

INVERTER AND TRANSFORMER NOISE ANALYSIS

Randolph Davis Solar

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15 RAILROAD ROW, SUITE 101

WHITE RIVER JUNCTION, VT 05001

The table shows the noise level of each component at a 3, 200, and 600-foot distance:

Component	Capacity	Noise Level (dBA) @ 3.3FT	dBA @ 200FT	dBA @ 600FT
Inverter 001	50 kW	60	24.3	14.8
Inverter 002	50 kW	60	24.3	14.8
Inverter 003	50 kW	60	24.3	14.8
Inverter 004	50 kW	60	24.3	14.8
Inverter 005	50 kW	60	24.3	14.8
Inverter 006	50 kW	60	24.3	14.8
Inverter 007	50 kW	60	24.3	14.8
Inverter 008	50 kW	60	24.3	14.8
Inverter 009	50 kW	60	24.3	14.8
Inverter 010	50 kW	60	24.3	14.8
Transformer 001	167 kVa	55	19.3	9.8
Transformer 002	167 kVa	55	19.3	9.8
Transformer 003	167 kVa	55	19.3	9.8

Component	Dist to Residence (FT)	dBA @ Dist
Inverter 001	605	14.7
Inverter 002	655	14.0
Inverter 003	710	13.3
Inverter 004	765	12.6
Inverter 005	795	12.3
Inverter 006	825	12.0
Inverter 007	850	11.7
Inverter 008	905	11.2
Inverter 009	965	10.6
Inverter 010	1025	10.1
Transformer 001	720	8.2
Transformer 002	720	8.2
Transformer 003	720	8.2
Combined Impact (dBA)		22.9

Commercial	Industrial	Residential	dB Level
Threshold For Hearing			0
Good Recording Studio		Breathing	10
		Rustling Leaves	15
		Whisper, Mosquito	20
Library		Living / Dining Room	30
Refrigerator Hum		Kitchen / Bathroom	40
Quiet Office	Power Lawn Mower	Home Office	50
		Birds at 10'	55
Conversational Speech			60
Piano Practice		Electric Shaver	60
Business Office		Piano Practice	65
Noisy Restaurant	Implant Office	Street Traffic	70
Chamber Music		Barking Dog	75
Classroom		Alarm Clock	75
		Television / Dishwasher	75

Relevant equations:

FT-M conversion: 1 foot = 0.3048 meter

Sound level of individual components:

$$R2 = R1 - 20 \cdot \log(D)$$

Where:

R2 = sound level at user-specified distance

R1 = sound level at one meter distance

D = user-specified distance, in meters

Combined sound level:

$$RN = 10 \cdot \log(\sum (10^{R2/10}))$$

Where:

RN = sound level of combined components

R2 = sound level at user-specified distance

[1] Noise level CPS 50kW inverter online datasheet <https://www.chintpowersystems.com/wp-content/uploads/2021/04/CPS-SCA50-60KTL-DO-US-480-Datasheet-April-15-2021.pdf>

[2] Transformer noise level from National Electrical Manufacturers Association (NEMA) Standard ST-20 for sound level based on transformer kVA (151-300 kVA < 55 dBA)

[3] Decibel chart from NetWell Noise Control and Soundproofing <http://www.controlnoise.com/decibel-chart>