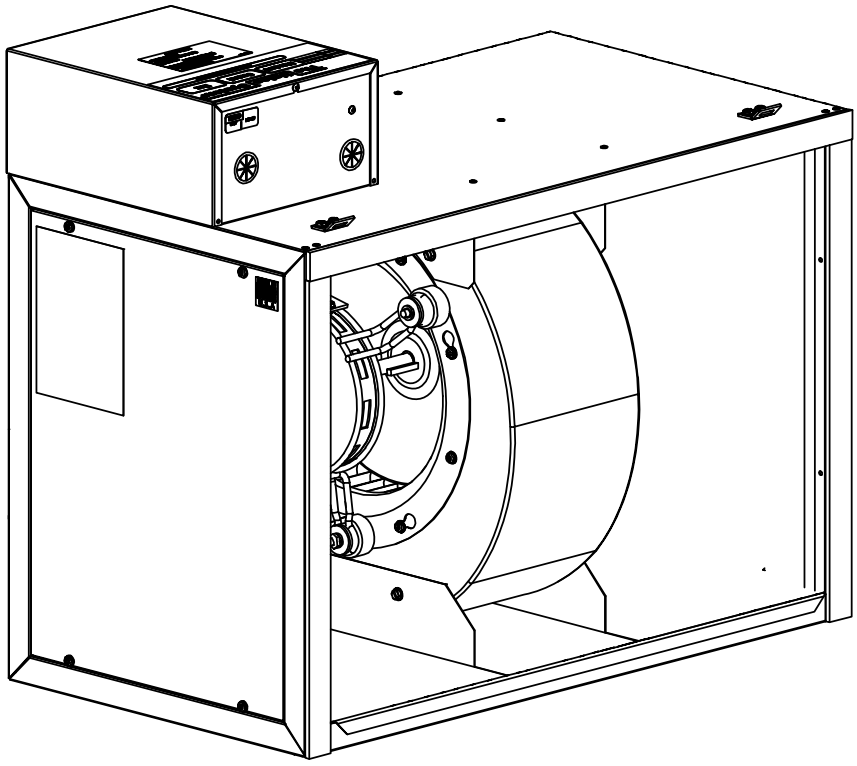
The Unico System®

M SERIES
BLOWER MODULE
SPECIFICATIONS

Bulletin 20-020.1 (UK)



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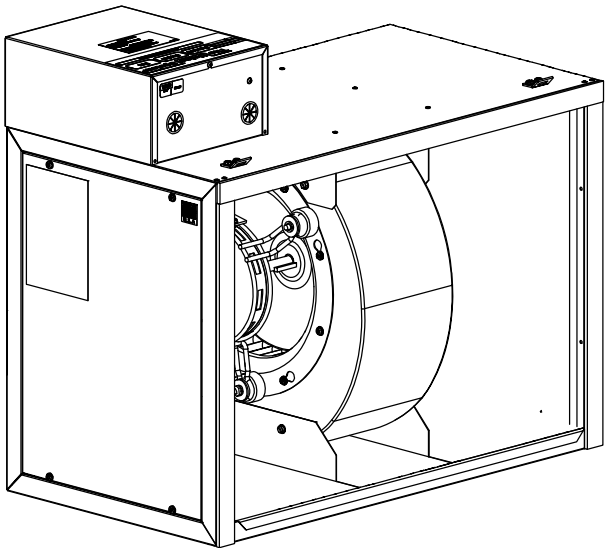
Certified to UL Standard 1995
Conforms to CAN/CSA Standard C22.2 NO. 236

Intertek

Unico products comply with the European regulations that guarantee product safety.

M Series Blower Module

Engineering Specifications



Model Number Key

M 2430 B L 1-EC3 1

- **Paint Option**
  (Blank)=None
  1 = White
- **Motor Type, Power Supply (1 phase)**
  EC3 = Variable Speed, 120/208-240V, 50/60 Hz
- **Revision**
  1, 2, 3, etc.
- **Configuration**
  L=Left-hand connection
  R=Right-hand connection
- **Module Type**
  B= Blower Module
- **Size (Nominal Cooling Capacity Range)**
  1218=12000 to 18000 Btu/hr (3.5 to 5.2 kW)
  2430=24000 to 30000 Btu/hr (7.0 to 8.8 kW)
  3036=30000 to 36000 Btu/hr (8.8 to 10.5 kW)
  3642=36000 to 42000 Btu/hr (10.5 to 12.3 kW)
  4860=48000 to 60000 Btu/hr (14.0 to 17.5 kW)
- **Unit Type**
  M=Modular

GENERAL INFORMATION

The Unico System modular blowers are designed for use with the Unico System small-duct high-velocity (SDHV) system. The blower modules are compatible with other modules of the same size (Table 1). The blowers exceed the static pressure requirements for SDHV air conditioner and heat pump systems at the design airflow when installed with the compatible Unico air cooling module[1].

Table 1. Compatible Modules

Module	Description
MxxxxC-B,E	Refrigerant Coil
MxxxxC-C	Chilled Water Coil
MxxxxC-H	Hot Water Coil
MxxxxV	Vertical Plenum
MxxxxR	Horizontal Return

APPLICATIONS

For air-conditioning, the rated airflow is generally 250 CFM per nominal[2] cooling ton (34 L/kW-s) and for heat pumps it is 275 CFM per nominal ton (37 L/kW-s). We do not recommend flow rates less than 200 CFM per nominal ton (27 L/kW-s).

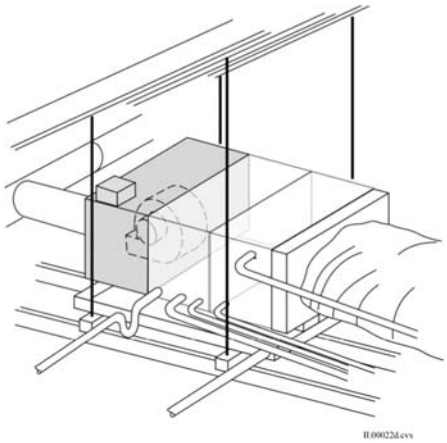


Figure 1. Attic Installation with Unico System Cooling and Heating Module.

[2] Nominal refers to nameplate capacity of outdoor unit

FEATURES AND BENEFITS

The blower module uses an efficient variable speed electronically commutated motor (ECM). The control box includes the S-M-A-R-T[1] control board (SCB) and a USB communications board.

Balanced wheels – All blower wheels are individually balanced.

Direct drive motor – The blower wheel is mounted directly to the motor shaft to improve drive efficiency and lower costs.

Shaft key – The blower wheel is attached to the motor shaft using a square keyway instead of a set screw.

Quick motor replacement (QMR)– The QMR feature is a quick twist-and-lock motor mount for easy maintenance. The motor is mounted to the inlet ring which is attached to the blower housing with six screws through twist-lock keyholes. When service is required by the motor or the wheel, the entire assembly may be removed as a whole (*Figure 2*).

