



High Pressure Water Mist System

Technical Documentation

1. Overview

1.1 Brief Introduction to the Equipment

The high-pressure water mist extinguishing equipment, which uses water as the medium, and special nozzle to decompose the water flow into drop under a specific pressure (usually 10MPa) for fire extinguishing, is economic and widely used. Now it has become one of the important technologies to replace gas extinguishing and other extinguishing equipment, and has a wide application prospect.

Water mist refers to the drop with a diameter $Dv0.50$ less than 200 μm and $Dv0.99$ less than 400 μm that are ejected through the nozzle and formed in a plane 1 m downward the nozzle axis at the minimum design working pressure.

The diameter of the drop is small, so the surface area increases sharply compared with the same volume of water, which improves the heat exchange efficiency and cooling effect. Meanwhile, the water mist vaporizes rapidly in the fire scene, the volume expands rapidly, absorbing a large amount of heat, which can quickly cool the combustion surface, surrounds and covers the combustion area as water vapor after vaporization, so as to extinguish the fire due to oxygen deficiency. In addition, the water mist has a superior effect of blocking the transfer of heat radiation.

1.2 Performance Characteristics

The main characteristics of the unit are as follows:

- 1) It is environment-friendly and ideal for environmental protection;
- 2) Good electrical insulation performance, which can put out the fire of live equipment;
- 3) Less water consumption for fire extinguishing and less water stain residue;
- 4) It can greatly reduce the smoke content and toxicity in fire, which is conducive to safe evacuation;
- 5) Good extinguishing performance and wide application;
- 6) Water can easily used and is cheap as a fire extinguishing agent;

1.3 Application site

The unit is mainly applicable to:

- 1) Fires on the combustible solid surface in archives, libraries, archives databases, museums, cultural relics museums and ancient buildings, etc.;
- 2) Fires of combustible liquid in hydraulic station, oil-immersed power transformer room, lubricating oil station and warehouse, turbine oil warehouse, turbine room, diesel generator room, fuel oil boiler room, paint spraying and baking production line, fuel oil boiler room, fuel oil direct-fired machine room, liquor and alcohol warehouse, oil switch cabinet room and other places;
- 3) Fires of electrical equipment in power transformation and distribution room, generator room, computer room, data center room, communication room, central control room, large cable room, cable tunnel (gallery), cable interlayer, cable shaft and other places;
- 4) Fires of engine test room, tobacco warehouse, subway station hall, tunnel, airport terminal, hospital parking lot, underground space and large-space warehouse, etc.;
- 5) Cooling of some chemical facilities and temperature and dust control in environmental protection.

This equipment is not suitable for extinguishing the following fires:

- 1) Deep fire of combustible solids;
- 2) Fire of active metals and their compounds that can react violently with water or produce a large amount of harmful substances;
- 3) Combustible gas fire.

2. Equipment Composition and Working Principle

2.1 Composition

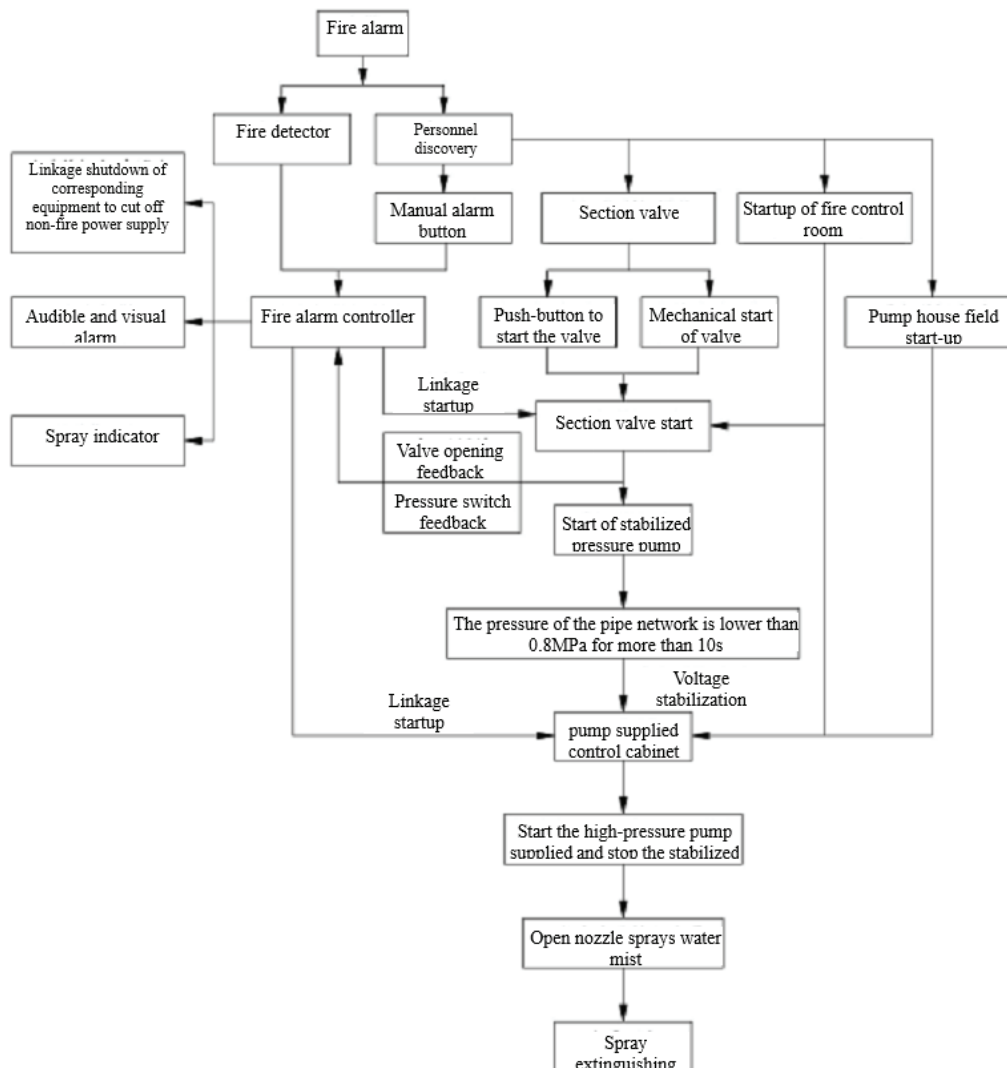
The high-pressure water mist extinguishing equipment (open type) is mainly composed of high-pressure pump supplied, relay water tank, pump supplied control cabinet, stabilized pressure pump supplied, open section valve, open water mist nozzle and other components and high-pressure water supply pipes, which can automatically and manually start and spray water mist for fire extinguishing or fire control.

