

## **MAINTENANCE MANUAL**



### **V7000 BRIGADE™ / V9000 COMMANDER™**

### **Cabin Fire + Smoke Trainer**

Status: Revised issue

Version: 3.00

© Copyright Flame Aviation B.V. 2020



#### Document changes and history

Revision	By	Date	List of effective pages	Reason
3.00	RP	01-02-2020		Initial issue



## 1. Table of contents

1. TABLE OF CONTENTS .....	3
2. SAFETY INFORMATION .....	5
2.1 SAFETY CAUTIONS .....	5
2.2 SAFETY FEATURES .....	5
2.3 <i>Emergency stop</i> .....	7
2.4 <i>Gas detection system</i> .....	8
2.5 <i>Evacuation</i> .....	9
3. INTRODUCTION.....	10
3.1 GENERAL INFORMATION .....	10
3.2 SPARE PARTS AND COMPONENTS .....	10
3.3 CONSUMABLES AND SERVICE .....	10
4. SYSTEM START UP.....	11
5. ROUTINE MAINTENANCE .....	13
5.1 MAINTENANCE SCHEDULE .....	13
6. TROUBLESHOOTING .....	15
6.1 TROUBLESHOOTING PROCEDURE.....	15
6.2 EMERGENCY STOP INDICATION .....	16
6.3 DECALCIFIER FAULT INDICATION .....	16
6.4 REFILLING STATION FAULT INDICATION .....	16
6.5 PILOT BURNER FAULT.....	17
6.6 ROOM TEMPERATURE TOO HIGH .....	19
6.7 WATER SUPPLY FAULT .....	19
6.8 MAIN BURNER FAULT.....	19
6.9 GAS DETECTED FAULT .....	20
6.10 NO GAS INDICATION .....	20
6.11 LEAK-TEST FAULT INDICATION.....	20
6.12 SMOKE FLUID LOW INDICATION .....	21
6.13 GAS LOW INDICATION.....	21
6.14 AIR FLOW FAULT INDICATION .....	21
6.15 SMOKE SYSTEM FAULT.....	22
6.16 REFILLING STATION FAULT.....	23
6.17 DRAIN WATER PUMP FAULT.....	24
6.18 IOS SCREEN REMAINS DARK.....	24
7. JOB GUIDES .....	25
JOB GUIDE 1 DRAIN AIR COMPRESSOR (IF APPLICABLE) .....	26
JOB GUIDE 2 FLUSH WATER LINES .....	27
JOB GUIDE 3 CHECK ALL FIRE EXTINGUISHERS .....	28
JOB GUIDE 4 TEST ALL FIRES AND SMOKE .....	29
JOB GUIDE 5 CHECK WATER DRAIN.....	30
JOB GUIDE 6 DRAIN SMOKE RESERVOIR.....	31
JOB GUIDE 7 CHECK SALT LEVEL IN DE-CALCIFIER .....	32
JOB GUIDE 8 CHECK EMERGENCY STOPS.....	33
JOB GUIDE 9 CLEAN INTERIOR.....	34
JOB GUIDE 10 CLEAN WATER DRAIN AND RESERVOIR.....	35
JOB GUIDE 11 AIR COMPRESSOR MAINTENANCE.....	36
JOB GUIDE 12 SMOKE GENERATOR MAINTENANCE.....	37
JOB GUIDE 13 DE-CALCIFIER MAINTENANCE.....	38
JOB GUIDE 14 REFILLING STATION MAINTENANCE.....	39

JOB GUIDE 15 UV SENSOR CLEANING .....	40
JOB GUIDE 16 GAS DETECTION SYSTEM.....	43
JOB GUIDE 17 WATER DRAIN PUMP REPLACEMENT .....	44
JOB GUIDE 18 GAS BOTTLE REPLACEMENT .....	45

### List of illustrations and pictures:

Figure 1 - V9000 Commander safety measures overview .....	6
Figure 2 - Emergency stop buttons .....	7
Figure 3 - Gas detection system .....	8
Figure 4 - Exit signs and panic escape handles .....	9
Figure 5 - Evacuation routes .....	9
Figure 6 – Main power switch .....	11
Figure 7 – Gas bottle .....	11
Figure 8 – Light/standby switch.....	11
Figure 9 – System ON/OFF .....	12
Figure 10 - Gas leak test notification.....	12
Figure 11 - Maintenance schedule .....	13
Figure 12 - Routine Maintenance Record.....	14
Figure 13 - Fault indications .....	15
Figure 14 - Location Junction boxes .....	18
Figure 15 - Burner Control Units .....	18
Figure 16 - Location smoke pump and valves .....	22
Figure 17 - Water drain .....	30
Figure 18 - Smoke residue drain .....	31
Figure 19 - Water de-calcifier unit .....	32
Figure 20 - Emergency stop button locations .....	33
Figure 21 - Cleaning materials .....	34
Figure 22 - water drain.....	35
Figure 23 - Access to water reservoir.....	35
Figure 24 - manual air and water closing valves .....	39
Figure 25 - Water separator .....	39
Figure 26 - UV sensor locations.....	40
Figure 27 - Oven UV sensors.....	40
Figure 28 - Laptop UV sensors .....	41
Figure 29 - Luggage bin UV sensors.....	41
Figure 30 - Seat UV sensors.....	41
Figure 31 - Lavatory UV sensors.....	42
Figure 32 - Water drain system.....	44

## 2. Safety information

### 2.1 Safety cautions

In order to ensure personal health and safety during installation and maintenance of the fire trainer, the following shall be observed:

- ⚠ The fire trainer shall only be maintained by a qualified engineer who is aware of the safety procedures for this fire trainer.
- ⚠ The fire trainer shall be connected to the power as indicated in the electrical drawings of the fire trainer.
- ⚠ Operating the fire trainer shall only be performed by trained personnel. For this training the Instructor Manual shall be studied.
- ⚠ In case of an emergency situation, an aural alarm sounds, all persons shall exit the fire trainer as quickly as possible and wait outside for further instructions.
- ⚠ The fire places are very hot after being used, do not touch them until they are cooled down.
- ⚠ Smoking inside or in the proximity of the fire trainer is strictly prohibited.
- ⚠ The gas detection system shall be checked by either Flame Aviation or the local Dräger service station annually.
- ⚠ Make sure the gas detection transmitters do not get wet since this can cause the malfunctioning of the gas detection transmitter
- ⚠ The inside temperature of the fire trainer shall not be lower than 6°C to allow proper functioning of the Instructor Operating Station (HMI).
- ⚠ All regulatory and legal requirements for the installation and usage of the fire trainer must be considered by the operator of the fire trainer.
- ⚠ Do not switch off the main power unless necessary for maintenance or relocation. The power should remain available for the gas detection system and heating/cooling purposes.
- ⚠ Water supply lines and reservoirs shall be kept free from freezing.

