



4270 Hollywood Road ■ St. Joseph ■ MI 49085
Toll Free 866-665-5463 ■ 269-429-3000 ■ Fax 269-429-3700
www.k-linena.com ■ info@k-linena.com

INSTALLATION/OPERATION MANUAL

*MANUAL INCLUDES INSTALLATION
STEPS AND TIPS, A QUICK REFERENCE
OUTLINE, A PARTS IDENTIFICATION GUIDE,
AND WINTERIZATION AND TROUBLE
SHOOTING GUIDE*

Contents

Part One

Quick Reference Outline

- Page 3 A. Review of Engineering Plan
- B. Marking and Flagging the Field
- C. K-Line Tubing Layout
- D. Sprinkler/Pod Placement
- Page 4 E. Tapping Saddle Installation
- F. K-Line NAAN Impact Sprinklers
- G. K-Line Nelson R2000WF Windfighter Sprinklers
- H. Windfighter Pressure Compensated Sprinklers
- Page 5 I. Installation of K-Line Fittings
- J. Finish Marking Off Fields
- K. Changing Nozzles
- Page 6 L. Field Shut Off Valves
- M. Inlet Pressure Regulator at Riser Valve
- N. Timers
- O. Filtration
- P. Shifting the K-Line Pods
- Page 7 Q. Winterizing a K-Line System

Part Two

Detailed Installation/Operation, and Maintenance Instruction

- Page 8 A. Review of Engineering Plan
- B. Marking and Flagging the Field
- Page 9 C. K-Line Tubing Layout
- Page 10 D. Sprinkler/Pod Placement
- Page 11 E. Tapping Saddle Installation
- F. K-Line NAAN Impact Sprinklers
- Page 12 G. K-Line Nelson R2000WF Windfighter Sprinklers
- H. Windfighter Pressure Compensated Sprinklers
- I. Installation of K-Line Fittings
- Page 13 J. Finish Marking Off Fields
- K. Changing Nozzles

Other Related K-Line System Information

- Page 14 L. Field Shut Off Valves
- M. Inlet Pressure Regulator at Riser Valve
- Page 15 N. Timers
- O. Filtration
- Page 16 P. Shifting the K-Line Pods
- Page 18 Q. Winterizing a K-Line System
- Page 27 Descriptions and Pictures of K-Line Connectors and Components
- Page 29 K-Line Quick Trouble Shooting Guide
- Page 30 K-Line's Kwik Shifter
- Page 31 K-Line's Kwik Shift2



INSTALLATION/OPERATION MANUAL

INSTALLATION STEPS QUICK REFERENCE OUTLINE

Refer to Pages 8-19 for Complete
explanation of installation procedures

A. REVIEW ENGINEERING PLAN

1. Use Measuring Wheel – mark off areas to be irrigated
2. Use colored flags or stakes for markers
3. Mark area according to layout of engineering plan
4. Review pages 27 and 28 for parts identification

B. MARKING/FLAGGING

1. Mark approximate center of area to be watered for each line of K-Line Pods
2. Maintain 25 foot distance to edge of field – install line of markers
3. Place markers at engineered spacing of each pod. **(SEE DIAGRAM #1 page 20)**

C. K-LINE TUBING LAYOUT

1. Roll out tubing – starting with either 32 or 40mm tubing first; the green line(s) on the K-Line tubing will indicate if tubing is being twisted; **(avoid twisting)**.
2. Distant end of K-line Tubing starts 4-5 feet beyond last sprinkler.
3. Roll out the 40 or 45mm K-Line tubing next – start at junction point of the K-Line tubing.
4. Reducing couplings are not to be installed until pods have been slid onto tubing.
5. After 40 or 45mm K-line tubing has been spooled out to reach centerline point, enough additional 40, 45, or 50mm tubing must be spooled out to provide feed line to riser (water supply).
6. If riser (water supply) is centered in field, then the additional tubing needed will be $\frac{1}{2}$ the width of the field.
7. A Cam fitting is then installed along with a shut-off ball or gate valve at supply riser.

D. SPRINKLER/POD PLACEMENT

1. Take correct number of pods for field, and slide them onto ends of K-Line tubing.
2. Slide pods along tubing until near a flag/marker.
3. Make pilot hole for tapping saddles at each marked location. **(SEE DIAGRAM #2 page 21)**

4. Drill through center of green line/lines on top side of K-Line tubing – do not penetrate through bottom of tubing.

E. TAPPING SADDLE INSTALLATION

1. Make sure tapping saddle size is same as K-Line tubing.
2. Center pod over pilot hole. **(SEE DIAGRAM #2 page 21)**
3. Push tapping saddle into pilot hole and down over threaded posts of the stainless steel U-Bolt in the bottom of each pod. **(Ensure that tapping saddle nipple is centered on pilot hole and does not pinch tubing).**
4. Put stainless steel washer on each of threaded posts.
5. Thread on the stainless steel nuts and hand tighten.
6. Finish securing tapping saddle by tightening nuts – use 13mm socket and ratchet.
7. Tighten first nut until it becomes snug, and then second nut – switching back and forth during the tightening process so saddle will be square when tightening is completed.
8. Once saddle is tightly secured, screw in the K-Line adapter post (may use Teflon tape or paste) on male pipe threads. **(Do not over-tighten adapter)**

F. K-LINE NAAN IMPACT SPRINKLERS

1. Use Teflon tape/paste on male threads of sprinkler (Optional)
2. Hand start the sprinkler into K-Line NAAN Adapter, preassembly here often saves time.
3. Make sure threads are not cross-threaded
4. Securely tighten the sprinkler in place – use 13/16 open-end wrench

G. K-LINE NELSON R2000WF WINDFIGHTER SPRINKLERS

1. K-Line Nelson adapter post will have male Acme threads on top
2. Adapter should already be securely tightened using 1-1/16” open-end wrench
3. Pre-assembling adapter post & tapping saddle prior to installing often saves time
4. Top of adapter post has male Acme threads which includes an “O” ring (no Teflon tape or paste)
5. “O”-ring allows for sprinkler to be tightened in place by hand with a snug twist

(If you should encounter the sprinkler coming loose from the adapter, a small drop of white, Elmers type, glue on the ACME threads will eliminate the problem).

H. WINDFIGHTER PRESSURE COMPENSATED VERSION

1. The K-Line Nelson adapter nipple with ½” male pipe threads on both ends is threaded into tapping saddle.
2. Nipple is non-directional - either end can be used first
3. Screw the mini-regulator (with ½” female thread base and male Acme threads on top) onto the K-Line Nelson nipple
4. Pre-assembling K-Line Nelson nipple & mini-regulator first into tapping saddle often saves time.

5. Windfighter sprinkler is threaded on by hand once mini-regulator is securely tightened
6. Finish process with a snug twist.
7. For the three K-Line sprinkler options, and component parts, **(SEE DIAGRAM #3 PAGE 22)**.

I. INSTALLATION OF K-LINE FITTINGS

1. Rubber hammer/heat torch & pipe wrenches are the tools for this job
2. After squaring end of tubing, install coupling/reducing coupling by driving plastic coupling onto end of K-Line tubing. Use rubber hammer, wood mallet, or short piece of 2" x 4" lumber. (Ensure correct number of pods have been placed on line first).
3. If necessary slightly heat end of other K-Line tubing – then wiggle it up & down while pushing together, so tubing is seated all the way onto plastic fitting
4. **Hand start the threads then use 2 pipe wrenches to make sure fittings collars are very tight causing the K-Line fittings barbs to deeply embed into the K-Line tubing**
5. **If a K-Line fitting ever comes apart – discard and use new fitting to repair**

J. FINISH MARKING OFF FIELDS

1. Accomplished by placing markers/flags at each end of field, at centerline of each shift width. **(SEE DIAGRAM #4 page 23)**
2. Have a definite object at which to aim and a stop point.
3. System uniformity is best when pods are shifted accurately.
4. Using alternating colored markers/flags of various shapes/colors is helpful.
5. Make sure field/paddock is free of sharp rocks/obstructions in the shifting area.

K. CHANGING NOZZLES

1. NAAN 5022 IMPACT SPRINKLER

- a. existing color nozzle is removed by turning nozzle ¼ turn counter-clockwise and pulling outward
- b. small pair of pliers may be necessary – do not squeeze hard
- c. clear nozzle by using water pressure or a thin wire
- d. reinsert nozzle – pushing down into nozzle chamber turning ¼ clockwise hearing a click sound when locked

2. NELSON R2000WF WINDFIGHTER SPRINKLER

- a. Possibly requires changing of rotating colored plate as well as nozzle
- b. To separate the sprinkler look for the word “squeeze” on side of outer collar
- c. Squeeze two spots simultaneously between thumb/forefinger –while turning outer collar counter-clockwise –Windfighter top will come off
- d. Upper portion re-secured by aligning top back on base of sprinkler & turning ¼ turn until click is heard & top stops turning
- e. Check web site for detailed disassembling information or call for faxed copy at 1-866-665-5463.

