

GL-35 GL-35-LV



Solar Pool & Spa Control

Description

The GL-35 and GL-35-LV are differential temperature controls for solar heating of pools, spas, and hot tubs. These models provide differential temperature control with an adjustable, calibrated water temperature high limit. Automatic nocturnal cooling (for pools that overheat in hot climates) and recirculate freeze protection functions can be enabled/disabled via internal jumpers.

Input power can be either 115 or 240 VAC. The output controls a 24 VAC automatic valve actuator. For older systems with 12 VAC valves, an internal jumper can be moved to select 12 VAC output operation. The GL-35-LV has one output for controlling a single valve and is available only as part of the GLC (Goldline Combo). The GL-35 has one output for controlling a single valve and a second output for controlling a filter pump or booster pump.

Specifications

Power: 105-130VAC, .5A 50/60Hz.
or
195-250VAC, .3A 50/60Hz

Output: Selectable low voltage
24VAC, 20VA, .85A or
12VAC, 20VA, 1.7A

GL-35:
SPST-NO isolated contact
115VAC 1 HP
240VAC 2 HP

Sensors: 2 required (thermistors, 10K @ 25°C/
77°F) snap switches recommended
if recirculate
freeze protection is used)

On differential: 4°F

Off differential: 1.5°F

High limit: 70-104°F calibrated
scale

Recirculate freeze: on at 40°F, off at 45°F

Nocturnal cooling: on when collector 6°F
less than pool and pool
hotter than high limit,
off when collector 3°F
less than pool or pool
cooler than high limit

1. Mounting

The GL-35/LV is designed for outdoor use. Mount the box vertically with the knockouts facing downward. For safety, the GL-35/LV must be a minimum of 5 feet (horizontally) from the pool or spa.

2. Power input

Turn off power at circuit breaker before wiring. Remove the internal panel to expose the wiring connections. Either 115VAC or 240VAC can be used. Refer to the input wiring diagram (Figure 1) below.

3. Grounding

Refer to NEC and local codes for specific grounding requirements. In general, a separate ground conductor (12AWG minimum) must be run to the ground terminal on the pool service panel.

4. Output wiring to solar valve(s)

The GL-35 and GL-35-LV control a single valve. In most applications this is the solar valve which diverts water through the collector panels or through the normal pool loop depending on conditions.

All controls are shipped with the output voltage set to the industry standard 24 VAC. To use the GL-35/LV with older 12 VAC valves, move the jumper J1, located next to the fuse on the main circuit board (see Figure 2).

The GL-35 provides two different types of connections to the pool/spa actuators. For older actuators with no wire end connectors, a 3 position terminal block is used. Connect the wires to the proper terminal block according to the color code shown in Figure 4. If the valve operates opposite to the way it is supposed to, reverse the

red and white wires. Be careful not to short the valve output wiring. The GL-35/LV is fused and shorting the output will require replacing the fuse.

For newer Goldline, Jandy and Compool actuators (with wire end connectors), two 3 pin connectors are supplied. (The GL-35-LV model, supplied as part of the GLC Goldline Combo, has two 3 pin connectors only.) Plug the actuator into one of the two 3 pin connectors as shown in Figure 2 or 3. If the valve operates opposite to the way it is supposed to, disconnect and plug into the other connector.

5. Sensor Mounting and Wiring

Most installations use a PC insulation sensor connected to the "COLLECTOR" terminals and another PC drill-in sensor (for plastic piping) connected to the "POOL/SPA" terminals (see various diagrams).

Other 10K ohm Goldline sensors may be substituted. Wire should be twisted pair 20AWG. Sensor wiring run outdoors must be rated for outdoor use and ensure that the wire connections are protected from the weather. For long runs or runs near other electrical wiring use shielded cable (Belden 8428 for outdoor use). Ground the shields to the GL-35/LV ground screw.