### 2.2 Safety features

# ■ ■ ■ FLAME ■ ■ ■

## A V I A T I O N

The V7000 Brigade™ and V9000 Commander™ fire trainer is equipped with the following safety measures:

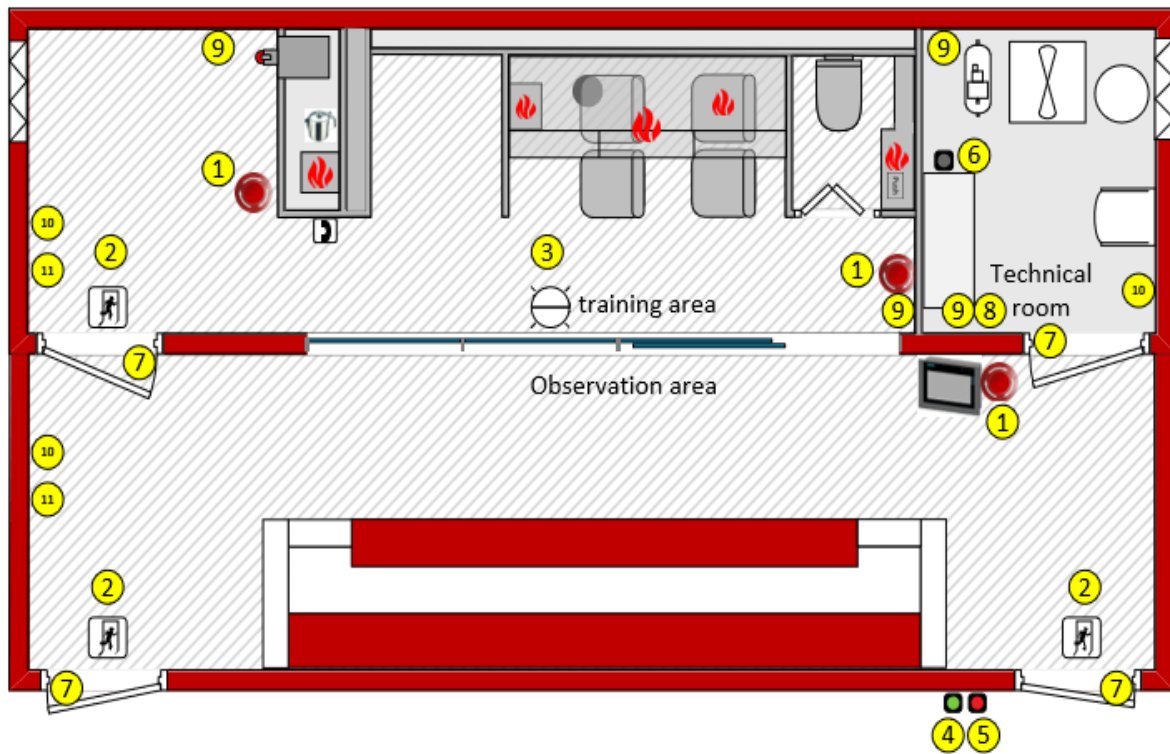


Figure 1 - V9000 Commander safety measures overview

1. Emergency stop buttons
2. Evacuation lighting
3. Orientation light
4. System OK light (outside, green)
5. Warning light (outside, red)
6. Acoustic warning horn (inside)
7. Emergency exits
8. Gas detection system
9. Gas detectors
10. Position for real fire extinguishers (to be installed by operator)
11. Position for fire blanket (to be installed by operator)

### 2.3 **Emergency stop**

The V9000 Commander™ fire trainer has three Emergency stop buttons:

1. One (1) located on the instructor operating station (IOS) in the observation cabin (V9000 Commander™ fire trainer only)
2. One (1) in the preparation area
3. One (1) under the air extraction outlet in the fire training cabin

These Emergency buttons shall be used in case of an emergency and will shut down the fire trainer immediately.



*Figure 2 - Emergency stop buttons*

Selecting an Emergency stop button will activate the emergency shutdown. The emergency shutdown is also activated in the following situations:

- Leak test failure
- Gas detection system alarm, 10% LEL is exceeded
- 'Room temperature too high' results in the following actions:

The following actions will be taken when the emergency shutdown is executed

- All scenario's and functionalities are being switched off.
- The main gas valve will be closed
- The cabin lights and observation lights are being switched to BRIGHT
- The ventilation is being switched to MAX
- The optical alarm is activated
- The acoustic alarm is being activated

If an emergency shutdown has been activated, inform a qualified engineer.

## 2.4 Gas detection system

The fire trainer is equipped with a gas detection system with four infra-red gas detection transmitters.

The system operates independently from the PLC. Two independent gas detection transmitters are installed in each room (fire training area and the technical room) at 25 cm above the floor level in order to detect gas. Since propane is denser than air the gas will sink to the ground in the event of a leak in the system.



Figure 3 - Gas detection system

## 2.5 Evacuation

In case of a power loss in the Trainer, an emergency exit light will illuminate above the main exit door, and an orientation light will illuminate the fire training area. This will provide instructor and trainees enough light to evacuate the Trainer.



Figure 4 - Exit signs and panic escape handles

All external doors can be opened from the inside at all times by pushing the panic escape handle.

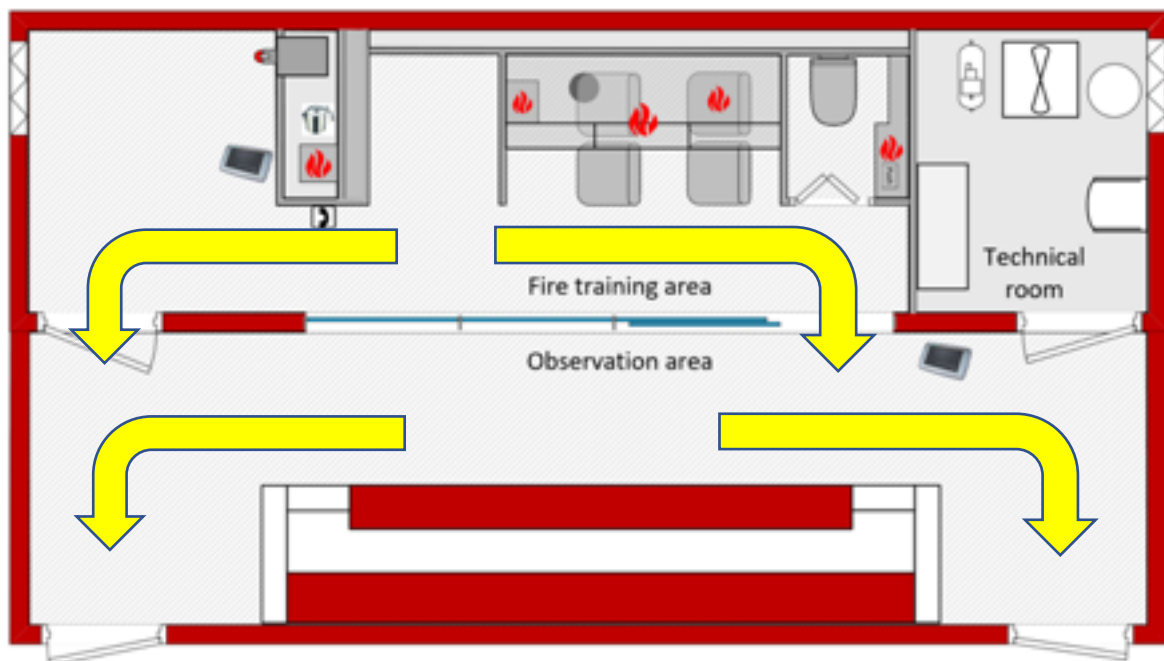


Figure 5 - Evacuation routes



### **3. INTRODUCTION**

#### **3.1 General information**

This manual is an outline for the maintenance and troubleshooting of the V7000 Brigade™ and V9000 Commander™ Cabin Fire + Smoke Trainer, hereinafter referred to as fire trainer.

The purpose of this manual is to provide:

1. schedule for routine maintenance
2. Job Guides on how to perform routine maintenance tasks
3. Troubleshooting guidance

Information on the operation of the fire trainer can be found in the Instructor Manual. Information on the installation of the fire trainer and the required installation prerequisites can be found in the Installation Provisions Manual.

#### **3.2 Spare parts and components**

Most parts and components do not require any maintenance. In case of failure they shall be replaced. Part of the provided documentation are the Electrical diagrams. The electrical diagrams manual contains a detailed parts list with manufacturer, type and part numbers.

Applied parts and components are generally from manufacturers that are operating globally and can therefore be obtained from local suppliers all over the world or online. You can also contact Flame Aviation for whatever parts you need.

Contact Flame Aviation should you have problems finding the right replacement.

#### **3.3 Consumables and service**

Consumables are being used for the smoke generator and the de-calcifier unit.

For finding your local supplier for smoke fluid, please check:

<https://www.looksolutions.com/distributors-fog-machines.html#4>

For finding your local supplier for salt tablets, please google:

Water softener salt tablets + country name

Annual service is required for the Gas Detection System. Please check [www.draeger.com](http://www.draeger.com) for your nearest Dräger service point or contact Flame Aviation.

