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**A Siebe Group Company**

**AV-642**

**Valve Linkage Kit  
General Instructions**

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## Application

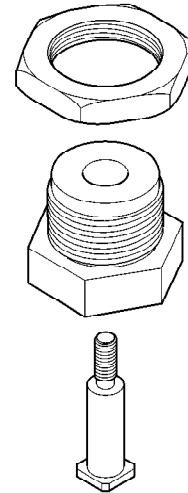
The AV-642 Valve Linkage is designed for mounting MF-22XX3 Series Floating Electric and MS-22353 Proportional actuators onto 15 mm and 20 mm GBX and VT Controlli Series valve bodies.

## Features

- Provides direct couple interface between actuators and Controlli valve bodies.

## Applicable Literature

- Siebe Environmental Controls Cross-Reference Guide, F-23638
- Siebe Environmental Controls Reference Manual, F-21683
- Siebe Environmental Controls Application Manual, F-21335
- MF-22XX3 Series Floating Valve Actuator General Instructions, F-26264
- MS-22353 Proportional Valve Actuator General Instructions, F-26263



## SPECIFICATIONS

**Table-1 Restrictions on Ambient Temperature °C for Valve Assemblies.**

Controlli Valve Body		Maximum Allowable Fluid Temperature	Maximum, Allowable Ambient Temperature
Size	Part Number		
G1/2	VTT11, VTT12, VTT13, VTT1	95°C	60°C
G3/4	VTT21, VTT2		

**Table-2 Close-Off Ratings.**

Controlli Valve Body		Nominal Close-Off Pressure Rating
Size	Part Numbers	
G1/2	VTT11, VTT12, VTT13, VTT1	350 kPa
G3/4	VTT21, VTT2	

**Caution:** Consult valve body manufacturer's literature for all performance specifications, including temperature and pressure ratings, and installation limitations. Consult **MF-22XX3 Series, Floating Valve Actuator General Instructions, F-26264** or **MS-22353, Proportional Valve Actuator General Instructions, F-26263** for complete actuator specifications and installation limitations.

## INSTALLATION

### Inspection

Inspect the package for damage. If damaged, notify the appropriate carrier immediately. If undamaged, open the package and inspect the device for obvious damage. Return damaged products.

### Requirements

- Tools (not provided):
  - (4 mm) Hex Allen wrench
  - Open end wrenches in the following sizes 9.5 mm, 13 mm, and (35 mm) for stem extension and locknut
  - TOOL-37, (42 mm) open-ended wrench
  - Caliper or 12 mm wide Scale
- Training: Installer must be a qualified, experienced technician

**Caution:**

- Avoid locations where excessive moisture, corrosive fumes, or vibration is present.
- Install all two-way valves so that they close against the flow. An arrow on the valve body or a tag indicates the proper flow direction.
- Always install three-way mixing and Four-Port valves with two inlets and one outlet.
- Always install three-way diverting valves with one inlet and two outlets.
- The actuators can be mounted in any position above the horizontal centerline of the valve body.

### Mounting

1. Actuators can be mounted in any upright position above the centerline of a valve body.
2. When selecting a location, allow sufficient room for accessories and for service of the product.
3. Maintain proper flow direction when installing the actuator. Flow direction is indicated by an arrow on the valve body or by information on the attached tag.

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*Note:* When the actuator is ordered with the Controlli kit installed (MX-22XX3-642) the potentiometer position is factory set.

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### MF-22XX3 or MS-22353 with AV-642 Factory Installed

The following instructions explain how to mount MF-22XX3 and MS-22353 Actuators onto a Controlli Series valve body when the AV-642 is factory installed (MX-22XX3-642).

1. Place the actuator and AV-642 assembly onto the valve, aligning the threads of mounting nut with the valve.
2. Screw the mounting nut and actuator onto the valve and tighten using a 35 mm open end wrench.
3. The actuator can be positioned (rotated  $\pm 90^\circ$ ) by loosening the lock nut, moving the actuator into position and then lock it in place by tightening the lock nut against the actuator.

### MF-22XX3 or MS-22353 and AV-642 Purchased Separately

The following instructions cover the assembly of the MF-22XX3 and MS-22353 actuators onto a Controlli Series valve body when the AV-642 is purchased separately.

The Controlli valve stem is held in the up position by a positioning spring within the valve body. The nominal stroke of the valve stem is 6.5 millimeters. See Figure-1 for parts identification.

