

# engineering manual



## mini-Spot

### Comfort Ceiling A/C's 1-3 Tons

- 1, 1-1/2, 2 and 3 Ton Capacities
- Perfect for Conference Rooms, Classrooms & Office Space
- T-Bar Ceiling Mounted - Ductless Spot Cooler or Ducted
- DX Air, Water & Glycol Cooled plus Chilled Water Systems



Excellence In Ceiling Mounted AC and Environmental Control Systems  
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# Do It Up!



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## Model Nomenclature

**MAA-036**

mini Spot - **M**

Air Cooled - **A**

Chilled Water - **C**

Water Cooled - **W**

Glycol Cooled - **G**

Comfort - **A**

**012** - Nominal 1.0 Ton

**018** - Nominal 1.5 Ton

**024** - Nominal 2.0 Ton

**036** - Nominal 3.0 Ton

**H1/DHP**

Horizontal - **H**

208-230/1/60 - **1**

208-230/3/60 - **3**

460/3/60 - **4**

575/1/60 - **5**

277/1/60 - **7**

**HP** - Heat Pump Option

**O** - Outdoor Air Option

**BU** - Indoor Centrifugal Blower Air Cooled Remote Condensing Unit

**B** - Indoor Centrifugal Blower Air Cooled Remote Condenser

**D** - Self-Contained Air Cooled Unit

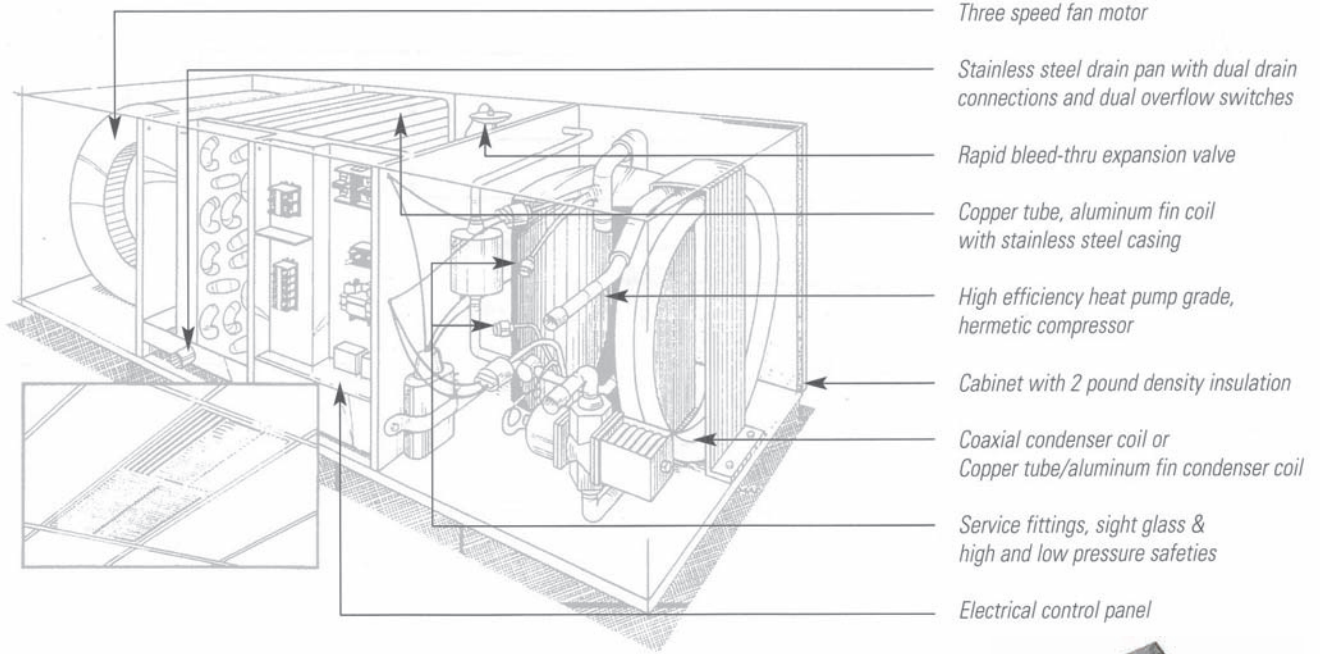
**FU** - Outdoor Propeller Fan Air Cooled Remote Condensing Unit

**F** - Outdoor Propeller Fan Air Cooled Remote Condenser Unit

**Note:** 277/1/60 available via transformers.

# mini-Spot™

Skil-aire™ Built to Last With Design Features That Assure Superior Performance and Dependability in Any Application.



Three speed fan motor

Stainless steel drain pan with dual drain connections and dual overflow switches

Rapid bleed-thru expansion valve

Copper tube, aluminum fin coil with stainless steel casing

High efficiency heat pump grade, hermetic compressor

Cabinet with 2 pound density insulation

Coaxial condenser coil or Copper tube/aluminum fin condenser coil

Service fittings, sight glass & high and low pressure safeties

Electrical control panel



## Invisible Air Conditioning Systems Incorporating Indoor Air Quality Features For Total Comfort:

### Microprocessor Controls:



**DigiSkil-100/200**  
(Digital T-Stats)



**MicroSkil-100/200**  
(Micro T/H Controls)

### IAQ Comfort:

- Steam Humidifier
- Electric, Hot Water, Steam or Heat Pump Heating
- High Efficiency Air Filtration

### Head Pressure Control:

- Air Cooled - Choose from -17.8°C (0°F), -28.9°C (-20°F) and -34.4°C (-30°F) Low Ambient Options
- Water/Glycol Cooled - 2 and 3-way standard and high pressure regulating valve options



### Air Pattern Options:

- 2'x4' Ductless Spot Cooler (standard)
- Ducted Evaporator (optional)

### Capacity Modulation:

- Hot Gas Bypass

### Select Accessories:

- Condensate Pumps
- Non-Fused Disconnects
- Firestats
- Smoke Detectors
- Remote Water Detectors
- and more ...!



**MEA-386-90-E NYC Approved**  
**Chicago Code Approved**

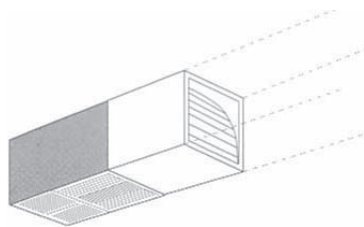
# MECHANICAL DATA

Nominal Tons	1.0	1.5	2.0	3.0
Model Size	012	018	024	036
<b>AIR COOLED @ 35°C (95°F) Entering Condenser Air</b>				
<b>26.7°C (80°F) DB, 50% RH</b>				
Total / Sensible	KW (MBH) 4.25 / 2.9 (14.5 / 9.9)	6.2 / 4.8 (21.1 / 16.4)	7.5 / 5.8 (25.6 / 19.8)	10.7 / 8.6 (36.6 / 29.3)
<b>23.9°C (75°F) DB, 50% RH</b>				
Total / Sensible	KW (MBH) 3.9 / 2.8 (13.5 / 9.7)	5.8 / 4.8 (19.7 / 16.4)	6.9 / 5.8 (23.6 / 19.7)	9.9 / 8.5 (33.7 / 29.2)
<b>22.2°C (72°F) DB, 50% RH</b>				
Total / Sensible	KW (MBH) 3.2 / 2.7 (10.8 / 9.1)	5.5 / 4.7 (18.8 / 16.1)	6.6 / 5.6 (22.5 / 19.3)	9.4 / 8.0 (32.2 / 27.4)
<b>WATER COOLED @ 29.4°C (85°F) Entering Condenser Water</b>				
<b>26.7°C (80°F) DB, 50% RH</b>				
Total / Sensible	KW (MBH) 4.8 / 3.9 (16.4 / 13.2)	6.0 / 4.7 (20.4 / 16.0)	7.3 / 5.6 (24.8 / 19.3)	11.3 / 8.8 (38.7 / 30.0)
<b>23.9°C (75°F) DB, 50% RH</b>				
Total / Sensible	KW (MBH) 4.4 / 3.8 (15.0 / 12.9)	5.5 / 4.6 (18.7 / 15.6)	6.7 / 5.5 (22.9 / 18.9)	10.5 / 8.6 (35.7 / 29.4)
<b>22.2°C (72°F) DB, 50% RH</b>				
Total / Sensible	KW (MBH) 3.6 / 2.8 (12.3 / 9.8)	4.4 / 4.2 (15.1 / 14.3)	6.3 / 5.4 (21.6 / 18.4)	9.6 / 7.7 (32.8 / 26.2)
<b>GLYCOL COOLED @ 43.3°C (110°F), 40% Entering Ethylene Glycol</b>				
<b>26.7°C (80°F) DB, 50% RH</b>				
Total / Sensible	KW (MBH) 4.1 / 3.3 (14.1 / 11.3)	5.2 / 4.3 (17.8 / 14.8)	6.6 / 5.1 (22.5 / 17.6)	10.0 / 8.3 (34.1 / 28.2)
<b>23.9°C (75°F) DB, 50% RH</b>				
Total / Sensible	KW (MBH) 3.7 / 3.2 (12.6 / 10.8)	4.6 / 4.2 (15.9 / 14.2)	6.1 / 5.1 (20.9 / 17.4)	9.3 / 8.2 (31.7 / 27.9)
<b>22.2°C (72°F) DB, 50% RH</b>				
Total / Sensible	KW (MBH) 3.6 / 2.9 (12.3 / 9.8)	4.4 / 4.0 (15.0 / 13.7)	5.7 / 4.6 (19.4 / 15.7)	8.9 / 7.6 (30.5 / 26.1)
<b>CHILLED WATER SYSTEMS @ 7.2°C (45°F) Entering Water Temp.</b>				
<b>26.7°C (80°F) DB, 50% RH</b>				
Total / Sensible	KW (MBH) 4.2 / 3.2 (14.2 / 11.0)	7.3 / 5.2 (24.8 / 17.9)	7.8 / 6.0 (26.8 / 20.4)	13.1 / 9.1 (44.7 / 31.2)
<b>23.9°C (75°F) DB, 50% RH</b>				
Total / Sensible	KW (MBH) 3.4 / 3.0 (11.5 / 10.2)	5.8 / 4.8 (19.7 / 16.5)	6.3 / 5.6 (21.6 / 19.0)	10.5 / 8.5 (36.0 / 29.1)
<b>22.2°C (72°F) DB, 50% RH</b>				
Total / Sensible	KW (MBH) 3.0 / 2.8 (10.1 / 9.7)	5.0 / 4.5 (17.0 / 15.4)	5.5 / 5.2 (18.9 / 17.9)	8.3 / 7.5 (28.2 / 25.5)
Flow Rate	LPM (GPM) 13.2 (3.5)	18.9 (5.0)	18.9 (5.0)	28.4 (7.5)
Pressure Drop	kPa (FT W.G.) 1.2 (0.4)	14.6 (4.9)	14.6 (4.9)	32.3 (10.8)
Standard Valve	2-way, 150 psig - factory installed			