## 4. SYSTEM START UP

This section describes the start-up of the fire trainer.

### STEP 1: Turn main power on



The fire trainer Main Power Switch in the Technical Room shall be ON. It is recommended to have the Main Power Switch on at all times to ensure the proper functioning of the gas detection system and the cabin defrost heating.

*Figure 6 – Main power switch*

### STEP 2: Open gas bottle



The gas bottle, normally located in the gas cabinet in the technical room, shall be opened by turning counter clockwise.

*Figure 7 – Gas bottle*

### STEP 3: Activate light/standby switch



A light/standby switch is normally located next to the entrance door. This switch will turn on the lights and will activate the IOS screen.

*Figure 8 – Light/standby switch*

## STEP 4: Activate System

Select System On/Off on the IOS.

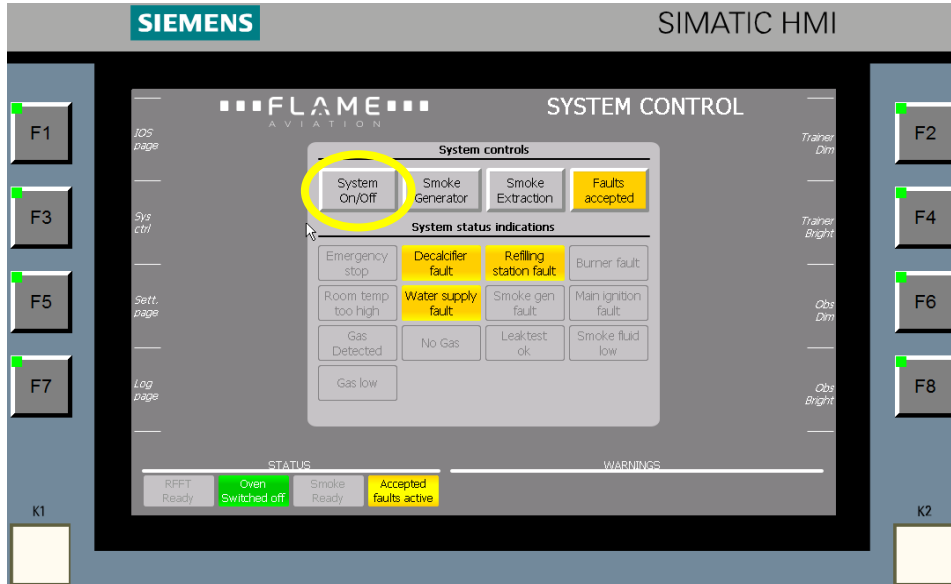


Figure 9 – System ON/OFF

When the System is being started, an automatic gas leak test will be initiated (1 minute). A notification is presented on the instructor station.

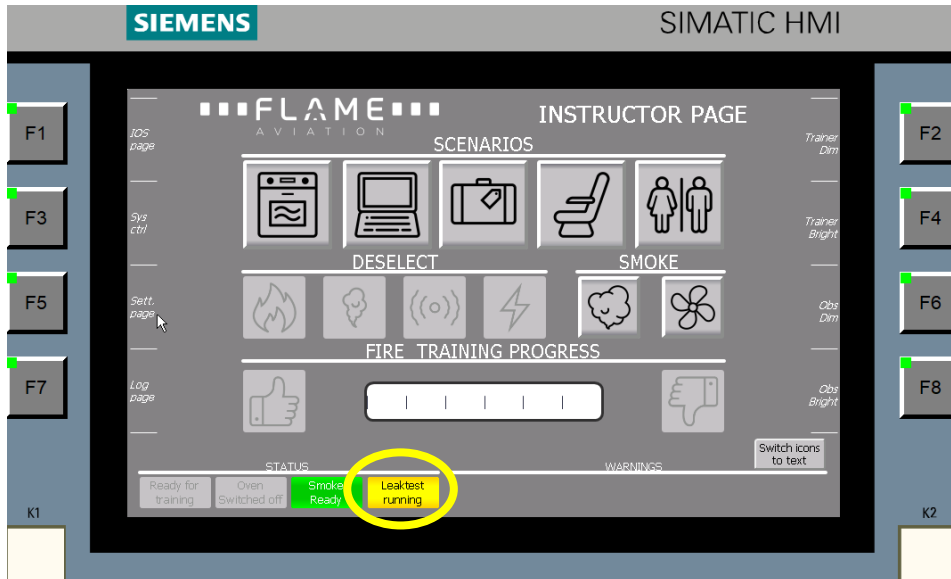


Figure 10 - Gas leak test notification

## 5. ROUTINE MAINTENANCE

### 5.1 Maintenance schedule

#### Prevention

- Keep the Trainer free from insects and other animals like mice, etc. which can enter the Trainer via the ventilation openings or the water exhaust. Use authorized pesticides in the technical room to keep the technical room free from animals and/or insects.
- Keep the air inlets clean, do not place objects against or down on it. It is important to ensure an unobstructed airflow.

#### Maintenance schedule:

	Maintenance task	Daily	Weekly	Monthly	Annual	Notes
1	Drain air compressor (if applicable)	X				Job Guide 1
2	Flush water lines	X				Job Guide 2
3	Check all fire extinguishers		X			Job Guide 3
4	Test all fires and smoke		X			Job Guide 4
5	Check water drain		X			Job Guide 5
6	Drain smoke reservoir		X			Job Guide 6
7	Check salt level in de-calcifier unit		X			Job Guide 7
8	Check emergency stops		X			Job Guide 8
9	Clean interior		X			Job Guide 9
10	Clean water drain and reservoir			X		Job Guide 10
11	Air compressor maintenance			X		Job Guide 11
12	Smoke generator maintenance			X		Job Guide 12
13	De-calcifier maintenance			X		Job Guide 13
14	Refilling station maintenance			X		Job Guide 14
15	Clean UV-sensors				X	Job Guide 15
16	Revalidate gas detection system				X	Job Guide 16

Figure 11 - Maintenance schedule

#### Routine maintenance record

Keep a maintenance record (as per next page) for maintenance and cleaning work, stating what work was carried out, when and by whom.

ROUTINE MAINTENANCE RECORD V7000 Brigade™ and V9000 Commander™																																	
Month:		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	REFERENCE
Daily	1	Drain air compressor (if applicable)																														See Job Guide 1	
	2	Flush water lines																														See Job Guide 2	
Weekly	3	Check all fire extinguishers																														See Job Guide 3	
	4	Test all fires and smoke																														See Job Guide 4	
	5	Check water drain																														See Job Guide 5	
	6	Drain smoke reservoir																														See Job Guide 6	
	7	Check salt level																														See Job Guide 7	
	8	Check emergency stops																														See Job Guide 8	
	9	Clean interior																														See Job Guide 9	
Monthly	10	Clean water drain and reservoir																														See Job Guide 10	
	11	Air compressor maint																														See Job Guide 11	
	12	Smoke generator maint																														See Job Guide 12	
	13	De-calcifier unit maint																														See Job Guide 13	
	14	Refilling station maint																														see Job Guide 14	
Annual	15	Clean UV sensors																														See Job Guide 15	
	16	Gas detection system																														See Job Guide 16	

Figure 12 - Routine Maintenance Record

## 6. TROUBLESHOOTING

The System Control page on the Instructor Operating Station (IOS) has indications for a variety of malfunctions. In this section possible causes and remedies for fault indications are described.