1. Remove position indicator nut and then remove the stem extension from the actuator.
2. Establish potentiometer position (potentiometer models MF-22323 or MS-22353 only).

#### MF-22323 Only

- a. Depress manual override button of actuator and turn manual adjustment screw [using a 4 mm (5/32") hex allen wrench] to obtain 25% output from wiper (white/blue) to retract (white/orange).
- b. Output should read 2.5 volt, if 10 volts is applied across the potentiometer ( $\pm 10$  volts to white/brown; 0 volts to white/orange).

#### MS-22353 Only

- a. Apply 4.5 Vdc between +VDC (IN), COMMON, and power to the actuator. When the actuator has reached a position and stopped the position feedback voltage, (VFB), should be approximately 4.5 Vdc. Remove power from the actuator and go to step 3.

or

- b. Apply power to the actuator. Then depress the manual override button and turn the manual override screw so that the position feedback voltage, (VFB), is 4.5 Vdc. Remove power from the actuator before releasing the override button. Continue following the assembly steps listed below.

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**Caution:** Manually adjusting or cycling the actuator prior to mounting to valve will change the potentiometer position/output and could damage the potentiometer, if operated beyond the length of the potentiometer.

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3. Thread the stem extension cap from AV-642 onto the actuator stem extension and tighten.
4. Assemble the remaining two items from AV-642. Thread the lock nut onto the mounting nut all the way down to the shoulder. Do not tighten.
5. Prepare the actuator for mounting. Confirm that there is 15.3 mm between the top of drive screw and the top of the actuator case (see Figure-2). If the drive screw is not in the proper position, insert into the drive screw a pen or tapered pencil and rotate until the proper position is attained.
6. Insert the valve stem extension through the mounting nut then through the bottom of the actuator.
  - a. MX-223X3 chilled/hot water models — if necessary rotate the drive screw slightly to align the hex in the drive screw to the square in the lower bearing to match the stem extension hex and square.
  - b. MF-22203 hot water models — rotate the actuator slightly until the stem extension slides through the actuator.

7. Screw the mounting nut into the actuator until the mounting nut is seated on the actuator. Do not tighten yet.
8. Align the position indicator nut over the stem extension that is now visible from the top of the actuator and tighten.
9. Screw the mounting nut and actuator assembly onto the valve body all the way down to the top of the valve and tighten mounting nut to valve.
10. Rotate the actuator to the desired position for wiring, by rotating it up to 180°, then lock assembly in place by tightening the lock nut against the actuator using a 42 mm open end wrench.

