



**Highland
Equipment
Limited**
STAINLESS STEEL EQUIPMENT

Manually operated

Description

The types 601 and 602 are extremely compact valves with many features which make them ideal for pharmaceutical and bio-processing applications.

Standard Features

- Compact design
- Ultem® 1000 handwheel, standard with type 601
- Stainless steel handwheel, standard with type 602
- Stainless steel bonnet with sanitary internals
- Internal adjustable travel stop (U.S. Pat. 5 377 956)
- Adjustable minimum flow regulator
- Autoclavable
- Visual position indicator
- FDA compliant diaphragms
- Body material 316L stainless steel
- Triclamp®, O.D. Tubing, ISO, and DIN end connections
- Sizes 1/4", 3/8", 1/2"

Available Options

Special connections

Hose barb, tube extensions, Swagelok®, Cajon VCR®, Ingold®, and others available upon request.

Fabrications

Cluster valve assemblies for both horizontal and vertical orientations, Zero Static T-valves, Duplex, Multiported, Bottle Sampling, Tank Bottom/Side Sampling, and custom fabrications upon request.

Materials

AL-6XN®, Hastelloy®, Titanium®, and others available upon request.

Typical Applications

- Pharmaceutical manufacturing
- Bioprocessing
- Cosmetic
- Brewery Service
- Food and Beverage
- Semiconductor
- High Purity Chemicals



Type 601



Type 602

Type 601/602 Technical Data

Size (In.)	Nominal bore (mm)	Operating pressure (psi)	C _v -value (gpm)		Body configuration D = straight through	Weight (lbs)	
			ISO Connection	O.D. Tubing		601	602
-	4	0 - 150		-	D	.35	.49
-	6	0 - 150		-	D	.35	.49
1/4	8	0 - 150		0.7	D	.35	.49
3/8	10	0 - 150		1.5	D	.35	.49
1/2	15	0 - 150		2.3	D	.35	.49

Max. perm. temperature of the operating medium: 302° F (150°C)
(Depending on diaphragm material)

The valve is completely sealed in both flow directions up to full operating pressure.

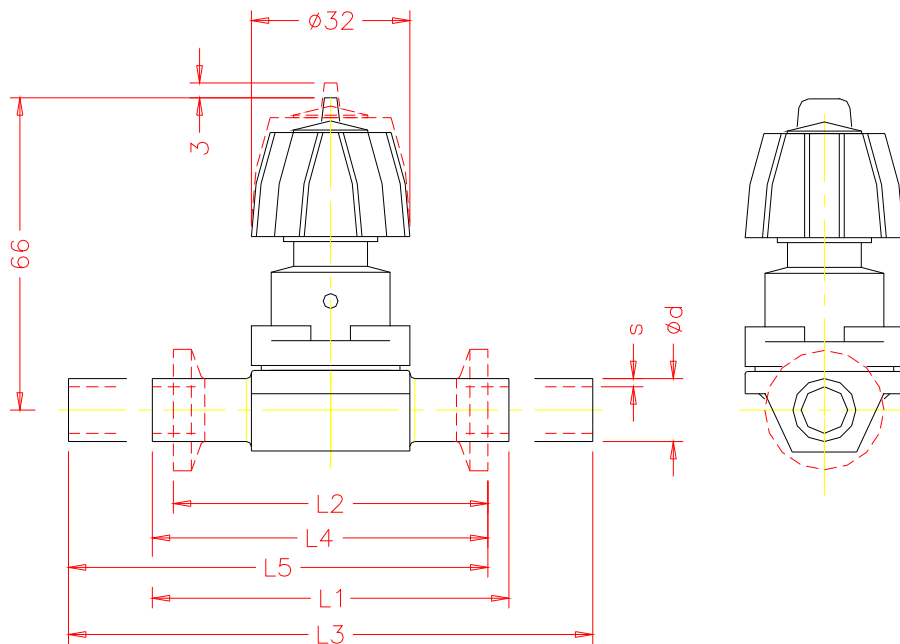
All pressure values are specified in psig.

