



2.2.5 MANUAL MOVE SYSTEMS

MANUAL MOVE
SYSTEMS

How to Operate Siderolls

The precise instructions for operating sideroll irrigators will vary for each brand of machine. The operators manual must be consulted to ensure safe operation of the irrigator. However, for most siderolls, the basic operational steps are similar, and are listed below. For further information and practical operating tips, see Section 2.2.7.

General operation

1. After irrigation, close the hydrant, remove the submain and relocate it to the next position.
2. It is important that before the sideroll is moved that enough time has been allowed so that the line drains completely, due to the additional weight of the water.
3. Set the controls to the start position and start the engine.
4. The engine and the gearbox oil should be allowed around a minute to warm up.
5. Put the engine into gear to start movement of the sideroll in the desired direction.
6. The speed of the irrigator can be altered as required. If the engine sounds laboured, reduce the speed (lower gear). The engine should be operated at no less than the specified RPM. This reduces the likelihood of overheating, due to decreased fan cooling.
7. The distance travelled is dependent on the diameter of the wheels. This means that the distance to the next position can be determined by watching the number of wheel rotations.
8. It is usual that the end pipes lag slightly behind the pipes at the centre. To ensure that the all sprinklers are upright, move until the sprinklers on the end of the sideroll are upright. Shift the gear lever to neutral position. With the stabilisers engaged at the end, reverse until the central sprinklers are also upright.
9. Connect the submain, support the sideroll line and turn on the hydrant.

Daily maintenance

1. When moving, it is important that the sideroll is kept straight or the ends are lagging slightly behind. This is usually done by pulling the ends back at the start of the new irrigation round. Otherwise the ends tend towards the centre, which can cause buckling and damage to occur.
2. If the sideroll is out of position the ends can easily be swung back into position.

Moving to the start of next irrigation round.

1. Disconnect the sideroll from the mainline.
2. If stabilisers are used, switch the ratchet bars to the other side of the sideroll.
3. Roll the sideroll back to the desired location.

4. Return the ratchets to the trailing side of the sideroll.

Terrain

1. If soil conditions vary along the line, e.g. soft ground, the sideroll tends to drift towards the softer ground. This effect can be reduced by repositioning the mover unit nearer the end with the soft ground. This helps balance the load of the two ends on the mover.
2. If the paddocks are irregular in shape, e.g. the width increases or decreases, it is useful to add or drop off sections as required.
3. If the sideroll is not tracking parallel with the mainline, the tracking can be improved by moving one end ahead of the line and the other end back. These changes need to be made gradually.

Winter storage

1. To increase the life of the sideroll it is suggested that the drive unit with the engine and the transmission be removed and stored inside.
2. Ensure that the line is completely drained.
3. Anchor the line, e.g. to a fence, to prevent rolling.
4. Problems may arise with contraction and expansion of joints in the winter. To reduce these effects divide the line into short sections, disconnecting couplers.

How to calculate the depth of water applied

It is important to understand the relationship between flow rate, shift distance and sideroll length to work out how much water the irrigator will apply. The depth of water applied is determined by:

1. Flow rate (m^3/hr)
2. Shift Distance (m)
3. Sideroll Length (m).

The flow rate, sprinkler spacing and sideroll length are assumed constant for a particular system.

The water applied per eight hours can be determined from Table 1 over. For operating times other than an eight hours, the calculation described in Step 2 over can be used.

To use Table 1 follow these steps:

1. Using the sprayline length, sprinkler

spacing and flow rate that most closely matches your system, intersect the vertical and horizontal lines and read off the depth of water applied (mm/8 hr).

- To determine the depth applied for an irrigation cycle longer or shorter than 8 hours, then use the following equation to adjust the value selected from the table.

$$\text{Depth applied} = \frac{\text{actual rotation time in hours} \times \text{depth applied in 8 hours}}{8}$$

Example

Sideroll flow rate 50 m³/hr

Sideroll length 400 m
 Operating time 8 h (for all values in table)
 Depth of water applied 56 mm (from Table 1)

If actual operating time is 4 hours;

$$\begin{aligned} \text{Depth applied} &= \frac{\text{actual operating time in hours} \times \text{depth applied in 8 hours}}{8} \\ &= \frac{4 \times 56}{8} = 28 \text{ mm} \end{aligned}$$

