

MORVEN GLENAVY IKAWAI IRRIGATION COMPANY LIMITED

Irrigation Field Day

Making Good Irrigation Decisions

Wednesday 2 April 2014









MORVEN GLENAVY IKAWAI IRRIGATION COMPANY LIMITED

Irrigation Field Days

Making Good Irrigation Decisions

Date	Location	
Wednesday 2 April	Mitch Bragg, Rua Farming	Dairy farm – all irrigators
10.30 am – 12.00 pm	657 Old Ferry Rd, Dairy 36435	welcome – focus on pastoral
followed by sausage sizzle	Ph 027 4487 141	farming
Wednesday 2 April	Nick Ruddenklau, Craigburn	Arable farm – all irrigators
2.00 – 3.30pm	580 Waihao Back Rd	welcome – focus on cropping
followed by tea/coffee	Ph 03 689 6350	

- Do you really need to irrigate now? Or can you save power, labour, and money?
- How can you prevent runoff or ponding?
- How can you prevent loss to groundwater and nutrient leaching?

Speaker: Ian McIndoe, (Aqualinc and Irrigation NZ board member) will talk about how to get the answers to the above questions. He will discuss any other questions you have too.

1. Using a hand-held soil moisture meter

At the field day you can test at least 2 brands of hand held meters that are readily available for purchase. You will get a hand-out with details of each type of meter, where to buy them and price.

We will discuss soil moisture monitoring results and show how they can save you power, labour, nutrients and money.

2. Which system will you choose?

Several soil moisture monitoring options are available; hand held probes, buried soil moisture sensors and neutron probe monitoring services. What's the difference? How, where and when to use each type? What's the price difference?

3. Doing the Bucket Test – for irrigation water and effluent

The 'Bucket test' is a straight forward check of both the **Application Depth** and **Application Uniformity** of spray irrigation. With the results you can check how your system is working. The results also provide the evidence needed for farm plan audits. The same check can be used for both spray irrigation water and spray effluent application.

Come to the field day to use a hand-held soil moisture meter and to learn or practice the Bucket Test.

Contact: Sue Cumberworth (027 6286 110) or Claire Mulcock (027 4415 605)



MORVEN GLENAVY IKAWAI IRRIGATION COMPANY LIMITED

DairyNZ Discussion Group



Irrigation conversion – Border dyke to pivot/spray

All MGI irrigators are invited to this DairyNZ discussion group

When:	Wednesday 14 May, 10.45am – 1.00pm
Where:	Paul & Jo Kuriger's property, 592 Morven Glenavy Rd, Ph 03 689 4896
Speaker:	Ian McIndoe, Aqualinc Research Ltd and Irrigation NZ board member
Contact:	Chrissy Williams, Ph 021 227 6476

This discussion group meeting will look at all aspects of conversion from border dyke to spray irrigation. Paul and Jo Kuriger have installed one pivot and plan to put in a second.

Topics for discussion include:

- Planning and Design
- Installation and Commissioning
- Contracts
- Operation and monitoring for efficient irrigation
- Pasture growth rates under spray vs border dyke
- Effects on ground water levels of reduced border dyke area and the impacts



Do you really need to irrigate now?

Field Day Activity

In a small group go to Site 1 or Site 2 and assess the soil moisture and need to irrigate following the techniques and questions below. Write your answers in the table.

Change to the second site and repeat the activity.

Farm Irrigation Scenario

- Date early November
- Soil Type Templeton silt loam
- Rainfall average season, rain forecast in 3 days
- Pivot irrigation
- 3 day return applying 15mm
- Permanent pasture
- Flat land

	Site 1	Site 2
1. Visual and Walking		
a. Where is soil moisture at?		
b. When does it need irrigation?		
c. How many mm?		
2. Electric Fence Standard		
a. Where is soil moisture at?		
b. When does it need irrigation?		
c. How many mm?		
3. Digging Hole		
a. Where is soil moisture at?		
b. When does it need irrigation?		
c. How many mm?		
4. Hand held Probe		
a. Where is soil moisture at?		
b. When does it need irrigation?		
c. How many mm?		

