



BOSCH

Reference Manual

Sound Power Data

For Water Source Heat Pumps Low GWP

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1 Introduction

Sound has become of increasing concern in the industry. Bosch has invested in a state of the art sound test facility to test our products according to the AHRI standard 260-2017 and what, if any, impact changes to the design may have on the unit sound spectrum.

It is important to understand the difference between Sound Power and Sound Pressure in the evaluation of the impact the Water Source Heat Pump will have on the occupied space.

1.1 Sound Power

Sound power is the energy radiated from the source, in this case the heat pump. The energy is radiated directly from the source and the acoustical characteristics of the space are not taken into account. Sound power is the base measure used by the engineer as the starting point to determine the resultant sound in the conditioned space. Building materials have acoustic characteristics that define the sound attenuation and enable the engineer to predict sound pressure levels in the conditioned space. So to sum up sound power is the basis for an acoustical evaluation of the sound that will be heard in a space.

All Sound Components are tested utilizing either a reverberation room (qualified by test) or using Sound Intensity. Reverberation room tests are conducted using the Comparison Method and a calibrated Reference Sound Source, while the sound intensity tests are conducted using measurements made at discrete points or by the scanning method. Sound ratings are in the form of octave band Sound Power Levels (dB) from 63 to 8000 Hz derived from one-third octave band measurements.

This sound measurement is the 'purest' since it does not include any assumptions for room size or furnishings.

1.2 Sound Pressure

Sound pressure is a measure of the dynamic pressure that causes local pressure fluctuations in the air molecules. These fluctuations can be measured in Pascals (Pa) or when expressed in decibels (dB) the term is known as Sound Pressure Level. This pressure is what is measured by a microphone or perceived by our ear drums.

The sound pressure is depend upon the nature of the space volume, furnishings and surface treatment. The design engineer's challenge is to convert Sound Power, taking into consideration the nature of the room, to predict Sound Pressure. Sound pressure levels are the measure used when trying to determine the resultant effects of the operating equipment on the conditioned space.

The sound pressure can be estimated for any room using the sound power levels, room volume and surface furnishing. The sound pressure can also be easily measured using simple equipment.

1.3 About AHRI 260 Sound Ratings

In 2001 ARI 260-2001 Sound Rating of Ducted Air Moving and Conditioning Equipment established the procedure for determining the sound power ratings for Water Source Heat Pumps. This standard has been updated multiple times and is now AHRI 260-2017.

The AHRI 260 provides test procedures and rating criteria for 5 configurations of the Water Source Heat Pumps:

- Ducted Inlet
- Casing Radiated
- Free Inlet
- Free Inlet/Casing Radiated
- Ducted Discharge

The most common configurations for the Water Source Heat Pumps are "Casing Radiated" & "Ducted Discharge".

Casing radiated sound power represents the sound a person would hear if they were standing directly in front of the unit. Ducted discharge sound power levels represent the sound a person would hear through air vents in a room when the heat pump is installed elsewhere.

The following tables present the Sound Power of the different series offered by Bosch. The data includes both the Casing Radiated and Ducted Discharge for horizontal and vertical units. As required in AHRI 260-2017 sound power in the 63 through 8000 Hz bands are presented. The 63 Hz sound power has a significant effect in the total sound power from a unit. It is therefore important when comparing sound power from different units that this frequency is included in the overall total. Additionally, all data presented in the following tables was collected at the AHRI rated CFM and static pressure for each unit.

1.4 Sound Attenuation Package

Bosch offers a sound reduction package for projects where a lower sound level is a requirement. This package includes a compressor blanket and close cell foam insulation.

1.5 Correction Factors

Correction factors are needed to adjust the frequency band by accounting for the loss of acoustical energy through the acoustical test duct during transmission to the test space. This is done so that the sound power presented is representative of what would be transmitted into a non-reflecting duct system. In accordance with AHRI 260, the correction factors listed within this document include a duct end correction and an acoustic test duct elbow correction. The ducted discharge data in the following sound power data tables already has the correction factors applied, and is not the raw data. The specific correction factors used can be found in the tables below.

For reference see 2019 ASHRAE Applications Handbook, Section 49, page 49.24 Table 24.

Ducted Discharge Correction Factors - All Other Models								
1/3rd Octave band	50	63	80	100	125	160	200	250
Adjustment factor	9.841	1.777	1.185	0.794	1.525	1.328	1.213	4.137
1/3rd Octave band	315	400	500	630	800	1000	1250	1600
Adjustment factor	4.087	4.054	7.035	7.022	7.014	7.009	7.006	7.003
1/3rd Octave band	2000	2500	3150	4000	5000	6300	8000	10000
Adjustment factor	7.002	7.001	7.001	7.001	7.000	7.000	7.000	7.000



Table values may vary slightly depending on unit configuration, model, and test setup.

