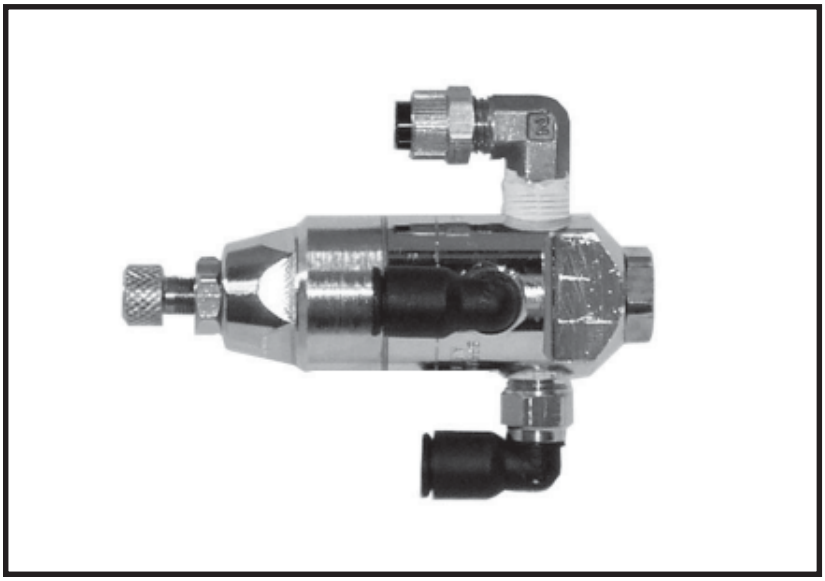
UNIVERSAL
STENCILING & MARKING SYSTEMS

OWNER'S MANUAL

USMR
MICRO-SPRAY MARKERS
ALL MODELS

INSTALLATION - OPERATION - MAINTENANCE



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USMR-22172

IMPORTANT NOTE

UNIVERSAL products are manufactured to exacting standards and every available step has been taken to assure your complete satisfaction. It is most important, however, that the instructions contained in this manual are read and carefully followed for best results. Failure to do so may result in unsatisfactory performance, damage to the equipment and personal injury.

TABLE OF CONTENTS

- LIMITED WARRANTY -

UNIVERSAL Micro-Spray Markers are guaranteed to be free from defects in materials and workmanship for a period of 90 days from the date of purchase. Components found to be defective during this time will be repaired free of charge if returned to the factory. Damage resulting from use of improper inks, improper installation, or operation is not covered under the scope of this warranty. For warranty service please contact our Customer Service Department.

SPECIFICATIONS

USMR-20AF MICRO-SPRAY MARKER WITH ADJUSTABLE FLUID CONTROL
NET WEIGHT: 8.289 OZ. (235 GRAMS)

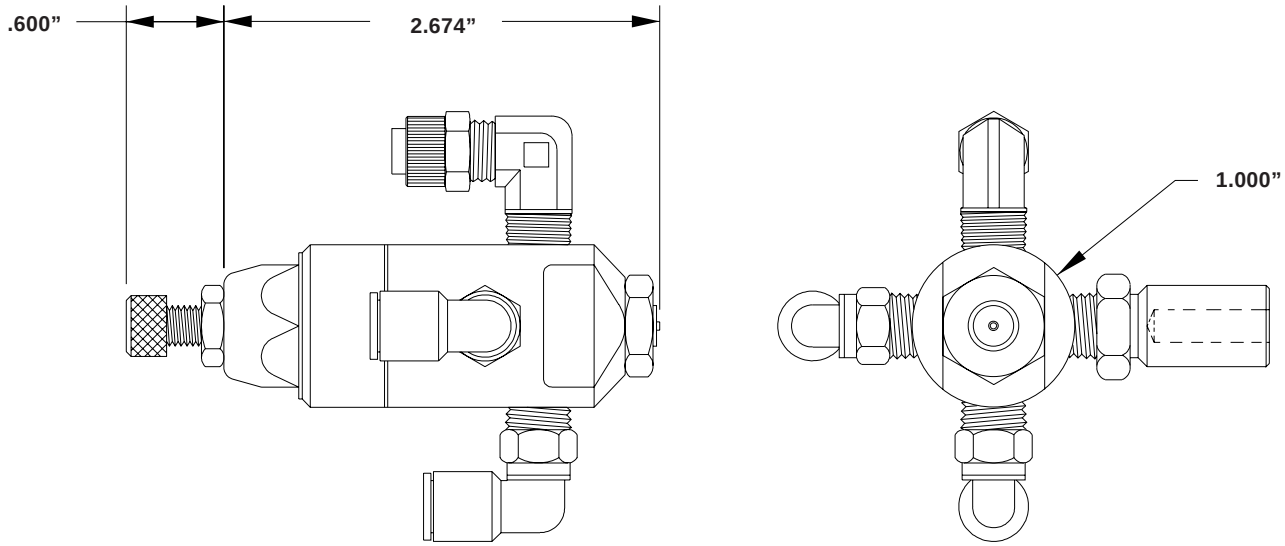


FIGURE 1

SPECIFICATIONS

SPRAY PATTERN

Micro-Spray Markers are designed for color coding applications where round spot marks or stripes are required for product identification or acceptance/rejection indication marks.

The low pressure spray marking unit can produce up to 180 marks per minute, thus providing a high degree of marking flexibility at typical automation speeds. Spot or stripe size is adjustable from 1/4" minimum to a maximum of 1". These units may be mounted near automation and sensitive test equipment, placed in marking stations on the production line, or attached to robot arms or other machinery. The small size and light weight of the Micro-Spray Marker makes it ideal for mounting in a variety of locations where space is severely limited. The Micro-Spray Marker is capable of marking in any attitude and it's low-mass operation provides fast response for high speed requirements.

Micro-Spray Marker Systems require 5 - 12 PSI atomizing air pressure and 70-80 PSI trigger air pressure to operate. Remote gravity feed or pressure fed ink reservoirs can handle extremely fast drying dye or pigmented inks for both porous and non-porous marking applications. These markers excel when marking operations require extremely fast drying inks on non-porous surfaces. A stainless steel clean out needle seats in the nozzle orifice after every cycle to insure that the marker will continue to print even after prolonged idle periods where most contact marking systems tend to fail.

SPRAY PATTERN

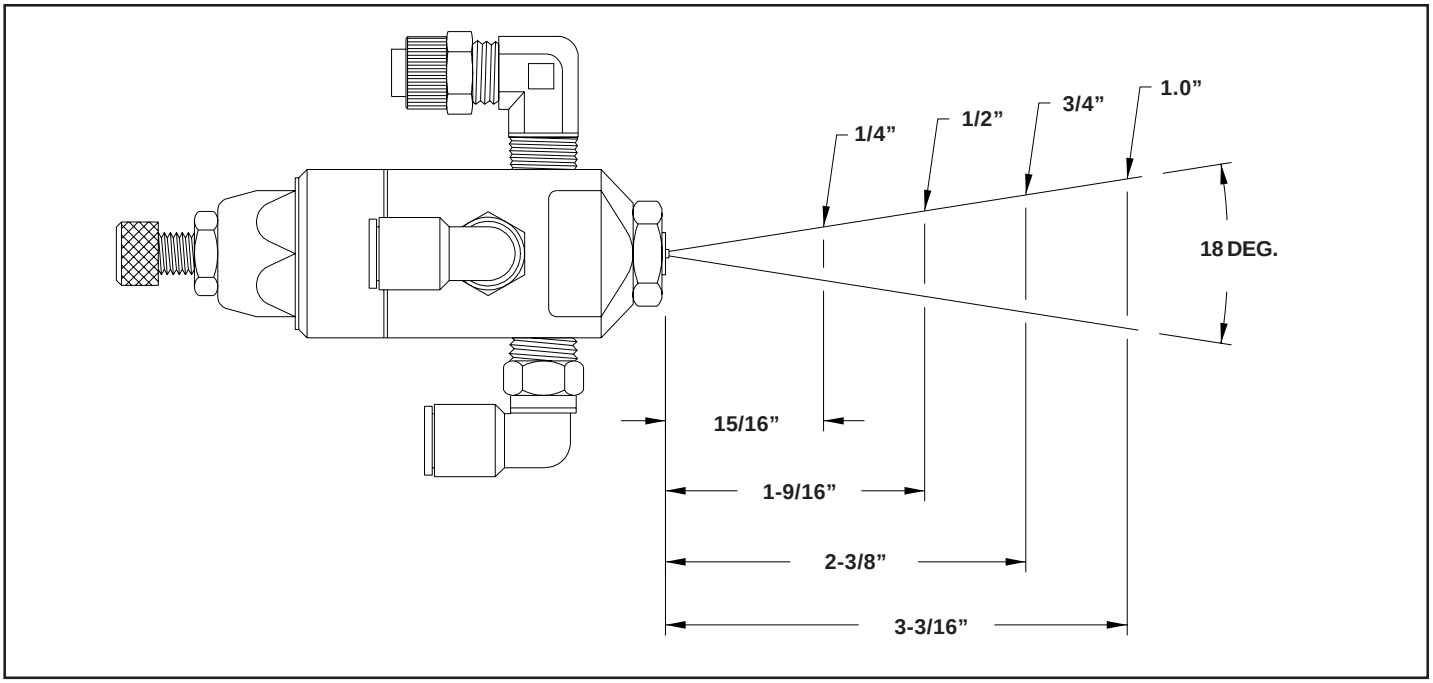


FIGURE 2

The Micro-Spray Markers fire an 18 degree conical spray pattern. Adjusting the spot diameter or line width is accomplished by positioning the marker at the appropriate distance from the surface of the material being marked as shown in the figure above.

INSTALLATION

MOUNTING THE MARKER

WARNING: ***Do not mount these markers near sparks or open flames when using flammable solvent based inks. Atomized solvent vapor is extremely flammable! Use common sense and standard safety precautions when handling all flammable liquids.***

A standard mounting shaft is supplied with each Micro-Spray Marker. The mounting shaft (Figure 3) is designed to provide two mounting options. The 1/2" diameter shaft can be clamped into a bracket assembly or the 1/4 -20 threaded hole in the end of the shaft can be used to attach the marker to a fixture with a socket head machine screw.

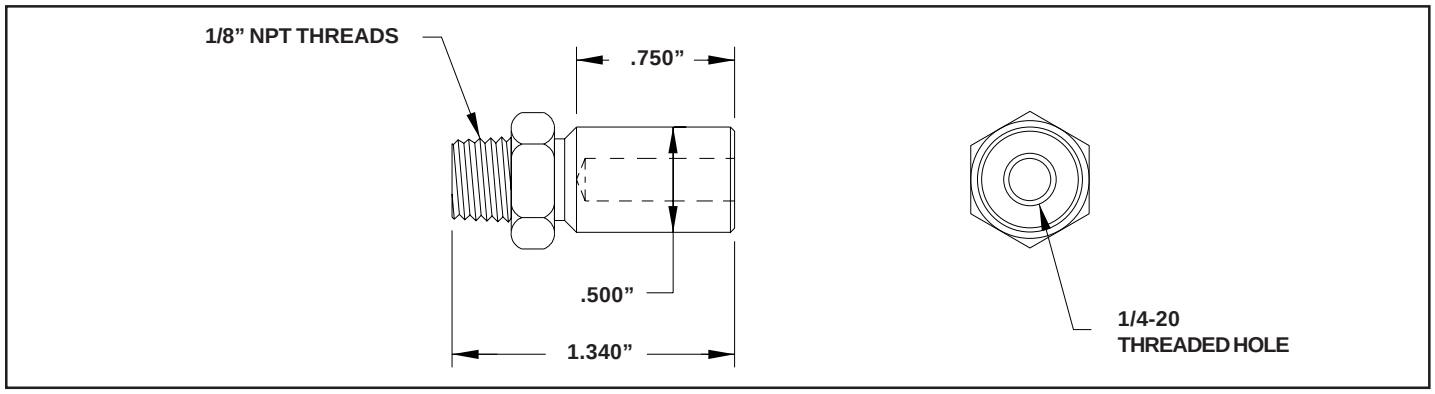


FIGURE 3

The body of the Micro-Spray Marker has four 1/8" NPT threaded ports as shown in Figure 4. The two ports marked CYL can be used interchangeably for installation of the mounting shaft and the trigger air line. The externally threaded end of the mounting shaft is screwed into one of these ports and serves as both a plug for the extra trigger air port and a mount. Teflon tape is applied to the mounting shaft to ensure a tight seal and prevent air leakage.