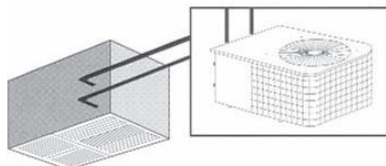
## COMMON FEATURES

<b>Evaporator Airflow - @ 0.4" e.s.p., Direct Drive Centrifugal</b>					
Discharge	L/S (CFM)	212.4 (450)	339.8 (720)	415.3 (880)	566.3 (1,200)
Fan Motor	HP	1/2 Hp	1/2 Hp	1/2 Hp	1/2 Hp
Fan Dia x Width	CM (IN)	22.9 x 22.9 (9 x 9)	22.9 x 22.9 (9 x 9)	22.9 x 22.9 (9 x 9)	22.9 x 22.9 (9 x 9)
<b>Evaporator Coil - Aluminum Fin, Copper Tube</b>					
Face Area	M <sup>2</sup> (FT <sup>2</sup> )	0.1 (1.1)	0.18 (1.9)	0.18 (1.9)	0.23 (2.5)
Rows	NO	4	4	4	4
Face Velocity	MPM (FPM)	125 (410)	115.8 (380)	140.2 (460)	152.4 (500)
<b>Air Filtration - @ 20% Dust Spot</b>					
Nominal Size	CM (IN)	50.8x50.8x2.5 (20x20x1)	50.8x50.8x2.5 (20x20x1)	50.8x50.8x2.5 (20x20x1)	50.8x50.8x2.5 (20x20x1)
<b>Compressor - Heat Pump Duty Hermetic</b>					
Size (Qty.)	HP (NO)	1.0 (1)	1.5 (1)	2.0 (1)	3.0 (1)
<b>Heat - includes evaporator motor heat, (Optional)</b>					
Electric Heat	BTUH	17,065	17,065	17,065	17,065
	KW	5.0	5.0	5.0	5.0
<b>Steam Canister Humidifier, (Optional)</b>					
Steam Canister	LBS/HR	3	5	5	5
Max Water Press	PSI	15-85	15-85	15-85	15-85
<b>Connection Sizes</b>					
Humidifier Inlet	FLARE CM (IN)	0.6 (1/4)	0.6 (1/4)	0.6 (1/4)	0.6 (1/4)
Condensate Drain	FPT CM (IN)	1.9 (3/4)	1.9 (3/4)	1.9 (3/4)	1.9 (3/4)

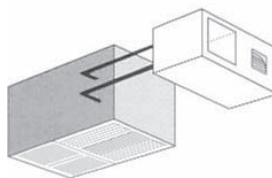
## DX - Air Cooled



**MAA / D**  
Self contained Air Cooled System for ducted condenser applications or free discharge of condenser air into open or vented spaces.

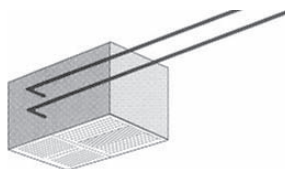


**MAA / FU**  
Air Cooled Split System with outdoor propeller fan remote condensing unit.



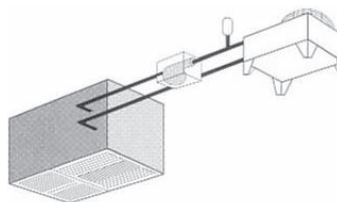
**MAA / BU**  
Air Cooled Split System with indoor centrifugal blower remote condensing unit.

## DX - Water Cooled



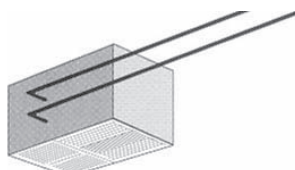
**MWA**  
Self contained Water Cooled System complete with coaxial condenser and water regulating valve.

## DX - Glycol Cooled



**MGA / FCPP**  
Self contained Glycol Cooled System complete with coaxial condenser, glycol regulating valve, remote drycooler, pump package and expansion tank.

## Chilled Water



**MCA**  
Chilled Water Systems for use with building chilled water systems. Each unit complete with factory installed chilled water valve.

# MECHANICAL DATA

## Condenser Data

Nominal Tons	1.0	1.5	2.0	3.0
Model Size	012	018	024	036

### AIR COOLED CONDENSER DATA

Indoor, Centrifugal Blower Air Cooled Condenser Data - (D and BU models)					
Discharge	L/S (CFM)	354 (750)	566.3 (1,200)	566.3 (1,200)	566.3 (1,200)
	IN ESP	0.4	0.4	0.4	0.4
Fan Motor	HP	1/2	1/2	1/2	1/2
Fan Dia x Width	CM (IN)	22.9 x 22.9 (9 x 9)	22.9 x 22.9 (9 x 9)	22.9 x 22.9 (9 x 9)	22.9 x 22.9 (9 x 9)
Coil Face Area	M <sup>2</sup> (FT <sup>2</sup> )	0.15 (1.6)	0.18 (1.9)	0.18 (1.9)	0.23 (2.5)
Rows	NO	4	4	4	4
Outdoor, Propeller Fan Remote Air Cooled Condensing Unit - (FU models)					
Discharge	L/S (CFM)	991.1 (2,100)	991.1 (2,100)	1085.5 (2,300)	1368.6 (2,900)
	Fan Motor	HP	1/8	1/8	1/6

### WATER COOLED CONDENSER DATA

Water Cooled Condenser Data - (MWA models)					
Flow @ 29.4°C (85°F) EWT	LPM (GPM)	7.6 (2.0)	13.6 (3.6)	22.7 (6.0)	34.1 (9.0)
	Water Press. Drop	kPa (FT WG)	15.5 (5.2)	20.9 (7.0)	18.2 (6.1)
Water Reg. Valve		2-Way, 150 psig - factory installed			

### GLYCOL COOLED CONDENSER DATA

Glycol Cooled Condenser Data - @ 40% Ethylene Glycol (MGA models)					
Flow @ 43.3°C (110°F) EGT	LPM (GPM)	15.9 (4.2)	22.7 (6.0)	34.1 (9.0)	45.4 (12.0)
	Glycol Press. Drop	kPa (FT WG)	23.9 (8.0)	31.4 (10.5)	25.4 (8.5)
Glycol Reg. Valve		2-Way, 150 psig - factory installed			

## Connection Sizes

Nominal Tons	1.0	1.5	2.0	3.0	
Model Size	012	018	024	036	
AIR COOLED REFRIGERANT (R410A) CONNECTION DATA					
DX Air Handling Units - (MAA models)					
Suction Line	OD CM (IN)	1.3 (1/2)	1.6 (5/8)	1.6 (5/8)	2.2 (7/8)
Liquid Line	OD CM (IN)	1 (3/8)	1 (3/8)	1 (3/8)	1 (3/8)
FU Outdoor, Propeller Fan Remote Air Cooled Condensing Units					
Suction Line	OD CM (IN)	1.9 (3/4)	1.9 (3/4)	1.9 (3/4)	1.9 (3/4)
Liquid Line	OD CM (IN)	1 (3/8)	1 (3/8)	1 (3/8)	1 (3/8)
BU Indoor, Centrifugal Blower Remote Air Cooled Condensing Units					
Suction Line	OD CM (IN)	1.3 (1/2)	1.6 (5/8)	1.6 (5/8)	2.2 (7/8)
Liquid Line	OD CM (IN)	1 (3/8)	1 (3/8)	1 (3/8)	1 (3/8)
WATER COOLED CONDENSER CONNECTION DATA					
Water Cooled Condenser Data - (MWA models)					
Water IN/OUT	OD CM (IN)	1.3 (1/2)	1.3 (1/2)	1.6 (5/8)	1.9 (3/4)
GLYCOL COOLED CONDENSER CONNECTION DATA					
Glycol Cooled Condenser Data - @ 40% Ethylene Glycol (MGA models)					
Glycol IN/OUT	OD CM (IN)	1.3 (1/2)	1.3 (1/2)	1.6 (5/8)	1.9 (3/4)
CHILLED WATER SYSTEMS CONNECTION DATA					
Chilled Water System Data - (MCA models)					
Chilled Water IN/OUT	OD CM (IN)	1.6 (5/8)	1.6 (5/8)	1.6 (5/8)	2.2 (7/8)

## Ship Weight kg (lbs.)

MODEL	EVAP	COND
MAA-012 / D	131.5 (290)	
MAA-018 / D	136.1 (300)	
MAA-024 / D	136.1 (300)	
MAA-036 / D	140.6 (310)	
MAA-012 / FU	63.5 (140)	80.7 (178)
MAA-018 / FU	68 (150)	80.7 (178)
MAA-024 / FU	68 (150)	80.7 (178)
MAA-036 / FU	68 (150)	99.3 (219)
MAA-012 / BU	63.5 (140)	56.7 (125)
MAA-018 / BU	68 (150)	56.7 (125)
MAA-024 / BU	68 (150)	61.2 (135)
MAA-036 / BU	68 (150)	63.5 (140)
MWA & MGA-012	108.9 (240)	
MWA & MGA-018	113.4 (250)	
MWA & MGA-024	113.4 (250)	
MWA & MGA-036	117.9 (260)	
MCA-012	86.2 (190)	
MCA-018	90.7 (200)	
MCA-024	90.7 (200)	
MCA-036	95.3 (210)	

Skil-air™. We Hang Around All The Best Places.

