INSTRUCTION MANUAL

Accessories

ATEX APPROVED

4-WAY VALVE

INSTRUCTION MANUAL FOR SAMSON 4-WAY VALVES 3", 4" & 5"

- Technical data
- Functional description
- Installation
- Maintenance

Click here for Parts

CONTENTS

1 INTRODUCTION

1.1 Foreword

This user manual applies to both ATEX and standard valves.

- 4-way valve 3“ with pneumatic actuator, item No.: 1634898
- 4-way valve 3“ with handle bar, item No.: 1634908
- 4-way valve 4“ with pneumatic actuator, item No.: 1634896
- 4-way valve 4“ with handle bar, item No.: 1634997
- 4-way valve 5“ with pneumatic actuator, item No.: 1634895
- 4-way valve 5“ with handle bar, item No.: 1634911

1.2 Declaration of incorporation

SAMSON PUMPS

Declaration of Conformity

Annex IIA

Samson Pumps A/S
Petersmindevej 21
DK-8800 Viborg

Hereby declares that the following products:

4-way valve with pneumatic actuator & 3 positioning switch
4-way valve with pneumatic actuator & 3 positioning switch (According to ATEX directive 2014/34/EU)
4-way valve with pneumatic actuator (According to ATEX directive 2014/34/EU)
4-way valve with hydraulic shifting handle (According to ATEX directive 2014/34/EU)
4-way valve with manual shifting handle (According to ATEX directive 2014/34/EU)
4-way valve only (According to ATEX directive 2014/34/EU)

Conforms to the following directives:

Machinery Directive 2006/42/EC
ATEX Directive 2014/34/EU (ATEX approved products only)

Explosion protection as follows on nameplate:

Ex II 1G Ex h IIC T4 Ga Internal
Ex II 2G Ex h IIC T4 Gb External

I hereby declare, that the machine are in conformity with the following harmonized standards:

DS/EN ISO 12100:2011	Safety of machinery - General principles for design - Risk assessment and risk reduction
DS/EN 1127-1:2019	Explosive atmospheres - Explosion prevention and protection - part 1: Basic concepts and methodology
DS/EN ISO 80079-36:2016	Explosive atmospheres - Part 36: Non-electrical equipment for explosive atmospheres - Basic method and requirements
DS/EN ISO 80079-37:2016	Explosive atmospheres - Part 37: Non-electrical equipment for explosive atmospheres - Non-electrical type of protection constructional safety "c", control of ignition sources "b", liquid immersion "k"

The standard above only applies to the extent that it is relevant for the purpose of the product.
The product must not be used before the complete system, which it must be incorporated in, has been conformity assessed and found to comply with all relevant health and safety requirements of 2006/42/EC and other relevant directives. The product must be included in the overall risk assessment.

EU TYPE-Examination Certificate Number **Ex type approval is under preparation**
Certification body Identification Number **2804**

Viborg, 23.11.2022

Jan S. Christiansen – Manager, Technical dept.

DOC4050

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1.3 Explanation of warning symbols

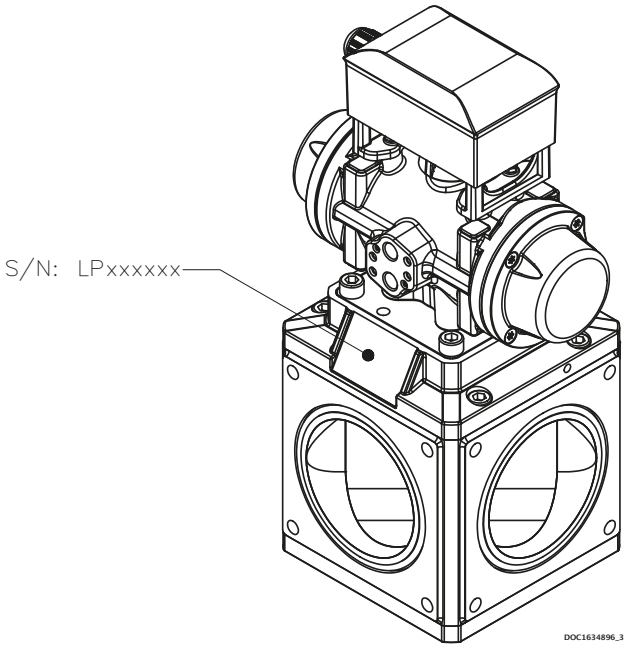
Important technical and safety instructions is showed by symbols. If instructions are not performed correctly, it may lead to personnel injury or incorrect function of the 4-way valve.

To be used with all safety instructions that must be followed. A failure to follow the instructions may result in injury and/or incorrect machine operation.

This symbol stands for safety instructions which – if they are not observed – may lead to a risk of explosion. You must therefore always follow these instructions.

1.4 Marking and identification

The 4-way valve is equipped with an Serial No. as shown below.



1.5 How to order

Example:	TM4WAY	4	A	1	R	0	1
Valve size:							
DN75 - 3”	3						
DN100 - 4”	4						
DN125 - 5”	5						
Operation:							
None	0						
Mounted with pneumatic 3-way actuator with end switch	A						
Manual	M						
Welding flanges:							
None	0						
Mounted with welding flanges - Steel	1						
Mounted with welding flanges - Stainless Steel	2						
Colour:							
None / Special colour	0						
RAL 7039	R						
On request	X						
Miscellaneous:							
None	0						
Generation of 4-way valve:							
Generation 1	1						

1.6 ATEX Directive 2014/34/EU (ATEX approved only)

The 4-way valve may be incorporated into a larger system, if the internal atmosphere has an area classification of Zone 0 and external atmosphere classification of Zone 1.

The 4-way valve can also be implemented in other ATEX zones, except Zone 0 outside.

These systems must be certified in accordance with the ATEX Directive 2014/34/EU.

For the certification to be valid, the 4-way valve must be installed as described in this manual.

