

**TRANQUILITY VERTICAL  
STACK (TRW) SERIES  
SUBMITTAL DATA**

**MODELS TRW09 - 36  
60HZ - HFC-410A**

**ENGLISH LANGUAGE/I-P UNITS**



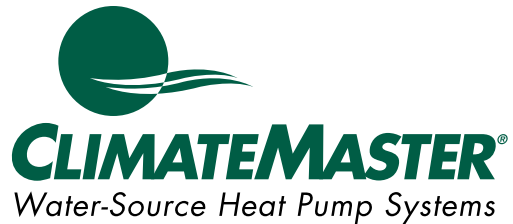
**Created: 05 Oct., 2010**

ClimateMaster works continually to improve its products. As a result, the design and specifications of each product at the time of order may be changed without notice and may not be as described herein. Please contact ClimateMaster's Customer Service Department at 1-405-745-6000 for specific information on the current design and specifications. Statements and other information contained herein are not express warranties and do not form the basis of any bargain between the parties, but are merely ClimateMaster's opinion or commendation of its products. The latest version of this document is available at [climatemaster.com](http://climatemaster.com).



LC973

Created: 05 Oct., 2010



***SUBMITTAL DATA - I-P UNITS***

Unit Designation: \_\_\_\_\_

Job Name: \_\_\_\_\_

Architect: \_\_\_\_\_

Engineer: \_\_\_\_\_

Contractor: \_\_\_\_\_

***PERFORMANCE DATA***

Cooling Capacity: \_\_\_\_\_ Btuh

EER: \_\_\_\_\_

Heating Capacity: \_\_\_\_\_ Btuh

COP: \_\_\_\_\_

Ambient Air Temp: \_\_\_\_\_ °F

Entering Water Temp (Clg): \_\_\_\_\_ °F

Entering Air Temp (Clg): \_\_\_\_\_ °F

Entering Water Temp (Htg): \_\_\_\_\_ °F

Entering Air Temp (Htg): \_\_\_\_\_ °F

Airflow: \_\_\_\_\_ CFM

Fan Speed or Motor/RPM/Turns: \_\_\_\_\_

Operating Weight: \_\_\_\_\_ (lb)

***ELECTRICAL DATA***

Power Supply: \_\_\_\_\_ Volts \_\_\_\_\_ Phase \_\_\_\_\_ Hz

Minimum Circuit Ampacity: \_\_\_\_\_

Maximum Overcurrent Protection: \_\_\_\_\_

# TRANQUILITY VERTICAL STACK (TRW) SERIES SUBMITTAL DATA

MODELS TRW09 - 36  
60HZ - HFC-410A

ENGLISH LANGUAGE/S-I UNITS



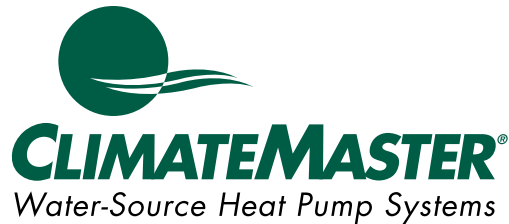
Created: 05 Oct., 2010

ClimateMaster works continually to improve its products. As a result, the design and specifications of each product at the time of order may be changed without notice and may not be as described herein. Please contact ClimateMaster's Customer Service Department at 1-405-745-6000 for specific information on the current design and specifications. Statements and other information contained herein are not express warranties and do not form the basis of any bargain between the parties, but are merely ClimateMaster's opinion or commendation of its products. The latest version of this document is available at [climatemaster.com](http://climatemaster.com).



LC973

Created: 05 Oct., 2010



## SUBMITTAL DATA - S-I UNITS

Unit Designation: \_\_\_\_\_

Job Name: \_\_\_\_\_

Architect: \_\_\_\_\_

Engineer: \_\_\_\_\_

Contractor: \_\_\_\_\_

## PERFORMANCE DATA

Cooling Capacity: \_\_\_\_\_ kW

EER: \_\_\_\_\_

Heating Capacity: \_\_\_\_\_ kW

COP: \_\_\_\_\_

Ambient Air Temp: \_\_\_\_\_ °C

Entering Water Temp (Clg): \_\_\_\_\_ °C

Entering Air Temp (Clg): \_\_\_\_\_ °C

Entering Water Temp (Htg): \_\_\_\_\_ °C

Entering Air Temp (Htg): \_\_\_\_\_ °C

Airflow: \_\_\_\_\_ l/s

Fan Speed or Motor/RPM/Turns: \_\_\_\_\_

Operating Weight: \_\_\_\_\_ (kg)

## ELECTRICAL DATA

Power Supply: \_\_\_\_\_ Volts \_\_\_\_\_ Phase \_\_\_\_\_ Hz

Minimum Circuit Ampacity: \_\_\_\_\_

Maximum Overcurrent Protection: \_\_\_\_\_

## Table of Contents

	*Page Number
Unit Features	4
Selection Procedure	5
TRW Series Nomenclature	7
Cooling Performance Data - AHRI/ASHRAE/ISO 13256-1	10
Cooling Performance Data - TRW09-TRW036	11
Cooling Performance Data Correction Tables	17
Hydronic Heating Performance Data	18
Blower Performance Data	19
Physical Data	20
Electrical Data	21
Wiring Diagram Matrix	22
Typical Wiring Diagram Single Phase TRW Units With DXM Controller	23
Typical Wiring Diagram TRW with ECM-X Motor	24
Typical Unit - Exploded View Single Unit: Furred In & Ducted	25
AHH Series Stainless Steel Braided Hose Kit	26
Hinged "G" Style Return Air Panel - AVHSG Series	27
"G" Style Return Air Panel with Cabinet Flush Mounted	28
"G" Style Return Air Panel with Cabinet Recessed Frame Kit Required	29
AVHSH Series "H" Style Return Air Panel	30
"H" Style Return Air Panel	31
TRW Unit Dimensions - Single Unit, Furred In Cabinet (88 in. [2235mm] Height) with Risers	32
TRW Unit Dimensions Master Unit, Furred In Cabinet (88 in. [2235mm] Height)	33
TRW Unit Dimensions Slave Unit, Furred In Cabinet (88 in. [2235mm] Height), No Risers	34
TRW Master-Slave	35
TRW Electrical Options	35
TRW Cabinet Configurations	36
Air Flow vs. Grille Selection	37
Riser Definitions	38
Riser Arrangements - Top Floor Units	40
Riser Arrangements- Bottom Floor Units	41
Riser Extension Sizing	42
Riser Length Sizing	43
Cabinet Height & Slab Slot Size	44
Slab Slot Chart - 3 Pipe	45
Riser GPM Sizing	46
Riser Diameter Sizing	47
Riser Slot Arrangements	48
Shipping	49
TRW Series Engineering Specifications	50
Revision History	58

\*Document page number is shown next to part number (e.g. LC973 - 3 = page 3). Since not all pages are typically used in the submittals process, the page number in the lower right corner can still be used (page \_\_\_\_ of \_\_\_\_).

## TRANQUILITY VERTICAL STACK (TRW) SERIES WITH EARTHPURE® REFRIGERANT

The Tranquility Vertical Stack (TRW) Series offers an innovative, labor-saving solution for spaces where individual, quiet control of the heating and cooling system is important. TRW units' pre-piped risers and pre-wired cabinets are especially ideal for multi-story buildings. Cabinets can operate as stand-alone "ductless" systems, or can be ducted to an adjacent room, making them convenient for low-rise buildings as well. The TRW Series exceeds ASHRAE 90.1 efficiencies, yet maintains small cabinet dimensions. Using EarthPure® (HFC-410A) refrigerant, the TRW Series not only protects the environment, it does so while delivering unprecedented comfort, efficiency, and reliability.

For use on water loop systems (boiler-tower). The TRW Hybrid Series offers compressor cooling or hydronic heating. Any unit in building can be cooling or heating with loop temperatures up to 125°F (52°C). If all units are in heating, loop temperature can be up to 130°F (54°C). Loop controller is customer supplied.

Available in sizes 3/4 ton (2.6 kW) through 3 tons (10.6 kW) with numerous cabinet, water piping and control choices, the TRW Series offers a wide range of units for most any installation. Standard features are many. Microprocessor controls, TXV metering device, galvanized steel cabinet, torsion-flex blower motor mounting, and (optional) coated air coil are just some of the features of the innovative TRW Series.

ClimateMaster's exclusive double isolation compressor mounting system makes the TRW Series the quietest vertical stack units on the market. Compressors are mounted on specially engineered sound-tested EPDM grommets to a heavy gauge mounting plate, which is then isolated from the cabinet base with grommets for maximized vibration/sound attenuation. Options such as DDC controls allow customized design solutions.

The TRW Series vertical stack water-source heat pumps are designed to meet the challenges of today's HVAC demands with a low cost/high value solution.

## UNIT FEATURES

- Compressor cooling or hydronic heating
- Sizes 09 (3/4 ton, 2.6 kW) through 36 (3 ton, 10.6 kW)
- Environmentally-friendly EarthPure® (HFC-410A) zero ozone depletion refrigerant
- High efficiency rotary and scroll compressors
- Exceeds ASHRAE 90.1 efficiencies
- Removable chassis allows staged installation and ease of maintenance
- Galvanized steel cabinet
- Unique double isolation compressor mounting for quiet operation
- Water diverting valve is standard (Energized for Heating)
- UltraQuiet option
- TXV metering device
- Cabinet construction for unit or remote-mounted control
- Microprocessor controls standard (optional DXM and/or DDC controls)
- LonWorks, BACnet, Modbus and Johnson N2 compatibility options for DDC controls
- Unit Performance Sentinel performance monitoring system
- Integrated drain pan with condensate overflow sensor
- Attractive return air panel with hinged access door ("G" panel)
- Multiple supply air discharge options
- Full port shut-off valves with memory stop, for supply and return, located opposite return air panel inside cabinet
- Stainless steel braided hose kits for connection from piping risers to chassis
- Eight Safeties Standard
- Wide variety of cabinet options including disconnect switch, breaker, stand, thermostat whip with molex connector, isolation pad, air vent, stainless steel drain pan, riser chase, ECM-X motor
- Wide variety of chassis options including stainless steel drain pan, coated air coil, insulated tubing, and cupro-nickel coaxial heat exchanger
- Selection of thermostats including manual changeover, automatic changeover, or programmable are available

### Reference Calculations

Heating	Cooling
$TC = \Delta T \text{ (of water)} \times GPM \times 500$ $TC = \Delta T \text{ (air)} \times CFM \times 1.08$	$LWT = EWT + \frac{HR}{GPM \times 500}$ $LAT \text{ (DB)} = EAT \text{ (DB)} - \frac{SC}{CFM \times 1.08}$ $LC = TC - SC$ $S/T = \frac{SC}{TC}$

### Legend and Glossary of Abbreviations

BTUH = BTU( British Thermal Unit) per hour	HWC = hot water generator (desuperheater) capacity, Mbtuh
CFM = airflow, cubic feet/minute	FPT = female pipe thread
COP = coefficient of performance = BTUH output/BTUH input	KW = total power unit input, kilowatts
DB = dry bulb temperature (°F)	LAT = leaving air temperature, °F
EAT = entering air temperature, Fahrenheit (dry bulb/wet bulb)	LC = latent cooling capacity, BTUH
EER = energy efficiency ratio = BTUH output/Watt input	LWT = leaving water temperature, °F
MPT = male pipe thread	MBTUH = 1000 BTU per hour
ESP = external static pressure (inches w.g.)	S/T = sensible to total cooling ratio
EWT = entering water temperature	SC = sensible cooling capacity, BTUH
GPM = water flow in U.S. gallons/minute	TC = total cooling capacity, BTUH
HE = total heat of extraction, BTUH	WB = wet bulb temperature (°F)
HC = air heating capacity, BTUH	WPD = waterside pressure drop (psi & ft. of hd.)
HR = total heat of rejection, BTUH	

### Conversion Table - to convert inch-pound (English) to S-I (Metric)

Air Flow	Water Flow	Ext Static Pressure	Water Pressure Drop
Airflow (L/s) = CFM x 0.472	Water Flow (L/s) = gpm x 0.0631	ESP (Pa) = ESP (in of wg) x 249	PD (kPa) = PD (ft of hd) x 2.99

## Selection Procedure

- Step 1 Determine the actual cooling loads at the desired dry bulb and wet bulb conditions.
- Step 2 Obtain the following design parameters: Entering water temperature, water flow rate in GPM, air flow in CFM, water flow pressure drop and design wet and dry bulb temperatures. Air flow CFM should be between 300 and 450 CFM per ton. Unit water pressure drop should be kept as close as possible to each other to make water balancing easier. Go to the appropriate tables and find the proper indicated water flow and water temperature.
- Step 3 Select a unit based on total and sensible cooling conditions. Select a unit which is closest to, but no larger than, the actual cooling load.
- Step 4 Enter tables at the design water flow and water temperature. Read the total and sensible cooling capacities (Note: interpolation is permissible, extrapolation is not).
- Step 5 Determine the correction factors associated with the variable factors of dry bulb and wet bulb.
- Corrected Total Cooling = tabulated total cooling x wet bulb correction.
- Corrected Sensible Cooling = tabulated sensible cooling x wet/dry bulb correction.
- Step 6 Compare the corrected capacities to the load requirements. Normally if the capacities are within 10% of the loads, the equipment is acceptable. It is better to undersize than oversize, as undersizing improves humidity control, reduces sound levels and extends the life of the equipment.
- Step 7 When completed, calculate water temperature rise and assess the selection. If the units selected are not within 10% of the load calculations, then review what effect changing the GPM, water temperature and/or air flow and air temperature would have on the corrected capacities. If the desired capacity cannot be achieved, select the next larger or smaller unit and repeat the procedure. Remember, when in doubt, undersize slightly for best performance.
- Step 8 Determine the heating load. Flow regulator (GPM), loop temperature, and CFM determine heating capacity.

## Example Equipment Selection For Cooling

### Step 1 Load Determination:

Assume we have determined that the appropriate cooling load at the desired dry bulb 80°F and wet bulb 65°F conditions is as follows

Total Cooling.....15,100 BTUH  
Sensible Cooling.....10,500 BTUH  
Entering Air Temp.....80°F Dry Bulb / 65°F Wet Bulb

### Step 2 Design Conditions:

Similarly, we have also obtained the following design parameters:

Entering Water Temp.....90°F  
Water Flow (Based upon 10°F rise in temp.).....4.5 GPM  
Air Flow.....515 CFM

### Step 3, 4 HP Selection:

After making our preliminary selection (TRW18), we enter the tables at design water flow and water temperature and read Total Cooling, Sens. Cooling and Heat of Rej. capacities:

Total Cooling.....16,800 BTUH  
Sensible Cooling.....12,500 BTUH  
Heat of Rejection.....21,300 BTUH

### Step 5 & 6 Entering Air and Airflow Corrections:

Next, we determine our correction factors.

Table	Ent Air	Air Flow	Corrected
Corrected Total Cooling = 16,800	x 0.957	x 0.934	= 15,016
Corrected Sens Cooling = 12,500	x 1.093	x 0.833	= 11,381
Corrected Heat of Reject = 21,300	x 0.970	x 0.952	= 19,669

### Step 7 Water Temperature Rise Calculation & Assessment:

Actual Temperature Rise.....8.9°F

When we compare the Corrected Total Cooling and Corrected Sensible Cooling figures with our load requirements stated in Step 1, we discover that our selection is within +/- 10% of our sensible load requirement. Furthermore, we see that our Corrected Total Cooling figure is slightly undersized as recommended, when compared to the actual indicated load.

Step 8 Use heating capacity table, look up model selected above.

## TRW Series Nomenclature

## Cabinet

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

0 9 K G O N A A 1 A O O O O A

**UNIT SIZE**  
(TRW)  
SIZE / HFC-410A  
09  
12  
15  
18  
24  
30  
36

**CABINET STYLE**  
(TRW)  
HFC-410A  
G = STANDARD  
H = MASTER  
J = SLAVE  
K = STANDARD  
L = MASTER  
M = SLAVE  
625 Flange  
"H" PANEL  
1,250 Flange  
"G" PANEL

**VOLTAGE**  
OPTION Voltage/Phase  
G 208-230/50/1  
E 265/60/1

**OPTIONS**

OPTION	S.S. DRAIN PAN	MANUAL AIR VENT	RISER CHASE
D	X	X	-
M	-	X	-
1	X	-	X
4	X	X	X
7	-	X	X
O	NO OPTIONS		

**CONTROLS**

OPTION	DXM	SURFACE/ REMOTE/ WALL SENSOR	X-MOTOR	MPC/ LOW
D	X	W	-	M
M	X	W	-	L
R	X	R	-	-
S	X	S	-	-
1	X	R	X	-
2	X	S	X	-
5	X	W	X	M
7	X	W	X	L
O	NO OPTION			

**POWER TERMINATION**

OPTION	DISCONNECT SWITCH	BREAKER	2 SPD FAN SW
A	X	-	-
C	-	X	-
D	X	-	-
E	-	X	-
F	-	-	-
G	X	-	X
H	-	X	X
J	-	-	X
O	NO OPTIONS		

**REVISION LEVEL**  
A = CURRENT HFC-410A UNITS

**STANDARD**  
O = STANDARD  
A, B, C etc... = SPECIAL 1, 2, 3 etc...

**SUPPLY AIR OPENING SIZES**  
A = 10"W x 6"H G = 14"W x 6"H  
B = 10"W x 8"H H = 14"W x 8"H  
C = 10"W x 10"H M = 16"W x 6"H  
D = 12"W x 10"H P = 16"W x 10"H  
E = 12"W x 12"H Q = 16"W x 12"H  
F = 12"W x 6"H R = 16"W x 14"H  
O = NO OPENINGS

**TOP DISCHARGE OPENINGS BY UNIT SIZE**

UNIT SIZE	OPENING
TRW-09 & 12	10" x 10"
TRW-15 & 18	13" x 13"
TRW-24, 30 & 36	17" x 17"

**RETURN & SUPPLY AIR**

**SINGLE SUPPLY**

QUANTITY OF AIR FLOW SUPPLIES	RETURN AIR POSITION	DIGIT 9 & 10	SUPPLY AIR POSITION			
			FRONT	RIGHT	LEFT	TOP
SINGLE SUPPLY	FRONT	1A	-	X	-	-
	FRONT	1B	-	X	-	-
	FRONT	1C	-	-	X	-
	FRONT	1D	-	-	-	X
	RIGHT	1E	X	-	-	-
	RIGHT	1F	-	X	-	-
	RIGHT	1G	-	-	X	-
	RIGHT	1H	-	-	-	X
	LEFT	1J	X	-	-	-
	LEFT	1K	-	X	-	-
	LEFT	1L	-	-	X	-
	LEFT	1M	-	-	-	X

**DOUBLE SUPPLY**

QUANTITY OF AIR FLOW SUPPLIES	RETURN AIR POSITION	DIGIT 9 & 10	SUPPLY AIR POSITION			
			FRONT	RIGHT	LEFT	TOP
DOUBLE SUPPLY	FRONT	2A	X	X	-	-
	FRONT	2B	X	-	X	-
	FRONT	2C	X	-	-	X
	FRONT	2D	-	X	X	-
	FRONT	2E	-	X	-	X
	FRONT	2F	-	-	X	X
	RIGHT	2G	X	X	-	-
	RIGHT	2H	X	-	X	-
	RIGHT	2J	X	-	-	X
	RIGHT	2K	-	X	X	-
	RIGHT	2L	-	X	-	X
	RIGHT	2M	-	-	X	X

**QUANTITY OF AIR FLOW SUPPLIES**

QUANTITY OF AIR FLOW SUPPLIES	RETURN AIR POSITION	DIGIT 9 & 10	SUPPLY AIR POSITION			
			FRONT	RIGHT	LEFT	TOP
QUAD SUPPLY	FRONT	4A	X	X	X	X
	RIGHT	4B	X	X	X	X
	LEFT	4C	X	X	X	X
	LEFT	4D	X	X	X	X
NO SUPPLY (Zero)	FRONT	0A	-	-	-	-
	RIGHT	0B	-	-	-	-
	LEFT	0C	-	-	-	-
	LEFT	0D	-	-	-	-

**CABINET HEIGHT**

OPTION	80"	88"	9' CABINET STAND	ISO PAD
A	-	X	-	-
B	X	-	-	-
C	-	X	X	-
D	X	-	X	-
E	-	X	-	X
F	X	-	-	X
G	-	X	X	X
H	X	-	X	X

**BACK**

S U P P L Y D R A I N R E T U R N

LEFT RIGHT

**FRONT**

TRW SERIES 60HZ - HFC-410A SUBMITTAL DATA ENG/I-P

TRW Series Nomenclature

Chassis

123456789101112

TRW09GSSSCSA

Series

TRW = Tranquility Hybrid High Rise Chassis

Unit Size

09, 12, 15, 18, 24, 30, 36

Voltage

G = 208-230/60/1  
E = 265/60/1

Options

OPTION	S.S. Drain Pan	MUTE	AST008 RAS	AST009 RAS
A	X	-	-	-
B	-	-	-	X
C	X	-	-	X
D	-	-	X	-
E	X	-	X	-
1	-	X	-	-
2	X	X	-	-
3	-	X	-	X
4	X	X	-	X
5	-	X	X	-
6	X	X	X	-
S	-	-	-	-

Revision Level

A = 24, 30, 36  
B = 09, 12, 15, 18

Standard

S = Standard

Heat Exchanger Options

	Non Coated Air Coil		Coated Air Coil	
	Copper	Cupro-Nickel	Copper	Cupro-Nickel
Standard	L	M	C	N

Water Valve & Pump Option

S = Water Valve, 3 way diverting

Auto Flow Regulator

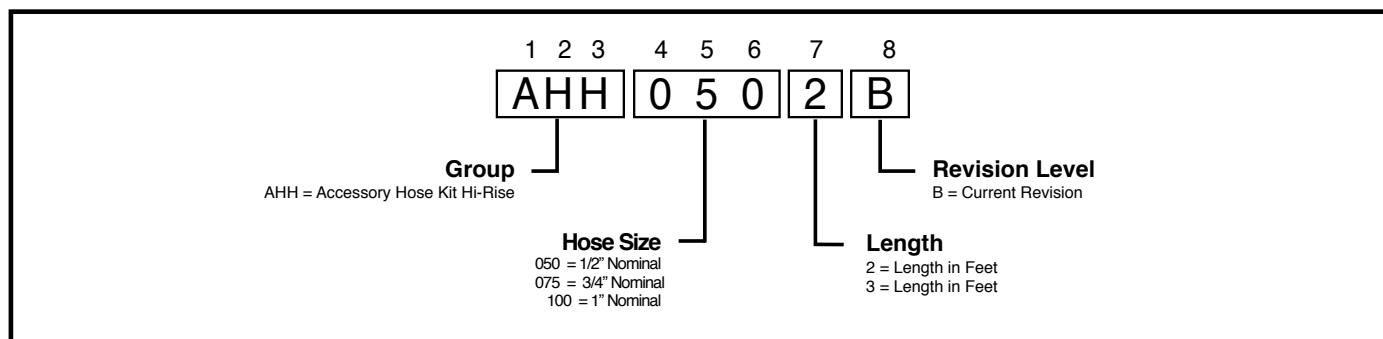
	5/8 SWEAT		7/8 SWEAT			
	UNIT 09	UNIT 12	UNIT 15 & 18	UNIT 24	UNIT 30	UNIT 36
D	2.0					
E	2.5	2.5				
F	3.0	3.0				
G	3.5	3.5	3.5			
H		4.0	4.0			
J			5.0	5.0	5.0	5.0
K			6.0	6.0	6.0	6.0
L				7.0	7.0	7.0
M				8.0	8.0	8.0

