

FILTON

SWIVEL JOINTS technical manual





FILTON SWIVEL JOINTS • AN INTRODUCTION

What are Swivel Joints?

Swivel Joints are sealing devices which allow the leakproof transfer of fluid to and from slow and intermittent rotating machinery.

These products are intended for use in a factory environment. Contact us if the installation is subjected to climatic conditions.

A few typical applications are shown on p3.

Fluids should be free of abrasive particles and water systems should be treated if "scaling" is likely to occur.

The majority of FILTON SWIVEL JOINTS use industrial standard ball bearings. These have the distinct advantage that spare bearings are available anywhere in the world. These bearings do not cause wear on the body and spindle which does occur where these items are designed to be the bearing races.

Page No.	4	5	6	7	8	9
Medium	NHP	LD	XP	XP/RS	XP/MT	XP/MO
Air	✓	✓	✓	✓	✓	✓
Gas *		✓	✓			
Oil-lubrication	✓	✓	✓	✓	✓	✓
Oil-hydraulic	✓		✓	✓	✓	✓
Vacuum	✓	✓				
Water	✓	✓	✓	✓	✓	✓

✓ - Suitable but check full working conditions

* - Dependant on the type of gas and working conditions

Who are Filton Limited?

Filton Limited is a Private Limited Company which celebrated its 60th Anniversary in 2002. The Company was founded by Mr William Murray, to manufacture conventional leather oil seals for rotary shafts, but is now universally known as one of the world's leading manufacturers of Swivel Joints various types of which are described in the following pages. The main interest of the Company is still with rotary seals but using state of the art designs and when required, sophisticated seal materials which enable us to undertake and solve complex sealing problems. Multi-port Swivel Joints are now common-place, and if a suitable design is not already available our design team is at your disposal to consider the specification needed. **Quality is Paramount.** All components are rigorously inspected during manufacture and every Swivel Joint is pressure tested before despatch to ensure satisfactory performance when installed in accordance with our recommendations.

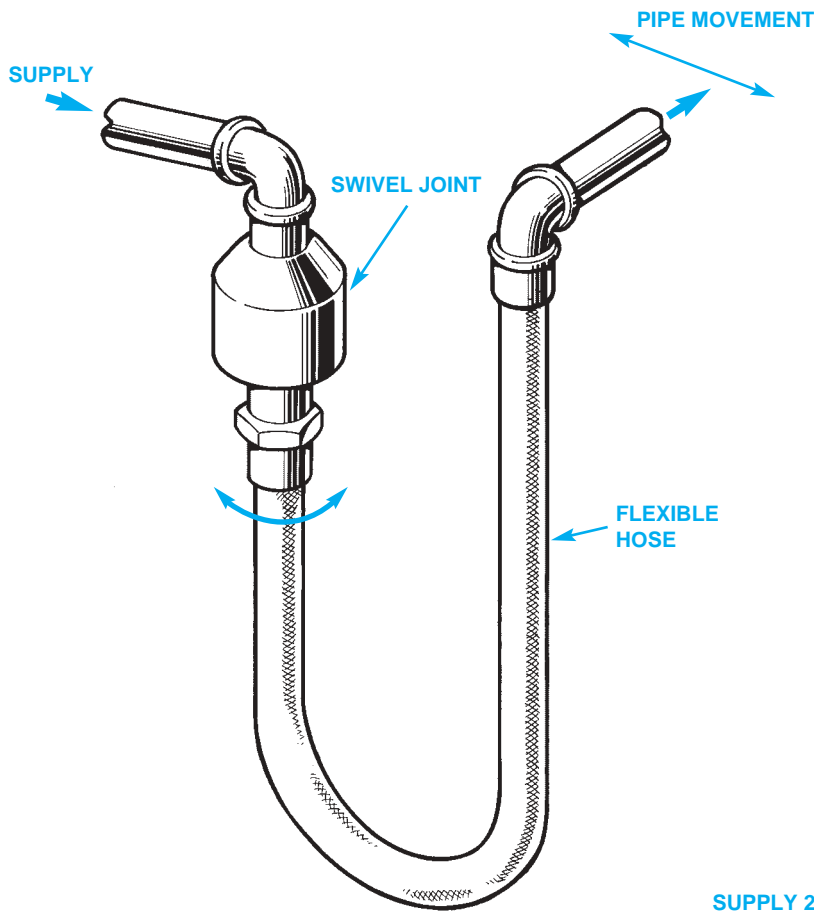
Health and Safety

The Swivel Joints shown in this leaflet should not present any hazard when correctly fitted and used.

ALL FILTON SWIVEL JOINTS ARE LEAKAGE TESTED BEFORE DESPATCH.