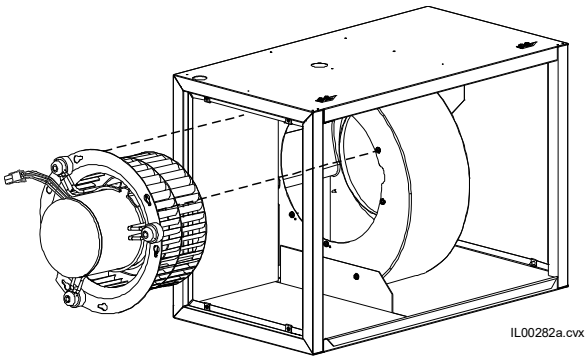


Figure 2. Quick motor replacement (QMR) feature (2430, 3036, 3642, and 4860 models only)

Separate control box – The control box is separate from the cabinet (ships inside the cabinet) for easy accessibility. It may be mounted to the top or front of the cabinet or even on a wall, depending on which is more convenient. Knockout and starter holes for the screws are provided to assist in mounting:

Control voltage transformer – A 48VA 24-volt transformer provides control power to the thermostat, electric heaters, and other optional equipment.

Screw terminal connections – Terminal blocks include screws and wire washers to securely connect the control wires.

Heat pump AFS bypass – Removes the anti-frost switch (AFS) from the circuit during heat pump heating mode which eliminates nuisance shutdowns during defrost mode.

6 Modes of operation– The SCB control board has 6 independent modes of operation, , each with its own programmable airflow and RPM limit settings (Fan-Only, Low-Cool, High-Cool, Low-Heat, High-Heat, and Emergency-Heat).

Soft-start and soft-stop – For quieter operation, the unit slowly ramps the motor from stop to full speed, and vice versa.

Constant airflow – The SCB control board will deliver the airflow requested without requiring the user to measure the amperage or make any other adjustments to the duct system.

Optimized for efficiency and sound – The ECM control uses the lowest motor speed required to achieve the required airflow, which minimizes sound and maximizes electrical efficiency.

Pre-set airflow rate – The SCB is pre-programmed with two different air flow rates for the High-Cool Mode. These rates are based on the nominal tonnage of the unit (See the *Applications* section) and can be selected with a board mounted switch. Each of the six different airflow control modes are a fixed percentage of this selected airflow.

Laptop configurable – The airflow for each mode of operation is adjustable to any value between the blower minimum and maximum using the ECMconfig software (available for download at www.unicosystem.com) and an ordinary USB cable.

Point-to-point wiring – The control boards have separate terminals for the thermostat, electric heater, outdoor condenser, and other options for easy wiring and troubleshooting.

Electric heater interlocks – The ECM control board includes two electric heater safety lockouts. The lockout prevents the heaters from operating if the programmed airflow is too low. This prevents the heating elements from overheating, which can severely reduce their useful life.

The other lockout prevents the electric heater third stage from operating if the heat pump is on. This prevents nuisance shutdowns from overheating the electric heater.

Boiler relay – The SCB includes a separate dry-contact relay (HotW) that can be used to turn on the boiler, boiler pump, or hot water coil valve.

Chilled water relay – The control box includes a separate dry-contact relay (ColdW) to turn on a chiller or zone pump.

[1] Software Managed Airflow Rate and Temperatures

Fan cycling– The control board includes a separate switch to provide periodic cycling of the fan. This will minimize or prevent condensation in the ducts located in unconditioned spaces during winter, or to provide fresh air if the system is connected to a fresh air source.

EAC, ERV, or HRV relay – For the optimum in indoor air quality, the control board includes a dry-contact relay to turn on an electronic air cleaner, energy recovery ventilator, or heat recovery ventilator any time the fan is on, or to control a fresh air damper for ventilation per ASHRAE 62.2-2010.

Potable water circulation (EC2) – For improved health and safety, the control board provides a switch-selectable feature to turn on the boiler pump periodically (if installed as part of a domestic water system) to prevent the formation of stagnant water.

Humidifier integration – The control board includes a humidistat input with a humidifier output. If the humidistat calls for humidity, the humifier output will turn on. It will also turn the fan on high or low (user selectable) if not already on.

Air-to-water heat pump (heat pump chiller) compatibility – For systems with multiple air handlers connected to one AWHP. This feature allows one air handler (Leader) to control the mode of operation (heating or cooling) to avoid runaway cooling or heating from other connected air handlers (Followers).

Low airflow indicator – The SCB includes an indicator light that signals the user if the desired airflow is not being met. This is usually caused by a restrictive duct system or too few outlets.

Optimized for zoning – The ECMconfig software includes programmable motor speed limits to prevent the motor from over-speeding as zone dampers are closed. Refer to the Unico Tech Bulletin on zoning for more information.

