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FORT VALE®



Catalogue

Standard Equipment for Tank Containers



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Manlid & Inspection Hatch Assemblies





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Function

A manlid assembly or inspection hatch assembly is usually installed on the top of the tank. A manlid assembly is used to give access to personnel to let them examine, repair or clean the inside of the tank. An inspection hatch is used for access to take a sample of cargo and can also be used as access for cleaning equipment.

Design Options

The design options below are available on our standard range of hinged circular manlid and inspection hatch assemblies. We can deliver manlids and inspection hatches assembled or disassembled.

Nominal Diameter

Inspection Hatch:
170mm, 300mm

Manlid:
460mm, 500mm, 600mm



Design Pressure: MAWP

From 0 Bar to 4 Bar

Special service conditions:
> 4 Bar

Opening Angle

120°: Fixed or liftover

135°: Fixed or liftover



Fixing Points

3, 4, 6, 8 points

Special service conditions:
Single point, 10 points

Neckring / Compensating Ring

Height: From ultra-low to extended

Profile: Straight (no profile) or profiled compatible with the tank radius

Compensation: With or without compensating ring

Material thickness: 6mm, 8mm or compatible with the MAWP and the tank shell thickness



Swingbolt Assemblies

Eyebolt: stainless steel

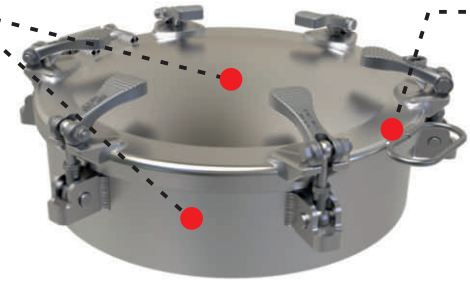
Handnut: naval brass - low profile; stainless steel - low profile or extended, with/without brass insert

Special service conditions:
Safebolt assembly (at one point)
Hexagonal nuts
Bow nuts
Single arm handnuts
Quick release latches
With locknuts

Material

Contact parts: 316 stainless steel

Special service conditions:
304 stainless steel
High nickel alloys
Carbon steel: Neckring only



Seal

A large range of seal materials is available

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Design Options - continued

Special Options

Where compatible, we can also offer:

Weld-in fittings: E.g. sockets, flanges, breathers, vents, sight glass

Customer logo: Laser etched on cover

Hand polishing: To ultra-high grade

Lining: For corrosive cargo



Related Parts

We recommend our range of compatible accessories:

- Manlid cover seals
- Safebolts
- Fasteners

We have a large range of accessories, please contact us for more information about these parts.

Manlid Assemblies for Dedicated Service

We offer a range of manlid assemblies for these service conditions and special cargoes:

- Elliptical manlid assemblies for brewery & hygienic service
- Flat bolted assemblies for high pressure/dangerous cargo
- U.S. tank trucks
- Rail tank cars
- Hydrogen peroxide service
- Side-entry manlid assemblies for hygienic service

Please contact us for more information about these special assemblies.

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300mm Ultra Low Profile Inspection Hatch Assembly

Part No: 8PB/2750XXXP



Specification

Nominal size
DN300

Cover
4 point

Neckring/compensating ring
Thickness: 8mm
Tank radius profiling range: 750mm to 1220mm

Materials
Contact parts: 316 stainless steel
Fasteners: stainless steel swingbolts with naval brass handnuts
Seal: supplied separately

Alternatives are available, refer to the Design Options page

Design Conditions

Weight:	19.8 Kg
Design Pressure (MAWP):	4 Bar
Test Pressure:	6 Bar
Design Temperature Min:	-40°C
Design Temperature Max:	200°C

NOTE: The Design Temperature limits refer to metal parts only. The Design Conditions and Section View dimensions are for the specified part number only.

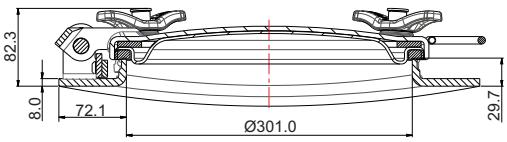
Design Code
BS EN 14025: 730/0600P cover only

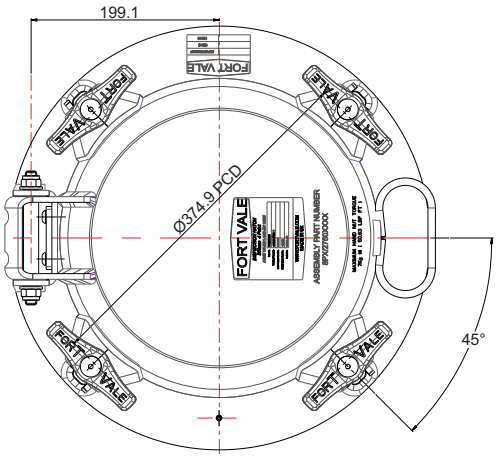
Range

Handnut Material	Part No.
Naval brass	8PB/2750XXXP
Stainless steel	8PB/2750XXXS

NOTE: The assembly specification changes the Part No.

Section View





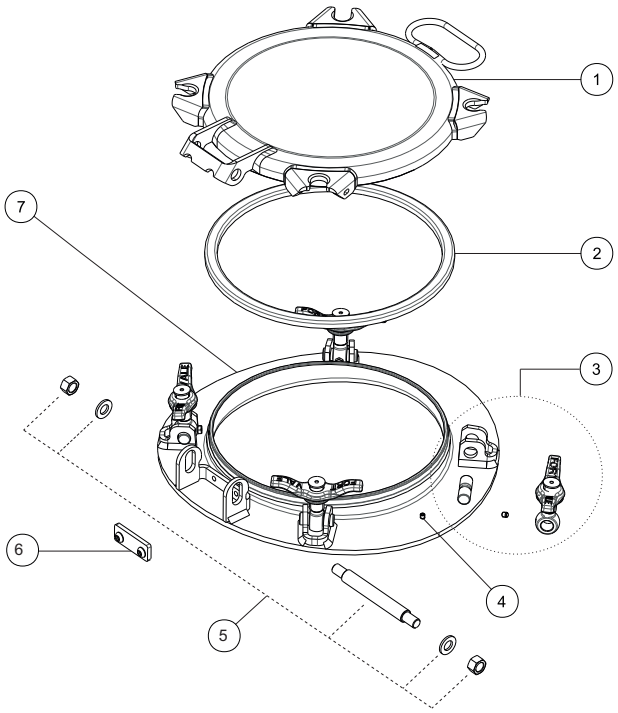
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300mm Ultra Low Profile Inspection Hatch Assembly

Part No: 8PB/2750XXXP

Parts Drawing



Parts List

Item	Description	Part No.
1	Cover	703/0600P
2	Seal (not included) ***Note**	5005-XXXX
3	Swingbolt assembly (4)	496/1260
4	Grubscrew	5111-009
5	Hinge pin assembly	600/1060
6	Hinge kit - 135° fixed	135B
7	Neck/compensating ring ***Note**	63P/2750XXXP

NOTE: The specification changes the Part No.

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500mm Ultra Low Profile Pendle Manlid Assembly

Part No: E4C/85XX025B



Specification

Nominal size
DN500

Cover
8 point

Neckring/compensating ring
Thickness: 8mm
Tank radius profiling range: 750mm to 1300mm

Materials
Contact parts: 316 stainless steel
Fasteners: stainless steel swingbolts with naval brass handnuts
Seal: supplied separately

Alternatives are available, refer to the Design Options page

Design Conditions

Weight:	40 Kg
Design Pressure (MAWP):	4 Bar
Test Pressure:	6 Bar
Design Temperature Min:	-40°C
Design Temperature Max:	200°C

NOTE: The Design Temperature limits refer to metal parts only. The Design Conditions and Section View dimensions are for the specified part number only.

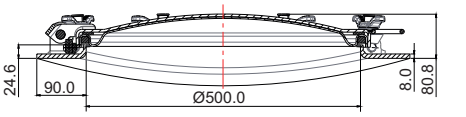
Design Codes
BS EN14025: 74E/0500 cover only (4 Bar)
BS EN14025: 73E/0500 cover only (3 Bar)

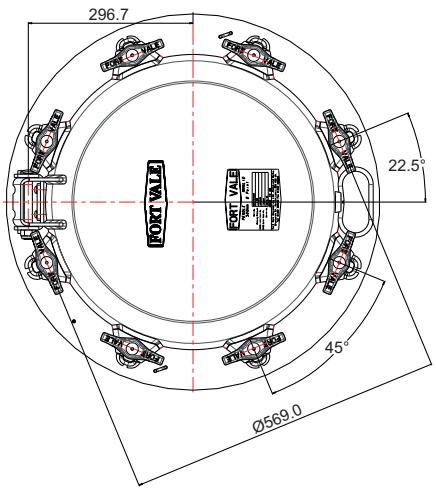
Range

Points	MAWP	Part No.
8	4 Bar	E4C/85XX025B
6	3 Bar	E3C/65XX025B

NOTE: The assembly specification changes the Part No.

Section View





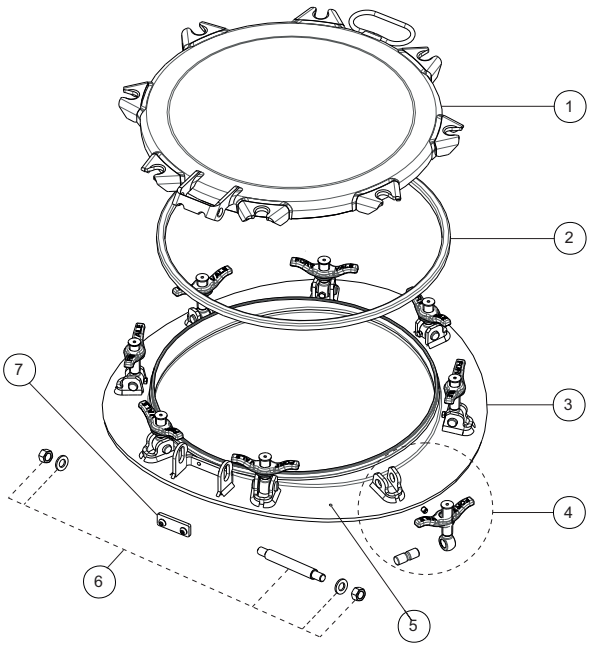
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500mm Ultra Low Profile Pendle Manlid Assembly

Part No: E4C/85XX025B

Parts Drawing



Parts List

Item	Description	Part No.
1	Cover	74E/0500
2	Seal (not included) ***Note**	5005-XXXX
3	Neck/compensating ring ***Note**	6EP/7403XXXP
4	Long swingbolt assy. (4) ***Note**	496/XXXX
	Short swingbolt assembly (4)	496/1240
5	Grub screw	5111-009
6	Hinge pin assembly	600/1060
7	Hinge kit - 135° fixed	135B

NOTE: The specification changes the Part No.

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Relief Valves







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Function

A Super Maxi or Hyper Maxi is a spring-loaded relief valve which is installed in the vapour space of a tank. It is pre-set to be compatible with the service conditions and it vents to protect the tank from accidental over-pressure or unwanted vacuum conditions.

Super Maxi & Hyper Maxi relief valves have a high flow performance to prevent the catastrophic failure of a tank. This type of valve is often used on tanks carrying hazardous cargo.

We offer a range of relief valves for different service conditions and flow requirements. Contact us for more information.

Design Options

The design options below are available on our standard range of Super Maxi & Hyper Maxi relief valves.

Tank Connection

2½" BSP

Flanged with holes or slots: a selection of drilling patterns is available

Special service conditions:
DIN11851: 80mm



Special Options

Manual vacuum vent button

Tank Seal

Rubber/PTFE - 2½" BSP only

Other materials are available

Nominal Bore

65mm: Super Maxi

82.5mm: Hyper Maxi

Special service conditions:
Tapered bore: 65mm to 80mm



Body

Standard body:
Super Maxi: ≤ 4.8 Bar
Hyper Maxi: ≤ 5.15 Bar

Extended body:
Super Maxi: ≥ 4.55 Bar
Hyper Maxi: ≥ 5.15 Bar

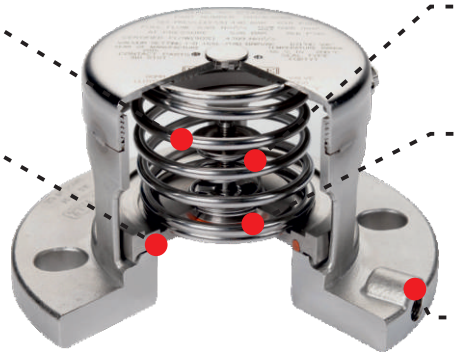
Pressure Setting

Super Maxi: 0.15 Bar to 16 Bar
Hyper Maxi: 0.15 Bar to 14.3 Bar

Pressure Seal

Fortyt

Special service conditions:
A range of seal materials is available



Vacuum Setting

From 2 kPa to 88 kPa

Vacuum Seal

Fortyt

Special service conditions:
A range of seal materials is available

Gauge Connection

Flanged valves only:
¼" BSP (standard)
¼" NPT (special)

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Design Options - continued

Valve Materials

316 stainless steel

Special service conditions:
Lined/coated wetted parts e.g. PFA

High nickel alloys



Finish

Electropolished

Special service conditions:
Corrosion-resistant paint on external surfaces to prevent damage from corrosive cargo vapour/splash

Related Parts

We recommend our range of compatible accessories:

- Flame arrester or gauzed cowl ***Note**
- Burst discs ***Note**
- Pressure gauges
- Flanges - weld-in and adaptor
- Weld-in sockets
- Gaskets
- Fasteners

NOTE: If you install an accessory item, e.g. a flame arrester, cowl, burst disc or baffle, it will decrease the air flow capacity of the relief valve. Thus, you must calculate again to make sure that the decreased flow capacity will give sufficient protection to your vessel/system.

Please contact us for more information about these parts.

Relief Valves for Dedicated Service

We offer a range of relief valves for these service conditions and special cargoes:

- T50 tank containers for liquefied gas
- Rail tank wagons
- U.S. tank trucks
- IBCs and small capacity tanks
- Steam-heating systems for tanks
- Hygienic service
- Food grade for liquid flow

Please contact us for more information about these valves.

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2½” BSP Super Maxi Relief Valve - Pressure/Vacuum

Part No: 010/1XXXXX - Metric Setting



Specification

Nominal size
DN65

Tank connection
2½” BSP

Set pressure
From 0.15 Bar to 5.15 Bar

Set vacuum
From 1 kPa to 88 kPa

Materials
Contact parts: 316 stainless steel
Pressure O ring: Fortyt
Vacuum O ring: Fortyt
Tank seal: Rubber/PTFE envelope

Alternatives are available, refer to the Design Options page

Design Conditions

Weight:	2.9 Kg
Design Pressure (MAWP):	5.2 Bar
Test Pressure:	10.1 Bar
Design Temperature Min:	-55°C
Design Temperature Max:	200°C

NOTE: The working temperature of the pressure and vacuum O rings can change the design temperature limits. The Design Conditions and Section View dimensions are for the specified part number only.

Approval
Design Approval by Lloyds Register of Shipping

WARNING: If you install an approved relief valve accessory item, e.g. a flame arrester, cowl, burst disc or baffle, it will decrease the air flow capacity of the relief valve. Thus, you must calculate again to make sure that the decreased air flow capacity will give sufficient protection to your vessel/system. Refer to Fort Vale for more information.

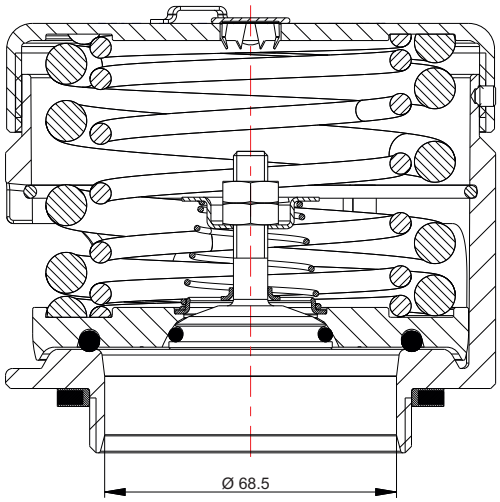
Range

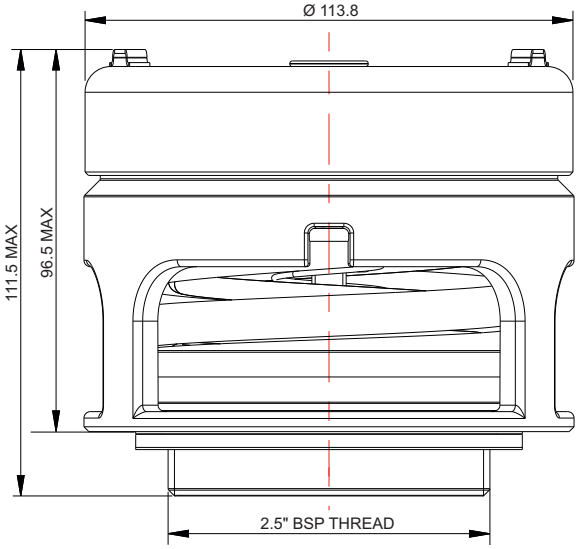
Standard Settings	Part No.
2.19 Bar & 21 kPa	010/121921
3.31 Bar & 21 kPa	010/133121
3.71 Bar & 21 kPa	010/137121
4.40 Bar & 21 kPa	010/144021

Related Parts

Description	Part No.
2½” BSP weld-in socket	600/1000
Tank weld-in flange	176/3150
CNAF/PTFE gasket (adaptor flange)	5005-398
0-7 Bar pressure gauge, brass internal parts	921/07BBSP
0-7 Bar pressure gauge, stainless steel internal parts	920/07BBSP
Flame arrester ***Warning**	176/2900
Gauzed cowl ***Warning**	176/6000

Section View





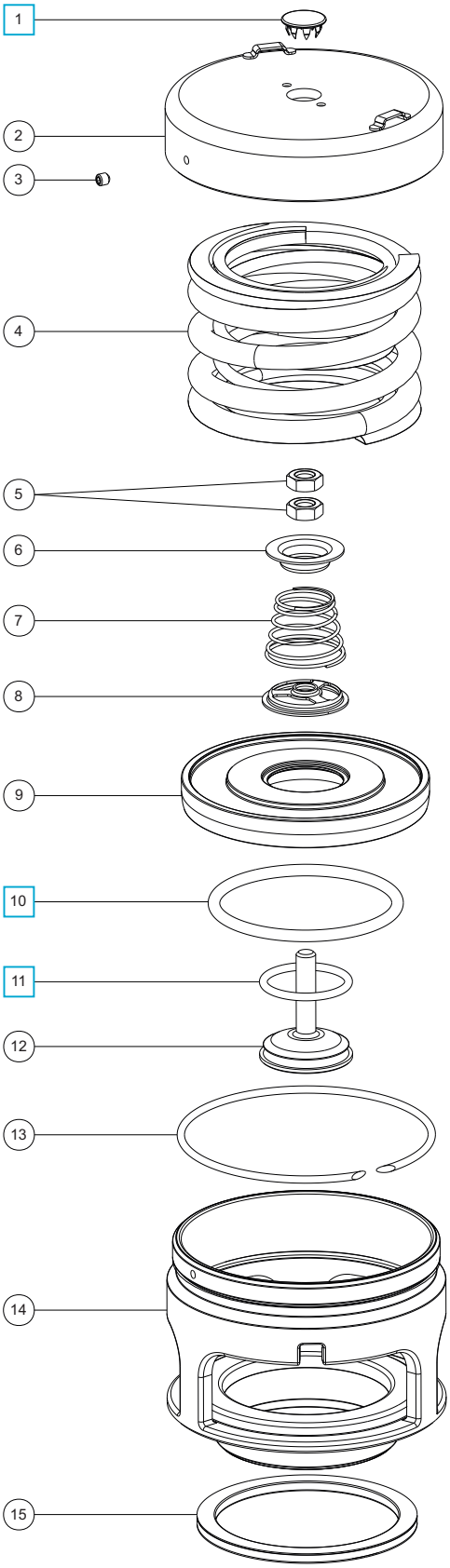
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2½” BSP Super Maxi Relief Valve - Pressure/Vacuum

Part No: 010/1XXXXX - Metric Setting

Parts Drawing



Parts List

Item	Description	Part No.	
1	Stainless steel plug	10978	☐
2	Cap ***Note**	1760/0005XX	
3	Anti-tamper screw	5121-001	
4	Pressure springs	Refer to Table 1	
5	M8 half nut (2)	5112-004	
6	Vacuum spring pad	1860/0005	
7	Vacuum spring	Refer to Table 2	
8	Spring pad	10986/3	
9	Pressure plate ***Note**	1860/005XXX	
10	Fortyt pressure O ring	5005-101	☐
11	Fortyt vacuum O ring	5005-108H	☐
12	Vacuum poppet	10983V/3	
13	Retaining ring clip	5120-067	
14	Body	1860/0100	
15	Rubber/PTFE envelope seal	5005-046	

NOTE: The valve specification changes the Part No.

Table 1

Std. Pressure Settings	Pressure Spring Part No.
2.19 Bar	6104-0252
3.31 Bar	6104-0112 & 6104-0252
3.71 Bar	6104-0422 (Pair)
4.40 Bar	6104-0485 (Pair)

Pressure springs are available from 0.15 Bar to 5.15 Bar

Table 2

Std. Vacuum Setting	Vacuum Spring Part No.
21 kPa	7104-012

Vacuum springs are available from 1 kPa to 88 kPa

Seal Kit

Description	Part No.
All parts marked ☐ in the Parts List	000/1PVSK

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82.5mm Flanged Hyper Maxi Relief Valve - Pressure/Vacuum

Part No: 043/1XXXXX82S - Metric Settings



Specification

Nominal size
DN80

Tank connection
Flanged: 4 slots equi-spaced on a 145.0/152.4 min/max PCD. ¼" BSP gauge connection.
Refer to Flange Drilling & Accessory Parts

Set pressure
From 0.15 Bar to 5.15 Bar

Set vacuum
From 1 kPa to 88 kPa

Materials
Contact parts: 316 stainless steel
Pressure O ring: Fortyt
Vacuum O ring: Fortyt

Alternatives are available, refer to the Design Options page

Design Conditions

Weight:	5.85 Kg
Design Pressure (MAWP):	5.2 Bar
Test Pressure:	10.2 Bar
Design Temperature Min:	-55°C
Design Temperature Max:	200°C

NOTE: The working temperature of the pressure and vacuum O rings can change the design temperature limits. The Design Conditions and Section View dimensions are for the specified part number only.