The 4-way valve has explosion protection:

II 1G Ex h IIC T4 Ga Internal

II 2G Ex h IIC T4 Gb External

Explanation of symbols and characters used in ATEX marking:

The European Commission's mark for Ex products

II	Equipment group II (non-mining)
1	Equipment category
G	Type of explosive atmosphere (G = Gas)
Ex	Indication of equipment for use in potentially explosive atmospheres
h	Explosion protection
IIC	Gas group (explosion group)
T4	Temperature class (T4 = 135°C)
Ga	Equipment protection level

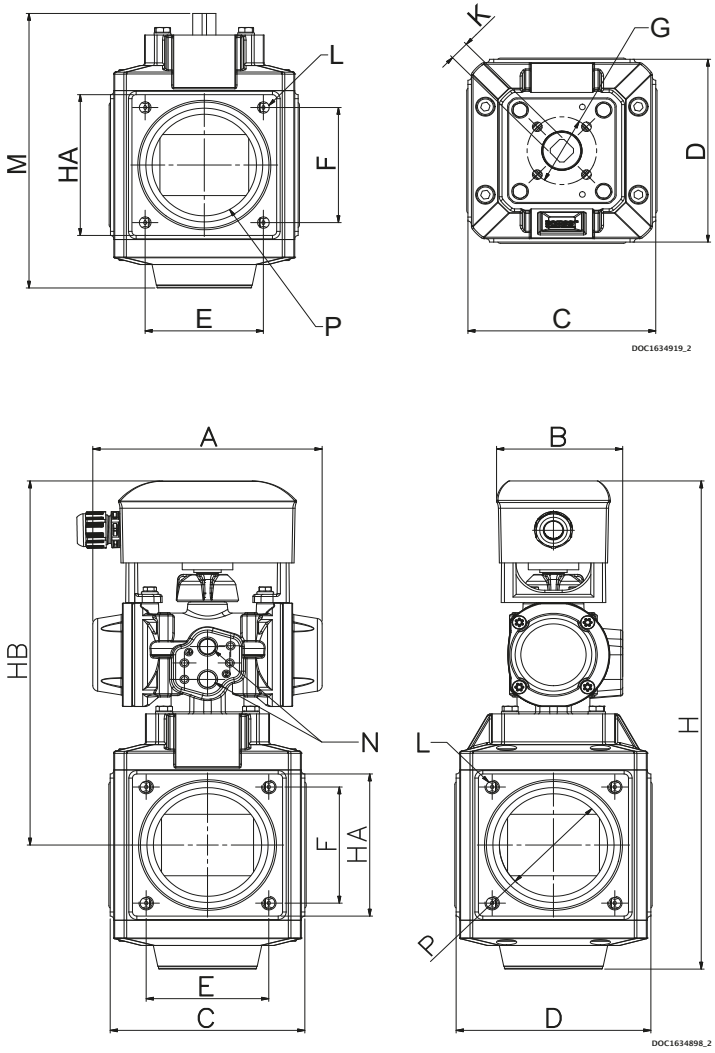
1.7 Field of application

Inlet of foreign objects can damage the 4-way valve.

The 4-way valve may only be used with media that are not aggressive to the valves materials. See section 2.6 for components and appertaining materials.

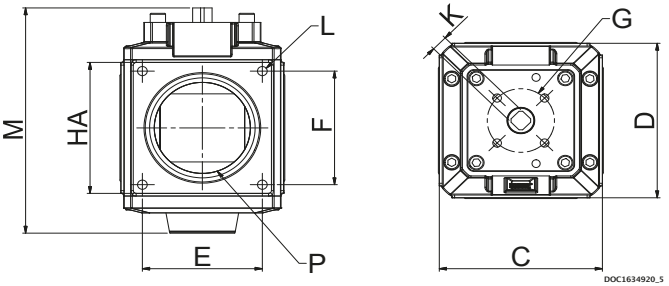
2 TECHNICAL DATA

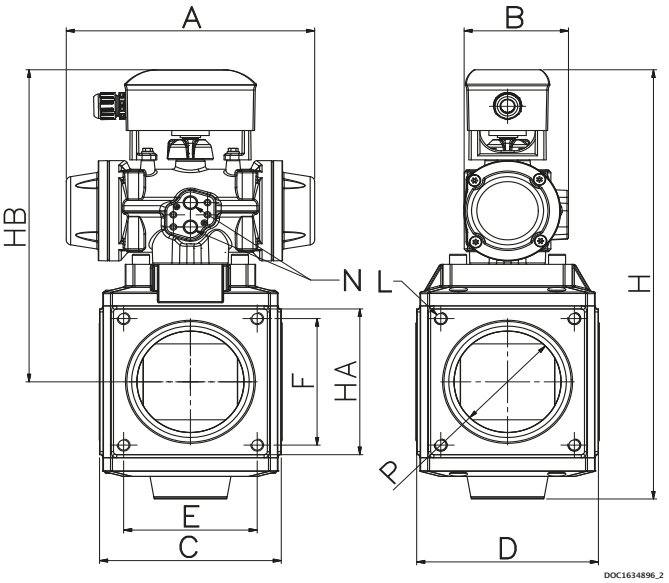
2.1 Dimensions - 3”



A	B	C	D	E	F	G	H	HA	HB	K	L	M	N	P	Weight [Kg]
159	88	135	135	85	85	50	357	104	267	14	M10	203	¼“BSPP	75	13 /14

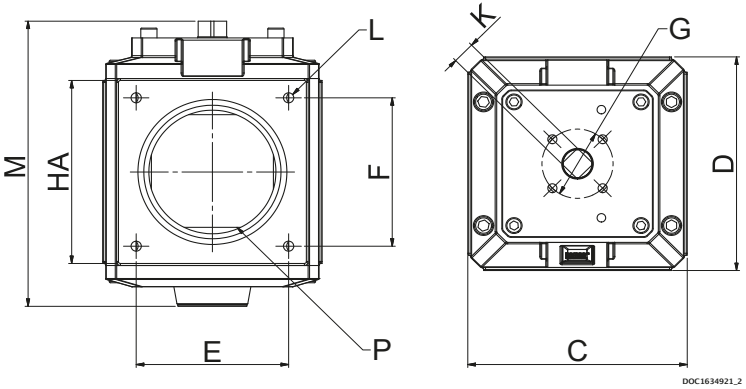
2.2 Dimensions – 4”