6. Freeze Protection

If you are relying on the collectors naturally draining to provide freeze protection it is very important that you use a non-positive seal valve or drill a hole in the diverter of a positive seal valve to allow the collectors to drain. Alternatively, the GL-35/LV control can provide recirculate freeze protection. If enabled, when the GL-35/LV senses a freeze condition at the collector sensor, it will allow circulation of

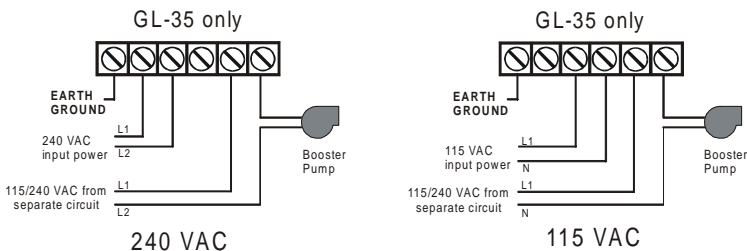


Figure 1

relatively warmer water from the pool to the collector panels. The GL-35/LV will allow recirculation when the collector temperature falls to 40°F and will stop circulation when the collector temperature rises to 45°F. 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 or last for extended periods.

The GL-35 is shipped from the factory with recirculate freeze protection disabled (the jumper is installed on a single pin). To activate recirculate freeze protection, install the jumper provided onto the left two pins on the circuit board mounted to the front panel. See diagram inside control. IE strongly recommends using 1 or more GC-1 or GC-2 freeze snap switches in addition to the collector sensor.

Snap switches 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.

If recirculate freeze protection is to be used on a GL-35/LV either:

- the filter pump must be set for continuous operation.
- the GL-35 High Voltage Output must be wired for Timer Override function.

7. Nocturnal Cooling

The GL-35/LV has nocturnal cooling logic which can be enabled/disabled via a jumper on the circuit board mounted to the front panel. During nighttime

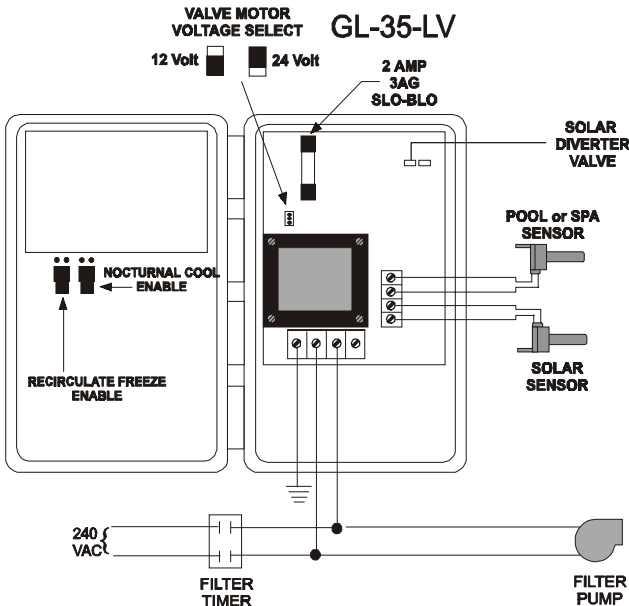


Figure 2

hours, when enabled, the GL-35/LV will circulate relatively warmer water from the pool to the collector panels, thus cooling the pool over time. The GL-35/LV will circulate water when the collector temperature is 6° less than the pool temperature AND the pool temperature is hotter than the high limit setting. Circulation will stop when the collector temperature is 3°F less than pool temperature OR the pool temperature is cooler than the high limit setting. The GL-35/LV is shipped from the factory with nocturnal cooling disabled (the jumper is installed on a single pin). To activate nocturnal cooling, install the jumper provided onto the right two pins on the circuit board mounted to the front panel. See diagram inside control. If nocturnal cooling is to be used on a GL-35/LV either:

- the filter pump must be set for continuous operation.

