

ENGINEERING DATA

Noise Criteria Quick Reference

Noise Criteria (NC)										
Inlet Size (in)	Max CFM	Min. Op. Pressure (in. wc)	DISCHARGE				RADIATED			
			P _s				P _s			
			0.5"	1.0"	2.0"	3.0"	0.5"	1.0"	2.0"	3.0"
04	75	0.041	-	-	29	37	-	-	-	-
	100	0.073	-	-	28	36	-	-	-	-
	150	0.165	-	-	27	35	-	-	-	22
	200	0.294	-	-	26	34	-	20	26	31
05	125	0.047	-	22	35	43	-	-	-	-
	200	0.121	-	21	34	42	-	-	-	21
	250	0.190	-	20	33	41	-	-	23	27
	350	0.372	-	-	30	37	-	26	33	37
06	200	0.040	-	-	-	-	-	-	-	-
	300	0.090	-	-	-	-	-	-	20	24
	400	0.160	-	-	20	24	-	21	28	32
	450	0.203	-	-	22	26	-	24	31	35
07	275	0.040	-	-	-	-	-	-	-	-
	450	0.107	-	-	-	23	-	-	24	28
	550	0.160	-	-	23	27	-	23	30	34
	650	0.223	-	-	26	30	21	28	34	38
08	350	0.038	-	-	-	-	-	-	-	-
	600	0.111	-	-	21	25	-	-	26	30
	700	0.150	-	-	24	27	-	23	30	34
	850	0.222	-	-	25	28	22	29	35	39
10	575	0.042	-	-	-	20	-	-	-	-
	950	0.116	-	-	23	26	-	21	28	32
	1150	0.170	-	21	25	28	20	26	33	37
	1350	0.234	-	23	28	31	24	31	38	42
12	850	0.045	-	-	21	24	-	-	-	20
	1300	0.105	-	21	26	28	-	21	28	32
	1700	0.180	-	24	29	32	22	29	36	40
	2000	0.249	20	25	32	35	26.7	34	40	44
14	1100	0.040	-	-	23	26	-	-	-	20
	1700	0.095	20	24	29	31	-	21	28	32
	2200	0.160	23	28	32	35	22	29	36	40
	3000	0.297	27	32	36	40	31	38	45	49
16	1500	0.042	-	23	27	30	-	-	-	22
	2200	0.091	23	27	32	34	-	22	29	33
	3000	0.170	27	31	35	38	24	31	38	42
	4000	0.302	30	35	39	41	33	39	46	50

Noise Criteria (NC) Notes:

1. A hyphen (-) indicates the NC is lower than 20.
2. Noise Criteria (NC) were found using ARI Standard 885-98 Appendix E (2002 Addendum):
 - a. Radiated NC were found using the type 2 ceiling (mineral fiber) condition.
 - b. Discharge NC were found using the large terminal condition due to the multitude of possible dischargeduct sizes.
3. ARI Standard 885-98 Appendix E, Table E1. Typical Sound Attenuation Values, dB.



LEAKAGE DATA

DAMPER LEAKAGE						
Size	1.5" wc		3.0" wc		6.0" wc	
	CFM	% Leakage	CFM	% Leakage	CFM	% Leakage
4	4	1.7%	5	2.2%	7	3.0%
5	4	1.1%	5	1.4%	7	1.9%
6	4	0.8%	5	1.0%	7	1.3%
7	4	0.6%	5	0.7%	7	1.0%
8	4	0.4%	5	0.5%	7	0.8%
10	4	0.3%	5	0.3%	7	0.5%
12	4	0.2%	5	0.2%	7	0.3%
14	4	0.1%	6	0.2%	8	0.3%
16	5	0.1%	7	0.2%	9	0.2%

ENGINEERING DATA

Minimum Pressure Requirement

Inlet Size (in)	Max CFM	P _s (in. wc)
04	75	0.041
	100	0.073
	150	0.165
	200	0.294
05	125	0.047
	200	0.121
	250	0.190
	350	0.372
06	200	0.040
	300	0.090
	400	0.160
	450	0.203
07	275	0.040
	450	0.107
	550	0.160
	650	0.223
08	350	0.038
	600	0.111
	700	0.150
	850	0.222

