DURBIN
INDUSTRIAL VALVE
Innovation Through Flow

SYNERGYSERIES

Durbin Industrial Valve

Servo Driven Smart Control Valves

DURBIN
INDUSTRIAL VALVE

SYNERGY SERIES

FEATURES

•Pressures up to ASME 600# class
•Process temperature range -40°F to 450°F (-40°C to 231°C)
•Connection sizes from ¼”-2”
•Multiple trim sizes and flow profiles in each connection size
•Internal spring returns the valve to the original open or closed position upon signal loss, power loss or E-stop
•Normally Closed or Normally Open designs
•Stainless steel wetted components to ASME material standards
•Advanced engineered thermal plastic used for critical sealing components
•Compatible with most process fluids, both liquids and gases
•Cv ratings from .05 to 56.7
•Globe style or angle style designs available
•82,000 discrete positions per inch of travel
•**Speeds up to 1” of travel per second**
•Ambient temperature rating of 180° F (82° C)

BENEFITS

•Servomotor-actuated position control with internal smoothing of PLC analog output signal
•Soft-Seated, positive shutoff, engineered sealing edge meets highest ANSI/FCI 70-3 Class VI leakage rate standards
•Energy efficient: eliminates compressed air, tubing, fittings, I/P, regulators, solenoids, dryers
•Instantaneous reaction time (small dead time or lag)
•Reduction in hysteresis
•Repeatable, due to high resolution encoder
•Elimination of stick slip
•Longer service life: estimated 10.5 years
•Reduced and simplified maintenance
•Ability to rehome and reseat to maintain positive shutoff
•Increase in stiffness to negate the effects of upstream process condition changes
•Automatic initialization for easy setup

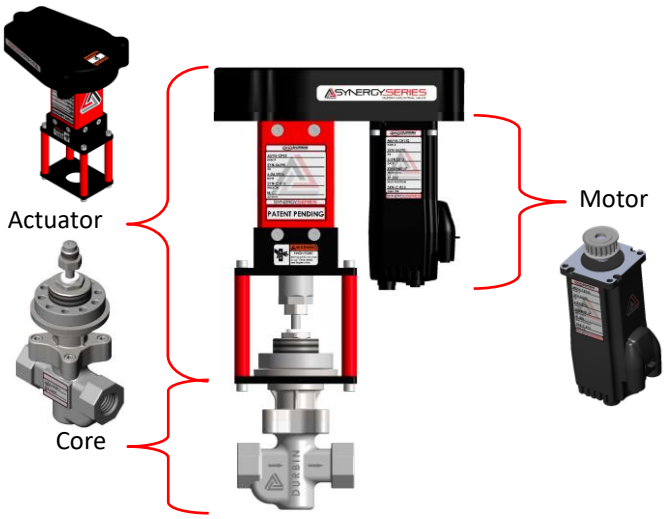
Communication

Synergy Series valves are very versatile in their ability to speak a multitude of languages, protocols, and drive commands. From the most simple analog 4-20 mA plug and play, to the more sophisticated protocols such as Ethernet/IP, the Synergy Series valves can be configured to speak with your PLC or be integrated with a standalone PLC for an all-in-one solution.

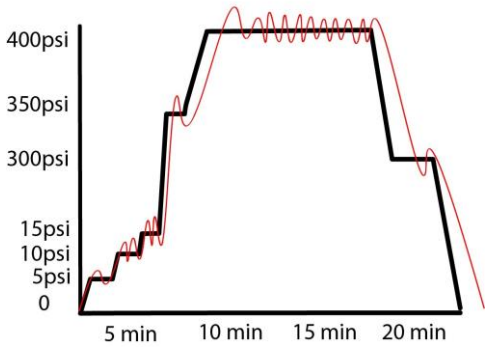
- Analog 0-20 mA
- Analog 4-20 mA
- Analog 0-10 Volts
- Analog 0-24 Volts
- Digital Step and Direction
- Ethernet
- Ethernet/IP
- ProfiNet
- Modbus TCP
- EtherCat
- CANopen
- RS-485
- 24V I/O input
- Custom analog range

Modular Design

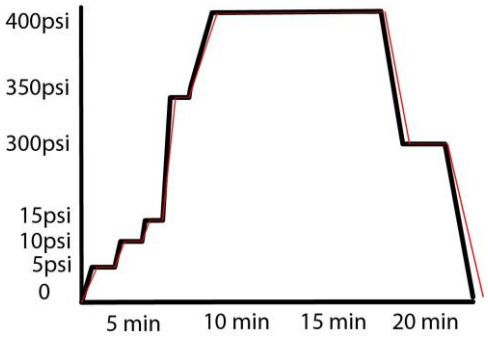
Synergy Series valves are modular. Rather than replacing the entire valve if a component fails, the user can replace just the needed component. This allows for a decrease in storeroom inventory and increased up-times as the valve may be serviced in line.



