

# Actuated Ball Valve Selection Guide

ISO 5211-Compliant Actuator  
Mounting Bracket Kits



40G, 40, 60, 83, H83, SK, and FKB Series Valves  
AFS Ball Valves

- Calculate valve operating torque
- Choose actuators and related components
- Select mounting bracket kits

Contents

Introduction . . . . . 485

Valve Operating Torque . . . . . 485

40G Series Valves . . . . . 485

40 Series Valves . . . . . 487

60 Series Valves . . . . . 489

83 and H83 Series Valves . . . . . 491

AFS Ball Valves . . . . . 492

SK Series Valves . . . . . 493

FKB Series Valves . . . . . 494

Mounting Bracket Kits . . . . . 495

Actuated Ball Valve Assemblies . . . . . 495

Introduction

- This guide enables the user to:
- determine the operating torque for Swagelok® 40G, 40, 60, 83, H83, SK, and FKB series valves and AFS ball valves in a variety of operating conditions
  - select and size actuators, based on valve operating torque
  - choose Swagelok ISO 5211 dimensionally compliant mounting bracket kits, based on calculated operating torque values and actuator manufacturers' literature.

Valve Operating Torque

**Start (break) torque** is the torque required to begin actuation of a valve. The actuator start torque must be greater than the valve start torque.

**End (run) torque** is the torque required to complete the actuation. The actuator end torque must be greater than the valve end torque.

Factors that Affect Operating Torque

Frequency of Use

Operating torque typically increases as the time interval between cycles increases.

For applications in which valves are cycled less frequently than noted in the **Calculating Operating Torque** instructions, contact your authorized Swagelok sales and service representative.

Cycle Wear

Contacting surfaces—valve ball, seat, and body, for example—gradually wear as valves are actuated repeatedly, resulting in increased friction and operating torque. Actuation speed may influence the rate of valve wear as well.

For applications in which valves are actuated rapidly or repeatedly—more often than once per hour—contact your authorized Swagelok representative.

40G Series Valves



Swagelok 43G series valve with ISO 5211-compliant actuator.

Operating Torque

Operating torque for a Swagelok 40G series ball valve is influenced by:

- packing material
- system pressure
- system temperature
- system media.

The tables and calculations on page 486 can be used for 2- and 3-way stainless steel 40G series valves.

Seat or Packing Material

In some ball valve designs, friction between ball and seat or packing affects operating torque, which varies with material and lubricant.

System Pressure

Higher pressures cause greater contact forces and friction, resulting in higher operating torque.

System Temperature

The values given in the tables that follow were generated at room temperature. Lower or higher temperatures, depending on the valve design, can cause increased operating torque.

System Media

The values given in the tables that follow were generated with clean, dry nitrogen gas. Different system fluids have varying viscosities, bringing about different levels of friction and affecting operating torque. Some lightweight oils may reduce operating torque. Dirty, abrasive, or highly viscous fluids may increase operating torque.

ACTUATED  
BALL VALVE  
SELECTION

## 40G Series Valves

### Calculating Operating Torque

1. Select the base start and base end torque at system pressure from Table 1.
2. Select the temperature factor from Table 2.
3. Select the media factor from Table 3.
4. Calculate the start and end operating torque:  
Base torque (Table 1)  
× temperature factor (Table 2)  
× media factor (Table 3).

**Example:** A 43G valve with modified PTFE packing is operated with nitrogen at 2500 psig and 70°F (20°C).

1. According to Table 1, the base start torque is 37 in.-lb and the base end torque is 11 in.-lb.
2. According to Table 2, the temperature factor is 1.0.
3. According to Table 3, the media factor is 1.0.
4. Start torque = 37 in.-lb × 1.0 × 1.0 = 37 in.-lb  
End torque = 11 in.-lb × 1.0 × 1.0 = 11 in.-lb

### Ordering Information

1. Select the desired 40G series valve and packing material. Using the **Calculating Operating Torque** instructions at left, calculate the valve start and end torque.
2. Choose an actuator based on the valve start and end torque. See the actuator manufacturer's literature to specify ISO 5211 mounting dimensions, including flange and coupling sizes.
3. Select a mounting bracket kit ordering number based on valve series, flange size, and coupling size.

**Table 1—Base Start and End Torque**

Use linear interpolation to obtain torque values for system pressures not listed.

| Valve Series      | System Pressure, psig (bar, MPa) |              |                  |              |                  |              |                  |              |
|-------------------|----------------------------------|--------------|------------------|--------------|------------------|--------------|------------------|--------------|
|                   | 0 to 1000 (68.9, 6.89)           |              | 1500 (103, 10.3) |              | 2500 (172, 17.2) |              | 3000 (206, 20.6) |              |
|                   | Base Torque, in.-lb (N·m, cm·kg) |              |                  |              |                  |              |                  |              |
|                   | Start                            | End          | Start            | End          | Start            | End          | Start            | End          |
|                   |                                  |              |                  |              |                  |              |                  |              |
| 41G/42G           | 13 (1.5, 15)                     | 7 (0.8, 8.1) | 15 (1.7, 18)     | 7 (0.8, 8.1) | 15 (1.7, 18)     | 8 (0.9, 9.3) |                  |              |
| 41GE/42GE         | 10 (1.2, 12)                     | 7 (0.8, 8.1) | 11 (1.3, 13)     | 7 (0.8, 8.1) | 12 (1.4, 14)     | 8 (0.9, 9.3) | —                | —            |
| 41G-1466/42G-1466 | 13 (1.5, 15)                     | 7 (0.8, 8.1) | —                | —            | —                | —            |                  |              |
| 43G               | 32 (3.7, 37)                     | 9 (1.1, 11)  | 33 (3.8, 39)     | 10 (1.2, 12) | 37 (4.2, 43)     | 11 (1.3, 13) | 40 (4.6, 47)     | 11 (1.3, 13) |
| 43GE              | 23 (2.6, 27)                     | 10 (1.2, 12) | 25 (2.9, 29)     | 11 (1.3, 13) | 27 (3.1, 32)     | 12 (1.4, 14) | 30 (3.4, 35)     | 13 (1.5, 15) |
| 43G-1466          | 28 (3.2, 33)                     | 16 (1.9, 19) | —                | —            | —                | —            | —                | —            |

**Table 2—Temperature Factors**

Use linear interpolation to obtain factors for system temperatures not listed.

| Valve Series      | Temperature, °F (°C) |                       |
|-------------------|----------------------|-----------------------|
|                   | –65 (–53)            | 50 to 300 (10 to 148) |
| 41G/42G           | 1.0                  | 1.0                   |
| 41GE/42GE         | 1.5                  | 1.0                   |
| 41G-1466/42G-1466 | 1.0                  | 1.0                   |
| 43G               | 1.0                  | 1.0                   |
| 43GE              | 1.5                  | 1.0                   |
| 43G-1466          | 1.0                  | 1.0                   |

**Table 3—Media Factors**

| Medium-Weight Oil | Clean Water | Nitrogen Gas |
|-------------------|-------------|--------------|
| 0.85              | 1.0         | 1.0          |

#### 40G Series Valve Designators

**None**—standard, modified PTFE packing

**E**—UHMWPE packing

**-1466**—modified PTFE packing, assembled without lubricant and cleaned and packaged in accordance with Swagelok *Special Cleaning and Packaging* (SC-11) (MS-06-63), page 1175.

See *Mounting Instructions, ISO 5211 Dimensionally Compliant Bracket, Coupling, and Actuator*, MS-INS-4080-NAMUR.

