ECA F Valve Sizing Program 072921

Valve Sizing Program

Downloadable Content

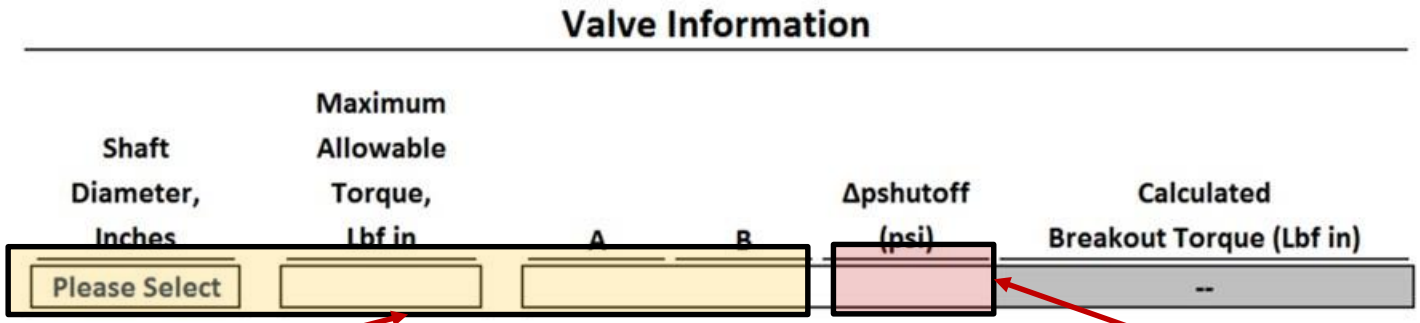
- ECA F Valve Sizing Program:

  https://www.easytork.com/downloads/ECA%20F%20Sizing%20Program.xlsx

  - For valves not covered under “ECA F Valve Pairing 072921”, “ECA F Valve Sizing Program 072921” will assist appropriate actuator-to-valve combination.

How to Use Valve Sizing Program

- Five inputs are required to calculate breakout torque
  - Note: With the exception of valves with attenuators (noise attenuator), breakout torque (as opposed to dynamic torque) is typically the largest torque the valve requires.



Catalog 14 has the following public information

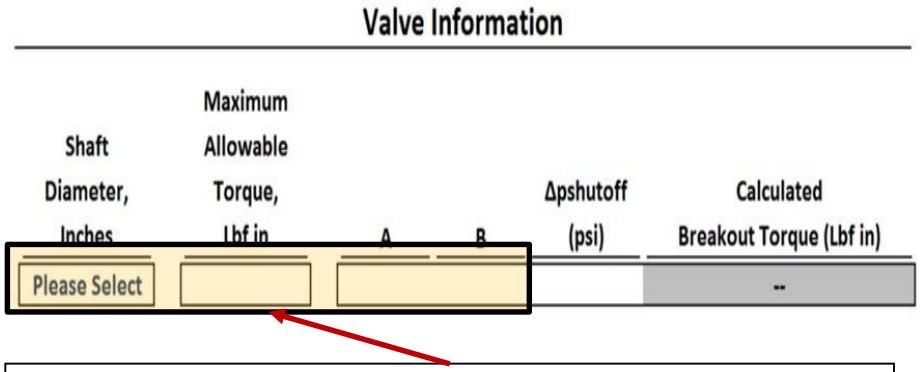
Based on local process. What is the pressure drop of your pipeline?

Note: If Δpshutoff is not known, use the max allowed PSI by each valve class:
CL150 = 285 psi
CL300 = 740 psi
CL600 = 1480 psi

Catalog 14

- Search and download Catalog 14:

  “https://www.emerson.com/documents/automation/catalog-14-en-1630606.pdf”



Catalog 14 has the following public information.

Triangulate “Shaft Diameter, Inches”, Maximum Allowable Torque, Lbf in”, “A”, “B” based on the valve model, valve construction, and valve size by using publicly available information on Catalog 14

Valve Model	Pg # in Catalog 14
Table of Contents	365
7600	368
8532	372
8560	384
8580	392
8590	395
9500	401
30,000	403
A11	412
A31A	439
Control-Disk™ Valves	465
SIS	479
Three-Way Butterfly Valves	486
U Vee-Ball™	488
V100	490
V150, V200 and V300	492
V250	503
V260	505
V270	508
V280	510
V500	512
Z500	515

Interpreting Valve Sizing Program

Valve Information

Shaft Diameter, Inches	Maximum Allowable Torque, Lbf in	A	B	Δpshutoff (psi)	Calculated Breakout Torque (Lbf in)
1	4140	1.8	500	270	986

ECA-F Sizing & Order Code

Available Actuator	No Safety Factor Included (1) Max PSI Allowed (2)	Min PSI Required (3) DA Sizing	Min PSI Required (3) FS Sizing	Order Code
ECA-07	240.0 psi	58.6 psi	88.1 psi	ECA-07-F-1-11-1
ECA-10	118.7 psi	29.0 psi	43.8 psi	ECA-10-F-1-11-1
ECA-12	53.5 psi	13.1 psi	19.4 psi	ECA-12-F-1-11-1

Note (1): Calculated with actuator actual output torque and Valve Information.