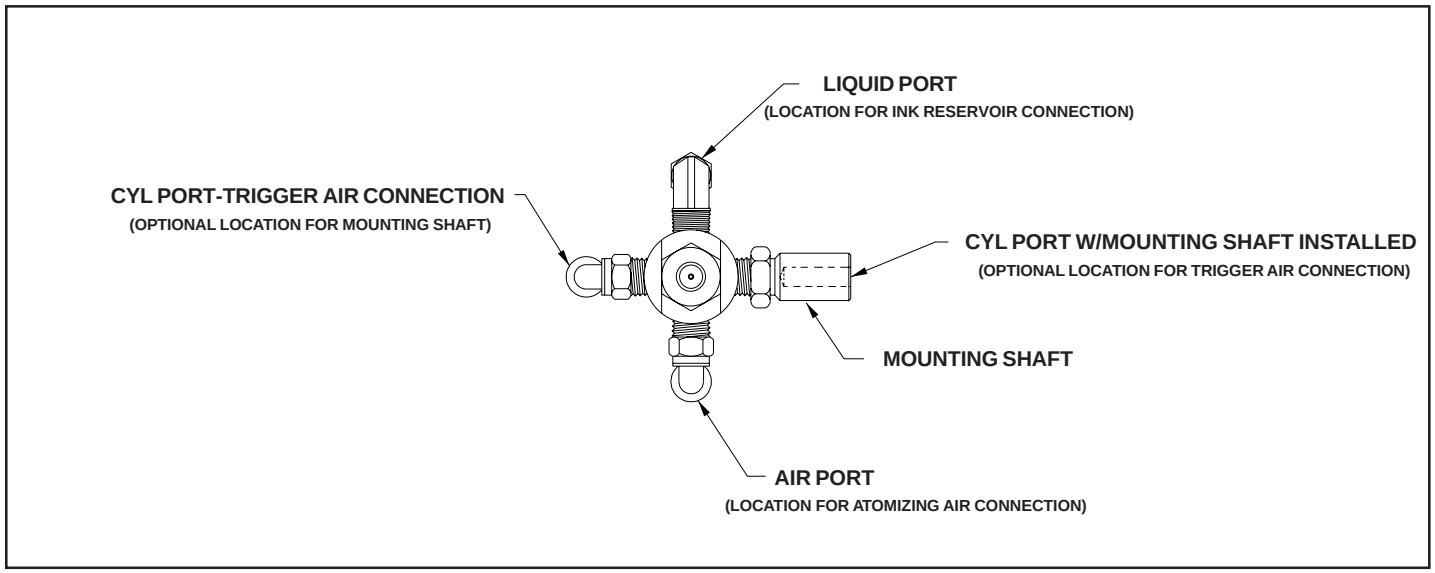


FIGURE 4

After installing the mounting shaft into the marker body, mount the marker in a suitable location in proper proximity of the part to be marked. The marker can be mounted in any attitude necessary to apply the mark to the part in the desired location.

INSTALLATION

To simplify mounting the Micro-Spray Markers, Universal offers two optional mounting systems which provide multiple axis positioning adjustment as shown in Figure 5. The USMR-MSA-TM Top Mount system is designed to be mounted on a flat surface such as the mounting plate on an inspection machine base or a table top. The USMR-MSA-SM Side Mount system is designed for mounting on the side rails of a powered conveyor or the side of a machine base. Both systems utilize stainless steel columns with plastic cross blocks and aluminum mounting brackets which provide up to 7 axis adjustment capabilities. A mounting plate and screws are provided to attach the marker. Mounting system assemblies with integral reservoir mounts are also available.

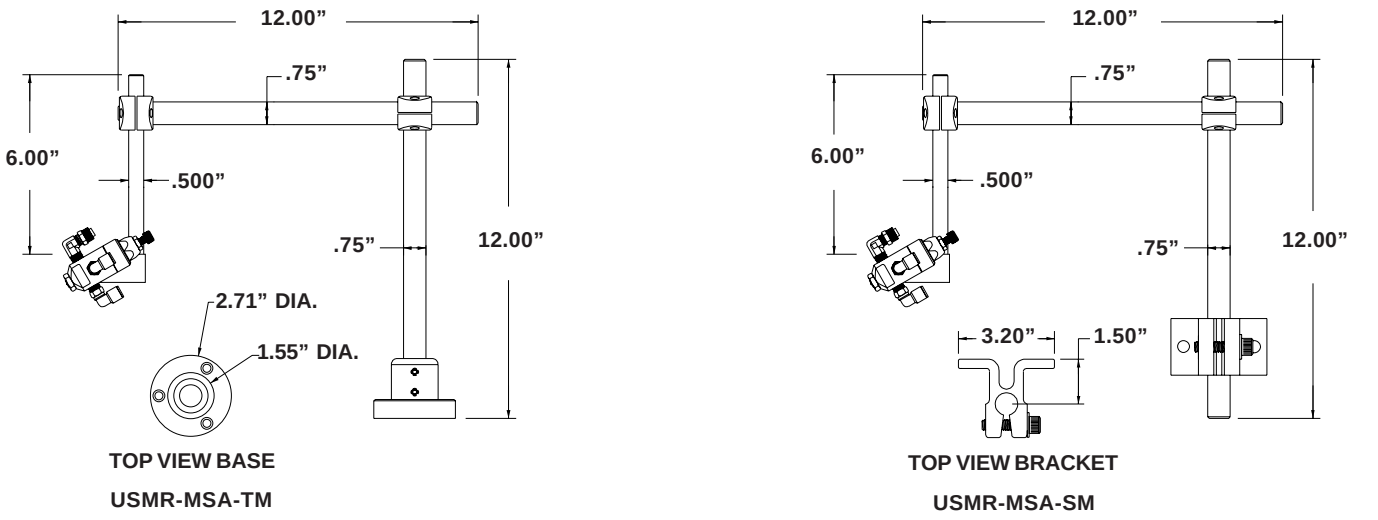


FIGURE 5

INK RESERVOIRS

Micro-Spray Markers normally use USM-GFR series gravity feed reservoirs to supply ink to the marker. The USM-GFR reservoirs are available in four standard sizes as shown in Figure 6. When selecting an appropriate reservoir size for your application, two factors should be considered:

1 - Spot marking applications typically consume extremely small volumes of ink. With accurate fluid control adjustment, approximately 500 1/4” diameter spot marks can be applied with 1 milliliter of ink.

2 - Unlike dye base inks that contain liquid colorants, pigmented inks contain ground solids which will settle to the bottom of the reservoirs when they remain unagitated for prolonged periods of time. As the pigments settle, the viscosity of the ink being fed to the marker will increase. Unless the ink is stirred periodically, pigment settling can eventually cause clogging of the fluid inlet port on the marker body. To prevent this problem, it is recommended that you select the smallest reservoir size appropriate for your application and then only fill the reservoir with enough ink to last 1 - 2 days of operation. When refilling the reservoir, thoroughly shake the supply container of ink to ensure the pigments are thoroughly mixed.

INSTALLATION

MOUNTING THE RESERVOIR

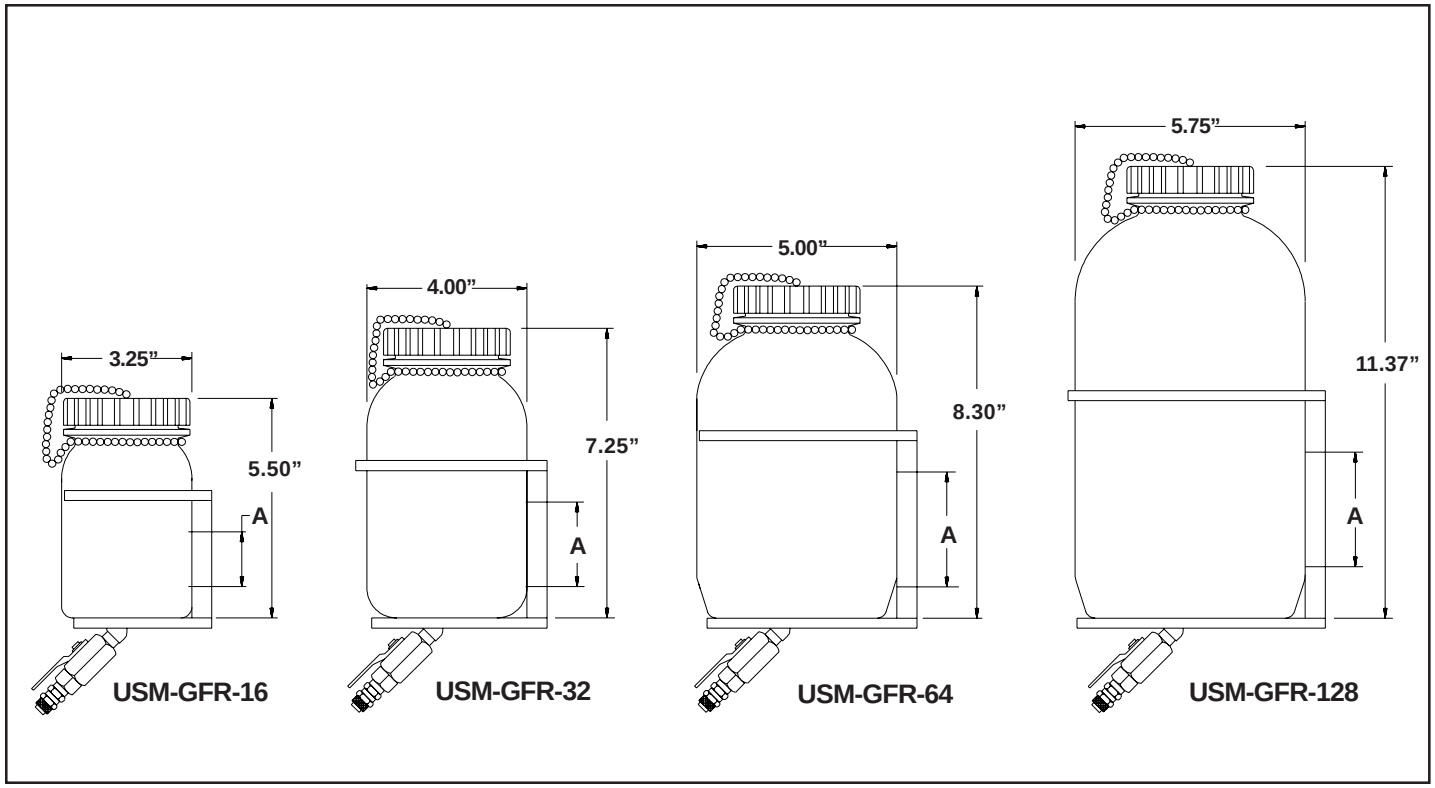


FIGURE 6

Increasing the height of the reservoir relative to the position of the marker will increase ink supply line pressure at the marker. In applications requiring high fluid flow rates, raising the reservoir height will result in larger ink volumes being applied while all other adjustments remain constant.

Once the reservoir is mounted, connect a 1/4" O.D. poly tube from the reservoir to the liquid inlet port on the marker body. It is recommended that natural poly tube be used for the ink line so the presence of ink can be visually detected when the reservoir is filled.

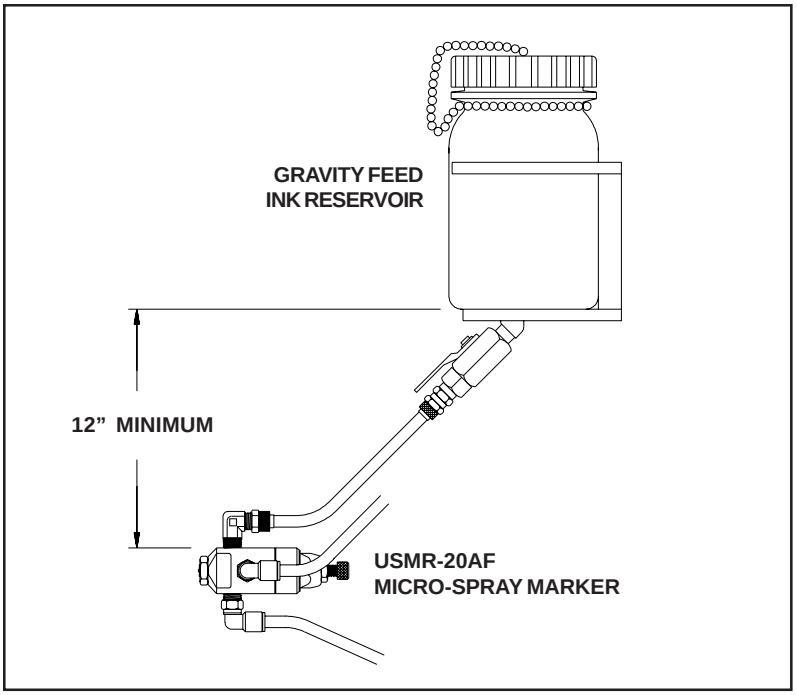


FIGURE 7

INSTALLATION

MULTIPLE RESERVOIR INSTALLATIONS

For applications requiring the use of multiple ink colors through a common Micro-Spray Marker, quick disconnect fittings are used to expedite ink color change-over as shown in Figure 8. A solvent reservoir is used to purge the marker clean before switching to a different ink color.