2 Sound Power Data

2.1 CP/RP Series

CP/RP Sound Power Data -Vertical																					
Model	Load	Octave Band Sound Power Levels dB, re 10-12 Watts																			
		Casing Radiated Vertical										Ducted Discharge Vertical									
		Center Frequency - Hz										Center Frequency - Hz									
		63	125	250	500	1000	2000	4000	8000	Overall	Overall AHRI-260:2017 (63Hz-8kHz) (dBA)	63	125	250	500	1000	2000	4000	8000	Overall	Overall AHRI-260:2017 (63Hz-8kHz) (dBA)
CP024 RP024	Cooling Full	72	58	56	49	45	41	33	27	72	53	73	62	62	61	59	56	53	44	74	64
	Heating Full	68	57	58	49	43	38	32	28	69	53	75	63	63	60	58	55	52	42	76	63
	Cooling Part	70	54	55	49	43	38	34	29	71	52	71	61	60	60	56	54	49	39	72	62
	Heating Part	67	54	53	46	42	36	31	26	67	50	69	59	60	57	55	52	47	37	71	60
	FAN Only	59	49	45	45	39	32	25	23	59	45	63	56	55	55	51	48	42	31	65	56
CP036 RP036	Cooling Full	74	64	54	51	50	43	38	33	75	55	82	70	66	64	63	61	58	50	82	68
	Heating Full	77	61	54	51	48	42	38	33	77	55	73	69	64	64	61	59	57	48	76	67
	Cooling Part	76	58	54	49	47	41	38	34	76	54	76	63	62	59	58	55	51	41	76	63
	Heating Part	78	58	53	48	44	38	35	30	78	54	75	64	60	58	57	53	49	39	76	62
	FAN Only	62	47	44	44	36	31	24	24	63	44	70	59	57	55	54	50	45	34	70	58
CP048 RP048	Cooling Full	75	59	54	50	49	42	35	29	75	54	77	69	64	64	62	60	59	52	78	68
	Heating Full	75	59	55	50	46	42	34	29	75	54	76	67	64	64	62	60	59	51	77	67
	Cooling Part	75	58	54	49	45	40	33	29	75	53	76	67	61	59	58	55	52	43	77	63
	Heating Part	74	59	54	49	44	39	32	28	74	53	77	65	61	59	58	55	52	42	78	63
	FAN Only	63	50	48	41	35	30	24	24	63	44	72	61	58	57	54	51	48	37	73	59
CP060 RP060	Cooling Full	77	64	56	53	51	45	39	30	77	57	79	73	70	69	67	66	64	57	81	73
	Heating Full	76	63	57	53	52	44	39	31	76	57	80	73	71	69	67	66	65	57	82	73
	Cooling Part	76	62	54	50	50	40	34	26	77	55	79	69	65	65	62	61	58	50	80	68
	Heating Part	75	60	54	50	50	39	33	26	76	55	77	69	66	64	63	61	58	49	78	68
	FAN Only	66	52	47	44	39	34	27	23	66	47	75	66	63	63	60	58	54	45	76	63
CP070 RP070	Cooling Full	84	67	57	55	54	45	39	32	84	61	80	74	71	71	69	68	66	59	83	75
	Heating Full	81	65	58	55	55	45	39	32	81	60	82	74	72	71	69	67	66	59	83	75
	Cooling Part	83	63	56	52	51	42	35	29	83	59	79	72	67	67	65	64	62	54	80	71
	Heating Part	81	62	56	52	52	42	35	29	81	58	82	70	68	67	65	64	62	53	82	71
	FAN Only	68	56	48	46	40	35	28	24	68	48	75	65	63	62	60	58	55	46	76	65

NOTES:

1) Sound tests are performed at 0.1-.2 external static based on capacity of the units to align with AHRI 600 "Performance Rating of Water/Brine to Air Heat Pump Equipment" as well as DOE proposed rulemaking both expected to be release in 2024.

2) Sound ratings for all sizes based on constant airflow motor option

3) Sound based on standard refrigerant option. No Hot Gas Reheat. No economizer.

CP/RP Sound Power Data - Horizontal																					
Model	Load	Octave Band Sound Power Levels dB, re 10-12 Watts																			
		Casing Radiated Horizontal										Ducted Discharge Horizontal									
		Center Frequency - Hz										Center Frequency - Hz									
		63	125	250	500	1000	2000	4000	8000	Overall	Overall AHRI-260:2017 (63Hz-8kHz) (dBA)	63	125	250	500	1000	2000	4000	8000	Overall	Overall AHRI-260:2017 (63Hz-8kHz) (dBA)
CP024 RP024	Cooling Full	78	69	59	49	50	44	37	30	79	58	76	69	64	65	63	61	59	52	77	69
	Heating Full	74	70	61	53	49	44	36	30	75	58	76	71	63	63	61	59	57	50	78	67
	Cooling Part	79	64	59	49	45	40	32	27	79	57	74	64	61	61	59	56	54	45	75	64
	Heating Part	74	64	58	48	46	40	33	27	74	55	79	65	61	62	58	55	53	43	79	64
	FAN Only	59	46	45	41	36	32	26	23	59	43	69	57	56	57	54	50	47	37	70	59
CP036 RP036	Cooling Full	78	68	59	55	53	47	42	35	79	59	78	73	69	67	66	64	61	52	80	71
	Heating Full	72	67	58	55	52	44	36	31	73	58	76	70	66	65	63	61	57	48	78	68
	Cooling Part	79	65	59	54	50	42	34	29	79	58	75	68	64	63	61	58	53	42	77	66
	Heating Part	70	66	57	55	49	41	33	27	72	56	78	68	62	60	59	56	51	40	78	64
	FAN Only	66	52	48	44	38	32	24	23	66	46	71	64	62	58	57	53	48	36	73	62
CP048 RP048	Cooling Full	76	68	57	55	51	45	40	30	77	58	78	72	68	69	67	66	65	58	80	73
	Heating Full	77	66	58	55	51	44	39	31	77	58	80	72	68	68	67	65	64	58	81	73
	Cooling Part	76	65	57	53	48	44	35	27	77	56	76	67	64	64	62	60	58	50	77	67
	Heating Part	77	66	55	53	47	39	34	26	78	56	79	71	64	63	62	60	58	50	80	67
	FAN Only	68	59	48	46	40	35	29	24	68	49	71	63	60	60	58	56	53	45	73	63
CP060 RP060	Cooling Full	79	71	63	57	53	48	44	35	80	61	80	74	73	71	72	71	70	64	83	77
	Heating Full	80	72	64	58	54	48	45	37	81	62	80	74	73	71	72	70	70	64	83	77
	Cooling Part	80	65	61	56	49	44	39	31	80	59	76	70	69	67	66	65	64	57	78	72
	Heating Part	80	64	61	56	49	44	40	31	80	59	80	71	68	67	67	65	64	58	81	72
	FAN Only	65	58	53	48	42	38	33	25	66	50	72	67	64	63	63	61	59	51	75	68
CP070 RP070	Cooling Full	78	70	64	59	54	50	46	36	79	62	80	75	75	73	73	71	71	65	84	78
	Heating Full	79	71	65	59	54	49	45	37	80	62	82	74	74	73	73	71	71	66	85	78
	Cooling Part	75	64	62	57	51	45	41	32	76	59	81	72	70	69	68	66	65	59	82	74
	Heating Part	79	64	62	56	50	45	40	32	79	59	79	71	70	69	68	66	65	59	81	74
	FAN Only	68	59	55	50	43	39	35	26	69	52	73	68	65	64	63	61	59	52	75	68

NOTES:

- 1) Sound tests are performed at 0.1-.2 external static based on capacity of the units to align with AHRI 600 "Performance Rating of Water/Brine to Air Heat Pump Equipment" as well as DOE proposed rulemaking both expected to be release in 2024.
- 2) Sound ratings for all sizes based on constant airflow motor option
- 3) Sound based on standard refrigerant option. No Hot Gas Reheat. No economizer.