2.2 Working Principle

Under the condition of standing by, a certain pressure (between 0.8MPa and 1.2MPa) is maintained in the pipeline between the header pipe and the section valve, which can be started through the linkage startup of the fire alarm controller and its own pressure stabilization function.

Pressure stabilization function startup: When the section valve is started, the pipeline pressure drops, and when it is lower than 0.8MPa, the stabilized pressure pump starts, when it runs for more than 10S and the pressure in the pipeline is still under 0.8MPa, the high-pressure pump supplied starts, and the stabilized pressure pump stops, then the high-pressure water is sprayed through the water mist nozzle to extinguish the fire.

The working principle diagram of the equipment is as follows:



2.3 Control Mode

Fire extinguishing equipment has three control modes: automatic start, manual start and mechanical emergency start.

2.3.1 Automatic Start

When the fire alarm controller is placed in the "automatic" position, the extinguishing equipment is in the automatic state.

In this state, the fire detector detects fire in the enclosure and sends an alarm signal to the fire alarm controller, which confirms the enclosure suffering fire according to the address of the fire detector and sends a linkage signal to start the section valve of the corresponding enclosure (according to the situation, a delay of 0 to 30s can be set). After the section valve is fully opened, the feedback valve opening signal is sent to the fire alarm controller, which will then send a linkage signal to the pump supplied control cabinet. The cabinet starts the high-pressure pump supplied according to the prefabricated procedure, and the high-pressure pump supplied delivers high-pressure water to the nozzle to spray water mist for fire extinguishing. At the same time, the pressure switch in the section valve detects the rise of water pressure in the pipeline and sends a feedback signal to the fire alarm controller. After receiving the feedback signal, the fire alarm controller sends a linkage signal to light up the spray indicator.

2.3.2 Manual Start

When the fire alarm controller is in placed the "manual" position, the extinguishing equipment is in the manual state.

Start mode I:

After a fire is found, the fire alarm controller can be manually operated, and the section valve and the pump supplied control cabinet can be started respectively to spray water mist for fire extinguishing.

Start mode II:

After a fire is found, press the start button of the section valve, which will be automatically started through the pressure stabilization function to spray water mist for fire extinguishing.

2.3.3 Mechanical Emergency Start

In case of emergency, the handle on the section valve can be operated manually by machinery, which will be automatically started through the pressure stabilization function to spray water mist for fire extinguishing.

3. Main Technical Parameters

The main technical parameters of the high-pressure water mist extinguishing equipment are shown in the following table.

Product Model	LF-WMS (rated flow)/14-PL (imported Danfoss nine-plunger pump series)								
Product Model	LF-WMS (rated flow)/14-PAVLN (domestic nine-plunger pump series)								
Rated Flow (L/min)	112	224	336	448	560	672	784	896	1008
Rated Working Pressure	14 MPa								
Rated flow of Single Pump Supplied	112 L/min								
Rated Power of Motor of Single Pump Supplied	30 kW								
Working Power Supply	AC 380V, 50 Hz								
Starting Mode	Automatic, manual, mechanical emergency								
Operating Ambient Temperature	4 °C ~ 50 °C								

Note: Model representation of high-pressure water mist extinguishing equipment: such as LF-WMS-112

LF: LIFECO Product series;

