

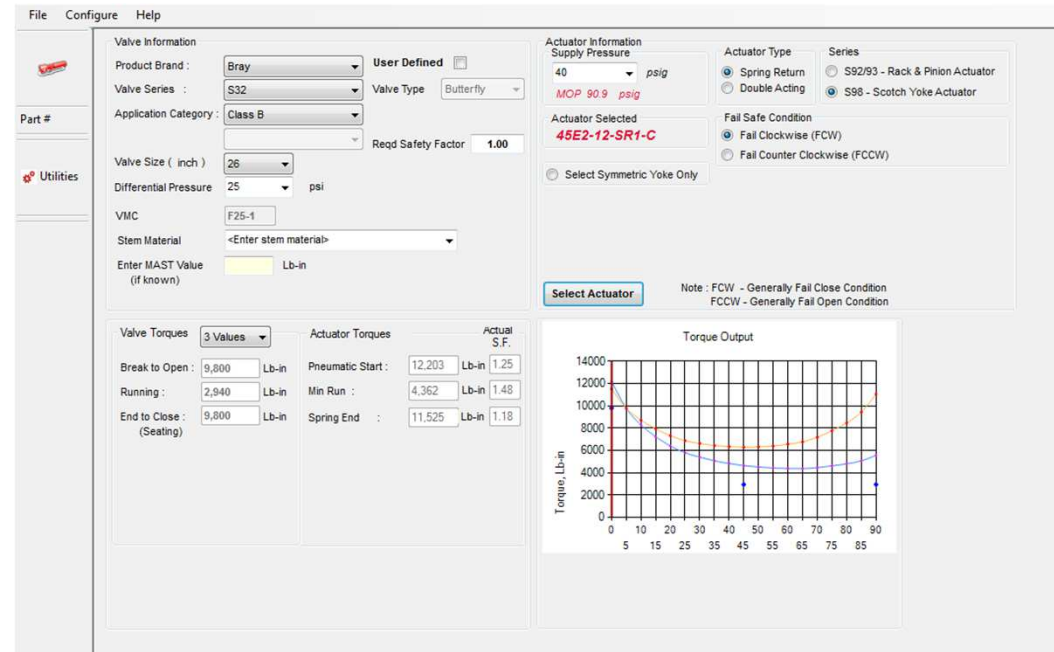


ActSize

S92/93/98 Actuator Sizing Tool

BTSI
February, 2014

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Introduction

This is the standalone sizing program developed by BTSI, for the selection of suitable S92/93/98 Scotch Yoke Actuators for Bray butterfly valves and Flow Tek ball valves.

The program selects the most economical option, but has some user discretion built-in for varying applications and customer specified factors.

Selection for Bray valves involves simple steps of picking the valve details from the drop-down menus and the program populates the operating torque of the valve from database, whereas for third party valves, the user is required to define the operating torque values of the valve.

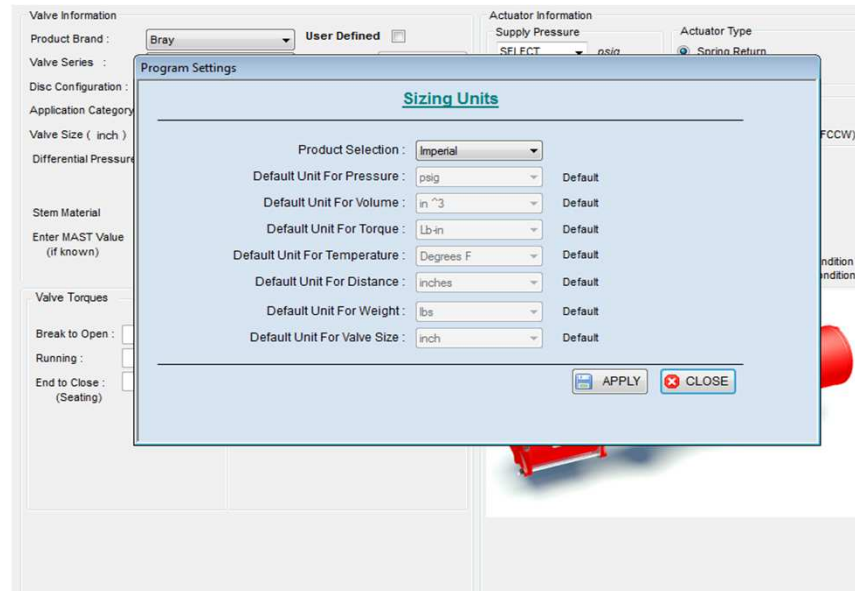
In addition to the Sizing, the program provides the part number of the selected actuator, which shall be processed by the inside sales teams for quotations. Basic details of the selected actuator are auto populated in second page and the user defines other options to complete the code generation.