Inlet Size (in)	Max CFM	P _s (in. wc)
10	575	0.042
	950	0.116
	1150	0.170
	1350	0.234
12	850	0.045
	1300	0.105
	1700	0.180
	2000	0.249
14	1100	0.040
	1700	0.095
	2200	0.160
	3000	0.297
16	1500	0.042
	2200	0.091
	3000	0.170
	4000	0.302



ENGINEERING DATA

SDR Discharge & Radiated Sound

0.5" Inlet Static Pressure

Inlet Size (in)	Max CFM	Min. Op. Pressure (in. wc)	DISCHARGE							NC Levels	RADIATED							NC Levels
			Octave Bands								Octave Bands							
			2	3	4	5	6	7	2		3	4	5	6	7			
04	75	0.041	52	40	39	41	29	31	-	22	12	13	16	21	13	-		
	100	0.073	51	41	41	43	34	35	-	29	20	21	24	28	20	-		
	150	0.165	50	43	44	45	40	41	-	39	31	32	34	38	30	-		
	200	0.294	49	44	46	47	45	44	-	46	39	39	42	44	37	-		
05	125	0.047	57	44	44	44	34	36	-	26	16	17	20	25	18	-		
	200	0.121	56	47	47	47	41	43	-	37	29	30	32	36	29	-		
	250	0.190	55	48	49	49	45	46	-	43	35	36	38	41	35	-		
	350	0.372	55	50	51	52	50	51	-	51	44	45	47	49	43	-		
06	200	0.040	47	37	39	39	39	34	-	31	21	22	23	29	22	-		
	300	0.090	53	44	44	45	45	38	-	41	33	33	34	38	32	-		
	400	0.160	57	49	48	49	49	42	-	47	40	41	42	45	39	-		
	450	0.203	59	51	50	51	51	43	-	50	44	44	45	48	42	-		
07	275	0.040	49	40	42	42	42	37	-	32	23	24	25	30	24	-		
	450	0.107	56	49	49	49	49	43	-	44	36	37	38	41	36	-		
	550	0.160	59	52	52	52	52	45	-	49	42	42	43	46	41	-		
	650	0.223	61	55	54	54	54	47	-	53	46	47	47	50	45	21		
08	350	0.038	50	42	43	43	43	39	-	34	23	25	25	31	25	-		
	600	0.111	58	51	51	51	51	46	-	46	38	39	39	43	38	-		
	700	0.150	60	53	53	53	53	48	-	50	42	43	43	47	42	-		
	850	0.222	63	57	56	56	56	50	-	54	48	48	48	51	47	22		
10	575	0.042	53	46	47	47	47	45	-	37	27	28	27	33	28	-		
	950	0.116	60	54	54	54	54	51	-	49	41	41	40	45	40	-		
	1150	0.170	63	57	57	57	57	53	-	53	46	46	45	49	45	20		
	1350	0.234	65	60	59	59	59	55	-	57	50	50	49	53	49	24		
12	850	0.045	56	49	50	50	50	48	-	39	29	30	29	34	30	-		
	1300	0.105	62	56	56	56	56	52	-	49	41	41	40	44	41	-		
	1700	0.180	66	60	60	60	60	55	-	56	48	48	47	51	47	22		
	2000	0.249	68	63	62	62	63	57	20	60	52	52	51	55	51	27		
14	1100	0.040	57	50	51	51	51	51	-	40	29	30	29	35	31	-		
	1700	0.095	63	57	57	58	58	56	20	50	41	41	40	45	42	-		
	2200	0.160	67	62	60	61	61	60	23	56	48	48	47	51	48	22		
	3000	0.297	71	67	64	66	66	64	27	63	56	56	55	58	56	31		
16	1500	0.042	56	52	54	54	54	54	-	42	31	32	31	37	34	-		
	2200	0.091	58	59	59	59	60	59	23	51	42	42	41	46	43	-		
	3000	0.170	60	64	64	64	64	63	27	58	50	50	49	53	51	24		
	4000	0.302	62	69	68	68	68	67	30	65	58	58	56	60	58	33		



See Page 11 for notes on performance testing.