DIY Irrigation Evaluation - Step 4b: Measure application depth and distribution uniformity (DU)

The 'bucket test'

Use a set of buckets to measure how much water is being applied by the irrigator and how uniformly. Carry out these measurements at least once, even if there is a digital readout on the machine, as sometimes they can be wrong.

- 1. Spread 10 to 50 buckets evenly across the irrigated area putting a stone or weight in each bucket for stability. See the bucket layout suggestions
- 2. Operate the irrigation on that area as per normal procedure
- 3. Measure and record how much water is in each bucket using the tables below
- 4. Calculate the application depth and application uniformity using the steps on the following pages.

Bucket number	Irrigator 1	Irrigator 2	Irrigator 3
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
10			
17			
10			
20			
Total			
volume	ml	ml	ml

Bucket	Irrigator 1	Irrigator 2	Irrigator 3
21			J
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
36			
37			
38			
39			
40 Tetel			
volume	ml	ml	ml

This 'bucket test' guide has been adapted from the DIY Irrigation Evaluation publication Version 1 – October 2012 produced by DairyNZ. Funded by Sustainable Farming Fund grant No. C07/004



Bucket test layout: travelling irrigator



Bucket test layout: centre-pivot



Centre pivot and travelling irrigators

	Value	Irrigator 1	Irrigator 2	Irrigator 3	Units
Number of buckets	Α				
Total volume of buckets	В				ml
Average volume C = B ÷ A	C				ml
Total number of buckets \div 4 D = A \div 4	D				
Total volume of water from the lowest 25% of buckets (refer to previous page)	E				ml
Average volume of water from lowest 25% of buckets (refer to previous page) $F = E \div D$	F				mi
Width across the bucket		Warehouse			
(inside top diameter)	G	bucket = 55			mm
Bucket radius H = G ÷ 2	Н	55 ÷ 2 = 27.5			mm
Bucket area (πr^2) : I = 3.14 x H x H	I	2375			Mm²
Average application depth $J = 1000 \times C \div I$ or (55mm bucket $J = C \times .42$)	J				mm
Average distribution uniformity (DU) K = F ÷ C	к				%

griBusiness Group. 7

K-line irrigator

- 1. Spread 12 to 20 (a multiple of 4) buckets evenly, every 2-3 metres under the K-line, as shown in the diagram, putting a stone or weight in each bucket for stability
- 2. Operate the irrigation on that area as per normal procedure (allow at least 6 hours to collect enough water to measure)
- 3. Measure how much water is in the buckets after a known amount of time, and calculate the average application depth and distribution uniformity.

Bucket layout: k-line

The unique watering pattern and low application rate of k-line irrigators require a different bucket test design and slightly different calculations to determine application depth.



To do this:	Value	Irrigator 1	Irrigator 2	Irrigator 3	Units
Number of buckets	Α				
Total volume of buckets	В				ml
Average volume C = B ÷ A	C				ml
Total number of buckets \div 4 D = A \div 4	D				
Total volume of water from the lowest 25% of buckets (refer to front page)	E				ml
Average volume of water from lowest 25% of buckets (refer to front page) F = E ÷ D	F				ml
Width across the	~	Warehouse			
bucket (inside top diameter)	G	bucket = 55			mm
Bucket radius H = G ÷ 2	Н	55 ÷ 2 = 27.5			mm
Bucket area (πr^2) : I = 3.14 x H x H	I	2375			mm²
The short between a state to the sec					
J	J				hours
Average application depth (1 hr) K = $1000 \times C \div I \div J$	К				mm
Or					
Average application depth (12 hr) L = K x 12	L				mm
Or					
Average application depth (24 hr) M = K x 24	M				mm
Average distribution uniformity (DU) N = F \div C	N				%

The AgriBusiness Group.