<u>Cure Time Optimization & Realization</u>: Pneumatic valves suffer from losses in both time and accuracy caused by stick slip and hysteresis. Also, repeatability is lost due to inconsistencies in traditional pneumatic actuated systems. Synergy Series eliminates these problems and ensures exact position control to maximize the cure model.



Traditional pneumatic PID



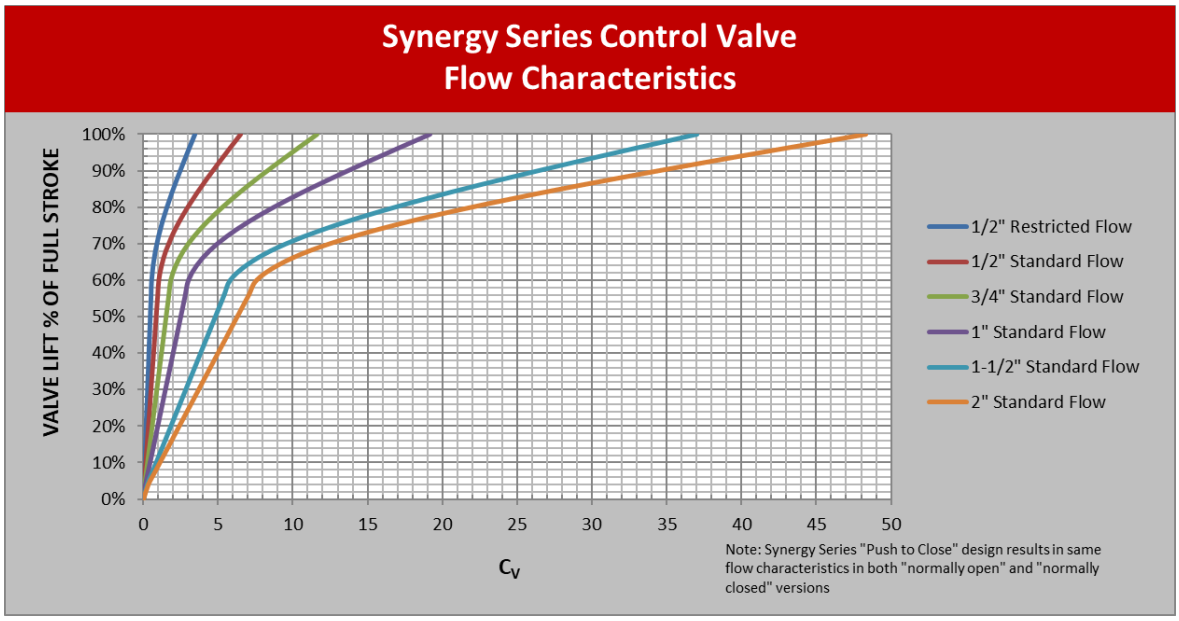
Synergy PID

Flow Profile: Control Version

Synergy Series Control valves utilize a unique flow characteristic over traditional control valves on the market today. Traditional control valves are classified into two basic flow characteristics. They are either **LINEAR** or **EQUAL PERCENTAGE**. Both of these flow types have advantages and disadvantages over the other. The Synergy Series combines **BOTH** of these flow types into a hybrid, giving the user precise control when a large turndown is required or when a continual control loop is in play. It also allows for less precise control when the valve is called upon to perform a fill function or when the valve is instructed to travel to a full open position. All Synergy control versions are designed to provide about 20% of maximum flow at 60% of valve travel.

Due to the feedback ability of this intelligent valve, customers can now evaluate the average position of the valve during any control portions of their specific cycle to determine if the valve is sized properly.

