FEDERATION INTERNATIONALE
DE L'AUTOMOBILE

Homologation N°

EX 001 • 97

Certificat d'homologation pour les systèmes d'extinction plombés dans les voitures de course
Homologation certificate for motor sport fire extinguisher systems

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1. GENERALITES / GENERAL

FEDERATION INTERNATIONALE
DE L'AUTOMOBILE
8, place de la Concorde, 75008 Paris
Services Administratifs :
8 bis, rue Boissy d'Anglas, 75008 Paris

101. Constructeur
Manufacturer **OTC**

102. Adresse
Address Linnégatan/se-35233 Vâxjô Sweden

Tel (46) 470 24340 Fax : 46.470 244440 E-mail : Info@otc.se

103. Nom du système
System name **Fogmaker**

104. Dénomination commerciale
Commercial name **Fogmaker universal**

105. Véhicules pouvant être équipés de ce système (Le cas échéant, indiquez si ce système est valide pour tous les groupes)
Vehicule for which the system may be used (Indicate if the system is valid for all groups):

All

106. Photo du sytème complet
Photo of the complete system

Constructeur
Manufacturer **OTC**

Nom du système
System name **Fogmaker**

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2. DESCRIPTION DU SYSTEME / SYSTEM DESCRIPTION

201. Agent extincteur
Extinguishant Water+AFFF

202. Capacité totale du système
Complete Capacity of the system 3,30 Litres / Kg

203. Norme à partir de laquelle a été approuvé l'agent d'extincteur
Standard from which the extinguishant has been approved NTFIRE023

204. Couleur de l'étiquette indiquant le type d'extincteur utilisé
Colour of the label showing the type of extinguishant used White

205. Pression d'utilisation
Fill pressure 100 Bar

206. Pression minimale
Min Pressure 20 Bar

207. Si le système est normalement non pressurisé, définir le type de pressurisation
If system is normally unpressurised define type of pressurisation :

_____
_____
_____
_____

208. Taille de la bonbonne
Size of the bottle
Diamètre
Diameter 152 mm
Hauteur
Height 365 mm

209. Poids de la bonbonne
Weight of the bottle 9,3 Kg

210. Système de déclenchement
Activation system

Manuel / Manual	Electrique / Electric	Automatique / Automatic
☒	☒	☐

Cocher la mention utile
Tick off as applicable

211. Gamme de température d'utilisation
Operating temperature range -30/+65 °C

212. Nombre d'ajutage minimum dans le compartiment moteur
Minimum number of nozzles in the engine compartment 4

Constructeur
Manufacturer **OTC**

Nom du système
System name **Fogmaker**

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213. Photo d'une bonbonne montrant l'étiquette indiquant l'agent d'extincteur utilisé
Photo of one bottle showing the label of the extinguishant used

214. Photo d'un ajutage
Photo of a nozzle

Constructeur
Manufacturer OTC

Nom du système
System name Fogmaker

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3. ENGAGEMENT DU FABRICANT / MANUFACTURER'S RECOGNITION

Je déclare que le système décrit ci-dessus :
- est conforme à la norme FIA sur les systèmes d'extinction plombés dans les voitures de courses
- a passé, sous ma supervision, avec succès l'ensemble des tests décrit dans la norme FIA

I declare that the system described above :
- is in conformity with the FIA standard for motor sport fire extinguisher systems
- has passed, under my supervision, all the tests described in the standard

Date	Nom et signature Name and signature	Visa d'approbation Endorsement stamp
5th September, 1997	OTC Olle Termén	OTC Olle Termén Consulting AB

ANNEXES / APPENDICES :

- **Rapport de test / Tests report**
- **Instruction d'installation / Installation instructions**
- **Instruction de maintenance / Maintenance instructions**

FOGMAKER - Fire extinguisher

Total capacity:	3.3 litres
Extinguishant:	Water and AFFF (6 %)
Gas pressure:	10 MPa (100 bar), nitrogen N_2
Date of manufacture:	10 Oct 97
Serial number:	U7-02-001
Due service date:	10 Oct 99
Homologation Certificate Reference number:	EX.001.97

WARNING

The extinguisher may under no circumstances be released, without beeing properly connected to the pipe distribution system, including the nozzles.

The release valve shall at transport or servicing of the extinguisher be secured with the safety spring. Valves, pressure gauge and other attached details may under no circumstances be unscrewed, unless the extinguisher is made completely free of pressure, built up by the extinguishant and the drive-gas.

For further information on the assembly, installation, use and dismantling, please refer to the users manual.