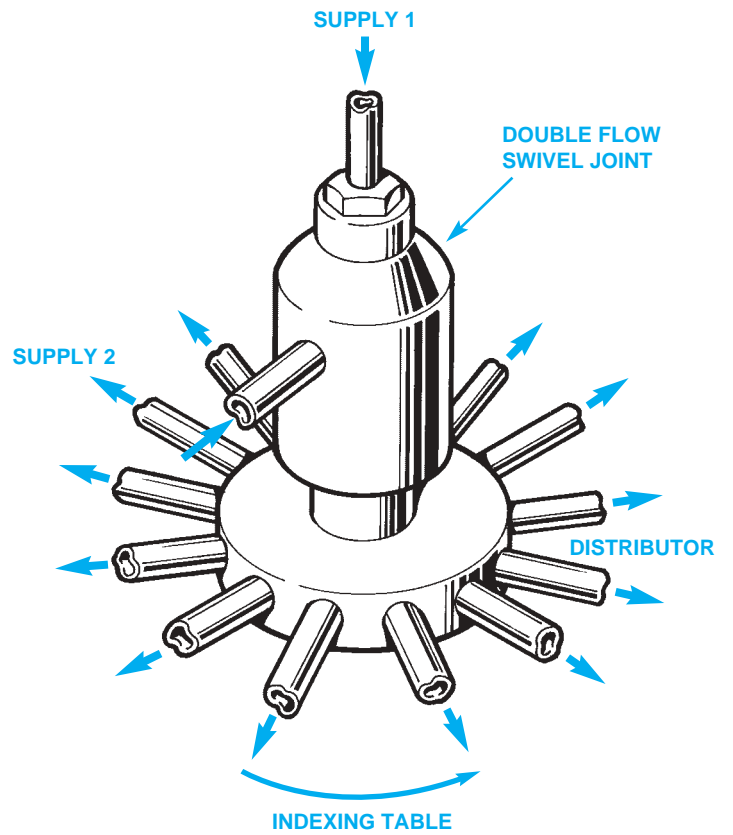
At some time the seals in the Swivel Joint will leak, so inspect regularly, also ensure that leakages are not hazardous to personnel and that the Swivel Joint is removed for repair immediately. If leakages are not attended to promptly, bearing seizure may occur causing massive leakage. Fit protective guards if leakages are likely to be hazardous to personnel or equipment.

With oil systems minor leakages occur due to the natural characteristics of oil preventing the seal from contacting fully.



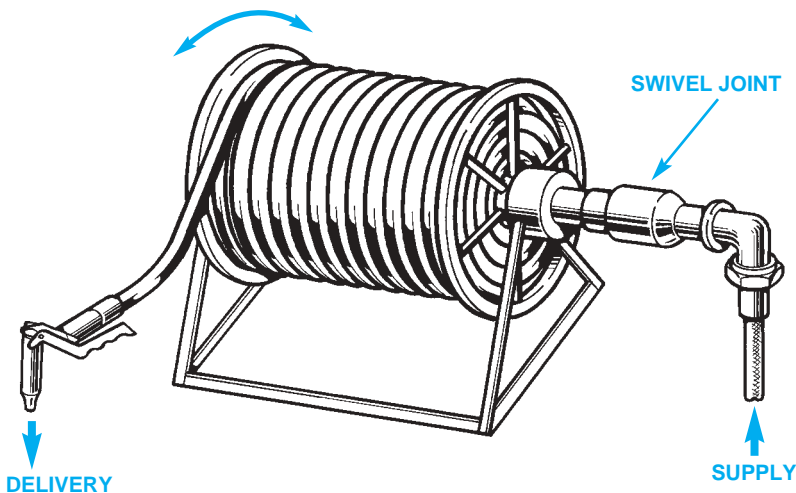
FLEXIBLE HOSE

Where pipework connections are made with flexible hose and movement occurs the hose can have a short life. Remove the strain by using a FILTON SWIVEL JOINT



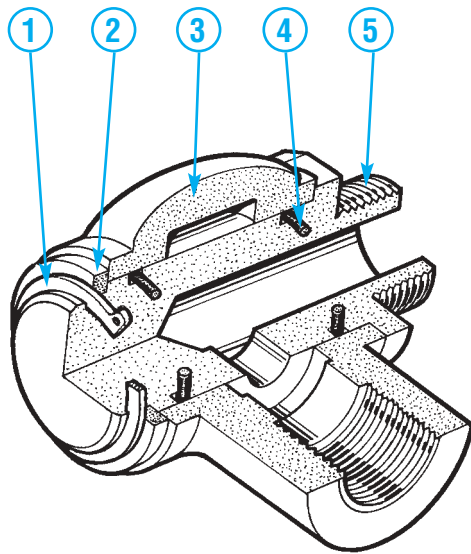
INDEXING MACHINES

A double flow FILTON SWIVEL JOINT can be used to supply pneumatic or hydraulic services for functional or sensing purposes on a semi rotary machine table.



HOSE REELS

A FILTON SWIVEL JOINT will allow leak proof transfer from a bulk supply tank to a hose reel system for distribution purposes.



Specification

1. Circlip - carbon spring steel
2. Washer - steel, zn plated
3. Body - s.g. iron
4. 'O' rings - nitrile rubber
5. Spindle - steel, e.ni plated

SPECIALS ARE AVAILABLE SEE PAGE 10

The NHP SWIVEL JOINT is the simplest form of swivel joint used mainly for very slow occasional movements.

Operational Guidelines

FLUIDS

Water, mineral oils and lubricated compressed air.

All fluids must be clean and free of abrasive and corrosive elements.

PRESSURE

85 bar maximum. (For 40 (1 1/2") and 50 (2") maximum pressure for compressed air is 20 bar.)

VACUUM

740 mm Hg

TEMPERATURE

100°C maximum

SPEED

Slow intermittent rotary movement.