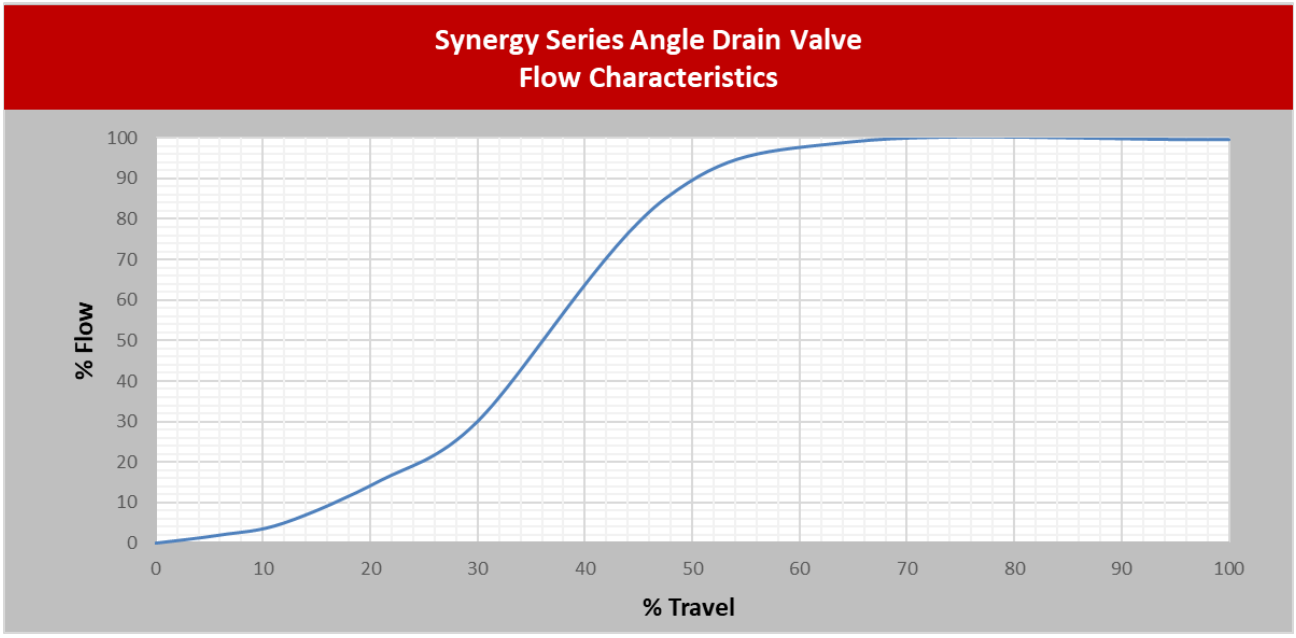
All Synergy Series Control valves are available in Restricted Flow, Standard Flow and Full Flow versions. In addition to these stock flow profiles, Durbin engineers can develop customized flow characteristics tailored to user specific needs.

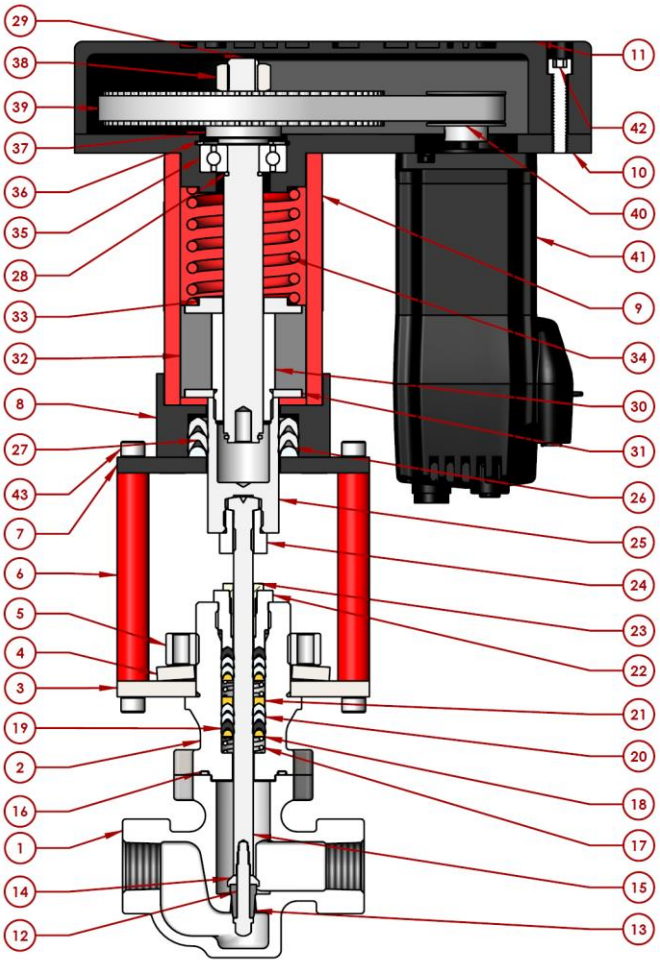


Flow Profile: Angle Drain

The Synergy Series Angle Drain is designed for use on critical drain applications where a controlled pressure step down is required, or when a fill operation requires a specific blow by on the downstream side of the vessel. The angled body design allows for near full flow characteristics comparable to that of a full flow ball valve, but also provides the improved long term sealing capabilities of a globe valve.