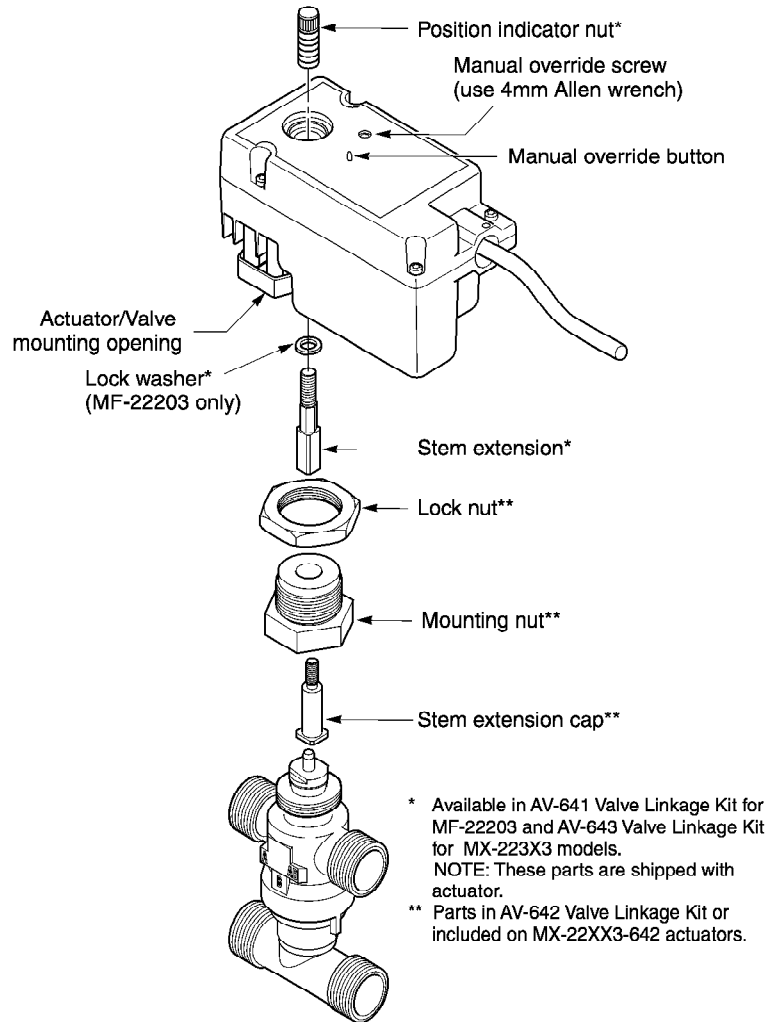


Figure-1 MF-22XX3 Actuator with AV-642 Valve Linkage.

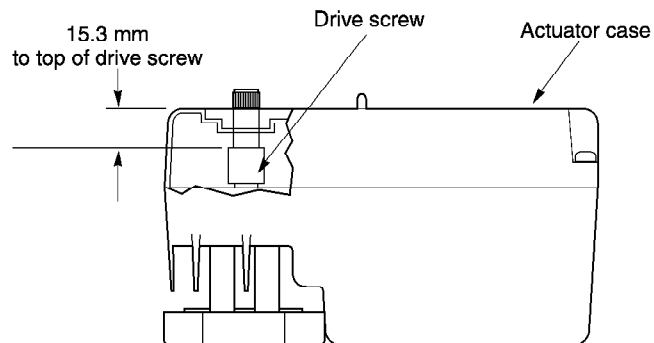


Figure-2 Proper Drive Screw Position.

*Note:* At this point, the valve stem should be at or near its top position. The actuator can now be adjusted to any desired position by depressing the manual override button and using a 4 millimeter Allen wrench to turn the manual override screw.

## TYPICAL ACTUATOR APPLICATION (wiring diagrams)

### Basic MF-22XX3 Actuator Wiring

Figure-3 and Figure-4 illustrate typical wiring diagrams.

**Caution:**

- One SPDT output or two SPST outputs can control one actuator. This actuator features automatic load limiting that switches off the motor. Each actuator must have its own separate controller output or relay/triacs.
- If two SPST contacts are used, insure that both are not closed at the same time. Damage to the motor will result if this happens.
- If two triacs are used to control one actuator, insure that only one triac closes at a time.
- Controller hysteresis settings of 5% or greater are required for optimum actuator life.

CAUTION: Each actuator must have its own separate controller output or relay.

- 1 Actuator Extend wire may be Violet on some models.
- 2 Two-position 3 wire control is possible by use of a snap acting Form-C controller output.

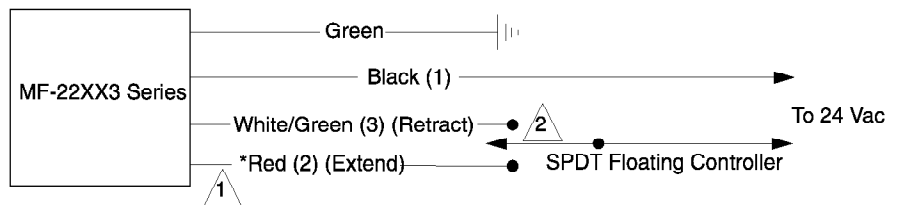


Figure-3 Basic Wiring Diagram with SPDT Floating Control.

CAUTION: Each actuator must have its own separate controller output or relay.

- 1 Actuator Extend wire may be Violet on some models.

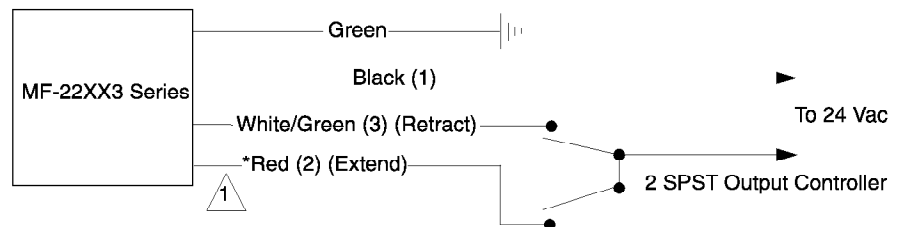


Figure-4 Basic Wiring Diagram with Two SPST Control Contacts.