L. FIELD SHUT-OFF VALVES.

1. Ball Valves or Gate Valves make the best shut-off valves
2. Used to keep remainder of system operating while turning off one line or removing a line of pods for maintenance, relocation, etc.
3. Contact dealer for more specifics.

M. INLET PRESSURE REGULATOR AT RISOR VALVE

1. Used in K-Line Systems on hilly terrain with multiple lines of K-Line sprinkler pods - equalizes the input pressure of each line.
2. Also used where the water source is providing higher pressures than desired for the K-Line sprinklers.
3. These in-line plastic regulators with 1 ½" male threads (both ends) install between the riser valve and the Cam quick connect fittings. **(SEE DIAGRAM #5 page 24)** Choose 35psi, 43psi, 50psi, or 57psi regulators. 2" regulators available by special order.

N. TIMERS

1. Electric timers – part of controls for electric pumps supplying water to the K-Line System
2. Allows for system to be adjusted automatically for length of run time, and turning pump on and off.

O. FILTRATION

1. WELLS: filtration should not be necessary for K-Line Irrigation
2. SURFACE Water Source: screening techniques work well
3. POND/LAKE Water Source: floating suction most often used
4. RIVER/STREAM: dig small pond beside flowing water – creating good supply of relatively clean water
5. SHALLOW STREAMS: digging pond several feet deeper and to the side allows debris in the water to settle - good place to install suction device for pump
6. WASTEWATER SOURCE: automatic flush filter needed in most cases. Discuss with your K-Line Dealer/Designer.

P. SHIFTING THE K-LINE PODS

1. Shifting while irrigation is operating saves time; keeps K-Line tubing cooler and stronger and helps avoid kinking.
2. Shift so K-Line tubing makes a quick 5' U-turn to keep the K-Line pods from overturning. **(SEE DIAGRAMS 6A and 6B page 25).**
3. The feed line can be run over during shifting; the loop in the feed line needs to be repositioned every second or third shift. **(SEE DIAGRAM 6C page 25).**

Q. WINTERIZING A K-LINE SYSTEM

1. Make provisions during installation to either drain or blow out the underground piping system.
2. Drain out as much water as possible from the K-Line tubing by making use of a slope in the field.
3. If the K-Line tubing is to be stored along the edge of the field at end of the season, make sure to cover the open ends of all disconnected fittings to insure that animals will not use opening for winter nests.
4. Leave all valves open during freezing weather to prevent damage; pressure gauges can also be unscrewed and removed for winter to prevent damage.



4270 Hollywood Road ■ St. Joseph ■ MI 49085
Toll Free 866-665-5463 ■ 269-429-3000 ■ Fax 269-429-3700
www.k-linena.com ■ info@k-linena.com

INSTALLATION/OPERATION MANUAL

THE K-LINE COMPONENT PARTS ARE OF THE HIGHEST QUALITY AND ENGINEERED TO FIT TOGETHER QUICKLY AND EFFICIENTLY. YEARS OF EXPERIENCE HAVE PROVEN THEM TO BE LONG LASTING AND DEPENDABLE.

A. REVIEW ENGINEERING PLAN

The starting point for installing a K-Line Irrigation System is to first review the engineering plan or layout of the fields or paddocks. A measuring wheel (which is a revolving wheel that activates a counter) is most helpful in marking off the area to be watered with each line of K-Line sprinkler pods. Colored flags make good markers as they can be pushed into the ground quickly, moved around as necessary, and are readily visible at a far distance. Start out by marking the area to be irrigated with each line of pods and verify that the actual area to be watered matches the measurements on the engineering plan. If the actual measurements vary considerably from the designed plan, your engineer should be consulted before proceeding further.

B. MARKING/FLAGGING

The next step is to find the approximate center of each area of to be irrigated. The simplest configuration for each row of pods is to have the water supply in the center of the field. Keep in mind that the K-Line tubing is to be pulled back and forth from end to end in each field, usually moving each line of K-Line pods once a day. Each day you should find the line of pods irrigating a new strip of ground approximately 50-foot wide that reaches from the center of the field to the end of each field. Some K-Line irrigation systems may be engineered to move twice a day, but that fact will not change the installation procedures. By having the water supply located at the center of the field, the amount of feed line (K-Line tubing) is kept to a minimum and the line of pods is easier to shift. However, in some cases locating the supply riser along the edge of a field (such as along a fence line) is important. This option is important when the field is to be mowed to make hay, is part of a crop rotation, or for some other field activity that is to take place without an obstruction. In these cases, the feed line of K-Line tubing will have to be long enough to reach completely across the narrow width of the field being watered and in nearly all cases should be a minimum of 40mm K-Line tubing and possibly 45 or 50mm tubing depending on the volume required. If the field is not wider

than 200 feet, this alternative of feeding from the edge is usually acceptable. If the field is 250-300 feet wide, then the resulting long feed line is usually not desirable. A removable, flexible supply line such as layflat hose can often be used to center the water supply without creating a permanent obstruction in the field. Layflat hose can be attached to a riser or water supply located anywhere in the field as long as it is properly sized and secured with a post or stake at the center of the field.

Once the length of the field area has been accurately checked and the center located, a line of flags or stakes should be placed at the pod spacing that is required by the engineering plan (usually 40-50 feet apart). A good plan for where to start marking is to find the spot that is approximately 25 feet from the edge of the field as well as half the distance of sprinkler spacing from the end of the field and place marker there **(SEE DIAGRAM #1 PAGE 20)**. While maintaining a distance of about 25 feet from the edge of the field, install a line of markers at the prescribed spacing toward the centerline of the field. When each pod has been marked according to the plan you should find that the last marker in that line is 20-25 feet short of the centerline, if everything has been calculated correctly. If multiple lines of the same length and spacing are to be assembled, they can all be laid out side-by-side and then shifted to another location after assembly.

C. K-LINE TUBING LAYOUT

The next step in the process is to roll out or unspool the K-Line tubing. It is best to start with the 32 or 40mm tubing for the far end of the line if your engineering plan calls for it. Then use 40 or 45mm K-line tubing on the near end of the field for the appropriate number of pods. Use 40, 45, or 50mm tubing as called out in the engineering plan for the feed line. Your engineering plan may call for all 40mm or all 45mm pod lines for long lines and or when using large sprinkler nozzles. Understanding the properties of the K-Line tubing that make it such an important part of a K-Line system will be helpful. The K-Line tubing itself is very specially formulated tubing of high quality and unique properties. It has burst strength of approximately 250 psi. It is made primarily from linear low density polyethylene resin which is well known for its exceptional flexibility as well as its ability to withstand freezing, most effects of sunlight, changes in temperature and is resistant to permanent damage from occasional kinking. The K-Line tubing, together with its special heavy-duty companion fittings, is what allows the K-Line irrigation systems to be moved continuously for many, many years of dependable service. The K-Line tubing is easily identified by its distinctive and visible green stripes along the top, it's label "K-Line", along with the tubing size. The 32mm K-Line tubing has a single green stripe, the 40mm tubing has two green stripes, the 45mm tubing has three green stripes, and the 50mm tubing has two wide green stripes. Not only do the stripes help identify the sizes of the K-Line tubing but they serve the important, practical function of indicating if the K-Line tubing is being twisted as it is being unspooled. Using a spool-out reel quickens the unspooling process and keeps the coil laying flat so the tubing will not twist as long as the spool-out reel keeps turning - preventing a "slinky like" loop from coming off the top of the coil.

The distant end of the K-Line tubing should extend about 4-5 feet beyond the last sprinkler pod to provide enough length beyond the last sprinkler for easy hookup when starting the shift movement of the K-Line sprinkler line.

Once the 32mm portion of the K-Line tubing has been rolled out or unspooled, then do the same with the 40mm K-Line tubing starting at the junction point of the 32mm and 40mm K-line tubing. If 45mm tubing is used, then spool out the 45mm starting at the junction point of the 40 and 45mm tubing. Do not install the reducing coupling until the pods have been slid onto the K-Line tubing. Once enough of the K-Line tubing has been spooled out to reach the centerline point of the field, additional 40, 45, or 50mm tubing must also be unspooled to provide enough feed line to reach the riser or water supply. Sometimes efficient use of tubing will result in feed lines being layed out at a later point in time.