Made in Sweden by:

OTC
Linnégatan 1
SE-352 33 VÄXJÖ
Tel + 46 - 470 243 40
Fax + 46 - 470 244 40

FOGMAKER
INTERNATIONAL AB

User´s Manual

FOGMAKER ® Universal

Fire-extinguisher with water-mist for permanent installation.

Effective against fires in petrol, diesel and other liquid fuels in engine rooms and other closed rooms.

FOGMAKER® is a registered trademark for the fire extinguisher, which is described in this manual and intended for extinction of fires in petrol, diesel, oil etc in engine rooms and other closed rooms. The extinction is effected with cold water-mist, which reduces the temperature very efficiently and at the same time pushes the air out, so that the content of oxygen is reduced. The extinction efficiency is fulfilled when the extinguishant is vaporized.

Description

FOGMAKER ® Universal consists of the following parts:

1. Cylinder with extinguishant and compressed N_2	Fig 1	*The numbers in the text*
2. Release valve	Fig 2A, 2B	*in the different sections*
3. Activation equipment	Fig 3	*refer to encircled numbers*
4. Pipeing, couplings and nozzles	Fig 4	*in the corresponding figures.*

The pipes are not exposed to pressure, as long as the release valve has not been activated.

Summary of the Instructions for Installation

FOGMAKER ® Universal is to be installed in the following order. Take a look at sections 1-4 for more detailed instructions. **Please do not detach the safety spring until the installation is completed !**

1. Pipes and nozzles are to be installed in the protected room to ensure best possible effect. Please notice Figure 5 as an example.

2. Connection pipes for the cylinder with extinguishant are to be drawn through a wall or bulkhead, using a bulkhead passage, to a place outside the protected room, where the cylinder is to be installed.

3. The cylinder is to be installed on the floor or a wall outside the protected room, using the assembly fittings. This should be done with as little winding of the wires and pipes as possible. Make sure that the cylinder is placed in such a way that it cannot be activated by mistake.

4. The activation equipment (pull-cable) is to be installed on an easily reached place and the connections are to be drawn to the realease valve on the cylinder. The stretching of the wires is to be checked. The activation arm can be protected against unintended release with a safety clamp.

5. The safety spring on the valve is to be dismantled when ***FOGMAKER ® Universal*** is ready for activation. If not it should be kept in place.

1. Fire-extinguisher

1.1 General Description (Figure 1)

The cylinder (1) consists of an extruded aluminium alloy with high tenacity. The cylinder with lid is outside and inside anodized to about 20 uμ, which gives a very resistant protection against corrosion, even in a very trying surroundings as for example saline air.

The lid is fastened to the cylinder with a stainless lock ring and tightened with an O-ring of rubber. There is a refilling valve (2) in the bottom for driving gas. A refilling valve (3) for extinguishant, a release valve (4) and a pressure gauge (6) are placed on the lid. ***Fogmaker ® Universal*** is also available as a double-assembled cylinder, which is described in section 10.

WARNING

It is absolutely forbidden to remove the valves (2) - (4) and/or the pressure gauge (6) when the cylinder is filled up and exposed to pressure, as the pressure in the cylinder in such a case will be released, which because of it´s high pressure force, might injure a person seriously. Do not release the safety spring (5) until the installation has been completed!

1.2 Refilling

The fire extinguisher is filled up and exposed to pressure when delivered. Refilling is to be done at an authorized service station. An adapter, which is available at the service station, is required to fill up driving gas and extinguishant. The cylinder (1) contains the driving gas nitrogen (nitrogen gas, N_2), which is filled up from the bottom through the valve (2). Normally the cylinder can be refilled with extinguishant without filling up driving gas, if this is done shortly after the release. If the cylinder, however, has been taken apart for service, both extinguishant and driving gas must be refilled.

1.3 Installation

The cylinder shall be installed near to the room, which is to be protected. Assembly fitting (7) and clamps (8) are enclosed for mounting the cylinder into the assembly fitting. Screws are not enclosed as the type is dependent on where and how the cylinder is to be installed. The assembly fitting, or the installation profile, is to be fixed in such a way that it provides free space outside the release valve. The free space must be big enough to make it possible to connect the pipes to the nozzles, the release wire and an electrical release equipment if required. The cylinder can be set up in whichever position you want but see to it that the pressure gauge can be checked. For the installing of pipes and nozzles, see section 4.

1.4 Extinguishant

If nothing else has been agreed upon, the extinguishant consists of water, an anti-freeze salt solution and a film forming chemical, intended to facilitate the extinction as well as preventing from reignition.