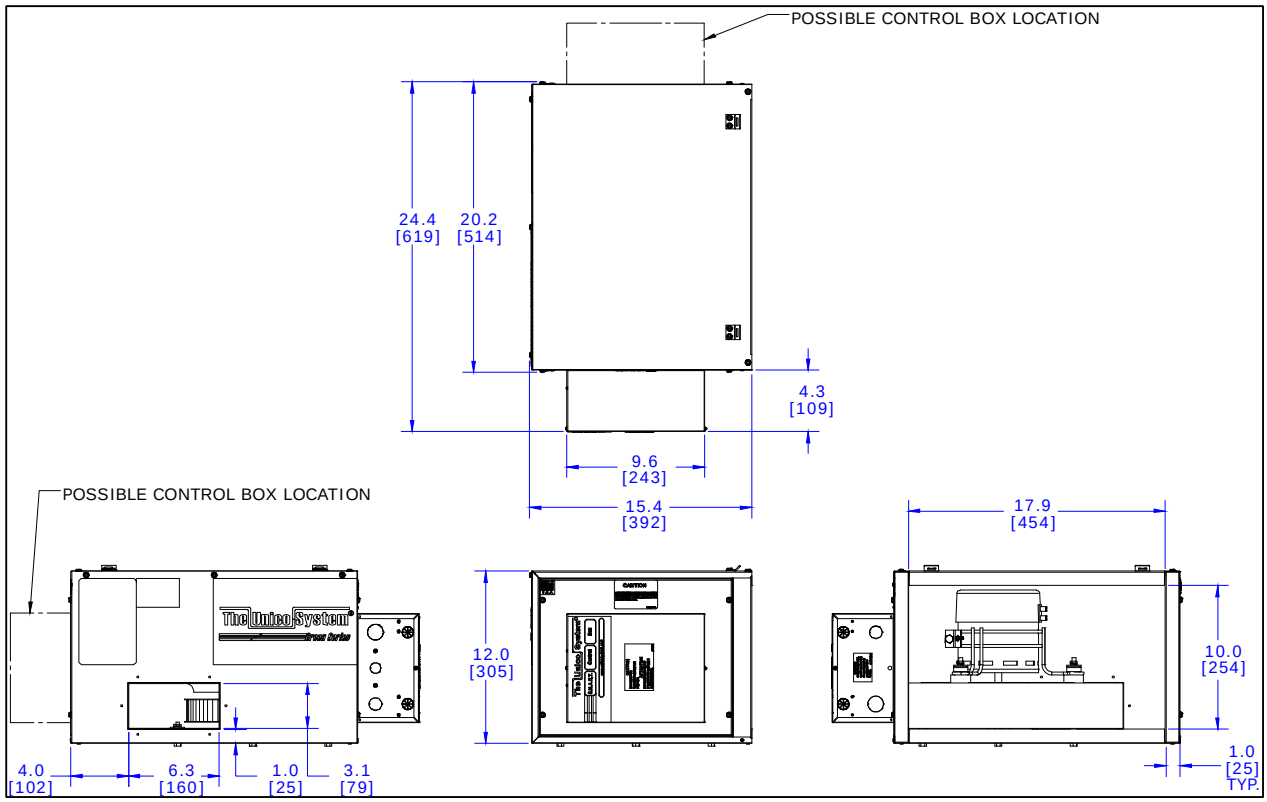
CABINET CONSTRUCTION

The cabinet is constructed of 22 gauge (0.7 mm) galvanized steel with removable access panels installed on both sides for ease of service. All access panels are secured with slotted hex head washer screws and hardened steel U-clip nuts to prevent stripping. The cabinet is fully insulated with closed cell insulation. There is no exposed fiberglass inside the cabinet. See dimension drawing.

All blower modules feature electrical connections and service access panels on the left-hand side of the unit when viewing the return with the airflow at your back. Right hand blowers are available upon request. In this case, the blower discharge opening is near the top of the cabinet.

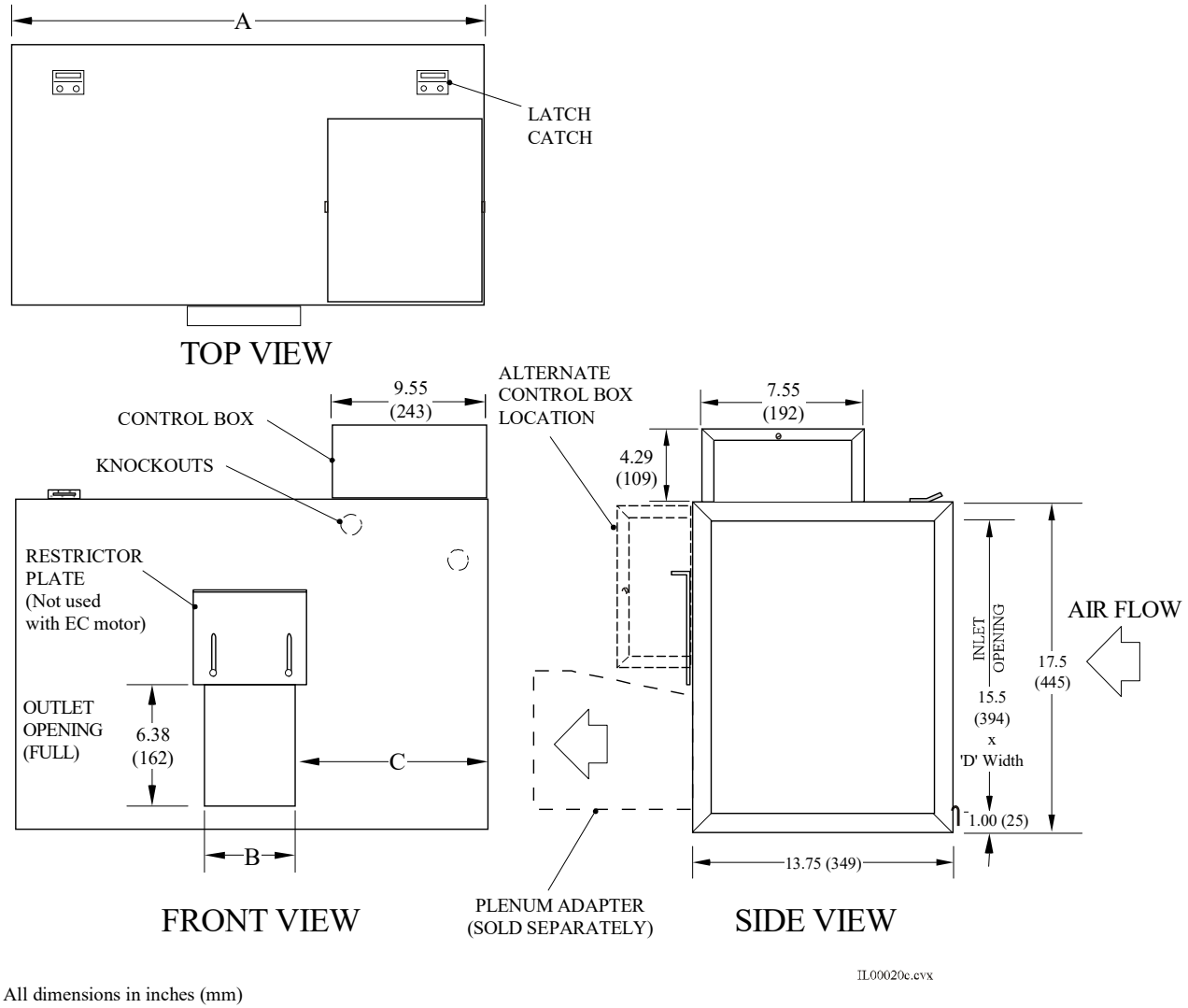
DIMENSIONAL DATA

M1218



All dimensions in inches [mm]

M2430/3036/3642/4860



All dimensions in inches (mm)

Table 2. Blower Dimensional Table

Model No.		M2430BL	M3036BL	M3642BL	M4860BL
Dimensions [in. (mm)]	A	25.00 (635)	30.00 (762)	38.00 (965)	38.00 (965)
	B	6.00 (152)	7.24 (184)	7.16 (182)	9.92 (252)
	C	9.50 (242)	11.38 (289)	15.40 (392)	14.00 (356)
	D	23.00 (584)	28.00 (711)	36.00 (915)	36.00 (915)

BLOWER MODULE SPECIFICATIONS

Model No.		M1218BL	M2430BL	M3036BL	M3642BL	M4860BL
Motor Electrical Characteristics		120/208-240 V, 50/60 Hz, 1 ph				
Motor Size, HP (kW)		1/2 (0.37)		1 (0.75)		
Motor Type		ECM (variable speed)				
Motor minimum circuit ampacity (MCA)		7.0 / 4.0		12.8 / 7.7		
Max. Overcurrent Protection (MOP), Amps		15 / 15		20 / 15		
Motor Full Load, Amps		5.6 / 3.2		10.2 / 6.1		
Motor Speed, RPM		400 – 1800				
Blower Wheel Diameter, in. (mm)		9.5 (241)				
Blower Wheel Width, in. (mm)		1.5 (3.8)	3.75 (95)	5.0 (127)	5.0 (127)	7.75 (197)
Nominal Air Flow Rate, CFM (m^3/s)		400 (0.19)	750 (0.35)	900 (0.42)	1100 (0.52)	1300 (0.61)
Nominal Static Pressure, in. w.c. (kPa)		1.5 (0.373)				
Minimum Plenum Size (ID), in. (mm)		7 (178)	7 (178)	9 (229)	9 (229)	10 (254)
Sound Pressure Level	dB(A)	52	56	56	56	58
	NC	40	50	47	47	50
Shipping Weight, lbs (kg)		32 (15)	62 (28)	65 (30)	72 (33)	74 (34)

MOTOR TEMPERATURE LIMITS

Table 3. Air Over Motor

Motor Type	Recommended Temperature Limit	Maximum Temperature Limit
EC	130 °F (54.4 °C)	150 °F (65.6 °C)

Note: The EC motor is sensitive to air temperatures that exceed the recommended temperature limit. A reduction in motor life of as much as 50% could result when operating at the maximum temperature limit.