FLOW CAPACITY

Nominal Size	Liquids *		Air ▲
	m³/h	l/min	m³/h
8 (1/4")	0.3	5	10
10 (3/8")	0.8	14	30
15 (1/2")	1.2	20	42
20 (3/4")	2.4	41	85
25 (1")	4.1	68	142
32 (1 1/4")	7.6	127	264
40 (1 1/2")	11.0	183	380
50 (2")	17.2	283	594

* Flow at a velocity of 3 m/s

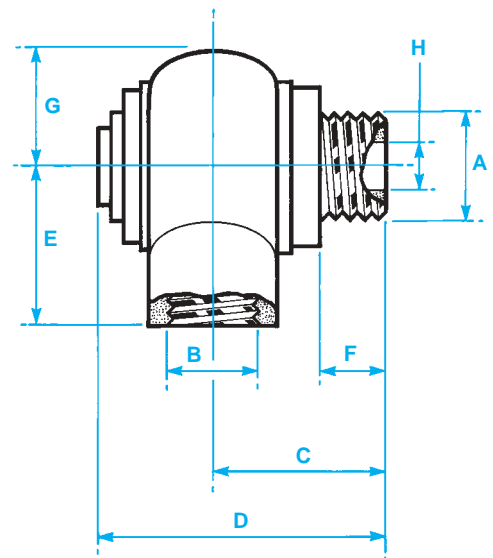
▲ Flow of free air at 15 m/s and 6 bar

DIMENSIONS

Nom. Size	Part No.	A	B	C	D	E	F	G	H
8 (1/4")	16899	G. 1/4"	G. 1/4"	29	48	35	8	18	6
8 (1/4")	16899BOS	G. 1/4"	G. 3/8"	29	48	35	8	18	6
10 (3/8")	16900	G. 3/8"	G. 3/8"	30	49	35	10	18	10
15 (1/2")	16901	G. 1/2"	G. 1/2"	49	84	57	16	32	12
20 (3/4")	16902	G. 3/4"	G. 3/4"	56	90	57	19	32	17
25 (1")	16903	G. 1"	G. 1"	70	116	76	22	43	22
32 (1 1/4")	16904	G. 1 1/4"	G. 1 1/4"	76	122	76	25	43	30
40 (1 1/2")	16905	G. 1 1/2"	G. 1 1/2"	87	149	95	25	64	36
50 (2")	16906	G. 2"	G. 2"	94	156	95	32	64	45

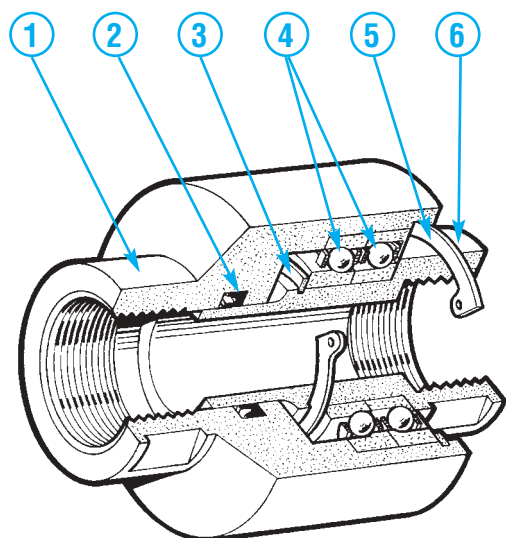
Dimensions in millimetres

'G' is the designation for parallel pipe threads to B.S.2779 and ISO.228/1 (formerly B.S.P. parallel).



LD SWIVEL JOINT

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Specification

1. Body - steel
2. Seal - nitrile rubber
3. Circlip - spring steel
4. Ball bearings
5. Circlip - spring steel
6. Spindle - e.ni plated

SPECIALS ARE AVAILABLE SEE PAGE 10

The LD SWIVEL JOINT is generally used for slow continuous rotation and intermittent angular movements for modest pressures.

Operational Guidelines

FLUIDS

Water, mineral oils, lubricated air and natural gas (see page 11 for specials if general gas leakage detection is not available).
 Sizes 32 (1 1/4") to 50 (2") - Natural Gas on application.

All fluids must be clean and free of abrasive and corrosive elements.

PRESSURE

10 bar maximum

VACUUM

740 mm Hg {add suffix 'VAC' to the part No.}

TEMPERATURE

100°C maximum

SPEED

5 rpm - intermittent

FLOW CAPACITY

Nominal Size	Liquids *		Air ▲
	m ³ /h	l/min	m ³ /h
20 (3/4")	3.06	51	106
25 (1")	5.48	91	189
32 (1 1/4")	8.68	145	300
40 (1 1/2")	12.25	204	424
50 (2")	21.89	365	757

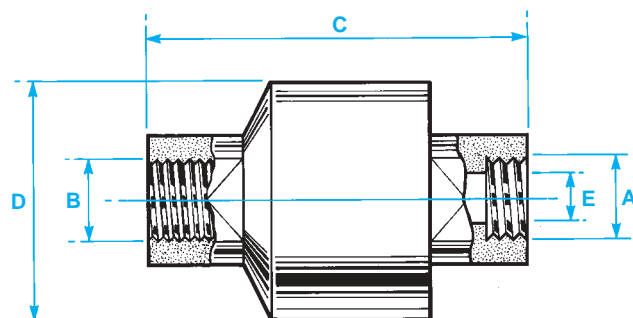
* Flow at a velocity of 3 m/s

▲ Flow of free air at 15 m/s and 6 bar

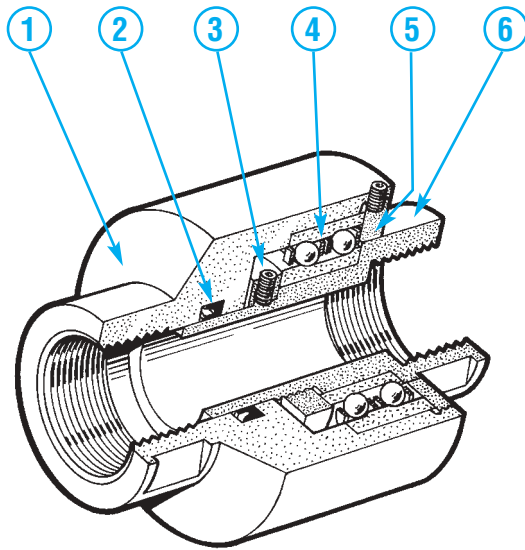
DIMENSIONS

Nom. Size	Part No.	A & B	C	D	E
20 (3/4")	18216	G.3/4"	96	65	19
25 (1")	18217	G.1"	106	76	25
32 (1 1/4")	18218	G.1 1/4"	114	85	32
40 (1 1/2")	18158	G.1 1/2"	127	90	38
50 (2")	18159	G.2"	155	110	51

Dimensions in millimetres



'G' is the designation for parallel pipe threads to B.S.2779 and ISO.228/1 (formerly B.S.P. parallel).