1.5 Continuing Checking

The function of the extinguisher shall be checked regularly and it should be tested and refilled at an authorized service station according to the service label on the extinguisher. The cylinder (1) shall be checked regularly (see section 12) what concerns visible damages or defects. The pressure is to be checked on the pressure gauge (6), which shall indicate about 100 bar. If the pressure is below 85 bar at +20°C, the fire extinguisher is to be refilled in order to secure a complete function. ***FOGMAKER ® Universal*** is working also with a lower pressure but the size of the drops and thus also the forming of mist is reduced when the pressure is lower. The optimum water-mist is obtained at a pressure of about 70-100 bar.

2. Release Valve

2.1 Valve for Manual Release (Figure 2A)

The release valve consists of one part (1) of casted red metal, which at the bottom is thread into an adapter (8), which in turn is thread into the lid of the bottle. To make it possible to fix the release valve in the best position there is also an adjusting nut (9). There is one outflow opening (2) on the valve for the extinguishant, one activation arm (3) and fastening screws (4) for the hold (6) for one or two pull-cables. The activation arm is provided with a safety spring (5)**,** which shall be in function by service, installation and dismantling and at transport of a cylinder exposed to pressure. The safety spring shall be taken away, when the extinguisher has been installed and shall be in operation, but ought to be kept on, if not, in order to avoid an unintended activation.

WARNING

*When the safety spring is removed **FOGMAKER ® Universal** can be activated by a slight pulling upwards of the activation arm (3). **FOGMAKER ® Universal** should therefore always be installed so that it cannot be activated by an unintended touch of the activation arm. The release valve may not be dismantled when the cylinder is exposed to pressure. If the valve is unfastened when the cylinder is exposed to pressure a hard liquid jet will be spread, which might injure a person seriously.*

2.2 Valve for Electrical Activation (Figure 2B)

FOGMAKER ® Universal can be activated electrically, manually from a control panel or automatically by a detector circuit. Fogmaker International AB has several different central units, which can control the electrical release – manually, semi- or fully automatic. Please contact your retailer for further information. The numbers in Figure 2B correspond to those in Figure 2A, except for No (10) which shows the cables to a small powder load, that is exploding as a result of an electrical impulse, thereby lifting the activation arm (3) and releasing the extinguishant.

2.3 The Function of the Valve

When the activation arm is lifted a channel is opened between the cylinder and the outlet to the pipeing, which is assembled by way of a steel-reinforced rubber hose (see Figure 3) which is intended for the elimination of vibration damages on the pipeing. The hose is to be assembled between the opening of the valve (2) and a bulkhead passage (see Figure 4). After release, the flow can't be stopped and the extinguishant is therefore completely emptied.

3. Activation Equipment (Figure 2A, 2B)

Activation equipment is available for manual activation with pull-cable or for electric activation using a powder load.

3.1 Manual Activation

Manual activation is done by pulling the activation arm on the release valve upwards by hand.

3.2 Activation by pull-cable

One or two pull-cables (7) with stainless steel fastening brackets and screws are delivered as standard. The fastening brackets are to be affixed at a distance of about 30 cm along the wire casing. The brackets are affixed on plate, wall or similar using appropriate screws or rivets.

It is important that the cable is affixed in such a way, that it cannot be exposed to fracture and that it does not have sharp windings to such an extent, that the activation is hindered or complicated. The handle of the cable is to be installed on an easily reached place outside the room in which ***FOGMAKER ® Universal*** shall operate in case of fire. When using it in cars one handle shall be affixed near the operator´s / driver's seat and the other one outside the car. The exterior handle is to be affixed in such a way that it cannot be affected by some outside obstacle. In competition cars, both handles are to be marked with a sticker (E).

In order to secure an adequate function of the pull-cables, please do as follows:

1. Drill an 8 mm hole where the handle is to be placed. Unscrew the outer of the two M8 nuts and insert the hold of the cable from "the back side". Attach the security clamp, if this is to be assembled, and then screw on the outer M8 nut again and pull tight. Then also pull tight the M8 nut on "the back side".