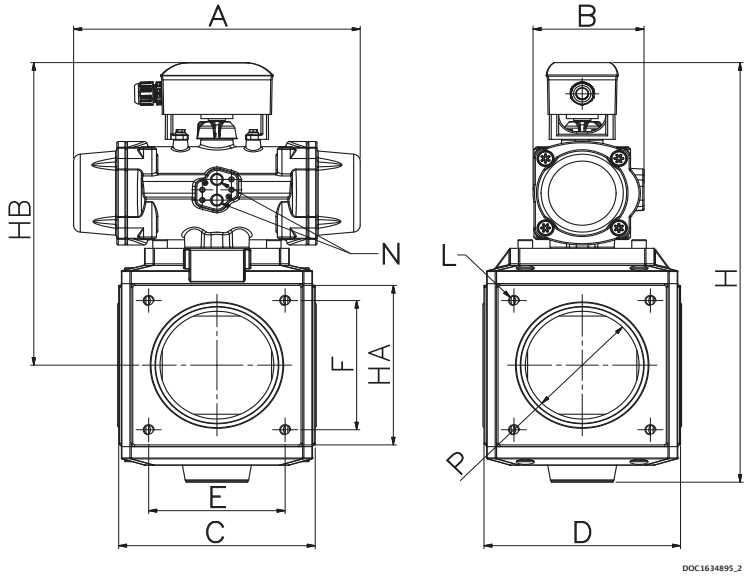




A	B	C	D	E	F	G	H	HA	HB	K	L	M	N	P	Weight [Kg]
230	98	170	170	125	125	70	424	144	308	17	M12	248	¼“BSPP	100	24 / 26

2.3 Dimensions – 5”

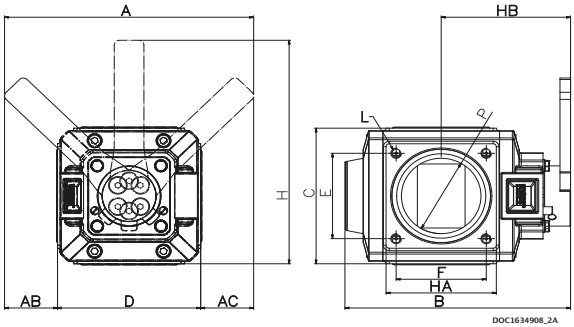




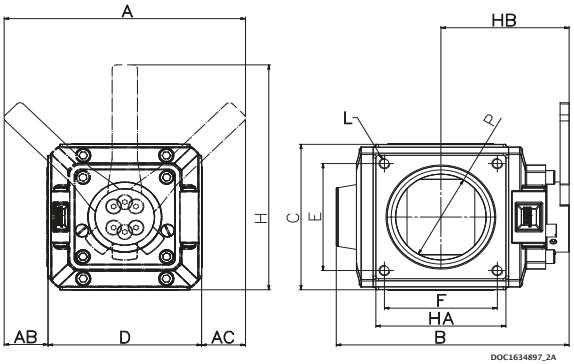
A	B	C	D	E	F	G	H	HA	HB	K	L	M	N	P	Weight [Kg]
313	122	216	216	150	150	70	487	185	351	22	M12	289	¼“BSPP	125	43 / 46

2.4 Dimensions - With handle bar, (3",4" & 5")

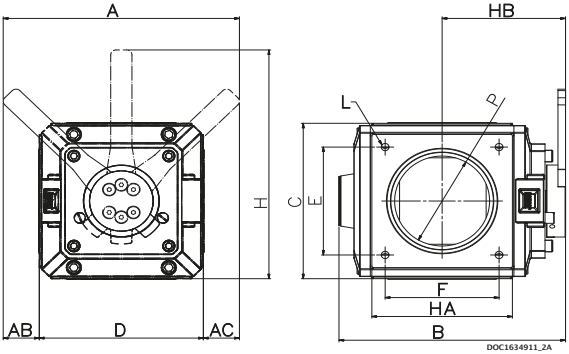
3"



4"



5"



	Dimensions [mm]													
	A	AB	AC	B	C	D	E	F	H	HA	HB	L	P	Weight [Kg]
3"	247	55	55	218	135	135	85	85	228	104	127	M10	75	14
4"	280	55	55	263	170	170	125	125	268	144	147	M12	100	25
5"	325	55	55	303	216	216	150	150	323	185	167	M12	125	44

2.5 Specifications

A failure to meet these specifications may result in damage to the 4-way valve and a potential risk of explosion.

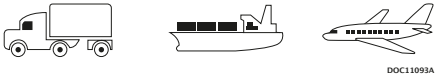
Description	Minimum	Maximum
Ambient temperature, operation	-20°C	40°C
Ambient temperature, storage	-20°C	60°C
Working pressure	Full vacuum	3 bar(g)
Test pressure		16 bar(g)

2.6 Operating the 4-way valve

The 4-way valve may not be used if it is damaged.

The 4-way valve must be inspected for damages upon delivery. If the 4-way valve is damaged, it may not be used and the damage must be reported to the dealer.

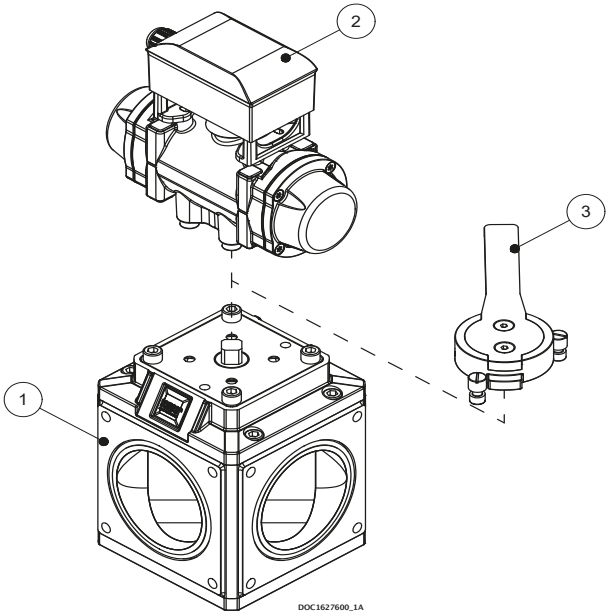
The 4-way valve can be transported in the following ways:



2.7 Storage

After operation, the 4-way valve can be stored without further action.

