tekmar® - Data Brochure

Mixing Setpoint Control 153

D 153

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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.

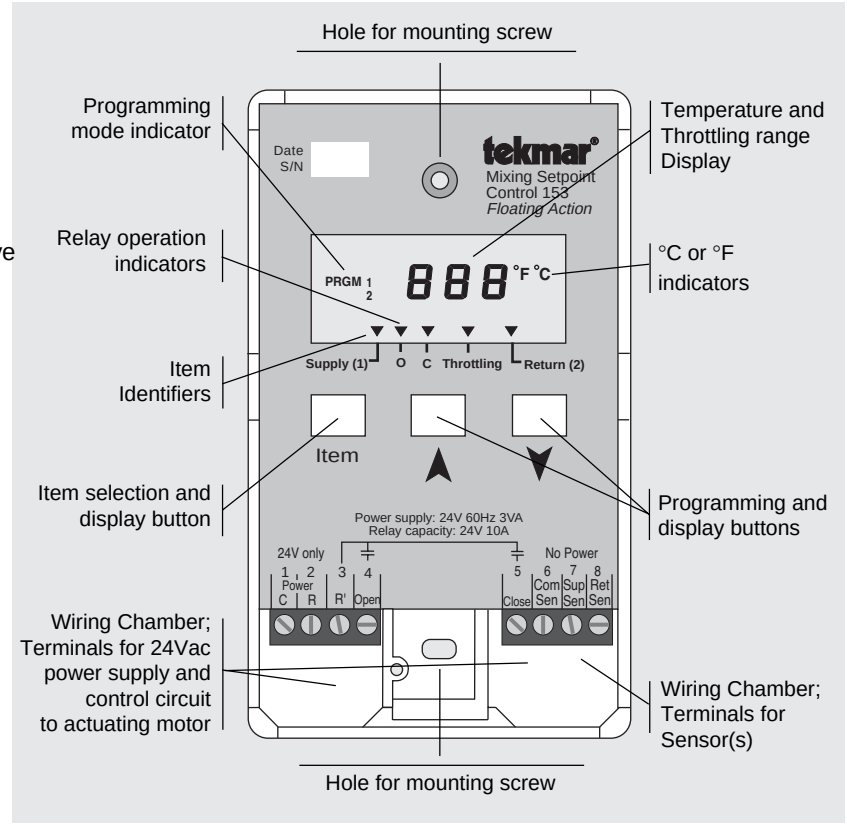
Technical Data

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	—	20 to 28Vac, 60 Hz, 3VA, class II transformer
Relay capacity	—	SPST, 24Vac, 10 amp resistive
Sensor	—	10 kΩ @ 77°F (25 ± 0.2°C), curve 3, NTC thermistor 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



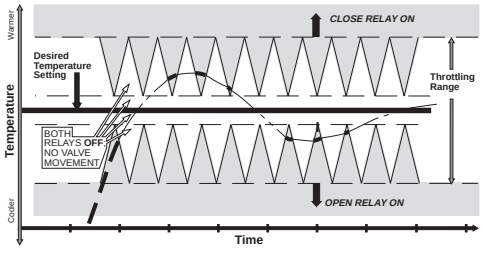
Sequence of Operation

- *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 Vac Floating Action

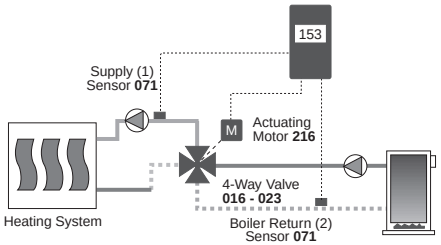


Supply Sensor Operating Mode

- *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 001 and run the wiring back to the control but don't connect.
- Install a 24Vac Class II transformer with a minimum 5 VA 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 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 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* 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

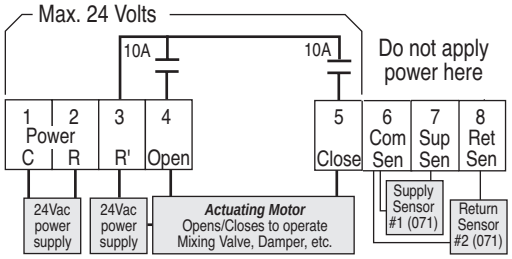
- Ensure that the wires from the power supply transformer are not touching each other, any other wires, or ground. Turn on the power and, using an AC voltmeter, you should measure between 20 and 28 volts at the secondary side of the transformer.
- Turn off the power and complete the electrical connections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

