



300

8

K3N05

15TH



SO

SO4097



MODEL

KGV.30.250.WL3B.A300.PA



BODY

WCB

SIZE

DN25



WEDGE

AISI 316L

RATING

300PSI

STEM

SS316

DRILLING

ANSI300

www.wmvalves.com



WARREN-MORRISON VALVES LTD



***Manufacturers of Industrial Valve Products
& Process Solution Providers***





About Warren-Morrison

Established in 1949 in the United Kingdom, Warren-Morrison Valves Ltd has been manufacturing its own unique range of industrial valves for over 63 years.

Having our internal powder coating application, rubber moulding department, machine shop, development and test facilities ensures we maintain total control over production and quality through continuous in process inspection (IPI). Our dedication towards forward development has continued to ensure our market position as a selected industrial valve manufacturer and supplier.

Along with our standard manual range of industrial valves, such configurations include:

- Full installation packages supplied with process control valves, positioners, solenoid valves, AR regulators, limit and proximity indication including mechanical, electrical and magnetic.
- Direct acting air operated diaphragm valves manually extended pit valves.
- High pressure ANSI 150 & 300lb fire hydrant valves based on the tried and trusted S type design S.O.L.A.S approved and pursuing FM approval.
- Bespoke flange connections to suit all piping schedules.
- Cast modifications and bespoke engineered platform designed specifically to accept customers actuated needs.
- Pneumatically actuated valve configurations.
- Electrically actuated valve configurations.
- Colour coded valve packages in various protective coatings to meet the demands of modern plant requirements, both practically and environmentally.
- Troubleshooting and consultation.

Warren-Morrison Valves Ltd has continued to re-invest in efficient equipment to further improve our service to our valued customers. As part of our conscious attitude towards 21st century process applications, we can confidently configure our existing standard valve range in response to customer's specific needs to ensure complete harmony and control within specific piping and control systems. It is our policy to provide the most flexible, personal and attentive response to all queries and orders. As Warren-Morrison, we pride ourselves on our strong technical ability to support our clients through all stages of the procurement process even continuing the same level of efficiency and support long after successful sale. Warren-Morrison equally prides itself on its remedial support response (RSR). Warren-Morrison can provide all valve spares and usually delivered within 36 hours of notification, consequently limiting unscheduled maintenance time to an absolute minimum.

Our products are accepted worldwide for engineering excellence, economy, reliability and above all longevity. Our extensive understanding experience, project engineers and design engineers along with computer aided generated drawings and designs, helps support customers every step of the way striving to reduce the cost of long term ownership.

Warren-Morrison are supported by an ever growing network of authorised sales and service agents worldwide offering greater value to unrivalled service.

Our products are completely unique by design and manufactured from verified and traceable raw materials from THE UK and Europe only. Our company logo is integrally cast on each product to identify us as the manufacturer, this further ensures our authenticity and above all, your complete satisfaction.



United by Quality



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'S' Type Diaphragm Valves



HPE - Encapsulated Valve

NOTE: Warren-Morrison manufacture bespoke valve configurations offering many permutations to suit exact customers specifications.

Diaphragm Technology

The Warren-Morrison 'S' Type Diaphragm Valve is of an advanced design that provides a straight through flow with a diaphragm moulded in the open position. This is achieved by employing a curved bonnet flange and a diaphragm so moulded that it moves from the open to closed position merely by partially straightening its curved surfaces and, therefore, no undue stress is applied. Moulded into the rubber is a synthetic fibre reinforcement and diaphragm stud by which the diaphragm is attached to the compressor.

To ensure correct sealing it is essential that the bonnet assembly is in the closed position when a diaphragm is fitted to a valve body.



Standard Body Linings

- Hard Rubber
- Soft Natural Rubber
- EPDM
- Hypalon
- Butyl
- ECTFE
- HPE - Encapsulation
- Neoprene
- PFA
- Others available on request

Warren-Morrison Diaphragm Valves are of an advanced design which provides straight through flow whilst restricting to a minimum flexing stress imposed on the diaphragm.

The internal contours of the body ensure smooth flow and are suitable for all types of protective lining. A wide selection of body materials coupled with a variety of highly developed rubbers and synthetics for the diaphragm enable the valve to handle the widest possible range of duties.

The diaphragm is moulded in the open position and has therefore no tendency to seize when closed. The body design gives very low flow resistance and the valve can be rodded should build up occur in adjacent pipework.

A further refinement of the 'S' Type Valve is the design of common bonnet assemblies resulting in fewer spare diaphragms needed to cover the full range of valve sizes. Standard production of the 'S' Type covers sizes DN15 to DN450 and the range includes options for hand wheel, pneumatic, electric and hydraulic operation.

Standard production covers sizes up to DN80 with screwed ends (BSP, API, NPT etc.) socket and butt weld. DN15 to DN450 with flanged ends (BST D/E, ASA 125/150) or metric. Face to face dimensions for flanged valves are to BS 5156 (13397) or DIN 3202F1.

All 'S' Type Diaphragm Valves are available in manual and actuated styles and we are able to modify our castings to suit any type of electric, pneumatic or hydraulic actuator.

Typical Applications

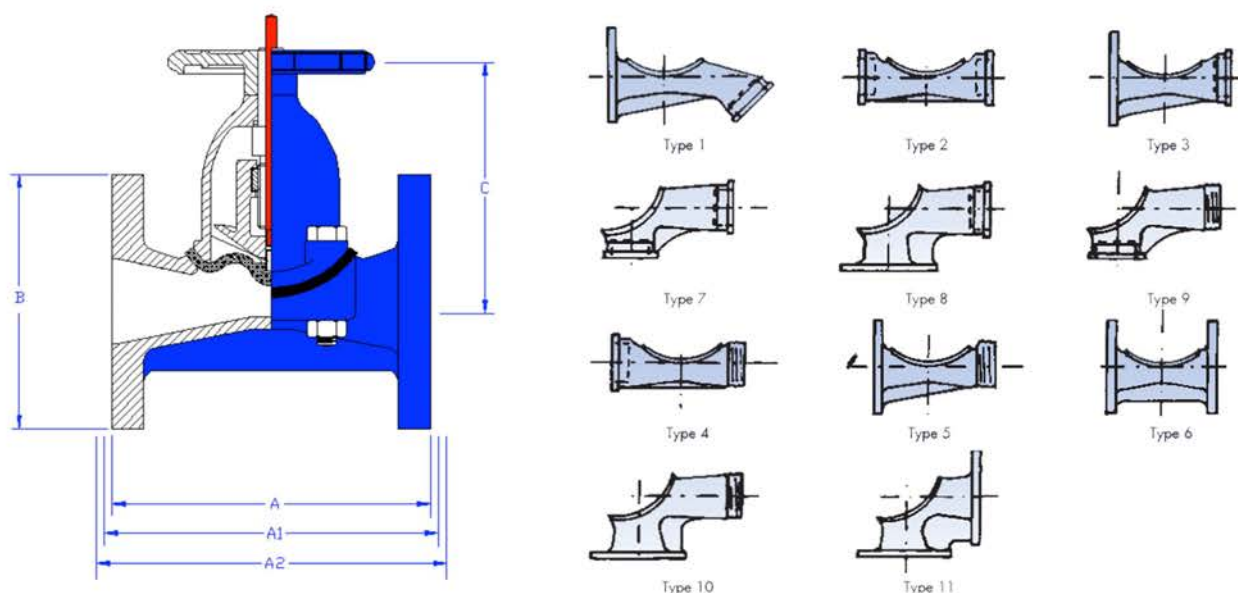
- Water treatment - demineralisation, portable water treatment, acids, alkalis, treated sludges, effluent treatment
- Corrosive mineral acids - sulphuric, hydrochloric, nitric, hydrofluoric
- Chloralkali - chlorine, caustic soda, sodium, hypochlorite, brine, pure water, gases
- Petroleum based organics - diesel, paraffin, organic acids
- Toxic hazardous chemicals and gases
- Power plant generation - hydrogen, acids and alkalis
- Pulp and paper production - bleach, pulp, slurry, black and green liquors, chlorine gas
- Fire and safety - fire main valves, wet riser landing valves on high rise buildings
- Pressure relief valves on sludge lines
- Compressed air lines - 100% shut off

Please contact Warren-Morrison Valves for more details

Standard Body Materials

- Grey Iron BS 452 EN
- S. G. Iron to BS 2789 EN
- Stainless Steel A2
- Carbon Steel - WCB/LCB/LCC/WCC
- Copper Alloys 1351400
- Bronzes to BS1 400 - B62
- Aluminium BS 490 EN

'S' Type Diaphragm Valve Size Data



Dimensions in millimeters (BASED ON BS 4504 PN 16)

Nominal Bore		15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400	450
Unlined to BS5156	A	108	117	127	146	159	190	216	254	305	356	406	521	635	749	749	1100	1200
Rubber lined to BS5156	A1	114	123	133	152	165	196	222	260	311	362	412	527	641	755	755	1112	1212
Unlined and rubber lined to DIN 3202 F1	A2	130	150	160	180	200	230	290	310	350	400	480	600	730	850	980	1100	1200
Flange Diameter	B	95	105	115	140	150	165	185	200	220	250	285	340	405	460	520	580	640
Height from centre	C	62	62	89	89	152	152	172	172	229	286	286	406	406	600	600	660	654
Weight cast iron to BS5156	kg	2	2.3	3.6	3.8	6	9	13.2	15	28.1	45.4	60	125	152	375	409	660	680
Weight cast iron to DIN 3202 F1	kg	2.7	3	4.5	5	9.5	11	17.7	19	31	51.3	65	143	174	424	*	*	*
Standard Pressure Rating (Higher pressure ratings are available)	bar	16	16	16	16	16	16	10	10	10	10	10	10	10	10	10	10	10
Other drilling specifications available on request															*Details on application			

Dimensions in millimeters (BASED ON ANSI 150)

Nominal Bore		15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400	450
Unlined to BS5156	A	108	117	127	146	159	190	216	254	305	356	406	521	635	749	749	1100	1200
Rubber lined to BS5156	A1	114	123	133	152	165	196	222	260	311	362	412	527	641	755	755	1112	1212
Unlined and rubber lined to DIN 3202 F1	A2	130	150	160	180	200	230	290	310	350	400	480	600	730	850	980	1100	1200
Flange Diameter	B	89	98	108	117	127	152	178	191	229	254	279	343	406	483	533	597	635
Height from centre	C	62	62	89	89	152	152	172	172	229	286	286	406	406	600	600	660	654
Weight cast iron to BS5156	kg	2	2.3	3.6	3.8	6	9	13.2	15	28.1	45.4	60	125	152	375	409	660	680
Weight cast iron to DIN 3202 F1	kg	2.7	3	4.5	5	9.5	11	17.7	19	31	51.3	65	143	174	424	*	*	*
Standard Pressure Rating (Higher pressure ratings are available)	bar	16	16	16	16	16	16	10	10	10	10	10	10	10	10	10	10	10
Other drilling specifications available on request															*Details on application			

