tekmar® - Data Brochure

Mixing Setpoint Control 153

D 153

12/08

The tekmar Mixing Setpoint Control 153 is a microprocessor-based control with a floating action output intended to operate a mixing valve, damper, etc. through an actuating motor.

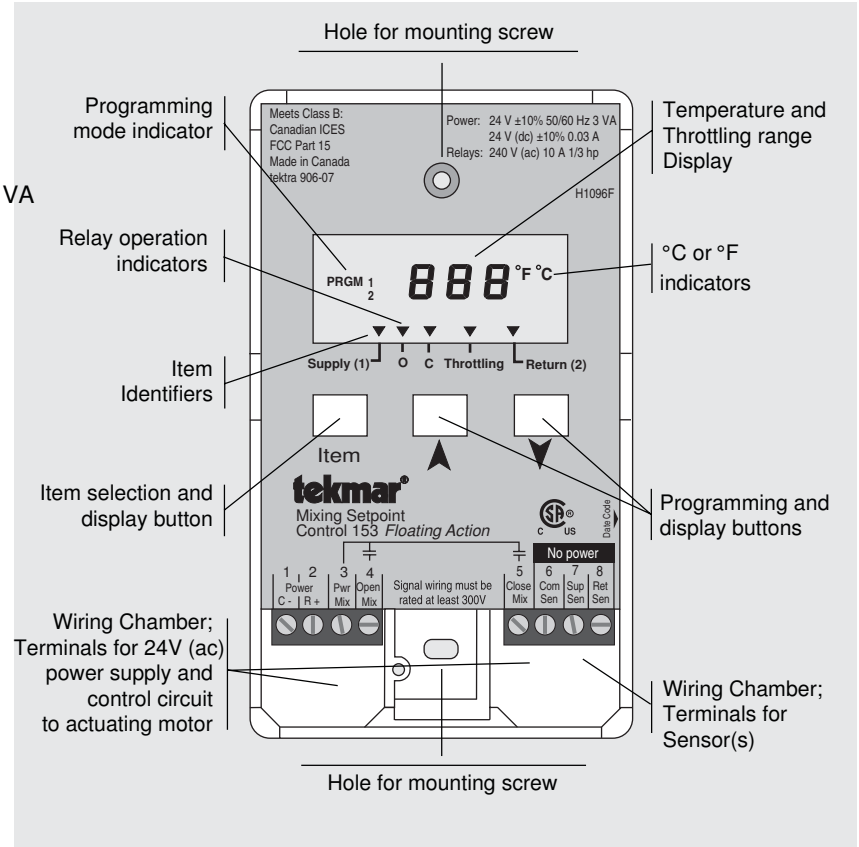
This reliable and versatile control has an adjustable throttling range and a very wide setpoint range that makes it useable in many different applications. The control has a digital LCD window that normally shows the actual sensor temperature and can be used to view the setpoint and other programmed settings.

A Universal Sensor 071 is supplied with the control. The wire to the sensor may be extended for any length up to 500 ft. (150m) by standard 18 AWG low voltage wire. When an optional return sensor is added, a minimum boiler return temperature can be constrained. The display will indicate a sensor fault whenever the sensor is disconnected or short circuited, or the return sensor is short circuited.

Technical Data

Technical specifications

Dimensions	—	2-7/8" x 4-3/4" x 7/8" (74 x 120 x 22 mm)
Gross Weight	—	1 lb (450g)
Ambient	—	–20 to 120°F (–30 to 50°C) < 90% RH non-condensing
Power supply	—	24 V (ac) ±10%, 50/60 Hz, 3 VA 24 V DC ±10%, 0.03 A
Relay capacity	—	240 V (ac), Max 10 A, 1/3hp
Sensor	—	10 kΩ @ 77°F (25 ± 0.2°C), NTC thermistor, ß = 3892 accurate with up to 500 ft. (150m) of 18 gauge wire
Control accuracy	—	± 0.5°F (± 0.3°C) at 70°F (21°C)



Settings

Temperature Display	—	–85 to 302°F (–65 to 150°C)
Supply (1) Setpoint	—	–40 to 239°F (–40 to 115°C)
Throttling Range	—	16 to 67°F (9 to 37°C)
Boiler Return (2)	—	–40 to 239°F (–40 to 115°C)
Temperature Scale	—	Fahrenheit/Celsius
Program settings	—	Ten year memory backup

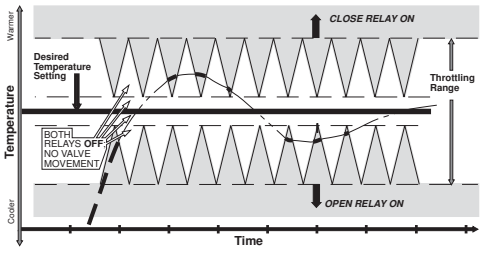
Sequence of Operation

- *When the Mixing Setpoint Control 153 Floating Action is powered-up* the digital display will show all of the display elements. The control will then monitor sensor Supply (1) temperature. If a Boiler Return (2) sensor is connected, pressing and releasing the Item button will toggle the display between Supply (1) and Boiler Return (2) temperature readings.

Floating Action Operating Mode

- *If the relay Open (O) is constantly on,* the measured temperature is at least 1/2 the throttling range setting below the setpoint. The mixing valve should be opening or fully opened because more heat is required.
- *If the relay Close (C) is constantly on,* the measured temperature is at least 1/2 the throttling range setting above the setpoint. The mixing valve should be closing or fully closed.
- *Floating Action occurs when* the measured temperature is between these two points (Throttling range).

24 V (ac) Floating Action

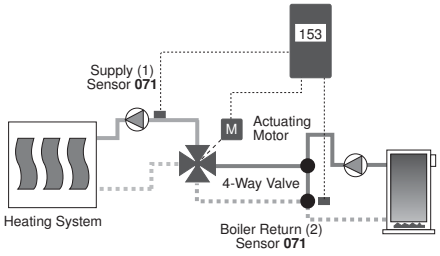


Supply Sensor Operating Mode

- *If only a Supply Sensor is installed,* the control regulates the supply water temperature through applying a floating output signal to the actuating motor. Supply (1) adjustment sets the setpoint temperature. Adjusting the throttling range will set the temperature range in which floating output action occurs.

Supply and Boiler Return Sensor Operating Mode

- *If a Boiler Return Sensor option is installed,* then whenever the measured boiler return water temperature is near the return minimum, the control starts to close the 4-way mixing valve in order to divert more hot water back to the boiler. The Return (2) indicator will be flashing at a slow rate to indicate mixing valve is being controlled by the Boiler Return (2) sensor reading. When using a Boiler Return (2) sensor for minimum boiler return protection, it is essential that there always be water flow past the Boiler Return (2) sensor whenever there is Supply (1) demand.



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 153 includes:
- One Control 153 • One Universal Sensor 071
- One Data Brochure D 153 • One Data Brochure D 001

Other information available:
- Essay E 001

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 Universal Sensor 071 according to the instructions in Data Brochure D 070 and run the wiring back to the control but don't connect.
- Install a 24V (ac) Class 2 transformer with a minimum 5 VA rating close to the control, and run the wiring from the transformer to the control. *A Class 2 transformer must be used. Do not connect any of the transformer terminals to ground.*
- Or provide 24 V DC power of at least 0.03 A and run wiring to the control location.
- Install the wiring from the actuating motor to the control.

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 28V be measured as power supply to this control.

Test the sensor

This test must be performed *before* power is applied to the control and *before* a sensor is connected to the terminal strip. Test the sensor(s) 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

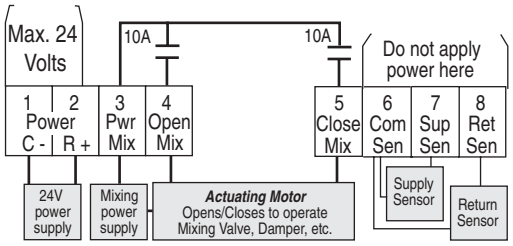
Power connections — Caution, Maximum 24 Volts ±10%

Connect the power supply to terminals 1 (C –) and 2 (R +).

Connect a power supply (24 - 120 V ac) for the mixing valve actuator to terminal 3 (Pwr Mix).

Connect neutral side of power supply to actuator common (–) terminal.

Connect the floating output device circuit to Relay terminals 4 (Open Mix) and 5 (Close Mix).