2.2 CF/RF Series

CF/RF Sound Power Data - Vertical																					
Model	Load	Octave Band Sound Power Levels dB, re 10-12 Watts																			
		Casing Radiated Vertical										Ducted Discharge Vertical									
		Center Frequency - Hz										Center Frequency - Hz									
		63	125	250	500	1000	2000	4000	8000	Overall	Overall AHRI-260:2017 (63Hz-8kHz) (dBA)	63	125	250	500	1000	2000	4000	8000	Overall	Overall AHRI-260:2017 (63Hz-8kHz) (dBA)
CF007 RF007	Cooling Full	78	56	50	46	41	36	29	23	78	53	74	67	64	62	61	58	54	50	76	66
	Heating Full	79	56	51	46	41	36	28	23	80	54	78	68	64	62	61	58	54	50	79	66
	FAN Only	59	48	42	39	34	28	22	21	60	41	71	63	58	54	53	49	44	35	72	58
CF009 RF009	Cooling Full	83	56	51	47	43	38	34	34	83	57	77	62	58	62	62	59	55	51	77	66
	Heating Full	85	59	52	46	41	38	34	32	85	59	81	63	58	62	63	59	55	50	82	67
	FAN Only	60	45	39	38	33	28	22	22	60	40	71	57	52	55	54	50	45	37	71	58
CF012 RF012	Cooling Full	71	55	52	49	45	40	34	29	71	52	78	67	66	63	64	61	59	56	79	68
	Heating Full	71	57	52	49	45	41	34	28	71	51	76	67	65	62	64	61	59	55	77	68
	FAN Only	63	47	44	42	37	32	25	22	63	43	67	59	58	55	55	52	49	43	68	60
CF015 RF015	Cooling Full	71	61	50	43	42	35	30	28	71	50	70	62	57	60	56	51	48	37	71	61
	Heating Full	73	62	52	42	40	35	30	25	73	51	76	60	56	60	54	48	44	33	77	60
	FAN Only	58	50	39	38	33	26	23	21	59	40	68	63	52	54	50	44	40	28	69	55
CF018 RF018	Cooling Full	76	54	53	49	44	37	33	33	76	53	76	62	60	63	57	54	50	40	77	63
	Heating Full	77	60	54	50	43	39	33	29	77	54	78	64	60	63	56	52	49	38	78	63
	FAN Only	59	49	42	44	34	28	23	21	59	43	64	60	54	57	52	46	41	29	67	57
CF024 RF024	Cooling Full	69	58	54	50	46	41	32	27	69	53	79	65	66	68	63	60	58	50	80	70
	Heating Full	66	60	56	49	46	41	32	27	68	53	79	65	66	68	62	59	57	48	80	69
	Cooling Part	69	53	49	46	42	37	29	26	69	49	77	62	62	63	58	54	51	41	78	64
	Heating Part	67	55	50	48	43	37	29	26	68	49	78	64	61	65	57	53	49	39	79	64
	FAN Only	59	56	45	42	37	31	24	23	61	44	72	60	59	61	55	51	47	38	73	61
CF030 RF030	Cooling Full	67	58	54	50	49	45	40	31	68	54	79	68	69	67	65	62	60	52	80	70
	Heating Full	69	57	54	50	50	43	35	28	69	54	78	68	68	66	64	61	59	51	79	69
	Cooling Part	70	56	50	47	48	40	31	25	71	52	79	66	63	62	61	57	54	44	79	66
	Heating Part	68	55	51	49	48	39	29	24	68	51	78	64	62	62	60	56	52	42	78	65
	FAN Only	60	48	43	46	40	33	24	22	61	46	70	62	60	59	57	53	49	39	71	62
CF036 RF036	Cooling Full	73	62	55	54	51	47	43	40	74	57	80	67	68	68	67	65	64	58	81	72
	Heating Full	76	65	56	52	50	44	41	36	76	56	80	68	65	66	65	62	61	54	81	70
	Cooling Part	75	65	58	51	47	41	40	37	75	55	78	64	63	63	61	59	57	49	79	67
	Heating Part	76	62	59	50	46	42	40	39	76	56	78	64	61	63	61	57	55	47	79	66
	FAN Only	64	54	46	45	40	34	27	25	64	47	70	65	60	62	59	56	53	45	72	64
CF042 RF042	Cooling Full	83	63	57	53	50	47	41	31	83	59	78	70	70	72	69	65	66	60	81	74
	Heating Full	78	63	56	53	49	45	38	31	78	57	78	70	69	71	67	64	64	58	80	73
	Cooling Part	80	58	55	50	46	41	34	30	80	56	76	66	66	67	63	60	60	52	78	69
	Heating Part	79	60	55	50	45	40	34	30	79	56	76	65	65	66	62	59	59	51	78	68
	FAN Only	61	51	47	44	41	36	28	23	62	46	71	63	63	63	60	57	55	47	73	65
CF048 RF048	Cooling Full	77	61	58	56	55	47	40	33	77	59	80	72	72	73	72	69	69	64	82	77
	Heating Full	79	61	57	57	56	48	40	34	79	60	79	70	72	73	72	69	69	63	82	77
	Cooling Part	73	56	56	53	51	42	35	31	73	56	77	68	66	68	65	63	62	55	79	71
	Heating Part	75	54	57	53	51	43	35	30	75	56	79	66	66	68	65	62	62	55	80	71
	FAN Only	63	57	50	49	43	38	30	24	64	50	73	67	65	66	63	60	59	52	75	68
CF060 RF060	Cooling Full	86	69	60	56	51	45	39	32	86	62	83	79	73	71	71	70	69	63	85	77
	Heating Full	81	67	61	57	50	45	38	30	81	60	81	77	73	71	71	70	70	64	84	77
	Cooling Part	60	48	49	50	46	42	35	26	61	61	78	73	68	66	65	63	62	55	80	71
	Heating Part	85	63	61	54	46	40	32	26	85	60	81	70	68	67	65	63	62	55	82	71
	FAN Only	63	52	48	46	42	41	35	30	64	49	73	68	65	62	62	60	58	51	75	67
CF070 RF070	Cooling Full	75	65	59	57	52	48	41	34	76	59	81	73	71	71	70	69	69	64	83	76
	Heating Full	79	64	59	57	52	48	42	35	79	59	81	73	72	72	71	70	70	65	83	77
	Cooling Part	74	64	58	55	49	43	37	31	75	57	77	71	68	66	65	64	63	57	79	71
	Heating Part	77	66	59	54	50	43	38	32	78	58	79	71	67	67	65	64	64	57	80	71
	FAN Only	64	53	48	46	40	36	30	24	64	47	72	67	63	63	61	59	58	51	75	67

