Mesa Union School District

Agenda for the Special Meeting of the Board of Trustees to be held on Tuesday, July11, 2017, in the School Multi-Purpose Room located at 3901 North Mesa School Road, Somis, California 93066

1. OFFICIAL OPENING OF MEETING

2. ADOPTION OF AGENDA

Usually an agenda covers an entire session, in which case it is the order of business for that session and is adopted by majority vote of the assembly. Thereafter, no change can be made in the agenda except by a two-thirds vote or by unanimous consent. At the point of adoption of the agenda, any Board member or the Superintendent can request that the agenda be re-ordered.

3. OFFICIAL OPENING- PLEDGE OF ALLEGIANCE

4. PUBLIC HEARING

A. Pupil Textbook and Instructional Materials Adoption-English Language Arts and English Language Development

5. AUDIENCE TO ADDRESS BOARD OF TRUSTEES - COMMENTS BY THE PUBLIC

All individuals are invited to speak to the Board during public comment on matters related to the District. If you wish to address the Board, please plan to complete a Speaker Form prior to the start of the meeting. Forms are available in the District Office, at the Board meeting and online at www.mesaschooldistrict.org.

6. ACTION/DISCUSSION ITEMS:

A. Consideration of Adoption of the K-5 and 6-8 English Language Arts and English Language Development Instructional Materials

It is the recommendation of the District Administration that the Board of Trustees adopt the K-5 and 6-8 English Language Arts and English Language Development instructional materials.

PLEASE SEE AGENDA ITEM 6A IN THE PACKET

B. Consideration of Approval of Alliance Building Solutions Incorporated Proposition 39 Scope of Work.

It is the recommendation of the District Administration that the Board of Trustees approve the Alliance Solutions Incorporated Proposition 39 Scope of Work.

PLEASE SEE AGENDA ITEM 6B IN THE PACKET

C. Consideration of Approval of the Proposal with Howard's Rug Co. for the installation of carpet in Classroom 2 Classroom 6, Classroom 12, Classroom 14, Classroom 18, Classroom 21, Classroom 22, and Classroom 24 cost not to exceed $34,000.

It is the recommendation of the District Administration that the Board of Trustees approve the proposal with Howard's Rug Co. for the installation of carpet in Classroom 2, Classroom 6, Classroom 12, Classroom 14, Classroom 18, Classroom 21, Classroom 22, and Classroom 24 cost not to exceed $34,000.

PLEASE SEE AGENDA ITEM 6B IN THE PACKET

7. PERSONNEL

Mesa Union School District

Agenda for the Special Meeting of the Board of Trustees to be held on Tuesday, July11, 2017, in the School Multi-Purpose Room located at 3901 North Mesa School Road, Somis, California 93066

A. Consideration of approval of hiring the following certificated and classified employees for Summer School. Employment will be based on student enrollment.

Jill Brody- Teacher
Kelsey White-Teacher
Taylor Moore-Teacher
Brenda Rivas-Teacher
Jazmine Martinez-Teacher
Christina Mendoza- Instructional Assistant
Martha Bautista-Instructional Assistant
Giselle Buchanan-Instructional Assistant
Melissa Cancino-Instructional Assistant
Debbie Sussex-Food Service Worker

It is the recommendation of the district administration that the Board of Trustees approve the hiring of certificated and classified employees for summer school.

B. Consideration of Approval of Rehiring Kristine Garza as a 1.00 FTE Elementary Teacher for the 2017-2018 School Year

It is the recommendation of the District Administration that the Board of Trustees approve the rehiring of Kristine Garza as an Elementary Teacher for the 2017-2018 school year.

C. Consideration of Approval of Rehiring Sara Hocamp as a .40 FTE Elementary Teacher for the 2017-2018 School Year

It is the recommendation of the District Administration that the Board of Trustees approve the rehiring of Sara Hocamp as a .40 FTE Elementary Teacher for the 2017-2018 school year.

D. Consideration of Approval of Hiring Amy Catlett as an 1.00 FTE Elementary Teacher for the 2017-2018 School Year.

It is the recommendation of the District Administration that the Board of Trustees approve the rehiring of Amy Catlett as a 1.00 FTE Elementary Teacher for the 2017-2018 school year.

E. Consideration of Approval of Hiring Stacy Shin as a 1.00 FTE Speech and Language Specialist for the 2017-2018 School Year.

It is the recommendation of the District Administration that the Board of Trustees approve the rehiring of Stacy Shin as a 1.0 FTE Speech and Language Specialist for the 2017-2018 school year.

F. Consideration of Approval of Rehiring Elaine Montefu as a 5.5 hour Special Education Instructional Assistant for the 2017-2018 school year

It is the recommendation of the District Administration that the Board of Trustees approve the rehiring of Elaine Montefu as a 5.5 hour Special Education Instructional Assistant.

G. Consideration of Approval of Rehiring Melissa Cancino as a 5.5 hour Special Education Instructional Assistant for the 2017-2018 school year

It is the recommendation of the District Administration that the Board of Trustees approve the rehiring of Melissa

Cancino as a 5.5 hour Special Education Instructional Assistant for the 2017-2018 school year.

H. Consideration of Approval of Hiring Christina Mendoza as a 6.0 hour K-2 Special Education Class Instructional Assistant for the 2017-2018 school year.

It is the recommendation of the District Administration that the Board of Trustees approve the hiring of Christina Mendoza as a 6.0 hour K-2 Special Education Class Instructional Assistant for the 2017-2018 school year.

8. PUBLIC COMMENT ON CLOSED SESSION ITEMS

At this time, any member of the public may address the Board concerning the closed session items. A person addressing the Board is urged to use not more than three (3) minutes of time. If you wish to address the Board, please plan to complete a Speaker Form prior to the start of the meeting. Forms are available in the District Office, at the Board meeting and online at www.mesaschooldistrict.org

9. CLOSED SESSION

During this time, the Board may adjourn to closed session to discuss confidential material relating to:

A. Superintendent's Evaluation Process authorized by Government Code §54957.

ADJOURN FROM CLOSED SESSION

Time: _____

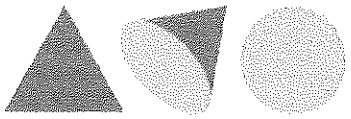
RECONVENE IN PUBLIC

(Approximate time 8:00 p.m.) Time: _____

Report of actions taken during closed session: The president of the Board will report on actions taken during closed session.

10. ADJOURNMENT Time: _____

In accordance with requirements of the Americans with Disabilities Act and related federal regulations, individuals who require special accommodation, including but not limited to an American sign language interpreter, accessible seating or documentation in accessible formats, should contact the Superintendent's office at least two days before the meeting.



Houghton Mifflin Harcourt

Cost Proposal
Prepared For

Mesa Union Elem School Dist

For the Purchase of:

CA Journeys 2017 GR K-5 8 Year

Prepared By
Diane Gullman
diane.gullman@hmhco.com

PLEASE SUBMIT THIS PROPOSAL WITH YOUR PURCHASE ORDER.

Mesa Union Elem School Dist

CA Journeys 2017 GR K-5 8 Year

ISBN	Title	Sale Price	Purchase Quantity	Purchase Amount	Complimentary Quantity
Grade K					
	Classroom Package				
	SRP/TRP				
1618370	9780544618930 Journeys California Premium Student Resource package (print w/ 8yr Digital) Grade K 2017	$139.45 C	89	$12,411.05	
	Package includes:				
	California Student Edition Set Grade K				
	California Interactive Digital Student Resources 8 Year Grade K				
	California Student Edition eText ePub Download 8-Year Grade K				
	California Downloadable Student Resource Tool Grade K				
	Common Core Reading Practice and Assessment App Grade K				
	Reader's Notebook Consumable 8-Year Print Subscription Grade K				
	Common Core Writing Handbook Student 8-year print subscription Grade K				
1618376	9780544618992 Journeys California Premium Teacher Resource package (print w/ 8yr Digital) Grade K	$1,008.00 C	7	$7,056.00	
	Package includes:				
	California Teacher Edition Collection Grade K				
	California Interactive Digital Teacher Resources 8-Year Grade K				
	California Teacher's Edition eText ePub Download 8-Year Grade K				
	California Downloadable Teacher Resource Tool Grade K				
	California Transitional K Teacher's Guide Grade K				
	California Quick Start Pacing Guide Grade K				
	California Language Workshop Resources Grade K				
	California Language Workshop Assessment Handbook Grade K				
	California Language Workshop Teacher's Guide Grade K				
	My Journey Home Connections Resource Grade K				
	Instructional Flip Chart Set Grade K				
	Grab and Go Complete Set Grade K				
	HMH Readers App (eText Leveled Reader Grade Level Set App) for all Grade Level Readers; per device				
	Vocabulary and Spelling Flip-Card eTextbook EPub Package 8-Year Grade K				
	Instructional Card Kit Grade K				
	Teacher Resource Kit Grade K				
	-HMH Intervention Assessments Grade K-6				
	-Benchmark and Unit Tests Consumable Grade K				
	-Benchmark and Unit Tests Teacher's Edition (Answer Key) Grade K				
	-Intervention Teacher Resources Grade K				
	-Language Support Cards Grade K				
	-Long Vowel Sound Spelling Cards Grade K				
	-Sound Spelling Cards Grade K				
	-Reader's Notebook Teacher's Guide Grade K				
	-Common Core Writing Handbook Teacher's Guide Grade K				
	-Alphafriends Cards Large Grade K				
	-Standards-Based Assessment Resource Grade K				
	Premium Teacher Resource Kit Add-On Grade K				
	-Common Core ELA Exemplar Instructional & Performance Assessment Resource Grade K-1				
	-ELL Handbook Grades K-6				
	-ELL Newcomer Teacher's Guide Grades K-6				
	-Literacy and Language Guide Grade K				
	A Journey From A to Z Big Book Grade K				
	A Journey In Songs and Rhymes Big Book Grade K				
	Big Book Set Grade K				
	Little Big Book Set Grade K				
	Read Aloud Set of 30 Grade K				
	Included in package but must be entered as a no charge line item separately (See ISBNs listed in section below):				
	1 Complete Set of 6 Leveled Readers with purchase of 1 Premium Teacher Resource Package				

Mesa Union Elem School Dist

CA Journeys 2017 GR K-5 8 Year

ISBN	Title	Sale Price		Purchase Quantity	Purchase Amount	Complimentary Quantity
Grade K						
	Total for Classroom Package				**$19,467.05**	
	Leveled Readers					
1511216	9780547905716 Journeys Grade Level Strand Complete Set of 6 Grade K	$4,835.26	C			7
	Total for Leveled Readers					
	Flip Chart & Curious About Word Kit					
1416794	9780547327716 Journeys Curious About Words Kit Grade K	$219.62	C			2
1503749	9780547866819 Houghton Mifflin Harcourt Journeys Common Core Literacy Center Flip Chart Set Grade K	$169.84	C			2
	Total for Flip Chart & Curious About Word Kit					
	Reading Inventory					
6001572	9780545660297 Reading Inventory Student Subscription (one year), per license	$5.50				89
	(Enter 1yr Reading Inventory as NO Charge, per student)					
	Total for Reading Inventory					
Total for Grade K					**$19,467.05**	
Grade 1						
	Classroom Package					
	SRP/TRP					
1618371	9780544618947 Journeys California Premium Student Resource package (print w/ 8yr Digital) Grade 1 2017	$186.10	C	78	$14,515.80	

Package includes:
California Student Edition Set Grade 1
California Interactive Digital Student Resources 8 Year Grade 1
California Student Edition eText ePub Download 8-Year Grade 1
California Downloadable Student Resource Tool Grade 1
Trade Book Unit 2 Grade 1 – From Seed to Pumpkin
Trade Book Unit 4 Grade 1 – Amazing Whales!
Trade Book Unit 6 Grade 1 – Owl at Home
Common Core Reading Practice and Assessment App Grade 1
Decodable Reader (Set of 1) Grade 1
Reader's Notebook Consumable 8-Year Print Subscription Grade 1
Common Core Writing Handbook Student 8-year print subscription Grade 1
Close Reader Student 8-Year Print Subscription Grade 1

C = Contract Price

Houghton Mifflin Harcourt

Attention:
Jeff Turner
jturner@mesaschool.org

HMH Confidential and Proprietary

Intervention Solutions Group
255 38th St. Suite L
St. Charles, IL 60174
FAX: 800-724-4716
InterventionSolutionsOrders@hmhco.com

Please submit this form with your purchase order.

Mesa Union Elem School Dist

CA Journeys 2017 GR K-5 8 Year

ISBN		Title	Sale Price		Purchase Quantity	Purchase Amount	Complimentary Quantity
Grade 1							
1618377	9780544619005	Journeys California Premium Teacher Resource package (print w/ 8yr Digital) Grade 1	$692.96	C	6	$4,157.76	
		Package includes:					
		California Teacher Edition Collection Grade 1					
		California Interactive Digital Teacher Resources 8-Year Grade 1					
		California Teacher's Edition eText ePub Download 8-Year Grade 1					
		California Downloadable Teacher Resource Tool Grade 1					
		California Quick Start Pacing Guide Grade 1					
		California Language Workshop Assessment Handbook Grade 1					
		California Language Workshop Resources Grade 1					
		California Language Workshop Teacher's Guide Grade 1					
		Family Connection Book Grade 1					
		Blend-it Books Volume 1 Grade 1					
		Blend-it Books Volume 2 Grade 1					
		Grab and Go Complete Set Grade 1					
		Vocabulary and Spelling Flip-Card eTextbook EPub Package 8-Year Grade 1					
		Instructional Card Kit Grade 1					
		HMH Readers App (eText Leveled Reader Grade Level Set App) for all Grade Level Readers; per device					
		Teacher Resource Kit Grade 1 (Items included listed below)					
		-HMH Intervention Assessments Grade K-6					
		-Cold Reads Grade 1					
		-Language Support Cards Grade 1					
		-Sound Spelling Cards Grades 1-3					
		-Reader's Notebook Teacher's Guide Grade 1					
		-Close Reader Teacher's Guide Grade 1					
		-Common Core Writing Handbook Teacher's Guide - Grade 1					
		-Benchmark and Unit Tests Consumable Grade 1					
		-Benchmark and Unit Tests Teacher's Edition (Answer Key) Grade 1					
		-Standards-Based Assessment Resource Grade 1					
		Premium Teacher Resource Kit Add-On Grade 1 (Items included listed below)					
		-Common Core ELA Exemplar Instructional & Performance Assessment Resource Grade K-1					
		-ELL Handbook Grades K-6					
		-ELL Newcomer Teacher's Guide Grades K-6					
		-Literacy and Language Guide Grade 1					
		Write-in Reader 6-Pack Grade 1 (2)					
		Back To School Big Book 1 Grade 1					
		Back To School Big Book 2 Grade 1					
		Big Book Set Grade 1					
		Included in package but must be entered as a no charge line item separately (See ISBNs listed in section below):					
		1 Complete Set of 6 Leveled Readers with purchase of 1 Premium Teacher Resource Package					
		Total for Classroom Package				**$18,673.56**	
		Leveled Readers					
1511217	9780547904917	Journeys Leveled Readers Grade Level Six-Copy Complete Set Grade 1	$4,835.26	C			6
		Total for Leveled Readers					
		Flip Chart & Curious About Word Kit					
1416795	9780547327747	Journeys Curious About Words Kit Grade 1	$219.62	C			2
1512090	9780547909950	Houghton Mifflin Harcourt Journeys Common Core Literacy Center Flip Chart Set Grade 1	$163.21	C			2
		Total for Flip Chart & Curious About Word Kit					
		Reading Inventory					

C = Contract Price

Houghton Mifflin Harcourt

Attention:
Jeff Turner
jturner@mesaschool.org

Intervention Solutions Group
255 38th St. Suite L
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FAX: 800-724-4716
InterventionSolutionsOrders@hmhco.com

HMH Confidential and Proprietary

Please submit this form with your purchase order.

Mesa Union Elem School Dist

CA Journeys 2017 GR K-5 8 Year

ISBN	Title	Sale Price	Purchase Quantity	Purchase Amount	Complimentary Quantity
Grade 1					
6001572	9780545660297 Reading Inventory Student Subscription (one year), per license	$5.50			78
	(Enter 1yr Reading Inventory as NO Charge, per student)				
	Total for Reading Inventory				
Total for Grade 1				**$18,673.56**	
Grade 2					
	Classroom Package				
	SRP/TRP				
1618372	9780544618954 Journeys California Premium Student Resource package (print w/ 8yr Digital) Grade 2 2017	$111.35 C	55	$6,124.25	
	Package includes:				
	California Student Edition, Volume 1 Grade 2				
	California Student Edition, Volume 2 Grade 2				
	California Interactive Digital Student Resources 8 Year Grade 2				
	California Student Edition eText ePub Download 8-Year Grade 2				
	California Downloadable Student Resource Tool Grade 2				
	Trade Book Unit 2 Grade 2 - Poppleton in Winter				
	Trade Book Unit 4 Grade 2 - Where do Polar Bears Live?				
	Trade Book Unit 6 Grade 2 - Exploring Space Travel, Laura Waxman				
	Common Core Reading Practice and Assessment App Grade 2				
	Reader's Notebook Consumable 8-Year Print Subscription Grade 2				
	Common Core Writing Handbook Student 8-Year Print Subscription Grade 2				
	Close Reader Student 8-Year Print Subscription Grade 2				
	Decodable Reader (Set of 1) Grade 2				

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CA Journeys 2017 GR K-5 8 Year

ISBN	Title	Sale Price		Purchase Quantity	Purchase Amount	Complimentary Quantity
Grade 2						
1618378	9780544619012 Journeys California Premium Teacher Resource package (print w/ 8yr Digital) Grade 2	$692.96	C	5	$3,464.80	
	Package includes:					
	California Teacher Edition Collection Grade 2					
	California Interactive Digital Teacher Resources 8-Year Grade 2					
	California Teacher's Edition eText ePub Download 8-Year Grade 2					
	California Downloadable Teacher Resource Tool Grade 2					
	California Quick Start Pacing Guide Grade 2					
	California Language Workshop Assessment Handbook Grade 2					
	California Language Workshop Resources Grade 2					
	California Language Workshop Teacher's Guide Grade 2					
	Family Connection Book Grade 2					
	Blend-it Books Volume 1 Grade 2					
	Blend-it Books Volume 2 Grade 2					
	Grab and Go Complete Set Grade 2					
	Instructional Card Kit Grade 2					
	Vocabulary and Spelling Flip-Card eTextbook EPub Package 8-Year Grade 2					
	HMH Readers App (eText Leveled Reader Grade Level Set App) for all Grade Level Readers; per device					
	Teacher Resource Kit Grade 2 (Items included listed below)					
	-Cold Reads Grade 2					
	-Language Support Cards Grade 2					
	-Sound Spelling Cards Grades 1-3					
	-Reader's Notebook Teacher's Guide Grade 2					
	-Common Core Writing Handbook Teacher's Guide - Grade 2					
	-Close Reader Teacher's Guide Grade 2					
	-HMH Intervention Assessments Grade K-6					
	-Benchmark and Unit Tests Consumable Grade 2					
	-Benchmark and Unit Tests Teacher's Edition (Answer Key) Grade 2					
	-Standards-Based Assessment Resource Grade 2					
	Premium Teacher Resource Kit Add-On Grade 2 (Items included listed below)					
	-ELL Handbook Grades K-6					
	-ELL Newcomer Teacher's Guide Grades K-6					
	-Common Core ELA Exemplar Instructional & Performance Assessment Resource Grade 2-3					
	-Literacy and Language Guide Grade 2					
	Write-in Reader 6-Pack Grade 2 (2)					
	Included in package but must be entered as a no charge line item separately (See ISBNs listed in section below):					
	1 Complete Set of 6 Leveled Readers with purchase of 1 Premium Teacher Resource Package					
	Total for Classroom Package				**$9,589.05**	
	Leveled Readers					
1511218	9780547904818 Journeys Grade Level Strand Complete Set of 6 Grade 2	$4,835.26	C			5
	Total for Leveled Readers					
	Flip Chart & Curious About Word Kit					
1416796	9780547327754 Journeys Curious About Words Kit Grade 2	$219.62	C			1
1512094	9780547910611 Houghton Mifflin Harcourt Journeys Common Core Literacy Center Flip Chart Set Grade 2	$163.21	C			1
	Total for Flip Chart & Curious About Word Kit					
	Reading Inventory					
6001572	9780545660297 Reading Inventory Student Subscription (one year), per license	$5.50				55
	(Enter 1yr Reading Inventory as NO Charge, per student)					

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Houghton Mifflin Harcourt

Attention:
Jeff Turner
jturner@mesaschool.org

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255 38th St. Suite L
St. Charles, IL 60174
FAX: 800-724-4716
InterventionSolutionsOrders@hmhco.com

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CA Journeys 2017 GR K-5 8 Year

ISBN	Title	Sale Price	Purchase Quantity	Purchase Amount	Complimentary Quantity
Grade 2					
	Total for Reading Inventory				
Total for Grade 2				**$9,589.05**	
Grade 3					
	Classroom Package				
	SRP/TRP				
1618373	9780544618961 Journeys California Premium Student Resource package (print w/ 8yr Digital) Grade 3 2017	$118.00 C	69	$8,142.00	
	Package includes:				
	California Student Edition, Volume 1 Grade 3				
	California Student Edition, Volume 2 Grade 3				
	California Interactive Digital Student Resources 8 Year Grade 3				
	California Student Edition eText ePub Download 8-Year Grade 3				
	California Downloadable Student Resource Tool Grade 3				
	Common Core Reading Practice and Assessment App Grade 3				
	Reading Adventures Student Edition Magazine Grade 3				
	Reading Adventure Student Magazine ePub 8-Year Grade 3				
	Trade Book Unit 2 Grade 3 - Amos & Boris				
	Trade Book Unit 4 Grade 3 - Boy, Were We Wrong About Dinosaurs!				
	Trade Book Unit 6 Grade 3 - Capoeira				
	Reader's Notebook Consumable 8-Year Print Subscription Grade 3				
	Performance Assessment Student Edition 8-Year Print Subscription Grade 3				
	Common Core Writing Handbook Student 8-Year Print Subscription Grade 3				
	Close Reader Student 8-Year Print Subscription Grade 3				

Mesa Union Elem School Dist

CA Journeys 2017 GR K-5 8 Year

ISBN	Title	Sale Price		Purchase Quantity	Purchase Amount	Complimentary Quantity
Grade 3						
1618379	9780544619029 Journeys California Premium Teacher Resource package (print w/ 8yr Digital) Grade 3	$692.96	C	6	$4,157.76	
	Package includes:					
	California Teacher Edition Collection Grade 3					
	California Interactive Digital Teacher Resources 8-Year Grade 3					
	California Teacher's Edition eText ePub Download 8-Year Grade 3					
	California Downloadable Teacher Resource Tool Grade 3					
	California Quick Start Pacing Guide Grade 3					
	California Language Workshop Assessment Handbook Grade 3					
	California Language Workshop Resources Grade 3					
	California Language Workshop Teacher's Guide Grade 3					
	Family Connection Book Grade 3					
	Grab and Go Complete Set Grade 3					
	Instructional Card Kit Grade 3					
	Vocabulary and Spelling Flip-Card eTextbook EPub Package 8-Year Grade 3					
	HMH Readers App (eText Leveled Reader Grade Level Set App) for all Grade Level Readers; per device					
	Teacher Resource Kit Grade 3 (Items included listed below)					
	-Cold Reads Grade 3					
	-Performance Assessment Teacher Edition Grade 3					
	-Reader's Notebook Teacher's Guide Grade 3					
	-Common Core Writing Handbook Teacher's Guide Grade 3					
	-Close Reader Teacher's Guide Grade 3					
	-Language Support Cards Grade 3					
	-Sound Spelling Cards Grades 1-3					
	-HMH Intervention Assessments Grade K-6					
	-Benchmark and Unit Tests Consumable Grade 3					
	-Benchmark and Unit Tests Teacher's Edition (Answer Key) Grade 3					
	-Standards-Based Assessment Resource Grade 3					
	Premium Teacher Resource Kit Add-On Grade 3 (Items included listed below)					
	-Common Core ELA Exemplar Instructional & Performance Assessment Resource Grade 2-3					
	-ELL Handbook Grades K-6					
	-ELL Newcomer Teacher's Guide Grades K-6					
	-Literacy and Language Guide Grade 3					
	Write-in Reader 6-Pack Grade 3 (2)					
	Included in package but must be entered as a no charge line item separately (See ISBNs listed in section below):					
	1 Complete Set of 6 Leveled Readers with purchase of 1 Premium Teacher Resource Package					
	Total for Classroom Package				**$12,299.76**	
	Leveled Readers					
1511219	9780547905419 Journeys Grade Level Strand Complete Set of 6 Grade 3	$4,029.38	C			6
	Total for Leveled Readers					
	Flip Chart & Curious About Word Kit					
1416797	9780547327761 Journeys Curious About Words Kit Grade 3	$219.62	C			2
1512096	9780547908212 Houghton Mifflin Harcourt Journeys Common Core Literacy Center Flip Chart Set Grade 3	$163.21	C			2
	Total for Flip Chart & Curious About Word Kit					
	Reading Inventory					
6001572	9780545660297 Reading Inventory Student Subscription (one year), per license	$5.50				69
	(Enter 1yr Reading Inventory as NO Charge, per student)					
	Total for Reading Inventory					

C = Contract Price

Houghton Mifflin Harcourt

Attention:
Jeff Turner
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InterventionSolutionsOrders@hmhco.com

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CA Journeys 2017 GR K-5 8 Year

ISBN	Title	Sale Price	Purchase Quantity	Purchase Amount	Complimentary Quantity
Total for Grade 3				**$12,299.76**	
Grade 4					
	Classroom Package				
	SRP/TRP				
1618374	9780544618978 Journeys California Premium Student Resource package (print w/ 8yr Digital) Grade 4 2017	$84.40 C	81	$6,836.40	
	Package includes:				
	California Student Edition Grade 4				
	California Interactive Digital Student Resources 8 Year Grade 4				
	California Student Edition eText ePub Download 8-Year Grade 4				
	California Downloadable Student Resource Tool Grade 4				
	Reading Adventures Student Edition Magazine Grade 4				
	Reading Adventure Student Magazine ePub 8-Year Grade 4				
	Trade Book Unit 2 Grade 4 - Discovering Mars: The Amazing Story of the Red Planet				
	Trade Book Unit 4 Grade 4 - Horses				
	Trade Book Unit 6 Grade 4 - Sea Turtles: Ocean Nomads				
	Common Core Reading Practice and Assessment App Grade 4				
	Reader's Notebook Consumable 8-Year Print Subscription Grade 4				
	Performance Assessment Student Edition 8-Year Print Subscription Grade 4				
	Common Core Writing Handbook Student 8-Year Print Subscription Grade 4				
	Close Reader Student 8-Year Print Subscription Grade 4				
1618380	9780544619036 Journeys California Premium Teacher Resource package (print w/ 8yr Digital) Grade 4	$692.96 C	7	$4,850.72	
	Package includes:				
	California Teacher Edition Collection Grade 4				
	California Interactive Digital Teacher Resources 8-Year Grade 4				
	California Teacher's Edition eText ePub Download 8-Year Grade 4				
	California Downloadable Teacher Resource Tool Grade 4				
	California Quick Start Pacing Guide Grade 4				
	California Language Workshop Assessment Handbook Grade 4				
	California Language Workshop Resources Grade 4				
	California Language Workshop Teacher's Guide Grade 4				
	Family Connection Book Grade 4				
	Vocabulary in Context Cards eTextbook ePub 8-Year Grade 4				
	Grab and Go Complete Set Grade 4				
	Instructional Card Kit Grade 4				
	HMH Readers App (eText Leveled Reader Grade Level Set App) for all Grade Level Readers; per device				
	Teacher Resource Kit Grade 4 (Items included listed below)				
	-Cold Reads Grade 4				
	-Performance Assessment Teacher Edition Grade 4				
	-Reader's Notebook Teacher's Guide Grade 4				
	-Common Core Writing Handbook Teacher's Guide - Grade 4				
	-Close Reader Teacher's Guide Grade 4				
	-HMH Intervention Assessments Grade K-6				
	-Benchmark and Unit Tests Consumable Grade 4				
	-Benchmark and Unit Tests Teacher's Edition (Answer Key) Grade 4				
	-Standards-Based Assessment Resource Grade 4				
	Premium Teacher Resource Kit Add-On Grade 4				
	-ELL Handbook Grades K-6				
	-ELL Newcomer Teacher's Guide Grades K-6				
	-Common Core ELA Exemplar Instructional & Performance Assessment Resource Grade 4-5				
	-Literacy and Language Guide Grade 4				
	Write-in Reader 6-Pack Grade 4 (2)				
	Included in package but must be entered as a no charge line item separately (See ISBNs listed in section below):				
	1 Complete Set of 6 Leveled Readers with purchase of 1 Premium Teacher Resource Package				

C = Contract Price

Houghton Mifflin Harcourt

Attention:
Jeff Turner
jturner@mesaschool.org

Intervention Solutions Group
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Please submit this form with your purchase order.

Mesa Union Elem School Dist

CA Journeys 2017 GR K-5 8 Year

ISBN	Title	Sale Price	Purchase Quantity	Purchase Amount	Complimentary Quantity
Grade 4					
	Total for Classroom Package			**$11,687.12**	
	Leveled Readers				
1511220	9780547905020 Journeys Grade Level Strand Complete Set of 6 Grade 4	$4,029.38 C			7
	Total for Leveled Readers				
	Flip Chart Set				
1512097	9780547907543 Houghton Mifflin Harcourt Journeys Common Core Literacy Center Flip Chart Set Grade 4	$163.21 C			2
	Total for Flip Chart Set				
	Reading Inventory				
6001572	9780545660297 Reading Inventory Student Subscription (one year), per license	$5.50			81
	(Enter 1yr Reading Inventory as NO Charge, per student)				
	Total for Reading Inventory				
Total for Grade 4				**$11,687.12**	
Grade 5					
	Classroom Package				
	SRP/TRP				
1618375	9780544618985 Journeys California Premium Student Resource package (print w/ 8yr Digital) Grade 5 2017	$84.40 C	79	$6,667.60	
	Package includes:				
	California Student Edition Grade 5				
	California Interactive Digital Student Resources 8 Year Grade 5				
	California Student Edition eText ePub Download 8-Year Grade 5				
	California Downloadable Student Resource Tool Grade 5				
	Reading Adventures Student Edition Magazine Grade 5				
	Reading Adventure Student Magazine ePub 8-Year Grade 5				
	Trade Book Unit 2 Grade 5 - Hound Dog True				
	Trade Book Unit 4 Grade 5 - About Time: A First Look at Time and Clocks				
	Trade Book Unit 6 Above Level Grade 5 - Mysteries of the Mummy Kids				
	Common Core Reading Practice and Assessment App Grade 5				
	Reader's Notebook Consumable 8-Year Print Subscription Grade 5				
	Performance Assessment Student Edition 8-Year Print Subscription Grade 5				
	Common Core Writing Handbook Student 8-Year Print Subscription Grade 5				
	Close Reader Student 8-Year Print Subscription Grade 5				

C = Contract Price

Houghton Mifflin Harcourt

Attention:
Jeff Turner
jturner@mesaschool.org

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Intervention Solutions Group
255 38th St. Suite L
St. Charles, IL 60174
FAX: 800-724-4716
InterventionSolutionsOrders@hmhco.com

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Mesa Union Elem School Dist

CA Journeys 2017 GR K-5 8 Year

ISBN	Title	Sale Price		Purchase Quantity	Purchase Amount	Complimentary Quantity
Grade 5						
1618381	9780544619043 Journeys California Premium Teacher Resource package (print w/ 8yr Digital) Grade 5	$692.96	C	7	$4,850.72	
	Package includes:					
	California Teacher Edition Collection Grade 5					
	California Interactive Digital Teacher Resources 8-Year Grade 5					
	California Teacher's Edition eText ePub Download 8-Year Grade 5					
	California Downloadable Teacher Resource Tool Grade 5					
	California Quick Start Pacing Guide Grade 5					
	California Language Workshop Assessment Handbook Grade 5					
	California Language Workshop Resources Grade 5					
	California Language Workshop Teacher's Guide Grade 5					
	Family Connection Book Grade 5					
	Vocabulary in Context Cards eTextbook ePub 8-Year Grade 5					
	Grab and Go Complete Set Grade 5					
	Instructional Card Kit Grade 5					
	HMH Readers App (eText Leveled Reader Grade Level Set App) for all Grade Level Readers; per device					
	Teacher Resource Kit Grade 5 (Items included listed below)					
	-Cold Reads Grade 5					
	-Reader's Notebook Teacher's Guide Grade 5					
	-Performance Assessment Teacher Edition Grade 5					
	-Common Core Writing Handbook Teacher's Guide Grade 5					
	-Close Reader Teacher's Guide Grade 5					
	-HMH Intervention Assessments Grade K-6					
	-Benchmark and Unit Tests Consumable Grade 5					
	-Benchmark and Unit Tests Teacher's Edition (Answer Key) Grade 5					
	-Standards-Based Assessment Resource Grade 5					
	Premium Teacher Resource Kit Add-On Grade 5 (Items included listed below)					
	-Common Core ELA Exemplar Instructional & Performance Assessment Resource Grade 4-5					
	-ELL Newcomer Teacher's Guide Grades K-6					
	-ELL Handbook Grades K-6					
	-Literacy and Language Guide Grade 5					
	Write-in Reader 6-Pack Grade 5 (2)					
	Included in package but must be entered as a no charge line item separately (See ISBNs listed in section below):					
	1 Complete Set of 6 Leveled Readers with purchase of 1 Premium Teacher Resource Package					
	Total for Classroom Package				**$11,518.32**	
	Leveled Readers					
1511221	9780547905921 Journeys Grade Level Strand Complete Set of 6 Grade 5	$4,029.38	C			7
	Total for Leveled Readers					
	Flip Chart Set					
1512098	9780547907864 Houghton Mifflin Harcourt Journeys Common Core Literacy Center Flip Chart Set Grade 5	$163.21	C			2
	Total for Flip Chart Set					
	Reading Inventory					
6001572	9780545660297 Reading Inventory Student Subscription (one year), per license	$5.50				79
	(Enter 1yr Reading Inventory as NO Charge, per student)					
	Total for Reading Inventory					
Total for Grade 5					**$11,518.32**	
HMH Professional Services						

C = Contract Price

Attention:
Jeff Turner
jturner@mesaschool.org

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255 38th St. Suite L
St. Charles, IL 60174
FAX: 800-724-4716
InterventionSolutionsOrders@hmhco.com

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Mesa Union Elem School Dist

CA Journeys 2017 GR K-5 8 Year

ISBN	Title	Sale Price	Purchase Quantity	Purchase Amount	Complimentary Quantity
HMH Professional Services					
	askHMH				
1642281	9780544816633 Journeys 2017 California ASK HMH Individual 1-year	$199.00	12	$2,388.00	
	AskHMH provides personalized performance support giving teachers just-in-time access to program experts. Teachers can ask pedagogical questions and request online conferencing to support implementation of California Journeys. One-year subscription for a single user.				
	Total for askHMH			**$2,388.00**	
	Follow Up Courses				
1638256	9780544782716 Journeys 2017 California Getting Started eLearning 35 User License	$349.00			1
	Gain a fundamental understanding of California Journeys curriculum and its rich set of classroom and digital resources. License for 25 users.				
	Total for Follow Up Courses				
	Getting Started				
1647702	9780544862043 Journeys 2017 California Planning Effectively Follow Up Full Day In Person	$2,950.00	1	$2,950.00	
	In this full-day course, teachers learn to strategically plan engaging and rigorous daily and weekly lessons using California Journeys. Participants engage in effective planning, prioritizing content and resources to impact student achievement.				
1647708	9780544862104 Journeys 2017 California Progress Monitoring Follow Up Full Day In Person	$2,950.00	1	$2,950.00	
	In this full-day course, teachers learn to monitor and assess student learning using California Journeys. Participants understand the roles of formative and summative assessment from the lens of their HMH program and plan for how to effectively inform daily instruction using Journeys assessments.				
47714	9780544862623 Journeys 2017 California Differentiate with HMH Player Digital Follow Up Full Day In Person	$2,950.00	1	$2,950.00	
	In this full-day course, teachers learn to differentiate and personalize instruction for digital learners. Using the HMH Player App, participants will explore how to deliver instruction, effectively collaborate, monitor progress and differentiate using the HMH Player.				
	Total for Getting Started			**$8,850.00**	
	Coaching				
1648056	9780544856073 Journeys 2017 California Team Coaching Full Day In Person	$2,650.00	2	$5,300.00	
	Team Coaching builds a community of learners, synchronizing teams of teachers across grade levels to share experience and expertise and collaborate on plans and protocol regarding product implementation.				
	Total for Coaching			**$5,300.00**	
Total for HMH Professional Services				**$16,538.00**	

Proposal Summary

Subtotal Purchase Amount:	**$99,772.86**
Shipping & Handling:	**$0.00**
Sales Tax: (6.00%)	**$6,034.54**
Total Cost of Proposal (PO Amount):	**$105,807.40**

C = Contract Price

Houghton Mifflin Harcourt

Attention:
Jeff Turner
jturner@mesaschool.org

Intervention Solutions Group
255 38th St. Suite L
St. Charles, IL 60174
FAX: 800-724-4716
InterventionSolutionsOrders@hmhco.com

Please submit this form with your purchase order.

Proposal Date: 6/26/2017 | Proposal for | Expiration Date:8/10/2017

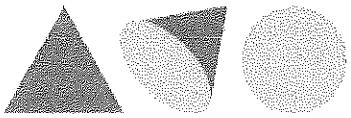
Mesa Union Elem School Dist

CA Journeys 2017 GR K-5 8 Year

Total Cost of Proposal (PO Amount): $ 105,807.40

This is a cost proposal only.
This cost proposal is subject to HMH's Standard Terms and Conditions ("Ts & Cs") below:
<http://www.hmhco.com/common/terms-conditions>
Ts & Cs are also found on HMH invoices.
HMH reserves the right to modify its Ts & Cs from time to time and agrees to notify you prior to such modifications becoming effective.

Date of Proposal: 6/26/2017 **Proposal Expiration Date:8/10/2017**



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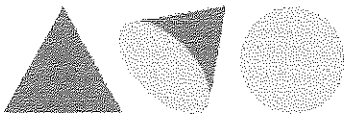

Houghton Mifflin Harcourt

Cost Proposal
Prepared For

Mesa Union Elem School Dist

For the Purchase of:

CA Collections 2017 GR 6-8 8 Year

Prepared By
Diane Gullman
diane.gullman@hmhco.com

PLEASE SUBMIT THIS PROPOSAL WITH YOUR PURCHASE ORDER.

Mesa Union Elem School Dist

CA Collections 2017 GR 6-8 8 Year

ISBN	Title	Sale Price	Purchase Quantity	Purchase Amount	Complimentary Quantity
Grade 6					
	Classroom Package				
	SRP/TRP				
1616907	9780544607071 Collections California Premium Student Resource Package (print w/8yr digital) Grade 6 2017	$121.00 C	78	$9,438.00	
	Package includes:				
	California Student Edition Grade 6				
	Close Reader 8-year Print Subscription Grade 6				
	California Student Edition and Close Reader eTextbook ePub 8-Year Grade 6				
	California Interactive Digital Student Resources Enhanced 8-Year Grade 6				
	California Downloadable Student Resource Tool Grade 6				
	Performance Assessment 8-year Print Subscription Grade 6				
	HMH Close Reads App, Grade 6				
	Included in package but must be entered as a no charge line item separately:				
	3 Novels per Student or equivalent to 3 Novel Points.				
1616928	9780544607576 Collections California Teacher Resource Package (print w/8yr digital) Grade 6 2017	$300.00 C	1	$300.00	
	Package includes:				
	California Teacher Edition Grade 6				
	California Teacher Edition and Close Reader eTextbook ePub 8-Year Grade 6				
	California Interactive Digital Teacher Resources Enhanced 8-Year Grade 6				
	California Downloadable Teacher Resource Tool Grade 6				
	Performance Assessment Teacher Edition Grade 6				
	California Quick Start Pacing Guide Grade 6				
	Included with the purchase of the Premium Package:				
	California Language Workshop Resources Grade 6				
	California Language Workshop Teacher's Guide Grade 6				
	California Language Workshop Assessment Handbook Grade 6				
	Total for Classroom Package			**$9,738.00**	
	Reading Inventory				
6001572	9780545660297 SRI Web Subscription Student License (5000+)	$5.50			78
	(Enter 1yr Reading Inventory as NO Charge, per student)				
	Total for Reading Inventory				
Total for Grade 6				**$9,738.00**	
Grade 7					
	Classroom Package				
	SRP/TRP				

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Attention:
Jeff Turner
jturner@mesaschool.org

Intervention Solutions Group
255 38th St. Suite L
St. Charles, IL 60174
FAX: 800-724-4716
InterventionSolutionsOrders@hmhco.com

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CA Collections 2017 GR 6-8 8 Year

ISBN	Title	Sale Price	Purchase Quantity	Purchase Amount	Complimentary Quantity
Grade 7					
1616908	9780544607088 Collections California Premium Student Resource Package (print w/8yr digital) Grade 7 2017	$121.00 C	76	$9,196.00	
	Package includes:				
	California Student Edition Grade 7				
	Close Reader 8-year Print Subscription Grade 7				
	California Student Edition and Close Reader eTextbook ePub 8-Year Grade 7				
	California Interactive Digital Student Resources Enhanced 8-Year Grade 7				
	California Downloadable Student Resource Tool Grade 7				
	Performance Assessment 8-year Print Subscription Grade 7				
	HMH Close Reads App, Grade 7				
	Included in package but must be entered as a no charge line item separately:				
	3 Novels per Student or equivalent to 3 Novel Points.				
1616929	9780544607583 Collections California Teacher Resource Package (print w/8yr digital) Grade 7 2017	$300.00 C	1	$300.00	
	Package includes:				
	California Teacher Edition Grade 7				
	California Teacher Edition and Close Reader eTextbook ePub 8-Year Grade 7				
	California Interactive Digital Teacher Resources Enhanced 8-Year Grade 7				
	California Downloadable Teacher Resource Tool Grade 7				
	Performance Assessment Teacher Edition Grade 7				
	California Quick Start Pacing Guide Grade 7				
	Included with the purchase of the Premium Package:				
	California Language Workshop Resources Grade 7				
	California Language Workshop Teacher Guide Grade 7				
	California Language Workshop Assessment Handbook Grade 7				
	Total for Classroom Package			**$9,496.00**	
	Reading Inventory				
6001572	9780545660297 SRI Web Subscription Student License (5000+)	$5.50			76
	(Enter 1yr Reading Inventory as NO Charge, per student)				
	Total for Reading Inventory				
Total for Grade 7				**$9,496.00**	
Grade 8					
	Classroom Package				
	SRP/TRP				
1616909	9780544607095 Collections California Premium Student Resource Package (print w/8yr digital) Grade 8 2017	$121.00 C	66	$7,986.00	
	California Student Edition Grade 8				
	Close Reader 8-year Print Subscription Grade 8				
	California Student Edition and Close Reader eTextbook ePub 8-Year Grade 8				
	California Interactive Digital Student Resources Enhanced 8-Year Grade 8				
	California Downloadable Student Resource Tool Grade 8				
	Performance Assessment 8-year Print Subscription Grade 8				
	HMH Close Reads App, Grade 8				
	Included in package but must be entered as a no charge line item separately:				
	3 Novels per Student or equivalent to 3 Novel Points.				

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jturner@mesaschool.org

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Mesa Union Elem School Dist

CA Collections 2017 GR 6-8 8 Year

ISBN	Title	Sale Price	Purchase Quantity	Purchase Amount	Complimentary Quantity
Grade 8					
1616930	9780544607668 Collections California Teacher Resource Package (print w/8yr digital) Grade 8 2017	$300.00 C	1	$300.00	
Package includes:					
California Teacher Edition Grade 8					
California Teacher Edition and Close Reader eTextbook ePub 8-Year Grade 8					
California Interactive Digital Teacher Resources Enhanced 8-Year Grade 8					
California Downloadable Teacher Resource Tool Grade 8					
Performance Assessment Teacher Edition Grade 8					
California Quick Start Pacing Guide Grade 8					
Included with the purchase of the Premium Package:					
California Language Workshop Resources Grade 8					
California Language Workshop Teacher Guide Grade 8					
California Language Workshop Assessment Handbook Grade 8					
	Total for Classroom Package			**$8,286.00**	
	Reading Inventory				
6001572	9780545660297 SRI Web Subscription Student License (5000+)	$5.50			66
(Enter 1yr Reading Inventory as NO Charge, per student)					
	Total for Reading Inventory				
Total for Grade 8				**$8,286.00**	
HMH Professional Services					
	AskHMH				
1642279	9780544816619 Collections 2017 California ASK HMH Individual 1-year	$199.00	3	$597.00	
AskHMH provides personalized performance support giving teachers just-in-time access to program experts. Teachers can ask pedagogical questions and request online conferencing to support implementation of California Collections. One-year subscription for a single user.					
	Total for AskHMH			**$597.00**	
	Getting Started				
1638254	9780544782693 Collections 2017 California Getting Started eLearning 35 User License	$349.00			1
Gain a fundamental understanding of California Collections curriculum and its rich set of classroom and digital resources. License for 25 users.					
	Total for Getting Started				
	Follow-up Courses				
1647700	9780544862029 Collections 2017 California Planning Effectively Follow Up Full Day InPerson	$2,950.00	1	$2,950.00	
In this full-day course, teachers learn to strategically plan engaging and rigorous daily and weekly lessons using California Collections. Participants engage in effective planning, prioritizing content and resources to impact student achievement.					
1647706	9780544862081 Collections 2017 California Progress Monitoring Follow Up Full Day In Person	$2,950.00	1	$2,950.00	
In this full-day course, teachers learn to monitor and assess student learning using California Collections. Participants understand the roles of formative and summative assessment from the lens of their HMH program and plan for how to effectively inform daily instruction using Collections assessments.					

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jturner@mesaschool.org

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Mesa Union Elem School Dist

CA Collections 2017 GR 6-8 8 Year

ISBN	Title	Sale Price	Purchase Quantity	Purchase Amount	Complimentary Quantity
HMH Professional Services					
1647712	9780544862142 Collections 2017 California Differentiate with HMH Player Digital Follow Up Full Day In Person	$2,950.00	1	$2,950.00	
In this full-day course, teachers learn to differentiate and personalize instruction for digital learners. Using the HMH Player App, participants will explore how to deliver instruction, effectively collaborate, monitor progress and differentiate using the HMH Player.					
Total for Follow-up Courses				**$8,850.00**	
Coaching					
1648059	9780544856097 Collections 2017 California Team Coaching Full Day In Person	$2,650.00	1	$2,650.00	
Team Coaching builds a community of learners, synchronizing teams of teachers across grade levels to share experience and expertise and collaborate on plans and protocol regarding product implementation.					
Total for Coaching				**$2,650.00**	
Total for HMH Professional Services				**$12,097.00**	

Proposal Summary

Subtotal Purchase Amount:	**$39,617.00**
Shipping & Handling:	**$0.00**
Sales Tax: (5.00%)	**$1,995.21**
Total Cost of Proposal (PO Amount):	**$41,612.21**

Proposal Date: 6/26/2017 | Proposal for | Expiration Date:8/10/2017

Mesa Union Elem School Dist

CA Collections 2017 GR 6-8 8 Year

Total Cost of Proposal (PO Amount): $ 41,612.21

This is a cost proposal only.

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<http://www.hmhco.com/common/terms-conditions>

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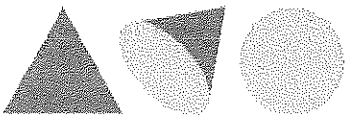
Date of Proposal: 6/26/2017 **Proposal Expiration Date:8/10/2017**



Houghton Mifflin Harcourt

Mesa Union School District

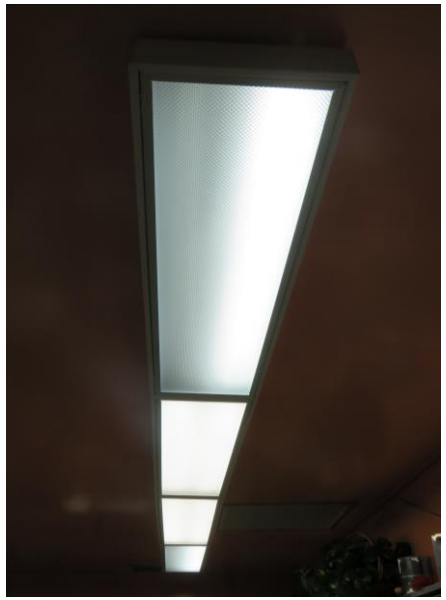
Prop 39 Energy Efficiency Project

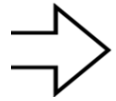
ALLIANCE
BUILDING SOLUTIONS, INC

Lighting

- Interior Lighting
  - Interior LED Upgrades

Totals
Lamps: **1,907**





ALLIANCE
BUILDING SOLUTIONS, INC

HVAC

- New High Efficiency Wall Mount HVAC Unit
  - (3) Units

- New High Efficiency HVAC Package Unit
  - (2) Units

ALLIANCE BUILDING SOLUTIONS, INC

Controls

- HVAC Controls System
  - Install Network-Based Programmable Smart Thermostats
    - (42) Units

ALLIANCE
BUILDING SOLUTIONS, INC

Project Summary

Project Amount	**$ 256,496**
Total Project Savings	**$ 360,101**
- Interior Lighting Upgrades	(1,907) Lamps
- HVAC Upgrades	(5) New High Efficiency HVAC Units
- Controls Upgrades	(42) Smart Wi-Fi Networked Thermostats

ALLIANCE
BUILDING SOLUTIONS, INC

Price Breakout

Price Breakout	Mesa Union School
Lighting Upgrades	$88,586
HVAC Upgrades	$62,370
Controls Upgrades	$28,350
Site Subtotals:	$179,306

Price Summary	
Project Subtotal:	$179,306
Proj Dev / APME / PM / GC:	$19,480
Overhead Expense:	$21,517
Gross Profit:	$17,624
Project Total*:	**$237,927**

Program Assistance :	$15,000
Performance Bond :	$3,569

Total Project Amount: $256,496

ALLIANCE BUILDING SOLUTIONS, INC

ALLIANCE
BUILDING SOLUTIONS, INC

Attachment A – Scope of Work

12526 High Bluff Drive Suite 345, San Diego, CA 92130
www.absenergy.com
(858) 333-4775
Contractor's License # 1008135

Mesa Union School

Lighting

- Replace existing interior linear fluorescent lighting systems with high efficiency light emitting diode (LED) systems. The LED systems shall provide equal or better color rendering to increase visual clarity and comfort, as well as eliminate fluorescent ballast noise and lamp flickering. LED systems have instant start capabilities and provide substantially longer equipment life. Please refer to the Lighting Submittal for specific quantities and locations.

Heating, Ventilation and Air Conditioning (HVAC)

- Replace (5) HVAC units with new high efficiency units of similar size and capacity. The existing equipment is past its useful effective life, suffers from efficiency loses, and creates maintenance issues for facility staff. Replacement shall include demolition of existing equipment and turn-key installation of new equipment, including start-up and testing of the new equipment installation. Refer to the HVAC Submittal for details, including specific units identified for replacement, equipment information, locations, capacities and ages.

Controls and Monitoring

- Install (42) network based smart thermostats to control HVAC equipment. The new smart thermostats shall be a networked system and will include a single point of access to adjust equipment schedules and space temperature setpoints across all connected thermostats. Heating and cooling setpoints will be user adjustable by the occupant within a preprogrammed amount during occupied times, and allow for afterhours operation with user input. Refer to the Controls & Monitoring Submittal for details, including specific equipment information and locations.

ALLIANCE
BUILDING SOLUTIONS, INC

Attachment B – Lighting Submittal

12526 High Bluff Drive Suite 345, San Diego, CA 92130
www.absenergy.com
(858) 333-4775
Contractor's License # 1008135

Mesa Union School - Detailed Lighting Inventory

ALLIANCE BUILDING SOLUTIONS, INC

General Information			Existing Fixture Data					Proposed Fixture Data				
Line	Measure Type	Space Description	Qty	Control	Description	Lamp Type	Fixture Watts	Qty	New Control	Proposed Description	Lamp Type	Fixture Watts
1	Interior Fixture Retrofit	Nurses Office	1	AB	(2) 32W T8 [48" (4'),]	T8	64	1		ESPEN - L48T/840/12G-EB	LED	24
2	Interior Fixture Retrofit	Nurse Office	6	AB	(3) 32W T8 [48" (4'),]	T8	96	6		ESPEN - L48T/840/12G-EB	LED	36
3	Interior Fixture Retrofit	Nurses Hallway	1	AB	(2) 32W T8 [48" (4'),]	T8	64	1		ESPEN - L48T/840/12G-EB	LED	24
4	Interior Fixture Retrofit	Main Office	9	AB	(3) 32W T8 [48" (4'),]	T8	96	9		ESPEN - L48T/840/12G-EB	LED	36
5	Interior Fixture Retrofit	Superintendents Office	6	AB	(3) 32W T8 [48" (4'),]	T8	96	6		ESPEN - L48T/840/12G-EB	LED	36
6	Interior Fixture Retrofit	Classroom 1	15	AB	(3) 32W T8 [48" (4'),]	T8	96	15		ESPEN - L48T/840/12G-EB	LED	36
7	Interior Fixture Retrofit	Classroom 2	15	AB	(4) 32W T8 [48" (4'),]	T8	128	15		ESPEN - L48T/840/12G-EB	LED	48
8	Interior Fixture Retrofit	Classroom 2	4	AB	(2) 32W T8 [48" (4'),]	T8	64	4		ESPEN - L48T/840/12G-EB	LED	24
9	Interior Fixture Retrofit	Classroom 3	18	AB	(4) 32W T8 [48" (4'),]	T8	128	18		ESPEN - L48T/840/12G-EB	LED	48
10	Interior Fixture Retrofit	Classroom 4A	3	AB	(3) 32W T8 [48" (4'),]	T8	96	3		ESPEN - L48T/840/12G-EB	LED	36
11	Interior Fixture Retrofit	Classroom 4B	15	AB	(3) 32W T8 [48" (4'),]	T8	96	15		ESPEN - L48T/840/12G-EB	LED	36
12	Interior Fixture Retrofit	Maintenance Office	3	Man	(2) 32W T8 [24" (2'),]	T8	64	3		ALEO LTR-22HE-22-840	LED	22
13	Interior Fixture Retrofit	District Office	3	AB	(3) 32W T8 [48" (4'),]	T8	96	3		ESPEN - L48T/840/12G-EB	LED	36
14	Interior Fixture Retrofit	Office	3	AB	(3) 32W T8 [48" (4'),]	T8	96	3		ESPEN - L48T/840/12G-EB	LED	36
15	Interior Fixture Retrofit	Office	1	Man	(2) 32W T8 [48" (4'),]	T8	64	1		ESPEN - L48T/840/12G-EB	LED	24
16	Interior Fixture Retrofit	Handicap Restroom	1	Man	(2) 32W T8 [48" (4'),]	T8	64	1		ESPEN - L48T/840/12G-EB	LED	24
17	Interior Fixture Retrofit	Girls Restroom	6	Man	(2) 32W T8 [48" (4'),]	T8	64	6		ESPEN - L48T/840/12G-EB	LED	24
18	Interior Fixture Retrofit	Boys Restroom	6	Man	(2) 32W T8 [48" (4'),]	T8	64	6		ESPEN - L48T/840/12G-EB	LED	24
19	Interior Fixture Retrofit	Restroom Hallway	3	AB	(3) 32W T8 [48" (4'),]	T8	96	3		ESPEN - L48T/840/12G-EB	LED	36
20	Interior Fixture Retrofit	Staff Lounge	10	Man	(1) 60W INC [A19, E26]	INC	60			-- No Change --		
21	Interior Fixture Retrofit	Staff Lounge	1	Man	(4) 32W T8 [48" (4'),]	T8	128	1		ESPEN - L48T/840/12G-EB	LED	48
22	Interior Fixture Retrofit	Conference Room	4	Man	(4) 40W T12 [48" (4'),]	T12	160	4		ESPEN - L48T/840/12G-EB	LED	48
23	Interior Fixture Retrofit	Outside Classroom 1	9	AB	(3) 32W T8 [48" (4'),]	T8	96	9		ESPEN - L48T/840/12G-EB	LED	36
24	Interior Fixture Retrofit	Outside Classroom 2	9	AB	(3) 32W T8 [48" (4'),]	T8	96	9		ESPEN - L48T/840/12G-EB	LED	36
25	Interior Fixture Retrofit	Maintenance Room	1	Man	(2) 32W T8 [48" (4'),]	T8	64	1		ESPEN - L48T/840/12G-EB	LED	24
26	Interior Fixture Retrofit	Maintenance Room	1	Man	(2) 75W T12 [96" (8'),]	T12	150	1		ESPEN - L96T8/840/24G-EB 96	LED	84
27	Interior Fixture Retrofit	Maintenance Room	3	Man	(1) 50W INC [,]	INC	50			-- No Change --		
28	Interior Fixture Retrofit	Multipurpose Room	24	AB	(4) 32W T8 [48" (4'),]	T8	128	24		ESPEN - L48T/840/12G-EB	LED	48
29	Interior Fixture Retrofit	Entry way to MPR	43	Man	(2) 18W CFL [2U (PLC),]	CFL	36			-- No Change --		
30	Interior Fixture Retrofit	Storage	10	Man	(2) 32W T8 [48" (4'),]	T8	64	10		ESPEN - L48T/840/12G-EB	LED	24
31	Interior Fixture Retrofit	Library	35	Man	(2) 32W T8 [48" (4'),]	T8	64	35		ESPEN - L48T/840/12G-EB	LED	24
32	Interior Fixture Retrofit	Library Offices	8	AB	(3) 32W T8 [48" (4'),]	T8	96	8		ESPEN - L48T/840/12G-EB	LED	36
33	Interior Fixture Retrofit	Library	20	Man	(2) 18W CFL [2U (PLC),]	CFL	36			-- No Change --		
34	Interior Fixture Retrofit	Computer Lab	24	AB	(3) 32W T8 [48" (4'),]	T8	96	24		ESPEN - L48T/840/12G-EB	LED	36
35	Interior Fixture Retrofit	Computer Lab	3	Man	(3) 32W T8 [48" (4'),]	T8	96	3		ESPEN - L48T/840/12G-EB	LED	36

Mesa Union School - Detailed Lighting Inventory (Continued)

ALLIANCE BUILDING SOLUTIONS, INC

General Information			Existing Fixture Data					Proposed Fixture Data				
Line	Measure Type	Space Description	Qty	Control	Description	Lamp Type	Fixture Watts	Qty	New Control	Proposed Description	Lamp Type	Fixture Watts
36	Interior Fixture Retrofit	Scence Lab	31	AB	(3) 32W T8 [48" (4'),]	T8	96	31		ESPEN - L48T/840/12G-EB	LED	36
37	Interior Fixture Retrofit	Classroom 21	12	AB	(4) 32W T8 [48" (4'),]	T8	128	12		ESPEN - L48T/840/12G-EB	LED	48
38	Interior Fixture Retrofit	Classroom 22	12	AB	(4) 32W T8 [48" (4'),]	T8	128	12		ESPEN - L48T/840/12G-EB	LED	48
39	Interior Fixture Retrofit	Classroom 23	12	AB	(4) 32W T8 [48" (4'),]	T8	128	12		ESPEN - L48T/840/12G-EB	LED	48
40	Interior Fixture Retrofit	Classroom 24	12	AB	(4) 32W T8 [48" (4'),]	T8	128	12		ESPEN - L48T/840/12G-EB	LED	48
41	Interior Fixture Retrofit	Classroom 25	10	AB	(4) 32W T8 [48" (4'),]	T8	128	10		ESPEN - L48T/840/12G-EB	LED	48
42	Interior Fixture Retrofit	Electrical Room Area C	2	Man	(4) 32W T8 [48" (4'),]	T8	128	2		ESPEN - L48T/840/12G-EB	LED	48
43	Interior Fixture Retrofit	Classroom 8	14	AB	(3) 32W T8 [48" (4'),]	T8	96	14		ESPEN - L48T/840/12G-EB	LED	36
44	Interior Fixture Retrofit	Classroom 7	14	AB	(3) 32W T8 [48" (4'),]	T8	96	14		ESPEN - L48T/840/12G-EB	LED	36
45	Interior Fixture Retrofit	Classroom 7	4	AB	(2) 32W T8 [48" (4'),]	T8	64	4		ESPEN - L48T/840/12G-EB	LED	24
46	Interior Fixture Retrofit	Classroom 6	14	AB	(3) 32W T8 [48" (4'),]	T8	96	14		ESPEN - L48T/840/12G-EB	LED	36
47	Interior Fixture Retrofit	Classroom 6	6	AB	(2) 32W T8 [48" (4'),]	T8	64	6		ESPEN - L48T/840/12G-EB	LED	24
48	Interior Fixture Retrofit	Classroom 5A	6	AB	(3) 32W T8 [48" (4'),]	T8	96	6		ESPEN - L48T/840/12G-EB	LED	36
49	Interior Fixture Retrofit	Classroom 5B	6	AB	(2) 32W T8 [48" (4'),]	T8	64	6		ESPEN - L48T/840/12G-EB	LED	24
50	Interior Fixture Retrofit	Restrooms Block C	2	Man	(2) 32W T8 [48" (4'),]	T8	64	2		ESPEN - L48T/840/12G-EB	LED	24
51	Interior Fixture Retrofit	Electrical Room Area D	2	Man	(4) 32W T8 [48" (4'),]	T8	128	2		ESPEN - L48T/840/12G-EB	LED	48
52	Interior Fixture Retrofit	Classroom 9	14	AB	(3) 32W T8 [48" (4'),]	T8	96	14		ESPEN - L48T/840/12G-EB	LED	36
53	Interior Fixture Retrofit	Classroom 10	14	AB	(3) 32W T8 [48" (4'),]	T8	96	14		ESPEN - L48T/840/12G-EB	LED	36
54	Interior Fixture Retrofit	Classroom 11	14	AB	(3) 32W T8 [48" (4'),]	T8	96	14		ESPEN - L48T/840/12G-EB	LED	36
55	Interior Fixture Retrofit	Classroom 12	14	AB	(3) 32W T8 [48" (4'),]	T8	96	14		ESPEN - L48T/840/12G-EB	LED	36
56	Interior Fixture Retrofit	Classroom 13	14	AB	(3) 32W T8 [48" (4'),]	T8	96	14		ESPEN - L48T/840/12G-EB	LED	36
57	Interior Fixture Retrofit	Classroom 14	14	AB	(3) 32W T8 [48" (4'),]	T8	96	14		ESPEN - L48T/840/12G-EB	LED	36
58	Interior Fixture Retrofit	Restrooms Block D	4	Man	(2) 32W T8 [48" (4'),]	T8	64	4		ESPEN - L48T/840/12G-EB	LED	24
59	Interior Fixture Retrofit	Classroom 15	14	AB	(3) 32W T8 [48" (4'),]	T8	96	14		ESPEN - L48T/840/12G-EB	LED	36
60	Interior Fixture Retrofit	Classroom 16	14	AB	(3) 32W T8 [48" (4'),]	T8	96	14		ESPEN - L48T/840/12G-EB	LED	36
61	Interior Fixture Retrofit	Classroom 17	14	AB	(3) 32W T8 [48" (4'),]	T8	96	14		ESPEN - L48T/840/12G-EB	LED	36
62	Interior Fixture Retrofit	Classroom 18	14	AB	(3) 32W T8 [48" (4'),]	T8	96	14		ESPEN - L48T/840/12G-EB	LED	36
63	Interior Fixture Retrofit	Classroom 19	14	AB	(3) 32W T8 [48" (4'),]	T8	96	14		ESPEN - L48T/840/12G-EB	LED	36
64	Interior Fixture Retrofit	Classroom 20	14	AB	(3) 32W T8 [48" (4'),]	T8	96	14		ESPEN - L48T/840/12G-EB	LED	36
65	Interior Fixture Retrofit	Restrooms Block E	5	Man	(2) 32W T8 [48" (4'),]	T8	64	5		ESPEN - L48T/840/12G-EB	LED	24
66	Interior Fixture Retrofit	Electrical Room Area E	2	Man	(4) 32W T8 [48" (4'),]	T8	128	2		ESPEN - L48T/840/12G-EB	LED	48
67	Interior Fixture Retrofit	Kitchen	16	Man	(2) 32W T8 [48" (4'),]	T8	64	16		ESPEN - L48T/840/12G-EB	LED	24
68	Interior Fixture Retrofit	Stage	12	Man	(2) 32W T8 [48" (4'),]	T8	64	12		ESPEN - L48T/840/12G-EB	LED	24
69	Interior Fixture Retrofit	Cafeteria	10	Man	(1) 75W INC [Par30,]	INC	75			-- No Change --		
70	Interior Fixture Retrofit	Cafeteria	25	Man	(2) 40W T12 [48" (4'),]	T12	80	25		ESPEN - L48T/840/12G-EB	LED	24

Mesa Union School - Detailed Lighting Inventory (Continued)

ALLIANCE BUILDING SOLUTIONS, INC

General Information			Existing Fixture Data					Proposed Fixture Data				
Line	Measure Type	Space Description	Qty	Control	Description	Lamp Type	Fixture Watts	Qty	New Control	Proposed Description	Lamp Type	Fixture Watts
71	Interior Fixture Retrofit	Storage	4	Man	(2) 32W T8 [48" (4'),]	T8	64	4		ESPEN - L48T/840/12G-EB	LED	24
72	Interior Fixture Retrofit	Exterior Storage of Cafeteria	6	Man	(2) 32W T8 [48" (4'),]	T8	64	6		ESPEN - L48T/840/12G-EB	LED	24
73	Exterior Fixture Retrofit	Exterior Wallpack Area B	8	T	(1) 70W HPS [N/A, E26]	HPS	70			-- No Change --		
74	Exterior Fixture Retrofit	Exterior Flood Area B	4	T	(1) 400W HPS [N/A, E26]	HPS	400			-- No Change --		
75	Exterior Fixture Retrofit	Exerior Wallpack Area A	25	T	(1) 70W HPS [N/A, E26]	HPS	70			-- No Change --		
76	Exterior Fixture Retrofit	Exterior Flood Area A	3	T	(1) 400W HPS [N/A, E26]	HPS	400			-- No Change --		
77	Exterior Fixture Retrofit	Exterior Flood Area A	1	T	(1) 70W HPS [N/A, E26] - Flood	HPS	70			-- No Change --		
78	Exterior Fixture Retrofit	Exterior Area G	1	T	(1) 100W HPS [N/A, E26]	HPS	100			-- No Change --		
79	Exterior Fixture Retrofit	Exterior Jar Lights Area G	2	T	(1) 60W INC [A19, E26]	INC	60			-- No Change --		
80	Exterior Fixture Retrofit	Exterior Flood Area F	6	T	(1) 400W HPS [N/A, E26]	HPS	400			-- No Change --		
81	Exterior Fixture Retrofit	Exterior Can Lights Area F	12	T	(2) 18W CFL [2U (PLC),]	CFL	36			-- No Change --		
82	Exterior Fixture Retrofit	Exterior Wall Packs Area C	15	T	(1) 70W HPS [N/A, E26]	HPS	70			-- No Change --		
83	Exterior Fixture Retrofit	Exterior Wall Packs Area D	12	T	(1) 70W HPS [N/A, E26]	HPS	70			-- No Change --		
84	Exterior Fixture Retrofit	Exterior Wall Packs Are E	13	T	(1) 70W HPS [N/A, E26]	HPS	70			-- No Change --		
85	Exterior Fixture Retrofit	Exterior Flood Area E	5	T	(1) 70W HPS [N/A, E26] - Flood	HPS	70			-- No Change --		

Control Key

Man	Manual
AB	A-B Switch
C	Ceiling Mounted Occ Sensor
W	Wall Mounted Occ Sensor
D	Dimming Control
Day	Daylighting Control (Photocell/Dimming)
P	Photocell (Exterior)
T	Timeclock (Exterior)
B	Bi-Level Occ Sensor (Exterior)

Features & Benefits

- No rewiring needed
- Works with fluorescent electronic ballast (Instant Start, Programmed Start, and Dimming)*
- Long life
- High CRI
- Instant on, no delay
- Convenient and quick installation
- Utilizes existing instant start or rapid start sockets
- Compatible with controls and sensors
- Dimmable
- Works in cold temperature applications
- Glass tube for superior optical performance
- 5 Year Warranty

* EMERGENCY BALLAST RESTRICTIONS

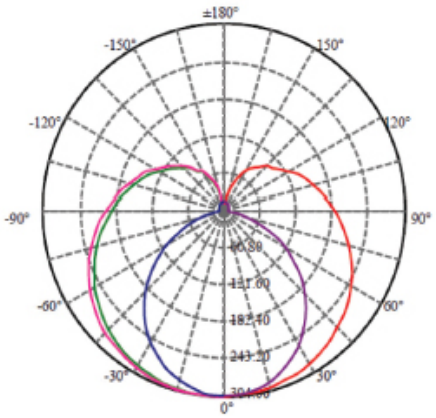
RetroFlex™
LED T8 LAMP • Simplicity.
Commercial Grade **LED T8 Lamp**

Specification Data

Order Code	Length	Lamp wattage	System wattage	CCT	Initial Lumens	CRI	Beam Angle	Lamp Efficacy	System Efficacy	Life	DLC
L48T8/850/12G-EB	48	12	14	5000K	1800	83	325	135	125	50,000	Yes
L48T8/840/12G-EB	48	12	14	4000K	1800	83	325	135	125	50,000	Yes
L48T8/835/12G-EB	48	12	14	3500K	1800	83	325	135	125	50,000	Yes

PRODUCT SPECIFICATIONS

Photometric Data

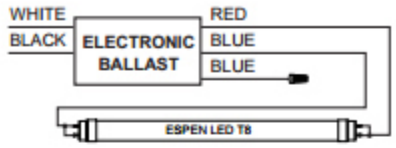


C195(Max) _____

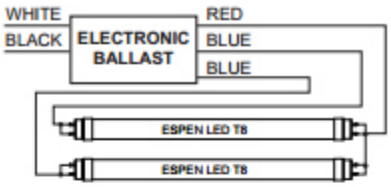
C0 _____
C180 _____
C90 _____
C270 _____

Wiring diagram

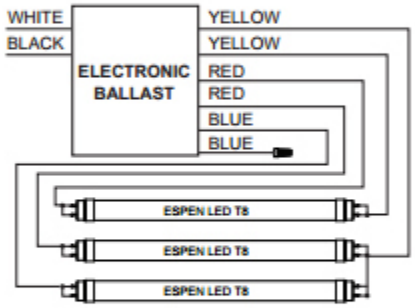
1-LAMP Instant Start Electronic Ballast



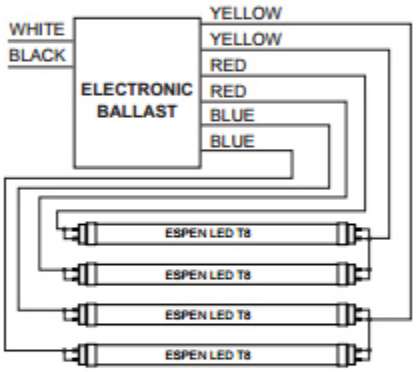
2-LAMP Instant Start Electronic Ballast



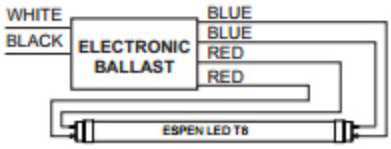
3-LAMP Instant Start Electronic Ballast



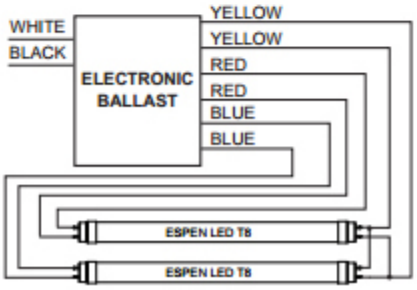
4-LAMP Instant Start Electronic Ballast



1-LAMP Programmed Start Electronic Ballast



2-LAMP Programmed Start Electronic Ballast



* Not compatible with products equipped with battery backup and/or emergency ballasts.
* Please refer to "Ballast Compatibility List" on Related Downloads.

Specification data is based on tests performed in a controlled environment and represents relative performance. Actual performance can vary depending on operating conditions. Application and performance data subject to change without notice. All specifications are nominal unless noted otherwise.

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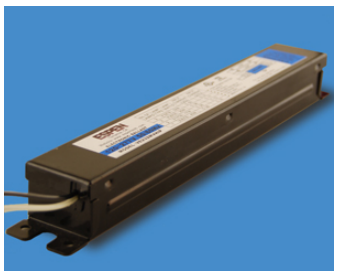
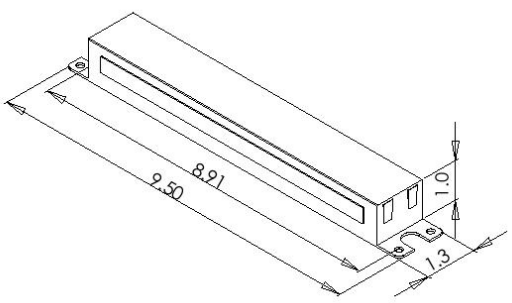


Model No.	VE232MVHIPE
Family	Elite
Ballast Type	Electronic
Lamp Operation	Parallel
Input Voltage	120/277V
Starting Method	Instant Start

PRODUCT SPECIFICATION — ELECTRONIC BALLASTS

Lamp Type	No. of Lamps	Input Voltage (V)	Input Current (A)	Input Power (W)	Power Factor	MAX THD (%)	Ballast Factor	Min. Starting Temp.(F/C)	Lamp Current Crest Factor	B.E.F.
F32T8 32W	2	120/277	0.46/0.20	55/54	0.98	10	0.89	0	1.7	1.59/1.60
F32T8/ES 30W	2	120/277	0.43/0.19	51	0.98	10/15	0.89	0	1.7	1.74/1.70
F32T8/ES 28W	2	120/277	0.41/0.18	49/47	0.98	10	0.89	0	1.7	1.82/1.70
F17T8 17W	1	120/277	0.17/0.08	19	0.98	10	1.06	0	1.7	
F17T8 17W	2	120/277	0.26/0.11	30	0.98	10	0.90	0	1.7	
F25T8 25W	1	120/277	0.23/0.10	28	0.98	10	1.05	0	1.7	
F25T8 25W	2	120/277	0.37/0.16	43	0.98	10	0.88	0	1.7	
F32T8/ES 25W	1	120/277	0.23/0.10	27	0.98	10	1.05	0	1.7	
F32T8/ES 25W	2	120/277	0.39/0.17	44	0.98	10	0.89	0	1.7	
F32T8/ES 28W	1	120/277	0.26/0.11	31	0.98	10	1.05	0	1.7	
F32T8/ES 30W	1	120/277	0.28/0.12	33	0.98	10	1.05	0	1.7	
F32T8 32W	1	120/277	0.30/0.13	35	0.98	10	1.05	0	1.7	
F40T8 40W	1	120/277	0.35/0.15	41	0.98	10	1.01	0	1.7	

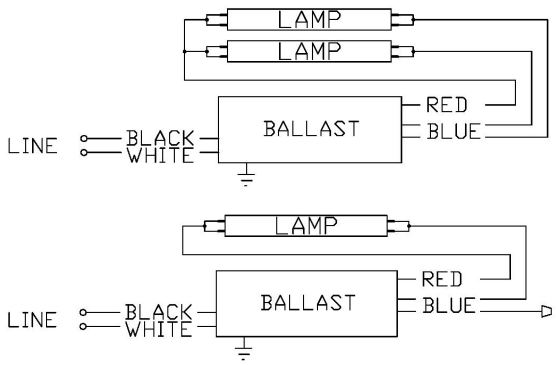
Physical Parameters



Enclosure	(in)
Length	9.5
Width	1.3
Height	1.0
Mounting	8.91

Lead Length	in.(+/-1.0)
Black	12
White	12
Red	36
Blue	24
Yellow	N/A

Wiring Diagram



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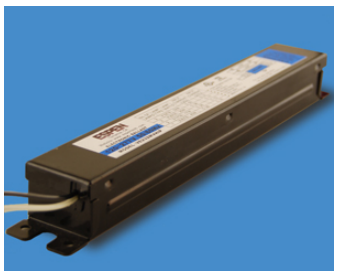
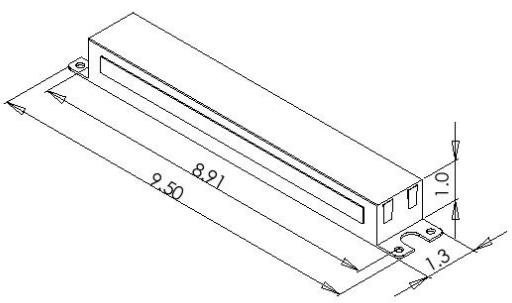


Model No.	VE332MVHIPE
Family	Elite
Ballast Type	Electronic
Lamp Operation	Parallel
Input Voltage	120/277V
Starting Method	Instant Start

PRODUCT SPECIFICATION — ELECTRONIC BALLASTS

Lamp Type	No. of Lamps	Input Voltage (V)	Input Current (A)	Input Power (W)	Power Factor	MAX THD (%)	Ballast Factor	Min. Starting Temp.(F/C)	Lamp Current Crest Factor	B.E.F.
F32T8 32W	3	120/277	0.71/0.31	84/83	0.98	10	0.88	0	1.7	1.05/1.06
F17T8	2	120/277	0.31/0.14	36	0.98	15	1.07	0	1.7	
F17T8 17W	3	120/277	0.39/0.18	46	0.98	10	0.92	0	1.7	
F25T8 25W	2	120/277	0.43/0.19	50	0.98	10	1.02	0	1.7	
F25T8 25W	3	120/277	0.55/0.24	65	0.98	10	0.90	0	1.7	
F32T8/ES 25W	2	120/277	0.43/0.19	50	0.98	10	1.02	0	1.7	
F32T8/ES 25W	3	120/277	0.56/0.24	66	0.98	10	0.88	0	1.7	
F32T8/ES 28W	2	120/277	0.47/0.21	56	0.98	10	1.02	0	1.7	
F32T8/ES 28W	3	120/277	0.63/0.27	74	0.98	10	0.88	0	1.7	
F32T8/ES 30W	2	120/277	0.49/0.22	59	0.98	10	1.02	0	1.7	
F32T8/ES 30W	3	120/277	0.68/0.29	80	0.98	10	0.88	0	1.7	
F32T8 32W	2	120/277	0.53/0.24	63	0.98	10	1.02	0	1.7	
F40T8 40W	2	120/277	0.65/0.28	75/74	0.98	10	1.03	0	1.7	

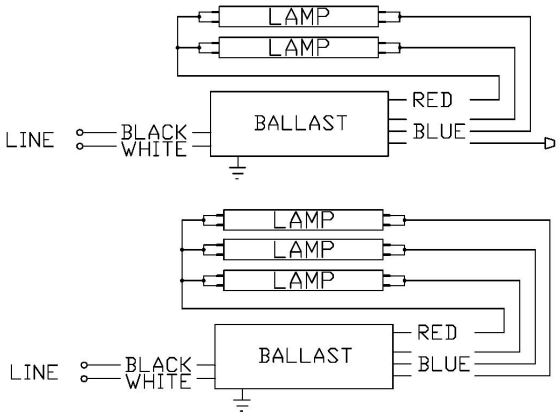
Physical Parameters



Enclosure	(in)
Length	9.5
Width	1.3
Height	1.0
Mounting	8.91

Lead Length	in.(+/-1.0)
Black	12
White	12
Red	36
Blue	24
Yellow	N/A

Wiring Diagram



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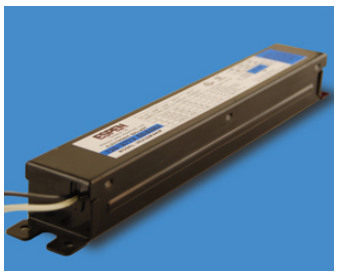


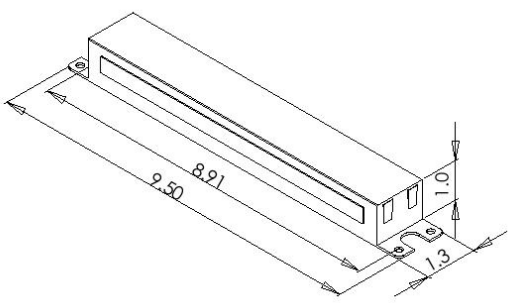
Model No.	VE432MVHIPE
Family	Elite
Ballast Type	Electronic
Lamp Operation	Parallel
Input Voltage	120/277V
Starting Method	Instant Start

PRODUCT SPECIFICATION

ELECTRONIC BALLASTS

Lamp Type	No. of Lamps	Input Voltage (V)	Input Current (A)	Input Power (W)	Power Factor	MAX THD (%)	Ballast Factor	Min. Starting Temp.(F/C)	Lamp Current Crest Factor	B.E.F.
F32T8 32W	4	120/277	0.94/0.40	110/108	0.99/0.98	10	0.88	0	1.7	0.80/0.81
F17T8	3	120/277	0.42/0.19	50	0.98	15	1.01	0	1.7	
F17T8 17W	4	120/277	0.50/0.22	59	0.98	10	0.91	0	1.7	
F25T8 25W	3	120/277	0.60/0.27	72	0.98	10	0.98	0	1.7	
F25T8 25W	4	120/277	0.73/0.32	86	0.98	10	0.89	0	1.7	
F32T8/ES 25W	3	120/277	0.60/0.27	72	0.98	10	0.98	0	1.7	
F32T8/ES 25W	4	120/277	0.74/0.32	87	0.98	10	0.88	0	1.7	
F32T8/ES 28W	3	120/277	0.67/0.29	80	0.98	10	0.98	0	1.7	
F32T8/ES 28W	4	120/277	0.82/0.36	97/96	0.98	10	0.88	0	1.7	
F32T8/ES 30W	3	120/277	0.71/0.31	84	0.98	10	0.98	0	1.7	
F32T8/ES 30W	4	120/277	0.89/0.39	105	0.98	10	0.88	0	1.7	
F32T8 32w	3	120/277	0.76/0.33	91/90	0.98	10	0.98	0	1.7	
F40T8 40W	3	120/277	0.93/0.39	110	0.98	10	0.94	32	1.7	

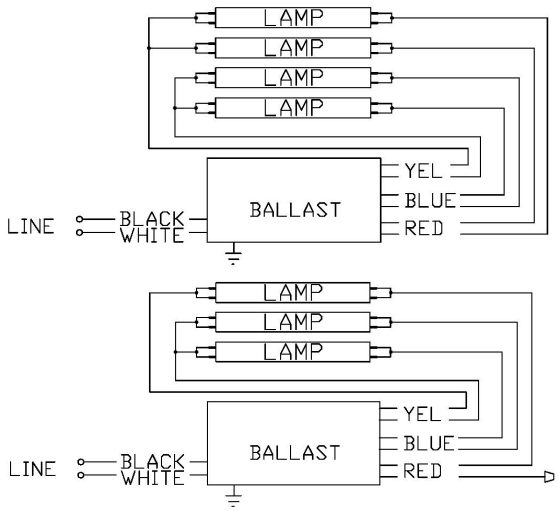
Physical Parameters



Enclosure	(in)
Length	9.5
Width	1.3
Height	1.0
Mounting	8.91

Lead Length	in.(+/-1.0)
Black	12
White	12
Red	24
Blue	24
Yellow	36

Wiring Diagram



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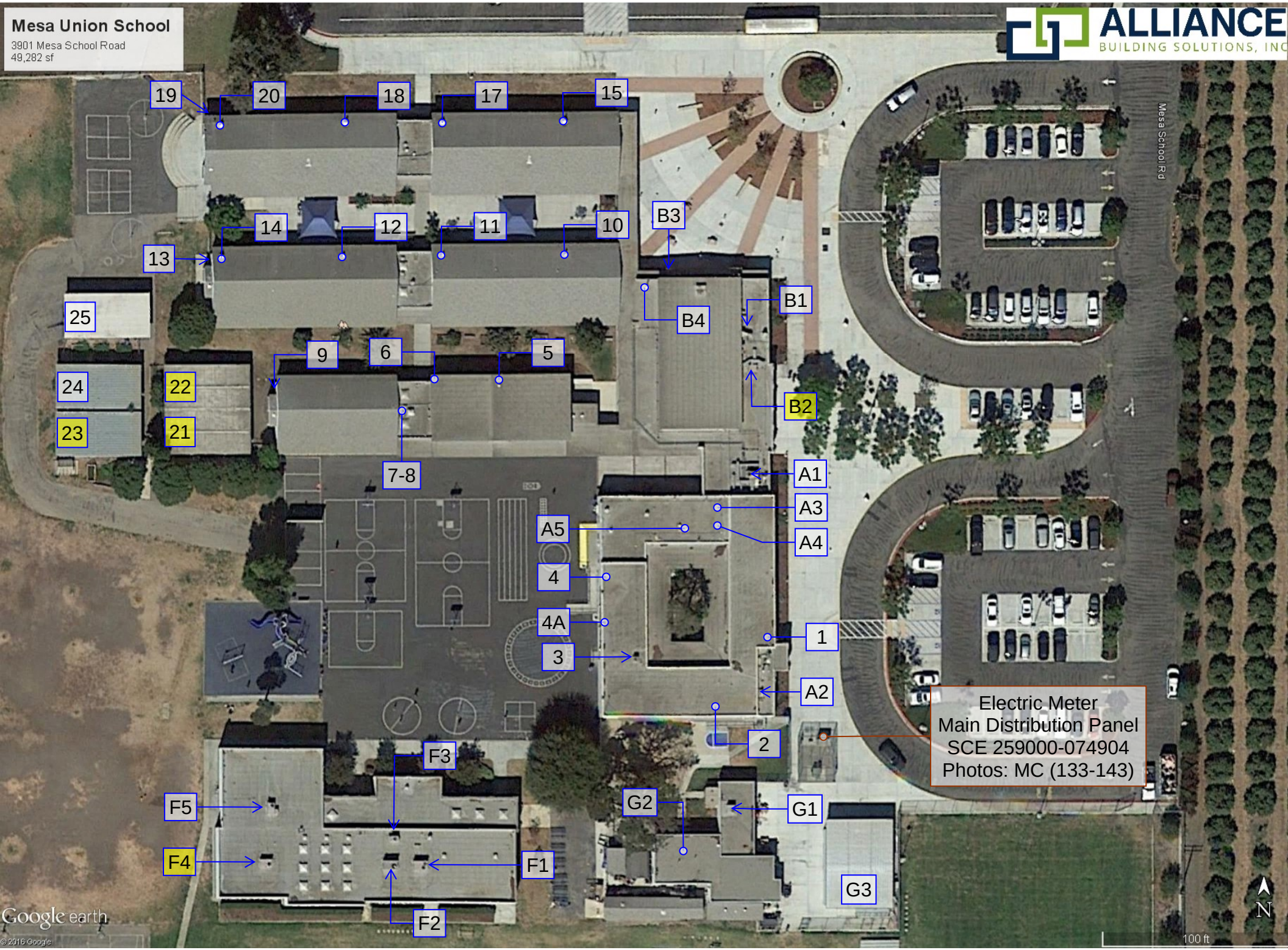
ALLIANCE
BUILDING SOLUTIONS, INC

Attachment C – HVAC Submittal

Mesa Union School - HVAC Inventory

ALLIANCE BUILDING SOLUTIONS, INC

Existing Equipment											Proposed Equipment		
Map ID	Unit Tag	Location Served	Equipment	Manufacturer	Model Number	Serial Number	Size	Year	Electrical	*Replace*	Manufacturer	Model Number	Min Efficiency
B1		Bldg B - Kitchen	Evap Cooler	AdobeAir	ES430G	A04000241	1/2 hp	2004	115V-1ph				
B2		Bldg B - Kitchen Stor.	Packaged Gas / Elec	Carrier	48SS-036040521AA	3497G10685	3.0-ton	1997	208/230V-3ph	*Yes*	Carrier	48VLN-36	14 SEER
B3		Bldg B - Elec Rm	Split Sys Cooling	Carrier	38AN009120	4803Y10545	0.8-ton	2003	115V-1ph				
B4		Bldg B - Cafeteria	Furnace	--inaccessible--	--inaccessible--	--inaccessible--	180 MBH	1997	115V-1ph				
A1		Bldg A - Office	Packaged Gas / Elec	Payne	585HBW060100ACAG	3287C92532	5.0-ton	1987	208/230V-1ph				
A2		Bldg A - IT Closet	Split Sys Cooling	Mitsubishi	MU-A09WA	4001673T	0.8-ton	2008					
A3		Conf. Office 1	Wall Furnace	Williams	20GV-A1-5	--inaccessible--	14 MBH	old	115V-1ph				
A4		Conf. Office 2	Wall Furnace	Williams	20GV-A1-5	--inaccessible--	14 MBH	old	115V-1ph				
A5		Conf. Office 3	Wall Furnace	Williams	20GV-A1-5	J0322427	14 MBH	old	115V-1ph				
1		Bldg A - Rm 1	Furnace	Midland Ross	20-10J	26694	80 MBH	1994	115V-1ph				
2		Bldg A - Rm 2	Furnace	Midland Ross	20-10J	--inaccessible--	80 MBH	1994	115V-1ph				
3		Bldg A - Rm 3	Split Sys Gas / Elec	Carrier	38CKC060300	3997E08066	5.0-ton	1997	208/230V-1ph				
4		Bldg A - Rm 4	Furnace	Midland Ross	20-10J	--inaccessible--	80 MBH	1994	115V-1ph				
4A		Bldg A - Rm 4A	Wall Furnace	Williams	20GV-A1-5	--inaccessible--	14 MBH	old	115V-1ph				
5		Bldg C - Rm 5A & 5B	Furnace	Bryant	395CAV060155	0598A05015	124 MBH	1998	115V-1ph				
6		Bldg C - Rm 6	Furnace	Carrier	--inaccessible--	--inaccessible--	60 MBH	1998	115V-1ph				
7		Bldg C - Rm 7	Furnace	Rheem	R801PA050314ZXB	W501610770	40 MBH	2016	115V-1ph				
8		Bldg C - Rm 8	Furnace	Rheem	R801PA050314ZXB	--inaccessible--	40 MBH	2016	115V-1ph				
9		Bldg C - IT Closet	Split Sys Cooling	Carrier	38AN009120	4803Y10551	0.8-ton	2003	115V-1ph				
10		Bldg D - Rm 9 & 10	Furnace	Carrier	--inaccessible--	--inaccessible--	120 MBH	1998	115V-1ph				
11		Bldg D - Rm 11	Furnace	Carrier	--inaccessible--	--inaccessible--	60 MBH	1998	115V-1ph				
12		Bldg D - Rm 12 & 13	Furnace	Carrier	--inaccessible--	--inaccessible--	120 MBH	1998	115V-1ph				
13		Bldg D - IT Closet	Split Sys Cooling	Carrier	--illegible--	--illegible--	0.8-ton	2003	115V-1ph				
14		Bldg D - Rm 14	Furnace	Carrier	--inaccessible--	--inaccessible--	60 MBH	1998	115V-1ph				
15		Bldg E - Rm 15 & 16	Furnace	Carrier	--inaccessible--	--inaccessible--	120 MBH	1998	115V-1ph				
17		Bldg E - Rm 17	Furnace	Carrier	--inaccessible--	--inaccessible--	60 MBH	1998	115V-1ph				
18		Bldg E - Rm 18 & 19	Furnace	Carrier	--inaccessible--	--inaccessible--	120 MBH	1998	115V-1ph				
19		Bldg E - IT Closet	Split Sys Cooling	Carrier	38AN009120	4803Y10533	0.8-ton	2003	115V-1ph				
20		Bldg E - Rm 20	Furnace	Carrier	--inaccessible--	--inaccessible--	60 MBH	1998	115V-1ph				
21		Portable - Rm 21	Wall Mount HP	Bard	WH421-A10VX4XXX	126H971122499-02	3.5-ton	1997	208/230V-1ph	*Yes*	Bard	C42H1	11 EER
22		Portable - Rm 22	Wall Mount HP	Bard	WH421-A10VX4XXX	126H971122493-03	3.5-ton	1997	208/230V-1ph	*Yes*	Bard	C42H1	11 EER
23		Portable - Rm 23	Wall Mount HP	Bard	WH421-A10VX4XXX	126N971176244-02	3.5-ton	1997	208/230V-1ph	*Yes*	Bard	C42H1	11 EER
24		Portable - Rm 24	Wall Mount HP	Bard	WH421-A10VX4XXX	126N971176270-02	3.5-ton	1997	208/230V-1ph				
25		Portable - Rm 25	Wall Mount HP	Eubank	H448B00A1FDS-NBAB	JB22462	4.0-ton	2010	208/230V-1ph				
F1		Bldg F - MPR	Packaged Gas / Elec	Carrier	48TMD009-M-501--	1404G30554	8.5-ton	2004	208/230V-3ph				
F2		Bldg F - Library	Packaged Gas / Elec	Carrier	48TCDD14A2A5A0A0A0	0915P96732	11.5-ton	2015	208/230V-3ph				
F3		Bldg F - Lobby	Packaged Gas / Elec	Carrier	48GSN024040301--	0604G11905	2.0-ton	2004	208/230V-1ph				
F4		Bldg F - PC Lab	Packaged Gas / Elec	Carrier	48TFL006-M-511--	1404G30491	5.0-ton	2004	208/230V-3ph	*Yes*	Carrier	48HC-006	14 SEER
F5		Bldg F - Science Lab	Packaged Gas / Elec	Carrier	48TFL006-M-511--	1404G30492	5.0-ton	2004	208/230V-3ph				
G1		Bldg G - Conf Rm	Packaged Heat Pump	Rheem	RQKA-A018JK	5615F199812171	1.5-ton	1998	208/230V-1ph				
G2		Bldg G - Staff Lounge	Wall Furnace	Williams	20GV-A1-5	--inaccessible--	14 MBH	old	115V-1ph				
G3		Bldg G - Locker Rooms	Wall Mount HP	Bard	W43H1-A04HH4XXX	349H102707712-02	3.5-ton	2010	208/230V-1ph				


Mesa Union School
3901 Mesa School Road
49,282 sf
ALLIANCE
BUILDING SOLUTIONS, INC
Mesa School Rd
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7-8
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A3
A4
A5
4
4A
3
1
A2
2
Electric Meter
Main Distribution Panel
SCE 259000-074904
Photos: MC (133-143)
F3
F5
F4
F1
F2
G2
G1
G3
N
100 ft
Google earth
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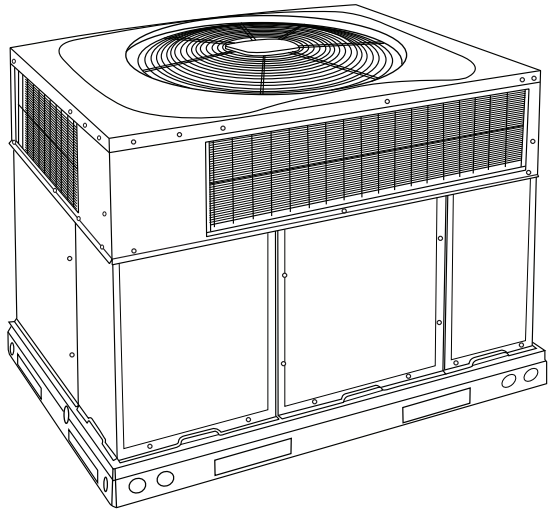
48VL−B
Comfort™ 14 SEER Single−Packaged Air Conditioner and Gas Furnace System with Puron® (R−410A) Refrigerant
Single and Three Phase
2 to 5 Nominal Tons (Sizes 24−60)

Carrier
turn to the experts

Product Data



A09034

Fig. 1 - Unit 48VL-B

Single-Packaged Products with Energy-Saving Features and Puron® refrigerant.

- 14.2 to 14.5 SEER
- 12.0 EER
- 81.0% AFUE (Single phase models)
- Factory-Installed TXV
- ECM Motor-Standard
- Direct Spark Ignition
- Low Sound Levels
- Dehumidification Feature

FEATURES/BENEFITS

One-piece heating and cooling units with low sound levels, easy installation, low maintenance, and dependable performance.

Puron is Carrier's unique refrigerant designed to help protect the environment. Puron is an HFC refrigerant which does not contain chlorine that can harm the ozone layer. The most important advantage of Puron refrigerant is that it has not been banned in future air conditioning systems as the traditional refrigerant R-22 has been. Puron refrigerant is in service in millions of systems proving highly reliable, environmentally sound performance.

Easy Installation

Factory-assembled package is a compact, fully self-contained, combination gas heating/electric cooling unit that is prewired, pre-piped, and pre-charged for minimum installation expense. These units are available in a variety of standard and optional heating/ cooling size combinations with voltage options to meet residential and light commercial requirements. Units are lightweight and install easily on a rooftop or at ground level. The high tech composite base eliminates rust problems associated with ground level applications.

Innovative Unit Base Design

On the inside a high-tech composite material will not rust and incorporates a sloped drain pan which improves drainage and helps inhibit mold, algae and bacterial growth. On the outside metal base rails provide added stability as well as easier handling and rigging.

Convertible duct configuration

Unit is designed for use in either downflow or horizontal applications. Each unit is converted from horizontal to downflow and includes two horizontal duct covers. Downflow operation is provided in the field to allow vertical ductwork connections. The basepan seals on the bottom openings to ensure a positive seal in the vertical airflow mode.

Efficient operation High-efficiency design offers SEER (Seasonal Energy Efficiency Ratios) of 14.2 to 14.5, 12.0 EER, and AFUE (Annual Fuel Utilization Efficiency) ratings up to 81.0%.

Energy-saving, direct spark ignition saves gas by operating only when the room thermostat calls for heating. Standard units are furnished with natural gas controls. A low-cost field installed kit for propane conversion is available for all units.

Low NOx units are designed for California installations. These models meet the California maximum oxides of nitrogen (NOx) emissions requirement of 40 nanograms/joule or less as shipped from the factory and MUST be installed in California Air Quality Management Districts and wherever a Low NOx rule exists.

Durable, dependable components Compressors are designed for high efficiency. Each compressor is hermetically sealed against contamination to help promote longer life and dependable operation. Each compressor also has vibration isolation to provide quieter operation. All compressors have internal high pressure and overcurrent protection.

Monoport inshot burners produce precise air-to-gas mixture, which provides for clean and efficient combustion. The large monoport on the inshot (or injection type) burners seldom, if ever, requires cleaning. All gas furnace components are accessible in one compartment.

Turbo-tubular™ heat exchangers are constructed of aluminized steel for corrosion resistance and optimum heat transfer for improved efficiency. The tubular design permits hot gases to make multiple passes across the path of the supply air.

In addition, dimples located on the heat exchanger walls force the hot gases to stay in close contact with the walls, improving heat transfer.

ECM Motor is standard on all models.

Direct-drive PSC (Permanent Split Capacitor) condenser-fan motors are designed to help reduce energy consumption and provide for cooing operation down to 40°F (4.4°C) outdoor temperature. Motormaster® II low ambient kit is available as a field-installed accessory.

Thermostat controls

Time Guard® II anti-short cycle protection circuitry. If a non-corporate thermostat without anti-short cycle protection is used the Time Guard II field-installed anti-short cycle kit is recommended.

Thermostatic Expansion Valve - A hard shutoff, balance port TXV maintains a constant superheat at the evaporator exit (cooling cycle) resulting in higher overall system efficiency.

Refrigerant system is designed to provide dependability. Liquid filter driers are used to promote clean, unrestricted operation. Each unit leaves the factory with a full refrigerant charge. Refrigerant service connections make checking operating pressures easier.

High and Low Pressure Switches provide added reliability for the compressor.

Indoor and Outdoor coils are computer-designed for optimum heat transfer and efficiency. The indoor coil is fabricated from copper tube and aluminum fins and is located inside the unit for protection against damage. The outdoor coil is internally mounted on the top tier of the unit.

Low sound ratings ensure a quiet indoor and outdoor environment with sound ratings as low as 72dBA.

Easy to service cabinets provide easy 3-panel accessibility to serviceable components during maintenance and installation. The basepan with integrated drain pan provides easy ground level installation with mounting pad. A nesting feature ensures a positive basepan to roof curb seal when the unit is roof mounted. A convenient 3/4-in. (19.05 mm) wide perimeter flange makes frame mounting on a rooftop easy.

Standard horizontal metal duct covers with insulation come with the unit and cover the horizontal duct openings. These can be left in place if the units are converted to downflow.

Integrated Gas Control (IGC) board provides safe and efficient control of heating and simplifies trouble-shooting through its built-in diagnostic function.

Cabinets are constructed of heavyduty, phosphated, zinc-coated prepainted steel capable of withstanding 500 hours in salt spray. Interior surfaces of the evaporator/heat exchanger compartment are insulated with cleanable semi-rigid insulation board, which keeps the conditioned air from being affected by the outdoor ambient temperature and provides improved indoor air quality. (Conforms to American Society of Heating, Refrigeration and Air Conditioning Engineers 62.2.) The sloped drain pan minimizes standing water in the drain. An external drain is provided.

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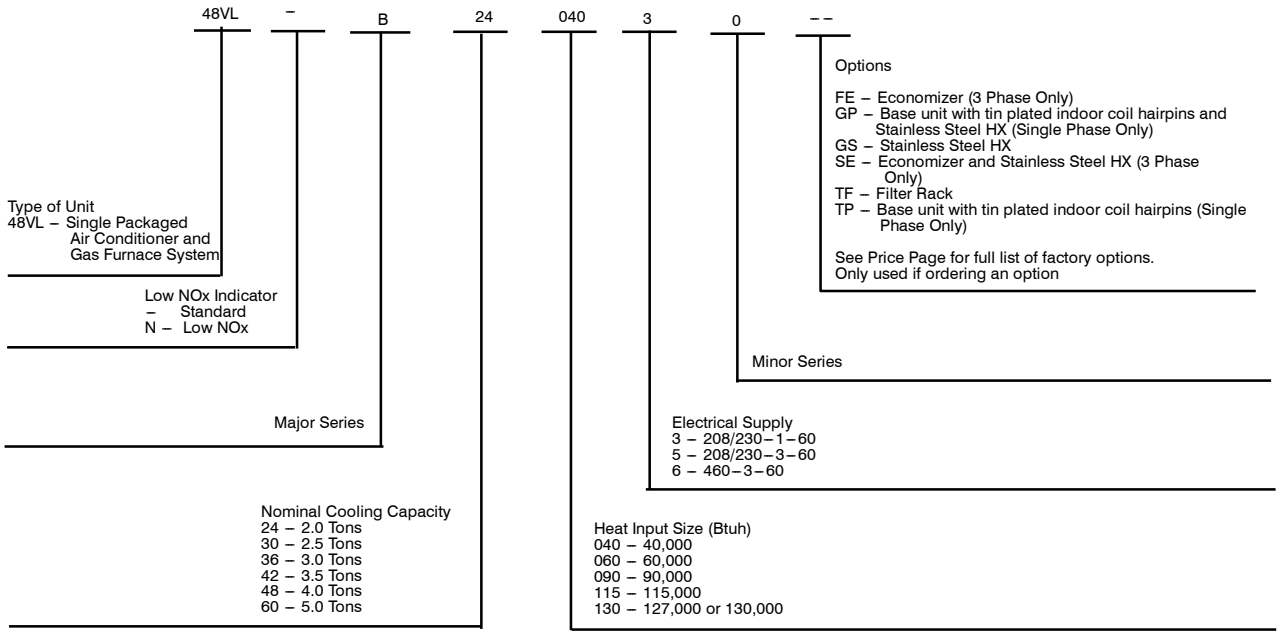
MODEL NUMBER NOMENCLATURE



ASHRAE 90.1 COMPLIANT

GAS-FIRED

c UL us LISTED

c UL us LISTED

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Use of the AHRI Certified TM Mark indicates a manufacturer's participation in the program For verification of certification for individual products, go to www.ahridirectory.org.

ENERGY STAR

AHRI* CAPACITIES

Cooling Capacities and Efficiencies

UNIT SIZE	NOMINAL TONS	STANDARD CFM	COOLING CAPACITY	EER	SEER
24	2	800	23600	12.0	14.5
30	2.5	1000	28600	12.0	14.5
36	3	1200	34200	12.0	14.5
42	3.5	1400	41000	12.0	14.5
48	4	1600	47000	12.0	14.2
60	5	1750	57000	12.0	14.2

LEGEND
dB–Sound Levels (decibels)
db—Dry Bulb
SEER—Seasonal Energy Efficiency Ratio
wb—Wet Bulb
COP–Coefficient of Performance
* Air Conditioning, Heating & Refrigeration Institute.
**At "A" conditions–80°F (26.7°C) indoor db/67°F (19.4°C) indoor wb & 95°F (35°C) outdoor db.
† Rated in accordance with U.S. Government DOE Department of Energy) test procedures and/or AHRI Standards 210/240.

Notes:
1. Ratings are net values, reflecting the effects of circulating fan heat. Ratings are based on:
Cooling Standard: 80°F (26.7°C) db, 67°F wb (19.4°C) indoor entering–air temperature and 95°F db (35°C) outdoor entering–air temperature.
2. Before purchasing this appliance, read important energy cost and efficiency information available from your retailer.

48VL–B

Gas Heating Capacities and Efficiencies, Single Phase Models

UNIT SIZE	HEATING INPUT (Btuh)	OUTPUT CAPACITY (Btuh)	TEMPERATURE RISE RANGE °F 〈°C)	AFUE (%)
24040 **30040**	40,000	33,000	25–55 (14–31)	81.0
24060 **30060** **36060** **42060**	60,000	49,000	25–55 (14–31)	81.0
36090 **42090** **48090** **60090**	90,000	73,000 74,000 74,000 74,000	35–65 (19–36)	81.0
48115 **60115**	115,000	94,000	30–60 (17–33)	81.0
48130 **60130**	127,000	104,000	35–65 (19–36)	81.0

LEGEND
AFUE—Annual Fuel Utilization Efficiency
NOTE: Before purchasing this appliance, read important energy cost and efficiency information available from your retailer.

Gas Heating Capacities and Efficiencies, Three Phase Models

UNIT SIZE	HEATING INPUT (Btuh)	OUTPUT CAPACITY (Btuh)	TEMPERATURE RISE RANGE °F 〈°C)	AFUE (%)
24040 **30040**	40,000	32,000	30–60 (17–33)	80.0
24060 **30060** **36060** **42060**	60,000	48,000 48,000 48,000 47,000	25–55 (14–31)	80.0 80.0 80.0 78.5
36090 **42090** **48090** **60090**	90,000	72,000 73,000 73,000 73,000	35–65 (19–36)	79.3 80.4 80.4 80.4
48115 **60115**	115,000	93,000	30–60 (17–33)	80.3
48130 **60130**	130,000	103,000	35–65 (19–36)	78.9

LEGEND
AFUE—Annual Fuel Utilization Efficiency
NOTE: Before purchasing this appliance, read important energy cost and efficiency information available from your retailer.

A-Weighted Sound Power Level (dBA)

UNIT SIZE	SOUND RATING	TYPICAL OCTAVE BAND SPECTRUM (without tone adjustment)						
		125	250	500	1000	2000	4000	8000
24	76	58.0	65.5	71.5	71.0	65.5	60.5	53.0
30	73	62.0	64.0	67.5	67.5	65.0	60.0	54.5
36	76	64.5	66.5	70.0	70.0	67.5	61.0	54.0
42	77	70.5	68.0	70.5	70.5	68.0	62.5	58.0
48	77	71.5	65.0	71.0	67.5	67.5	63.0	57.5
60	77	73.5	65.5	68.5	67.5	66.5	62.0	58.0

NOTE: Tested in accordance with AHRI Standard 270–1995 (not listed in AHRI).

PHYSICAL DATA

UNIT SIZE	24040	24060	30040	30060	36060	36090	42060	42090
NOMINAL CAPACITY (ton)	2	2	2–1/2	2–1/2	3	3	3–1/2	3–1/2
SHIPPING WEIGHT** lb.	337	337	349	349	383	383	472	472
SHIPPING WEIGHT** (kg)	153	153	158	158	174	174	214	214
COMPRESSOR / QUANTITY	Scroll / 1							
REFRIGERANT (R–410A)								
Quantity lb.	6.0	6.0	5.6	5.6	9.5	9.5	8.8	8.8
Quantity (kg)	2.7	2.7	2.5	2.5	4.3	4.3	4.0	4.0
REFRIGERANT METERING DEVICE	TXV							
OUTDOOR COIL								
Rows...Fins/in.	1..21	1...21	1...21	1...21	2...21	2...21	2...21	2...21
Face Area (sq ft)	11.9	11.9	13.6	13.6	15.4	15.4	13.6	13.6
OUTDOOR FAN								
Nominal CFM	2500	2500	2700	2700	2800	2800	3000	3000
Diameter in.	24	24	24	24	24	24	26	26
Diameter (mm)	609.6	609.6	609.6	609.6	609.6	609.6	660.4	660.4
Motor Hp (Rpm)	1/10 (810)	1/10 (810)	1/10 (810)	1/10 (810)	1/5 (810)	1/5 (810)	1/5 (810	1/5 (810)
INDOOR COIL								
Rows...Fins/in.	3...17	3...17	3...17	3...17	3...17	3...17	3...17	3...17
Face Area (sq ft)	3.7	3.7	3.7	3.7	3.7	3.7	4.7	4.7
INDOOR BLOWER								
Nominal Cooling Airflow (Cfm)	800	800	1000	1000	1200	1200	1400	1400
Size in.	10x10	10x10	10x10	10x10	11x10	11x10	11x10	11x10
Size (mm.)	254x254	254x254	254x254	254x254	279.4x254	279.4x254	279.4x254	279.4x254
Motor HP (RPM)	1/2 (1050)	1/2 (1050)	1/2 (1050)	1/2 (1050)	3/4 (1000)	3/4 (1000)	3/4 (1075)	3/4 (1075)
FURNACE SECTION*								
Burner Orifice No. (Qty...Drill Size)								
1 Phase Natural Gas (Factory Installed)	2...44	3...44	2...44	3...44	3...44	3...38	3...44	3...38
1 Phase Propane Gas	2...55	3...55	2...55	3...55	3...55	3...53	3...55	3...53
3 Phase Natural Gas (Factory Installed)	2...44	2...38	2...44	2...38	2...38	3...38	2...38	3...38
3 Phase Propane Gas	2...55	2...53	2...55	2...53	2...53	3...53	2...53	3...53
HIGH-PRESSURE SWITCH (psig) Cut-out Reset (Auto)	650 +/- 15 420 +/- 25							
LOSS-OF-CHARGE / LOW-PRESSURE SWITCH (Liquid Line) (psig) cut-out Reset (auto)	20 +/- 5 45 +/- 10							
RETURN–AIR FILTERS†‡								
Throwaway Size in.	20x20x1	20x24x1			24x30x1			
(mm)	508x508x25	508x610x25			610x762x25			

UNIT SIZE	48090	48115	48130	60090	60115	60130
NOMINAL CAPACITY (ton)	4	4	4	5	5	5
SHIPPING WEIGHT** lb	490	490	490	518	518	518
SHIPPING WEIGHT** kg	222	222	222	235	235	235
COMPRESSOR / QUANTITY	Scroll / 1					
REFRIGERANT (R–410A)						
Quantity lb	9.4	9.4	9.4	12.5	12.5	12.5
Quantity (kg.)	4.3	4.3	4.3	5.7	5.7	5.7
REFRIGERANT METERING DEVICE	TXV					
OUTDOOR COIL						
Rows...Fins/in.	2...21	2...21	2...21	2...21	2...21	2...21
Face Area (sq ft)	17.5	17.5	17.5	21.4	21.4	21.4
OUTDOOR FAN						
Nominal Cfm	3200	3200	3200	3600	3600	3600
Diameter in.	26	26	26	26	26	26
Diameter (mm)	660.4	660.4	660.4	660.4	660.4	660.4
Motor Hp (Rpm)	1/5 (810)	1/5 (810)	1/5 (810)	1/5 (810)	1/5 (810)	1/5 (810)
INDOOR COIL						
Rows...Fins/in.	3...17	3...17	3...17	3...17	3...17	3...17
Face Area (sq ft)	4.7	4.7	4.7	5.7	5.7	5.7
INDOOR BLOWER						
Nominal Cooling Airflow (Cfm)	1600	1600	1600	1750	1750	1750
Size in.	11x10	11x10	11x10	11x10	11x10	11x10
Size (mm)	279.4x254	279.4x254	279.4x254	279.4x254	279.4x254	279.4x254
Motor HP (RPM)	1.0 (1075)	1.0 (1075)	1.0 (1075)	1.0 (1040)	1.0 (1040)	1.0 (1040)
FURNACE SECTION*						
Burner Orifice No. (Qty...Drill Size)						
1 & 3 Phase Natural Gas (Factory Installed)	3...38	3...33	3...31	3...38	3...33	3...31
1 & 3 Phase Propane Gas	3...53	3...51	3...49	3...53	3...51	3...49
HIGH-PRESSURE SWITCH (psig) Cut-out Reset (Auto)	650 +/- 15 420 +/- 25					
LOSS-OF-CHARGE / LOW-PRESSURE SWITCH (Liquid Line) (psig) cut-out Reset (auto)	20 +/- 5 45 +/- 10					
RETURN-AIR FILTERS Throwaway†‡ in. (mm)	24x36x1 610x914x25					

*Based on altitude of 0 to 2000 ft (0–610 m).

† Required filter sizes shown are based on the larger of the AHRI (Air Conditioning Heating and Refrigeration Institute) rated cooling airflow or the heating airflow velocity of 300 ft/minute for throwaway type. Air filter pressure drop for non–standard filters must not exceed 0.08 IN. W.C.

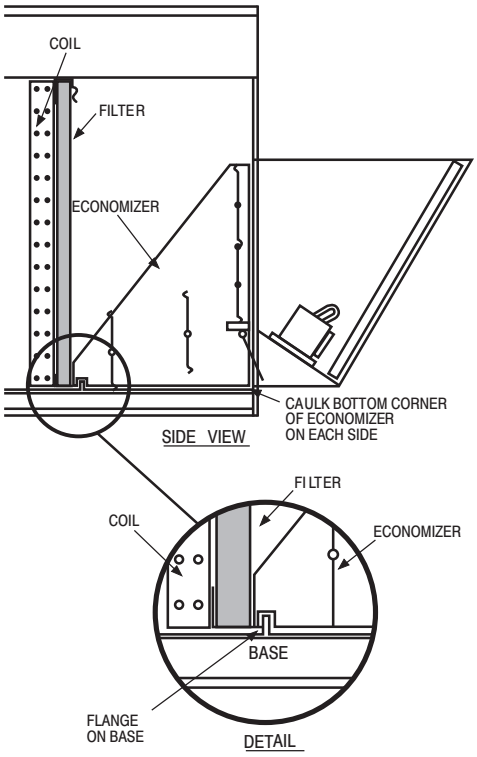
‡ If using accessory filter rack refer to the filter rack installation instructions for correct filter sizes and quantity.