## MF-22323 Feedback Signal When Mounted on Controlli Valve Body

The MF-22323 contains a 15 K $\Omega$  (nominal) position feedback potentiometer (pot) to indicate the actuator's stroke position (see Figure-5 and Table-3).



Figure-5 MF-22323 Feedback Wire Designations.

*Note:* The MF-22323 and its feedback potentiometer are designed for a 13 millimeter nominal valve stroke. When the MF-22323 is mounted on a Controlli valve body, it can utilize only a portion of its available range. For the Controlli VVT Series Valve bodies with its 6.5 millimeter stroke, this is 51% of the available range. For the Controlli GBX Series valve bodies with 5.5 millimeter stroke, this is 43% of the available range. Table-3 illustrate typical values which may be utilized with the Controlli valve body with 10 volts applied across the potentiometer.

Table-3 MF-22323 Feedback Potentiometer Values.

Controlli Valve Part Number	Controlli Valve Stroke	Actuator Position	Valve Stem Position	Flow (Port B = Bypass Port for 4-Port)	Nominal Actuator Feedback Voltage +10 V applied to Extend (White/Brown) 0 V applied to Retract (White/Orange)	
					White/Blue with reference to White/Orange (Wiper to Retract)	
VVT Series	6.55 mm	Retracted	Up	B to AB	2.5 V	
		Extended	Down	A to AB	6.3 V	
GBX Series	2-Way	5.5 mm	Retracted	Up	Closed	2.5 V
			Extended	Down	A to AB	5.7 V
	3-Way & 4-Port	Retracted	Up	B to AB	2.5 V	
		Extended	Down	A to AB	5.7 V	

# MS-22353 Actuator Wiring

Figure-6 and Figure-7 illustrate typical wiring diagrams

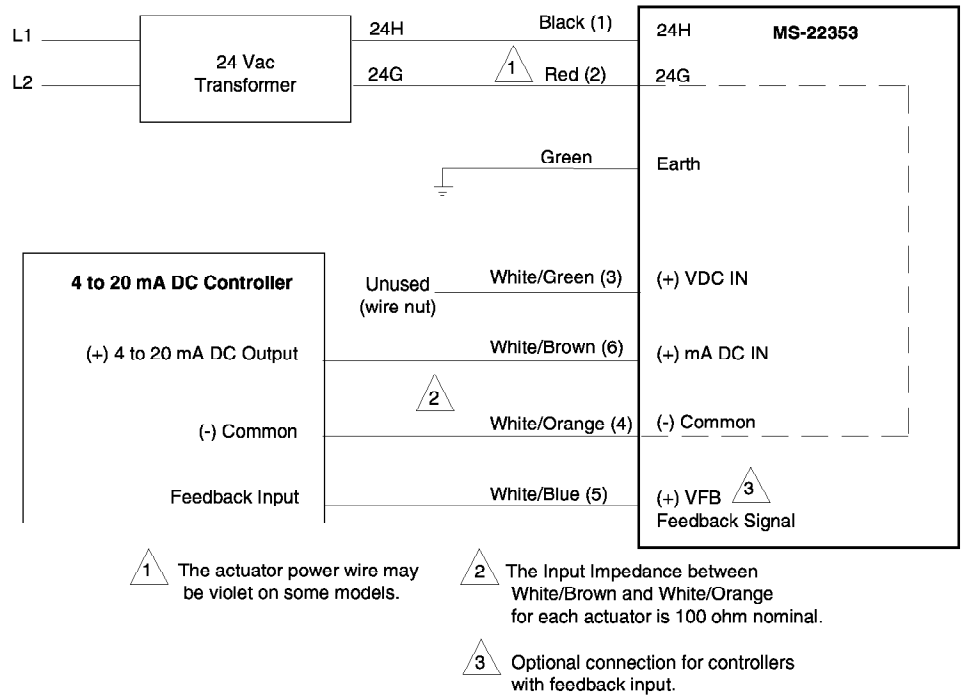


Figure-6 Wiring Diagram for 4 to 20 mA DC Proportional Control.