Specification

1. Body - steel
2. Seal - polyurethane rubber
3. Locking ring - steel
4. Double row angular contact ball bearing
5. Locking ring - steel
6. Spindle - steel, hard chromed on sealing surface

SPECIALS ARE AVAILABLE SEE PAGE 10

The XP SWIVEL JOINT is generally used for slow continuous rotation and intermittent angular movements for high pressure systems.

Operational Guidelines

FLUIDS

Water, mineral oils and compressed air.

All fluids must be clean and free of abrasive and corrosive elements.

PRESSURE

200/400 bar maximum depends on size - see below
 For 40 (1 1/2") and 50 (2") maximum for compressed air is 20 bar.

TEMPERATURE

80°C maximum

SPEED

5 rpm - intermittent

FLOW CAPACITY

Nominal Size	Liquids *		Air ▲
	m ³ /h	l/min	m ³ /h
6 (1/4")	0.35	5.8	12
10 (3/8")	0.77	12.8	27
15 (1/2")	1.37	22.8	47
20 (3/4")	3.06	51	106
25 (1")	5.48	91	189
32 (1 1/4")	8.68	145	300
40 (1 1/2")	12.25	204	424
50 (2")	21.89	365	757

* Flow at a velocity of 3 m/s

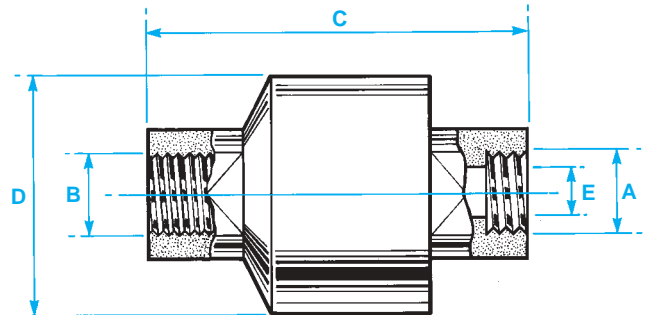
▲ Flow of free air at 15 m/s and 6 bar

DIMENSIONS

Nom. Size	Part No.	A & B	C	D	E	Max Press.
6 (1/4")	17699	G.1/4"	86	65	6.4	400
10 (3/8")	17681	G.3/8"	86	65	9.5	400
15 (1/2")	17682	G.1/2"	90	65	12.7	400
20 (3/4")	17683	G.3/4"	100	75	19.0	400
25 (1")	17684	G.1"	110	85	25.0	400
32 (1 1/4")	17685	G.1 1/4"	125	100	32.0	300
40 (1 1/2")	16545	G.1 1/2"	120	100	38.0	200
50 (2")	16473	G.2"	135	155	51.0	200

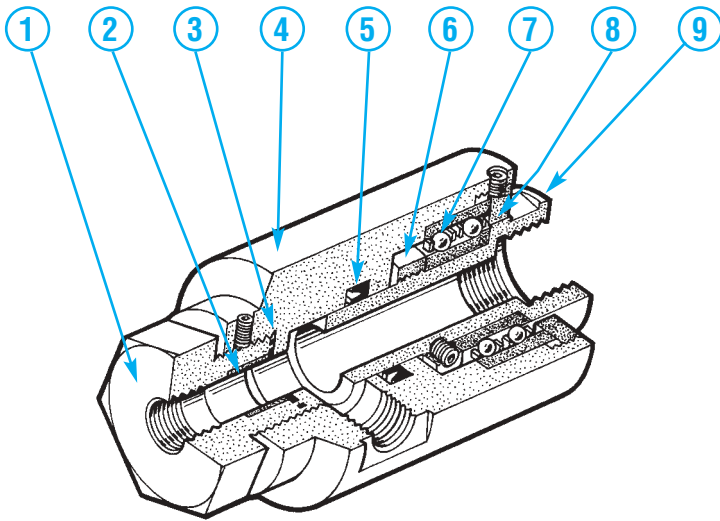
Dimensions in millimetres

'G' is the designation for parallel pipe threads to B.S.2779 and ISO.228/1 (formerly B.S.P. parallel).



XP/RS SWIVEL JOINT

FILTON



Specification

1. Adaptor - steel
2. Centre tube steady bearing
3. Centre tube seal - ptfе + nitrile rubber
4. Body - steel
5. Seal - polyurethane rubber
6. Locking ring - steel
7. Double row angular contact ball bearing
8. Locking ring - steel
9. Spindle - steel, hard chromed on sealing surface

SPECIALS ARE AVAILABLE SEE PAGE 10

The XP/RS SWIVEL JOINT is a double channel unit generally used for slow continuous rotation and intermittent angular movements.

Operational Guidelines

FLUIDS

Water, mineral oils and compressed air.

All fluids must be clean and free of abrasive and corrosive elements.