2.8 Materials

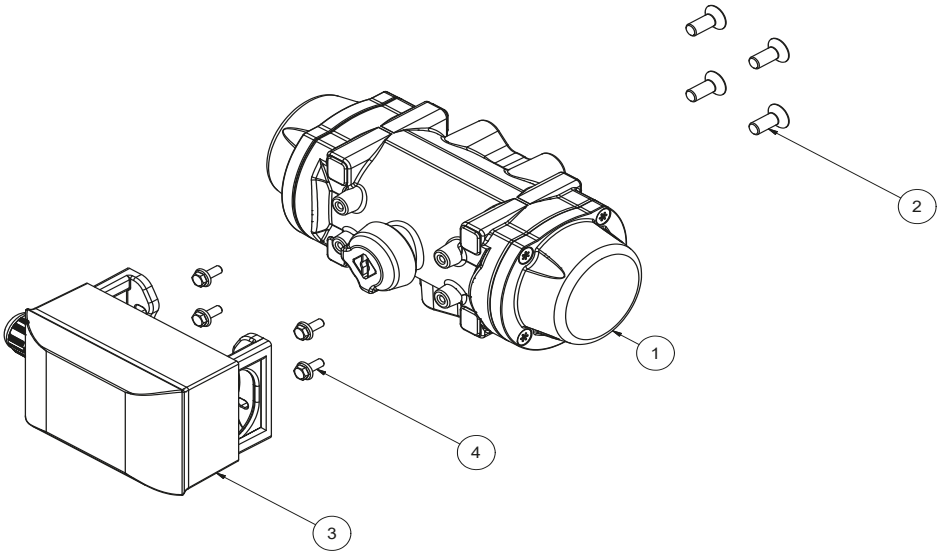


The 4-way valve is composed by two main components:

- Pneumatic operated Pos.1 & Pos.2
- Manually operated Pos.1 & Pos.3

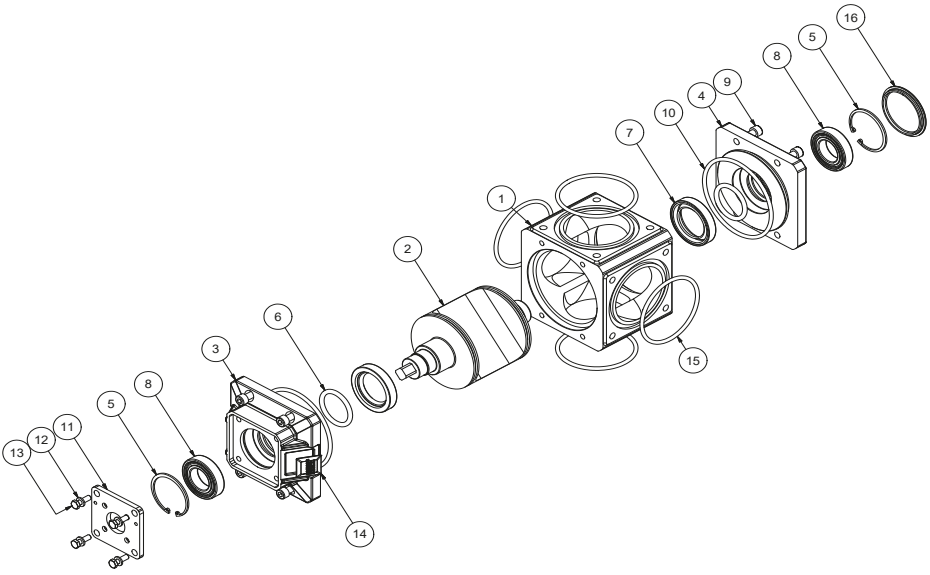
Term	Pos.	Material	Description
4-way valve	1	-	-
Actuator set	2		
Handle bar set	3	-	-

2.8.1 Pneumatic actuator set, (3",4" & 5")



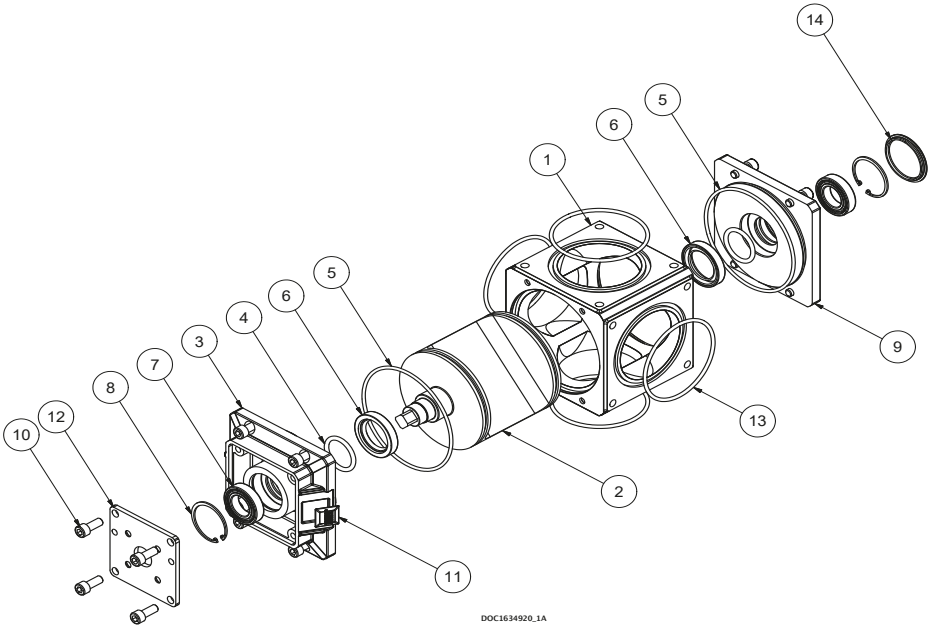
Pos.	Part number	Description	Qty.	Material
1	944600332	Pneumatic actuator – 3"	1	Plastic
	944600333	Pneumatic actuator – 4"	1	Plastic
	944600334	Pneumatic actuator – 5"	1	Plastic
2	910300268	Screw – 3"	4	Stainless steel
	910000454	Screw – 4" & 5"	4	Stainless steel
3	948000436	Feedback switch for pneumatic actuator	1	Plastic
4	910400230	Screw	4	Stainless steel

2.8.2 4-way valve - 3”



