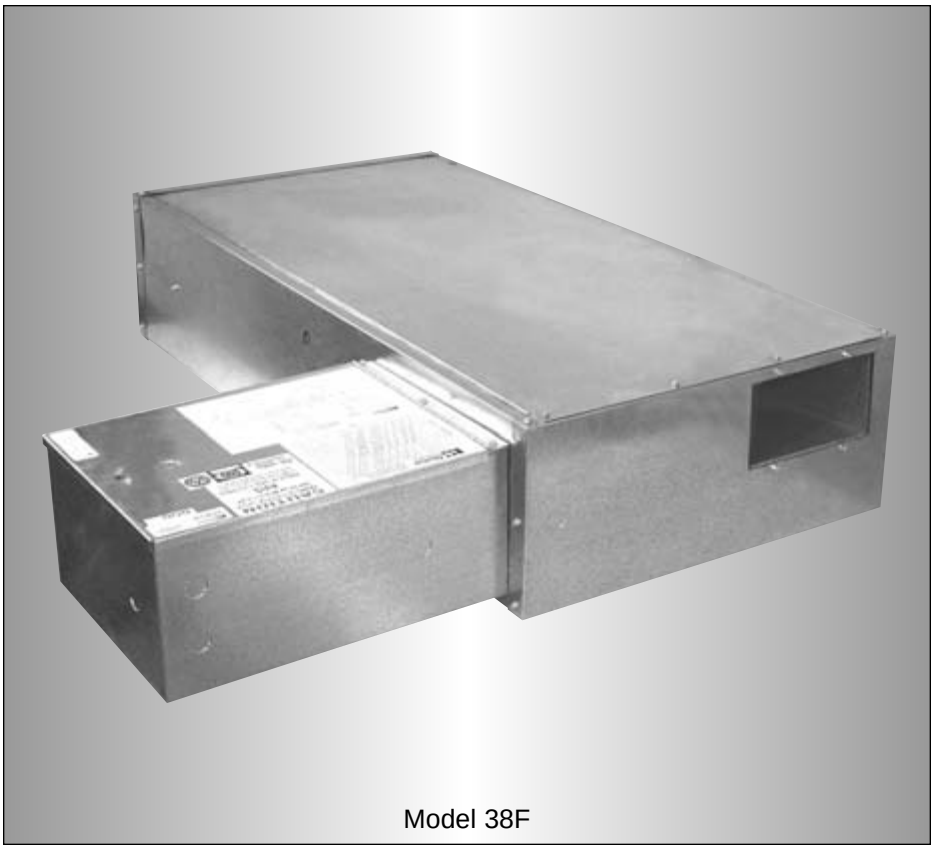
FAN COIL UNITS

UNDERFLOOR

Nailor Industries Inc.

Contents

UNDERFLOOR FAN COIL/ BOOSTER UNITS
CONSTANT VOLUME
38F SERIES



Model 38F

Models:

38F	**Fan Booster Units**
38FE	**Electric Heat**
38FW	**Hot Water Heat**
38FWE	**Hot Water/ Electric Heat**
38FZ	**Chilled Water**
38FZW	**Chilled/Hot Water**
38FZE	**Chilled Water/ Electric Heat**
38FZWE	**Chilled/Hot Water and Electric Heat**

The **Nailor Model Series 38F Underfloor Fan Coil/Booster Units** are specially engineered to meet the requirements of the most demanding underfloor applications where premium quality design and performance characteristics are desired. These compact low profile units feature excellent sound performance, independently tested and certified. Heavy gauge unit casings, designed to accommodate the floor pedestal layout, feature convenient access to all components.
Designed to optimize energy efficiency the standard units feature our ultra-high efficiency EPIC™/ECM motor technology. Additional options include two or four pipe water coils, electric heating coils, and various 'IAQ' linings including a solid metal liner.

STANDARD FEATURES:

- 20 ga. (1.0) galvanized steel construction.
- Full size top access panel.
- 1/2" (13) dual density insulation, exposed edges coated to prevent air erosion. Meets requirements of NFPA 90A and UL 181.
- Single point electrical connection.
- Discharge opening designed for flanged duct connection.
- Top access hinged door line voltage/fan controls enclosure.
- Controls mounted as standard on RH side as shown. Terminals ordered with LH controls (optional).
- Motor blower assembly mounted on special 16 ga. (1.6) angles and isolated from casing with rubber isolators.
- Ultra-energy efficient ECM fan motor with overload protection. Solid state Nailor EPIC™ fan volume controller.
- Controls are mounted on exterior of terminal providing ready access for field adjustment.
- Each terminal factory tested prior to shipment.
- Available with electric heat, hot water heat and chilled water cooling options.
- Stainless steel drain pans with primary and secondary (overflow) connections.

OPTIONS AND ACCESSORIES:

- Filter frame and 1" (25) pleated/2" (51) disposable filter.
- Rubber support feet.
- Toggle disconnect switch.
- Steri-liner.
- Fiber-free liner.
- Solid metal liner.
- Perforated metal liner.
- Fan unit fusing.
- Left-hand configuration.
- Factory assembled valve piping packages.
- Ultraviolet light packages.
- Nailor Thermostat.
- Safety overflow float switch.

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ARI Standard 440

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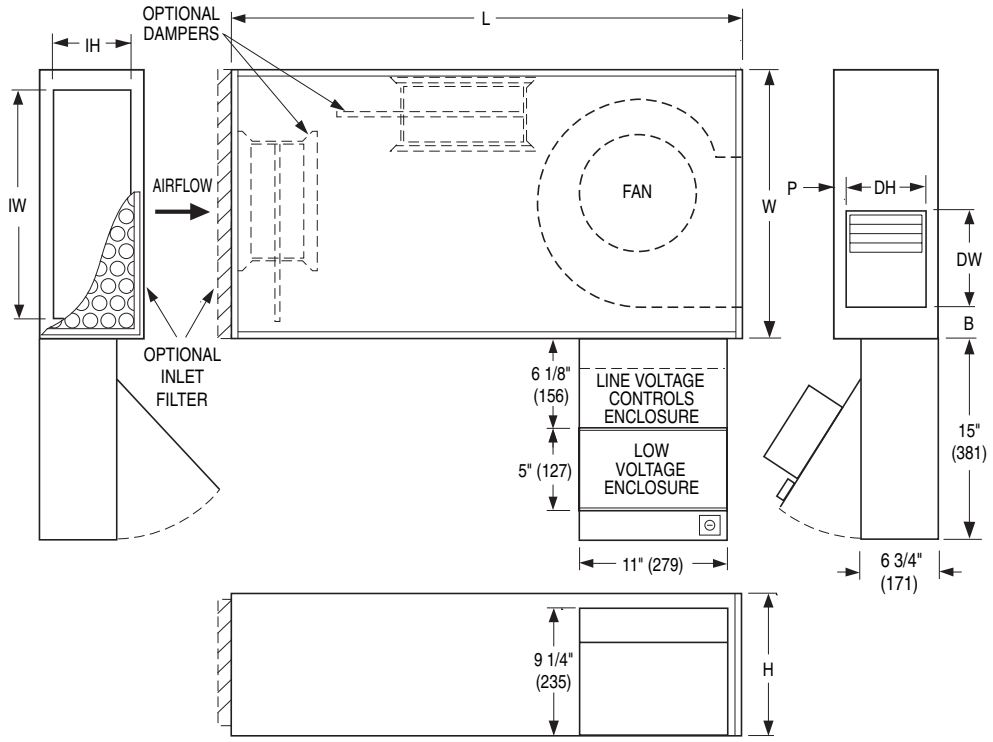
UNDERFLOOR FAN COIL UNITS

Underfloor Fan Booster Unit • ECM Motor

Models: 38F • Unit Sizes 1, 3 and 5



Dimensional Data. Imperial Units (inches)

Unit Size	W	H	L	B	P	Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
1	20	8 1/2	40	2 3/8	29/32	17 x 5 3/4	7 3/16 x 5 15/16	19 x 7
3	20	11	40	4 3/8	1 1/2	17 x 8	12 1/4 x 8	19 x 10
5	20	15	44	1 1/4	2	17 x 12	13 1/4 x 11 1/2	20 x 15

Dimensional Data. Metric Units (mm)

Unit Size	W	H	L	B	P	Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
1	508	216	1016	60	23	432 x 146	183 x 151	483 x 178
3	508	279	1016	111	38	432 x 203	311 x 203	483 x 254
5	508	381	1118	32	51	432 x 305	337 x 292	508 x 381

Electrical Data

Unit Size	ECM Motor FLA			
	Voltage	120/1/60	208/240/1/60	277/1/60
1	Watts	277	276	270
	FLA	3.7	1.9	1.9
3	Watts	420	450	410
	FLA	5.8	3.4	2.9
5	Watts	930	1080	940
	FLA	12.6	6.2	5.5

FLA = Full load amperage

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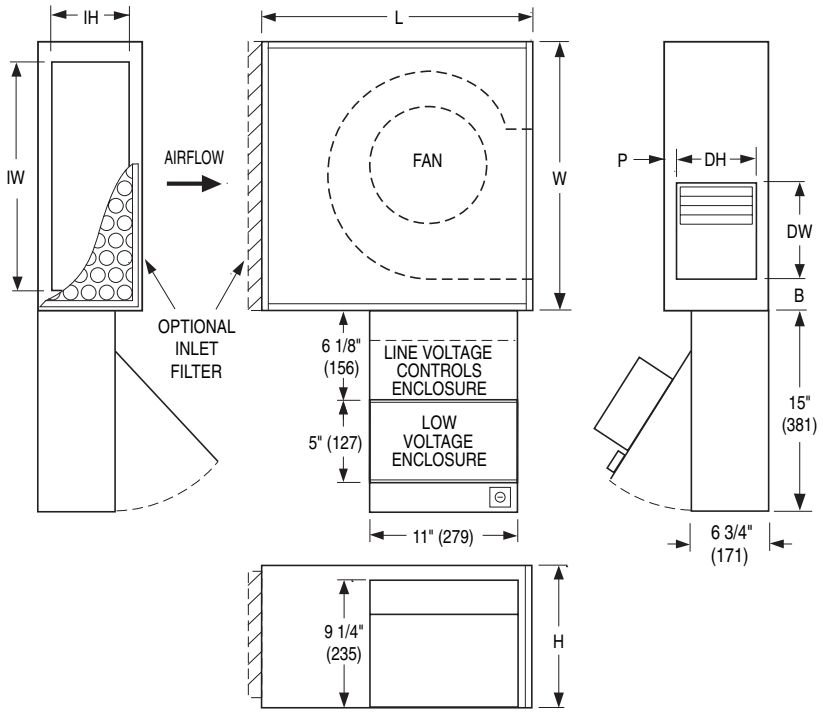
Underfloor Fan Booster Unit • ECM Motor

Models: 38F • Unit Size 2



Dimensional Data. Imperial Units (inches)

Unit Size	W	H	L	B	P	Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
2	20	11	20	4 3/8	1 1/2	17 x 8	12 1/4 x 8	19 x 10

Dimensional Data. Metric Units (mm)

Unit Size	W	H	L	B	P	Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
2	508	279	508	111	38	432 x 203	311 x 203	483 x 254

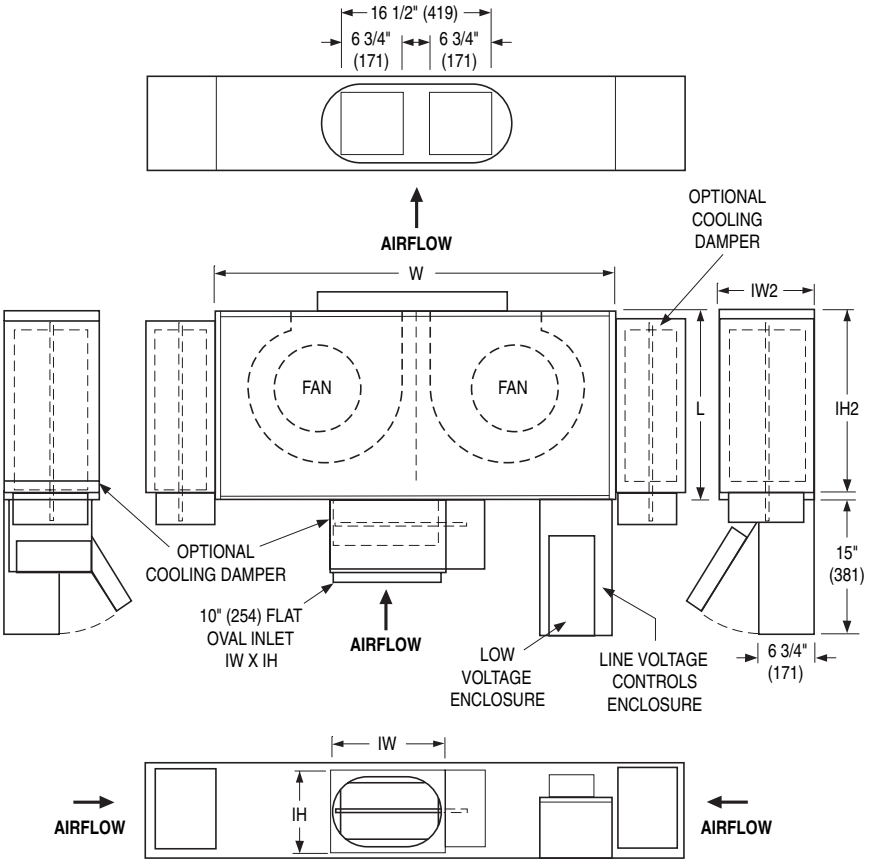
Electrical Data

Unit Size	ECM Motor FLA			
	Voltage	120/1/60	208/240/1/60	277/1/60
2	Watts	410	400	430
	FLA	5.7	2.8	3.1

FLA = Full load amperage

Underfloor Fan Booster Unit • ECM Motor

Models: 38F • Unit Size 6



Dimensional Data. Imperial Units (inches)

Unit Size	W	H	L	Oval Inlet IW x IH	Rect. Inlet Discharge IW2 x IH2	Oval Outlet DW x DH
6	44	10 1/2	21	11 1/4 x 7 3/4	10 3/8 x 19	17 5/8 x 7 1/4

Dimensional Data. Metric Units (mm)

Unit Size	W	H	L	Oval Inlet IW x IH	Rect. Inlet Discharge IW2 x IH2	Oval Outlet DW x DH
6	1118	267	533	286 x 197	264 x 483	448 x 184

Electrical Data

Unit Size	ECM Motor FLA			
	Voltage	120/1/60	208/240/1/60	277/1/60
6	Watts	840	840	890
	FLA	10.2	5.3	5.9

FLA = Full load amperage

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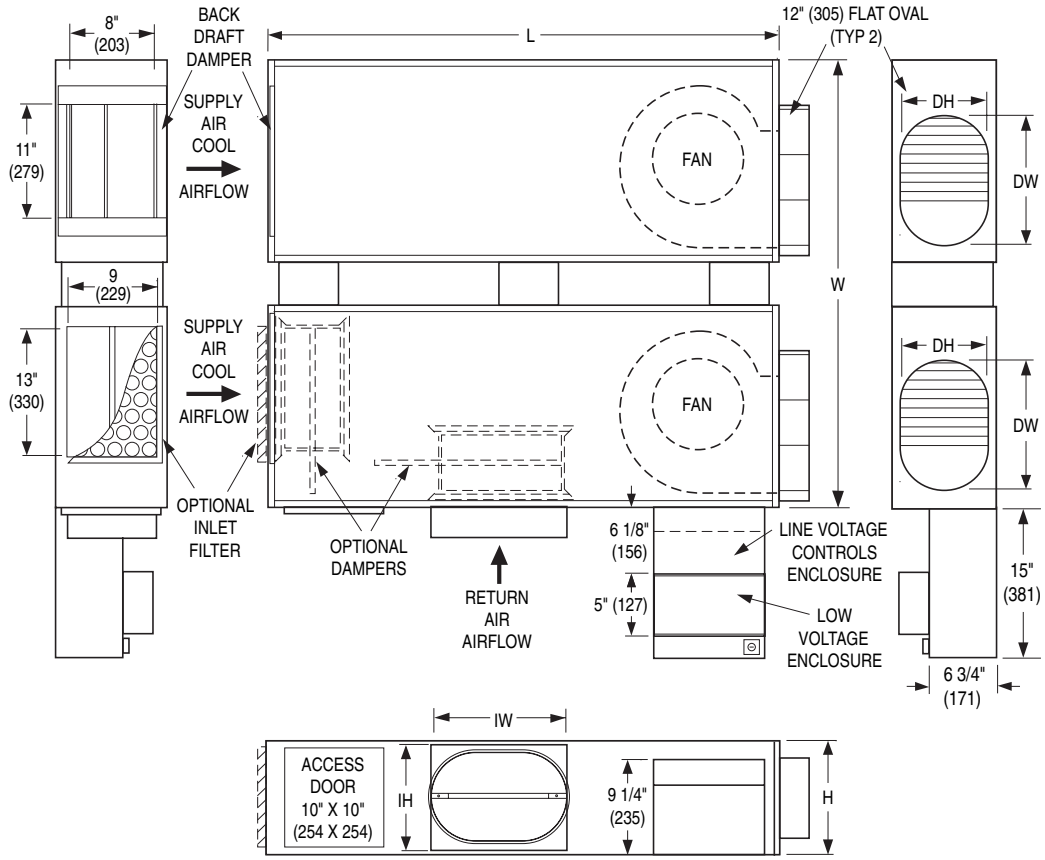
Underfloor Fan Booster Unit • ECM Motor

Models: 38F • Unit Size 33



Dimensional Data. Imperial Units (inches)

Unit Size	W	H	L	Oval Ducted Inlet IW x IH	Oval Outlet Discharge DW x DH	Filter Size
33	44 15/16	11	50 15/16	14 1/4 x 7 3/4	7 3/16 x 5 15/16	11 x 15

Dimensional Data. Metric Units (mm)

Unit Size	W	H	L	Oval Ducted Inlet IW x IH	Oval Outlet Discharge DW x DH	Filter Size
33	1141	279	1294	362 x 197	183 x 151	279 x 381

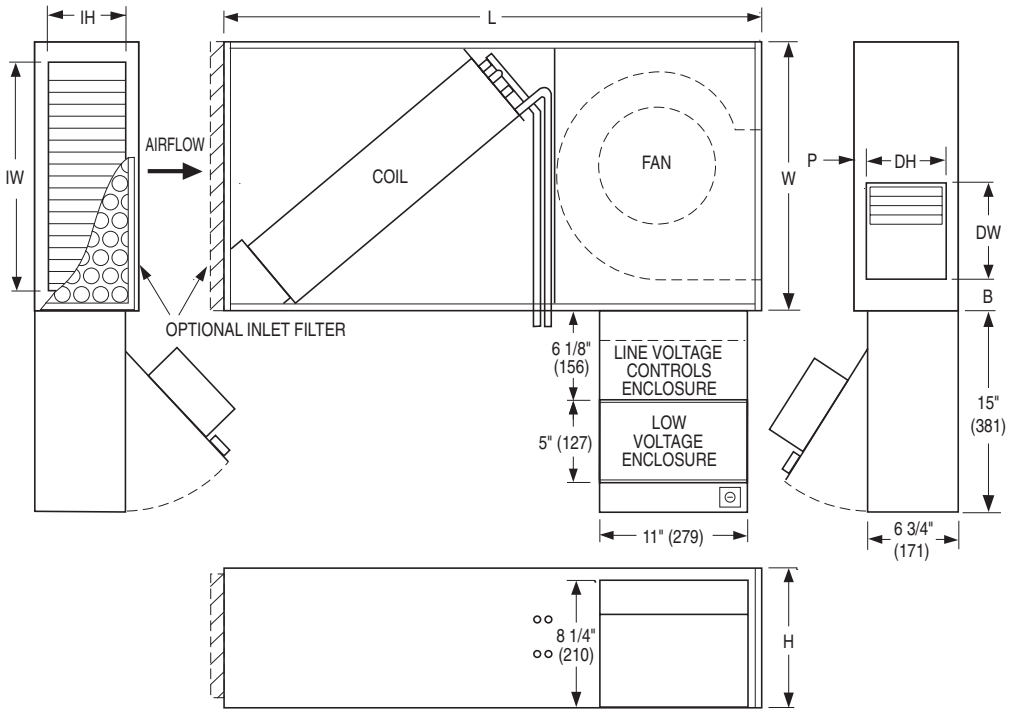
Electrical Data

Unit Size	ECM Motor FLA			
	Voltage	120/1/60	208/240/1/60	277/1/60
33	Watts	840	900	820
	FLA	11.6	6.8	5.8

FLA = Full load amperage

Underfloor Fan Coil Unit with Chilled Water and/or Hot Water Coil ECM Motor

Models: 38FZ, 38FW, 38FZW • Unit Size 1



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Dimensional Data. Imperial Units (inches)

Unit Size	W	H	L	B	P	Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
1	20	8 1/2	40	2 3/8	29/32	17 x 5 3/4	7 3/16 x 4	19 x 7

Dimensional Data. Metric Units (mm)

Unit Size	W	H	L	B	P	Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
1	508	216	1016	60	23	432 x 146	183 x 102	483 x 178

Electrical Data

Unit Size	ECM Motor FLA			
	Voltage	120/1/60	208/240/1/60	277/1/60
1	Watts	277	276	270
	FLA	3.7	1.9	1.9

FLA = Full load amperage

STANDARD FEATURES:

- 20 ga. (1.0) galvanized steel casing components.
- 1/2" (13) dual density insulation, exposed edges coated to prevent air erosion. Meets requirements of NFPA 90A and UL 181.
- 1/2" (13) copper tubed coil.
- Aluminum sine wave ripple fins.
- Units are only 8 1/2" (216) in height.
- Coil and header installed in insulated casing to increase thermal efficiency.
- Cooling coils include an insulated stainless steel drain pan with primary drain connection 3/4" (19) male NPT and secondary drain connection 1/2" (13) male NPT.
- Discharge opening designed for flanged outlet duct connection.
- Right hand coil connections (looking in direction of airflow) are standard. Left hand is optional. Controls enclosure is on same side as connections.
- Single point electrical connection.
- Top access panel.
- Sweat connections:

Heating Coils: One Row 1/2" (13) and Two Row 7/8" (22) O.D. male solder.

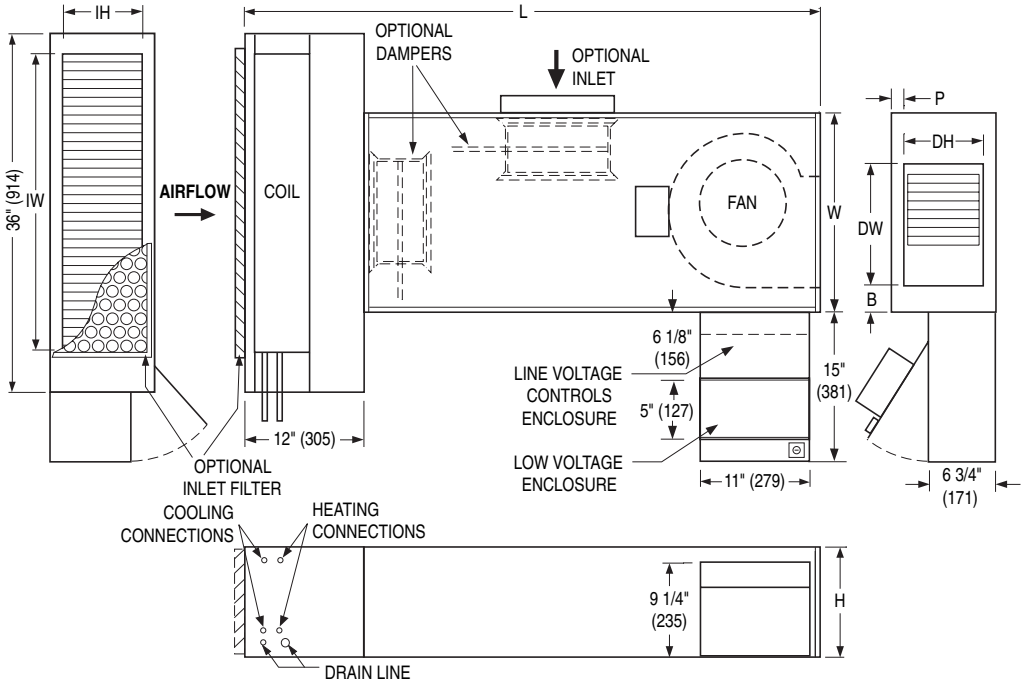
Cooling Coils: Three Row and Four Row 7/8" (22) O.D. male solder.