Approval
Design Approval by Lloyds Register of Shipping for valves with a setting of ≥ 1.7 Bar

WARNING: If you install an approved relief valve accessory item, e.g. a flame arrester, cowl, burst disc or baffle, it will decrease the air flow capacity of the relief valve. Thus, you must calculate again to make sure that the decreased air flow capacity will give sufficient protection to your vessel/system. Please refer to Fort Vale for more information.

Flange Drilling & Accessory Parts

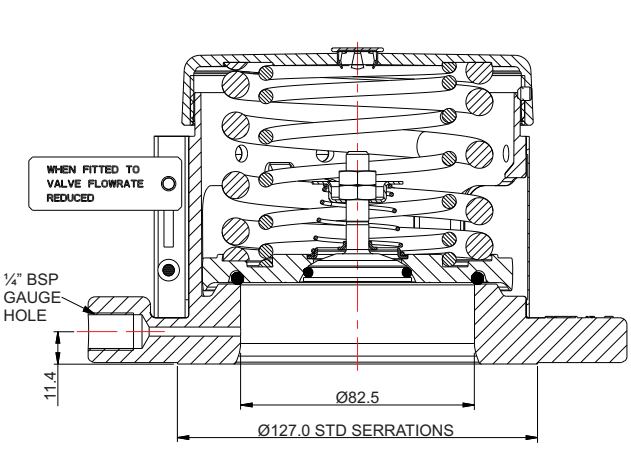
Drilling Spec.	PCD mm	Weld-in flange	Gasket
DIN65 PN10	145.0	176/3250	5005-332
3" Table D	146.1	176/3140	5005-013
DIN80 PN6	150.0	176/3158	5005-334
3" ASA 150	152.4	176/3125	5005-204
Slotted	145.0-152.4	N/A	5005-930

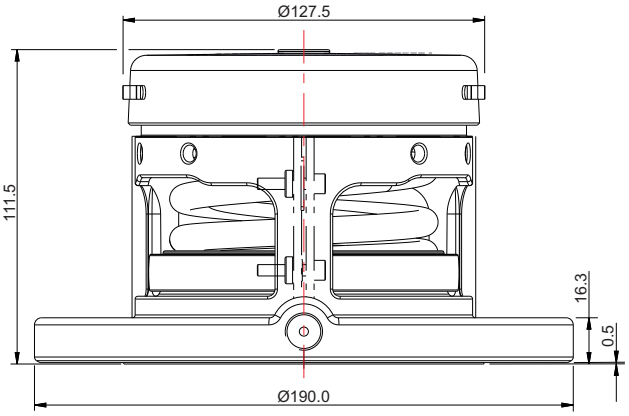
Related Parts

Description	Part No.
0-7 Bar pressure gauge, brass internal parts	921/07BBSP
0-7 Bar pressure gauge, stainless steel internal parts	920/07BBSP
Flame arrester ***Warning**	176/2920
M16 stud kit: 150 & 152.4 PCD	311/3700
M16 cap screw bolt kit: 145 & 146 PCD	311/3785

Section View

Shown with a flame arrester installed





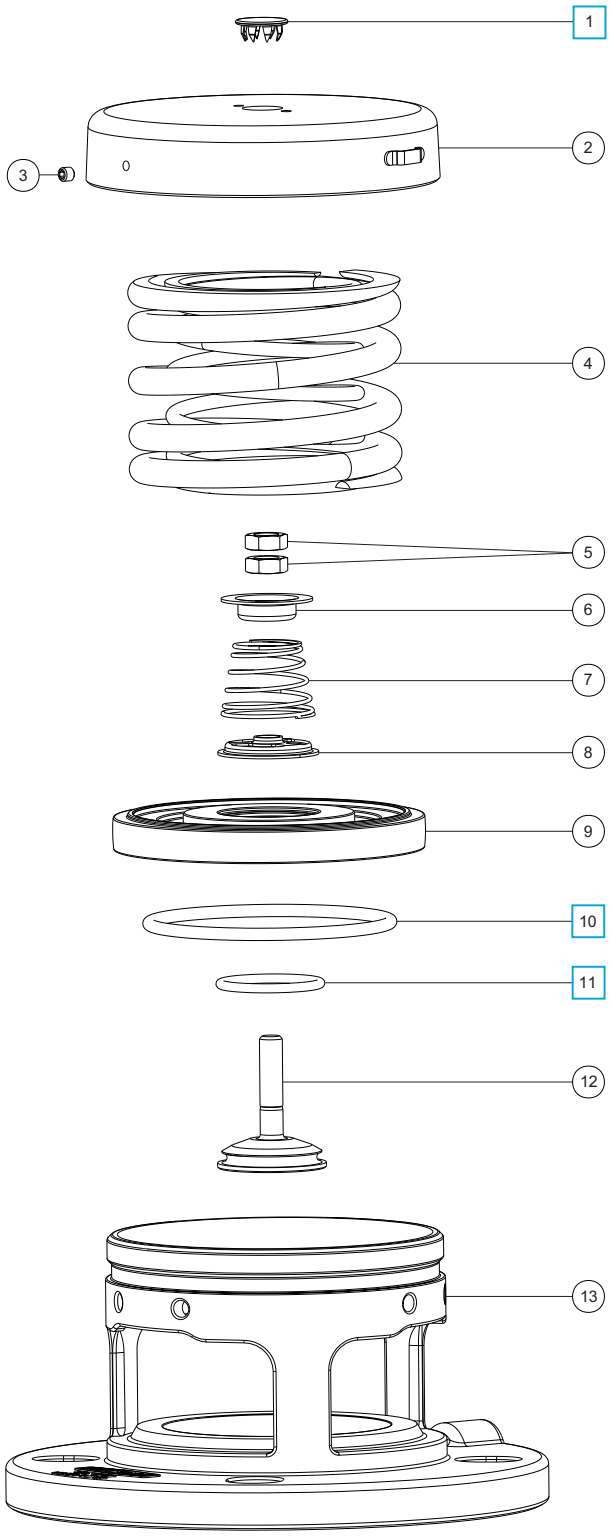
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82.5mm Flanged Hyper Maxi Relief Valve - Pressure/Vacuum

Part No: 043/1XXXXX82S - Metric Settings

Parts Drawing



Parts List

Item	Description	Part No.	
1	Stainless steel plug	10978	☐
2	Cap ***Note**	1860/1008XX	
3	Anti-tamper screw	5121-001	
4	Pressure spring	Refer to Table 1	
5	M8 half nut (2)	5112-004	
6	Vacuum spring pad	1860/0005	
7	Vacuum spring	Refer to Table 2	
8	Spring pad	10986/3	
9	Pressure plate ***Note**	1860/1071XX	
10	Fortyt pressure O ring	ORB337F0	☐
11	Fortyt vacuum O ring	5005-108H	☐
12	Vacuum poppet	10983V/3	
13	Body	1860/19SL	

NOTE: The valve specification changes the Part No.

Table 1

Std. Pressure Settings	Pressure Spring Part No.
2.20 Bar	6104-0048 & 6104-0310
2.65 Bar	6104-0085 & 6104-0310
3.30 Bar	6104-0195 & 6104-0310
4.40 Bar	6104-0665 (Pair)

Pressure springs are available from 0.15 Bar to 5.15 Bar

Table 2

Std. Vacuum Setting	Vacuum Spring Part No.
21 kPa	7104-012

Vacuum springs are available from 1 kPa to 88 kPa

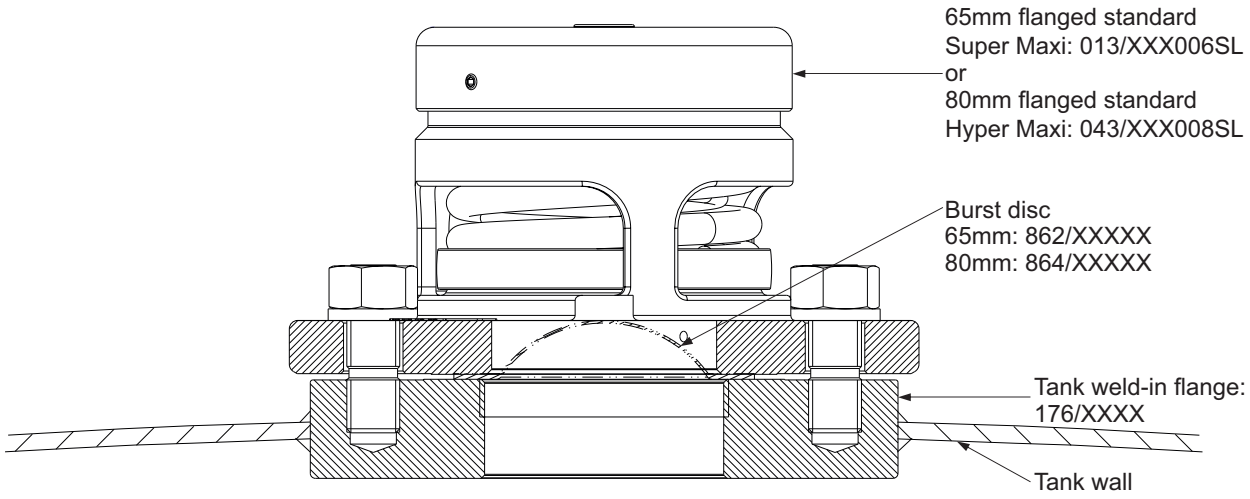
Seal Kit

Description	Part No.
All parts marked ☐ in the Parts List	043/1PVSK

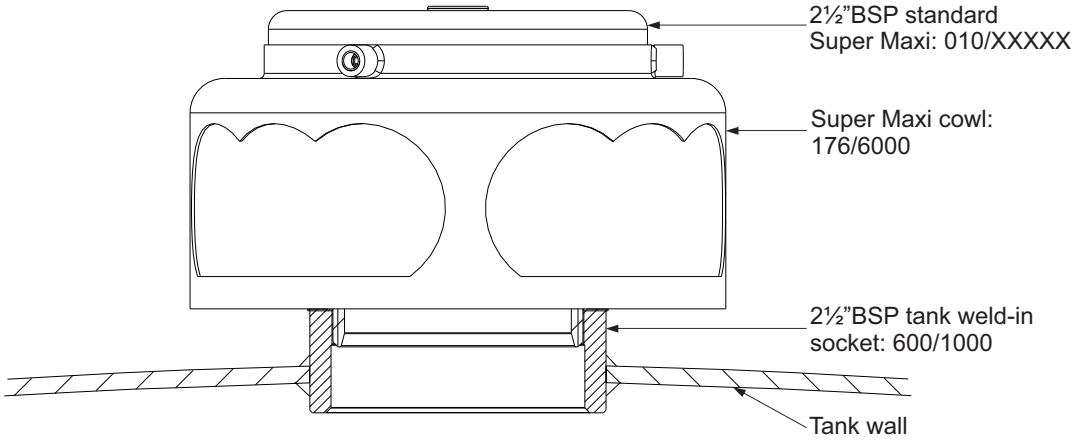
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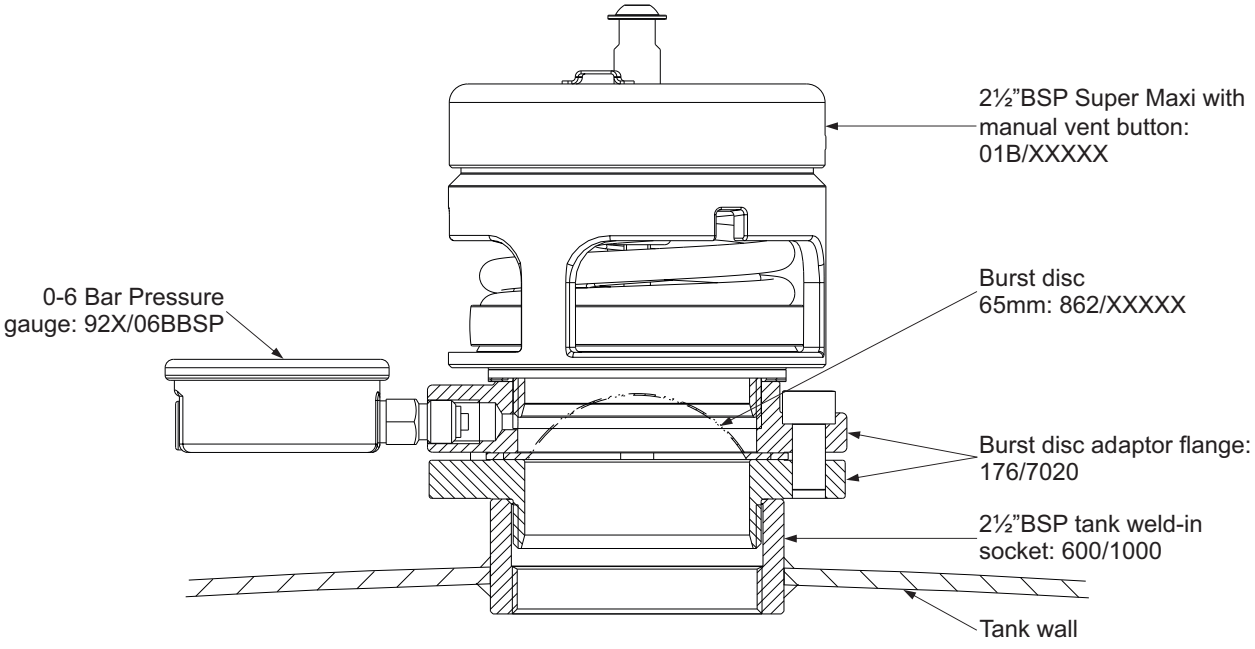
Flanged Super Maxi/Hyper Maxi relief valve with burst disc and tank weld-in flange



2½”BSP Super Maxi with weatherproof cowl and tank weld-in socket



2½”BSP Super Maxi with burst disc, pressure gauge, adaptor flange & weld-in socket



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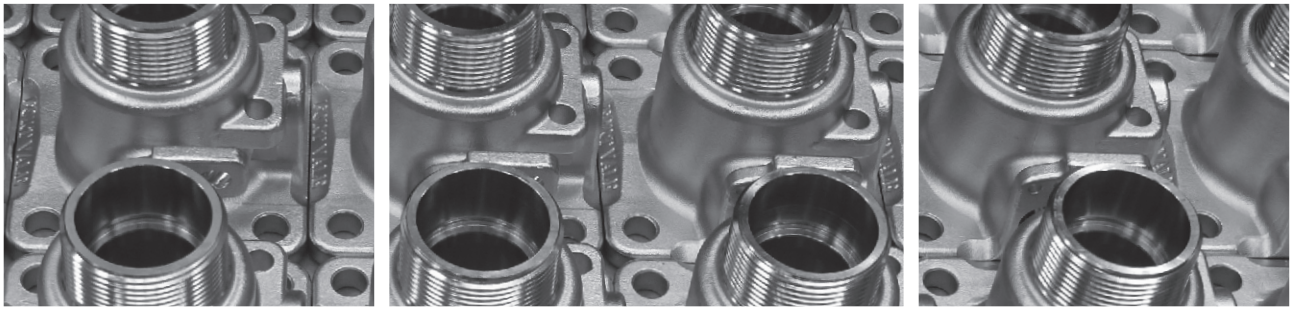
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Airline Valves



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Function

An airline valve is used when the tank is pressurised during testing or discharge and can be used for inert gas blanketing or vapour recovery. We offer ball valves and butterfly valves for airline connections.

Design Options

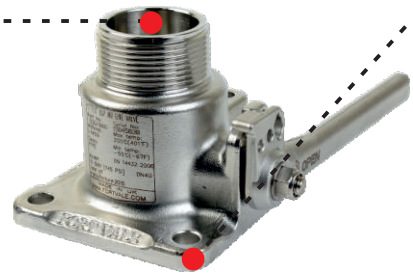
The design options below are available on our standard range of airline valves.

Nominal Bore

40mm (1½"): Ball valves

50mm (2"): Ball valves & butterfly valves

Special service conditions:
Reduced bore e.g. 25mm (1")



Tank Connection

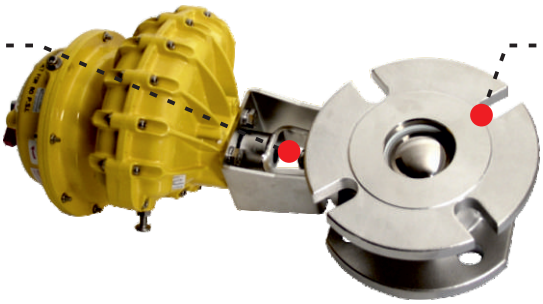
Flanged: 4 holes

Different drilling patterns

Operation

Manually operated: A range of handles is available

Pneumatically actuated



Outlet / Process Connection

Threaded: 1½" BSP, 2" BSP

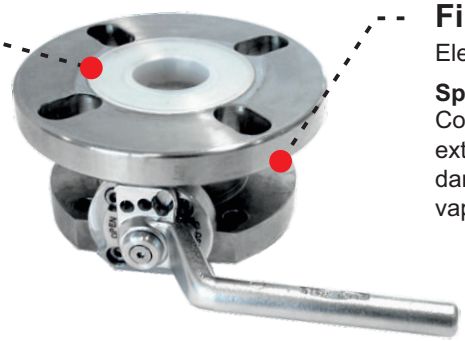
Dual threaded: 1½" BSP/1½" NPT

Flanged: Closed or open slots

Valve Materials

316 stainless steel

Special service conditions:
Lined wetted parts, e.g. PFA



Finish

Electropolished

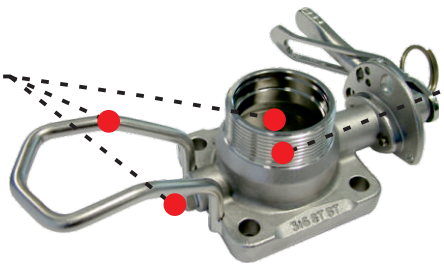
Special service conditions:
Corrosion-resistant paint on external surfaces to prevent damage from corrosive cargo vapour/splash

Accessories

Gauge guard

Gauze or sintered filter

TIR to gauge inlet plug



Main Seal

PTFE

Special service conditions:
High-temperature compatible seals

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Related Parts

We recommend our range of compatible accessories:

- Pressure gauges
- Filters: gauzed or sintered
- Blank caps
- Flanges - weld-in and adaptor
- Fasteners
- Gaskets

Please contact us for more information about these parts.

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1½” BSP Blacko Airline Ball Valve

Part No: 530/0000



Specification

Nominal size
32mm

Tank connection
Flanged: 4 x 10.8mm holes on a 103.5mm PCD

Outlet/Process connection
Threaded: 1½” BSP male

Properties
¼” BSP gauge connection, handle with TIR

Materials
Contact parts: 316 stainless steel
Main seal: PTFE

Alternatives are available, refer to the Design Options page

Design Conditions

Weight:	2.9 Kg
Design Pressure (MAWP):	10 Bar
Test Pressure:	21.4 Bar
Design Temperature Min:	-55°C
Design Temperature Max:	205°C

NOTE: The Design Conditions and Section View dimensions are for the specified part number only.

Design Code
BS EN14432

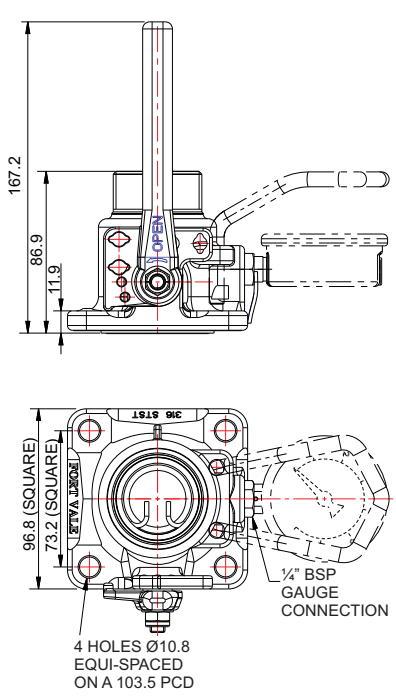
Range

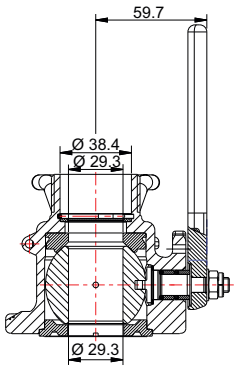
Description	Part No.
Standard specification	530/0000
With gauze	530/0000F
With gauge guard	530/0000G
With gauze and gauge guard	530/0000FG
With TIR wire to ¼” BSP plug	530/0000W

Related Parts

Description	Part No.
Pressure gauge	920/07BBSP
Gauge adaptor	352/4004
1½” BSP dust cap	10300PS
Stud kit	350/1300
Weld-in flange	350/0025

Section View





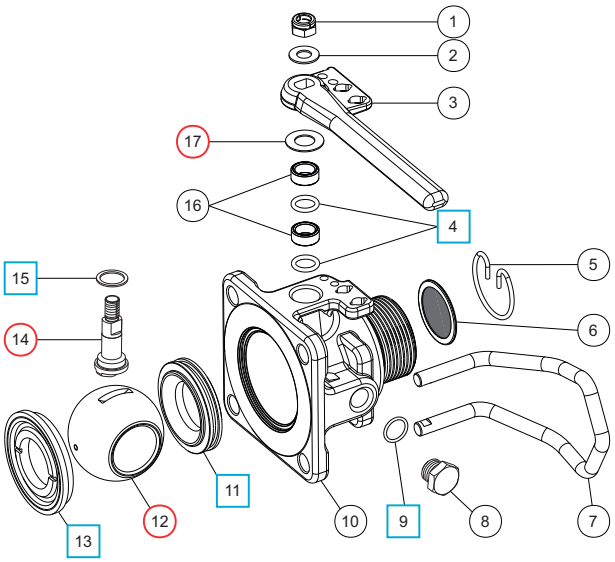
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1½” BSP Blacko Airline Ball Valve

Part No: 530/0000

Parts Drawing



Parts List

Item	Description	Part No.	
1	Self-locking nut	5112-031	
2	M8 washer	5113-005	
3	Handle	531/0025	
4	PTFE O ring (2)	5005-008	□ ○
5	Snap ring ***Note 1**	5120-017	
6	Gauze filter ***Note 1**	353/0010	
7	Gauge guard ***Note 2**	530/0040	
8	¼” BSP plug	5128-005	
9	PTFE O ring	5005-048	□ ○
10	Body	530/0100	
11	Front ball seal	5005-006	□ ○
12	Ball	350/0002	○
13	Rear ball seal	5005-007	□ ○
14	Spindle	530/0001	○
15	PTFE washer	5003-002	□ ○
16	Stuffing boss (2)	530/0003	
17	Disc spring	5113-036	○

NOTE 1: Optional part, see Range 530/0000F

NOTE 2: Optional part, see Range 530/0000G

Seal Kit

Description	Part No.
All parts marked □ in the Parts List	530/00SK

Repair Kit

Description	Part No.
All parts marked ○ in the Parts List	530/00RK

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2" BSP Airline Butterfly Valve

Part No: 535/0200



Specification

Nominal size
50mm

Tank connection
Flanged: 4 x 10.9mm holes on a 100mm PCD

Outlet/Process connection
Threaded: 2” BSP male

Properties
¼” BSP gauge connection, gauge guard, handle with TIR

Materials
Contact parts: 316 stainless steel
Main seal: PTFE

Alternatives are available, refer to the Design Options page

Design Conditions

Weight:	3.7 Kg
Design Pressure (MAWP):	6.9 Bar
Test Pressure:	12.5 Bar
Design Temperature Min:	-40°C
Design Temperature Max:	190°C

NOTE: The Design Conditions and Section View dimensions are for the specified part number only.

