

Training step 1.2



SERVICE MANUAL

Instructions for service (Five-year) of Fogmaker Fire suppression system (FSS) etc.



Fogmaker International AB

Service manual (Part no. 8011-002) Version 2.2.

This manual comes into force in May 2019, replacing version 2.1 from March 2017.

Version	Description of essential changes:
2.2	Final check, added information Mini suppressor (1005), added info 10-year service,

© Copyright Fogmaker International AB, 2019 Box 8005 SE-350 08 Växjö, Sweden

Any reproduction of this manual, electronic or mechanical, including copying, storage in an information management system or translation of all or parts of the document is prohibited unless Fogmaker International AB has given written permission to do so.

Phone: 0470-77 22 00 Fax: 0470-77 22 10

info@fogmaker.com www.fogmaker.com



<u>Summary</u>

Fogmaker International AB develops, manufactures and markets fire suppression systems which use high pressure water mist to suppress fires in engine compartments and enclosed spaces. Fogmaker's system can be found in buses, forestry machines, underground vehicles and non-road mobile machinery.

This Service Manual describes all the steps in a 1-year, 5-year and 10-year service, as well as the resetting of Fogmaker fire suppression systems.

- An "annual inspection" is performed every year.
- A "service" is performed every five years.
- A service is performed at least once every ten years, unless national requirements prescribe more frequent services. 10-year service, see Appendix 5.

Inspection plan						
Intervals:	Annual control	Servicing	Action			
1 year	٠					
5 years	•	•				
If necessary			•			
10 years: Follow national requirements	see Appendix 5					

Table 1. Inspection plan

The Service Manual provides support for trained and certified service personnel and is part of training package step 1.2, which belongs to Fogmaker International AB. The information contained herein is correct at the time of publication.

For part numbers for all items in this document, refer to our product catalogue. Please contact Fogmaker International AB if you have any questions!

DISCLAIMERS

Only FOGMAKER certified personnel may service Fogmaker fire suppression systems.

FOGMAKER cannot be held accountable for any non-functioning fire suppression system in the case of non-compliance with the instructions and inspection plan in the manual.

This manual assumes that the responsible service technician will comply with all national requirements and other technical information.



Table of Contents

Summary	III
Introduction	1
Protective measures	2
1. Piston Accumulator	6
1.1 Production date/serial number/pressure/volume	6
1.2 The functionality of the piston accumulator	1
1.3 Signal module/micro switch	8
1.4 Damage/leakage	
1.5 The protection box	
1.6 5-year service/reset of piston accumulator	10
2. Detector bottle	30
2.1 Serial number and pressure	30
2.2 Check functionality	1
2.3 Damage/leakage, detector bottle	32
2.4 Refilling/resetting of detector bottle	I
(3. Novec™ system moved to Appendix 6)	
4. Alarm and Cabling	38
4.1 Check functionality, general	38
5. Distribution system	42
5.1 Check functionality/air blow cleaning	42
5.2 Mounting	44
5.3 Damage and leakage	1
5.4 Leakage test of distribution system (if needed)	
5.5 Resetting after system deployment	
6a. Hydropneumatic detection	46
6.1 Check the hydropneumatic activation function	46
6.2 Check mounting of detector tube	



6.3 Check for damage/leakage	
6.4 Electrical/mechanical trigger on the detector loop.	48
6.5 Solenoid valve/semi-automation	
6.6 Resetting the fire detection system	50
6b. Electric Activation	52
6.7 Check functionality	52
6c. Mechanical activation	54
6.8 Check functionality	54
7. Labels and seals	56
7.1 Signs/labels	56
7.2 Check seals	57
8. Final arming and control of the system	58
8.1 Final arming	58
8.2 Functionality check	
Appendix 1: Filling tool 1800	61
Appendix 2: Adjust pressure in the detector bottle	63
Appendix 3: Valves, generation 1 and 2	65
Appendix 4: Service of Mini fire suppression system, MBSS	67
Appendix 5: Service (10-year)	73
Appendix 6: Novec™ system	95
Appendix 7: Waste disposal	99
Other	101
Index	102



www.fogmaker.com



Introduction

This manual explains all the steps in an annual inspection, 5-year service and 10-year service. The manual and checklist have the same structure. For example: Section 1 on page 6 in this manual concerns all steps for the piston accumulator, in the same way as on the service checklist, see Picture 1.

Fill in type of service performed	Checklist for maintenance of the Fogmaker system Place Date Customer	Performed maintenance Annual inspect Service (Five-ye Service (10-yea Action Work order	e: iion ear) ar)	Performed by, company log/name: PARTNER CERTIFIED BY FORMAKER PORMAKER The safety screw must be mounted in the valve when you are working with the system! Type of vehicle/machine/internal no./chassis no.	
Check for each step	1. Piston Accumulator Prod. date:	Not Applicable Not Applicable	Action	B4. Mini fire suppression system, MBSS Applicable, D B4.1 Prod. date: Pressure: OK Series no.: OK CK OK B4.2 Functionality check CK CK B4.3 Damage/leakage CK CK B4.4 Refilling/resetting CK CK B5. Service (10-year) Not Applicable. OK Not Applicable. OK Action CK B5. Service 10-year Piston accumulator (also fill in step 1) CK CK B6.1 Service 10-year Piston accumulator (also fill in step 1) CK Service. B6.1 Prod. date: Pressure: OK Service. B6.2 Functionality check CK CK CK B6.3 Damage/leakage CK CK CK CK B6.4 Refilling/resetting CK CK CK CK Possible action/other notes: CK CK CK CK CK	
	5.5 Resetting 6a. Hydropneumatic de 6.1 Functionality check 6.2 Installation 6.3 Damage/leakage 6.4 Electric/mechanical punc 6.5 Solenoid valve 6.6 Resetting 6b. Electric activation 6.7 6.7 Functionality check 6c. Mechanical activation 6.7 7.1 Signs/labels 7.2 Seals Annual fire safety control has beed [External Service checklit, tff.se] Yes, in accordance with SBF128: Inspection/service not approved: [] Inspection/service approved: []	Not Applicable tection Not Applicable th Not Applicable Not Applicable Not Applicable Not Applicable Not Applicable n completed? accordance No: Irave	Action	Signature, customer Signature, authorised service technician	Fill in any measure required & other commer

Picture 1. Checklist for annual inspection/service/measures (Part no. 8027-002)



Protective measures

All persons responsible for servicing the Fogmaker fire suppression system shall: *

- ... be certified.
- ... follow the instructions in this manual.
- ... take into account that this manual is part of Fogmaker Fire suppression system.
- ... keep this manual intact and available throughout the active life of this product.
- ... follow the inspection plan, see Table 1 on page III, in order for Fogmaker to be able to guarantee the functionality of the system.
- ... continuously service all the tools and calibrate all measuring equipment used for inspection, service and action.
- ... Note that the vehicle's general condition will affect the performance of the Fogmaker system. Annual fire safety inspection, in accordance with SBF127/128, is one way to reduce the risk of vehicle damage due to fire.



The warning triangle marks the instructions that are important for your personal safety and/or affect the system's basic function. Accompanying text in bold next to the warning triangle.



The NOTE box draws attention to instructions that could affect system performance. Accompanying text is in bold next to the NOTE box.



Safety glasses must be used where this symbol is displayed.



WARNING!

When transporting/servicing the Fogmaker fire detection and suppression systems, the safety screw must always be mounted in the valve as otherwise the system may deploy accidentally.

The valve must not be removed when the piston accumulator is pressurised. If the valve or any other part on the cylinder cover is removed when the piston accumulator is pressurised, a powerful jet of liquid may flow out and cause serious personal injury.



Mounted safety screw

* In the case of non-compliance with the above instructions, Fogmaker cannot be held accountable for any non-functioning fire suppression system or personal injury caused by improper handling.





Fogmaker fire suppression system, description Bus

Description of bus, see Picture 2:

- 1. The piston accumulator single type.
- 2. Detector bottle connected to piston accumulator.
- 3. Pressure switch is connected to the bus alarm or directly to the bus CAN bus system.
- 4. Distribution system with spray nozzle for suppressant is connected to the piston accumulator.
- 5. Hydropneumatically activated system, detector tube bursts in case of fire.

OPTIONAL: The Mini fire suppression system or the Novec[™] system may be mounted in a separate space. see appendices.





Fogmaker Fire suppression system, example: machine/

Example description of machine and other installations, see Picture 3

- 1. The piston accumulator one or more cylinders and protection box (gen 1 & 2).
- 2. Detector bottle connected to piston accumulator.
- 3. OPTIONAL: The Mini fire protection system or the Novec[™] system may be mounted in a separate space.
- 4. Pressure switch connected to the alarm panel and separate audible and visual alarm.
- 5. Distribution system with spray nozzle for suppressant is connected to the piston accumulator.
- Hydropneumatically (Picture 3), electrically (Picture 4) or mechanically activated system (Picture 5); they are described under sections 6a, 6b and 6c respectively. Different triggers and solenoid valve/semiautomation can be mounted on the detector tube, see section 6a (Picture 3).







1

Items for 5-year service

1. Piston Accumulator

Fogmaker piston accumulator is a cylindrical container made by anodized aluminium, with one gas side and one liquid side, and a valve on the cylinder cover.

The piston accumulator is pressurised at 100-105 bar at 20°C.

Piston accumulators are mounted outside the fire-protected area. In buses, they are often placed behind the ceiling panel or in the luggage compartment. On machines, the containers are usually placed in protection boxes on the outside of the machine. Follow the hoses and check the size of the system.

1.1 Production date/serial number/pressure/volume

- a. Note the production year and serial number of the piston accumulator, found on the service label (Part no. 8100) on the outside of the cylinder. The serial number and production date are given as numbers or punched in a table, see Picture 6. If the serial number cannot be read, the chassis number stamped on the bottom of the piston accumulator can be given instead, see Picture 7. Also see Chapter 7.
- b. Read the pressure in the container on the pressure gauge, see Picture 8.
- c. Note volume/number of suppressant in liters on the check list, mentioned on safety decal (Part no. 8100), see Picture 6. Also see Chapter 7.