NOTES:

1) Sound tests are performed at 0.1-.2 external static based on capacity of the units to align with AHRI 600 "Performance Rating of Water/Brine to Air Heat Pump Equipment" as well as DOE proposed rulemaking both expected to be release in 2024.

2) Sound ratings for model sizes 007, 009, 012 based on constant torque motor option

3) Sound ratings for model sizes 015, 018, 024, 030, 036, 042, 048, 060, 070 based on constant airflow motor option

4) Sound based on standard refrigerant option. No Hot Gas Reheat. No economizer.

CF/RF Sound Power Data - Horizontal																					
Model	Load	Octave Band Sound Power Levels dB, re 10-12 Watts																			
		Casing Radiated Horizontal										Ducted Discharge Horizontal									
		Center Frequency - Hz										Center Frequency - Hz									
		63	125	250	500	1000	2000	4000	8000	Overall	Overall AHRI-260:2017 (63Hz-8kHz) (dBA)	63	125	250	500	1000	2000	4000	8000	Overall	Overall AHRI-260:2017 (63Hz-8kHz) (dBA)
CF007 RF007	Cooling Full	84	63	58	48	46	41	36	31	84	59	86	62	59	57	58	55	52	46	86	64
	Heating Full	80	64	55	45	43	38	33	27	80	56	84	64	59	56	59	56	52	48	84	64
	FAN Only	60	48	42	38	35	29	24	23	60	41	69	56	52	50	51	47	41	34	69	55
CF009 RF009	Cooling Full	85	61	59	50	47	44	38	36	85	60	84	63	61	59	60	58	56	52	84	66
	Heating Full	83	61	54	47	45	43	36	34	83	58	88	64	60	58	60	58	55	51	88	66
	FAN Only	60	47	43	39	37	33	27	25	61	43	66	56	53	51	52	49	44	37	67	56
CF012 RF012	Cooling Full	89	61	55	48	47	43	34	29	89	63	84	64	62	62	65	62	59	58	84	69
	Heating Full	87	61	56	48	47	43	35	31	87	61	81	65	63	62	65	63	60	58	82	69
	FAN Only	60	47	43	42	40	36	26	23	61	44	68	56	57	55	57	54	50	44	69	61
CF015 RF015	Cooling Full	86	56	53	46	46	38	35	28	86	60	78	62	59	59	56	53	49	38	78	62
	Heating Full	81	60	56	47	44	36	34	28	81	57	79	64	61	58	55	50	46	35	79	61
	FAN Only	58	49	42	39	34	27	23	23	59	41	68	58	54	55	51	47	42	30	69	56
CF018 RF018	Cooling Full	83	57	56	51	46	43	41	42	83	58	79	62	62	64	59	56	52	42	80	65
	Heating Full	81	57	58	49	43	40	43	42	81	57	78	63	62	65	58	54	50	40	79	65
	FAN Only	58	55	44	40	35	29	24	23	60	43	67	61	56	58	52	48	43	31	69	58
CF024 RF024	Cooling Full	80	65	58	52	48	42	35	27	80	57	77	65	66	67	64	62	59	52	79	69
	Heating Full	78	67	59	51	47	42	34	27	78	57	78	67	65	66	62	60	58	49	79	68
	Cooling Part	80	62	55	50	45	40	32	27	80	56	75	61	61	62	58	55	52	42	75	63
	Heating Part	75	63	60	52	44	40	31	25	76	56	76	64	62	62	56	53	50	39	76	63
	FAN Only	59	48	46	41	34	28	24	22	59	42	67	57	59	59	55	52	48	36	69	60
CF030 RF030	Cooling Full	77	68	57	54	50	43	36	30	78	58	77	67	66	66	65	62	60	53	78	70
	Heating Full	79	72	55	53	50	44	35	31	79	59	81	68	62	63	62	59	56	49	81	67
	Cooling Part	82	63	59	55	47	42	32	28	82	58	76	64	62	62	59	57	53	45	77	64
	Heating Part	79	65	57	56	47	42	33	31	79	58	80	62	59	60	58	54	50	43	80	63
	FAN Only	61	50	44	42	37	30	26	23	62	44	67	56	56	57	54	50	45	34	68	58
CF036 RF036	Cooling Full	78	60	57	53	52	47	41	32	78	58	78	70	70	70	70	67	66	60	80	75
	Heating Full	74	60	55	53	51	46	40	33	75	56	77	67	66	66	66	64	62	56	79	71
	Cooling Part	76	59	61	50	49	43	36	31	77	57	77	66	65	65	63	61	59	51	78	69
	Heating Part	75	63	57	50	48	43	36	32	75	55	75	65	62	63	61	58	56	49	76	66
	FAN Only	61	52	47	45	42	37	28	24	61	47	69	62	61	61	60	57	55	46	71	65
CF042 RF042	Cooling Full	86	63	60	55	53	49	45	37	86	62	79	72	72	71	71	68	68	61	82	76
	Heating Full	84	62	65	55	51	46	41	32	84	62	81	71	70	71	69	67	66	60	82	74
	Cooling Part	84	60	62	54	48	44	39	30	84	61	79	68	68	69	66	64	63	55	80	72
	Heating Part	84	62	65	54	47	42	37	30	84	61	81	66	66	66	64	62	60	52	82	69
	FAN Only	61	51	50	46	41	36	30	23	62	47	69	65	64	65	62	60	57	48	73	67
CF048 RF048	Cooling Full	74	70	61	56	54	50	49	38	76	61	79	73	72	73	73	71	70	65	82	78
	Heating Full	74	69	62	56	53	49	45	36	75	60	78	72	71	72	72	69	69	63	81	77
	Cooling Part	73	63	60	53	49	46	42	32	74	57	77	67	66	70	67	65	64	57	79	72
	Heating Part	73	66	64	54	49	44	39	30	74	59	79	68	66	68	66	64	63	55	80	71
	FAN Only	62	53	51	48	44	42	35	26	63	50	71	65	64	66	64	62	60	53	74	69
CF060 RF060	Cooling Full	83	72	64	58	56	50	45	37	83	63	83	77	76	73	74	72	71	65	86	79
	Heating Full	86	69	64	58	55	49	44	37	86	63	85	76	75	72	73	71	70	65	86	78
	Cooling Part	82	69	60	56	51	46	41	34	83	61	80	72	70	68	67	66	64	56	81	73
	Heating Part	86	65	65	56	49	43	37	31	86	62	79	70	68	67	65	63	62	55	80	71
	FAN Only	65	53	50	47	42	36	31	25	65	49	73	66	64	62	61	60	57	50	75	67
CF070 RF070	Cooling Full	88	71	64	61	55	49	45	40	88	64	83	74	72	72	73	72	70	65	85	78
	Heating Full	82	73	67	61	56	50	45	42	83	64	82	76	73	72	73	72	71	65	84	78
	Cooling Part	85	68	65	57	50	45	40	34	85	61	80	69	68	68	66	66	64	57	81	72
	Heating Part	84	73	68	58	51	45	40	40	85	63	79	72	68	68	67	66	64	58	81	73
	FAN Only	68	57	53	51	44	40	34	27	68	52	75	67	65	65	63	63	60	53	77	69

