas detection graph](image)
6.1.5 Control unit flow chart
6.2 LAS-10 Monitor/Sniff-Tec software

The Leakage Alarm System can be operated from the LAS-10 Monitor, a standard MS Windows® operated touch panel PC. The Monitor is equipped with the DASPOS software Sniff-Tec which provides the user with the most advanced options in our entire product portfolio, in relation to monitoring and controlling the LAS-10 system. The LAS-10 Monitor is also fitted with a USB Socket which allows data to be extracted for data analysis, troubleshooting, etc.

The Sniff-Tec software menu has six different tabs (shown below) and an Overview (optional). When needed, an on-screen keyboard will pop up allowing the user to program the system with different text and values.

| Data | Graph | Data Setup | Save Log | Setup | Contact |

Saving changes to settings requires a password, which is handed over to technical management upon commissioning. Contact service@daspos.com, to retrieve password.

6.2.1 Overview

If installed, the Overview provides a general layout drawing of the engine room(s) with all Detector positions- and numbers indicated.

- If status is ‘OK’, Detectors will be **green**.
- If status is ‘Inhibit’, Detectors will flash **green**.
- If status is ‘Fault’, Detectors will flash **yellow**.
- If status is ‘Alarm’, Detectors will **red**, and a **red** frame will appear around the Overview.

Tapping the screen will direct the user to the Data tab, and tapping the Overview button on the Data tab will direct the user to the Overview. After 5 minutes of inactivity on the Data tab, the Overview will automatically be activated.

See: Appendix 1 - Overview
6.2.2 Data tab

The Data tab provides an overview of all Detectors; Names, status and both current levels as well as alarm levels for oil and gas values independently.

Tapping the OK button will acknowledge alarms and faults, but they will not disappear before current levels are brought below alarm level, or before the specific sensor (Pressure sensor/Hydrocarbon sensor) has been inhibited and uninhibited from the Data setup tab.

All values are shown in [%]. Filter levels = [% of a fully clogged DP-filter] Gas levels = [% of LEL

<table>
<thead>
<tr>
<th>Filter % Level</th>
<th>The current differential pressure across the DP-filter.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filter % HIGH</td>
<td>The current threshold for the presence of oil, and the maximum for the allowable differential pressure increase across the DP-filter/hour.</td>
</tr>
<tr>
<td>Gas % Level</td>
<td>The current level of Hydrocarbons.</td>
</tr>
<tr>
<td>Gas % HIGH</td>
<td>The threshold for the presence of Hydrocarbons.</td>
</tr>
</tbody>
</table>

- If the status is ‘Fault’, values will light up yellow, with a yellow frame at the edge of the screen.
- If the status is ‘Alarm’, values will light up red, with a red frame at the edge of the screen.

For investigation purposes, tapping anywhere in the Detector name cell in case of an Alarm, will direct the user to the Graph tab of the specific Detector channel.

Tapping the Overview button will direct the user to the Overview. After 5 minutes of inactivity on the Data tab, the Overview will automatically activate.

See: Appendix 2 - Data tab

6.2.3 Graph tab

For investigation purposes, the Graph tab provides a graphic display of the historic data for all Detectors in terms of Filter-, Filter alarm-, Gas- and Gas alarm levels independently in different time intervals.

The drop-down lists and arrows, seen to the right, allow the user to toggle through all Detectors and time intervals.

The Filter-, Filter alarm-, Gas- and Gas alarm curves can be set ON/OFF.

See: Appendix 3 - Graph tab

---

3 Lower Explosive Level (LEL): The lowest concentration in [%] of a gas or a vapor in air capable of producing a flash of fire in presence of an ignition source (arc, flame, heat). At a concentration in air below the LEL there is not enough fuel to continue an explosion. Concentrations lower than the LEL are too lean to explode but may still deflagrate.
6.2.4 Data setup tab
The Data setup tab allows the user to change/set name, alarm- and fault settings, alarm group (if used, see Appendix 8 – Group Alarms) and filter cleaning interval for each Detector. The Data setup tab also allows the user to inhibit Detectors and specific sensors (Pressure sensor/Hydrocarbon sensor) as well as select ON/OFF.

Tapping the Detector name (Channel) of a specific Detector will direct the user to a new window, where the above settings can be adjusted. - See 5.6 Check list, Installation & Commissioning for default alarm- and fault settings.

- **INHIBIT** Detectors from the Data setup tab in case of e.g. maintenance, painting, welding, etc.
- **INHIBIT + UNINHIBIT** Detectors from the Data setup to retrieve a new alarm set point.

The INHIBIT function automatically reminds the crew to either remove or extend the INHIBIT function after two hours, with an Inhibit time out. Pressing the OK button, will extend the INHIBIT period for two hours.

For configuration of Group alarm relays – See Appendix 8 – Group alarms.

See: Appendix 4 - Data setup tab

6.2.5 Save log tab
The Save log tab allows the user to extract data for service, troubleshooting and general analysis of the conditions in the engine room, Detectors and other main equipment.

As a standard, DASPOS always request each system owner to send a data file 4 weeks into operation (after commissioning), to re-evaluate and customize the system settings for the specific engine room.

To save a data file, the user must:

- Place a USB memory stick in the USB Socket.
- Choose the desired period from the drop-down list (last day, last week, last 2 weeks, last 4 weeks) and press Save.
- Name the file acc. to the extraction date, e.g.: ‘24122017’ using the on-screen keyboard, and save it onto the USB memory stick (as a .CSV file).
- After this, the file can be zipped to minimum size and sent to DASPOS by email to service@daspos.com.