S = STANDARD - NO FLOW REGULATOR

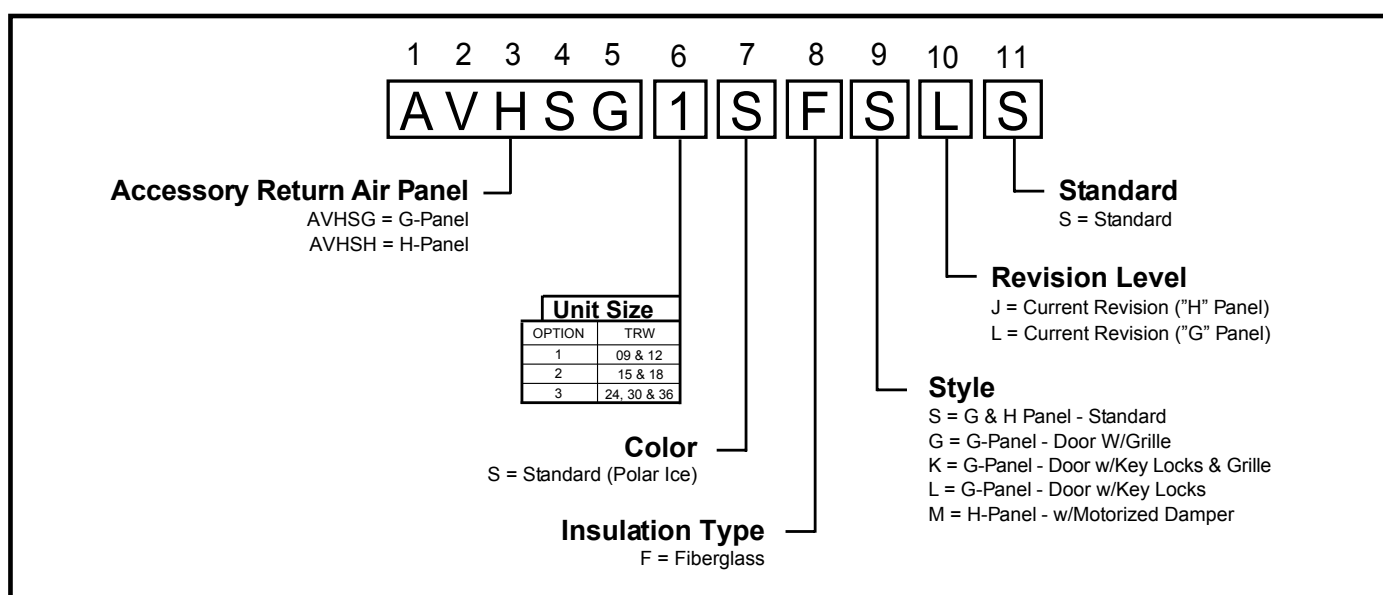


## TRW Series Nomenclature

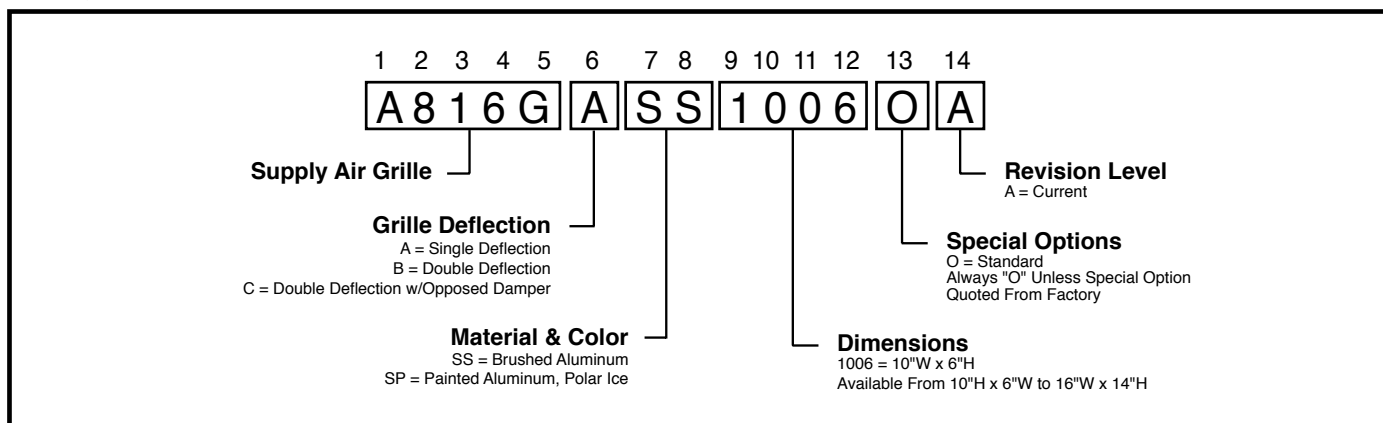
## Hose Kit



## Return Air Panel



## Supply Air Grille



# TRW SERIES 60HZ - HFC-410A SUBMITTAL DATA ENG/I-P

## Performance Data AHRI/ASHRAE/ISO 13256-1

### ASHRAE/AHRI/ISO 13256-1. English (I-P) Units

Model	Cooling Capacity	
	Cooling 86°F	
	Capacity Btuh	EER Btuh/W
TRW09	8,800	13.0
TRW12	11,600	13.0
TRW15	13,800	13.0
TRW18	16,700	13.0
TRW24	22,100	13.0
TRW30	27,100	13.0
TRW36	32,000	12.5

Cooling capacities based upon 80.6°F DB, 66.2°F WB entering air temperature, on high speed motor TAP.

All ratings based upon operation at lower voltage of dual voltage rated models

### ASHRAE/AHRI/ISO 13256-1. Metric (S-I) Units

Model	Cooling Capacity	
	Cooling 30°C	
	Capacity kW	EER W/W
TRW09	2.58	3.8
TRW12	3.40	3.8
TRW15	4.05	3.8
TRW18	4.89	3.8
TRW24	6.48	3.8
TRW30	7.94	3.8
TRW36	9.38	3.7

Cooling capacities based upon 27°C DB, 19°C WB entering air temperature, on high speed motor TAP.

All ratings based upon operation at lower voltage of dual voltage rated models.

## Performance Data TRW09

325 CFM (Rated) Airflow

Performance capacities shown in thousands of Btuh

COOLING - EAT 80/67 °F									
EWT °F	GPM	WPD		TC	SC	Sens/Tot Ratio	kW	HR	EER
		PSI	FT						
70	2.00	1.3	2.9	10.051	7.015	0.70	0.60	12.063	16.8
	2.50	3.5	8.0	10.248	7.071	0.69	0.57	12.168	17.9
	3.00	4.9	11.2	10.310	7.087	0.69	0.56	12.200	18.3
80	2.00	1.7	3.8	9.485	6.831	0.72	0.67	11.740	14.2
	2.50	3.4	7.8	9.723	6.914	0.71	0.64	11.880	15.2
	3.00	4.8	11.0	9.800	6.939	0.71	0.63	11.924	15.6
90	2.00	1.6	3.8	8.795	6.559	0.75	0.74	11.313	11.9
	2.50	3.3	7.7	9.073	6.676	0.74	0.71	11.489	12.7
	3.00	4.7	10.8	9.163	6.712	0.73	0.70	11.545	13.0
100	2.00	1.6	3.7	7.973	6.176	0.77	0.82	10.771	9.7
	2.50	3.3	7.6	8.287	6.331	0.76	0.79	10.982	10.5
	3.00	4.7	10.7	8.390	6.380	0.76	0.78	11.051	10.7
110	2.00	1.6	3.7	7.015	5.656	0.81	0.90	10.104	7.8
	2.50	3.3	7.6	7.357	5.851	0.80	0.88	10.346	8.4
	3.00	4.6	10.7	7.471	5.915	0.79	0.87	10.426	8.6
120	2.00	1.6	3.7	5.917	4.973	0.84	0.99	9.305	6.0
	2.50	3.3	7.6	6.277	5.208	0.83	0.96	9.571	6.5
	3.00	4.6	10.7	6.399	5.285	0.83	0.95	9.660	6.7

Interpolation is permissible; extrapolation is not.

All entering air conditions are 80°F DB and 67°F WB in cooling.

Table does not reflect fan or pump power corrections for AHRI/ISO conditions.

All performance is based upon the lower voltage of dual voltage rated units.

Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.

See performance correction tables for operating conditions other than those listed above.

ClimateMaster works continually to improve its products. As a result, the design and specifications of each product at the time of order may be changed without notice and may not be as described herein. Please contact ClimateMaster's Customer Service Department at 1-405-745-6000 for specific information on the current design and specifications. Statements and other information contained herein are not express warranties and do not form the basis of any bargain between the parties, but are merely ClimateMaster's opinion or commendation of its products. The latest version of this document is available at [climatemaster.com](http://climatemaster.com).

# TRW SERIES 60HZ - HFC-410A SUBMITTAL DATA ENG/I-P

## Performance Data TRW12

350 CFM (Rated) Airflow

Performance capacities shown in thousands of Btu/h

COOLING - EAT 80/67 °F									
EWT °F	GPM	WPD		TC	SC	S/T	KW	HR	EER
		PSI	FT						
70	2.50	3.3	7.6	15.579	6.585	0.42	0.58	17.519	26.7
	3.00	5.7	13.2	12.907	7.845	0.61	0.71	15.299	18.1
	3.50	8.4	19.4	13.227	7.810	0.59	0.69	15.556	19.1
80	2.50	3.2	7.4	13.478	7.758	0.58	0.68	15.760	19.8
	3.00	5.5	12.7	11.636	7.592	0.65	0.79	14.317	14.7
	3.50	8.2	18.9	11.846	7.682	0.65	0.78	14.474	15.2
90	2.50	3.2	7.4	11.349	7.434	0.66	0.82	14.108	13.9
	3.00	5.5	12.7	10.700	6.942	0.65	0.87	13.653	12.3
	3.50	8.2	18.9	10.856	7.075	0.65	0.86	13.760	12.7
100	2.50	3.2	7.4	10.971	7.168	0.65	0.85	13.840	13.0
	3.00	5.4	12.5	9.854	6.190	0.63	0.95	13.072	10.4
	3.50	7.9	18.2	10.006	6.318	0.63	0.93	13.178	10.7
110	2.50	3.1	7.2	10.114	6.413	0.63	0.92	13.252	11.0
	3.00	5.2	12.0	8.834	5.516	0.62	1.02	12.325	8.6
	3.50	7.7	17.8	9.023	5.618	0.62	1.01	12.468	8.9
120	2.50	3.1	7.2	9.155	5.694	0.62	1.00	12.567	9.1
	3.00	5.1	11.8	7.410	4.948	0.67	1.11	11.194	6.7
	3.50	7.6	17.6	7.657	5.033	0.66	1.09	11.395	7.0

Interpolation is permissible; extrapolation is not.

All entering air conditions are 80°F DB and 67°F WB in cooling.

Table does not reflect fan or pump power corrections for AHRI/ISO conditions.

All performance is based upon the lower voltage of dual voltage rated units.

Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.

See performance correction tables for operating conditions other than those listed above.

# TRW SERIES 60HZ - HFC-410A SUBMITTAL DATA ENG/I-P

## Performance Data TRW15

550 CFM (Rated) Airflow

Performance capacities shown in thousands of Btuh

COOLING - EAT 80/67 °F									
EWT °F	GPM	WPD		TC	SC	S/T	KW	HR	EER
		PSI	FT						
70	3.50	1.5	3.5	16.600	11.824	0.71	0.90	19.626	18.4
	4.50	3.3	7.6	16.843	12.024	0.71	0.88	19.785	19.2
	5.50	5.1	11.8	17.013	12.137	0.71	0.86	19.899	19.8
80	3.50	1.5	3.5	15.773	10.825	0.69	1.00	19.134	15.8
	4.50	3.3	7.6	15.960	11.082	0.69	0.97	19.241	16.4
	5.50	5.1	11.8	16.083	11.244	0.69	0.96	19.311	16.8
90	3.50	1.4	3.2	14.945	9.802	0.66	1.10	18.653	13.6
	4.50	3.0	6.9	15.158	10.027	0.66	1.07	18.782	14.1
	5.50	4.7	10.9	15.287	10.179	0.67	1.06	18.858	14.5
100	3.50	1.4	3.2	13.791	9.057	0.66	1.21	17.884	11.4
	4.50	3.0	6.9	14.097	9.192	0.65	1.18	18.098	12.0
	5.50	4.6	10.6	14.280	9.291	0.65	1.16	18.223	12.3
110	3.50	1.3	3.0	12.040	8.658	0.72	1.33	16.576	9.0
	4.50	2.8	6.5	12.472	8.725	0.70	1.30	16.908	9.6
	5.50	4.4	10.2	12.737	8.771	0.69	1.28	17.109	9.9
120	3.50	1.3	3.0	9.501	8.215	0.86	1.48	14.553	6.4
	4.50	2.7	6.2	10.045	8.339	0.83	1.45	14.994	6.9
	5.50	4.3	9.9	10.390	8.407	0.81	1.43	15.272	7.3

Interpolation is permissible; extrapolation is not.  
 All entering air conditions are 80°F DB and 67°F WB in cooling.  
 Table does not reflect fan or pump power corrections for AHRI/ISO conditions.  
 All performance is based upon the lower voltage of dual voltage rated units.  
 Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.  
 See performance correction tables for operating conditions other than those listed above.

# TRW SERIES 60HZ - HFC-410A SUBMITTAL DATA ENG/I-P

## Performance Data TRW18

600 CFM (Rated) Airflow

Performance capacities shown in thousands of Btuh

COOLING - EAT 80/67 °F									
EWT °F	GPM	WPD		TC	SC	S/T	KW	HR	EER
		PSI	FT						
70	3.50	2.6	6.0	17.935	10.422	0.58	1.15	21.832	15.5
	4.00	3.3	7.6	18.093	10.292	0.57	1.14	21.925	15.9
	5.50	5.8	13.4	18.369	10.108	0.55	1.10	22.070	16.7
80	3.50	2.5	5.8	16.731	11.427	0.68	1.26	21.009	13.2
	4.00	3.1	7.2	16.926	11.286	0.67	1.25	21.150	13.6
	5.50	5.6	12.9	17.292	10.989	0.64	1.22	21.409	14.2
90	3.50	2.4	5.5	15.372	11.889	0.77	1.36	19.992	11.3
	4.00	3.0	6.9	15.567	11.890	0.76	1.35	20.139	11.6
	5.50	5.7	13.2	15.948	11.821	0.74	1.32	20.426	12.1
100	3.50	2.4	5.5	14.064	11.027	0.78	1.46	19.025	9.7
	4.00	3.0	6.9	14.230	11.240	0.79	1.44	19.144	9.9
	5.50	5.6	12.9	14.565	11.564	0.79	1.42	19.389	10.3
110	3.50	2.3	5.3	13.017	8.340	0.64	1.57	18.358	8.3
	4.00	4.9	11.3	13.130	8.811	0.67	1.55	18.418	8.5
	5.50	5.6	12.9	13.370	9.611	0.72	1.52	18.560	8.8
120	3.50	2.3	5.3	12.487	3.126	0.25	1.70	18.288	7.4
	4.00	2.7	6.2	12.516	3.987	0.32	1.68	18.251	7.5
	5.50	5.5	12.7	12.606	5.452	0.43	1.64	18.222	7.7

Interpolation is permissible; extrapolation is not.

All entering air conditions are 80°F DB and 67°F WB in cooling.

Table does not reflect fan or pump power corrections for AHRI/ISO conditions.

All performance is based upon the lower voltage of dual voltage rated units.

Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.

See performance correction tables for operating conditions other than those listed above.

# TRW SERIES 60HZ - HFC-410A SUBMITTAL DATA ENG/I-P

## Performance Data TRW24

800 CFM (Rated) Airflow

Performance capacities shown in thousands of Btuh

COOLING - EAT 80/67 °F									
EWT °F	GPM	WPD		TC	SC	S/T	KW	HR	EER
		PSI	FT						
70	4.50	3.3	7.6	26.720	17.730	0.66	1.48	31.700	18.0
	6.00	5.5	12.7	27.198	18.140	0.67	1.43	32.003	19.0
	8.00	8.9	20.6	27.566	18.401	0.67	1.39	32.238	19.8
80	4.50	3.2	7.4	25.350	16.286	0.64	1.63	30.855	15.5
	6.00	5.3	12.2	25.822	16.810	0.65	1.58	31.141	16.4
	8.00	8.8	20.3	26.178	17.192	0.66	1.54	31.361	17.0
90	4.50	3.2	7.4	23.919	14.734	0.62	1.80	30.026	13.3
	6.00	5.2	12.0	24.406	15.241	0.62	1.74	30.301	14.0
	8.00	8.7	20.1	24.769	15.637	0.63	1.70	30.511	14.6
100	4.50	3.2	7.4	22.361	13.391	0.60	2.01	29.198	11.1
	6.00	5.2	12.0	22.883	13.787	0.60	1.94	29.467	11.8
	8.00	8.6	19.9	23.269	14.116	0.61	1.89	29.671	12.3
110	4.50	3.1	7.2	20.611	12.482	0.61	2.27	28.356	9.1
	6.00	5.0	11.6	21.185	12.712	0.60	2.18	28.623	9.7
	8.00	8.5	19.6	21.608	12.923	0.60	2.12	28.825	10.2
120	4.50	3.0	6.9	18.603	12.107	0.65	2.60	27.485	7.2
	6.00	4.9	11.3	19.246	12.165	0.63	2.49	27.754	7.7
	8.00	8.4	19.4	19.717	12.242	0.62	2.41	27.957	8.2

Interpolation is permissible; extrapolation is not.  
 All entering air conditions are 80°F DB and 67°F WB in cooling.  
 Table does not reflect fan or pump power corrections for AHRI/ISO conditions.  
 All performance is based upon the lower voltage of dual voltage rated units.  
 Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.  
 See performance correction tables for operating conditions other than those listed above.

# TRW SERIES 60HZ - HFC-410A SUBMITTAL DATA ENG/I-P

## Performance Data TRW30

1075 CFM (Rated) Airflow

Performance capacities shown in thousands of Btuh

COOLING - EAT 80/67 °F									
EWT °F	GPM	WPD		TC	SC	S/T	KW	HR	EER
		PSI	FT						
70	5.00	3.5	8.1	30.561	22.668	0.74	1.80	36.632	17.0
	6.50	5.7	13.2	31.146	22.990	0.74	1.74	37.014	17.8
	8.00	9.1	21.0	31.515	23.152	0.73	1.71	37.259	18.4
80	5.00	3.4	7.9	28.781	21.365	0.74	1.99	35.509	14.5
	6.50	5.5	12.7	29.372	21.835	0.74	1.93	35.875	15.2
	8.00	9.0	20.8	29.743	22.115	0.74	1.89	36.108	15.8
90	5.00	3.4	7.9	26.908	19.809	0.74	2.21	34.396	12.2
	6.50	5.4	12.5	27.513	20.311	0.74	2.14	34.748	12.9
	8.00	8.9	20.6	27.892	20.628	0.74	2.09	34.972	13.3
100	5.00	3.4	7.9	24.911	18.283	0.73	2.46	33.283	10.1
	6.50	5.4	12.5	25.538	18.734	0.73	2.38	33.625	10.7
	8.00	8.8	20.3	25.930	19.030	0.73	2.33	33.842	11.1
110	5.00	3.3	7.6	22.763	16.984	0.75	2.75	32.160	8.3
	6.50	5.3	12.2	23.417	17.337	0.74	2.66	32.494	8.8
	8.00	8.7	20.1	23.825	17.576	0.74	2.61	32.706	9.1
120	5.00	3.2	7.4	20.433	16.007	0.78	3.10	31.020	6.6
	6.50	5.2	12.0	21.119	16.253	0.77	2.99	31.348	7.1
	8.00	8.6	19.9	21.547	16.422	0.76	2.93	31.556	7.4

Interpolation is permissible; extrapolation is not.

All entering air conditions are 80°F DB and 67°F WB in cooling.

Table does not reflect fan or pump power corrections for AHRI/ISO conditions.

All performance is based upon the lower voltage of dual voltage rated units.

Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.

See performance correction tables for operating conditions other than those listed above.

# TRW SERIES 60HZ - HFC-410A SUBMITTAL DATA ENG/I-P

## Performance Data TRW36

1250 CFM (Rated) Airflow

Performance capacities shown in thousands of Btuh

COOLING - EAT 80/67 °F									
EWT °F	GPM	WPD		TC	SC	S/T	KW	HR	EER
		PSI	FT						
70	5.00	1.9	4.4	35.429	24.280	0.69	2.14	42.626	16.6
	6.50	2.8	6.5	36.163	24.782	0.69	2.05	43.076	17.6
	8.00	3.7	8.5	36.624	25.060	0.68	2.00	43.358	18.3
80	5.00	1.7	3.9	33.502	22.752	0.68	2.36	41.466	14.2
	6.50	2.6	6.0	34.250	23.368	0.68	2.27	41.910	15.1
	8.00	3.5	8.1	34.718	23.742	0.68	2.22	42.193	15.7
90	5.00	1.7	3.9	31.477	21.059	0.67	2.61	40.316	12.1
	6.50	2.4	5.5	32.242	21.693	0.67	2.51	40.740	12.9
	8.00	3.3	7.6	32.721	22.095	0.68	2.45	41.012	13.4
100	5.00	1.7	3.9	29.336	19.406	0.66	2.90	39.216	10.1
	6.50	2.5	5.8	30.124	19.988	0.66	2.79	39.605	10.8
	8.00	3.2	7.4	30.616	20.368	0.67	2.72	39.858	11.3
110	5.00	1.5	3.5	27.059	17.943	0.66	3.27	38.209	8.3
	6.50	2.3	5.2	27.876	18.429	0.66	3.13	38.550	8.9
	8.00	3.0	6.9	28.385	18.754	0.66	3.05	38.774	9.3
120	5.00	1.5	3.5	24.628	16.761	0.68	3.72	37.335	6.6
	6.50	2.4	5.5	25.481	17.132	0.67	3.55	37.617	7.2
	8.00	3.2	7.4	26.011	17.386	0.67	3.45	37.805	7.5

Interpolation is permissible; extrapolation is not.

All entering air conditions are 80°F DB and 67°F WB in cooling.

Table does not reflect fan or pump power corrections for AHRI/ISO conditions.

All performance is based upon the lower voltage of dual voltage rated units.

Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.

See performance correction tables for operating conditions other than those listed above.