The USM-QCC-EPR1 quick disconnect female coupling body should be mounted as close as possible to the marker. This will reduce the amount of ink which must be purged out of the quick disconnect fitting, ink line and marker. USM-QCC-EPR2 quick disconnect male coupling inserts are attached to the ink feed tubes of each reservoir. Both the male and female quick disconnect fittings contain shut-off valves which will open when the two fittings are connected and close when they are taken apart.

When using pigmented inks, periodicaly purging the marker with solvent will remove accumulated pigment residue and clean the fluid chamber of the marker. If the marker is not to be used for more than 3 days, purging the marker with solvent will ensure trouble free start-ups .

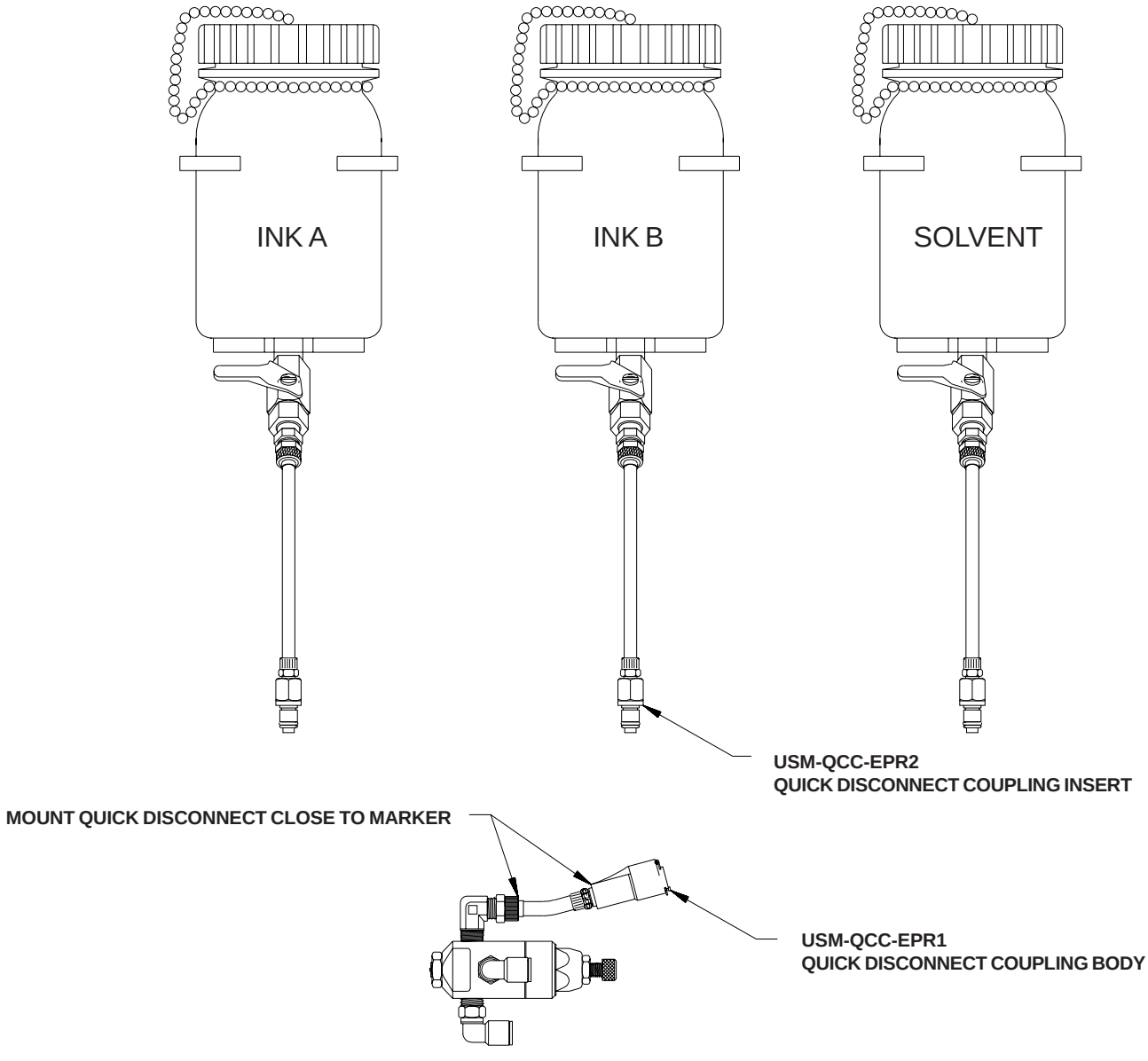


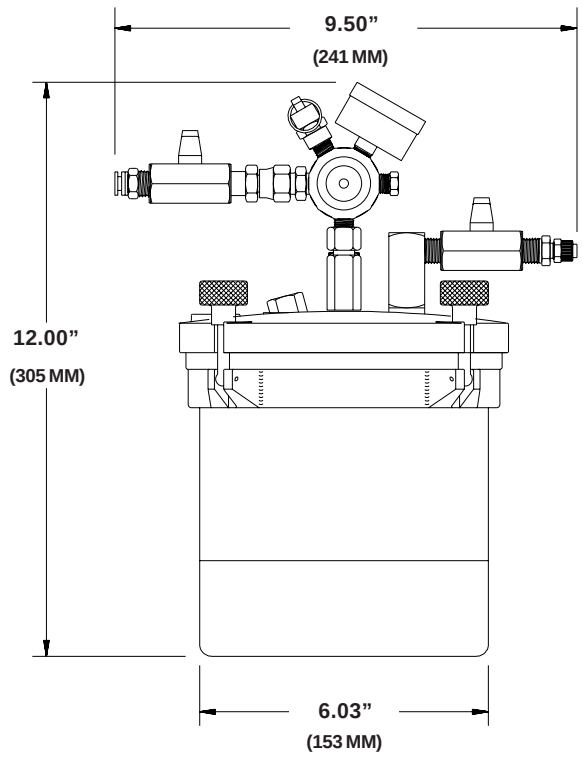
FIGURE 8

INSTALLATION

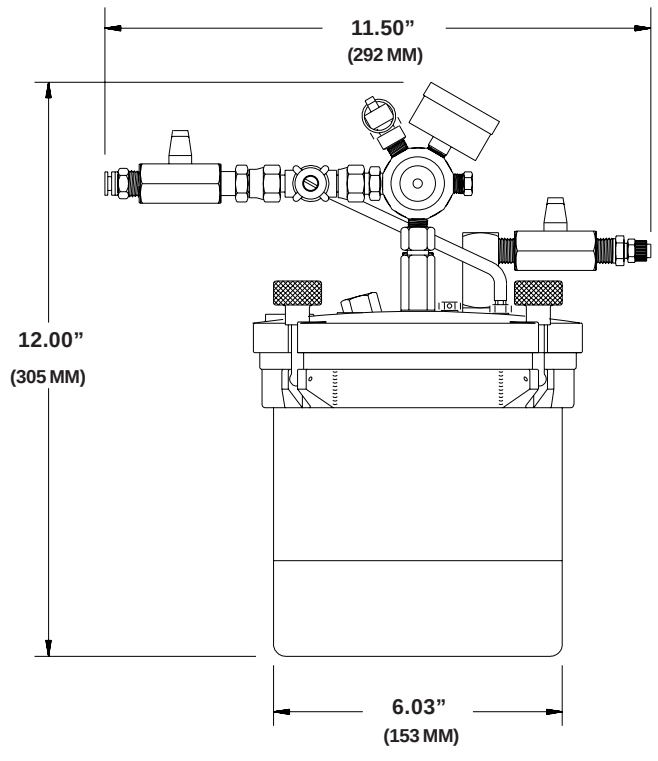
PRESSURE RESERVOIR

Universal's USM-80600 Pressure Reservoirs are used to increase the ink supply pressure to the USMR-20AF markers. Higher supply pressure allows more ink to flow into the atomizing air stream in a given time interval. The use of a pressure reservoir enables shorter duration triggering signals to be used and results in a faster reaction time for the marker. The pressure reservoirs are also recommended in applications requiring higher ink volume delivery. For most applications, tank pressure is set to 2-3 psi.

The USM-80600 is a 64oz. capacity unit complete with pressure regulator, gauge and disposable liner. The USM-80601 unit is similar to the USM-80600 but includes a pneumatically operated ink agitation system which keeps pigmented inks in uniform suspension during use. Disposable liners are available for both units.



USM-80600
64 OZS. PRESSURE RESERVOIR



USM-80601
64 OZS. PRESSURE RESERVOIR
WITH AGITATOR

FIGURE 9

INSTALLATION

INSTALLING THE PNEUMATIC CONTROLS

Micro-Spray Markers require a source of clean, dry compressed air for operation. A precision, low pressure regulator and gauge is required to supply 5 - 12 psi atomizing air to the marker and a standard pressure regulator and gauge is required for the 70-80 psi trigger air.

When installing the pneumatic control system, two connection options are available:

The most precise method of controlling the Marker operation requires the use of two electrical solenoid valves. One is used to control the cycle of the trigger air and one for the atomizing air. Operating these two valves in the proper sequence provides increased spot definition and faster shut off response of the marker. This can be a significant factor in high speed marking applications.

The markers can also be controlled with the use of only a single trigger air solenoid valve. In these installations, atomizing air is allowed to flow continuously. Although this option is somewhat less complicated, some control over the mark is sacrificed. When applying small spot marks on smooth non-porous surfaces, continuously flowing atomizing air can blow the wet ink outward from the center of the mark resulting in a larger, more poorly defined spot. Continuously flowing atomizing air can also blow a small mist of ink from residue accumulated around the marker orifice after the trigger air signal has been removed and the valve has closed.

Single and dual solenoid connections are shown in Figures10 and 11.

Note: In applications where both atomizing air and trigger air solenoids are being controlled by a common electrical signal, the exhaust port on the atomizing air solenoid should be plugged. This will cause the air to exhaust out through the marker nozzle and remove any residue ink accumulation.