WARNING

It must be checked that the safety spring (5), which locks the activation arm on the valve, is in function before starting the installation, in order to secure that ***FOGMAKER ® Universal*** *is not unintentionally activated during the installation.*

2. Attach the enclosed M5 nut and the T-handle on the wire. Lock the T-handle with the M5 nut in an appropriate position. It is especially important, if the security clamp is used, to make sure that this can be opened and shut with an adequate inertia.
3. Clamp the pull-cable all along, except for the last 50 cm before the valve (1).
4. Measure and cut the wire and its casing so that the end of the pull-cable reaches 4-5 cm below the downside of the activation arm (3).
5. Pull back the wire in the casing, about 12-15 cm (in order not to cut off the wire even more, since you now shall adjust the length of the casing).
6. Cut off the casing so that it ends at the upper side of the fitting (6) which is assembled on the valve, over the activation arm (3).
7. Push out the wire and attach the end socket on the casing. Affix the socket to the assembly fitting. Squeeze and fasten the socket, but not so much that it will not allow the wire to run properly.
8. Push in the T-handle to its bottom position and put the free end of the wire through one of the 2 mm-holes from above. Put on the screw-nipple on the wire, below the activation arm. Stretch the wire by means of tongs in the free wire end (the T-handle in its bottom position!) and screw on the nipple on the wire, 2-3 cm below the activation arm. This will allow some margin against unintended release.
9. Affix the last clamps as close to the valve as possible, to make sure that the pull-cable casing is properly fastened, without space to move around when the pull-cable comes at use.

WARNING

The checking of the cable stretching must be done when the safety spring (5) is in function. This means that the fire extinguisher will not be activated when checking by pulling the handle, but you can notice if the stretching is too loose or if it is an appropriate gape in the stretching (2-3 cm). The pull-cable ought to be checked by pulling before it is attached to the valve.

3.3 Activation Equipment with Powder Load

As an alternative to the mechanical valve, there is a valve (see Figure 2B) intended for electrical activation available. Fogmaker International AB sells different control units, which control a detector circuit and activate a small powder load (10) that opens the valve in case of fire. Also in this case, pull-cables can be installed and used independently of the automatic release function.

3.4 Activation with Detector

If ***FOGMAKER ® Universal*** is installed to protect an unguarded room, a detector is required which can activate the fire extinguisher also if a fire starts, when nobody is at hand to activate the fire extinguisher.

A detector reacting on f.i increased heat, smoke production and/or visible flames could be used. Please contact your retailer for more information.

4. Pipes, Couplings and Nozzles (Figure 4.)

4.1 Pipes

As standard 6 x 0.8 mm soft treated copper pipe (1) of required lenght in accordance with the order is delivered. As an alternative pipes of steel (stainless or not) or steel-reinforced rubber hose, or combinations of these, can be used. Copper pipes are, however, more easy to handle when installing by yourself. They allow a bending into pliant curves, which can be adjusted to the construction of the protected room. The pipes may not be bent too many times, as the material hardens. If the pipe has to be rebent it must at first be annealed.

It is not possible to use a pipeing of plastic or some other material, which runs a risk of bursting into pieces because of the high pressure that comes out with the extinguishant. According to the motor sport regulations of FIA valid from 1998-01-01 the pipeing must consist of a fire resistant material.

When cutting the pipes into suitable lengths a special pipe cutting tool should be used, in order to avoid leaving burrs in the cutted ends.

WARNING

Be very careful if you cut with a hacksaw so that no cutting chips, file chips or burrs can come into the pipeing. Therefore also keep the pipe end downwards when fileing and clearing the pipe. Prefereably, you should blow clean the pipeing with compressed air, if available, before the nozzles are assembled. There is a risk that remaining chips and burrs, if any, may diminish the inside diameter of the pipeing and the nozzle passage so that the flowing through of the extinguishant is reduced when ***FOGMAKER ® Universal*** *is activated.*

The pipes are affixed with brackets (2) and screws (3) at a distance of about 30 cm. It is appropriate to affix brackets on both sides of the couplings and along the pipes rather frequently in order to avoid vibration and hanging down.

4.2 Couplings

As a standard 1/4” clamp ring couplings of nickled brass are enclosed in accordance with the following. ***(Note that if you are going to use steel pipes, steel couplings have to be used!)***

- A steel-reinforced rubber hose with nipples for the connection of the valve to the pipeing (Please see the separate assembly instruction, that is enclosed with the hose package)
- straight coupling nipple (14) for nozzle (amount = nozzle amount, if not (11) are used for some)
- T-coupling (5) for joining pipes alternatively (11) for joining nozzle directly with a double sleeve
- If ordered, also angle couplings (9) for joining of pipes, alternatively (10) for direct assembly of nozzles, could be delivered

When the pipes have been cut into suitable lengths and the ends have been filed and cleared, in accordance with section 4.1 above, the couplings are to be affixed. The pipe, which is to be connected with the release valve, has, however first, to be conducted through the partition

between the protected room and the room where the fire extinguisher is to be installed. A rubber passage (12) or a bulkhead passage (13) is to be used. The latter (nickeled brass) is included in the delivery as standard. The pipeing is joint directly to the bulkhead passage on "the inside" of the protected room. In the end of the bulkhead passage that is on "the outside" the valve hose (see Figure 3) is assembled, and this hose is used to connect the extinguisher's valve with the sprinkler system.

