

# tekmar® - Data Brochure

## Actuating Motor 010

D 010

09/94



The tekmar Actuating Motor 010 is designed to operate any of the tekmar 4-way mixing valves from type 016 through to type 023. An isolated, auxiliary end switch is provided to turn on a boiler or other device. The cam for this end switch is adjustable. The tekmar Actuating Motor 010 can deliver 310 in•lbs (35 N•m) over a 90° stroke. Quality metal gears, bearings and shaft help ensure a long trouble-free operating life.

## Sequence of Operation

### Motor

The actuating motor rotates its output shaft whenever 24 V (ac) is applied between either the counter clockwise (↺) or clockwise (↻) terminals and the neutral C/N terminal. The motor is compatible with any control having a 24 V (ac) floating output.

### Cam operated switches

There are three cams within the motor housing. The bottom cam closes a contact between terminals (↺) and 1 when the output shaft is rotated fully counter clockwise. The second cam closes a contact between terminals (↻) and 2 when the output shaft is rotated fully clockwise. When these end switches are closed, the motor is stopped. The terminals C/N and 1 or C/N and 2 can be connected to an auxiliary device to signal when the tekmar 4-way mixing valve is either fully open or fully closed.

**Note: Do not attempt to loosen the hex head screw or adjust the bottom two cams as damage to the motor can result. Loosening the hex head screw voids the warranty.**

The top cam is factory set to close the auxiliary end switch between terminals 3 and 4 when the output shaft is rotated greater than 5 to 10% counter clockwise. This allows the actuating motor to turn on a boiler or other device once the mixing valve is partially open. Systems with a large boiler output to load requirement may require the cam to be adjusted for greater flow before the boiler is fired. The top cam can be rotated 180° to allow the same switching action for clockwise opening valves.

## Installation

### Step One ■ Getting ready ■

Check the contents of this package. If any of the items listed below 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 local tekmar representative.

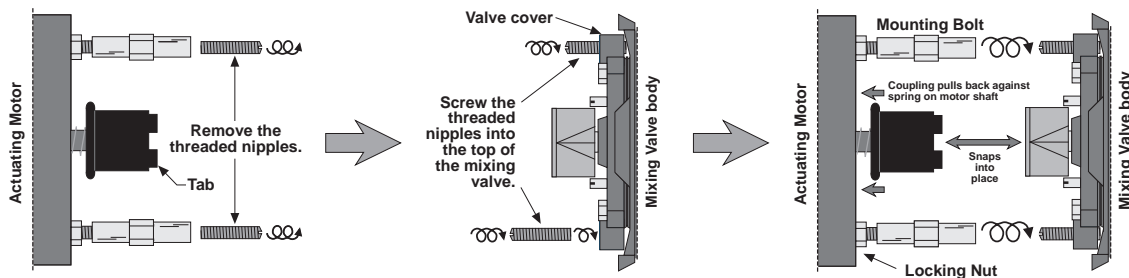
*Type 010 includes:*

- One Actuating Motor 010 (including mounting hardware & coupling) & One Data Brochure D 010

### Step Two ■ Mounting ■

- Unscrew the threaded nipples from the actuating motor mounting bolts and thread them into the valve cover.
- Align the mounting bolts on the actuating motor with the threaded nipples in the mixing valve cover. Make sure the slots in the valve handle line up with the tabs extending from the coupling. The coupling should snap neatly into place on the mixing valve handle.
- Tighten the mounting bolts by hand and then, using a 13 mm wrench, tighten the bolts until they are against the valve cover.
- Tighten the locking nuts with a 13 mm wrench until they are firmly against the mounting plate of the actuating motor.
- Test that the coupling can be easily disengaged from the mixing valve handle by pulling the coupling towards the motor and turning the valve handle. To re-engage the motor, turn the handle until the coupling snaps into place.

**Note: If the mixing valve becomes frozen or jammed, the black plastic coupling is designed to break, preventing damage to the motor. If this occurs, the valve should be disassembled and the cause of the jamming corrected. A new coupling is available through your local tekmar representative.**

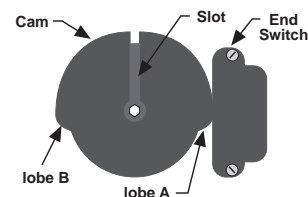


### Step Three ■ Setting the Auxiliary End Switch Cam ■

- The following assumes that the valve is plumbed with hot water from the boiler entering the right hand valve port.
  - Remove the motor cover and apply 24 V (ac) between the terminals C/N and (↻) or (↺) in order to run the motor to the desired valve position where the end switch needs to operate. The scale on the mixing valve can be used to estimate the percent mixing.
- Example: If 25% mixing is desired before the auxiliary device is turned on, power the motor until the valve handle points between 2 and 3 on the valve scale. At the desired valve position remove power from the actuating motor.

