

Sprinklers[®]

DOMESTIC SPRINKLERS



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FIRE SAFETY FEATURES OF YOUR NEW HOME

Your home has now been provided with fire safety equipment, which has been designed to save your life should you need them.

This manual describes these fire safety features, and includes information on how they work and how to care for them. Please take the time to familiarize yourself with them.

**If you discover a fire, follow the Fire
Brigade's advice:**

**GET OUT!
STAY OUT!
CALL THE FIRE BRIGADE!**

**Do not turn off the
sprinkler system, Leave
this in the hands of the
Fire Brigade.**

Maintaining your sprinkler system

The maintenance of sprinklers installed to **BS9251** is neither onerous nor costly, but it is essential. The requirements are covered in **Section 7** of the Standard. Unless the system is installed in domestic premises, maintenance will be required under **The Regulatory Reform (Fire Safety) Order 2005**.

The first clause of the RRO about maintenance states that:

'Where necessary to safeguard the safety of relevant persons the responsible person must ensure that the premises and any facilities, equipment and devices provided in respect of the premises under this Order ... are subject to a suitable system of maintenance and are maintained in an efficient state, in efficient working order and in good repair'.

BS 9251 states that 'Systems should be inspected and tested annually, by a suitably qualified and experienced sprinkler contractor'.

A sprinkler contractor is one which has independent documentation providing evidence of capability and is likely to be third party certificated by a certification body.

Maintaining smoke alarms

Keeping smoke alarms operational is easy. The big problem occurs when dust accumulates inside the unit due to the consistent flow of air through them. Once a year, hold a vacuum cleaner up against the smoke alarm units to remove any dust that may have built up within. If units are battery operated, replace the batteries every year unless of course you have long-life batteries installed.

Maintenance schedule

The objectives of the maintenance schedule are to check that:

1. The sprinkler's heat sensing capacity and their spray pattern are not impeded.
2. The minimum flow rate recommended in the Standard is achieved at the drain and test valve.
3. The alarm is effective and can be heard in all parts of the building or otherwise as determined by the AHJ.
4. The system has not been modified except in accordance with the Standard.

To achieve these requirements, the system should be tested as follows;

1. Each sprinkler should be visually inspected to ensure that it is not damaged in any way and where necessary the cover plate has not been painted/sealed by any means to the ceiling.
2. Any obstructions to the sprinkler discharge, such as the installation of new partitions, other internal building alterations and the location of large items of furniture, such as wardrobes, should be reported.
3. The system should be visually inspected throughout for possible leaks, (Often there are tell-tale stains). If a leak is suspected the pipework may be pressure tested to 1.5 times working pressure for an adequate period, such as an hour, to detect the leak. If a leak is found it should be repaired before the system is re-commissioned.
4. The alarm should be checked for audibility in all parts of the building. In large buildings, the AHJ or the owners may have limited the alarm sounding to areas. In this case, it is the audibility in these areas that should be checked. If there is an external audio/visual alarm, then the operation of this should also be checked.
5. The stand-by battery for the alarm should be load tested to ensure that it has no less than 60% of its original capacity.

Continued on next page...

6. The sprinkler system should be flow tested for a suitable time at the drain and test valve to ensure that the pressure and flow meets or exceeds the original requirements.

The drain valve to test the pressure and flow should also cause operation of;

1. An automatic pump (if fitted).
2. The priority demand valve, to shut off the water supply to the domestic water system (if fitted).
3. The alarm system should sound within 12 and 37 seconds of the start of flow.
 4. Both internal and external alarms should be left active.
5. Stop valves should be exercised to ensure free movement. After the test, the stop valve should be secured in an open position.
6. Where trace heating is installed, it should be checked for satisfactory operation.
 7. If a pump is installed, it should be checked that this has a means of automatically starting at no less than 60 day intervals. If there is no automatic means of achieving this, a procedure should be in place to ensure that this is done manually.

Repairs

Should repairs be required to the sprinkler system for any given reason the first procedure carried out will be to isolate the sprinkler control valve and turn the system off. This control valve will be located at the water supply source for the sprinkler system. So, either at the Pump and tank or the incoming water mains supply. The water left in the sprinkler system will be emptied.

Dependent on the size of the system two procedures can be adopted:

Domestic Systems

A domestic system will not store as much water. To drain down the system of its water, the test valve would be opened, followed by the attachment of a hose leading to the nearest available drain. This would leave behind a very minimal amount of water in the system.

Residential Systems

A residential system would follow the same procedure as above. However, once all the water has drained from the test point a vacuum pump would be fitted. This would suck out the rest of the water left within the tails of the pipe leading to the sprinkler heads.

To ensure the vacuum pump does not compress the pipe work and damage the sprinkler system, the furthest/highest head would be removed to allow the intake of air into the system.

Finally;

Now the sprinkler system is empty, the repair work can commence by simply replacing a sprinkler head or extending/altering the system. Once the maintenance has been carried out, the system will be tested, commissioned and certified.

False Activation

BAFSA;

“It is an extremely rare occurrence for a property maintained sprinkler system to discharge accidentally. Records indicate that the possibility of one accidentally going off is in the region of 16 million to one. You probably have more chance of winning the lottery.”

The likelihood of a sprinkler head falsely activating is extremely rare. However, should a sprinkler falsely activate and it has been visually confirmed as a false activation then we would recommend doing the following;

1. Close the isolation valve located at the water source to the sprinkler system as so to minimize water discharge.
2. Proceed to contact Domestic Sprinklers on **01305765763**. We will issue an engineer out to assess the situation and reinstate the sprinkler system as soon as practically possible.

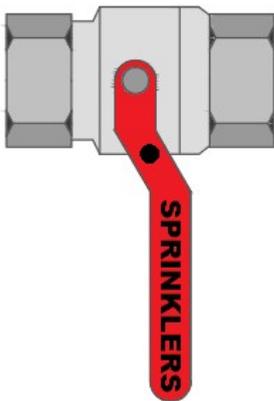
Disclaimer: Domestic Sprinklers would be the first point of contact for all claims until we can determine precise means of activation. Unfortunate malfunction of a sprinkler head would result in us forwarding the claim to the manufacturers.

Isolation Procedures

The sprinkler system should only be turned off by a sprinkler specialist or the fire brigade. If for any reason the sprinkler system needs to be turned off due to building maintenance, repairs etc., we would recommend you do the following;

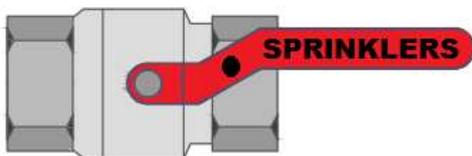
1. Turn **OFF** the main lever control valve located at the source of water for your sprinkler system. By turning this off (see below for valve operation) you will cut off the water supply and no further water will enter the sprinkler system.

VALVE OFF



When the lever is not sat in line with the pipe work, the system is off.

(shown left)



Correct position of the valve on the system when the system is on.

(shown left)

VALVE ON

How fire sprinkler systems work

Home fire sprinklers include a network of piping filled with water installed behind walls and ceilings. Individual sprinklers are mathematically placed along the piping to protect the area beneath them. With water, always in the pipes, the fire sprinklers are essentially “on standby” 24/7. When a fire breaks out the fire creates a narrow plume of hot air and gases that rises to the ceiling and spreads. When the hot gases reach the nearest sprinkler, they heat the fusible element that holds the cap in place. The cap falls away, followed by a flow of water that is broken up into a fine spray distributing water forcefully over active flames, extinguishing them completely in most cases, or at least controlling the heat and limiting the development of toxic smoke until the fire brigade arrive.



Because the water immediately cools the hot fire gases, only the sprinkler nearest the fire will activate. If, however the fire is hot enough that one sprinkler cannot handle it alone, hot gases will reach the next nearest sprinkler. That sprinkler would then activate to help stop the fire. This design of operation limits the number of sprinklers needed to stop a fire.

When the temperature of the burning material drops to below its combustion temperature, it can no longer burn and the fire goes out.

DO'S:

- **Do** have your sprinkler system inspected annually.
- **Do** make sure you know the location of the control valve and ensure occupants are aware of its location.
 - **Do** make certain the control valve is always open.
- **Do** contact the sprinkler contractor if you discover a potential leak.
- **Do** contact the sprinkler contractor if you carry out alterations to the buildings layout (reposition walls etc.).

DONTS:

- **Do not** paint the sprinkler cover plates.
- **Do not** hang anything such as decorations, plant holdings or anything else on the sprinkler heads.
- **Do not** manually turn off or disconnect the fire sprinkler system on your own accord.
 - **Do not** obstruct or cover the fire sprinklers.
 - **Do not** use wall paper steamers near sprinkler heads.
- **Do not** interfere with any of the sprinkler components without contractor consent.

In the event of a fire, stay calm and leave the building immediately. Call the fire brigade from outside the building.

Sprinkler FAQ'S

Will sprinklers leak?

Sprinklers and their piping are pressure tested at two or three times higher than your plumbing system, even though they use the same standing pressure as your plumbing. Therefore, the chance of a leaking sprinkler is practically nil. Like your plumbing pipes, sprinkler pipes are not exposed to cold areas through use of lagging. Thus, preventing the pipe from freezing and bursting in colder periods of the year.

If a fire starts will all the sprinklers activate?

In the event of a fire, typically, only the sprinkler closest to the fire will activate, spraying water directly over the fire. The water from the sprinkler head cools the hot fire gases, so in nearly all cases there is not enough heat to activate the next nearest sprinkler. Thus, leaving the rest of the house dry and secure.

Will sprinklers activate anytime a smoke alarm is set off?

Each individual sprinkler is designed and calibrated to activate when it senses a significant heat change. They do not operate in response to smoke, burnt toast, cooking vapors, steam, or an activating smoke alarm.

Won't the water create more damage than the fire?

Home fire sprinklers can significantly reduce property loss and damage in the event of a fire. The sprinkler will quickly control the heat and smoke from the fire, limiting damage to other areas of the house, giving occupants valuable time to vacate the building safely. Any resulting water damage from the sprinkler will be much less severe than the damage caused by water from fire-fighting hoselines. Fire departments use up to eight-and-a-half times more water.

Do I have to do anything in the event of a fire?

Just get yourself and anyone else out of the house! Fire Sprinklers will do the rest. They are fully automatic and will work even if there is a power failure. Leave the system running until the Fire Brigade deems it safe to turn it off.

Sprinkler Facts

Sprinklers save lives.

Sprinklers are the most effective fire safety device ever invented. The National Fire Protection Association reports that people with smoke alarms in their homes have a 47 percent better chance of surviving a fire. Adding sprinklers along with smoke alarms increases your chances of surviving a fire by over 97 percent.

Sprinklers save property.

Residential fire sprinklers are designed to save lives, but because they control fires so quickly, they also reduce property damage. Fire reports show that property damage is nine times lower in sprinklered homes.

Lifetime safety is lifetime quality.

The features of your home reflect your values and priorities. You will select high-quality features for things that you want to last. Fire safety is a quality issue. You can ignore it and accept the minimum level of safety for your family and possessions, or you can build on quality protection for them. Fire sprinklers will protect occupants for the life of the home.

Manufactures Literature

The following pages include all manufactures data sheets and information available, making up the sprinkler system.

Relevant contact information should be included on the documentation should they be needed.

Basic Principles of Solvent Cementing

The solvent cemented connection in thermoplastic pipe and fittings is the last vital link in a plastic pipe installation. It can mean the success or failure of the system as a whole. Accordingly, it requires the same professional care and attention that are given to other components of the system.

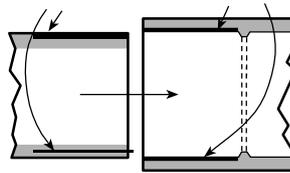
There are many solvent cementing techniques published covering step by step procedures on just how to make solvent cemented joints. However, we feel that if the basic principles involved are explained, known and understood, a better understanding would be gained, as to what techniques are necessary to suit particular applications, temperature conditions, and variations in size and fits of pipe and fittings.

Be aware at all times of good safety practices. Solvent cements for pipe and fittings are flammable, so there should be no smoking nor other sources of heat or flame in working or storage areas. Be sure to work only in a well ventilated space and avoid unnecessary skin contact with all solvents. More detailed safety information is available from Harvel or IPS (Weld-On) Corporation.

To consistently make good joints, the following should be carefully understood.

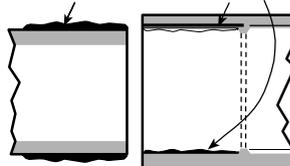
- 1 The joining surfaces must be softened and made semifluid.
- 2 Sufficient cement must be applied to fill the gap between pipe and fitting.
- 3 Assembly of pipe and fittings must be made while the surfaces are still wet and fluid.
- 4 Joint strength develops as the cement dries. In the tight part of the joint the surfaces will tend to fuse together, in the loose part the cement will bond to both surfaces.

These areas must be softened and penetrated



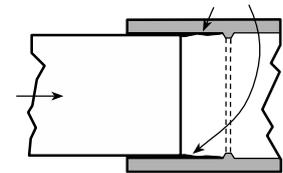
When using the ONE STEP cementing process, penetration and softening can be achieved by the cement itself (read ONE STEP cementing procedures carefully; refer to installation instructions). For certain sizes, under certain conditions, it may be desirable to use the TWO STEP process which utilizes a primer to ensure adequate softening. For example, when working in cold weather with large diameter pipe, more time and additional applications may be required.

Cement coatings of sufficient thickness



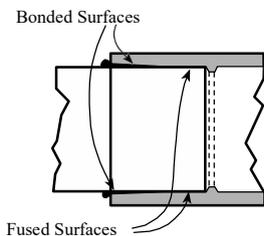
More than sufficient cement to fill the loose part of the joint must be applied. Besides filling the gap, adequate cement layers will penetrate the surfaces and also remain wet until the joint is assembled. Prove this yourself. Apply on the top surface of a piece of pipe two separate layers of cement. First flow on a heavy layer of cement, then alongside it a thin brushed out layer. Test the layers every 15 seconds or so by a gentle tap with your finger. You will note that the thin layer becomes tacky and then dries quickly (probably within 15 seconds) The heavy layer will remain wet much longer. Now check for penetration a few minutes after applying these layers. Scrape them with a knife. The thin layer will have achieved little or no penetration. The heavy one, much more penetration.

Surfaces must be assembled while they are wet and soft



If the cement coatings on the pipe and fittings are wet and fluid when assembly takes place, they will tend to flow together and become one layer. Also, if the cement is wet the surfaces beneath them will still be soft, and these softened surfaces in the tight part of the joint will tend to fuse together.

Surfaces



As the solvent dissipates, the cement layer and the softened surfaces will harden with a corresponding increase in joint strength. A good joint will take the required working pressure long before the joint is fully dry and final strength is obtained. In the tight (fused) part of the joint, strength will develop more quickly than in the looser (bonded) part of the joint. Information about the development of bond strength of solvent cemented joints is available.

The QUALITY Line

Solvent Cementing in Hot or Cold Weather

Hot Weather

There are many occasions when solvent cementing Harvel piping products in 95°F temperatures and over cannot be avoided. If a few special precautions are taken, problems can be avoided. Solvent cements contain high-strength solvents which evaporate faster at elevated temperatures. This is especially true when there is a hot wind blowing. If the pipe has been in direct sunlight for any length of time, surface temperatures may be 20°F to 30°F above air temperature. Solvents attack these hot surfaces faster and deeper, especially inside a joint. Thus, it is very important to avoid puddling inside sockets, and to wipe off excess cement outside.

Tips to Follow when Solvent Cementing in High Temperatures

- 1 Store solvent cements in a cool or shaded area prior to use.
- 2 If possible, store the fittings and pipe, or at least the ends to be solvent welded, in a shady area before cementing.
- 3 Cool surfaces to be joined by wiping with a damp rag. Be sure that surfaces are dry prior to applying solvent cement.
- 4 Try to do the solvent cementing in cooler morning hours.
- 5 Make sure that both surfaces to be joined are still wet with cement when putting them together.

By following Harvel's Installation Instructions, and using a little extra care, as outlined above, successful solvent cemented joints can be made in even the most extreme hot weather conditions.