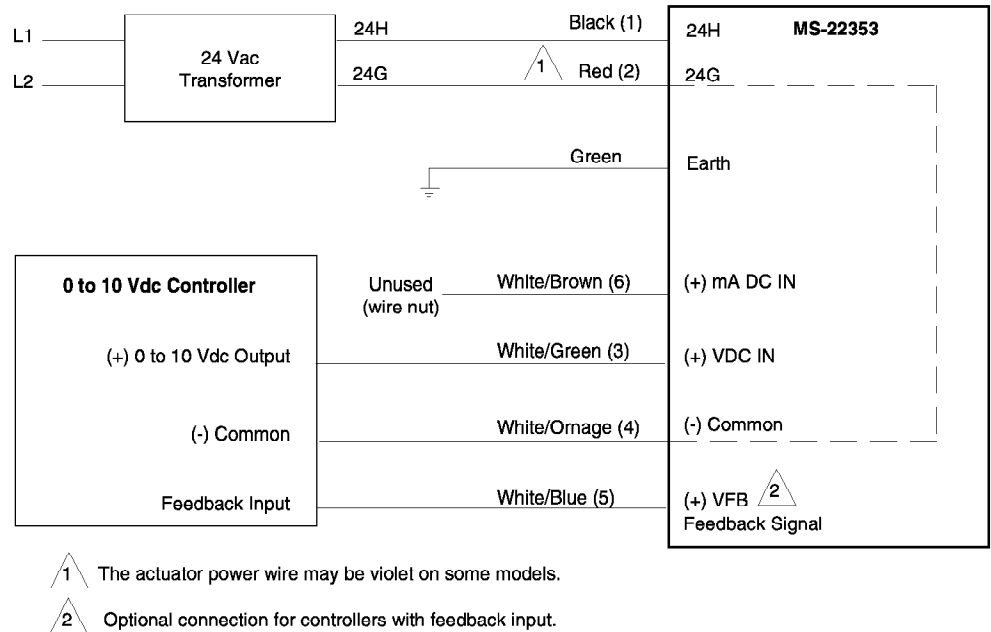


Figure-7 Wiring Diagram for 2 to 10 VDC Proportional Control.

*Note:* The MS-22353 and its feedback potentiometer are designed for a 13 millimeter nominal valve stroke. When the MS-22353 is mounted on a Controlli valve body, it can utilize only a portion of its available range. For the Controlli VVT Series Valve bodies with its 6.5 millimeter stroke, this is 51% of the available range. For the Controlli GBX Series valve bodies with 5.5 millimeter stroke, this is 43% of the available range. Table-4 illustrate typical values which may be utilized with the Controlli valve body. with 10 volts applied across the potentiometer.

**Table-4 MS-22353 Feedback Potentiometer Values.**

Controlli Valve Part Number	Controlli Valve Stroke	Actuator Position	Valve Stem Position	Flow (Port B = Bypass Port for 4-Port)	Nominal Actuator Feedback Voltage	
					White/Blue with reference to White/Orange (VFB to Common)	
VVT Series	6.6 mm	Retracted	Up	B to AB	4.5 V	
		Extended	Down	A to AB	7.3V	
GBX Series	2-Way	5.5 mm	Retracted	Up	Closed	4.5 V
			Extended	Down	A to AB	6.9 V
	3-Way & 4-Port	Retracted	Up	B to AB	4.5 V	
		Extended	Down	A to AB	6.9V	

*Note:* When the MS-22353 is assembled on a valve, the feedback signal may not reach exactly the valve stem up or stem down feedback voltage values.

## MAINTENANCE

The actuator requires no maintenance.

Regular maintenance of the total system is recommended to assure sustained, optimum performance. Hard water leaves abrasive deposits and reduces component life. To maximize valve life consult **EN-205, Water System Guidelines, F-26080**.

## FIELD REPAIR

**Caution:** Do not remove cover of actuator. No user serviceable parts inside.

Replace with a functional actuator. The AV-642 or AV-643 valve linkage kit can be ordered separately as replacement parts for the parts that were included with the actuator. The following instructions are for disassembling the actuator from the valve for actuator replacement. See Figure-1.

### Disassembly Instructions

1. Turn off power to the actuator and disconnect wires at the junction box.

**Warning:** Disconnect the power before disassembly to prevent electrical shock.

*Note:* Do not remove actuator cover to disconnect wires.

2. Unscrew the position indicator nut.
3. Unscrew the mounting nut and lift the actuator from the valve.