# Do It Up!

# TYPICAL ELECTRICAL DATA : mini-Spot™

## Air, Water & Glycol Self-Contained

(FLA = Full Load Amps / MCA = Min Circuit Amps / MFS = Max Fuse Size) \* see notes 1-3 below

HEAT	None, Heat Pump, Hot Water or Steam Heat				Electric Heat				None, Heat Pump, Hot Water or Steam Heat				Electric Heat			
HUMIDIFICATION	None				None				Steam Canister Humidifier				Steam Canister Humidifier			
Power Supply	208/1/60	277/1/60	208/3/60	460/3/60	208/1/60	277/1/60	208/3/60	460/3/60	208/1/60	277/1/60	208/3/60	460/3/60	208/1/60	277/1/60	208/3/60	460/3/60
<b>AIR COOLED SELF-CONTAINED</b>																
<b>MAA-012 / D*</b>																
FLA	14.5	11.0	N/A	N/A	28.1	21.3	N/A	N/A	22.7	17.8	N/A	N/A	36.3	28.1	N/A	N/A
MCA	16.2	12.3			35.2	26.6			24.4	19.1			45.4	35.1		
MFS	20	15			40	30			30	20			50	40		
<b>MAA-018 / D*</b>																
FLA	16.1	12.2	N/A	N/A	28.1	21.3	N/A	N/A	24.3	19.0	N/A	N/A	36.3	28.1	N/A	N/A
MCA	18.2	13.8			35.2	26.6			26.4	20.6			45.4	35.1		
MFS	25	20			40	30			30	25			50	40		
<b>MAA-024 / D*</b>																
FLA	19.9	15.1	18.5	9.0	28.1	21.3	18.5	9.0	28.1	21.9	31.3	15.4	36.3	28.1	31.3	15.4
MCA	23.0	17.4	21.2	10.3	35.2	26.6	22.5	10.5	31.2	24.2	34.0	16.7	45.4	35.1	38.5	18.5
MFS	35	25	30	15	40	30	30	15	40	30	40	20	50	40	40	20
<b>MAA-036 / D*</b>																
FLA	21.9	16.6	18.5	9.0	27.3	20.7	18.5	9.0	30.1	23.4	31.3	15.4	35.5	27.5	31.3	15.4
MCA	25.9	19.5	21.2	10.3	34.2	25.8	22.5	10.5	34.1	26.3	34.0	16.7	44.4	34.3	38.5	18.5
MFS	40	30	30	15	40	30	30	15	45	35	40	20	50	40	40	20
<b>WATER / GLYCOL COOLED SELF-CONTAINED</b>																
<b>MWA &amp; MGA-012*</b>																
FLA	10.9	8.3	N/A	N/A	28.1	21.3	N/A	N/A	19.1	15.1	N/A	N/A	36.3	28.1	N/A	N/A
MCA	12.6	9.6			35.2	26.6			20.8	16.4			45.4	35.1		
MFS	15	15			40	30			25	20			50	40		
<b>MWA &amp; MGA-018*</b>																
FLA	12.5	9.5	N/A	N/A	28.1	21.3	N/A	N/A	20.7	16.3	N/A	N/A	36.3	28.1	N/A	N/A
MCA	14.6	11.1			35.2	26.6			22.8	17.9			45.4	35.1		
MFS	20	15			40	30			30	20			50	40		
<b>MWA &amp; MGA-024*</b>																
FLA	16.3	12.4	14.9	7.4	28.1	21.3	18.0	8.4	24.5	19.2	27.7	13.8	36.3	28.1	30.8	14.8
MCA	19.4	14.7	17.6	8.7	35.2	26.6	22.5	10.5	27.6	21.5	30.4	15.1	45.4	35.1	38.5	18.5
MFS	30	20	25	15	40	30	25	15	35	30	40	20	50	40	40	20
<b>MWA &amp; MGA-036*</b>																
FLA	19.1	14.5	14.9	7.4	27.3	20.7	18.0	8.4	27.3	21.3	27.7	13.8	35.5	27.5	30.8	14.8
MCA	23.1	17.4	17.6	8.7	34.2	25.8	22.5	10.5	31.3	24.2	30.4	15.1	44.4	34.3	38.5	18.5
MFS	35	25	25	15	40	30	25	15	45	35	40	20	50	40	40	20

\* Note:

- 1) 277V available via field installed step-down transformer.
- 2) The above unit electrical data is reflective of the standard performance data and standard options as shown on pages 4 & 5.
- 3) Due to a policy of continuous improvement, Skil-aire reserves the right to change specifications without notice and without incurring any liability. Always consult equipment name plate for exact electrical requirements.

# TYPICAL ELECTRICAL DATA : mini-Spot™

## DX and Chilled Water Air Handling Units

(FLA = Full Load Amps / MCA = Min Circuit Amps / MFS = Max Fuse Size) \* see notes 1-3 below

HEAT	None, Heat Pump, Hot Water or Steam Heat				Electric Heat				None, Heat Pump, Hot Water or Steam Heat				Electric Heat			
HUMIDIFICATION	None				None				Steam Canister Humidifier				Steam Canister Humidifier			
Power Supply	208/1/60	277/1/60	208/3/60	460/3/60	208/1/60	277/1/60	208/3/60	460/3/60	208/1/60	277/1/60	208/3/60	460/3/60	208/1/60	277/1/60	208/3/60	460/3/60
<b>DX AND CHILLED WATER AIR HANDLING UNITS</b>																
<b>MAA &amp; MCA-012</b>																
FLA	4.1	3.2	N/A	N/A	28.1	21.3	N/A	N/A	12.3	10.0	N/A	N/A	36.3	28.1	N/A	N/A
MCA	5.1	4.0			35.2	26.6			15.4	12.5			45.4	35.1		
MFS	15	15			40	30			20	15			50	40		
<b>MAA &amp; MCA-018</b>																
FLA	4.1	3.2	N/A	N/A	28.1	21.3	N/A	N/A	12.3	10.0	N/A	N/A	36.3	28.1	N/A	N/A
MCA	5.1	4.0			35.2	26.6			15.4	12.5			45.4	35.1		
MFS	15	15			40	30			20	15			50	40		
<b>MAA &amp; MCA-024</b>																
FLA	4.1	3.2	4.1	2.1	28.1	21.3	18.0	8.4	12.3	10.0	16.9	8.5	36.3	28.1	30.8	14.8
MCA	5.1	4.0	5.1	2.6	35.2	26.6	22.5	10.5	15.4	12.5	21.1	10.6	45.4	35.1	38.5	18.5
MFS	15	15	15	15	40	30	25	15	20	15	25	15	50	40	40	20
<b>MAA &amp; MCA-036</b>																
FLA	4.1	3.2	4.1	2.1	28.1	21.3	18.0	8.4	12.3	10.0	16.9	8.5	36.3	28.1	30.8	14.8
MCA	5.1	4.0	5.1	2.6	35.2	26.6	22.5	10.5	15.4	12.5	21.1	10.6	45.4	35.1	38.5	18.5
MFS	15	15	15	15	40	30	25	15	20	15	25	15	50	40	40	20

## Air Cooled, Remote Condensing Units

(FLA = Full Load Amps / MCA = Min Circuit Amps / MFS = Max Fuse Size) \* see notes 1-3 below

FU - Outdoor Propeller Fan Air Cooled Remote Condensing Units					
Power Supply	208/1/60	277/1/60	208/3/60	460/3/60	
<b>012-FU</b>					
FLA	7.7	N/A	N/A	N/A	
MCA	9.3				
MFS	15				
<b>018-FU</b>					
FLA	7.7	N/A	N/A	N/A	
MCA	9.3				
MFS	15				
<b>024-FU</b>					
FLA	11.9	N/A	N/A	N/A	
MCA	14.6				
MFS	20				
<b>036-FU</b>					
FLA	12.7	N/A	10.5	5.8	
MCA	15.5		12.7	7.1	
MFS	20		20	15	

BU - Indoor Centrifugal Blower Air Cooled Remote Condensing Units					
Power Supply	208/1/60	277/1/60	208/3/60	460/3/60	
<b>012-FU</b>					
FLA	10.4	7.8	N/A	N/A	
MCA	12.1	9.1			
MFS	15	15			
<b>018-FU</b>					
FLA	12.0	9.0	N/A	N/A	
MCA	14.1	10.6			
MFS	20	15			
<b>024-FU</b>					
FLA	15.8	N/A	14.4	6.9	
MCA	18.9		17.1	8.2	
MFS	30		25	15	
<b>036-FU</b>					
FLA	18.6	N/A	14.4	6.9	
MCA	22.6		17.1	8.2	
MFS	35		25	15	

\* Note:

- 1) 277V available via field installed step-down transformer.
- 2) The above unit electrical data is reflective of the standard performance data and standard options as shown on pages 4 & 5.
- 3) Due to a policy of continuous improvement, Skil-aire reserves the right to change specifications without notice and without incurring any liability. Always consult equipment name plate for exact electrical requirements.

## 1.0 GENERAL

### 1.1 SUMMARY

These specifications describe requirements for an air conditioning system. The system shall be designed to maintain temperature and relative humidity conditions within the room. The manufacturer shall design and furnish all equipment to be fully compatible with heat dissipation requirements of the site.

The system shall be manufactured by Skil-aire in Baltimore, Maryland U.S.A. The system shall be approved and labeled by Underwriters Laboratories, Inc. (UL). The system shall be New York City MEA (MEA-386-90-E) and Chicago Code Approved.

### 1.2 DESIGN REQUIREMENTS

The comfort control system shall be a Skil-aire factory assembled mini-Spot™ model ceiling mounted system. The evaporator section shall be specifically designed for above ceiling installation.

The system shall have a total cooling capacity of \_\_\_\_\_ BTUH and a sensible cooling capacity of \_\_\_\_\_ BTUH based on an entering air temperature of \_\_\_\_\_ °F DB and \_\_\_\_\_ °F WB. The unit shall be supplied with \_\_\_\_\_ volt, \_\_\_\_\_ phase, \_\_\_\_\_ Hz electrical service. The system model number shall be \_\_\_\_\_.