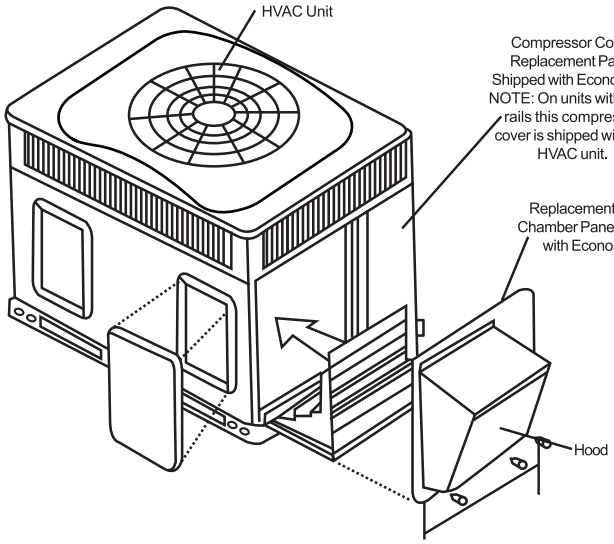
** For 460 volt units, add 14 lbs (6.35 kg) to the shipping weight.

OPTIONS AND ACCESSORIES

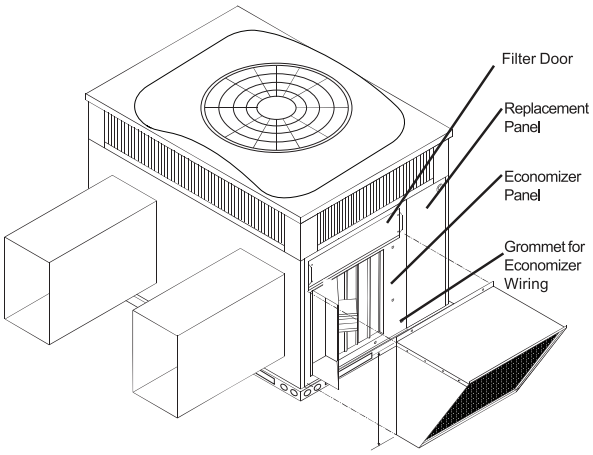
ITEM	DESCRIPTION	FACTORY INSTALLED OPTION	FIELD INSTALLED ACCESSORY
Coil Options	Base unit with tin plated indoor coil hairpins	X	
Compressor Start Kit	Compressor Start Kit assists compressor start–up by providing additional starting torque on sing phase units only.		X
Corporate Thermostats	Thermostats provide control for the system heating and cooling functions.		X
Crankcase Heater	Crankcase Heater provides anti–floodback protection for low–load cooling applications.		X*
Economizer	Horizontal Economizer with solid state controls and barometric relief dampers includes filter racks and provide outdoor air during cooling and reduce compressor operation.		X
	Vertical Economizer with solid state controls and barometric relief dampers includes filter racks and provide outdoor air during cooling and reduce compressor operation.	X	X
Filter Rack	Filter Rack features easy installation, serviceability, and high–filtering performance for vertical applications. Includes 1–in. filter.	X	X
Flat Roof Curbs	Flat Roof Curbs in both 11–in (279 mm) and 14–in. (356 mm) sizes are available for roof mounted applications.		X
Flue Discharge Deflector	Directs flue gas exhaust 90 degrees upward from current discharge.		X
Heat Exchanger	Stainless Steel Heat Exchanger	X	
High Altitude Propane Conversion Kit	High Altitude Propane Conversion Kit is for use at 2001 to 6000 ft. (611–1829 m) above sea level. Kit consists of propane gas orifices that compensate for gas heat operation at high altitude.		X
Low Ambient Kit	Low Ambient Kit (Motormaster II Control) allows the use of mechanical cooling down to outdoor temperatures as low as 0°F (–18° C) when properly installed.		X
Manual Outside Air Damper	Manual Outside Air Damper includes hood and filter rack with adjustable damper blade for up to 25% outdoor air.		X
Natural to Propane Gas Conversion Kit	Natural to Propane Gas Conversion Kit allows for conversion from natural gas to propane gas (0–2000 ft) (0–610 m)		X
Propane to Natural Gas Conversion Kit	Propane to Natural Gas Conversion Kit allows for conversion from propane to natural gas for altitudes of 0–2000 ft (0–610 m)		X
Square–to–Round Duct Transition Kit	Square–to–Round Duct Transition Kit enable 24–48 size units to be fitted to 14 in. (356 mm) round ductwork.		X
Time Guard II	Automatically prevents the compressor from restarting for at least 4 minutes and 45 seconds after shutdown of the compressor. Not required when a corporate programmable thermostat is applied or with a RTU–MP control.		X
Louver Metal Outdoor Coil Grilles	Louver Metal Outdoor Coil Grilles provide hail and vandalism protection.		X

*Refer to Price Page for application detail.

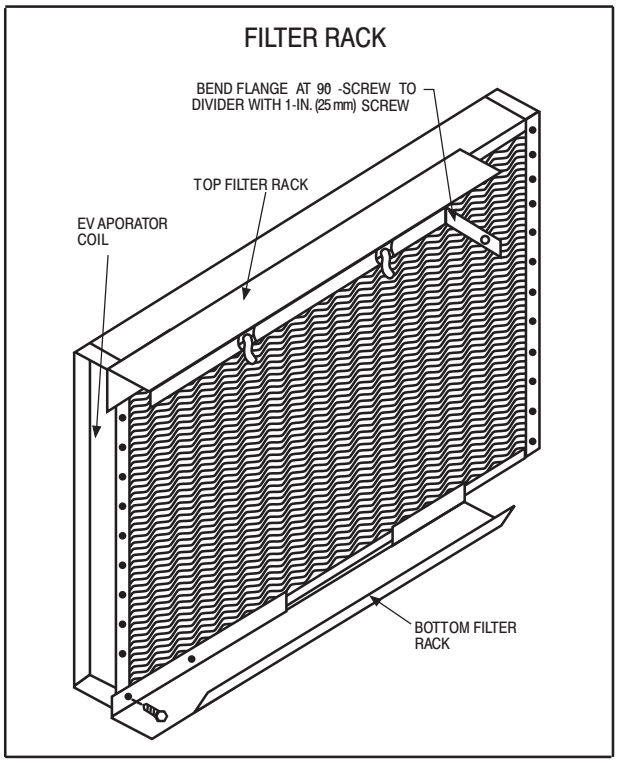


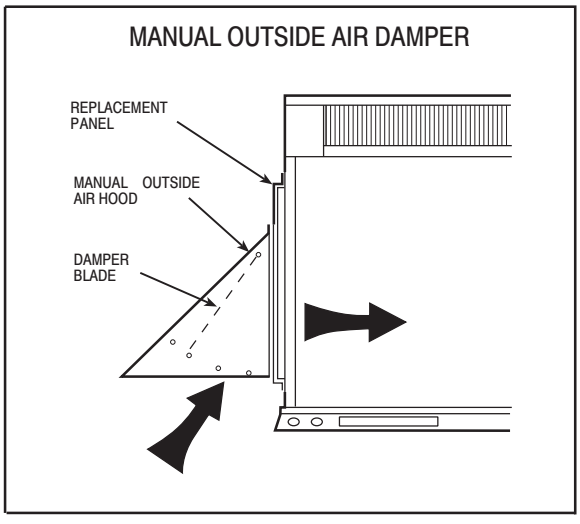


Vertical Economizer



Horizontal Economizer





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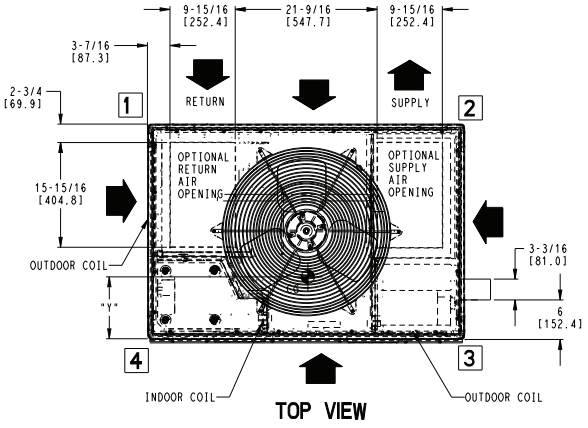
UNIT DIMENSIONS - 24-36

UNIT	ELECTRICAL CHARACTERISTICS	UNIT WT.		UNIT HEIGHT IN/MM		CENTER OF GRAVITY IN/MM					
		LB	KG	"A"		X		Y		Z	
48VL(-/N)B24(040/060)30	208/230-1-60	330	149.6	42-1/8	1070	22-13/16	579.4	15-5/16	388.9	15-11/16	398.5
48VL(-/N)B30(040/060)(3/5)0	208/230-1, 208/230-3-60	342	155.0	44-1/8	1121	22-13/16	579.4	15-5/16	388.9	15-13/16	401.6
48VL(-/N)B36(060/090)(3/5)0	208/230-1, 208/230-3-60	376	170.4	46-1/8	1172	22-13/16	579.4	15-5/16	388.9	16-5/8	422.3
48VL(-/N)B36(060/090)60	460-3-60	390	176.8	46-1/8	1172	22-13/16	579.4	15-5/16	388.9	16-5/8	422.3

UNITS	VOLTAGE	CORNER WEIGHT LB/KG							
		"1"		"2"		"3"		"4"	
48VL(-/N)B24(040/060)30	208/230	49.5	22.5	66.0	29.9	98.9	44.9	115.4	52.4
48VL(-/N)B30(040/060)(3/5)0	208/230	51.3	23.3	68.4	31.0	102.5	46.5	119.6	54.3
48VL(-/N)B36(060/090)(3/5)0	208/230	56.4	25.6	75.2	34.1	112.7	51.2	131.5	59.7
48VL(-/N)B36(060/090)60	460	56.4	25.6	75.2	34.1	121.7	55.3	136.5	62.0

NOTE: ALL TABLE DATA RELEVANT FOR ALL FACTORY INSTALLED OPTIONS EXCEPT ECONOMIZER



TOP VIEW

REQUIRED CLEARANCES TO COMBUSTIBLE MATL.

	INCHES [MM]
TOP OF UNIT	14 [355.6]
DUCT SIDE OF UNIT	2 [50.8]
SIDE OPPOSITE DUCTS	14 [355.6]
BOTTOM OF UNIT	1/2 [12.7]
FLUE PANEL	36 [914.4]

NEC. REQUIRED CLEARANCES.

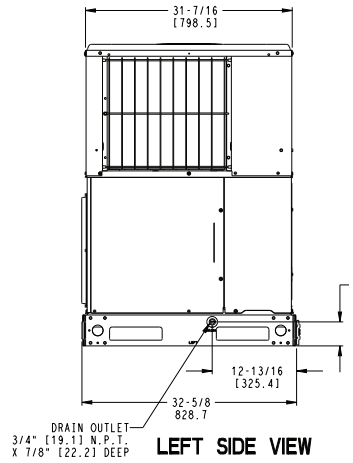
	INCHES [MM]
BETWEEN UNITS, POWER ENTRY SIDE	42 [1066.8]
UNIT AND UNGROUNDED SURFACES, POWER ENTRY SIDE	36 [914.0]
UNIT AND BLOCK OR CONCRETE WALLS AND OTHER GROUNDED SURFACES, POWER ENTRY SIDE	42 [1066.8]

REQUIRED CLEARANCE FOR OPERATION AND SERVICING

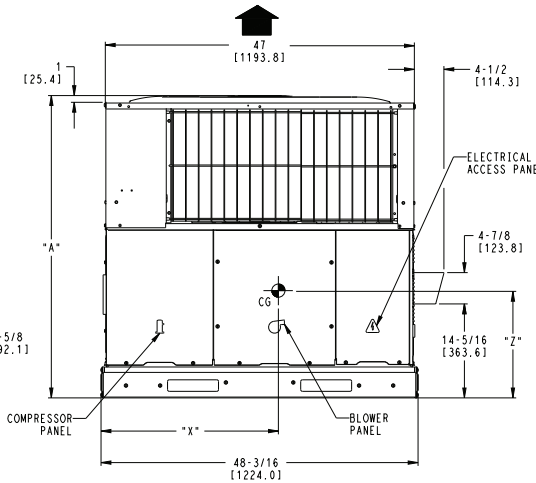
	INCHES [MM]
EVAP. COIL ACCESS SIDE	36 [914.0]
POWER ENTRY SIDE	42 [1066.8]
(EXCEPT FOR NEC REQUIREMENTS)	
UNIT TOP	48 [1219.2]
SIDE OPPOSITE DUCTS	36 [914.0]
DUCT PANEL	12 [304.8]*

*MINIMUM DISTANCES: IF UNIT IS PLACED LESS THAN 12 [304.8] FROM WALL SYSTEM, THEN SYSTEM PERFORMANCE MAYBE COMPROMISED.

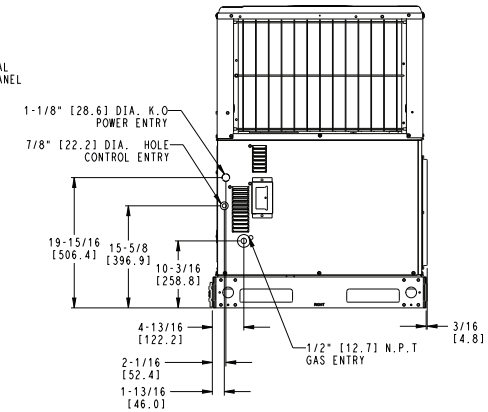
DIMENSIONS IN [] ARE IN MM



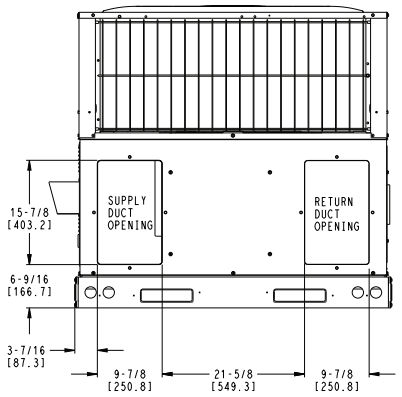
LEFT SIDE VIEW



FRONT VIEW



RIGHT SIDE VIEW



REAR VIEW

48VL500346	REV -

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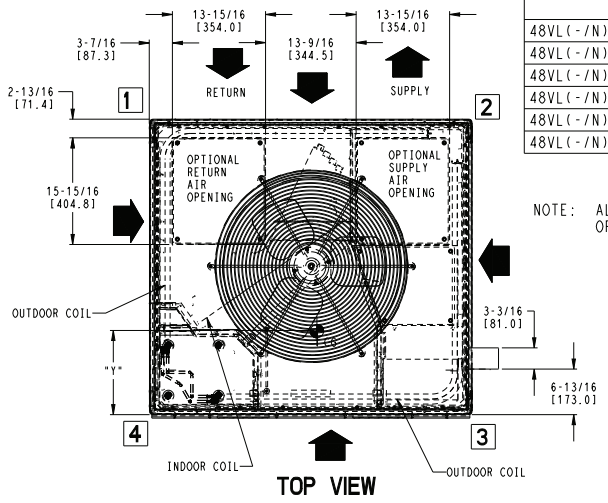
UNIT DIMENSIONS - 42-60

UNIT	ELECTRICAL CHARACTERISTICS	UNIT WT.		UNIT HEIGHT IN/MM		CENTER OF GRAVITY IN/MM					
		LB	KG	"A"		X		Y		Z	
48VL(-/N)B42(060/090)(3/5)0	208/230-1,208/230-3-60	463	210.1	44-3/4	1137	22-13/16	579.4	18	457.2	17-1/8	435.0
48VL(-/N)B42(060/090)60	460-3-60	477	216.5	44-3/4	1137	22-13/16	579.4	18	457.2	17-1/8	435.0
48VL(-/N)B48(090/115/130)(3/5)0	208/230-1,208/230-3-60	481	218.3	48-3/4	1238	22-13/16	579.4	18	457.2	17-3/8	441.3
48VL(-/N)B48(090/115/130)60	460-3-60	495	224.6	48-3/4	1238	22-13/16	579.4	18	457.2	17-3/8	441.3
48VL(-/N)B60(090/115/130)(3/5)0	208/230-1,208/230-3-60	509	231.0	52-3/4	1340	22-13/16	579.4	18	457.2	17-5/8	447.7
48VL(-/N)B60(090/115/130)60	460-3-60	523	237.3	52-3/4	1340	22-13/16	579.4	18	457.2	17-5/8	447.7

UNITS	VOLTAGE	CORNER WEIGHT LB/KG							
		"1"		"2"		"3"		"4"	
48VL(-/N)B42(060/090)(3/5)0	208/230	69.5	31.5	92.6	42.1	139.0	63.1	162.1	73.6
48VL(-/N)B42(060/090)60	460	69.5	31.5	92.6	42.1	148.0	67.2	167.1	75.9
48VL(-/N)B48(090/115/130)(3/5)0	208/230	72.2	32.8	96.2	43.7	144.4	65.5	168.4	76.5
48VL(-/N)B48(090/115/130)60	460	72.2	32.8	96.2	43.7	153.4	69.6	173.4	78.7
48VL(-/N)B60(090/115/130)(3/5)0	208/230	76.4	34.7	101.8	46.2	152.8	69.4	178.2	80.9
48VL(-/N)B60(090/115/130)60	460	76.4	34.7	101.8	46.2	161.8	73.4	183.2	83.2

NOTE: ALL TABLE DATA RELEVANT FOR ALL FACTORY INSTALLED OPTIONS EXCEPT ECONOMIZER



TOP VIEW

REQUIRED CLEARANCES TO COMBUSTIBLE MATL.

	INCHES [MM]
TOP OF UNIT	14 [355.6]
DUCT SIDE OF UNIT	2 [50.8]
SIDE OPPOSITE DUCTS	14 [355.6]
BOTTOM OF UNIT	1/2 [12.7]
FLUE PANEL	36 [914.4]

NEC. REQUIRED CLEARANCES.

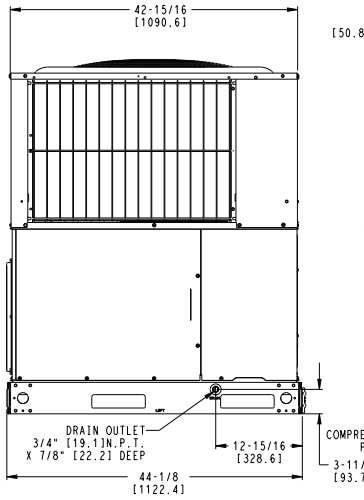
	INCHES [MM]
BETWEEN UNITS, POWER ENTRY SIDE	42 [1066.8]
UNIT AND UNGROUNDED SURFACES,POWER ENTRY SIDE	36 [914.0]
UNIT AND BLOCK OR CONCRETE WALLS AND OTHER GROUNDED SURFACES, POWER ENTRY SIDE	42 [1066.8]

REQUIRED CLEARANCE FOR OPERATION AND SERVICING

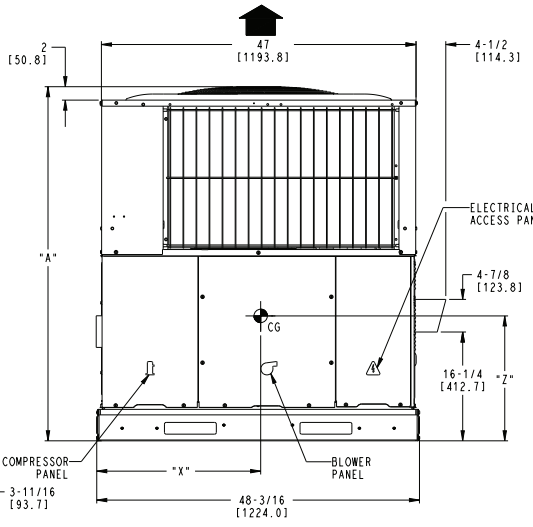
	INCHES [MM]
EVAP. COIL ACCESS SIDE	36 [914.0]
POWER ENTRY SIDE	42 [1066.8]
(EXCEPT FOR NEC REQUIREMENTS)	
UNIT TOP	48 [1219.2]
SIDE OPPOSITE DUCTS	36 [914.0]
DUCT PANEL	12 [304.8]*

*MINIMUM DISTANCES: IF UNIT IS PLACED LESS THAN 12 [304.8] FROM WALL SYSTEM, THEN SYSTEM PERFORMANCE MAYBE COMPROMISED.

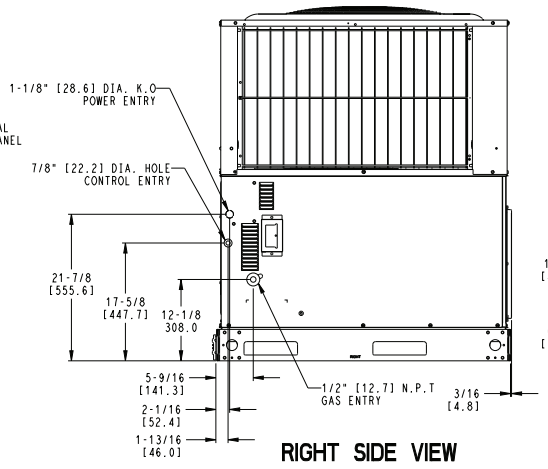
DIMENSIONS IN [] ARE IN MM



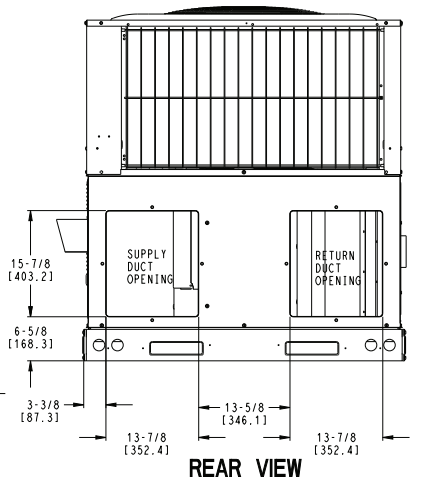
LEFT SIDE VIEW



FRONT VIEW



RIGHT SIDE VIEW



REAR VIEW

48VL500347	REV -

48VL--B

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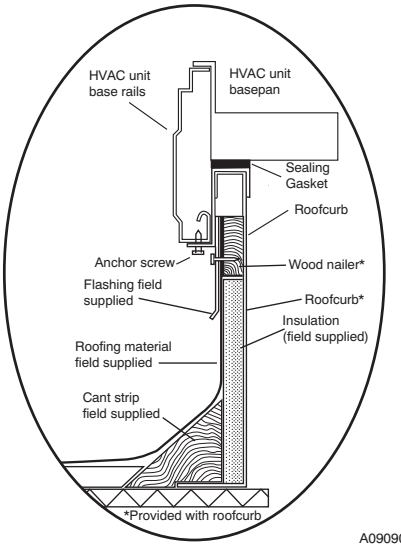
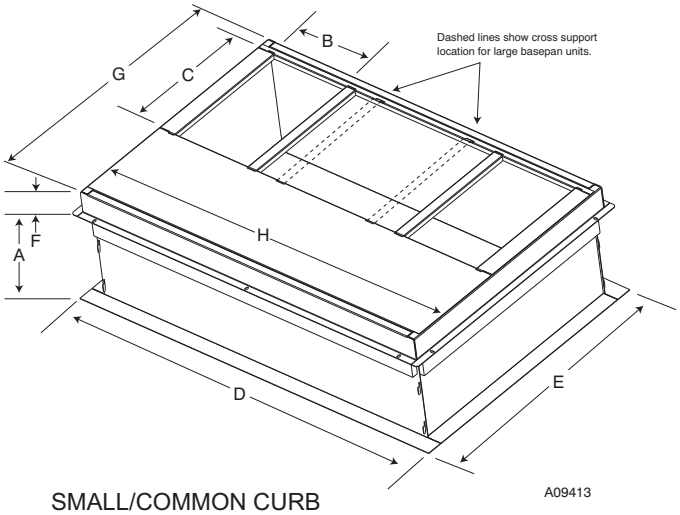
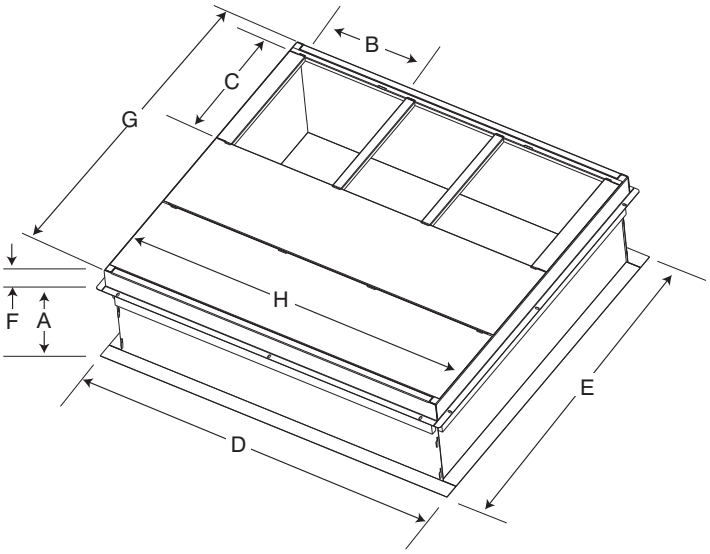
ACCESSORY DIMENSIONS



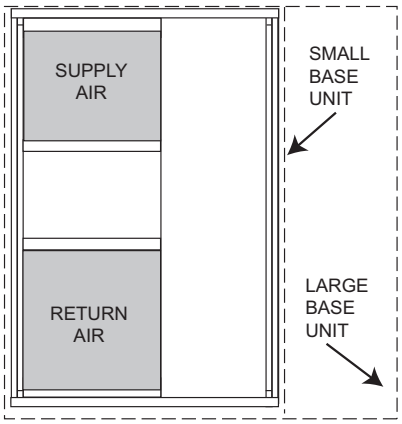
ROOF CURB DETAIL



SMALL/COMMON CURB



LARGE CURB



UNIT PLACEMENT ON COMMON CURB

SMALL OR LARGE BASE UNIT

A09414

UNIT SIZE	CATALOG NUMBER	A IN. (mm)	B (small / common base) IN. (mm)*	B (large base) IN. (mm)*	C IN. (mm)	D IN. (mm)	E IN. (mm)	F IN. (mm)	G IN. (mm)	H IN. (mm)
Small or Large	CPRFCURB010A00	11 (279)	10 (254)	14 (356)	16 (406)	47.8 (1214)	32.4 (822)	2.7 (69)	30.6 (778)	46.1 (1170)
	CPRFCURB011A00	14 (356)								
Large	CPRFCURB012A00	11 (279)	14 (356)				43.9 (1116)		42.2 (1072)	
	CPRFCURB013A00	14 (356)								

* Part Numbers CPRCURB010A00 and CPRCURB011A00 can be used on both small and large basepan units. The cross supports must be located based on whether the unit is a small basepan or a large basepan.

NOTES:

1. Roof curb must be set up for unit being installed.
2. Seal strip must be applied, as required, to unit being installed.
3. Roof curb is made of 16-gauge steel.
4. Attach ductwork to curb (flanges of duct rest on curb).
5. Insulated panels: 1-in. (25.4 mm) thick fiberglass 1 lb. density.

SELECTION PROCEDURE (WITH EXAMPLE)

1. Determine cooling and heating requirements at design conditions:

Given:

Required Cooling Capacity (TC) . . . . . 34,000 Btuh
Sensible Heat Capacity (SHC) . . . . . 25,000 Btuh
Required Heating Capacity . . . . . 60,000 Btuh
Condenser Entering Air Temperature . . . . . 95°F (35°C)
Indoor-Air Temperature . 80°F (26°C)edb 67°F (19°C)ewb
Evaporator Air Quantity . . . . . 1200 CFM
External Static Pressure . . . . . 0.100 IN. W.C.
Electrical Characteristics 208-1-60

2. Select unit based on required cooling capacity.

Enter Net Cooling Capacities table at condenser entering temperature of 95°F (35°C). Unit 036 at 1200 cfm and 67°F (19°C) ewb (entering wet bulb) will provide a total capacity of 34,200 Btuh and a SHC of 27,400 Btuh. Calculate SHC correction, if required, using Note 4 under Cooling Capacities tables.

3. Select heating capacity of unit to provide design condition requirement.

In the Heating Capacities and Efficiencies table, note that the single phase unit 036090 will provide 73,000 Btuh with an input of 90,000 Btuh.

4. Determine fan speed and power requirements at design conditions.

Before entering the air delivery tables, calculate the total static pressure required. From the given example, the Wet Coil Pressure Drop Table, and the Filter Pressure Drop Table:

External Static Pressure	0.100 IN. W.C
Filter	0.07 IN. W.C
Wet Coil Pressure Drop	0.180 IN. W.C
Total Static Pressure	0.287 IN. W.C

Enter the table for Dry Coil Air Delivery—Horizontal and Downflow Discharge. At .287 IN. W.C. ESP, the closest speed to 1200 CFM is Med-Low (pink wire), which delivers 1213 CFM at .3 in ESP.

5. Select unit that corresponds to power source available.

The Electrical Data Table shows that the unit is designed to operate at 208-1-60.

PERFORMANCE DATA

24 SIZE

EVAPORATOR AIR		CONDENSER ENTERING AIR TEMPERATURES °F (°C)																	
		75 (23.9)			85 (29.4)			95 (35)			105 (40.6)			115 (46.1)			125 (51.7)		
CFM/BF	EWB °F (°C)	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW
		Total	Sens		Total	Sens		Total	Sens		Total	Sens		Total	Sens		Total	Sens	
VL-A24 Outdoor Section With NONE Indoor Section																			
700/0.02	57 (13.8)	22.98	22.98	1.47	21.68	21.68	1.68	20.31	20.31	1.90	18.78	18.78	2.14	17.08	17.08	2.40	15.36	15.36	2.68
	62 (16.6)	23.82	21.37	1.48	22.23	20.56	1.68	20.58	19.70	1.91	18.81	18.81	2.14	17.11	17.11	2.40	15.39	15.39	2.68
	63* (17.2)	24.35	17.47	1.49	22.73	16.72	1.69	21.04	15.94	1.91	19.13	15.07	2.15	16.92	14.08	2.39	14.70	13.09	2.66
	67 (19.4)	26.42	18.21	1.49	24.76	17.49	1.71	23.03	16.75	1.95	21.14	15.93	2.20	18.89	14.98	2.44	16.58	14.01	2.71
	72 (22.2)	28.85	14.79	1.50	27.32	14.23	1.72	25.63	13.61	1.96	23.80	12.93	2.23	21.65	12.14	2.52	19.22	11.24	2.79
800/0.03	57 (13.8)	24.12	24.12	1.50	22.76	22.76	1.71	21.34	21.34	1.94	19.80	19.80	2.18	17.99	17.99	2.43	16.19	16.19	2.72
	62 (16.6)	24.50	23.07	1.50	22.90	22.19	1.71	21.38	21.38	1.94	19.84	19.84	2.18	18.02	18.02	2.44	16.22	16.22	2.72
	63* (17.2)	25.00	18.69	1.50	23.32	17.92	1.72	21.58	17.12	1.94	19.66	16.24	2.18	17.37	15.21	2.42	15.09	14.18	2.69
	67 (19.4)	27.05	19.46	1.51	25.38	18.76	1.72	23.60	18.00	1.97	21.66	17.17	2.23	19.36	16.20	2.47	17.00	15.20	2.74
	72 (22.2)	29.34	15.47	1.53	27.83	14.96	1.74	26.14	14.36	1.98	24.31	13.70	2.25	22.19	12.94	2.54	19.67	12.02	2.83
900/0.04	57 (13.8)	25.11	25.11	1.52	23.69	23.69	1.74	22.22	22.22	1.97	20.65	20.65	2.22	18.78	18.78	2.47	16.90	16.90	2.76
	62 (16.6)	25.16	25.16	1.52	23.73	23.73	1.74	22.26	22.26	1.97	20.68	20.68	2.22	18.81	18.81	2.47	16.93	16.93	2.76
	63* (17.2)	25.49	19.84	1.52	23.79	19.07	1.74	22.01	18.25	1.97	20.08	17.36	2.21	17.74	16.30	2.45	15.43	15.18	2.72
	67 (19.4)	27.52	20.63	1.53	25.83	19.96	1.74	24.04	19.20	1.98	22.07	18.37	2.25	19.75	17.37	2.50	17.35	16.33	2.77
	72 (22.2)	29.68	16.09	1.55	28.19	15.62	1.76	26.50	15.05	2.00	24.67	14.41	2.27	22.61	13.70	2.57	20.03	12.76	2.86

See Legend and Notes on Page 18.

PERFORMANCE DATA

30 SIZE

EVAPORATOR AIR		CONDENSER ENTERING AIR TEMPERATURES °F (°C)																	
		75 (23.9)			85 (29.4)			95 (35)			105 (40.6)			115 (46.1)			125 (51.7)		
CFM/BF	EWB °F (°C)	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW
		Total	Sens		Total	Sens		Total	Sens		Total	Sens		Total	Sens		Total	Sens	
VL-A30 Outdoor Section With NONE Indoor Section																			
875/0.03	57 (13.8)	26.99	26.99	1.86	26.03	26.03	2.08	24.84	24.84	2.31	23.28	23.28	2.55	21.63	21.63	2.82	19.83	19.83	3.11
	62 (16.6)	27.80	26.01	1.87	26.54	25.26	2.08	25.04	24.35	2.31	23.33	23.33	2.55	21.67	21.67	2.82	19.87	19.87	3.11
	63* (17.2)	28.37	21.21	1.87	27.09	20.50	2.09	25.54	19.70	2.32	23.41	18.68	2.55	21.13	17.63	2.81	18.66	16.51	3.08
	67 (19.4)	30.73	22.07	1.86	29.48	21.44	2.10	27.98	20.72	2.35	25.91	19.78	2.59	23.61	18.78	2.85	21.10	17.72	3.13
	72 (22.2)	33.46	17.78	1.87	32.40	17.30	2.10	31.09	16.72	2.36	29.42	16.04	2.64	27.07	15.10	2.93	24.52	14.14	3.21
1000/0.04	57 (13.8)	28.26	28.26	1.89	27.27	27.27	2.12	26.09	26.09	2.36	24.45	24.45	2.59	22.72	22.72	2.87	20.84	20.84	3.16
	62 (16.6)	28.57	27.98	1.89	27.32	27.32	2.13	26.13	26.13	2.36	24.49	24.49	2.60	22.76	22.76	2.87	20.87	20.87	3.16
	63* (17.2)	29.05	22.65	1.89	27.73	21.95	2.13	26.16	21.15	2.36	23.97	20.11	2.59	21.65	19.03	2.85	19.13	17.84	3.12
	67 (19.4)	31.37	23.54	1.89	30.12	22.95	2.12	28.60	22.25	2.38	26.53	21.33	2.63	24.15	20.29	2.89	21.60	19.20	3.18
	72 (22.2)	33.95	18.56	1.90	32.92	18.14	2.14	31.61	17.60	2.39	30.05	16.99	2.68	27.65	16.09	2.98	25.04	15.12	3.26
1125/0.05	57 (13.8)	29.32	29.32	1.92	28.31	28.31	2.15	27.10	27.10	2.41	25.45	25.45	2.64	23.65	23.65	2.91	21.70	21.70	3.21
	62 (16.6)	29.36	29.36	1.92	28.35	28.35	2.15	27.14	27.14	2.41	25.49	25.49	2.64	23.68	23.68	2.92	21.73	21.73	3.21
	63* (17.2)	29.55	24.01	1.92	28.22	23.33	2.15	26.63	22.53	2.40	24.43	21.47	2.62	22.07	20.33	2.88	19.66	19.66	3.17
	67 (19.4)	31.84	24.91	1.92	30.59	24.37	2.15	29.08	23.70	2.41	27.00	22.80	2.68	24.60	21.73	2.93	22.02	20.55	3.22
	72 (22.2)	34.29	19.27	1.94	33.28	18.91	2.17	31.97	18.40	2.43	30.44	17.85	2.71	28.11	17.06	3.01	25.43	16.05	3.31

See Legend and Notes on Page 18.

PERFORMANCE DATA (CONT)

36 SIZE

EVAPORATOR AIR		CONDENSER ENTERING AIR TEMPERATURES °F (°C)																	
		75 (23.9)			85 (29.4)			95 (35)			105 (40.6)			115 (46.1)			125 (51.7)		
CFM/BF	EWB °F (°C)	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW
		Total	Sens		Total	Sens		Total	Sens		Total	Sens		Total	Sens		Total	Sens	
VL-A36 Outdoor Section With NONE Indoor Section																			
1050/0.04	57 (13.8)	32.04	32.04	2.19	31.05	31.05	2.46	29.67	29.67	2.74	27.89	27.89	3.04	25.97	25.97	3.38	23.86	23.86	3.76
	62 (16.6)	32.91	27.48	2.20	31.59	27.24	2.46	29.83	29.66	2.74	27.93	27.93	3.04	26.01	26.01	3.38	23.90	23.90	3.76
	63* (17.2)	33.62	22.38	2.21	32.24	22.10	2.47	30.40	21.63	2.75	27.88	20.90	3.04	25.18	20.09	3.37	22.23	19.16	3.72
	67 (19.4)	36.45	23.33	2.21	35.13	23.14	2.49	33.48	22.83	2.80	30.96	22.18	3.09	28.22	21.45	3.42	25.24	20.62	3.78
	72 (22.2)	39.67	18.74	2.22	38.63	18.63	2.50	37.24	18.38	2.81	35.25	17.95	3.16	32.48	17.21	3.51	29.45	16.41	3.88
1200/0.05	57 (13.8)	33.50	33.50	2.25	32.48	32.48	2.53	31.16	31.16	2.81	29.25	29.25	3.11	27.24	27.24	3.46	25.04	25.04	3.83
	62 (16.6)	33.79	29.49	2.25	32.53	32.53	2.53	31.22	31.22	2.82	29.30	29.30	3.11	27.28	27.28	3.46	25.08	25.08	3.84
	63* (17.2)	34.36	23.89	2.25	32.96	23.65	2.53	31.14	23.23	2.81	28.52	22.48	3.10	25.75	21.66	3.43	22.79	20.63	3.79
	67 (19.4)	37.19	24.89	2.25	35.85	24.76	2.54	34.20	24.50	2.85	31.64	23.89	3.16	28.84	23.16	3.49	25.80	22.30	3.85
	72 (22.2)	40.13	19.52	2.27	39.14	19.50	2.55	37.77	19.31	2.86	35.97	19.03	3.21	33.15	18.34	3.58	30.03	17.54	3.95
1350/0.06	57 (13.8)	34.72	34.72	2.30	33.67	33.67	2.58	32.38	32.38	2.89	30.42	30.42	3.18	28.32	28.32	3.53	26.03	26.03	3.91
	62 (16.6)	34.77	34.77	2.30	33.72	33.72	2.58	32.42	32.42	2.89	30.47	30.47	3.19	28.36	28.36	3.53	26.07	26.07	3.91
	63* (17.2)	34.95	25.34	2.30	33.50	25.12	2.58	31.73	24.75	2.88	29.03	23.98	3.16	26.24	23.10	3.49	23.49	23.49	3.85
	67 (19.4)	37.71	26.36	2.30	36.39	26.30	2.58	34.73	26.08	2.90	32.19	25.52	3.22	29.33	24.77	3.55	26.31	23.80	3.92
	72 (22.2)	40.41	20.21	2.32	39.47	20.28	2.60	38.09	20.14	2.91	36.46	20.02	3.26	33.65	19.42	3.64	30.47	18.63	4.02

See Legend and Notes on Page 18.

PERFORMANCE DATA

42 SIZE

EVAPORATOR AIR		CONDENSER ENTERING AIR TEMPERATURES °F (°C)																	
		75 (23.9)			85 (29.4)			95 (35)			105 (40.6)			115 (46.1)			125 (51.7)		
CFM/BF	EWB °F (°C)	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW
		Total	Sens		Total	Sens		Total	Sens		Total	Sens		Total	Sens		Total	Sens	
VL-A42 Outdoor Section With NONE Indoor Section																			
1225/0.03	57 (13.8)	39.61	39.61	2.72	37.75	37.75	3.11	35.18	35.18	3.47	32.60	32.60	3.87	29.87	29.87	4.29	27.01	27.01	4.72
	62 (16.6)	41.07	38.45	2.67	38.75	36.39	3.09	35.55	33.89	3.46	32.66	32.66	3.87	29.92	29.92	4.29	27.06	27.06	4.72
	63* (17.2)	41.95	31.44	2.64	39.60	29.62	3.07	36.33	27.46	3.45	32.90	25.32	3.87	29.27	23.19	4.30	25.42	21.06	4.73
	67 (19.4)	45.37	32.67	2.53	43.06	30.92	2.96	39.97	28.94	3.40	36.45	26.82	3.83	32.72	24.71	4.27	28.81	22.62	4.72
	72 (22.2)	49.27	26.39	2.42	46.93	24.87	2.85	44.47	23.37	3.31	41.33	21.77	3.74	37.56	19.92	4.23	33.52	18.06	4.71
1400/0.04	57 (13.8)	41.50	41.50	2.69	39.58	39.58	3.11	36.97	36.97	3.49	34.25	34.25	3.90	31.39	31.39	4.32	28.40	28.40	4.76
	62 (16.6)	42.21	41.36	2.67	39.89	39.13	3.10	37.03	37.03	3.49	34.31	34.31	3.89	31.45	31.45	4.32	28.45	28.45	4.76
	63* (17.2)	42.97	33.53	2.65	40.58	31.68	3.08	37.25	29.48	3.49	33.72	27.26	3.90	29.98	25.02	4.34	26.10	22.75	4.77
	67 (19.4)	46.35	34.80	2.54	43.98	33.00	2.97	41.00	31.10	3.42	37.31	28.90	3.87	33.50	26.70	4.31	29.50	24.50	4.76
	72 (22.2)	50.00	27.51	2.44	47.63	26.00	2.87	45.07	24.46	3.33	42.19	23.04	3.76	38.40	21.21	4.25	34.25	19.32	4.76
1575/0.05	57 (13.8)	43.07	43.07	2.68	41.12	41.12	3.10	38.51	38.51	3.52	35.67	35.67	3.92	32.70	32.70	4.36	29.59	29.59	4.80
	62 (16.6)	43.17	43.17	2.68	41.17	41.17	3.10	38.57	38.57	3.52	35.73	35.73	3.92	32.75	32.75	4.36	29.63	29.63	4.80
	63* (17.2)	43.75	35.51	2.67	41.32	33.62	3.10	37.99	31.40	3.52	34.37	29.08	3.94	30.58	26.74	4.37	26.77	26.77	4.81
	67 (19.4)	47.03	36.77	2.56	44.64	34.95	2.99	41.77	33.12	3.44	38.00	30.88	3.90	34.12	28.58	4.35	30.10	26.23	4.80
	72 (22.2)	50.51	28.53	2.47	48.10	27.01	2.90	45.48	25.44	3.37	42.80	24.21	3.79	39.02	22.42	4.27	34.83	20.52	4.79

See Legend and Notes on Page 18.

PERFORMANCE DATA (CONT)
48 SIZE

EVAPORATOR AIR		CONDENSER ENTERING AIR TEMPERATURES °F (°C)																	
		75 (23.9)			85 (29.4)			95 (35)			105 (40.6)			115 (46.1)			125 (51.7)		
CFM/BF	EWB °F (°C)	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW
		Total	Sens		Total	Sens		Total	Sens		Total	Sens		Total	Sens		Total	Sens	
VL-A48 Outdoor Section With NONE Indoor Section																			
1400/0.04	57 (13.8)	45.84	45.84	2.98	43.32	43.32	3.39	40.27	40.27	3.79	36.93	36.93	4.23	33.57	33.57	4.70	30.16	30.16	5.21
	62 (16.6)	47.63	42.40	3.00	44.58	40.08	3.40	40.96	37.50	3.80	36.99	36.99	4.23	33.63	33.63	4.70	30.21	30.21	5.21
	63* (17.2)	48.63	34.72	3.00	45.52	32.68	3.41	41.85	30.46	3.82	37.52	28.03	4.23	33.20	25.66	4.69	28.77	23.31	5.18
	67 (19.4)	52.66	36.12	2.99	49.43	34.10	3.41	46.02	32.06	3.86	41.50	29.66	4.31	37.03	27.31	4.77	32.47	24.99	5.27
	72 (22.2)	57.51	29.34	2.99	54.21	27.62	3.41	50.75	25.85	3.86	46.93	24.09	4.35	42.34	22.07	4.88	37.63	20.03	5.42
1600/0.05	57 (13.8)	47.96	47.96	3.06	45.32	45.32	3.47	42.32	42.32	3.89	38.76	38.76	4.32	35.24	35.24	4.80	31.66	31.66	5.31
	62 (16.6)	48.90	45.54	3.06	45.80	43.03	3.47	42.41	42.41	3.89	38.82	38.82	4.32	35.30	35.30	4.80	31.72	31.72	5.32
	63* (17.2)	49.79	37.01	3.06	46.56	34.90	3.47	42.93	32.66	3.90	38.42	30.10	4.31	33.97	27.62	4.77	29.47	25.14	5.26
	67 (19.4)	53.81	38.48	3.05	50.48	36.40	3.46	47.00	34.30	3.92	42.43	31.88	4.39	37.88	29.44	4.86	33.20	27.00	5.35
	72 (22.2)	58.37	30.60	3.05	55.05	28.87	3.47	51.47	27.05	3.93	47.81	25.40	4.41	43.22	23.43	4.94	38.39	21.38	5.50
1800/0.06	57 (13.8)	49.74	49.74	3.12	47.00	47.00	3.53	44.06	44.06	3.98	40.29	40.29	4.41	36.64	36.64	4.89	32.92	32.92	5.41
	62 (16.6)	50.02	49.61	3.11	47.06	47.06	3.53	44.13	44.13	3.98	40.35	40.35	4.41	36.69	36.69	4.89	32.97	32.97	5.41
	63* (17.2)	50.68	39.21	3.11	47.38	37.03	3.53	43.79	34.77	3.98	39.13	32.09	4.38	34.61	29.48	4.84	30.08	26.75	5.33
	67 (19.4)	54.66	40.72	3.10	51.27	38.58	3.52	47.75	36.43	3.97	43.18	34.03	4.47	38.53	31.47	4.93	33.83	28.88	5.44
	72 (22.2)	58.98	31.74	3.11	55.61	30.01	3.53	51.97	28.16	3.99	48.35	26.51	4.48	43.87	24.71	4.99	38.98	22.66	5.56

See Legend and Notes on Page 18.

PERFORMANCE DATA

60 SIZE

EVAPORATOR AIR		CONDENSER ENTERING AIR TEMPERATURES °F (°C)																	
		75 (23.9)			85 (29.4)			95 (35)			105 (40.6)			115 (46.1)			125 (51.7)		
CFM/BF	EWB °F (°C)	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW	Capacity MBtuh		Total Sys kW
		Total	Sens		Total	Sens		Total	Sens		Total	Sens		Total	Sens		Total	Sens	
1750/0.19	57 (13.8)	57.97	57.97	3.80	55.02	55.02	4.21	51.93	51.93	4.68	48.68	48.68	5.21	45.23	45.23	5.81	41.56	41.56	6.49
	62 (16.6)	59.45	53.94	3.82	55.93	51.73	4.22	52.32	49.43	4.68	48.74	48.74	5.21	45.29	45.29	5.81	41.61	41.61	6.49
	63* (17.2)	60.48	43.88	3.83	56.84	41.90	4.23	53.09	39.89	4.69	49.17	37.85	5.21	45.08	35.75	5.80	40.81	33.61	6.47
	67 (19.4)	65.05	45.58	3.88	61.08	43.55	4.29	57.00	41.50	4.75	52.75	39.41	5.27	48.31	37.28	5.86	43.70	35.10	6.52
	72 (22.2)	71.36	36.96	3.97	66.97	35.08	4.38	62.43	33.17	4.83	57.72	31.22	5.35	52.82	29.25	5.94	47.74	27.24	6.59
2000/0.23	57 (13.8)	60.36	60.36	3.91	57.19	57.19	4.32	53.88	53.88	4.79	50.41	50.41	5.31	46.72	46.72	5.91	42.83	42.83	6.59
	62 (16.6)	60.82	57.92	3.91	57.29	57.29	4.32	53.96	53.96	4.79	50.47	50.47	5.32	46.78	46.78	5.92	42.88	42.88	6.59
	63* (17.2)	61.65	46.80	3.92	57.84	44.73	4.33	53.93	42.64	4.78	49.88	40.51	5.30	45.65	38.32	5.89	41.27	36.06	6.56
	67 (19.4)	66.24	48.72	3.98	62.11	46.60	4.39	57.86	44.46	4.85	53.47	42.28	5.36	48.88	40.05	5.95	44.14	37.77	6.61
	72 (22.2)	72.62	38.94	4.06	68.04	36.99	4.47	63.32	35.02	4.93	58.45	33.03	5.45	53.38	30.99	6.03	48.15	28.93	6.68
2250/0.27	57 (13.8)	62.35	62.35	4.01	58.99	58.99	4.43	55.49	55.49	4.89	51.82	51.82	5.42	47.93	47.93	6.02	43.84	43.84	6.69
	62 (16.6)	62.44	62.44	4.01	59.07	59.07	4.43	55.56	55.56	4.89	51.88	51.88	5.42	47.99	47.99	6.02	43.88	43.88	6.69
	63* (17.2)	62.51	49.60	4.01	58.59	47.45	4.42	54.57	45.27	4.87	50.40	43.04	5.39	46.08	40.74	5.98	41.62	38.30	6.65
	67 (19.4)	67.13	51.74	4.07	62.86	49.53	4.48	58.50	47.31	4.94	53.98	45.03	5.46	49.29	42.69	6.04	44.47	40.24	6.70
	72 (22.2)	73.55	40.84	4.16	68.82	38.84	4.57	63.97	36.82	5.02	58.95	34.76	5.54	53.76	32.68	6.12	48.40	30.58	6.77

See Legend and Notes on Page 18.

PERFORMANCE DATA (CONT)

* At 75°F (24°C) entering dry bulb–Tennessee Valley Authority (TVA) rating conditions; all others at 80°F dry bulb.

LEGEND

BF— Bypass Factor
edb— Entering Dry–Bulb
Ewb— Entering Wet–Bulb
kW — Total Unit Power Input
SHC— Sensible Heat Capacity (1000 Btuh)
TC — Total Capacity (1000 Btuh) (net)
rh—Relative Humidity

COOLING NOTES:

1. Ratings are net; they account for the effects of the evaporator–fan motor power and heat.
2. Direct interpolation is permissible. Do not extrapolate.
3. The following formulas may be used:

$$^{t}ldb = {}^{t}edb - \frac{\text{Sensible capacity (Btuh)}}{1.10 \times \text{cfm}}$$

^{t}lwb = Wet–bulb temperature corresponding to enthalpy air leaving evaporator coil (^{h}lwb)

$$^{h}lwb = {}^{h}ewb - \frac{\text{total capacity (Btuh)}}{4.5 \times \text{cfm}}$$

Where: ^{h}ewb = Enthalpy of air entering evaporator coil

4. The SHC is based on 80°F (26.6°C) edb temperature of air entering evaporator coil. Below 80°F (26.6°C) edb, subtract (corr factor x cfm) from SHC.
   Above 80°F (26.6°C) edb, add (corr factor x cfm) to SHC.
   Correction Factor = 1.10 x (1 + BF) x (edb – 80).
5. Integrated capacity is maximum (instantaneous) capacity less the effect of frost on the outdoor coil and the heat required to defrost it.

PERFORMANCE DATA (CONT)

GAS ADJUSTMENT

Natural Gas Orifice Sizes and Manifold Pressure - Single Phase Models

Nameplate Input (Btu/hr)		ALTITUDE OF INSTALLATION (FT. ABOVE SEA LEVEL) U.S.A.*				
		0 to 2000 (0–610 m)	2001 to 3000* (611 to 914 m)	3001 to 4000 (915 to 1219 m)	4001 to 5000 (1220 to 1524 m)	5001 to 6000 (1524 to 1829 m)
40000	Orifice No. (Qty)	44 (2)	45 (2)†	48 (2)†	48 (2)†	48 (2)†
	Manifold Press. (in. W.C.)	3.2	3.2	3.8	3.5	3.2
60000	Orifice No. (Qty)	44 (3)	45 (3)†	48 (3)†	48 (3)†	48 (3)†
	Manifold Press. (in. W.C.)	3.2	3.2	3.8	3.5	3.2
90000	Orifice No. (Qty)	38 (3)	41 (3)†	41 (3)†	42 (3)†	42 (3)†
	Manifold Press. (in. W.C.)	3.6	3.8	3.4	3.4	3.2
115000	Orifice No. (Qty)	33 (3)	36 (3)†	36 (3)†	36 (3)†	38 (3)†
	Manifold Press. (in. W.C.)	3.8	3.8	3.6	3.3	3.6
127000	Orifice No. (Qty)	31 (3)	31 (3)	33 (3)†	33 (3)†	34 (3)†
	Manifold Press. (in. W.C.)	3.7	3.2	3.5	3.2	3.2

*In the U.S.A., the input rating for altitudes above 2000 ft (610m) must be reduced by 4% for each 1000 ft (305 m) above sea level.
In Canada, the input rating for altitudes from 2001 to 4500 ft (611 to 1372 m) above sea level must be derated by 10% by an authorized gas conversion station or dealer.
For Canadian Installations from 2000 to 4500 ft, use U.S.A. column 2001 to 3000 ft.
Note: Orifice sizes and manifold pressure settings are based on natural gas with a heating value of 1025 Btu/ft3 and a specific gravity of .6.
† Orifices available through your distributor.

Natural Gas Orifice Sizes and Manifold Pressure - Three Phase Models

Nameplate Input (Btu/hr)		ALTITUDE OF INSTALLATION (FT. ABOVE SEA LEVEL) U.S.A.*				
		0 to 2000 (0–610 m)	2001 to 3000* (611 to 914 m)	3001 to 4000 (915 to 1219 m)	4001 to 5000 (1220 to 1524 m)	5001 to 6000 (1524 to 1829 m)
40000	Orifice No. (Qty)	44 (2)	45 (2)†	48 (2)†	48 (2)†	48 (2)†
	Manifold Press. (in. W.C.)	3.2	3.2	3.8	3.5	3.2
60000	Orifice No. (Qty)	38 (2)	41 (2)†	41 (2)†	42 (2)†	42 (2)†
	Manifold Press. (in. W.C.)	3.6	3.8	3.4	3.4	3.2
90000	Orifice No. (Qty)	38 (3)	41 (3)†	41 (3)†	42 (3)†	42 (3)†
	Manifold Press. (in. W.C.)	3.6	3.8	3.4	3.4	3.2
115000	Orifice No. (Qty)	33 (3)	36 (3)†	36 (3)†	36 (3)†	38 (3)†
	Manifold Press. (in. W.C.)	3.8	3.8	3.6	3.3	3.6
130000	Orifice No. (Qty)	31 (3)	31 (3)	33 (3)†	33 (3)†	34 (3)†
	Manifold Press. (in. W.C.)	3.8	3.2	3.7	3.4	3.3

*In the U.S.A., the input rating for altitudes above 2000 ft (610m) must be reduced by 4% for each 1000 ft (305 m) above sea level.
In Canada, the input rating for altitudes from 2001 to 4500 ft (611 to 1372 m) above sea level must be derated by 10% by an authorized gas conversion station or dealer.
For Canadian Installations from 2000 to 4500 ft, use U.S.A. column 2001 to 3000 ft.
Note: Orifice sizes and manifold pressure settings are based on natural gas with a heating value of 1025 Btu/ft3 and a specific gravity of .6.
† Orifices available through your distributor.

Propane Gas Orifice Sizes and Manifold Pressure - Single Phase Models

Nameplate Input (Btu/hr)		ALTITUDE OF INSTALLATION (FT. ABOVE SEA LEVEL) U.S.A.*				
		0 to 2000 (0–610 m)	2001 to 3000* (611 to 914 m)	3001 to 4000 (915 to 1219 m)	4001 to 5000 (1220 to 1524 m)	5001 to 6000 (1524 to 1829 m)
40000	Orifice No. (Qty)	55 (2)	56 (2)	56 (2)	56 (2)	56 (2)
	Manifold Press. (in. W.C.)	10.0	11.0	11.0	11.0	10.7
60000	Orifice No. (Qty)	55 (3)	56 (3)	56 (3)	56 (3)	56 (3)
	Manifold Press. (in. W.C.)	10.0	11.0	11.0	11.0	10.7
90000	Orifice No. (Qty)	53 (3)	54 (3)	54 (3)	54 (3)	54 (3)
	Manifold Press. (in. W.C.)	10.0	11.0	11.0	11.0	11.0
115000	Orifice No. (Qty)	51 (3)	52 (3)	52 (3)	53 (3)	53 (3)
	Manifold Press. (in. W.C.)	10.0	11.0	10.6	11.0	11.0
127000	Orifice No. (Qty)	49 (3)	50 (3)	51 (3)	52 (3)	52 (3)
	Manifold Press. (in. W.C.)	10.0	11.0	11.0	11.0	11.0

*In the U.S.A., the input rating for altitudes above 2000 ft (610m) must be reduced by 4% for each 1000 ft (305 m) above sea level.
In Canada, the input rating for altitudes from 2001 to 4500 ft (611 to 1372 m) above sea level must be derated by 10% by an authorized gas conversion station or dealer.
For Canadian Installations from 2000 to 4500 ft (610–1372 m), use U.S.A. column 2001 to 3000 ft (611 to 914 m).
†Use Kit No. CPLPCONV013C00 (0–2000 ft [0–610 m] above sea level). Use Kit No. CPLPCONV014C00 (2001–6000 ft [611–1829 m] above sea level).

Propane Gas Orifice Sizes and Manifold Pressure - Three Phase Models

Nameplate Input (Btu/hr)		ALTITUDE OF INSTALLATION (FT. ABOVE SEA LEVEL) U.S.A.*				
		0 to 2000 (0–610 m)	2001 to 3000* (611 to 914 m)	3001 to 4000 (915 to 1219 m)	4001 to 5000 (1220 to 1524 m)	5001 to 6000 (1524 to 1829 m)
40000	Orifice No. (Qty)	55 (2)	56 (2)	56 (2)	56 (2)	56 (2)
	Manifold Press. (in. W.C.)	10.0	11.0	11.0	11.0	10.7
60000	Orifice No. (Qty)	53 (2)	54 (2)	54 (2)	54 (2)	54 (2)
	Manifold Press. (in. W.C.)	10.0	11.0	11.0	11.0	11.0
90000	Orifice No. (Qty)	53 (3)	54 (3)	54 (3)	54 (3)	54 (3)
	Manifold Press. (in. W.C.)	10.0	11.0	11.0	11.0	11.0
115000	Orifice No. (Qty)	51 (3)	52 (3)	52 (3)	53 (3)	53 (3)
	Manifold Press. (in. W.C.)	10.0	11.0	10.6	11.0	11.0
130000	Orifice No. (Qty)	49 (3)	50 (3)	51 (3)	52 (3)	52 (3)
	Manifold Press. (in. W.C.)	10.0	11.0	11.0	11.0	11.0

*In the U.S.A., the input rating for altitudes above 2000 ft (610m) must be reduced by 4% for each 1000 ft (305 m) above sea level.
In Canada, the input rating for altitudes from 2001 to 4500 ft (611 to 1372 m) above sea level must be derated by 10% by an authorized gas conversion station or dealer.
For Canadian Installations from 2000 to 4500 ft (610–1372 m), use U.S.A. column 2001 to 3000 ft (611 to 914 m).
†Use Kit No. CPLPCONV013*00 (0–2000 ft [0–610 m] above sea level). Use Kit No. CPLPCONV014*00 (2001–6000 ft [611–1829 m] above sea level).

High Altitude Compensation, Propane Gas - Single Phase Models

Nameplate Input (Btu/hr)	Rated Heating Input (Btu/hr), LP Gas at Installation Altitude Above Sea Level, U.S.A.*				
	0 to 2000 ft (0–610 m)	2001 to 3000 ft* (611 to 914 m)	3001 to 4000 ft (915 to 1219 m)	4001 to 5000 ft (1220 to 1524 m)	5001 to 6000 ft (1524 to 1829 m)
40000	38000	31700	31700	31700	31200
60000	57000	47500	47500	47500	46900
90000	79000	68900	68900	68600	68600
115000	103000	100400	98900	83000	83000
127000	116000	115500	111800	101300	100400

*In the U.S.A., the input rating for altitudes above 2000 ft (610m) must be reduced by 4% for each 1000 ft (305 m) above sea level.
In Canada, the input rating for altitudes from 2001 to 4500 ft (611 to 1372 m) above sea level must be derated by 10% by an authorized gas conversion station or dealer.
For Canadian Installations from 2000 to 4500 ft (610–1372 m), use U.S.A. column 2001 to 3000 ft (611 to 914 m).

High Altitude Compensation, Propane Gas - Three Phase Models

Nameplate Input (Btu/hr)	Rated Heating Input (Btu/hr), LP Gas at Installation Altitude Above Sea Level, U.S.A.*				
	0 to 2000 ft (0–610 m)	2001 to 3000 ft* (611 to 914 m)	3001 to 4000 ft (915 to 1219 m)	4001 to 5000 ft (1220 to 1524 m)	5001 to 6000 ft (1524 to 1829 m)
40000	38000	31700	31700	31700	31200
60000	53000	45900	45900	45800	45800
90000	79000	68900	68900	68600	68600
115000	103000	100400	98900	83000	83000
130000	116000	115500	111800	101300	100400

*In the U.S.A., the input rating for altitudes above 2000 ft (610m) must be reduced by 4% for each 1000 ft (305 m) above sea level.
In Canada, the input rating for altitudes from 2001 to 4500 ft (611 to 1372 m) above sea level must be derated by 10% by an authorized gas conversion station or dealer.
For Canadian Installations from 2000 to 4500 ft (610–1372 m), use U.S.A. column 2001 to 3000 ft (611 to 914 m).

High Altitude Compensation, Natural Gas - Single Phase Models

Nameplate Input (Btu/hr)	Rated Heating Input (Btu/hr), Natural Gas at Installation Altitude Above Sea Level, U.S.A.*				
	0 to 2000 ft (0–610 m)	2001 to 3000 ft* (611 to 914 m)	3001 to 4000 ft (915 to 1219 m)	4001 to 5000 ft (1220 to 1524 m)	5001 to 6000 ft (1524 to 1829 m)
40000	40000	36000	34400	32800	31200
60000	60000	54000	51600	49200	46800
90000	90000	81000	77400	73800	70200
115000	115000	103500	98900	94300	89700
127000	127000	114300	109200	104100	99100

*In the U.S.A., the input rating for altitudes above 2000 ft (610m) must be reduced by 4% for each 1000 ft (305 m) above sea level.
In Canada, the input rating for altitudes from 2001 to 4500 ft (611 to 1372 m) above sea level must be derated by 10% by an authorized gas conversion station or dealer.
For Canadian Installations from 2000 to 4500 ft (610–1372 m), use U.S.A. column 2001 to 3000 ft (611 to 914 m).

High Altitude Compensation, Natural Gas - Three Phase

Nameplate Input (Btu/hr)	Rated Heating Input (Btu/hr), Natural Gas at Installation Altitude Above Sea Level, U.S.A.*				
	0 to 2000 ft (0–610 m)	2001 to 3000 ft* (611 to 914 m)	3001 to 4000 ft (915 to 1219 m)	4001 to 5000 ft (1220 to 1524 m)	5001 to 6000 ft (1524 to 1829 m)
40000	40000	36000	34400	32800	31200
60000	60000	54000	51600	49200	46800
90000	90000	81000	77400	73800	70200
115000	115000	103500	98900	94300	89700
130000	130000	117000	111800	106600	101400

*In the U.S.A., the input rating for altitudes above 2000 ft (610m) must be reduced by 4% for each 1000 ft (305 m) above sea level.
In Canada, the input rating for altitudes from 2001 to 4500 ft (611 to 1372 m) above sea level must be derated by 10% by an authorized gas conversion station or dealer.
For Canadian Installations from 2000 to 4500 ft (610–1372 m), use U.S.A. column 2001 to 3000 ft (611 to 914 m).

Dry Coil Air Delivery* - Horizontal and Downflow Discharge Unit 24-60 208/230VAC - 1 Phase

Unit Size	Heating Rise Range °F (°C)	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)									
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
24040	25 - 55 (14 - 31)	Low[1]	Blue	CFM	774	700	623	546	439	339	---	---	---	---
				BHP	0.12	0.13	0.13	0.14	0.14	0.15	---	---	---	---
				Heat Rise (°F)	39	43	48	55	NA	NA	NA	NA	NA	NA
				Heat Rise (°C)	21	24	27	30	NA	NA	NA	NA	NA	NA
		Med-Low[3]	Pink	CFM	804	734	659	574	482	387	---	---	---	---
				BHP	0.13	0.14	0.14	0.15	0.15	0.16	---	---	---	---
				Heat Rise (°F)	37	41	45	52	NA	NA	NA	NA	NA	NA
				Heat Rise (°C)	21	23	25	29	NA	NA	NA	NA	NA	NA
		Medium[2]	Red	CFM	842	787	715	641	556	461	382	---	---	---
				BHP	0.15	0.16	0.16	0.17	0.17	0.18	0.19	---	---	---
				Heat Rise (°F)	36	38	42	47	54	NA	NA	NA	NA	NA
				Heat Rise (°C)	20	21	23	26	30	NA	NA	NA	NA	NA
		Med-High	Orange	CFM	920	868	803	738	654	570	491	404	---	---
				BHP	0.18	0.19	0.19	0.20	0.21	0.21	0.22	0.23	---	---
				Heat Rise (°F)	33	35	37	41	46	53	NA	NA	NA	NA
				Heat Rise (°C)	18	19	21	23	25	29	NA	NA	NA	NA
		High	Black	CFM	1125	1075	1019	956	891	825	760	695	594	491
				BHP	0.30	0.31	0.32	0.32	0.33	0.34	0.34	0.35	0.35	0.34
				Heat Rise (°F)	27	28	29	31	34	36	39	43	50	NA
				Heat Rise (°C)	15	15	16	17	19	20	22	24	28	NA
24060	25 - 55 (14 - 31)	Low[3]	Blue	CFM	774	700	623	546	439	339	---	---	---	---
				BHP	0.12	0.13	0.13	0.14	0.14	0.15	---	---	---	---
				Heat Rise (°F)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
				Heat Rise (°C)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Med-Low	Pink	CFM	804	734	659	574	482	387	---	---	---	---
				BHP	0.13	0.14	0.14	0.15	0.15	0.16	---	---	---	---
				Heat Rise (°F)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
				Heat Rise (°C)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Medium[2]	Red	CFM	842	787	715	641	556	461	382	---	---	---
				BHP	0.15	0.16	0.16	0.17	0.17	0.18	0.19	---	---	---
				Heat Rise (°F)	53	NA	NA	NA	NA	NA	NA	NA	NA	NA
				Heat Rise (°C)	30	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Med-High	Orange	CFM	920	868	803	738	654	570	491	404	---	---
				BHP	0.18	0.19	0.19	0.20	0.21	0.21	0.22	0.23	---	---
				Heat Rise (°F)	49	52	NA	NA	NA	NA	NA	NA	NA	NA
				Heat Rise (°C)	27	29	NA	NA	NA	NA	NA	NA	NA	NA
		High[1]	Black	CFM	1125	1075	1019	956	891	825	760	695	594	491
				BHP	0.30	0.31	0.32	0.32	0.33	0.34	0.34	0.35	0.35	0.34
				Heat Rise (°F)	40	42	44	47	51	55	NA	NA	NA	NA
				Heat Rise (°C)	22	23	25	26	28	30	NA	NA	NA	NA

Dry Coil Air Delivery* - Horizontal and Downflow Discharge Unit 24-60 208/230VAC - 1 Phase (Cont.)

Unit Size	Heating Rise Range °F (°C)	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)									
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
30040	25 - 55 (14 - 31)	Low[1]	Blue	CFM	774	700	623	546	439	339	---	---	---	---
				BHP	0.12	0.13	0.13	0.14	0.14	0.15	---	---	---	---
				Heat Rise (°F)	39	43	48	55	NA	NA	NA	NA	NA	NA
				Heat Rise (°C)	21	24	27	30	NA	NA	NA	NA	NA	NA
		Med-Low[3]	Pink	CFM	906	843	771	707	624	548	451	340	---	---
				BHP	0.18	0.18	0.19	0.20	0.20	0.21	0.21	0.22	---	---
				Heat Rise (°F)	33	36	39	42	48	55	NA	NA	NA	NA
				Heat Rise (°C)	18	20	22	24	27	30	NA	NA	NA	NA
		Medium	Red	CFM	1008	942	872	804	734	647	546	510	399	---
				BHP	0.22	0.23	0.24	0.24	0.24	0.26	0.26	0.27	0.27	---
				Heat Rise (°F)	30	32	34	37	41	46	55	NA	NA	NA
				Heat Rise (°C)	17	18	19	21	23	26	30	NA	NA	NA
		Med-High[2]	Orange	CFM	1047	997	931	875	804	737	676	584	494	401
				BHP	0.25	0.26	0.26	0.27	0.28	0.28	0.29	0.30	0.30	0.31
				Heat Rise (°F)	29	30	32	34	37	41	44	51	NA	NA
				Heat Rise (°C)	16	17	18	19	21	23	25	28	NA	NA
		High	Black	CFM	1125	1075	1019	956	891	825	760	695	594	491
				BHP	0.30	0.31	0.32	0.32	0.33	0.34	0.34	0.35	0.35	0.34
				Heat Rise (°F)	27	28	29	31	34	36	39	43	50	NA
				Heat Rise (°C)	15	15	16	17	19	20	22	24	28	NA
30060	25 - 55 (14 - 31)	Low[3]	Blue	CFM	774	700	623	546	439	339	---	---	---	---
				BHP	0.12	0.13	0.13	0.14	0.14	0.15	---	---	---	---
				Heat Rise (°F)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
				Heat Rise (°C)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Med-Low	Pink	CFM	906	843	771	707	624	548	451	340	---	---
				BHP	0.18	0.18	0.19	0.20	0.20	0.21	0.21	0.22	---	---
				Heat Rise (°F)	50	NA	NA	NA	NA	NA	NA	NA	NA	NA
				Heat Rise (°C)	28	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Medium	Red	CFM	1008	942	872	804	734	647	546	510	399	---
				BHP	0.22	0.23	0.24	0.24	0.24	0.26	0.26	0.27	0.27	---
				Heat Rise (°F)	45	48	52	NA	NA	NA	NA	NA	NA	NA
				Heat Rise (°C)	25	27	29	NA	NA	NA	NA	NA	NA	NA
		Med-High[2]	Orange	CFM	1047	997	931	875	804	737	676	584	494	401
				BHP	0.25	0.26	0.26	0.27	0.28	0.28	0.29	0.30	0.30	0.31
				Heat Rise (°F)	43	45	48	51	NA	NA	NA	NA	NA	NA
				Heat Rise (°C)	24	25	27	29	NA	NA	NA	NA	NA	NA
		High[1]	Black	CFM	1125	1075	1019	956	891	825	760	695	594	491
				BHP	0.30	0.31	0.32	0.32	0.33	0.34	0.34	0.35	0.35	0.34
				Heat Rise (°F)	40	42	44	47	51	55	NA	NA	NA	NA
				Heat Rise (°C)	22	23	25	26	28	30	NA	NA	NA	NA

Dry Coil Air Delivery* - Horizontal and Downflow Discharge Unit 24-60 208/230VAC - 1 Phase (Cont.)

Unit Size	Heating Rise Range °F (°C)	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)									
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
36060	25 - 55 (14 - 31)	Low[1]	Blue	CFM	1245	1188	1146	1094	1046	985	935	888	828	781
				BHP	0.34	0.34	0.35	0.36	0.37	0.37	0.38	0.39	0.39	0.40
				Heat Rise (°F)	36	38	39	41	43	46	48	51	54	NA
				Heat Rise (°C)	20	21	22	23	24	25	27	28	30	NA
		Med-Low[2]	Pink	CFM	1302	1253	1213	1160	1113	1060	1008	963	908	863
				BHP	0.38	0.39	0.40	0.41	0.42	0.42	0.43	0.44	0.44	0.45
				Heat Rise (°F)	35	36	37	39	40	42	45	47	50	52
				Heat Rise (°C)	19	20	21	22	22	24	25	26	28	29
		Medium[3]	Red	CFM	1362	1322	1284	1230	1184	1141	1087	1044	996	954
				BHP	0.42	0.44	0.44	0.46	0.47	0.47	0.48	0.49	0.50	0.51
				Heat Rise (°F)	33	34	35	37	38	39	41	43	45	47
				Heat Rise (°C)	18	19	19	20	21	22	23	24	25	26
		Med-High	Orange	CFM	1490	1448	1407	1364	1323	1279	1236	1192	1146	1099
				BHP	0.54	0.55	0.57	0.57	0.58	0.59	0.60	0.61	0.62	0.62
				Heat Rise (°F)	30	31	32	33	34	35	36	38	39	41
				Heat Rise (°C)	17	17	18	18	19	20	20	21	22	23
		High	Black	CFM	1577	1538	1502	1457	1420	1373	1327	1282	1213	1148
				BHP	0.65	0.65	0.67	0.67	0.68	0.69	0.69	0.69	0.68	0.67
				Heat Rise (°F)	29	29	30	31	32	33	34	35	37	39
				Heat Rise (°C)	16	16	17	17	18	18	19	20	21	22
36090	35 - 65 (19 - 36)	Low[3]	Blue	CFM	1245	1188	1146	1094	1046	985	935	888	828	781
				BHP	0.34	0.34	0.35	0.36	0.37	0.37	0.38	0.39	0.39	0.40
				Heat Rise (°F)	54	57	59	61	64	NA	NA	NA	NA	NA
				Heat Rise (°C)	30	31	33	34	36	NA	NA	NA	NA	NA
		Med-Low[2]	Pink	CFM	1302	1253	1213	1160	1113	1060	1008	963	908	863
				BHP	0.38	0.39	0.40	0.41	0.42	0.42	0.43	0.44	0.44	0.45
				Heat Rise (°F)	52	54	55	58	60	63	NA	NA	NA	NA
				Heat Rise (°C)	29	30	31	32	34	35	NA	NA	NA	NA
		Medium	Red	CFM	1362	1322	1284	1230	1184	1141	1087	1044	996	954
				BHP	0.42	0.44	0.44	0.46	0.47	0.47	0.48	0.49	0.50	0.51
				Heat Rise (°F)	49	51	52	55	57	59	62	64	NA	NA
				Heat Rise (°C)	27	28	29	30	32	33	34	36	NA	NA
		Med-High[1]	Orange	CFM	1490	1448	1407	1364	1323	1279	1236	1192	1146	1099
				BHP	0.54	0.55	0.57	0.57	0.58	0.59	0.60	0.61	0.62	0.62
				Heat Rise (°F)	45	46	48	49	51	52	54	56	59	61
				Heat Rise (°C)	25	26	27	27	28	29	30	31	33	34
		High	Black	CFM	1577	1538	1502	1457	1420	1373	1327	1282	1213	1148
				BHP	0.65	0.65	0.67	0.67	0.68	0.69	0.69	0.69	0.68	0.67
				Heat Rise (°F)	43	44	45	46	47	49	51	52	55	58
				Heat Rise (°C)	24	24	25	26	26	27	28	29	31	32

Dry Coil Air Delivery* - Horizontal and Downflow Discharge Unit 24-60 208/230VAC - 1 Phase (Cont.)

Unit Size	Heating Rise Range °F (°C)	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)									
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
42060	25 - 55 (14 - 31)	Low[3]	Blue	CFM	1113	1069	1018	964	914	868	820	778	739	686
				BHP	0.16	0.17	0.18	0.19	0.20	0.21	0.23	0.24	0.25	0.26
				Heat Rise (°F)	40	42	44	47	49	52	55	NA	NA	NA
				Heat Rise (°C)	22	23	25	26	27	29	30	NA	NA	NA
		Med-Low[1]	Pink	CFM	1205	1167	1120	1064	1016	975	930	886	848	811
				BHP	0.19	0.21	0.22	0.23	0.24	0.25	0.27	0.27	0.29	0.30
				Heat Rise (°F)	37	39	40	42	44	46	48	51	53	55
				Heat Rise (°C)	21	21	22	23	25	26	27	28	29	31
		Medium[2]	Red	CFM	1442	1407	1372	1326	1284	1245	1205	1160	1121	1085
				BHP	0.31	0.33	0.34	0.35	0.36	0.38	0.39	0.40	0.41	0.42
				Heat Rise (°F)	31	32	33	34	35	36	37	39	40	41
				Heat Rise (°C)	17	18	18	19	19	20	21	22	22	23
		Med-High	Orange	CFM	1510	1458	1433	1390	1358	1311	1267	1227	1189	1151
				BHP	0.34	0.36	0.37	0.39	0.40	0.42	0.43	0.44	0.45	0.46
				Heat Rise (°F)	30	31	31	32	33	34	36	37	38	39
				Heat Rise (°C)	17	17	17	18	18	19	20	20	21	22
		High	Black	CFM	1581	1545	1509	1475	1443	1401	1357	1318	1279	1247
				BHP	0.39	0.41	0.43	0.44	0.46	0.47	0.49	0.49	0.51	0.52
				Heat Rise (°F)	28	29	30	31	31	32	33	34	35	36
				Heat Rise (°C)	16	16	17	17	17	18	18	19	20	20
42090	35 - 65 (19 - 36)	Low[3]	Blue	CFM	1113	1069	1018	964	914	868	820	778	739	686
				BHP	0.16	0.17	0.18	0.19	0.20	0.21	0.23	0.24	0.25	0.26
				Heat Rise (°F)	61	63	NA	NA	NA	NA	NA	NA	NA	NA
				Heat Rise (°C)	34	35	NA	NA	NA	NA	NA	NA	NA	NA
		Med-Low	Pink	CFM	1205	1167	1120	1064	1016	975	930	886	848	811
				BHP	0.19	0.21	0.22	0.23	0.24	0.25	0.27	0.27	0.29	0.30
				Heat Rise (°F)	56	58	61	64	NA	NA	NA	NA	NA	NA
				Heat Rise (°C)	31	32	34	35	NA	NA	NA	NA	NA	NA
		Medium[2]	Red	CFM	1442	1407	1372	1326	1284	1245	1205	1160	1121	1085
				BHP	0.31	0.33	0.34	0.35	0.36	0.38	0.39	0.40	0.41	0.42
				Heat Rise (°F)	47	48	49	51	53	55	56	59	61	63
				Heat Rise (°C)	26	27	27	28	29	30	31	33	34	35
		Med-High[1]	Orange	CFM	1510	1458	1433	1390	1358	1311	1267	1227	1189	1151
				BHP	0.34	0.36	0.37	0.39	0.40	0.42	0.43	0.44	0.45	0.46
				Heat Rise (°F)	45	47	47	49	50	52	54	55	57	59
				Heat Rise (°C)	25	26	26	27	28	29	30	31	32	33
		High	Black	CFM	1581	1545	1509	1475	1443	1401	1357	1318	1279	1247
				BHP	0.39	0.41	0.43	0.44	0.46	0.47	0.49	0.49	0.51	0.52
				Heat Rise (°F)	43	44	45	46	47	48	50	52	53	54
				Heat Rise (°C)	24	24	25	26	26	27	28	29	29	30

Dry Coil Air Delivery* - Horizontal and Downflow Discharge Unit 24-60 208/230VAC - 1 Phase (Cont.)

Unit Size	Heating Rise Range °F (°C)	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)									
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
48090	35 - 65 (19 - 36)	Low[1]	Blue	CFM	1378	1344	1295	1260	1216	1179	1135	1087	1035	995
				BHP	0.26	0.27	0.29	0.31	0.31	0.33	0.34	0.36	0.36	0.38
				Heat Rise (°F)	49	51	52	54	56	58	60	62	NA	NA
				Heat Rise (°C)	27	28	29	30	31	32	33	35	NA	NA
		Med-Low[2]	Pink	CFM	1696	1671	1631	1607	1574	1539	1507	1463	1432	1393
				BHP	0.45	0.47	0.49	0.50	0.52	0.52	0.54	0.55	0.57	0.58
				Heat Rise (°F)	40	41	42	42	43	44	45	46	47	49
				Heat Rise (°C)	22	23	23	23	24	25	25	26	26	27
		Medium[3]	Red	CFM	1994	1968	1943	1910	1882	1835	1774	1702	1614	1512
				BHP	0.72	0.73	0.75	0.76	0.78	0.78	0.76	0.73	0.70	0.66
				Heat Rise (°F)	NA	NA	35	36	36	37	38	40	42	45
				Heat Rise (°C)	NA	NA	19	20	20	21	21	22	23	25
		Med-High	Orange	CFM	2054	2013	1986	1964	1919	1854	1779	1695	1605	1498
				BHP	0.77	0.79	0.80	0.82	0.81	0.80	0.76	0.74	0.69	0.65
				Heat Rise (°F)	NA	NA	NA	35	35	37	38	40	42	45
				Heat Rise (°C)	NA	NA	NA	19	20	20	21	22	23	25
		High	Black	CFM	2267	2201	2133	2071	1997	1923	1835	1739	1654	1551
				BHP	1.03	1.00	0.97	0.93	0.89	0.86	0.82	0.78	0.74	0.69
				Heat Rise (°F)	NA	NA	NA	NA	NA	35	37	39	41	44
				Heat Rise (°C)	NA	NA	NA	NA	NA	20	21	22	23	24
48115	30 - 60 (17 - 33)	Low[3]	Blue	CFM	1378	1344	1295	1260	1216	1179	1135	1087	1035	995
				BHP	0.26	0.27	0.29	0.31	0.31	0.33	0.34	0.36	0.36	0.38
				Heat Rise (°F)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
				Heat Rise (°C)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Med-Low[2]	Pink	CFM	1696	1671	1631	1607	1574	1539	1507	1463	1432	1393
				BHP	0.45	0.47	0.49	0.50	0.52	0.52	0.54	0.55	0.57	0.58
				Heat Rise (°F)	51	52	53	54	55	56	58	59	NA	NA
				Heat Rise (°C)	28	29	30	30	31	31	32	33	NA	NA
		Medium[1]	Red	CFM	1994	1968	1943	1910	1882	1835	1774	1702	1614	1512
				BHP	0.72	0.73	0.75	0.76	0.78	0.78	0.76	0.73	0.70	0.66
				Heat Rise (°F)	43	44	45	45	46	47	49	51	54	57
				Heat Rise (°C)	24	24	25	25	26	26	27	28	30	32
		Med-High	Orange	CFM	2054	2013	1986	1964	1919	1854	1779	1695	1605	1498
				BHP	0.77	0.79	0.80	0.82	0.81	0.80	0.76	0.74	0.69	0.65
				Heat Rise (°F)	42	43	44	44	45	47	49	51	54	58
				Heat Rise (°C)	23	24	24	25	25	26	27	28	30	32
		High	Black	CFM	2267	2201	2133	2071	1997	1923	1835	1739	1654	1551
				BHP	1.03	1.00	0.97	0.93	0.89	0.86	0.82	0.78	0.74	0.69
				Heat Rise (°F)	38	39	41	42	43	45	47	50	52	56
				Heat Rise (°C)	21	22	23	23	24	25	26	28	29	31

Dry Coil Air Delivery* - Horizontal and Downflow Discharge Unit 24-60 208/230VAC - 1 Phase (Cont.)

Unit Size	Heating Rise Range °F (°C)	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)									
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
48130	35 - 65 (19 - 36)	Low[3]	Blue	CFM	1378	1344	1295	1260	1216	1179	1135	1087	1035	995
				BHP	0.26	0.27	0.29	0.31	0.31	0.33	0.34	0.36	0.36	0.38
				Heat Rise (°F)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
				Heat Rise (°C)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Med-Low[2]	Pink	CFM	1696	1671	1631	1607	1574	1539	1507	1463	1432	1393
				BHP	0.45	0.47	0.49	0.50	0.52	0.52	0.54	0.55	0.57	0.58
				Heat Rise (°F)	57	58	59	60	61	62	64	NA	NA	NA
				Heat Rise (°C)	31	32	33	33	34	35	35	NA	NA	NA
		Medium	Red	CFM	1994	1968	1943	1910	1882	1835	1774	1702	1614	1512
				BHP	0.72	0.73	0.75	0.76	0.78	0.78	0.76	0.73	0.70	0.66
				Heat Rise (°F)	48	49	49	50	51	52	54	56	60	64
				Heat Rise (°C)	27	27	27	28	28	29	30	31	33	35
		Med-High[1]	Orange	CFM	2054	2013	1986	1964	1919	1854	1779	1695	1605	1498
				BHP	0.77	0.79	0.80	0.82	0.81	0.80	0.76	0.74	0.69	0.65
				Heat Rise (°F)	47	48	48	49	50	52	54	57	60	64
				Heat Rise (°C)	26	27	27	27	28	29	30	32	33	36
		High	Black	CFM	2267	2201	2133	2071	1997	1923	1835	1739	1654	1551
				BHP	1.03	1.00	0.97	0.93	0.89	0.86	0.82	0.78	0.74	0.69
				Heat Rise (°F)	42	44	45	46	48	50	52	55	58	62
				Heat Rise (°C)	24	24	25	26	27	28	29	31	32	34
60090	35 - 65 (19 - 36)	Low[3]	Blue	CFM	1330	1277	1232	1191	1147	1103	1060	1004	963	919
				BHP	0.26	0.27	0.29	0.30	0.31	0.32	0.33	0.34	0.36	0.37
				Heat Rise (°F)	51	53	55	57	59	62	64	68	NA	NA
				Heat Rise (°C)	28	30	31	32	33	34	36	38	NA	NA
		Med-Low[1]	Pink	CFM	1475	1436	1399	1351	1317	1270	1236	1188	1152	1105
				BHP	0.35	0.36	0.37	0.38	0.40	0.41	0.42	0.43	0.45	0.45
				Heat Rise (°F)	46	47	49	50	52	53	55	57	59	61
				Heat Rise (°C)	26	26	27	28	29	30	31	32	33	34
		Medium[2]	Red	CFM	1736	1710	1668	1630	1600	1557	1522	1479	1450	1406
				BHP	0.53	0.54	0.55	0.58	0.59	0.60	0.62	0.63	0.64	0.65
				Heat Rise (°F)	NA	NA	41	42	42	44	45	46	47	48
				Heat Rise (°C)	NA	NA	23	23	24	24	25	25	26	27
		Med-High	Orange	CFM	1935	1909	1867	1836	1808	1766	1696	1619	1535	1454
				BHP	0.71	0.73	0.74	0.76	0.78	0.79	0.77	0.75	0.72	0.68
				Heat Rise (°F)	NA	NA	NA	37	38	38	40	42	44	47
				Heat Rise (°C)	NA	NA	NA	21	21	21	22	23	25	26
		High	Black	CFM	2205	2150	2078	2011	1941	1852	1779	1672	1572	1473
				BHP	1.04	1.02	0.99	0.95	0.92	0.87	0.85	0.79	0.75	0.70
				Heat Rise (°F)	NA	NA	NA	NA	NA	37	38	41	43	46
				Heat Rise (°C)	NA	NA	NA	NA	NA	20	21	23	24	26

Dry Coil Air Delivery* - Horizontal and Downflow Discharge Unit 24-60 208/230VAC - 1 Phase (Cont.)

Unit Size	Heating Rise Range °F (°C)	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)									
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
60115	30 - 60 (17 - 33)	Low[3]	Blue	CFM	1330	1277	1232	1191	1147	1103	1060	1004	963	919
				BHP	0.26	0.27	0.29	0.30	0.31	0.32	0.33	0.34	0.36	0.37
				Heat Rise (°F)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
				Heat Rise (°C)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Med-Low	Pink	CFM	1475	1436	1399	1351	1317	1270	1236	1188	1152	1105
				BHP	0.35	0.36	0.37	0.38	0.40	0.41	0.42	0.43	0.45	0.45
				Heat Rise (°F)	59	60	NA	NA	NA	NA	NA	NA	NA	NA
				Heat Rise (°C)	33	34	NA	NA	NA	NA	NA	NA	NA	NA
		Medium[2]	Red	CFM	1736	1710	1668	1630	1600	1557	1522	1479	1450	1406
				BHP	0.53	0.54	0.55	0.58	0.59	0.60	0.62	0.63	0.64	0.65
				Heat Rise (°F)	50	51	52	53	54	56	57	59	60	NA
				Heat Rise (°C)	28	28	29	30	30	31	32	33	33	NA
		Med-High[1]	Orange	CFM	1935	1909	1867	1836	1808	1766	1696	1619	1535	1454
				BHP	0.71	0.73	0.74	0.76	0.78	0.79	0.77	0.75	0.72	0.68
				Heat Rise (°F)	45	45	46	47	48	49	51	54	56	60
				Heat Rise (°C)	25	25	26	26	27	27	28	30	31	33
		High	Black	CFM	2205	2150	2078	2011	1941	1852	1779	1672	1572	1473
				BHP	1.04	1.02	0.99	0.95	0.92	0.87	0.85	0.79	0.75	0.70
				Heat Rise (°F)	39	40	42	43	45	47	49	52	55	59
				Heat Rise (°C)	22	22	23	24	25	26	27	29	31	33

Dry Coil Air Delivery* - Horizontal and Downflow Discharge Unit 24-60 208/230VAC - 1 Phase (Cont.)

Unit Size	Heating Rise Range °F (°C)	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)									
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
60130	35 - 65 (19 - 36)	Low[3]	Blue	CFM	1330	1277	1232	1191	1147	1103	1060	1004	963	919
				BHP	0.26	0.27	0.29	0.30	0.31	0.32	0.33	0.34	0.36	0.37
				Heat Rise (°F)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
				Heat Rise (°C)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Med-Low	Pink	CFM	1475	1436	1399	1351	1317	1270	1236	1188	1152	1105
				BHP	0.35	0.36	0.37	0.38	0.40	0.41	0.42	0.43	0.45	0.45
				Heat Rise (°F)	65	NA	NA	NA	NA	NA	NA	NA	NA	NA
				Heat Rise (°C)	36	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Medium[2]	Red	CFM	1736	1710	1668	1630	1600	1557	1522	1479	1450	1406
				BHP	0.53	0.54	0.55	0.58	0.59	0.60	0.62	0.63	0.64	0.65
				Heat Rise (°F)	55	56	58	59	60	62	63	65	NA	NA
				Heat Rise (°C)	31	31	32	33	33	34	35	36	NA	NA
		Med-High[1]	Orange	CFM	1935	1909	1867	1836	1808	1766	1696	1619	1535	1454
				BHP	0.71	0.73	0.74	0.76	0.78	0.79	0.77	0.75	0.72	0.68
				Heat Rise (°F)	50	50	51	52	53	54	57	59	63	NA
				Heat Rise (°C)	28	28	29	29	30	30	31	33	35	NA
		High	Black	CFM	2205	2150	2078	2011	1941	1852	1779	1672	1572	1473
				BHP	1.04	1.02	0.99	0.95	0.92	0.87	0.85	0.79	0.75	0.70
				Heat Rise (°F)	44	45	46	48	50	52	54	57	61	65
				Heat Rise (°C)	24	25	26	27	28	29	30	32	34	36

*Air delivery values are without air filter and are for dry coil (See 48VL Wet Coil Pressure Drop table).

[1] Factory-shipped heating speed

[2] Factory-shipped cooling speed

[3] Factory-shipped continuous fan speed

"NA" = Not allowed for heating speed

NOTE: Deduct field-supplied air filter pressure drop and wet coil pressure drop to obtain external static pressure available for ducting.

Shaded areas indicate speed/static combinations that are not permitted for dehumidification speed.

Dry Coil Air Delivery* - Horizontal Discharge - Unit 30-60 3 Phase Models Only

Unit	Heating Rise Range °F (°C)	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)								
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
30040	30 – 60 (17 – 33)	Low	Blue	CFM	741	638	547	415	– –	– –	– –	– –	– –
				Heating Rise (°F)	41	47	55	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	23	26	31	NA	NA	NA	NA	NA	NA
		Med – Low[1]	Pink	CFM	973	887	823	733	665	538	451	– –	– –
				Heating Rise (°F)	31	34	37	41	45	56	NA	NA	NA
				Heating Rise (°C)	17	19	20	23	25	31	NA	NA	NA
		Medium	Red	CFM	1088	1023	954	881	800	723	658	563	461
				Heating Rise (°F)	NA	30	32	34	38	42	46	54	NA
				Heating Rise (°C)	NA	16	18	19	21	23	26	30	NA
		Med – High[2]	Orange	CFM	1140	1064	996	915	840	758	687	564	480
				Heating Rise (°F)	NA	NA	30	33	36	40	44	54	NA
				Heating Rise (°C)	NA	NA	17	18	20	22	24	30	NA
		High	Black	CFM	1202	1140	1082	1015	961	881	810	732	631
				Heating Rise (°F)	NA	NA	NA	30	31	34	37	41	48
				Heating Rise (°C)	NA	NA	NA	17	17	19	21	23	27
30060	25 – 55 (14 – 31)	Low	Blue	CFM	741	638	547	415	– –	– –	– –	– –	– –
				Heating Rise (°F)	NA	NA	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Med – Low	Pink	CFM	973	887	823	733	665	538	451	– –	– –
				Heating Rise (°F)	46	50	54	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	25	28	30	NA	NA	NA	NA	NA	NA
		Medium	Red	CFM	1088	1023	954	881	800	723	658	563	461
				Heating Rise (°F)	41	43	47	50	NA	NA	NA	NA	NA
				Heating Rise (°C)	23	24	26	28	NA	NA	NA	NA	NA
		Med – High[2]	Orange	CFM	1140	1064	996	915	840	758	687	564	480
				Heating Rise (°F)	39	42	45	49	53	NA	NA	NA	NA
				Heating Rise (°C)	22	23	25	27	29	NA	NA	NA	NA
		High[1]	Black	CFM	1202	1140	1082	1015	961	881	810	732	631
				Heating Rise (°F)	37	39	41	44	46	50	55	NA	NA
				Heating Rise (°C)	21	22	23	24	26	28	30	NA	NA

Dry Coil Air Delivery* - Horizontal Discharge - Unit 30-60 3 Phase Models Only (Cont.)

Unit	Heating Rise Range °F (°C)	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)								
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
36060	25 – 55 (14 – 31)	Low[1]	Blue	CFM	1234	1168	1093	1021	961	894	825	759	687
				Heating Rise (°F)	36	38	41	44	46	50	54	NA	NA
				Heating Rise (°C)	20	21	23	24	26	28	30	NA	NA
		Med–Low	Pink	CFM	1290	1223	1154	1090	1027	977	894	828	762
				Heating Rise (°F)	34	36	39	41	43	45	50	54	NA
				Heating Rise (°C)	19	20	21	23	24	25	28	30	NA
		Medium[2]	Red	CFM	1354	1290	1226	1158	1102	1046	981	918	843
				Heating Rise (°F)	33	34	36	38	40	42	45	48	53
				Heating Rise (°C)	18	19	20	21	22	24	25	27	29
		Med–High	Orange	CFM	1606	1546	1489	1430	1371	1316	1258	1208	1140
				Heating Rise (°F)	28	29	30	31	32	34	35	37	39
				Heating Rise (°C)	15	16	17	17	18	19	20	20	22
		High	Black	CFM	1630	1580	1517	1463	1407	1339	1277	1210	1131
				Heating Rise (°F)	27	28	29	30	32	33	35	37	39
				Heating Rise (°C)	15	16	16	17	18	18	19	20	22
36090	35 – 65 (19 – 36)	Low	Blue	CFM	1234	1168	1093	1021	961	894	825	759	687
				Heating Rise (°F)	55	58	62	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	31	32	35	NA	NA	NA	NA	NA	NA
		Med–Low	Pink	CFM	1290	1223	1154	1090	1027	977	894	828	762
				Heating Rise (°F)	53	56	59	62	NA	NA	NA	NA	NA
				Heating Rise (°C)	29	31	33	35	NA	NA	NA	NA	NA
		Medium[2]	Red	CFM	1354	1290	1226	1158	1102	1046	981	918	843
				Heating Rise (°F)	50	53	55	59	62	65	NA	NA	NA
				Heating Rise (°C)	28	29	31	33	34	36	NA	NA	NA
		Med–High	Orange	CFM	1606	1546	1489	1430	1371	1316	1258	1208	1140
				Heating Rise (°F)	42	44	46	48	50	52	54	56	60
				Heating Rise (°C)	24	24	25	26	28	29	30	31	33
		High[1]	Black	CFM	1630	1580	1517	1463	1407	1339	1277	1210	1131
				Heating Rise (°F)	42	43	45	46	48	51	53	56	60
				Heating Rise (°C)	23	24	25	26	27	28	30	31	33

Dry Coil Air Delivery* - Horizontal Discharge - Unit 30-60 3 Phase Models Only (Cont.)

Unit	Heating Rise Range °F (°C)	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)								
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
42060	25 – 55 (14 – 31)	Low[1]	Blue	CFM	1295	1234	1182	1126	1075	1016	955	898	857
				Heating Rise (°F)	34	36	38	39	41	44	47	49	52
				Heating Rise (°C)	19	20	21	22	23	24	26	27	29
		Med – Low	Pink	CFM	1345	1282	1235	1194	1140	1095	1027	974	921
				Heating Rise (°F)	33	35	36	37	39	41	43	46	48
				Heating Rise (°C)	18	19	20	21	22	23	24	25	27
		Medium	Red	CFM	1505	1452	1413	1358	1323	1282	1234	1169	1130
				Heating Rise (°F)	30	31	31	33	34	35	36	38	39
				Heating Rise (°C)	16	17	17	18	19	19	20	21	22
		Med – High[2]	Orange	CFM	1545	1492	1449	1411	1362	1313	1278	1231	1188
				Heating Rise (°F)	29	30	31	31	33	34	35	36	37
				Heating Rise (°C)	16	17	17	17	18	19	19	20	21
		High	Black	CFM	1705	1643	1607	1568	1518	1483	1448	1404	1360
				Heating Rise (°F)	26	27	28	28	29	30	31	32	33
				Heating Rise (°C)	14	15	15	16	16	17	17	18	18
42090	35 – 65 (19 – 36)	Low	Blue	CFM	1295	1234	1182	1126	1075	1016	955	898	857
				Heating Rise (°F)	53	55	58	60	63	NA	NA	NA	NA
				Heating Rise (°C)	29	31	32	34	35	NA	NA	NA	NA
		Med – Low	Pink	CFM	1345	1282	1235	1194	1140	1095	1027	974	921
				Heating Rise (°F)	51	53	55	57	60	62	NA	NA	NA
				Heating Rise (°C)	28	29	31	32	33	35	NA	NA	NA
		Medium[1]	Red	CFM	1505	1452	1413	1358	1323	1282	1234	1169	1130
				Heating Rise (°F)	45	47	48	50	51	53	55	58	60
				Heating Rise (°C)	25	26	27	28	29	29	31	32	33
		Med – High[2]	Orange	CFM	1545	1492	1449	1411	1362	1313	1278	1231	1188
				Heating Rise (°F)	44	46	47	48	50	52	53	55	57
				Heating Rise (°C)	24	25	26	27	28	29	30	31	32
		High	Black	CFM	1705	1643	1607	1568	1518	1483	1448	1404	1360
				Heating Rise (°F)	40	41	42	43	45	46	47	48	50
				Heating Rise (°C)	22	23	24	24	25	25	26	27	28

Dry Coil Air Delivery* - Horizontal Discharge - Unit 30-60 3 Phase Models Only (Cont.)

Unit	Heating Rise Range °F (°C)	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)								
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
48090	35 – 65 (19 – 36)	Low[1]	Blue	CFM	1402	1351	1311	1263	1224	1172	1136	1080	1041
				Heating Rise (°F)	49	50	52	54	56	58	60	63	65
				Heating Rise (°C)	27	28	29	30	31	32	33	35	36
		Med–Low	Pink	CFM	1457	1404	1367	1318	1284	1233	1197	1144	1104
				Heating Rise (°F)	47	48	50	52	53	55	57	59	62
				Heating Rise (°C)	26	27	28	29	29	31	32	33	34
		Medium[2]	Red	CFM	1736	1695	1642	1601	1553	1512	1465	1427	1381
				Heating Rise (°F)	39	40	41	42	44	45	46	48	49
				Heating Rise (°C)	22	22	23	24	24	25	26	26	27
		Med–High	Orange	CFM	2149	2111	2062	2026	1980	1945	1905	1864	1793
				Heating Rise (°F)	NA	NA	NA	NA	NA	35	36	36	38
				Heating Rise (°C)	NA	NA	NA	NA	NA	19	20	20	21
		High	Black	CFM	2344	2306	2259	2203	2141	2070	1991	1902	1803
				Heating Rise (°F)	NA	NA	NA	NA	NA	NA	NA	36	38
				Heating Rise (°C)	NA	NA	NA	NA	NA	NA	NA	20	21
48115	30 – 60 (17 – 33)	Low	Blue	CFM	1402	1351	1311	1263	1224	1172	1136	1080	1041
				Heating Rise (°F)	NA	NA	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Med–Low	Pink	CFM	1457	1404	1367	1318	1284	1233	1197	1144	1104
				Heating Rise (°F)	60	NA	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	33	NA	NA	NA	NA	NA	NA	NA	NA
		Medium[2]	Red	CFM	1736	1695	1642	1601	1553	1512	1465	1427	1381
				Heating Rise (°F)	50	51	53	54	56	57	59	NA	NA
				Heating Rise (°C)	28	28	29	30	31	32	33	NA	NA
		Med–High[1]	Orange	CFM	2149	2111	2062	2026	1980	1945	1905	1864	1793
				Heating Rise (°F)	40	41	42	43	44	45	46	47	48
				Heating Rise (°C)	22	23	23	24	24	25	25	26	27
		High	Black	CFM	2344	2306	2259	2203	2141	2070	1991	1902	1803
				Heating Rise (°F)	37	38	38	39	41	42	44	46	48
				Heating Rise (°C)	21	21	21	22	23	23	24	25	27

Dry Coil Air Delivery* - Horizontal Discharge - Unit 30-60 3 Phase Models Only (Cont.)

Unit	Heating Rise Range °F (°C)	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)								
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
48130	35 – 65 (19 – 36)	Low	Blue	CFM	1402	1351	1311	1263	1224	1172	1136	1080	1041
				Heating Rise (°F)	NA	NA	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Med – Low	Pink	CFM	1457	1404	1367	1318	1284	1233	1197	1144	1104
				Heating Rise (°F)	NA	NA	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Medium[2]	Red	CFM	1736	1695	1642	1601	1553	1512	1465	1427	1381
				Heating Rise (°F)	55	57	59	60	62	64	NA	NA	NA
				Heating Rise (°C)	31	32	33	33	34	35	NA	NA	NA
		Med – High[1]	Orange	CFM	2149	2111	2062	2026	1980	1945	1905	1864	1793
				Heating Rise (°F)	45	46	47	48	49	50	51	52	54
				Heating Rise (°C)	25	25	26	26	27	28	28	29	30
		High	Black	CFM	2344	2306	2259	2203	2141	2070	1991	1902	1803
				Heating Rise (°F)	41	42	43	44	45	47	48	51	53
				Heating Rise (°C)	23	23	24	24	25	26	27	28	30
60090	35 – 65 (19 – 36)	Low[1]	Blue	CFM	1445	1389	1341	1281	1236	1189	1139	1072	1027
				Heating Rise (°F)	47	49	51	53	55	57	60	63	NA
				Heating Rise (°C)	26	27	28	29	31	32	33	35	NA
		Med – Low	Pink	CFM	1678	1635	1602	1558	1513	1474	1438	1404	1349
				Heating Rise (°F)	41	42	42	44	45	46	47	48	50
				Heating Rise (°C)	23	23	24	24	25	26	26	27	28
		Medium[2]	Red	CFM	1962	1915	1880	1843	1794	1753	1711	1675	1628
				Heating Rise (°F)	35	36	36	37	38	39	40	41	42
				Heating Rise (°C)	19	20	20	20	21	22	22	23	23
		Med – High	Orange	CFM	2131	2088	2065	2013	1982	1941	1888	1860	1785
				Heating Rise (°F)	NA	NA	NA	NA	NA	35	36	37	38
				Heating Rise (°C)	NA	NA	NA	NA	NA	19	20	20	21
		High	Black	CFM	2461	2409	2339	2286	2192	2140	2062	1968	1874
				Heating Rise (°F)	NA	NA	NA	NA	NA	NA	NA	35	36
				Heating Rise (°C)	NA	NA	NA	NA	NA	NA	NA	19	20

Dry Coil Air Delivery* - Horizontal Discharge - Unit 30-60 3 Phase Models Only (Cont.)

Unit	Heating Rise Range °F (°C)	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)								
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
60115	30 – 60 (17 – 33)	Low	Blue	CFM	1445	1389	1341	1281	1236	1189	1139	1072	1027
				Heating Rise (°F)	60	NA	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	33	NA	NA	NA	NA	NA	NA	NA	NA
		Med–Low	Pink	CFM	1678	1635	1602	1558	1513	1474	1438	1404	1349
				Heating Rise (°F)	52	53	54	56	57	59	60	NA	NA
				Heating Rise (°C)	29	30	30	31	32	33	34	NA	NA
		Medium[2]	Red	CFM	1962	1915	1880	1843	1794	1753	1711	1675	1628
				Heating Rise (°F)	44	45	46	47	48	50	51	52	53
				Heating Rise (°C)	25	25	26	26	27	28	28	29	30
		Med–High[1]	Orange	CFM	2131	2088	2065	2013	1982	1941	1888	1860	1785
				Heating Rise (°F)	41	42	42	43	44	45	46	47	49
				Heating Rise (°C)	23	23	23	24	24	25	26	26	27
		High	Black	CFM	2461	2409	2339	2286	2192	2140	2062	1968	1874
				Heating Rise (°F)	35	36	37	38	40	41	42	44	46
				Heating Rise (°C)	20	20	21	21	22	23	23	25	26
60130	35 – 65 (19 – 36)	Low	Blue	CFM	1445	1389	1341	1281	1236	1189	1139	1072	1027
				Heating Rise (°F)	NA	NA	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Med–Low	Pink	CFM	1678	1635	1602	1558	1513	1474	1438	1404	1349
				Heating Rise (°F)	57	59	60	62	64	65	NA	NA	NA
				Heating Rise (°C)	32	33	33	34	35	36	NA	NA	NA
		Medium[2]	Red	CFM	1962	1915	1880	1843	1794	1753	1711	1675	1628
				Heating Rise (°F)	49	50	51	52	54	55	56	57	59
				Heating Rise (°C)	27	28	28	29	30	31	31	32	33
		Med–High[1]	Orange	CFM	2131	2088	2065	2013	1982	1941	1888	1860	1785
				Heating Rise (°F)	45	46	47	48	49	50	51	52	54
				Heating Rise (°C)	25	26	26	27	27	28	28	29	30
		High	Black	CFM	2461	2409	2339	2286	2192	2140	2062	1968	1874
				Heating Rise (°F)	39	40	41	42	44	45	47	49	51
				Heating Rise (°C)	22	22	23	23	24	25	26	27	29

*Air delivery values are without air filter and are for dry coil (See 48VL Wet Coil Pressure Drop table).
[1] Factory-shipped heating speed
[2] Factory-shipped cooling speed
"NA" = Not allowed for heating speed
Note: Deduct field-supplied air filter pressure drop and wet coil pressure drop to obtain external static pressure available for ducting.
Shaded areas indicate speed/static combinations that are not permitted for dehumidification speed.
Note: Deduct 10% for 208 volt operation.

Dry Coil Air Delivery - Downflow Discharge 3 Phase Models Only

Unit	Heating Rise Range	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)									
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
24040	30 - 60ºF 17 - 33ºC)	Low	Blue	CFM	809	664	554	447	---	---	---	---	---	---
				WATTS	85	82	87	95	---	---	---	---	---	---
				BHP	0.09	0.09	0.09	0.10	---	---	---	---	---	---
				Heating Rise (ºF)	37	46	55	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (ºC)	21	25	30	NA	NA	NA	NA	NA	NA	NA
		Med-Low	Pink	CFM	875	787	693	612	498	392	---	---	---	---
				WATTS	101	111	115	125	131	142	---	---	---	---
				BHP	0.11	0.12	0.12	0.13	0.14	0.15	---	---	---	---
				Heating Rise (ºF)	35	38	44	49	NA	NA	NA	NA	NA	NA
				Heating Rise (ºC)	19	21	24	27	NA	NA	NA	NA	NA	NA
		Medium[2]	Red	CFM	939	860	748	663	591	472	399	---	---	---
				WATTS	119	124	134	138	147	155	164	---	---	---
				BHP	0.13	0.13	0.14	0.15	0.16	0.17	0.18	---	---	---
				Heating Rise (ºF)	32	35	40	46	51	NA	NA	NA	NA	NA
				Heating Rise (ºC)	18	20	22	25	28	NA	NA	NA	NA	NA
		Med-High[1]	Orange	CFM	1026	949	873	786	694	604	516	---	---	---
				WATTS	146	151	161	167	177	183	195	---	---	---
				BHP	0.16	0.16	0.17	0.18	0.19	0.20	0.21	---	---	---
				Heating Rise (ºF)	NA	32	35	38	44	50	59	NA	NA	NA
				Heating Rise (ºC)	NA	18	19	21	24	28	33	NA	NA	NA
		High	Black	CFM	1264	1202	1134	1070	1002	931	870	806	699	610
				WATTS	250	261	274	279	290	296	308	319	328	332
				BHP	0.27	0.28	0.29	0.30	0.31	0.32	0.33	0.34	0.35	0.36
				Heating Rise (ºF)	NA	NA	NA	NA	30	32	35	37	43	50
				Heating Rise (ºC)	NA	NA	NA	NA	17	18	19	21	24	28

Dry Coil Air Delivery - Downflow Discharge 3 Phase Models Only (Cont.)

Unit	Heating Rise Range	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)									
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
24060	25 - 55°F (14 - 31°C)	Low	Blue	CFM	809	664	554	447	---	---	---	---	---	---
				WATTS	85	82	87	95	---	---	---	---	---	---
				BHP	0.09	0.09	0.09	0.10	---	---	---	---	---	---
				Heating Rise (°F)	55	NA	NA	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	31	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Med-Low	Pink	CFM	875	787	693	612	498	392	---	---	---	---
				WATTS	101	111	115	125	131	142	---	---	---	---
				BHP	0.11	0.12	0.12	0.13	0.14	0.15	---	---	---	---
				Heating Rise (°F)	51	NA	NA	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	28	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Medium[2]	Red	CFM	939	860	748	663	591	472	399	---	---	---
				WATTS	119	124	134	138	147	155	164	---	---	---
				BHP	0.13	0.13	0.14	0.15	0.16	0.17	0.18	---	---	---
				Heating Rise (°F)	47	52	NA	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	26	29	NA	NA	NA	NA	NA	NA	NA	NA
		Med-High	Orange	CFM	1026	949	873	786	694	604	516	---	---	---
				WATTS	146	151	161	167	177	183	195	---	---	---
				BHP	0.16	0.16	0.17	0.18	0.19	0.20	0.21	---	---	---
				Heating Rise (°F)	43	47	51	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	24	26	28	NA	NA	NA	NA	NA	NA	NA
		High[1]	Black	CFM	1264	1202	1134	1070	1002	931	870	806	699	610
				WATTS	250	261	274	279	290	296	308	319	328	332
				BHP	0.27	0.28	0.29	0.30	0.31	0.32	0.33	0.34	0.35	0.36
				Heating Rise (°F)	35	37	39	42	44	48	51	55	NA	NA
				Heating Rise (°C)	20	21	22	23	25	27	28	31	NA	NA

Dry Coil Air Delivery - Downflow Discharge 3 Phase Models Only (Cont.)

Unit	Heating Rise Range	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)									
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
30040	30 - 60°F (17 - 33°C)	Low	Blue	CFM	756	669	548	457	---	---	---	---	---	---
				WATTS	84	90	96	106	---	---	---	---	---	---
				BHP	0.09	0.10	0.10	0.11	---	---	---	---	---	---
				Heating Rise (°F)	40	45	55	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	22	25	31	NA	NA	NA	NA	NA	NA	NA
		Med-Low[1]	Pink	CFM	1002	928	842	733	660	560	450	---	---	---
				WATTS	144	155	161	173	185	192	203	---	---	---
				BHP	0.15	0.17	0.17	0.19	0.20	0.21	0.22	---	---	---
				Heating Rise (°F)	30	33	36	41	46	54	NA	NA	NA	NA
				Heating Rise (°C)	17	18	20	23	25	30	NA	NA	NA	NA
		Medium	Red	CFM	1110	1025	967	879	814	706	611	509	461	---
				WATTS	188	195	205	211	223	236	243	255	243	--- ---
				BHP	0.20	0.21	0.22	0.23	0.24	0.25	0.26	--- ---	--- ---	--- ---
				Heating Rise (°F)	NA	NA	31	34	37	43	49	59	NA	NA
				Heating Rise (°C)	NA	NA	17	19	21	24	27	33	NA	NA
		Med-High[2]	Orange	CFM	1160	1091	1004	945	866	804	699	615	496	---
				WATTS	213	225	232	243	249	261	273	285	291	---
				BHP	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.31	0.31	---
				Heating Rise (°F)	NA	NA	30	32	35	38	43	49	NA	NA
				Heating Rise (°C)	NA	NA	17	18	19	21	24	27	NA	NA
		High	Black	CFM	1240	1173	1110	1031	966	902	821	726	626	---
				WATTS	254	266	274	284	295	302	315	327	331	---
				BHP	0.27	0.29	0.29	0.30	0.32	0.32	0.34	0.35	0.35	---
				Heating Rise (°F)	NA	NA	NA	NA	31	34	37	42	48	NA
				Heating Rise (°C)	NA	NA	NA	NA	17	19	20	23	27	NA

Dry Coil Air Delivery - Downflow Discharge 3 Phase Models Only (Cont.)