Note (2): Decrease air pressure to actuator for additional safety factor (for more threshold below valve MAST).

Note (3): Increase air pressure to actuator for additional safety factor (for more actuator torque to valve).

Never exceed the valve's Maximum Allowable Torque (MAST).

This is the maximum air supply allowed to the actuator (double-acting or fail-safe sizing). There is no safety factor in these figures, actuators will generate the same amount of torque as the listed Maximum Allowed Torque.

In this example, ECA-10 at 118.7 PSI and ECA-12 at 53.5 PSI will generate 4140 in-lb of torque. Reducing air pressure by X% will reduce actuator torque by the equal %. For example, a 10% reduction of air pressure to ECA-10 (from 118.7 psi 106.83 PSI) will give a 10% safety factor (from 4140 to 3726 in-lb).

Interpreting Valve Sizing Program

Valve Information

Shaft Diameter, Inches	Maximum Allowable Torque, Lbf in	A	B	Δpshutoff (psi)	Calculated Breakout Torque (Lbf in)
1	4140	1.8	500	270	986

ECA-F Sizing & Order Code

Available Actuator	No Safety Factor Included (1) Max PSI Allowed (2)	Min PSI Required (3) DA Sizing	Min PSI Required (3) FS Sizing	Order Code
ECA-07	240.0 psi	58.6 psi	88.1 psi	ECA-07-F-1-11-1
ECA-10	118.7 psi	29.0 psi	43.8 psi	ECA-10-F-1-11-1
ECA-12	53.5 psi	13.1 psi	19.4 psi	ECA-12-F-1-11-1

Note (1): Calculated with actuator actual output torque and Valve Information.

Note (2): Decrease air pressure to actuator for additional safety factor (for more threshold below valve MAST).

Note (3): Increase air pressure to actuator for additional safety factor (for more actuator torque to valve).

The minimum air supply needed by the actuator for double-acting and fail-safe sizing, respectively, to generate torque equal to the breakout torque.

There is no safety factor in these figures. In this example, ECA-07 at 58.6 PSI will generate 986 in-lb of double-acting torque, while ECA-10 at 43.8 PSI will generate 986 in-lb of fail-safe torque.

Increasing air pressure by X% will increase actuator torque by the equal %. For example, a 50% increase of air pressure to ECA-10 (43.8 to 65.7 PSI) will increase fail-safe torque by 50% (986 to 1479 in-lb), while 25% increase of air pressure to ECA-07 (58.6 to 73.25 PSI) will increase double-acting torque by 25% (986 to 1233 in-lb).

Valve Sizing Program – Example 1

Example 1

4” V200, Composition Seal, Flat Metal Seal, and Flow-Ring Construction, TCM Plus Ball Seal

Unknown shutoff pressure

Valve Information

Shaft Diameter, Inches	Maximum Allowable Torque, Lbf in	A	B	Δpshutoff (psi)	Calculated Breakout Torque (Lbf in)
3/4	2120	0.1	380	285	408.5

ECA-F Sizing & Order Code

Available Actuator	No Safety Factor Included (1) Max PSI Allowed (2)	Min PSI Required (3) DA Sizing	Min PSI Required (3) FS Sizing	Order Code
ECA-07	122.9 psi	24.3 psi	36.5 psi	ECA-07-F-3/4-11-1
ECA-10	60.8 psi	12.0 psi	18.1 psi	ECA-10-F-3/4-11-1

Note (1): Calculated with actuator actual output torque and Valve Information.
Note (2): Decrease air pressure to actuator for additional safety factor (for more threshold below valve MAST).
Note (3): Increase air pressure to actuator for additional safety factor (for more actuator torque to valve).