Steps :

1. Uninstall previous version of Actuator Sizing Tool (if exists) from
2. Control panel - Programs and features.
3. Copy ActSize.zip to local drive and extract all the files.
4. Run setup.exe to install the program.
5. After installation you may find [ActSize Version number] Icon on the desktop.
6. Click on [ActSize] to execute Actuator Sizing Program.

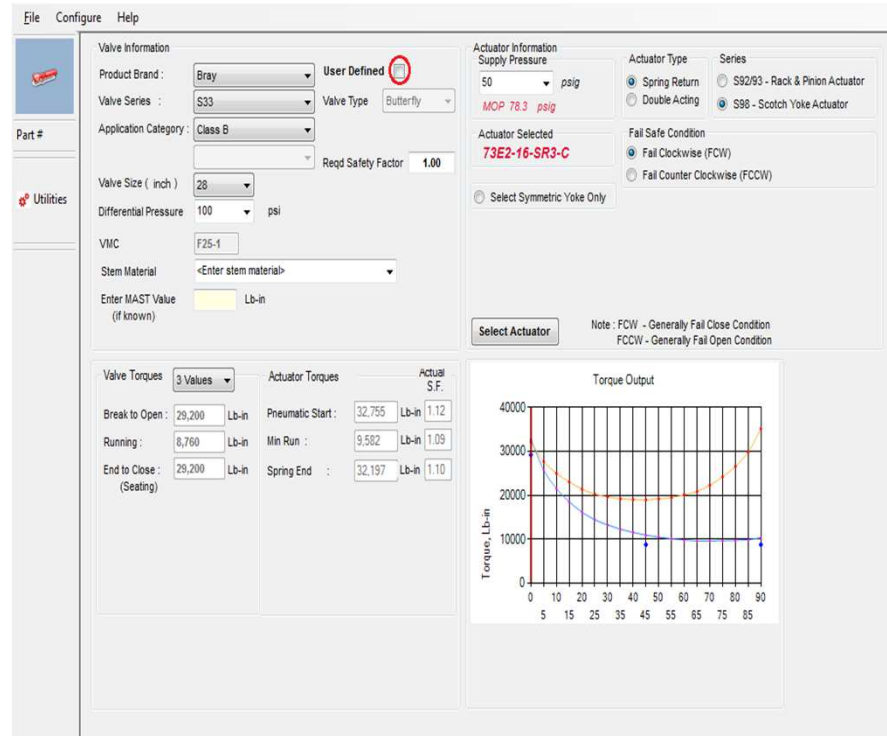
The Interface

- Three Tabs on the left of the Home screen provide the navigation.
- Clicking on the Bray logo tab opens the Actuator Sizing program.
- Part # tab is used once the sizing is done, and additional information on the options is selected from drop down menus.
- Utilities tab would provide functions like volume tank calculations, stroke speed data, etc. This is under construction, at present.
- Imperial / Metric Units for sizing can be selected from the Configure tab.



Selection Options

- The Sizing page has sections for the Valve and Actuator inputs and output data.
- Valve details like series, flow direction, configuration, class, size, differential pressure and MAST value may be selected in the respective fields for Bray valves.
- For other valves, check the 'user defined' check box and enter the valve torque values manually.



The screenshot shows the 'Configure' window of the software. It is divided into several sections:

- Valve Information:** Includes fields for Product Brand (Bray), Valve Series (S33), Application Category (Class B), Valve Size (28 inch), Differential Pressure (100 psi), VMIC (F25-1), Stem Material, and Enter MAST Value.
- Actuator Information:** Includes Supply Pressure (50 psig), MOP (78.3 psig), Actuator Selected (73E2-16-SR3-C), and Actuator Type (Spring Return).
- Fail Safe Condition:** Includes options for Fail Clockwise (FCW) and Fail Counter Clockwise (FCCW).
- Valve Torques:** A table with 3 values for Break to Open, Running, and End to Close (Seating) torques.
- Actuator Torques:** A table with Pneumatic Start, Min Run, and Spring End torques and their corresponding Actual S.F. values.
- Torque Output Graph:** A line graph showing Torque (Lb-in) on the y-axis (0 to 40000) versus an unlabeled x-axis (0 to 90). The graph shows a curve that starts at approximately 30000 Lb-in at x=0, drops to a minimum of about 10000 Lb-in around x=45, and then rises back to 30000 Lb-in at x=90.