ENGINEERING DATA

SDR Discharge & Radiated Sound

1.0" Inlet Static Pressure

Inlet Size (in)	Max CFM	Min. Op. Pressure (in. wc)	DISCHARGE							NC Levels	RADIATED							NC Levels
			Octave Bands								Octave Bands							
			2	3	4	5	6	7	2		3	4	5	6	7			
04	75	0.041	62	49	46	47	32	36	-	27	18	20	22	27	19	-		
	100	0.073	61	50	48	49	37	40	-	34	26	27	30	33	26	-		
	150	0.165	60	52	51	51	43	45	-	44	38	38	40	43	36	-		
	200	0.294	60	53	53	53	48	49	-	51	46	46	48	50	43	20		
05	125	0.047	67	53	51	50	37	41	22	31	22	24	26	30	23	-		
	200	0.121	66	56	54	53	44	47	21	43	35	36	38	41	35	-		
	250	0.190	66	57	55	55	47	50	20	48	42	42	44	47	40	-		
	350	0.372	65	59	58	58	53	55	-	56	51	51	53	55	48	26		
06	200	0.040	52	42	43	43	43	38	-	36	27	29	29	34	27	-		
	300	0.090	58	49	48	49	49	43	-	46	39	39	40	44	37	-		
	400	0.160	62	54	52	53	53	46	-	52	46	47	48	50	45	21		
	450	0.203	64	56	54	54	55	48	-	55	50	50	51	53	48	24		
07	275	0.040	54	45	46	45	45	41	-	37	29	30	31	35	29	-		
	450	0.107	61	54	53	52	52	47	-	49	42	43	44	47	42	-		
	550	0.160	64	57	56	55	55	50	-	54	48	49	49	51	47	23		
	650	0.223	66	60	58	58	58	52	-	58	52	53	53	55	51	28		
08	350	0.038	55	47	47	47	47	44	-	39	29	31	31	36	30	-		
	600	0.111	63	56	55	54	55	50	-	51	44	45	45	48	44	-		
	700	0.150	65	58	57	57	57	52	-	55	49	49	49	52	47	23		
	850	0.222	68	62	60	59	60	54	-	59	54	54	54	56	52	29		
10	575	0.042	58	51	51	50	51	49	-	42	33	34	33	39	34	-		
	950	0.116	65	59	58	58	58	55	-	54	47	47	46	50	46	21		
	1150	0.170	68	62	61	60	61	57	21	58	52	52	51	55	51	26		
	1350	0.234	70	65	63	63	63	59	23	62	56	56	55	58	55	31		
12	850	0.045	61	54	54	54	54	53	-	44	35	36	35	39	36	-		
	1300	0.105	67	61	60	60	60	57	21	54	47	47	46	49	46	21		
	1700	0.180	71	65	64	63	64	60	24	61	54	54	53	56	53	29		
	2000	0.249	73	68	66	66	66	61	25	65	58	59	57	60	57	34		
14	1100	0.040	62	55	55	55	55	55	-	45	35	36	34	40	37	-		
	1700	0.095	69	62	61	61	61	61	24	55	47	47	46	50	47	21		
	2200	0.160	72	67	64	65	65	64	28	61	54	54	53	56	54	29		
	3000	0.297	77	72	68	69	69	68	32	68	62	62	61	64	61	38		
16	1500	0.042	63	57	58	57	58	59	23	47	37	38	37	42	39	-		
	2200	0.091	65	64	64	63	63	64	27	56	48	48	46	51	49	22		
	3000	0.170	67	69	68	67	68	67	31	63	56	56	55	58	56	31		
	4000	0.302	69	74	72	72	72	71	35	70	64	64	62	65	63	39		

See Page 11 for notes on performance testing.