1.2 The functionality of the piston accumulator

The valve opens and closes the piston accumulator and the safety screw locks the valve mechanism.



The safety screw must always be installed so that the fire suppression system is not triggered by mistake during servicing.

- On valve, generation 1 (Part no. 6090-/6091-/6092-010), the safety screw locks the valve latch through a hole on top of the valve straight through the latch, see Picture 9-11.
- On valve, generation 2 (Part no. 6090-/6091-/6092-020), the red screw locks the valve latch by screwing it in through the hole on the side of the valve housing, see Picture 12 and Picture 14. The green cover screw must be placed on the left side of the valve and protected from dirt when the system is activated, see Picture 13.
- The safety screw prevents the valve latch from moving and therefore activating the piston accumulator.





Picture 6. Example service label Picture 7. Chassis number

Picture 8. Top view, piston accumulator



Picture 11. Safety screw in valve



Picture 12. Valve latch, Generation 2 Picture 13. Safety screw, not fitted

Picture 14. Safety screw in valve



1.3 Signal module/micro switch

- a. A micro switch may be mounted on valve, generation 1 (Part no. 6009-020), see Picture 15. Perform a functionality test of the micro switch by removing the safety screws and checking that an alarm is activated.
- b. A signal module may be mounted on generation 2 valves (Part no. 6009-030), see Picture 16. Perform a functionality test of the signal module by removing the green magnet screw and checking that an alarm is activated.
- c. Check that the micro switch/signal module is mounted correctly and is not damaged, and that the magnet is still attached to the green screw for the signal module, see Picture 17.

1.4 Damage/leakage

Visual inspection of piston accumulator, brackets and back mounts, see Picture 18-20. Damage deeper than 2 mm is not permitted on part of the bottom (yellow), damage deeper than 0.5 mm is not permitted on the side (blue). No damage is permitted on the other surfaces (red-white).

Damage deeper than 2 mm is not permitted on any part of the cylinder. A damaged cylinder must be scrapped.



Check for leaks:

- a. Dismantle distribution hose/tube, connected to the nipple on the valve.
- b. Check that there is **no** fluid inside the fitting, see Picture 21.
- c. Check nipple, washer and valve outlet.

If there is no leakage of suppressant, the whole system can be assumed to be free from leakage and thus operational. If suppressant is leaking from the valve, continue to section 1.6.

1.5 The protection box

Check protection box condition.

- a. Protection box must be properly installed and not have any damage that might have damaged the content or reduce the protection of the contents, see Picture 22-24.
- b. Check the mounting of the protection container and the assembly of the piston accumulator in the protection container.
- c. Check that labels are readable and fully visible, see section 7.



Safety screw



Picture 15. Micro switch kit (Part no. 6009-020)



Picture 16. Signal module (Part no. 6009-030)



Picture 17. Safety screw and magnet screw (Part no. 5902-020-M)



Picture 19. Double piston accumulator



Picture 20. Triple accumulator



Picture 18. Piston accumulator, single Ø156 and Ø178 mm



Picture 21. Remove distribution hose, nipple and washer.



Picture 22. Protection box, single



Picture 23. Protection box, gen 1 & 2, double



Picture 24. Protection box, gen 1 & 2, triple



1.6 5-year service/reset of piston accumulator

A service of the Fogmaker fire suppression system must be performed at a longer time interval, where suppressant is refilled and o-rings are replaced, if necessary. If the system was deployed, it must be reset according to this section. See picture 25 for an overview of the piston accumulator.



Check the pressure in the piston accumulator and detector bottle - if both are without pressure and the nozzle caps are gone on the distribution system, the system has been deployed.



Always perform these steps before commencement of service/reset:

- Check that the safety screw is mounted, see Picture 26 27.
- Close the valve on the detector bottle, see Picture 28.
- Disconnect the detector tube from the valve, see Picture 29.
- Disconnect the distribution hose from the valve, see Picture 30.
- Disconnect the piston accumulator from the mounting brackets only applicable to piston accumulator, single type. Double and triple accumulators must have the mounting brackets left.

If it is possible and there is room for the filling tool, the piston accumulator may be serviced while still mounted in the vehicle. The piston accumulator, however, has to be removed if there is suspicion of leakage. If the piston accumulator is hard to reach and/or there is no room for the filling tool, the whole piston accumulator must be disconnected from the vehicle.

The following steps are included in a service/reset of the piston accumulator:

1.6.1	Empty	suppressant	
-------	-------	-------------	--

1.6.2 Disconnect valve/pressure gauge	Performed if there are signs	١
1.6.3 Empty nitrogen gas	of leakage, see page 14.	T
1.6.4 Replace o-rings	er realinge, see prose rit	1

- 1.6.5 Refill nitrogen gas
- 1.6.6 Service/reset valve
- 1.6.7 Refill suppressant

See tool list in Table 7 on page 75.

J





Picture 29. Remove the detector tube

Picture 30. Remove the distribution hose, nipple and washer

1

START

1.6 Cont. Service/reset of piston accumulator

Check the pressure in the piston accumulator and in the detector bottle, start the service according to the steps in the service schedule, Picture 31. Follow the arrows and see the section recommended in each box.



Picture 31. Service schedule, piston accumulator



Open the engine bonnet - inspect the distribution system. If the nozzle caps are gone -there is no pressure in the detector bottle and piston accumulator - the system has been deployed.

13

1.6.1 Empty suppressant from piston accumulator:

Check that the safety screws are fitted. Close the valve on the detector bottle, see Picture 28.

- a. Disconnect the detector hose and distribution hose from the valve, see Picture 29 and 30.
- b. Remove the protection plug carefully in order to gain access to the filling screw, see Picture 35.
- c. Check that the filling tool (Part no. 1800) is functional, see "Appendix 1: Filling tool 1800". See instructional video on our web page: www.fogmaker.com.
- d. Mount the filling tool on the filling screw for liquid, see Picture 36.
- e. Empty the suppressant by carefully opening the filling screw with the filling tool, see Picture 36. The piston accumulator is emptied of liquid when the pressure gauge drops to 20 and then falls to 0 bar.
- f. Disconnect the filling tool.

Used suppressant should be handled according to Appendix 7.

Use a transparent hose when emptying the suppressant as bubbles can be detected during emptying - indicating leakage between gas and liquid sides.

1.6.2 Remove valve, pressure gauge and pressure switch (in case of leakage) If there is suspected leakage in the piston accumulator, all parts on the cylinder cover must be removed, see Picture 37. Does not apply to Ø178 mm extinguishers.

Gas pressure must remain in the piston accumulator for easy removal.

- a. Disconnect the three Allen screws on the valve.
- b. Disassemble pressure gauge
- c. Disassemble pressure switch (optional).
- d. Disconnect the metal hose (Part no. 4117) between the double and triple accumulators, see Picture 38.
- e. Check the threads visually on each of the dismantled items to ensure possible future use. If that is not the case, send the parts for recycling. Washers must not be re-used.
- f. Cylinder covers without components, see Picture 39.

Picture 38. Double piston accumulator m metallslang

Picture 39. Clean cylinder cover

The propellant is nitrogen gas (N_2) , ensure good ventilation during emptying.

- a. Remove the protection plug in the bottom of the cylinder to gain access to the gas filling screw, see Picture 40.
- b. Mount the filling tool (Part no. 1800), see Appendix 1.

Carefully loosen the gas filling screw so the gas starts to evaporate slowly, see Picture 41. When adjusting gas pressure, you will need the gas filling tool (1975) to cut off the gas flow once the pressure is ok.

Check for possible leakage when releasing the gas.

An indication of leakage is that liquid is released together with the gas, in that case the o-rings must be replaced on the piston and on the cylinder cover. Remove the gas filling nipple, Picture 42, and keep the cylinder upside-down when the gas has been removed to ensure no liquid leaks out.

1.6.4 Replace o-rings (in case of leakage)

In order to replace the o-rings on the piston and the cylinder cover, the piston accumulator has to be removed:

- a. Press down the cylinder cover, use tools for cylinder cover (Part no. 1820). Mount the tool and press/wiggle down the cover 4-5 cm, see Picture 43. If needed, use a rubber mallet and tap down the cover.
- b. When the cylinder cover has been pushed down far enough, the lock segments on the inside of the cylinder are exposed - remove these. The number of locking segments depends on the model - the earlier generation has one segment, whereas the later generation has three separate segments, see Picture 44.
- c. Pull up the cylinder cover and put aside once the locking segments are removed, see Picture 45.
- d. Now the piston down in the piston accumulator is visible, see Picture 46. To remove the piston, push a soft rod (up to \emptyset 16 mm) through the hole in the bottom of the cylinder and gently push out the piston, see Picture 47.

It is important that the piston does not overturn inside the cylinder.

Compressed air cannot be used to remove the piston.

e. Check the interior of the cylinder. If the cylinder looks good, rinse the inside/ clean the inside with damp paper and then wipe dry. Also clean the locking segments. If the cylinder is damaged on the inside, Fogmaker should be contacted for evaluation.

Picture 41. Carefully loosen on the filling screw using the filler tool

Picture 40. Remove the protection plug

Picture 42. Remove the gas filling nipple

Picture 44. Locking segment (Part no. 2118)

Picture 43. Press down

Picture 45. Lift out cylinder cover

Picture 46. The piston at bottom of the cylinder

Picture 47. Take the piston out of the cylinder

- 1
- f. Remove the old o-rings from the piston (2 units) and the cylinder cover (1 unit), see Picture 48 49.
- g. Clean the piston and the cylinder cover and mount new o-rings. Use o-ring (Part no. 5501) on previous generation piston, see Picture 49, as well as o-ring (Part no. 5502) on the piston for Ø 178 mm extinguishers.
- h. Grease the inside of the cylinder around 5 cm from the top and down the whole surface with Dow Corning® 200 silicon oil, 350 CST (Part no. 7900), as well as the outside of the piston and the cylinder cover.
- i. Mount the piston into the cylinder by carefully placing it over the cylinder with your hands and then gently pressing and tapping it down with a rubber mallet, see Picture 51. Tap the piston down to 10 cm under the locking grooves in order to make space for the cylinder cover. Do not tap the piston all the way down to the bottom.

