SP-32DT Refrigerator Temperature Control and Defrost Timer

GOLDLINE

Description

The SP-32DT combines both temperature control and defrost function into a single dependable electronic controller. The temperature control precisely senses refrigerated space temperature with a remote mounted sensor. It cycles the compressor or solenoid valve to provide $\pm 1^{\circ}$ F accurate temperature control. Both refrigeration and defrost loads are activated by isolated 2HP relays.

The defrost timer function initiates defrost at selectable time intervals rather than on a time of day basis. Manual initiation using a switch can also be used. Defrost can be terminated by either time, temperature, or manually using a switch.

The SP-32DT can be configured to provide defrost for either electric heater systems or hot gas systems. In electric heater mode, the defrost relay contacts close energizing electric defrost heaters and simultaneously the refrigeration relay contacts open to shut off the compressor. When defrost terminates, the refrigeration relay contacts are allowed to close (depending on refrigeration temperature) to continue refrigeration. In hot gas mode the defrost relay closes to energize the hot gas solenoid and simultaneously the refrigeration contacts close to run the compressor.

The SP-32DT features a plug in connector for the optional TD-SP Digital Display Monitor or TDA-SP Alarm and Display Monitor. The TD-SP displays setpoint and refrigeration sensor temperatures as well as highest and lowest temperatures reached. The TDA-SP provides the same functions as the TD-SP as well as an alarm function and separate alarm output.

Specifications

Power:	Approx. 2VA required from any power source:	Differential:	adjustable 1-25°F				
	105-130VAC, 50/60Hz	Accuracy:	+/- 1°F				
	195-250VAC, 50/60Hz	Environment:	-30 to +130°F 0-95% rH, non-condensing				
Outputs:	SPDT isolated (dry) contacts, 1HP@115VAC 2HP@240VAC	Defrost Interva	l: 2 -30 hours - selectable in 2 hour increments				
	20A on NO contacts 10A on NC contacts	Time Termination: adjustable 15 to 60 minutes					
Sensors:	Thermistor, 10K @ 25°C/77°F	Temp Termina	tion: adjustable 40 to +70°F				
	Type SW supplied with control Interchangeable with any IE	Features: Selectable electric or hot gas modes					
	temperature sensor	Manual Initiation					
Setpoint:	1000 ft. maximum wire run	Manual Termination Remote Setpoint					
	adjustable -26 to +90°F						

Installation

1. Mounting

The SP-32DT control is designed for mounting indoors, protected from the weather and with noncondensing humidity. For outdoor use or in moist environments use a Goldline **RE-1** raintight enclosure.

2. Sensor Mounting and Wiring

Temperature Control sensor: The included temperature sensor should be installed in the refrigerated air space and attached to terminals 2 & 3.

Defrost Termination sensor: If using temperature termination for defrost, a Goldline temperature sensor (not included) must be attached to terminals 5 & 6 and mounted on the evaporator coil.

Sensors can be mounted up to 1000' away from the SP-32DT. 18 AWG twisted pair wire should be used for normal indoor wire runs. Sensor wiring run outdoors must be rated for outdoor use and ensure that wire connections are protected from the weather. For long runs or runs near other electrical wiring use shielded cable (Belden 8760 for indoor use or Belden 8428 for outdoor use). Ground the shields to one of the control's cover screws. Contact your distributor for information on the wide range of interchangeable Goldline temperature sensors available.



3. Power input

The SP-32DT control requires power to operate. Connect either 115VAC to the terminals marked "115VAC" or 208/240VAC to the terminals marked "240VAC". Connect grounds to the green screw provided.

4. Output wiring

The SP-32DT provides two sets of isolated SPDT 2HP relay outputs, one for refrigeration control and one for defrost control. The Output 1 relay cycles on/off to control refrigeration temperatures and the Output 2 relay controls defrost loads. Both are dry contact relays, offering normally open (NO) and normally closed (NC) contacts. If you are directly controlling a load (eg compressor, contactor coil, valve, etc.), you must connect a source of power through these output relays. The diagram shown on page 3 shows general wiring configurations. The wiring configuration that you use will be dependent on your particular equipment and desired functions. Sample wiring diagrams showing typical electric defrost and hot gas defrost can be found on page 6.

5. Manual Defrost Initiation

This optional feature allows the ability to initiate defrost at other that the scheduled time due to unusual conditions or other circumstances. For





SP-32DT Power Input Wiring

Installation (Continued)



manual initiation of defrost, wire a normally open pushbutton switch across screw terminals 4 & 5. Defrost will initiate whenever the button is pushed.

6. Manual Defrost Termination

This optional feature allows the ability to terminate defrost at other that the scheduled time/ temperature due to unusual conditions or circumstances. Two sets of screw terminals are provided for manual termination using either a normally open or normally closed pushbutton switch. If using a normally open switch, wire the switch directly to screw terminals 5 & 6, in parallel with the defrost termination sensor. If using a normally closed switch, remove the factory installed jumper on the two screw terminals under the Output 2 relay and wire the switch directly to these terminals. Defrost will terminate whenever the button is pushed.