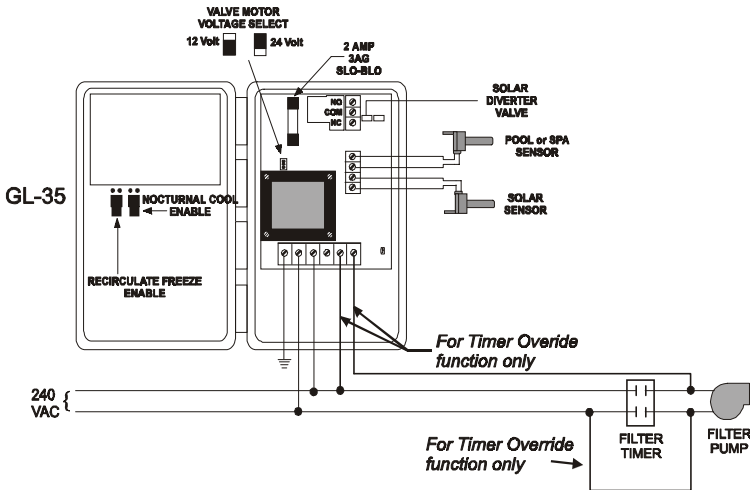
- the GL-35 High Voltage Output must be wired for Timer Override function.

9. Booster Pump (model GL-35 only)

The GL-35 can control a high voltage booster pump in addition to the normal low voltage solar valve. Note the high voltage relay contacts are isolated so that the booster pump can be run on a separate circuit, as required by many local codes. The GL-35 will turn the booster pump and solar valve on/off simultaneously. Refer to Fig. 4 on page 6 for typical wiring.

10. Timer Override (model GL-35 only)

The GL-35 can also be used to override the filter pump timer. This is very important if the recirculate freeze protection or nocturnal cooling functions are being used. Also, this function can be used on systems where the system should operate whenever solar heat is available, regardless of the timer settings. Refer the GL-35 control in Fig 3. for typical timer override wiring.



GL-35 with High Voltage Output used for Timer Override

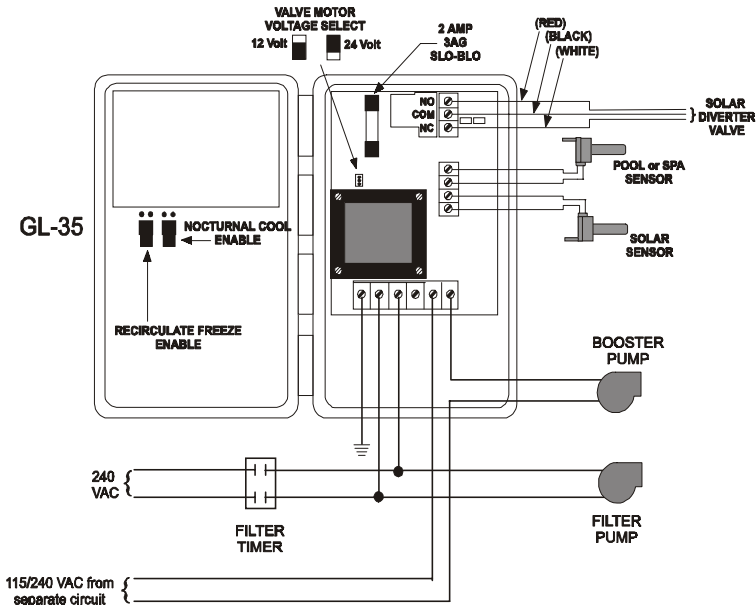
Figure 3

For normal operation place the switch in the "AUTO" position and adjust the desired pool/spa/hot tub temperature setting. The "Power" LED indicator should always be on. The "Heating" LED indicator will show when the system is collecting solar heat. If the nocturnal cooling function is enabled inside the GL-35/LV, the "Cooling" LED indicator will show when the system is exhausting excess heat.

