

Installation Instructions

- **Support weight of piping independently.** Do not place any Maxon Flow Control Valve in a piping bind. Provide pipe hangers and/or special support for related manifolds.
- **Maxon connecting base and linkage assemblies are designed to locate and/or position the control operator** for its interaction with the Flow Control Valve assembly. They are not intended to support the weight of the control motor. Special provisions will be required to support the weight of the control operators.
- **Use of pipe heavier than Schedule #40 can cause interference** with butterfly-type Flow Control Valves and restrict the valve from full opening.
- **Flow Control Valves provide the means to adjust fluid and/or gas flows.** They should be installed with at least four pipe diameter lengths of straight pipe before and after the valve. This lessens the chance of internal flow turbulence being set-up in the piping manifolds and control valve.
- **Install flow control valves carefully and maintain adequate dimensional clearance** to allow full stroke and travel of the valve's control linkage. Internal drive mechanisms within a control motor may be damaged if linkage is restricted as to cause binding in high or low flow positions.

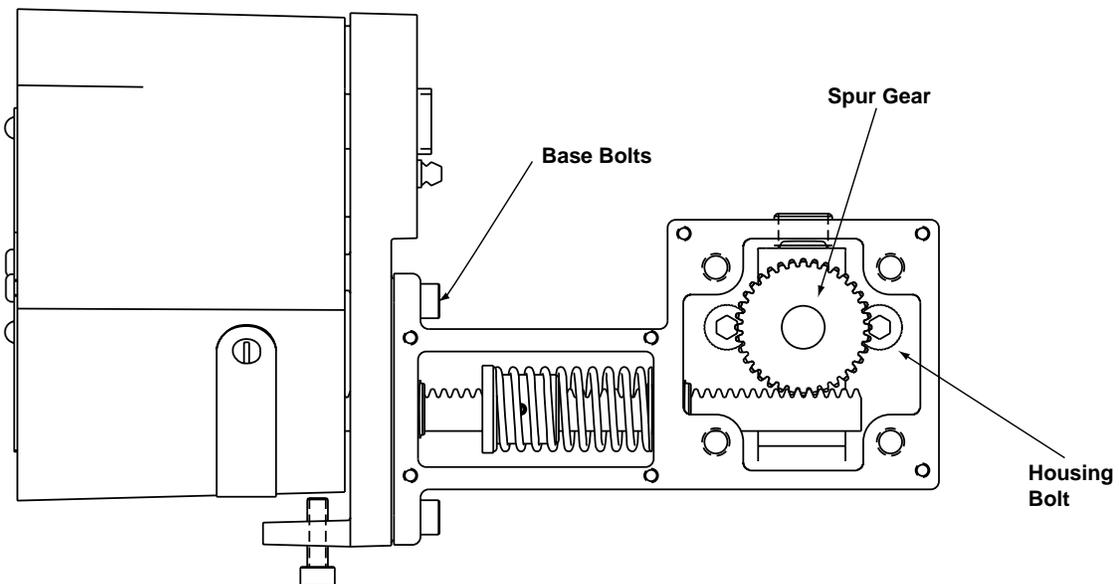
CAUTION: All flow control valves are designed for throttling service only and are not intended for tight shut-off.

- **Main system shut-off should always use a manual "leak-tight" upstream fuel cock.**

Screw Carrier Rotation Instructions

To rotate screw carrier in 90° increments:

- Remove four base bolts.
- Rotate screw carrier on its shaft to desired position.
- Reinstall base bolts.



Adjusting Instructions

Series "A" Push/Pull SYNCHRO Valves

General Instructions

Important: Do not discard packing materials until all loose items are accounted for.

To prevent damage in transit, some connecting base and linkage components may be packed separately and shipped loose with your new Maxon flow control valve.

The flow control valve is normally only a part of your complete combustion system. Additional pipe train accessories and control components may be required for a complete system installation. Read complete instructions before proceeding, and familiarize yourself with all the system's equipment components. Verify that your equipment has been installed in accordance with the original manufacturer's current instructions.