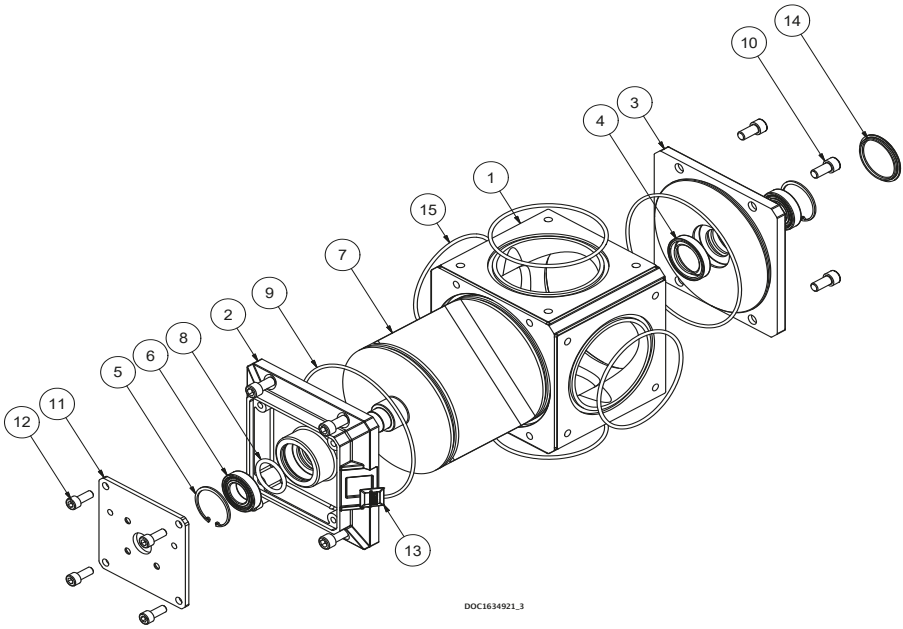
Pos.	Part number	Description	Qty.	Material
1	1634899	Valve body	1	Cast iron
2	1634901	Valve cone	1	Cast iron
3	1634903	Cover DE	1	Cast iron
4	1634906	Cover NDE	1	Cast iron
5	920000214	Locking ring	2	Stainless steel
6	922100381	O-ring	2	Rubber
7	922200271	Rotary Seal	2	Rubber
8	930000321	Ball bearing	2	Chrome steel
9	910300179	Screw	8	Stainless steel
10	922100386	O-ring	2	Rubber
11	1634905	Flange	1	Stainless steel
12	910100125	Washer	4	Stainless steel
13	910000392	Bolt	4	Stainless steel
14	107989	Transfer domet	1	Foil
15	922100385	O-ring	4	Rubber
16	948300065	End cap	1	Plastic

2.8.3 4-way valve - 4”



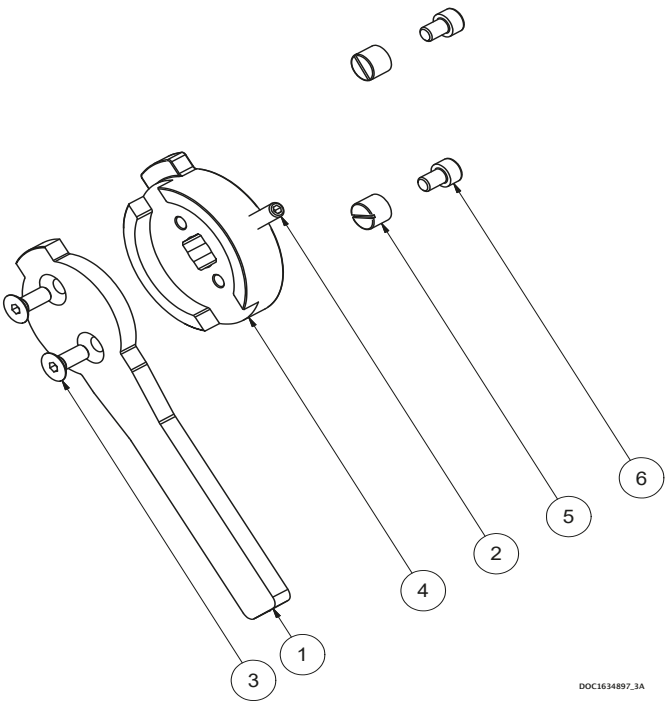
Pos.	Part number	Description	Qty.	Material
1	1634861	Valve body	1	Cast iron
2	1634863	Valve cone	1	Cast iron
3	1634865	Cover DE	1	Cast iron
4	922100381	O-ring	2	Rubber
5	922100382	O-ring	2	Rubber
6	922200271	Rotary Seal	2	Rubber
7	930000321	Ball bearing	2	Chrome steel
8	920000214	Locking ring	2	Stainless steel
9	1634871	Cover NDE	1	Cast iron
10	910300051	Bolt	12	Stainless steel
11	107989	Transfer domet	1	Foil
12	1634867	Flange	1	Stainless steel
13	922100380	O-ring	4	Rubber
14	948300065	End cap	1	Plastic

2.8.4 4-way valve - 5”



Pos.	Part number	Description	Qty.	Material
1	1634881	Valve body	1	Cast iron
2	1634885	Cover DE	1	Cast iron
3	1634888	Cover NDE	1	Cast iron
4	922200271	Rotary Seal	2	Rubber
5	920000214	Locking ring	2	Stainless steel
6	930000321	Ball bearing	2	Chrome steel
7	1634883	Valve cone	1	Cast iron
8	922100381	O-ring	2	Rubber
9	922100387	O-ring	2	Rubber
10	910300490	Screw	8	Stainless steel
11	1634887	Flange	1	Stainless steel
12	910300051	Bolt	4	Stainless steel
13	107989	Transfer domet	1	Foil
14	948300065	End cap	1	Plastic
15	922100389	O-ring	4	Rubber

2.8.5 Handle bar set, (3",4" & 5")



Term	Pos.	Material	Description
Knob	1	Rubber	-
Handle	2	Stainless steel	AISI 316
Socket screw	3	Stainless steel	A4
Screw	4	Stainless steel	A4
Adaptor	5	Cast iron	EN-GJL-250 EN1561
End stop	6	Stainless steel	AISI 316
Bolt	7	Stainless steel	A4

