tekmar® - Data Brochure

One Stage Setpoint Control 160

D 160

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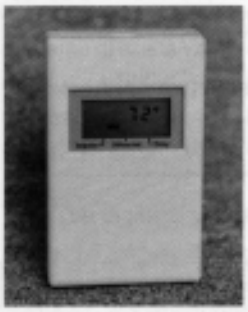
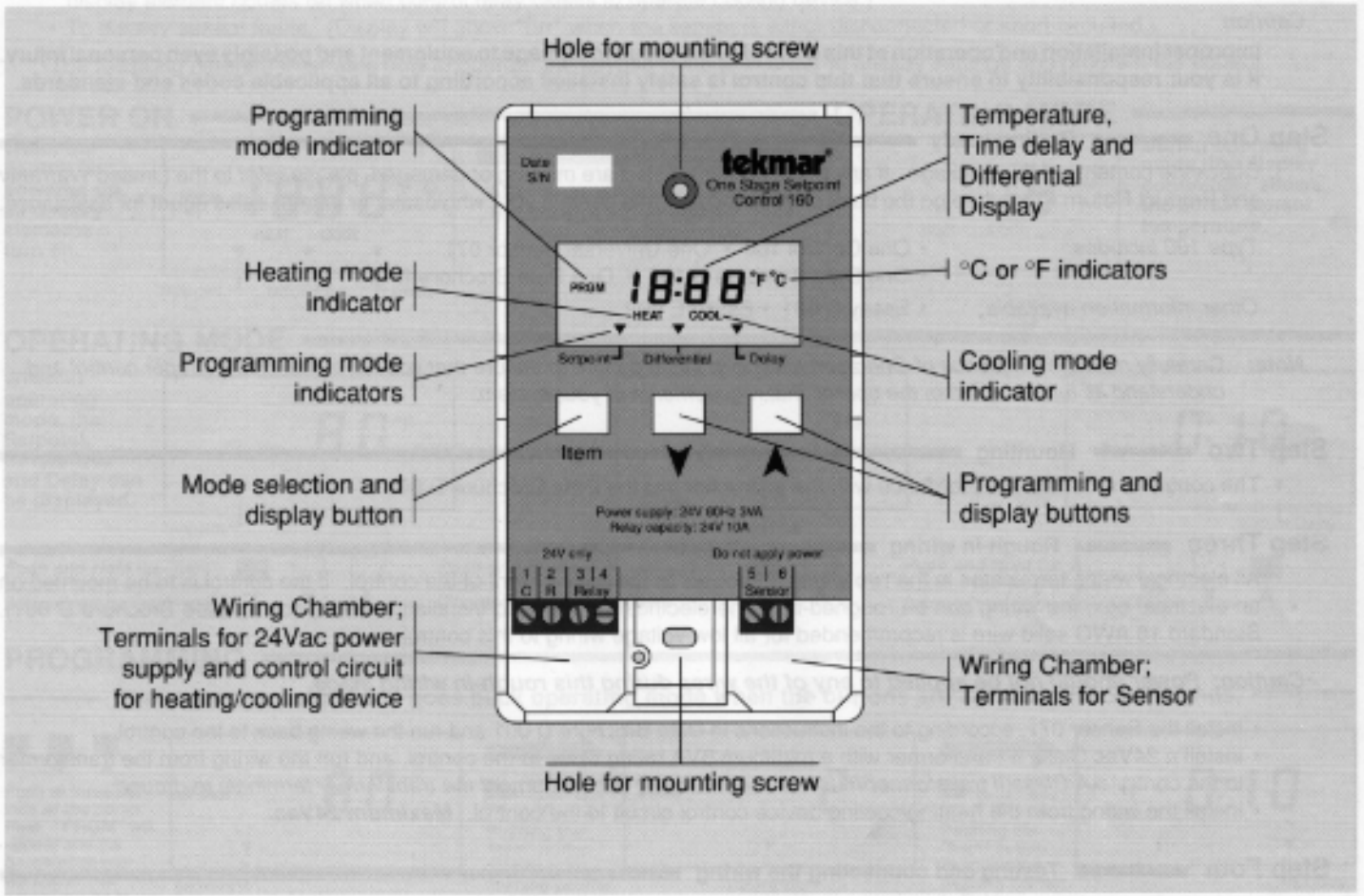


The tekmar One Stage Setpoint Control 160 is a microprocessor-based control that can be programmed to maintain a fixed setpoint temperature by cycling a heating or cooling device on and off.