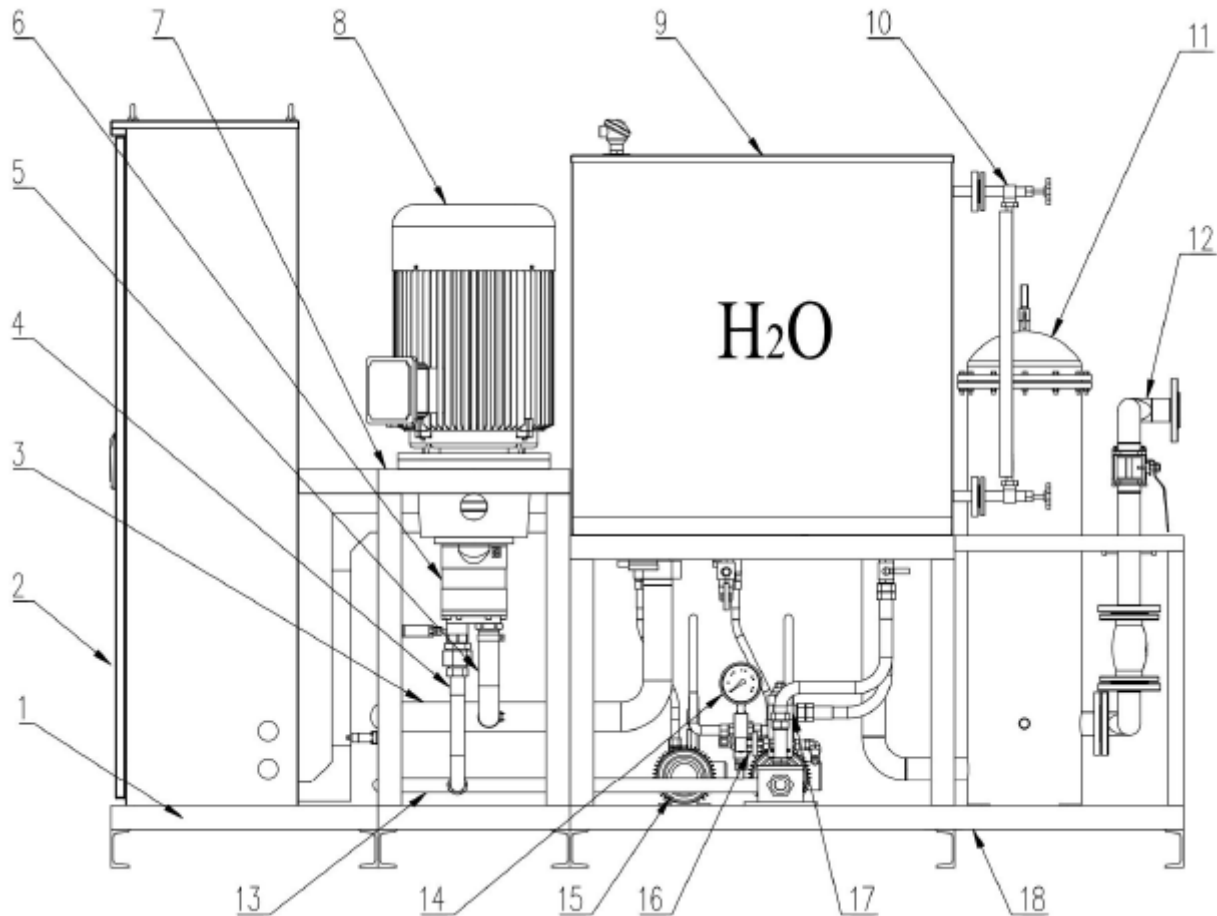
WMS: water mist system;

112: Rated flow of the equipment (L/min);

4. Main Components of the Equipment

4.1 Pump Supplied Unit

It consists of high-pressure pump, pressure relief regulating valve, safety valve, pressure gauge, water inlet pipeline, high-pressure water outlet pipeline, overflow pipeline, relay tank, stabilized pressure pump, control cabinet, etc., and is used for water supply of high-pressure pump supplied, pressure stabilization of pipeline and control of extinguishing equipment. as shown in the figure.



- | | |
|---|---------------------------------------|
| 1. Control cabinet mounting rack | 2. Control cabinet |
| 3. Main water inlet pipe of pump supplied | 4. Water outlet hose of pump supplied |
| 5. Water inlet hose of pump supplied | 6. High-pressure pump |
| 7. Pump supplied mounting bracket | 8. Motor |
| 9. Relay water tank | 10. Liquidometer |
| 11. High precision filter | 12. Water tank inlet pipe group |
| 13. Header | 14. Stabilized pressure pump |
| 15. Safety valve | 17. Pressure relief regulating valve |

Main technical parameters:

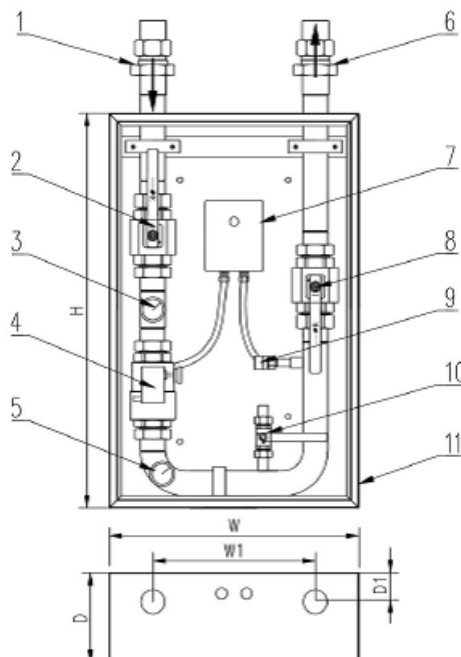
Product Model	Flow	Pressure	Dimensions (L x W x H) mm	Water Inlet Pipeline	HP Water Outlet Pipeline
XSWBG112/14	112L/min	14MPa	1010X2855X2000	DN50 Flange	DN32
XSWBG224/14	224L/min	14MPa	1010X3360X2000		
XSWBG336/14	336L/min	14MPa	1010X3540X2000	DN65 Flange	DN40
XSWBG448/14	448L/min	14MPa	1010X4045X2000		
XSWBG560/14	560L/min	14MPa	1010X4195X2000	DN80 Flange	DN50
XSWBG672/14	672L/min	14MPa	1010X4700X2000		
XSWBG784/14	784L/min	14MPa	1010X4780X2000	DN100 Flange	DN50
XSWBG896/14	896L/min	14MPa	1010X5365X2000	DN100 Flange	DN65
XSWBG1008/14	1008L/min	14MPa	1010X5365X2000		

4.2 Section Valve

4.2.1 Type A

It consists of pressure switch, high-pressure manual ball valve, high-pressure electric stop valve, junction box, pressure gauge and box. The working power supply is DC24V, 0.15A, and the rated working pressure is 16MPa.

It starts automatically when receiving the linkage signal from the fire alarm controller and the feedback valve opening signal is sent to the fire alarm controller, then the high-pressure pump supplied starts to release water mist to the enclosure for fire extinguishing, the pressure switch sends a spraying feedback signal to the fire alarm controller, as shown in the figure.