Cold Weather

Solvent Cement products have excellent cold weather stability and are formulated to have well balanced drying characteristics even in subfreezing temperatures. Good solvent cemented joints can be made in very cold conditions provided proper care and a little common sense are used.

In cold weather, solvents penetrate and soften surfaces more slowly than in warm weather. The plastic is also more resistant to solvent attack, therefore, it becomes more important to pre-soften surfaces. Because of slower evaporation, a longer cure time is necessary

Tips to Follow when Solvent Cementing in Cold Temperatures

- 1 Prefabricate as much of the system as possible in a heated work area.
- 2 Store cements in a warmer area when not in use and make sure they remain fluid.
- 3 Take special care to remove moisture, including ice and snow.
- 4 Use special care to ensure joining surfaces are adequately softened; more than one application may be necessary.
- 5 Allow a longer cure period before the system is used.

Solvent Cement and Primer Spills

Work areas should be protected by using drop cloths in the event of an accidental spill. Cement and/or primer spills can cause irreparable damage depending on the type of surface affected. Accidental spills should be wiped up immediately before the cement sets. A mild soap and water mixture may aid in removal of a stain; however, the use of solvents or harsh cleansers may do more damage than good. In the event of a spill, consult the manufacturer of the affected surface for possible suggestions.

Protecting the work area prior to starting is recommended.

Storage and Handling

General

Thermoplastic piping products have long established their value as a superior material resistant to attack from corrosives, chemicals, and electrolytic action. In many applications, service life is unlimited due to the characteristics of the material, in comparison to metal piping products.

It is important to understand that thermoplastic piping products do have a much lower impact strength when compared to metal piping products. Improper or careless handling is often the cause of damage to plastic piping products. Unfortunately, previously unnoticed or undetected damage is often discovered only after the system has been installed and put into service.

The following information provides the basic guidelines for the proper handling and storage of thermoplastic piping products. Losses due to damage and expensive replacements of thermoplastic piping components can be avoided through correct handling and storage practices.

Storage

Thermoplastic pipe and fittings offer excellent resistance to weathering and may therefore be stored outside.

Pipe and fittings stored outside must be covered with a light tarpaulin to prevent excessive temperature buildup and possible warpage or color fading. Exposure to sunlight (U.V. radiation) will cause a color fade of the pipe, but will not affect the physical properties of the CPVC material. However, piping which exhibits color fade is an indication that the product was not stored properly. Pipe in this condition should be examined carefully for signs of physical abuse due to improper storage and handling. When stored inside, they should be stored in a well ventilated area, away from steam lines or other types of heat sources.

Pipe should be stored on a clean, flat surface that provides an even support surface for the entire length of the pipe. Palletized pipe should be stacked no more than three pallets high, with the wooden pallet bracing in full contact with each other. Loose pipe should not be stacked to exceed a height of over three feet; bundled pipe may be stacked twice that. When storing pipe on racks, the racks should have continuous or close support arms to prevent the pipe from sagging.

Thermoplastic pipe fittings should be stored in their original cartons, on pallets. Pallets should be wrapped with thin plastic sheeting to prevent moisture from penetrating the cartons, causing them to collapse.

Handling

Extra care is required when handling thermoplastic pipe and fittings, as they have a much lower impact strength and resistance to abuse than steel.

Pipe fittings, whether cartoned or loose, should not be tossed or thrown to the ground; pipe should not be dropped or dragged on the ground - i.e., when being unloaded from a truck. Impact cracks, splits or scratches can weaken or damage the pipe and fitting. Heavy or sharp objects should not be thrown onto or against thermoplastic pipe and fittings. Pipe fittings should never be mixed in storage bins with metal piping products.

When handling thermoplastic pipe with fork lift, only one pallet at a time should be carried. When using a hydraulic boom and cable for unloading, chain slings should not be used. Instead, wide canvas or fiberglass slings should be used, with adequate placements on the pallet load to prevent sagging.

Caution: Very cold weather will make thermoplastic pipe and fittings more susceptible to damage caused by impact. Extra care should be taken during handling to prevent damage.

The use of ratchet type cutters should be avoided, especially during cold weather. These types of cutters tend to compress the pipe prior to cutting which can result in hairline fracturing. Blades on this style of cutter tend to dull quickly. The use of dull blades can fracture the pipe prior to making a clean cut.

Inspection Before Use

Pipe and fittings should always be inspected for damage before actual installation. Pipe or pipe fittings with cuts, gouges, scratches, splits, or other signs of damage from improper handling or storage should not be used. Damaged sections on lengths of pipe can easily be cut out, using proper techniques for cutting thermoplastic pipe.

Painting of Pipe

Harvel CPVC Fire Sprinkler Piping Products can be painted as necessary for aesthetic purposes. ONLY WATER-BASED LATEX PAINTS ARE RECOMMENDED. The use of oil-based paints are not recommended with CPVC piping and can result in damage. The piping can be cleaned with a mild soap and water mixture prior to painting.

Safety Information on Primers and Solvents

Over a period of 30 years, millions of solvent cemented joints have been made with only rare cases of mishap. However, since these products are flammable and contain chemical solvents, appropriate safety precautions should be taken.

Virtually all solvent cements and primers for plastic pipe are flammable and should not be used or stored near heat, spark or open flames.

Do not smoke during use. Cement should be stored in closed containers at temperatures between 40°F and 110°F. They should be used only with adequate ventilation. In confined or partially enclosed areas, a ventilating device should be used to remove vapors and minimize their inhalation.

Respirators especially designed to minimize the inhalation of organic vapors can also be used. They are commercially available.

Containers should be kept tightly closed when not in use and covered as much as possible when in use. Use of an applicator can with applicator attached to a lid is especially recommended.

Avoid frequent contact with skin and eyes. May be absorbed through the skin. May cause eye injury. In case of contact, flush with plenty of water for 15 minutes. If irritation persists, get medical attention. If swallowed, call a physician immediately and follow precautionary statement given on side panel of cement container. Keep out of reach of children.

Use Caution with Welding Torches

At construction sites where plastic pipe is being installed or has recently been solvent welded, special caution should be taken when using welding torches or other equipment where sparks might be involved. Flammable vapors from cemented joints sometimes linger within or around a piping system for some time.

Special care must be taken when using a welding torch in these applications:

- Well casing installations
- Installing pumps in irrigation water lines
- Installation of plastic pipe systems in industrial plants

In all cases, lines should be purged to remove solvent vapors before welding.

Use Caution with Calcium Hypochlorite

Do not use a dry granular calcium hypochlorite as a disinfecting material for water purification in potable water piping systems. The introductions of granules or pellets of calcium hypochlorite with solvent cements and primers (including their vapors) may result in violent chemical reactions if a water solution is not used. It is advisable to purify lines by pumping chlorinated water into the piping system - this solution will be nonvolatile.

Furthermore, dry granular calcium hypochlorite should not be stored or used near solvent cements or primers.

Actually, solvent cementing is no more dangerous than putting gasoline in your automobile. People have learned they must be careful with gasoline. Although solvent cements are not as flammable as gasoline - users must also learn to be careful. Again, accidents and injuries have seldom occurred in the use of our products. Help maintain and improve this excellent record by following the above recommendations.

Plastic Piping Tools

Tools used with Plastic Piping

The use of tools that have been specifically designed for use with thermoplastic pipe and fittings is strongly recommended to obtain optimum results when installing thermoplastic piping systems. A variety of tools that are designed for cutting, beveling, and assembling plastic pipe and fittings are readily available through local wholesale supply houses dealing in plastic pipe and fittings.

Warning: Improper use of tools normally used with metal piping systems, i.e., hacksaws, water pump pliers, pipe wrenches, etc., can cause damage to plastic pipe and fittings. Visible and non-visible fractures, scoring or gouging of material, and over tightening of plastic threaded connections are some of the major problems associated with the use of incorrect tools and/or procedures.



Pipe Cutters

Plastic pipe must have square-cut ends to allow for the proper interfacing of the pipe end and the fitting socket bottom. A wheel type pipe cutter, with special blades for plastic pipe, provides easy and clean cutting action.

The raised bead left on the outside of the pipe after cutting must then be removed. A miter box saw may also be used to produce square-cut ends.



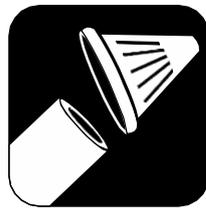
Pipe Cutters for Large Diameter Pipe

Blade cutters made for use with large diameter plastic pipe are easy to adjust and operate for square, burrless cuts. Blades with carbide edges will provide longer life. With one style blade cutter, pipe ends may also be beveled for solvent joints while being cut, by using an optional bevel tool in place of one cutter blade.



Power Saws

Power saws especially for use with plastic pipe are available. These are particularly useful in prefabrication operations where a large quantity of pipe is being cut. Blades designed for thermoplastic pipe **MUST** be used. Follow manufacturer's instructions regarding speed, set, and proper use of tool.



Pipe Bevelers

Pipe ends must be chamfered (or beveled) to allow easy insertion of the pipe into the fitting and to help prevent scraping the solvent cement from the inside of the fitting socket. A recommended bevel of 1/16" to 3/32" at a 10° to 15° angle can be quickly achieved using a plastic pipe beveler.



Deburring Tools

A smooth, beveled pipe end helps spread the solvent easily as the pipe is joined to the fitting. All burrs should be removed from the inside, as well as the outside, of the pipe ends. Special plastic pipe deburring tools deburr pipe ends quickly and efficiently.



Strap Wrenches

Strap wrenches with special woven nylon straps are extra strong and are treated for slip resistance. These strap wrenches, designed for use with plastic pipe, provide gripping power for turning, without scratching or deforming the pipe.



Chain Vises

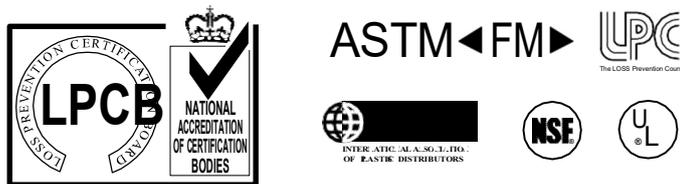
Chain vises are made with jaws for holding plastic pipe. Jaws engineered for use with plastic pipe provide holding power, without damage to the pipe.

Harvel BlazeMaster® CPVC Fire Sprinkler Piping Products

Harvel Plastics, Inc. manufactures BlazeMaster® CPVC fire sprinkler pipe. It does not manufacture the other products, tools, or cements shown in this bulletin.

This information has been compiled solely as an aid and general guide for the users of plastic piping products. No warranty, expressed or implied, or endorsement of any kind is made by Harvel Plastics, Inc. for the products shown, or their manufacture. The procedures and information contained herein are based on the best available information and believed to be reliable. It is the users responsibility to determine the suitability of these products for each application, and to contact the product manufacturer for recommendations and instructions for use.

For detailed installation information, please refer to Harvel Installation Instructions (HFS-3).



Quality System Certificate No. 270
Assessed to BS 5750:Part 2 / ISO 9002 / EN 29002

AFSA NFPA NFSA

The QUALITY Line



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TECHNICAL DATA

FREEDOM® RESIDENTIAL CONCEALED PENDENT SPRINKLER VK494 (K4.9)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058

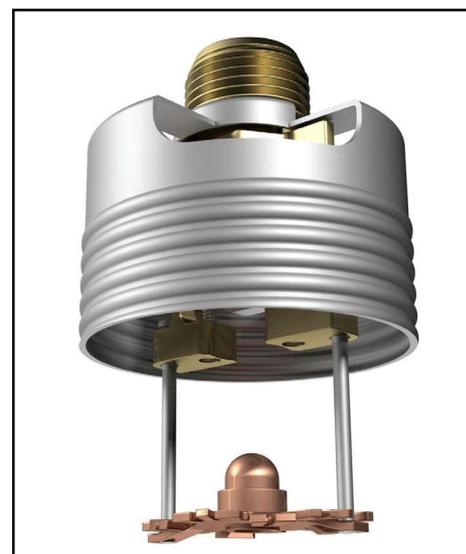
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com

1. DESCRIPTION

Viking Freedom® Residential Concealed Pendent Sprinkler VK494 is a small thermosensitive, glass-bulb residential sprinkler designed for installation on concealed pipe systems where the appearance of a smooth ceiling is desired. The orifice design, with a K-factor of 4.9 (70.6 metric*), allows the sprinkler's efficient use of available water supplies for the hydraulically designed fire-protection system. The fast response glass bulb operating element and special deflector characteristics meet the challenges of residential sprinkler standards.

The sprinkler is pre-assembled with a threaded adapter for installation with a low-profile small-diameter cover assembly installed flush to the ceiling. The two-piece design allows installation and testing of the sprinkler prior to installation of the cover plate. The "push-on", "thread-off" design of the concealed cover plate assembly allows easy installation of the cover plate after the system has been tested and the ceiling finish has been applied, while also providing up to 1/2" (13 mm) of vertical adjustment. The cover assembly can be removed and reinstalled, allowing temporary removal of ceiling panels without taking the sprinkler system out of service or removing the sprinkler. The Electroless Nickel PTFE (ENT) coating has been investigated for installation in corrosive atmospheres and is C-UL-US-EU Listed as indicated in the Approval Charts. The ENT finish is only available for the sprinkler assembly, the cover plate is not plated.



2. LISTINGS AND APPROVALS



UL Listed (C-UL-US-EU): Category VKKW

Refer to the Approval Charts and Design Criteria for C-UL-US-EU Listing requirements that must be followed.

3. TECHNICAL DATA

Specifications:

Minimum Operating Pressure: Refer to the Approval Chart.

Maximum Working Pressure: 175 psi (12 bar). Factory tested hydrostatically to 500 psi (34.5 bar).

Thread size: 1/2" (15 mm) NPT

Nominal K-factor: 4.9 U.S. (70.6 metric*)

Glass-bulb fluid temperature rating: to -65 °F (-55 °C)

* Metric K-factor measurement shown is in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.

Material Standards:

Sprinkler Body: Brass UNS-C84400 or QM Brass

Deflector: Phosphor Bronze UNS-C51000

Deflector Pins: Stainless Steel UNS-S30200

Button: Brass UNS-C36000

Pip Cap and Insert Assembly: Copper UNS-C11000 and Stainless Steel UNS-S30400

Compression Screw: 18-8 Stainless Steel

Yoke: Phosphor Bronze UNS-C51000

Belleville Spring Sealing Assembly: Beryllium Nickel Alloy, coated on both sides with PTFE Tape

Cover Adapter: Cold Rolled Steel UNS-G10080, Finish: Clear Chromate over Zinc Plating

Shipping Cap: High Density Polyethylene

Cover Plate Materials:

Cover Plate Assembly: Copper UNS-C11000 and Brass UNS-C26800 or Stainless Steel UNS-S30400

Spring: Beryllium Nickel

Solder: Eutectic

Available Finishes and Temperature Ratings:

Finish	Brass	ENT
Suffix	A	JN
Temperature	155 °F (68 °C)	200 °F (93 °C)
Suffix	B	E

Refer to Tables 1 and 2 for complete ordering information.

Ordering Information: Refer to Tables 1 and 2.

4. INSTALLATION

Refer to appropriate NFPA Installation Standards.



TECHNICAL DATA

FREEDOM® RESIDENTIAL CONCEALED PENDENT SPRINKLER VK494 (K4.9)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058

Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com

5. OPERATION

During fire conditions, when the temperature around the sprinkler approaches the cover plate's nominal temperature rating, the cover plate detaches and releases the deflector. Continued heating of the exposed sprinkler causes the heat-sensitive liquid in the glass bulb to expand. When the temperature reaches the sprinkler's nominal temperature rating, the glass bulb shatters releasing the yoke, pip cap assembly and sealing spring. Water begins flowing through the sprinkler orifice and strikes the deflector forming a uniform spray pattern over a specific area of coverage, which is determined by the water supply pressure at the sprinkler, in order to extinguish or control the fire.

6. INSPECTIONS, TESTS AND MAINTENANCE

Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

7. AVAILABILITY

Viking Sprinkler Model VK494 is available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE

For details of warranty, refer to Viking's current list price schedule or contact Viking directly.