**Mounting Bracket Kit Ordering Numbers**

| Valve Series | ISO 5211 Flange Size | Coupling Size | Cap Screw Type | Bracket Kit Ordering Number |
|--------------|----------------------|---------------|----------------|-----------------------------|
| 41G/42G      | F03                  | 9 mm ISO      | Metric         | SS-MB-41G-F03-9ISO-M        |
|              |                      | 9 mm ISO      | Fractional     | SS-MB-41G-F03-9ISO-F        |
|              |                      | 9 mm DIN      | Metric         | SS-MB-41G-F03-9DIN-M        |
|              |                      | 9 mm DIN      | Fractional     | SS-MB-41G-F03-9DIN-F        |
|              | F04                  | 9 mm ISO      | Metric         | SS-MB-41G-F04-9ISO-M        |
|              |                      | 9 mm ISO      | Fractional     | SS-MB-41G-F04-9ISO-F        |
|              |                      | 9 mm DIN      | Metric         | SS-MB-41G-F04-9DIN-M        |
|              |                      | 9 mm DIN      | Fractional     | SS-MB-41G-F04-9DIN-F        |
| 43G          | F03                  | 11 mm ISO     | Metric         | SS-MB-41G-F04-11ISO-M       |
|              |                      | 11 mm ISO     | Fractional     | SS-MB-41G-F04-11ISO-F       |
|              |                      | 11 mm DIN     | Metric         | SS-MB-41G-F04-11DIN-M       |
|              |                      | 11 mm DIN     | Fractional     | SS-MB-41G-F04-11DIN-F       |
|              | F04                  | 9 mm ISO      | Metric         | SS-MB-43G-F03-9ISO-M        |
|              |                      | 9 mm ISO      | Fractional     | SS-MB-43G-F03-9ISO-F        |
|              |                      | 9 mm DIN      | Metric         | SS-MB-43G-F03-9DIN-M        |
|              |                      | 9 mm DIN      | Fractional     | SS-MB-43G-F03-9DIN-F        |
|              | F04                  | 9 mm ISO      | Metric         | SS-MB-43G-F04-9ISO-M        |
|              |                      | 9 mm ISO      | Fractional     | SS-MB-43G-F04-9ISO-F        |
|              |                      | 9 mm DIN      | Metric         | SS-MB-43G-F04-9DIN-M        |
|              |                      | 9 mm DIN      | Fractional     | SS-MB-43G-F04-9DIN-F        |
|              | F05                  | 11 mm ISO     | Metric         | SS-MB-43G-F04-11ISO-M       |
|              |                      | 11 mm ISO     | Fractional     | SS-MB-43G-F04-11ISO-F       |
|              |                      | 11 mm DIN     | Metric         | SS-MB-43G-F04-11DIN-M       |
|              |                      | 11 mm DIN     | Fractional     | SS-MB-43G-F04-11DIN-F       |
|              | F05                  | 14 mm ISO     | Metric         | SS-MB-43G-F05-14ISO-M       |
|              |                      | 14 mm ISO     | Fractional     | SS-MB-43G-F05-14ISO-F       |
|              |                      | 14 mm DIN     | Metric         | SS-MB-43G-F05-14DIN-M       |
|              |                      | 14 mm DIN     | Fractional     | SS-MB-43G-F05-14DIN-F       |

## 40 Series Valves

### Operating Torque

Operating torque for a Swagelok 40 series ball valve is influenced by:

- cycle frequency
- packing material
- system pressure
- system temperature
- system media.

The tables and calculations on this page can be used for 2- and 3-way 40 series valves in stainless steel, brass, and alloy 400 materials.

### Calculating Operating Torque

If the valve will be cycled at least once per 3 days, but not more than once per hour:

1. Select the base start and base end torque at system pressure from Table 4.
2. Select the temperature factor from Table 5.
3. Select the media factor from Table 6.
4. Calculate the start and end operating torque:  
Base torque (Table 4)  
× temperature factor (Table 5)  
× media factor (Table 6).

**Example:** A 43 series valve with PTFE packing is operated with nitrogen at 1500 psig and 70°F (20°C) and cycled every 3 days.

1. According to Table 4, the base start torque is 33 in.-lb and the base end torque is 10 in.-lb.

2. According to Table 5, the temperature factor is 1.0.

3. According to Table 6, the media factor is 1.0.

4. Start torque = 33 in.-lb × 1.0 × 1.0  
= 33 in.-lb

End torque = 10 in.-lb × 1.0 × 1.0  
= 10 in.-lb.

If the valve will be cycled less frequently than once per 3 days or more frequently than once per hour, contact your authorized Swagelok representative.

**Table 4—Base Start and End Torque**

Use linear interpolation to obtain torque values for system pressures not listed.

| Valve Series    | System Pressure, psig (bar, MPa) |                |                  |              |
|-----------------|----------------------------------|----------------|------------------|--------------|
|                 | 0 to 1000 (68.9, 6.89)           |                | 1500 (103, 10.3) |              |
|                 | Base Torque, in.-lb (N-m, cm-kg) |                |                  |              |
|                 | Start                            | End            | Start            | End          |
| 41/42           | 13 (1.5, 15)                     | 7 (0.8, 8.1)   | 15 (1.7, 18)     | 7 (0.8, 8.1) |
| 41T/42T         | 13 (1.5, 15)                     | 7 (0.8, 8.1)   | 15 (1.7, 18)     | 7 (0.8, 8.1) |
| 41E/42E         | 10 (1.2, 12)                     | 7 (0.8, 8.1)   | 11 (1.3, 13)     | 7 (0.8, 8.1) |
| 41-1466/42-1466 | 13 (1.5, 15)                     | 7 (0.8, 8.1)   | —                | —            |
| 43              | 32 (3.7, 37)                     | 9 (1.1, 11)    | 33 (3.8, 39)     | 10 (1.2, 12) |
| 43T             | 36 (4.1, 42)                     | 15 (1.7, 18)   | 38 (4.3, 44)     | 16 (1.9, 19) |
| 43E             | 23 (2.6, 27)                     | 10 (1.2, 12)   | 25 (2.9, 29)     | 11 (1.3, 13) |
| 43-1466         | 28 (3.2, 33)                     | 16 (1.9, 19)   | —                | —            |
| 44              | 37 (4.2, 43)                     | 20 (2.3, 24)   | 40 (4.6, 47)     | 22 (2.5, 26) |
| 44T             | 48 (5.5, 56)                     | 22 (2.5, 26)   | 52 (5.9, 60)     | 23 (2.6, 27) |
| 44E             | 70 (8.0, 81)                     | 33 (3.8, 39)   | 75 (8.5, 87)     | 35 (4.0, 41) |
| 44-1466         | 60 (6.8, 70)                     | 40 (4.6, 47)   | —                | —            |
| 45              | 80 (9.1, 93)                     | 30 (3.4, 35)   | 85 (9.7, 98)     | 32 (3.7, 37) |
| 45T             | 80 (9.1, 93)                     | 35 (4.0, 41)   | 85 (9.7, 98)     | 37 (4.2, 43) |
| 45E             | 130 (14.7, 150)                  | 46 (5.2, 53)   | 135 (15.3, 156)  | 50 (5.7, 58) |
| 45-1466         | 135 (15.3, 156)                  | 95 (10.8, 110) | —                | —            |

| Valve Series    | System Pressure, psig (bar, MPa) |              |                  |              |
|-----------------|----------------------------------|--------------|------------------|--------------|
|                 | 2500 (172, 17.2)                 |              | 3000 (206, 20.6) |              |
|                 | Base Torque, in.-lb (N-m, cm-kg) |              |                  |              |
|                 | Start                            | End          | Start            | End          |
| 41/42           | 15 (1.7, 18)                     | 8 (0.9, 9.3) | —                | —            |
| 41T/42T         | 15 (1.7, 18)                     | 8 (0.9, 9.3) |                  |              |
| 41E/42E         | 12 (1.4, 14)                     | 8 (0.9, 9.3) |                  |              |
| 41-1466/42-1466 | —                                | —            |                  |              |
| 43              | 37 (4.2, 43)                     | 11 (1.3, 13) | 40 (4.6, 47)     | 11 (1.3, 13) |
| 43T             | 42 (4.8, 49)                     | 18 (2.1, 21) | 45 (5.1, 52)     | 20 (2.3, 24) |
| 43E             | 27 (3.1, 32)                     | 12 (1.4, 14) | 30 (3.4, 35)     | 13 (1.5, 15) |
| 43-1466         | —                                | —            | —                | —            |
| 44              | 44 (5.0, 51)                     | 25 (2.9, 29) | —                | —            |
| 44T             | 57 (6.5, 66)                     | 26 (3.0, 30) |                  |              |
| 44E             | 83 (9.4, 96)                     | 40 (4.6, 47) |                  |              |
| 44-1466         | —                                | —            |                  |              |
| 45              | 95 (10.8, 110)                   | 35 (4.0, 41) | —                | —            |
| 45T             | 95 (10.8, 110)                   | 42 (4.8, 49) |                  |              |
| 45E             | 150 (17.0, 173)                  | 55 (6.3, 64) |                  |              |
| 45-1466         | —                                | —            |                  |              |