Unit	Heating Rise Range	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)									
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
30060	25 - 55°F (14 - 31°C)	Low	Blue	CFM	756	669	548	457	---	---	---	---	---	---
				WATTS	84	90	96	106	---	---	---	---	---	---
				BHP	0.09	0.10	0.10	0.11	---	---	---	---	---	---
				Heating Rise (°F)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Med-Low	Pink	CFM	1002	928	842	733	660	560	450	---	---	---
				WATTS	144	155	161	173	185	192	203	---	---	---
				BHP	0.15	0.17	0.17	0.19	0.20	0.21	0.22	---	---	---
				Heating Rise (°F)	44	48	53	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	25	27	29	NA	NA	NA	NA	NA	NA	NA
		Medium	Red	CFM	1110	1025	967	879	814	706	611	509	461	---
				WATTS	188	195	205	211	223	236	243	255	243	---
				BHP	0.20	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.26	---
				Heating Rise (°F)	40	43	46	51	55	NA	NA	NA	NA	NA
				Heating Rise (°C)	22	24	26	28	30	NA	NA	NA	NA	NA
		Med-High[2]	Orange	CFM	1160	1091	1004	945	866	804	699	615	496	--- ---
				WATTS	213	225	232	243	249	261	273	285	291	--- ---
				BHP	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.31	0.31	--- ---
				Heating Rise (°F)	38	41	44	47	51	55	NA	NA	NA	NA
				Heating Rise (°C)	21	23	25	26	29	31	NA	NA	NA	NA
		High[1]	Black	CFM	1240	1173	1110	1031	966	902	821	726	626	---
				WATTS	254	266	274	284	295	302	315	327	331	---
				BHP	0.27	0.29	0.29	0.30	0.32	0.32	0.34	0.35	0.35	---
				Heating Rise (°F)	36	38	40	43	46	49	54	NA	NA	NA
				Heating Rise (°C)	20	21	22	24	26	27	30	NA	NA	NA

Dry Coil Air Delivery - Downflow Discharge 3 Phase Models Only (Cont.)

Unit	Heating Rise Range	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)									
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
36060	25 - 55°F (14 - 31°C)	Low[1]	Blue	CFM	1277	1215	1147	1094	1045	992	932	874	826	757
				WATTS	285	289	299	305	314	319	328	335	347	352
				BHP	0.31	0.31	0.32	0.33	0.34	0.34	0.35	0.36	0.37	0.38
				Heating Rise (°F)	35	37	39	41	43	45	48	51	54	NA
				Heating Rise (°C)	19	20	22	23	24	25	26	28	30	NA
		Med-Low	Pink	CFM	1312	1260	1203	1153	1095	1050	995	943	889	829
				WATTS	314	324	329	340	344	355	361	372	382	387
				BHP	0.34	0.35	0.35	0.36	0.37	0.38	0.39	0.40	0.41	
				Heating Rise (°F)	34	35	37	39	41	42	45	47	50	54
				Heating Rise (°C)	19	20	21	21	23	24	25	26	28	30
		Medium[2]	Red	CFM	1381	1326	1269	1212	1161	1121	1070	1019	974	912
				WATTS	358	365	375	383	391	395	406	418	424	434
				BHP	0.38	0.39	0.40	0.41	0.42	0.42	0.44	0.45	0.45	0.47
				Heating Rise (°F)	32	34	35	37	38	40	42	44	46	49
				Heating Rise (°C)	18	19	19	20	21	22	23	24	25	27
		Med-High	Orange	CFM	1631	1579	1525	1477	1423	1372	1336	1284	1233	1166
				WATTS	567	576	581	592	598	609	617	619	613	598
				BHP	0.61	0.62	0.62	0.63	0.64	0.65	0.66	0.66	0.66	0.64
				Heating Rise (°F)	27	28	29	30	31	32	33	35	36	38
				Heating Rise (°C)	15	16	16	17	17	18	18	19	20	21
		High	Black	CFM	1681	1633	1575	1526	1478	1415	1366	1312	1249	1159
				WATTS	618	626	636	644	652	653	649	642	627	602
				BHP	0.66	0.67	0.68	0.69	0.70	0.70	0.70	0.69	0.67	0.65
				Heating Rise (°F)	26	27	28	29	30	31	33	34	36	38
				Heating Rise (°C)	15	15	16	16	17	17	18	19	20	21

Dry Coil Air Delivery - Downflow Discharge 3 Phase Models Only (Cont.)

Unit	Heating Rise Range	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)									
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
36090	35 - 65°F (19 - 36°C)	Low	Blue	CFM	1277	1215	1147	1094	1045	992	932	874	826	757
				WATTS	285	289	299	305	314	319	328	335	347	352
				BHP	0.31	0.31	0.32	0.33	0.34	0.34	0.35	0.36	0.37	0.38
				Heating Rise (°F)	53	56	59	62	65	NA	NA	NA	NA	NA
				Heating Rise (°C)	30	31	33	35	36	NA	NA	NA	NA	NA
		Med-Low	Pink	CFM	1312	1260	1203	1153	1095	1050	995	943	889	829
				WATTS	314	324	329	340	344	355	361	372	382	387
				BHP	0.34	0.35	0.35	0.36	0.37	0.38	0.39	0.40	0.41	
				Heating Rise (°F)	52	54	57	59	62	65	NA	NA	NA	NA
				Heating Rise (°C)	29	30	31	33	35	36	NA	NA	NA	NA
		Medium[2]	Red	CFM	1381	1326	1269	1212	1161	1121	1070	1019	974	912
				WATTS	358	365	375	383	391	395	406	418	424	434
				BHP	0.38	0.39	0.40	0.41	0.42	0.42	0.44	0.45	0.45	0.47
				Heating Rise (°F)	49	51	54	56	59	61	64	NA	NA	NA
				Heating Rise (°C)	27	28	30	31	33	34	35	NA	NA	NA
		Med-High	Orange	CFM	1631	1579	1525	1477	1423	1372	1336	1284	1233	1166
				WATTS	567	576	581	592	598	609	617	619	613	598
				BHP	0.61	0.62	0.62	0.63	0.64	0.65	0.66	0.66	0.66	0.64
				Heating Rise (°F)	42	43	45	46	48	50	51	53	55	58
				Heating Rise (°C)	23	24	25	26	27	28	28	29	31	32
		High[1]	Black	CFM	1681	1633	1575	1526	1478	1415	1366	1312	1249	1159
				WATTS	618	626	636	644	652	653	649	642	627	602
				BHP	0.66	0.67	0.68	0.69	0.70	0.70	0.70	0.69	0.67	0.65
				Heating Rise (°F)	40	42	43	45	46	48	50	52	54	59
				Heating Rise (°C)	22	23	24	25	26	27	28	29	30	33

Dry Coil Air Delivery - Downflow Discharge 3 Phase Models Only (Cont.)

Unit	Heating Rise Range	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)									
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
42060	25 - 55°F (14 - 31°C)	Low[1]	Blue	CFM	1365	1324	1284	1233	1181	1127	1084	1039	984	939
				WATTS	177	189	201	210	222	236	248	261	269	281
				BHP	0.19	0.20	0.22	0.23	0.24	0.25	0.27	0.28	0.29	0.30
				Heating Rise (°F)	33	34	35	36	38	39	41	43	45	47
				Heating Rise (°C)	18	19	19	20	21	22	23	24	25	26
		Med-Low	Pink	CFM	1425	1384	1339	1301	1254	1199	1151	1104	1065	1015
				WATTS	197	210	223	235	248	257	271	284	296	305
				BHP	0.21	0.23	0.24	0.25	0.27	0.28	0.29	0.30	0.32	0.33
				Heating Rise (°F)	31	32	33	34	35	37	39	40	42	44
				Heating Rise (°C)	17	18	18	19	20	21	21	22	23	24
		Medium	Red	CFM	1582	1549	1509	1469	1433	1392	1346	1300	1249	1213
				WATTS	267	280	294	308	322	336	344	359	374	387
				BHP	0.29	0.30	0.32	0.33	0.35	0.36	0.37	0.38	0.40	0.42
				Heating Rise (°F)	28	29	29	30	31	32	33	34	36	37
				Heating Rise (°C)	16	16	16	17	17	18	18	19	20	20
		Med-High[2]	Orange	CFM	1623	1586	1553	1511	1470	1433	1393	1350	1309	1261
				WATTS	285	299	312	324	335	349	363	378	393	407
				BHP	0.31	0.32	0.33	0.35	0.36	0.37	0.39	0.41	0.42	0.44
				Heating Rise (°F)	27	28	29	29	30	31	32	33	34	35
				Heating Rise (°C)	15	16	16	16	17	17	18	18	19	20
		High	Black	CFM	1775	1736	1696	1660	1622	1588	1557	1516	1472	1426
				WATTS	371	386	401	410	424	439	453	468	483	497
				BHP	0.40	0.41	0.43	0.44	0.45	0.47	0.49	0.50	0.52	0.53
				Heating Rise (°F)	25	26	26	27	27	28	29	29	30	31
				Heating Rise (°C)	14	14	15	15	15	16	16	16	17	17

Dry Coil Air Delivery - Downflow Discharge 3 Phase Models Only (Cont.)

Unit	Heating Rise Range	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)									
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
42090	35 - 65°F (19 - 36°C)	Low	Blue	CFM	1365	1324	1284	1233	1181	1127	1084	1039	984	939
				WATTS	177	189	201	210	222	236	248	261	269	281
				BHP	0.19	0.20	0.22	0.23	0.24	0.25	0.27	0.28	0.29	0.30
				Heating Rise (°F)	50	51	53	55	58	60	63	65	NA	NA
				Heating Rise (°C)	28	29	29	31	32	34	35	36	NA	NA
		Med-Low	Pink	CFM	1425	1384	1339	1301	1254	1199	1151	1104	1065	1015
				WATTS	197	210	223	235	248	257	271	284	296	305
				BHP	0.21	0.23	0.24	0.25	0.27	0.28	0.29	0.30	0.32	0.33
				Heating Rise (°F)	48	49	51	52	54	57	59	62	64	NA
				Heating Rise (°C)	27	27	28	29	30	32	33	34	35	NA
		Medium[1]	Red	CFM	1582	1549	1509	1469	1433	1392	1346	1300	1249	1213
				WATTS	267	280	294	308	322	336	344	359	374	387
				BHP	0.29	0.30	0.32	0.33	0.35	0.36	0.37	0.38	0.40	0.42
				Heating Rise (°F)	43	44	45	46	47	49	51	52	54	56
				Heating Rise (°C)	24	24	25	26	26	27	28	29	30	31
		Med-High[2]	Orange	CFM	1623	1586	1553	1511	1470	1433	1393	1350	1309	1261
				WATTS	285	299	312	324	335	349	363	378	393	407
				BHP	0.31	0.32	0.33	0.35	0.36	0.37	0.39	0.41	0.42	0.44
				Heating Rise (°F)	42	43	44	45	46	47	49	50	52	54
				Heating Rise (°C)	23	24	24	25	26	26	27	28	29	30
		High	Black	CFM	1775	1736	1696	1660	1622	1588	1557	1516	1472	1426
				WATTS	371	386	401	410	424	439	453	468	483	497
				BHP	0.40	0.41	0.43	0.44	0.45	0.47	0.49	0.50	0.52	0.53
				Heating Rise (°F)	38	39	40	41	42	43	44	45	46	48
				Heating Rise (°C)	21	22	22	23	23	24	24	25	26	26

Dry Coil Air Delivery - Downflow Discharge 3 Phase Models Only (Cont.)

Unit	Heating Rise Range	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)									
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
48090	35 - 65°F (19 - 36°C)	Low[1]	Blue	CFM	1503	1457	1423	1374	1330	1287	1241	1199	1153	1111
				WATTS	225	233	246	254	269	282	292	307	314	329
				BHP	0.24	0.25	0.26	0.27	0.29	0.30	0.31	0.33	0.34	0.35
				Heating Rise (°F)	45	47	48	49	51	53	55	57	59	61
				Heating Rise (°C)	25	26	27	27	28	29	30	32	33	34
		Med-Low	Pink	CFM	1556	1508	1461	1432	1388	1346	1302	1256	1221	1168
				WATTS	244	261	268	281	290	305	319	330	345	353
				BHP	0.26	0.28	0.29	0.30	0.31	0.33	0.34	0.35	0.37	0.38
				Heating Rise (°F)	44	45	47	47	49	51	52	54	56	58
				Heating Rise (°C)	24	25	26	26	27	28	29	30	31	32
		Medium[2]	Red	CFM	1861	1822	1786	1758	1716	1688	1660	1619	1583	1539
				WATTS	400	417	426	441	452	467	482	492	507	519
				BHP	0.43	0.45	0.46	0.47	0.48	0.50	0.52	0.53	0.54	0.56
				Heating Rise (°F)	37	37	38	39	40	40	41	42	43	44
				Heating Rise (°C)	20	21	21	21	22	22	23	23	24	25
		Med-High	Orange	CFM	2319	2291	2255	2230	2193	2166	2118	2057	1992	1887
				WATTS	758	769	787	799	808	823	822	805	780	737
				BHP	0.81	0.82	0.84	0.86	0.87	0.88	0.88	0.86	0.84	0.79
				Heating Rise (°F)	NA	NA	NA	NA	NA	NA	NA	NA	NA	36
				Heating Rise (°C)	NA	NA	NA	NA	NA	NA	NA	NA	NA	20
		High	Black	CFM	2532	2487	2444	2391	2330	2259	2179	2111	2033	1949
				WATTS	1014	1022	1015	994	965	935	898	858	823	786
				BHP	1.09	1.10	1.09	1.07	1.03	1.00	0.96	0.92	0.88	0.84
				Heating Rise (°F)	NA	NA	NA	NA	NA	NA	NA	NA	NA	35
				Heating Rise (°C)	NA	NA	NA	NA	NA	NA	NA	NA	NA	19

Dry Coil Air Delivery - Downflow Discharge 3 Phase Models Only (Cont.)

Unit	Heating Rise Range	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)									
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
48115	30 - 60°F (17 - 33°C)	Low	Blue	CFM	1503	1457	1423	1374	1330	1287	1241	1199	1153	1111
				WATTS	225	233	246	254	269	282	292	307	314	329
				BHP	0.24	0.25	0.26	0.27	0.29	0.30	0.31	0.33	0.34	0.35
				Heating Rise (°F)	58	60	NA	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	32	33	NA	NA	NA	NA	NA	NA	NA	NA
		Med-Low	Pink	CFM	1556	1508	1461	1432	1388	1346	1302	1256	1221	1168
				WATTS	244	261	268	281	290	305	319	330	345	353
				BHP	0.26	0.28	0.29	0.30	0.31	0.33	0.34	0.35	0.37	0.38
				Heating Rise (°F)	56	58	59	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	31	32	33	NA	NA	NA	NA	NA	NA	NA
		Medium[2]	Red	CFM	1861	1822	1786	1758	1716	1688	1660	1619	1583	1539
				WATTS	400	417	426	441	452	467	482	492	507	519
				BHP	0.43	0.45	0.46	0.47	0.48	0.50	0.52	0.53	0.54	0.56
				Heating Rise (°F)	47	48	49	49	51	51	52	54	55	56
				Heating Rise (°C)	26	26	27	27	28	29	29	30	30	31
		Med-High[1]	Orange	CFM	2319	2291	2255	2230	2193	2166	2118	2057	1992	1887
				WATTS	758	769	787	799	808	823	822	805	780	737
				BHP	0.81	0.82	0.84	0.86	0.87	0.88	0.88	0.86	0.84	0.79
				Heating Rise (°F)	37	38	39	39	40	40	41	42	44	46
				Heating Rise (°C)	21	21	21	22	22	22	23	23	24	26
		High	Black	CFM	2532	2487	2444	2391	2330	2259	2179	2111	2033	1949
				WATTS	1014	1022	1015	994	965	935	898	858	823	786
				BHP	1.09	1.10	1.09	1.07	1.03	1.00	0.96	0.92	0.88	0.84
				Heating Rise (°F)	34	35	36	36	37	38	40	41	43	45
				Heating Rise (°C)	19	19	20	20	21	21	22	23	24	25

Dry Coil Air Delivery - Downflow Discharge 3 Phase Models Only (Cont.)

Unit	Heating Rise Range	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)									
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
48130	35 - 65°F (19 - 36°C)	Low	Blue	CFM	1503	1457	1423	1374	1330	1287	1241	1199	1153	1111
				WATTS	225	233	246	254	269	282	292	307	314	329
				BHP	0.24	0.25	0.26	0.27	0.29	0.30	0.31	0.33	0.34	0.35
				Heating Rise (°F)	64	NA	NA	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	36	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Med-Low	Pink	CFM	1556	1508	1461	1432	1388	1346	1302	1256	1221	1168
				WATTS	244	261	268	281	290	305	319	330	345	353
				BHP	0.26	0.28	0.29	0.30	0.31	0.33	0.34	0.35	0.37	0.38
				Heating Rise (°F)	62	64	NA	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	34	35	NA	NA	NA	NA	NA	NA	NA	NA
		Medium[2]	Red	CFM	1861	1822	1786	1758	1716	1688	1660	1619	1583	1539
				WATTS	400	417	426	441	452	467	482	492	507	519
				BHP	0.43	0.45	0.46	0.47	0.48	0.50	0.52	0.53	0.54	0.56
				Heating Rise (°F)	52	53	54	55	56	57	58	59	61	63
				Heating Rise (°C)	29	29	30	30	31	32	32	33	34	35
		Med-High[1]	Orange	CFM	2319	2291	2255	2230	2193	2166	2118	2057	1992	1887
				WATTS	758	769	787	799	808	823	822	805	780	737
				BHP	0.81	0.82	0.84	0.86	0.87	0.88	0.88	0.86	0.84	0.79
				Heating Rise (°F)	42	42	43	43	44	44	45	47	48	51
				Heating Rise (°C)	23	23	24	24	24	25	25	26	27	28
		High	Black	CFM	2532	2487	2444	2391	2330	2259	2179	2111	2033	1949
				WATTS	1014	1022	1015	994	965	935	898	858	823	786
				BHP	1.09	1.10	1.09	1.07	1.03	1.00	0.96	0.92	0.88	0.84
				Heating Rise (°F)	38	39	39	40	41	43	44	46	47	49
				Heating Rise (°C)	21	22	22	22	23	24	25	25	26	27

Dry Coil Air Delivery - Downflow Discharge 3 Phase Models Only (Cont.)

Unit	Heating Rise Range	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)									
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
60090	35 - 65°F (19 - 36°C)	Low[1]	Blue	CFM	1479	1436	1387	1346	1298	1253	1206	1160	1114	1061
				WATTS	224	239	247	262	270	284	300	307	319	330
				BHP	0.24	0.26	0.26	0.28	0.29	0.30	0.32	0.33	0.34	0.35
				Heating Rise (°F)	46	47	49	51	52	54	56	59	61	64
				Heating Rise (°C)	26	26	27	28	29	30	31	33	34	36
		Med-Low	Pink	CFM	1841	1796	1761	1724	1690	1651	1616	1578	1527	1478
				WATTS	425	434	453	460	476	485	501	508	525	542
				BHP	0.46	0.47	0.49	0.49	0.51	0.52	0.54	0.54	0.56	0.58
				Heating Rise (°F)	37	38	39	39	40	41	42	43	45	46
				Heating Rise (°C)	21	21	21	22	22	23	23	24	25	26
		Medium[2]	Red	CFM	1944	1913	1872	1838	1801	1771	1731	1698	1655	1613
				WATTS	486	501	511	529	537	554	565	578	595	603
				BHP	0.52	0.54	0.55	0.57	0.58	0.59	0.61	0.62	0.64	0.65
				Heating Rise (°F)	35	36	36	37	38	38	39	40	41	42
				Heating Rise (°C)	19	20	20	21	21	21	22	22	23	23
		Med-High	Orange	CFM	2178	2148	2105	2073	2036	2002	1967	1919	1845	1751
				WATTS	674	691	703	717	733	743	758	754	734	701
				BHP	0.72	0.74	0.75	0.77	0.79	0.80	0.81	0.81	0.79	0.75
				Heating Rise (°F)	NA	NA	NA	NA	NA	NA	35	35	37	39
				Heating Rise (°C)	NA	NA	NA	NA	NA	NA	19	20	20	22
		High	Black	CFM	2480	2432	2375	2322	2236	2161	2085	2006	1917	1808
				WATTS	1029	1012	995	975	941	908	869	836	796	751
				BHP	1.10	1.09	1.07	1.05	1.01	0.97	0.93	0.90	0.85	0.81
				Heating Rise (°F)	NA	NA	NA	NA	NA	NA	NA	NA	35	38
				Heating Rise (°C)	NA	NA	NA	NA	NA	NA	NA	NA	20	21

Dry Coil Air Delivery - Downflow Discharge 3 Phase Models Only (Cont.)

Unit	Heating Rise Range	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)									
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
60115	30 - 60°F (17 - 33°C)	Low	Blue	CFM	1479	1436	1387	1346	1298	1253	1206	1160	1114	1061
				WATTS	224	239	247	262	270	284	300	307	319	330
				BHP	0.24	0.26	0.26	0.28	0.29	0.30	0.32	0.33	0.34	0.35
				Heating Rise (°F)	59	NA	NA	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	33	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Med-Low	Pink	CFM	1841	1796	1761	1724	1690	1651	1616	1578	1527	1478
				WATTS	425	434	453	460	476	485	501	508	525	542
				BHP	0.46	0.47	0.49	0.49	0.51	0.52	0.54	0.54	0.56	0.58
				Heating Rise (°F)	47	48	49	50	51	53	54	55	57	59
				Heating Rise (°C)	26	27	27	28	29	29	30	31	32	33
		Medium[2]	Red	CFM	1944	1913	1872	1838	1801	1771	1731	1698	1655	1613
				WATTS	486	501	511	529	537	554	565	578	595	603
				BHP	0.52	0.54	0.55	0.57	0.58	0.59	0.61	0.62	0.64	0.65
				Heating Rise (°F)	45	45	46	47	48	49	50	51	53	54
				Heating Rise (°C)	25	25	26	26	27	27	28	28	29	30
		Med-High[1]	Orange	CFM	2178	2148	2105	2073	2036	2002	1967	1919	1845	1751
				WATTS	674	691	703	717	733	743	758	754	734	701
				BHP	0.72	0.74	0.75	0.77	0.79	0.80	0.81	0.81	0.79	0.75
				Heating Rise (°F)	40	40	41	42	43	43	44	45	47	50
				Heating Rise (°C)	22	22	23	23	24	24	25	25	26	28
		High	Black	CFM	2480	2432	2375	2322	2236	2161	2085	2006	1917	1808
				WATTS	1029	1012	995	975	941	908	869	836	796	751
				BHP	1.10	1.09	1.07	1.05	1.01	0.97	0.93	0.90	0.85	0.81
				Heating Rise (°F)	35	36	37	37	39	40	42	43	45	48
				Heating Rise (°C)	19	20	20	21	22	22	23	24	25	27

Dry Coil Air Delivery - Downflow Discharge 3 Phase Models Only (Cont.)

Unit	Heating Rise Range	Motor Speed	Wire Color		External Static Pressure (IN. W.C.)									
					0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
60130	35 - 65°F (19 - 36°C)	Low	Blue	CFM	1479	1436	1387	1346	1298	1253	1206	1160	1114	1061
				WATTS	224	239	247	262	270	284	300	307	319	330
				BHP	0.24	0.26	0.26	0.28	0.29	0.30	0.32	0.33	0.34	0.35
				Heating Rise (°F)	65	NA	NA	NA	NA	NA	NA	NA	NA	NA
				Heating Rise (°C)	36	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Med-Low	Pink	CFM	1841	1796	1761	1724	1690	1651	1616	1578	1527	1478
				WATTS	425	434	453	460	476	485	501	508	525	542
				BHP	0.46	0.47	0.49	0.49	0.51	0.52	0.54	0.54	0.56	0.58
				Heating Rise (°F)	52	54	55	56	57	58	60	61	63	65
				Heating Rise (°C)	29	30	30	31	32	32	33	34	35	36
		Medium[2]	Red	CFM	1944	1913	1872	1838	1801	1771	1731	1698	1655	1613
				WATTS	486	501	511	529	537	554	565	578	595	603
				BHP	0.52	0.54	0.55	0.57	0.58	0.59	0.61	0.62	0.64	0.65
				Heating Rise (°F)	50	50	51	52	53	54	56	57	58	60
				Heating Rise (°C)	28	28	29	29	30	30	31	32	32	33
		Med-High[1]	Orange	CFM	2178	2148	2105	2073	2036	2002	1967	1919	1845	1751
				WATTS	674	691	703	717	733	743	758	754	734	701
				BHP	0.72	0.74	0.75	0.77	0.79	0.80	0.81	0.81	0.79	0.75
				Heating Rise (°F)	44	45	46	46	47	48	49	50	52	55
				Heating Rise (°C)	25	25	25	26	26	27	27	28	29	31
		High	Black	CFM	2480	2432	2375	2322	2236	2161	2085	2006	1917	1808
				WATTS	1029	1012	995	975	941	908	869	836	796	751
				BHP	1.10	1.09	1.07	1.05	1.01	0.97	0.93	0.90	0.85	0.81
				Heating Rise (°F)	39	40	41	41	43	45	46	48	50	53
				Heating Rise (°C)	22	22	23	23	24	25	26	27	28	30

*Air delivery values are without air filter and are for dry coil (See Wet Coil Pressure Drop table).
[1] Factory-shipped heating speed
[2] Factory-shipped cooling speed
"NA" = Not allowed for heating speed
NOTE: Deduct field-supplied air filter pressure drop and wet coil pressure drop to obtain external static pressure available for ducting.
Shaded areas indicate speed/static combinations that are not permitted for dehumidification speed.

Wet Coil Pressure Drop (IN. W.C.)

UNIT SIZE	STANDARD CFM (SCFM)																
	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200
24	0.03	0.04	0.04	0.05	0.06												
30				0.05	0.06	0.07	0.08	0.11									
36				0.06	0.06	0.09	0.10	0.11	0.14								
42					0.05	0.05	0.06	0.07	0.08	0.08	0.09	0.09	0.11				
48							0.04	0.06	0.09	0.10	0.10	0.11	0.12	0.13	0.14		
60										0.06	0.07	0.01	0.08	0.09	0.10	0.12	0.13

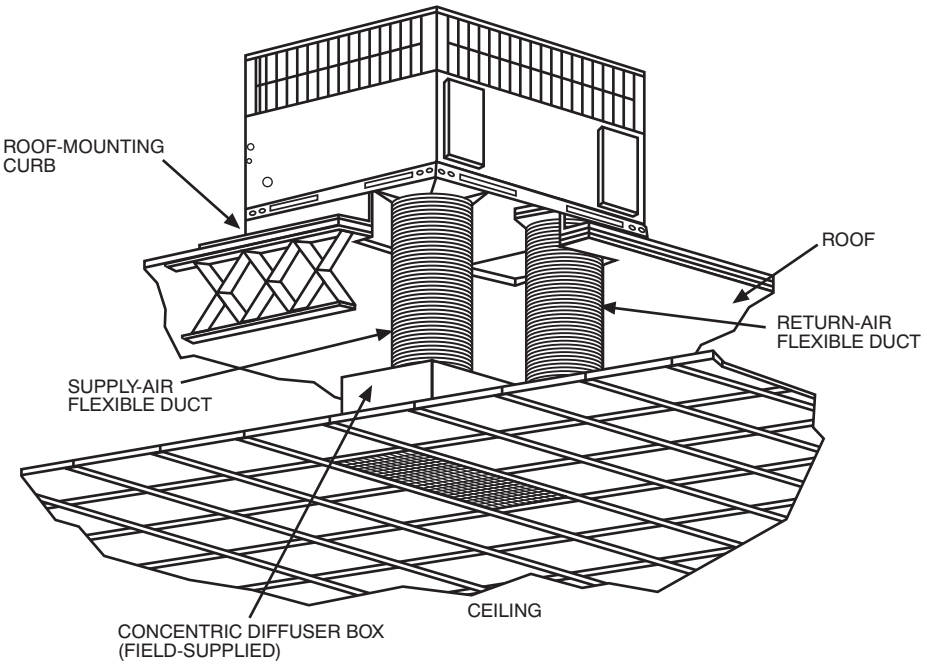
Economizer with 1-in. Filter Pressure Drop (IN. W.C.)

FILTER SIZE IN. (MM)	COOLING TONS	STANDARD CFM (SCFM)																
		600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200
600-1400 CFM 12x20x1+12x20x1 (305x508x25+305x508x25)	**2.0, 2.5, 3.0**	-	-	0.09	0.14	0.16	0.18	0.25	0.28	0.30	-	-	-	-	-	-	-	-
1200-1800 CFM 16x24x1+14x24x1 (406x610x25+356x610x25)	**3.5, 4.0**	-	-	-	-	-	-	0.10	0.11	0.12	0.13	0.14	0.16	0.16	-	-	-	-
1500-2200 CFM 16x24x1+18x24x1 (406x610x25+457x610x25)	**5.0**	-	-	-	-	-	-	-	-	-	0.15	0.17	0.18	0.20	0.21	0.22	0.23	0.23

Filter Pressure Drop Table (IN. W.C.)

FILTER SIZE IN. (MM)	COOLING TONS	STANDARD CFM (SCFM)																
		600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200
600-1400 CFM 12x20x1+12x20x1 (305x508x25+305x508x25)	**2.0, 2.5, 3.0**	0.03	0.05	0.06	0.08	0.10	0.11	0.13	0.14	0.16	-	-	-	-	-	-	-	-
1200-1800 CFM 16x24x1+14x24x1 (406x610x25+356x610x25)	**3.5, 4.0**	-	-	-	-	-	-	0.07	0.08	0.09	0.09	0.10	0.11	0.12	-	-	-	-
1500-2200 CFM 16x24x1+18x24x1 (406x610x25+457x610x25)	**5.0**	-	-	-	-	-	-	-	-	-	0.04	0.06	0.08	0.10	0.11	0.13	0.14	0.15

TYPICAL PIPING AND WIRING



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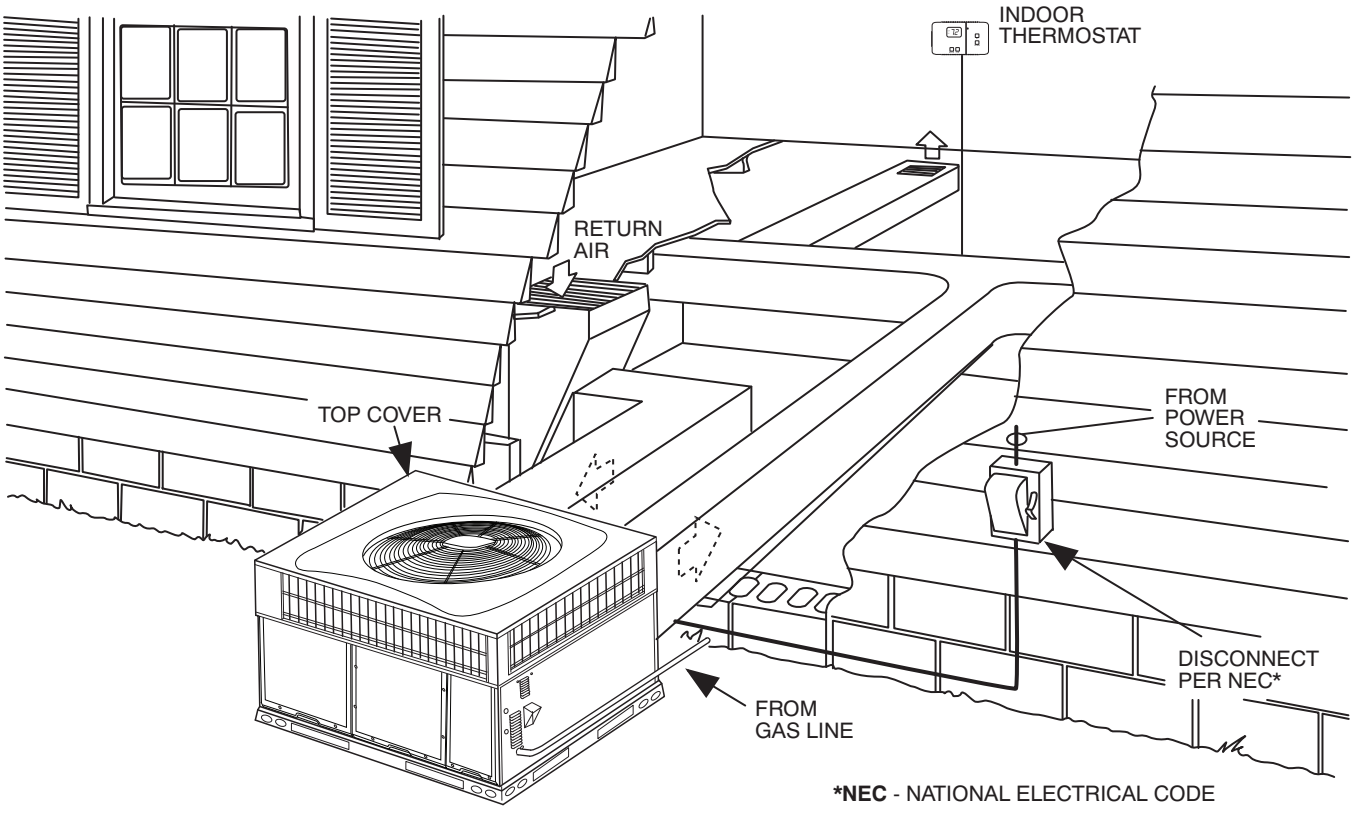

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APPLICATION DATA

Condensate trap — A 2-in. (50.8 mm) condensate trap must be field supplied.

Ductwork — Secure downflow discharge ductwork to roof curb. For horizontal discharge applications, attach ductwork to unit with flanges.

To convert a unit to downflow discharge — Units are equipped with factory-installed inserts in the down-flow openings. Removal of the inserts is similar to removing an electrical knock-out. Use the duct cover to seal the horizontal discharge openings in the unit. Units installed in horizontal discharge orientation do not require duct covers.

Airflow — Units are draw-thru in the cooling mode and blow-thru in the heating mode.

Maximum cooling airflow — To minimize the possibility of condensate blow-off from the evaporator, airflow through the units should not exceed 450 cfm per ton.

Minimum cooling airflow — Minimum cooling airflow is 350 cfm per ton.

Minimum ambient cooling operation temperature — All standard units have a minimum ambient operating temperature of 40°F (4°C). With accessory low ambient temperature kit, units can operate at temperatures down to 0°F (-17°C).

Minimum temperature — Air entering the heat exchanger in heating mode must be a minimum of 50°F (10°C) continuous and/or 45°F (7°C) intermittent.

ELECTRICAL DATA

UNIT	NOMINAL V–PH–HZ	VOLTAGE RANGE		COMPRESSOR		OFM	IFM	IDM	POWER SUPPLY	
		MIN	MAX	RLA	LRA	FLA	FLA	FLA	MCA	MOCP
48VL(–,N)024040	208/230–1–60	197	253	13.5	58.3	0.7	4.1	0.65	21.7	30
48VL(–,N)024060				13.5	58.3	0.7	4.1	0.65	21.7	30
48VL(–,N)030040				12.8	64.0	0.7	4.1	0.65	20.8	30
48VL(–,N)030060				12.8	64.0	0.7	4.1	0.65	20.8	30
48VL(–,N)036060				14.1	77.0	1.2	6.0	0.65	24.8	35
48VL(–,N)036090				14.1	77.0	1.2	6.0	0.75	24.8	35
48VL(–,N)042060				17.9	112.0	1.2	6.0	0.65	29.6	40
48VL(–,N)042090				17.9	112.0	1.2	6.0	0.65	29.6	40
48VL(–,N)048090				21.8	117.0	1.2	7.6	0.65	36.1	50
48VL(–,N)048115				21.8	117.0	1.2	7.6	0.65	36.1	50
48VL(–,N)048130				21.8	117.0	1.2	7.6	0.75	36.1	50
48VL(–,N)060090				26.4	134.0	1.2	7.6	0.65	41.8	60
48VL(–,N)060115				26.4	134.0	1.2	7.6	0.65	41.8	60
48VL(–,N)060130				26.4	134.0	1.2	7.6	0.75	41.8	60
48VL(–,N)030040	208/230–3–60	197	253	8.3	58.0	0.7	4.1	0.65	15.2	20
48VL(–,N)030060				8.3	58.0	0.7	4.1	1.65	15.2	20
48VL(–,N)036060				9.0	71.0	1.2	6.0	1.65	18.5	25
48VL(–,N)036090				9.0	71.0	1.2	6.0	0.52	18.5	25
48VL(–,N)042060				13.5	88.0	1.2	6.0	1.65	24.1	35
48VL(–,N)042090				13.5	88.0	1.2	6.0	0.65	24.1	35
48VL(–,N)048090				13.7	83.1	1.2	7.6	0.65	25.9	35
48VL(–,N)048115				13.7	83.1	1.2	7.6	1.65	25.9	35
48VL(–,N)048130				13.7	83.1	1.2	7.6	0.52	25.9	35
48VL(–,N)060090				16.0	110.0	1.2	7.6	0.65	28.8	40
48VL(–,N)060115				16.0	110.0	1.2	7.6	1.65	28.8	40
48VL(–,N)060130				16.0	110.0	1.2	7.6	0.52	28.8	40
48VL(–,N)036060	460–3–60	414	506	5.6	38.0	0.5	3.0	0.70	10.5	15
48VL(–,N)036090				5.6	38.0	0.5	3.0	0.30	10.5	15
48VL(–,N)042060				6.0	44.0	0.5	3.0	0.70	11.0	15
48VL(–,N)042090				6.0	44.0	0.5	3.0	0.33	11.0	15
48VL(–,N)048090				6.2	41.0	0.5	3.8	0.33	12.1	15
48VL(–,N)048115				6.2	41.0	0.5	3.8	0.70	12.1	15
48VL(–,N)048130				6.2	41.0	0.5	3.8	0.30	12.1	15
48VL(–,N)060090				7.8	52.0	0.5	3.8	0.33	14.1	20
48VL(–,N)060115				7.8	52.0	0.5	3.8	0.70	14.1	20
48VL(–,N)060130				7.8	52.0	0.5	3.8	0.30	14.1	20

LEGEND

FLA - Full Load Amps
IDM - Inducer Motor
IFM - Indoor Fan Motor
LRA -Locked Rotor Amps
MCA - Minimum Circuit Amps
MOCP - Maximum Over Current Protection
OFM - Outdoor Fan Motor
RLA - Rated Load Amps

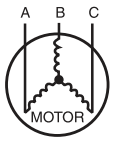
NOTES:

1. In compliance with NEC (National Electrical Code) requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be Power Supply fuse or circuit breaker.
2. Minimum wire size is based on 60 C copper wire. If other than 60 C wire is used, or if length exceeds wire length in table, determine size from NEC.
3. Unbalanced 3-Phase Supply Voltage
   Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percentage of voltage imbalance

   % Voltage imbalance

   $$= 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

EXAMPLE: Supply voltage is 230-3-60.



AB = 228 v
BC = 231 v
AC = 227 v

$$\text{Average Voltage} = \frac{228 + 231 + 227}{3}$$

$$= \frac{686}{3}$$

$$= 229$$

Determine maximum deviation from average voltage.
(AB) 229 - 228 = 1 v
(BC) 231 - 229 = 2 v
(AC) 229 - 227 = 2 v

Maximum deviation is 2 v.

Determine percent of voltage imbalance

$$\% \text{ Voltage Imbalance} = 100 \times \frac{2}{229}$$

$$= 0.8\%$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

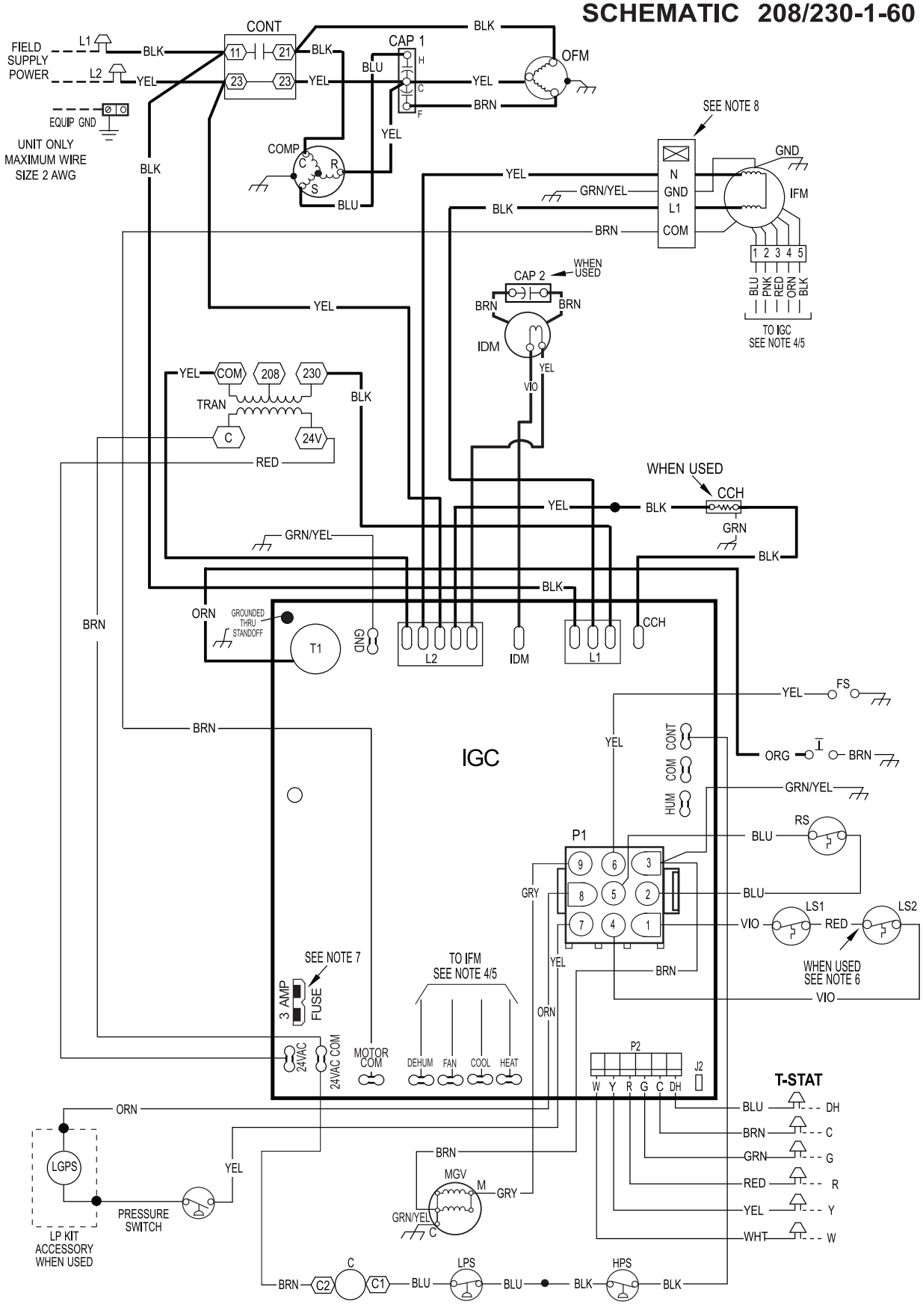
A06564

CONNECTION WIRING SCHEMATIC 208/230-1-60

CONNECTION WIRING DIAGRAM

DANGER: ELECTRICAL SHOCK HAZARD DISCONNECT POWER BEFORE SERVICING

SCHEMATIC 208/230-1-60



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48VL--B

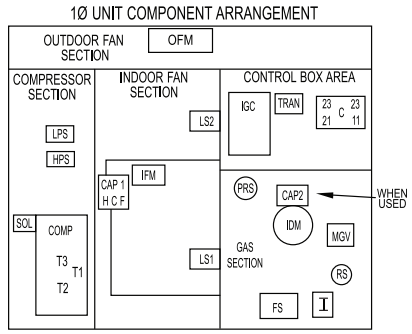
LADDER WIRING SCHEMATIC 208/230-1-60

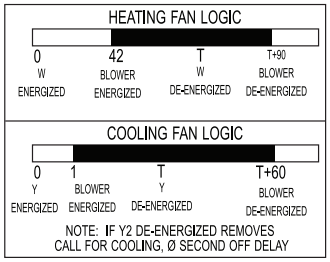
LADDER WIRING DIAGRAM

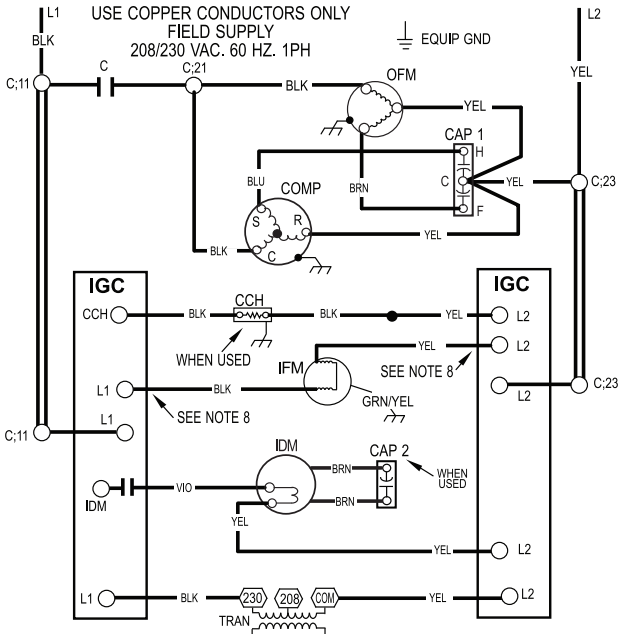
DANGER: ELECTRICAL SHOCK HAZARD DISCONNECT POWER BEFORE SERVICING

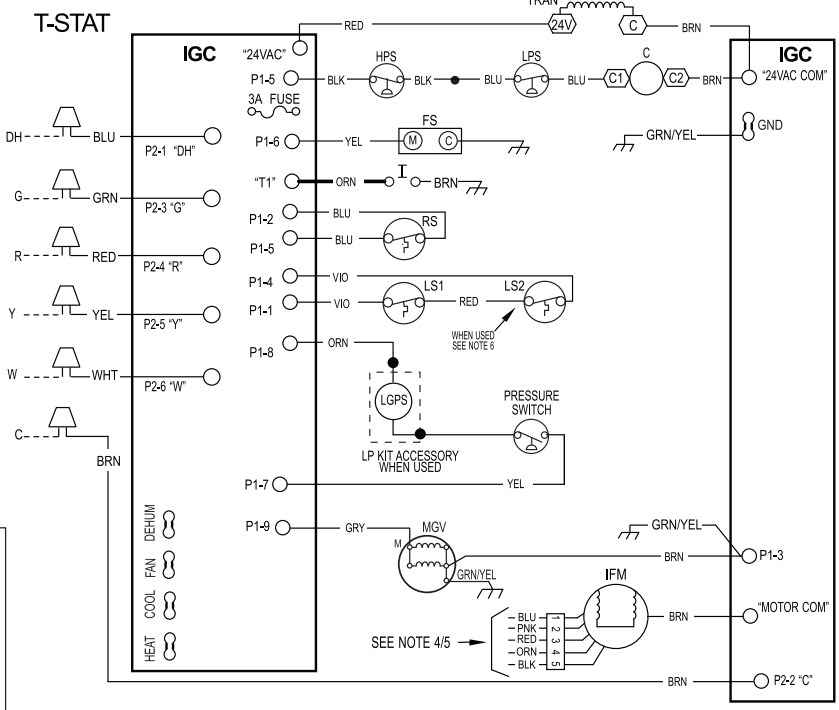
LEGEND

	FIELD SPLICE	EQUIP	EQUIPMENT
	TERMINAL (MARKED)	FS	FLAME SENSOR
	TERMINAL (UNMARKED)	GND	GROUND
	SPLICE	HPS	HIGH PRESSURE SWITCH
	SPLICE (MARKED)	I	IGNITOR
	FACTORY LO VOLTAGE	IDM	INDUCED DRAFT MOTOR
	FIELD CONTROL WIRING	IFM	INDOOR FAN MOTOR
	FIELD POWER WIRING	IGC	INTERGRATED GAS UNIT CONTROLLER
	ACCESSORY OR OPTIONAL WIRING	LGPS	LOW GAS PRESSURE SWITCH (WHEN USED)
	FACTORY HI VOLTAGE	LPS	LOW PRESSURE SWITCH
C	CONTACTOR	LS1	PRIMARY LIMIT SWITCH
CAP1	CAPACITOR, COMP	LS2	SECONDARY LIMIT SWITCH
CAP2	CAPACITOR, INDUCER (WHEN USED)	MGV	MAIN GAS VALVE
CCH	CRANKCASE HEATER	OFM	OUTDOOR FAN MOTOR
COMP	COMPRESSOR MOTOR	OT	QUADRUPLE TERMINAL
		RS	ROLLOUT SWITCH
		TRAN	TRANSFORMER
		T-STAT	THERMOSTAT









NOTES:

1. IF ANY OF THE ORIGINAL WIRES FURNISHED ARE REPLACED THEY MUST BE REPLACED WITH THE SAME WIRE OR IT'S EQUIVALENT.
2. SEE PRE-SALE LITERATURE FOR THERMOSTATS.
3. USE 75 DEGREES C COPPER CONDUCTORS FOR FIELD INSTALLATION.
4. REFER TO INSTALLATION INSTRUCTIONS FOR CORRECT SPEED SELECTION FOR IFM.
5. SEE INSTALLATION INSTRUCTIONS FOR PROPER HEATING AND COOLING CONNECTIONS FOR YOUR UNIT.
6. ON SOME MODELS LS1 AND LS2 ARE WIRED IN SERIES. ON OTHER MODELS ONLY LS1 IS USED.
7. THIS FUSE IS MANUFACTURED BY LITTLE FUSE, P/N 257003.
8. DO NOT DISCONNECT PLUG UNDER LOAD.
9. N.E.C. CLASS 2, 24V.

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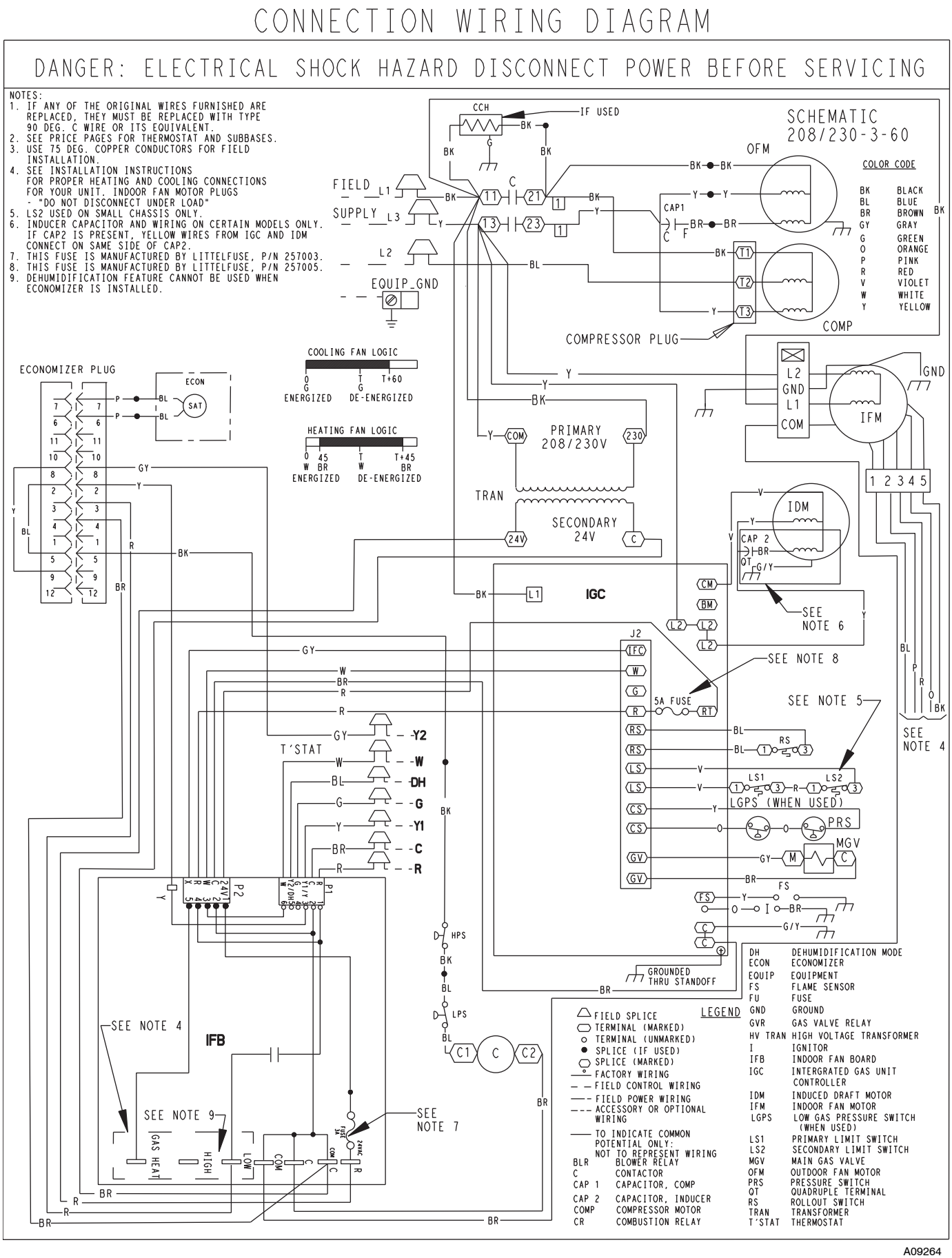
CONNECTION WIRING SCHEMATIC 208/230-3-60



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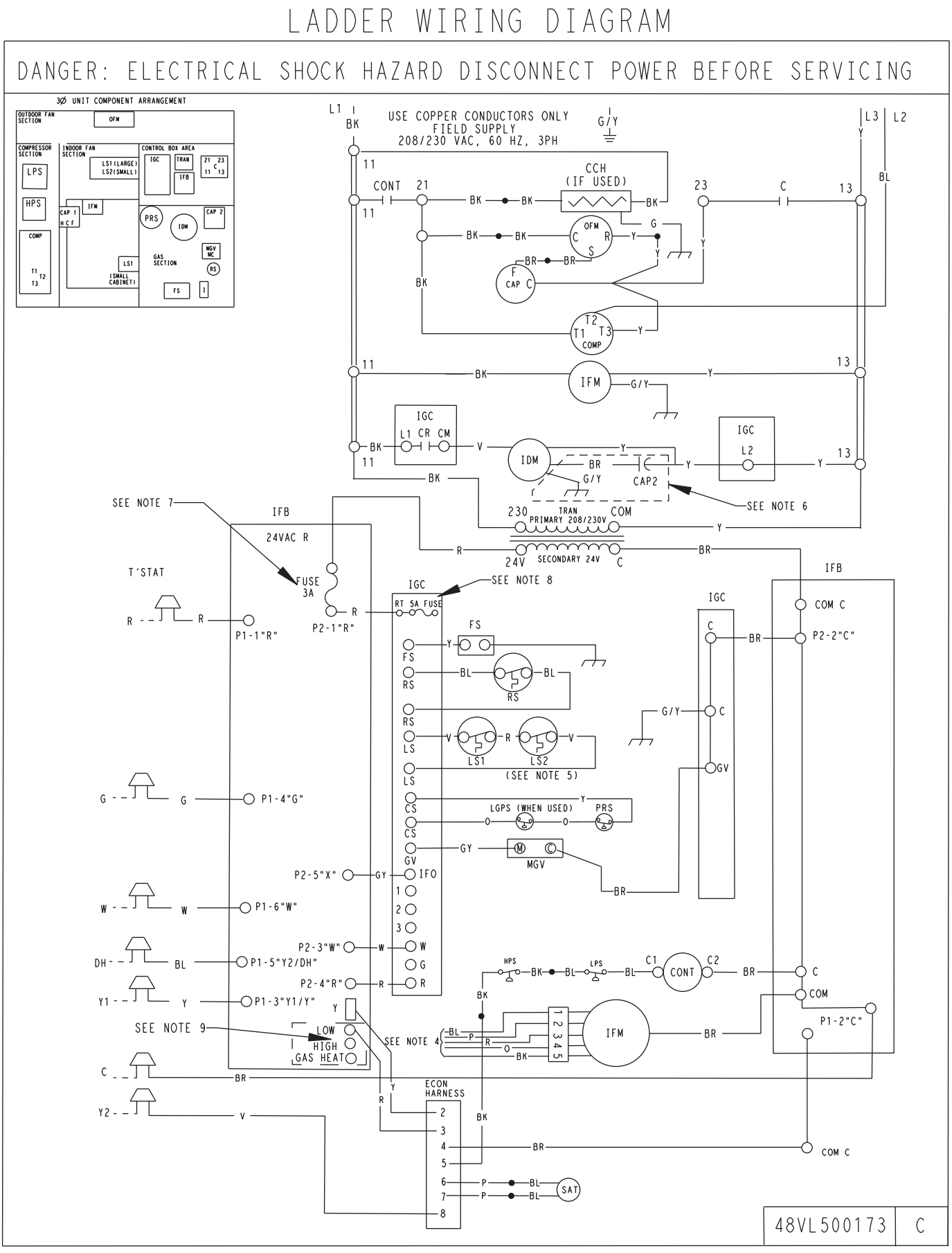
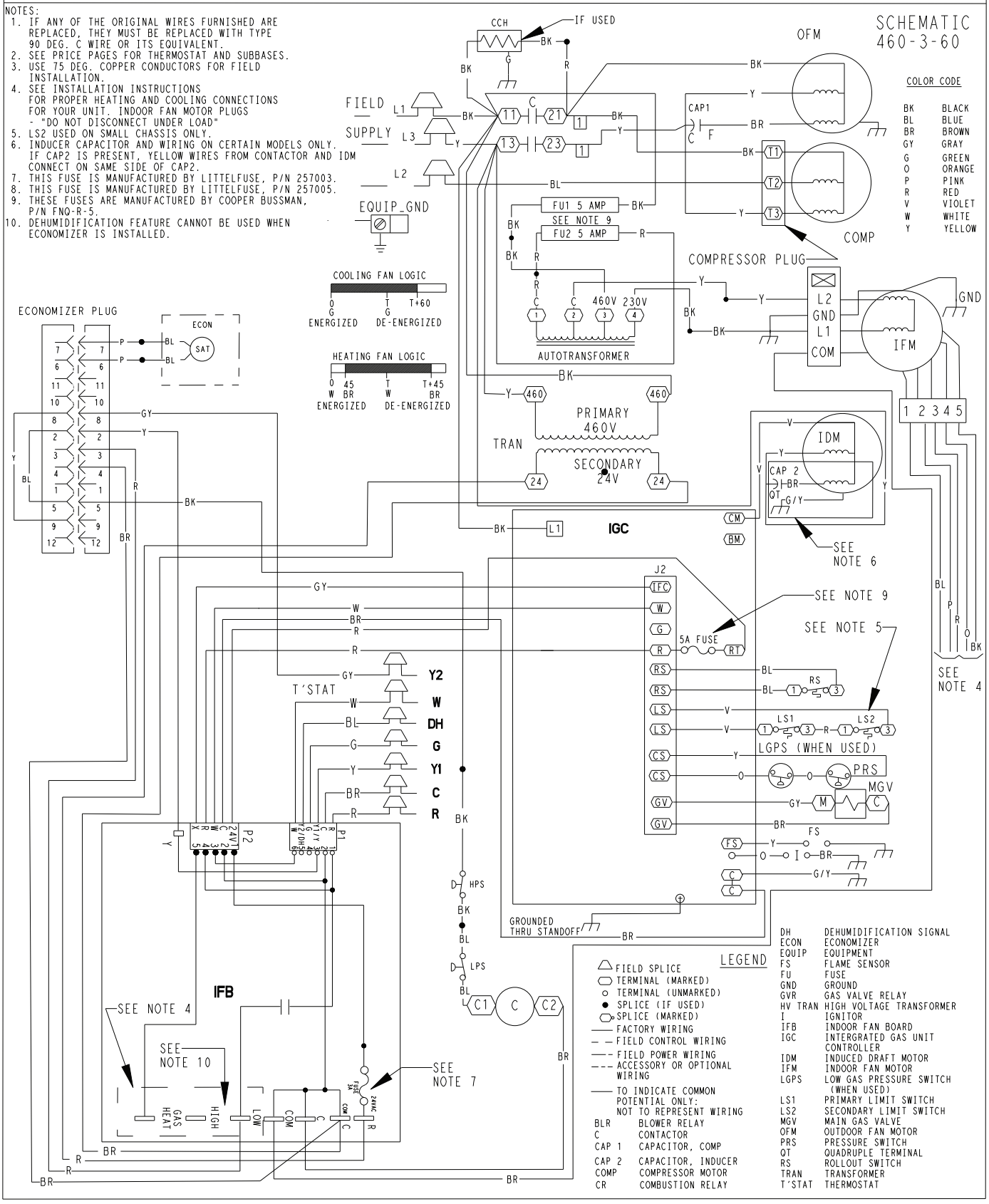
LADDER WIRING SCHEMATIC 208/230-3-60



CONNECTION WIRING SCHEMATIC 460-3-60

CONNECTION WIRING DIAGRAM

DANGER: ELECTRICAL SHOCK HAZARD DISCONNECT POWER BEFORE SERVICING



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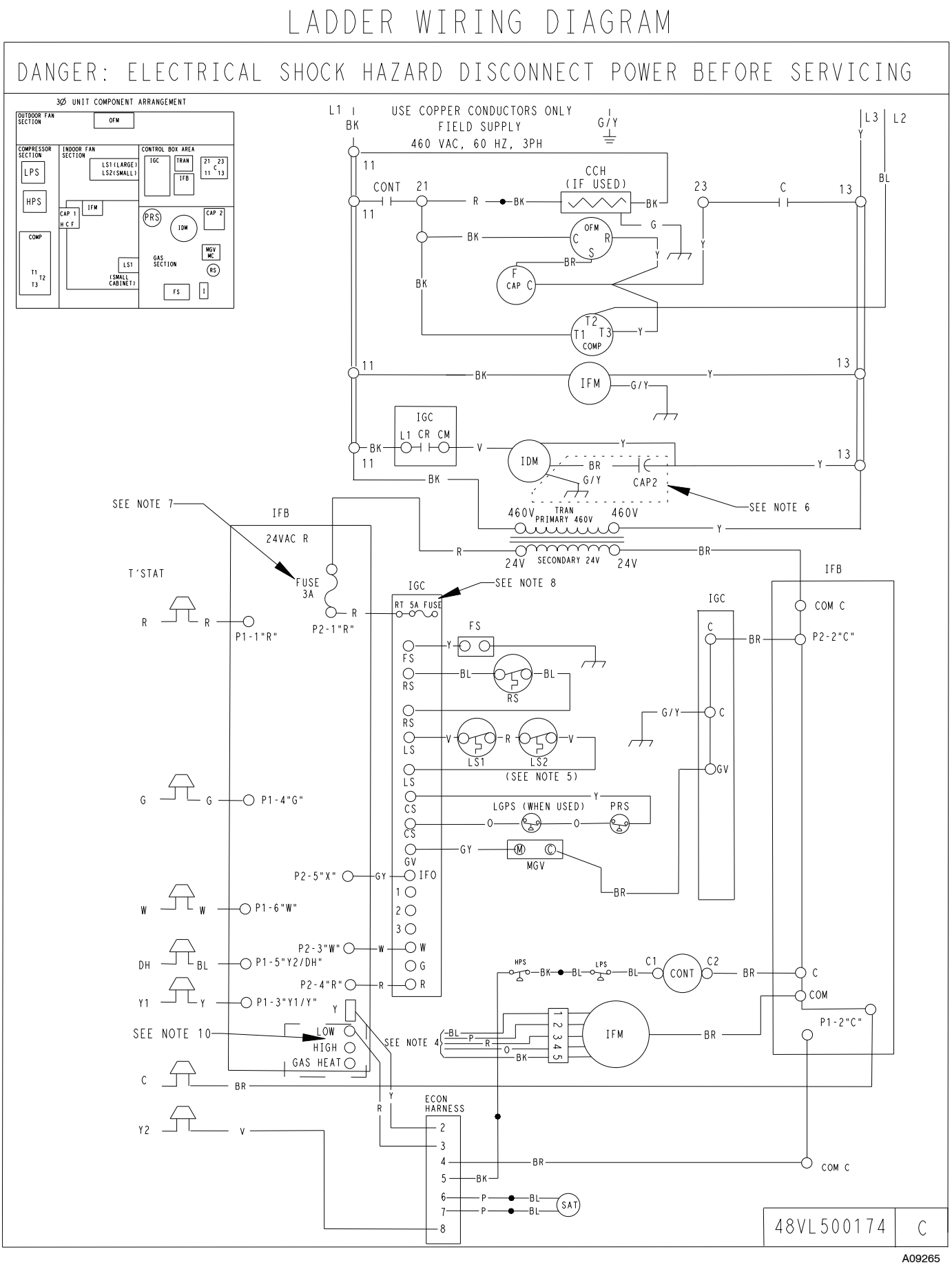
LADDER WIRING SCHEMATIC 460-3-60



CONTROLS

Operating sequence

Heating (Single Phase Models) - (See unit wiring label) On a call for heating, terminal W of the thermostat is energized, starting the induced-draft motor for a 5 second pre-purge. When the pressure switch senses that the induced-draft motor is moving sufficient combustion air, the burner sequence begins. This function is controlled by the integrated gas unit controller (IGC). The indoor (evaporator) –fan motor is energized 30 seconds after flame is established. When the thermostat is satisfied and W is de-energized, the burners stop firing and the indoor (evaporator) fan motor shuts off after a 90 second time-off delay. Please note that the IGC has the capability to automatically reduce the indoor fan motor on delay and increase the indoor fan motor off delay in the event of high duct static and/or a partially-clogged filter.

Heating (Three Phase Models) - On a call for heating, terminal W of the thermostat is energized, starting the induced-draft motor. When the pressure switch senses that the induced-draft motor is moving sufficient combustion air, the burner sequence begins. This function is performed by the integrated gas unit controller (IGC). The indoor (evaporator)-fan motor is energized 45 sec after flame is established. When the thermostat is satisfied and W is de-energized, the burners stop firing and the indoor (evaporator) fan motor shuts off after a 45-sec time-off delay. Please note that the IGC has the capability to automatically reduce the indoor fan motor on delay and increase the indoor fan motor off delay in the event of high duct static and/or partially-clogged filter.

Cooling — When the system thermostat calls for cooling, 24 V is supplied to the "Y" and "G" terminals of the thermostat. This completes the circuit to the contactor coil (C) and indoor (evaporator) fan relay (IFR). The normally open contacts of energized C close and complete the circuit through compressor motor (COMP) to outdoor (condenser) fan motor (OFM). Both motors start instantly. The set of normally open contacts of energized IFR close and complete the circuit through IFM. The IFM starts instantly.

On the loss of the thermostat call for cooling, 24 V is removed from both the "Y" and "G" terminals (provided the fan switch is in the "AUTO" position) de-energizing the compressor contactor and opening the contacts supplying power to compressor/OFM. After a 60-second delay (1-phase) or 90-second delay (3-phase), the IFM shuts off. If the thermostat fan selector switch is in the "ON" position, the IFM will run continuously.

NOTE: On units with a Time Guard® II device: Once the compressor has started and then stopped, it cannot be restarted again until 5 minutes have elapsed.

GUIDE SPECIFICATIONS

Packaged Gas Heating/Electric Cooling Units Constant Volume Application

HVAC Guide Specifications

Size Range: **2 to 5 Tons, Nominal Cooling 40,000 to 127,000 Btuh, Nominal Heating Input**

SYSTEM DESCRIPTION

Outdoor rooftop mounted, gas heating/electric cooling unit utilizing a hermetic scroll compressor for cooling duty. Unit shall discharge supply air vertically or horizontally as shown on contract drawings. Condenser fan/coil section shall have a draw-thru design with vertical discharge for minimum sound levels.

QUALITY ASSURANCE

A. Unit shall be rated in accordance with AHRI Standards 210/240 and 270-1995.

B. Unit shall be designed in accordance with UL Standard 1995 and ANSI Z 21.47.

C. Unit shall be manufactured in a facility registered to ISO 9001 manufacturing quality standard.

D. Unit shall be UL listed and c-UL certified as a total package for safety requirements.

E. Roof curb shall be designed to conform to NRCA Standards.

F. Insulation and adhesives shall meet NFPA 90.1 requirements for flame spread and smoke generation.

G. Cabinet insulation shall meet ASHRAE Standard 62.2.

DELIVERY, STORAGE AND HANDLING

Unit shall be stored and handled per manufacturer's recommendations.

Part 2 — Products

EQUIPMENT

A. General:

Factory-assembled, single-piece, heating and cooling unit. Contained within the enclosure shall be all factory wiring, piping, controls, refrigerant charge with R-410A refrigerant, and special features required prior to field start-up.

B. Unit Cabinet:

1. Unit cabinet shall be constructed of phosphated, zinc-coated, pre-painted steel capable of with-standing 500 hours in salt spray.
2. Normal service shall be through 3 removable cabinet panels.
3. The unit shall be constructed on a rust proof unit base that has an externally trapped, integrated sloped drain.
4. Evaporator fan compartment top surface shall be insulated with a minimum 1/2-in. (12.7 mm) thick, flexible fiberglass insulation, coated on the air side and retained by adhesive and mechanical means. The evaporator wall sections will be insulated with a minimum semi-rigid foil-faced board capable of being wiped clean. Aluminum foil-faced fiberglass insulation shall be used in the entire indoor air cavity section.
5. Unit shall have a field-supplied condensate trap.

C. Fans:

1. The evaporator fan shall be a multi-speed, direct-drive, as shown on equipment drawings.
2. Fan wheel shall be made from steel, be double-inlet type with forward curved blades with corrosion resistant finish. Fan wheel shall be dynamically balanced.
3. Condenser fan shall be direct drive propeller type with aluminum blades riveted to corrosion resistant steel spiders, be dynamically balanced, and discharge air vertically.

D. Compressor:

1. Fully hermetic compressors with factory-installed vibration isolation.
2. Scroll compressors shall be standard on all units.

E. Coils:

Evaporator and condenser coils shall have aluminum plate fins mechanically bonded to seamless copper tubes with all joints brazed. Tube sheet openings shall be belled to prevent tube wear.

F. Heating Section:

1. Induced-draft combustion type with energy saving direct spark ignition system and redundant main gas valve.
2. Induced-draft motors shall provide adequate airflow for combustion.
3. The heat exchangers shall be constructed of aluminized steel for corrosion resistance.
4. Burners shall be of the in-shot type constructed of aluminum coated steel.
5. All gas piping and electric power shall enter the unit cabinet at a single location.

G. Refrigerant Components:

Refrigerant expansion device shall be of the TXV (thermostatic expansion valve) type.

H. Filters:

Filter section shall consist of field-installed, throwaway, 1-in. (25 mm) thick fiberglass filters of commercially available sizes.

I. Controls and Safeties:

1. Unit controls shall be complete with a self-contained low voltage control circuit.
2. Compressors shall incorporate a solid-state compressor protector that provides reset capability.

J. Operating Characteristics:

1. Unit shall be capable of starting and running at 125°F (51°C) ambient outdoor temperature per maximum load criteria of AHRI Standard 210.
2. Compressor with standard controls shall be capable of operation down to 40°F (4°C) ambient outdoor temperature.
3. Units shall be provided with fan time delay to prevent cold air delivery before the heat exchanger warms up.
4. Unit shall be provided with 60-second fan time delay(single phase models) or 90 second fan time delay (three phase models) after the thermostat is satisfied.

K. Electrical Requirements:

All unit power wiring shall enter the unit cabinet at a single location.

L. Motors:

1. Compressor motors shall be of the refrigerant-cooled type with line-break thermal and current overload protection.
2. All fan motors shall have permanently lubricated bearings, and inherent, automatic reset, thermal overload protection.
3. Condenser fan motor shall be totally enclosed.
4. Evaporator Fan Motor to be ECM Motor.

M. Compressor Protection:

Solid-state control shall protect compressor by preventing "short cycling."

GUIDE SPECIFICATIONS (CONT)

N. Low NOx:
Shall provide NOx reduction to values below 40 nanograms/joule to meet California's and other localities' emission requirements as shipped from factory.

O. Special Features Available:

1. Coil Options
Base unit with tin plated indoor coil hairpins available as a factory installed option.
2. Compressor Start Kit (single phase units only):
Shall provide additional starting torque for single-phase compressors.
3. Thermostat:
To provide for one-stage heating and cooling in addition manual or automatic changeover and indoor fan control.
4. Crankcase Heater:
Shall provide anti-floodback protection for low-load cooling applications.
5. Economizer:
(Horizontal - Field installed accessory)
(Vertical - Field installed accessory or factory installed option)
   a. Economizer controls capable of providing free cooling using outside air.
   b. Equipped with low leakage dampers not to exceed 3% leakage, at 1.0 IN. W.C. pressure differential.
   c. Spring return motor shuts off outdoor damper on power failure.
6. Filter Rack Kit:
Shall provide filter mounting for downflow applications. Offered as an accessory or as a factory installed option.
7. Flat Roof Curb:
Curbs shall have seal strip and a wood nailer for flashing and shall be installed per manufacturer's instructions.
8. Flue Discharge Deflector
Directs flue gas exhaust; 90 degrees upward from current discharge.
9. Heat Exchanger
Stainless Steel Heat Exchanger available as a factory installed option.
10. High Altitude Propane Conversion Kit:
Shall consist of all required hardware to convert to propane gas heat operation at 2001 to 6000 ft (611 to 1829 m) above sea level.
11. Low Ambient Package:
Shall consist of a solid-state control and condenser coil temperature sensor for controlling condenser-fan motor operation, which shall allow unit to operate down to 0°F (-18°C) outdoor ambient temperature when properly installed.
12. Manual Outdoor Air Damper:
Package shall consist of damper, birdscreen, and rainhood which can be preset to admit outdoor air for year-round ventilation.
13. Natural-to-Propane Conversion Kit:
Shall be complete with all required hardware to convert to propane gas operation at 10.0 IN. W.C. manifold pressure.
14. Propane-to-Natural Conversion Kit
Shall be complete with all hardware to convert to natural gas at standard altitude (0 to 2000 ft [0 to 610 m] above sea level).
15. Square-To-Round Duct Transitions (24-48 models):
Shall have the ability to convert the supply and return openings from rectangular to round.
16. Time Guard II
Automatically prevents the compressor from restarting for at least 4 minutes and 45 seconds after shutdown of the compressor. Not required when a corporate programmable thermostat is applied or with a RTU-MP control.

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Edition Date: 09/14

Catalog No: 48VL–08PD

Manufacturer reserves the right to change, at any time, specifications and designs without notice and without obligations.

Replaces: 48VL–07PD

48HC
High Efficiency
Gas Heat/Electric Cooling Packaged Rooftop
3 to 12.5 Nominal Tons

Carrier
turn to the experts

Product Data

WeatherMaster®

C10222

Puron™
the environmentally sound refrigerant

ENERGY STAR

ASHRAE 90.1 COMPLIANT

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Carrier
turn to the experts

The Carrier rooftop unit (RTU) was designed by customers for customers. With “no-strip” screw collars, handled access panels, and more we’ve made your unit easy to install, easy to maintain and easy to use.

Easy to install:

All WeatherMaster® units are field-convertible to horizontal air flow, which makes it easy to adjust to unexpected job-site complications. Lighter units make easy replacement. Most of Carrier’s 3-12.5 ton 48HC rooftops fit on existing Carrier curbs dating back to 1989. Also, our large control box gives you room to work and room to mount Carrier accessory controls.

Easy to maintain:

Easy access handles by Carrier provide quick and easy access to all normally serviced components. Our “no-strip” screw system has superior holding power and guides screws into position while preventing the screw from stripping the unit’s metal. Take accurate pressure readings by reading condenser pressure with panels on. Simply remove the black, composite plug, route your gauge line(s) through the hole, and connect them to the refrigeration service valve(s). Now, you can take refrigeration system pressure readings without affecting the condenser airflow.

Easy to use:

The newly designed, central terminal board by Carrier puts all your connections and troubleshooting points in one convenient place, standard. Most low voltage connections are made to the same board and make it easy to find what you’re looking for and easy to access it. Carrier rooftops have high and low pressure switches, a filter drier, and 2-in (51mm) filters standard.

FEATURES AND BENEFITS

- Single-stage cooling capacity control on 04 to 07 models, 2-stage cooling capacity control on 08 to 14 models
- SEER up to 15.6, EER up to 13.0
- IEER's up to 13.0 with single speed indoor fan motor, and up to 14.3 with SAV™ (Staged Air Volume) 2-speed/VFD indoor fan motor system
- Exclusive non-corrosive composite condensate pan in accordance with ASHRAE 62 Standard, sloping design; side or center drain
- Gas efficiencies up to 82%
- Induced draft combustion design
- Redundant gas valve, with up to 2 stages of heating
- Pre-painted exterior panels and primer-coated interior panels tested to 500 hours salt spray protection
- TXV refrigerant metering system on each circuit
- Fully insulated cabinet
- Exclusive IGC solid-state control for on-board diagnostics with LED error code designation, burner control logic and energy saving indoor fan motor delay
- Dedicated 3-5 ton "Low NOx" models available that meet California Air Quality Management NOx requirement of 40 nangram/joule or less. Low NOx models include stainless steel heat exchangers
- Cooling operating range up to 125°F (52°C), and down to 35°F (2°C), 0°F (-18°C) on 11 size standard
- Access panels with easy grip handles
- Innovative , easy starting, no-strip screw feature on unit access panels
- Two-inch disposable return air filters
- Tool-less filter access door
- Belt drive evaporator-fan motor and pulley combinations available on all three phase models
- Electric Drive X13 (5 speed/torque) motor on 04 to 06 models
- New terminal board facilitating simple safety circuit troubleshooting and simplified control box arrangement
- Field Convertible airflow (3-12.5 ton). Being able to convert a unit from vertical airflow to horizontal makes it easy to overcome job site complications. 12.5 ton models require a simple supply air duct cover to field convert from factory vertical to horizontal.
- Provisions for thru-the-bottom power entry capability as standard
- Single point gas and electric connections
- Full perimeter base rail with built-in rigging adapters and fork truck slots
- Scroll compressors with internal line-break overload protection
- 24-volt control circuit protected with resettable circuit breaker
- Permanently lubricated evaporator-fan motor
- Totally enclosed condenser motors with permanently lubricated bearings
- Low Pressure switch and high-pressure switch protection
- Exclusive IGC anti-cycle protection for gas heat operation
- Solid-state electronic direct spark ignition system
- Flame roll-out safety protector
- Liquid line filter drier on each circuit
- Factory-installed Humidi-MiZer® Adaptive Dehumidification System on all sizes, includes MotorMaster I controller.
- Standard Warranty: 10 yr. aluminized heat exchanger, 15 yr. stainless steel heat exchanger, 5 yr. compressor, 1 yr. parts.
- Optional SAV system utilizes a Variable Frequency Drive (VFD) to automatically adjust the indoor fan motor speed between cooling stages. Available on 2-stage cooling models 08-14 with electromechanical, ComfortLink or RTU Open controls.

MODEL NUMBER NOMENCLATURE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
4	8	H	C	–	D	0	8	A	3	A	5	–	D	A	0	A	0

Product Type
48 = Gas Heat Pkg. Rooftop

Model Series – WeatherMaster
HC = High Efficiency

Heat Size
D = Low Gas Heat
E = Medium Gas Heat
F = High Gas Heat
L = Low No_x – Low gas heat
M = Low No_x – Med gas heat
N = Low No_x – High gas heat
S = Low Heat w/Stainless Steel Exchanger
R = Med Heat w/Stainless Steel Exchanger
T = High Heat w/Stainless Steel Exchanger
(Low No_x models incl. Stainless Steel HX)

Refrigerant System Options
A = Single stage cooling models
B – Single stage cooling w/Humidi–Mizer
D = 2 stage Cooling
E = 2 stg cooling w/Humidi–MiZer
F = Single stg cool w/MotorMaster low amb cntl
G = 2 stg cool w/Motormaster low amb cntl

Cooling Tons
04 = 3 ton
05 = 4 ton
06 = 5 ton
07 = 6 ton
08 = 7.5 ton
09 = 8.5 ton
11 = 10 ton (12.0 EER)
12 = 10 ton (11.5 EER)
14 = 12.5 ton

Sensor Options
A = None
B = RA Smoke Detector
C = SA Smoke Detector
D = RA + SA Smoke Detector
E = CO_2 Sensor
F = RA Smoke Detector + CO_2
G = SA Smoke Detector + CO_2
H = RA + SA Smoke Detector + CO_2

Indoor Fan Options 3, 4, 5 Ton Models Only*
0 = Electric (Direct) Drive x13 motor
2 = Medium Static Option – Belt Drive
3 = High Static Option – Belt Drive
Indoor Fan Options 66–12.5 Ton Models Only
1 = Standard Static Option – Belt Drive
2 = Medium Static Option – Belt Drive
3 = High Static Option – Belt Drive
C = High Static Option w/High Eff Motor – Belt Drive

*See Price page details for specific Humidi–MiZer models

Note: On single phase (–3 voltage code models, the Following are not available as a factory installed option:
– Humidi–MiZer
– Coated coils or Cu fin coils
– Louvered hail guard
– Economizer or 2 position damper
– Powered 115 volt convenience outlet

Coil Options (Outdoor–Indoor–Hail Guard)
A = Al/Cu – Al/Cu
B = Pre–coat Al/Cu – Al/Cu
C = E–coat Al/Cu – Al/Cu
D = E–coat AL/Cu – E–coat AL/Cu
E = Cu/Cu – Al/Cu
F = Cu/Cu – Cu/Cu
M = Al/Cu – Al/Cu – Louvered Hail Guard
N = Pre–Coat Al/Cu – Al/Cu – Louvered Hail Guard
P = E–Coat Al/Cu – Al/Cu Louvered Hail Guard
Q = E–Coat Al/Cu – E–coat Al/Cu – Louvered Hail Guard
R – Cu/Cu – Al/Cu – Louvered Hail Guard
S – Cu/Cu – Cu/Cu – Louvered Hail Guard

Voltage
1 = 575/3/60
5 = 208–230/3/60
6 = 460/3/60

Design Revision
– = Factory Design Revision

Base Unit Controls
0 = Base Electromechanical Controls
1 = PremierLink Controller
2 = RTU Open Multi–Protocol Controller
6 = Electromechanical w/2 spd fan and W7220 Econo controller
D = ComfortLink Controls

Intake / Exhaust Options
A = None
B = Temperature Economizer w/Barometric Relief
F = Enthalpy Economizer w/Barometric Relief
K = 2 position Damper
U = Temp Ultra Low Leak Economizer w/Baro Relief
W = Enthalpy Ultra Low Leak Econo w/Baro Relief

Service Options
0 = None
1 = Un–powered Convenience Outlet
2 = Powered Convenience Outlet
3 = Hinged Panels
4 = Hinged Panels, un–powered C.O.
5 = Hinged Panels, powered C.O.
C = Foil faced insulation

Electrical Options
A = None
B = HACR breaker
C = Non–fused disconnect
D = Thru–the–base Connections
F = Non–fused Disconn & thru–the–base
G = 2–speed indoor fan (VFD) controller
J = 2–spd contr (VFD) & non–fused disc.
K = 2 spd contr & thru–the–base
L = 2spd fan contr (VFD) &non–fused disc
N = 2 spd contr w/non–fused disc & thru–the–base conn.

Packaging
0 = Standard
1 = LTL

Not all possible options can be displayed above – see price pages or contact your Carrier Expert for more details.

Table 1 – FACTORY-INSTALLED OPTIONS AND FIELD-INSTALLED ACCESSORIES

CATEGORY	ITEM	FACTORY INSTALLED OPTION	FIELD INSTALLED ACCESSORY
Cabinet	Thru–the–base electrical or gas–line connections	X	X
	Hinged access panels	X	
	Supply duct cover – 14 size only		X
	Foil faced insulation throughout entire cabinet	X	
Coil Options	Cu/Cu indoor and/or outdoor coils[1]	X	
	Pre–coated outdoor coils[1]	X	
	Premium, E–coated outdoor coils[1]	X	
Humidity Control	Humidi–MiZer Adaptive Dehumidification System[1]	X	
Condenser Protection	Condenser coil hail guard (louvered design)[1]	X	X
Controls	Thermostats, temperature sensors, and subbases		X
	PremierLink™ DDC communicating controller	X	X
	ComfortLink Controls	X	
	RTU Open Multi–Protocol Controller	X	
	Smoke detector (supply and/or return air)	X	
	Time Guard II compressor delay control circuit		X
	Phase Monitor		X
Economizers & Outdoor Air Dampers	EconoMi$er™ IV (for electro–mechanical controlled RTUs)[1]	X	X
	EconoMi$er™2 (for DDC controlled RTUs)[1]	X	X
	Motorized 2 position outdoor–air damper[1]	X	X
	Manual outdoor–air damper (25% and 50%)	X	X
	Barometric relief[2]	X	X
	Power exhaust (prop design)		X
	Ultra Low Leak EconoMi$er X (for 2–speed SAV system only, 08–14 sizes with 2 stages of cooling), vertical supply and return air only.	X	X
Economizer Sensors & IAQ Devices	Single dry bulb temperature sensors[3]	X	X
	Differential dry bulb temperature sensors[3]		X
	Single enthalpy sensors[3]	X	X
	Differential enthalpy sensors[3]		X
	Wall or duct mounted CO_2 sensor[3]		X
	Unit mounted CO_2 sensor[3]	X	
Gas Heat	Propane conversion kit		X
	Stainless steel heat exchanger	X	
	High altitude conversion kit		X
	Flue Shield (04–12 models only)		X
	Flue Discharge Deflector (04–12 models only)		X
Indoor Motor & Drive	Multiple motor and drive packages	X	
	Staged Air Vol (SAV) system w/VFD controller (2–stage cool only with electrical mechanical and RTU Open controls)	X	
	Display Kit for SAV system with VFD		X
Low Ambient Control	Winter start kit[4]		X
	Motormaster head pressure controller to –20°F[4]		X
	Cooling Low Ambient Controller to 0°F (except 11 size)[4]	X	
Power Options	Convenience outlet (powered)[1,5]	X	
	Convenience outlet (unpowered)	X	
	HACR circuit breaker[6]	X	
	Non–fused disconnect[7]	X	
Roof Curbs	Roof curb 14–in (356mm)		X
	Roof curb 24–in (610mm)		X

NOTES:

1. Not available as factory installed option on single phase (208/230/1/60) models. Use field installed accessory where available.
2. Included with economizer.
3. Sensors used to optimize economizer performance.
4. See application data for assistance.
5. Powered convenience outlet is not available on 11 size with ComfortLink or RTU Open controls
6. HACR circuit breaker cannot be used when rooftop MOCP electrical rating exceeds:
   04–12 sizes – 208/230/1/60 and 208/230/3/60 = 100 amps, 460/3/60 = 90 amps, 575/3/60 = 70 amps.
   14 size – 208/230/3/60 = 200 amps, 460/3/60 = 90 amps, 575/3/60 = 80 amps.
   HACR circuit breaker on 575 volt can only be used on Wye power supply. Delta power supply is prohibited. Carrier RTUBuilder automatically selects the amp limitations.
7. Non–fused disconnect switch (04–12 sizes) cannot be used when unit FLA electrical rating exceeds:
   208/230/1/60 and 208/230/3/60 = 80 amps, 460/3/60 and 575/3/60 = 80 amps.
   Non–fused disconnect switch (14 size) cannot be used when unit FLA electrical rating exceeds:
   208/230/3/60 = 100 amps, 460/3/60 and 575/3/60 = 100 amps.
   Carrier RTUBuilder automatically selects the amp limitations.

FACTORY OPTIONS AND/OR ACCESSORIES

Economizer (dry-bulb or enthalpy)

Economizers save money. They bring in fresh, outside air for ventilation; and provide cool, outside air to cool your building. This is the preferred method of low-ambient cooling. When coupled to CO_2 sensors, economizers can provide even more savings by coupling the ventilation air to only that amount required.

Economizers are available, installed and tested by the factory, with either enthalpy or dry-bulb temperature inputs. There are also models for electromechanical as well as direct digital controllers. Additional sensors are available as accessories to optimize the economizers.

Economizers include gravity controlled, barometric relief equalizes building pressure and ambient air pressures. This can be a cast effective solution to prevent building pressurization.

CO_2 Sensor

Improves productivity and saves money by working with the economizer to intake only the correct amount of outside air for ventilation. As occupants fill your building, the CO_2 sensor detects their presence through increasing CO_2 levels, and opens the economizer appropriately.

When the occupants leave, the CO_2 levels decrease, and the sensor appropriately closes the economizer. This intelligent control of the ventilation air, called Demand Control Ventilation (DCV) reduces the overall load on the rooftop, saving money.

Smoke Detectors

Trust the experts. Smoke detectors make your application safer and your job easier. Carrier smoke detectors immediately shut down the rooftop unit when smoke is detected. They are available, installed by the factory, for supply air, return air, or both.

Louvered Hail Guards

Sleek, louvered panels protect the condenser coil from hail damage, foreign objects, and incidental contact.

Convenience Outlet (powered or un-powered)

Reduce service and/or installation costs by including a convenience outlet in your specification. Carrier will install this service feature at our factory. Provides a convenient, 15 amp, 115v GFCI receptacle with “Wet in Use” cover. The “powered” option allows the installer to power the outlet from the line side of the disconnect or load side as required by code. The “unpowered” option is to be powered from a separate 115/120v power source.

Non-fused Disconnect

This OSHA-compliant, factory-installed, safety switch allows a service technician to locally secure power to the rooftop.

Power Exhaust with Barometric Relief

Superior internal building pressure control. This field-installed accessory may eliminate the need for costly, external pressure control fans.

PremierLink™, DDC Controller

This CCN controller regulates your rooftop’s performance to tighter tolerances and expanded limits, as well as facilitates zoning systems and digital accessories. It also unites your Carrier HVAC equipment together on one, coherent CCN network. The PremierLink can be factory-installed, or easily field-installed.

RTU Open, Multi-Protocol Controller

Connect the rooftop to an existing BAS without needing complicated translators or adapter modules using the RTU Open controller. This new controller speaks the 4 most common building automation system languages (Bacnet, Modbus, N2, and Lonworks). Use this controller when you have an existing BAS. Besides the 4 protocols, it also communicates with a Carrier Open system (I-Vu and VVT).

Time Guard II Control Circuit

This accessory protects your compressor by preventing short-cycling in the event of some other failure, prevents the compressor from restarting for 30 seconds after stopping. Not required with PremierLink, RTU Open, or authorized commercial thermostats.

Motorized 2-Position Damper

The new Carrier 2-position, motorized outdoor air damper admits up to 100% outside air. Using reliable, gear-driven technology, the 2-position damper opens to allow ventilation air and closes when the rooftop stops, stopping unwanted infiltration.

Manual OA Damper

Manual outdoor air dampers are an economical way to bring in ventilation air. The dampers are available in 25% and 50% versions.

Optional Humidi-MiZer Adaptive Dehumidification System

Carrier’s Humidi-MiZer adaptive dehumidification system is an all-inclusive factory installed option that can be ordered with any WeatherMaster 48HC04-14 rooftop unit.

This system expands the envelope of operation of Carrier’s WeatherMaster rooftop products to provide unprecedented flexibility to meet year round comfort conditions.

The Humidi-MiZer adaptive dehumidification system has the industry’s only dual dehumidification mode setting. The Humidi-MiZer system includes two new modes of operation.

FACTORY OPTIONS AND/OR ACCESSORIES (cont.)

Optional Humidi-MiZer Adaptive Dehumidification System (cont.)

The WeatherMaster 48HC04-14 rooftop coupled with the Humidi-MiZer system is capable of operating in normal design cooling mode, subcooling mode, and hot gas reheat mode. Normal design cooling mode is when the unit will operate under its normal sequence of operation by cycling compressors to maintain comfort conditions.

Subcooling mode will operate to satisfy part load type conditions when the space requires combined sensible and a higher proportion of latent load control. Hot Gas Reheat mode will operate when outdoor temperatures diminish and the need for latent capacity is required for sole humidity control. Hot Gas Reheat mode will provide neutral air for maximum dehumidification operation.

Staged Air Volume (SAV) Indoor Fan Speed System

Carrier's Staged Air Volume (SAV) system saves energy and installation time by utilizing a Variable Frequency Drive (VFD) to automatically adjust the indoor fan motor speed in sequence with the units cooling operation. Per ASHRAE 90.1 2010 standard section 6.4.3.10.b, during the first stage of cooling operation the VFD will adjust the fan motor to provide 2/3rd of the total cfm established for the unit. When a call for the second stage of cooling is required, the VFD will allow the total cfm for the unit established (100%). During the heating mode the VFD will allow total design cfm (100%) operation and during the ventilation mode the VFD will allow operation to 2/3rd of total cfm.

Compared to single speed indoor fan motor systems, Carrier's SAV system can save substantial energy, 25%+*, versus single speed indoor fan motor systems.

The VFD used in Carrier's SAV system has soft start capabilities to slowly ramp up the speeds, thus eliminating any high inrush air volume during initial start-up. It also has internal over current protection for the fan motor and a field installed display kit that allows adjustment and in depth diagnostics of the VFD.

This SAV system is available on models with 2-stage cooling operation with electrical mechanical or RTU Open, Multi Protocol controls. Both space sensor and conventional thermostats controls can be used to provide accurate control in any application.

The SAV system is very flexible for initial fan performance set up and adjustment. The standard factory shipped VFD is pre-programmed to automatically stage the fan speed between the first and second stage of cooling. The unit fan performance static pressure and cfm can be easily adjusted using the traditional means of pulley adjustments. The other means to adjust the unit static and cfm performance is to utilize the field installed Display Kit and adjust the frequency and voltage in the VFD to required performance requirements. In either case, once set up, the VFD will automatically adjust the speed between the cooling stage operations.

*Data based on .10 ($/kWh) in an office application utilizing Carrier's HAP 4.6 simulation software program

Hinged Access Panels

Allows access to unit's major components with specifically designed hinged access panels. Panels are: filter, control box, fan motor and compressor.

MotorMaster Head Pressure Controller

The MotorMaster motor controller is a low ambient, head pressure controller kit that is designed to maintain the unit's condenser head pressure during periods of low ambient cooling operation. This device should be used as an alternative to economizer free cooling not when economizer usage is either not appropriate or desired. The MotorMaster will either cycle the outdoor-fan motors or operate them at reduced speed to maintain the unit operation, depending on the model.

MotorMaster allows cooling operation down to -20°F (-29°C) ambient conditions.

Winter Start Kit

The winter start kit by Carrier extends the low ambient limit of your rooftop to 25°F (-4°C). The kit bypasses the low pressure switch, preventing nuisance tripping of the low pressure switch. Other low ambient precautions may still be prudent.

Propane Heating

Convert your gas heat rooftop from standard natural gas operation to Propane using this field-installed kit.

High Altitude Heating

High altitudes have less oxygen, which means heat exchangers need less fuel. The new gas orifices in this field-installed kit make the necessary adjustment for high altitude applications. They restore the optimal fuel to air mixture and maintain healthy combustion at altitudes above 2000 ft (610m). Kits may not be required in all areas.

Flue Discharge Deflector

The flue discharge deflector is a useful accessory when flue gas recirculation is a concern. By venting the flue discharge upwards, the deflector minimizes the chance for a neighboring unit to intake the flue exhaust (04-12 models only).

FACTORY OPTIONS AND/OR ACCESSORIES (cont.)

Optional Stainless Steel Heat Exchanger

The stainless steel heat exchanger option provides the tubular heat exchanger be made out of a minimum 20 gauge type 409 stainless steel for applications where the mixed air to the heat exchanger is expected to drop below 45°F (7°C). Stainless steel may be specified on applications where the presence of airborne contaminants require its use (applications such as paper mills) or in area with very high outdoor humidity that may result in severe condensation in the heat exchanger during cooling operation.

Flue Discharge Heat Shield

The flue discharge heat shield keeps people from touching the rooftop unit's potentially hot flue discharge. This is especially useful for ground level applications, where more, untrained people could have access to the unit's exterior (04-12 models only).

Alternate Motors and Drives

Some applications need larger horsepower motors, some need more airflow, and some need both. Regardless of the case, your Carrier expert has a factory installed combination to meet your application. A wide selection of motors and pulleys (drives) are available, factory installed, to handle nearly any application.

Thru-the-Base Connections

Thru-the-base connections, available as either an accessory or as a factory option, are necessary to ensure proper connection and seal when routing wire and piping through the rooftop's basepan and curb. These couplings eliminate roof penetration and should be considered for gas lines, main power lines, as well as control power.

ComfortLink Controls

Models with the optional Carrier ComfortLink Controls allow added unit diagnostics and operation setup capabilities, as well as controlling logic for single zone Variable Air Volume (VAV) applications.

The ComfortLink control is your link to a world of simple and easy to use rooftop units that offer outstanding performance and value. It optimizes the performance of the refrigeration circuits as conditions change, resulting in the following features:

- Better control of temperature and humidity
- Superior reliability
- Automatic redundancy
- Low ambient cooling operation to 0°F (-18°C)
- More accurate diagnostics, at unit or remote

The ComfortLink Scrolling Marquee is very easy to use. The messages are displayed in easy to understand English, no decoding is required. A scrolling readout provides detailed explanations of control information. Only four, large, easy-to-use buttons are required to maneuver through the entire menu. The readout is designed to be visible even in the brightest sunlight. A handheld Navigator accessory or wall-mounted System Pilot™ accessory can be used for added service flexibility.

The ComfortLink control provides unparalleled service diagnostic information. Temperature and pressure can be read directly from the display with no need for separate gauges. Other data, such as compressor cycles, unit run time hours, current alarms, can also be accessed. A history of alarms is also available for viewing.

The service run test can be very helpful when troubleshooting. The user can run test major components to determine the root cause of a problem. The unit can be run-tested before an installation is complete to ensure satisfactory start-up. To ensure reliability, the ComfortLink control prevents reverse compressor rotation. No laptop computers are required for start-up.

Time schedules are built in and the Scrolling Marquee display provides easy access to setpoints. The ComfortLink control accepts input from a CO_2 sensor and a smoke detector. Both are available as factory installed options or as field installed accessories.

HACR Breaker

These manual reset devices provide overload and short circuit protection for the unit. Factory wired and mounted with the units with access cover to help provide environment protection.

On 575V applications, HACR breaker can only be used with WYE power distribution systems. Use on Delta power distribution systems is prohibited.

Foil Faced Insulated Cabinet

Cabinet is fully insulated with non-fibrous, foil faced cleanable insulation that is secured and encapsulated in unit design.

Low Ambient Controller

The low ambient controller is a head pressure controller kit that is designed to maintain the unit's condenser head pressure during periods of low ambient cooling operation. This device should be used as an alternative to economizer free cooling not when economizer usage is either not appropriate or desired. The low ambient controller will either cycle the outdoor fan motors or operate them at reduced speed to maintain the unit operation, depending on the model. This controller allows cooling operation down to 0°F (-18°C) ambient conditions. (Not available on 11 size models as standard unit cooling operation down to 0°F /-18°C.)

Table 2 – AHRI COOLING RATING TABLE 1-STAGE COOLING

UNIT	COOLING STAGES	NOM. CAPACITY (TONS)	NET COOLING CAPACITY (MBH)	TOTAL POWER (kW)	SEER	EER	IEER
A04	1	3	36.0	2.9	15.00	12.50	–
A05	1	4	48.5	3.7	15.60	13.00	–
A06	1	5	57.5	4.6	15.20	12.45	–
A07	1	6	73.0	6.0	–	12.00	13.00

Table 3 – AHRI COOLING RATING TABLE 2-STAGE COOLING

UNIT	COOLING STAGES	NOM. CAPACITY (TONS)	NET COOLING CAPACITY (MBH)	TOTAL POWER (kW)	EER	IEER WITH SINGLE SPEED INDOOR MOTOR	IEER WITH 2–SPEED INDOOR MOTOR
D08	2	7.5	89.0	7.4	12.0	13.0	13.8
D09	2	8.5	97.0	8.1	12.0	13.0	13.8
D11	2	10.0	111.0	9.3	12.0	12.6	14.3
D12	2	10.0	115.0	10.0	11.5	12.0	12.4
D14	2	12.5	146.0	11.9	12.2	13.0	13.9

LEGEND

– – Not Applicable
AHRI – Air Conditioning, Heating and Refrigeration Institute Test Standard
ASHRAE – American Society of Heating, Refrigerating and Air Conditioning, Inc.
EER – Energy Efficiency Ratio
IEER – Integrated Energy Efficiency Ratio
SEER – Seasonal Energy Efficiency Ratio

Use of the AHRI Certified TM Mark indicates a manufacturer's participation in the program For verification of certification for individual products, go to www.ahridirectory.org.

NOTES:

1. Rated in accordance with AHRI Standards 210/240 (04–06 size) and 340/360 (07–14 size).
2. Ratings are based on:
   Cooling Standard: 80°F (27°C) db, 67°F (19°C) wb indoor air temp and 95°F (35°C) db outdoor air temp.
   IEER Standard: A measure that expresses cooling part–load EER efficiency for commercial unitary air–conditioning and heat pump equipment on the basis of weighted operation at various load capacities.
3. All 48HC units comply with ASHRAE 90.1 and Energy Star Energy Standard for minimum SEER and EER requirements.
4. 48HC units comply with US Energy Policy Act (2005). To evaluate code compliance requirements, refer to state and local codes.

Table 4 – HEATING RATING TABLE - NATURAL GAS & PROPANE

UNITS		GAS HEAT	AL/SS HEAT EXCHANGER		TEMP RISE (DEG F)	THERMAL EFFICIENCY (%)	AFUE (%)
			INPUT / OUTPUT STAGE 1 (MBH)	INPUT / OUTPUT STAGE 2 (MBH)			
Single Phase	04	LOW	–	72 / 56	25 – 55	82%	79.1%
		MED	–	115 / 89	55 – 85	80%	78.5%
		HIGH	–	–	–	–	–
	05	LOW	–	72 / 56	25 – 55	82%	79.1%
		MED	–	115 / 90	35 – 65	81%	79%
		HIGH	–	150 / 117	50 – 80	80%	78.8%
	06	LOW	–	72 / 56	20 – 55	82%	79.1%
		MED	–	115 / 90	30 – 65	81%	79%
		HIGH	–	150 / 117	40 – 80	80%	78.8%
Three Phase	04	LOW	50 / 41	72 / 56	25 – 55	82%	–
		MED	82 / 66	115 / 89	55 – 85	80%	–
		HIGH	–	–	–	–	–
	05	LOW	50 / 41	72 / 56	25 – 55	82%	–
		MED	82 / 66	115 / 90	35 – 65	81%	–
		HIGH	120 / 96	150 / 117	50 – 80	80%	–
	06	LOW	50 / 41	72 / 56	20 – 55	82%	–
		MED	82 / 66	115 / 90	30 – 65	81%	–
		HIGH	120 / 96	150 / 117	40 – 80	80%	–
	07	LOW	50 / 41	72 / 59	15 – 55	82%	–
		MED	90 / 73	125 / 103	20 – 50	82%	–
		HIGH	105 / 84	150 / 120	30 – 60	81%	–
	08	LOW	90 / 73	125 / 103	20 – 50	82%	–
		MED	120 / 98	180 / 148	35 – 65	82%	–
		HIGH	180 / 147	224 / 184	45 – 75	82%	–
	09	LOW	90 / 73	125 / 103	20 – 50	82%	–
		MED	120 / 98	180 / 148	30 – 65	82%	–
		HIGH	180 / 147	224 / 184	40 – 75	82%	–
	11	LOW	120 / 98	180 / 148	25 – 65	82%	–
		MED	180 / 147	224 / 184	30 – 65	82%	–
		HIGH	200 / 160	250 / 205	35 – 70	80%	–
	12	LOW	120 / 98	180 / 148	25 – 65	82%	–
		MED	180 / 147	224 / 184	30 – 65	82%	–
		HIGH	200 / 160	250 / 205	35 – 70	80%	–
	14	LOW	120 / 96	150 / 120	15 – 60	80%	–
		MED	144 / 118	180 / 146	20 – 55	81%	–
		HIGH	192 / 156	240 / 195	25 – 60	81%	–

– Not Applicable

NOTES:

Heat ratings are for natural gas heat exchangers operated at or below 2000 ft (610 m). For information on Propane or altitudes above 2000 ft (610 m), see the Application Data section of this book. Accessory Propane/High Altitude kits are also available.

In the USA the input rating for altitudes above 2000 ft (610m) must be derated by 4% for each 1000 ft (305 m) above sea level. In Canada, the input rating must be derated by 10% for altitudes of 2000 ft (610 m) to 4500 ft (1372 m) above sea level.

Table 5 – HEATING RATING TABLE - LOW NO_X[1]

UNIT		GAS HEAT	LOW NOx HEAT EXCHANGER INPUT / OUTPUT STAGE 1 (MBH)	TEMP RISE (DEG F)	THERMAL EFFICIENCY (%)	AFUE (%)
Single Phase	04	LOW	60 / 47	20 – 50	81%	80.6%
		MED	90 / 72	30 – 60	81%	80.6%
		HIGH	–	–	–	–
	05	LOW	60 / 47	20 – 50	81%	80.6%
		MED	90 / 72	30 – 60	81%	80.6%
		HIGH	120 / 97	40 – 70	81%	81.5%
	06	LOW	60 / 47	15 – 50	81%	80.6%
		MED	90 / 72	25 – 60	80%	80.6%
		HIGH	120 / 97	35 – 70	80%	81.5%
Three Phase	04	LOW	60 / 47	20 – 50	81%	–
		MED	90 / 72	30 – 60	81%	–
		HIGH	–	–	–	–
	05	LOW	60 / 47	20 – 50	81%	–
		MED	90 / 72	30 – 60	81%	–
		HIGH	120 / 97	40 – 70	81%	–
	06	LOW	60 / 47	15 – 50	81%	–
		MED	90 / 72	25 – 60	80%	–
		HIGH	120 / 97	35 – 70	80%	–

– Not Applicable

NOTE:

1. Units meet California's South Coast Air Quality Management District (SCAQMD) Low–NO_x emissions requirement of 40 nanograms per joule or less.

Table 6 – SOUND PERFORMANCE TABLE

UNIT	COOLING STAGES	OUTDOOR SOUND (dB) AT 60								
		A–WEIGHTED	63	125	250	500	1000	2000	4000	8000
A04	1	76	78.2	78.0	74.2	73.3	70.6	66.0	62.4	56.9
A05	1	78	84.7	83.6	77.1	74.6	72.3	68.3	64.7	60.9
A06	1	77	87.5	82.5	76.1	73.6	71.3	67.1	64.1	60.0
A07	1	82	90.1	82.6	81.0	79.4	77.0	73.0	70.4	66.7
D08	2	82	90.6	84.3	80.2	79.3	77.1	72.2	67.4	63.7
D09	2	82	88.6	85.0	81.6	79.5	77.4	74.1	71.0	66.3
D11	2	87	85.9	87.9	85.6	84.4	82.8	78.5	74.9	72.5
D12	2	87	85.9	87.9	85.6	84.4	82.8	78.5	74.9	72.5
D14	2	83	89.3	86.0	82.9	80.7	78.5	73.6	69.6	64.5

LEGEND

dB – Decibel

NOTES:

1. Outdoor sound data is measure in accordance with AHRI.
2. Measurements are expressed in terms of sound power. Do not compare these values to sound pressure values because sound pressure depends on specific environmental factors which normally do not match individual applications. Sound power values are independent of the environment and therefore more accurate.
3. A–weighted sound ratings filter out very high and very low frequencies, to better approximate the response of "average" human ear. A–weighted measurements for Carrier units are taken in accordance with AHRI.