Design Code
BS EN14432

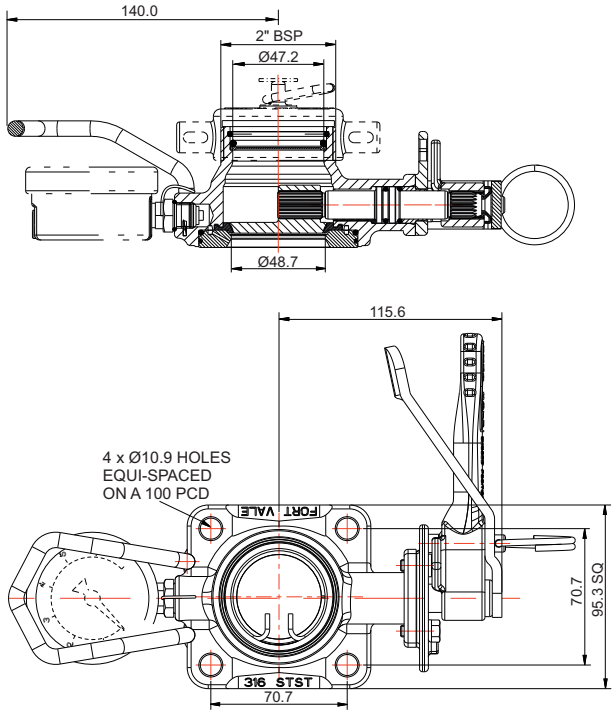
Range

Description	Part No.
Standard specification	535/0200
With gauze filter	535/0200F
With sintered filter	535/0200S

Related Parts

Description	Part No.
Dust cap	10301PS
Pressure gauge	920/07BBSP
Gauge adaptor	352/4004
Stud kit	350/1300
Gasket	5005-500
Weld-in flange	355/1000

Section View



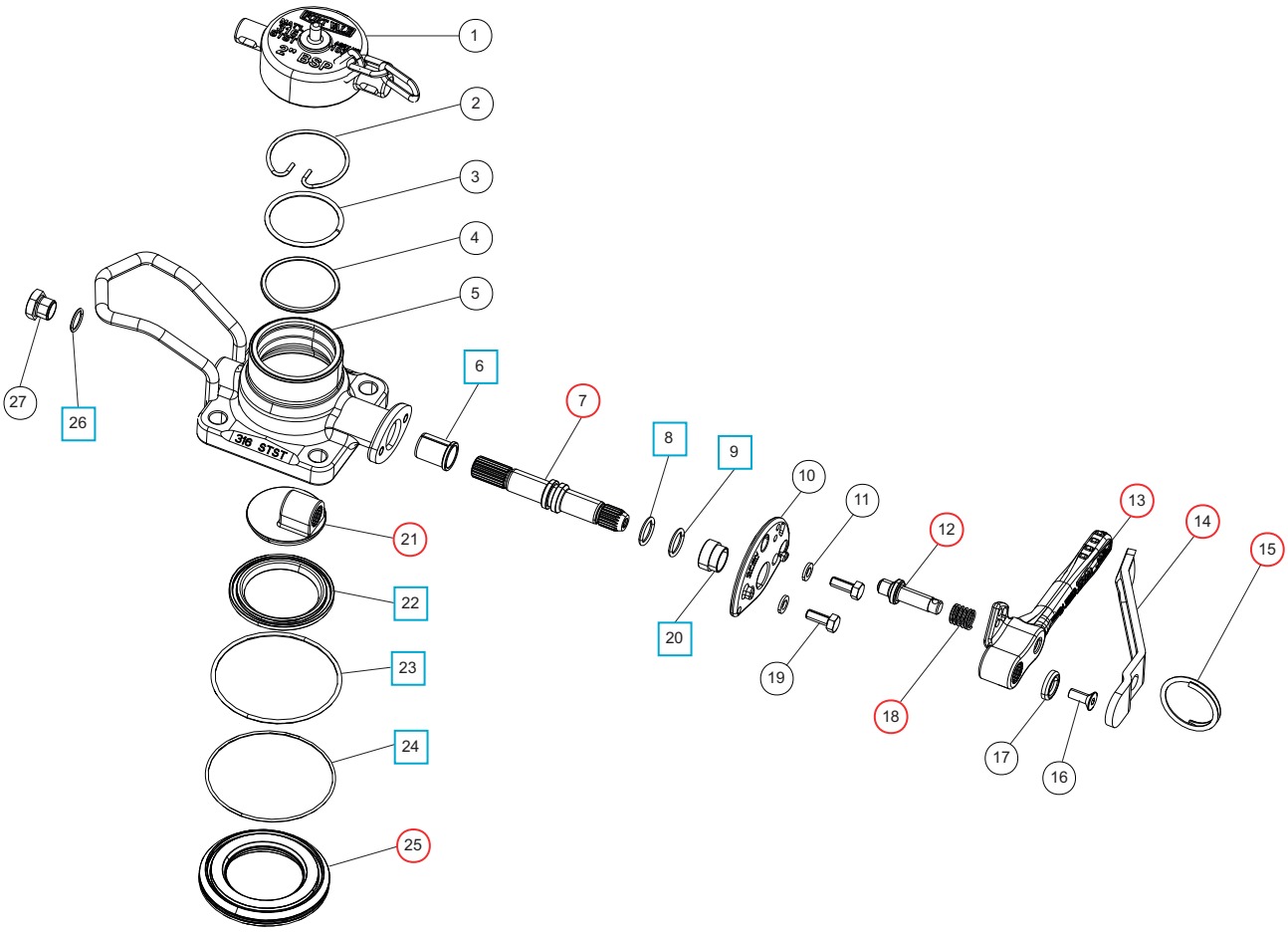
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2" BSP Airline Butterfly Valve

Part No: 535/0200

Parts Drawing



Parts List

Item	Description	Part No.	
1	2" BSP dust cap (supplied separately)	10301PS	
2	Snap ring ***Note 1 & 2**	5120-005	
3	Spacer ***Note 1 & 2**	355/0295	
4	Gauze filter ***Note 1** Sintered filter (2) ***Note 2**	355/0010 355/0206	
5	Body	535/0215	
6	PTFE bush	535/0009	□ ○
7	Spindle	535/0203	○
8	Viton O ring	20361	□ ○
9	PTFE O ring	20363	□ ○
10	Stuffing clamp	535/0204	
11	Spring washer (2)	5113-008	
12	Handle location pin	368/0010	○
13	Handle	535/0050	○
14	Operating lever	368/9838	○
15	Split ring	368/0011	○
16	Countersunk bolt	5111-030	
17	Retaining washer	20370	
18	Handle spring	368/0012	○

Parts List

Item	Description	Part No.	
19	Hex bolt (2)	5111-022	
20	PTFE stuffing clamp bush	368/0301	□ ○
21	Closure plate	535/0225	○
22	PTFE main seal	355/0202	□ ○
23	PTFE O ring	5005-659	□ ○
24	EPDM O ring	5005-664	□ ○
25	Clamp plate	535/0201	○
26	PTFE O ring	5005-048	□ ○
27	¼" BSP plug	5128-005	

NOTE 1: Optional part, see Range 535/0200F

NOTE 2: Optional part, see Range 535/0200S

Seal Kit

Description	Part No.
All parts marked □ in the Parts List	535/00SK

Repair Kit

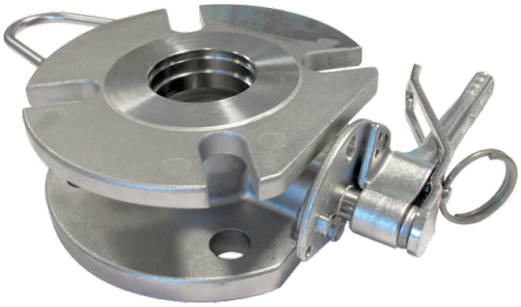
Description	Part No.
All parts marked ○ in the Parts List	535/00RK

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2" MKII Flanged Airline Butterfly Valve

Part No: 535/3000



Specification

Nominal size
50mm

Tank connection
Flanged: 4 x 18mm holes on a 125mm PCD (DIN50 PN10)

Outlet/Process connection
Flanged: 4 x open slots, min. PCD: 2" BSTD

Properties
¼" BSP gauge connection, gauge guard, handle with TIR

Materials
Contact parts: 316 stainless steel
Main seal: PTFE

Alternatives are available, refer to the Design Options page

Design Conditions

Weight:	5.9 Kg
Design Pressure (MAWP):	6.9 Bar
Test Pressure:	12.6 Bar
Design Temperature Min:	-40°C
Design Temperature Max:	190°C

NOTE: The Design Conditions and Section View dimensions are for the specified part number only.

Design Code
BS EN14432

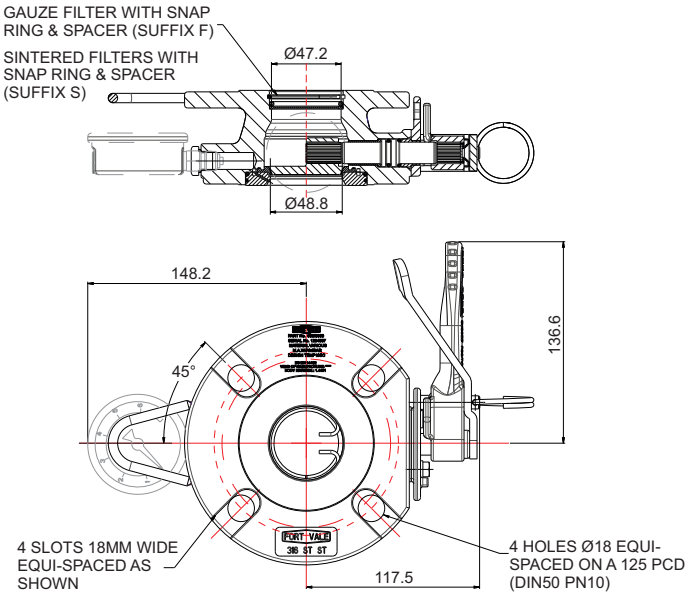
Range

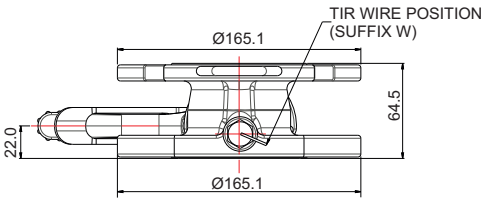
Description	Part No.
Standard specification	535/3000
With gauze filter	535/3000F
With sintered filter	535/3000S
With TIR wire to ¼" BSP plug	535/3000W

Related Parts

Description	Part No.
Blind flange	370/4239CM
Inlet gasket	5005-360
Pressure gauge	920/07BBSP
Gauge adaptor	352/4004
Stud kit	311/3700
Outlet gasket	5005-361
Weld-in flange	355/3100

Section View





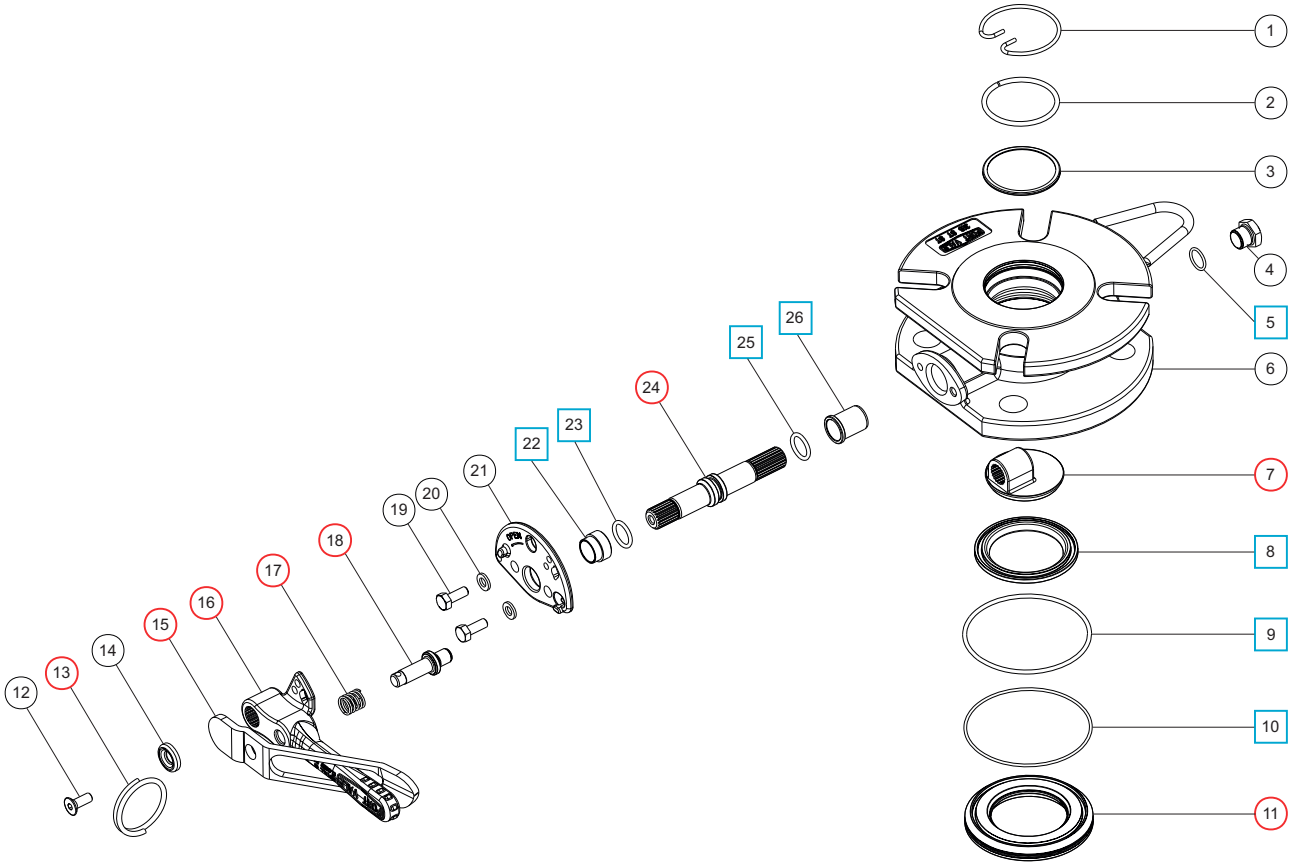
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2" MKII Flanged Airline Butterfly Valve

Part No: 535/3000

Parts Drawing



Parts List

Item	Description	Part No.	
1	Snap ring ***Note 1 & 2**	5120-005	
2	Spacer ***Note 1 & 2**	355/0295	
3	Gauze filter ***Note 1** Sintered filter (2) ***Note 2**	355/0010 355/0206	
4	¼" BSP plug	5128-005	
5	PTFE O ring	5005-048	□ ○
6	Body	535/3015	
7	Closure plate	535/0225	○
8	Main seal	355/0202	□ ○
9	PTFE O ring	5005-659	□ ○
10	EPDM O ring	5005-664	□ ○
11	Seal plate	535/0201	○
12	M6 screw	5111-030	
13	Split ring	368/0011	○
14	Retaining washer	20370	
15	Operating lever	368/9838	○
16	Handle	535/0050	○
17	Handle spring	368/0012	○
18	Location pin	368/0010	○
19	M6 hex bolt (2)	5111-022	

Parts List

Item	Description	Part No.	
20	M6 spring washer (2)	5113-008	
21	Stuffing clamp	535/0204C	
22	Stuffing bush	368/0301	□ ○
23	PTFE O ring	20363	□ ○
24	Spindle	535/0203	○
25	Viton O ring	20361	□ ○
26	PTFE bearing	535/0009	□ ○

NOTE 1: Optional part, see Range 535/3000F

NOTE 2: Optional part, see Range 535/3000S

Seal Kit

Description	Part No.
All parts marked □ in the Parts List	535/00SK

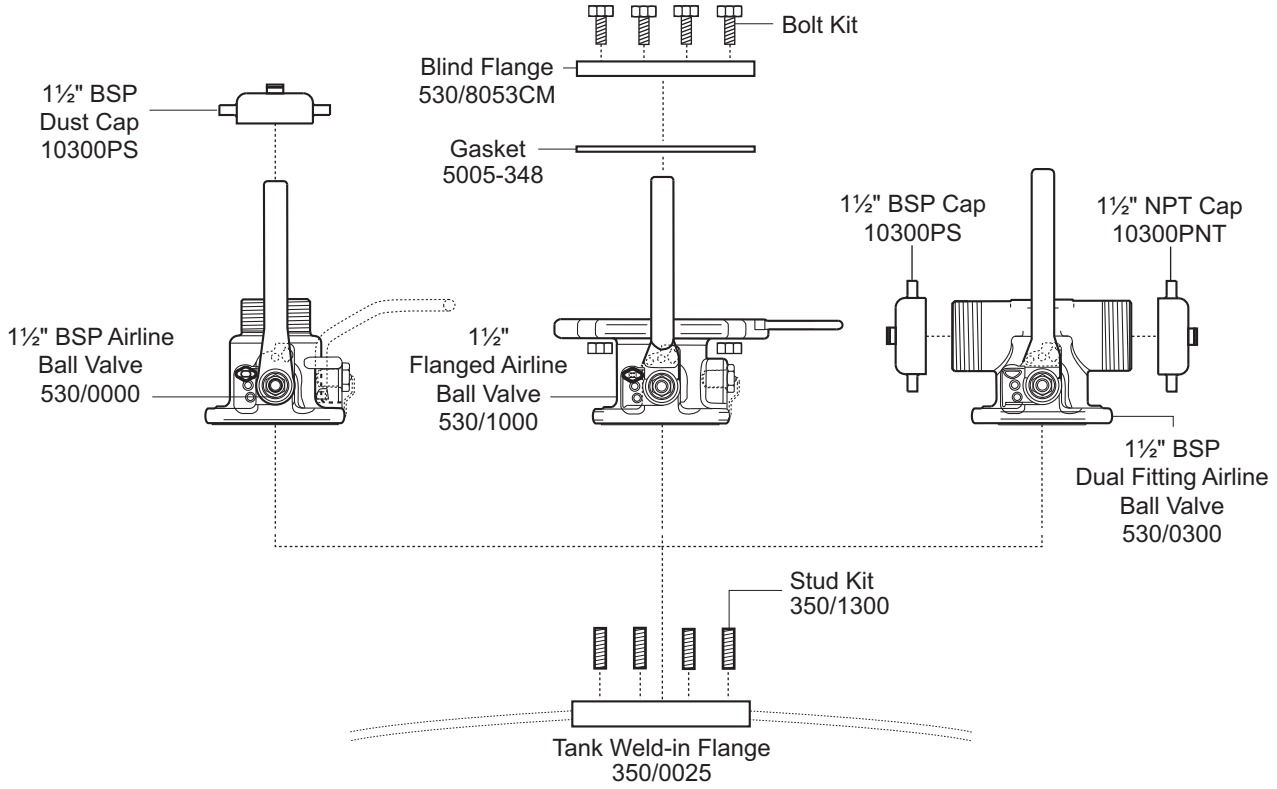
Repair Kit

Description	Part No.
All parts marked ○ in the Parts List	535/00RK

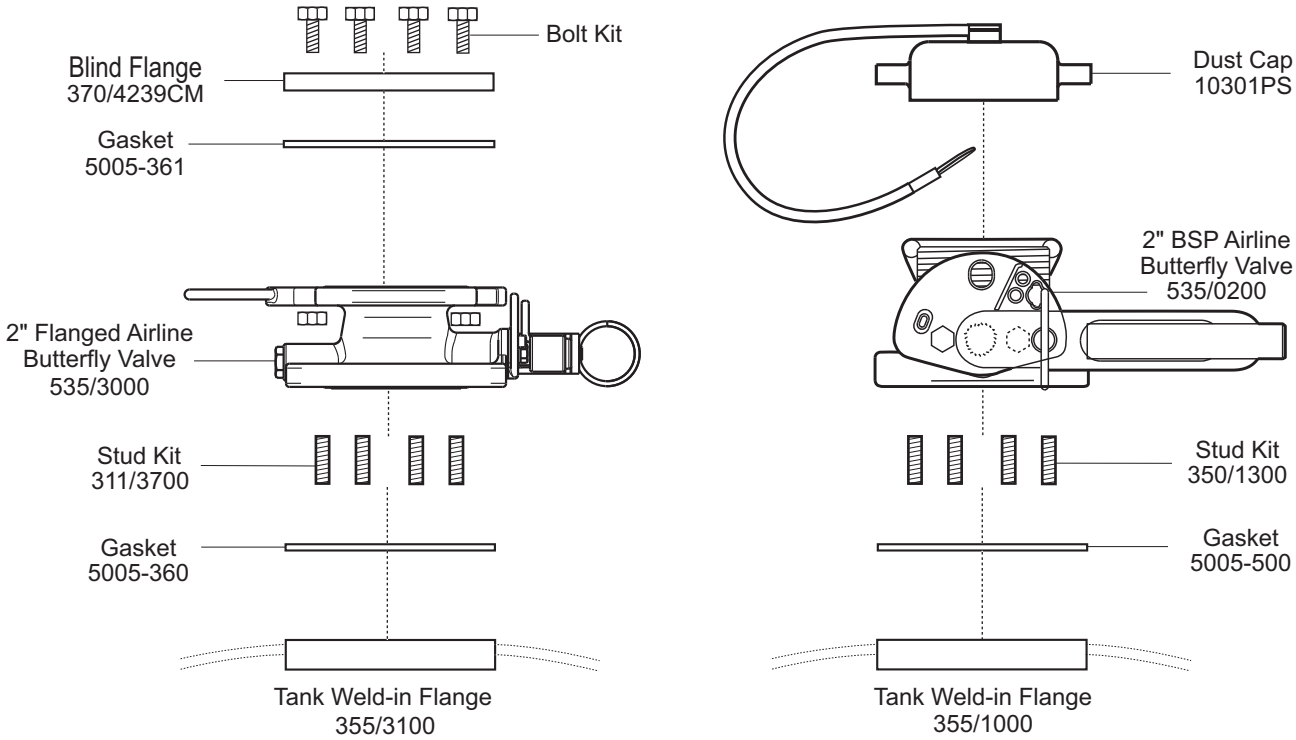
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1½” Airline Ball Valves



2” Airline Butterfly Valves



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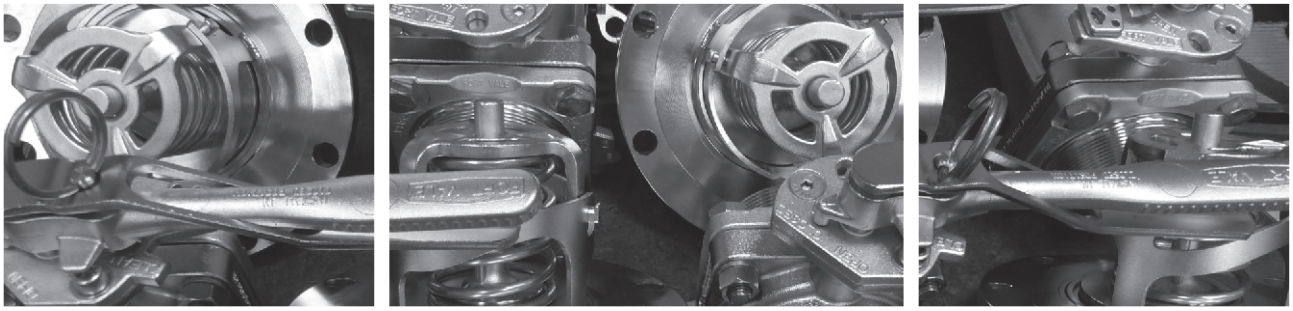
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Bottom Discharge Valves



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Function

A footvalve is a primary closure valve that is installed at the drain point of a tank. It is used to load and discharge cargo in combination with a secondary closure valve. The footvalve body has a shear groove. To prevent leakage if there was an accident, the groove will break and keep the internal part of the valve closed and attached to the tank.