Performance Data  
Correction Tables

Air Flow Correction Table

Percent of Rated Airflow	Total Capacity	Sensible	Power	Heat of Rejection
75%	0.934	0.833	0.974	0.952
80%	0.946	0.866	0.979	0.961
85%	0.958	0.899	0.985	0.970
90%	0.971	0.932	0.990	0.979
100%	1.000	1.000	1.000	1.000
105%	1.017	1.035	1.005	1.013

Entering Air Correction Table

Entering Air WB °F	Total Capacity	Sensible Cooling Capacity Multiplier - Entering Air DB °F							Power	Heat of Rejection
		70	75	80	80.6	85	90	95		
60	0.851	0.854	1.091	1.325	1.385	*	*	*	0.996	0.896
65	0.957	0.617	0.857	1.093	1.152	1.326	*	*	0.999	0.970
66.2	0.985	0.618	0.824	1.036	1.061	1.245	*	*	1.000	0.988
67	1.000	0.523	0.763	1.000	1.059	1.232	*	*	1.000	1.000
70	1.064		0.623	0.861	0.920	1.090	1.339	*	1.000	1.042
75	1.171			0.629	0.688	0.854	1.101	1.318	1.005	1.119

\* = Sensible capacity equals total capacity

# TRW SERIES 60HZ - HFC-410A SUBMITTAL DATA ENG/I-P

## Hydronic Heating Performance Data

Model	Heating Pressure Drop		Hydronic Heating Capacity BTUH								
			CFM	GPM	Entering Water Temperature						
	PSI	FT			90°F	100°F	110°F	115°F	120°F	125°F	130°F
TRW09	2.5	5.8	285	2.0	3,840	5,760	7,255	8,064	9,067	10,008	10,906
	3.2	7.4	305	2.5	4,128	6,240	7,825	8,755	9,726	10,559	11,508
	5.5	12.7	325	3.0	4,608	6,624	8,975	10,068	10,848	11,118	12,116
TRW12	3.2	7.4	300	2.5	4,128	6,240	7,825	8,755	9,726	10,559	11,712
	5.5	12.7	350	3.0	4,800	6,912	9,167	10,260	11,352	11,592	13,536
	7.3	16.9	350	3.5	4,896	7,008	9,372	10,509	11,629	11,782	13,824
TRW15	2.2	5.1	530	3.5	6,240	9,216	10,235	11,436	12,739	14,730	16,060
	3.0	6.9	530	4.0	6,336	9,408	10,412	11,605	12,981	14,956	16,306
	4.0	9.2	600	4.5	6,816	10,080	11,757	13,070	14,466	15,868	17,301
	6.3	14.6	600	5.5	6,912	10,272	12,011	13,373	14,816	16,501	17,628
TRW18	2.2	5.1	530	3.5	6,240	9,216	10,235	11,436	12,739	14,052	16,060
	4.0	9.2	530	4.0	6,336	9,408	10,412	11,605	12,981	14,730	16,306
	2.2	5.1	600	3.5	6,528	9,696	11,344	12,661	14,026	15,482	16,654
	4.0	9.2	600	4.5	6,816	10,080	11,712	13,056	14,400	15,868	17,301
	3.0	6.9	700	4.0	7,104	10,560	13,459	15,061	16,586	16,521	18,015
	6.3	14.6	700	5.5	7,392	10,944	14,295	15,850	17,538	17,086	18,630
TRW24	5.5	12.7	700	4.5	8,738	12,563	16,341	18,254	20,316	22,371	24,502
	5.8	13.3	700	5.0	8,818	12,797	16,661	18,588	20,684	22,692	24,852
	9.1	21.0	700	6.0	9,089	13,176	17,086	19,019	21,338	23,190	25,393
	15.4	35.6	700	8.0	9,418	13,694	17,662	19,765	21,862	23,839	26,099
	5.5	12.7	800	4.5	9,441	13,623	17,707	19,803	21,957	23,953	26,230
	5.8	13.3	800	5.0	9,644	13,908	18,084	20,134	22,383	24,325	26,636
	9.1	21.0	800	6.0	9,969	14,295	18,552	20,729	22,970	24,903	27,264
	15.4	35.6	800	8.0	10,394	14,775	1,973	21,499	23,843	25,661	28,088
TRW30	5.8	13.4	1060	5.0	11,649	16,770	21,733	24,306	26,880	29,064	31,723
	9.1	21.0	1060	6.0	12,008	17,504	22,489	25,152	27,744	29,852	32,580
	12.7	29.3	1060	7.0	12,192	17,760	23,029	25,718	28,453	30,440	33,220
	15.4	35.6	1060	8.0	12,469	18,108	23,420	26,208	28,964	30,895	33,715
	5.8	13.4	1200	5.0	12,769	18,214	23,598	26,469	29,120	32,104	33,844
	9.1	21.0	1200	6.0	13,171	18,895	24,445	27,324	30,106	33,144	34,839
	12.7	29.3	1200	7.0	13,506	19,252	25,062	28,206	30,767	34,083	35,580
	15.4	35.6	1200	8.0	13,763	19,252	25,534	28,441	31,210	34,725	36,155
TRW36	4.2	9.7	1060	5.0	11,649	16,770	21,733	24,306	26,880	29,064	31,723
	6.1	14.1	1060	6.0	12,008	17,504	22,489	25,152	27,744	29,852	32,580
	8.3	19.2	1060	7.0	12,192	17,760	23,029	25,718	28,453	30,440	33,220
	10.5	24.3	1060	8.0	12,469	18,108	23,420	26,208	28,964	30,895	33,715
	4.2	9.7	1200	5.0	12,769	18,214	23,598	26,469	29,120	32,104	33,844
	6.1	14.1	1200	6.0	13,171	18,895	24,445	27,324	30,106	33,144	34,839
	8.3	19.2	1200	7.0	13,506	19,252	25,062	28,206	30,767	34,083	35,580
	10.5	24.3	1200	8.0	13,763	19,252	25,534	28,441	31,210	34,725	36,155

Entering air temperature 70°F (21.1°C).

Entering water temperature above 130°F (54.4°C) will cause unit to fail.

## Blower Performance Data

Airflow in CFM with wet coil and clean air filter.

Size	Fan Speed	Rated CFM	Min CFM	External Static Pressure (in. wg)																											
				0.00	0.01	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65													
09	High	325	285	367	346	325	292	Operation Not Recommended																							
	Medium			297																											
	Low																														
12	High	350	300	367	346	325	Operation Not Recommended																								
	Medium			300																											
	Low																														
15	High	550	416	647	638	620													600	579	529	Operation Not Recommended									
	Medium			561	551	539													516	427											
	Low			482																											
18	High	600	480	713	707	699	690	679	671	647	638	620	600	579	529	Operation Not Recommended															
	Medium			618	615	603	595	591	583	574	561	551	539	516																	
	Low			529	529	523	512	509	500	494	482																				
24	High	800	600	811	811	808	802	784	765	740	717	693	661	620	Operation Not Recommended																
	Medium			719	715	713	700	693	666	655	634	606																			
	Low			712	710	706	703	684	668	645	628																				
30	High	1075	798	1220	1190	1153	1133	1097	1069	1039	1002	969	925	885				864	Operation Not Recommended												
	Medium			1094	1074	1054	1034	1014	986	960	935	910	878	835				800													
	Low			990	975	963	956	945	935	919	896	870	845																		
36	High	1150	882	1170	1153	1133	1097	1069	1039	1002	969	925	Operation Not Recommended																		
	Medium			1054	1034	1014	986	960	935	910																					
	Low			956	945	935	919	896																							

# TRW SERIES 60HZ - HFC-410A SUBMITTAL DATA ENG/I-P

## Physical Data

Model	09	12	15	18	24	30	36
Compressor (1 Each)	Rotary				Scroll		
Factory Charge HFC-410A (oz) [kg]	34 [.96]	34 [.96]	45 [1.28]	45 [1.28]	60 [1.70]	60 [1.70]	66 [1.87]
PSC Fan Motor & Blower Wheel							
Fan Motor (hp) [w]	1/30 [25]	1/15 [50]	1/6 [124]	1/6 [124]	1/5 [149]	1/2 [373]	1/2 [373]
Blower Wheel Size (dia x w) (in) [mm]	6.75 x 7.25 [174 x 184]	6.75 x 7.25 [174 x 184]	9.50 x 7.12 [241 x 181]	9.50 x 7.12 [241 x 181]	9.50 x 7.12 [241 x 181]	9.50 x 8.06 [241 x 205]	9.50 x 8.06 [241 x 205]
ECM-X Motor & Blower Wheel							
Fan Motor (hp) [w]	Not Available	Not Available	1/3 [248]	1/3 [248]	1/3 [248]	1/3 [248]	1/2 [373]
Blower Wheel Size (dia x w) (in) [mm]	Not Available	Not Available	9.50 x 7.12 [241 x 181]	9.50 x 7.12 [241 x 181]	9.50 x 7.12 [241 x 181]	9.50 x 8.06 [241 x 205]	9.50 x 8.06 [241 x 205]
Coax and Hydronic coil							
Internal Volume U.S. Gallon [L]	.57 [2.16]	.61 [2.31]	.82 [3.10]		1.23 [4.66]		
Hose Kit (AHH Series Required)							
FPT (in)	1/2	1/2	3/4	3/4	1	1	1
Drain Hose							
Internal Diameter In [mm]	.875 [22.2]						
Chassis Air Coil							
Air Coil Dimensions (h x w) - (in) [mm]	22 x 11.5 [559 x 292]	22 x 11.5 [559 x 292]	28 x 14 [711 x 356]	28 x 14 [711 x 356]	30 x 18 [762 x 457]	30 x 18 [762 x 457]	30 x 18 [762 x 457]
Standard Filter - 1" [25.4 mm], (w x h) - (in) [mm]	14 x 24 [356 x 610]	14 x 24 [356 x 610]	16 x 30 [406 x 762]	16 x 30 [406 x 762]	20 x 32 [508 x 813]	20 x 32 [508 x 813]	20 x 32 [508 x 813]
Weight							
Chassis - (lbs) [kg]	100 [45]	107 [49]	125 [57]	125 [57]	188 [85]	194 [85]	198 [90]
Cabinet - (lbs) [kg]	174 [79]	174 [79]	189 [86]	189 [86]	243 [110]	243 [110]	243 [110]

Unit Maximum Water Working Pressure	
Options	Max Pressure PSIG [kPa]
Base Unit 09-30*	400 [2756]
Base Unit 36*	375 [2585]

\*includes hoses and 3 way diverter valve

Model with PSC Motor	Voltage Code	Voltage	Min/Max Voltage	Compressor		Fan Motor FLA	Standard Units		
				RLA	LRA		Total Unit FLA	Min Circuit Amps	Max Fuse/HACR
TRW09	G	208-230/60/1	197/254	3.7	23	0.41	4.11	5.04	15
TRW12	G	208-230/60/1	197/254	4.7	30	0.7	5.4	6.6	15
TRW15	G	208-230/60/1	197/254	5.6	29	1	6.6	8	15
TRW18	G	208-230/60/1	197/254	6.6	33	1	7.6	9.25	15
TRW24	G	208-230/60/1	197/254	12.8	58.3	1.1	13.9	17.1	30
TRW30	G	208-230/60/1	197/254	12.8	64	1.8	14.6	17.8	30
TRW36	G	208-230/60/1	197/254	14.1	77	1.8	15.9	19.4	30
TRW09	E	265/60/1	239/292	3.5	22.0	0.30	3.8	4.7	15
TRW12	E	265/60/1	239/292	4.2	22.0	0.60	4.8	5.85	15
TRW15	E	265/60/1	239/292	5.0	28.0	0.90	5.9	7.15	15
TRW18	E	265/60/1	239/292	5.6	28.0	0.90	6.5	7.9	15
TRW24	E	265/60/1	239/292	9.6	47.5	0.90	10.5	12.9	20
TRW30	E	265/60/1	239/292	10.9	52.0	2.00	12.9	15.8	25
TRW36	E	265/60/1	239/292	12.2	63.0	2.00	14.2	17.25	30

Model with ECM-X Motor	Voltage Code	Voltage	Min/Max Voltage	Compressor		Fan Motor FLA	Standard Units		
				RLA	LRA		Total Unit FLA	Min Circuit Amps	Max Fuse/HACR
TRW15	G	208-230/60/1	197/254	5.6	30.0	2.80	8.4	9.8	15
TRW18	G	208-230/60/1	197/254	6.6	33.0	2.80	9.4	11.05	20
TRW24	G	208-230/60/1	197/254	12.8	58.3	2.80	13.4	15.8	25
TRW30	G	208-230/60/1	197/254	12.8	64.0	4.10	16.9	20.1	25
TRW36	G	208-230/60/1	197/254	14.1	77.0	4.10	18.2	21.725	30

# TRW SERIES 60HZ - HFC-410A SUBMITTAL DATA ENG/I-P

## TRW Series Wiring Diagram Matrix

Only CXM and DXM diagrams for ACO/MCO Controls are presented in this submittal.  
Other diagrams can be located online at [climatemaster.com](http://climatemaster.com) using the part numbers presented below.

### Cabinet

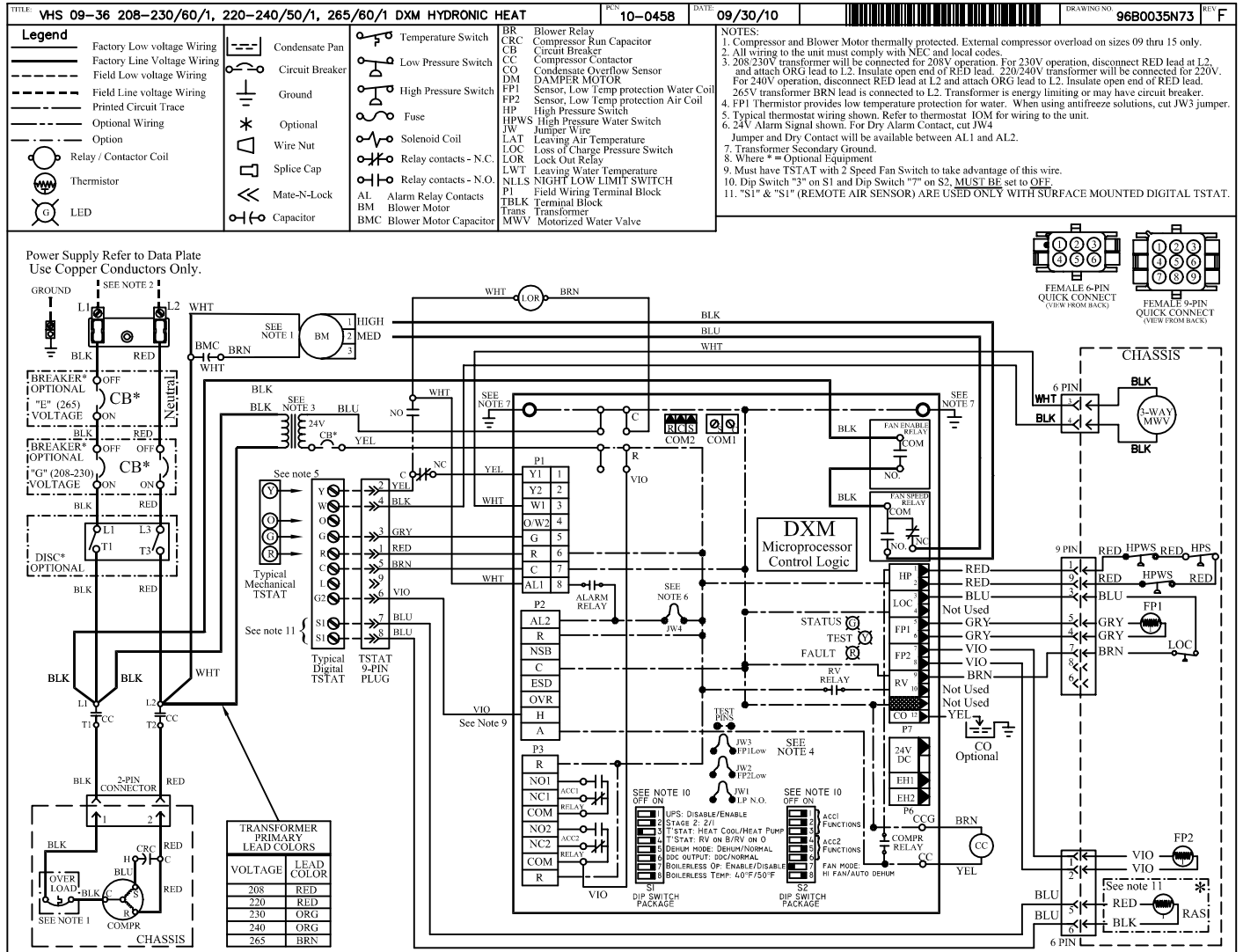
Model	Refrigerant	Wiring Diagram Part Number	Electrical	Control		Agency
TRW09-36 PSC Motor	EarthPure® (HFC-410A)	96B0035N73	208-230/60/1, 265/60/1	DXM	ACO/MCO	ETL
TRW 15-36 ECM-X Motor		96B0035N97	208-230/60/1		LON	
					MPC	

### Chassis

Model	Refrigerant	Wiring Diagram Part Number	Electrical	Control	Agency
TRW09-36	EarthPure® (HFC-410A)	96B0036N16	208-230/1/60, 265/1/60	DXM	ETL

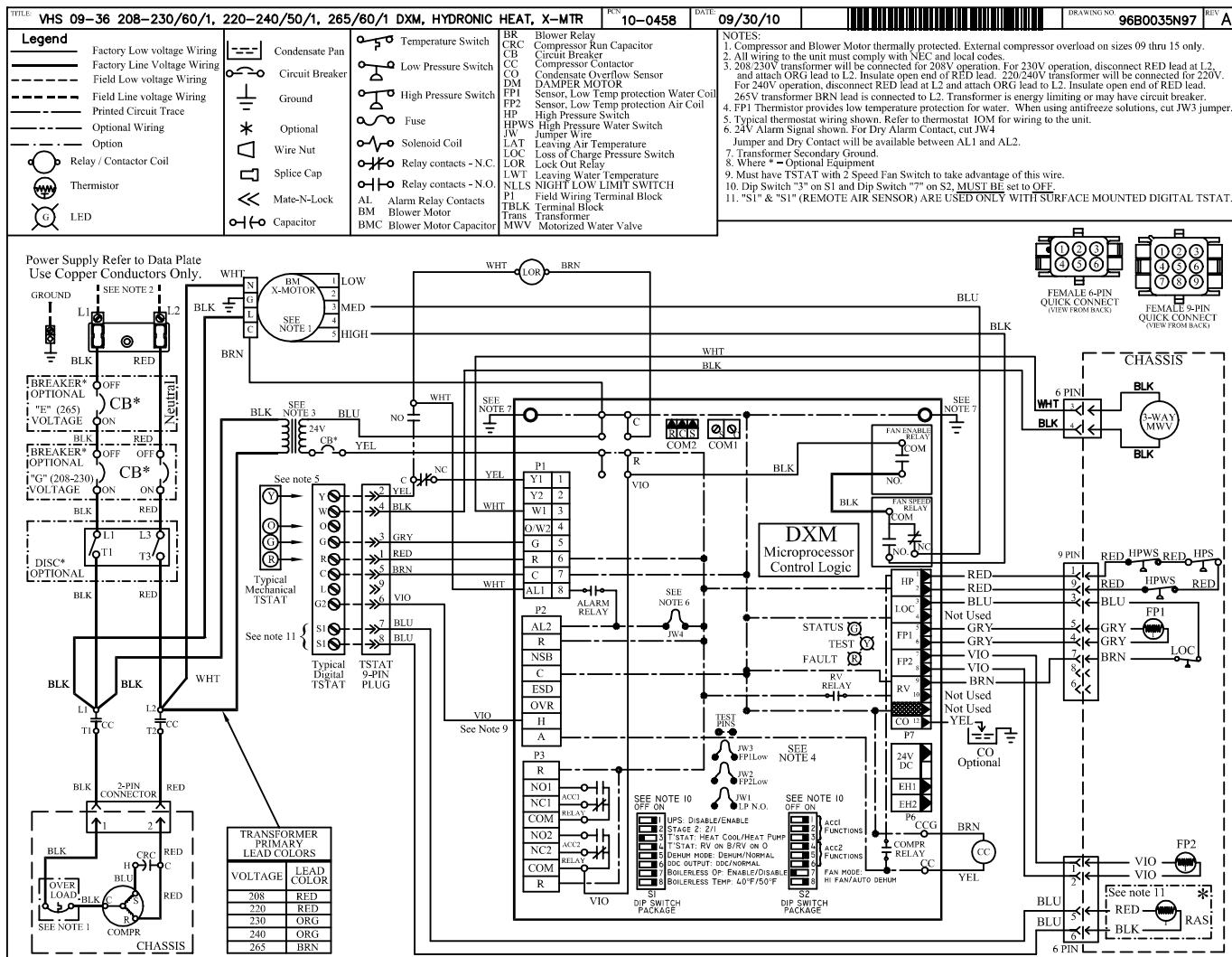
# Typical Wiring Diagram

## Single Phase TRW Units With DXM Controller



# TRW SERIES 60HZ - HFC-410A SUBMITTAL DATA ENG/I-P

## Typical Wiring Diagram TRW with ECM-X Motor

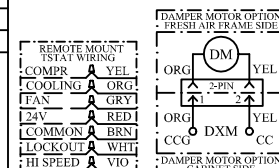
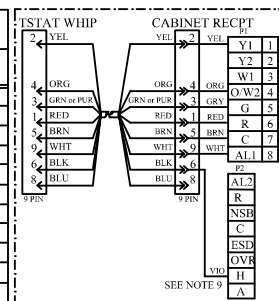


## DXM CONTROLLER FAULT CODES

### DXM CONTROLLER FAULT CODES

OPERATION	STATUS LED (GREEN)	TEST LED (YELLOW)	FAULT LED (RED)	ALARM RELAY
NORMAL MODE	ON	OFF	NOTE: 2	OPEN
DXM IS NON-FUNCTIONAL	OFF	OFF	OFF	OPEN
TEST MODE	-	ON	NOTE: 2	Cycle (Note 3)
NIGHT SETBACK	FLASHING CODE 2	-	NOTE: 2	-
EMERGENCY SHUT DOWN	FLASHING CODE 3	-	NOTE: 2	-
INVALID T-STAT INPUTS	FLASHING CODE 4	-	NOTE: 2	-
NO FAULT IN MEMORY	ON	OFF	FLASHING CODE 1	OPEN
HP: FAULT / (LOCKOUT) NOTE: 1	SLOW FLASH / (FAST FLASH)	OFF	FLASHING CODE 2	OPEN / (CLOSED)
LP: FAULT / (LOCKOUT) NOTE: 2	SLOW FLASH / (FAST FLASH)	OFF	FLASHING CODE 3	OPEN / (CLOSED)
FP1: FAULT / (LOCKOUT) NOTE: 1	SLOW FLASH / (FAST FLASH)	OFF	FLASHING CODE 4	OPEN / (CLOSED)
FP2: FAULT / (LOCKOUT) NOTE: 1	SLOW FLASH / (FAST FLASH)	OFF	FLASHING CODE 5	OPEN / (CLOSED)
CO: FAULT / (LOCKOUT) NOTE: 1	SLOW FLASH / (FAST FLASH)	OFF	FLASHING CODE 6	OPEN / (CLOSED)
OVER-UNDER VOLTAGE	SLOW FLASH	OFF	FLASHING CODE 7	OPEN (NOTE 4)
NORMAL MODE w/UPS	ON	OFF	FLASHING CODE 8	CYCLE (NOTE 5)
SWAPPED FP1/FP2 LOCKOUT	FAST FLASH	OFF	FLASHING CODE 9	CLOSED

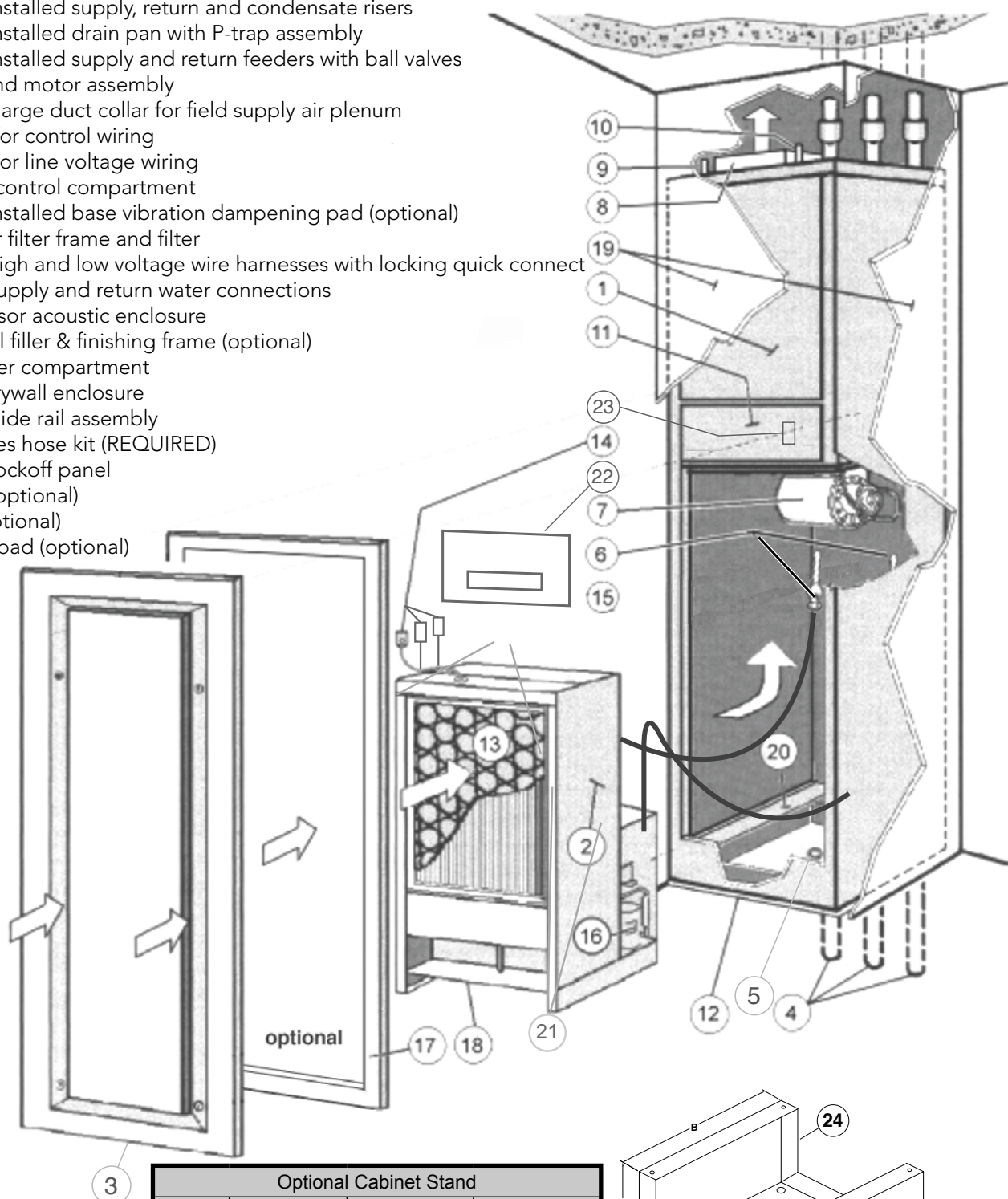
1. STATUS LED (GREEN) : SLOW FLASH - CONTROLLER IN FAULT RETRY MODE, FAST FLASH - CONTROLLER IN LOCKOUT MODE SLOW FLASH = 1 FLASH PER EVERY 2 SECONDS. FAST FLASH = 2 FLASHES PER EVERY 1 SECOND.
2. FAULT LED (RED) FLASHES A CODE REPRESENTING LAST FAULT IN MEMORY. IF NO FAULT IN MEMORY, CODE 1 IS FLASHED.
3. CYCLES APPROPRIATE CODE, BY CYCLING ALARM RELAY IN THE SAME SEQUENCE AS FAULT LED.
4. ALARM RELAY CLOSSES AFTER 15 MINUTES.
5. ALARM RELAY CYCLES : CLOSED FOR 5 SECONDS AND OPEN FOR 25 SECONDS. . .