TABLE 1: SPRINKLER ORDERING INFORMATION

Instructions: Using the sprinkler base part number,
(1) add the suffix for the desired Finish
(2) add the suffix for the desired Temperature Rating.
(3) Select a cover plate (See Table 2)

Sprinkler Base Part Number ¹	Size	1: Finishes		2: Temperature Ratings ⁷			
	NPT Inch	Description	Suffix	Nominal Rating	Bulb Color	Max. Ambient Ceiling Temperature ²	Suffix
20759	1/2	Brass	A	155 °F (68 °C)	Red	100 °F (38 °C)	B
		ENT ^{5,6}	JN	200 °F (93 °C)	Green	150 °F (65 °C)	E
		Corrosion Resistant Sprinkler Finish: ENT		Example: 20759AB = 155 °F (68 °C) Temperature Rated Sprinkler with a standard Brass finish.			

Accessories

Sprinkler Wrenches and tools:

- A. Heavy Duty Part Number: 14047W/B³ (available since 2006)
- B. Head Cabinet Wrench Part Number: 14031^{3,4} (available since 2006)
- C. Optional Concealed Cover Plate Installer Tool Part Number: 14412 (available since 2007)
- D. Optional Large Concealed Cover Plate Installer Tool Part No. 14867 (available since 2007)

Sprinkler Cabinet:

Holds up to 6 sprinklers: Part number 01731A (available since 1971).

Footnotes

1. Part number shown is the base part number. For complete part number, refer to the current Viking price list schedule.
2. Based on NFPA 13, NFPA 13R, and NFPA 13D. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.
3. Requires a ½" ratchet (not available from Viking).
4. Also optional for removal of the protective cap. Ideal for sprinkler cabinets.
5. cULus Listed as corrosion resistant.
6. The corrosion resistant coatings have passed the standard corrosion test required by the approving agencies indicated in the Approval Charts. These tests cannot and do not represent all possible corrosive environments. Prior to installation, verify through the end-user that the coatings are compatible with or suitable for the proposed environment. For automatic sprinklers, the ENT coating is applied to all exposed exterior surfaces, including the waterway. For ENT coated sprinklers, the Belleville spring is exposed.
7. The sprinkler temperature rating is stamped on the deflector.



TECHNICAL DATA

FREEDOM® RESIDENTIAL CONCEALED PENDENT SPRINKLER VK494 (K4.9)

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 Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com

TABLE 2: COVER PLATE ORDERING INFORMATION

Instructions: Using the cover plate base part number,
 (1) add the suffix for the desired Finish
 (2) add the suffix for the required Cover Plate Nominal Rating.

Cover Plate Base Part Number ¹	Size Inch (mm)	Style	1: Finishes		2: Temperature Rating Matrix			
			Description	Suffix ⁴	Cover Plate Nominal Rating (Required)	Sprinkler Nominal Rating ²	Sprinkler Max. Ambient Ceiling Temperature ³	Suffix
13504	2-3/4 (70)	Round	Polished Chrome	F	135 °F (57 °C)	155 °F (68 °C)	100 °F (38 °C)	A
13642	3-5/16 (84)	Round	Brushed Chrome	F-/B	165 °F (74 °C)	200 °F (93 °C)	150 °F (65 °C)	C
15394	3-5/16 (84)	Square	Bright Brass	B	<p>Example: 13504MA/W = 135 °F (57 °C) Temperature Rated, 2-3/4" (70 mm) Diameter, Round Cover Plate with a Painted White finish.</p>			
21876 ⁵	2-3/4 (70)	SST Round	Antique Brass	B-/A				
21875 ⁵	3-5/16 (84)	SST Round	Brushed Brass	B-/B				
			Brushed Copper	E-/B				
			Painted White	M-/W				
			Painted Ivory	M-/I				
			Painted Black	M-/B				

Footnotes

- Part number shown is the base part number. For complete part number, refer to the current Viking price list schedule.
- The sprinkler temperature rating is stamped on the deflector.
- Based on NFPA-13, NFPA 13R, and NFPA 13D. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.
- Where a dash (-) is shown in the Finish suffix designation, insert the desired Temperature Rating suffix. See example above.
- Stainless Steel versions are not available with any finishes or paint.



TECHNICAL DATA

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Approval Chart

Viking VK494, 4.9 K-factor Residential Concealed Pendent Sprinkler

For systems designed to NFPA 13D or NFPA 13R. For systems designed to NFPA 13, refer to the Design Criteria. For Ceiling types refer to current editions of NFPA 13, 13R or 13D

Sprinkler Base Part Number ¹	SIN	NPT Thread Size		Nominal K-factor		Maximum Water Working Pressure	
		Inches	mm	U.S.	metric ²		
20759	VK494	1/2	15	4.9	70.6	175 psi (12 bar)	
Max. Coverage Area ⁶ W X L Ft. X Ft. (m X m)	Flow GPM (LPM)		Pressure PSI (bar)	Deflector to Ceiling	Installation Type	Listings and Approvals ^{3,5}	Minimum Spacing Ft. (m)
	155 °F (68 °C), 200 °F (93 °C) Temperature Rated Sprinklers						
12 X 12 (3.7 X 3.7)	13 (49.2)	7.0 (0.48)	Refer to Figure 2	Concealed with Cover Plate Assembly. See Footnote 7.	See Footnotes 8, & 9	8 (2.4)	
14 X 14 (4.3 X 4.3)	13 (49.2)	7.0 (0.48)					
16 X 16 (4.9 X 4.9)	13 (49.2)	7.0 (0.48)					
18 X 18 (5.5 X 5.5)	17 (64.4)	12.0 (0.83)					
20 X 20 (6.1 X 6.1)	20 (75.7)	16.7 (1.15)					

Footnotes

- Part number shown is the base part number. For complete part number, refer to the current Viking price schedule.
- Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.
- This chart shows the listings and approvals available at the time of printing. Other approvals may be in process. Check with the manufacturer for any additional approvals. Refer also to Design Criteria.
- Listed by Underwriter's Laboratories, Inc. for use in the U.S., Canada, and European Union.
- Meets New York City requirements, effective July 1, 2008.
- For areas of coverage smaller than shown, use the "Flow" and "Pressure" for the next larger area listed. Flows and pressures listed are per sprinkler. The distance from sprinklers to walls shall not exceed one-half the sprinkler spacing indicated for the minimum "Flow" and "Pressure" used.
- Other paint colors are available on request with the same listings as the standard finish colors. Stainless Steel cover plates are not available with any finishes or paint. Listings and approvals apply for any paint manufacturer. Contact Viking for additional information. Custom colors are indicated on a label inside the cover assembly. Refer to Figure 3.
- Accepted Cover Plate Finishes are: Polished Chrome, Brushed Chrome, Bright Brass, Antique Brass, Brushed Brass, Brushed Copper, Painted White, Painted Ivory, or Painted Black ⁷.
- C-UL-US-EU Listed as corrosion resistant - Electroless Nickel PTFE (ENT)



TECHNICAL DATA

FREEDOM® RESIDENTIAL CONCEALED PENDENT SPRINKLER VK494 (K4.9)

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DESIGN CRITERIA

(Also refer to the Approval Chart.)

UL Listing Requirements (C-UL-US-EU):

When using Viking Residential Concealed Pendent Sprinkler VK494 for systems designed to NFPA 13D or NFPA 13R, apply the listed areas of coverage and minimum water supply requirements shown in the Approval Chart.

For systems designed to NFPA 13: The number of design sprinklers is to be the four contiguous most hydraulically demanding sprinklers. The minimum required discharge from each of the four sprinklers is to be the greater of the following:

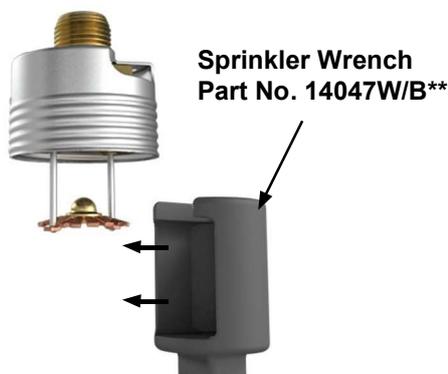
- The flow rates given in the Approval Chart for NFPA 13D and NFPA 13R applications for each listed area of coverage, or
- Calculated based on a minimum discharge of 0.1 gpm/sq. ft. over the "design area" in accordance with sections 9.5.2.1 or 10.2.4.1.2 of the current edition of NFPA 13.
- Minimum distance between residential sprinklers: 8 ft. (2.4 m).

NOTE: Concealed sprinklers must be installed in neutral or negative pressure plenums only.

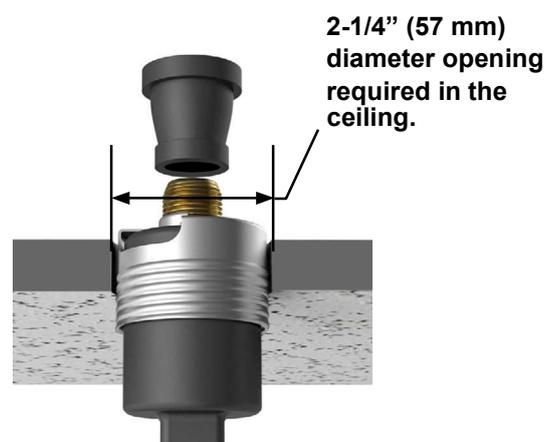
IMPORTANT: Always refer to Bulletin Form No. F_080415 - Best Practices for Residential Sprinkler Handling and Installation. Also refer to Form No. F_080614 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA and any other similar Authorities Having Jurisdiction, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable. Final approval and acceptance of all residential sprinkler installations must be obtained from the Authorities Having Jurisdiction.

Sprinkler and Adapter Assembly

- Protective cap removed
- Use wrench 14047W/B**



Step 1:
Carefully slide the wrench sideways around the deflector and pins



Step 2:
Carefully press the wrench upward and turn slightly to ensure engagement with the sprinkler wrench flats.

NEVER install the sprinkler by applying the installation wrench across the frame arms. **DO NOT** overtighten. Use only the designated sprinkler wrenches, Viking Part Numbers 14047W/B** or 14031**. A leak tight seal should be achieved by turning the sprinkler clockwise 1 to 1-1/2 turns beyond finger tight.

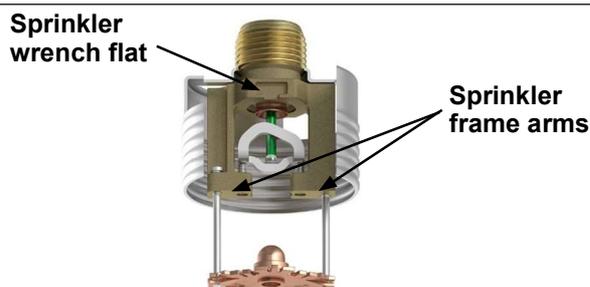


Figure 1: Sprinkler Installation and Proper Wrench Usage

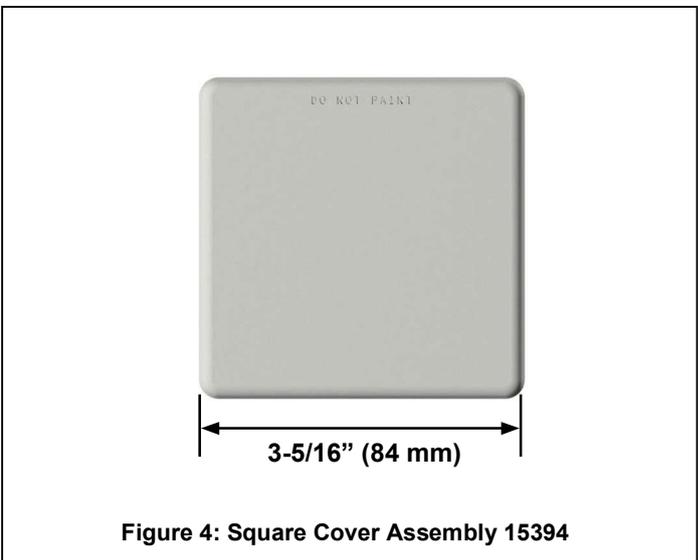
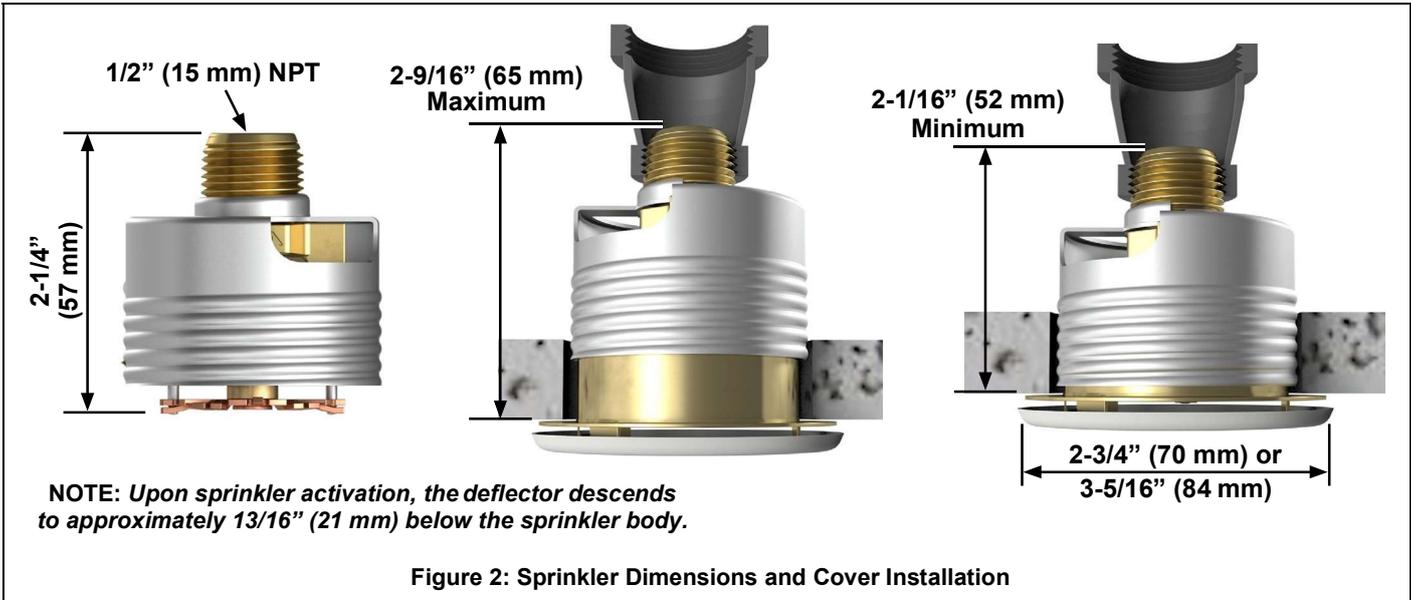
** A 1/2" ratchet is required (Not available from Viking)



TECHNICAL DATA

**FREEDOM® RESIDENTIAL
CONCEALED PENDENT
SPRINKLER VK494 (K4.9)**

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TECHNICAL DATA

FREEDOM® RESIDENTIAL CONCEALED PENDENT SPRINKLER VK496 (K3.0)

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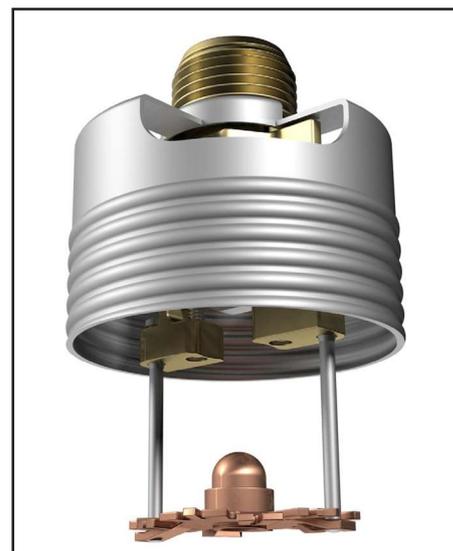
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Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com

1. DESCRIPTION

Viking Freedom® Residential Concealed Pendent Sprinkler VK496 is a small thermosensitive, glass-bulb residential sprinkler designed for installation on concealed pipe systems where the appearance of a smooth ceiling is desired. The orifice design, with a K-Factor of 3.0 (43.2 metric*), allows the sprinkler's efficient use of available water supplies for the hydraulically designed fire-protection system. The fast response glass bulb operating element and special deflector characteristics meet the challenges of residential sprinkler standards.

