GOLDLINE®

SP-30
SP-30D

Single Stage Temperature Control

Description

The SP-30 and SP-30D controls are single stage, general purpose, temperature controls for use in HVAC, refrigeration, and industrial applications. The setpoint temperature range is user selectable from:

-30°F to +100°F *or* **70°F to 200°F**

The SP-30 control provides one isolated SPDT relay output while the SP-30D provides two (effectively DPDT). The relays on both the SP-30 and SP-30D are controlled by comparing the thermistor temperature sensor to the adjustable setpoint temperature. The user can select either "heat" mode (relay operates on temperature fall) or "cool" mode (relay operates on temperature rise). The control setpoint can be set using the internal setpoint dial (factory setting) or a remote setpoint dial (see Goldline **RSP-30** remote setpoint on page 7). The SP-30 and SP-30D also features a plug in connector for a TD-30 Digital Display Monitor. The TD-30 snaps into the cover for easy mounting and displays both sensor and setpoint temperatures.

Power can be provided from a 24VAC, 24VDC, 115VAC or 240VAC power source. Relay contacts are completely isolated so the outputs can switch any voltage, regardless of the power source. On SP-30D models, one relay output can switch high voltage, the other switch low voltage. A movable divider is provided to separate high and low voltage wiring compartments.

Specifications

Power: Approx. 2VA required from any power source:
21-27VDC
21-27VAC, 50/60Hz
105-130VAC, 50/60Hz
195-250VAC, 50/60Hz

Outputs: SPDT isolated (dry)contacts,
1HP@115VAC, 2HP@240VAC
rating @ 240VAC:
20A on NO contacts
10A on NC contacts

Sensors: Thermistor, 10K @ 25°C/77°F
Type SW supplied with control
Interchangeable with any IE temperature sensor
1000 ft. maximum wire run

Setpoint: Low -30 to +100°F
High 70 to 200°F

Differential: 1-25°F

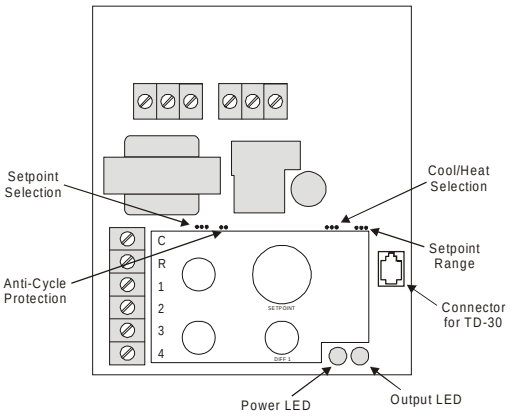
Accuracy: +/- 1°F

Environment: -30 to +130°F
0-95% rH, non-condensing

Installation

Setup

The SP-30 and SP-30D can be configured to operate in a variety of applications using jumpers located on the circuit board (see diagram below). Set these jumpers based on your application, before attempting to install or wire the control. The jumper functions and appropriate positions are shown in the diagram below.



NOTE: Factory default settings are shaded

FUNCTION	SELECTION	JUMPER POSITION	DESCRIPTION
Setpoint Select	Internal	● ▬	Use the setpoint knob
	External	▬ ●	Wire an RSP-30 remote setpoint to terminals 1/2/3
Setpoint Range	-30 to +100°F	● ▬	Low range - use the blue temperature scale
	+70 to +200°F	▬ ●	High range - use the red temperature scale
Cool/Heat Selection	Cool mode	▬ ●	Control operates on temperature rise
	Heat mode	● ▬	Control operates on temperature fall
Anti-Cycle Protection	Disable	▬	The output turns on/off normally
	Enable	● ●	Rapid on/off cycling is prevented by a 4 minute delay

Installation (Continued)

Mounting

The SP-30 and SP-30D controls are designed for mounting indoors, protected from the weather and with non-condensing humidity. For outdoor use or in moist environments use a Goldline **RE-1** raintight enclosure. Use the mounting screws supplied or optional mounting bracket (consult IE factory).