If the riser supplying irrigation water is in the center of the field or paddock, then the amount of additional tubing needed for the feed line is approximately one-half the width of that field. Example, if the field being watered is 250 feet wide, then about 125 feet of 40mm, 45mm, or 50mm K-Line tubing is needed for the feed line. A common practice is to install a quick-connect CAM fitting or a K-Line union at the junction of the feed line and the pod line. This allows for the feed line to be completely disconnected from the line of K-Line pods when moving the pods from one side of the field to the other. This practice applies when one is repositioning the line of K-Line pods to the starting point after completing the initial watering of the entire width of the field. **(SEE DIAGRAM # 6B page 25)**

In most cases, a Cam fitting is installed along with a shut-off ball valve or gate valve at the supply riser. This allows the feed lines as well as the K-Line tubing and pods to be shifted to the edge of the field when the field is to be mowed or when storing for winter.

D. SPRINKLER POD PLACEMENT

Once the K-Line tubing has been spooled out, take the correct number of K-Line pods for that field and slide them onto the ends of the K-Line tubing. The pods then need to be slid along the K-Line tubing until a pod is approximately at each one of the markers. A tip for doing this job quickly and easily is to take a long heavy wire hook and temporarily hook onto the lip of the last pod that has been slid on the K-Line tubing. Then walk along or ride on an ATV pulling the pods along the ground to the first flag (you may have 6 or 7 pods sliding along at one time). At the first flag, drop the last pod and then hook onto the next pod and bring along the remaining pods; then at the next flag drop the last pod again and repeat the process until all the pods are approximately in the correct location. Next walk along with a battery powered drill with a 14mm or 9/16" spade bit to make the pilot hole for each tapping saddle. Make sure the K-line pods are aligned with the markers as closely as possible.

Drill only the topside of the K-Line tubing – **be especially careful to not insert the drill bit too deeply causing an unintended puncture of the other side of the K-line tubing!** A stop washer can be welded onto the drill bit or multiple wraps of electrical tape about $\frac{3}{4}$ " back from the tip will form a stop to prevent this from happening and to make this job more foolproof. Positioning the green line upward and drilling holes for the tapping saddle on the green line ensures there are no twists in the K-Line tubing.

E. TAPPING SADDLE INSTALLATION

To install the tapping saddle, first make sure you have the same size tapping saddle as the K-Line tubing you are installing the pods onto. 32mm tapping saddles are green, 40mm are black, and 45mm are green. **(Earlier versions of the 32, 40, and 45mm tapping saddles were all black).** Center the K-Line pod over the pilot hole that has been drilled for the tapping saddle. Insert the tapping saddle into the pilot hole. A round pointed object such as a good-sized Phillips' head screwdriver may be used to help align the tapping saddle into the pilot hole. Push the tapping saddle into the pilot hole and down over the threaded posts of the stainless steel U-Bolt in the bottom of the K-Line pod. Rock back and forth to seat the nipple squarely in the pilot hole. Allow for the O-ring to form a proper seal between the saddle and tubing. Next put a stainless steel washer on each of the two threaded posts and then thread on the stainless steel nuts and hand tighten. Finish securing the tapping saddle by tightening the nuts using a ratchet or speed wrench with a 13mm socket. To insure that the tapping saddle ends up square with the bottom of the pod, only tighten the first nut until it starts to become snug, then switch and tighten the second nut. By switching back and forth in the tightening process, the saddle will be square when it is completely tightened. **CAUTION: If one side of the saddle is tightened completely before any tightening is done on the second nut, the saddle may sit slightly cocked sideways which can cause the water stream from the sprinkler to hit the inside edge of the pod in its rotation.** After the saddle has been securely tightened, screw in the K-Line adapter post if it was not already pre-assembled. Teflon tape or Teflon paste may be used on all male threads for both the NAAN and Nelson assemblies. **Do not over-tighten the adapter.**

F. K-LINE NAAN IMPACT SPRINKLERS

If installing the K-Line NAAN impact sprinklers, hand start the sprinkler into the NAAN adapter to insure that the threads are not cross-threaded and securely tighten the sprinkler in place using a 13/16 open-end wrench. The NAAN sprinklers may also be used with the Hendrickson mini-regulators - in which case the mini-regulator is screwed into the tapping saddle and then the NAAN sprinkler is screwed into the mini-regulator. To save time, some installers assemble and tighten the tapping saddle, the adapter, and the sprinkler, prior to installing the tapping saddle to the pod out in the field.

G. K-LINE NELSON R2000WF WINDFIGHTER SPRINKLERS

If using the K-Line Nelson R2000WF Windfighter sprinkler, the Nelson adapter post will have male Acme threads on the top. The K-Line Nelson adapter should already be securely tightened using a 1 1/16" open-end wrench. To save time, some installers assemble and tighten the tapping saddle, the adapter, and the sprinkler, prior to installing the tapping saddle to the pod out in the field.

The top of the K-Line Nelson adapter post has male Acme threads that include an "O" ring. No Teflon tape or paste is necessary due to the O-ring. This allows the K-Line Nelson R2000WF sprinklers to then be tightened in place by hand with a snug twist.

H. WINDFIGHTER PRESSURE COMPENSATED VERSION

For the pressure compensated version of the K-Line Nelson Windfighter system, a K-Line Nelson adapter nipple with 1/2" male pipe threads on both ends is threaded into the tapping saddle. This nipple is non-directional so either end can be first put into the tapping saddle. Again, pre-assembling the Nelson nipple into the tapping saddle using a 1 1/8" open-end wrench may be the quickest and easiest assembly procedure. Screw onto the K-Line Nelson nipple the Nelson mini-regulator with its 1/2" female pipe thread base and male Acme threads on top. Once the mini-regulator is securely tightened the Windfighter sprinkler is threaded on by hand, finishing the process with a snug twist. **(SEE DIAGRAM # 3 for the three- (3) K-Line sprinkler options and a complete breakdown of their component parts page 22.)**

I. INSTALLATION OF K-LINE FITTINGS

Installation of the K-Line fittings is next. A rubber hammer and one or two pipe wrenches are the tools for this job. (In cold weather try warming the ends of the tubing with a propane torch to ease the connectors on and enable them to bite deeply into the tubing). When installing a coupling or reducing coupling make sure that the appropriate number of pods are in place and that each end of the K-Line tubing being connected has a square cut end before inserting a K-Line fitting. Next, drive the plastic coupling onto one of the ends of one of the K-Line tubing being connected using the rubber hammer, a wood mallet or a short piece of 2" X 4" board. The next step is to slightly heat the end of the other K-Line tubing (if necessary) and wiggle it up and down while pushing it together making sure the K-Line tubing is seated all the way onto the plastic fitting. (Two people makes this process much easier). Next, hand tighten the plastic locking collars of the coupling onto the K-Line tubing and then finish tightening with one or two pipe wrenches. **(Remember that the green lines on the tubing should run continuously, even from one size of tubing to the next)**. When tightened properly, the fittings collars are very snug and the inside of the plastic fitting has embedded its barbs into the K-Line tubing insuring a connection that is not likely to ever come off when the K-Line sprinkler pods

are being shifted. **(Should a plastic K-Line fitting ever come apart, that fitting should be discarded and a new one substituted as the first one is not likely to tighten properly again.)** Also, any damaged tubing should be cut off and new fitting installed onto the clean end. The water should then be turned on to flush out all the plastic shavings prior to installing the hook end-cap. A ten (10) foot length of $\frac{3}{4}$ " or larger rope (yellow polypropylene is good) with a metal hook (with spring loaded safety catch) should be purchased for shifting. Use of a chain (instead of rope) may cause binding, which could cause twisting and rolling of the K-Line pods. For large numbers of K-Lines, a marine ball attached to the hook cap using a polypropylene rope can be used in conjunction with the K-Line KWIK-SHIFTR or KWIK-SHIFT2, **(SEE PAGE 30 AND 31)**, to move many K-Lines quickly without repeatedly getting on and off the ATV.

J. FINISH MARKING OFF FIELDS

After the assembly of the K-Line sprinkler pods is completed, the next step is to finish marking off the field. Marking is accomplished by placing flags or markers at each end of the field, at the centerline of each shift width. **(SEE DIAGRAM #4 page 23)** If the person shifting the K-Line tubing and sprinkler pods has a definite object at which to aim and a position at which to stop, their job is considerably easier. Best system uniformity is achieved when the lines are shifted as close to in-line with the markers as possible. Alternating colored flags or marking with various shapes or colors is also helpful to distinguish between markers at a distance.