'S' Type Diaphragm Valve Size Data

Dimensions in millimeters (BASED ON ANSI 300)

Nominal Bore		15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400	450
Unlined to BS5156	A	108	117	127	146	159	190	216	254	305	356	406	521	635	749	749	1100	1200
Rubber lined to BS5156	A1	114	123	133	152	165	196	222	260	311	362	412	527	641	755	755	1112	1212
Unlined and rubber lined to DIN 3202 F1	A2	130	150	160	180	200	230	290	310	350	400	480	600	730	850	980	1100	1200
Flange Diameter	B	95	117	124	133	156	165	191	210	254	279	318	381	445	521	584	648	711
Height from centre	C	62	62	89	89	152	152	172	172	229	286	286	406	406	600	600	660	654
Weight cast iron to BS5156	kg	3	3.3	4.6	4.8	7	10	14.2	16	30.1	47.4	62	127	154	377	411	662	682
Weight cast iron to DIN 3202 F1	kg	3.7	4	5.5	6	9	14.5	17.7	20	33	53.3	67	145	176	426	*	*	*
Standard Pressure Rating (Higher pressure ratings are available)	bar	33	33	33	33	33	33	27	27	27	27	27	27	27	27	27	27	27
Other drilling specifications available on request										*Details on application								

Dimensions in millimeters (BASED ON BS Table D)

Nominal Bore		15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400	450
Unlined to BS5156	A	108	117	127	146	159	190	216	254	305	356	406	521	635	749	749	1100	1200
Rubber lined to BS5156	A1	114	123	133	152	165	196	222	260	311	362	412	527	641	755	755	1112	1212
Unlined and rubber lined to DIN 3202 F1	A2	130	150	160	180	200	230	290	310	350	400	480	600	730	850	980	1100	1200
Flange Diameter	B	95	102	114	121	133	152	165	184	216	254	279	337	406	457	527	578	641
Height from centre	C	62	62	89	89	152	152	172	172	229	286	286	406	406	600	600	660	654
Weight cast iron to BS5156	kg	2	2.3	3.6	3.8	6	9	13.2	15	28.1	45.4	60	125	152	375	409	660	680
Weight cast iron to DIN 3202 F1	kg	2.7	3	4.5	5	9.5	11	17.7	19	31	51.3	65	143	174	424	*	*	*
Standard Pressure Rating (Higher pressure ratings are available)	bar	16	16	16	16	16	16	10	10	10	10	10	10	10	10	10	10	10
Other drilling specifications available on request										*Details on application								

Dimensions in millimeters (BASED ON JIS)

Nominal Bore		15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400	450
Unlined to BS5156	A	108	117	127	146	159	190	216	254	305	356	406	521	635	749	749	1100	1200
Rubber lined to BS5156	A1	114	123	133	152	165	196	222	260	311	362	412	527	641	755	755	1112	1212
Unlined and rubber lined to DIN 3202 F1	A2	130	150	160	180	200	230	290	310	350	400	480	600	730	850	980	1100	1200
Flange Diameter (5K)	B	80	85	95	115	120	130	155	180	200	235	265	320	385	430	480	540	-
Flange Diameter (10K)	B	95	100	125	135	140	155	175	185	210	250	280	330	400	445	490	560	620
Height from centre	C	62	62	89	89	152	152	172	172	229	286	286	406	406	600	600	660	654
Weight cast iron to BS5156	kg	2	2.3	3.6	3.8	6	9	13.2	15	28.1	45.4	60	125	152	375	409	660	680
Weight cast iron to DIN 3202 F1	kg	2.7	3	4.5	5	9.5	11	17.7	19	31	51.3	65	143	174	424	*	*	*
Standard Pressure Rating (Higher pressure ratings are available)	bar	16	16	16	16	16	16	10	10	10	10	10	10	10	10	10	10	10
Other drilling specifications available on request										*Details on application								

Automated 'S' Type Diaphragm Valve

Warren-Morrison believe that in addition to our very successful range of manually operated diaphragm valves, we have secured an ever-growing niche in the market place for Bespoke Remote Actuation (BRA).

Warren-Morrison has undertaken extensive research into the development of pneumatic and electromechanical actuation that has been specifically created to serve the most demanding of applications where performance, practicality and reliability are all of equal importance.

Our understanding of such equipment has led us to the forefront of valve manufacture and secured our preferential place amongst other market leaders.

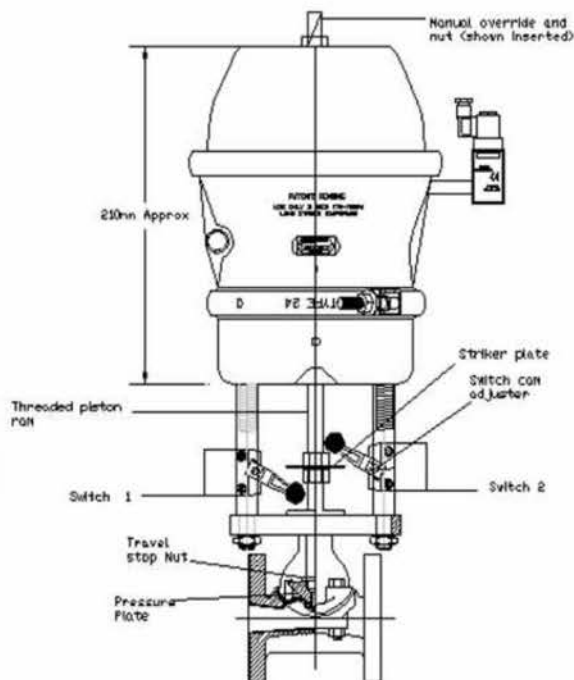
Warren-Morrison can offer a vast array of actuated configurations complete and function tested. Double acting, single acting all with specific fail positions, solenoid valves AFR (air filter regulators), limit switches (mechanical, inductive, capacitive, magnetic) and more. We also offer pneumatic positioners and electro-pneumatic positioners upon request.

Warren-Morrison further understands the extreme importance of "hazardous environments" and the behaviour of specific equipment in such environments.



Above: 100mm DIN 3202F1 cast iron body, ebonite lined pneumatically actuated diaphragm valve coupled with a 200mm double acting pneumatic air cylinder and air booster.

The equipment above has been specifically designed to our exact customers needs to transport raw water. The specific specification has equal air supply to that of the working line pressure. Warren-Morrison overcame this by piping a reciprocating air boosting cylinder to the "open" port of the DA cylinder.



Above: In addition to our extensive range of bespoke pneumatic actuation Warren-Morrison are delighted to introduce our budget series of pneumatically actuated diaphragm valves. The size range currently available is DN15mm to DN100mm lined or unlined. (Please contact us for further details)

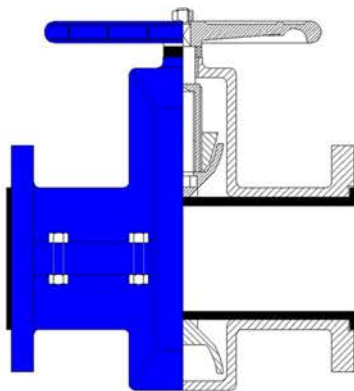
Below: Warren-Morrison also manufacture and supply the rotary range, electric actuation. Electric actuation has become increasingly popular whilst Warren-Morrison can offer numerous permutations regarding size, type and all available voltages.



Full Bore Pinch Valve MK 4 & MK 2



MK 4 PINCH VALVE



MK 2 PINCH VALVE

The Warren-Morrison Pinch Valve is the number one choice for controlling the flow of corrosive or abrasive slurries, powders and granular material and is equally efficient when handling gases and viscous liquids.

For added safety Warren-Morrison Pinch Valves are normally supplied with totally enclosed bodies acting as a secondary containment system. Open bodied versions are also available for less critical applications.

The easily replaceable rubber sleeve is the only part in contact with the medium, thus eliminating gland leaks and the problems associated with jamming mechanisms.

Correct selection of sleeve elastomer will ensure maximised maintenance schedules and the ease of sleeve replacement minimises downtime.

All sizes are suitable for use in food and brewing industries and we offer a food quality EPDM rubber sleeve suitable for occasional steam sterilisation at 140°C.

The Mark 4 Pinch Valve has both pressure ratings and face to face dimensions to BS5156 which allows interchangeability with lined diaphragm valves.

All Pinch Valves are available in manual and actuated styles and we are able to modify our castings to fit any suitable type of electric, pneumatic or hydraulic actuator.

Depending on the size and application, Warren-Morrison Pinch Valves use either one or two moving pinch bars to effect closure.

The single pinch bar type closes against the lower valve body whereas the two pinch bar type closes on the center line.

The sleeve prevents the body being exposed to the media, therefore in normal cases we would recommend the use of aluminium bodies as being light in weight and less costly. However, in certain applications the customer may require an alternative material in which case we offer a range suitable for most situations.

