GOLDLINE®

GL-30 (-LCO)

Solar Control

Description

The GL-30 is a differential temperature control for solar heating. The control output is typically wired to a circulator pump or blower which is turned on when the collector sensor temperature is hotter than the storage sensor temperature. The control also provides an adjustable high limit function and selectable recirculate freeze protection.

Specifications

Power:	105-130VAC, 50/60Hz, or 195-250VAC, 50/60Hz	**Sensors:**	thermistor, 10K @ 25°C/77°F
Output:	115VAC, 1HP, 20 A, or 240VAC, 2 HP, 20 A	**On differential:**	8-24°F adjustable
		Off differential:	4°F
LCO Output:	115VAC,1/2HP,10A	**High limit:**	110-230°F adjustable

Installation

1. **Mounting**
The GL-30 is designed for mounting indoors, protected from the weather. Use the mounting screws supplied.

2. **Power input**
Refer to wiring diagram. The GL-30 may be used with either 115VAC or 240VAC.

   GL-30-LCO: Connect the line cord to a grounded (3 wire) outlet. Note that the GL-30-LCO is intended for use with portable systems. Do NOT use extension cords.

3. **Output wiring**   Refer to wiring diagram. The GL-30 may be used with either 115VAC or 240VAC.

   GL-30-LCO: Plug the circulator or blower into GL-30 outlet.

4. **Sensor Mounting and Wiring**
Refer to diagram for location of sensor wiring terminals. To maximize temperature measurement accuracy securely mount the sensor and then insulate it to protect it from the effects of ambient temperature. 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 shield to one of the GL-30 cover screws.

5. **Auxiliary Sensor (optional)**   A n auxiliary temperature sensor can be wired to terminals 5 and 6 when using an optional TD-GL temperature display. This sensor does not affect the function of the GL-30 and is used for display purposes only.

6. **Collector Grounding**
The collector array must be grounded to prevent damage from nearby lightning strikes that produce high energy static discharges. Ensure that there is a good electrical ground path between the collector array and the cold water service pipe. If you are relying on the copper plumbing for grounding, check for teflon taped fittings, dielectric unions, plastic fittings, etc. An 8AWG solid copper wire is best.

7. **Adjustments**
Adjust the turn on differential to the desired setting. When the collector sensor temperature is hotter than the storage sensor temperature by this amount, the GL-30 will turn the pump or fan on. The pump or fan off will turn off when the temperature difference is less the 4°.

Installation (Continued)
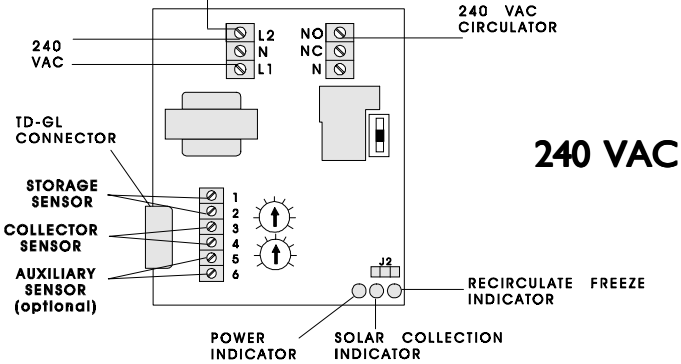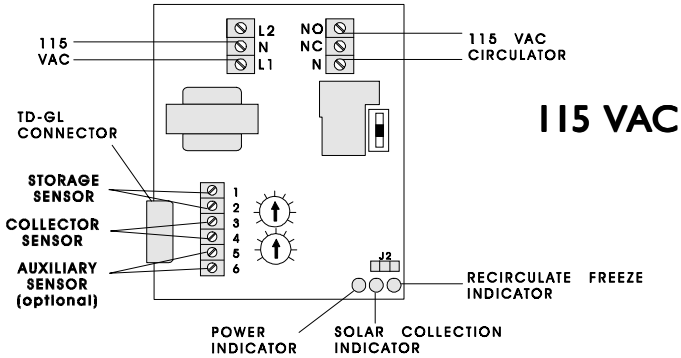
Adjust the high limit to the desired setting.   The GL-30 will not allow the pump or fan to come on when the storage sensor temperature is higher than the storage high limit setting. Note that the storage temperature may actually get hotter than the high limit setting since the storage sensor is usually located near the bottom (coldest part) of the tank.