The field or paddock should be examined to make sure sharp rocks or obstructions that could cut the K-Line tubing or stop the K-Line tubing and pods from being shifted are removed. Once a pattern of movement of the K-Line tubing and pods is established, future moves will usually follow the same path – thus not all obstructions in a field or paddock will be a problem. In fact, an important feature of the K-Line irrigation system is that it can usually, quite easily, be designed around obstructions such as trees, water troughs, gullies or ditches, that would be a serious problem for other types of irrigation systems.

K. CHANGING NOZZLES

If a nozzle needs to be changed on the K-Line NAAN 5022 impact sprinkler, the existing colored nozzle is removed from the NAAN sprinkler by turning the nozzle about $\frac{1}{4}$ turn counter-clockwise and then pulling outward. If the sprinkler has been in operation for awhile, silt or dirt may make the colored nozzle more difficult to turn and remove. A small pair of pliers might be helpful. Care should be taken if using pliers that you not squeeze so hard as to permanently damage the nozzle. Debris that has lodged into the nozzle water stream is cleared out by removing the nozzle, (see above), and using a small piece of wire or the stream of water from the sprinkler to

dislodge debris then reinsert the nozzle. To reinsert the nozzle, make sure the nozzle chamber and the nozzle itself is free of debris. Next, push the nozzle down into the nozzle chamber and turn the nozzle about ¼ turn clockwise. An audible click is usually heard as the nozzle locks into place. If cleaning a nozzle while the system is running, it may be a good idea to have extra nozzles on hand and a dry towel.

To change a nozzle in the Nelson R2000WF Windfighter sprinkler, the process is a little more involved because changing the colored nozzle will likely require changing the rotating colored plate as well. If cleaning out debris from the sprinkler, the Windfighter top and bottom can be easily separated by looking for the word “squeeze” on each side of the outer collar of this sprinkler. Squeezing the two spots simultaneously between your thumb and forefinger while at the same time turning the outer collar counter-clockwise will allow the top part of the Windfighter to come right off. This upper portion can quickly be secured back into place by aligning the top of the sprinkler back on the base of the sprinkler and turning the top about ¼ turn until a click is heard and the top stops turning.

A detailed set of instructions for disassembling the Nelson Windfighter is readily available on the K-Line Web site or one can be faxed to you by contacting us at 1-866-665-5463, (1-866-66-K-LINE).

OTHER RELATED K-LINE SYSTEM INFORMATION

L. FIELD SHUT-OFF VALVES

A shut-off valve mounted at each riser (such as a ball valve or gate valve) is highly suggested for each line of K-Line pods. Most K-Line irrigation systems will have numerous individual lines of K-Line sprinkler pods all operating at the same time and connected to the same pumping system. If it becomes necessary to shut off one of the lines of sprinkler pods, the remaining part of the K-Line irrigation system can continue operating with little effect on the rest of the sprinkler pods. Your K-Line irrigation designer can explain further on this topic.

M. INLET PRESSURE REGULATOR AT RISER VALVE

Pressure regulators to control the inlet pressure of each K-line tubing line and pods can greatly assist in the uniformity and operation of the K-Line system. On hilly terrain, where multiple lines of K-Line are to be operated, adding a pressure regulator at each riser insures that the same inlet pressure occurs in each line. If the line of sprinkler pods is then kept mostly on a **contour**, the water delivery of the K-Line system will be quite uniform despite the large pressure differences due to the changes in altitude.

For any K-Line system, where the inlet pressure is higher than desired for the K-Line sprinklers, adding an in-line pressure regulator will adjust the pressure to the desirable range. You will need to choose between a 43psi, a 50psi, or a 57psi regulator.

These regulators have 1 ½" male pipe thread on both ends and a directional arrow which makes them easy to install between the inlet valve and the quick connect cam fitting for each line of sprinkler pods. **(SEE DIAGRAM #5 page 24)**

N. TIMERS IN THE K-LINE IRRIGATION SYSTEM

Many K-Line systems will have a timer incorporated into the controls when using electric pumps to supply the water. This allows for the K-Line Irrigation System to be adjusted to run for a particular length of time or during certain hours. In some cases, the cost of electricity is more economical during nighttime hours. Also, wind conditions are normally greater during daytime hours (particularly during the afternoon) and these hours can be avoided by using a timer in the system.

O. FILTRATION FOR A K-LINE IRRIGATION SYSTEM

In K-Line irrigation systems where a well is the water source; filtration of the water for use in a K-Line system should not be necessary since particles large enough to clog a nozzle should not be possible.

In K-Line systems where surface water is the supply source, simple screening techniques are usually adequate to clear up the water to prevent plugging of K-Line sprinkler nozzles. K-Line provides a line of excellent quality (Pump Rite) stainless steel intake screens for use where stream waters are shallow or full of debris. Call us at 1-866-665-5463.

When a pond or lake is the water source, a floating suction is often used where a foot valve and basket screen is incorporated onto the end of the suction pipe. This provides pre-screening of the water and maintains a water supply into the pump chamber so the pump can easily catch its prime.

Where the surface water is relatively still, the cleanest water will usually be found 2-3 feet below the surface. A floating suction that positions the intake into this relatively clean water area will work the best. Surface water may have floating debris that would affect the pumping system. Drawing water off the bottom may draw weeds, silt, stones, bottom trash, etc. which could result in clogged nozzles. Therefore, it is very important to suspend the suction into the cleanest water possible.

In places where a river or stream is the water source, digging a small pond beside the flowing water is a good method for creating a good supply of relatively clean water. If the connecting channel between the little pond and the stream is angled backward to the flow of the stream, most of the trash going down stream will by-pass the pond keeping the water cleaner. If the stream is quite shallow, digging the pond several feet deeper creates a settling pond of sorts and provides a good place to install a suction device for the pump. **Checking local and state laws before digging alongside of any river or stream is advisable.**

If wastewater is the supply source of irrigation water for a K-Line system, an automatic flush filter will likely be needed to clean the water sufficiently. A number of good quality filters are available. Working closely with a knowledgeable irrigation consultant is probably the best way to proceed.

P. SHIFTING THE K-LINE PODS

With the K-Line Irrigation system operating, the lines of K-Line sprinkler pods are easily and quickly shifted using an ATV, a small tractor, etc. If a K-Line hook cap has been installed on the end of the K-Line tubing, use a latching hook tied to a ten (10) foot length of 3/8 inch or larger flexible rope to attach to the hook cap. **(Do not use a chain as it tends to bind and cause the pods to roll over.)** The ATV (or pulling equipment) should already be pointed somewhat back towards the riser as the driver attaches to the K-Line tubing. This causes the end sprinkler pod to quickly make a U-turn back toward the riser and prevents the entire line of K-Line sprinkler pods from having to immediately move. There will be almost no immediate weight on the ATV (or pulling equipment) because the pull initially is only turning the end sprinkler back toward the center of the field. Most operators will drive within approximately ten (10) feet of the pods as they move toward the centerline of the field. This process causes the K-Line tubing to bend in a rather sharp U-turn but its strong, flexible properties are designed for that purpose. Since the K-Line pods do not have to move much sideways, they should almost never turn over. Should a pod flip over, due to hitting a stone, hole etc., the sprinkler is protected by the pod. **Caution: If the operator shifting the pods makes a rather wide turn (twenty (20) feet or more) the pods must then slide sideways for a longer distance which greatly increases the chances of the pods overturning.**

Tip: Attaching a snap clothes pin to the NAAN sprinkler in the first pod will keep the sprinkler pointed backwards and eliminate the driver from getting soaked. A weighted coffee can over a Nelson sprinkler works equally well in keeping the driver dryer.

As the ATV approaches the centerline of the field, the operator should aim toward the center of the

next strip of land to be irrigated. If a flag or marker has been placed at the other end of the field in the centerline of that shift width, the operator should drive straight for that marker, not stopping until reaching the marker. The operator will sometimes have to first make a little sideways movement to align the centerline end of the K-Line pods. **(SEE MOVEMENT PATTERN OF PODS – DIAGRAM 6A page 25)**. Stopping halfway through a shift will make it more difficult to pull the K-Line pods to the end of that shift. Whenever possible, stopping should be avoided as it increases stress on the K-Line tubing, the fittings, and the machinery. The rope with latching hook is then disconnected from the hook cap and the operator moves to the next line of K-Line sprinkler pods (if multiple lines are operating from the same pumping station).