1. High-pressure welded union (water inlet)
2. High-pressure manual ball valve (normally open)
3. Pressure gauge
4. High-pressure electric stop valve (normally closed)
5. Pressure gauge
6. High-pressure welded union (water outlet)
7. Junction box
8. High-pressure manual ball valve (normally open)
9. Pressure switch
10. Test valve (normally closed)
11. Box

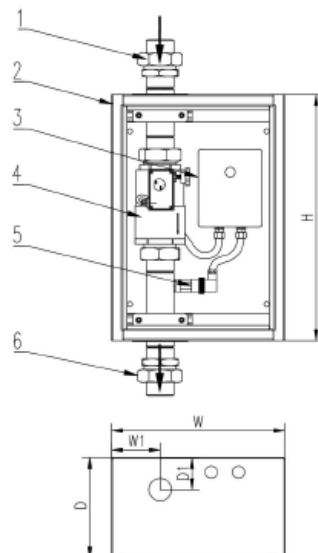
Main technical parameters:

Product Model	LF-SVA-(Nominal Diameter)					
Nominal diameter DN	15	20	25	32	40	50
Pipe Specification (mm) (outer diameter X thickness)	φ22×2.5	φ27×2.5	Φ34×3	Φ42×3.5	Φ48×4	Φ60×5
Rated Working Pressure	160 Bar					
Working Power Supply	≥ DC24V, 0.15A					
Overall Dimensions	H=950mm		W=600mm		D=220mm	
Pipe Connection Size	WI=390mm			DI = 701mm		
<p>Note: Model Representation of Section Valve: Such as LF-SVA-32 LF: LIFECO Product Series; SVA: Section Valve Type A 32: Nominal Diameter.</p>						

4.2.2 Type B

It consists of pressure switch, high-pressure electric stop valve, junction box and box. The working power supply is DC24V, 0.15A, and the rated working pressure is 16MPa.

It starts automatically when receiving the linkage signal from the fire alarm controller and the feedback valve opening signal is sent to the fire alarm controller, then the high-pressure pump supplied starts to release water mist to the enclosure for fire extinguishing, the pressure switch sends a spraying feedback signal to the fire alarm controller, as shown in the figure.



1. High-pressure welded union (water inlet)
2. Box body
3. Junction box
4. High-pressure electric stop valve (normally closed)
5. Pressure switch
6. High-pressure welded union (water outlet)

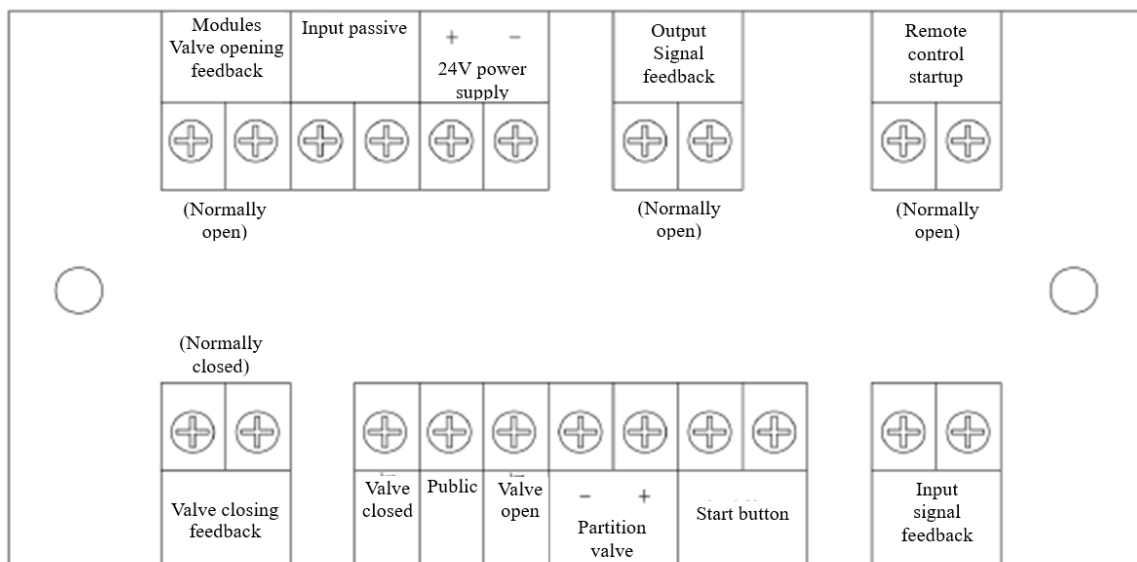
Main technical parameters:

Product Model	LF-SVB- (Nominal Bore)						
Nominal Diameter DN	15	20	25	32	40	50	65
Specification ff Welded Pipe (mm) (Outer Diameter X Thickness)	φ22×2.5	φ27×2.5	Φ34×3	Φ42×3.5	Φ48×4	Φ60×5	Φ76×6
Rated Working Pressure	160 Bar						
Working Power Supply	≥ DC24V, 0. 15A						
Overall Dimensions (DN15~DN50)	H=540mm		W=380mm		D=220mm		
Installation Dimension (DN15~DN50)	W1=105mm			D1=70mm			
Overall Dimensions (DN65)	H=650mm		W=450mm		D=220mm		
Installation Dimension (DN65)	W>150mm			DI=110mm			

Note: Model Representation of Section Valve: Such as LF-SVB-32.
 LF: LIFECO Product Series;
 SVB: Section Valve Type B
 32: Nominal Diameter.