This reliable and versatile control has an adjustable differential and time delay, and a very wide setpoint range that makes it useable in many different applications. The control has a digital LCD window that normally shows the actual sensor temperature and can be used to view the setpoint desired temperature as well as the various programmed functions.
A sensor is supplied with the control, and may be extended for any length up to 1000 ft. (300m) by using standard 18 AWG low voltage wire. The display will indicate a sensor fault whenever the sensor is either disconnected or short circuited.



Technical Data

Technical specifications

Dimensions	— 2-7/8" x 4-3/4" x 7/8" (74 x 120 x 22 mm)
Weight	— 1 lb (450g)
Ambient	— -20 to 120° F (-30 to 50° C) < 90% RH non-condensing
Power supply	— 20 to 28Vac, 60 Hz, 2VA, class II transformer
Relay capacity	— SPST, 24Vac, 10 amp
Sensor	— 10 kΩ @ 77°F (25° ± 0.2°C), curve 3, NTC thermistor accurate with up to 1000 ft. (300m) of 18 gauge wire
Control accuracy	— ± 0.5° F (± 0.3°C) at 70°F (21°C)

Settings

Setpoint	— -40 to 239°F (-40 to 115°C)
Differential	— 1 to 40°F (1 to 22°C)
Time delay	— 0 to 19 min 50 sec
Operating mode	— Heating/Cooling
Temperature scale	— Fahrenheit/Celsius

Sequence of Operation

- *When the One Stage Setpoint Control 160 is powered-up;* the digital display will show all of the display elements. The control will then monitor the sensor temperature and display the temperature in the digital display. (See diagram, opposite page.)
- *If the control is programmed for "Heat":* the control turns on its relay and show the "HEAT" display element when the sensor temperature is; (a) — 1/2 the differential setting below the setpoint, *and* (b) — the Delay has timed out. When the sensor temperature rises 1/2 the differential setting above the setpoint, the control switches its relay off and the Delay starts to time out.
- *If the control is programmed for "Cool":* the control turns on its relay and the "COOL" display element when the sensor temperature is; (a) — 1/2 the differential setting above the setpoint, *and* (b) — the Delay has timed out. When the sensor temperature drops 1/2 the differential setting below the setpoint, the control switches its relay off and the Delay starts to time out.

Note:
While the Delay is timing out, the triangular "Delay" indicator will flash on and off in one second pulses.

Installation

Caution

Improper installation and operation of this control could result in damage to equipment and possibly even personal injury. It is your responsibility to ensure that this control is safely installed according to all applicable codes and standards.

Step One — Getting ready

Check the contents of this package. If any of the contents listed are missing or damaged, please refer to the Limited Warranty and Product Return Procedure on the back of this brochure and contact your wholesaler or tekmar sales agent for assistance.

Type 160 includes:
- One Control 160 • One Universal Sensor 071
- One Data Brochure D 160 • One Data Brochure D 001

Other information available:
- Essay E 001 • Essay E 002

Note: *Carefully read the Sequence of Operation section in this brochure to ensure that you have chosen the proper control and understand its functions within the operational requirements of your system.*

Step Two — Mounting

The control is mounted in accordance with the instructions in the Data Brochure D 001.