Sizing - Bray Valves

- Selecting the valve details progressively, would auto populate the Valve Torques.
- MAST value would also show up if it has been published in the Tech Manuals. If not, user can manually input this value. If left blank, the program will proceed sizing without this input.
- Except for Trilok, the default Factor of Safety for selection would be 1.00. For Trilok, this would be 1.25 by default. User can overwrite these default values.
- Next, proceed to select the Air supply pressure for sizing and the configuration required. Image of the selected configuration updates.

Valve Information

Product Brand : Bray User Defined

Valve Series : S20 Valve Type : Butterfly

Disc Configuration : Full Disc

Application Category : Class A Req'd Safety Factor : 1.00

Valve Size (inch) : 8

Differential Pressure : 150 psi

Stem Material : <Enter stem material>

Enter MAST Value (if known) :

Valve Torques	Actuator Torques	Actual S.F.
Break to Open : 1,660 Lb-in	Pneumatic Start : <input type="text"/> Lb-in	
Running : 498 Lb-in	Min Run : <input type="text"/> Lb-in	
End to Close (Seating) : 1,660 Lb-in	Spring End : <input type="text"/> Lb-in	

Actuator Information

Supply Pressure : 60 psig

Actuator Selected :

Actuator Type

Spring Return

Double

Fail Safe Condition

Fail Clockwise (FCW)

Fail Counter Clockwise (FCCW)

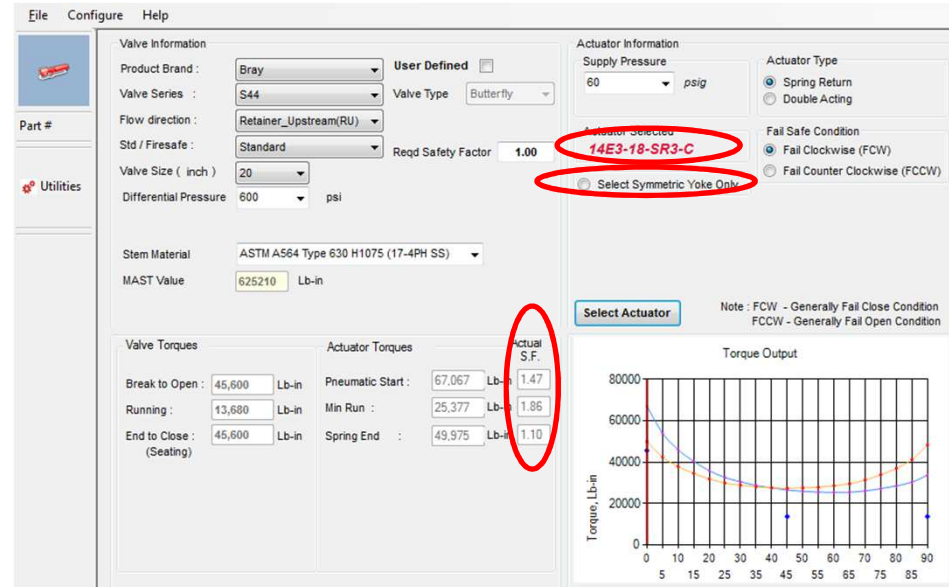
Select

Note : FCW - Generally Fail Close (FC) / FCCW - Generally Fail Open (FO)