4.2.3 Wiring of section valve

Internal wiring of section valve box:

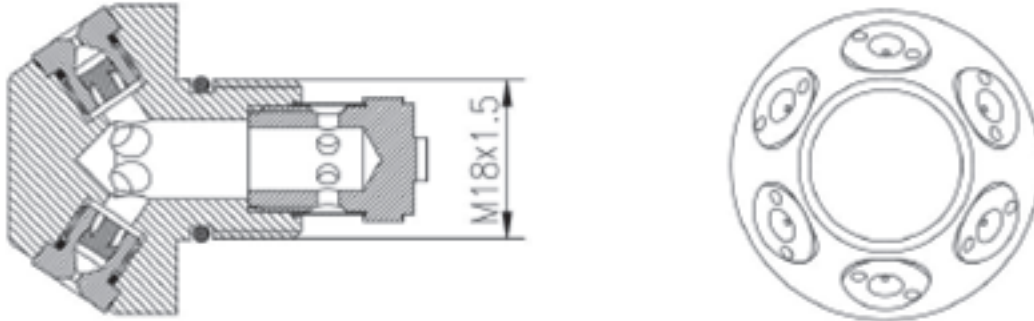


Description of external wiring of section valve box:

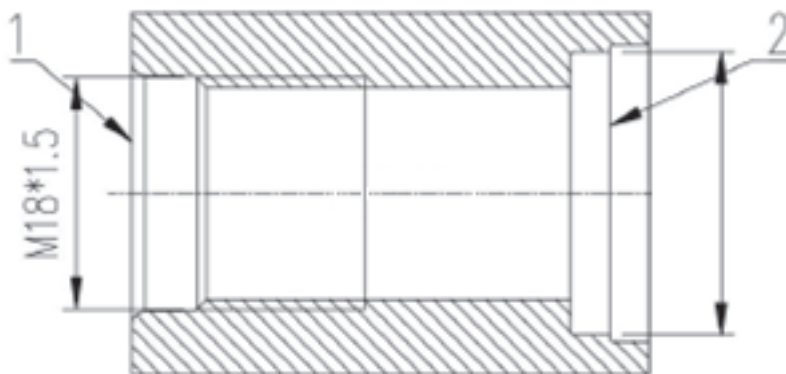
S/N	Terminal Name	Purpose and Description
1	Module valve open feedback	Normally open passive contact, output contact closing signal after the section valve is fully opened
2	Input passive	Normally open passive contact, input contact closed signal when energized, section valve open
3	+24V power supply	Control valve power supply of zone 0, \geq DC24V, 0.15A
4	Output feedback signal	Normally open passive contact, output contact closing signal when the water pressure in the pipeline reaches the set value
5	Remote control startup	Normally open passive contact, connected with the pump supplied control cabinet, the section valve is fully opened, and the output contact closing signal directly starts the pump supplied control cabinet
6	Valve closing feedback	Normally closed passive contact, output contact opening signal after the section valve is opened

4.3 Water Mist Nozzle

Connect with water mist pipe through special connectors for nozzles, which is used for high-pressure water mist, as shown in the figure.



Nozzle



Special connector for nozzle

1. Connect with nozzle thread 2. Connect with pipeline weld (the outer diameter 6 of connecting pipeline shall be provided)

Main Technical Parameters

Specification and Model	Rated Flow (L/min)	Rated Working Pressure/MPa	Maximum installation spacing and height (spacing X height) for local application/m	Maximum installation spacing and height (spacing X height) in total flooding application/m
LF-WMN-03	3	100	/	3X4.5
LF-WMN-05	5	100	/	3X4.5
LF-WMN-07	7	100	3x3	3X4.5
LF-WMN-09	9	100	3x3	3X4.5
LF-WMN-10	10	100	3X3.5	3X7.5
LF-WMN-12	12	100	3X3.5	3X7.5
LF-WMN-15	15	100	3X4.0	3X7.5
LF-WMN-17	17	100	3X4.0	3X7.5
LF-WMN-20	20	100	3X4.0	3X7.5
LF-WMN-25	25	100	3X4.0	3X7.5

Note: The Model Representation of Water Mist Nozzle: Such as LF-WMN-25
 LF: LIFECO Product Series.
 WMN: Water Mist Nozzle.
 25: K-Factor/10.

5. Installation

5.1 General Requirements

Before installation of the system, the design unit shall make technical disclosure to the construction unit, and shall meet the following conditions:

- 1) Through review, the approved design and construction drawings, design specifications, design changes and other technical documents are complete;
- 2) Data on the installation and use of the system and its main components, etc. are complete;
- 3) The types, specifications and models of system components, pipe fittings and other equipment and materials shall meet the design requirements;
- 4) The configuration conditions of the enclosure or protected object and equipment room are consistent with the design document;
- 5) Embedded parts and reserved holes, etc. required by the system shall meet the design requirements;
- 6) The water, electricity and gas used on the construction site and during the construction shall meet the construction requirements;
- 7) Construction of the system shall be undertaken by qualified professional construction teams;
- 8) Construction and installation shall be carried out in accordance with relevant engineering design documents and relevant national construction technical standards.

5.2 Installations

5.2.1 Installation of Pump Supplied Unit

- 1) The placement of the pump supplied unit shall comply with the requirements of the design drawings;
- 2) The levelness deviation of foundation of the pump supplied unit should not be greater than $\pm 2\text{mm/m}$;
- 3) If the pump supplied unit is fixed with anchor bolts, the bolt diameter is 16mm, the bolt exposed from the base is 60 ~ 70mm high, and rubber shock cushion should be used between the pump supplied unit and the foundation;
- 4) The maintenance channel should be set around the pump supplied unit, and the width of the channel should not be less than 0.7m;
- 5) When making the inlet and outlet of the control cabinet, the protection level of the control cabinet should not be damaged;
- 6) The overflow pipe and sewage pipe of the trunk tank are connected to the drainage ditch through the pipe.