NOTES:

1) Sound tests are performed at 0.1-.2 external static based on capacity of the units to align with AHRI 600 "Performance Rating of Water/Brine to Air Heat Pump Equipment" as well as DOE proposed rulemaking both expected to be release in 2024.

2) Sound ratings for model sizes 007, 009, 012 based on constant torque motor option

3) Sound ratings for model sizes 015, 018, 024, 030, 036, 042, 048, 060, 070 based on constant airflow motor option

4) Sound based on standard refrigerant option. No Hot Gas Reheat. No economizer.

CF/RF Sound Power Data - Counter Flow																					
Model	Load	Octave Band Sound Power Levels dB, re 10 ⁻¹² Watts																			
		Casing Radiated Counter Flow										Ducted Discharge Counter Flow									
		Center Frequency - Hz										Center Frequency - Hz									
		63	125	250	500	1000	2000	4000	8000	Overall	Overall AHRI-260:2017 (63Hz-8kHz) (dBA)	63	125	250	500	1000	2000	4000	8000	Overall	Overall AHRI-260:2017 (63Hz-8kHz) (dBA)
CF024 RF024	Cooling Full	73	70	56	52	49	43	36	31	75	57	74	68	65	61	52	55	53	45	76	63
	Heating Full	76	72	58	52	48	43	37	32	77	58	76	68	65	59	52	54	52	44	77	63
	Cooling Part	72	65	54	47	42	38	34	31	73	53	71	64	58	57	46	47	45	38	72	58
	Heating Part	71	65	54	47	43	38	34	29	72	53	75	61	59	57	46	48	44	38	76	58
	FAN Only	59	54	47	43	38	33	27	25	61	45	64	56	57	57	46	46	42	37	66	56
CF030 RF030	Cooling Full	80	65	58	51	48	44	37	28	80	57	75	69	66	62	55	56	55	48	77	65
	Heating Full	77	64	57	51	49	44	37	29	77	56	78	65	68	62	55	55	54	46	78	64
	Cooling Part	80	60	53	49	45	40	32	28	80	56	72	63	62	58	51	51	49	42	73	60
	Heating Part	79	60	54	48	46	40	32	26	79	55	73	62	61	57	52	51	48	40	74	60
	FAN Only	62	56	49	45	42	36	28	23	63	48	70	60	60	57	52	50	47	40	71	59
CF036 RF036	Cooling Full	76	65	58	54	50	44	36	28	76	57	76	67	68	64	55	58	57	52	78	66
	Heating Full	77	65	59	55	51	44	37	29	78	58	76	66	68	62	55	58	56	50	77	65
	Cooling Part	75	61	56	53	49	40	34	27	75	55	72	63	62	60	50	52	50	46	73	61
	Heating Part	77	60	55	52	50	41	33	28	77	56	77	63	63	58	51	52	50	44	77	61
	FAN Only	62	58	50	45	41	35	27	24	64	48	68	61	59	56	48	49	47	42	70	58
CF042 RF042	Cooling Full	83	66	58	55	51	46	41	30	83	60	78	68	70	66	57	59	59	53	79	68
	Heating Full	83	65	58	55	50	44	38	33	83	59	85	67	69	65	56	59	58	52	85	68
	Cooling Part	80	61	55	52	48	43	36	28	81	57	76	66	64	61	52	54	53	47	77	63
	Heating Part	83	62	55	51	46	40	34	31	83	58	79	64	64	60	53	54	53	46	79	63
	FAN Only	63	55	48	45	41	34	27	24	63	47	67	58	59	54	47	48	47	41	68	56
CF048 RF048	Cooling Full	80	68	62	57	53	48	41	34	81	61	77	72	73	68	61	63	63	58	80	71
	Heating Full	83	68	61	57	53	48	43	36	84	61	82	71	72	67	60	63	63	57	83	71
	Cooling Part	83	65	60	52	49	42	35	30	83	60	76	68	67	64	54	56	56	50	78	66
	Heating Part	85	65	56	53	49	43	38	35	85	60	80	67	66	62	53	56	56	49	81	65
	FAN Only	64	62	52	49	44	38	31	24	66	52	69	63	62	59	50	52	52	45	71	61
CF060 RF060	Cooling Full	84	72	65	60	55	48	42	33	85	64	79	75	76	69	63	64	62	57	82	73
	Heating Full	82	73	66	61	55	48	43	35	83	64	81	75	77	69	64	65	63	57	84	73
	Cooling Part	83	69	65	56	50	44	40	33	83	61	76	70	71	63	56	56	54	48	78	67
	Heating Part	76	68	61	56	50	44	37	31	77	58	78	69	70	63	56	57	55	48	79	66
	FAN Only	68	62	56	51	44	38	31	26	69	53	71	67	67	60	54	54	51	44	74	63
CF070 RF070	Cooling Full	79	74	67	62	58	49	43	36	81	65	53	59	68	67	64	67	64	57	74	74
	Heating Full	83	75	68	62	58	49	43	36	83	65	56	61	70	67	65	68	65	58	75	75
	Cooling Part	77	69	64	60	52	45	39	34	78	61	52	54	62	61	58	60	58	49	67	67
	Heating Part	79	69	62	59	52	45	40	34	79	61	54	55	63	61	58	61	58	50	68	68
	FAN Only	72	65	57	53	46	39	32	25	73	55	43	49	58	57	53	55	53	43	63	63