Common unit conversions

Flow rate

	m³/hr	m³/min	gpm	l/s
m³/hr	1	0.017	3.7	0.28
m³/min	60	1	220	17
gpm	0.27	0.0045	1	0.076
l/s	3.6	0.060	13.2	1

Pressure

	psi	kPa	bar	m
psi	1	6.9	0.069	0.70
kPa	0.145	1	0.01	0.10
bar	14.5	100	1	10
m	1.4	9.8	0.098	1

System capacity

l/s/ha x 8.64 = mm/day

mm/day x 0.116 = l/s/ha

Water depths and volumes

1 mm applied to 1 $m^2 = 1$ litre	1 mm applied to 1 ha = 10 m^3
Seasonal volume (m ³) \rightarrow mm applied	$m^3 \div ha \div 10 = mm$
mm applied (irrigation or rainfall) \rightarrow m ³	mm x 10 x ha = m^3

Other tools

Soil moisture monitoring - There are many methods available to show how irrigation is affecting the plant root zone. **myirrigation.co.nz** > Click on 'free guides'

Irrig8Quick - For measuring performance parameters in more detail, including application uniformity
(DU). pagebloomer.co.nz > Click on 'resources'

DairyNZ Guide to Good Irrigation – Parts one and two

Acknowledgements

DIY Spray Irrigation Performance Evaluation was developed by:

Aqualinc research Ltd – Joe Powers The AgriBusiness Group – Sue Cumberworth, Dave Lucock and Geoff Dunham Mulgor Consulting Ltd – Claire Mulcock

With funding from:

Sustainable Farming Fund Grant No. C07/004 DairyNZ Energy Efficiency Conservation Authority PGG Wrightson Meridian



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Loncel Technologies Ltd – Water Monitoring System Overview



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		Instrument	Cost (approximate)	Contact	Advantages	Disadvantages
	~	Aquaflex	\$1700 (single)-	Aquaflex 03 384 8900	Moisture averaged through a soil	No regular farm visits by an expert
		NZ designed	\$2900 (double)	(Christchurch)	depth.	Instrument is not portable
		and made;	integrated with		Soil temperature measurement	
		sold	MGI telemetry	Watermetrics 0800 493 7626	Good accuracy	
		worldwide	system	(Lincoln) watermetrics.co.nz	Data can be remotely down-loaded	
					to an office computer.	
				Aqualinc 03 964 6521	Season long record of data	
	-	Decagon	\$1 -\$2,000 (two	Kirk Irrigation 03 689 8474	Moisture measured at discrete soil	Not good in stony soils
			sensors) using MGI		depths.	No regular farm visits by an expert
	101	USA	telemetry system	Aqualinc 03 964 6521	Soil temperature measurement	Instruments are not portable
S	HS Anna Io				Good accuracy	-
ພະ					Data can be remotely down-loaded	
əţs					to an office computer.	
sλs					Season long record of data	
p		HydroServices	\$1000-\$1200	03 341 0970	Regular on-farm expert advice.	> On-going seasonal costs
θIJ	100	Irrigation	/site/season	www.hydroservices.co.nz	Very good accuracy	Does not produce continuous
eta		scheduling			Moisture measured throughout the	readings
su		services			soil profile	Instruments are not portable
i γ	Nor and the Part				 Season long record of data 	
ltn					Good in all soils	
əu		Hydrotec –	\$700 + on-going	www.frizzell.co.nz	Data can be remotely down-loaded	No regular farm visits by an expert
eu		Remote	monitoring costs		to an office computer.	Instruments are not portable
นม		Irrigation	of \$45/month		Accuracy unknown	
Pe		Monitor	GST excl		Season long record of data	
	States Value					
		FRIZZELL Soil	\$200	www.frizzell.co.nz/irrigationm	Can measure any number of	Accuracy unknown
	A STATE OF S	Moisture		oisture/soil-moisture-sensor	locations	Gypsum blocks need to be
		Sensor	GST excl		Only need one unit for each soil	replaced every 2 to 4 years
		(Gypsum			type/and or irrigation system	 Old technology, although in a new varsion
1	2	(NZ made)			 Low cost 	
2	2					