OPTIONS:

- Right hand (illustrated). Standard.
- Filter frame and 1" (25) pleated/2" (51) disposable filter.
- Factory assembled valve piping package.
- Ultraviolet light package.
- Perforated metal liner.
- Steri-liner.
- Left-hand configuration.
- Fan Unit fusing.
- Nailor Thermostat.
- Safety overflow float switch.
- Toggle disconnect switch.

Underfloor Fan Coil Unit with Chilled Water and/or Hot Water Coil ECM Motor

Models: 38FZ, 38FW and 38FZW • Unit Sizes 3 and 5



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UNDERFLOOR FAN COIL UNITS

Dimensional Data. Imperial Units (inches)

Unit Size	W	H	L	B	P	Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
3	20	11	40 1/4	1	1 1/2	17 x 8	30 x 8	19 x 10
5	20	15	52	1 1/4	2	35 x 12	13 1/4 x 11 1/2	37 x 14

Dimensional Data. Metric Units (mm)

Unit Size	W	H	L	B	P	Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
3	508	279	1022	25	38	432 x 203	762 x 203	483 x 254
5	508	381	1321	32	51	889 x 305	337 x 292	940 x 356

Electrical Data

Unit Size	ECM Motor FLA			
	Voltage	120/1/60	208/240/1/60	277/1/60
3	Watts	420	450	410
	FLA	5.8	3.4	2.9
5	Watts	930	1080	940
	FLA	12.6	6.2	5.5

FLA = Full load amperage

STANDARD FEATURES:

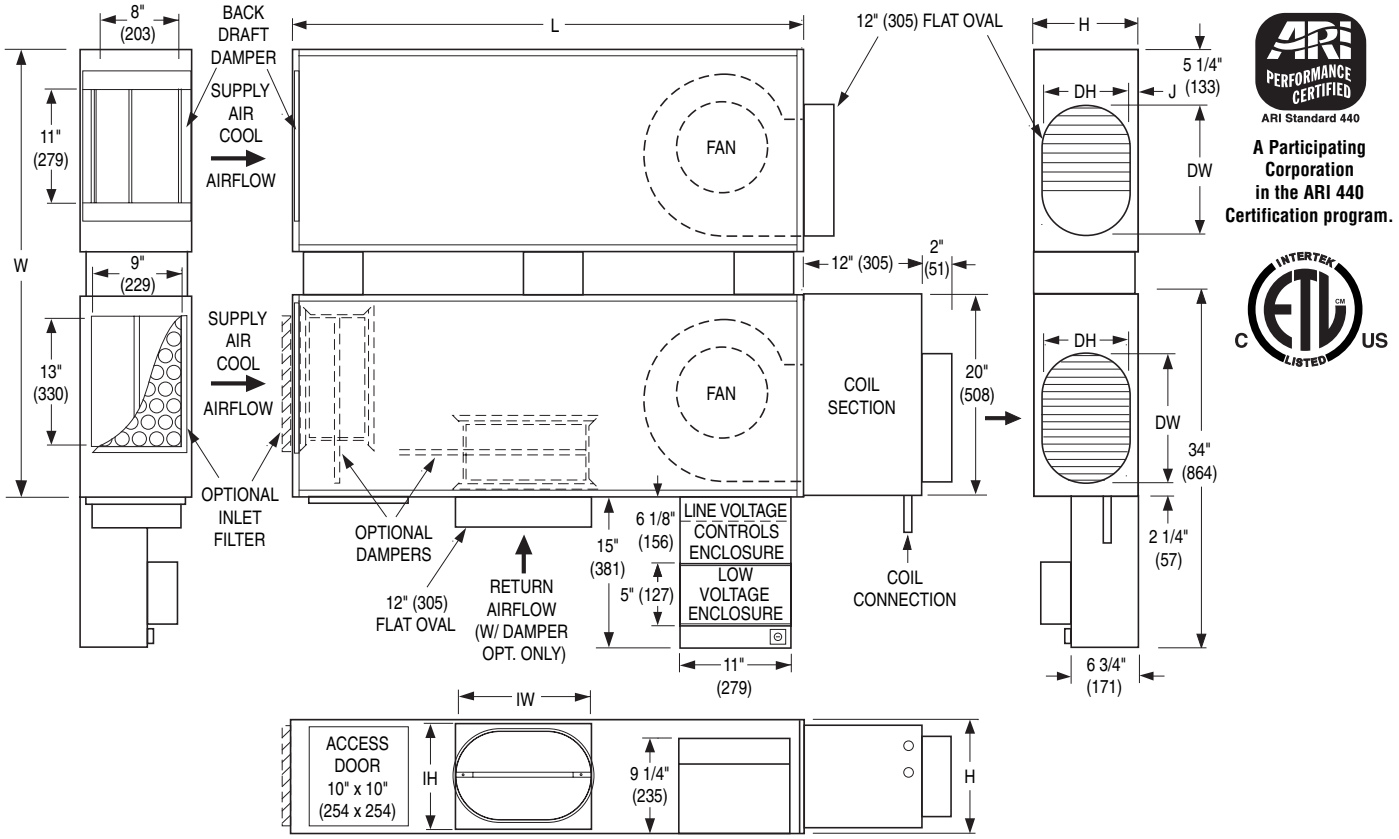
- 20 ga. (1.0) galvanized steel casing components.
- 1/2" (13) dual density insulation, exposed edges coated to prevent air erosion. Meets requirements of NFPA 90A and UL 181.
- 1/2" (13) copper tubed coil.
- Aluminum sine wave ripple fins.
- Coil and header installed in insulated casing to increase thermal efficiency.
- Cooling coils include an insulated stainless steel drain pan with primary drain connection 3/4" (19) male NPT and secondary drain connection 1/2" (13) male NPT.
- Discharge opening designed for flanged outlet duct connection.
- Right hand coil connections (looking in direction of airflow) are standard. Left hand is optional. Controls enclosure is on same side as connections.
- Single point electrical connection.
- Top access panel.
- Sweat connections:
  Heating Coils: One Row 1/2" (13) and Two Row 7/8" (22) O.D. male solder.
  Cooling Coils: Three Row and Four Row 7/8" (22) O.D. male solder.

OPTIONS:

- Right hand (illustrated). Standard.
- Filter frame and 1" (25) pleated/2" (51) disposable filter.
- Factory assembled valve piping package.
- Ultraviolet light package.
- Perforated metal liner.
- Steri-liner.
- Left-hand configuration.
- Fan Unit fusing.
- Nailor Thermostat.
- Safety overflow float switch.
- Toggle disconnect switch.

Underfloor Fan Coil Unit with Hot Water Coil • ECM Motor

Model: 38FW • Unit Size 33



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Dimensional Data. Imperial Units (inches)

Unit Size	W	H	L	Oval Ducted Inlet IW x IH	Oval Outlet Discharge DW x DH	J	Filter Size
33	44 15/16	11	50 15/16	14 1/4 x 7 3/4	7 3/16 x 5 15/16	1 1/2	11 x 15

Dimensional Data. Metric Units (mm)

Unit Size	W	H	L	Oval Ducted Inlet IW x IH	Oval Outlet Discharge DW x DH	J	Filter Size
33	1141	279	1294	362 x 197	183 x 151	38	279 x 381

Electrical Data

Unit Size	ECM Motor FLA			
	Voltage	120/1/60	208/240/1/60	277/1/60
33	Watts	840	900	820
	FLA	11.6	6.8	5.8

FLA = Full load amperage

STANDARD FEATURES:

• High capacity units. Single fan on heating cycle (50% airflow).

• 20 ga. (1.0) galvanized steel casing components.

• 1/2" (13) dual density insulation, exposed edges coated to prevent air erosion. Meets requirements of NFPA 90A and UL 181.

• 1/2" (13) copper tubed coil.

• Aluminum sine wave ripple fins.

• Coil and header installed in insulated casing to increase thermal efficiency.

• Discharge opening designed for flanged outlet duct connection.

• Right hand coil connections (looking in direction of airflow) are standard. Left hand is optional. Controls enclosure is on same side as connections.

• Single point electrical connection.

• Top access panel.

• Sweat connections:
Heating Coils: One Row 1/2" (13) O.D. male solder. Two Row and Three Row and Four Row 7/8" (22) O.D. male solder.

Coil Rows:

• 1 Row • 2 Row • 3 Row

OPTIONS:

• Two 2 position supply/return inlet dampers.

• Filter frame and 1" (25) pleated/2" (51) disposable filter.

• Factory assembled valve piping package.

• Ultraviolet light package.

• Perforated metal liner.

• Steri-liner.

• Left-hand configuration.

• Fan Unit fusing.

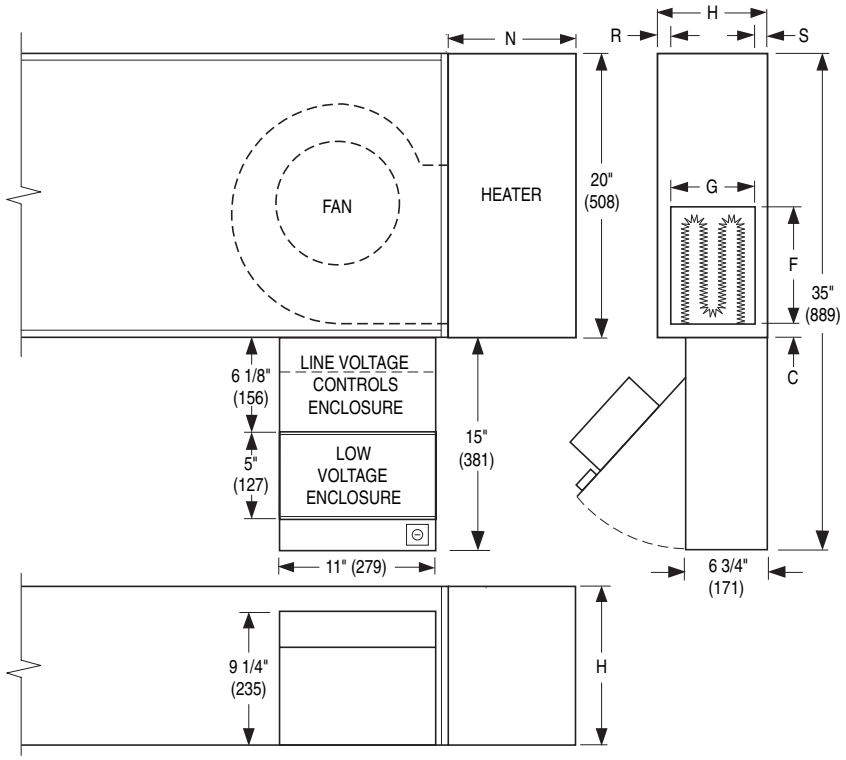
• Nailor Thermostat.

• Safety overflow float switch.

• Toggle disconnect switch.

Underfloor Fan Coil Unit w/Electric Heat, Chilled and/or Hot Water + Electric Heat

Models: 38FE, 38FZE, 38FWE, 38FZWE • Unit Sizes 1, 3 and 5



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UNDERFLOOR FAN COIL UNITS

Dimensional Data. Imperial Units (inches)

Unit Size	Outlet Discharge F x G	H	N	C	R	S	Filter Size
1	8 1/4 x 5 1/2	8 1/2	9	1 3/8	2	1	19 x 7
3	11 x 7 7/8	11	9	1	1 5/8	1 5/8	19 x 10/32 x 10 (w/Coil)
5	12 x 8 3/4	15	13 3/4	1	1	4	20 x 15

Dimensional Data. Metric Units (mm)

Unit Size	Outlet Discharge F x G	H	N	C	R	S	Filter Size
1	210 x 140	216	229	35	51	25	483 x 178
3	279 x 200	278	229	25	41	41	483 x 254/813 x 254 (w/Coil)
5	305 x 222	381	352	25	25	102	508 x 381

Electrical Data

Unit Size	ECM Motor FLA			
	Voltage	120/1/60	208/240/1/60	277/1/60
1	Watts	277	276	270
	FLA	3.7	1.9	1.9
3	Watts	420	450	410
	FLA	5.8	3.4	2.9
5	Watts	930	1080	940
	FLA	12.6	6.2	5.5

FLA = Full load amperage

STANDARD FEATURES:

- 20 ga. (1.0) galv. steel construction.
- Automatic reset high limit cut-outs (one per element).
- Controls enclosure incorporates a hinged access door opening upstream to help ensure NEC clearance and reduce footprint. FN2 (90° design) is standard.
- Controls mounted as standard on RHS as shown.
- Electric heater installed on unit discharge.
- Flanged outlet duct connection.
- Insulated heater element wrapper.
- Positive pressure airflow switch.
- Single point electric connection for the entire terminal unit.
- Terminal unit with heater is ETL listed as an assembly.

Standard Supply Voltage (60 Hz):

Single phase:
• 120V • 208V • 220V* • 240V
• 277V • 347V • 380V* • 480V
• 600V

Three phase - delta configuration:
• 208V • 220V* • 240V

Three phase - wye configuration:
• 380V* • 480V • 600V

(Three phase applies only on unit sizes 3 and 5).

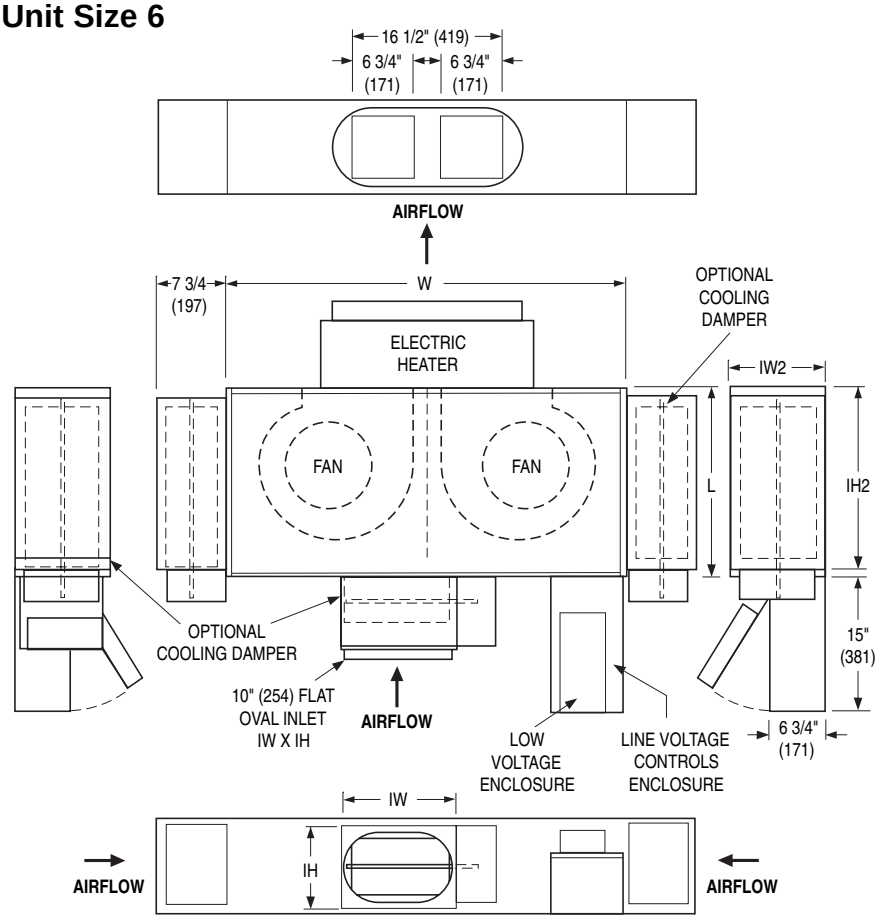
* Outside of the U.S.

OPTIONS:

- Class 'A' 80/20 Ni./Cr. Wire.
- Door interlock disconnect switch.
- Dust tight construction.
- Left hand configuration.
- Manual reset secondary thermal cut-outs.
- Mercury contactors.
- Power circuit fusing.
- Toggle disconnect switch.

Underfloor Fan Coil Unit with Electric Heat only • ECM Motor

Models: 38FE • Unit Size 6



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Dimensional Data. Imperial Units (inches)

Unit Size	W	H	L	Oval Inlet IW x IH	Rect. Inlet Discharge IW2 x IH2	Oval Outlet DW x DH
6	55 5/16	11	21	14 1/4 x 7 3/4	10 x 15	17 5/8 x 7 3/4

Dimensional Data. Metric Units (mm)

Unit Size	W	H	L	Oval Inlet IW x IH	Rect. Inlet Discharge IW2 x IH2	Oval Outlet DW x DH
6	1405	279	533	362 x 197	254 x 381	448 x 184

Electrical Data

Unit Size	ECM Motor FLA			
	Voltage	120/1/60	208/240/1/60	277/1/60
6	Watts	840	840	890
	FLA	10.2	5.3	5.9

FLA = Full load amperage

STANDARD FEATURES:

- 20 ga. (1.0) galv. steel construction.
- Automatic reset high limit cut-outs (one per element).
- Controls enclosure incorporates a hinged access door opening upstream to help ensure NEC clearance and reduce footprint. FN2 (90° design) is standard, FN3 (remote) is an option.
- Controls mounted as standard on RHS as shown. Terminals ordered with LH controls (optional).
- Electric heater installed on unit discharge.
- Flanged outlet duct connection.
- Insulated heater element wrapper.
- Positive pressure airflow switch.
- Single point electric connection for the entire terminal unit.
- Terminal unit with heater is ETL listed as an assembly.

Standard Supply Voltage (60 Hz):

Single phase:
• 120V • 208V • 220V* • 240V
• 277V • 347V • 380V* • 480V
• 600V

Three phase - delta configuration:
• 208V • 220V* • 240V

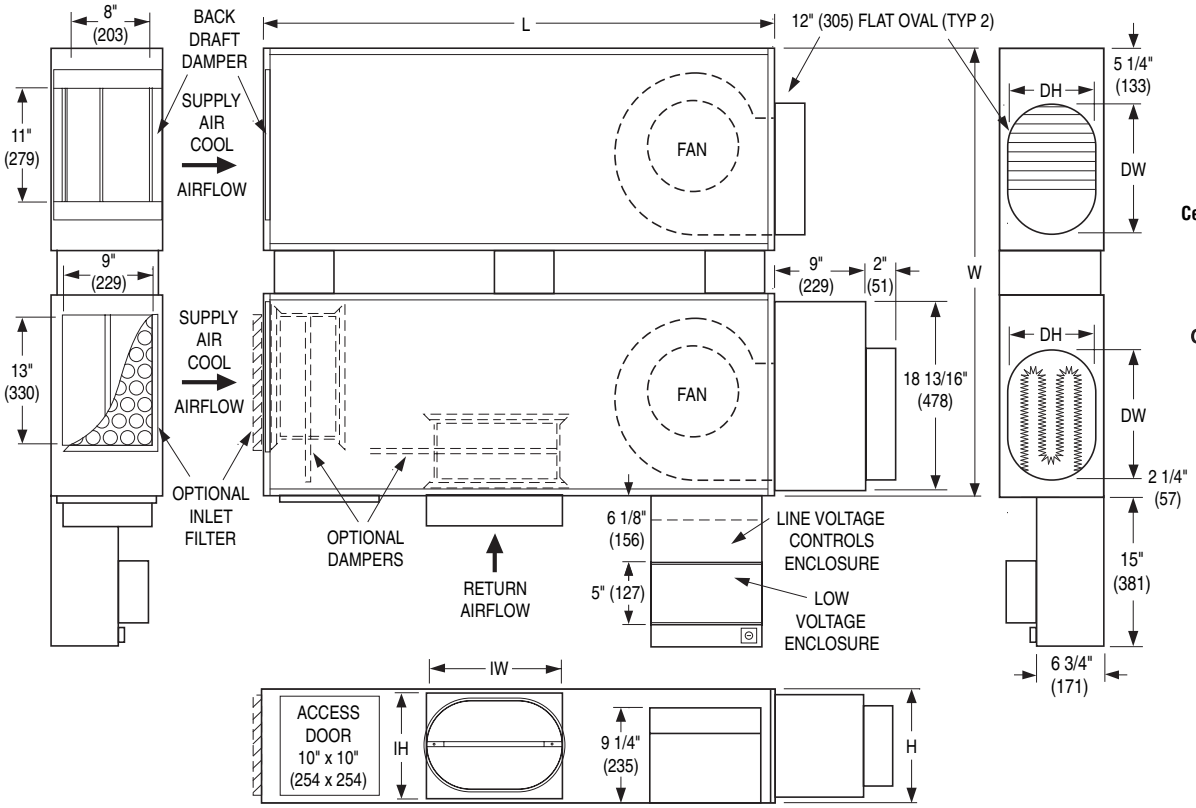
Three phase - wye configuration:
• 380V* • 480V • 600V
* Outside of the U.S.

OPTIONS:

- Class 'A' 80/20 Ni./Cr. Wire.
- Door interlock disconnect switch.
- Dust tight construction.
- Left hand configuration.
- Manual reset secondary thermal cut-out.
- Mercury contactors.
- Power circuit fusing.
- Toggle disconnect switch.

Underfloor Fan Coil Unit with Electric Heat only • ECM Motor

Model: 38FE • Unit Size 33



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Dimensional Data. Imperial Units (inches)

Unit Size	W	H	L	Oval Ducted Inlet IW x IH	Oval Outlet Discharge DW x DH	Filter Size
33	44 15/16	11	50 15/16	14 1/4 x 7 3/4	7 3/16 x 5 15/16	11 x 15

Dimensional Data. Metric Units (mm)

Unit Size	W	H	L	Oval Ducted Inlet IW x IH	Oval Outlet Discharge DW x DH	Filter Size
33	1141	279	1294	362 x 197	183 x 151	279 x 381

Electrical Data

Unit Size	ECM Motor FLA			
	Voltage	120/1/60	208/240/1/60	277/1/60
33	Watts	840	900	820
	FLA	11.6	6.8	5.8

FLA = Full load amperage

STANDARD FEATURES:

• 20 ga. (1.0) galvanized steel construction.

• Automatic reset high limit cut-outs (one per element).

• Controls enclosure incorporates a hinged access door opening upstream to help ensure NEC clearance and reduce footprint. FN2 (90° design) is standard.

• Controls mounted as standard on RHS as shown. Terminals ordered with LH controls (optional).

• Coil installed on unit discharge.

• Flanged outlet duct connection.

• Insulated coil element wrapper.

• Positive pressure airflow switch.

• Single point electric connection for the entire terminal unit.

• Terminal unit with coil is ETL listed as an assembly.

Standard Supply Voltage (60 Hz):

Single phase:

• 120V • 208V • 220V* • 240V
• 277V • 347V • 380V* • 480V
• 600V

Three phase - delta configuration:

• 208V • 220V* • 240V

Three phase - wye configuration:

• 380V* • 480V • 600V

* Outside of the U.S.

OPTIONS:

• Class 'A' 80/20 Ni./Cr. Wire.

• Door interlock disconnect switch.

• Dust tight construction.

• Left hand configuration.

• Manual reset secondary thermal cut-out.

• Mercury contactors.

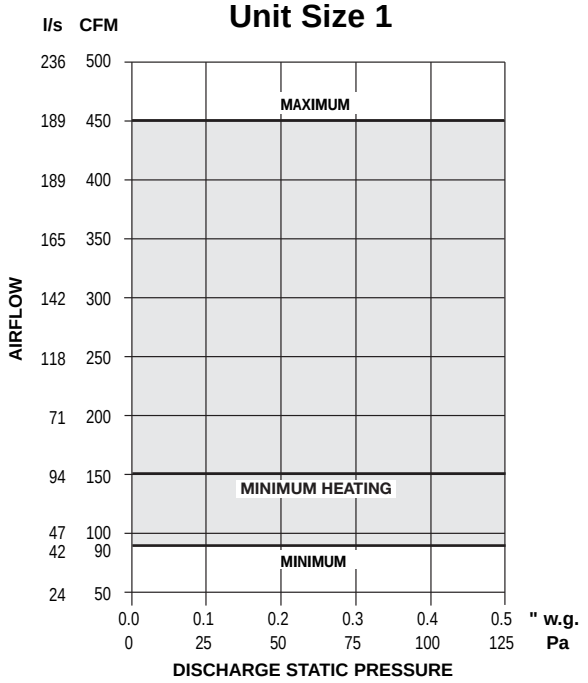
• Power circuit fusing.