As the K-Line tubing is moved back and forth across the field, questions always arise as to the correct position of the feed line. If the feed line is properly installed so that it has enough length to prevent it from ever pulling tight, it will almost always have a loop in it. Attention should be paid to the sharpness of the loop in the feed line so that the K-Line tubing does not kink. Kinking can be prevented by always driving so that the feed line is un-looped on the return shift to the other end of the field. The feed line loop will get larger as the shifting gets closer to the riser (if the riser is in the center of the field). The loop in the feed line should be pulled toward the next area to be irrigated prior to shifting so that the K-Line sprinkler pod closest to the feed line can follow the line of the other K-Line sprinkler pods without having to slide much sideways. **(SEE DIAGRAM 6C page 25)**. If you have any questions on this process, contact your K-Line dealer.

Your ATV will run over the K-Line tubing feed line during shifting. The internal water pressure keeps the tough K-Line tubing firm and undamaged from vehicle weight while the K-Line system is operating. There are several reasons for moving the K-Line system while it is still irrigating. The water pressure provides extra strength for the K-Line tubing to resist kinking, as well as keeping the K-Line tubing cool during hot summertime temperatures. Another good reason for shifting the K-Line system while it is still operating is the time savings of not having to shut down the pumping system or the inlet to that particular line. If it is necessary to move the K-Line pods while not irrigating, it is recommended to move the lines in the morning or late evening when temperatures are normally cooler.

A new type of shifting equipment has been developed that is a real time saver. It is a specially designed kwik-shift rubber tired trailer that has a scoop mechanism built into it. The object that is scooped up is a large plastic ball with a hole through it. The ball is attached to the end of the K-Line sprinkler pods with a short piece of rope. The operator drives the ATV pulling the kwik-shift trailer over the ball at the proper angle, the scoop catches the ball and holds it while the line of K-Line

sprinkler pods is being shifted. To release the ball at the end of the shift the operator does not need to stop, but simply pulls a rope to open the scoop and drop the ball. The “KWIK-SHIFTR” K-Line trailer also has a hook mechanism for hooking the feed line so that the feed line can also be quickly repositioned when necessary. **(SEE PICTURES OF K-LINE KWIK-SHIFTR TRAILERS ON PAGES 30 AND 31).**

Upon completion of irrigating the entire field (end to end/across), the K-Line pods need to be shifted back to the starting point. This is easily done if a quick connect CAM fitting or a K-Line union has been installed between the feed line and the first K-Line sprinkler pod. First, turn off the water to this line of the K-Line sprinkler pods, followed by disconnecting the feed line from the K-Line sprinkler pods. The K-Line sprinkler pods can then be shifted in a wide arc to the other side of the field. Choosing the evening or early morning when the K-Line tubing is cooler for this shift is recommended. **(SEE THE SHIFTING ILLUSTRATED IN DIAGRAMS #6A, B, AND C page 25).** The operator can then return and pull the feed line to the connection of K-Line sprinkler pods, reconnecting them, then restarting the irrigation to the line of K-Line pods.

An alternate method of moving the lines that is preferred by some users is to move over one position each time you move the line. The move cycle sequence is depicted in **(Diagram # 7 page 26)**. This method eliminates the need to relocate the lines back to shift one at the end of the entire cycle. (When first utilizing this method it is useful to put up markers at the ends of the fields to keep your shifts aligned).

Q. WINTERIZING A K-LINE SYSTEM

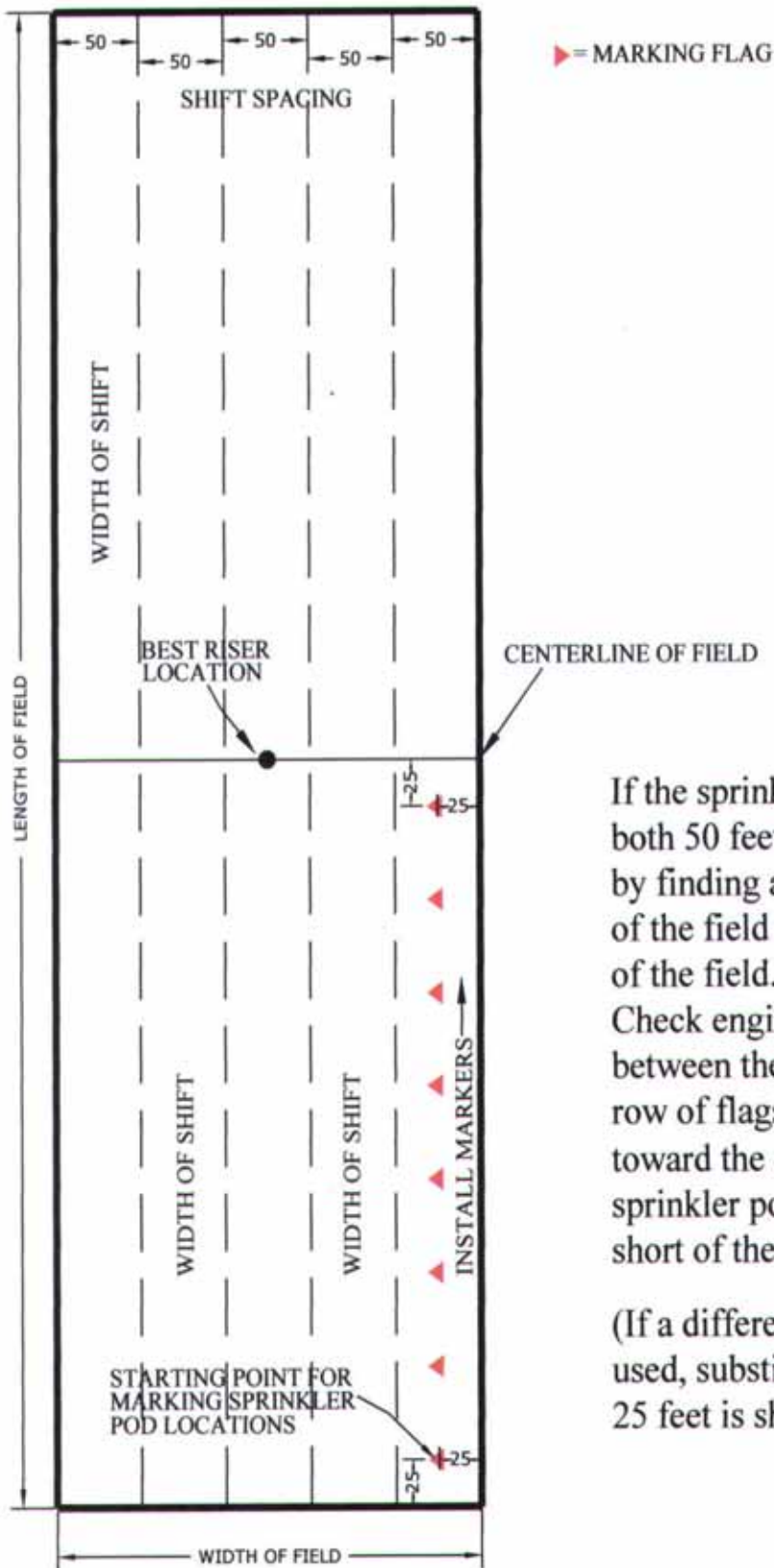
Provisions for draining or blowing out the underground piping and risers should be made during installation. Installing gate valve drains in valve boxes at the pump, risers, and low places of the field is usually sufficient for draining the below ground PVC piping. Ask your designer for more information if you have questions.

In areas where freezing may occur, the K-Line tubing and sprinkler pods do not have to be completely emptied of water for the winter. The K-Line tubing is designed to withstand some freezing, as the special resin blend will allow the K-Line tubing to stretch slightly and its molecular structure to interlock, giving it added strength. We do however advise disconnecting the feed line from the riser and draining the water from the feed and pod lines.

If the K-line tubing and pods are being disconnected from the riser and stored along the edge of the field for the off season, a majority of the water will drain out as the tubing is being moved. If the field has an incline, that slope can be used to drain out the majority of the water in the K-Line tubing. This is the recommended way to winterize the K-Line portion of the system.

CAUTION: If the K-Line tubing is to be disconnected at the CAM fittings at the risers, be sure to cover the open ends of any lines after the water has drained. This will prevent mice and other small animals from making a winter nest inside. CAM plugs are readily available for closing off those entry points.

Diagram 1.