PRESSURE

300/400 bar maximum depends on size - see below

TEMPERATURE

80°C maximum

SPEED

5 rpm - intermittent

FLOW CAPACITY

Nominal Size	Liquids * m ³ /h	l/min	Air ▲ m ³ /h
2x6 (1/4")	0.25	4	9
2x10 (3/8")	0.56	9	19
2x15 (1/2")	1.61	27	56
2x20 (3/4")	2.65	44	92

* Flow at a velocity of 3 m/s

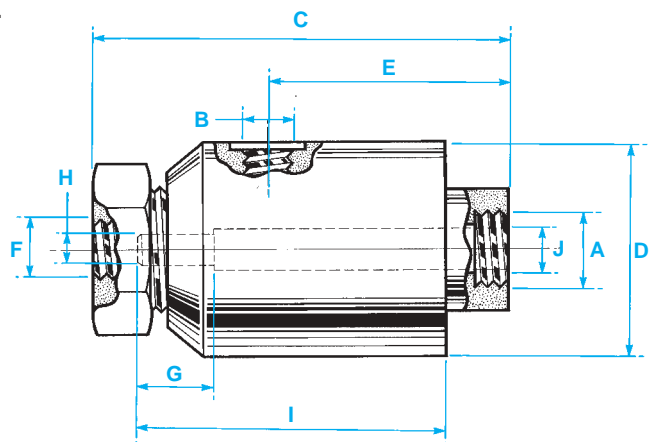
▲ Flow of free air at 15 m/s and 6 bar

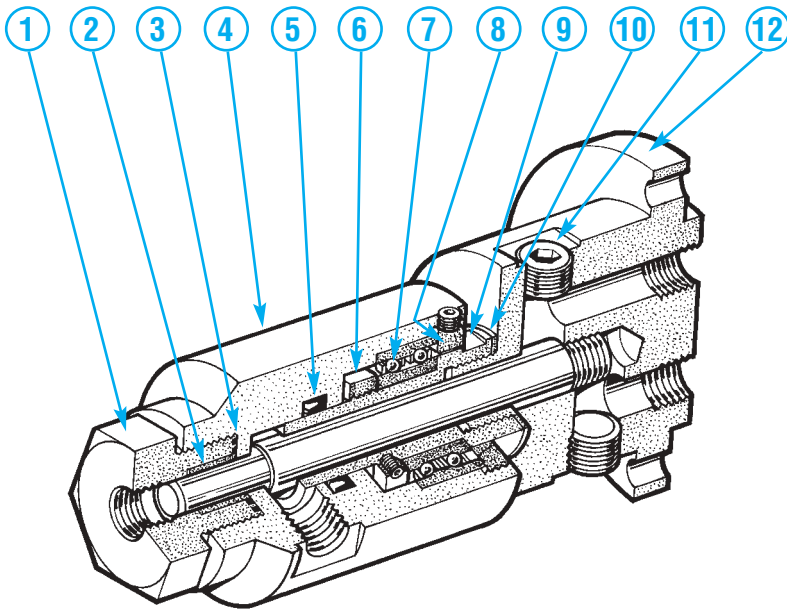
DIMENSIONS

Nom. Size	Part No.	A	B & F	C	D	E	G	H	I	J	Max Press.
2x6 (1/4")	17690	G.1/2"	G.1/4"	118	65	73	25	10	100	13	400 bar
2x10 (3/8")	17691	G.3/4"	G.3/8"	138	75	85	30	16	120	19	
2x15 (1/2")	17692	G.1"	G.1/2"	150	85	90	30	20	130	25	300 bar
2x20 (3/4")	17693	G.1 1/4"	G.3/4"	168	100	105	30	25	140	32	

Dimensions in millimetres

'G' is the designation for parallel pipe threads to B.S.2779 and ISO.228/1 (formerly B.S.P. parallel).





Specification

1. Adaptor - steel
2. Centre tube steady bearing
3. Centre tube seal - ptfe + nitrile rubber
4. Body - steel
5. Seal - polyurethane rubber
6. Locking ring - steel
7. Double row angular contact ball bearing
8. Locking ring - steel
9. Spindle - steel, hard chromed on sealing surface
10. Sealing washer - steel and nitrile rubber
11. Plugs - steel (can be transferred to alternative ports to suit flow system)
12. Distributor - steel + tube - stainless steel

SPECIALS ARE AVAILABLE SEE PAGE 10

The XP/MT SWIVEL JOINT is a double channel unit with a threaded interface for slow continuous rotation and intermittent angular movements.

Operational Guidelines

FLUIDS

Water, mineral oils and compressed air.

All fluids must be clean and free of abrasive and corrosive elements.

PRESSURE

300/400 bar maximum depends on size - see below

TEMPERATURE

80°C maximum

SPEED

5 rpm - intermittent

FLOW CAPACITY

Nominal Size	Liquids *		Air ▲
	m ³ /h	l/min	m ³ /h
2x6 (1/4")	0.25	4	9
2x10 (3/8")	0.56	9	19
2x15 (1/2")	1.61	27	56
2x20 (3/4")	2.65	44	92