Body Configuration	Ref.no.	Diaphragm material	Ref.no.																																																																		
Tank bottom valve body	B	Ethylene-propylene Rubber for saturated steam max 302° F	EPDM 3A																																																																		
2-way valve body	D																																																																				
2-way angled valve body	E																																																																				
Multiported valve body	M																																																																				
Zero Static T-Valve	T	2nd generation, modified PTFE with Ethylene-propylene backing	TFM/EPDM 5A																																																																		
U-bend	U																																																																				
		Ethylene-propylene Rubber for saturated steam max 302° F	EPDM 6A																																																																		
Connection	Ref.no.	<i>All diaphragms listed conform to the FDA code of Federal Regulations paragraph 177.2600 of section 21.</i>																																																																			
DIN	0																																																																				
DIN 11850/Series 1	16																																																																				
DIN 11850/Series 2	17																																																																				
DIN 11850/Series 3	18																																																																				
Butt weld OD tubing	59																																																																				
Sizes 1/4-3/8" 20 gauge .035" wall																																																																					
Sizes 1/2-3" 16 gauge .065" wall																																																																					
Sizes 4" 14 gauge .083" wall																																																																					
Tri-clamp®	80			Control function	Ref.no.																																																																
O.D. Tubing by Triclamp®	93	Manually operated	0																																																																		
Extended O.D. Tubing	94																																																																				
Extended O.D. Tubing by Triclamp®	95																																																																				
Body material	Ref.no.	Surface finish																																																																			
Investment cast body																																																																					
Stainless steel 316 L \geq 1.4435 (BN2) Fe < 0.5%	32	<table border="1"> <thead> <tr> <th rowspan="2">μ-in.</th> <th rowspan="2">BPE Surface Designation</th> <th colspan="2">Ra Average [Note (1)]</th> <th colspan="2">Ra Max</th> <th rowspan="2"></th> </tr> <tr> <th>μ-in.</th> <th>μm</th> <th>μ-in.</th> <th>μm</th> </tr> </thead> <tbody> <tr> <td>32</td> <td>Mechanical</td> <td></td> <td></td> <td></td> <td></td> <td>3</td> </tr> <tr> <td>25</td> <td>Mechanical</td> <td>SFV3</td> <td>25</td> <td>0.625</td> <td>30</td> <td>0.750</td> <td>1502</td> </tr> <tr> <td>20</td> <td>E-pol</td> <td>SFV6</td> <td>20</td> <td>0.500</td> <td>25</td> <td>0.625</td> <td>1508</td> </tr> <tr> <td>20</td> <td>Mechanical</td> <td>SFV2</td> <td>20</td> <td>0.500</td> <td>25</td> <td>0.625</td> <td>1507</td> </tr> <tr> <td>15</td> <td>E-pol</td> <td>SFV5</td> <td>15</td> <td>0.375</td> <td>20</td> <td>0.500</td> <td>1537</td> </tr> <tr> <td>11</td> <td>Mechanical</td> <td>SFV1</td> <td>15</td> <td>0.375</td> <td>20</td> <td>0.500</td> <td>1536</td> </tr> <tr> <td>10</td> <td>E-pol</td> <td>SFV4</td> <td>10</td> <td>0.250</td> <td>15</td> <td>0.375</td> <td>1516</td> </tr> </tbody> </table>		μ -in.	BPE Surface Designation	Ra Average [Note (1)]		Ra Max			μ -in.	μ m	μ -in.	μ m	32	Mechanical					3	25	Mechanical	SFV3	25	0.625	30	0.750	1502	20	E-pol	SFV6	20	0.500	25	0.625	1508	20	Mechanical	SFV2	20	0.500	25	0.625	1507	15	E-pol	SFV5	15	0.375	20	0.500	1537	11	Mechanical	SFV1	15	0.375	20	0.500	1536	10	E-pol	SFV4	10	0.250	15	0.375	1516
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Stainless steel 1.4539 (UNS N 08904)	33																																																																				
Forged Body																																																																					
Stainless steel 316 L \geq 1.4435 (ASTM A 182)	40																																																																				
Stainless steel 316 L \geq 1.4435 (BN2) Fe < 0.5%	42																																																																				
Machined block																																																																					
Stainless steel 316 L \geq 1.4435 (ASTM A 479)	41	Special Versions	Ref.no.																																																																		
Special versions		Special versions	UXXXX																																																																		
(Consult factory for special material reference numbers)	91																																																																				