MEASURING AIRFLOW

Count the LED blinks on the control board or use the ECMconfig software to display the airflow per the installation instructions.

ACOUSTIC DATA

Sound is always present in our lives and is important to comfort. Understanding how sound is defined is essential to understanding how to design a proper Unico System. Sound is defined as a physical disturbance in pressure that is detectable by the human ear. Sound is usually presented as Sound Pressure Level (SPL) in decibels (dB) but can also be presented as Sound Power Level (SWL). Sound pressure is what you hear so it is the only value that is important to the occupant. However, determining the value is difficult because it is dependent on the surroundings and distance from the sound source. For instance, a carpeted room is much quieter than a room with wood floors.

For the Unico System, it is also important to consider sound transmission losses through ceilings and walls. Since the blower is never placed in an occupied space, the SPL in that space is always less than the published value. This reduction in sound level depends on the construction of the ceiling or wall. For instance, a ceiling structure made of gypsum board with insulation above it will have a much greater sound transmission loss (TL) than a dropped ceiling without insulation.

The data shown in this catalog comes from measurements taken in a large room with hard surfaces for the walls and floor. It is considered to be the worst case (i.e. loudest) situation. The SPL in the occupied space will always be considerably less than this, depending on where the unit is located. To determine the actual SPL, subtract the TL for the barrier from the sound data of the unit. The table below shows typical TL values for common construction configurations. Subtract these values from the Unico air handler data.

Table 4. Transmission Loss for Common, dB

Construction	Frequency (Hz)						
	125	250	500	1k	2k	4k	R
Sheet Metal, 24 ga	13	17	20	27	34	39	**18**
Ceiling Tile, mineral fiber	13	21	27	31	35	40	**20**
Gypsum Frame wall	12	23	31	38	42	37	**20**
Gypsum Frame wall, insul.	15	30	32	43	46	38	**23**
Wood Floor, uninsulated	22	28	37	43	46	43	**25**
Wood Floor, insulated	29	40	51	57	60	58	**26**
Concrete Block, 190-mm	38	41	43	50	55	61	**26**
Concrete, 100-mm (4 in.)	41	41	45	52	56	64	**26**

Ref: *Handbook of Acoustical Measurements and Noise Control*, 1998
R = Overall Loss for typical Blower Module

All – Standard models include a patented restrictor plate to fine tune the airflow. This plate creates a small amount of turbulence and noise. However, this is only noticeable near the unit if the unit is installed close to the occupied space. The –EC2 models do not need a restrictor plate and, consequently, the sound pressure level in the occupied space can be as much as 3-5 dB quieter.

Note: Using muffler on the discharge of the unit will reduce the sound pressure by 3 dB. The muffler should be a metal duct with at least 1.5 inches (38 mm) of fiberglass insulation, measuring at least 10in. D × 20in. L (250mm D × 500mm L).

Example. Consider an M2430BL1 located above a dropped ceiling. The SPL generated by the unit is 56dB, and the transmission loss due to the ceiling is 20dB, resulting in a overall SPL of 36dB. Similarly, if the same unit were installed in an attic with insulation (TL=26dB), the SPL would be only 30dB. This makes the Unico System one of the quietest systems on the market.

Sound Pressure Levels (L_p)
The sound pressure level for each unit was measured in a reverberant room measuring approximately 21ft × 35ft (6.4m × 10.7m) with hard tiled floors, hard walls, acoustical ceiling tiles, and no furniture. The sound level meter was located near the side of the unit *(Figure 3)*.

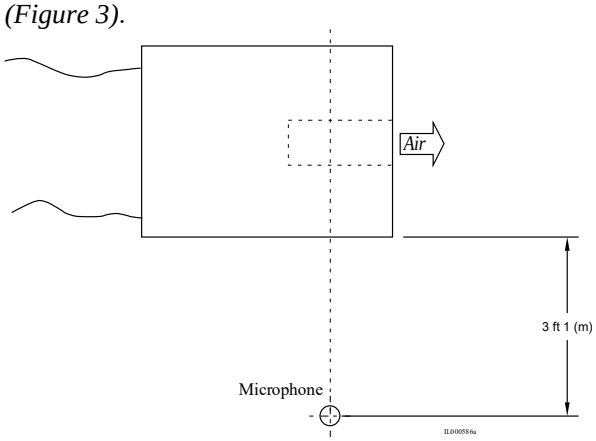
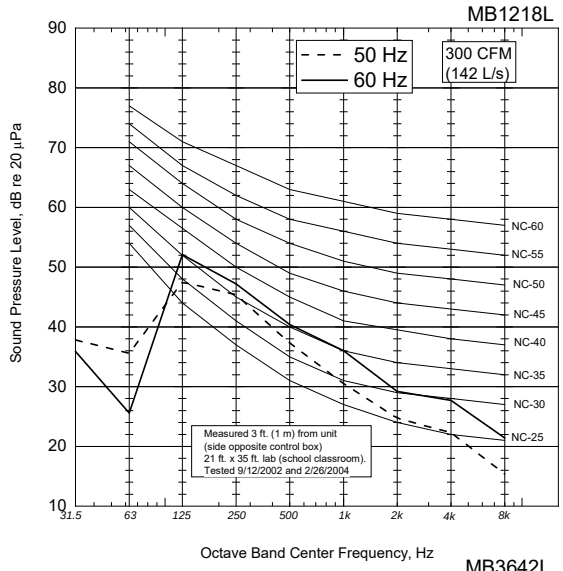
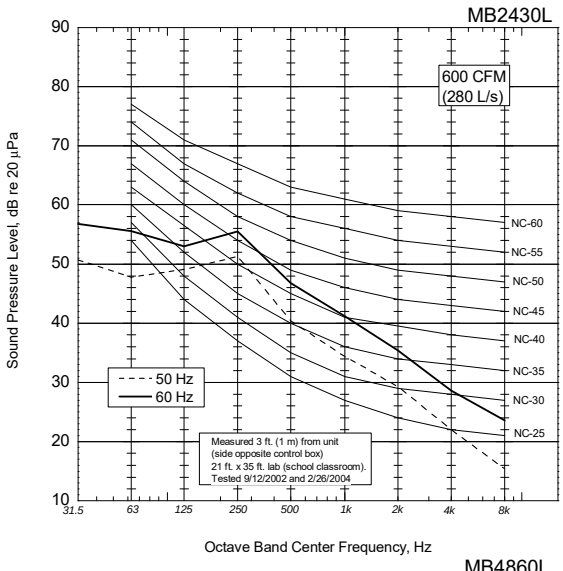
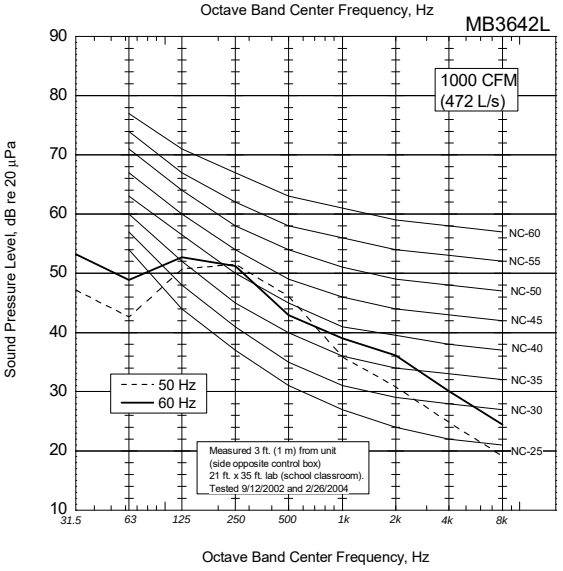