NOTES:

- 1) Sound tests are performed at 0.1-2 external static based on capacity of the units to align with AHRI 600 "Performance Rating of Water/Brine to Air Heat Pump Equipment" as well as DOE proposed rulemaking both expected to be release in 2024.
- 2) Sound ratings for model sizes 007, 009, 012 based on constant torque motor option
- 3) Sound ratings for model sizes 015, 018, 024, 030, 036, 042, 048, 060, 070 based on constant airflow motor option
- 4) Sound based on standard refrigerant option. No Hot Gas Reheat. No economizer.

2.3 CL/RL Series

CL/RL Sound Power Data - Vertical																					
Model	Load	Octave Band Sound Power Levels dB, re 10-12 Watts																			
		Casing Radiated Vertical										Ducted Discharge Vertical									
		Center Frequency - Hz										Center Frequency - Hz									
		63	125	250	500	1000	2000	4000	8000	Overall	Overall AHRI-260:2017 (63Hz-8kHz) (dBA)	63	125	250	500	1000	2000	4000	8000	Overall	Overall AHRI-260:2017 (63Hz-8kHz) (dBA)
CL007 RL007	Cooling Full	77	58	55	52	48	44	40	33	77	55	82	66	66	66	66	64	62	57	82	71
	Heating Full	81	56	59	49	47	43	39	31	81	57	84	70	67	67	67	65	62	58	85	72
	FAN Only	65	52	50	49	47	43	39	32	65	52	72	66	65	65	67	64	62	57	76	71
CL009 RL009	Cooling Full	84	58	56	55	48	42	37	31	84	59	78	66	66	65	65	63	60	56	79	70
	Heating Full	81	58	56	56	48	42	36	29	81	58	75	66	65	65	66	63	60	56	77	70
	FAN Only	67	55	53	52	48	43	36	30	67	53	72	66	66	65	66	64	61	57	75	70
CL012 RL012	Cooling Full	79	59	56	54	49	45	42	33	79	57	75	66	68	67	68	65	62	57	78	72
	Heating Full	79	60	58	55	50	45	39	33	79	57	75	67	68	67	67	65	62	58	78	72
	FAN Only	64	54	53	51	48	44	38	30	65	53	72	66	68	68	68	65	63	58	76	72
CL015 RL015	Cooling Full	85	65	55	50	47	41	36	31	85	60	81	67	64	64	61	57	54	44	81	66
	Heating Full	86	68	54	48	43	40	35	31	86	61	80	66	62	61	59	54	51	41	80	64
	FAN Only	67	57	54	53	48	41	36	27	68	54	73	63	60	60	58	52	49	38	74	62
CL018 RL018	Cooling Full	84	64	57	48	47	38	35	42	84	59	87	71	71	68	64	58	56	49	87	70
	Heating Full	85	62	55	48	47	40	37	50	85	60	88	71	72	67	63	58	54	47	88	70
	FAN Only	66	61	55	48	45	36	32	23	67	51	68	56	57	52	48	42	38	28	68	54
CL024 RL024 (208-230V 1 Phase)	Cooling Full	77	58	55	55	50	49	46	40	78	58	54	53	60	68	65	64	61	52	72	72
	Heating Full	74	60	56	55	50	44	45	36	75	57	55	53	60	67	64	63	60	51	71	71
	FAN Only	64	51	48	47	41	34	28	26	64	47	50	49	55	61	59	57	53	42	65	65
CL030 RL030 (208-230V 1 Phase)	Cooling Full	84	63	56	55	51	49	53	37	85	61	80	67	69	72	68	65	63	56	82	73
	Heating Full	83	67	56	54	53	49	48	42	83	61	79	67	68	71	66	63	61	53	80	72
	FAN Only	61	48	46	41	37	31	25	24	61	44	70	59	61	56	53	50	47	37	71	59
CL024 RL024 (265V, 208-230 3 Phase, 460V)	Cooling Full	72	59	56	59	54	47	40	35	73	59	80	70	69	70	65	62	60	52	81	72
	Heating Full	78	64	57	56	52	45	39	33	79	58	81	69	69	70	65	62	59	51	82	71
	FAN Only	62	53	48	50	43	36	29	25	63	49	77	66	63	64	59	56	52	42	78	65
CL030 RL030 (265V, 208-230 3 Phase, 460V)	Cooling Full	76	65	58	56	53	50	40	33	77	59	80	68	71	73	70	66	65	58	82	75
	Heating Full	79	64	57	55	51	47	39	32	79	58	83	68	70	73	68	65	63	56	84	74
	FAN Only	62	51	50	47	42	37	30	26	63	48	70	62	62	65	59	55	53	43	73	65
CL036 RL036	Cooling Full	77	64	59	56	53	49	44	37	78	59	81	72	74	71	70	68	66	60	83	75
	Heating Full	74	62	57	54	52	48	41	34	74	57	78	71	71	69	69	66	64	57	80	74
	FAN Only	75	58	56	54	50	46	39	29	75	56	81	71	71	68	67	64	62	54	82	72
CL042 RL042	Cooling Full	74	60	58	56	53	47	40	35	74	58	81	71	72	73	72	69	68	62	83	77
	Heating Full	77	62	57	56	52	47	40	34	77	58	83	70	71	73	70	67	66	60	84	76
	FAN Only	64	61	51	49	45	40	35	41	66	51	79	66	66	66	64	61	59	51	80	69
CL048 RL048	Cooling Full	81	63	59	55	54	49	43	36	81	60	81	71	71	72	71	68	68	63	83	76
	Heating Full	80	62	59	55	54	49	42	35	80	59	81	70	71	72	71	67	68	62	83	76
	FAN Only	67	55	53	50	48	43	37	30	67	52	73	64	64	66	62	59	59	51	75	68
CL060 RL060	Cooling Full	79	65	62	59	57	54	50	43	80	63	83	77	78	74	75	71	71	65	86	79
	Heating Full	81	65	61	58	56	51	46	40	81	62	82	75	75	73	73	70	70	64	85	78
	FAN Only	69	58	56	52	48	45	38	30	70	54	77	71	71	67	67	63	62	53	80	72
CL070 RL070	Cooling Full	82	67	61	58	54	51	43	37	83	62	84	74	74	73	74	71	71	66	86	78
	Heating Full	80	64	60	58	54	51	43	37	80	61	85	74	74	72	73	71	71	65	87	78
	FAN Only	69	58	54	52	47	44	36	29	69	53	78	71	69	67	65	64	63	56	80	71