Order Example	-601	015	U	80	41	3A	0			040	94	1537	
Type of valve	-601												
Size DN		015											
Body configuration			U										
Connection (valve body)				80									
Body material					41								
Diaphragm material						3A							
Control function							0						
Actuator size													
Locking device													
Pipe main size										040			
Pipe main connection											94		
Surface finish												1537	
Special version (XXXX)													



Type 601/602 Dimensional Data



Take Out Dimension For Standard Connections

Size	DN	Units	Con. Ref. No.		(59)	(80)	(94)	(93)	(95)
			Ød	s	L1	L2	L3	L4	L5
1/4	8	mm	6.35	0.89	72.00	63.50	148.20	67.75	105.85
		in	0.250	0.035	2.835	2.500	5.835	2.667	4.167
3/8	10	mm	9.53	0.89	72.00	63.50	148.20	67.75	105.85
		in	0.375	0.035	2.835	2.500	5.835	2.667	4.167
1/2	15	mm	12.70	1.65	72.00	63.50	148.20	67.75	105.85
		in	0.500	0.065	2.835	2.500	5.835	2.667	4.167

- L1 = Connection Code 59 = Standard butt-weld
- L2 = Connection Code 80 = Standard clamp
- L3 = Connection Code 94 = Standard butt-weld extension (AWF)
- L4 = Connection Code 93 = Standard clamp X butt-weld
- L5 = Connection Code 95 = Standard clamp X butt-weld extension (AWF)

Optional Spigot Dimensions

Size	DN	L ₁	DIN (0)		DIN Series 1 (16)		DIN Series 2 (17)		DIN Series 3 (18)		ISO (60)		O.D. Tubing (59)	
			s	ø d	ø d	s	ø d	s	ø d	s	ø d	s	ø d	s
-	4	72	1	6	-	-	-	-	-	-	-	-	-	-
-	6	72	1	8	-	-	-	-	-	-	-	-	-	-
1/4"	8	72	1	10	-	-	-	-	-	-	13.5	1.6	.250	.035
3/8"	10	72	-	-	12	1	13	1.5	14	2	-	-	.375	.035
1/2"	15	72	-	-	-	-	-	-	-	-	-	-	.500	.065

Drain Angles

Size	DN	Degrees
1/4"	8	55°
3/8"	10	60°
1/2"	15	65°

Drain angles are for BS O.D. Tubing only.

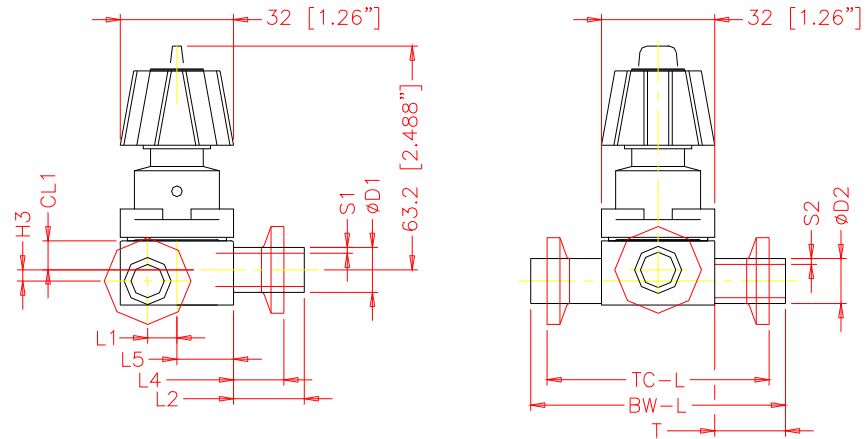
Type 601/602 Dimensional Data

Standard Features

- Sterile design
- Mechanical parts isolated from process
- Zero dead-leg with no bacteria entrapment
- Maximum drainage, leaving virtually no residue
- Body machined from 316L stainless steel solid bar stock or specified material
- Compact design
- Minimum tube length of 1.5" for automatic orbital welding

Typical Applications

- WFI point-of-use
- DI systems
- SIP (steam-in-place)
- CIP (clean-in-place)
- Sampling
- Product transfer
- Draining
- Diverting applications of critical process fluids