• Toggle disconnect switch.

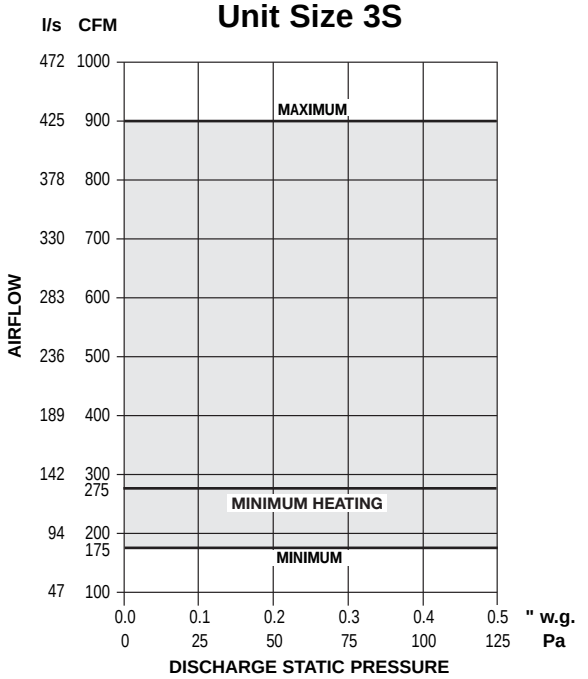
Model Series 38F • Underfloor Fan Coil/Booster Units • Performance Data

ECM Motor Fan Curves - Airflow vs. Downstream Static Pressure

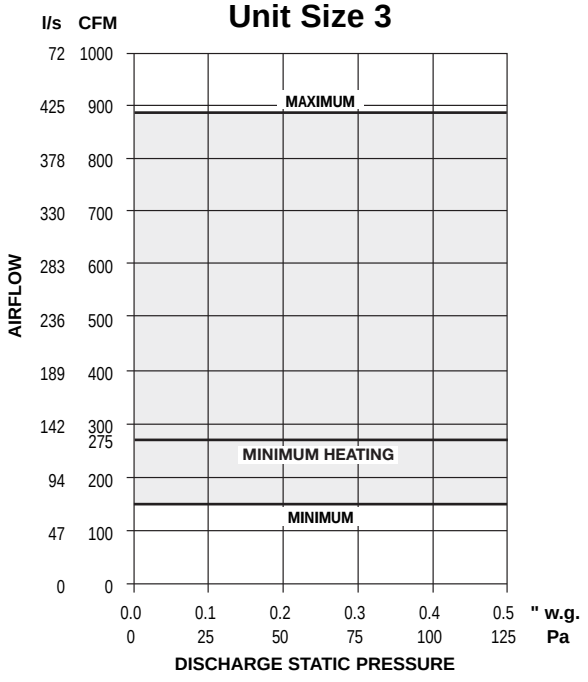
Unit Size 1



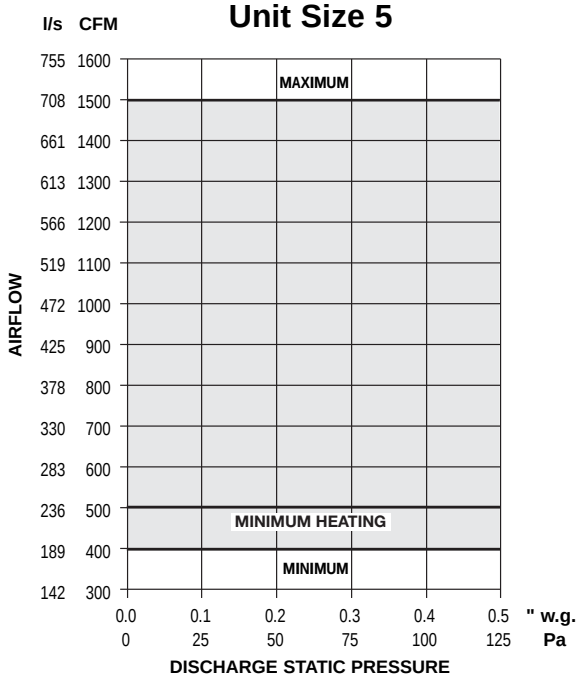
Unit Size 3S



Unit Size 3



Unit Size 5



Electrical Data

Unit Size	Motor H.P.	ECM Motor			
		Voltage	120/1/60	208/240/1/60	277/1/60
1	1/3	Watts	277	276	270
		FLA	3.7	1.9	1.9
3S	1/3	Watts	410	400	430
		FLA	5.7	2.8	3.1

Unit Size	Motor H.P.	ECM Motor			
		Voltage	120/1/60	208/240/1/60	277/1/60
3	1/3	Watts	420	450	410
		FLA	5.8	3.4	2.9
5	3/4	Watts	930	1080	940
		FLA	12.6	6.2	5.5

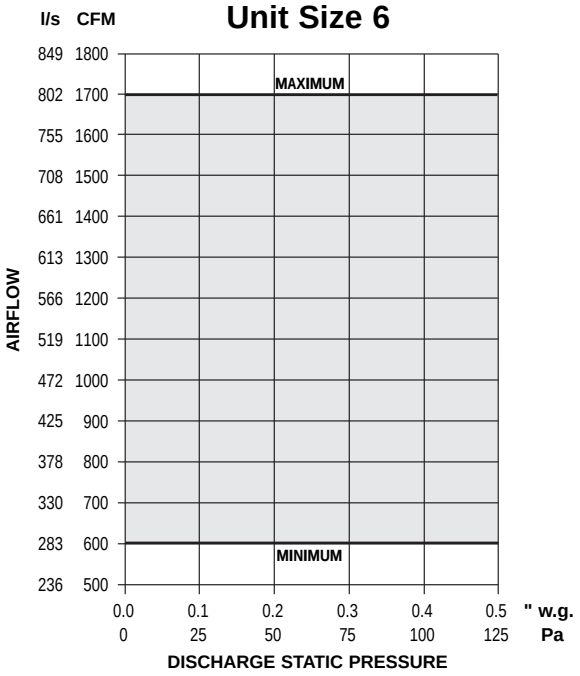
FLA = Full load amperage

Notes: See next page.

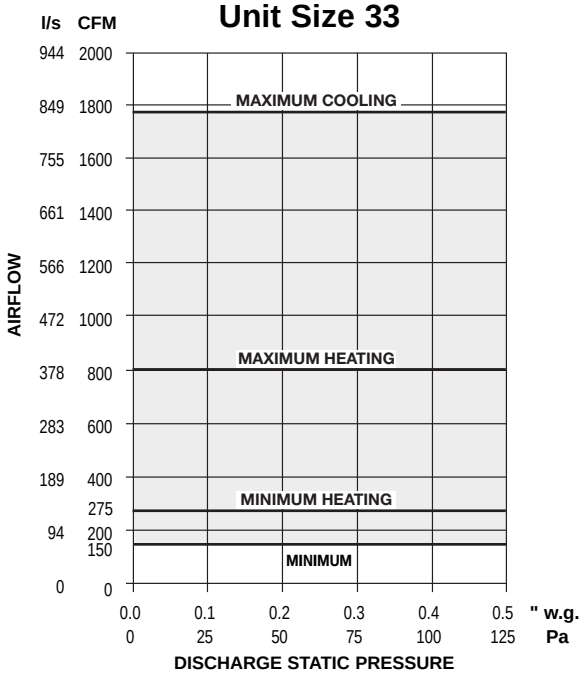
Model Series 38F • Underfloor Fan Coil/Booster Units • Performance Data

ECM Motor Fan Curves - Airflow vs. Downstream Static Pressure

Unit Size 6



Unit Size 33



Notes: Dual fan on cooling, single fan only on heating.

Electrical Data

Unit Size	Motor H.P.	ECM Motor			
		Voltage	120/1/60	208/240/1/60	277/1/60
6	2@1/3	Watts	840	840	890
		FLA	10.2	5.3	5.9
33	2@1/3	Watts	840	900	820
		FLA	11.6	6.8	5.8

FLA = Full load amperage

NOTES:

- The fan curves for the ECM motor are unlike those for traditional PSC motors. The ECM motor is constant volume (at factory or field set point) and airflow does not vary with changing static pressure conditions. The motor compensates for any changes in external static pressure such as filter loading.
- Airflow can be set to operate on horizontal performance line at any point within shaded area using the solid state volume controller provided.
- Fan curves shown are applicable to 120/208/240 and 277 volt, single phase ECM motors. ECM motors, although DC in operation, include a built-in inverter.

Model Series 38F • Underfloor Fan Coil/Booster Units • Performance Data

NC Level Application Guide

Unit Size	Airflow cfm	Airflow l/s	NC Levels Octave Bands Discharge	NC Levels Octave Bands Radiated
1	450	212	34	34
	400	189	31	30
	300	142	22	24
	200	94	–	–
	110	52	–	–
3S	933	440	32	34
	800	378	26	30
	650	307	21	25
	500	236	–	20
	350	165	–	–
	200	94	–	–
3	880	415	31	35
	700	330	24	25
	550	260	–	22
	400	189	–	–
	250	118	–	–
	150	71	–	–
5	1500	708	41	44
	1200	566	34	37
	900	425	27	28
	600	283	–	22
	300	142	–	–
6	1700	802	39	42
	1550	731	34	38
	1400	661	30	36
	1250	590	26	33
	1000	472	20	30
	850	401	–	26
	700	330	–	22
	600	283	–	–
33	1760	831	35	39
	1400	661	26	30
	1100	519	–	25
	800	378	–	20
	500	236	–	–
	300	142	–	–

Performance Notes:

1. NC levels are calculated from the published raw data and based on procedures outlined in Appendix E, ARI 885-98.

2. Discharge sound attenuation deductions are based on environmental effect, duct lining, branch power division, insulated flex duct, end reflection and space effect and are as follows:

Discharge attenuation	Octave Band 2	3	4	5	6	7
< 300 cfm	24	28	39	53	58	40
300 – 700 cfm	27	29	40	51	53	39
> 700 cfm	29	30	41	51	52	39

3. Radiated sound attenuation deductions are based on an assumed effect of an access floor tile equal to 1/2" (13) gypsum board and environmental effect and are as follows:

Radiated attenuation	Octave Band 2	3	4	5	6	7
Environmental effect	2	1	0	0	0	0
Ceiling/Space effect	21	25	25	27	27	28
Total dB Reduction	23	26	25	27	27	28

4. Dash (–) in space denotes an NC level of less than 20.

Sound Power Levels

Unit Size	Airflow cfm	Airflow l/s	Discharge Sound Power Octave Bands 2	3	4	5	6	7	Radiated Sound Power Octave Bands 2	3	4	5	6	7
1	450	212	70	73	71	74	71	70	73	70	62	57	56	54
	400	189	68	71	69	72	68	67	70	67	59	54	53	51
	300	142	61	64	64	64	60	60	67	61	54	47	46	44
	200	94	57	52	54	50	47	45	55	50	45	35	32	26
	110	52	48	35	34	31	29	31	40	36	26	25	26	26
3S	933	440	74	73	69	70	67	66	73	68	63	62	55	45
	800	378	69	68	65	66	62	61	69	64	60	58	51	40
	650	307	64	63	60	60	56	54	63	59	56	53	45	34
	500	236	58	57	55	54	50	46	56	53	51	47	38	25
	350	165	49	48	47	45	39	34	50	47	45	38	31	25
	200	94	39	32	32	28	25	24	35	33	30	25	24	20
3	880	415	73	72	68	70	67	66	75	68	62	57	52	52
	700	330	67	65	63	64	60	59	68	63	57	52	46	46
	550	260	60	58	57	58	54	51	63	57	53	47	40	38
	400	189	53	52	51	50	45	41	59	52	48	40	36	33
	250	118	54	45	43	40	35	32	59	46	40	34	31	30
	150	71	51	38	35	33	31	32	54	40	34	31	30	30
5	1500	708	84	79	77	79	78	77	82	74	68	64	59	56
	1200	566	79	73	72	74	72	71	77	68	64	60	54	51
	900	425	71	65	66	66	65	63	70	62	59	54	48	43
	600	283	64	58	59	60	58	53	63	55	53	48	41	34
	300	142	53	48	50	50	45	38	55	49	47	42	32	24
6	1700	802	81	77	74	72	70	69	80	73	71	70	64	55
	1550	731	78	74	71	68	66	65	76	69	67	66	59	49
	1400	661	76	71	68	65	63	62	73	67	65	64	56	46
	1250	590	72	68	65	62	59	58	70	64	63	61	53	43
	1000	472	66	62	59	57	53	51	66	57	57	53	44	35
	850	401	63	59	56	53	49	47	62	57	57	53	44	35
	700	330	56	56	54	51	47	45	55	53	54	50	41	30
	600	283	53	52	51	48	43	40	51	50	51	47	37	27
33	1760	831	76	75	71	73	70	69	78	71	65	60	55	55
	1400	661	70	68	66	67	63	62	71	66	60	55	49	49
	1100	519	63	61	60	61	57	54	66	60	56	50	43	41
	800	378	56	55	54	53	48	44	62	55	51	43	39	36
	500	236	57	48	46	43	38	35	62	49	43	37	34	33
	300	142	54	41	38	36	34	35	57	43	37	34	33	33

Performance Notes:

1. Fan discharge (external) static pressure is 0.25" w.g. (63 Pa) in all cases. It is the difference (ΔPs) in static pressure from fan coil unit discharge to the room.
2. Discharge sound power is the noise emitted from the unit discharge into the downstream duct.
3. Radiated sound power is the breakout noise transmitted through the unit casing walls.
4. Sound power levels are in decibels, dB re 10^{-12} watts.
5. All sound data listed by octave bands is raw data without any corrections for room absorption or duct attenuation.
6. Data derived from independent tests conducted in accordance with ARI Standard 880-98.

Model Series 38F • Underfloor Fan Coil/Booster Units • Performance Data

ARI Standard Ratings

ARI STANDARD RATINGS									
Unit Size	COIL			AIRFLOW CFM (DRY BLOW)	COOLING CAPACITY		WATER		
	Row	FPI	CIRC		QT (BTUH)	QS (BTUH)	FLOW RATE (GPM)	WPD ft-wg	POWER INPUT (WATTS)
1	3 4	12	2 2	400	8835 10089	7283 8191	1.8 2	1 0.6	120 122
2	N/A	N/A	N/A	930	N/A	N/A	N/A	N/A	320
3	3 4	12	2 4	700	14993 19673	12468 15006	3 3.9	1.2 2.7	270 274
6	N/A	N/A	N/A	1700	N/A	N/A	N/A	N/A	890
***33**	N/A	N/A	N/A	1680	N/A	N/A	N/A	N/A	640

ARI Standard 440

A Participating Corporation in the ARI 440 Certification program.

* In heating mode, the size 33 sound power levels are the same as the size 3 single only one fan is running.

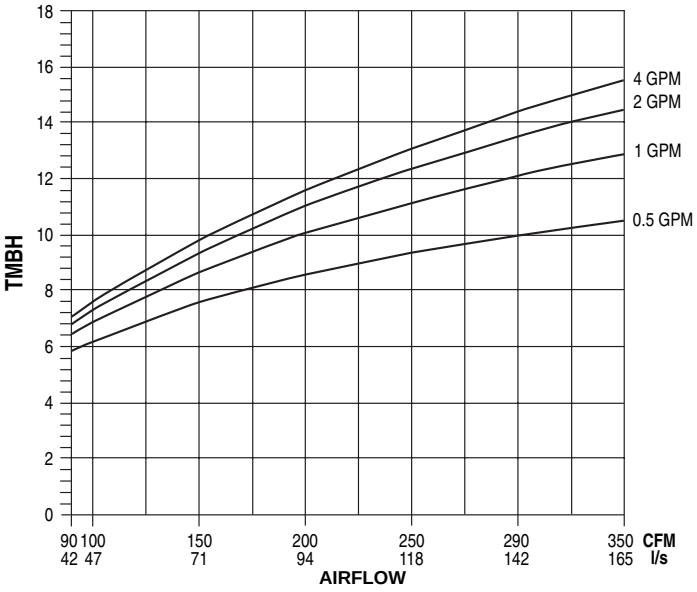
NOTE: Based on 80°F DB and 67°F WB EAT, 45°F EWT 10° temperature rise, maximum fan speed. Motor type is ECM and motor voltage is 115/1/60. Airflow under dry conditions. Power consumption based on 0.0" static pressure.

Model Series 38F • Underfloor Fan Coil Units

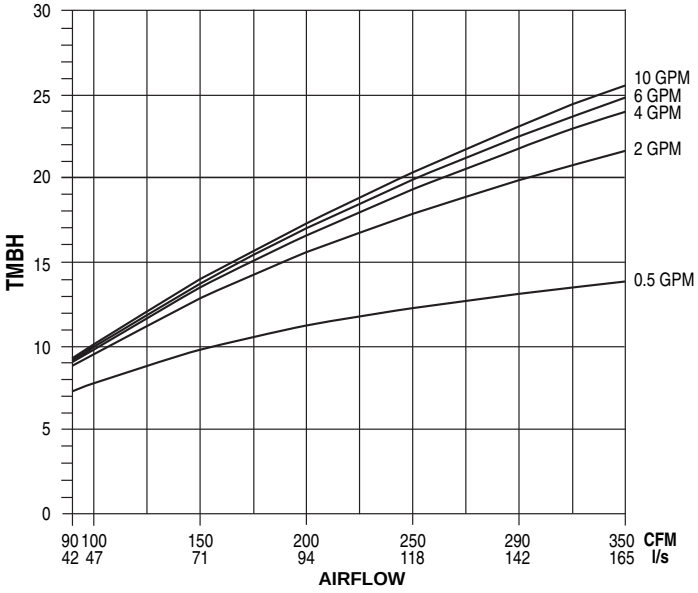
Performance Data • Hot Water Coils • Unit Size 1

Data Based on 70°F DB Entering Air & 180°F Entering Water

1 Row (Total MBH)



2 Row (Total MBH)



Notes:

1. Capacities are in Mbh (thousands of Btu per hour).
2. Mbh values are based on a ΔT (temperature difference) of 110°F between entering air and entering water. For other ΔT's; multiply the Mbh values by the factors below.
3. Air Temperature Rise. ATR = 927 x $\frac{\text{Mbh}}{\text{CFM}}$
4. Water Temp. Drop. WTD = 2.04 x $\frac{\text{Mbh}}{\text{GPM}}$
5. Connections: 1, 2 and 3 Row 7/8" (22); O.D. male solder.

Correction factors at other entering conditions:

ΔT °F	50	60	70	80	90	100	110	120	130	140	150
Factor	.455	.545	.636	.727	.818	.909	1.00	1.09	1.18	1.27	1.36

Altitude Correction Factors:

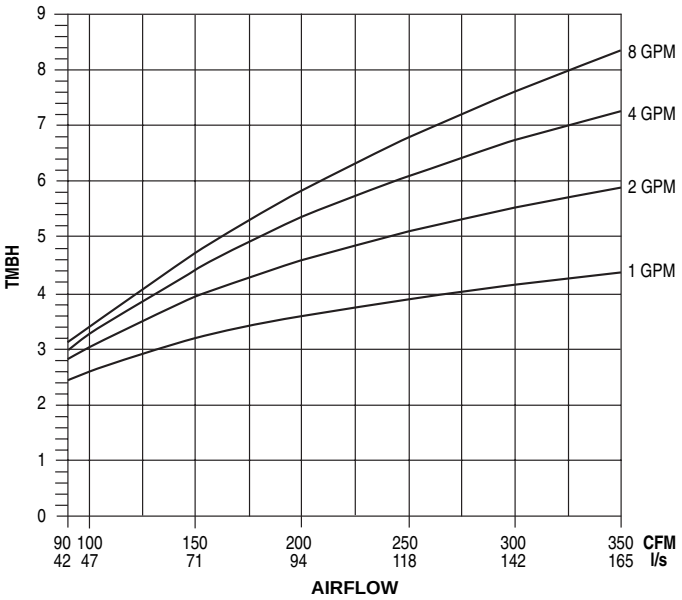
Altitude (ft.)	Sensible Heat Factor
0	1.00
2000	0.94
3000	0.90
4000	0.87
5000	0.84
6000	0.81
7000	0.78

Model Series 38F • Underfloor Fan Coil Units

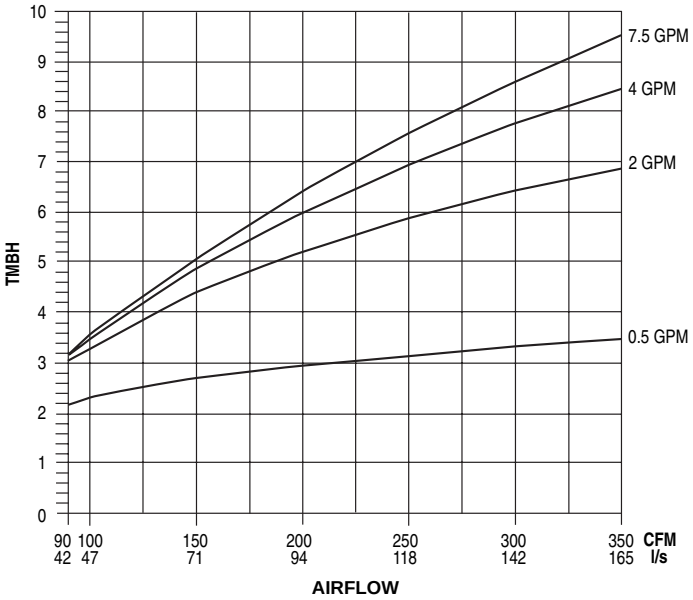
Performance Data • Chilled Water Coils • Unit Size 1

Data Based on 65°F DB 59°F WB Entering Air & 45°F Entering Water

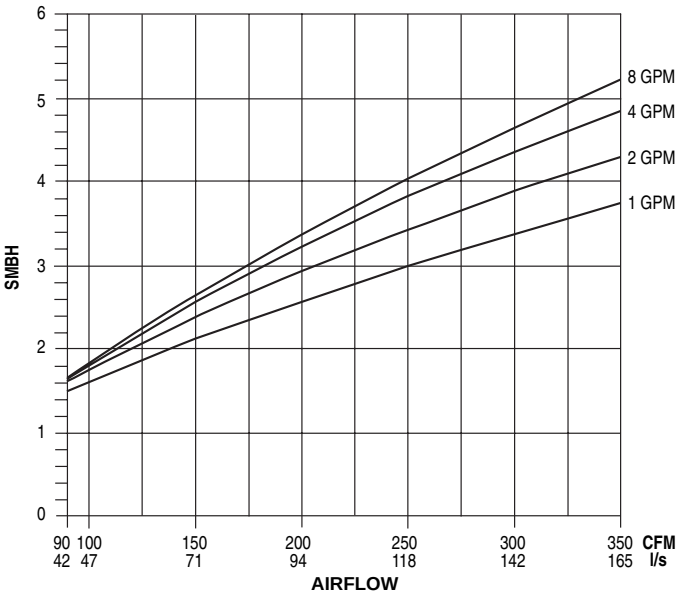
3 Row (Total MBH)



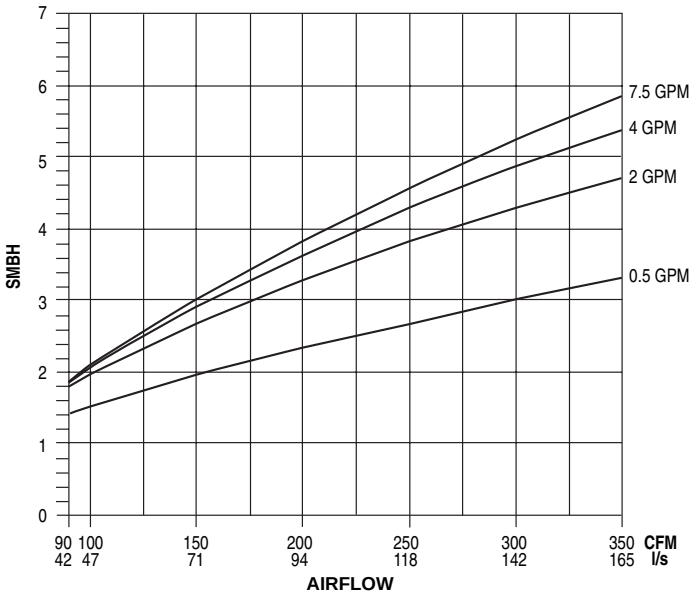
4 Row (Total MBH)



3 Row (Sensible MBH)



4 Row (Sensible MBH)



Altitude Correction Factors

Altitude (ft.)	0	1000	2000	3000	4000	5000	6000	7000
Air Density (lb./ft.3)	0.075	0.072	0.070	0.067	0.065	0.063	0.060	0.058
Total Capacity	1.000	0.988	0.986	0.983	0.981	0.979	0.977	0.975
Sensible Capacity	1.000	0.960	0.930	0.900	0.860	0.830	0.800	0.770
Static Pressure	1.000	0.960	0.930	0.900	0.860	0.830	0.800	0.770

Notes:

Capacity and static pressure will be affected for applications above sea level. To apply correction factors, multiply factor by desired coil capacity or fan curve data.