Be careful until the piston/cylinder cover is right down in the cylinder. There is a risk that the o-ring will be pushed out of its track and squeezed against the inside of the cylinder.

- j. Remount the cylinder cover to the cylinder by first mounting the tool (Part no. 1820) on the cylinder cover, see Picture 52, and pressing/wiggling it down and then tapping it down carefully with a rubber mallet. Tap the cover down 4-5 cm under the locking grooves in order to mount the locking segments.
- k. Place the locking segments in the locking groove.
- 1. Pull the tool upwards (Part no. 1820) so the cylinder cover ends up level with the edge of the cylinder.

Replace o-ring on the gas filling nipple and gas filling screw:

- a. Remove the old o-ring on the gas filling nipple, see Picture 53.
- b. Clean the nipple. Grease a new o-ring (Part no. 5518) with Dow Corning® 200 silicon oil, 350 CST (Part no. 7900) and mount o-ring with tool on the filling nipple.
- c. Check and clean the threaded hole in the bottom of the cylinder.
- d. Apply thread sealant Loctite® 5400 (Part no. 7904) on the nipple thread and mount the filling nipple in the threaded hole in the bottom of the cylinder with 50Nm.
- e. Mount a new aluminium washer (Part no. 5011) under the gas filling screw (Part no. 2132), see Picture 54.

Attach the gas filling screw all the way in and then unscrew it 1 turn, see Picture 55. This is done in order to later be able to easily use the filling tool.

Picture 54. Washer (Part no. 5011) with Screw (Part no. 2132)

Picture 55. Tighten the gas filling screw

1.6.5 Pressurise piston accumulator/check gas pressure

In order to fill with gas, a filling tool (Part no. 1800) only intended for use with gas is used, alternatively a filling tool also used for liquid can be blown clean before gas filling. If there is still gas left in the cylinder: release the gas carefully, see section 1.6.3.

Only nitrogen gas (N₂) may be used for gas filling.

a. Mount a new aluminium washer under the gas filling screw.

Attach the gas filling screw all the way in and then unscrew it 1 turn, see previous section.

- b. Mount the filler tool (after inspection according to Appendix 1) on the gas-filling nipple, see Picture 56 and screw the hexagonal rod into the tool so it grips the filling screw inside the nipple, see "Appendix 1: Filling tool 1800" and the video on the website: www.fogmaker.com for further instructions.
- c. Connect the filling tool, gas filling tool and gas regulator to the nitrogen gas holder, see Picture 57.
- d. Then loosen the gas filling screw 2 3 turns with the filling tool.
- e. Ensure that the pressure relief valve is closed, see Picture 57.
- f. Adjust the gas regulator on the gas bottle in accordance with Table 2, see also Picture 57. Before serial number 17607 on the piston accumulator, the piston height is 61 mm, thereafter the piston height is 45 mm, and the gas pressure is adjusted accordingly.

Proglangint age processes	Piston accumulator (litres - Ø)					
breakpoint gas pressure	3.3-151	4-151	6-178	6.5-151	7.5-151	11.5-178
Piston accumulator serial number.	Gas pressure (bar)					
17608>	20	18	20	18	16.5	16.5
0-17607	20	20	-	20	-	-

Table 2. Breakpoint gas pressure

- g. Open the main valve on the gas bottle, see Picture 57. When the gas pressure increases, you may hear a "plop" when the piston is pushed upwards in the cylinder by the pressure. Continue filling until the cylinder has obtained the correct gas pressure, check the pressure gauge.
- h. When the gas pressure is correct according to Table 2, tighten the gas filling screw with the filling tool (Part no. 1800).
- i. Close the main valve of the gas bottle.
- j. Open the pressure release valve on the gas filling tool and release the pressure in the hose, see Picture 57.
- k. Remove the filling tool (Part no. 1800) and the gas filling tool (Part no. 1975).
- 1. Tighten the gas filling screw with a torque wrench 7±1 Nm.
- m. Mount the protection plug (Part no. 5050-10) on the gas filling nipple with a torque wrench 15±1 Nm.

Picture 56. Mount (Part no. 1800) on the gas filling nipple

Picture 57. Mount the gas filling tool and gas regulator

1

1.6.6 5 Service & resetting of valve

There are three types of valves:

- The hydropneumatically activated valve.
- The electrically activated valve.
- The mechanically activated valve.

They are available in two different generations: 1 and 2. Generation 2 is fully enclosed and has a different design/barrier function, see Picture 58 and Picture 59. The membrane plug and electrical/metron plug are replaced in the same way on the different generations of valve.

Servicing of the valve can be performed with the valve mounted on the piston accumulator, but only if the piston accumulator is emptied of liquid and pressurised with gas.

For comprehensive service of the valve, see Appendix 5: 10-year service.

Service (Five-year) of hydropneumatic valve, (see Appendix 5 for 10-year service)

a. Remove the membrane plug, replace the membrane, see Picture 60.

For membrane plugs with safety valves, do NOT remove 13 mm hexagon screws, see Picture 61.

- b. Clean membrane plug and replace o-ring (Part no. 5517).
- c. Check the version of the membrane plug, see Picture 62. If the membrane plug has a flat bottom surface, it is from version 1 and it is recommended that you replace it with version 2, which has a border around the bottom surface (and a security valve, see Picture 61).
- d. Mount new membrane on the membrane plug: Version 1 has a membrane with a diameter of 14 mm (Part no. 5520). Version 2 has a membrane with a diameter of 13 mm (Part no. 5520-13). Apply silicone lubricant, Molykote[®] compound 111 (Part no. 7907), on the membrane and place on the end face of the membrane plug.
- e. Apply a small amount of thread sealant Loctite[®] 5400 (Part no. 7904) on the threads of the membrane plug. Generation 1 membrane plugs must be mounted in the valve with **7± 1 Nm**. Generation 2 membrane plugs must be mounted in the valve with **12± 1 Nm**. The membrane plug must be mounted in the left hole of the valve, see Picture 60.

Service (five-year) of Electrically activated valve (Part no. 6091-010/-020):

- a. Replace the membrane as described above.
- b. Replace the electrical plug/metron in the right hole in the valve with a new complete plug (Part no. 6033/6033M), see Picture 63. Apply thread sealant Loctite[®] 5400 (Part no. 7904) on the threads of the adaptor and mount.

Picture 63. Servicing of electrically activated valves is done in the same way for generation 1 and 2 valves and for the metron/powder charge

2:

Service (5-year) of Mechanically activated valve (Part no. 6090-010/-020):

a. Replace the membrane in accordance with "Service of hydropneumatic valve", see Picture 60-61 and 63.

An overview of the valves and parts can be found in Appendix 3.

Resetting of hydropneumatic valve (Part no. 6092-010/-020):

If the system has been deployed, the valve on the piston accumulator needs to be reset.

- a. Replace the membrane according to instructions on page 22.
- b. Restore the valve latch and insert the security screw, see Picture 65 hydropneumatic valve.

Resetting of Electrically activated valve (Part no. 6091-010/-020):

- a. Replace the membrane according to instructions on page 22.
- b. Dismount the electrical plug and replace for a new complete plug according to instructions on page 22.
- c. Put the valve latch in restored position, see Picture 65- electrical valve.

Resetting of Mechanically activated valve (Part no. 6090-010/-020):

- a. Replace the membrane according to instructions on page 22.
- b. Check the wires and seals on handles, see section "6c. Mechanical activation" on page 54.
- c. Put the valve latch in restored position, see Picture 65 mechanical valve.

1

Picture 64. Servicing of mechanically activated valves is done in the same way for generation 1 and 2 valves.

Re-mounting the valve, pressure gauge and pressure switch

(for components that were previously removed, otherwise continue to section 1.6.7)

- a. Place a new o-ring under the valve, see Picture 66. Mount the valve with three Allen screws, torque: 10±1Nm.
- b. Re-mount the pressure gauge (Part no. 6200/6200-30/6200-50/6200-60), or if not functional, replace with a new pressure gauge.

If pressure gauge 6200-30 (conical thread) is replaced with pressure gauge 6200-50/-60 (straight thread), the threads in the cylinder cover must be inspected for possible damage prior to installation. A steel-rubber washer (Part No. 5605) must always be used when installing a pressure gauge 6200-50/-60.

Apply thread sealant Loctite® 5400 (Part no. 7904) on the thread of the pressure gauge. Tightening torque: 10±1 Nm with torque wrench. If the pressure gauge (Part no. 6200/6200-30) is installed on a used cylinder cover, a steel rubber washer must be used when re-mounting (Part no. 5605).

- c. Re-mount pressure switch, if any (Part no. 6607/6608-075/6608-080) with a new steel rubber washer underneath, torque: 20±1Nm. Replace the pressure switch with a new one if it is no longer functional.
- d. Mount a new aluminium washer under the filling screw.
- e. In case of double/triple accumulator, re-mount the metal hose (Part no. 4117) between the containers, tightening torque 58±2 Nm, see Picture 67.

Picture 66. Exploded drawing, cylinder cover with components, same o-ring and screws are used for generation 1 and 2 valves.

Picture 67. Double piston accumulator m metallslang

1.6.7 Refill suppressant

Pay close attention to cleanliness when handling the filling pump!

- a. Remove the protection plug if it is attached, Picture 68.
- b. Mount the filling tool (after inspection according to Appendix 1) on the filling screw, Picture 69, see instructional video on the website: www.fogmaker.com.
- c. In order to fill the piston accumulator, a Fogmaker filling pump is used, see manual Mount the high-pressure, re-circulation and low-pressure hoses in accordance with Picture 70. There are different types of suppressants, check which type of suppressant that shall be used, see label on the service decal, Picture 71.

Suppresent volume (Bart pe	Volume				
suppressum, volume/Familio.	25 LIT	200 LIT	1000 LIT		
Suppressant -35°C	1891	1831-200	8131-1000		
Suppressant 0°C	1890	-	-		

Table 3. FM suppressant

Only use suppressant from Fogmaker, see Table 3.

c. Fill the piston accumulator.