NOTES:

- 1) Sound tests are performed at 0.1-.2 external static based on capacity of the units to align with AHRI 600 "Performance Rating of Water/Brine to Air Heat Pump Equipment" as well as DOE proposed rulemaking both expected to be release in 2024.
- 2) Sound ratings for model sizes 007, 009, 012 based on constant torque motor option
- 3) Sound ratings for model sizes 015, 018, 024, 030, 036, 042, 048, 060, 070 based on constant airflow motor option
- 4) Sound based on standard refrigerant option. No Hot Gas Reheat. No economizer.

CL/RL Sound Power Data - Horizontal																					
Model	Load	Octave Band Sound Power Levels dB, re 10-12 Watts																			
		Casing Radiated Horizontal										Ducted Discharge Horizontal									
		Center Frequency - Hz										Center Frequency - Hz									
		63	125	250	500	1000	2000	4000	8000	Overall	Overall AHRI-260:2017 (63Hz-8kHz) (dBA)	63	125	250	500	1000	2000	4000	8000	Overall	Overall AHRI-260:2017 (63Hz-8kHz) (dBA)
CL007 RL007	Cooling Full	80	75	66	54	51	47	46	34	82	63	85	72	67	62	66	62	59	59	85	70
	Heating Full	82	75	66	54	50	47	47	37	83	63	91	73	66	60	65	60	57	56	91	70
	FAN Only	65	57	52	49	48	46	41	34	66	53	85	70	66	60	65	60	57	57	85	69
CL009 RL009	Cooling Full	85	63	60	57	50	49	42	32	85	61	87	64	64	62	66	63	60	56	87	70
	Heating Full	83	65	61	59	49	43	41	32	83	60	86	63	63	62	67	63	60	56	86	70
	FAN Only	64	54	50	48	47	41	37	29	65	51	70	62	63	62	67	63	60	56	74	70
CL012 RL012	Cooling Full	87	72	59	54	51	47	45	40	88	63	92	79	68	63	65	61	58	58	92	71
	Heating Full	87	73	62	58	52	46	44	38	87	64	92	79	68	63	65	60	57	56	93	71
	FAN Only	62	62	56	50	48	45	44	38	66	54	89	78	68	63	65	60	57	56	90	70
CL015 RL015	Cooling Full	88	61	57	52	51	47	42	39	88	62	83	64	60	63	58	55	51	43	83	64
	Heating Full	87	62	58	53	53	50	42	39	87	62	83	63	59	60	55	51	47	40	83	62
	FAN Only	61	50	43	39	34	27	24	25	62	42	67	60	55	56	52	47	42	32	68	57
CL018 RL018	Cooling Full	79	60	54	48	45	43	35	30	79	55	78	63	63	64	59	57	53	43	78	65
	Heating Full	80	59	58	47	42	37	35	28	80	56	82	63	61	66	57	54	50	39	83	65
	FAN Only	59	49	43	42	40	30	26	24	60	44	67	64	56	58	52	48	44	33	69	58
CL024 RL024 (208-230V 1 Phase)	Cooling Full	85	63	60	56	51	48	46	50	85	61	82	67	67	68	64	62	60	52	83	70
	Heating Full	82	63	61	54	50	48	46	48	82	60	85	68	67	67	62	60	58	48	86	69
	FAN Only	61	48	49	40	34	28	24	24	62	44	71	59	60	66	57	54	50	40	73	64
CL030 RL030 (208-230V 1 Phase)	Cooling Full	84	66	62	56	56	53	51	43	84	63	86	72	70	71	68	66	64	57	86	74
	Heating Full	81	67	61	55	55	52	50	44	82	62	82	71	69	70	66	64	62	55	83	72
	FAN Only	66	55	52	49	43	38	32	26	66	50	69	64	61	66	57	54	51	41	72	65
CL024 RL024 (265V, 208-230 3 Phase, 460V)	Cooling Full	84	60	57	54	52	46	39	32	84	60	72	61	63	65	61	59	57	49	74	67
	Heating Full	79	62	58	53	54	49	41	34	79	59	73	61	61	63	59	56	54	45	74	65
	FAN Only	62	54	47	44	39	33	27	25	63	46	63	56	57	58	54	51	47	37	66	59
CL030 RL030 (265V, 208-230 3 Phase, 460V)	Cooling Full	85	62	58	56	54	46	40	34	85	61	81	68	70	71	71	66	64	57	82	74
	Heating Full	81	65	59	56	53	46	40	34	81	60	84	69	69	70	66	63	62	54	84	72
	FAN Only	62	55	50	47	42	37	31	26	63	48	71	61	61	61	57	55	51	42	72	63
CL036 RL036	Cooling Full	82	65	63	57	56	54	55	38	82	61	79	73	73	71	71	68	67	61	82	76
	Heating Full	77	64	62	57	54	49	43	35	78	60	80	70	71	69	68	66	64	57	82	73
	FAN Only	66	57	54	50	46	41	33	26	67	52	72	64	63	62	60	57	55	46	74	65
CL042 RL042	Cooling Full	76	64	62	60	58	53	45	37	76	62	81	73	75	73	73	71	70	64	84	78
	Heating Full	78	64	62	59	56	49	43	37	79	61	80	73	75	72	72	70	69	63	83	77
	FAN Only	64	52	49	43	40	31	26	25	64	46	74	67	66	65	64	61	60	52	76	69
CL048 RL048	Cooling Full	77	72	62	56	55	51	45	35	78	62	82	76	73	74	73	71	71	65	84	78
	Heating Full	76	68	63	57	55	51	45	36	77	61	81	73	73	73	72	70	70	64	83	78
	FAN Only	66	59	54	50	46	41	36	28	67	53	73	65	65	66	63	61	61	53	76	69
CL060 RL060	Cooling Full	78	74	65	59	57	54	52	40	80	64	80	72	72	71	71	68	67	61	82	76
	Heating Full	78	74	65	59	56	54	50	38	80	64	81	74	72	71	72	69	68	62	84	76
	FAN Only	72	60	57	53	50	49	39	31	72	56	74	67	65	65	62	60	57	49	76	68
CL070 RL070	Cooling Full	80	70	66	59	57	52	48	42	81	64	83	75	75	73	74	72	71	66	79	79
	Heating Full	79	69	63	59	57	51	47	41	80	63	84	75	75	71	73	71	70	65	78	78
	FAN Only	67	56	54	51	46	42	36	28	67	53	74	68	67	66	64	63	62	55	70	70