The sprinkler is pre-assembled with a threaded adapter for installation with a low-profile small-diameter cover assembly installed flush to the ceiling. The two-piece design allows installation and testing of the sprinkler prior to installation of the cover plate. The "push-on", "thread-off" design of the concealed cover plate assembly allows easy installation of the cover plate after the system has been tested and the ceiling finish has been applied, while also providing up to 1/2" (13 mm) of vertical adjustment. The cover assembly can be removed and reinstalled, allowing temporary removal of ceiling panels without taking the sprinkler system out of service or removing the sprinkler. The Electroless Nickel PTFE (ENT) coating has been investigated for installation in corrosive atmospheres and is C-UL- US-EU Listed as corrosion resistant as indicated in the Approval Charts. The ENT finish is only available for the sprinkler assembly, the cover plate is not plated.



2. LISTINGS AND APPROVALS



UL Listed (C-UL-US-EU): Category VKKW

Refer to the Approval Charts and Design Criteria on for C-UL-US-EU Listing requirements that must be followed.



WARNING: Cancer and Reproductive Harm-
www.P65Warnings.ca.gov

3. TECHNICAL DATA

Specifications:

Minimum Operating Pressure: Refer to the Approval Chart.

Maximum Working Pressure: 175 psi (12 bar). Factory tested hydrostatically to 500 psi (34.5 bar).

Thread size: 1/2" (15 mm) NPT

Nominal K-Factor: 3.0 U.S. (43.2 metric*)

Glass-bulb fluid temperature rated to -65 °F (-55 °C)

* Metric K-factor measurement shown is in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.

Material Standards:

Sprinkler Body: Brass UNS-C84400 or QM Brass

Deflector: Phosphor Bronze UNS-C51000

Deflector Pins: Stainless Steel UNS-S30200

Button: Brass UNS-C31600

Pip Cap and Insert Assembly: Copper UNS-C11000 and SS UNS-S30400

Compression Screw: 18-8 Stainless Steel

Yoke: UNS-S43000 Stainless Steel or Phosphor Bronze UNS-C51000

Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with PTFE Tape

Cover Adapter: Cold Rolled Steel UNS-G10080, Finish: Clear Chromate over Zinc Plating

Shipping Cap: Polyethylene

Cover Plate Materials:

Cover Plate Assembly: Copper UNS-C11000 and Brass UNS-C26800

Spring: Beryllium Nickel

Solder: Eutectic

Available Finishes and Temperature Ratings:

Finish	Brass	ENT
Suffix	A	JN
Temperature	155 °F (68 °C)	200 °F (93 °C)
Suffix	B	E

Ordering Information: Refer to Tables 1 and 2.



TECHNICAL DATA

FREEDOM® RESIDENTIAL CONCEALED PENDENT SPRINKLER VK496 (K3.0)

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4. INSTALLATION

Refer to appropriate NFPA Installation Standards.

5. OPERATION

During fire conditions, when the temperature around the sprinkler approaches its operating temperature, the cover plate detaches, releasing the deflector. Continued heating of the exposed sprinkler causes the heat-sensitive liquid in the glass bulb to expand, causing the glass to shatter, releasing the yoke and pip cap and sealing spring assembly. Water flowing through the sprinkler orifice strikes the deflector, forming a uniform spray pattern over a specific area of coverage determined by the water supply pressure at the sprinkler to extinguish or control the fire.

6. INSPECTIONS, TESTS AND MAINTENANCE

Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

7. AVAILABILITY

Viking Sprinkler Model VK496 is available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE

For details of warranty, refer to Viking's current list price schedule or contact Viking directly.

TABLE 1: ORDERING INFORMATION

Instructions: Using the sprinkler base part number,
(1) add the suffix for the desired Finish
(2) add the suffix for the desired Temperature Rating.
(3) Order a cover plate (refer to Table 2)

Sprinkler Base Part No.	Size		1: Finishes		2: Temperature Ratings			
	NPT Inch	BSPT mm	Description	Suffix ¹	Nominal Rating	Bulb Color	Max. Ambient Ceiling Temperature ²	Suffix
22773	1/2	--	Brass	A	155 °F (68 °C)	Red	100 °F (38 °C)	B
			ENT ^{3,4}	JN	200 °F (93 °C)	Green	150 °F (65 °C)	E
					Example: 22773AE = 200 °F (93 °C) Temperature Rated Sprinkler with a standard Brass finish.			

Accessories

Sprinkler Wrenches (see Figure 1):

A. Heavy Duty Part Number: 14047WB⁵

B. Head Cabinet Wrench Part Number: 14031⁶

Sprinkler Cabinet:

Part number 01731A.

Footnotes

- Where a dash (-) is shown in the Finish suffix designation, insert the desired Temperature Rating suffix. See example above.
- Based on NFPA 13, NFPA 13R, and NFPA 13D. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.
- UL Listed as corrosion resistant.
- The corrosion resistant coatings have passed the standard corrosion test required by the approving agencies indicated in the Approval Chart. These tests cannot and do not represent all possible corrosive environments. Prior to installation, verify through the end-user that the coatings are compatible with or suitable for the proposed environment. For automatic sprinklers, the ENT coating is applied to all exposed exterior surfaces, including the waterway.
- Requires a 1/2" ratchet which is not available from us.
- Optional for removal of the protective cap. Ideal for sprinkler cabinets.



TECHNICAL DATA

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TABLE 2: COVER PLATE ORDERING INFORMATION

Instructions: Using the cover plate base part number,
 (1) add the suffix for the desired Finish
 (2) add the suffix for the required Cover Plate Nominal Rating.

Cover Plate Base Part Number ⁴	Size Inch (mm)	Style	1: Finishes		Temperature Rating Matrix ^{1,2}			
			Description	Suffix ⁶	Cover Plate Nominal Rating (Required)	Sprinkler Nominal Rating	Sprinkler Max. Ambient Ceiling Temperature ²	Suffix
13504	2-3/4 (70)	Round	Polished Chrome	F	135 °F (57 °C)	155 °F (68 °C)	100 °F (38 °C)	A
13642	3-5/16 (84)	Round	Brushed Chrome	F-/B	165 °F (73 °C) ³	200 °F (93 °C)	150 °F (65 °C)	C
15394	3-5/16 (84)	Square	Bright Brass	B	<p style="text-align: center;">Corrosion Resistant Sprinkler Coating: ENT⁵</p> <p style="text-align: center;">Example: 13504MA/W = 135 °F (57 °C) Temperature Rated 2-3/4" (70 mm) Diameter Round Cover Plate with a Painted White finish.</p>			
			Antique Brass	B-/A				
			Brushed Brass	B-/B				
			Brushed Copper	E-/B				
			Painted White	M-/W				
			Painted Ivory	M-/I				
			Painted Black	M-/B				

Footnotes

- The sprinkler temperature rating is stamped on the deflector.
- Based on NFPA-13, NFPA 13R, and NFPA 13D. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.
- Maximum ambient temperature for cover assembly is 100 °F (38 °C).
- Part number shown is the base part number. For complete part number, refer to current our price list schedule.
- The corrosion resistant coatings have passed the standard corrosion test required by the approving agencies indicated in the Approval Charts. These tests cannot and do not represent all possible corrosive environments. Prior to installation, verify through the end-user that the coatings are compatible with or suitable for the proposed environment. For automatic sprinklers, the ENT coating is applied to all exposed exterior surfaces, including the waterway. For ENT coated sprinklers, the Belleville spring is exposed.
- Where a dash (-) is shown in the Finish suffix designation, insert the desired Temperature Rating suffix. See example above.



TECHNICAL DATA

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APPROVAL CHART

VK496, 3.0 K-Factor Residential Concealed Pendent Sprinkler

For systems designed to NFPA 13D or NFPA 13R. For systems designed to NFPA 13, refer to the design criteria. For Ceiling types refer to current editions of NFPA 13, 13R or 13D

Sprinkler Base Part Number ¹	SIN	Thread Size		Nominal K-Factor		Maximum Water Working Pressure
		Inches	mm	U.S.	metric ²	
22773	VK496	1/2	15	3.0	43.2	175 psi (12 bar)
Maximum Coverage Area ⁵ W X L Ft. X Ft. (m X m)	All Temperatures		Deflector to Ceiling	Installation Type	Listings and Approvals ³ 	Minimum Spacing Ft. (m)
	Flow gpm (Lpm)	Pressure PSI (bar)				
12 X 12 (3.7 X 3.7)	8 (30.3)	7.1 (0.49)	Refer to Figure 2	Concealed with Cover Plate Assembly. See Footnotes 6 & 7.	See Footnotes 3, 4, and 8	8 (2.4)
14 X 14 (4.3 X 4.3)	12 (45.4)	16 (1.1)				
16 X 16 (4.9 X 4.9)	15 (56.8)	25 (1.72)				

Footnotes

- Part number shown is the base part number. For complete part number, refer to current our price schedule.
- Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.
- This chart shows the listings and approvals available at the time of printing. Other approvals may be in process. Check with the manufacturer for any additional approvals. Refer also to Design Criteria.
- Listed by Underwriter's Laboratories, Inc. for use in the U.S., Canada, and European Union.
- For areas of coverage smaller than shown, use the "Flow" and "Pressure" for the next larger area listed. Flows and pressures listed are per sprinkler. The distance from sprinklers to walls shall not exceed one-half the sprinkler spacing indicated for the minimum "Flow" and "Pressure" used.
- Other paint colors are available on request with the same listings as the standard finish colors. Listings and approvals apply for any paint manufacturer. Contact Viking for additional information. Custom colors are indicated on a label inside the cover assembly. Refer to Figure 3.
- Accepted Cover Plate Finishes are: Polished Chrome, Brushed Chrome, Bright Brass, Antique Brass, Brushed Brass, Brushed Copper, Painted White, Painted Ivory, or Painted Black ⁶.
- C-UL-US-EU Listed as corrosion resistant - Electroless Nickel PTFE (ENT)



TECHNICAL DATA

FREEDOM® RESIDENTIAL CONCEALED PENDENT SPRINKLER VK496 (K3.0)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
 Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
 Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com

DESIGN CRITERIA

(Also refer to the Approval Chart on page 3.)

UL Listing Requirements (C-UL-US-EU):

When using Viking Residential Concealed Pendent Sprinkler VK496 for systems designed to NFPA 13D or NFPA 13R, apply the listed areas of coverage and minimum water supply requirements shown in the Approval Chart.

For systems designed to NFPA 13: The number of design sprinklers is to be the four contiguous most hydraulically demanding sprinklers. The minimum required discharge from each of the four sprinklers is to be the greater of the following:

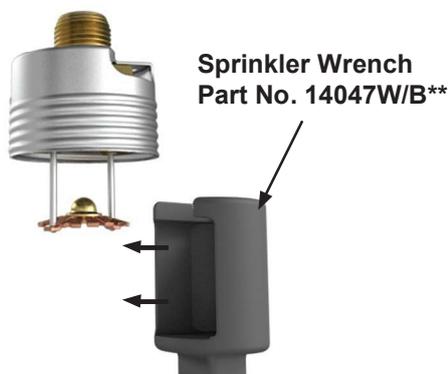
- The flow rates given in the Approval Chart for NFPA 13D and NFPA 13R applications for each listed area of coverage, or
- Calculated based on a minimum discharge of 0.1 gpm/sq. ft. over the "design area" in accordance with sections 8.5.2.1 or 8.6.2.1.2 of NFPA 13.
- Minimum distance between residential sprinklers: 8 ft. (2.4 m).

NOTE: Concealed sprinklers must be installed in neutral or negative pressure plenums only.

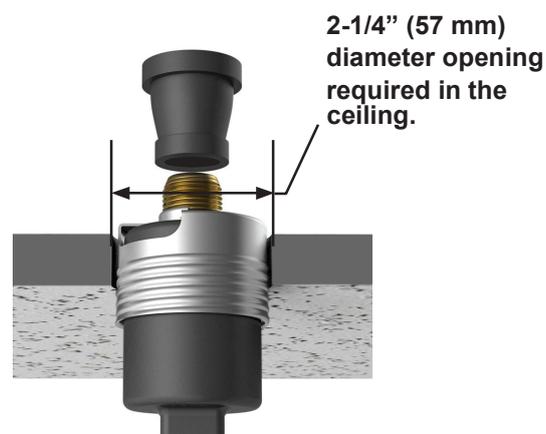
IMPORTANT: Always refer to Bulletin Form No. F_080415 - Best Practices for Residential Sprinkler Handling and Installation. Also refer to Form No. F_080614 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA and any other similar Authorities Having Jurisdiction, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable. Final approval and acceptance of all residential sprinkler installations must be obtained from the Authorities Having Jurisdiction.

Sprinkler and Adapter Assembly

- Protective cap removed
- Use wrench 14047W/B**



Step 1:
Carefully slide the wrench sideways around the deflector and pins



Step 2:
Carefully press the wrench upward and turn slightly to ensure engagement with the sprinkler wrench flats.

NEVER install the sprinkler by applying the installation wrench across the frame arms. **DO NOT** overtighten. Use only the designated sprinkler wrenches, Viking Part Numbers 14047W/B** or 14031**. A leak tight seal should be achieved by turning the sprinkler clockwise 1 to 1-1/2 turns beyond finger tight.

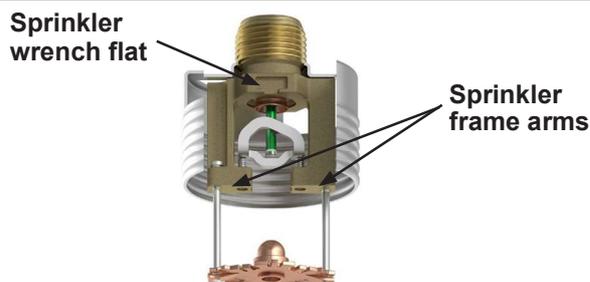


Figure 1: Sprinkler Installation and Proper Wrench Usage

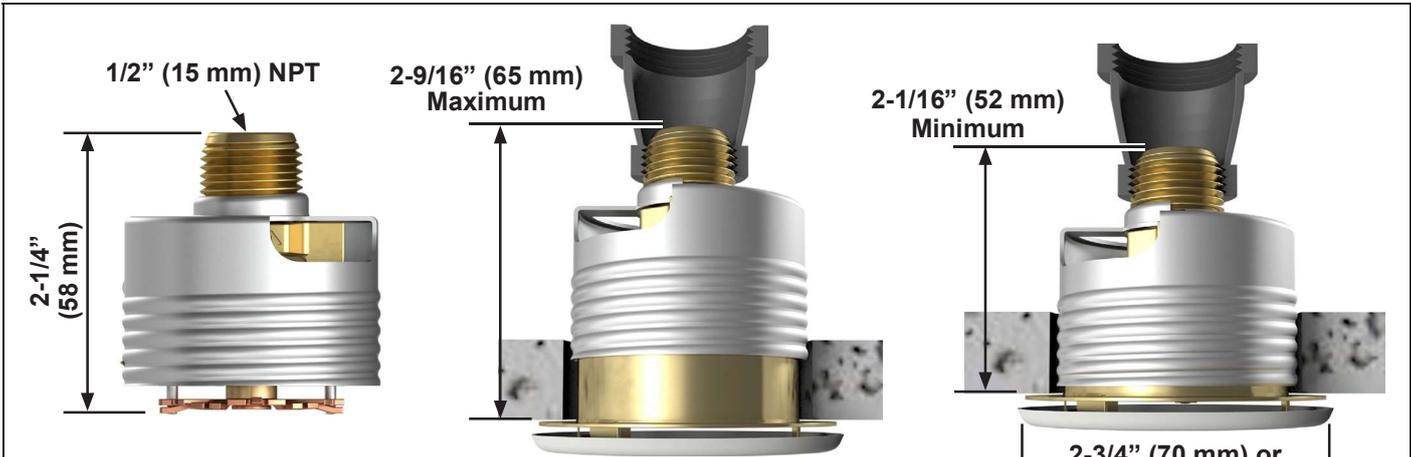
** A 1/2" ratchet is required (Not available from Viking)



TECHNICAL DATA

FREEDOM® RESIDENTIAL
CONCEALED PENDENT
SPRINKLER VK496 (K3.0)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
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NOTE: Upon sprinkler activation, the deflector descends to approximately 13/16" (21 mm) below the sprinkler body.