**Table 5—Temperature Factors**

Use linear interpolation to obtain factors for temperatures from –65 to 50°F (–53 to 10°C).

| Valve Series    | Temperature, °F (°C) |                      |
|-----------------|----------------------|----------------------|
|                 | (–65) (–53)          | 50 to 150 (10 to 65) |
| 41/42           | 1.0                  | 1.0                  |
| 41T/42T         | 1.0                  | 1.0                  |
| 41E/42E         | 1.5                  | 1.0                  |
| 41-1466/42-1466 | 1.0                  | 1.0                  |
| 43              | 1.0                  | 1.0                  |
| 43T             | 1.0                  | 1.0                  |
| 43E             | 1.5                  | 1.0                  |
| 43-1466         | 1.0                  | 1.0                  |
| 44              | 1.0                  | 1.0                  |
| 44T             | 1.35                 | 1.0                  |
| 44E             | 1.5                  | 1.0                  |
| 44-1466         | 1.0                  | 1.0                  |
| 45              | 1.0                  | 1.0                  |
| 45T             | 1.35                 | 1.0                  |
| 45E             | 1.5                  | 1.0                  |
| 45-1466         | 1.0                  | 1.0                  |

**Table 6—Media Factors**

| Medium-Weight Oil | Clean Water | Nitrogen Gas |
|-------------------|-------------|--------------|
| 0.85              | 1.0         | 1.0          |

### 40 Series Valve Designators

**None**—standard, PTFE packing

**T**—low-temperature, PFA packing

**E**—low-temperature, UHMWPE packing

**-1466**—modified PTFE packing, assembled without lubricant and cleaned and packaged in accordance with Swagelok *Special Cleaning and Packaging (SC-11)* (MS-06-63), page 1175.

## 40 Series Valves

### Ordering Information

1. Select the desired 40 series valve and packing material.  
Using the **Calculating Operating Torque** instructions at left, calculate the valve start and end torque.
  2. Choose an actuator based on the valve start and end torque. See the actuator manufacturer's literature to specify ISO 5211 mounting dimensions, including flange and coupling sizes.
  3. Select a Swagelok 40 series bracket kit ordering number.  
Bracket kits can be used with stainless steel, brass, and alloy 400 valves with K-style, double-flat stems.
- K-style stems are standard for all many 44 and 45 series valves, but are optional for 41, 42, and 43 series valves.  
For more information, contact your authorized Swagelok representative.

To order a valve with a K-style, double-flat stem and without a handle, if they are not standard, add **-K-NH** to the valve ordering number.

Example: SS-41S1-K-NH

See *Mounting Instructions, ISO 5211 Dimensionally Compliant Bracket, Coupling, and Actuator*, MS-INS-4080-NAMUR.



Swagelok 45 series valve with El-O-Matic® actuator and Westlock® limit switch.

### Mounting Bracket Kit Ordering Numbers

| Valve Series | ISO 5211 Flange Size | Coupling Size | Cap Screw Type | Bracket Kit Ordering Number |
|--------------|----------------------|---------------|----------------|-----------------------------|
| 41/42        | F03                  | 9 mm ISO      | Metric         | SS-MB-41-F03-9ISO-M         |
|              |                      | 9 mm ISO      | Fractional     | SS-MB-41-F03-9ISO-F         |
|              |                      | 9 mm DIN      | Metric         | SS-MB-41-F03-9DIN-M         |
|              |                      | 9 mm DIN      | Fractional     | SS-MB-41-F03-9DIN-F         |
|              | F04                  | 9 mm ISO      | Metric         | SS-MB-41-F04-9ISO-M         |
|              |                      | 9 mm ISO      | Fractional     | SS-MB-41-F04-9ISO-F         |
|              |                      | 9 mm DIN      | Metric         | SS-MB-41-F04-9DIN-M         |
|              |                      | 9 mm DIN      | Fractional     | SS-MB-41-F04-9DIN-F         |
| 43           | F03                  | 11 mm ISO     | Metric         | SS-MB-41-F04-11ISO-M        |
|              |                      | 11 mm ISO     | Fractional     | SS-MB-41-F04-11ISO-F        |
|              |                      | 11 mm DIN     | Metric         | SS-MB-41-F04-11DIN-M        |
|              |                      | 11 mm DIN     | Fractional     | SS-MB-41-F04-11DIN-F        |
|              | F04                  | 9 mm ISO      | Metric         | SS-MB-43-F03-9ISO-M         |
|              |                      | 9 mm ISO      | Fractional     | SS-MB-43-F03-9ISO-F         |
|              |                      | 9 mm DIN      | Metric         | SS-MB-43-F03-9DIN-M         |
|              |                      | 9 mm DIN      | Fractional     | SS-MB-43-F03-9DIN-F         |
|              | F04                  | 9 mm ISO      | Metric         | SS-MB-43-F04-9ISO-M         |
|              |                      | 9 mm ISO      | Fractional     | SS-MB-43-F04-9ISO-F         |
|              |                      | 9 mm DIN      | Metric         | SS-MB-43-F04-9DIN-M         |
|              |                      | 9 mm DIN      | Fractional     | SS-MB-43-F04-9DIN-F         |
|              | F05                  | 11 mm ISO     | Metric         | SS-MB-43-F04-11ISO-M        |
|              |                      | 11 mm ISO     | Fractional     | SS-MB-43-F04-11ISO-F        |
|              |                      | 11 mm DIN     | Metric         | SS-MB-43-F04-11DIN-M        |
|              |                      | 11 mm DIN     | Fractional     | SS-MB-43-F04-11DIN-F        |
|              | F05                  | 11 mm ISO     | Metric         | SS-MB-43-F05-11ISO-M        |
|              |                      | 11 mm ISO     | Fractional     | SS-MB-43-F05-11ISO-F        |
|              |                      | 11 mm DIN     | Metric         | SS-MB-43-F05-11DIN-M        |
|              |                      | 11 mm DIN     | Fractional     | SS-MB-43-F05-11DIN-F        |
| 45           | F03                  | 14 mm ISO     | Metric         | SS-MB-44-F03-14ISO-M        |
|              |                      | 14 mm ISO     | Fractional     | SS-MB-44-F03-14ISO-F        |
|              |                      | 14 mm DIN     | Metric         | SS-MB-44-F03-14DIN-M        |
|              |                      | 14 mm DIN     | Fractional     | SS-MB-44-F03-14DIN-F        |
|              | F04                  | 11 mm ISO     | Metric         | SS-MB-44-F04-11ISO-M        |
|              |                      | 11 mm ISO     | Fractional     | SS-MB-44-F04-11ISO-F        |
|              |                      | 11 mm DIN     | Metric         | SS-MB-44-F04-11DIN-M        |
|              |                      | 11 mm DIN     | Fractional     | SS-MB-44-F04-11DIN-F        |
|              | F05                  | 11 mm ISO     | Metric         | SS-MB-44-F05-11ISO-M        |
|              |                      | 11 mm ISO     | Fractional     | SS-MB-44-F05-11ISO-F        |
|              |                      | 11 mm DIN     | Metric         | SS-MB-44-F05-11DIN-M        |
|              |                      | 11 mm DIN     | Fractional     | SS-MB-44-F05-11DIN-F        |
|              | F05                  | 14 mm ISO     | Metric         | SS-MB-44-F05-14ISO-M        |
|              |                      | 14 mm ISO     | Fractional     | SS-MB-44-F05-14ISO-F        |
|              |                      | 14 mm DIN     | Metric         | SS-MB-44-F05-14DIN-M        |
|              |                      | 14 mm DIN     | Fractional     | SS-MB-44-F05-14DIN-F        |
|              | F07                  | 17 mm ISO     | Metric         | SS-MB-45-F05-17ISO-M        |
|              |                      | 17 mm ISO     | Fractional     | SS-MB-45-F05-17ISO-F        |
|              |                      | 17 mm DIN     | Metric         | SS-MB-45-F05-17DIN-M        |
|              |                      | 17 mm DIN     | Fractional     | SS-MB-45-F05-17DIN-F        |