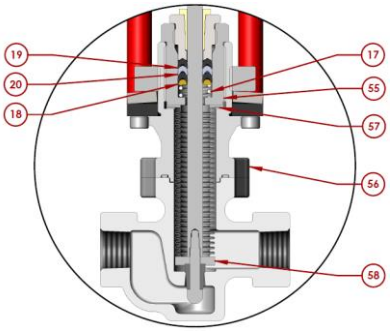
The flow profile is optimized for higher flow rates with less stem travel devoted to the control region. Typical flow profile consists of tight linear control for 12% of the travel, large gradient linear control for the next 30% and reaches full flow by 65% of travel. The remainder of the travel is designed to allow for maximum flow through the valve, while allowing any foreign debris to pass through the valve body.

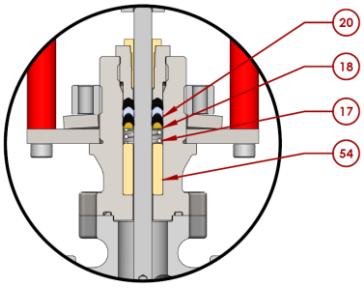




Bill of Materials-Double Packed Version

ITEM NO.	DESCRIPTION	MATERIAL	QTY.
1	Valve Body, NPT	SA-351 Gr. CF8M Stainless Steel	1
2	Packing Gland	SA-351 Gr. CF8M Stainless Steel	1
3	Bottom Mounting Plate	316 SS	1
4	Spring Washer	17-4 PH SS	1
5	Spanner Nut	316 SS	1
6	Standoff	316 SS	4
7	Top Mounting Plate	316 SS	1
8	Packing Block	Powder Coated 6061 T6 Aluminum	1
9	Actuator Tube	Powder Coated 6061 T6 Aluminum	1
10	Bottom Plate	Powder Coated 6061 T6 Aluminum	1
11	Actuator Cover	Powder Coated 6061 T6 Aluminum	1
12	Seal Retainer	316 SS	1
13	Control Seal	Modified PEEK	1
14	Stem Washer	316 SS	1
15	Stem	17-4 PH SS	1
16	Body Gasket	Spiral wound SS	1
17	Packing Spring	17-7	2
18	Packing Spreader	CDA 360	2
19	Black Packer	Modified PTFE	2
20	White Packer	Modified PTFE	4
21	Packing Spacer	CDA 360	1
22	Packing Nut	304 SS	1
23	Packing Nut Bushing	PEEK	1
24	Stem Swivel Nut	304 SS	1
25	Stem Shaft	304 SS	1
26	Stem Shaft Spreader	CDA 360	1
27	Stem Shaft Packers	Modified PTFE	2
28	Ball Screw Snap Ring	Stainless Steel	2
29	Ball Screw	Carbon Steel	1
30	Ball Nut	Carbon Steel	1
31	Ball Nut Flange	316 SS	1
32	Ball Nut Square Bushing	Thermoplastic	1
33	Ball Nut Spring Flange	316 SS	1
34	Fail Safe Spring	Chrome Silicon	1
35	Ball Bearing	Stainless Steel	1
36	Bearing Snap Ring	316 SS	1
37	Actuator Sprocket	Aluminum	1
38	Sprocket Hex Nut	Zn Coated Steel	1
39	Timing Belt	Neoprene	1
40	Drive Sprocket	Aluminum	1
41	Synergy Motor	-	1
42	Hardware	Stainless Steel	-