Fill the piston accumulator until the pressure gauge shows a pressure of 100-105 bar at 20°C

- d. Shut off the filling pump, release pressure from the high-pressure hose and remove it according to Filling pump manual.
- e. Disconnect the filling tool.
- f. Tighten the filling screw with 7±1 Nm.

Final steps: It is important to clean the piston accumulator after service!

- a. Wipe down the piston accumulator until it is clean. Use methylated spirits if necessary.
- b. Replace damaged labels, see section "7. Labels and seals" on page 56.

Picture 68. Remove the protection plug

See instruction movie on our web page: www.fogmaker.com

Picture 69. Filling tool mounted on filling screw

Picture 72. Cleaning the piston accumulator

2. Detector bottle

The detector bottle contains liquid and nitrogen gas and is pressurised at 20-24 bar after installation, see Picture 73 and 74. The detector bottle has one or two pressure switches, which indicate if the pressure is under 14 bar (and 5 bar, respectively, optional) in the system. The detector bottle has a ball valve which must be open when the system is active.

2.1 Serial number and pressure

- a. Note the serial number found on the label of the detector bottle (Part no. 8191), see Picture 74. If the number is not visible, note the chassis number that is punched on the bottleneck, see Picture 75.
- b. Also check the rest of the labels, see section 7.
- c. The bottle pressure can be checked on the pressure gauge on the top of the bottle and should be within the green area, see variations of the pressure gauge on Picture 77 and 78.

Pressure in the detector bottle should be 20-24 bar at 20°C. Variations may occur.

If the pressure is too low - under 20 bar at 20°C - go to section 2.4 and refill the bottle.

If the pressure is too high - over 24 bar at 20°C - go to Appendix 2 and adjust the pressure in the bottle.

2.2 Check functionality

There is a siphon tube in the detector bottle, Picture 76which means that the bottle must be placed according the instructions for normal function.

The bottle should be mounted standing up at an angle of maximum -90 to 90° see Picture 79.

If a detector bottle at the wrong angle is detected during a service, the bottle must be refitted at the correct angle.

The hydropneumatic detection system is activated when the valve is open and deactivated when the valve is closed, see Picture 80.

If the valve is closed, check that the safety screw is mounted in the valve on the piston accumulator and that the detector tube is undamaged before the valve is opened.




Picture 73. Detector Bottle

Picture 75. Chassis number





Picture 77. Approved pressure, pressure gauge (Part no. 6203-05)



Picture 78. Approved pressure, pressure gauge (Part no. 6203-06)



Picture 79. Detector bottle position

Picture 80. Closed/Open valve



2.3 Damage/leakage, detector bottle

Check that the bottle is not damaged and is tightly fastened. If the bottle pressure is OK, no leakage can occur, see Picture 81.



Damage deeper than 0.7 mm is not permitted on any part of the 0.8 litre bottle, see Picture 82. **Damage is not permitted** on any part of the 0.9 litre bottle, see Picture 83. Contact an authorised partner to exchange a bottle. A damaged bottle must be scrapped.

2.4 Refilling/resetting of detector bottle

The manual only concerns refilling of detector bottle if the system has been deployed. Only refill the detector bottle when the pressure gauge shows a pressure under 20 bar, following these steps:

- 2.4.1. Empty the bottle before refilling it.
- 2.4.2. Create vacuum inside the bottle
- 2.4.3 Refilling
- 2.4.4 Pressurise the detector bottle

2.4.1. Empty the bottle before refilling it

After system deployment, a detector bottle has about 50 ml of liquid left in it due to the design.

- a. Compare the weight of the bottle with the values in table 3. If the weight exceeds the values in the table, there is extra liquid remaining that needs to be emptied in order to ensure that the correct amount of liquid is refilled in the detector bottle. There are two different volumes of detector bottles, 0.9 l and 0.8 l. The actual volume is printed on the bottleneck, see Picture 82 and 83.
- b. Pressurize the bottle with 3 7 bar with nitrogen gas, see section 2.4.4.
- c. After that, keep the detector bottle with the pressure gauge upwards.
- d. Place one end of the connected detector tube in an empty container and carefully open the ball valve in order to release excess liquid, see Picture 84.

2.4.2. Create vacuum inside the bottle:

Mount the parts that are parts of tools for refilling of detector bottle, see Picture 85-87 depending on L- or T-coupling on the detector bottle. Use enclosed end plug for the T-coupling. If end plug is missing, temporarily use a standard pneumatic blind plug \emptyset 6 mm. Check the direction of the vacuum ejector, see Picture 88.

- a. Connect the blue hose to compressed air (at least 6 bar).
- b. Open the ball valve on the detector bottle
- c. Wait 10 15 seconds in order to create vacuum in the bottle.
- d. Close the ball valve on the detector bottle and disconnect the compressed air.
- e. Disconnect the vacuum ejector from orange hose: press the outer ring and pull the orange hose outwards.





Picture 81. Damage, leakage, attachment



Picture 82. 0.8 litre detector bottle (Generation 2) NOTE! No damage deeper than 0.7 mm is permitted!



Picture 85. Detector filling tool (Part no. 1970)

Type of detector bottle: 0.9 L	Part no.	50 ml liquid
1 pressure switch with L-coupling	1657	740 g
2 pressure switches with L-coupling	1655	780 g
1 pressure switch with T-coupling	1656	750 g
2 pressure switches with T-coupling	1654	790 g

Type of detector bottle: 0.8 L	Part no.	50 ml liquid
1 pressure switch with L-coupling	1657	980 g
2 pressure switches with L-coupling	1655	1020 g
1 pressure switch with T-coupling	1656	990 g
2 pressure switches with T-coupling	1654	1030 g

Table 4. Detector bottle with weights



Picture 83. 0.9 litre detector bottle (Generation 1) NOTE! No damage permitted.



Picture 84. Emptying detector bottle





2.4.3 Refilling:

- a. There are two different types of detector liquid. Standard is propylene glycol, which is red coloured. Ethylene glycol is blue coloured, check designation on the information label, see Picture 89.
- b. For refill, use the amount of liquid stated in Table 5. Fill a container with the correct amount of liquid.
- c. Place the detector tube in the container with liquid and ensure that it reaches the bottom of the container, see Picture 90.
- d. Open the ball valve on the detector bottle and wait until the content in the plastic bottle has been sucked in to the detector bottle. When the vacuum is gone, close the ball valve on the detector bottle.

2.4.4 Pressurise the detector bottle:

Only use nitrogen gas (N₂).

Pressure in the detector bottle should be 24 bar and the detector tube must be pre-filled.

Use the gas filling tool, see Picture 91:

a. Connect the gas filling tool to the detector bottle with detector tube a. Then connect the other end of the gas filling tool via the high-pressure hose to the gas regulator on the nitrogen gas bottle, see Picture 92.



Be careful with the pressure gauge on the gas filling tool.

- b. Adjust the gas regulator on the nitrogen gas bottle until desired pressure (24 or 31 bar, see above) and open the flow.
- c. Open the ball valve on the gas filling tool.



- d. Open the ball valve on the detector bottle carefully. Gas filling begins. Wait until the pressure is equalised and there is no more sound of any flow.
- e. Close the ball valve on the detector bottle
- f. Close the ball valve on the filling tool
- g. Close the valve on the gas bottle
- h. Open the pressure release valve on the gas filling tool to release residual pressure in the hose
- i. Dismantle all equipment from the detector bottle, which is now ready for use. To disconnect hoses from the couplings, press the outer ring inwards and disconnect the detector tube. This also applies to the quick coupling on the detector bottle, see Picture 93.





Warning Harmful if swallowed, Contains may explode if heated. Content: Ethylene glycol (Index

Picture 89. Designation on the information label for ethylene glycol



Picture 90. Refilling of detector bottle

Refill the bottle with detector
liquid:Fluid amount
(ml)Type of detector bottle: 0.9 I400Type of detector bottle: 0.8 I300

Table 5. Detector liquid amount, refilling





Picture 93. Remove coupling from detector tube



Service of vacuum ejector

The vacuum ejector does not work if there is liquid inside it. To clean the ejector, rinse it thoroughly in water, blow it dry with compressed air, see Picture 94.

Resetting the detector bottle after system deployment:

- a. If the bottle is not damaged, restore it in accordance with the instructions in section 2.4.
- b. Re-mount the reset bottle at the right angle, see Picture 95.

For resetting of the complete fire detection system, see section "6.6 Resetting the fire detection system" on page 50.





Picture 94. Vacuum ejector (Part no. 4260)



Picture 95. Detector bottle position



4. Alarm and Cabling

A pressure switch on the piston accumulator gives an alarm if the pressure falls below 80 bar (optional).

Pressure switch(es) on the detector bottle gives an alarm if the pressure falls below 14 bar and 5 bar (optional).

These are connected to the alarm panel or the CAN-bus in the driver environment and sound and light signals, if available. For the system to trigger an alarm in case of a fire, the requirement is that the cables are undamaged and functional, which is checked during the service.

4.1 Check functionality, general

Check that visible cables and/or accessible cables and cable protection are undamaged. See Picture 96 and 97 for an overview. Note that cabling varies a lot depending on the installation.

See next pages for checking of alarm panels.





Picture 96. Overview: Fogmaker fire suppression system in bus



Picture 97. Overview: Fogmaker fire suppression system in underground loader



Check functionality, alarm panels

Perform systems test by pushing the test button on the central unit or alarm panel, see pictures of Fogmaker alarm panels, Picture 98-101. For machine installations, acoustic and visual alarms can also be installed, see Picture 102 and 103.

If the test button is missing: In order to test the alarm function, disconnect a coupling to a pressure switch on detector bottle or piston accumulator, see Picture 104 and 105. The pressure switches are type NO, which means that the alarm indicates if the pressure falls below the pressure switch's breakpoint when the circuit is closed. If signal is given when connector is disconnected, the alarm circuit is OK.

Pressure switch on the piston accumulator and a second pressure switch on the detector bottle is optional so the number of pressure switches installed may vary. Alarm or error signal is emitted depending on which panel is installed and the different number of pressure switches. See wiring diagram for each part.

Remember to refit the contacts on the pressure switches on the detector bottle and piston accumulator after a service.