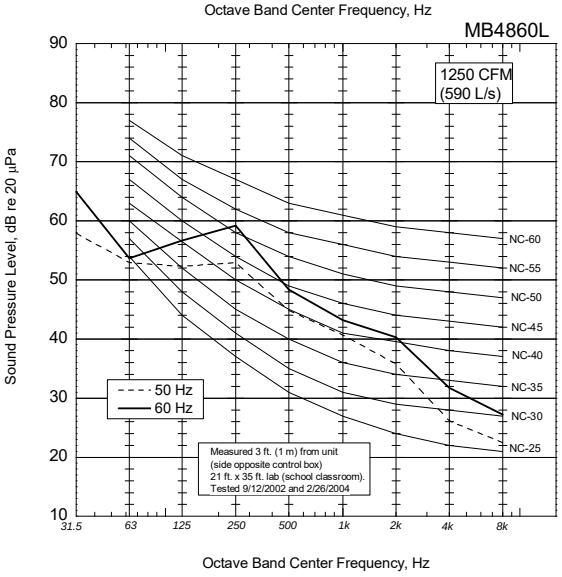
Figure 3. Location of Sound Level Meter

The data shown on the next page was measured at a motor speed of 1700 RPM at maximum airflow. It is considered the worst (loudest) case scenario. Using the EC motor with additional outlets will significantly reduce the radiated sound by reducing the required static pressure and consequently the motor speed.