3 DESIGN

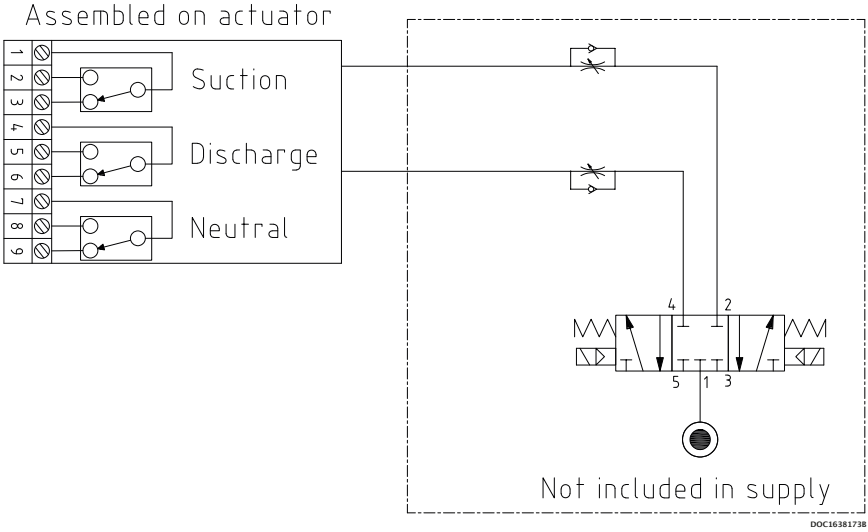
3.1 3-way pneumatic actuator positions

The actuator is assembled with a switch providing signals for suction, neutral and discharge position.

For air control its necessary to install a 5/3 way pneumatic operated valve as illustrated below. This valve can activate the actuator and turn it between suction and discharge.

During this rotation, a signal for neutral position is given. If neutral position is requested its possible to stop the valve in this position simply by removing the signal to the valve.

It is recommended to mount needle valves on the supply line to the actuator - see illustration below.
This will ensure higher accuracy in neutral position when the installation is with pneumatic hoses more than few meters.

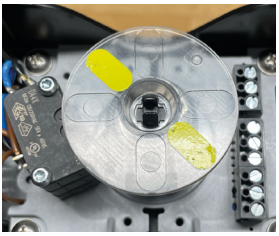


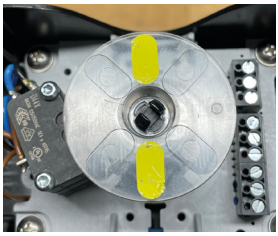
3.2 Adjusting the 3-way pneumatic actuator positioning switch (camshaft)

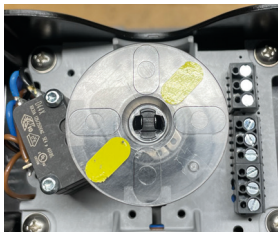
The actuator is assembled with a positioning switch.

The cams on the camshaft, in the positioning switch, are manually calibrated in order to get signals for suction, neutral and discharge positions.

The valve cone position corresponds to the yellow marking on top of camshaft. See illustrations below. (Suction - Neutral - Discharge)

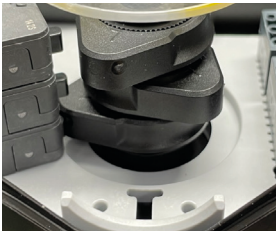

DOC11799

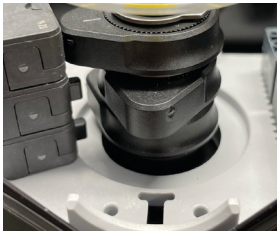

DOC11800


DOC11801

The adjustment is done as follows:

- Turn the valve cone CCW to max position. See below left illustration.
- Push the lower cam of the camshaft and turn it CW until the lower micro switch is activated. Release the cam.
- Turn the valve cone CW until the valve cone is in the middle position. See middle illustration.
- Push the upper cam of the camshaft and turn it CW until the upper micro switch is activated. Release the cam.
- Turn the valve cone CW until the valve cone is in the max position. See below right illustration.
- Push the middle cam of the camshaft and turn it CW until the upper micro switch is activated. Release the cam.


DOC11802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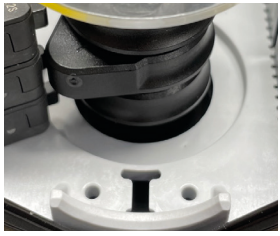
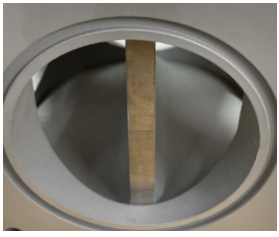

DOC11804

- Check if the valve cone positions corresponds to the micro switch activations, by manually turn the valve cone to the three positions. See illustrations below. (Suction - Neutral - Discharge)

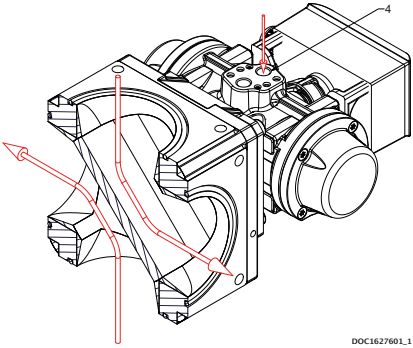

DOC11807


DOC11806

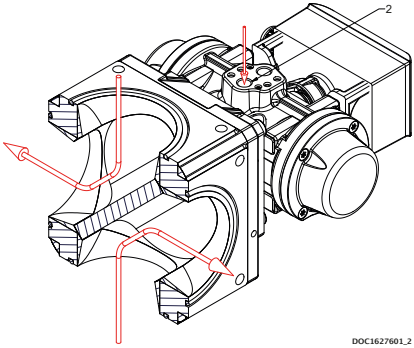

DOC11805

3.3 Positions - With pneumatic actuator, (3",4" & 5")

By connecting compressed air to connection 4 on the 4-way valve. See below.

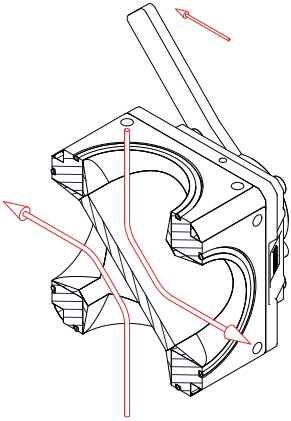


By connecting compressed air to connection 2 on the 4-way valve. See below.