D1 x D2	Units	D1	s1	D2	s2	H3	L1	Code 59			Code 94			Code 80		
								L2	T	BW-L	L2	T	BW-L	L4	L5	TC-L
1/4 x 1/4	mm in	6.35 0.250	1.2 0.047	6.35 0.250	1.2 0.047	-0.02 0.0	5.4 0.2	20.0 0.8	20.0 0.8	72.0 2.8	38.1 1.5	38.1 1.5	108.2 4.26	19.7 0.8	16.0 0.6	71.4 2.8
1/4 x 1/2	mm in	6.35 0.250	1.2 0.047	12.7 0.500	1.65 0.065	3.15 0.1	8.2 0.3	20.0 0.8	20.0 0.8	72.0 2.8	38.1 1.5	38.1 1.5	108.2 4.26	19.7 0.8	16.0 0.6	71.4 2.8
1/4 x 3/4	mm in	6.35 0.250	1.2 0.047	19.05 0.750	1.65 0.065	6.33 0.2	11.7 0.5	20.0 0.8	25.0 1.0	82.0 3.2	38.1 1.5	38.1 1.5	108.2 4.26	19.7 0.8	16.0 0.6	71.4 2.8
1/4 x 1	mm in	6.35 0.250	1.2 0.047	25.4 1.000	1.65 0.065	9.5 0.4	15.3 0.6	20.0 0.8	25.0 1.0	82.0 3.2	38.1 1.5	38.1 1.5	108.2 4.26	19.7 0.8	16.0 0.6	71.4 2.8
1/4 x 1 1/2	mm in	6.35 0.250	1.2 0.047	38.1 1.500	1.65 0.065	15.85 0.6	22.3 0.9	20.0 0.8	25.0 1.0	82.0 3.2	38.1 1.5	38.1 1.5	108.2 4.26	19.7 0.8	16.0 0.6	71.4 2.8
1/4 x 2	mm in	6.35 0.250	1.2 0.047	50.8 2.000	1.65 0.065	22.2 0.9	29.4 1.2	20.0 0.8	30.0 1.2	92.0 3.6	38.1 1.5	44.5 1.8	120.9 4.76	19.7 0.8	16.0 0.6	71.4 2.8
1/4 x 2 1/2	mm in	6.35 0.250	1.2 0.047	63.5 2.500	1.65 0.065	28.55 1.1	36.4 1.4	20.0 0.8	30.0 1.2	92.0 3.6	38.1 1.5	44.5 1.8	120.9 4.76	19.7 0.8	16.0 0.6	71.4 2.8
3/8 x 1/2	mm in	9.525 0.375	1.2 0.047	12.7 0.500	1.65 0.065	3.15 0.1	8.2 0.3	20.0 0.8	20.0 0.8	72.0 2.8	38.1 1.5	38.1 1.5	108.2 4.26	19.7 0.8	16.0 0.6	71.4 2.8
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3/8 x 1	mm in	9.525 0.375	1.2 0.047	25.4 1.000	1.65 0.065	9.5 0.4	15.3 0.6	20.0 0.8	25.0 1.0	82.0 3.2	38.1 1.5	38.1 1.5	108.2 4.26	19.7 0.8	16.0 0.6	71.4 2.8
3/8 x 1 1/2	mm in	9.525 0.375	1.2 0.047	38.1 1.500	1.65 0.065	15.85 0.6	22.3 0.9	20.0 0.8	25.0 1.0	82.0 3.2	38.1 1.5	38.1 1.5	108.2 4.26	19.7 0.8	16.0 0.6	71.4 2.8
3/8 x 2	mm in	9.525 0.375	1.2 0.047	50.8 2.000	1.65 0.065	22.2 0.9	29.4 1.2	20.0 0.8	30.0 1.2	92.0 3.6	38.1 1.5	44.5 1.8	120.9 4.76	19.7 0.8	16.0 0.6	71.4 2.8
1/2 x 1/2	mm in	12.7 0.500	1.65 0.065	12.7 0.500	1.65 0.065	3.15 0.1	8.2 0.3	20.0 0.8	20.0 0.8	72.0 2.8	38.1 1.5	38.1 1.5	108.2 4.26	19.7 0.8	16.0 0.6	71.4 2.8
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1/2 x 1 1/2	mm in	12.7 0.500	1.65 0.065	38.1 1.500	1.65 0.065	15.85 0.6	22.3 0.9	20.0 0.8	25.0 1.0	82.0 3.2	38.1 1.5	38.1 1.5	108.2 4.26	19.7 0.8	16.0 0.6	71.4 2.8
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TOL ±1mm Note: Dimension subject to change