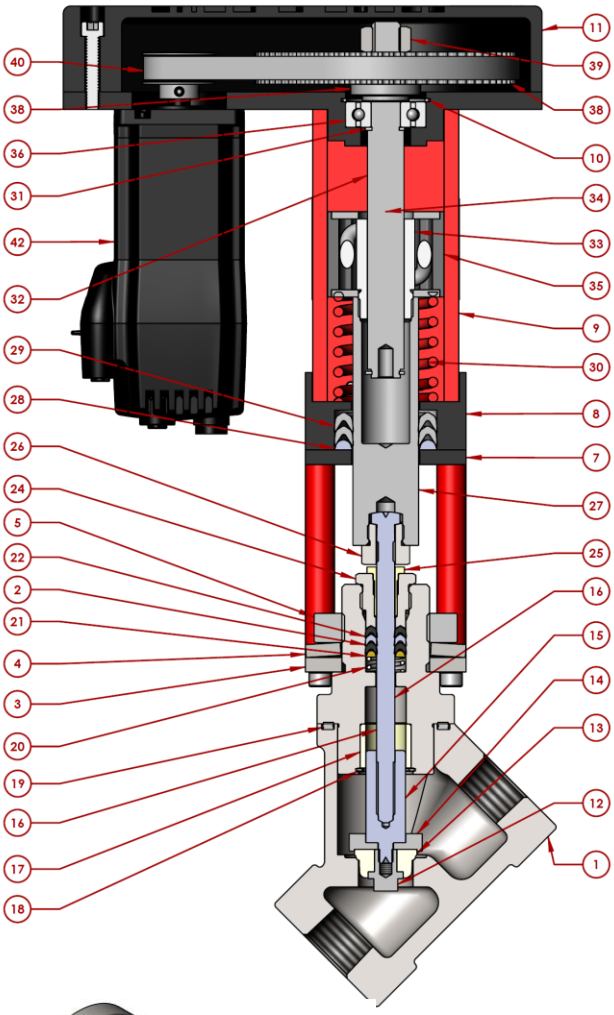


Bill of Materials-Bellows Version

ITEM NO.	DESCRIPTION	MATERIAL	QTY.
17	Packing Spring	17-7	1
18	Packing Spreader	CDA 360	1
19	Black Packer	Modified PTFE	2
20	White Packer	Modified PTFE	1
55	Outer Packing Nut	304 SS	1
56	Bellows Style Packing Gland	SA-351 Gr. CF8M Stainless Steel	1
57	Bellows Gasket	Compressed Graphite	1
58	Bellows	Inconel 625 LCF	1

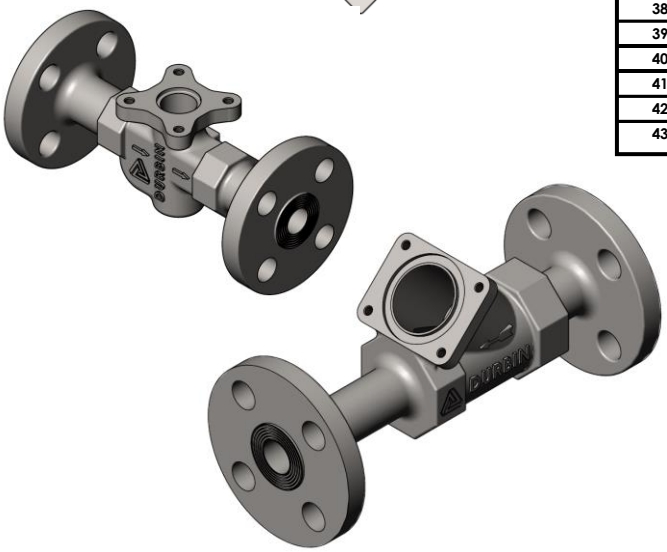
Bill of Materials-Single Packed Version

ITEM NO.	DESCRIPTION	MATERIAL	QTY.
17	Packing Spring	17-7	1
18	Packing Spreader	CDA 360	1
19	Black Packer	Modified PTFE	2
20	White Packer	Modified PTFE	1
21	Packing Spacer	CDA 360	1
54	Single Pack Spacer	Thermoplastic	1



Bill of Materials-Angle Drain

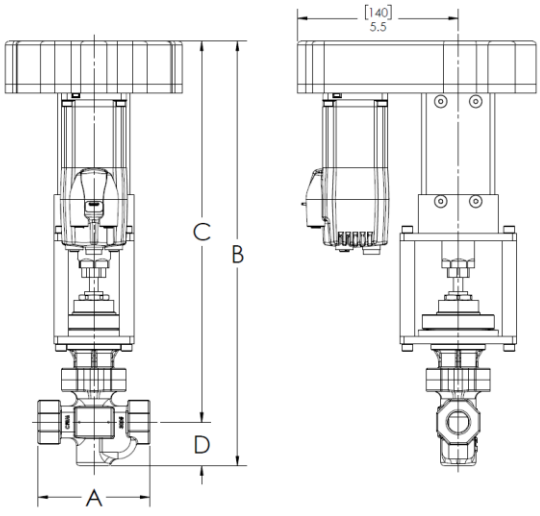
ITEM NO.	DESCRIPTION	MATERIAL	QTY.
1	Valve Body, NPT	SA-351 Gr. CF8M Stainless Steel	1
2	Packing Gland	SA-351 Gr. CF8M Stainless Steel	1
3	Bottom Mounting Plate	316 SS	1
4	Spring Washer	17-4 PH SS	1
5	Spanner Nut	316 SS	1
6	Standoff	316 SS	4
7	Top Mounting Plate	316 SS	1
8	Packing Block	Powder Coated 6061 T6 Aluminum	1
9	Actuator Tube	Powder Coated 6061 T6 Aluminum	1
10	Bottom Plate	Powder Coated 6061 T6 Aluminum	1
11	Actuator Cover	Powder Coated 6061 T6 Aluminum	1
12	Seal Retainer	316 SS	1
13	Control Seal	Modified PEEK	1
14	Stem Washer	316 SS	1
15	Upper Stem	17-4 PH SS	1
16	Lower Stem	17-4 PH SS	1
17	Body Gasket	Spiral wound SS	1
18	Packing Spring	17-7	2
19	Packing Spreader	CDA 360	2
20	Black Packer	Modified PTFE	2
21	White Packer	Modified PTFE	4
22	Packing Spacer	CDA 360	1
23	Packing Nut	304 SS	1
24	Packing Nut Bushing	PEEK	1
25	Stem Swivel Nut	304 SS	1
26	Stem Shaft	304 SS	1
27	Stem Shaft Spreader	CDA 360	1
28	Stem Shaft Packers	Modified PTFE	2
29	Ball Screw Snap Ring	Stainless Steel	2
30	Ball Screw	Carbon Steel	1
31	Ball Nut	Carbon Steel	1
32	Ball Nut Flange	316 SS	1
33	Ball Nut Square Bushing	Thermoplastic	1
34	Ball Nut Spring Flange	316 SS	1
35	Fail Safe Spring	Chrome Silicon	1
36	Ball Bearing	Stainless Steel	1
37	Bearing Snap Ring	316 SS	1
38	Actuator Sprocket	Aluminum	1
39	Sprocket Hex Nut	Zn Coated Steel	1
40	Timing Belt	Neoprene	1
41	Drive Sprocket	Aluminum	1
42	Synergy Motor	-	1
43	Hardware	Stainless Steel	-