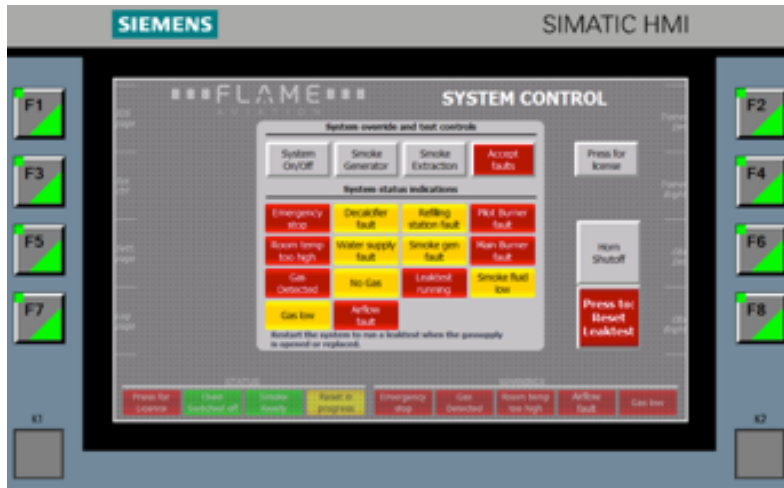


Figure 13 - Fault indications

### 6.1 Troubleshooting procedure

If a technical issue occurs in the fire trainer, please follow the following procedure:

1. Check if the technical issue is persistent. Switch OFF the fire trainer and switch ON again.
2. Check if the issue is described in this troubleshooting section of the maintenance manual.
3. Follow the instructions in the troubleshooting section.
4. If the issue is related to a device, check the troubleshooting section of the vendor documentation.
5. If this does not solve the issue:

- a. Make sure the internet connection is active
- b. Contact Flame Support for further diagnostics:

Support line: +31 71 302 2405

E-mail: support@flame-aviation.com



## 6.2 Emergency stop indication

Fault indication	Situation	Causes and remedies
Emergency stop indication	Emergency stop button is activated	Reset Emergency stop button by turning button counter clockwise.
	Leak-test failed	Check "Leak-test failed" indication troubleshooting
	Room temperature exceeds preset value	Check "Room temp too high" indication
	More than 10% LEL gas is detected	Check "Gas detected" indication troubleshooting

## 6.3 Decalcifier fault indication

Fault indication	Situation	Causes and remedies
Decalcifier fault indication	Decalcifier unit has a fault indication	Check the display on the decalcifier unit and refer to the vendor documentation

## 6.4 Refilling station fault indication

Fault indication	Situation	Causes and remedies
Refilling station fault indication. Red "Error/Reset" button on the refilling station does illuminate	Empty cycle fault: occurs when the fire extinguisher cannot be filled with air and the emptying process cannot be finished.	Possible cause: compressed air pressure too low or no air pressure at all. Remedy: restore air pressure
	Water fill fault: occurs when the extinguisher cannot be filled with water.	Possible cause: water pressure too low or no water pressure at all. Remedy: Restore water connection
	Emergency stop button is pressed.	Remedy: release Emergency stop button by turning counter clockwise.

### 6.5 Pilot Burner Fault

Fault indication	Situation	Causes and remedies
Pilot Burner Fault indication	Pilot burner does <b>not</b> ignite and after four attempts the “Press to reset burners” button becomes visible.	1. If this occurs during start up, the gas lines might still be empty. Remedy: Try a couple of times
		2. If the problem insists: check the gas pressure (on the Settings page) which shall be more than 300 mBar. Remedy: restore gas supply
		3. Check: is the opening of the pilot burner gas valve heard? No? Make sure the internet connection is active and contact Flame Support for further diagnostics.
		4. Check: is the ignition spark heard? No? Make sure the internet connection is active and contact Flame Support for further diagnostics.
		5. Ensure the (yellow) manual pilot gas valve at the particular burner unit is open. (is open on delivery)
Pilot Burner Fault indication	Pilot burner does ignite for a few seconds and after three attempts the “Press to reset burners” button becomes visible.	Check the respective Burner Control Unit for its LED alarm codes which can be found in the vendor documentation. (Siemens LME39 Burner Control Unit)
		Clean the respective UV sensor. (Job Guide 15)

# ■ ■ ■ FLAME ■ ■ ■

## A V I A T I O N

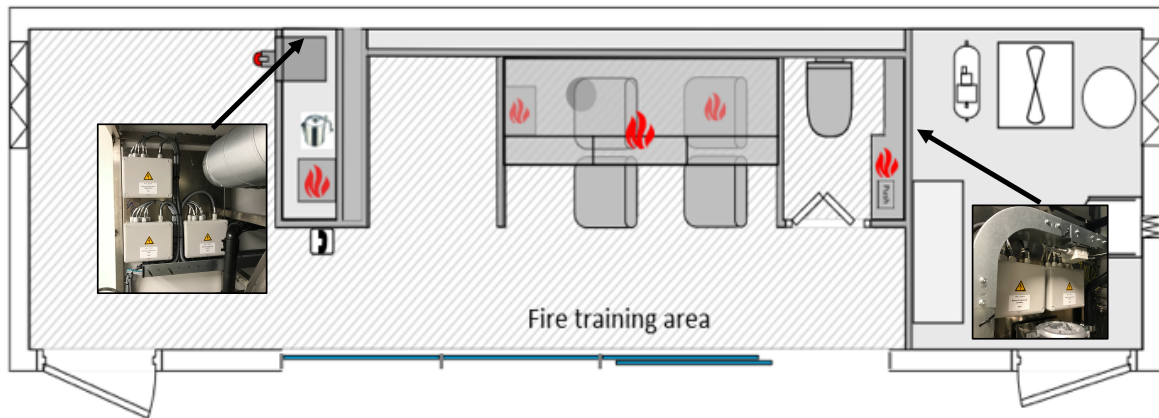


Figure 14 - Location Junction boxes

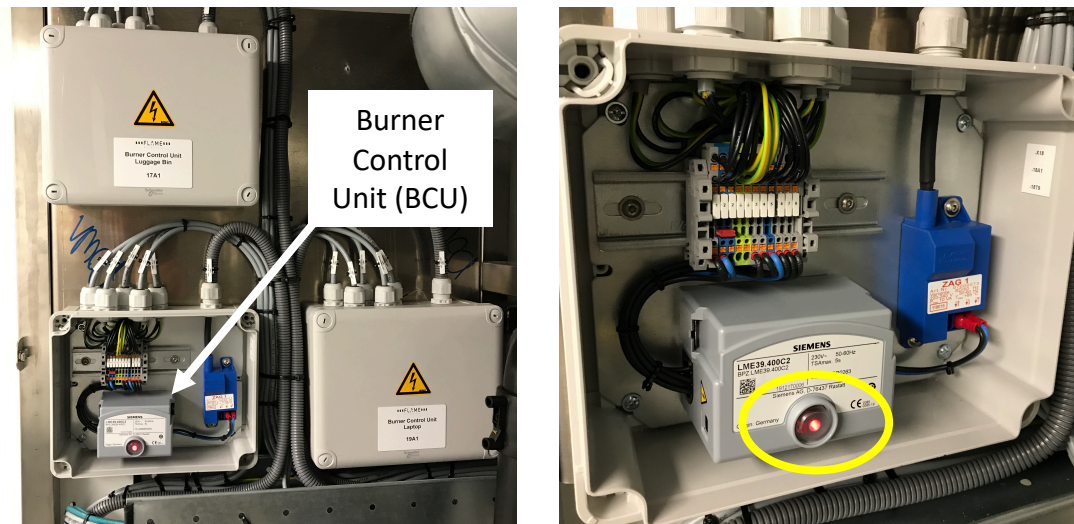


Figure 15 - Burner Control Units

## 6.6 Room temperature too high

Fault indication	Situation	Causes and remedies
Room temperature too high fault indication	Temperature in the fire trainer cabin exceeds the preset value.	The room temperature does exceed the preset value. Remedy: reduce the room temperature (e.g. by opening doors) or adjust the preset max room temperature value on the Settings page of the IOS.

## 6.7 Water supply fault

Fault indication	Situation	Causes and remedies
Water supply fault indication	Occurs when the extinguisher cannot be filled with water.	Possible cause: water pressure too low or no water pressure or supply at all. Remedy: Restore water connection.