Size		¼	3/8	½	¾	1	1½	2	2½	3	4
DN		8	10	15	20	25	40	50	65	80	100
Order Example	-601 015 T 80 41 3A 0					040	94	1537			
Type of valve	-601										
Size DN	015										
Body configuration	T										
Connection (valve body)	80										
Body material	41										
Diaphragm material	3A										
Control function	0										
Actuator size											
Locking device											
Pipe main size					040						
Pipe main connection						94					
Surface finish								1537			
Special version (XXXX)											



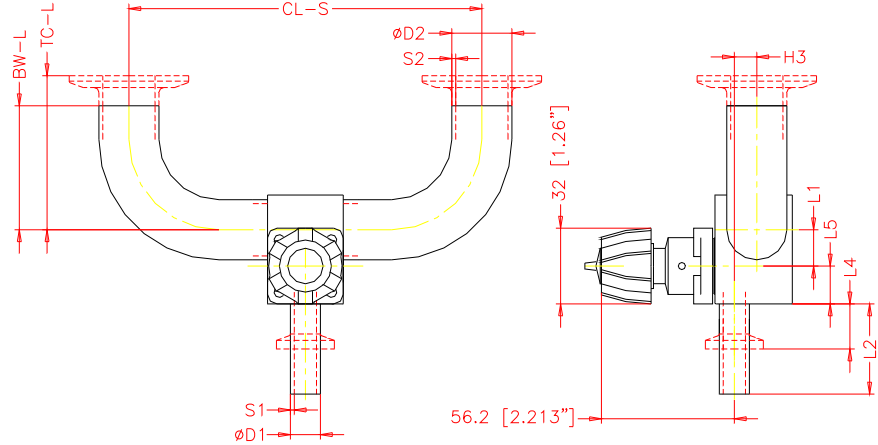
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- Sterile design
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- Body machined from 316L stainless steel solid bar stock or specified material
- Compact design
- Minimum tube length for automatic orbital welding

Typical Applications

- WFI point-of-use
- DI systems
- SIP (steam-in-place)
- CIP (clean-in-place)
- Sampling
- Product transfer
- Draining
- Diverting applications of critical process