Step Three — Rough-in wiring

All electrical wiring terminates in the two wiring chambers at the bottom front of the control. If the control is to be mounted on an electrical box, the wiring can be roughed-in at the electrical box prior to installation of the control (see Brochure D 001). Standard 18 AWG solid wire is recommended for all low voltage wiring to this control.

Caution: Power should not be applied to any of the wires during this rough-in wiring stage.

- Install the Sensor 071, according to the instructions in Data Brochure D 001 and run the wiring back to the control.
- Install a 24Vac Class II transformer with a minimum 5VA rating close to the control, and run the wiring from the transformer to the control. *A Class II transformer must be used. Do not connect any of the transformer terminals to ground.*
- Install the wiring from the heating/cooling device control circuit to the control. ***Maximum 24Vac.***

Step Four — Testing and connecting the wiring

Caution

These tests are to be performed using standard testing practices and procedures and should only be carried out by a properly trained and experienced technician.

A good quality electrical test meter, capable of reading from at least 0 — 200 Volts AC, and at least 0 — 2,000,000 Ohms, is essential to properly test this control.

At no time should voltages in excess of 28Vac be measured at any of the wires connected to this control.

Test the sensor

This test must be performed *before* power is applied to the control and *before* the sensor is connected to the terminal strip. Test the sensor according to the instructions printed in the enclosed Data Brochure D 001.

Test the power supply

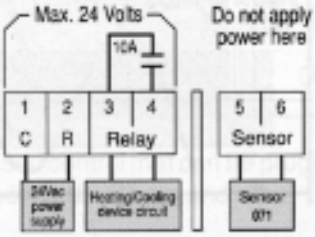
- Ensure that the wires from the power supply transformer are not touching each other, any other wires or ground. Turn on the power, and using an AC voltmeter, you should measure between 20 and 28 volts at the secondary side of the transformer.
- Turn off the power and complete the electrical connections to the terminal strip of the control.

Electrical connections

Power and output connections; ***Caution, Maximum 24 Volts***

Connect: — the transformer to terminals *C* — *R* (1 and 2)

— the heating/cooling device circuit to terminals *Relay* (3 and 4)



Sensor connection; ***Caution, voltage is never applied to these terminals***

Connect: the Sensor 071 to terminals *Sensor* (5 and 6)

Settings

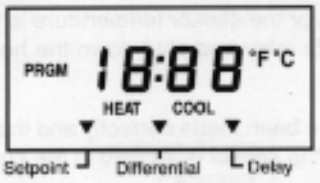
The digital display on the One Stage Setpoint Control 160 has the following uses:

- To display the actual temperature during normal operating mode.
- To allow the user to check the various control settings and program the various control functions.
- To display control operation. ("HEAT" display element comes on when control relay closes to operate heat source and "COOL" display element comes on when control relay closes to operate cooling device.)
- To display sensor faults. (Display will show "Err" when the sensor is either disconnected or short circuited.)

The following diagram illustrates how to operate the keypad buttons in order to display settings and program the control.

POWER ON

When the control is powered-up, all display elements turn on.



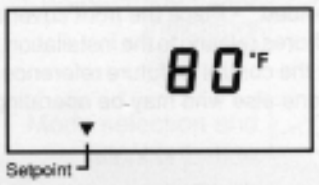
After approximately 5 seconds, the control automatically goes into operating mode.

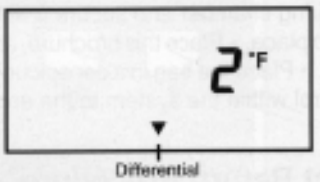
OPERATING MODE

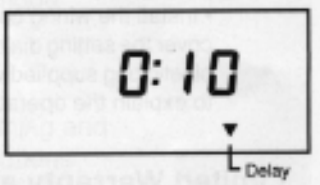
During operating mode, the display continually shows the actual sensor temperature.

OPERATING MODE

When in operating mode, the Setpoint, Differential and Delay can be displayed.







Push and Hold the "Item" button. The programmed Setpoint will be displayed.