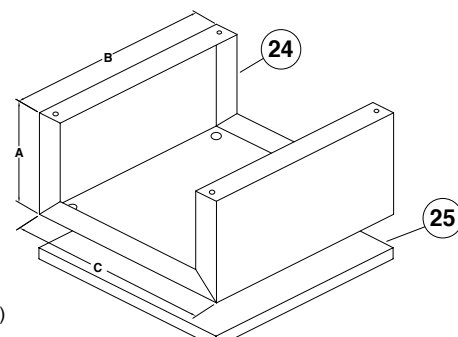
## Typical Unit - Exploded View Single Unit: Furred In & Ducted

1. TRW cabinet (furred-in)
2. Slide-in heating and cooling chassis
3. Architectural acoustic R/A panel with hinged center door
4. Factory installed supply, return and condensate risers
5. Factory installed drain pan with P-trap assembly
6. Factory installed supply and return feeders with ball valves
7. Blower and motor assembly
8. Top discharge duct collar for field supply air plenum
9. Conduit for control wiring
10. Conduit for line voltage wiring
11. Electr. & control compartment
12. Factory installed base vibration dampening pad (optional)
13. Return air filter frame and filter
14. Chassis high and low voltage wire harnesses with locking quick connect
15. Chassis supply and return water connections
16. Compressor acoustic enclosure
17. R/A panel filler & finishing frame (optional)
18. Condenser compartment
19. Typical drywall enclosure
20. Chassis slide rail assembly
21. AHH series hose kit (REQUIRED)
22. Upper blockoff panel
23. Breaker (optional)
24. Stand (optional)
25. Isolation pad (optional)



Optional Cabinet Stand			
Model	A	B	C
09/12	8" [203]	15.41" [391]	15.97" [405]
15/18	8" [203]	18.41" [468]	18.97" [482]
24-36	8" [203]	22.41" [569]	22.97" [583]

\*. Special stands available 4" [102] to 12" [305]. (1" [25.4] increments)

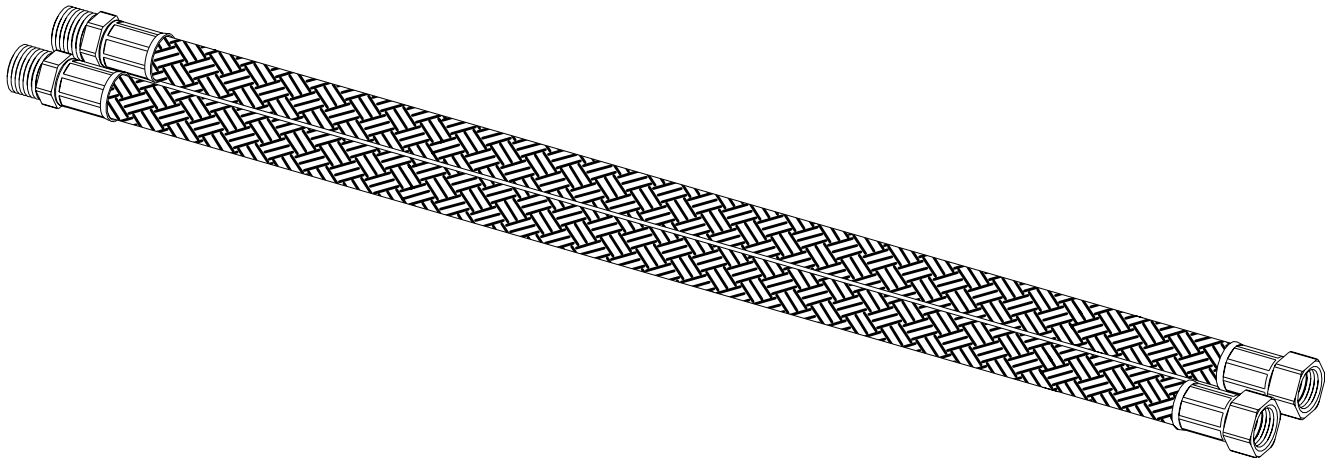


ClimateMaster works continually to improve its products. As a result, the design and specifications of each product at the time of order may be changed without notice and may not be as described herein. Please contact ClimateMaster's Customer Service Department at 1-405-745-6000 for specific information on the current design and specifications. Statements and other information contained herein are not express warranties and do not form the basis of any bargain between the parties, but are merely ClimateMaster's opinion or commendation of its products. The latest version of this document is available at [climatemaster.com](http://climatemaster.com).

AHH Series  
Stainless Steel Braided Hose Kit

Specifications:

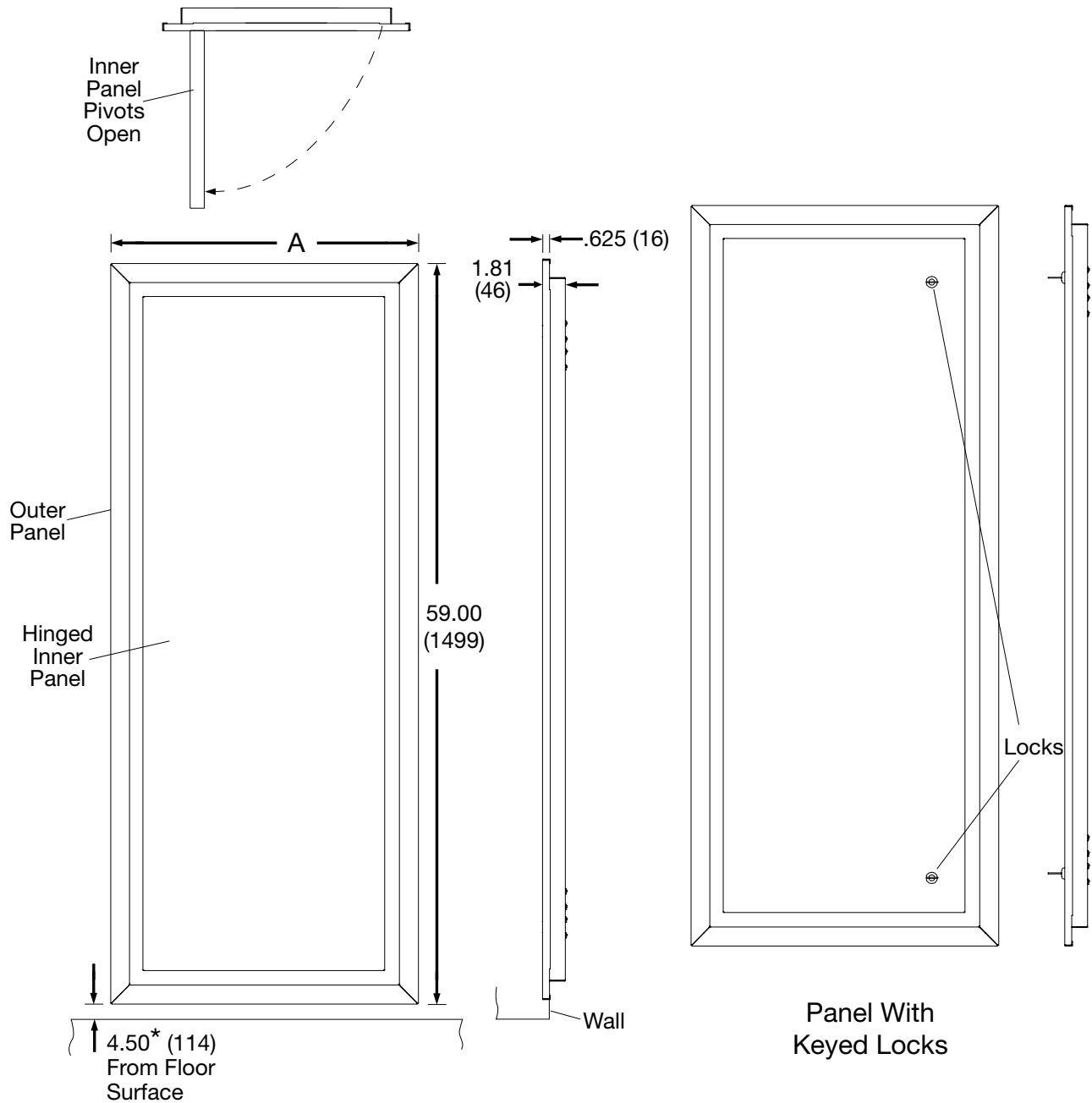
- Designed for VHS water source heat pump applications.
- Kevlar® reinforced EPDM core with ANSI 302/304 stainless steel outer braid.
- Fire rated materials per ASTM E 84-00 (NFPA 255, ANSI/UL 723 & UBC 8-1).
- NPT(E) (External Pipe Thread) fitting at one end; swivel with NPSH thread connector (Internal Thread) at the other end (seals via fiber or EPDM gasket, shipped inside connection).
- Swivel connection provides union between chassis and risers.
- Brass fittings, stainless steel ferrules.
- Temperature range of 15°F [9°C] to 180°F [82°C]. (Operation below 32°F requires antifreeze)
- Max. working pressure of 400 psi [2756 kPa].
- Min. burst pressure of four times working pressure.



Physical Data

Unit	Part #	Inside Diameter inches	Length feet [cm]	Working Pressure psi [kPa]	Min. Burst Pressure psi [kPa]	Min. Bend Radius inches [mm]
09, 12	AHH0502B	0.50	2 [61]	400 [2756]	1600 [11024]	2.5 [63.5]
15, 18	AHH0753B	0.75	3 [91]	400 [2756]	1600 [11024]	4.5 [114.3]
24-36	AHH1003B	1.00	3 [91]	400 [2756]	1600 [11024]	5.5 [139.7]

Hinged "G" Style Return Air Panel  
AVHSG Series



\* - Dimension increases if cabinet is on stand or pad

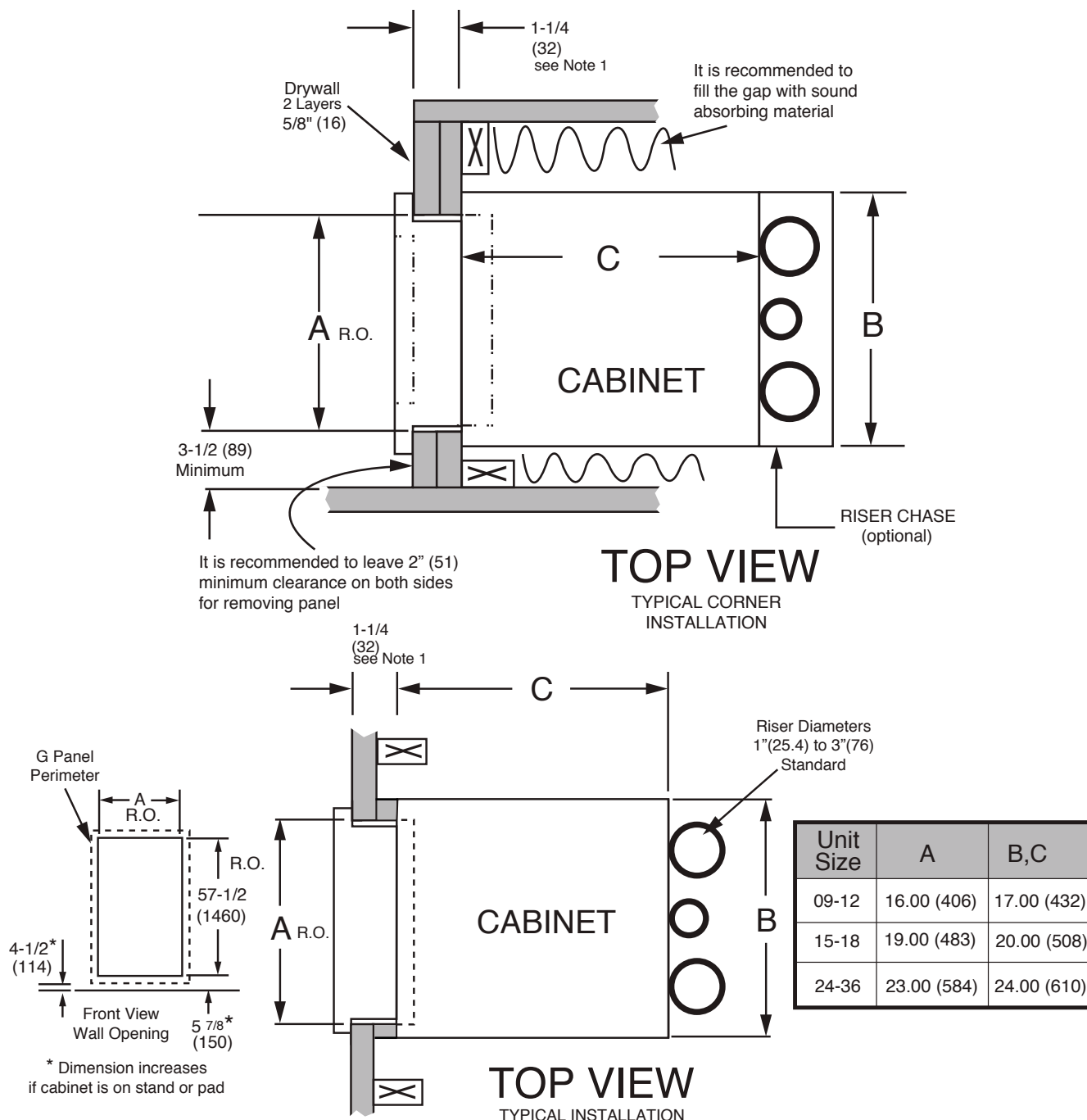
Front View  
Standard Panel

Notes:

1. Dimensions are in inches (mm)
2. Panel painted polar ice
3. Inner panel pivots open 90°, for filter replacement without removing panel.
4. Shipped as left-hand pivot, but can be field converted to right hand.
5. Optional louvered panel available.
6. See mounting methods.

Unit	Digit 6	A
09 - 12	1	18.50 (470)
15 - 18	2	21.50 (546)
24 - 36	3	25.50 (648)

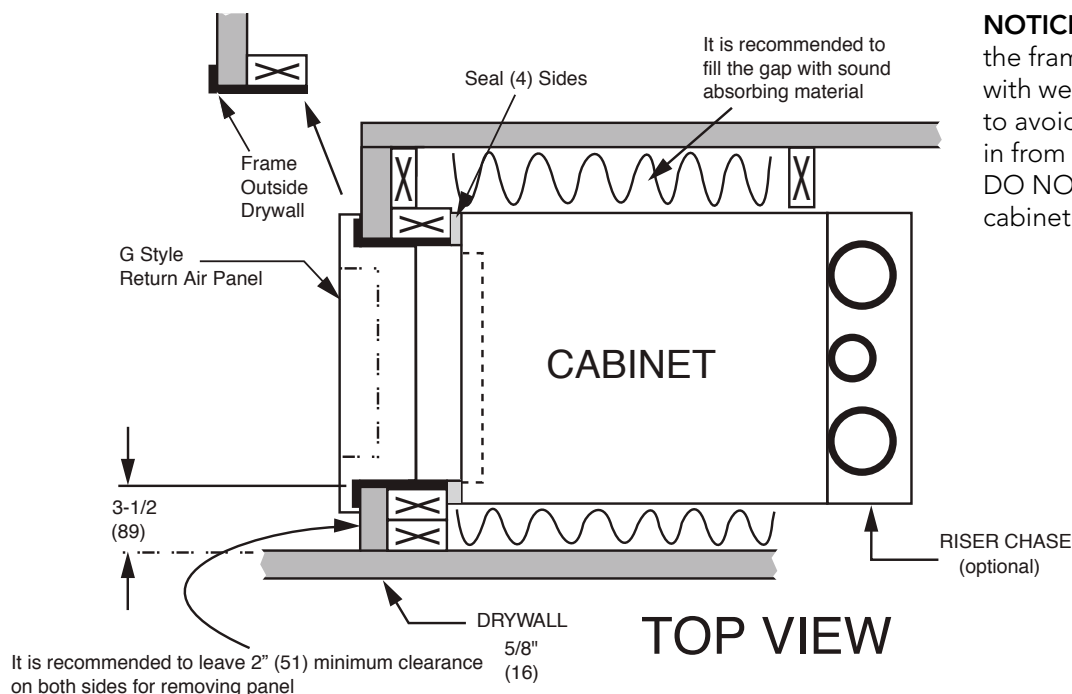
## "G" Style Return Air Panel with Cabinet Flush Mounted



### Notes:

1. Must have 1-1/4 (32) from front of drywall to front surface of cabinet for correct fit of "G" panel. Drywall can be attached directly to front surface of cabinet, use 2 layers of 5/8 (16).
2. Drywall can be applied directly to cabinet sides, however, for best sound attenuation, a furred in stud wall installation is recommended. Studs should not touch cabinet.
3. G Panel attaches to cabinet. Do not caulk outer panel to wall.
4. All measurements are in inches (mm). All studs - nominal 2x4 (1.50 [38] x 3.50 [89])
5. For filter access, pivot panel, open filter access snap. For chassis removal, remove G Panel and slide out chassis.

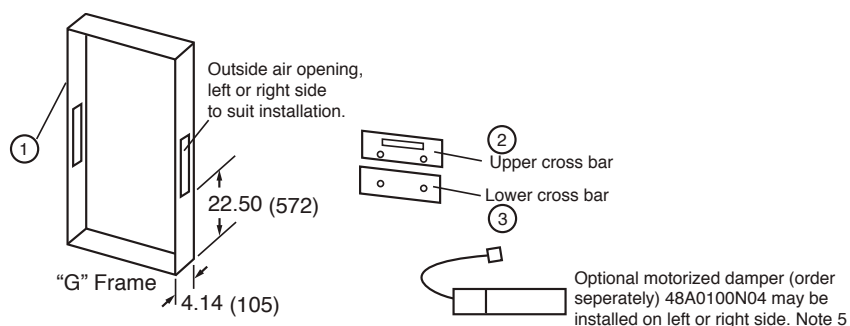
## "G" Style Return Air Panel with Cabinet Recessed Frame Kit Required and Motorized Damper Required if Ducting in Outside Air



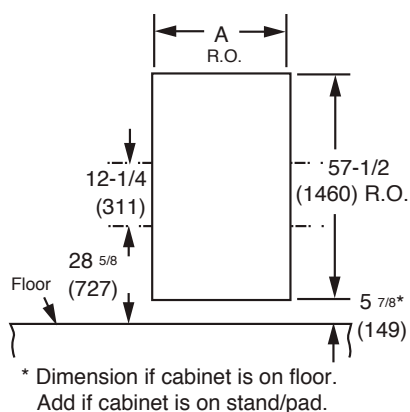
**NOTICE:** Seal between the frame and cabinet with weather seal material to avoid air being pulled in from the wall cavity. DO NOT attach frame to cabinet.

### Notes:

1. Drywall can be applied directly to side surfaces, however, for best sound attenuation, a furred in stud wall installation is recommended. Studs should not touch cabinet.
2. G Panel attaches to frame cross bars. Cabinet can be recessed behind wall. Do not caulk outer panel to wall.
3. Dimensions are in inches (mm). All studs nominal 2x4, 1.50 (38) x 3.50 (89)
4. For filter access, pivot inner panel, open filter access snap. For chassis removal, remove G Panel, remove 2 cross bars, slide out chassis.
5. If motorized damper is used, mixed air temperature should be a minimum of 45°F (7°C).