Figure 2: Sprinkler Dimensions and Cover Installation



All custom color painted cover plates will have an identifying label affixed to the inside of the cover that indicates the custom color and will have a representative sample (a paint dot) of the paint on the label.

Figure 3: Identification of Custom Paint for Concealed Covers



3-5/16" (84 mm)

Figure 4: Square Cover Assembly 15394

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www.appeng.co.uk



APPLICATIONS
ENGINEERING LTD

Dual port Fire Sprinkler Valve Set



Applications Engineering Ltd, 16 Horsted Square, Bellbrook Industrial Estate, Uckfield, East Sussex, TN22 1QG, UK
REGISTERED IN THE UK, COMPANY NO. 01754698 (ENGLAND) - VAT NO. GB 207 6966 82



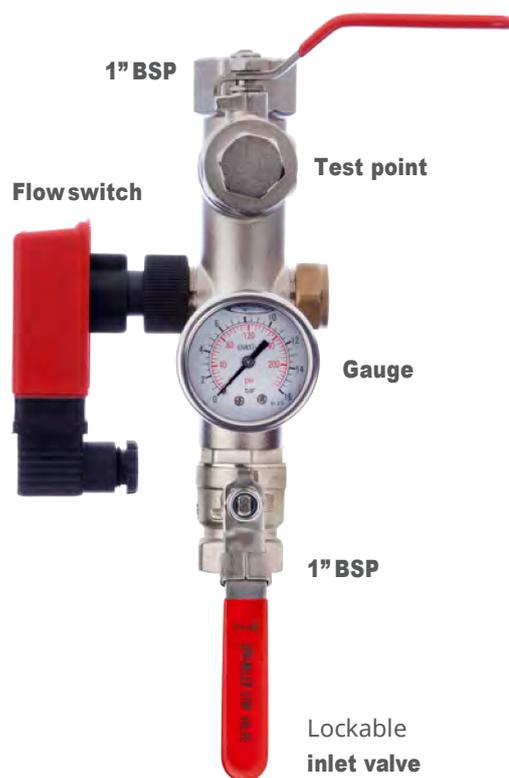
Dual port Fire Sprinkler Valve Set

Benefits and Design features

- Dual ports that enable the flow switch to be mounted on either side.
- Uses the Sika flow switch which has been designed specifically for the valve set to operate at 25L/min
- The flow switch has a 3/4" union nut for simple, hand tight, installation. No need for tools or awkward 360° rotation of the whole switch.
- Available with optional CPVC mating sockets.
- 100% pressure tested.
- Supplied with DIN 43650 electrical connector as standard
- Lockable inlet valve handle
- 1" full bore test valve
- Glycerine filled 16 bar pressure gauge
- Easy access for servicing
- Space saving - 232.5mm end to end
- Less joints minimise risk of leaks
- Different flow switch options available including cable versions and brass paddle versions



We also supply a full range of WRAS approved single and double check valves.



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APPLICATIONS
 ENGINEERING LTD

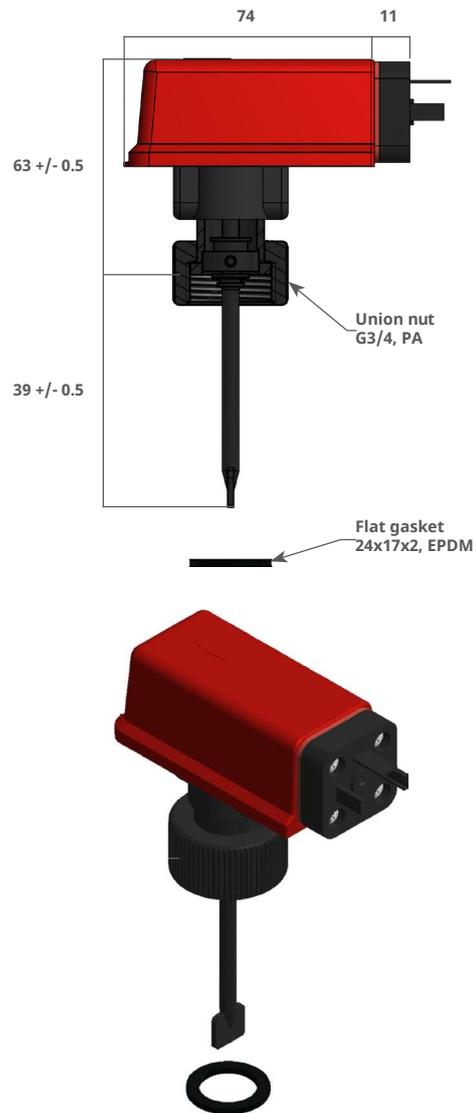
Flow switch ae vks25m2apeng14

For use in residential and domestic sprinkler systems according to BS9251:2014

- Plastic flow switch, paddle type
- Easy installation:
 - install the gasket
 - insert the flow switch
 - tighten the union nut
- Low pressure drop
- Rugged glass-fibre reinforced plastic ensures highest strength and performance
- Long-term stable set point, reset of paddle by magnetic force, no spring fatigue.
- Supplied with DIN 43650A mating electrical connector as standard.

Technical data (for flow switch)	
Pressure rating	PN10
Pressure drop	typ. 0.04 bar at 60 l/min
Max. test pressure	16 bar, 1h, 20°C
Medium temperature	Max. 70°C
Ambient temperature	Max. 70°C
Protection class	IP 65
Switching current	Max. 1 A
Switching voltage	Max. 230 VAC, 48 VDC
Switching capacity	Max. 26 VA, 20 W
Materials	
Body / paddle system	PPO Noryl GFN3
Gasket	EPDM
Magnet	Hard ferrite

Order code	VKS25M2APENG14
Switching functions	Contact closes at increasing flow
Approvals	



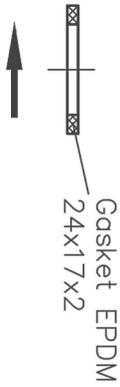
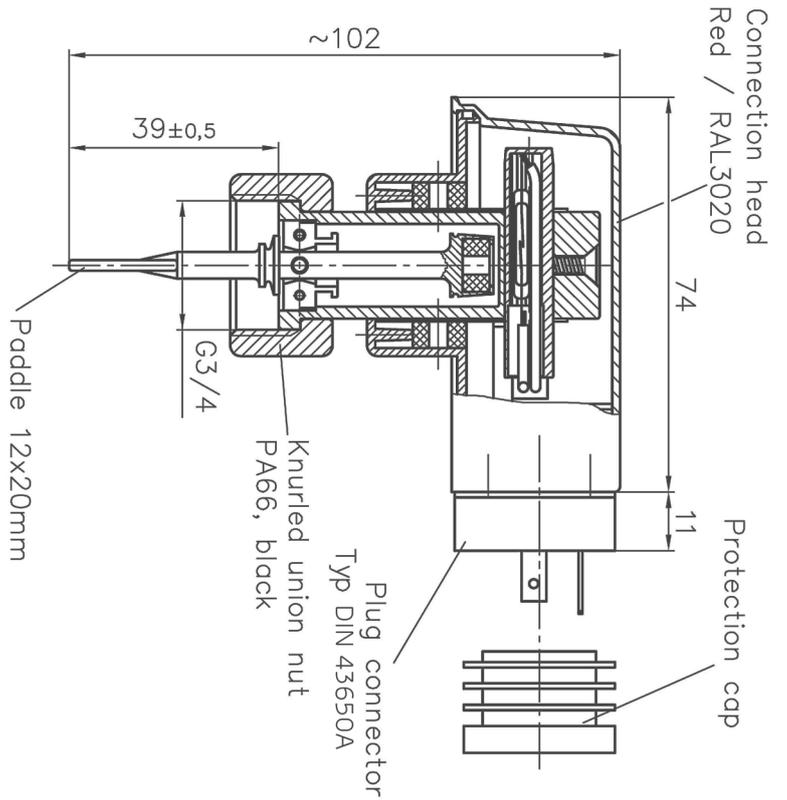
Setpoints (vertical pipe, flow direction upwards, water, 20 °C) contact at increasing flow (l/min)	20
Setpoints (horizontal pipe, water 20 °C) contact at increasing flow (l/min)	25
Max. flow rate (l/min)	210

Setpoint tolerance $\pm 15\%$
 Subject to change without notice

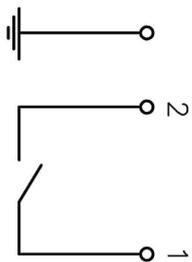
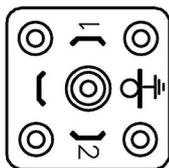
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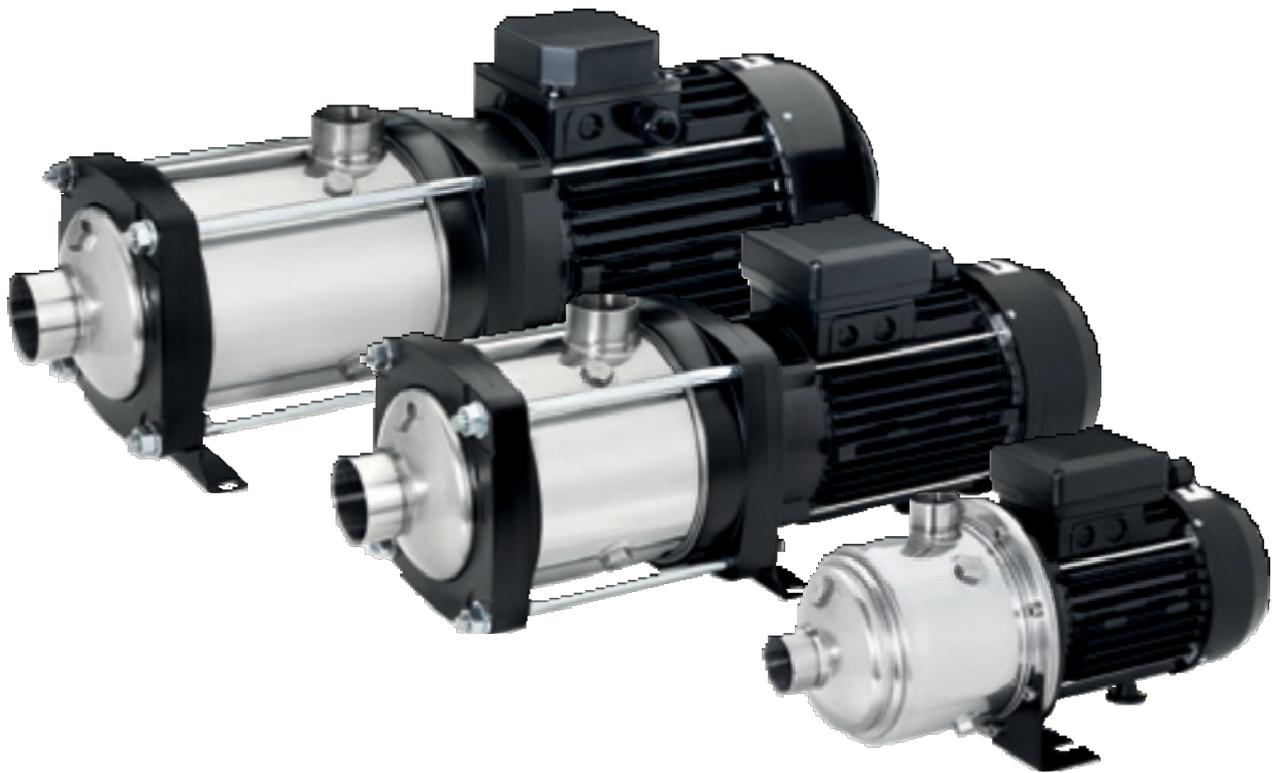
APPLICATIONS
 ENGINEERING LTD



Technical data	
Setpoint:	25 l/min ± 15%
Switching function:	Contact to close at increasing flow
Mounting position:	Horizontal pipe
Protection class:	IP 65
Ambient temperature:	max. +70°C
Medium temperature:	max. +100°C
Pressure rating:	PN 10
Switching current:	1A
Switching voltage:	max. 230VAC, 48VDC
Switching capacity:	max. 26VA, 20W



Flow switch ae vks25m2apeng14





1 INTRODUCTION AND SAFETY

This manual contains basic instructions to be observed during installation, use and maintenance.

It is essential that this manual be consulted by the installation personnel and by all qualified personnel chosen by the installation manager to follow its operation. Furthermore, this manual should always be at hand at the site where the pump is being used.

1.1 Identification of the codified instructions in this manual

WARNING: General danger: inobservance of these safety instructions may cause physical injury.

WARNING: Electrical hazard: failure to comply with these instructions may cause an electric shock and resulting serious physical injury or death.

WARNING: Hot surface: inobservance of these safety instructions may cause physical injury.

Risks deriving from failure to comply with safety regulations

Failure to comply with safety regulations may cause physical injury or material damage, as well as possible environmental contamination. Inobservance of safety regulations may lead to the complete loss of warranty rights.

For example, non-compliance with the said regulations may cause:

- breakdown of the main functions of the machine or of the installation,
- compromised maintenance operations,
- electrical, mechanical physical damage.

1.1 General information

This pump has been made according to the most recent, advanced techniques, in full compliance with current standards and has been subject to strict quality control. This manual will help you understand its function and learn its possible applications. The user manual contains important recommendations necessary for correct and efficient operation.

These recommendations must be observed in order to guarantee reliability and lifespan and to prevent accidents arising from improper use.

The pump should not be used outside the limits described in the technical specifications. It is necessary to observe the instructions regarding the nature, density, temperature and volume of the pumped liquid, rotation speed and direction, pressure and motor power, as well as all the other instructions contained in this manual or the documentation attached to the contract.

The data plate indicates the model, the main service specifications and the serial number. It is important to provide these indications when requesting repairs or support and when ordering spare parts.

The manufacturer declines all liability for any damage caused, directly or indirectly, by persons or objects, as a consequence of failure to comply with all instructions given in this instruction manual and regarding, in particular, warnings concerning installation, use and maintenance of the electric pump or in conditions other than those specified on the data plate.

The warranty will be permanently withdrawn in the case of wrong or improper use of the product, or negligence.

WARNING: This equipment must not be used by children or persons with reduced physical, sensory or mental abilities, or lacking in experience and expertise, unless supervised or trained.

WARNING: Children may not use the equipment and must not play with the pump or in the near vicinity.

WARNING: For all normal operations of installation/commissioning and functioning of the machine it is not necessary to remove the protective devices (motor fan cover).

EC declaration of conformity

In accordance with Annexe II.A of Directive 2006/42/EC

Franklin Electric s.r.l., Via Asolo, 7 - 36031 - Dueville - Vicenza - Italia

declares that the machine:

PUMP MODEL: EH

SERIAL NUMBER: (SEE STICKER ON LAST PAGE AND PUMP DATA PLATE)

is compliant with the following Directives:

- Machinery Directive 2006/42/EC
- Low Voltage Directive 2006/95/EC
- Electromagnetic Compatibility Directive 2004/108/EC
- Ecodesign Directive 2009/125/E, RULING (EC) 640/2009 (MOTOR 3~, 50Hz, PN≥ 0.75 kW 50Hz) if marked IE2 or IE3 and with the following technical standards:

- EN 809:2009
- EN 60335-1:2013, EN 60335-2-41:2005
- EN 62233:2005
- EN 61000-6-1:2007, EN 61000-6-3:2007
- EN 60034-30-1:2014

The person authorised to compile the technical file is:

Franklin Electric s.r.l., Via Asolo, 7 - 36031 Dueville - VI - Dueville, 01/03/2015

Riccardo Fornasa
Director of Engineering - R&D

2 PRELIMINARY INSPECTION

2.1 Delivery and packing

The pumps are supplied in their original packing, in which they should remain until the time of installation.

