
MODELS:

WH243D, WH302D, WH362D

WH422D, WH484D, WH603D



Bard Manufacturing Company, Inc.
Bryan, Ohio 43506

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 S3210 for the standard features of the base unit. Electrical data for the dehumidification models is identical to the electrical data for the standard WH 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 capillary tube 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 capillary. 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.

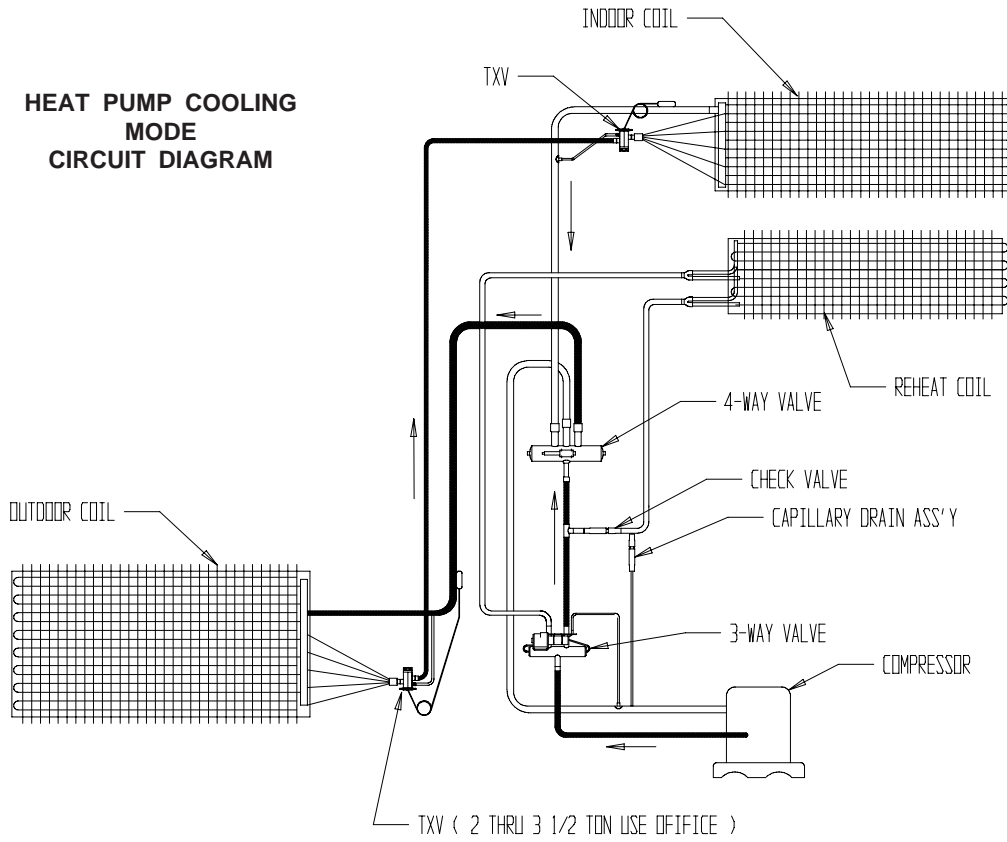
If the room temperature falls below 1st stage heating setpoint, electric heat will be energized by the room thermostat and cycle to maintain room temperature.

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

If the mixed (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.

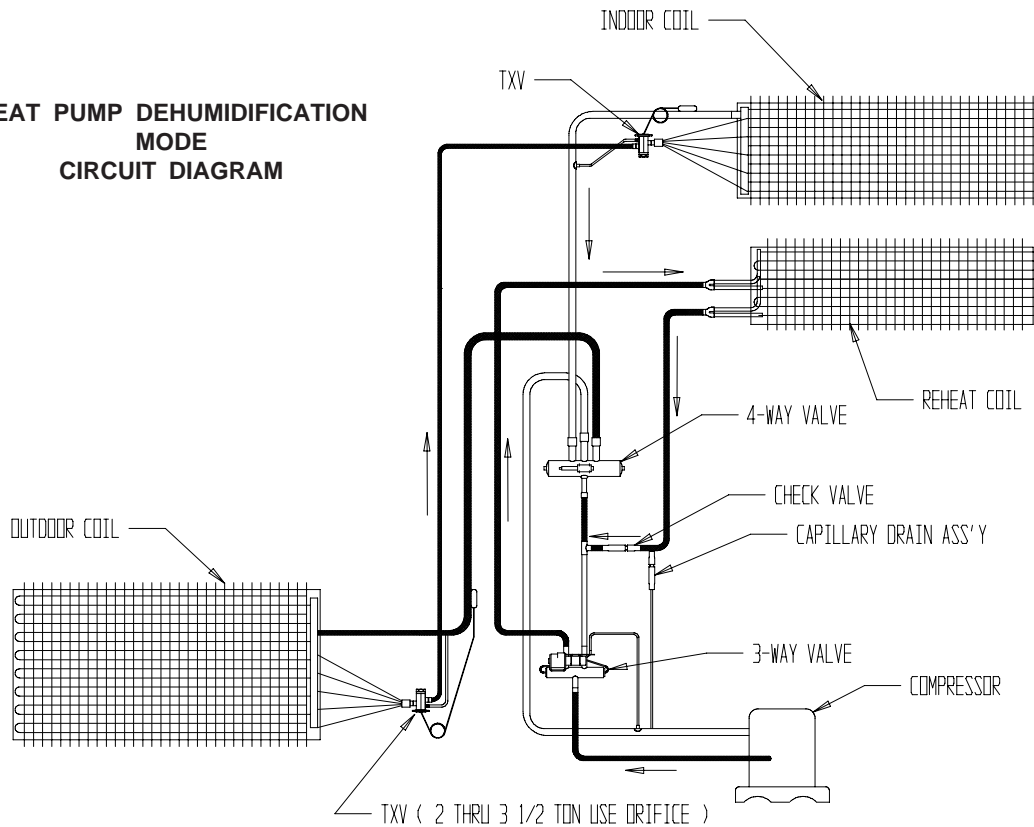
Anytime there is a R-Y call for cooling, dehumidification is canceled and the unit will operate in the cooling mode until satisfied. If dehumidification call is still present when cooling call is satisfied, the unit will continue to operate and revert to dehumidification mode.

**HEAT PUMP COOLING
MODE
CIRCUIT DIAGRAM**



MIS-1426

**HEAT PUMP DEHUMIDIFICATION
MODE
CIRCUIT DIAGRAM**



MIS-1427

WH243D Application Performance Data										
Indoor Conditions		Outdoor Conditions	System Capacity				Pounds of Water/Hour	Evaporator Air Flow	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	26,000	11,000	15,000	0.42	12.81	800	52.7 / 52.0	A/C
65/63	90	65	14,000	-0-	14,000	-0-	13.20	800	67.2 / 57.8	Dehum
75/62.5	50	75	23,000	18,000	5,000	0.77	4.68	800	54.6 / 52.5	A/C
75/62.5	50	75	8,800	3,700	5,100	0.42	4.84	800	70.7 / 59.1	Dehum
75/65.5	60	75	25,200	15,800	9,400	0.62	8.20	800	57.0 / 55.3	A/C
75/65.5	60	75	10,400	1,800	8,600	0.17	8.12	800	73.1 / 61.5	Dehum
75/68	70	75	27,000	14,200	12,800	0.52	11.27	800	59.0 / 57.8	A/C
75/68	70	75	11,700	-0-	11,700	-0-	11.08	800	75.0 / 63.5	Dehum
80/67	50	95	23,600	17,700	5,900	0.74	5.37	800	60.2 / 57.9	A/C
80/67	50	95	4,200	-0-	4,200	-0-	3.92	800	80.0 / 65.4	Dehum

WH302D Application Performance Data										
Indoor Conditions		Outdoor Conditions	System Capacity				Pounds of Water/Hour	Evaporator Air Flow	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	35,300	14,800	20,500	0.41	18.2	1000	51.7 / 51.1	A/C
65/63	90	65		[5,000]	19,300	-0-	18.2	1000	69.5 / 58.2	Dehum
75/62.5	50	75	32,200	24,400	7,800	0.75	6.16	1000	52.9 / 51.1	A/C
75/62.5	50	75	9,600	2,600	7,000	0.27	6.56	1000	72.6 / 59.1	Dehum
75/65.5	60	75	34,800	21,500	13,300	0.61	11.32	1000	55.5 / 54.2	A/C
75/65.5	60	75	11,800	-0-	11,800	-0-	11.16	1000	74.9 / 61.5	Dehum
75/68	70	75	37,000	19,000	18,000	0.51	15.52	1000	57.8 / 56.8	A/C
75/68	70	75		[2,200]	15,700	-0-	14.84	1000	77.0 / 63.6	Dehum
80/67	50	95	30,000	23,300	6,700	0.77	6.30	1000	59.5 / 57.7	A/C
80/67	50	95		[2,600]	7,000	-0-	6.40	1000	82.5 / 65.5	Dehum

Values shown in [] are BTUH of heat available at these conditions

WH362D Application Performance Data										
Indoor Conditions		Outdoor Conditions	System Capacity				Pounds of Water/Hour	Evaporator Air Flow	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	17,300	22,800	0.43	20.94	1100	51.2 / 50.9	A/C
65/63	90	65		[5,300]	21,400	-0-	20.2	1100	69.4 / 58.3	Dehum
75/62.5	50	75	36,100	27,000	9,100	0.70	7.64	1100	52.0 / 50.6	A/C
75/62.5	50	75	10,900	3,200	7,700	0.29	7.28	1100	72.4 / 59.3	Dehum
75/65.5	60	75	39,400	24,400	15,000	0.61	13.10	1100	54.8 / 53.7	A/C
75/65.5	60	75	13,000	-0-	13,000	-0-	12.32	1100	74.9 / 61.9	Dehum
75/68	70	75	41,600	21,700	19,900	0.52	17.52	1100	56.9 / 56.1	A/C
75/68	70	75		[2,450]	17,700	-0-	16.76	1100	77.1 / 64.0	Dehum
80/67	50	95	35,600	26,800	8,800	0.75	8.30	1100	59.0 / 57.2	A/C
80/67	50	95		[3,000]	8,000	-0-	7.65	1100	82.6 / 65.8	Dehum

Values shown in [] are BTUH of heat available at these conditions

WH422D Application Performance Data										
Indoor Conditions		Outdoor Conditions	System Capacity				Pounds of Water/Hour	Evaporator Air Flow	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	48,700	20,100	28,600	0.41	26.00	1400	51.7 / 51.2	A/C
65/63	90	65		[6,000]	26,000	-0-	24.60	1400	68.8 / 58.3	Dehum
75/62.5	50	75	45,100	34,500	10,600	0.76	9.48	1400	52.6 / 51.5	A/C
75/62.5	50	75	15,000	4,700	10,300	0.31	9.68	1400	71.9 / 59.2	Dehum
75/65.5	60	75	47,200	30,200	17,000	0.63	16.00	1400	55.2 / 54.5	A/C
75/65.5	60	75	15,800	-0-	15,800	-0-	14.95	1400	74.1 / 61.9	Dehum
75/68	70	75	51,600	26,500	25,100	0.51	21.76	1400	57.6 / 56.5	A/C
75/68	70	75		[1,800]	21,600	-0-	20.40	1400	76.2 / 63.0	Dehum
80/67	50	95	41,500	32,000	10,000	0.78	9.43	1400	58.7 / 57.5	A/C
80/67	50	95	7,600	-0-	7,600	-0-	7.17	1400	80.0 / 65.5	Dehum

Values shown in [] are BTUH of heat available at these conditions

WH484D Application Performance Data										
Indoor Conditions		Outdoor Conditions	System Capacity				Pounds of Water/Hour	Evaporator Air Flow	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	53,100	23,000	30,100	0.42	26.08	1550	51.5 / 50.9	A/C
65/63	90	65		[4,600]	24,400	-0-	23.00	1550	67.7 / 58.6	Dehum
75/62.5	50	75	49,700	38,300	11,400	0.77	10.00	1550	52.0 / 51.2	A/C
75/62.5	50	75	14,800	6,800	8,000	0.46	6.80	1550	70.9 / 59.3	Dehum
75/65.5	60	75	52,800	33,800	19,000	0.64	16.54	1550	55.0 / 54.2	A/C
75/65.5	60	75	16,900	2,400	14,500	0.14	13.64	1550	73.6 / 62.1	Dehum
75/68	70	75	55,400	29,400	26,000	0.53	22.76	1550	57.4 / 56.7	A/C
75/68	70	75	19,300	-0-	19,300	-0-	18.24	1550	75.4 / 64.1	Dehum
80/67	50	95	47,000	36,000	11,000	0.76	10.37	1550	58.3 / 57.2	A/C
80/67	50	95	5,500	-0-	5,500	-0-	5.16	1550	80.0 / 65.7	Dehum

Values shown in [] are BTUH of heat available at these conditions

WH603D Application Performance Data										
Indoor Conditions		Outdoor Conditions	System Capacity				Pounds of Water/Hour	Evaporator Air Flow	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	62,600	28,300	34,300	0.45	32.30	1650	52.2 / 51.6	A/C
65/63	90	65		[1,750]	28,000	-0-	26.40	1650	65.0 / 57.4	Dehum
75/62.5	50	75	58,000	43,700	14,300	0.75	13.50	1650	50.8 / 50.0	A/C
75/62.5	50	75	23,000	9,800	13,200	0.42	12.50	1650	69.6 / 58.0	Dehum
75/65.5	60	75	62,600	39,200	23,400	0.62	22.00	1650	53.2 / 52.9	A/C
75/65.5	60	75	27,000	5,550	21,450	0.20	20.20	1650	72.0 / 60.4	Dehum
75/68	70	75	68,300	35,200	33,100	0.48	31.00	1650	55.6 / 55.2	A/C
75/68	70	75	29,200	3,000	26,500	0.11	25.00	1650	73.4 / 62.7	Dehum
80/67	50	95	56,500	41,800	14,700	0.73	13.80	1650	57.0 / 55.7	A/C
80/67	50	95	15,300	1,500	13,800	0.09	13.00	1650	79.2 / 64.3	Dehum

Values shown in [] are BTUH of heat available at these conditions