Reset of alarm after discharge of the fire suppression system:

- Replace all damaged components.
- Check all wires.
- Perform systems test by pushing the test button if there is one.





Picture 104. Pressure switch on detector/Novec^{$^{\text{m}}$} bottle



Picture 105. Pressure switch on piston accumulator



5. Distribution system

The distribution system consists of distribution hoses, pipes and fittings, and spray nozzles. Their task is to distribute the suppressant from the piston accumulator out into the fire protected area, see Picture 107.

5.1 Check functionality/air blow cleaning

- a. Air blow clean the distribution system to find any inner/exterior damage to the tube, check that all couplings are correctly tightened and to test the nozzle's function: Mount the safety screw and remove the distribution hose from the valve, and turn on the compressed air, see Picture 106. This can be conveniently carried out in connection with item 1.4 on page 8.
- b. Fit new protective caps on all nozzles in the system, see Picture 108 and 123.

All spray nozzles must have protective caps. Protective caps cannot be reused.

If it is not possible to air blow clean the system or the system leaks, the functionality is not approved and the system must be investigated to find the blockage/damage/loose coupling.



When replacing the nozzle, check that the correct type of spray nozzle is re-mounted: see designation or shape of the nozzle, see Picture 110.

The previous generation with a brass cap has a different shape of nozzle body, see Part no. 1500 (smooth), 1501 (turned groove) and 15010 (hexagon). Use tool (Part no. 1819) to replace it. The later generations with rubber protective caps have a designation punched along the edge, see Picture 110. Remove the nut holding the nozzle in place and remove the old nozzle. Blow clean with compressed air and mount a new spray nozzle, see Picture 111. Tighten the nut to 20 Nm using a torque wrench. This applies only to the latest generation of Fogmaker nozzles. If other generations of nozzles are installed, please contact Fogmaker.





Picture 111. Nozzle replacement



5.2 Mounting

The tube is mounted with a tightening torque = 40±1Nm. For all other couplings, tightening torque: 20-30Nm.

Pipes must be fastened with steel rubber clamps. The distribution hose must be fixed with steel rubber clamps or cable ties, see Picture 112 - 115. Minimum distance between steel rubber clamps is 300 mm, maximum distance from the end part to clamp is 100 mm, see Picture 112 and 115. If worn, replace steel rubber clamps.

5.3 Damage and leakage

- a. Clamps keeping pipes and hoses in place shall be tightened, but there should be no abrasions on distribution hoses or pipes, check that they still have the rubber protection intact.
- b. Check that pipes and hoses are not exposed against a hot or sharp surface that can damage.
- c. Check distribution hoses for damages generated from sunlight, age and similar, see Picture 116 and 117. Pay extra attention to hoses on the exterior of machinery, which are exposed to the elements.

5.4 Leakage test of distribution system (if needed)

Leakage testing is only carried out if leakage in the pipe system is suspected, see Picture 118.

- a. Mount the safety screw in the valve.
- b. Remove the distribution hose from the piston accumulator.
- c. Replace nozzles with plugs.
- d. Spray couplings with leakage spray.
- e. Connect compressed air to the distribution hose.
- f. Check for bubbles around the couplings.

5.5 Resetting after system deployment

Rinse with water as soon as possible after system deployment. If the system has been left without rinsing after deployment for more than 24 to 48 hours, depending on external factors, a functionality test must be performed as follows:

Check that the system has been deployed before commencing resetting.

- a. Remove the distribution hose from the piston accumulator.
- b. Leave all nozzles in place and flush the pipe system with water using the filling pump (Part no. 1811-05) and the same couplings according to Picture 118.
- c. After that, blow the pipe system with compressed air Picture 118.
- d. Mount new spray nozzles.





Picture 112. Distribution system



Picture 113. Clamp (Part No. 5318)

Picture 114. Clamp (Part no. 5314) Picture 115. End nozzle with clamp (Part no. 5308)





Picture 116. Distribution hose (Part no. 41XX)

Picture 117. Distribution hose with protection conduit



Picture 118. Leakage test



6a. Hydropneumatic detection

Hydropneumatic detection means fully automated activation of the fire suppression system in case of fire. The detector tube, filled with liquid and pressurised to 24 bar, bursts at an **inner temperature of 170°C**. The detector tube is protected by a protective conduit/coil if needed, to avoid damage, see Picture 119.

If the detector tube is mounted to couplings in hot areas where the air temperature can reach 65°C, a support sleeve must be mounted. Fogmaker recommends that a support sleeve is fitted <u>in all connections</u>. The support sleeve must always be fully fitted, see Picture 120.

6.1 Check the hydropneumatic activation function

a. Check that the protective conduit is mounted where it is supposed to protect the detector tube from damage.

The protective conduit must be undamaged and cover the detector tube outside the fire protected area, see Picture 121.

b. Check that the spiral is attached to the whole detector tube in the fire protected area. Check the protective coil's cut ends so it is bent upwards according to Picture 122 so there is no risk of damage to the detector tube.

The protection coil must cover the detector tube in fire protected areas, see Picture 122.

6.2 Check mounting of detector tube

- a. Check that the detector tube is placed high up in the engine room and fasten with clamps or cable ties. Cable ties should be 10 mm wide or more. If thinner cable ties are used, a piece of protective conduit (at least 50 mm in length) always needs to be placed between the detector tube and the cable tie, see Picture 123.
- b. Check couplings so the detector tube is attached to these, see Picture 119.
- c. The detector loop must be marked so it is easily identifiable, using labels as in Picture 124. Replace if needed. 8220 must be placed at a suitable distance from each other on the detector tube for good visibility, use one label per metre.

6.3 Check for damage/leakage

Check that the detector tube is intact. A damaged detector tube will burst at a lower temperature than intended, which increases the risk of unintentional activation. Replace damaged tube, see section 6.6.





47

<mark>6</mark>a



6.4 Electrical/mechanical trigger on the detector loop.

The electrically activated trigger and the mechanical trigger, see Picture 125 and 141, are used to create a manual deployment option for the fire suppression system's hydropneumatic detection. They are complementary to the fully automatic function.

The electrically activated trigger on Picture 125, is mounted on the detector tube and connected to an activation button placed by the driver's seat, see Picture 126. When the button is pressed, the detector tube is punctured and the fluid leaks.

The manual trigger exists in three generations:

- Generation 1 (Part No. 1317) on Picture 127.
- Generation 2 & 3 (Part no. 1316), same appearance, on Picture 128.
- As well as the robust trigger (Part no. 1315-030) on Picture 129.

They are all mounted on the detector tube. When the safety pin is pulled out and the pressure is reduced, detector liquid leaks out and the system is activated.

An evacuation hose is connected to all triggers, and it leads away the detector liquid if the trigger is installed in the passenger/driver's area.

- a. Check that the evacuation hose is not blocked, see Picture 130.
- b. Check holder for the mechanical trigger, see Picture 130.
- c. Check that cables and mechanical parts are undamaged and that the seal is unbroken, see Picture 131.

6.5 Solenoid valve/semi-automation

The solenoid valve enables semi-automation of the Fogmaker's hydropneumatic functionality. When the ignition is on, the solenoid valve is closed and the system only gives a signal for the alarm, no activation of the system. When the ignition is switched off, the solenoid valve is activated and opens the detection system all the way to the piston accumulator. The system can then be deployed in case of fire.

- a. Check the solenoid valve it should be intact and clean, see Picture 132.
- b. The check valve looks like this Picture 133, check that the arrow on the check valve points along the detector tube from the piston accumulator, see Picture 134.
- c. Check electric cables.
- d. Perform a functionality check as follows: switch on the ignition and touch the solenoid valve, it is working if it "clicks" when the power is turned on/off.







Picture 128. Manual trigger generation 2 & 3 (Part no. 1316)



Picture 125. Electrical trigger (Part no. 1318)

Picture 129. Heavy-duty trigger (Part No. 1315-030)







Picture 130. Holder (Part no. 1317-07) Picture 131. Seal



Picture 132. Solenoid valve (Part no. 4926)



Picture 133. Check valve (Part no. 4924-010



Picture 134. Mounting Solenoid valve



6.6 Resetting the fire detection system

0

Check that the system has been deployed before commencing resetting.

Replace the whole detector tube or only one part. If so, splice with a straight detector fitting and support sleeve:

- a. Remove the old tube, Picture 135.
- b. Cut the hose in the right length with the detector tube cutter see Picture 136 ensure that the edges are straight.
- c. Mount a support sleeve in each end of the detector hose, see Picture 137.
- d. Re-mount the detector tube with protective conduit and protective coil with steel rubber clamp in the fire protected area, see Picture 139.
- e. The detector tube must be pre-filled and connected to a detector bottle with 24 bar pressure, according to the user guide Pre-fill detector tube (Part no. 8025-001), se Picture 140.
- f. Finally, connect the detector tube to the coupling on the detector bottle/valve on the piston accumulator. Draw a control line at 23 mm from the end of the detector tube and press/twist the tube into the couplings, see Picture 141.
- g. Check the manual triggers: When the manual trigger, generation 1 (Part no. 1317) is activated: Pull up the button if it is stuck in down position. Remove and check the inside of needle for any residues from the detector tube. When generation 2/3 (Part no. 1316) is activated, the button gets stuck in down position:
 - Unscrew the top nut.
 - Pull out the button with axis.
 - Replace o-ring (Part no. 5510, 4.1 mm x 1.6 mm) on the mechanical trigger (Part no. 1316 generation 2 of 3). The o-ring must be mounted in the lower groove, see Picture 142. Generation 3 has an o-ring that does not need replacement.
 - Grease the o-ring and axis with silicon fat Molykote® compound 111 (Part no. 7907).
 - Re-mount the button with axis and o-ring.
- h. Replace the complete electrical trigger (Part no. 1318).

Unlock the fire detection system by gently turning the ball valve on the detector bottle to the open position, see Picture 143.

i. Check labels and seals, see section 7.

<mark>6</mark>a





Picture 143. Activate fire detection system

6a



6b. Electric Activation

The Fogmaker fire suppression system can be electrically activated when the piston accumulator has an electrically activated valve, see Picture 144. Activation of the system is done by pressing the a button, where the button is connected with cables to the powder charge/metron in the valve, see Picture 145 and 146. The buttons used are mounted close to the driver's environment or on the side of the machine, see Picture 147-149.