## 2.0 PRODUCTS

### 2.1 STANDARD FEATURES / ALL SYSTEMS

#### 2.1.1 CABINET

The cabinet and access panels shall be fabricated from heavy gauge galvanized steel. The panels shall be lined with 1/2" 2 lb. density insulation. Removable side doors shall provide ease of installation, service and maintenance. (In most instances, units can be serviced in place, while in operation.) A stainless steel drain pan with dual condensate drain connections shall be provided. Quick adjusting external hanger brackets with vibration isolators shall simplify installation on hanger rods by providing easy leveling, smooth operation, reduced noise and component wear.

#### 2.1.2 AIR DISTRIBUTION

The blower shall be double-inlet, dynamically balanced blower with multiple forward curved blades, self-aligning sleeve bearings, and lifetime lubrication. The blower motor shall be permanent-split capacitor, high efficiency type. Air delivery shall be \_\_\_\_\_ CFM. System shall be suitable for plenum or ducted air distribution.

### 2.1.3 EVAPORATOR AIR PATTERN - SPOT COOLER

The system shall be a spot-cooler configuration with factory provided bottom supply and return-filter grille assembly for field installation.

#### 2.1.4 FILTERS

The filters shall be rated not less than 20% dust spot efficiency with MERV of 8, based on ASHRAE 52-76 test method. They shall be removable without shutting down the system.

#### 2.1.5 ELECTRICAL CIRCUITS

The control panel shall be pre-wired to include all contactors, fuses, relays, control transformers and capacitors necessary for complete operation. Terminal blocks shall be provided for power and control connections. Units shall be supplied with on/off control.

## 2.2 DIRECT EXPANSION SYSTEM COMPONENTS

### 2.2.1 EVAPORATOR COILS

The evaporator coil shall be quality construction of seamless drawn rifled copper tube, mechanically bonded to tempered aluminum laced fins with galvanized coil end plates. The coil shall have \_\_\_\_\_ sq. ft. face area, \_\_\_\_\_ rows deep. The coil shall be factory pressure tested. The refrigeration system shall be sealed prior to shipment. An externally equalized thermostatic expansion valve shall control refrigerant flow. The coil shall be provided with a stainless steel drain pan covering the entire coil area.

### 2.2.2 COMPRESSORS

The compressor shall be a full hermetic type mounted on vibration isolators and located in a separate compartment out of the evaporator air stream to facilitate servicing while equipment is operating. The compressor shall be complete with reversible positive oil pump, charging and service ports, internal spring isolation, and discharge gas vibration eliminator.

### 2.2.3 REFRIGERATION CIRCUIT

The refrigeration circuit shall be pre-piped with type "L" refrigerant copper tubing. The refrigeration system shall include but not be limited to: expansion valve with external equalizer and rapid bleed-through capacity, filter dryer, sight glass, pressure fittings and high pressure/low pressure safety cutouts.

## 2.3 CHILLED WATER SYSTEMS

### 2.3.1 CHILLED WATER COIL

The chilled water coil shall be of quality construction of seamless drawn rifled copper tube, mechanically bonded



to tempered aluminum laced fins with galvanized coil end plates. The coil shall be factory pressure tested. The coil shall be sized to provide high sensible cooling. The coil shall be designed with a minimum of \_\_\_\_ sq. ft. face area; \_\_\_\_ rows deep and have a maximum face velocity of \_\_\_\_ FPM at \_\_\_\_ CFM. The coil shall be controlled by a factory installed 2-way chilled water control valve. The coil shall be designed to distribute water into the entire coil face area. The coil shall be supplied with \_\_\_\_ °F entering water temperature with a \_\_\_\_ °F temperature rise. The coil shall require \_\_\_\_ GPM of chilled water and the pressure drop shall not exceed \_\_\_\_ PSI. The entire coil assembly shall be mounted in a stainless steel condensate drain pan.

## 2.4 STANDARD FEATURES - INDIVIDUAL SYSTEMS

### 2.4.1 AIR COOLED SYSTEMS

#### 2.4.1.1 SELF-CONTAINED, INTEGRAL AIR COOLED CENTRIFUGAL BLOWER CONDENSING UNIT (D models)

The system shall be self-contained with integral factory installed air cooled condensing unit. The condensing unit shall be a direct driven, centrifugal blower type. The condenser coil shall be constructed of copper tubes and aluminum fins. The condensing unit shall be sized for full heat of rejection at 35°C (95°F) ambient and be capable of operation to \_\_\_\_ °F low ambient air temperature. The system shall be factory tested, charged with refrigerant, sealed and ship from the factory as a one-piece system.

#### 2.4.1.2 INDOOR, REMOTE, AIR COOLED CENTRIFUGAL BLOWER CONDENSING UNIT (BU models)

The system shall be an indoor (*outdoor - optional*) remote air cooled condensing unit designed for field connection to a dx air handling unit. The condensing unit shall be a direct driven, centrifugal blower type. The condensing unit shall be sized for full heat of rejection at 35°C (95°F) ambient and be capable of operation to \_\_\_\_ °F low ambient air temperature. The condensing unit shall be factory tested and shall ship with a dry-nitrogen holding charge and copper sweat connections for field charging.

#### 2.4.1.3 OUTDOOR, REMOTE PROPELLER FAN, AIR COOLED CONDENSING UNIT (FU models)

The remote air cooled condensing unit shall be a direct drive, propeller fan type arranged for vertical air discharge. The condensing unit shall be sized for full heat of rejection at 35°C (95°F) ambient and be capable of operation to \_\_\_\_ °F. The condenser coil constructed of copper tube and aluminum fins. The coil shall be factory tested, and refrigeration system sealed prior to shipment.

The condenser motor shall have permanently lubricated bearings and inherent internal overload protection.

### 2.4.2 WATER COOLED CONDENSERS (MWA models)

Water cooled systems shall have a coaxial, counter flow liquid condenser with adjustable 2-way water regulating valve to maintain head pressure with condenser water flow. The maximum operating pressure shall not exceed 150 psig. per circuit. The unit shall require \_\_\_\_ GPM of \_\_\_\_ °F water and have a maximum pressure drop of \_\_\_\_ PSI.

### 2.4.3 GLYCOL COOLED CONDENSER (MGA models)

Glycol cooled systems shall have a coaxial, counter flow liquid condenser with adjustable 2-way glycol regulating valve to maintain head pressure with condenser glycol flow. The maximum glycol operating pressure shall not exceed 150 psig per circuit. The unit shall require \_\_\_\_ GPM of \_\_\_\_ °F, \_\_\_\_% ethylene glycol and have a maximum pressure drop of \_\_\_\_ PSI.

### 2.4.4 DRY COOLER & SIMPLEX PUMP PACKAGE (FCPP models)

The drycooler shall be complete with field mounted expansion tank and aquastat to control fan motor operation. The coil shall have seamless copper tubes bonded to aluminum fins for high transfer efficiency. The motor(s) shall have permanently lubricated bearings with inherent overload protection on 1 Phase motors and three coil overloads on 3 Phase motors.

The pump package shall include controls to operate the drycooler and the pump. The pump package shall be enclosed in a weatherproof housing. The pump shall be rated for \_\_\_\_ GPM at \_\_\_\_ Ft. of head, and operate on \_\_\_\_ volt, \_\_\_\_ PH, \_\_\_\_ Hz.

## 2.5 OPTIONS

### 2.5.1 DUCTED EVAPORATOR AIR PATTERN

The system shall be designed for ducted evaporator return and supply air. Factory provided duct flanges shall be provided for ease of field duct connection.

### 2.5.2 AIR COOLED CONDENSER - LOW AMBIENT CONTROL

#### 2.5.2.1 -17.8°C (0°F) AMBIENT - FANCYCLING (D, FU & BU Models)

Condenser fan cycling controls shall be factory provided for field installation to allow for low ambient condenser operation to -17.8°C (0°F).

## 2.5.2.2 -17.8°C (0°F) LOW AMBIENT DAMPER (D, BU Centrifugal Blower Condensers Only)

A low ambient inlet damper shall be provided for the condenser section to allow operation to -17.8°C (0°F). The damper shall include an actuator that is controlled directly by the condensed liquid line pressure. The damper shall be field mounted with all control piping furnished by the contractor.

## 2.5.2.3 -28.9°C (-20°F) VARIABLE SPEED FAN (FU Propeller Fan Models)

Variable speed head pressure controls shall be factory provided for field installation to allow for low ambient condenser operation to -28.9°C (-20°F) minimum air temperature.

## 2.5.2.4 -34.4°C (-30°F) FLOODED CONDENSER (FU & BU Models)

A flooded condenser system shall be provided to allow for low ambient condenser operation to -34.4°C (-30°F). The flooded system shall include a factory installed liquid refrigerant receiver and head pressure control valve.

## 2.5.3 WATER / GLYCOL COOLED CONDENSER REGULATING VALVES (MWA & MGA Models)

System head pressure shall be controlled by a factory provided \_\_\_\_ -way water / glycol regulating valve rated for \_\_\_\_ psig w.w.p. 2-way valves shall be factory installed, while 3-way valves shall be field installed. (2-way & 3-way valves rated for 150 or 350 psig are optionally available.)

## 2.5.4 CONTROL OPTIONS

### 2.5.4.1 DigiSkil-100: Remote Wall Mounted, Heat / Cool Digital Thermostat

A DigiSkil-100 model remote wall mounted single stage heat / cool non-programmable thermostat with digital display shall be factory provided for field installation. The thermostat shall include FAN AUTO-ON and COOL-OFF-HEAT selector switches.

### 2.5.4.2 DigiSkil-200™: 7-Day Programmable Wall Mounted Digital Heat / Cool Thermostat

A DigiSkil-200™ model remote wall mounted deluxe 7-day programmable heat pump ready thermostat with digital display shall be factory provided for field installation. The thermostat shall include FAN AUTO-ON, COOL-OFF-HEAT-EM (emergency heat), SET and PROG/MAN selector switches.

