



Count on it.

TORO[®] SENTINEL[®] APPLICATION NOTE:

AN03: CYCLE & DELAY PROGRAMMING



CYCLE & DELAY PROGRAMMING

Watering Cycles, Repeats, & Delays are designed within Sentinel to be programmed as a water management feature to aid in matching sprinkler/drip application rates to soil/slope infiltration rates. Puddling and run off can occur when water is applied faster than the soil/slope can accept it. Irrigation applied to sandy soils can soak through the soil and run past the plant root zone if applied too fast or in a single application.

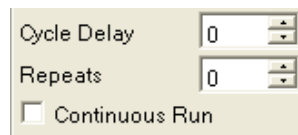
Automatic Operations > Program

Each Program in Automatic Operations has three primary settings correlating to Cycles & Delay:

Cycle Delay: The delay (in minutes from 0-255) between repeats of the watering cycle (as defined in the program slots).

Repeats: The number of times the watering cycle (as defined in the program slots) should repeat per Program Start.

Continuous Run: If selected, Continuous Run will automatically repeat the watering cycle (as defined in the program slots) for the entire defined watering window (looping functionality).



A screenshot of a software interface showing three settings: 'Cycle Delay' with a value of 0, 'Repeats' with a value of 0, and a checkbox for 'Continuous Run' which is currently unchecked.

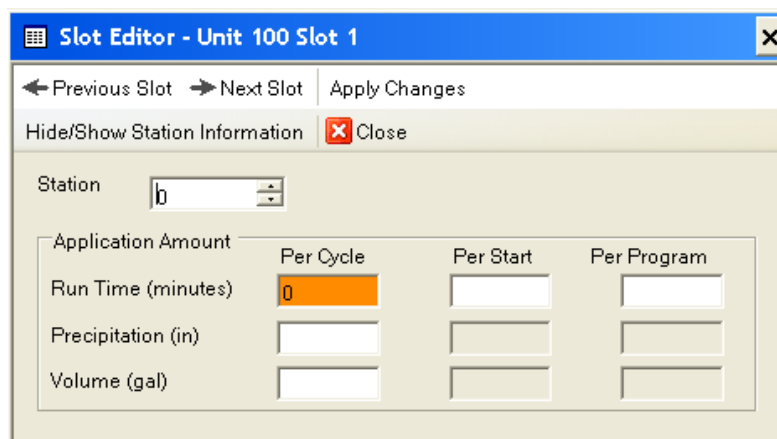
Automatic Operations > Slot Editor

The Slot Editor in each Program in Automatic Operations has three settings correlating to Cycles & Delay:

Runtime per Cycle: Runtime of a station in the program at that slot

Runtime per Start: [calculated] Runtime per cycle times the number of Program Repeats

Runtime per Program: [calculated] Runtime per Cycle times the number of Repeats times the number of Start Times for the Program.



A screenshot of the 'Slot Editor - Unit 100 Slot 1' window. The window has a blue title bar and a close button. Below the title bar are navigation buttons: 'Previous Slot', 'Next Slot', and 'Apply Changes'. There are also buttons for 'Hide/Show Station Information' and 'Close'. A 'Station' dropdown menu is set to 'b'. Below this is a table with three columns: 'Per Cycle', 'Per Start', and 'Per Program'. The rows are 'Run Time (minutes)', 'Precipitation (in)', and 'Volume (gal)'. The 'Run Time (minutes)' cell under 'Per Cycle' is highlighted in orange and contains the value '0'.

Application Amount	Per Cycle	Per Start	Per Program
Run Time (minutes)	0		
Precipitation (in)			
Volume (gal)			

Automatic Operations > Program > Slots

The 48 individual Slots in a program can be used to create individual station repeats and delays within a watering cycle. Each of the 48 Slot can be assigned a station & runtime. To repeat an individual station or stations, you can enter the same station in multiple slots. To create a delay within the watering cycle, enter a time in a slot, but do not assign a station number to it (leave station as 0). This will create a timed delay within the watering cycle for however many minutes are in the slot.

Slots - Station order and run times for one cycle.

Station Search Clear Slots Compact Slot Editor Start Now Stop Now

1	10	2	10	0	5	1	10	2	10	0	5	1	10	2	10	0		0		0		0	
0		0		0		0		0		0		0		0		0		0		0		0	
0		0		0		0		0		0		0		0		0		0		0		0	
0		0		0		0		0		0		0		0		0		0		0		0	

Slots - Station order and run times for one cycle.

Station Search Clear Slots Compact Slot Editor Start Now Stop Now

1	10	2	10	0	5	1	10	2	10	0	5	1	10	2	10	0		0		0		0	
0		0		0		0		0		0		0		0		0		0		0		0	
0		0		0		0		0		0		0		0		0		0		0		0	
0		0		0		0		0		0		0		0		0		0		0		0	

5-Minute Delay within Watering Cycle

Slots - Station order and run times for one cycle.

Station Search Clear Slots Compact Slot Editor Start Now Stop Now

1	10	2	10	0	5	1	10	2	10	0	5	1	10	2	10	0		0		0		0	
0		0		0		0		0		0		0		0		0		0		0		0	
0		0		0		0		0		0		0		0		0		0		0		0	
0		0		0		0		0		0		0		0		0		0		0		0	

Repeated Station (# 1 – 10 mins) within Watering Cycle

Cycle & Delay Rules-of-Thumb

The attached chart shows examples of how to utilize the Cycle Mode for various soil/slope conditions with various sprinkler precipitation rates. The chart assumes a pre-wetted soil condition. The user can set runtime characteristics by setting station Per Cycle runtime and Cycle Delay (minutes) per the below chart, or test in applicable zones to see amount of time irrigation can occur before runoff.

When irrigating by ET, Sentinel will break the total run time into segments equating to the Per Cycle Runtime set by the User. When not irrigating by ET, User should set number of Repeats if using Cycle/Delay. Run Times listed in Automatic Operations are per Cycle.

	Precip. Rate (In/hr)	≤ 0.55" Micro	0.55" PRN	0.55" to 1.0" Rotors	1.0" PSN	1.0" to 1.5" Rotors	1.5" to 2.0" Sprays	> 2.0" Sprays
Sandy Soil 0-5% Slope	Per Cycle Time (min)	60	60	60	60	60	60	45
	Cycle Delay (min)	0	0	0	0	0	0	15
Sandy Soil 5-8% Slope	Per Cycle Time (min)	60	60	60	60	60	45	30
	Cycle Delay (min)	0	0	0	0	0	15	30
Sandy Soil 8-12% Slope	Per Cycle Time (min)	60	60	60	53	45	30	12
	Cycle Delay (min)	0	0	0	8	15	30	48
Sandy Soil 12%+ Slope	Per Cycle Time (min)	60	45	30	25	20	15	12
	Cycle Delay (min)	0	15	30	35	40	45	48
Loam Soil 0-5% Slope	Per Cycle Time (min)	60	53	45	38	30	24	20
	Cycle Delay (min)	0	8	15	23	30	36	40
Loam Soil 5-8% Slope	Per Cycle Time (min)	60	45	30	25	20	15	12
	Cycle Delay (min)	0	15	30	35	40	45	48
Loam Soil 8-12% Slope	Per Cycle Time (min)	50	37	24	20	16	12	10
	Cycle Delay (min)	10	23	36	40	44	48	50
Loam Soil 12%+ Slope	Per Cycle Time (min)	36	27	18	15	12	8	6
	Cycle Delay (min)	24	33	42	45	48	52	54
Silt Soil 0-5% Slope	Per Cycle Time (min)	36	27	18	15	12	8	6
	Cycle Delay (min)	24	33	42	45	48	52	54
Silt Soil 5-8% Slope	Per Cycle Time (min)	30	23	15	13	10	8	6
	Cycle Delay (min)	30	38	45	48	50	52	54
Silt Soil 8-12% Slope	Per Cycle Time (min)	18	14	9	8	6	5	4
	Cycle Delay (min)	42	47	51	53	54	55	56
Silt Soil 12%+ Slope	Per Cycle Time (min)	12	9	6	5	4	3	2
	Cycle Delay (min)	48	51	54	55	56	57	58
Clay Soil 0-5% Slope	Per Cycle Time (min)	18	14	9	8	6	5	4
	Cycle Delay (min)	42	48	54	54	54	55	56
Clay Soil 5-8% Slope	Per Cycle Time (min)	12	9	6	5	4	3	2
	Cycle Delay (min)	48	51	54	55	56	57	58
Clay Soil 8-12% Slope	Per Cycle Time (min)	10	8	5	4	3	2	1
	Cycle Delay (min)	50	53	55	56	57	58	59
Clay Soil 12%+ Slope	Per Cycle Time (min)	7	6	4	4	3	2	1
	Cycle Delay (min)	53	55	56	57	58	58	59