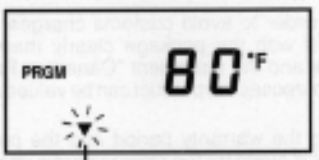
Push and Hold the ▼ button. The programmed Differential will be displayed.

Push and Hold the ▲ button. The programmed Delay will be displayed.

PROGRAMMING

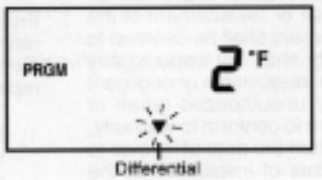
The control automatically goes back operating mode when the buttons are left alone for 20 seconds.

Push all three buttons ***at the same time.*** **"PRGM"** will appear and the **Setpoint** pointer will flash. The control will be in programming mode.

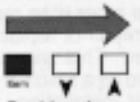


Push ▼ or ▲ to change Setpoint

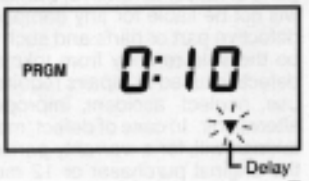
Pushing the "Item" button changes the flashing pointer to **Differential**



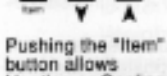
Push ▼ or ▲ to change Differential



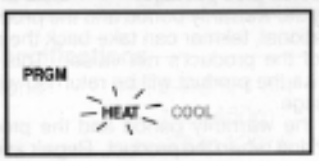
Pushing the "Item" button changes the flashing pointer to **Delay**



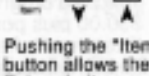
Push ▼ or ▲ to change Delay



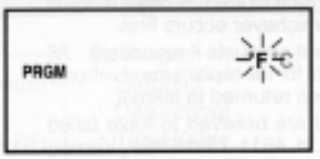
Pushing the "Item" button allows Heating or Cooling operation to be selected



Push ▼ or ▲ to select between Heating or Cooling operation



Pushing the "Item" button allows the Fahrenheit or Celsius scale to be selected

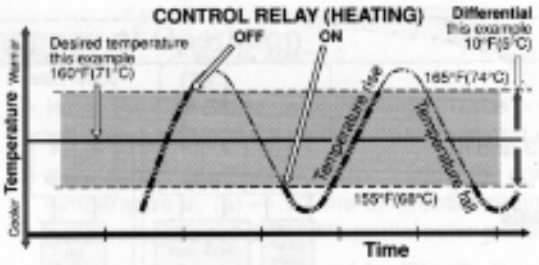


Push ▼ or ▲ to select between Fahrenheit or Celsius scales

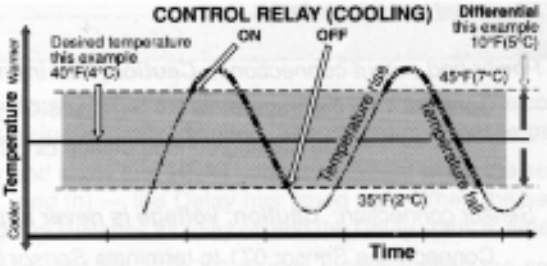
To return to operating mode from programming mode, simply leave the buttons alone for 20 seconds; the control will automatically return to operating mode.

Differential

Setting the differential on any control depends entirely on the actual operating characteristics of heating/cooling equipment in each specific application. Differential settings should normally be set as small as possible for greatest accuracy, but care must be taken to avoid short cycling of equipment. Experience, plus trial and error during actual operating conditions is usually the way most installers determine the correct differential setting.



Setpoint Control action in Heating Mode



Setpoint Control action in Cooling Mode

Delay

Setting the time delay also depends on the actual operating characteristics of heating/cooling equipment in each specific application. With some equipment, time delays are unnecessary and the Delay setting can be set to zero time delay. Other types of equipment depend on a fixed off delay to prevent damage to equipment components, particularly in the case of certain types of refrigeration equipment. Consult the manufacturer's operating and installation instructions for advice on required time delays.