Electric activation can be combined with mechanical activation, see section 6c.

Note that if the valve has only electrical and/or mechanical actuation, the system must be deployed manually.

6.7 Check functionality

- a. Check cables to and from the valve, and that the buttons are undamaged.
- b. To check functionality of the activation button, either test method A or B is used:

Check that the safety screw is mounted in the valve on the piston accumulator before checking functionality!

• Test method A:

Loosen the connector to the valve on the piston accumulator and press the activation button. Measure with a multimeter to ensure that there is voltage to the valve on the piston accumulator, at least 12 V.

• Test method B:

To check the alarm circuit, connect an audible or visual alarm (see section 4) temporarily to the electric activation button. This must give a sound or light signal when the activation button is pushed.

Resetting an electrically activated system

Check that the system has been deployed before commencing resetting.

- a. Mount the safety screw to the valve on the piston accumulator with the valve latch in reset position, see Picture 150.
- b. Reset the piston accumulator, see 1.6.
- c. Replace the powder charge to the metron, see resetting of valve, section 1.6.6.
- d. Check all wires
- e. Check labels and seals, see section 7.

6b





Picture 144. Exploded drawing electrically activated valve (Part no. 6091-010/020)



Picture 145. Powder charge (Part no. 6033)



Picture 146. Metron (Part no. 6033M)



Picture 147. Push button box (Part no. 6955) Picture 148. Activation button



Picture 149. Activation button 6999



Picture 150. Valve latch, electric/mechanical valve





6b



6c. Mechanical activation

Fogmaker fire suppression system with mechanical activation means that the piston accumulator has a mechanically activated valve, see Picture 151. This valve is connected to one or several wires with pull handles, see Picture 152 (and Picture 5). When mounted in vehicles, one handle is often placed by the operator/driver's seat and the other on the outside of the vehicle. Up to four handles can be mounted on the same machine. The handles are equipped with shackle locks, which are sealed, see Picture 153. Wires are clamped with steel rubber clamps at a distance of 300 mm along the housing of the wire.

Note that if the valve has only electrical and/or mechanical actuation, the system must be deployed manually.

6.8 Check functionality

Check that the safety screw is mounted in the valve before the functionality test - so the system is not deployed unintentionally.

Remove the wire from the valve latch. This is done by pulling the wire stop out of the groove of the latch, see Picture 154.

- a. Check that the mechanical wires runs freely from valve to activation handle by breaking the seal and pulling the handle(s).
- b. Check the wire so it is not broken or bent. The minimum radius of the wire should be more than 150 mm.
- c. Check the clamping of the wire case. The last clamp should be attached as close to the valve as possible so the wire housing is fixed.
- d. Check that safety locks on the handles can be opened with enough resistance.
- e. Check that the wire runs easily if not, replace it: contact an authorised installer.
- f. Check labels and put new seal, see section 7.

Resetting a mechanically activated system

6c

Check that the system has been deployed before commencing resetting.

- a. Fasten the safety screw in the valve with the valve latch in reset position, see Picture 155, and remove mechanical wires to be able to reset the piston accumulator.
- b. Reset the valve in accordance to section 1.6.6.
- c. Check the functionality of mechanical parts as per above.
- d. Check labels and seals, section 7.

) (





Picture 151. Mechanical attachment to the valve, generation $\ensuremath{\mathbf{2}}$

Picture 152. Mechanically activated valve (Part no. 6090-010/020)



Picture 153. Activation handle (Part no. 1309-1313)

6090-010/-020 mech.



Picture 154. Wire stop mounted on the valve latch on generation 1 valves



Picture 155. Reset position on valve latch

6c



7. Labels and seals

7.1 Signs/labels

Check that all labels/signs are undamaged and readable. Add and replace if needed:

Labels on piston accumulator/protection box: See bPicture 156-162.



Mount a new service marker after service:







Picture 158. Information label, also placed on the protection containers.



Picture 159. Warning label, also placed on the protection containers.



Picture 156. Serial number label (preprinted) with service marker and suppressant marker. Contact your Dealer if the serial number label needs replacing.



Picture 157. Pressure testing label, contact your dealer if it needs to be replaced.

PROXIMA R	EVI	SIC	N	• 1	NĂ.	ST/	A RI	EVI	SIC	DN
20YY-MM	0	1	2	3	4	5	6	7	8	9
Y										
Y										
M										
M										

Picture 160. 10-year service label, Mark when the next 10year service must be done,



Picture 161. Warning sign should be placed on the metal hose between double and triple cylinders.



Picture 162. Valve label, cut off and place above the hole after the safety screw in the valve (generation 1).

Labels on detector bottle/system:

See Picture 163-166.



Picture 163. Information label

Load pressure 0 bar	Load pressure 31 bar
1656-AIR	1654-02-31
1657-AIR	1655-02-31
Load pressure 24 bar	1656
1656-00-24	1657
1657-00-24	1658-02-31
1657-04-24	1659-02-31
_	
	8192





Picture 165. Serial number label, contact your dealer if this needs to be replaced as it has a pre-printed serial number



Picture 166. The detector label must be placed on the detector tube



Labels on/beside alarm panels, driver information:

Check all labels/signs so they are undamaged and readable, see Picture 167-170.



Labels for manual trigger, electric/mechanical activation:

Check signs/labels beside the manual trigger, and signs/labels beside the activation button/handle in the driver's area, see Picture 171-174:



General:

Mount Information label in a suitable place, Picture 175.

motorrum

Picture 175. Information label

8422

7.2 Check seals

Check that there is a seal on the manual trigger, Picture 176, on the activation buttons, Picture 177. and on the mechanical pull handle, Picture 178.



Picture 176. Seal, trigger



Picture 177. Seal activation buttons



Picture 178. Seal mechanical pull handles



8. Final arming and control of the system

When the entire fire suppression system has been serviced, you can arm it:

8.1 Final arming

After service of hydropneumatic system: **Always check that the detection system is pressurised and fully operational before the safety screw on the piston accumulator's valve is dismantled**!

Once you have checked that all the components parts of the detection system are connected properly, perform steps a-b and then c: (In event a mechanical/ electrical activated system is being serviced, you can go directly to step c.)

- a. Pressurise the detection system by slowly opening the valve on the detector bottle, see Picture 179.
- b. Check that the pressure in the detection system is 20–24 bar at 20°C. Check this value again after 15 minutes. If the value is then constant, the detection system is assumed to be fully operational.

After the detection system has been found to be fully operational, you can proceed:

c. Remove the safety screw from the side of the suppression valve and install it instead in the signal module on top of the valve. Replace the safety screw with the cover screw in the side of the valve.

8.2 Functionality check

This list shows how the system must be checked, see Picture 180:

- a. Pressure=OK. If you are unsure of the status of the piston accumulator, please contact Fogmaker.
- b. Make sure that the distribution system is tight.
- c. Check to see if the alarms are properly connected by pressing the test button on the alarm panel. You can also pull out the pressure switch on the detector bottle and on the piston accumulator, if it is equipped with a pressure switch, the alarm must sound/illuminate with visual and acoustic signals.
- d. Make sure that the ball valve on the detector bottle is open.
- e. Check that the safety screw is removed from the valve.

The Fogmaker fire suppression system is ready for use as soon as it has been checked according to this list.













www.fogmaker.com

B1



Appendix 1: Filling tool 1800

Inspection and service of filling tool (Part no. 1800 and 1800_L), Picture 181. The filling tool is used when:

- Filling and emptying suppressant in the piston accumulator.
- Filling and emptying nitrogen gas in the piston accumulator, see Picture 182.







Picture 181. Filling tool (Part no. 1800 and 1800_L)

Picture 182. Filling tool mounted on the suppressant side and the gas side

It is recommended that you have one filling tool intended for liquid and one for gas, if not, blow filling tool dry before gas filling.

See the video here for a description of how the filling tool is used: fogmaker.com.

Check before each use (see Picture 183):

- a. That the hexagon rod has sharp edges at least 5 mm from the end and is tightly fastened.
- b. That all four handles are firmly attached.
- c. That the external thread ¼" is functional and is firmly attached.



If the filling tool does not comply with all of the above, it cannot be used!



Service (must be performed after every fifty fillings) see Picture 183:

- a. All four handles must be firmly attached if not scrap the tool.
- b. Outer thread 1/4" shall be checked with thread gauge (go/stop gauge), if worn out, the tool must be scrapped.
- c. External/internal thread M22x1 or M20 x 1.5 shall be checked with thread gauge (go/stop gauge), if worn out, the thread needs repair/replacement.



- d. Replacement of O-rings. Material: EPDM Dimension: 5.3 x 2.4 and 15.3 x 2.4.
- e. Check that the hexagon rod has sharp edges at least 5 mm upwards from the end in accordance with the picture. If not, replace the hexagon rod.
- f. Check that the hexagon rod is securely attached. If the hexagon rod is loose, it needs to be removed, cleaned and degreased. Hexagon sleeve shall be cleaned and degreased. Then, apply thread sealant Loctite® 5400 (Part no. 7903) on the hexagon rod and reassemble.
- g. The connection (with or without pivot pin, OPTIONAL) must be leak tested. If leaking, the connection needs to be changed.

B1



Appendix 2: Adjust pressure in the detector bottle

Use gas filling tool (Part no. 1975):

a. Connect the gas filling tool with the detector bottle according to Picture 184 and 185 with two pieces of detector tube (around 5 cm, included in gas filling tool kit).



Picture 184. T-coupling med gasfyllverktyg

- b. Keep the detector bottle upside down, Picture 186. Ensure that the ball valve (B) is closed.
- c. Open the ball valve (A) carefully. Read pressure level on the pressure gauge (C). The pressure gauge has a tolerance of $\pm 1.6\%$.
- d. After that, open ball valve (B) slightly and carefully for around 0.5 seconds, and then close ball valve (B).
- e. Wait for 3 5 seconds for the pressure to equalize.
- f. Read pressure level on the pressure gauge (C).
- g. Repeat 3 5 times until the desired pressure has been obtained.
- h. Close ball valve (A).
- i. Open ball valve (B) to release pressure.
- To disconnect hoses from the fittings, press j. the outer ring inwards and disconnect the hose (this also applies to the connection on the detector bottle), see Picture 187.