5.2.2 Installation of Section Valve

- 1) The installation position of section valve shall comply with requirements of the design drawings;
- 2) The installation position of the observation instrument and operating valve of the valve group should be determined according to the design requirements, and should be easy to observe and operate. The opening and closing mark on the valve group shall be easy to identify, and the permanent sign indicating the controlled enclosure shall be set and indicated on the control valve;
- 3) The installation height of section valve should be 1.2m ~ 1.6m (based on the operating surface of electric globe valve), and the distance between the operating surface and the wall or other equipment should not be less than 0.8m, and should meet the requirements of safe operation, the installation height of the valve box suggested by us is 1.3m, and the bottom of the valve box is 0.9m from the ground;
- 4) The section valve is fixed on the wall with expansion bolts with diameter of 12mm, 4 expansion bolts for each valve box.

5. Installation

5.2.3 Installation of Pipeline

5.2.3.1 In addition to the relevant provisions of the current national standards《Code for construction of industrial metallic piping engineering》GB 50235 and 《Code for construction of field equipment, industrial pipe welding engineering》GB 50236, the installation of pipes and pipe fittings shall comply with the following provisions:

- 1) The layout of pipelines shall comply with requirements of the design drawings;
- 2) The pipeline should comply with austenitic stainless steel seamless steel pipe of Grade 022Cr17Ni12Mo2 stipulated in the current national standard 《Stainless and heat-resisting steels—Designation and chemical composition》GB/T 20878 (generally called 316L), or other metal pipe with corrosion resistance and pressure resistance of no less than the grade 022Cr17Ni12Mo2;
- 3) The material of pipe fittings should be the same as that of pipeline, and the pipe should be connected with special joint or flange, or Argon arc welding;
- 4) The nominal pressure of pipelines and pipe connectors should not be less than the maximum design working pressure of the system, and the nominal pressure of pipelines, pipe connectors and valves between the pump group inlet and the water storage tank should not be less than 1.0 Mpa;
- 5) For those set in system with environment of explosion risk, the pipe and pipe fitting shall take the measures of electrostatic conductivity removal;
- 6) Pipelines should be cleaned in sections before installation. During the construction process, the interior of the pipeline shall be kept clean, without welding slag, welding burr, oxide skin, impurities or other foreign bodies., and the openings in the construction process shall be closed in time;
- 7) If flange connection is used, side-by-side pipe flange should be convenient to disassemble and assemble, with space of no less than 100mm;
- 8) The welding between pipes or between pipes and pipe fittings shall be butt-welded, the Argon arc welding process shall be used for pipe welding, and a compatible electrode shall be used. The joint preparation form, processing method and size shall conform to the relevant provisions of current national standard《Recommended joint preparation for gas welding manual metal arc welding gas-shield arc welding and beam welding》GB/T 985.1
- 9) Casing should be used at place where the pipe crosses the wall and floor; the length of casing crossing the wall should not be less than the thickness of the wall, and the length of the casing crossing the floor should be 50mm above the floor. The gap between the pipe and the casing shall be filled densely with fireproof sealing materials;
- 10) The pipeline shall be fixed on the building components with anti-shaking metal supports and hangers. The support and hanger shall be able to withstand the weight and impact of the pipeline when it is filled with water, and the spacing shall not be greater than that regulated in the following table. The support and hanger shall be subject to anti-corrosion treatment, and measures shall be taken to prevent electrochemical corrosion with the pipeline.

Space between supports and hangers of the system pipeline

Pipe Diameter DN	<16	20	24	28	32	40	48	60	276
Max. Space (m)	1.5	1.8	2.0	2.2	2.5	2.8	2.8	3.2	3.8

5.2.3.2 After installation and fixing, the pipeline should be flushed and should comply with the following provisions:

- 1) Before flushing, protective measures shall be taken for the instrument of the system, and pipe support and hanger shall be inspected, and reinforcement measures shall be taken if necessary;
- 2) The water quality of flushing water should meet the requirements of the system;
- 3) Flushing velocity should not be lower than the design velocity;
- 4) After qualified flushing, fill in the pipeline flushing record.

5.2.3.3 After pipeline flushing is qualified, pressure test shall be carried out on the pipeline, and the following requirements shall be met:

- 1) The quality of the test water should be consistent with the flushing water of the pipeline;
- 2) The test pressure should be 1.5 times of the working pressure of the system, the pipeline is filled with water, and the air is emptied, and the pressure test device is used to increase the pressure slowly, when the pressure rises to the test pressure and the pressure is stabilized for 5 minutes, the pipeline shall be free from damage and deformation, then the pressure is lowered to the working pressure of the system and the pressure is stabilized for 120min, and the pipeline be free from pressure drop, deformation or leakage.
- 3) The test point is suggested at the lowest point of the system pipe network, and the equipment, instruments, valves and accessories that cannot be involved in the pressure test should be isolated or installed after the test;
- 4) After passing the test, the test record should be filled in.

5.2.3.4 After passing the pipeline pressure test, the system pipeline should be purged with compressed air or nitrogen with purge pressure not greater than the working pressure of the pipeline, and the flow rate should not be less than 20m/s. The end of the pipeline is set with target plate coated with white cloth or white paint, and the target plate is qualified if it is free of rust slag, dust, water stains and other debris within 5 minutes.

5.2.4 Installation of nozzle

- 1) Nozzle installation shall be carried out after pressure test and purging are qualified;
- 2) When installing nozzle, check the nozzle type, specifications and the orifice direction one by one according to the design document, do not disassemble and assemble or modify nozzle;
- 3) Special wrench shall be used for nozzle installation;
- 4) The installation height and space of nozzle, the distance between nozzle and the ceiling, door, window, mouth, wall or obstacle should meet the design requirements;
- 5) For nozzle without decorative cover, the end thread of the connecting pipe should not expose from the ceiling, and nozzle with decorative cover should closely fit with the ceiling.