See: Appendix 5 - Save log tab
6.2.6 Setup tab
The Setup tab allows the user to change/set the time, names and no. of Masters (Control units) in the system, as well as the specific no. of Detectors connected to each of the Masters. These options are accessed by pressing the Config button, which will open a new window, shown here to the right.

Pressing the Settings button will enable the user to choose a day for the Filter cleaning interval alarm, as well as hide the cursor (or press: Ctrl + Shift + M) and select the automatic Overview function ON/OFF.

When the no. of Masters has been configured, the related COM-port (for the LAS-10 Monitor) can be chosen from the drop-down list. In systems with more than one Control unit, we recommend that USB Interfaces are connected one by one in chronological order (CU1, CU2, CU3...), and the highest no. from the COM-port drop-down list be chosen each time. If a new COM-port does not appear when the USB Interface is connected, simply go to another tab and back to the Setup tab again – and a new COM port is created.

Finally, the Communication Speed is chosen for each of the Control units, **19200 baud rates** as a standard, before pressing Connect. (The baud rate must be the same in the Control unit as in Sniff-Tec)

It is also possible to set the Monitor time using Sniff-Tec. This is done by pressing anywhere on the time stamp of the Setup tab, as shown to the right.

The Reset button below the Connect button synchronizes the time in the Control unit and the Monitor, and retrieves new alarm set points for all Detectors. Control units should be reset at the end of every commissioning (See 5.6 Check list, Installation & Commissioning)

See: Appendix 6 - Setup tab
6.2.7 Contact tab
The Contact tab provides access to DASPOS’ contact information, if needed.

You can also access the Log files that form the backbone of the Sniff-Tec software. Only DASPOS personnel or users instructed directly by DASPOS should enter this folder, as the functionality of the system - and thereby general safety - could otherwise be jeopardized.

Finally, the button Toggle full screen is used to minimize/maximize the Sniff-Tec program, and Exit program is used to close Sniff-Tec.

See: Appendix 7 - Contact tab
7. Maintenance

7.1 Maintenance strategy
LAS-10 was developed in close cooperation with end-users, and tested in harsh environments. The system uses high-quality components to ensure a high level of durability. As LAS-10 is an active detection system and acts as a fire protection initiative; DASPOS A/S strongly recommends that preventative maintenance is carried out on all our products. Like all other equipment, regular cleaning will ensure long system durability. However, some components degenerate over time and need replacing/recalibration at various intervals - See chapter: 7.3 Periodic maintenance and 8. Service.

7.2 Regular maintenance

7.2.1 DP-filter
Maintenance of the Leakage Alarm System is easy. The only component requiring regular cleaning is the DP-filter - See Maintenance/Replacement procedure: 7.4.5 DP-filter, D-1009. Over time, the surface of the DP-filter becomes covered in oil-, grease- and dust particles that require removal.

When the DP-filter needs cleaning, the system will notify the crew with a system fault; FILTER FAULT HIGH is displayed on the LAS-10 Monitor/LAS-10 Control Unit. The yellow LED: Filter on the LAS-10 Control Unit will activate 5% before the notification to prepare the crew for a filter cleaning. When the DP-filter has been cleaned, the alarm setting will be automatically reset within 1 hour. Alternatively, Inhibit the DP-filter in the Sniff-Tec software or the LAS-10 Control Unit before replacement and the setting will reset as soon as the Inhibit is removed again.

Replace the filter if it has any damages – the filter can last for a very long time if cleaned carefully!

7.3 Periodic maintenance

7.3.1 Sinter-filter
The Sinter-filter rarely requires cleaning. Depending on the frequency of events (pollution) and the location of the LAS-10 Detector, an oil film tends to build up on the surface of the Sinter-filter, requiring removal in order to generate proper detection results - See Maintenance/Replacement procedure: 7.4.3 Sinter-filter, D-2645.

The Sinter-filter requires replacement at an interval of max. 2 years; the same frequency as replacement of the Gas sensor or recalibration of the Detector PCB!

7.3.2 DP-pipes
The DP-pipes rarely require cleaning. Depending on the frequency of events (pollution) and the location of the LAS-10 Detector, the inlets of the pipes and internal ducts may experience oil film build up or trapped foreign objects, requiring removal in order to generate proper detection results - See Maintenance/Replacement procedure: 7.4.4 DP-pipes, D-3964.
7.3.3 Fan, 24V DC/41W
The Fan, 24V DC/41W rarely requires cleaning. Depending on the frequency of events (pollution) and the location of the LAS-10 Detector, an oil film tends to build up on the fan, requiring removal in order to generate proper detection results - See Maintenance/Replacement procedure: 7.4.6 Fan, 24V DC/41W, D-2741

7.3.4 Detector PCB
The Detector PCB does not require cleaning. HOWEVER, since the Gas sensor and other components located on the Detector PCB degenerate with time, these require replacement/recalibration at various intervals in order to generate proper detection results - See Maintenance/Replacement procedure: 7.4.1 Detector PCB, D-1020/D-1031 and 7.4.2 Gas sensor, B-1852.

The Gas sensor requires replacement and the Detector PCB calibration every 2 years; the Detector PCB requires replacement every 6 years – See 8. Service.

Calibration
Calibration of Detector PCB should only be carried out by authorized DASPOS personnel; calibration is only carried out if the owner or DASPOS A/S deems it necessary.