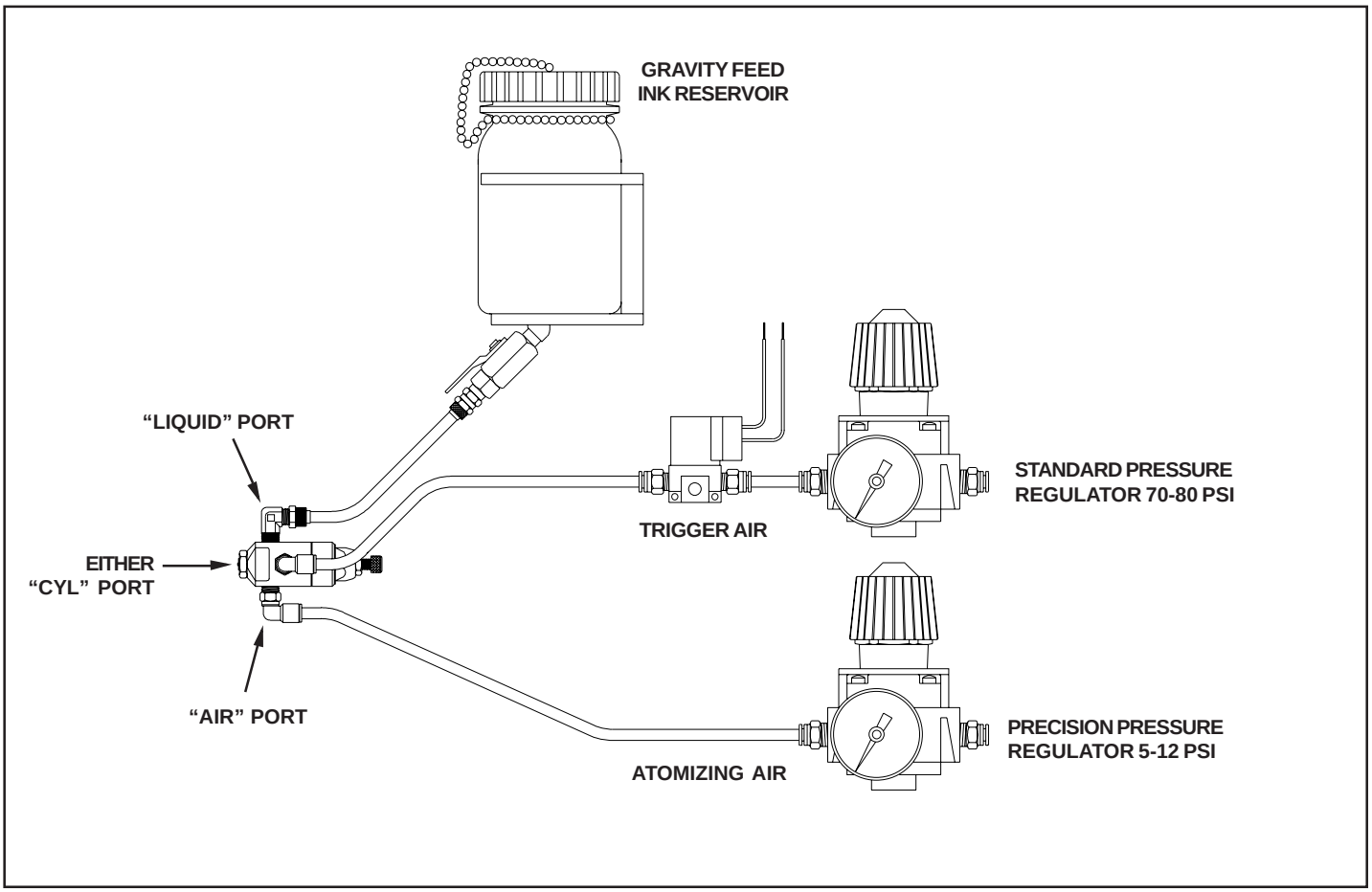


FIGURE 10

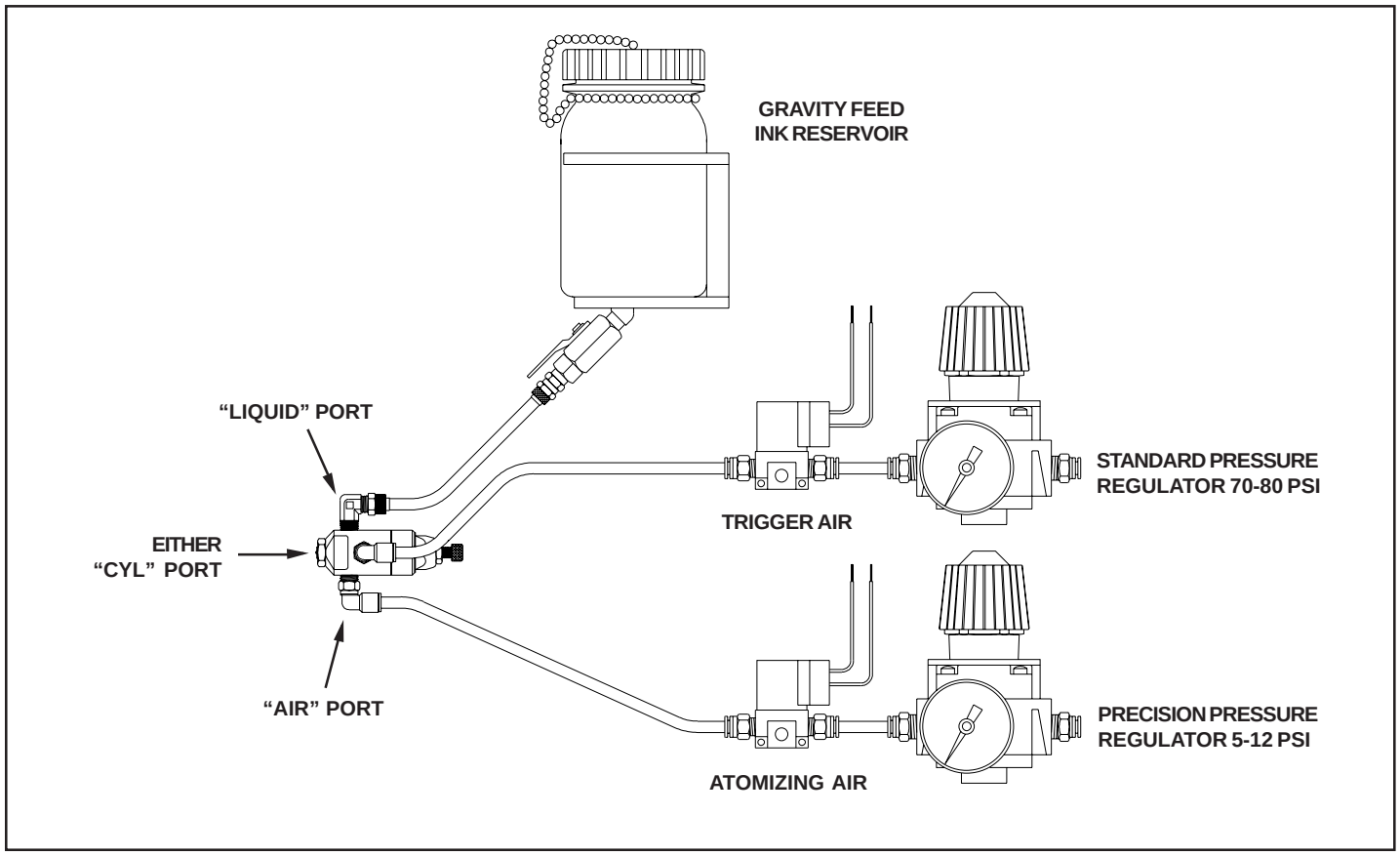


FIGURE 11

TRIGGER AIR

It should be noted that in operation, when an electrical signal is received by the 3-way solenoid, 70-80 psi compressed air is fed to the CYL trigger air port on the marker body. The trigger air signal exerts pressure on a piston in the marker body which in turn lifts the needle valve off it's seat. As soon as the needle valve is opened, ink begins to flow into the atomizing air stream and the marker begins to spray. When the solenoid is de-energized, the trigger air must be completely vented out of the marker through the exhaust port on the solenoid valve before the spring return mechanism can again seat the needle valve and stop the marker from spraying.

In order to ensure that the marker responds rapidly to these electrical signals, the length of tube from the electrical solenoid to the marker body should be kept at a minimum. Excessive line lengths hold a greater volume of compressed air and take longer to pressurize and vent thus slowing down the response of the marker to the electrical signals. It should also be noted that exhaust mufflers should not be used on the solenoids exhaust air port since these will also cause restriction in venting the trigger air and slow down the response time.

The 3-way electrical solenoids are available in a variety of coil voltages to match the requirements of the parent equipment being used. All compressed air connections are made using 1/4" o.d. poly tubing rated for at least 125 psi air pressure.

INSTALLATION

ATOMIZING AIR

If an atomizing air solenoid is not used, 5 - 12 psi atomizing air is fed directly from the precision regulator to the atomizing air port on the marker body. This allows the atomizing air to free flow through the marker which consumes very little compressed air due to the low pressure and small orifice size of the marker.

When an atomizing air solenoid is used, the length of tube used between the air port on the marker body and the solenoid should be made as short as possible. With lower pressures, it takes more time to pressurize the tube. Until the tube is fully pressurized, the atomizing air stream flowing from the air cap on the marker will not reach the desired flow rates.

ELECTRICAL CONTROL OF THE MARKER

After mounting all the components and making the ink line and air line connections, the only remaining step is to provide the electrical signals to the solenoids. Regardless of the connection method used, when cycling the marker to fire, it is critical that the atomizing air is flowing at full pressure before applying a trigger air signal. As soon as the trigger air solenoid is energized, ink is allowed to flow through the fluid cap in the marker. If atomizing air is not flowing properly when this occurs, the ink will not be completely atomized. Stripe marking and spot marking applications are addressed in the following sections.

STRIPE MARKING APPLICATIONS

In stripe marking applications, either a single or dual solenoid connection can be used. If a single trigger air solenoid is used, the duration of the electrical signal used to energize the solenoid controls the length of the line being applied. The marker will continue to spray as long as the trigger air solenoid remains energized.

When dual solenoids are used for stripe printing applications, the triggering sequence of the solenoids is applied in the same manner as in spot printing. The only difference is that the duration of the signals is adjusted according to the length of the stripe required and the product speed. The electrical signals in these applications are normally supplied by the controls of the parent equipment. It is recommended that you consult with a qualified electrician for connection advice.

For the best results in stripe marking applications, it is normally recommended that the marker be mounted at a 30-45 degree angle to the moving web or part as indicated in Figure 12. Mounting the marker at an angle to the web instead of perpendicular to the web, will result in sharper edge definition by minimizing the feathering of the spray pattern. If fired statically in this position, the marker produces an elliptical mark rather that a circular mark.

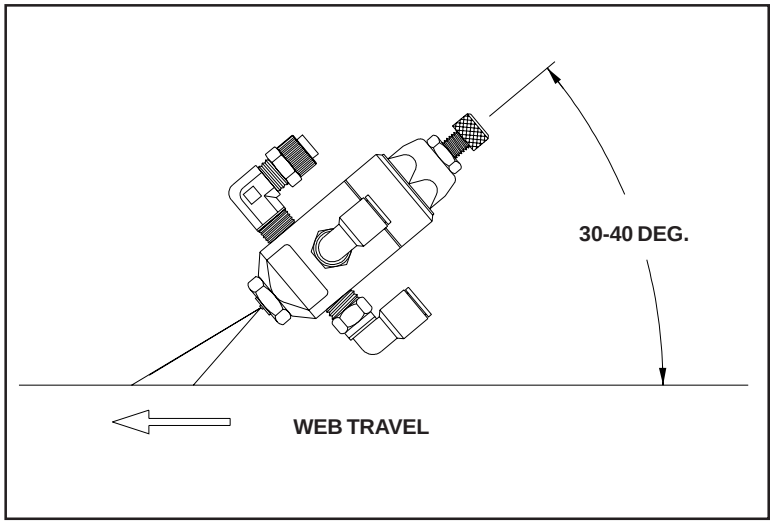


FIGURE 12

INSTALLATION

SPOT MARKING

One of the most common applications for the Micro-Spray Marker involves applying a small spot mark to a stationary or moving part to indicate acceptance or rejection after automated inspection. There are a number of ways to control the marker function for spot marking applications and some will produce better results than others. Typically, the most critical in terms of spot size and definition is acceptance marking where the mark remains on an accepted part and aesthetics are an issue. Regardless of how the marker is controlled, it is important to remember that the amount of ink being applied when spot marking is a function of both the duration of the triggering signal and the adjustment of the fluid control knob.

It is important to note that when applying spot marks to fast moving products, a 100 millisecond spray duration may result in a short line mark and not a round spot. As a general guideline, the spot will be elongated by an amount equal to the distance the product travels in 1/10 of a second. For example, if the product is traveling at 60 feet per minute (12 inches per second), the spot would be elongated to a line of approximately 1.2 inches in length.

CONTROLLING THE MARKER WITH A PLC

THE RECOMMENDED CONTROL SYSTEM FOR CRITICAL APPLICATION

The ideal way to control the function of the marker is by using a PLC (Programmable Logic Controller) with two available outputs. In spot marking applications, both the atomizing air solenoid and the trigger air solenoid are cycled in a specific sequence to provide the optimal spot pattern. The electrical signal provided by the PLC must naturally match the coil voltage of the solenoid used. Universal offers 3-Way Solenoid Valves with a variety of coil voltages in both AC and DC versions for this reason.

When a PLC is used to control the marker, the atomizing air solenoid should be energized first to allow time for the low pressure atomizing air to flow at full volume through the air cap on the marker. The amount of time for this to occur depends somewhat on the length of the connecting tubes but typically 50 - 100 milliseconds is an adequate delay before energizing the trigger air solenoid. The trigger air solenoid is then energized for approximately 100 milliseconds. When trigger air pressure reaches the marker CYL port, a piston lifts the needle off its seat and allows ink to flow into the atomizing air stream. After the trigger air solenoid is de-energized, the atomizing air should be allowed to continue flowing for another 50 - 100 milliseconds to ensure all ink residue is blown off the face of the orifice. A typical pulse sequence is shown in Figure 13.