* Flow at a velocity of 3 m/s

▲ Flow of free air at 15 m/s and 6 bar

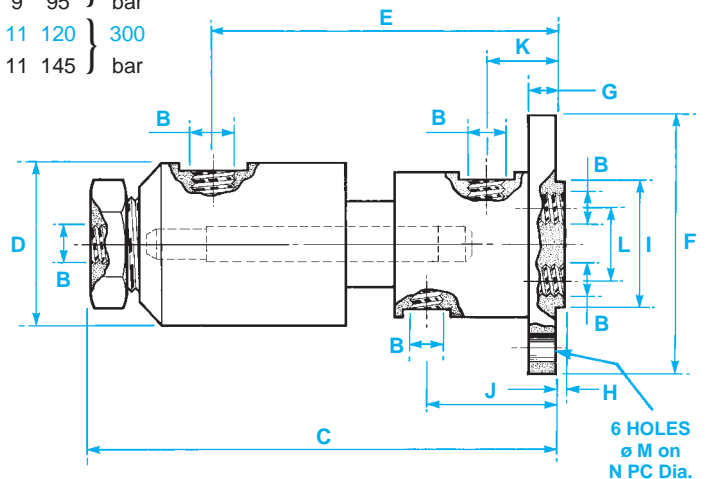
DIMENSIONS

Nom. Size	Part No.	B	C	D	E	F	G	H	I†	J	K	L	M	N	Max Press.
2x6 (1/4")	17703	G. 1/4"	180	65	135	95	10	6	50	45	24	28	9	80	400
2x10 (3/8")	17704	G. 3/8"	215	75	163	115	12	8	65	60	30	40	9	95	
2x15 (1/2")	17705	G. 1/2"	238	85	178	140	12	8	80	65	32	45	11	120	300
2x20 (3/4")	17706	G. 3/4"	280	100	217	165	12	8	100	88	45	60	11	145	

Dimensions in millimetres

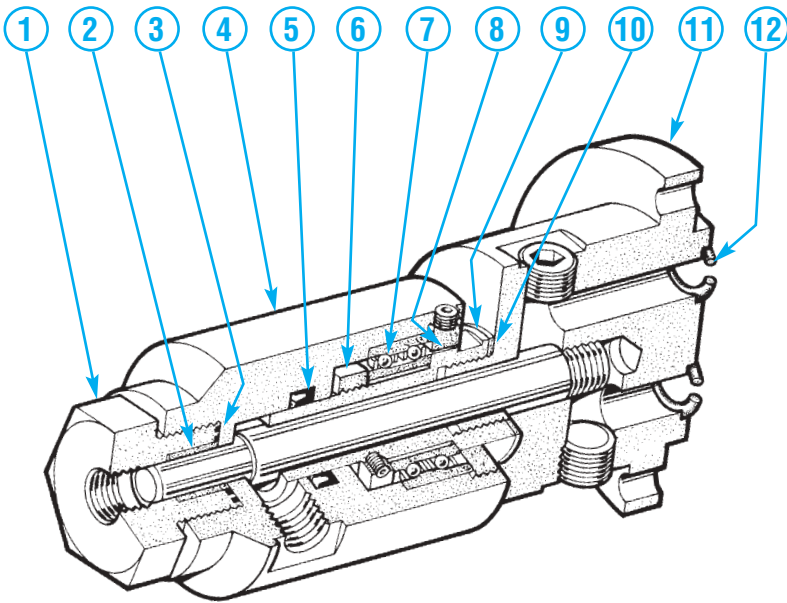
'G' is the designation for parallel pipe threads to B.S.2779 and ISO.228/1 (formerly B.S.P. parallel).

† The machine recess dimension should be H8 - BS.4500 and ISO.R286.



XP/MO SWIVEL JOINT

FILTON



Specification

1. Adaptor - steel
2. Centre tube steady bearing
3. Centre tube seal - ptfе + nitrile rubber
4. Body - steel
5. Seal - polyurethane rubber
6. Locking ring - steel
7. Double row angular contact ball bearing
8. Locking ring - steel
9. Spindle - steel, hard chromed on sealing surface
10. Sealing washer - steel and nitrile rubber
11. Distributor - steel + tube - stainless steel
12. 'O' rings - nitrile rubber

SPECIALS ARE AVAILABLE SEE PAGE 10

The XP/MO SWIVEL JOINT is a double channel unit with an 'O' ring sealed interface for slow continuous rotation and intermittent angular movements.

Operational Guidelines

FLUIDS

Water, mineral oils and compressed air.

All fluids must be clean and free of abrasive and corrosive elements.

PRESSURE

300/400 bar maximum depends on size - see below

TEMPERATURE

80°C maximum

SPEED

5 rpm - intermittent

FLOW CAPACITY

Nominal Size	Liquids *		Air ▲
	m ³ /h	l/min	m ³ /h
2x6 (1/4")	0.25	4	9
2x10 (3/8")	0.56	9	19
2x15 (1/2")	1.61	27	56
2x20 (3/4")	2.65	44	92

* Flow at a velocity of 3 m/s

▲ Flow of free air at 15 m/s and 6 bar

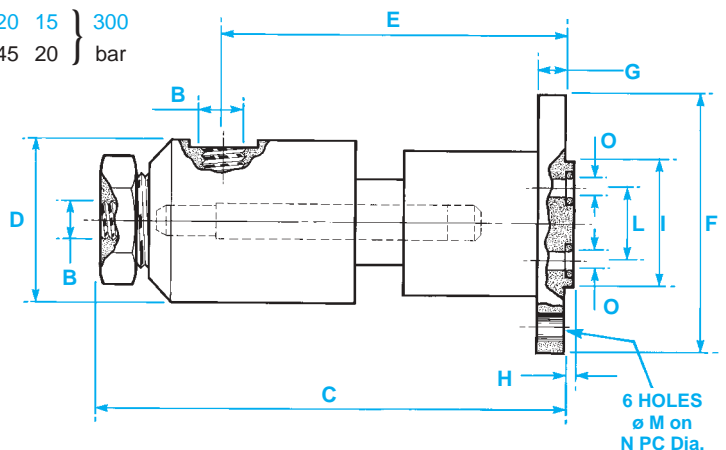
DIMENSIONS

Nom. Size	Part No.	B	C	D	E	F	G	H	I†	L	M	N	O	Max Press.
2x6 (1/4")	18700	G.1/4"	180	65	135	95	10	6	50	28	9	80	6	400 bar
2x10 (3/8")	18701	G.3/8"	215	75	163	115	12	8	65	40	9	95	10	
2x15 (1/2")	18702	G.1/2"	238	85	178	140	12	8	80	45	11	120	15	300 bar
2x20 (3/4")	18703	G.3/4"	280	100	217	165	12	8	100	60	11	145	20	

Dimensions in millimetres

'G' is the designation for parallel pipe threads to B.S.2779 and ISO.228/1 (formerly B.S.P. parallel).