D1 x D2	Units	D1	s1	D2	s2	H3	L1	Code 59		Code 94		CL	Code 94		Code 80
								L2	L2	L4	L5		BW-L	TC-L	
1/4 x 1/4	mm	6.35	1.2	6.35	1.2	-0.02	5.4	20.0	38.1	19.7	16.0	198.4	76.2	41.3	
	in	0.250	0.047	0.250	0.047	0.0	0.2	0.8	1.5	0.8	0.6	7.8	3.0	1.6	
1/4 x 1/2	mm	6.35	1.2	12.7	1.65	3.15	8.2	20.0	38.1	19.7	16.0	198.4	76.2	41.3	
	in	0.250	0.047	0.500	0.065	0.1	0.3	0.8	1.5	0.8	0.6	7.8	3.0	1.6	
1/4 x 3/4	mm	6.35	1.2	19.05	1.65	6.33	11.7	20.0	38.1	19.7	16.0	198.4	76.2	41.3	
	in	0.250	0.047	0.750	0.065	0.2	0.5	0.8	1.5	0.8	0.6	7.8	3.0	1.6	
1/4 x 1	mm	6.35	1.2	25.4	1.65	9.5	15.3	20.0	38.1	19.7	16.0	198.4	76.2	50.8	
	in	0.250	0.047	1.000	0.065	0.4	0.6	0.8	1.5	0.8	0.6	7.8	3.0	2.0	
1/4 x 1 1/2	mm	6.35	1.2	38.1	1.65	15.85	22.3	20.0	38.1	19.7	16.0	236.5	95.3	69.9	
	in	0.250	0.047	1.500	0.065	0.6	0.9	0.8	1.5	0.8	0.6	9.3	3.8	2.8	
1/4 x 2	mm	6.35	1.2	50.8	1.65	22.2	29.4	20.0	38.1	19.7	16.0	287.3	120.7	88.9	
	in	0.250	0.047	2.000	0.065	0.9	1.2	0.8	1.5	0.8	0.6	11.3	4.8	3.5	
1/4 x 2 1/2	mm	6.35	1.2	63.5	1.65	28.55	36.4	20.0	38.1	19.7	16.0	325.4	139.7	108.0	
	in	0.250	0.047	2.500	0.065	1.1	1.4	0.8	1.5	0.8	0.6	12.8	5.5	4.3	
3/8 x 1/2	mm	9.525	1.2	12.7	1.65	3.15	8.2	20.0	38.1	19.7	16.0	198.4	76.2	41.3	
	in	0.375	0.047	0.500	0.065	0.1	0.3	0.8	1.5	0.8	0.6	7.8	3.0	1.6	
3/8 x 3/4	mm	9.525	1.2	19.05	1.65	6.33	11.7	20.0	38.1	19.7	16.0	198.4	76.2	41.3	
	in	0.375	0.047	0.750	0.065	0.2	0.5	0.8	1.5	0.8	0.6	7.8	3.0	1.6	
3/8 x 1	mm	9.525	1.2	25.4	1.65	9.5	15.3	20.0	38.1	19.7	16.0	198.4	76.2	50.8	
	in	0.375	0.047	1.000	0.065	0.4	0.6	0.8	1.5	0.8	0.6	7.8	3.0	2.0	
3/8 x 1 1/2	mm	9.525	1.2	38.1	1.65	15.85	22.3	20.0	38.1	19.7	16.0	236.5	95.3	69.9	
	in	0.375	0.047	1.500	0.065	0.6	0.9	0.8	1.5	0.8	0.6	9.3	3.8	2.8	
3/8 x 2	mm	9.525	1.2	50.8	1.65	22.2	29.4	20.0	38.1	19.7	16.0	287.3	120.7	88.9	
	in	0.375	0.047	2.000	0.065	0.9	1.2	0.8	1.5	0.8	0.6	11.3	4.8	3.5	
1/2 x 1/2	mm	12.7	1.65	12.7	1.65	3.15	8.2	20.0	38.1	19.7	16.0	198.4	76.2	41.3	
	in	0.500	0.065	0.500	0.065	0.1	0.3	0.8	1.5	0.8	0.6	7.8	3.0	1.6	
1/2 x 3/4	mm	12.7	1.65	19.05	1.65	6.33	11.7	20.0	38.1	19.7	16.0	198.4	76.2	41.3	
	in	0.500	0.065	0.750	0.065	0.2	0.5	0.8	1.5	0.8	0.6	7.8	3.0	1.6	
1/2 x 1	mm	12.7	1.65	25.4	1.65	9.5	15.3	20.0	38.1	19.7	16.0	198.4	76.2	50.8	
	in	0.500	0.065	1.000	0.065	0.4	0.6	0.8	1.5	0.8	0.6	7.8	3.0	2.0	
1/2 x 1 1/2	mm	12.7	1.65	38.1	1.65	15.85	22.3	20.0	38.1	19.7	16.0	236.5	95.3	69.9	
	in	0.500	0.065	1.500	0.065	0.6	0.9	0.8	1.5	0.8	0.6	9.3	3.8	2.8	
1/2 x 2	mm	12.7	1.65	50.8	1.65	22.2	29.4	20.0	38.1	19.7	16.0	287.3	120.7	88.9	
	in	0.500	0.065	2.000	0.065	0.9	1.2	0.8	1.5	0.8	0.6	11.3	4.8	3.5	

TOL ±1mm Note: Dimension subject to change

Size	1/4	3/8	1/2	3/4	1	1 1/2	2	2 1/2	3	4
DN	8	10	15	20	25	40	50	65	80	100

Order Example	-601	015	U	80	41	3A	0			040	94	1537	
Type of valve	-601												
Size DN		015											
Body configuration			U										
Connection (valve body)				80									
Body material					41								
Diaphragm material						3A							
Control function							0						
Actuator size													
Locking device													
Pipe main size										040			
Pipe main connection											94		
Surface finish												1537	
Special version (XXXX)													