Table 7 – MINIMUM - MAXIMUM AIRFLOW RATINGS - NATURAL GAS & PROPANE

UNIT	HEAT LEVEL	COOLING				HEATING	
		Minimum Single Speed Fan Motor	Minimum 2–speed Fan Motor (at high speed)	Minimum 2–speed Fan Motor (at low speed)	Maximum	Minimum	Maximum
48HC**04	LOW	900	–	–	1500	990	2190
	MED					1000	1550
	HIGH					–	–
48HC**05	LOW	1200	–	–	2000	990	2190
	MED					1330	2460
	HIGH					1390	2220
48HC**06	LOW	1500	–	–	2500	990	2730
	MED					1330	2880
	HIGH					1390	2780
48HC**07	LOW	1800	–	–	3000	990	3640
	MED					1330	4750
	HIGH					1390	3750
48HC**08	LOW	2250	2535	1673	3750	1900	4750
	MED					2100	3900
	HIGH					2270	3780
48HC**09	LOW	2550	2550	1683	4250	1900	4750
	MED					2100	4560
	HIGH					2270	4250
48HC**11	LOW	3000	3380	2231	5000	1900	4750
	MED					2100	4560
	HIGH					2270	4250
48HC**12	LOW	3000	3380	2231	5000	2100	5470
	MED					2620	5670
	HIGH					2650	5290
48HC**14	LOW	3750	4225	2789	6250	1880	7500
	MED					2450	6750
	HIGH					3000	7200

– Not available

Table 8 – PHYSICAL DATA (COOLING) 3 - 6 TONS

		48HC*04	48HC*05	48HC*06	48HC*07
Refrigeration System					
	# Circuits / # Comp. / Type	1 / 1 / Scroll	1 / 1 / Scroll	1 / 1 / Scroll	1 / 1 / Scroll
	Puron® refrigerant (R–410A) charge (lbs–oz)	9 – 0	12 – 8	13 – 3	14 – 0
	Humidi–MiZer Puron refrigerant (R–410A) charge (lbs–oz)	11 – 0	19 – 12	20 – 0	22 – 8
	Metering Device	TXV	TXV	TXV	TXV
	High–press. Trip / Reset (psig)	630 / 505	630 / 505	630 / 505	630 / 505
	Low–press. Trip / Reset (psig)	54 / 117	54 / 117	54 / 117	54 / 117
	Compressor Capacity Staging (%)	100%	100%	100%	100%
Evap. Coil					
	Material (Tube Fin)	Cu / Al	Cu / Al	Cu / Al	Cu / Al
	Coil type	3/8–in RTPF	3/8–in RTPF	3/8–in RTPF	3/8–in RTPF
	Rows / FPI	3 / 15	3 / 15	4 / 15	3 / 15
	Total Face Area (ft^2)	5.5	7.3	7.3	8.9
	Condensate Drain Conn. Size	3/4–in	3/4–in	3/4–in	3/4–in
Humidi–MiZer Coil					
	Material (Tube Fin)	Cu / Al	Cu / Al	Cu / Al	Cu / Al
	Coil type	3/8–in RTPF	3/8–in RTPF	3/8–in RTPF	3/8–in RTPF
	Rows / FPI	1 / 17	2 / 17	2 / 17	2 / 17
	Total Face Area (ft^2)	3.9	5.2	5.2	5.2
Evap. Fan and Motor					
Standard Static 1 phase	Motor Qty / Drive Type	1 / Direct	1 / Direct	1 / Direct	–
	Max BHP	1.0	1.0	1.0	–
	RPM Range	600–1200	600–1200	600–1200	–
	Motor Frame Size	48	48	48	–
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	–
	Fan Diameter (in)	10 x 10	10 x 10	10 x 10	–
Standard Static 3 phase	Motor Qty / Drive Type	1 / Direct	1 / Direct	1 / Direct	1 / Belt
	Max BHP	1.0	1.0	1.0	1.7
	RPM Range	600–1200	600–1200	600–1200	489–747
	Motor Frame Size	48	48	48	56
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in)	10 x 10	10 x 10	11 x 10	15 x 15
Standard Static 3 phase*	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt	–
	Max BHP	1.2	1.2	1.2	–
	RPM Range	560–854	560–854	770–1175	–
	Motor Frame Size	48	48	48	–
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	–
	Fan Diameter (in)	10 x 10	10 x 10	10 x 10	–

* Humidi–MiZer models only
– Not Applicable

Table 8 (cont.) - PHYSICAL DATA (COOLING) 3 - 6 TONS

		48HC*04	48HC*05	48HC*06	48HC*07
Evap. Fan and Motor					
Medium Static 3 phase	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt	1 / Belt
	Max BHP	1.2	1.7	2.4	2.9
	RPM Range	770 – 1175	920 – 1303	1035 – 1466	733 – 949
	Motor Frame Size	48	56	56	56
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in)	10 x 10	10 x 10	10 x 10	15 x 15
Medium Static 3 phase*	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt	–
	Max BHP	1.2	1.7	2.4	–
	RPM Range	770 – 1175	770 – 1175	1035 – 1466	–
	Motor Frame Size	48	48	56	–
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	–
	Fan Diameter (in)	10 x 10	10 x 10	10 x 10	–
High Static 3 phase	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt	1 / Belt
	Max BHP	2.4	2.9	2.9	4.7
	RPM Range	1035 – 1466	1208 – 1639	1303 – 1687	909 – 1102
	Motor Frame Size	56	56	56	14
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in)	10 x 10	10 x 10	10 x 10	15 x 15
Condenser Coil					
	Material (Tube/Fin)	Cu / Al	Cu / Al	Cu / Al	Cu / Al
	Coil type	3/8 – in RTPF	3/8 – in RTPF	3/8 – in RTPF	3/8 – in RTPF
	Rows / FPI	2 / 17	2 / 17	2 / 17	2 / 17
	Total Face Area (ft^2)	12.7	21.3	21.3	20.5
Condenser fan / motor					
	Qty / Motor Drive Type	1/ Direct	1/ Direct	1/ Direct	2/ Direct
	Motor HP / RPM	1/8 / 825	1/4 / 1100	1/4 / 1100	1/4 / 1100
	Fan diameter (in)	22	22	22	22
Filters					
	RA Filter # / Size (in)	2 / 16 x 25 x 2	4 / 16 x 16 x 2	4 / 16 x 16 x 2	4 / 16 x 20 x 2
	OA inlet screen # / Size (in)	1 / 20 x 24 x 1	1 / 20 x 24 x 1	1 / 20 x 24 x 1	1 / 20 x 36 x 1

* Humidi – MiZer models only
– Not Applicable

Table 9 – PHYSICAL DATA (HEATING) 3 - 6 TONS

	48HC**04	48HC**05	48HC**06	48HC**07
Gas Connection				
# of Gas Valves	1	1	1	1
Nat. gas supply line press (in. w.g.)/(PSIG)	4 –13 / 0.18 – 0.47	4 –13 / 0.18 – 0.47	4 –13 / 0.18 – 0.47	4 –13 / 0.18 – 0.47
Propane supply line press (in. w.g.)/(PSIG)	11 –13 / 0.40 – 0.47	11 –13 / 0.40 – 0.47	11 –13 / 0.40 – 0.47	11 –13 / 0.40 – 0.47
Heat Anticipator Setting (Amps)				
1st stage	0.14	0.14	0.14	0.14
2nd stage	0.14	0.14	0.14	0.14
Natural Gas, Propane Heat				
# of stages / # of burners (total)	1 or 2 / 2	1 or 2 / 2	1 or 2 / 2	2 / 2
LOW Connection size	1/2–in NPT	1/2–in NPT	1/2–in NPT	1/2–in NPT
LOW Rollout switch opens / closes	195 / 115	195 / 115	195 / 115	195 / 115
LOW Temperature rise range (F)	25 – 55	25 – 55	20 – 55	15 – 55
# of stages / # of burners (total)	1 or 2 / 3	1 or 2 / 3	1 or 2 / 3	2 / 3
MED Connection size	1/2–in NPT	1/2–in NPT	1/2–in NPT	1/2–in NPT
MED Rollout switch opens / closes	195 / 115	195 / 115	195 / 115	195 / 115
MED Temperature rise range (F)	55 – 85	35 – 65	30 – 65	20 – 50
# of stages / # of burners (total)	–	1 or 2 / 3	1 or 2 / 3	2 / 4
HIGH Connection size	–	1/2–in NPT	1/2–in NPT	3/4–in NPT
HIGH Rollout switch opens / closes	–	195 / 115	195 / 115	195 / 115
HIGH Temperature rise range (F)	–	50 – 80	40 – 80	30 – 60
Low NO_x Gas Heat				
# of stages / # of burners (total)	1 / 2	1 / 2	1 / 2	–
LOW Connection size	1/2–in NPT	1/2–in NPT	1/2–in NPT	–
LOW Rollout switch opens / closes	195 / 115	195 / 115	195 / 115	–
LOW Temperature rise range (F)	20 – 50	20 – 50	15 – 50	–
# of stages / # of burners (total)	1 / 3	1 / 3	1 / 3	–
MED Connection size	1/2–in NPT	1/2–in NPT	1/2–in NPT	–
MED Rollout switch opens / closes	195 / 115	195 / 115	195 / 115	–
MED Temperature rise range (F)	30 – 60	30 – 60	25 – 60	–
				–
# of stages / # of burners (total)	–	1 / 3	1 / 3	–
HIGH Connection size	–	1/2–in NPT	1/2–in NPT	–
HIGH Rollout switch opens / closes	–	195 / 115	195 / 115	–
HIGH Temperature rise range (F)	–	40 – 70	35 – 70	–

– Not Applicable

Table 10 – PHYSICAL DATA (COOLING) 7.5 - 12.5 TONS

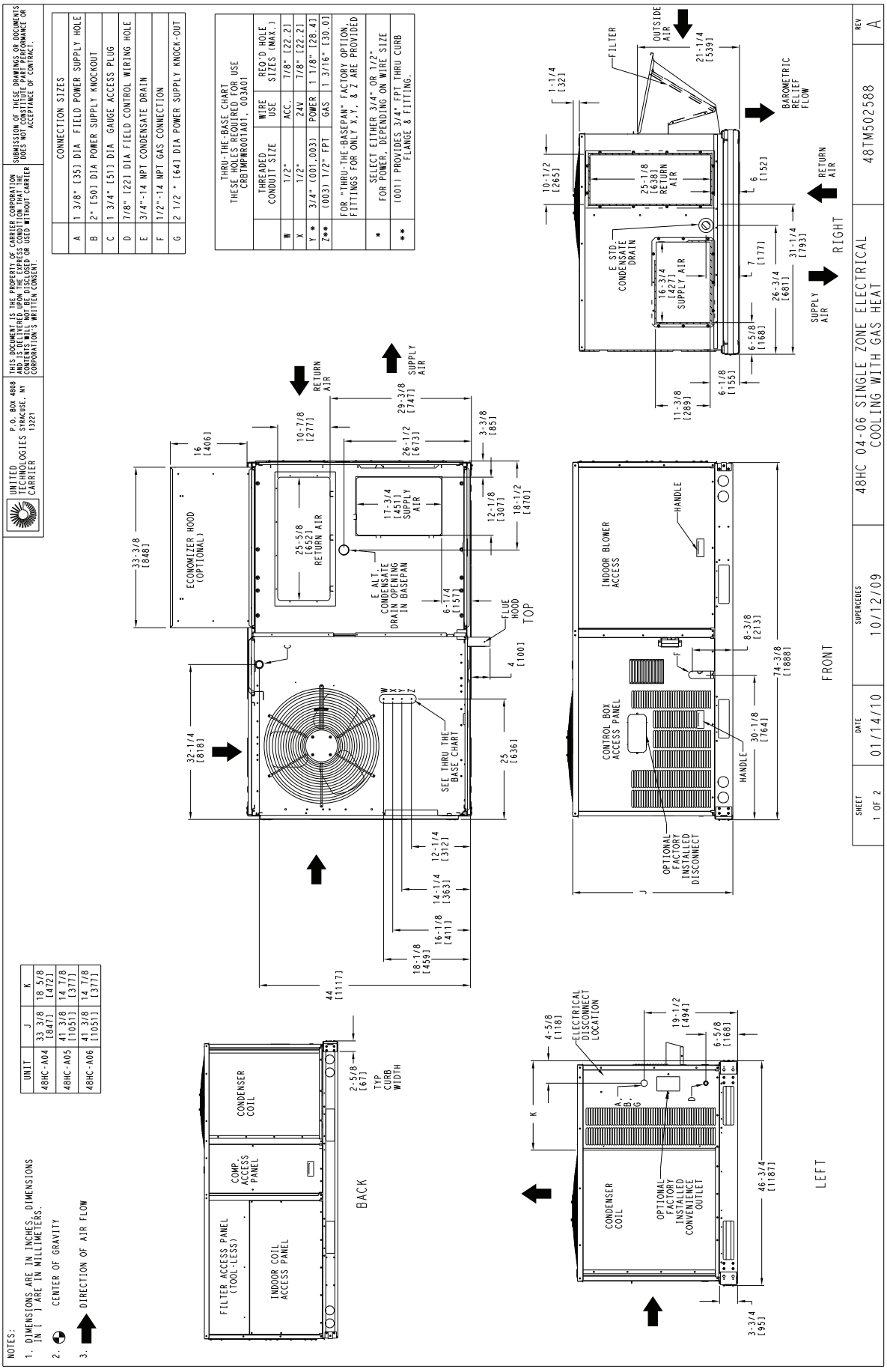
	48HC*08	48HC*09	48HC*11	48HC*12	48HC*14
Refrigeration System					
# Circuits / # Comp. / Type	2 / 2 / Scroll	2 / 2 / Scroll	2 / 2 / Scroll	2 / 2 / Scroll	2 / 2 / Scroll
Puron Refrig (R–410A) charge A/B (lbs–oz)	9 – 10 / 9 – 10	9 – 14 / 9 – 14	12 – 10 / 13 – 0	12 – 11 / 12 – 5	16 – 7 / 15 – 5
Humidi–MiZer Puron Refrig (R–410A) charge A/B (lbs–oz)	17–0 / 17–0	15–2 / 15–2	–	18–3 / 17–3	25–8 / 22–8
Metering device	TXV	TXV	TXV	TXV	TXV
High–press. Trip / Reset (psig)	630 / 505	630 / 505	630 / 505	630 / 505	630 / 505
Low–press. Trip / Reset (psig)	54 / 117	54 / 117	27 / 44	54 / 117	54 / 117
Compressor Capacity Staging (%)	50% / 100%	50% / 100%	50% / 100%	50% / 100%	50% / 100%
Evaporator Coil					
Material (Tube/Fin)	Cu / Al	Cu / Al	Cu / Al	Cu / Al	Cu / Al
Coil type	3/8–in RTPF	3/8–in RTPF	3/8–in RTPF	3/8–in RTPF	3/8–in RTPF
Rows / FPI	4 / 15	4 / 15	4 / 15	4 / 15	4 / 15
Total face area (ft2)	11.1	11.1	11.1	11.1	17.5
Condensate drain conn. size	3/4–in	3/4–in	3/4–in	3/4–in	3/4–in
Humidi–MiZer Coil					
Material (Tube/Fin)	Cu / Al	Cu / Al	Cu / Al	Cu / Al	Cu / Al
Coil type	3/8–in RTPF	3/8–in RTPF	3/8–in RTPF	3/8–in RTPF	3/8–in RTPF
Rows / FPI	2 / 17	2 / 17	2 / 17	2 / 17	1 / 17
Total face area (ft2)	6.3	8.4	8.6	8.6	13.8
Evaporator fan and motor					
Standard Static 3 phase – Motor Qty / Drive type	1 / Belt	1 / Belt	1 / Belt	1 / Belt	1 / Belt
Max BHP	1.7	1.7	2.4	2.4	2.9
RPM range	518–733	518–733	591–838	591–838	440–609
Motor Frame Size	56	56	56	56	56Y
Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
Fan Diameter (in)	15 x 15	15 x 15	15 x 15	15 x 15	18 x 18
Medium Static 3 phase – Motor Qty / Drive type	1 / Belt	1 / Belt	1 / Belt	1 / Belt	1 / Belt
Max BHP	2.4	2.4	3.7	3.7	3.7
RPM range	690–936	690–936	838–1084	838–1084	609–778
Motor Frame Size	56	56	56HZ	56HZ	56HZ
Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
Fan Diameter (in)	15 x 15	15 x 15	15 x 15	15 x 15	18 x 18
High Static 3 phase – Motor Qty / Drive type	1 / Belt	1 / Belt	1 / Belt	1 / Belt	1 / Belt
Max BHP	3.7	3.7	4.9	4.9	6.1*
RPM range	838–1084	838–1084	1022–1240	1022–1240	776–955
Motor Frame Size	56	56	145TY	145TY	S184T
Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
Fan Diameter (in)	15 x 15	15 x 15	15 x 15	15 x 15	18 x 18
Condenser Coil					
Material (Tube/Fin)	Cu / Al	Cu / Al	Cu / Al	Cu / Al	Cu / Al
Coil type	3/8–in RTPF	3/8–in RTPF	3/8–in RTPF	3/8–in RTPF	3/8–in RTPF
Rows / FPI	2 / 17	2 / 17	3 / 17	3 / 17	2 / 17
Total Face Area (ft^2)	25.1	25.1	25.1	25.1	2 at 23.1
Condenser fan / motor					
Qty / Motor drive type	2 / direct	2 / direct	1 / direct ECM	1 / direct	3 / direct
Motor HP / RPM	1/4 / 1100	1/4 / 1100	1 / 1050	1 / 1175	1/4 / 1100
Fan diameter (in)	22	22	30	30	22
Filters					
RA Filter # / size (in)	4 / 20 x 20 x 2	4 / 20 x 20 x 2	4 / 20 x 20 x 2	4 / 20 x 20 x 2	6 / 18 x 24 x 2 Vert 2 / 24 x 27 x 1
OA inlet screen # / size (in)	1 / 20 x 24 x 1	1 / 20 x 24 x 1	1 / 20 x 24 x 1	1 / 20 x 24 x 1	Horz 1 / 30 x 39 x 1

– Not Applicable

Table 11 – PHYSICAL DATA (HEATING) 7.5 - 12.5 TONS

	48HC**08	48HC**09	48HC**11	48HC**12	48HC**14
Gas Connection					
# of Gas Valves	1	1	1	1	1
Nat. gas supply line press (in. w.g.)/(PSIG)	4 –13 / 0.18 – 0.47	4 –13 / 0.18 – 0.47	4 –13 / 0.18 – 0.47	4 –13 / 0.18 – 0.47	5 –13 / 0.18 – 0.47
Propane supply line press (in. w.g.)/(PSIG)	11 –13 / 0.40 – 0.47	11 –13 / 0.40 – 0.47	11 –13 / 0.40 – 0.47	11 –13 / 0.40 – 0.47	11 –13 / 0.40 – 0.47
Heat Anticipator Setting (Amps)					
1st stage	0.14	0.14	0.14	0.14	0.14
2nd stage	0.14	0.14	0.14	0.14	0.14
Natural Gas, Propane Heat					
# of stages / # of burners (total)	2 / 3	2 / 3	2 / 4	2 / 4	2 / 5
LOW Connection size	1/2 – in NPT	1/2 – in NPT	3/4 – in NPT	3/4 – in NPT	3/4 – in NPT
LOW Rollout switch opens / closes	195 / 115	195 / 115	195 / 115	195 / 115	225 / 145
LOW Temperature rise range (F)	20 – 50	20 – 50	25 – 65	25 – 65	15 – 60
# of stages / # of burners (total)	2 / 4	2 / 4	2 / 5	2 / 5	2 / 6
MED Connection size	3/4 – in NPT	3/4 – in NPT	3/4 – in NPT	3/4 – in NPT	3/4 – in NPT
MED Rollout switch opens / closes	195 / 115	195 / 115	195 / 115	195 / 115	225 / 145
MED Temperature rise range (F)	35 – 65	30 – 65	30 – 65	30 – 65	20 – 55
# of stages / # of burners (total)	2 / 5	2 / 5	2 / 5	2 / 5	2 / 8
HIGH Connection size	3/4 – in NPT	3/4 – in NPT	3/4 – in NPT	3/4 – in NPT	3/4 – in NPT
HIGH Rollout switch opens / closes	195 / 115	195 / 115	195 / 115	195 / 115	225 / 145
HIGH Temperature rise range (F)	45 – 75	40 – 75	35 – 70	35 – 70	25 – 60

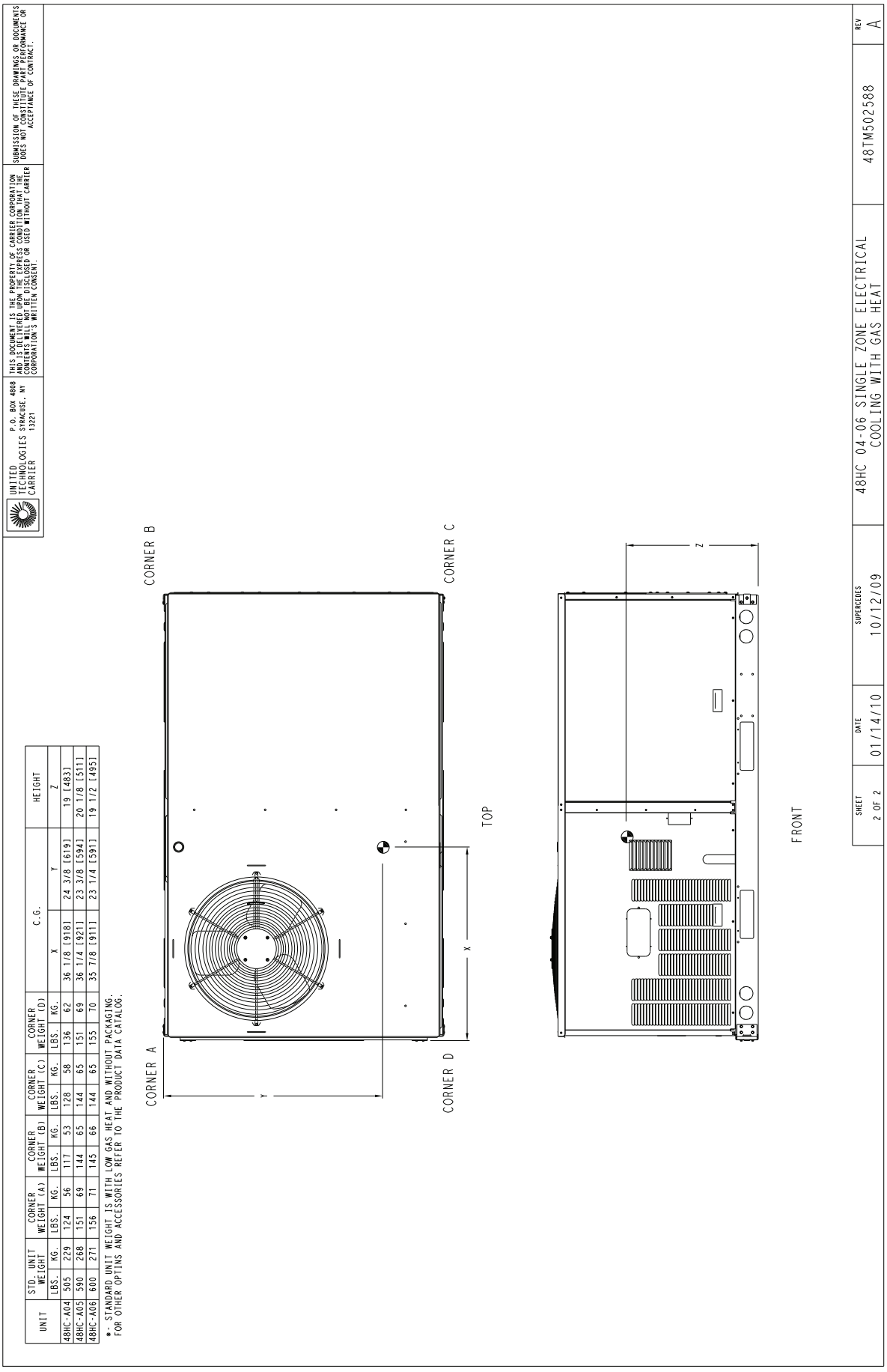
CURBS & WEIGHTS DIMENSIONS - 48HC 04-06



C10104

Fig. 1 - Dimensions 48HC 04-06

CURBS & WEIGHTS DIMENSIONS - 48HC 04-06 (cont.)



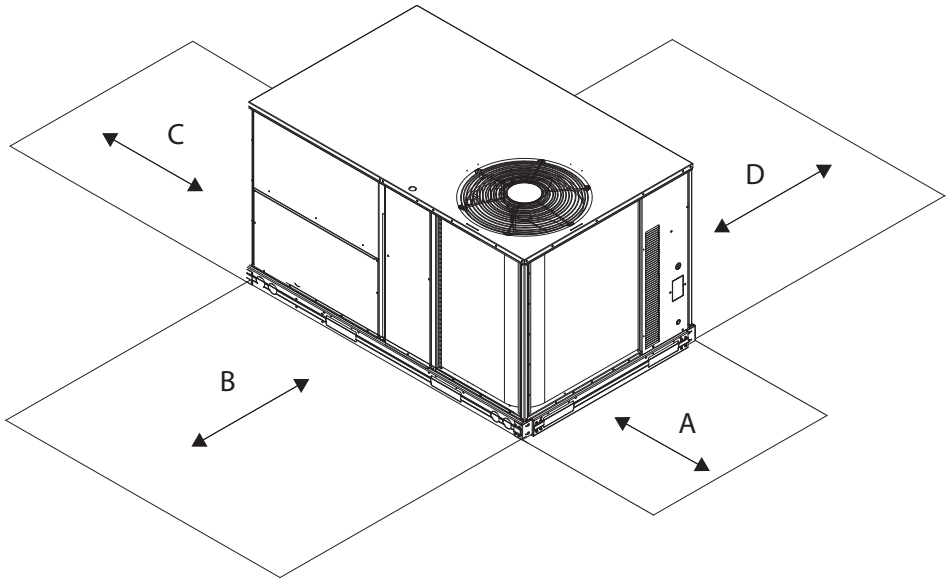
UNIT	STD. UNIT WEIGHT		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)		C.G.		HEIGHT
	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	X	Y	Z
48HC-A04	505	229	124	56	117	53	128	58	136	62	36 1/8 [918]	24 3/8 [619]	19 [483]
48HC-A05	590	268	151	69	144	65	144	65	151	69	36 1/4 [921]	23 3/8 [594]	20 1/8 [511]
48HC-A06	600	271	156	71	145	66	144	65	155	70	35 7/8 [911]	23 1/4 [591]	19 1/2 [495]

*- STANDARD UNIT WEIGHT IS WITH LOW GAS HEAT AND WITHOUT PACKAGING.
FOR OTHER OPTINS AND ACCESSORIES REFER TO THE PRODUCT DATA CATALOG.

C10105

Fig. 2 - Dimensions 48HC 04-06

CURBS & WEIGHTS DIMENSIONS - 48HC 04-06 (cont.)



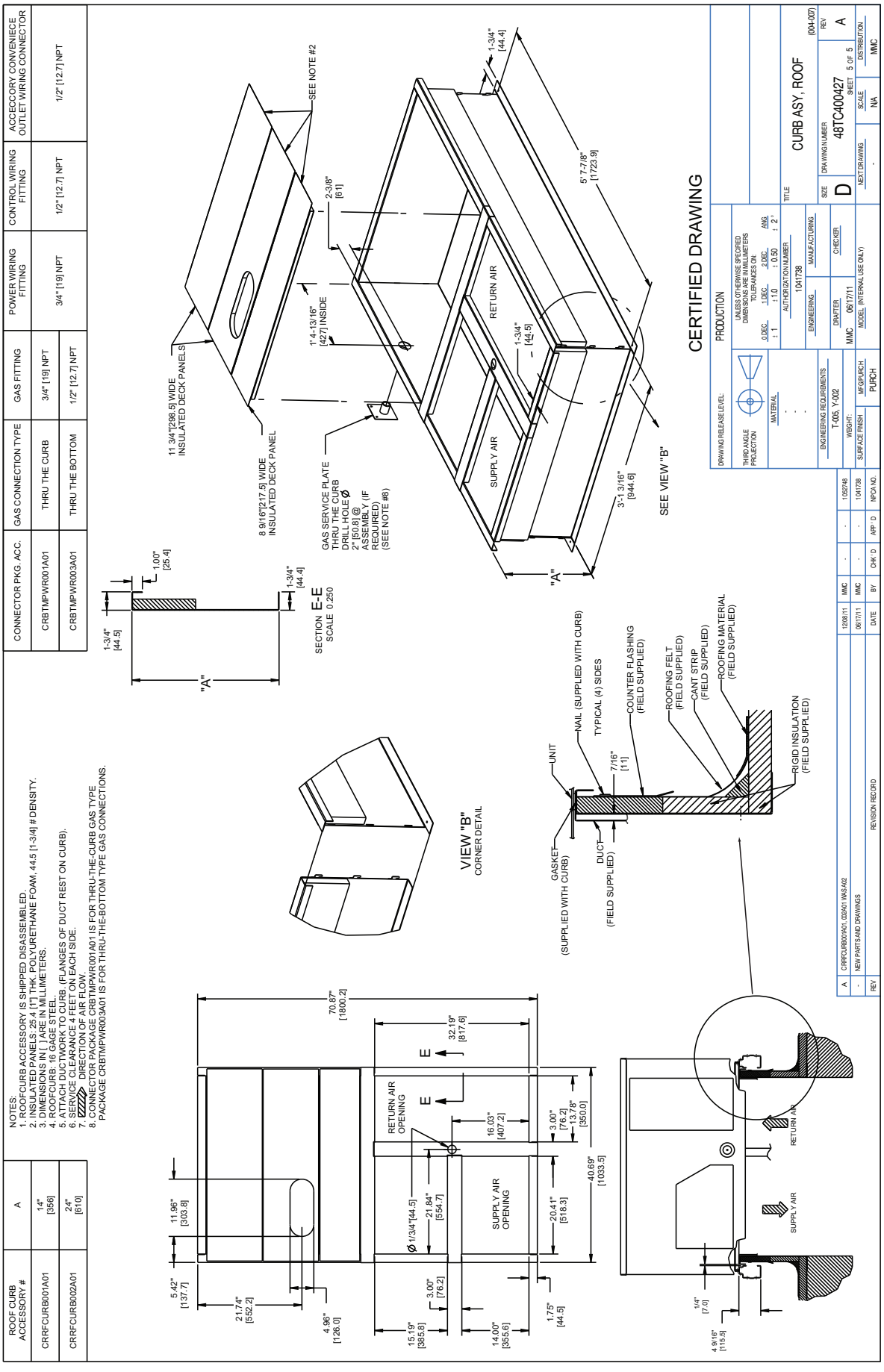
C08337

Fig. 3 - Service Clearance

LOC	DIMENSION	CONDITION
A	48–in (1219 mm)	Unit disconnect is mounted on panel
	18–in (457 mm)	No disconnect, convenience outlet option
	18–in (457 mm)	Recommended service clearance
	12–in (305 mm)	Minimum clearance
B	42–in (1067 mm)	Surface behind servicer is grounded (e.g., metal, masonry wall)
	36–in (914 mm)	Surface behind servicer is electrically non–conductive (e.g., wood, fiberglass)
	Special	Check for sources of flue products within 10–ft of unit fresh air intake hood
C	36–in (914 mm)	Side condensate drain is used
	18–in (457 mm)	Minimum clearance
D	48–in (1219 mm)	No flue discharge accessory installed, surface is combustible material
	42–in (1067 mm)	Surface behind servicer is grounded (e.g., metal, masonry wall, another unit)
	36–in (914 mm)	Surface behind servicer is electrically non–conductive (e.g., wood, fiberglass)
	Special	Check for adjacent units or building fresh air intakes within 10–ft of this unit's flue outlet

NOTE: Unit not designed to have overhead obstruction. Contact Application Engineering for guidance on any application planning overhead obstruction or for vertical clearances.

CURBS & WEIGHTS DIMENSIONS - 48HC 04-06 (cont.)



ROOF CURB ACCESSORY #	A
CRRFCURB001A01	14" [356]
CRRFCURB002A01	24" [610]

CONNECTOR PKG. ACC.	GAS CONNECTION TYPE	GAS FITTING	POWER WIRING FITTING	CONTROL WIRING FITTING	ACCECCORY CONVENIECE OUTLET WIRING CONNECTOR
CRBTMPWR001A01	THRU THE CURB	3/4" [19] NPT	3/4" [19] NPT	1/2" [12.7] NPT	1/2" [12.7] NPT
CRBTMPWR003A01	THRU THE BOTTOM	1/2" [12.7] NPT			

REV	REVISION RECORD	DATE	BY	CHK'D	APP'D	NPCA NO.
A	CRRFCURB001401, 002A01 WAS A02	12/08/11	MMC	-	-	1092748
-	NEW PARTS AND DRAWINGS	06/17/11	MMC	-	-	1041788

DRAWING RELEASE LEVEL:	ENGINEERING REQUIREMENTS	DRAFTER	CHECKER
THIRD ANGLE PROJECTION	T-005, Y-002	MMC 06/17/11	
MATERIAL	WEIGHT:	MFG/PURCH	
-	SURFACE FINISH	PURCH	
-			
-			

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS TOLERANCES ON:
0 DEC. ± 1.0 | 1 DEC. ± 0.50 | ANG. ± 2°
AUTHORIZATION NUMBER 1041738
ENGINEERING | MANUFACTURING
MODEL (INTERNAL USE ONLY)

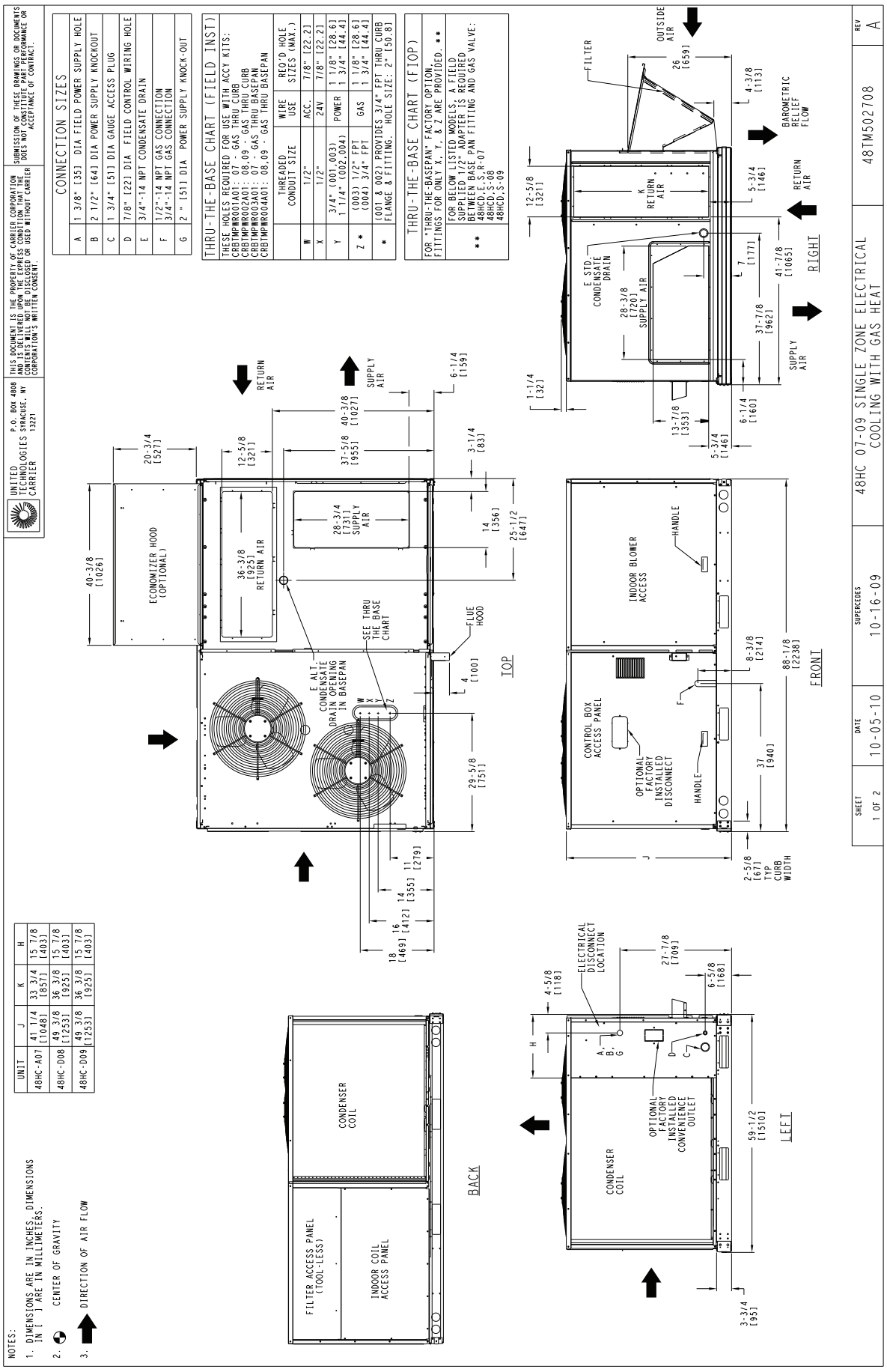
SIZE	DRAWING NUMBER	REV
D	48TC400427	A
NEXT DRAWING -	SHEET 5 OF 5	
	SCALE N/A	DISTRIBUTION MMC

(004-007)

C12596

Fig. 4 - Roof Curb Details

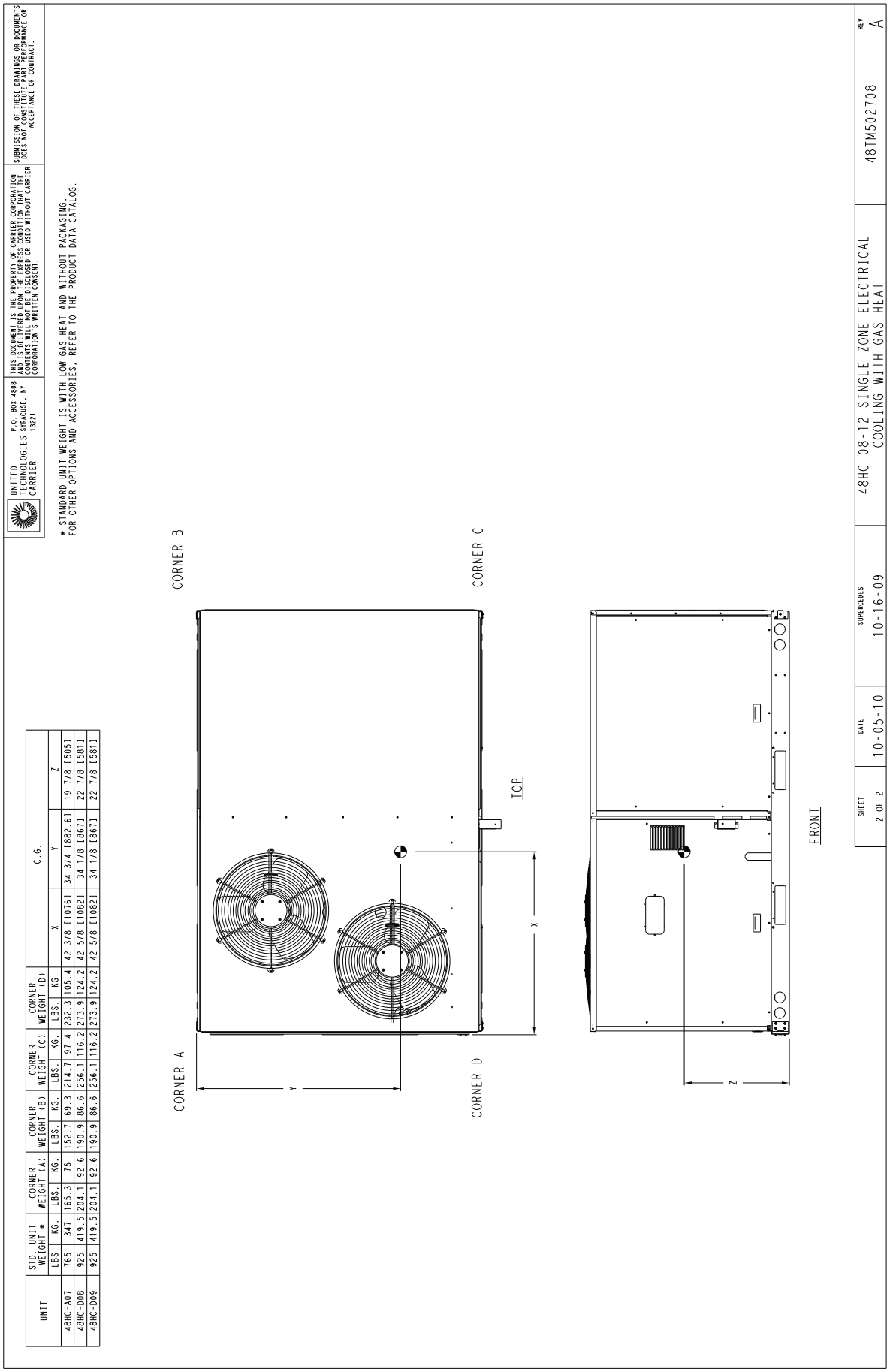
CURBS & WEIGHTS DIMENSIONS - 48HC 07-09



C11322

Fig. 5 - Dimensions 48HC 07-09

CURBS & WEIGHTS DIMENSIONS - 48HC 07-09 (cont.)

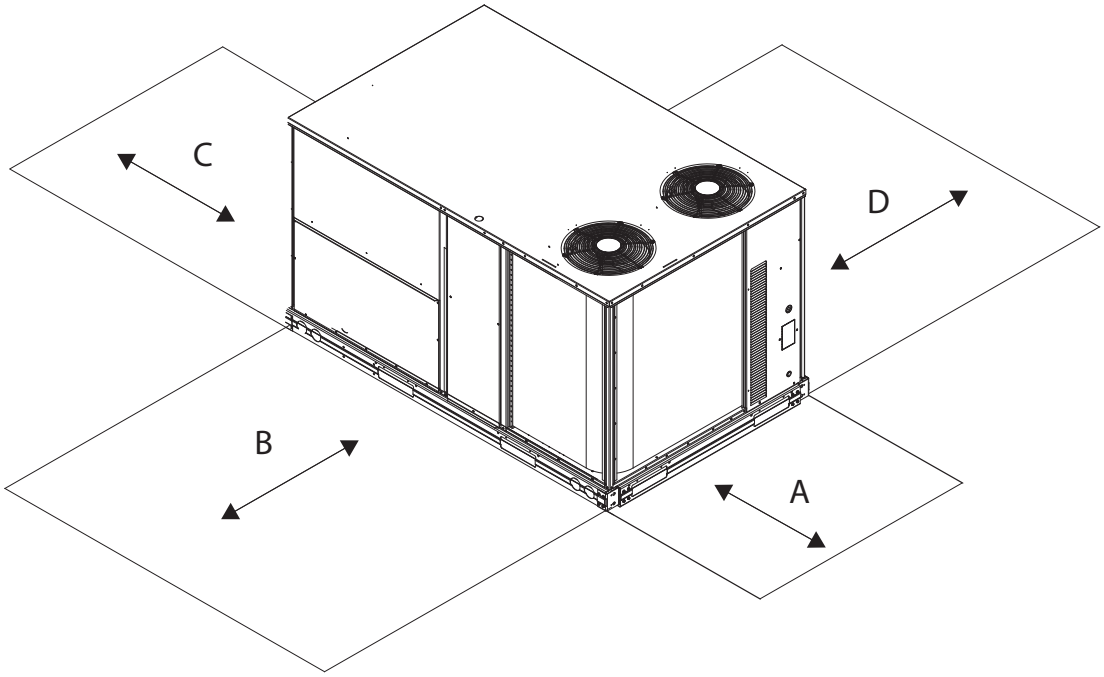


UNIT	STD. UNIT WEIGHT *		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)		C.G.		
	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	X	Y	Z
48HC-A07	765	347	165.3	75	152.7	69.3	214.7	97.4	232.3	105.4	42 3/8 [1076]	34 3/4 [882.6]	19 7/8 [505]
48HC-D08	925	419.5	204.1	92.6	190.9	86.6	256.1	116.2	273.9	124.2	42 5/8 [1082]	34 1/8 [867]	22 7/8 [581]
48HC-D09	925	419.5	204.1	92.6	190.9	86.6	256.1	116.2	273.9	124.2	42 5/8 [1082]	34 1/8 [867]	22 7/8 [581]

C11323

Fig. 6 - Dimensions 48HC 07-09

CURBS & WEIGHTS DIMENSIONS - 48HC 07-09 (cont.)



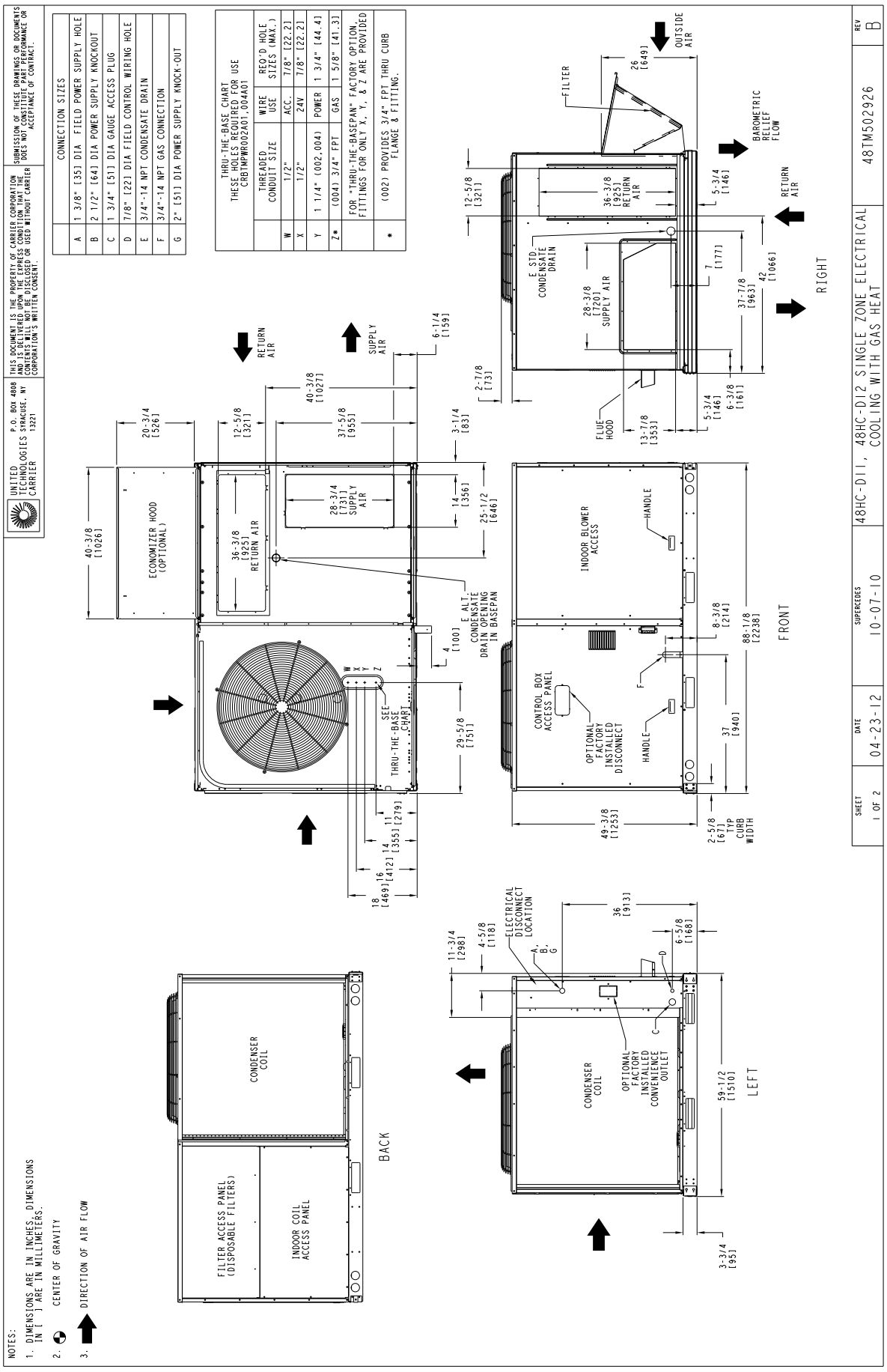
C10577

Fig. 7 - Service Clearance

LOC	DIMENSION	CONDITION
A	48–in (1219 mm)	Unit disconnect is mounted on panel
	18–in (457 mm)	No disconnect, convenience outlet option
	18–in (457 mm)	Recommended service clearance
	12–in (305 mm)	Minimum clearance
B	42–in (1067 mm)	Surface behind servicer is grounded (e.g., metal, masonry wall)
	36–in (914 mm)	Surface behind servicer is electrically non–conductive (e.g., wood, fiberglass)
	Special	Check for sources of flue products within 10–ft of unit fresh air intake hood
C	36–in (914 mm)	Side condensate drain is used
	18–in (457 mm)	Minimum clearance
D	48–in (1219 mm)	No flue discharge accessory installed, surface is combustible material
	42–in (1067 mm)	Surface behind servicer is grounded (e.g., metal, masonry wall, another unit)
	36–in (914 mm)	Surface behind servicer is electrically non–conductive (e.g., wood, fiberglass)
	Special	Check for adjacent units or building fresh air intakes within 10–ft of this unit's flue outlet

NOTE: Unit not designed to have overhead obstruction. Contact Application Engineering for guidance on any application planning overhead obstruction or for vertical clearances.

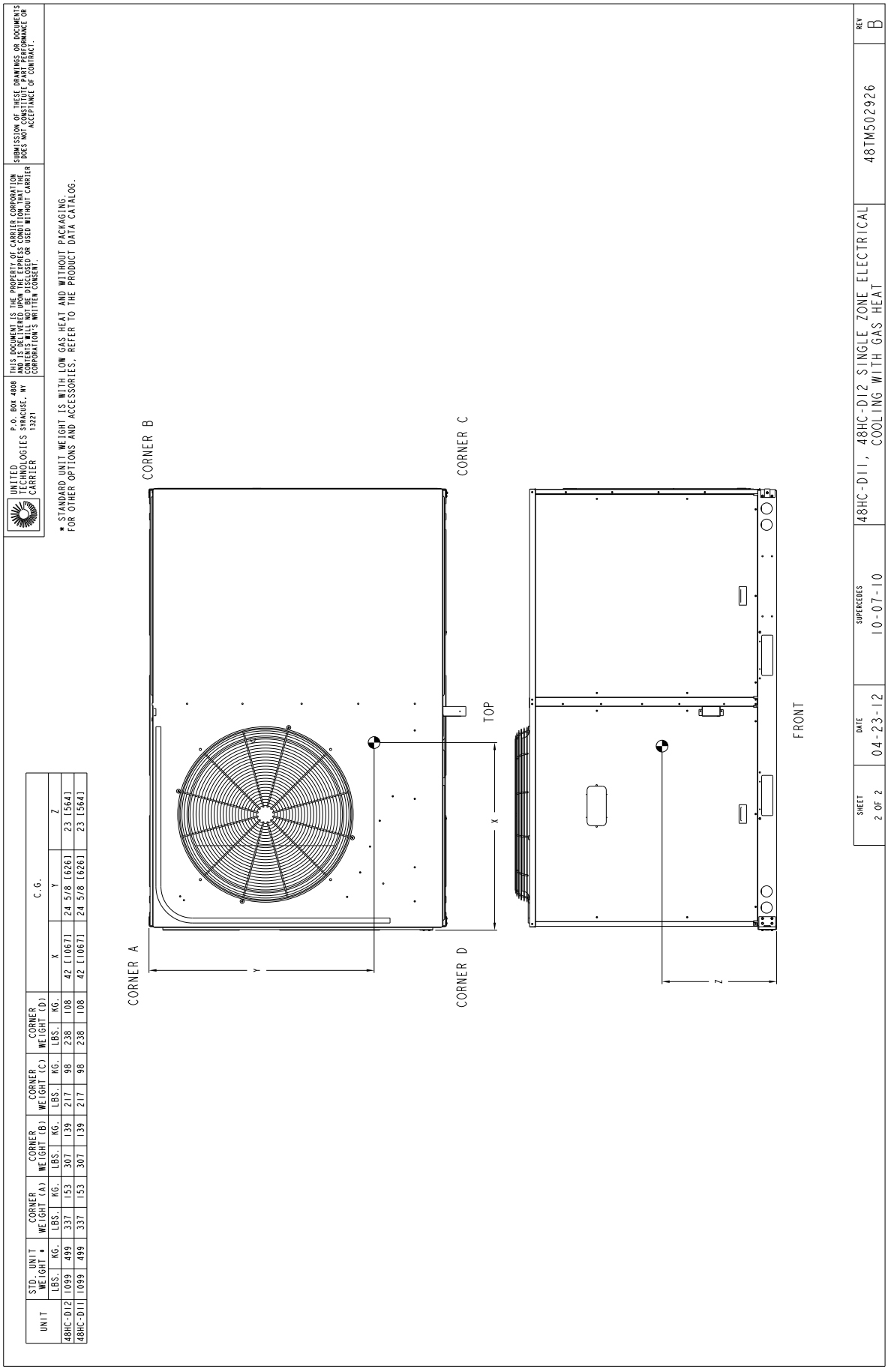
CURBS & WEIGHTS DIMENSIONS - 48HC 11-12



C12269

Fig. 8 - Dimensions 48HC 11-12

CURBS & WEIGHTS DIMENSIONS - 48HC 11-12 (cont.)

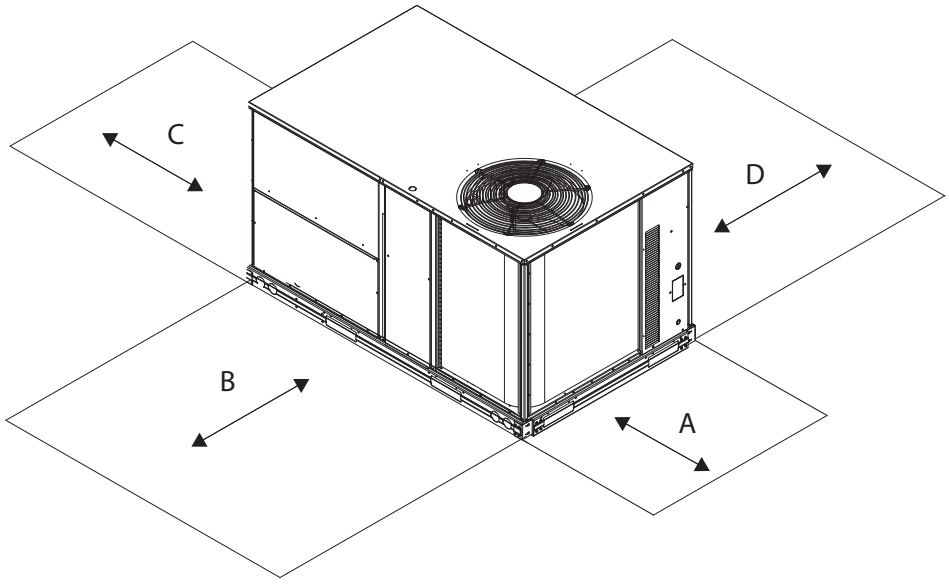


UNIT	STD. UNIT WEIGHT *		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)		C.G.			
	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	X	Y	Z	
48HC-D12	1099	499	337	153	307	139	217	98	238	108	42 [1067]	24 5/8 [626]	23 [564]	
48HC-D11	1099	499	337	153	307	139	217	98	238	108	42 [1067]	24 5/8 [626]	23 [564]	

C12270

Fig. 9 - Dimensions 48HC 12

CURBS & WEIGHTS DIMENSIONS - 48HC 11-12 (cont.)



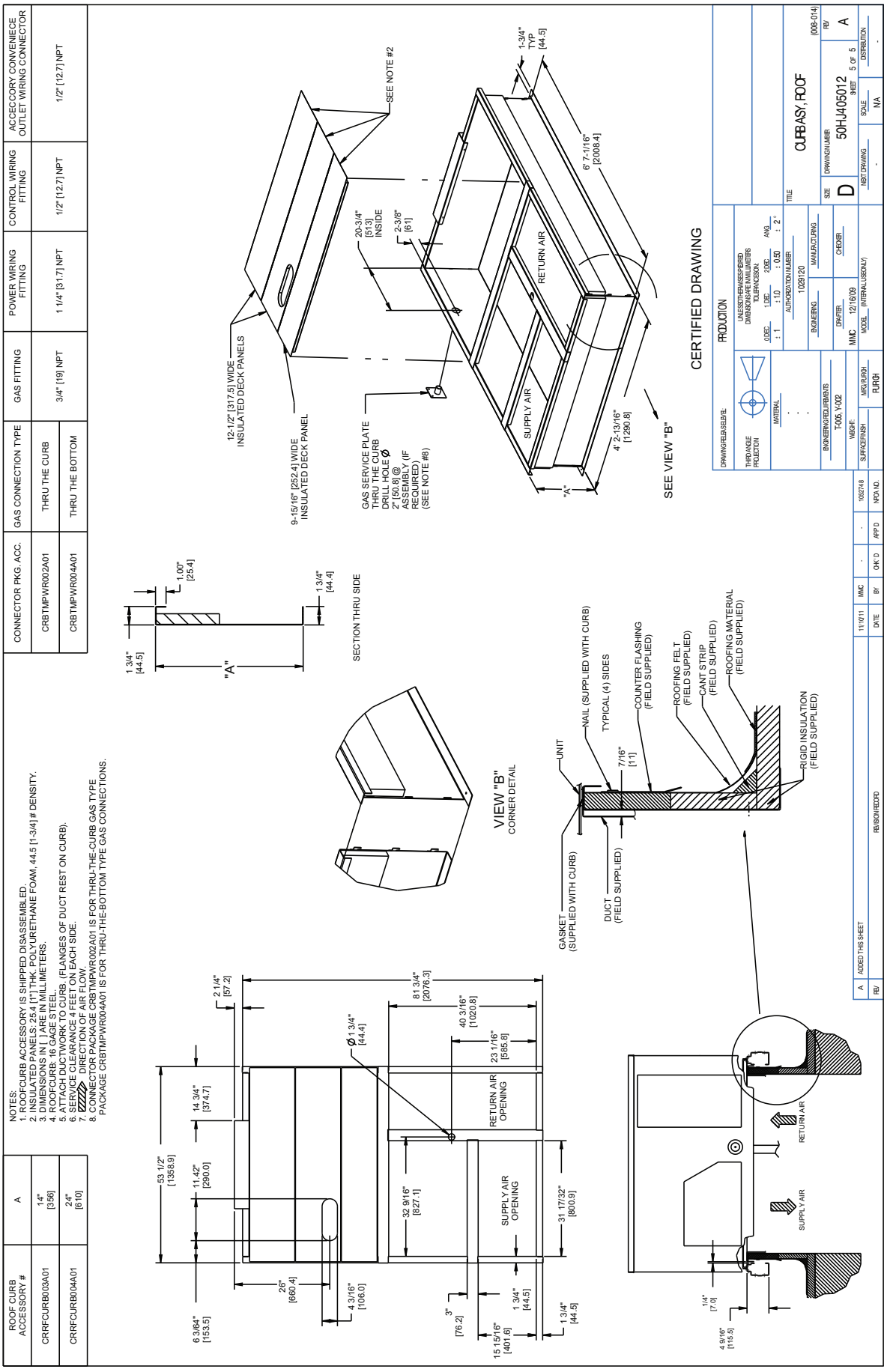
C08337

Fig. 10 - Service Clearance

LOC	DIMENSION	CONDITION
A	48–in (1219 mm)	Unit disconnect is mounted on panel
	18–in (457 mm)	No disconnect, convenience outlet option
	18–in (457 mm)	Recommended service clearance
	12–in (305 mm)	Minimum clearance
B	42–in (1067 mm)	Surface behind servicer is grounded (e.g., metal, masonry wall)
	36–in (914 mm)	Surface behind servicer is electrically non–conductive (e.g., wood, fiberglass)
	Special	Check for sources of flue products within 10–ft of unit fresh air intake hood
C	36–in (914 mm)	Side condensate drain is used
	18–in (457 mm)	Minimum clearance
D	48–in (1219 mm)	No flue discharge accessory installed, surface is combustible material
	42–in (1067 mm)	Surface behind servicer is grounded (e.g., metal, masonry wall, another unit)
	36–in (914 mm)	Surface behind servicer is electrically non–conductive (e.g., wood, fiberglass)
	Special	Check for adjacent units or building fresh air intakes within 10–ft of this unit's flue outlet

NOTE: Unit not designed to have overhead obstruction. Contact Application Engineering for guidance on any application planning overhead obstruction or for vertical clearances.

CURBS & WEIGHTS DIMENSIONS - 48HC 07-12 (cont.)



ROOF CURB ACCESSORY #	A
CRRFCURB003A01	14" [356]
CRRFCURB004A01	24" [610]

CONNECTOR PKG. ACC.	GAS CONNECTION TYPE	GAS FITTING	POWER WIRING FITTING	CONTROL WIRING FITTING	ACCECCORY CONVENIECE OUTLET WIRING CONNECTOR
CRBTMPWR002A01	THRU THE CURB	3/4" [19] NPT	1 1/4" [31.7] NPT	1/2" [12.7] NPT	1/2" [12.7] NPT
CRBTMPWR004A01	THRU THE BOTTOM				

Fig. 11 - Roof Curb Details

CURBS & WEIGHTS DIMENSIONS - 48HC 14

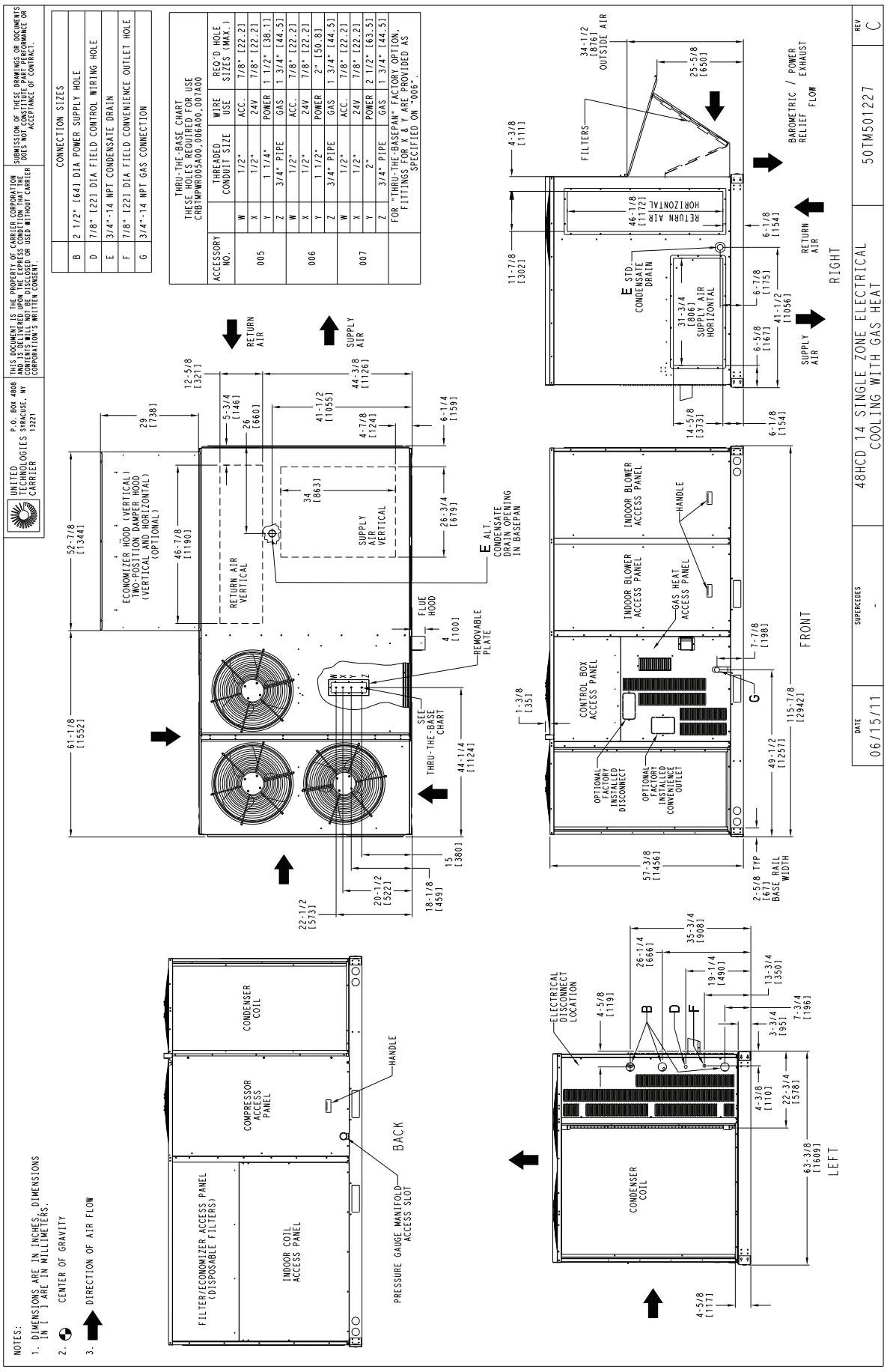


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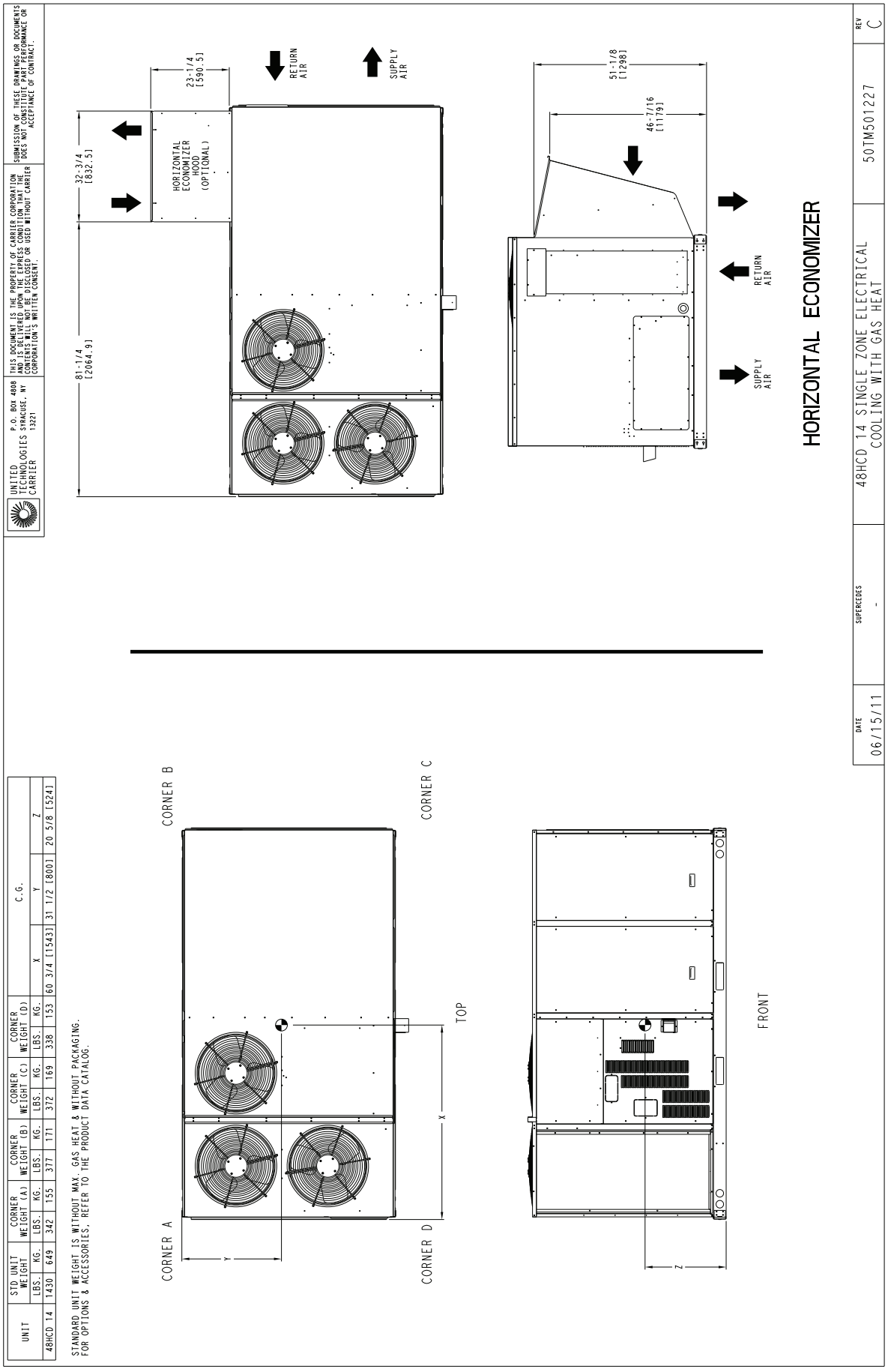
Fig. 12 - Dimensions 48HC 14

CURBS & WEIGHTS DIMENSIONS - 48HC 14 (cont.)



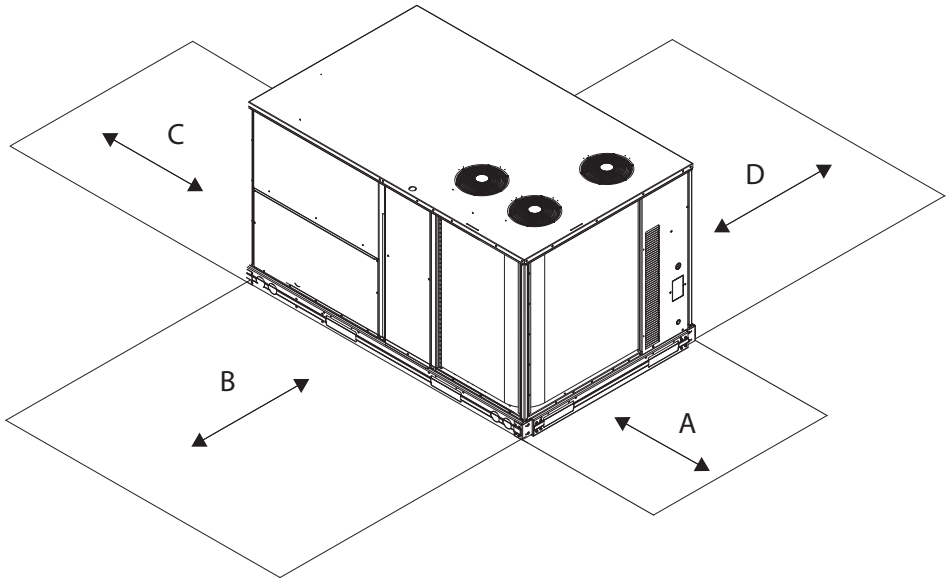
UNIT	STD UNIT WEIGHT		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)		C.G.		
	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	X	Y	Z
48HCD 14	1430	649	342	155	377	171	372	169	338	153	60 3/4 [1543]	31 1/2 [800]	20 5/8 [524]

STANDARD UNIT WEIGHT IS WITHOUT MAX. GAS HEAT & WITHOUT PACKAGING.
FOR OPTIONS & ACCESSORIES, REFER TO THE PRODUCT DATA CATALOG.

C11327

Fig. 13 - Dimensions 48HC 14

CURBS & WEIGHTS DIMENSIONS - 48HC 14 (cont.)



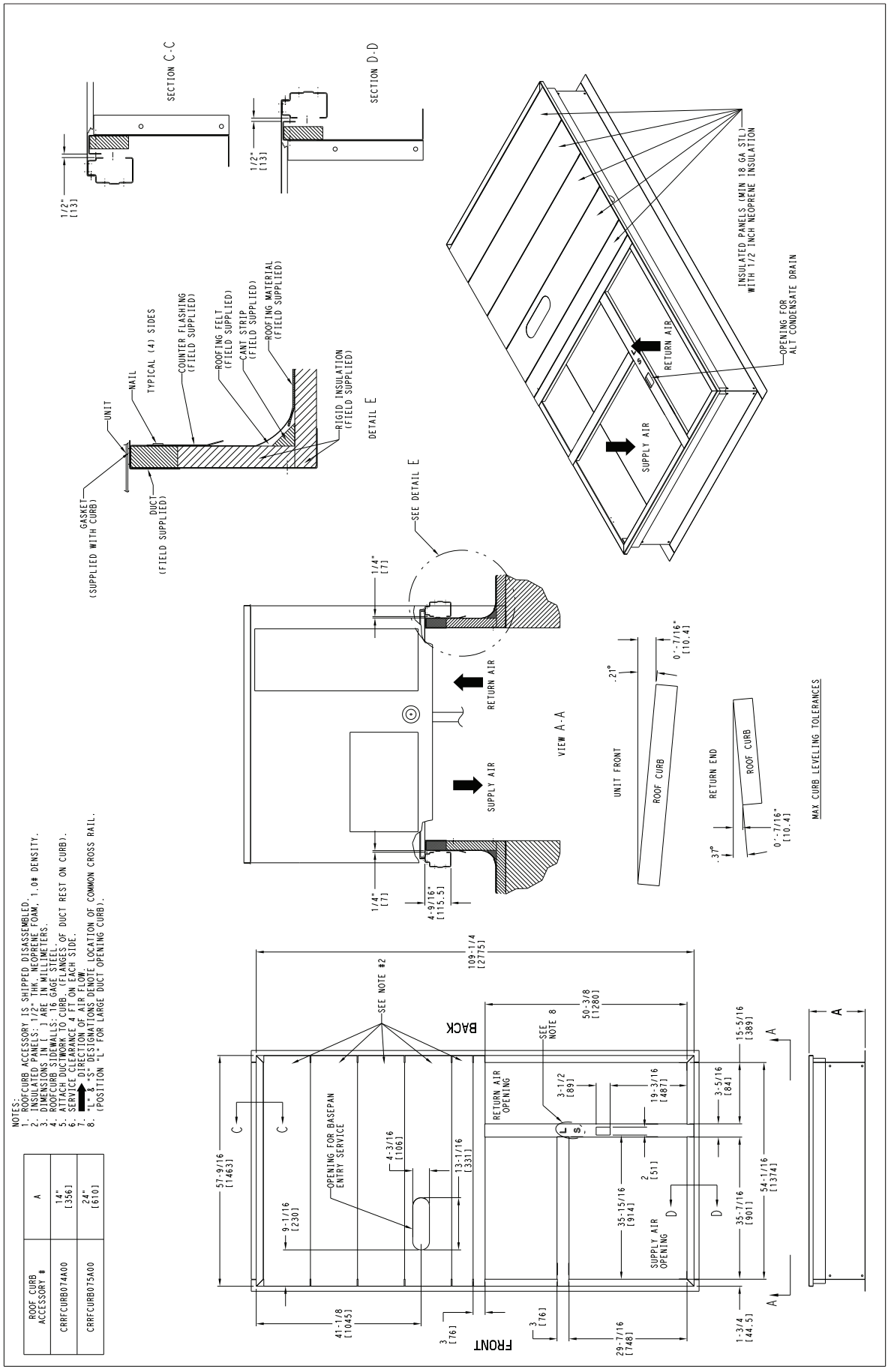
C10578B

Fig. 14 - Service Clearance

LOC	DIMENSION	CONDITION
A	48–in (1219 mm)	Unit disconnect is mounted on panel
	18–in (457 mm)	No disconnect, convenience outlet option
	18–in (457 mm)	Recommended service clearance
	12–in (305 mm)	Minimum clearance
B	42–in (1067 mm)	Surface behind servicer is grounded (e.g., metal, masonry wall)
	36–in (914 mm)	Surface behind servicer is electrically non–conductive (e.g., wood, fiberglass)
	Special	Check for sources of flue products within 10–ft of unit fresh air intake hood
C	36–in (914 mm)	Side condensate drain is used
	18–in (457 mm)	Minimum clearance
D	48–in (1219 mm)	No flue discharge accessory installed or available, surface is combustible material
	42–in (1067 mm)	Surface behind servicer is grounded (e.g., metal, masonry wall, another unit)
	36–in (914 mm)	Surface behind servicer is electrically non–conductive (e.g., wood, fiberglass)
	Special	Check for adjacent units or building fresh air intakes within 10–ft of this unit's flue outlet

NOTE: Unit not designed to have overhead obstruction. Contact Application Engineering for guidance on any application planning overhead obstruction or for vertical clearances.

CURBS & WEIGHTS DIMENSIONS - 48HC 14 (cont.)



ROOF CURB ACCESSORY #	A
CRRFCURB074A00	14" [356]
CRRFCURB075A00	24" [610]

NOTES:
1. ROOFCURB ACCESSORY IS SHIPPED DISASSEMBLED.
2. INSULATED PANELS: 1/2" THK. NEOPRENE FOAM, 1.0# DENSITY.
3. DIMENSIONS IN [ ] ARE IN MILLIMETERS.
4. ROOFCURB SIDEWALLS: 16 GAGE STEEL.
5. ATTACH DUCTWORK TO CURB (FLANGES OF DUCT REST ON CURB).
6. SERVICE CLEARANCE 4 FT ON EACH SIDE.
7. ⇧ DIRECTION OF AIR FLOW.
8. "L" & "S" DESIGNATIONS DENOTE LOCATION OF COMMON CROSS RAIL. (POSITION "L" FOR LARGE DUCT OPENING CURB).

C10772B

Fig. 15 - Roof Curb Details

OPTIONS & ACCESSORY WEIGHTS

OPTION / ACCESSORY	OPTION / ACCESSORY WEIGHTS																	
	04		05		06		07		08		09		11		12		14	
	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
Humidi–MiZer[1]	15	7	23	10	25	11	29	13	38	17	47	21	47	21	47	21	57	26
Power Exhaust – vertical	50	23	50	23	50	23	75	34	75	34	75	34	75	34	75	34	85	39
Power Exhaust – horizontal	30	14	30	14	30	14	30	14	30	14	30	14	30	14	30	14	75	34
EconoMi$er (X, IV or 2)	50	23	50	23	50	23	75	34	75	34	75	34	75	34	75	34	132	60
Two Position damper	39	18	39	18	39	18	58	26	58	26	58	26	58	26	58	26	65	29
Manual Dampers	12	5	12	5	12	5	18	8	18	8	18	8	18	8	18	8	25	11
Medium Gas Heat	12	5	9	4	9	4	15	7	15	7	15	7	18	8	18	8	18	8
High Gas Heat	–	–	17	8	17	8	29	13	29	13	29	13	35	16	35	16	42	19
Hail Guard (louvered)	16	7	16	7	16	7	34	15	34	15	34	15	34	15	34	15	45	20
Cu/Cu Condenser Coil	35	16	35	16	35	16	95	43	95	43	95	43	170	77	170	77	190	86
Cu/Cu Cond. & Evap. Coils	60	27	60	27	90	41	140	64	140	64	195	88	270	122	270	122	280	127
Roof Curb (14–in. curb)	115	52	115	52	115	52	143	65	143	65	143	65	143	65	143	65	180	82
Roof Curb (24–in. curb)	197	89	197	89	197	89	245	111	245	111	245	111	245	111	245	111	255	116
CO_2 sensor	5	2	5	2	5	2	5	2	5	2	5	2	5	2	5	2	5	2
Flue Discharge Deflector	7	3	7	3	7	3	7	3	7	3	7	3	7	3	7	3	–	–
Optional Indoor Motor/Drive	10	5	10	5	10	5	15	7	15	7	15	7	15	7	15	7	45	20
Motor Master Controller	35	16	35	16	35	16	35	16	35	16	35	16	35	16	35	16	40	18
Low Ambient Controller	5	2	5	2	5	2	5	2	5	2	5	2	8	3	10	5	30	14
Return Smoke Detector	5	2	5	2	5	2	5	2	5	2	5	2	5	2	5	2	5	2
Supply Smoke Detector	5	2	5	2	5	2	5	2	5	2	5	2	5	2	5	2	5	2
Fan/Filter Status Switch	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1
Non–Fused Disconnect	15	7	15	7	15	7	15	7	15	7	15	7	15	7	15	7	15	7
HACR Circuit Breaker	15	7	15	7	15	7	15	7	15	7	15	7	15	7	15	7	15	7
Powered Convenience Outlet	35	16	35	16	35	16	35	16	35	16	35	16	35	16	35	16	35	16
Non–Powered C.O.	5	2	5	2	5	2	5	2	5	2	5	2	5	2	5	2	5	2
Enthalpy Sensor	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1
Differential Enthalpy Sensor	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1
SAV System with VFD	–	–	–	–	–	–	–	–	20	9	20	9	20	9	20	9	20	9

NOTE: Where multiple variations are available, the heaviest combination is listed.

– Not Available

[1] For Humidi–MiZer add MotorMaster Controller.

APPLICATION DATA

Min operating ambient temp (cooling):

In mechanical cooling mode, your Carrier rooftop unit can safely operate down to an outdoor ambient temperature of 35°F (-2°C) and 25°F (-4°C), with an accessory winter start kit. It is possible to provide cooling at lower outdoor ambient temperatures by using less outside air, economizers, and/or accessory low ambient kits.

Max operating ambient temp (cooling):

The maximum operating ambient temperature for cooling mode is 125°F (52°C). While cooling operation above 125°F (52°C) may be possible, it could cause either a reduction in performance, reliability, or a protective action by the unit's internal safety devices.

Min mixed air temp (heating):

Using the factory settings, the minimum temperatures for the mixed air (the combined temperature of the warm return air and the cold outdoor air) entering the dimpled, gas heat exchangers are:

Aluminized	Stainless Steel
50°F (10°C) continuous	40°F (4°C) continuous
45°F (7°C) intermittent	35°F (2°C) intermittent

Operating at lower mixed-air temperatures may be possible, if a field-supplied, outdoor air thermostat initiates both heat stages when the temperature is less than the minimum temperatures listed above. Please contact your local Carrier representative for assistance.

Min and max airflow (heating and cooling):

To maintain safe and reliable operation of your rooftop, operate within the heating airflow limits during heating mode and cooling airflow limits during cooling mode. Operating above the max may cause blow-off, undesired airflow noise, or airflow related problems with the rooftop unit. Operating below the min may cause problems with coil freeze-up and unsafe heating operation. Heating and cooling limitations differ when evaluating operating CFM, the minimum value is the HIGHER of the cooling and heating minimum CFM values published in Table 7 and the maximum value is the LOWER of the cooling and heating minimum values published in Table 7.

Heating-to-cooling changeover:

Your unit will automatically change from heating to cooling mode when using a thermostat with an auto-change-over feature.

Airflow:

All units are draw-though in cooling mode and blow-through in heating mode.

Outdoor air application strategies:

Economizers reduce operating expenses and compressor run time by providing a free source of cooling and a means of ventilation to match application changing needs. In fact, they should be considered for most applications. Also, consider the various economizer control methods and their benefits, as well as sensors required to accomplish your application goals. Please contact your local Carrier representative for assistance.

Motor limits, break horsepower (BHP):

Due to internal design of Carrier units, the air path, and specially designed motors, the full horsepower (maximum continuous BHP) band, as listed in Table 8 and 10, can be used with the utmost confidence. There is no need for extra safety factors, as Carrier motors are designed and rigorously tested to use the entire, listed BHP range without either nuisance tripping or premature motor failure.

Propane heating:

Propane has different physical qualities than natural gas. As a result, Propane requires different fuel to air mixture. To optimize the fuel/air mixture for Propane, Carrier sells different burner orifices in an easy to install accessory kit. To select the correct burner orifices or determine the heat capacity for an Propane application, use either the selection software, or the unit's service manual.

High altitude heating:

High altitudes have less oxygen, which affects the fuel/air mixture in heat exchangers. In order to maintain a proper fuel/air mixture, heat exchangers operating in altitudes above 2000 ft (610 m) require different orifices. To select the correct burner orifices or determine the heat capacity for a high altitude application, use either the selection software, or the unit's service manual.

High altitudes have less oxygen, which means heat exchangers need less fuel. The new gas orifices in this field-installed kit make the necessary adjustment for high altitude applications. They restore the optimal fuel to air mixture and maintain healthy combustion on altitudes above 2000 ft (610 m).

NOTE: Typical natural gas heating value ranges from 975 to 1050 Btu/ft^3 at sea level nationally. The heating value goes down approximately 1.7% per every thousand feet elevation. Standard factory orifices can typically be used up to 2000 ft (610m) elevation without any operational issues.

NOTE: For installations in Canada, the input rating should be derated by 10% for altitudes from 2000 ft (610m) to 4500 ft (1372m) above sea level.

APPLICATION DATA (cont.)

Sizing a rooftop

Bigger isn't necessarily better. While an air conditioner needs to have enough capacity to meet the design loads, it doesn't need excess capacity. In fact, excess capacity typically results in very poor part load performance and humidity control.

Using higher design temperatures than ASHRAE recommends for your location, adding "safety factors" to the calculated load, are all signs of oversizing air conditioners. Oversizing the air conditioner leads to poor humidity control, reduced efficiency, higher utility bills, larger indoor temperature swings, excessive noise, and increased wear and tear on the air conditioner.

Rather than oversizing an air conditioner, engineers should "right-size" or even slightly undersize air conditioners. Correctly sizing an air conditioner controls humidity better; promotes efficiency; reduces utility bills; extends equipment life, and maintains even, comfortable temperatures. Please contact your local Carrier representative for assistance.

Low ambient applications

The optional Carrier economizer can adequately cool your space by bringing in fresh, cool outside air. In fact, when so equipped, accessory low-ambient kit may not be necessary. In low ambient conditions, unless the outdoor air is excessively humid or contaminated, economizer-based "free cooling" is the preferred less costly and energy conscious method.

In low ambient applications where outside air might not be desired (such as contaminated or excessively humid outdoor environments), your Carrier rooftop can operate to ambient temperatures down to -20°F (-29°C) using the recommended field installed accessory Motormaster low ambient controller or 0°F (-18°C) with the factory installed low ambient controller option.

SELECTION PROCEDURE (WITH 48HC*A07 EXAMPLE)[1]

I. Determine cooling and heating loads.

Given:

Mixed air dry bulb	80°F (27°C)
Mixed air wet bulb	67°F (19°C)
Ambient dry bulb	95°F (35°C)
TC_{Load}	73.6 MBH
SHC_{Load}	53.3 MBH
Vertical supply air	2100 CFM
Heating load	85.0 MBH
External static pressure	0.67 in. wg
Electrical characteristics	230-3-60

II. Make an initial guess at cooling tons.

Refrig. tons = TC_{Load} / 12 MBH per ton
Refrig. tons = 72.0 / 12 = 6.0 tons
In this case, start by looking at the 48HC**07.

III. Look up the rooftop's TC and SHC.

Table 18 shows that, at the application's supply air CFM, mixed air and ambient temperatures, the 48HC*A07 supplies:
TC = 73.6 MBH[2]
SHC = 53.3 MBH[2]

IV. Calculate the building latent heat load.

$LC_{Load} = TC_{Load} - SHC_{Load}$
LC_{Load} = 72.0 MBH - 54.0 MBH = 18.0 MBH

V. Calculate RTU latent heat capacity.

LC = TC - SHC
LC = 73.6 MBH - 53.3 MBH = 20.3 MBH

VI. Compare RTU capacities to loads.[3]

Compare the rooftop's SHC and LC to the building's sensible and latent heat loads.

VII. Select factory options (FIOP)

Local code requires an economizer for any unit with TC greater than 65.0 MBH.

VIII. Calculate the total static pressure.

External static pressure	0.67 in. wg
Sum of FIOP / Accessory static	+0.13 in. wg
Total Static Pressure	0.80 in. wg

IX. Look up the indoor fan RPM & BHP.

Table 42 shows, at 2100 CFM & ESP= 0.8,
RPM = 712 & BHP = 1.17

X. Convert BHP (Step VIII) into fan motor heat.

Fan motor heat = 2.546* BHP/Motor Eff.[4]
Fan motor heat = 3.7 MBH

XI. Calculate RTU heating capacity.

Building heating load	85.0 MBH
Fan motor heat	-3.7 MBH
Required heating capacity	81.3 MBH

XII. Select a gas heater.

Table 4 shows the heating capacities of the 48HCEA07 = 103.0 MBH. Select the 48HCEA07

XIII. Determine electrical requirements.

MCA/MOCP tables show the MCA and Breaker Size of a 48HC*A07 (without convenience outlet) as:
MCA = 32.0 amps & MOCP = 50.0 amps
Min. disconnect size: FLA = 31.0 & LRA = 148.

Legend

BHP	—	Break horsepower
FLA	—	Full load amps
LC	—	Latent capacity
LRA	—	Lock rotor amp
MBH	—	(1,000) BTUH
MCA	—	Min. circuit ampacity
MOCP	—	Max. over–current protection
RPM	—	Revolutions per minute
RTU	—	Rooftop unit
SHC	—	Sensible heat capacity
TC	—	Total capacity

NOTES:

1. Selection software by Carrier saves time by performing many of the steps above. Contact your Carrier sales representative for assistance.
2. Unit ratings are gross capacities and do not include the effect of evaporator fan motor heat. See Step XI. for determining amount of evaporator fan motor heat to subtract from total and sensible capacities to obtain net cooling and net sensible capacities.
3. Selecting a unit with a SHC slightly lower than the SHC_{Load} is often better than oversizing. Slightly lower SHC's will help control indoor humidity, and prevent temperature swings.
4. Indoor fan motor efficiency is available in Table 82. Use the decimal form in the equation, eg. 80% = .8.

Table 12 – COOLING CAPACITIES 1-STAGE COOLING 3 TONS

48HC*A04				AMBIENT TEMPERATURE															
				85			95			105			115			125			
				EA (dB)			EA (dB)			EA (dB)			EA (dB)			EA (dB)			
				75	80	85	75	80	85	75	80	85	75	80	85	75	80	85	
900 Cfm	EA (wb)	58	TC	32.1	32.1	36.3	30.8	30.8	34.9	29.4	29.4	33.4	28.0	28.0	31.7	26.3	26.3	29.8	
			SHC	27.8	32.1	36.3	26.7	30.8	34.9	25.5	29.4	33.4	24.2	28.0	31.7	22.8	26.3	29.8	
		62	TC	34.0	34.0	34.3	32.3	32.3	33.5	30.6	30.6	32.6	28.7	28.7	31.7	26.6	26.6	30.6	
			SHC	25.0	29.7	34.3	24.2	28.9	33.5	23.4	28.0	32.6	22.5	27.1	31.7	21.5	26.0	30.6	
		67	TC	37.3	37.3	37.3	35.5	35.5	35.5	33.6	33.6	33.6	31.5	31.5	31.5	29.2	29.2	29.2	
			SHC	20.7	25.4	30.0	20.0	24.6	29.3	19.2	23.8	28.4	18.3	22.9	27.6	17.4	22.0	26.6	
		72	TC	40.8	40.8	40.8	38.9	38.9	38.9	36.9	36.9	36.9	34.6	34.6	34.6	32.2	32.2	32.2	
			SHC	16.3	21.0	25.7	15.6	20.3	25.0	14.8	19.5	24.1	13.9	18.6	23.3	13.0	17.7	22.3	
		76	TC	–	43.9	43.9	–	41.8	41.8	–	39.6	39.6	–	37.2	37.2	–	34.6	34.6	
			SHC	–	17.4	22.4	–	16.7	21.7	–	15.9	20.8	–	15.1	19.9	–	14.2	19.0	
1050 Cfm	EA (wb)	58	TC	33.8	33.8	38.4	32.5	32.5	36.8	31.0	31.0	35.1	29.4	29.4	33.3	27.6	27.6	31.3	
			SHC	29.3	33.8	38.4	28.1	32.5	36.8	26.9	31.0	35.1	25.5	29.4	33.3	23.9	27.6	31.3	
		62	TC	35.1	35.1	37.5	33.3	33.3	36.6	31.5	31.5	35.7	29.6	29.6	34.5	27.7	27.7	32.6	
			SHC	26.9	32.2	37.5	26.0	31.3	36.6	25.1	30.4	35.7	24.1	29.3	34.5	22.7	27.7	32.6	
		67	TC	38.4	38.4	38.4	36.5	36.5	36.5	34.5	34.5	34.5	32.3	32.3	32.3	29.9	29.9	29.9	
			SHC	22.0	27.3	32.7	21.2	26.5	31.9	20.3	25.7	31.0	19.4	24.8	30.1	18.5	23.8	29.1	
		72	TC	42.0	42.0	42.0	40.0	40.0	40.0	37.8	37.8	37.8	35.5	35.5	35.5	32.9	32.9	32.9	
			SHC	16.9	22.3	27.6	16.1	21.5	26.9	15.3	20.7	26.0	14.4	19.8	25.1	13.5	18.8	24.2	
		76	TC	–	45.0	45.0	–	42.9	42.9	–	40.6	40.6	–	38.0	38.0	–	35.3	35.3	
			SHC	–	18.1	23.8	–	17.4	23.0	–	16.6	22.2	–	15.7	21.3	–	14.8	20.3	
1200 Cfm	EA (wb)	58	TC	35.3	35.3	40.0	33.9	33.9	38.4	32.3	32.3	36.6	30.6	30.6	34.7	28.7	28.7	32.5	
			SHC	30.6	35.3	40.0	29.4	33.9	38.4	28.0	32.3	36.6	26.5	30.6	34.7	24.9	28.7	32.5	
		62	TC	35.9	35.9	40.5	34.2	34.2	39.4	32.4	32.4	38.1	30.6	30.6	36.1	28.7	28.7	33.9	
			SHC	28.6	34.5	40.5	27.7	33.6	39.4	26.6	32.4	38.1	25.2	30.6	36.1	23.6	28.7	33.9	
		67	TC	39.3	39.3	39.3	37.3	37.3	37.3	35.2	35.2	35.2	32.9	32.9	32.9	30.5	30.5	31.6	
			SHC	23.1	29.1	35.2	22.3	28.3	34.4	21.4	27.5	33.5	20.5	26.6	32.6	19.5	25.6	31.6	
		72	TC	42.9	42.9	42.9	40.8	40.8	40.8	38.5	38.5	38.5	36.1	36.1	36.1	33.4	33.4	33.4	
			SHC	17.3	23.4	29.5	16.6	22.6	28.7	15.7	21.8	27.9	14.8	20.9	27.0	13.9	19.9	26.0	
		76	TC	–	45.9	45.9	–	43.7	43.7	–	41.3	41.3	–	38.7	38.7	–	35.9	35.9	
			SHC	–	18.8	25.1	–	18.0	24.3	–	17.2	23.4	–	16.3	22.5	–	15.4	21.5	
1350 Cfm	EA (wb)	58	TC	36.6	36.6	41.5	35.1	35.1	39.7	33.4	33.4	37.9	31.6	31.6	35.8	29.6	29.6	33.6	
			SHC	31.7	36.6	41.5	30.4	35.1	39.7	28.9	33.4	37.9	27.4	31.6	35.8	25.7	29.6	33.6	
		62	TC	36.7	36.7	43.2	35.1	35.1	41.3	33.4	33.4	39.4	31.6	31.6	37.3	29.6	29.6	34.9	
			SHC	30.2	36.7	43.2	28.8	35.1	41.3	27.5	33.4	39.4	26.0	31.6	37.3	24.4	29.6	34.9	
		67	TC	39.9	39.9	39.9	37.9	37.9	37.9	35.8	35.8	35.9	33.4	33.4	34.9	30.9	30.9	33.9	
			SHC	24.2	30.9	37.6	23.4	30.1	36.8	22.5	29.2	35.9	21.6	28.3	34.9	20.6	27.2	33.9	
		72	TC	43.6	43.6	43.6	41.4	41.4	41.4	39.1	39.1	39.1	36.6	36.6	36.6	33.9	33.9	33.9	
			SHC	17.8	24.5	31.3	17.0	23.7	30.5	16.1	22.9	29.6	15.2	22.0	28.7	14.3	21.0	27.7	
		78	TC	–	46.7	46.7	–	44.4	44.4	–	41.9	41.9	–	39.2	39.2	–	36.3	36.3	
			SHC	–	19.4	26.3	–	18.6	25.5	–	17.8	24.6	–	16.9	23.7	–	15.9	22.7	
1500 Cfm	EA (wb)	58	TC	37.7	37.7	42.7	36.1	36.1	40.9	34.3	34.3	38.9	32.5	32.5	36.8	30.4	30.4	34.4	
			SHC	32.6	37.7	42.7	31.3	36.1	40.9	29.8	34.3	38.9	28.1	32.5	36.8	26.3	30.4	34.4	
		62	TC	37.7	37.7	44.4	36.1	36.1	42.5	34.4	34.4	40.5	32.5	32.5	38.3	30.4	30.4	35.8	
			SHC	31.0	37.7	44.4	29.7	36.1	42.5	28.3	34.4	40.5	26.7	32.5	38.3	25.0	30.4	35.8	
		67	TC	40.5	40.5	40.5	38.4	38.4	39.1	36.2	36.2	38.2	33.8	33.8	37.2	31.2	31.2	36.1	
			SHC	25.2	32.6	40.0	24.4	31.7	39.1	23.5	30.8	38.2	22.5	29.9	37.2	21.5	28.8	36.1	
		72	TC	44.2	44.2	44.2	41.9	41.9	41.9	39.6	39.6	39.6	37.0	37.0	37.0	34.2	34.2	34.2	
			SHC	18.2	25.6	33.0	17.4	24.8	32.2	16.5	23.9	31.3	15.6	23.0	30.4	14.7	22.0	29.4	
		76	TC	–	47.2	47.2	–	44.9	44.9	–	42.3	42.3	–	39.6	39.6	–	36.7	36.7	
			SHC	–	19.9	27.5	–	19.1	26.7	–	18.3	25.8	–	17.4	24.9	–	16.4	23.9	

LEGEND:

– – Do not operate
Cfm – Cubic feet per minute (supply air)
EAT(db) – Entering air temperature (dry bulb)
EAT(wb) – Entering air temperature (wet bulb)
SHC – Sensible heat capacity
TC – Total capacity

48HC04 (3 TONS) – UNIT WITH HUMIDI–MIZER SYSTEM IN SUBCOOLING MODE										
Temp (F) Air Entering Condenser (Edb)		AIR ENTERING EVAPORATOR – CFM								
		900 / 0.01			1200 / 0.02			1500 / 0.04		
		Air Entering Evaporator – Ewb (F)								
		72	67	62	72	67	62	72	67	62
75	TC	44.6	40.3	36.5	47.0	43.0	39.1	48.8	44.3	40.8
	SHC	19.8	24.5	29.3	22.6	29.1	35.3	25.4	33.0	40.4
	kW	2.02	1.97	1.93	1.96	2.00	2.05	2.08	2.02	1.98
85	TC	42.1	38.1	34.4	44.6	40.5	36.9	46.1	41.9	38.6
	SHC	17.5	22.5	27.4	20.4	26.8	33.2	22.9	30.8	38.2
	kW	2.28	2.23	2.19	2.22	2.26	2.31	2.33	2.28	2.24
95	TC	39.6	35.8	32.3	41.9	38.0	34.5	43.2	39.3	36.2
	SHC	15.2	20.3	25.5	17.8	24.5	31.1	20.2	28.4	35.9
	kW	2.56	2.51	2.47	2.50	2.54	2.60	2.62	2.56	2.52
105	TC	36.8	33.2	30.0	38.9	35.3	32.0	40.2	36.5	33.6
	SHC	12.7	18.1	23.4	15.1	22.0	28.8	17.5	25.8	33.6
	kW	2.88	2.83	2.79	2.82	2.86	2.91	2.93	2.88	2.84
115	TC	33.9	30.5	27.5	35.8	32.4	29.4	37.0	33.5	30.9
	SHC	10.1	15.7	21.2	12.3	19.5	26.4	14.5	23.1	30.9
	kW	3.23	3.19	3.15	3.17	3.21	3.26	3.28	3.23	3.19
125	TC	30.8	27.7	24.9	32.5	29.3	26.5	33.5	30.3	27.9
	SHC	7.3	13.1	18.9	9.4	16.7	23.9	11.4	20.3	27.9
	kW	3.62	3.59	3.56	3.57	3.60	3.65	3.66	3.62	3.59

48HC04 (3 TONS) – UNIT WITH HUMIDI–MIZER SYSTEM IN HOT GAS REHEAT MODE										
Temp (F) Air Entering Condenser (Edb)		AIR ENTERING EVAPORATOR - Ewb (F)								
		75 Dry Bulb 62.5 Wet Bulb (50% Relative)			75 Dry Bulb 64 Wet Bulb (56% Relative)			75 Dry Bulb 65.3 Wet Bulb (60% Relative)		
		Air Entering Evaporator - Cfm								
		900	1200	1500	900	1200	1500	900	1200	1500
80	TC	16.46	17.15	17.74	16.66	17.23	17.79	16.85	17.74	18.29
	SHC	5.10	6.60	8.15	3.21	4.33	5.61	1.59	2.75	3.83
	kW	1.94	2.01	2.02	2.04	2.13	2.15	2.12	2.14	2.16
75	TC	16.61	17.52	18.09	17.18	18.09	18.67	17.69	18.61	19.19
	SHC	5.24	6.96	8.48	3.71	5.15	6.45	2.40	3.59	4.69
	kW	1.98	2.00	2.01	1.99	2.01	2.02	2.00	2.02	2.03
70	TC	17.00	18.06	18.63	17.56	18.46	19.40	18.41	19.35	20.10
	SHC	5.62	7.47	9.00	4.08	5.50	7.16	3.09	4.31	5.58
	kW	1.96	1.94	1.96	1.97	2.00	1.94	1.91	1.94	1.92
60	TC	17.63	18.49	19.37	18.17	19.38	19.95	18.66	19.52	20.46
	SHC	6.21	7.89	9.71	4.66	6.39	7.68	3.31	4.45	5.90
	kW	1.93	1.96	1.92	1.95	1.92	1.94	1.97	2.00	1.96
50	TC	17.82	18.59	19.72	18.31	19.73	20.26	18.76	20.21	20.73
	SHC	6.40	7.99	10.05	4.79	6.71	7.97	3.40	5.11	6.16
	kW	1.98	2.03	1.94	2.01	1.94	1.97	2.03	1.96	1.99
40	TC	17.70	19.38	19.85	19.10	20.30	20.34	19.53	20.76	21.26
	SHC	6.30	8.74	10.17	5.54	7.26	8.05	4.13	5.64	6.67
	kW	2.07	1.95	1.99	1.93	1.91	2.02	1.96	1.94	1.97

LEGEND

Edb – Entering Dry–Bulb
Ewb – Entering Wet–Bulb
kW – Compressor Motor Power Input
ldb – Leaving Dry–Bulb
lwb – Leaving Wet–Bulb
SHC – Sensible Heat Capacity (1000 Btuh) Gross
TC – Total Capacity (1000 Btuh) Gross

NOTES:

1. Direct interpolation is permissible. Do not extrapolate.
2. The following formulas may be used:

$$t_{ldb} = t_{edb} - \frac{\text{sensible capacity (Btuh)}}{1.10 \times \text{cfm}}$$

t_{lwb} = Wet–bulb temperature corresponding to enthalpy of air leaving evaporator coil (h_{lwb})

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.5 \times \text{cfm}}$$

Where: h_{ewb} = Enthalpy of air entering evaporator coil

Table 14 – COOLING CAPACITIES 1-STAGE COOLING 4 TONS

48HC*A05				AMBIENT TEMPERATURE													
				85			95			105			115			125		
				EA (dB)			EA (dB)			EA (dB)			EA (dB)			EA (dB)		
				75	80	85	75	80	85	75	80	85	75	80	85	75	80	85
1200 Cfm	EA (wb)	58	TC	43.2	43.2	49.1	41.5	41.5	47.2	39.7	39.7	45.1	37.7	37.7	42.9	35.6	35.6	40.4
			SHC	37.3	43.2	49.1	35.9	41.5	47.2	34.3	39.7	45.1	32.6	37.7	42.9	30.7	35.6	40.4
		62	TC	45.9	45.9	46.0	43.7	43.7	45.0	41.3	41.3	43.8	38.8	38.8	42.6	36.0	36.0	41.2
			SHC	33.5	39.8	46.0	32.5	38.7	45.0	31.3	37.6	43.8	30.1	36.3	42.6	28.8	35.0	41.2
		67	TC	50.5	50.5	50.5	48.0	48.0	48.0	45.4	45.4	45.4	42.6	42.6	42.6	39.6	39.6	39.6
			SHC	27.9	34.1	40.4	26.8	33.1	39.4	25.7	32.0	38.2	24.5	30.8	37.1	23.2	29.5	35.8
		72	TC	55.4	55.4	55.4	52.7	52.7	52.7	49.9	49.9	49.9	46.8	46.8	46.8	43.5	43.5	43.5
			SHC	22.0	28.4	34.7	21.0	27.3	33.7	19.9	26.2	32.5	18.7	25.0	31.3	17.4	23.8	30.1
		76	TC	–	59.7	59.7	–	56.8	56.8	–	53.7	53.7	–	50.4	50.4	–	46.8	46.8
			SHC	–	23.6	30.2	–	22.6	29.2	–	21.5	28.1	–	20.3	26.8	–	19.1	25.5
1400 Cfm	EA (wb)	58	TC	45.6	45.6	51.9	43.8	43.8	49.8	41.9	41.9	47.6	39.7	39.7	45.1	37.3	37.3	42.4
			SHC	39.4	45.6	51.9	37.9	43.8	49.8	36.2	41.9	47.6	34.3	39.7	45.1	32.3	37.3	42.4
		62	TC	47.4	47.4	50.5	45.1	45.1	49.3	42.6	42.6	48.0	40.0	40.0	46.5	37.4	37.4	44.2
			SHC	36.0	43.2	50.5	34.9	42.1	49.3	33.7	40.9	48.0	32.4	39.5	46.5	30.6	37.4	44.2
		67	TC	52.1	52.1	52.1	49.5	49.5	49.5	46.7	46.7	46.7	43.7	43.7	43.7	40.5	40.5	40.5
			SHC	29.5	36.8	44.0	28.4	35.7	42.9	27.3	34.5	41.8	26.0	33.3	40.5	24.7	32.0	39.2
		72	TC	57.1	57.1	57.1	54.3	54.3	54.3	51.2	51.2	51.2	48.0	48.0	48.0	44.5	44.5	44.5
			SHC	22.8	30.1	37.4	21.7	29.0	36.3	20.5	27.8	35.1	19.3	26.6	33.9	18.0	25.3	32.6
		76	TC	–	61.4	61.4	–	58.3	58.3	–	55.1	55.1	–	51.6	51.6	–	47.8	47.8
			SHC	–	24.6	32.2	–	23.5	31.1	–	22.4	29.9	–	21.2	28.7	–	19.9	27.4
1600 Cfm	EA (wb)	58	TC	47.7	47.7	54.2	45.8	45.8	52.0	43.7	43.7	49.6	41.3	41.3	47.0	38.8	38.8	44.1
			SHC	41.2	47.7	54.2	39.5	45.8	52.0	37.7	43.7	49.6	35.7	41.3	47.0	33.5	38.8	44.1
		62	TC	48.7	48.7	54.5	46.3	46.3	53.2	43.7	43.7	51.7	41.4	41.4	48.9	38.8	38.8	45.9
			SHC	38.3	46.4	54.5	37.1	45.2	53.2	35.8	43.7	51.7	33.9	41.4	48.9	31.8	38.8	45.9
		67	TC	53.3	53.3	53.3	50.6	50.6	50.6	47.7	47.7	47.7	44.6	44.6	44.6	41.2	41.2	42.6
			SHC	31.0	39.2	47.5	29.9	38.1	46.3	28.7	37.0	45.2	27.5	35.7	43.9	26.2	34.4	42.6
		72	TC	58.4	58.4	58.4	55.4	55.4	55.4	52.3	52.3	52.3	48.9	48.9	48.9	45.2	45.2	45.2
			SHC	23.4	31.7	39.9	22.3	30.6	38.8	21.1	29.4	37.6	19.9	28.2	36.4	18.6	26.8	35.1
		76	TC	–	62.7	62.7	–	59.5	59.5	–	56.1	56.1	–	52.5	52.5	–	48.6	48.6
			SHC	–	25.5	34.0	–	24.4	32.9	–	23.2	31.7	–	22.0	30.4	–	20.7	29.1
1800 Cfm	EA (wb)	58	TC	49.5	49.5	56.2	47.4	47.4	53.9	45.2	45.2	51.3	42.7	42.7	48.5	40.1	40.1	45.5
			SHC	42.8	49.5	56.2	41.0	47.4	53.9	39.0	45.2	51.3	36.9	42.7	48.5	34.6	40.1	45.5
		62	TC	49.8	49.8	58.1	47.5	47.5	56.1	45.2	45.2	53.4	42.8	42.8	50.5	40.1	40.1	47.4
			SHC	40.4	49.2	58.1	38.8	47.5	56.1	37.0	45.2	53.4	35.0	42.8	50.5	32.8	40.1	47.4
		67	TC	54.3	54.3	54.3	51.5	51.5	51.5	48.5	48.5	48.5	45.3	45.3	47.1	41.8	41.8	45.7
			SHC	32.5	41.7	50.8	31.4	40.5	49.7	30.2	39.3	48.5	28.9	38.0	47.1	27.5	36.6	45.7
		72	TC	59.4	59.4	59.4	56.3	56.3	56.3	53.1	53.1	53.1	49.6	49.6	49.6	45.8	45.8	45.8
			SHC	24.0	33.2	42.4	22.9	32.1	41.3	21.7	30.9	40.1	20.4	29.6	38.8	19.1	28.3	37.5
		76	TC	–	63.8	63.8	–	60.5	60.5	–	57.0	57.0	–	53.2	53.2	–	49.2	49.2
			SHC	–	26.3	35.8	–	25.2	34.6	–	24.0	33.4	–	22.8	32.1	–	21.5	30.8
2000 Cfm	EA (wb)	58	TC	51.0	51.0	58.0	48.8	48.8	55.5	46.5	46.5	52.8	43.9	43.9	49.9	41.1	41.1	46.7
			SHC	44.1	51.0	58.0	42.2	48.8	55.5	40.2	46.5	52.8	37.9	43.9	49.9	35.5	41.1	46.7
		62	TC	51.1	51.1	60.4	48.9	48.9	57.8	46.5	46.5	55.0	44.0	44.0	51.9	41.1	41.1	48.6
			SHC	41.8	51.1	60.4	40.0	48.9	57.8	38.1	46.5	55.0	36.0	44.0	51.9	33.7	41.1	48.6
		67	TC	55.1	55.1	55.1	52.1	52.1	52.9	49.1	49.1	51.6	45.8	45.8	50.2	42.3	42.3	48.7
			SHC	33.9	44.0	54.1	32.7	42.8	52.9	31.5	41.5	51.6	30.2	40.2	50.2	28.8	38.8	48.7
		72	TC	60.3	60.3	60.3	57.1	57.1	57.1	53.7	53.7	53.7	50.1	50.1	50.1	46.3	46.3	46.3
			SHC	24.5	34.7	44.8	23.4	33.5	43.6	22.2	32.3	42.4	21.0	31.1	41.2	19.6	29.7	39.8
		76	TC	–	64.6	64.6	–	61.2	61.2	–	57.6	57.6	–	53.8	53.8	–	49.7	49.7
			SHC	–	27.1	37.5	–	26.0	36.3	–	24.8	35.1	–	23.5	33.8	–	22.2	32.4

LEGEND:

– – Do not operate
Cfm – Cubic feet per minute (supply air)
EAT(db) – Entering air temperature (dry bulb)
EAT(wb) – Entering air temperature (wet bulb)
SHC – Sensible heat capacity
TC – Total capacity

48HC05 (4 TONS) – UNIT WITH HUMIDI–MIZER IN SUBCOOLING MODE										
Temp (F) Air Entering Condenser (Edb)		AIR ENTERING EVAPORATOR – CFM								
		1200 / 0.04			1600 / 0.07			2000 / 0.10		
		Air Entering Evaporator – Ewb (F)								
		72	67	62	72	67	62	72	67	62
75	TC	57.8	52.3	47.2	61.5	55.6	50.6	63.7	57.9	0.0
	SHC	24.2	30.5	36.8	27.9	35.9	44.0	31.2	40.9	0.0
	kW	2.50	2.47	2.44	2.46	2.48	2.51	2.53	2.50	0.00
85	TC	54.1	48.9	44.1	57.1	52.0	47.3	59.6	54.0	49.5
	SHC	20.7	27.3	33.9	23.9	32.6	41.0	27.3	37.3	47.1
	kW	2.81	2.78	2.76	2.78	2.80	2.82	2.84	2.81	2.79
95	TC	50.1	45.3	40.8	53.3	48.2	43.7	55.2	50.1	45.8
	SHC	17.0	24.0	30.9	20.4	29.1	37.7	23.3	33.6	43.6
	kW	3.16	3.14	3.12	3.13	3.15	3.18	3.19	3.16	3.14
105	TC	45.7	41.1	37.2	48.6	43.8	39.8	50.5	45.5	41.8
	SHC	12.9	20.1	27.6	16.0	25.0	34.1	19.0	29.4	39.9
	kW	3.56	3.54	3.52	3.54	3.55	3.58	3.59	3.56	3.55
115	TC	41.1	37.0	33.2	43.5	39.2	35.5	45.4	41.1	37.5
	SHC	8.7	16.4	23.9	11.3	20.7	30.1	14.3	25.4	35.8
	kW	4.02	4.01	4.00	4.00	4.01	4.03	4.04	4.03	4.01
125	TC	36.3	32.5	29.0	38.6	34.7	31.2	40.2	36.1	32.9
	SHC	4.3	12.2	20.1	6.8	16.6	26.2	9.4	20.8	31.5
	kW	4.54	4.53	4.53	4.53	4.54	4.54	4.55	4.54	4.54

48HC05 (4 TONS) – UNIT WITH HUMIDI–MIZER SYSTEM IN HOT GAS REHEAT MODE										
Temp (F) Air Entering Condenser (Edb)		AIR ENTERING EVAPORATOR – Ewb (F)								
		75 Dry Bulb 62.5 Wet Bulb (50% Relative)			75 Dry Bulb 64 Wet Bulb (56% Relative)			75 Dry Bulb 65.3 Wet Bulb (60% Relative)		
		Air Entering Evaporator – Cfm								
		1200	1600	2000	1200	1600	2000	1200	1600	2000
80	TC	18.64	19.95	20.78	19.35	20.71	21.51	20.00	21.37	22.33
	SHC	0.78	4.36	8.24	–1.95	1.01	4.29	–4.33	–1.91	0.99
	kW	2.66	2.68	2.69	2.67	2.69	2.69	2.68	2.69	2.68
75	TC	19.37	21.21	22.15	20.47	21.97	22.92	21.15	22.78	23.65
	SHC	1.48	5.52	9.49	–0.91	2.18	5.57	–3.26	–0.61	2.20
	kW	2.62	2.54	2.54	2.56	2.55	2.55	2.56	2.55	2.56
70	TC	19.92	21.63	22.64	20.77	22.52	23.61	21.70	23.39	24.26
	SHC	2.01	5.94	9.98	–0.61	2.70	6.23	–2.72	–0.02	2.78
	kW	2.60	2.56	2.54	2.58	2.54	2.53	2.54	2.52	2.54
60	TC	20.11	21.27	22.23	20.75	23.15	23.43	22.49	23.78	24.55
	SHC	2.24	5.70	9.70	–0.57	3.35	6.15	–1.95	0.40	3.13
	kW	2.69	2.74	2.73	2.72	2.58	2.68	2.56	2.60	2.63
50	TC	21.56	22.70	23.37	22.18	23.33	24.01	22.75	23.90	25.40
	SHC	3.61	7.03	10.76	0.78	3.57	6.73	–1.67	0.57	3.96
	kW	2.57	2.63	2.66	2.60	2.66	2.69	2.63	2.69	2.62
40	TC	21.67	23.23	24.04	22.76	23.82	25.57	23.28	24.34	26.13
	SHC	3.74	7.56	9.89	1.35	4.06	8.17	–1.15	1.01	4.67
	kW	2.64	2.64	2.69	2.61	2.67	2.58	2.64	2.70	2.61

LEGEND

Edb – Entering Dry–Bulb
Ewb – Entering Wet–Bulb
kW – Compressor Motor Power Input
ldb – Leaving Dry–Bulb
lwb – Leaving Wet–Bulb
SHC – Sensible Heat Capacity (1000 Btuh) Gross
TC – Total Capacity (1000 Btuh) Gross

NOTES:

1. Direct interpolation is permissible. Do not extrapolate.
2. The following formulas may be used:

$$t_{ldb} = t_{edb} - \frac{\text{sensible capacity (Btuh)}}{1.10 \times \text{cfm}}$$

t_{lwb} = Wet–bulb temperature corresponding to enthalpy of air leaving evaporator coil (h_{lwb})

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.5 \times \text{cfm}}$$

Where: h_{ewb} = Enthalpy of air entering evaporator coil

Table 16 – COOLING CAPACITIES 1-STAGE COOLING 5 TONS

48HC*A06				AMBIENT TEMPERATURE															
				85			95			105			115			125			
				EA (dB)			EA (dB)			EA (dB)			EA (dB)			EA (dB)			
				75	80	85	75	80	85	75	80	85	75	80	85	75	80	85	
1500 Cfm	EA (wb)	58	TC	53.4	53.4	60.6	51.3	51.3	58.2	49.0	49.0	55.6	46.5	46.5	52.7	43.7	43.7	49.5	
			SHC	46.3	53.4	60.6	44.5	51.3	58.2	42.5	49.0	55.6	40.3	46.5	52.7	37.9	43.7	49.5	
		62	TC	55.6	55.6	58.2	52.9	52.9	56.9	50.0	50.0	55.5	46.9	46.9	53.9	43.8	43.8	51.6	
			SHC	42.0	50.1	58.2	40.7	48.8	56.9	39.4	47.4	55.5	37.9	45.9	53.9	36.0	43.8	51.6	
		67	TC	60.8	60.8	60.8	57.8	57.8	57.8	54.6	54.6	54.6	51.1	51.1	51.1	47.4	47.4	47.4	
			SHC	34.4	42.6	50.7	33.2	41.3	49.4	31.8	39.9	48.1	30.4	38.5	46.6	28.9	37.0	45.1	
		72	TC	66.6	66.6	66.6	63.2	63.2	63.2	59.7	59.7	59.7	55.9	55.9	55.9	51.8	51.8	51.8	
			SHC	26.7	34.8	43.0	25.4	33.6	41.7	24.1	32.2	40.4	22.6	30.8	38.9	21.1	29.3	37.4	
		76	TC	–	71.4	71.4	–	67.9	67.9	–	64.0	64.0	–	59.9	59.9	–	55.5	55.5	
			SHC	–	28.5	36.7	–	27.2	35.5	–	25.9	34.2	–	24.5	32.7	–	23.0	31.3	
1750 Cfm	EA (wb)	58	TC	56.3	56.3	63.8	54.0	54.0	61.2	51.5	51.5	58.3	48.7	48.7	55.2	45.7	45.7	51.8	
			SHC	48.8	56.3	63.8	46.8	54.0	61.2	44.6	51.5	58.3	42.2	48.7	55.2	39.6	45.7	51.8	
		62	TC	57.3	57.3	64.0	54.5	54.5	62.5	51.6	51.6	60.7	48.8	48.8	57.5	45.8	45.8	53.9	
			SHC	45.3	54.7	64.0	44.0	53.3	62.5	42.4	51.6	60.7	40.1	48.8	57.5	37.6	45.8	53.9	
		67	TC	62.5	62.5	62.5	59.3	59.3	59.3	55.9	55.9	55.9	52.3	52.3	52.3	48.3	48.3	49.7	
			SHC	36.6	46.0	55.4	35.3	44.7	54.1	33.9	43.3	52.7	32.4	41.8	51.3	30.9	40.3	49.7	
		72	TC	68.3	68.3	68.3	64.8	64.8	64.8	61.0	61.0	61.0	57.0	57.0	57.0	52.7	52.7	52.7	
			SHC	27.5	37.0	46.5	26.2	35.7	45.2	24.9	34.4	43.8	23.4	32.9	42.4	21.9	31.4	40.8	
		76	TC	–	73.2	73.2	–	69.4	69.4	–	65.4	65.4	–	61.1	61.1	–	56.5	56.5	
			SHC	–	29.7	39.3	–	28.4	38.0	–	27.1	36.7	–	25.6	35.2	–	24.1	33.7	
2000 Cfm	EA (wb)	58	TC	58.7	58.7	66.5	56.2	56.2	63.7	53.5	53.5	60.6	50.6	50.6	57.3	47.3	47.3	53.7	
			SHC	50.9	58.7	66.5	48.7	56.2	63.7	46.4	53.5	60.6	43.8	50.6	57.3	41.0	47.3	53.7	
		62	TC	58.8	58.8	69.2	56.3	56.3	66.3	53.6	53.6	63.1	50.6	50.6	59.6	47.4	47.4	55.8	
			SHC	48.3	58.8	69.2	46.3	56.3	66.3	44.0	53.6	63.1	41.6	50.6	59.6	39.0	47.4	55.8	
		67	TC	63.8	63.8	63.8	60.4	60.4	60.4	56.9	56.9	57.3	53.1	53.1	55.8	49.1	49.1	54.1	
			SHC	38.6	49.3	60.1	37.3	48.0	58.7	35.9	46.6	57.3	34.4	45.1	55.8	32.8	43.4	54.1	
		72	TC	69.6	69.6	69.6	65.9	65.9	65.9	62.1	62.1	62.1	57.9	57.9	57.9	53.5	53.5	53.5	
			SHC	28.4	39.1	49.9	27.0	37.8	48.6	25.7	36.4	47.2	24.2	35.0	45.7	22.6	33.4	44.2	
		76	TC	–	74.5	74.5	–	70.6	70.6	–	66.5	66.5	–	62.0	62.0	–	–	–	
			SHC	–	30.8	41.8	–	29.5	40.4	–	28.2	39.0	–	26.7	37.6	–	–	–	
2250 Cfm	EA (wb)	58	TC	60.7	60.7	68.8	58.1	58.1	65.8	55.2	55.2	62.6	52.1	52.1	59.1	48.7	48.7	55.2	
			SHC	52.6	60.7	68.8	50.3	58.1	65.8	47.9	55.2	62.6	45.2	52.1	59.1	42.2	48.7	55.2	
		62	TC	60.8	60.8	71.6	58.1	58.1	68.5	55.3	55.3	65.1	52.2	52.2	61.4	48.7	48.7	57.4	
			SHC	50.0	60.8	71.6	47.8	58.1	68.5	45.4	55.3	65.1	42.9	52.2	61.4	40.1	48.7	57.4	
		67	TC	64.7	64.7	64.7	61.3	61.3	63.2	57.7	57.7	61.7	53.8	53.8	60.1	49.7	49.7	58.3	
			SHC	40.6	52.6	64.5	39.2	51.2	63.2	37.8	49.7	61.7	36.2	48.2	60.1	34.6	46.5	58.3	
		72	TC	70.6	70.6	70.6	66.8	66.8	66.8	62.8	62.8	62.8	58.6	58.6	58.6	54.0	54.0	54.0	
			SHC	29.1	41.2	53.3	27.8	39.9	51.9	26.4	38.4	50.5	24.9	37.0	49.0	23.3	35.4	47.4	
		76	TC	–	75.6	75.6	–	71.6	71.6	–	67.3	67.3	–	–	–	–	–	–	
			SHC	–	31.9	44.1	–	30.6	42.8	–	29.2	41.4	–	–	–	–	–	–	
2500 Cfm	EA (wb)	58	TC	62.5	62.5	70.8	59.7	59.7	67.6	56.7	56.7	64.2	53.4	53.4	60.5	49.9	49.9	56.5	
			SHC	54.1	62.5	70.8	51.7	59.7	67.6	49.1	56.7	64.2	46.3	53.4	60.5	43.2	49.9	56.5	
		62	TC	62.5	62.5	73.6	59.7	59.7	70.3	56.7	56.7	66.8	53.5	53.5	63.0	49.9	49.9	58.8	
			SHC	51.4	62.5	73.6	49.1	59.7	70.3	46.6	56.7	66.8	43.9	53.5	63.0	41.0	49.9	58.8	
		67	TC	65.5	65.5	68.9	62.0	62.0	67.4	58.3	58.3	65.9	54.4	54.4	64.2	50.2	50.2	62.2	
			SHC	42.5	55.7	68.9	41.1	54.3	67.4	39.6	52.7	65.9	38.0	51.1	64.2	36.3	49.2	62.2	
		72	TC	71.4	71.4	71.4	67.5	67.5	67.5	63.4	63.4	63.4	59.1	59.1	59.1	54.4	54.4	54.4	
			SHC	29.9	43.2	56.5	28.5	41.8	55.2	27.1	40.4	53.7	25.6	38.9	52.2	24.0	37.3	50.6	
		76	TC	–	76.4	76.4	–	72.3	72.3	–	–	–	–	–	–	–	–	–	
			SHC	–	33.0	46.4	–	31.6	45.1	–	–	–	–	–	–	–	–	–	