7. Settings and Adjustments

Refer to the diagram at the bottom of page 4 for the location of these adjustments.

Setpoint: Controls are shipped from the factory set up to use the internal setpoint adjustment knob. If you would like to use a remote setpoint or a fixed setpoint, set the external/internal setpoint jumper located on the circuit board near screw terminal "1" to "external". Now connect an RSP (potentiometer) or an ESP (fixed resistor) to terminals "1" and "2". RSP's and ESP's are available through your Goldline dealer.

The setpoint should be adjusted to the desired refrigeration temperature. Refrigeration will cycle off at this temperature and come back on after the temperature rises by the differential setting.

Differential: Set this to the amount of "deadband" desired in the refrigeration cycle. Refrigeration will cycle on after the temperature rises by this amount from the setpoint setting.

Defrost Time Interval Dip switch settings: Located on the circuit board above the setpoint, these 4 dip switch settings control the interval of time between defrost cycles. When a dip switch is up,

Installation (Continued)



it is ON. When down, it is OFF. Each switch adds its numerical value of hours to the interval between defrosts when it is in the OFF position. From left to right, switch 1 adds 2 hours, switch 2 adds 4 hours, switch 3 adds 8 hours, and switch 4 adds 16 hours. The 4 switches provide 16 combinations of defrost intervals from 2 to 30 hours in 2 hour increments. NOTE: When all switches are ON, the interval is approximately 4 minutes, providing a means for testing the control. Some sample diagrams are shown above.

Defrost Time Termination adjustment: If defrost termination is to be based on time, use this adjustment. Time termination can be set from 15 to 60 minutes. After this amount of time has passed, defrost will terminate and refrigeration will be allowed to resume. NOTE: the time termination feature will override temperature termination if both are used.

Defrost Temperature Termination adjustment: If defrost termination is to be based on temperature, use this adjustment. Temperature termination can be set from 40°F/4°C to 70°F/21°C and requires a separate temperature sensor (not included). When the coil temperature rises to this setting, defrost will terminate, and refrigeration will be allowed to resume.

Normal/Hot Gas Defrost: Controls are shipped from the factory set up to run Normal defrost. This mode will disable the refrigeration relay during defrost and should be used for typical electric or timed off defrost. If you are using a Hot Gas defrost system, set the defrost selection jumper located on the circuit board near the defrost interval dip switches to "HG". Unlike Normal defrost, when defrost is initiated in Hot Gas mode, the compressor is forced on.



Differential adjustment

Operation

Determine the time interval between defrost cycles and set the proper dip switches. If using time to terminate defrost, set the proper time interval on the "Terminate Time" adjustment. If using temperature to terminate defrost, attach a Goldline temperature sensor to terminals 5 & 6 and set the proper temperature on the "Terminate Temperature" adjustment. If manual initiation or termination is desired, make sure the correct type of switch is attached to the proper terminals (see "Settings and Adjustments"). Set desired setpoint and differential adjustments for desired refrigeration control.

Refrigeration: After applying power to the SP-32DT, the power LED will indicate that the unit is on. The refrigeration LED will light (and refrigeration relay will energize) when the refrigeration sensor temperature rises above the setpoint temperature setting plus the differential setting, essentially a call for cooling. Cooling will stop when the refrigeration sensor temperature falls below the setpoint temperature setting. The SP-32DT will continue to function in this manner (calling and satisfying) until a defrost cycle.

Defrost: The defrost LED will light (and defrost relay will energize) when the interval time set by the dip switches has expired. Defrost can also be initiated manually (see Adjustments and Settings). During defrost, the refrigeration relay will be disabled and the LED will be off when in "Normal" defrost mode. If in "Hot Gas" mode, the refrigeration relay (and LED) will energize. Defrost will continue until it is terminated by time, temperature, or manually forced off. If time termination is used, defrost will continue until the amount of time set on the Time Termination adjustment has expired. If temperature termination is used, defrost will continue until the defrost sensor temperature rises above the Temp Termination setting. When defrost finally terminates, the defrost relay (and LED) will de-energize and the refrigeration relay will be allowed to resume normal function.

Technical Assistance

For help in installing, operating, or troubleshooting this control, you may call for technical assistance at 800-343-0826. Independent Energy's technicians are available from 8:00AM to 5:00PM Eastern Time, Monday through Friday. You may call at other times and leave a message, and a technician will call you back as soon as possible.



Electric Defrost



Hot Gas Defrost

Temperature vs. Resistance Chart

All Goldline controls use 10K thermistor sensors. When disconnected from the control, the sensor will read 10 K ohms at 25°C/77°F. Refer to the chart below for the resistance at other tempera-

tures. For a given temperature, the resistance is accurate to +/- 1%. For a given resistance the temperature is accurate to +/- 0.5° F.