CAUTION: Initial adjustment and light-off of burner systems should be undertaken only by trained and experienced personnel familiar with combustion systems, with control/safety circuitry, and with knowledge of the overall installation. Instructions provided by the company and/or individuals responsible for the manufacture and/or overall installation of complete systems incorporating Maxon burners take precedence over these provided by Maxon. If Maxon instructions conflict with any codes or regulations, contact Maxon Corporation before attempting start-up.

Adjusting the Series "A" Push/Pull SYNCHRO Control Valve:

The Series "A" Push/Pull SYNCHRO has multiple adjusting screws that are pre-set by Maxon to an approximate ramp to assist the customer in beginning their adjustments.

CAUTION: Pre-set condition will allow flow to occur.

The Push/Pull SYNCHRO relies on direct connections from the adjusting screw through to the valve shaft. **Carefully follow these adjusting instructions** to prevent permanent damage to the cam strips or linkages, which could cause the valve to not operate properly or result in an unsafe condition.

The following tools are needed to adjust the Maxon Push/Pull SYNCHRO screw carrier:

- Flat tipped screw driver
 - 5mm hex wrench (screw carrier position lock)
 - 5/32" hex ('T' handle recommended) wrench (adjusting screws)
1. Remove any connecting linkages as needed to allow access to the screw carrier.
 2. Lock the screw carrier in a convenient position (use 5mm hex wrench).
 3. Swing out of the way or remove the adjusting screws cover plate (flat tipped screw driver).
 4. Unlike the 'M' style screw carrier, which is adjusted by setting the MAX and MIN screw positions and then blending the remaining screw positions, the Push/Pull screw carrier cannot be adjusted in this manner due to its different design.

As a general rule of thumb, there should not be more than 1/8" difference between screw heights. This is approximately 3 turns between 2 adjacent screws.

For ease of operation, longer cam strip life and reduced torque, it is best to adjust the cam strips to a smooth ramp from MIN to MAX.

Try to spread adjustments out over several screws to avoid distortion of the cam strips. This may take more time to achieve a good ramp, but it will eliminate the possibility of damage to the cam strips or adjusting screws.

A smooth ramp will also lengthen the life of the cam strips, other components of the screw carrier and the control motor.



Maxon practices a policy of continuous product improvement. It reserves the right to alter specifications without prior notice.

Adjusting Instructions

For initial adjustment and/or burner start-up:

1. **Close all burner fuel valves and cocks.** Make preliminary adjustments to fuel gas regulators.
2. **Check all electric circuitry.** Verify that all control devices and interlocks are operable and functioning within their respective settings/ranges. Be sure all air and fuel manifolds are tight and that test ports are plugged if not being used.
3. **Check that any air handling dampers are properly positioned** and locked into operating positions.
4. **Disconnect the automatic control motor's linkage** from the control valve's operating crank arm by loosening the control motor's connecting rod from the burner's toggle linkage.
Initial adjustment should only be accomplished during a "manual" control mode.
5. **Start all system-related fans and blowers.** Check for proper motor rotation and impeller direction. Verify that all control interlocks are working. Allow air handling equipment to run for adequate purge of your manifolds.

CAUTION: Do not by-pass control panel timers typically controlling sequential operations.

6. **With MICRO-RATIO® Valve combinations of air and fuel valves, the minimum differential pressure setting is initially established with the air valve only.**
 - A. By disconnecting the linkage between the air butterfly valve and interconnected fuel valve(s), the minimum and maximum limits of travel on the air valve may be determined.
For example, a combustion system may need the air valve to be 15° open for the "minimum" setting and the "maximum" requirements are satisfied with the air valve open to 60°. By marking these points on the air valve's indicating strip, the SYNCHRO Fuel Valve's linkage is ready to be reconnected to the air valve.
 - B. **The next step involves adjusting the connecting linkage** between the air valve and the fuel valve(s) so that each fuel valve travels its full quadrant range (i.e. from minimum to maximum), while the air valve swings from its pre-determined minimum and maximum positions.

CAUTION: Verify all safety interlocks are operational before opening any main and/or individual burner valves.

