NOW DEVICES, INC.

APOLLO MODEL NF
DIFFERENTIAL TEMPERATURE CONTROLLER

The Apollo Model NF is designed to automatically control on the basis of the differential between two temperatures, components common to solar systems such as motors, blowers, dampers, pumps, valves, etc..

If you wish to incorporate freeze protection or hi-limit cut-off, you must obtain and connect the appropriate switch to the terminal strip provided. The high limit function will de-energize the primary relay K-1 when the high limit switch opens. In the case of an A Model (one relay), you may achieve drain back freeze protection without the use of a freeze switch. Redundant freeze protection is possible by placing a freeze switch in series with the high limit switch.

If you wish to use a drain-down valve in conjunction with the NF controller, you must use a Model NF-B (two relays). There are two additional terminals provided so that the freeze switch may be connected to work in conjunction with the second relay (K-2). When the freeze switch opens on temperature fall, the relay K-2 drops out, removing power from the drain-down valve.

The Apollo Model NF has one output relay with N.O. (normally open) dry contacts rated at 1 horsepower 120 or 230 VAC. This contact closes when the temperature difference between the high and low sensor exceeds the delta T ON setting. The relay will open when the temperature difference is less than the delta T OFF setting.

The Apollo NF-B is identical, except that a second identical relay (K-2) has been added. Positions 7 & 8 have been added to the terminal strip to accomodate a freeze switch, which, when connected, energizes K-2 , which in turn powers the drain-down valve. When the freeze switch opens, the relay de-energizes and removes power from the drain-down vlave.

Design Features:

Adjustable Differential ON - 1° to 50°

Adjustable Differential OFF - 1° to 50°

LED indicators for controller ON and relay activated.

Terminals for thermostat, high limit switch and freeze switch.

Terminals for freeze switch with drain-down system, (B Model only).

Interference (noise) supression circuitry is standard on all units to prevent false cycling and eliminate the need for shielded sensor leads.

Standard 10K sensors are used. Internal circuitry converts the non-linear response of the sensors to a linear voltage so that accuracy is maintained over the widest possible temperature range.

All units are subjected to a spray coating to eliminate the possibility of deteriorated performance due to excessive humidity. The aluminum case has an iridite finish. This, however, does not mean that the unit can be wet. It should be installed in a clean, dry place, preferably with an ambiant temperature between 0 degrees and 100 degrees.

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READ AND FOLLOW THESE DIRECTIONS

Failure to do so may void the warranty. The Apollo NF controller has been designed and manufactured to perform to specifications for many years. It will provide long service as the control center for an efficient heating system. In order for it to perform as it is capable of performing, it must be installed in accordance with these instructions. The unit should be treated with the same care due any delicate instrument. The circuit components and the circuit board itself should not be subjected to any unnecessary handling and certainly no abrasive forces. A scratched circuit line will render the device inoperable or inaccurate. This type of device failure is not regarded as under warranty.

WARNING
Installation must be performed by Trained Service Personnel in accordance with the National Electrical Codes and Applicable Local Codes.

CAUTION
Disconnect all power to all system components before installation or before performing any servicing.

REFER TO THE DECALS ON BOTH THE INSIDE AND THE OUTSIDE OF THE COVER.
REFER TO THE DIAGRAM IN THESE INSTRUCTIONS.

MOUNTING: Apollo NF Controllers should be mounted in a normal environmnet, free from any caustic substances, moisture, vapors, gases or dust. The ambient temperature of the location should range between 0°F and 100°F. Choose the mounting space so that the knockouts are accessable without difficulty. The unit is provided with two number 8 self tapping screws suitable for mounting to a wood or metal surface. Use a screw-holding screwdriver to prevent dropping the screw between the case bottom and the circuit board. If left in there, a loose screw could cause considerable trouble.

There are three knockouts provided, these are 7/8 inch holes. Two hole plugs are provided with each unit so that unused holes may be closed off after installation is complete. The overall dimensions of the unit are: 6 inches long, 5½ inches wide and 2½ inches high.

SENSORS: Controllers are normally shipped with two (2) type T sensors. Wire runs of up to 100 feet to the sensor locations will not cause any problem. Use #18 or #20 thermostat or bell wire for your connections. It is recommended that each connection be twisted and soldered or that a proper crimp splice be used. Be sure that each connection is insulated from each other and from everything else. Refer to the table below: this will give you the resistance that you should measure with the sensor leads removed from the controller terminals. It is best that these be checked before they are connected to the controller.

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RESISTANCE vs. TEMPERATURE - NDI 10K Sensors

Temp °C	Temp °F	Resistance (OHMS)	Temp °C	Temp °F	Resistance (OHMS)
0	32	32,650	55	131	2,990
5	41	25,400	60	140	2,490
10	50	19,900	65	149	2,090
15	59	15,710	70	158	1,750
20	68	12,490	75	167	1,480
25	77	10,000	80	176	1,255
30	86	8,060	85	185	1,070
35	95	6,530	90	194	915
40	104	5,330	95	203	787
45	113	4,370	100	212	680
50	122	3,600			

The values shown are nominal, there is a 2% tolerance applied to all sensor resistance values.