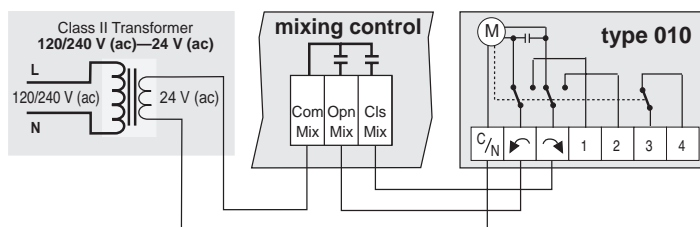
- Place a flat screwdriver into the slot in the top cam. If you want the contacts between terminals 3 and 4 to make when the valve opens to this point, rotate the cam until lobe A causes the end switch to click.
- If you want the contacts between terminals 3 and 4 to break when the valve opens to this point, rotate the cam until lobe B causes the end switch to click.
- If hot water from the boiler is plumbed into the left side of the valve, the functions of lobes A and B are reversed. This plumbing arrangement also reverses the function of the (↶) and (↷) terminals.
- Test that the system operates correctly by powering the valve closed and then powering it open until the terminals 3 and 4 make or break. If power to the boiler is supplied through this end switch, the boiler should turn on when the contacts are made.

#### Top Cam and End Switch



## Step Four ——— Rough in wiring

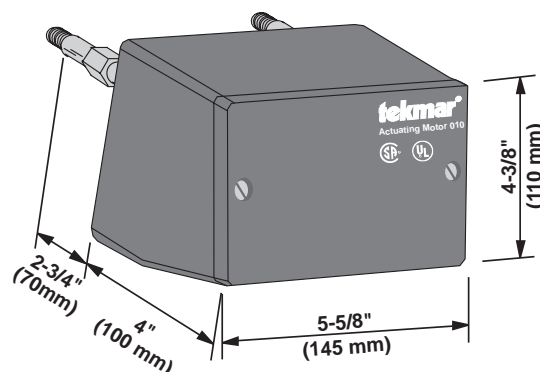
All electric wiring enters the motor through the standard 7/8" (22 mm) hole in the bottom of its case. This hole allows conduit to be run to the motor enclosure. Standard 18 AWG solid wire is recommended for all connections to the motor terminals. The specific wiring details for your application are provided in the brochures supplied with the control used in your system.



## Technical Data

### Actuating Motor 010

Literature	— D 010
Packaged weight	— 3.7 lb. (1700 g), Polycarbonate plastic enclosure
Dimensions	— 4-3/8" H x 5-5/8" W x 6-3/4" D (110 x 145 x 170 mm)
Approvals	— CSA, UL listed.
Ambient conditions	— Indoor use only, 32 to 140°F (0 to 60°C), < 90% RH non-condensing.
Power supply	— Class 2, 24 V (ac) ±10% 60 Hz 3 VA
Auxiliary switch	— 24 V (ac) 5 A 1/10 hp, pilot duty 24 VA 1 A
Control signal	— 24 V (ac) three point floating
Angle of rotation	— 90° shaft rotation
Running time	— 210 seconds
Maximum torque	— 310 in. • lb. (35 N•m)
Auxiliary Switch	— 0 to 90°; make or break



## 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  
tekmar Control Systems, Inc., USA  
Head Office: 4611 - 23rd Street  
Vernon, B.C. Canada V1T 4K7  
Tel. (604) 545-7749 Fax. (604) 545-0650

**Stop** Before you go ahead and replace the coupler, ask yourself why the old coupling broke in the first place. Replacing the coupling without doing any maintenance to the system will only result in another service call down the road. Please read the section in the D 016 (01/96) mixing valve section regarding Valve Maintenance and Corrosion Control.

The breakage of an actuating motor coupling is a symptom of a problem within the heating system. The tekmar controls that operate the actuating motor will typically be a Setpoint Control 153, Mixing Control 354, House Control 371, Snow Melting Control 662, Mixing Valve Reset Control 228 or 229. Other O.E.M. floating action controls may also be used to drive the actuating motor. The following trouble shooting guide is included to help identify what may be causing the problem.

### *Symptoms, Possible cause:*

- Foreign material in system causing jam in valve port.
- Corrosion build up on valve bonnet or inside walls of valve. Water not treated or leak in heating system.
- Failure of end stop switches within the Actuating Motor 010. If the control operates the close and open output at the same time, damage to the actuating motor end switches may occur.
- Misalignment of Actuating motor 010 to the valve body.
- Piping arrangements when using 2 1/2" to 4" valves.
- Valve "sits" for the summer months or long time intervals without any movement.
- Valve used on potable water (open) system.
- Leaking valve stem from top of bonnet. "O" ring seals damaged on valve stem. Leak in any part of the heating system.