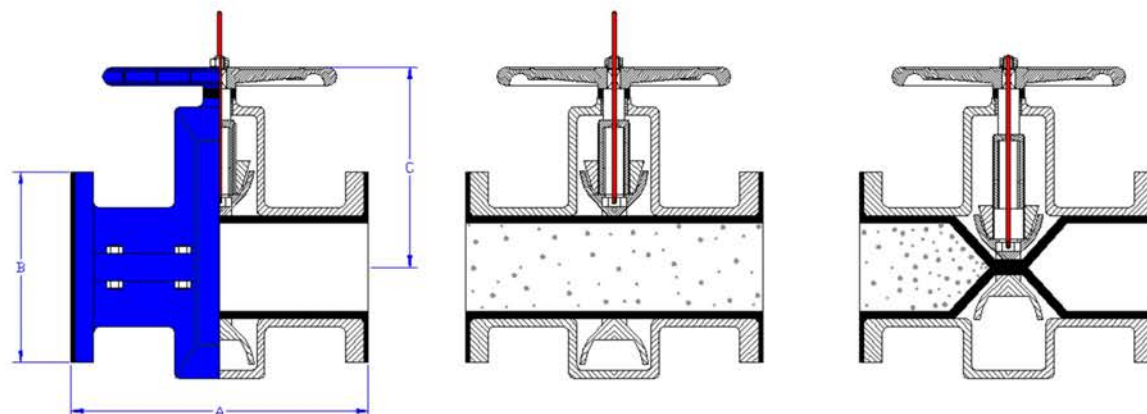
Pinch Valve - Typical Applications

- Ceramics - slip and glaze, clays
- Waste treatment incinerators - line dosing control valves
- Mining - tailings and slurries, flotation, hydrocyclones
- Water treatment - granular activated carbon, micro-sand separation
- Nuclear fuels - cement grout control lines
- Food process - isolation and control valves
- Paper and pulp - recausticising, washing, screening, pulp lines, re-cycled paper handling
- Ink and paint manufacture - control of raw and finished products
- Iron and steel manufacture - control of additives, e.g. Manganese
- Chemical industry - abrasive, viscous and noxious media
- Oil and gas exploration and production - drilling mud and screenings

Body Materials

- Aluminium BS1490
- Grey Iron BS1452
- Bronzes to BS1400
- S. G. Iron to BS2789
- Stainless Steel
- Carbon Steel

Full Bore Pinch Valve Size Data



Dimensions in millimeters (BASED ON BS 4504 PN 16)

Nominal Bore		15	20	25	40	50	65	80	100	125	150	200	250	300	350
Length to BS 5156	A	114	123	133	165	196	222	260	311	362	412	527	881	749	1229
Flange Diameter	B	95	105	115	150	165	185	200	220	254	285	343	406	457	527
Height from centre – manual operation	C	102	108	127	152	184	222	222	267	324	381	470	572	622	686
Centre line to cylinder end – actuator operation	D	These dimensions are determined by the maximum working pressure and minimum air available to operate the cylinders.													
Weight-Aluminum – manual operation	kg	1.4	2	2.7	4.6	7.3	9.6	11.8	20.3	32.5	44.2	95	185	358	*
Weight-Cast Iron – manual operation	kg	3.4	3.9	5.6	9.4	14.5	19.1	23.2	41	74	92	196	454	606	750
Pressure rating standard	bar	16	16	16	16	16	10	10	10	10	10	6	6	6	6
Other drilling specifications available on request												*Details on application			

Dimensions in millimeters (BASED ON ANSI 150)

Nominal Bore		15	20	25	40	50	65	80	100	125	150	200	250	300	350
Length to BS 5156	A	114	123	133	165	196	222	260	311	362	412	527	881	749	1229
Flange Diameter	B	89	98	108	127	152	178	191	229	254	279	343	406	483	533
Height from centre – manual operation	C	102	108	127	152	184	222	222	267	324	381	470	572	622	686
Centre line to cylinder end – actuator operation	D	These dimensions are determined by the maximum working pressure and minimum air available to operate the cylinders.													
Weight-Aluminum – manual operation	kg	1.4	2	2.7	4.6	7.3	9.6	11.8	20.3	32.5	44.2	95	185	358	*
Weight-Cast Iron – manual operation	kg	3.4	3.9	5.6	9.4	14.5	19.1	23.2	41	74	92	196	454	606	750
Pressure rating standard	bar	16	16	16	16	16	10	10	10	10	10	6	6	6	6
Other drilling specifications available on request												*Details on application			

Dimensions in millimeters (TABLE D)

Nominal Bore		15	20	25	40	50	65	80	100	125	150	200	250	300	350
Length to BS 5156	A	114	123	133	165	196	222	260	311	362	412	527	881	749	1229
Flange Diameter	B	95	102	114	121	133	152	165	184	216	254	279	337	406	457
Height from centre – manual operation	C	102	108	127	152	184	222	222	267	324	381	470	572	622	686
Centre line to cylinder end – actuator operation	D	These dimensions are determined by the maximum working pressure and minimum air available to operate the cylinders.													
Weight-Aluminum – manual operation	kg	1.4	2	2.7	4.6	7.3	9.6	11.8	20.3	32.5	44.2	95	185	358	*
Weight-Cast Iron – manual operation	kg	3.4	3.9	5.6	9.4	14.5	19.1	23.2	41	74	92	196	454	606	750
Pressure rating standard	bar	16	16	16	16	16	10	10	10	10	10	6	6	6	6
Other drilling specifications available on request												*Details on application			

Knife Gate Valve

The Warren-Morrison Knife Gate Valve has been designed to be versatile, to cater for a diverse range of process industry applications, the primary applications being fluid and suspensions up to 5%. The WMKGV is also employed in other common applications such as sludge, slurry, waste water, pulp, recycled pulp and in some types of food etc.

The WMKGV is constructed from a single or twin section body, materials of body construction are currently available in stainless steel, nodular or cast iron, the gate material is always of a premium quality stainless steel.

Thanks to the versatility of the WMKGV, it has been possible to offer many alternative drive options, from manual with a convenient speed knob for faster operation, pneumatic and electric operation. Also available are telemetry systems that provide signal feed back through limit switches. It is also possible to utilise the WMKGV as a control valve.

Design Data

Maximum working pressure body at 20°C

DN	bar
50-125	16
150-300	10
350-600	6
700-1000	4

Maximum differential pressure preferred direction at 20°C

DN	bar
50-125	16
150-300	10
350-600	6
700-1000	4

The WMV Knife Gate Valves with seat in E/N/V, also manages a certain differential pressure in the reversed direction. The design varies between the valve body in stainless steel (E) and nodular iron (L).

Maximum differential pressure reversed direction at 20°C

DN	Stainless steel (E) bar	Nodular iron (L) bar
50-200	3,5	3,5
250	3,0	3,0
300-450	-	3,0
500-1000	-	-

Pressure Tests

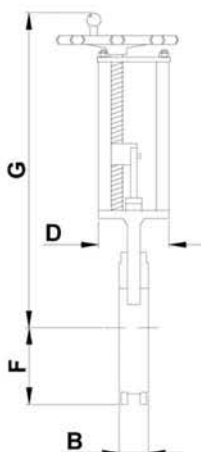
Pressure tests are performed with water at 20°C according to ISO 5208 meaning:

1,5 x maximum working pressure for open valve - shell test

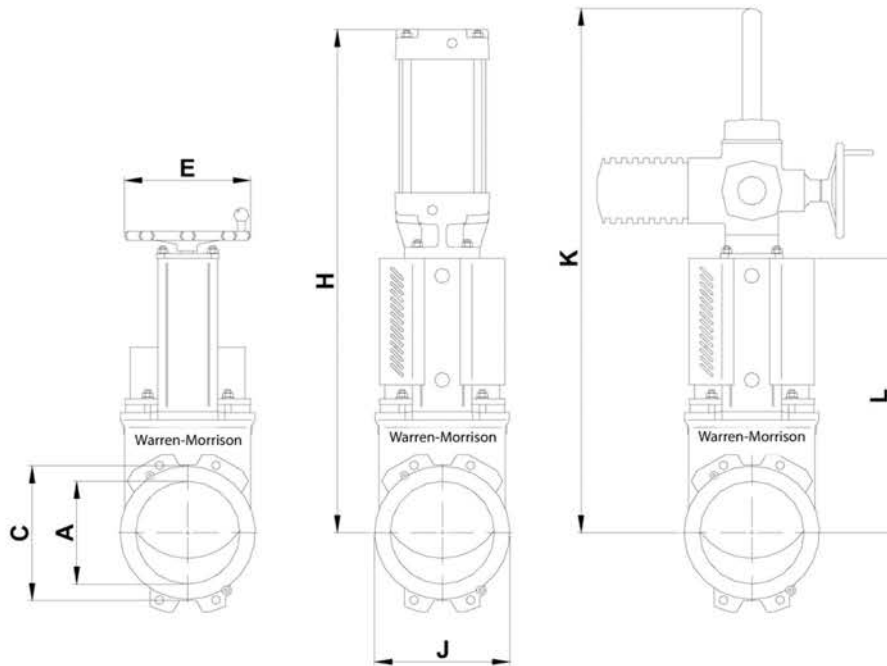
1,1 x maximum differential pressure for closed valve - obturator tightness test

Leakage Rate

For soft sealed valves rate A according to ISO 5208 - no visible leakage for the duration of the test TAPPI TIS 405-8, MSS SP-81



Knife Gate Valve Size Data



Dimensions (mm)

DN	50	65	80	100	125	150	200	250	300	350	400	450
A	52	64	79	103	128	153	202	250	302	332	380	428
B	41	41	51	51	56	60	60	69	78	78	89	89
C	91	107	124	154	179	204	267	320	374	419	479	535
D	80	80	80	80	80	80	145	145	145	175	175	200
E	200	200	200	200	250	250	315	315	315	400	400	520
F	56	65	88	102	116	130	160	192	230	210	245	280
G	360	380	405	453	495	550	694	779	879	993	1083	1180
H	475	495	545	593	685	740	1017	1102	1252	1415	1555	1680
J	116	130	135	155	178	205	268	320	375	420	490	560
K	620	650	690	765	830	910	1115	1250	1400	1550	1690	1820
L	230	250	275	323	365	420	555	640	740	820	910	990

DN	500	600	700	750	800	900	1000
A	470	560	665	710	760	855	950
B	114	114	118	118	118	118	150
C	580	680	800	860	900	1010	1110
D	250	260	310	305	310	320	320
E	520	635	635	635	635	635	635
F	313	370	390	490	490	580	640
G	1315	1540	1750	1880	1970	2220	2400
H	1865	2355	2513	2900	3030	3380	3670
J	625	740	865	930	985	1160	1280
K	2010	2340	2650	2830	2970	3340	3630
L	1127	1352	1565	1635	1780	1985	2215

Actuator EM is rotated 45° for DN 50-150.

Weight, Valve incl. hand wheel(HW)

DN	50	65	80	100	125	150	200	250	300	350	400	450
kg	7	7	8	10	13	15	31	40	55	90	120	180

DN	500	600	700	750	800	900	1000
kg	245	340	460	700	540	900	1500

Automated Knife Gate Valve

The Warren-Morrison Automated Knife Gate Valve has been designed to be versatile, to cater for a diverse range of process industry applications, the primary application being fluid and suspensions up to 5%. The WMKGV is also employed in other common applications such as sludge, slurry, waste water, pulp, recycled pulp and in some types of food etc.

The WMKGV is constructed from a single or twin section body, materials of body construction are currently available in stainless steel, nodular or cast iron, the gate material is always of a premium quality stainless steel.

Thanks to the versatility of the WMKGV, it has been possible to offer many alternative drive options, from manual with a convenient speed knob for faster operation, pneumatic and electric operation. Also, available are telemetry systems that provide signal feed back through limit switches. It is also possible to utilise the WMKGV as a control valve.