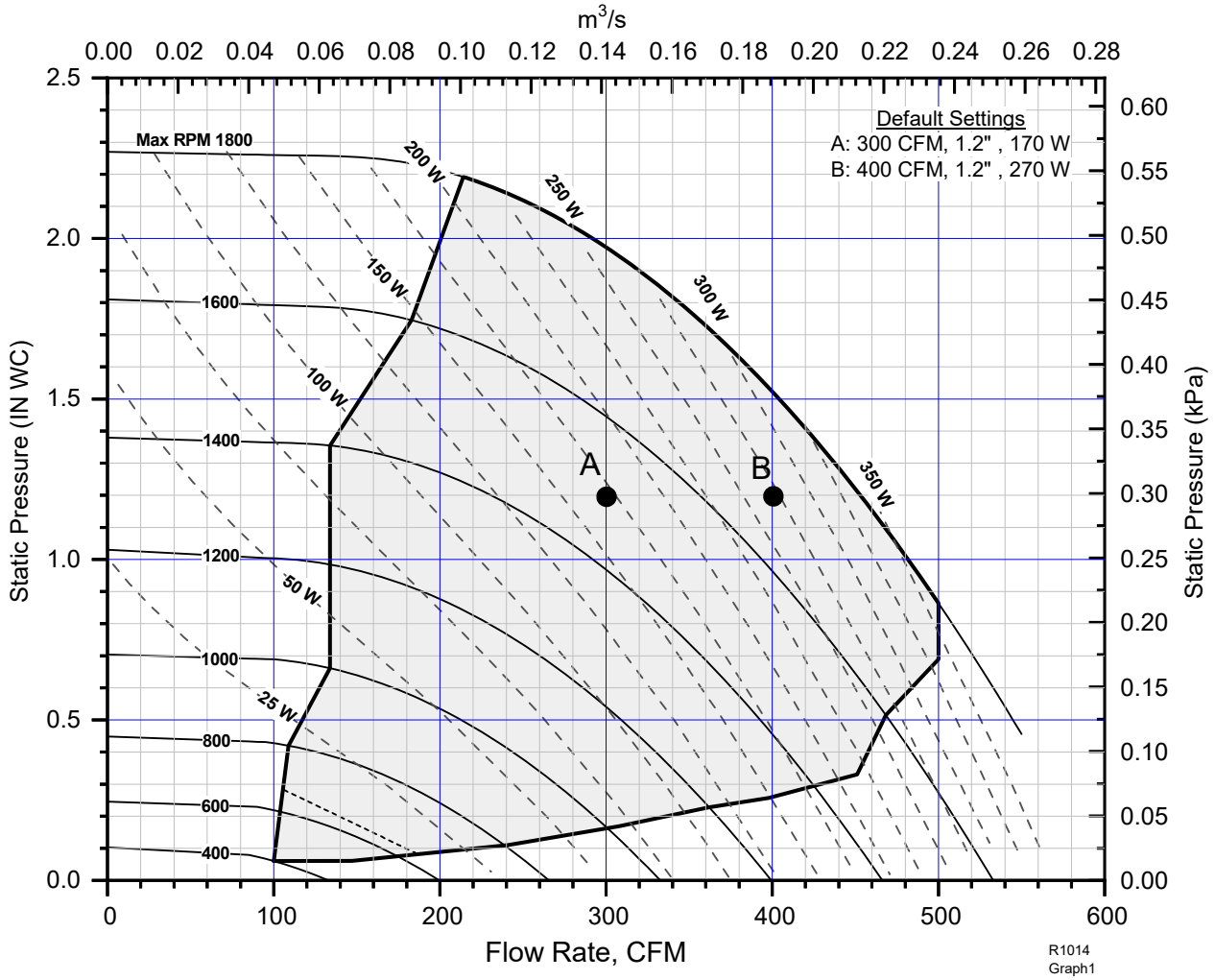






BLOWER PERFORMANCE DATA

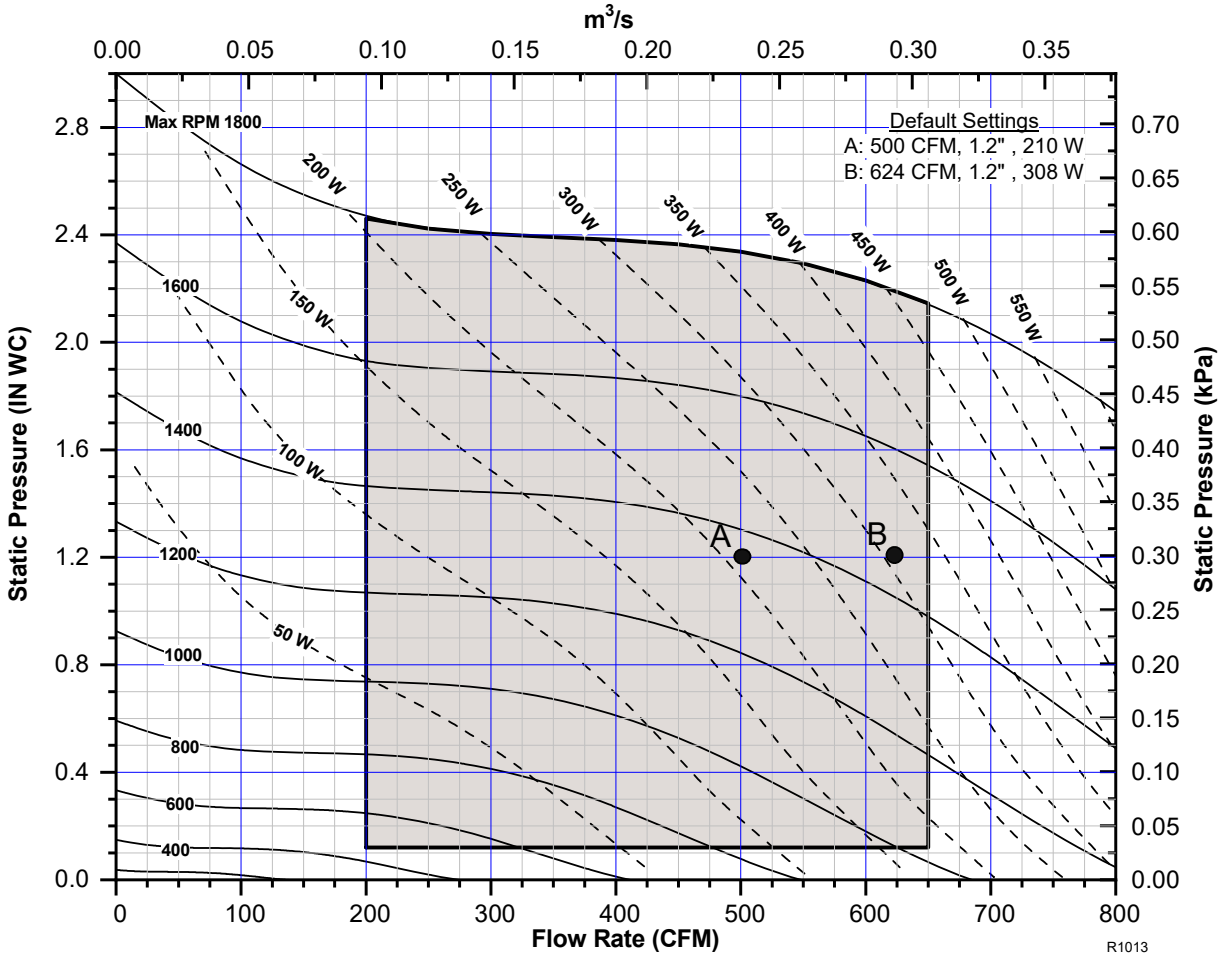
M1218BL1-EC3 50/60 Hz



* Shaded Area Represents the best Operating Range

SP, in. wc (Pa)		0.25	(62)	0.5	(124)	0.75	186	1	(248)	1.2	(298)	1.5	(373)	1.75	(435)
CFM	(m^3/hr)	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W
100	(0.05)	640	10	870	25	1050	35	1210	50	1320	65	1470	85	1590	100
150	(0.07)	710	20	910	35	1090	50	1230	70	1340	85	1490	105	1600	125
200	(0.09)	800	30	980	50	1140	65	1280	90	1380	105	1520	135	1630	155
250	(0.12)	910	50	1070	70	1210	90	1340	115	1440	135	1570	165	1680	195
300	(0.14)	1030	75	1170	95	1300	120	1420	150	1510	170	1630	205	1730	235
350	(0.16)	1160	105	1280	130	1400	160	1510	190	1590	215	1710	255	1800	285
400	(0.19)	1290	150	1400	180	1510	210	1610	240	1680	270	1790	310	--	--
450	(0.21)	1420	205	1520	235	1620	270	1710	305	1780	335	--	--	--	--