Press on the ring

Picture 185. L-coupling with gas filling tool





Picture 187. Remove coupling from detector tube



www.fogmaker.com







Appendix 3: Valves, generation 1 and 2

These pictures give an overview of parts for Fogmaker valves, generation 1 and 2.

Note that the pictures contain show valve latches and gas adaptors from <u>both</u> hydropneumatically and electrically/mechanically activated valves.



Picture 188. Exploded drawing valve generation 1 (Part no. 609X-010)





Picture 189. Exploded drawing valve generation 2 (Part no. 609X-030)


Appendix 4: Service of Mini fire suppression system, MFSS

The Fogmaker Mini fire suppression system (MFSS) consists primarily of a bottle containing suppressant and nitrogen pressurized at 20-24 bar, see Picture 190. The bottle is connected to a nozzle and a detector tube equipped with a pressure switch that triggers an alarm if the pressure in the system falls below 14 bar. To be stored and transported in the intended carton.



Intended use: Fixed fire suppression system in areas smaller than 0.8m³.

Inspection and test plan - see table 6. Steps for annual control, see B4.1-B4.3 Steps for 5-year service, see B4.1-B4.4 Steps for 10-year service, see B4.5.

B4.1 Serial number, date of manufacture, and pressure

- a. Note the serial number and date of manufacture shown on the label, see Picture 191. If the label is not legible, note the bottle's chassis number (stamped on the bottle's neck), see Picture 192.
- b. The pressure in the bottle can be read from the pressure gauge on the top of the bottle; the pressure should be within the green area, see Picture 193.

The pressure in the bottle should be 20-24 bar at 20°C. Variations may occur.

If pressure is too low - under 20 bar at 20°C - go to step B4.4 and refill the bottle. If the pressure is too high - over 24 bar at 20°C - go to Appendix 2 and adjust the pressure in the bottle.



Picture 190. Mini fire suppression system (MFSS) installed in intended area with a nozzle and detector tube connected to a pressure switch and fire alarm.

Inspection plan						
Intervals:	Annual control	Servicing	Action			
1 year	•					
5 years	•	•				
If necessary			•			
10 years: Follow national requirements	Scrapping, recycling of components					

Table 6. Inspection plan





Picture 191. Information label Part no. 81005



Picture 193. Pressure gauge



B4.2 Function check

Press the alarm button, see Picture 194; if the alarm generates an acoustic signal and a light signal, the system is OK.



Normal operation: The MFSS bottle has a valve that must be open when the system is unsecured - see Picture 195.



If the valve is closed, check that the distribution system is installed and that the detector tube is intact before opening the valve.



The bottle is to be installed in bracket 5111, see Picture 196-198.

In the MFSS bottle is a siphon tube, Picture 197, which means that the bottle must be placed according to instructions in Picture 198 for normal functioning. If a mini extinguisher bottle is found to be at the wrong angle during service, the bottle must be installed at the correct angle.





Picture 196. Mini extinguisher's position



Picture 197. Mini extinguisher, cross-section



Picture 198. Mini extinguisher, approved angles. The valve must always be angled at least 5° upwards



B4.3 Damage/leakage, MFSS bottle

Check the bottle and its installation. If the pressure in the bottle is in the correct range, no leakage is expected. For test of the detection and distribution systems, see sections 5 and 6a.



B4.4 Replace suppressant/reset of MFSS system

The service manual only covers **suppressant replacement** at the 5-year service or after system discharge.

Cleanliness is important when servicing the system. Follow these steps to refill:

B4.4.0. To dismantle the bottle:

a. Close the valve, see Picture 199.

 \odot

b. Cut the detector tube. c. Remove the distribution hose/ coupling

B4.4.1. Empty the bottle of gas (if pressurised):a. Hold the bottle upside down!



b. Keep the bottle immersed in a container and carefully turn the valve to open it and empty the bottle of gas, see Picture 200.

B4.4.2. Empty the bottle completely before refilling:

a. Disconnect the couplings,

see Picture 201.

b. Remove the nipple from the bottle see Picture 202.

c. Empty the bottle, see Picture 203.

B4.4.3. Refilling

a. Measure out 600ml of Fogmaker Suppressant -35 (Part no. 1831/1891). b. Fill the bottle, see Picture 204.

B4.4.4. Reinstall the nipple + components a. Install the nipple's o-ring (5516), use Molykote, see Picture 205.

b. Install the twist ring on the nipple according to Picture 206. the ring's arrow should be towards the open padlock.



Picture 206. Fit the twist ring

49

c. Reinstall the nipple with 50 ± 2 Nm.

d. Attach a new steel rubber washer on the connection nipple [4430], see Picture 207.

e. Re-mount the connection nipple to the bottle with a torque of 13 ± 1 Nm to the side without a reference hole, see Picture 208.

f. Push back the mini piston using a pencil, see Picture 209.

g. Install the piston stop - verify that the piston stop attaches in the mini piston's thread, see Picture 210.

h. Re-attach the L-coupling at a torque of 13 ± 1 Nm, see Picture 211.

i. Close the valve.



- a. Verify that the piston top is installed
- b. Verify that the valve is closed.

c. Install the gas filling tool by following these steps: 2.4.4.a-c on pages 34-35.

d. Carefully open the valve! Gas

filling starts. Wait until the pressure is equalised and the gas flow has stopped.

e. Close the valve.

f. Close the ball valve on the gas filling tool

g. Follow steps 2.4.4.g-i

B4.4.5. Flush out the distribution system and replace the nozzle, see section 5.5.

B4.4.6. Install a new detector tube, see section 6.6

NOTE! If the detector tube >1m it must be prefilled.



Picture 207. Attach new washer



Picture 209. Push back the mini piston



Picture 208. Reinstall connection nipple 4430



Picture 210. Piston stop grips the mini piston's thread



Install the gas filling tool, see Figure 92 on page 35 Picture 212. Configuration during gas filling, see also section 2.4.4



B4.4.7. Reassemble the bottle

a. Reinstall the detector tube first!

b. Open the valve and seal, see Picture 213-215.

c. Dismantle the piston stop. Screw the piston stop in the ring and secure with cable ties so it is available for servicing, see Picture 215.

d. Reinstall the distribution system according to Section 5.2.

e. Ensure that the pressure in the system is stable by checking the pressure gauge on the bottle after 10-15 minutes after pressurizing. Check the pressure switch after 15 min.

B4.5 Mini fire suppression system MFSS, 10-year service/Waste handling

This unit and the included fluids must be recycled or discarded in accordance with applicable local and national regulations. Discard no later than 10 years after manufacture.

- B4.6.1. Empty the bottle as shown in B4.4.1
- B4.6.2. Disassemble the bottle
- B4.6.3. Ensure the relevant components are sorted for correct waste handling, see Appendix 7.

NOTE! Important to pressurize the detector tube before installing the distribution system NOTE!



Picture 214. Seal the valve in the open position



B4



www.fogmaker.com



II.

IV.

Appendix 5: Service (10-year)

B5.1. 10-year service of the piston accumulator

Always perform the following (I-VI) steps before commencement of 10-year service:



The safety screw must always be installed so that the piston accumulator is not triggered by mistake during servicing.

Check the pressure in the container. ► Section 1.



DGMAKER

Disconnect the piston accumulator from the mounting brackets. Keep the mounting brackets for the double/triple piston accumulator (PA) until there is no pressure, i.e. steps B5.1.1-3 are complete.



Assess the condition of the piston accumulator's exterior: ► Section 1.4.



Read the manufacturing date, serial number and note the volume, → Section 1.1.





As needed - wash the piston accumulator in an industrial dishwasher or similar. If you was it manually - use dish soap and a brush with hot water. Remember that the condition in which it goes out to the customer is important!

Then, proceed according to the following steps:

B5.1.1.	Empty suppressant	
B5.1.2.	Dismantle all objects on the cover	
B5.1.3.	Empty nitrogen gas	
B5.1.4.	Dismantle the piston accumulator	
B5.1.5.	Check the condition of the cylinder's interior	
B5.1.6.	Test pressure in the piston accumulator	
B5.1.7.	10-year service, valves	
B5.1.8.	Remount the piston accumulator	
B5.1.9.	Refilling of gas & fluid	
DE 1 10	Labola wino cloan	

- **B5.1.10**. Labels, wipe clean
- B5.1.11. Waste disposal - Appendix 7.







Tools and chemicals needed for the 10-year service of the extinguisher: For replacement parts, see the Product Catalogue (Part no. 8045).

Part no.	Name	Description/usage		
	Inert shielding gas H ₂ 5% ±0,5%, Rest N ₂	With regulator, pressure: 200bar, valve connection: W 24, 32 x 1/14"		
7910	Gas filling kit	Regulator plus Gas filling tool (1975)		
-	Safety section/fixture	Holds suppressant cylinder in place		
-	Pressure testing equipment	Used to test the pressure in cylinders in accordance with national requirements		
1800	Filler tool, suppressant	Used for emptying and filling (only for suppressant)		
1800	Filling tool, nitrogen gas	Used for filling (only for nitrogen gas, N_2)		
1811	Filling pump	Used for filling suppressant		
1820	Removal tool	Removal tool for cover (crutch)		
1821	Tool for o-ring	Protects the o-ring on the hp piston during installation		
-	Multimeter	Check the pressure switch's function		
-	Iron rod	\emptyset =16mm, dismounting the piston		
-	Hex keys 2.5-6 mm.	Removing protection plugs, valve		
-	Hex key extension	Provides greater torque		
-	Spanner 8-24 mm	Removing the pressure gauge etc.		
-	Socket spanner 6-17mm	Disassembly of pressure switch		
-	Torque wrenches (socket and open spanner)	Re-tightening the pressure gauge and pressure switch with the correct torque		
	Screwdriver, phillips	Mounting the safety screw (1 gen valve)		
	Knife	Pistons disassembly in valve, decals		
-	Tool for o-ring installation on the gas filling nipple	Used to prevent damage to o-ring during installation of o-ring on the gas filling nipple		
-	Rubber mallet	To tap down the piston and cover		
-	Steel brush	For cleaning external threads		
-	Container <20 litre	Collection of used suppressant		
-	Flashlight	Inspection of cylinder interior		
-	Industrial-strength paper towels	Cleaning various surfaces		
-	Silicone brush	Application of silicone oil		
Chemicals:				
	Loctite 5400	For mounting pressure gauge etc.		
	Silicone oil	For assembly of piston and cylinder etc.		
	Molycote	For assembly of membranes in valves etc.		