For actuators classified according to ATEX, please contact Warren-Morrison Valves Ltd.

Pneumatic cylinder – recommended sizes at 5 bar air pressure

DN	50	65	80	100	125	150	200	250	300	350
AC	100-80	100-80	100-100	100-100	100-150	100-150	160-250	160-250	160-300	200-350
Maximum force (kN)	3,5	3,5	3,5	3,5	3,5	3,5	9,0	9,0	9,0	14,1

DN	400	450	500	600	700	750	800	900	1000
AC	200-400	200-450	200-500	250-600	250-700	320-750	320-800	320-900	320-1000
Maximum force (kN)	14,1	14,1	14,1	22,1	22,1	36,2	36,2	36,2	36,2

The table gives recommended cylinder sizes at normal operation at 5 bar air pressure. For other operating conditions, please contact Warren-Morrison Valves Ltd.

Electric motor – recommended sizes with AUMA multi-turn

DN	50	65	80	100	125	150	200	250	300	350
AUMA	SA 07.1	SA 07.1	SA 07.1	SA 07.1	SA 07.1	SA 07.1	SA 07.5	SA 07.5	SA 10.1	SA 10.1
Attachment	F10/A	F10/A	F10/A	F10/A	F10/A	F10/A	F10/A	F10/A	F10/A	F10/A

DN	400	450	500	600	700	750	800	900	1000
AUMA	SA 10.1	SA 10.1	SA 10.1	SA 10.1	SA 14.1	SA 14.1	SA 14.1	SA 14.5	SA 14.5
Attachment	F10/A	F10/A	F10/A	F10/A	F14/A	F14/A	F14/A	F14/A	F14/A

Electric motors are mounted according to standard ISO 5210. The table gives recommended motor sizes at normal operation. For other operating conditions, please contact Warren-Morrison Valves Ltd.

For other actuators, please contact Warren-Morrison Valves Ltd.

Accessories

Limit switches

Mechanical	Ersce E100	
Inductive	ifm electronic IG-2008-ABOA / IG0006	2-wire 20-250 V AC/DC
	ifm electronic IG-3008-BPKG / IG5401	3-wire 10-36 V DC PNP

For accessories classified according to ATEX, please contact Warren-Morrison Valves Ltd.

Accessories to pneumatic cylinder

Solenoid valve	Metal Work SOV 35 SOS OO	1/4"
	Metal Work SOV 45 SOS OO	1/2"
Magnetic limit switch	Elobau 102 247	2-wire 10-250 V AC/DC
	Elobau 102 290 PE	3-wire 10-30 V DC

Control valve

Retainer ring V-port	DN 50-600
Positioner	PMV Palmstierna

Purge port

The WMV Knife Gate Valve DN 500-1000 is equipped with purge ports with pipe thread G1/2" acc. to ISO 228/1. Valve sizes DN 50-450 can be equipped with purge ports on order.

For advice regarding accessories, please contact Warren-Morrison Valves Ltd.

Automated Globe Valve

Application

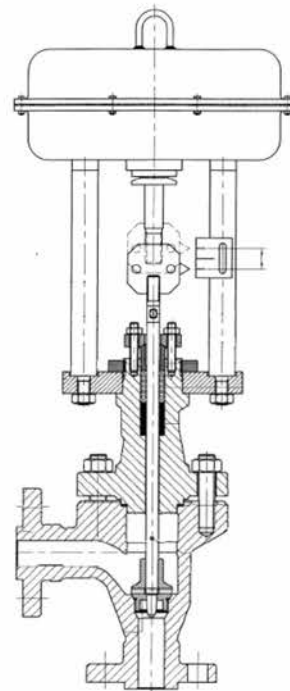
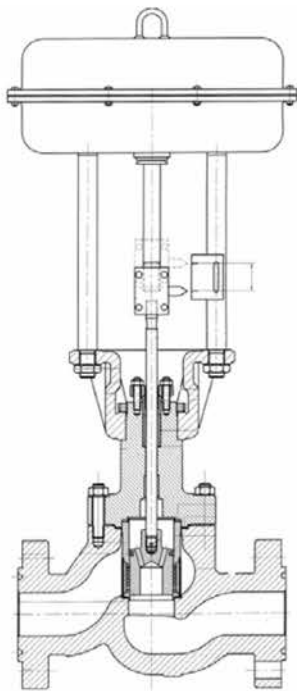
High-pressure valve for control of liquid and gaseous media in a robust streamlined construction.

Construction

Series 800 Globe valves are constructed for pressure ratings up to 2500 lbs. Depending on the bonnet selected standard operating temperatures range between -10°C to 450°C. Special bonnets are available for temperatures outside these ranges.

Re-adjustable gland packing available.

Pneumatic, electric or hydraulic actuators can be used.



CV Standard Trims 9110/9210

	Valve Size	inch mm	1 25	1 ½ 40	2 50	2 ½ 65	3 80	4 100	6 150	8 200	10 250	12 300
Seat Diameter	Full and reduced	inch mm	1.06 27	1.65 42	2.01 51	2.48 63	3.07 78	3.78 96	5.87 149	9.17 233	9.17 233	11.67 296.5
Characteristics	Trim Size	Cv Values										
Linear	Full		15	37	58	82	130	210	420	825	930	1625
	Reduced		8.2	19	29	42	58	74	190	365	365	650
Equal Percentage	Full		13	33	52	74	120	190	365	650	730	1390
	Reduced		7.4	19	29	47	74	116	235	420	420	825
Quick opening	Full			42	62	87	145	220				

Butterfly Valve

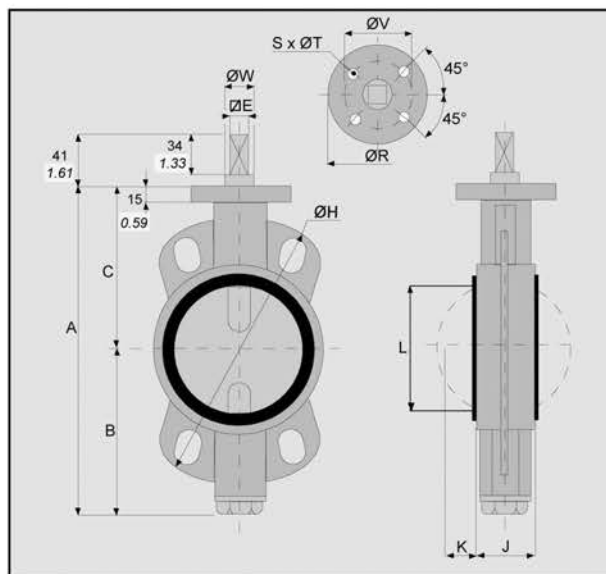
The Butterfly Valve consists of a disc rotating on a shaft at right angles within a pipe section body.

They are generally designed for insertion between two pipe flanges using through bolts, thus saving substantial space and weight. This design is known as Wafer type. The Wafer lug type allows end of pipe installation without the use of a second flange. Offset designs are also manufactured with double flanges in both ball and gate valve face-to-face valve types by the butterfly valve.

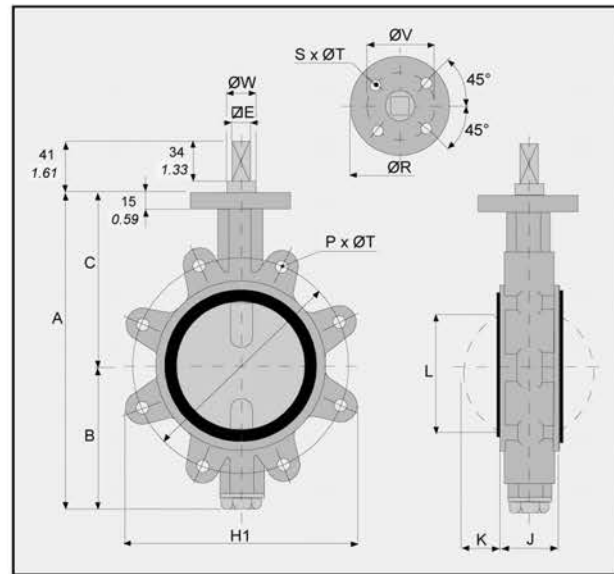
Butterfly valves are available in sizes from DN25 to very large sizes.



WAFER TYPE



LUG TYPE



DIAM. SIZES	A	B	C	ØE	ØH	H1	J**	K	L	ØM PN6	ØM PN10	ØM PN16	ØM ANSI 150lbs	ØN PN6	ØN PN10	ØN PN16	ØN ANSI 150lbs ***	P PN6	P PN10	P PN16	P ANSI 150lbs	ØR FLANGIA FLANGE	S N° FORI N° HOLES	T Ø FORI Ø HOLES	ØV CERCHIO FORI HOLES CIRCLE	ØW
40	188	90	98	12	145	111	33	6.6	31	100	110	110	98.5	M12	M16	M16	1/2"	4	4	4	4	90	4	8.5	70	16
11/2	7.4	3.54	3.86	0.47	5.71	4.37	1.30	0.26	1.22	3.94	4.33	4.33	3.87	M12	M16	M16	M14	4	4	4	4	3.54	4	0.33	2.76	0.62
50	205	96	109	12	160	120	43	7.2	36	110	125	125	120.5	M12	M16	M16	5/8"	4	4	4	4	90	4	8.5	70	16
2	8.07	3.78	4.29	0.47	6.3	4.72	1.69	0.28	1.42	4.33	4.92	4.92	4.74	M12	M16	M16	M18	4	4	4	4	3.54	4	0.33	2.76	0.62
65	230	108	122	12	180	138	46	12.9	53	130	145	145	139.5	M12	M16	M16	5/8"	4	4	4	4	90	4	8.5	70	16
21/2	9.06	4.25	4.80	0.47	7.09	5.43	1.81	0.51	2.09	5.12	5.7	5.7	5.49	M12	M16	M16	M18	4	4	4	4	3.54	4	0.33	2.76	0.62
80	250	118	132	12	198	150	46	19.3	69	150	160	160	152.5	M16	M16	M16	5/8"	4	8	8	4	90	4	8.5	70	16
3	9.84	4.65	5.2	0.47	7.8	5.9	1.81	0.76	2.72	5.91	6.29	6.29	6	M16	M16	M16	M18	4	8	8	4	3.54	4	0.33	2.76	0.62
100	285	132	153	12	230	213	52	27.15	90	170	180	180	190.5	M16	M16	M16	5/8"	4*	8	8	8	90	4	8.5	70	16
4	11.22	5.20	6.02	0.47	9.06	8.39	2.05	1.07	3.54	6.69	7.08	7.08	7.5	M16	M16	M16	M18	4*	8	8	8	3.54	4	0.33	2.76	0.62
125	327	150	177	16	256	243	56	36.4	115	200	210	210	216	M16	M16	M16	3/4"	8	8	8	8	90	4	8.5	70	19.5
5	12.87	5.91	6.97	0.62	10.08	9.57	2.2	1.43	4.53	7.87	8.26	8.26	8.5	M16	M16	M16	M20	8	8	8	8	3.54	4	0.33	2.76	0.76
150	359	165	194	16	286	267	56	48.6	142	225	240	240	241.5	M16	M20	M20	3/4"	8	8	8	8	90	4	8.5	70	19.5
6	14.13	6.50	7.64	0.62	11.26	10.51	2.2	1.91	5.59	8.86	9.44	9.44	9.5	M16	M20	M20	M20	8	8	8	8	3.54	4	0.33	2.76	0.76
200	419	194	225	16	348	320	60	69.8	199	280	295	295	298.5	M16	M20	M20	3/4"	8	8	12	8	90	4	8.5	70	19.5
8	16.5	7.64	8.86	0.62	13.7	12.6	2.36	2.75	7.83	11.02	11.61	11.61	11.75	M16	M20	M20	M20	8	8	12	8	3.54	4	0.33	2.76	0.76
250	495	220	275	18	414	402	68	90	238	335	350	355	362	M16	M20	M24	7/8"	12	12	12	12	125	4	11	102	24
10	19.49	8.66	10.83	0.70	16.3	15.83	2.68	3.54	9.37	13.19	13.77	13.97	14.25	M16	M20	M24	M22	12	12	12	12	4.92	4	0.43	4.01	0.94
300	559	262	297	22	490	473	78	111.1	289	395	400	410	432	M20	M20	M24	7/8"	12	12	12	12	125	4	11	102	29
12	22	10.31	11.69	0.87	19.29	18.62	3.07	4.37	11.38	15.55	15.74	16.14	17	M20	M20	M24	M22	12	12	12	12	4.92	4	0.43	4.01	1.14

