



CLIMATE CONTROL SOLUTIONS
Bard Manufacturing Company, Inc.
Bryan, Ohio 43506

MODELS:

W24H1D, W30H1D, W36H1D

W42H1D, W48H1D, W60H1D

MODEL FEATURES

This model provides a unique dehumidification circuit for periods of high indoor humidity conditions. Additionally an "energy recovery ventilator" may be provided to allow for outside ventilation air requirements by eliminating excessive sensible and latent loads as a result of the increased ventilation requirement.

Refer to Specification Sheet S3398 for the standard features of the base unit. Electrical data for the dehumidification models is identical to the electrical data for the standard W**H1D models.

SPECIAL FEATURES

DEHUMIDIFICATION CIRCUIT

The dehumidification circuit incorporates an independent heat exchanger coil in the supply air stream in addition to the standard evaporator coil. This coil reheats the supply air after it passes over the cooling coil, and is sized to nominally match the sensible cooling capacity of the evaporator coil. Extended run times in dehumidification mode can be achieved using waste heat from the refrigeration cycle to achieve the reheat process, while at the same time large amounts of moisture can be extracted from the passing air stream. Models that also have electric heaters installed have the electric heat inhibited during dehumidification mode, although it remains available for additional reheat during certain conditions. See below for specific operating sequences, and see attached tables for performance on sensible and latent capacities, water removal ratings, and supply air delivery conditions.

The dehumidification refrigerant reheat circuit is controlled by a 3-way valve directing the refrigerant gas to the normal condenser during periods when standard air conditioning is required. During periods of time of low ambient temperature (approximately 65° to 75° outdoor) and high indoor humidity, a humidistat senses the need for mechanical dehumidification. It then energizes both the compressor circuit and the 3-way valve, thus directing the hot refrigerant discharge gas into a separate desuperheating condenser circuit which reheats the conditioned air before it is delivered to the room. The refrigerant gas is then routed from the desuperheating condenser to the system condenser for further heat transfer. A small orifice inserted between the reheat coil return line and suction line will prevent liquid from accumulating in the reheat coil when it is inactive. This drain does not affect the normal operation of the system. A check valve is located in the reheat coil return line. It has a soft spring to hold the ball on the seat. Refer to Page 2 for the location of the check valve and drain back orifice. When the humidistat is satisfied, the system automatically switches back to normal A/C mode and either continues to operate or turns off based on the signal from the wall thermostat. The result is separate humidity control at minimum operating cost.

DEHUMIDIFICATION SEQUENCE OF OPERATION

Dehumidification is controlled through a humidistat and is independent of the thermostat. On a call for dehumidification mode of operation, the compressor and 3-way valve that feeds the reheat coil are energized through circuit R-W3. Dehumidification will continue until the humidistat is satisfied.

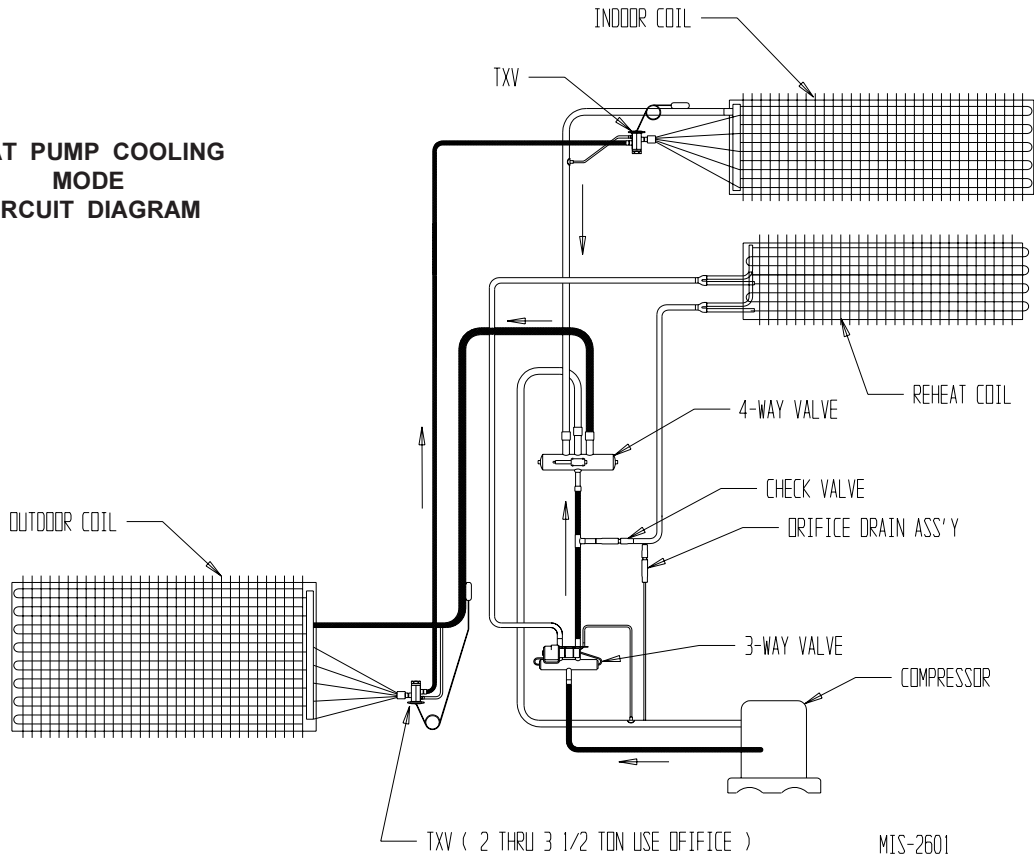
If the room temperature falls below 1st stage heating setpoint, electric heat will be energized by the room thermostat and cycle to maintain room temperature.

If 2nd stage heating setpoint is reached, dehumidification cycle is de-energized and heat pump heating is energized.

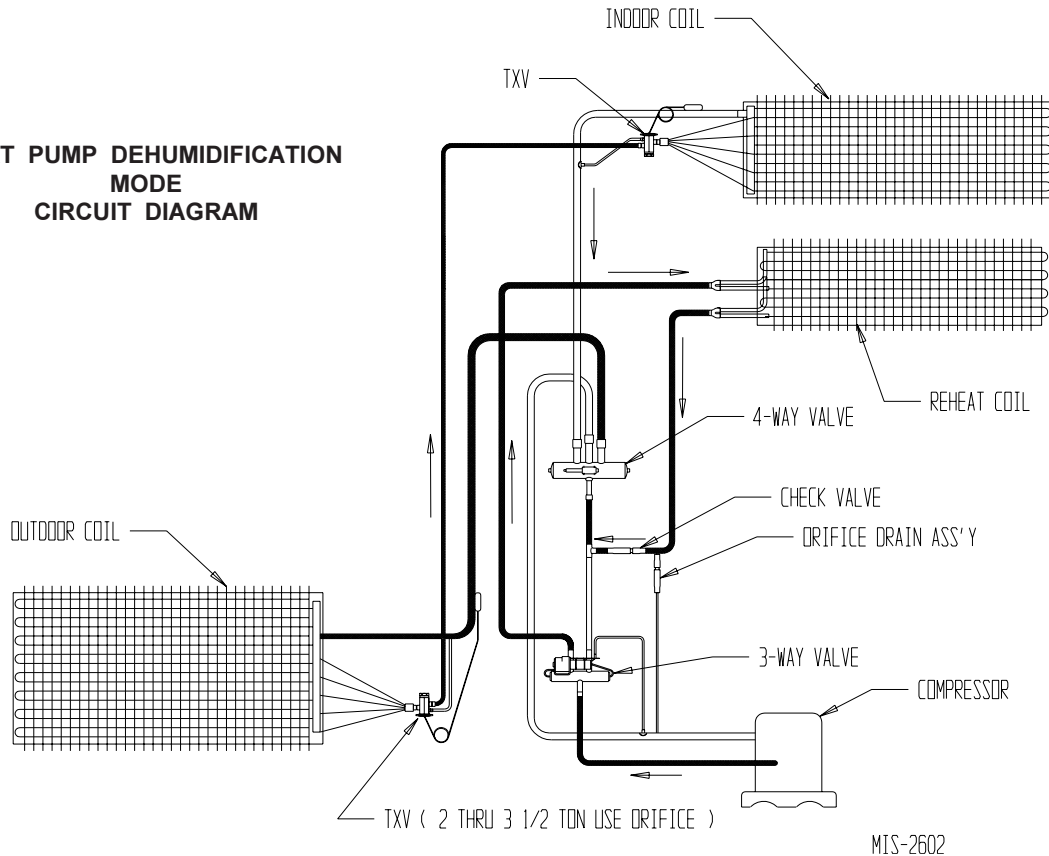
If the mixed air (return and ventilation, if used) temperature (measured at the internal filter location) drops below 65°F during dehumidification cycle, electric heat will cycle to help maintain room temperature to the 65°F condition.

Anytime there is a R-Y call for cooling, dehumidification is canceled and the unit will operate in the cooling mode until satisfied. If dehumidification call is still present when cooling call is satisfied, the unit will continue to operate and revert to dehumidification mode.

**HEAT PUMP COOLING
MODE
CIRCUIT DIAGRAM**



**HEAT PUMP DEHUMIDIFICATION
MODE
CIRCUIT DIAGRAM**



W24H1D Application Performance Data

Indoor Conditions		Outdoor Conditions	System Capacity				Pounds of Water/Hour	Evaporator Airflow	Approximate Supply Air	Mode
DB/WB	% RH	DB	Total	Sensible	Latent	S/T	Lbs.	CFM	DB/WB	A/C vs Dehum
65/63	90	65	28,100	11,900	16,200	0.42	15.30	800	51.8 / 51.3	A/C
65/63	90	65	13,900	300	13,600	0.02	12.84	800	64.1 / 57.5	Dehum
75/62.5	50	75	26,100	19,900	6,200	0.76	5.84	800	52.9 / 51.2	A/C
75/62.5	50	75	10,100	4,900	5,200	0.48	4.91	800	69.6 / 58.4	Dehum
75/65.5	60	75	27,400	17,300	10,100	0.63	9.55	800	55.6 / 54.4	A/C
75/65.5	60	75	11,300	3,300	8,000	0.29	7.59	800	71.4 / 61.2	Dehum
75/68	70	75	28,900	15,100	13,800	0.52	13.00	800	57.9 / 56.9	A/C
75/68	70	75	12,100	1,700	10,400	0.15	9.80	800	73.0 / 63.6	Dehum
80/67	50	95	23,400	18,200	4,900	0.78	4.91	800	59.0 / 57.0	A/C
80/67	50	95	6,100	200	5,900	0.04	5.56	800	79.8 / 64.7	Dehum

W30H1D Application Performance Data

Indoor Conditions		Outdoor Conditions	System Capacity				Pounds of Water/Hour	Evaporator Airflow	Approximate Supply Air	Mode
DB/WB	% RH	DB	Total	Sensible	Latent	S/T	Lbs.	CFM	DB/WB	A/C vs Dehum
65/63	90	65	35,100	15,100	20,000	0.43	18.92	1000	51.4 / 51.0	A/C
65/63	90	65	17,100	(-1,900)	19,000	0	17.99	1000	66.8 / 57.5	Dehum
75/62.5	50	75	32,000	23,900	8,100	0.75	7.60	1000	53.2 / 51.4	A/C
75/62.5	50	75	11,500	4,100	7,400	0.35	7.01	1000	71.3 / 58.8	Dehum
75/65.5	60	75	34,200	21,000	13,100	0.62	12.40	1000	55.8 / 54.3	A/C
75/65.5	60	75	13,800	1,700	12,100	0.12	11.36	1000	73.3 / 61.4	Dehum
75/68	70	75	36,700	18,800	17,900	0.51	16.85	1000	58.0 / 56.9	A/C
75/68	70	75	15,700	(-200)	15,900	0	14.98	1000	75.2 / 63.6	Dehum
80/67	50	95	29,800	22,600	7,200	0.76	6.79	1000	59.3 / 57.2	A/C
80/67	50	95	5,100	(-1,600)	6,700	0	6.32	1000	81.5 / 65.5	Dehum

W36H1D Application Performance Data

Indoor Conditions		Outdoor Conditions	System Capacity				Pounds of Water/Hour	Evaporator Airflow	Approximate Supply Air	Mode
DB/WB	% RH	DB	Total	Sensible	Latent	S/T	Lbs.	CFM	DB/WB	A/C vs Dehum
65/63	90	65	40,100	17,100	23,000	0.43	21.72	1100	51.0 / 50.5	A/C
65/63	90	65	19,600	(-1,700)	21,300	0	20.15	1100	66.5 / 57.5	Dehum
75/62.5	50	75	37,000	27,800	9,200	0.75	8.66	1100	52.0 / 50.5	A/C
75/62.5	50	75	13,200	5,200	8,000	0.40	7.54	1100	70.6 / 58.6	Dehum
75/65.5	60	75	39,600	24,500	15,100	0.62	14.28	1100	54.8 / 53.6	A/C
75/65.5	60	75	16,500	2,800	13,700	0.17	12.92	1100	77.6 / 60.8	Dehum
75/68	70	75	41,700	21,700	20,000	0.52	18.83	1100	57.0 / 56.0	A/C
75/68	70	75	18,600	500	18,100	0.02	17.11	1100	75.6 / 63.1	Dehum
80/67	50	95	34,600	24,000	10,600	0.69	9.99	1100	58.1 / 56.3	A/C
80/67	50	95	7,000	(-800)	7,800	0	7.35	1100	80.7 / 65.2	Dehum

Values shown in () are BTUH of heat available at these conditions

W42H1D Application Performance Data

Indoor Conditions		Outdoor Conditions	System Capacity				Pounds of Water/Hour	Evaporator Airflow	Approximate Supply Air	Mode
DB/WB	% RH	DB	Total	Sensible	Latent	S/T	Lbs.	CFM	DB/WB	A/C vs Dehum
65/63	90	65	51,000	22,000	29,000	0.43	27.36	1400	50.6 / 50.2	A/C
65/63	90	65	25,100	(-2,500)	27,600	0	26.00	1400	66.6 / 57.2	Dehum
75/62.5	50	75	43,300	34,700	8,600	0.80	8.09	1400	52.8 / 51.7	A/C
75/62.5	50	75	16,800	7,600	9,200	0.45	8.69	1400	70.1 / 58.5	Dehum
75/65.5	60	75	49,600	31,100	18,500	0.63	17.42	1400	54.7 / 53.9	A/C
75/65.5	60	75	20,500	3,300	17,200	0.16	16.24	1400	72.8 / 61.1	Dehum
75/68	70	75	52,600	27,700	24,900	0.53	23.54	1400	57.0 / 56.2	A/C
75/68	70	75	23,500	300	23,200	0.01	21.93	1400	74.9 / 63.2	Dehum
80/67	50	95	42,000	31,800	10,200	0.76	9.64	1400	58.4 / 57.1	A/C
80/67	50	95	7,300	(-700)	8,000	0	7.51	1400	80.5 / 65.5	Dehum

W48H1D Application Performance Data

Indoor Conditions		Outdoor Conditions	System Capacity				Pounds of Water/Hour	Evaporator Airflow	Approximate Supply Air	Mode
DB/WB	% RH	DB	Total	Sensible	Latent	S/T	Lbs.	CFM	DB/WB	A/C vs Dehum
65/63	90	65	52,200	22,200	30,000	0.42	28.33	1550	51.7 / 51.3	A/C
65/63	90	65	25,200	-3,400	28,600	0	26.99	1550	67.0 / 57.9	Dehum
75/62.5	50	75	47,900	37,600	10,300	0.78	9.77	1550	52.9 / 51.8	A/C
75/62.5	50	75	17,100	8,300	8,800	0.49	8.28	1550	70.0 / 58.9	Dehum
75/65.5	60	75	51,200	33,500	17,700	0.65	16.68	1550	55.3 / 54.6	A/C
75/65.5	60	75	20,700	4,300	16,400	0.21	15.47	1550	72.4 / 61.4	Dehum
75/68	70	75	54,400	29,500	24,900	0.54	23.52	1550	57.7 / 57.0	A/C
75/68	70	75	24,600	700	23,900	0.03	22.51	1550	74.5 / 63.5	Dehum
80/67	50	95	46,000	35,900	10,100	0.78	9.54	1550	58.6 / 57.5	A/C
80/67	50	95	6,400	(-700)	7,100	0	6.65	1550	80.4 / 65.7	Dehum

W60H1D Application Performance Data

Indoor Conditions		Outdoor Conditions	System Capacity				Pounds of Water/Hour	Evaporator Airflow	Approximate Supply Air	Mode
DB/WB	% RH	DB	Total	Sensible	Latent	S/T	Lbs.	CFM	DB/WB	A/C vs Dehum
65/63	90	65	62,900	27,000	35,900	0.42	33.85	1700	50.5 / 50.1	A/C
65/63	90	65	30,000	(-2,900)	32,900	0	31.08	1700	66.6 / 57.4	Dehum
75/62.5	50	75	58,600	43,900	14,700	0.75	13.90	1700	51.7 / 50.4	A/C
75/62.5	50	75	21,100	8,800	12,300	0.42	11.61	1700	70.4 / 58.4	Dehum
75/65.5	60	75	62,500	38,700	23,800	0.62	22.45	1700	54.3 / 53.2	A/C
75/65.5	60	75	25,600	4,500	21,100	0.18	19.91	1700	72.6 / 61.0	Dehum
75/68	70	75	65,700	34,100	31,600	0.52	29.83	1700	56.8 / 55.8	A/C
75/68	70	75	28,900	1,000	27,900	0.03	26.36	1700	74.5 / 63.2	Dehum
80/67	50	95	54,000	39,200	14,800	0.73	13.97	1700	58.1 / 56.5	A/C
80/67	50	95	8,900	(-1,600)	10,500	0	9.90	1700	80.8 / 65.4	Dehum

Values shown in () are BTUH of heat available at these conditions

**TABLE 1
DEHUMIDIFICATION RELAY LOGIC BOARD**

	Inputs to Board										Outputs From Board									
	G	Y	B	W2	E1	A1	D	RAT	L	G1	BK	YO	WV	W	E	A2	TWV	L		
Cooling Mode	X	X								X	X	X								
Cooling Mode	X	X			X					X	X	X				X				
Cooling Mode	X	X				X				X	X	X								
1st Stage Heating	X	X	X							X	X	X	X							
1st Stage Heating						X				X	X	X	X			X				
1st Stage Heating	X	X	X				X			X	X	X		X			X			
2nd Stage Heating	X	X	X	X						X	X	X	X	X						
2nd Stage Heating	X	X	X	X		X				X	X	X	X	X		X				
2nd Stage Heating	X	X	X	X			X			X	X	X	X	X						
Emergency Heat				X	X					X	X		X	X	X					
Emergency Heat				X	X	X				X	X		X	X	X	X				
Emergency Heat				X	X		X			X		X			X		X			
Dehumidification							X			X							X			
Dehumidification							X	X		X	X	X	X	X			X	X		

**TABLE 2
ELECTRICAL SPECIFICATIONS**

Model	SINGLE CIRCUIT						DUAL CIRCUIT							
	Rated Volts & Phase	No. Field Power Ckts.	④	①	②	②	④		①		②		②	
			Minimum Circuit Ampacity	Maximum External Fuse or Circuit Breaker	Field Power Wire Size	Ground Wire Size	Minimum Circuit Ampacity	Maximum External Fuse or Ckt. Breaker	Field Power Wire Size	Ground Wire Size	Ckt A	Ckt B	Ckt A	Ckt B
W24H1DA00, A0Z A04 ③ A08	230/208-1	1 1 1 or 2	24	30	10	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			44	50	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			65	70	6	8	44	21	45	25	8	10	10	10
W24H1DB00, B0Z B06	230/208-3	1 1	17	20	12	12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			35	40	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
W24H1DC00, C0Z C06	460-3	1 1	12	15	14	14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			21	25	10	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
W30H1DA00, A0Z A05 ③ A10	230/208-1	1 1 1 or 2	27	35	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			52	60	6	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			79	80	4	8	52	26	60	30	6	10	10	10
W30H1DB00, B0Z B06 ③ B09	230/208-3	1 1 1	19	25	10	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			37	40	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			47	50	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
W30H1DC00, C0Z C06 ③ C09	460-3	1 1 1	12	15	14	14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			21	25	10	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			26	30	10	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
W36H1DA00, A0Z A05 ③ A10	230/208-1	1 1 1 or 2	30	40	10	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			56	60	6	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			82	90	4	8	55	26	60	30	6	10	10	10
W36H1DB00, B0Z B06 ③ B09	230/208-3	1 1 1	24	30	10	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			42	50	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			51	60	6	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
W36H1DC00, C0Z C06 ③ C09	460-3	1 1 1	12	15	14	14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			21	25	10	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			25	25	10	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
W42H1DA00, A0Z A05 ③ A10	230/208-1	1 1 1 or 2	40	60	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			66	70	6	8	40	26	50	30	8	10	10	10
			92	100	3	8	40	52	50	60	8	6	10	10
W42H1DB00, B0Z B06 ③ B09	230/208-3	1 1 1	28	40	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			46	50	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			55	60	6	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
W42H1DC00, C0Z C06 ③ C09	460-3	1 1 1	14	20	12	12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			23	25	10	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			27	30	10	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
W48H1DA00, A0Z A05 ③ A10	230/208-1	1 1 1 or 2	38	50	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			64	80	6	8	38	26	50	30	8	10	10	10
			90	90	3	8	38	52	50	60	8	6	10	10
W48H1DB00, B0Z B06 ③ B09	230/208-3	1 1 1	29	35	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			47	50	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			56	60	6	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
W48H1DC00, C0Z ③ C09	460-3	1 1	14	20	12	12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			27	30	10	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
W60H1DA00, A0Z A05 ③ A10	230/208-1	1 1 1 or 2	41	60	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			67	80	4	8	41	26	60	60	8	10	10	10
			93	100	3	8	41	52	60	60	8	6	10	10
W60H1DB00, B0Z ③ B09	230/208-3	1 1	28	40	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			55	60	6	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
W60H1DC00, C0Z ③ C09	460	1 1	15	20	12	12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			28	30	10	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

① Maximum size of the time delay fuse or HACR type circuit breaker for protection of field wiring conductors.

② Based on 75°C copper wire. All wiring must conform to NEC and all local codes.

③ Maximum KW that can operate with heat pump on. These "Minimum Circuit Ampacity" values are to be used for sizing the field power conductors. Refer to the National Electrical Code (latest version), article 310 for power conductor sizing.

CAUTION: When more than one field power conductor circuit is run through one conduit, the conductors must be derated. Pay special attention to note 8 of table 310 regarding Ampacity Adjustment Factors when more than 3 conductors are in a raceway.