| Valve Series | ISO 5211 Flange Size | Coupling Size | Cap Screw Type | Bracket Kit Ordering Number |
|--------------|----------------------|---------------|----------------|-----------------------------|
| 44           | F03                  | 9 mm ISO      | Metric         | SS-MB-44-F03-9ISO-M         |
|              |                      | 9 mm ISO      | Fractional     | SS-MB-44-F03-9ISO-F         |
|              |                      | 9 mm DIN      | Metric         | SS-MB-44-F03-9DIN-M         |
|              |                      | 9 mm DIN      | Fractional     | SS-MB-44-F03-9DIN-F         |
|              | F04                  | 11 mm ISO     | Metric         | SS-MB-44-F04-11ISO-M        |
|              |                      | 11 mm ISO     | Fractional     | SS-MB-44-F04-11ISO-F        |
|              |                      | 11 mm DIN     | Metric         | SS-MB-44-F04-11DIN-M        |
|              |                      | 11 mm DIN     | Fractional     | SS-MB-44-F04-11DIN-F        |
| 45           | F05                  | 11 mm ISO     | Metric         | SS-MB-44-F05-11ISO-M        |
|              |                      | 11 mm ISO     | Fractional     | SS-MB-44-F05-11ISO-F        |
|              |                      | 11 mm DIN     | Metric         | SS-MB-44-F05-11DIN-M        |
|              |                      | 11 mm DIN     | Fractional     | SS-MB-44-F05-11DIN-F        |
|              | F05                  | 14 mm ISO     | Metric         | SS-MB-44-F05-14ISO-M        |
|              |                      | 14 mm ISO     | Fractional     | SS-MB-44-F05-14ISO-F        |
|              |                      | 14 mm DIN     | Metric         | SS-MB-44-F05-14DIN-M        |
|              |                      | 14 mm DIN     | Fractional     | SS-MB-44-F05-14DIN-F        |
|              | F05                  | 11 mm ISO     | Metric         | SS-MB-45-F05-11ISO-M        |
|              |                      | 11 mm ISO     | Fractional     | SS-MB-45-F05-11ISO-F        |
|              |                      | 11 mm DIN     | Metric         | SS-MB-45-F05-11DIN-M        |
|              |                      | 11 mm DIN     | Fractional     | SS-MB-45-F05-11DIN-F        |
|              | F05                  | 14 mm ISO     | Metric         | SS-MB-45-F05-14ISO-M        |
|              |                      | 14 mm ISO     | Fractional     | SS-MB-45-F05-14ISO-F        |
|              |                      | 14 mm DIN     | Metric         | SS-MB-45-F05-14DIN-M        |
|              |                      | 14 mm DIN     | Fractional     | SS-MB-45-F05-14DIN-F        |
|              | F07                  | 17 mm ISO     | Metric         | SS-MB-45-F05-17ISO-M        |
|              |                      | 17 mm ISO     | Fractional     | SS-MB-45-F05-17ISO-F        |
|              |                      | 17 mm DIN     | Metric         | SS-MB-45-F05-17DIN-M        |
|              |                      | 17 mm DIN     | Fractional     | SS-MB-45-F05-17DIN-F        |



## 60 Series Valves

### Operating Torque

Operating torque for a Swagelok 60 series valve is influenced by:

- cycle frequency
- seat material
- system pressure
- system temperature
- system media.

The tables and calculations on this page can be used for 2- and 3-way 60 series valves in stainless steel, carbon steel, and brass materials.

### Calculating Operating Torque

If the valve will be cycled at least once per day, but not more than once per hour:

1. Select the base start and base end torque at system pressure from Table 7.
2. Select the temperature factor from Table 8.
3. Select the media factor from Table 9.
4. Calculate the start and end operating torque:  
Base torque (Table 7)  
× temperature factor (Table 8)  
× media factor (Table 9).

**Example:** A 63 series valve with reinforced PTFE seat is operated with nitrogen at 1500 psig and 70°F (20°C) and cycled once per day.

1. According to Table 7, the base start torque is 62 in.·lb and the base end torque is 37 in.·lb.

2. According to Table 8, the temperature factor is 1.0.

3. According to Table 9, the media factor is 1.0.

4. Start torque = 62 in.·lb × 1.0 × 1.0  
= 62 in.·lb

End torque = 37 in.·lb × 1.0 × 1.0  
= 37 in.·lb.

If the valve will be cycled less frequently than once per day or more frequently than once per hour, contact your authorized Swagelok representative.

**Table 7—Base Start and End Torque**

Use linear interpolation to obtain torque values for system pressures not listed.

| Valve Series | System Pressure, psig (bar, MPa) |                 |                   |                 |                  |                 |
|--------------|----------------------------------|-----------------|-------------------|-----------------|------------------|-----------------|
|              | 0                                |                 | 1000 (68.9, 6.89) |                 | 1500 (103, 10.3) |                 |
|              | Base Torque, in.·lb (N·m, cm·kg) |                 |                   |                 |                  |                 |
|              | Start                            | End             | Start             | End             | Start            | End             |
| 62T          | 18 (2.1, 21)                     | 16 (1.9, 19)    | 22 (2.5, 26)      | 20 (2.3, 24)    | 25 (2.9, 29)     | 22 (2.5, 26)    |
| 62P          | 25 (2.9, 29)                     | 16 (1.9, 19)    | 25 (2.9, 29)      | 16 (1.9, 19)    | 30 (3.4, 35)     | 20 (2.3, 24)    |
| 63T          | 52 (5.9, 60)                     | 28 (3.2, 33)    | 58 (6.6, 67)      | 35 (4.0, 41)    | 62 (7.1, 72)     | 37 (4.2, 43)    |
| 63P          | 50 (5.7, 58)                     | 40 (4.6, 47)    | 50 (5.7, 58)      | 40 (4.6, 47)    | 65 (7.4, 75)     | 50 (5.7, 58)    |
| 65T          | 125 (14.2, 144)                  | 60 (6.8, 70)    | 160 (18.1, 185)   | 100 (11.3, 116) | 180 (20.4, 208)  | 120 (13.6, 139) |
| 65P          | 90 (10.2, 104)                   | 75 (8.5, 87)    | 90 (10.2, 104)    | 75 (8.5, 87)    | 150 (17.0, 173)  | 125 (14.2, 144) |
| 67T          | 250 (28.3, 288)                  | 120 (13.6, 139) | 290 (32.8, 335)   | 140 (15.9, 162) | 310 (35.1, 358)  | 145 (16.4, 168) |
| 67P          | 190 (21.5, 219)                  | 160 (18.1, 185) | 190 (21.5, 219)   | 160 (18.1, 185) | 275 (31.1, 317)  | 230 (26.0, 265) |
| 68T          | 290 (32.8, 335)                  | 135 (15.3, 156) | 370 (41.9, 427)   | 200 (22.6, 231) | 500 (56.5, 576)  | 235 (26.6, 271) |
| 68P          | 280 (31.7, 323)                  | 230 (26.0, 265) | 280 (31.7, 323)   | 230 (26.0, 265) | 360 (40.7, 415)  | 295 (33.4, 340) |