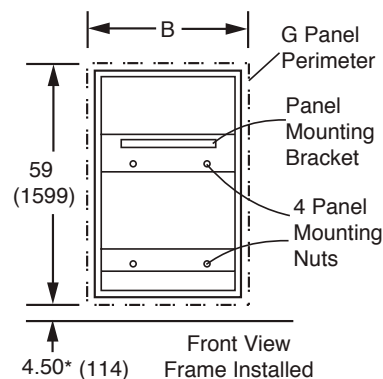
Kit Part	Qty	Description
1	1	Frame
2	1	Upper Cross Bar
3	1	Lower Cross Bar



### Frame Kit

Kit	Size	A	B
48A0100N11	9-12	16 5/8 (400)	18.50 (470)
48A0100N12	15-18	19 5/8 (498)	21.50 (546)
48A0100N13	24-36	23 5/8 (600)	25.50 (648)

**Note:** When outside air is used, contractor must supply outside air duct and cut hole in stud.

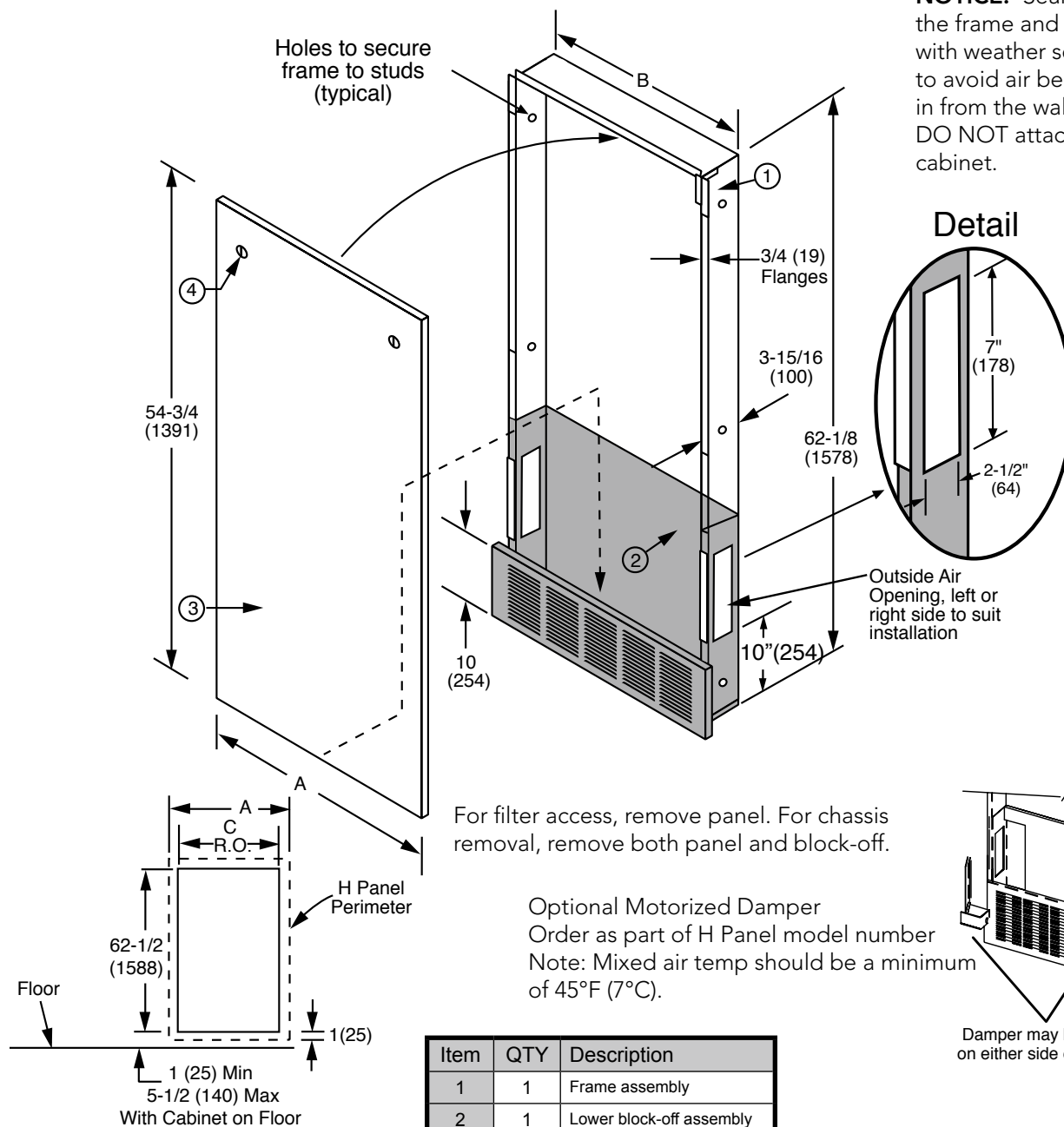


# TRW SERIES 60HZ - HFC-410A SUBMITTAL DATA ENG/I-P

## AVHSH Series "H" Style Return Air Panel

(Frame Required and Motorized Damper Required if Ducting in Outside Air)

**NOTICE:** Seal between the frame and cabinet with weather seal material to avoid air being pulled in from the wall cavity. DO NOT attach frame to cabinet.



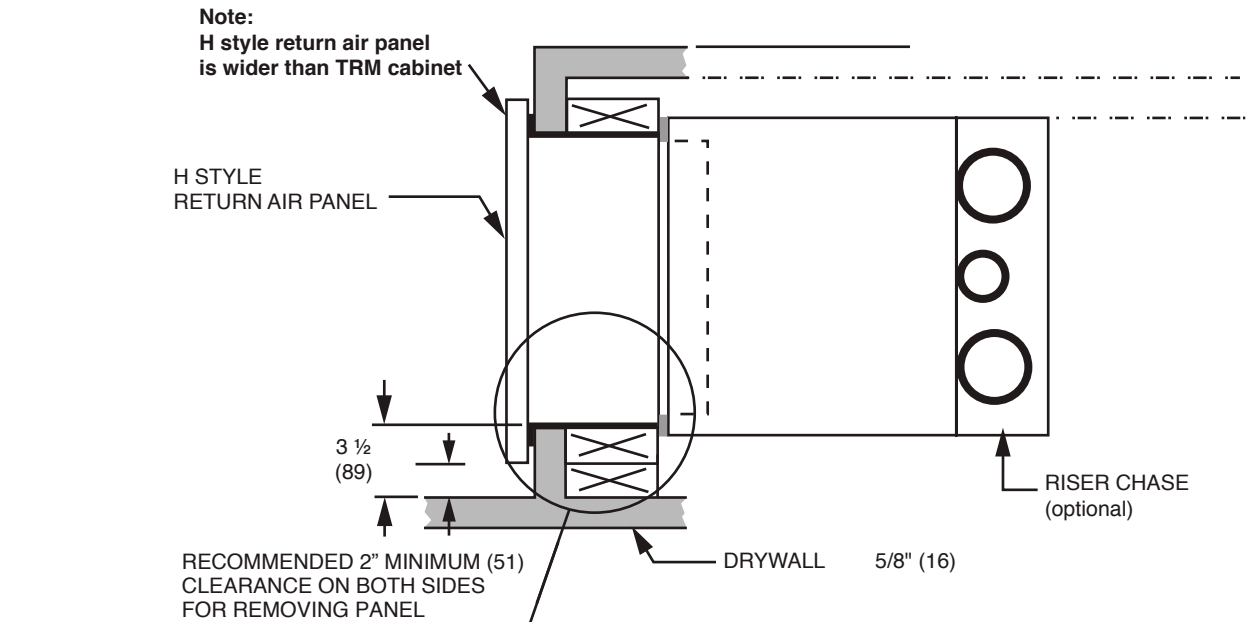
Item	QTY	Description
1	1	Frame assembly
2	1	Lower block-off assembly
3	1	Insulated front panel
4	2	1/4 turn fastener

**Note:** When outside air is used, contractor must supply outside air duct and cut hole in stud. Entering air temperature should be above 45°F (7°C).

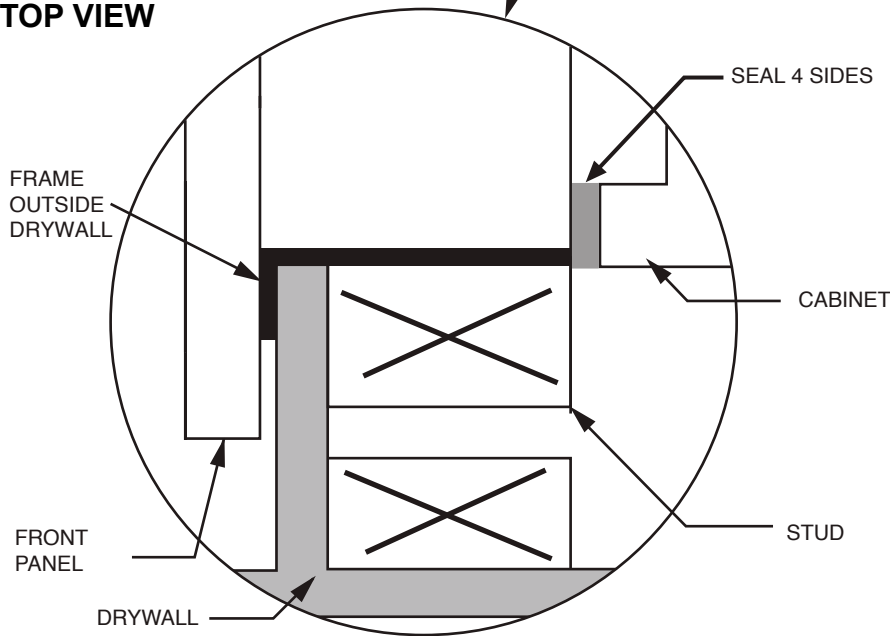
Unit Size	Frame (IT#1)	A	B	C
09 - 12	49A0077GNN	18 5/8 [473]	16 3/4 [425]	17 (433)
15 - 18	49A0078GNN	21 5/8 [549]	19 3/4 [502]	20 (508)
24 - 36	49A0079GNN	25 5/8 [650]	23 3/4 [603]	24 (610)

**Note:** All dimensions are in inches (mm)

"H" Style Return Air Panel

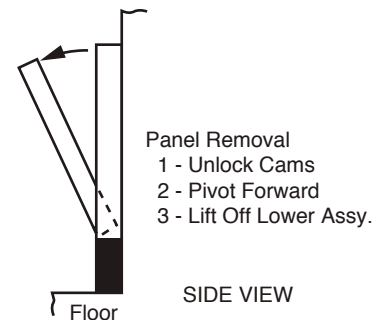


**TOP VIEW**



**NOTICE:** Seal between the frame and cabinet with weather seal material to avoid air being pulled in from the wall cavity. DO NOT attach frame to cabinet.

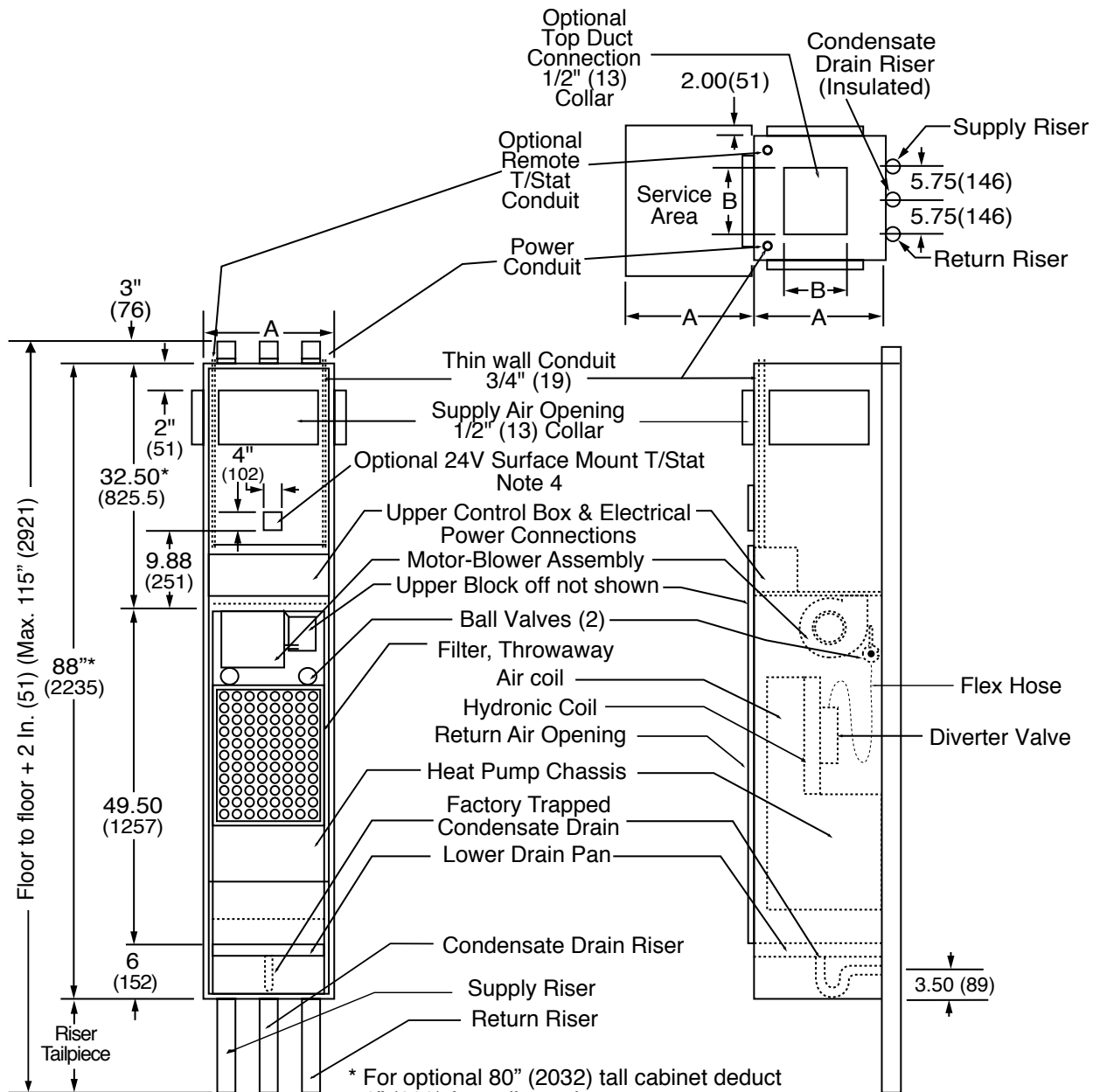
**Note:** All measurements are in inches, millimeters are in parenthesis.  
All studs nominal 2x4, 1.50 (38) x 3.50 (89)





# TRW SERIES 60HZ - HFC-410A SUBMITTAL DATA ENG/I-P

## TRW Unit Dimensions Single Unit, Furred In Cabinet (88 in. [2235mm] Height) with Risers

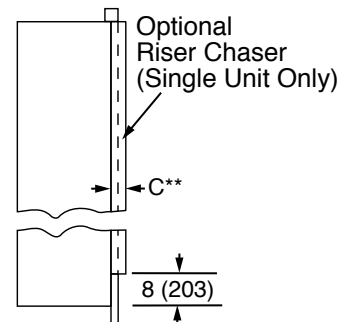


\* For optional 80" (2032) tall cabinet deduct 8" (203) from dimensions.  
**Note: May limit front supply opening size.**

Unit Size	A	B	C**
TRW09 - 12	17 [432]	10 [254]	4.25 [92]
TRW15 - 18	20 [508]	13 [330]	4.25 [92]
TRW24 - 36	24 [610]	17 [432]	4.25 [92]

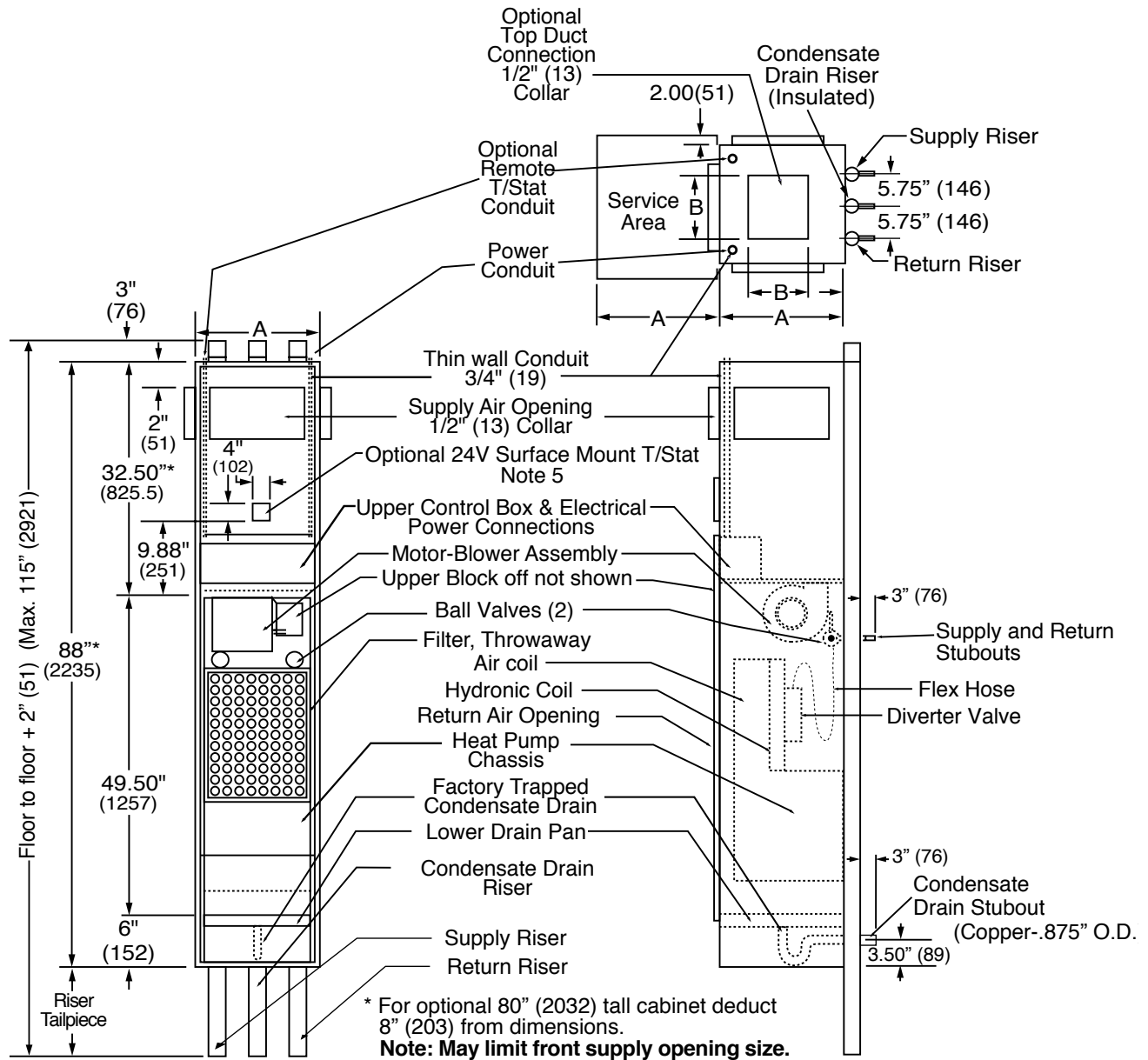
### Notes:

- The riser compartment is defined as being the rear of each unit. Supply air grilles and return air/access panel can be any side except rear.
- \*\* C Dimension = 4-1/4" (92) for risers up to 2-1/2" (64) diameter. Consult factory for larger diameter risers.
- All measurements are in inches (mm).
- Ball valves are always located opposite of the return air opening. Return riser is on the right.
- Units with 24v surface mount T/stat option have 2x4 tile rings factory installed. Contractor must specify horizontal vertical orientation to suit thermostat type.





TRW Unit Dimensions  
Master Unit, Furred In Cabinet  
(88 in. [2235mm] Height)



Unit Size	A	B
TRW09 - 12	17 [432]	10 [254]
TRW15 - 18	20 [508]	13 [330]
TRW24 - 36	24 [610]	17 [432]

Notes

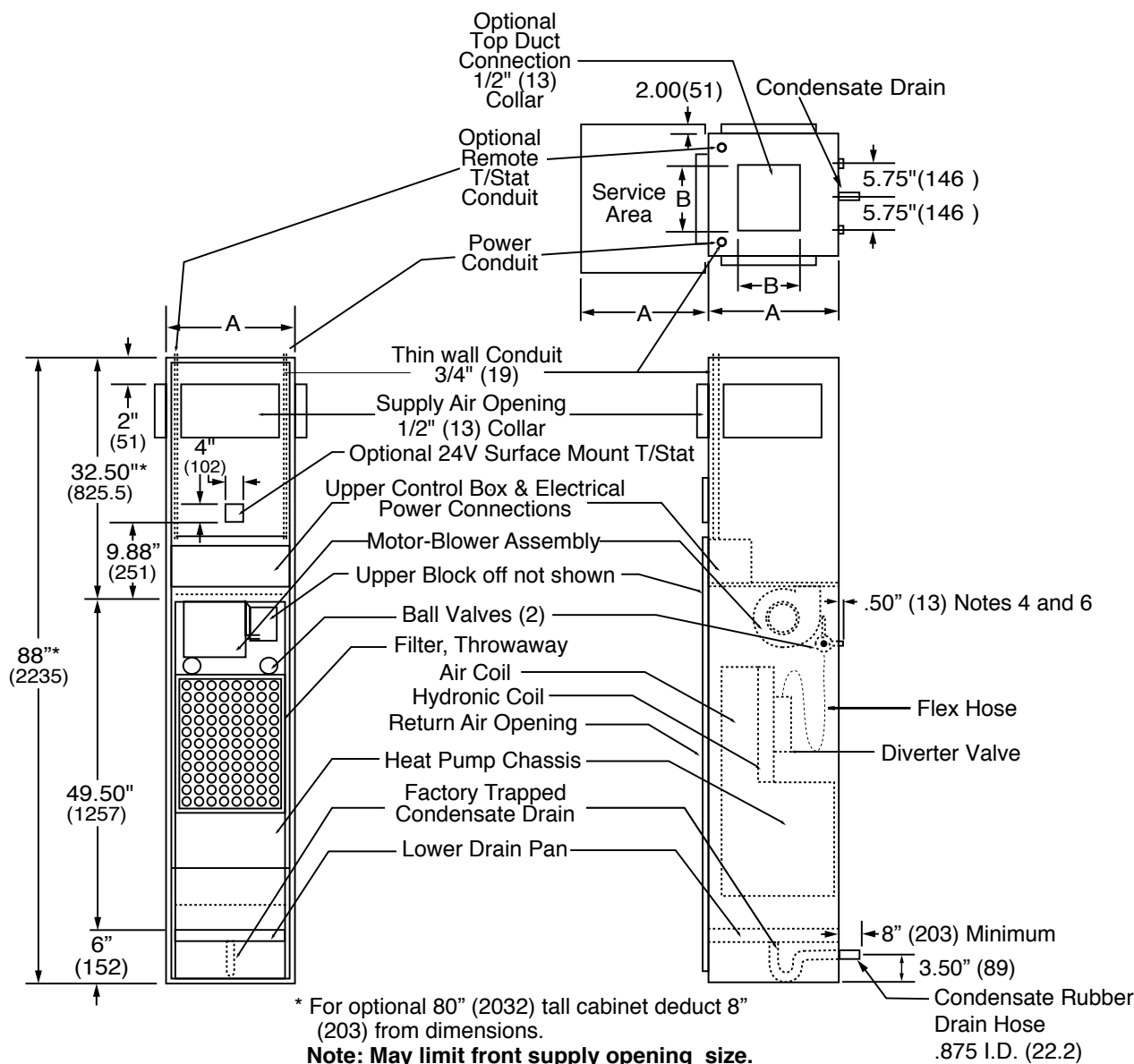
1. The riser compartment is defined as being the rear of each unit. Supply air grilles and return air/access panel can be any side except rear.
2. All measurements are in inches (mm).
3. Installer must provide crossover water piping from Master to Slave unit.
4. See master-slave cabinet connected.
5. Units with 24v surface mount T/stat option have 2x4 tile rings factory installed. Contractor must specify horizontal vertical orientation to suit thermostat type.
6. Ball valves are always located opposite return air opening and the return riser is on the right.

