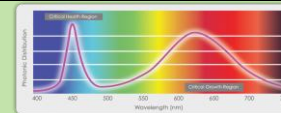




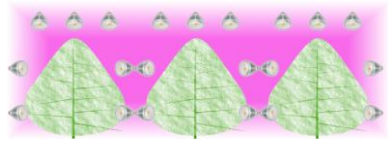
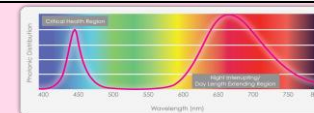






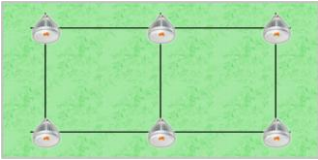
Usage Guidelines: TG1A Broad Grow Spectrum Light



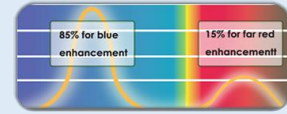
 TG1A-2A-1003	Plant Size	Small	Medium	Large
	Examples	Germination, Early Propagation, Microgreens  	Late Propagation, Lettuce, Basil 	Tomatoes, Large Pepper Plants, Plants larger than 1 cu ft 
Sole Source (100% Artificial Lighting)	Bulb Coverage	1.5-2 sq ft	1 sq ft	1/4 - 3/4 sq ft
	Bulb Spacing	15-18"	12"	6-12" (intracanopy lighting advised†)
	Bulb Height*	10-24"	8-12"	6-12"
Supplemental (greenhouse sun + lights)	Bulb Coverage	6-9 sq ft	3-5 sq ft	1-2 sq ft
	Bulb Spacing	30-36"	2'	12-18" (intracanopy lighting advised†)
	Bulb Height*	20-36"	16-24"	8-24"
*Plant top to bulb bottom; lower heights are important for small numbers of bulbs, heights can be increased as desired in large grids of bulbs. †Add horizontal/angled bulbs between plants for additional lights beyond "Medium Plant Size" grid, e.g. 1 bulb directed at the side of a plant for every 1-2 bulbs above the plant.				





Usage Guidelines: TG1A Night & Day Management Light



 TG1A-2A-1004	Installation Style	Bulb Retrofits	New/Other Installations
		 or 60-100W Incandescent or CFL equivalents   11W	
TG1A NDM Light Spacing	Optimum	60W incandescent → 11W TG1A	8'x8' (hang at least 5' high)
	Standard	100W incandescent → 11W TG1A	10'x10' (hang at least 6.5' high)
	Minimum*		12'x12' (hang at least 8' high)
Rule 1 - Replace effective 60-100W incandescent or CFL equivalents directly with TG1A lights. Rule 2 - For new installations or HID replacement, install lights on 8' -12' centers. Use 8' for demanding plants and fewer lights for sensitive plants. Rule 3 - Hang bulbs above plants at least 2/3 of the spacing (e.g. 8' high for 12' spacing). Favor lower heights for small installations (e.g. 10 bulbs) and higher for large installations (e.g. 200+ bulbs).			
*Different plants vary significantly in the light level needed for successful day length extension/night interruption. Minimum levels should only be used where lower intensities have been proven effective.			

Usage Guidelines: TG1A Blue Supplement Light



 TG1A-2A-1005	Light to be Supplemented	400 Watt High Pressure Sodium	600 Watt High Pressure Sodium	1000 Watt High Pressure Sodium
				
TG1A Lights per HPS fixture	Economy	1-2	1-3	1-4
	Recommended	3	4	6
	Super Charge	4	6	10

For best results, distribute TG1A lights uniformly within the grow area. Clusters of lights can be used if spacing between clusters is less than 150% of their height above the plants, e.g. 9' between clusters for heights at or above 6'.

Usage Guidelines: General Bulb Output Information



Single Bulb Center Intensities (µmole/m2/s)

Height (ft)	Intensity
0.5	170
0.67	95
0.83	63
1'	44
1.5'	20
2'	11
3'	5.2
4'	3.0
6'	1.3
8'	0.75
10'	0.50
12'	0.35
14'	0.25

Output Change vs. Distance Relative to Hang Height

Height	0.25	0.5	0.75	1	1.25	1.5	1.75	2	
2	5%	5%	4%	4%	3%	3%	2%	2%	1%
1.75	8%	7%	7%	6%	5%	4%	3%	2%	2%
1.5	13%	12%	11%	9%	7%	5%	4%	3%	2%
1.25	16%	16%	14%	13%	10%	7%	5%	4%	3%
1	29%	27%	22%	16%	13%	10%	7%	5%	3%
0.75	48%	45%	36%	25%	16%	13%	9%	6%	4%
0.5	69%	64%	52%	36%	22%	14%	11%	7%	4%
0.25	88%	80%	64%	45%	27%	16%	12%	7%	5%
0	100%	88%	69%	48%	29%	16%	13%	8%	5%

2' Hang Height, Single Bulb Intensities Example

4'	0.5	0.5	0.5	0.4	0.3	0.3	0.2	0.2	0.1
3.5'	0.8	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.2
3'	1.4	1.4	1.2	1.0	0.7	0.6	0.4	0.3	0.2
2.5'	1.8	1.7	1.5	1.5	1.1	0.8	0.6	0.4	0.3
2'	3.2	3.0	2.4	1.8	1.5	1.1	0.7	0.5	0.3
1.5'	5.3	4.9	4.0	2.8	1.8	1.5	1.0	0.6	0.4
1'	7.6	7.0	5.7	4.0	2.4	1.5	1.2	0.7	0.5
0.5'	9.6	8.8	7.0	4.9	3.0	1.7	1.4	0.8	0.5
0'	11.0	9.6	7.6	5.3	3.2	1.8	1.4	0.8	0.5
	0'	0.5'	1'	1.5'	2'	2.5'	3'	3.5'	4'

10' Hang Height, Single Bulb Intensities Example

20'	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01
17.5'	0.03	0.03	0.03	0.03	0.02	0.02	0.01	0.01	0.01
15'	0.06	0.06	0.05	0.04	0.03	0.02	0.02	0.01	0.01
12.5'	0.08	0.07	0.06	0.06	0.05	0.03	0.02	0.02	0.01
10'	0.13	0.13	0.10	0.08	0.06	0.05	0.03	0.02	0.01
7.5'	0.22	0.21	0.17	0.12	0.08	0.06	0.04	0.03	0.02
5'	0.32	0.29	0.24	0.17	0.10	0.06	0.05	0.03	0.02
2.5'	0.40	0.37	0.29	0.21	0.13	0.07	0.06	0.03	0.02
0'	0.46	0.40	0.32	0.22	0.13	0.08	0.06	0.03	0.02
	0'	2.5'	5'	7.5'	10'	12.5'	15'	17.5'	20'

Large Grid of Bulbs Intensities (µmole/m2/s)

Spacing (ft)	Avg. Intensity	Min. Height (ft)
0.5	603	0.33
0.67	339	0.44
0.83	217	0.56
1	151	0.67
1.5	67	1
2	38	1.3
3	17	2
4	9.4	2.5
6	4.2	4
8	2.4	5.5
10	1.5	6.5
12	1.0	8
14	0.77	9



Center intensities at a given height decrease away from center as shown in the next table.

Axes shown in "height units," e.g. at 2' high the grid is in 0.5' increments up to 4' away; at 10' high the grid is in 2.5' increments up to 20' away. Multiply percentages by single bulb intensities. Only one quadrant shown.