Recirculate Freeze Protection

The GL-30 provide recirculate freeze protection. While this type of freeze protection has proven to be adequate in relatively mild climates, it is extremely important that the sensors be properly placed and that the homeowner realize that the system is unprotected in the event of a power failure.   Recirculate freeze protection is NOT recommended in climates where freezing temperatures are common (more than 4 per year) or last for extended (more than 8 hours) periods.

IE strongly recommends a minimum of 1 GC-1 or GC-2 freeze snap switch for each 3 collectors in the system. The GC-1 or GC-2 should be wired in series with the collector thermistor sensor. Placement of the snap switch(es) at the coldest points of the collector array and exposed plumbing system will help assure that freeze protection starts early enough to protect the system.   Freeze sensors should also be located to ensure that once recirculation has started, the entire collection system is heated before the sensors react to stop circulation.

Recirculate Freeze Protection

The GL-30 is shipped from the factory with recirculate freeze protection disabled. Jumper J2 is in the "OUT" position. To enable recirculation, move the J2 jumper to the "IN" position. The GL-30 will start circulation when either the collector sensor drops to 40°F or any one of the snap switches drop to 44°F. Recirculation terminates when the collector is above 45°F and snap switches are above 54°F.

Operation

The GL-30 test switch should be left in the "AUTO" position in which case operation is completely automatic with no operator intervention required. The "Power" indicator should always be on, the "Solar" #1 indicator will show when the system is collecting solar heat and the "Freeze" #2 indicator will show when the system is recirculating to protect from freezing.

To test the system, push the test switch to "ON" and verify that the "Solar" #1 indicator is lit and that the pump or blower connected to the control output is on. Move the switch to "OFF" and verify that the "Solar" #1 indicator is off and that the pump or blower is off.

Digital Display

Plug the optional TD-GL digital temperature display into the connector provided. The TD-GL can be mounted directly into the GL-30 cover, remotely up to 50 feet away (use ABC-10F/10M cable) or used as a temporary plug-in troubleshooting tool.

Troubleshooting

The GL-30 is straightforward to troubleshoot. If you can not determine the problem then refer to the "Technical Assistance" section below.

1. **If solar collection ("Solar" #1 indicator) runs continuously**

Check that the test switch is in the "AUTO" position. Next verify that the control circuitry is operating properly by temporarily shorting the storage sensor terminals. If the control continues to run there is an internal circuit failure and the GL-30 will have to be returned for repair. If the recirculation stops check both collector and storage sensors with an ohmmeter referring to the temperature vs. resistance chart on the back page.

2. **If solar collection ("Solar" #1 indicator) never runs**

Check that the test switch is in the "AUTO" position. Next, with the collector terminals shorted, disconnect the storage sensor. If the control does not turn on there is an internal circuit failure and the GL-30 will have to be returned for repair. If the control runs, check both the collector and storage sensors with an ohmmeter referring to the temperature vs. resistance chart on the back page.

3. **Recirculate freeze protection ("Freeze" #2 indicator) runs continuously**

Temporarily short the collector sensor terminals to force freeze recirculation off. If freeze recirculation continues, there is an internal circuit failure and the GL-30 must be returned for repair. If freeze recirculation does stop, verify that the collector sensor is warmer than 45°F using an ohmmeter and the temperature vs. resistance chart on the back page. Also check that all snap switches are closed (normally 54°F or above).

4. **Recirculate freeze protection ("Freeze" #2 indicator) never runs**

Check that the jumper J2 is in the "IN" position. Temporarily disconnect the collector sensor to force freeze recirculation on. If freeze recirculation doesn't turn on, there is an internal circuit failure and the GL-30 must be returned for repair. Otherwise check the collector sensor and all GC-1 snap switches using an ohmmeter and the temperature vs. resistance chart on the back page.

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.

Temperature vs. Resistance

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 reading should be accurate to +/- 1%. For a given resistance reading, the temperature reading should be accurate to +/- 0.5°F.

°F	OHM	°F	OHM	°F	OHM	°F	OHM	°F	OHM	°F	OHM	°F	OHM
-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