† The machine recess dimension should be H8 - BS.4500 and ISO.R286.



The standard SWIVEL JOINTS shown in this technical manual do not always meet the application required, we do therefore consider other applications.

A simple variation from our standard product may be all that is required. Simple variations can be obtained by adding the suffix code shown below to the standard part number.

We also offer a bespoke service when required. The illustrations shown below and on the opposite page gives some idea of our capabilities.

SEMI - STANDARDS

Connections:-

NPT = American taper pipe threads
 T = 'R' pipe threads (BSP Taper)
 WN = Weldneck ends

Metal Parts:-

DS = Bleed port and double seals
 RA = 90° connection - solid body
 RAW = 90° connection - fabricated
 S = Stainless steel type 316

Seal Materials:-

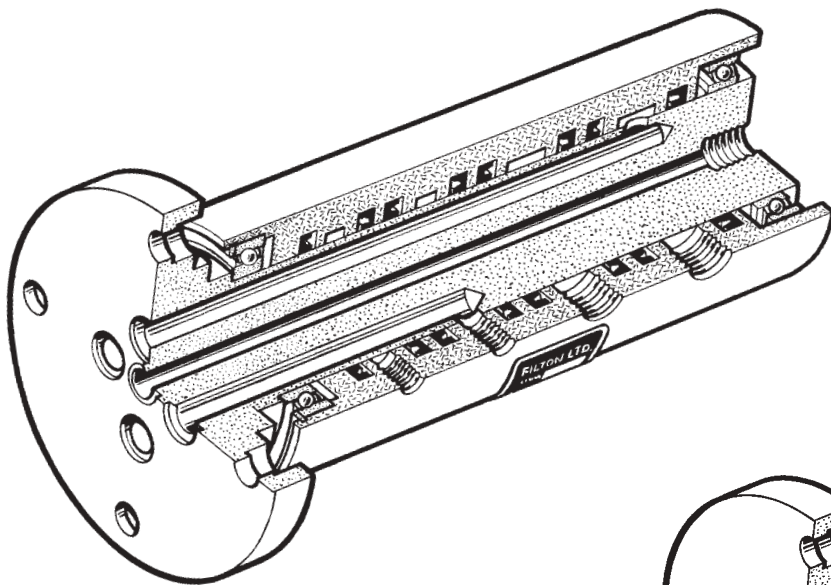
EP = Ethylene propylene
 N = Nitrile
 PU = Polyurethane
 TF = P.t.f.e base
 V = Fluorocarbon

Conditions:-

FQ = Non-toxic contact parts
 VAC = Vacuum service

Flanges are available - please specify the type required.

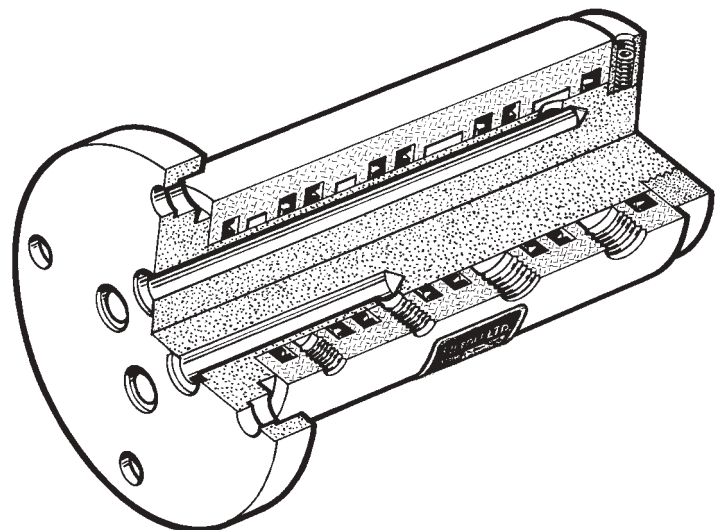
MULTI-PORT SWIVEL JOINTS



The illustration above shows a four port Swivel Joint with a central bore for electric cable access from a slip ring which can be mounted on the end, or for an additional Swivel Joint service.

This unit is supported by ball bearings for the more arduous duties.

The illustration below shows a four port Swivel Joint for hydraulic service. This is a plain bearing type which is the simplest form.