ENGINEERING DATA

SDR Discharge & Radiated Sound

2.0" Inlet Static Pressure

Inlet Size (in)	Max CFM	Min. Op. Pressure (in. wc)	DISCHARGE							NC Levels	RADIATED							NC Levels
			Octave Bands								Octave Bands							
			2	3	4	5	6	7	2		3	4	5	6	7			
04	75	0.041	73	59	53	53	35	40	29	33	24	26	28	32	25	-		
	100	0.073	72	60	55	55	40	44	28	40	33	34	36	39	32	-		
	150	0.165	71	61	58	58	46	50	27	49	44	44	46	48	42	-		
	200	0.294	70	63	60	59	51	53	26	56	52	52	53	55	49	26		
05	125	0.047	77	62	58	56	40	45	35	37	29	30	32	36	28	-		
	200	0.121	76	65	61	59	47	52	34	48	42	43	44	47	40	-		
	250	0.190	76	66	62	61	50	55	33	53	48	49	50	52	45	23		
	350	0.372	75	68	64	63	56	59	30	61	57	58	58	60	54	33		
06	200	0.040	57	47	47	46	47	43	-	41	33	35	35	39	33	-		
	300	0.090	63	54	53	52	53	47	-	51	45	46	46	49	43	20		
	400	0.160	67	59	57	56	57	51	20	57	52	53	53	55	50	28		
	450	0.203	69	61	58	58	58	52	22	60	56	56	57	58	53	31		
07	275	0.040	60	50	50	49	49	46	-	42	35	36	37	41	35	-		
	450	0.107	67	59	57	56	56	52	-	54	48	50	49	52	47	24		
	550	0.160	69	62	60	59	59	54	23	59	54	55	55	57	52	30		
	650	0.223	72	65	63	61	61	56	26	63	58	59	59	61	56	34		
08	350	0.038	60	52	51	50	50	48	-	44	36	37	36	41	36	-		
	600	0.111	68	61	59	58	58	55	21	56	50	51	51	53	49	26		
	700	0.150	70	64	61	60	60	56	24	60	55	55	55	57	53	30		
	850	0.222	73	67	64	63	63	59	25	64	60	60	60	61	58	35		
10	575	0.042	63	56	55	54	55	54	-	47	39	40	39	44	39	-		
	950	0.116	70	64	63	61	62	59	23	59	53	53	52	56	52	28		
	1150	0.170	73	67	65	64	64	62	25	63	58	58	57	60	57	33		
	1350	0.234	75	70	68	66	67	64	28	67	62	62	61	64	60	38		
12	850	0.045	66	59	58	57	57	58	21	49	41	42	41	44	42	-		
	1300	0.105	72	66	65	63	63	62	26	59	52	53	52	54	52	28		
	1700	0.180	76	70	68	67	67	65	29	66	60	60	59	61	59	36		
	2000	0.249	78	73	71	69	69	66	32	70	64	65	63	65	63	40		
14	1100	0.040	68	60	60	59	59	60	23	50	41	42	40	45	42	-		
	1700	0.095	74	67	65	65	65	65	29	60	53	54	52	55	53	28		
	2200	0.160	77	72	69	69	69	69	32	66	60	60	59	61	59	36		
	3000	0.297	82	77	73	73	73	73	36	73	68	69	67	69	67	45		
16	1500	0.042	70	62	62	61	61	63	27	52	43	44	42	47	45	-		
	2200	0.091	73	69	68	66	67	68	32	61	54	54	52	56	54	29		
	3000	0.170	74	74	72	71	71	72	35	68	62	62	60	63	62	38		
	4000	0.302	76	79	76	75	75	76	39	75	70	70	68	70	69	46		



See Page 11 for notes on performance testing.