7.3.5 Battery, 3V
The Battery, 3V does not require cleaning. HOWEVER, it has a capacity of max. 2 years, and requires replacement every 2nd year (See 8. Service), so that the alarm settings in the Control unit can be saved in case of power failure – See Maintenance/Replacement procedure: 7.4.11 Battery, 3V, D-2870

7.3.6 Air inlet + filter
The Air inlet + filter rarely require cleaning. Depending on the location of the LAS-10 Power Supply Unit, the filter may experience buildup of dust or trapped foreign objects, requiring removal in order to maintain an optimized performance - See Maintenance/Replacement procedure: 7.4.13 Air inlet + filter, P-1703
7.4 Maintenance/Replacement procedures

7.4.1 Detector PCB, D-1020/D-1031

Replacement

- Inhibit Detector from the LAS-10 Monitor/LAS-10 Control Unit.
- Disconnect Power/Communication plug, 5-pole (16).
- Unscrew 4 x Screw, M5x12mm. (1) and remove cover.
- Disconnect DP-hoses (3).
- Disconnect the green 4-terminal and 5-terminal block connectors on the Detector PCB (2).
- Replace Detector PCB (2), unscrewing the 4 x M3 screws.
- Reassemble Detector.

Cleaning

- No cleaning needed.
7.4.2 Gas sensor, B-1852

Replacement
- Inhibit Detector from the LAS-10 Monitor/LAS-10 Control Unit.
- Disconnect Power/Communication plug, 5-pole (16).
- Unscrew 4 x Screw, M5x12mm. (1) and remove cover.
- Disconnect DP-hoses (3).
- Disconnect the green 4-terminal and 5-terminal block connectors on the Detector PCB (2).
- Unscrew the 4 x M3 screws on the Detector PCB (2).
- Replace Gas sensor (4).
- Reassemble Detector.

Cleaning
- No cleaning needed.
7.4.3 Sinter-filter, D-2645

**Replacement**
- Inhibit Detector from the LAS-10 Monitor/LAS-10 Control Unit.
- Disconnect Power/Communication plug, 5-pole (16).
- Replace/clean Sinter-filter (9), using a 22-mm. combination wrench and enter through the air-intakes. Do not use excessive force and be careful **NOT** to damage the Gas sensor (4) – alternatively, remove Detector PCB (2)!
- Reassemble Detector.

**Cleaning**
- Clean Sinter-filter (9) using hot water, degreasing soap, and clean cloths/pressurized air.
  Be sure to remove all particles, as leftovers will complicate future cleaning - **NEVER** use solvents containing hydrocarbons!
7.4.4 DP pipes, D-3964

Replacement
- Inhibit Detector from the LAS-10 Monitor/LAS-10 Control Unit.
- Disconnect Power/Communication plug, 5-pole (16).
- Unscrew 4 x Screw, M5x12mm. (1) and remove cover.
- Disconnect fan wires from the green 4-terminal block connector on the Detector PCB (2). Note the color-sequence! (+ Fan, 0V, NC, NC)
- Unscrew 2 x Screw, M4x65mm. (14) and remove Protective grid (13) + Fan, 24V DC/41W (12).
- Remove DP-filter (11).
- Replace/clean DP-pipes (10).
- Reassemble Detector.

Cleaning
- Clean DP-pipes (10) using pressurized air.
7.4.5 DP-filter, D-1009

**Replacement**
- Remove and replace DP-filter (11) within 10 sec.

**Cleaning**
- Clean DP-filter (11) using hot water, degreasing soap, and clean cloths/pressurized air.
  Be sure to remove all particles, as leftovers will complicate future cleaning. When the DP-filter (11) is installed, the DP-filter (11) tongue and groove must fit into the detector housing.
7.4.6 Fan, 24V DC/41W, D-2741

Replacement
- Inhibit Detector from the LAS-10 Monitor/LAS-10 Control Unit.
- Disconnect Power/Communication plug, 5-pole (16).
- Unscrew 4 x Screw, M5x12mm. (1) and remove cover.
- Disconnect fan wires from green 4-terminal block connector on Detector PCB (2). Note the color-sequence! (+Fan, 0V, NC, NC)
- Unscrew 2 x Screw, M4x65mm. (14) and remove Protective grid (13).
- Replace/clean Fan, 24V DC/41W (12).
- Reassemble Detector.

Cleaning
- Clean Fan, 24V DC/41W (12), using hot water, degreasing soap, and clean cloths.
7.4.7 Fuse, 4A/5x20 mm., P-1111

**Replacement**
- Inhibit Detector from the LAS-10 Monitor/LAS-10 Control Unit.
- Disconnect Power/Communication plug, 5-pole (16).
- Unscrew 4 x Screw, M5x12mm. (1) and remove cover.
- Replace the Fuse, 4A/5x20mm. (15), by means of a small flat screw driver.
- Reassemble the Detector.

**Cleaning**
- No cleaning needed.
7.4.8 CPU PCB, P-3457

Replacement
- Power off the LAS-10 Control Unit from the LAS-10 Power Supply Unit.
- Unscrew 4 x M4 screws on the front of the cover to open the LAS-10 Control Unit.
- Disconnect Ribbon cable (6) from CPU PCB (1).
- Replace the CPU PCB (1), unscrewing the 8 x M4 screws on the inside of the cover.
- Reassemble LAS-10 Control Unit.

Cleaning
- No cleaning needed.
7.4.9 Interface PCB, P-3451

Replacement
- Power off the LAS-10 Control Unit from the LAS-10 Power Supply Unit.
- Unscrew 4 x M4 screws on the front of the cover to open the LAS-10 Control Unit.
- Disconnect ALL detector/power/alarm/data cables + Ribbon cable (6) from Interface PCB (2).
- Replace Interface PCB (2), unscrewing 4 x M4 screws in the back of the LAS-10 Control Unit.
- Reassemble LAS-10 Control Unit.

Cleaning
- No cleaning needed.
7.4.10 Fuse, 4A/5x20 mm., P-1111

Replacement
- Unscrew 4 x M4 screws on the front of the cover to open the LAS-10 Control Unit.
- Replace the Fuse, 4A/5x20mm. (3), unscrewing fuse holder using a small screwdriver.
- Reassemble LAS-10 Control Unit.