Example: 38F Size XX with 3 row coil, high speed fan operation at 3000 ft. above sea level and with 0.1 inch. W.C. ESP.

Solution: Using correction factors from Altitude Correction chart for 3000 ft. above sea level, data from ARI Standard Ratings table and fan curves.

Total capacity = 12,500 BTUH (0.983) = 12,288 BTUH

Sensible Capacity = 8,000 BTUH (0.90) = 7,200 BTUH

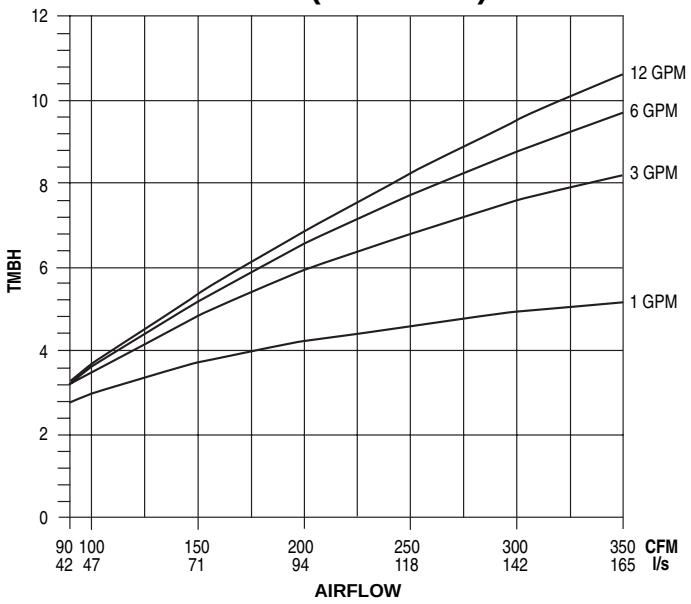
SP = 0.1 (0.90) = 0.09 Inch W.C.

Model Series 38F • Underfloor Fan Coil Units

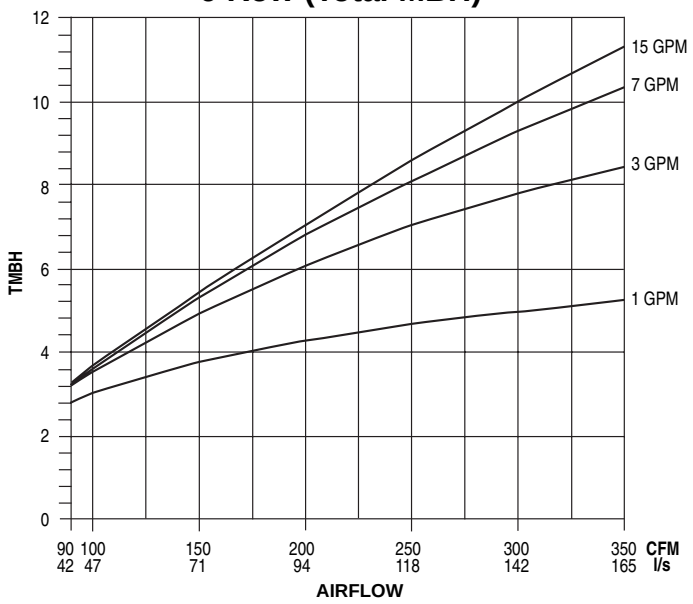
Performance Data • Chilled Water Coils • Unit Size 1

Data Based on 65°F DB 59°F WB Entering Air & 45°F Entering Water

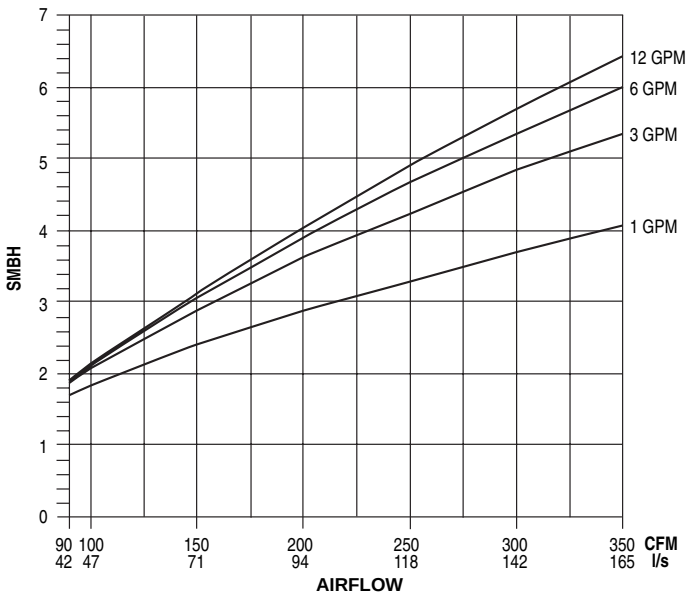
5 Row (Total MBH)



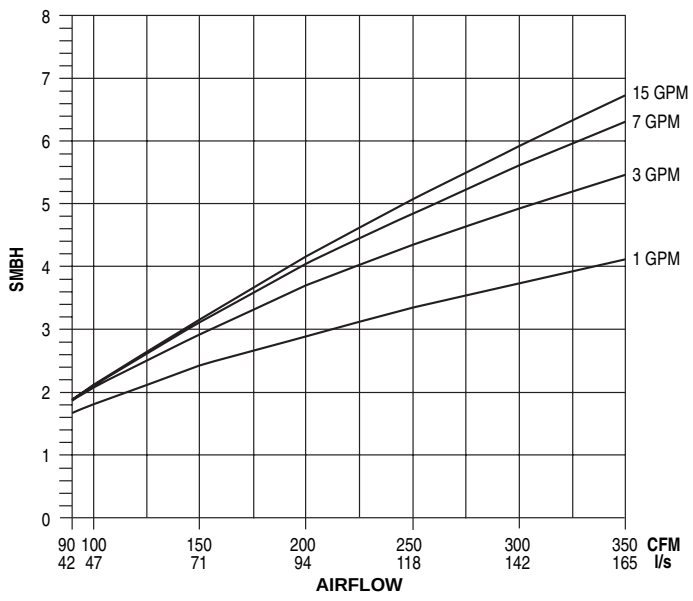
6 Row (Total MBH)



5 Row (Sensible MBH)



6 Row (Sensible MBH)



Altitude Correction Factors

Altitude (ft.)	0	1000	2000	3000	4000	5000	6000	7000
Air Density (lb./ft.3)	0.075	0.072	0.070	0.067	0.065	0.063	0.060	0.058
Total Capacity	1.000	0.988	0.986	0.983	0.981	0.979	0.977	0.975
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Notes:

Capacity and static pressure will be affected for applications above sea level. To apply correction factors, multiply factor by desired coil capacity or fan curve data.

Example: 38F Size XX with 3 row coil, high speed fan operation at 3000 ft. above sea level and with 0.1 inch. W.C. ESP.

Solution: Using correction factors from Altitude Correction chart for 3000 ft. above sea level, data from ARI Standard Ratings table and fan curves.

Total capacity = 12,500 BTUH (0.983) = 12,288 BTUH

Sensible Capacity = 8,000 BTUH (0.90) = 7,200 BTUH

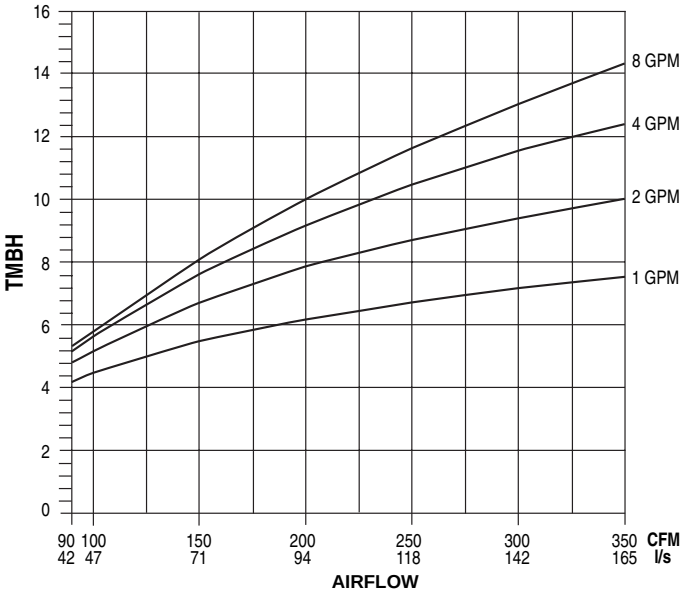
SP = 0.1 (0.90) = 0.09 Inch W.C.

Model Series 38F • Underfloor Fan Coil Units

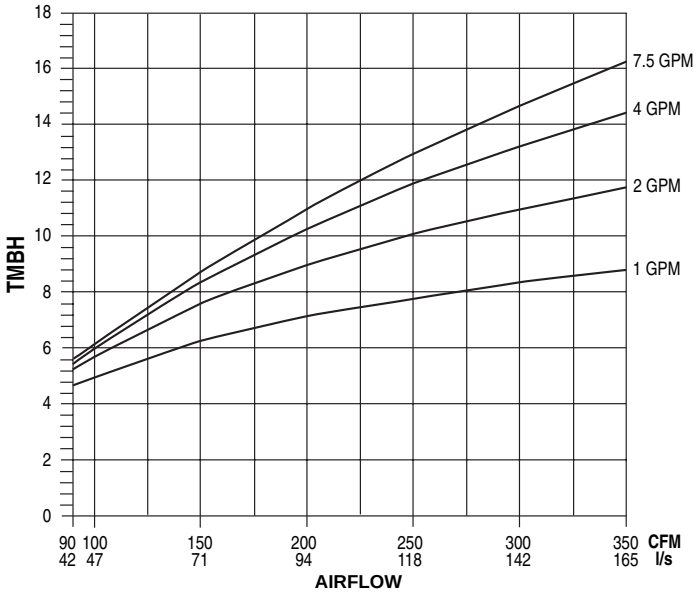
Performance Data • Chilled Water Coils • Unit Size 1

Data Based on 80°F DB 67°F WB Entering Air & 45°F Entering Water

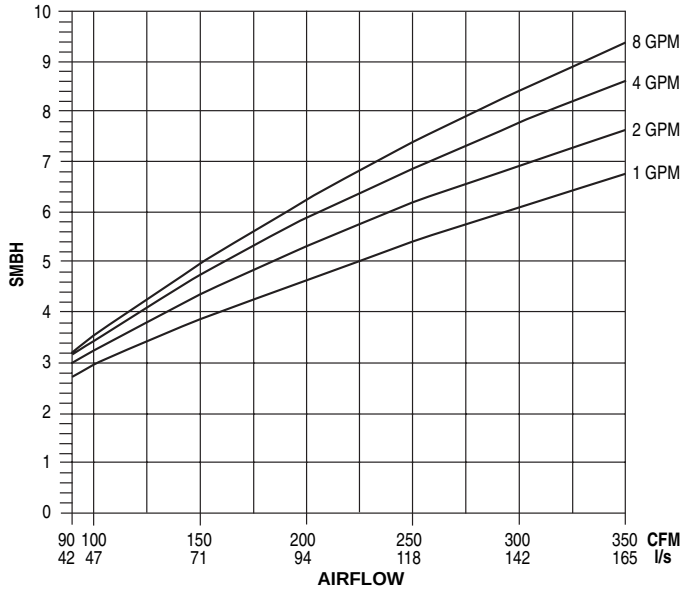
3 Row (Total MBH)



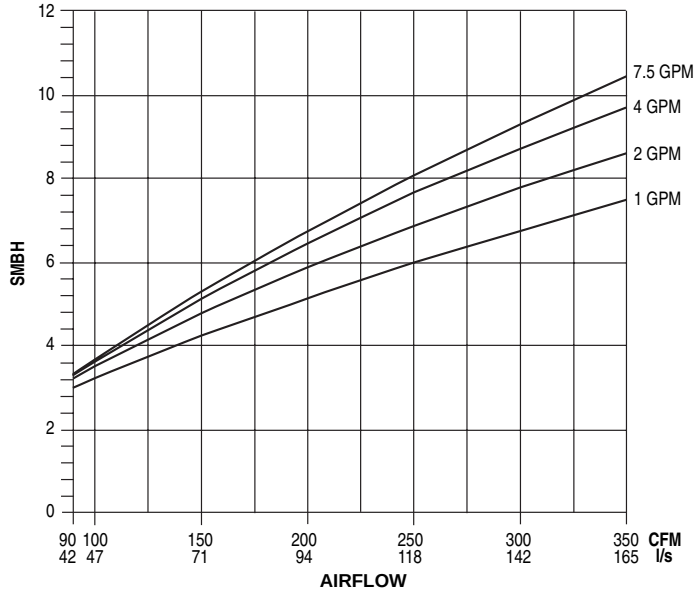
4 Row (Total MBH)



3 Row (Sensible MBH)



4 Row (Sensible MBH)



Altitude Correction Factors

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Notes:

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Example: 38F Size XX with 3 row coil, high speed fan operation at 3000 ft. above sea level and with 0.1 inch. W.C. ESP.

Solution: Using correction factors from Altitude Correction chart for 3000 ft. above sea level, data from ARI Standard Ratings table and fan curves.

Total capacity = 12,500 BTUH (0.983) = 12,288 BTUH

Sensible Capacity = 8,000 BTUH (0.90) = 7,200 BTUH

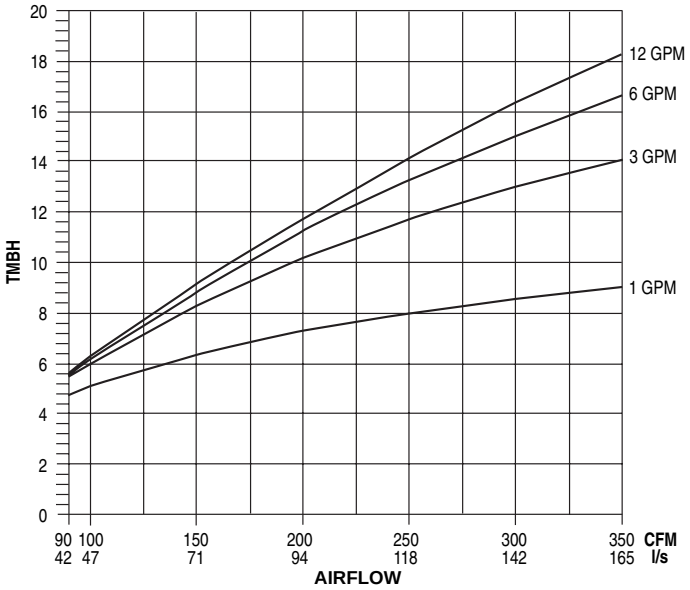
SP = 0.1 (0.90) = 0.09 Inch W.C.

Model Series 38F • Underfloor Fan Coil Units

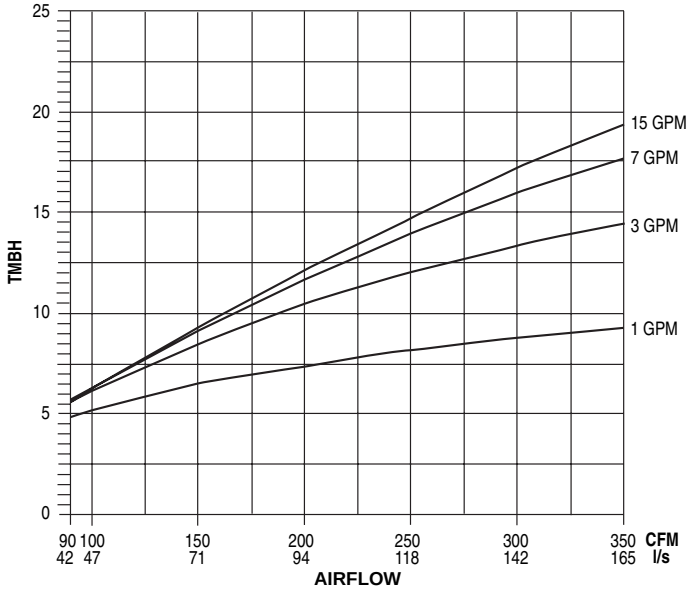
Performance Data • Chilled Water Coils • Unit Size 1

Data Based on 80°F DB 67°F WB Entering Air & 45°F Entering Water

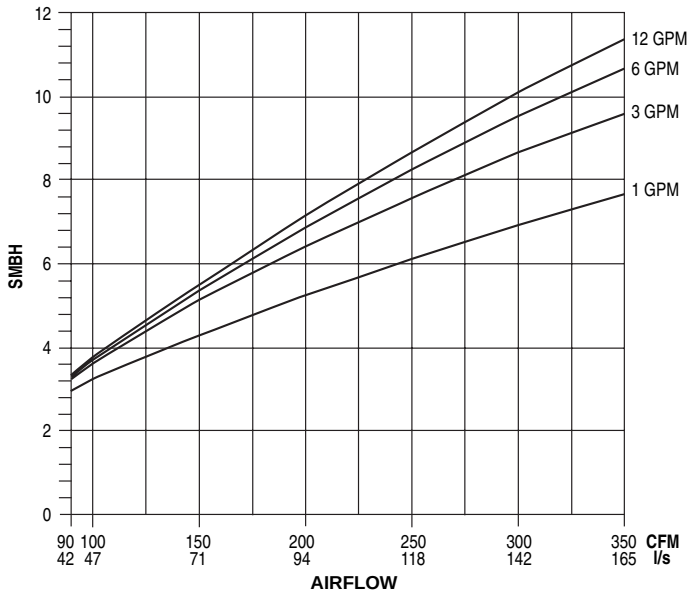
5 Row (Total MBH)



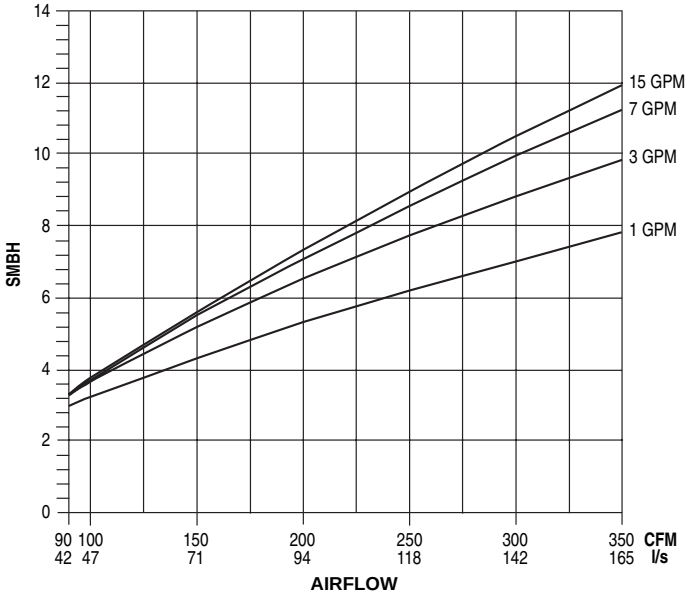
6 Row (Total MBH)



5 Row (Sensible MBH)



6 Row (Sensible MBH)



Altitude Correction Factors

Altitude (ft.)	0	1000	2000	3000	4000	5000	6000	7000
Air Density (lb./ft.3)	0.075	0.072	0.070	0.067	0.065	0.063	0.060	0.058
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Sensible Capacity	1.000	0.960	0.930	0.900	0.860	0.830	0.800	0.770
Static Pressure	1.000	0.960	0.930	0.900	0.860	0.830	0.800	0.770

Notes:

Capacity and static pressure will be affected for applications above sea level. To apply correction factors, multiply factor by desired coil capacity or fan curve data.

Example: 38F Size XX with 3 row coil, high speed fan operation at 3000 ft. above sea level and with 0.1 inch. W.C. ESP.

Solution: Using correction factors from Altitude Correction chart for 3000 ft. above sea level, data from ARI Standard Ratings table and fan curves.

Total capacity = 12,500 BTUH (0.983) = 12,288 BTUH

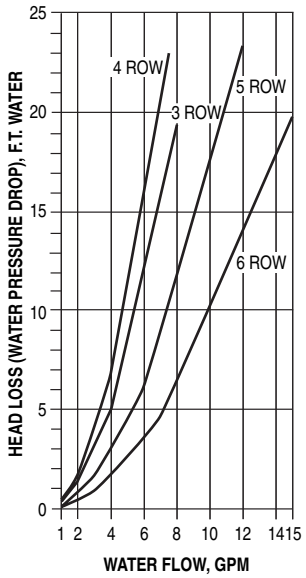
Sensible Capacity = 8,000 BTUH (0.90) = 7,200 BTUH

SP = 0.1 (0.90) = 0.09 Inch W.C.

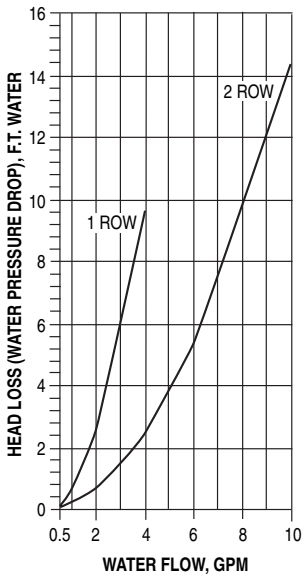
Model Series 38F • Underfloor Fan Coil Units

Performance Data • Pressure Drop - Unit Size 1

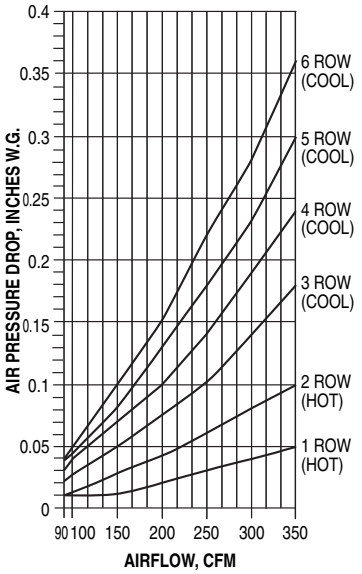
Chilled Water Pressure Drop



Hot Water Pressure Drop



Chilled and Hot Water Air Pressure Drop



Metric Conversion Factors:

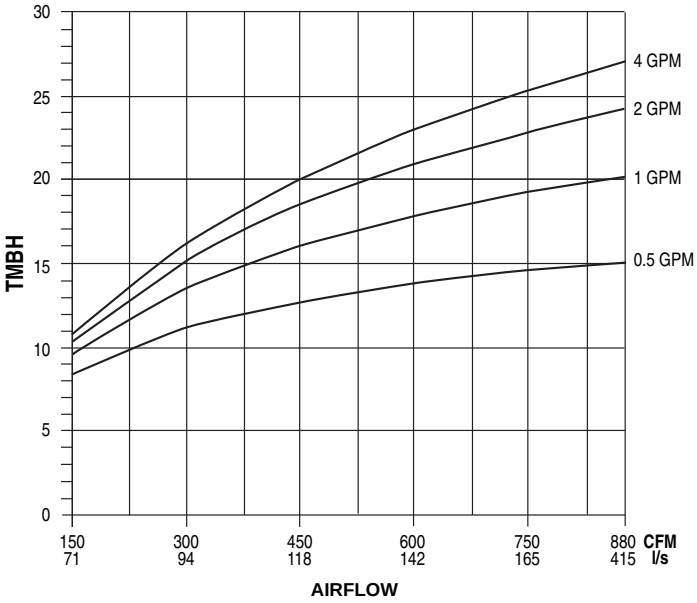
1. Water Flow (liters per second)
   l/s = gpm x 0.6309
2. Water Head Loss (kilopascals):
   kPa = ft. w.g. x 2.9837
3. Airflow Volume (liters per second)
   l/s = CFM x 0.472
4. Air Pressure Drop (Pascals):
   Pa = in. w.g. x 248.6
5. Heat (kilowatts):
   kW = Mbh x 0.293
6. Air Temperature Rise.
   $ATR = 927 \times \frac{Mbh}{CFM}$
7. Water Temp. Drop.
   $WTD = 2.04 \times \frac{Mbh}{GPM}$
8. Connections:
   1 Row 1/2" (13) O.D. male solder.