WARRANTY

Your Apollo NF controller carries a one year/five year limited warranty. In the case of a controller failure: up to twelve months from the date of purchase; a repaired and retested unit or a replacement unit (at our option) will be furnished at no charge, providing the failure was not caused by improper installation practices or that the unit was abnormally used. You must bear the cost of transportation to our facility, (address listed below). We will pay return transportation costs. In the event we determine that the failure is due to improper installation or maltreatment, you will be notified and repairs made only after you okay such repairs. After one year and before the fifth anniversary of purchase, replacement or repair at our option will be made for a handling and service fee of $18.00. It should be noted that failure to adhere to these installation instruction or tampering with the internal circuitry or subjecting the device to any abnormal voltage, current or temperature stress will cause any warranty to be null and void.
This warranty applies only to the Apollo NF controller itself, and does not apply to any other portion or portions of the system.

NOW DEVICES, INC.
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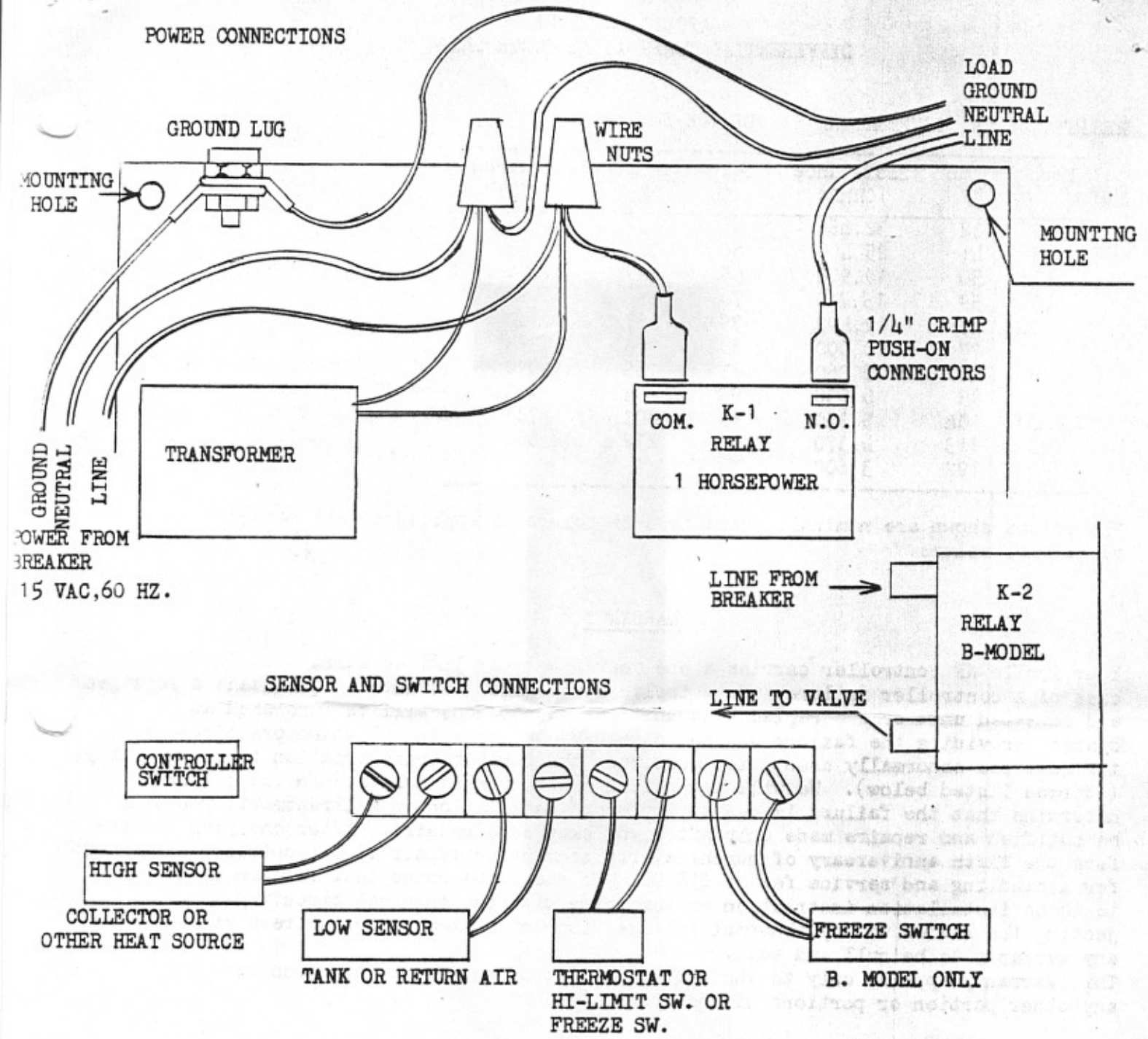
INSTALLATION INSTRUCTIONS

MODEL NF

POWER CONNECTIONS



SENSOR AND SWITCH CONNECTIONS

1. Installation should be performed only by trained personel. Make sure all power is turned off at the source.
2. All connections must be secure and well insulated. Sensor leads need not be shielded. However you should route them so that they do not run close to and parallel to power lines for long distances.
3. This controller is capable of driving a load up to a full horsepower. It can be a blower, a pump or damper other relays or combinations of these.
4. The thermostat used must be a simple switch type. It must <u>not</u> supply <u>any</u> voltage to the controller.
   Remember..sensors must <u>not</u> be immersed in <u>any</u> liquid.
5. Use 1/4" crimp type push on connectors where shown. Do NOT solder to the relay contacts. This will damage the relay and void your warranty.
7. The controller switch controlls only the D.C. power inside the controller. With the switch off, there is no logic or relay coil power. The relay is open.