6. Commissioning

6.1 Commissioning Preparation

- 1) The system and other devices, power sources and water sources linked with the system shall be in standby state, and the safety conditions on site shall meet the commissioning requirements;
- 2) The inspection equipment required for system commissioning should be complete.

6.2 Commissioning

6.2.1 Device Commissioning

- 1) Close the collecting pipe control valve, open the control valve of the test pipeline and pressure relief pipeline and the vent ball valve switch at the top of the filter;
- 2) Adjust the manual-automatic switching knob of the control cabinet to the manual position, open all the power switches in the control cabinet, the main electric indicator on the control cabinet is on, the intelligent single loop measurement and control instrument shows 0, and the water pressure indicator in the stabilization area is on;
- 3) After the control cabinet is powered, the low liquid level indicator is on, the low water alarm indicator of water tank will be on and emit an alarm buzzer, the water refill solenoid valve automatically opens for water refill (Note: When the liquid level is low, water will refill automatically regardless the state of the control cabinet), the water refill will start and the indicator light is on, when the water level of the trunk tank exceeds the low water level, the low water alarm indicator of the tank will be off and the alarm buzzer will stop, when the liquid level of the trunk tank exceeds the low level, the low level indicator will be off, and water will continue to be refilled to high level, the water refill solenoid valve should be closed to stop water refill, the high level indicator is on. Observe the bleed ball valve switch at the top of the filter during the water refill process, and close the ball valve after water flows out upon completion of venting.
- 4) Open the sewage valve of the relay tank to drain water and clean the relay tank, the liquid level control should be able to operate automatically during the cleaning process. Close the sewage valve after cleaning and refill the relay tank to the high liquid level;
- 5) Open the control valve of the water inlet pipe of the pressurized pump under the relay tank to refill the water to the pressurized pump. The next step can be proceeded only after confirming that the pipeline is full of water;
- 6) Press the start and indication buttons of the stabilized pressure pump on the control cabinet to start the stabilized pressure pump and confirm the normal operation and the correct phase sequence of the power supply of the stabilized pressure pump. Press the stop button of the stabilized pressure pump to stop the operation of the stabilized pressure pump and test two stabilized pressure pumps one by one;
- 7) Loosen the air release bolt on the pimp supplied unit, and then tighten the air release bolt when the water sprays from the bolt hole, then press the start and indication buttons of the high pressure pump on the control cabinet to start the high-pressure pump supplied, confirm the normal operation of the high-pressure pump supplied, then press the stop button of the high-pressure pump supplied, the high-pressure pump supplied will stop running, all the high-pressure pump supplied are tested one by one, if the operation of pimp supplied unit is noisy, the operation and commissioning of the pimp supplied unit should be carried out after secondary venting treatment;
- 8) Press the start and indication button of the high pressure pump on the control cabinet to start the high-pressure pump supplied, slowly close the test pipeline control valve, check the value displayed by the intelligent single loop measurement and control instrument, the output pressure of the high-pressure pump supplied should reach 14MPa, press the stop button of the high-pressure pump supplied and the high-pressure pump supplied will stop running, and the opening position of the test pipeline control valve will remain unchanged. All high-pressure pump supplied can meet the pressure requirements through testing one by one, after testing, open the control valve on test pipeline for pressure relief;

- 9) Close the control valve of test pipeline, adjust the control cabinet manual-automatic switch knob to the automatic position, the stabilized pressure pump should be able to start automatically, the stabilized pressure pump start and indication light will be on, when the value showed on intelligent single loop measurement and control instrument is larger than 1.2, the stabilized pressure pump should be able to stop automatically, at the same time, the water pressure indicator in the stabilization area is off;
- 10) The control cabinet manual-automatic switch knob is in the automatic position, slowly open the control valve of test pipeline, and when the value displayed on intelligent single loop measurement and control instrument is smaller than 0.8, the stabilized pressure pump should be able to start immediately, the start and indication light of stabilized pressure pump will be on, continue to open the control valve of test pipe and maintain the valued showed on intelligent single loop measurement and control instrument continuously smaller than 0.8, when such value can be maintained for more than 10 s, the high-pressure pump supplied should be able to start automatically while the stabilized pressure pump stops automatically, and continue to start the next high-pressure pump supplied through linkage of pressure until the pressure in the pipeline meets the design requirements, then stop the linkage start, press the emergency stop button to stop all the high-pressure pump supplied from starting automatically. After the test is completed, adjust the control cabinet manual-automatic switch knob to the manual position and turn the emergency stop button to restore the device;
- 11) The control cabinet manual-automatic switching knob is in the manual position, open the control valve of test pipe, press the one-key start and indication button, the high-pressure pump supplied should be able to start automatically, and continue to start the next high-pressure pump supplied through pressure linkage, press the one-key stop button, the high-pressure pump supplied should be able to stop all operation;
- 12) Close the control valve of the test pipeline, start the stabilized pressure pump until the intelligent single loop measurement and control instrument shows 21.1. adjust the control cabinet manual-automatic switching knob to the automatic position, and input the alarm signal, the high-pressure pump supplied should be able to start automatically, and continue to start the next high-pressure pump supplied through linkage pressure until the pressure in the pipeline meets the design requirements, then stop the linkage start and press the emergency stop button to stop the start of all high-pressure pump supplied. During the test, the fire alarm indicator is on and emits the alarm buzzer, the operation signal feedback of the pimp supplied unit is normal. After the test is completed, adjust the control cabinet manual-automatic switch knob to the manual position and turn the emergency stop button to restore the device
- 13) Open the control valve of the test pipeline, adjust the control cabinet manual-automatic switch knob to the inspection position, press the inspection start and indication button, and the device enters the automatic inspection state, upon completion of the inspection, the inspection start and indication button is off, and upon completion of the inspection commissioning, adjust the control cabinet manual-automatic switch knob to the manual state;
- 14) Provide DC24V power supply to the open section valve, press the open valve button, the control valve of the section valve should be able to start immediately, after opening in place and stop, the corresponding valve opening signal should be sent out; manually restore the control valve to the closed state, input the alarm signal, the control valve of the partition valve should be able to start immediately, after opening in place to stop, the corresponding valve opening signal should be sent out;
- 15) Upon completion of commissioning, check the status of all valves of the device.