NOTES:

1) Sound tests are performed at 0.1-.2 external static based on capacity of the units to align with AHRI 600 "Performance Rating of Water/Brine to Air Heat Pump Equipment" as well as DOE proposed rulemaking both expected to be release in 2024.

2) Sound ratings for model sizes 007, 009, 012 based on constant torque motor option

3) Sound ratings for model sizes 015, 018, 024, 030, 036, 042, 048, 060, 070 based on constant airflow motor option

4) Sound based on standard refrigerant option. No Hot Gas Reheat. No economizer.

2.4 CA Console

CA Sound Power Data										
Model	Load	Octave Band Sound Power Levels dB, re 10-12 Watts								
		Center Frequency - Hz								
		125	250	500	1000	2000	4000	8000	Overall	Overall ARI-260:2001 (100hz-10kHz)
CA009	Cooling Full	65	59	47	43	34	30	28	66	54
CA012	Cooling Full	65	58	52	44	37	33	28	66	55
CA015	Cooling Full	62	61	54	50	43	40	35	65	56
CA018	Cooling Full	70	62	55	51	45	40	34	70	59

2.5 EC Series

EC Sound Power Data																			
Model	Load	Octave Band Sound Power Levels dB, re 10-12 Watts																	
		Ducted Discharge - Vertical									Ducted Discharge - Horizontal								
		Center Frequency - Hz									Center Frequency - Hz								
		125	250	500	1000	2000	4000	8000	Overall	Overall ARI-260:2017 (100Hz-10kHz) (dBA)	125	250	500	1000	2000	4000	8000	Overall	Overall ARI-260:2017 (100Hz-10kHz) (dBA)
EC072	Cooling Full	67	64	64	65	61	56	49	72	68	67	64	64	65	61	56	49	72	68
EC096	Cooling Full	69	66	66	67	63	58	51	74	70	69	66	66	67	63	58	51	74	70
EC120	Cooling Full	74	71	71	72	68	63	56	79	75	67	64	64	65	61	56	49	72	68
EC150	Cooling Full										80	77	77	78	74	69	62	85	81
EC151	Cooling Full	80	77	77	78	74	69	62	85	81									
EC180	Cooling Full										70	67	67	68	64	59	52	75	71
EC181	Cooling Full	85	82	82	83	79	74	67	90	86									
EC210	Cooling Full	75	72	72	73	69	64	57	80	76									
EC240	Cooling Full	76	73	73	74	70	65	58	81	77									
EC242	Cooling Full										76	73	73	74	70	55	58	81	77
EC300	Cooling Full	84	81	81	82	78	73	66	89	85									
EC360	Cooling Full	85	82	82	83	79	74	57	90	86									

2.6 MC Series

MC Sound Power Data													
Model	Selected RPM	Selected Motor HP	Sound Data CFM	Octave Band Sound Power Levels dB, re 10-12 Watts									
				Ducted Discharge									
				Center Frequency - Hz									
				63	125	250	500	1000	2000	4000	8000	Overall	Overall ARI-260:2017 (63Hz-8kHz) (dBA)
360	813	7.5	9,500	94	87	82	85	80	77	72	69	96	86
	949	10	10,000	98	94	88	89	86	83	78	75	100	91
	1,111	15	11,000	101	100	93	92	91	87	82	79	104	95
	1,172	20	12,000	102	102	95	93	92	88	84	80	106	97
480	842	7.5	16,000	95	90	90	88	90	85	82	77	99	93
	1,072	10	15,000	103	103	93	90	89	86	82	76	106	95
	1,111	15	18,000	104	106	95	92	90	88	84	78	109	97
	1,172	20	19,000	105	109	97	93	92	89	86	80	111	99
600	813	7.5	19,000	85	91	86	82	79	75	70	65	94	85
	949	10	19,000	96	92	90	90	91	87	83	78	100	95
	1,034	15	21,000	97	95	92	92	92	89	85	80	102	96
	1,172	20	24,000	99	100	95	95	94	93	88	84	105	99
720	813	7.5	20,000	88	84	87	84	88	80	77	70	94	90
	842	10	22,000	94	88	89	88	87	81	79	75	97	91
	1,072	15	24,000	95	92	93	91	93	88	84	79	100	96
	1,172	20	25,000	99	100	95	95	94	93	88	84	105	99

NOTES:

**United States and Canada
Bosch Thermotechnology Corp.
65 Grove St.
Watertown, MA 02472**

**Tel: 800-283-3787
www.bosch-homecomfort.us**

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