Cleaning
- No cleaning needed.
7.4.11 Battery, 3V, D-2870

**Replacement**
- Leave power **ON**.
- Unscrew 4 x M4 screws on the front of the cover to open the LAS-10 Control Unit.
- Replace **Battery, 3V (5)**, using a small screwdriver.
- Reassemble LAS-10 Control Unit.

**Cleaning**
- No cleaning needed.
7.4.12 Fuse, 15A/250V, P-1701

Replacement
- Open the door in the LAS-10 Power Supply Unit.
- Replace Fuse, 15A/250V (2), unscrewing fuse holder using fingers.
- Reassemble LAS-10 Power Supply Unit.

Cleaning
- No cleaning needed.
7.4.13 Air inlet + filter, P-1703

Replacement

- Open hatch in Air inlet + filter (4) from outside of the LAS-10 Power Supply Unit.
- Replace filter by hand.
- Reassemble LAS-10 Power Supply Unit.

Cleaning

- Cleaning of Air inlet + filter (4) is done by replacing filter.
8. Service
To support our customers in improving the safety of crew, environment, and assets, as well as ensuring the liability of our product portfolio, it is our belief that we must establish and maintain a customer-centered and logistically sound service- and support strategy to the mutual benefit of ship owners, crew, and the continued business development of DASPOS A/S.

On the following pages, you will find our recommended (standard) service activity check lists for a period of 6 years. Contact DASPOS A/S at any time to establish a service agreement!

8.1 Check list, Service (every 2/4 years)

Detector(s)
- Collect Detectors.
- Disassemble Detector PCBs and replace Gas sensors.
- Disassemble and clean Fans and Protective grids.
- Replace Sinter-filters.
- Clean DP-pipes and internal ducts.
- Clean detector housing.
- Replace DP-filter.

Control unit(s)
- Replace Battery, 3V.
- Update CPU Software

Power supply unit(s)
- Clean Power supply unit.
- Inspect filters

Monitor
- Analyze data.
- Update Sniff-Tec software.
- Update Log files.

Handover/Documentation
- Training
- Service report
- Data
8.2 Check list, Service (every 6 years)

**Detector(s)**
- Collect Detectors.
- Disassemble and replace Detector PCBs incl. Gas sensors.
- Disassemble and replace Fans.
- Disassemble and clean Protective grids.
- Replace Sinter-filters.
- Clean DP-pipes and internal ducts.
- Clean detector housing.
- Replace DP-filter.

**Control unit(s)**
- Replace Battery, 3V.
- Update CPU Software

**Power supply unit(s)**
- Clean Power supply unit.
- Inspect filters.

**Monitor**
- Analyze data.
- Update Sniff-Tec software.
- Update Log files.

**Handover/Documentation**
- Training
- Service report
- Data
9. Periodic tests

9.1 Quarterly test

<table>
<thead>
<tr>
<th>Test – Methodological design</th>
<th>Alarm:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure</td>
<td>1. Decrease open area of filter until an alarm is triggered (e.g. place a business card on the DP-filter.)</td>
</tr>
<tr>
<td></td>
<td>2. Expose gas sensor to any kind of gas/F. O. (hydrocarbon) until an alarm is triggered (e.g. place rag soaked in gas oil on detector bracket, or spray with brake cleaner in proximity of Detector).</td>
</tr>
<tr>
<td></td>
<td>Fault:</td>
</tr>
<tr>
<td></td>
<td>3. Remove filter from Detector.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm:</td>
</tr>
<tr>
<td>1. Control unit/ Monitor must display ‘Oil alarm’.</td>
</tr>
<tr>
<td>2. Control unit/ Monitor must display ‘Gas alarm’.</td>
</tr>
<tr>
<td>Fault:</td>
</tr>
<tr>
<td>3. Control unit/ Monitor must show ‘Fault’. Must occur within &lt; 60 sec.</td>
</tr>
</tbody>
</table>

1. [Image of filter being covered with tape]

2. [Image of detector with filter]

9.2 Annual test

<table>
<thead>
<tr>
<th>Test – Methodological design</th>
<th>Pressure sensor:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure</td>
<td>1. Cover DP-filter completely (e.g. with adhesive tape) and install it in the LAS-10 Detector.</td>
</tr>
<tr>
<td></td>
<td>Fault:</td>
</tr>
<tr>
<td></td>
<td>2. Do not clean DP-filter until ‘Oil level’ exceeds ‘Filter fault HIGH’ level (Normally 65%).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure sensor:</td>
</tr>
<tr>
<td>1. The ‘Oil level’ on Control unit/ Monitor must increase to 100% (± 10%).</td>
</tr>
<tr>
<td>Fault:</td>
</tr>
<tr>
<td>2. ‘Filter fault HIGH’ must occur, and ‘Filter’ LED on Control unit must activate at 5% below ‘Filter fault HIGH’ set point.</td>
</tr>
</tbody>
</table>