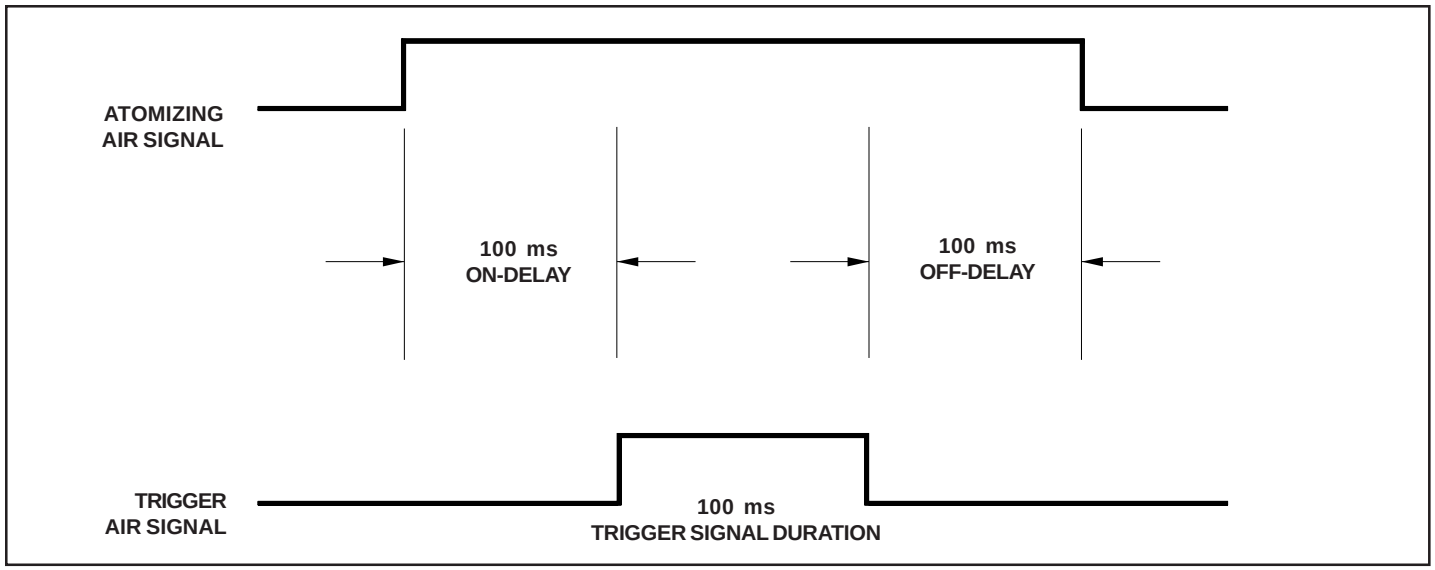


FIGURE 13

INSTALLATION

CONTROLLING THE MARKER WITH A ONE-SHOT TIMER

In installations where a PLC Control is not available, an inexpensive modular One-Shot Timer can be used to provide the required 100 millisecond duration signal to the trigger air solenoid each time the marker is to be fired. In a single solenoid installation, a One-Shot Timer can be connected as shown in Figure 14.

A One-Shot Timer can also be used in dual solenoid installations by wiring the two solenoids in parallel. This configuration will activate both solenoids simultaneously rather than in the optimal pulse sequence but will prevent atomizing air from flowing continuously. Please see the spray pattern examples on page 18 for additional details.

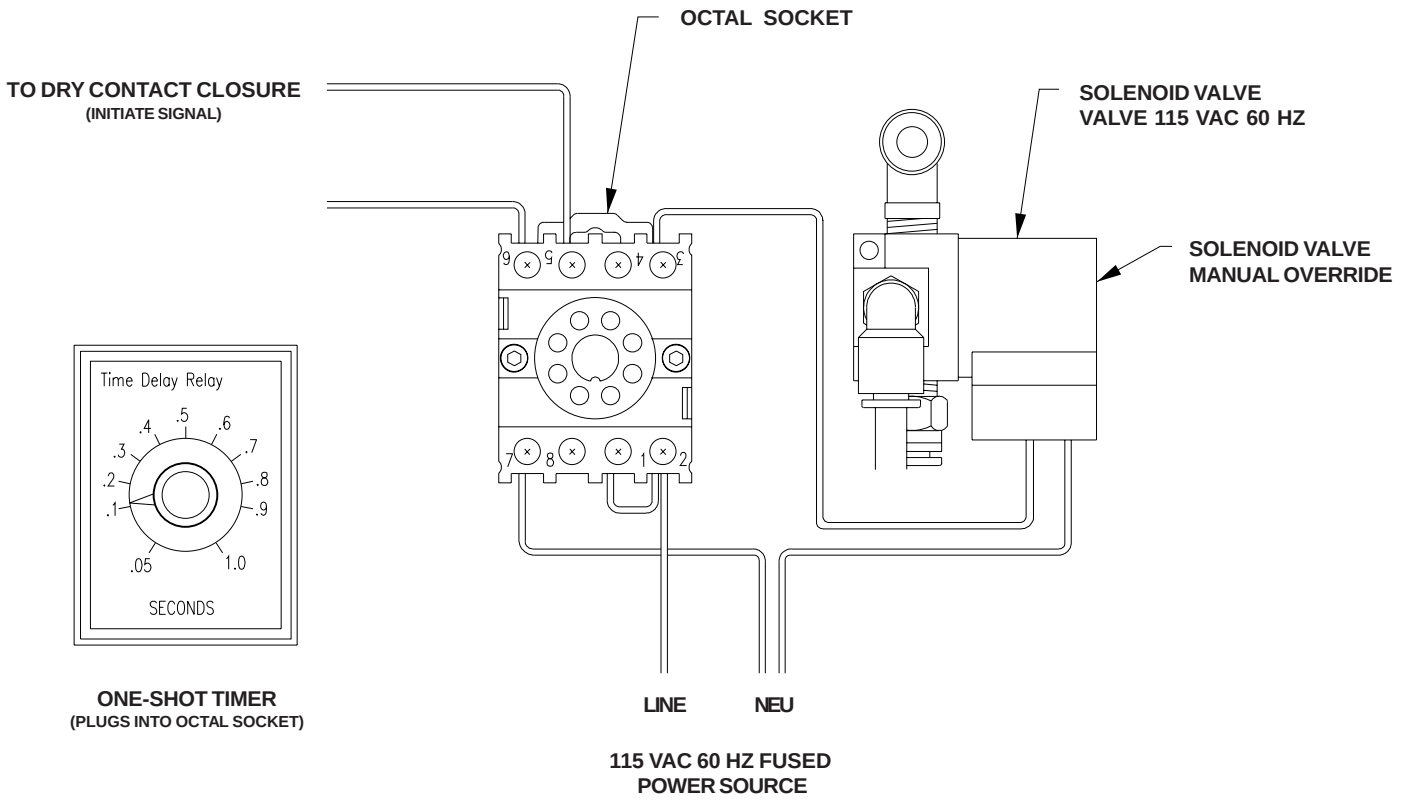


FIGURE 14

Electronic One-Shot Timers accept a dry contact closure initiate signal from a device such as a micro switch, control relay, or photo eye. The initiate signal can be a momentary or a maintained contact closure. As soon as the One-Shot Timer receives the initiate signal, it fires an adjustable duration electrical pulse to the connected solenoid or solenoids. An adjustment knob on the top of the timer allows the timer to be set from .05 - 1 second output duration. The adjustment knob is normally set to .1 seconds (100 milliseconds) for a spot marking application. After sending an output signal to the solenoid, the contacts in the micro switch, control relay, or photo eye must be opened before the One-Shot Timer will reset and be ready to accept another initiate signal.

OPERATION

After all tubing and electrical connections have been made, adjust the air pressure regulators to the required pressures; 5-12 psi for the atomizing air and 70-80 psi for the trigger air.

Fill the ink reservoir with the desired ink and open the manual valve at the bottom of the reservoir. Please note that when using pigmented inks it is best to fill the reservoir with only enough ink to last for 1-2 days maximum since all pigmented inks will separate after sitting for long periods.

It is normally necessary to purge the air from the ink supply line by either sending a continuous electrical signal to the solenoids or pressing the manual override buttons on the solenoids until ink begins to spray from the marker nozzle. This process can be accelerated by adjusting the fluid adjusting screw to allow the maximum flow rate through the marker. Once ink begins to spray from the marker nozzle, the system is ready for final adjustment.

ADJUSTING THE FLUID ADJUSTING SCREW

The fluid adjusting screw is used to regulate the amount of ink flowing into the atomizing air stream during the marking cycle. This is accomplished by limiting the stoke of the control piston which is attached to the valve needle. The more the piston is allowed to move, the greater the valve opening, thus increasing the ink flow rates.

1- To adjust the fluid adjusting screw , use a 7/16" wrench and loosen the lock nut on the rear of the marker body by turning it counter-clockwise as shown in Figure 15.

2- Turn the fluid adjusting screw in a clockwise direction (Figure 16) until it stops. At this point, the screw is touching the rear of the valve control piston and will prevent the valve from opening.

3- Turn the fluid adjusting screw in the counter-clockwise direction in 1/4 turn increments, test firing between each adjustment until ink begins to spray.

4- To fine tune the flow rates, turn the fluid adjusting screw in extremely small increments, 5 - 10 degrees at a time.

5- When the desired flow rate is reached, tighten the lock nut slightly to prevent movement of the fluid adjusting screw.

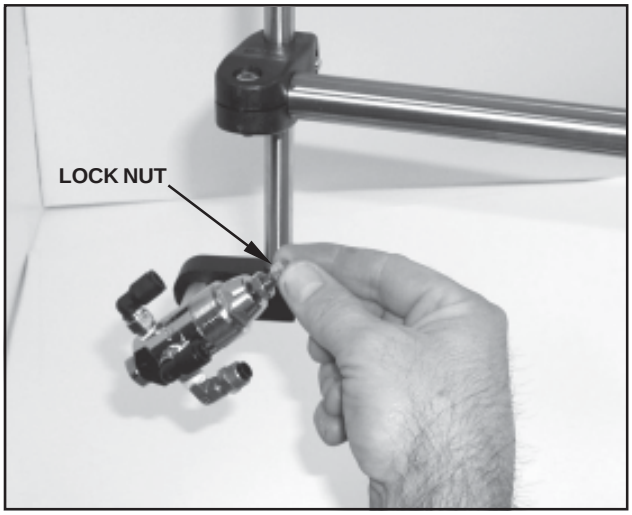


FIGURE 15

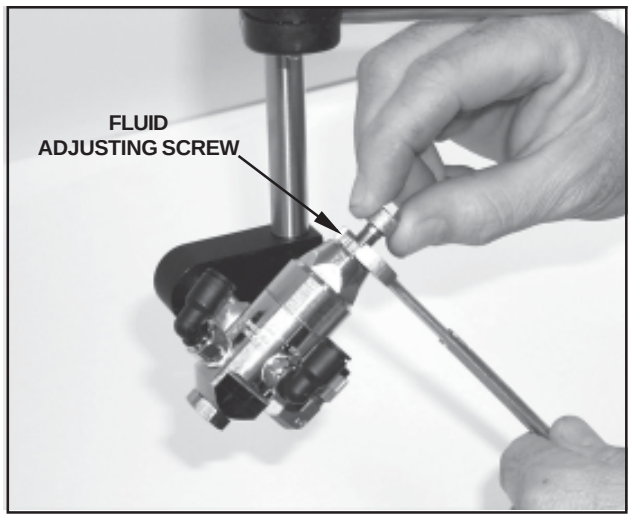


FIGURE 16

TROUBLESHOOTING

Failure of the marker to operate when first installed can be caused by several factors. Check each item and make adjustments as necessary.

INSUFFICIENT NEEDLE VALVE OPENING

On the USMR-20AF models, the fluid adjusting screw physically limits the travel of the piston which is connected to the valve needle. If the fluid adjusting screw is in too far, the needle valve will not open up enough to allow ink to flow into the atomizing air stream when the marker is fired. To test for this problem, loosen the locknut on the adjusting screw and turn the adjusting screw counter-clockwise 4-5 turns and test the marker again. If the marker fires, fine tune the fluid adjusting screw setting by adjusting it in small increments. You should note restricting the opening of the needle valve too much may also cause intermittent spray problems.

INSUFFICIENT TRIGGER AIR PRESSURE

The packing glands in new markers can be somewhat tight around the needle. If the marker fails to fire, increase the trigger air pressure slightly and test fire the marker again. If this solves the problem, leave the trigger air pressure at a higher setting until the marker has been used enough for the packing glands to wear in.

INSUFFICIENT TRIGGER SIGNAL DURATION

If you are using a One-Shot Timer, turn the adjusting knob on top of the timer to the 1 second position. Test fire the marker again. If the marker sprays, readjust the timer to the .1 (100 millisecond) position. It is not recommended to use settings below the .1 position on One-Shot Timers.

TRIGGER AIR SOLENOID MALFUNCTION

If you are using a One-Shot Timer on your system, it is very difficult to check the trigger signal voltage with a meter since the duration of the signal is very short. The easiest way to check the function of the solenoid is to depress the recessed override button on the end of the solenoid. The override button shifts the spool in the solenoid and feeds trigger air to the marker. If the marker begins to spray when this button is depressed, either the coil on the solenoid is faulty or the duration of the triggering signal is not adequate to operate the marker.