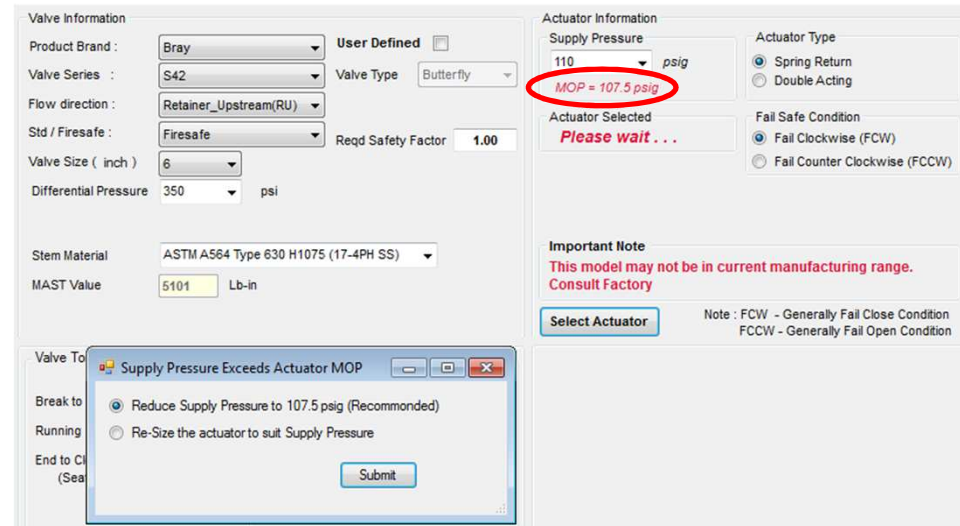
Sizing Output

- Clicking ‘Select Actuator’ button gives the basic model of the selected actuator.
- Actual Factor of Safety is displayed against each of the Valve-Actuator torque values.
- The configuration image is replaced by a torque graph showing the air and spring stroke torque curves.
- If the sized actuator is a Canted Yoke, an option button ‘Select Symmetric Yoke’ shows up. Selecting this option and resizing will give the next best selection in ‘Symmetric Yoke’ option. This would be useful if preference is for this Yoke style or prior knowledge is available on ‘out of stock’ situation on Canted yoke.



Re-Sizing w.r.t MOP

- In some cases, the program would prompt a selection to Reduce the supply pressure or Resize to supply pressure.
- This is because the optimum actuator selected by the program has MOP lower than the supply pressure input.
- User can opt to size the actuator by clicking 'Submit' for 'Reduce Supply Pressure' option and reduce the supply pressure to < indicated MOP. This requires use of pressure reducing valve for the actuator selection
- Alternately, the user can select the Re-size option and proceed with the sizing. This selection is for line pressure, doesn't require pressure reducing valve.



Valve Information

Product Brand : Bray

Valve Series : S42

Flow direction : Retainer_Upstream(RU)

Std / Firesafe : Firesafe

Valve Size (inch) : 6

Differential Pressure : 350 psi

Stem Material : ASTM A564 Type 630 H1075 (17-4PH SS)

MAST Value : 5101 Lb-in

Actuator Information

Supply Pressure : 110 psig

Actuator Type : Spring Return Double Acting

Fail Safe Condition : Fail Clockwise (FCW) Fail Counter Clockwise (FCCW)

Important Note

This model may not be in current manufacturing range.
Consult Factory

Select Actuator

Note : FCW - Generally Fail Close Condition
FCCW - Generally Fail Open Condition

Supply Pressure Exceeds Actuator MOP

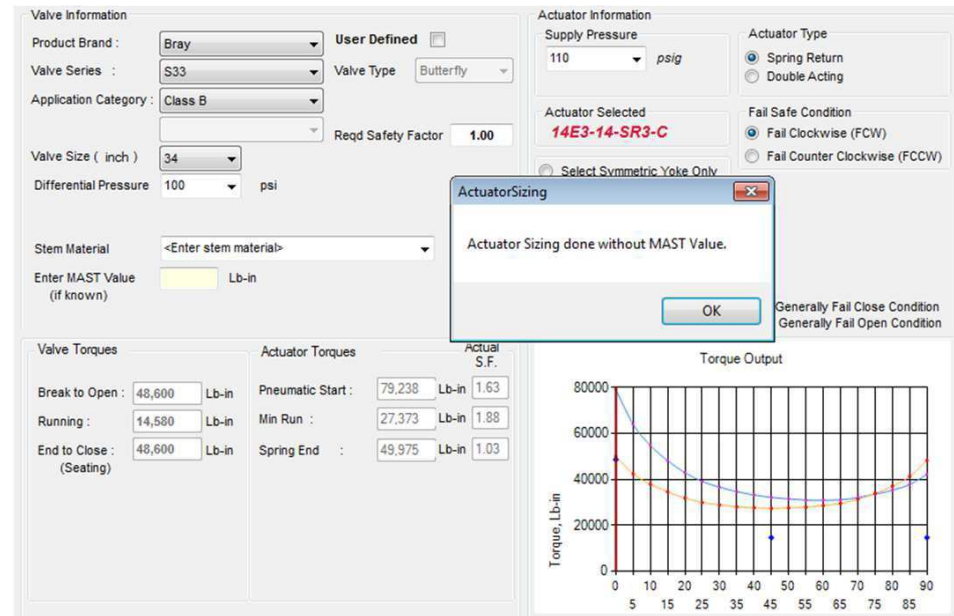
Reduce Supply Pressure to 107.5 psig (Recommended)

Re-Size the actuator to suit Supply Pressure

Submit

MAST Verification

- When the sizing is done with the MAST value input, the program validates the input against the maximum output torque of the selected actuator.
- If MAST input is not provided, the sizing will proceed with warning prompt. The user shall then verify if MAST is higher than the actuator's torque output.