Table 1. Water applied, millimetres per eight hours

| | | | | Flow Rate | | | | | | | m ³ /hr |
|------------------|------|----------------|----|-----------|----|-----|-----|-----|-----|-----|--------------------|
| | | | | 10 | 20 | 30 | 40 | 50 | 60 | 70 | |
| Sprayline Length | | Shift Distance | | 37 | 73 | 110 | 147 | 184 | 220 | 257 | GPM |
| m | ft | m | ft | | | | | | | | Hectares |
| 200 | 656 | 12 | 39 | 33 | 67 | 100 | 133 | | | | 0.2 |
| 200 | 656 | 14 | 46 | 29 | 57 | 86 | 114 | 143 | | | 0.3 |
| 200 | 656 | 16 | 52 | 25 | 50 | 75 | 100 | 125 | 150 | | 0.3 |
| 200 | 656 | 18 | 59 | 22 | 44 | 67 | 89 | 111 | 133 | 156 | 0.4 |
| 200 | 656 | 20 | 66 | 20 | 40 | 60 | 80 | 100 | 120 | 140 | 0.4 |
| | | | | | | | | | | | |
| 250 | 820 | 12 | 39 | 27 | 53 | 80 | 107 | 133 | | | 0.3 |
| 250 | 820 | 14 | 46 | 23 | 46 | 69 | 91 | 114 | 137 | | 0.4 |
| 250 | 820 | 16 | 52 | 20 | 40 | 60 | 80 | 100 | 120 | 140 | 0.4 |
| 250 | 820 | 18 | 59 | 18 | 36 | 53 | 71 | 89 | 107 | 124 | 0.5 |
| 250 | 820 | 20 | 66 | 16 | 32 | 48 | 64 | 80 | 96 | 112 | 0.5 |
| | | | | | | | | | | | |
| 300 | 984 | 12 | 39 | 22 | 44 | 67 | 89 | 111 | 133 | 156 | 0.4 |
| 300 | 984 | 14 | 46 | 19 | 38 | 57 | 76 | 95 | 114 | 133 | 0.4 |
| 300 | 984 | 16 | 52 | 17 | 33 | 50 | 67 | 83 | 100 | 117 | 0.5 |
| 300 | 984 | 18 | 59 | 15 | 30 | 44 | 59 | 74 | 89 | 104 | 0.5 |
| 300 | 984 | 20 | 66 | 13 | 27 | 40 | 53 | 67 | 80 | 93 | 0.6 |
| | | | | | | | | | | | |
| 350 | 1148 | 12 | 39 | 19 | 38 | 57 | 76 | 95 | 114 | 133 | 0.4 |
| 350 | 1148 | 14 | 46 | 16 | 33 | 49 | 65 | 82 | 98 | 114 | 0.5 |
| 350 | 1148 | 16 | 52 | 14 | 29 | 43 | 57 | 71 | 86 | 100 | 0.6 |
| 350 | 1148 | 18 | 59 | 13 | 25 | 38 | 51 | 63 | 76 | 89 | 0.6 |
| 350 | 1148 | 20 | 66 | 11 | 23 | 34 | 46 | 57 | 69 | 80 | 0.7 |
| | | | | | | | | | | | |
| 400 | 1311 | 12 | 39 | 17 | 33 | 50 | 67 | 83 | 100 | 117 | 0.5 |
| 400 | 1311 | 14 | 46 | 14 | 29 | 43 | 57 | 71 | 86 | 100 | 0.6 |
| 400 | 1311 | 16 | 52 | 12 | 25 | 37 | 50 | 62 | 75 | 87 | 0.6 |
| 400 | 1311 | 18 | 59 | 11 | 22 | 33 | 44 | 56 | 67 | 78 | 0.7 |
| 400 | 1311 | 20 | 66 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 0.8 |

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How to operate K Lines

K Line irrigation systems are simple in construction and are relatively straightforward to operate. However, some care is required to get optimum performance out of the system.

General Operation

The shifting procedure is detailed in the instruction manual. Further information is given in the Practical Tips Section 2.2.7.

The following is a summary of the shifting process.