INK SUPPLY PROBLEM

Although the gravity feed reservoirs are very simple devices, air bubbles in the ink supply tube running from the reservoir to the marker can cause the marker to misfire. Check the ink line tubing for air bubbles and purge the lines as necessary. Purging the ink supply tubing can be accomplished by either feeding a continuous voltage signal to the trigger air solenoid or by depressing and holding the manual override button on the solenoid and allowing the marker to spray until the ink supply tube has been purged.

Although it is not recommended to fill the reservoir with more than a one or two day supply of ink, allowing the ink reservoir to become empty can cause air bubbles to enter the ink supply tube. Keep at least a 1" level of ink in the reservoir at all times to prevent air from entering the ink supply tube.

TROUBLESHOOTING

CLOGGING PROBLEMS

The USMR-20AF series markers have a stainless steel cleanout needle which cleans the spray orifice on every marking cycle. This feature eliminates the possibility of ink residue or other particulate matter from clogging the spray orifice. Clogging problems can occur however, in two other areas of the marker.

1- If dust or other contaminates accumulate on the face of the marker orifice, this can block the orifice and although it usually does not completely disable the marker, it can cause serious degradation of the spray pattern. Check the face of the marker orifice for dust or other contaminates. Use a soft cloth saturated with ink solvent and gently dab the area being careful not to bend the tip of the cleanout needle which protrudes slightly from the orifice.

2- The second possible cause of clogging is either contaminates in the ink reservoir which have entered the marker body or a heavy concentration of pigment which has accumulated in the ink supply tube or the ink passages in the marker body leading to the fluid chamber. Although the USMR-20AF markers are designed to use low viscosity pigmented inks, improper use of pigmented inks can cause clogging problems.

It is important to understand that pigments are ground solids which are dispersed in solvent. When pigmented inks remain unagitated in any container for prolonged periods of time, the pigments will settle to the bottom of the container. If excessive amounts of pigmented inks are poured into the USM-GFR reservoir and it is not agitated in some manner, the pigments will settle to the bottom where the ink feed tube is connected. Given adequate time, the settled pigments will become as thick as paste and can cause clogging of the reservoir valve, ink supply tube and the small passages in the marker body. If this is allowed to occur, the only solution is to empty and clean the reservoir, replace the ink supply tube and disassemble and clean the marker.

It is highly recommended that whenever pigmented inks are used in a USMR-20AF marking system, the supply container should be vigorously shaken before the ink is poured into the USM-GFR reservoir. It is extremely important that only enough ink for one or two days of marking is added to the reservoir at a time. When more ink is needed, vigorously shake up the supply container and add another one or two days supply of ink. Keep in mind that these markers use very small quantities of ink in spot marking applications so a one or two day supply may only be a few ounces.

USM-GFR ink reservoirs have a small vent hole in the cap and should not ever be shaken. However, it certainly does not hurt to carefully remove the reservoir bottle from its bracket and gently swirl the ink in the reservoir. This will help to prevent pigment settling and may eliminate potential clogging problems.

Note: Dye base inks contain no solid particles and are not adversely affected by sitting for prolonged periods of time without agitation.

TROUBLESHOOTING

SPOT DEFINITION

Although the Micro-Spray Markers are precision devices, they are not designed to compete with high resolution contact printers. They are typically used for acceptance/rejection marking where a color coded spot mark is required for quick visual identification. The following photos are enlarged somewhat for clarity.

The spot mark shown in Figure 17 is a typical 1/4" diameter spot mark produced by the USMR-20AF Micro-Spray Marker. Although spots produced by these markers will be reasonably consistent in size, they will not be perfectly symmetrical round spots. Slight feathering around the solid spot is normal and will be fairly proportionate to the spot diameter.

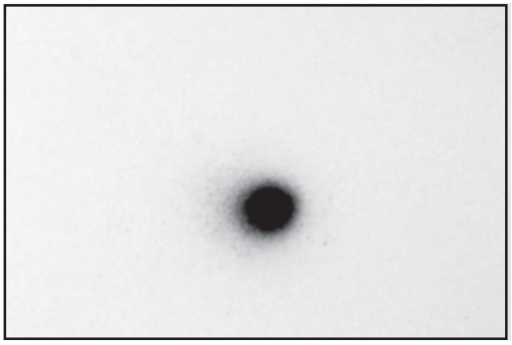


FIGURE 17

The spot mark shown in Figure 18 shows the affect of close proximity marking with non-solenoid controlled atomizing air. Atomizing air blowing at higher pressures in close proximity to a slick part surface will cause the wet ink to be blown outward from the solid center of the spot. This effect can be minimized or completely eliminated by adding a solenoid to the atomizing air line and turning atomizing air off immediately after the trigger air solenoid is de-energized.

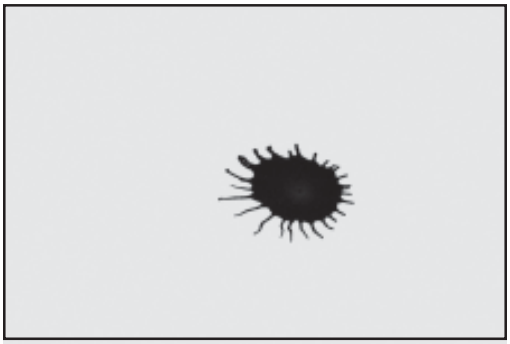


FIGURE 18

The spot mark shown in Figure 19 shows the affect of controlling both a trigger air and an atomizing air solenoid with the same electrical signal. As the needle moves forward to close the valve, ink residue which remains in the orifice is pushed out. In the absence of atomizing air, the residual ink hits the part in large droplets rather than a fine mist. One generally effective corrective action is to plug the exhaust port on the atomizing air solenoid which forces all the compressed air in the tube to vent through the air cap on the marker. This keeps atomizing air flowing for a short duration after the solenoids are de-energized.

FIGURE 19

The spot mark shown in Figure 20 shows the affect of continuously flowing (non-solenoid controlled), higher pressure atomizing air when the part is moved immediately after the trigger air solenoid is de-energized. The valve has closed but the small amount of residual ink in the orifice is being sucked into the atomizing air stream leaving a faint trail during product movement. Reducing atomizing air pressure will normally eliminate this problem but controlling the atomizing air with a solenoid is the best solution.

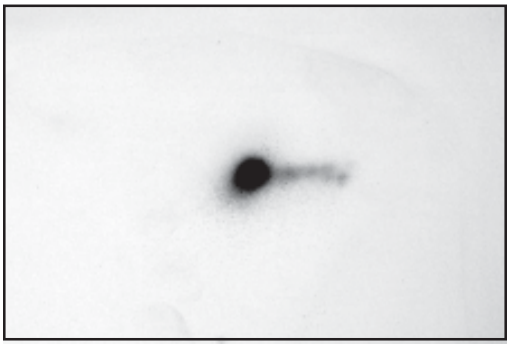


FIGURE 20

MAINTENANCE

DISASSEMBLING THE MARKER

Before attempting to disassemble any Micro-Spray Marker, first turn off the valve on the ink supply reservoir and disconnect the marker from the ink supply tube, the trigger air tube and the atomizing air tube.

1- Grip the milled flat section on the front end of the marker with an adjustable wrench and the 3/4" milled hex on the back end of the marker body with another. Turn the back end counter-clockwise to loosen the two marker halves. Once loosened, the back half can be unscrewed by hand.

Hold the components tightly during this process and be prepared for the piston compression spring to push the two halves apart as soon as the threads are disengaged.

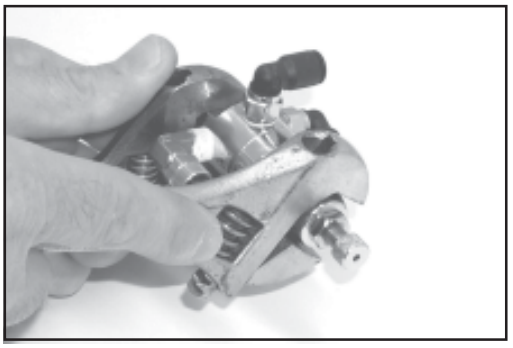


FIGURE 21

2- Grip the piston/needle assembly and carefully pull the needle straight out of the marker.

Note: The tip of the needle is very fragile and extreme care should be exercised not to bend the tip during disassembly and handling.

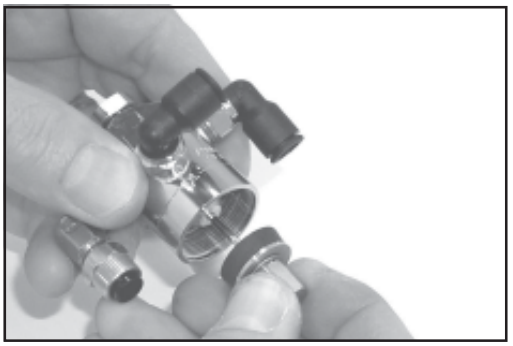


FIGURE 22

3 - Grip the milled flat section on the front end of the marker with an adjustable wrench and the hex retainer cap with a 9/16" box end wrench. Turn the hex retainer cap in a counter-clockwise direction to loosen.

FIGURE 23

4 - Hold the marker in a vertical orientation and carefully unscrew the hex retainer cap the rest of the way by hand.

Note: Hold the marker close to the bench top during removal. The fluid cap & air cap will be loose and may fall out of the marker body when the hex retainer cap is removed.

FIGURE 24

5- Pull the fluid cap and air cap out of the hex retainer cap.

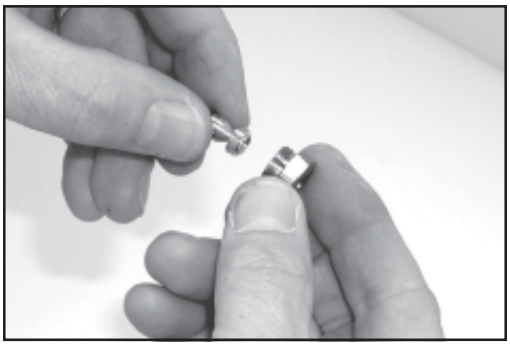


FIGURE 25

6- Separate the fluid cap and air cap and you should now have the marker broken down into separate parts.

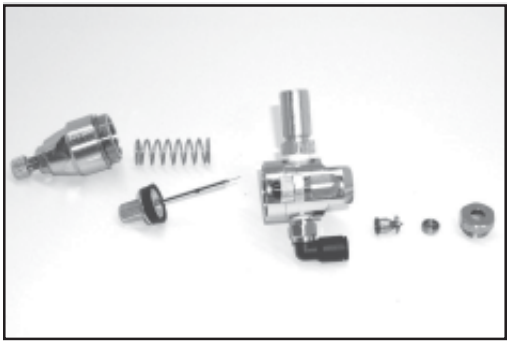


FIGURE 26

7- To remove the 2 quad rings and quad ring retainer, you will have to remove the packing screw and the lock washer.

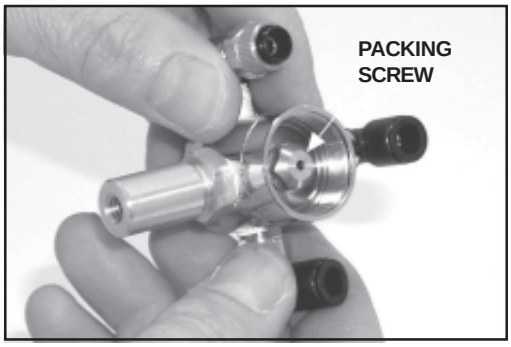


FIGURE 27

8- Using a 3/8” socket wrench, turn the packing srew in a counter-clockwise direction until loose. Grip the packing screw by hand and continue to unscrew until it comes free from the marker body.

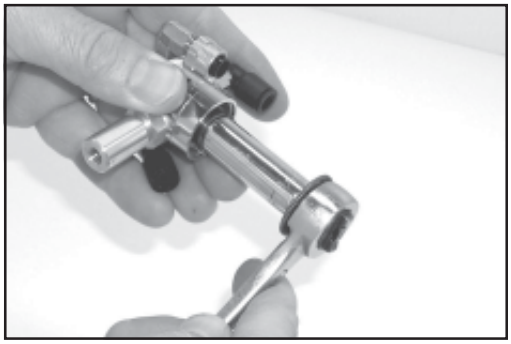


FIGURE 28

9- One of the quad rings will remain in the packing screw and the quad retainer should fall free from the marker body when inverted. The second quad ring will remain in the front half of the marker body.