LEGEND:

– – Do not operate
Cfm – Cubic feet per minute (supply air)
EAT(db) – Entering air temperature (dry bulb)
EAT(wb) – Entering air temperature (wet bulb)
SHC – Sensible heat capacity
TC – Total capacity

48HC06 (5 TONS) – UNIT WITH HUMIDI–MIZER IN SUBCOOLING MODE										
Temp (F) Air Entering Condenser (Edb)		AIR ENTERING EVAPORATOR – CFM								
		1500 / 0.01			2000 / 0.02			2500 / 0.03		
		Air Entering Evaporator – Ewb (F)								
		72	67	62	72	67	62	72	67	62
75	TC	66.9	60.3	54.8	71.0	64.4	58.6	73.5	66.9	61.6
	SHC	25.8	34.1	43.0	30.5	41.7	52.6	35.0	48.6	61.2
	kW	3.11	3.06	3.03	3.05	3.09	3.16	3.16	3.11	3.07
85	TC	62.4	56.5	51.2	66.3	60.1	54.7	68.2	62.3	57.5
	SHC	21.5	30.6	39.6	26.1	37.6	49.0	29.9	44.2	57.2
	kW	3.47	3.43	3.39	3.42	3.46	3.51	3.52	3.48	3.44
95	TC	57.8	52.3	47.3	61.3	55.6	50.6	63.5	57.7	53.2
	SHC	17.2	26.6	35.9	21.4	33.3	45.1	25.6	39.9	53.2
	kW	3.89	3.85	3.80	3.83	3.88	3.93	3.95	3.90	3.86
105	TC	52.8	47.5	42.9	55.4	50.0	45.3	58.0	52.2	47.9
	SHC	12.5	22.1	31.7	15.8	28.1	40.1	20.4	34.7	47.9
	kW	4.36	4.31	4.26	4.29	4.33	4.38	4.42	4.36	4.32
115	TC	47.4	42.8	38.6	50.1	45.2	41.1	51.8	47.1	43.4
	SHC	7.4	17.7	27.8	11.0	23.6	36.1	14.7	30.0	43.4
	kW	4.88	4.83	4.78	4.81	4.86	4.91	4.93	4.88	4.84
125	TC	41.6	37.5	33.8	44.0	39.7	35.8	45.8	41.3	38.0
	SHC	2.1	12.8	23.3	5.3	18.6	31.2	9.1	24.7	38.0
	kW	5.44	5.39	5.35	5.37	5.42	5.47	5.49	5.44	5.40

48HC06 (5 TONS) – UNIT WITH HUMIDI–MIZER SYSTEM IN HOT GAS REHEAT MODE										
Temp (F) Air Entering Condenser (Edb)		AIR ENTERING EVAPORATOR – Ewb (F)								
		75 Dry Bulb 62.5 Wet Bulb (50% Relative)			75 Dry Bulb 64 Wet Bulb (56% Relative)			75 Dry Bulb 65.3 Wet Bulb (60% Relative)		
		Air Entering Evaporator – Cfm								
		1500	2000	2500	1500	2000	2500	1500	2000	2500
80	TC	25.29	27.61	28.72	26.81	28.62	29.71	27.68	29.53	30.63
	SHC	5.06	10.68	15.86	2.37	6.73	11.22	–0.40	3.30	7.17
	kW	3.23	3.12	3.13	3.12	3.13	3.14	3.12	3.14	3.15
75	TC	26.69	28.45	29.73	27.65	29.64	30.73	28.53	30.55	31.65
	SHC	6.39	11.52	16.85	3.20	7.72	12.20	0.43	4.29	8.16
	kW	3.08	3.11	3.09	3.10	3.09	3.11	3.11	3.10	3.12
70	TC	27.04	29.08	30.15	28.29	30.04	31.09	29.13	30.91	31.97
	SHC	6.76	12.14	17.28	3.82	8.14	12.60	1.02	4.67	8.51
	kW	3.15	3.12	3.15	3.11	3.14	3.17	3.13	3.16	3.18
60	TC	27.99	29.57	31.33	28.86	30.46	32.25	29.63	32.44	33.81
	SHC	7.70	12.66	18.45	4.41	8.60	13.74	1.54	6.16	10.28
	kW	3.17	3.23	3.15	3.21	3.26	3.18	3.23	3.12	3.10
50	TC	30.09	31.66	32.64	30.93	32.57	33.53	31.73	33.38	34.35
	SHC	9.72	14.66	19.72	6.40	10.61	14.99	3.56	7.10	10.85
	kW	3.01	3.07	3.11	3.04	3.10	3.15	3.07	3.14	3.18
40	TC	28.39	30.78	32.67	31.13	32.60	34.40	31.86	33.33	36.07
	SHC	8.17	13.89	19.80	6.63	10.69	15.85	3.72	7.10	12.51
	kW	3.39	3.32	3.24	3.14	3.23	3.15	3.18	3.27	3.08

LEGEND

Edb – Entering Dry–Bulb
Ewb – Entering Wet–Bulb
kW – Compressor Motor Power Input
ldb – Leaving Dry–Bulb
lwb – Leaving Wet–Bulb
SHC – Sensible Heat Capacity (1000 Btuh) Gross
TC – Total Capacity (1000 Btuh) Gross

NOTES:

1. Direct interpolation is permissible. Do not extrapolate.
2. The following formulas may be used:

$$t_{ldb} = t_{edb} - \frac{\text{sensible capacity (Btuh)}}{1.10 \times \text{cfm}}$$

t_{lwb} = Wet–bulb temperature corresponding to enthalpy of air leaving evaporator coil (h_{lwb})

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.5 \times \text{cfm}}$$

Where: h_{ewb} = Enthalpy of air entering evaporator coil

Table 18 – COOLING CAPACITIES 1-STAGE COOLING 6 TONS

48HC*A07				AMBIENT TEMPERATURE															
				85			95			105			115			125			
				EA (dB)			EA (dB)			EA (dB)			EA (dB)			EA (dB)			
				75	80	85	75	80	85	75	80	85	75	80	85	75	80	85	
1800 Cfm	EA (wb)	58	TC	64.1	64.1	72.5	61.8	61.8	69.9	59.2	59.2	67	56.3	56.3	63.7	53.2	53.2	60.2	
			SHC	55.7	64.1	72.5	53.7	61.8	69.9	51.4	59.2	67	48.9	56.3	63.7	46.2	53.2	60.2	
		62	TC	67.9	67.9	68.5	64.9	64.9	67	61.5	61.5	65.3	57.9	57.9	63.5	54	54	61.4	
			SHC	50.2	59.4	68.5	48.8	57.9	67	47.1	56.2	65.3	45.4	54.4	63.5	43.4	52.4	61.4	
		67	TC	74.8	74.8	74.8	71.5	71.5	71.5	67.8	67.8	67.8	63.8	63.8	63.8	59.5	59.5	59.5	
			SHC	41.8	50.9	60.1	40.3	49.5	58.7	38.8	47.9	57.1	37.1	46.2	55.4	35.3	44.4	53.6	
		72	TC	82.2	82.2	82.2	78.7	78.7	78.7	74.7	74.7	74.7	70.4	70.4	70.4	65.6	65.6	65.6	
			SHC	33	42.3	51.6	31.6	40.9	50.2	30.1	39.3	48.6	28.4	37.7	46.9	26.7	35.9	45.1	
		76	TC	–	88.7	88.7	–	84.8	84.8	–	80.6	80.6	–	76	76	–	70.9	70.9	
			SHC	–	35.3	45.2	–	33.9	43.7	–	32.4	42	–	30.7	40.3	–	28.9	38.5	
2100 Cfm	EA (wb)	58	TC	67.6	67.6	76.5	65.1	65.1	73.7	62.3	62.3	70.5	59.3	59.3	67.1	55.9	55.9	63.2	
			SHC	58.7	67.6	76.5	56.6	65.1	73.7	54.1	62.3	70.5	51.5	59.3	67.1	48.5	55.9	63.2	
		62	TC	70.1	70.1	74.9	67	67	73.2	63.5	63.5	71.3	59.7	59.7	69.1	56	56	65.8	
			SHC	53.9	64.4	74.9	52.4	62.8	73.2	50.6	61	71.3	48.7	58.9	69.1	46.2	56	65.8	
		67	TC	77.1	77.1	77.1	73.6	73.6	73.6	69.7	69.7	69.7	65.5	65.5	65.5	60.9	60.9	60.9	
			SHC	44.2	54.8	65.3	42.7	53.3	63.9	41.2	51.7	62.3	39.4	50	60.5	37.6	48.1	58.6	
		72	TC	84.7	84.7	84.7	80.9	80.9	80.9	76.8	76.8	76.8	72.2	72.2	72.2	67.2	67.2	67.2	
			SHC	34.2	44.8	55.5	32.7	43.4	54	31.1	41.8	52.4	29.5	40.1	50.7	27.6	38.2	48.8	
		76	TC	–	91.3	91.3	–	87.2	87.2	–	82.7	82.7	–	77.8	77.8	–	72.5	72.5	
			SHC	–	36.7	47.8	–	35.3	46.3	–	33.7	44.7	–	32	43	–	30.2	41.1	
2400 Cfm	EA (wb)	58	TC	70.6	70.6	79.9	68	68	76.9	65	65	73.5	61.7	61.7	69.8	58.1	58.1	65.8	
			SHC	61.3	70.6	79.9	59	68	76.9	56.4	65	73.5	53.6	61.7	69.8	50.5	58.1	65.8	
		62	TC	72	72	80.6	68.7	68.7	78.7	65.2	65.2	76.6	61.8	61.8	72.6	58.2	58.2	68.4	
			SHC	57.3	69	80.6	55.6	67.2	78.7	53.7	65.2	76.6	50.9	61.8	72.6	48	58.2	68.4	
		67	TC	78.9	78.9	78.9	75.2	75.2	75.2	71.2	71.2	71.2	66.8	66.8	66.8	62	62	63.4	
			SHC	46.5	58.4	70.3	45	56.9	68.8	43.4	55.3	67.2	41.6	53.5	65.4	39.7	51.6	63.4	
		72	TC	86.6	86.6	86.6	82.7	82.7	82.7	78.3	78.3	78.3	73.6	73.6	73.6	68.4	68.4	68.4	
			SHC	35.2	47.2	59.2	33.7	45.7	57.7	32.1	44.1	56	30.4	42.3	54.3	28.5	40.5	52.4	
		76	TC	–	93.3	93.3	–	89	89	–	84.4	84.4	–	79.3	79.3	–	73.7	73.7	
			SHC	–	38	50.4	–	36.6	48.9	–	35	47.3	–	33.3	45.5	–	31.4	43.6	
2700 Cfm	EA (wb)	58	TC	73.2	73.2	82.8	70.4	70.4	79.6	67.3	67.3	76.1	63.8	63.8	72.2	60	60	67.9	
			SHC	63.6	73.2	82.8	61.1	70.4	79.6	58.4	67.3	76.1	55.4	63.8	72.2	52.1	60	67.9	
		62	TC	73.7	73.7	85.5	70.5	70.5	82.8	67.3	67.3	79.1	63.9	63.9	75.1	60.1	60.1	70.6	
			SHC	60.2	72.9	85.5	58.1	70.5	82.8	55.5	67.3	79.1	52.7	63.9	75.1	49.5	60.1	70.6	
		67	TC	80.3	80.3	80.3	76.5	76.5	76.5	72.4	72.4	72.4	67.8	67.8	70	62.9	62.9	67.9	
			SHC	48.7	61.9	75.1	47.1	60.4	73.6	45.5	58.7	71.9	43.7	56.8	70	41.7	54.8	67.9	
		72	TC	88.2	88.2	88.2	84	84	84	79.6	79.6	79.6	74.6	74.6	74.6	69.3	69.3	69.3	
			SHC	36.1	49.4	62.7	34.6	47.9	61.2	33	46.2	59.5	31.2	44.5	57.7	29.3	42.6	55.8	
		76	TC	–	94.9	94.9	–	90.4	90.4	–	85.6	85.6	–	80.4	80.4	–	74.7	74.7	
			SHC	–	39.2	52.9	–	37.7	51.4	–	36.1	49.7	–	34.4	47.9	–	32.5	46	
3000 Cfm	EA (wb)	58	TC	75.4	75.4	85.3	72.5	72.5	82	69.2	69.2	78.3	65.6	65.6	74.2	61.7	61.7	69.8	
			SHC	65.5	75.4	85.3	62.9	72.5	82	60.1	69.2	78.3	57	65.6	74.2	53.5	61.7	69.8	
		62	TC	75.5	75.5	88.7	72.5	72.5	85.3	69.3	69.3	81.4	65.7	65.7	77.2	61.7	61.7	72.5	
			SHC	62.2	75.5	88.7	59.8	72.5	85.3	57.1	69.3	81.4	54.1	65.7	77.2	50.9	61.7	72.5	
		67	TC	81.4	81.4	81.4	77.5	77.5	78.1	73.3	73.3	76.4	68.7	68.7	74.4	63.7	63.7	72.2	
			SHC	50.7	65.2	79.7	49.2	63.7	78.1	47.5	61.9	76.4	45.6	60	74.4	43.6	57.9	72.2	
		72	TC	89.4	89.4	89.4	85.2	85.2	85.2	80.5	80.5	80.5	75.5	75.5	75.5	70.1	70.1	70.1	
			SHC	36.9	51.5	66.1	35.4	50	64.6	33.8	48.3	62.9	32	46.5	61.1	30.1	44.6	59.1	
		76	TC	–	96.1	96.1	–	91.6	91.6	–	86.7	86.7	–	81.3	81.3	–	75.5	75.5	
			SHC	–	40.4	55.3	–	38.9	53.8	–	37.2	52.1	–	35.5	50.3	–	33.6	48.3	

LEGEND:

– – Do not operate
Cfm – Cubic feet per minute (supply air)
EAT(db) – Entering air temperature (dry bulb)
EAT(wb) – Entering air temperature (wet bulb)
SHC – Sensible heat capacity
TC – Total capacity

48HC07 (6 TONS) – UNIT WITH HUMIDI–MIZER SYSTEM IN SUBCOOLING MODE										
Temp (F) Air Entering Condenser (Edb)		AIR ENTERING EVAPORATOR – CFM								
		1800 / 0.06			2400 / 0.08			3000 / 0.10		
		Air Entering Evaporator – Ewb (F)								
		72	67	62	72	67	62	72	67	62
75	TC	85.7	77.4	70.0	91.1	82.6	74.9	94.5	85.7	78.4
	SHC	38.2	47.1	56.1	43.9	55.6	67.1	49.0	63.1	76.4
	kW	4.05	4.01	3.97	4.00	4.04	4.08	4.09	4.05	4.02
85	TC	80.9	73.1	66.0	85.9	77.9	70.6	89.2	80.9	73.9
	SHC	33.5	42.9	52.3	38.8	51.1	63.0	43.9	58.6	72.1
	kW	4.46	4.43	4.39	4.42	4.45	4.48	4.51	4.47	4.43
95	TC	75.7	68.4	61.7	80.6	72.9	66.0	83.6	75.7	69.1
	SHC	28.7	38.5	48.3	33.8	46.4	58.7	38.6	53.7	67.6
	kW	4.92	4.89	4.86	4.88	4.91	4.95	4.96	4.92	4.90
105	TC	70.2	63.3	57.0	74.7	67.5	61.1	77.5	70.1	64.0
	SHC	23.6	33.9	44.1	28.4	41.4	54.2	32.9	48.6	62.7
	kW	5.43	5.40	5.37	5.39	5.42	5.45	5.47	5.43	5.41
115	TC	64.3	57.8	52.0	68.4	61.7	55.7	71.0	64.1	58.3
	SHC	18.2	28.9	39.6	22.7	36.2	49.4	27.0	43.1	58.2
	kW	5.99	5.96	5.93	5.95	5.98	6.01	6.02	5.99	5.97
125	TC	57.9	52.0	46.6	61.6	55.4	49.9	64.0	57.5	52.4
	SHC	12.4	23.8	34.9	16.6	30.7	44.3	20.7	37.3	52.4
	kW	6.59	6.57	6.55	6.56	6.59	6.61	6.62	6.60	6.58

48HC07 (6 TONS) – UNIT WITH HUMIDI–MIZER SYSTEM IN HOT GAS REHEAT MODE										
Temp (F) Air Entering Condenser (Edb)		AIR ENTERING EVAPORATOR – Ewb (F)								
		75 Dry Bulb 62.5 Wet Bulb (50% Relative)			75 Dry Bulb 64 Wet Bulb (56% Relative)			75 Dry Bulb 65.3 Wet Bulb (60% Relative)		
		Air Entering Evaporator – Cfm								
		1800	2400	3000	1800	2400	3000	1800	2400	3000
80	TC	24.17	25.88	26.92	25.35	27.08	28.15	26.39	28.18	29.25
	SHC	–1.44	2.99	7.86	–5.08	–1.55	2.50	–8.25	–5.47	–2.14
	kW	4.15	4.16	4.17	4.17	4.18	4.18	4.18	4.19	4.20
75	TC	26.03	27.87	28.95	27.27	29.11	30.21	28.36	30.24	31.35
	SHC	0.43	4.97	9.86	–3.12	0.49	4.56	–6.19	–3.36	–0.03
	kW	3.96	3.97	3.98	3.98	3.99	4.00	4.00	4.01	4.01
70	TC	26.50	28.76	30.07	27.92	29.99	31.34	29.45	31.67	33.23
	SHC	0.87	5.84	10.97	–2.49	1.35	5.68	–5.06	–1.85	1.94
	kW	3.97	3.93	3.91	3.96	3.95	3.93	3.92	3.89	3.87
60	TC	27.59	29.22	30.17	28.70	30.33	31.30	31.50	31.32	32.91
	SHC	1.91	6.25	11.02	–1.79	1.63	5.57	–3.31	–2.39	1.45
	kW	3.95	3.99	4.01	3.99	4.02	4.04	4.09	4.05	4.01
50	TC	27.77	29.18	30.03	28.75	30.18	32.02	29.63	32.07	32.96
	SHC	2.03	6.18	10.85	–1.80	1.43	6.25	–5.14	–1.69	1.45
	kW	4.03	4.08	4.11	4.07	4.12	4.05	4.12	4.06	4.09
40	TC	29.02	30.38	31.46	29.96	31.32	32.09	30.79	33.49	34.34
	SHC	3.26	7.34	10.07	–0.63	2.54	6.29	–4.01	–0.30	2.80
	kW	3.96	4.02	4.08	4.01	4.08	4.11	4.06	4.00	4.03

LEGEND

Edb – Entering Dry–Bulb
Ewb – Entering Wet–Bulb
kW – Compressor Motor Power Input
ldb – Leaving Dry–Bulb
lwb – Leaving Wet–Bulb
SHC – Sensible Heat Capacity (1000 Btuh) Gross
TC – Total Capacity (1000 Btuh) Gross

NOTES:

1. Direct interpolation is permissible. Do not extrapolate.
2. The following formulas may be used:

$$t_{ldb} = t_{edb} - \frac{\text{sensible capacity (Btuh)}}{1.10 \times \text{cfm}}$$

t_{lwb} = Wet–bulb temperature corresponding to enthalpy of air leaving evaporator coil (h_{lwb})

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.5 \times \text{cfm}}$$

Where: h_{ewb} = Enthalpy of air entering evaporator coil

Table 20 – COOLING CAPACITIES 2-STAGE COOLING 7.5 TONS

48HC*D08				AMBIENT TEMPERATURE													
				85			95			105			115			125		
				EA (dB)			EA (dB)			EA (dB)			EA (dB)			EA (dB)		
				75	80	85	75	80	85	75	80	85	75	80	85	75	80	85
2250 Cfm	EA (wb)	58	TC	81	81	91.8	77.9	77.9	88.4	74.7	74.7	84.6	71.1	71.1	80.6	67.3	67.3	76.3
			SHC	70.2	81	91.8	67.5	77.9	88.4	64.7	74.7	84.6	61.6	71.1	80.6	58.3	67.3	76.3
		62	TC	85.1	85.1	87.2	81.1	81.1	85.3	76.9	76.9	83.2	72.5	72.5	81	67.8	67.8	78.5
			SHC	63.3	75.3	87.2	61.4	73.4	85.3	59.5	71.3	83.2	57.3	69.2	81	55	66.7	78.5
		67	TC	93.3	93.3	93.3	89	89	89	84.3	84.3	84.3	79.4	79.4	79.4	74.1	74.1	74.1
			SHC	52.3	64.2	76.2	50.4	62.4	74.4	48.4	60.4	72.4	46.4	58.3	70.3	44.2	56.2	68.1
		72	TC	102.3	102.3	102.3	97.5	97.5	97.5	92.5	92.5	92.5	87.1	87.1	87.1	81.3	81.3	81.3
			SHC	40.9	53	65	39	51.1	63.1	37.1	49.2	61.2	35.1	47.1	59.1	32.9	44.9	57
		76	TC	–	110	110	–	104.8	104.8	–	99.4	99.4	–	93.5	93.5	–	87.3	87.3
			SHC	–	43.7	56.1	–	41.9	54.2	–	39.9	52.2	–	37.9	50.2	–	35.8	48
2625 Cfm	EA (wb)	58	TC	85.4	85.4	96.9	82.1	82.1	93.1	78.6	78.6	89.1	74.7	74.7	84.7	70.5	70.5	80
			SHC	74	85.4	96.9	71.2	82.1	93.1	68.1	78.6	89.1	64.7	74.7	84.7	61.1	70.5	80
		62	TC	87.8	87.8	95.7	83.7	83.7	93.6	79.3	79.3	91.3	75	75	87.8	70.6	70.6	83.2
			SHC	68.2	82	95.7	66.2	79.9	93.6	64.1	77.7	91.3	61.3	74.6	87.8	58	70.6	83.2
		67	TC	96	96	96	91.4	91.4	91.4	86.5	86.5	86.5	81.3	81.3	81.3	75.8	75.8	75.8
			SHC	55.4	69.3	83.2	53.5	67.4	81.2	51.5	65.4	79.2	49.4	63.2	77.1	47.2	61	74.8
		72	TC	105.2	105.2	105.2	100.1	100.1	100.1	94.8	94.8	94.8	89.1	89.1	89.1	83	83	83
			SHC	42.3	56.2	70.2	40.4	54.3	68.2	38.4	52.3	66.2	36.3	50.2	64.1	34.1	48	61.9
		76	TC	–	112.9	112.9	–	107.5	107.5	–	101.7	101.7	–	95.6	95.6	–	89.1	89.1
			SHC	–	45.5	59.8	–	43.6	57.8	–	41.7	55.8	–	39.6	53.7	–	37.4	51.5
3000 Cfm	EA (wb)	58	TC	89.2	89.2	101.1	85.6	85.6	97.1	81.8	81.8	92.8	77.7	77.7	88.1	73.2	73.2	83
			SHC	77.3	89.2	101.1	74.2	85.6	97.1	70.9	81.8	92.8	67.3	77.7	88.1	63.5	73.2	83
		62	TC	90.1	90.1	103.5	86.1	86.1	100.3	81.9	81.9	96.5	77.8	77.8	91.6	73.3	73.3	86.4
			SHC	72.7	88.1	103.5	70.1	85.2	100.3	67.3	81.9	96.5	63.9	77.8	91.6	60.2	73.3	86.4
		67	TC	98.1	98.1	98.1	93.3	93.3	93.3	88.2	88.2	88.2	82.8	82.8	83.6	77	77	81.3
			SHC	58.4	74.1	89.9	56.5	72.2	87.9	54.4	70.1	85.8	52.3	67.9	83.6	50	65.6	81.3
		72	TC	107.3	107.3	107.3	102.1	102.1	102.1	96.5	96.5	96.5	90.6	90.6	90.6	84.3	84.3	84.3
			SHC	43.5	59.3	75.1	41.6	57.3	73.1	39.5	55.3	71.1	37.4	53.2	69	35.2	50.9	66.7
		76	TC	–	115.2	115.2	–	109.5	109.5	–	103.5	103.5	–	97.2	97.2	–	90.4	90.4
			SHC	–	47.2	63.2	–	45.3	61.3	–	43.3	59.3	–	41.2	57.1	–	38.9	54.8
3375 Cfm	EA (wb)	58	TC	92.4	92.4	104.7	88.6	88.6	100.4	84.6	84.6	95.9	80.2	80.2	90.9	75.5	75.5	85.6
			SHC	80	92.4	104.7	76.8	88.6	100.4	73.3	84.6	95.9	69.5	80.2	90.9	65.4	75.5	85.6
		62	TC	92.5	92.5	109	88.7	88.7	104.5	84.6	84.6	99.7	80.3	80.3	94.6	75.6	75.6	89
			SHC	76	92.5	109	72.9	88.7	104.5	69.6	84.6	99.7	66	80.3	94.6	62.1	75.6	89
		67	TC	99.7	99.7	99.7	94.8	94.8	94.8	89.5	89.5	92.2	84	84	89.9	78	78	87.4
			SHC	61.3	78.8	96.4	59.3	76.8	94.3	57.2	74.7	92.2	55	72.4	89.9	52.6	70	87.4
		72	TC	109	109	109	103.6	103.6	103.6	97.8	97.8	97.8	91.8	91.8	91.8	85.3	85.3	85.3
			SHC	44.6	62.2	79.9	42.7	60.3	77.9	40.6	58.2	75.8	38.5	56.1	73.6	36.2	53.8	71.3
		76	TC	–	116.9	116.9	–	111.1	111.1	–	104.9	104.9	–	98.4	98.4	–	91.5	91.5
			SHC	–	48.8	66.6	–	46.8	64.6	–	44.8	62.6	–	42.7	60.4	–	40.4	58.1
3750 Cfm	EA (wb)	58	TC	95.1	95.1	107.8	91.2	91.2	103.3	86.9	86.9	98.5	82.3	82.3	93.3	77.4	77.4	87.8
			SHC	82.4	95.1	107.8	79	91.2	103.3	75.3	86.9	98.5	71.3	82.3	93.3	67.1	77.4	87.8
		62	TC	95.2	95.2	112.2	91.2	91.2	107.5	87	87	102.5	82.4	82.4	97.1	77.5	77.5	91.3
			SHC	78.2	95.2	112.2	75	91.2	107.5	71.5	87	102.5	67.7	82.4	97.1	63.7	77.5	91.3
		67	TC	101.1	101.1	102.6	96	96	100.5	90.6	90.6	98.3	84.9	84.9	95.9	78.9	78.9	93.2
			SHC	64	83.3	102.6	62	81.2	100.5	59.8	79.1	98.3	57.6	76.7	95.9	55.1	74.2	93.2
		72	TC	110.4	110.4	110.4	104.8	104.8	104.8	98.9	98.9	98.9	92.7	92.7	92.7	86.1	86.1	86.1
			SHC	45.7	65.1	84.5	43.7	63.1	82.5	41.7	61	80.4	39.5	58.8	78.2	37.2	56.5	75.9
		76	TC	–	118.3	118.3	–	112.4	112.4	–	106	106	–	99.4	99.4	–	92.3	92.3
			SHC	–	50.3	69.9	–	48.3	67.9	–	46.2	65.8	–	44.1	63.6	–	41.8	61.3

* See Minimum – Maximum Airflow Ratings in Table 7. Do not operate outside these limits.

LEGEND:

– – Do not operate
Cfm – Cubic feet per minute (supply air)
EAT(db) – Entering air temperature (dry bulb)
EAT(wb) – Entering air temperature (wet bulb)
SHC – Sensible heat capacity
TC – Total capacity

48HC08 (7.5 TONS) – UNIT WITH HUMIDI–MIZER SYSTEM IS SUBCOOLING MODE										
Temp (F) Air Entering Condenser (Edb)		AIR ENTERING EVAPORATOR – CFM								
		2250 / 0.03			3000 / 0.04			3750 / 0.06		
		Air Entering Evaporator – Ewb (F)								
		72	67	62	72	67	62	72	67	62
75	TC	101.9	92.9	84.0	109.6	96.3	89.9	113.6	103.0	94.5
	SHC	43.9	54.6	66.7	50.2	62.7	80.9	56.8	75.8	93.0
	kW	4.60	4.54	4.48	4.65	4.50	4.52	4.68	4.60	4.55
85	TC	96.6	87.3	78.9	102.8	92.9	84.5	106.5	96.7	88.7
	SHC	36.8	49.3	61.9	43.8	59.7	75.9	50.2	69.8	87.4
	kW	5.15	5.09	5.04	5.20	5.13	5.08	5.22	5.16	5.11
95	TC	90.2	81.4	73.5	95.7	86.8	78.8	99.4	90.1	82.7
	SHC	30.8	43.9	56.9	37.2	54.1	70.5	43.6	63.8	81.6
	kW	5.78	5.72	5.67	5.82	5.76	5.71	5.85	5.79	5.74
105	TC	83.5	75.2	67.8	88.8	80.2	72.7	92.0	83.2	76.4
	SHC	24.6	38.2	51.7	30.8	48.0	64.9	36.7	57.4	75.5
	kW	6.50	6.45	6.40	6.54	6.48	6.43	6.57	6.50	6.46
115	TC	76.3	68.7	61.8	81.1	73.2	66.3	84.1	76.0	69.7
	SHC	17.9	32.1	46.2	23.7	41.5	59.0	29.4	50.7	69.0
	kW	7.32	7.28	7.24	7.35	7.31	7.27	7.38	7.32	7.29
125	TC	68.6	61.6	55.4	73.0	65.7	59.3	75.8	68.2	62.6
	SHC	10.9	25.6	40.3	16.2	34.7	52.6	21.7	43.6	62.1
	kW	8.24	8.22	8.20	8.27	8.23	8.21	8.29	8.25	8.22

48HC08 (7.5 TONS) – UNIT WITH HUMIDI–MIZER SYSTEM IN HOT GAS REHEAT MODE										
Temp (F) Air Entering Condenser (Edb)		AIR ENTERING EVAPORATOR – Ewb (F)								
		75 Dry Bulb 62.5 Wet Bulb (50% Relative)			75 Dry Bulb 64 Wet Bulb (56% Relative)			75 Dry Bulb 65.3 Wet Bulb (60% Relative)		
		Air Entering Evaporator – Cfm								
		2250	3000	3750	2250	3000	3750	2250	3000	3750
80	TC	24.06	26.14	27.48	25.50	27.56	28.78	26.59	28.71	29.96
	SHC	–5.55	1.16	8.38	–10.20	–4.69	1.40	–14.39	–9.85	–4.68
	kW	4.43	4.42	4.41	4.40	4.41	4.42	4.42	4.43	4.44
75	TC	24.87	27.26	28.47	26.06	28.53	30.02	27.67	29.77	31.02
	SHC	–4.77	2.23	9.32	–9.65	–3.76	2.59	–13.35	–8.83	–3.66
	kW	4.42	4.36	4.38	4.45	4.38	4.36	4.36	4.39	4.40
70	TC	25.16	27.88	28.56	26.72	29.10	30.26	28.17	30.20	31.83
	SHC	–4.48	2.84	9.45	–9.02	–3.19	2.85	–12.88	–8.40	–2.87
	kW	4.49	4.38	4.48	4.44	4.41	4.44	4.40	4.44	4.40
60	TC	26.43	28.14	29.14	27.49	29.24	30.27	28.50	30.24	32.33
	SHC	–3.25	3.14	10.05	–8.26	–2.99	2.94	–12.54	–8.29	–2.32
	kW	4.48	4.55	4.59	4.53	4.60	4.65	4.58	4.65	4.54
50	TC	27.19	29.55	31.26	28.94	30.59	32.36	30.54	31.54	32.52
	SHC	–2.50	4.50	12.05	–6.87	–1.69	4.92	–10.60	–7.02	–2.07
	kW	4.53	4.51	4.46	4.48	4.57	4.52	4.43	4.63	4.70
40	TC	27.92	31.58	32.82	28.81	32.60	33.54	31.82	33.50	34.44
	SHC	–1.79	6.42	10.84	–6.94	0.23	6.05	–9.36	–5.15	–0.25
	kW	4.57	4.37	4.46	4.65	4.45	4.51	4.40	4.51	4.58

LEGEND

Edb – Entering Dry–Bulb
Ewb – Entering Wet–Bulb
kW – Compressor Motor Power Input
ldb – Leaving Dry–Bulb
lwb – Leaving Wet–Bulb
SHC – Sensible Heat Capacity (1000 Btuh) Gross
TC – Total Capacity (1000 Btuh) Gross

NOTES:

1. Direct interpolation is permissible. Do not extrapolate.
2. The following formulas may be used:

$$t_{ldb} = t_{edb} - \frac{\text{sensible capacity (Btuh)}}{1.10 \times \text{cfm}}$$

t_{lwb} = Wet–bulb temperature corresponding to enthalpy of air leaving evaporator coil (h_{lwb})

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.5 \times \text{cfm}}$$

Where: h_{ewb} = Enthalpy of air entering evaporator coil

Table 22 – COOLING CAPACITIES 2-STAGE COOLING 8.5 TONS

48HC*D09				AMBIENT TEMPERATURE															
				85			95			105			115			125		
				EA (dB)			EA (dB)			EA (dB)			EA (dB)			EA (dB)		
				75	80	85	75	80	85	75	80	85	75	80	85	75	80	85
2550 Cfm	EA (wb)	58	TC	90.5	90.5	102.4	87	87	98.5	83.2	83.2	94.2	79.1	79.1	89.6	74.7	74.7	84.6
			SHC	78.6	90.5	102.4	75.5	87	98.5	72.2	83.2	94.2	68.7	79.1	89.6	64.8	74.7	84.6
		62	TC	94.8	94.8	98.1	90.2	90.2	95.8	85.4	85.4	93.4	80.3	80.3	90.8	74.9	74.9	87.8
			SHC	71.2	84.6	98.1	69.1	82.4	95.8	66.8	80.1	93.4	64.3	77.5	90.8	61.6	74.7	87.8
		67	TC	104	104	104	99	99	99	93.7	93.7	93.7	88	88	88	81.9	81.9	81.9
			SHC	58.7	72.2	85.7	56.6	70	83.5	54.3	67.8	81.3	52	65.4	78.9	49.5	62.9	76.4
		72	TC	114	114	114	108.5	108.5	108.5	102.7	102.7	102.7	96.5	96.5	96.5	89.8	89.8	89.8
			SHC	45.8	59.3	72.9	43.7	57.2	70.8	41.4	55	68.5	39.1	52.7	66.2	36.7	50.2	63.7
		76	TC	–	122.4	122.4	–	116.5	116.5	–	110.3	110.3	–	103.7	103.7	–	96.5	96.5
			SHC	–	48.8	62.8	–	46.7	60.6	–	44.5	58.4	–	42.2	56	–	39.8	53.5
2975 Cfm	EA (wb)	58	TC	95.4	95.4	108	91.6	91.6	103.7	87.5	87.5	99	83.1	83.1	94	78.3	78.3	88.6
			SHC	82.8	95.4	108	79.5	91.6	103.7	75.9	87.5	99	72.1	83.1	94	68	78.3	88.6
		62	TC	97.7	97.7	107.4	93	93	104.9	88.1	88.1	102.1	83.2	83.2	97.9	78.4	78.4	92.2
			SHC	76.7	92	107.4	74.3	89.6	104.9	71.8	86.9	102.1	68.6	83.2	97.9	64.6	78.4	92.2
		67	TC	106.9	106.9	106.9	101.6	101.6	101.6	96	96	96	90.1	90.1	90.1	83.7	83.7	83.9
			SHC	62.3	77.8	93.4	60.1	75.6	91.2	57.8	73.3	88.9	55.4	70.9	86.5	52.8	68.3	83.9
		72	TC	117	117	117	111.2	111.2	111.2	105.1	105.1	105.1	98.6	98.6	98.6	91.7	91.7	91.7
			SHC	47.3	62.9	78.6	45.1	60.8	76.4	42.9	58.5	74.1	40.5	56.1	71.7	38	53.6	69.2
		76	TC	–	125.6	125.6	–	119.4	119.4	–	112.8	112.8	–	105.9	105.9	–	98.4	98.4
			SHC	–	50.8	66.8	–	48.7	64.6	–	46.4	62.3	–	44.1	59.9	–	41.6	57.4
3400 Cfm	EA (wb)	58	TC	99.5	99.5	112.7	95.4	95.4	108	91	91	103	86.3	86.3	97.7	81.2	81.2	91.9
			SHC	86.4	99.5	112.7	82.8	95.4	108	79	91	103	74.9	86.3	97.7	70.5	81.2	91.9
		62	TC	100.3	100.3	115.8	95.6	95.6	112.4	91.2	91.2	107.2	86.4	86.4	101.6	81.3	81.3	95.6
			SHC	81.5	98.6	115.8	78.7	95.6	112.4	75.1	91.2	107.2	71.2	86.4	101.6	67	81.3	95.6
		67	TC	109.1	109.1	109.1	103.6	103.6	103.6	97.8	97.8	97.8	91.6	91.6	93.7	85	85	90.9
			SHC	65.6	83.2	100.8	63.4	81	98.6	61	78.6	96.2	58.6	76.1	93.7	55.9	73.4	90.9
		72	TC	119.3	119.3	119.3	113.3	113.3	113.3	107	107	107	100.3	100.3	100.3	93	93	93
			SHC	48.7	66.4	84.1	46.5	64.2	81.8	44.2	61.8	79.5	41.8	59.4	77.1	39.2	56.9	74.5
		76	TC	–	128	128	–	121.5	121.5	–	114.7	114.7	–	107.5	107.5	–	99.8	99.8
			SHC	–	52.6	70.6	–	50.5	68.4	–	48.2	66.1	–	45.8	63.6	–	43.3	61.1
3825 Cfm	EA (wb)	58	TC	103	103	116.6	98.7	98.7	111.7	94	94	106.4	89	89	100.8	83.6	83.6	94.7
			SHC	89.4	103	116.6	85.6	98.7	111.7	81.6	94	106.4	77.3	89	100.8	72.6	83.6	94.7
		62	TC	103.1	103.1	121.3	98.8	98.8	116.1	94.1	94.1	110.7	89.1	89.1	104.8	83.7	83.7	98.4
			SHC	85	103.1	121.3	81.4	98.8	116.1	77.5	94.1	110.7	73.4	89.1	104.8	69	83.7	98.4
		67	TC	110.9	110.9	110.9	105.2	105.2	105.7	99.2	99.2	103.2	92.9	92.9	100.5	86.1	86.1	97.6
			SHC	68.8	88.4	108	66.5	86.1	105.7	64.1	83.7	103.2	61.6	81.1	100.5	58.9	78.3	97.6
		72	TC	121.2	121.2	121.2	114.9	114.9	114.9	108.4	108.4	108.4	101.5	101.5	101.5	94.1	94.1	94.1
			SHC	50	69.7	89.4	47.7	67.4	87.1	45.4	65.1	84.7	43	62.6	82.3	40.4	60	79.6
		76	TC	–	129.8	129.8	–	123.2	123.2	–	116.2	116.2	–	108.8	108.8	–	100.9	100.9
			SHC	–	54.4	74.3	–	52.2	72.1	–	49.9	69.7	–	47.5	67.3	–	44.9	64.7
4250 Cfm	EA (wb)	58	TC	106	106	119.9	101.4	101.4	114.8	96.6	96.6	109.3	91.3	91.3	103.4	85.7	85.7	97
			SHC	92	106	119.9	88	101.4	114.8	83.8	96.6	109.3	79.3	91.3	103.4	74.4	85.7	97
		62	TC	106.1	106.1	124.7	101.5	101.5	119.4	96.6	96.6	113.6	91.4	91.4	107.5	85.7	85.7	100.8
			SHC	87.4	106.1	124.7	83.6	101.5	119.4	79.6	96.6	113.6	75.3	91.4	107.5	70.6	85.7	100.8
		67	TC	112.3	112.3	114.9	106.5	106.5	112.5	100.4	100.4	109.9	93.9	93.9	107	87.1	87.1	103.8
			SHC	71.8	93.4	114.9	69.5	91	112.5	67	88.5	109.9	64.4	85.7	107	61.6	82.7	103.8
		72	TC	122.6	122.6	122.6	116.2	116.2	116.2	109.5	109.5	109.5	102.5	102.5	102.5	94.9	94.9	94.9
			SHC	51.2	72.8	94.5	48.9	70.5	92.2	46.6	68.2	89.8	44.1	65.7	87.3	41.5	63.1	84.6
		76	TC	–	131.3	131.3	–	124.5	124.5	–	117.4	117.4	–	109.8	109.8	–	101.8	101.8
			SHC	–	56	77.9	–	53.8	75.6	–	51.5	73.3	–	49.1	70.8	–	46.5	68.1

* See Minimum – Maximum Airflow Ratings in Table 7. Do not operate outside these limits.

LEGEND:

– – Do not operate
Cfm – Cubic feet per minute (supply air)
EAT(db) – Entering air temperature (dry bulb)
EAT(wb) – Entering air temperature (wet bulb)
SHC – Sensible heat capacity
TC – Total capacity

48HC09 (8.5 TONS) – UNIT WITH HUMIDI–MIZER SYSTEM IN SUBCOOLING MODE										
Temp (F) Air Entering Condenser (Edb)		AIR ENTERING EVAPORATOR – CFM								
		2550 / 0.04			3400 / 0.06			4250 / 0.08		
		Air Entering Evaporator – Ewb (F)								
		72	67	62	72	67	62	72	67	62
75	TC	114.7	103.9	93.9	104.3	110.6	100.5	122.9	114.6	105.5
	SHC	48.7	62.2	75.7	84.7	74.2	91.4	60.6	85.1	103.9
	kW	5.17	5.09	5.01	5.10	5.14	5.07	5.20	5.18	5.11
85	TC	107.8	97.4	88.0	114.2	102.9	94.2	116.2	107.6	98.7
	SHC	42.3	56.3	70.3	49.7	67.0	85.6	61.1	78.7	97.3
	kW	5.79	5.71	5.63	5.85	5.75	5.69	5.88	5.80	5.72
95	TC	100.5	90.8	82.0	106.6	96.2	87.7	110.2	100.1	92.2
	SHC	35.6	50.2	64.8	42.8	61.0	79.6	49.2	71.9	91.0
	kW	6.50	6.42	6.34	6.56	6.46	6.40	6.59	6.50	6.44
105	TC	92.7	83.8	75.7	98.5	89.0	80.9	102.1	92.4	85.1
	SHC	28.5	43.9	59.1	35.4	54.6	73.4	41.9	64.9	84.2
	kW	7.30	7.23	7.16	7.36	7.28	7.21	7.40	7.31	7.25
115	TC	85.0	76.5	69.0	90.0	81.3	73.8	93.3	84.4	77.7
	SHC	21.5	37.4	53.1	27.7	47.6	66.9	34.0	57.7	77.0
	kW	8.23	8.16	8.10	8.27	8.20	8.14	8.31	8.23	8.18
125	TC	76.5	68.8	61.8	81.1	72.9	66.2	84.1	75.8	69.8
	SHC	13.8	30.4	46.7	19.7	40.0	60.1	25.6	50.0	69.8
	kW	9.25	9.20	9.16	9.28	9.22	9.19	9.31	9.25	9.21

48HC09 (8.5 TONS) – UNIT WITH HUMIDI–MIZER SYSTEM IN HOT GAS REHEAT MODE										
Temp (F) Air Entering Condenser (Edb)		AIR ENTERING EVAPORATOR – Ewb (F)								
		75 Dry Bulb 62.5 Wet Bulb (50% Relative)			75 Dry Bulb 64 Wet Bulb (56% Relative)			75 Dry Bulb 65.3 Wet Bulb (60% Relative)		
		Air Entering Evaporator – Cfm								
		2550	3400	4250	2550	3400	4250	2550	3400	4250
80	TC	27.53	29.56	30.72	28.95	31.03	32.22	30.26	32.33	33.58
	SHC	–3.84	3.82	11.92	–9.25	–2.92	4.09	–13.93	–8.77	–2.82
	kW	5.09	5.11	5.13	5.11	5.14	5.15	5.14	5.15	5.17
75	TC	29.09	31.60	32.81	30.77	33.10	34.33	32.30	34.45	35.73
	SHC	–2.34	5.72	13.84	–7.51	–0.98	6.04	–11.95	–6.78	–0.82
	kW	4.97	4.91	4.93	4.95	4.94	4.95	4.94	4.96	4.97
70	TC	29.58	32.45	33.63	31.48	34.12	35.55	33.12	35.65	37.38
	SHC	–1.88	6.54	14.63	–6.83	0.00	7.20	–11.16	–5.63	0.75
	kW	4.99	4.90	4.92	4.96	4.90	4.89	4.93	4.90	4.86
60	TC	30.71	33.44	34.52	32.90	34.79	35.86	34.07	36.02	37.09
	SHC	–0.78	7.52	15.54	–5.47	0.68	7.57	–10.28	–5.24	0.55
	kW	5.03	4.95	5.00	4.94	5.01	5.05	4.99	5.06	5.09
50	TC	32.63	34.31	35.26	33.81	35.53	36.51	34.90	36.66	37.65
	SHC	1.05	8.38	16.29	–4.60	1.42	8.24	–9.49	–4.59	1.14
	kW	4.92	5.01	5.06	4.99	5.07	5.13	5.05	5.14	5.19
40	TC	31.94	33.26	35.77	32.96	35.70	37.86	35.17	38.01	38.92
	SHC	0.45	7.47	13.75	–5.35	1.63	9.52	–9.20	–3.29	2.36
	kW	5.16	5.27	5.20	5.25	5.19	5.10	5.16	5.11	5.17

LEGEND

Edb – Entering Dry–Bulb
Ewb – Entering Wet–Bulb
kW – Compressor Motor Power Input
ldb – Leaving Dry–Bulb
lwb – Leaving Wet–Bulb
SHC – Sensible Heat Capacity (1000 Btuh) Gross
TC – Total Capacity (1000 Btuh) Gross

NOTES:

1. Direct interpolation is permissible. Do not extrapolate.
2. The following formulas may be used:

$$t_{ldb} = t_{edb} - \frac{\text{sensible capacity (Btuh)}}{1.10 \times \text{cfm}}$$

t_{lwb} = Wet–bulb temperature corresponding to enthalpy of air leaving evaporator coil (h_{lwb})

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.5 \times \text{cfm}}$$

Where: h_{ewb} = Enthalpy of air entering evaporator coil

Table 24 – COOLING CAPACITIES 2-STAGE COOLING 10 TONS (12.0 EER)

48HC*D11				AMBIENT TEMPERATURE															
				85			95			105			115			125			
				EA (dB)			EA (dB)			EA (dB)			EA (dB)			EA (dB)			
				75	80	85	75	80	85	75	80	85	75	80	85	75	80	85	
3000 Cfm	EA (wB)	58	THC	105.6	105.6	118.0	101.7	101.7	114.1	97.5	97.5	109.9	97.5	97.5	109.9	87.8	87.8	100.2	
			SHC	93.3	105.6	118.0	89.4	101.7	114.1	85.1	97.5	109.9	85.1	97.5	109.9	75.4	87.8	100.2	
		62	THC	110.6	110.6	110.6	105.5	105.5	108.0	100.1	100.1	105.5	100.1	100.1	105.5	88.5	88.5	98.5	
			SHC	85.6	98.0	110.3	83.3	95.7	108.0	80.7	93.1	105.5	80.7	93.1	105.5	73.8	86.1	98.5	
		67	THC	120.5	120.5	120.5	115.0	115.0	115.0	109.0	109.0	109.0	109.0	109.0	109.0	95.7	95.7	95.7	
			SHC	70.0	82.3	94.7	67.7	80.1	92.5	65.4	77.8	90.1	65.4	77.8	90.1	60.0	72.4	84.8	
		72	THC	131.4	131.4	131.4	125.4	125.4	125.4	118.8	118.8	118.8	118.8	118.8	118.8	104.2	104.2	104.2	
			SHC	53.9	66.3	78.7	51.8	64.2	76.6	49.5	61.9	74.3	49.5	61.9	74.3	44.3	56.7	69.1	
		76	THC	–	140.8	140.8	–	134.2	134.2	–	127.0	127.0	–	127.0	127.0	–	111.5	111.5	
			SHC	–	52.5	64.9	–	50.8	63.2	–	48.7	61.1	–	48.7	61.1	–	44.0	56.4	
3500 Cfm	EA (wB)	58	THC	110.9	110.9	125.3	106.7	106.7	121.1	102.1	102.1	116.5	102.1	102.1	116.5	91.6	91.6	106.0	
			SHC	96.4	110.9	125.3	92.2	106.7	121.1	87.6	102.1	116.5	87.6	102.1	116.5	77.1	91.6	106.0	
		62	THC	113.6	113.6	120.7	108.4	108.4	118.1	103.1	103.1	114.5	103.1	103.1	114.5	92.0	92.0	105.3	
			SHC	91.9	106.3	120.7	89.3	103.7	118.1	85.7	100.1	114.5	85.7	100.1	114.5	76.4	90.8	105.3	
		67	THC	123.5	123.5	123.5	117.8	117.8	117.8	111.5	111.5	111.5	111.5	111.5	111.5	97.6	97.6	97.6	
			SHC	74.2	88.6	103.1	72.2	86.6	101.0	69.8	84.3	98.7	69.8	84.3	98.7	64.3	78.8	93.2	
		72	THC	134.6	134.6	134.6	128.2	128.2	128.2	121.3	121.3	121.3	121.3	121.3	121.3	106.1	106.1	106.1	
			SHC	55.9	70.3	84.8	53.7	68.1	82.6	51.4	65.8	80.2	51.4	65.8	80.2	46.1	60.6	75.0	
		76	THC	–	144.0	144.0	–	137.1	137.1	–	129.7	129.7	–	129.7	129.7	–	113.5	113.5	
			SHC	–	55.3	69.7	–	53.1	67.6	–	50.9	65.4	–	50.9	65.4	–	46.0	60.5	
4000 Cfm	EA (wB)	58	THC	115.3	115.3	131.8	110.7	110.7	127.2	105.8	105.8	122.3	105.8	105.8	122.3	94.6	94.6	111.1	
			SHC	98.8	115.3	131.8	94.2	110.7	127.2	89.3	105.8	122.3	89.3	105.8	122.3	78.1	94.6	111.1	
		62	THC	116.5	116.5	129.1	112.0	112.0	124.0	106.5	106.5	120.9	106.5	106.5	120.9	94.7	94.7	111.2	
			SHC	96.1	112.6	129.1	91.0	107.5	124.0	87.9	104.4	120.9	87.9	104.4	120.9	78.2	94.7	111.2	
		67	THC	125.9	125.9	125.9	119.8	119.8	119.8	113.3	113.3	113.3	113.3	113.3	113.3	99.1	99.1	101.1	
			SHC	78.2	94.7	111.2	76.0	92.5	109.0	73.5	90.0	106.5	73.5	90.0	106.5	68.1	84.6	101.1	
		72	THC	137.0	137.0	137.0	130.3	130.3	130.3	123.2	123.2	123.2	123.2	123.2	123.2	107.5	107.5	107.5	
			SHC	57.7	74.2	90.7	55.4	71.9	88.4	53.0	69.5	86.0	53.0	69.5	86.0	47.7	64.2	80.7	
		76	THC	–	146.5	146.5	–	139.3	139.3	–	131.6	131.6	–	131.6	131.6	–	115.0	115.0	
			SHC	–	57.4	73.9	–	55.3	71.8	–	53.0	69.5	–	53.0	69.5	–	48.0	64.5	
4500 Cfm	EA (wB)	58	THC	118.9	118.9	137.5	114.1	114.1	132.7	108.9	108.9	127.5	108.9	108.9	127.5	97.2	97.2	115.8	
			SHC	100.3	118.9	137.5	95.5	114.1	132.7	90.3	108.9	127.5	90.3	108.9	127.5	78.6	97.2	115.8	
		62	THC	119.9	119.9	135.3	115.0	115.0	130.8	109.2	109.2	126.7	109.2	109.2	126.7	97.2	97.2	115.8	
			SHC	98.2	116.8	135.3	93.7	112.3	130.8	89.6	108.2	126.7	89.6	108.2	126.7	78.7	97.2	115.8	
		67	THC	127.7	127.7	127.7	121.4	121.4	121.4	114.8	114.8	114.8	114.8	114.8	114.8	100.1	100.1	108.5	
			SHC	82.1	100.7	119.3	79.8	98.3	116.9	77.2	95.8	114.4	77.2	95.8	114.4	71.4	89.9	108.5	
		72	THC	138.9	138.9	138.9	132.1	132.1	132.1	124.7	124.7	124.7	124.7	124.7	124.7	108.6	108.6	108.6	
			SHC	59.3	77.9	96.5	57.2	75.7	94.3	54.8	73.3	91.9	54.8	73.3	91.9	49.3	67.9	86.5	
		76	THC	–	148.4	148.4	–	141.1	141.1	–	133.2	133.2	–	133.2	133.2	–	116.1	116.1	
			SHC	–	59.4	78.0	–	57.2	75.8	–	54.9	73.5	–	54.9	73.5	–	49.9	68.4	
5000 Cfm	EA (wB)	58	THC	122.0	122.0	142.6	117.0	117.0	137.6	111.6	111.6	132.2	111.6	111.6	132.2	99.3	99.3	119.9	
			SHC	101.4	122.0	142.6	96.4	117.0	137.6	90.9	111.6	132.2	90.9	111.6	132.2	78.7	99.3	119.9	
		62	THC	122.7	122.7	141.4	117.1	117.1	137.7	111.6	111.6	132.2	111.6	111.6	132.2	99.4	99.4	120.0	
			SHC	100.2	120.8	141.4	96.4	117.1	137.7	91.0	111.6	132.2	91.0	111.6	132.2	78.8	99.4	120.0	
		67	THC	129.2	129.2	129.2	122.8	122.8	124.6	115.9	115.9	121.9	115.9	115.9	121.9	101.1	101.1	115.7	
			SHC	85.7	106.4	127.0	83.3	104.0	124.6	80.7	101.3	121.9	80.7	101.3	121.9	74.4	95.1	115.7	
		72	THC	140.5	140.5	140.5	133.4	133.4	133.4	125.9	125.9	125.9	125.9	125.9	125.9	109.6	109.6	109.6	
			SHC	61.0	81.6	102.3	58.7	79.3	99.9	56.3	76.9	97.5	56.3	76.9	97.5	50.9	71.5	92.1	
		76	THC	–	150.1	150.1	–	142.6	142.6	–	134.5	134.5	–	134.5	134.5	–	117.1	117.1	
			SHC	–	61.4	82.0	–	59.2	79.8	–	56.8	77.4	–	56.8	77.4	–	51.7	72.3	

* See Minimum – Maximum Airflow Ratings in Table 7. Do not operate outside these limits.

LEGEND:

– – Do not operate
Cfm – Cubic feet per minute (supply air)
EAT(db) – Entering air temperature (dry bulb)
EAT(wb) – Entering air temperature (wet bulb)
SHC – Sensible heat capacity
TC – Total capacity

Humidi – MiZer currently not available on this size model.

NOTES:

1. Direct interpolation is permissible. Do not extrapolate.
2. The following formulas may be used:

$$t_{ldb} = t_{edb} - \frac{\text{sensible capacity (Btuh)}}{1.10 \times \text{cfm}}$$

t_{lwb} = Wet – bulb temperature corresponding to enthalpy of air leaving evaporator coil (h_{lwb})

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.5 \times \text{cfm}}$$

Where: h_{ewb} = Enthalpy of air entering evaporator coil

Table 25 – COOLING CAPACITIES 2-STAGE COOLING 10 TONS (11.5 EER)

48HC*D12				AMBIENT TEMPERATURE																
				85			95			105			115			125				
				EA (dB)			EA (dB)			EA (dB)			EA (dB)			EA (dB)				
				75	80	85	75	80	85	75	80	85	75	80	85	75	80	85		
3000 Cfm	EA (wb)	58	TC	104.3	104.3	118.5	99.5	99.5	113	93.4	93.4	106.1	86.7	86.7	98.6	79.7	79.7	90.6		
			SHC	90.2	104.3	118.5	86	99.5	113	80.6	93.4	106.1	74.9	86.7	98.6	68.8	79.7	90.6		
		62	TC	109.7	109.7	112.4	103.6	103.6	109.5	95.9	95.9	105.9	87.6	87.6	101.2	79.8	79.8	94.4		
			SHC	80.8	96.6	112.4	78	93.8	109.5	74.5	90.2	105.9	70.3	85.7	101.2	65.2	79.8	94.4		
		67	TC	121.5	121.5	121.5	115.4	115.4	115.4	107.8	107.8	107.8	98.7	98.7	98.7	89.1	89.1	89.1		
			SHC	65.2	81	96.9	62.7	78.6	94.5	59.7	75.6	91.5	56.2	72	87.9	52.5	68.3	84.2		
		72	TC	133	133	133	127.1	127.1	127.1	120.5	120.5	120.5	112	112	112	102.1	102.1	102.1		
			SHC	48.7	64.5	80.4	46.5	62.4	78.3	44.1	60	75.9	41.2	57.1	73	37.8	53.7	69.6		
		76	TC	–	140.9	140.9	–	135.1	135.1	–	128.4	128.4	–	121.3	121.3	–	112.5	112.5		
			SHC	–	50.6	67.1	–	48.7	65.2	–	46.6	63.1	–	44.3	60.7	–	41.4	57.7		
3500 Cfm	EA (wb)	58	TC	109.9	109.9	124.9	104.9	104.9	119.3	98.7	98.7	112.2	91.6	91.6	104.2	84.2	84.2	95.8		
			SHC	94.9	109.9	124.9	90.6	104.9	119.3	85.2	98.7	112.2	79	91.6	104.2	72.6	84.2	95.8		
		62	TC	112.8	112.8	123.1	106.7	106.7	120	99.5	99.5	115.3	91.7	91.7	108.5	84.3	84.3	99.8		
			SHC	86.8	104.9	123.1	83.9	102	120	80	97.6	115.3	74.9	91.7	108.5	68.8	84.3	99.8		
		67	TC	124.2	124.2	124.2	118	118	118	110.3	110.3	110.3	101	101	101	91	91	92.5		
			SHC	68.4	86.7	104.9	66.1	84.3	102.6	63.2	81.5	99.8	59.6	78	96.3	55.9	74.2	92.5		
		72	TC	135.2	135.2	135.2	129.1	129.1	129.1	122.4	122.4	122.4	114.2	114.2	114.2	104.2	104.2	104.2		
			SHC	49.2	67.3	85.4	47.1	65.3	83.4	44.8	63	81.2	42	60.4	78.7	38.7	57.1	75.5		
		76	TC	–	142.4	142.4	–	136.5	136.5	–	129.6	129.6	–	122.4	122.4	–	114	114		
			SHC	–	51.7	70.9	–	49.7	68.7	–	47.5	66.3	–	45.2	63.8	–	42.6	61.2		
4000 Cfm	EA (wb)	58	TC	114.3	114.3	130	109.2	109.2	124.2	102.9	102.9	117	95.4	95.4	108.7	87.7	87.7	99.9		
			SHC	98.6	114.3	130	94.2	109.2	124.2	88.7	102.9	117	82.2	95.4	108.7	75.5	87.7	99.9		
		62	TC	115.3	115.3	132.4	109.6	109.6	128.3	102.9	102.9	121.9	95.5	95.5	113.2	87.8	87.8	104.1		
			SHC	91.9	112.2	132.4	88.7	108.5	128.3	84	102.9	121.9	77.9	95.5	113.2	71.5	87.8	104.1		
		67	TC	125.8	125.8	125.8	119.5	119.5	119.5	111.9	111.9	111.9	102.4	102.4	104.2	92.2	92.2	100.4		
			SHC	71.3	91.8	112.3	69	89.6	110.2	66.2	86.9	107.6	62.8	83.5	104.2	59.1	79.7	100.4		
		72	TC	136.3	136.3	136.3	130.2	130.2	130.2	123.4	123.4	123.4	115.4	115.4	115.4	105.3	105.3	105.3		
			SHC	49.5	69.7	89.8	47.4	67.7	87.9	45.1	65.5	85.9	42.5	63.1	83.7	39.3	60.1	80.9		
		76	TC	–	143.1	143.1	–	137.1	137.1	–	130.1	130.1	–	122.6	122.6	–	114.5	114.5		
			SHC	–	52.2	73.2	–	50.2	71.1	–	48	68.7	–	45.7	66.4	–	43.3	64.1		
4500 Cfm	EA (wb)	58	TC	117.5	117.5	133.8	112.4	112.4	127.9	106	106	120.7	98.4	98.4	112.1	90.3	90.3	103		
			SHC	101.3	117.5	133.8	96.8	112.4	127.9	91.2	106	120.7	84.6	98.4	112.1	77.7	90.3	103		
		62	TC	117.6	117.6	139.4	112.5	112.5	133.3	106.1	106.1	125.8	98.5	98.5	116.8	90.4	90.4	107.4		
			SHC	95.9	117.6	139.4	91.6	112.5	133.3	86.4	106.1	125.8	80.1	98.5	116.8	73.5	90.4	107.4		
		67	TC	126.6	126.6	126.6	120.2	120.2	120.2	112.8	112.8	114.8	103.2	103.2	111.6	93	93	107.6		
			SHC	73.7	96.4	119.2	71.5	94.3	117.2	68.9	91.8	114.8	65.6	88.6	111.6	61.8	84.7	107.6		
		72	TC	136.7	136.7	136.7	130.5	130.5	130.5	123.6	123.6	123.6	115.7	115.7	115.7	105.7	105.7	105.7		
			SHC	49.4	71.6	93.7	47.4	69.7	91.9	45.1	67.5	89.9	42.7	65.4	88.2	39.5	62.6	85.8		
		76	TC	–	143.1	143.1	–	137	137	–	129.9	129.9	–	122.4	122.4	–	114.3	114.3		
			SHC	–	52.4	75.1	–	50.5	73.1	–	48.2	70.8	–	46	68.5	–	43.7	66.5		
5000 Cfm	EA (wb)	58	TC	119.9	119.9	136.7	114.7	114.7	130.7	108.4	108.4	123.6	100.6	100.6	114.8	92.3	92.3	105.4		
			SHC	103.2	119.9	136.7	98.6	114.7	130.7	93.2	108.4	123.6	86.4	100.6	114.8	79.2	92.3	105.4		
		62	TC	120	120	142.4	114.7	114.7	136.2	108.5	108.5	128.8	100.7	100.7	119.7	92.4	92.4	109.9		
			SHC	97.6	120	142.4	93.3	114.7	136.2	88.1	108.5	128.8	81.7	100.7	119.7	74.9	92.4	109.9		
		67	TC	126.8	126.8	126.8	120.4	120.4	123.6	113.2	113.2	121.3	103.8	103.8	118.4	93.6	93.6	114		
			SHC	75.7	100.6	125.4	73.6	98.6	123.6	71.2	96.2	121.3	68	93.2	118.4	64.2	89.1	114		
		72	TC	136.5	136.5	136.5	130.2	130.2	130.2	123.2	123.2	123.2	115.5	115.5	115.5	105.6	105.6	105.6		
			SHC	49.1	73.1	97	47.1	71.3	95.4	44.9	69.2	93.5	42.5	67.3	92	39.5	64.9	90.2		
		76	TC	–	142.7	142.7	–	136.5	136.5	–	129.4	129.4	–	121.6	121.6	–	113.6	113.6		
			SHC	–	52.2	76.7	–	50.4	74.7	–	48.2	72.4	–	45.9	70.1	–	43.7	68.3		

* See Minimum – Maximum Airflow Ratings in Table 7. Do not operate outside these limits.

LEGEND:

– – Do not operate
Cfm – Cubic feet per minute (supply air)
EAT(db) – Entering air temperature (dry bulb)
EAT(wb) – Entering air temperature (wet bulb)
SHC – Sensible heat capacity
TC – Total capacity

48HC12 (10 TONS) – UNIT WITH HUMIDI–MIZER SYSTEM IN SUBCOOLING MODE										
Temp (F) Air Entering Condenser (Edb)		AIR ENTERING EVAPORATOR – CFM								
		3000/0.04			4000/0.06			5000/0.07		
		Air Entering Evaporator – Ewb (F)								
		72	67	62	72	67	62	72	67	62
75	TC	135.8	123.1	111.6	144.0	130.9	119.2	148.7	135.7	122.9
	SHC	56.7	72.8	88.9	66.1	86.9	107.4	74.4	100.1	121.0
	kW	6.42	6.26	6.13	6.54	6.37	6.22	6.61	6.43	6.26
85	TC	127.3	115.4	104.5	134.9	120.1	111.7	139.3	126.9	116.8
	SHC	48.6	65.4	82.1	57.5	76.6	100.2	65.4	91.8	115.0
	kW	7.20	7.04	6.90	7.31	7.11	7.00	7.38	7.21	7.07
95	TC	118.1	106.5	96.9	125.2	113.6	103.6	129.5	117.8	108.4
	SHC	39.9	57.0	74.9	48.3	70.5	92.4	56.2	83.1	106.8
	kW	8.06	7.89	7.76	8.17	8.00	7.86	8.24	8.07	7.93
105	TC	107.3	97.8	87.8	114.5	103.8	94.5	117.6	107.3	99.0
	SHC	29.6	48.7	66.2	38.1	61.3	83.8	44.9	73.1	97.5
	kW	8.99	8.85	8.72	9.11	8.95	8.82	9.16	9.01	8.88
115	TC	95.7	86.3	78.2	102.1	91.3	83.4	105.7	95.8	88.2
	SHC	18.6	37.8	57.1	26.4	49.4	73.2	33.6	62.3	87.0
	kW	10.03	9.89	9.79	10.14	9.97	9.86	10.20	10.05	9.94
125	TC	83.7	75.2	67.7	87.5	80.1	72.5	92.1	83.1	75.2
	SHC	7.3	27.4	47.2	12.5	38.8	62.9	20.6	50.3	74.2
	kW	11.17	11.06	10.98	11.23	11.13	11.03	11.30	11.17	11.07

48HC12 (10 TONS) – UNIT WITH HUMIDI–MIZER SYSTEM IN HOT GAS REHEAT MODE										
Temp (F) Air Entering Condenser (Edb)		AIR ENTERING EVAPORATOR – Ewb (F)								
		75 Dry Bulb 62.5 Wet Bulb (50% Relative)			75 Dry Bulb 64 Wet Bulb (56% Relative)			75 Dry Bulb 65.3 Wet Bulb (60% Relative)		
		Air Entering Evaporator – Cfm								
		3000	4000	5000	3000	4000	5000	3000	4000	5000
80	TC	45.83	49.08	50.90	47.62	50.84	52.72	49.16	52.45	54.33
	SHC	4.82	14.45	24.36	–1.60	6.39	14.99	–7.27	–0.59	6.73
	kW	7.33	7.46	7.55	7.40	7.53	7.62	7.46	7.60	7.68
75	TC	48.52	51.89	53.81	50.31	53.74	55.73	51.92	55.47	57.43
	SHC	7.37	17.08	27.08	0.95	9.11	17.81	–4.65	2.25	9.63
	kW	6.93	7.07	7.15	7.00	7.14	7.23	7.06	7.21	7.29
70	TC	51.15	54.66	56.69	52.96	56.60	58.66	54.65	58.34	60.43
	SHC	9.87	19.70	29.80	3.47	11.82	20.57	–2.05	4.98	12.45
	kW	6.56	6.69	6.78	6.62	6.76	6.85	6.68	6.83	6.91
60	TC	52.89	56.41	59.04	55.63	59.10	62.68	58.00	62.31	64.50
	SHC	11.58	21.44	32.07	6.06	14.26	24.41	1.21	8.78	16.36
	kW	6.60	6.80	6.72	6.53	6.71	6.51	6.46	6.48	6.58
50	TC	55.13	59.53	62.75	58.04	62.61	64.69	59.64	64.34	66.41
	SHC	13.77	24.43	35.63	8.41	17.62	26.38	2.80	10.77	18.23
	kW	6.57	6.53	6.44	6.43	6.41	6.54	6.52	6.50	6.64
40	TC	57.08	60.11	64.35	58.75	63.63	65.58	60.16	65.23	69.04
	SHC	15.67	25.05	33.55	9.13	18.64	27.28	3.34	11.67	20.76
	kW	6.51	6.77	6.62	6.64	6.54	6.70	6.75	6.65	6.50

LEGEND

Edb – Entering Dry–Bulb
Ewb – Entering Wet–Bulb
kW – Compressor Motor Power Input
ldb – Leaving Dry–Bulb
lwb – Leaving Wet–Bulb
SHC – Sensible Heat Capacity (1000 Btuh) Gross
TC – Total Capacity (1000 Btuh) Gross

NOTES:

1. Direct interpolation is permissible. Do not extrapolate.
2. The following formulas may be used:

$$t_{ldb} = t_{edb} - \frac{\text{sensible capacity (Btuh)}}{1.10 \times \text{cfm}}$$

t_{lwb} = Wet–bulb temperature corresponding to enthalpy of air leaving evaporator coil (h_{lwb})

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.5 \times \text{cfm}}$$

Where: h_{ewb} = Enthalpy of air entering evaporator coil

Table 27 – COOLING CAPACITIES 2-STAGE COOLING 12.5 TONS

48HC*D14				AMBIENT TEMPERATURE															
				85			95			105			115			125			
				EA (dB)			EA (dB)			EA (dB)			EA (dB)			EA (dB)			
				75	80	85	75	80	85	75	80	85	75	80	85	75	80	85	
3750 Cfm	EA (wb)	58	TC	131.9	131.9	149.8	127.0	127.0	144.1	121.5	121.5	137.9	115.4	115.4	131.0	108.7	108.7	123.4	
			SHC	114.1	131.9	149.8	109.8	127.0	144.1	105.0	121.5	137.9	99.8	115.4	131.0	94.0	108.7	123.4	
		62	TC	138.0	138.0	143.4	131.7	131.7	140.4	124.7	124.7	136.9	117.1	117.1	133.1	109.4	109.4	127.4	
			SHC	103.4	123.4	143.4	100.4	120.4	140.4	97.1	117.0	136.9	93.4	113.2	133.1	88.8	108.1	127.4	
		67	TC	151.5	151.5	151.5	144.5	144.5	144.5	136.9	136.9	136.9	128.5	128.5	128.5	119.4	119.4	119.4	
			SHC	85.1	105.2	125.3	82.1	102.2	122.3	78.9	99.0	119.0	75.4	95.5	115.5	71.7	91.8	111.8	
		72	TC	166.1	166.1	166.1	158.5	158.5	158.5	150.2	150.2	150.2	141.1	141.1	141.1	131.3	131.3	131.3	
			SHC	66.2	86.5	106.7	63.3	83.6	103.8	60.2	80.4	100.6	56.8	76.9	97.1	53.1	73.3	93.4	
		76	TC	–	178.6	178.6	–	170.5	170.5	–	161.6	161.6	–	151.8	151.8	–	141.3	141.3	
			SHC	–	71.1	91.8	–	68.3	88.9	–	65.2	85.8	–	61.8	82.5	–	58.2	78.7	
4375 Cfm	EA (wb)	58	TC	139.2	139.2	158.0	133.8	133.8	151.9	127.9	127.9	145.2	121.3	121.3	137.7	114.1	114.1	129.5	
			SHC	120.4	139.2	158.0	115.7	133.8	151.9	110.6	127.9	145.2	104.9	121.3	137.7	98.7	114.1	129.5	
		62	TC	142.4	142.4	157.6	135.8	135.8	154.1	128.9	128.9	149.2	121.7	121.7	142.9	114.2	114.2	134.8	
			SHC	111.5	134.5	157.6	108.2	131.2	154.1	104.2	126.7	149.2	99.4	121.1	142.9	93.6	114.2	134.8	
		67	TC	155.8	155.8	155.8	148.5	148.5	148.5	140.4	140.4	140.4	131.6	131.6	131.6	122.1	122.1	123.0	
			SHC	90.3	113.6	136.8	87.3	110.5	133.8	84.0	107.2	130.5	80.4	103.6	126.8	76.6	99.8	123.0	
		72	TC	170.6	170.6	170.6	162.7	162.7	162.7	154.0	154.0	154.0	144.4	144.4	144.4	134.1	134.1	134.1	
			SHC	68.5	91.9	115.3	65.5	88.9	112.3	62.3	85.6	109.0	58.8	82.1	105.4	55.1	78.4	101.7	
		76	TC	–	183.3	183.3	–	174.8	174.8	–	165.4	165.4	–	155.2	155.2	–	144.3	144.3	
			SHC	–	74.3	98.3	–	71.3	95.2	–	68.0	91.9	–	64.6	88.3	–	60.9	84.5	
5000 Cfm	EA (wb)	58	TC	145.3	145.3	164.9	139.5	139.5	158.4	133.2	133.2	151.2	126.2	126.2	143.2	118.5	118.5	134.5	
			SHC	125.6	145.3	164.9	120.7	139.5	158.4	115.2	133.2	151.2	109.1	126.2	143.2	102.5	118.5	134.5	
		62	TC	146.5	146.5	169.3	140.2	140.2	163.9	133.3	133.3	157.4	126.3	126.3	149.1	118.6	118.6	140.0	
			SHC	118.3	143.8	169.3	114.1	139.0	163.9	109.3	133.3	157.4	103.5	126.3	149.1	97.2	118.6	140.0	
		67	TC	159.1	159.1	159.1	151.5	151.5	151.5	143.1	143.1	143.1	134.0	134.0	137.7	124.2	124.2	133.7	
			SHC	95.2	121.6	148.0	92.2	118.5	144.9	88.8	115.1	141.5	85.1	111.4	137.7	81.3	107.5	133.7	
		72	TC	174.1	174.1	174.1	165.9	165.9	165.9	156.8	156.8	156.8	146.9	146.9	146.9	136.2	136.2	136.2	
			SHC	70.5	97.0	123.5	67.5	94.0	120.5	64.2	90.7	117.1	60.6	87.1	113.5	56.9	83.3	109.6	
		76	TC	–	187.0	187.0	–	178.1	178.1	–	168.3	168.3	–	157.7	157.7	–	146.4	146.4	
			SHC	–	77.0	104.0	–	74.0	100.9	–	70.7	97.5	–	67.2	93.9	–	63.4	90.0	
5625 Cfm	EA (wb)	58	TC	150.4	150.4	170.8	144.4	144.4	163.9	137.7	137.7	156.3	130.3	130.3	147.9	122.2	122.2	138.7	
			SHC	130.1	150.4	170.8	124.9	144.4	163.9	119.0	137.7	156.3	112.7	130.3	147.9	105.7	122.2	138.7	
		62	TC	150.7	150.7	177.9	144.5	144.5	170.6	137.8	137.8	162.7	130.4	130.4	153.9	122.3	122.3	144.4	
			SHC	123.5	150.7	177.9	118.4	144.5	170.6	112.9	137.8	162.7	106.8	130.4	153.9	100.2	122.3	144.4	
		67	TC	161.7	161.7	161.7	153.9	153.9	155.6	145.3	145.3	152.1	135.9	135.9	148.2	125.9	125.9	143.9	
			SHC	100.0	129.4	158.8	96.8	126.2	155.6	93.4	122.7	152.1	89.7	118.9	148.2	85.6	114.8	143.9	
		72	TC	176.9	176.9	176.9	168.3	168.3	168.3	159.0	159.0	159.0	148.8	148.8	148.8	137.9	137.9	137.9	
			SHC	72.3	101.9	131.5	69.3	98.8	128.4	66.0	95.5	125.0	62.4	91.8	121.3	58.6	88.0	117.4	
		76	TC	–	189.8	189.8	–	180.6	180.6	–	170.6	170.6	–	159.7	159.7	–	148.1	148.1	
			SHC	–	79.6	109.7	–	76.5	106.5	–	73.2	103.0	–	69.6	99.2	–	65.7	95.1	
6250 Cfm	EA (wb)	58	TC	154.8	154.8	175.8	148.5	148.5	168.6	141.5	141.5	160.6	133.7	133.7	151.8	125.3	125.3	142.3	
			SHC	133.9	154.8	175.8	128.4	148.5	168.6	122.3	141.5	160.6	115.6	133.7	151.8	108.4	125.3	142.3	
		62	TC	155.0	155.0	183.0	148.6	148.6	175.5	141.6	141.6	167.2	133.9	133.9	158.0	125.4	125.4	148.1	
			SHC	127.0	155.0	183.0	121.8	148.6	175.5	116.0	141.6	167.2	109.7	133.9	158.0	102.8	125.4	148.1	
		67	TC	163.8	163.8	169.3	155.8	155.8	166.0	147.0	147.0	162.3	137.5	137.5	158.1	127.4	127.4	153.3	
			SHC	104.5	136.9	169.3	101.3	133.6	166.0	97.8	130.0	162.3	93.9	126.0	158.1	89.7	121.5	153.3	
		72	TC	179.1	179.1	179.1	170.3	170.3	170.3	160.8	160.8	160.8	150.3	150.3	150.3	139.2	139.2	139.2	
			SHC	74.1	106.7	139.3	71.0	103.6	136.1	67.7	100.2	132.7	64.1	96.5	128.9	60.2	92.6	124.9	
		76	TC	–	192.1	192.1	–	182.7	182.7	–	172.3	172.3	–	161.2	161.2	–	149.4	149.4	
			SHC	–	82.1	115.1	–	79.0	111.8	–	75.6	108.2	–	71.9	104.3	–	67.9	100.0	

* See Minimum – Maximum Airflow Ratings in Table 7. Do not operate outside these limits.

LEGEND:

– – Do not operate
Cfm – Cubic feet per minute (supply air)
EAT(db) – Entering air temperature (dry bulb)
EAT(wb) – Entering air temperature (wet bulb)
SHC – Sensible heat capacity
TC – Total capacity

48HC14 (12.5 TONS) – UNIT WITH HUMIDI–MIZER SYSTEM IN SUBCOOLING MODE										
Temp (F) Air Entering Condenser (Edb)		AIR ENTERING EVAPORATOR – CFM								
		3750/0.02			5000/0.04			6250/0.05		
		Air Entering Evaporator – Ewb (F)								
		72	67	62	72	67	62	72	67	62
75	TC	162.0	147.4	132.8	185.6	167.2	148.8	209.5	187.2	164.9
	SHC	85.0	101.4	117.4	96.9	113.0	129.0	106.5	122.4	138.4
	kW	7.70	7.60	7.30	7.90	7.70	7.40	8.10	7.80	7.50
85	TC	154.8	140.9	127.0	171.7	154.4	137.1	188.8	168.0	147.2
	SHC	70.2	90.4	110.6	83.1	103.2	123.2	93.4	113.4	133.3
	kW	8.80	8.70	8.30	8.90	8.70	8.40	9.10	8.80	8.50
95	TC	147.5	134.4	121.2	157.8	141.6	125.4	168.1	148.8	129.6
	SHC	55.5	79.7	103.9	69.3	93.4	117.5	80.4	104.3	128.3
	kW	9.80	9.70	9.30	9.90	9.70	9.50	10.10	9.80	9.60
105	TC	140.3	127.8	115.4	143.8	128.7	113.7	147.4	129.7	111.9
	SHC	40.9	69.0	97.2	55.5	83.6	111.7	67.3	95.3	111.9
	kW	10.80	10.70	10.30	10.90	10.70	10.50	11.10	10.80	10.60
115	TC	133.0	121.3	109.5	129.9	115.9	101.9	126.7	110.5	94.2
	SHC	26.2	58.3	90.4	41.8	73.8	101.9	54.2	86.2	94.2
	kW	11.80	11.70	11.40	11.90	11.70	11.60	12.10	11.80	11.70
125	TC	125.8	114.7	103.7	115.9	103.1	90.2	106.0	91.3	76.6
	SHC	11.5	47.6	83.7	28.0	64.0	90.2	41.2	77.2	76.6
	kW	12.80	12.70	12.40	12.90	12.70	12.60	13.10	12.80	12.70

48HC14 (12.5 TONS) – UNIT WITH HUMIDI–MIZER SYSTEM IN HOT GAS REHEAT MODE										
Temp (F) Air Entering Condenser (Edb)		AIR ENTERING EVAPORATOR – Ewb (F)								
		75 Dry Bulb 62.5 Wet Bulb (50% Relative)			75 Dry Bulb 64 Wet Bulb (56% Relative)			75 Dry Bulb 65.3 Wet Bulb (60% Relative)		
		Air Entering Evaporator – Cfm								
		3750	5000	6250	3750	5000	6250	3750	5000	6250
80	TC	57.70	60.00	66.40	60.20	66.80	69.50	64.30	69.10	72.30
	SHC	21.30	27.00	44.00	12.80	22.40	32.50	8.60	16.20	25.50
	kW	8.08	8.15	8.23	8.28	8.34	8.37	8.36	8.43	8.52
75	TC	59.00	61.20	67.90	61.40	68.10	71.00	65.80	70.70	73.70
	SHC	22.40	28.10	44.80	13.50	23.50	33.70	9.30	17.10	26.30
	kW	8.06	8.13	8.21	8.25	8.31	8.34	8.33	8.40	8.49
70	TC	60.40	62.90	69.20	63.10	69.40	72.50	67.00	72.00	75.00
	SHC	23.20	28.90	46.00	14.50	24.30	34.40	10.30	17.90	27.40
	kW	8.04	8.11	8.18	8.23	8.29	8.32	8.31	8.38	8.47
60	TC	63.40	65.70	72.00	65.90	72.30	75.20	70.00	74.80	77.80
	SHC	24.80	30.50	47.80	16.10	25.90	36.00	11.90	19.60	29.00
	kW	8.00	8.07	8.15	8.20	8.25	8.29	8.28	8.35	8.44
50	TC	66.20	68.60	74.30	68.80	74.60	78.20	72.80	77.80	80.70
	SHC	26.60	32.30	49.40	17.70	27.70	37.80	13.50	21.20	30.60
	kW	7.94	8.01	8.08	8.13	8.20	8.23	8.22	8.29	8.38
40	TC	69.10	71.60	77.80	71.80	78.00	81.00	75.70	80.60	83.70
	SHC	28.20	33.90	50.10	19.40	29.30	39.80	15.20	22.90	32.20
	kW	7.90	7.97	8.04	8.09	8.15	8.17	8.16	8.23	8.32

LEGEND

Edb – Entering Dry–Bulb
Ewb – Entering Wet–Bulb
kW – Compressor Motor Power Input
ldb – Leaving Dry–Bulb
lwb – Leaving Wet–Bulb
SHC – Sensible Heat Capacity (1000 Btuh) Gross
TC – Total Capacity (1000 Btuh) Gross

NOTES:

1. Direct interpolation is permissible. Do not extrapolate.
2. The following formulas may be used:

$$t_{ldb} = t_{edb} - \frac{\text{sensible capacity (Btuh)}}{1.10 \times \text{cfm}}$$

t_{lwb} = Wet–bulb temperature corresponding to enthalpy of air leaving evaporator coil (h_{lwb})

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.5 \times \text{cfm}}$$

Where: h_{ewb} = Enthalpy of air entering evaporator coil

Table 29 – STATIC PRESSURE ADDERS (IN. WG) (FACTORY OPTIONS AND/OR ACCESSORIES)

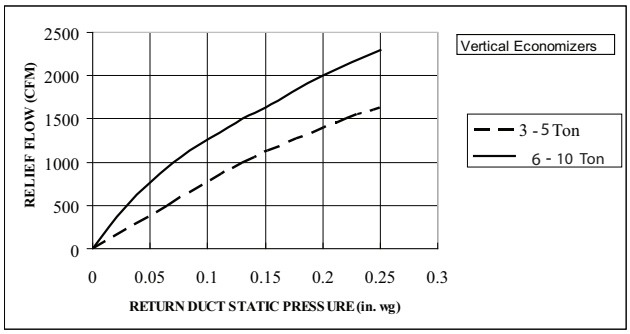
Humidi-MiZer

3–6 TONS									
CFM (in. wg)	1000	1250	1500	1750	2000	2250	2500	2750	3000
3 Tons	0.04	0.052	0.07	–	–	–	–	–	–
4 Tons	–	0.106	0.138	0.172	0.21	–	–	–	–
5 Tons	–	–	0.138	0.172	0.21	0.252	0.30	–	–
6 Tons	–	–	–	0.112	0.125	0.161	0.19	0.22	0.25

	7.5–12.5 TONS									
CFM (in. wg)	4000	4250	4500	4750	5000	5250	5500	5750	6000	6250
7.5 Tons	–	–	–	–	–	–	–	–	–	–
8.5 Tons	0.20	0.22	–	–	–	–	–	–	–	–
10 Tons	0.20	0.22	0.24	0.26	0.28	–	–	–	–	–
12.5 Tons	0.06	0.07	0.07	0.08	0.08	0.09	0.10	0.10	0.11	0.12

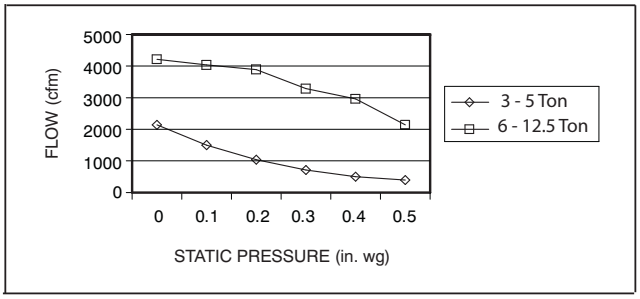
ECONOMIZER, BAROMETRIC RELIEF AND PE PERFORMANCE

Vertical Application



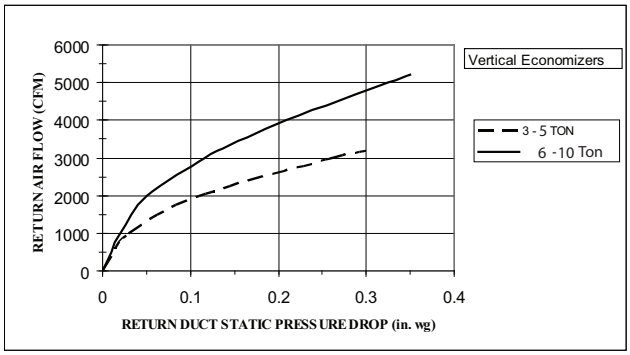
C10475

Fig. 16 - Barometric Relief Flow-Vertical 3-10 Ton



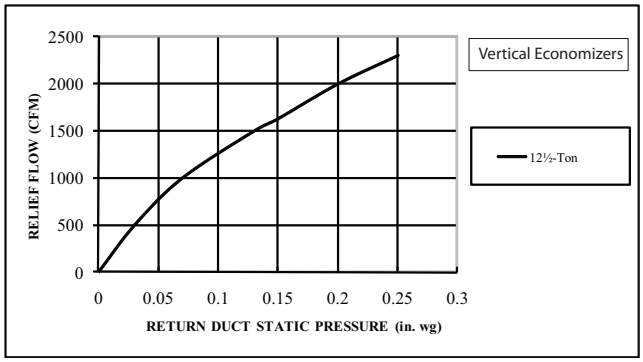
C10996

Fig. 18 - Vertical Power Exhaust Performance



C10477

Fig. 17 - Return Air Pressure Drop-Vertical 3-10 Ton

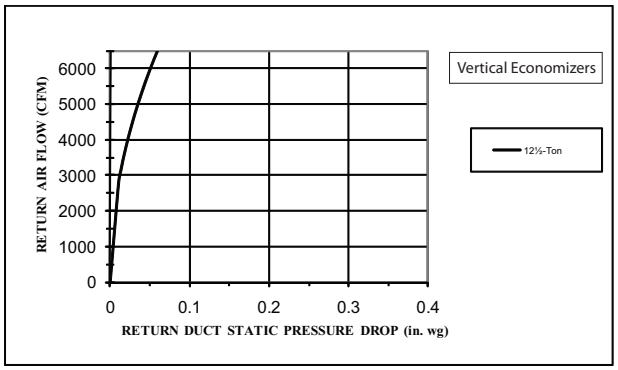


C101004

Fig. 19 - Barometric Relief Flow-Vertical 12.5 Ton

ECONOMIZER, BAROMETRIC RELIEF AND PE PERFORMANCE (cont.)

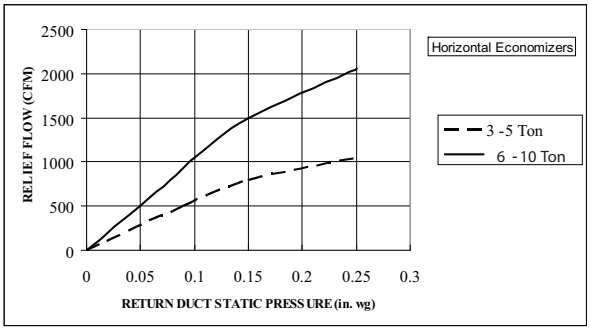
Vertical Application (cont.)



C101005

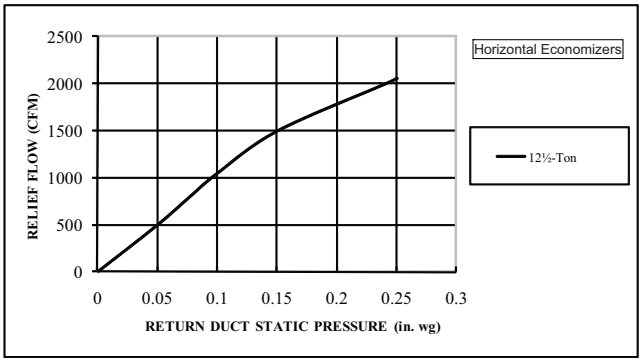
Fig. 20 - Return Air Pressure Drop-Vertical 12.5 Ton

Horizontal Application



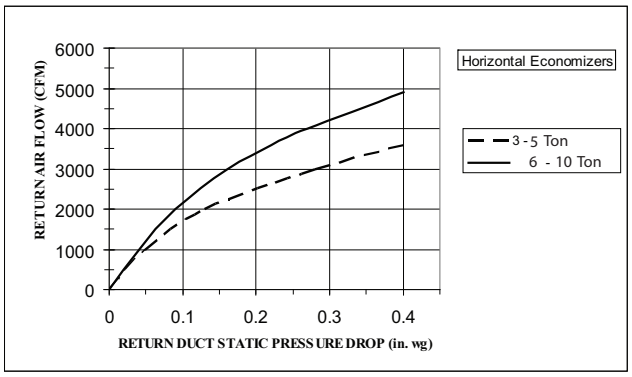
C10472

Fig. 21 - Barometric Relief Flow-Horizontal 3-10 Ton



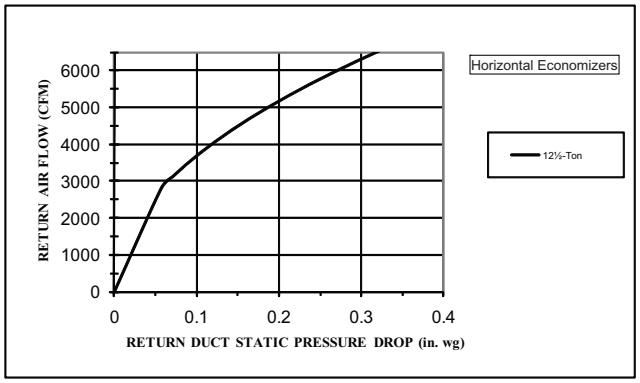
C101002

Fig. 23 - Barometric Relief Flow-Horizontal 12.5 Ton



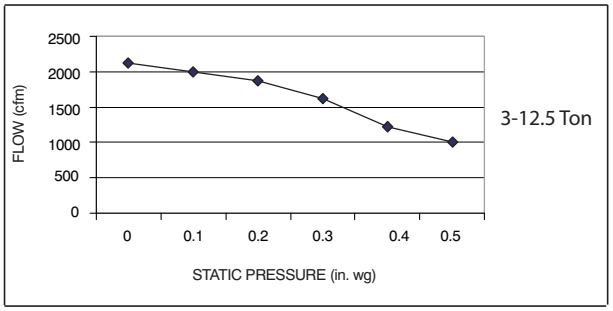
C10474

Fig. 22 - Return Air Pressure Drop-Horizontal 3-10 Ton



C101003

Fig. 24 - Return Air Pressure Drop-Horizontal-12.5 Ton



C10995

Fig. 25 - Horizontal Power Exhaust Performance

GENERAL FAN PERFORMANCE NOTES:

1. Interpolation is permissible. Do not extrapolate.
2. External static pressure is the static pressure difference between the return duct and the supply duct plus the static pressure caused by any FIOPs or accessories.
3. Tabular data accounts for pressure loss due to clean filters, unit casing, and wet coils. Factory options and accessories may add static pressure losses. Selection software is available, through your salesperson, to help you select the best motor/drive combination for your application.
4. The Fan Performance tables offer motor/drive recommendations. In cases when two motor/drive combinations would work, Carrier recommended the lower horsepower option.
5. For information on the electrical properties of Carrier motors, please see the Electrical information section of this book.
6. For more information on the performance limits of Carrier motors, see the application data section of this book.
7. The EPACT (Energy Policy Act of 1992) regulates energy requirements for specific types of indoor fan motors. Motors regulated by EPACT include any general purpose, T-frame (three-digit, 143 and larger), single-speed, foot mounted, polyphase, squirrel cage induction motors of NEMA (National Electrical Manufacturers Association) design A and B, manufactured for use in the United States. Ranging from 1 to 200 Hp, these continuous-duty motors operate on 230 and 460 volt, 60 Hz power. If a motor does not fit into these specifications, the motor does not have to be replaced by an EPACT compliant energy-efficient motor. Variable-speed motors are exempt from EPACT compliance requirements.

FAN PERFORMANCE (BELT DRIVE)

Table 30 – 48HC04 3 PHASE NON-HUMIDI-MIZER 3 TON VERTICAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	**592**	**0.14**	**721**	**0.25**	826	0.38	916	0.53	997	0.69
975	**616**	**0.17**	**744**	**0.28**	847	0.41	936	0.56	1016	0.72
1050	**641**	**0.19**	**766**	**0.30**	868	0.44	957	0.59	1036	0.76
1125	**667**	**0.22**	790	0.33	890	0.47	978	0.63	1056	0.80
1200	**693**	**0.25**	813	0.37	913	0.51	999	0.67	1077	0.84
1275	**720**	**0.29**	837	0.41	935	0.55	1021	0.71	1098	0.88
1350	**747**	**0.33**	862	0.45	958	0.60	1043	0.76	1119	0.94
1425	775	0.37	887	0.50	982	0.65	1066	0.81	1141	0.99
1500	802	0.42	912	0.55	1006	0.70	1088	0.87	1163	1.05

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	1070	0.88	1137	1.07	1201	1.29	1260	1.51	1317	1.75
975	1089	0.91	1156	1.11	1219	1.32	1279	1.54	1335	1.78
1050	1108	0.94	1175	1.14	1238	1.36	1297	1.58	1353	1.82
1125	1128	0.98	1195	1.18	1257	1.40	1316	1.62	1372	1.86
1200	1148	1.03	1214	1.23	1276	1.44	1335	1.67	1391	1.91
1275	1169	1.07	1235	1.28	1296	1.50	1354	1.72	1410	1.97
1350	1190	1.13	1255	1.33	1316	1.55	1374	1.78	1429	2.03
1425	1211	1.19	1276	1.39	1337	1.61	1394	1.85	1449	2.09
1500	1232	1.25	1297	1.46	1357	1.68	1415	1.91	**1469**	**2.16**

NOTE: For more information, see General Fan Performance Notes.
Boldface indicates field–supplied drive is required.

Medium static 770–1175 RPM, 1.2 BHP max
High static 1035–1466 RPM, 2.4 BHP max

Table 31 – 48HC04 3 PHASE HUMIDI-MIZER 3 TON VERTICAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	592	0.14	721	0.25	826	0.38	916	0.53	997	0.69
975	616	0.17	744	0.28	847	0.41	936	0.56	1016	0.72
1050	641	0.19	766	0.30	868	0.44	957	0.59	1036	0.76
1125	667	0.22	790	0.33	890	0.47	978	0.63	1056	0.80
1200	693	0.25	813	0.37	913	0.51	999	0.67	1077	0.84
1275	720	0.29	837	0.41	935	0.55	1021	0.71	1098	0.88
1350	747	0.33	862	0.45	958	0.60	1043	0.76	1119	0.94
1425	775	0.37	887	0.50	982	0.65	1066	0.81	1141	0.99
1500	802	0.42	912	0.55	1006	0.70	1088	0.87	1163	1.05

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	1070	0.88	1137	1.07	1201	1.29	1260	1.51	1317	1.75
975	1089	0.91	1156	1.11	1219	1.32	1279	1.54	1335	1.78
1050	1108	0.94	1175	1.14	1238	1.36	1297	1.58	1353	1.82
1125	1128	0.98	1195	1.18	1257	1.40	1316	1.62	1372	1.86
1200	1148	1.03	1214	1.23	1276	1.44	1335	1.67	1391	1.91
1275	1169	1.07	1235	1.28	1296	1.50	1354	1.72	1410	1.97
1350	1190	1.13	1255	1.33	1316	1.55	1374	1.78	1429	2.03
1425	1211	1.19	1276	1.39	1337	1.61	1394	1.85	1449	2.09
1500	1232	1.25	1297	1.46	1357	1.68	1415	1.91	**1469**	**2.16**

NOTE: For more information, see General Fan Performance Notes.
Boldface indicates field–supplied drive is required.

Standard static 560–854 RPM, 1.2 BHP max
Medium static 770–1175 RPM, 1.2 BHP max
High static 1035–1466 RPM, 2.4 BHP max

FAN PERFORMANCE (BELT DRIVE) cont.

Table 32 – 48HC04 3 PHASE NON-HUMIDI-MIZER 3 TON HORIZONTAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	**582**	**0.14**	**715**	**0.24**	825	0.35	921	0.48	1007	0.63
975	**606**	**0.16**	**735**	**0.26**	843	0.38	938	0.51	1023	0.66
1050	**630**	**0.18**	**756**	**0.29**	862	0.41	955	0.55	1040	0.70
1125	**655**	**0.21**	778	0.32	882	0.45	974	0.58	1057	0.74
1200	**681**	**0.24**	800	0.35	902	0.48	992	0.63	1074	0.78
1275	**708**	**0.27**	823	0.39	923	0.53	1012	0.67	1093	0.83
1350	**735**	**0.31**	847	0.43	945	0.57	1032	0.72	1112	0.88
1425	**762**	**0.35**	871	0.48	967	0.62	1053	0.77	1131	0.94
1500	790	0.40	896	0.53	990	0.67	1074	0.83	1151	1.00

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	1086	0.79	1159	0.96	1228	1.14	1293	1.33	1354	1.53
975	1101	0.82	1174	0.99	1242	1.18	1306	1.37	1367	1.57
1050	1117	0.86	1189	1.03	1256	1.22	1320	1.41	1381	1.62
1125	1133	0.90	1204	1.08	1271	1.26	1335	1.46	1395	1.67
1200	1150	0.95	1221	1.13	1287	1.31	1350	1.51	1410	1.72
1275	1168	1.00	1237	1.18	1303	1.37	1365	1.57	1425	1.78
1350	1186	1.05	1255	1.24	1320	1.43	1382	1.63	1441	1.84
1425	1204	1.11	1272	1.30	1337	1.49	1398	1.70	1457	1.91
1500	1223	1.18	1291	1.36	1355	1.56	1415	1.77	**1473**	**1.99**

NOTE: For more information, see General Fan Performance Notes.
Boldface indicates field–supplied drive is required.

Medium static 770–1175 RPM, 1.2 BHP max
High static 1035–1466 RPM, 2.4 BHP max

Table 33 – 48HC04 3 PHASE HUMIDI-MIZER 3 TON HORIZONTAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	582	0.14	715	0.24	825	0.35	921	0.48	1007	0.63
975	606	0.16	735	0.26	843	0.38	938	0.51	1023	0.66
1050	630	0.18	756	0.29	862	0.41	955	0.55	1040	0.70
1125	655	0.21	778	0.32	882	0.45	974	0.58	1057	0.74
1200	681	0.24	800	0.35	902	0.48	992	0.63	1074	0.78
1275	708	0.27	823	0.39	923	0.53	1012	0.67	1093	0.83
1350	735	0.31	847	0.43	945	0.57	1032	0.72	1112	0.88
1425	762	0.35	871	0.48	967	0.62	1053	0.77	1131	0.94
1500	790	0.40	896	0.53	990	0.67	1074	0.83	1151	1.00

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	1086	0.79	1159	0.96	1228	1.14	1293	1.33	1354	1.53
975	1101	0.82	1174	0.99	1242	1.18	1306	1.37	1367	1.57
1050	1117	0.86	1189	1.03	1256	1.22	1320	1.41	1381	1.62
1125	1133	0.90	1204	1.08	1271	1.26	1335	1.46	1395	1.67
1200	1150	0.95	1221	1.13	1287	1.31	1350	1.51	1410	1.72
1275	1168	1.00	1237	1.18	1303	1.37	1365	1.57	1425	1.78
1350	1186	1.05	1255	1.24	1320	1.43	1382	1.63	1441	1.84
1425	1204	1.11	1272	1.30	1337	1.49	1398	1.70	1457	1.91
1500	1223	1.18	1291	1.36	1355	1.56	1415	1.77	**1473**	**1.99**

NOTE: For more information, see General Fan Performance Notes.
Boldface indicates field–supplied drive is required.

Standard static 560–864 RPM, 1.2 BHP max
Medium static 770–1175 RPM, 1.2 BHP max
High static 1035–1466 RPM, 2.4 BHP max

FAN PERFORMANCE (BELT DRIVE) cont.

Table 34 – 48HC05 3 PHASE NON-HUMIDI-MIZER 4 TON VERTICAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	**693**	**0.25**	**813**	**0.37**	**913**	**0.51**	999	0.67	1077	0.84
1300	**729**	**0.30**	**846**	**0.42**	943	0.57	1028	0.73	1105	0.90
1400	**765**	**0.35**	**879**	**0.48**	974	0.63	1058	0.79	1134	0.97
1500	**802**	**0.42**	**912**	**0.55**	1006	0.70	1088	0.87	1163	1.05
1600	**840**	**0.49**	947	0.63	1038	0.78	1119	0.95	1193	1.14
1700	**878**	**0.57**	982	0.71	1071	0.87	1151	1.05	1224	1.24
1800	**917**	**0.65**	1017	0.81	1105	0.97	1183	1.15	1255	1.35
1900	956	0.75	1053	0.91	1139	1.08	1216	1.27	1287	1.47
2000	995	0.86	1090	1.02	1173	1.20	1249	1.39	1319	1.59

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1148	1.03	1214	1.23	1276	1.44	1335	1.67	1391	1.91
1300	1176	1.09	1241	1.30	1303	1.51	1361	1.74	1416	1.98
1400	1204	1.17	1269	1.37	1330	1.59	1388	1.82	1442	2.07
1500	1232	1.25	1297	1.46	1357	1.68	1415	1.91	1469	2.16
1600	1262	1.34	1325	1.55	1385	1.78	1442	2.01	1496	2.26
1700	1291	1.44	1354	1.66	1414	1.89	1470	2.12	1524	2.37
1800	1322	1.55	1384	1.77	1443	2.00	1499	2.25	1552	2.50
1900	1352	1.68	1414	1.90	1472	2.13	1528	2.38	1580	2.63
2000	1384	1.81	1445	2.04	1502	2.27	1557	2.52	1609	2.78

NOTE: For more information, see General Fan Performance Notes.
Boldface indicates field–supplied drive is required.

Medium static 920–1303 RPM, 1.7 BHP max
High static 1208–1639 RPM, 2.9 BHP max

Table 35 – 48HC05 3 PHASE HUMIDI-MIZER 4 TON VERTICAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	693	0.25	813	0.37	913	0.51	999	0.67	1077	0.84
1300	729	0.30	846	0.42	943	0.57	1028	0.73	1105	0.90
1400	765	0.35	879	0.48	974	0.63	1058	0.79	1134	0.97
1500	802	0.42	912	0.55	1006	0.70	1088	0.87	1163	1.05
1600	840	0.49	947	0.63	1038	0.78	1119	0.95	1193	1.14
1700	878	0.57	982	0.71	1071	0.87	1151	1.05	1224	1.24
1800	917	0.65	1017	0.81	1105	0.97	1183	1.15	1255	1.35
1900	956	0.75	1053	0.91	1139	1.08	1216	1.27	1287	1.47
2000	995	0.86	1090	1.02	1173	1.20	1249	1.39	1319	1.59

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1148	1.03	1214	1.23	1276	1.44	1335	1.67	1391	1.91
1300	1176	1.09	1241	1.30	1303	1.51	1361	1.74	1416	1.98
1400	1204	1.17	1269	1.37	1330	1.59	1388	1.82	1442	2.07
1500	1232	1.25	1297	1.46	1357	1.68	1415	1.91	1469	2.16
1600	1262	1.34	1325	1.55	1385	1.78	1442	2.01	1496	2.26
1700	1291	1.44	1354	1.66	1414	1.89	1470	2.12	1524	2.37
1800	1322	1.55	1384	1.77	1443	2.00	1499	2.25	1552	2.50
1900	1352	1.68	1414	1.90	1472	2.13	1528	2.38	1580	2.63
2000	1384	1.81	1445	2.04	1502	2.27	1557	2.52	1609	2.78

NOTE: For more information, see General Fan Performance Notes.

Standard static 560–854 RPM, 1.2 BHP max
Medium static 770–1175 RPM, 1.7 BHP max
High static 1208–1639 RPM, 2.9 BHP max

FAN PERFORMANCE (BELT DRIVE) cont.

Table 36 – 48HC05 3 PHASE NON-HUMIDI-MIZER 4 TON HORIZONTAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	**681**	**0.24**	**800**	**0.35**	**902**	**0.48**	992	0.63	1074	0.78
1300	**717**	**0.29**	**831**	**0.41**	930	0.54	1019	0.69	1099	0.85
1400	**753**	**0.34**	**863**	**0.46**	959	0.60	1046	0.75	1125	0.92
1500	**790**	**0.40**	**896**	**0.53**	990	0.67	1074	0.83	1151	1.00
1600	**828**	**0.46**	930	0.60	1021	0.75	1103	0.91	1179	1.09
1700	**866**	**0.54**	964	0.68	1053	0.84	1133	1.01	1207	1.18
1800	**905**	**0.62**	1000	0.77	1085	0.94	1164	1.11	1236	1.29
1900	944	0.71	1036	0.87	1119	1.04	1195	1.22	1266	1.41
2000	984	0.82	1072	0.98	1153	1.15	1227	1.34	1297	1.53

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1150	0.95	1221	1.13	1287	1.31	1350	1.51	1410	1.72
1300	1173	1.02	1243	1.20	1309	1.39	1371	1.59	1430	1.80
1400	1198	1.09	1266	1.28	1331	1.47	1393	1.68	1451	1.89
1500	1223	1.18	1291	1.36	1355	1.56	1415	1.77	1473	1.99
1600	1249	1.27	1316	1.46	1379	1.66	1439	1.87	1496	2.09
1700	1277	1.37	1342	1.57	1404	1.77	1463	1.99	1520	2.21
1800	1305	1.48	1369	1.68	1430	1.89	1489	2.11	1545	2.34
1900	1333	1.60	1397	1.81	1457	2.02	1514	2.25	1570	2.48
2000	1363	1.73	1425	1.94	1484	2.16	1541	2.39	1596	2.63

NOTE: For more information, see General Fan Performance Notes.
Boldface indicates field–supplied drive is required.
Medium static 920–1303 RPM, 1.7 BHP max
High static 1208–1639 RPM, 2.9 BHP max

Table 37 – 48HC05 3 PHASE HUMIDI-MIZER 4 TON HORIZONTAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	681	0.24	800	0.35	902	0.48	992	0.63	1074	0.78
1300	717	0.29	831	0.41	930	0.54	1019	0.69	1099	0.85
1400	753	0.34	863	0.46	959	0.60	1046	0.75	1125	0.92
1500	790	0.40	896	0.53	990	0.67	1074	0.83	1151	1.00
1600	828	0.46	930	0.60	1021	0.75	1103	0.91	1179	1.09
1700	866	0.54	964	0.68	1053	0.84	1133	1.01	1207	1.18
1800	905	0.62	1000	0.77	1085	0.94	1164	1.11	1236	1.29
1900	944	0.71	1036	0.87	1119	1.04	1195	1.22	1266	1.41
2000	984	0.82	1072	0.98	1153	1.15	1227	1.34	1297	1.53

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1150	0.95	1221	1.13	1287	1.31	1350	1.51	1410	1.72
1300	1173	1.02	1243	1.20	1309	1.39	1371	1.59	1430	1.80
1400	1198	1.09	1266	1.28	1331	1.47	1393	1.68	1451	1.89
1500	1223	1.18	1291	1.36	1355	1.56	1415	1.77	1473	1.99
1600	1249	1.27	1316	1.46	1379	1.66	1439	1.87	1496	2.09
1700	1277	1.37	1342	1.57	1404	1.77	1463	1.99	1520	2.21
1800	1305	1.48	1369	1.68	1430	1.89	1489	2.11	1545	2.34
1900	1333	1.60	1397	1.81	1457	2.02	1514	2.25	1570	2.48
2000	1363	1.73	1425	1.94	1484	2.16	1541	2.39	1596	2.63

NOTE: For more information, see General Fan Performance Notes.
Standard static 560–854 RPM, 1.2 BHP max
Medium static 770–1175 RPM, 1.7 BHP max
High static 1208–1639 RPM, 2.9 BHP max

FAN PERFORMANCE (BELT DRIVE) cont.

Table 38 – 48HC06 3 PHASE NON-HUMIDI-MIZER 5 TON VERTICAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	**847**	**0.41**	966	0.55	1067	0.68	1158	0.81	1240	0.93
1625	**896**	**0.50**	1010	0.65	1109	0.79	1198	0.93	1278	1.07
1750	**947**	**0.59**	1056	0.76	1152	0.92	1238	1.07	1318	1.22
1875	**998**	**0.70**	1103	0.88	1196	1.05	1280	1.22	1358	1.38
2000	1049	0.82	1151	1.02	1241	1.20	1323	1.38	1399	1.56
2125	1102	0.96	1199	1.17	1287	1.37	1367	1.56	1441	1.75
2250	1154	1.11	1248	1.33	1333	1.55	1411	1.75	1484	1.96
2375	1208	1.28	1298	1.52	1381	1.74	1457	1.96	1528	2.18
2500	1261	1.47	1349	1.72	1429	1.96	1503	2.19	1572	2.42

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	1316	1.05	1387	1.17	1454	1.28	1517	1.39	1578	1.50
1625	1353	1.20	1423	1.33	1489	1.46	1552	1.58	1611	1.70
1750	1391	1.36	1460	1.51	1525	1.65	1587	1.78	1646	1.91
1875	1430	1.54	1498	1.70	1562	1.85	1623	2.00	1681	2.14
2000	1470	1.73	1537	1.90	1600	2.06	1660	2.23	**1718**	**2.38**
2125	1511	1.93	1576	2.12	1639	2.29	**1698**	**2.47**	**1755**	**2.64**
2250	1552	2.15	1617	2.35	1678	2.54	**1737**	**2.73**	1793	2.92
2375	1595	2.39	1658	2.60	**1718**	**2.80**	1776	3.01	–	–
2500	1638	2.64	**1700**	**2.87**	1760	3.08	–	–	–	–

NOTE: For more information, see General Fan Performance Notes.
Boldface indicates field–supplied drive is required.
Medium static 1035–1466 RPM, 2.4 BHP max
High static 1303 – 1687 RPM, 2.9 BHP max

Table 39 – 48HC06 3 PHASE HUMIDI-MIZER 5 TON VERTICAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	847	0.41	966	0.55	1067	0.68	1158	0.81	1240	0.93
1625	896	0.50	1010	0.65	1109	0.79	1198	0.93	1278	1.07
1750	947	0.59	1056	0.76	1152	0.92	1238	1.07	1318	1.22
1875	998	0.70	1103	0.88	1196	1.05	1280	1.22	1358	1.38
2000	1049	0.82	1151	1.02	1241	1.20	1323	1.38	1399	1.56
2125	1102	0.96	1199	1.17	1287	1.37	1367	1.56	1441	1.75
2250	1154	1.11	1248	1.33	1333	1.55	1411	1.75	1484	1.96
2375	1208	1.28	1298	1.52	1381	1.74	1457	1.96	1528	2.18
2500	1261	1.47	1349	1.72	1429	1.96	1503	2.19	1572	2.42

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	1316	1.05	1387	1.17	1454	1.28	1517	1.39	1578	1.50
1625	1353	1.20	1423	1.33	1489	1.46	1552	1.58	1611	1.70
1750	1391	1.36	1460	1.51	1525	1.65	1587	1.78	1646	1.91
1875	1430	1.54	1498	1.70	1562	1.85	1623	2.00	1681	2.14
2000	1470	1.73	1537	1.90	1600	2.06	1660	2.23	**1718**	**2.38**
2125	1511	1.93	1576	2.12	1639	2.29	**1698**	**2.47**	**1755**	**2.64**
2250	1552	2.15	1617	2.35	1678	2.54	**1737**	**2.73**	**1793**	**2.92**
2375	1595	2.39	1658	2.60	**1718**	**2.80**	**1776**	**3.01**	–	–
2500	1638	2.64	**1700**	**2.87**	**1760**	**3.08**	–	–	–	–

NOTE: For more information, see General Fan Performance Notes.
Boldface indicates field–supplied drive is required.
Standard static 770–1175 RPM, 1.2 BHP max
Medium static 1035–1466 RPM, 2.4 BHP max
High static 1303–1687 RPM, 2.9 BHP max

FAN PERFORMANCE (BELT DRIVE) cont.