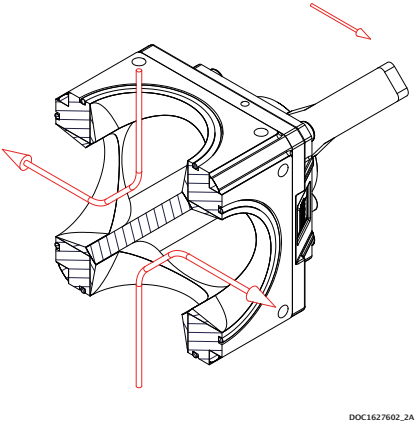


3.4 Positions - With handle bar, (3",4" & 5")

Position A achieved by turning the handle clockwise (CW). See below.



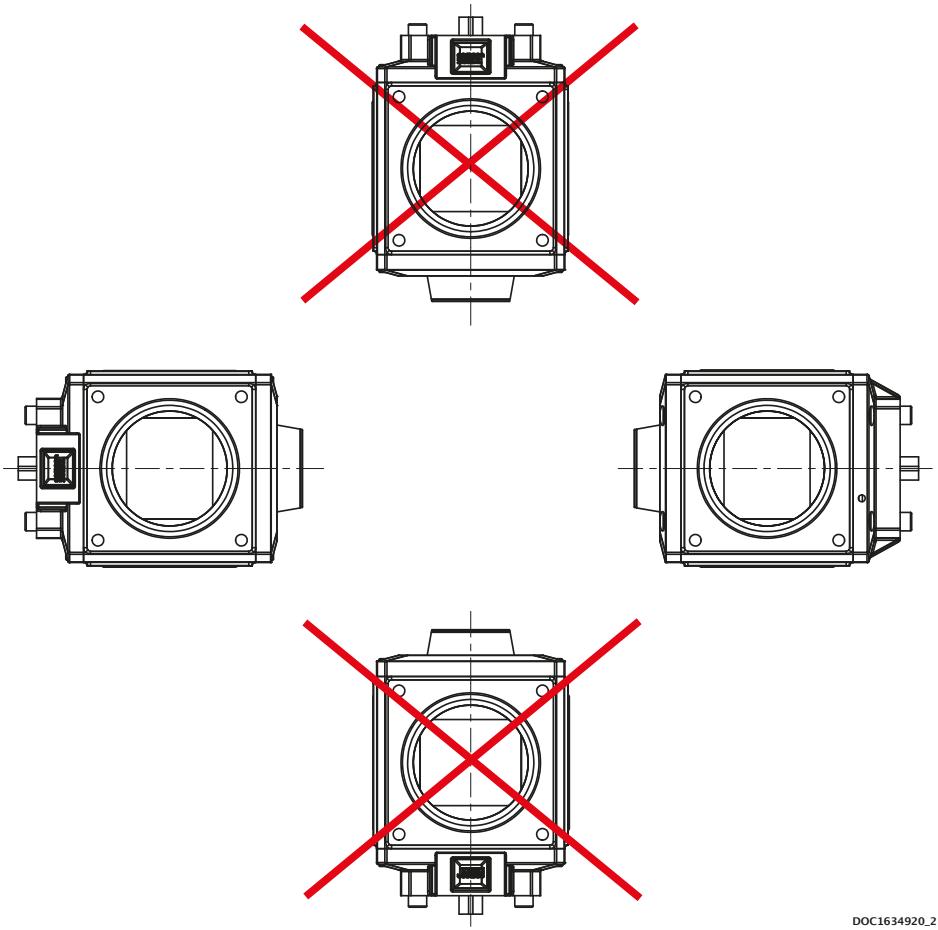
Position B achieved by turning the handle counter clockwise (CCW). See below.



4 INSTALLATION AND START-UP

4.1 Installing the 4-way valve

- The 4-way valve must be installed with the valve spindle shaft horizontally. See illustraion below. All horizontal positions are allowed.
- Do NOT install the 4-way valve with the valve spindle shaft vertically. See illustration below. All vertical positions are prohibited.



DOC1634920_2

4.2 Securing the 4-way valve

The following is primarily for when the valve is used in ATEX area.

External effects on the 4-way valve may lead to leakage and, as a result, a potential risk of explosion.
Foreign objects must not generate sparks.

- Gaskets to be handeled with highest degree of caution.
- Gasket and sealing surfaces must be cleaned before assembly and without damage.
- If the tolerance for securing the 4-way valve is not observed, there is a risk of damage and of potential explosion.
- Be aware of static electricity, the 4-way valve must be grounded if necessary.
- Read Chapter 4.3

The 4-way valve must be installed on a stable foundation, which must be level and stable, so that the 4-way valve is not twisted or exposed to a ±0.1 mm profile distortion.

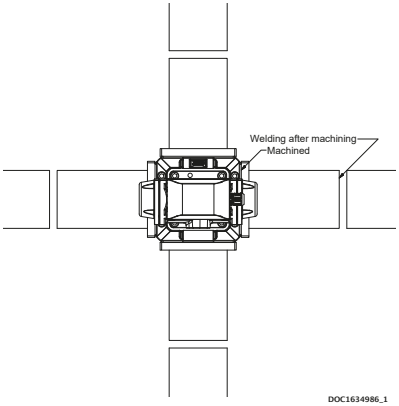
Bolts must be tightened in accordance with supplier's instructions.

Ensure that the flow direction is correct before assembly.

The 4-way valve's end stop can only be used as a stop when operating with manual handle bar. When activated with a cylinder, the cylinder's own end stop must be used.

4.3 Flange connections

Deflection on the flanges from the welding process can affect the tolerances inside the valve and block the cones free rotation. Therefore its important to use machined flanges or alternatively use maximum 8 mm flanges. See below illustration.



5 SERVICE, MAINTENANCE AND INSPECTION INTERVALS

A failure to observe the inspection intervals described in table below, may result in damage to the 4-way valve and a potential risk of explosion.

Only qualified personnel may carry out repairs. The qualified person shall have the following knowledge:

- Knowledge of methods of protection.(For ATEX approved only)
- Knowledge of area classification. (For ATEX approved only)
- Knowledge of installation practices. (For ATEX approved only)

Repairs must be carried out according to manufacturer recommendations. If these are not followed, the ATEX declaration is not valid.