Model Series 38F • Underfloor Fan Coil Units

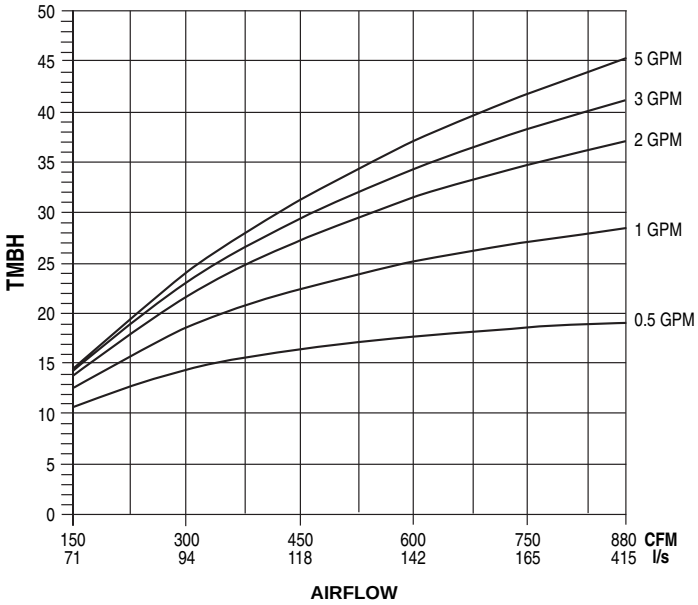
Performance Data • Hot Water Coils • Unit Size 3

Data Based on 70°F DB Entering Air & 180°F Entering Water

1 Row (Total MBH)



2 Row (Total MBH)



Notes:

1. Capacities are in Mbh (thousands of Btu per hour).
2. Mbh values are based on a ΔT (temperature difference) of 110°F between entering air and entering water. For other ΔT's; multiply the Mbh values by the factors below.
3. Air Temperature Rise. ATR = 927 x $\frac{\text{Mbh}}{\text{CFM}}$
4. Water Temp. Drop. WTD = 2.04 x $\frac{\text{Mbh}}{\text{GPM}}$
5. Connections: 1, 2 and 3 Row 7/8" (22); O.D. male solder.

Correction factors at other entering conditions:

ΔT °F	50	60	70	80	90	100	110	120	130	140	150
Factor	.455	.545	.636	.727	.818	.909	1.00	1.09	1.18	1.27	1.36

Altitude Correction Factors:

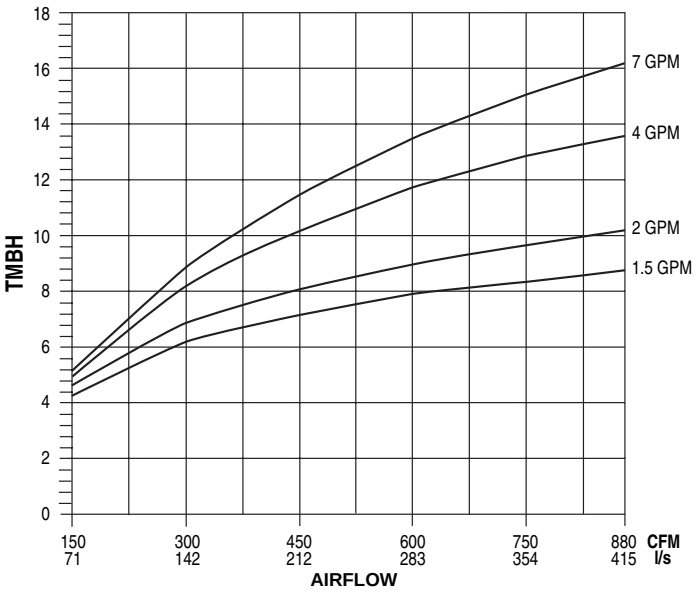
Altitude (ft.)	Sensible Heat Factor
0	1.00
2000	0.94
3000	0.90
4000	0.87
5000	0.84
6000	0.81
7000	0.78

Model Series 38F • Underfloor Fan Coil Units

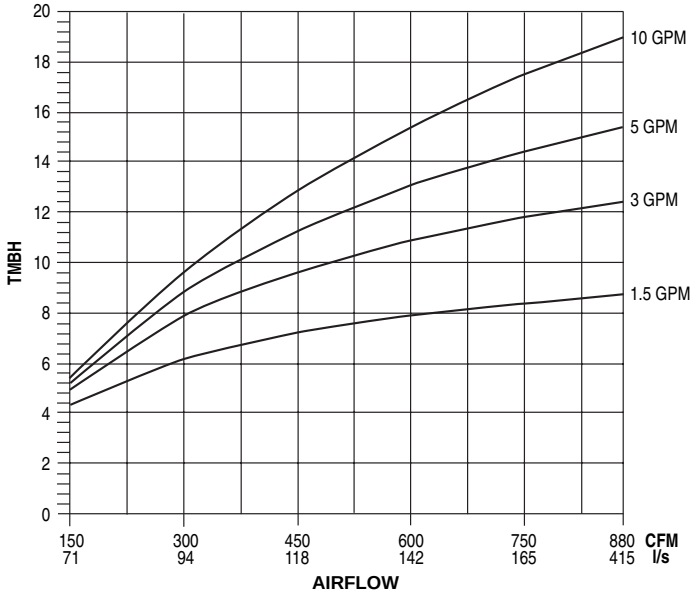
Performance Data • Chilled Water Coils • Unit Size 3

Data Based on 65°F DB 59°F WB Entering Air & 45°F Entering Water

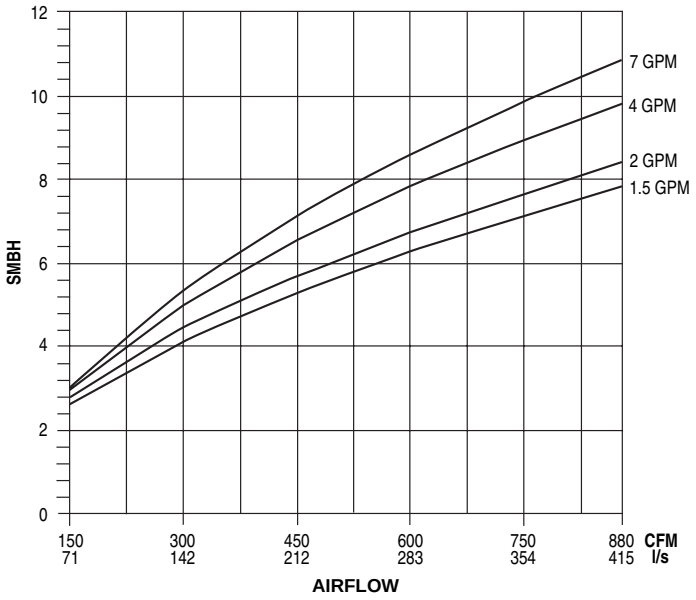
3 Row (Total MBH)



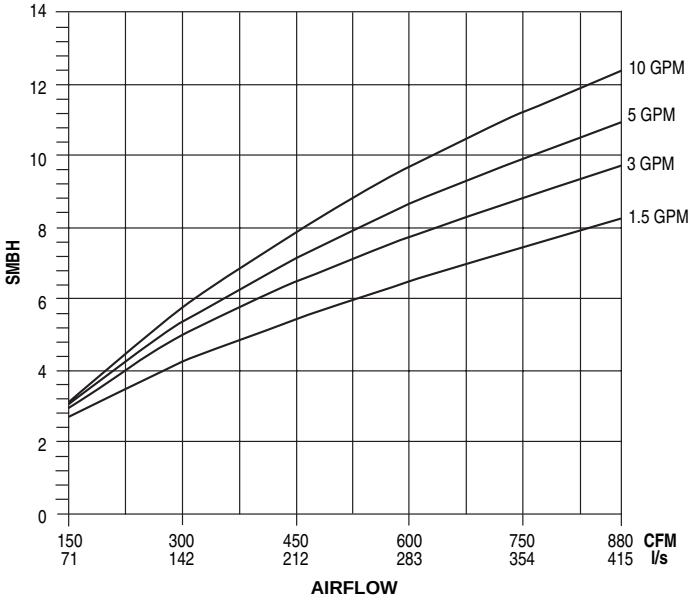
4 Row (Total MBH)



3 Row (Sensible MBH)



4 Row (Sensible MBH)



Altitude Correction Factors

Altitude (ft.)	0	1000	2000	3000	4000	5000	6000	7000
Air Density (lb./ft.3)	0.075	0.072	0.070	0.067	0.065	0.063	0.060	0.058
Total Capacity	1.000	0.988	0.986	0.983	0.981	0.979	0.977	0.975
Sensible Capacity	1.000	0.960	0.930	0.900	0.860	0.830	0.800	0.770
Static Pressure	1.000	0.960	0.930	0.900	0.860	0.830	0.800	0.770

Notes:

Capacity and static pressure will be affected for applications above sea level. To apply correction factors, multiply factor by desired coil capacity or fan curve data.

Example: 38F Size XX with 3 row coil, high speed fan operation at 3000 ft. above sea level and with 0.1 inch. W.C. ESP.

Solution: Using correction factors from Altitude Correction chart for 3000 ft. above sea level, data from ARI Standard Ratings table and fan curves.

Total capacity = 12,500 BTUH (0.983) = 12,288 BTUH

Sensible Capacity = 8,000 BTUH (0.90) = 7,200 BTUH

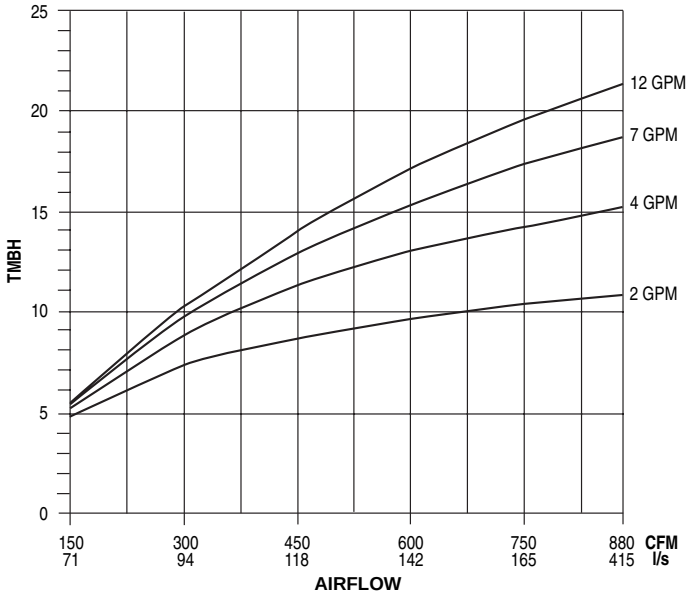
SP = 0.1 (0.90) = 0.09 Inch W.C.

Model Series 38F • Underfloor Fan Coil Units

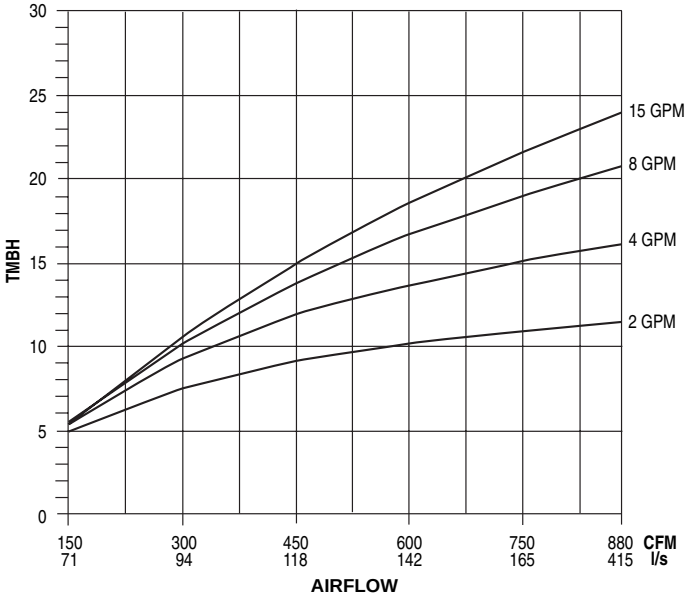
Performance Data • Chilled Water Coils • Unit Size 3

Data Based on 65°F DB 59°F WB Entering Air & 45°F Entering Water

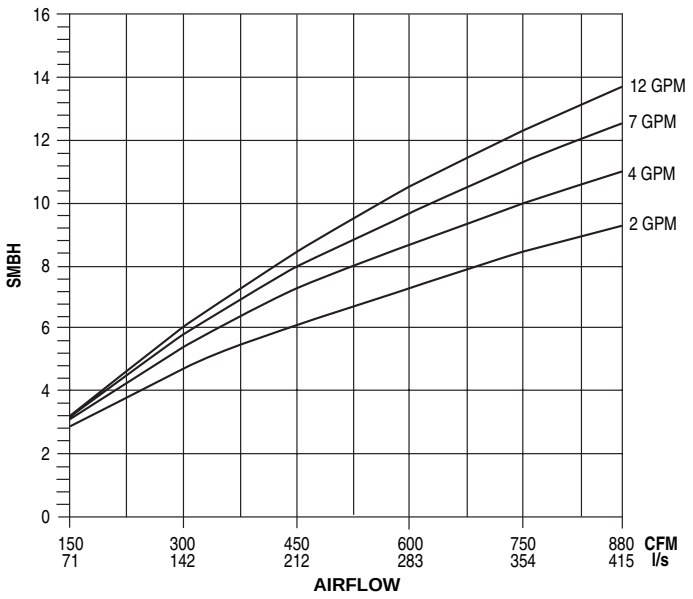
5 Row (Total MBH)



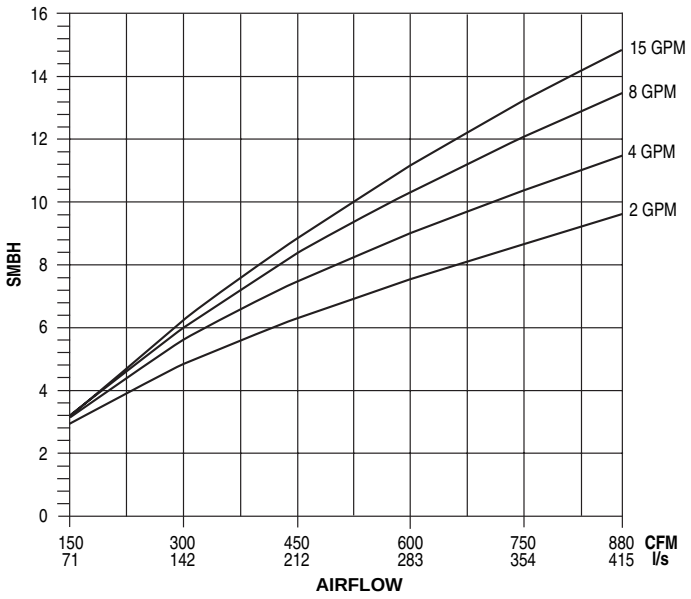
6 Row (Total MBH)



5 Row (Sensible MBH)



6 Row (Sensible MBH)



Altitude Correction Factors

Altitude (ft.)	0	1000	2000	3000	4000	5000	6000	7000
Air Density (lb./ft.3)	0.075	0.072	0.070	0.067	0.065	0.063	0.060	0.058
Total Capacity	1.000	0.988	0.986	0.983	0.981	0.979	0.977	0.975
Sensible Capacity	1.000	0.960	0.930	0.900	0.860	0.830	0.800	0.770
Static Pressure	1.000	0.960	0.930	0.900	0.860	0.830	0.800	0.770

Notes:

Capacity and static pressure will be affected for applications above sea level. To apply correction factors, multiply factor by desired coil capacity or fan curve data.

Example: 38F Size XX with 3 row coil, high speed fan operation at 3000 ft. above sea level and with 0.1 inch. W.C. ESP.

Solution: Using correction factors from Altitude Correction chart for 3000 ft. above sea level, data from ARI Standard Ratings table and fan curves.

Total capacity = 12,500 BTUH (0.983) = 12,288 BTUH

Sensible Capacity = 8,000 BTUH (0.90) = 7,200 BTUH

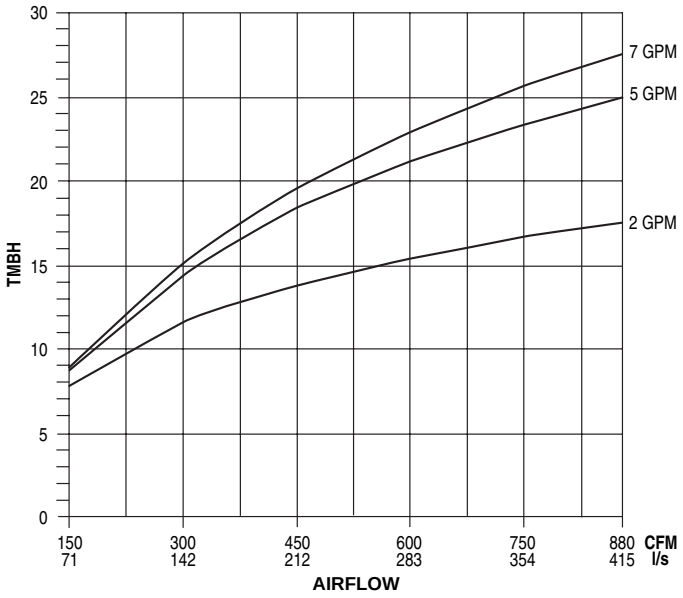
SP = 0.1 (0.90) = 0.09 Inch W.C.

Model Series 38F • Underfloor Fan Coil Units

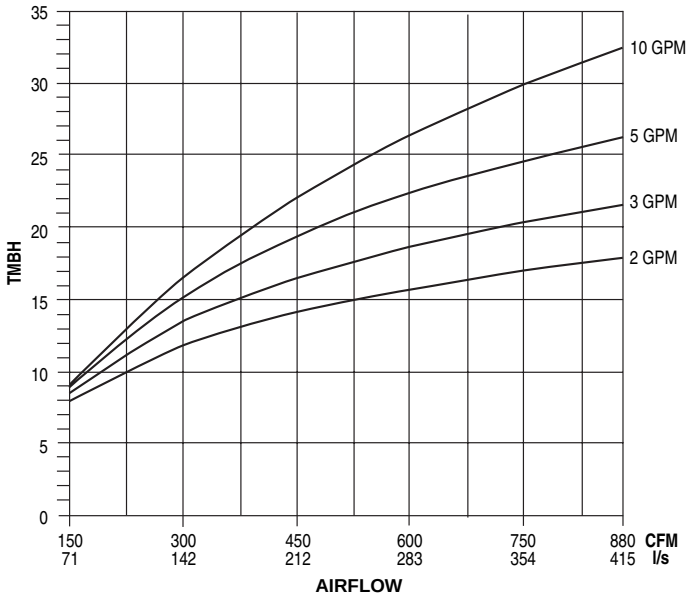
Performance Data • Chilled Water Coils • Unit Size 3

Data Based on 80°F DB 67°F WB Entering Air & 45°F Entering Water

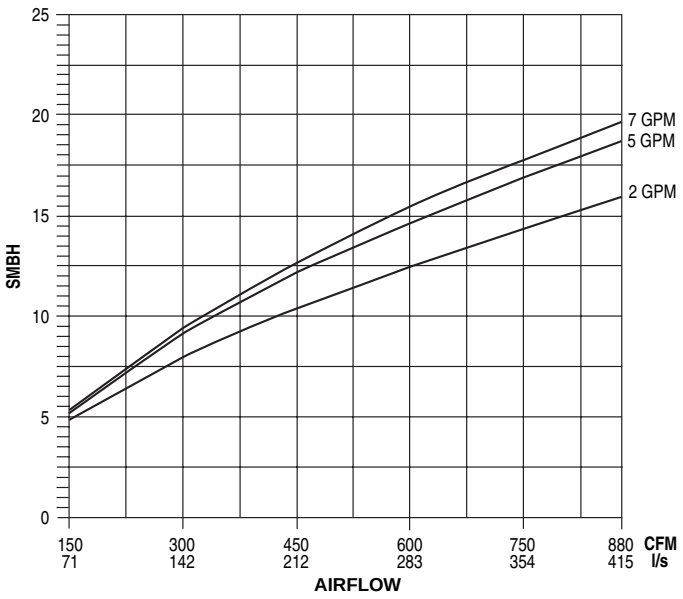
3 Row (Total MBH)



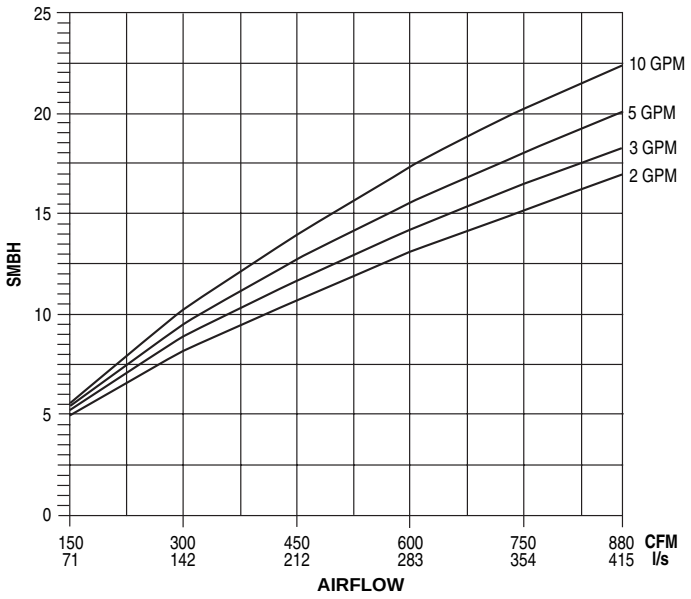
4 Row (Total MBH)



3 Row (Sensible MBH)



4 Row (Sensible MBH)



Altitude Correction Factors

Altitude (ft.)	0	1000	2000	3000	4000	5000	6000	7000
Air Density (lb./ft.3)	0.075	0.072	0.070	0.067	0.065	0.063	0.060	0.058
Total Capacity	1.000	0.988	0.986	0.983	0.981	0.979	0.977	0.975
Sensible Capacity	1.000	0.960	0.930	0.900	0.860	0.830	0.800	0.770
Static Pressure	1.000	0.960	0.930	0.900	0.860	0.830	0.800	0.770

Notes:

Capacity and static pressure will be affected for applications above sea level. To apply correction factors, multiply factor by desired coil capacity or fan curve data.

Example: 38F Size XX with 3 row coil, high speed fan operation at 3000 ft. above sea level and with 0.1 inch. W.C. ESP.

Solution: Using correction factors from Altitude Correction chart for 3000 ft. above sea level, data from ARI Standard Ratings table and fan curves.