If the sprinkler spacing and shift width are both 50 feet, then start the marking process by finding a spot 25 feet from the edge of the field as well as 25 feet from the end of the field. Put the first flag/marker there. Check engineering plan for the distance between the sprinkler pods, then install a row of flags/marker from the first flag toward the centerline of the field. The last sprinkler pod should be located 25 feet short of the centerline of the field.

(If a different sprinkler and shift width are used, substitute 1/2 of those widths where 25 feet is shown in diagram.)

Diagram 2.



Pod shown with 9/16" hole drilled in one side of polyethylene tubing.



Pod Shown with saddle, NAAN adapter, and NAAN sprinkler.

Diagram 3.



K-Line Irrigation

of North America

SPRINKLER COMPONENTS & OPTIONS



NAAN 5022 IMPACT SPRINKLER

order code: **NAAN-5022-(x)**

Nozzle Options: x =

O = Orange 7/64" **R** = Red .118" **G** = Green 1/8"

BU = Blue 9/64" **BK** = Black 5/32"

K-LINE NAAN ADAPTER (connects NAAN 5022 sprinkler to the K-Line Saddle)

order code: **NAAN-ADAPT** 1/2" mnpt (bottom) x 1/2" fnpt (top)

K-LINE TAPPING SADDLE (includes nuts and washers for u-bolt in pod)

order code: **KLTPS32** 32mm Tapping Saddle

KLTPS40 40mm Tapping Saddle

KLTPS45 45mm Tapping Saddle



NELSON R2000WF WINDFIGHTER

order code: **R2000WF-(x)**

Nozzle Options: x =

G = Green Nozzle & Green Plate **T** = Tan Nozzle & Red Plate

R = Red Nozzle & Red Plate **A** = Gold Nozzle & Gold Plate

B = Brown Nozzle & Brown Plate

K-LINE NELSON ADAPTER (connects Nelson Windfighter Sprinkler to the

order code: **NEL-ADAPT** K-Line Saddle)

1/2" mnpt (bottom) x male acme (top)

K-LINE TAPPING SADDLE (includes nuts and washers for u-bolt in pod)

order code: **KLTPS32** 32mm Tapping Saddle

KLTPS40 40mm Tapping Saddle

KLTPS45 45mm Tapping Saddle



NELSON R2000WF WINDFIGHTER - PRESSURE REGULATED

order code: **R2000WF-(x)**

Nozzle Options: x =

G = Green Nozzle & Green Plate **T** = Tan Nozzle & Red Plate

R = Red Nozzle & Red Plate **A** = Gold Nozzle & Gold Plate

B = Brown Nozzle & Brown Plate

NELSON MINI REGULATOR

order code: **NEL-REG-(x)**

Regulator Options: x =

40 = 40 psi **45** = 45 psi **50** = 50 psi

1/2" fnpt (bottom) x male acme (top)

K-LINE NELSON NIPPLE (connects Nelson Mini-Regulator to the K-Line Saddle)

K-LINE TAPPING SADDLE (includes nuts and washers for u-bolt in pod)

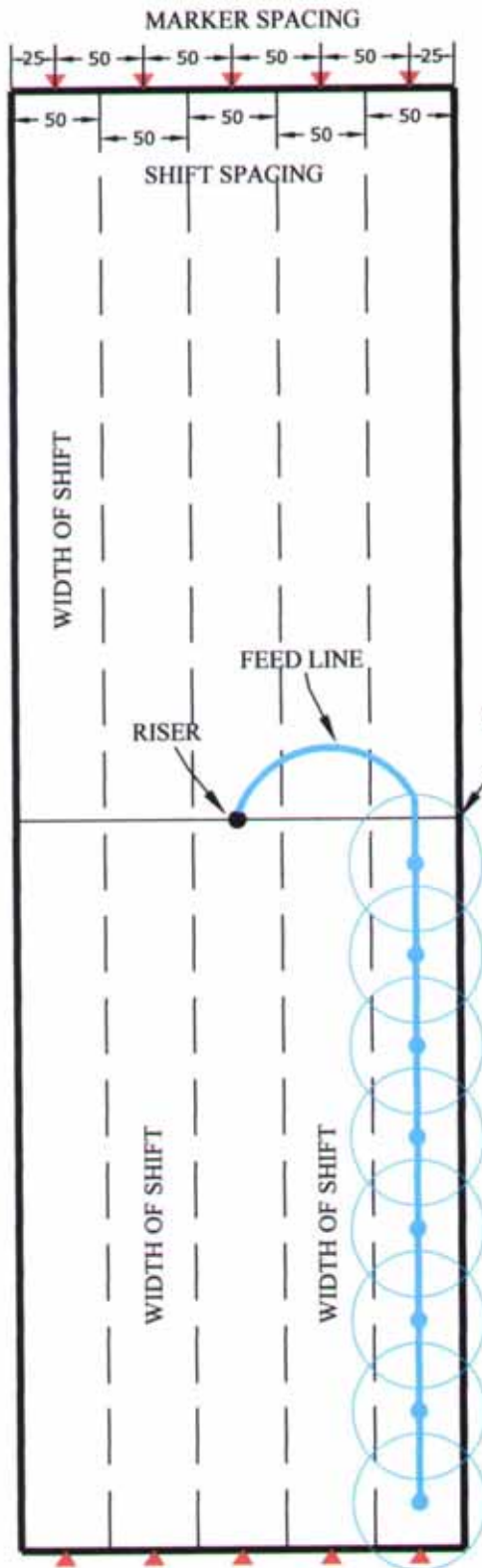
order code: **KLTPS32** 32mm Tapping Saddle

KLTPS40 40mm Tapping Saddle

KLTPS45 45mm Tapping Saddle

Diagram 4.

A Field marked off for K-Line Irrigation (10 day return)-10 shifts



Put visible markers at the end of the field in the center of each shift.

- ▶ = MARKING FLAG
- = K-LINE SPRINKLER POD

If the width of a shift is 50 feet, then the center of the shift width would be 25 feet from the edge of the field. Put a marker there and then mark 50 feet thereafter across the end of the field. If a different shift width is required, start by using $1/2$ the shift width, put a marker there and then mark multiple shift widths across the end of the field. At the other side of the field, you should find that the last marker is $1/2$ the shift width from the other edge of the field.

Put visible markers at the end of the field in the center of each shift.

Diagram 1.