* For oil pipeline, valves must have 8 holes. ** Conf. Norme I.S. EN 558-1 - ** Complying with I.S. EN 558-1 Standards

- "L" is the measurement of the disc chord, which determines its full opening.

*** For flanges ANSI 150 lbs thread is according to ANSI B1.1 type UNC / 8-UN.

*** On request, for ANSI 150 lbs metric threading UNI EN 1092-1.

mm

ins

Automated Butterfly Valve

The Butterfly Valve consists of a disc rotating on a shaft at right angles within a pipe section body.

They are generally designed for insertion between two pipe flanges using through bolts, thus saving substantial space and weight. The design is known as Wafer type. The Wafer lug type allows end of pipe installation without the use of a second flange. Offset designs are also manufactured with double flanges in both Ball and Gate Valve face-to-face dimensions to facilitate the replacements of these valves types by the Butterfly Valve.

Butterfly Valves are available in sizes DN25 to very large sizes. An undesirable feature of the Butterfly Valve is that in all positions the disc is in, the fluid and so it is not a valve type that can be used in a pigging application. In small sizes the disc occupies a significant proportion of the flow area resulting a low CV, where as in large sizes and high pressures the requirement to carry the pressure load in the closed position results in very thick section and heavy disc, which creates operating challenges for the shaft support bearings.



Automated Ball Valve Features

Enclosure:

- IP 67 (NEMA 4, NEMA 4X) waterproof and dust-proof.
- Material: Dry powder coated aluminum alloy.
- ISO Mounting

Motor:

- Standard extended duty cycle induction motor.
- Class H insulation for FEM-01; Class F insulation for FEM-02 through FEM-12.
- Built-in thermal protection (135 C) prevents motor burning out.
- Various powers supplies available: 110/220vac 1ph, 12/24vac & vdc, 380/415vac 3ph and others.

Position Indicator:

- Continuous mechanical position indicator is visible on top of the actuator.

Manual Override (FEM-02 to FEM-12):

- Upon power outage, the manual override is operated via a hand wheel. It is not necessary to de-clutch any lever or other system to operate, simply turn the wheel. When the electric motor is operating, the handwheel does not rotate.
- For FEM-01 use of a spanner or similar tool is required.

Gear Train:

- 35 Nm-4500 Nm output torques available.
- High alloy-steel gear trains are self-locking to avoid any valve back drive.
- Gear trains are factory lubricated with high temperature lubricant.

Working Conditions:

- Ambient temperature: -5°C - +70°C

Standard Features:

- 1x open and 1x close limit switches (live), 2x extra limit switches (voltage free).
- Anti-condensation heater.
- 2x 1/2" conduit entries.

Optional Features (upon request):

- Feedback potentiometer unit (1K Ohm) and / or current position transmitter (output 4-40mA).
- Local control unit (local/remote/open/close).
- Adjustable torque switches (2 units) - not available for FEM-01.
- Modulating controller - field configurable.

Diamond Grip Couplings & Hoses

Couplings

Warren-Morrison manufacture and supply a range of cut hose couplings and hoses. These particular products primarily serve the mining sector although can be employed in most arduous conditions.

The couplings are manufactured from a high strength hi-grade aluminium, utilising the accuracy of gravity die casting methods. The connecting flange orientation has been designed to be universal incorporating ANSI and DIN pitch circle diameters in one flange.

The name Diamond Grip derived from the term facets. This unique gripping mechanism is integrated and by far them most reliable in gripping performance yet and can be reused again and again.



The four facet Diamond Grip mechanism cast integrally within the inner bore.

Construction:

Inner tube material: NR/BR, black, smooth
Reinforcement: Textile cord, Helix
Cover: NR/BR, Black, smooth with cloth finish

Temperature range: -30°C to 85°C

Size (mm)	ID (mm)	OD (mm)	Wall	Bend Radius (mm)	Weight Approx. (kg/m)	Working Pressure (bar)	Burst Pressure (bar)	Standard Length (m)
TMH900-50	51.0	70.0	10.0	350	2.4	10	30	40
TMH900-80	80.0	102.0	11.0	560	4.2	10	30	40
TMH900-100	102.0	124.0	11.0	714	5.6	10	30	40
TMH900-150	127.0	153.0	13.0	889	7.8	10	30	40
TMH900-150	152.0	178.0	13.0	1064	10.3	10	30	20
TMH900-200	204.0	238.0	17.0	1421	19.8	10	30	20
TMH900-250	254.0	291.0	18.5	1778	25.5	5	15	20
TMH900-300	305.0	341.0	18.0	2135	29.6	5	15	10
TMH900-355	355.0	392.0	25.5	2450	40.2	5	15	10
TMH900-450	450.0	503.0	26.5	3150	57.7	5	15	6
TMH900-508	508.0	558.0	25.0	3556	61.8	5	15	6
TMH900-612	612.0	664.0	26.0	4284	76.1	5	15	6

Other sizes available upon request.



Flexible Hoses

Warren-Morrison also supply durable flexible hoses constructed from a premium abrasion resistant elastomer that are helically designed to offer superior strength and integrity and will not collapse if negative pressure is introduced. Our premium quality hoses are specifically designed to transport aggressive slurries and granular medias where demands are high and reliability is paramount.

Our hoses are manufactured in a variety of sizes as per the table below. The working pressures are nominal with a safety factor of 2 and a destructive pressure of 3. These factors are apportioned accordingly based on the nominal working pressure of the host. The helically wound reinforced structure of the hoses also lend themselves to moderate over-pressure surges should they inadvertently exist, another welcomed and reassuring element.



Size range from DN 77 - 302mm

Formula to calculate length of hose for a given angle:

$$L = (A/360^\circ) \times 2\pi \times B$$

L = shortest hose length for a given angle of bend.

A = angle of bend

B = Hose bend radius

n = 3.14

Controlling Fugitive Emissions

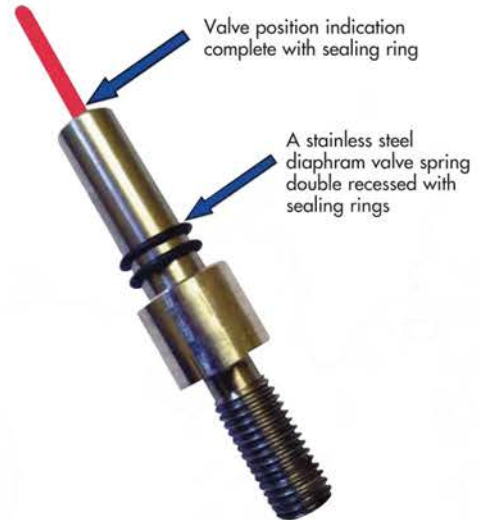
Warren-Morrison is a conscientious and proactive company, alert to the ever-growing concerns surrounding the importance of preserving our environment. We understand the effects, implications and the overall benefits of helping to prevent fugitive emissions, especially within the petrochemical industry.

Knowing this, Warren-Morrison have responded by developing the most practical means of media containment within the valve assembly. We have achieved this by sufficiently and effectively sealing our spindle necks position indicators in both the diaphragm valve and also the pinch valve body joint.

