



**Manual & Self Oscillating Monitors Models
VMT, VMH, VMW and Nozzle Models VNN & VNS
Installation, operation and maintenance manual**

For design, product selection and planning information, please refer to ***Technical Data Page TD1.3.5.1***



TECHNICAL MANUAL

**MANUAL & SELF OSCILLATING
MONITORS MODELS VMT, VMH, VMW
AND NOZZLE MODELS VNN & VNS
INSTALLATION, OPERATION AND
MAINTENANCE MANUAL**

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
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VISIT THE VIKING WEBSITE FOR THE LATEST EDITION OF THIS TECHNICAL MANUAL

NOTICE

THIS DOCUMENT PROVIDES IMPORTANT SAFETY INSTRUCTIONS

The user is strongly recommended to read and to follow carefully the instructions contained in this manual to prevent damage to people and objects.

This document must be kept in a safe place together with all the technical documentation relevant to the materials purchased (certificates, test report, etc...)

All the information contained in this manual is relevant to the description and operation of the whole equipment. For more details regarding the sub-components, please make reference to the relevant manufacturer's documentation.

DISCLAIMER

The manufacturer declines any responsibility due to non-observance of these instructions, improper use of the equipment or use outside its design limitation.

The compliance, partial or full, with the prescriptions and the information contained in this manual does not relieve anyone who is in charge to install, to operate or to maintain in full efficiency the equipment from the responsibility due to improper actions or inexperience.

The manufacturer is not responsible for the damage and any other consequence caused by a lack of skill of the personnel involved with the equipment's operation.

It is the sole purpose of this document to provide operating personnel with a basic understanding of the equipment and of its components. In order to maintain the equipment and its accessories at a high level of efficiency, all operators and maintenance crew are urged to carefully read this instruction manual and keep it readily available for future reference.

This manual does not provide instructions on the procedures for installation, operation and maintenance that are specifically in place at the installation site. In addition, this manual does not provide instructions on the procedures, installation, operation and maintenance of the fire protection system the equipment is part of.

The user must be informed on the local regulations and laws and get in contact with the local authorities to obtain all required permissions and approvals for operation within the installation plant.

In case any of the instructions provided in this manual are not completely understood by anybody involved in the installation, operation and maintenance of the equipment, this must be reported to the manufacturer before making any further actions.



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SECTION 1 – SAFETY PRECAUTIONS

1.1 Safety and warning notices

Throughout this publication, **DANGER**, **WARNING** and **CAUTION** signs may be used to alert the installer/user to special instructions concerning a particular service or operation that may be hazardous if performed incorrectly or carelessly. **OBSERVE THEM CAREFULLY.**

Safety notices are introduced by signal words which indicate the degree of danger.

These “Safety Notices” cannot eliminate by themselves the hazards that they signal. Strict compliance to these special instructions plus “common sense” operations are major accident prevention measures.

 **DANGER** Indicates an imminently hazardous situation. If not avoided, death or serious injury will result.

 **WARNING** Indicates a potentially hazardous situation. If not avoided, death or serious injury could result.

 **CAUTION** Indicates a potentially hazardous situation. If not avoided, slight or minor injuries could result.

 **NOTICE** Indicates a potentially harmful situation. If not avoided, the system or something in its surroundings may be damaged.

 **INFORMATION** This symbol emphasizes useful tips and recommendations as well as in formation for efficient and trouble-free operation.

1.2 General notes for operator safety

 **CAUTION**

The equipment is designed to work under pressure and to handle fire fighting foam concentrates. Both these two conditions represent a potential risk for people and property.

For the appropriate operation when the equipment is under pressure, please refer to the instructions that follow in this manual. For safe foam concentrate handling and first aid measures, please refer to the applicable parts of the concentrate's MSDS.

1.3 Safety during maintenance

 **WARNING**

Maintenance staff **MUST** carry out a risk assessment prior to performing any activity on the equipment. Particular care must be paid to those actions where the lowering or removal of safety measures may be required (e.g. temporary removal of the thermal relief valve, etc...).

The personnel in charge of the maintenance must be equipped with all the individual protection equipment to act safely and in accordance with all the applicable laws and rules. In particular:

1. Safety clothes must be worn
2. The work tools must be according to the law and in good condition



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SECTION 2 – SCOPE OF THE MANUAL

2.1 Purpose of the manual

The scope of this manual is to provide adequate information and instruction this equipment's user, maintenance staff and any other qualified personnel who is involved with and authorized to operate and maintain the unit. Attention is focused on the potential for the risk of damage, injury or death that may occur due to the lack of compliance with the instructions given in this document.

This manual details installation, initial start-up, operation of the equipment plus recommended periodic maintenance activities.

2.2 Precautions to extend the equipment lifetime

NOTICE

All installation, commissioning, operation and maintenance activities must be carried out by personnel who are qualified and authorized by the system's owner or manager. The personnel responsible for these activities must proceed only after reading and fully understanding this manual.

As the equipment has been designed, tested and approved by third party organizations including the durability and performance of the original accessories installed - only original spare parts and consumables must be used when replacements are required. The use of non-original spare parts may result in an unsafe or poor performance of the equipment and decrease its overall lifetime usage. Use of non-original spare parts automatically expires the warranty clause of the supplied equipment.

2.3 Environment

NOTICE

The equipment user is responsible for the appropriate disposal of all parts that have to be replaced, during the routine and special maintenance, according to local applicable laws and rules. In particular, consumables (seals, gaskets, grease, etc...) and the foam concentrate used in combination with the monitor.

Care must be taken when flow and mixing tests are carried out at the installation site, in such a way not to threaten the environment. Please always refer to the foam concentrate's MSDS indications concerning the environmental considerations prior to the handling of foam concentrate and water-foam solution.



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SECTION 3 – STRUCTURE AND FUNCTION

3.1 Monitor description and principle of operation

3.1.1 Manual monitor

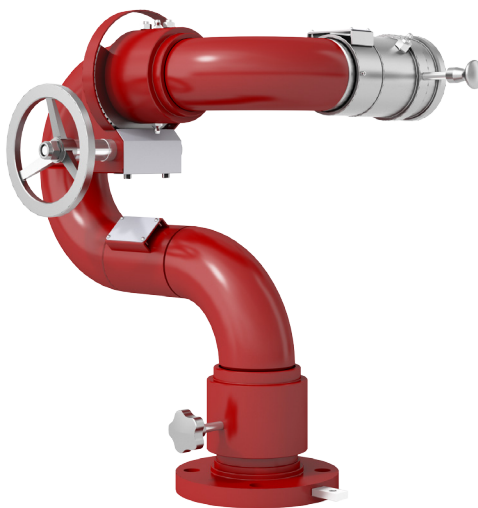


Fig 3.1.1.1 – 1 Handwheel manual monitor

The tiller or handwheel manual monitor is a locally operated discharge device used for industrial firefighting protection. The local control allows the orientation of the water or water/foam stream, adjusting its horizontal or its vertical angle, from a control tiller (lever) or handwheel fixed to the monitor body.

The manually operated monitor and nozzle can also be secured in a pre-determined position for specific application protection with water water/foam discharge initiated remotely.

When equipped with the non-self-inducting or self-inducting nozzle the discharge stream shape is adjustable from full jet to a fog pattern.

All these controls are intended to achieve the highest efficiency in controlling and extinguishing a fire or in cooling down hot fire exposed surfaces.

The manual monitor is composed of three main parts:

- a lower body, rigidly connected through a flanged connection to the system's supply piping network.
- an intermediate body containing the two rotating joints – this section being the one rotating horizontally.
- a top terminal section that is connected to the nozzle. This terminal section rotates horizontally together with the intermediate body and independently of it, it can also rotate vertically.



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3.1.2 Oscillating monitor

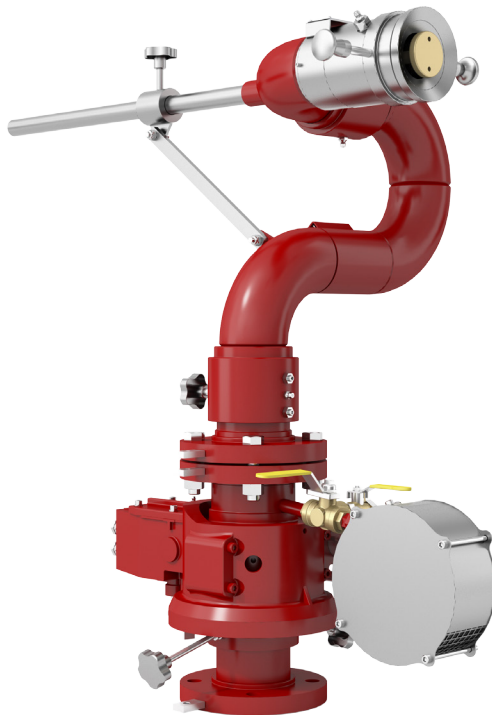


Fig 3.1.2.1 – Tiller oscillating monitor

The tiller or handwheel oscillating monitor is a locally operated discharge device used for industrial firefighting protection. The local control allows the orientation of the water or water/foam stream, adjusting its horizontal or its vertical angle, from a control tiller (lever) or handwheel fixed to the monitor body.

