

## Frost Protection Calibration Quick Check

### Guidelines for Solid Set on Row Crops

Download from: [www.claw.net.nz/resources/irrigation](http://www.claw.net.nz/resources/irrigation)

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#### Measurement Procedure

##### What equipment will you need?

This guide and the worksheet

- 20 Collectors >150mm (9L buckets with handles)
- 1 Measuring cylinder (about 1 Litre)
- 1 50 m tape
- 1 Stop watch
- 1 Pen or pencil

##### Application test

- 1 Set up the test grid as described
- 2 Run the system to collect an easily measured amount of water. Record the run time
- 3 Measure the volume of water caught in each bucket. Record each in the correct position
- 4 Do the calculations as shown in the worksheet

#### Test Grid Layout

- 1 Observe the proposed test area in operation
- 2 Choose an area where all sprinklers appear to be operating correctly
- 3 Select four adjacent rows, starting with a sprinkler row (Diagram 1 in Guidelines)
- 4 Space five collectors (buckets) evenly between two adjacent sprinklers on the first row (Diagram 2 in Guidelines)
- 5 Align collectors in the crop row to represent the canopy to be protected. It may be easy to hang them by their handles on trellis wires
- 6 Space additional sets of five collectors on the three adjacent rows forming a square grid of twenty collectors in total (Diag 1).

### Recording

Record details from the field in the boxes below and over the page. Use the same measurement units (e.g. millimetres or metres) as specified and your calculated answers will have the correct units.

Area 1	
	Property Name
	Area 1 Test Date
	Area 1 Block
	Area 1 Rows
	Wind conditions
	Temperature
<b>a</b>	Test Pressure at pump [kPa]
<b>b</b>	Water Meter Flow Rate [m <sup>3</sup> /hr]
<b>c</b>	Target Application Rate [mm/hr]
<b>d</b>	Actual Application Rate [mm/hr]
<b>e</b>	Variance ( <b>d</b> / <b>c</b> x 100) [%]
<b>f</b>	Row width wetted [m]
<b>g</b>	Length of rows operating [m]
<b>h</b>	Area wetted ( <b>f</b> x <b>g</b> / 10,000) [ha]
<b>i</b>	*Field Flow Rate ( <b>d</b> x <b>h</b> x10) [m <sup>3</sup> /hr]
<b>j</b>	Variance ( <b>i</b> / <b>b</b> x 100) [%]

Area 2	
	Property Name
	Area 1 Test Date
	Area 1 Block
	Area 1 Rows
	Wind conditions
	Temperature
<b>a</b>	Test Pressure at pump [kPa]
<b>b</b>	Water Meter Flow Rate [m <sup>3</sup> /hr]
<b>c</b>	Target Application Rate [mm/hr]
<b>d</b>	Actual Application Rate [mm/hr]
<b>e</b>	Variance ( <b>d</b> / <b>c</b> x 100) [%]
<b>f</b>	Row width wetted [m]
<b>g</b>	Length of rows operating [m]
<b>h</b>	Area wetted ( <b>f</b> x <b>g</b> / 10,000) [ha]
<b>i</b>	*Field Flow Rate ( <b>d</b> x <b>h</b> x10) [m <sup>3</sup> /hr]
<b>j</b>	Variance ( <b>i</b> / <b>b</b> x 100) [%]

\* Calculating Field Flow Rate is difficult if there are varying row or sprinkler set ups in different areas within one system

## Worksheet for Row Crop Frost Protection Calibration

Enter your field measurements from Area 1 collectors by Row (R1 – R4)

Complete the calculations as shown

Repeat for Area 2

Use additional Worksheets for extra test areas

Area 1				Area 2			
Collected Volumes (mL)		Enter lowest five volumes in boxes 1 – 5		Collected Volumes (mL)		Enter lowest five volumes in boxes 1 – 5	
R1/1		1		1		1	
R1/2		2		2		2	
R1/3		3		3		3	
R1/4		4		4		4	
R1/5		5		5		5	
SUM R1		SUM Lo5		SUM R1		SUM Lo5	
R2/1		AVG Lo5		1		AVG Lo5	
R2/2		SUM ALL		2		SUM ALL	
R2/3		AVG ALL		3		AVG ALL	
R2/4		Calculate DU AVG Lo5 / AVG ALL		4		Calculate DU AVG Lo5 / AVG ALL	
R2/5		DU		5		DU	
SUM R2		Calculate Ave Applied Depth		SUM R2		Calculate Ave Applied Depth	
R3/1		Collector Area = (MouthDiam/2) <sup>2</sup> x 3.14		1		Collector Area = (MouthDiam/2) <sup>2</sup> x 3.14	
R3/2		Mouth Diam m		2		Mouth Diam m	
R3/3		Area m <sup>2</sup>		3		Area m2	
R3/4		Depth = AVG Vol ÷ Collector Area ÷ 1000		4		Depth = AVG Vol ÷ Collector Area ÷ 1000	
R3/5		Depth mm		5		Depth mm	
SUM R3		Calculate Application Rate:		SUM R3		Calculate Application Rate:	
R4/1		Depth / Test Time		1		Depth / Test Time	
R4/2		Test Time hr		2		Test Time hr	
R4/3		App Rate mm/h		3		App Rate mm/h	
R4/4		Calc. Excess Water Factor EWF%		4		Calculate Excess Water Factor EWF%	
R4/5		= ( (Rate ÷ DU) – Rate ) ÷ Rate x 100		5		= ((Rate ÷ DU) –Rate ) ÷ Rate x 100	
SUM R4		EWF %		SUM R4		EWF %	
SUM ALL				SUM ALL			