K-Line - Risers

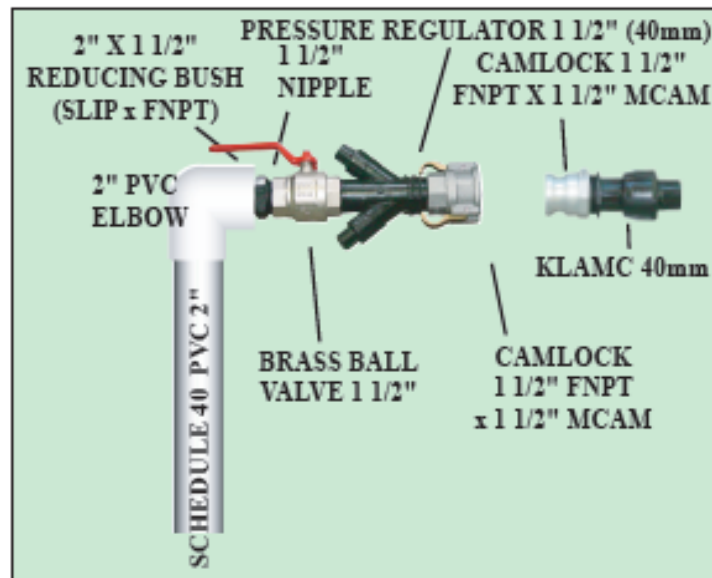
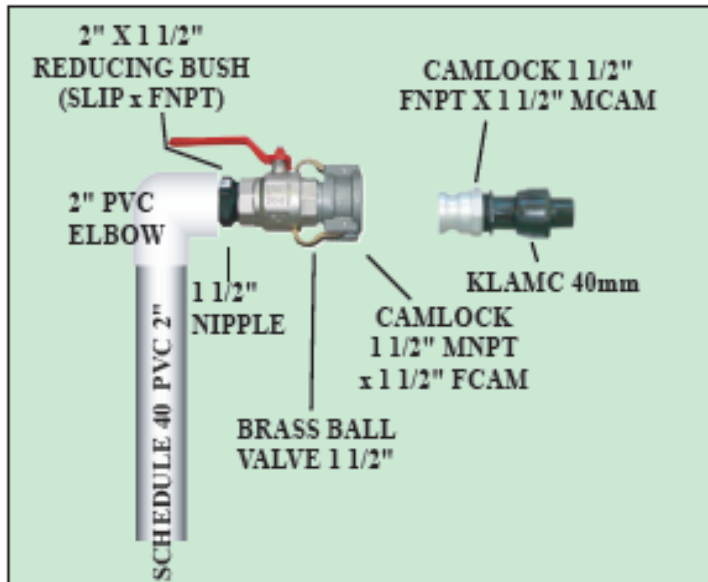
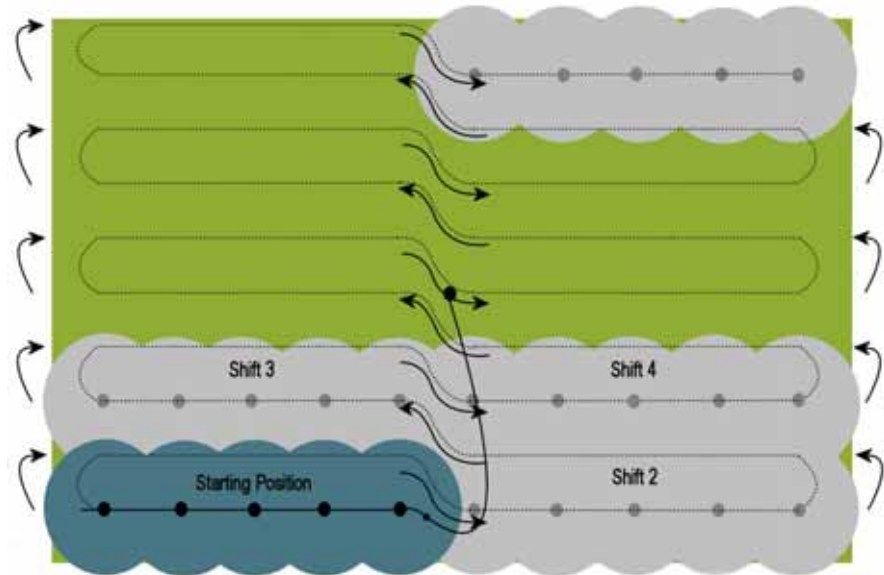
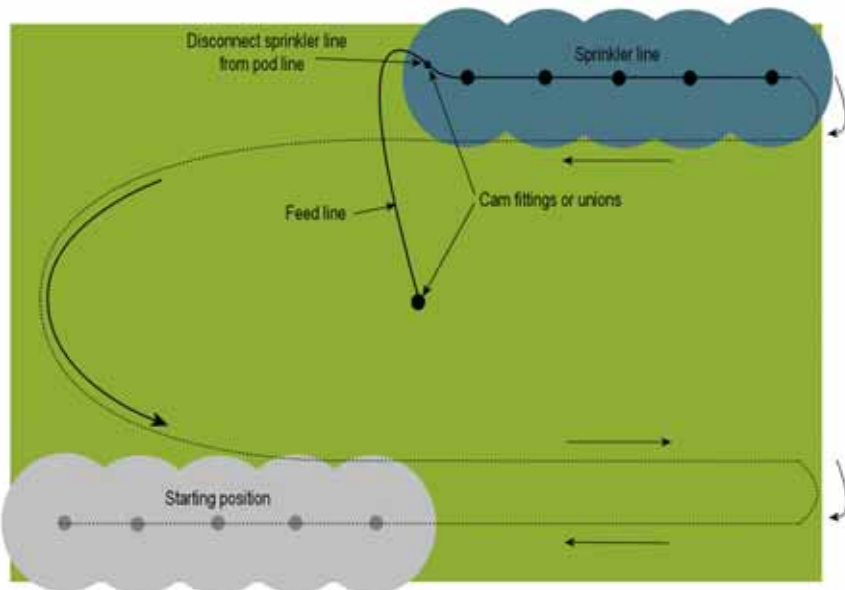


Diagram 6.

6 A.
Shifting rotation within
a typical field



6 B.
Pods returned to start
position after field has
been irrigated.



6 C.
Correct feedline
positioning to keep
pod lines straight.

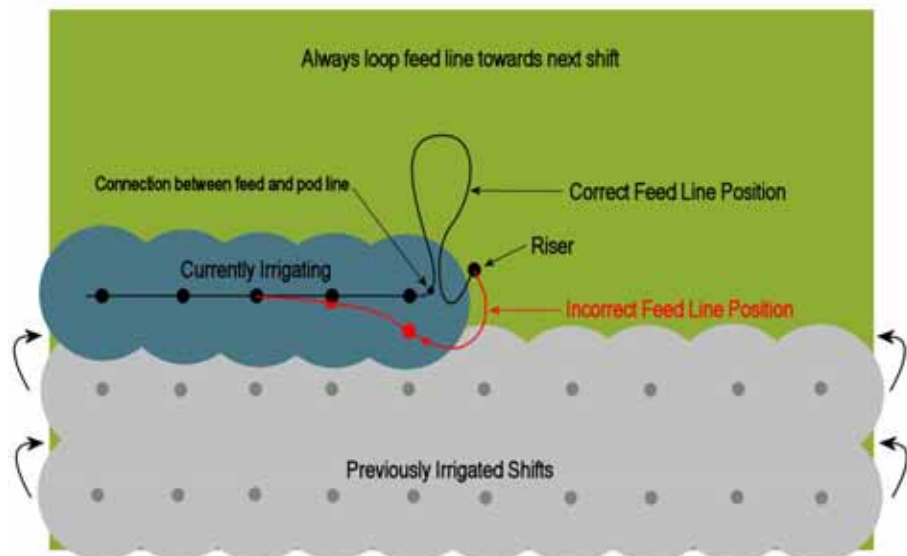
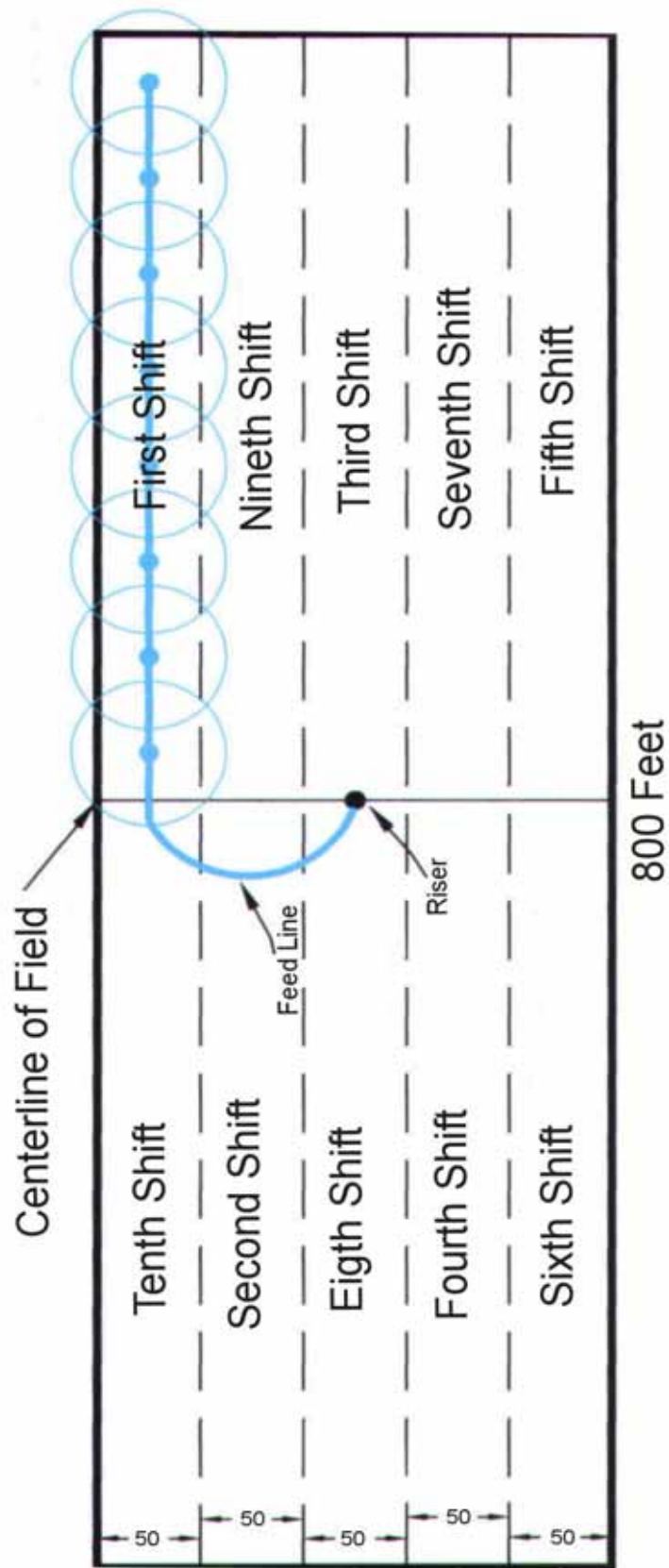















Diagram 7.