## 2.5.4.3 MicroSkil-100™: Microprocessor Temperature Humidity Controller with Alarms

The system shall be provided with a MicroSkil-100™ model microprocessor based temperature and humidity controller with alarms. Centered in the remote wall mounted controller shall be a graphic LCD display with characters to show the operating mode, time, set points and actual readings. The temperature and humidity sensors shall be internal to the remote display. The controller shall be capable of three different set points: normal, temporary and night per day, 7 days per week.

The controller shall include the following visual and audible alarm indications (if applicable):

- High and Low Temperature
- High and Low Humidity
- Dirty Filter
- Sensor Failure
- Common Alarm Failure

The controller shall include the following system operations (if applicable):

- Unit Operational Status Indication - Cooling, Heating, Humidifying, Dehumidifying (if applicable)
- Fan - continuous or on demand
- Auto-restart upon power loss
- Remote stop/start connection
- Short cycle protection
- Cold start time delay
- Heat pump operation with aux. heat

### 2.5.4.4 MicroSkil-™, Advanced Microprocessor Temperature & Humidity Controller with Alarms

The system shall be provided with a MicroSkil-™ advanced microprocessor based temperature and humidity controller with alarms.

#### Select Features/Benefits:

- 4x20 Character Liquid Crystal Alpha-numerical Display
- User Configurable
- Run-Time Hours
- Current Unit Mode Status
- Alarm Status
- Digital & Analog Inputs /Outputs
- Temperature Anticipation
- Remote Stop / Start Contact
- Summary Alarm Contact
- Automatic or Manual (selectable) Restart After Power Loss
- Sequential Load After Restart
- Recovery Delay
- Compressor Short Cycle Timers
- Cold Start Time Delay
- Security Password Access
- Self-Diagnostics
- Service Mode

## Select Options:

- Multi-Unit Sequencing (Optional)
- BMS Communications(Optional)

## Unit Status Display

The control system shall display current unit functions and room status (if applicable):

- Current Dry Bulb Temp Set Point
- Current Relative Humidity Set Point
- System ON/OFF
- Cooling
- Heating
- Humidifying
- Dehumidifying - (Available with mini-Might™ Series)
- Reheating - (Available with mini-Might™ Series)
- Actual Room DBTemperature
- Actual Room RelativeHumidity

## Alarm Conditions:

Alarm conditions activate an audible and visual indicator plus close a summary alarm dry contact connection. The control system shall alert to the following alarm conditions (if applicable):

- High Temperature
- Low Temperature
- High Humidity
- Low Humidity
- High Head Press
- Loss of Air Flow
- Loss of Power
- Dirty Filter
- Smoke Detection
- Firestat
- Leak Detection
- Sensor Failure
- Summary Failure

## Digital & Analog Control Inputs / Outputs:

The control system shall be capable of both digital (ON/OFF) and analog (proportional integral, PI) input and output control.

## 2.5.5 HEAT OPTIONS

### 2.5.5.1 ELECTRIC HEAT

The electric heat shall include factory mounted nichrome open wire elements, contactors and limit controls. The electric element shall be UL approved. The electric heat shall have a capacity of \_\_\_\_\_ BTU/H and a KW rating of \_\_\_\_ KW.

### 2.5.5.2 STEAM HEAT

The steam heating coil shall have copper tubes and aluminum fins with capacity of \_\_\_\_\_ BTU/H with \_\_\_\_ PSIG steam. The system shall be factory pre-piped with a 2-way control valve.

### 2.5.5.3 HOT WATER HEAT

The hot water heating coil shall have copper tubes and aluminum fins with a capacity of \_\_\_\_\_ BTU/HR when supplied with \_\_\_\_ °F entering water temperature, \_\_\_\_ GPM at \_\_\_\_ PSI pressure drop. The control shall be factory pre-piped with a 2-way control valve.

### 2.5.5.4 HEAT PUMP OPTION

(MAA-( ) /DHP & FUHP models)

The system shall include a factory installed heat pump heating cycle including reversing valve, automatic defrost cycle and remote wall mounted temperature controller with auxiliary heating control capability. The heat pump mode heating capacity shall be \_\_\_\_\_ BTU/HR.

### 2.5.6 STEAM GENERATING HUMIDIFIER

The humidification system shall be an electrode canister type, complete with fill valve, drain valve, adjustable humidity output, and automatic flush cycle. Humidification shall be in the coil bypass to provide maximum humidification efficiency. The humidifier shall be producing \_\_\_\_\_ lbs/hr.

### 2.5.7 CONDENSATE PUMP

The condensate pump shall have the capacity of \_\_\_\_\_ GPH at \_\_\_\_\_ Ft. of head. It shall be complete with integral float switch, pump and motor assembly, check valve and reservoir.

### 2.5.8 HOT GAS BYPASS

A hot gas bypass system shall be factory installed to provide capacity modulation.

### 2.5.9 MAIN POWER NON-FUSED DISCONNECT

A main power non-fused disconnect shall be factory provided for field installation.

### 2.5.10 FIRESTAT

The firestat shall immediately shut down the environmental control system when activated. The firestat shall be mounted with sensing element in the return air duct, and wired by installing contractor to unit control panel.

### 2.5.11 SMOKE DETECTOR

The smoke detector shall immediately shut down the environmental control system when activated. The smoke detector shall be mounted in the return air duct by the installing contractor and wired to the unit control panel.

### 2.5.12 REMOTE WATER-LEAK DETECTOR

A remote water-leak detector shall be factory provided for field installation. The remote water-leak detector shall be wired to shut down all A/C unit water producing functions upon sensing a water leak.

### 2.5.13 REFRIGERANTLINE-SETS

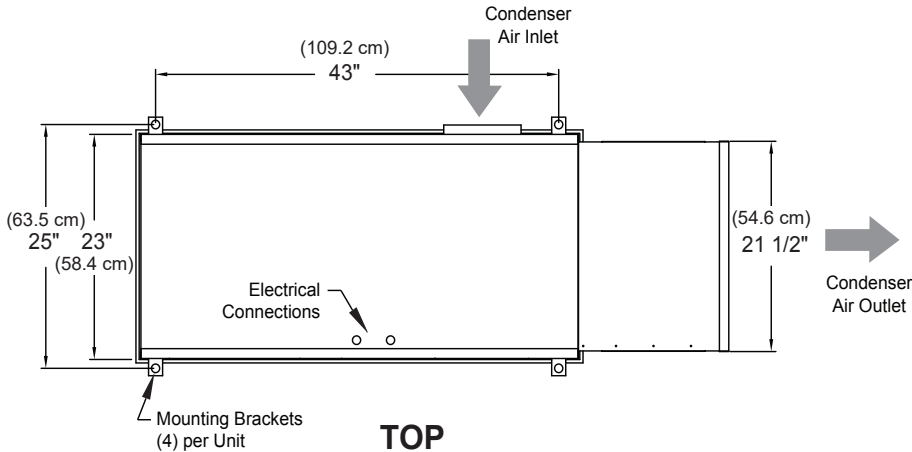
(MAA-( ) / FU & BU models)

Pre-charged refrigerant (R410A) line sets in the specified length shall be factory provided for field connection of split systems. Factory installed Unit and Line-Set quick refrigerant disconnect couplings shall be provided for ease of field installation.

# UNIT DIMENSIONS: mini-Spot™

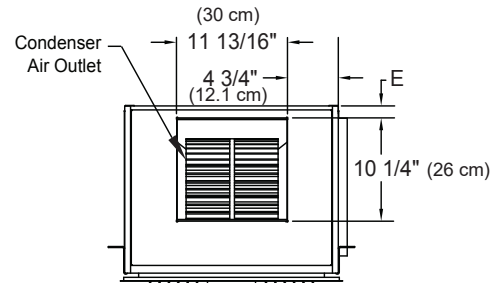
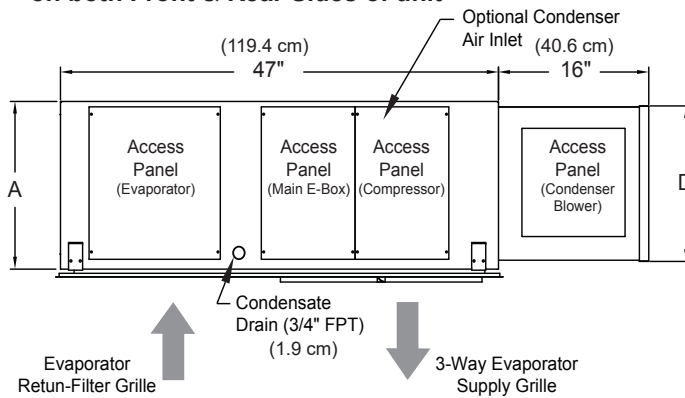
## MAA-012/036-H\_/D

Air Cooled Self-Contained (1-3 Tons)  
(Spot Cooler with Bottom Supply/Return-Filter Grille)



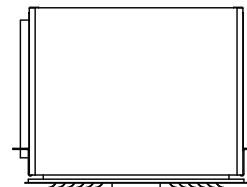
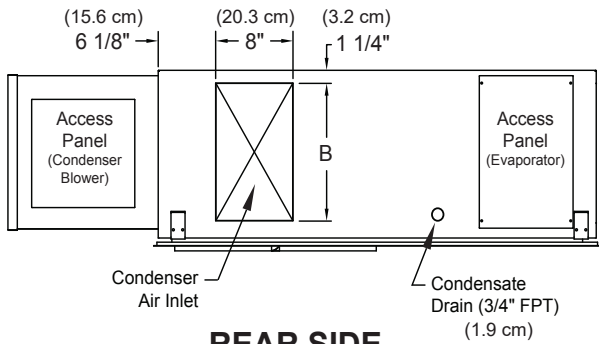
MAA-( )/D Model Size	Dimensions cm (inches)			
	A	B	C	D
012, 018 & 024	43.2 (17)	35.6 (14)	40.6 (16)	2.5-1 (1-3/8)
036	61 (24)	53.3 (21)	58.4 (23)	15.2-1.7 (6-11/16)