In our standard range, we offer two main types of footvalve; Cleanflow and Highlift.



Cleanflow

The Cleanflow footvalve does not protrude into the tank. When the valve is open, the poppet does not obstruct the discharge orifice, so the cargo discharges faster.



Highlift

The Highlift footvalve has a traditional internal cage and a spring-loaded poppet with a lifting finger.

Design Options

The design options below are available on our standard range of Cleanflow and Highlift footvalves.

Nominal Bore

80mm (3")

100mm (4")

Special service conditions:
125mm (5")

150mm (6")

Reduced bore: 80mm to 50mm (3" to 2")



Body Style

Angle between the inlet & outlet flange

30°

45°

90°

180°

Special service conditions:
105° - Cleanflow only

Outlet Flange

Round and square flanges

4, 6 and 8 hole drilling patterns

Flats milled top and bottom



Operation

Manually operated: A range of handles is available

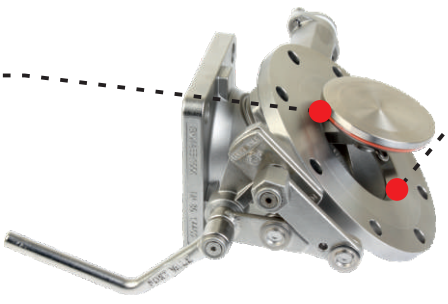
Pneumatically actuated

Hydraulically actuated

Main Seal

Fortyt

Special service conditions:
A range of seal materials is available



Inlet/Seat Area

Superseat: Alloy 625 integral seat

Special service conditions:
Replaceable seat:
High nickel alloy, e.g. Alloy C276, 904L stainless steel or
special metals, e.g. Titanium GR2

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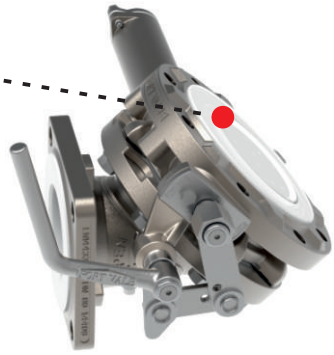
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Design Options - continued

Valve Materials

316 stainless steel

Special service conditions:
Lined wetted parts, e.g. PFA, Halar ®

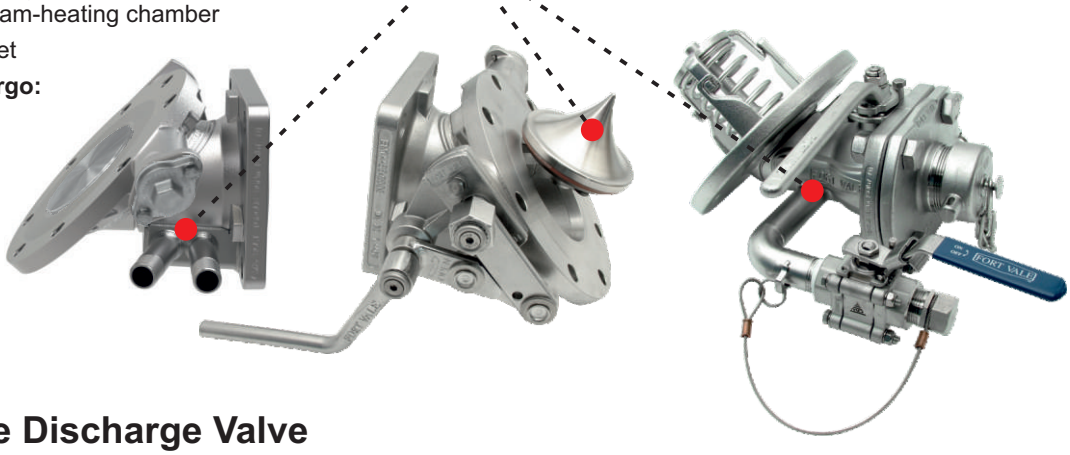


Special Cargoes

Solidifying cargo:
Body with steam-heating chamber

Conical poppet

Sensitive cargo:
Sample point



Composite Discharge Valve

A composite discharge valve is a combined primary and secondary closure valve. It saves space and reduces the number of joints between valves. Many of our design options are available on composite valves.

Please contact us for more information.

Related Parts

We recommend our range of compatible accessories:

- Remote closure systems and fusible elements
- Flanges - weld-in and adaptor
- Fasteners
- Gaskets

Please contact us for more information about these parts.

Footvalves for Dedicated Service

We offer a range of footvalves and discharge systems for these service conditions and special cargoes:

- Offshore fuel and chemical tanks
- T50 tank containers for liquefied gas
- Rail tank wagons
- Road tankers carrying hot product (bitumen)
- Road tankers: top operated screwdown valve

Please contact us for more information about these valves.

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3" 45° Cleanflow Footvalve

Part No: 845/1200A



Specification

Nominal size/body angle
80mm / 45°

Inlet connection
Flanged: 8 x 14mm holes equi-spaced on a 178mm PCD

Outlet connection
Flanged: 4 x 17mm holes on a 160mm PCD

Materials
Seating area: Superseat (alloy 625)
Contact parts: 316 stainless steel
Main seal: Fortyt

Alternatives are available, refer to the Design Options page

Design Conditions

Weight:	9.87 Kg
Design Pressure (MAWP):	4 Bar
Test Pressure:	6 Bar
Design Temperature Min:	-40°C
Design Temperature Max:	200°C

NOTE: The Design Conditions and Section View dimensions are for the specified part number only.

Approvals
BS EN 14433
Design Approval by Lloyds Register of Shipping

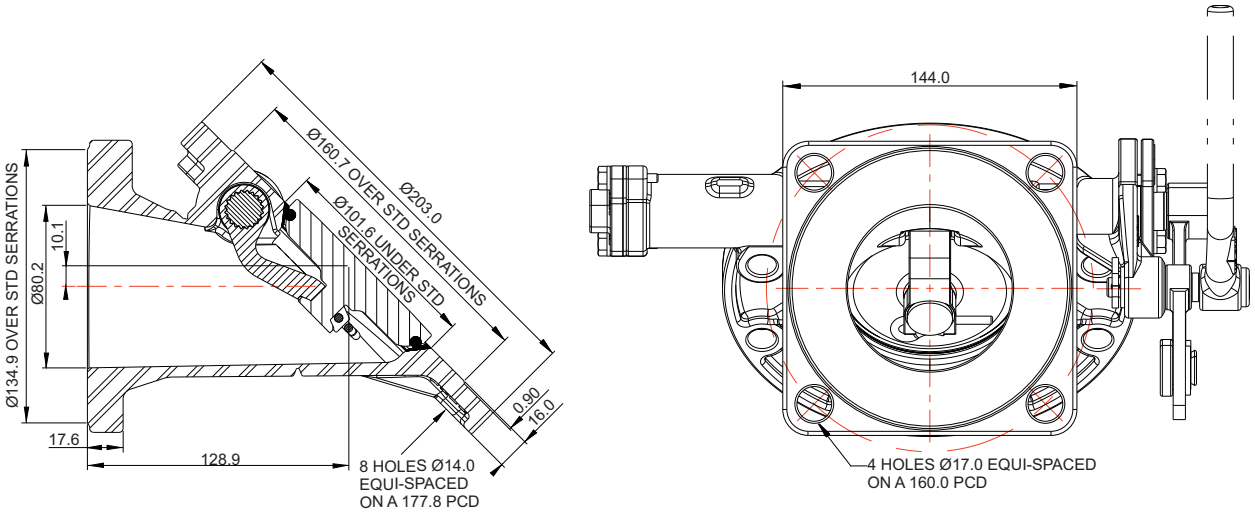
Range

Description	Part No.
Standard specification	845/1200A
With alloy C276 seating area	845/1200AHS

Related Parts

Description	Part No.
Weld-in flange	324/9000
Stud kit	845/2040
CNAF/PTFE inlet gasket	5005-015
CNAF/PTFE outlet ring gasket	5005-049
CNAF/PTFE outlet gasket - 6 hole	5005-169
Valve operation decal	845/0320

Section View



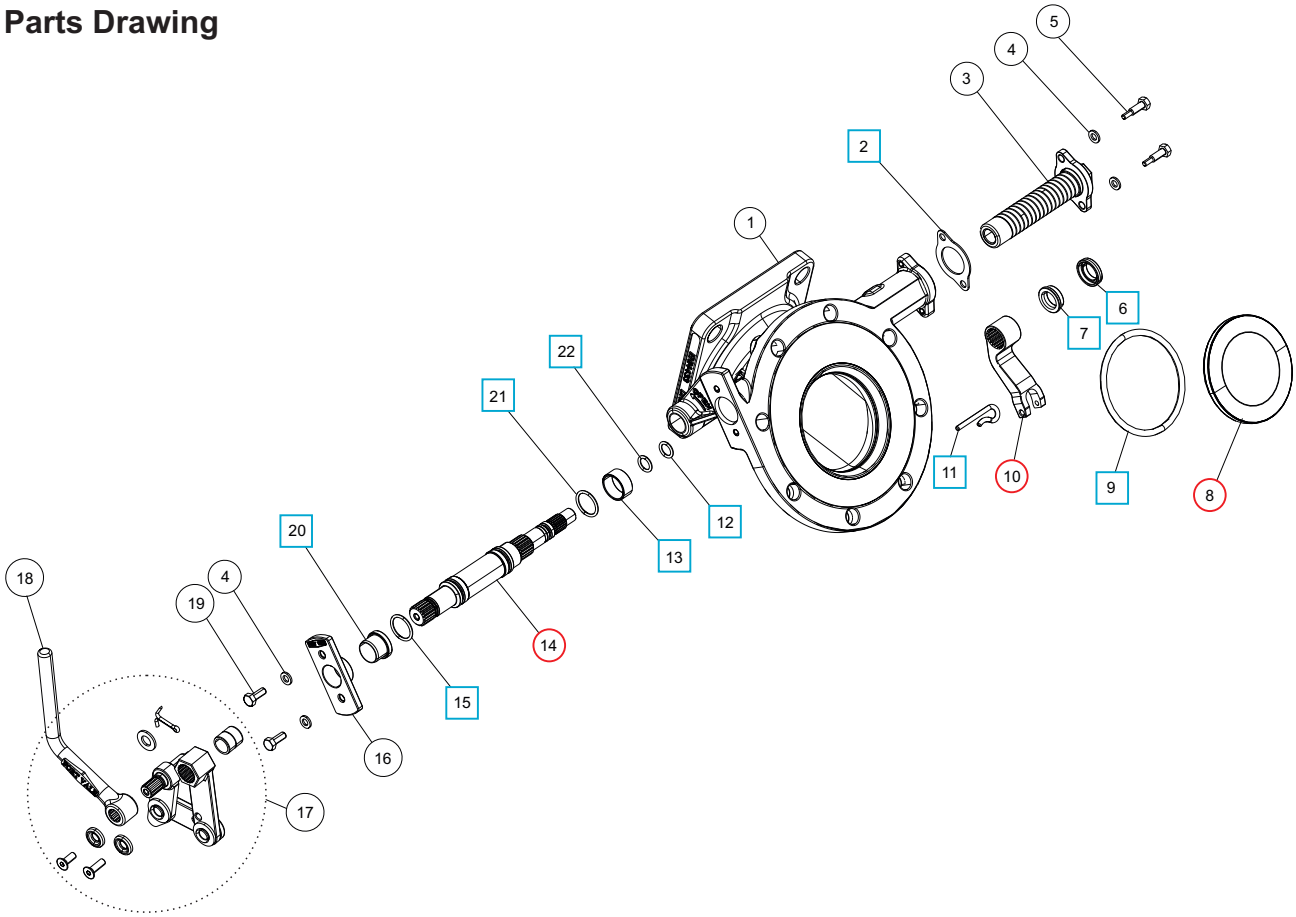
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3" 45° Cleanflow Footvalve

Part No: 845/1200A

Parts Drawing



Parts List

Item	Description	Part No.	
1	Body	845/1100B	
2	Spring housing gasket	5005-845	□ ○
3	Spring assembly	845/0050	
4	M6 spring washer (4)	5113-008	
5	M6 hex bolt (2)	845/0017	
6	Bush seal	845/0064	□ ○
7	Seal energizer	845/0063	□ ○
8	Poppet	845/0040	○
9	Fortyt O ring	5005-104	□ ○
10	Lifting fork	845/0010	○
11	Retaining pin	845/0015	□ ○
12	Perlast O ring	10133PHT	□ ○
13	Spindle bearing	845/0062	□ ○
14	Spindle ***Note**	845/0200	○
15	Viton O ring	5005-336	□ ○
16	Stuffing clamp flange	845/0016	
17	Handle linkage assembly	324/8910	
18	Handle ***Refer to Handle Options Table**		
19	M6 X 16mm hex bolt (2)	5111-022	
20	Stuffing seal	845/0061	□ ○
21	Perlast O ring	5005-384	□ ○
22	PTFE O ring	5005-008	□ ○

Footvalve Handle Options

Specification	Type	Part No.
Std. Cleanflow handle		324/8670
Cranked Cleanflow handle		324/8671
Std. Highlift handle		330/5010

NOTE: We can supply the spindle with the seals installed. Part no. **845/0200S** includes item 6, 7, 12, 13, 14, 15, 20, 21 & 22.

Seal Kit

Description	Part No.
All parts marked □ in the Parts List	845/00SK

Repair Kit

Description	Part No.
All parts marked ○ in the Parts List, includes 845/0200S (see **NOTE**)	845/00RK

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3" 45° MKIII Highlift Footvalve

Part No: 826/1200A



Specification

Nominal size/body angle
80mm / 45°

Inlet connection
Flanged: 8 x 14mm holes equi-spaced on a 178mm PCD

Outlet connection
Flanged: 4 x 17mm holes on a 160mm PCD

Materials
Seating area: Superseat (alloy 625)
Contact parts: 316 stainless steel
Main seal: Fortyt

Alternatives are available, refer to the Design Options page

Design Conditions

Weight:	8.9 Kg
Design Pressure (MAWP):	4 Bar
Test Pressure:	6 Bar
Design Temperature Min:	-40°C
Design Temperature Max:	200°C

NOTE: The Design Conditions and Section View dimensions are for the specified part number only.

Approvals
BS EN14433
Design Approval by Lloyds Register of Shipping

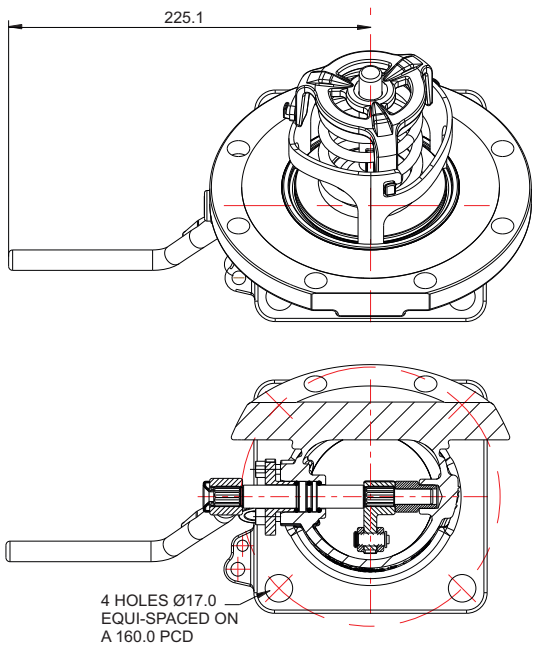
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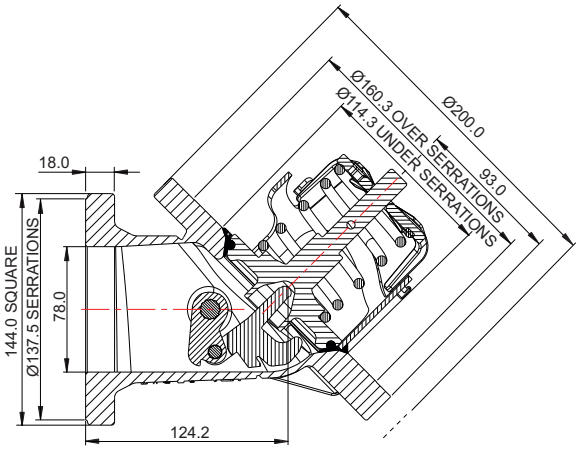
Description	Part No.
Standard specification	826/1200A
With alloy C276 seating area	826/1200AHS

Related Parts

Description	Part No.
Weld-in flange	324/9000
Stud kit	324/2070
CNAF/PTFE inlet gasket	5005-015
CNAF/PTFE outlet gasket	5005-049
Valve operation decal	326/0300

Section View





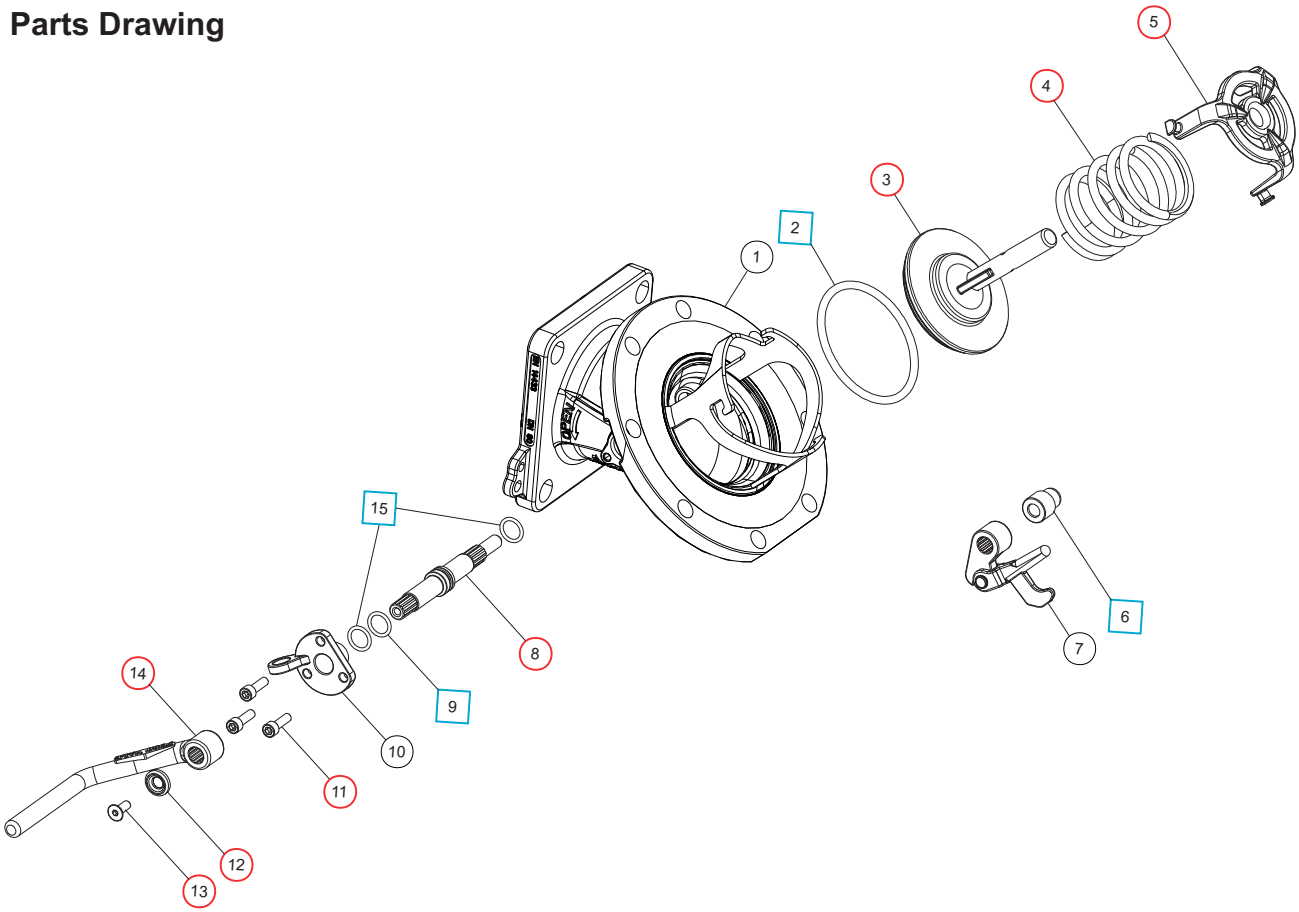
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3" 45° MKIII Highlift Footvalve

Part No: 826/1200A

Parts Drawing



Parts List

Item	Description	Part No.	
1	Body	826/1100B	
2	Fortyt O ring	5005-104	□ ○
3	Solid poppet	324/2020	○
4	Spring	5104-971	○
5	Spring top plate	290/6104	○
6	PTFE crankshaft end bush	20362	□ ○
7	Crank block assembly	821/0300	
8	Spindle	821/0010	○
9	Viton O ring	20361	□ ○
10	Stuffing clamp	324/1001	
11	M6 capscrew (3)	5111-017	○
12	Handle retaining washer	20370	○
13	Handle retaining screw	5111-030	○
14	Handle	330/5010	○
15	PTFE O ring (2)	20363	□ ○

Seal Kit

Description	Part No.
All parts marked □ in the Parts List	826/00SK

Repair Kit

Description	Part No.
All parts marked ○ in the Parts List	826/00RKA

Spare Parts

Description	Type	Part No.
Spindle & crank block assy Item 6, 7, 8, 9, & 15		821/0200

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3" 45° Cleanflow/Butterfly Compact-3 Composite Assembly

Part No: 806/E0057 (Superseat)



Specification

Nominal size/body angle
80mm / 45°

Inlet connection
Flanged: 8 x 14mm holes equi-spaced on a 178mm PCD

Outlet connection
3" BSP spigot flange with cap

Properties
Cleanflow footvalve, low profile butterfly valve, offset outlet spigot flange, 3" BSP cap

Materials
Seating area: Superseat (alloy 625)
Contact parts: 316 stainless steel
Footvalve main seal: Fortyt
Butterfly valve main seal: PTFE
Cap seal: PTFE

Alternatives are available, please contact Fort Vale

Design Conditions

Weight:	14.4 Kg
Design Pressure (MAWP):	4 Bar
Test Pressure:	7.5 Bar
Design Temperature Min:	-40°C
Design Temperature Max:	200°C

NOTE: The Design Conditions and Section View dimensions are for the specified part number only.