The screenshot displays the software interface for valve and actuator configuration. The 'Valve Information' section includes fields for Product Brand (Bray), Valve Series (S33), Application Category (Class B), Valve Size (34 inch), and Differential Pressure (100 psi). The 'Actuator Information' section shows Supply Pressure (110 psig) and Actuator Type (Spring Return). A warning dialog box titled 'ActuatorSizing' is overlaid on the interface, displaying the message 'Actuator Sizing done without MAST Value.' and an 'OK' button.

The 'Valve Torques' and 'Actuator Torques' sections provide the following data:

Valve Torques	Actuator Torques	Actual S.F.
Break to Open : 48,600 Lb-in	Pneumatic Start : 79,238 Lb-in	1.63
Running : 14,580 Lb-in	Min Run : 27,373 Lb-in	1.88
End to Close : 48,600 Lb-in (Seating)	Spring End : 49,975 Lb-in	1.03

The 'Torque Output' graph shows Torque (Lb-in) on the Y-axis (0 to 80,000) versus an unlabeled X-axis (0 to 90). The graph displays a curve representing the torque output of the actuator, with a minimum torque of approximately 27,000 Lb-in at the 45-degree position.

Current Manufacturing Range

- If actuator size is not available in current manufacturing range, the program populates note like “This model may not be in current manufacturing range. Contact Factory”.

Valve Information

Product Brand : Bray User Defined

Valve Series : S42 Valve Type Butterfly

Flow direction : Retainer_Upstream(RU)

Std / Firesafe : Firesafe Reqd Safety Factor 1.00

Valve Size (inch) : 6

Differential Pressure : 350 psi

Stem Material : ASTM A564 Type 630 H1075 (17-4PH SS)

MAST Value : 5101 Lb-in

Actuator Information

Supply Pressure : 110 psig

Actuator Type : Spring Return Double Acting

Actuator Selected : 12E2-05-SR1

Fail Safe Condition : Fail Clockwise (FCW) Fail Counter Clockwise (FCCW)

Important Note
This model may not be in current manufacturing range. Consult Factory

[Select Actuator](#) Note : FCW - Generally Fail Close Condition
 FCCW - Generally Fail Open Condition

Valve Torques

Break to Open : 2,610 Lb-in

Running : 783 Lb-in

End to Close : 2,610 Lb-in (Seating)

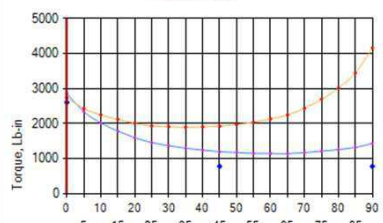
Actuator Torques

Pneumatic Start : 2,864 Lb-in 1.10 Actual S.F.