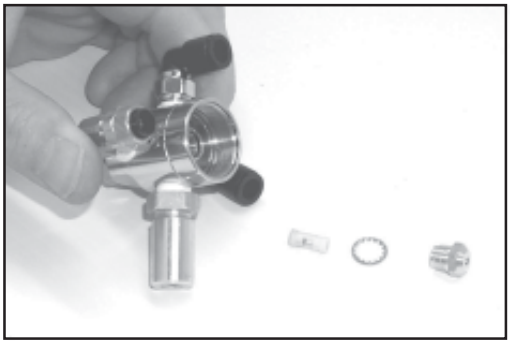


FIGURE 29

10- To remove the quad ring in the packing screw, it is best to use the blunt end of a #46 drill bit which is the perfect diameter for this process. If one is not available, the needle can be used but extreme care must be exercised to avoid bending the fragile tip.

Push the blunt end of the drill bit or the needle tip through the hole in the hex end of the packing screw. It may take several attempts if you are using the needle and pushing at a slight angle will help.

FIGURE 30

11- The quad ring in the front half of the marker body can be removed in the same manner using the blunt end of the #46 drill bit or the needle.

Push the needle through from the front end of the marker towards the threaded hole where the packing screw was removed. Again, this may take several attempts and pushing at a slight angle will help.

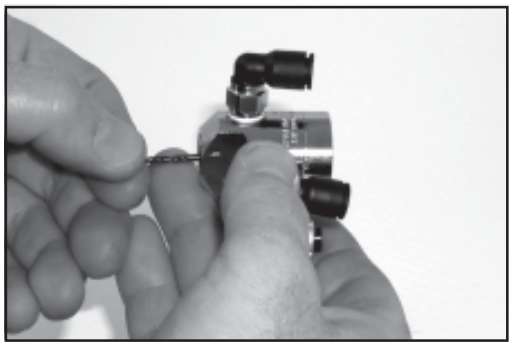


FIGURE 31

12- To remove the needle from the piston assembly, carefully insert the needle into the end of the piston assembly tool (USMR-PAT) with the small hole. See figure 32.

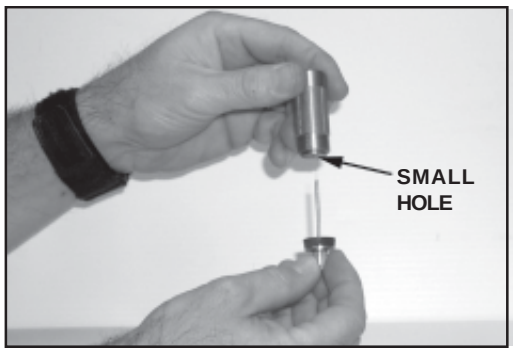


FIGURE 32

12- Ensure tool tab is fully seated in the slot on the cap nut washer. Using a 5/16" hex wrench or adjustable wrench, turn the cap nut counter-clockwise to loosen. If a piston assembly tool is not available, carefully and gently grip the cap nut washer (the brass washer closest to the hex cap nut) with a pair of pliers. Do not exert too much pressure on the cap nut washer or piston nut or they may become damaged.

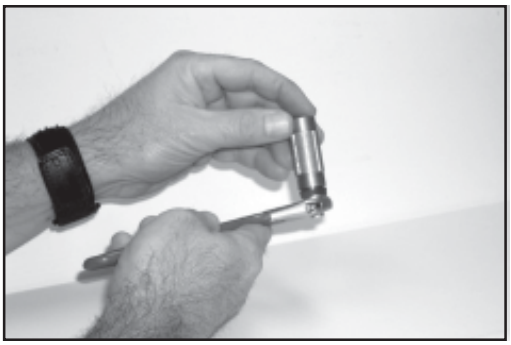


FIGURE 33

13- While holding the piston assembly in a vertical orientation, unscrew the cap nut the rest of the way by hand.

FIGURE 34

14- The needle can now be pulled straight out of the piston body.

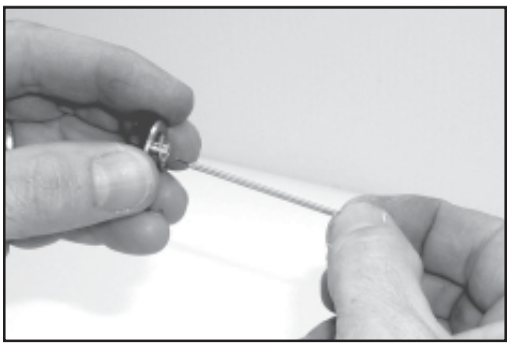


FIGURE 35

MAINTENANCE

MARKER RE-ASSEMBLY

Reassemble the Micro-Spray Marker in the reverse order of the disassemble. If the fluid adjusting screw was removed during disassembly, install it last to prevent damage to the needle and/or fluid cap when the marker body halves are reassembled. Also ensure that the copper gasket, Key #6 page 27, is reinstalled if removed during disassembly.

CLEANING THE MARKER

For a thorough cleaning, the marker should be completely disassembled including the removal of the air and fluid tube connecting elbows. Clean all ink residue from the marker body and the component parts using the appropriate ink solvent. Pay particular attention to the internal cavities in the marker body and the male compression elbow fitting. The metal components should be soaked in solvent to dissolve ink residue and a cotton swab may be useful in cleaning the internal cavities. Do not use any sharp objects to scrape ink residue from the metal components or you may scratch critical sealing surfaces.

For particularly stubborn areas, after cleaning in solvent, an ultrasonic cleaner can be used with a mild solution of detergent and water. All parts should be free from ink contamination and dry before seal replacement and/or reassembly.

Apply teflon thread sealing tape to the threads of the air and fluid elbows before reassembly.

MAINTENANCE

SEAL REPLACEMENT

1- Replace the fluid cap o-ring by rolling it off the back end of the fluid cap. Be sure the fluid cap is free of contaminates and ink residue before installing a new o-ring.

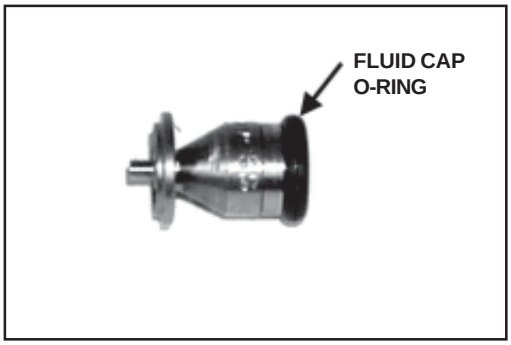


FIGURE 36

2- To install a new quad ring in the front end of the marker body, carefully center the quad ring over the center hole in the marker body.

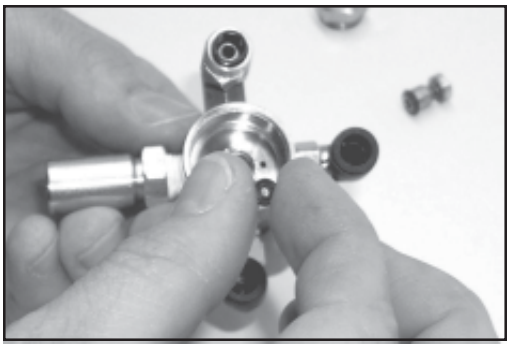


FIGURE 37

3- Use a blunt end metal rod (slightly smaller than the O.D. of the quad ring) to push the ring to the bottom of the hole. The blunt end of a 3/16" diameter drill bit works nicely.

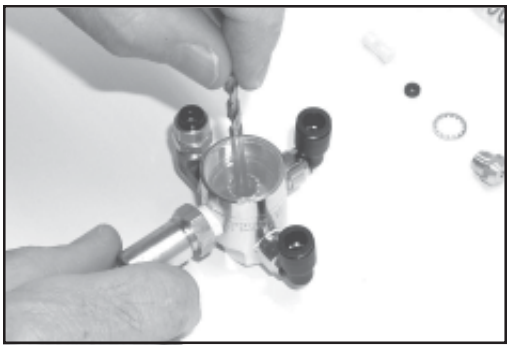


FIGURE 38

4- To install a new quad ring in the packing screw, carefully center the quad ring over the large hole on the threaded end of the packing screw.

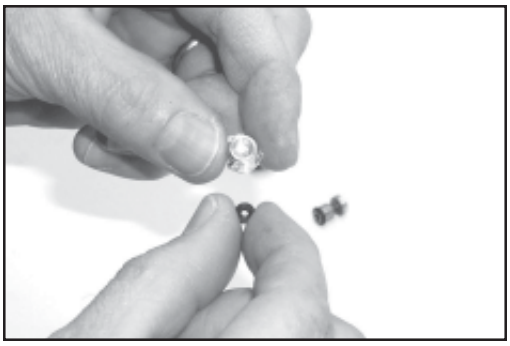


FIGURE 39

5- Use a blunt end metal rod (slightly smaller than the O.D. of the quad ring) or a 3/16" diameter drill bit to push the ring to the bottom of the hole.

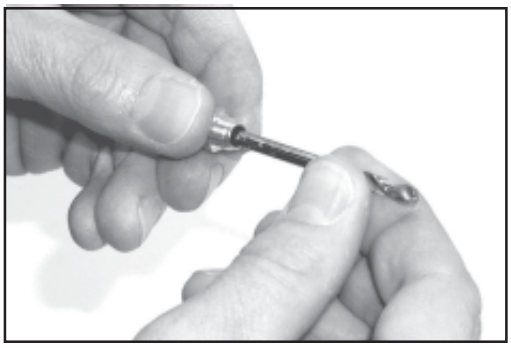


FIGURE 40

6- Insert the quad retainer into the hole in the packing screw. Part of the retainer will still protrude out of the threaded end of the packing screw when it is fully seated.

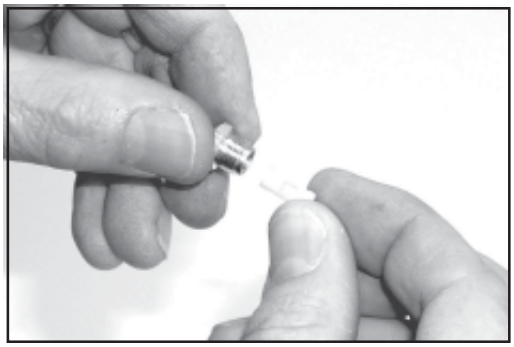


FIGURE 41

7- Install the lock washer over the threaded end of the packing screw.

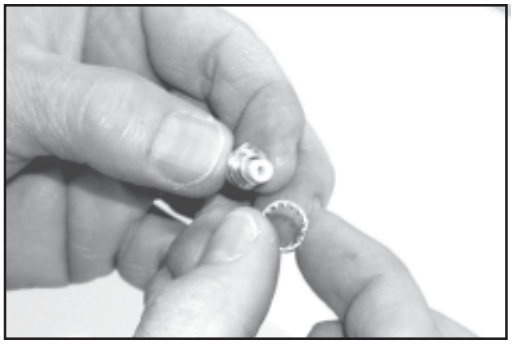
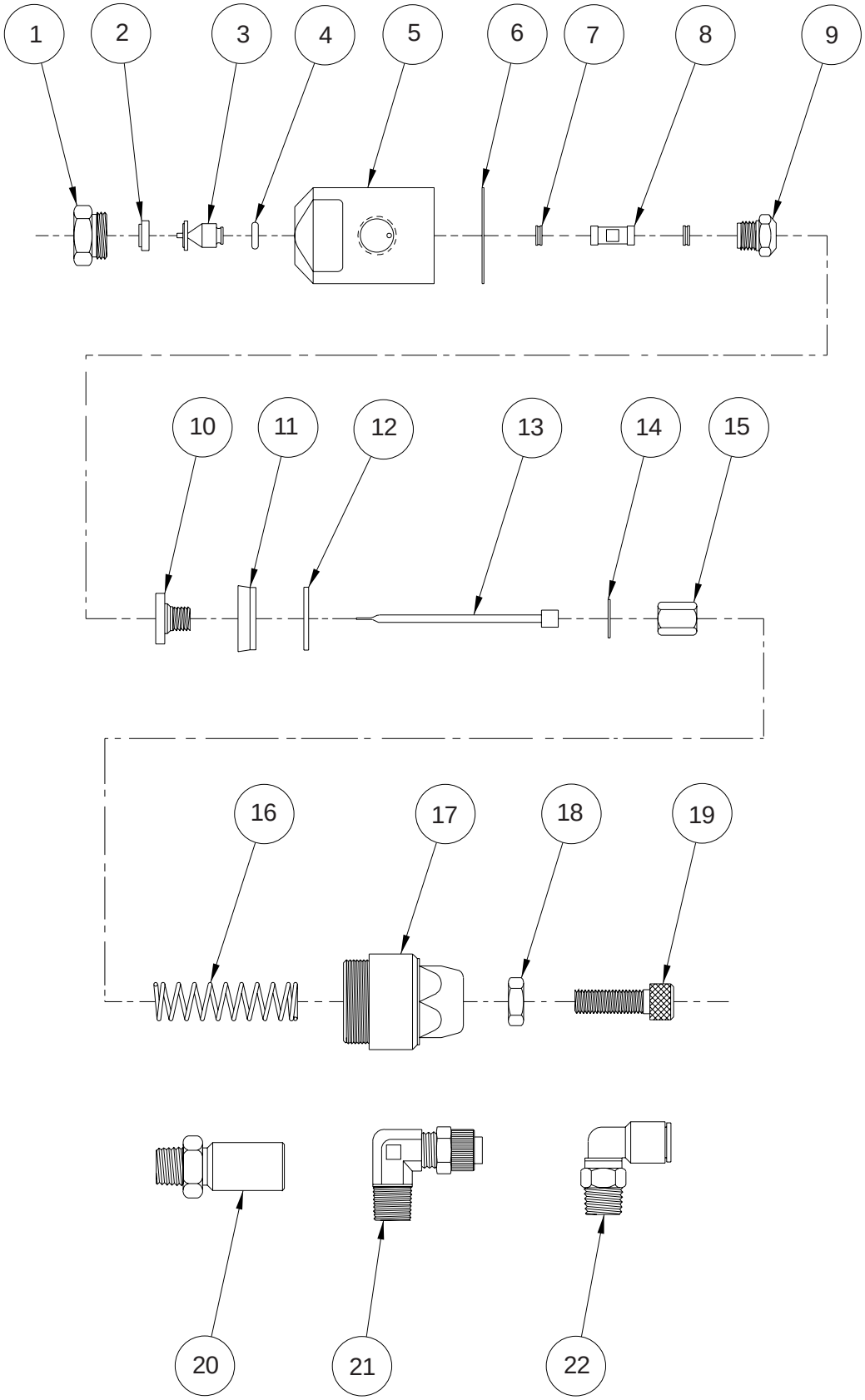