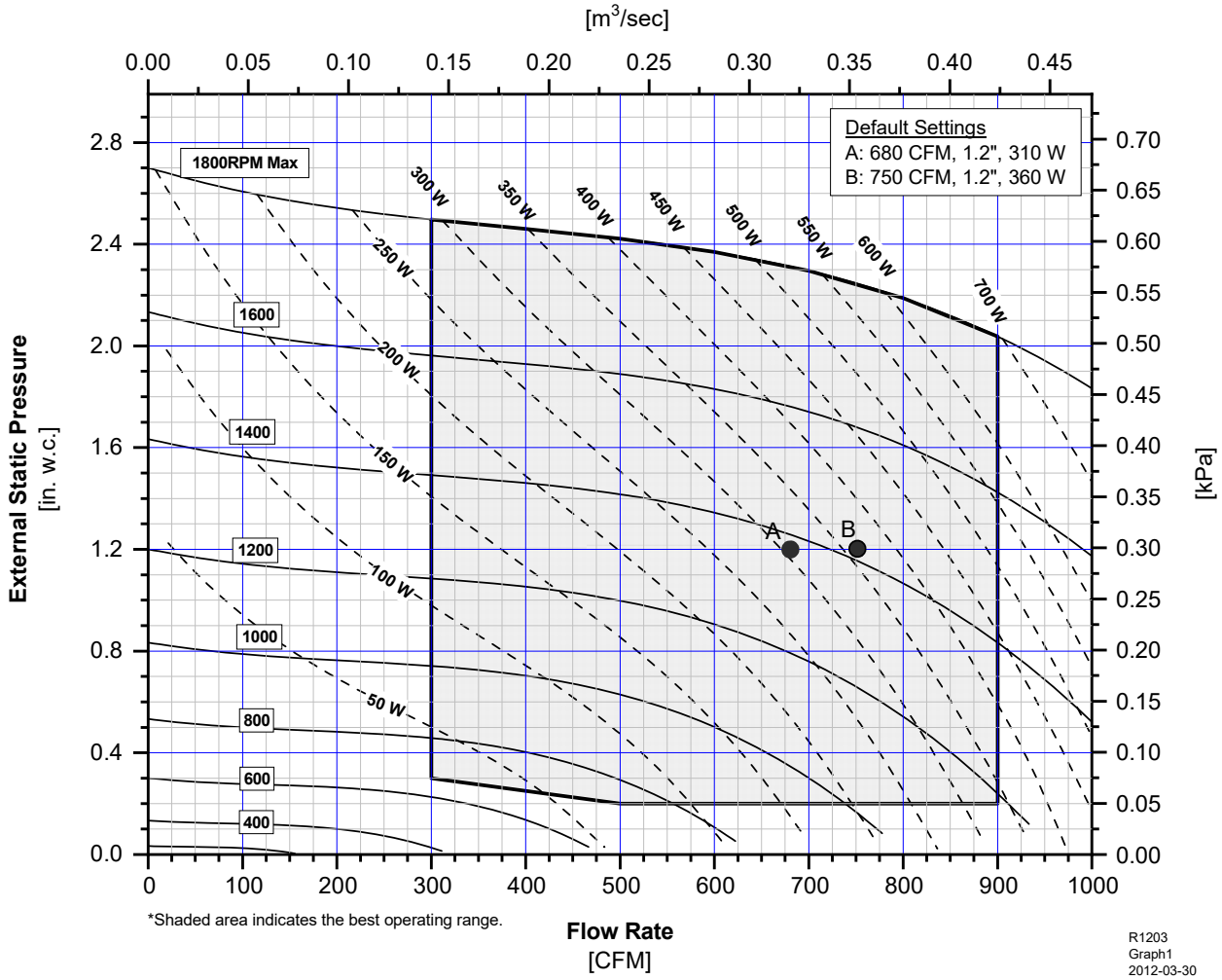
M2430BL1-EC3 50/60 Hz



* Shaded Area Represents the best Operating Range

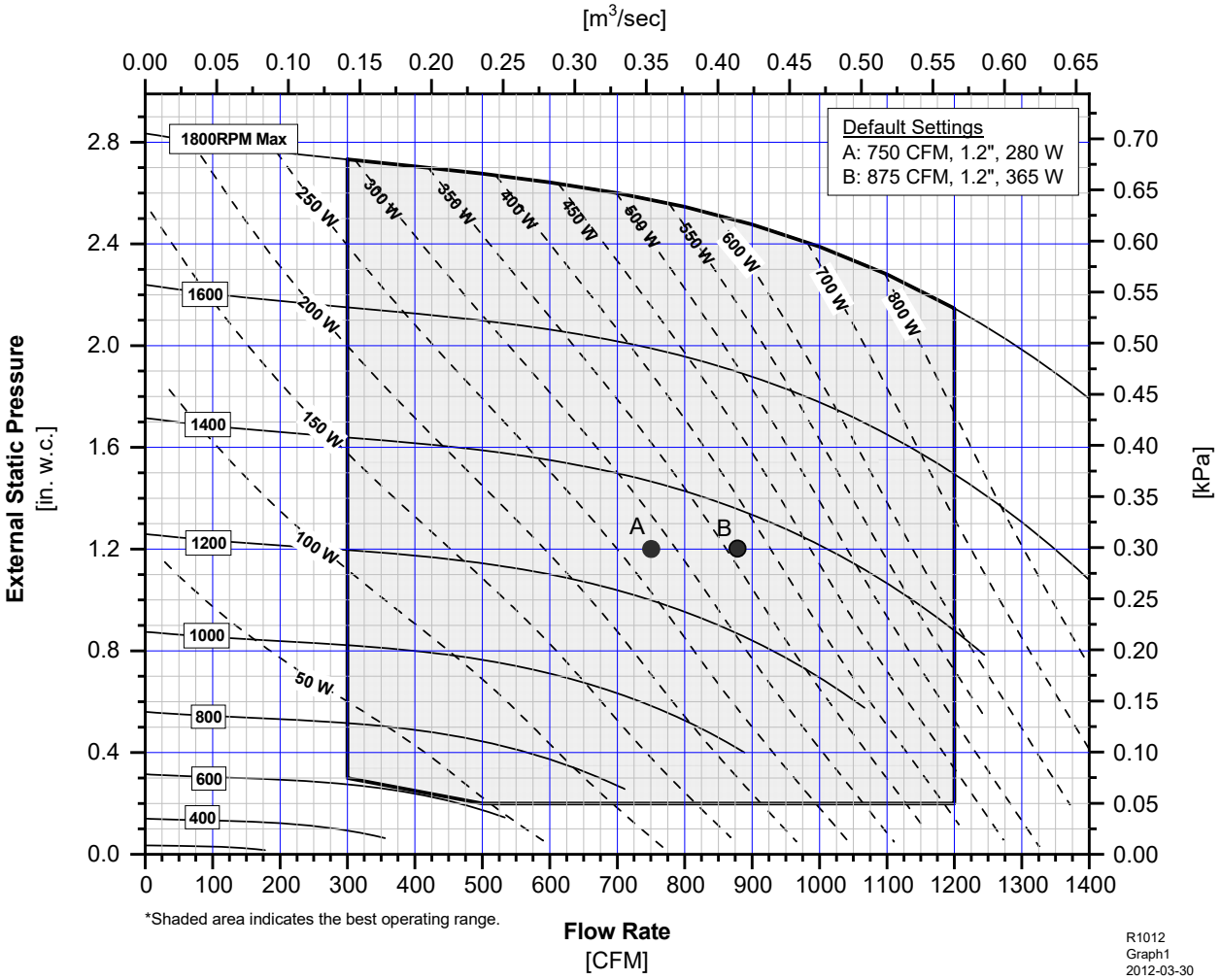
SP, in. wc (Pa)		0.25	(62)	0.5	(124)	0.75	186	1	(248)	1.2	(298)	1.5	(373)	1.75	(435)
CFM	(m^3/hr)	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W
100	(0.05)	580	10	810	20	990	30	1140	45	1240	55	1380	75	1480	90
200	(0.09)	600	15	830	30	1010	50	1160	70	1270	85	1420	110	1530	130
300	(0.14)	680	35	860	50	1020	75	1170	95	1280	115	1430	150	1540	175
400	(0.19)	790	60	940	85	1070	110	1200	135	1300	160	1440	195	1550	225
500	(0.24)	910	105	1040	130	1160	160	1270	190	1360	215	1480	255	1580	290
600	(0.28)	1040	165	1150	195	1260	230	1360	265	1430	290	1540	335	1630	375
700	(0.33)	1170	245	1280	285	1370	325	1460	360	1530	395	1630	440	1710	485
800	(0.38)	1310	355	1400	400	1490	445	1570	485	1640	520	1730	575	1800	620