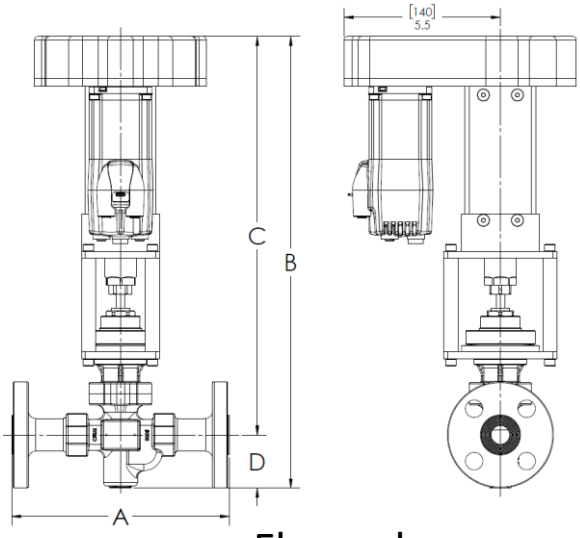
Connection Styles

ITEM NO.	DESCRIPTION	MATERIAL
1	NPT	SA-351 Gr. CF8M Stainless Steel
2	ASME B16.5/ANSI B16.5	SA-351 Gr. CF8M Stainless Steel
3	DIN*	SA-351 Gr. CF8M Stainless Steel
4	JIS*	SA-351 Gr. CF8M Stainless Steel
5	BSPT*	SA-351 Gr. CF8M Stainless Steel
6	Sanitary*	SA-351 Gr. CF8M Stainless Steel
7	Hub*	SA-351 Gr. CF8M Stainless Steel

* Non-standard connection style, allow additional lead times for initial order.