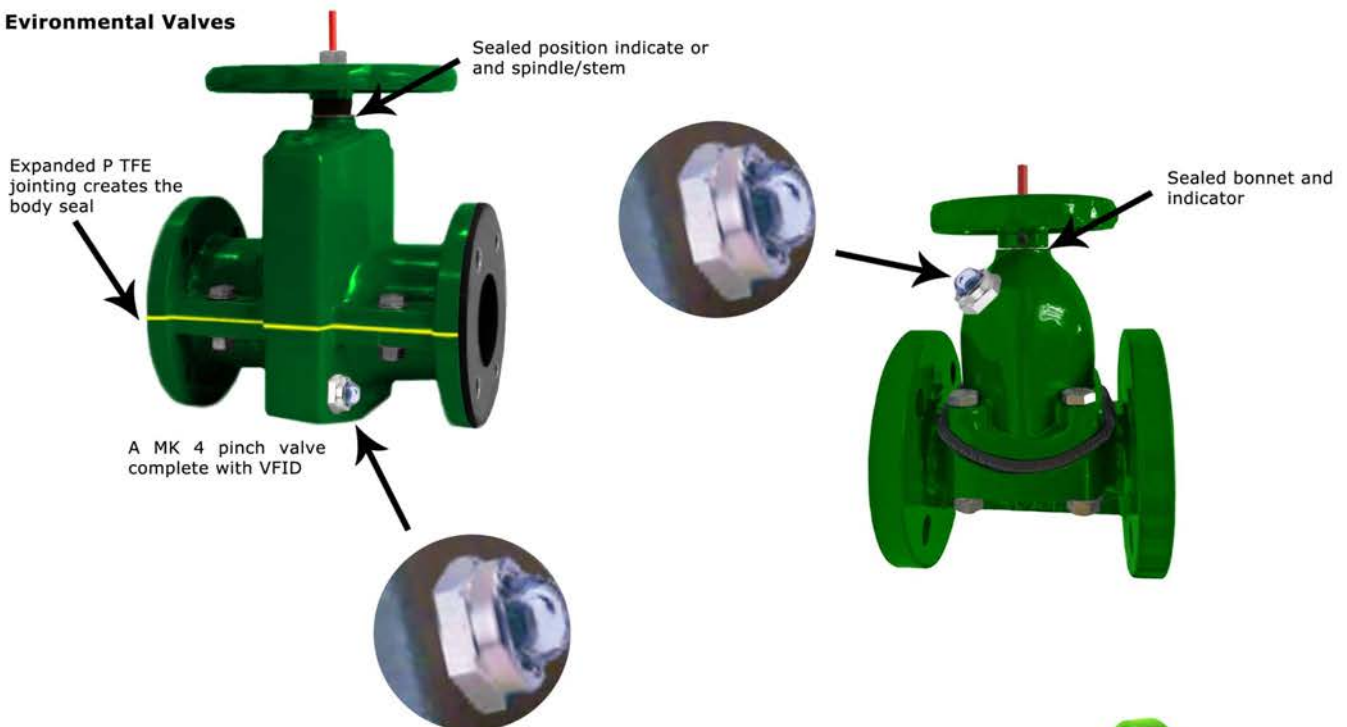
Further peace of mind has been introduced as an optional extra. Warren-Morrison is able to provide a "valve fail indication device" (VFID). This device offers visual indication to the user that the serviceable diaphragm or sleeve has failed within the valve, thus prompting responsive remedial action to be taken. This simple but effective device combined with sealed valve technology can be provided at the time of ordering.

The importance of controlling potentially hazardous media types is paramount; we know containment is essential and so is "post failure control". Post failure control is a means of dispelling the media in a safe and controlled fashion. In the unlikely event the diaphragm or sleeve should rupture prematurely, the media will begin to infiltrate the bonnet or body enclosure. The media requires to be safely drained from the valve. On the Diaphragm Valve and Pinch Valve, the VFID can be easily removed and the media drained safely and effectively minimising the risk of exposure to humans and of course the environment.

The VFID is constructed from mild steel that is zinc coated. The working pressure is 16 bar with a work temperature up to 180°C.



Environmental Valves



Protecting the environment.....



Pneumatic Actuators

Pneumatic power has been used for the actuation of valves for many years. It is particularly suited to the operation of rotary motion valves with their limited stroke requirements, but it can also be applied to the operation of linear motion valves.

Pneumatic power is easy to store and pneumatic actuators are therefore commonly the most suitable choice for installations where electric power sources are of limited capacity, or unreliable. Pneumatic actuators are available to suit valves of almost all sizes except the very largest and highest differential pressures.

In particular for those actuators requiring spring-to-close the spring force needed to achieve the maximum acceptable level of seat leakage can become impractically large.



Piston Actuator

The piston actuator consists of a cylinder and piston which is sealed with an elastomer 'O' ring. Air is supplied either to both sides of the piston (called double acting) and movement is achieved by one side being at a higher pressure than the other, or air is supplied to one side (single acting) and the return energy comes from a spring.

Piston actuators generate linear force by the air acting on the piston. They can be used to operate linear motion valves by directly attaching them to the valve stem. However the stroke length - particularly for Gate Valves - and the area of the cylinder to give the necessary operating thrust require huge volumes of air to operate the valve. This generally means that rotary motion valves are given preference over linear motion valves when pneumatic fail closed or open operation is required.

Sizing Double-Acting Actuators

All actuator manufacturers publish the torque output for their actuators and show a wide variation between double acting, spring return, scotch yoke, rack and pinion, and vane type designs. Actuators thrust or torque output is proportional to air supply pressure.

When sizing actuators for linear motion valves, maximum travel must also be taken into account. Most actuators are sized on a compressor standard of 5.5 bar air. However, if the valve and actuator are situated at a remote part of the plant, or in an area where there are many items of equipment feeding off the air supply, the supply pressure could fall to 4 bar, which will reduce the thrust or torque output of the actuator. Due consideration should be given to this and other environmental and operating factors when considering safety factors to add to the valve manufacturer's specified torque.

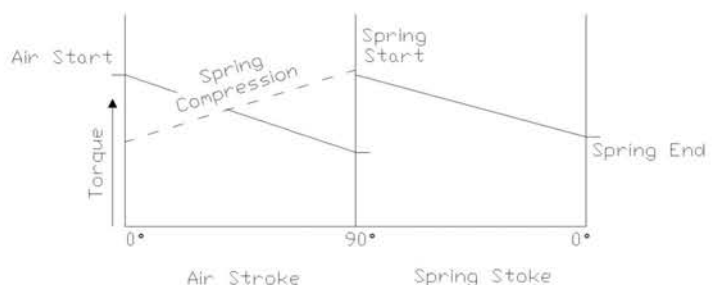
Actuators are selected from a range of available sizes. The chosen actuator will usually have a torque or thrust output at least 15% higher than the valve operating torque at the minimum air supply pressure.

Sizing Double-Acting Actuators

A spring return actuator has air pressure producing torque or thrust in one direction only and is reversed to its original position by a spring action. Some manufacturers use multiple-spring designs for this purpose while others use one or two large ones. Such spring combinations can be seen in several figures.

Advantages of Pneumatic Actuators

- Compressed air is an economical and convenient source of power
- The different failure options of closed, open and last position can easily be provided
- Air, when subjected to heat will still act satisfactory as an energy transfer medium and any increase in pressure due to thermal expansion will tend to assist valve operation.
- Adjustment of the air supply pressure is possible thereby more closely matching actuator operating torque output to valve operating torque requirements with minimum potential for exceeding the valve strength torque
- Can be installed in hazardous areas providing any auxiliary equipment is also rated for the same area classification
- Can operate satisfactorily from ambient up to 150°C when housings are manufactured from an appropriate material
- When exposed to a fire 1110°C for a period of 15 minutes, should remain functional both during and after if manufactured from SG iron castings, or fabricated in carbon steel or stainless steels
- Exhaust air can be vented to atmosphere



Electric Actuators

The conventional modern electric-motor-powered valve actuator provides a versatile method of valve operation.

For linear motion valve types (Gate, Globe, Diaphragm), actuators with a "multi-turn" output drive raise and lower the valve obturator via a drive nut - threaded stem arrangement.

Rotary motion valve types (Plug, Ball and Butterfly) use actuators with a direct drive 90 output or, for higher torque applications a multi-turn gearbox driving into second stage part-turn output gearbox.

Facilities for local and remote electrical operation plus handwheel operation are normal features and sizes are available to suit the complete spectrum of both linear and rotary motion valve types.



Environmental Protection

Actuators for valves on isolating duty often remain idle for long periods and may be installed in harsh environmental conditions. It is essential therefore that the design of electric actuators is such that the electrical components are housed in enclosures which provide watertight protection to at least IP67. It is also desirable that the actuator has a segregated, "double sealed" compartment for cable termination as this will protect the actuator should terminal covers be left off during installation or if cable glands are poorly sealed.

Advantages of Electric Actuators

- Electric actuators have a "flat line" torque output making sizing easier. Providing the actuator rated torque meets or exceeds the maximum valve required torque, no further consideration of the valve stroke torque characteristic is required.
- Energy efficient operation.
- Motors have high rotational speed providing high kinetic energy to help the unseating of valves.
- Valve position stability is inherent due to the reduction gearing and/or nut/screw arrangement normally employed for transmitting the drive to the valve.
- Ability to interface directly with modern computerised and telemetric remote control systems.
- Fewer system components and low maintenance.
- Electric circuits do not transmit dirt or moisture, and operate instantly over great distances.
- Handwheel operation is simple to provide, together with a hand/power clutch mechanism having power preference.
- Interface between motor and remote control is a contact, which has better reliability than solenoid pilot valves.
- The complete actuator and control system, apart from the final drive to the valve can be tested without moving the valve position by holding the handwheel engagement clutch lever in the 'hand' position.
- Where safe plant shut down demands a particular sequence of valve operation, the necessary interlocks can be provided simply by interconnection of limit switches on the appropriate apparatus.
- Segregation of emergency and normal control circuits is relatively simple and enables fire protection considerations to be concentrated on the particular circuits that are essential for reliable emergency operation (e.g. by-passing of motor thermal protection devices, local/remote selector switches, and stop circuits for emergency operation)
- Usually only two cables, one for power and one for control connections, need to be brought into the actuator location, irrespective of the degree of sophistication of the control and instrumentation system.
- Complete electric operators or sub-assemblies are usually readily interchangeable, though they may have initially been supplied for completely different applications. This leads to the possibility of quick turn-around on repair or replacement of a faulty actuator on emergency duty if electrical actuators are chosen for both emergency and normal applications on the same installation.

Remote Mounted Solenoid Valve



These are remote mounted or in-line valves available in sizes $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$ and 1 inch body ported valves.

They can be 3/2, 5/2 and 5/3 functions with sol/spring or sol/sol and a choice of internal or external pilot supplies.

Available with an interchangeable CNOMO coil unit, including hazardous area options.

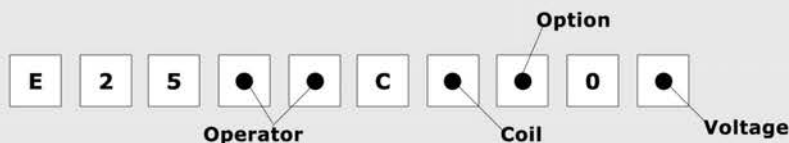
A choice of 4 different manual overrides are available.

A range of coils are available including Exd, Exm, Exia and many more. All RGS valves are suitable for hazardous areas and include ranges 0, 1 or 2.

A choice of voltages are available with 12 vdc, 24 vdc, 110 vac and 240 vac being the most popular. Other voltages are available on request.

Approvals are in accordance from BASEEFA (CENELEC), FM (America) CSA (Canada) and SAA (Australia).

Product Code:



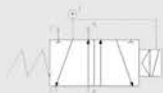
See below for product code details.

