

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.
- **Check fluid flow direction through “-P” and “-O” poppet-type valves.** It must flow only in direction matching the arrow cast into valve body. If necessary, valve body may be rotated per instructions given on page 7016.
- **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 position.

CAUTION: All Flow Control Valves are designed for throttling service only and are not intended for tight shut-off.

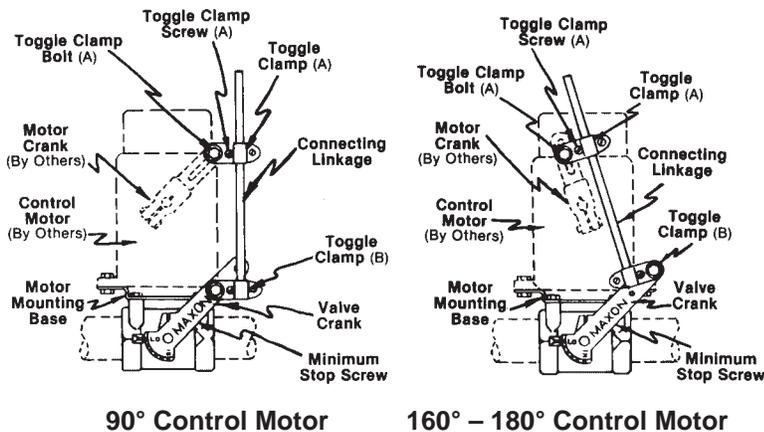
- **Main system shut-off should always use a manual “leak-tight” upstream fuel cock.**

Mounting Instructions for motor operator on Series “CV” Flow Control Valves

For those Series “CV” Valve assemblies furnished with connecting base and linkage, the accompanying diagrams illustrate mounting procedures relative to each specific type operator.

First, mount your control motor to connecting base in accordance with diagrams at right.

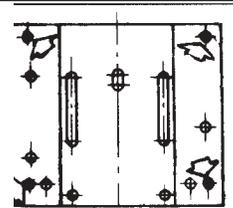
Secondly, determine if your electric operator travels through 90° or 180° rotations. Then arrange connecting linkage and motor crank arm as shown below for your specific operator.



90° Control Motor

160° – 180° Control Motor

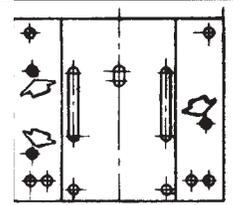
**Honeywell
#M644, M744,
M941 or M944
(7616BR Crank)**



Mount with four short bolts and nuts at indicated holes.

Crank & Linkage Side

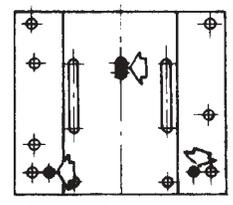
**Barber-Colman
EA50**



Mount with three short bolts and nuts at indicated holes.

Crank & Linkage Side

**Penn/Johnson
M80, M81
(MD3-600 Crank)**



Mount with two short bolts and nuts and long bolt screwed into operator base through slotted hole.

Crank & Linkage Side

Installation Instructions

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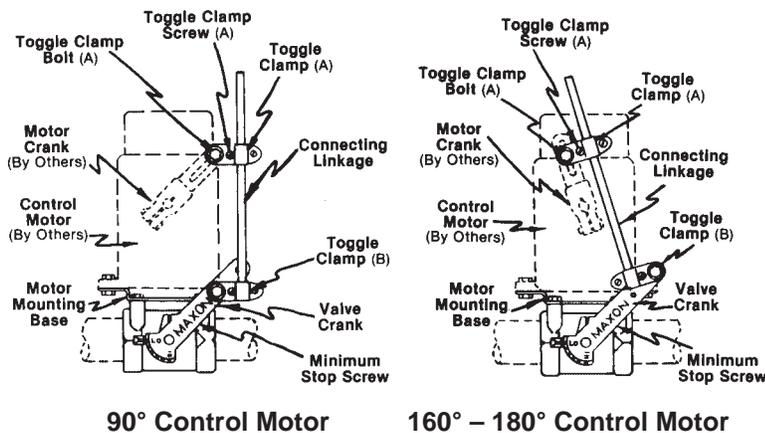
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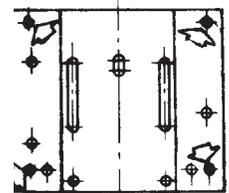
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90° Control Motor

160° – 180° Control Motor

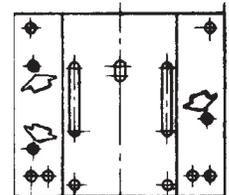
**Honeywell
#M644, M744,
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(7616BR Crank)**



Mount with four short bolts and nuts at indicated holes.

Crank & Linkage Side

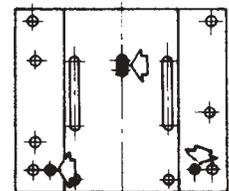
**Barber-Colman
EA50**



Mount with three short bolts and nuts at indicated holes.

Crank & Linkage Side

**Penn/Johnson
M80, M81
(MD3-600 Crank)**



Mount with two short bolts and nuts and long bolt screwed into operator base through slotted hole.

Crank & Linkage Side

Adjusting Instructions

Notice: Only generalized instructions can be provided here. Detailed adjusting instructions are provided with each individual Maxon burner and/or mixer system.

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 system 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.

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 your 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, you are ready to reconnect the SYNCHRO Fuel Valve's linkage 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.
 - C. **With Series "CV" Valves and Series "Q" adjustable-gradient Flow Control Valves,** the minimum flow position is set by their minimum stop screw. This adjustable stop is located on the side of the screw carrier of Series "Q" Valves and at the base of crank arm of Series "CV" Valves. Screwing "in" on the minimum stop screw produces a physical stop on the quadrant's travel that prohibits valve from being completely closed off.



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INDUSTRIAL COMBUSTION EQUIPMENT AND VALVES

Adjusting Instructions

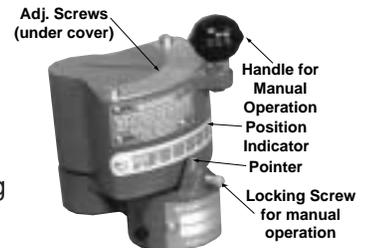
- D. **SYNCHRO gas and oil valves have multiple adjusting screws** and, when used alone (without an inter-connected air valve as in the MICRO-RATIO® Valve assemblies), the minimum adjusting screws are not screwed in, thus not permitting flows at the specific minimum flow positions.
- E. **Series “BV” Balancing Valves** have fixed setting control points. The butterfly-type body may be locked in any particular flow position by simply screwing “in” on the locking Allen screw on the side of the wheel handle.

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. This assumes you have visual access to the pilot flame. If this is not possible, then **adjust pilot to give a strong and stable flame signal through your 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 you have with your 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 your 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 Fuel Control Valve(s):**
With SYNCHRO Valve at minimum position, open upstream fuel cock. Using the Allen wrench provided, turn minimum adjusting screw “down” (clockwise) to permit fuel flow to your burner.



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 your flame is established and refined** at this position, and without advancing the screw carrier quadrant higher, screw all remaining screws down to at least the same level as your first adjusted screw.

NOTE: A preliminary setting can be established with all the remaining adjusting screws. Generally each succeeding screw needs to be screwed in approximately one full turn deeper than its preceding screw. A smooth “stair-step” gradient pre-set at this point from low to high will simplify the remaining adjustment steps.

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.

13. **Without advancing the Flow Control Valve quadrant**, screw down on #2 screw (one or two turns). Then slowly advance the Flow Control Valve quadrant to the #2 position. Adjust flame appearance at this new position #2.

Adjusting Instructions

NOTE: If firing chamber is of refractory construction, allow your 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.

Again, without moving valve, bring #3 and all remaining adjusting screws down to the same level as #2 screw. (If approximate pre-set gradient was made earlier, the remaining screws will already be at or below appropriate levels.)

14. **Progressively work your way up through each adjusting screw position**, developing a smooth progression slope from your first screw to the maximum position.

NOTE: To adjust the flame at any position, you must move the Flow Control Valve to the number you desire to adjust. This aligns the adjusting screw directly on top of the fuel valve plunger. A resulting adjustment of the screw is directly applied to the fuel valve plunger 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.

NOTE: To avoid possible damage to cam strips, always turn all higher-numbered screws in as far as the last one adjusted.

15. **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.

16. **Repeat procedure for any other fuels.**
 17. **Cycle burner from minimum to maximum and refine adjustment, if necessary.** Always set Flow Control Valve to the numbered position you wish to adjust.

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.

18. **Reconnect linkage to control motor**, plug all test connections, replace equipment cover caps and tighten linkage screws.
 19. **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.
 20. **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.

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



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INDUSTRIAL COMBUSTION EQUIPMENT AND VALVES

Adjusting Instructions

Notice: Only generalized instructions can be provided here. Detailed adjusting instructions are provided with each individual Maxon burner and/or mixer system.

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 system 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.

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 your 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, you are ready to reconnect the SYNCHRO Fuel Valve's linkage 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.
 - C. **With Series "CV" Valves and Series "Q" adjustable-gradient Flow Control Valves,** the minimum flow position is set by their minimum stop screw. This adjustable stop is located on the side of the screw carrier of Series "Q" Valves and at the base of crank arm of Series "CV" Valves. Screwing "in" on the minimum stop screw produces a physical stop on the quadrant's travel that prohibits valve from being completely closed off.



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INDUSTRIAL COMBUSTION EQUIPMENT AND VALVES

Adjusting Instructions “Push-to-Close” SYNCHRO Valve

D. “Push-to-Close” SYNCHRO gas and oil valves have multiple adjusting screws and, when used alone (without an inter-connected air valve as in the MICRO-RATIO® Valve assemblies), the minimum adjusting screws are screwed “in”, thus reducing flows at the minimum flow positions.

WARNING: The “Push-to-Close” SYNCHRO Valve is adjusted differently than a standard Maxon SYNCHRO Valve. Before installing or operating, read and comply with all instructions and warnings shipped by Maxon Corporation in envelope with your Maxon Flow Control device. If you are unclear about the method of adjustment or if these instructions were misplaced or not received, immediately contact Maxon Corporation in Muncie, Indiana, U.S.A. for a set before attempting to use the valve.

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. This assumes you have visual access to the pilot flame. If this is not possible, then **adjust pilot to give a strong and stable flame signal through your 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 you have with your 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 your main fuel Shut-Off Valve(s).

CAUTION: After completing these steps, 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.

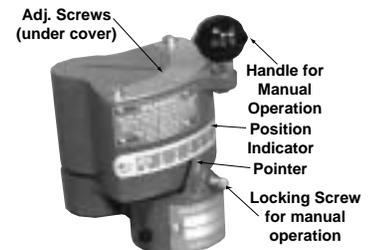
10. To light and adjust burner on gas:

With gas pilot established and flame supervision system operational, opening the main fuel Shut-Off Valve(s) will allow fuel flow to the “Push-to-Close” SYNCHRO Control Valve.

NOTICE: If fuel valve has been shipped directly from the factory, the adjusting screws will normally be in their inner position (valve port fully closed). Turn adjusting screws “counter-clockwise” to open valve port and/or increase flow. **This is opposite to standard Maxon SYNCHRO Control Valve.**

11. To adjust “Push-to-Close” SYNCHRO Fuel Control Valve(s):

With SYNCHRO Valve at minimum position, open upstream fuel cock. Using the Allen wrench provided, turn minimum adjusting screw “out” (counter-clockwise) to permit fuel flow to your burner.



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

12. **Once your flame is established and refined** at this position, and without advancing the screw carrier quadrant higher, screw all remaining screws “out” to at least the same level as your first adjusted screw.

NOTE: A preliminary setting can be established with all the remaining adjusting screws. Generally each succeeding screw needs to be screwed “out” (counter-clockwise) approximately one full turn farther than its preceding screw. A smooth “stair-step” gradient pre-set at this point from low to high will simplify the remaining adjustment steps.

Adjusting Instructions “Push-to-Close” SYNCHRO Valves

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

13. **Without advancing the Flow Control Valve quadrant**, screw “out” on #2 screw (one or two turns). Then slowly advance the Flow Control Valve quadrant to the #2 position. Adjust flame appearance at this new position #2.

NOTE: If firing chamber is of refractory construction, allow your 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 “Push-to-Close” Flow Control Valve.

Again, without moving valve, bring #3 and all remaining adjusting screws “out” to the same level as #2 screw. (If approximate pre-set gradient was made earlier, the remaining screws will already be at or above appropriate levels.)

14. **Progressively work your way up through each adjusting screw position**, developing a smooth progression slope from your first screw to the maximum position.

NOTE: To adjust the flame at any position, you must move the “Push-to-Close” Flow Control Valve to the number you desire to adjust. This aligns the adjusting screw directly on the fuel valve plunger. A resulting adjustment of the screw is directly applied to the fuel valve plunger 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.

NOTE: To avoid possible damage to cam strips, always turn all higher-numbered screws “out” as far as the last one adjusted.

15. **Refine adjustment as needed**, always turning valve so that position indicator matches screw being adjusted.
For more fuel, turn screw “out” (counter-clockwise). For less fuel, turn screw “in” (clockwise).
16. **Repeat procedure for any other fuels.**
17. **Cycle burner from minimum to maximum and refine adjustment, if necessary.** Always set Flow Control Valve to the numbered position you wish to adjust.
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.
18. **Reconnect linkage to control motor**, plug all test connections, replace equipment cover caps and tighten linkage screws.
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21. **Before system is placed into full service, instruct operator personnel** on proper start-up, operation and shut-down of system. Establish written instructions for their future reference, emphasizing the difference between these “Push-to-Close” valves and the standard Maxon SYNCHRO Valve.



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