# TRW SERIES 60HZ - HFC-410A SUBMITTAL DATA ENG/I-P

## TRW Unit Dimensions

### Slave Unit, Furred In Cabinet

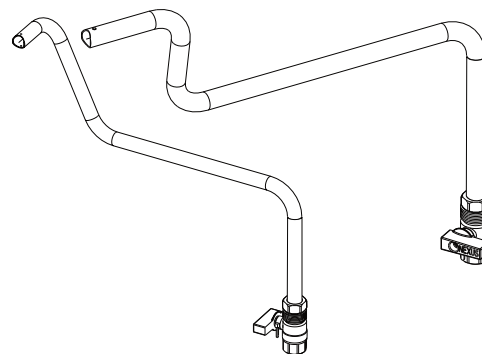
(88 in. [2235mm] Height), No Risers



Unit Size	A	B
TRW09 - 12	17 [432]	10 [254]
TRW15 - 18	20 [508]	13 [330]
TRW24 - 36	24 [610]	17 [432]

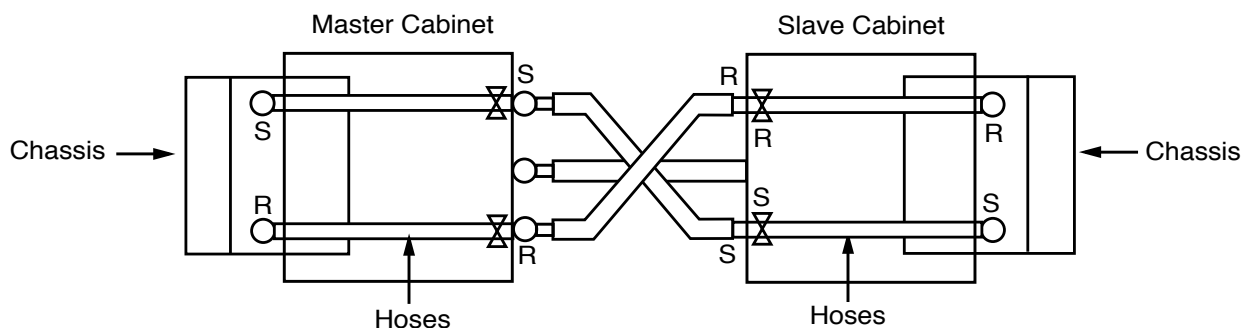
### Notes

- The riser compartment is defined as being the rear of each unit. Supply air grilles and return air/access panel can be any side except rear.
- All measurements are in inches (mm).
- Installer must provide crossover water piping from Master to Slave unit.
- Ball valve package is shipped loose. Field must position in cabinet (valve opposite RA side and copper protruding 1/2" out of cabinet) and connect to master riser stubouts.
- Units with 24v surface mount T/stat option have 2x4 tile rings factory installed. Contractor must specify horizontal vertical orientation to suit thermostat type.
- Supply and return depends on which option (see next page) installer uses to connect master.

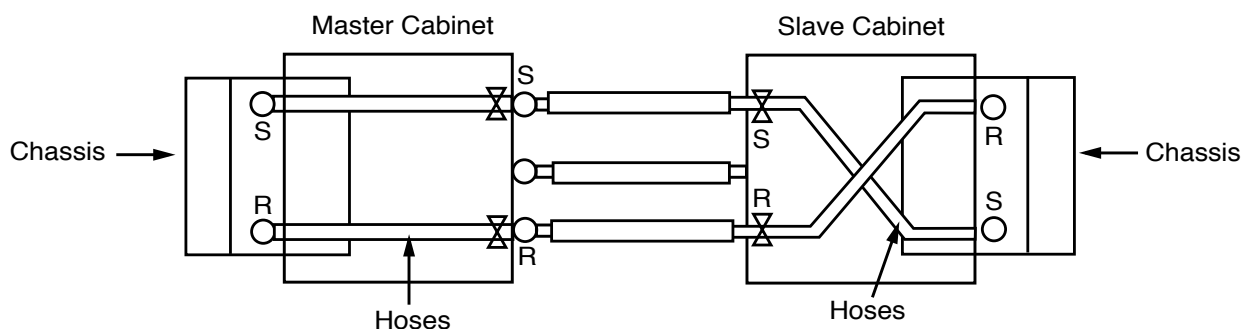


Ball Valve Package  
(Notes 4 & 8) Right Return Shown

ClimateMaster works continually to improve its products. As a result, the design and specifications of each product at the time of order may be changed without notice and may not be as described herein. Please contact ClimateMaster's Customer Service Department at 1-405-745-6000 for specific information on the current design and specifications. Statements and other information contained herein are not express warranties and do not form the basis of any bargain between the parties, but are merely ClimateMaster's opinion or commendation of its products. The latest version of this document is available at [climatemaster.com](http://climatemaster.com).



Option 1 - Cross field supplied piping between cabinets. Mark shutoffs inside slave cabinet. Run hoses straight across.



Option 2 - Field supplied and brazed piping to be straight across. Mark shutoffs inside slave cabinet. Cross hoses to chassis.

**Notes:**

1. Distance between cabinets must suit local codes and installer.
2. Both cabinets must have shutoffs inside (factory standard).
3. Condensate drains are internally trapped. Do not trap or allow tubing to sag outside cabinet.
4. Chassis shown partway out of cabinet for clarity.
5. Field-supplied piping must have same or higher pressure rating as risers.

**TRW Electrical Options**

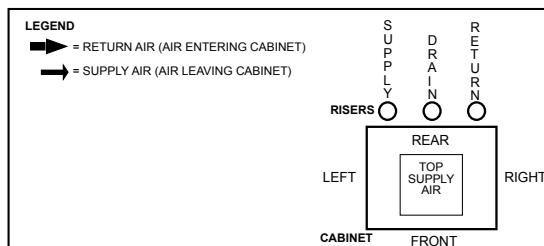
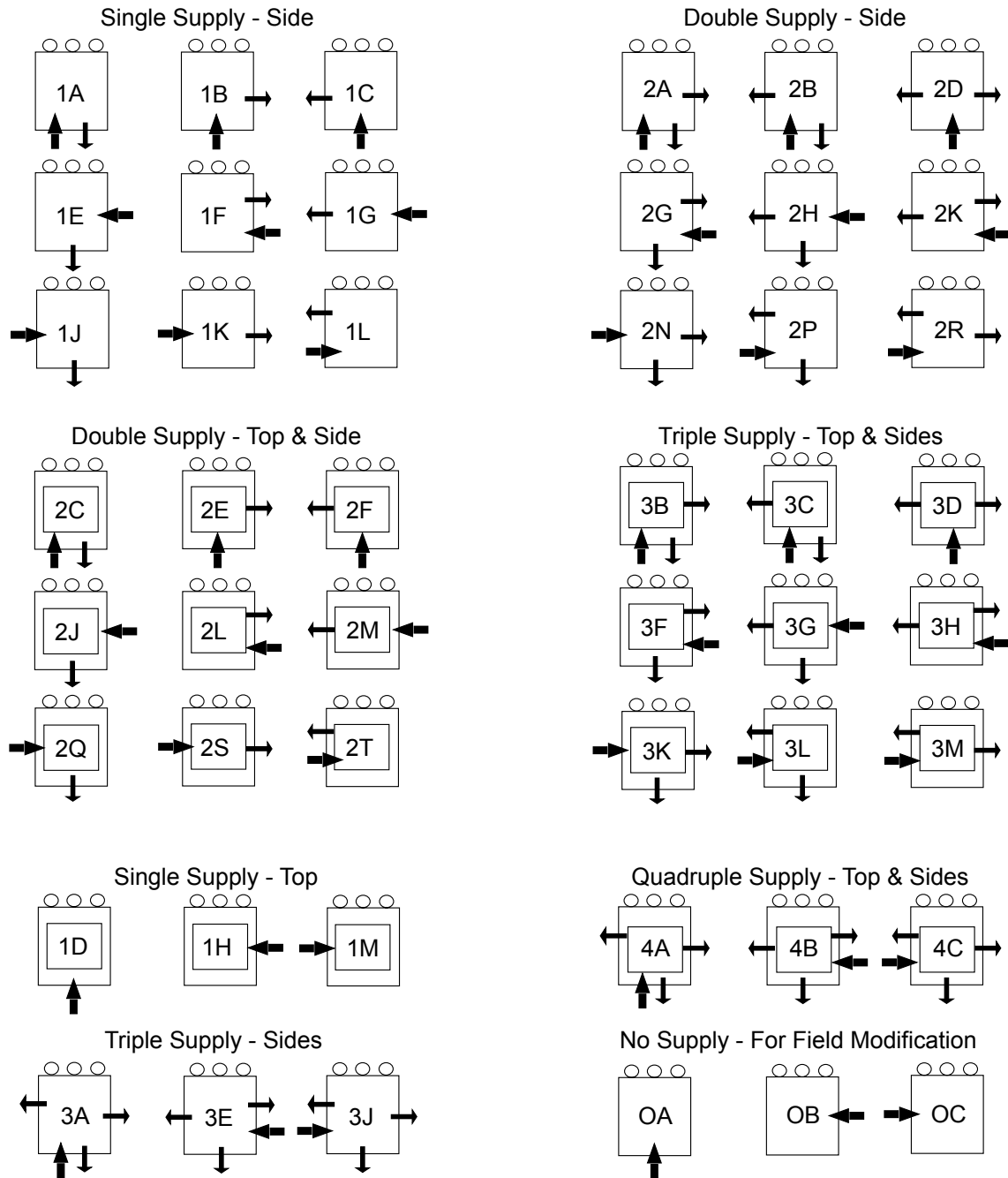
**Optional Cabinet Disconnect Switch**

Located on control box access door. Can be accessed through slot in "G" Panel Frame. Classified as motor disconnect.

**Optional Cabinet Circuit Breaker**

Located on control box access door. Can be accessed through slot in "G" Panel Frame. All 208/230V and 265V 15 and 20 amp classified as HACR breaker. 265V 25 amp and higher classified as supplemental breaker.

## TRW Cabinet Configurations



### Notes:

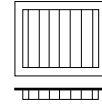
1. The riser compartment is defined as being the rear of each unit. Supply air grilles and return air/access panel can be any side except rear.
2. Return air side also defines control location and service access.
3. Triple discharge openings are not recommended for sizes TRW09 & TRW12. Single discharge openings are not recommended for sizes TRW24, 30, 36 (Except top discharge).
4. Solid plenum option for field conversion of discharge air arrangement is available.

## Air Flow vs. Grille Selection

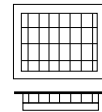
\* Grilles are shipped loose for field installation after drywall has been applied to cabinets that are furred in.

\*\* Grilles are brushed aluminum or painted (polar ice).

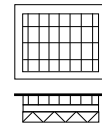
**Single Deflection-** Adjustable vertical blades for controlling horizontal path of discharge air.



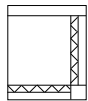
**Double Deflection-** Adjustable vertical and horizontal blades for controlling horizontal and vertical path of discharge air. (Recommended for all standard applications.)



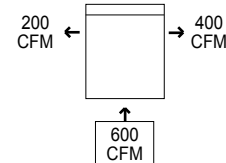
**Double Deflection with Opposed Blade Damper-** Addition of opposed blade damper to grille allows control of air volume (CFM) and path of discharge air. (Recommended for applications requiring unequal air flow or side discharge grille(s) with additional top discharge air opening.)



**Unequal Air Flow-** Air discharges requiring different air volumes (CFM). Use double deflection grilles with opposed blade damper.



**Note:** Units with adjacent grilles and opposed blade dampers may require special grilles. Consult factory with specific application.



**Top Discharge-** Units are designed to operate against relatively low air resistance (external static). Use of liberal duct sizing is recommended to maximize total unit air flow (CFM). Top duct outlet will offer more resistance to air flow than side outlets on the same cabinet. Therefore side outlet grille(s) must have opposed blade dampers to field balance the air flow.

### Multiple Discharge/Top Grille & Opening Sizing When Air Flow Is Divided Equally

Unit Size	Single Discharge	Double Discharge	Triple Discharge
TRW09	12" x 10" [305 x 254]	10" x 6" [254 x 152]	Not Recommended
TRW12	12" x 12" [305 x 305]	10" x 8" [254 x 203]	Not Recommended
TRW15 - 18	16" x 12" [406 x 305]	14" x 8" [356 x 203]	14" x 6" [356 x 152]
TRW24	Not Recommended	16" x 10" [406 x 254]	16" x 6" [406 x 152]
TRW30	Not Recommended	16" x 12" [406 x 305]	12" x 10" [305 x 254]
TRW36	Not Recommended	16" x 14" [406 x 356]	16" x 10" [406 x 254]

### Multiple Discharge/Top Discharge Grille & Opening Sizing When Air Flow Is Divided Unequally

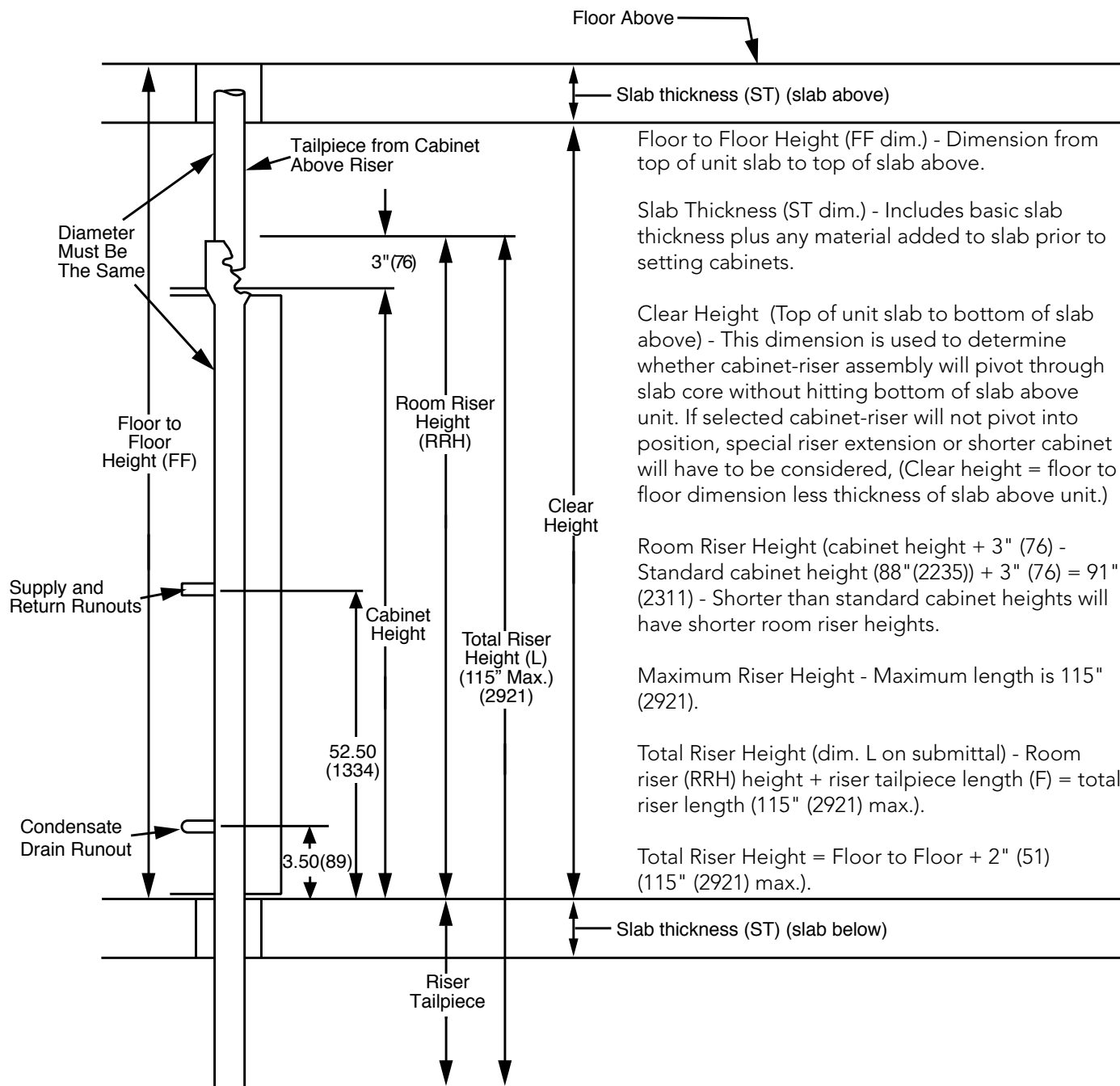
Model	Specified Discharge CFM	Grille Selection Chart												Top Discharge Opening Size (Up to 100% Unit CFM)
		10" [254] Wide x			12" [305] Wide x			14" [356] Wide x		16" [406] Wide x				
		6"H	8"H	10"H	6"H	10"H	12"H	6"H	8"H	6"H	10"H	12"H	14"H	
09 12	100 - 150	X			X									10 x 10 [254 x 254]
	175 - 225		X											
	250 - 275			X			X							
15 18	150 - 200							X						13 x 13 [330 x 330]
	250 - 325								X					
	400 - 450										X			
24 30 36	200 - 275									X				17 x 17 [432 x 432]
	300 - 350					X								
	375 - 450										X			
	500 - 600											X		
	625 - 725												X	

## Riser Definitions

Riser Tailpiece (length of riser that extends down from cabinet bottom) -

Dimension F on submittal drawing- Riser tailpiece sized for 2" (51) insertion into 3" (76) expanded section at top of cabinet. Actual job fit may be 1" (25) to 3" (76) insertion (built-in +1" (25) floor to floor tolerance). Riser tailpiece should extend beneath bottom of slab a minimum of 5" (127) to facilitate brazing.

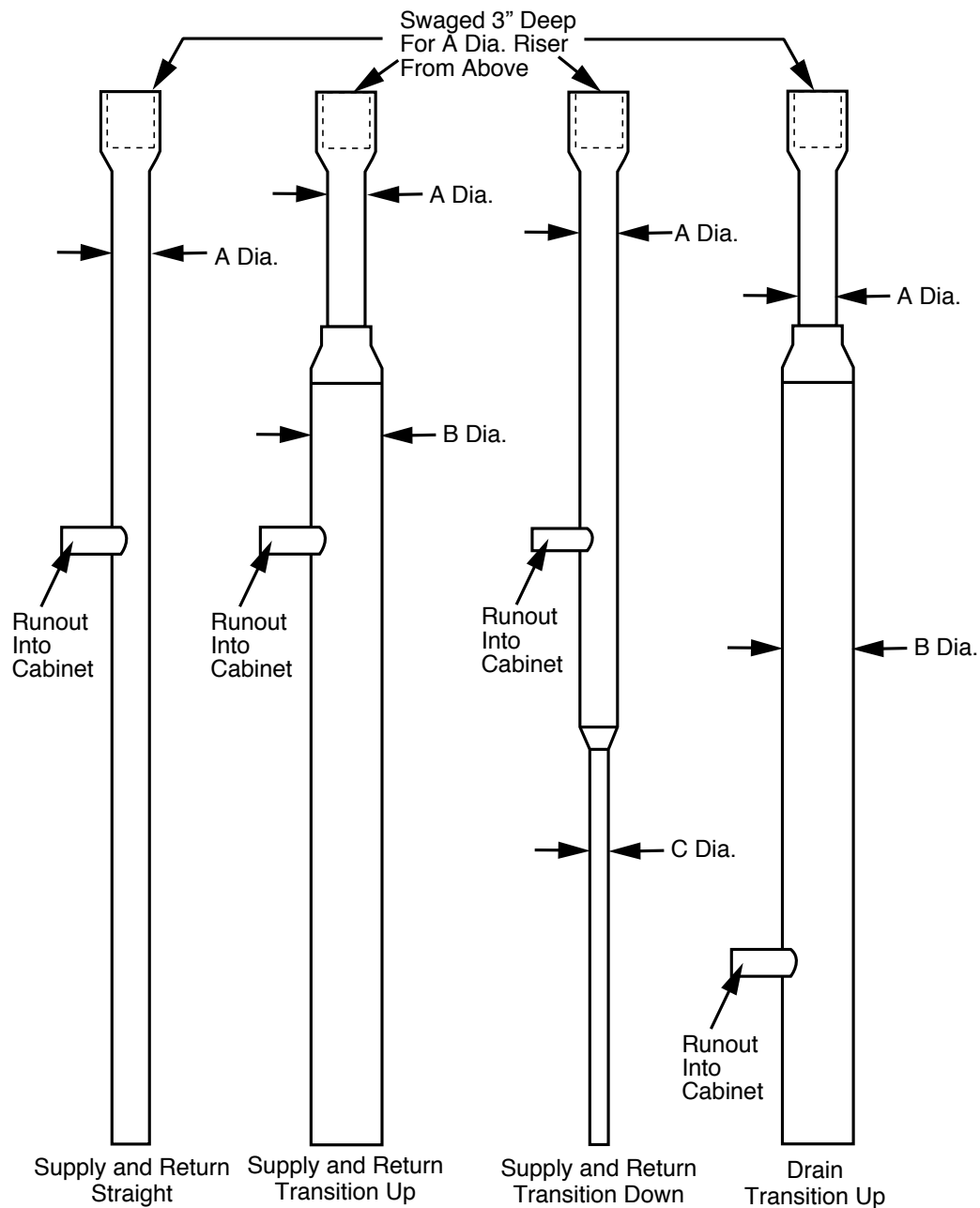
3" Swage (Expanded) Section - Riser expanded at top of unit to accept a pipe diameter from cabinet above. (Top of riser always 3" (76) above top of cabinet.)



### Notes:

1. Dimensions are in inches (mm)
2. Standard Riser Dimensions - 1, 1 1/4, 1 1/2, 2, 2 1/2, 3. Type M or L available.
3. Drain Riser Insulated standard. Supply and Return Riser Insulated optional.

# Riser Definitions



## Notes

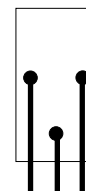
1. You must know water flow direction to determine if cabinet requires transition up or down.
2. Transitions can only change by one diameter (1" to 1¼", 1¼" to 1½", etc.)
3. Riser transition couplings and runouts are factory brazed.
4. All risers are factory pressure tested.
5. Standard riser diameters are 1", 1¼", 1½", 2", 2½" and 3".
6. Copper Type M and L available.
7. Drain riser insulated standard. Supply and return insulated optional.

A	1.00	1.25	1.50	2.00	2.50	3.00
B	1.25	1.50	2.00	2.50	3.00	-
C	-	1.00	1.25	1.50	2.00	2.50

## Riser Arrangements Top Floor Units

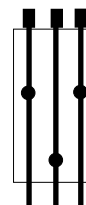
1. All Risers Capped At Cabinet Run-Outs
  - System piping is bottom supply & return

Standard for bottom supply & return unless otherwise specified.

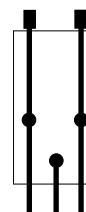


2. All Risers Open At Top
  - Bottom supply & return piping for supplying water to other units
  - Bottom supply & return piping for drain vent to roof, flushing crossover
  - Top supply & return piping

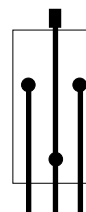
Standard for top supply & return unless otherwise specified.



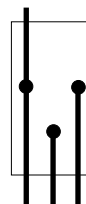
3. Supply & Return Open, Drain Capped At Cabinet Run-Out
  - Bottom supply & return piping with open top for venting or flushing crossover
  - Top supply & return



4. Capped Supply and Return, Drain Open At Top
  - Bottom supply & return piping with open drain riser for venting to roof or picking up drain from other equipment above



5. Supply Or Return Open At Top, Others Capped At Cabinet Run- Out
  - Bottom supply & top return piping
  - Top supply & bottom return piping



**Note: Check system flushing & air venting specifications.**



## Riser Arrangements Bottom Floor Units

### 1. All Riser Through Slab At Bottom

- Bottom supply & return
- Top supply & return feeding other equipment below

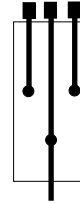
Standard for bottom supply & return unless otherwise specified.



### 2. Supply & Return Capped At Cabinet Run-Out, Drain Through Slab

- Top supply & return
- Supply & return mains above these units on "Between-Floors" main piping

Standard for top supply & return unless otherwise specified.