Example 1: Fail-Safe Sizing With ECA-07

Valve Information

Shaft Diameter, Inches	Maximum Allowable Torque, Lbf in	A	B	Δpshutoff (psi)	Calculated Breakout Torque (Lbf in)
3/4	2120	0.1	380	285	408.5

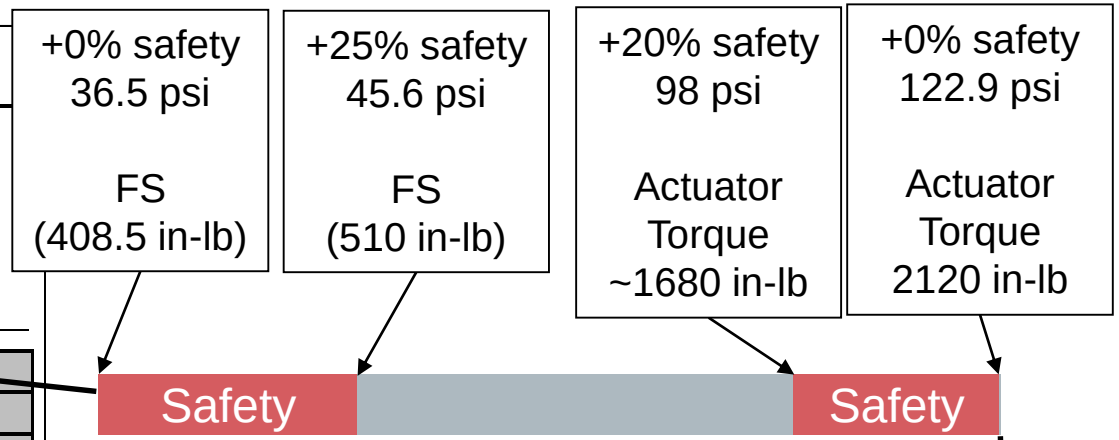
ECA-F Sizing & Order Code

Available Actuator	No Safety Factor Included (1) Max PSI Allowed (2)	Min PSI Required (3) DA Sizing	Min PSI Required (3) FS Sizing	Order Code
ECA-07	122.9 psi	24.3 psi	36.5 psi	ECA-07-F-3/4-11-1
ECA-10	60.8 psi	12.0 psi	18.1 psi	ECA-10-F-3/4-11-1

Note (1): Calculated with actuator actual output torque and Valve Information.

Note (2): Decrease air pressure to actuator for additional safety factor (for more threshold below valve MAST).

Note (3): Increase air pressure to actuator for additional safety factor (for more actuator torque to valve).



Example 2: Double-Acting Sizing With ECA-10

Valve Information

Shaft Diameter, Inches	Maximum Allowable Torque, Lbf in	A	B	Δpshutoff (psi)	Calculated Breakout Torque (Lbf in)
3/4	2120	0.1	380	285	408.5

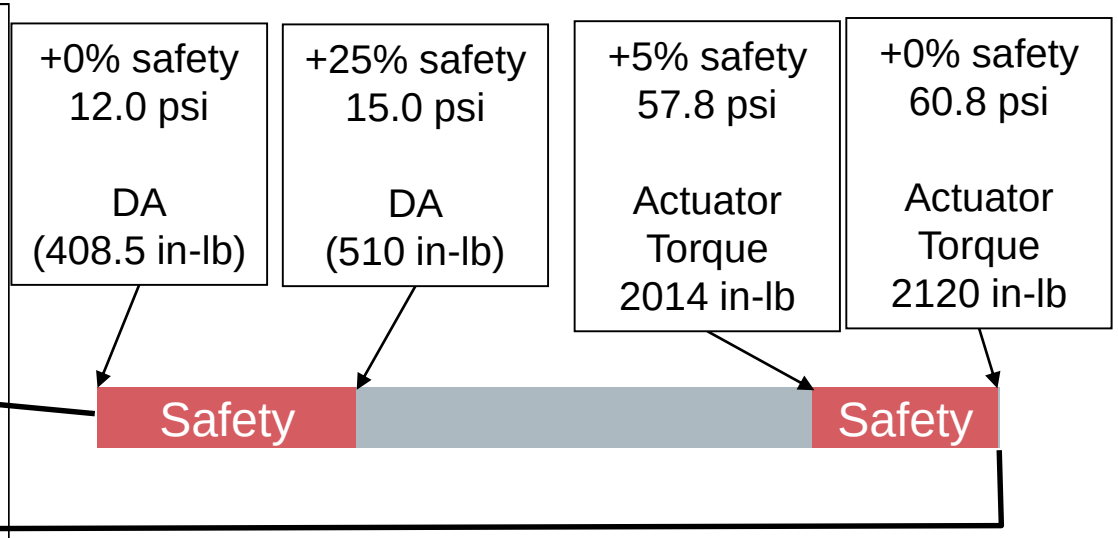
ECA-F Sizing & Order Code

Available Actuator	No Safety Factor Included (1) Max PSI Allowed (2)	Min PSI Required (3) DA Sizing	Min PSI Required (3) FS Sizing	Order Code
ECA-07	122.9 psi	24.3 psi	36.5 psi	ECA-07-F-3/4-11-1
ECA-10	60.8 psi	12.0 psi	18.1 psi	ECA-10-F-3/4-11-1

Note (1): Calculated with actuator actual output torque and Valve Information.