## 6.8 Main burner fault

Fault indication	Situation	Causes and remedies
Main Burner Fault indication	Main burner does <b>not</b> ignite and after four attempts and then the “Main ignition fault” alarm becomes visible.	1. If this occurs during start up, the gas lines might still be empty. Remedy: Try a couple of times
		2. If the problem insists: check the gas pressure (on the Settings page) which shall be more than 300 mBar. Remedy: restore gas supply
		3. Check: is the opening of the main burner gas valve heard? No? Make sure the internet connection is active and contact Flame Support for further diagnostics.
		4. Ensure the (yellow) manual pilot gas valve at the particular burner unit is open. (is open on delivery)
Main Burner Fault indication	Main burner does ignite and then the “Main ignition fault” alarm becomes visible.	Check and clean the UV sensor. (Job Guide 15)

### 6.9 Gas detected fault

Fault indication	Situation	Causes and remedies
Gas detected fault indication	This alarm becomes visible when the gas detection system detects a propane gas level > 10% LEL.	Close the gas bottle. Check gas detection system for proper functioning.
		Gas might leak from the gas distribution system due to: 1. an open valve 2. a leak in the gas distribution system Remedy: close the gas bottle. Search for the gas leak.

### 6.10 No gas indication

Fault indication	Situation	Causes and remedies
No gas indication	Gas pressure is below the preset value	Restore the gas supply or exchange gas bottle (Job Guide 18)

### 6.11 Leak-test fault indication

Fault indication	Situation	Causes and remedies
Leak-test fault	After the leak test is performed the leak-test fault indication appears. The PLC has detected a difference in pressure between the two pressure sensors.	The gas pressure might be too low. The Gas Low indication might appear as well. Remedy: replace the gas bottle.
		Check the gas detection system safety valve and the leak test valve for proper operation. (If one or both of them are closed the secondary pressure sensor should state 0)
		If the cause cannot be found, do the test again.
		Make sure the internet connection is active and contact Flame Support for further diagnostics.



#### 6.12 Smoke fluid low indication

Fault indication	Situation	Causes and remedies
Smoke fluid low indication	The available smoke fluid has reached a minimum level	Refill the smoke fluid can with a funnel (do not replace the can!)

#### 6.13 Gas low indication

Fault indication	Situation	Causes and remedies
Gas low indication	Gas pressure is below the preset value	Make sure a new gas bottle is ordered.

#### 6.14 Air flow fault indication

Fault indication	Situation	Causes and remedies
Air flow fault indication	The air flow sensor does not sense air flow in the air extraction system.	Air extraction fan may be malfunctioning. Check air extraction fan and troubleshooting section in the vendor documentation.
		Air flow sensor may be malfunctioning. Check air flow sensor.

### 6.15 Smoke system fault

Fault indication	Situation	Causes and remedies
No smoke appearance	'Smoke' or 'smoke all' is selected on the IOS	Smoke generator has not reached the operating temperature yet. Check if Smoke Ready indication is green on the IOS. Remedy: wait until Smoke Ready illuminates green
		Smoke fluid might be empty. Smoke fluid low indication might appear on the IOS. Remedy: ensure there is enough smoke fluid in the reservoir.
		When the smoke generator is producing smoke but the smoke is not reaching the fire place: <ol style="list-style-type: none"> <li>1. the smoke pump might be malfunctioning</li> <li>2. the smoke valve might be malfunctioning</li> </ol> Remedy: check smoke pump functioning and check smoke valve sound while selecting smoke.



Figure 16 - Location smoke pump and valves

## 6.16 Refilling station fault

Fault indication	Situation	Causes and remedies
Fire extinguisher is not locked in the refilling station	Fire extinguisher is placed but not locked in the refilling station	Make sure the Ready for Training indication is illuminated green on the IOS. Remedy: follow the start-up procedure and start-up the fire trainer.
		There might not be enough air pressure available to lock the fire extinguisher. Remedy: check air pressure on the air compressor.
		The proximity sensors might not detect the fire extinguisher. Remedy: the sensors can be adjusted by pushing it in from the back. For this adjustment a small locking screw underneath the filling head needs to be loosened. Please contact Flame Support for a Job Guide.
Fire extinguisher is not refilled in the refilling station	Fire extinguisher is placed and locked in the refilling station	The sensor might not sense the filling pin. Result: the filling pin is not connected fully. Remedy: 1. check air pressure on the air compressor (there might not be enough air pressure available to move the filling pin) 2. check water pressure Make sure the internet connection is active and contact Flame Support for further diagnostics.

### 6.17 Drain water pump fault

For trainers equipped with an automatic drain pump:

Fault indication	Situation	Causes and remedies
Drain water pump fault. Check water pump immediately.	Water drainage pump is not working properly. Note: this can cause flooding!	Water pump might be malfunctioning. Check functioning of water drain pump. Remedy: replace water pump (see Job Guide 17)

### 6.18 IOS screen remains dark

For trainers equipped with an automatic drain pump:

Fault indication	Situation	Causes and remedies
No indication.	The IOS screen remains dark.	Fire trainer might be in standby mode. Remedy: Switch on the Light/Standby switch, located next to the entrance
	The IOS screen remains dark and the inside cabin temperature is below 6°C.	The IOS screen might be too cold for proper functioning. Remedy: switch on the heating in the observation cabin.



## 7. JOB GUIDES

Job Guides give guidance for the most common maintenance tasks applicable to the fire trainer. These Job Guides may not be complete. In case of doubt, please contact Flame Aviation for clarification.

Before commencing on any job on the fire trainer, make sure

⚠ You are aware of the safety cautions and features of the fire trainer!

⚠ You should have experience with the maintenance of similar or more complex installations!



**JOB GUIDE 1      Drain air compressor (if applicable)**

Title	Task	Frequency
JOB GUIDE 1	Drain air compressor	Daily

NOTE: the later models are equipped with automatic air compressor drain functionality. In that case this daily task is not applicable.

Objective:

The objective is to drain the air compressor tank in order to prevent water entering the air system of the automatic refilling stations.

Reference:

- Kaiser Premium Compact Operator manual

Job instructions:

Unless your fire trainer is equipped with an automatic air compressor drain system (optional), follow the job instructions as described in the Vendor documentation for the installed air compressor.



## JOB GUIDE 2

### Flush water lines

Title	Task	Frequency
JOB GUIDE 2	Flush water lines	Daily

#### Objective:

The objective is to flush the water system of the fire trainer in order to prevent the Legionella bacteria from developing in the un-used water lines.

#### Reference:

- Flame Aviation Instructor manual, paragraph 7.0

#### Job instructions:

1. Fill two fire extinguishers in each automatic refilling station. It is not necessary to discharge the fire extinguishers. The fire extinguishers can be taken out of the bracket and after the green light switched off, the fire extinguishers can be replaced again.
2. Fill the coffee can in galley area and discharge the coffee can in sink. Repeat this job three times.



### **JOB GUIDE 3      Check all fire extinguishers**

Reference	Title	Frequency
JOB GUIDE 3	Check all fire extinguishers	Weekly

Objective:

The objective is to check each training fire extinguishers in order to ensure a trouble-free operation.

Reference:

- Flame Aviation Instructor manual, paragraph 4.2
- Flame Aviation Maintenance manual, paragraph 4.6 and 4.8

Job instructions:

1. Refill a fire extinguisher.in the automatic refilling station
2. Check if the extinguisher is leaking between the adapter or from the refilling point
3. Check the condition of the O-ring. Replace O-ring when necessary.
4. Discharge fire extinguisher and check spray picture, range and duration.



#### **JOB GUIDE 4      Test all fires and smoke**

Reference	Title	Frequency
JOB GUIDE 4	Test all fires and smoke	Weekly

Objective:

The objective is to check each fire place in order to ensure a trouble-free operation.