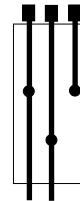
### 3. All Risers Capped At Cabinet Run-Out, Drain Through Slab

- Isolated unit top supply & return from adjacent riser with separate drain
- Check riser venting



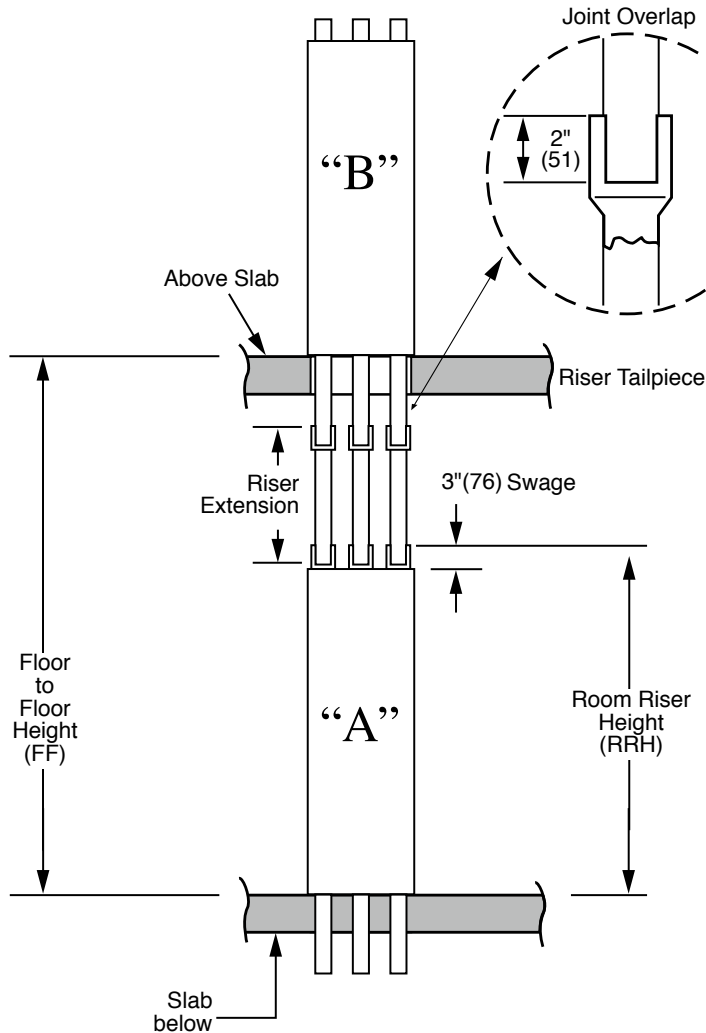
### 4. Supply Or Return Capped At Cabinet Run-Out, Other Risers Extend Through Slab

- Bottom supply, top return piping
- Bottom return, top supply piping



**Note:** Check system flushing and air venting specifications.

## Riser Extension Sizing



Riser Tail Piece: Length of riser extending down from the cabinet. Riser tail piece must extend a minimum of 5" (127) below slab.

Room Riser Height (RRH): Cabinet height + 3" (76). Standard Cabinet is 88" (2235) + 3" (76) = 91" (2311).

Floor To Floor Height (FF): Distance from top of unit slab to top of above slab.

Riser Extension Length: Start with the floor to floor Dim. (FF) From this subtract the room riser height and tail piece length. Then add 4" (102) to the two joint overlaps.

Riser Extension:  $FF - (\text{tailpiece} + \text{RRH}) + 4" (102)$ .

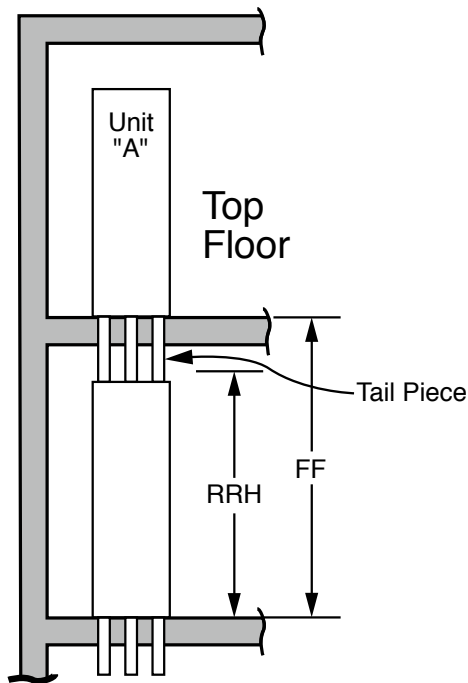
Example: Floor to floor (FF) = 120" (3048)  
Room Riser Height (RRH) = 91" (2311)  
Tail Piece = 13" (330).

Riser Extension:  $120" (3048) - (13" (330) + 91" (2311)) + 4" (102) = 20" (508)$ .

### Notes

1. Example shown - riser extensions would be ordered with "A" and assembled between "A" and "B".
2. Riser "A" Top and Riser "B" bottom must be the same diameter. Extensions cannot transition.

## Riser Length Sizing



To determine the riser tail piece length of a unit (unit "A").

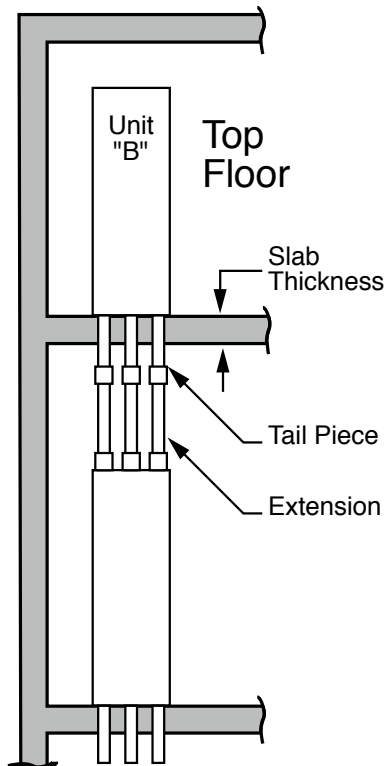
Riser Tail Piece ( of unit A) =  $FF - RRH + 2"$  (51).

RRH: Room riser height is cabinet height + 3" (76).

Standard cabinet height is 88" (2235).

$RRH = 88" (2235) + 3" (76) = 91" (2311)$ .

FF: Floor to Floor height is the dimension from the top of the slab above to the top of the slab below.



To determine the riser tail piece length of a unit (unit "B") that will require riser extensions to a unit below.

Minimum Tail Piece Length (of unit "B") =  $\text{slab thickness} + 5"$  (127).

To determine riser extensions lengths see page Riser Extension Sizing.

**Note: If riser length exceeds 115" (2921), riser extensions must be used. See Riser Extension Sizing. The riser tail piece must extend through the slab a minimum of 5" (127) to facilitate brazing. Special care must be taken in sizing riser lengths and tail piece lengths when:**

- A) Riser extensions are used.
- B) Floor to floor heights vary.
- C) Slab thickness varies from floor to floor.

See Riser Arrangement for selection of top floor riser applications.

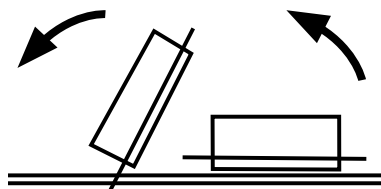
## Cabinet Height & Slab Slot Size

To determine the slab slot size required for the risers and to determine if clear height is OK for unit installation, use the cabinet height and slab slot charts on the next page.

To use the charts you will need the clear height in the room the unit is in, size of unit, number of risers, riser dimensions and type of installation. (See below)

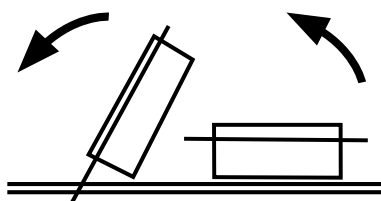
### Type 1 Single Units

With a minimum clear height of 94" (2388). Start with the unit lying on the chase.



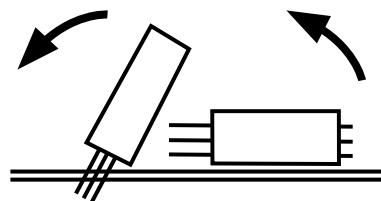
### Type 2 Single Units

With a minimum clear height of 96" (2438). Start with the unit lying with the chase on top.



### Type 3 Single

With a minimum clear height of 94" (2388). Start with the unit lying on its side as shown.

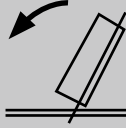
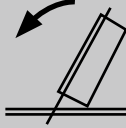
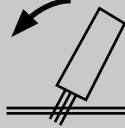


If any clear height is less than 96" (2438) check the minimum cabinet height and slot size chart to determine if the size unit you need will fit. If the standard 88" (2235) cabinet does not fit check the short 80" (2032) cabinet height and slot size chart. Call the factory if the short 80" (2032) cabinet does not fit. Check with the contractor for OK to use 80" (2032) cabinet.

Clear Height (swing height) = Floor to Floor Dimensions - Slab Thickness of Slab above the unit.  $CH = FF - ST$ .

## Slab Slot Chart - 3 Pipe

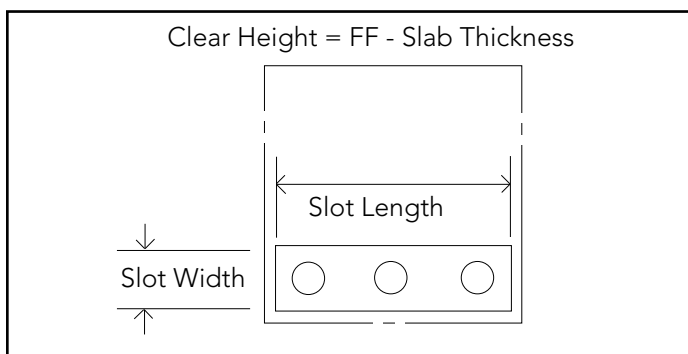
### 3 Pipe Standard 88" Cabinet

Model TRW	Clear Height	Slab Slot Size		
		Type of Installation		
		Type 1	Type 2	Type 3
		 W x L	 W x L	 W x L
09 - 12	96	5 7/8" X 15" [149 X 381]	5 7/8" X 15" [149 X 381]	5" X 15" [127 X 381]
	95	6 1/4" X 15" [159 X 381]	5 3/8" X 15" [137 X 381]	5" X 15" [127 X 381]
	94	6 5/8" X 15" [168 X 381]	5 3/8" X 15" [137 X 381]	5" X 15" [127 X 381]
	93	7" X 15" [179 X 381]	Not Recommended	5" X 15" [127 X 381]
	92	7 1/2" X 15" [191 X 381]	Not Recommended	Not Recommended
15 - 18	96	6 1/4" X 18" [159 X 457]	5 1/8" X 18" [130 X 457]	5" X 18" [127 X 457]
	95	6 3/4" X 18" [171 X 457]	5 3/8" X 18" [137 X 457]	5" X 18" [127 X 457]
	94	7 1/8" X 18" [181 X 457]	Not Recommended	5" X 18" [127 X 457]
	93	7 5/8" X 18" [194 X 457]	Not Recommended	5" X 18" [127 X 457]
24 - 36	96	7" X 22" [178 X 559]	5 1/8" X 22" [130 X 599]	5" X 22" [149 X 599]
	95	7 1/2" X 22" [191 X 559]	Not Recommended	5" X 22" [149 X 599]
	94	8" X 22" [203 X 559]	Not Recommended	5" X 22" [149 X 599]
09 - 12	91 or less	Not Recommended	Not Recommended	Not Recommended
15 - 18	92 or less	Not Recommended	Not Recommended	5" X 18" [149 x 457]
24 - 36	93 or less	Not Recommended	Not Recommended	5" X 22" [127 x 599]

To use this chart look down the model column to find the model. Then look across to find the clear height. If your clear height exceeds 96" use the 96" slab slot size. Then under the type of installation read the slab slot size.

Above charts allow 1" tolerance in clear height to allow for variance in floor to floor dimensions.

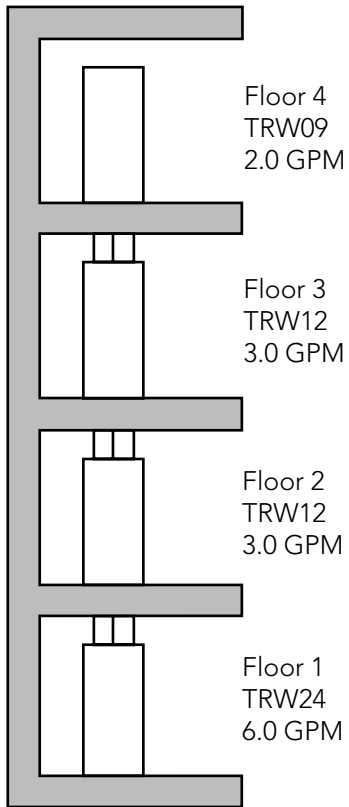
Clear height is the floor to floor dimension of the floor the unit is on minus the slab thickness above.



## Riser GPM Sizing

Riser GPM requirements and individual Unit GPM requirements are necessary to select the proper Riser Piping diameters. Refer to this page to determine GPM requirement, then refer to Riser Diameter Sizing Table to determine Riser Piping diameters.

Example is for bottom supply - bottom return system feed loop. GPM's are dependent upon unit load and system loop water temperatures. Please refer to Performance Charts for individual Unit GPM requirements.



Unit GPM (UGPM) = Required gallon per minute from "Performance Charts," in "Vertical Stacked Design Guide."

Total Riser GPM (TRGPM) = The sum of, all Units, GPM on each Riser.

Total GPM Per Floor (TGF) = Total GPM minus the sum of Unit GPM from all floors below.  $TGF = TRGPM - (\text{sum UGPM from units below})$ .

Example: Four floors, Consisting of units sizes TRW24, TRW12 and TRW09, as shown in diagram. GPM's are 6.0, 3.0 and 2.0 respectively.

$TRGPM = 6.0 + 3.0 + 3.0 + 2.0 = 14 \text{ GPM}$ .

Floor 4:  $TGF = 14 - (3.0 + 3.0 + 2.0) = 2 \text{ GPM}$  needed at floor 4.

Floor 3:  $TGF = 14 - (3.0 + 2.0) = 5 \text{ GPM}$  needed at floor 3.

Floor 2:  $TGF = 14 - (2.0) = 8 \text{ GPM}$  needed at floor 2.

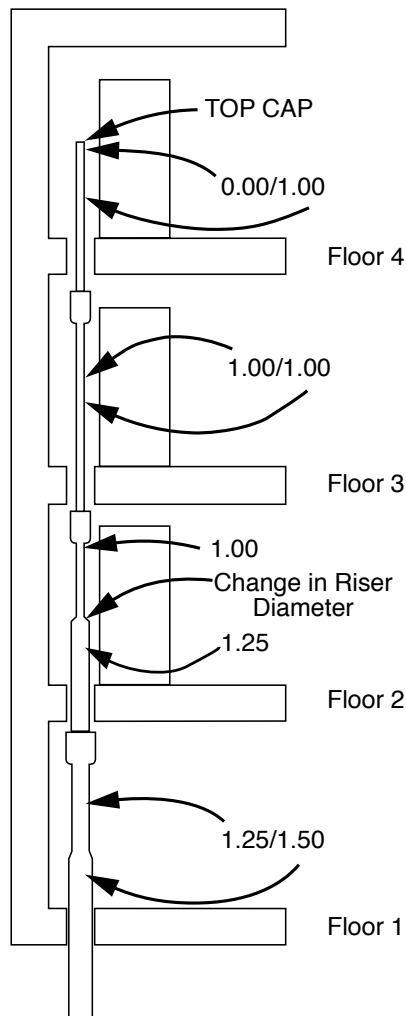
Floor 1:  $TGF = 14 - (\text{no floors below}) = 14 \text{ GPM}$  needed at floor 1.

Refer to Riser Diameter Sizing page.

## Riser Diameter Sizing

Refer to Riser GPM Sizing for the prefix to this example.

Each TRW Vertical Stack unit has three riser pipes. The following example will be for one riser pipe (from the top floor to the bottom floor), and will be representative of the remaining two riser pipes.



From Table 1 (below) determine the proper riser diameter needed to satisfy the required GPM's at each unit. Refer to Table 2 (below) for a summary.

The following nomenclature is used to designate the diameters at the top and bottom of each unit.

Top Cap - Top half of riser is eliminated and sealed.

Bottom Cap - Bottom half of riser is eliminated and sealed.

0.00/1.00 - Indicates top cap/1" bottom.

1.00/1.25 - Indicates 1" top/1.25" bottom.

1.25/0.00 - Indicates 1.25" top/bottom cap.

(from this we develop Table 3)

**Note: Transitions limited to 1 nominal diameter size larger or smaller within each floor.**

Values from Table 3 are to be entered on the Riser Piping Schedule. Top diameter must match bottom diameter of floor above.

**Table 1** (Max GPM for Frictional Loss = 4 PD FT/100 FT)

Maximum GPM	7	12	20	44	78	130
Nominal Riser Diameter	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"

**Table 2**

Floor	GPM	Diameter From Table 1
4	2	1" [25.4]
3	5	1 [25.4]
2	8	1.25" [31.8]
1	14	1.50" [38.1]

**Table 3**

Nomenclature per Unit	Description
0.00/1.00	Top Cap, w/1" Bot Feed
1.00/1.00	1" Full Length Riser
1.00/1.25	1" Top, 1.25" to 1st Floor
1.25/1.50	1.25" Top, 1.50" Bottom

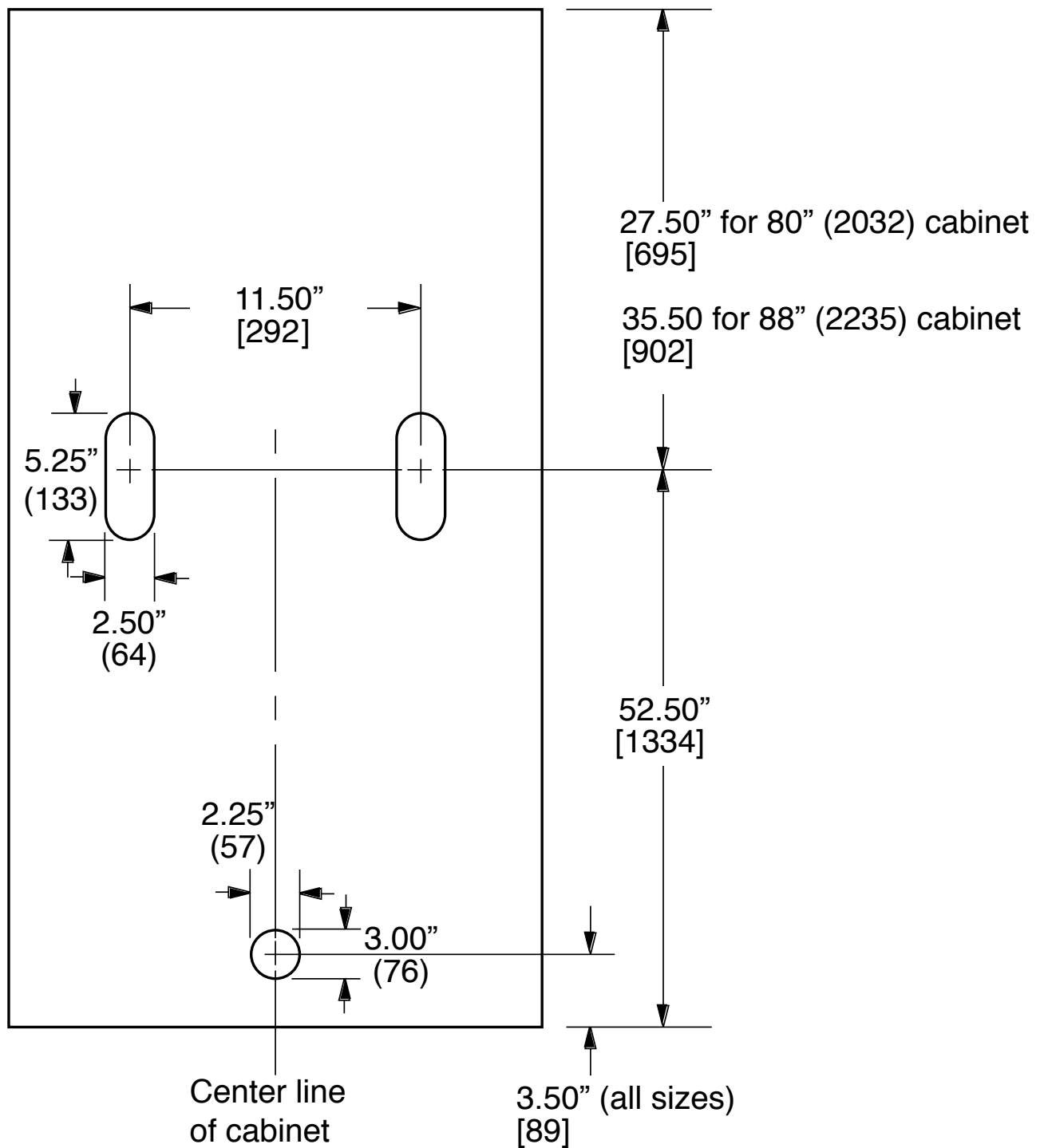
**Table 4**

Drain Diameter	Max Tonnage
1" [25 mm]	6
1 1/4" [32mm]	30
1 1/2" [38mm]	50
2" [51mm]	150

Values from Table 3 are to be entered on the Riser Piping Schedule. Top diameter must match bottom diameter of floor above.

Table 4 shows max A/C tonnage for drain riser diameter.

## Riser Slot Arrangements



Slots allow for riser stack expansion and contraction. Riser stub should be centered in slot. Dimensions are in inches [mm].



**Units Are Shipped FOB Factory**

ClimateMaster Hi-Rise Cabinets are normally shipped to the jobsite on dedicated open flatbed trailers, palletized for maximum shipping density, grouped together by building, size, and floor where possible, wrapped and covered with tarp for protection (Figure 1). The size of each pallet depends upon the cabinet size and number of cabinets (Figure 2).

Special shipping accommodations can be provided by ClimateMaster. Examples might include:

- Closed truck or container shipping, on special end fork pallets.
- Reduced height, width or weight pallets.
- Unit grouped on pallets by riser instead of floor (for example, a retrofit job).
- Export or over-crating.
- Risers shipped separately from cabinets.

However, any such special shipping needs must be included with the order of the units. ClimateMaster will charge extra for any accommodations which significantly increase the cost of the shipment.

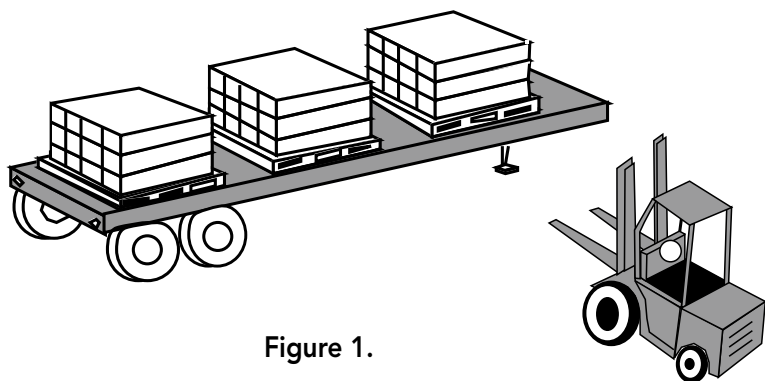


Figure 1.

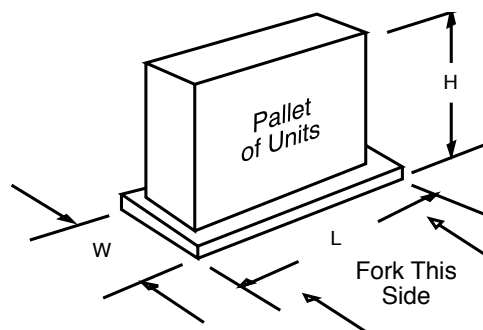


Figure 2.