Design Codes
BS EN 14432
BS EN 14433

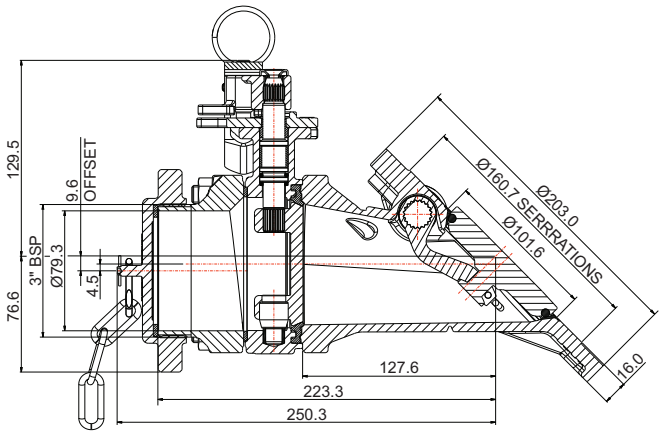
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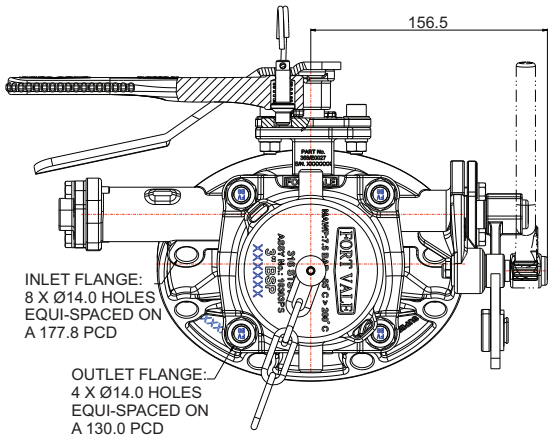
Description	Part No.
Assembly with Superseat footvalve	806/E0057
Assembly with non-Superseat footvalve	806/E0071

Related Parts

Description	Part No.
Weld-in flange	324/9000
Stud kit	845/2040
CNAF/PTFE inlet gasket	5005-015

Section View





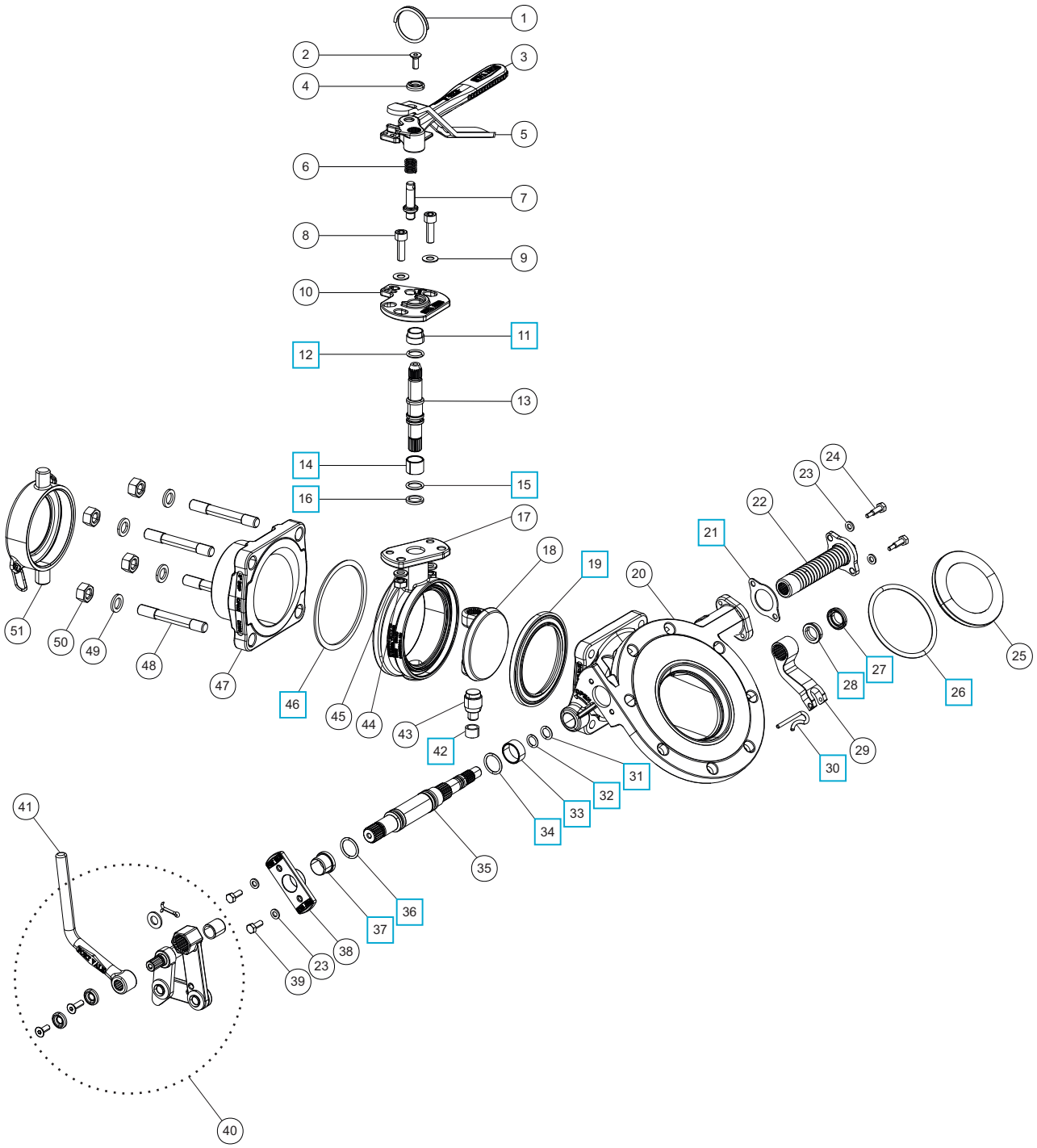
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3" 45° Cleanflow/Butterfly Compact-3 Composite Assembly

Part No: 806/E0057 (Superseat)

Parts Drawing



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3" 45° Cleanflow/Butterfly Compact-3 Composite Assembly

Part No: 806/E0057 (Superseat)

Parts List

Item	Description	Part No.	
1	Split ring	368/0011	
2	M6 countersunk bolt	5111-030	
3	Butterfly valve handle	368/A0034	
4	Retaining washer (2)	20370	
5	Butterfly handle lever	368/9837	
6	Butterfly handle spring	368/0012	
7	Butterfly handle location pin	368/0010	
8	M8 capscrew (2)	5111-148	
9	M8 plain washer (2)	5113-005	
10	Stuffing clamp	368/A0035C	
11	PTFE stuffing clamp bush	368/0301	■
12	PTFE O ring	20363	■
13	Spindle	368/0201	
14	Split bearing	252/0517	■
15	Viton O ring	20361	■
16	PTFE spindle seat	368/0009	■
17	Butterfly valve body	368/A0047	
18	Butterfly closure plate	368/0400	
19	Butterfly main seal	368/0002	■
20	Footvalve body	845/A0042	
21	Spring housing gasket	5005-845	□
22	Spring assembly	845/0050	
23	M6 spring washer (4)	5113-008	
24	M6 hex bolt (2)	845/0017	
25	Poppet	845/0040	
26	Fortyt O ring	5005-104	□
27	Bush seal	845/0064	□
28	Seal energizer	845/0063	□
29	Lifting fork	845/0010	
30	Retaining pin	845/0015	□
31	Perfluoroelastomer O ring	10133PHT	□
32	PTFE O ring	5005-008	□
33	Spindle bearing	845/0062	□
34	Perfluoroelastomer O ring	5005-384	□
35	Spindle ***Note**	845/0200	
36	Viton O ring	5005-336	□
37	Stuffing seal	845/0061	□
38	Stuffing clamp flange	845/0016	
39	M6 x 16mm hex bolt (2)	5111-022	
40	Handle linkage assembly	324/8910	
41	Handle ***Refer to Handle Options Table**		
42	Butterfly bottom bush	368/0035	■
43	Butterfly bottom spindle	368/0036	
44	M8 full nut (2)	5112-001	
45	M8 spring washer (2)	5113-003	
46	PTFE ring gasket	6005-1010912501	■

Parts List

Item	Description	Part No.
47	3" BSP offset outlet	113/0170
48	M12 x 92mm stud (4)	112/0073
49	M12 plain washer (4)	5113-010
50	M12 full nut (4)	5112-006
51	3" BSP blank cap, PTFE, chain	10303PS

Seal Kits

Description	Part No.
Seal kit for 845/E0029 footvalve: All parts marked □ in the Parts List	845/00SK
Seal kit for 368/E0027 butterfly valve: All parts marked ■ in the Parts List	368/E27SK
Seal kit for complete assembly 806/E0057: All parts marked □ & ■ in the Parts List	806/E0057SK

Footvalve Handle Options

Specification	Type	Part No.
Std. Cleanflow handle		324/8670
Cranked Cleanflow handle		324/8671
Std. Highlift handle		330/5010

NOTE: We can supply the spindle with the seals installed. Part no. **845/0200S** includes item 27, 28, 31, 32, 33, 34, 35, 36, 37.

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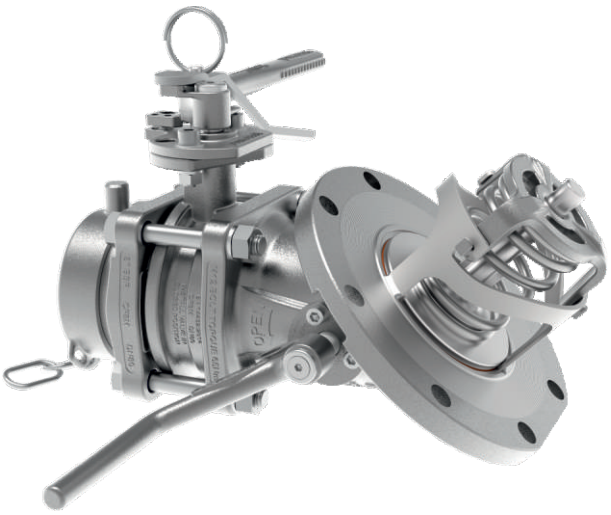
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3" 45° Highlift/Butterfly Compact-3 Composite Assembly

Part No: 804/E0040 (Superseat)



Specification

Nominal size/body angle
80mm / 45°

Inlet connection
Flanged: 8 x 14mm holes equi-spaced on a 178mm PCD

Outlet connection
3" BSP spigot flange with cap

Properties
Highlift footvalve, low profile butterfly valve, offset outlet spigot flange, 3" BSP cap

Materials
Seating area: Superseat (alloy 625)
Contact parts: 316 stainless steel
Footvalve main seal: Fortyt
Butterfly valve main seal: PTFE
Cap seal: PTFE

Alternatives are available, please contact Fort Vale

Design Conditions

Weight:	13.7 Kg
Design Pressure (MAWP):	4 Bar
Test Pressure:	7.3 Bar
Design Temperature Min:	-40°C
Design Temperature Max:	200°C

NOTE: The Design Conditions and Section View dimensions are for the specified part number only.

Design Codes
BS EN 14432
BS EN 14433

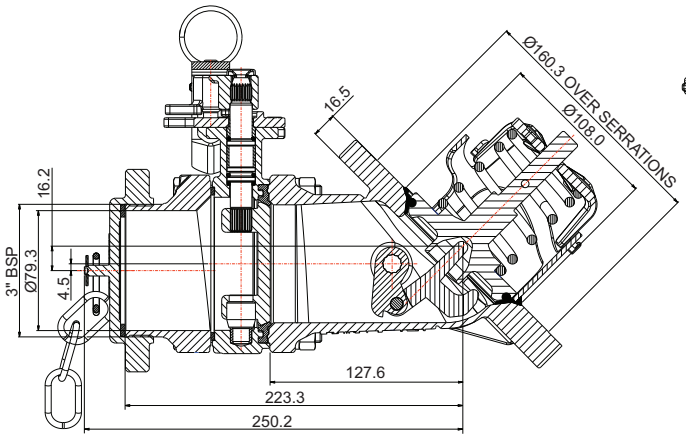
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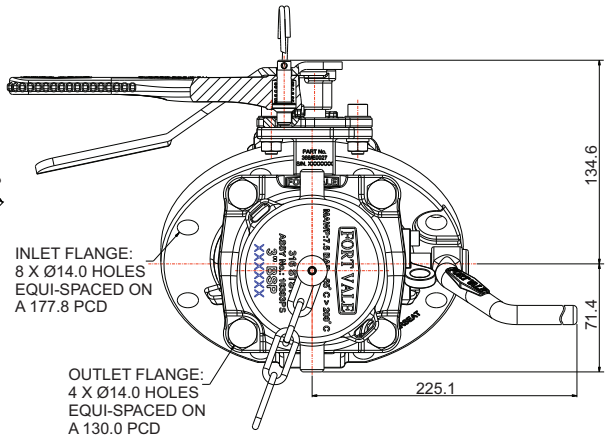
Description	Part No.
Assembly with Superseat footvalve	804/E0040
Assembly with non-Superseat footvalve	804/E0054

Related Parts

Description	Part No.
Weld-in flange	324/9000
Stud kit	324/2070
CNAF/PTFE inlet gasket	5005-015
Valve operation decal	326/0302

Section View





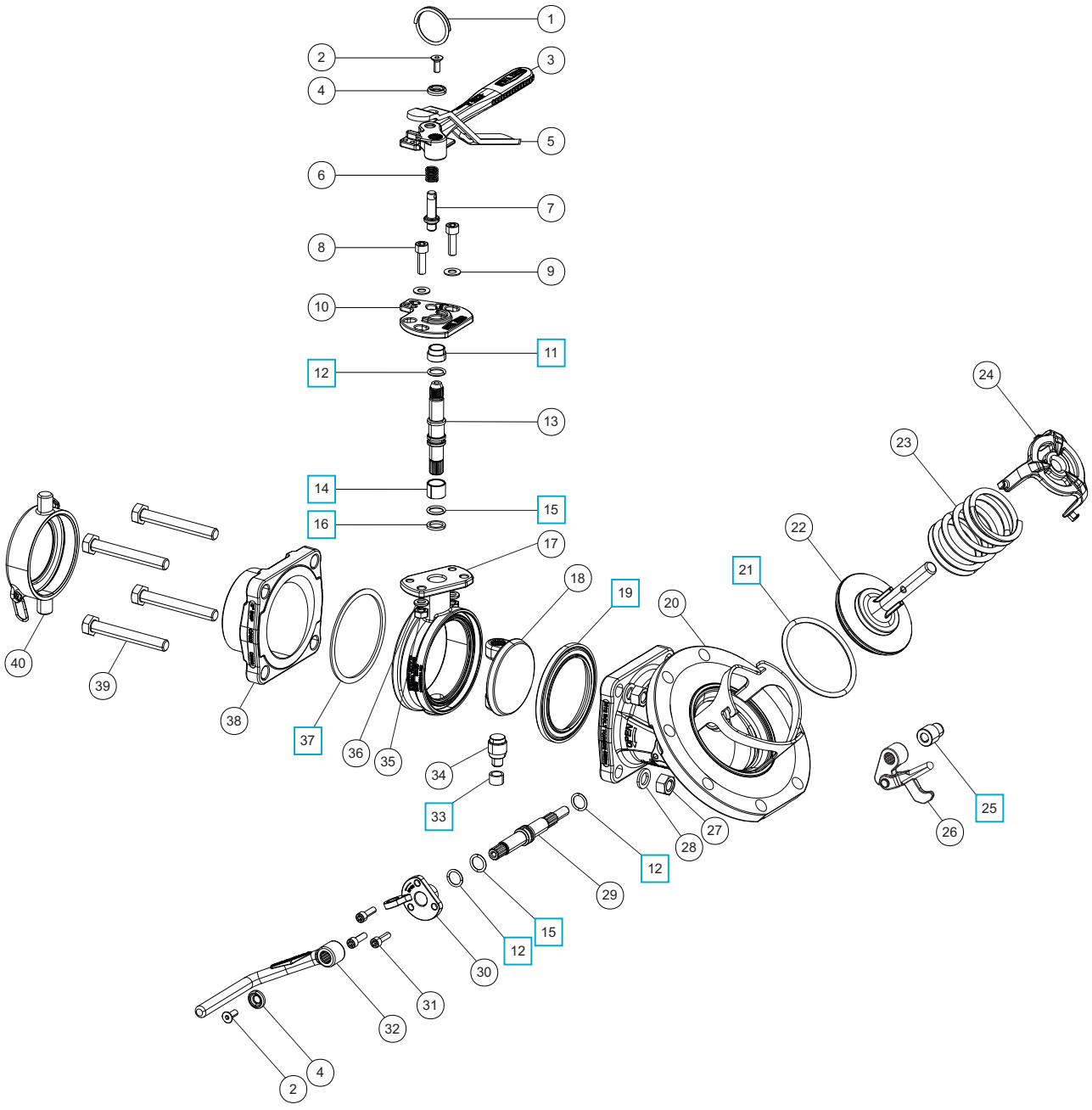
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3" 45° Highlift/Butterfly Compact-3 Composite Assembly

Part No: 804/E0040 (Superseat)

Parts Drawing



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3" 45° Highlift/Butterfly Compact-3 Composite Assembly

Part No: 804/E0040 (Superseat)

Parts List

Item	Description	Part No.	
1	Split ring	368/0011	
2	M6 countersunk bolt (2)	5111-030	
3	Butterfly valve handle	368/A0034	
4	Retaining washer (2)	20370	
5	Butterfly handle lever	368/9837	
6	Butterfly handle spring	368/0012	
7	Butterfly handle location pin	368/0010	
8	M8 capscrew (2)	5111-148	
9	M8 plain washer (2)	5113-005	
10	Stuffing clamp	368/A0035C	
11	PTFE stuffing clamp bush	368/0301	■
12	PTFE O ring (3)	20363	■ □
13	Spindle	368/0201	
14	Split bearing	252/0517	■
15	Viton O ring (2)	20361	■ □
16	PTFE spindle seat	368/0009	■
17	Butterfly valve body	368/A0047	
18	Butterfly closure plate	368/0400	
19	Butterfly main seal	368/0002	■
20	Footvalve body	826/A0003	
21	Footvalve Fortyt poppet O ring	5005-104	□
22	Poppet	324/2020	
23	Spring	5104-971	
24	Spring top plate	290/6104	
25	PTFE crankshaft end bush	20362	□
26	Crank block & lifting finger	821/0300	
27	M12 full nut (4)	5112-006	
28	M12 spring washer (4)	5113-010	
29	Spindle	821/0010	
30	Stuffing clamp	324/1001	
31	M6 cap screw (3)	5111-017	
32	Footvalve handle	330/5010	
33	Butterfly bottom bush	368/0035	■
34	Butterfly bottom spindle	368/0036	
35	M8 full nut (2)	5112-001	
36	M8 spring washer (2)	5113-003	
37	PTFE ring gasket	6005-1010912501	■
38	3" BSP offset outlet	113/0170	
39	M12 x 90 bolt (4)	5111-238	
40	3" BSP blank cap, PTFE, chain	10303PS	

Seal Kits

Description	Part No.
Seal kit for 826/E0006 footvalve: All parts marked □ in the Parts List	826/00SK
Seal kit for 368/E0027 butterfly valve: All parts marked ■ in the Parts List	368/E27SK
Seal kit for complete assembly 804/E0040: All parts marked □ & ■ in the Parts List	804/E0040SK

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3" 45° Highlift/Butterfly Compact-3 Composite Assembly

Part No: 804/E0054 (Non-Superseat)



Specification

Nominal size/body angle
80mm / 45°

Inlet connection
Flanged: 8 x 14mm holes equi-spaced on a 178mm PCD

Outlet connection
3" BSP spigot flange with cap

Properties
Highlift footvalve, low profile butterfly valve, offset outlet spigot flange, 3" BSP cap

Materials
Footvalve body: CF3M
Contact parts: 316 stainless steel
Footvalve main seal: Fortyt
Butterfly valve main seal: PTFE
Cap seal: PTFE

Alternatives are available, please contact Fort Vale

Design Conditions

Weight:	13.8 Kg
Design Pressure (MAWP):	4 Bar
Test Pressure:	7.3 Bar
Design Temperature Min:	-40°C
Design Temperature Max:	200°C

NOTE: The Design Conditions and Section View dimensions are for the specified part number only.