IF THE QUARTERLY OR ANNUAL TESTS DEVIATE FROM ABOVE RESULTS, CONSULT DASPOS A/S IMMEDIATELY.
## Troubleshooting

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Prioilized sequence of actions</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>All data on Monitor writes: N/A</td>
<td>Check if Control unit is connected to the Setup tab on the Monitor.</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Check if Control unit power is ON.</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Check if “Baud rate”/“Speed” is the same in the Control unit as in the Monitor.</td>
<td>Baud rate is set in the “System setup” tab on the Control unit and in the “Setup” tab of the Monitor. If “Baud rate” is changed, Control unit must be reset from either the reset button on the CPU/PC or the “Setup” tab on the Monitor. (See Page 20 + 6.1.3 Control unit flow chart and 6.2.6 “Setup” tab + Appendix 6.)</td>
</tr>
<tr>
<td></td>
<td>Check all electrical connections incl. EMC screening in cable glands, for RS232 data interface in both Control unit and USB interface.</td>
<td>See 6.2.3 + 6.3.3 Electrical connection drawings</td>
</tr>
<tr>
<td>Oil/Gas reading on Monitor/Control unit reads: ‘---’</td>
<td>Check if “Process #4 4-way, 100mm” in Control unit.</td>
<td>If “Process #4 4-way, 100mm” in Control unit keeps blowing when replaced, go to next action point. (See Maintenance/Replacement procedure 7.4.10 Fuse. 4-way, 100mm, P-111.)</td>
</tr>
<tr>
<td></td>
<td>Check all electrical connections in both Control unit and “I/O Attributes/Communication plug, 5 pole”.</td>
<td>See 6.2.3 + 6.3.3 Electrical connection drawings</td>
</tr>
<tr>
<td></td>
<td>Check if Detector PCB is faulty.</td>
<td>Change Detector PCB. (See Maintenance/Replacement procedure 7.4.1 Detector PCB, D-100/D-101)</td>
</tr>
<tr>
<td>Filter/Oil readings jumps: “Alarm” on Monitor/Control unit</td>
<td>Check if there is a leakage.</td>
<td>If yes: Locate/Stop leakage!</td>
</tr>
<tr>
<td></td>
<td>Check if there is any ongoing maintenance: painting, welding, cutting, duct, mist?</td>
<td>If yes: Inhibit Detector from the “Data setup” tab on the Monitor or in the “Main menu” of the Control unit. (See 6.2.4 Data setup tab + Appendix 4 or Page 20 + 6.1.5 Control unit flow chart)</td>
</tr>
<tr>
<td></td>
<td>Clean or remove foreign objects from “DP-filter”.</td>
<td>See Maintenance/Replacement procedures 7.4.5 DP-filter, D-1000</td>
</tr>
<tr>
<td>Gas readings writes: “Alarm” on Monitor/Control unit</td>
<td>Check if there is a leakage.</td>
<td>If yes: Locate/Stop leakage!</td>
</tr>
<tr>
<td></td>
<td>Check if there is any ongoing maintenance: painting, welding, open systems containing Hyd locations?</td>
<td>If yes: Inhibit Detector from the “Data setup” tab on the Monitor or in the “Main menu” of the Control unit. (See 6.2.4 Data setup tab + Appendix 4 or Page 20 + 6.1.5 Control unit flow chart)</td>
</tr>
<tr>
<td></td>
<td>Is alarm level too low?</td>
<td>If yes: change alarm settings from either the “Data setup” tab on the Monitor or in the “Setup mode” of the Control unit. (See 6.2.4 Data setup tab + Appendix 4 or Page 20 + 6.1.5 Control unit flow chart)</td>
</tr>
<tr>
<td>Filter/Oil readings jumps: “Flow fault”</td>
<td>Check if “DP-filter” is installed.</td>
<td>If yes: skip next action point</td>
</tr>
<tr>
<td></td>
<td>Check if Fan, 24V DC is running.</td>
<td>See Maintenance/Replacement procedures 7.4.5 DP-filter, D-1000</td>
</tr>
<tr>
<td></td>
<td>Calibrate “Detector PCB”.</td>
<td>Remove the 4-wire plug to the left on the Detector PCB, to stop the Fan. Remove the “DP-filter” with a small screwdriver, turn potentiometer 90° counter clockwise / clockwise until the Oil/Filler reading reaches 1%. Plug in the 4-wire plug and install the “DP-filter”.</td>
</tr>
<tr>
<td>Filter/Oil readings jumps: “Filter fault”</td>
<td>Check if there is a leakage.</td>
<td>If yes: Locate/Stop leakage!</td>
</tr>
<tr>
<td></td>
<td>Check if there is any ongoing maintenance: cleaning, painting, welding, cutting, duct, mist?</td>
<td>If yes: Inhibit Detector from the “Data setup” tab on the Monitor or in the “Main menu” of the Control unit. (See 6.2.4 Data setup tab + Appendix 4 or Page 20 + 6.1.5 Control unit flow chart)</td>
</tr>
<tr>
<td></td>
<td>Is alarm level too low?</td>
<td>If yes: change alarm settings from either the “Data setup” tab on the Monitor or in the “Setup mode” of the Control unit. (See 6.2.4 Data setup tab + Appendix 4 or Page 20 + 6.1.5 Control unit flow chart)</td>
</tr>
<tr>
<td></td>
<td>Clean or remove foreign objects from “DP-filter”.</td>
<td>See Maintenance/Replacement procedures 7.4.5 DP-filter, D-1000</td>
</tr>
<tr>
<td>The ‘Overview’ is not activated after 5min. of inactivity on the ‘Data input’ tab of the Monitor.</td>
<td>Select the Auto-awake ON from the Settings button on the Setup tab of the Monitor.</td>
<td>-</td>
</tr>
<tr>
<td>Date/time on the Monitor is incorrect.</td>
<td>Edit by pressing the date/time in the upper left corner on the “Setup” tab of the Monitor. Default setting is UTC (Coordinated Universal Time).</td>
<td>-</td>
</tr>
<tr>
<td>Show/hide cursor on the Monitor.</td>
<td>Select the Hide mouse ON/OFF from the Settings button on the Setup tab of the Monitor or by pressing Ctrl-W on the on-screen keyboard.</td>
<td>-</td>
</tr>
<tr>
<td>Oil/Gas status writes: ‘OK’ / ‘NORMAL’ on LAS-10 Monitor/Control unit</td>
<td>No actions needed.</td>
<td>System is fully operational.</td>
</tr>
</tbody>
</table>
## 11. Spare parts

### 11.1 Spare part list

<table>
<thead>
<tr>
<th>Equipment</th>
<th>P/N</th>
<th>Component name</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAS-10 Detector</td>
<td>D-1115</td>
<td>LAS-10 Detector, Complete</td>
</tr>
<tr>
<td>LAS-10 Detector</td>
<td>D-1813</td>
<td>Screw, M5x12mm.</td>
</tr>
<tr>
<td>LAS-10 Detector</td>
<td>D-1020/D-1031</td>
<td>Detector PCB (New/Calibrated)</td>
</tr>
<tr>
<td>LAS-10 Detector</td>
<td>D-2868</td>
<td>DP-hoses, 3x6mm.</td>
</tr>
<tr>
<td>LAS-10 Detector</td>
<td>B-1852</td>
<td>Gas sensor</td>
</tr>
<tr>
<td>LAS-10 Detector</td>
<td>D-2884</td>
<td>O-ring, 8x2mm.</td>
</tr>
<tr>
<td>LAS-10 Detector</td>
<td>D-1874</td>
<td>O-ring, 190x2mm.</td>
</tr>
<tr>
<td>LAS-10 Detector</td>
<td>D-2865</td>
<td>Power/Communication socket, 5-pole</td>
</tr>
<tr>
<td>LAS-10 Detector</td>
<td>D-1832</td>
<td>DP-hose stud</td>
</tr>
<tr>
<td>LAS-10 Detector</td>
<td>D-2645</td>
<td>Sinter-filter</td>
</tr>
<tr>
<td>LAS-10 Detector</td>
<td>D-3964</td>
<td>DP-pipes</td>
</tr>
<tr>
<td>LAS-10 Detector</td>
<td>D-1009</td>
<td>DP-filter</td>
</tr>
<tr>
<td>LAS-10 Detector</td>
<td>D-2741</td>
<td>Fan, 24VDC/41W</td>
</tr>
<tr>
<td>LAS-10 Detector</td>
<td>D-2874</td>
<td>Protective grid</td>
</tr>
<tr>
<td>LAS-10 Detector</td>
<td>D-2875</td>
<td>Screw, M4x65mm.</td>
</tr>
<tr>
<td>LAS-10 Detector</td>
<td>P-1111</td>
<td>Fuse, 4A/5x20mm.</td>
</tr>
<tr>
<td>LAS-10 Detector</td>
<td>P-2869</td>
<td>Power/Communication plug, 5-pole</td>
</tr>
<tr>
<td>LAS-10 Detector</td>
<td>M-1010</td>
<td>Detector bracket</td>
</tr>
<tr>
<td>LAS-10 Detector</td>
<td>M-1012</td>
<td>Wire set</td>
</tr>
<tr>
<td>LAS-10 Control unit</td>
<td>P-3269</td>
<td>LAS-10 Control unit, Complete</td>
</tr>
<tr>
<td>LAS-10 Control unit</td>
<td>P-3457</td>
<td>CPU PCB</td>
</tr>
<tr>
<td>LAS-10 Control unit</td>
<td>P-3451</td>
<td>Interface PCB</td>
</tr>
<tr>
<td>LAS-10 Control unit</td>
<td>P-1111</td>
<td>Fuse, 4A/5x20mm.</td>
</tr>
<tr>
<td>LAS-10 Control unit</td>
<td>P-1686</td>
<td>Cable gland, M16 EMC</td>
</tr>
<tr>
<td>LAS-10 Control unit</td>
<td>D-2870</td>
<td>Battery, 3V</td>
</tr>
<tr>
<td>LAS-10 Control unit</td>
<td>P-3452</td>
<td>Ribbon cable</td>
</tr>
<tr>
<td>LAS-10 Control unit</td>
<td>P-1707</td>
<td>Cable gland, M20 EMC + Thread increaser</td>
</tr>
<tr>
<td>LAS-10 Control unit</td>
<td>K-1018</td>
<td>Blind, M16</td>
</tr>
<tr>
<td>LAS-10 USB Interface</td>
<td>M-2002</td>
<td>LAS-10 USB Interface, Complete</td>
</tr>
<tr>
<td>LAS-10 USB Interface</td>
<td>P-1686</td>
<td>Cable gland, M16 EMC</td>
</tr>
<tr>
<td>LAS-10 USB Interface</td>
<td>M-2003</td>
<td>USB A/B Cable</td>
</tr>
<tr>
<td>LAS-10 Power supply unit</td>
<td>P-2010</td>
<td>LAS-10 Power supply unit 1000W, Complete</td>
</tr>
<tr>
<td>LAS-10 Power supply unit</td>
<td>P-2011</td>
<td>LAS-10 Power supply unit 3000W, Complete</td>
</tr>
<tr>
<td>LAS-10 Power supply unit</td>
<td>P-1114</td>
<td>Switchmode power supply, 1000W</td>
</tr>
<tr>
<td>LAS-10 Power supply unit</td>
<td>P-1118</td>
<td>Switchmode power supply, 3000W</td>
</tr>
<tr>
<td>LAS-10 Power supply unit</td>
<td>P-1701</td>
<td>Fuse, 15A/250V</td>
</tr>
<tr>
<td>LAS-10 Power supply unit</td>
<td>P-1706</td>
<td>Fan, 230V AC/9W (1000 W)</td>
</tr>
<tr>
<td>LAS-10 Power supply unit</td>
<td>P-1702</td>
<td>Fan, 230V AC/18W (3000 W)</td>
</tr>
<tr>
<td>LAS-10 Power supply unit</td>
<td>P-1703</td>
<td>Air inlet + filter</td>
</tr>
<tr>
<td>LAS-10 Power supply unit</td>
<td>P-1704</td>
<td>Cable gland PG16</td>
</tr>
<tr>
<td>LAS-10 Power supply unit</td>
<td>P-1705</td>
<td>Cable gland, PG7</td>
</tr>
<tr>
<td>LAS-10 Monitor</td>
<td>P-3301</td>
<td>LAS-10 Monitor 12”, Complete</td>
</tr>
<tr>
<td>LAS-10 Monitor</td>
<td>P-3302</td>
<td>LAS-10 Monitor 17”, Complete</td>
</tr>
<tr>
<td>LAS-10 Monitor</td>
<td>P-3310</td>
<td>USB Socket</td>
</tr>
<tr>
<td>LAS-10 Monitor</td>
<td>P-3311</td>
<td>Touch screen pen</td>
</tr>
</tbody>
</table>
# 11.2 Spare part assembly - LAS-10 Detector