Connections between pipes and couplings are made in accordance with the following:

- affix the nut part on the pipe end
- affix the inner clamp ring on the pipe end. **Note that the ring must be kept in the correct direction!**
- put the pipe end into the coupling and tighten the nut, by which the ring gets locked
- check that the pipe is properly locked in the coupling

The nuts ought to be tightened moderately, so that the coupling keeps tight when the fire extinguisher is activated.

The pipe ends supplied with nozzles are to be bent, with least possible radius, without deforming the pipe, so that the nozzles after installation are pointing inwards/downwards, facing the spot which is to be protected. As an alternative angle couplings of type (9) or (10) can be used. These are, however, not included in the standard delivery, but can be delivered at special order in required amount. If possible, affix the nozzles with a suitable fitting, in order to prevent from later possible vibration damages to the pipes.

4.3 Nozzles

The nozzle consists of one body (6) with a built-in turbulence former and one fixed sintered filter (7). Around the body an O-ring (15) is placed. On the top of the nozzle there is a hole from which the water-mist is sprayed when released. In order to avoid that the hole in time shall be stuffed up by pollution a protection hood (8), which shall remain sitting on the nozzle after installation, is included in the delivery. This protection hood will be forced away by the released pressure when water-mist is created. At assembly of the nozzles, you ought to use some thread-locking liquid, or thread-tape. **Please observe, that it is very important to see to, that thread-tape can not come loose and come into the pipeing, since the nozzle filters in such a case could be obstructed.**

Install the nozzles in "the ceiling" in the protected room, 30-45 cm from wall and with 70-90 cm distance between the nozzles, in order to reach best possible distribution of the flow. The nozzle will spread the water-mist in an ejection, at an initial spreading angle of approx. 110°. The flow will bend off at about 20-25 cm out from the centre of the ejection and then spread with full force in form of a pillar with a diameter of 50-60 cm at a distance of about 100 cm from the nozzle. The ejection from separate nozzles ought to be directed so that the mist-clouds do not counteract ("collide") and so that as few objects as possible are in the way to affect the forming of the mist. The water drops will whirl round in the protected room and will in few seconds spread everywhere.

The effect of the extinction is improved if the nozzles are directed towards the spots where a fire might start, as for example towards the spreading pipes in a diesel engine or towards the carburettor in a petrol engine. It is an advantage if the mist can hit some hot component, which will speed up the vaporization and thereby the extinction.

5. Checking of the Function

FOGMAKER ® Universal has been checked in connection with the delivery and will work when activated, provided that the activation equipment and the pipeing are correctly installed and that the safety spring, which locks the activation arm, is dismantled. To check the fire extinguisher is therefore not necessary. If there is any doubt about of the function, the checking of the fire extinguisher must be made by an authorized service station.

The tightness of the pipeing ought to be checked after installation. This can be made by compressed air from the end where the fire extinguisher is to be connected. All couplings and joints are smeared with soap water and noticed with regard to a possible leakage.

It is not a determining factor for the function, that all couplings in the room are absolutely free from leakage, but the effect of the fire extinguisher is reduced, if the extinguishant can be pressed out through joints instead of only through the nozzles.

The activation equipment can be checked in the way described in section 3.2.

6. Measurements in case of Fire

6.1 When a Fire Arises

Following actions are to be taken when a fire arises in the protected room:

1. Stop engines and ventilators in operation.
2. Close the electrical circuit with the main switch
3. Shut, if possible, the doors to the room in question
4. Activate ***FOGMAKER ® Universal***
   a) Pull the pull-cable handle,
   b) You can also activate by lifting the activation arm manually
5. Stop the fuel supply to the engine
6. Keep if possible the protected toom closed for five minutes after extinction. Hold a fire rescue blanket or a hand-held extinguisher in readiness if a reignition should occur.

6.2 Measurements after Extinction

The extinguishant of ***FOGMAKER ® Universal*** contains an anti-freeze based on boron salt (which will be decomposed by nature's own organisms). In the liquid, there is a corrosion inhibitor, which protects the equipment against corrosion. However, when the extinguishant dries up, the corrosion inhibitor loses its effect. In order to avoid corrosion on metal parts, the cleaning up after extinction shall be done as soon as possible. This is to be done by washing away and wipeing off rests of extinction fluid with a damp cloth. Prefereably you should also use some degreaser, which will simplify the removal of the film forming chemical. Otherwise, there could remain some film that could collect dust.