| Valve Series | System Pressure, psig (bar, MPa) |                 |                  |                 |                  |              |
|--------------|----------------------------------|-----------------|------------------|-----------------|------------------|--------------|
|              | 2200 (151, 15.1)                 |                 | 2500 (172, 17.2) |                 | 3000 (206, 20.6) |              |
|              | Base Torque, in.·lb (N·m, cm·kg) |                 |                  |                 |                  |              |
|              | Start                            | End             | Start            | End             | Start            | End          |
| 62T          | 26 (3.0, 30)                     | 23 (2.6, 27)    | —                | —               | —                | —            |
| 62P          | 37 (4.2, 43)                     | 23 (2.6, 27)    | 40 (4.6, 47)     | 25 (2.9, 29)    | 45 (5.1, 52)     | 30 (3.4, 35) |
| 63T          | 67 (7.6, 78)                     | 42 (4.8, 49)    | —                | —               | —                | —            |
| 63P          | 100 (11.3, 116)                  | 75 (8.5, 85)    | 110 (12.5, 127)  | 85 (9.7, 98)    | —                | —            |
| 65T          | 205 (23.2, 237)                  | 150 (17.0, 173) | —                | —               | —                | —            |
| 65P          | 230 (26.0, 265)                  | 190 (21.5, 219) | 260 (29.4, 300)  | 215 (24.3, 248) | —                | —            |
| 67T          | 335 (37.9, 386)                  | 160 (18.1, 185) | —                | —               | —                | —            |
| 67P          | 405 (45.8, 467)                  | 340 (38.5, 392) | —                | —               | —                | —            |
| 68T          | 500 (56.5, 576)                  | 280 (31.7, 323) | —                | —               | —                | —            |
| 68P          | 485 (54.9, 559)                  | 400 (45.2, 461) | —                | —               | —                | —            |

**Table 8—Temperature Factors**

Use linear interpolation to obtain factors for temperatures from 100 to 450°F (37 to 232°C).

| Valve Series | Temperature, °F (°C)   |           |
|--------------|------------------------|-----------|
|              | –20 to 100 (–28 to 37) | 450 (232) |
| 62T          | 1.0                    | 1.9       |
| 62P          | 1.0                    | 1.0       |
| 63T          | 1.0                    | 3.0       |
| 63P          | 1.0                    | 1.0       |
| 65T          | 1.0                    | 2.3       |
| 65P          | 1.0                    | 1.2       |
| 67T          | 1.0                    | 2.0       |
| 67P          | 1.0                    | 1.0       |
| 68T          | 1.0                    | 2.8       |
| 68P          | 1.0                    | 1.0       |

**Table 9—Media Factors**

| Seat Material | Medium-Weight Oil | Clean Water | Nitrogen Gas |
|---------------|-------------------|-------------|--------------|
| PTFE          | 0.9               | 1.0         | 1.0          |
| PEEK          | 1.0               | 1.0         | 1.0          |

### 60 Series Valve Designators

**T**—reinforced PTFE seat and packing

**P**—PEEK seat and packing

## 60 Series Valves

### Ordering Information

1. Select the desired 4-bolt 60 series valve and seat material. Using the **Calculating Operating Torque** instructions at left, calculate the valve start and end operating torque. For 60 series valves with encased 8-bolt construction, contact your authorized Swagelok representative.
2. Choose an actuator based on the valve start and end torque. See the actuator manufacturer's literature to specify ISO 5211 mounting dimensions, including flange and coupling sizes.
3. Select a Swagelok 60 series bracket kit ordering number. Bracket kits can be used with stainless steel, carbon steel, and alloy 400 valves.

To order bracket kits for brass valves, insert **-B** into the bracket kit ordering number.

Example: SS-MB-62-**B**-F03-9ISO-M

See *Mounting Instructions, ISO 5211 Dimensionally Compliant Bracket, Coupling, and Actuator to 4-Bolt 60 Series Valves*, MS-INS-4B60NM.



Swagelok 63 series valve with ISO 5211-compliant actuator, ASCO® solenoid, and Pepperl+Fuchs proximity sensor.

### Mounting Bracket Kit Ordering Numbers

| Valve Series | ISO 5211 Flange Size | Coupling Size | Cap Screw Type | Bracket Kit Ordering Number |
|--------------|----------------------|---------------|----------------|-----------------------------|
| 62           | F03                  | 9 mm ISO      | Metric         | SS-MB-62-F03-9ISO-M         |
|              |                      | 9 mm ISO      | Fractional     | SS-MB-62-F03-9ISO-F         |
|              |                      | 9 mm DIN      | Metric         | SS-MB-62-F03-9DIN-M         |
|              |                      | 9 mm DIN      | Fractional     | SS-MB-62-F03-9DIN-F         |
|              |                      | 11 mm ISO     | Metric         | SS-MB-62-F03-11ISO-M        |
|              |                      | 11 mm ISO     | Fractional     | SS-MB-62-F03-11ISO-F        |
|              |                      | 11 mm DIN     | Metric         | SS-MB-62-F03-11DIN-M        |
|              |                      | 11 mm DIN     | Fractional     | SS-MB-62-F03-11DIN-F        |
|              | F04                  | 14 mm ISO     | Metric         | SS-MB-62-F03-14ISO-M        |
|              |                      | 14 mm ISO     | Fractional     | SS-MB-62-F03-14ISO-F        |
|              |                      | 14 mm DIN     | Metric         | SS-MB-62-F03-14DIN-M        |
|              |                      | 14 mm DIN     | Fractional     | SS-MB-62-F03-14DIN-F        |
|              |                      | 9 mm ISO      | Metric         | SS-MB-62-F04-9ISO-M         |
|              |                      | 9 mm ISO      | Fractional     | SS-MB-62-F04-9ISO-F         |
|              |                      | 9 mm DIN      | Metric         | SS-MB-62-F04-9DIN-M         |
|              |                      | 9 mm DIN      | Fractional     | SS-MB-62-F04-9DIN-F         |
| 63           | F05                  | 11 mm ISO     | Metric         | SS-MB-63-F05-11ISO-M        |
|              |                      | 11 mm ISO     | Fractional     | SS-MB-63-F05-11ISO-F        |
|              |                      | 11 mm DIN     | Metric         | SS-MB-63-F05-11DIN-M        |
|              |                      | 11 mm DIN     | Fractional     | SS-MB-63-F05-11DIN-F        |
|              |                      | 14 mm ISO     | Metric         | SS-MB-63-F05-14ISO-M        |
|              |                      | 14 mm ISO     | Fractional     | SS-MB-63-F05-14ISO-F        |
|              |                      | 14 mm DIN     | Metric         | SS-MB-63-F05-14DIN-M        |
|              |                      | 14 mm DIN     | Fractional     | SS-MB-63-F05-14DIN-F        |
|              |                      | 17 mm ISO     | Metric         | SS-MB-63-F05-17ISO-M        |
|              |                      | 17 mm ISO     | Fractional     | SS-MB-63-F05-17ISO-F        |
|              |                      | 17 mm DIN     | Metric         | SS-MB-63-F05-17DIN-M        |
|              |                      | 17 mm DIN     | Fractional     | SS-MB-63-F05-17DIN-F        |