Min Run : 1,147 Lb-in 1.46

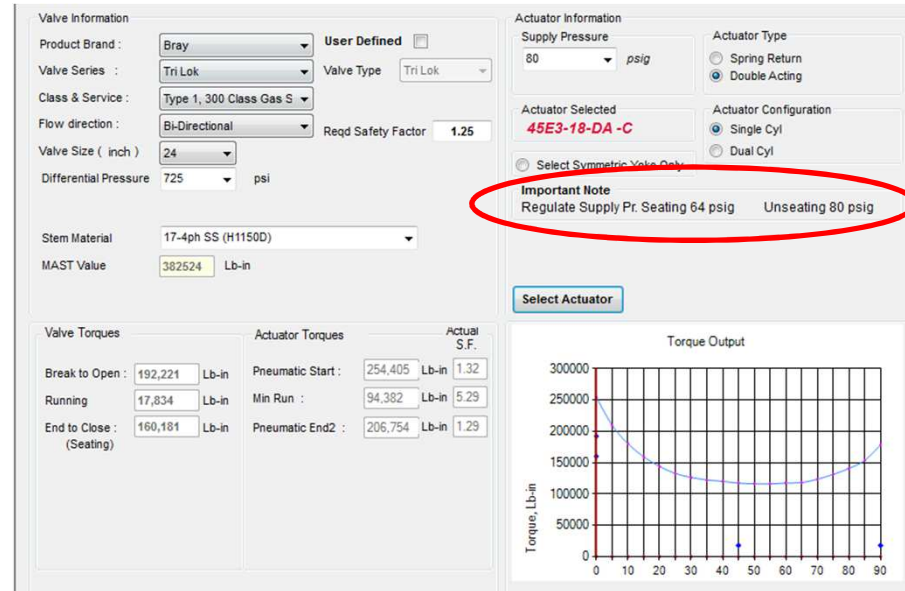
Spring End : 2,741 Lb-in 1.05

Torque Output



Sizing Trilok with DA Actuator

- The actuator sizing for Trilok valves follows a different logic from other products, to suit the requirements for the seating and unseating torques.
- While sizing DA actuators, the Output provides an Important Note stating the pressure on the actuator's ports for the valve seating and unseating actions.
- The supply pressure input for the sizing is used for the unseating of the valve, but the pressure for seating must be reduced using a pressure reducing valve.

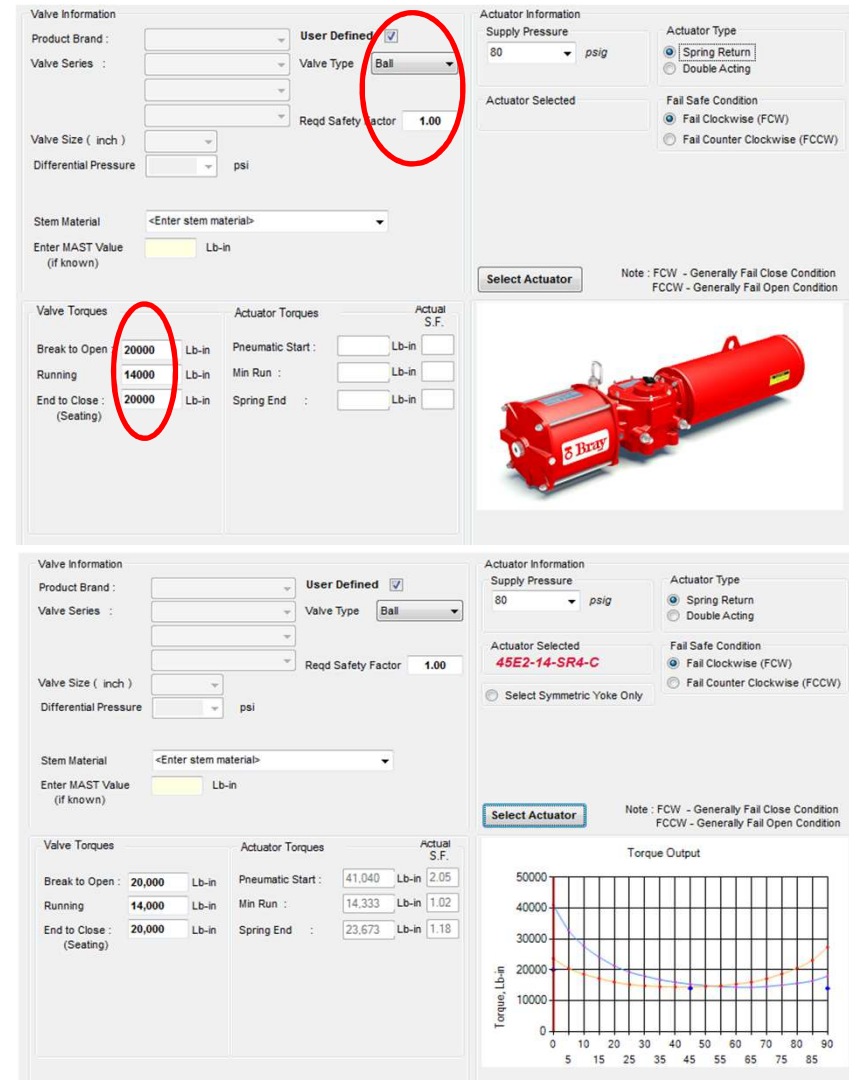


The screenshot shows the following data:

Section	Parameter	Value
Valve Information	Product Brand	Bray
	Valve Series	Tri Lok
	Class & Service	Type 1, 300 Class Gas S
	Flow direction	Bi-Directional
	Valve Size (inch)	24
	Differential Pressure	725 psi
	Stem Material	17-4ph SS (H1150D)
	MAST Value	382524 Lb-in
	Reqd Safety Factor	1.25
	Valve Type	Tri Lok
Actuator Information	Supply Pressure	80 psig
	Actuator Type	Double Acting
	Actuator Selected	45E3-18-DA-C
	Actuator Configuration	Single Cyl
Valve Torques	Break to Open	192,221 Lb-in
	Running	17,834 Lb-in
	End to Close (Seating)	160,181 Lb-in
	Pneumatic Start	254,405 Lb-in
	Min Run	94,382 Lb-in
	Pneumatic End2	206,754 Lb-in
Actuator Torques	Actual S.F.	1.32
	Actual S.F.	1.29
Important Note	Regulate Supply Pr. Seating	64 psig
	Unseating	80 psig
Torque Output Graph	Y-axis (Torque, Lb-in)	0 to 300,000
	X-axis (Angle)	0 to 90

User Defined Selection

- Sizing for unlisted valves or third party products, click 'User Defined' check box.
- Select the valve type, input the Valve, required safety factor, supply pressure, MAST value and configuration to proceed with the selection.
- The sizing proceeds in the same way as previous case, and the output shows the actuator torque, actual safety factors, torque graph, etc.
- Uncheck the check box to return to sizing the Bray listing.



The screenshot displays the software interface for selecting an actuator. The top section, 'Valve Information', includes fields for Product Brand, Valve Series, Valve Size, Differential Pressure, Stem Material, and Enter MAST Value. The 'User Defined' checkbox is checked, and the 'Valve Type' is set to 'Ball'. The 'Reqd Safety Factor' is set to 1.00. The 'Valve Torques' section shows: Break to Open: 20000 Lb-in, Running: 14000 Lb-in, End to Close (Seating): 20000 Lb-in. The 'Actuator Information' section shows: Supply Pressure: 80 psig, Actuator Type: Spring Return, and Fail Safe Condition: Fail Clockwise (FCW). A 'Select Actuator' button is present. The bottom section shows the same interface but with 'User Defined' unchecked and 'Actuator Selected' set to '45E2-14-SR4-C'. A 'Torque Output' graph is displayed at the bottom right, showing Torque (Lb-in) on the y-axis (0 to 50000) versus an unlabeled x-axis (0 to 85). The graph shows a curve that starts at approximately 40000 Lb-in at x=0, drops to a minimum of about 15000 Lb-in at x=45, and then rises to about 30000 Lb-in at x=85.

Part Number

- The sized actuator's basic information is transferred to this page in the relevant fields and is greyed out.
- User can now select the other options, and the Part Number builds up simultaneously. This code can be processed further for the Part # generation.
- Valve information is also displayed on the page.
- The information on this page shall be transferred into the spec sheet, when printed.
- Additionally, the DMK requirement would be indicated here, if the sized actuator cannot be direct mounted on the selected valve.

Actuator Specification Sheet

Series: 98 Generate Data Sheet

Actuator Size: 14E3 F

Bore Size: 3 1

Cyl Size: 16" L

Spring Size: Spring 4 4

Base Code: 213

Action: Spring Return, Fail CW C

Mounting / Yoke: ISO / Canted 2 F25

Ports: Single NPT (Standard) 1

Standard Options: None N

Design Code: Standard Pneumatic 00

Material: Standard 0

Temp Trim: Standard S

Coatings: Standard 0

Part Number 98 F 1 L 4 - 213 C 2 1 N 00S0

Valve Information

Brand / Make: Bray Valve Type: Butterfly

Valve Size: 30 inch Series / Model: S40

Additional Information: Retainer_Upstream(RU) - Standard

Differential Pressure: 285 psi MAST Value: 423121 Lb-in

Stem Material: ASTM A564 Type 630 H1075 (17-4PH SS)