PLEASE OBSERVE

In order to protect engine, electrical installations and other metal parts from corrosion – wash away remains of dried up or damp extinguishant as soon as possible after release of the extinguisher, irrespective of the fact that the release has been done in connection with fire or not.

FOGMAKER ® Universal does normally not influence the function of engines. If extinguishant should be sucked up in the air intake of the engine, it will normally be of no consequence to the engine's function. Starting problems could occur in diesel engines, since extinguishant contains water. Please observe that the extinguishant can cause corrosion damages if the engine is not restarted shortly after release. As a precaution, you should protect the engine, by pouring in some oil and pulling around a couple of turns.

The function of 12V electrical systems will not be affected in any way different from what would be the case if the engine is exposed to moisture in connection with normal motor cleaning. After removal of the cause of fire, and the equipment has been cleaned, it can be used again, provided that the fire itself has not caused damages that first need to be repaired.

6.3. Restoring Function of ***FOGMAKER ® Universal*** after Extinction

When ***FOGMAKER ® Universal*** has been used the cylinder has to be refilled. This is to be made at an authorized service station. Take the following measures:

1. Unfasten the couplings between the release valve and the hose that connects to the pipes.
2. Unfasten the pull-cable(s) from the activation arm on the valve.
3. Detach and hand in the cylinder to an authorized service station for checking and refilling.
4. Unfasten the nozzles and blow pipeing with compressed air in order to remove remaining extinguishant.
5. Blow the nozzles clean with compressed air.
6. Check the packing of the O-ring on the nozzle and exchange it if needed.
7. Reinstall the nozzles.
8. Clean and put on the protection hoods on the nozzles again.

When the cylinder has been refilled it shall be reinstalled in the same way as before.

7. Winter Keeping

As the extinguishant in ***FOGMAKER ® Universal*** contains water, there is a certain risk of freezing at low temperatures. The extinguishant is therefore freeze-protected, down to -35°C when delivered, if nothing else has been agreed.

If ***FOGMAKER ® Universal*** shall be kept in a non-heated environment during winter conditions, and if the temperature then could go below the limit for the anti-freeze, the cylinder must be removed through the winter.

Dismantelling is done in the same way as after a fire. (Section 6.3) **In addition to this a not activated cylinder at first ought to be secured with the safety spring.**

WARNING

The safety spring, which locks the activation arm, shall be fixed before dismantling a not activated bottle and disconnecting pipeing and activation equipment.

8. Technical Data

Type	**Universal 33**	**Universal 66**
Measures (mm)		
Diameter excl. assembly fittings	152	152
Distance from wall incl. assembly fittings	165	170
Biggest width incl. assembly fittings	152	390
Length (height) incl. valve	485	485
Hole distance on assembly fittings		w 350, h 280 (M8)
Need of space above valve (for pull-cable assembly)	200	200
Weights (approx., kg), filled cylinder incl fittings	10	20.5
Volume, pressure		
Extinguishant (approx., litres)	3.3	6.6
Driving gas (approx., litres)	80	160
Charging pressure (bar, at +20^{o}C)	100	100
Test pressure (bar)	250	250
Materials		
Cylinder	Extruded duralumin	
Assembly fittings	Aluminium, fastening clamps stainless	
Valve, mechanical release	Nickeled red-hoted, details stainless steel	
Valve, electrical release	Nickeled brass, details stainless steel	
Anodizing (all inner & outer parts of aluminium)	Min. 20 uµ	Min. 20 uµ
Emptying time (approx. seconds)		
4 nozzles	60	
6 nozzles	40	80
8 nozzles	30	60
10 nozzles		50
12 nozzles		40
Nozzle flow	Approx. 50 litres/hour per nozzle	
Other specifications		
Driving gas	Nitrogen (N_2)	
Extinguishant	Water, antifreeze, film-forming tensides	
Anti-freeze temperature (standard)	-35^{o}C	
Couplings	See Fig. 4-5 and chapter 9	

Functional tests and technical approvals

Institute	**Standard**	**Date**	**Comments**
SAQ Kontroll AB	AFS 1994:39	97-02-12	Pressure vessel –40/+65^{o}C
Swedish National Testing and Research Institute (SP)	National Maritime Authority 96-01-11	96-06-18	Extinguishing test in 5 m^3 room
FIA's Technical and Homologation Certificate Committe	Article 253, Safety Equipment (Groups N, A, B, ST)	96-12-02	Homologation Certificate Ref. No. Ex.001.97, Technical List No. 16
The Swedish National Administration of Shipping and Navigation	Type approval	97-02-04	Leisure boats, engine rooms ≤ 5 m^3
The Swedish Fire Safety Association	RUS 127:1996	98-05-18	Approval of extinguishing capacity in construction vehicle (flammable material/ environm.)