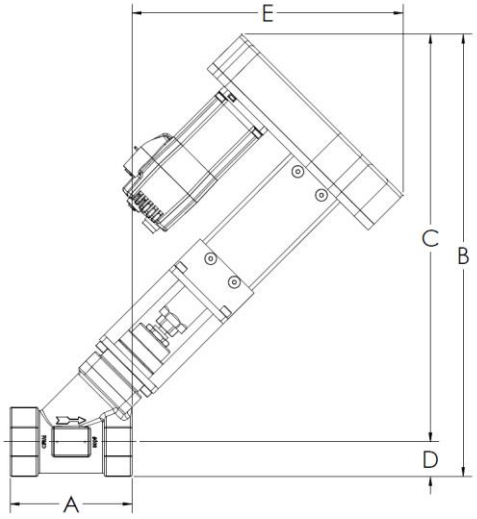


NPT

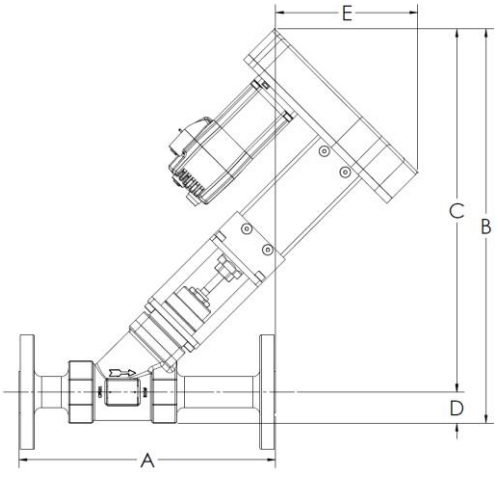


Flanged

Size	Trim	Cv	NPT				Flanged (ASME/ANSI B16.5 300#)			
			A	B	C	D	A	B	C	D
1/2"	Restricted	3.46	3.8 in	14.6 in	13.1 in	1.5 in	7.7 in	14.6 in	13.1 in	1.5 in
			97 mm	370 mm	332 mm	38 mm	195 mm	370 mm	332 mm	38 mm
	Standard	6.53	3.8 in	14.6 in	13.1 in	1.5 in	7.7 in	14.6 in	13.1 in	1.5 in
			97 mm	370 mm	332 mm	38 mm	195 mm	370 mm	332 mm	38 mm
	Full	8.5	3.8 in	14.6 in	13.1 in	1.5 in	7.7 in	14.6 in	13.1 in	1.5 in
			97 mm	370 mm	332 mm	38 mm	195 mm	370 mm	332 mm	38 mm
3/4"	Restricted	8.8	3.8 in	14.6 in	13.1 in	1.5 in	7.7 in	14.6 in	13.1 in	1.5 in
			97 mm	370 mm	332 mm	38 mm	195 mm	370 mm	332 mm	38 mm
	Standard	11.65	4.1 in	17.4 in	14.8 in	1.4 in	7.7 in	17.4 in	14.8 in	1.4 in
			105 mm	441 mm	375 mm	36 mm	195 mm	441 mm	375 mm	36 mm
	Full	17.7	4.1 in	17.4 in	14.8 in	1.4 in	7.7 in	17.4 in	14.8 in	1.4 in
			105 mm	441 mm	375 mm	36 mm	195 mm	441 mm	375 mm	36 mm
1"	Restricted	12.4	4.1 in	17.4 in	14.8 in	1.4 in	7.8 in	17.4 in	14.8 in	1.4 in
			105 mm	441 mm	375 mm	36 mm	197 mm	441 mm	375 mm	36 mm
	Standard	19.2	4.1 in	17.4 in	14.8 in	1.4 in	7.8 in	17.4 in	14.8 in	1.4 in
			105 mm	441 mm	375 mm	36 mm	197 mm	441 mm	375 mm	36 mm
	Full	25.3	4.1 in	17.4 in	14.8 in	1.4 in	7.8 in	17.4 in	14.8 in	1.4 in
			105 mm	441 mm	375 mm	36 mm	197 mm	441 mm	375 mm	36 mm
1-1/2"	Restricted	27.1	6.5 in	21.4 in	17.7 in	3.7 in	10.4 in	21.4 in	17.7 in	3.7 in
			166 mm	543 mm	450 mm	93 mm	264 mm	543 mm	450 mm	93 mm
	Standard	37	6.5 in	21.4 in	17.7 in	3.7 in	10.4 in	21.4 in	17.7 in	3.7 in
			166 mm	543 mm	450 mm	93 mm	264 mm	543 mm	450 mm	93 mm
	Full	42.7	6.5 in	21.4 in	17.7 in	3.7 in	10.4 in	21.4 in	17.7 in	3.7 in
			166 mm	543 mm	450 mm	93 mm	264 mm	543 mm	450 mm	93 mm
2"	Restricted	43.5	7.3 in	21.3 in	17.7 in	3.6 in	11.4 in	21.3 in	17.7 in	3.6 in
			184 mm	540 mm	450 mm	91 mm	289 mm	540 mm	450 mm	91 mm
	Standard	48.3	7.3 in	21.3 in	17.7 in	3.6 in	11.4 in	21.3 in	17.7 in	3.6 in
			184 mm	540 mm	450 mm	91 mm	289 mm	540 mm	450 mm	91 mm
	Full	56.7	7.3 in	21.3 in	17.7 in	3.6 in	11.4 in	21.3 in	17.7 in	3.6 in
			184 mm	540 mm	450 mm	91 mm	289 mm	540 mm	450 mm	91 mm