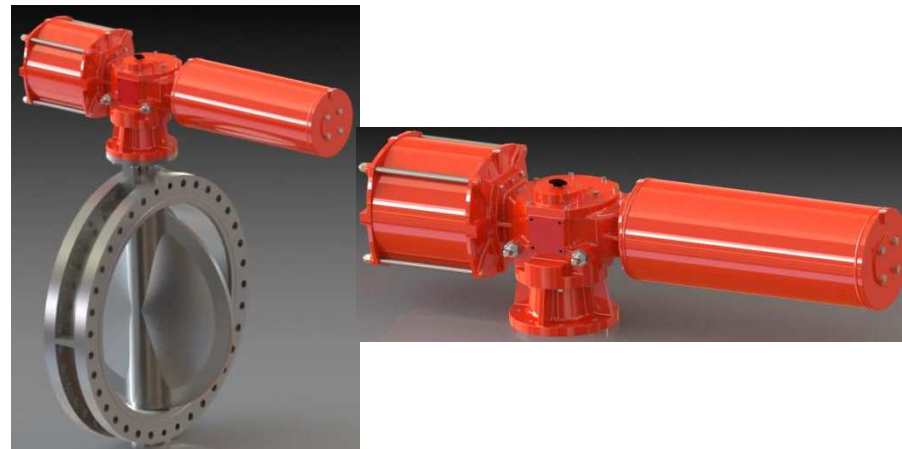
Required Safety Factor: 1.00

Stem diameter: 3.5 Mounting Flange: F30

Mounting Kit: 98 - F302 - 22850 - 536 VMC F30-2

Important Note: Pneumatic Supply Pressure: 80 psig

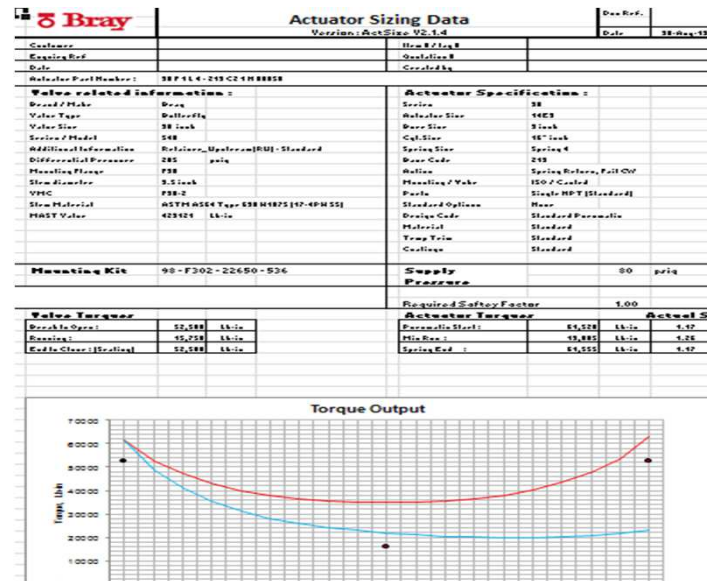
Valve Torques		Actuator Torques		Actual S.F.
Break to Open:	52,500 Lb-in	Pneumatic Start:	61,520 Lb-in	1.17
Running:	15,750 Lb-in	Min Run:	19,805 Lb-in	1.26
End to Close (Seating):	52,500 Lb-in	Spring End:	61,555 Lb-in	1.17






Printing Specifications

- All information of the selected Valve and the sized Actuator is captured and printed in an excel format file.
- This program generates final assembly Part # for selected actuator and defined options.



S92/93 Actuator Sizing

- Select series S92/93 for sizing of rack and pinion actuators.

Valve Information		Actuator Information	
Product Brand :	Bray	Supply Pressure :	60 psig
Valve Series :	S22	Actuator Type :	<input checked="" type="radio"/> Spring Return <input type="radio"/> Double Acting <input checked="" type="radio"/> S92 / 93
Seat Material :	PTFE/UHMWPE	Actuator Selected :	Actuator Model : S93 Actuator Size : 210 No. of Spring : 3
Valve Size (inch) :	8	Fail Safe Condition :	<input checked="" type="radio"/> Fail Clockwise (FCW) <input type="radio"/> Fail Counter Clockwise (FCCW)
Differential Pressure :	150 psi	Act Orientation :	Perpendicular
VMC :	D	Manual Override :	No
Stem Material :	<Enter stem material>	<input type="button" value="Generate Data Sheet"/> <input type="button" value="Select Actuator"/>	
Enter MAST Value (if known) :	Lb-in	Note : FCW - Generally Fail Close Condition FCCW - Generally Fail Open Condition	
Reqd Safety Factor : 1.00			
Valve Torques		Actuator Torques	
Break to Open :	2,402 Lb-in	Pneumatic Start :	5,902 Lb-in
Running :	721 Lb-in	Min Run :	4,906 Lb-in
End to Close (Seating) :	2,402 Lb-in	Spring End :	2,924 Lb-in
		Actual S.F. :	2.46
			6.80
			1.22



S92/93 Actuator Sizing

- Select series S92/93 for sizing of rack and pinion actuators.

Series	Size [inch]	Pressure Allowed [psi]
Triad FP	¼" to 3"	2200
Triad FP	4"	1500
Triad SP	¼" to 1 ½"	2200
Triad HP	¼" to 2"	2200
F15	½" to 12"	285
F30	½" to 12"	740
7000/8000	¼" to 4"	400
RF15	1" to 12"	285
RF30	1" to 12"	740

- The database is built up from the Sales and Technical documentation published by Bray.
- Please mail to Nedu (nedumaran.ramachandiran@bray.com/kannan.mani@bray.com) for any suggestions and improvements.