Total capacity = 12,500 BTUH (0.983) = 12,288 BTUH

Sensible Capacity = 8,000 BTUH (0.90) = 7,200 BTUH

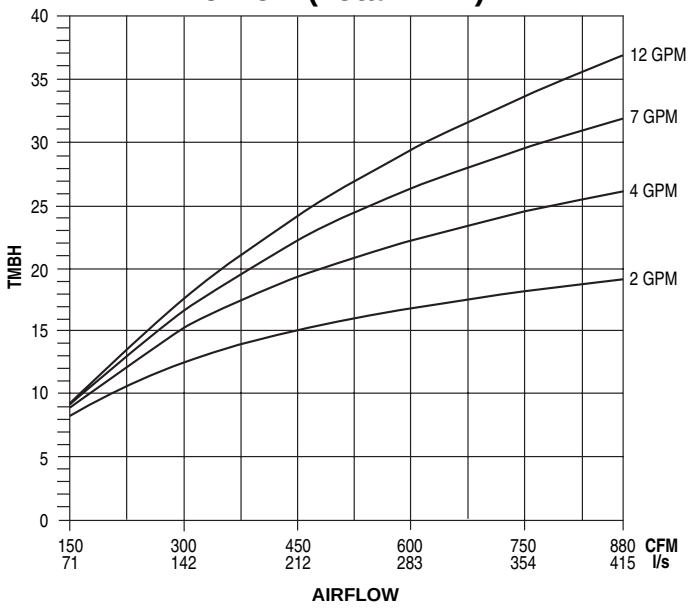
SP = 0.1 (0.90) = 0.09 Inch W.C.

Model Series 38F • Underfloor Fan Coil Units

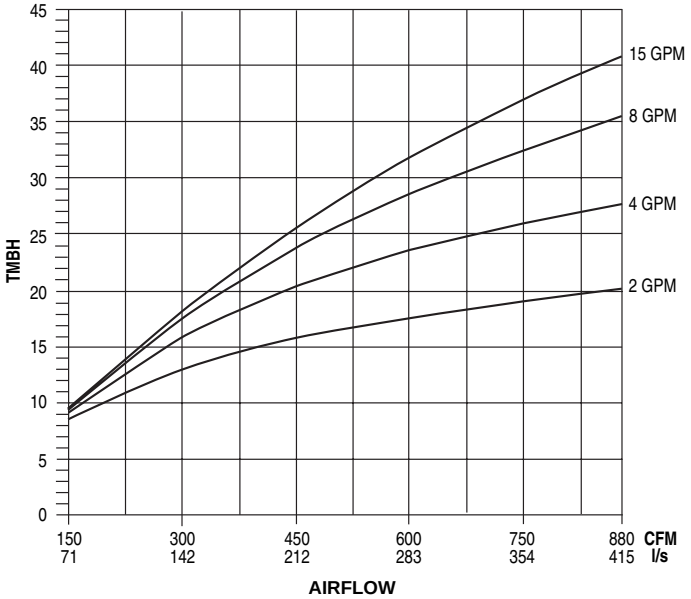
Performance Data • Chilled Water Coils • Unit Size 3

Data Based on 80°F DB 67°F WB Entering Air & 45°F Entering Water

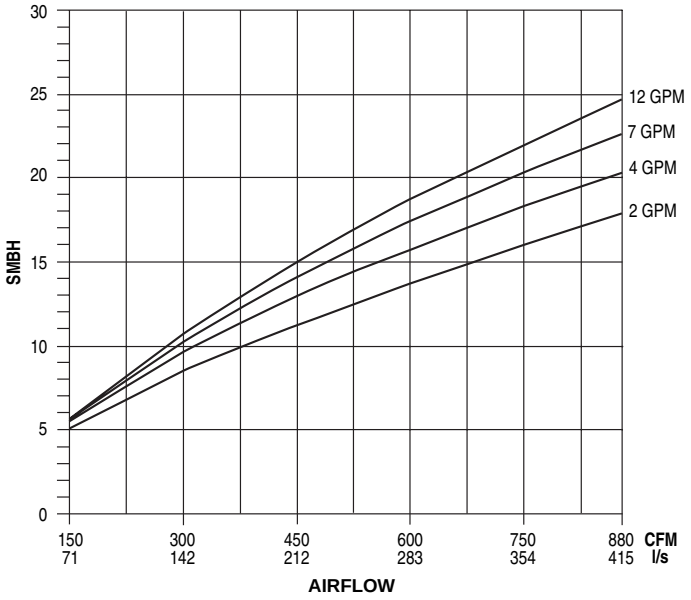
5 Row (Total MBH)



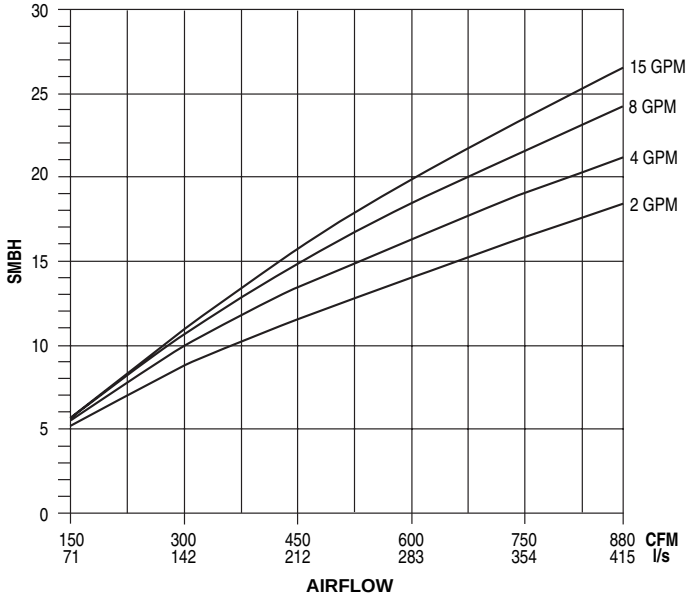
6 Row (Total MBH)



5 Row (Sensible MBH)



6 Row (Sensible MBH)



Altitude Correction Factors

Altitude (ft.)	0	1000	2000	3000	4000	5000	6000	7000
Air Density (lb./ft.3)	0.075	0.072	0.070	0.067	0.065	0.063	0.060	0.058
Total Capacity	1.000	0.988	0.986	0.983	0.981	0.979	0.977	0.975
Sensible Capacity	1.000	0.960	0.930	0.900	0.860	0.830	0.800	0.770
Static Pressure	1.000	0.960	0.930	0.900	0.860	0.830	0.800	0.770

Notes:

Capacity and static pressure will be affected for applications above sea level. To apply correction factors, multiply factor by desired coil capacity or fan curve data.

Example: 38F Size XX with 3 row coil, high speed fan operation at 3000 ft. above sea level and with 0.1 inch. W.C. ESP.

Solution: Using correction factors from Altitude Correction chart for 3000 ft. above sea level, data from ARI Standard Ratings table and fan curves.

Total capacity = 12,500 BTUH (0.983) = 12,288 BTUH

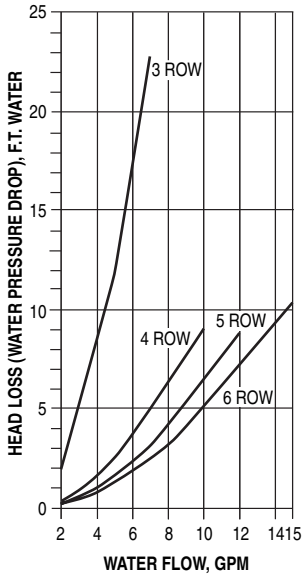
Sensible Capacity = 8,000 BTUH (0.90) = 7,200 BTUH

SP = 0.1 (0.90) = 0.09 Inch W.C.

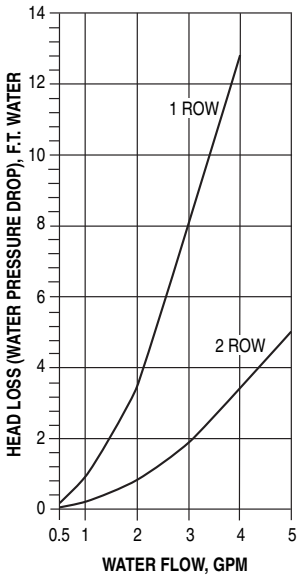
Model Series 38F • Underfloor Fan Coil Units

Performance Data • Pressure Drop - Unit Size 3

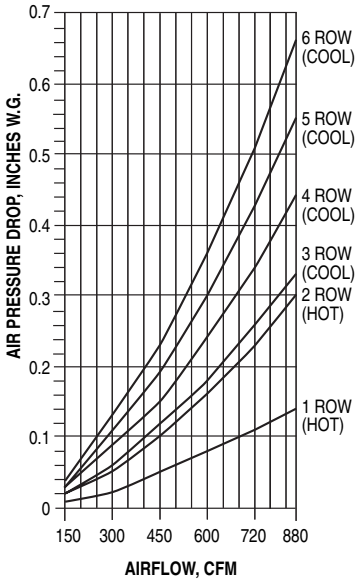
Chilled Water Pressure Drop



Hot Water Pressure Drop



Chilled and Hot Water Air Pressure Drop



Metric Conversion Factors:

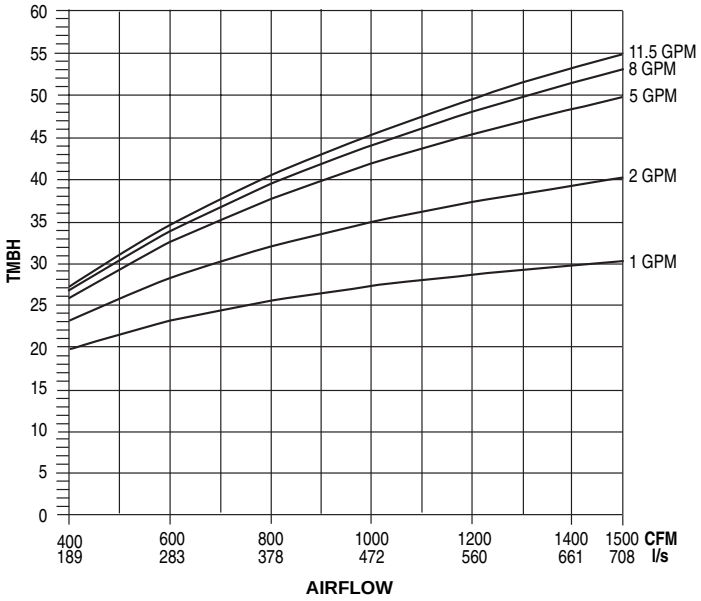
1. Water Flow (liters per second)
   l/s = gpm x 0.6309
2. Water Head Loss (kilopascals):
   kPa = ft. w.g. x 2.9837
3. Airflow Volume (liters per second)
   l/s = CFM x 0.472
4. Air Pressure Drop (Pascals):
   Pa = in. w.g. x 248.6
5. Heat (kilowatts):
   kW = Mbh x 0.293
6. Air Temperature Rise.
   $ATR = 927 \times \frac{Mbh}{CFM}$
7. Water Temp. Drop.
   $WTD = 2.04 \times \frac{Mbh}{GPM}$
8. Connections:
   1 Row 1/2" (13) O.D. male solder.

Model Series 38F • Underfloor Fan Coil Units

Performance Data • Hot Water Coils • Unit Size 5

Data Based on 70°F DB Entering Air & 180°F Entering Water

1 Row (Total MBH)



Notes:

1. Capacities are in Mbh (thousands of Btu per hour).
2. Mbh values are based on a ΔT (temperature difference) of 110°F between entering air and entering water. For other ΔT's; multiply the Mbh values by the factors below.
3. Air Temperature Rise. ATR = 927 x $\frac{\text{Mbh}}{\text{CFM}}$
4. Water Temp. Drop. WTD = 2.04 x $\frac{\text{Mbh}}{\text{GPM}}$
5. Connections: 1, 2 and 3 Row 7/8" (22); O.D. male solder.

Correction factors at other entering conditions:

ΔT °F	50	60	70	80	90	100	110	120	130	140	150
Factor	.455	.545	.636	.727	.818	.909	1.00	1.09	1.18	1.27	1.36

Altitude Correction Factors:

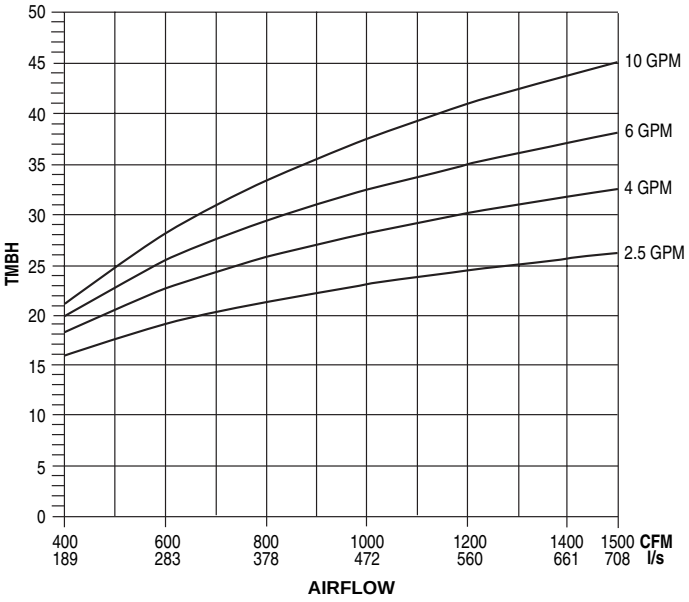
Altitude (ft.)	Sensible Heat Factor
0	1.00
2000	0.94
3000	0.90
4000	0.87
5000	0.84
6000	0.81
7000	0.78

Model Series 38F • Underfloor Fan Coil Units

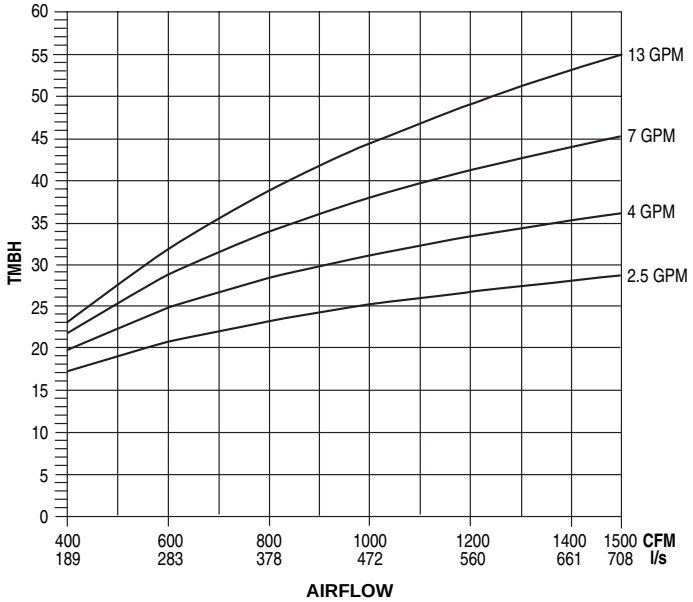
Performance Data • Chilled Water Coils • Unit Size 5

Data Based on 80°F DB 67°F WB Entering Air & 45°F Entering Water

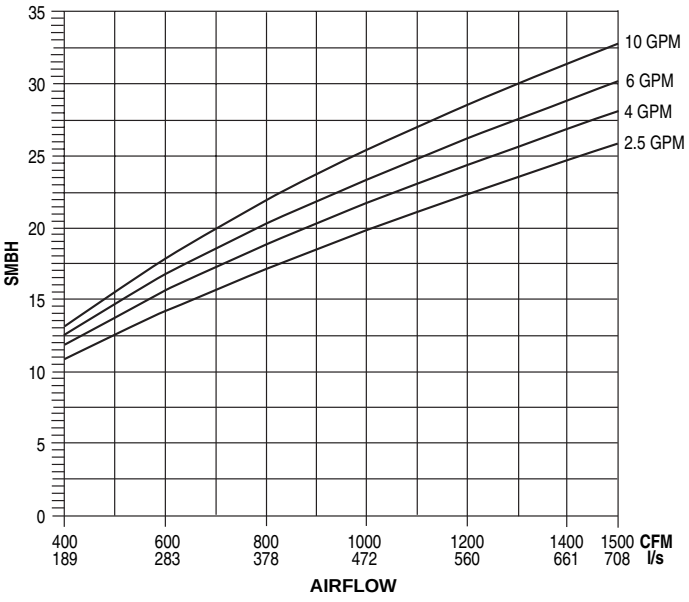
3 Row (Total MBH)



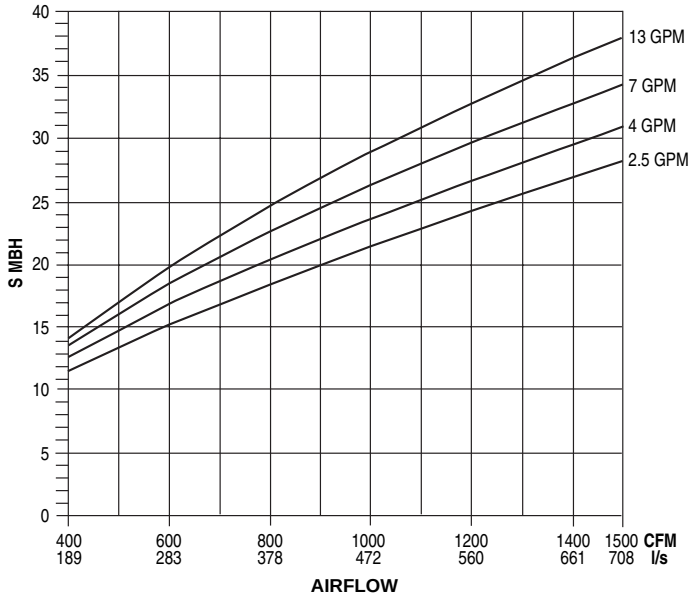
4 Row (Total MBH)



3 Row (Sensible MBH)



4 Row (Sensible MBH)



Altitude Correction Factors

Altitude (ft.)	0	1000	2000	3000	4000	5000	6000	7000
Air Density (lb./ft.3)	0.075	0.072	0.070	0.067	0.065	0.063	0.060	0.058
Total Capacity	1.000	0.988	0.986	0.983	0.981	0.979	0.977	0.975
Sensible Capacity	1.000	0.960	0.930	0.900	0.860	0.830	0.800	0.770
Static Pressure	1.000	0.960	0.930	0.900	0.860	0.830	0.800	0.770

Notes:

Capacity and static pressure will be affected for applications above sea level. To apply correction factors, multiply factor by desired coil capacity or fan curve data.

Example: 38F Size XX with 3 row coil, high speed fan operation at 3000 ft. above sea level and with 0.1 inch. W.C. ESP.

Solution: Using correction factors from Altitude Correction chart for 3000 ft. above sea level, data from ARI Standard Ratings table and fan curves.

Total capacity = 12,500 BTUH (0.983) = 12,288 BTUH

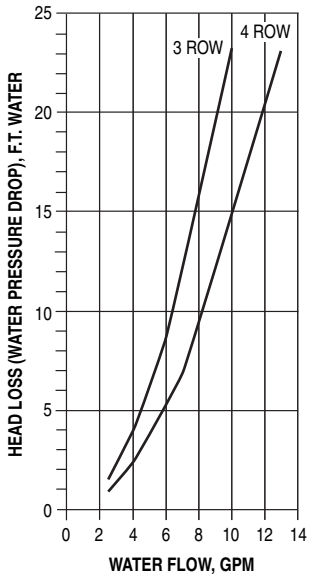
Sensible Capacity = 8,000 BTUH (0.90) = 7,200 BTUH

SP = 0.1 (0.90) = 0.09 Inch W.C.

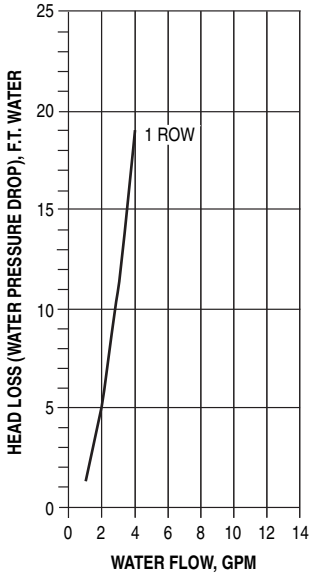
Model Series 38F • Underfloor Fan Coil Units

Performance Data • Pressure Drop - Unit Size 5

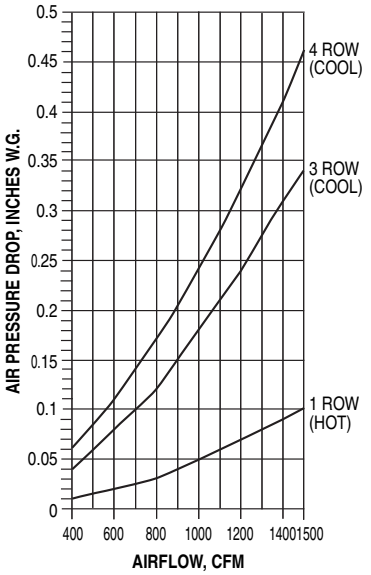
Chilled Water Pressure Drop



Hot Water Pressure Drop



Chilled and Hot Water Air Pressure Drop



Metric Conversion Factors:

1. Water Flow (liters per second)
   l/s = gpm x 0.6309
2. Water Head Loss (kilopascals):
   kPa = ft. w.g. x 2.9837
3. Airflow Volume (liters per second)
   l/s = CFM x 0.472
4. Air Pressure Drop (Pascals):
   Pa = in. w.g. x 248.6
5. Heat (kilowatts):
   kW = Mbh x 0.293
6. Air Temperature Rise.
   $ATR = 927 \times \frac{Mbh}{CFM}$
7. Water Temp. Drop.
   $WTD = 2.04 \times \frac{Mbh}{GPM}$
8. Connections:
   1 Row 1/2" (13) O.D. male solder.

Electric Heating Coils • Construction Features, Selection and Capacities

Nailor Electric Coils are tested with the fan terminal in accordance with UL Standard 1995 and meet all requirements of the National Electric Code and CSA. Units are listed and labeled by the ETL Testing Laboratory as a total package. All controls are enclosed in a NEMA 1 electrical enclosure on the side of the fan package for easy access.

All wiring for the motor and heater terminates in the enclosure for single point electrical connection in the field. Each unit is supplied with a wiring diagram. Note: NEC requires a means to disconnect the heater power supply within sight or on the terminal.

Standard Features Include:

- Automatic reset high limit thermal cut-outs.
- Nickel-chrome heating elements.
- Magnetic contactors per stage on terminals with DDC or analog electronic controls.
- P.E. switch per stage to carry load or pilot duty with magnetic contactors as required with pneumatic control.
- Positive pressure airflow safety switch or CT relay.
- Fan relay for DDC fan coils.
- Control voltage transformer (Class 2) for DDC or analog electronic fan coils.

Optional Accessories:

- Toggle disconnect switch.
- Door interlocking disconnect switch.
- Mercury contactors.
- Power circuit fusing.
- Dust tight control enclosure.
- Class 'A' 80/20 nickel/chrome element wire.
- Manual reset high limits.
- SCR Control.

Tested and approved to the following standards:

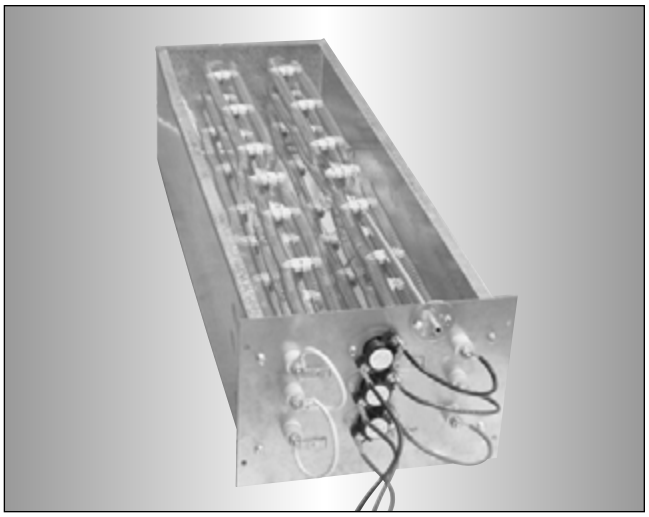
ANSI/UL 1996, 1st. ed.

CSA C22.2 No. 155-M1986.