Examples of Readily Available Soil Moisture Monitoring Instruments

		Instrument	Cost (approximate)	Contacts	Advantages	Disadvantages
		HydroSense II	See handout for	Sold locally by:	 Can measure any number of locations 	 Not good in stony soils
	5		more details		Only need one unit for a farm	 No regular farm visits by an
		Campbell Scientific		 Kirk Irrigation 	No on-going seasonal costs	expert
	0	(NSA)	\$2,000	V Scottech	Good accuracy	 Takes time to go out and take
					Data from newer models can be	
	l		See attached	See attached brochure for	remotely down-loaded to an office	readings
	A A		brochure for	details	computer.	 Difficult to push into drier or
			details		Must choose probe length when	compacted soil
					purchasing	
•		Field Scout	Various models	Sold locally by:	 Can measure any number of locations 	 Not good in stony soils
ເພ	1		\$1,300 - \$2,000		Only need one unit for a farm	 No regular farm visits by an
ləj		Spectrum		📡 NZ Sports Turf Institute	No on-going seasonal costs	expert
۶٨	a la	Technologies (USA)	See attached	ENVCO	Good accuracy	Takes time to on or take
S	V)	brochure for		Data from some models can be	
əle			details	See attached brochure for	down-loaded to a computer	readings
qe				details	Can use different nrohe lengths	Difficult to push into drier or
st'i						compacted soil
Рo		Frizzell Soil	\$500 (GST excl)	Frizzell Electronics	Suitable for less compacted soil	 Accuracy unknown
		Moisture Probe		03 318 1333	Can measure any number of locations	Not good in stony soils
		(NZ made)			Only need one unit for a farm	No regular farm visits by an
	1				No on-going seasonal costs	expert
				http://www.frizzell.co.nz/irri		 Takes time to go out and take
				gationmoisture/portable-		readings
				soil-moisture-probe		
	-					
		Elactric fanco	/¢10	Dortable	P Inevnenciva	Accuracy is an actionable
Life Style		cieculo lence standard / Pocket knife	0164			

Summary

le with permanent pasture on flat Permanently installed system le with cropping Permanently installed system or portable system or crop Portable system pes Portable system or permanently installed system	ו ו or portable system חלוע installed system plus portable system
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FieldScout TDR 300 Soil Moisture Meter



Specifications

- Measurement Principle: Proven time-domain measurement methods
- Measurement Units: Percent volumetric water content
- Resolution: 0.1% volumetric water content
- Accuracy: ±3.0% volumetric water content with electrical conductivity < 2 mS/cm
- Range: 0% to saturation (Saturation typically around 50% volumetric water)
- Battery/Life: 4 AAA alkaline batteries; approximately 12-month battery life
- Data Logger: 3,250 measurements without GPS; 1,350 with GPS/DGPS
- Software and PC cable included

The TDR 300 Soil Moisture Probe Rods

Measurement rods are purchased separately for Field Scout TDR products. They come in lengths of <u>3.8cm</u>, <u>7.5cm</u>, <u>12cm</u> or <u>20cm</u> to suit the desired depth measurement. These stainless-steel rods can be changed while testing out in the field.

Based on proven time-domain measurement technology, these portable units accurately measure soil moisture across the full range of soil moisture conditions. Install PVC access tubes and take readings deeper in the soil profile for permanent crops like apple, grapes, and nut crops.

The TDR 300 has two volumetric water content modes; one for standard soils and one for higher clay soils. In volumetric water content (VWC) mode, the meter converts a measured electrical signal into percent soil moisture content using an equation valid over a wide range of mineral soils. In irrigation mode, the meter displays a relative water content (RWC) on a scale of 0 to 100 corresponding to a user-defined upper and lower soil moisture reference

level. Water deficit, the amount of water needed to bring the soil moisture content up to the upper reference level, is also calculated and displayed. The reference levels are easily programmed into the meter with the accompanying software. Create up to 2 monitoring sites based on your soil types and crop needs. Use the raw reading mode (measurement period in microseconds) to do soil-specific calibrations.