Design Codes
BS EN 14432
BS EN 14433

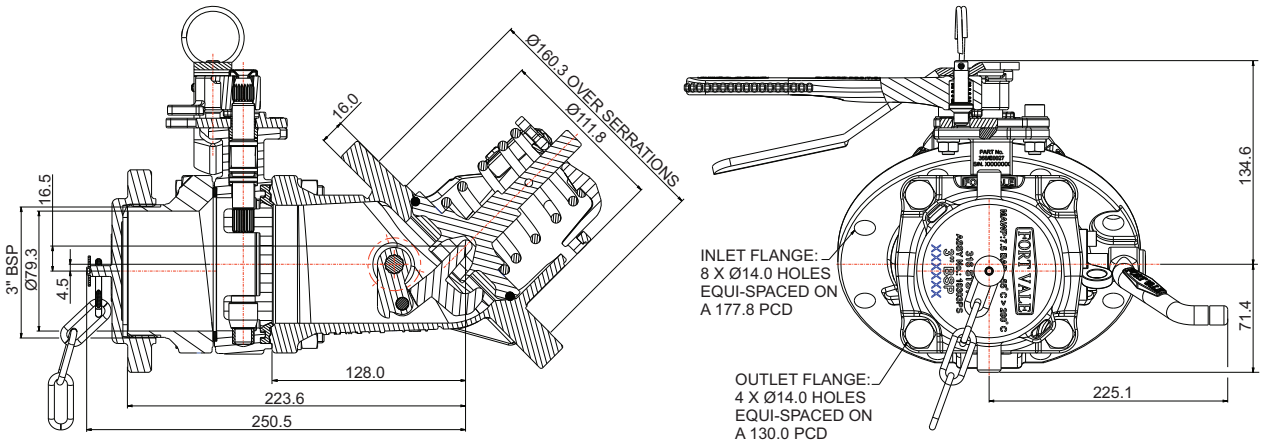
Range

Description	Part No.
Assembly with non-Superseat footvalve	804/E0054
Assembly with Superseat footvalve	804/E0040

Related Parts

Description	Part No.
Weld-in flange	324/9000
Stud kit	324/2070
CNAF/PTFE inlet gasket	5005-015
Valve operation decal	326/0302

Section View



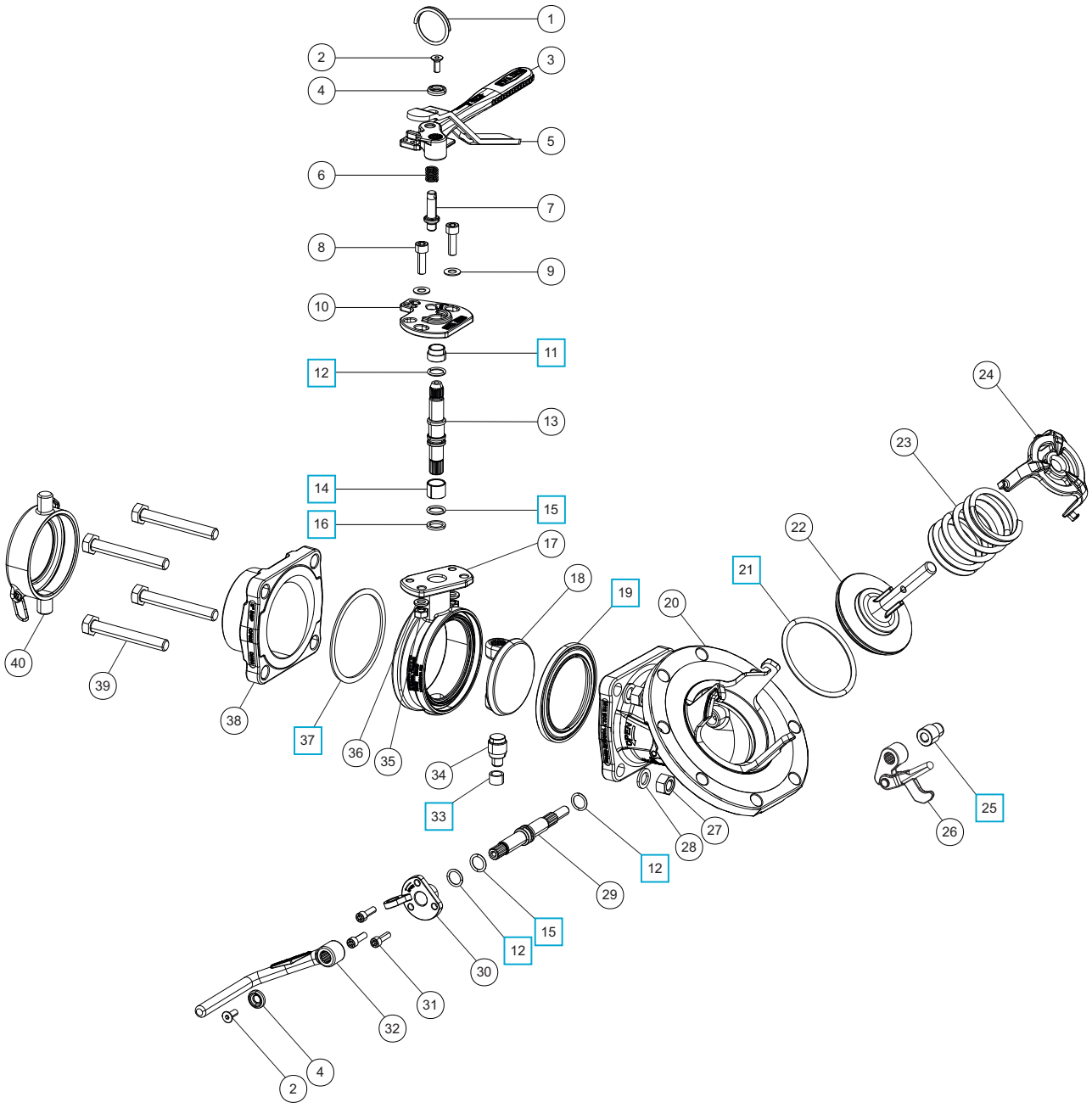
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3" 45° Highlift/Butterfly Compact-3 Composite Assembly

Part No: 804/E0054 (Non-Superseat)

Parts Drawing



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3" 45° Highlift/Butterfly Compact-3 Composite Assembly

Part No: 804/E0054 (Non-Superseat)

Parts List

Item	Description	Part No.	
1	Split ring	368/0011	
2	M6 countersunk bolt (2)	5111-030	
3	Butterfly valve handle	368/A0034	
4	Retaining washer (2)	20370	
5	Butterfly handle lever	368/9837	
6	Butterfly handle spring	368/0012	
7	Butterfly handle location pin	368/0010	
8	M8 capscrew (2)	5111-148	
9	M8 plain washer (2)	5113-005	
10	Stuffing clamp	368/A0035C	
11	PTFE stuffing clamp bush	368/0301	■
12	PTFE O ring (3)	20363	■ □
13	Spindle	368/0201	
14	Split bearing	252/0517	■
15	Viton O ring (2)	20361	■ □
16	PTFE spindle seat	368/0009	■
17	Butterfly valve body	368/A0047	
18	Butterfly closure plate	368/0400	
19	Butterfly main seal	368/0002	■
20	Footvalve body	826/A0010	
21	Footvalve Fortyt poppet O ring	5005-104	□
22	Poppet	324/2020	
23	Spring	5104-971	
24	Spring top plate	290/6104	
25	PTFE crankshaft end bush	20362	□
26	Crank block & lifting finger	821/0300	
27	M12 full nut (4)	5112-006	
28	M12 spring washer (4)	5113-010	
29	Spindle	821/0010	
30	Stuffing clamp	324/1001	
31	M6 cap screw (3)	5111-017	
32	Footvalve handle	330/5010	
33	Butterfly bottom bush	368/0035	■
34	Butterfly bottom spindle	368/0036	
35	M8 full nut (2)	5112-001	
36	M8 spring washer (2)	5113-003	
37	PTFE ring gasket	6005-1010912501	■
38	3" BSP offset outlet	113/0170	
39	M12 x 90 bolt (4)	5111-238	
40	3" BSP blank cap, PTFE, chain	10303PS	

Seal Kits

Description	Part No.
Seal kit for 826/E0006 footvalve: All parts marked □ in the Parts List	826/00SK
Seal kit for 368/E0027 butterfly valve: All parts marked ■ in the Parts List	368/E27SK
Seal kit for complete assembly 804/E0040: All parts marked □ & ■ in the Parts List	804/E0054SK

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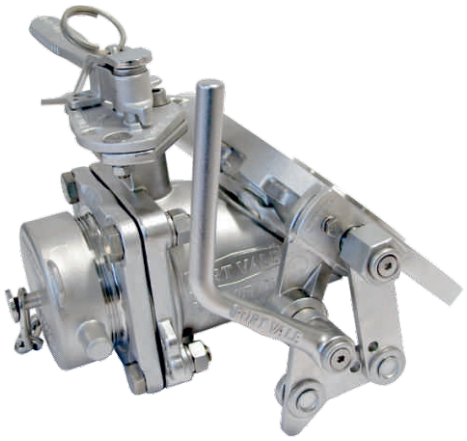
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3" 45° Uniflow Bottom Discharge Assembly

Part No: 806/4000



Specification

Nominal size/body angle
80mm / 45°

Inlet connection
Flanged: 8 x 14mm holes equi-spaced on a 178mm PCD

Outlet connection
3" BSP spigot flange with cap

Properties
Cleanflow footvalve with integral butterfly valve

Materials
Seating area: Superseat (alloy 625)
Contact parts: 316 stainless steel
Footvalve main seal: Fortyt
Butterfly valve main seal: PTFE
Cap seal: PTFE

Alternatives are available, refer to the Design Options page

Design Conditions

Weight:	13.0 Kg
Design Pressure (MAWP):	4 Bar
Test Pressure:	6 Bar
Design Temperature Min:	-40°C
Design Temperature Max:	200°C

NOTE: The Design Conditions and Section View dimensions are for the specified part number only.

Approvals
BS EN14432
BS EN14433
Design Approval by Lloyds Register of Shipping

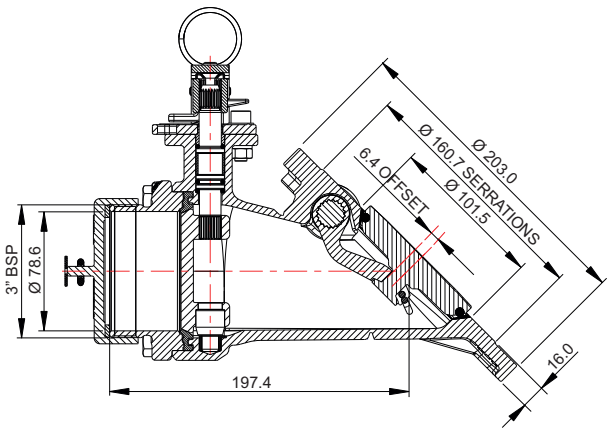
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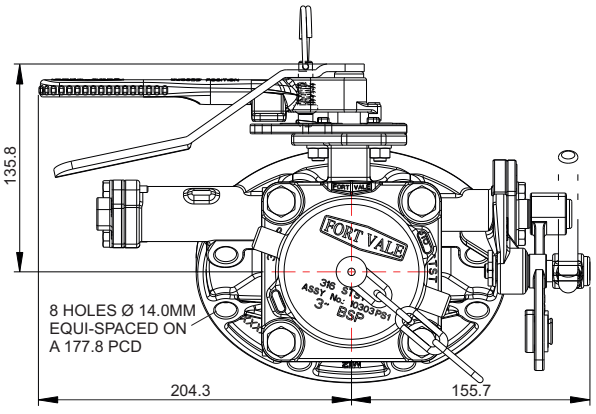
Description	Part No.
Standard specification: 80mm / 45°	806/4000
With alloy C276 seating area	806/4000HS
Standard specification: 80mm / 30°	807/4000

Related Parts

Description	Part No.
Weld-in flange	324/9000
Stud kit	845/2040
CNAF/PTFE inlet gasket	5005-015
Valve operation decal	326/0303

Section View





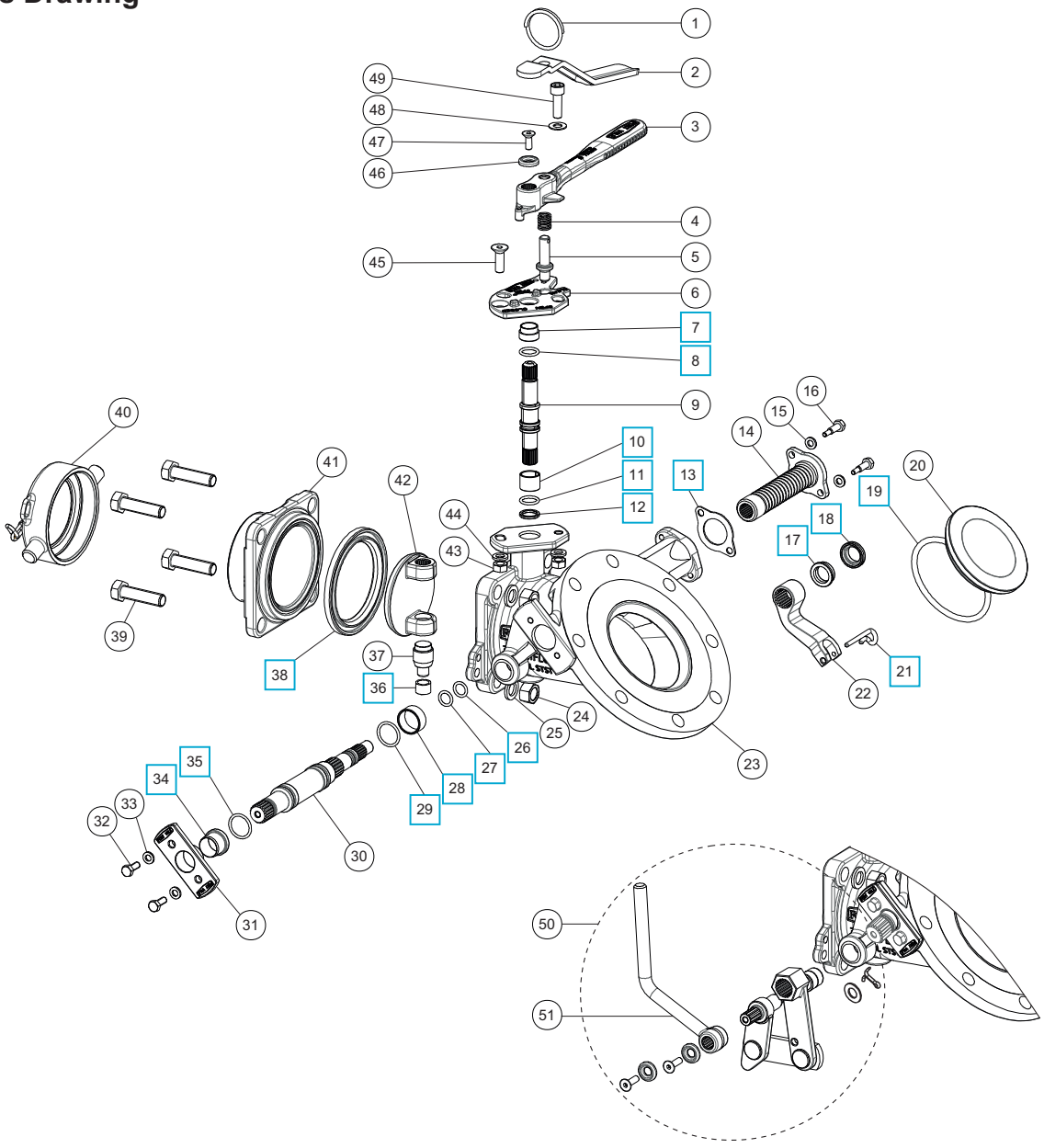
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3" 45° Uniflow Bottom Discharge Assembly

Part No: 806/4000

Parts Drawing



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3" 45° Uniflow Bottom Discharge Assembly

Part No: 806/4000

Parts List

Item	Description	Part No.	
1	Split ring	368/0011	
2	Handle lever	368/9837	
3	Butterfly valve handle	368/0057	
4	Handle location spring	368/0012	
5	Handle location pin	368/0010	
6	Stuffing clamp	368/0047	
7	Stuffing clamp bush	368/0301	☐
8	PTFE O ring	20363	☐
9	Spindle	368/0201	
10	Split bearing	252/0517	☐
11	Viton O ring	20361	☐
12	PTFE spindle seat	368/0009	☐
13	Spring boss gasket	5005-845	☐
14	Spring assembly	845/0050	
15	Spring washer (2)	5113-008	
16	Clamp screw (2)	845/0017	
17	Seal energizer	845/0063	☐
18	Bush seal	845/0064	☐
19	Fortyt O ring	5005-104	☐
20	Poppet	845/0040	
21	Retaining pin	845/0015	☐
22	Lifting fork	845/0010	
23	Body	845/1107B	
24	M12 full nut (4)	5112-006	
25	M12 spring washer (4)	5113-010	
26	Perfluoroelastomer O ring	10133PHT	☐
27	PTFE O ring	5005-008	☐
28	Spindle bearing	845/0062	☐
29	Perlast O ring	5005-384	☐
30	Spindle	845/0200	
31	Stuffing clamp	845/0016	
32	Clamp bolt (2)	5111-022	
33	Spring washer (2)	5113-008	
34	Stuffing seal	845/0061	☐
35	Viton O ring	5005-336	☐
36	PTFE bottom bush	368/0035	☐
37	Bottom spindle	368/0036	
38	PTFE butterfly valve main seal	368/0002	☐
39	M12 hex bolt (4)	5111-023	
40	3" BSP cap with chain & seal	10303PS1	
41	Outlet flange	368/5129	
42	Closure plate	368/0400	
43	M8 full nut (2)	5112-001	
44	M8 spring washer (2)	5113-003	
45	M8 countersunk bolt	5111-085	
46	Retaining washer	20370	
47	M6 set screw	5111-030	

Parts List

Item	Description	Part No.
48	M8 plain washer	5113-005
49	M8 cap screw	5111-148
50	Handle linkage assembly	324/8910
51	Handle ***Refer to Handle Options Table**	

Footvalve Handle Options

Specification	Type	Part No.
Std. Cleanflow handle		324/8670
Cranked Cleanflow handle		324/8671
Std. Highlift handle		330/5010

Seal Kit

Description	Part No.
All parts marked ☐ in the Parts List	806/40SK

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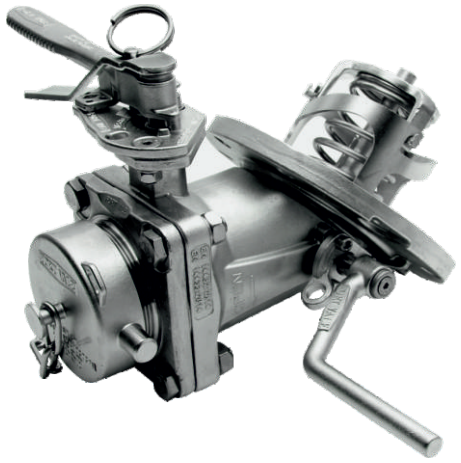
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3" 45° Univalve Bottom Discharge Assembly

Part No: 804/4000A



Specification

Nominal size/body angle
80mm / 45°

Inlet connection
Flanged: 8 x 14mm holes equi-spaced on a 178mm PCD

Outlet connection
3" BSP spigot flange with cap

Properties
Highlift footvalve with integral butterfly valve

Materials
Seating area: Superseat (alloy 625)
Contact parts: 316 stainless steel
Footvalve main seal: Fortyt
Butterfly valve main seal: PTFE
Cap seal: PTFE

Alternatives are available, refer to the Design Options page

Design Conditions

Weight:	12.1 Kg
Design Pressure (MAWP):	4 Bar
Test Pressure:	6 Bar
Design Temperature Min:	-55°C
Design Temperature Max:	200°C

NOTE: The Design Conditions and Section View dimensions are for the specified part number only.