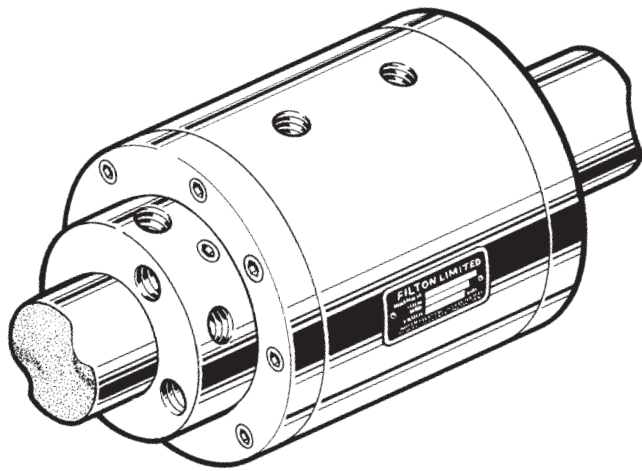
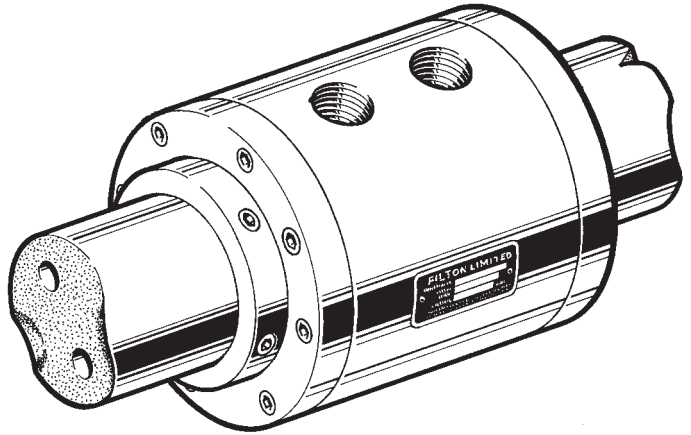
We have designed and manufactured multi-port Swivel Joints weighing up to 1.25 tonne.

OVERSHAFT SWIVEL JOINTS

FOR RADIAL CONNECTION

The illustration on the right shows a two port Overshaft Swivel Joint for fluid transfer through radial ports into the rotating shaft.

Single and multiple port systems are also possible using the same principle.



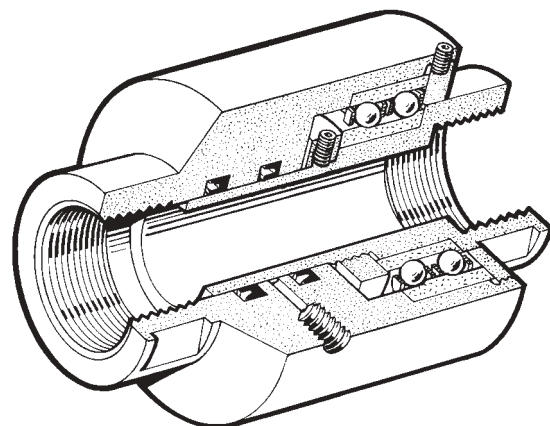
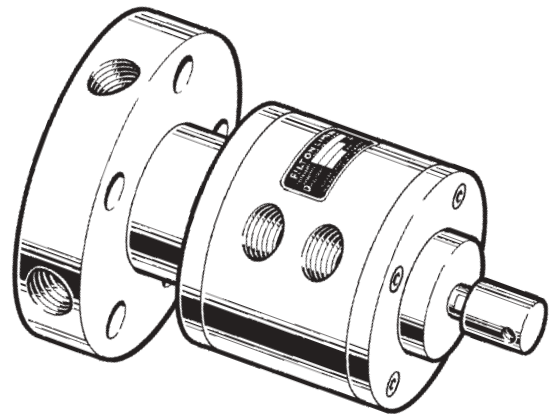
FOR AXIAL CONNECTION

The illustration on the left shows a two port Overshaft Swivel Joint for fluid transfer through axial ports in the Swivel Joint sleeve which rotates with the shaft.

Alternatively the ports in the sleeve can exit radially outwards.

PIGGYBACK SWIVEL JOINT

The illustration on the right shows a Piggyback Swivel Joint with two hydraulic ports and one pneumatic port. This principle can be applied to other fluids where intermixing of services could cause problems.



SWIVEL JOINT - LEAKAGE DETECTION

The illustration on the left shows a Swivel Joint fitted with two seals and having a bleed port between them.

A typical application is for flammable gases where a "sniffer" can be attached to the bleed port to detect leakage from the primary seal.

Another use is for some difficult fluids where a compatible barrier fluid can be injected into the bleed port.



MECHANICAL SEALS

Our range of ROLTAC® Mechanical Seals include balanced internally mounted seals to DIN 24960 for shaft diameters ranging from 25 to 100mm diameter. We also have a range of externally mounted seals for shaft diameters from 19 to 75mm diameter.

Both internally and externally mounted seals are also available for imperial sized shafts.

AIR BREATHER FILTERS

This product is a device which equalises pressure and prevents the ingress of abrasives to closed chambers such as gear boxes and hydraulic power packs. The standard range covers from R $\frac{1}{8}$ " to R $\frac{1}{4}$ " with options of four grades of filter element, from 5 to 65 micrometres particle retention size.



ROTARY UNIONS

Rotary unions are self-contained and self-supporting rotary seals used to transfer fluids such as steam, water, air or oil, to and from rotating machinery.

The range of standard models from G $\frac{1}{4}$ " to G.6" (BSP) for single or dual flow are available with a choice of ball bearings for temperatures up to 160°C and with carbon bearings for temperatures up to 300°C. Pressure range is 740mm of Hg vacuum to 70 bar with rotating speeds up to 3000 rpm. It is possible to exceed these conditions, but please consult our technical department.

Filton undertake to design and manufacture special rotary unions.



SPECIALIST SEALS

We will consider any rotary shaft sealing application which cannot be resolved with any of our standard seals. We have gained a wide experience, with our bespoke service, which has given us a considerable data bank to draw on to resolve the more unusual applications.