In the "AUTO" position, the GL-35/LV will heat the pool or spa (rotate valve to solar loop) when the collector sensor temperature is higher than the pool/spa sensor temperature by 4°F or more AND the pool or spa temperature is less than the high limit setting. The GL-35/LV will stop heating (return valve

to pool loop) when the two sensor temperatures get to within 1.5°F OR the pool or spa sensor is above the high limit setting.

To test the system, move the switch to "ON" and verify that both the "Heating" and "Cooling" indicators light and that the valve(s) are in the solar loop position. Move the switch to "OFF" and verify that all indicators except "Power" are off. The valve(s) should be in the normal recirculating loop position. If the valve(s) positions are working in reverse, see section 4. in the Installation section. If you are relying on recirculate freeze protection for your system, do NOT leave the system in the "OFF" position during cold weather. Also note that the switch does NOT turn power off to the GL-35/LV.



GL-35 with High Voltage Output used for Booster Pump

Figure 4

1. Fuse Replacement

The GL-35/LV is protected by a fuse which is located on the circuit board in the bottom of the unit. Replace the fuse with a 2A, type 3AG fuse which is readily available in most electrical or electronics stores.

2. If “Heating” is always on

Disable recirculate freeze protection if enabled. Check that the switch is in the “AUTO” position. Next verify that the control circuitry is operating properly by disconnecting the collector sensor and temporarily shorting the two storage sensor terminals. The “Heating” LED should go off. If so, check both sensors with an ohmmeter referring to the temperature vs. resistance chart on the back page. If “Heating” remains on there is an internal circuit failure and the GL-35/LV will have to be returned for repair.

3. If “Heating” never comes on

Check that the switch is in the “AUTO” position. Disconnect the pool sensor from the GL-35/LV and temporarily short the two collector sensor terminals. The “Heating” LED should go on. If so, check both sensors with an ohmmeter referring to the temperature vs. resistance chart on the back page. If “Heating” still does not come on there is an internal circuit failure and the GL-35/LV will have to be returned for repair.

4. If nocturnal “Cooling” is always on

Check that the switch is in the “AUTO” position. Disconnect the pool sensor and temporarily short the two collector sensor terminals. The “Cooling” LED should go off and the “Heating” LED should go on. If so, check both sensors with an ohmmeter referring to the temperature vs. resistance chart on the back page. If “Cooling” still does not go off there is an internal circuit failure and the GL-35/LV should be returned for repair.

5. If nocturnal “Cooling” is never on

Disable recirculate freeze protection if enabled. Check that the switch is in the “AUTO” position. Disconnect the collector terminals and temporarily short the two pool sensor terminals. The “Cooling” LED should go on. If so, check both sensors with an ohmmeter referring to the temperature vs. resistance chart on the back page. If “Cooling” still does not come on there is an internal circuit failure and the GL-35/LV should be returned for repair.

6. Recirculate “Freeze Protection” runs continuously

Temporarily short collector sensor terminals. The output should go off. If so, 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 GC-1 or GC-2 snap switches are closed (normally 54°F or above). If freeze protection is still on there is an internal circuit failure and the GL-35/LV should be returned for repair.

7. Recirculate “Freeze Protection” never runs

Check that the internal jumper that enables freeze protection is properly installed and the switch is in the “AUTO” position. Temporarily disconnect the collector sensor. The freeze protection should go on. If so, verify that the collector sensor is colder than 45°F using an ohmmeter referring to the temperature vs. resistance chart on the back page. If freeze protection still does not go on there is an internal circuit failure and the GL-35/LV should be returned for repair.