**Note: 18" (45.7 cm) service clearance on both Front & Rear Sides of unit**



### FRONT SIDE

### RIGHT END



### REAR SIDE

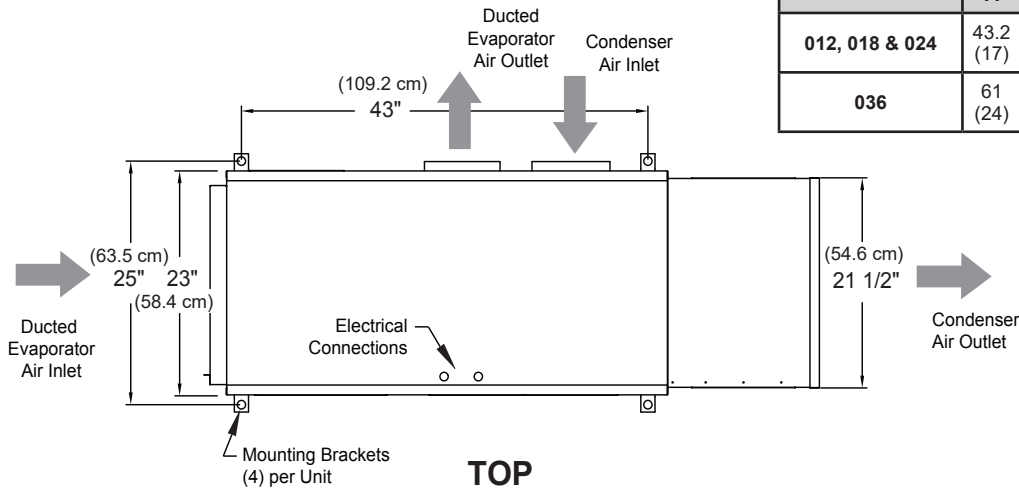
### LEFT END

# UNIT DIMENSIONS: mini-Spot™

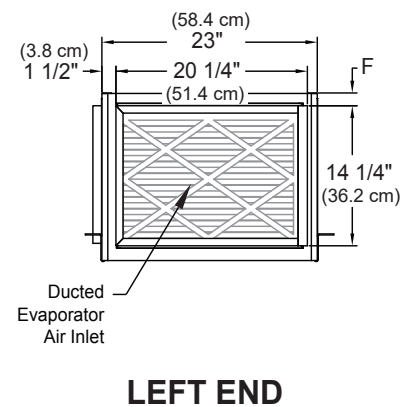
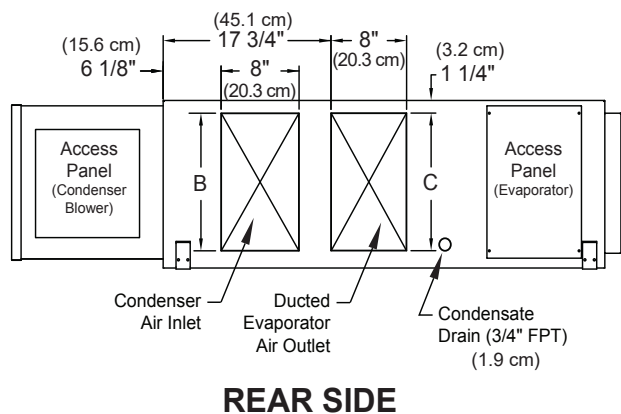
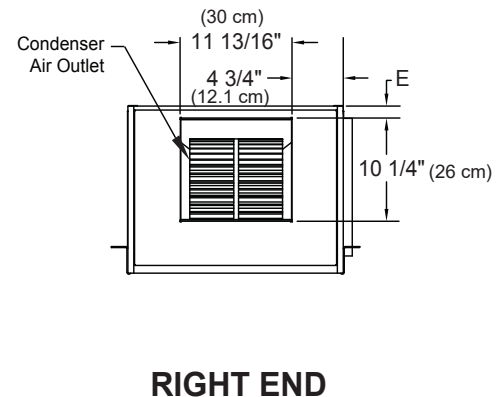
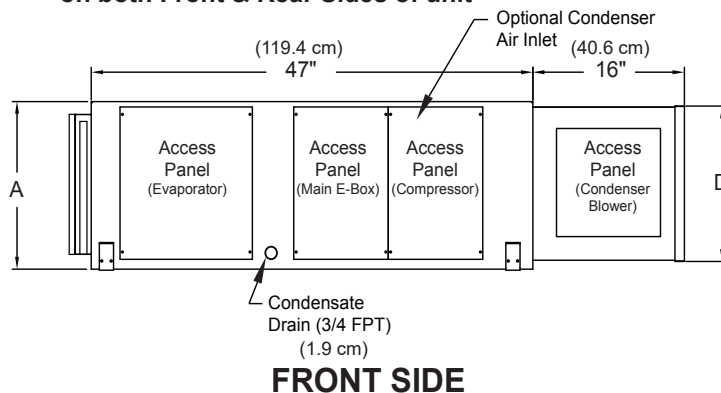
## MAA-012/036-H\_/D

### Air Cooled Self-Contained (1-3 Tons) (Optional Ducted Evaporator)

MAC-( )/D Model Size	Dimensions cm (inches)					
	A	B	C	D	E	F
012, 018 & 024	43.2 (17)	35.6 (14)	35.6 (14)	38.1 (15)	2.5-1 (1-3/8)	2.5-0.6 (1-1/4)
036	61 (24)	53.3 (21)	53.3 (21)	58.4 (23)	15.2-1.7 (6-11/16)	10.16-1.9 (4-3/4)



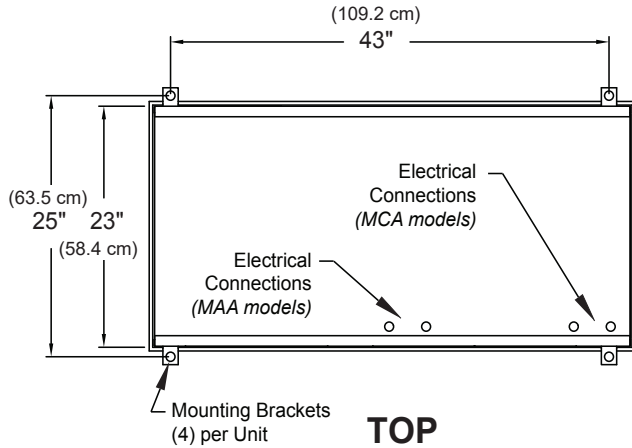
**Note: 18" (45.7 cm) service clearance on both Front & Rear Sides of unit**



# UNIT DIMENSIONS: mini-Spot™

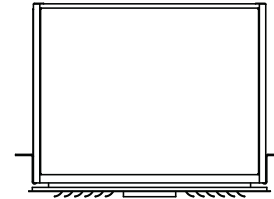
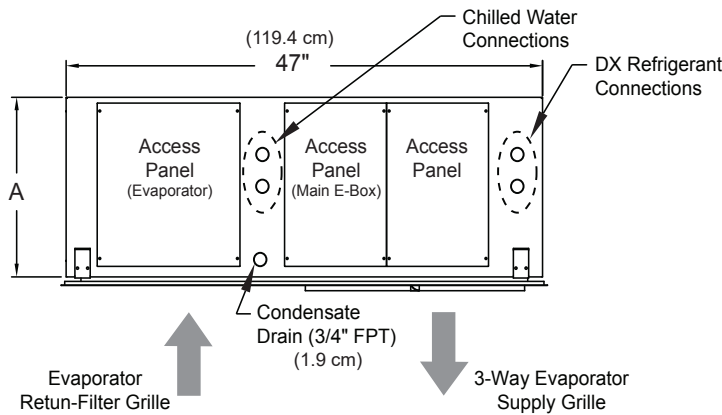
## MAA & MCA-012/036-H\_

### Split DX & Chilled Water Air Handling Units (1-3 Tons) (Spot Cooler with Bottom Supply/Return-Filter Grille)



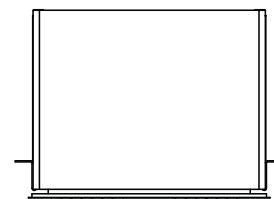
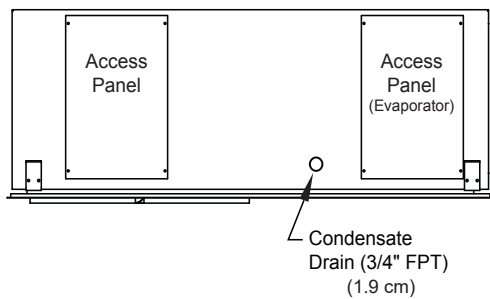
MAA & MCA-( ) Model Size	Dimensions cm (inches)
	A
012, 018 & 024	43.2 (17)
036	61 (24)

**Note: 18" (45.7 cm) service clearance on both Front & Rear Sides of unit**



**FRONT SIDE**

**RIGHT END**

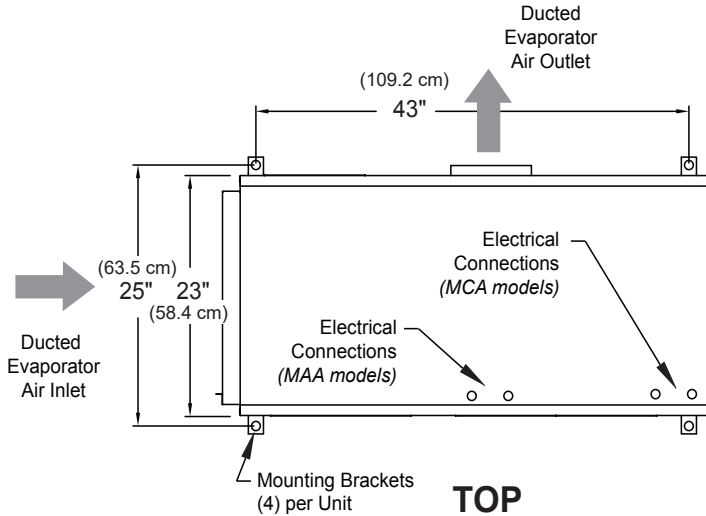


**REAR SIDE**

**LEFT END**

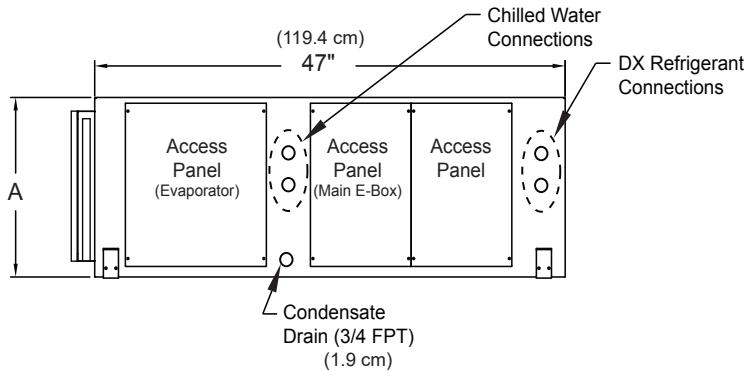
## MAA & MCA-012/036-H\_

### Split DX & Chilled Water Air Handling Units (1-3 Tons) (Optional Ducted Evaporator)

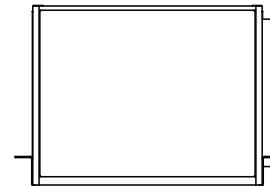


MAC & MCC-() Model Size	Dimensions cm (inches)		
	A	C	F
012, 018 & 024	43.2 (17)	35.6 (14)	2.5-0.6 (1-1/4)
036	61 (24)	53.3 (21)	10.16-1.9 (4-3/4)