Note (2): Decrease air pressure to actuator for additional safety factor (for more threshold below valve MAST).

Note (3): Increase air pressure to actuator for additional safety factor (for more actuator torque to valve).



Valve Sizing Program – Example 2

Example 2

V300

NPS 2 V300 CG8M CL300 VALVE BODY W/O TAPPING , ISA 75.08.02 FACE TO FACE CG8M PROTECTOR RING , CG8M CRPL VEE BALL S20910 5/8 SPLINE SHAFT , PEEK BEARINGS , GTB GRAFOIL GASKETS , ALLOY 6 HD SEAL , PTFE/CARBON FILLED PTFE PACKING ARRANGE 14A9776 , SST PKG BOX PARTS,B8M CL2 BOLTING , STL ACTUATOR BOLTING , NAMEPLATE , ANSI CL300 HYDRO 1125 PSI/1 MIN , FORWARD FLOW , V300 , SEAT LEAK CLASS IV 17 SCFH PER FGS 4L5

Valve Information

Shaft Diameter, Inches	Maximum Allowable Torque, Lbf in	A	B	Δpshutoff (psi)	Calculated Breakout Torque (Lbf in)
5/8	1225	0.26	140	740	332.4

ECA-F Sizing & Order Code

Available Actuator	No Safety Factor Included (1) Max PSI Allowed (2)	Min PSI Required (3) DA Sizing	Min PSI Required (3) FS Sizing	Order Code
ECA-07	71.0 psi	19.7 psi	29.7 psi	ECA-07-F-5/8-11-1

Note (1): Calculated with actuator actual output torque and Valve Information.
Note (2): Decrease air pressure to actuator for additional safety factor (for more threshold below valve MAST).
Note (3): Increase air pressure to actuator for additional safety factor (for more actuator torque to valve).

Example 2: Fail-Safe Sizing With ECA-07

Valve Information

Shaft Diameter, Inches	Maximum Allowable Torque, Lbf in	A	B	Δpshutoff (psi)	Calculated Breakout Torque (Lbf in)
5/8	1225	0.26	140	740	332.4

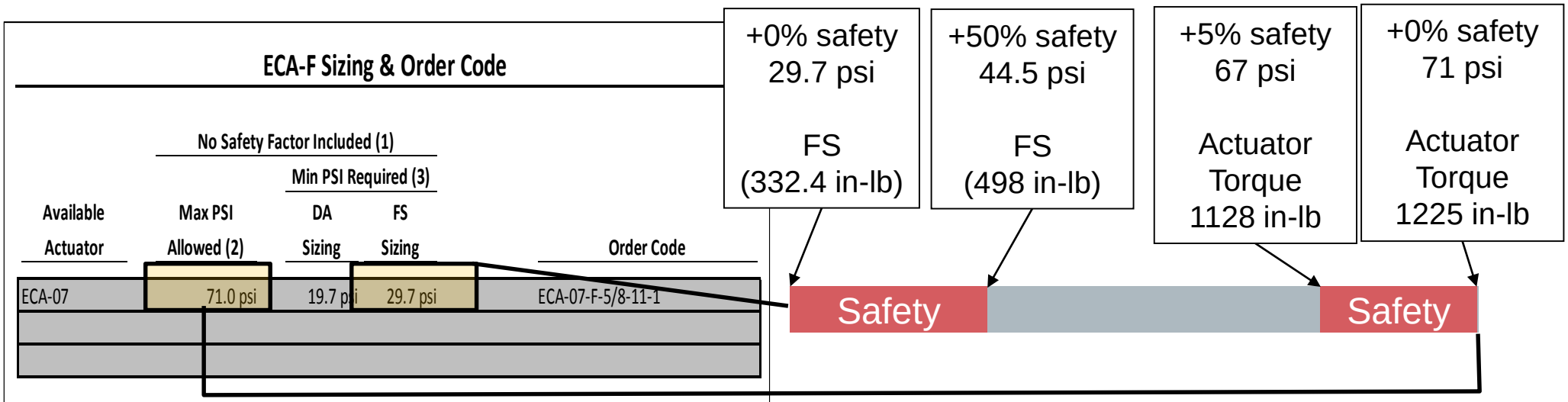
ECA-F Sizing & Order Code

Available Actuator	No Safety Factor Included (1) Max PSI Allowed (2)	Min PSI Required (3) DA Sizing	Min PSI Required (3) FS Sizing	Order Code
ECA-07	71.0 psi	19.7 psi	29.7 psi	ECA-07-F-5/8-11-1

Note (1): Calculated with actuator actual output torque and Valve Information.

Note (2): Decrease air pressure to actuator for additional safety factor (for more threshold below valve MAST).

Note (3): Increase air pressure to actuator for additional safety factor (for more actuator torque to valve).



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