### *Possible result, Corrective action:*

- Once jammed, flap assembly in mixing valves from 1" to 2" may break as well as coupler. The system may experience pump failures. Install strainer in system to remove foreign material.
- Possible damage to flapper assembly (1" to 2" valves), broken nylon coupler, bent bottom plate on actuating motor. Do water treatment as described in D 016, Corrosion Control.
- Motor over drives handle past marker peg(s). Tip of handle drives past marker peg(s), or actuating motor drives back of handle into mounting bolts. Damage to the handle tip and the marker peg(s) will be apparent. Return control and actuating motor for repair.
- Motor will be loading and unloading during movement. Motor may be noisy and the net result may be a broken coupler. Correct alignment and check operation.
- If you pipe pumps in series with the larger valves, the forces within the valve when the valve is trying to close from the 2 to 0 position may exceed the rating of the motor (310 in lbs) of force. Use primary - secondary piping arrangements.
- Valve flapper may "freeze" to the valve body. During fall start up, coupler is broken. Manually exercise and check water quality on a regular basis. Most tekmar controls automatically exercise the mixing valve.
- Incorrect application for this type of valve. Replace with a non-ferrous material.
- Leaking systems will introduce a continuous flow of new oxygen rich water. Net result will be deteriorated water quality. Fix leak(s). Recommend a low water cut off switch with water feed "turned off".

## Installation

As you will notice, improvements have been implemented on the materials used to connect the actuating motor to the 4-way mixing valves.

The following changes are being implemented:

- 1) The black nylon coupler has been replaced by aluminium zinc die-cast coupler (**Part # G4002**) and a shear pin (**Part #G5063**). The die cast coupler will not break under any condition. The shear pin becomes the item that breaks if there is a restriction in the movement of the valve.
- 2) The coupler spring (**Part # G5060**) which is mounted between the coupler and the actuating motor on the main shaft is being replaced. Changing this spring will reduce the amount of downward force on the flap assembly.
- 3) The existing marker pegs mounted on the valve are to be changed to the enclosed screws (**Part # G5059**). This change ensures that the handle pointer will not contact any objects through the complete 90° handle movement.

## Service Procedure

### STEP ONE — GETTING READY

Check the contents of this package. If any of the items listed below are missing or damaged, please refer to the Limited Warranty and Product Return Procedure on the back of Data Brochure D 010 and contact your wholesaler or local tekmar representative.

**M3029 includes**

- Data Brochure D 010, Data Brochure D 010 A addendum, Data Brochure D 016
- Zinc die-cast coupler, (Part # G4002)
- Shear pin (Part # G5063)
- Spring (Part # G5060)
- Screws, 2 pieces (Part # G5059)

### STEP TWO — SERVICING

Loosen nuts from bottom side of actuating motor plate.  
Remove mounting bolts and actuating motor from valve.

**4-Way Mixing Valve Service, Data Brochure D 016**

**Note** Have valve seal kit on hand (Part # M3022 or M3023 or M3024).

Remove the two stop pins from the position indicator plate; Discard.

Replace stop pins with supplied screws (Part # G5059).

Isolate valve from system.

Remove the four bolts that hold the flap assembly to valve.

Carefully remove flap assembly from valve body.

Clean inside valve body, check valve flap assembly for integrity.

Re-install flap assembly with new seal kit.

**Actuating Motor 010 Service, Data Brochure D 010**

While supporting shaft, drive key pin out from shaft with punch and hammer.

Remove old spring from shaft.

Install new spring onto shaft (Part # G5060).

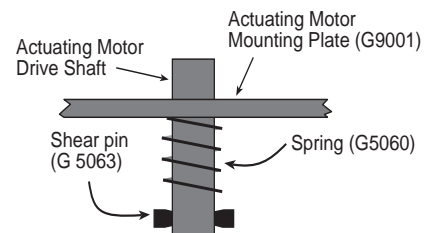
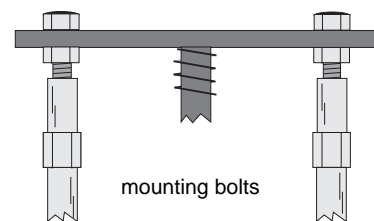
Install new shear pin (Part # G5063) centering it in the actuating motor shaft.

Remove any burrs from shaft.

Install new coupling and ensure smooth movement on drive shaft.

Check back mounting plate of actuating motor. If bent, remove and straighten, or if badly bent, replace plate (Part # G9001).

Threads to be flush with top of retaining nut

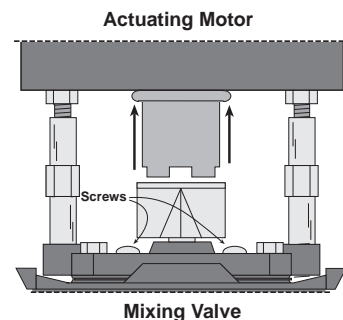


### STEP THREE — ASSEMBLE

Follow the instructions in Data Brochure D 010, Step Two to reinstall actuating motor to valve.

**Note** It is important to have proper alignment of the motor to the valve. The actuating motor should be able to rotate the full 90° without any binding or loading / unloading of the motor.

**Note** Once the actuating motor is connected to the valve, one should be able to pull the coupling towards the motor and then freely rotate the handle. If this cannot be accomplished, the actuating motor is mounted too close to the valve or the motor is misaligned with the valve body.



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