Use only original materials and components as described, during repair and maintenance.

During repair or disassembly, check that the flow direction remains unchanged.

For repair of the actuator, see accompanying supplier instructions.

Section	Operation	Interval	Category 1	Category 2
5.1	Visually inspect for leakage	Weekly	X	X
5.2	Inspection and cleaning (if necessary)	Monthly	X	X

5.1 Inspecting for leakage

The 4-way valve and pipe system around, must be inspected for leakage once a week. The inspection must be performed when the 4-way valve is both operating and idle. Any leaks must be repaired before operation may continue.

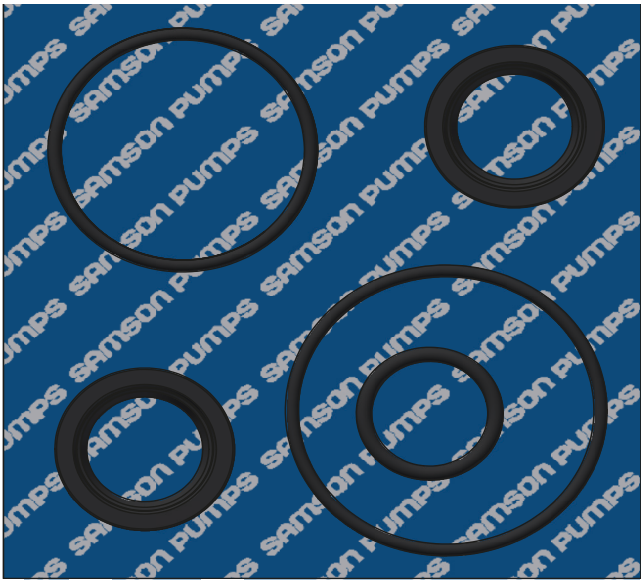
5.2 Inspection and cleaning

The pipe connections of 4-way valves must be inspected at least once a month, and any contaminants must be removed.

The 4-way valve must always run easily and effortlessly, otherwise it must be cleaned.

6 GASKET SET

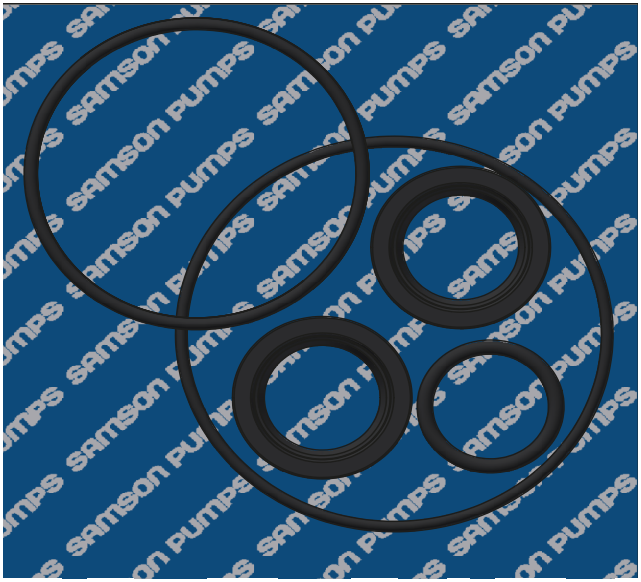
6.1 4-way valve - 3”



1634991

Pos.	Part number	Description	Qty.	Material
1	922200271	Radial shaft seal 40x62x11	2	Rubber / Steel
2	922100387	O-ring 188x4,0 NBR70	2	Rubber
3	922100389	O-ring 136x4,5 NBR70	4	Rubber
4	922100381	O-ring 40x5,35 NBR70	2	Rubber

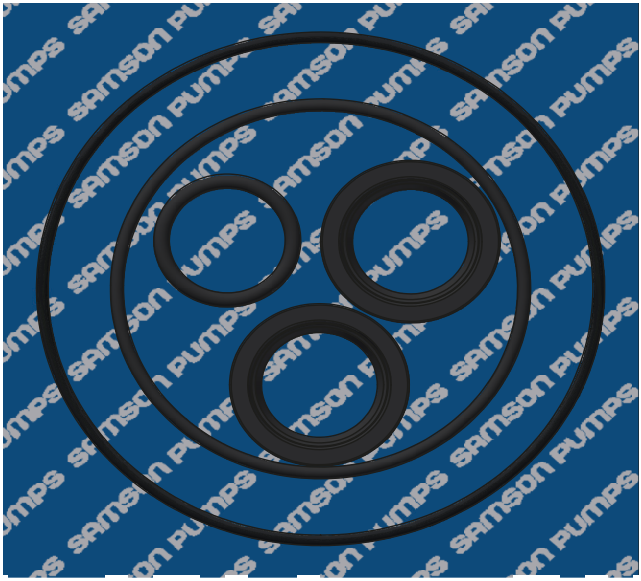
6.2 4-way valve - 4”



1634992

Pos.	Part number	Description	Qty.	Material
1	922100382	O-ring 143x4,0 NBR70	2	Rubber
2	922100380	O-ring 110x4,5 NBR70	4	Rubber
3	922100381	O-ring 40x5,35 NBR70	2	Rubber
4	922200271	Radial shaft seal 40x62x11	2	Rubber / Steel

6.3 4-way valve - 5”



1634993

Pos.	Part number	Description	Qty.	Material
1	922200271	Radial shaft seal 40x62x11	2	Rubber / Steel
2	922100387	O-ring 188x4,0 NBR70	2	Rubber
3	922100389	O-ring 136x4,5 NBR70	4	Rubber
4	922100381	O-ring 40x5,35 NBR70	2	Rubber

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For over 40 years, our name has been synonymous with the strongest pumps for vacuum trucks and tankers. We constantly adapt our products to meet the changing needs of our customers. Today, it is not enough to simply produce a pump. Products must be refined so the customer can concentrate on what they do best. We therefore offer a wide range of standardised components that allow our customers to build vacuum systems without the need for specialist in-house expertise.

Strength and durability are our hallmarks! We have often heard from customers that our pumps are working in many years, and in most cases without the need for maintenance or repair. This emboldens us to say that we have the strongest program of pumps on the market.

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