Table 40 – 48HC06 3 PHASE NON-HUMIDI-MIZER 5 TON HORIZONTAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	**798**	**0.41**	906	0.55	1002	0.71	1088	0.87	1167	1.05
1625	**845**	**0.50**	949	0.65	1041	0.81	1125	0.98	1202	1.17
1750	**893**	**0.60**	993	0.76	1081	0.93	1163	1.11	1238	1.30
1875	**942**	**0.71**	1037	0.88	1123	1.06	1202	1.25	1275	1.44
2000	**992**	**0.84**	1083	1.02	1166	1.21	1242	1.40	1313	1.61
2125	1043	0.98	1129	1.17	1209	1.37	1283	1.57	1353	1.79
2250	1093	1.14	1177	1.34	1254	1.55	1325	1.76	1393	1.98
2375	1145	1.32	1225	1.53	1299	1.74	1369	1.97	1434	2.20
2500	1196	1.51	1273	1.73	1345	1.96	1413	2.19	1477	2.43

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	1241	1.23	1310	1.42	1375	1.63	1438	1.84	1497	2.06
1625	1274	1.36	1342	1.56	1406	1.77	1467	1.98	1526	2.21
1750	1308	1.50	1375	1.70	1438	1.92	1498	2.14	1555	2.37
1875	1344	1.65	1409	1.86	1471	2.09	1530	2.32	1586	2.55
2000	1380	1.82	1444	2.04	1505	2.27	1563	2.51	1619	2.75
2125	1418	2.01	1481	2.24	1540	2.47	1597	2.72	**1652**	**2.97**
2250	1457	2.21	1518	2.45	1576	2.69	**1632**	**2.94**	**1686**	**3.20**
2375	1497	2.43	1556	2.68	**1614**	**2.93**	**1669**	**3.19**	–	–
2500	1538	2.68	**1596**	**2.93**	**1652**	**3.19**	–	–	–	–

NOTE: For more information, see General Fan Performance Notes.
Boldface indicates field–supplied drive is required.
Medium static 1035–1466 RPM, 2.4 BHP max
High static 1303–1687 RPM, 2.9 BHP max

Table 41 – 48HC06 3 PHASE HUMIDI-MIZER 5 TON HORIZONTAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	798	0.41	906	0.55	1002	0.71	1088	0.87	1167	1.05
1625	845	0.50	949	0.65	1041	0.81	1125	0.98	1202	1.17
1750	893	0.60	993	0.76	1081	0.93	1163	1.11	1238	1.30
1875	942	0.71	1037	0.88	1123	1.06	1202	1.25	1275	1.44
2000	992	0.84	1083	1.02	1166	1.21	1242	1.40	1313	1.61
2125	1043	0.98	1129	1.17	1209	1.37	1283	1.57	1353	1.79
2250	1093	1.14	1177	1.34	1254	1.55	1325	1.76	1393	1.98
2375	1145	1.32	1225	1.53	1299	1.74	1369	1.97	1434	2.20
2500	1196	1.51	1273	1.73	1345	1.96	1413	2.19	1477	2.43

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	1241	1.23	1310	1.42	1375	1.63	1438	1.84	1497	2.06
1625	1274	1.36	1342	1.56	1406	1.77	1467	1.98	1526	2.21
1750	1308	1.50	1375	1.70	1438	1.92	1498	2.14	1555	2.37
1875	1344	1.65	1409	1.86	1471	2.09	1530	2.32	1586	2.55
2000	1380	1.82	1444	2.04	1505	2.27	1563	2.51	1619	2.75
2125	1418	2.01	1481	2.24	1540	2.47	1597	2.72	1652	2.97
2250	1457	2.21	1518	2.45	1576	2.69	1632	2.94	**1686**	**3.20**
2375	1497	2.43	1556	2.68	1614	2.93	**1669**	**3.19**	–	–
2500	1538	2.68	1596	2.93	**1652**	**3.19**	–	–	–	–

NOTE: For more information, see General Fan Performance Notes.
Boldface indicates field–supplied drive is required.
Standard static 770–1175 RPM, 1.2 BHP max
Medium static 1035–1466 RPM, 2.4 BHP max
High static 1303–1687 RPM, 2.9 BHP max

FAN PERFORMANCE (BELT DRIVE) cont.

Table 42 – 48HC07** **3 PHASE** **6 TON VERTICAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1800	**449**	**0.34**	539	0.53	615	0.75	681	0.99	742	1.26
1950	**470**	**0.40**	557	0.60	631	0.83	696	1.08	756	1.35
2100	491	0.47	576	0.68	648	0.91	712	1.17	771	1.45
2250	513	0.54	595	0.76	665	1.01	728	1.27	786	1.56
2400	536	0.63	615	0.86	684	1.11	745	1.39	802	1.68
2550	558	0.72	635	0.97	702	1.23	763	1.51	818	1.81
2700	582	0.83	656	1.08	721	1.35	781	1.65	835	1.95
2850	605	0.94	677	1.21	741	1.49	799	1.79	853	2.11
3000	629	1.07	699	1.35	761	1.64	818	1.95	871	2.28

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1800	797	1.54	848	1.84	896	2.16	942	2.49	985	2.84
1950	810	1.64	861	1.94	909	2.26	954	2.60	997	2.96
2100	824	1.74	875	2.06	922	2.38	967	2.73	1009	3.09
2250	839	1.86	889	2.18	935	2.52	980	2.87	1022	3.23
2400	854	1.99	903	2.32	950	2.66	993	3.02	1035	3.39
2550	870	2.13	918	2.46	964	2.81	1008	3.18	1049	3.55
2700	886	2.28	934	2.62	979	2.98	1022	3.35	1063	3.74
2850	903	2.44	950	2.79	995	3.16	1037	3.54	1078	3.93
3000	920	2.62	966	2.98	1010	3.35	1052	3.74	1093	4.14

NOTE: For more information, see General Fan Performance Notes.
Boldface indicates field–supplied drive is required.

Standard static 489 – 747 RPM, 1.7 BHP max
Medium static 733 – 949 RPM, 2.9 BHP max
High static 909 – 1102 RPM, 4.7 BHP max

Table 43 – 48HC07** **3 PHASE** **6 TON HORIZONTAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1800	**441**	**0.33**	533	0.51	611	0.72	681	0.96	745	1.23
1950	**462**	**0.38**	550	0.58	626	0.80	694	1.04	757	1.31
2100	**483**	**0.45**	567	0.65	641	0.88	708	1.13	769	1.40
2250	505	0.52	586	0.73	657	0.97	722	1.22	782	1.50
2400	528	0.60	605	0.82	674	1.07	738	1.33	796	1.62
2550	550	0.69	625	0.92	692	1.17	754	1.45	811	1.74
2700	574	0.80	645	1.03	710	1.29	770	1.57	826	1.88
2850	597	0.91	666	1.16	729	1.43	788	1.71	843	2.02
3000	621	1.03	688	1.29	749	1.57	806	1.87	859	2.18

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1800	804	1.51	860	1.82	912	2.15	961	2.49	1008	2.85
1950	815	1.60	869	1.91	920	2.24	969	2.59	1016	2.96
2100	826	1.70	880	2.01	930	2.35	978	2.70	1024	3.07
2250	838	1.81	891	2.12	941	2.46	988	2.82	1033	3.19
2400	851	1.92	903	2.25	952	2.59	999	2.95	1043	3.33
2550	865	2.05	916	2.38	964	2.73	1010	3.10	1054	3.48
2700	879	2.19	929	2.53	976	2.88	1022	3.25	1066	3.64
2850	894	2.35	943	2.69	990	3.05	1035	3.43	1078	3.82
3000	910	2.51	958	2.86	1004	3.23	1048	3.61	1090	4.01

NOTE: For more information, see General Fan Performance Notes.
Boldface indicates field–supplied drive is required.

Standard static 489 – 747 RPM, 1.7 BHP max
Medium static 733 – 949 RPM, 2.9 BHP max
High static 909 – 1102 RPM, 4.7 BHP max

FAN PERFORMANCE (BELT DRIVE) cont.

Table 44 – 48HC08** **3 PHASE** **7.5 TON VERTICAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2250	505	0.39	595	0.54	676	0.69	750	0.86	819	1.03
2438	532	0.47	617	0.63	694	0.79	766	0.97	833	1.15
2625	559	0.56	640	0.73	714	0.90	783	1.08	848	1.28
2813	588	0.67	664	0.84	735	1.03	801	1.22	864	1.42
3000	616	0.79	689	0.97	757	1.16	821	1.36	882	1.57
3188	646	0.92	715	1.11	780	1.31	842	1.52	901	1.74
3375	675	1.06	742	1.27	804	1.48	864	1.70	920	1.93
3563	705	1.23	769	1.44	829	1.66	886	1.89	941	2.13
3750	736	1.41	797	1.63	855	1.86	910	2.10	963	2.35

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2250	884	1.21	945	1.40	1003	1.60	1059	1.80	1112	2.01
2438	896	1.34	955	1.54	1012	1.74	1066	1.95	1118	2.17
2625	909	1.47	967	1.68	1022	1.89	1075	2.11	1126	2.34
2813	923	1.62	980	1.84	1034	2.06	1086	2.29	1136	2.52
3000	939	1.79	994	2.01	1047	2.24	1098	2.47	1147	2.71
3188	956	1.97	1010	2.20	1061	2.43	1111	2.68	1159	2.93
3375	975	2.16	1027	2.40	1077	2.65	1125	2.90	1172	3.15
3563	994	2.37	1044	2.62	1093	2.87	1141	3.13	1186	3.40
3750	1014	2.60	1063	2.86	1111	3.12	1157	3.39	1202	3.66

NOTE: For more information, see General Fan Performance Notes.

Standard static 518 – 733 RPM, 1.7 BHP max

Medium static 690 – 936 RPM, 2.4 BHP max

High static 838 – 1084 RPM, 3.7 BHP max

Table 45 – 48HC08** **3 PHASE** **7.5 TON HORIZONTAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2250	482	0.36	577	0.51	659	0.66	732	0.82	799	0.98
2438	505	0.43	597	0.59	676	0.75	748	0.92	813	1.09
2625	529	0.51	617	0.68	694	0.85	764	1.03	827	1.22
2813	554	0.60	638	0.78	713	0.97	781	1.16	843	1.35
3000	579	0.70	660	0.89	732	1.09	799	1.29	860	1.50
3188	604	0.81	683	1.02	753	1.23	817	1.44	877	1.65
3375	630	0.94	706	1.15	774	1.37	836	1.60	895	1.82
3563	657	1.08	729	1.31	795	1.54	856	1.77	913	2.01
3750	683	1.23	753	1.47	817	1.71	877	1.96	933	2.21

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2250	860	1.14	917	1.31	971	1.48	1022	1.66	1071	1.84
2438	873	1.27	929	1.45	983	1.63	1033	1.81	1081	2.00
2625	887	1.40	942	1.59	995	1.78	1045	1.98	1092	2.18
2813	901	1.55	956	1.75	1008	1.95	1057	2.15	1104	2.36
3000	917	1.70	970	1.91	1021	2.13	1070	2.34	1117	2.56
3188	933	1.87	986	2.09	1036	2.32	1084	2.54	1130	2.77
3375	950	2.05	1002	2.29	1051	2.52	1098	2.76	1144	3.00
3563	967	2.25	1018	2.49	1067	2.74	1113	2.99	1158	3.24
3750	985	2.46	1035	2.71	1083	2.97	1129	3.23	1173	3.49

NOTE: For more information, see General Fan Performance Notes.

Standard static 518 – 733 RPM, 1.7 BHP max

Medium static 690 – 936 RPM, 2.4 BHP max

High static 838 – 1084 RPM, 3.7 BHP max

FAN PERFORMANCE (BELT DRIVE) cont.

Table 46 – 48HC09** **3 PHASE** **8.5 TON VERTICAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2250	505	0.39	595	0.54	676	0.69	750	0.86	819	1.03
2438	532	0.47	617	0.63	694	0.79	766	0.97	833	1.15
2625	559	0.56	640	0.73	714	0.90	783	1.08	848	1.28
2813	588	0.67	664	0.84	735	1.03	801	1.22	864	1.42
3000	616	0.79	689	0.97	757	1.16	821	1.36	882	1.57
3188	646	0.92	715	1.11	780	1.31	842	1.52	901	1.74
3375	675	1.06	742	1.27	804	1.48	864	1.70	920	1.93
3563	705	1.23	769	1.44	829	1.66	886	1.89	941	2.13
3750	736	1.41	797	1.63	855	1.86	910	2.10	963	2.35

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2250	884	1.21	945	1.40	1003	1.60	1059	1.80	1112	2.01
2438	896	1.34	955	1.54	1012	1.74	1066	1.95	1118	2.17
2625	909	1.47	967	1.68	1022	1.89	1075	2.11	1126	2.34
2813	923	1.62	980	1.84	1034	2.06	1086	2.29	1136	2.52
3000	939	1.79	994	2.01	1047	2.24	1098	2.47	1147	2.71
3188	956	1.97	1010	2.20	1061	2.43	1111	2.68	1159	2.93
3375	975	2.16	1027	2.40	1077	2.65	1125	2.90	1172	3.15
3563	994	2.37	1044	2.62	1093	2.87	1141	3.13	1186	3.40
3750	1014	2.60	1063	2.86	1111	3.12	1157	3.39	1202	3.66

NOTE: For more information, see General Fan Performance Notes.

Standard static 518 – 733 RPM, 1.7 BHP max
Medium static 690 – 936 RPM, 2.4 BHP max
High static 838 – 1084 RPM, 3.7 BHP max

Table 47 – 48HC09** **3 PHASE** **8.5 TON HORIZONTAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2250	520	0.47	609	0.64	687	0.81	757	0.99	821	1.16
2438	547	0.57	633	0.75	708	0.94	776	1.12	839	1.31
2625	575	0.68	657	0.88	730	1.07	796	1.27	857	1.48
2813	604	0.81	683	1.02	753	1.23	817	1.44	877	1.65
3000	634	0.95	709	1.17	777	1.40	839	1.62	897	1.85
3188	664	1.11	736	1.35	801	1.58	862	1.82	919	2.06
3375	694	1.29	763	1.54	826	1.79	885	2.04	941	2.29
3563	725	1.49	791	1.75	852	2.01	909	2.28	963	2.54
3750	756	1.71	819	1.98	879	2.26	934	2.53	987	2.81

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2250	881	1.35	937	1.53	990	1.72	1040	1.91	1088	2.11
2438	897	1.51	952	1.70	1004	1.90	1054	2.11	1101	2.31
2625	915	1.68	968	1.89	1020	2.10	1068	2.32	1115	2.53
2813	933	1.87	986	2.09	1036	2.32	1084	2.54	1130	2.77
3000	952	2.08	1004	2.31	1053	2.55	1100	2.79	1145	3.03
3188	972	2.30	1023	2.55	1071	2.80	1118	3.05	1162	3.30
3375	993	2.55	1043	2.81	1090	3.07	1136	3.33	1179	3.59
3563	1014	2.81	1063	3.08	1110	3.36	1154	3.63	1198	3.91
3750	1037	3.09	1084	3.38	1130	3.66	1174	3.95	1216	4.24

NOTE: For more information, see General Fan Performance Notes.

Standard static 518 – 733 RPM, 1.7 BHP max
Medium static 690 – 936 RPM, 2.4 BHP max
High static 838 – 1084 RPM, 3.7 BHP max

FAN PERFORMANCE (BELT DRIVE) cont.

Table 48 – 48HC11** **3 PHASE** **10 TON VERTICAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3000	616	0.79	689	0.97	757	1.16	821	1.36	882	1.57
3250	655	0.96	724	1.16	788	1.37	849	1.58	907	1.80
3500	695	1.17	760	1.38	821	1.60	879	1.83	934	2.06
3750	736	1.41	797	1.63	855	1.86	910	2.10	963	2.35
4000	777	1.68	834	1.91	889	2.16	942	2.41	993	2.67
4250	818	1.98	873	2.23	925	2.49	976	2.75	1025	3.02
4500	860	2.32	912	2.58	962	2.85	1010	3.13	1057	3.41
4750	902	2.69	951	2.97	999	3.26	1046	3.55	1091	3.84
5000	944	3.11	991	3.40	1037	3.70	1082	4.00	1125	4.31

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3000	939	1.79	994	2.01	1047	2.24	1098	2.47	1147	2.71
3250	962	2.03	1015	2.26	1066	2.50	1115	2.75	1163	3.00
3500	987	2.30	1038	2.54	1088	2.80	1135	3.05	1181	3.32
3750	1014	2.60	1063	2.86	1111	3.12	1157	3.39	1202	3.66
4000	1042	2.93	1090	3.20	1136	3.48	1180	3.76	1224	4.04
4250	1072	3.30	1118	3.58	1162	3.87	1205	4.16	1247	4.46
4500	1103	3.70	1147	4.00	1190	4.29	1232	4.60	–	–
4750	1135	4.14	1177	4.45	–	–	–	–	–	–
5000	1167	4.63	–	–	–	–	–	–	–	–

NOTE: For more information, see General Fan Performance Notes.

Standard static 591 – 838 RPM, 2.4 BHP max
Medium static 838 – 1084 RPM, 3.7 BHP max
High static 1022 – 1240 RPM, 4.9 BHP max

Table 49 – 48HC11** **3 PHASE** **10 TON HORIZONTAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3000	579	0.70	660	0.89	732	1.09	799	1.29	860	1.50
3250	613	0.85	690	1.06	760	1.27	823	1.49	883	1.71
3500	648	1.03	721	1.25	788	1.48	850	1.71	907	1.95
3750	683	1.23	753	1.47	817	1.71	877	1.96	933	2.21
4000	719	1.45	786	1.71	848	1.97	905	2.23	959	2.50
4250	756	1.71	819	1.98	879	2.26	934	2.53	987	2.81
4500	792	1.99	853	2.28	910	2.57	964	2.87	1015	3.16
4750	830	2.31	888	2.62	943	2.92	995	3.23	1044	3.54
5000	867	2.66	923	2.98	976	3.30	1026	3.63	1074	3.95

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3000	917	1.70	970	1.91	1021	2.13	1070	2.34	1117	2.56
3250	938	1.93	991	2.16	1041	2.38	1089	2.61	1134	2.85
3500	961	2.18	1013	2.42	1062	2.66	1108	2.91	1153	3.15
3750	985	2.46	1035	2.71	1083	2.97	1129	3.23	1173	3.49
4000	1011	2.76	1059	3.03	1106	3.30	1151	3.58	1194	3.85
4250	1037	3.09	1084	3.38	1130	3.66	1174	3.95	1216	4.24
4500	1064	3.46	1110	3.76	1155	4.06	1198	4.36	1239	4.66
4750	1091	3.85	1137	4.16	1180	4.48	–	–	–	–
5000	1120	4.28	1164	4.61	–	–	–	–	–	–

NOTE: For more information, see General Fan Performance Notes.

Standard static 591 – 838 RPM, 2.4 BHP max
Medium static 838 – 1084 RPM, 3.7 BHP max
High static 1022 – 1240 RPM, 4.9 BHP max

FAN PERFORMANCE (BELT DRIVE) cont.

Table 50 – 48HC12** **3 PHASE** **10 TON VERTICAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3000	616	0.79	689	0.97	757	1.16	821	1.36	882	1.57
3250	655	0.96	724	1.16	788	1.37	849	1.58	907	1.80
3500	695	1.17	760	1.38	821	1.60	879	1.83	934	2.06
3750	736	1.41	797	1.63	855	1.86	910	2.10	963	2.35
4000	777	1.68	834	1.91	889	2.16	942	2.41	993	2.67
4250	818	1.98	873	2.23	925	2.49	976	2.75	1025	3.02
4500	860	2.32	912	2.58	962	2.85	1010	3.13	1057	3.41
4750	902	2.69	951	2.97	999	3.26	1046	3.55	1091	3.84
5000	944	3.11	991	3.40	1037	3.70	1082	4.00	1125	4.31

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3000	939	1.79	994	2.01	1047	2.24	1098	2.47	1147	2.71
3250	962	2.03	1015	2.26	1066	2.50	1115	2.75	1163	3.00
3500	987	2.30	1038	2.54	1088	2.80	1135	3.05	1181	3.32
3750	1014	2.60	1063	2.86	1111	3.12	1157	3.39	1202	3.66
4000	1042	2.93	1090	3.20	1136	3.48	1180	3.76	1224	4.04
4250	1072	3.30	1118	3.58	1162	3.87	1205	4.16	1247	4.46
4500	1103	3.70	1147	4.00	1190	4.29	1232	4.60	–	–
4750	1135	4.14	1177	4.45	–	–	–	–	–	–
5000	1167	4.63	–	–	–	–	–	–	–	–

NOTE: For more information, see General Fan Performance Notes.

Standard static 591 – 838 RPM, 2.4 BHP max
Medium static 838 – 1084 RPM, 3.7 BHP max
High static 1022 – 1240 RPM, 4.9 BHP max

Table 51 – 48HC12** **3 PHASE** **10 TON HORIZONTAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3000	579	0.70	660	0.89	732	1.09	799	1.29	860	1.50
3250	613	0.85	690	1.06	760	1.27	823	1.49	883	1.71
3500	648	1.03	721	1.25	788	1.48	850	1.71	907	1.95
3750	683	1.23	753	1.47	817	1.71	877	1.96	933	2.21
4000	719	1.45	786	1.71	848	1.97	905	2.23	959	2.50
4250	756	1.71	819	1.98	879	2.26	934	2.53	987	2.81
4500	792	1.99	853	2.28	910	2.57	964	2.87	1015	3.16
4750	830	2.31	888	2.62	943	2.92	995	3.23	1044	3.54
5000	867	2.66	923	2.98	976	3.30	1026	3.63	1074	3.95

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3000	917	1.70	970	1.91	1021	2.13	1070	2.34	1117	2.56
3250	938	1.93	991	2.16	1041	2.38	1089	2.61	1134	2.85
3500	961	2.18	1013	2.42	1062	2.66	1108	2.91	1153	3.15
3750	985	2.46	1035	2.71	1083	2.97	1129	3.23	1173	3.49
4000	1011	2.76	1059	3.03	1106	3.30	1151	3.58	1194	3.85
4250	1037	3.09	1084	3.38	1130	3.66	1174	3.95	1216	4.24
4500	1064	3.46	1110	3.76	1155	4.06	1198	4.36	1239	4.66
4750	1091	3.85	1137	4.16	1180	4.48	–	–	–	–
5000	1120	4.28	1164	4.61	–	–	–	–	–	–

NOTE: For more information, see General Fan Performance Notes.

Standard static 591 – 838 RPM, 2.4 BHP max
Medium static 838 – 1084 RPM, 3.7 BHP max
High static 1022 – 1240 RPM, 4.9 BHP max

FAN PERFORMANCE (BELT DRIVE) cont.

Table 52 – 48HC14** **3 PHASE** **12.5 TON VERTICAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3438	431	0.59	504	0.81	574	1.08	643	1.40	706	1.74
3750	456	0.71	524	0.95	589	1.22	653	1.54	715	1.90
4063	481	0.86	546	1.11	606	1.39	666	1.71	725	2.07
4375	507	1.03	569	1.30	626	1.59	681	1.91	736	2.27
4688	533	1.22	593	1.51	647	1.81	698	2.13	750	2.49
5000	560	1.44	617	1.74	669	2.05	718	2.39	766	2.75
5313	587	1.68	642	2.00	691	2.33	738	2.67	784	3.04
5625	614	1.95	667	2.29	715	2.63	760	2.99	804	3.36
5938	642	2.25	692	2.60	739	2.97	782	3.34	824	3.72
6250	670	2.58	718	2.95	763	3.33	805	3.72	846	4.11

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3438	763	2.10	815	2.46	862	2.82	905	3.18	946	3.55
3750	772	2.28	825	2.66	873	3.05	918	3.45	959	3.84
4063	781	2.46	834	2.87	883	3.29	929	3.71	971	4.14
4375	790	2.66	843	3.09	892	3.53	938	3.98	982	4.43
4688	801	2.89	852	3.32	901	3.78	947	4.25	991	4.73
5000	814	3.15	863	3.58	910	4.04	956	4.53	999	5.03
5313	830	3.44	875	3.87	920	4.33	965	4.83	1008	5.34
5625	847	3.77	890	4.20	933	4.66	975	5.15	1017	5.67
5938	865	4.13	906	4.56	947	5.03	987	5.52	1028	6.04
6250	885	4.53	924	4.97	962	5.43	1001	5.92	–	–

NOTE: For more information, see General Fan Performance Notes.

Standard static 440 – 609 RPM, 2.9 BHP max

Medium static 609 – 778 RPM, 3.7 BHP max

High static 776 – 955 RPM, 6.1 BHP max

Table 53 – 48HC14** **3 PHASE** **12.5 TON HORIZONTAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3438	421	0.57	493	0.78	561	1.02	627	1.30	688	1.62
3750	445	0.69	512	0.91	576	1.17	638	1.45	697	1.77
4063	470	0.84	533	1.07	593	1.33	651	1.62	707	1.94
4375	496	1.00	555	1.25	612	1.52	666	1.82	720	2.14
4688	522	1.19	579	1.46	632	1.74	683	2.04	734	2.37
5000	549	1.41	602	1.68	653	1.98	702	2.29	750	2.62
5313	576	1.64	627	1.94	675	2.24	721	2.57	767	2.91
5625	603	1.91	652	2.22	698	2.54	742	2.87	786	3.23
5938	630	2.20	677	2.53	721	2.87	764	3.21	805	3.57
6250	657	2.53	702	2.87	745	3.22	786	3.58	826	3.96

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3438	746	1.96	799	2.32	849	2.70	896	3.09	940	3.50
3750	753	2.12	806	2.48	856	2.88	903	3.28	947	3.70
4063	761	2.29	813	2.67	862	3.07	909	3.48	953	3.92
4375	771	2.50	821	2.88	869	3.28	916	3.70	960	4.15
4688	783	2.73	831	3.11	878	3.52	923	3.95	966	4.40
5000	797	2.99	843	3.37	888	3.78	931	4.22	974	4.67
5313	812	3.28	856	3.67	899	4.08	941	4.52	983	4.98
5625	828	3.60	870	3.99	912	4.41	953	4.85	993	5.31
5938	846	3.95	886	4.36	926	4.78	965	5.22	1004	5.69
6250	865	4.35	904	4.75	942	5.18	979	5.63	–	–

NOTE: For more information, see General Fan Performance Notes.

Standard static 440 – 609 RPM, 2.9 BHP max

Medium static 609 – 778 RPM, 3.7 BHP max

High static 776 – 955 RPM, 6.1 BHP max

FAN PERFORMANCE (cont.)

X13 MULTI-SPEED/TORQUE MOTOR

Table 54 – 48HC*A04 Vertical Unit-Direct Drive

Speed (Torque) Tap	CFM	ESP	BHP
1	900	0.30	0.19
	975	0.17	0.17
	1050	0.06	0.16
	1125	–	–
	1200	–	–
	1275	–	–
	1350	–	–
	1425	–	–
	1500	–	–
2	900	0.48	0.25
	975	0.34	0.23
	1050	0.20	0.22
	1125	0.07	0.20
	1200	–	–
	1275	–	–
	1350	–	–
	1425	–	–
	1500	–	–
3	900	0.84	0.38
	975	0.69	0.36
	1050	0.53	0.33
	1125	0.38	0.32
	1200	0.24	0.31
	1275	0.10	0.31
	1350	–	–
	1425	–	–
	1500	–	–
4	900	0.99	0.43
	975	0.88	0.43
	1050	0.75	0.43
	1125	0.61	0.43
	1200	0.47	0.42
	1275	0.33	0.40
	1350	0.19	0.38
	1425	–	–
	1500	–	–
5	900	1.10	0.47
	975	1.02	0.49
	1050	0.75	0.51
	1125	0.61	0.54
	1200	0.81	0.56
	1275	0.74	0.58
	1350	0.67	0.61
	1425	0.60	0.63
	1500	0.52	0.66

Table 55 – 48HC*A04 Horizontal Unit-Direct Drive

Speed (Torque) Tap	CFM	ESP	BHP
1	900	0.45	0.23
	975	0.33	0.22
	1050	0.22	0.20
	1125	0.12	0.19
	1200	0.05	0.17
	1275	–	–
	1350	–	–
	1425	–	–
	1500	–	–
2	900	0.66	0.30
	975	0.52	0.28
	1050	0.39	0.27
	1125	0.27	0.26
	1200	0.16	0.24
	1275	0.05	0.23
	1350	–	–
	1425	–	–
	1500	–	–
3	900	1.01	0.43
	975	0.88	0.41
	1050	0.73	0.39
	1125	0.59	0.38
	1200	0.46	0.36
	1275	0.33	0.36
	1350	0.21	0.33
	1425	0.09	0.31
	1500	–	–
4	900	1.13	0.46
	975	1.03	0.46
	1050	0.92	0.46
	1125	0.81	0.46
	1200	0.69	0.46
	1275	0.57	0.45
	1350	0.44	0.44
	1425	0.31	0.42
	1500	0.18	0.40
5	900	1.20	0.49
	975	1.14	0.51
	1050	0.92	0.53
	1125	0.81	0.55
	1200	0.95	0.57
	1275	0.90	0.60
	1350	0.84	0.62
	1425	0.78	0.65
	1500	0.72	0.68

FAN PERFORMANCE (cont.)

X13 MULTI-SPEED/TORQUE MOTOR (cont.)

Table 56 – 48HC*A05 Vertical Unit-Direct Drive

Speed (Torque) Tap	CFM	ESP	BHP
1	1200	0.38	0.30
	1300	0.24	0.28
	1400	0.12	0.27
	1500	0.01	0.26
	1600	–	–
	1700	–	–
	1800	–	–
	1900	–	–
	2000	–	–
2	1200	0.49	0.34
	1300	0.34	0.32
	1400	0.20	0.31
	1500	0.05	0.29
	1600	–	–
	1700	–	–
	1800	–	–
	1900	–	–
	2000	–	–
3	1200	0.87	0.56
	1300	0.74	0.57
	1400	0.60	0.59
	1500	0.44	0.56
	1600	0.29	0.50
	1700	0.14	0.47
	1800	0.02	0.46
	1900	–	–
	2000	–	–
4	1200	0.93	0.57
	1300	0.83	0.60
	1400	0.72	0.63
	1500	0.60	0.63
	1600	0.48	0.62
	1700	0.35	0.62
	1800	0.21	0.61
	1900	0.06	0.58
	2000	–	–
5	1200	0.97	0.58
	1300	0.89	0.61
	1400	0.72	0.65
	1500	0.60	0.68
	1600	0.64	0.72
	1700	0.55	0.75
	1800	0.46	0.79
	1900	0.35	0.82
	2000	0.25	0.86

Table 57 – 48HC*A05 Horizontal Unit-Direct Drive

Speed (Torque) Tap	CFM	ESP	BHP
1	1200	0.49	0.35
	1300	0.34	0.33
	1400	0.20	0.31
	1500	0.06	0.29
	1600	–	–
	1700	–	–
	1800	–	–
	1900	–	–
	2000	–	–
2	1200	0.60	0.40
	1300	0.45	0.38
	1400	0.30	0.36
	1500	0.16	0.34
	1600	0.01	0.32
	1700	–	–
	1800	–	–
	1900	–	–
	2000	–	–
3	1200	0.94	0.59
	1300	0.83	0.61
	1400	0.71	0.63
	1500	0.59	0.61
	1600	0.46	0.59
	1700	0.33	0.56
	1800	0.19	0.53
	1900	0.07	0.49
	2000	–	–
4	1200	0.98	0.59
	1300	0.89	0.62
	1400	0.81	0.65
	1500	0.72	0.66
	1600	0.62	0.67
	1700	0.52	0.68
	1800	0.40	0.68
	1900	0.27	0.66
	2000	0.12	0.61
5	1200	1.02	0.60
	1300	0.95	0.63
	1400	0.81	0.67
	1500	0.72	0.70
	1600	0.74	0.74
	1700	0.67	0.78
	1800	0.59	0.82
	1900	0.51	0.86
	2000	0.42	0.89

FAN PERFORMANCE (cont.)

X13 MULTI-SPEED/TORQUE MOTOR (cont.)

Table 58 – 48HC*A06 Vertical Unit-Direct Drive

Speed (Torque) Tap	CFM	ESP	BHP
1	1500	0.27	0.45
	1625	0.08	0.43
	1750	–	–
	1875	–	–
	2000	–	–
	2125	–	–
	2250	–	–
	2375	–	–
	2500	–	–
2	1500	0.48	0.57
	1625	0.26	0.55
	1750	0.08	0.53
	1875	–	–
	2000	–	–
	2125	–	–
	2250	–	–
	2375	–	–
	2500	–	–
3	1500	0.91	0.82
	1625	0.72	0.82
	1750	0.52	0.81
	1875	0.31	0.78
	2000	0.11	0.77
	2125	–	–
	2250	–	–
	2375	–	–
	2500	–	–
4	1500	0.98	0.85
	1625	0.82	0.89
	1750	0.66	0.92
	1875	0.50	0.90
	2000	0.32	0.92
	2125	0.13	0.86
	2250	–	–
	2375	–	–
	2500	–	–
5	1500	1.00	–
	1625	0.86	0.91
	1750	0.66	0.95
	1875	0.50	0.98
	2000	0.41	1.01
	2125	0.25	0.88
	2250	0.06	1.01
	2375	–	–
	2500	–	–

Table 59 – 48HC*A06 Horizontal Unit-Direct Drive

Speed (Torque) Tap	CFM	ESP	BHP
1	1500	0.40	0.50
	1625	0.20	0.48
	1750	0.04	0.45
	1875	–	–
	2000	–	–
	2125	–	–
	2250	–	–
	2375	–	–
	2500	–	–
2	1500	0.62	0.62
	1625	0.39	0.60
	1750	0.19	0.57
	1875	0.03	0.53
	2000	–	–
	2125	–	–
	2250	–	–
	2375	–	–
	2500	–	–
3	1500	1.04	0.87
	1625	0.87	0.88
	1750	0.68	0.88
	1875	0.48	0.84
	2000	0.28	0.84
	2125	0.07	0.84
	2250	–	–
	2375	–	–
	2500	–	–
4	1500	1.10	0.90
	1625	0.96	0.94
	1750	0.81	0.98
	1875	0.65	0.95
	2000	0.47	1.00
	2125	0.27	0.94
	2250	0.05	0.96
	2375	–	–
	2500	–	–
5	1500	1.12	0.92
	1625	1.00	0.96
	1750	0.81	1.00
	1875	0.65	1.04
	2000	0.56	1.08
	2125	0.39	0.95
	2250	0.19	1.09
	2375	–	–
	2500	–	–

FAN PERFORMANCE (cont.)

Table 60 – PULLEY ADJUSTMENT

UNIT		Motor/Drive Combo	Motor Pulley turns open										
			0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
04	1 Phase	Standard Static	854	825	795	766	736	707	678	648	619	589	560
		Medium Static	1175	1135	1094	1054	1013	973	932	892	851	811	770
	3 Phase	Standard Static*	854	825	795	766	736	707	678	648	619	589	560
		Medium Static*	1175	1135	1094	1054	1013	973	932	892	851	811	770
		High Static	1466	1423	1380	1337	1294	1251	1207	1164	1121	1078	1035
05	1 Phase	Standard Static	854	825	795	766	736	707	678	648	619	589	560
		Medium Static	1175	1135	1094	1054	1013	973	932	892	851	811	770
	3 Phase	Standard Static*	854	825	795	766	736	707	678	648	619	589	560
		Medium Static*	1175	1135	1094	1054	1013	973	932	892	851	811	770
		Medium Static	1303	1265	1226	1188	1150	1112	1073	1035	997	958	920
		High Static	1639	1596	1553	1510	1467	1424	1380	1337	1294	1251	1208
06	1 Phase	Standard Static	1175	1135	1094	1054	1013	973	932	892	851	811	770
		Medium Static	1466	1423	1380	1337	1294	1251	1207	1164	1121	1078	1035
	3 Phase	Standard Static*	1175	1135	1094	1054	1013	973	932	892	851	811	770
		Medium Static*	1466	1423	1380	1337	1294	1251	1207	1164	1121	1078	1035
		High Static	1687	1649	1610	1572	1533	1495	1457	1418	1380	1341	1303
07	3 Phase	Standard Static	747	721	695	670	644	618	592	566	541	515	489
		Medium Static	949	927	906	884	863	841	819	798	776	755	733
		High Static	1102	1083	1063	1044	1025	1006	986	967	948	928	909
08	3 Phase	Standard Static	733	712	690	669	647	626	604	583	561	540	518
		Medium Static	936	911	887	862	838	813	788	764	739	715	690
		High Static	1084	1059	1035	1010	986	961	936	912	887	863	838
09	3 Phase	Standard Static	733	712	690	669	647	626	604	583	561	540	518
		Medium Static	936	911	887	862	838	813	788	764	739	715	690
		High Static	1084	1059	1035	1010	986	961	936	912	887	863	838
11	3 Phase	Standard Static	838	813	789	764	739	715	690	665	640	616	591
		Medium Static	1084	1059	1035	1010	986	961	936	912	887	863	838
		High Static	1240	1218	1196	1175	1153	1131	1109	1087	1066	1044	1022
12	3 Phase	Standard Static	838	813	789	764	739	715	690	665	640	616	591
		Medium Static	1084	1059	1035	1010	986	961	936	912	887	863	838
		High Static	1240	1218	1196	1175	1153	1131	1109	1087	1066	1044	1022
14	3 Phase	Standard Static	609	592	575	558	541	525	508	491	474	457	440
		Medium Static	778	761	744	727	710	694	677	660	643	626	609
		High Static	955	973	951	929	907	886	864	842	820	798	776

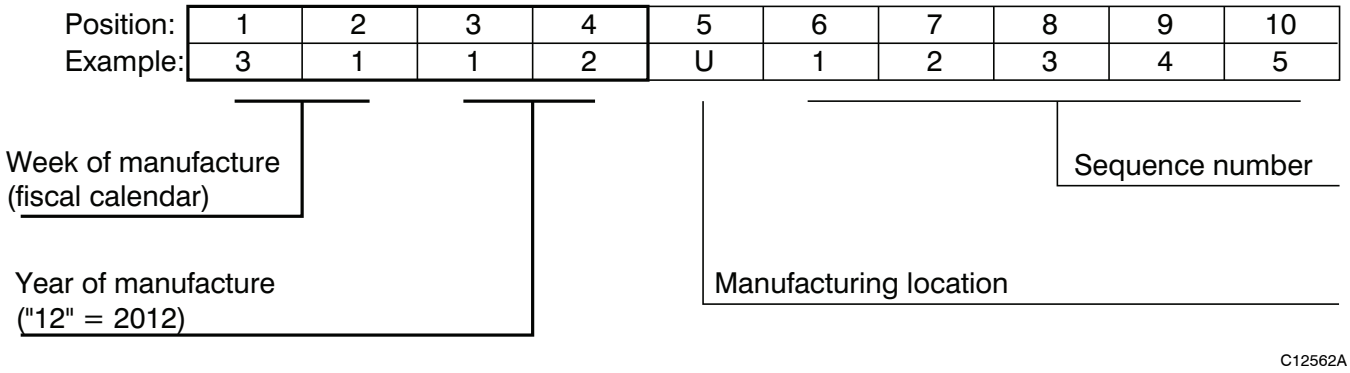
– Factory settings

* Humidi–MiZer models only

ELECTRICAL DATA FOR UNITS PRODUCED ON OR AFTER JULY 30, 2012

NOTE: Check the serial number of unit to verify production date.

To confirm the date of manufacture, locate the unit nameplate and check the first four digits of the Serial Number. If the number listed in the first 4 digits of the Serial Number is 3112 or higher, the unit was produced on or after July 30, 2012.



ELECTRICAL INFORMATION
(UNITS PRODUCED ON OR AFTER JULY 30, 2012)

Table 61 – 48HC04 SINGLE STAGE COOLING WITH SINGLE SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP (ea)		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208–1–60	187	253	16.6	79	190	1.0	DD–STD	78%	7.4
					190	1.0	STD	67%	4.9
					190	1.0	MED	67%	4.9
230–1–60	187	253	16.6	79	190	1.0	DD–STD	78%	7.4
					190	1.0	STD	67%	4.9
					190	1.0	MED	67%	4.9
208–3–60	187	253	10.4	73	190	1.0	DD–STD	78%	7.4
					190	1.0	STD	75%	5.2
					190	1.0	MED	75%	5.2
					190	1.0	HIGH	87%	6.9
230–3–60	187	253	10.4	73	190	1.0	DD–STD	78%	7.4
					190	1.0	STD	75%	5.2
					190	1.0	MED	75%	5.2
					190	1.0	HIGH	87%	6.7
460–3–60	414	506	5.8	38	190	0.5	DD–STD	78%	4.0
					190	0.5	STD	75%	2.6
					190	0.5	MED	75%	2.6
					190	0.5	HIGH	87%	3.4
575–3–60	518	633	3.8	37	190	0.5	DD–STD	78%	4.0
					190	0.5	STD	73%	1.2
					190	0.5	MED	73%	1.2
					190	0.5	HIGH	78%	2.0

Table 62 – 48HC05 SINGLE STAGE COOLING WITH SINGLE SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP (ea)		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208–1–60	187	253	21.8	117	325	1.4	DD–STD	78%	7.4
					325	1.4	STD	67%	4.9
					325	1.4	MED	67%	4.9
230–1–60	187	253	21.8	117	325	1.4	DD–STD	78%	7.4
					325	1.4	STD	67%	4.9
					325	1.4	MED	67%	4.9
208–3–60	187	253	13.7	83	325	1.4	DD–STD	78%	7.4
					325	1.4	STD	75%	5.2
					325	1.4	MED	87%	5.2
					325	1.4	HIGH	89%	8.4
230–3–60	187	253	13.7	83	325	1.4	DD–STD	78%	7.4
					325	1.4	STD	75%	5.2
					325	1.4	MED	87%	4.9
					325	1.4	HIGH	89%	8.3
460–3–60	414	506	6.2	41	325	0.9	DD–STD	78%	4.0
					325	0.9	STD	75%	2.6
					325	0.9	MED	87%	2.5
					325	0.9	HIGH	89%	4.2
575–3–60	518	633	4.8	33	325	0.9	DD–STD	78%	4.0
					325	0.9	STD	73%	1.2
					325	0.9	MED	72%	1.6
					325	0.9	HIGH	77%	2.8

ELECTRICAL INFORMATION
(UNITS PRODUCED ON OR AFTER JULY 30, 2012)

Table 63 – 48HC06 SINGLE STAGE COOLING WITH SINGLE SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP (ea)		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208–1–60	187	253	25.0	134	325	1.4	DD–STD	78%	7.4
					325	1.4	STD	67%	4.9
					325	1.4	MED	76%	7.0
230–1–60	187	253	25.0	134	325	1.4	DD–STD	78%	7.4
					325	1.4	STD	67%	4.9
					325	1.4	MED	76%	7.0
208–3–60	187	253	15.9	110	325	1.4	DD–STD	78%	7.4
					325	1.4	STD	75%	5.2
					325	1.4	MED	87%	6.9
					325	1.4	HIGH	89%	8.4
230–3–60	187	253	15.9	110	325	1.4	DD–STD	78%	7.4
					325	1.4	STD	75%	5.2
					325	1.4	MED	87%	6.7
					325	1.4	HIGH	89%	8.3
460–3–60	414	506	7.0	52	325	0.9	DD–STD	78%	4.0
					325	0.9	STD	75%	2.6
					325	0.9	MED	87%	3.4
					325	0.9	HIGH	89%	4.2
575–3–60	518	633	5.1	40	325	0.9	DD–STD	78%	4.0
					325	0.9	STD	73%	1.2
					325	0.9	MED	78%	2.0
					325	0.9	HIGH	77%	2.8

Table 64 – 48HC07 SINGLE STAGE COOLING WITH SINGLE SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP (ea)		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208–3–60	187	253	19.0	123	325	1.5	STD	87%	5.2
					325	1.5	MED	89%	8.4
					325	1.5	HIGH	83%	13.6
230–3–60	187	253	19.0	123	325	1.5	STD	87%	4.9
					325	1.5	MED	89%	8.3
					325	1.5	HIGH	83%	12.7
460–3–60	414	506	9.7	62	325	0.8	STD	87%	2.5
					325	0.8	MED	89%	4.2
					325	0.8	HIGH	83%	6.4
575–3–60	518	633	7.4	50	325	0.6	STD	72%	1.6
					325	0.6	MED	77%	2.8
					325	0.6	HIGH	81%	5.6

ELECTRICAL INFORMATION
(UNITS PRODUCED ON OR AFTER JULY 30, 2012)

Table 65 – 48HC08** **2-STAGE COOLING WITH SINGLE SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP (Cir 1)		COMP (Cir 2)		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208–3–60	187	253	13.6	83	13.6	83	325	1.5	STD	87%	5.2
							325	1.5	MED	87%	6.9
							325	1.5	HIGH	87%	10.6
230–3–60	187	253	13.6	83	13.6	83	325	1.5	STD	87%	4.9
							325	1.5	MED	87%	6.7
							325	1.5	HIGH	87%	10.6
460–3–60	414	506	6.1	41	6.1	41	325	0.8	STD	87%	2.5
							325	0.8	MED	87%	3.4
							325	0.8	HIGH	87%	5.3
575–3–60	518	633	4.2	33	4.2	33	325	0.6	STD	72%	1.6
							325	0.6	MED	78%	2
							325	0.6	HIGH	77%	2.8

Table 66 – 48HC09** **2-STAGE COOLING WITH SINGLE SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP (Cir 1)		COMP (Cir 2)		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208–3–60	187	253	13.7	83	13.7	83	325	1.5	STD	87%	5.2
							325	1.5	MED	87%	6.9
							325	1.5	HIGH	87%	10.6
230–3–60	187	253	13.7	83	13.7	83	325	1.5	STD	87%	4.9
							325	1.5	MED	87%	6.7
							325	1.5	HIGH	87%	10.6
460–3–60	414	506	6.2	41	6.2	41	325	0.8	STD	87%	2.5
							325	0.8	MED	87%	3.4
							325	0.8	HIGH	87%	5.3
575–3–60	518	633	4.8	33	4.8	33	325	0.6	STD	72%	1.6
							325	0.6	MED	78%	2
							325	0.6	HIGH	77%	2.8

Table 67 – 48HC11** **2-STAGE COOLING WITH SINGLE SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP (Cir 1)		COMP (Cir 2)		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208–3–60	187	253	15.9	110	15.9	110	610	7.4	STD	87%	6.9
							610	7.4	MED	87%	10.6
							610	7.4	HIGH	83%	13.6
230–3–60	187	253	15.9	110	15.9	110	610	7.4	STD	87%	6.7
							610	7.4	MED	87%	10.6
							610	7.4	HIGH	83%	12.7
460–3–60	414	506	7.0	52	7.0	52	610	3.6	STD	87%	3.4
							610	3.6	MED	87%	5.3
							610	3.6	HIGH	83%	6.4
575–3–60	518	633	5.1	40	5.1	40	610	3.6	STD	78%	2
							610	3.6	MED	77%	2.8
							610	3.6	HIGH	81%	5.6

ELECTRICAL INFORMATION
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Table 68 – 48HC12** **2-STAGE COOLING WITH SINGLE SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP (Cir 1)		COMP (Cir 2)		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208–3–60	187	253	15.9	110	15.9	110	1070	6.2	STD	87%	6.9
							1070	6.2	MED	87%	10.6
							1070	6.2	HIGH	83%	13.6
230–3–60	187	253	15.9	110	15.9	110	1070	6.2	STD	87%	6.7
							1070	6.2	MED	87%	10.6
							1070	6.2	HIGH	83%	12.7
460–3–60	414	506	7.7	52	7.7	52	1070	3.1	STD	87%	3.4
							1070	3.1	MED	87%	5.3
							1070	3.1	HIGH	83%	6.4
575–3–60	518	633	5.7	39	5.7	39	1070	2.5	STD	78%	2
							1070	2.5	MED	77%	2.8
							1070	2.5	HIGH	81%	5.6

Table 69 – 48HC14** **2-STAGE COOLING WITH SINGLE SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP (Cir 1)		COMP (Cir 2)		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208–3–60	187	253	19.0	123	19.0	123	280	1.5	STD	89%	8.4
							280	1.5	MED	87%	10.6
							280	1.5	HIGH	90%	20.4
230–3–60	187	253	19.0	123	19.0	123	280	1.5	STD	89%	8.3
							280	1.5	MED	87%	10.6
							280	1.5	HIGH	90%	20.4
460–3–60	414	506	9.7	62	9.7	62	280	0.8	STD	89%	4.2
							280	0.8	MED	87%	5.3
							280	0.8	HIGH	90%	10.2
575–3–60	518	633	7.4	50	7.4	50	280	0.7	STD	77%	2.8
							280	0.7	MED	77%	2.8
							280	0.7	HIGH	94%	9

ELECTRICAL INFORMATION
(UNITS PRODUCED ON OR AFTER JULY 30, 2012)

Table 70 – 48HC08** **2-STAGE COOLING WITH 2-SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP (Cir 1)		COMP (Cir 2)		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208–3–60	187	253	13.6	83	13.6	83	325	1.5	STD	84%	5.8
							325	1.5	MED	77%	7.1
							325	1.5	HIGH	82%	10.8
230–3–60	187	253	13.6	83	13.6	83	325	1.5	STD	84%	5.6
							325	1.5	MED	77%	6.8
							325	1.5	HIGH	82%	9.8
460–3–60	414	506	6.1	41	6.1	41	325	0.8	STD	79%	2.9
							325	0.8	MED	77%	3.8
							325	0.8	HIGH	82%	4.9
575–3–60	518	633	4.2	33	4.2	33	325	0.6	STD	81%	2.8
							325	0.6	MED	80%	3.5
							325	0.6	HIGH	84%	4.5

Table 71 – 48HC09** **2-STAGE COOLING WITH 2-SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP (Cir 1)		COMP (Cir 2)		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208–3–60	187	253	13.7	83	13.7	83	325	1.5	STD	84%	5.8
							325	1.5	MED	77%	7.1
							325	1.5	HIGH	82%	10.8
230–3–60	187	253	13.7	83	13.7	83	325	1.5	STD	84%	5.6
							325	1.5	MED	77%	6.8
							325	1.5	HIGH	82%	9.8
460–3–60	414	506	6.2	41	6.2	41	325	0.8	STD	79%	2.9
							325	0.8	MED	77%	3.8
							325	0.8	HIGH	82%	4.9
575–3–60	518	633	4.8	33	4.8	33	325	0.6	STD	81%	2.8
							325	0.6	MED	80%	3.5
							325	0.6	HIGH	84%	4.5

Table 72 – 48HC11** **2-STAGE COOLING WITH 2-SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP (Cir 1)		COMP (Cir 2)		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208–3–60	187	253	15.9	110	15.9	110	610	7.4	STD	77%	7.1
							610	7.4	MED	82%	10.8
							610	7.4	HIGH	84%	13.6
230–3–60	187	253	15.9	110	15.9	110	610	7.4	STD	77%	6.8
							610	7.4	MED	82%	9.8
							610	7.4	HIGH	84%	12.7
460–3–60	414	506	7.0	52	7.0	52	610	3.6	STD	77%	3.8
							610	3.6	MED	82%	4.9
							610	3.6	HIGH	84%	6.4
575–3–60	518	633	5.1	40	5.1	40	610	3.6	STD	80%	3.5
							610	3.6	MED	84%	4.5
							610	3.6	HIGH	83%	6.2

ELECTRICAL INFORMATION
(UNITS PRODUCED ON OR AFTER JULY 30, 2012)

Table 73 – 48HC12** **2-STAGE COOLING WITH 2-SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP (Cir 1)		COMP (Cir 2)		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208–3–60	187	253	15.9	110	15.9	110	1070	6.2	STD	77%	7.1
							1070	6.2	MED	82%	10.8
							1070	6.2	HIGH	84%	13.6
230–3–60	187	253	15.9	110	15.9	110	1070	6.2	STD	77%	6.8
							1070	6.2	MED	82%	9.8
							1070	6.2	HIGH	84%	12.7
460–3–60	414	506	7.7	52	7.7	52	1070	3.1	STD	77%	3.8
							1070	3.1	MED	82%	4.9
							1070	3.1	HIGH	84%	6.4
575–3–60	518	633	5.7	39	5.7	39	1070	2.5	STD	80%	3.5
							1070	2.5	MED	84%	4.5
							1070	2.5	HIGH	83%	6.2

Table 74 – 48HC14** **2-STAGE COOLING WITH 2-SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP (Cir 1)		COMP (Cir 2)		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208–3–60	187	253	19.0	123	19.0	123	280	1.5	STD	85%	8.6
							280	1.5	MED	82%	10.8
							280	1.5	HIGH	90%	20.4
230–3–60	187	253	19.0	123	19.0	123	280	1.5	STD	85%	7.8
							280	1.5	MED	82%	9.8
							280	1.5	HIGH	90%	20.4
460–3–60	414	506	9.7	62	9.7	62	280	0.8	STD	85%	3.8
							280	0.8	MED	82%	4.9
							280	0.8	HIGH	90%	10.2
575–3–60	518	633	7.4	50	7.4	50	280	0.7	STD	84%	4.5
							280	0.7	MED	84%	4.5
							280	0.7	HIGH	94%	9

ELECTRICAL INFORMATION
(UNITS PRODUCED ON OR AFTER JULY 30, 2012) cont.

Table 75 – UNIT WIRE/FUSE OR HACR BREAKER SIZING DATA

UNIT	NOM. V–Ph–Hz	IFM TYPE	NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
			NO P.E.				w/ P.E. (pwrd fr/ unit)				NO P.E.				w/ P.E. (pwrd fr/ unit)			
			MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE	
					FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
48HC*A04	208/230–1–60	DD–STD	30	45	29	88	32	45	31	90	34	50	34	93	36	50	36	95
		STD	27	40	26	93	29	45	28	95	32	45	31	98	34	45	34	100
		MED	27	40	26	93	29	45	28	95	32	45	31	98	34	45	34	100
	208/230–3–60	DD–STD	22	30	22	82	24	30	24	84	27	30	27	87	29	35	29	89
		STD	20	25	19	94	22	30	21	96	24	30	25	99	26	30	27	101
		MED	20	25	19	94	22	30	21	96	24	30	25	99	26	30	27	101
		HIGH	21/21	30/30	21/21	132	23/23	30/30	23/23	134	26/26	30/30	27/26	137	28/28	35/35	29/29	139
	460–3–60	DD–STD	12	15	12	43	13	15	13	44	14	20	14	45	15	20	16	46
		STD	11	15	10	48	12	15	11	49	13	15	13	50	14	20	14	51
		MED	11	15	10	48	12	15	11	49	13	15	13	50	14	20	14	51
		HIGH	12	15	11	67	13	15	12	68	14	15	14	69	15	20	15	70
	575–3–60	DD–STD	10	15	10	42	12	15	12	44	11	15	12	44	13	15	14	46
		STD	7	15	6	45	9	15	9	47	9	15	8	47	11	15	10	49
		MED	7	15	6	45	9	15	9	47	9	15	8	47	11	15	10	49
		HIGH	8	15	7	49	10	15	9	51	9	15	9	51	11	15	11	53
48HC*A05	208/230–1–60	DD–STD	37	50	35	127	38	50	37	129	41	60	41	132	43	60	43	134
		STD	34	50	32	132	36	50	35	134	39	60	38	137	41	60	40	139
		MED	34	50	32	132	36	50	35	134	39	60	38	137	41	60	40	139
	208/230–3–60	DD–STD	26	30	26	93	28	40	28	95	31	40	31	98	33	45	34	100
		STD	24	30	23	105	26	30	26	107	29	40	29	110	31	40	31	112
		MED	24/24	30/30	23/23	122	26/26	30/30	26/25	124	29/29	40/40	29/29	127	31/31	40/40	31/31	129
		HIGH	27/27	40/40	27/27	158	29/29	40/40	29/29	160	32/32	45/45	33/32	163	34/34	45/45	35/35	165
	460–3–60	DD–STD	13	15	13	47	14	20	14	48	15	20	15	49	16	20	16	50
		STD	12	15	11	52	13	15	12	53	14	20	14	54	15	20	15	55
		MED	12	15	11	61	13	15	12	62	14	15	14	63	15	20	15	64
		HIGH	13	15	13	79	14	20	14	80	16	20	16	81	17	20	17	82
	575–3–60	DD–STD	11	15	11	39	13	15	13	41	13	15	13	41	15	20	15	43
		STD	9	15	8	42	10	15	10	44	10	15	10	44	12	15	12	46
		MED	9	15	8	42	11	15	11	44	11	15	10	44	13	15	13	46
		HIGH	10	15	10	57	12	15	12	59	12	15	12	59	14	15	14	61

ELECTRICAL INFORMATION
(UNITS PRODUCED ON OR AFTER JULY 30, 2012) cont.

Table 75 - UNIT WIRE/FUSE OR HACR BREAKER SIZING DATA (cont)

UNIT	NOM. V–Ph–Hz	IFM TYPE	NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
			NO P.E.				w/ P.E. (pwrd fr/ unit)				NO P.E.				w/ P.E. (pwrd fr/ unit)			
			MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE	
					FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
48HC*A06	208/230–1–60	DD–STD	41	60	39	144	42	60	41	146	45	60	44	149	47	60	47	151
		STD	38	60	36	149	40	60	38	151	43	60	42	154	45	60	44	156
		MED	40	60	38	174	42	60	41	176	45	60	44	179	47	60	46	181
	208/230–3–60	DD–STD	29	40	28	120	31	45	31	122	34	45	34	125	36	50	36	127
		STD	27	40	26	132	29	40	28	134	32	45	31	137	34	45	34	139
		MED	29/28	40/40	28/28	170	31/30	45/45	30/30	172	33/33	45/45	33/33	175	35/35	50/50	36/35	177
		HIGH	30/30	45/45	30/29	185	32/32	45/45	32/32	187	35/35	50/50	35/35	190	37/37	50/50	37/37	192
	460–3–60	DD–STD	14	20	14	58	15	20	15	59	16	20	16	60	17	20	17	61
		STD	13	15	12	63	14	20	13	64	15	20	15	65	16	20	16	66
		MED	14	20	13	82	15	20	14	83	16	20	16	84	17	20	17	85
		HIGH	14	20	14	90	15	20	15	91	17	20	16	92	18	20	18	93
	575–3–60	DD–STD	12	15	12	46	14	15	14	48	13	15	13	48	15	20	16	50
		STD	9	15	8	49	11	15	10	51	11	15	10	51	13	15	12	53
		MED	10	15	9	53	12	15	11	55	11	15	11	55	13	15	13	57
		HIGH	11	15	10	64	12	15	12	66	12	15	12	66	14	15	14	68
48HC*A07	208/230–3–60	STD	32/32	50/50	31/31	165	36/36	50/50	36/35	169	37/37	50/50	37/36	170	41/41	50/50	41/41	174
		MED	36/36	50/50	35/35	201	39/39	50/50	39/39	205	40/40	50/50	40/40	206	44/44	60/60	45/45	210
		HIGH	41/40	50/50	41/40	217	45/44	60/60	45/44	221	46/45	60/60	46/45	222	49/49	60/60	51/50	226
	460–3–60	STD	17	25	16	84	18	25	18	86	19	25	18	86	21	25	20	88
		MED	18	25	18	102	20	25	20	104	21	25	20	104	22	30	22	106
		HIGH	21	25	20	110	22	30	22	112	23	30	23	112	25	30	25	114
	575–3–60	STD	13	15	12	61	16	20	16	65	14	20	14	63	18	20	18	67
		MED	14	20	13	76	18	20	17	80	15	20	15	78	19	25	19	82
		HIGH	17	20	16	90	20	25	21	94	18	25	18	92	22	25	23	96
48HC*D08	208/230–3–60	STD	39/39	50/50	41/40	208	43/43	50/50	45/45	212	44/44	50/50	46/46	213	48/48	60/60	51/50	217
		MED	41/41	50/50	43/42	229	45/45	50/50	47/47	233	46/46	50/50	48/48	234	50/49	60/60	53/52	238
		HIGH	45	50	47	258	48	60	51	262	49	60	52	263	53	60	57	267
	460–3–60	STD	18	20	19	104	20	25	21	106	20	25	21	106	22	25	23	108
		MED	19	25	20	114	21	25	22	116	21	25	22	116	23	25	24	118
		HIGH	21	25	22	129	23	25	24	131	23	25	24	131	25	30	27	133
	575–3–60	STD	13	15	13	77	17	20	17	81	14	15	15	79	18	20	19	83
		MED	13	15	13	81	17	20	18	85	15	20	15	83	19	20	20	87
		HIGH	14	15	14	92	18	20	19	96	16	20	16	94	19	25	21	98

ELECTRICAL INFORMATION
(UNITS PRODUCED ON OR AFTER JULY 30, 2012) cont.

Table 75 - UNIT WIRE/FUSE OR HACR BREAKER SIZING DATA (cont)

UNIT	NOM. V–Ph–Hz	IFM TYPE	NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
			NO P.E.				w/ P.E. (pwrd fr/ unit)				NO P.E.				w/ P.E. (pwrd fr/ unit)			
			MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE	
					FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
48HC*D09	208/230–3–60	STD	39/39	50/50	41/41	208	43/43	50/50	45/45	212	44/44	50/50	46/46	213	48/48	60/60	51/50	217
		MED	41/41	50/50	43/43	229	45/45	50/50	47/47	233	46/46	50/50	48/48	234	50/50	60/60	53/53	238
		HIGH	45	50	47	258	49	60	52	262	50	60	53	263	53	60	57	267
	460–3–60	STD	19	20	19	104	20	25	21	106	21	25	22	106	23	25	24	108
		MED	19	25	20	114	21	25	22	116	22	25	23	116	23	25	25	118
		HIGH	21	25	22	129	23	25	24	131	24	25	25	131	25	30	27	133
	575–3–60	STD	14	15	14	77	18	20	19	81	16	20	16	79	20	25	21	83
		MED	14	20	15	81	18	20	19	85	16	20	17	83	20	25	21	87
		HIGH	15	20	16	92	19	20	20	96	17	20	18	94	21	25	22	98
48HC*D11	208/230–3–60	STD	51/50	60/60	53/53	284	54/54	60/60	57/57	288	55/55	60/60	59/58	289	59/59	70/70	63/63	293
		MED	54	60	57	313	58	70	62	317	59	70	63	318	63	70	67	322
		HIGH	57/56	70/60	61/60	315	61/60	70/70	65/64	319	62/61	70/70	66/65	320	66/65	80/80	71/70	324
	460–3–60	STD	23	25	24	136	25	30	26	138	25	30	27	138	27	30	29	140
		MED	25	30	26	151	27	30	28	153	27	30	29	153	29	35	31	155
		HIGH	26	30	28	152	28	30	30	154	28	30	30	154	30	35	32	156
	575–3–60	STD	18	20	18	95	21	25	23	99	19	25	20	97	23	25	24	101
		MED	18	20	19	106	22	25	23	110	20	25	21	108	24	25	25	112
		HIGH	21	25	22	120	25	30	27	124	23	25	24	122	27	30	29	126
48HC*D12	208/230–3–60	STD	49/49	60/60	52/51	309	53/53	60/60	56/56	313	54/54	60/60	57/57	314	58/58	70/70	62/61	318
		MED	53	60	56	338	57	70	60	342	58	70	61	343	62	70	66	347
		HIGH	56/55	60/60	59/58	340	60/59	70/70	64/63	344	61/60	70/70	65/64	345	65/64	80/70	69/68	349
	460–3–60	STD	24	30	25	148	26	30	27	150	26	30	28	150	28	30	30	152
		MED	26	30	27	163	28	30	29	165	28	30	30	165	30	35	32	167
		HIGH	27	30	29	164	29	35	31	166	29	35	31	166	31	35	33	168
	575–3–60	STD	18	20	18	105	22	25	23	109	19	25	20	107	23	25	25	111
		MED	19	20	19	116	22	25	24	120	20	25	21	118	24	30	26	122
		HIGH	21	25	22	130	25	30	27	134	23	25	24	132	27	30	29	136
48HC*D14	208/230–3–60	STD	56/56	70/70	59/58	330	60/60	70/70	63/63	334	61/61	70/70	64/64	335	65/65	80/80	68/68	339
		MED	58	70	61	344	62	80	65	348	63	80	67	349	67	80	71	353
		HIGH	68	80	72	350	72	80	77	354	73	80	78	355	77	90	82	359
	460–3–60	STD	29	35	30	166	31	35	32	168	31	40	32	168	33	40	35	170
		MED	30	35	31	173	32	40	33	175	32	40	34	175	34	40	36	177
		HIGH	35	40	37	176	37	45	39	178	37	45	39	178	39	45	41	180
	575–3–60	STD	22	25	23	128	26	30	27	132	24	30	25	130	28	30	29	134
		MED	22	25	23	128	26	30	27	132	24	30	25	130	28	30	29	134
		HIGH	29	35	30	140	32	40	34	144	30	35	32	142	34	40	36	146

ELECTRICAL INFORMATION
(UNITS PRODUCED ON OR AFTER JULY 30, 2012) cont.

Table 76 – UNIT WIRE SIZING DATA WITH FACTORY INSTALLED HACR BREAKER

UNIT	NOM. V–Ph–Hz	IFM TYPE	NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
			NO P.E.				w/ P.E. (pwrd fr/ unit)				NO P.E.				w/ P.E. (pwrd fr/ unit)			
			MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE	
					FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
48HC*A04	208/230–1–60	DD–STD	30	45	29	88	32	45	31	90	34	50	34	93	36	50	36	95
		STD	27	40	26	93	29	45	28	95	32	45	31	98	34	45	34	100
		MED	27	40	26	93	29	45	28	95	32	45	31	98	34	45	34	100
	208/230–3–60	DD–STD	22	30	22	82	24	30	24	84	27	30	27	87	29	35	29	89
		STD	20	25	19	94	22	30	21	96	24	30	25	99	26	30	27	101
		MED	20	25	19	94	22	30	21	96	24	30	25	99	26	30	27	101
		HIGH	21/21	30/30	21/21	132	23/23	30/30	23/23	134	26/26	30/30	27/26	137	28/28	35/35	29/29	139
	460–3–60	DD–STD	12	15	12	43	13	15	13	44	14	20	14	45	15	20	16	46
		STD	11	15	10	48	12	15	11	49	13	15	13	50	14	20	14	51
		MED	11	15	10	48	12	15	11	49	13	15	13	50	14	20	14	51
		HIGH	12	15	11	67	13	15	12	68	14	15	14	69	15	20	15	70
	575–3–60	DD–STD	10	15	10	42	12	15	12	44	11	15	12	44	13	15	14	46
		STD	7	15	6	45	9	15	9	47	9	15	8	47	11	15	10	49
		MED	7	15	6	45	9	15	9	47	9	15	8	47	11	15	10	49
		HIGH	8	15	7	49	10	15	9	51	9	15	9	51	11	15	11	53
48HC*A05	208/230–1–60	DD–STD	37	50	35	127	38	50	37	129	41	60	41	132	43	60	43	134
		STD	34	50	32	132	36	50	35	134	39	60	38	137	41	60	40	139
		MED	34	50	32	132	36	50	35	134	39	60	38	137	41	60	40	139
	208/230–3–60	DD–STD	26	30	26	93	28	40	28	95	31	40	31	98	33	45	34	100
		STD	24	30	23	105	26	30	26	107	29	40	29	110	31	40	31	112
		MED	24/24	30/30	23/23	122	26/26	30/30	26/25	124	29/29	40/40	29/29	127	31/31	40/40	31/31	129
		HIGH	27/27	40/40	27/27	158	29/29	40/40	29/29	160	32/32	45/45	33/32	163	34/34	45/45	35/35	165
	460–3–60	DD–STD	13	15	13	47	14	20	14	48	15	20	15	49	16	20	16	50
		STD	12	15	11	52	13	15	12	53	14	20	14	54	15	20	15	55
		MED	12	15	11	61	13	15	12	62	14	15	14	63	15	20	15	64
		HIGH	13	15	13	79	14	20	14	80	16	20	16	81	17	20	17	82
	575–3–60	DD–STD	11	15	11	39	13	15	13	41	13	15	13	41	15	20	15	43
		STD	9	15	8	42	10	15	10	44	10	15	10	44	12	15	12	46
		MED	9	15	8	42	11	15	11	44	11	15	10	44	13	15	13	46
		HIGH	10	15	10	57	12	15	12	59	12	15	12	59	14	15	14	61

ELECTRICAL INFORMATION
(UNITS PRODUCED ON OR AFTER JULY 30, 2012) cont.

Table 76 - UNIT WIRE SIZING DATA WITH FACTORY INSTALLED HACR BREAKER (cont)

UNIT	NOM. V–Ph–Hz	IFM TYPE	NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
			NO P.E.				w/ P.E. (pwrd fr/ unit)				NO P.E.				w/ P.E. (pwrd fr/ unit)			
			MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE	
					FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
48HC*A06	208/230–1–60	DD–STD	41	60	39	144	42	60	41	146	45	60	44	149	47	60	47	151
		STD	38	60	36	149	40	60	38	151	43	60	42	154	45	60	44	156
		MED	40	60	38	174	42	60	41	176	45	60	44	179	47	60	46	181
	208/230–3–60	DD–STD	29	40	28	120	31	45	31	122	34	45	34	125	36	50	36	127
		STD	27	40	26	132	29	40	28	134	32	45	31	137	34	45	34	139
		MED	29/29	40/40	28/28	170	31/31	45/45	30/30	172	33/33	45/45	33/33	175	35/35	50/50	36/35	177
		HIGH	30/30	45/45	30/29	185	32/32	45/45	32/32	187	35/35	50/50	35/35	190	37/37	50/50	37/37	192
	460–3–60	DD–STD	14	20	14	58	15	20	15	59	16	20	16	60	17	20	17	61
		STD	13	15	12	63	14	20	13	64	15	20	15	65	16	20	16	66
		MED	14	20	13	82	15	20	14	83	16	20	16	84	17	20	17	85
		HIGH	14	20	14	90	15	20	15	91	17	20	16	92	18	20	18	93
	575–3–60	DD–STD	12	15	12	46	14	15	14	48	13	15	13	48	15	20	16	50
		STD	9	15	8	49	11	15	10	51	11	15	10	51	13	15	12	53
		MED	10	15	9	53	12	15	11	55	11	15	11	55	13	15	13	57
		HIGH	11	15	10	64	12	15	12	66	12	15	12	66	14	15	14	68
48HC*A07	208/230–3–60	STD	32/32	50/50	31/31	165	36/36	50/50	36/35	169	37/37	50/50	37/36	170	41/41	50/50	41/41	174
		MED	36/36	50/50	35/35	201	39/39	50/50	39/39	205	40/40	50/50	40/40	206	44/44	60/60	45/45	210
		HIGH	41/41	50/50	41/40	217	45/45	60/60	45/44	221	46/46	60/60	46/45	222	49/49	60/60	51/50	226
	460–3–60	STD	17	25	16	84	18	25	18	86	19	25	18	86	21	25	20	88
		MED	18	25	18	102	20	25	20	104	21	25	20	104	22	30	22	106
		HIGH	21	25	20	110	22	30	22	112	23	30	23	112	25	30	25	114
	575–3–60	STD	13	15	12	61	16	20	16	65	14	20	14	63	18	20	18	67
		MED	14	20	13	76	18	20	17	80	15	20	15	78	19	25	19	82
		HIGH	17	20	16	90	20	25	21	94	18	25	18	92	22	25	23	96
48HC*D08	208/230–3–60	STD	39/39	50/50	41/40	208	43/43	50/50	45/45	212	44/44	50/50	46/46	213	48/48	60/60	51/50	217
		MED	41/41	50/50	43/42	229	45/45	50/50	47/47	233	46/46	50/50	48/48	234	50/50	60/60	53/52	238
		HIGH	45	50	47	258	48	60	51	262	49	60	52	263	53	60	57	267
	460–3–60	STD	18	20	19	104	20	25	21	106	20	25	21	106	22	25	23	108
		MED	19	25	20	114	21	25	22	116	21	25	22	116	23	25	24	118
		HIGH	21	25	22	129	23	25	24	131	23	25	24	131	25	30	27	133
	575–3–60	STD	13	15	13	77	17	20	17	81	14	15	15	79	18	20	19	83
		MED	13	15	13	81	17	20	18	85	15	20	15	83	19	20	20	87
		HIGH	14	15	14	92	18	20	19	96	16	20	16	94	19	25	21	98

ELECTRICAL INFORMATION
(UNITS PRODUCED ON OR AFTER JULY 30, 2012) cont.

Table 76 - UNIT WIRE SIZING DATA WITH FACTORY INSTALLED HACR BREAKER (cont)

UNIT	NOM. V–Ph–Hz	IFM TYPE	NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
			NO P.E.				w/ P.E. (pwrd fr/ unit)				NO P.E.				w/ P.E. (pwrd fr/ unit)			
			MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE	
					FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
48HC*D09	208/230–3–60	STD	39/39	50/50	41/41	208	43/43	50/50	45/45	212	44/44	50/50	46/46	213	48/48	60/60	51/50	217
		MED	41/41	50/50	43/43	229	45/45	50/50	47/47	233	46/46	50/50	48/48	234	50/50	60/60	53/53	238
		HIGH	45	50	47	258	49	60	52	262	50	60	53	263	53	60	57	267
	460–3–60	STD	19	20	19	104	20	25	21	106	21	25	22	106	23	25	24	108
		MED	19	25	20	114	21	25	22	116	22	25	23	116	23	25	25	118
		HIGH	21	25	22	129	23	25	24	131	24	25	25	131	25	30	27	133
	575–3–60	STD	14	15	14	77	18	20	19	81	16	20	16	79	20	25	21	83
		MED	14	20	15	81	18	20	19	85	16	20	17	83	20	25	21	87
		HIGH	15	20	16	92	19	20	20	96	17	20	18	94	21	25	22	98
48HC*D11	208/230–3–60	STD	51/51	60/60	53/53	284	54/54	60/60	57/57	288	55/55	60/60	59/58	289	59/59	70/70	63/63	293
		MED	54	60	57	313	58	70	62	317	59	70	63	318	63	70	67	322
		HIGH	57/57	70/70	61/60	315	61/61	70/70	65/64	319	62/62	70/70	66/65	320	66/66	80/80	71/70	324
	460–3–60	STD	23	25	24	136	25	30	26	138	25	30	27	138	27	30	29	140
		MED	25	30	26	151	27	30	28	153	27	30	29	153	29	35	31	155
		HIGH	26	30	28	152	28	30	30	154	28	30	30	154	30	35	32	156
	575–3–60	STD	18	20	18	95	21	25	23	99	19	25	20	97	23	25	24	101
		MED	18	20	19	106	22	25	23	110	20	25	21	108	24	25	25	112
		HIGH	21	25	22	120	25	30	27	124	23	25	24	122	27	30	29	126
48HC*D12	208/230–3–60	STD	49/49	60/60	52/51	309	53/53	60/60	56/56	313	54/54	60/60	57/57	314	58/58	70/70	62/61	318
		MED	53	60	56	338	57	70	60	342	58	70	61	343	62	70	66	347
		HIGH	56/56	60/60	59/58	340	60/60	70/70	64/63	344	61/61	70/70	65/64	345	65/65	80/80	69/68	349
	460–3–60	STD	24	30	25	148	26	30	27	150	26	30	28	150	28	30	30	152
		MED	26	30	27	163	28	30	29	165	28	30	30	165	30	35	32	167
		HIGH	27	30	29	164	29	35	31	166	29	35	31	166	31	35	33	168
	575–3–60	STD	18	20	18	105	22	25	23	109	19	25	20	107	23	25	25	111
		MED	19	20	19	116	22	25	24	120	20	25	21	118	24	30	26	122
		HIGH	21	25	22	130	25	30	27	134	23	25	24	132	27	30	29	136
48HC*D14	208/230–3–60	STD	56/56	70/70	59/58	330	60/60	70/70	63/63	334	61/61	70/70	64/64	335	65/65	80/80	68/68	339
		MED	58	70	61	344	62	80	65	348	63	80	67	349	67	80	71	353
		HIGH	68	80	72	350	72	80	77	354	73	80	78	355	77	90	82	359
	460–3–60	STD	29	35	30	166	31	35	32	168	31	40	32	168	33	40	35	170
		MED	30	35	31	173	32	40	33	175	32	40	34	175	34	40	36	177
		HIGH	35	40	37	176	37	45	39	178	37	45	39	178	39	45	41	180
	575–3–60	STD	22	25	23	128	26	30	27	132	24	30	25	130	28	30	29	134
		MED	22	25	23	128	26	30	27	132	24	30	25	130	28	30	29	134
		HIGH	29	35	30	140	32	40	34	144	30	35	32	142	34	40	36	146

ELECTRICAL INFORMATION
(UNITS PRODUCED ON OR AFTER JULY 30, 2012) cont.

Table 77 – UNIT WIRE SIZING DATA WITH FACTORY INSTALLED 2 SPEED INDOOR FAN OPTION

UNIT	NOM. V–Ph–Hz	IFM TYPE	NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
			NO P.E.				w/ P.E. (pwrd fr/ unit)				NO P.E.				w/ P.E. (pwrd fr/ unit)			
			MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE	
					FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
48HC*D08	208/230–3–60	STD	40/40	50/50	41/41	195	44/43	50/50	46/46	199	45/44	50/50	47/47	200	48/48	60/60	51/51	204
		MED	41/41	50/50	43/43	199	45/45	50/50	47/47	203	46/46	50/50	48/48	204	50/49	60/60	53/52	208
		HIGH	45/44	50/50	47/46	249	49/48	60/60	52/50	253	50/49	60/60	53/52	254	53/52	60/60	57/56	258
	460–3–60	STD	19	20	19	97	20	25	21	99	21	25	22	99	23	25	24	101
		MED	20	25	20	100	21	25	22	102	22	25	23	102	24	25	25	104
		HIGH	21	25	22	125	22	25	24	127	23	25	24	127	25	30	26	129
	575–3–60	STD	14	15	14	79	18	20	19	83	16	20	16	81	19	25	21	85
		MED	15	20	15	83	18	20	19	87	16	20	17	85	20	25	21	89
		HIGH	16	20	16	92	19	25	21	96	17	20	18	94	21	25	23	98
48HC*D09	208/230–3–60	STD	40/40	50/50	42/41	195	44/44	50/50	46/46	199	45/45	50/50	47/47	200	49/48	60/60	52/51	204
		MED	41/41	50/50	43/43	199	45/45	50/50	47/47	203	46/46	50/50	49/48	204	50/50	60/60	53/53	208
		HIGH	45/44	50/50	47/46	249	49/48	60/60	52/51	253	50/49	60/60	53/52	254	54/53	60/60	57/56	258
	460–3–60	STD	19	25	19	97	21	25	22	99	21	25	22	99	23	25	24	101
		MED	20	25	20	100	22	25	23	102	22	25	23	102	24	25	25	104
		HIGH	21	25	22	125	23	25	24	127	23	25	24	127	25	30	26	129
	575–3–60	STD	15	20	16	79	19	20	20	83	17	20	18	81	21	25	22	85
		MED	16	20	16	83	20	25	21	87	18	20	18	85	21	25	23	89
		HIGH	17	20	18	92	21	25	22	96	19	20	20	94	22	25	24	98
48HC*D11	208/230–3–60	STD	51/50	60/60	53/53	254	55/54	60/60	58/57	258	56/55	60/60	59/58	259	59/59	70/70	63/63	263
		MED	54/53	60/60	58/56	304	58/57	70/70	62/61	308	59/58	70/70	63/62	309	63/62	70/70	67/66	313
		HIGH	57/56	70/60	61/60	315	61/60	70/70	65/64	319	62/61	70/70	66/65	320	66/65	80/80	71/70	324
	460–3–60	STD	24	30	25	122	25	30	27	124	26	30	27	124	28	30	29	126
		MED	25	30	26	147	27	30	28	149	27	30	28	149	29	35	30	151
		HIGH	26	30	28	152	28	30	30	154	28	30	30	154	30	35	32	156
	575–3–60	STD	19	20	20	97	23	25	24	101	21	25	22	99	25	30	26	103
		MED	20	25	21	106	24	25	25	110	22	25	23	108	26	30	27	112
		HIGH	22	25	23	120	26	30	27	124	24	25	25	122	28	30	29	126

ELECTRICAL INFORMATION
(UNITS PRODUCED ON OR AFTER JULY 30, 2012) cont.

Table 77 - UNIT WIRE SIZING DATA WITH FACTORY INSTALLED 2 SPEED INDOOR FAN OPTION (cont)

UNIT	NOM. V–Ph–Hz	IFM TYPE	NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
			NO P.E.				w/ P.E. (pwrd fr/ unit)				NO P.E.				w/ P.E. (pwrd fr/ unit)			
			MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE	
					FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
48HC*D12	208/230–3–60	STD	50/49	60/60	52/52	279	53/53	60/60	56/56	283	54/54	60/60	57/57	284	58/58	70/70	62/61	288
		MED	53/52	60/60	56/55	329	57/56	70/60	60/59	333	58/57	70/70	62/60	334	62/61	70/70	66/65	338
		HIGH	56/55	60/60	59/58	340	60/59	70/70	64/63	344	61/60	70/70	65/64	345	65/64	80/70	69/68	349
	460–3–60	STD	25	30	26	134	26	30	28	136	27	30	28	136	29	35	30	138
		MED	26	30	27	159	28	30	29	161	28	30	29	161	30	35	32	163
		HIGH	27	30	29	164	29	35	31	166	29	35	31	166	31	35	33	168
	575–3–60	STD	19	25	20	107	23	25	24	111	21	25	22	109	25	30	26	113
		MED	20	25	21	116	24	30	26	120	22	25	23	118	26	30	27	122
		HIGH	22	25	23	130	26	30	27	134	24	25	25	132	28	30	29	136
48HC*D14	208/230–3–60	STD	56/56	70/60	59/58	311	60/59	70/70	63/62	315	61/60	70/70	64/63	316	65/64	80/80	69/68	320
		MED	59/58	70/70	61/60	335	62/61	80/70	66/65	339	63/62	80/80	67/66	340	67/66	80/80	71/70	344
		HIGH	68	80	72	350	72	80	77	354	73	80	78	355	77	90	82	359
	460–3–60	STD	28	35	29	157	30	35	32	159	31	35	32	159	32	40	34	161
		MED	30	35	31	169	31	40	33	171	32	40	33	171	34	40	35	173
		HIGH	35	40	37	176	37	45	39	178	37	45	39	178	39	45	41	180
	575–3–60	STD	24	30	25	128	28	30	29	132	25	30	27	130	29	35	31	134
		MED	24	30	25	128	28	30	29	132	25	30	27	130	29	35	31	134
		HIGH	29	35	30	140	32	40	34	144	30	35	32	142	34	40	36	146

ELECTRICAL INFORMATION
(UNITS PRODUCED ON OR AFTER JULY 30, 2012) cont.

Table 78 – UNIT WIRE SIZING DATA WITH FACTORY INSTALLED HACR BREAKER AND 2 SPEED INDOOR FAN OPTION

UNIT	NOM. V–Ph–Hz	IFM TYPE	NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
			NO P.E.				w/ P.E. (pwrd fr/ unit)				NO P.E.				w/ P.E. (pwrd fr/ unit)			
			MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE	
48HC*D08	208/230–3–60	STD	40/40	50/50	41/41	195	44/44	50/50	46/46	199	45/45	50/50	47/47	200	48/48	60/60	51/51	204
		MED	41/41	50/50	43/43	199	45/45	50/50	47/47	203	46/46	50/50	48/48	204	50/50	60/60	53/52	208
		HIGH	45/45	50/50	47/46	249	49/49	60/60	52/50	253	50/50	60/60	53/52	254	53/53	60/60	57/56	258
	460–3–60	STD	19	20	19	97	20	25	21	99	21	25	22	99	23	25	24	101
		MED	20	25	20	100	21	25	22	102	22	25	23	102	24	25	25	104
		HIGH	21	25	22	125	22	25	24	127	23	25	24	127	25	30	26	129
	575–3–60	STD	14	15	14	79	18	20	19	83	16	20	16	81	19	25	21	85
		MED	15	20	15	83	18	20	19	87	16	20	17	85	20	25	21	89
		HIGH	16	20	16	92	19	25	21	96	17	20	18	94	21	25	23	98
48HC*D09	208/230–3–60	STD	40/40	50/50	42/41	195	44/44	50/50	46/46	199	45/45	50/50	47/47	200	49/49	60/60	52/51	204
		MED	41/41	50/50	43/43	199	45/45	50/50	47/47	203	46/46	50/50	49/48	204	50/50	60/60	53/53	208
		HIGH	45/45	50/50	47/46	249	49/49	60/60	52/51	253	50/50	60/60	53/52	254	54/54	60/60	57/56	258
	460–3–60	STD	19	25	19	97	21	25	22	99	21	25	22	99	23	25	24	101
		MED	20	25	20	100	22	25	23	102	22	25	23	102	24	25	25	104
		HIGH	21	25	22	125	23	25	24	127	23	25	24	127	25	30	26	129
	575–3–60	STD	15	20	16	79	19	20	20	83	17	20	18	81	21	25	22	85
		MED	16	20	16	83	20	25	21	87	18	20	18	85	21	25	23	89
		HIGH	17	20	18	92	21	25	22	96	19	20	20	94	22	25	24	98
48HC*D11	208/230–3–60	STD	51/51	60/60	53/53	254	55/55	60/60	58/57	258	56/56	60/60	59/58	259	59/59	70/70	63/63	263
		MED	54/54	60/60	58/56	304	58/58	70/70	62/61	308	59/59	70/70	63/62	309	63/63	70/70	67/66	313
		HIGH	57/57	70/70	61/60	315	61/61	70/70	65/64	319	62/62	70/70	66/65	320	66/66	80/80	71/70	324
	460–3–60	STD	24	30	25	122	25	30	27	124	26	30	27	124	28	30	29	126
		MED	25	30	26	147	27	30	28	149	27	30	28	149	29	35	30	151
		HIGH	26	30	28	152	28	30	30	154	28	30	30	154	30	35	32	156
	575–3–60	STD	19	20	20	97	23	25	24	101	21	25	22	99	25	30	26	103
		MED	20	25	21	106	24	25	25	110	22	25	23	108	26	30	27	112
		HIGH	22	25	23	120	26	30	27	124	24	25	25	122	28	30	29	126

ELECTRICAL INFORMATION
(UNITS PRODUCED ON OR AFTER JULY 30, 2012) cont.

Table 78 - UNIT WIRE SIZING DATA WITH FACTORY INSTALLED HACR BREAKER AND 2 SPEED INDOOR FAN OPTION (cont)

UNIT	NOM. V–Ph–Hz	IFM TYPE	NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
			NO P.E.				w/ P.E. (pwrd fr/ unit)				NO P.E.				w/ P.E. (pwrd fr/ unit)			
			MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE	
					FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
48HC*D12	208/230–3–60	STD	50/50	60/60	52/52	279	53/53	60/60	56/56	283	54/54	60/60	57/57	284	58/58	70/70	62/61	288
		MED	53/53	60/60	56/55	329	57/57	70/70	60/59	333	58/58	70/70	62/60	334	62/62	70/70	66/65	338
		HIGH	56/56	60/60	59/58	340	60/60	70/70	64/63	344	61/61	70/70	65/64	345	65/65	80/80	69/68	349
	460–3–60	STD	25	30	26	134	26	30	28	136	27	30	28	136	29	35	30	138
		MED	26	30	27	159	28	30	29	161	28	30	29	161	30	35	32	163
		HIGH	27	30	29	164	29	35	31	166	29	35	31	166	31	35	33	168
	575–3–60	STD	19	25	20	107	23	25	24	111	21	25	22	109	25	30	26	113
		MED	20	25	21	116	24	30	26	120	22	25	23	118	26	30	27	122
		HIGH	22	25	23	130	26	30	27	134	24	25	25	132	28	30	29	136
48HC*D14	208/230–3–60	STD	56/56	70/70	59/58	311	60/60	70/70	63/62	315	61/61	70/70	64/63	316	65/65	80/80	69/68	320
		MED	59/59	70/70	61/60	335	62/62	80/80	66/65	339	63/63	80/80	67/66	340	67/67	80/80	71/70	344
		HIGH	68	80	72	350	72	80	77	354	73	80	78	355	77	90	82	359
	460–3–60	STD	28	35	29	157	30	35	32	159	31	35	32	159	32	40	34	161
		MED	30	35	31	169	31	40	33	171	32	40	33	171	34	40	35	173
		HIGH	35	40	37	176	37	45	39	178	37	45	39	178	39	45	41	180
	575–3–60	STD	24	30	25	128	28	30	29	132	25	30	27	130	29	35	31	134
		MED	24	30	25	128	28	30	29	132	25	30	27	130	29	35	31	134
		HIGH	29	35	30	140	32	40	34	144	30	35	32	142	34	40	36	146

LEGEND:

BRKR	–	Circuit breaker
CO	–	Convenience outlet
DISC	–	Disconnect
FLA	–	Full load amps
IFM	–	Indoor fan motor
LRA	–	Locked rotor amps
MCA	–	Minimum circuit amps
MOCP	–	MAX FUSE or HACR Breaker
PE	–	Power exhaust
PWRD CO	–	Powered convenient outlet
UNPWR CO	–	Unpowered convenient outlet

NOTES:

1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. Canadian units may be fuse or circuit breaker.
2. **Unbalanced 3-Phase Supply Voltage**
   Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percentage of voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

Example: Supply voltage is 230-3-60

AB = 224 v
BC = 231 v
AC = 226 v

$$\text{Average Voltage} = \frac{(224 + 231 + 226)}{3} = \frac{681}{3}$$

$$= 227$$

Determine maximum deviation from average voltage.
(AB) 227 – 224 = 3 v
(BC) 231 – 227 = 4 v
(AC) 227 – 226 = 1 v
Maximum deviation is 4 v.
Determine percent of voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{4}{227}$$

$$= 1.76\%$$

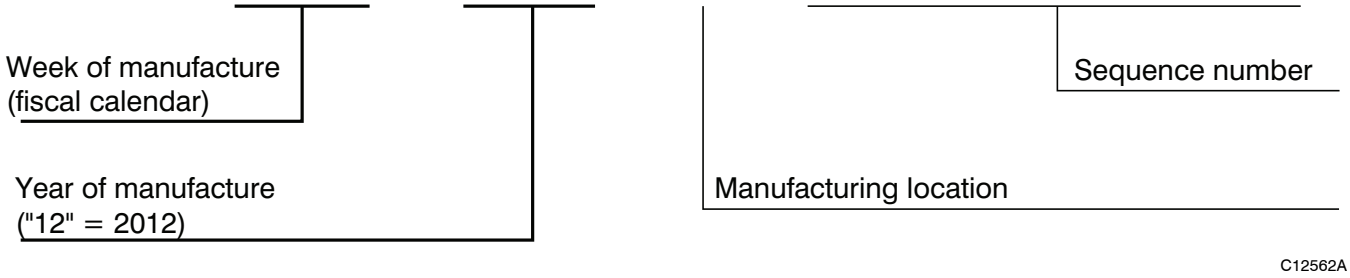
This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.
IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

ELECTRICAL DATA FOR UNITS PRODUCED PRIOR TO JULY 30, 2012

NOTE: Check the serial number of unit to verify production date.

To confirm the date of manufacture, locate the unit nameplate and check the first four digits of the Serial Number. If the number listed in the first 4 digits of the Serial Number is 3012 or lower, the unit was produced prior to July 30, 2012.

Position:	1	2	3	4	5	6	7	8	9	10
Example:	3	1	1	2	U	1	2	3	4	5



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ELECTRICAL INFORMATION
(UNITS PRODUCED PRIOR TO JULY 30, 2012)

Table 79 – 48HC*04 SINGLE STAGE COOLING WITH SINGLE SPEED INDOOR FAN MOTOR

V–Ph–Hz	VOLTAGE RANGE		COMP (ea)		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208–1–60	187	253	16.6	79	190	1.0	DD–STD	84%	7.4
							BD–STD	70%	4.9
							MED	70%	4.9
230–1–60	187	253	16.6	79	190	1.0	DD–STD	84%	7.4
							BD–STD	70%	4.9
							MED	70%	4.9
208–3–60	187	253	10.4	73	190	1.0	DD–STD	84%	7.4
							BD–STD	70%	4.9
							MED	70%	4.9
							HIGH	80%	5.2
230–3–60	187	253	10.4	73	190	1.0	DD–STD	84%	7.4
							BD–STD	70%	4.9
							MED	70%	4.9
							HIGH	80%	5.2
460–3–60	414	506	5.8	38	190	0.5	DD–STD	84%	4.0
							BD–STD	70%	2.1
							MED	70%	2.1
							HIGH	80%	2.6
575–3–60	518	633	3.8	37	190	0.5	DD–STD	84%	4.0
							BD–STD	71%	1.9
							MED	71%	1.9
							HIGH	80%	2.0

Table 80 – 48HC05 SINGLE STAGE COOLING WITH SINGLE SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP (ea)		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208–1–60	187	253	21.8	117	325	1.4	DD–STD	84%	7.4
							BD–STD	70%	4.9
							MED	70%	4.9
230–1–60	187	253	21.8	117	325	1.4	DD–STD	84%	7.4
							BD–STD	70%	4.9
							MED	70%	4.9
208–3–60	187	253	13.7	83	325	1.4	DD–STD	84%	7.4
							BD–STD	70%	4.9
							MED	70%	4.9
							HIGH	80%	5.2
230–3–60	187	253	13.7	83	325	1.4	DD–STD	84%	7.4
							BD–STD	70%	4.9
							MED	70%	4.9
							HIGH	80%	5.2
460–3–60	414	506	6.2	41	325	0.9	DD–STD	84%	4.0
							BD–STD	70%	2.1
							MED	70%	2.1
							HIGH	80%	2.6
575–3–60	518	633	4.8	33	325	0.9	DD–STD	84%	4.0
							BD–STD	71%	1.9
							MED	71%	1.9
							HIGH	80%	2.0

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Table 81 – 48HC06 SINGLE STAGE COOLING WITH SINGLE SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP (ea)		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208–1–60	187	253	25.0	134	325	1.4	DD–STD	84%	7.4
							BD–STD	70%	4.9
							MED	70%	7.0
230–1–60	187	253	25.0	134	325	1.4	DD–STD	84%	7.4
							BD–STD	70%	4.9
							MED	70%	7.0
208–3–60	187	253	15.9	110	325	1.4	DD–STD	84%	7.4
							BD–STD	70%	4.9
							MED	80%	5.2
							HIGH	81%	7.5
230–3–60	187	253	15.9	110	325	1.4	DD–STD	84%	7.4
							BD–STD	70%	4.9
							MED	80%	5.2
							HIGH	81%	7.5
460–3–60	414	506	7.0	52	325	0.9	DD–STD	84%	4.0
							BD–STD	70%	2.1
							MED	80%	2.6
							HIGH	81%	3.4
575–3–60	518	633	5.1	40	325	0.9	DD–STD	84%	4.0
							BD–STD	71%	1.9
							MED	81%	2.0
							HIGH	81%	2.8

Table 82 – 48HC07 SINGLE STAGE COOLING WITH SINGLE SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP (ea)		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208–3–60	187	253	19.0	123	325	1.5	STD	80%	5.2
							MED	81%	7.5
							HIGH	81%	15.0
230–3–60	187	253	19.0	123	325	1.5	STD	80%	5.2
							MED	81%	7.5
							HIGH	81%	15.0
460–3–60	414	506	9.7	62	325	0.8	STD	80%	2.6
							MED	81%	3.4
							HIGH	81%	7.4
575–3–60	518	633	7.4	50	325	0.6	STD	80%	2.4
							MED	81%	2.8
							HIGH	81%	5.6

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Table 83 – 48HC08 2-STAGE COOLING WITH SINGLE SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP (Cir 1)		COMP (Cir 2)		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208–3–60	187	253	13.6	83	13.6	83	325	1.5	STD	80%	5.2
									MED	81%	7.5
									HIGH	81%	15.0
230–3–60	187	253	13.6	83	13.6	83	325	1.5	STD	80%	5.2
									MED	81%	7.5
									HIGH	81%	15.0
460–3–60	414	506	6.1	41	6.1	41	325	0.8	STD	80%	2.6
									MED	81%	3.4
									HIGH	81%	7.4
575–3–60	518	633	4.2	33	4.2	33	325	0.6	STD	80%	2.4
									MED	81%	2.8
									HIGH	81%	5.6

Table 84 – 48HC09 2-STAGE COOLING WITH SINGLE SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP (Cir 1)		COMP (Cir 2)		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208–3–60	187	253	13.7	83	13.7	83	325	1.5	STD	80%	5.2
									MED	80%	5.2
									HIGH	80%	10.0
230–3–60	187	253	13.7	83	13.7	83	325	1.5	STD	80%	5.2
									MED	80%	5.2
									HIGH	80%	10.0
460–3–60	414	506	6.2	41	6.2	41	325	0.8	STD	80%	2.6
									MED	80%	2.6
									HIGH	80%	4.4
575–3–60	518	633	4.8	37	4.8	37	325	0.6	STD	80%	2.4
									MED	80%	2.0
									HIGH	81%	2.8

Table 85 – 48HC11 2-STAGE COOLING WITH SINGLE SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP (Cir 1)		COMP (Cir 2)		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208-3-60	187	253	15.9	110.0	15.9	110.0	610	7.4	STD	80%	5.2
									MED	81%	10.0
									HIGH	81%	15.0
230-3-60	187	253	15.9	110.0	15.9	110.0	610	7.4	STD	80%	5.2
									MED	81%	10.0
									HIGH	81%	15.0
460-3-60	414	506	7.1	52.0	7.1	52.0	610	3.6	STD	80%	2.6
									MED	81%	4.4
									HIGH	81%	7.4
575-3-60	518	633	5.1	39.5	5.1	39.5	610	3.6	STD	80%	2.0
									MED	81%	2.8
									HIGH	81%	5.6

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Table 86 – 48HC12** **2-STAGE COOLING WITH SINGLE SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP (Cir 1)		COMP (Cir 2)		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208–3–60	187	253	15.9	110	15.9	110	1070	6.2	STD	80%	5.2
									MED	81%	10.0
									HIGH	81%	15.0
230–3–60	187	253	15.9	110	15.9	110	1070	6.2	STD	80%	5.2
									MED	81%	10.0
									HIGH	81%	15.0
460–3–60	414	506	7.7	52	7.7	52	1070	3.1	STD	80%	2.6
									MED	81%	4.4
									HIGH	81%	7.4
575–3–60	518	633	5.7	39	5.7	39	1070	2.5	STD	80%	2.0
									MED	81%	2.8
									HIGH	81%	5.6

Table 87 – 48HC14** **2-STAGE COOLING WITH SINGLE SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP (Cir 1)		COMP (Cir 2)		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208–3–60	187	253	19.0	123	19.0	123	1288	1.5	STD	81%	7.5
									MED	81%	10.0
									HIGH	89.5%	20.4
230–3–60	187	253	19.0	123	19.0	123	1288	1.5	STD	81%	7.5
									MED	81%	10.0
									HIGH	89.5%	20.4
460–3–60	414	506	9.7	62	9.7	62	1288	0.8	STD	81%	3.4
									MED	81%	4.4
									HIGH	89.5%	10.2
575–3–60	518	633	7.4	50	7.4	50	1288	0.7	STD	81%	2.8
									MED	81%	2.8
									HIGH	89.5%	9.0

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Table 88 – 48HC08** — **2-STAGE COOLING WITH 2-SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP 1		COMP 2		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208–3–60	187	253	13.6	83	13.6	83	325	1.5	STD	84%	5.8
							325	1.5	MED	77%	7.1
							325	1.5	HIGH	82%	10.8
230–3–60	187	253	13.6	83	13.6	83	325	1.5	STD	84%	5.6
							325	1.5	MED	77%	6.8
							325	1.5	HIGH	82%	9.8
460–3–60	414	506	6.1	41	6.1	41	325	0.8	STD	79%	2.9
							325	0.8	MED	77%	3.8
							325	0.8	HIGH	82%	4.9
575–3–60	518	633	4.2	33	4.2	33	325	0.6	STD	81%	2.8
							325	0.6	MED	80%	3.5
							325	0.6	HIGH	84%	4.5

Table 89 – 48HC09** — **2-STAGE COOLING WITH 2-SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP 1		COMP 2		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208–3–60	187	253	13.7	83	13.7	83	325	1.5	STD	84%	5.8
							325	1.5	MED	77%	7.1
							325	1.5	HIGH	82%	10.8
230–3–60	187	253	13.7	83	13.7	83	325	1.5	STD	84%	5.6
							325	1.5	MED	77%	6.8
							325	1.5	HIGH	82%	9.8
460–3–60	414	506	6.2	41	6.2	41	325	0.8	STD	79%	2.9
							325	0.8	MED	77%	3.8
							325	0.8	HIGH	82%	4.9
575–3–60	518	633	4.8	33	4.8	33	325	0.6	STD	81%	2.8
							325	0.6	MED	80%	3.5
							325	0.6	HIGH	84%	4.5

Table 90 – 48HC11** — **2-STAGE COOLING WITH 2-SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP 1		COMP 2		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208-3-60	187	253	15.9	110	15.9	110	610	7.4	STD	77%	7.1
							610	7.4	MED	82%	10.8
							610	7.4	HIGH	84%	13.6
230-3-60	187	253	15.9	110	15.9	110	610	7.4	STD	77%	6.8
							610	7.4	MED	82%	9.8
							610	7.4	HIGH	84%	12.7
460-3-60	414	506	7.0	52	7.0	52	610	3.6	STD	77%	3.8
							610	3.6	MED	82%	4.9
							610	3.6	HIGH	84%	6.4
575-3-60	518	633	5.1	40	5.1	40	610	3.6	STD	80%	3.5
							610	3.6	MED	84%	4.5
							610	3.6	HIGH	83%	6.2

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Table 91 – 48HC12** **2-STAGE COOLING WITH 2-SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP 1		COMP 2		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208–3–60	187	253	15.9	110	15.9	110	1070	6.2	STD	77%	7.1
							1070	6.2	MED	82%	10.8
							1070	6.2	HIGH	84%	13.6
230–3–60	187	253	15.9	110	15.9	110	1070	6.2	STD	77%	6.8
							1070	6.2	MED	82%	9.8
							1070	6.2	HIGH	84%	12.7
460–3–60	414	506	7.7	52	7.7	52	1070	3.1	STD	77%	3.8
							1070	3.1	MED	82%	4.9
							1070	3.1	HIGH	84%	6.4
575–3–60	518	633	5.7	39	5.7	39	1070	2.5	STD	80%	3.5
							1070	2.5	MED	84%	4.5
							1070	2.5	HIGH	83%	6.2

Table 92 – 48HC14** **2-STAGE COOLING WITH 2-SPEED INDOOR FAN MOTOR**

V–Ph–Hz	VOLTAGE RANGE		COMP 1		COMP 2		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208–3–60	187	253	19.0	123	19.0	123	280	1.5	STD	85%	8.6
							280	1.5	MED	82%	10.8
							280	1.5	HIGH	90%	20.4
230–3–60	187	253	19.0	123	19.0	123	280	1.5	STD	85%	7.8
							280	1.5	MED	82%	9.8
							280	1.5	HIGH	90%	20.4
460–3–60	414	506	9.7	62	9.7	62	280	0.8	STD	85%	3.8
							280	0.8	MED	82%	4.9
							280	0.8	HIGH	90%	10.2
575–3–60	518	633	7.4	50	7.4	50	280	0.7	STD	84%	4.5
							280	0.7	MED	84%	4.5
							280	0.7	HIGH	94%	9.0

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Table 93 – UNIT WIRE/FUSE OR HACR BREAKER SIZING DATA

UNIT	NOM. V–Ph–Hz	IFM TYPE	NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
			NO P.E.				w/ P.E. (pwrd fr/ unit)				NO P.E.				w/ P.E. (pwrd fr/ unit)			
			MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE	
					FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
48HC*A/B/F04	208/230–1–60‡	DD–STD	30	45	29	88	32	45	31	90	34	50	34	93	36	50	36	95
		BD–STD†	27	40	26	93	29	45	28	95	32	45	31	98	34	45	34	100
		MED†	27	40	26	93	29	45	28	95	32	45	31	98	34	45	34	100
	208/230–3–60	DD–STD	22	30	22	82	24	30	24	84	27	30	27	87	29	35	29	89
		BD–STD†	19	25	19	87	21	30	21	89	24	30	24	92	26	30	26	94
		MED	19	25	19	87	21	30	21	89	24	30	24	92	26	30	26	94
		HIGH	20	25	19	105	22	30	21	107	24	30	25	110	26	30	27	112
	460–3–60	DD–STD	12	15	12	43	13	15	13	44	14	20	14	45	15	20	16	46
		BD–STD†	10	15	10	45	11	15	11	46	13	15	12	47	14	15	13	48
		MED	10	15	10	45	11	15	11	46	13	15	12	47	14	15	13	48
		HIGH	11	15	10	54	12	15	11	55	13	15	13	56	14	20	14	57
	575–3–60	DD–STD	10	15	10	42	12	15	12	44	11	15	12	44	13	15	14	46
		BD–STD†	8	15	7	43	10	15	9	45	9	15	9	45	11	15	11	47
		MED	8	15	7	43	10	15	9	45	9	15	9	45	11	15	11	47
		HIGH	8	15	7	49	10	15	9	51	9	15	9	51	11	15	11	53
48HC*A/B/F05	208/230–1–60‡	DD–STD	37	50	35	127	38	50	37	129	41	60	41	132	43	60	43	134
		BD–STD†	34	50	32	132	36	50	35	134	39	60	38	137	41	60	40	139
		MED†	34	50	32	132	36	50	35	134	39	60	38	137	41	60	40	139
	208/230–3–60	DD–STD	26	30	26	93	28	40	28	95	31	40	31	98	33	45	34	100
		BD–STD†	24	30	23	98	26	30	25	100	29	40	29	103	31	40	31	105
		MED	24	30	23	105	26	30	26	107	29	40	29	110	31	40	31	112
		HIGH	26	30	26	142	28	40	28	144	31	40	32	147	33	45	34	149
	460–3–60	DD–STD	13	15	13	47	14	20	14	48	15	20	15	49	16	20	16	50
		BD–STD†	11	15	11	49	12	15	12	50	13	15	13	51	14	20	14	52
		MED	12	15	11	52	13	15	12	53	14	20	14	54	15	20	15	55
		HIGH	13	15	12	71	14	15	13	72	15	20	15	73	16	20	16	74
	575–3–60	DD–STD	11	15	11	39	13	15	13	41	13	15	13	41	15	20	15	43
		BD–STD†	9	15	9	40	11	15	11	42	11	15	11	42	13	15	13	44
		MED	9	15	8	42	11	15	11	44	11	15	10	44	13	15	13	46
		HIGH	10	15	10	57	12	15	12	59	12	15	12	59	14	15	14	61

† Drive package is only available on Humidi–MiZer® equipped units

‡ Single phase models are not available with factory–installed powered convenience outlet.

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Table 93 - UNIT WIRE/FUSE OR HACR BREAKER SIZING DATA (cont)

UNIT	NOM. V–Ph–Hz	IFM TYPE	NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
			NO P.E.				w/ P.E. (pwrd fr/ unit)				NO P.E.				w/ P.E. (pwrd fr/ unit)			
			MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE	
					FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
48HC*A/b/f06	208/230–1–60‡	DD–STD	41	60	39	144	42	60	41	146	45	60	44	149	47	60	47	151
		BD–STD†	38	60	36	149	40	60	38	151	43	60	42	154	45	60	44	156
		MED†	40	60	38	174	42	60	41	176	45	60	44	179	47	60	46	181
	208/230–3–60	DD–STD	29	40	28	120	31	45	31	122	34	45	34	125	36	50	36	127
		BD–STD†	27	40	26	125	29	40	28	127	31	45	31	130	33	45	33	132
		MED	27	40	26	143	29	40	28	145	32	45	31	148	34	45	34	150
		HIGH	29	40	29	169	31	45	31	171	34	45	34	174	36	50	36	176
	460–3–60	DD–STD	14	20	14	58	15	20	15	59	16	20	16	60	17	20	17	61
		BD–STD†	12	15	12	60	13	15	13	61	14	20	14	62	15	20	15	63
		MED	13	15	12	69	14	20	13	70	15	20	15	71	16	20	16	72
		HIGH	14	20	13	82	15	20	14	83	16	20	16	84	17	20	17	85
	575–3–60	DD–STD	12	15	12	46	14	15	14	48	13	15	13	48	15	20	16	50
		BD–STD†	10	15	9	47	12	15	11	49	11	15	11	49	13	15	13	51
		MED	10	15	9	53	12	15	11	55	11	15	11	55	13	15	13	57
		HIGH	11	15	10	64	12	15	12	66	12	15	12	66	14	15	14	68

† Drive package is only available on Humidi–MiZer® equipped units
‡ Single phase models are not available with factory–installed powered convenience outlet.

ELECTRICAL INFORMATION
(UNITS PRODUCED PRIOR TO JULY 30, 2012)

Table 94 – UNIT WIRE SIZING DATA WITH FACTORY-INSTALLED HACR BREAKER

UNIT	NOM. V–Ph–Hz	IFM TYPE	NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
			NO P.E.				w/ P.E. (pwrd fr/ unit)				NO P.E.				w/ P.E. (pwrd fr/ unit)			
			MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE	
					FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
48HC*A/B/F04	208/230–1–60‡	DD–STD	30	45	29	88	32	45	31	90	34	50	34	93	36	50	36	95
		STD	27	40	26	93	29	45	28	95	32	45	31	98	34	45	34	100
		MED	27	40	26	93	29	45	28	95	32	45	31	98	34	45	34	100
	208/230–3–60	DD–STD	22	30	22	82	24	30	24	84	27	30	27	87	29	35	29	89
		STD	19	25	19	87	21	30	21	89	24	30	24	92	26	30	26	94
		MED	19	25	19	87	21	30	21	89	24	30	24	92	26	30	26	94
		HIGH	20	25	19	105	22	30	21	107	24	30	25	110	26	30	27	112
	460–3–60	DD–STD	12	15	12	43	13	15	13	44	14	20	14	45	15	20	16	46
		STD	10	15	10	45	11	15	11	46	13	15	12	47	14	15	13	48
		MED	10	15	10	45	11	15	11	46	13	15	12	47	14	15	13	48
		HIGH	11	15	10	54	12	15	11	55	13	15	13	56	14	20	14	57
	575–3–60	DD–STD	10	15	10	42	12	15	12	44	11	15	12	44	13	15	14	46
		STD	8	15	7	43	10	15	9	45	9	15	9	45	11	15	11	47
		MED	8	15	7	43	10	15	9	45	9	15	9	45	11	15	11	47
		HIGH	8	15	7	49	10	15	9	51	9	15	9	51	11	15	11	53
48HC*A/B/F05	208/230–1–60‡	DD–STD	37	50	35	127	38	50	37	129	41	60	41	132	43	60	43	134
		STD	34	50	32	132	36	50	35	134	39	60	38	137	41	60	40	139
		MED	34	50	32	132	36	50	35	134	39	60	38	137	41	60	40	139
	208/230–3–60	DD–STD	26	30	26	93	28	40	28	95	31	40	31	98	33	45	34	100
		STD	24	30	23	98	26	30	25	100	29	40	29	103	31	40	31	105
		MED	24	30	23	105	26	30	26	107	29	40	29	110	31	40	31	112
		HIGH	26	30	26	142	28	40	28	144	31	40	32	147	33	45	34	149
	460–3–60	DD–STD	13	15	13	47	14	20	14	48	15	20	15	49	16	20	16	50
		STD	11	15	11	49	12	15	12	50	13	15	13	51	14	20	14	52
		MED	12	15	11	52	13	15	12	53	14	20	14	54	15	20	15	55
		HIGH	13	15	12	71	14	15	13	72	15	20	15	73	16	20	16	74
	575–3–60	DD–STD	11	15	11	39	13	15	13	41	13	15	13	41	15	20	15	43
		STD	9	15	9	40	11	15	11	42	11	15	11	42	13	15	13	44
		MED	9	15	8	42	11	15	11	44	11	15	10	44	13	15	13	46
		HIGH	10	15	10	57	12	15	12	59	12	15	12	59	14	15	14	61

‡ Single phase models are not available with factory–installed powered convenience outlet.