Electrical connections

Power and output connections — ***Caution, Maximum 24 Volts A.C.***

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

— the floating output device circuit to terminal Relays:
R^{I} — Open (3 and 4)
R^{I} — Close (3 and 5)



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

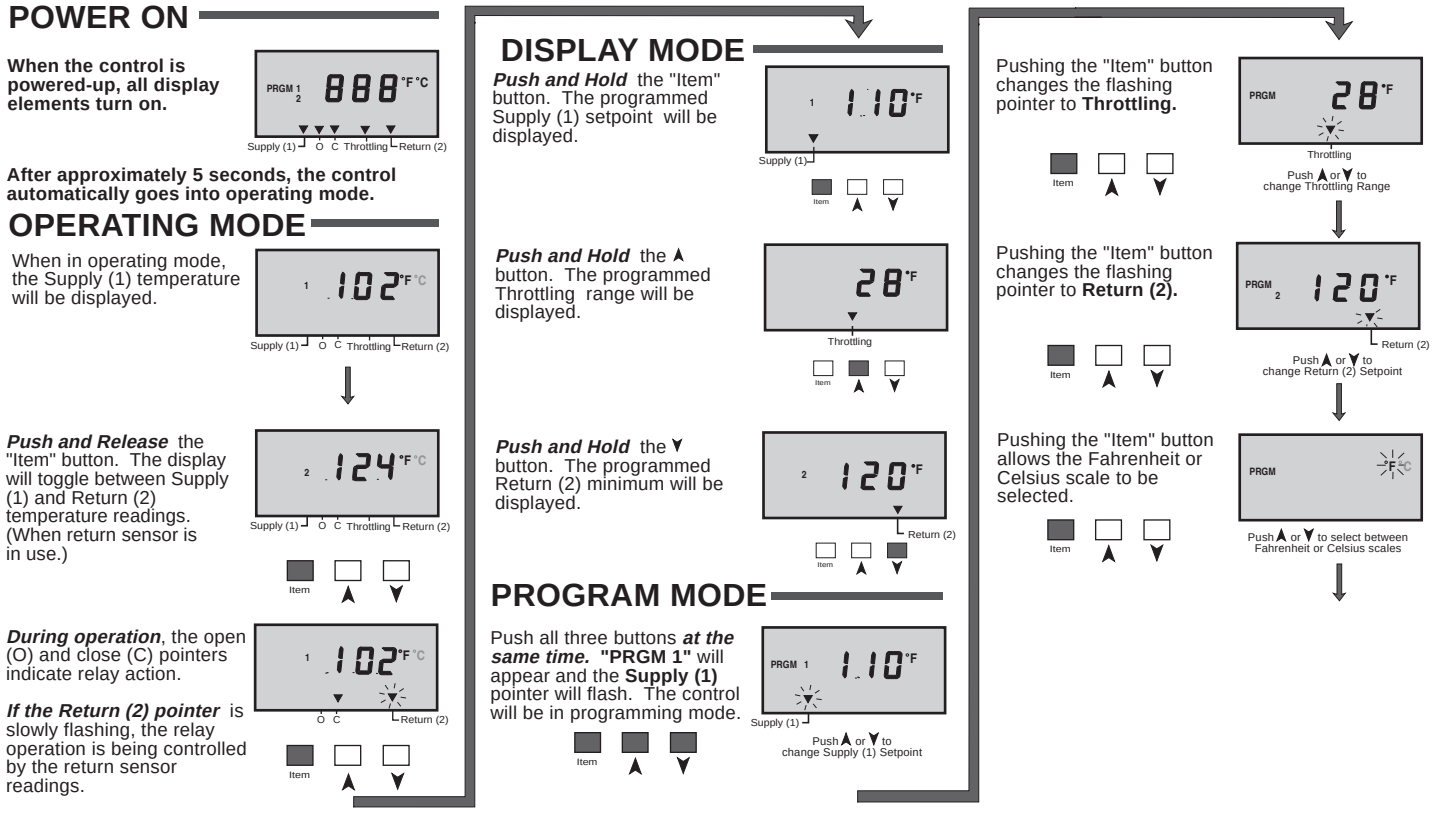
Connect Supply (1) Sensor 071 to terminals *Sup Sen and Com Sen* (6 and 7)
Return (2) Sensor 071 to terminals *Ret Sen and Com Sen* (6 and 8) ***Optional***

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.



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: 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.

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