ENGINEERING DATA

SDR Discharge & Radiated Sound

3.0" Inlet Static Pressure

Inlet Size (in)	Max CFM	Min. Op. Pressure (in. wc)	DISCHARGE							NC Levels	RADIATED							NC Levels
			Octave Bands								Octave Bands							
			2	3	4	5	6	7	2		3	4	5	6	7			
04	75	0.041	79	64	57	57	37	43	37	36	28	30	32	35	28	-		
	100	0.073	78	65	59	59	42	47	36	43	36	38	39	42	35	-		
	150	0.165	77	67	62	61	48	52	35	52	48	48	49	51	45	22		
	200	0.294	76	68	64	63	53	56	34	59	56	56	57	58	52	31		
05	125	0.047	83	67	62	59	41	48	43	40	33	34	35	39	32	-		
	200	0.121	82	70	65	63	49	54	42	51	46	47	47	50	43	21		
	250	0.190	82	71	66	64	52	57	41	56	52	53	53	55	49	27		
	350	0.372	81	73	69	67	57	62	37	65	61	62	62	63	57	37		
06	200	0.040	60	50	50	48	49	45	-	44	37	39	39	42	36	-		
	300	0.090	66	57	55	54	55	50	-	54	48	49	49	52	46	24		
	400	0.160	70	62	59	58	59	53	24	60	56	57	57	59	53	32		
	450	0.203	72	64	61	60	61	55	26	63	59	60	60	61	56	35		
07	275	0.040	63	53	53	51	51	48	-	45	38	40	40	44	38	-		
	450	0.107	70	62	60	58	58	54	23	57	52	53	53	55	50	28		
	550	0.160	72	65	63	61	61	57	27	62	57	59	58	60	55	34		
	650	0.223	75	68	65	63	63	59	30	66	62	63	62	64	59	38		
08	350	0.038	63	55	53	52	52	51	-	47	39	41	40	44	39	-		
	600	0.111	71	64	61	60	60	57	25	59	54	55	54	56	52	30		
	700	0.150	73	66	63	62	62	59	27	63	58	59	58	60	56	34		
	850	0.222	76	70	66	65	65	61	28	67	64	64	63	64	61	39		
10	575	0.042	66	59	58	56	57	56	20	50	43	44	42	47	43	-		
	950	0.116	73	67	65	63	64	62	26	62	56	57	55	59	55	32		
	1150	0.170	76	70	68	66	67	64	28	66	61	62	60	63	60	37		
	1350	0.234	78	73	70	68	69	66	31	70	66	66	64	67	64	42		
12	850	0.045	69	62	61	59	59	60	24	52	44	46	44	47	45	20		
	1300	0.105	75	69	67	65	65	65	28	62	56	57	55	57	55	32		
	1700	0.180	79	73	71	69	69	68	32	69	63	64	62	64	62	40		
	2000	0.249	81	76	73	71	71	69	35	73	68	68	66	68	66	44		
14	1100	0.040	71	63	62	61	61	62	26	53	45	46	44	48	45	20		
	1700	0.095	77	70	68	67	67	68	31	63	57	57	55	58	56	32		
	2200	0.160	81	75	71	71	71	71	35	69	64	64	62	64	63	40		
	3000	0.297	85	80	75	75	75	75	40	76	72	72	70	72	70	49		
16	1500	0.042	75	65	65	63	63	66	30	54	47	48	46	50	48	22		
	2200	0.091	77	72	70	68	69	71	34	63	57	58	56	59	57	33		
	3000	0.170	79	77	75	73	73	75	38	71	66	66	64	66	65	42		
	4000	0.302	80	82	79	77	77	78	41	78	74	74	71	73	72	50		

See Page 11 for notes on performance testing.

ENGINEERING DATA

SDP Sound Data Notes

Notes:

1. Tests were conducted in accordance with ARI Standard 880-94
2. Sound power levels are referenced to 10^{-12} watt
3. Octave bands 2-7 correspond to 125 to 4000 Hz

Noise Criteria (NC) Notes:

1. A hyphen (-) indicates the NC is lower than 20.
2. Noise Criteria (NC) were found using ARI Standard 885-98 Appendix E (2002 Addendum):
 - a. Radiated NC were found using the type 2 ceiling (mineral fiber) condition.
 - b. Discharge NC were found using the large terminal condition due to the multitude of possible discharge duct sizes.
3. ARI Standard 885-98 Appendix E, Table E1. Typical Sound Attenuation Values, dB.

Typical sound attenuation values dB:

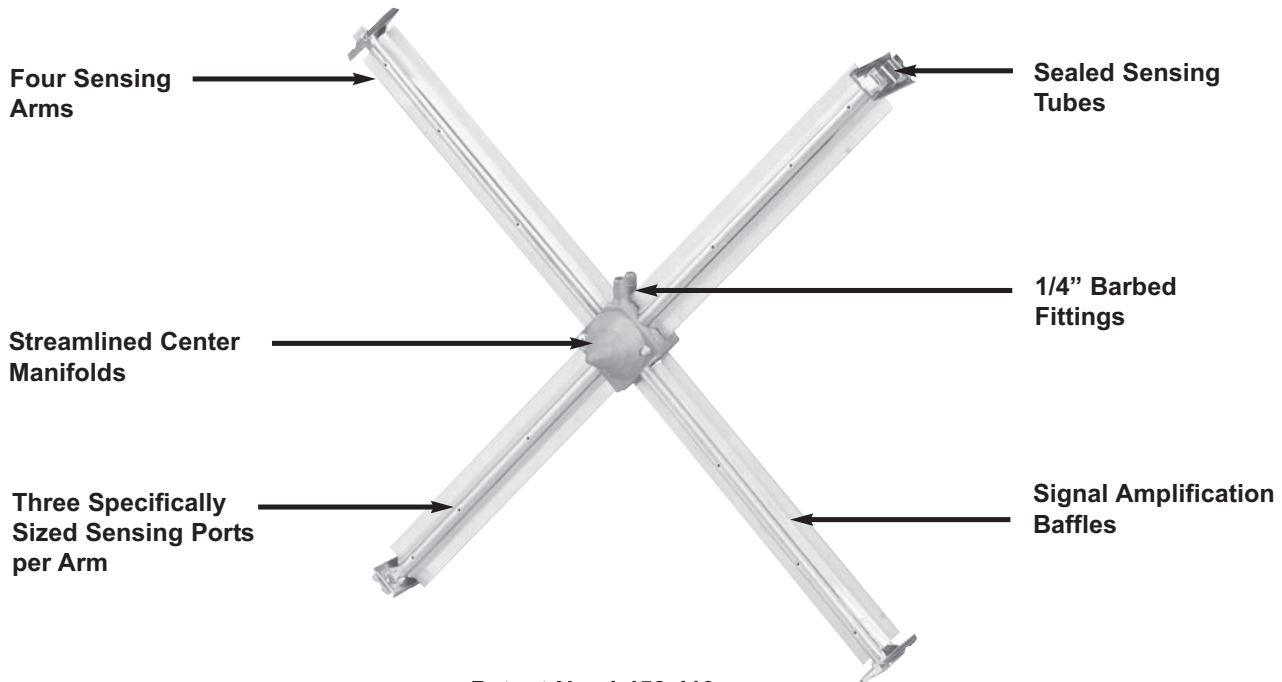
OCTAVE BAND CENTER FREQUENCY (Hz)						
DISCHARGE	125	250	500	1000	2000	4000
Small Terminal	24	28	39	53	59	40
Medium Terminal	27	29	40	51	53	39
Large Terminal	29	30	41	51	52	39

OCTAVE BAND CENTER FREQUENCY (Hz)						
RADIATED	125	250	500	1000	2000	4000
Type 1 - Glass Fiber	19	19	21	25	29	35
Type 2 - Mineral Fiber	18	19	20	26	31	36
Type 3 - Gypsum Board	23	26	25	27	27	28



FLO-CROSS[®]

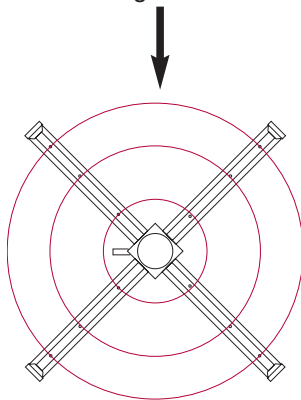
Flow Sensor



Patent No. 4,453,419

- Patented Flo-Cross[®] (Patent No. 4,453,419) is accurate to $\pm 5\%$ throughout the cataloged operating range
- Sensing arms sample the inlet cross section mitigating turbulent flow effects
- Barbed fittings positively lock plastic tubing
- 24 total sensing ports provide a differential pressure (ΔP) output proportional to the average duct velocity
- Amplification baffles strengthen ΔP signals to levels three times higher than standard Pitot tube readings
- Center manifolds average velocity profiles and reduce pulsations from dynamic ΔP signals
- Sensing tube constructions eliminates signal loss due to leakage
- Concentric ring sensing port configuration imitates major flow testing standards by locating them at the center of equal areas
- Corrosion resistant aluminum construction

Upstream and Downstream
Concentric Ring Sensing
Port Configuration



Flo-Cross[®] Sensor Performance Parameters/Formulas

Size	Area (ft ²)	Cv	K*
4	0.0819	209	2.8
5	0.1296	315	3
6	0.1883	462	2.9
7	0.2578	612	9
8	0.3382	817	2.9
10	0.5319	1250	3
12	0.7691	1792	3
14	1.05	2474	3
16	1.3745	235	3

*"K" is the amplification factor
Cv=flow coefficient

- Flow (CFM) = $C_v \times \sqrt{\Delta P}$

- ΔP (Inches W.G.) = $K \times \left(\frac{FPM}{4005} \right)^2$

- $FPM = \frac{CFM}{Area (sq.ft)}$

- 500 to 3000 FPM Nominal Velocity Range