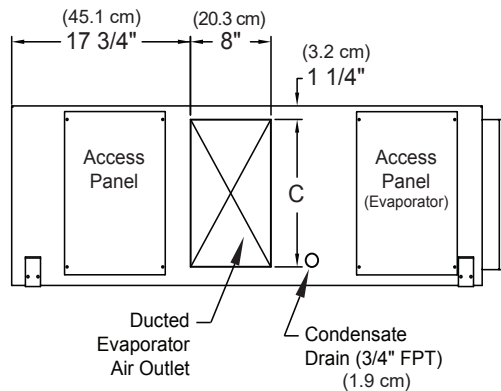
**Note: 18" (45.7 cm) service clearance on both Front & Rear Sides of unit**



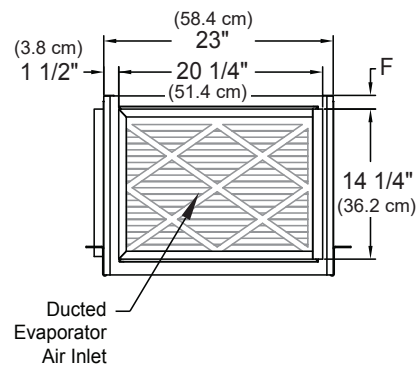
**FRONT SIDE**



**RIGHT END**



**REAR SIDE**



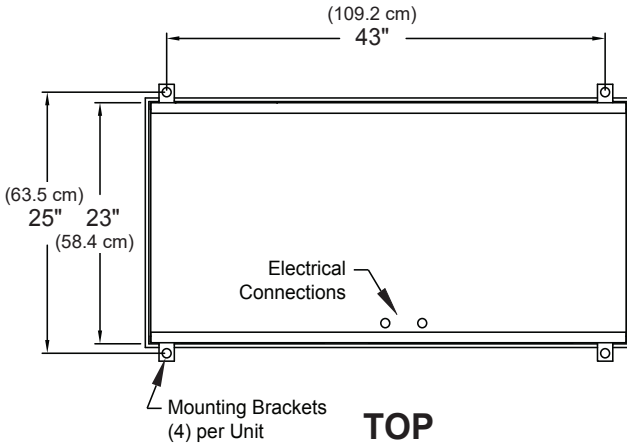
**LEFT END**

# UNIT DIMENSIONS: mini-Spot™

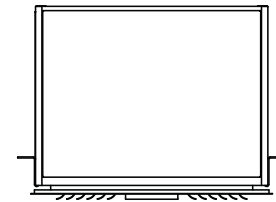
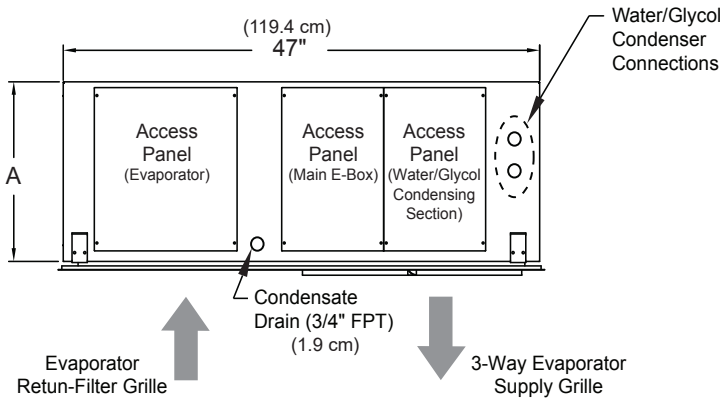
## MWA & MGA-012/036-H\_

Water/Glycol Cooled Self-Contained (1-3 Tons)  
*(Spot Cooler with Bottom Supply/Return-Filter Grille)*

MWC & MGC(-) Model Size	Dimensions cm (inches)
	A
012, 018 & 024	43.2 (17)
036	61 (24)

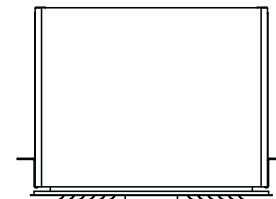
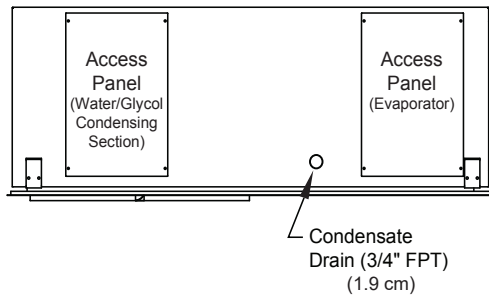


**Note: 18" (45.7 cm) service clearance on both Front & Rear Sides of unit**



**FRONT SIDE**

**RIGHT END**



**REAR SIDE**

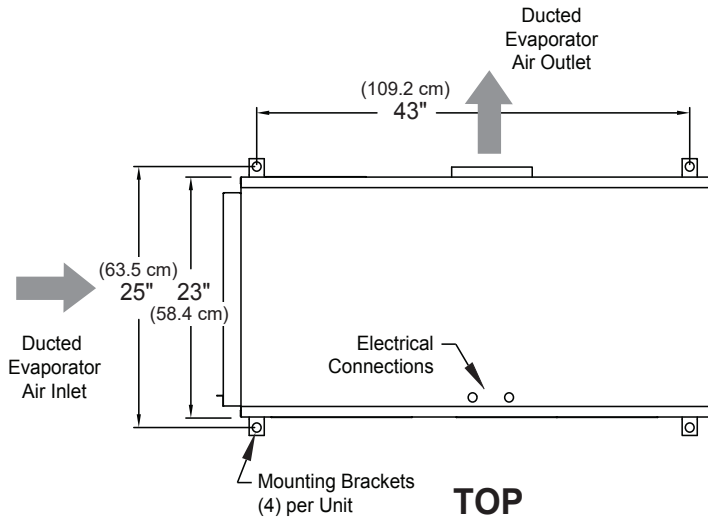
**LEFT END**



# UNIT DIMENSIONS: mini-Spot™

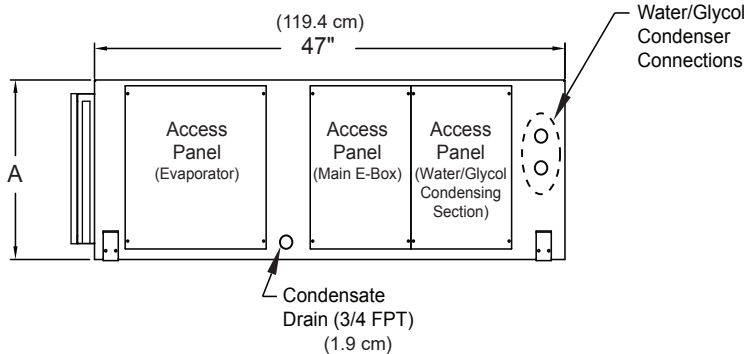
## MWA & MGA-012/036-H\_

### Water/Glycol Cooled Self-Contained (1-3 Tons) (Optional Ducted Evaporator)

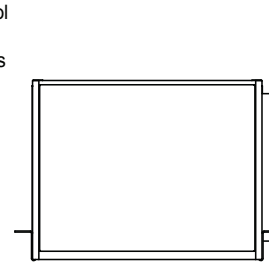


MWC & MGC(-) Model Size	Dimensions cm (inches)		
	A	C	F
012, 018 & 024	43.2 (17)	35.6 (14)	2.5-0.6 (1-1/4)
036	61 (24)	53.3 (21)	10.16-1.9 (4-3/4)

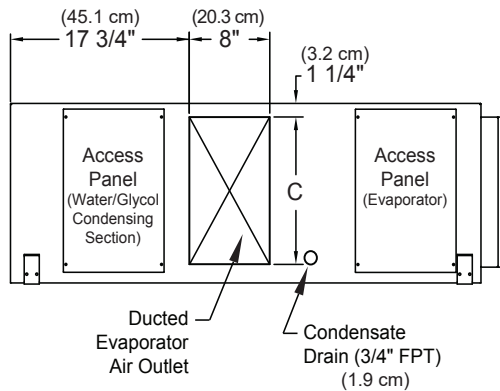
**Note: 18" (45.7 cm) service clearance on both Front & Rear Sides of unit**



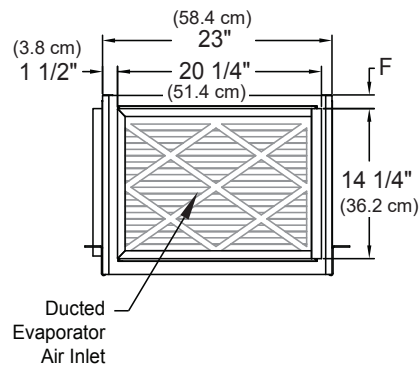
**FRONT SIDE**



**RIGHT END**



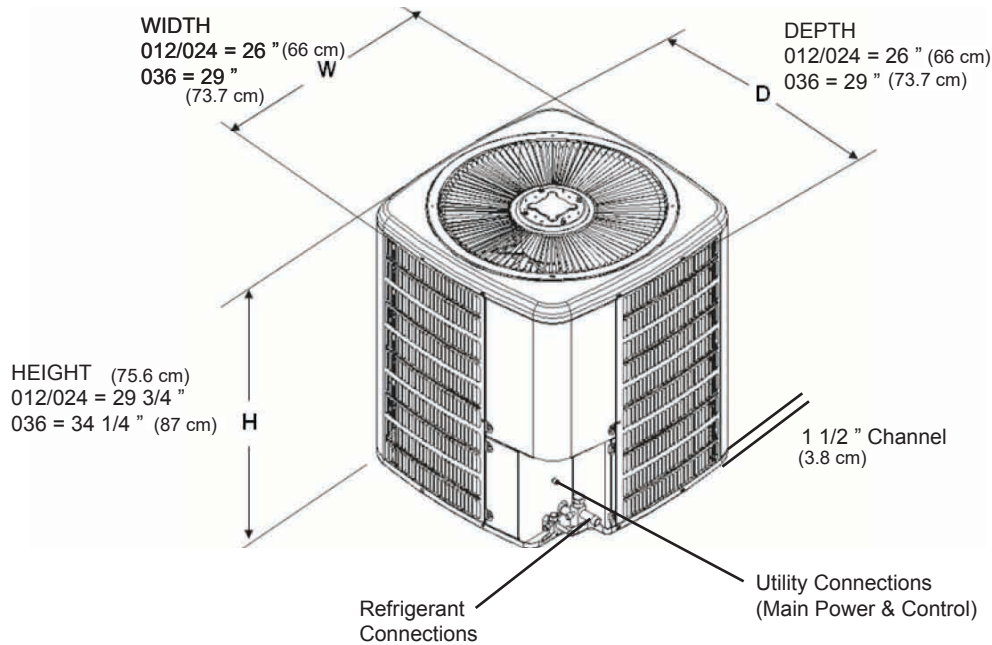
**REAR SIDE**



**LEFT END**

## 012/036-FU

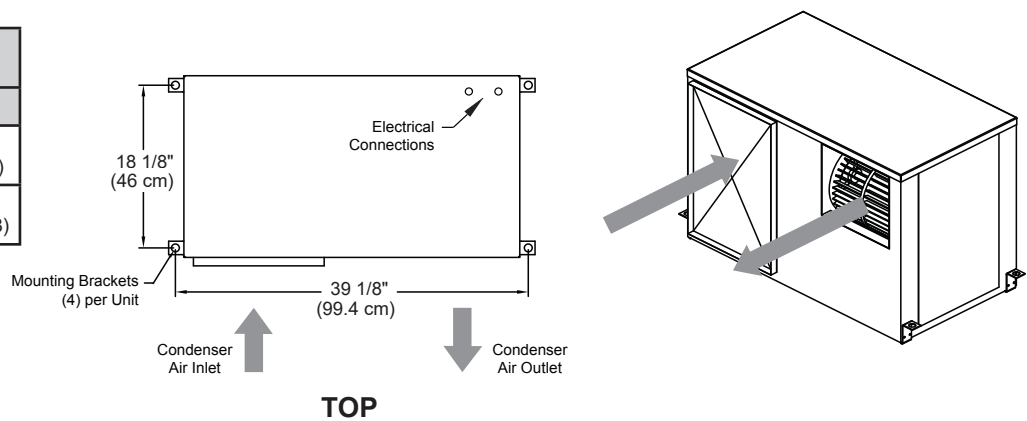
### Outdoor, Propeller Fan Remote Air Cooled Condensing Units



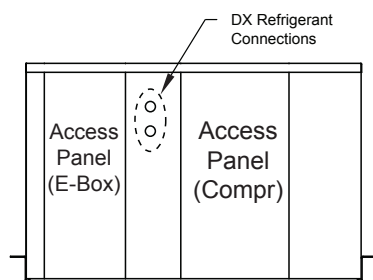
## 012/036-BU

### Indoor Horizontal, Centrifugal Blower Remote Air Cooled Condensing Units

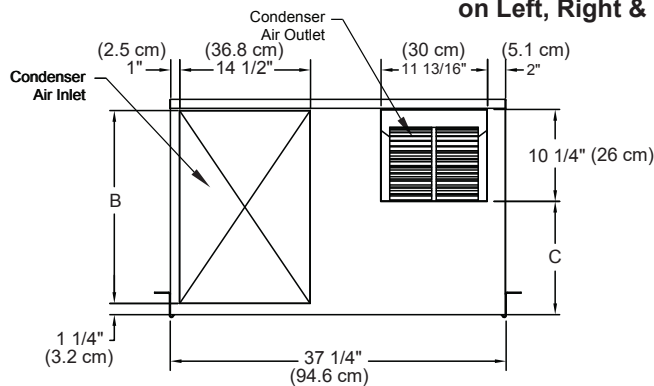
BU Model Size	Dimensions cm (inches)		
	A	B	C
012, 018 & 024	43.2 (17)	36.8 (14 1/2)	17.1 (6 3/4)
036	61 (24)	54.6 (21 1/2)	32.1 (12 5/8)



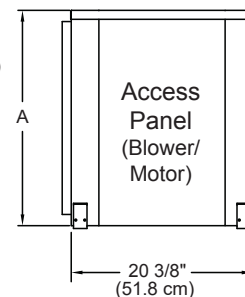
**Note: 18" (45.7 cm) service clearance on Left, Right & Rear Sides of unit**



**REAR SIDE**



**FRONT SIDE**



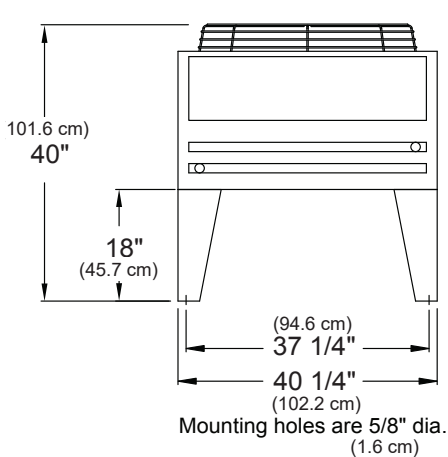
**RIGHT SIDE**

# UNIT DIMENSIONS: mini-Spot™

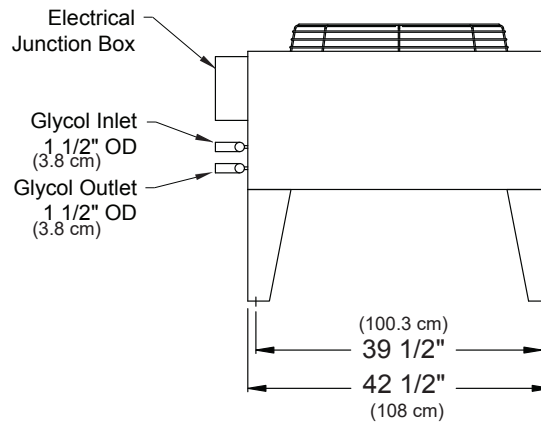
## Glycol Drycooler/Fluid Cooler (For MGC-012/036 Glycol Cooled Systems)

Fluid/Drycooler Electrical Data

Drycooler Model	Power Supply (V / PH / Hz)	Drycooler Fan	
		HP	FLA
FC-06	208-230/1/60	1/2	4.0
	208-230/3/60		4.0
	460/3/60	1.2	



END VIEW

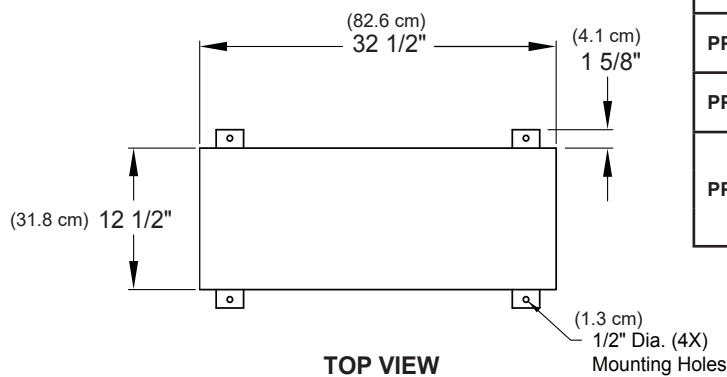


SIDE VIEW

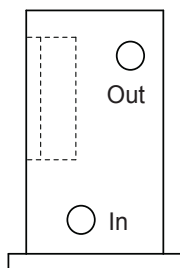
## Glycol Pump Packages

Simplex Pump Package Technical Data

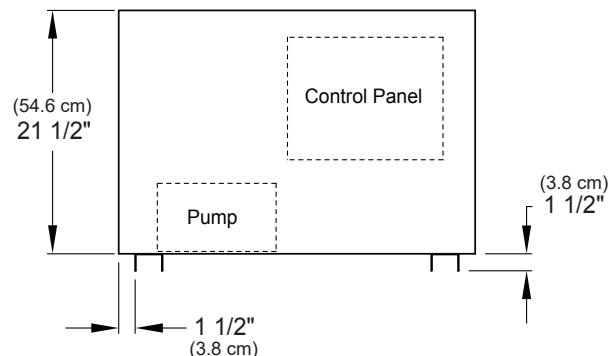
Pump Model	HP	LPM (GPM)	Total Head	Power Supply (V / PH / Hz)	FLA
PP-005	1/2	18.9 (5)	70 Ft.	208-230/1/60	5.3
PP-075	3/4	37.9 (10)	70 Ft.	208-230/1/60	7.4
PP-010	1	75.7 (20)	85 Ft.	208-230/1/60	8.5
PP-015	1 1/2	151.4 (40)	88 Ft.	208-230/1/60	9.9
				208-230/3/60	6.5
				460/3/60	3.0



TOP VIEW



END VIEW



SIDE VIEW