Approvals
BS EN14432
BS EN14433
Design Approval by Lloyds Register of Shipping

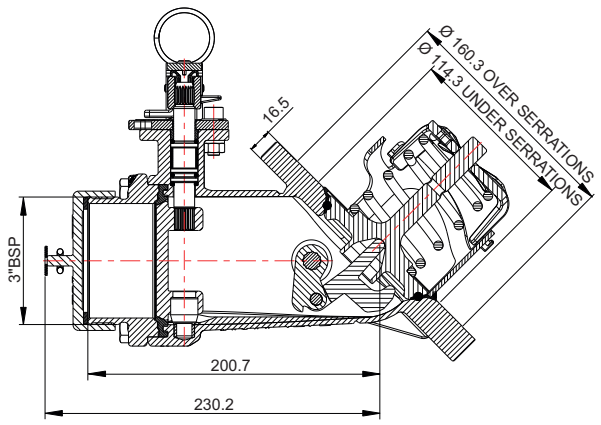
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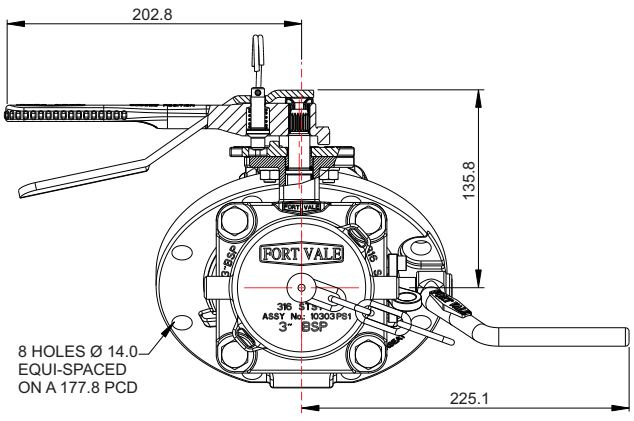
Description	Part No.
Standard specification	804/4000A
With alloy C276 seating area	804/4000AHS
Superseat; 3" camlock outlet & cap	804/4020A

Related Parts

Description	Part No.
Weld-in flange	324/9000
Stud kit	324/2070
CNAF/PTFE inlet gasket	5005-015
Valve operation decal	326/0302

Section View





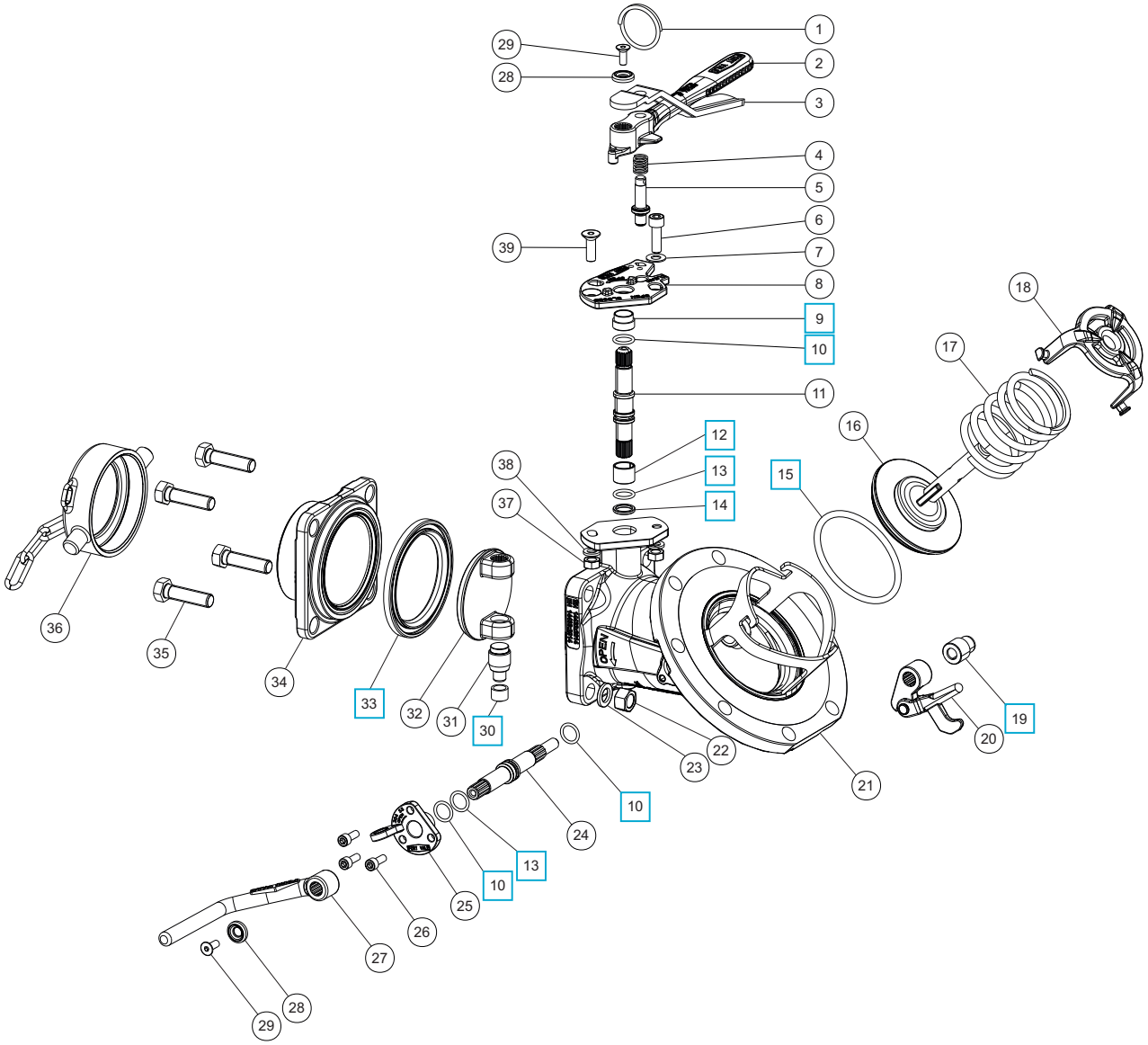
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3" 45° Univalve Bottom Discharge Assembly

Part No: 804/4000A

Parts Drawing



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3" 45° Univalve Bottom Discharge Assembly

Part No: 804/4000A

Parts List

Item	Description	Part No.	
1	Split ring	368/0011	
2	Butterfly valve handle	368/0057	
3	Handle lever	368/9837	
4	Handle location spring	368/0012	
5	Handle location pin	368/0010	
6	M8 cap screw	5111-148	
7	M8 plain washer	5113-005	
8	Stuffing clamp	368/0047	
9	Stuffing clamp bush	368/0301	☐
10	PTFE O ring (3)	20363	☐
11	Spindle	368/0201	
12	Split bearing	252/0517	☐
13	Viton O ring (2)	20361	☐
14	PTFE spindle seat	368/0009	☐
15	Fortyt O ring	5005-104	☐
16	Poppet	324/2020	
17	Closure spring	5104-971	
18	Spring top plate	290/6104	
19	PTFE crankshaft end bush	20362	☐
20	Crank block & lifting finger	821/0300	
21	Body assembly	826/1252B	
22	M12 full nut (4)	5112-006	
23	M12 spring washer (4)	5113-010	
24	Spindle	821/0010	
25	Stuffing clamp	324/1001	
26	M6 cap screw (3)	5111-017	
27	Footvalve handle	330/5010	
28	Retaining washer (2)	20370	
29	M6 bolt (2)	5111-030	
30	PTFE bottom bush	368/0035	☐
31	Bottom spindle	368/0036	
32	Closure plate	368/0400	
33	PTFE butterfly valve main seal	368/0002	☐
34	Outlet flange	368/5129	
35	M12 hex bolt (4)	5111-023	
36	3" BSP cap with chain & seal	10303PS1	
37	M8 full nut (2)	5112-001	
38	M8 spring washer (2)	5113-003	
39	M8 countersunk bolt	5111-085	

Seal Kit

Description	Part No.
All parts marked ☐ in the Parts List	804/40SK

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Function

A discharge butterfly valve is used to load and discharge cargo. It is usually a secondary closure valve that is installed onto a footvalve (primary closure valve) at the drain point of a tank. A butterfly valve can also be used as a primary closure valve on the top of a tank.

NOTE: Refer to a separate page for discharge butterfly valves dedicated to Road Tankers.

Design Options

The design options below are available on our standard range of discharge butterfly valves.

Clamped Body

Scrolled face, installed between two flanges



Flanged Body

4 or 6 hole drilling patterns

Dual-drilled hole patterns

Open slots



TW Drilled Body

Compatible with Tankwagen drilling pattern

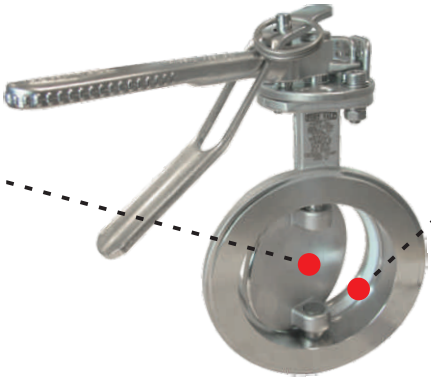


Nominal Bore

50mm (2")

80mm (3")

100mm (4")



Main Seal

PTFE

Special service conditions:
High-temperature compatible seals

Operation

Manually operated

Lockable handle

Left hand or right hand operation

Pneumatically actuated



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Design Options - continued

Valve Materials

316 stainless steel

Special service applications:
Lined wetted parts, e.g. PFA

Wetted parts in high nickel alloys, e.g. 904L stainless steel, Alloy C276



Special Cargoes

Solidifying cargo:
Body with steam-heating connections

Hemispherical closure plate



Related Parts

We recommend our range of compatible accessories:

- Flanges - inlet, adapter, outlet, blind
- Tertiary closures
- Fasteners
- Gaskets

Please contact us for more information about these parts.

Discharge Butterfly Valves for Dedicated Service

We offer a range of discharge butterfly valves suitable for these service conditions and special cargoes:

- Road Tankers
- Hygienic service

Please contact us for more information about these valves.

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3" Clamped Widdop Butterfly Valve

Part No: 368/7000B



Specification

Nominal size
80mm

Body type
Clamped

Properties
Left hand operated, handle with TIR and padlock slots

Materials
Contact parts: 316 stainless steel
Main seal: PTFE

Alternatives are available, refer to the Design Options page

Design Conditions

Weight:	3.5 Kg
Design Pressure (MAWP):	6 Bar
Test Pressure:	10.2 Bar
Design Temperature Min:	-40°C
Design Temperature Max:	200°C

NOTE: The Design Conditions and Section View dimensions are for the specified part number only.

Design Code
BS EN14432

Design Approvals
Lloyds Register of Shipping
Rijksdienst
SNCF
RMRS

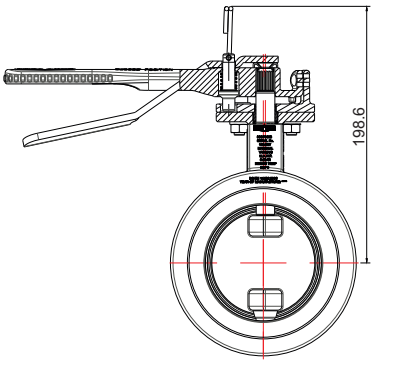
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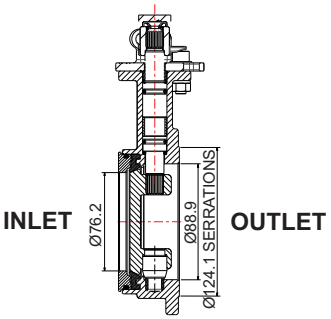
Description	Part No.
Standard specification	368/7000B
With hemi-spherical closure plate	368/9110B
Std. specification, right hand operated	368/4000A

Related Parts

Description	Part No.
CNAF/PTFE inlet gasket	5005-049
CNAF/PTFE outlet gasket	5005-490
CNAF/PTFE 4 hole square inlet gasket	5005-198
CNAF/PTFE 4 hole square outlet gasket	5005-195
Bolting kit	368/1100
3" BSP outlet flange	SP368/8047
3" BSP blank cap with PTFE seal	10303PS
3" camlock outlet flange	368/8058
3" camlock blank cap	90/DC300
DIN80 mating flange	294/0081

Section View





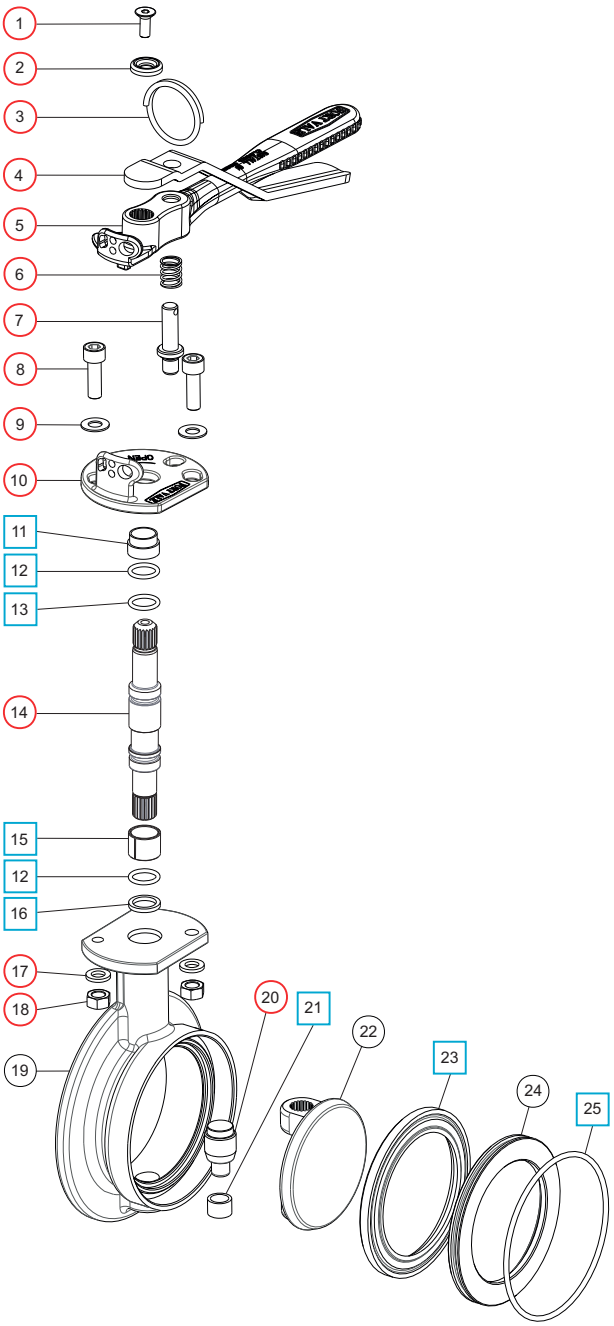
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3" Clamped Widdop Butterfly Valve

Part No: 368/7000B

Parts Drawing



Parts List

Item	Description	Part No.	
1	M6 set screw	5111-030	○
2	Washer	20370	○
3	Split ring	368/0011	○
4	Operating lever	368/9837	○
5	Handle	368/0050	○
6	Handle location spring	368/0012	○
7	Handle location pin	368/0010	○
8	M8 cap screw (2)	5111-148	○
9	M8 plain washer (2)	5113-005	○
10	Stuffing clamp	368/0040	○
11	PTFE stuffing clamp bush	368/0301	□ ○
12	PTFE O ring (2)	20363	□ ○
13	Viton O ring	20361	□ ○
14	Spindle ***Note**	368/0200	○
15	Split bearing	252/0517	□ ○
16	PTFE spindle seat	368/0009	□ ○
17	M8 spring washer (2)	5113-003	○
18	M8 full nut (2)	5112-001	○
19	Body	368/0150	
20	Bottom spindle	368/0036	○
21	PTFE bottom bush	368/0035	□ ○
22	Closure plate	368/0400	
23	PTFE main seal	368/0002	□ ○
24	Seal clamp plate	368/0045	
25	Nitrile O ring	5005-342	□ ○

NOTE: We can supply the spindle with the seals installed. Part no. **368/0200S** includes item 11 thru 16.

Seal Kit

Description	Part No.
All parts marked □ in the Parts List	368/00SK

Repair Kit

Description	Part No.
All parts marked ○ in the Parts List, includes 368/0200S (see **NOTE**)	368/00RKA

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3" Clamped Widdop Butterfly Valve - High Temperature

Part No: 368/71HTB



Specification

Nominal size
80mm

Body type
Clamped

Properties
Left hand operated, handle with TIR and padlock slots

Materials
Contact parts: 316 stainless steel
Main seal: Flextyt

Alternatives are available, refer to the Design Options page

Design Conditions

Weight:	3.7 Kg
Design Pressure (MAWP):	6.9 Bar
Test Pressure:	10.35 Bar
Design Temperature Min:	-40°C
Design Temperature Max:	260°C ***Note**

NOTE: The maximum design temperature may be decreased by the maximum working temperature of the inlet/outlet gaskets. Design Conditions and Section View dimensions are for the specified part number only.

Design Code
BS EN14432

Design Approvals
Lloyds Register of Shipping
Rijksdienst
SNCF
RMRS

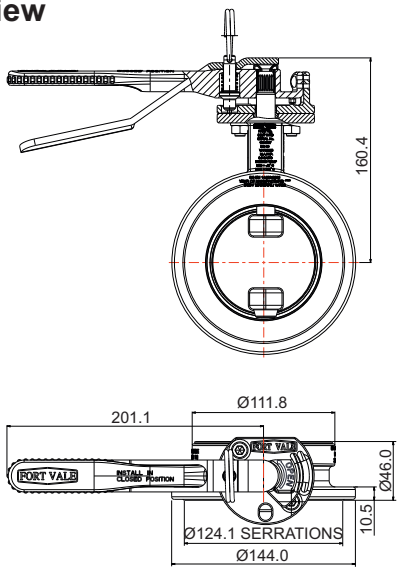
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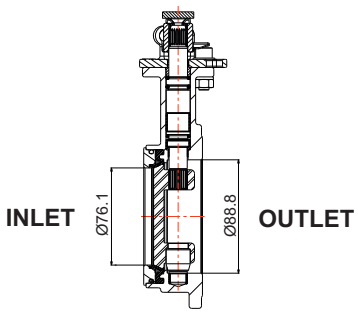
Description	Part No.
Standard specification	368/71HTB
With hemi-spherical closure plate	368/91HTB

Related Parts

Description	Part No.
CNAF/PTFE inlet gasket	5005-049HT
CNAF/PTFE outlet gasket	5005-490HT
CNAF/PTFE 4 hole square inlet gasket	5005-198HT
CNAF/PTFE 4 hole square outlet gasket	5005-195HT
Bolting kit	368/1100
3" BSP outlet flange	368/8047
3" BSP blank cap with PTFE seal	10303PS
3" camlock outlet flange	368/8058
3" camlock blank cap	90/DC300
3" NPT outlet flange	368/8049
3" NPT blank cap with PTFE washer	425/3250

Section View





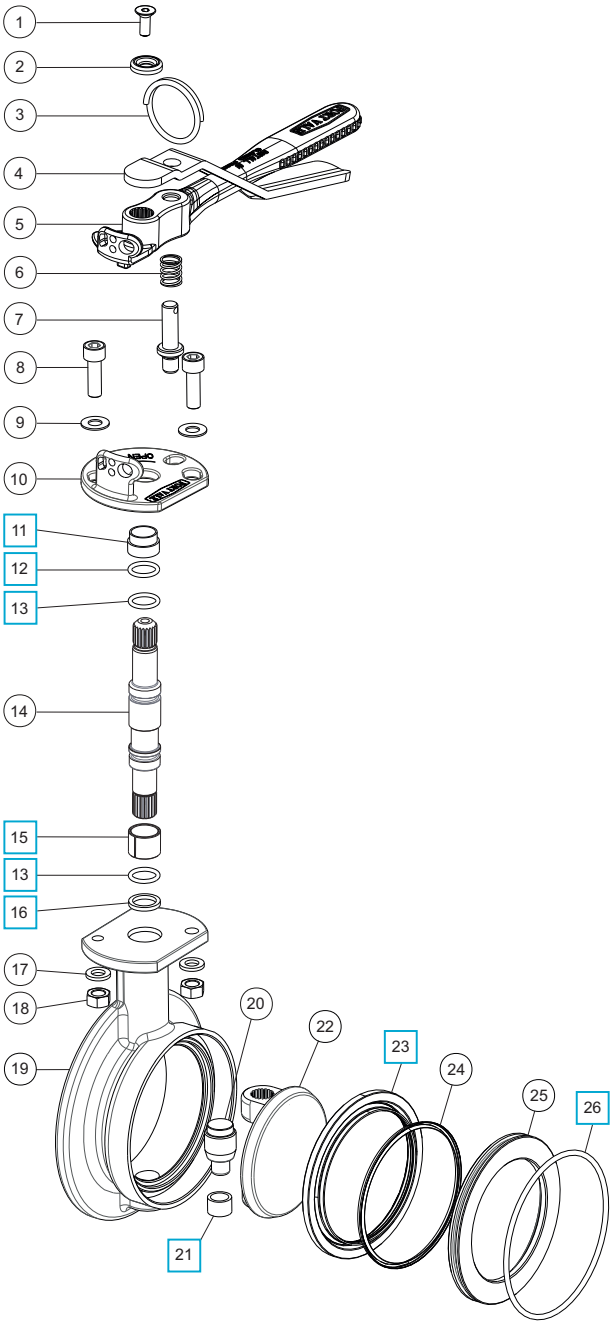
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3" Clamped Widdop Butterfly Valve - High Temperature

Part No: 368/71HTB

Parts Drawing



Parts List

Item	Description	Part No.	
1	M6 set screw	5111-030	
2	Washer	20370	
3	Split ring	368/0011	
4	Operating lever	368/9837	
5	Handle	368/0050	
6	Handle location spring	368/0012	
7	Handle location pin	368/0010	
8	M8 cap screw (2)	5111-148	
9	M8 plain washer (2)	5113-005	
10	Stuffing clamp	368/0040	
11	PTFE stuffing clamp bush	368/0301	☐
12	RTFE O ring	20363HT	☐
13	Perfluoroelastomer O ring (2)	5005-586	☐
14	Spindle	368/0205	
15	RTFE spindle bearing	368/0039	☐
16	RTFE spindle seat	368/0009HT/1	☐
17	M8 spring washer (2)	5113-003	
18	M8 full nut (2)	5112-001	
19	Body	368/0150	
20	Bottom spindle	368/0038	
21	RTFE bottom bush	368/0037	☐
22	Closure plate	368/0400	
23	RTFE main seal	368/0002HT/5	☐
24	Seal spring	368/0031	
25	Seal clamp plate	368/0033	
26	Silicone O ring	5005-342S	☐

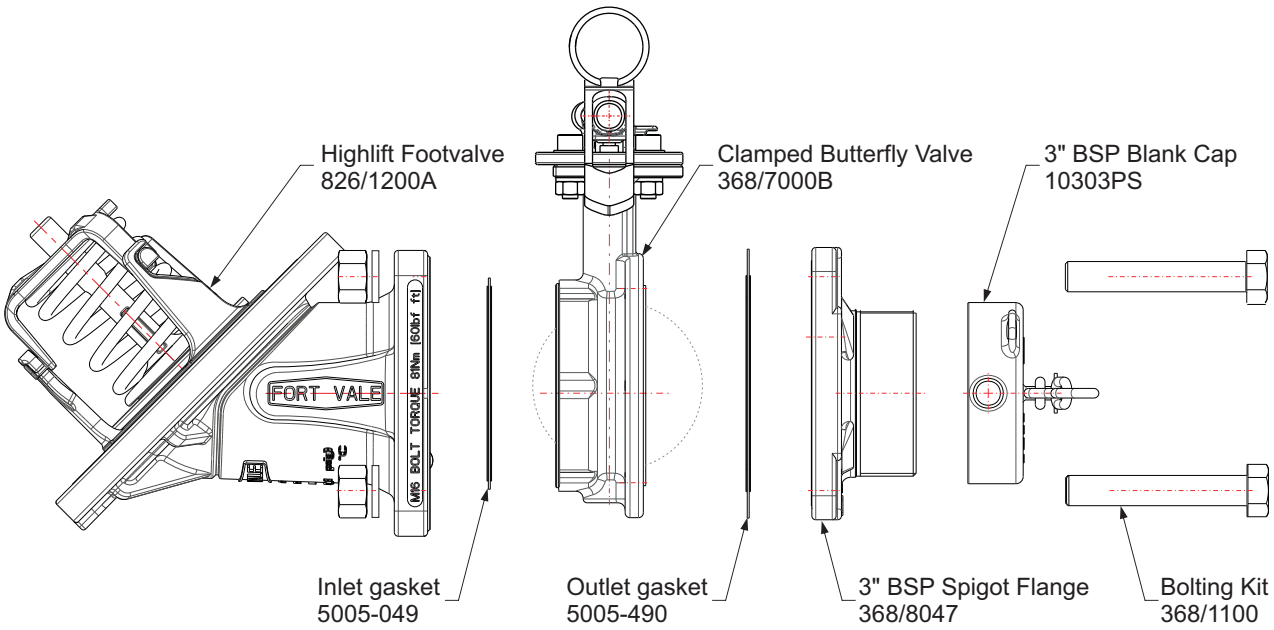
Seal Kit

Description	Part No.
All parts marked ☐ in the Parts List	368/71SKB

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Example: 3" 3-Closure Bottom Discharge Assembly



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Discharge Ball Valves

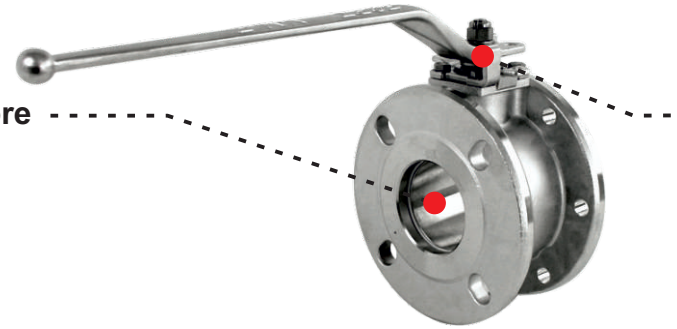
Design Options

Function

A discharge ball valve is used to load and discharge cargo. It is usually a secondary closure valve that is installed onto a footvalve (primary closure valve) at the drain point of a tank. A ball valve can also be used as a primary closure valve on the top of a tank.