Any of the below options that are not required enter '0' in the relevant box.

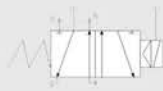
Operator

Options:

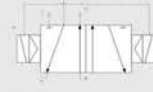
Spring return, internal pilot air feed



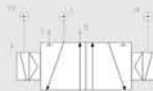
Spring return, external pilot air connection



Double solenoid, internal pilot air feed



Double solenoid, external pilot air connection



Code:

1 8

8 0

1 9

9 0

Option

Options:

Screw Driver Override (Standard)

Lever Manual Override

Push Button Manual Override

No Option Required

Code:

S

C

D

0

Coil

Coil:

Code:

EEExia (BASEEFA)

A

EEExm

9

EEExia (FM)

U

ExN

N

EEExia (SAA)

W

Plug & Socket

P

EEExira (CSA)

V

MC30

K

EEExd

D

Terminal Box

B

No Coil (no jet)

2

No Coil (no jet)

2

Voltage

Voltage:

12v DC

Code:

A

12v DC Low Power

G

24v DC

B

24v DC Low Power

H

No Voltage (no coil)

0

Voltage:

24v AC (50/60 Hz)

Code:

R

48v AC (50/60 Hz)

S

110v AC (50/60 Hz)

T

240v AC (50/60 Hz)

U

415v AC (50/60 Hz)

3

Filtration and Regulation Air Sets

Air Treatment Units also called air preparation units work as separate units and are auxiliary components. They are mainly for treating air sources from air compressors. There are 3 different air treatment units for different functions: Air filter, Air regulator and Air lubricator.

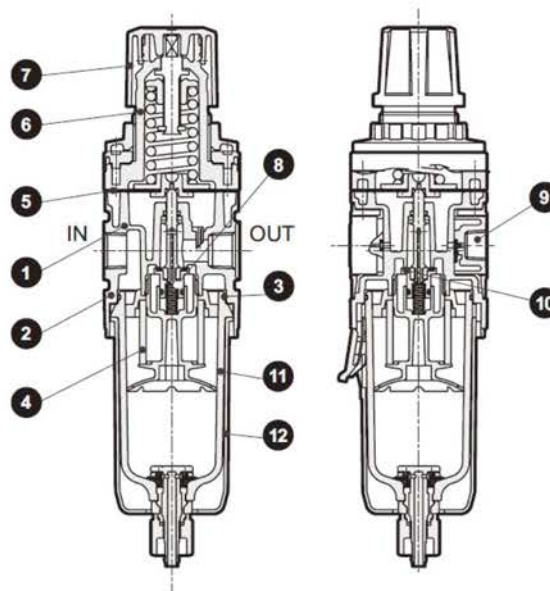
Air filter is for filtering the dirt and some big particles from air sources. After the filtration the air will be clean and dry. Some air filters have the accuracy of 40 microns while standard units are 25 microns to 5 microns.

Air regulator is for regulating the pressure of the air source and can adjust air source from higher pressure or lower pressure to the pneumatic cylinder operating pressure. When the air source was filtered and regulated by the former two air treatment units, it becomes clean, dry and has a stable pressure.

It still requires oil lubrication by the air lubricator so the air source will be working more smooth; and the valves and cylinders can also work more stable with long life cycles.



Internal Structure and Parts List



No.	Part Name	Material	
		WP01AC	WP01AF
1	Plate Cover	ABS resin	
2	Body	Polyamide resin, steel	Aluminum alloy die-casting
3	O Ring	Special nitrile rubber	
4	Element	Polyacetal resin polypropylene	Polypropylene
5	Diaphragm assembly	Polyacetal resin polypropylene	Zinc alloy-die casting, nitrile rubber
6	Guard	Polyamide resin	PBT Resin
7	Knob	Polyacetal resin	
8	Valve assembly	Brass, hydrogen nitrile rubber (polyacetal resin: WP01AC and WP01AF only)	
9	Pressure gauge assembly	PBT resin, polyacetal resin, polycarbonate resin, nitrile rubber, brass, steel	
10	Gauge plug assembly Banking plug assembly	PBT resin, nitrile rubber, steel	Polyamide resin, nitrile rubber, steel
11	Bowl assembly	Polycarbonate resin, polyacetal resin, urethane rubber resin	
12	Bowl guard	Polyamide resin	

Inductive Proximity Switches

We offer a wide range of inductive proximity switches and sensors, and supply switches and sensors sourced from leading international independent manufacturers including: Selet, Comepi, Pulsotronic and Zwicker Sensoren.

As an independent company we are able to source products from ANY worldwide manufacturer, in fact a one stop shop for all your sensor requirements.

The Range Includes:

- Miniature Inductives
- Standard Cylindrical Inductives
- Inductive Shorties
- Extended Range Sensors
- Rectangular Sensors
- Ring and Fork Sensors
- Metal Faced & Weld Immune Sensors
- High Temperature Sensors
- Analogue Sensors

Available in Diameters 3mm - 40mm
Available in Lengths 16mm - 120mm
Sensing Ranges 0.6mm - 50mm

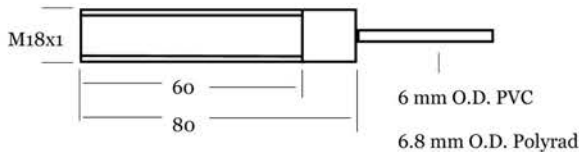


Inductive Proximity Sizing Data

316 stainless steel body PG9 entry PVC cable -20°C + 75°C
316 stainless steel body fully potted Polyrad cable -55°C to + 125°C

The above switches are IP68 & supplied with 2 metres of cable they are double insulated & do not require an earth connection, a flexible conduit kit is available for PVC cables.

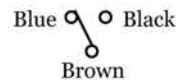
Dimensions in mm



Supplied with 2 M18x1 locknuts

Connections

PVC Cable



Polyrad Cable



Ratings - Also available as Exia

Switch Type	Contacts	Max Current	Max Volts	Power Watts	Sensing Range in mm*		
3000 Series	S.P.C.O	24v DC 2.5A 110v AC 540mA 250v AC 250mA	400v AC/DC	60W VA	MA-1	MA-4	MA-7S
					6	8	15

* switches should be mounted on none ferrous material otherwise sensing range will be reduced*

Certification ATEX GOST-R

Exd IIC T4 Gb Extb IIIC T130 C Db
Exd IIC t6 Gb Extb IIC T85 C Db
EN 60079-0 : 2009
EN 60079-1 : 2007
EN 60079-31 : 2009

Certificate No ISSep10ATEX049X
GOST-R Certificate No POCC GB.AB28.B12795



ES-3021 Exd IIC T6 Gb
ES-3022 Exd IIC T4 Gb

Material Identification Colour Coding

Rubber Diaphragm Materials

Elastomer	Colour Code	Colour Dot	Application	Temperature range
Natural Rubber	Blue		General Purpose	-60 to +75 ° C
Butyl	Red		Acids and Alkalies	-20 to +130 ° C
Neoprene	Yellow		General Purpose with better oil & acid resistance than Natural Rubber.	-40 to +95 ° C
Nitrile	White		Mineral and Vegetable oils, Hydrocarbon solvents.	-20 to +100 ° C
E-ViTite	White/Blue		Strong aggressive chemicals. Abrasive resistance.	-20 to +180 ° C
EPDM	Red/White		Food quality, WRC approved for portable water. Can handle short bursts of low-pressure steam sterilization.	-50 to +130 ° C
Hypalon	Orange		Severe service Acids & Alkalies at elevated temperatures.	-25 to +130 ° C
PSN	Self coloured brilliant yellow		Exceptional abrasion resistance to aggressive slurries, mild chemical use.	-20 to +100 ° C
ViTite	Green/White		Similar to Viton, with good adhesion characteristics, very durable chemically.	-20 to +205 ° C
PFTE-S	Self coloured white		Highest chemical resistance at elevated temperatures	-200 to +250 ° C
HSN GUM	Pink		High abrasion – cut/tear resistant rubber.	-50 to +75 ° C

Rubber Pinch Valve Materials

Elastomer	Colour Code	Colour Dot	Application	Temperature range
Natural Rubber	Blue		General Purpose abrasive elastomer also suitable for seawater application.	-60 to +75 ° C
Butyl	Red		Strong Acids and Alkali bases, durable.	-20 to +130 ° C
Neoprene	Yellow		General Purpose with better oil & acid resistance than Natural Rubber.	-40 to +95 ° C
Nitrile	White		Mineral and Vegetable oils, Hydrocarbon solvents.	-20 to +100 ° C
E-ViTite	White/Blue		Strong aggressive chemicals. Abrasive resistance.	-20 to +280 ° C
EPDM	Red/White		Food quality, WRC approved for portable water. Can handle short bursts of low-pressure steam sterilization.	-50 to +130 ° C
Hypalon® (acid)	Orange		Severe service Acids & Alkalies at elevated temperatures.	-25 to +130 ° C
Hypalon® (fire)	Orange/Green		Reinforced with Kevlar, good flame retardancy.	-25 to +130 ° C
PSN	Self coloured brilliant yellow		Exceptional abrasion resistance to aggressive slurries, mild chemical use.	-20 to +205 ° C
Viton	Green		Outstanding resistance to oils, fuels, lubricants, many aliphatic and aromatic hydrocarbons and most mineral acids.	-20 to +205 ° C
ViTite	Green/White		Similar to Viton, with good adhesion characteristics, very durable chemically.	-20 to +220 ° C
Gum	Green		Abrasive slurries and mild chemicals	-15 to +90 ° C
HSN GUM	Pink		High abrasion – cut/tear resistant rubber.	-50 to +75 ° C

Hypalon® is a DuPont patent

Conversion Tables

Conversions to SI Units

The following conversions have generally been based on BS350. The degree of rounding has been adjusted to an extent considered to be of value to a practical engineer. In the tabulation of conversion factors, the SI unit, or multiple thereof, recommended by the British Valve and Actuators Manufacturers Association for use in the valve industry, is shown in the left hand column.