- Instantaneous readings of root zone soil moisture
- Connects to any GPS receiver with serial output**
- Equipped with internal data logger and RS-232 port
- TDR 300 meter includes soft-sided carrying case
- Rods sold separately

For full specs and info see: http://www.specmeters.com/tdr300/ (US web site)

NZ Sales

Approximate price:

TDR300 = one set of probes: \$1,900 incl GST Additional Probes (each set of 2) 4 lengths available: approx. \$100 incl GST per set

NZ Sports Turf Institute http://www.nzsti.org.nz/soil-water/

Ph 06 356 8090 or shop on-line

ENVCO – Environmental Equipment Suppliers

http://www.envco.co.nz - look under 'Soil'

Freephone: New Zealand 0800 623 336 – phone for prices or send query from web site.

Similar products

FieldScout TDR 100 Soil Moisture Meter – does not have datalogging capability or stand

FieldScout TDR 100 Soil Moisture Meter



The TDR 100 provides quick, reliable, and convenient measurement in a field, greenhouse, or laboratory.

Based on the proven time-domain measurement technology, the portable TDR 100 accurately measures soil moisture across the full range of soil moisture conditions. Select from <u>3.8cm</u>, <u>7.5cm</u>, <u>12cm</u> or <u>20cm</u> probe rods to suit your measurement depth. The LCD interface provides two modes: volumetric water content and relative water content (irrigation management) mode.

Hand-held design allows for easy transportation and storage. Measures in less than one second.

- Instant readings of root zone soil moisture.
- Ideal for measuring containers on benches.
- Probe block comes with a 1.5m cable.
- Configure meter with FieldScout software (included)
- TDR 100 meter includes hard-sided carrying case.
- Rods sold separately.

This meter has no data logging or geo-referencing capability. For those features, you need the FieldScout TDR 300 Soil Moisture Meter (see above).

Get more information at: http://www.specmeters.com/tdr100/ (US web site)

Availability in NZ

Approximate price

TDR100 plus one set of probes Additional probes (each set of 2) 4 lengths available: \$1,300 incl GST \$100 incl GST per set

NZ Sports Turf Institute

http://www.nzsti.org.nz/soil-water/ Ph 06 356 8090 or shop on-line

ENVCO – Environmental Equipment Suppliers

http://www.envco.co.nz - look under 'Soil'

Freephone: New Zealand 0800 623 336 – phone for prices or send query from web site.

SYSTEMS



Fast and Portable

Soil Water Content Measurements



Overview

The Hydrosense II is a portable, handheld device for easily obtaining soil measurements. It is the next generation of the Hydrosense soil-water measurement system. Improvements over its predecessor include a more rugged probe design, additional navigation buttons for the display, expanded memory, an internal GPS receiver, Bluetooth communications, and more powerful PC software.

Benefits and Features

- Large LCD and four navigation button that simplifies operation
- Splash-proof housing
- Onboard data storage of more than 1000 points
- Integrated GPS receiver for tagging measurements
- Bluetooth for wireless connection to PC
- Data exportable to Google Earth, GPX and CSV
- Rugged probe design that allows insertion into harder soils

Soil Moisture Sensors

Two sensor options are offered. The CS658 has 20-cm rods and the CS659 (shown above) has 12-cm rods. These probes use the same accurate measurement technique as the old probes, but their housing has been redesigned to aid insertion into and removal from hard soils. Their rods are secured to the probe housing with ferrule nuts to provide extra stability during insertion. A molded plastic grip connects their cable to the housing, which provides better grip.

For more info and prices contact: Kirk Irrigation 03 689 8474 www.kirkirrigation.co.nz Scottech 03 374 2101 www.scottech.net

Handheld Display

The display consists of a three-inch LCD and four navigation buttons that make changing settings and taking measurements as easy as possible. The integrated GPS allows a latitude and longitude to be associated with each measurement. Zones can be created on the unit which group measurements together so that average soil moisture can be calculated for an area.