6.2.2 Spray Test

- 1) Perform the water mist spray test, adjust the control cabinet manual-automatic switch knob to the manual position, check and close the electric stop valve and test valve of all section valves, open other valves on the pipeline, close the control valve of test pipeline in the pump room and open the collecting pipe control valve, start the stabilized pressure pump to pressurize the pipeline to 0.8MPa, then adjust the control cabinet to the automatic position, manually open the section valve outside the enclosure that needs to be subject to spray test, and start the high-pressure pump supplied through the stabilized pressure function, the high-pressure pump supplied delivers high-pressure water to nozzle to spray water mist. Upon completion of the spray test, press the emergency stop button on the pump supplied unit control cabinet to stop, and then restore the device;
- 2) Link with the fire alarm controller for water mist spray test, adjust the control cabinet manual-automatic switch knob to manual position, check and close the electric stop valve and test valve of all section valves, open other valves on the pipeline, close the control valve of test pipeline and open the collecting pipe control valve in the pump room, start the stabilized pressure pump to pressurize the pipeline to 0.8MPa, and then adjust the control cabinet to the automatic position, the fire alarm controller sends a linkage signal to start the enclosure section valve which needs to be subject to spray test. After the section valve is fully opened, the feedback valve opening signal will be sent to the fire alarm controller, after receiving the valve opening signal, the fire alarm controller will send a linkage signal to the pump supplied unit control cabinet, which will start the high-pressure pump supplied according to the preset program. The high-pressure pump supplied delivers high-pressure water to nozzle to spray water mist, at the same time, the pressure switch in the section valve detects the rising water pressure in the pipe and sends a feedback signal to the fire alarm controller, after receiving the feedback signal, the fire alarm controller sends a linkage signal to lighten the spray indicator. Upon completion of the spray test, press the emergency stop button on the pump supplied unit control cabinet to stop, and then restore the device.

7. Maintenance and Management

The user shall formulate the system maintenance management system, and shall execute the system according to the maintenance system and operation rules, so as to keep the system in normal operation status, and the maintenance management shall comply with relevant regulations; the maintenance and management of the system should be undertaken by trained personnel, who should be familiar with the working principles, operation and maintenance methods and requirements of the system.

7.1 Daily Maintenance

- 1) Check whether the appearance and opening & closing state of the control valve and other valves meet the design requirements;
- 2) Check whether the main and standby power supplies of the system are connected;
- 3) In cold and severe regions, check the room temperature where the water storage equipment is set, and the temperature should not be lower than 5°C;
- 4) Check the control panel and display signal status of the pump supplied unit control cabinet;
- 5) Check whether system marks and operation instructions of the system are correct, clear and complete, and they should be in the correct position.

7.2 Monthly Maintenance

- 1) Check the appearance of the system components, and there should be no collision deformation and other mechanical damages;
- 2) Check whether the operation of section valve is normal;
- 3) Check whether the valve is in the correct position;
- 4) Check whether the water level of the water storage tank meets the design requirements;
- 5) Check whether the nozzle appearance and spare quantity meet the requirements.

7.3 Quarterly Maintenance

- 1) Carry out water discharge test on the system, and check whether the pump supplied unit startup, switch between main and standby pumps and alarm linkage function are normal;
- 2) Check whether the pipe, support and hanger are loose, and whether the pipe fitting is deformed, aged or cracked, etc.

7.4 Annual Maintenance

- 1) Regularly measure the water supply capacity of primary system water source;
- 2) Carry out comprehensive inspection on the system components, pipes and fittings, and shall clean the water storage tank and filter, meanwhile, the pipes behind the control valve shall be purged;
- 3) The water storage tank should change water once every six months;
- 4) Carry out system simulation linkage function test.

6. Precautions

- 1) The extinguishing equipment should be gently loaded and unloaded during transportation, collision, lying down or upside down is strictly prohibited.
- 2) In the process of disassembly and assembly, damage to surface of the device should be avoided to affect the appearance.
- 3) Irrelevant personnel are not allowed to touch various components of the device to avoid accidents.
- 4) The installation and commissioning personnel of the device should be familiar with the basic structure, working principle, performance and operation procedures of the device, as well as the basic structure and working state of each component.
- 5) Maintenance should be carried out in strict accordance with the operating procedures to prevent malfunction.
- 6) Other safety measures shall follow the relevant national regulations.

9. After-sale Services

- 1) Service tenet: integrity, speed, speediness and thoughtfulness.
- 2) Service objectives: superior products, integrity-based, customer first, considerate service
- 3) Service efficiency: If the device fails during or beyond the warranty period, upon receiving the notice, the supplier shall assign maintenance personnel on site within the shortest time to quickly troubleshoot the problem for the demander.
- 4) Service principle: According to the relevant national laws and regulations, the product implements three guarantees, that is, within the warranty period, the supplier will repair and replace the damaged parts free of charge, for damaged parts beyond the warranty period, only cost price is charged for the provided parts, for equipment damage caused by human factors of the user, the accessories repaired or provided by the supplier are calculated at the cost price.
- 5) Training: Train personnel for the user, so that they can understand the working principle of the device, be skilled in device operation, and be able to solve common problems.

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