Length

Millimetre mm	Metre m	Inch in	Foot ft	Yard yd
1	0.001	0.0394	0.0033	0.0011
1000	1	39.3701	3.2808	1.0936
25.4	0.0254	1	0.0833	0.0278
304.8	0.3048	12	1	0.3333
814.4	0.9144	36	3	1

Volume

Cubic Metre mm ³	Cubic Centimetre cm ³	Litre l	Cubic Inch in ³	Cubic Foot ft ³	UK Gallon UK gal	US Gallon US gal
1	1 000 000	999.972	61 023.7	35.314 7	219.969	264.172
0.000 001	1	0.000 999 7	0.0610	0.000 035 3	0.000 22	0.000 26
0.001	1 000 028	1	61.0255	0.035 3	0.22	0.264 2
0.000 16	15.3871	0.016 4	1	0.000 58	0.003 6	0.004 3
0.028 3	28 316.8	28.316 1	1 728	1	6.228 8	7.480 5
0.004 5	4 546.09	4.546	277.419	0.160 5	1	1.201
0.003 8	3 785.41	3.785 3	231	0.133 7	0.823 7	1

Velocity

Metre per Second m/s	Foot per Second ft/s	Foot per Minute ft/m	Kilometre per Hour km/h	Mile per Hour mile/h
1	3.2808	0.0547	3.6	2.2369
0.3048	1	0.0167	1.0973	0.6818
18.288	60	1	65.8368	40.9091
0.2778	0.9113	0.0152	1	0.6214
0.4470	1.4667	0.0245	1.6093	1

Mass

Kilogram Kg	Pound Lb	Hundred Weight Cwt	Tonne t	UK Ton	US Short Ton Sh ton
1	2.2046	0.0197	0.001	0.000 98	0.0011
0.4536	1	0.0089	0.00 454	0.000 446	0.0005
50.8023	112	1	0.050 8	0.05	0.056
1000	2204.62	19.6841	1	0.984 2	1.1023
1016.05	2240	20	1.016 1	1	1.12
907.185	2000	17.8571	0.907 2	0.892 9	1

Mass Rate of Flow

Litre per Second l/s	Litre per Minute l/min	Cubic Metre per Hour m ³ /h	Cubic Foot per Hour ft ³ /h	Cubic Foot per Minute ft ³ /min	UK Gallon per Minute UK gal/min	US Gallon per Minute US gal/min	US Barrel per Day US barrel/d
1	60	3.6001	127.136	2.1189	13.1986	15.8508	543.456
0.0167	1	0.600	2.1189	0.3532	0.22	0.2642	9.0576
0.2778	16.6666	1	35.3147	0.5886	3.6662	4.4029	150.956
0.0079	0.4719	0.0283	1	0.1067	0.1038	0.1247	4.2746
0.4719	28.316	1.6990	60	1	6.2288	7.4805	256.475
0.758	4.546	0.2728	9.6326	0.1605	1	1.201	41.1754
0.0631	3.7853	0.2271	8.0208	0.1337	0.8327	1	34.2857
0.0018	0.1104	0.0066	0.2339	0.0039	0.0243	0.0292	1

Volumetric Rate of Flow

① bar	② Kilogram Force per Square Centimetre kgf/cm ²	③ Pound Force per Square Inch lbf/in ²	④ atm	⑤ Foot of Water ft H ₂ O	⑥ Inch of Water in H ₂ O	⑦ Metre of Water m H ₂ O	⑧ Centimetre of Mercury cm Hg	⑨ Inch of Mercury in Hg	⑩ Millimetre of Mercury mm Hg
1	1.0197	14.5038	0.9869	33.4553	401.463	10.1972	75.0062	29.530	750.062
0.9807	1	14.2233	0.9878	32.8084	393.701	10	73.556	28.959	735.559
0.0689	0.0703	1	0.0809	2.3067	27.68	0.7031	5.1715	2.036	51.716
1.0133	1.0332	14.6959	1	33.889	406.782	10.3323	76.0	29.9213	760
0.0299	0.0305	0.4335	0.0295	1	12	0.3048	2.242	0.8827	22.4198
0.0025	0.0025	0.0361	0.0025	0.0833	1	0.0254	0.1868	0.0734	1.8683
0.0981	0.1000	1.422	0.0968	3.2808	39.3701	1	7.3556	2.896	73.356
0.0133	0.0136	0.1934	0.0132	0.4461	5.3524	0.136	1	0.3937	10
0.0339	0.0345	0.4911	0.0334	1.133	13.5951	0.3453	2.54	1	25.4
0.0013	0.0014	0.0193	0.0013	0.446	0.5352	0.0136	0.1	0.0394	1

① 1 bar = 10⁵ N/m²

② Often denoted non-technically as psi

③ At density 1g/cm³

④ Technical (metric) atmosphere (at)

⑤ International standard atmosphere

⑥ Also known as torr

Pressure Conversions and Equivalents

Head and pressure equivalents are based on pure air-free water at standard atmosphere at 20°C having a density of 0.99823 g/cm³.

Metres head to feet head, bar and lbf/in²

metres	feet	bar	lbf/in ²
0.10	0.328	0.010	0.142
0.20	0.656	0.020	0.282
0.30	0.984	0.030	0.426
0.40	1.312	0.040	0.568
0.50	1.640	0.050	0.710
0.60	1.969	0.059	0.852
0.70	2.297	0.069	0.994
0.80	2.625	0.078	1.136
0.90	2.953	0.088	1.278
1	3.281	0.098	1.420
2	6.562	0.196	2.840
3	9.843	0.294	4.259
4	13.123	0.392	5.679
5	16.404	0.489	7.099
6	19.685	0.587	8.519
7	22.956	0.685	9.939
8	26.247	0.783	11.358
9	29.528	0.881	12.777
10	32.808	0.979	14.198
11	36.089	1.077	15.618
12	39.370	1.175	17.038
13	42.651	1.273	18.457
14	45.932	1.371	19.877
15	49.213	1.468	21.297
16	52.493	1.566	22.717
17	55.774	1.664	24.137
18	59.055	1.762	25.557
19	62.336	1.860	26.976
20	65.617	1.958	28.396
30	98.425	2.937	42.594
40	131.234	3.916	56.792
50	164.042	4.895	70.990
60	196.850	5.874	85.188
70	229.659	6.853	99.386
80	262.467	7.831	113.584
90	295.276	8.810	127.783
100	328.084	9.789	141.981
110	360.892	10.768	156.179
120	393.701	11.747	170.377
130	426.509	12.726	184.575
140	459.318	13.705	198.773
150	492.126	14.684	212.971
160	524.934	15.663	227.169
170	557.743	16.642	241.367
180	590.551	17.621	255.565
190	623.360	18.600	269.763
200	656.168	19.579	283.961
210	688.976	20.558	298.159
220	721.785	21.536	312.357
230	754.593	22.515	326.555
240	787.402	23.494	340.753
250	820.210	24.473	354.951

Feet head to metres head, bar and lbf/in²

feet	metres	bar	lbf/in ²
1	0.305	0.030	0.433
2	0.610	0.060	0.866
3	0.914	0.090	1.298
4	1.219	0.119	1.731
5	1.524	0.149	2.164
6	1.829	0.179	2.597
7	2.134	0.209	3.029
8	2.438	0.239	3.462
9	2.743	0.269	3.895
10	3.048	0.298	4.328
20	6.095	0.597	8.655
30	9.144	0.895	12.983
40	12.192	1.194	17.310
50	15.240	1.492	21.638
60	18.288	1.790	25.965
70	21.336	2.089	30.293
80	24.384	2.387	34.621
90	27.432	2.685	38.948
100	30.480	2.984	43.276
150	45.720	4.476	64.914
200	60.960	5.968	86.551
250	76.200	7.459	108.189
300	91.440	8.951	129.827
350	106.680	10.443	151.465
400	121.920	11.935	173.103
450	137.160	13.427	194.741
500	152.400	14.919	216.379
550	167.640	16.411	238.016
600	182.880	17.903	259.654
650	198.120	19.395	281.292
700	213.360	20.886	302.930
750	228.600	22.378	324.568
800	243.840	23.870	346.205

Bar to lbf/in², metres head and feet head

bar	lbf/in ²	metres	feet
0.01	0.145	0.102	0.335
0.02	0.290	0.204	0.670
0.03	0.435	0.306	1.005
0.04	0.580	0.409	1.341
0.05	0.725	0.511	1.676
0.06	0.870	0.613	2.011
0.07	1.015	0.715	2.346
0.08	1.160	0.817	2.681
0.09	1.305	0.919	3.016
0.10	1.450	1.022	3.351

Pressure Drop and Flow Characteristics of General Purpose Valves

When a valve is inserted into a pipeline, pressure drop, additional to that already present due to the inevitable changes in shape and direction of flow, eddy currents and obstructions in the seating vicinity and end fittings. The general formula given in this section constitute a guide in establishing the value of this pressure drop for a given size and type of valve: alternatively they establish size and/or type of valve required for a given acceptable value of pressure drop. Users are advised, whenever possible, to consult Warren-Morrison. It is important to note that the information given relates to the TURBULENT flow region, i.e. where Reynolds Numbers exceed approximately 2000 and which covers the majority of cases. However, in the few cases where high viscosities or low flow rates drop the Reynolds Number well below 2000, some correction will be necessary.

Liquid Flow

$$\Delta P = \frac{K Q^2}{S^5}$$

$$Q = C_v \sqrt{\frac{\Delta P}{S}}$$

$$Q = K_v \sqrt{\frac{\Delta P}{S}}$$

ΔP = Pressure Drop, lbf/in²
 K = Head loss Coefficient*
 Q = Flow, gal/min
 S = Specific Gravity
 A = Nominal Valve Area, in²
 C_v = Flow Coefficient*, gal/min or US gal/min
 Q = Flow, gal/min or US gal/min
 S = Specific Gravity
 K_v = Flow Coefficient*, l/min
 Q = Flow, l/min
 S = Specific Gravity

Specific Gravity of Liquids

Liquid	Specific Gravity
Water	1.0
Sea Water	1.025
Kerosene	0.80
Sulphuric Acid 100%	1.83
Hydrochloric Acid 45%	1.48
Sodium Hydroxide 25%	1.27
Carbon Tetrachloride	1.60
Petrol (Gasoline)	0.65-0.80
Benzene	0.88
Turpentine	1.1-1.2



WARREN-MORRISON VALVES LTD

Established in 1949

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Johnson Valves LTD
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www.processvalvesolutions.com

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www.hydraulics2u.co.uk

Summit Controls
www.summitcontrols.com

PEB
www.peb.nl

Flowtech LLC
www.flowtech-me.com

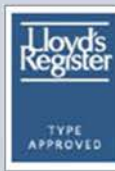
Bi-Water Man Lee Ltd
www.chinawater.com.hk

Flow Technology Services
www.flowtechnologyservices.com

Al Manasir
www.manasir.net

Thrane & Thrane Norway & Russia
www.thrane.no

Nordic Teknikk 3AO
www.nordic-teknikk.ru



Fire Type Approval
SAS F50170
Lloyds Register EMEA
SOLAS 1974

Distributor: