Installation and Maintenance Manual IM 1228-2

Group: **Applied Air Systems**
Part Number: **IM 1228**
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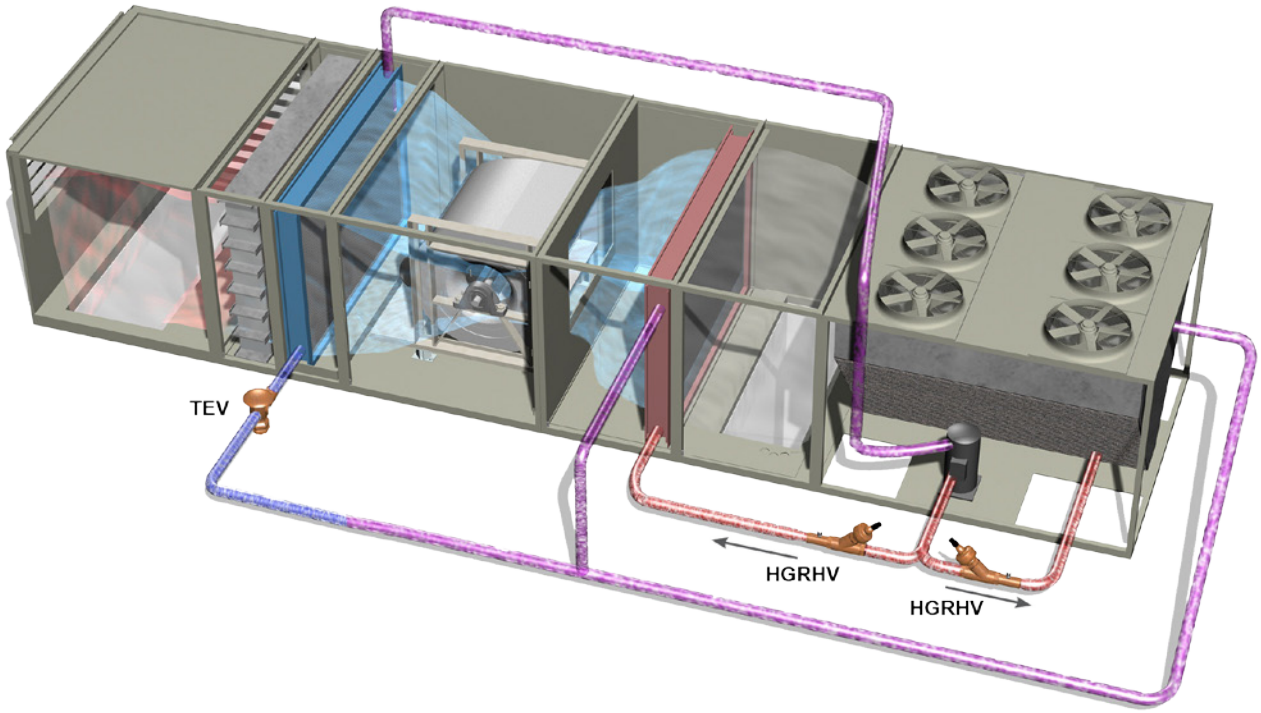
Modulating Hot Gas Reheat (MHGRH)

Controls By Others

Modulating Hot Gas Reheat (MHGRH) is typically used during dehumidification mode. During dehumidification, mechanical cooling cools the air in order to lower the moisture content of the air. MHGRH is then used to temper (raise) the temperature of the air to a desired setpoint. The amount of reheat is controlled via a 0-10Vdc input signal from the customer to terminals TB3:620 & 621. When MHGRH is active, the minimum position for the reheat valves is 10% (1 VDC). The minimum signal should not fall below 1.0 Vdc when MHGRH is active for proper operation of the system. The recommended ramp up/down rates of the valves is 0.1V per second. The signal to the reheat valves should be 0 Vdc when MHGRH is inactive.

MHGRH is used to maintain the discharge air at the required setpoint. Daikin has supplied the unit with a Discharge Air Temperature (DAT) sensor to provide this value. The DAT sensor is of the averaging type to compensate for uneven temperatures at the unit discharge. The DAT sensor can be found on Electrical Schematic and can be connected to via terminals TB2: 132 & 133 (Figure 3). The customer is responsible for the PI loop that controls the 0-10 Vdc output to the reheat valves.

Figure 1: Typical Modulating Hot Gas Reheat System



Communication with the reheat control valves is accomplished by providing a 0-10 Vdc signal to the unit, Figure 4. This signal is sent to a pair of interface boards and a smart relay that communicate with the reheat valves. The interface boards can provide up to 6386 steps of resolution to the reheat valves. The smart relay assists in controlling the required functions of the unit such as operating valves and energizing contactors. Upon termination of dehumidification (or reheat), the smart relay will keep compressor #2 operating for an additional 3 minutes to stabilize the system before reverting to cooling mode or unit shut-down. The reheat valves are of the step type and will remain in a set position until a signal is sent to the valve. The valves modulate (in small steps) with a change in the input signal.

Compressor staging is used to control the Leaving Coil Temperature (LCT)/Entering Fan Temperature (EFT) during dehumidification mode. Daikin has supplied the unit with an EFT Sensor to support this operational sequence. The EFT sensor can be found on Electrical Schematic Page 2 and can be connected to via terminals TB2: 130 & 131. During reheat, the recommended temperature range (EFT) for compressor staging is 45–52 F, and circuit #2 (COOL-2 & COOL-4 & COOL-6) should lead and load up before starting circuit #1. If circuit #1 is leading prior to going into the dehumidification mode, lead should be switched over to circuit #2 upon entering dehumidification mode.

The need for dehumidification is typically determined by a separate humidity sensor/transducer and is usually mounted in the building space or return duct. Daikin can provide this sensor, but it must be installed by the field.

Daikin supplied temperature sensors are passive negative temperature coefficient (NTC) 10K ohm sensors. Table 1 details the resistance versus temperature values.

Figure 2: Typical Modulating Hot Gas Reheat Coil

Use with Digital Scroll Compressor Units

MHGRH is available with units that have no controls and digital scroll compressors however the wiring and control vary slightly depending on the unit size. For RPS/RDT/RFS/RCS -035D and greater with tandem compressor on circuit #2 the smart relay will control compressor #4 in lieu of compressor #2. On units -015D thru -030D with a single compressor on circuit #2 the user will have to send a 1-5VDC signal to the digital compressor controller [DCC] simultaneously with the MHGRH signal. For more information on the DCC see the digital compressor literature sent with the unit or consult the Copeland website.

Table 1: Nominal Input Resistance versus Temperature

Temp (°F)	R nominal (Ω)	Temp (°F)	R nominal (Ω)	Temp (°F)	R nominal (Ω)	Temp (°F)	R nominal (Ω)	Temp (°F)	R nominal (Ω)
-40	336.05	-6	103.486	28	36.601	62	14.546	96	6.382
-39	323.889	-5	100.184	29	35.565	63	14.179	97	6.238
-38	312.212	-4	96.999	30	34.562	64	13.822	98	6.097
-37	300.999	-3	93.927	31	33.591	65	13.475	99	5.96
-36	290.229	-2	90.962	32	32.65	66	13.139	100	5.826
-35	279.884	-1	88.101	33	31.739	67	12.811	101	5.696
-34	269.945	0	85.34	34	30.856	68	12.493	102	5.569
-33	260.396	1	82.676	35	30	69	12.184	103	5.446
-32	251.218	2	80.103	36	29.171	70	11.884	104	5.325
-31	242.397	3	77.62	37	28.368	71	11.591	105	5.208
-30	233.918	4	75.222	38	27.59	72	11.307	106	5.093
-29	225.766	5	72.906	39	26.835	73	11.031	107	4.981
-28	217.928	6	70.67	40	26.104	74	10.762	108	4.872
-27	210.39	7	68.51	41	25.394	75	10.501	109	4.766
-26	203.139	8	66.424	42	24.707	76	10.247	110	4.663
-25	196.165	9	64.408	43	24.04	77	10	111	4.562
-24	189.455	10	62.46	44	23.394	78	9.76	112	4.463
-23	182.998	11	60.578	45	22.767	79	9.526	113	4.367
-22	176.785	12	58.759	46	22.159	80	9.298	114	4.273
-21	170.804	13	57.001	47	21.569	81	9.077	115	4.182
-20	165.048	14	55.301	48	20.997	82	8.862	116	4.093
-19	159.506	15	53.658	49	20.442	83	8.652	117	4.006
-18	154.169	16	52.069	50	19.903	84	8.448	118	3.921
-17	149.03	17	50.533	51	19.38	85	8.249	119	3.838
-16	144.081	18	49.047	52	18.873	86	8.056	120	3.757
-15	139.313	19	47.61	53	18.38	87	7.868	121	3.678
-14	134.72	20	46.22	54	17.902	88	7.685	122	3.601
-13	130.295	21	44.875	55	17.438	89	7.506	123	3.526
-12	126.031	22	43.574	56	16.988	90	7.333	124	3.453
-11	121.921	23	42.315	57	16.551	91	7.164	125	3.381
-10	117.96	24	41.097	58	16.126	92	6.999	126	3.311
-9	114.141	25	39.917	59	15.714	93	6.839	127	3.243
-8	110.46	26	38.776	60	15.313	94	6.682	128	3.176
-7	106.91	27	37.671	61	14.924	95	6.53	129	3.111

Figure 3: Field Wiring from TB2 to Field-Supplied Controls – DAT Sensor

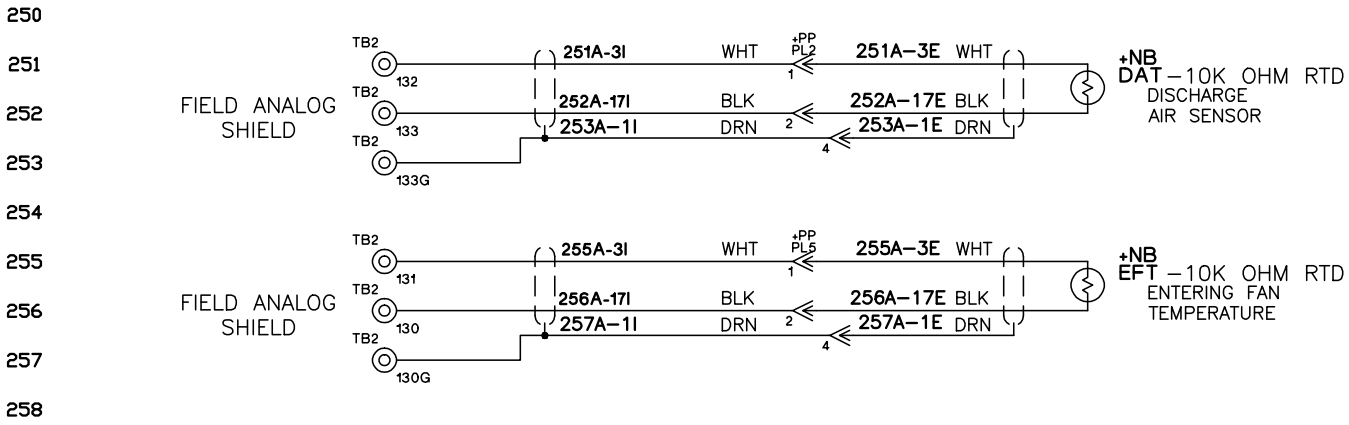


Figure 4: Field WiringFrom TB3 to Field-Supplied Controls – Reheat Control Valves