7. **Open main and pilot gas cocks**, then attempt spark ignition to light pilot while slowly turning pilot gas regulator clockwise and/or adjustable orifice screw counter-clockwise to increase fuel flow. Repeat procedure as necessary until pilot ignites, as air might have to be bled out of fuel supply lines before reliable pilot flame is established. Pilot gas regulator should normally be set for as low a pressure as possible.
8. **After ignition, adjust pilot flame** with pilot gas adjustable orifice for good stable flame shape. A "rule of thumb" is that any pilot over a tennis ball size is probably too large. If visual access to the pilot flame is not available, **adjust pilot to give a strong and stable flame signal through the flame safety circuit.** This signal strength can be read with a micro-amp meter. The signal strength (or range) will be determined by the specific type of flame safeguard instrument used with the burner system.
9. **Re-check pilot ignition** by closing pilot gas cock or otherwise causing pilot outage. Re-light and refine pilot gas adjustment as necessary to get ignition within a second or two. The flame safeguard relays should now power the main fuel Shut-Off Valve(s).

CAUTION: After completing steps above, re-check all interlocking safety components and circuitry to prove that they are properly installed, correctly set, and fully operational. If in doubt, shut the system down, close pilot cock and contact responsible individual before proceeding further.

10. **To light and adjust burner on gas:**
With gas pilot established and flame supervision system operational, opening the main fuel Shut-Off Valve(s) will allow fuel flow to the Flow Control Valve.
11. **To adjust SYNCHRO flow control valves:**
With SYNCHRO valve in minimum position, open upstream fuel cock. Using a 5/32" hex wrench, turn minimum adjusting screw (first adjusting screw) clockwise to permit fuel flow to the burner.

Adjusting Instructions

CAUTION: Pre-set of adjusting screw gradient may permit fuel flow at minimum position. Flame safeguard interlocking safety components and circuitry must be operating properly.

NOTE: At this point, it is more important to get any kind of flame as soon as possible. The flame geometry can be adjusted and refined as needed later.

12. **Once flame is established and refined** at this position, and without advancing the screw carrier quadrant higher, place the 5/32" hex wrench on the next screw and rotate to position #1 (second adjusting screw). Observe and refine flame characteristics per the appropriate burner adjustment procedures.

CAUTION: If flame is extinguished, immediately return Flow Control Valve to minimum position and shut off fuel (if flame safeguard has not already done so). Turn in slightly on adjusting screw at point where ignition was lost, then return Flow Control Valve to minimum position, re-establish pilots, open fuel valve and verify ignition.

NOTE: If firing chamber is of refractory construction, allow the burner system to operate at this low setting for the necessary dry/cure-out time period recommended by the chamber or refractory manufacturer. Then continue adjustments of Flow Control Valve.

13. **Progressively work up through each adjusting screw position**, developing a smooth progression slope from the first screw to the maximum position while adjusting and refining flame geometry as required.

NOTE: To adjust the flame at any position, move the Flow Control Valve to the desired number to be adjusted. This aligns the adjusting screw directly on top of the fuel valve yoke shaft and its interconnected valve body linkage.

CAUTION: Oil flames are highly radiant. Use eye protection and avoid prolonged viewing. Prepare to shut off oil quickly if there is a noticeable drop in oil pressure or if ignition does not occur.

14. **Refine adjustment as needed**, always turning valve so that position indicator matches screw being adjusted.
For more fuel, turn screw in (clockwise). For less fuel, turn screw out (counter-clockwise).
If screws must be turned in flush with carrier casting, increase fuel pressure and re-adjust.
15. **Repeat procedure for any other fuels.**
16. **Cycle burner from minimum to maximum and refine adjustment, if necessary.** Always set Flow Control Valve to the desired numbered position to be adjusted.
For operation with interrupted pilot (as recommended), shut off pilots and cycle burner from minimum to maximum and back several times to verify the flame is maintained.
17. **Reconnect linkage to control motor**, plug all test connections, replace equipment cover caps and tighten linkage screws.
18. **Check out overall system operation** by cycling through light-off at minimum, interrupting pilot, and allow temperature control system to cycle burner from minimum to maximum and return.
19. **Recheck all safety system interlocks** for proper setting and operation.

WARNING: Test every UV installation for dangerous spark excitation from ignitors and other possible sources of direct or reflected UV radiation. Use only gas-tight scanner connections.

20. **Before system is placed into full service, instruct operator personnel** on proper start-up, operation and shut-down of system. Establish written instructions for future reference.



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INDUSTRIAL COMBUSTION EQUIPMENT AND VALVES