UL 1995

SCR Control Option:

The SCR (Thyrister) option provides infinite solid state heater control using a proportional signal (0 – 10 Vdc or 4 – 20 mA). This option may be specified compatible with analog electronic or digital (DDC) controls.



Time proportional control of the electric heater provides superior comfort and energy savings. The SCR controller modulates the heater to supply the exact amount of heat based upon the zone requirement. Room set points are maintained more accurately, undershoot and overshoot as associated with staged heat are eliminated, reducing operation costs.

SCR controllers provide silent operation, as mechanical staged contactors are eliminated. Zero cross switching of the thyristor prevents electrical noise.

Recommended Selection:

The table below is a quick reference guide, to illustrate the relationship between electrical power supply, heater capacity in kilowatts and fan coil unit sizes that are available.

- Pneumatic and digital control terminals are available with up to 3 stages of heat. Analog electronic control terminals are available with 1 or 2 stages of heat only. A minimum of 0.5 kW per stage is required.
- Voltage and kilowatt ratings are sized so as not to exceed 48 amps, in order to avoid the NEC code requirement for circuit fusing.
- A minimum airflow of 70 cfm (33 l/s) per kW is required for any given fan coils in order to avoid possible nuisance tripping of the thermal cut-outs.
- Discharge air temperature should not exceed 120°F (49°C).

Model Series	Unit Size	Electric Heat Maximum Kilowatts												
		120V 1 Ph	208/220/240V 1 Ph	277V 1 Ph	347V 1Ph	480V 1 Ph	600V 1Ph (120V Fan)	600V 1Ph (240/277V Fan)	208V 3Ph	220/240V 3Ph	380V 3Ph	480V 3Ph	600V (120V Fan)	600V (240/277V Fan)
38F	1	4.8	5	5	5	5	5	5	—	—	—	—	—	—
	2	4.8	8	9	9	9	9	9	9	9.5	8	9	9	9
	3	4.8	8	11.5	13	14	14	14	9	9.5	8	10	12	12
	5	5.4	9.3	12.4	15.6	21.6	21.6	21.6	10.8	10.8	11.7	12.4	14.1	14.1
	6	5.4	9.3	12.4	15.6	23.2	23.2	23.2	12.6	13.3	14.5	16.6	19.3	19.3
	33	4.8	8	11.5	13	14	14	14	9	9.5	8	10	12	12

Electric Heating Coils • Application Guidelines

Discharge Air Temperature

When considering the capacity and airflow for the heater, discharge air temperature can be an important factor. Rooms use different types of diffusers, and they are intended to perform different functions. Slots that blend the air at the glass and set up air curtains within the room, must be able to blow the air very low in the room. Hot air will be too buoyant to be effective in this case. Discharge air temperatures for this application should be in the 85 – 90°F (29 – 32°C) maximum range.

Diffusers in the center of the room blend their discharge air as it crosses the ceiling. Discharge air temperatures in this application can be as high as 105°F (41°C) and still be effective. However, if the return air grilles are in the discharge air pattern, the warm air will be returned to the plenum before it heats the room. Again, the air temperature needs to be blended down to an acceptable temperature that can be forced down into the occupied space by the time the air gets to the walls. Discharging warm air into the room at temperatures above 105°F (41°C) usually will set up stratification layers and will not keep the occupants warm if there is a ceiling return because only the top 12" – 24" (300 – 600 mm) of the room will be heated.

The maximum approved discharge air temperature for any Nailor Fan Coil Units with supplemental heat is 120°F (49°C). No heater should be applied to exceed this temperature.

Electric Heater Selection

To properly select an electric heater, three things must be determined: the heat requirement for the room, the entering air temperature and the desired discharge air temperature. The heat requirement for the room is the sum of the heat loss calculation and the amount of heat required to raise the entering air temperature to the desired room temperature. Usually, the second item is small compared to the first for fan coil units in a return air plenum. MBH can be converted to kW by using the chart or by calculation. There are 3413 BTU's in 1 kW. If using the chart, find the MBH on the left scale, then move horizontally to the right and read kW.

Next, the desired discharge air temperature should be ascertained. This will depend on the type of diffusers that are in the room.

The desired heating airflow for the room can then be calculated using the following equation:

$$cfm = \frac{kW \times 3160}{\Delta T \text{ (discharge air temp} - \text{inlet air temp.) °F}}$$

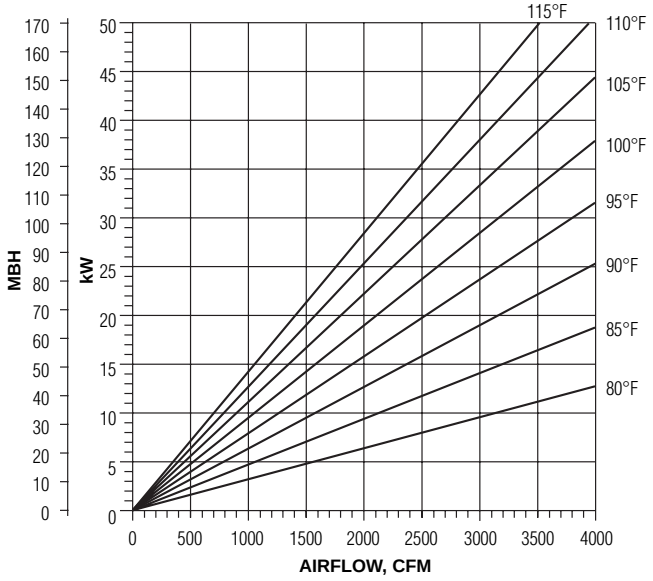
Assuming 70°F (21°C) supply air temperature to the heater, the room airflow can be selected directly from the chart. Start at the left at the design kW. Move horizontally to the desired discharge air temperature. Then, move vertically down to the cfm at the bottom of the chart.

The kW can be selected directly from the chart. Start at the bottom with the design cfm into the room. Move vertically up to the line that represents the desired discharge air temperature. Then, move left to the kW.

The discharge air temperature can also be selected directly from the chart. Start at the bottom with the design cfm into the room. Move to the left side of the chart and find the design kW. Move horizontally and vertically into the chart until the lines intersect. The intersection will be the desired discharge air temperature. Interpolation between the curves is linear.

Heater Selection Chart

Assuming 70°F inlet air temperature at heater.



Diagonal lines are constant output temperature.

Optional Fan Coil Unit Liners For 'IAQ' Sensitive Applications

Nailor offers several options for fan coil unit applications where the maintenance of a high Indoor Air Quality is a primary concern. Specific 'IAQ' liners are designed to address applications where the issue of fiberglass insulation eroding and entering the airstream is a concern and/or to reduce the risk of microbial growth.
The sound power levels published in this catalog for fan coil units are based upon testing with standard dual density fiberglass insulation. Dual density insulation is surface treated to prevent erosion and was developed to optimize attenuation for unit applications. Cataloged discharge sound power levels for fan coil units are not significantly affected by the different liner options, however radiated sound levels may escalate depending on the unit model and liner selection. Contact your Nailor representative for further information.

Fiber-Free Liner

Fiber-Free liner.

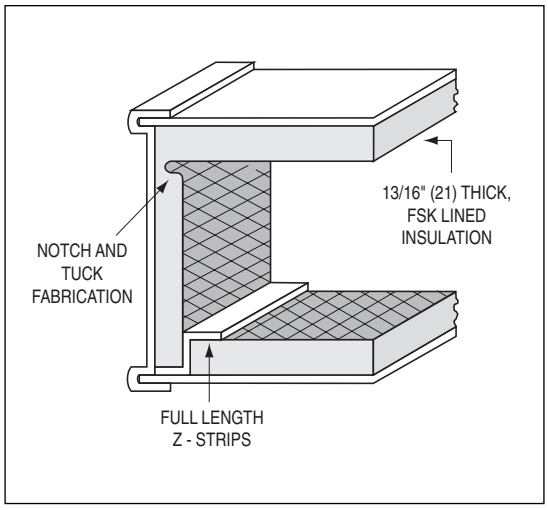
A new offering that totally eliminates fiberglass; Nailor's Fiber-Free liner is 3/4" (19) thick, closed cell elastomeric foam. The liner has excellent thermal insulating characteristics. The foam does not absorb water, reducing the likelihood of mold or bacterial growth.
The Fiber-Free liner surface is smooth, so that dirt and debris won't accumulate, durable, erosion resistant and washable.
Complies with the following standards and tests:

- NFPA 90A Supplementary materials for air distribution systems.
- ASTM E84 and UL 181 (25/50) Smoke and Flame spread.
- ASTM C1071, G21, G22. No bacterial or fungal growth.
- Acoustical attenuation of radiated sound is reduced compared with standard dual density fiberglass insulation.

Steri-Liner

Steri-Liner is an internal insulation designed to reduce the risk of microbial growth within the unit. A smooth non-porous facing provides a vapor barrier to moisture and reduces the risk of micro-organisms becoming trapped. It also facilitates cleaning and prevents insulating material erosion. Damage to the liner though, will expose fiberglass particles to the airstream.

- 13/16" (21) thick, 4 lb./sq. ft. (64 kg/m^3) density rigid fiberglass with a fire resistant reinforced aluminum foil-scrim-kraft (FSK) facing on all panels in the mixing chamber.
- Meets the requirements of NFPA 90A and UL 181 for smoke and flame spread and the bacteriological requirements of ASTM C665. Will not support the growth of fungi or bacteria.
- No exposed edges. Steri-Liner features 'notch and tuck' fabrication and full seam length steel Z-strip construction providing both superior edge protection and an extremely rigid unit.



Steri-Liner detail on 38F Series fan coil unit.

Solid Metal Liner

Nailor also offers a solid inner metal liner that completely isolates the standard insulation from the airstream within the unit mixing chamber. Solid metal liners offer the ultimate protection against exposure of fiberglass particles to the airstream, all but eliminating the possibility of punctures exposing fiberglass. This option is also resistant to moisture. The encased insulation still provides thermal resistance and radiated sound attenuation, but acoustic absorption of discharge sound is eliminated.
Fabricated as a box within a box to separate all surfaces and exposed edges of the insulation.

Perforated Metal Liner

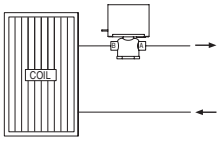
Provides additional security and retains standard dual density fiberglass insulation or optional Steri-Liner insulation reducing possibility of long term erosion or breakdown.

Model Series 38F • Underfloor Fan Coil Units

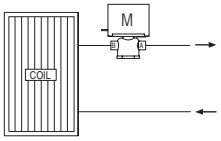
Valve Packages • Chilled/Hot Water

Single Component for Chilled/Hot Water

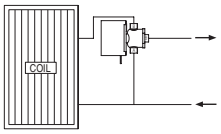
CODE C/H001:
2-WAY 2 POSITION VALVE



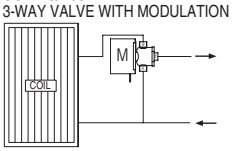
CODE C/H002:
2-WAY VALVE W/MODULATION



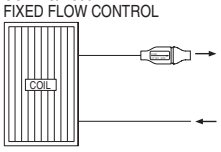
CODE C/H003:
3-WAY 2 POSITION VALVE



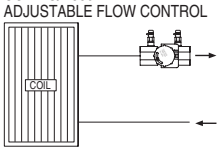
CODE C/H004:
3-WAY VALVE WITH MODULATION



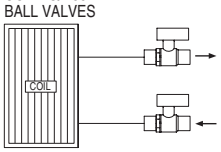
CODE C/H005:
FIXED FLOW CONTROL



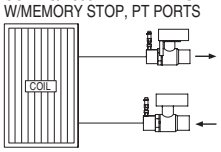
CODE C/H006:
ADJUSTABLE FLOW CONTROL



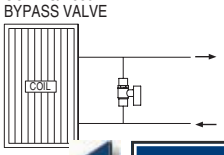
CODE C/H007:
BALL VALVES



CODE C/H008: BALL VALVES W/MEMORY STOP, PT PORTS

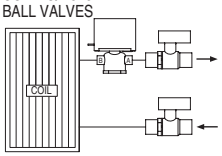


CODE C/H009:
BYPASS VALVE

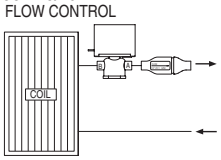


2-Way 2-Position Chilled/Hot Water Valve Packages

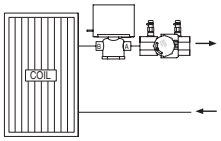
CODE C/H010:
BALL VALVES



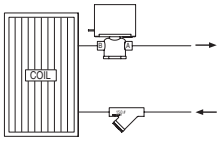
CODE C/H011:
FLOW CONTROL



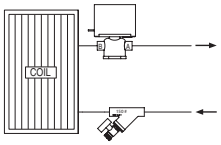
CODE C/H012:
ADJUST. FLOW CONTROL



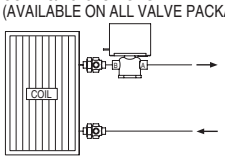
CODE C/H013:
Y-STRAINER



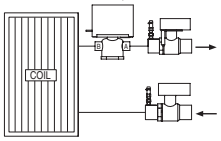
CODE C/H014:
Y-STRAINER W/HOSE BIB



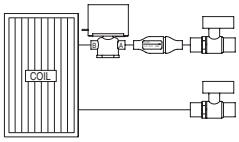
CODE C/H015: UNIONS (AVAILABLE ON ALL VALVE PACKAGES)



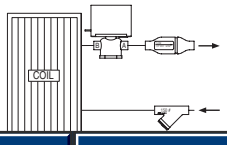
CODE C/H016: BALL VALVES W/MEMORY STOP, PT PORTS



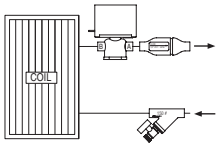
CODE C/H017: BALL VALVES, FIXED FLOW CONTROL



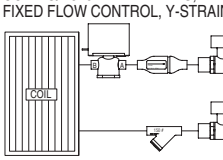
CODE C/H018: FIXED FLOW CONTROL, Y-STRAINER



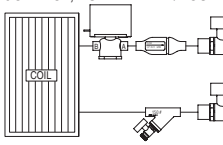
CODE C/H019: FIXED FLOW CONTROL, Y-STRAINER W/HOSE BIB



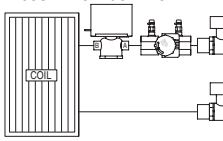
CODE C/H020: BALL VALVES, FIXED FLOW CONTROL, Y-STRAINER



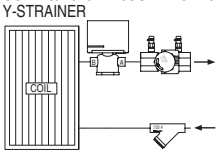
CODE C/H021: BALL VALVES, FIXED FLOW CONTROL,Y-STRAINER W/HOSE BIB



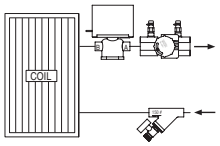
CODE C/H022: BALL VALVES ADJUST. FLOW CONTROL



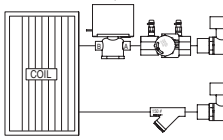
CODE C/H023: ADJUST. FLOW CONTROL, Y-STRAINER



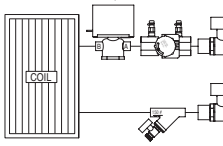
CODE C/H024: ADJUST. FLOW CONTROL Y-STRAINER W/HOSE BIB



CODE C/H025: BALL VALVES, ADJUST. FLOW CONTROL, Y-STRAINER

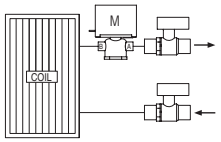


CODE C/H026: BALL VALVES, ADJUST. FLOW CONTROL, Y-STRAINER W/HOSE BIB

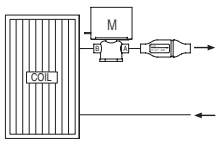


2-Way Modulating Valve, Chilled/Hot Water Valve Packages

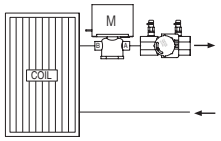
CODE C/H027:
BALL VALVES



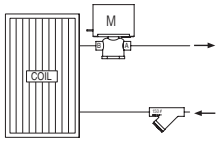
CODE C/H028:
FIXED FLOW CONTROL



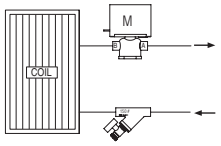
CODE C/H029:
ADJUST. FLOW CONTROL



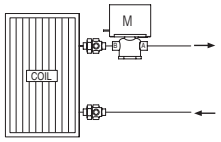
CODE C/H030:
Y-STRAINER



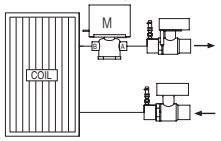
CODE C/H031:
Y-STRAINER W/HOSE BIB



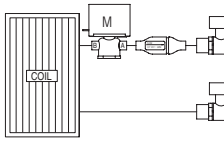
CODE C/H032: UNIONS (AVAILABLE ON ALL VALVE PACKAGES)



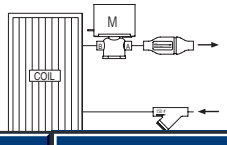
CODE C/H033: BALL VALVES W/MEMORY STOP, PT PORTS



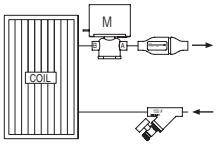
CODE C/H034: BALL VALVES, FIXED FLOW CONTROL



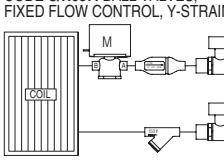
CODE C/H035: FIXED FLOW CONTROL, Y-STRAINER



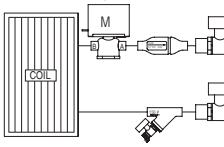
CODE C/H036: FIXED FLOW CONTROL, Y-STRAINER W/HOSE BIB



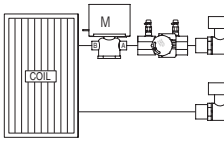
CODE C/H037: BALL VALVES, FIXED FLOW CONTROL, Y-STRAINER



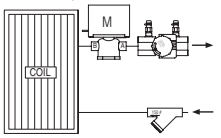
CODE C/H038: BALL VALVES, FIXED FLOW CONTROL, Y-STRAINER W/HOSE BIB



CODE C/H039: BALL VALVES, ADJUST. FLOW CONTROL



CODE C/H040: ADJUST. FLOW CONTROL, Y-STRAINER



CODE C/H041: ADJUST. FLOW CONTROL, Y-STRAINER W/HOSE BIB

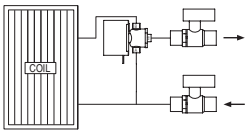
CODE C/H042: BALL VALVES, ADJUST. FLOW CONTROL, Y-STRAINER

CODE C/H043: BALL VALVES, ADJUST. FLOW CONTROL, Y-STRAINER W/HOSE BIB

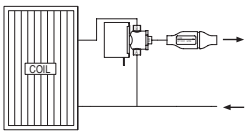
Model Series 38F • Underfloor Fan Coil Units

Valve Packages • Chilled/Hot Water • 3-Way, 2-Position Valve

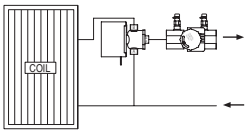
CODE C/H044:
BALL VALVES



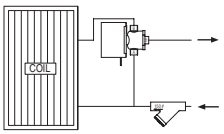
CODE C/H045:
FIXED FLOW CONTROL



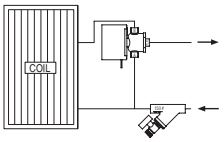
CODE C/H046:
ADJUST. FLOW CONTROL



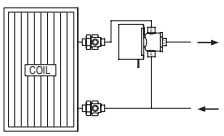
CODE C/H047:
Y-STRAINER



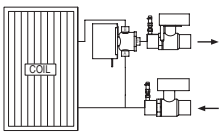
CODE C/H048:
Y-STRAINER W/HOSE BIB



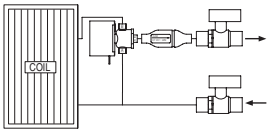
CODE C/H049: UNIONS
(AVAILABLE ON ALL VALVE PACKAGES)



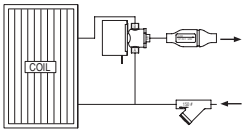
CODE C/H050: BALL VALVES
W/MEMORY STOP, PT PORTS



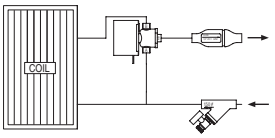
CODE C/H051: BALL VALVES
FIXED FLOW CONTROL



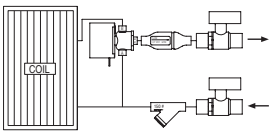
CODE C/H052: FIXED FLOW CONTROL,
Y-STRAINER



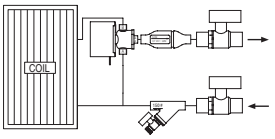
CODE C/H053: FIXED FLOW CONTROL
Y-STRAINER W/HOSE BIB



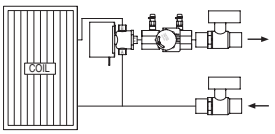
CODE C/H054: BALL VALVES, FIXED
FLOW CONTROL, Y-STRAINER



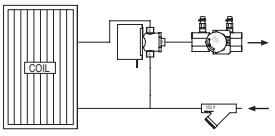
CODE C/H055: BALL VALVES, FIXED FLOW
CONTROL, Y-STRAINER W/ HOSE BIB



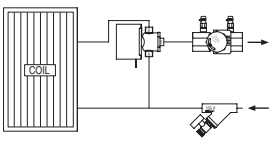
CODE C/H056: BALL VALVES,
ADJUST. FLOW CONTROL



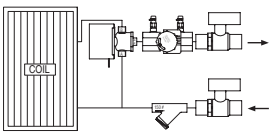
CODE C/H057: ADJUST. FLOW
CONTROL,



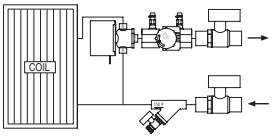
CODE C/H058: ADJUST. FLOW CONTROL,
Y-STRAINER W/HOSE BIB



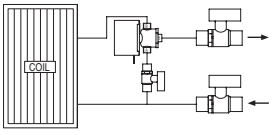
CODE C/H059: BALL VALVES, ADJUST.
FLOW CONTROL, Y-STRAINER



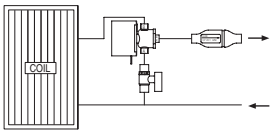
CODE C/H060: BALL VALVES, ADJUST.
FLOW CONTROL, Y-STRAINER W/HOSE BIB



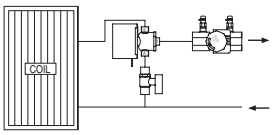
CODE C/H061: BALL VALVES,
BYPASS VALVE



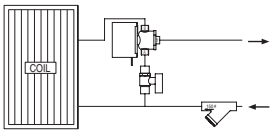
CODE C/H062: BYPASS VALVE,
FIXED FLOW CONTROL



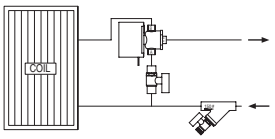
CODE C/H063: BYPASS VALVE
ADJUST. FLOW CONTROL



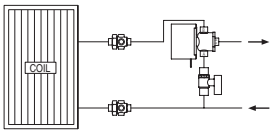
CODE C/H064: BYPASS VALVE
Y-STRAINER



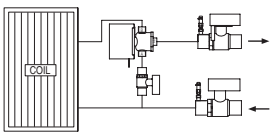
CODE C/H065: BYPASS VALVE
Y-STRAINER W/HOSE BIB



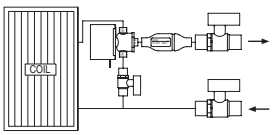
CODE C/H066: UNIONS,
BYPASS VALVE



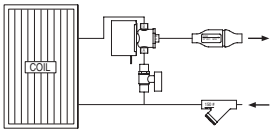
CODE C/H067: BALL VALVES W/ MEMORY
STOP, PT PORTS



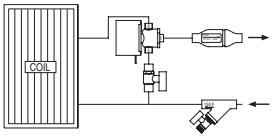
CODE C/H068: BYPASS VALVE,
BALL VALVES, FIXED FLOW CONTROL



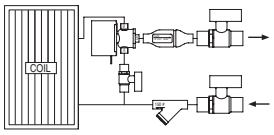
CODE C/H069: BYPASS VALVE,
FIXED FLOW CONTROL, Y-STRAINER