Cabinet Size	# of Cabinets	L (in.)	W (in.)	H (in.)	Approx. Weight per pallet	Approx. Quantity per truck
09 - 12	4	106*	22	84	725	80
	8	106*	44	84	1450	80
15 - 18	4	106*	25	96	785	80
	8	106*	50	96	1570	80
24 - 36	3	106*	29	87	750	60
	6	106*	58	87	1500	60

\* 106" for standard, 104" long risers (typically add 2" to riser length.)

# NOTICE!

This product specification document is furnished as a means to copy and paste ClimateMaster product information into a project specification. It is not intended to be a complete list of product requirements. This document is an excerpt from the product submittal and must not be used without consulting the complete product submittal. For complete product installation and application requirements, please consult the complete product submittal. ClimateMaster is not responsible for misuse of this document or a failure to adequately review specific requirements in the product submittal.

**General:**

Furnish and install ClimateMaster Tranquility "Vertical Stack" Water Source Heat Pumps, as indicated on the plans with capacities and characteristics as listed in the schedule and the specifications that follow.

Units shall be a hybrid design with compressor cooling and hydronic heating. Loop water temperature shall be 85° to 125°F (29.4° to 51.7°C) for cooling and heating simultaneously in the building. If all units in heating mode maximum loop temperature can be 130°F (54°C). Equivalent units from other manufacturers may be proposed provided approval to bid is given 10 days prior to bid closing. All equipment listed in this section must be rated and certified in accordance with Air-Conditioning, Heating and Refrigeration Institute/International Standards Organization (AHRI / ISO 13256-1). All equipment must be tested, investigated, and determined to comply with the requirements of the standards for Heating and Cooling Equipment UL-1995 for the United States and CAN/CSA-C22.2 NO.236 for Canada, by Intertek Testing Laboratories (ETL). The units shall have ETL-US-C labels.

All units shall be fully quality tested by factory run testing under normal operating conditions as described herein. Quality control system shall automatically perform via computer: triple leak check, pressure tests, evacuation and accurately charge system, perform detailed heating and cooling mode tests, and quality cross check all operational and test conditions to pass/fail criteria. Detailed report card will ship with each unit displaying status for critical tests and components. **Note: If unit fails on any cross check, it shall not be allowed to ship. Serial numbers will be recorded by factory and furnished to contractor on report card for ease of unit warranty status. Units tested without water flow are not acceptable.**

**Basic Construction:**

The cabinet panels shall be fabricated from heavy gauge galvanized steel. The rigid one-piece cabinet assembly shall be constructed so that it is self-supporting, and can be installed prior to the chassis arrival, and to be able to avoid damage during construction. Top, base, fan deck, and other metal structural parts are to be 16 gauge construction, while exterior panels to be 20 gauge; unit further strengthened by structural breaks at corners. **Units not constructed of a minimum of these thicknesses are not acceptable.** Cabinet shall have a top panel and a bottom panel for structural rigidity of the cabinet; **no "open" top or "open" bottom designs allowed.**

The cabinet base shall contain a secondary drain pan fully insulated with a pressure differential drain trap connected to the condensate riser pipe, and guide rails for the slide in refrigeration chassis. Drain pan(s) shall be easily accessible for cleaning. All interior surfaces shall be lined with 1/2 inch (12.7mm) thick, 1-1/2 lb/ft<sup>3</sup> (24 kg/m<sup>3</sup>) acoustic type fiberglass insulation. All fiberglass shall be coated and have exposed edges butted up to flanges to prevent the introduction of glass fibers into the air stream.

Standard insulation must meet NFPA Fire Hazard Classification requirements 25/50 per ASTM E84, UL 723, CAN/ULC S102-M88 and NFPA 90A requirements; air erosion and mold growth limits of UL-181; stringent fungal resistance test per ASTM-C1071 and ASTM G21; and shall meet zero level bacteria growth per ASTM G22. **Unit insulation must meet these stringent requirements or unit(s) will not be accepted.**

Cabinet arrangements shall allow symmetrical placement of riser piping on any one of the three sides of the cabinet not used for the chassis access. All Cabinet openings shall have dry wall flanges on all sides. Supply air openings shall be factory cut and flanged as shown on plans. For air noise attenuation purposes, the discharge air from fan shall discharge into insulated plenum that also contains insulated x-shape air baffle. **Units without supply air noise baffles are not acceptable.** Cabinet design shall allow a full height base board (4.50 inches/114mm) beneath the return air "G" panel. The cabinet shall contain an easily removable motor/blower assembly.

Electrical conduit shall be installed from electrical unit control compartment to top of cabinet for low voltage control wiring as well as separate conduit for main power wiring. **Units without these two factory installed electric conduits will not be accepted.**

Full-length supply, return, and insulated condensate water risers shall be type M copper. Supply and return risers have integral internal piping including ball valves (for shut off purposes at unit). Risers and piping shall be factory pressure tested to check for leaks. Field installed hose kits are required to connect the chassis piping to the cabinet ball valve. The condensate riser shall be insulated with 3/8" (9.5mm) Armaflex type insulation. The top of each riser shall be deeply swaged (3 inch/76.2mm) to accept connection to the riser above/below, allowing for a floor-to-floor dimensional variance of ± one inch (25.4mm). **Units without swaged riser-piping connections shall not be acceptable. Couplings and trim pieces shall not be allowed.**

Option: Type L riser piping.

Option: Supply and return risers insulated with 3/8" (9.5mm) ARMAFLEX type insulation.

Option: Unit mounted Thermostat provisions -- includes insulated junction box mounted inside discharge plenum that is connected to Molex-type connector wired to unit thermostat terminals, and having tile ring on cabinet for drywall installation to accept thermostat mounting. Use part number A9155740, A9155741, A915531 or A9155727 thermostat assembly, which is thermostat model ATM11C11, ATA11C06, ATP32U03 or ATA11C04, respectively with mating Molex-type connector.

ClimateMaster works continually to improve its products. As a result, the design and specifications of each product at the time of order may be changed without notice and may not be as described herein. Please contact ClimateMaster's Customer Service Department at 1-405-745-6000 for specific information on the current design and specifications. Statements and other information contained herein are not express warranties and do not form the basis of any bargain between the parties, but are merely ClimateMaster's opinion or commendation of its products. The latest version of this document is available at [climatemaster.com](http://climatemaster.com).

## Tranquility Vertical - TRW Series Engineering Specifications Page 3

Option: Low voltage 15 foot whip with molex-type connector for connection to remote thermostat. Use part number A9155725, A9155729, A9155740, or A9155742 thermostat assembly, which is thermostat model ATA11C04, ATP32U03, ATM11C11 or ATA11C06, respectively with mating molex-type connector.

### Fan and Motor Assembly:

The cabinet shall contain a removable motor/blower assembly. Units shall have a direct drive centrifugal fan. The fan motor shall be 3 speed, permanently lubricated, PSC type with thermal overload protection. The fan motor for small size units (09 and 12) shall be isolated from the fan housing by a torsionally flexible motor mounting system with rubber type grommets to inhibit vibration induced high noise levels associated with "hard wire belly band" motor mounting. The fan motor on medium and large units (15-36) shall be isolated with flexible rubber type isolation grommets only. Airflow/External static pressure rating of the unit shall be based on a wet coil and clean filter. **Ratings based on a dry coil and/or no air filter shall not be acceptable.**

Option: ECM-X Motor, high efficient, preprogrammed motor for constant torque. Utilize up to 2 of the 5 speed taps for optimum CFM and lowest starting sound.

### Chassis:

The chassis, which incorporates the air coil, water coil, hydronic coil, 3 way diverter valve, drain pan, and compressor, shall be easily installed for quick jobsite installation and future servicing purposes. The slide in chassis shall have insulated panels surrounding the compressor. Compressors are not in the air stream. The chassis base shall be fabricated from heavy gauge galvanized steel formed to match the slide in rails of the cabinet. All electrical connections between the chassis and cabinet shall be made via locking quick-connects. Units shall have a factory installed 1 inch (25.4mm) thick filter bracket and throwaway type glass fiber filter. Furnish one spare set of filters.

Option: UltraQuiet package shall consist of high technology sound attenuating material that is strategically applied to the compressor (rotary only) and inside compressor compartment to dampen and attenuate sound transmissions. Compressor is mounted on specially engineered sound-tested isolators.

Water connections between chassis and the cabinet shall be accomplished via a hose kit consisting of Kevlar-reinforced EPDM core hose surrounded by a stainless-steel braid. Hose kit shall have brass fittings with stainless-steel ferrules. Hose ends shall be solid External MPT which connects to mating fitting on cabinet shut off ball valve(s), and Internal NPSM (National Pipe Straight Mechanical) swivel end with fiber or EPDM washer which connects to mating threaded end connection on chassis. The hose kit shall be rated for 400 PSIG (2756 kPa) design working pressure.

### Refrigerant Circuit: (For Cooling Only)

All units shall contain an EarthPure® (HFC-410A) sealed refrigerant circuit including a high efficiency scroll or rotary compressor designed for heat pump operation, a thermostatic expansion valve for refrigerant metering, an enhanced corrugated aluminum lanced fin and rifled copper tube refrigerant to air heat exchanger, reversing valve, coaxial (tube in tube) refrigerant to water heat exchanger, and safety controls including a high pressure switch, low pressure switch (loss of charge), water coil low temperature sensor, and air coil low temperature sensor. Access fittings shall be factory installed on high and low pressure refrigerant lines to facilitate field service. Activation of any safety device shall prevent compressor operation via a microprocessor lockout circuit. The lockout circuit shall be reset at the thermostat or at the contractor supplied disconnect switch. **Units that cannot be reset at the thermostat shall not be acceptable.**

Hermetic compressors shall be internally sprung and externally isolated. The compressor shall have a dual level vibration isolation system. The compressor will be mounted on specially engineered sound-tested EPDM vibration isolation grommets to a large heavy gauge compressor mounting plate, which is then isolated from the cabinet base with grommets for maximized vibration attenuation. All units (except units with rotary compressors) shall include a discharge muffler to further enhance sound attenuation. Compressor shall have thermal overload protection.

Refrigerant to air heat exchangers shall utilize enhanced corrugated lanced aluminum fins and rifled copper tube construction rated to withstand 625 PSIG (4309 kPa) refrigerant working pressure. Refrigerant to water heat exchangers shall be of copper inner water tube and steel refrigerant outer tube design, rated to withstand 625 PSIG (4309 kPa) working refrigerant pressure and 500 PSIG (3445 kPa) working water pressure. The refrigerant to water heat exchanger shall be "electro-coated" with a low cure cathodic epoxy material a minimum of 0.4 mils thick (0.4 – 1.5 mils range) on all surfaces. The black colored coating shall provide a minimum of 1000 hours salt spray protection per ASTM B117-97 on all external steel and copper tubing. The material shall be formulated without the inclusion of any heavy metals and shall exhibit a pencil hardness of 2H (ASTM D3363-92A), crosshatch adhesion of 4B-5B (ASTM D3359-95), and impact resistance of 160 in-lbs (184 kg-cm) direct (ASTM D2794-93).

Option: The refrigerant to air heat exchanger shall be coated.

Refrigerant metering shall be accomplished by thermostatic expansion valve only. Expansion valves shall be dual port balanced types with external equalizer for optimum refrigerant metering. Units shall be designed and tested for operating ranges of entering water temperatures from 20° to 120°F (-6.7° to 48.9°C). Reversing valve shall be four-way solenoid activated refrigerant valve, which shall default to heating mode should the solenoid fail to function. If the reversing valve solenoid defaults to cooling mode, an additional low temperature thermostat must be provided to prevent over-cooling an already cold room.

Option: The unit will be supplied with cupro-nickel coaxial water to refrigerant heat exchanger.

Option: The unit will be supplied with internally factory mounted two-way water valve for variable speed pumping requirements. Valve to be normally closed type.

Option: The unit will be supplied with internally factory mounted automatic water flow regulators.

#### Hydronic water coil (for heating only):

When diverter valve is energized, loop water circulates through the hydronic water coil. Water coil shall be copper tube and aluminum fin, multi-circuited for low pressure drop. Rated for 500 PSIG (3445 kPa) working water pressure.

#### Cabinet Drain Pan:

The drain pan shall be constructed of galvanized steel and have a powder coat paint application to further inhibit corrosion. This corrosion protection system shall meet the stringent 1000 hour salt spray test per ASTM B117. If plastic type material is used, it must be HDPE (High Density Polyethylene) to avoid thermal cycling shock stress failure over the lifetime of the unit. Drain pan shall be fully insulated. Drain pan shall have at a minimum a doubled sloped surface to allow positive drainage to the outlet opening, which shall be at the lowest level of the entire pan surface. Drain outlet shall be connected from pan outlet to condensate riser (if supplied) with factory installed trap inside of cabinet. The unit as standard will be supplied with solid-state electronic condensate overflow protection. **Mechanical float switches will NOT be accepted.**

Option: Stainless steel drain pan

#### Electrical:

A control compartment shall be located within the cabinet and shall contain a 50VA transformer, 24 volt activated, 2 or 3 pole compressor contactor, terminal block for thermostat wiring and solid-state controller for complete unit operation. Reversing valve and fan motor wiring shall be routed through this electronic controller. Units shall be name-plated for use with time delay fuses or HACR circuit breakers. Unit controls shall be 24 Volt and provide heating or cooling as required by the remote thermostat/sensor.

Option: Disconnect Switch, Non-Fused, classified as motor disconnect.

Option: Circuit Breaker, all 208/230 volt and 265 volt, 15 and 20 amp - HACR rated, 265 volt 25 amp and higher - supplemental rated.

#### Solid State Control System (DXM):

This control system features two stage control of cooling and two stage control of heating modes for exacting temperature and dehumidification purposes.

This control system coupled with a multi-stage thermostat will better dehumidify room air by automatically running the heat pump's fan at lower speed on the first stage of cooling thereby implementing low sensible heat ratio cooling. On the need for higher cooling performance the system will activate the second stage of cooling and automatically switch the fan to the higher fan speed setting. This system may be further enhanced with a humidistat. **Units without automatic low sensible heat ratio cooling will not be accepted; as an alternate a hot gas reheat coil may be provided with control system for automatic activation.**

- a. Anti-short cycle time delay on compressor operation.
- b. Random start on power up mode.
- c. Low voltage protection.
- d. High voltage protection.
- e. Unit shutdown on high or low refrigerant pressures.
- f. Unit shutdown on low water temperature (cooling) and high water temperature (heating).
- g. Condensate overflow electronic protection.
- h. Option to reset unit at thermostat or disconnect.
- i. Automatic intelligent reset. Unit shall automatically reset the unit 5 minutes after trip if the fault has cleared. If a fault occurs 3 times sequentially without thermostat meeting temperature, then lockout requiring manual reset will occur.
- j. Ability to defeat time delays for servicing.
- k. Light emitting diode (LED) on circuit board to indicate high pressure, low pressure, low voltage, high voltage, low water/air temperature cut-out, condensate overflow, and control voltage status.

ClimateMaster works continually to improve its products. As a result, the design and specifications of each product at the time of order may be changed without notice and may not be as described herein. Please contact ClimateMaster's Customer Service Department at 1-405-745-6000 for specific information on the current design and specifications. Statements and other information contained herein are not express warranties and do not form the basis of any bargain between the parties, but are merely ClimateMaster's opinion or commendation of its products. The latest version of this document is available at [climatemaster.com](http://climatemaster.com).

## Tranquility Vertical - TRW Series

### Engineering Specifications Page 5

- l. The low-pressure switch shall not be monitored for the first 120 seconds after a compressor start command to prevent nuisance safety trips.
- m. 24V output to cycle a motorized water valve or other device with compressor contactor.
- n. Unit Performance Sentinel (UPS). The UPS warns when the heat pump is running inefficiently.
- o. Water coil low temperature sensing (selectable for water or anti-freeze).
- p. Air coil low temperature sensing.
- q. Removable thermostat connector.
- r. Minimized reversing valve operation (Unit control logic shall only switch the reversing valve when cooling is demanded for the first time. The reversing valve shall be held in this position until the first call for heating, ensuring quiet operation and increased valve life.).
- s. Override temperature control with 2-hour timer for room occupant to override setback temperature at the thermostat.
- t. Ability to work with heat pump or heat/cool (Y, W) type thermostats.
- u. Ability to work with heat pump thermostats using O or B reversing valve control.
- v. Emergency shutdown contacts.
- w. Boilerless system heat control at low loop water temperature.
- x. Ability to allow up to 3 units to be controlled by one thermostat.
- y. Relay to operate an external damper.
- z. Ability to automatically change fan speed from multistage thermostat.
- aa. Relay to start system pump.
- bb. 75 VA control transformer. Control transformer shall have load side short circuit and overload protection via a built in circuit breaker.

**NOTE: Units not providing the 8 safety protections of anti-short cycle, low voltage, high voltage, high refrigerant pressure, low pressure (loss of charge), air coil low temperature cut-out, water coil high temperature cut-out, and condensate overflow protections will not be accepted.**

#### Remote Service Sentinel (DXM):

Solid state control system shall communicate with thermostat to display (at the thermostat) the unit status, fault status, and specific fault condition, as well as retrieve previously stored fault that caused unit shutdown. The Remote Service Sentinel allows building maintenance personnel or service personnel to diagnose unit from the wall thermostat. The control board shall provide a signal to the thermostat fault light, indicating a lockout. Upon cycling the G (fan) input 3 times within a 60 second time period, the fault light shall display the specific code as indicated by a sequence of flashes. A detailed flashing code shall be provided at the thermostat LED to display unit status and specific fault status such as over/under voltage fault, high pressure fault, low pressure fault, low water temperature fault, condensate overflow fault, etc. **Units that do not provide this remote service sentinel shall not be acceptable.**

#### Option: Lonworks interface system

Units shall have all the features listed above and the control board will be supplied with a LONWORKS interface board, which is LONMark certified. This will permit all units to be daisy chained via a 2-wire twisted pair shielded cable. The following points must be available at a central or remote computer location:

- a. Space temperature
- b. Leaving water temperature
- c. Discharge air temperature
- d. Command of space temperature setpoint
- e. Cooling status
- f. Heating status
- g. Low temperature sensor alarm
- h. Low pressure sensor alarm
- i. High pressure switch alarm
- j. Condensate sensor alarm
- k. Hi/low voltage alarm
- l. Fan "ON/AUTO" position of space thermostat as specified above
- m. Unoccupied/occupied command
- n. Cooling command
- o. Heating command
- p. Fan "ON/AUTO" command
- q. Fault reset command
- r. Itemized fault code revealing reason for specific shutdown fault (any one of 7)

This option also provides the upgraded 75VA control transformer with load side short circuit and overload protection via a built in circuit breaker.

ClimateMaster works continually to improve its products. As a result, the design and specifications of each product at the time of order may be changed without notice and may not be as described herein. Please contact ClimateMaster's Customer Service Department at 1-405-745-6000 for specific information on the current design and specifications. Statements and other information contained herein are not express warranties and do not form the basis of any bargain between the parties, but are merely ClimateMaster's opinion or commendation of its products. The latest version of this document is available at [climatemaster.com](http://climatemaster.com).

**Option: MPC (Multiple Protocol Control) interface system**

Units shall have all the features listed above and the control board will be supplied with a Multiple Protocol interface board. Available protocols are BACnet MS/TP, Modbus, or Johnson Controls N2. The choice of protocol shall be field selectable/changeable via the use of a simple selector switch. Protocol selection shall not require any additional programming or special external hardware or software tools. This will permit all units to be daisy chain connected by a 2-wire twisted pair shielded cable. The following points must be available at a central or remote computer location:

- a. Space temperature
- b. Leaving water temperature
- c. Discharge air temperature
- d. Command of space temperature setpoint
- e. Cooling status
- f. Heating status
- g. Low temperature sensor alarm
- h. Low pressure sensor alarm
- i. High pressure switch alarm
- j. Condensate overflow alarm
- k. Hi/low voltage alarm
- l. Fan "ON/AUTO" position of space thermostat as specified above
- m. Unoccupied/occupied command
- n. Cooling command
- o. Heating command
- p. Fan "ON/AUTO" command
- q. Fault reset command
- r. Itemized fault code revealing reason for specific shutdown fault (any one of 7)

This option also provides the upgraded 75VA control transformer with load side short circuit and overload protection via a built in circuit breaker.

**Return Panel/Supply Grilles:**

The return panel shall be architecturally designed, acoustic type, flush mounted with hinged door for easy and quick access to filter and unit interior. Chassis shall be easily removed. The hinged return panel shall be made of heavy gauge die formed galvanized steel with a powder coat finish in "polar ice" color.

**Return air panels that protrude from wall more than 5/8 inch (15.9mm) are not acceptable.** Supply grille(s) shall be architecturally designed "brushed" aluminum or powder coated steel (color: polar ice).

Option: Style "G" return air panel with frame.

Option: Supply grille with double deflection style louvers.

Option: Supply grille with double deflection style louvers with opposed damper.

Option: Motorized fresh air damper for either "G" or "H" panel with frame - allows outside air to enter on right or left side.

Option: Style "H" return air panel with frame (Note: This option eliminates unit-mounted thermostat option).

**Warranty:**

ClimateMaster shall warranty equipment for a period of 12 months from start up or 18 months from shipping (which ever occurs first).

Option: Extended 4-year compressor warranty covers compressor for a total of 5 years.

Option: Extended 4-year refrigeration circuit warranty covers coils, reversing valve, expansion valve and compressor for a total of 5 years.

Option: Extended 4-year control board warranty covers the CXM/DXM control board for a total of 5 years.

**DDC LOOP CONTROLLER - field supplied.** Must be able to limit entering water temperature to 130°F (54°C). Controller must have outdoor air sensor; relays to control 2 main pumps, heater pump, and alarm; shut down audible alarm; operator control panel; and connection for fluid flow monitoring pressure differential switch. **Unit operation without loop controller is not acceptable and will void the warranty.**

## Tranquility Vertical - TRW Series Engineering Specifications Page 7

### FIELD INSTALLED OPTIONS

#### Hose Kits - AHH Series (required for field water connections):

Water connections between chassis and the cabinet shall be accomplished via a hose kit consisting of Kevlar-reinforced EPDM core hose surrounded by a stainless-steel braid. Hose kit shall have brass fittings with stainless-steel ferrules. Hose ends shall be solid External NPT which connects to mating fitting on cabinet shut off ball valve(s), and Internal NPSM (National Pipe Straight Mechanical) swivel end with fiber or EPDM washer which connects to mating threaded end connection on chassis. The hose kit shall be rated for 400 psi (2756 kPa) design working pressure. This hose kit accessory is required for each cabinet.

#### Thermostats:

The thermostat shall be a ClimateMaster mechanical or electronic type heat/cool thermostat as selected below with the described features:

a. Single Stage Standard Manual Changeover (ATM11C11)

Thermostat shall be a single-stage, horizontal mount, manual changeover with HEAT-OFF-COOL system switch and fan ON-AUTO switch, and heat/cool-heat pump jumper. Thermostat shall have a mechanical temperature set point indicator. Thermostat shall only require 4 wires (G,Y,W,R) for connection. Mercury bulb thermostats are not acceptable.

#### DDC Sensors:

ClimateMaster wall mounted DDC sensor to monitor room temperature and interfaces with optional interface system described above. Several types as described below:

- a. Sensor only with no display (LON and MPC).
- b. Sensor with override (LON only).
- c. Sensor with setpoint adjustment and override (MPC only).
- d. Sensor with setpoint adjustment and override, LCD display, status/fault indication (LON and MPC).



Notes:

Revision History

Date:	Item:	Action:
10/05/10	First Published	