9. Accessories and Spare Parts

Pos. No.	Description	Article No.
1	Pipeing, soft-treated copper, 6 x 0.8 mm, 1 m	4000
2	Bracket 6/12 W 3	5306
3	Screw for bracket, stainless steel 4.8 x 16 mm	5240
4	Straight coupling 6 x1/4” OF	4200
5	T-coupling 6x6x6	4201
6	Nozzle, including 5512	4501
7	Nozzle filter	4502
8	Protection hood for nozzle	4503
9	Angle coupling 90^o 6x6	4209
10	Angle coupling 90^o, 6x1/4”OF (demands double socket 4206)	4219+4206
11	T-coupling, 6x6x1/4” OF (demands double socket 4206)	4202+4206
12	Bulkhead rubber passage	Not standard
13	Bulkhead passage, nickeled brass	4205
14	Finishing nozzle coupling 6x1/4” IF	4204
15	O-ring for nozzle	5512
	Double socket 1/4” IFxIF	4206
	Nozzle with accessories (= 4501, 5512, 4502, 4503)	1500

OF = Outer fixed thread
IF = Inner fixed thread

10. Double-assembled cylinder (Figure 6)

FOGMAKER ® Universal can also be delivered double-assembled. Thereby the volume of extinguishant is doubled at 6.6 litre, which gives enough capacity for a sprinkler system with about 11-13 nozzles. A ***FOGMAKER ® Universal*** with 3.3 litres of extinguishant can work with up to 6-8 nozzles.

The double-assembled extinguisher is fixed at its assembly fittings at the delivery and they are coupled together through a steel-reinforced hose (see Fig. 6). The cylinders must not be uncoupled from the assembly fittings at the assembly, since there is a risk that the couplings between this hose and the cylinder’s lids could be affected, causing a risk of leakage.

The double-assembled extinguisher is primarily used in connection with fire protection of bigger vehicles in flammable environments.

11. Cover boxes

Fogmaker International AB can deliver a cover box in powder coated iron-plate for as well the single as the double-assembled type of cylinder. These boxes are primarily used at out-side assembly on vehicles and machines that work in severe environments.

12. Scheme for supervising the extinguisher and sprinkler system

The extinguishing system should be checked regularly by the owner with reference to the check-points below. An authorized service station should make an extended check every second year. If needed, the extinguishant and driving gas would then be exchanged. Please contact your retailer, when an authorized service is called for.

Pos	**Checking point**	**√**	**Notes**
1	**Extinguisher**		
1.1	Assembly fittings, fastening		
1.2	Cylinder clamps, fastening		
1.3	Pressure according to the gauge		Pressure: bar
1.4	Visible leakage		
1.5	Labels, check		
1.6	Yellow labels		Serial No., next service
2	**Pull-cable (one or two)**		
2.1	Checking of function, greasing		
2.2	Pull-handle and security clamp		
2.3	Sticker on handle		
3	**Sprinkler system**		
3.1	Pipeing / hoses – scrapes, cracks, breakages		
3.2	Pipeing / hoses – bracketing, down-hang		
3.3	Control blowing		Free passage in all nozzles
3.4	Tightening of coupling on pipeing / hoses		
3.5	Assembly of nozzles, filters and protection hoods		Use thread-lock liquid
3.6	Tightening of nozzles		
3.7	Checking / adjusting of the spray directions		

For electrically released systems, there are further controls to be made, which are described in the user's manual for those.