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 10K 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	491,14	0	85,387	50	19,900	100	5,827	150	2,044	200	829	250	378
-49	472.64	1	82,719	51	19,377	101	5,697	151	2,005	201	815	251	373
-48	454.90	2	80,142	52	18,870	102	5,570	152	1,966	202	802	252	367
-47	437.90	3	77,656	53	18,377	103	5,446	153	1,929	203	788	253	362
-46	421.60	4	75,255	54	17,899	104	5,326	154	1,892	204	775	254	357
-45	405.96	5	72,937	55	17,435	105	5,208	155	1,856	205	763	255	352
-44	390.96	6	70,698	56	16,985	106	5,094	156	1,821	206	750	256	347
-43	376.57	7	68,535	57	16,548	107	4,982	157	1,787	207	738	257	342
-42	362.77	8	66,447	58	16,123	108	4,873	158	1,753	208	726	258	337
-41	349.52	9	64,428	59	15,711	109	4,767	159	1,720	209	714	259	332
-40	336.80	10	62,479	60	15,310	110	4,664	160	1,688	210	702	260	327
-39	324.59	11	60,595	61	14,921	111	4,563	161	1,657	211	691	261	323
-38	312.87	12	58,774	62	14,543	112	4,464	162	1,626	212	680	262	318
-37	301.62	13	57,014	63	14,176	113	4,368	163	1,596	213	669	263	314
-36	290.81	14	55,313	64	13,820	114	4,274	164	1,567	214	658	264	309
-35	280.43	15	53,669	65	13,473	115	4,183	165	1,538	215	648	265	305
-34	270.46	16	52,078	66	13,136	116	4,094	166	1,509	216	637	266	301
-33	260.87	17	50,541	67	12,809	117	4,007	167	1,482	217	627	267	296
-32	251.67	18	49,054	68	12,491	118	3,922	168	1,455	218	617	268	292
-31	242.82	19	47,616	69	12,182	119	3,839	169	1,428	219	607	269	288
-30	234.31	20	46,225	70	11,882	120	3,758	170	1,402	220	598	270	284
-29	226.13	21	44,879	71	11,589	121	3,679	171	1,377	221	588	271	280
-28	218.27	22	43,577	72	11,305	122	3,602	172	1,352	222	579	272	276
-27	210.71	23	42,318	73	11,029	123	3,527	173	1,328	223	570	273	273
-26	203.44	24	41,099	74	10,761	124	3,454	174	1,304	224	561	274	269
-25	196.45	25	39,919	75	10,500	125	3,382	175	1,281	225	553	275	265
-24	189.72	26	38,777	76	10,246	126	3,312	176	1,258	226	544	276	262
-23	183.24	27	37,671	77	9,999	127	3,244	177	1,235	227	536	277	258
-22	177.01	28	36,601	78	9,758	128	3,177	178	1,213	228	527	278	255
-21	171.02	29	35,565	79	9,525	129	3,112	179	1,192	229	519	279	251
-20	165.25	30	34,561	80	9,297	130	3,049	180	1,171	230	511	280	248
-19	159.69	31	33,590	81	9,076	131	2,987	181	1,150	231	503	281	244
-18	154.34	32	32,648	82	8,861	132	2,926	182	1,130	232	496	282	241
-17	149.19	33	31,737	83	8,651	133	2,867	183	1,110	233	488	283	238
-16	144.23	34	30,853	84	8,447	134	2,809	184	1,091	234	481	284	235
-15	139.45	35	29,998	85	8,249	135	2,752	185	1,072	235	473	285	232
-14	134.85	36	29,169	86	8,056	136	2,697	186	1,054	236	466	286	229
-13	130.42	37	28,365	87	7,867	137	2,643	187	1,035	237	459	287	225
-12	126.14	38	27,587	88	7,684	138	2,591	188	1,017	238	452	288	223
-11	122.03	39	26,832	89	7,506	139	2,539	189	1,000	239	445	289	220
-10	118.06	40	26,100	90	7,333	140	2,489	190	983	240	439	290	217
-9	114.23	41	25,391	91	7,164	141	2,440	191	966	241	432	291	214
-8	110.54	42	24,704	92	6,999	142	2,392	192	950	242	426	292	211
-7	106.99	43	24,037	93	6,839	143	2,345	193	933	243	420	293	208
-6	103.56	44	23,391	94	6,683	144	2,299	194	918	244	413	294	206
-5	100.25	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