| Valve Series | ISO 5211 Flange Size | Coupling Size | Cap Screw Type | Bracket Kit Ordering Number |
|--------------|----------------------|---------------|----------------|-----------------------------|
| 65           | F05                  | 14 mm ISO     | Metric         | SS-MB-65-F05-14ISO-M        |
|              |                      | 14 mm ISO     | Fractional     | SS-MB-65-F05-14ISO-F        |
|              |                      | 14 mm DIN     | Metric         | SS-MB-65-F05-14DIN-M        |
|              |                      | 14 mm DIN     | Fractional     | SS-MB-65-F05-14DIN-F        |
|              | F07                  | 17 mm ISO     | Metric         | SS-MB-65-F05-17ISO-M        |
|              |                      | 17 mm ISO     | Fractional     | SS-MB-65-F05-17ISO-F        |
|              |                      | 17 mm DIN     | Metric         | SS-MB-65-F05-17DIN-M        |
|              |                      | 17 mm DIN     | Fractional     | SS-MB-65-F05-17DIN-F        |
| 67           | F07                  | 14 mm ISO     | Metric         | SS-MB-67-F07-14ISO-M        |
|              |                      | 14 mm ISO     | Fractional     | SS-MB-67-F07-14ISO-F        |
|              |                      | 14 mm DIN     | Metric         | SS-MB-67-F07-14DIN-M        |
|              |                      | 14 mm DIN     | Fractional     | SS-MB-67-F07-14DIN-F        |
|              |                      | 17 mm ISO     | Metric         | SS-MB-67-F07-17ISO-M        |
|              |                      | 17 mm ISO     | Fractional     | SS-MB-67-F07-17ISO-F        |
|              |                      | 17 mm DIN     | Metric         | SS-MB-67-F07-17DIN-M        |
|              |                      | 17 mm DIN     | Fractional     | SS-MB-67-F07-17DIN-F        |
| 68           | F07                  | 14 mm ISO     | Metric         | SS-MB-68-F07-14ISO-M        |
|              |                      | 14 mm ISO     | Fractional     | SS-MB-68-F07-14ISO-F        |
|              |                      | 14 mm DIN     | Metric         | SS-MB-68-F07-14DIN-M        |
|              |                      | 14 mm DIN     | Fractional     | SS-MB-68-F07-14DIN-F        |
|              |                      | 17 mm ISO     | Metric         | SS-MB-68-F07-17ISO-M        |
|              |                      | 17 mm ISO     | Fractional     | SS-MB-68-F07-17ISO-F        |
|              |                      | 17 mm DIN     | Metric         | SS-MB-68-F07-17DIN-M        |
|              |                      | 17 mm DIN     | Fractional     | SS-MB-68-F07-17DIN-F        |

## 83 and H83 Series Valves

### Operating Torque

Operating torque for a Swagelok 83 or H83 series valve is influenced by:

- system pressure
- cycle frequency
- system media.

The tables and calculations on this page can be used for 83 and H83 series valves of stainless steel and alloy 400 with any seat material.

### Calculating Operating Torque

If the valve will be cycled no more than once per hour:

1. Select the base start and base end torque at system pressure from Table 10.
2. Select the media factor from Table 11.
3. Calculate the start and end operating torque:  
Base torque (Table 10)  
× media factor (Table 11).

**Example:** An 83 series 3-way valve is operated with medium-weight oil at 1500 psig and cycled once per day.

1. According to Table 10, the base start torque is 25 in.-lb and the base end torque is 15 in.-lb.

2. According to Table 11, the media factor is 0.9.

3. Start torque = 25 in.-lb × 0.9  
= 22.5 in.-lb

End torque = 15 in.-lb × 0.9  
= 13.5 in.-lb.

If the valve will be cycled more frequently than once per hour, contact your authorized Swagelok representative.

**Table 10—Base Start and End Torque**

Use linear interpolation to obtain torque values for system pressures not listed.

| Valve Series | System Pressure, psig (bar, MPa) |              |                  |              |                  |              |                  |              |                    |              |
|--------------|----------------------------------|--------------|------------------|--------------|------------------|--------------|------------------|--------------|--------------------|--------------|
|              | 0                                |              | 1500 (103, 10.3) |              | 3000 (206, 20.6) |              | 6000 (413, 41.3) |              | 10 000 (689, 68.9) |              |
|              | Base Torque, in.·lb (N·m, cm·kg) |              |                  |              |                  |              |                  |              |                    |              |
|              | Start                            | End          | Start            | End          | Start            | End          | Start            | End          | Start              | End          |
| 83 2-way     | 15 (1.7, 18)                     | 15 (1.7, 18) | 15 (1.7, 18)     | 15 (1.7, 18) | 17 (2.0, 20)     | 17 (2.0, 20) | 20 (2.3, 24)     | 20 (2.3, 24) | —                  | —            |
| 83 3-way     | 25 (2.9, 29)                     | 15 (1.7, 18) | 25 (2.9, 29)     | 15 (1.7, 18) | 27 (3.1, 32)     | 17 (2.0, 20) | 30 (3.4, 35)     | 20 (2.3, 24) | —                  | —            |
| All H83      | 25 (2.9, 29)                     | 15 (1.7, 18) | 25 (2.9, 29)     | 15 (1.7, 18) | 27 (3.1, 32)     | 17 (2.0, 20) | 30 (3.4, 35)     | 20 (2.3, 24) | 35 (4.0, 41)       | 20 (2.3, 24) |

### Ordering Information



Swagelok 83 series valve with ISO 5211-compliant actuator.

1. Select the desired 83 or H83 series valve. Using the **Calculating Operating Torque** instructions above, calculate the valve start and end operating torque.
2. Choose an actuator based on the valve start and end torque. See the actuator manufacturer's literature to specify ISO 5211 mounting dimensions, including flange and coupling sizes.
3. Select a Swagelok 83 series bracket kit ordering number. Bracket kits can be used with stainless steel and alloy 400 valves.

See *Mounting Instructions, ISO 5211 Dimensionally Compliant Bracket, Coupling, and Actuator*, MS-INS-4080-NAMUR.

**Table 11—Media Factors**

| Medium-Weight Oil | Clean Water | Nitrogen Gas |
|-------------------|-------------|--------------|
| 0.9               | 1.0         | 1.0          |

### Mounting Bracket Kit Ordering Numbers

| ISO 5211 Flange Size | Coupling Size | Cap Screw Type | Bracket Kit Ordering Number |
|----------------------|---------------|----------------|-----------------------------|
| F03                  | 9 mm ISO      | Metric         | SS-MB-83-F03-9ISO-M         |
|                      | 9 mm ISO      | Fractional     | SS-MB-83-F03-9ISO-F         |
|                      | 9 mm DIN      | Metric         | SS-MB-83-F03-9DIN-M         |
|                      | 9 mm DIN      | Fractional     | SS-MB-83-F03-9DIN-F         |
| F04                  | 9 mm ISO      | Metric         | SS-MB-83-F04-9ISO-M         |
|                      | 9 mm ISO      | Fractional     | SS-MB-83-F04-9ISO-F         |
|                      | 9 mm DIN      | Metric         | SS-MB-83-F04-9DIN-M         |
|                      | 9 mm DIN      | Fractional     | SS-MB-83-F04-9DIN-F         |
| F05                  | 11 mm ISO     | Metric         | SS-MB-83-F04-11ISO-M        |
|                      | 11 mm ISO     | Fractional     | SS-MB-83-F04-11ISO-F        |
|                      | 11 mm DIN     | Metric         | SS-MB-83-F04-11DIN-M        |
|                      | 11 mm DIN     | Fractional     | SS-MB-83-F04-11DIN-F        |
| F05                  | 11 mm ISO     | Metric         | SS-MB-83-F05-11ISO-M        |
|                      | 11 mm ISO     | Fractional     | SS-MB-83-F05-11ISO-F        |
|                      | 11 mm DIN     | Metric         | SS-MB-83-F05-11DIN-M        |
|                      | 11 mm DIN     | Fractional     | SS-MB-83-F05-11DIN-F        |
| F05                  | 14 mm ISO     | Metric         | SS-MB-83-F05-14ISO-M        |
|                      | 14 mm ISO     | Fractional     | SS-MB-83-F05-14ISO-F        |
|                      | 14 mm DIN     | Metric         | SS-MB-83-F05-14DIN-M        |
|                      | 14 mm DIN     | Fractional     | SS-MB-83-F05-14DIN-F        |



## AFS Ball Valves

### Operating Torque

Operating torque for a Swagelok AFS ball valve is influenced by:

- system pressure
- system temperature.

### Calculating Operating Torque

If the valve will be cycled at least once per day, but not more than once per hour:

1. Select the base start and base end torque at system pressure from Table 12.
2. Select the temperature factor from Table 13.
3. Calculate the start and end operating torque:  
Base torque (Table 12)  
× temperature factor (Table 13).

**Example:** AFS valve is operated with nitrogen at 4500 psig and 70°F (20°C).

1. According to Table 12, the base start torque is 61 in.·lb and the base end torque is 36 in.·lb.
2. According to Table 13, the temperature factor is 1.0.
3. Start torque = 61 in.·lb × 1.0  
= 61 in.·lb  
End torque = 36 in.·lb × 1.0  
= 36 in.·lb.