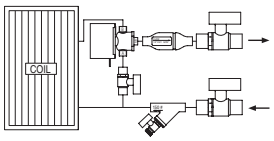
CODE C/H070: BYPASS VALVE, FIXED FLOW
CONTROL, Y-STRAINER W/HOSE BIB



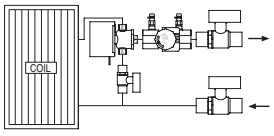
CODE C/H071: BYPASS VALVE, BALL
VALVES



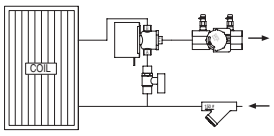
CODE C/H072: BALL VALVES, FIXED FLOW
CONTROL, BYPASS VLAVE, Y-STRAINER W/HOSE



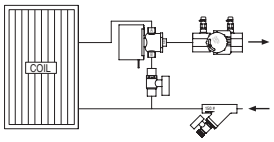
CODE C/H073: BYPASS VALVE, BALL
VALVES, ADJUST. FLOW CONTROL



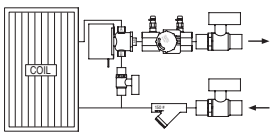
CODE C/H074: BYPASS VALVE,
ADJUST. FLOW CONTROL, Y-STRAINER



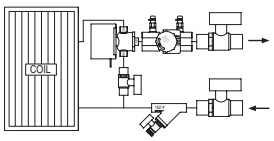
CODE C/H075: BYPASS VALVE, ADJUST.
FLOW CONTROL, Y-STRAINER W/HOSE BIB



CODE C/H076: BYPASS VALVE, BALL VALVES,
ADJUST. FLOW CONTROL, Y-STRAINER



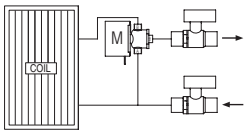
CODE C/H077: BALL VALVES, ADJUST. FLOW
CONTROL, BYPASS VALVE, Y-STRAINER W/HOSE BIB



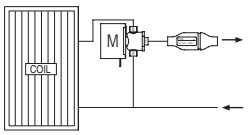
Model Series 38F • Underfloor Fan Coil Units

Valve Packages • Chilled/Hot Water • 3-Way Modulating Valve

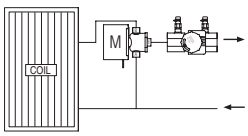
CODE C/H078:
BALL VALVES



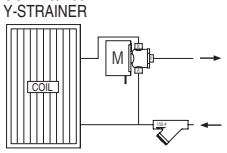
CODE C/H079:
FIXED FLOW CONTROL



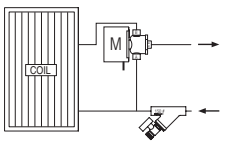
CODE C/H080:
ADJUST. FLOW CONTROL



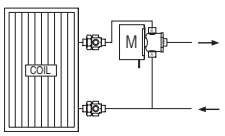
CODE C/H081:
Y-STRAINER



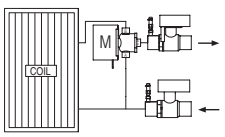
CODE C/H082:
Y-STRAINER W/HOSE BIB



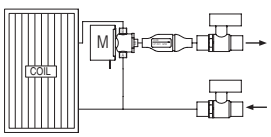
CODE C/H083: UNIONS
(AVAILABLE ON ALL VALVE PACKAGE)



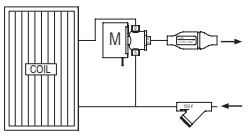
CODE C/H084: BALL VALVES
W/MEMORY STOP, PT PORTS



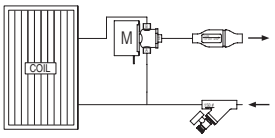
CODE C/H085: BALL VALVES
FIXED FLOW CONTROL



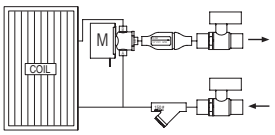
CODE C/H086: FIXED FLOW
CONTROL,Y-STRAINER



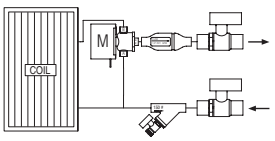
CODE C/H087: FIXED FLOW CONTROL
Y-STRAINER W/HOSE BIB



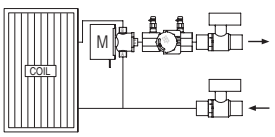
CODE C/H088: BALL VALVES, FIXED
FLOW CONTROL, Y-STRAINER



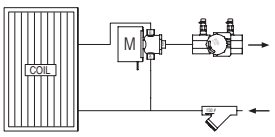
CODE C/H089: BALL VALVES, FIXED FLOW
CONTROL, Y-STRAINER W/HOSE BIB



CODE C/H090: BALL VALVES
ADJUST. FLOW CONTROL



CODE C/H091: ADJUST. FLOW CONTROL,
Y-STRAINER



CODE C/H092: ADJUST. FLOW CONTROL
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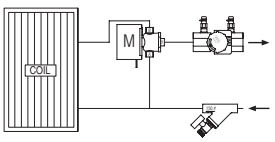
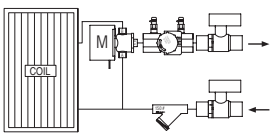


CODE 93: BALL VALVES,
ADJUST. FLOW CONTROL, Y-STRAINER



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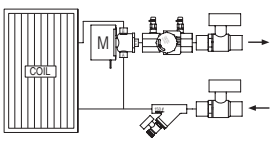

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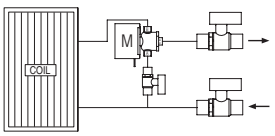

CODE C/H096: BYPASS VALVE,
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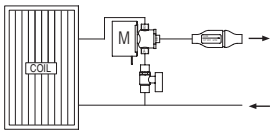
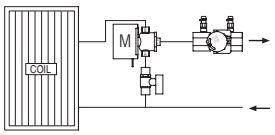
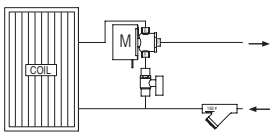


CODE C/H097: BYPASS VALVE
ADJUST. FLOW CONTROL



CODE C/H098:
BYPASS VALVE, Y-STRAINER



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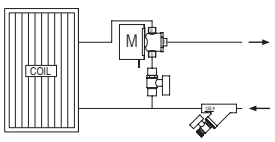
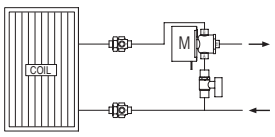
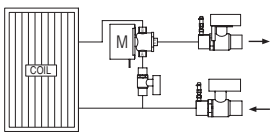
Y-STRAINER W/HOSE BIB



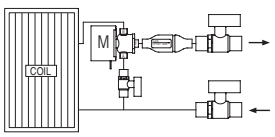
CODE C/H100: UNIONS,
BYPASS VALVE



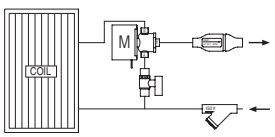
CODE C/H101: BALL VALVES W/MEMORY
STOP, PT PORTS



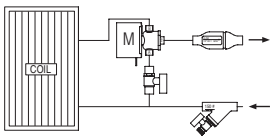
CODE C/H102: BYPASS VALVE, BALL
VALVES, FIXED FLOW CONTRPOL



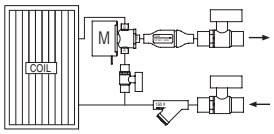
CODE C/H103: BYPASS VALVE,
FIXED FLOW CONTROL, Y-STRAINER



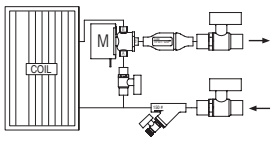
CODE C/H0104: BYPASS VALVE, FIXED
FLOW CONTROL, Y-STRAINER W/HOSE BIB



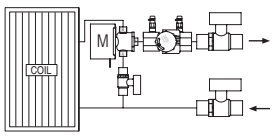
CODE C/H105: BYPASS VALVE, BALL VALVES,
FIXED FLOW CONTROL, Y-STRAINER



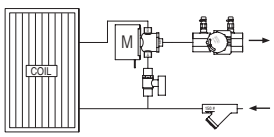
CODE C/H106: BALL VALVES, FIXED FLOW CONTROL,
BYPASS VLAVE, Y-STRAINER W/HOSE BIB



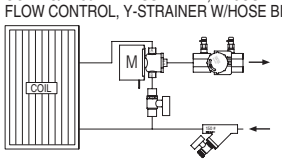
CODE C/H107: BYPASS VALVE, BALL VALVES
ADJUST. FLOW CONTROL



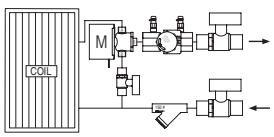
CODE C/H108: BYPASS VALVE,
ADJUST. FLOW CONTROL, Y-STRAINER



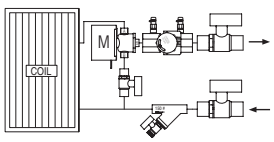
CODE C/H109: BYPASS VALVE, ADJUST.
FLOW CONTROL, Y-STRAINER W/HOSE BIB



CODE C/H110: BYPASS VALVE, BALL VALVES,
ADJUST. FLOW CONTROL, Y-STRAINER



CODE C/H111: BALL VALVES, ADJUST. FLOW CONTROL,
BYPASS VALVE, Y-STRAINER W/HOSE BIB



Suggested Specifications • Underfloor Fan Coil Units • Model Series 38F

PART 1 – GENERAL

Specification Text File

1.01 RELATED DOCUMENTS

A. The requirements of the general conditions, supplementary conditions, and the following specification sections apply to all work herein:

1. Section 15??? -- General.
2. Section 15??? -- Scope of Work.
3. Section 15??? -- Design Conditions.
4. Section 15??? -- Electric Motors and Controllers.
5. Section 15??? -- Access Doors and Color Coded Identification in General Construction.
6. Section 15??? -- Ductwork and Sheet Metal.
7. Section 15??? -- Testing, Balancing, and Adjusting.

1.02 SUMMARY

A. Furnish and install all fan coil units herein specified and as indicated on the drawings.

1.03 REFERENCE STANDARDS

A. All fan coil units shall be designed, manufactured, and tested in accordance with the latest applicable industry standards including the following:

1. ANSI/ASHRAE Standard 130-96.
2. ARI Standard 440
3. ARI Standard 880-98.
4. Underwriters Laboratories UL Standard 1995.
5. Underwriters Laboratories UL Standard 1996.

1.04 QUALITY ASSURANCE

A. All equipment and material to be furnished and installed on this project shall be UL or ETL listed, in accordance with the requirements of the authority having jurisdiction, and suitable for its intended use on this project. Space limitations shall be reviewed to ensure that the equipment will fit into the space allowed.

B. All equipment and material to be furnished and installed on this project shall be run tested at the factory and results of that testing shall be tabulated and provided to the engineer when the equipment ships to the job site. See paragraph 2.03 J for specific requirements.

C. All equipment and material to be furnished and installed on this project shall have been pre-tested in a mock-up facility suitable to the engineer. The test shall be as described in 2.03 D. The test results shall be supplied with the equipment submittal.

1.05 SUBMITTALS

A. The following submittal data shall be furnished according to the conditions of the construction contract, Division 1 specifications, and Section 15010 and shall include but not be limited to:

1. **Underfloor Fan Coil Units**, complete with capacity data, test data, construction details, physical dimensions, electrical characteristics, etc.

1.06 ACOUSTICS

Section A of this acoustical specification describes sound power levels as tested to ARI 880 and ASHRAE 130. These are not the selection criteria for this specification. The selection criteria will be in section B where sound pressure readings are taken in an actual mock-up that will exhibit worst case performance for the purpose of guaranteeing equipment performance when the building is commissioned and turned over to the occupant. Section A is important in that it provides a guideline for the minimum performance that the fan coil units will have to meet in order to anticipate performance that will be acceptable under section B.

A. Sound Power Acoustical Performance:

1. **Discharge Noise:** Maximum permissible sound-power levels in octave bands of discharge sound through discharge ducts from fan coil units operated at an inlet pressure of 0.1" w.g. and the maximum amount of air volume shown on the project mechanical drawings leaving the fan coil unit and entering the reverberant chamber shall be as follows:

DISCHARGE SOUND POWER (dB re 10^{-12} Watt)		
Octave Band	**NC-35**	**NC-40**
2	64	67
3	65	67
4	66	68
5	64	66
6	61	63
7	59	62

2. **Radiated Noise:** Maximum permissible radiated sound-power levels in octave bands of radiated transmission from fan coil units operated at an inlet pressure of 0.1" w.g. and the maximum scheduled air quantity in an installed condition over occupied spaces shall be as follows:

RADIATED SOUND POWER (dB re 10^{-12} Watt)		
Octave Band	**NC-35**	**NC-40**
2	64	68
3	56	61
4	49	54
5	48	53
6	47	52
7	51	56

B. Sound Pressure Acoustical Performance:

Each size of each fan coil unit to be used on this project shall be completely laboratory tested for air performance and acoustics. Performance to NC 30, 35, 40 and 45 shall be charted for each size unit showing its maximum and minimum range limits under each NC condition listed above. If heater options change the overall performance, then the equipment shall be shown with electric and hot water coils in addition to no heat configurations. This data shall be submitted with the equipment submittal. Units that comply with the sound power data listed above may comply with the sound pressure performance. Testing is required to determine compliance and the performance range. Units that do not comply with the sound power performance in paragraph 1.06 A. probably will not comply with the sound pressure requirements or will have restricted ranges of acceptance.

1.07 WARRANTY

Manufacturer shall warrant equipment for one year from start up or 18 months from shipment.

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PART 2 – PRODUCTS

2.01 UNAUTHORIZED MATERIALS

A. Materials and products required for the work of this section shall not contain asbestos, polychlorinated biphenyl's (PCB) or other hazardous materials identified by the engineer or owner.

2.02 ACCEPTABLE MANUFACTURERS

A. These specifications set forth the minimum requirements for fan coil units. If they comply with these specifications, fan coil units manufactured by one of the following manufacturers will be acceptable:

1. Nailor Industries.

2.03 VARIABLE PRIMARY AIR VOLUME FAN COIL UNITS

A. Furnish and install underfloor fan coil units as indicated on the drawings. The units shall be designed and built as a single unit and provided with or without a primary variable air volume damper that controls the primary air quantity in response to a temperature control signal. The damper construction shall be rectangular with multiple opposed blades designed to operate on a 45° arc. Blades shall be heavy gauge galvanized steel, single thickness construction with heavy-duty gasket glued to the blades. Units shall be suitable for pressure independent control with [pneumatic, analog electronic or electronic DDC] controls. The units shall contain a fan and motor assembly and [electric or hot water] heating coils where scheduled and/or chilled water cooling coils where scheduled or indicated on the drawings. The fan shall provide a constant volume of discharge air at all air blending ratios from minimum to maximum scheduled primary air quantities and zero to 100% return airflow rates and shall be controlled in sequence as outlined hereinafter. The space limitations shall be reviewed carefully to ensure all fan coil units will fit into the space provided including National Electric Code clearances required in front of all panels containing electrical devices. Units shall have removable access doors or panels of minimum 20 gauge galvanized steel on the top of the fan coil unit that shall provide access to service the fan, electric motor and all internal components. Panels shall be attached with [screws or quick connect latches or hinges]. Unit shall be fully lined with at least 1/2" thick, dual density fiberglass insulation complying with NFPA 90 for fire and smoke resistivity and UL 181 for erosion. Any cut edges of insulation shall be coated with NFPA 90 approved sealant. Drain pans shall be of stainless steel construction and internally pitched to provide positive drain free performance. Casing leakage shall not exceed 2% of terminal rated airflow at 0.1" wg. interior casing pressure. Provide a filter rack with a 1" thick throwaway filter to be used during construction.

When scheduled, the fan coil unit manufacturer shall provide flow curves for the primary air sensor clearly labeled and permanently attached on the bottom or side of each fan terminal.

The unit shall include all equipment and controls as required to provide a complete and operating system with at least the following equipment and controls:

1. Single point electrical connection for the voltage/phase as scheduled in the contract documents. See electrical drawings for power feeder arrangements. Motors shall be rated at [277 single phase or 120 single phase] as scheduled in the contract documents.

2. A toggle disconnect switch for cooling only units, or a door interlocking disconnect switch for fan coil units with electric heating coils. All disconnecting devices shall be sized and located as required to disconnect all ungrounded power conductors to all internal electrical components.

3. Individual overcurrent protection devices as required to protect individual units and transformers.

4. If there is a pressurized primary air source, the primary inlet shall be equipped with an inlet collar sized to fit the primary duct size shown on the drawings. Any transitions shall be provided and installed by the Division 15 mechanical subcontractor. The inlet collar shall provide at least a 6" length with a 1/8" high raised single or double bead located approximately 1 1/2" from the inlet connection. The primary and fan design cfm settings shall be clearly and permanently marked on the bottom of the unit along with the fan coil unit identification numbers. Each fan coil unit with a primary air inlet and damper shall incorporate a Nailor Diamond Flow sensor with four pick up points on each side to insure that with typical duct turbulence, the controller fidelity shall be +/- 5% of set volume even with a hard 90° elbow at the inlet. Static variation of 0.5" wg. to 6.0" wg. shall not affect the flow reading. Provide a transformer with 24 volt AC secondary to provide power for the unit's controls and the Division 17 controls. The VAV fan coil unit manufacturer and the Division 17 building controls subcontractor shall verify compatibility of the multi-point flow sensors with transducer and DDC microprocessor furnished under Division 17 prior to bidding this project.

5. The outlets shall be rectangular or round as required. Unit shall be designed to fit between the floor pedestals with no bridging required.

6. Fan motor assembly shall be a forward curved centrifugal fan with a direct drive motor. Motors shall be AO Smith or General Electric ECM and/or Nailor EPIC variable-speed DC brushless motors specifically designed for use with a single phase, (120, 208, 240 277) volt, 50 or 60 Hertz electrical input. Motor shall be complete with and operated by a single phase integrated controller/inverter that operates the wound stator and senses rotor position to electrically commutate the stator. All motors shall be designed for synchronous rotation. Motor rotor shall be permanent magnet type with near zero rotor losses. Motor shall have built-in soft start and slewed speed change ramps. Motor shall be able to be mounted with shaft in horizontal or vertical orientation. Motor shall be permanently lubricated with ball bearings. Motor shall be direct coupled to the blower. Motor shall maintain a minimum of 65% efficiency over its entire operating range. Provide isolation between fan motor assembly and unit casing in at least 4 locations to eliminate any vibration from the fan to the fan coil unit casing. Provide isolation between the motor and blower as well as between the blower and casing. Provide anti-back rotation system or provide a motor that is designed to overcome reverse rotation and not affect life expectancy.

a. The manufacturer of the fan coil units shall set the fan discharge cfm at the factory. If the fan coil unit manufacturer cannot factory set the fan cfm, he shall send factory technicians to the field to adjust the GE ECM and/or Nailor EPIC motor and the associated controller/inverter to the discharge CFM indicated in the schedules in the contract documents. Fan cfm shall be constant within ± 5% regardless of changes in static upstream or downstream of the fan coil unit after it is installed in the field. Fan cfm is to be set with a potentiometer and digital meter. Neither SCR's nor rheostats shall be an acceptable means of setting the fan cfm. The fan coil unit manufacturer shall provide one speed adjustment device to the owner for field adjustment of the fan speed should construction or design changes become necessary.

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PART 2 – PRODUCTS

b. A witnessed test shall be conducted by the fan coil unit manufacturer in an independent testing laboratory to confirm that the fan coil unit and the fan motor as an assembly performs in accordance with this specification. If the fan coil unit and DC motor as an assembly fails to perform as specified and as scheduled on the drawings, the fan coil unit manufacturer shall make adjustments and take all corrective action as necessary at the fan coil unit manufacturer's sole expense.

7. The fan coil unit shall be listed in accordance with UL 1995 as a composite assembly consisting of the fan coil unit with or without the electric or hot water heating device and or chilled water cooling device.

8. **Heating Options:**

9. **If there is a pressurized primary air duct**, the fan coil unit shall be capable of operation as described herein with inlet static pressure of .05 at full cooling with no mixing of induced and primary air. [The sequence of operation should be described here if not part of the temperature controls specifications.] The primary air damper shall be of a design that shall vary primary air supply in response to [a pneumatic or an electronic] signal. Primary air damper close-off leakage shall not exceed 2% of the maximum ARI rated primary air cfm as shown in the manufacturer's catalog for each size fan coil unit at 3" w.g. inlet static pressure. Submit damper leakage test data to the engineer for review. Damper linkage and actuator shall be located inside the fan coil unit. Damper connection to the operating shaft shall be a positive mechanical through bolt connection to prevent any slippage. Provide non-lubricated Delrin or bronze oilite bearings for the damper shaft. The primary air damper in conjunction with the [pneumatic or analog electronic controller or DDC microprocessor] furnished under Division 17 shall be selected to provide accurate control at low primary air velocities. The total deviation in primary airflow shall not exceed ± 5% of the primary air cfm corresponding to a 300 fpm air velocity through the primary air damper.

10. **If the unit incorporates a mixing chamber**, the mixing chamber shall provide mixing of primary air and plenum air from 100% primary air to 0% primary air. Mixing of the primary and secondary air streams shall be as described in paragraph 2.03 D. The deviation of fan supply air at design conditions and primary airflow rates from 100% primary air to 0% primary air shall not exceed 5%.

11. Provide duct inlet and outlet connections as indicated on the drawings.

12. All components, including all controls and wiring, shall be factory installed, except the room sensor or thermostat. No field assembly will be allowed. The unit shall be complete and suitable to accept the following field connections if required:

a. Primary duct.

b. Secondary duct.

c. Single point electrical connection. See drawings for control box locations required for each fan coil unit.

d. DDC controller control signals and wiring.

e. Room sensor connection.

B. The fan coil unit shall be capable of operating throughout the full cataloged primary airflow range with an inlet static pressure of 0.10" w.g. or less. All downstream static pressure requirements are to be supplied by the fan coil unit internal fan. See the schedules on the contract documents for static pressure requirements.

C. The control sequence shall be as specified in Division 17.

D. Each size of each fan coil unit to be used on this project shall be completely laboratory tested for air performance and acoustics. The acceptability of the independent testing laboratory is subject to review by the owner, project acoustical consultant, and the engineer. The fan coil unit manufacturer shall submit complete details, brochures, instrumentation information, etc., for review. The laboratory shall be capable of properly testing the largest fan coil unit on this project. See paragraph 1.06 B for acoustic guidelines.

E. After the manufacturer has submitted certified copies of the laboratory air performance and acoustical performance test results to the engineer, the engineer may witness the laboratory tests to verify compliance with the Specifications. See Section 15??? for additional submittal and certification requirements.

I. All fan coil units shall be identified on the top of the unit (minimum 1/2" high letters) and on the shipping carton, with the floor and box number that identifies it along with the CFM settings. Every unit shall have a unique number combination that matches numbers on the contractor's coordination drawings as to its location and capacity and is coordinated with the DDC controller and the Division 17 Building Control System submittal drawings.

J. The manufacturer will verify the operation of each unit before shipment. Testing shall include at least the following:

1. Apply electric power to the unit.

2. Start the fan and verify fan rotates properly.

3. The manufacturer shall factory or field adjust the GE ECM and/or Nailor EPIC motor and associated controller/inverter to the discharge CFM indicated in the schedules. (Refer to paragraph 2.03 A.2.e.1 hereinbefore.)

4. Energize the electric heat through the electric heating coil relay. Verify the signal with a voltmeter and ammeter to ensure proper heater operation.

5. De-energize the electric heating coil and verify the signal with a voltmeter to ensure the heater is de-energized.

6. If DDC controls are mounted, disconnect the primary air damper actuator from the DDC fan coil unit controller. Provide separate power source to the actuator to verify operation and rotation of damper. Drive the damper closed and verify by feel or observation that damper is driven fully closed. Return primary air damper to the fully open position prior to shipment.

7. Provide a written inspection report for each fan coil unit signed and dated by the factory test technician verifying all fan coil unit wiring and testing has been performed per the manufacturer's testing and quality assurance requirements.