NPT



Flanged

Size	Trim	Cv	NPT					Flanged (ASME/ANSI B16.5 300#)				
			A	B	C	D	E	A	B	C	D	E
3/4"	Angle	22	4.4 in	15.6 in	14.3 in	1.3 in	9.7 in	10.4 in	15.6 in	14.3 in	1.3 in	9.7 in
			111 mm	397 mm	364 mm	32 mm	245 mm	264 mm	397 mm	364 mm	32 mm	245 mm
1"	Angle	34	4.4 in	15.6 in	14.3 in	1.3 in	9.7 in	10.5 in	15.6 in	14.3 in	1.3 in	9.7 in
			111 mm	397 mm	364 mm	32 mm	245 mm	267 mm	397 mm	364 mm	32 mm	245 mm
1-1/2"	Angle	42	6.0 in	17.4 in	15.9 in	1.5 in	10.1 in	15 in	17.4 in	15.9 in	1.5 in	10.1 in
			151 mm	15.9 mm	404 mm	38 mm	256 mm	381 mm	15.9 mm	404 mm	38 mm	256 mm

Valve Type Numbering System

Durbin's valve type numbering system is designed to simplify the process of proper valve selection, as each digit of the valve number has a distinct significance. This type of numbering system, often called a smart numbering system, describes the function, flow type, action, pipe size, packing type, connection style, rating and communication. This system also provides a vehicle for customers to order custom trim designs and other custom parameters, such as materials of construction. After working with Durbin Engineering, each customer-specific design would carry a special two-digit code that is unique to that customer.

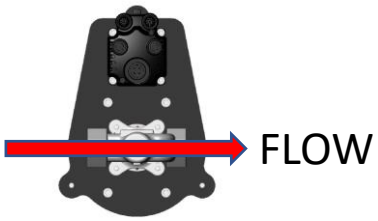
ORDERING GUIDE

SYNERGY SERIES	<---FUNCTION	<---FLOW TYPE	<---ACTION (FAIL SAFE)	<---NOMINAL PIPE SIZE	<---PACKING	<---CONNECTION STYLE	<---RATING	<---PROTOCOL
S Y N -	C -	R	1	3	3	1	2	1
	C CONTROL (2-WAY) I ISOLATION (2-WAY) D DIRECTIONAL (3-WAY) V CONTROL VACUUM (2-WAY) *3 WAY not available in Angle design *3 WAY not available with control valve function	R RESTRICTED FLOW S STANDARD FLOW F FULL FLOW A ANGLE DESIGN (Max Flow) V MODEL "V" TRIM	1 NORMALLY CLOSED 2 NORMALLY OPEN	1 1/4" NPS 2 3/8" NPS 3 1/2" NPS 4 3/4" NPS 5 1" NPS 6 1-1/4" NPS 7 1-1/2" NPS 8 2" NPS	1 SINLGE PACK 2 DOUBLE PACK 3 BELLOWS/SINGLE PACK * Angle design only available in Single Pack * "Pack" consists of 3 packers	1 NPT 2 BSPT 3 ANSI/ASME B16.5 FLANGE 4 DIN FLANGE 5 JIS FLANGE 6 SANITARY 7 HUB 8 SPEED STACK MALE 9 SPEED STACK FEMALE C CUSTOM U Union Body Connection	1 500 PSI/450 F 2 150# 3 300# LW 4 300# 5 600#	1 ETHERNET/IP 2 MODBUS TCP 3 ANALOG 4-20 MA 4 PROFINET 5 SD CARD/BLANK 6 I/O Pos. Control 7 0-10 Volt 8 0-5 Volt C Custom Program **Others available upon request

Ordering Example 1:

SYN-C-R132111

Series: Synergy Series
Function Type: Control Valve
Flow Type: Restricted Flow
Action Type: Normally Closed
Nominal Pipe Size: 1/2"
Packing Style: Double Packed
Connection Style: NPT (Female Threaded)
Pressure/Temperature Rating: 500 psi/450 F
Communication: Ethernet/IP

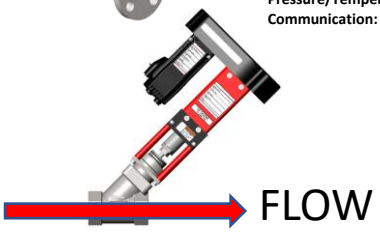


STANDARD FACTORY SET ACTUATOR/MOTOR ORIENTATION

Ordering Example 2:

SYN-C-A241343

Series: Synergy Series
Function Type: Control Valve
Flow Type: Angle Design
Action Type: Normally Open
Nominal Pipe Size: 3/4"
Packing Style: Single Packed
Connection Style: ASME/ANSI B16.5 Flanged
Pressure/Temperature Rating: 300#
Communication: Analog 4-20 mA



ANGLE ACTUATOR ORIENTATION

General Notes:

- Not every number combination is valid.
- Customer specified motor/actuator orientation available upon request on purchase order.
- Not all connection styles are readily available but can be ordered with extended lead times
- For custom connection types, custom trim designs, materials of construction or any other non-standard configuration, please contact Durbin at 330-724-9968 or email communications to sales@durbinvalve.com