If the valve will be cycled less frequently than once per day or more frequently than once per hour, contact your authorized Swagelok representative.

**Table 12—Base Start and End Torque**

Torque values based on the valve's remaining closed for one day at pressure. Use linear interpolation to obtain torque values for system pressures not listed.

| Valve Torque | System Pressure, psig (bar, MPa) |                      |                     |                     |
|--------------|----------------------------------|----------------------|---------------------|---------------------|
|              | 0                                | 1000<br>(68.9, 6.89) | 4500<br>(310, 31.0) | 6000<br>(413, 41.3) |
|              | Base Torque, in.·lb (N·m, cm·kg) |                      |                     |                     |
| Start        | 13 (1.5, 15)                     | 23 (2.6, 27)         | 61 (6.9, 71)        | 76 (8.6, 88)        |
| End          | 12 (1.4, 14)                     | 18 (2.1, 21)         | 36 (4.1, 42)        | 41 (4.7, 48)        |

**Table 13—Temperature Factors**

Temperature factors based 6000 psig (413 bar) system pressure and on the valve's remaining closed for one day at pressure. Use linear interpolation to obtain factors for system temperatures not listed.

| Temperature, °F (°C) |         |          |           |
|----------------------|---------|----------|-----------|
| −40 (−40)            | 70 (20) | 185 (85) | 250 (121) |
| 2.9                  | 1.0     | 1.0      | 1.0       |

### Ordering Information



Swagelok AFS ball valve with ISO 5211-compliant actuator.

1. Select the desired AFS valve. Using the **Calculating Operating Torque** instructions at right, calculate the valve start and end torque.
2. Choose an actuator based on the valve start and end torque. See the actuator manufacturer's literature to specify ISO 5211 mounting dimensions, including flange and coupling sizes.
3. Select a mounting bracket kit ordering number.

See *Mounting Instructions, ISO 5211 Dimensionally Compliant Bracket, Coupling, and Actuator*, MS-INS-4080-NAMUR.

### Mounting Bracket Kit Ordering Numbers

| ISO 5211 Flange Size | Coupling Size | Cap Screw Type | Bracket Kit Ordering Number |
|----------------------|---------------|----------------|-----------------------------|
| F05                  | 11 mm ISO     | Metric         | SS-MB-AFS-F05-11ISO-M       |
|                      | 11 mm ISO     | Fractional     | SS-MB-AFS-F05-11ISO-F       |
|                      | 11 mm DIN     | Metric         | SS-MB-AFS-F05-11DIN-M       |
|                      | 11 mm DIN     | Fractional     | SS-MB-AFS-F05-11DIN-F       |
|                      | 14 mm ISO     | Metric         | SS-MB-AFS-F05-14ISO-M       |
|                      | 14 mm ISO     | Fractional     | SS-MB-AFS-F05-14ISO-F       |
|                      | 14 mm DIN     | Metric         | SS-MB-AFS-F05-14DIN-M       |
|                      | 14 mm DIN     | Fractional     | SS-MB-AFS-F05-14DIN-F       |
|                      | 17 mm ISO     | Metric         | SS-MB-AFS-F05-17ISO-M       |
|                      | 17 mm ISO     | Fractional     | SS-MB-AFS-F05-17ISO-F       |
|                      | 17 mm DIN     | Metric         | SS-MB-AFS-F05-17DIN-M       |
|                      | 17 mm DIN     | Fractional     | SS-MB-AFS-F05-17DIN-F       |
| F07                  | 17 mm ISO     | Metric         | SS-MB-AFS-F07-17ISO-M       |
|                      | 17 mm ISO     | Fractional     | SS-MB-AFS-F07-17ISO-F       |
|                      | 17 mm DIN     | Metric         | SS-MB-AFS-F07-17DIN-M       |
|                      | 17 mm DIN     | Fractional     | SS-MB-AFS-F07-17DIN-F       |

## SK Series Valves

### Operating Torque

Operating torque for a Swagelok SK series valve is influenced by:

- cycle frequency
- system pressure
- system temperature.

### Calculating Operating Torque

1. Determine the base start and base end torque at system pressure from Table 14.
2. Determine the temperature factor from Table 15.
3. Calculate the start and end operating torque:  
Base torque (Table 14)  
× temperature factor (Table 15).

**Example:** SK series valve is operated with nitrogen at 3000 psig and 70°F (20°C).

1. According to Table 14, the base start torque is 21 in.·lb and the base end torque is 10 in.·lb.

2. According to Table 15, the temperature factor is 1.0.

3. Start torque = 21 in.·lb × 1.0  
= 21 in.·lb

End torque = 10 in.·lb × 1.0  
= 10 in.·lb.

If the valve will be cycled less frequently than once per day or more frequently than once per hour, contact your authorized Swagelok representative.

**Table 14—Base Start and End Torque**

Use linear interpolation to obtain torque values for system pressures not listed.

| Valve Torque | System Pressure, psig (bar, MPa) |                  |                  |
|--------------|----------------------------------|------------------|------------------|
|              | 0                                | 3000 (206, 20.6) | 6000 (413, 41.3) |
|              | Base Torque, in.·lb (N·m, cm·kg) |                  |                  |
| Start        | 14 (1.6, 17)                     | 21 (2.4, 25)     | 26 (3.0, 30)     |
| End          | 10 (1.2, 12)                     | 10 (1.2, 12)     | 10 (1.2, 12)     |

**Table 15—Temperature Factors**

Use linear interpolation to obtain factors for system temperatures not listed.

| Temperature, °F (°C) |         |         |           |           |
|----------------------|---------|---------|-----------|-----------|
| −40 (−40)            | 0 (−17) | 70 (20) | 250 (121) | 302 (150) |
| 2.0                  | 2.0     | 1.0     | 1.0       | 1.0       |

### Ordering Information



Swagelok SK series valve with ISO 5211-compliant actuator.

### Mounting Bracket Kit Ordering Numbers

| ISO 5211 Flange Size | Coupling Size                                    | Cap Screw Type                               | Bracket Kit Ordering Number                                                                      |
|----------------------|--------------------------------------------------|----------------------------------------------|--------------------------------------------------------------------------------------------------|
| F04                  | 11 mm ISO<br>11 mm ISO<br>11 mm DIN<br>11 mm DIN | Metric<br>Fractional<br>Metric<br>Fractional | SS-MB-4SK-F04-11ISO-M<br>SS-MB-4SK-F04-11ISO-F<br>SS-MB-4SK-F04-11DIN-M<br>SS-MB-4SK-F04-11DIN-F |

1. Choose an actuator based on the valve start and end torque. See the actuator manufacturer's literature to specify ISO 5211 mounting dimensions, including flange and coupling sizes.

2. Select a mounting bracket kit ordering number.

See *Mounting Instructions, ISO 5211 Dimensionally Compliant Bracket, Coupling, and Actuator*, MS-INS-4080-NAMUR.

## FKB Series Valves

### Operating Torque

Operating torque for a Swagelok FKB series valve is influenced by:

- system pressure
- system temperature.

### Calculating Operating Torque

If the valve will be cycled at least once per day, but not more than once per hour:

1. Select the base start and base end torque at system pressure from Table 16.
2. Select the temperature factor from Table 17.
3. Calculate the start and end operating torque:  
Base torque (Table 16)  
× temperature factor (Table 17).

**Example:** 8FKB valve is operated with nitrogen at 7500 psig and 70°F (20°C).

1. According to Table 16, the base start torque is 256 in.-lb and the base end torque is 63 in.-lb.

2. According to Table 17, the temperature factor is 1.0.

3. Start torque = 256 in.-lb × 1.0  
= 256 in.-lb

End torque = 63 in.-lb × 1.0  
= 63 in.-lb.

If the valve will be cycled less frequently than once per day or more frequently than once per hour, contact your authorized Swagelok representative.