## PARTS LIST

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>PART NUMBER</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw, M5x12mm.</td>
<td>D-1813</td>
<td>101</td>
</tr>
<tr>
<td>Detector PCB (New/Calibrated)</td>
<td>D-1020/D-1031</td>
<td>12</td>
</tr>
<tr>
<td>DP-hoses, 3x6mm.</td>
<td>D-2868</td>
<td>23</td>
</tr>
<tr>
<td>Gas sensor</td>
<td>B-1852</td>
<td>14</td>
</tr>
<tr>
<td>O-ring, 8x2mm.</td>
<td>D-2884</td>
<td>15</td>
</tr>
<tr>
<td>O-ring, 190x2mm.</td>
<td>D-1874</td>
<td>16</td>
</tr>
<tr>
<td>Power/Communication socket, 5-pole</td>
<td>D-2865</td>
<td>17</td>
</tr>
<tr>
<td>DP-hose stud</td>
<td>D-1832</td>
<td>28</td>
</tr>
<tr>
<td>Sinter-filter</td>
<td>D-2645</td>
<td>19</td>
</tr>
<tr>
<td>DP-pipes</td>
<td>D-3964</td>
<td>210</td>
</tr>
<tr>
<td>DP-filter</td>
<td>D-1009</td>
<td>111</td>
</tr>
<tr>
<td>Fan, 24V DC/41 WD</td>
<td>D-2741</td>
<td>112</td>
</tr>
<tr>
<td>Protective grid</td>
<td>D-2874</td>
<td>113</td>
</tr>
<tr>
<td>Screw, M4x65mm.</td>
<td>D-2875</td>
<td>214</td>
</tr>
<tr>
<td>Fuse, 4A/5x20mm.</td>
<td>P-1111</td>
<td>115</td>
</tr>
<tr>
<td>Power/Communication plug, 5-pole</td>
<td>P-2869</td>
<td>116</td>
</tr>
</tbody>
</table>

## MISCELLANEOUS (NOT SHOWN)

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>PART NUMBER</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detector bracket</td>
<td>M-1010</td>
<td>1</td>
</tr>
<tr>
<td>Wire set</td>
<td>M-1012</td>
<td>1</td>
</tr>
</tbody>
</table>

---

Spare part assembly

DASPOS A/S
Gammel Klausdalsbrovej 495
2730 Herlev - DK
CO MC 19-09-2016 04-07-2016

Designed by Checked by Approved by

Edition Sheet
LAS-10 Detector - 1001

WWW.DASPOS.COM "We prevent fire" Page | 57
### 11.3 Spare part assembly - LAS-10 Control Unit

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>PART NUMBER</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU PCBP-345711</td>
<td>Interface PCBP-345112</td>
<td>1</td>
</tr>
<tr>
<td>Fuse, 4A/5x20mm.P-1111123</td>
<td>Cable gland, M16 EMCP-1686-4</td>
<td>1</td>
</tr>
<tr>
<td>Battery, 3VD-287015</td>
<td>Ribbon cableP-345216</td>
<td>1</td>
</tr>
<tr>
<td>Cable gland, M20 EMC + Thread increaserP-170717</td>
<td>Blind, M16K-1018-8</td>
<td>1</td>
</tr>
</tbody>
</table>

**MISCELLANEOUS (NOT SHOWN)**

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>PART NUMBER</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blind, M16K-1018-8</td>
<td>CPU PCBP-345711</td>
<td>1</td>
</tr>
</tbody>
</table>

**Spare part assembly**

**DASPOS A/S**

Gammel Klausdalsbrovej 495

2730 Herlev - DK

**CO MC 19-09-2016 04-07-2016**

**Designed by Checked by Approved by**

**1 / 1 Edition Sheet**

**LAS-10 Control Unit - 2001**

---

**WWW.DASPOS.COM**

"We prevent fire"
11.4 Spare part assembly - LAS-10 USB Interface
11.5 Spare part assembly - LAS-10 Power Supply Unit
11.6 Spare part assembly - LAS-10 Monitor 12”
11.7 Spare part assembly - LAS-10 Monitor 17”
12. Contact information

Address: DASPOS A/S
Gammel Klausdalsbrovej 495
DK-2730 Herlev

Phone: +45 4432 7767

Website: www.daspos.com

Emails
Service: service@daspos.com
Sales: sales@daspos.com
Other inquiries: info@daspos.com

QR-code
Scan to open our website!
Appendix 1 - Overview
### Appendix 2 - Data tab