ELECTRICAL INFORMATION
(UNITS PRODUCED PRIOR TO JULY 30, 2012)

Table 94 - UNIT WIRE SIZING DATA WITH FACTORY-INSTALLED HACR BREAKER (cont)

UNIT	NOM. V–Ph–Hz	IFM TYPE	NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
			NO P.E.				w/ P.E. (pwrd fr/ unit)				NO P.E.				w/ P.E. (pwrd fr/ unit)			
			MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE	
					FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
48HC*A/B/F06	208/230–1–60‡	DD–STD	41	60	39	144	42	60	41	146	45	60	44	149	47	60	47	151
		STD	38	60	36	149	40	60	38	151	43	60	42	154	45	60	44	156
		MED	40	60	38	174	42	60	41	176	45	60	44	179	47	60	46	181
	208/230–3–60	DD–STD	29	40	28	120	31	45	31	122	34	45	34	125	36	50	36	127
		STD	27	40	26	125	29	40	28	127	31	45	31	130	33	45	33	132
		MED	27	40	26	143	29	40	28	145	32	45	31	148	34	45	34	150
		HIGH	29	40	29	169	31	45	31	171	34	45	34	174	36	50	36	176
	460–3–60	DD–STD	14	20	14	58	15	20	15	59	16	20	16	60	17	20	17	61
		STD	12	15	12	60	13	15	13	61	14	20	14	62	15	20	15	63
		MED	13	15	12	69	14	20	13	70	15	20	15	71	16	20	16	72
		HIGH	14	20	13	82	15	20	14	83	16	20	16	84	17	20	17	85
	575–3–60	DD–STD	12	15	12	46	14	15	14	48	13	15	13	48	15	20	16	50
		STD	10	15	9	47	12	15	11	49	11	15	11	49	13	15	13	51
		MED	10	15	9	53	12	15	11	55	11	15	11	55	13	15	13	57
		HIGH	11	15	10	64	12	15	12	66	12	15	12	66	14	15	14	68

‡ Single phase models are not available with factory–installed powered convenience outlet.

ELECTRICAL INFORMATION
(UNITS PRODUCED PRIOR TO JULY 30, 2012)

Table 95 – UNIT WIRE/FUSE OR HACR BREAKER SIZING DATA

UNIT	NOM. V–Ph–Hz	IFM TYPE	NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
			NO P.E.				w/ P.E. (pwrd fr/ unit)				NO P.E.				w/ P.E. (pwrd fr/ unit)			
			MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE	
					FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
48HC*A07	208/230–3–60	STD	32	50	31	148	36	50	36	152	37	50	37	153	41	50	41	157
		MED	35	50	34	185	39	50	38	189	40	50	39	190	43	60	44	194
		HIGH	42	60	43	211	46	60	47	215	47	60	48	216	51	60	52	220
	460–3–60	STD	17	25	16	75	19	25	18	77	19	25	19	77	21	30	21	79
		MED	18	25	17	94	19	25	19	96	20	25	19	96	22	30	22	98
		HIGH	22	30	22	107	23	30	24	109	24	30	24	109	26	30	26	111
	575–3–60	STD	12	15	11	61	16	20	16	65	14	20	13	63	18	20	18	67
		MED	14	20	13	76	18	20	17	80	15	20	15	78	19	25	19	82
		HIGH	17	20	16	90	20	25	21	94	18	25	18	92	22	25	23	96
48HC*D08	208/230–3–60	STD	39	50	41	191	43	50	45	195	44	50	46	196	48	60	51	200
		MED	39	50	41	202	43	50	45	206	44	50	46	207	48	60	51	211
		HIGH	44	50	46	245	48	60	51	249	49	60	52	250	53	60	56	254
	460–3–60	STD	18	20	19	95	20	25	21	97	21	25	21	97	22	25	23	99
		MED	18	20	19	101	20	25	21	103	21	25	21	103	22	25	23	105
		HIGH	20	25	21	123	22	25	23	125	22	25	23	125	24	30	26	127
	575–3–60	STD	12	15	12	77	16	20	17	81	14	15	14	79	18	20	19	83
		MED	13	15	13	81	17	20	18	85	15	20	15	83	19	20	20	87
		HIGH	14	15	14	92	18	20	19	96	16	20	16	94	19	25	21	98
48HC*D09	208/230–3–60	STD	39	50	41	191	43	50	45	195	44	50	46	196	48	60	51	200
		MED	39	50	41	202	43	50	45	206	44	50	46	207	48	60	51	211
		HIGH	44	50	46	245	48	60	51	249	49	60	52	250	53	60	56	254
	460–3–60	STD	19	20	19	95	20	25	21	97	21	25	22	97	23	25	24	99
		MED	19	20	19	101	20	25	21	103	21	25	22	103	23	25	24	105
		HIGH	20	25	21	123	22	25	23	125	23	25	24	125	24	30	26	127
	575–3–60	STD	14	15	14	77	17	20	18	81	15	20	16	79	19	20	20	83
		MED	14	20	15	81	18	20	19	85	16	20	17	83	20	25	21	87
		HIGH	15	20	16	92	19	20	20	96	17	20	18	94	21	25	22	98

ELECTRICAL INFORMATION
(UNITS PRODUCED PRIOR TO JULY 30, 2012)

Table 95 - UNIT WIRE/FUSE OR HACR BREAKER SIZING DATA (cont)

UNIT	NOM. V–Ph–Hz	IFM TYPE	NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
			NO P.E.				w/ P.E. (pwrd fr/ unit)				NO P.E.				w/ P.E. (pwrd fr/ unit)			
			MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE	
					FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
48HC*D11	208/230–3–60	STD	49	60	51	257	53	60	55	261	54	60	57	262	57	70	61	266
		MED	54	60	57	300	57	70	61	304	58	70	62	305	62	70	66	309
		HIGH	59	70	62	309	62	70	67	313	63	70	68	314	67	80	72	318
	460–3–60	STD	22	25	23	123	24	30	25	125	25	30	26	125	26	30	28	127
		MED	24	30	25	145	26	30	27	147	26	30	28	147	28	30	30	149
		HIGH	27	30	29	149	29	35	31	151	30	35	31	151	31	35	33	153
	575–3–60	STD	18	20	18	95	21	25	23	99	19	25	20	97	23	25	24	101
		MED	18	20	19	106	22	25	23	110	20	25	21	108	24	25	25	112
		HIGH	21	25	22	120	25	30	27	124	23	25	24	122	27	30	29	126
48HC*D12	208/230–3–60	STD	48	60	50	282	51	60	54	286	52	60	55	287	56	60	60	291
		MED	52	60	55	325	56	60	60	329	57	70	61	330	61	70	65	334
		HIGH	57	70	61	334	61	70	65	338	62	70	66	339	66	80	71	343
	460–3–60	STD	23	30	24	135	25	30	26	137	26	30	27	137	27	30	29	139
		MED	25	30	26	157	27	30	28	159	27	30	29	159	29	35	31	161
		HIGH	28	30	30	161	30	35	32	163	30	35	32	163	32	35	34	165
	575–3–60	STD	18	20	18	105	22	25	23	109	19	25	20	107	23	25	25	111
		MED	19	20	19	116	22	25	24	120	20	25	21	118	24	30	26	122
		HIGH	21	25	22	130	25	30	27	134	23	25	24	132	27	30	29	136

ELECTRICAL INFORMATION
(UNITS PRODUCED PRIOR TO JULY 30, 2012)

Table 96 – UNIT WIRE SIZING DATA WITH FACTORY INSTALLED HACR BREAKER

UNIT	NOM. V–Ph–Hz	IFM TYPE	NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
			NO P.E.				w/ P.E. (pwrd fr/ unit)				NO P.E.				w/ P.E. (pwrd fr/ unit)			
			MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE	
					FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
48HC*A07	208/230–3–60	STD	32	50	31	148	36	50	36	152	37	50	37	153	41	50	41	157
		MED	35	50	34	185	39	50	38	189	40	50	39	190	43	60	44	194
		HIGH	42	60	43	211	46	60	47	215	47	60	48	216	51	60	52	220
	460–3–60	STD	17	25	16	75	19	25	18	77	19	25	19	77	21	30	21	79
		MED	18	25	17	94	19	25	19	96	20	25	19	96	22	30	22	98
		HIGH	22	30	22	107	23	30	24	109	24	30	24	109	26	30	26	111
	575–3–60	STD	12	15	11	61	16	20	16	65	14	20	13	63	18	20	18	67
		MED	14	20	13	76	18	20	17	80	15	20	15	78	19	25	19	82
		HIGH	17	20	16	90	20	25	21	94	18	25	18	92	22	25	23	96
48HC*D08	208/230–3–60	STD	39	50	41	191	43	50	45	195	44	50	46	196	48	60	51	200
		MED	39	50	41	202	43	50	45	206	44	50	46	207	48	60	51	211
		HIGH	44	50	46	245	48	60	51	249	49	60	52	250	53	60	56	254
	460–3–60	STD	18	20	19	95	20	25	21	97	21	25	21	97	22	25	23	99
		MED	18	20	19	101	20	25	21	103	21	25	21	103	22	25	23	105
		HIGH	20	25	21	123	22	25	23	125	22	25	23	125	24	30	26	127
	575–3–60	STD	12	15	12	77	16	20	17	81	14	15	14	79	18	20	19	83
		MED	13	15	13	81	17	20	18	85	15	20	15	83	19	20	20	87
		HIGH	14	15	14	92	18	20	19	96	16	20	16	94	19	25	21	98
48HC*D09	208/230–3–60	STD	39	50	41	191	43	50	45	195	44	50	46	196	48	60	51	200
		MED	39	50	41	202	43	50	45	206	44	50	46	207	48	60	51	211
		HIGH	44	50	46	245	48	60	51	249	49	60	52	250	53	60	56	254
	460–3–60	STD	19	20	19	95	20	25	21	97	21	25	22	97	23	25	24	99
		MED	19	20	19	101	20	25	21	103	21	25	22	103	23	25	24	105
		HIGH	20	25	21	123	22	25	23	125	23	25	24	125	24	30	26	127
	575–3–60	STD	14	15	14	77	17	20	18	81	15	20	16	79	19	20	20	83
		MED	14	20	15	81	18	20	19	85	16	20	17	83	20	25	21	87
		HIGH	15	20	16	92	19	20	20	96	17	20	18	94	21	25	22	98

ELECTRICAL INFORMATION
(UNITS PRODUCED PRIOR TO JULY 30, 2012)

Table 96 - UNIT WIRE SIZING DATA WITH FACTORY INSTALLED HACR BREAKER (cont)

UNIT	NOM. V–Ph–Hz	IFM TYPE	NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
			NO P.E.				w/ P.E. (pwrd fr/ unit)				NO P.E.				w/ P.E. (pwrd fr/ unit)			
			MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE	
					FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
48HC*D11	208/230–3–60	STD	49	60	51	257	53	60	55	261	54	60	57	262	57	70	61	266
		MED	54	60	57	300	57	70	61	304	58	70	62	305	62	70	66	309
		HIGH	59	70	62	309	62	70	67	313	63	70	68	314	67	80	72	318
	460–3–60	STD	22	25	23	123	24	30	25	125	25	30	26	125	26	30	28	127
		MED	24	30	25	145	26	30	27	147	26	30	28	147	28	30	30	149
		HIGH	27	30	29	149	29	35	31	151	30	35	31	151	31	35	33	153
	575–3–60	STD	18	20	18	95	21	25	23	99	19	25	20	97	23	25	24	101
		MED	18	20	19	106	22	25	23	110	20	25	21	108	24	25	25	112
		HIGH	21	25	22	120	25	30	27	124	23	25	24	122	27	30	29	126
48HC*D12	208/230–3–60	STD	48	60	50	282	51	60	54	286	52	60	55	287	56	60	60	291
		MED	52	60	55	325	56	60	60	329	57	70	61	330	61	70	65	334
		HIGH	57	70	61	334	61	70	65	338	62	70	66	339	66	80	71	343
	460–3–60	STD	23	30	24	135	25	30	26	137	26	30	27	137	27	30	29	139
		MED	25	30	26	157	27	30	28	159	27	30	29	159	29	35	31	161
		HIGH	28	30	30	161	30	35	32	163	30	35	32	163	32	35	34	165
	575–3–60	STD	18	20	18	105	22	25	23	109	19	25	20	107	23	25	25	111
		MED	19	20	19	116	22	25	24	120	20	25	21	118	24	30	26	122
		HIGH	21	25	22	130	25	30	27	134	23	25	24	132	27	30	29	136

ELECTRICAL INFORMATION
(UNITS PRODUCED PRIOR TO JULY 30, 2012)

Table 97 – UNIT WIRE SIZING DATA WITH FACTORY INSTALLED HACR BREAKER AND 2 SPEED INDOOR FAN OPTION

UNIT	NOM. V–Ph–Hz	IFM TYPE	NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
			NO P.E.				w/ P.E. (pwrd fr/ unit)				NO P.E.				w/ P.E. (pwrd fr/ unit)			
			MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE	
					FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
48HC*D08	208/230–3–60	STD	40/40	50/50	41/41	195	44/44	50/50	46/46	199	45/45	50/50	47/47	200	48/48	60/60	51/51	204
		MED	41/41	50/50	43/43	199	45/45	50/50	47/47	203	46/46	50/50	48/48	204	50/50	60/60	53/52	208
		HIGH	45/45	50/50	47/46	249	49/49	60/60	52/50	253	50/50	60/60	53/52	254	53/53	60/60	57/56	258
	460–3–60	STD	19	20	19	97	20	25	21	99	21	25	22	99	23	25	24	101
		MED	20	25	20	100	21	25	22	102	22	25	23	102	24	25	25	104
		HIGH	21	25	22	125	22	25	24	127	23	25	24	127	25	30	26	129
	575–3–60	STD	14	15	14	79	18	20	19	83	16	20	16	81	19	25	21	85
		MED	15	20	15	83	18	20	19	87	16	20	17	85	20	25	21	89
		HIGH	16	20	16	92	19	25	21	96	17	20	18	94	21	25	23	98
48HC*D09	208/230–3–60	STD	40/40	50/50	42/41	195	44/44	50/50	46/46	199	45/45	50/50	47/47	200	49/49	60/60	52/51	204
		MED	41/41	50/50	43/43	199	45/45	50/50	47/47	203	46/46	50/50	49/48	204	50/50	60/60	53/53	208
		HIGH	45/45	50/50	47/46	249	49/49	60/60	52/51	253	50/50	60/60	53/52	254	54/54	60/60	57/56	258
	460–3–60	STD	19	25	19	97	21	25	22	99	21	25	22	99	23	25	24	101
		MED	20	25	20	100	22	25	23	102	22	25	23	102	24	25	25	104
		HIGH	21	25	22	125	23	25	24	127	23	25	24	127	25	30	26	129
	575–3–60	STD	15	20	16	79	19	20	20	83	17	20	18	81	21	25	22	85
		MED	16	20	16	83	20	25	21	87	18	20	18	85	21	25	23	89
		HIGH	17	20	18	92	21	25	22	96	19	20	20	94	22	25	24	98

ELECTRICAL INFORMATION
(UNITS PRODUCED PRIOR TO JULY 30, 2012)

Table 97 - UNIT WIRE SIZING DATA WITH FACTORY INSTALLED HACR BREAKER AND 2 SPEED INDOOR FAN OPTION (cont)

UNIT	NOM. V–Ph–Hz	IFM TYPE	NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
			NO P.E.				w/ P.E. (pwrd fr/ unit)				NO P.E.				w/ P.E. (pwrd fr/ unit)			
			MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE	
					FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
48HC*D11	208/230–3–60	STD	51/51	60/60	53/53	254	55/55	60/60	58/57	258	56/56	60/60	59/58	259	59/59	70/70	63/63	263
		MED	54/54	60/60	58/56	304	58/58	70/70	62/61	308	59/59	70/70	63/62	309	63/63	70/70	67/66	313
		HIGH	57/57	70/70	61/60	315	61/61	70/70	65/64	319	62/62	70/70	66/65	320	66/66	80/80	71/70	324
	460–3–60	STD	24	30	25	122	25	30	27	124	26	30	27	124	28	30	29	126
		MED	25	30	26	147	27	30	28	149	27	30	28	149	29	35	30	151
		HIGH	26	30	28	152	28	30	30	154	28	30	30	154	30	35	32	156
	575–3–60	STD	19	20	20	97	23	25	24	101	21	25	22	99	25	30	26	103
		MED	20	25	21	106	24	25	25	110	22	25	23	108	26	30	27	112
		HIGH	22	25	23	120	26	30	27	124	24	25	25	122	28	30	29	126
48HC*D12	208/230–3–60	STD	50/50	60/60	52/52	279	53/53	60/60	56/56	283	54/54	60/60	57/57	284	58/58	70/70	62/61	288
		MED	53/53	60/60	56/55	329	57/57	70/70	60/59	333	58/58	70/70	62/60	334	62/62	70/70	66/65	338
		HIGH	56/56	60/60	59/58	340	60/60	70/70	64/63	344	61/61	70/70	65/64	345	65/65	80/80	69/68	349
	460–3–60	STD	25	30	26	134	26	30	28	136	27	30	28	136	29	35	30	138
		MED	26	30	27	159	28	30	29	161	28	30	29	161	30	35	32	163
		HIGH	27	30	29	164	29	35	31	166	29	35	31	166	31	35	33	168
	575–3–60	STD	19	25	20	107	23	25	24	111	21	25	22	109	25	30	26	113
		MED	20	25	21	116	24	30	26	120	22	25	23	118	26	30	27	122
		HIGH	22	25	23	130	26	30	27	134	24	25	25	132	28	30	29	136

ELECTRICAL INFORMATION
(UNITS PRODUCED PRIOR TO JULY 30, 2012)

Table 98 – UNIT WIRE/FUSE OR HACR BREAKER SIZING DATA

UNIT	NOM. V–Ph–Hz	IFM TYPE	NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
			NO P.E.				w/ P.E. (pwrd fr/ unit)				NO P.E.				w/ P.E. (pwrd fr/ unit)			
			MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE	
					FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
48HC*D14	208/230–3–60	STD	55	60	58	314	59	70	62	318	60	70	63	319	64	80	67	323
		MED	58	70	60	331	62	80	65	335	63	80	66	336	66	80	70	340
		HIGH	68	80	72	350	72	80	77	354	73	80	78	355	77	90	82	359
	460–3–60	STD	28	35	29	158	30	35	31	160	30	35	32	160	32	40	34	162
		MED	29	35	30	167	31	40	32	169	31	40	33	169	33	40	35	171
		HIGH	35	40	37	176	37	45	39	178	37	45	39	178	39	45	41	180
	575–3–60	STD	22	25	23	128	26	30	27	132	24	30	25	130	28	30	29	134
		MED	22	25	23	128	26	30	27	132	24	30	25	130	28	30	29	134
		HIGH	29	35	30	140	32	40	34	144	30	35	32	142	34	40	36	146

Table 99 – UNIT WIRE SIZING DATA WITH FACTORY INSTALLED HACR BREAKER

UNIT	NOM. V–Ph–Hz	IFM TYPE	NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
			NO P.E.				w/ P.E. (pwrd fr/ unit)				NO P.E.				w/ P.E. (pwrd fr/ unit)			
			MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE	
					FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
48HC*D14	208/230–3–60	STD	55	60	58	314	59	70	62	318	60	70	63	319	64	80	67	323
		MED	58	70	60	331	62	80	65	335	63	80	66	336	66	80	70	340
		HIGH	68	80	72	350	72	80	77	354	73	80	78	355	77	90	82	359
	460–3–60	STD	28	35	29	158	30	35	31	160	30	35	32	160	32	40	34	162
		MED	29	35	30	167	31	40	32	169	31	40	33	169	33	40	35	171
		HIGH	35	40	37	176	37	45	39	178	37	45	39	178	39	45	41	180
	575–3–60	STD	22	25	23	128	26	30	27	132	24	30	25	130	28	30	29	134
		MED	22	25	23	128	26	30	27	132	24	30	25	130	28	30	29	134
		HIGH	29	35	30	140	32	40	34	144	30	35	32	142	34	40	36	146

ELECTRICAL INFORMATION
(UNITS PRODUCED PRIOR TO JULY 30, 2012)

Table 100 – UNIT WIRE SIZING DATA WITH FACTORY INSTALLED HACR BREAKER AND 2 SPEED INDOOR FAN OPTION

UNIT	NOM. V–Ph–Hz	IFM TYPE	NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
			NO P.E.				w/ P.E. (pwrd fr/ unit)				NO P.E.				w/ P.E. (pwrd fr/ unit)			
			MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE		MCA	HACR BRKR	DISC. SIZE	
					FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
48HC*D14	208/230–3–60	STD	56/56	70/70	59/58	311	60/60	70/70	63/62	315	61/61	70/70	64/63	316	65/65	80/80	69/68	320
		MED	59/59	70/70	61/60	335	62/62	80/80	66/65	339	63/63	80/80	67/66	340	67/67	80/80	71/70	344
		HIGH	68	80	72	350	72	80	77	354	73	80	78	355	77	90	82	359
	460–3–60	STD	28	35	29	157	30	35	32	159	31	35	32	159	32	40	34	161
		MED	30	35	31	169	31	40	33	171	32	40	33	171	34	40	35	173
		HIGH	35	40	37	176	37	45	39	178	37	45	39	178	39	45	41	180
	575–3–60	STD	24	30	25	128	28	30	29	132	25	30	27	130	29	35	31	134
		MED	24	30	25	128	28	30	29	132	25	30	27	130	29	35	31	134
		HIGH	29	35	30	140	32	40	34	144	30	35	32	142	34	40	36	146

LEGEND:

BRKR – Circuit breaker
CO – Convenience outlet
DISC – Disconnect
FLA – Full load amps
IFM – Indoor fan motor
LRA – Locked rotor amps
MCA – Minimum circuit amps
MOCP – MAX FUSE or HACR Breaker
PE – Power exhaust
PWRD CO – Powered convenient outlet
UNPWR CO – Unpowered convenient outlet

NOTES:

1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. Canadian units may be fuse or circuit breaker.
2. **Unbalanced 3-Phase Supply Voltage**
   Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percentage of voltage imbalance.

$$\%\ \text{Voltage Imbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

Example: Supply voltage is 230-3-60

AB = 224 v
BC = 231 v
AC = 226 v

$$\text{Average Voltage} = \frac{(224 + 231 + 226)}{3} = \frac{681}{3} = 227$$

Determine maximum deviation from average voltage.
(AB) 227 – 224 = 3 v
(BC) 231 – 227 = 4 v
(AC) 227 – 226 = 1 v
Maximum deviation is 4 v.
Determine percent of voltage imbalance.

$$\%\ \text{Voltage Imbalance} = 100 \times \frac{4}{227} = 1.76\%$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

SEQUENCE OF OPERATION

General

The sequence below describes the sequence of operation for an electro-mechanical unit with and without a factory installed EconoMi$er™ IV and X (called "economizer" in this sequence). For information regarding a direct digital controller, see the start-up, operations, and troubleshooting manual for the applicable controller.

Electro-mechanical units with no economizer

Cooling (Single speed indoor fan motor) —

When the thermostat calls for cooling, terminals G and Y1 are energized. As a result, the indoor-fan contactor (IFC) and the compressor contactor (C1) are energized, causing the indoor-an motor (IFM), compressor #1, and outdoor fan to start. If the unit has 2 stages of cooling, the thermostat will additionally energize Y2. The Y2 signal will energize compressor contactor #2 (C2), causing compressor #2 to start. Regardless of the number of stages, the outdoor-fan motor runs continuously while unit is cooling.

Cooling (2-speed indoor fan motor) —

Per ASHRAE 90.1 2010 standard section 6.4.3.10.b, during the first stage of cooling operation the VFD will adjust the fan motor to provide 2/3rd of the total cfm established for the unit. When a call for the second stage of cooling is required, the VFD will allow the total cfm for the unit established (100%).

Heating

NOTE: WeatherMaster (48HC) units have either 1 or 2 stages of gas heat.

When the thermostat calls for heating, power is sent to W on the Integrated Gas Controller (IGC) board. An LED (light-emitting diode) on the IGC board turns on and remains on during normal operation. A check is made to ensure that the rollout switch and limit switch are closed. If the check was successful, the induced-draft motor is energized, and when its speed is satisfactory, as proven by the "hall effect" sensor, the ignition activation period begins. The burners will ignite within 5 seconds. If the burners do not light, there is a 22-second delay before another 5-second attempt. This sequence is repeated for 15 minutes or until the burners light. If, after the 15 minutes, the burners still have not lit, heating is locked out. To reset the control, break 24-v power to the thermostat.

When ignition occurs, the IGC board will continue to monitor the condition of the rollout switch, the limit switches, the "hall effect" sensor, as well as the flame sensor. 45 seconds after ignition occurs, assuming the unit is controlled through a room thermostat set for fan auto, the indoor-fan motor will energize (and the outdoor-air dampers will open to their minimum position). If, for some reason, the over-temperature limit opens prior to the start of the indoor fan blower, the unit will shorten the 45-second delay to 5 seconds less than the time from initiation of heat to when the limit tripped. Gas will not be interrupted to the burners and heating will continue. Once the fan-on delay has been modified, it will not change back to 45 seconds until power is reset to the control.

On units with 2 stages of heat, when additional heat is required, W2 closes and initiates power to the second stage of the main gas valve. When the thermostat is satisfied, W1 and W2 open and the gas valve closes, interrupting the flow of gas to the main burners.

If the call for W1 lasted less than 1 minute, the heating cycle will not terminate until 1 minute after W1 became active. If the unit is controlled through a room thermostat set for fan auto, the indoor-fan motor will continue to operate for an additional 45 seconds then stop. If the over-temperature limit opens after the indoor motor is stopped, but within 10 minutes of W1 becoming inactive, on the next cycle the time will be extended by 15 seconds. The maximum delay is 3 minutes. Once modified, the fan off delay will not change back to 45 seconds unless power is reset to the control. A LED indicator is provided on the IGC to monitor operation.

Electro-mechanical units with an economizer

Cooling —

When free cooling is not available, the compressors will be controlled by the zone thermostat. When free cooling is available, the outdoor-air damper is modulated by the EconoMi$er IV and X control to provide a 50°F (10°C) to 55°F (13°C) mixed-air temperature into the zone. As the mixed air temperature fluctuates above 55°F (13°C)or below 50°F (10°C) dampers will be modulated (open or close) to bring the mixed-air temperature back within control. If mechanical cooling is utilized with free cooling, the outdoor-air damper will maintain its current position at the time the compressor is started. If the increase in cooling capacity causes the mixed-air temperature to drop below 45°F (7°C), then the outdoor-air damper position will be decreased to the minimum position. If the mixed-air temperature continues to fall, the outdoor-air damper will close. Control returns to normal once the mixed-air temperature rises above 48°F (9°C). The power exhaust fans will be energized and de-energized, if installed, as the outdoor-air damper opens and closes.

If field-installed accessory CO_2 sensors are connected to the EconoMi$er IV and X control, a demand controlled ventilation strategy will begin to operate. As the CO_2 level in the zone increases above the CO_2 setpoint, the minimum position of the damper will be increased proportionally. As the CO_2 level decreases because of the increase in fresh air, the outdoor-air damper will be proportionally closed. For EconoMi$er IV and X operation, there must be a thermostat call for the fan (G). If the unit is occupied and the fan is on, the damper will operate at minimum position. Otherwise, the damper will be closed.

SEQUENCE OF OPERATION (cont.)

When the EconoMi$er IV and X control is in the occupied mode and a call for cooling exists (Y1 on the thermostat), the control will first check for indoor fan operation. If the fan is not on, then cooling will not be activated. If the fan is on, then the control will open the EconoMi$er IV and X damper to the minimum position.

On the initial power to the EconoMi$er IV and X control, it will take the damper up to 2 1/2 minutes before it begins to position itself. After the initial power-up, further changes in damper position can take up to 30 seconds to initiate. Damper movement from full closed to full open (or vice versa) will take between 1 1/2 and 2 1/2 minutes. If free cooling can be used as determined from the appropriate changeover command (switch, dry bulb, enthalpy curve, differential dry bulb, or differential enthalpy), then the control will modulate the dampers open to maintain the mixed-air temperature setpoint at 50°F (10°C) to 55°F (13°C). If there is a further demand for cooling (cooling second stage - Y2 is energized), then the control will bring on compressor stage 1 to maintain the mixed-air temperature setpoint. The EconoMi$er IV and X damper will be open at maximum position. EconoMi$er IV and X operation is limited to a single compressor.

2-Speed Note: When operating in ventilation mode only, the indoor fan motor will automatically adjust to 2/3rd of the total cfm established.

Heating

The sequence of operation for the heating is the same as an electromechanical unit with no economizer. The only difference is how the economizer acts. The economizer will stay at the Economizer Minimum Position while the evaporator fan is operating. The outdoor-air damper is closed when the indoor fan is not operating.

Optional Humidi-MiZer Dehumidification System

Units with the factory equipped Humidi-MiZer option are capable of providing multiple modes of improved dehumidification as a variation of the normal cooling cycle. The Humidi-MiZer option includes additional valves in the liquid line and discharge line of each refrigerant circuit, a small reheat condenser coil downstream of the evaporator, and Motormaster variable-speed control of some or all outdoor fans. Operation of the revised refrigerant circuit for each mode is described below.

The Humidi-MiZer system provides three sub-modes of operation: Cool, Reheat1, and Reheat2.

Cool mode - provides a normal ratio of Sensible and Latent Cooling effect from the evaporator coil.

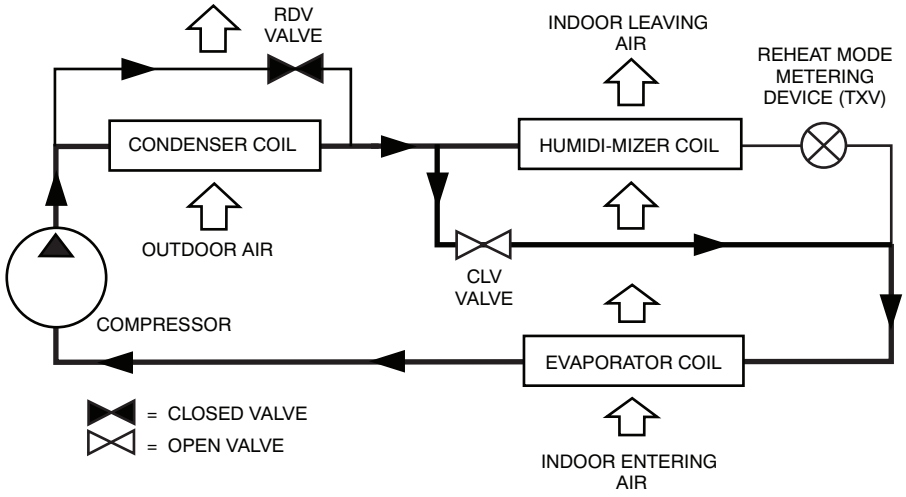
Reheat1 - provides increased Latent Cooling while slightly reducing the Sensible Cooling effect.

Reheat2 - provides normal Latent Cooling but with null or minimum Sensible Cooling effect delivered to the space.

The Reheat1 and Reheat2 modes are available when the unit is not in a Heating mode and when the Low Ambient Lockout switch is closed.

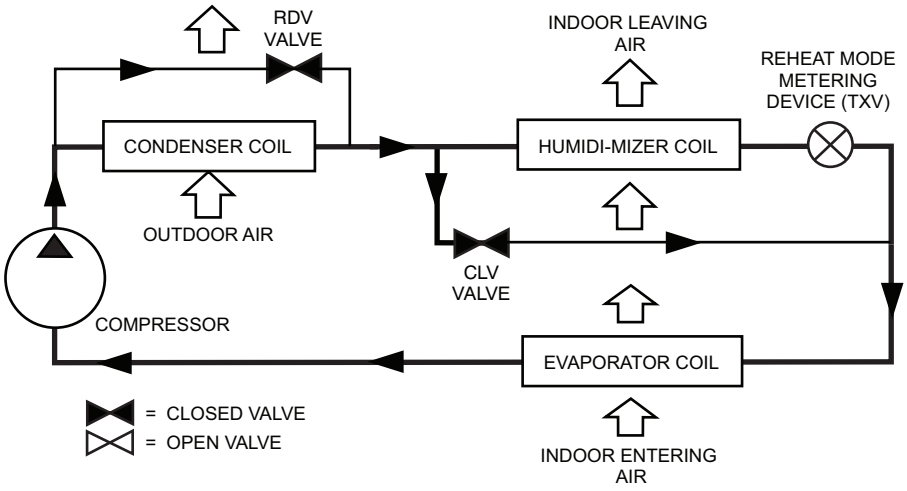
The following diagrams depict piping for Single Stage cooling units.

SEQUENCE OF OPERATION (cont.)



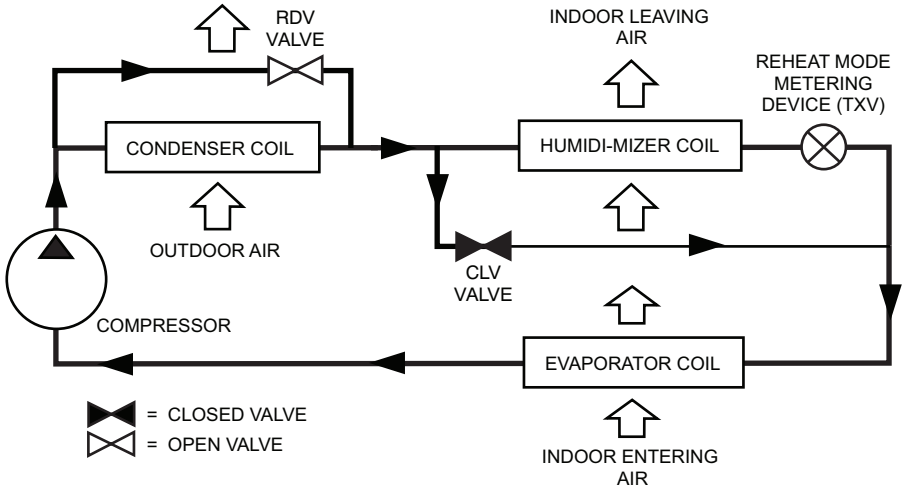
C12702

Normal Cooling Mode - Humidi-MiZer System with Single Stage Cooling



C12703

Subcooling Mode (Reheat 1) - Humidi-MiZer System with Single Stage Cooling



C12704

Hot Gas Reheat Mode (Reheat2) - Humidi-MiZer System with Single Stage Cooling

GUIDE SPECIFICATIONS - 48HC**04-14

Note about this specification:

This specification is in the “Masterformat” as published by the Construction Specification Institute. Please feel free to copy this specification directly into your building spec.

Gas Heat/Electric Cooling Packaged Rooftop

HVAC Guide Specifications

Size Range: **3 to 12.5 Nominal Tons**

Section **Description**

23 06 80 Schedules for Decentralized HVAC Equipment

23 06 80.13 Decentralized Unitary HVAC Equipment Schedule

23 06 80.13.A. Rooftop unit schedule

1. Schedule is per the project specification requirements.

23 07 16 HVAC Equipment Insulation

23 07 16.13 Decentralized, Rooftop Units:

23 07 16.13.A. Evaporator fan compartment:

1. Interior cabinet surfaces shall be insulated with a minimum 1/2-in. thick, minimum 1 1/2 lb density, flexible fiberglass insulation bonded with a phenolic binder, neoprene coated on the air side.
2. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.

23 07 16.13.B. Gas heat compartment:

1. Aluminum foil-faced fiberglass insulation shall be used.
2. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.

23 09 13 Instrumentation and Control Devices for HVAC

23 09 13.23 Sensors and Transmitters

23 09 13.23.A. Thermostats

1. Thermostat must
   a. energize both “W” and “G” when calling for heat.
   b. have capability to energize 2 different stages of cooling, and 2 different stages of heating.
   c. include capability for occupancy scheduling.

23 09 23 Direct-digital Control system for HVAC

23 09 23.13 Decentralized, Rooftop Units:

23 09 23.13.A. PremierLink™ controller

1. Shall be ASHRAE 62-2001 compliant.
2. Shall accept 18-32 VAC input power.
3. Shall have an operating temperature range from -40°F (-40°C) to 158°F (70°C), 10% - 95% RH (non-condensing).
4. Shall include an integrated economizer controller to support an economizer with 4 to 20 mA actuator input and no microprocessor controller.
5. Controller shall accept the following inputs: space temperature, setpoint adjustment, outdoor air temperature, indoor air quality, outdoor air quality, indoor relative humidity, compressor lock-out, fire shutdown, enthalpy, fan status, remote time clock/door switch.
6. Shall accept a CO_2 sensor in the conditioned space, and be Demand Control Ventilation (DCV) ready.
7. Shall provide the following outputs: economizer, fan, cooling stage 1, cooling stage 2, heat stage 1, heat stage 2, heat stage 3/ exhaust/ reversing valve/ dehumidify/ occupied.
8. Unit shall provide surge protection for the controller through a circuit breaker.
9. Shall be Internet capable, and communicate at a Baud rate of 38.4K or faster.

10. Shall have an LED display independently showing the status of activity on the communication bus, and processor operation.
11. Shall include an EIA-485 protocol communication port, an access port for connection of either a computer or a Carrier technician tool, an EIA-485 port for network communication to intelligent space sensors and displays, and a port to connect an optional LonWorks plug-in communications card.
12. Shall have built-in Carrier Comfort Network™ (CCN) protocol, and be compatible with other CCN devices, including ComfortLink™ and ComfortVIEW™ controllers.
13. Shall have built-in support for Carrier technician tool.
14. Software upgrades will be accomplished by local download. Software upgrades through chip replacements are not allowed.
15. Shall be shock resistant in all planes to 5G peak, 11ms during operation, and 100G peak, 11ms during storage.
16. Shall be vibration resistant in all planes to 1.5G @ 20-300 Hz.
17. Shall support a bus length of 4000 ft (1219m) max, 60 devices per 1000 ft (305m) section, and 1 RS-485 repeater per 1000 ft (305m) sections.

23 09 23.13.B. ComfortLink Unit Controls shall contain:

1. Four button detailed English scrolling marquee display.
2. CCN (Carrier Comfort Network) capable.
3. Unit control with standard suction pressure transducers and condensing temperature thermistors.
4. Shall provide a 5°F temperature difference between cooling and heating set points to meet ASHRAE 90.1 Energy Standard.
5. Shall provide and display a current alarm list and an alarm history list.
6. Service run test capability.
7. Shall accept input from a CO_2 sensor (both indoor and outdoor).
8. Configurable alarm light shall be provided which activates when certain types of alarms occur.
9. Compressor minimum run time (3 minutes) and minimum off time (5 minutes) are provided.
10. Service diagnostic mode.
11. Economizer control (optional).
12. Control multi capacity stages
13. Unit shall be complete with self-contained low voltage control circuit.
14. Unit shall have 0°F low ambient cooling operation.

23 09 23.13.C. RTU Open - multi-protocol, direct digital controller:

1. Shall be ASHRAE 62-2001 compliant.
2. Shall accept 18-30VAC, 50-60Hz, and consumer 15VA or less power.
3. Shall have an operating temperature range from -40°F (-40°C) to 130°F (54°C), 10% - 90% RH (non-condensing).
4. Shall include built-in protocol for BACNET (MS/TP and PTP modes), Modbus (RTU and ASCII), Johnson N2 and LonWorks. LonWorks Echelon processor required for all Lon applications shall be contained in separate communication board.
5. Shall allow access of up to 62 network variables (SNVT). Shall be compatible with all open controllers
6. Baud rate Controller shall be selectable using a dipswitch.
7. Shall have an LED display independently showing the status of serial communication, running, errors, power, all digital outputs, and all analog inputs.
8. Shall accept the following inputs: space temperature, setpoint adjustment, outdoor air temperature, indoor air quality, outdoor air quality, compressor lock-out, fire shutdown, enthalpy switch, and fan status/filter status/ humidity/ remote occupancy.
9. Shall provide the following outputs: economizer, fan, cooling stage 1, cooling stage 2, heat stage 1, heat stage 2, heat stage 3/ exhaust/ reversing valve.
10. Shall have built-in surge protection circuitry through solid state polyswitches. Polyswitches shall be used on incoming power and network connections. Polyswitches will return to normal when the “trip” condition clears.
11. Shall have a battery back-up capable of a minimum of 10,000 hours of data and time clock retention during power outages.
12. Shall have built-in support for Carrier technician tool.
13. Shall include an EIA-485 protocol communication port, an access port for connection of either a computer or a Carrier technician tool, an EIA-485 port for network communication to intelligent space sensors and displays, and a port to connect an optional LonWorks communications card.

14. Software upgrades will be accomplished by either local or remote download. No software upgrades through chip replacements are allowed.

23 09 33 Electric and Electronic Control System for HVAC

23 09 33.13 Decentralized, Rooftop Units:

23 09 33.13.A. General:

1. Shall be complete with self-contained low-voltage control circuit protected by a resettable circuit breaker on the 24-v transformer side. Transformer shall have 75VA capability.
2. Shall utilize color-coded wiring.
3. Shall include a central control terminal board to conveniently and safely provide connection points for vital control functions such as: smoke detectors, phase monitor, gas controller, economizer, thermostat, DDC control options, and low and high pressure switches.
4. The heat exchanger shall be controlled by an integrated gas controller (IGC) microprocessor. See heat exchanger section of this specification.
5. Unit shall include a minimum of one 8-pin screw terminal connection board for connection of control wiring.

23 09 33.23.B. Safeties:

1. Compressor over-temperature, over-current. High internal pressure differential.
2. Low-pressure switch.
   a. Units with 2 compressors shall have different sized connectors for the circuit 1 and circuit 2 low and high pressure switches. They shall physically prevent the cross-wiring of the safety switches between circuits 1 and 2.
   b. Low pressure switch shall use different color wire than the high pressure switch. The purpose is to assist the installer and service technician to correctly wire and or troubleshoot the rooftop unit.
3. High-pressure switch.
   a. Units with 2 compressors shall have different sized connectors for the circuit 1 and circuit 2 low and high pressure switches. They shall physically prevent the cross-wiring of the safety switches between circuits 1 and 2.
   b. High pressure switch shall use different color wire than the low pressure switch. The purpose is to assist the installer and service technician to correctly wire and or troubleshoot the rooftop unit.
4. Automatic reset, motor thermal overload protector.
5. Heating section shall be provided with the following minimum protections:
   a. High-temperature limit switches.
   b. Induced draft motor speed sensor.
   c. Flame rollout switch.
   d. Flame proving controls.

23 09 93 Sequence of Operations for HVAC Controls

23 09 93.13 Decentralized, Rooftop Units:

23 09 93.13 INSERT SEQUENCE OF OPERATION

23 40 13 Panel Air Filters

23 40 13.13 Decentralized, Rooftop Units:

23 40 13.13.A. Standard filter section

1. Shall consist of factory-installed, low velocity, disposable 2-in. thick fiberglass filters of commercially available sizes.
2. Unit shall use only one filter size. Multiple sizes are not acceptable.
3. Filters shall be accessible through an access panel with “no-tool” removal as described in the unit cabinet section of this specification (23 81 19.13.H).

23 81 19 Self-Contained Air Conditioners

23 81 19.13 Small-Capacity Self-Contained Air Conditioners (48HC**04-14)

23 81 19.13.A. General

1. Outdoor, rooftop mounted, electrically controlled, heating and cooling unit utilizing a fully hermetic scroll compressor(s) for cooling duty and gas combustion for heating duty.
2. Factory assembled, single-piece heating and cooling rooftop unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, and special features required prior to field start-up.
3. Unit shall use environmentally sound, Puron® refrigerant.
4. Unit shall be installed in accordance with the manufacturer’s instructions.

5. Unit must be selected and installed in compliance with local, state, and federal codes.

23 81 19.13.B. Quality Assurance

1. Unit meets ASHRAE 90.1 minimum efficiency requirements.
2. 3-phase units are Energy Star certified.
3. Unit shall be rated in accordance with AHRI Standards 210/240 and 340/360.
4. Unit shall be designed to conform to ASHRAE 15, 2001.
5. Unit shall be UL-tested and certified in accordance with ANSI Z21.47 Standards and UL-listed and certified under Canadian standards as a total package for safety requirements.
6. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
7. Unit casing shall be capable of withstanding 500-hour salt spray exposure per ASTM B117 (scribed specimen).
8. Unit casing shall be capable of withstanding Federal Test Method Standard No. 141 (Method 6061) 5000-hour salt spray.
9. Unit shall be designed in accordance with ISO 9001, and shall be manufactured in a facility registered by ISO 9001.
10. Roof curb shall be designed to conform to NRCA Standards.
11. Unit shall be subjected to a completely automated run test on the assembly line. The data for each unit will be stored at the factory, and must be available upon request.
12. Unit shall be designed in accordance with UL Standard 1995, including tested to withstand rain.
13. Unit shall be constructed to prevent intrusion of snow and tested to prevent snow intrusion into the control box up to 40 mph.
14. Unit shake tested to assurance level 1, ASTM D4169 to ensure shipping reliability.
15. High Efficient Motors listed shall meet section 313 of the Energy Independence and Security Act of 2007 (EISA 2007).

23 81 19.13.C. Delivery, Storage, and Handling

1. Unit shall be stored and handled per manufacturer's recommendations.
2. Lifted by crane requires either shipping top panel or spreader bars.
3. Unit shall only be stored or positioned in the upright position.

23 81 19.13.E. Project Conditions

1. As specified in the contract.

23 81 19.13.F. Operating Characteristics

1. Unit shall be capable of starting and running at 125°F (52°C) ambient outdoor temperature, meeting maximum load criteria of AHRI Standard 210/240 or 340/360 at ± 10% voltage.
2. Compressor with standard controls shall be capable of operation down to 35°F (2°C), ambient outdoor temperatures. Accessory low ambient kits shall be available if operation below 35°F (2°C), is required. See below for head pressure control package or winter start kit.
3. Unit shall discharge supply air vertically or horizontally as shown on contract drawings.
4. Unit shall be factory configured for vertical supply & return configurations.
5. Unit shall be field convertible from vertical to horizontal airflow on all models. No special kit required on 04-12 models. Supply duct kit required for 14 size model only.
6. Unit shall be capable of mixed operation: vertical supply with horizontal return or horizontal supply with vertical return.

23 81 19.13.G. Electrical Requirements

1. Main power supply voltage, phase, and frequency must match those required by the manufacturer.

23 81 19.13.H. Unit Cabinet

1. Unit cabinet shall be constructed of galvanized steel, and shall be bonderized and coated with a pre-painted baked enamel finish on all externally exposed surfaces.
2. Unit cabinet exterior paint shall be: film thickness, (dry) 0.003 inches minimum, gloss (per ASTM D523, 60°F / 16°C): 60, Hardness: H-2H Pencil hardness.
3. Evaporator fan compartment interior cabinet insulation shall conform to AHRI Standards 210/240 or 340/360 minimum exterior sweat criteria. Interior surfaces shall be insulated with a minimum 1/2-in. thick, 1 lb density, flexible fiberglass insulation, neoprene coated on the air side. Aluminum foil-faced fiberglass insulation shall be used in the gas heat compartment.
4. Base of unit shall have a minimum of four locations for thru-the-base gas and electrical connections (factory installed or field installed), standard.

5. Base Rail
   a. Unit shall have base rails on a minimum of 4 sides.
   b. Holes shall be provided in the base rails for rigging shackles to facilitate maneuvering and overhead rigging.
   c. Holes shall be provided in the base rail for moving the rooftop by fork truck.
   d. Base rail shall be a minimum of 16 gauge thickness.
6. Condensate pan and connections:
   a. Shall be an internally sloped condensate drain pan made of a non-corrosive material.
   b. Shall comply with ASHRAE Standard 62.
   c. Shall use a 3/4" -14 NPT drain connection, possible either through the bottom or side of the drain pan. Connection shall be made per manufacturer's recommendations.
7. Top panel:
   a. Shall be a single piece top panel on 04 thru 12 sizes, two piece on 14 size.
8. Gas Connections:
   a. All gas piping connecting to unit gas valve shall enter the unit cabinet at a single location on side of unit (horizontal plane).
   b. Thru-the-base capability
      (1.) Standard unit shall have a thru-the-base gas-line location using a raised, embossed portion of the unit basepan.
      (2.) Optional, factory-approved, water-tight connection method must be used for thru-the-base gas connections.
      (3.) No basepan penetration, other than those authorized by the manufacturer, is permitted.
9. Electrical Connections
   a. All unit power wiring shall enter unit cabinet at a single, factory-prepared, knockout location.
   b. Thru-the-base capability.
      (1.) Standard unit shall have a thru-the-base electrical location (s) using a raised, embossed portion of the unit basepan.
      (2.) Optional, factory-approved, water-tight connection method must be used for thru-the-base electrical connections.
      (3.) No basepan penetration, other than those authorized by the manufacturer, is permitted.
10. Component access panels (standard)
   a. Cabinet panels shall be easily removable for servicing.
   b. Unit shall have one factory installed, tool-less, removable, filter access panel.
   c. Panels covering control box, indoor fan, indoor fan motor, gas components (where applicable), and compressors shall have a molded composite handles.
   d. Handles shall be UV modified, composite. They shall be permanently attached, and recessed into the panel.
   e. Screws on the vertical portion of all removable access panel shall engage into heat resistant, molded composite collars.
   f. Collars shall be removable and easily replaceable using manufacturer recommended parts.

23 81 19.13.I. Gas Heat

1. General
   a. Heat exchanger shall be an induced draft design. Positive pressure heat exchanger designs shall not be allowed.
   b. Shall incorporate a direct-spark ignition system and redundant main gas valve.
   c. Gas supply pressure at the inlet to the rooftop unit gas valve must match that required by the manufacturer.
2. The heat exchanger shall be controlled by an integrated gas controller (IGC) microprocessor.
   a. IGC board shall notify users of fault using an LED (light-emitting diode).
   b. The LED shall be visible without removing the control box access panel.
   c. IGC board shall contain algorithms that modify evaporator-fan operation to prevent future cycling on high temperature limit switch.
   d. Unit shall be equipped with anti-cycle protection with one short cycle on unit flame rollout switch or 4 continuous short cycles on the high temperature limit switch. Fault indication shall be made using an LED.
3. Standard Heat Exchanger construction
   a. Heat exchanger shall be of the tubular-section type constructed of a minimum of 20-gauge steel coated with a nominal 1.2 mil aluminum-silicone alloy for corrosion resistance.

b. Burners shall be of the in-shot type constructed of aluminum-coated steel.
c. Burners shall incorporate orifices for rated heat output up to 2000 ft (610m) elevation. Additional accessory kits may be required for applications above 2000 ft (610m) elevation, depending on local gas supply conditions.
d. Each heat exchanger tube shall contain multiple dimples for increased heating effectiveness.

4. Optional Stainless Steel Heat Exchanger construction
   a. Use energy saving, direct-spark ignition system.
   b. Use a redundant main gas valve.
   c. Burners shall be of the in-shot type constructed of aluminum-coated steel.
   d. All gas piping shall enter the unit cabinet at a single location on side of unit (horizontal plane).
   e. The optional stainless steel heat exchanger shall be of the tubular-section type, constructed of a minimum of 20-gauge type 409 stainless steel.
   f. Type 409 stainless steel shall be used in heat exchanger tubes and vestibule plate.
   g. Complete stainless steel heat exchanger allows for greater application flexibility.
5. Optional Low NO_x Heat Exchanger construction
   a. Low NO_x reduction shall be provided to reduce nitrous oxide emissions to meet California's Air Quality Management District (SCAQMD) low-NO_x emissions requirement of 40 nanograms per joule or less.
   b. Primary tubes and vestibule plates on low NO_x units shall be 409 stainless steel. Other components shall be aluminized steel.
6. Induced draft combustion motor and blower
   a. Shall be a direct-drive, single inlet, forward-curved centrifugal type.
   b. Shall be made from steel with a corrosion-resistant finish.
   c. Shall have permanently lubricated sealed bearings.
   d. Shall have inherent thermal overload protection.
   e. Shall have an automatic reset feature.

23 81 19.13.J. Coils

1. Standard Aluminum Fin/Copper Tube Coils:
   a. Standard evaporator and condenser coils shall have aluminum lanced plate fins mechanically bonded to seamless internally grooved copper tubes with all joints brazed.
   b. Evaporator coils shall be leak tested to 150 psig, pressure tested to 450 psig, and qualified to UL 1995 burst test at 1775 psig.
   c. Condenser coils shall be leak tested to 150 psig, pressure tested to 650 psig, and qualified to UL 1995 burst test at 1980 psig.
2. Optional Pre-coated aluminum-fin condenser coils (3-phase models only):
   a. Shall have a durable epoxy-phenolic coating to provide protection in mildly corrosive coastal environments.
   b. Coating shall be applied to the aluminum fin stock prior to the fin stamping process to create an inert barrier between the aluminum fin and copper tube.
   c. Epoxy-phenolic barrier shall minimize galvanic action between dissimilar metals.
3. Optional Copper-fin evaporator and condenser coils(3-phase models only) :
   a. Shall be constructed of copper fins mechanically bonded to copper tubes and copper tube sheets.
   b. Galvanized steel tube sheets shall not be acceptable.
   c. A polymer strip shall prevent coil assembly from contacting the sheet metal coil pan to minimize potential for galvanic corrosion between coil and pan.
4. Optional E-coated aluminum-fin evaporator and condenser coils (3-phase models only):
   a. Shall have a flexible epoxy polymer coating uniformly applied to all coil surface areas without material bridging between fins.
   b. Coating process shall ensure complete coil encapsulation of tubes, fins and headers.
   c. Color shall be high gloss black with gloss per ASTM D523-89.
   d. Uniform dry film thickness from 0.8 to 1.2 mil on all surface areas including fin edges.
   e. Superior hardness characteristics of 2H per ASTM D3363-92A and cross-hatch adhesion of 4B-5B per ASTM D3359-93.
   f. Impact resistance shall be up to 160 in.-lb (ASTM D2794-93).
   g. Humidity and water immersion resistance shall be up to minimum 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92).

h. Corrosion durability shall be confirmed through testing to be no less than 1000 hours salt spray per ASTM B117-90.

5. Optional E-coated aluminum-fin, aluminum tube condenser coils:
   a. Shall have a flexible epoxy polymer coating uniformly applied to all coil external surface areas without material bridging between fins or louvers.
   b. Coating process shall ensure complete coil encapsulation, including all exposed fin edges.
   c. E-coat thickness of 0.8 to 1.2 mil with top coat having a uniform dry film thickness from 1.0 to 2.0 mil on all external coil surface areas, including fin edges, shall be provided.
   d. Shall have superior hardness characteristics of 2H per ASTM D3363-00 and cross-hatch adhesion of 4B-5B per ASTM D3359-02.
   e. Shall have superior impact resistance with no cracking, chipping or peeling per NSF/ANSI 51-2002 Method 10.2.

23 81 19.13.K. Refrigerant Components

1. Refrigerant circuit shall include the following control, safety, and maintenance features:
   a. Thermostatic Expansion Valve (TXV) shall help provide optimum performance across the entire operating range. Shall contain removable power element to allow change out of power element and bulb without removing the valve body.
   b. Refrigerant filter drier - Solid core design.
   c. Service gauge connections on suction and discharge lines.
   d. Pressure gauge access through a specially designed access port in the top panel of the unit.
2. There shall be gauge line access port in the skin of the rooftop, covered by a black, removable plug.
   a. The plug shall be easy to remove and replace.
   b. When the plug is removed, the gauge access port shall enable maintenance personnel to route their pressure gauge lines.
   c. This gauge access port shall facilitate correct and accurate condenser pressure readings by enabling the reading with the compressor access panel on.
   d. The plug shall be made of a leak proof, UV-resistant, composite material.
3. Compressors
   a. Unit shall use fully hermetic, scroll compressor for each independent refrigeration circuit.
   b. Models shall be available with single compressor/single stage cooling designs on 04 – 07 sizes models, and 2 compressor/2-stage cooling models on 08 – 14 sizes.
   c. Compressor motors shall be cooled by refrigerant gas passing through motor windings.
   d. Compressors shall be internally protected from high discharge temperature conditions.
   e. Compressors shall be protected from an over-temperature and over-amperage conditions by an internal, motor overload device.
   f. Compressor shall be factory mounted on rubber grommets.
   g. Compressor motors shall have internal line break thermal, current overload and high pressure differential protection.
   h. Crankcase heaters shall not be required for normal operating range, unless provided by the factory.

23 81 19.13.L. Filter Section

1. Filters access is specified in the unit cabinet section of this specification.
2. Filters shall be held in place by a pivoting filter tray, facilitating easy removal and installation.
3. Shall consist of factory-installed, low velocity, throw-away 2-in. thick fiberglass filters.
4. Filters shall be standard, commercially available sizes.
5. Only one size filter per unit is allowed.

23 81 19.13.M. Evaporator Fan and Motor

1. Evaporator fan motor:
   a. Shall have permanently lubricated bearings.
   b. Shall have inherent automatic-reset thermal overload protection or circuit breaker.
   c. Shall have a maximum continuous bhp rating for continuous duty operation; no safety factors above that rating shall be required.
2. Electric Drive (Direct Drive) X13 – 5 Speed/Torque Evaporator Fan:
   a. Multi-speed motor with easy quick adjustment settings.
   b. Blower fan shall be double-inlet type with forward-curved blades.
   c. Shall be constructed from steel with a corrosion resistant finish and dynamically balanced.

d. Standard on all 04-06 models with 208/230/1/60 operation without Humidi-MiZer
e. Standard on all 04-06 3-phase models without Humidi-MiZer, with optional belt drive.

3. Belt-driven Evaporator Fan:
   a. Belt drive shall include an adjustable-pitch motor pulley.
   b. Shall use sealed, permanently lubricated ball-bearing type.
   c. Blower fan shall be double-inlet type with forward-curved blades.
   d. Shall be constructed from steel with a corrosion resistant finish and dynamically balanced.
   e. Standard on all 07-14 size and 04-06 with Humidi-MiZer models. Optional on all 04-06 3-phase models.

23 81 19.13.N. Condenser Fans and Motors

1. Condenser fan motors:
   a. Shall be a totally enclosed motor.
   b. Shall use permanently lubricated bearings.
   c. Shall have inherent thermal overload protection with an automatic reset feature.
   d. Shall use a shaft-down design on 04 to 12 models and shaft-up on 14 size with rain shield.
2. Condenser Fans:
   a. Shall be a direct-driven propeller type fan.
   b. Shall have galvalum blades riveted to corrosion-resistant steel spiders and shall be dynamically balanced.

23 81 19.13.O. Special Features Options and Accessories

1. Staged Air Volume System (SAV) for 2-stage cooling models only:
   a. Evaporator fan motor:
      (1.) Shall have permanently lubricated bearings.
      (2.) Shall have a maximum continuous bhp rating for continuous duty operation; no safety factors above that rating.
      (3.) Shall be Variable Frequency duty and 2-speed control.
      (4.) Shall contain motor shaft grounding ring to prevent electrical bearing fluting damage by safely diverting harmful shaft voltages and bearing currents to ground.
2. Variable Frequency Drive (VFD). Only available on 2-speed indoor fan motor option (SAV):
   a. Shall be installed inside the unit cabinet, mounted, wired and tested.
   b. Shall contain Electromagnetic Interference (EMI) frequency protection.
   c. Insulated Gate Bi-Polar Transistors (IGBT) used to produce the output pulse width modulated (PWM) waveform, allowing for quiet motor operation.
   d. Self diagnostics with fault and power code LED indicator. Field accessory Display Kit available for further diagnostics and special setup applications.
   e. RS485 capability standard.
   f. Electronic thermal overload protection.
   g. 5% swinging chokes for harmonic reduction and improved power factor.
   h. All printed circuit boards shall be conformal coated.
3. Standard Integrated Economizers (Factory installed on 3 Phase Models Only. Field installed on all 3 and 1 Phase Models):
   a. Integrated, gear-driven opposing modulating blade design type capable of simultaneous economizer and compressor operation.
   b. Independent modules for vertical or horizontal return configurations shall be available. Vertical return modules shall be available as a factory installed option.
   c. Damper blades shall be galvanized steel with composite gears. Plastic or composite blades on intake or return shall not be acceptable.
   d. Shall include all hardware and controls to provide free cooling with outdoor air when temperature and/or humidity are below setpoints.
   e. Shall be equipped with gear driven dampers for both the outdoor ventilation air and the return air for positive air stream control.
   f. Standard models shall be equipped with low-leakage dampers, not to exceed 2% leakage at 1 in. wg pressure differential. Economizer controller on electromechanical units shall be Honeywell W7212 that provides:
      (1.) Combined minimum and DCV maximum damper position potentiometers with compressor staging relay.
      (2.) Functions with solid state analog enthalpy or dry bulb changeover control sensing.

(3.) Contain LED indicates for:
when free cooling is available
when module is in DCV mode
when exhaust fan contact is closed

g. Ultra low leak EconoMi$er X system shall be available on models with SAV 2-speed Variable Frequency Drive (VFD) systems. Only available on 2-speed indoor fan motor systems with electromechanical, ComfortLink or RTU Open controls.

(1.) Maximum damper leakage rate to be equal to or less than 4.0 cfm/sq. ft. at 1.0 in. w.g., meeting or exceeding ASHRAE 90.1 requirements. Economizer controller on electromechanical units shall be Honeywell W7220 that provides:

(2.) 2-line LCD interface screen for setup, configuration and troubleshooting

(3.) On-board fault detection and diagnostics

(4.) Sensor failure loss of communication identification

(5.) Automatic sensor detection

(6.) Capabilities for use with multiple-speed indoor fan systems

(7.) Utilize digital sensors: Dry bulb and Enthalpy

h. Shall be capable of introducing up to 100% outdoor air.

i. Shall be equipped with a barometric relief damper capable of relieving up to 100% return air.

j. Shall be designed to close damper(s) during loss-of-power situations with spring return built into motor.

k. Dry bulb outdoor air temperature sensor shall be provided as standard. Outdoor air sensor setpoint shall be adjustable and shall range from 40 to 100°F / 4 to 38°C. Additional sensor options shall be available as accessories.

l. The economizer controller shall also provide control of an accessory power exhaust unit function. Factory set at 100%, with a range of 0% to 100%.

m. The economizer shall maintain minimum airflow into the building during occupied period and provide design ventilation rate for full occupancy. A remote potentiometer may be used to override the damper setpoint.

n. Dampers shall be completely closed when the unit is in the unoccupied mode.

o. Economizer controller shall accept a 2-10 Vdc CO_2 sensor input for IAQ/DCV control. In this mode, dampers shall modulate the outdoor air damper to provide ventilation based on the sensor input.

p. Compressor lockout sensor shall open at 35°F (2°C) and close closes at 50°F (10°C).

q. Actuator shall be direct coupled to economizer gear. No linkage arms or control rods shall be acceptable.

r. Economizer controller shall provide indications when in free cooling mode, in the DCV mode, or the exhaust fan contact is closed.

4. Two-Position Damper (Factory installed on 3 Phase Models Only. Field installed on all 3 and 1 Phase Models)

a. Damper shall be a Two-Position Damper. Damper travel shall be from the full closed position to the field adjustable %-open setpoint.

b. Damper shall include adjustable damper travel from 25% to 100% (full open).

c. Damper shall include single or dual blade, gear driven dampers and actuator motor.

d. Actuator shall be direct coupled to damper gear. No linkage arms or control rods shall be acceptable.

e. Damper will admit up to 100% outdoor air for applicable rooftop units.

f. Damper shall close upon indoor (evaporator) fan shutoff and/or loss of power.

g. The damper actuator shall plug into the rooftop unit's wiring harness plug. No hard wiring shall be required.

h. Outside air hood shall include aluminum water entrainment filter.

5. Manual damper

a. Manual damper package shall consist of damper, air inlet screen, and rain hood which can be preset to admit up to 25 or 50% outdoor air for year round ventilation.

6. Humidi-MiZer Adaptive Dehumidification System (3-phase models only):

a. The Humidi-MiZer Adaptive Dehumidification System shall be factory installed and shall provide greater dehumidification of the occupied space by two modes of dehumidification operations in addition to its normal design cooling mode:

(1.) Subcooling mode further sub cools the hot liquid refrigerant leaving the condenser coil when both temperature and humidity in the space are not satisfied.

(2.) Hot gas reheat mode shall mix a portion of the hot gas from the discharge of the compressor with the hot liquid refrigerant leaving the condenser coil to create a two-phase heat transfer in the system, resulting in a neutral leaving air temperature when only humidity in the space is not satisfied.

(3.) Includes head pressure controller.

7. Head Pressure Control Package (MotorMaster)
   a. Controller shall control coil head pressure by condenser-fan speed modulation or condenser-fan cycling and wind baffles.
   b. Shall consist of solid-state control and condenser-coil temperature sensor to maintain condensing temperature at outdoor ambient temperatures down to -20°F (-29°C).
8. Low Ambient Controller (Factory installed only)
   a. Controller shall control coil head pressure by condenser-fan speed modulation or condenser-fan cycling and wind baffles.
   b. Shall consist of solid-state control and condenser-coil temperature sensor to maintain condensing temperature at outdoor ambient temperatures down to 0°F (-18°C). (Not available on 11 size models as standard unit cooling operation down to 0°F /-18°C).
9. Propane Conversion Kit
   a. Package shall contain all the necessary hardware and instructions to convert a standard natural gas unit for use with liquefied propane, up to 2000 ft (610m) elevation.
   b. Additional accessory kits may be required for applications above 2000 ft (610m) elevation.
10. Flue Shield (04-12 models only)
   a. Flue shield shall provide protection from the hot sides of the gas flue hood.
11. Condenser Coil Hail Guard Assembly (Factory installed option on 3-phase models. Field installed on all 3 and 1 phase models):
   a. Shall protect against damage from hail.
   b. Shall be of louvered style.
12. Unit-Mounted, Non-Fused Disconnect Switch:
   a. Switch shall be factory-installed, internally mounted.
   b. National Electric Code (NEC) and UL approved non-fused switch shall provide unit power shutoff.
   c. Shall be accessible from outside the unit.
   d. Shall provide local shutdown and lockout capability.
13. HACR Breaker
   a. These manual reset devices provide overload and short circuit protection for the unit. Factory wired and mounted with the units, with access cover to help provide environmental protection. On 575V applications, HACR breaker can only be used with WYE power distribution systems. Use on Delta power distribution systems is prohibited.
14. Convenience Outlet:
   a. Powered convenience outlet (3-phase models only, not available on 11 size models with ComfortLink or RTU Open controls).
      (1.) Outlet shall be powered from main line power to the rooftop unit.
      (2.) Outlet shall be powered from line side or load side of disconnect by installing contractor, as required by code. If outlet is powered from load side of disconnect, unit electrical ratings shall be UL certified and rated for additional outlet amperage.
      (3.) Outlet shall be factory-installed and internally mounted with easily accessible 115-v female receptacle.
      (4.) Outlet shall include 15 amp GFI receptacles with independent fuse protection.
      (5.) Voltage required to operate convenience outlet shall be provided by a factory-installed step-down transformer.
      (6.) Outlet shall be accessible from outside the unit.
      (7.) Outlet shall include a field-installed “Wet in Use” cover.
   b. Non-Powered convenience outlet.
      (1.) Outlet shall be powered from a separate 115/120v power source.
      (2.) A transformer shall not be included.
      (3.) Outlet shall be factory-installed and internally mounted with easily accessible 115-v female receptacle.
      (4.) Outlet shall include 15 amp GFI receptacles with independent fuse protection.
      (5.) Outlet shall be accessible from outside the unit.

(6.) Outlet shall include a field-installed “Wet in Use” cover.

15. Flue Discharge Deflector (04-12 models only):
    a. Flue discharge deflector shall direct unit exhaust vertically instead of horizontally.
    b. Deflector shall be defined as a “natural draft” device by the National Fuel and Gas (NFG) code.
16. Thru-the-Base Connectors:
    a. Kits shall provide connectors to permit gas and electrical connections to be brought to the unit through the unit basepan.
    b. Minimum of four connection locations per unit.
17. Propeller Power Exhaust:
    a. Power exhaust shall be used in conjunction with an integrated economizer.
    b. Independent modules for vertical or horizontal return configurations shall be available.
    c. Horizontal power exhaust is shall be mounted in return ductwork.
    d. Power exhaust shall be controlled by economizer controller operation. Exhaust fans shall be energized when dampers open past the 0-100% adjustable setpoint on the economizer control.
18. Roof Curbs (Vertical):
    a. Full perimeter roof curb with exhaust capability providing separate air streams for energy recovery from the exhaust air without supply air contamination.
    b. Formed galvanized steel with wood nailer strip and shall be capable of supporting entire unit weight.
    c. Permits installation and securing of ductwork to curb prior to mounting unit on the curb.
19. High Altitude Gas Conversion Kit:
    a. Package shall contain all the necessary hardware and instructions to convert a standard natural gas unit to operate from 2000-7000 ft (610 to 2134m) elevation with natural gas or from 0-7000 ft (90-2134m) elevation with liquefied propane.
20. Outdoor Air Enthalpy Sensor:
    a. The outdoor air enthalpy sensor shall be used to provide single enthalpy control. When used in conjunction with a return air enthalpy sensor, the unit will provide differential enthalpy control. The sensor allows the unit to determine if outside air is suitable for free cooling.
21. Return Air Enthalpy Sensor:
    a. The return air enthalpy sensor shall be used in conjunction with an outdoor air enthalpy sensor to provide differential enthalpy control.
22. Indoor Air Quality (CO_2) Sensor:
    a. Shall be able to provide demand ventilation indoor air quality (IAQ) control.
    b. The IAQ sensor shall be available in duct mount, wall mount, or wall mount with LED display. The setpoint shall have adjustment capability.
23. Smoke detectors (factory-installed only):
    a. Shall be a Four-Wire Controller and Detector.
    b. Shall be environmental compensated with differential sensing for reliable, stable, and drift-free sensitivity.
    c. Shall use magnet-activated test/reset sensor switches.
    d. Shall have tool-less connection terminal access.
    e. Shall have a recessed momentary switch for testing and resetting the detector.
    f. Controller shall include:
        (1.) One set of normally open alarm initiation contacts for connection to an initiating device circuit on a fire alarm control panel.
        (2.) Two Form-C auxiliary alarm relays for interface with rooftop unit or other equipment.
        (3.) One Form-C supervision (trouble) relay to control the operation of the Trouble LED on a remote test/reset station.
        (4.) Capable of direct connection to two individual detector modules.
        (5.) Can be wired to up to 14 other duct smoke detectors for multiple fan shutdown applications
24. Winter start kit
    a. Shall contain a bypass device around the low pressure switch.
    b. Shall be required when mechanical cooling is required down to 25°F (-4°C).
    c. Shall not be required to operate on an economizer when below an outdoor ambient of 40°F (4°C).
25. Time Guard
    a. Shall prevent compressor short cycling by providing a 5-minute delay (±2 minutes) before restarting a compressor after shutdown for any reason.

b. One device shall be required per compressor.

26. Hinged Access Panels
    a. Shall provide easy access through integrated quarter turn latches.
    b. Shall be on major panels of – filter, control box, fan motor and compressor
27. Display Kit for Variable Frequency Drive
    a. Kit allows the ability to access the VFD controller programs to provide special setup capabilities and diagnostics.
    b. Kit contains display module, mounting bracket and communication cable.
    c. Display Kit can be permanently installed in the unit or used on any SAV system VFD controller as needed.
28. Foil faced insulation
    a. Throughout unit cabinet air stream, non-fibrous and cleanable foil faced insulation is used.

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THE WALL-MOUNT™ STEP CAPACITY HEAT PUMPS

Integrated Part Load Value (IPLV) Efficiency Up To 15.0 BTU/WATT

GREEN REFRIGERANT R-410A

Models:	**C24H to C60H**	**Up to 11.0 EER**
Cooling Capacities:		**22,200 to 55,500 BTUH**
Heating Capacities:		**19,200 to 51,000 BTUH**

The Bard Wall-Mount Heat Pump is a self-contained energy efficient heating and cooling system, which is designed to offer maximum indoor comfort at a minimal cost without using valuable indoor floor space or outside ground space. This unit is the ideal product for versatile applications such as: new construction, modular offices, school modernization, and the like. Factory or field installed accessories are available to meet specific job requirements.

CH Series Special Features

ECM Indoor Blower Motor:
Features a variable speed motor providing super-high efficiency, low sound levels & soft-start capabilities. The motor is self-adjusting to provide the proper airflow rate for the staged capacity, and for higher static pressure in ducted installations without user adjustment or wiring changes.

Step Capacity Compressor:
Scroll 2-Stage Compressors are standard on all 2 to 5 ton models. Eliminates need for crankcase heater.
Double isolated floating compressor mounting system, compressor sound blanket, and discharge line muffler for reduced sound level.

Quiet Curb Options:
Various curbs are specially designed for the CH product family that reduce sound levels for school and occupied building applications.

Draw-Thru Condenser Airflow:
Condenser air is brought in from the front of the unit condenser section, and exhausted through the side grilles. This allows quiet operation, and avoids heat pump defrost water accumulation in front of the CH unit.

Engineered Features

Copper Tube/Aluminum Fin Coils:
Grooved copper tubing and enhanced aluminum fins provide maximum heat transfer and high energy efficiency. Evaporator coil constructed with hydrophilic fin stock that seals fin surface against aluminum oxide formation, is resistant to mold and mildew growth (tested to ASTM D3273, no growth) and reduces beading of condensate on the fin surface. Optional phenolic-coated coils are also available.

Twin Blowers:
Move air quietly. All models feature variable speed blower motors providing airflow adjustment for high and low static operation. Motor overload protection is standard on all models.

Phase Rotation Monitor:
Standard on all 3 phase scroll compressors. Protects against reverse rotation if power supply is not properly connected.

R-410A Refrigerant:
Designed with R-410A (HFC) non-ozone depleting refrigerant in compliance with the Montreal protocol and 2010 EPA requirements.

Liquid Line Filter Drier:
Standard on all units. Protects system against moisture.

Foil Faced Insulation:
Standard on all units.

Galvanized 20 Gauge Zinc Coated Cabinet:
Cleaned, rinsed, sealed and dried before the polyurethane primer is applied. The cabinet is handsomely finished with a baked on, beige textured enamel, which allows it to withstand 1000 hours of salt spray tests per ASTM B117-03. Stainless Steel cabinets available.

Electrical Components:
Are easily accessible for routine inspection and maintenance through a right side, service panel opening. Features a lockable, hinged access cover to the circuit breaker or rotary disconnect switch.

Electric Heat Strips:
Features an automatic limit and thermal cut-off safety control. Heater packages are factory or field installed for all 2 through 5 ton models. Features easy slide-in field assembly with various BTUH outputs.

Condenser Fan and Motor Shroud Assembly:
Slide out for easy access.

Filter Service Door:
Separate service door provides easy access for filter change.

One Inch, Disposable Air Filters:
Are standard equipment. Filter rack permits the addition of 2" pleated filter. Factory or field installed.

Solid State Electronic Heat Pump Control:
Provides efficient 30, 60 or 90 minute defrost cycle. A thermistor sensor, speed up terminal for service and 10 minute defrost override are standard on the electronic heat pump control.

QUIET CLIMATE FLEX™ ✳

Model C42H shown with TCURBF3660 Wall Curb Attached
✳ Quiet Curb Option must be added to obtain Quiet Climate Flex™ sound ratings.

High & Low Pressure Switches are Auto-Reset:
Standard on all units. Built-in lockout circuit resets from the room thermostat. Provides commercial quality protection to the compressor.

Five Minute Compressor Time Delay:
Short cycle protection is standard. Built into the heat pump control.

Built-in Circuit Breakers:
Standard on all electric heat versions of single (230/208 volt) and three phase (230/208 volt) equipment. Rotary disconnects are standard on three phase (460 volt) equipment. 460V circuit breaker available as option on 0KW only.

Slope Top:
Standard feature for water run-off.

Full Length Mounting Brackets:
Built into cabinet for improved appearance and easy installation. NOTE: Bottom mounting bracket included to assist in installation.

Top Rain Flashing:
Standard feature on all models.

Outdoor Coil Drain Pan:
Standard built in feature. 8620-160 Drain Connnection Kit is standard (recommended for non-freezing climates only).

Certified Capacity and Efficiency Ratings at Full Capacity

MODELS	C24H1	C30H1	C36H1	C42H1	C48H1	C60H1
Cooling BTUH, Stage 2 (Full Capacity) ① 80/67-95 EER ①② Rated CFM	22,200 11.0 740	29,200 11.0 900	35,000 11.0 1100	40,000 11.0 1250	45,500 11.0 1500	55,500 10.6 1650
IPLV (Integrated Stage 1 and Stage 2) ①③ 80/67-80	14.3	14.5	14.5	14.5	15.0	14.8
High Temperature 47° Heating BTUH, Stage 2 (Full Capacity) COP ①④ Rated CFM	19,200 3.10 740	25,600 3.20 900	31,000 3.30 1100	38,500 3.40 1250	41,500 3.40 1500	51,000 3.20 1650

① Certified in accordance with ARI Standard 390-2003 for single package vertical units
② EER = Energy Efficiency Ratio - BTU/WATT efficiency
③ Integrated Part Load Value - BTU/WATT efficiency (combines Stage 1 & 2 performance)
④ COP = Coefficient of Performance - BTU/WATT efficiency

Capacity and Efficiency Ratings at Partial Capacity

MODELS	C24H1	C30H1	C36H1	C42H1	C48H1	C60H1
Cooling BTUH, Stage 1 (Partial Capacity) 80/67-80 EER @ Part Load (80/67-80) Stage 1 Cooling Operating CFM	17,700 14.4 550	24,000 14.75 650	27,000 14.8 750	31,400 14.7 900	35,800 15.5 1000	43,000 14.9 1300
High Temperature Heating 47° BTUH, Stage 1 (Partial Capacity) Operating CFM	14,200 550	18,600 650	21,400 750	26,600 900	29,200 1000	36,000 1300

Specifications 2-1/2 through 3 Ton

MODELS	C24H1-A	C24H1-B	—	C30H1-A	C30H1-B	C30H1-C	C36H1-A	C36H1-B	C36H1-C
Electrical Rating--60 Hz	230/208-1	230/208-3	---	230/208-1	230/208-3	460-3	230/208-1	230/208-3	460-3
Operating Voltage Range	197 - 253	197 - 253	---	197 - 253	197 - 253	414 - 506	197 - 253	197 - 253	414 - 506
Compressor--Circuit A									
Voltage	203/208	230/208	---	230/208	230/208	460	230/208	230/208	460
Rated Load Amps	7.5 / 8.4	4.2 / 4.7	---	9.7 / 11.2	7.2 / 8.3	4.2	11.8 / 13.3	9.0 / 10.1	5.0
Branch Circuit Selection Current	11.7	6.5	---	13.1	8.7	4.3	15.3	11.7	5.8
Lock Rotor Amps	58.3 / 58.3	55.4 / 55.4	---	73 / 73	58 / 58	28	83 / 83	73 / 73	38
Compressor Type	Scroll	Scroll	---	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Fan Motor & Condenser									
Fan Motor--HP-RPM-SPD	1/5-1050-1	1/5-1050-1	---	1/5-1050-1	1/5-1050-1	1/5-1050-1	1/3-825-2	1/3-825-2	1/3-825-2
Fan Motor--Amps	1.5	1.5	---	1.5	1.5	.8	2.5	2.5	1.3
Fan--DIA/CFM	20"-1900	20"-1900	---	20"-1900	20"-1900	20"-1900	24"-2900	24"-2900	24"-2900
Blower Motor & Evap.									
Blower Motor--HP-RPM-SPD	1/3 Var.	1/3 Var.	---	1/3 Var.	1/3 Var.	1/3 Var.	1/2 Var.	1/2 Var.	1/2 Var.
Blower Motor--Amps	2.4	2.4	---	2.8	2.8	2.8	2.8	2.8	2.8
CFM w/Filter ①	740 - .10	740 - .10	---	900 - .10	900 - .10	900 - .10	1100 - .15	1100 - .15	1100 - .15
Filter Sizes (inches) STD.	16 x 30 x 1	16 x 30 x 1	---	16 x 30 x 1	16 x 30 x 1	16 x 30 x 1	20 x 30 x 1	20 x 30 x 1	20 x 30 x 1
Basic Unit Weight-LBS.	375	375	---	375	375	375	470	470	470
Blank-Off Plate	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Commercial Room Ventilator	35.0	35.0		35.0	35.0	35.0	35.0	35.0	35.0
Economizer	45.0	45.0		45.0	45.0	45.0	45.0	45.0	45.0
Energy Recovery Ventilator	64.0	64.0		64.0	64.0	64.0	64.0	64.0	64.0

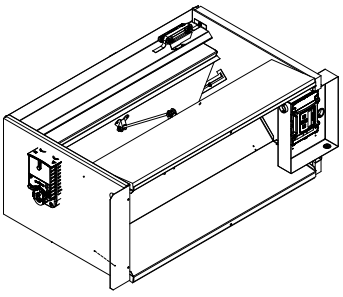
Specifications 3-1/2 through 5 Ton

MODELS	C42H1-A	C42H1-B	C42H1-C	C48H1-A	C48H1-B	C48H1-C	C60H1-A	C60H1-B	C60H1-C
Electrical Rating--60 Hz	230/208-1	230/208-3	460-3	230/208-1	230/208-3	460-3	230/208-1	230/208-3	460-3
Operating Voltage Range	197 - 253	197 - 253	414 - 506	197 - 253	197 - 253	414 - 506	197 - 253	197 - 253	414 - 506
Compressor--Circuit A									
Voltage	230/208	230/208	460	230/208	230/208	460	230/208	230/208	460
Rated Load Amps	14.0 / 15.9	11.2 / 12.7	5.6	16.8 / 19.2	11.1 / 12.7	5.8	21.4 / 23.3	13.1 / 14.2	6.2
Branch Circuit Selection Current	18.0	14.2	6.3	21.2	14.1	6.5	27.2	16.6	7.3
Lock Rotor Amps	96 / 96	88 / 88	44	104	83 / 83	41	153 / 153	110 / 110	52
Compressor Type	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Fan Motor & Condenser									
Fan Motor--HP-RPM-SPD	1/3-825-2	1/3-825-2	1/3-825-1	1/3-825-2	1/3-825-2	1/3-825-1	1/2-1025-1	1/2-1025-1	1/2-1025-1
Fan Motor--Amps	2.5	2.5	1.3	2.5	2.5	1.3	4.1	4.1	4.1
Fan--DIA/CFM	24"-2900	24"-2900	24"-2900	24"-2900	24"-2900	24"-2900	24"-3700	24"-3700	24"-3700
Blower Motor & Evap.									
Blower Motor--HP-RPM-SPD	3/4 Var.	3/4 Var.	3/4 Var.	3/4 Var.	3/4 Var.	3/4 Var.	3/4 Var.	3/4 Var.	3/4 Var.
Blower Motor--Amps	3.8	3.8	3.8	4.4	4.4	4.4	4.7	4.7	4.7
CFM w/Filter ①	1250 - .15	1250 - .15	1250 - .15	1550 - .2	1550 - .2	1550 - .2	1650 - .2	1650 - .2	1650 - .2
Filter Sizes (inches) STD.	20 x 30 x 1	20 x 30 x 1	20 x 30 x 1	20 x 30 x 1	20 x 30 x 1	20 x 30 x 1	20 x 30 x 1	20 x 30 x 1	20 x 30 x 1
Basic Unit Weight-LBS.	515	515	515	547	547	547	552	552	552
Blank-Off Plate	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Commercial Room Ventilator	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
Economizer	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Energy Recovery Ventilator	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0

See Curb Weights - Page 10

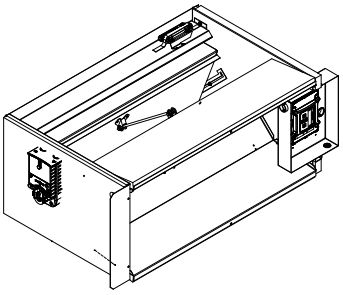
Ventilation System Packages

Bard Wall-Mounts are designed to provide optional ventilation packages to meet all of your ventilation and indoor air quality requirements. All units are equipped with a barometric fresh air damper as the standard ventilation package. All ventilation packages can be built-in at the factory, or field-installed at a later date.



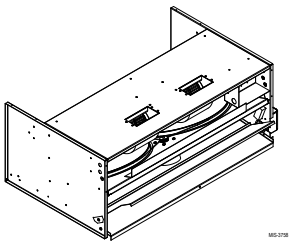
MIS-3838

Commercial Room Ventilator



MIS-3838

Economizer



MIS-3758

Energy Recovery Ventilator

BLANK OFF PLATE - BOP — OPTIONAL

A blank off plate is installed on the inside of the service door. It covers the air inlet openings which restricts any outside air from entering into the unit. The blank off plate should be utilized in applications where outside air is not required to be mixed with the conditioned air.

COMMERCIAL ROOM VENTILATOR - CHCRV — OPTIONAL

NOTE: Models C24H & C30H with CHCRV-3 require a Wall Curb Model TCURBF2430 or TCURBT2430 **(See Page 10)**

The built-in commercial room ventilator is internally mounted behind the service door and allows outside ventilation air, up to 50% of the total airflow rating of the unit, to be introduced through the air inlet openings. It includes a built-in exhaust air damper.

The commercial room ventilator (CRV) is a simple and innovative approach to improving the indoor air quality by providing fresh air intake and exhaust capability through the CRV. The damper can be easily adjusted to control the amount of fresh air supplied into the building. The CRV can be controlled by indoor blower operation or field controlled based on room occupancy. The CRV is modulating design with power open - spring return on power loss. Complies with ANSI/ASHRAE Standard 62.1 "Ventilation for Acceptable Indoor Air Quality."

ECONOMIZER - ECONCHS — OPTIONAL

All economizers require matching TCURBF or TCURBT **(See Page 10)**

The built-in economizer system is internally mounted behind the service door and allows outdoor air to be introduced through the air inlet openings. The amount of outdoor air varies in response to the system controls and settings defined by the end user. It includes a built-in exhaust air damper. The economizer is designed to provide "free cooling" when outside air conditions are cool and dry enough to satisfy cooling requirements without running the compressor. This in turn provides lower operating costs, while extending the life of the compressor.

Standard Features:

- Designed to deliver 75% of cooling rated CFM when equipped with standard 3" air intake hood
- Honeywell Direct Drive Hi-Torque Actuator
- Positive shut-off with non-stick gaskets
- Electronic sensors, Enthalpy used for outdoor free cooling decision
- Honeywell JADE electronic economizer module with precision settings and diagnostics

WALL-MOUNT ENERGY RECOVERY VENTILATOR - CHERV — OPTIONAL

The wall-mount energy recovery ventilator (ERV) is a highly innovative approach to meeting indoor air quality ventilation requirements as established by ANSI/ASHRAE Standard 62.1. The ERV allows from 200 to 450 CFM (depending upon model) of fresh air and exhaust through the unit while maintaining superior indoor comfort and humidity levels. In most cases this can be accomplished without increasing equipment sizing or operating costs. Heat transfer efficiency is up to 67% during summer and 75% during winter conditions.

The ERV consists of a unique "rotary energy recovery cassette" that provides effective sensible and latent heat transfer capabilities during summer and winter conditions. Various control schemes are addressed including limiting ventilation during building occupancy only.

The ERV is designed to be internally mounted behind the service door in the WA, WH or WL model wall-mount units. It can be built-in at the factory or field installed as an option. CHERV-*3 and CHERV-*5 can be independently adjusted for intake and exhaust rates. 3" air intake hood is standard.

CHERV Model ERV's have exhaust gravity shut-off dampers all sizes. CHERV-A5 & -C5 have motorized air intake damper.

DRAW-THRU CONDENSER AIRFLOW

The CH unit requires the use of a curb to meet the Quietflex sound ratings. Due to draw-thru air pressurizing the condenser section, room exhaust air exits the bottom of the curb. These special wall curbs allow for the exhaust air to pass through the bottom of the curb instead of through the condenser section of the CH unit.

The following vent options require the use of a wall curb:

- CHCRV-3
- ECONCHS-E3
- ECONCHS-E5

Refer to the "C**H Unit to Wall Curb Application Guide" (Page 10) for curb selection options when using the vent options listed above.

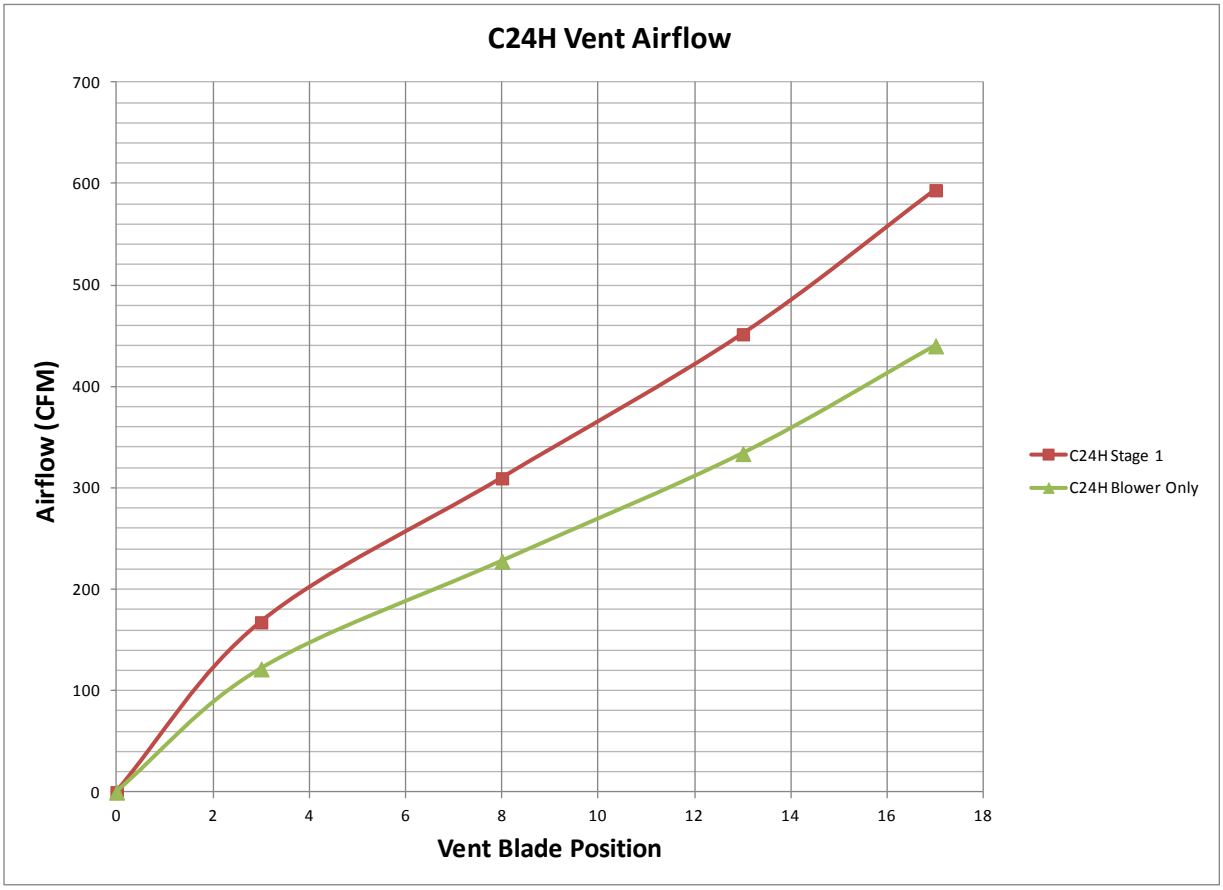
- Complies with efficiency requirements of ASHRAE/IESNA 90.1-2013.
- Certified to ANSI/ARI Standard 390-2003 for SPVU (Single Package Vertical Units).
- Intertek ETL Listed to Standard for Safety Heating and Cooling Equipment ANSI/UL 1995/CSA 22.2 No. 236-05, Fourth Edition.
- Commercial Product - Not intended for Residential application.

AHRI CERTIFIED™ www.ahridirectory.org Single Package Vertical HP AHRI Standard 390

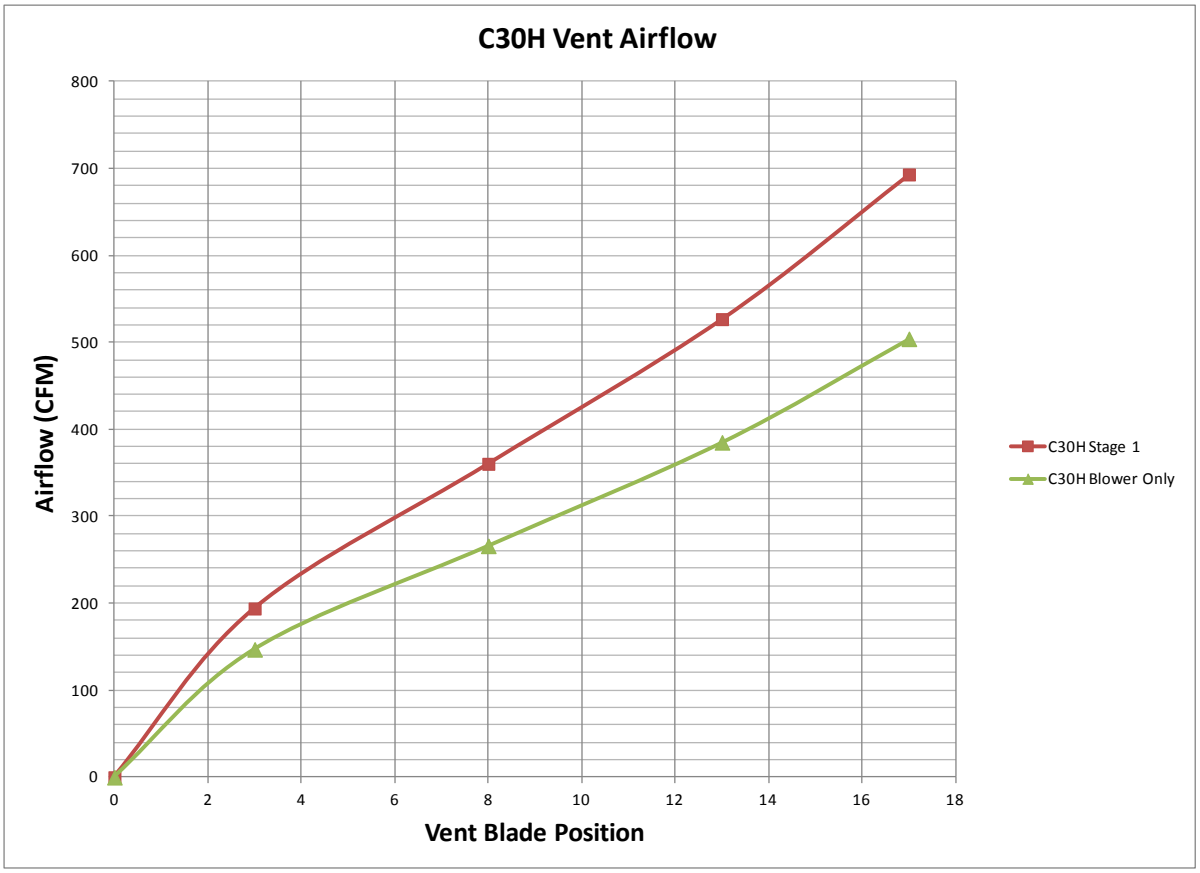
C ETL LISTED US Intertek

INTERTEK ISO 9001:2008

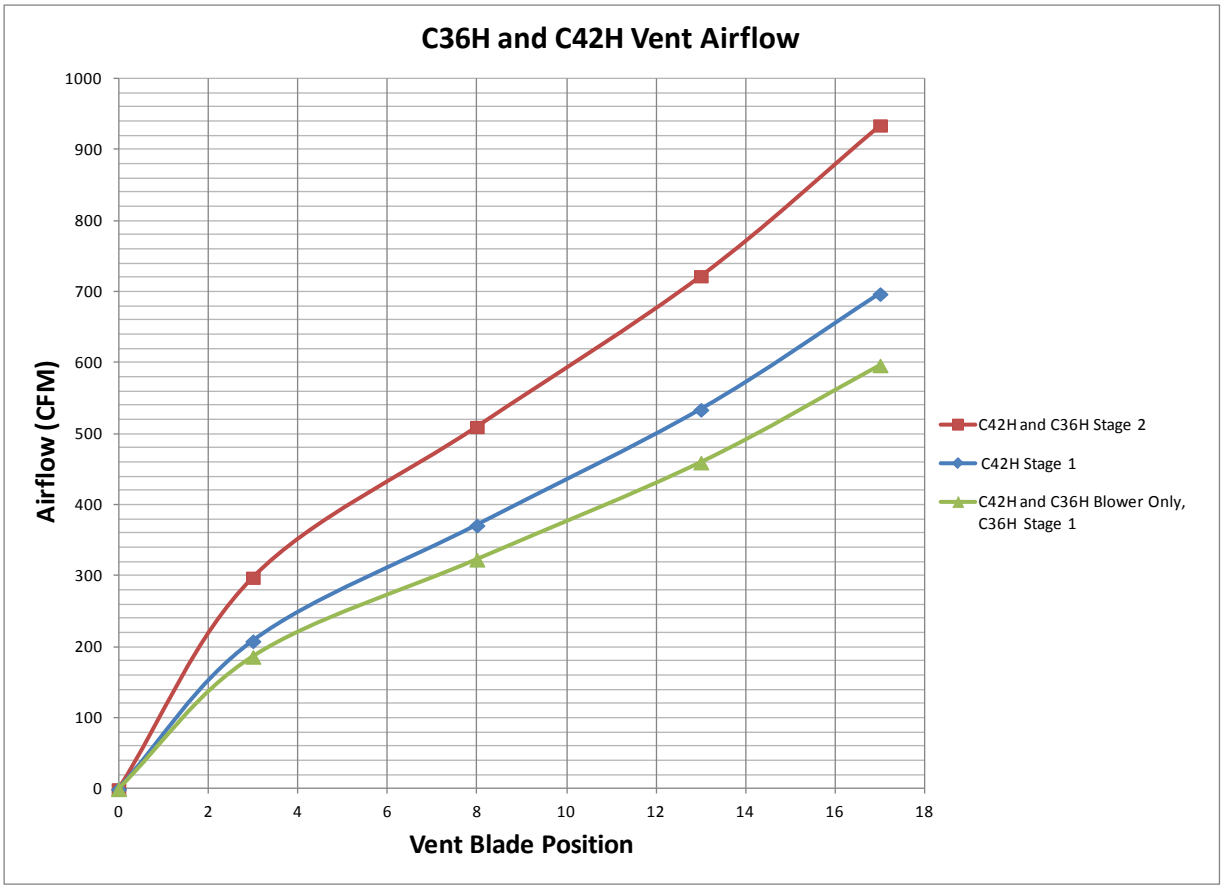
Modulating Commercial Room Ventilator Performance Data : CHCRV-3 for C24H



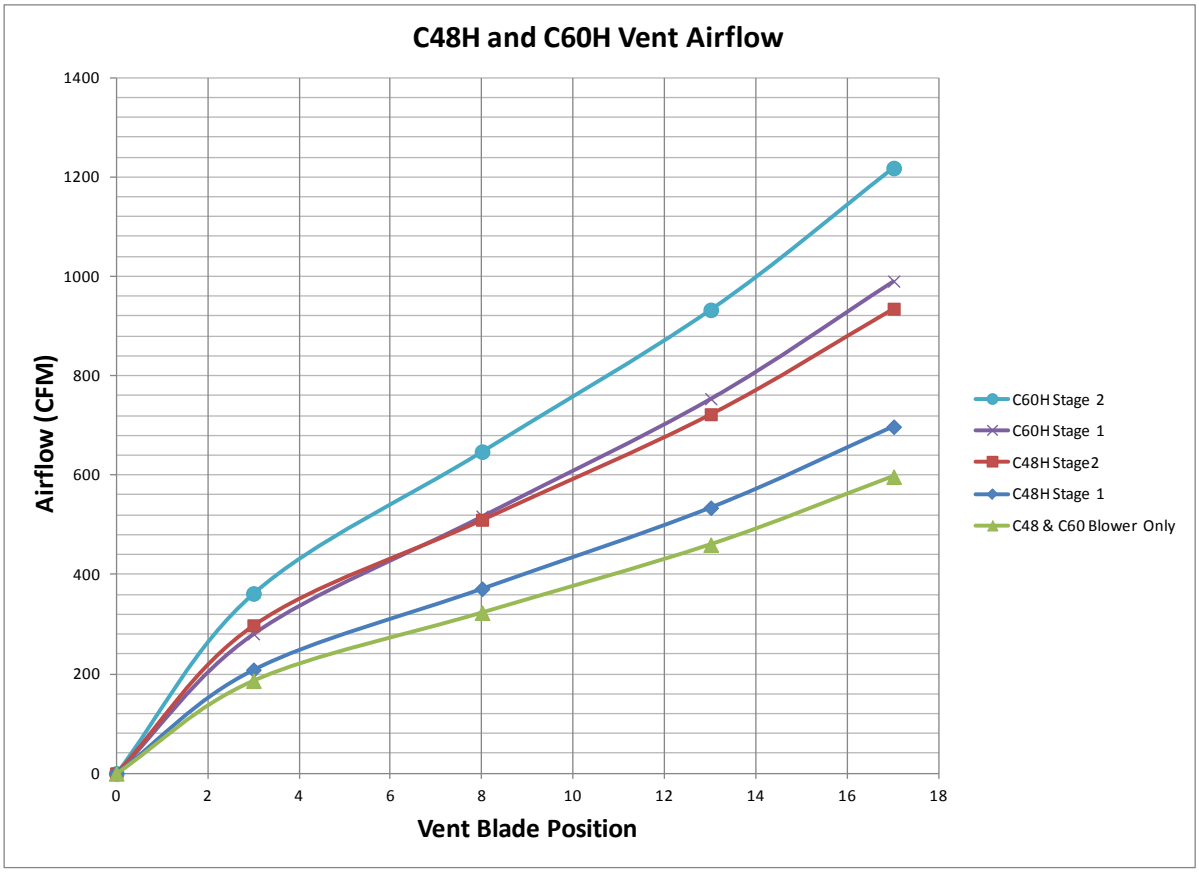
Modulating Commercial Room Ventilator Performance Data : CHCRV-3 for C30H



Commercial Room Ventilator Performance Data : CHCRV-5 for C36H & C42H



Commercial Room Ventilator Performance Data : CHCRV-5 for C48H & C60H



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Performance and Application Data - CHERV-*3 (C24H1 & C30H1)

SUMMER COOLING PERFORMANCE
(INDOOR DESIGN CONDITIONS 75°DB / 62°WB)

Ambient O.D.		VENTILATION RATE 400 CFM 63% EFFICIENCY						VENTILATION RATE 325 CFM 64% EFFICIENCY						VENTILATION RATE 250 CFM 65% EFFICIENCY					
DB/ WB	F	VLT	VLS	VLL	HRT	HRS	HRL	VLT	VLS	VLL	HRT	HRS	HRL	VLT	VLS	VLL	HRT	HRS	HRL
	75	19080	12960	6120	12020	8164	3855	15502	10530	4972	9921	6739	3182	11925	8100	3825	7751	5265	2486
105	70	12960	12960	0	8164	8164	0	10530	10530	0	6739	6739	0	8100	8100	0	5265	5265	0
	65	12960	12960	0	8164	8164	0	10530	10530	0	6739	6739	0	8100	8100	0	5265	5265	0
	80	28080	10800	17280	17690	6804	10886	22815	8775	14040	14601	5616	8985	17550	6750	10800	11407	4387	7019
	75	19080	10800	8280	12020	6804	5216	15502	8775	6727	9921	5616	4305	11925	6750	5175	7751	4387	3363
100	70	10980	10800	180	6717	6804	113	8921	8775	146	5709	5616	93	6862	6750	112	4460	4387	73
	65	10800	10800	0	6804	6804	0	8775	8775	0	5616	5616	0	6750	6750	0	4387	4387	0
	60	10800	10800	0	6804	6804	0	8775	8775	0	5616	5616	0	6750	6750	0	4387	4387	0
	80	28080	8640	19440	17690	5443	12247	22815	7020	15795	14601	4492	10108	17550	5400	12150	11407	3510	7897
	75	19080	8640	10440	12020	5443	6577	15502	7020	8482	9921	4492	5428	11925	5400	6525	7751	3510	4241
95	70	10980	8640	2340	6917	5443	1474	8921	7020	1901	5709	4492	1216	6862	5400	1462	4460	3510	950
	65	8640	8640	0	5443	5443	0	7020	7020	0	4492	4492	0	5400	5400	0	3510	3510	0
	60	8640	8640	0	5443	5443	0	7020	7020	0	4492	4492	0	5400	5400	0	3510	3510	0
	80	28080	6480	21600	17690	4082	13608	22815	5265	17550	14601	3369	11232	17550	4050	13500	11407	2632	8774
	75	19080	6480	12600	12020	4082	7938	15502	5265	10237	9921	3369	6552	11925	4050	7875	7751	2632	5118
90	70	10980	6480	4500	6917	4082	2835	8921	5265	3656	5709	3369	2340	6862	4050	2812	4460	2632	1828
	65	6480	6480	0	4082	4082	0	5265	5265	0	3369	3369	0	4050	4050	0	2632	2632	0
	60	6480	6480	0	4082	4082	0	5265	5265	0	3369	3369	0	4050	4050	0	2632	2632	0
	80	28080	4320	23760	17690	2721	14968	22815	3510	19305	14601	2246	12355	17550	2700	14850	11407	1755	9652
	75	19080	4320	14760	12020	2721	9298	15502	3510	11992	9921	2246	7675	11925	2700	9225	7751	1755	5996
85	70	10980	4320	6660	6917	2721	4195	8921	3510	5411	5709	2246	3463	6862	2700	4162	4460	1755	2705
	65	4320	4320	0	2721	2721	0	3510	3510	0	2246	2246	0	2700	2700	0	1755	1755	0
	60	4320	4320	0	2721	2721	0	3510	3510	0	2246	2246	0	2700	2700	0	1755	1755	0
	75	19080	2160	16920	12020	1360	10659	15502	1755	13747	9921	1123	8798	11925	1350	10575	7751	877	6873
	70	10980	2160	8820	6917	1360	5556	8921	1755	7166	5709	1123	4586	6862	1350	5512	4460	877	3583
80	65	3780	2160	1620	2381	1360	1020	3071	1755	1316	1965	1123	842	2362	1350	1012	1535	877	658
	60	2160	2160	0	1360	1360	0	1755	1755	0	1123	1123	0	1350	1350	0	877	877	0
	70	10980	0	10980	6917	0	6917	8921	0	8921	5709	0	5709	6862	0	6862	4460	0	4460
75	65	3780	0	3780	2381	0	2380	3071	0	3071	1965	0	1965	2362	0	2362	1535	0	1535
	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CHERV-*3 WINTER HEATING PERFORMANCE
(INDOOR DESIGN CONDITIONS 70°DB)

Ambient O.D.	VENTILATION RATE					
	400 CFM 75% EFF.		325 CFM 76% EFF.		250 CFM 77% EFF	
DB/°F	WVL	WHR	WVL	WHR	WVL	WHR
65	2160	1620	1755	1333	1350	1039
60	4320	3240	3510	2667	2700	2079
55	6480	4860	5265	4001	4050	3118
50	8640	6480	7020	5335	5400	4158
45	10800	8100	8775	6669	6750	5197
40	12960	9720	10530	8002	8100	6237
35	15120	11340	12285	9336	9450	7276
30	17280	12960	14040	10670	10800	8316
25	19440	14580	15795	12004	12150	9355
20	21600	16200	17550	13338	13500	10395
15	23760	17820	19305	14671	14850	11434

LEGEND:

VLT = Ventilation Load - Total
VLS = Ventilation Load - Sensible
VLL = Ventilation Load - Latent
HRT = Heat Recovery - Total
HRS = Heat Recovery - Sensible
HRL = Heat Recovery - Latent
WVL = Winter Ventilation Load
WHR = Winter Heat Recovery

NOTE: Sensible performance only is shown for winter application.

Performance and Application Data - CHERV-*5 (C36H1, C42H1, C48H1 & C60H1)

SUMMER COOLING PERFORMANCE
(INDOOR DESIGN CONDITIONS 75°DB / 62°WB)

Ambient O.D.		VENTILATION RATE 450 CFM						VENTILATION RATE 375 CFM						VENTILATION RATE 300 CFM					
DB/ WB	F	VLT	VLS	VLL	HRT	HRS	HRL	VLT	VLS	VLL	HRT	HRS	HRL	VLT	VLS	VLL	HRT	HRS	HRL
	75	21465	14580	6884	13952	9477	4475	17887	12150	5737	11805	8018	3786	14310	9720	4590	9587	6512	3075
105	70	14580	14580	0	9477	9477	0	12150	12150	0	8018	8018	0	9720	9720	0	6512	6512	0
	65	14580	14580	0	9477	9477	0	12150	12150	0	8018	8018	0	9720	9720	0	6512	6512	0
	80	31590	12150	19440	20533	7897	12635	26325	10125	16200	17374	6682	10692	21060	8100	12960	14110	5427	8683
	75	21465	12150	9314	13952	7897	6054	17887	10125	7762	11805	6682	5123	14310	8100	6210	9587	5427	4160
100	70	12352	12150	202	8029	7897	131	10293	10125	168	6793	6682	111	8235	8100	135	5517	5427	90
	65	12150	12150	0	7897	7897	0	10125	10125	0	6682	6682	0	8100	8100	0	5427	5427	0
	60	12150	12150	0	7897	7897	0	10125	10125	0	6682	6682	0	8100	8100	0	5427	5427	0
	80	31590	9720	21870	20533	6318	14215	26325	8100	18225	17374	5345	12028	21060	6480	14580	14110	4341	9768
	75	21465	9720	11744	13952	6318	7634	17887	8100	9787	11805	5345	6459	14310	6480	7830	9587	4341	5246
95	70	12352	9720	2632	8029	6318	1711	10293	8100	2193	6793	5345	1447	8235	6480	1755	5517	4341	1175
	65	9720	9720	0	6318	6318	0	8100	8100	0	5345	5345	0	6480	6480	0	4341	4341	0
	60	9720	9720	0	6318	6318	0	8100	8100	0	5345	5345	0	6480	6480	0	4341	4341	0
	80	31590	7290	24300	20533	4738	15794	26325	6075	20250	17374	4009	13365	21060	4860	16200	14110	3256	10854
	75	21465	7290	14175	13952	4738	9213	17887	6075	11812	11805	4009	7796	14310	4860	9450	9587	3256	6331
90	70	12352	7290	5062	8029	4738	3290	10293	6075	4218	6793	4009	2784	8235	4860	3375	5517	3256	2261
	65	7290	7290	0	4738	4738	0	6075	6075	0	4009	4009	0	4860	4860	0	3256	3256	0
	60	7290	7290	0	4738	4738	0	6075	6075	0	4009	4009	0	4860	4860	0	3256	3256	0
	80	31590	4860	26730	20533	3159	17374	26325	4050	22275	17374	2672	14701	21060	3240	17820	14110	2170	11939
	75	21465	4860	16605	13952	3159	10793	17887	4050	13837	11805	2672	9132	14310	3240	11070	9587	2170	7416
85	70	12352	4860	7492	8029	3159	4870	10293	4050	6243	6793	2672	4120	8235	3240	4995	5517	2170	3346
	65	4860	4860	0	3159	3159	0	4050	4050	0	2672	2672	0	3240	3240	0	2170	2170	0
	60	4860	4860	0	3159	3159	0	4050	4050	0	2672	2672	0	3240	3240	0	2170	2170	0
	75	21465	2430	19035	13952	1579	12372	17887	2025	15862	11805	1336	10469	14310	1620	12690	9587	1085	8502
	70	12352	2430	9922	8029	1579	6449	10293	2025	8268	6793	1336	5457	8235	1620	6615	5517	1085	4432
80	65	4252	2430	1822	2764	1579	1184	3543	2025	1518	2338	1336	1002	2835	1620	1215	1899	1085	814
	60	2430	2430	0	1579	1579	0	2025	2025	0	1336	1336	0	1620	1620	0	1085	1085	0
	70	12352	0	12352	8029	0	8029	10293	0	10293	6793	0	6793	8235	0	8235	5517	0	5517
75	65	4252	0	4252	2764	0	2764	3543	0	3543	2338	0	2338	2835	0	2835	1899	0	1899
	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CHERV-*5 WINTER HEATING PERFORMANCE
(INDOOR DESIGN CONDITIONS 70°DB)

Ambient O.D.	VENTILATION RATE					
	450 CFM		375 CFM		300 CFM	
DB/°F	WVL	WHR	WVL	WHR	WVL	WHR
65	2430	1944	2025	1640	1620	1328
60	4860	3888	4050	3280	3240	2656
55	7290	5832	6075	4920	4860	3985
50	9720	7776	8100	6561	6480	5313
45	12150	9720	10125	8201	8100	6642
40	14580	11664	12150	9841	9720	7970
35	17010	13608	14175	11481	11340	9298
30	19440	15552	16200	13122	12960	10627
25	21870	17496	18225	14762	14580	11955
20	24300	19440	20250	16402	16200	13284
15	26730	21384	22275	18042	17820	14612

LEGEND:

VLT = Ventilation Load - Total
VLS = Ventilation Load - Sensible
VLL = Ventilation Load - Latent
HRT = Heat Recovery - Total
HRS = Heat Recovery - Sensible
HRL = Heat Recovery - Latent
WVL = Winter Ventilation Load
WHR = Winter Heat Recovery

NOTE: Sensible performance only is shown for winter application.