**Table 16—Base Start and End Torque**

Torque values based on the valve's remaining closed for one day at pressure. Use linear interpolation to obtain torque values for system pressures not listed.

| Valve Series | System Pressure, psig (bar, MPa) |               |                   |               |                  |               |                    |               |                    |               |
|--------------|----------------------------------|---------------|-------------------|---------------|------------------|---------------|--------------------|---------------|--------------------|---------------|
|              | 0                                |               | 3750 (258, 25.83) |               | 7500 (516, 51.6) |               | 11 250 (775, 77.5) |               | 15 000 (1034, 103) |               |
|              | Base Torque, in.-lb (N-m, cm-kg) |               |                   |               |                  |               |                    |               |                    |               |
|              | Start                            | End           | Start             | End           | Start            | End           | Start              | End           | Start              | End           |
| 6FKB         | 30 (3.4, 35)                     | 30 (3.4, 35)  | 51 (5.8, 59)      | 33 (3.8, 39)  | 71 (8.1, 82)     | 35 (4.0, 41)  | 85 (9.7, 98)       | 47 (5.4, 55)  | 102 (12, 118)      | 49 (5.6, 57)  |
| 8FKB         | 84 (9.5, 97)                     | 71 (8.1, 82)  | 166 (19, 192)     | 72 (8.2, 83)  | 256 (29, 295)    | 63 (7.2, 73)  | 322 (37, 371)      | 64 (7.3, 74)  | 375 (43, 432)      | 76 (8.6, 88)  |
| 12FKB        | 288 (33, 332)                    | 184 (21, 212) | 308 (35, 355)     | 140 (16, 162) | 396 (45, 257)    | 145 (17, 168) | 443 (51, 511)      | 121 (14, 140) | 543 (62, 626)      | 116 (14, 134) |

### Ordering Information



Swagelok 6FKB series valve with ISO 5211-compliant actuator.

1. Select the desired FKB series valve. Using the **Calculating Operating Torque** instructions above, calculate the valve start and end torque.
2. Choose an actuator based on the valve start and end torque. See the actuator manufacturer's literature for ISO 5211 mounting dimensions, including flange and coupling sizes.
3. Select a mounting bracket kit ordering number.

See *Medium-Pressure Ball Valve, Mounting Instructions for FKB Series Medium-Pressure Ball Valves to ISO 5211-Compliant Actuators*, MS-CRD-0124.

**Table 17—Temperature Factors**

Temperature factors based 6000 psig (413 bar) system pressure and on the valve's remaining closed for one day at pressure. Use linear interpolation to obtain factors for system temperatures not listed.

| Valve Series | Temperature, °F (°C) |         |           |
|--------------|----------------------|---------|-----------|
|              | 0 (-17)              | 70 (20) | 250 (121) |
| 6FKB         | 1.5                  | 1.0     | 1.0       |
| 8FKB         | 1.2                  | 1.0     | 1.0       |
| 12FKB        | 1.0                  | 1.0     | 0.6       |

### Mounting Bracket Kit Ordering Numbers

| Valve Series | ISO 5211 Flange Size | Coupling Size | Cap Screw Type | Bracket Kit Ordering Number |
|--------------|----------------------|---------------|----------------|-----------------------------|
| 6FKB         | F05                  | 14 mm DIN     | Metric         | SS-MB-6FKB-F05-14DIN-M      |
| 8FKB         | F07                  | 17 mm DIN     | Metric         | SS-MB-8FKB-F07-17DIN-M      |
| 12FKB        | F07                  | 17 mm DIN     | Metric         | SS-MB-12FKB-F07-17DIN-M     |

## Mounting Bracket Kits

Kits for Swagelok 40G, 40, 83, H83, SK, and FKB series and AFS ball valves contain:

- 316 stainless steel mounting bracket that meets ISO 5211 dimensional specifications
- four (eight for FKB series valves) 316 stainless steel socket head cap screws for fractional sizes, or A4 stainless steel for metric sizes (A4 is approximately equivalent to AISI 316.)
- Coupling
  - 40G, SK, and FKB series—powdered metal 300 series stainless steel
  - 40, 83, and H83 series and AFS ball valves—316 stainless steel
- A4 stainless steel set screw (316 stainless steel for FKB series valves)
- instructions.

Kits for Swagelok 60 series valves contain:

- 316 stainless steel mounting bracket that meets ISO 5211 dimensional specifications
- four 316 stainless steel socket head cap screws for fractional sizes, or A4 stainless steel for metric sizes (A4 is approximately equivalent to AISI 316.)
- 316 stainless steel coupling
- 316 stainless steel wall mounting bracket
- two 316 stainless steel lock washers
- 302 stainless steel upper and lower grounding springs
- 316 stainless steel lock tab
- two 316 stainless steel hex nuts and bolts
- lubricant and MSDS
- instructions.

## Actuated Ball Valve Assemblies

In addition to bracket kits, Swagelok can provide complete actuated ball valve assemblies—including valves, actuators, sensors, and solenoids—with interfaces that meet ISO 5211, NAMUR, and VDI/VDE 3845 standards.

Assemblies are based on:

- maximum valve pressure
- ambient temperature (50 to 100°F [10 to 37°C])
- a design margin of 20 % for calculated operating torque

Contact your authorized Swagelok representative for assemblies built for other system conditions.

See the Swagelok *Actuation Options for Swagelok Ball Valves* catalog (MS-02-343), page 468, for more information.

### Swagelok-Stocked Components

#### Actuators

Swagelok

#### Sensors

Pepperl+Fuchs  
(proximity sensors)

Westlock  
(limit switches)

#### Solenoids

ASCO®

Additional components and manufacturers available on request.

**⚠ Caution: Actuated assemblies must be properly aligned and supported. Improper alignment or inadequate support of the actuated assembly may result in leakage or premature valve failure.**

**Caution: Do not mix or interchange valve components with those of other manufacturers.**

## About this document

Thank you for downloading this electronic catalog, which is part of General Product catalog Swagelok published in print. This type of electronic catalog is updated as new information arises or revisions, which may be more current than the printed version.

Swagelok Company is a major developer and provider of fluid system solutions, including products, integration solutions and services for industry research, instrumentation, pharmaceutical, oil and gas, power, petrochemical, alternative fuels, and semiconductor. Our manufacturing facilities, research, service and distribution facilities support a global network of more than 200 authorized sales and service centers in 57 countries.

Visit [www.swagelok.com](http://www.swagelok.com) to locate your Swagelok representative and obtain any information on features, technical information and product references, or to learn about the variety of services available only through authorized sales centers and service Swagelok.

### Safe Product Selection

**When selecting a product, the total system design must be considered to ensure safe, trouble-free performance. Function, material compatibility, adequate ratings, proper installation, operation, and maintenance are the responsibilities of the system designer and user.**

## Warranty Information

Swagelok products are backed by The Swagelok Limited Lifetime Warranty. For a copy, visit your Swagelok Web site or contact your authorized Swagelok representative.

Swagelok, Ferrule-Pak, Goop, Hinging-Colleting, IGC, Kenmac, Micro-Fit, Nupro, Snoop, Sno-Trik, SWAK, VCO, VCR, Ultra-Torr, Whitey—TM Swagelok Company  
Aflas—TM Asahi Glass Co. Ltd.  
AL-6XN—TM Allegheny Ludlum Corporation  
AutoCAD—TM Autodesk, Inc.  
CSA—TM Canadian Standards Association  
DeviceNet—TM ODVA  
Kalrez, Krytox—TM DuPont  
Elgiloy—TM Elgiloy Specialty Metals  
FM—TM FM Global  
Grafoil—TM GrafTech International Holdings, Inc.  
MAC—TM MAC Valves Inc.  
Microsoft, Windows—TM Microsoft Corp.  
NACE—TM NACE International  
picofast—TM HansTurck KG  
Pillar—TM Nippon Pillar Packing Company, Ltd.  
15-7 PH, 17-7 PH—TM AK Steel Corp.  
Sandvik—TM SandvikAB  
Silconert—TM Silcotek Corporation  
Simriz—TM Freudenberg-NOK  
SolidWorks—TM SolidWorks Corporation