Table 7. Tools and chemicals for the 10-year service





76





B5.1.2 Dismantle all objects on the cover

Consider!: Suppressant must be emptied before disassembling the components! Gas must remain in the piston accumulator in order to fix the cover. Hint: Take a photo of the cylinder cover (double/triple extinguisher) for a reference for correct assembly.













1Ê P

B5.1.4 Dismantle the piston accumulator



80





B5.1.5 Dismantle the piston accumulator's parts



Older model pistons (height=61mm) and older model cylinders are always scrapped.









0





Attach the pressure testing plug





Pressure testing shall be done in accordance with EN 13445-5 and any national guidelines. Pressure testing method used by Fogmaker International AB → see Installation manual. For more information, please contact Fogmaker International AB.











































B5.1.11 Waste handling of extinguisher components, see Appendix 7





B5.2. 10-year service of Detector bottle

The detector bottle must be recycled after 10 years.

B5.2.1 Empty of fluid and gas

If the container is pressurized: empty container of gas and liquid holding vertically. If there is no pressure in the container, but it contains liquid: remove the nipple and empty the liquid into a collecting tank for Detector liquid.

B5.2.2 Remove the detector bottle

Secure in a vice and remove the nipple.

Waste disposal, detector bottle, see Appendix 7



B5.3. 10-year service of Novec™ bottle

The Novec[™] bottle must be recycled after 10 years.

B5.3.1 Empty of fluid and gas

If the container is pressurized: empty container of gas and liquid holding vertically.

If there is no pressure in the container, but it contains liquid: remove the nipple and empty the liquid into a collecting tank for Novec[™]. Remember to seal the collection tank as Novec[™] liquid evaporates at room temperature.

B5.3.2 Dismount the Novec[™] bottle

Secure in a vice and remove the nipple.

Waste disposal, Novec™ bottle, see Appendix 7







www.fogmaker.com





Appendix 6: Novec[™] system

The Novec[™] system consists of a bottle filled with Novec[™] liquid and nitrogen and a red detector tube, the bottle can be obtained with one or two pressure switches (Part no. 1008 and 1008-02). In case of fire, the red detector tube bursts and the Novec[™] liquid spreads out, see the system on Picture 216.

The bottle is pressurised at 20-24 bar at 20°C after installation with a 0.6 m tube.

- The Novec[™] bottle contains 585/700 gram Novec[™] 1230 fire suppressant and the remaining part nitrogen gas (N₂).
- The Novec[™] bottle is equipped with one or two pressure switches, which trigger an alarm if the pressure drops under 14 bar (and 5 bar, respectively, optional) in the system.
- The Novec[™] system is installed in spaces of up to 0.8 m³.

B6.1 Serial number and pressure, Novec[™] bottle

a. Note the serial number found on the label of the Novec[™] bottle (Part no. 8191), see Picture 217 and 218. If the number is not visible, note the chassis number that is

punched on the bottleneck, see Picture 219.



Picture 216. Novec[™] system (Part no. 1008)



Picture 217. Information label (Part no.8191)

Picture 218. Novec™ bottle



Picture 219. Chassis number



b. Also check the remaining labels, "7. Labels and seals" on page 56. The red detector tube shall be marked with a warning sign (Part no. 8220), see Picture 220.



Picture 220. Detector label (Part No. 8220)

c. Check the pressure inside the bottle on the pressure gauge that is placed on top of the bottle. See variations of the pressure gauge on Picture 221 and 222.



The pressure gauge must show 20-24 bar at 20°C within the green area.





Picture 221. Pressure gauge (Part no. 6203-05) Picture 222. Pressure gauge (Part no. 6203-06)

B6.2 Check functionality of Novec[™] bottle and tube

There is a riser pipe in the Novec[™] bottle, Picture 223, which means that the bottle must be placed according to the instructions for normal function, see Picture 224.

a. Check the inclination of the Novec[™] bottle where it is installed.



The Novec[™] bottle should be mounted standing up at an angle of maximum 20° when the protected volume is up to 0.8 m³. Mounting up to maximum 45° is allowed only if the protected volume is less than 0.5 m³.





Picture 223. Novec™ bottle - riser pipe

Picture 224. Novec™ bottle's position



A ball valve on outgoing coupling allows the red detector tube to be pressurised and thus the system is activated, see Picture 225.

b. Check the valve of the Novec[™] bottle.

If the valve is closed, check that the red detector tube is undamaged and then open the valve carefully.

- c. Ensure that the red detector tube is placed at least 500 mm away from hot surfaces as the permitted surrounding temperature is maximum 90°C.
- d. Check the tube for damage, see Picture 226.

B6.3 Damage/leakage Novec[™] bottle

- a. Check that the bottle is not damaged and is tightly fastened.
- b. Check fittings and the bottle for possible leakage, see Picture 227. If the pressure gauge shows pressure within the green area, the bottle can be assumed free from leakage, see Picture 221 and 222.

B6.4 Resetting the Novec[™] system

The Novec[™] bottle may show too low pressure due to leakage in the system or no pressure on deployment of the system, Picture 228. In that case, check the detector tube.



Picture 228. Empty bottle



Picture 225. Closed/Open valve



Picture 226. Novec™ tube



Picture 227. Check for damage and the attachment





To reset the system: remove the Novec[™] bottle:

- a. Close the ball valve on the NovecTM bottle, Picture 225.
- b. Disconnect the detector tube from the coupling on the Novec[™] bottle, Picture 229, and remove the bottle.



Picture 229. Remove coupling from detector tube

Send back the Novec[™] bottle to Fogmaker for resetting. Mount a new Novec[™] system:



- a. Remove the damaged detector tube and clamps.
- b. Mount a new bottle from Fogmaker at the right angle, see Picture 224.
- c. Mount a new red detector tube with the same tightening in the space as before. Replace steel rubber clamps if necessary. Check that no sharp edges can damage the detector tube.
- d. Couple the detector tube to the NovecTM bottle.



Activate the system by carefully opening the ball valve on the bottle, Picture 230.

B6



Picture 230. Arm the Novec[™] system so that it can be deployed in the event of a fire.



Appendix 7: Waste disposal

Fogmaker strives to ensure that materials are reused when possible and that all waste is properly sorted so that we may reduce our environmental impact.

Follow all national and regional waste management guidelines!

Suppressant has certain harmful long-term effects on aquatic organisms, which requires a controlled destruction. Contaminated products must be disposed of as chemical waste with a transport declaration as non-hazardous goods.

Waste handling for respective components, see Table 8.

For all suppressants manufactured by Fogmaker, refer to the safety data sheet for the respective product: fogmaker.com/downloads. For purchased products, refer to our subcontractors' documentation.



Used detector liquid







0					
Sorted to: Details:	Metal recycling	Stainless Steel recycling	Aluminium recycling	Electronics recycling	For incin- eration
Cylinder, cover, piston			x		
Valve, valve latch, membrane plug	x				
Pressure gauge, piston Accumulator	x				
Pressure switch, piston accumulator	x				
Filling screw	x				
Gas filling nipple	x				
Steel rubber washer	x				
Cutting ring fittings (not stainless steel)	x				
Cutting ring fittings (stainless steel)		x			
Pipe		x			
Stoppers, 5050/5049		x			
Signal module				X	
O-rings					x
Labels					x
Detector bottle, nipple			x		
Pneumatic fittings		x			
Pressure switch, detector bottle	x				
Pressure gauge, detector bottle	x				
Support sleeve					
Spray nozzle					
Mount 5111		x			
Steel rubber clamps		x			
Detector tube					x
Wire Mechanical activation	x				
Powder charge/Metron	x	NOTE! Release the charge before scrapping!			
Mechanical trigger	x		x		
Bus alarm, unit/button				x	
Alarm panel				x	

Table 8. Waste disposal





Other

After each performed service: Use a cloth to clean the extinguisher.





Index

Α

Acoustic alarm 4, 40 Alarm panel IV, 38 Alarm signal 38, 52 Alarm system 38 Annual control III, 6

С

Cable tie 44, 46 Cover screw 6 Cylinder 6, 16 Cylinder cover 16, 19, 26

D

Detector bottle IV, 30, 93 Detector bottle pressure 30, 67 Detector tube 30, 46, 68 Distribution hose 44 Distribution system 42 Double accumulator 8

E

Electrically activated punch 48 Electrically activated valve 52

F

Filling tool 14, 61 Fire-protected area 3, 4, 5, 42, 46 Fogmaker Fire suppression system (FSS) 3

L

Locking groove 18 Locking segment(s) 18

Μ

Mechanically activated punch 48 Mechanically activated valve 54

Ν

Novec[®] bottle 95, 96

0

O-ring 12, 16, 26, 62

P

Pipe system 44 Piston accumulator 3, 4, 6, 10, 14 Piston accumulator pressure 6, 28 Protection container 8

R

Refilling 28 Reset 22, 36, 40, 44, 50, 52, 54

S

Safety goggles 2 Safety screw 6, 75 Servicing III, 6 Signal 40, 48, 52 Signal module 8 Suppressant 14, 76

T

Triple accumulator 8

V

Valve 6, 22, 52, 54 Valve servicing 22 Visual alarm 40


Notes:		

Fogmaker International AB

Postal address: PO Box 8005 SE-350 08 Växjö, Sweden Delivery address: Sandvägen 4 SE-352 45 Växjö, Sweden Tel: +46 470-77 22 00 Fax: +46 470-77 22 10 info@fogmaker.com

© Copyright Fogmaker International AB 2019 Reproduction and copying prohibited!