Reference:

- Flame Aviation Instructor manual, paragraph 3.3

Job instructions:

1. Select Automatic Mode on the Settings page of the IOS
2. Select a fire scenario
3. Check for proper and adequate ignition
4. Deselect the fire scenario
5. Repeat this exercise for each fire scenario

### JOB GUIDE 5      Check water drain

Reference	Title	Frequency
JOB GUIDE 5	Check water drain	Weekly

Objective:

The objective is to check the proper functioning of the water drainage system in order to prevent blockage of the water drainage and flooding.

Reference:

- Flame Aviation Maintenance manual, paragraph 4.6.3.

Job instructions:

1. Open the cover under the first seat row

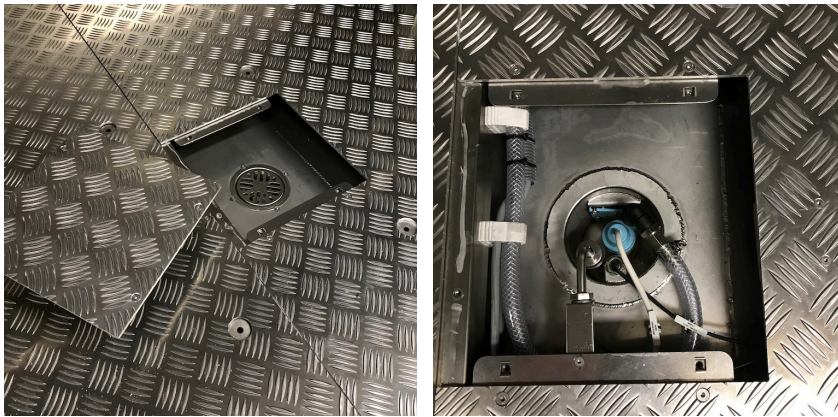


Figure 17 - Water drain

2. Check for proper functioning of the water drainage.

### JOB GUIDE 6      Drain smoke reservoir

Reference	Title	Frequency
JOB GUIDE 6	Drain smoke reservoir	Weekly

Objective:

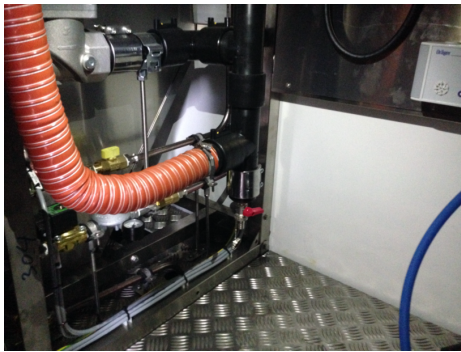
The objective is to remove the smoke residue from the smoke reservoir.

Reference:

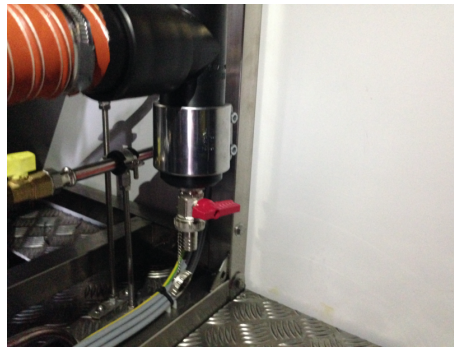
-

Job instructions:

1. Place a cup under the smoke reservoir
2. Open the smoke reservoir by switching the red handle.



*Figure 18 - Smoke residue drain*



3. Close the smoke reservoir again if the reservoir is empty.

**NOTE:** do not re-use the smoke residue in the smoke generator again! This might cause malfunctioning of the smoke generator.

### JOB GUIDE 7      Check salt level in de-calcifier

Reference	Title	Frequency
JOB GUIDE 7	Check salt level in de-calcifier	Weekly

#### Objective:

The objective is to ensure there is enough salt in the de-calcifier unit to ensure the proper and adequate de-calcification of the tap water by the de-calcifier unit in order to prevent the automatic refilling station from malfunctioning as a result of calcification in the water lines and valves.

#### Reference:

- Grünbeck User manual SoftliQ.

#### Job instructions:

Follow the job instructions as described in the Vendor documentation for the installed air de-calcifier unit.



*Figure 19 - Water de-calcifier unit*

For finding your local supplier for salt tablets, please Google:  
Water softener salt tablets + country name

### JOB GUIDE 8      Check emergency stops

Reference	Title	Frequency
JOB GUIDE 8	Check emergency stops	Weekly

#### Objective:

The objective is to ensure there is enough salt in the de-calcifier unit to ensure the proper and adequate de-calcification of the tap water by the de-calcifier unit in order to prevent the automatic refilling station from malfunctioning as a result of calcification in the water lines and valves.

#### Reference:

- Flame Aviation Maintenance manual, paragraph 2.3

#### Job instructions:

1. Dim the cabin lights
2. Select a fire scenario and wait until flames are visible.
3. Press the emergency stop button.
4. The following shall be checked:
  - ☐ All scenario's and functionalities shall switched off.
  - ☐ The main gas valve will be closed
  - ☐ The cabin lights and observation lights are being switched to BRIGHT
  - ☐ The ventilation is being switched to MAX
  - ☐ The optical alarm is activated (red light on the outside of the cabin)
  - ☐ The acoustic alarm is being activated (siren)
5. Test all emergency buttons



Figure 20 - Emergency stop button locations

### JOB GUIDE 9      Clean interior

Reference	Title	Frequency
JOB GUIDE 9	Clean interior	Weekly

Objective:

The objective is to maintain the

Reference:

■

Job instructions:

1. Remove all loose items and vacuum clean the fire trainer cabin and the observation cabin.
2. Clean all stainless-steel surfaces with a soft towel and a stainless-steel cleaning product. Try a small place first, to check the effect of the cleaning product on the stainless-steel surfaces.
3. Clean the glass observation window with water, soap and a sponge or with a dedicated glass cleaning spray and a soft or paper towel.



*Figure 21 - Cleaning materials*

### JOB GUIDE 10

### Clean water drain and reservoir

Reference	Title	Frequency
JOB GUIDE 10	Clean water drain + reservoir	Monthly

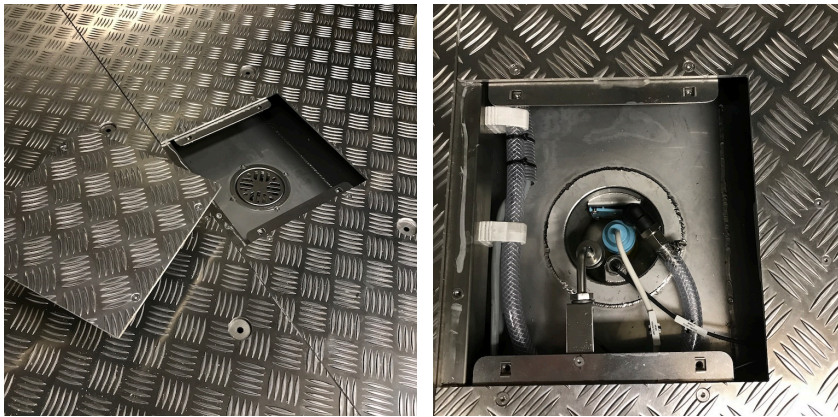
#### Objective:

The objective is to check the proper functioning of the water drainage system in order to prevent blockage of the water drainage and flooding.

#### Reference:

#### Job instructions:

1. Open the cover under the first seat row



*Figure 22 - water drain*

2. Check for dirt, grease, etc. Clean if necessary.



*Figure 23 - Access to water reservoir*

3. Open the panel in the preparation area and inspect the water reservoir for dirt, grease, etc. and clean or flush with a water hose if necessary.



## JOB GUIDE 11

### Air compressor maintenance

Reference	Title	Frequency
JOB GUIDE 11	Air compressor maintenance	Monthly

#### Objective:

The objective is to perform routine maintenance for the proper functioning of the air compressor.

#### Reference:

- Kaiser Premium Compact Operator manual

#### Job instructions:

Follow the maintenance instructions as described in the Vendor documentation for the installed air compressor.