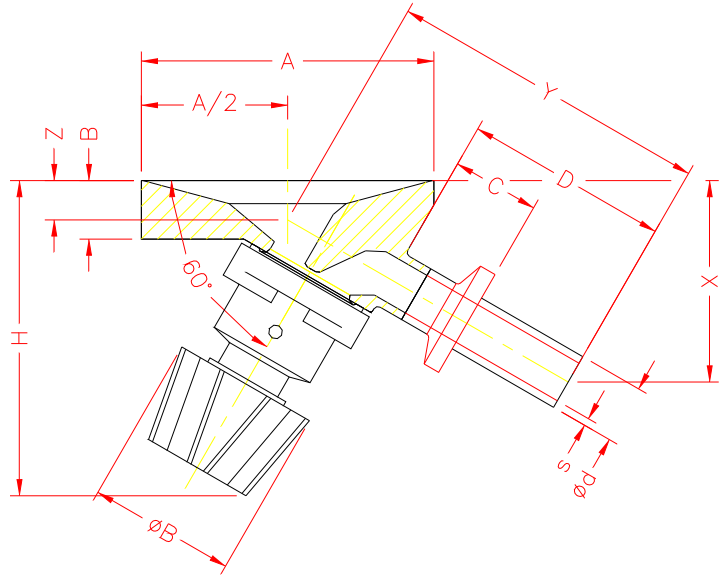
Type 601/602 Dimensional Data

Standard Features

- Sterile design
- Mechanical parts isolated from processes
- Designed to minimize fluid flow resistance
- Maximum drainage, leaving virtually no residue
- Pocket-free interior surface with no entrapment areas
- Body machined from 316L stainless steel bar stock ASME SA-479 (UNS S31 603)
- Complies with ASME Boiler & Pressure Vessel code requirements, section VIII Division #1

Typical Applications

- Media fill and transfer vessels
- CIP (clean-in-place) tanks
- Bioreactor & Fermentation vessels
- Water for Injection storage vessels (WFI)
- Sterile receivers
- Any process vessels used in pharmaceutical / bioprocessing applications



Connection Type	Size	DN		Ød	s	A	B	C	D	Y	X	Z	ØB	H
Code 59	1/4	8	mm	6.35	1.20	63.50	12.70	15.88	41.28	65.32	44.86	12.21	32.00	68.40
BS OD Tubing			in	0.250	0.047	2.500	0.500	0.625	1.625	2.571	1.766	0.481	1.260	2.693
Code 59	3/8	10	mm	9.53	1.20	63.50	12.70	15.88	41.28	66.23	43.48	10.37	32.00	68.40
BS OD Tubing			in	0.375	0.047	2.500	0.500	0.625	1.625	2.608	1.712	0.408	1.260	2.693
Code 59	1/2	15	mm	12.70	1.65	63.50	12.70	15.88	41.28	67.15	42.11	8.54	32.00	68.40
BS OD Tubing			in	0.500	0.065	2.500	0.500	0.625	1.625	2.644	1.658	0.336	1.260	2.693