<table>
<thead>
<tr>
<th>Channel</th>
<th>Status</th>
<th>Level High</th>
<th>Status</th>
<th>Level High</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-DG1 aft D</td>
<td>OK</td>
<td>6</td>
<td>OK</td>
<td>13</td>
</tr>
<tr>
<td>2-DG1 ps A</td>
<td>OK</td>
<td>22</td>
<td>OK</td>
<td>27</td>
</tr>
<tr>
<td>3-DG1 sb A</td>
<td>OK</td>
<td>12</td>
<td>OK</td>
<td>17</td>
</tr>
<tr>
<td>4-DG2 aft B</td>
<td>OK</td>
<td>9</td>
<td>OK</td>
<td>14</td>
</tr>
<tr>
<td>5-DG2 ps A</td>
<td>OK</td>
<td>38</td>
<td>OK</td>
<td>43</td>
</tr>
<tr>
<td>6-DG2 sb A</td>
<td>OK</td>
<td>21</td>
<td>OK</td>
<td>26</td>
</tr>
<tr>
<td>7-DG3 aft B</td>
<td>OK</td>
<td>12</td>
<td>OK</td>
<td>17</td>
</tr>
<tr>
<td>8-DG3 ps A</td>
<td>OK</td>
<td>44</td>
<td>OK</td>
<td>49</td>
</tr>
<tr>
<td>9-DG3 sb A</td>
<td>OK</td>
<td>11</td>
<td>OK</td>
<td>16</td>
</tr>
<tr>
<td>10-LO pur 1-2-3</td>
<td>OK</td>
<td>10</td>
<td>OK</td>
<td>15</td>
</tr>
<tr>
<td>11-LO pur 4-5-6</td>
<td>OK</td>
<td>33</td>
<td>OK</td>
<td>38</td>
</tr>
<tr>
<td>12 FO fd md</td>
<td>OK</td>
<td>19</td>
<td>OK</td>
<td>24</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Channel</th>
<th>Status</th>
<th>Level High</th>
<th>Status</th>
<th>Level High</th>
</tr>
</thead>
<tbody>
<tr>
<td>13-Boiler 1</td>
<td>OK</td>
<td>21</td>
<td>OK</td>
<td>20</td>
</tr>
<tr>
<td>14-Boiler 2</td>
<td>OK</td>
<td>12</td>
<td>OK</td>
<td>17</td>
</tr>
<tr>
<td>15-DG4 fwd B</td>
<td>OK</td>
<td>44</td>
<td>OK</td>
<td>49</td>
</tr>
<tr>
<td>16-DG4 ps A</td>
<td>New Alarm</td>
<td>20</td>
<td>OK</td>
<td>16</td>
</tr>
<tr>
<td>17-DG4 sb A</td>
<td>OK</td>
<td>10</td>
<td>OK</td>
<td>15</td>
</tr>
<tr>
<td>18-DG5 fwd B</td>
<td>OK</td>
<td>33</td>
<td>OK</td>
<td>38</td>
</tr>
<tr>
<td>19-DG5 ps A</td>
<td>OK</td>
<td>22</td>
<td>OK</td>
<td>27</td>
</tr>
<tr>
<td>20-DG5-6 A</td>
<td>OK</td>
<td>12</td>
<td>OK</td>
<td>17</td>
</tr>
<tr>
<td>21-DG6 fwd B</td>
<td>OK</td>
<td>33</td>
<td>OK</td>
<td>38</td>
</tr>
<tr>
<td>22-DG6 sb A</td>
<td>OK</td>
<td>19</td>
<td>OK</td>
<td>24</td>
</tr>
<tr>
<td>23-Incinerator 1</td>
<td>OK</td>
<td>8</td>
<td>OK</td>
<td>13</td>
</tr>
<tr>
<td>24-Incinerator 2</td>
<td>OK</td>
<td>22</td>
<td>OK</td>
<td>27</td>
</tr>
</tbody>
</table>
Appendix 3 - Graph tab
Appendix 4 - Data setup tab
Appendix 5 - Save log tab
Appendix 6 – Setup tab
Appendix 7 – Contact tab
Appendix 8 – Group alarms

The LAS-10 Control unit is equipped with 8 Group relays. Each individual Detector can - in relation to both the Oil/Filter alarm and the Gas alarm - relate to any of the 8 Group relays. This function is used if two, or more, Detectors have to activate a common output, e.g. if they are placed in the same area, or if ALL gas alarms AND ALL Oil/Filter alarms have to activate another common output.

The Data setup tab on the Monitor and the Setup mode on each Detector channel in the Control unit, allows the user to:

- Select Group alarm relay no. 1 – 8 for the Oil/Filter alarm. When the alarm limit is exceeded, BOTH the Common alarm relay and the selected Group alarm relay are triggered.
- Select Group alarm relay no. 1 – 8 for the Gas alarm. When the alarm limit is exceeded, BOTH the Common alarm relay and the selected Group alarm relay are triggered.
- Select Group alarm relay no. 9 – 16 for the Gas alarm. When the alarm limit is exceeded, ONLY the Common alarm relay is activated and when the Gas level exceeds a fixed level of 50% of LEL\(^4\), the associated Group alarm relay is triggered.

All Group alarm relays can be altered from System setup in the Control unit, as follows: NC, NO, NC-R (Repeated every minute), NO-R (Repeated every minute).

---

\(^4\) Lower Explosive Level (LEL): The lowest concentration in [%] of a gas or a vapor in air capable of producing a flash of fire in presence of an ignition source (arc, flame, heat). At a concentration in air below the LEL there is not enough fuel to continue an explosion. Concentrations lower than the LEL are too lean to explode but may still deflagrate.
Appendix 9 – Serial connection of Control units

In systems with more than one Control unit, the Alarm/Fault connection needs to be serial connected, as shown.

Set both Alarm- and Fault relay, in both Control units, to NC/NC-R (Repeated every minute) where applicable.

See 6.1.3 System setup and 6.1.5 Control unit flow chart.