## JOB GUIDE 12

## Smoke generator maintenance

Reference	Title	Frequency
JOB GUIDE 12	Smoke generator maintenance	Monthly

### Objective:

The objective is to perform routine maintenance for the proper functioning of the smoke generator.

### Reference:

- Look Solutions VIPER NT smoke generator Operator manual

### Job instructions:

Follow the maintenance instructions as described in the Vendor documentation for the installed smoke generator.



## JOB GUIDE 13

## De-calcifier maintenance

Reference	Title	Frequency
JOB GUIDE 13	De-calcifier unit maintenance	Monthly

### Objective:

The objective is to perform routine maintenance for the proper functioning of the de-calcifier unit.

### Reference:

- Grünbeck User manual SoftliQ.

### Job instructions:

Follow the job instructions as described in the Vendor documentation for the installed air de-calcifier unit.

For finding your local supplier for salt tablets, please Google:  
Water softener salt tablets + country name

### JOB GUIDE 14

### Refilling station maintenance

Reference	Title	Frequency
JOB GUIDE 14	Refilling station maintenance	Monthly

#### Objective:

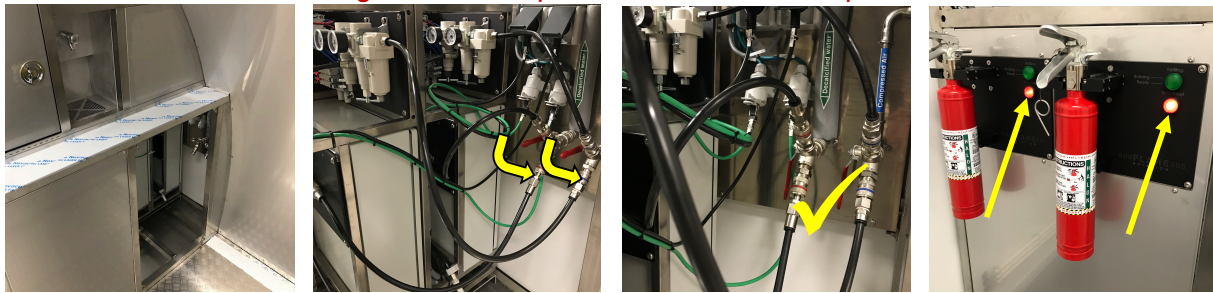
The objective is to prevent water entering the pneumatic system of the refilling station. For that purpose, the refilling station is equipped with a water separator in the air supply line. The water separator shall be checked for water, moist and dirt monthly.

#### Reference:

- -/-

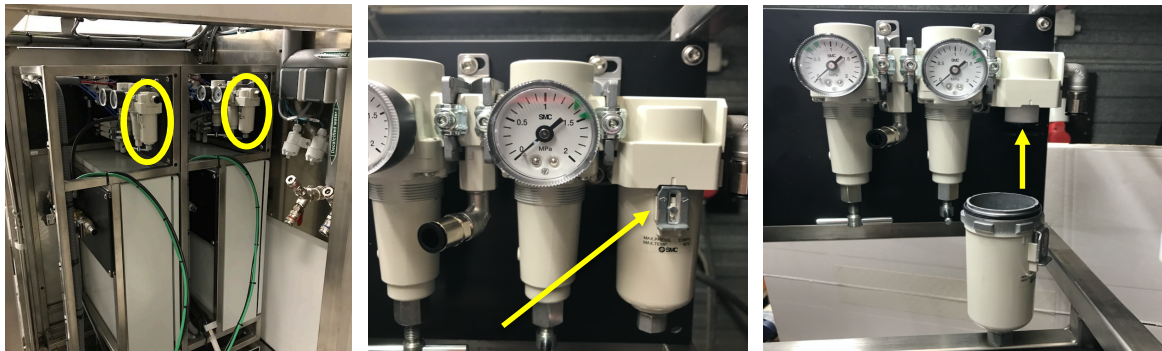
#### Job instructions:

1. Fire trainer shall be started
2. Remove the cover in the galley area.
3. Close the water and air supply lines by pushing the red handles downwards.
4. **Depressurize the refilling station by pushing the red Error/Reset button for more than 10 seconds until the refilling station is depressurized! Check the pressure indicators!**



*Figure 24 - manual air and water closing valves*

5. Open the water separator by pushing the metal clip downwards and turn the reservoir counter clockwise
6. Check and clean the water separator reservoir and install again
7. Open the water and air supply lines
8. Test the refilling station
9. Reinstall the cover



*Figure 25 - Water separator and pressure indicators*

## JOB GUIDE 15

## UV sensor cleaning

Reference	Title	Frequency
JOB GUIDE 15	UV Sensor cleaning	Annual

### Objective:

The objective is to ensure the proper functioning of the UV sensors which monitor the flames. For that purpose, the glass of the UV sensors shall be cleaned annually.

### Reference:

- /-

### Job instructions:

1. Remove the cover
2. Disassemble the UV sensor
3. Carefully clean the glass with a soft towel
4. Re-install the UV sensor and close the cover



Figure 26 - UV sensor locations

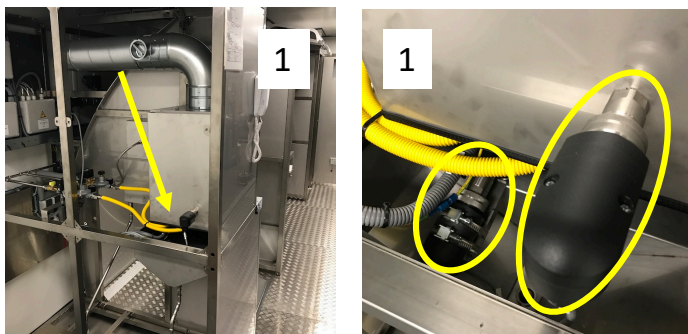


Figure 27 - Oven UV sensors

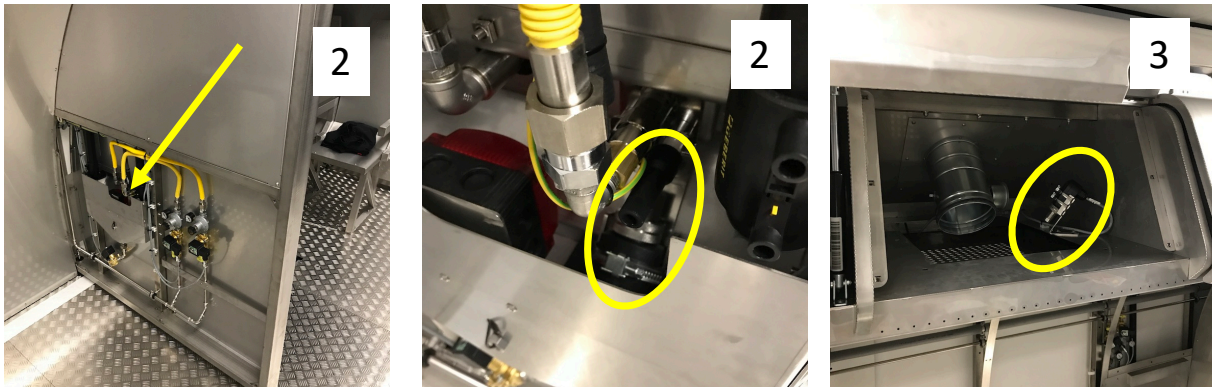


Figure 28 - Laptop UV sensors

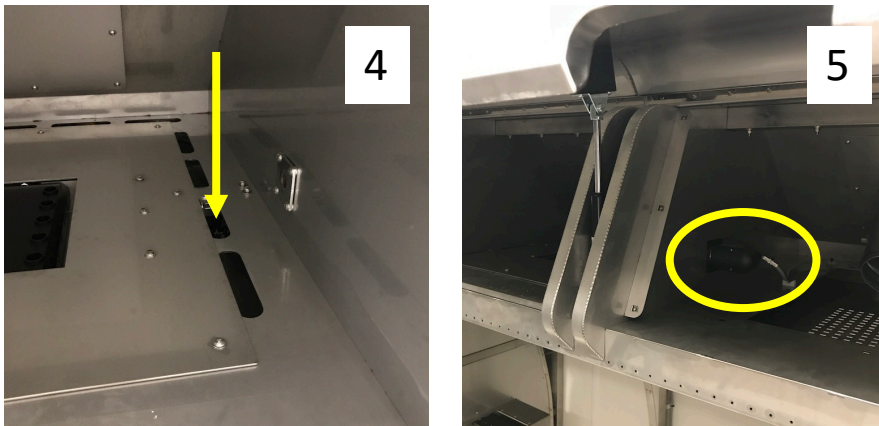


Figure 29 - Luggage bin UV sensors

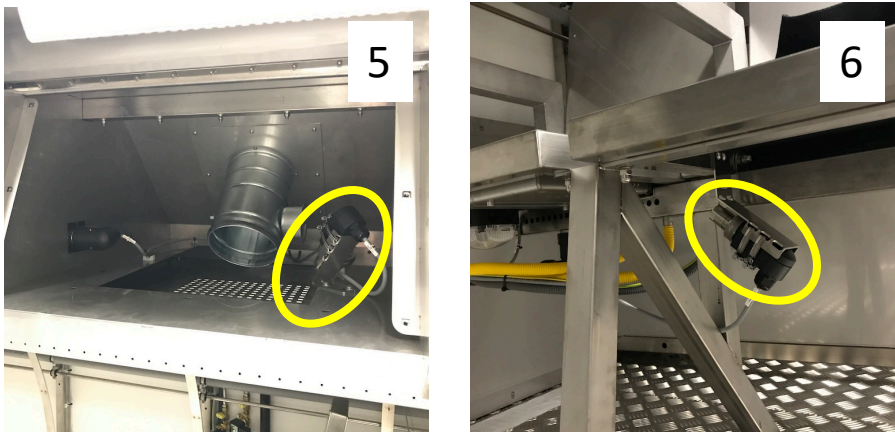
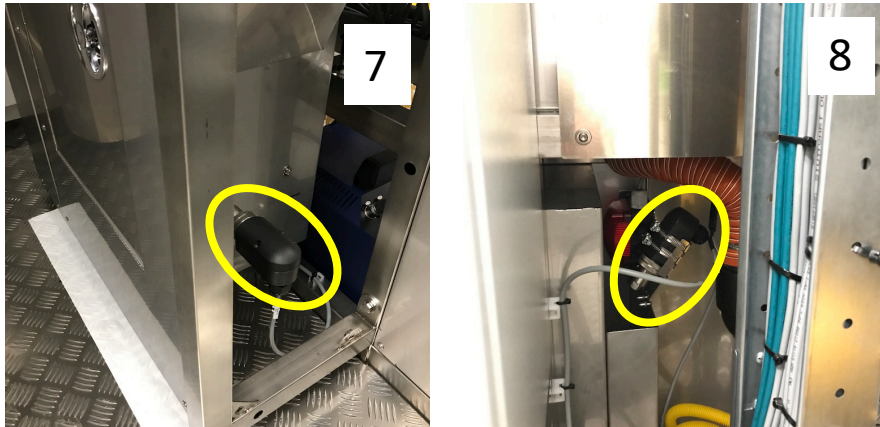


Figure 30 - Seat UV sensors

## Lavatory waste bin fire UV sensors



*Figure 31 - Lavatory UV sensors*



## JOB GUIDE 16

## Gas detection system

Reference	Title	Frequency
JOB GUIDE 16	Gas detection system	Annual

### Objective:

The objective is to ensure the proper functioning of the gas detection system. For that purpose the gas detection system shall be checked, tested and revalidated annually.

### Reference:

- [www.draeger.com](http://www.draeger.com)
- Flame Aviation support department: [support@flame-aviation.com](mailto:support@flame-aviation.com)

### Job instructions:

The gas detection system is essential within the safety concept of the fire trainer. The gas detection system shall only be checked, tested and revalidated by qualified and authorized personnel annually. Please contact your local Dräger dealer or contact Flame Aviation Support. You can find your local Dräger dealer on [www.draeger.com](http://www.draeger.com)

### JOB GUIDE 17

### Water drain pump replacement

Reference	Title	Frequency
JOB GUIDE 17	Water drain pump replacement	

#### Objective:

The objective is to replace the water drain pump.

#### Reference:

- -
- -

#### Job instructions:

The system is equipped with a pump which is activated by a primary float switch. In case the primary float switch is not activating the pump, the secondary float switch will be activated and shall activate the pump and close the after supply to the fire trainer by activating a water valve. An indication will appear in the IOS.

#### Replacement of the water pump:

1. Switch off the main power switch
2. Open the cover
3. Disconnect the Allen bolts and pull the connection box forward
4. Open the connection box and disconnect the Primary float switch connection
5. Disassemble the water pump
6. Replace the water pump and reconnect the Primary float switch connection
7. Re-install the connection box
8. Switch on the electrical power
9. Throw water in the drain to test the proper functioning of the water pump
10. Close the cover

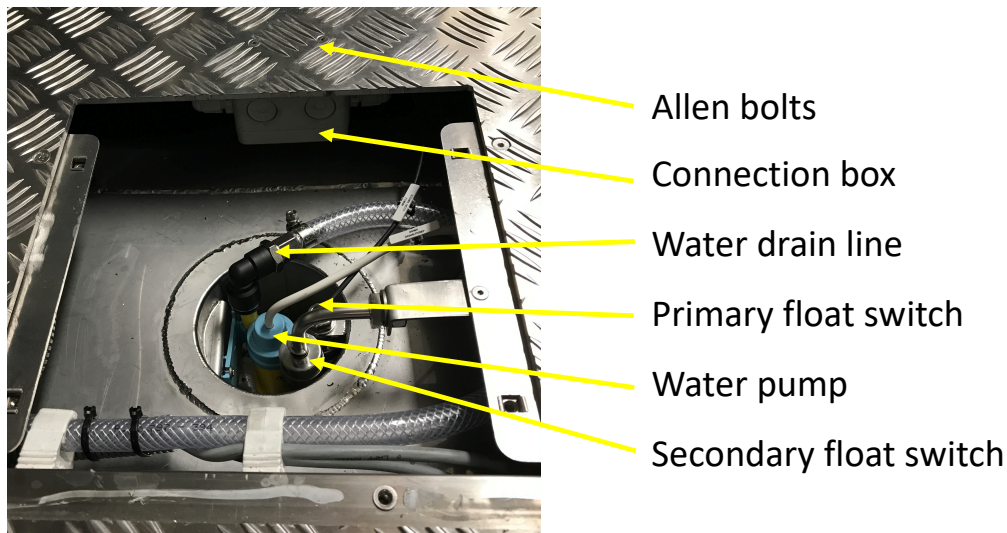


Figure 32 - Water drain system

### JOB GUIDE 18

### Gas bottle replacement

Reference	Title	Frequency
JOB GUIDE 18	Gas bottle replacement	

#### Objective:

The objective is to replace the gas bottle in the gas cabinet located in the technical room.

#### Reference:

- -
- -

#### Job instructions:

Note: do not switch off the main power of the fire trainer on the control cabinet in the technical room, because that will also switch off the gas detection system.

To replace the gas bottle the following actions shall be taken:

1. Close the empty gas bottle
2. Disconnect the hose from the bottle
3. Exchange gas bottles
4. Connect the hose to the new gas bottle
5. Open the gas bottle
6. Switch off the fire trainer on the System Control page by selecting SYSTEM OFF on the IOS
7. Restart the fire trainer by selecting SYSTEM ON in order to allow the automatic leak-test to start automatically. The automatic gas leak test takes approx. one minute
8. After start-up, the gas pressure shall indicate between 350-500 mBar on the Settings Page of the IOS

