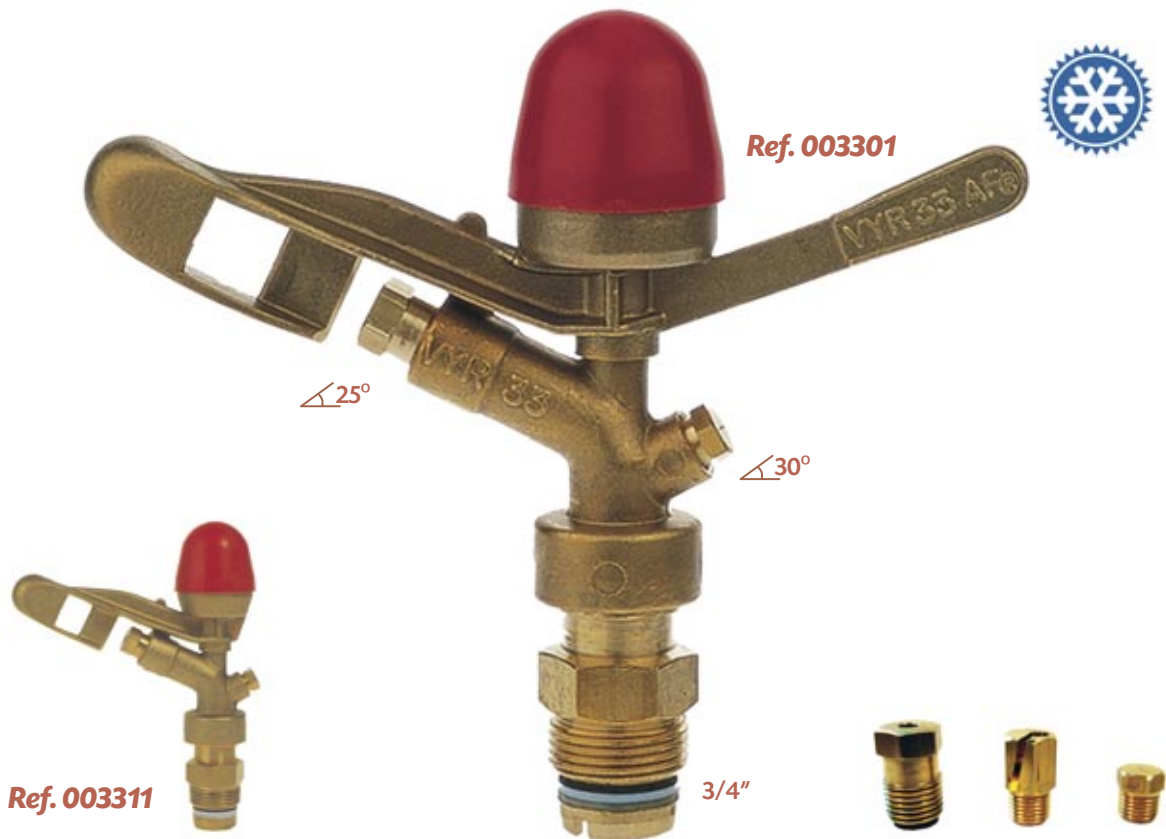


# VYR-33 Anti-Frost



## VYR-33 ANTI-FROST · Full Circle AG

### GENERAL PROPERTIES:

- Medium flow agricultural impact sprinkler.
- ANTI-FROST protection cover.
- 3/4" male or female connection.
- Made of brass and stainless steel.
- High-resistance rotating joints.
- Nozzle angles of 25° and 30°
- Special design for ANTI-FROST irrigation using materials resistant to extreme conditions.

### TECHNICAL SPECIFICATIONS:

- Range distance: 10 - 13,5 m / 33 - 44 ft.
- Flow: 900 - 2920 L/H / 237 - 770 GPH.
- Working pressure: 2,5 - 5 BAR / 36 - 72 PSI.
- Area: Full circle.
- Nozzles: Two nozzles: one main nozzle and a secondary deflector nozzle or plug.
- Trajectory angles: 25° and 30°
- Maximum stream height: 3.7 m / 12 ft.
- Rotation time: Depending on the pressure and the nozzles, the rotation will be constant and continuous.
- Uniformity coefficient higher than 90% in areas of 17x17R, 18x18T and 19x17T (meters)

### APPLICATIONS:

- Horticultural plantations, cereals, tubers, leguminous plants and fruit trees. Designed to work in ANTI-FROST conditions.

### MEASUREMENTS:

- Height: 15 cm / 5,9 in.
- Width: 17 cm / 6,7 in.
- Weight: 490 g / 1,1 Lbs.
- Units per box: 50

### OPTIONS:

- Threads in BSP or NPT under demand.
- Models with short arm with male or female connection.
- Brass or plastic nozzles, depending on the customer's technical specifications.
- Secondary nozzle with deflector slot or plug.
- Assembled on a pressure regulator for self-compensation of pressure and flow.

### MODELS:

- Ref. 003301: 3/4" male thread.
- Ref. 003302: 3/4" female thread.
- Ref. 003311: 3/4" short arm male thread.
- Ref. 003312: 3/4" short arm female thread.

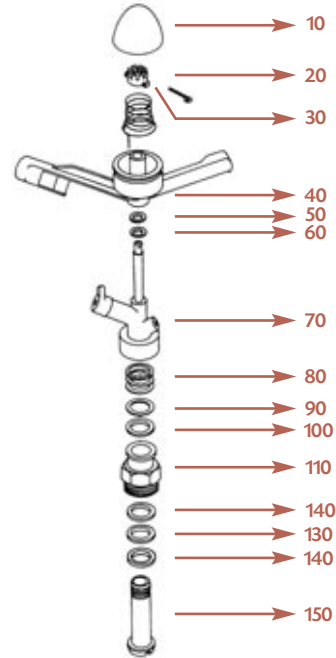


## TABLES & PARTS

### Technical guidance table VYR-33

NOZZLE	Spacing (m) / Precipit. rate (mm/h) Spacing (ft) / Precipit. rate (in/h)					
	BAR PSI	16x18 T	16x20 T	18x18 T	18x20 T	20x20 T
		53x59 T	53x66 T	59x59 T	59x66 T	66x66 T
4 mm 5/32"	3	3,6	3,3	3,2		
	44	0,14	0,13	0,13		
	3,5	3,9	3,5	3,5	3,1	
	51	0,15	0,14	0,14	0,12	
	4	4,2	3,8	3,7	3,4	3
	58	0,17	0,15	0,15	0,13	0,12
4,8 mm 3/16"	4,5	4,5	4	4	3,6	3,2
	65	0,18	0,16	0,16	0,14	0,13
	5	4,7	4,2	4,2	3,8	3,4
	73	0,19	0,17	0,17	0,15	0,13
	3	5,2	4,7	4,7	4,2	
	44	0,20	0,19	0,19	0,17	
4,8 x 2,4 mm 3/16" x 3/32"	3,5	5,7	5,1	5	4,5	4,1
	51	0,22	0,20	0,20	0,18	0,16
	4	6,1	5,4	4,5	4,8	4,4
	58	0,24	0,21	0,18	0,19	0,17
	4,5	6,4	5,8	5,7	5,1	4,6
	65	0,25	0,23	0,22	0,20	0,18
4,8 x 2,4 mm 3/16" x 3/32"	5	6,8	6,1	6	5,4	4,9
	73	0,27	0,24	0,24	0,21	0,19
	3	6,5	5,9	5,8	5,2	4,7
	44	0,26	0,23	0,23	0,20	0,19
	3,5	7,1	6,4	6,3	5,7	5,1
	51	0,28	0,25	0,25	0,22	0,20
4,8 x 2,4 mm 3/16" x 3/32"	4	7,6	6,8	6,7	6,1	5,4
	58	0,30	0,27	0,26	0,24	0,21
	4,5	8	7,2	7,1	6,4	5,8
	65	0,31	0,28	0,28	0,25	0,23
	5	8,5	7,6	7,5	6,8	6,1
	73	0,33	0,30	0,30	0,27	0,24

T: Triang. CU < 85% CU 85-88% CU 88-92% CU > 92%



### Performance nozzle table VYR-33

#### Long range nozzle (long vane) + plug

NOZZLE	4 mm 5/32"		4,4 mm 11/64"		4,8 mm 3/16"		5,5 mm 7/32"	
	BAR PSI	L/H GPH Ø m Ø ft	L/H GPH Ø m Ø ft	L/H GPH Ø m Ø ft	L/H GPH Ø m Ø ft	L/H GPH Ø m Ø ft	L/H GPH Ø m Ø ft	
2	900	27,5	1000	28	1270	30	1630	31
29	238	90	264	92	335	98	431	102
2,5	980	28	1140	29	1400	31	1795	32,4
36	259	92	301	95	370	102	474	106
3	1065	29,5	1225	30	1550	32	1960	33,2
44	281	97	324	98	409	105	518	109
3,5	1150	30,6	1295	31,2	1630	33	2095	34
51	304	100	342	102	431	108	553	112
4	1230	31	1390	32,3	1770	34	2220	35,3
58	325	102	367	106	468	112	586	116
4,5	1290	31,2	1445	32,5	1890	34	2340	36
65	341	102	382	107	499	112	618	118
5	1360	31,8	1510	32,5	1980	34	2470	36
73	359	104	399	107	523	112	653	118

