

**Note: Use only MOD 3 or MOD 0**

## Dave's Notes

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### LAKOTA Turbine Settings Summary



FERNDALE RENEWABLE ENERGY EVALUATION (F.R.E.E.)  
**WIND TEST CENTER**

### Multi-Voltage Use & Blade Selection

The LAKOTA alternator windings may be used in 2 voltage ranges and in low and high speed wind sites. Note that the resistance of a 24v MOD3 is quite close to a high wind 48v in MOD 0. (1.7- 2.0) and may be preferred to reduce heat build up from high wind events. Consult TRUE-NORTH before changing MODs.

For class 5 and higher wind sites over 300 watts/sqM select the shorter SAR blades for better alternator life.

Vertical extrapolation of wind speed based on the 1/7 power law

LAKOTA Stato Ohms Test					
All readings plus or minus 0.2 Ohms		Annual Average Wind Regime <sup>at 10M</sup>			
		<12mph	11-13mph	12-14mph	>12mph
Stator	Unwired	<b>MOD 3 24v</b>	MOD2 Med	MOD1 High	<b>MOD 0 12v</b>
12-24v	0.2	0.7	0.7	0.2	0.2
	0.2	0.7	0.5	0.5	0.2
	0.2	0.7	0.5	0.5	0.2
Stator	Unwired	<b>MOD 3 48v</b>	MOD2 Med	MOD1 High	<b>MOD 0 24v</b>
24-48v	0.5	1.7	1.7	0.5	0.5
	0.5	1.7	1.1	1.1	0.5
	0.5	1.7	1.1	1.1	0.5
Stator	Unwired	<b>MOD3 48v</b>	MOD2 Med	MOD1 High	<b>MOD 0 48v</b>
48-96v	2.0	7.9	4.9	4.9	2.0
	2.0	7.9	4.9	4.9	2.0
	2.0	7.9	7.9	2.0	2.0

**Use low wind settings ONLY on LOW WIND Sites - or for higher voltage**

Turbine Wind Regime - MOD Settings					
Add Phase and small wire when shown		Annual Average Wind Regime <sup>at 10M</sup>			
		<12mph	11-13mph	12-14mph	>12mph
Small Wire	Phase Wire	<b>Low Wind</b>	Med	High	<b>High Wind</b>
		<b>MOD 3</b>	MOD 2	MOD 1	<b>MOD 0</b>
<b>A (Red) with 1st</b>		1+2 only	1+2 only	1+2 only	2+A
<b>B (White) with 2nd</b>		3+4 only	3+4 only	3+B	3+B
<b>C (Black) with 3rd</b>		5+6 only	6+C	6+C	6+C
<b>"O" (Green)</b>		"O" capped	"O"+5	"O"+5+4	"O"+1+4+5

**Note: 2,3 & 6 should have continuity with "O" when check by Ohmmeter  
Wires 1,4 & 5 should NOT have continuity with "O"**

Lakota Site Specific Rotor Size and Wind Mod settings								
ROTOR MOD Selection		Classes of Wind Power Density at 10 m and 50 m <sup>(a) Tower/Hub height</sup>						
ROTOR	MOD	CLASS	W/SqM	Speed(b) at 10M (33ft)	W/SqM	Speed(b) at 50M (164ft)		
EAR	3	1	<100	<4.4	<9.8	<200	<5.6	<12.5
EAR	3	2	100-150	4.4-5.1	9.8-11.5	200-300	5.6-6.4	12.5-14.3
EAR	3	3	150-200	5.1-5.6	11.5-12.5	300-400	6.4-7.0	14.3-15.7
EAR	0	4	200-250	5.6-6.0	12.5-13.4	400-500	7.0-7.5	15.7-16.8
EAR/SAR	0	5	250-300	6.0-6.4	13.4-14.3	500-600	7.5-8.0	16.8-17.9
SAR	0	6	300-400	6.5-7.0	14.3-15.7	600-800	8.0-8.8	17.9-19.7
SAR	0	7	>400	>7.0	>15.7	>800	>8.8	>19.7

Note: Tower height will substantially affect turbine performance. Fly high for smoother performance and greater energy production

**SAR = Standard Area Rotor**

**EAR = Extended Area Rotor**

Standard Wind Class Definitions (Used in the U.S.)

Class	30 m height		50 m height	
	Wind speed m/s	Wind power W/m <sup>2</sup>	Wind speed m/s	Wind power W/m <sup>2</sup>
1	0-5.1	0-160	0-5.6	0-200
2	5.1-5.9	160-240	5.6-6.4	200-300
3	5.9-6.5	240-320	6.4-7.0	300-400
4	6.5-7.0	320-400	7.0-7.5	400-500
5	7.0-7.4	400-480	7.5-8.0	500-600
6	7.4-8.2	480-640	8.0-8.8	600-800
7	8.2-11.0	640-1600	8.8-11.9	800-2000

(b) Mean wind speed is based on the Rayleigh speed distribution of equivalent wind power density. Wind speed is for standard sea-level conditions. To maintain the same power density, speed increases 3%/1000 m (5%/5000 ft) of elevation.

### Why Use only Two of Four Settings

The LAKOTA alternator windings have 3 pair of windings that can be wired on series or in parallel. In parallel, the resistance of the pair can be roughly halved and the resulting optimum wind speed power output can be increased. All 3 pairs should be the same either parallel or series for a balanced output. Unbalanced wiring is possible but not recommended and making wiring changes without consulting TRUE-NORTH or AEROMAX will void the warranty.