1. Using a tractor, four wheel motorbike or farm truck, go to within a few metres of the far end of the K Line and park the vehicle in the direction of the next run, i.e. facing towards the centreline of the paddock.
2. Using a short tow rope (two - three metres long), attach the end of the K Line to the towing vehicle. Make sure that the pipeline is in a tight U but not so tight that it will kink.
3. Tow the K Line along the new line. A marker on the fence is useful to line shifts up. It is important to place the line in the correct position as exceeding the design spacing will result in uneven watering.
4. Make sure you stop towing at the correct position so that the sprinkler closest to the hydrant is at the correct spacing from the previous shift. It is easy to go too far, resulting in a dry strip in the middle or not far enough, resulting in an over-watered area in the centre.
5. Manually adjust the positions of the pods if necessary.
6. Visually check that all sprinklers are operating correctly and that there are no leaks in the hoses. If necessary, replace or repair them.

It is not necessary to turn the system off while shifting except when returning the system to the start position.

Improving uniformity

Normally standard K Lines are shifted about 15 metres from the previous shift. In extreme conditions, insufficient watering between the rows may become apparent. To minimise this effect, offset the shift distance by half a shift after completing a rotation in a paddock. When returning to the start position, place the K Line in between the positions it had been on the previous rotation. So, if shift distance is 15 metres, place the K Line 7.5 m from the first position and then 15 metres on subsequent moves until the rotation is complete. This fills in the gaps to give uniform irrigation over the whole paddock.

How to calculate the depth of water applied

It is important to understand the relationship between K Line sprinkler flows, shift distance and run time to work out how much water the system will apply. K Lines normally operate in one position for up to 24 hours and shifting twice daily is usually avoided if possible. The depth of water applied is determined by:

1. Sprinkler flow rate (l/h)
2. Lane spacing of K Line (m)
3. Sprinkler spacing along K Line (m)
4. Operating time (hours)

The sprinkler spacing and lane spacing are assumed to be fixed. Sprinkler flow rate depends on sprinkler operating pressure and nozzle size.

Depth of water applied over 24 hours can be calculated from Table 1 below. Applications other than for a 24-hour irrigation can be calculated from this value. To use the table, follow these three steps:

1. Select the nozzle size on the left of the chart that most closely matches the nozzles on the K Line.
2. Move across to the sprinkler nozzle operating pressure of the K Line sprinklers. If you are not sure of the operating pressure, you will have to measure it. Instruction on how to measure sprinkler operating pressure is given in Section 2.4.5.
3. Find the spacing at the top of the chart (sprinkler spacing x K Line shift distance) and move down the column to line up with the nozzle and operating pressure.
4. Read off the depth of water applied in 24 hours.

Example

Sprinkler nozzle size: 2.8 mm
 Sprinkler operating pressure 300 kPa
 Sprinkler spacing 15 m
 Shift distance 15 m
 Depth applied in 24 hours 59 mm (shaded in table)

Example

Actual irrigation time = 12 hours
 Depth of water applied = $\frac{12 \text{ hrs} \times 59 \text{ mm}}{24 \text{ hrs}}$
 = 30 mm

5. To determine the application depth for irrigation other than 24 hours — do the following calculation:

$$\text{Depth of water applied} = \frac{\text{Actual irrigation time} \times \text{depth applied (from chart)}}{24}$$

Table 1: Water applied mm/24 hours

| Nozzle (mm) | Sprinkler Pressure | | Sprinkler Flow | | Sprinkler Spacing x Shift Distance | | |
|----------------|--------------------|-------|---------------------|-------|------------------------------------|-------|-------|
| | (kPa) | (psi) | (m ³ /h) | (gpm) | 12x12 | 12x15 | 15x15 |
| 2.5 | 250 | 36 | 0.39 | 1.4 | 65 | 52 | 42 |
| | 300 | 43 | 0.43 | 1.6 | 72 | 57 | 46 |
| | 350 | 50 | 0.46 | 1.7 | 77 | 61 | 49 |
| 2.8 | 250 | 36 | 0.5 | 1.8 | 83 | 67 | 53 |
| | 300 | 43 | 0.55 | 2.0 | 92 | 73 | 59 |
| | 350 | 50 | 0.59 | 2.2 | 98 | 79 | 63 |
| 3.0 | 250 | 36 | 0.55 | 2.0 | 92 | 73 | 59 |
| | 300 | 43 | 0.63 | 2.3 | 105 | 84 | 67 |
| | 350 | 50 | 0.68 | 2.5 | 113 | 91 | 73 |

Note that these values are average values assuming no losses. In practice, some areas will receive more than the stated depth while other areas will receive less.

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