Electrical Specifications — Standard Heat Pumps

	Model	Rated Volts & Phase	No. Field Power Circuits	Single Circuit				Multiple Circuit											
				① Minimum Circuit Ampacity	② Max. External Fuse or Ckt. Brkr.	③ Field Power Wire Size	③ Ground Wire	① Minimum Circuit Ampacity			② Max. Circuit Exterior Fuse or Ckt. Brkr.			③ Field Power Wire Size			③ Ground Wire		
								Ckt. A	Ckt. B	Ckt. C	Ckt. A	Ckt. B	Ckt. C	Ckt. A	Ckt. B	Ckt. C	Ckt. A	Ckt. B	Ckt. C
	C24H1-A0Z	230/208-60-1	1	22	30	10	10												
	-A04		1	42	50	8	10												
	④ -AS8		1	48	50	8	10												
	⑦ -AF8		1 or 2	63	70	6	8	22	42		30	45		10	8		10	10	
	C24H1-B0Z	230/208-60-3	1	15	20	12	12												
	-B06		1	33	35	8	10												
	-B09		1	42	45	8	10												
	C30H1-A0Z	230/208-60-1	1	23	30	10	10												
	-A04		1	44	50	8	10												
	④ -AS8		1	49	50	8	10												
	⑦ -AF8		1 or 2	65	70	6	8	23	42		30	45		10	8		10	10	
	C30H1-B0Z	230/208-60-3	1	18	25	10	10												
	-B06		1	36	40	8	10												
	-B09		1	45	45	8	10												
NOTE A	C30H1-C0Z/C0C	460-60-3	1	10	15	14	14												
	-C06		1	19	20	12	12												
	-C09		1	24	25	10	10												
	C36H1-A0Z	230/208-60-1	1	27	40	8	10												
	-A05		1	53	60	6	10												
	-A10		1 or 2	79	80	4	8	27	52		40	60		8	6		10	10	
	⑤ -A15		1 or 2	85	90	4	8	33	52		40	60		8	6		10	10	
	C36H1-B0Z	230/208-60-3	1	23	30	10	10												
	-B06		1	41	45	8	10												
	-B09		1	50	50	8	10												
	⑥ -B15		1	52	60	6	10												
NOTE A	C36H1-C0Z/C0C	460-60-3	1	12	15	14	14												
	-C06		1	21	25	10	10												
	-C09		1	26	30	10	10												
	⑥ -C15		1	27	30	10	10												
	C42H1-A0Z	230/208-60-1	1	31	40	8	10												
	-A05		1	57	60	6	10												
	-A10		1 or 2	83	90	4	8	31	52		40	60		8	6		10	10	
	⑤ -A15		1 or 2	86	90	3	8	34	52		40	60		8	6		10	10	
	C42H1-B0Z	230/208-60-3	1	27	35	8	10												
	-B06		1	45	50	8	10												
	-B09		1	54	60	6	10												
	⑥ -B15		1	54	60	6	10												
NOTE A	C42H1-C0Z/C0C	460-60-3	1	13	15	14	14												
	-C06		1	22	25	10	10												
	-C09		1	26	30	10	10												
	⑥ -C15		1	27	30	10	10												
	C48H1-A0Z	230/208-60-1	1	37	50	8	10												
	-A04		1	57	60	6	10												
	-A05		1	62	70	6	8	37	26		50	30		8	10		10	10	
	-A10		1 or 2	88	90	3	8	37	52		50	60		8	6		10	10	
	⑤ -A15		1 or 2	88	90	3	8	37	52		50	60		8	6		10	10	
	⑤ -A20		1 or 3	113	125	2	6	37	52	26	50	60	30	8	6	10	10	10	10
	C48H1-B0Z	230/208-60-3	1	27	40	8	10												
	-B06		1	45	50	8	10												
	-B09		1	54	60	6	10												
	⑥ -B15		1	54	60	6	10												
	⑥ -B18		2	N/A	N/A	N/A	N/A	54	28		60	30		6	10		10	10	
NOTE A	C48H1-C0Z/C0C	460-60-3	1	13	20	12	12												
	-C06		1	22	25	10	10												
	-C09		1	27	30	10	10												
	⑥ -C15		1	27	30	10	10												
	C60H1-A0Z	230/208-60-1	1	45	60	8	10												
	-A05		1 or 2	71	80	4	8	45	26		50	30		8	10		10	10	
	-A10		1 or 2	97	100	3	8	45	52		50	60		8	6		10	10	
	⑤ -A15		1 or 2	97	100	3	8	45	52		50	60		8	6		10	10	
	⑤ -A20		1 or 3	113	125	2	6	45	52	26	50	60	30	8	6	10	10	10	10
	C60H1-B0Z	230/208-60-3	1	32	45	8	10												
	-B06		1	50	60	8	10												
	-B09		1	59	60	6	10												
	⑥ -B15		1	59	60	6	10												
	⑥ -B18		2	N/A	N/A	N/A	N/A	59	28		60	30		6	10		10	10	
NOTE A	C60H1-C0Z/C0C	460-60-3	1	17	20	12	12												
	-C06		1	26	30	10	10												
	-C09		1	31	35	8	10												
	⑥ -C15		1	31	35	8	10												

① These "Minimum Circuit Ampacity" values are to be used for sizing the field power conductors. Refer to the National Electrical Code (latest version), Article 310 for power conductor sizing.

Caution: When more than one field power circuit is run through one conduit, the conductors must be derated. Pay special attention to note 8 of Table 310 regarding Ampacity Adjustment Factors when more than three (3) conductors are in a raceway.

② Maximum size of the time delay fuse or HACR type circuit breaker for protection of field wiring conductors.

③ Based on 75°C copper wire. All wiring must conform to the National Electrical Code and all local codes.

④ Maximum KW that can operate with the heat pump on is 4KW. Full heat available during Emergency Heat Mode.

⑤ Maximum KW that can operate with the heat pump on is 10KW. Full heat available during Emergency Heat Mode.

⑥ Maximum KW that can operate with the heat pump on is 9KW. Full heat available during Emergency Heat Mode.

⑦ Maximum KW that can operate with the heat pump on is 8KW. Full heat available during Emergency Heat Mode.

IMPORTANT: While this electrical data is presented as a guide, it is important to electrically connect properly sized fuses & conductor wires in accordance with the National Electrical Code & all local codes.

NOTE A: -C Models have Rotary Disconnect. C0C 460V circuit breaker only available for 0KW. All electrical ratings are the same.

NOTE: To obtain Quiet Climate Flex™ sound ratings, a TCURB Model Fig. 1 to Fig. 6 must be used.

C**H Unit to Wall Curb Application Guide

						Unit Indoor Air Connections			Curb Indoor Air Connections				Shipping Weight Lbs.
Fig. No.	Curb Model ①②	Application	Curb Depth	Curb Height	Used with Unit Model(s)	Supply Air H x W	Return Air H x W	Spacing SA to RA	Supply Air H x W	Return Air H x W	Spacing SA to RA	Alt. Spacing SA to RA	
1	TCURBF2430		9.313	70-5/16	C24H, C30H	7.88 x 27.88	13.88 x 27.88	17.93	7.88 x 27.88	13.88 x 27.88	6.125	17.93	158
2	TCURBF3642A	Used to direct replace CH3S Models.	9.313	85⅜	C36H, C42H	9.88 x 29.88	15.88 x 29.88	30.00	9.88 x 29.88	15.88 x 29.88	6.125	30.00	188
3	TCURBF4860A	Used to direct replace CH4S and CH5S Models.	9.313	85-5/16	C48H, C60H	9.88 x 29.88	15.88 x 29.88	30.00	9.88 x 29.88	15.88 x 29.88	6.125	30.00	188
4	TCURBT2430	Used to install 2 or 2.5-ton cabinet machines installed in a soffit.	9.313	82¼	C24H, C30H	7.88 x 27.88	13.88 x 27.88	17.93	7.88 x 27.88	13.88 x 27.88	17.93	Refer to Installation Instruction 2100-586 for Spacing	170
5	TCURBT3642A	Used to install 3 or 3.5-ton cabinet machines installed in a soffit.	9.313	109¼	C36H, C42H	9.88 x 29.88	15.88 x 29.88	30.00	9.88 x 29.88	15.88 x 29.88	30.00		219
6	TCURBT4860A	Used to install 4 or 5-ton cabinet machines installed in a soffit.	9.313	109¼	C48H, C60H	9.88 x 29.88	15.88 x 29.88	30.00	9.88 x 29.88	15.88 x 29.88	30.00		219
7	WMICF3	Isolation Curb	3.625	70⅜	C24H, C30H	7.88 x 27.88	13.88 x 27.88	17.93	7.88 x 27.88	13.88 x 27.88	17.93		100
8	WMICF5	Isolation Curb	3.625	84⅞	C36H, C42H	9.88 x 29.88	15.88 x 29.88	30.00	9.88 x 29.88	15.88 x 29.88	30.00		125
9	WMICF5	Isolation Curb	3.625	84⅞	C48H, C60H	9.88 x 29.88	15.88 x 29.88	30.00	9.88 x 29.88	15.88 x 29.88	30.00		125
10	TFCT-32	Used to install new 2-ton in place of old 2-ton in a soffit.	9.313	80¼	C24H, C30H	7.88 x 27.88	13.88 x 27.88	17.93	7.88 x 19.88	11.88 x 19.88	20.56		162
11	TFCT-53	Used to install new 3-ton in place of old 3-ton in a soffit.	9.313	82¼	C36H, C42H	9.88 x 29.88	15.88 x 29.88	30.00	7.88 x 27.88	13.88 x 27.88	17.93		170
12	TFCF-32	Used to install new 2-ton in place of old 2-ton.	9.313	70⅜	C24H, C30H	7.88 x 27.88	13.88 x 27.88	17.93	7.88 x 19.88	11.88 x 19.88	20.56		153
13	TFCF-53	Used to install new 3-ton in place of old 3-ton.	9.313	70⅜	C36H, C42H	9.88 x 29.88	15.88 x 29.88	30.00	7.88 x 27.88	13.88 x 27.88	17.93		166
14	WMRSC3S	Used to install new 3-ton where there are obstacles (conduit, etc) underneath original unit.	9.313	72	C36H	9.88 x 29.88	15.88 x 29.88	30.00	7.88 x 27.88	13.88 x 27.88	17.93		170

SEE NOTE A (Fig. 1–3)

SEE NOTE A (Fig. 4–6)

① All curb model numbers followed by -X (beige), -4 (gray), etc to match unit color.

② All curbs have 4 rubber isolation mounts to reduce vibration to the installation wall.

NOTE A: For all economizer applications a TCURB***** is required. For C24 & C30 installations with CHCRV-3 a TCURB is also required.

All Dimensions in Inches.

FIG. 1
TCURBF2430

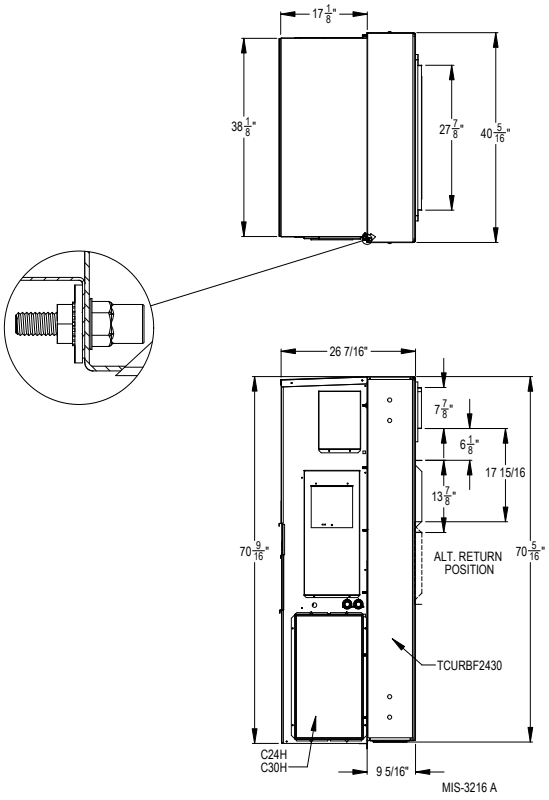

FIG. 2
TCURBF3642A

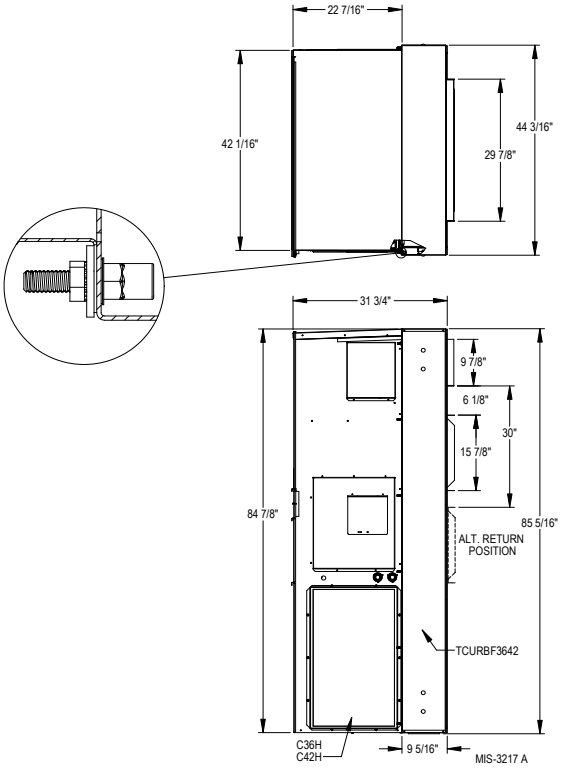

FIG. 3
TCURBF4860A

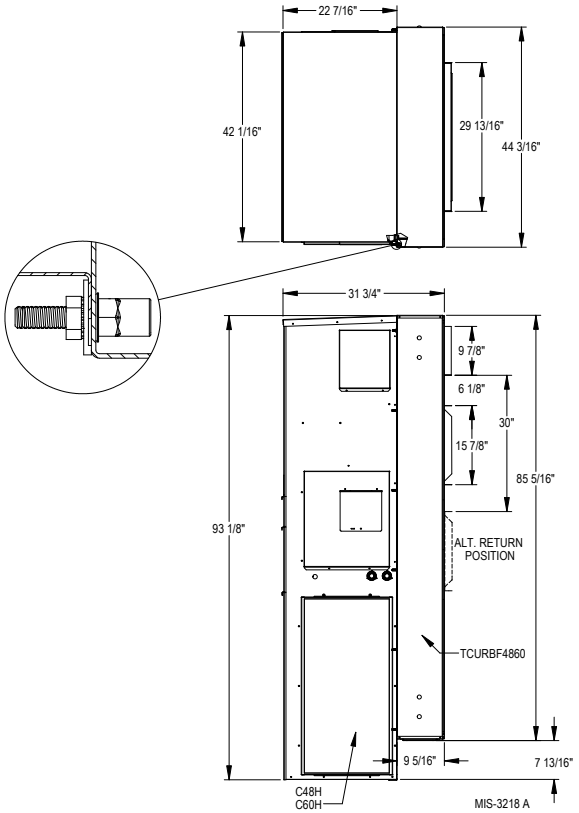

FIG. 4
TCURBT2430

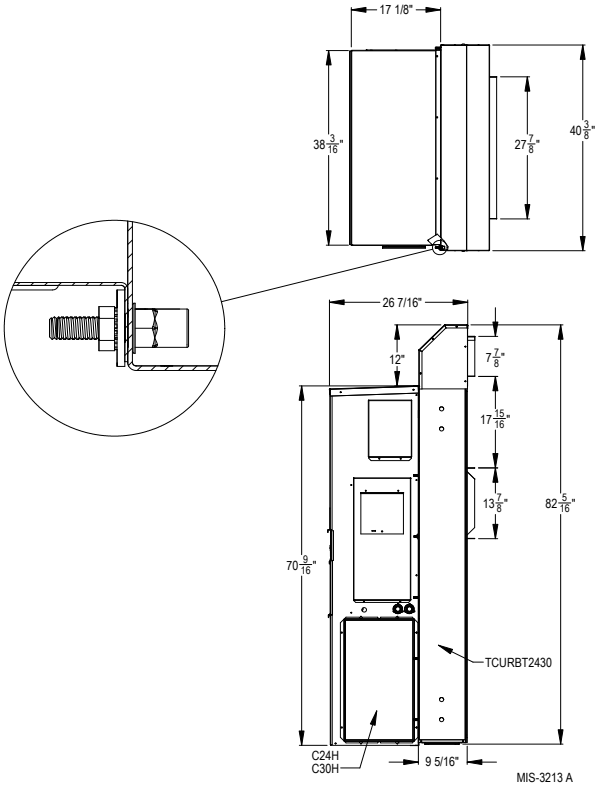

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FIG. 5
TCURBT3642A

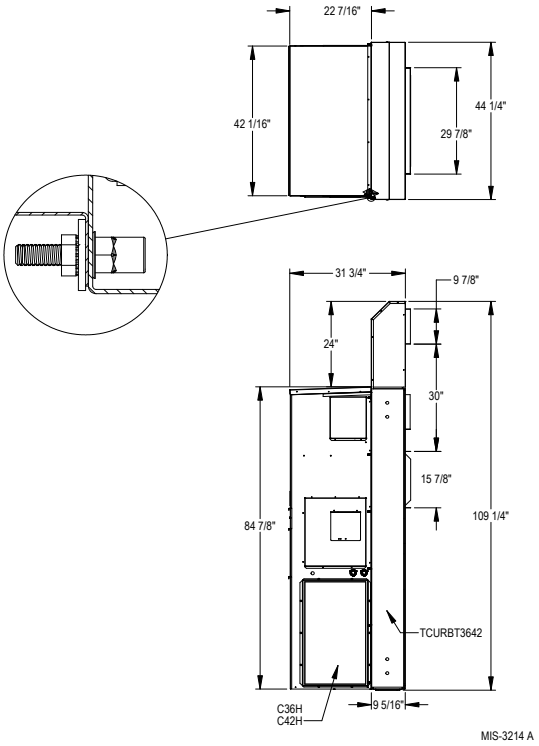


FIG. 6
TCURBT4860A

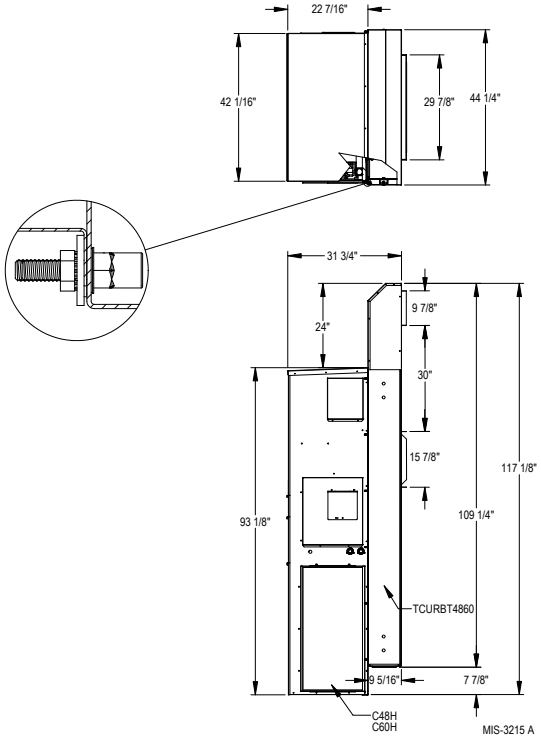


FIG. 7
WMICF3

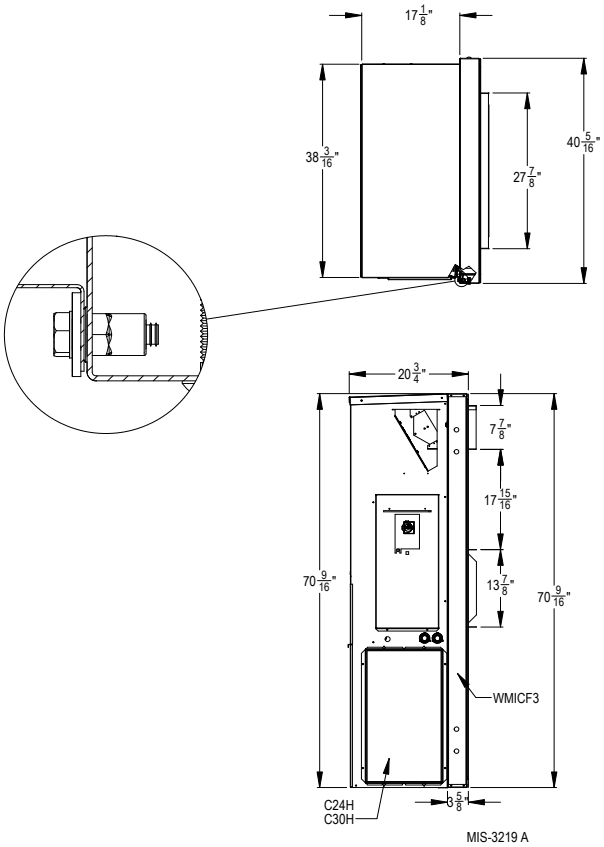
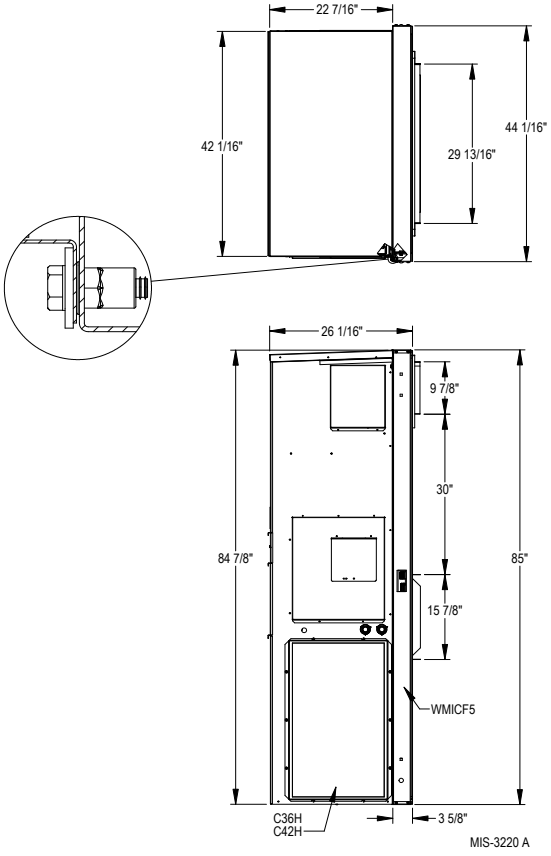


FIG. 8
WMICF5



PATENTED UNDER 9,004,995

FIG. 9
WMICF5

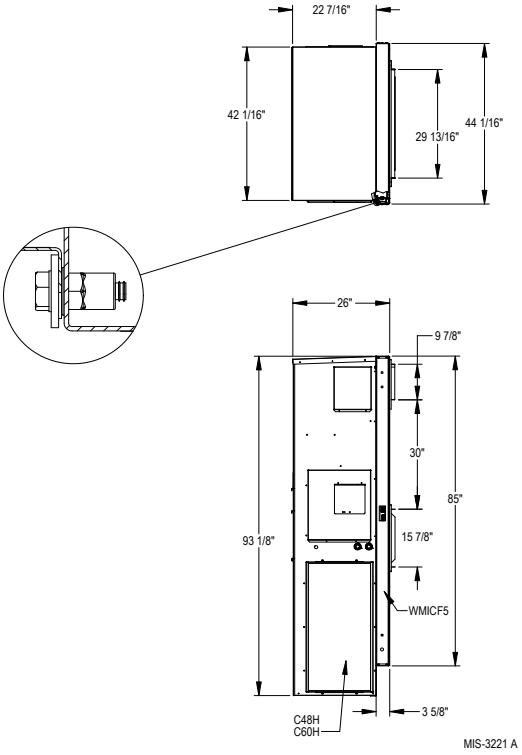
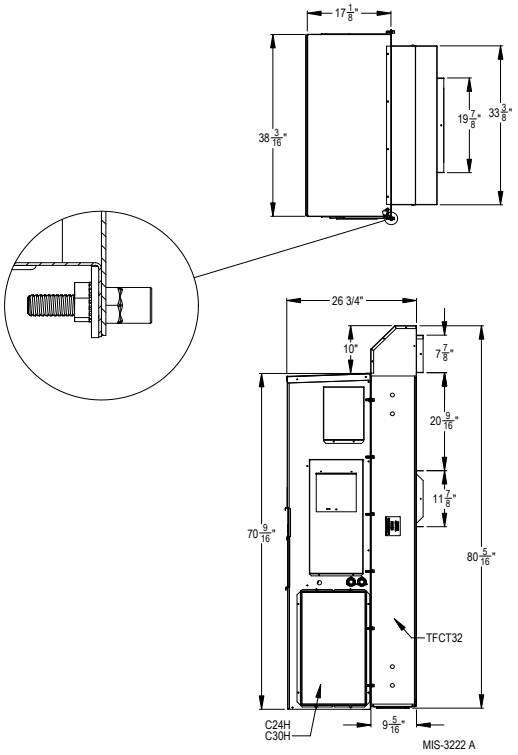


FIG. 10
TFCT-32 *



*** TFCT AND TFCF CURBS MAY REQUIRE WALL MODIFICATION FOR MOUNTING HOLE PATTERN.**

FIG. 11
TFCT-53 *

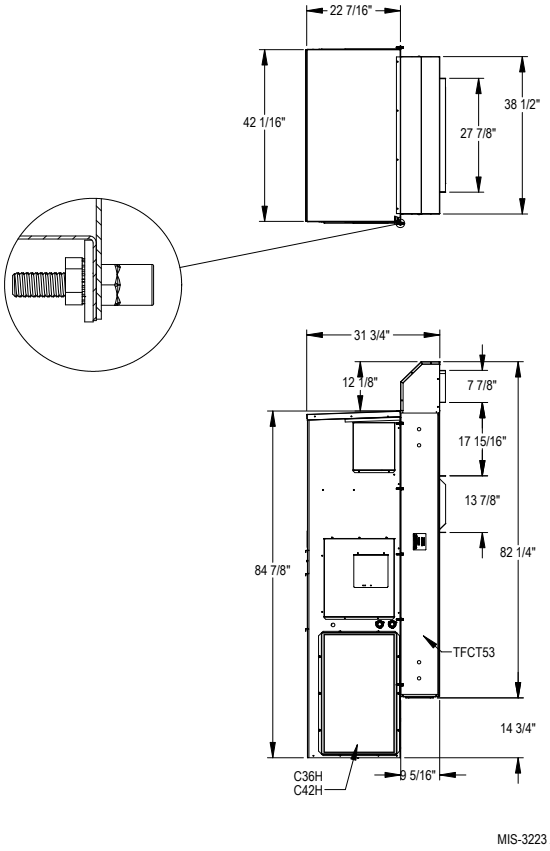
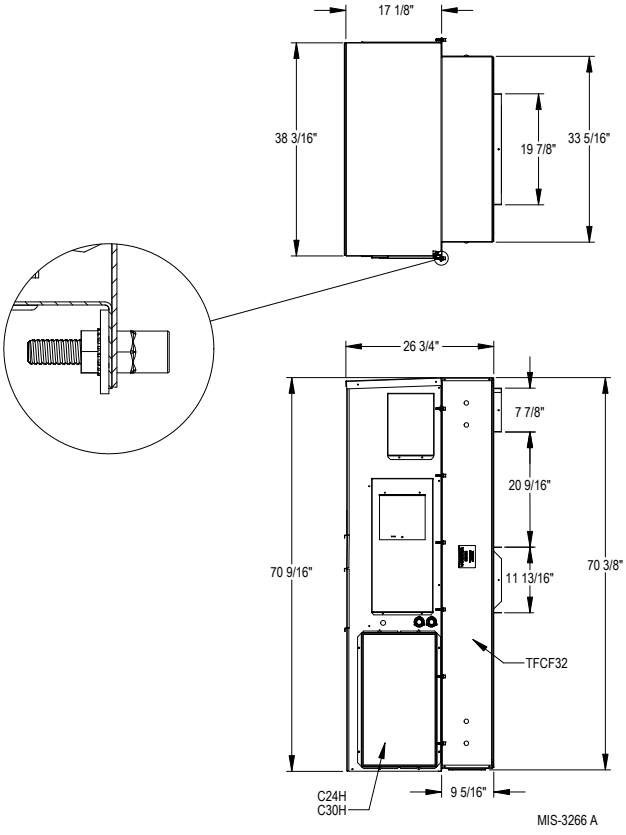


FIG. 12
TFCF-32 *



PATENTED UNDER 9,004,995

FIG. 13
TFCF-53 *

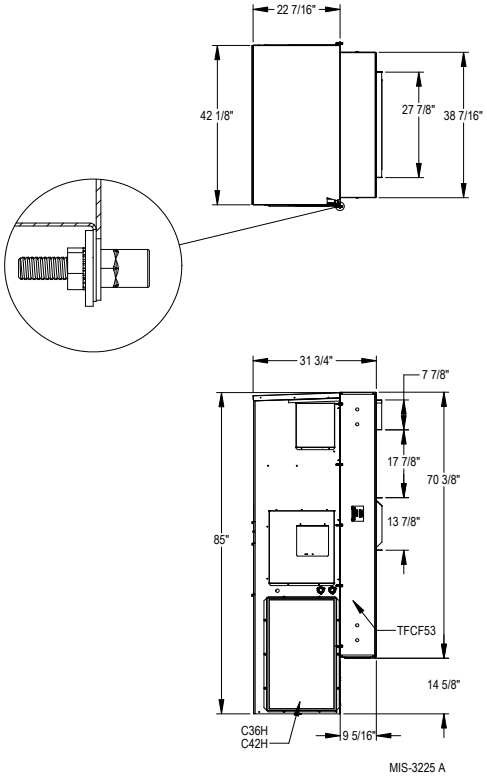
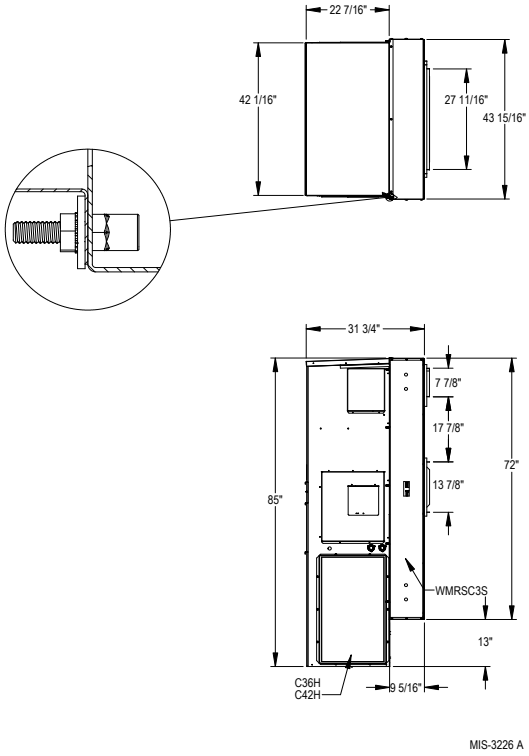


FIG. 14
WMRSC3S

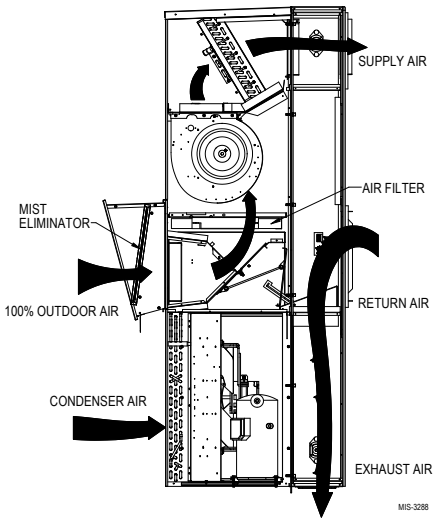


*** TFCT AND TFCF CURBS MAY REQUIRE WALL MODIFICATION FOR MOUNTING HOLE PATTERN.**

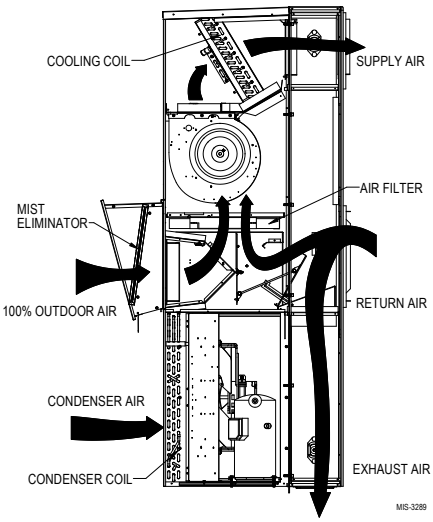
PATENTED UNDER 9,004,995

CH Unit & T Curb Economizer Airflow Path

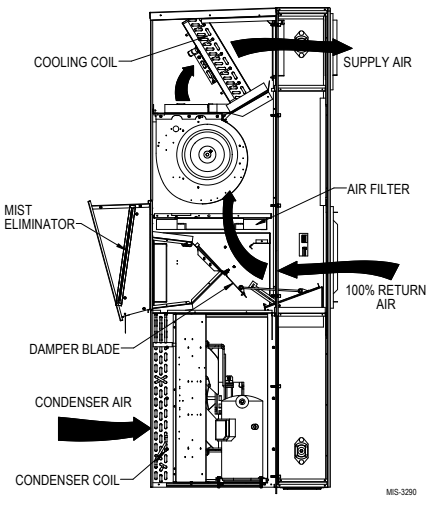
100% OUTSIDE AIRFLOW PATH



MIXED AIRFLOW PATH

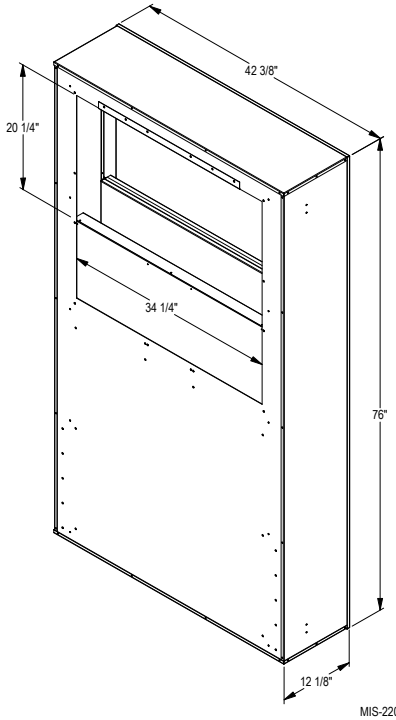


100% CLOSED LOOP AIRFLOW PATH



Return Air Acoustical Plenum

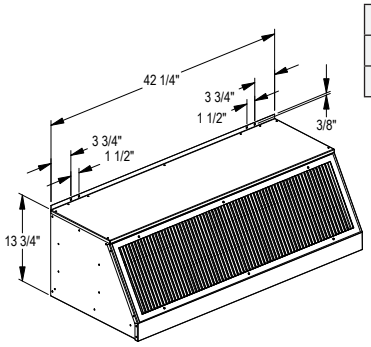
WAPR11

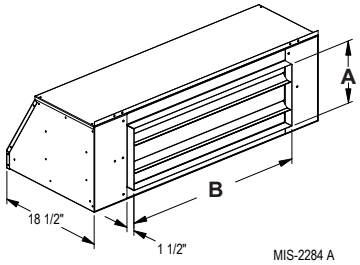


MIS-2208 A

Duct Free Acoustical Plenum

	A	B
WAPFB31	7-7/8	27-7/8
WAPFB51	9-7/8	29-7/8
WAPFB51FF	9-7/8	29-7/8





MIS-2284 A

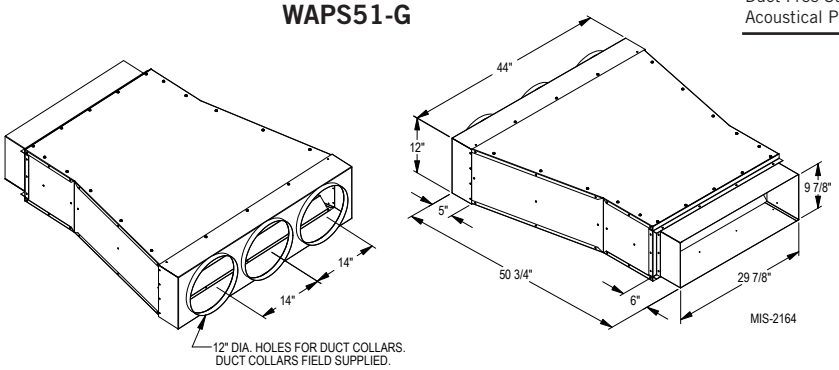
NOTE: WAPFB51FF same as shown, except has square front with grille straight up and down.

Optional Installation Accessories

Description	Model	Used With	Color	Shipping Weight (Lbs)
Return Air Acoustical Plenum	WAPR11-X WAPR11-4	C36H-C60H	Beige Buckeye Gray	190
Ducted Supply Air Acoustical Plenum	WAPS51-G	C36H-C60H	Galvanized	132
Duct Free Supply Air Acoustical Plenum	WAPFB51-X WAPFB51-4	C36H-C60H	Beige Buckeye Gray	66
Duct Free Supply Air Acoustical Plenum	WAPFB51FF-X WAPFB51FF-4	C36H-C60H	Beige Buckeye Gray	66

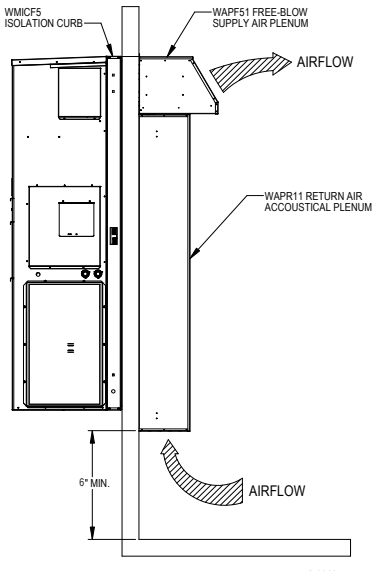
Supply Air Acoustical Plenum

WAPS51-G



MIS-2164

Typical installation with isolation curb, free blow, supply air acoustical plenum & return air acoustical plenum.



MIS-3228 A

Patent 8,336,672

Typical Sound Performance with Installation/Isolation Curbs & Acoustical Plenums

C24H1 Sound Data Matrix (dBA @ 5 feet)

	Free Blow Configuration				Front Outlet Ducted Configuration			
Unit Mounting	Direct	TCURBF2430 Isolation Curb	TCURBF2430 Isolation Curb	TCURBF2430 Isolation Curb	Direct	Direct	TCURBF2430 Isolation Curb	TCURBF2430 Isolation Curb
Supply Air Treatment	Grille	Grille	Grille	WAPFB31 Free Blow Supply Air Plenum	Standard Supply Duct	Standard Supply Duct	Standard Supply Duct	WAPS51-G Supply Air Silencer
Return Air Treatment	Grille	Grille	WAPR11-X Return Air Silencer	WAPR11-X Return Air Silencer	Grille	WAPR11-X Return Air Silencer	Grille	WAPR11-X Return Air Silencer
Blower Only Operation with CRV	NA	28.6	30.1	29.4	NA	NA	26.5	25.7
Compressor Stage 1 Operation with CRV	NA	43.2	40.2	40.4	NA	NA	43.7	39.4
Compressor Stage 2 Operation	NA	43.8	41.3	41.7	NA	NA	43.2	40.6
Compressor Stage 2 with ERV High Speed Operation								
Indoor Integrated dBA	NA	39.9	37.4	37.6	NA	NA	39.9	36.4
Compressor Stage 2 Outdoor Sound Level		65.4	65.4	65.4		65.4	65.4	65.4

Note 1: dBA is sound pressure measured 5 feet in front of unit and 5 feet above floor.
Note 2: Unit or isolation curb is mounted to frame construction.
Note 3: Results may vary depending upon other factors such as room size, type of construction and acoustical variances.

C30H1 Sound Data Matrix (dBA @ 5 feet)

	Free Blow Configuration				Front Outlet Ducted Configuration			
Unit Mounting	Direct	TCURBF2430 Isolation Curb	TCURBF2430 Isolation Curb	TCURBF2430 Isolation Curb	Direct	Direct	TCURBF2430 Isolation Curb	TCURBF2430 Isolation Curb
Supply Air Treatment	Grille	Grille	Grille	WAPFB31 Free Blow Supply Air Plenum	Standard Supply Duct	Standard Supply Duct	Standard Supply Duct	WAPS51-G Supply Air Silencer
Return Air Treatment	Grille	Grille	WAPR11-X Return Air Silencer	WAPR11-X Return Air Silencer	Grille	WAPR11-X Return Air Silencer	Grille	WAPR11-X Return Air Silencer
Blower Only Operation	NA	35.5	33.8	32.5	NA	NA	31.2	32.5
Compressor Stage 1 Operation	NA	41.2	40.7	40.9	NA	NA	40.8	38.0
Compressor Stage 2 Operation	NA	44.3	43.1	43.2	NA	NA	42.3	40.9
Compressor Stage 2 with ERV High Speed Operation								
Indoor Integrated dBA	NA	40.0	38.9	38.8	NA	NA	38.2	36.7
Compressor Stage 2 Outdoor Sound Level		63.8	63.8	63.8			63.8	63.8

Note 1: dBA is sound pressure measured 5 feet in front of unit and 5 feet above floor.
Note 2: Unit or isolation curb is mounted to frame construction.
Note 3: Results may vary depending upon other factors such as room size, type of construction and acoustical variances.

C36H1 Sound Data Matrix (dBA @ 5 feet)

	Free Blow Configuration				Front Outlet Ducted Configuration			
Unit Mounting	Direct	TCURBF3642 Isolation Curb	TCURBF3642 Isolation Curb	TCURBF3642 Isolation Curb	Direct	Direct	TCURBF3642 Isolation Curb	TCURBF3642 Isolation Curb
Supply Air Treatment	Grille	Grille	Grille	WAPFB51 Free Blow Supply Air Plenum	Standard Supply Duct	Standard Supply Duct	Standard Supply Duct	WAPS51-G Supply Air Silencer
Return Air Treatment	Grille	Grille	WAPR11-X Return Air Silencer	WAPR11-X Return Air Silencer	Grille	WAPR11-X Return Air Silencer	Grille	WAPR11-X Return Air Silencer
Blower Only Operation	37.1	32.7	32.6	30.2	36.1	32.3	28.7	29.3
Compressor Stage 1 Operation	53.6	45.7	40.9	40.0	51.1	42.8	39.7	38.0
Compressor Stage 2 Operation	53.3	46.1	42.4	41.8	51.8	43.5	40.0	39.8
Compressor Stage 2 with ERV High Speed Operation								
Indoor Integrated dBA	49.8	42.4	38.5	37.5	47.8	39.8	36.4	35.7
10' Compressor Stage 2 Outdoor Sound Level	62.6	62.6	62.6	62.6	62.6	62.6	62.6	62.6

Note 1: dBA is sound pressure measured 5 feet in front of unit and 5 feet above floor.
Note 2: Unit or isolation curb is mounted to frame construction.
Note 3: Results may vary depending upon other factors such as room size, type of construction and acoustical variances.

Typical Sound Performance with Installation/Isolation Curbs & Acoustical Plenums

C42H1 Sound Data Matrix (dBA @ 5 feet)

	Free Blow Configuration				Front Outlet Ducted Configuration			
Unit Mounting	Direct	TCURBF3642 Isolation Curb	TCURBF3642 Isolation Curb	TCURBF3642 Isolation Curb	Direct	Direct	TCURBF3642 Isolation Curb	TCURBF3642 Isolation Curb
Supply Air Treatment	Grille	Grille	Grille	WAPFB51 Free Blow Supply Air Plenum	Standard Supply Duct	Standard Supply Duct	Standard Supply Duct	WAPS51-G Supply Air Silencer
Return Air Treatment	Grille	Grille	WAPR11-X Return Air Silencer	WAPR11-X Return Air Silencer	Grille	WAPR11-X Return Air Silencer	Grille	WAPR11-X Return Air Silencer
Blower Only Operation with CRV	38.5	33.1	33.3	32.0	38.2	34.3	29.4	31.3
Compressor Stage 1 Operation with CRV	54.5	44.7	42.4	42.5	51.9	45.1	43.1	40.7
Compressor Stage 2 Operation	55.1	46.0	44.6	43.5	52.5	45.2	43.0	42.1
Compressor Stage 2 with ERV High Speed Operation								
Indoor Integrated dBA	51.1	41.9	40.2	39.6	48.6	41.8	39.5	38.1
Compressor Stage 2 Outdoor Sound Level	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0

Note 1: dBA is sound pressure measured 5 feet in front of unit and 5 feet above floor.
Note 2: Unit or isolation curb is mounted to frame construction.
Note 3: Results may vary depending upon other factors such as room size, type of construction and acoustical variances.

C48H1 Sound Data Matrix (dBA @ 5 feet)

	Free Blow Configuration				Front Outlet Ducted Configuration			
Unit Mounting	Direct	TCURBF4860 Isolation Curb	TCURBF4860 Isolation Curb	TCURBF4860 Isolation Curb	Direct	Direct	TCURBF4860 Isolation Curb	TCURBF4860 Isolation Curb
Supply Air Treatment	Grille	Grille	Grille	WAPFB51 Free Blow Supply Air Plenum	Standard Supply Duct	Standard Supply Duct	Standard Supply Duct	WAPS51-G Supply Air Silencer
Return Air Treatment	Grille	Grille	WAPR11-X Return Air Silencer	WAPR11-X Return Air Silencer	Grille	WAPR11-X Return Air Silencer	Grille	WAPR11-X Return Air Silencer
Blower Only Operation	38.7	32.3	34.1	31.6	38.4	33.5	29.0	30.0
Compressor Stage 1 Operation	50.5	43.0	42.5	41.1	48.6	40.5	40.3	39.1
Compressor Stage 2 Operation	53.5	46.5	45.0	44.3	52.2	45.3	43.6	42.0
Compressor Stage 2 with ERV High Speed Operation								
Indoor Integrated dBA	48.5	41.3	40.5	39.4	47.0	39.9	38.5	37.2
Compressor Stage 2 Outdoor Sound Level	61.8	61.8	61.8	61.8	61.8	61.8	61.8	61.8

Note 1: dBA is sound pressure measured 5 feet in front of unit and 5 feet above floor.
Note 2: Unit or isolation curb is mounted to frame construction.
Note 3: Results may vary depending upon other factors such as room size, type of construction and acoustical variances.

C60H1 Sound Data Matrix (dBA @ 5 feet)

	Free Blow Configuration				Front Outlet Ducted Configuration			
Unit Mounting	Direct	TCURBF4860 Isolation Curb	TCURBF4860 Isolation Curb	TCURBF4860 Isolation Curb	Direct	Direct	TCURBF4860 Isolation Curb	TCURBF4860 Isolation Curb
Supply Air Treatment	Grille	Grille	Grille	WAPFB51 Free Blow Supply Air Plenum	Standard Supply Duct	Standard Supply Duct	Standard Supply Duct	WAPS51-G Supply Air Silencer
Return Air Treatment	Grille	Grille	WAPR11-X Return Air Silencer	WAPR11-X Return Air Silencer	Grille	WAPR11-X Return Air Silencer	Grille	WAPR11-X Return Air Silencer
Blower Only Operation	40.2	33.3	32.5	31.7	39.0	33.6	30.1	32.9
Compressor Stage 1 Operation	52.1	45.4	42.1	41.4	50.7	44.2	42.8	40.2
Compressor Stage 2 Operation	58.8	51.1	51.6	51.7	57.5	52.5	51.5	50.6
Compressor Stage 2 with ERV High Speed Operation								
Indoor Integrated dBA	52.4	45.0	44.7	44.7	51.1	45.8	44.7	43.7
Compressor Stage 2 Outdoor Sound Level	67.6	67.6	67.6	67.6	67.6	67.6	67.6	67.6

Note 1: dBA is sound pressure measured 5 feet in front of unit and 5 feet above floor.
Note 2: Unit or isolation curb is mounted to frame construction.
Note 3: Results may vary depending upon other factors such as room size, type of construction and acoustical variances.

Typical Sound Performance with Installation/Isolation Curbs & Acoustical Plenums

C24H1 Sound Data Matrix (dBA @ 10 feet)

	Free Blow Configuration				Front Outlet Ducted Configuration			
Unit Mounting	Direct	TCURBF2430 Isolation Curb	TCURBF2430 Isolation Curb	TCURBF2430 Isolation Curb	Direct	Direct	TCURBF2430 Isolation Curb	TCURBF2430 Isolation Curb
Supply Air Treatment	Grille	Grille	Grille	WAPFB51 Free Blow Supply Air Plenum	Standard Supply Duct	Standard Supply Duct	Standard Supply Duct	WAPS51-G Supply Air Silencer
Return Air Treatment	Grille	Grille	WAPR11-X Return Air Silencer	WAPR11-X Return Air Silencer	Grille	WAPR11-X Return Air Silencer	Grille	WAPR11-X Return Air Silencer
Blower Only Operation with CRV	NA	27.4	28.1	25.9	NA	NA	24.5	24.8
Compressor Stage 1 Operation with CRV	NA	40.4	37.2	37.8	NA	NA	39.7	37.7
Compressor Stage 2 Operation	NA	41.2	38.9	38.7	NA	NA	39.5	39.3
Compressor Stage 2 with ERV High Speed Operation								
Indoor Integrated dBA	NA	37.2	34.8	34.8	NA	NA	36.0	34.9
Compressor Stage 2 Outdoor Sound Level		65.4	65.4	65.4			65.4	65.4

Note 1: dBA is sound pressure measured 10 feet in front of unit and 5 feet above floor.
Note 2: Unit or isolation curb is mounted to frame construction.
Note 3: Results may vary depending upon other factors such as room size, type of construction and acoustical variances.

C30H1 Sound Data Matrix (dBA @ 10 feet)

	Free Blow Configuration				Front Outlet Ducted Configuration			
Unit Mounting	Direct	TCURBF2430 Isolation Curb	TCURBF2430 Isolation Curb	TCURBF2430 Isolation Curb	Direct	Direct	TCURBF2430 Isolation Curb	TCURBF2430 Isolation Curb
Supply Air Treatment	Grille	Grille	Grille	WAPFB51 Free Blow Supply Air Plenum	Standard Supply Duct	Standard Supply Duct	Standard Supply Duct	WAPS51-G Supply Air Silencer
Return Air Treatment	Grille	Grille	WAPR11-X Return Air Silencer	WAPR11-X Return Air Silencer	Grille	WAPR11-X Return Air Silencer	Grille	WAPR11-X Return Air Silencer
Blower Only Operation	NA	32.5	31.8	29.9	NA	NA	29.4	30.5
Compressor Stage 1 Operation	NA	38.6	36.7	36.3	NA	NA	38.7	37.5
Compressor Stage 2 Operation	NA	42.2	41.0	39.2	NA	NA	39.7	39.5
Compressor Stage 2 with ERV High Speed Operation								
Indoor Integrated dBA	NA	37.5	36.2	34.8	NA	NA	36.0	35.5
Compressor Stage 2 Outdoor Sound Level		63.8	63.8	63.8			63.8	63.8

Note 1: dBA is sound pressure measured 10 feet in front of unit and 5 feet above floor.
Note 2: Unit or isolation curb is mounted to frame construction.
Note 3: Results may vary depending upon other factors such as room size, type of construction and acoustical variances.

C36H1 Sound Data Matrix (dBA @ 10 feet)

	Free Blow Configuration				Front Outlet Ducted Configuration			
Unit Mounting	Direct	TCURBF3642 Isolation Curb	TCURBF3642 Isolation Curb	TCURBF3642 Isolation Curb	Direct	Direct	TCURBF3642 Isolation Curb	TCURBF3642 Isolation Curb
Supply Air Treatment	Grille	Grille	Grille	WAPFB51 Free Blow Supply Air Plenum	Standard Supply Duct	Standard Supply Duct	Standard Supply Duct	WAPS51-G Supply Air Silencer
Return Air Treatment	Grille	Grille	WAPR11-X Return Air Silencer	WAPR11-X Return Air Silencer	Grille	WAPR11-X Return Air Silencer	Grille	WAPR11-X Return Air Silencer
Blower Only Operation	35.1	31.7	30.4	27.6	33.0	29.9	27.2	27.1
Compressor Stage 1 Operation	48.7	43.5	40.9	37.1	47.0	40.2	39.7	38.3
Compressor Stage 2 Operation	48.8	43.8	42.4	38.8	48.1	40.8	40.0	38.4
Compressor Stage 2 with ERV High Speed Operation								
Indoor Integrated dBA	45.2	40.2	38.5	34.6	43.9	37.2	36.4	35.0
Compressor Stage 2 Outdoor Sound Level	62.6	62.6	62.6	62.6	62.6	62.6	62.6	62.6

Note 1: dBA is sound pressure measured 10 feet in front of unit and 5 feet above floor.
Note 2: Unit or isolation curb is mounted to frame construction.
Note 3: Results may vary depending upon other factors such as room size, type of construction and acoustical variances.

Typical Sound Performance with Installation/Isolation Curbs & Acoustical Plenums

C42H1 Sound Data Matrix (dBA @ 10 feet)

	Free Blow Configuration				Front Outlet Ducted Configuration			
Unit Mounting	Direct	TCURBF3642 Isolation Curb	TCURBF3642 Isolation Curb	TCURBF3642 Isolation Curb	Direct	Direct	TCURBF3642 Isolation Curb	TCURBF3642 Isolation Curb
Supply Air Treatment	Grille	Grille	Grille	WAPFB51 Free Blow Supply Air Plenum	Standard Supply Duct	Standard Supply Duct	Standard Supply Duct	WAPS51-G Supply Air Silencer
Return Air Treatment	Grille	Grille	WAPR11-X Return Air Silencer	WAPR11-X Return Air Silencer	Grille	WAPR11-X Return Air Silencer	Grille	WAPR11-X Return Air Silencer
Blower Only Operation with CRV	35.7	31.5	30.3	28.6	35.0	31.6	27.6	29.3
Compressor Stage 1 Operation with CRV	48.7	43.0	41.3	40.0	49.2	40.4	42.1	39.0
Compressor Stage 2 Operation	49.0	44.5	42.2	40.6	50.3	42.5	41.7	40.5
Compressor Stage 2 with ERV High Speed Operation								
Indoor Integrated dBA	45.3	40.3	38.3	36.9	46.1	38.2	38.4	36.4
Compressor Stage 2 Outdoor Sound Level	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0

Note 1: dBA is sound pressure measured 10 feet in front of unit and 5 feet above floor.
Note 2: Unit or isolation curb is mounted to frame construction.
Note 3: Results may vary depending upon other factors such as room size, type of construction and acoustical variances.

C48H1 Sound Data Matrix (dBA @ 10 feet)

	Free Blow Configuration				Front Outlet Ducted Configuration			
Unit Mounting	Direct	TCURBF4860 Isolation Curb	TCURBF4860 Isolation Curb	TCURBF4860 Isolation Curb	Direct	Direct	TCURBF4860 Isolation Curb	TCURBF4860 Isolation Curb
Supply Air Treatment	Grille	Grille	Grille	WAPFB51 Free Blow Supply Air Plenum	Standard Supply Duct	Standard Supply Duct	Standard Supply Duct	WAPS51-G Supply Air Silencer
Return Air Treatment	Grille	Grille	WAPR11-X Return Air Silencer	WAPR11-X Return Air Silencer	Grille	WAPR11-X Return Air Silencer	Grille	WAPR11-X Return Air Silencer
Blower Only Operation	36.1	32.2	31.7	28.4	35.3	30.8	27.6	27.4
Compressor Stage 1 Operation	45.8	41.3	40.2	38.4	45.9	38.2	39.0	38.8
Compressor Stage 2 Operation	49.6	45.0	42.1	41.3	49.0	42.7	42.1	40.8
Compressor Stage 2 with ERV High Speed Operation								
Indoor Integrated dBA	44.4	39.9	37.9	36.5	44.0	37.4	37.1	36.3
Compressor Stage 2 Outdoor Sound Level	61.8	61.8	61.8	61.8	61.8	61.8	61.8	61.8

Note 1: dBA is sound pressure measured 10 feet in front of unit and 5 feet above floor.
Note 2: Unit or isolation curb is mounted to frame construction.
Note 3: Results may vary depending upon other factors such as room size, type of construction and acoustical variances.

C60H1 Sound Data Matrix (dBA @ 10 feet)

	Free Blow Configuration				Front Outlet Ducted Configuration			
Unit Mounting	Direct	TCURBF4860 Isolation Curb	TCURBF4860 Isolation Curb	TCURBF4860 Isolation Curb	Direct	Direct	TCURBF4860 Isolation Curb	TCURBF4860 Isolation Curb
Supply Air Treatment	Grille	Grille	Grille	WAPFB51 Free Blow Supply Air Plenum	Standard Supply Duct	Standard Supply Duct	Standard Supply Duct	WAPS51-G Supply Air Silencer
Return Air Treatment	Grille	Grille	WAPR11-X Return Air Silencer	WAPR11-X Return Air Silencer	Grille	WAPR11-X Return Air Silencer	Grille	WAPR11-X Return Air Silencer
Blower Only Operation	37.1	31.7	29.9	29.0	35.7	29.6	27.9	27.5
Compressor Stage 1 Operation	48.2	42.8	41.0	39.4	48.1	40.9	42.4	39.1
Compressor Stage 2 Operation	54.8	47.7	45.3	45.0	54.5	47.3	48.2	44.1
Compressor Stage 2 with ERV High Speed Operation								
Indoor Integrated dBA	48.5	42.3	39.8	39.0	48.2	41.0	42.0	38.3
Compressor Stage 2 Outdoor Sound Level	67.6	67.6	67.6	67.6	67.6	67.6	67.6	67.6

Note 1: dBA is sound pressure measured 10 feet in front of unit and 5 feet above floor.
Note 2: Unit or isolation curb is mounted to frame construction.
Note 3: Results may vary depending upon other factors such as room size, type of construction and acoustical variances.

Part Load Cooling Application Data - Outdoor Temperature °F ①

Model	D.B. / W.B. ②	COOLING CAPACITY	75°F	80°F	85°F	90°F	95°F	100°F	105°F	110°F	115°F	120°F
C24H1	75/62	Total Cooling	17,500	16,300	15,300	14,200	13,100	12,100	11,200	10,400	9,500	8,600
		Sensible Cooling	13,900	13,200	12,700	12,100	11,600	11,200	10,900	10,600	10,300	10,100
	80/67	Total Cooling	18,600	17,700	16,900	16,000	15,000	14,100	13,200	12,300	11,400	10,400
		Sensible Cooling	13,400	12,900	12,500	12,100	11,700	11,400	11,100	10,900	10,700	10,500
	85/72	Total Cooling	22,200	20,700	19,400	18,100	16,700	15,500	14,300	13,100	12,000	10,800
		Sensible Cooling	13,800	13,100	12,600	12,100	11,500	11,100	10,600	10,300	9,900	9,500
C30H1	75/62	Total Cooling	23,500	22,100	20,800	19,600	18,500	17,500	16,600	15,800	15,000	14,300
		Sensible Cooling	18,000	17,500	17,000	16,400	16,000	15,500	14,900	14,500	14,000	13,500
	80/67	Total Cooling	25,100	24,000	23,100	22,100	21,200	20,400	19,600	18,800	18,000	17,300
		Sensible Cooling	17,400	17,100	16,800	16,400	16,100	15,700	15,300	15,000	14,500	14,100
	85/72	Total Cooling	29,900	28,100	26,600	25,000	23,600	22,300	21,200	20,000	18,900	18,000
		Sensible Cooling	17,900	17,400	16,900	16,300	15,800	15,200	14,600	14,100	13,400	12,800
C36H1	75/62	Total Cooling	26,600	24,800	23,300	21,800	20,400	19,300	18,200	17,200	16,300	15,500
		Sensible Cooling	20,700	20,100	19,500	19,000	18,400	17,800	17,200	16,600	15,900	15,200
	80/67	Total Cooling	28,400	27,000	25,800	24,600	23,400	22,400	21,400	20,500	19,600	18,800
		Sensible Cooling	20,000	19,700	19,300	19,000	18,500	18,100	17,600	17,100	16,500	15,900
	85/72	Total Cooling	33,900	31,600	29,700	27,800	26,000	24,500	23,100	21,800	20,600	19,600
		Sensible Cooling	20,500	20,000	19,400	18,900	18,200	17,500	16,800	16,100	15,200	14,400
C42H1	75/62	Total Cooling	30,700	28,500	26,600	24,900	23,400	22,100	21,000	20,200	19,400	18,800
		Sensible Cooling	23,200	23,000	22,600	22,100	21,500	20,900	20,100	19,200	18,100	17,000
	80/67	Total Cooling	32,700	31,400	29,500	28,100	26,800	25,700	24,800	24,000	23,300	22,800
		Sensible Cooling	22,500	22,500	22,400	22,100	21,700	21,200	20,600	19,800	18,800	17,800
	85/72	Total Cooling	39,000	36,300	33,900	31,800	29,800	28,100	26,800	25,600	24,500	23,700
		Sensible Cooling	23,100	22,900	22,500	22,000	21,300	20,500	19,700	18,600	17,300	16,100
C48H1	75/62	Total Cooling	35,300	34,000	32,600	31,200	29,600	28,100	26,500	24,800	23,000	21,200
		Sensible Cooling	27,500	27,200	26,800	26,300	25,700	25,100	24,300	23,300	22,400	21,300
	80/67	Total Cooling	37,700	35,800	36,200	35,200	34,000	32,700	31,200	29,500	27,700	25,700
		Sensible Cooling	26,600	26,600	26,500	26,300	25,900	25,500	24,900	24,100	23,300	22,300
	85/72	Total Cooling	44,900	43,300	41,600	39,800	37,800	35,800	33,700	31,400	29,100	26,700
		Sensible Cooling	27,300	27,000	26,600	26,100	25,400	24,700	23,800	22,600	21,500	20,200
C60H1	75/62	Total Cooling	43,300	41,300	39,500	37,500	35,500	33,700	31,800	30,000	28,100	26,300
		Sensible Cooling	33,900	33,100	32,300	31,400	30,500	29,600	28,700	27,700	26,700	25,700
	80/67	Total Cooling	46,200	43,000	43,800	42,400	40,800	39,200	37,500	35,700	33,800	31,800
		Sensible Cooling	32,900	32,400	32,000	31,400	30,800	30,100	29,400	28,600	27,800	26,900
	85/72	Total Cooling	55,100	52,600	50,300	47,900	45,300	42,900	40,500	38,000	35,500	33,100
		Sensible Cooling	33,700	32,900	32,200	31,200	30,200	29,100	28,000	26,800	25,600	24,300

① Below 65°F, unit requires a factory or field installed low ambient control.
② Return air temperature °F.

Capacity Multiplier Factors			
% of Rated Airflow	-10	Rated	+10
Total BTUH	0.975	1.0	1.02
Sensible BTUH	0.950	1.0	1.05

Part Load Heating Application Rating & Outdoor Temperature °F*

MODEL		0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°F
C24H1	BTUH	3,600	4,700	5,900	7,000	8,100	9,300	10,400	11,600	12,700	13,800	14,900	16,100	17,200
	WATTS	1390	1400	1410	1410	1420	1420	1420	1410	1440	1460	1470	1480	1490
	COP	0.76	0.99	1.23	1.46	1.68	1.92	2.15	2.42	2.59	2.77	2.97	3.19	3.39
C30H1	BTUH	6,200	7,600	8,900	10,300	11,500	12,500	13,500	14,600	16,400	18,300	19,900	21,200	22,600
	WATTS	1680	1700	1720	1740	1760	1700	1770	1780	1820	1860	1890	1910	1930
	COP	1.09	1.31	1.52	1.74	1.92	2.07	2.24	2.41	2.65	2.89	3.09	3.26	3.44
C36H1	BTUH	7,000	8,600	10,100	11,600	13,100	14,400	15,700	17,100	18,900	20,700	22,400	23,900	25,400
	WATTS	1930	1940	1960	1970	1980	1980	1990	1990	2020	2060	2080	2090	2110
	COP	1.07	1.30	1.51	1.73	1.94	2.14	2.32	2.52	2.75	2.95	3.16	3.36	3.53
C42H1	BTUH	8,800	10,600	12,500	14,300	16,200	18,100	20,000	21,900	23,600	25,400	27,100	29,000	30,800
	WATTS	2340	2360	2390	2410	2410	2400	2380	2370	2450	2540	2590	2610	2640
	COP	1.11	1.32	1.54	1.74	1.97	2.21	2.47	2.71	2.83	2.93	3.07	3.26	3.42
C48H1	BTUH	10,800	12,900	15,100	17,200	18,900	20,300	21,600	23,000	26,300	29,500	32,100	34,300	36,400
	WATTS	2490	2520	2550	2580	2590	2600	2600	2600	2670	2740	2790	2820	2850
	COP	1.28	1.50	1.74	1.96	2.14	2.29	2.44	2.60	2.89	3.16	3.38	3.57	3.75
C60H1	BTUH	11,400	14,200	17,100	19,900	22,700	25,500	28,300	31,000	33,900	36,900	39,700	42,600	45,400
	WATTS	2860	2900	2950	2990	3040	3110	3170	3230	3250	3260	3290	3340	3380
	COP	1.17	1.44	1.70	1.96	2.19	2.41	2.62	2.82	3.06	3.32	3.54	3.74	3.94

* 70°F DB indoor return air at rated CFM includes defrost operation below 45°.

Full Load Cooling Application Data - Outdoor Temperature °F ①

Model	D.B. / W.B. ②	COOLING CAPACITY	75°F	80°F	85°F	90°F	95°F	100°F	105°F	110°F	115°F	120°F
C24H1	75/62	Total Cooling	24,400	23,200	22,000	20,700	19,400	18,100	16,700	15,400	13,900	12,400
		Sensible Cooling	19,200	18,800	18,300	17,700	17,200	16,500	15,800	15,100	14,400	13,600
	80/67	Total Cooling	26,000	26,000	24,400	23,400	22,200	21,000	19,700	18,300	16,700	15,000
		Sensible Cooling	18,600	18,600	18,100	17,700	17,300	16,800	16,200	15,600	14,900	14,200
	85/72	Total Cooling	31,000	29,500	28,100	26,500	24,700	23,000	21,300	19,500	17,600	15,600
		Sensible Cooling	19,100	18,700	18,200	17,600	17,000	16,300	15,500	14,700	13,800	12,900
C30H1	75/62	Total Cooling	31,200	29,600	28,100	26,700	25,500	24,300	23,200	22,100	21,000	20,100
		Sensible Cooling	24,300	23,400	22,600	22,000	21,300	20,800	20,200	19,700	19,200	18,800
	80/67	Total Cooling	33,300	32,200	31,200	30,200	29,200	28,300	27,300	26,300	25,300	24,300
		Sensible Cooling	23,500	22,900	22,400	22,000	21,500	21,100	20,700	20,300	19,900	19,600
	85/72	Total Cooling	39,700	37,700	35,900	34,100	32,500	31,000	29,500	28,000	26,600	25,300
		Sensible Cooling	24,100	23,300	22,500	21,900	21,100	20,400	19,800	19,100	18,400	17,700
C36H1	75/62	Total Cooling	37,200	35,500	33,800	32,100	30,500	28,900	27,400	25,800	24,400	22,900
		Sensible Cooling	29,500	28,700	27,800	26,900	26,100	25,300	24,500	23,600	22,900	22,100
	80/67	Total Cooling	39,700	38,600	37,500	36,300	35,000	33,700	32,300	30,800	29,300	27,700
		Sensible Cooling	28,600	28,100	27,500	26,900	26,300	25,700	25,100	24,400	23,800	23,100
	85/72	Total Cooling	47,300	45,200	43,100	41,000	38,900	36,900	34,900	32,800	30,800	28,800
		Sensible Cooling	29,300	28,500	27,700	26,700	25,800	24,900	23,900	22,900	21,900	20,900
C42H1	75/62	Total Cooling	42,100	40,100	38,300	36,500	34,700	33,000	31,300	29,700	28,100	26,500
		Sensible Cooling	33,400	32,400	31,300	30,400	29,500	28,600	27,800	27,100	26,400	25,700
	80/67	Total Cooling	44,900	43,700	42,500	41,200	40,000	38,400	36,900	35,400	33,800	32,100
		Sensible Cooling	32,400	31,700	31,000	30,400	29,700	29,100	28,500	28,000	27,400	26,900
	85/72	Total Cooling	53,500	51,100	48,800	46,500	44,200	42,000	39,800	37,700	35,500	33,400
		Sensible Cooling	33,200	32,200	31,200	30,200	29,200	28,200	27,200	26,300	25,300	24,300
C48H1	75/62	Total Cooling	48,800	46,600	44,600	42,500	40,500	38,600	36,800	35,000	33,200	31,400
		Sensible Cooling	39,400	38,500	37,600	36,700	35,700	34,800	33,800	32,800	31,800	30,800
	80/67	Total Cooling	52,100	50,800	49,500	48,000	45,500	45,000	43,400	41,700	39,900	38,000
		Sensible Cooling	38,200	37,700	37,200	36,700	36,000	35,400	34,700	33,900	33,100	32,200
	85/72	Total Cooling	62,100	59,400	56,900	54,200	51,700	49,200	46,800	44,400	41,900	39,500
		Sensible Cooling	39,100	38,300	37,400	36,500	35,300	34,300	33,100	31,800	30,500	29,100
C60H1	75/62	Total Cooling	58,100	55,600	53,200	51,000	48,800	46,700	44,700	42,700	40,800	38,900
		Sensible Cooling	45,200	43,700	42,400	41,100	39,900	38,800	37,800	36,900	36,000	35,200
	80/67	Total Cooling	62,000	60,600	59,100	57,600	55,500	54,400	52,700	50,900	49,100	47,200
		Sensible Cooling	43,800	42,800	42,000	41,100	40,300	39,500	38,800	38,100	37,400	36,800
	85/72	Total Cooling	73,900	70,900	67,900	65,000	62,200	59,500	56,800	54,200	51,600	49,100
		Sensible Cooling	44,900	43,400	42,200	40,800	39,500	38,200	37,000	35,700	34,500	33,300

① Below 65°F, unit requires a factory or field installed low ambient control.
② Return air temperature °F.

Capacity Multiplier Factors			
% of Rated Airflow	-10	Rated	+10
Total BTUH	0.975	1.0	1.02
Sensible BTUH	0.950	1.0	1.05

Full Load Heating Application Rating & Outdoor Temperature °F*

MODEL		0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°F
C24H1	BTUH	5,100	6,600	8,100	9,600	11,100	12,400	13,800	15,200	16,900	18,600	20,100	21,600	23,100
	WATTS	1570	1600	1620	1640	1660	1680	1690	1710	1750	1790	1820	1840	1860
	COP	0.96	1.21	1.47	1.72	1.96	2.17	2.40	2.61	2.83	3.05	3.24	3.44	3.64
C30H1	BTUH	10,600	12,200	13,800	15,400	16,400	16,900	17,400	17,900	21,200	24,400	26,600	28,200	29,800
	WATTS	2000	2030	2060	2100	2120	2120	2130	2130	2210	2290	2340	2380	2410
	COP	1.56	1.77	1.97	2.15	2.27	2.34	2.40	2.47	2.82	3.13	3.34	3.48	3.63
C36H1	BTUH	12,200	14,200	16,200	18,200	19,900	21,200	22,600	24,000	26,900	29,900	32,200	34,200	36,200
	WATTS	2270	2300	2340	2380	2410	2430	2450	2470	2530	2600	2640	2680	2720
	COP	1.58	1.81	2.03	2.25	2.42	2.56	2.71	2.85	3.12	3.37	3.58	3.74	3.90
C42H1	BTUH	14,000	16,600	19,300	22,000	23,900	25,400	26,900	28,400	32,800	37,300	40,600	43,300	46,000
	WATTS	2750	2810	2870	2930	2960	2970	2980	2990	3130	3270	3370	3430	3490
	COP	1.50	1.74	1.98	2.20	2.37	2.51	2.65	2.79	3.08	3.35	3.53	3.70	3.87
C48H1	BTUH	18,000	20,600	23,300	26,000	28,000	29,500	31,100	32,700	37,000	41,300	44,600	47,300	50,000
	WATTS	3010	3070	3130	3190	3240	3280	3320	3360	3450	3540	3610	3670	3730
	COP	1.76	1.97	2.19	2.39	2.54	2.64	2.75	2.86	3.15	3.42	3.62	3.78	3.93
C60H1	BTUH	24,800	27,700	30,600	33,500	35,800	37,600	39,400	41,300	45,800	50,300	53,800	56,700	59,600
	WATTS	3770	3850	3930	4010	4080	4140	4200	4260	4370	4470	4560	4640	4720
	COP	1.93	2.11	2.29	2.45	2.58	2.67	2.75	2.85	3.08	3.30	3.46	3.59	3.70

* 70°F DB indoor return air at rated CFM includes defrost operation below 45°.

Indoor Blower Performance - CFM (0.00" — 0.50" H_20) ①

Model	Rated ESP	① Max ESP	② Blower Only	Cooling & Heat Pump Stage 1	④ Cooling & Heat Pump Stage 2	④ Electric Heat
C24H	.10	.50	550	550	740	900
C30H	.10	.50	650	650	900	900
C36H	.15	.50	800	800	1100	1100
C42H	.15	.50	800	900 ③	1250	1250
C48H	.20	.50	825	1000 ③	1550	1550
C60H	.20	.50	850	1300 ③	1650	1650

NOTE: *These units are equipped with a variable speed (ECM) indoor motor that automatically adjusts itself to maintain approximately the same rate of indoor airflow in both heating & cooling, dry & wet coil conditions and at both 230/208 or 460 volts.*

① Maximum ESP (inches WC) shown is with 2" thick disposable filter.
② Blower only CFM is the total air being circulated during continuous fan only mode.
③ Blower only CFM reduces during continuous fan only mode.
④ CFM output on Stage 2 Cooling and Heat Pump or Electric Heat.

Electric Heat Table - Refer to Electrical Specifications for Availability by Unit Model

Nominal KW	At 240V (1)				At 208V (1)				At 480V (2)			At 460V (2)		
	KW	1-Ph Amps	3-Ph Amps	Btuh	KW	1-Ph Amps	3-Ph Amps	Btuh	KW	3-Ph Amps	Btuh	KW	3-Ph Amps	Btuh
4.0	4.0	16.7		13,652	3.00	14.4		10,239						
5.0	5.0	20.8		17,065	3.75	18.0		12,799						
6.0	6.0		14.4	20,478	4.50		12.5	15,359	6.0	7.2	20,478	5.52	6.9	18,840
8.0	8.0	33.3		27,304	6.00	28.8		20,478						
9.0	9.0		21.7	30,717	6.75		18.7	23,038	9.0	10.8	30,717	8.28	10.4	28,260
10.0	10.0	41.7		34,130	7.50	36.1		25,598						
15.0	15.0	62.5	36.1	51,195	11.25	54.1	31.2	38,396	15.0	18.0	51,195	13.80	17.3	47,099
18.0			43.4	61,434	13.5		37.4	46,076	18.0	21.6	61,434	16.56	20.8	56,520
20.0	20.0	83.3		68,260	15.00	72.1		51,195						

(1) These electric heaters are available in 230/208V units only.
(2) These electric heaters are available in 480V units only.

Heater Packages - Field Installed

- Designed for adding Electric Heat to 0 KW Units
- Circuit Breaker standard on 230/208V Models
- ETL – US & Canada Listed
- Rotary Disconnect standard on 460V Models

Heat Pump Models	-A00 Models 230/208-1		-B00 Models 230/208-3		-C00 Models 460-3	
	Heater Model #	KW	Heater Model #	KW	Heater Model #	KW
C24H1	EHT03H-A04B EHT03H-AF8B EHT03H-AS8B	4 F8 S8	EHT02H-B06B EHT03H-B09B	6 9		
C30H1	EHT03H-A04B EHT03H-AF8B EHT03H-AS8B	4 F8 S8	EHT03H-B06B EHT03H-B09B	6 9	EHT03H-C06 EHT03H-C09	6 9
C36H1	EHS03H-A05B EHT05H-A10B EHT05H-A15B	5 10 15	EHT05H-B06B EHT05H-B09B EHS05H-B15B	6 9 15	EHS05H-C06 EHS03H-C09 EHS03H-C15	6 9 15
C42H1	EHS03H-A05B EHT05H-A10B EHT05H-A15B	5 10 15	EHS05H-B06B EHS05H-B09B EHS05H-B15B	6 9 15	EHS05H-C06 EHS05H-C09 EHS05H-C15	6 9 15
C48H1	EHT06H-A04B EHT06H-A05B EHT06H-A10B EHT06H-A15B EHT06H-A20B	4 5 10 15 20	EHT06H-B06B EHT06H-B09B EHT06H-B15B EHT06H-B18B	6 9 15 18	EHT06H-C06 EHT06H-C09 EHT06H-C15	6 9 15
C60H1	EHT06H-A05B EHT06H-A10B EHT06H-A15B EHT06H-A20B	5 10 15 20	EHT06H-B06B EHT06H-B09B EHT06H-B15B EHT06H-B18B	6 9 15 18	EHT06H-C06 EHT06H-C09 EHT06H-C15 EHT06H-C18	6 9 15 18

Clearances Required for Service Access and Adequate Condenser Airflow

MODELS	LEFT SIDE	RIGHT SIDE
All Models	36"	36"

Minimum Clearances Required to Combustible Materials

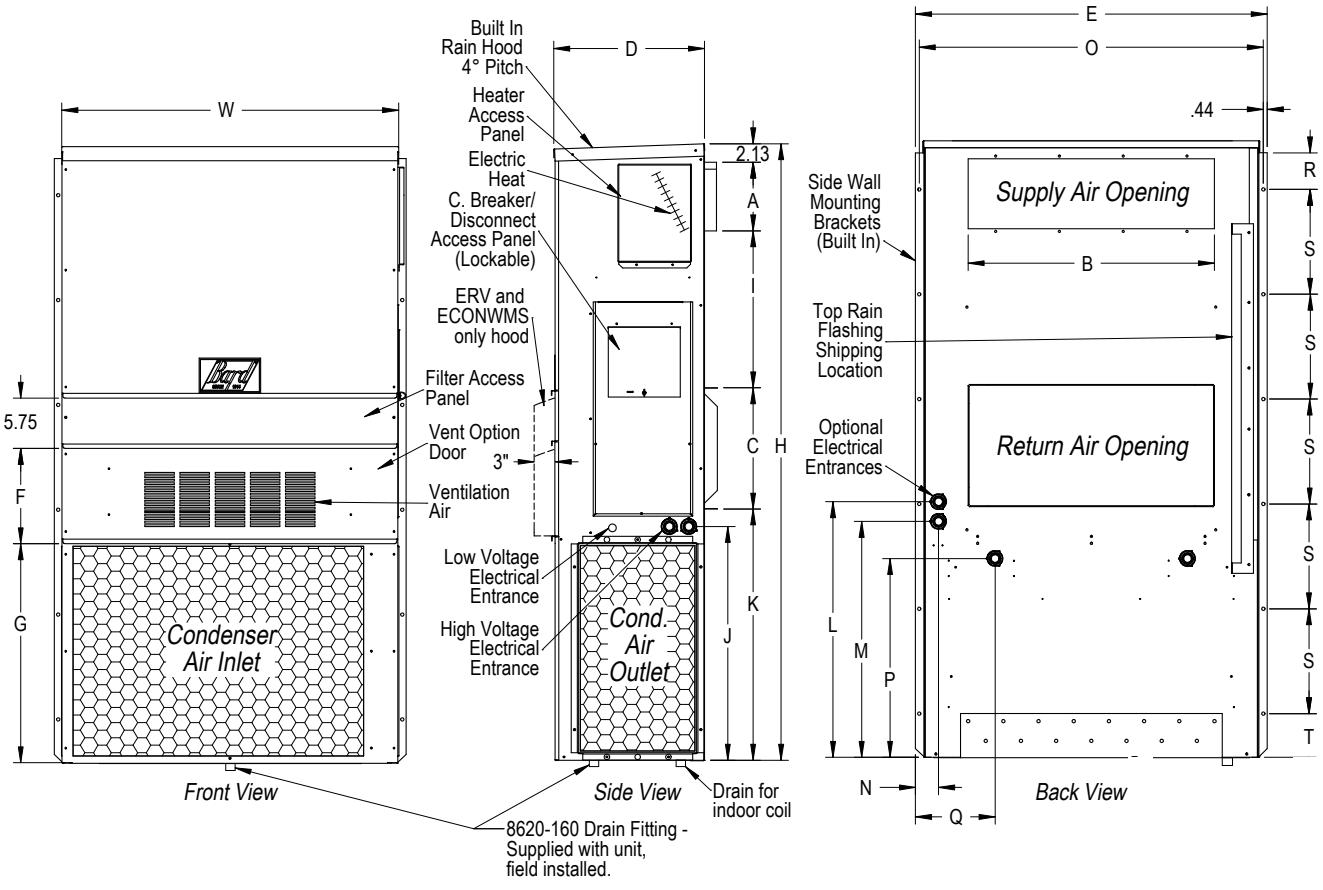
MODELS ①	SUPPLY AIR DUCT FIRST THREE FEET	CABINET
All Models	1/4"	0"

① Refer to the Installation Manual for more detailed information.

Dimensions of Basic Unit for Architectural and Installation Requirements (Nominal)

MODEL	WIDTH (W)	DEPTH (D)	HEIGHT (H)	SUPPLY		RETURN																
				A	B	C	B	E	F	G	I	J	K	L	M	N	O	P	Q	R	S	T
C24H1 C30H1	38.200	17.125	70.563	7.88	27.88	13.88	27.88	40.00	10.88	25.75	17.93	26.75	28.75	29.25	27.00	2.63	39.13	22.75	9.14	5.00	12.00	5.00
C36H1 C42H1	42.075	22.432	84.875	9.88	29.88	15.88	29.88	43.88	13.56	31.66	30.00	32.68	26.94	34.69	32.43	3.37	43.00	23.88	10.00	1.44	16.00	1.88
C48H1 C60H1	42.075	22.432	93.000	9.88	29.88	15.88	29.88	43.88	13.56	37.00	30.00	40.81	35.06	42.81	40.56	3.37	43.00	31.00	10.00	1.44	16.00	10.00

All dimensions are in inches. Dimensional drawings are not to scale.



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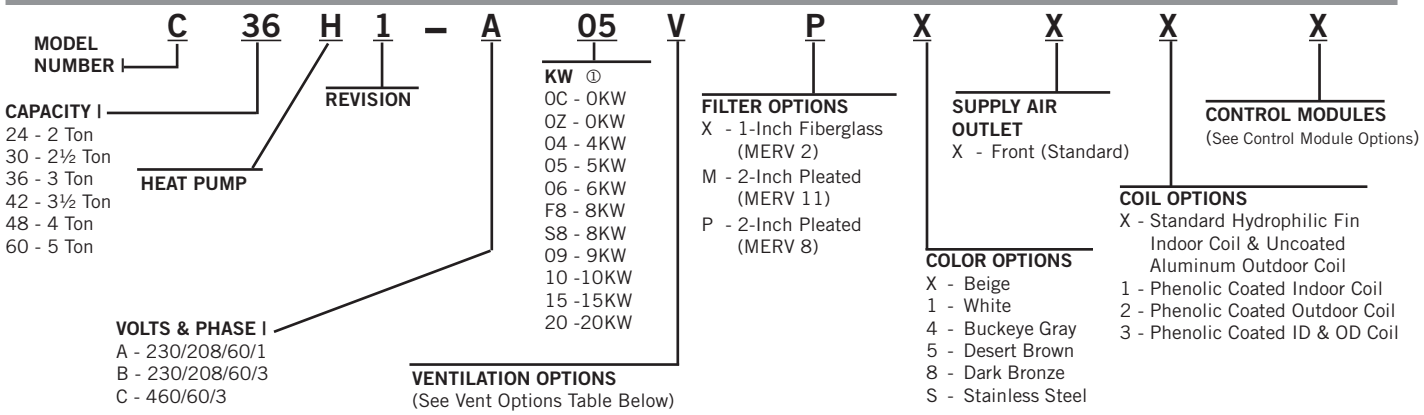
Heat Pump Wall-Mount Model Nomenclature



Note ① All 230/208V units with or without electric heat have circuit breaker. 0C is for 460V circuit breaker & 0KW. No 460V electric heat options w/circuit breaker available. 460V -0Z and all 460V KW options are with Rotary Disconnect. See Page 9 for available heater options by unit model number.

Ventilation Options

MODELS	C24H1, C30H1		C36H1, C42H1, C48H1, C60H1	
Description	**Factory Installed Code No.**	**Field Installed Part No.**	**Factory Installed Code No.**	**Field Installed Part No.**
Blank-Off Plate	B	BOP-3	B	BOP-5
Commercial Ventilator - Modulating Spring Return w/Exhaust	V	CHCRV-3 ④	V	CHCRV-5
Economizer (Internal) - Fully Modulating w/Exhaust mn	S	ECONCHS-E3 ②③④	S	ECONCHS-E5 ②③④
Energy Recovery Ventilator - 230V	R	CHERV-A3 ①②	R	CHERV-A5 ①②
Energy Recovery Ventilator - 460V	R	CHERV-C3 ①②	R	CHERV-C5 ①②

① Intake and exhaust can be independently adjusted.
② Insert color to match unit ("X" = Beige; "4" = Buckeye Gray; etc.)
③ Units controlled by thermostats other than Bard 8403-060 or Bard CompleteStat™ may require Bard "8620-220 2-Stage Heat Pump w/Economizer" Relay Kit for proper operation.
④ Requires use of TCURB, depending on unit model, when installing ECONCHS-E3, -E5 or CHCRV-3. See Page 10 for additional information.

NOTE: The WMDK Door Kit cannot be used with the CH Product-Line, due to door sizes.
All parts are included in the field installed vent kits, including door panels.

Heat Pump Control Modules

DESCRIPTION									
Low Pressure Control ①	High Pressure Control ①	Low Ambient Control & Relay ②	Start Kit ③	Start Kit ④	Outdoor Sensor	Freezestat ⑥	Dirty Filter Switch ⑦	Factory Installed Code Number	Field Installed Part Number
STD	STD							X	N/A
STD	STD	C24-48 ● 230V						E	CMH-20
STD	STD	C24-48 ● 460V						E	CMH-21
STD	STD	C60 ● All						E	CMH-19
STD	STD		●					Field Installed Only	CMC-15 ③
STD	STD			●				Field Installed Only	SK111 ④
STD	STD					●		Field Installed Only	CMC-29
STD	STD						●	Field Installed Only	CMC-30
STD	STD				●			Field Installed Only	8403-061 ⑤

STD = Standard Equipment

① The high & low pressure controls are auto reset. Operating circuit includes a lockout feature and is resettable from the wall thermostat. All low pressure controls use a timed bypass circuit to prevent nuisance tripping during low temperature start-up.

② The low ambient control includes an 8201-008 (fan relay) and permits cooling operation down to 0°F.

③ PTCR start kit can be used with all -A single phase models. Increases starting torque 2-3x. Not used for -B or -C three phase models. Do not use if SK111 is used.

④ Start capacitor and potential relay start kit can be used with all -A single phase models. Increases starting torque 9x. Not used for -B or -C three phase models. Do not use if CMC-15 is used.

⑤ ODT. Outdoor thermostat. Field-installed only. Bard Part #8403-061.
Comes with weatherproof enclosure. Works in conjunction with 8403-060 multi-stage thermostats offered by Bard and can be configured for any or all of compressor cut-off in heat pump mode, minimum cooling mode and maximum electric heat operation based on outdoor temperature.

⑥ Field installed option for standard units.

⑦ Dirty Filter Switch. Adjustable for different filter media. Normally open close-on-activation dry contact rated 1.5A 24VAC. Suitable for use with appropriate thermostat or alarm panels supplied by others.

***NOTE*:** Standard heat pump control board has a 5-minute compressor anti-short cycle timer.

LAC control is required for operation of cooling mode below 55 degrees. This option is recommended for applications throughout most of the United States & Canada.

Bard® SINCE 1914
Climate Control Solutions

Bard Manufacturing Company, Inc.
Bryan, Ohio 43506
www.bardhvac.com

Due to our continuous product improvement policy, all specifications subject to change without notice.

Before purchasing this appliance, read important energy cost and efficiency information available from your retailer.

Form No. S3459 March, 2016

Supersedes: S3459-1115

ALLIANCE
BUILDING SOLUTIONS, INC

Attachment D – Controls & Monitoring Submittal

12526 High Bluff Drive Suite 345, San Diego, CA 92130
www.absenergy.com
(858) 333-4775
Contractor's License # 1008135

Mesa Union School - Controls Inventory

ALLIANCE BUILDING SOLUTIONS, INC

Existing Equipment										Proposed Controls	
Map ID	Unit Tag	Location Served	Equipment	Manufacturer	Model Number	Serial Number	Size	Year	Control Type	New Control	Model
B1		Bldg B - Kitchen	Evap Cooler	AdobeAir	ES430G	A04000241	1/2 hp	2004	Man Tstat	Smart Tstat	Venstar T3800
B2		Bldg B - Kitchen Stor.	Packaged Gas / Elec	Carrier	48SS-036040521AA	3497G10685	3.0-ton	1997	Man Tstat	Smart Tstat	Venstar T3800
B3		Bldg B - Elec Rm	Split Sys Cooling	Carrier	38AN009120	4803Y10545	0.8-ton	2003	Man Tstat	Smart Tstat	Venstar T3800
B4		Bldg B - Cafeteria	Furnace	--inaccessible--	--inaccessible--	--inaccessible--	180 MBH	1997	Man Tstat	Smart Tstat	Venstar T3800
A1		Bldg A - Office	Packaged Gas / Elec	Payne	585HBW060100ACAG	3287C92532	5.0-ton	1987	Man Tstat	Smart Tstat	Venstar T3800
A2		Bldg A - IT Closet	Split Sys Cooling	Mitsubishi	MU-A09WA	4001673T	0.8-ton	2008	Man Tstat	Smart Tstat	Venstar T3800
A3		Conf. Office 1	Wall Furnace	Williams	20GV-A1-5	--inaccessible--	14 MBH	old	Man Tstat	Smart Tstat	Venstar T3800
A4		Conf. Office 2	Wall Furnace	Williams	20GV-A1-5	--inaccessible--	14 MBH	old	Man Tstat	Smart Tstat	Venstar T3800
A5		Conf. Office 3	Wall Furnace	Williams	20GV-A1-5	J0322427	14 MBH	old	Man Tstat	Smart Tstat	Venstar T3800
1		Bldg A - Rm 1	Furnace	Midland Ross	20-10J	26694	80 MBH	1994	Man Tstat	Smart Tstat	Venstar T3800
2		Bldg A - Rm 2	Furnace	Midland Ross	20-10J	--inaccessible--	80 MBH	1994	Man Tstat	Smart Tstat	Venstar T3800
3		Bldg A - Rm 3	Split Sys Gas / Elec	Carrier	38CKC060300	3997E08066	5.0-ton	1997	Man Tstat	Smart Tstat	Venstar T3800
4		Bldg A - Rm 4	Furnace	Midland Ross	20-10J	--inaccessible--	80 MBH	1994	Man Tstat	Smart Tstat	Venstar T3800
4A		Bldg A - Rm 4A	Wall Furnace	Williams	20GV-A1-5	--inaccessible--	14 MBH	old	Man Tstat	Smart Tstat	Venstar T3800
5		Bldg C - Rm 5A & 5B	Furnace	Bryant	395CAV060155	0598A05015	124 MBH	1998	Man Tstat	Smart Tstat	Venstar T3800
6		Bldg C - Rm 6	Furnace	Carrier	--inaccessible--	--inaccessible--	60 MBH	1998	Man Tstat	Smart Tstat	Venstar T3800
7		Bldg C - Rm 7	Furnace	Rheem	R801PA050314ZXB	W501610770	40 MBH	2016	Man Tstat	Smart Tstat	Venstar T3800
8		Bldg C - Rm 8	Furnace	Rheem	R801PA050314ZXB	--inaccessible--	40 MBH	2016	Man Tstat	Smart Tstat	Venstar T3800
9		Bldg C - IT Closet	Split Sys Cooling	Carrier	38AN009120	4803Y10551	0.8-ton	2003	Man Tstat	Smart Tstat	Venstar T3800
10		Bldg D - Rm 9 & 10	Furnace	Carrier	--inaccessible--	--inaccessible--	120 MBH	1998	Man Tstat	Smart Tstat	Venstar T3800
11		Bldg D - Rm 11	Furnace	Carrier	--inaccessible--	--inaccessible--	60 MBH	1998	Man Tstat	Smart Tstat	Venstar T3800
12		Bldg D - Rm 12 & 13	Furnace	Carrier	--inaccessible--	--inaccessible--	120 MBH	1998	Man Tstat	Smart Tstat	Venstar T3800
13		Bldg D - IT Closet	Split Sys Cooling	Carrier	--illegible--	--illegible--	0.8-ton	2003	Man Tstat	Smart Tstat	Venstar T3800
14		Bldg D - Rm 14	Furnace	Carrier	--inaccessible--	--inaccessible--	60 MBH	1998	Man Tstat	Smart Tstat	Venstar T3800
15		Bldg E - Rm 15 & 16	Furnace	Carrier	--inaccessible--	--inaccessible--	120 MBH	1998	Man Tstat	Smart Tstat	Venstar T3800
17		Bldg E - Rm 17	Furnace	Carrier	--inaccessible--	--inaccessible--	60 MBH	1998	Man Tstat	Smart Tstat	Venstar T3800
18		Bldg E - Rm 18 & 19	Furnace	Carrier	--inaccessible--	--inaccessible--	120 MBH	1998	Man Tstat	Smart Tstat	Venstar T3800
19		Bldg E - IT Closet	Split Sys Cooling	Carrier	38AN009120	4803Y10533	0.8-ton	2003	Man Tstat	Smart Tstat	Venstar T3800
20		Bldg E - Rm 20	Furnace	Carrier	--inaccessible--	--inaccessible--	60 MBH	1998	Man Tstat	Smart Tstat	Venstar T3800
21		Portable - Rm 21	Wall Mount HP	Bard	WH421-A10VX4XXX	126H971122499-02	3.5-ton	1997	Man Tstat	Smart Tstat	Venstar T3800
22		Portable - Rm 22	Wall Mount HP	Bard	WH421-A10VX4XXX	126H971122493-03	3.5-ton	1997	Man Tstat	Smart Tstat	Venstar T3800
23		Portable - Rm 23	Wall Mount HP	Bard	WH421-A10VX4XXX	126N971176244-02	3.5-ton	1997	Man Tstat	Smart Tstat	Venstar T3800
24		Portable - Rm 24	Wall Mount HP	Bard	WH421-A10VX4XXX	126N971176270-02	3.5-ton	1997	Man Tstat	Smart Tstat	Venstar T3800
25		Portable - Rm 25	Wall Mount HP	Eubank	H448B00A1FDS-NBAB	JB22462	4.0-ton	2010	Man Tstat	Smart Tstat	Venstar T3800
F1		Bldg F - MPR	Packaged Gas / Elec	Carrier	48TMD009-M-501--	1404G30554	8.5-ton	2004	Man Tstat	Smart Tstat	Venstar T3800
F2		Bldg F - Library	Packaged Gas / Elec	Carrier	48TCDD14A2A5A0A0A0	0915P96732	11.5-ton	2015	Man Tstat	Smart Tstat	Venstar T3800
F3		Bldg F - Lobby	Packaged Gas / Elec	Carrier	48GSN024040301--	0604G11905	2.0-ton	2004	Man Tstat	Smart Tstat	Venstar T3800
F4		Bldg F - PC Lab	Packaged Gas / Elec	Carrier	48TFL006-M-511--	1404G30491	5.0-ton	2004	Man Tstat	Smart Tstat	Venstar T3800
F5		Bldg F - Science Lab	Packaged Gas / Elec	Carrier	48TFL006-M-511--	1404G30492	5.0-ton	2004	Man Tstat	Smart Tstat	Venstar T3800
G1		Bldg G - Conf Rm	Packaged Heat Pump	Rheem	RQKA-A018JK	5615F199812171	1.5-ton	1998	Man Tstat	Smart Tstat	Venstar T3800
G2		Bldg G - Staff Lounge	Wall Furnace	Williams	20GV-A1-5	--inaccessible--	14 MBH	old	Man Tstat	Smart Tstat	Venstar T3800
G3		Bldg G - Locker Rooms	Wall Mount HP	Bard	W43H1-A04HH4XXX	349H102707712-02	3.5-ton	2010	Man Tstat	Smart Tstat	Venstar T3800

VENSTAR®

RESIDENTIAL MODELS

VOYAGER®
Digital Thermostat

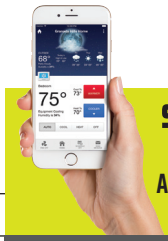
4.6"w x 5.2"h x 1.1"d

Accessories: ACC-0625 Lock Ring, ACC-0425 Wall Plate, and the wireless modules below.

standard features

- Gas/electric or heat pump – multi-stage
- *"Simple as you want operation™"*
  - Switchable: programmable or non-programmable
  - Choose 7-day, 5+2 day or 1-day programming
  - Switchable: auto changeover, or heat, or cool only
- Large, easy to read display
- Scrolling display makes setup easy
- Adjustable backlight intensity
- Backlit, color coded buttons and legends
- Choice of English, Spanish or French for scrolling display
- Bi-color LED indicates a heating or cooling demand
- Dry contact input
- Outdoor sensor ready
- Fahrenheit or Celsius display
- Compatible with condensate overflow warning systems – lockout compressor with message on the display
- Service alert indicators
- Non-volatile memory
- Keypad lock
- Wireless connectivity with optional accessory
- Title 24 compliant
- ADR (Automated Demand Response) ready
- FDD (Equipment Fault Protection) notification
- API for 3rd party monitor and control
- Night dimmer for brightness control in sensitive areas at night
- Configurator app to easily setup Wi-Fi and thermostat settings

c UL us LISTED 4Z95



Simply connected.
Anytime. Anywhere.*
Apple, Android and Blackberry mobile apps available

VENSTAR smart SM

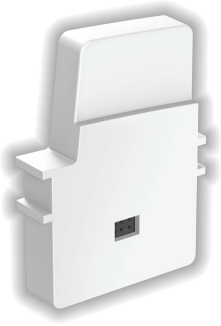
These Wireless Modules available*

Wi Fi **ACC-VWF1**

Z-WAVE PLUS **ACC-VZW1**

ZigBee Control your world **ACC-VZB1**

Skyport CLOUD SERVICES



Optional, not included with thermostat

model T3700

All of the standard features plus:

- 2 heat, 1 cool stages

model T3800

All of the T3700 features plus:

- Controls up to 4 heat & 2 cool stages
- Control to or monitor a 2nd temp sensor
  - Supply air or extra room, etc.
- Set point limiting
- Adjustable deadbands & timers
- Hi/low outdoor temps for the day
- Programmable fan
- Smart recovery

model T3900

All of the T3800 features plus:

- Dual fuel capable
- Controls humidification, dehumidification and reheat
- Auto humidity option based on outdoor temp
- Lockout aux heat based on outdoor temperature
- Can average 1 remote sensor with thermostat
- Programmable extra output

Industry Canada Industrie Canada

c UL us LISTED 4Z95

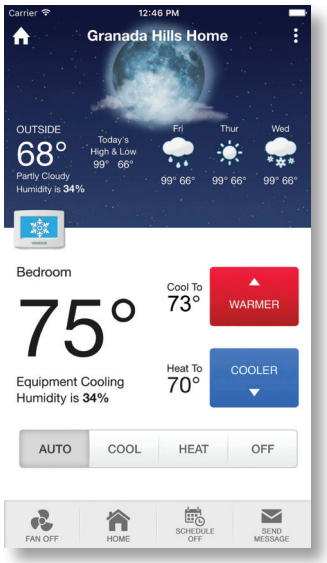
Thermostat MUH-SKYPORT3 Tested to Comply with FCC Standards FC FOR HOME OR OFFICE USE

Skyport™ CLOUD SERVICES

FREE Services

... help you connect to your Venstar Voyager thermostats (with Wi-Fi)

With our FREE app, access all these features remotely from your mobile device



View Thermostat Information

- Name & location of the thermostat
- Current weather & forecast
- Change heat & cool setpoints
- Change thermostat modes
- View equipment status: heating, cooling, off – including lockouts

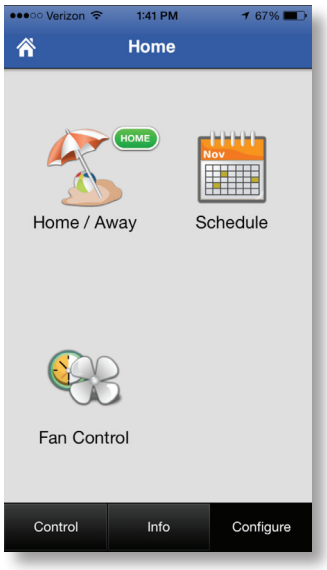
Set "Home" or "Away" at the Touch of a Button

Enable or Disable the Time Period Schedule

View Thermostat Alerts

- Supply air temperature**
- Time for service
- Air filter replacement
- Humidity pad replacement
- UV light bulb replacement

Send Text Messages to the Thermostat



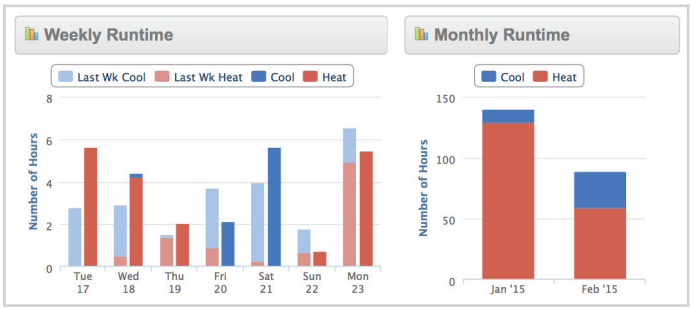
View Current System Temperatures with High and Low Values for the Day

- Indoor temperature
- Indoor humidity*
- Outdoor temperature
- Remote temperature**
- Supply air temperature**
- Return air temperature**

View Heating & Cooling Runtimes for the Day, Current Week, and Last Week

*T7900 Only
**Remote Sensor required for this feature

FREE Additional Features available from the Skyport web site:



View Daily, Weekly, and Monthly Runtime Graphs

Advanced Configuration

- Stage deadbands
- Stages of cooling & heating
- Hum/dehum setpoints*
- Thermostat language
- Readout in degrees F or C
- Display brightness

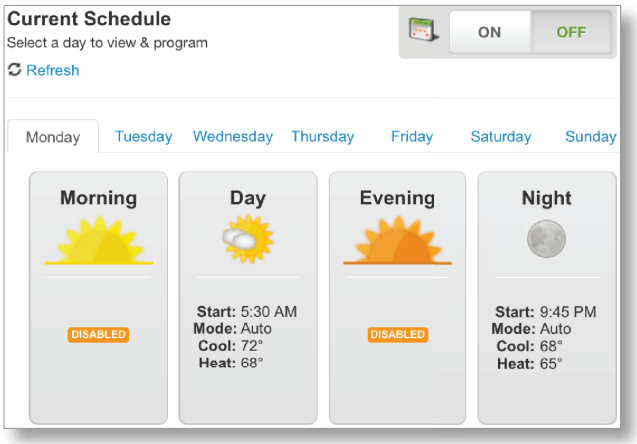
Program Time Period Schedules

Security Settings

- Set view only access
- Disable mode changes
- Disable/enable override
- Enable setpoint limits

Enable Popular Holidays at the Touch of a Button

Program Custom Holidays up to 20 Years in Advance



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88-1082
04.16

HOWARD'S RUG CO.

OF VENTURA INC.
701 Del Norte Blvd. Ste. 225, Oxnard, CA, 93030
Phone (805) 278-4446 Fax (805) 278-4448

PROPOSAL

TO: Mesa Union School District
3901 North Mesa School Road
Somis, CA 93066

PHONE: 805-485-1411

DATE: 06/21/17
P.O. #:
PAGE OF: 1 of 1
PROJECT: Classroom A
(Room 2)
ATTN: Irene Ramirez

DESCRIPTION	TOTAL
FURNISH AND INSTALL	
1. Shaw *Swizzle* carpet tile, color TBD, in classroom A.	**$ 4,781.00**
OR	**OR**
2. Shaw *Zing* carpet tile, color TBD, in classroom A.	**$ 4,781.00**
OR	**OR**
3. Shaw *Hook Up* carpet tile, color TBD, in classroom A.	**$ 4,141.00**
OR	**OR**
4. Mohawk *Faculty III* carpet tile, color TBD, in classroom A.	**$ 6,454.00**
OR	**OR**
5. Mohawk *New Basics III* carpet tile, color TBD, in classroom A.	**$ 4,917.00**
All options listed above include Burke 4" Rubbermyte base, color TBD.	
Notes: Normal floor prep included. No dings or gouges over 1/8". Area to be swept clean and clear of all trades and equipment before work begins. Demo is included in proposal.	
Prevailing Wage	
Total (Tax Included)	
TERMS: NET DUE UPON COMPLETION.	
PLEASE SIGN AND RETURN ORIGINAL COPY.	

NOTE: NO MATERIALS CAN BE ORDERED UNTIL WE RECEIVE OUR SIGNED PROPOSAL/CONTRACT OR A CONTRACT FROM YOU.

CONTINGENCIES:

- ☐ Estimate subject to review after **30 DAYS**_____
- ☐ Estimate assumes job is swept clean of debris and ready for installation.
- ☐ Estimate subject to mutually acceptable payment schedule.
- ☐ Estimate does not include floor preparation.
- ☐ Estimate includes minor floor preparation.
- ☐ Estimate assumes there will not be a conflict of trades at job site on day of installation.
- ☐ Bid subject to on-site measurement.
- ☐ Estimate excludes responsibility for problems caused by slab moisture.
- ☐ Estimate excludes: (waxing, buffing, protection of floor covering)
- ☐ Howard's will not move computers, copiers, telephones, or wall panels.
- ☐ Howard's is NOT responsible for any damage wiring layed under flooring, such as: security, telephones, cable or stereo.
- ☐ Owner or general contractor to provide lighting and heat to facilitate installation.
- ☐ Estimate excludes attic stock or extra stock of a material if specified.
- ☐ Estimate assumes installation is to be done during normal working hours, excludes nights and weekends.
- ☐ Light colored (white, beige, cream, etc.) rubber or vinyl base not recommended and often shows seams and irregularity in walls.
- ☐ Rubber and vinyl base is not recommended to be installed over vinyl or epoxy wall coverings or epoxy paint.

CONTRACTOR'S LICENSE # 583433

I appreciate your consideration and will look forward to hearing from you.

Respectfully submitted. _____ ***Scott Wening***

The above quotation is made subject to these conditions. The buyer acknowledges that he has read and unconditionally accepted the said conditions.

LEGAL NAME OF PURCHASER **TITLE** _____

(SIGNATURE) _____ PURCHASED ORDER NUMBER _____

HOWARD'S RUG CO.

OF VENTURA INC.
701 Del Norte Blvd. Ste. 225, Oxnard, CA, 93030
Phone (805) 278-4446 Fax (805) 278-4448

PROPOSAL

DATE: 06/21/17
P.O. #:
PAGE OF: 1 of 1
PROJECT: Classroom B (Room 6)
ATTN: Irene Ramirez

TO: Mesa Union School District
3901 North Mesa School Road
Somis, CA 93066

PHONE: 805-485-1411

DESCRIPTION	TOTAL
FURNISH AND INSTALL	
1. Shaw *Swizzle* carpet tile, color TBD, in classroom B.	**$ 4,964.00**
OR	**OR**
2. Shaw *Zing* carpet tile, color TBD, in classroom B.	**$ 4,964.00**
OR	**OR**
3. Shaw *Hook Up* carpet tile, color TBD, in classroom B.	**$ 4,295.00**
OR	**OR**
4. Mohawk *Faculty III* carpet tile, color TBD, in classroom B.	**$ 6,712.00**
OR	**OR**
5. Mohawk *New Basics III* carpet tile, color TBD, in classroom B.	**$ 5,106.00**
All options listed above include Burke 4" Rubbermyte base, color TBD.	
Notes: Normal floor prep included. No dings or gouges over 1/8". Area to be swept clean and clear of all trades and equipment before work begins. Demo is included in proposal.	
Prevailing Wage	
Total (Tax Included)	
TERMS: NET DUE UPON COMPLETION.	
PLEASE SIGN AND RETURN ORIGINAL COPY.	

NOTE: NO MATERIALS CAN BE ORDERED UNTIL WE RECEIVE OUR SIGNED PROPOSAL/CONTRACT OR A CONTRACT FROM YOU.

CONTINGENCIES:

- ☐ Estimate subject to review after **30 DAYS**_____
- ☐ Estimate assumes job is swept clean of debris and ready for installation.
- ☐ Estimate subject to mutually acceptable payment schedule.
- ☐ Estimate does not include floor preparation.
- ☐ Estimate includes minor floor preparation.
- ☐ Estimate assumes there will not be a conflict of trades at job site on day of installation.
- ☐ Bid subject to on-site measurement.
- ☐ Estimate excludes responsibility for problems caused by slab moisture.
- ☐ Estimate excludes: (waxing, buffing, protection of floor covering)
- ☐ Howard's will not move computers, copiers, telephones, or wall panels.
- ☐ Howard's is NOT responsible for any damage wiring layed under flooring, such as: security, telephones, cable or stereo.
- ☐ Owner or general contractor to provide lighting and heat to facilitate installation.
- ☐ Estimate excludes attic stock or extra stock of a material if specified.
- ☐ Estimate assumes installation is to be done during normal working hours, excludes nights and weekends.
- ☐ Light colored (white, beige, cream, etc.) rubber or vinyl base not recommended and often shows seams and irregularity in walls.
- ☐ Rubber and vinyl base is not recommended to be installed over vinyl or epoxy wall coverings or epoxy paint.

CONTRACTOR'S LICENSE # 583433

I appreciate your consideration and will look forward to hearing from you.

Respectfully submitted. _____ ***Scott Wening***

The above quotation is made subject to these conditions. The buyer acknowledges that he has read and unconditionally accepted the said conditions.

LEGAL NAME OF PURCHASER **TITLE** _____

(SIGNATURE) _____ PURCHASED ORDER NUMBER _____

HOWARD'S RUG CO.

OF VENTURA INC.

701 Del Norte Blvd. Ste. 225, Oxnard, CA, 93030
Phone (805) 278-4446 Fax (805) 278-4448

PROPOSAL

DATE: 06/21/17
P.O. #:
PAGE OF: 1 of 1
PROJECT: Classroom C (Room 12)
ATTN: Irene Ramirez

TO: Mesa Union School District
3901 North Mesa School Road
Somis, CA 93066

PHONE: 805-485-1411

DESCRIPTION	TOTAL
FURNISH AND INSTALL	
1. Shaw *Swizzle* carpet tile, color TBD, in classroom C.	**$ 4,781.00**
OR	**OR**
2. Shaw *Zing* carpet tile, color TBD, in classroom C.	**$ 4,781.00**
OR	**OR**
3. Shaw *Hook Up* carpet tile, color TBD, in classroom C.	**$ 4,141.00**
OR	**OR**
4. Mohawk *Faculty III* carpet tile, color TBD, in classroom C.	**$ 6,454.00**
OR	**OR**
5. Mohawk *New Basics III* carpet tile, color TBD, in classroom C.	**$ 4,917.00**
All options listed above include Burke 4" Rubbermyte base, color TBD.	
Notes: Normal floor prep included. No dings or gouges over 1/8". Area to be swept clean and clear of all trades and equipment before work begins. Demo is included in proposal.	
Prevailing Wage	
Total (Tax Included)	
TERMS: NET DUE UPON COMPLETION.	
PLEASE SIGN AND RETURN ORIGINAL COPY.	

NOTE: NO MATERIALS CAN BE ORDERED UNTIL WE RECEIVE OUR SIGNED PROPOSAL/CONTRACT OR A CONTRACT FROM YOU.

CONTINGENCIES:

- ☐ Estimate subject to review after **30 DAYS**_____
- ☐ Estimate assumes job is swept clean of debris and ready for installation.
- ☐ Estimate subject to mutually acceptable payment schedule.
- ☐ Estimate does not include floor preparation.
- ☐ Estimate includes minor floor preparation.
- ☐ Estimate assumes there will not be a conflict of trades at job site on day of installation.
- ☐ Bid subject to on-site measurement.
- ☐ Estimate excludes responsibility for problems caused by slab moisture.
- ☐ Estimate excludes: (waxing, buffing, protection of floor covering)
- ☐ Howard's will not move computers, copiers, telephones, or wall panels.
- ☐ Howard's is NOT responsible for any damage wiring layed under flooring, such as: security, telephones, cable or stereo.
- ☐ Owner or general contractor to provide lighting and heat to facilitate installation.
- ☐ Estimate excludes attic stock or extra stock of a material if specified.
- ☐ Estimate assumes installation is to be done during normal working hours, excludes nights and weekends.
- ☐ Light colored (white, beige, cream, etc.) rubber or vinyl base not recommended and often shows seams and irregularity in walls.
- ☐ Rubber and vinyl base is not recommended to be installed over vinyl or epoxy wall coverings or epoxy paint.

CONTRACTOR'S LICENSE # 583433

I appreciate your consideration and will look forward to hearing from you.

Respectfully submitted. _____ ***Scott Wening***

The above quotation is made subject to these conditions. The buyer acknowledges that he has read and unconditionally accepted the said conditions.

LEGAL NAME OF PURCHASER **TITLE** _____

(SIGNATURE) _____ PURCHASED ORDER NUMBER _____

HOWARD'S RUG CO.

OF VENTURA INC.
701 Del Norte Blvd. Ste. 225, Oxnard, CA, 93030
Phone (805) 278-4446 Fax (805) 278-4448

PROPOSAL

TO: Mesa Union School District
3901 North Mesa School Road
Somis, CA 93066

PHONE: 805-485-1411

DATE: 06/21/17
P.O. #:
PAGE OF: 1 of 1
PROJECT: Classroom D
(Room 18 - portable room)
ATTN: Irene Ramirez

DESCRIPTION	TOTAL
FURNISH AND INSTALL	
1. Shaw *Swizzle* carpet tile, color TBD, in classroom D.	**$ 4,634.00**
OR	**OR**
2. Shaw *Zing* carpet tile, color TBD, in classroom D.	**$ 4,634.00**
OR	**OR**
3. Shaw *Hook Up* carpet tile, color TBD, in classroom D.	**$ 4,017.00**
OR	**OR**
4. Mohawk *Faculty III* carpet tile, color TBD, in classroom D.	**$ 6,248.00**
OR	**OR**
5. Mohawk *New Basics III* carpet tile, color TBD, in classroom D.	**$ 4,765.00**
All options listed above include Burke 4" Rubbermyte base, color TBD.	
Notes: Normal floor prep included. No dings or gouges over 1/8". Area to be swept clean and clear of all trades and equipment before work begins. Demo is included in proposal.	
Prevailing Wage	
Total (Tax Included)	
TERMS: NET DUE UPON COMPLETION.	
PLEASE SIGN AND RETURN ORIGINAL COPY.	

NOTE: NO MATERIALS CAN BE ORDERED UNTIL WE RECEIVE OUR SIGNED PROPOSAL/CONTRACT OR A CONTRACT FROM YOU.

CONTINGENCIES:

- ☐ Estimate subject to review after **30 DAYS**_____
- ☐ Estimate assumes job is swept clean of debris and ready for installation.
- ☐ Estimate subject to mutually acceptable payment schedule.
- ☐ Estimate does not include floor preparation.
- ☐ Estimate includes minor floor preparation.
- ☐ Estimate assumes there will not be a conflict of trades at job site on day of installation.
- ☐ Bid subject to on-site measurement.
- ☐ Estimate excludes responsibility for problems caused by slab moisture.
- ☐ Estimate excludes: (waxing, buffing, protection of floor covering)
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CONTRACTOR'S LICENSE # 583433

I appreciate your consideration and will look forward to hearing from you.

Respectfully submitted. _____ ***Scott Wening***

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LEGAL NAME OF PURCHASER **TITLE** _____

(SIGNATURE) _____ PURCHASED ORDER NUMBER _____