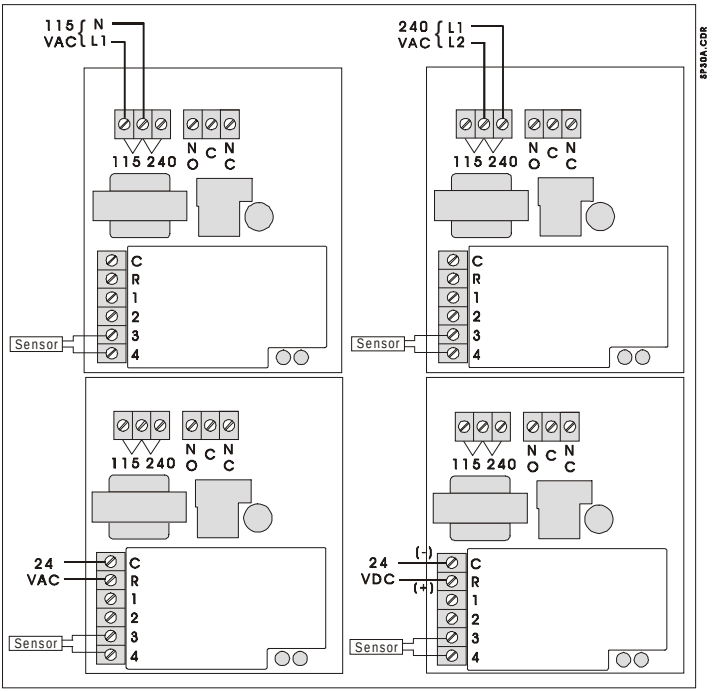
Sensor Mounting and Wiring

To maximize temperature measurement accuracy securely mount the sensor and then insulate it to protect it from the effects of ambient temperature. 18 AWG twisted pair wire should be used for normal indoor 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. If the **SW** sensor supplied with the control does not meet your needs, contact your distributor for information on the wide range of interchangeable Goldline temperature sensors.

The temperature sensor wires run back to the control should be connected to the screw terminals labeled "3" and "4". See diagram on page 5.

Power input

The SP-30 and SP-30D controls require power to operate. Either 24VAC, 24VDC, 115 or 208/240VAC can be used. Be sure to only power the control with ONE power input. Connect 24VAC to the “R” and “C” terminals; 24VDC to the “R” (+) and “C” (-); 115VAC to the terminals marked “115VAC” or 208/240VAC to the terminals marked “240VAC”. Connect grounds to the green screw provided or use grounding clips (eg Steel City “Gee clips” or Raco #975). Refer to wiring diagram below.

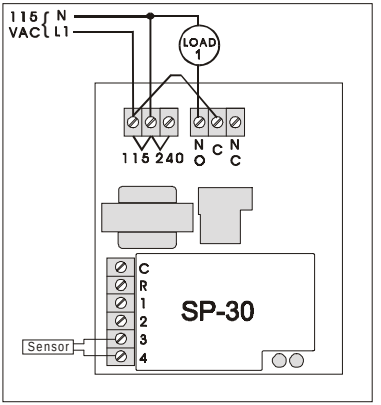


Installation (Continued)

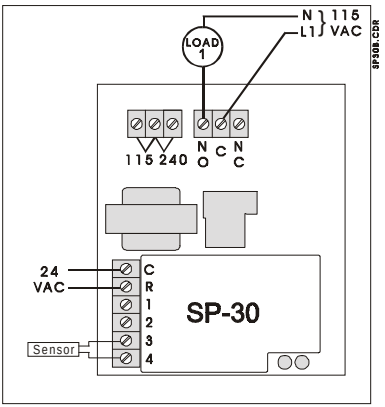
Output wiring

SP-30: The SP-30 provides one set of isolated SPDT relay outputs. If you are directly controlling a load (eg pump, blower, valve, etc), you must connect a source of power through this output relay. "NO" are normally open contacts which close when the control output is on. "NC" are normally closed contacts which open when the control output is on. Refer to the sample diagrams shown below.

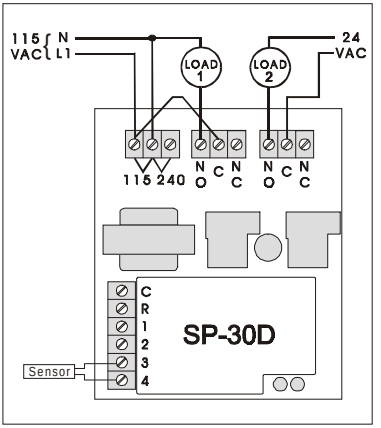
SP-30D: The SP-30D provides two sets of isolated SPDT relay outputs. If you are directly controlling a load (eg pump, blower, valve, etc), you must connect a source of power through these output relays. "NO" are normally open contacts which close when the control output is on. "NC" are normally closed contacts which open when the control output is on. Refer to the sample diagrams shown below.



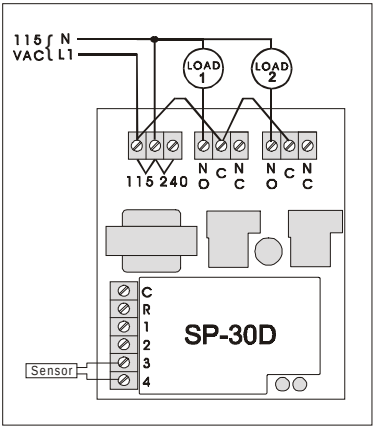
115 VAC Applied to Load
When Output Is ON, Control
Powered by 115 VAC