FIGURE 42

8- Thread the packing screw into the marker body and lightly tighten with a 3/8" socket wrench. Do not over torque this screw or you may damage the threads.

FIGURE 43

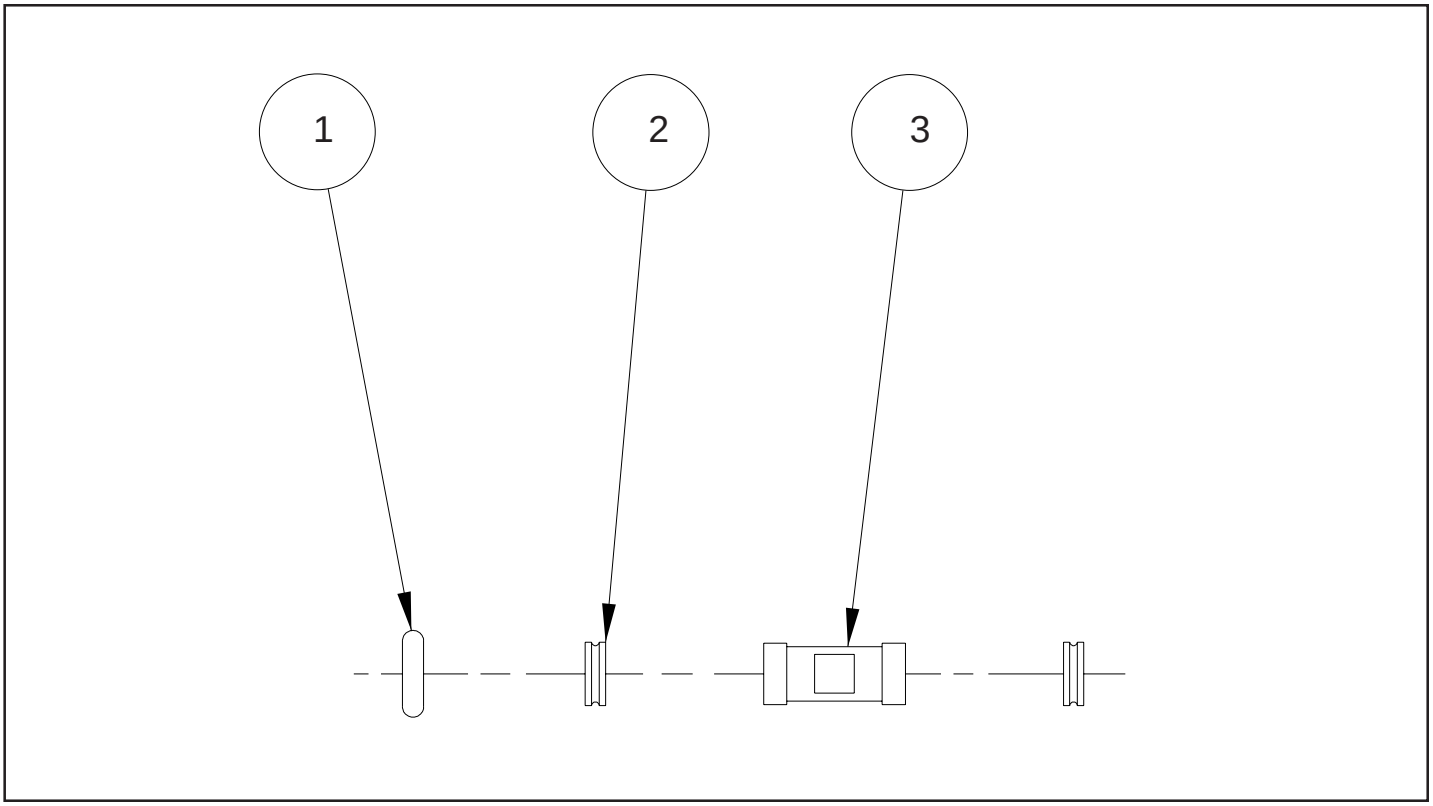
USMR-20AF MICRO-SPRAY MARKER



USMR-20AF MICRO-SPRAY MARKER

KEY NO.	PART NUMBER	QTY. REQD.	DESCRIPTION
1	USMR-001	1	HEX RETAINER CAP
2	USMR-014	1	AIR CAP
3	USMR-015	1	FLUID CAP
4	USMR-017	1	EPR “O” RING, FLUID CAP (STANDARD)
	USMR-017-VI		VITON “O” RING, FLUID CAP (SPECIAL)
5	USMR-024	1	BODY
6	USMR-012	1	GASKET
7	USMR-002-EPR	2	QUAD RING, EPR (STANDARD)
	USMR-002		QUAD RING, VITON (SPECIAL)
8	USMR-003	1	QUAD RING RETAINER
9	USMR-005	1	PACKING SCREW
10	USMR-006	1	PISTON BODY
11	USMR-007	1	PISTON CUP
12	USMR-008	1	CAP NUT WASHER
13	USMR-016	1	CLEAN-OUT NEEDLE, 0.020”
14	USMR-009	1	LOCK WASHER, REAR
15	USMR-010	1	CAP NUT
16	USMR-011	1	SHUT-OFF SPRING
17	USMR-021	1	ADJUSTABLE CAP
18	USMR-022	1	LOCK NUT
19	USMR-023	1	FLUID ADJUSTING SCREW
20	USMR-018	1	MOUNTING SHAFT
21	MRM-PC-08	1	MALE COMPRESSION ELBOW, LIQUID INLET
22	USMR-019	2	MALE PUSH-ON ELBOW

USMR-SRK SEAL REPAIR KIT



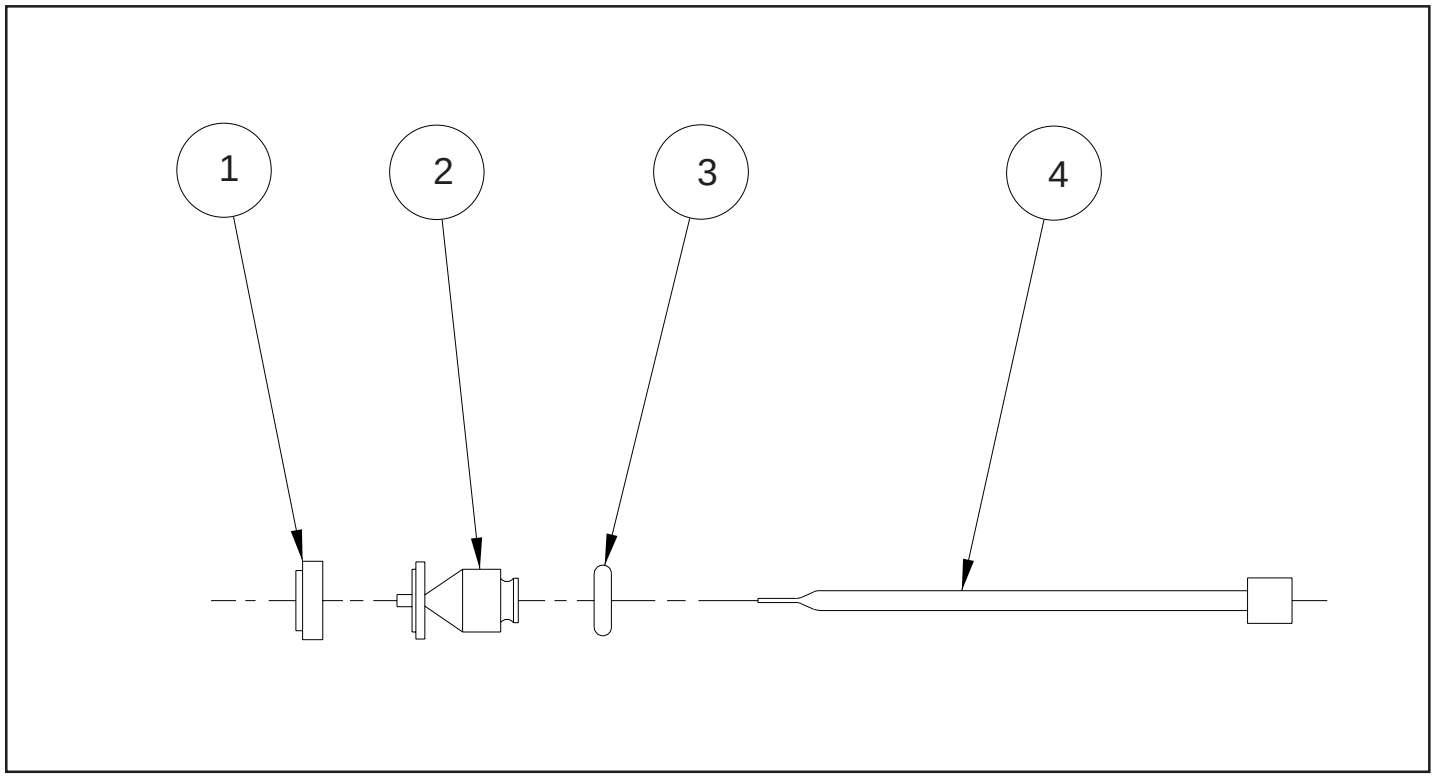
USMR-SRK EPR SEAL REPAIR KIT - STANDARD

KEY NO.	PART NUMBER	QTY. REQD.	DESCRIPTION
1	USMR-017	1	EPR “O” RING, FLUID CAP (STANDARD)
2	USMR-002-EPR	2	QUAD RING, EPR (STANDARD)
3	USMR-003	1	QUAD RING RETAINER

USMR-SRK-VI VITON SEAL REPAIR KIT - SPECIAL

KEY NO.	PART NUMBER	QTY. REQD.	DESCRIPTION
1	USMR-017-VI	1	VITON “O” RING, FLUID CAP (SPECIAL)
2	USMR-002	2	QUAD RING, VITON (SPECIAL)
3	USMR-003	1	QUAD RING RETAINER

USMR-PRK PARTS REPAIR KIT



USMR-PRK EPR PARTS REPAIR KIT - STANDARD			
KEY NO.	PART NUMBER	QTY. REQD.	DESCRIPTION
1	USMR-014	1	AIR CAP
2	USMR-015	1	FLUID CAP
3	USMR-017	1	EPR “O” RING, FLUID CAP (STANDARD)
4	USMR-016	1	CLEAN-OUT NEEDLE, 0.020”

USMR-PRK-VI VITON PARTS REPAIR KIT - SPECIAL			
KEY NO.	PART NUMBER	QTY. REQD.	DESCRIPTION
1	USMR-014	1	AIR CAP
2	USMR-015	1	FLUID CAP
3	USMR-017-VI	1	VITON “O” RING, FLUID CAP (SPECIAL)
4	USMR-016	1	CLEAN-OUT NEEDLE, 0.020”