Software

New PC software has been developed to make the most of the data storage capability of the HS2. The software connects to the HS2 via Bluetooth to avoid the need for extra cables.

The software allows the user to:

- > View data in table and chart views
- Edit zone positions and sizes
- Change device settings
- Export data to CSV to interface with third party software
- View zones and measurements in Google Earth

Specifications

Handheld Display

- Display: 128 x 64 pixel graphic LC
- Backlight: Blue and White LED, brightness adjustable
- GPS Accuracy: ±5 m (16.4 ft) typical; ±1 ms time with GPS sync)
- Bluetooth Range: ~10 ms
- Data Storage: >1000 records (ring memory)
- Zone Storage: >100 records
- Power Supply: 6 Vdc, 4 AA batteries
- Battery Life: 6 to 12 months typical usage
- Height: 200 mm (7.9 in.)
- Width: 100 mm (3.9 in.)
- Depth: 58 mm (2.3 in.)
- Weight: 340 g (12 oz.)

Typical Power Consumption

-) Sleep: 20 μA
- Backlight Off: 2 mA
- Backlight at 60%: 18 mA
- Backlight at 100%: 30 mA
- GPS Active: 35 mA
- Bluetooth Active: 30 mA





The HydroSense II software allows you to view zones and measurements using Google Earth.

CS658 Water Content Probe¹

- Volumetric Water Content Accuracy: 3% typical (solution electrical conductivity < 4 dS/m)
- Volumetric Water Content Resolution: < 0.05%)
- Volumetric Water Content Range: 0% to 50% VWC
- Cable: Spiral, 250 cm (98 in.) extended
- Weight: 450 g (15.9 oz)

Body Dimensions

- Height: 100 mm (3.9 in.)
- Width: 92 mm (3.6 in.)
- Depth: 40 mm (1.6 in.)

Rod Dimensions

- Diameter: 5 mm (0.14 in.)
- Length: 200 mm (7.9 in.)

CS659 Water Content Probe¹

- Volumetric Water Content Accuracy: 3% typical (solution electrical conductivity < 6.5 dS/m)
- Volumetric Water Content Resolution: < 0.05%
- Volumetric Water Content Range: 0% to 50% VWC
- Cable: Spiral, 250 cm (98 in.) extended
- Weight: 450 g (15.9 oz)

Body Dimensions

- Height: 100 mm (3.9 in.)
- Width: 92 mm (3.6 in.)
-) Depth: 40 mm (1.6 in.)

Rod Dimensions

- Diameter: 5 mm (0.14 in.)
- Length: 120 mm (4.7 in.)

¹ The CS659 and CS658 cannot share rods (i.e., 12-cm rods cannot be used with the CS658, and 20-cm rods cannot be used with the CS659).









HS2P HydroSense II Pole System

Fast and Portable

Soil Water Content Measurements

Overview

The HS2P is a combination of the Hydrosense II soil-water sensor with a strong handle and pole that make it easier to insert the probes into the soil. The lightweight pole allows soil testing without bending over. The HS2P is portable, with the layout of the buttons on the display allowing for operation with one hand.

Benefits and Features

- Large LCD and four navigation button that simplifies operation
- Splash-proof housing
- > Onboard data storage of more than 1000 points
- Integrated GPS receiver for tagging measurements
- Bluetooth for wireless connection to PC
- Data exportable to Google Earth, GPX and CSV
- Rugged probe design that allows insertion into harder soils

Soil Moisture Sensors

Two sensor options are offered. The CS658P has 20 cm rods and the CS659P (shown above) has 12 cm rods. These sensors use an accurate measurement technique and have a rugged design allowing insertion into and removal from hard soils. Their rods are secured to their housing with ferrule nuts that provide extra stability during insertion.

Handheld Display

The display consists of a three-inch LCD and four navigation buttons that make changing settings and taking measurements as easy as possible. The integrated GPS allows a latitude and longitude to be associated with each measurement. Zones can be created that group measurements together allowing the average soil moisture to be calculated for an area.

For more info and prices contact: Kirk Irrigation 03 689 8474 www.kirkirrigation.co.nz Scottech 03 374 2101 www.scottech.net

More info: 435.227.9082 www.campbellsci.com/hs2p



Software

The PC software makes the most of the data storage capability of the display. The software connects to the display via Bluetooth to avoid the need for extra cables.

The software allows the user to:

- > View data in table and chart views
- Edit zone positions and sizes
- Change device settings
- > Export data to CSV to interface with third party software
- > View zones and measurements in Google Earth

Specifications

- Weight With Display and Rods: 1.4 kg (3 lb) Without Display: 1.1 kg (2.4 lb)
- Handle Width: 29.2 cm (11.5 in)
- Height
- Handle to bottom of sensor: 82.3 cm (32.4 in) Top of display to bottom of sensor: 96.5 cm (38 in)
- Pole Width: 2.5 cm (1 in) Depth: 2.5 cm (1 in)

Handheld Display

- Display: 128 x 64 pixel graphic LC
- Backlight: Blue and White LED, brightness adjustable
- GPS Accuracy: ±5 m (16.4 ft) typical; ±1 ms time with GPS sync)
- Bluetooth Range: ~10 ms
- Data Storage: >1000 records (ring memory)
- Zone Storage: >100 records
- Power Supply: 6 Vdc, 4 AA batteries
- Battery Life: 6 to 12 months typical usage
- Height: 20.0 cm (7.9 in)
- Width: 10.0 cm (3.9 in)
- Depth: 5.8 cm (2.3 in)
- Weight: 340 g (12 oz)

Typical Power Consumption

- λ Sleep: 20 μA
- Backlight Off: 2 mA
- Backlight at 60%: 18 mA
- Backlight at 100%: 30 mA
- GPS Active: 35 mA
- Bluetooth Active: 30 mA



The HydroSense II software allows you to view zones and measurements using Google Earth.

CS658P Water Content Probe¹

- Volumetric Water Content Accuracy: 3% typical (solution electrical conductivity < 4 dS/m)
- Volumetric Water Content Resolution: < 0.05%)
- Volumetric Water Content Range: 0% to 50% VWC
- Weight: 450 g (15.9 oz)

Body Dimensions

- Height: 10.0 cm (3.9 in)
- Width: 9.2 cm (3.6 in)
- Depth: 4.0 cm (1.6 in)

Rod Dimensions

- Diameter: 0.5 cm (0.14 in)
- length: 20.0 cm (7.9 in)

CS659P Water Content Probe¹

- Volumetric Water Content Accuracy: 3% typical (solution electrical conductivity < 6.5 dS/m)
- Volumetric Water Content Resolution: < 0.05%
- Volumetric Water Content Range: 0% to 50% VWC
- Weight: 450 g (15.9 oz)

Body Dimensions

- Height: 10.0 cm (3.9 in)
- Width: 9.2 cm (3.6 in)
- > Depth: 4.0 cm (1.6 in)

Rod Dimensions

- Diameter: 0.5 cm (0.14 in)
- Length: 12.0 cm (4.7 in)

¹ The CS659P and CS658P cannot share rods (i.e., 12 cm rods cannot be used with the CS658P, and 20 cm rods cannot be used with the CS659P).



Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784 | (435) 227-9000 | www.campbellsci.com USA | AUSTRALIA | BRAZIL | CANADA | CHINA | COSTA RICA | ENGLAND | FRANCE | GERMANY | SOUTH AFRICA | SPAIN © 2014 Campbell Scientific, Inc. February 19, 2014



Irrigation Development Training

IrrigationNZ has developed a one day training course and resources aimed at farmers beginning irrigation development. It will improve their knowledge and enable them to identify the system type, system operation and system development for Irrigation on their properties. Being an informed purchaser of equipment and services will ensure they get what is needed for their property.