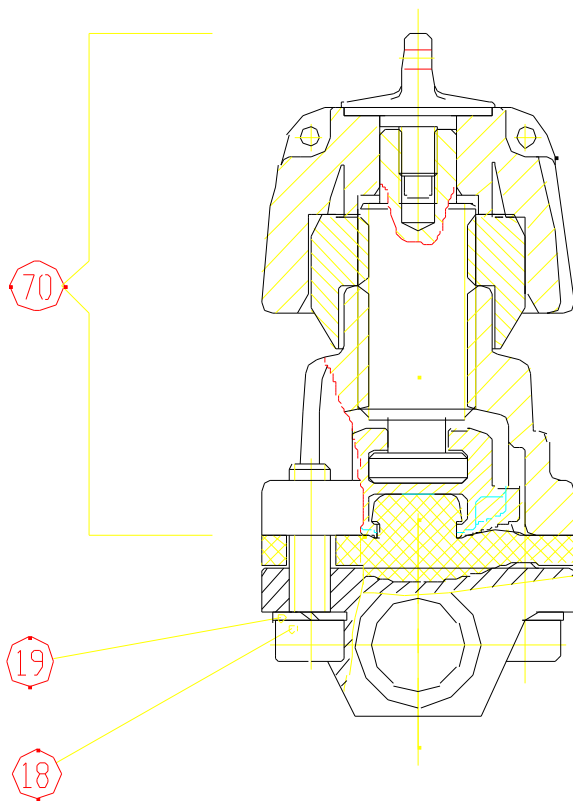
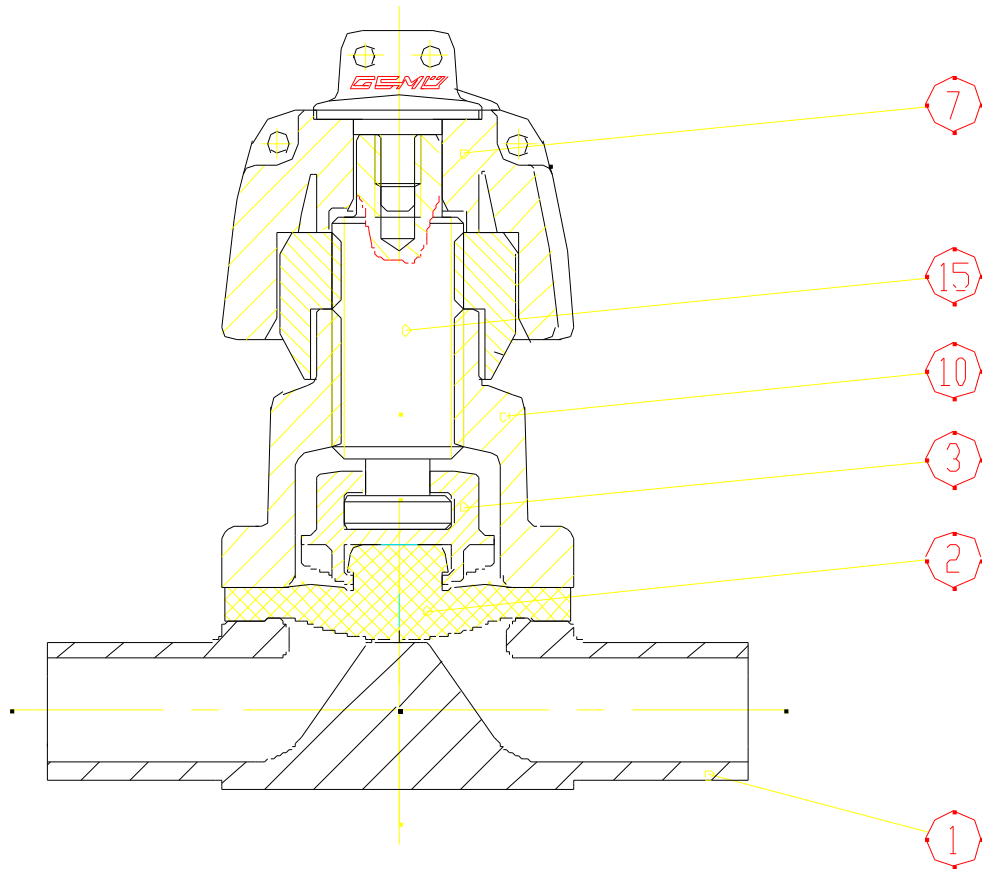
TOL ±1mm Note: Dimension subject to change

Size	¼	3/8	½	¾	1	1½	2	2½	3	4
DN	8	10	15	20	25	40	50	65	80	100

Order Example	-601	015	B	80	41	3A	0								1537
Type of valve	-601														
Size DN		015													
Body configuration			B												
Connection (valve body)				80											
Body material					41										
Diaphragm material						3A									
Control function							0								
Actuator size															
Locking device															
Pipe main size															
Pipe main connection															
Surface finish															1537
Special version (XXXX)															



Type 601/602 Spare Parts



ITEM	PART
1	Valve Body
2	Diaphragm
3	Compressor
6	Pin
7	Hand Wheel
10	Valve Top
15	Spindle
18	Screw
19	Lock Washer
20	Nut
21	Screw