*Sensor connections — **Caution, voltage is never applied to these terminals***

Connect Supply (1) Sensor 071 to terminals *Sup Sen and Com Sen* (6 and 7)
Return (2) Sensor 071 to terminals *Ret Sen and Com Sen* (6 and 8) ***Optional***

Settings

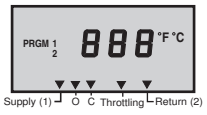
The digital display on the Mixing Setpoint Control 153 Floating Action has the following uses:

- To display the supply and return (if installed) temperature(s) during normal operating mode.
- To allow the user to check and program the various control settings.
- To display control operation. (“O” display element comes on when the Open relay turns on to drive the mixing valve open and “C” display element comes on when the Close relay turns on to drive the mixing valve close.)
- To display sensor faults. Display will show “Err 1” when the Supply (1) sensor is either open circuited, short circuited or out of temperature range. Display will show “Err 2” when Boiler Return (2) sensor is short circuited.

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

POWER ON

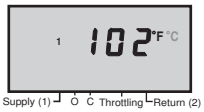
When the control is powered-up, all display elements turn on.



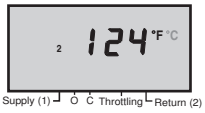
After approximately 5 seconds, the control automatically goes into operating mode.

OPERATING MODE

When in operating mode, the Supply (1) temperature will be displayed.

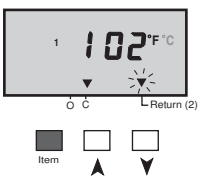


Push and Release the "Item" button. The display will toggle between Supply (1) and Return (2) temperature readings. (When return sensor is in use.)



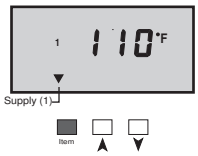
During operation, the open (O) and close (C) pointers indicate relay action.

If the Return (2) pointer is slowly flashing, the relay operation is being controlled by the return sensor readings.

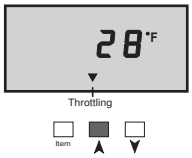


DISPLAY MODE

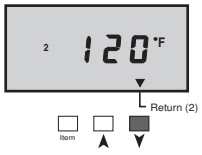
Push and Hold the "Item" button. The programmed Supply (1) setpoint will be displayed.



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

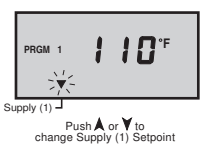


Push and Hold the ▼ button. The programmed Return (2) minimum will be displayed.

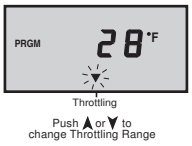


PROGRAM MODE

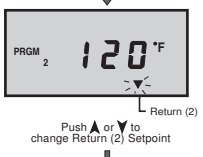
Push all three buttons ***at the same time.*** **"PRGM 1"** will appear and the **Supply (1)** pointer will flash. The control will be in programming mode.



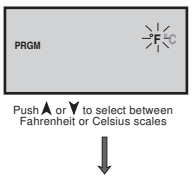
Pushing the "Item" button changes the flashing pointer to **Throttling.**



Pushing the "Item" button changes the flashing pointer to **Return (2).**



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



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

Throttling Range

Setting the Throttling range on any control depends entirely on the actual operating characteristics of the mixing device and the load in each specific application. Experience plus trial and error during actual operating conditions is usually the way most installers determine the correct setting. For a tekmar Actuating motor, a typical setting is 28 °F (15 °C). Faster motors require a larger throttling range.

Return (2)

The Return (2) setting provides a method to constrain the temperature of water returning to a boiler from a 4-way mixing valve. This setting should be adjusted to the lowest return temperature that the boiler is rated for. When the boiler return water temperature becomes too cold, the mixing valve is closed until the temperature is hotter than the Return (2) setting.

Testing and Troubleshooting

If troubleshooting becomes necessary with the Mixing Setpoint Control 153, follow the testing procedure in step four of the installation procedure on page 2 of this brochure.

If the display window shows "Err 1", the Supply (1) sensor is either open circuited, short circuited, or the sensor temperature is outside the temperature range of the control. If this type of fault occurs, the control will run the mixing valve fully closed.