Fig 1

Fig 2A

Fig 2B

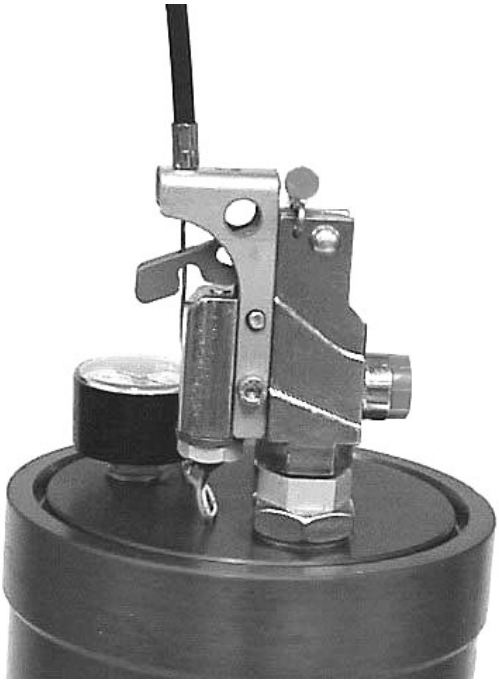

Fig 3

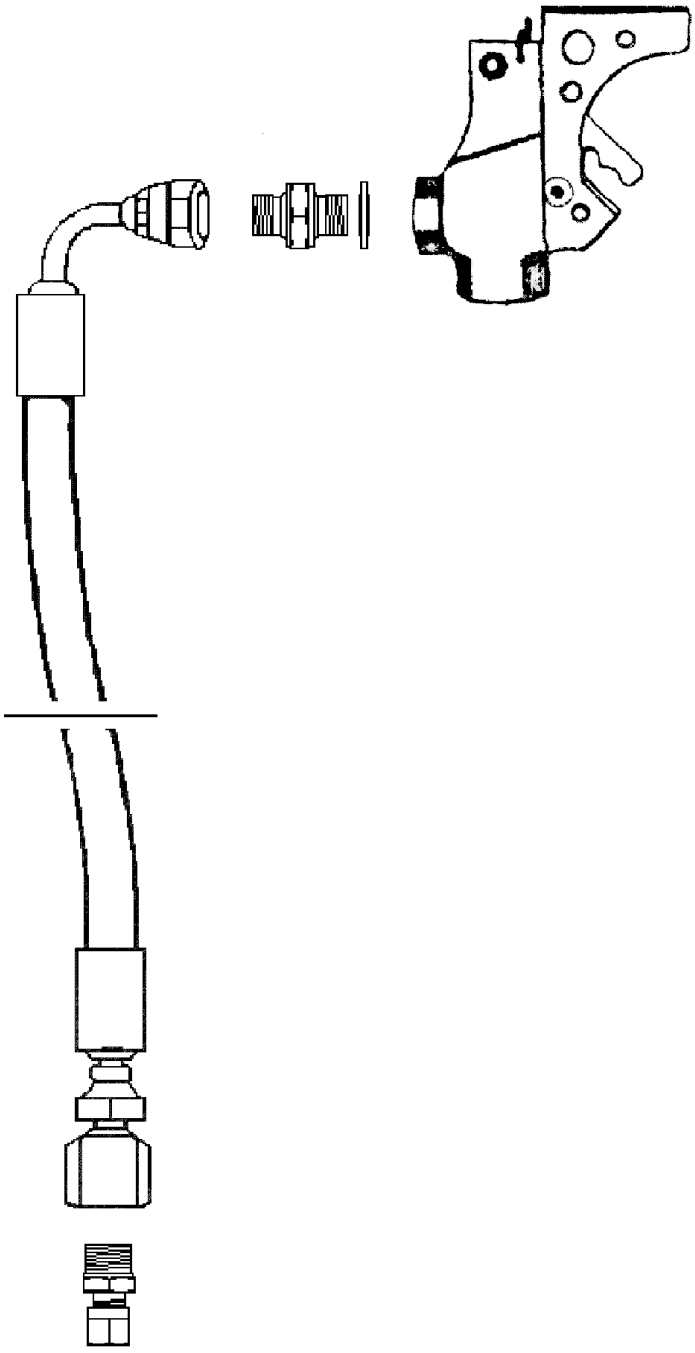

Fig 4

Fig 5

Fig 6

FOGMAKER® Universal is a registered trademark for fire extinguishers intended for protection of engine rooms in lift trucks, front-loaders, forestry- and construction machines and vehicles, busses or other heavy vehicles, engine rooms and cockpits in racing and rally cars, engine rooms in historical cars, engine and fuel tank rooms in pleasure boats and other smaller boats.

FOGMAKER ® Universal works and activates and empties the extinguishant completely uninfluenced by the position or angle in which it is installed or hanging when activated. This is built on a patented principle which makes the function more reliable than with traditional fire extinguishers of bottle type, using a vertical evacuation pipe, which reduces or even destroys the effect, if the extinguisher is activated when the bottle is hung or kept nearly horizontally or up side down.

FOGMAKER ® Universal is intended for self-installation and it is easy to install and dismantle in case of service or refilling. The extinguishant is based on water and contains adding ingredients for anti-freeze and for prevention of reignition, respectively. The extinguishant is, in comparison with powder-extinguishant, very friendly to the protected equipment and easy to clean up after a fire.

PRODUCT DATA

Type .....

Serial number .....

Date of delivery .....

FOGMAKER ® Universal is produced and marketed by

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