Standard Ø: Diameter range

#### Long range nozzle (long vane) + short range nozzle

NOZZLE	4 x 2,4 mm 5/32 x 3/32"		4,4 x 2,4 mm 11/64 x 3/32"		4,8 x 2,4 mm 3/16 x 3/32"		5,5 x 2,4 mm 7/32 x 3/32"	
	BAR PSI	L/H GPH Ø m Ø ft	L/H GPH Ø m Ø ft	L/H GPH Ø m Ø ft	L/H GPH Ø m Ø ft	L/H GPH Ø m Ø ft	L/H GPH Ø m Ø ft	
2	1150	27,5	1290	28	1560	30	1880	31
29	304	90	341	92	412	98	497	102
2,5	1310	28	1435	29	1750	31	2090	32,4
36	346	92	379	95	462	102	552	106
3	1420	29,5	1550	30	1920	32	2290	33,2
44	375	97	409	98	507	105	605	109
3,5	1530	30,6	1660	31,2	2050	33	2460	34
51	404	100	439	102	542	108	650	112
4	1630	31	1770	32,3	2180	34	2620	35,3
58	431	102	468	106	576	112	692	116
4,5	1720	31,2	1870	32,5	2300	34	2770	36
65	454	102	494	107	608	112	732	118
5	1800	31,8	1970	32,5	2430	34	2920	36
73	476	104	520	107	642	112	771	118

Standard Ø: Diameter range

- For optimum distribution avoid use in shady areas.
- Sprinklers will be supplied with standard nozzles unless otherwise specified.
- In order to calculate the flow, add the flows of the two nozzles. The range of the rear nozzle must be less than that of the main nozzle.
- These results has been obtained at indoor laboratory with 0 m/seg win velocity. Outdoor results may change range distances.

# Frost-protection irrigation

The sprinkler irrigation coverage method is the most efficient and reliable existing anti-freeze irrigation system. The **VYR-33** is the most widely used sprinkler and most versatile in the use of anti-frost irrigation.

The special physical and technical equipment and issuers are also special anti-frost irrigation, with materials like brass, steel and high strength plastics. Issuers are prepared to work with higher pressures than common sprinklers and they have protections in their torsion springs and rotary joints that these are never blocked by ice or other foreign matter.

The VYR-33 has these features that define a sprayer and also anti-freeze is justified in his long experience in the market. The solidity and robustness of VYR-33 together with the high quality of materials that has made us offer required confidence to use this model in a process as delicate as this in which their crops depend on proper functioning of this model.

Sprinkler irrigation with frost-protection coverage on the foliage of plants is the most widely used because this system best suited to most crops. The ice layer is produced on the flower in the future will yield the fruit is both protected by a layer of ice, thereby maintaining the latent heat from inside the plant and not allowing the cells are damaged wall of the flower, stem and / or fruit. Furthermore, the whole tree irrigation is unique in that through the formation of this layer of ice on the flower, while also protecting the pollen that bees need for the process of pollination. This is very important to always use the correct pressure, rather high, getting a very small drop. This small drop would not damage the flowers and also help faster freezing.

In most cases, damage caused by frost can be prevented by spraying the crops with water during periods of frost. Sprinkler irrigation on plant foliage is one of the most effective methods of preventing damage to delicate crops.

## HOW IRRIGATION FOR FROST PROTECTION WORKS

This method is based on three factors:

1. Latent heat is released as water freezes. This latent heat prevents the temperature of the plants from dropping below the freezing point.
2. A mixture of ice and water exposed to below-freezing conditions stays around 0°C until it is completely frozen.
3. Plant sap is not pure water; therefore plants have a lower freezing point than 0°C (32°F). Most plants do not get damaged by frost until temperatures drop well below freezing.

## IMPORTANT CONSIDERATIONS

### Sprinkler rotation speed:

In order to maintain a stable temperature the sprinkler must rotate quickly. The sprinkler must complete a rotation in less than 30 seconds in order to be deemed quick enough (the ideal rotation speed is normally between 30 and 40 seconds).

### Water application level:

The volume of water in relation to its application rate is one of the most important considerations when designing a frost protection irrigation system. The application rate is calculated after considering several factors, such as temperature, wind speed and humidity levels (see the table with minimum precipitation levels).

Wind can affect evaporation levels as well as uniformity, resulting in more water having to be applied in order to provide the same protection as in the absence of wind.

### Uniformity:

An effective frost protection system depends on how the sprinkler distributes the water.

You must pay special attention when evaluating the spacing between sprinklers, operational pressures and conditions. An acceptable design should result in a Uniformity Coefficient equal to or greater than 84% and a Distribution Uniformity equal to or greater than 75%.

## ADDITIONAL CONSIDERATIONS

Prolonged periods of frost and the application of frost protection irrigation may result in a significant accumulation of ice on the plants. The irrigation system should generally be started at around 2° C to prevent water from freezing inside the pipes.

## SPECIFIC FROST PROTECTION

The reason for using specific frost protection is to reduce the protected area to just the plant crop. This allows the system to operate with reduced flow and pressure, saving you water and money.

## CONCLUSIONS

A delicate crop can be destroyed by frost in just one night. The use of advanced irrigation systems for frost protection is an effective method for protecting your investment. Nevertheless, the correct design and use of these systems is very important for satisfactory results.

Minimum applications levels (fruit trees)					
Approx. minimum temperature (°C)	-3 a -4	-4 a -5	-5 a -6	-6 a -7	-7 a -8
Application rate (mm/h)	2.5	3	3.8	4.6	6.4