115 VAC Applied to Load
When Output Is ON, Control
Powered by 24 VAC



115 VAC Applied to Load 1
24 VAC Applied to Load 2
When Output Is ON
Control Powered by 115VAC



115 VAC Applied to Loads
When Output Is ON, Control
Powered by 115 VAC

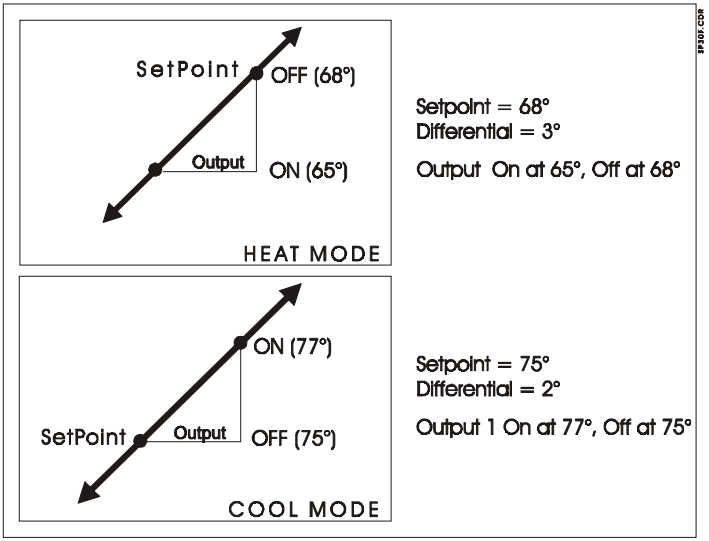
Operation

The SP-30 and SP-30D operation is straightforward.

Cool mode: The control output will turn on when the sensor temperature rises to the setpoint temperature plus the differential amount. The control output will turn off when the sensor temperature reaches the setpoint temperature.

Heat mode: The control output will turn on when the sensor temperature falls to the setpoint temperature minus the differential amount. The control output will turn off when the sensor temperature reaches the setpoint temperature.

Some sample diagrams of the control logic are shown below.



LEDs

The SP-30 and SP-30D use 2 LED indicators to display the status of the control. The diagram on page 2 shows the location of each LED. Refer to the chart below for LED information.

Anti-Cycle

This feature is used to prevent the output from turning on within 4 minutes of output turning off, regardless of temperature. An internal timer starts counting immediately after the control "satisfies" (output relay(s) turn off). The output relay(s) are only allowed to energize AFTER the timer has completed counting. If the timer hasn't finished counting, the Output LED will blink.

NOTE: When input power is first applied to the control, the Anti-Cycle internal timer automatically starts and will prevent the output relay(s) from energizing until after the timer has finished counting.

LED	STATUS	DESCRIPTION
Power	OFF	There is no input power applied to the control
	ON	Power applied to control - normal operation
	Blinking	Sensor error - check for a short or open sensor
Output	OFF	The control is "satisfied" - relay(s) not energized
	ON	There is a "call" for heat or cooling - relay(s) energized
	Blinking	Anti-Cycle feature is preventing relay(s) from energizing

SP-30E.CDR

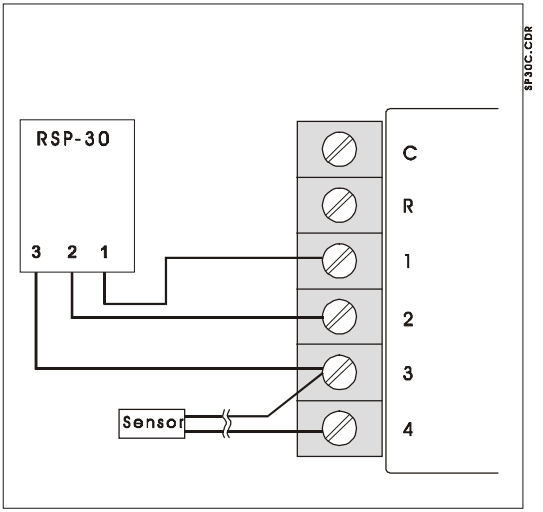
Operation (Continued)

Using the optional RSP-30

The RSP-30 is a remote setpoint adjustment and can be mounted up to 500 feet away from the SP-30 or SP30D control. Be sure to move the Setpoint Selection jumper to the "External" position and the Setpoint Range to the desired temperature range, when using the RSP-30. See included instructions for mounting information. The RSP-30 uses a 3 conductor connection to the SP-30/30D controls. A 3 position screw terminal block on the RSP-30 is labeled "1", "2", and "3", similar to the screw terminal located under "R" and "C" on the SP-30/30D controls. Using 3 conductor wire, connect each pair of similarly marked screw terminals. Refer to the diagram below.

Adjustments

Adjust the setpoint and differential to the desired settings.



Accessories

Contact you Goldline Dealer for these accesories:

- **TD-30** - *digital display*
- **TDA-30** - *digital display with alarm*
- **RSP-30** - *remote setpoint*
- **full line of sensors**

Technical Assistance

For help in installing, operating, or troubleshooting this control, you may call for technical assistance at 800-343-0826. Goldline Controls 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.

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

°F	OHMS	°F	OHMS	°F	OHMS	°F	OHMS	°F	OHMS	°F	OHMS	°F	OHMS
-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	6,097	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
												300	190

GOLDLINE CONTROLS

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