Additionally, the tiller or handwheel oscillating monitor can be configured to give automatic coverage of a predetermined area. The oscillating unit is a device that enables a continuous movement on the horizontal axis to the monitor installed on it. The rotation motion is generated by a hydraulic turbine, fed by the same water or water/foam flow going to the discharge device at the end of the monitor.

The turbine is combined with a reduction gear system and an inverting gear. The inverting gear changes the movement direction when the unit reaches one of the stops: these stops are field adjustable so that the total oscillation can be adjusted freely. If two knobs are used, the range can be adjusted from approximately 15° to 340° of total coverage. If only one stop is used, the total oscillation is approximately 355°. If both the stops are removed, the monitor is capable of rotating 360° continuously, but in this particular configuration is not able to reverse the movement. The oscillating unit is also available for order separately and can be adapted to any existing monitor already installed in the field.

The oscillating monitor and nozzle can also be secured in a predetermined position for specific application protection with water water/foam discharge initiated remotely.

When equipped with the non or self-inducting nozzle the discharge stream shape can be adjusted from full jet to a fog pattern.

All these controls are intended to achieve the highest efficiency in controlling and extinguishing a fire or in cooling down hot fire exposed surfaces.

The oscillating monitor is composed of four main parts:

- a lower body, rigidly connected through a flanged connection to the system's supply piping network.
- an intermediate body containing the two rotating joints— this section being the one rotating horizontally.
- a top terminal section that is connected to the nozzle. This terminal section rotates horizontally together with the intermediate body and independently of it, it can also rotate vertically.
- An oscillating unit, placed below the monitor flange, required for automatic horizontal movement, defining the total covered range



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3.2 Product features

3.2.1 Monitors

Non-oscillating and oscillating monitors are available in three different control types:

Tiller – Vertical and horizontal stand-by setting can be fixed via the locking knobs (6).

Manual movement by a trained operator is controlled by releasing the locking knobs and directing the water/foam flow via the tiller in the desired direction. (**Fig 3.2.1.1**)

1-Handwheel - Vertical stand-by setting can be fixed by adjusting the handwheel (5) to the desired position. The horizontal position is fixed via the locking knob (6). Manual movement by a trained operator is controlled by adjusting the handwheel for the vertical movement. Manual operation of the horizontal movement is not practical during water/foam flow so for this reason it is best suited to use with the oscillating unit only. (**Fig 3.2.1.2**)

2-Handwheel - Vertical and horizontal stand-by setting can be fixed by turning the handwheels (5). Manual movement by a trained operator is controlled by turning the handwheels and directing the water/foam flow. (**Fig 3.2.1.3**)

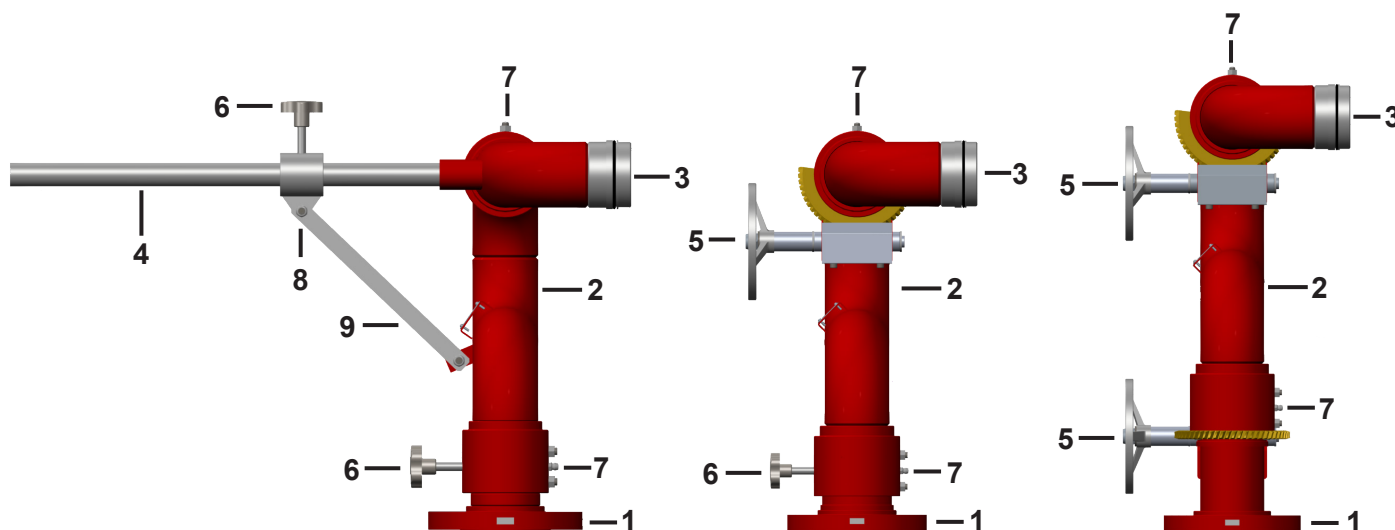


Figure 3.2.1.1

Figure 3.2.1.2

Figure 3.2.1.3

Table 3.2.1.4 – Manual Monitor General Features

Item	Description	Item	Description
1	Water / foam inlet (flanged)	6	Locking knob
2	Body	7	Greaser nipple
3	Water / foam outlet (threaded)	8	Tiller slide
4	Tiller	9	Tiller connecting rod
5	Handwheel	-	-



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3.2.2 Nozzles

Non-oscillating and oscillating monitors are available with non-self-inducting or self-inducting type nozzles.

Non-self-inducting nozzle is for use with water or with foam solution supplied via a suitable bladder tank proportioning, foam pump proportioning or other foam dosing system. (**Fig 3.2.2.1**)

Self-inducting nozzle will use the flow of water through the internal waterway to draw foam into the nozzle and mix into a foam solution locally before discharging from the outlet. The foam induction can be isolated using the supplied ball valve (**Fig 3.2.2.2**).

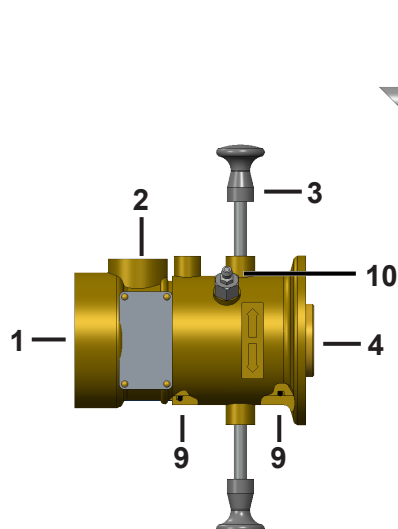


Figure 3.2.2.1

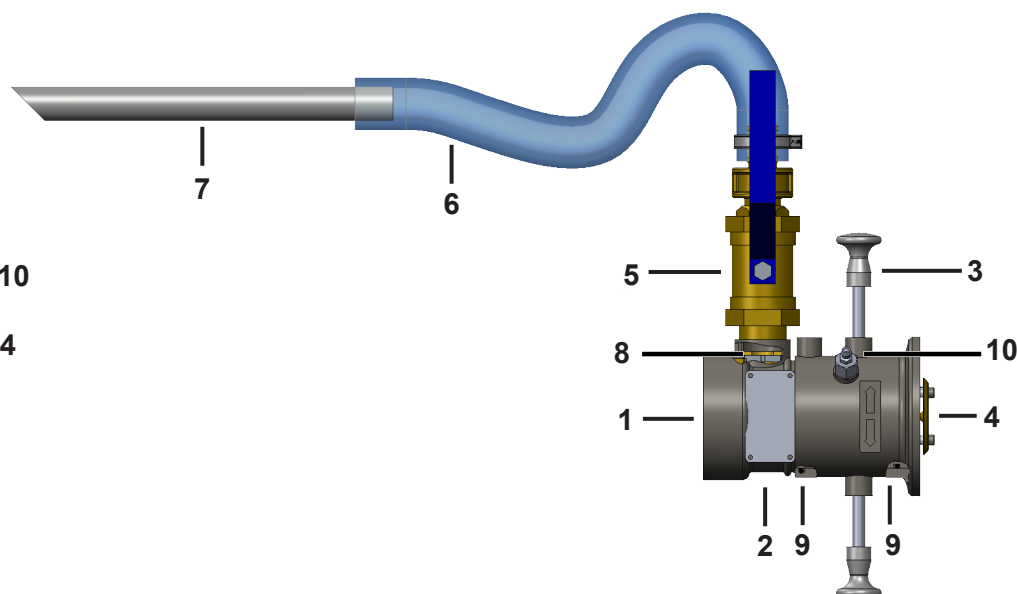


Figure 3.2.2.2

Table 3.2.2.3 – Nozzle General Features

Item	Description	Item	Description
1	Water / foam inlet (threaded)	6	Foam concentrate suction hose
2	Body	7	Foam concentrate pick-up pipe
3	Jet / spray adjustment nob	8	Sized orifice
4	Water / foam outlet	9	Terminal gasket
5	Foam concentrate isolation valve	10	Greaser nipple



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3.2.3 Oscillating unit

The oscillating unit's movement is driven by a small amount of redirected water/foam solution travelling through the monitor. A water turbine shield is included as standard to direct this water/foam solution downwards. A test feature is included to enable a test of the oscillation function and range without discharging from the monitor..

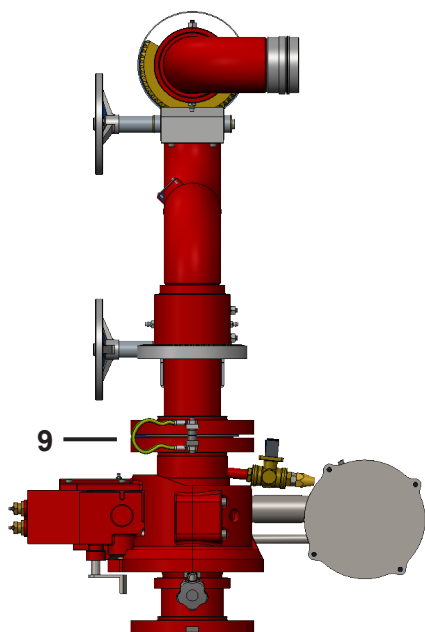


Figure 3.2.3.1 | Monitor & oscillating unit

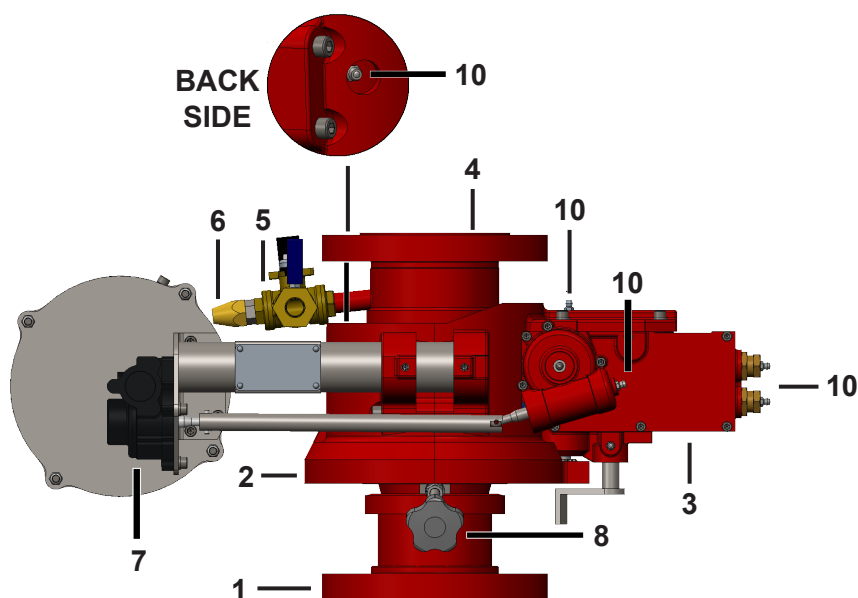


Figure 3.2.3.2 | Oscillating unit

Table 3.2.3.3 – Oscillating Unit General Features

Item	Description	Item	Description
1	Water / foam inlet (flanged)	6	Impeller nozzle
2	Body	7	Impeller wheel and reduction gear assembly
3	Gearbox	8	Oscillation angle adjustment knob (x2)
4	Water / foam outlet (flanged)	9	Earthing cable
5	3-Way test / run / impeller isolation valve	10	Greaser nipple



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SECTION 4 – TRANSPORTATION, RECEPTION AND STORAGE

4.1 Checks on the equipment at the reception



Unless otherwise stated, monitors and oscillating units are supplied on non-stackable pallets or inside individual cases suitable for inland (truck) transportation. Nozzles are supplied in separate boxes. This type of packaging design will avoid damage to the equipment if handled correctly during transit. Other types of packing can be provided on request (e.g. sea freight or for other expected severe handling conditions).

When received at the destination the equipment must be checked for signs of damage that may have occurred during transportation and unloading operations. Damage to the pressure-retaining portion of the equipment may result in liquid leaks, liquid spray jets or even structural failures. Such damage has to be reported to the manufacturer immediately for risk assessment.

Any other damage that, based on the judgment of the installer/end user, is supposed to potentially result in a failure or that may affect the performance of the equipment must be reported to the manufacturer and rectified before the start-up according to the manufacturer's indications.

The manufacturer is not responsible for damage due to equipment mishandling during the transportation, unloading and positioning stages. Equipment must only be handled by skilled and authorized personnel who are competent in the planning and execution of such operations using appropriate lifting machinery.

4.2 Storage recommendations before installation

NOTICE

Before installation, the equipment shall preferably be stored in a sheltered or in an indoor area. The storage temperature should not be outside the range (-30 °C; +80 °C) in a low humidity (<50%) environment. In any case, the monitor's storage temperature and humidity values shall be inside the respective acceptable range for any of the electrical accessories mounted on them (if fitted).

Direct sunlight exposure should be avoided during the storage period



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SECTION 5 – BEFORE INSTALLATION

5.1 Installation place requirements

The equipment **shall not** be installed in areas:

1. Too close to other equipment/objects that may prevent a safe access for equipment's operation and periodic inspections.
2. Where it is subject to heat sources that may affect its safety, performance or durability.
3. Close to flammable materials or chemicals that can generate a fire concern to the equipment.
4. Not protected against collision or tampering.
5. Where vibrations can generate uneven loads on the flange connection and propagate to the rest of equipment (in case of vibration, suitable damping methods shall be put in place).
6. Where a potentially explosive area is present, unless suitably earthed.
7. Where wind loads exceed the calculated limits.
8. Where seismic loads exceed the calculated limits.
9. Where the corrosion due to the atmosphere is more severe than that the painting cycle is designated to withstand (e.g. where aggressive chemicals such as sulphuric acid, chlorine or brine are present).
10. Where the temperature is outside the range (-20 °C; +80 °C)

5.2 Activities before the monitor installation

Before installing the monitor and oscillating unit in its designated position, perform a thorough piping network flushing. The flushing should be made with water or air at a sufficient flowrate and duration to allow for debris, sediments, foreign body removal, such as those that may have accumulated during and after the piping installation and that may affect negatively the monitor operation or even a complete blockage.



If the supply pipe flushing was not completed before the monitor and oscillating unit installation, this operation must be performed only after removing the discharge device from the monitor. Failure to do this will result in debris blocking and even damaging the discharge device internal parts (**see Section 7** for further details).



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SECTION 6 – INSTALLATION

6.1 General guidance

The Installer and user of this equipment has the responsibility to ensure that the following points are fulfilled:

1. The installation must be carried out by qualified and authorized personnel according to the applicable local regulations and laws.
2. Safety measures to prevent accidents shall be taken according to the applicable regulations, in particular when handling energized live equipment (if applicable).
3. The equipment shall be connected to the piping system in such a way the inlet flange connection is not subject to stresses above the design limits.
4. Supply pipework around the inlet flange will be subjected to additional forces due to the recoil effect of the monitor. Suitable brackets should be used - particularly when grooved couplings are used, to prevent pipe rotation.
5. The monitor pressure rating shall be higher than the maximum operating pressure of the supply system or approved methods to reduce the pressure shall be implemented.
6. It is highly recommended to have an isolation valve located close to the equipment to facilitate maintenance activities.
7. It is recommended to use a full port isolation valve to reduce pressure loss and turbulence into the equipment. Flow and pressure can be further optimised by installing a section of straight pipe equal to 5 pipe diameters before the equipment.
8. A pressure gauge should be placed close to the inlet of the monitor to facilitate supply condition verification and/or future trouble shooting.
9. Installation must be accomplished avoiding damage to the equipment. In case of damage, a thorough investigation must be made in order to assess the potential consequences for the equipment's safety and for the fire protection performance, it is supposed to provide. The manufacturer should be contacted in such situations.
10. Once the installation is completed, a final inspection shall be carried out to ensure that the installation drawings have been followed and that the quality of install is satisfactory. Non-conformities must be recorded and rectified prior to proceeding with commissioning and start-up.
11. When equipment is installed in cold/freezing climates, ensure that methods are used to maintain the extinguishing medium above its minimum use temperature.
12. In cold/freezing climates, ensure that the equipment and supply pipework in the exposed area is drained of water / water foam solution to prevent damage caused by expansion on freezing.



CAUTION

Most anti-freeze solutions are flammable and can cause irritation by contact on eye and skin. Please always refer to the relevant SDS if used in fixed fire protection systems.

6.2 Monitor positioning

The monitor shall be placed at the installation location according to the following steps:

1. Keep the monitor supply piping dry and isolated from the water pressure source.
2. Connect the monitor inlet flange to the system piping flange and position according to the design layout.
3. Ensure that the flange bolts are of correct type and that the applied tightening torque is suitable.
4. Always use asbestos-free gaskets between the flanges.



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SECTION 7 – MONITOR START-UP AND COMMISSIONING

Once installed, the equipment should be commissioned prior to the full operation. The commissioning of this equipment **MUST BE MADE AFTER** the commissioning of the supply system to relevant local rules and standards. The equipment and the supply system can be commissioned at same time if preferred.

Since the commissioning process must assess the correct installation and operation of the monitor's system that will influence the future lifetime of the equipment itself, this activity shall be carried out by expert personnel and shall follow carefully the instructions contained in this manual. It is highly recommended that the installer/user contact the manufacturer in case of doubts about the instructions shown hereinafter. The manufacturer is not responsible for damage caused to the equipment or to the surrounding system due to inappropriate commissioning.

Commissioning activities can take place only after that the equipment installation has been inspected and checked to be in full compliance with the engineering documents and according to the good engineering practice rules.

7.1 Start-up activities

Note: Please refer to the product feature drawings in **section 3.2** in conjunction with this table.

Table 7.1 Recommended Start-Up Activities

Step	Monitor type		Description
	Manual	Oscillating	
1	✓	✓	Check that the monitor is securely installed as per the requirements in Chapter 6
2	✓	✓	Tiller monitors could be supplied with the tiller partially detached to facilitate packing and transportation. This should be re-assembled as per Figure 3.2.1.1
3	✓	✓	In case of installation on mobile objects not supplied by the manufacturer such as trailers, movable skids, trucks etc, check for monitor stability in every condition of horizontal and vertical movements.
4	✗	✓	Check that the impeller isolation valve is closed to avoid water flowing to the turbine and causing the automatic oscillation during flushing and other preliminary activity.
5	✓	✓	a) Operate the vertical and horizontal manual movement through the tiller, knob and / or handwheel (depending on model selected). The tiller and knob both have a threaded locking knob that secures the monitor in a fixed standby position. b) Make several full scope oscillations from the left to right and from up to down. The motion should be smooth and easy. c) Should this not be the case, immediately stop the commissioning and report this to the manufacturer as the monitor may have been damaged during the transportation or installation.
6	✗	✓	The Oscillating Unit's earthing cable must be attached to the monitor (Section 8.2.3)
7	✓	✓	The monitor should be orientated in a direction where water discharge will not cause damage to people or to properties.
8	✓	✓	a) If the supply system flushing (as per Section 5.2) has previously not taken place, it should be completed now as per Step 8a . b) If system flushing is complete then move to step 9
8a	✓	✓	a) Flushing must be performed with the discharge device removed. b) Monitor shall be orientated in a direction where water discharge will not cause damage. c) Ensure the monitor isolation valve is closed with supply water to the underside. d) Open monitor isolation valve fully and discharge water for a minimum of 5 minutes. e) Depending on the quantity of foreign bodies in the piping, the flushing may even take longer. f) Observe the water stream color and consistency to judge when the flushing can be stopped. g) Close the monitor isolation valve.
9	✓	✓	a) Reattach/check the discharge device is screwed securely onto the monitor's threaded outlet connection. (Care should be taken not to cross or damage the threads). b) The discharge device is supplied with a small radial fixing screw to prevent unscrewing from the monitor after installation. Check this fixing screw is also tight.



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7.1 Start-up activities (*continued*)

Table 7.1 Recommended Start-Up Activities (*continued*)

Step	Monitor type		Description
	Manual	Oscillating	
10	✗	✓	Estimate the oscillating angle considering the limits required by the specific conditions in the field by manually adjusting the extreme left and right position using the two knobs on the GA- unit (see 8.2.2)
11	✓	✓	Adjust the monitor elevation angle and horizontal direction. Lock monitor in correct position through the dedicated knob on the tiller and monitor base swivel. (Handwheel controls require no locking)
12	✗	✓	Full opening of the impeller isolation valve will allow water to flow to the turbine and allow for automatic oscillation
13	✓	✓	Open the monitor isolation valve and observe the discharge pattern from the discharge device. The stream, in the full jet mode for nozzles shall be compact and solid. The throw must be satisfactory and consistent with the performance charts. An insufficient throw or a diffused jet pattern in the full-jet configuration may indicate presence of debris in the nozzle. In this case, the nozzle should be removed from the monitor and inspected.
14	✓	✓	With the locking setscrew loosened, operate the nozzle manually to adjust from the full jet to the fog-stream position. The patterns must be satisfactory and consistent with the performance charts. (see section 8.3.2)
15	✓	✓	If a self-inducting nozzle is used, the suction hose should be inserted securely into the foam storage container and the ball valve opened. This will verify that the nozzle is inducting foam correctly. If discharging foam is problematic, consider placing the suction hose temporarily into a container of water at the same level as the foam container to verify acceptable nozzle induction instead.
16	✓	✓	In case the discharge device is self-inducting, perform the mixing ratio measurement as indicated in NFPA 11 latest edition or in EN13565-2 whichever is applicable to the project. Note that the self-inducting nozzle is foam type specific as per the requirements of the UL Listing and cannot be adjusted.
17	✗	✓	If the jet stream hitting the impeller is allowing normal oscillation, leave the impeller nozzle isolation ball valve fully open. If the jet is too diffused and the impeller is not moving uniformly, partially close the impeller nozzle valve to re-establish a correct flow through the nozzle. Verify that with new setting the impeller is activated correctly allowing a full and uniform movement of the oscillating unit.
18	✓	✓	Close the monitor isolation valve
19	✓	✓	Drain the water from the monitor after use – especially in areas subject to freezing
20	✓	✓	The minimum recommended manual checks and commissioning steps on the monitor, nozzle and oscillating unit (where fitted) are now complete.



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SECTION 8 – OPERATION

This following section explains some of the operational features of the monitor equipment. Depending on the configuration chosen, some of the items or features may not be present:

8.1 Monitors

8.1.1 Locking knobs

The tiller and the one handwheel monitors have a locking knob on the bottom (horizontal) rotating joint. The tiller monitor also has one on the vertical adjustment tiller (lever). These knobs should be loosening to use the monitor in the horizontal movement axis. If the monitor is to left in a fixed position as part of an automatic fire protection system then these knobs shall be secured after adjustment. If they are not, the monitor may move erratically on its own after system operation.

The tiller monitor also has a locking knob for the vertical axis, which is controlled via the tiller. This should also be secured when not in use for the same reasons as mentioned above. The tiller style monitor gives a faster movement but requires a higher level of operator capability.

8.1.2 Handwheels

The horizontal (2-handwheel model only) and vertical axis movements are performed with a handwheel connected to a worm gear. Handwheels give a more controlled situation during a system discharge. The handwheels are not locked into position and will remain in their set position with or without operator intervention.

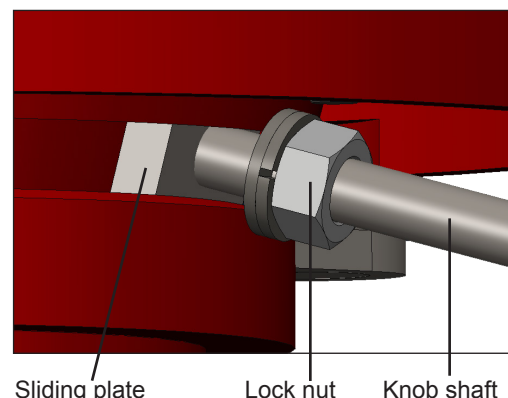
8.2 Oscillating unit

8.2.1 Impeller wheel water shield

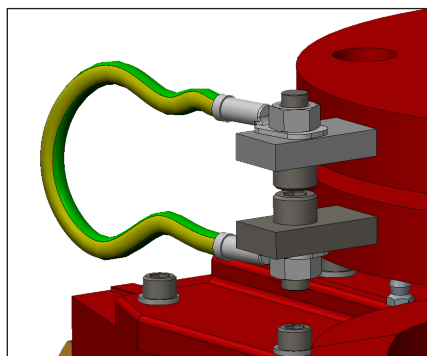
A jet of water or water/foam solution drives the impeller wheel. There is a protective shield in this housing that is enclosed approximately 300° around the wheel and prevents the water or water/foam from spraying erratically in the surrounding area. Instead, the water or water / foam solution is discharge out of the bottom. Consideration shall be given to this during planning, commissioning and usage phases.

8.2.2 Oscillation angle setting

The oscillation range is adjustable from approximately 15° to 340° via locking knobs situated just above the unit's inlet flange. There are two fitted as standard which set the left and right extremes. To adjust, loosen the lock nut and then the knob(s) can be turned anti-clockwise to loosen the knob shaft assembly. Do not fully unwind the shaft out of the sliding plate, as this is not required. The sliding plate can then be adjusted to the desired position. The knob(s) is then be re-tightened by turning clockwise then secured by re-tightening the locking nut. By removing one of the knobs, you can obtain a 355° degree oscillation. Removing both knobs will give a continual 360° coverage.



8.2.3 Earthing point



The earthing cable is supplied attached to the oscillating unit complete with fixing nuts and bolts. This is a requirement of the machine directive to avoid the buildup of static electricity during operation.

The earthing gland connection points on the monitor and oscillating unit should be aligned and the cable fixed as shown here.



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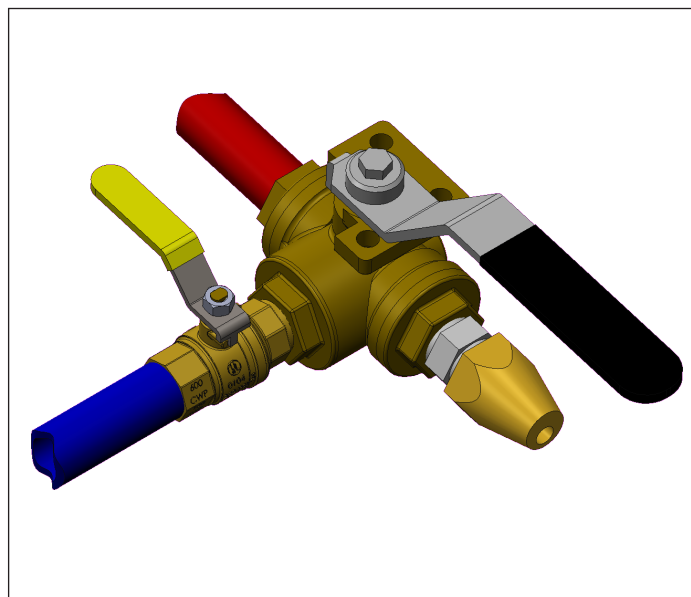
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8.2.4 Test feature

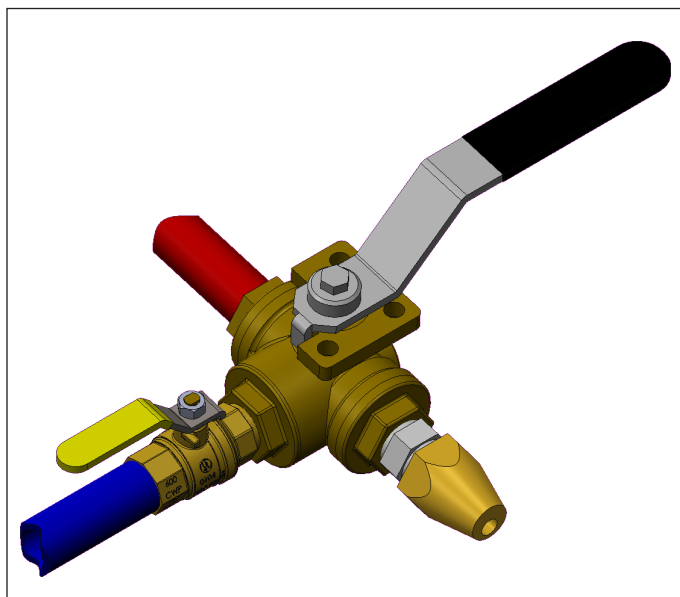
The oscillating unit has a feature to enable the setting and periodic checking of the oscillation range without flowing water or water/foam solution through the monitor. Connection of 1/2" (15 mm) ID hose supply will introduce water directly at the impellor nozzle. The 2-way test valve is then moved from its standard operating position, which allows the flow of water directly to the impellor nozzle while preventing flow back into the main supply channel to the monitor. This feature is particularly useful when installed in sensitive areas such as aircraft hangars. After testing, the 2-way valve should be returned to the operation position.

Note: If oscillation under normal conditions needs to be prevented then the main valve and test valve can be closed which will prevent water / water foam solution from discharging from the impeller nozzle.

The main valve can be secured in its correct operating position with a tie or small padlock



Normal operating position –
Oscillation on



Test operating position –
Oscillation by external water supply

8.3 Discharge nozzle

8.3.1 Nozzle

The discharge nozzle is connected to the monitor by a parallel thread. To install, screw the nozzle's female thread onto the monitor's male thread taking care not damage or cross the threads. Nozzle should be firmly hand tightened but the use of wrenches or additional force is not required. Sealing is made by the terminal gasket. PTFE tape or other sealants are not required on the threads.

8.3.2 Spray pattern adjustment

The non-self-inducting and self-inducting nozzles can be adjusted to give a discharge stream from a full jet to a full fog. This gives flexibility for system set-up depending if long distances are needed or if a wider and closer target is to be protected. The spray pattern can be adjusted during discharge by rotating the out body of the nozzle using the two provided knobs. Adjustment can only be achieved with the locking screw in a loosened position. To ensure the required spray pattern is retained, the locking screw should be tightened after adjustment.

8.3.3 Self-inducting nozzle

The self-inducting nozzle works on the venture principle. The flow of water passing through the nozzle (venture) will create an area of low pressure and effectively suck the foam concentrate into the mixing chamber before discharging a homogeneous and expanded foam stream. The foam concentrate supply should be in a suitable container and no more than 2.3 m horizontally or 1.5m vertically away from the nozzle, otherwise issues with correct functionality may occur. There is an isolation valve on the foam concentrate supply hose that can be secured in the fully open or fully closed position. The foam concentrate should be kept free of UV light and suitable measures should be taken to prevent freezing in cold installation climates.



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SECTION 9 – MAINTENANCE

The monitor, oscillating unit and nozzles require limited maintenance throughout the equipment's lifetime according to usage and environment. Some regular essential activities must be carried out to ensure appropriate performance and durability. In particular, gaskets and seals shall be regularly checked and possibly replaced.

This section covers periodic (i.e. "ordinary") maintenance activities. This ordinary maintenance does not include special repairing, like bearing or wormscrew replacement or damaged components, etc... that may be needed along the years in case of wrong operations or complete lack of ordinary maintenance.

For exceptional repairs like these, always contact the manufacturer. Reworks that may affect the equipment significantly, like drilling, machining, changing the layout, etc. would invalidate the warranty. These reworks should be avoided by anybody except the manufacturer. In extreme cases, non- standard repairs may involve a return to factory or replacement unit.

9.1 Periodic maintenance frequency

The frequency of maintenance activities on monitors and their accessories must comply with local regulations. It is the responsibility of the end user to keep themselves informed and updated on the laws pertaining to the frequency and extent of such maintenance activities.

The manufacturer indicates in this manual the minimum recommended maintenance activities to control and to ensure the efficiency of the supplied equipment. The extent and the frequency of the maintenance shall also be linked to environmental and usage conditions. Any additional requirements as a result of applicable norms, laws and regulations must be added to the recommendations given herein by the manufacturer.

9.2 General requirements



1. Maintenance must be carried out by qualified and authorized personnel according to the applicable local regulations and laws.
2. The end user must be informed in advance about the maintenance of the monitors and accessories. If applicable, alternative fire safety measures shall be put in place.
3. Safety precautions shall be taken according to the applicable local legislation and requirements.
4. Maintenance personnel shall operate with the necessary precaution and using the required personnel protective equipment (safety footwear/headwear, gloves, goggles etc.) relative to site rules and intended activities.
5. Ensure the water/foam solution supply to the monitor is isolated before performing maintenance activities.
6. Do not perform welding on the monitor if not previously authorized by the manufacturer.
7. If components or accessories are removed from the monitor or oscillating unit during maintenance, care should be taken to prevent damage to the connections and other joining parts.
8. In case some monitors parts or consumables are to be disposed, do so in accordance with the applicable regulation and with full respect of the environment. Make use of authorized disposal companies, if required.

The maintenance recommendations given in this manual are relevant to the monitors and accessories referenced herein only. Inspection and maintenance of the entire firefighting system, of which this monitor, oscillating unit or nozzle are installed, are not within the scope of this manual or of the following recommendations and shall follow the requirements of the applicable standards or regulations having jurisdiction (e.g. NFPA codes, EN standards, etc...).



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9.3 Maintenance schedule

As a minimum requirement, the maintenance program as indicated in the table below should be recommended.

Table 9.3.1 – Recommended Maintenance Activities

Ref	Activity	Type		Frequency					Related section
		Manual	Oscillating	Start up	Monthly	6 monthly	Every year	Every 5 years	
1	- Functional check of the monitor's manual movements through the tiller / knob / handwheel(s)	✓	✓	✓	✓	-	-	-	7.1
2	- Full discharge test, if feasible	✓	✓	✓	-	-	-	-	7.1, 7.2
3	- Check for integrity of turbine shield	✗	✓	✓	-	-	-	-	N/A
4	- Check for correct operation of oscillating angle and reversing functionality	✗	✓	✓	-	-	-	-	8.2.2
5	- Visual check of painting - Check of external surfaces - Check for signs of corrosion - Visual check of external welding points	✓	✓	✓	-	✓	-	-	N/A
6	- Check of flanged connections - Suitability of bolt tightening torque	✓	✓	✓	-	✓	-	-	N/A
7	- Check of nozzle tightness to monitor's body	✓	✓	✓	-	✓	-	-	8.3.1
8	- Lubrication of moving joints	✓	✓	✓	-	✓	-	-	9.4
9	- Verify correct, smooth function of the bearing/swivel joints on the monitor. (Change bearings if necessary. Bearings should be replaced in any case after 10 years or 1,000 hrs. of operation whichever is sooner).	✓	✓	✓	-	-	-	✓	Contact manufacturer

Note: More regular inspections may be required if monitor equipment is situated in extreme environments such as saline or dusty locations and / or if they are operated on a frequent basis.



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9.4 Lubrication of moving parts

NOTICE

*Care should be taken not over lubricate the joints as this may cause some damage to the internal components.
Lack / unsuitability of lubricant on the moving parts will decrease the product lifetime or incorrect performance.*

The monitor has several moving parts that need to be lubricated for proper operation and extended lifetime usage. These parts are the swivel monitor body parts, external nozzle deflector/inner body and the oscillating unit gearbox. These parts are fully lubricated during manufacturing using a multipurpose industrial grease, grade NLGI2, according to the table below:

Table 9.4.2 – Recommended Lubricant

Brand	Product	Temperature ¹			Base oil	Thickener	NLGI Class
		Minimum	Maximum	Drop			
Viscol ²	Lica F2	-20 °C (-4 °F)	+120 °C (248 °F)	>180 °C (356 °F)	Synthetic	Lithium Hydroxide	2

Footnotes
¹ Special temperature conditions may need a different lubricant.
² Other equivalent brands/products are acceptable if of same features.

9.4.3 Monitor rotating swivel assembly lubrication

The rotating swivel joints of the monitor need to be lubricated according to the maintenance schedule.

The lubricant is intended to reduce the friction between the male and female portion of the joint and between the joints and the bearing balls. The periodic lubrication can be made without dismounting any of the components by acting on the external greaser nipple(s) shown in **section 3.2.1**.

The following steps shall be taken and are applicable to both the vertical and horizontal assembly;

1. Select a suitable manual pump to inject the lubricant through the greaser nipple. (use of a powered pump should be avoided).
2. Inject the lubricant taking care to manually rotate the joint in order to distribute the grease uniformly.
3. Pump the grease until the free interstitial spaces between the bearing balls and the swivel parts are completely full.

9.4.4 Nozzle lubrication

All variants of discharge nozzles need to be lubricated according to the maintenance schedule.

The lubricant is intended to reduce the friction between the outer deflector and the inner body.

The periodic lubrication can be made without dismounting any of the components by acting on the external greaser nipple(s) shown in shown in **section 3.2.2** (total 1 per nozzle).The following steps shall be taken;

1. Select a suitable manual pump to inject the lubricant through the greaser nipple. (use of a powered pump should be avoided).
2. Inject the lubricant taking care to move the outer nozzle deflector along the complete stroke.
3. Pump the grease until the free interstitial spaces between the bearing the nozzle inner body and outer deflector are completely full;

9.4.5 Oscillating unit lubrication

The oscillating unit need to be lubricated according to the maintenance schedule.

The lubricant is intended to reduce the friction between internal workings and gearbox.

The periodic lubrication can be made without dismounting any of the components by acting on the external greaser nipple(s) shown in shown in **section 3.2.3** (total 4 per unit).The following steps shall be taken;

1. Select a suitable manual pump to inject the lubricant through the greaser nipple. (use of a powered pump should be avoided).
2. Inject the lubricant taking care to manually rotate the joint in order to distribute the grease uniformly.
3. Pump the grease until the free interstitial spaces between the bearing the nozzle inner body and outer deflector are completely full.



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9.5 Recommended spare parts

All products are designed and manufactured according to the highest quality standards to meet the expectation of many years trouble free operation. However, some parts are subject to wear and tear such as those withstanding a friction during the operation such as seals, torque limiters, etc. In order to secure the longest lifetime and to guarantee an uninterrupted fire protection service over many years, we recommend to procure and to store a suitable amount of spare parts as indicated in this section.

In addition to or instead of a spare parts storage on site, if the equipment is used in critical firefighting applications then a complete spare unit will facilitate a minimal interruption in protection allowing a more measured repair or maintenance intervention.

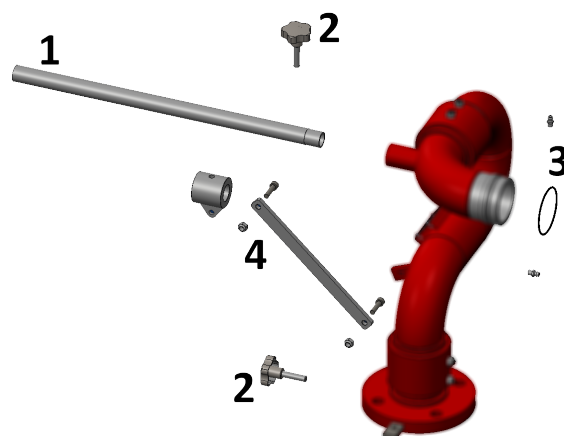
INFORMATION

Original spare parts and consumables must be used when replacements are needed. The use of non-original spare parts may give unsafe operation or poor product performance, eventually decreasing its overall lifetime. Use of non-original spare parts automatically voids the warranty.

9.5.1 Monitor

Table 9.5.1.1 - VMT 2.5" Tiller Monitor Spare Parts

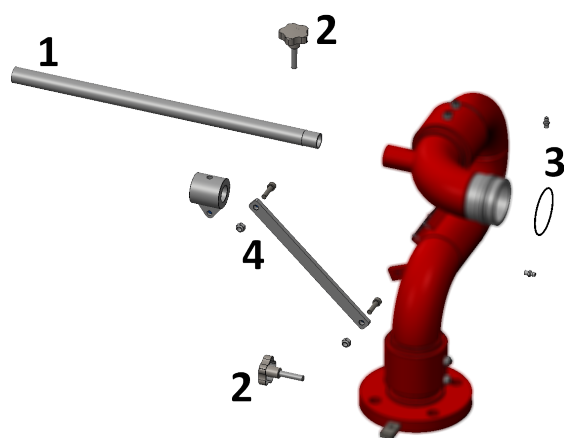
Ref	Part number	Required kits per device	Description	Items included	Qty needed	Qty in kit
1	SK110001	1	Tiller kit 2.5" monitor	Lever KMT25	1	1
				Rubber grip	1	1
2	SK110002	2	Spare monitor knob	Knob	1	1
3	SK110003	1	Commodities kit 2.5" monitor	M8 grease nipple	2	3
				M10 grease nipple	2	3
				O-ring terminal	1	2
4	SK110004	1	Con-rod kit 2.5" monitor	Rod KMT25	1	1
				Slider	1	1
				Socket screw M8 x 30	2	3
				Locking nut M8	2	3



**Fig 9.5.1.2 -
VMT 2.5" Tiller monitor spare parts**

Table 9.5.1.3 - VMT 3" Tiller Monitor Spare Parts

Ref	Part number	Required kits per device	Description	Items included	Qty needed	Qty in kit
1	SK110005	1	Tiller kit 3" monitor	Lever KMT3	1	1
				Rubber grip	1	1
2	SK110002	2	Spare monitor knob	Knob	1	1
3	SK110006	1	Commodities kit monitor 3"	M8 grease nipple	2	3
				M10 grease nipple	2	3
				O-ring terminal	1	2
4	SK110007	1	Con-rod kit 3" monitor	Rod KMT3	1	1
				Slider	1	1
				Socket screw M8 x 30	2	3
				Locking nut M8	2	3



**Fig 9.5.1.4 -
VMT 3" Tiller monitor spare parts**



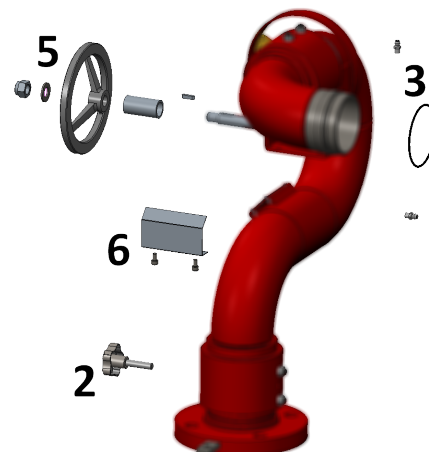
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Table 9.5.1.5 - VMH 3" 1 Handwheel Monitor Spare Parts

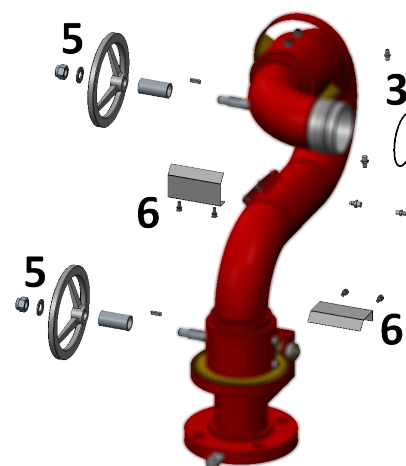
Ref	Part number	Required kits per device	Description	Items included	Qty needed	Qty in kit
5	SK110008	1	Monitor handwheel spare kit	SS handwheel	1	1
				Key	1	2
				Spacer	1	1
				Washer M14	2	3
				Locking nut M14	1	1
2	SK110002	1	Spare monitor knob	Knob	1	1
3	SK110006	1	Commodities kit monitor 3"	M8 grease nipple	2	3
				M10 grease nipple	2	3
				O-ring terminal	1	2
6	SK110009	1	Gear cover spare kit handwheel monitor	Gear cover	1	1
				Socket screw M6 x 10	2	3



**Fig 9.5.1.6 -
VMH 3" 1 Handwheel monitor spare parts**

Table 9.5.1.7 - VMW 3" 2 Handwheel Monitor Spare Parts

Ref	Part number	Required kits per device	Description	Items included	Qty needed	Qty in kit
5	SK110008	2	Monitor handwheel spare kit	SS handwheel	1	1
				Key	1	2
				Spacer	1	1
				Washer M14	2	3
				Locking nut M14	1	1
3	SK110006	1	Commodities kit monitor 3"	M8 grease nipple	2	3
				M10 grease nipple	2	3
				O-ring terminal	1	2
6	SK110009	2	Gear cover spare kit handwheel monitor	Gear cover	1	1
				Socket screw M6 x 10	2	3



**Fig 9.5.1.8 -
VMW 3" 2 Handwheel monitor spare parts**



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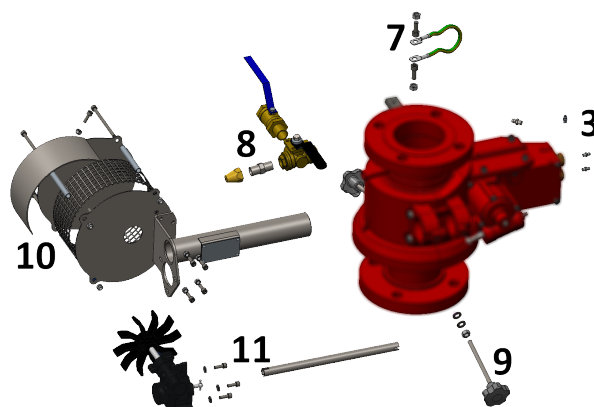
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9.5.2 Oscillating unit

Table 9.5.2.1 - VSO Oscillating Unit Spare Parts

Ref	Part number	Required kits per device	Description	Items included	Qty needed	Qty in kit
7	SK110010	1	Earthing kit oscillating unit	Electrical cord	1	1
				Socket screw M8 x 20	2	3
				Nut M8	2	3
3	SK110011		Commodities kit oscillating unit	M6 grease nipple	4	5
				M8 grease nipple	2	3
8	SK110012	1	Valve kit	3 way ball valve	1	1
				2 way ball valve	1	1
				Lockable handle	1	1
				Nipple	1	1
				Water nozzle	1	1
9	SK110013	2	Adjustment rod kit oscillating unit	Knob	1	1
				Rod	1	1
				Washer	1	2
				Spring washer	1	2
				Nut M8	1	2
10	SK110014	1	Cage support kit oscillating unit	Protective mesh	1	1
				Cage plate	1	1
				Cage plate for impeller	1	1
				Cage screws	4	5
				Cage-to-support screws	5	6
				Cage spacers	4	4
				Locking nut M6	9	10
				Cage support	1	1
				Grub screw	2	3
11	SK110015	1	Impeller kit oscillating unit	Splash protection	1	1
				Full impeller	1	1
				Transmission shaft	1	1
				Socket screw M6 x 16	3	4
				Washer M16	3	4



**Fig 9.5.2.2 -
VSO Oscillating unit spare parts**



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9.5.3 Nozzles

**Table 9.5.3.1 - VNN Non-Self-Inducting Nozzle Unit Spare Parts
(Flow Rates 250, 350, 500, 750 GPM Models)**

Ref	Part number	Required kits per device	Description	Items included	Qty needed	Qty in kit
1	SK180001	2	Nozzle handle spare kit	Rod	1	1
				Knob	1	1
2	SK180002	1	Commodities kit 250-750 gpm nozzle	Grease nipple M8	1	2
				O-ring cursor	1	2
				O-ring cursor	1	2

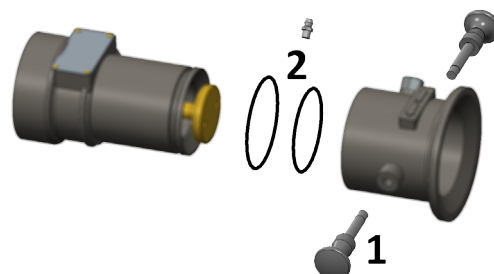


Fig 9.5.3.2 - VNN non-self-inducting nozzle unit spare parts (Flow rates 250, 350, 500, 750 GPM models)

**Table 9.5.3.3 - VNN Non-Self-Inducting Nozzle Unit Spare Parts
(Flow Rate 1,000 GPM Model)**

Ref	Part number	Required kits per device	Description	Items included	Qty needed	Qty in kit
1	SK180001	4	Nozzle handle spare kit	Rod	1	1
				Knob	1	1
2	SK180007	1	Commodities kit 1,000 gpm nozzle	Grease nipple M8	1	2
				O-ring cursor	1	2
				O-ring cursor	1	2

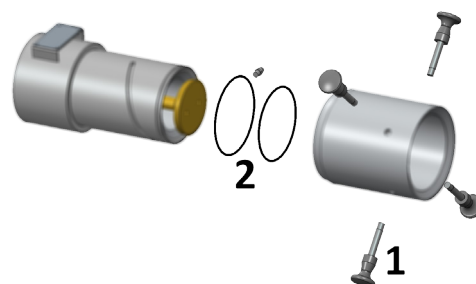


Fig 9.5.3.4 - VNN non-self-inducting nozzle unit spare parts (Flow rate 1,000 GPM model)

Table 9.5.3.5 - VNS Self-Inducting Nozzle Unit Spare Parts (Flow Rates 250, 350, 500 GPM Models)

Ref	Part number	Required kits per device	Description	Items included	Qty needed	Qty in kit
1	SK180001	2	Nozzle handle spare kit	Rod	1	1
				Knob	1	1
2	SK180002	1	Commodities kit 250-750 gpm nozzle	Grease nipple M8	1	2
				O-ring cursor	1	2
				O-ring cursor	1	2
3	SK180003	1	Valve kit 250-500 gpm nozzle	Ball valve 1"	1	1
				Nipple	1	1
				Lockable handle	1	1
				Male hose connection	1	1
4	SK180004	1	Pick up hose kit 250-500 gpm nozzle	Pick up pipe	0.3	0.3
				Pick up hose	2	2
				Tie	1	2
				Female swivel connection	1	1
				Swivel to hose adapter	1	1
				Rubber gasket for connection	1	1

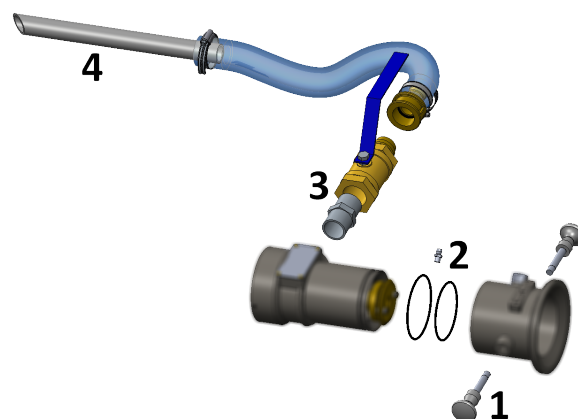


Fig 9.5.3.6 - VNS self-inducting nozzle unit spare parts (Flow rates 250, 350, 500 GPM models)



TECHNICAL MANUAL

**MANUAL & SELF OSCILLATING
MONITORS MODELS VMT, VMH, VMW
AND NOZZLE MODELS VNN & VNS**
INSTALLATION, OPERATION AND
MAINTENANCE MANUAL

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**Table 9.5.3.7 - VNS Self-inducing Nozzle Unit Spare Parts
(Flow Rate 750 GPM Model)**

Ref	Part number	Required kits per device	Description	Items included	Qty needed	Qty in kit
1	SK180001	2	Nozzle handle spare kit	Rod	1	1
				Knob	1	1
2	SK180002	1	Commodities kit 250-750 gpm nozzle	Grease nipple M8	1	2
				O-ring cursor	1	2
				O-ring cursor	1	2
3	SK180005	1	Valve kit 250-500 gpm nozzle	Ball valve 1 1/4"	1	1
				Nipple	1	1
				Lockable handle	1	1
				Male hose connection	1	1
4	SK180006	1	Pick up hose kit 750-1000 gpm nozzle	Pick up pipe	1	1
				Pick up hose	1	1
				Tie	1	2

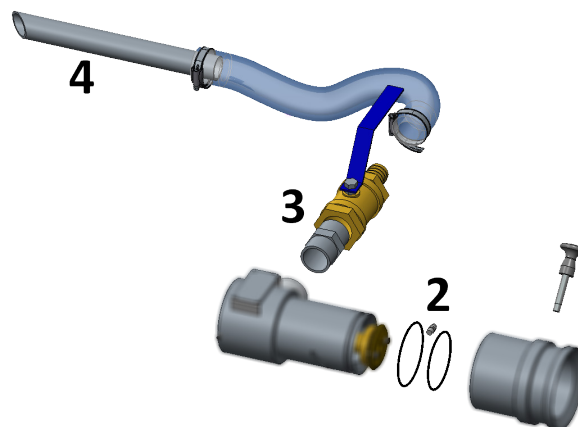


Fig 9.5.3.8 - VNS self-inducing nozzle unit spare parts (Flow rate 750 GPM model)

**Table 9.5.3.9 - VNS Self-inducing Nozzle Unit Spare Parts
(Flow Rate 1,000 GPM Model)**

Ref	Part number	Required kits per device	Description	Items included	Qty needed	Qty in kit
1	SK180001	4	Nozzle handle spare kit	Rod	1	1
				Knob	1	1
2	SK180007	1	Commodities kit 1,000 gpm nozzle	Grease nipple M8	1	2
				O-ring cursor	1	2
				O-ring cursor	1	2
3	SK180005	1	Valve kit 750-1,000 gpm nozzle	Ball valve 1 1/4"	1	1
				Nipple	1	1
				Lockable handle	1	1
				Male hose connection	1	1
4	SK180006	1	Pick up hose kit 750-1,000 gpm nozzle	Pick up pipe	1	1
				Pick up hose	1	1
				Tie	1	2

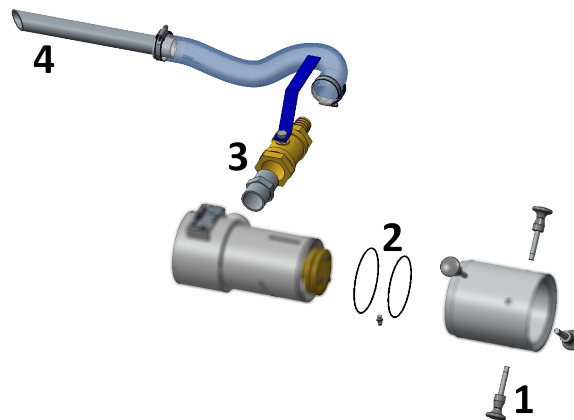


Table 9.5.3.10 - VNS self-inducing nozzle unit spare parts (Flow rate 1,000 GPM model)



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SECTION 10 – TROUBLESHOOTING

Table 10.1 – Troubleshooting		
Ref	Issue	Solution(s)
	Insufficient flow	a) Check nozzle for debris b) Verify actual flow rate with suitable flowmeter c) Check if pipework configuration on the monitor inlet is creating turbulence. d) A full-bore (ball) valve will create less pressure loss and turbulence when used close to the monitor inlet. e) Was the correct flow configuration set in the factory? (UL Listed nozzle is not field adjustable without invalidating the Listing).
	Insufficient throw / distance	a) Are expectations realistic compared to product technical data? b) Wind direction causing problems? c) If foam solution (instead of water) is used, was this factored into the throw estimation? d) If a self-inducting discharge nozzle is used was this factored into the throw estimation? e) Is the monitor elevation at the optimum angle?
	Monitor is blocked with Ice	Monitor equipment installed in cold climates must be attached to pipework that can be drained after operational activities.
	Oscillating Unit has inconsistent or no movement	a) Is the impeller isolation ball valve open b) Does the impeller move freely when turned by hand? c) Are the impeller blades undamaged? d) Is the water/foam jet striking the impeller blade in the correct effective position?
	Self-inducting nozzle is not sucking foam from the supply.	a) Foam induction requires a flow rate and pressure as defined on the nozzle data plate. The water supply system should be design to deliver at these parameters. b) Fine tuning could be achieved by partially closing the isolation ball valve on the foam line inlet. This is not a design feature but could help in some scenarios. c) Is the foam container within a distance of 2 m? Nozzle is supplied with a 2.3 m (7.5 ft) hose and if extended in may not work. d) Is the monitor elevated too far above the foam container (we recommend a maximum suction lift condition of 1.5 m (5 ft). e) Is the nozzle been used with high viscosity foam? The nozzle is UL Listed for use with AFFF 3% foam and is therefore not configured for other foam type
	Foam % ratio is not correct.	a) The self-inducting is UL Listed and factory configured for 3% AFFF Foam concentrate. b) Correct functionality with other foams types and certainly different foam concentrate % will not work correctly. c) Ensure that residual foam concentrate has not dried and blocked the hose or orifice. Hose can easily be removed and cleaned.