Testing and Troubleshooting

If troubleshooting becomes necessary with the One Stage Setpoint Control 160, follow the testing procedure in step four of the installation procedure on page 2 of this brochure.

If the display window shows "Err", the sensor is either disconnected, short circuited, or the sensor temperature is well outside the temperature range of the control. If this type of fault occurs, the control will open its relay and shut down the heating or cooling equipment it is controlling.

If you do not think the control is operating properly, check to see that the settings have been made correctly and that the problem is not a result of external causes. Make sure that all wiring connections are solid and the sensor is located in the correct location.

Before you leave

• Install the wiring cover over the wiring chamber and secure it with the screw provided. • Place the front cover on the control to cover the setting dials and snap it into place. • Place this brochure, and all other brochures relating to the installation, in the protective plastic bag supplied with the control. • Place the bag in a conspicuous location near the control for future reference. • It is important to explain the operation of this control within the system to the end user, and anyone else who may be operating the system.

Limited Warranty and Product Return Procedure

Limited Warranty: tekmar warrants to the original purchaser each tekmar product against defects in workmanship and materials when the product is installed and used in compliance with tekmar's instructions. This limited warranty covers the cost of parts and labour provided by tekmar to correct defects in materials and/or workmanship. Returned products that are fully operational are not considered a warranty case. tekmar also does not cover parts or labour to remove, transport or reinstall a defective product. tekmar will not be liable for any damage other than repair or replacement of the defective part or parts and such repair or replacement shall be deemed to be the sole remedy from tekmar. This warranty shall not apply to any defects caused or repairs required as a result of unreasonable or negligent use, neglect, accident, improper installation, or unauthorized repair or alterations. In case of defect, malfunction or failure to conform to warranty, tekmar will, for a warranty period of 24 months from the date of invoice to the original purchaser or 12 months from the date of installation of the product, whichever occurs first, repair, exchange or give credit for the defective product. Any express or implied warranty which the purchaser may have, including merchantability and fitness for a particular purpose, shall not extend beyond 24 months from the date of invoice or 12 months from the date of installation of the product, whichever occurs first.

Replacements: tekmar can send replacement products if requested. All replacements are invoiced. Any possible credit for the replacement will only be issued once the replaced product has been returned to tekmar.

Product Return Procedure: Products that are believed to have failed must be returned to tekmar Control Systems Ltd. 4611-23rd Street, Vernon B.C. Canada V1T 4K7 when agreed to by tekmar. The installer or other qualified service person must, at the owner's expense, determine which component has failed. The product must be returned complete with all of its components (sensors, base, etc.). Products must be returned together with the proof of purchase to the original purchaser who then returns the product to tekmar after receiving a Return Goods Authorization (RGA) number from tekmar.

Please include the following information with the product. The full address of the original purchaser, the RGA number and a description of the problem.

From the U.S.A., in order to avoid customs charges, products must be returned via US Post with the package clearly marked with the RGA number, product type and the statement "Canadian Product returned for repair". For shipping purposes the product can be valued at one half list price.

1) If returned during the warranty period and the product is defective, tekmar will issue full credit for the returned product less cost of missing parts.
2) If returned during the warranty period and the product is fully operational, tekmar will return the product to the original purchaser for a testing cost of $30.00 plus postage.
3) If returned during the warranty period and the product is not damaged and is fully operational, tekmar can take back the product for a return charge of 40% of the product's net value. This request has to be specified otherwise the product will be returned with a testing cost of $30.00 plus postage.
4) If returned after the warranty period and the product needs repair, tekmar will repair and return the product. Repair and postage costs will be invoiced. tekmar's repair costs are calculated at $30.00 / hour plus the cost of parts. If the repair costs will be more than $60.00 a repair estimate will be sent to the original purchaser.

In North America: tekmar Control Systems Ltd., Canada
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