If the display window shows “Err 2” the Boiler Return (2) sensor is short circuited, the control operates as if no return sensor is installed. If the Boiler Return (2) sensor is connected, but programming or Return (2) temperature displays do not function, the sensor is either open circuited or colder than -85 °F (-65 °C).

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(s) 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 The liability of tekmar under this warranty is limited. The Purchaser, by taking receipt of any tekmar product (“Product”), acknowledges the terms of the Limited Warranty in effect at the time of such Product sale and acknowledges that it has read and understands same.

The tekmar Limited Warranty to the Purchaser on the Products sold hereunder is a manufacturer’s pass-through warranty which the Purchaser is authorized to pass through to its customers. Under the Limited Warranty, each tekmar Product is warranted against defects in workmanship and materials if the Product is installed and used in compliance with tekmar’s instructions, ordinary wear and tear excepted. The pass-through warranty period is for a period of twenty-four (24) months from the production date if the Product is not installed during that period, or twelve (12) months from the documented date of installation if installed within twenty-four (24) months from the production date.

The liability of tekmar under the Limited Warranty shall be limited to, at tekmar’s sole discretion: the cost of parts and labor provided by tekmar to repair defects in materials and / or workmanship of the defective product; or to the exchange of the defective product for a warranty replacement product; or to the granting of credit limited to the original cost of the defective product, and such repair, exchange or credit shall be the sole remedy available from tekmar, and, without limiting the foregoing in any way, tekmar is not responsible, in contract, tort or strict product liability, for any other losses, costs, expenses, inconveniences, or damages, whether direct, indirect, special, secondary, incidental or consequential, arising from ownership or use of the product, or from defects in workmanship or materials, including any liability for fundamental breach of contract.

The pass-through Limited Warranty applies only to those defective Products returned to tekmar during the warranty period. This Limited Warranty does not cover the cost of the parts or labor to remove or transport the defective Product, or to reinstall the repaired or replacement Product, all such costs and expenses being subject to Purchaser’s agreement and warranty with its customers.

Any representations or warranties about the Products made by Purchaser to its customers which are different from or in excess of the tekmar Limited Warranty are the Purchaser’s sole responsibility and obligation. Purchaser shall indemnify and hold tekmar harmless from and against any and all claims, liabilities and damages of any kind or nature which arise out of or are related to any such representations or warranties by Purchaser to its customers.

The pass-through Limited Warranty does not apply if the returned Product has been damaged by negligence by persons other than tekmar, accident, fire, Act of God, abuse or misuse; or has been damaged by modifications, alterations or attachments made subsequent to purchase which have not been authorized by tekmar; or if the Product was not installed in compliance with tekmar’s instructions and / or the local codes and ordinances; or if due to defective installation of the Product; or if the Product was not used in compliance with tekmar’s instructions.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, WHICH THE GOVERNING LAW ALLOWS PARTIES TO CONTRACTUALLY EXCLUDE, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, DURABILITY OR DESCRIPTION OF THE PRODUCT, ITS NON-INFRINGEMENT OF ANY RELEVANT PATENTS OR TRADEMARKS, AND ITS COMPLIANCE WITH OR NON-VIOLATION OF ANY APPLICABLE ENVIRONMENTAL, HEALTH OR SAFETY LEGISLATION; THE TERM OF ANY OTHER WARRANTY NOT HEREBY CONTRACTUALLY EXCLUDED IS LIMITED SUCH THAT IT SHALL NOT EXTEND BEYOND TWENTY-FOUR (24) MONTHS FROM THE PRODUCTION DATE, TO THE EXTENT THAT SUCH LIMITATION IS ALLOWED BY THE GOVERNING LAW.

Product Warranty Return Procedure All Products that are believed to have defects in workmanship or materials must be returned, together with a written description of the defect, to the tekmar Representative assigned to the territory in which such Product is located. If tekmar receives an inquiry from someone other than a tekmar Representative, including an inquiry from Purchaser (if not a tekmar Representative) or Purchaser’s customers, regarding a potential warranty claim, tekmar’s sole obligation shall be to provide the address and other contact information regarding the appropriate Representative.

tekmar® Control Systems

tekmar Control Systems Ltd., Canada
tekmar Control Systems, Inc., U.S.A.
Head Office: 5100 Silver Star Road
Vernon, B.C. Canada V1B 3K4
Tel. (250) 545-7749 Fax. (250) 545-0650

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