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°F	онм	°F	онм	°F	онм	°F	онм	°F	онм	°F	онм	°F	онм
-50	491,142	0	85,387	50	19,900	100	5,827	150	2,044	200	829	250	378
-49	472,642	1	82,719	51	19,377	101	5,697	151	2,005	201	815	251	373
-48	454,909	2	80,142	52	18,870	102	5,570	152	1,966	202	802	252	367
-47	437,907	3	77,656	53	18,377	103	5,446	153	1,929	203	788	253	362
-46	421,602	4	75,255	54	17,899	104	5,326	154	1,892	204	775	254	357
-45	405,965	5	72,937	55	17,435	105	5,208	155	1,856	205	763	255	352
-44	390,966	6	70,698	56	16,985	106	5,094	156	1,821	206	750	256	347
-43	376,577	7	68,535	57	16,548	107	4,982	157	1,787	207	738	257	342
-42	362,770	8	66,447	58	16,123	108	4,873	158	1,753	208	726	258	337
-41	349,522	9	64,428	59	15,711	109	4,767	159	1,720	209	714	259	332
-40	336,804	10	62,479	60	15,310	110	4,664	160	1,688	210	702	260	327
-39	324,597	11	60,595	61	14,921	111	4,563	161	1,657	211	691	261	323
-38	312,876	12	58,774	62	14,543	112	4,464	162	1,626	212	680	262	318
-37	301,622	13	57,014	63	14,176	113	4,368	163	1,596	213	669	263	314
-36	290,813	14	55,313	64	13,820	114	4,274	164	1,567	214	658	264	309
-35	280,433	15	53,669	65	13,473	115	4,183	165	1,538	215	648	265	305
-34	270,460	16	52,078	66	13,136	116	4,094	166	1509	216	637	266	301
-33	260,878	17	50,541	67	12,809	117	4,007	167	1,482	217	627	267	296
-32	251,670	18	49,054	68	12,491	118	3,922	168	1,455	218	617	268	292
-31	242,821	19	47,616	69	12,182	119	3,839	169	1,428	219	607	269	288
-30	234,316	20	46,225	70	11,882	120	3,758	170	1,402	220	598	270	284
-29	226,138	21	44,879	71	11,589	121	3,679	171	1,377	221	588	271	280
-28	218,276	22	43,577	72	11,305	122	3,602	172	1,352	222	579	272	276
-27	210,716	23	42,318	73	11,029	123	3,527	173	1,328	223	570	273	273
-26	203,445	24	41,099	74	10,761	124	3,454	174	1,304	224	561	274	269
-25	196,451	25	39,919	75	10,500	125	3,382	175	1,281	225	553	275	265
-24	189,722	26	38,777	76	10,246	126	3,312	176	1,258	226	544	276	262
-23	183,248	27	37,671	77	9,999	127	3,244	177	1,235	227	536	277	258
-22	177,019	28	36,601	78	9,758	128	3,177	178	1,213	228	527	278	255
-21	171,023	29	35,565	79	9,525	129	3,112	179	1,192	229	519	279	251
-20	165,251	30	34,561	80	9,297	130	3,049	180	1,171	230	511	280	248
-19	159,696	31	33,590	81	9,076	131	2,987	181	1,150	231	503	281	244
-18	154,347	32	32,648	82	8,861	132	2,926	182	1,130	232	496	282	241
-17	149,197	33	31,737	83	8,651	133	2,867	183	1,110	233	488	283	238
-16	144,236	34	30,853	84	8,447	134	2,809	184	1,091	234	481	284	235
-15	139,458	35	29,998	85	8,249	135	2,752	185	1,072	235	473	285	232
-14	134,855	36	29,169	86	8,056	136	2,697	186	1,054	236	466	286	229
-13	130,420	37	28,365	87	7,867	137	2,643	187	1,035	237	459	287	225
-12	126,147	38	27,587	88	7,684	138	2,591	188	1,017	238	452	288	223
-11	122,030	39	26,832	89	7,506	139	2,539	189	1,000	239	445	289	220
-10	118,061	40	26,100	90	7,333	140	2,489	190	983	240	439	290	217
-9	114,235	41	25,391	91	7,164	141	2,440	191	966	241	432	291	214
-8	110,547	42	24,704	92	6,999	142	2,392	192	950	242	426	292	211
-7	106,991	43	24,037	93	6,839	143	2,345	193	933	243	420	293	208
-6	103,561	44	23,391	94	6,683	144	2,299	194	918	244	413	294	206
-5	100,254	45	22,764	95	6,530	145	2,254	195	902	245	407	295	203
-4	97,063	46	22,156	96	6,382	146	2,210	196	887	246	401	296	200
-3	93,986	47	21,566	97	6,238	147	2,167	197	872	247	395	297	198
-2	91,017	48	20,993	98	ь,097	148	2,125	198	857	248	390	298	195
-1	88,152	49	20,438	99	5,960	149	2,084	199	843	249	384	299	193
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GOLDLINE CONTROLS

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