M3036BL1-EC3 50/60 Hz



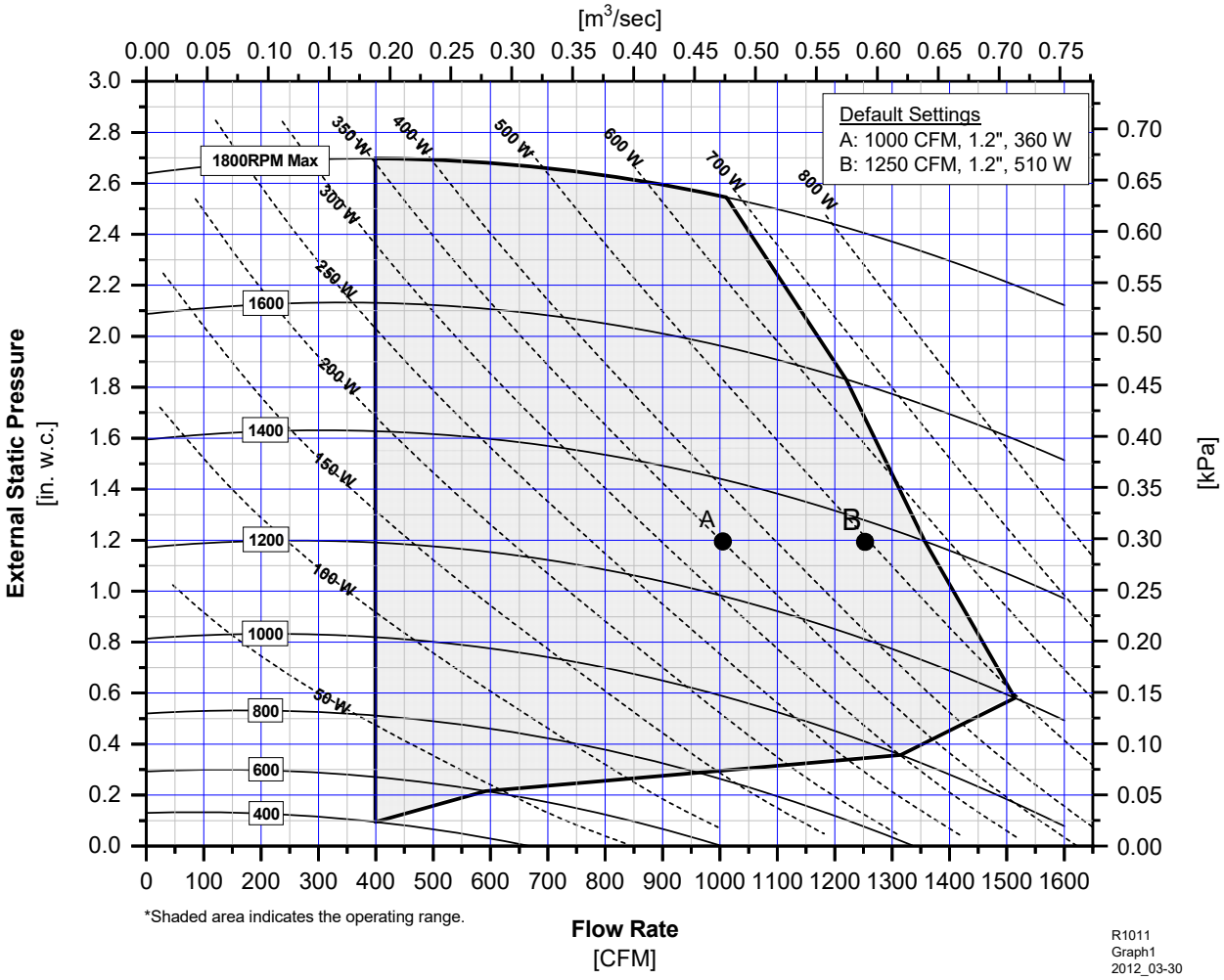
SP, in. wc (Pa)		0.25	(62)	0.5	(124)	0.75	(186)	1	(248)	1.2	(298)	1.5	(373)	1.75	(435)
CFM	(m^3/hr)	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W
100	(0.05)	570	10	800	20	980	40	1120	55	1230	70	1370	100	1480	120
200	(0.09)	590	15	810	35	990	50	1140	75	1250	90	1390	120	1500	145
300	(0.14)	620	30	830	50	1010	70	1150	95	1260	120	1400	150	1510	180
400	(0.19)	690	50	870	70	1030	100	1170	130	1280	155	1420	190	1530	225
500	(0.24)	770	80	920	105	1070	135	1200	170	1300	200	1440	240	1540	280
600	(0.28)	870	120	1000	150	1120	185	1240	225	1340	255	1470	305	1570	345
700	(0.33)	980	180	1090	215	1200	255	1300	295	1390	330	1510	380	1600	430
800	(0.38)	1090	255	1180	295	1280	335	1370	380	1450	420	1560	475	1650	525
900	(0.42)	1200	355	1290	395	1370	440	1460	490	1520	530	1630	590	1710	645
1000	(0.47)	1320	475	1390	520	1470	570	1550	620	1610	665	1700	730	1780	790

M3642BL1-EC3 50/60 Hz



SP, in. wc (Pa)		0.25	(62)	0.5	(124)	0.75	186	1	(248)	1.2	(298)	1.5	(373)	1.75	(435)
CFM	(m^3/hr)	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W
100	(0.05)	550	10	770	20	940	35	1080	50	1180	65	1320	90	1430	115
200	(0.09)	560	15	780	30	950	45	1090	65	1190	85	1330	110	1440	135
300	(0.14)	580	25	790	40	960	65	1100	85	1200	105	1340	135	1450	165
400	(0.19)	610	35	810	60	970	85	1110	110	1210	135	1350	170	1450	200
500	(0.24)	660	55	840	80	990	110	1130	145	1230	170	1360	210	1470	245
600	(0.28)	720	75	880	110	1020	145	1150	180	1250	210	1380	255	1480	295
700	(0.33)	790	110	930	145	1060	185	1180	230	1270	260	1400	310	1500	355
800	(0.38)	860	150	990	195	1110	235	1220	285	1310	320	1430	375	1520	425
900	(0.42)	940	200	1050	250	1160	300	1270	350	1350	390	1460	450	1550	505
1000	(0.47)	1020	265	1120	315	1220	370	1320	425	1390	470	1500	540	1590	595
1100	(0.52)	1100	340	1200	400	1290	455	1380	515	1450	565	1550	640	1630	700
1200	(0.57)	1190	435	1270	495	1360	555	1440	620	1510	670	1600	750	1680	820
1101	(0.52)	1270	540	1350	605	1430	670	1510	740	1570	795	1660	880	1730	950
1400	(0.66)	1360	660	1430	730	1510	805	1580	875	1630	935	1720	1025	1790	1100

M4860BL1-EC3 50/60 Hz



SP, in. wc (Pa)		0.25	(62)	0.5	(124)	0.75	186	1	(248)	1.2	(298)	1.5	(373)	1.75	(435)
CFM	(m^3/hr)	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W
200	(0.09)	540	15	760	30	930	50	1070	75	1170	90	1310	125	1410	155
300	(0.14)	560	20	770	40	940	65	1080	90	1180	110	1310	145	1420	180
400	(0.19)	580	30	780	55	950	80	1090	110	1190	135	1320	175	1420	205
500	(0.24)	600	40	800	70	960	100	1100	135	1200	160	1330	205	1430	240
600	(0.28)	630	55	820	85	980	125	1110	160	1210	190	1340	240	1440	280
700	(0.33)	670	70	850	110	1000	150	1130	190	1230	225	1360	280	1460	325
800	(0.38)	700	90	880	135	1030	180	1150	225	1250	265	1380	325	1480	375
900	(0.42)	740	115	910	165	1050	215	1180	270	1270	310	1400	375	1490	430
1000	(0.47)	790	145	950	200	1080	255	1210	315	1300	360	1420	430	1510	490
1100	(0.52)	830	175	980	240	1120	300	1230	365	1320	415	1440	490	1540	555
1250	(0.59)	880	225	1020	300	1150	370	1270	440	1370	510	1470	585	1560	655
1300	(0.61)	930	260	1060	335	1190	410	1300	485	1380	545	1500	635	1590	705
1400	(0.66)	970	315	1110	395	1230	475	1330	555	1410	620	1530	715	1620	795
1500	(0.71)	1020	370	1150	460	1270	545	1370	630	1450	700	1560	800	1650	885