One day 'Irrigation Development' training delivery

THE DAY IS A MIX OF CLASSROOM LEARNING AND IN THE PADDOCK PRACTICAL APPLICATION.

MODULE ONE: IRRIGATION REGULATION

What you need to know and how it affects your business. How do the RMA, Consents and Plan Rules fit together?

MODULE TWO: SPECIFYING AN IRRIGATION SYSTEM

What information do you need to know and how do you obtain it. Providing your designer with your design brief.

MODULE THREE: CONTRACTS AND COMMISSIONING

Why are contracts important? An overview of the INZ standard installation contract. What should commissioning involve?

MODULE FOUR: OPERATION AND MAINTENANCE

The safety and efficiency of your irrigator and your staff depends on regular maintenance and correct procedures being followed. How you go about developing procedures specific to your farm is explained.

Take home resources and support

A comprehensive set of resources is provided to take home for reference and further learning. Irrigation training enables correct and sustainable management, operation and use of the key input into your business.

Information and registration

REGISTER AT: WWW.IRRIGATIONNZ.CO.NZ/EVENTS

Cost: IrrigationNZ members \$195^{+GST}, Non-members \$250^{+GST}. Contact IrrigationNZ on 03 341 2225 Paul Reese 027 731 4433, preese@irrigationnz.co.nz or Kate Mills, kmills@irrigationnz.co.nz

The training and programme has had wide acceptance and support from industry and has been proudly sponsored by:



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Irrigation Operator and Manager Training

IrrigationNZ has developed a one day training course and resources aimed at irrigation managers and operators of irrigation systems, to be able to improve their knowledge and application of Irrigation on their properties.

One day 'Irrigation Manager' training delivery

THE DAY IS A MIX OF CLASSROOM LEARNING AND IN THE PADDOCK PRACTICAL APPLICATION.

MODULE ONE: IRRIGATION REGULATION

What you need to know and how it affects your business.

MODULE TWO: IRRIGATION SCHEDULING

Building on your knowledge of soils, water and climate, how to schedule water application and the tools available to help are explained and demonstrated.

MODULE THREE: OPERATION AND MAINTENANCE

The safety and efficiency of your irrigator and your staff depends on regular maintenance and correct procedures being followed. Developing procedures within Farm Plans is explained.

After an 'irrigator walk' we begin building an operations manual specific to your property.

MODULE FOUR: IRRIGATOR CALIBRATION

Data collected during the 'irrigator walk' is analysed using tools developed to check the performance of irrigators. This is a practical application that you can directly use on your farm.

Take home resources and support

A comprehensive set of resources is provided to take home for reference and further learning. Irrigation manager training enables correct and sustainable management, operation and use of the key input into your business.

Information and registration

REGISTER AT: WWW.IRRIGATIONNZ.CO.NZ/EVENTS

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Irrigation Development Training

IRRIGATION NEW ZEALAND

Tuesday 6th May, Omakau

GET IT RIGHT FIRST TIME.

A mix of classroom learning and practical in-the-field application

Topics include:

- Regulation
- Specifying an irrigation system
 - Contracts and commissioning
 - Operation and maintenance
- What you need to know.
- Get the information to be able to provide a design brief.
 - Know the importance and what is involved.
 - The building block for efficient irrigation.

Cost includes a complete 'Irrigation Resources Pack' for further reference and learning.

morning tea and lunch provided. Presented by Paul Reese and Ian McIndoe from Irrigation NZ. Start 9.30am -5pm Venue: Omakau

Numbers limited to 25 - book early

Cost: Irrigation NZ members \$195 Non members \$250 Information and registration at: <u>www.irrigationnz.co.nz/events</u>

Contact: Paul Reese; Irrigation NZ 03 341 2225, 0277 314 433 preese@irrigationnz.co.nz or Kate Mills kmills@irrigationnz.co.nz



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www.irrigationnz.co.nz/events

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