Check externally that the packing is free from damage. If the product appears to be damaged, inform the reseller immediately. The pump should not be exposed to unnecessary shocks and impacts.

2.2 Contents of packing

The packing contains the operating and installation manual and the electric pump.

3 STORAGE AND HANDLING

3.1 Storage:

Storage temperature: from -5°C to +40°C.

The electric pump must be kept indoors in a dry place, away from heat and protected from dirt and vibrations.

3.2 Handling:

WARNING: Observe the accident prevention regulations in force. Risk of crushing. The pump may be heavy. Use suitable lifting methods and always wear personal protection equipment.

Before handling the product, check its weight to identify suitable lifting equipment. The weight is indicated on the pump data plate.

There are two possible methods for handling the pump:

- 1) Where indicated, remove the cap and screw on a lifting eyebolt suitable for the weight involved. **Warning: The eyebolt does not correspond to the centre of gravity (see fig. 1-C).**
- 2) Position the hoist cables as shown in (fig. 1-A) and (fig. 1-B).

Take the pump out of its packing and check that it is in good condition.

Check also that the plate data correspond to those required. In the event of any anomaly, contact the supplier immediately, reporting the nature of the defects.

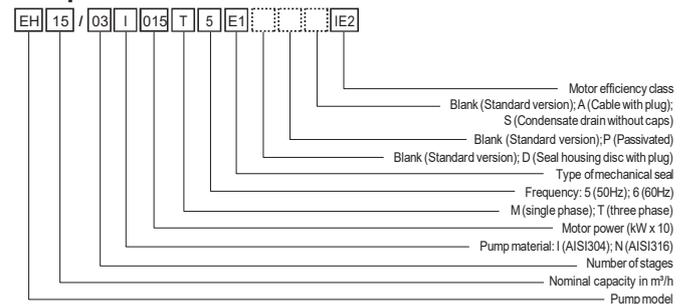
4 GENERAL INFORMATION

4.1 General description

This product is a non self-priming, close-coupled, multi-stage, horizontal pump, with an electric motor.

The pump can pump hot or cold water. The metal parts in contact with liquid are made of stainless steel.

Pump identification code



Permitted use

The pump is suitable for:

- Civil and industrial water distributions systems,
- Irrigation,
- Water treatment,
- Washing systems,
- HVAC (heating and cooling)

Non-permitted use

The pump is not suitable for:

- Pumping liquids not compatible with construction materials.
 - Pumping dangerous liquids (e.g. toxic, explosive, inflammable or corrosive liquids),
 - Pumping liquids for human consumption other than water (for example wine or milk),
 - Pumping liquids containing abrasive, solid or fibrous substances,
 - Working outside of the rated capacity range specified on the data plate.
- Examples of improper installation:
- Environments with explosive or corrosive atmospheres,
 - Outdoor installations without protection from the weather (e.g., sun, rain, high or freezing temperatures).

WARNING: Do not use this pump for inflammable or explosive liquids. Misuse may create hazardous conditions and cause personal injuries and material damage. Misuse of the product renders the warranty void.

Special use:

Contact the sales and service office:

- If the pump is used to pump liquids with viscosity or density greater than water (a motor with proportionately higher power should be used),
- If the water to be pumped has been chemically treated (softened, chlorinated, demineralised etc.),
- In any other situation other than those listed for permitted use.

4.2 Technical data

4.2.1 Temperature of the liquid

Pumped liquids must remain within certain temperature limits:

- with EPDM seals (standard versions): from -15°C to +110°C,

inspection and maintenance.

- Install a check valve (Fig. 5-5) to the discharge piping to prevent reflux and water hammer when the pump is switched off.
- See (Fig. 6) for the sizes of the pump's threaded connections.



WARNING: Depending on the temperature of the pumped liquid, the surfaces of the electric pump can become very hot. If deemed necessary, provide guards to avoid accidental contact.

5.4.2 Electrical connections



WARNING: Low voltage machines are made up of rotating, hazardous, live parts and also sometimes of hot surfaces.



WARNING:

- The specialist installer must carry out the connection conform to standards in force in the country of installation.
- Before doing any work on the unit make sure the power supply is disconnected and that neither the control panel nor the unit can switch on, not even accidentally.



WARNING:

- Ensure all electrical equipment of the pump, motor and any monitoring equipment is grounded before connecting the phase conductors.
- The earth conductor must be the last conductor to disconnect from the terminal.
- Make sure that the earth conductor is longer than the phase conductors on both ends of the cable.

Guidelines

- Protect electrical conductors from extreme heat, vibration and impact.
- The power line must be fitted with:
 - a protection circuit.
- As extra protection against lethal electric shocks install a high sensitivity residual current device, whose operating current differential is less than or equal to 30mA.
- An overvoltage category III all-pole mains isolator in the power supply network as per current standards.

The electric control panel should:

- Be suited to the rated values of the electric pump, to properly protect the motor.
 - Protect the motor from overload and short circuits.
 - Protect the motor from overheating (circuit breaker protection);
 - Be equipped with a system to protect against dry running, to which should be connected the pressure switch, level sensors, floats and other suitable devices.
- An inflow pressure switch is recommended if the pump is connected to the water supply or level sensors/floats if the pump draws from a tank.



WARNING: The data regarding the power supply of the motor are shown on the plate (Fig. 5-T) and paragraph 4.3.

Before starting up the motor, check that:

- The power cables conform, with 3 conductors (2 + Earth) for the single phase versions and with 4 conductors (3 + Earth) for the three phase version.
- The power supply is compatible with the motor characteristics.
- Wire the electric cable to the motor according to the diagram shown on the label inside the cover of the terminal box.
- Check that the earth cable is longer than the phase conductors. If the power supply cables are pulled and detached from their cable stay, the last one that should disconnect is the earth cable.
- Make the connection ensuring there is an effective earth circuit.



WARNING: Once the cables have been connected, replace the terminal board cover; failure to follow these instructions may cause personal injury.



WARNING:

- Avoid any contact between the electric cables and the pipes or other parts of the pump
- Carefully keep the cables away from damp.
- Tighten the cable glands properly to prevent moisture from entering the terminal and to ensure protection against sliding of the cables.

The electric motors can run with the voltage shown on the data plate, with a tolerance of +/- 10%.

The single-phase motors have built-in automatic thermal overload protection. The three-phase motors have no thermal protection. The installer must install it in the control panel.

6 START-UP



WARNING:

- Pay attention to discharged liquid so that it cannot cause damage to people or things.
- The motor protectors can cause an unexpected restart of the motor, which may cause serious personal injury.
- Never start up the pump without the coupling safety casings correctly installed.



WARNING:

- During operation the external surfaces of the pump and the motor could exceed 40°C (104°F) if the pumped liquid is not at ambient temperature.
- Do not touch the unit without proper protection.
- Do not place inflammable material near to the pump.



WARNING:

- The electric pump must NOT be started without first being filled.

- Its use without liquid may permanently damage the mechanical seal.
- Do not operate the pump with the inlet and discharge valves closed for more than 5 seconds.
- Do not expose the pump when idle to freezing temperatures. Frozen liquid will damage the pump.
- The pump should not operate if there is cavitation, because this damages the internal parts (see point 5.1).

Noise level

All the units generate an acoustic pressure level below LpA 70 dB.

6.1 Priming

With liquid level above the pump (positive suction head Fig. 5-B)

- Close the discharge valve (Fig. 5-8).
- Remove the filling caps (Fig. 5-A1 and Fig. 5-A2).
- Open the inlet gate valve (Fig. 5-4) to allow the liquid to enter and wait until the water overflows.
- Close the inlet valve and tighten the caps (see tightening torques in Fig. 6).

With liquid level below the pump (negative suction head Fig. 5-A)

- Close the discharge valve (Fig. 5-8).
- Remove the filling caps (Fig. 5-A1 and Fig. 5-A2).
- Using a funnel, fill the pump until the water comes out, (this operation may need to be repeated several times)
- Replace and tighten the caps (see tightening torques in Fig. 6).

6.2 Checking rotation direction

This operation is only required for three-phase motors. For single-phase motors, the direction of rotation is already set.

- Start up the motor for 1-2 seconds, and check the direction of rotation through the motor fan cover (no need to remove the cover). The arrow on the fan cover shows the correct direction.



WARNING: Before any operation on the electric pump, check that the power supply is disconnected and that it cannot be accidentally reconnected during maintenance operations.

If the direction is wrong:

- Disconnect the power supply.
- In the terminal box or control panel of the motor, swap the position of two phases of the power cable.
- Close the lid of the terminal box and/or control panel.
- Check again the direction of rotation.

6.3 Starting up the pump

Before starting up, check that:

- The electric pump is correctly connected to the power supply.
- The pump is correctly primed (procedure point 6.1)
- The discharge gate valve (Fig. 5-8) is closed and the inlet valve (Fig. 5-4) is open.
- Start the motor and gradually open the valve on the discharge side of the pump.
- After a few seconds of noisy operation to expel any air, the pump should function silently and regularly without any changes in pressure. Otherwise refer to the Troubleshooting table Point 9.

6.4 Emptying the pump



WARNING: Liquid may remain in some parts inside the pump. To remove all liquid, the pump must be completely disassembled.



WARNING: Be careful that the discharged liquid does not damage people or things.

If it is necessary to empty the pump for maintenance or for long downtimes, the procedure is as follows:

Close the gate valves of the discharge and inlet piping (Fig. 5-8 and Fig. 5-4). Partially unscrew the discharge cap to release pressure on the pump Fig. 5-A1. When there is no more pressure completely remove the inlet and discharge caps (Fig. 5-A3) and wait for pump to empty. Once emptying is completed, replace and tighten the caps again, (tightening torques shown in Fig. 6).

7 MAINTENANCE AND SUPPORT



WARNING: Before any repairs to the electric pump, check that the power supply is disconnected and that it cannot be accidentally reconnected during maintenance operations.



WARNING: If the electric pump is used for hot and/or hazardous liquids, it is essential to inform the personnel who will carry out the repair. In this case, clean the pump so as to ensure the safety of the operator.



WARNING: Repairing or having the electric pump repaired by personnel not authorised by the manufacturer means losing the warranty and operating with unsafe and potentially hazardous equipment.



WARNING: Be careful that the discharged liquid does not damage people or things.

The electric pump does not require any ordinary scheduled maintenance.

If the user wishes to prepare a scheduled maintenance plan, bear in mind that the due dates depend on the type of liquid pumped and the running conditions. For spare parts and maintenance documentation, contact our sales and service office.

Spare parts see (Fig. 8 and Fig. 9).

8 DISPOSAL

Disposal of this product or parts of it must be carried out using the local public or private waste disposal systems.

9 TROUBLESHOOTING



WARNING: Before any repairs to the electric pump, check that the power supply is disconnected and that it cannot be accidentally reconnected during maintenance operations.



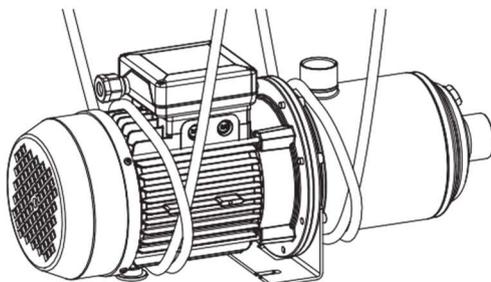
WARNING: If the electric pump is used for hot and/or hazardous liquids, it is essential to inform the personnel who will carry out the repair. In this case, clean the pump so as to ensure the safety of the operator.

For problems and solutions, consult table below: "TROUBLESHOOTING TABLE"

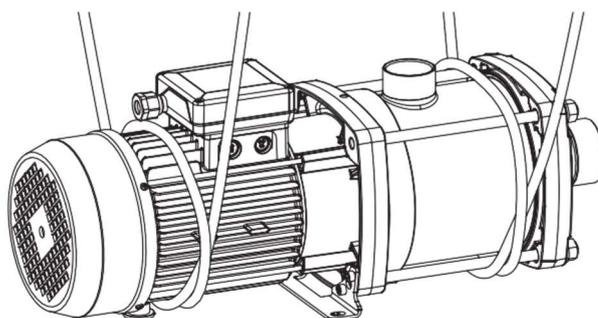
TROUBLESHOOTING TABLE:		
PROBLEM	CAUSE	ACTION
9.1 The pump turns but does not deliver	a) The internal parts are obstructed by foreign bodies:	Dismantle the pump and clean it.
	b) Inlet pipe is blocked:	Clean the pipe.
	c) Air is entering the inlet pipe:	Check that the pipe is airtight right up to the pump and seal it.
	d) The pump is unprimed:	Re-prime it by filling the pump. Check that the base valve is airtight.
	e) Inlet pressure is too low and generally accompanied by cavitation noise:	Excessive loss of head in suction or the suction height is excessive (check the NPSH of the installed pump).
	f) Voltage insufficient to power the motor:	Check the voltage of the motor terminals and the correct diameter of the conductors.
9.2 The pump vibrates	a) Anchorage on a faulty base:	Check and fully tighten the nuts on the bolts of the studs.
	b) Foreign bodies obstructing the pump:	Dismantle the pump and clean it.
	c) Obstruction to the pump rotation:	Check that the pump can rotate freely without any abnormal resistance.
	d) Faulty electrical connection:	Check the pump connections.
9.3 The motor heats up abnormally	a) Insufficient voltage:	Check the voltage of the motor terminals. The voltage should be $\pm 10\%$ of the rated voltage.
	b) Pump blocked by foreign bodies:	Dismantle the pump and clean it.
	c) Ambient temperature more than +40°C:	The motor is designed to function at a maximum ambient temperature of +40°C.
	d) Connection error in the terminal board:	Check that the connections respect the diagram shown inside the cover of the terminal box and the data plate information.
9.4 The pump does not deliver sufficient pressure	a) The motor is not rotating at normal speed (foreign bodies or faulty power supply etc.):	Dismantle the pump and correct the problem.
	b) The motor is faulty:	Replace it.
	c) The pump is not filling properly:	Repeat the priming operation.
	d) The motor rotates in reverse (three-phase motor):	Invert the direction of rotation by exchanging two phase wires on the motor terminal board or the electrical control panel.
	e) Voltage insufficient to power the motor:	Check the voltage of the motor terminals and the correct diameter of the conductors.
9.5 The automatic circuit breaker trips	a) Thermal overload relay value too low:	Control the intensity with an ammeter, set the value of the intensity shown on the motor rating plate.
	b) Voltage is too low:	Check that the diameter of the conductors of the electric cable is correct.
	c) Interruption of one phase:	Check the electric cable or fuse and replace if necessary.
	d) The thermal overload relay is faulty:	Replace it.
9.6 The flow is not regular	a) The inlet height is not being observed:	Check the installation conditions and the recommendations of this manual.
	b) The inlet piping has a smaller diameter than the pump:	The inlet piping should have the same diameter as the inlet mouth.
	c) The suction filter and inlet piping are partially blocked:	Clean the inlet duct.