Alternate Line
Movement Method



K-Line Connectors/Components

	KLTPS32	Tapping Saddle 32mm w/ # 8 Metric Nuts & Washers
	KLTPS40	Tapping Saddle 40mm w/ # 8 Metric Nuts & Washers
	KLTPS45	Tapping Saddle 45mm w/ # 8 Metric Nuts & Washers (to tighten tapping saddle use 1/2" or 13mm socket wrench)
	UBSS32/40	SS U-Bolt for Pods, # 8 Metric thread
	NAAN-ADAPT	Naan #5022 Adaptor to K-Line Saddle (1/2" mpt x 1/2" fpt)
	NEL-ADAPT	Nelson Windfighter Adaptor to K-Line Saddle (For use in non regulated applications)(1/2" mpt x Acme)
	NEL-NIPPLE	Nelson Windfighter Nipple to K-Line Saddle (For use in regulated applications only)(1/2" mpt x 1/2" mpt)
	NAAN-5022-x	Naan #5022 Impact Sprinkler (Color (x) indicates nozzle size)(1/2" mpt)
	NAAN-NOZ-x	Naan #5022 Nozzle Only (Color (x) indicates nozzle size)
	R2000WF-x	Nelson Windfighter Sprinkler (Color (x) indicates nozzle size and plate)(Acme Threads)
	NEL-NOZ-x	Nelson Windfighter Nozzle (Color (x) indicates nozzle size)
	NEL-REG-xx	Nelson Windfighter Regulator (Number (xx) indicates psi)(fpt x Acme Threads)
	KLSG	Generic Stock Guard w/ Screws for all sprinklers
	KLCG/NELSON	K-Line Coyote Guard for Nelson Windfighter Sprinkler
	RXPOP-UP	Pop up for Nelson 9 degree sprinkler for orchard application

K-Line Connectors/Components



KLASC32	Straight Coupling (CompXComp) 32mm
KLASC40	Straight Coupling (CompXComp) 40mm
KLASC50	Straight Coupling (CompXComp) 50mm
KLARC4032	Straight Reducing Coupling (CompXComp) 32x40mm
KLARC4540	Straight Reducing Coupling (CompXComp) 40x45mm
KLARC5040	Straight Reducing Coupling (CompXComp) 40x50mm



KLAMC32	IPS Male Adapter (MPTxCompression) 32mm
KLAMC40	IPS Male Adapter (MPTxCompression) 40mm
KLAMC45	IPS Male Adapter (MPTxCompression) 45mm
KLAMC50	IPS Male Adapter (MPTxCompression) 50mm



KLAFC32	IPS Female Adapter (FPTxCompression) 32mm
KLAFC40	IPS Female Adapter (FPTxCompression) 40mm
KLAFC50	IPS Female Adapter (FPTxCompression) 50mm



RXGHC32	Galvanized Hook Cap 32mm
RXGHC40	Galvanized Hook Cap 40mm
RXGHC45	Galvanized Hook Cap 40mm



KLPTH32	All-In-One Plastic Tow Hook 32mm
KLPTH40	All-In-One Plastic Tow Hook 40mm



APU32	Pipe Union 32mm
APU40	Pipe Union 40mm
APU50	Pipe Union 50mm
APU4032	Reducing Pipe Union 40mm x 32mm



KLRB5040	Reducing bush 50/40mm
----------	-----------------------



KLPRV40-xx	Pressure Regulator 1½" mipt x mipt (xx = psi)
------------	--

K-Line Quick Trouble Shooting Guide

Symptom	Possible Cause
1. Poor or no distribution pattern	<ul style="list-style-type: none">a. plugged nozzlesb. obstruction in tubingc. improper pump pressured. incorrect pod spacinge. shifts are too widef. check for holes in tubing
2. Pods rolling over during turns	<ul style="list-style-type: none">a. making too wide a turn during shifting processb. use of chain to connect to towing vehicle (Use rope instead of chain to connect to towing vehicle)
3. Connectors coming loose	<ul style="list-style-type: none">a. Improper tightening of K-Line connectors (Use two pipe wrenches to tighten, discard any connectors that may have come loose, cut off and discard 3" of old scarred tubing when repairing, make sure you have a square cut)
4. Nelson Windfighter Sprinklers coming loose	<ul style="list-style-type: none">a. Sprinklers improperly tightened (a small drop of Elmers type, white glue, on the ACME threads will eliminate the problem)
5. Water stream hits inside of the pod	<ul style="list-style-type: none">a. tapping saddle improperly tightened down, (reposition tapping saddle and tighten down evenly)
6. Feed line loop get too tight	<ul style="list-style-type: none">a. not enough feed line
7. Feed line tails in when trying to reach the outside edges of a parcel	<ul style="list-style-type: none">a. not enough feed line
8. K-Line feedline gets kinked	<ul style="list-style-type: none">a. Failure to reposition feedline. (Feedline needs to be repositioned every 3 - 4 moves, see page 17 and diagram 6A and 6C)



4270 Hollywood Road ■ St. Joseph ■ MI 49085
Toll Free 866-665-5463 ■ 269-429-3000 ■ Fax 269-429-3700
www.k-linena.com ■ info@k-linena.com

K-Line's Kwik Shifter



A device towed behind an ATV or other vehicle, the quick shifter is designed to pick up the ends of the K-Lines without the need to stop or dismount the towing vehicle.

Each K-Line is fitted with a brightly colored plastic ball attached to a short tow rope. As the Kwik Shifter passes over the ball it latches on allowing the shifting of the K-Line to commence.

On the completion of the shift the ball is released from the Kwik Shifter by pulling on a release rope, again without the need to dismount or stop the towing vehicle.

An added advantage of the Kwik Shifter is a hook attachment which allows the moving and adjustment of the feed line without the need to dismount the towing vehicle.

Features

- **Safety**
- **Quicker**

- **Less Effort**
- **Versatile**

- **Minimum set up**

Towing is from the towing vehicle draw bar.

Shifting can be done without stopping. Pick up and drop off at speeds of up to 15 MPH.

Feed lines can be adjusted without manhandling.

The Kwik Shifter can be towed behind an ATV or other suitable vehicle.

Existing K-Line systems are easily modified to suit the Kwik Shifter simply by adding a towing ball and rope to the end of each individual K-Line.



4270 Hollywood Road ■ St. Joseph, Michigan 49085
Phone 269.429.3000 ■ Fax 269.429.3700 ■ Toll Free 866.665.5463
www.K-LineNA.com ■ info@k-linena.com

K-Line's New Kwik Shifter II



The Kwik Shifter II is a device pulled behind an ATV or other small tow vehicle and is designed to catch the ends of K-Lines without the need to stop or dismount the towing vehicle.

Heavy duty, bright colored plastic balls (marine balls) are attached with a short rope to the ends of the K-Lines. The Kwik Shifter II passes over the ball, catching it, and allowing the driver to shift the K-Line to the new position without stopping or dismounting. When the driver reaches the new shift position, he pulls the trip rope, releasing the ball and K-Line from the Kwik Shifter II. The entire shift move can be done without stopping or dismounting the ATV.

K-Line's new Kwik Shifter II offers the same advantages of safety, efficiency, and convenience as our original model but with a new adjustable hitch and heavy duty frame.

Feature/Benefit

- Ease of Use:** The Kwik Shifter II allows for greater ease of use by shifting K-Lines without unnecessary handling.
- Saves Time:** Moving K-Lines with the Kwik Shifter II can be done without stopping. You can pick up and drop off K-Lines at speeds of up to 15 MPH making shift moves quick and easy.
- Easy to Setup:** K-Lines can be easily adapted for use with the Kwik Shifter II by adding a short rope and towing ball to the end of each individual K-Line.
- Easy to Adapt:** Kwik Shifter II's new adjustable hitch accommodates a wide variety of tow vehicles, ensuring proper height adjustment for reliable ball pickup.
- Safety:** Towing is done from the vehicle draw bar, providing an extra margin of safety along with a higher degree of traction.
- Reliable:** Kwik Shifter II's new heavier duty frame is rugged enough to withstand the stresses of towing heavy loads and also reduces side slip when towing lines.