Fig.1

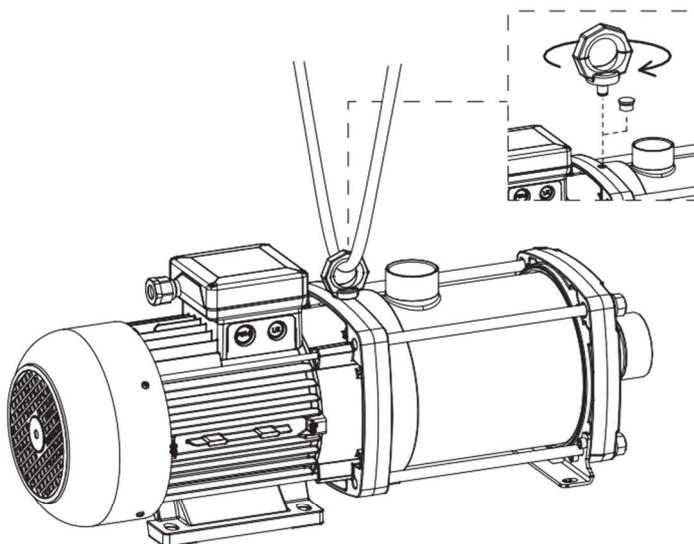
A



B



C



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Fig.2

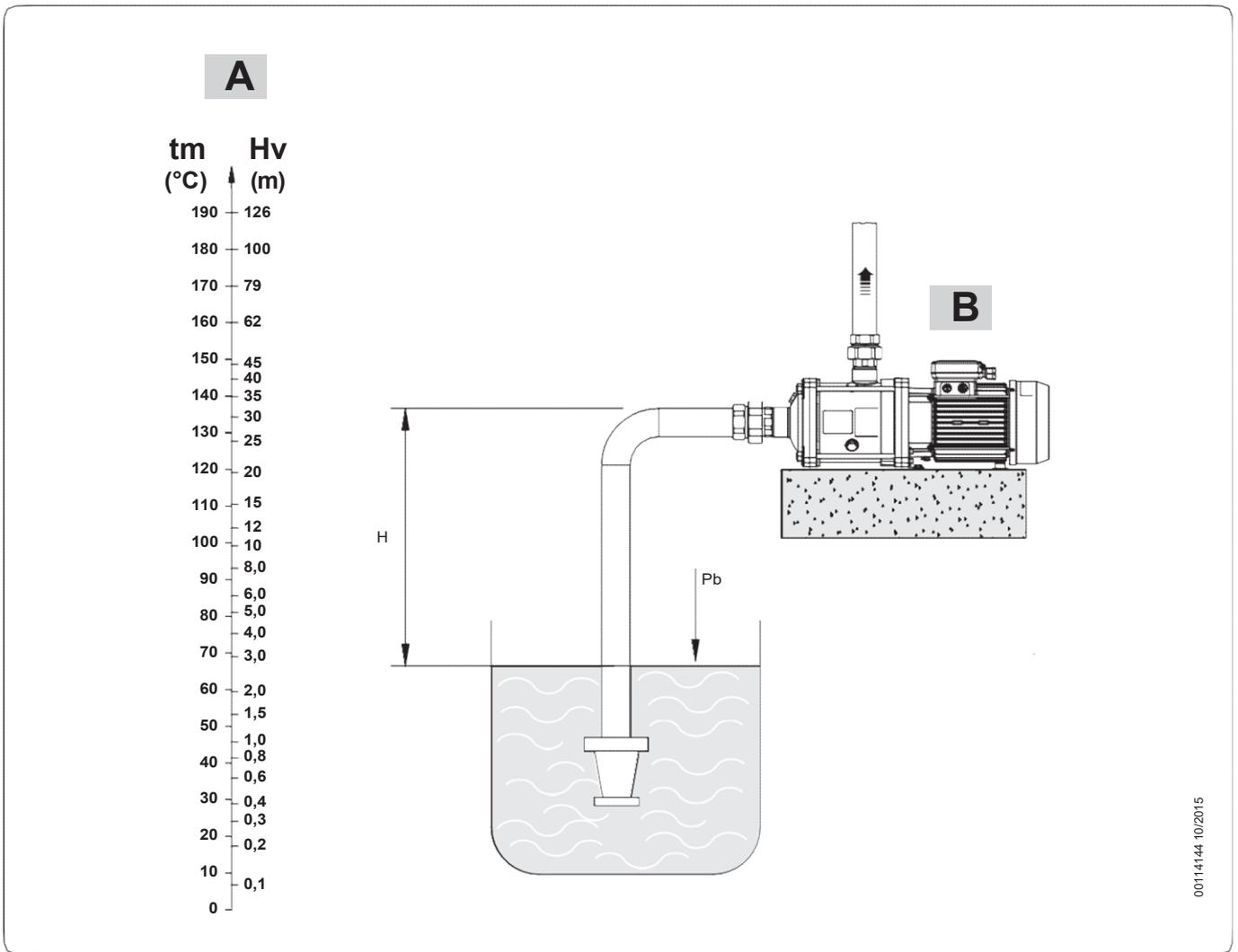


Fig.3

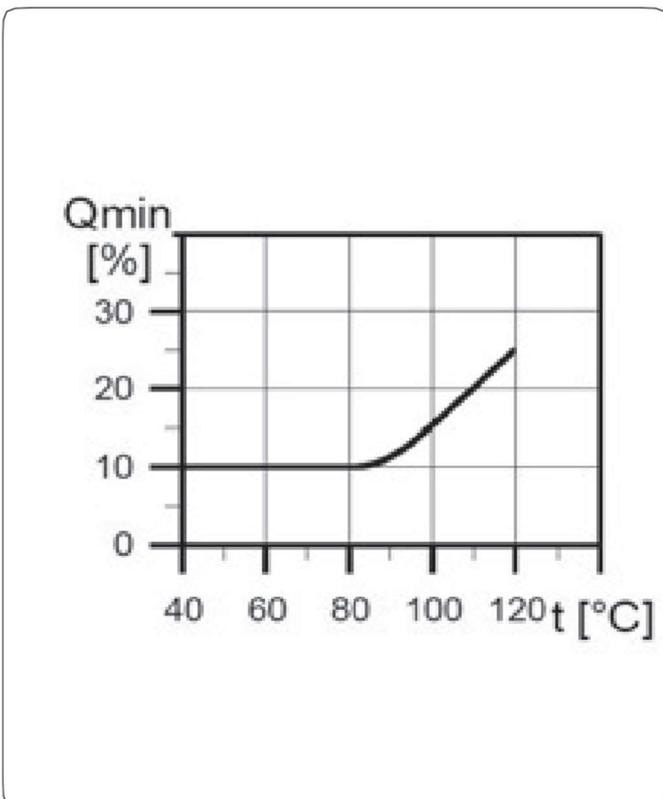


Fig.4

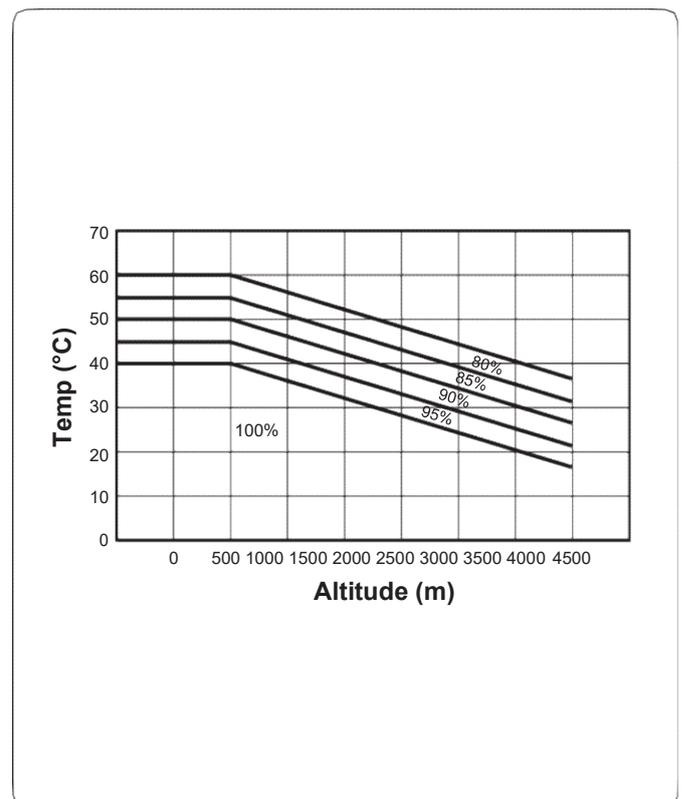
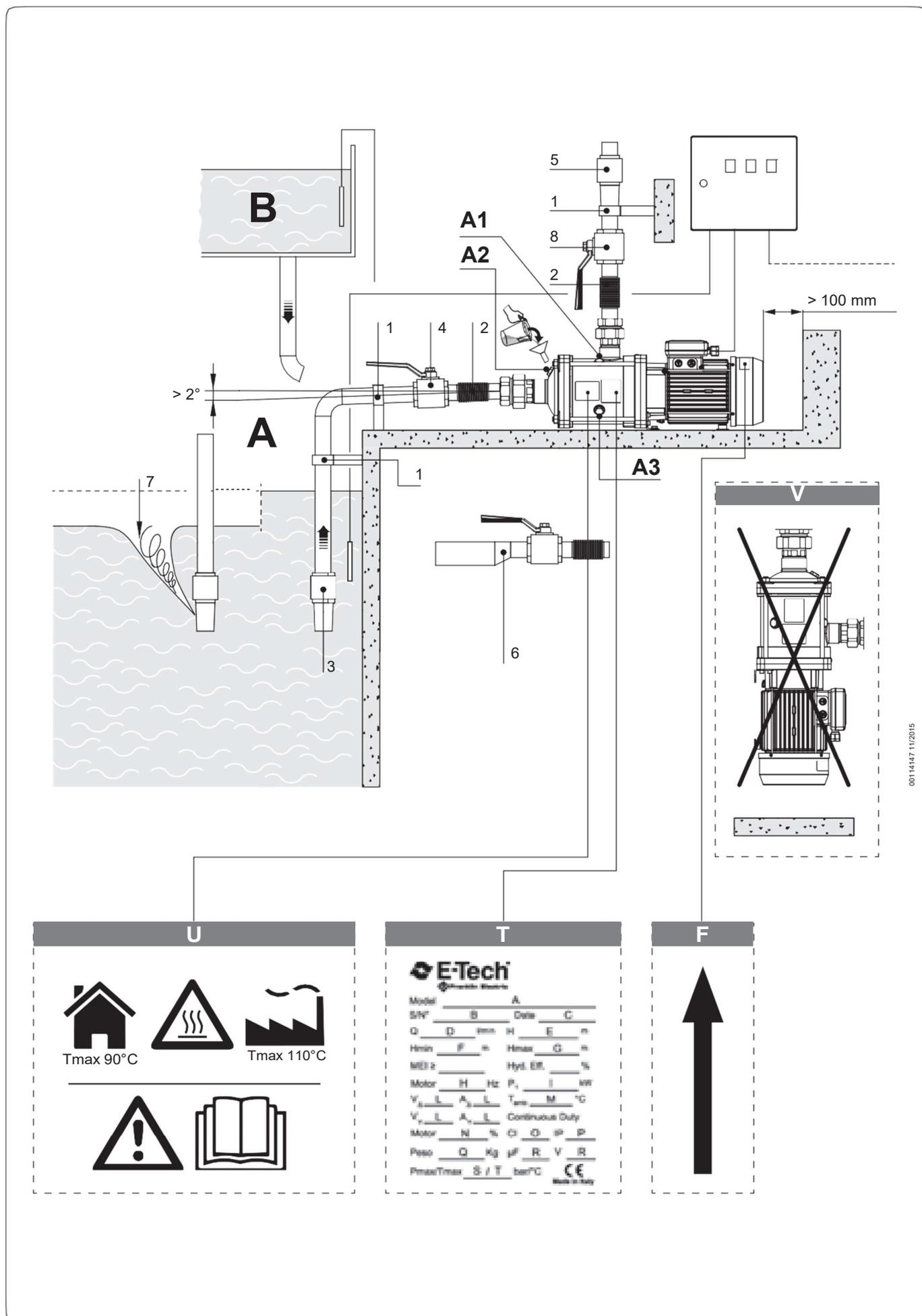
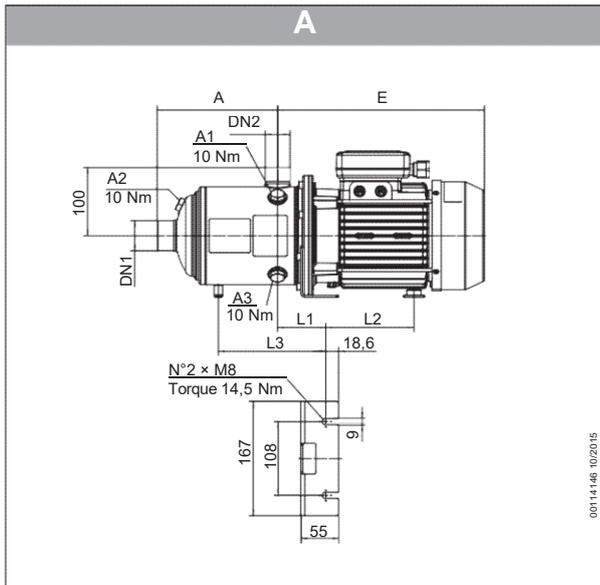


Fig.5

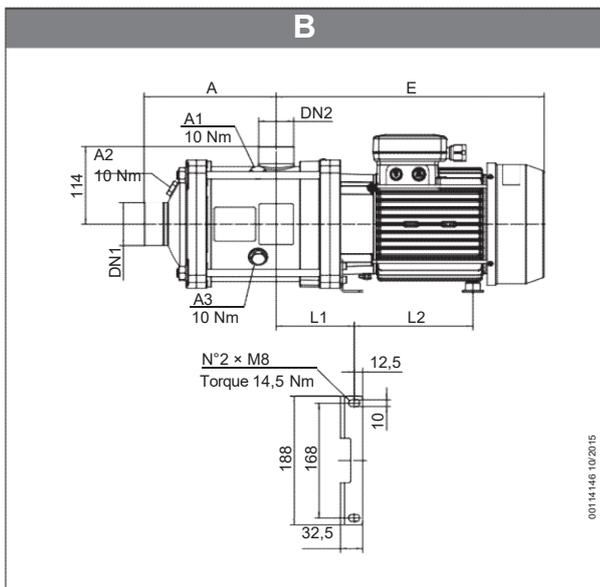


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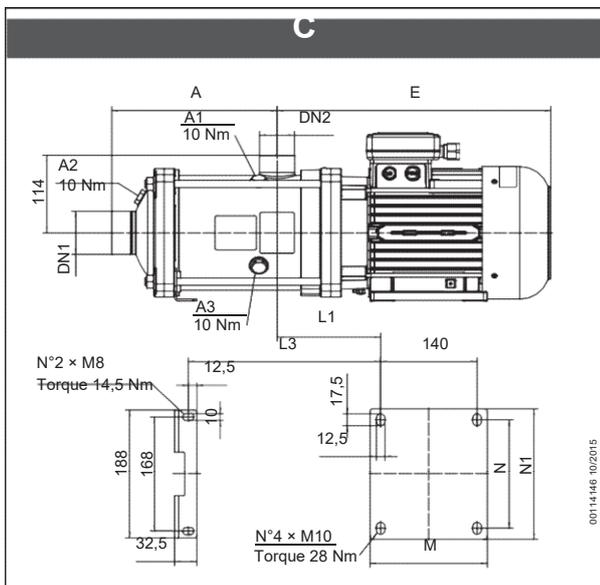
Fig.6



Pump Model	A	DN1	DN2	E	F	L1	L2	L3	
EH 3/2	103	Rp 1" ¼	Rp 1"	258	361	70	100,6	-	A
EH 3/3	103	Rp 1" ¼	Rp 1"	258	361	70	100,6	-	
EH 3/4	127	Rp 1" ¼	Rp 1"	258	385	70	100,6	-	
EH 3/5	151	Rp 1" ¼	Rp 1"	258	409	70	100,6	-	
EH 3/6	175	Rp 1" ¼	Rp 1"	258	433	70	100,6	-	
EH 3/7	199	Rp 1" ¼	Rp 1"	258	457	70	100,6	180	
EH 3/8	223	Rp 1" ¼	Rp 1"	300	523	70	128,1	204	
EH 3/9	247	Rp 1" ¼	Rp 1"	300	547	70	128,1	228	



Pump Model	A	DN1	DN2	E	F	L1	L2	L3	
EH 5/2	103	Rp 1" ¼	Rp 1"	258	361	70	100,6	-	A
EH 5/3	103	Rp 1" ¼	Rp 1"	258	361	70	100,6	-	
EH 5/4	127	Rp 1" ¼	Rp 1"	258	385	70	100,6	-	
EH 5/5	151	Rp 1" ¼	Rp 1"	258	409	70	100,6	-	
EH 5/6	175	Rp 1" ¼	Rp 1"	300	475	70	128,1	-	
EH 5/7	199	Rp 1" ¼	Rp 1"	300	499	70	128,1	180	
EH 5/8	223	Rp 1" ¼	Rp 1"	300	523	70	128,1	204	
EH 5/9	247	Rp 1" ¼	Rp 1"	300	547	70	128,1	228	



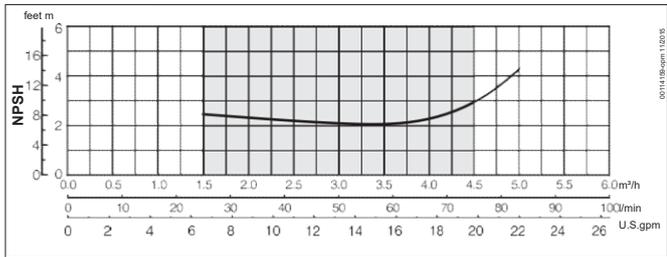
Pump Model	A	DN1	DN2	E	F	L1	L2	L3	
EH 9/2	118	Rp 1" ½	Rp 1" ¼	262	380	74	100,6	-	A
EH 9/3	118	Rp 1" ½	Rp 1" ¼	262	380	74	100,6	-	
EH 9/4	148	Rp 1" ½	Rp 1" ¼	304	452	74	128,1	-	
EH 9/5	178	Rp 1" ½	Rp 1" ¼	304	482	74	128,1	-	
EH 9/6	208	Rp 1" ½	Rp 1" ¼	304	512	74	128,1	192,1	
EH 9/7	238	Rp 1" ½	Rp 1" ¼	349	587	74	171,6	222,1	
EH 9/8	268	Rp 1" ½	Rp 1" ¼	349	617	74	171,6	252,1	

Pump Model	A	E	F	L1	L2	L3	M	N	N1	
EH 15/2	144	344	488	113,1	129,05	-	-	-	-	B
EH 15/3	144	344	488	113,1	129,1	-	-	-	-	
EH 15/4	192	388,5	580,5	113,1	172,55	-	-	-	-	C
EH 15/5	240	397	63	150,15	-	279,15	170	160	192	
EH 15/6	288	412	700	151,65	-	328,65	180	190	220	
EH 15/7	336	412	74	151,65	-	376,65	180	190	220	

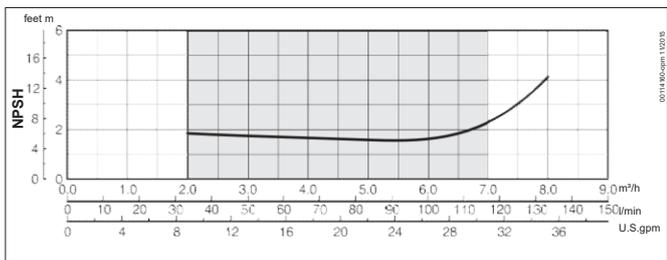
Pump Model	A	E	F	L1	L2	L3	M	N	N1	
EH 20/2	144	388,5	532,5	113,1	172,55	-	-	-	-	B
EH 20/3	144	388,5	532,5	113,1	172,55	-	-	-	-	
EH 20/4	192	397	589	150,15	-	231,15	170	160	192	C
EH 20/5	240	412	652	151,65	-	280,65	180	190	220	

Fig.7

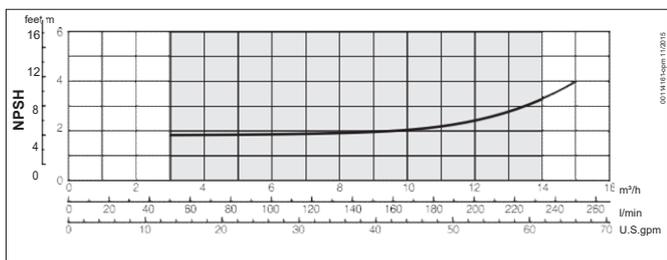
50 Hz **EH3**



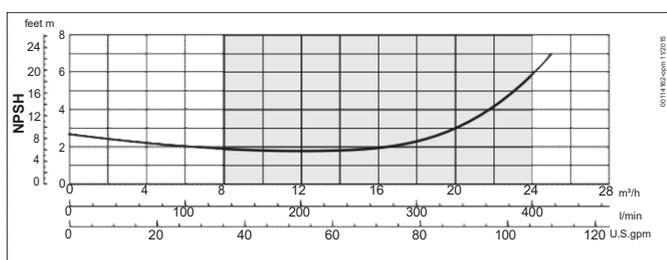
50 Hz **EH5**



50 Hz **EH9**



50 Hz **EH15**



50 Hz **EH20**

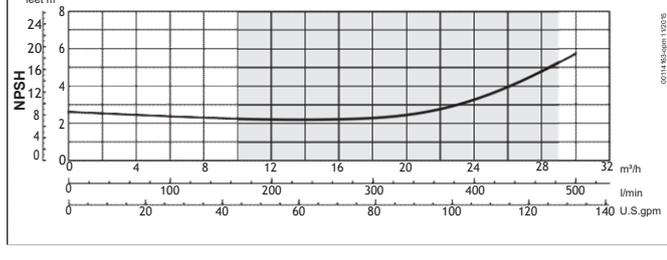
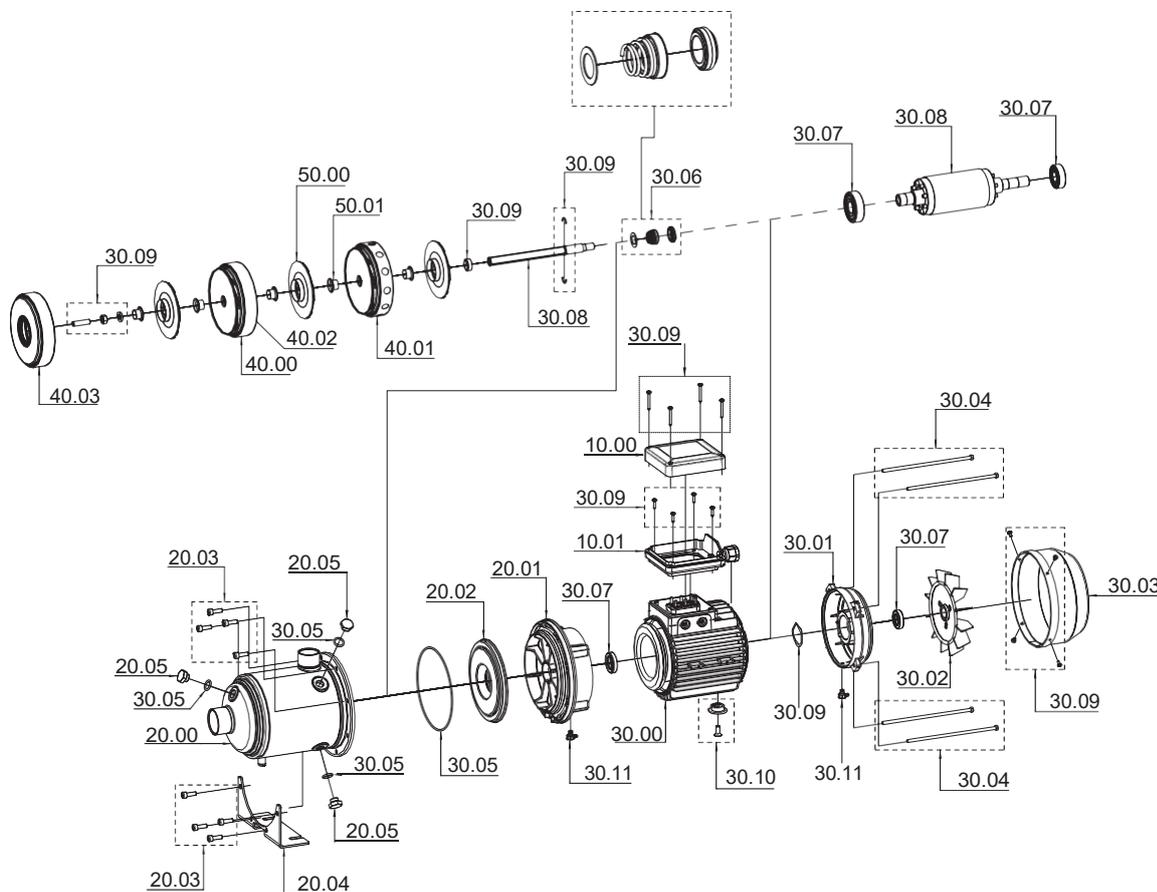


Fig.8

EH Series pump section and List of Main components

EH 3 - 5 - 9



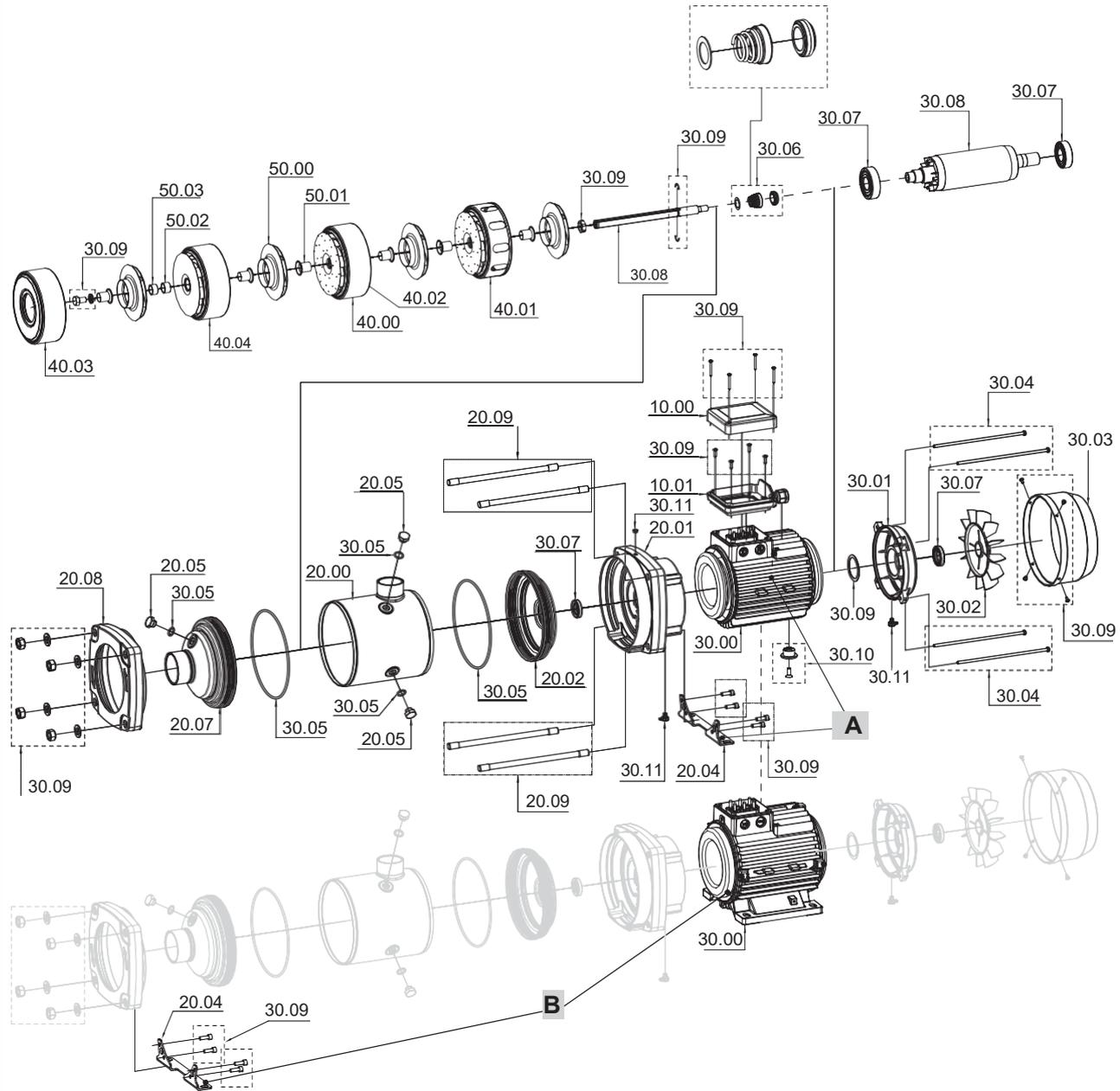
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Ref. N.	Description
10. 00	Terminal box cover
20. 00	Pump casing
20. 01	Motor bracket
20. 02	Seal housing
20. 03	Screws for pump casing
20. 04	Support foot
20. 05	Filling and draining plugs
20. 06	Pump casing foot
30. 00	Motor housing and stator
30. 01	Bearing housing
30. 02	Fan
30. 03	Fan cover
30. 04	Motor tie rod

Ref. N.	Description
30. 05	O-Rings
30. 06	Mechanical seals
30. 07	Ball bearings and lip seal
30. 08	Rotor and pump shaft
30. 09	Screws, nuts and washers
30. 10	Motor foot
30. 11	Valve plug
40. 00	Stage housing and diffuser
40. 01	Last stage with holes
40. 02	Floating neck ring assembly
40. 03	Initial stage housing
50. 00	Impeller
50. 01	Impeller spacers

Fig.9 EH Series pump section and List of Main components

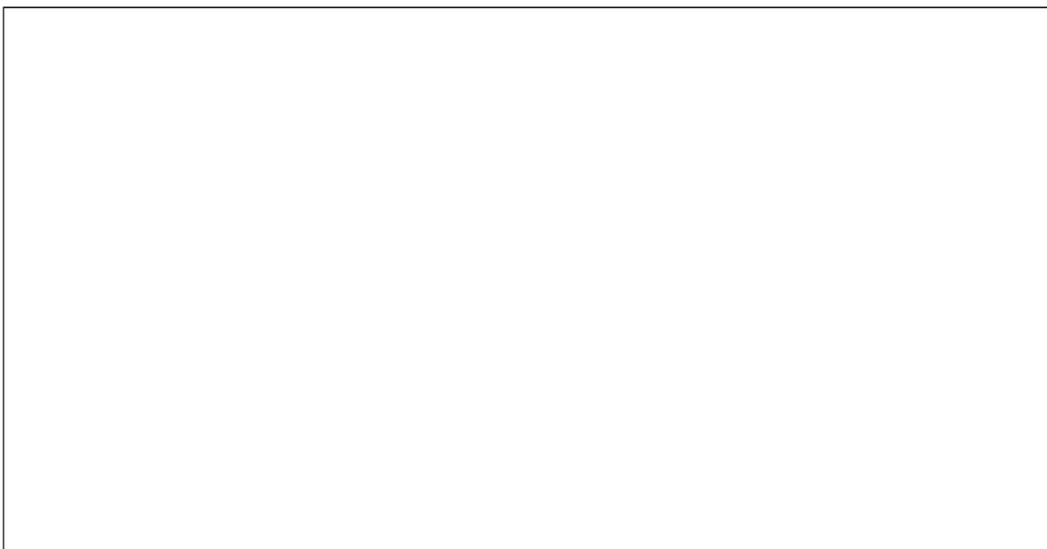
EH 15 - 20



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Ref. N.	Description
10. 00	Terminal box cover
20. 00	Pump casing
20. 01	Motor bracket
20. 02	Seal housing
20. 04	Impeller spacers
20. 05	Filling and draining plugs
20. 07	Inlet cover
20. 08	Flange
20. 09	Pump casing tie rods
30. 00	Motor housing and stator (version A or version B)
30. 01	Bearing housing
30. 02	Fan
30. 03	Fan cover
30. 04	Motor tie rod
30. 05	O-Rings

Ref. N.	Description
30. 06	Mechanical seals
30. 07	Ball bearings and lip seal
30. 08	Rotor and pump shaft
30. 09	Screws, nuts and washers
30. 10	Motor foot
30. 11	Valve plug
40. 00	Stage housing and diffuser
40. 01	Last stage with holes
40. 02	Floating neck ring assembly
40. 03	Initial stage housing
40. 04	Stage housing and diffuser with bearing
50. 00	Impeller
50. 01	Impeller spacers
50. 02	Intermediary sleeve
50. 03	Intermediary sleeve spacer



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