Design Options

The design options below are available on our standard range of discharge ball valves.



Nominal Bore

50mm (2")

80mm (3")

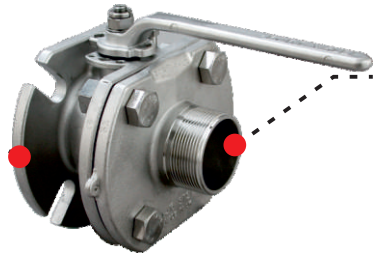
100mm (4")

Operation

Manually operated: A range of handles is available

Left hand, right hand, ambidextrous

Pneumatically actuated



Inlet Flange

4, 6 and 8 holes/slots drilling patterns

Flats milled top and bottom

Outlet

Threaded spigot flange

Flush fit

Bobbin flange with a range of drilling patterns

Flats milled top and bottom

Camlock



Valve Materials

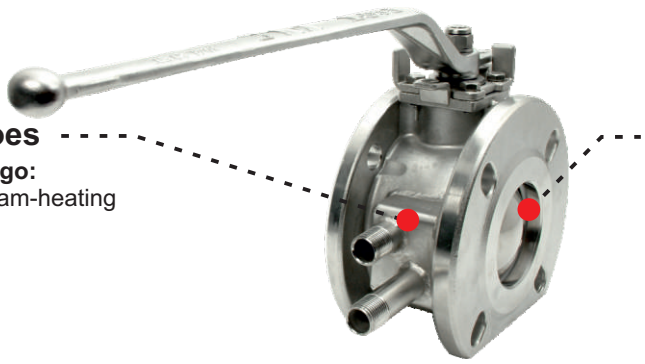
316 stainless steel

Special service conditions:
High nickel alloys
Lined wetted parts, e.g. PFA

Finish

Electropolished

Special service conditions:
Corrosion-resistant paint on external surfaces to prevent damage from corrosive cargo vapour/splash



Special Cargoes

For solidifying cargo:
Valve body with steam-heating chamber

Main Seal

PTFE

Special service conditions:
High-temperature compatible seals

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Related Parts

We recommend our range of compatible accessories:

- Flanges - mating, adapter, blind, weld-in, syphon
- Tertiary closures
- Fasteners
- Gaskets

Please contact us for more information about these parts.

Discharge Ball Valves for Dedicated Service

We offer a range of discharge ball valves suitable for these service conditions and special cargoes:

- T50 tank containers for liquefied gas
- Rail wagons
- Hydrogen peroxide
- Firesafe/lethal service

Please contact us for more information about these valves.

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DN40 Ball Valve with Inlet Seal Clamp

Part No: 370/2160X/XX



Specification

Nominal size
DN40

Tank connection
Flanged: a selection is available - Refer to Table 2 on the next page

Outlet/process connection
Flanged: a selection is available - Refer to Table 3 on the next page

Options
Left or right hand operation

Materials
Contact parts: 316 stainless steel
Main seal: PTFE

Alternatives are available, refer to the Design Options page

Design Conditions

Weight:	4.75 Kg
Design Pressure (MAWP):	11 Bar
Test Pressure:	20.2 Bar
Design Temperature Min:	-40°C
Design Temperature Max:	205°C

NOTE: The Design Conditions and Section View dimensions are for the specified part number only.

Design Codes
BS EN 14432

Range

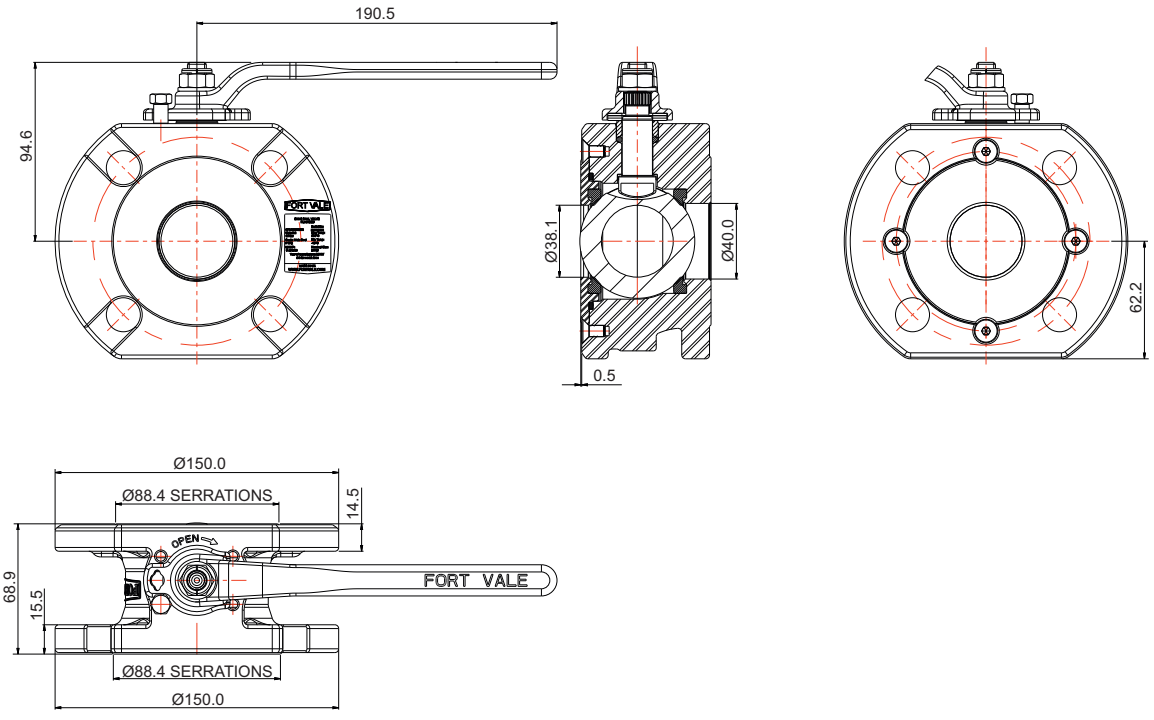
Description	Part No.
Left hand operated ***Note**	370/2160L/XX
Right hand operated ***Note**	370/2160R/XX

NOTE: The specification changes the Part No. Refer to the next page

Related Parts

Please refer to Fort Vale for Related Parts.

Section View



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Part Number Code: 370/2160X / X X

Valve Operation
Refer to Table 1

Inlet Flange Drilling
Refer to Table 2

Outlet Flange Drilling
Refer to Table 3

Table 1: Valve Operation

Description	Part No.
Left hand operated	370/2160L/XX
Right hand operated	370/2160R/XX

Table 2: Inlet Flange Drilling

Inlet Holes	Hole Ø (mm)	Hole PCD (mm)	Code
4 holes	18	110.0	A
4 slots	18 wide	110.0 to 125.0	B
4 holes	18	110.0	C

Refer to Figure 1 on the next page for more information.

Table 3: Outlet Flange Drilling

Outlet Holes	Hole Ø (mm)	Hole PCD (mm)	Code
4 open slots	18 wide	110.0 to O/D	A
4 holes	M16	110.0	B
4 slots	18 wide	98.5 to 125.0	C
4 holes	M16	110.0	D
4 slots	18 wide	110.0 to 125.0	E
4 holes	18	110.0	F
4 slots	17 wide	98.5 to 110.0	G
4 holes and 4 slots	M16 and 18 wide	110.0 and 98.5 to 125.0	H

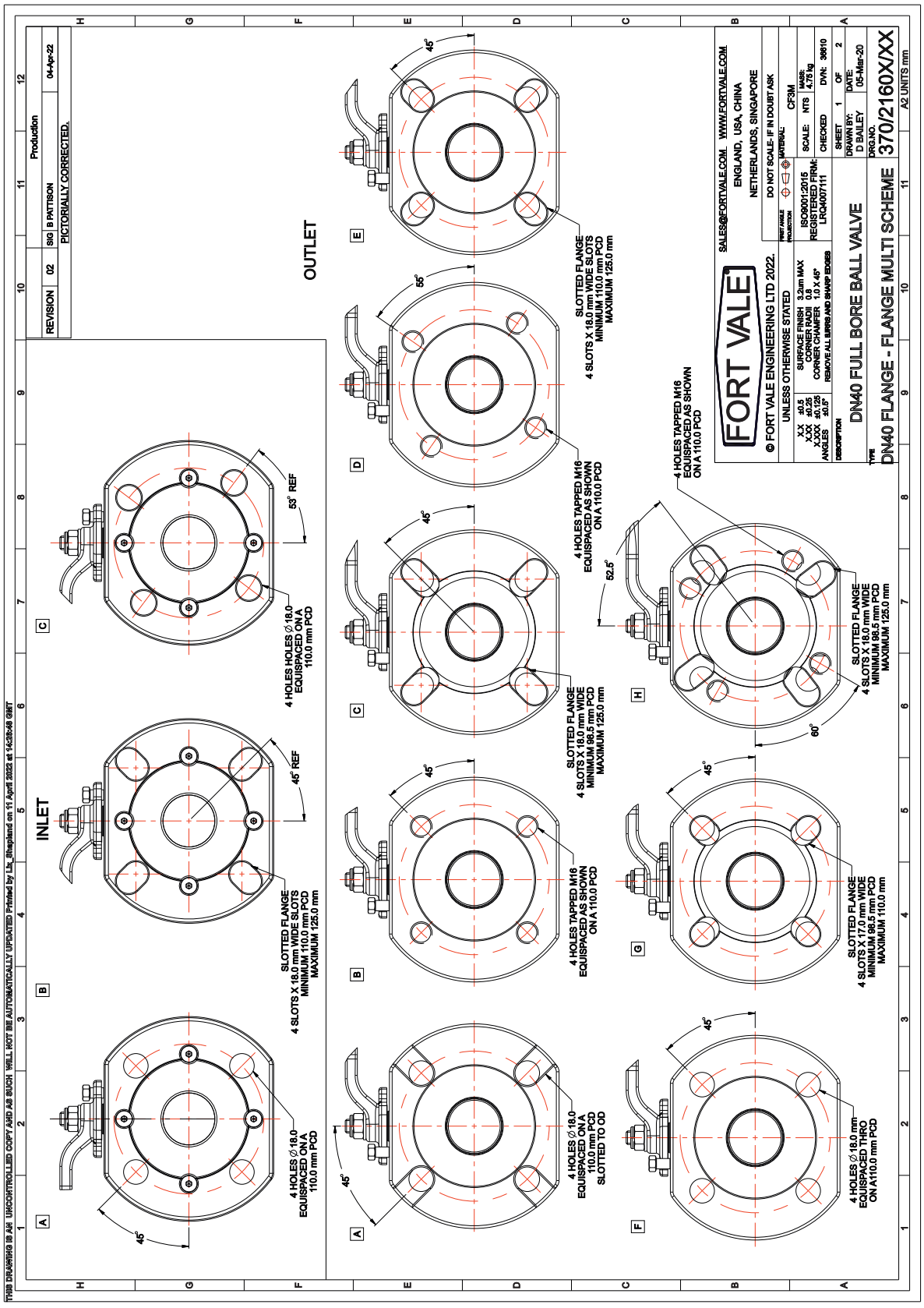
Refer to Figure 1 on the next page for more information.

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Figure 1

Uncontrolled Copy of Drawing 370/2160X/XX - Inlet/Outlet Flange Information



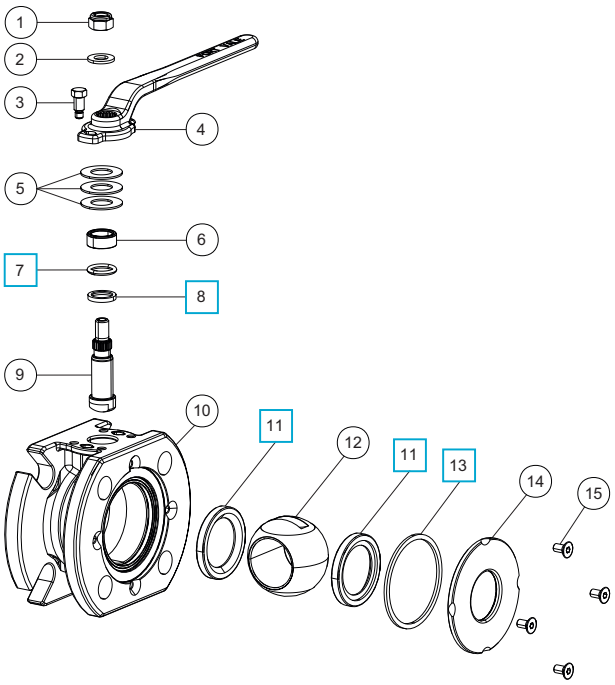
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DN40 Ball Valve with Inlet Seal Clamp

Part No: 370/2160X/XX

Parts Drawing



Parts List

Item	Description	Part No.	
1	M10 self-lock nut	5112-008	
2	M10 washer	5113-009	
3	Stop pin	370/0107	
4	Handle	370/0125	
5	Belleville washer (3)	5113-038	
6	Stuffing collar	370/0103	
7	PTFE O ring	5005-688	☐
8	Bottom bearing	370/0104	☐
9	Spindle	370/2112	
10	Body ***Note**	370/2101XX	
11	PTFE main seal (2)	370/2102	☐
12	Ball	370/2104	
13	Body seal	370/2109	☐
14	Seal carrier clamp	370/2161	
15	6mm countersunk bolt (4)	5111-018	

NOTE: The specification changes the Part No.

Seal Kit

Description	Part No.
All parts marked ☐ in the Parts List	370/21SK

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DN50 Ball Valve with Inlet Seal Clamp

Part No: 370/0760X/XX



Specification

Nominal size
DN50

Tank connection
Flanged: a selection is available - Refer to Table 2 on the next page

Outlet/process connection
Flanged: a selection is available - Refer to Table 3 on the next page

Options
Left or right hand operation

Materials
Contact parts: 316 stainless steel
Main seal: PTFE

Alternatives are available, refer to the Design Options page

Design Conditions

Weight:	5.74 Kg
Design Pressure (MAWP):	11 Bar
Test Pressure:	20.2 Bar
Design Temperature Min:	-40°C
Design Temperature Max:	205°C

NOTE: The Design Conditions and Section View dimensions are for the specified part number only.

Design Codes
BS EN 14432

Range

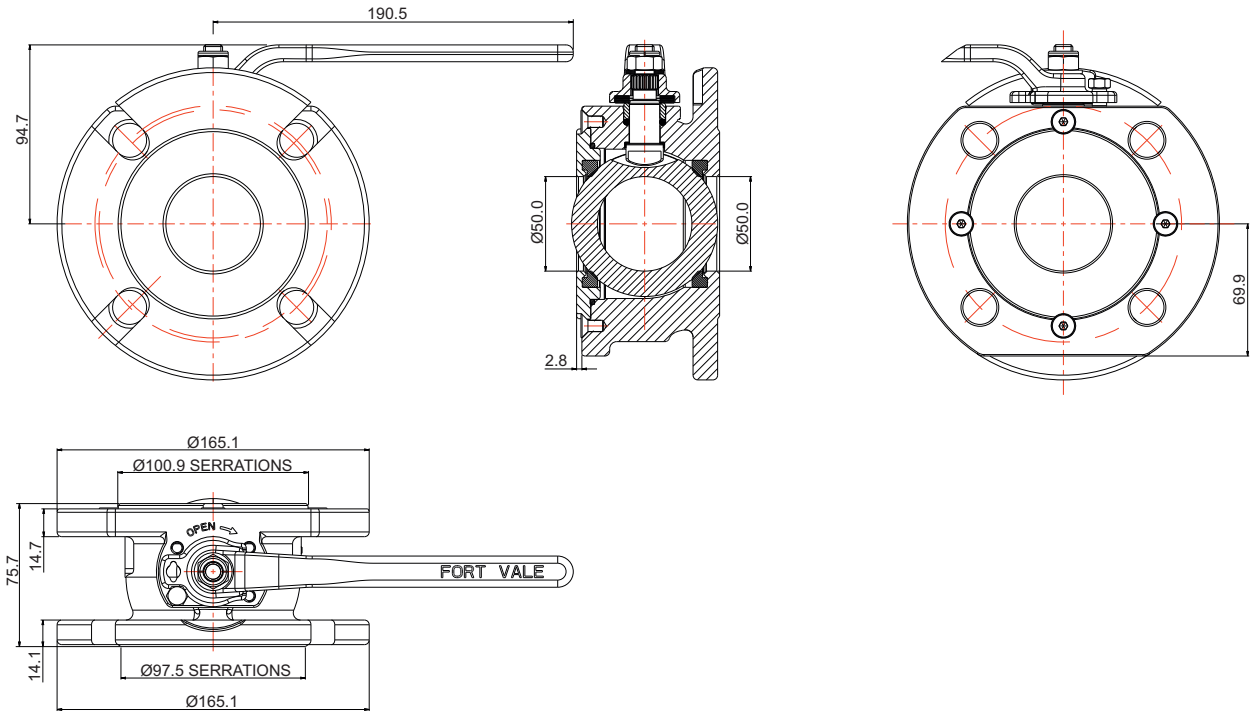
Description	Part No.
Left hand operated	370/0760L/XX
Right hand operated	370/0760R/XX

NOTE: The specification changes the Part No. Refer to the next page

Related Parts

Please refer to Fort Vale for Related Parts.

Section View



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Part Number Code: 370/0760X / X X

Valve Operation
Refer to Table 1

Inlet Flange Drilling
Refer to Table 2

Outlet Flange Drilling
Refer to Table 3

Table 1: Valve Operation

Description	Part No.
Left hand operated	370/0760L/XX
Right hand operated	370/0760R/XX

Table 2: Inlet Flange Drilling

Inlet Holes	Hole Ø (mm)	Hole PCD (mm)	Code
4 holes	18	125.0	A
4 slots	17.8 wide	120.7 to 125.0	B

Refer to Figure 1 on the next page for more information.

Table 3: Outlet Flange Drilling

Outlet Holes	Hole Ø (mm)	Hole PCD (mm)	Code
4 open slots	17.8 wide	120.7 to O/D	A
4 open slots	17.8 wide	114.3 to O/D	B
4 holes	18	125.0	C
4 holes	M16	125.0	D
4 holes	M16	120.7	E
4 holes	M16	120.7	F
4 holes	M16	120.7	G
4 holes and 4 slots	M16 17.5 wide	125.0 120.4 to 125.0	H
4 slots	17.5 wide	120.4 to 125.0	I

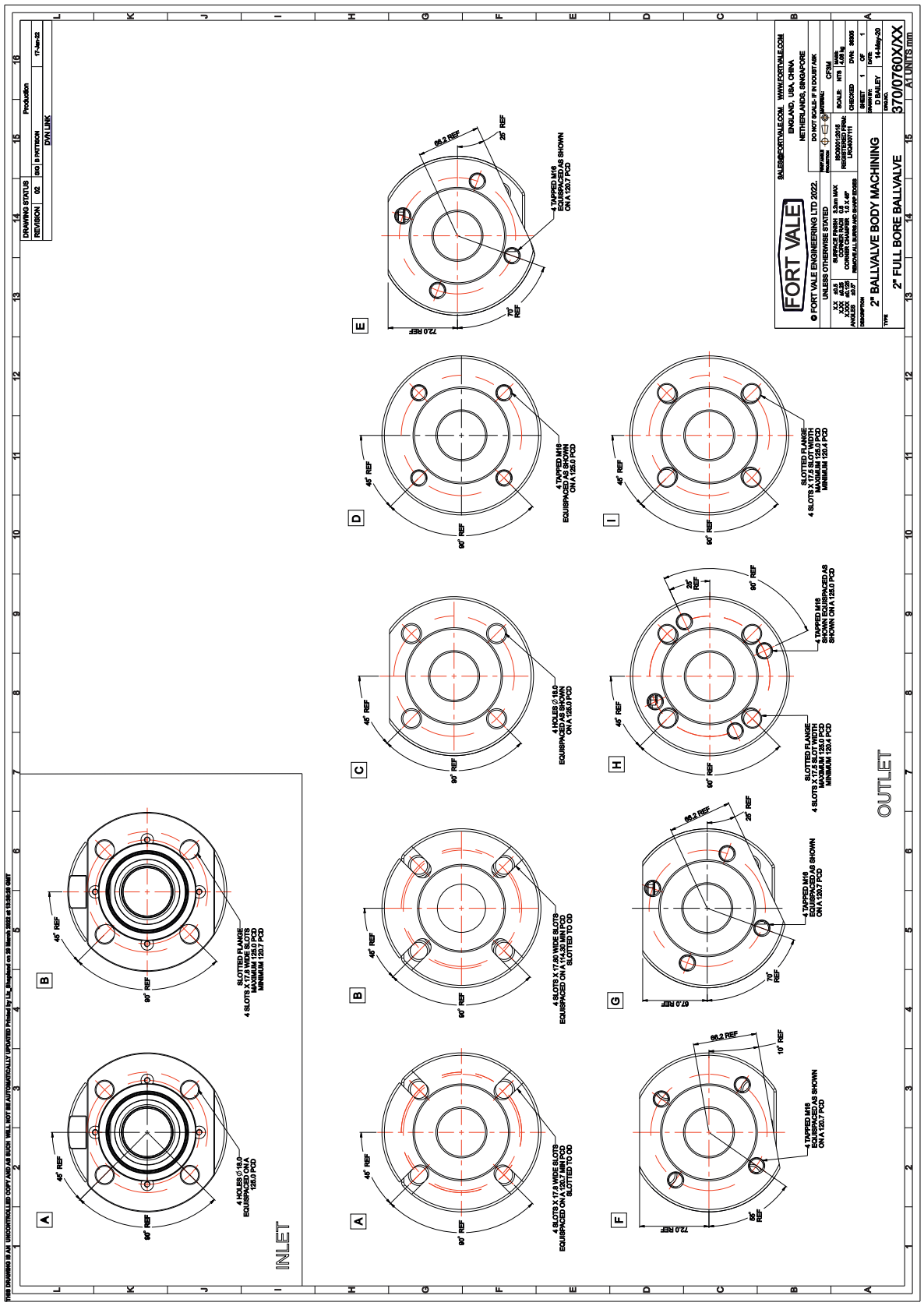
Refer to Figure 1 on the next page for more information.

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Figure 1

Uncontrolled Copy of Drawing 370/0760X/XX - Inlet/Outlet Flange Information



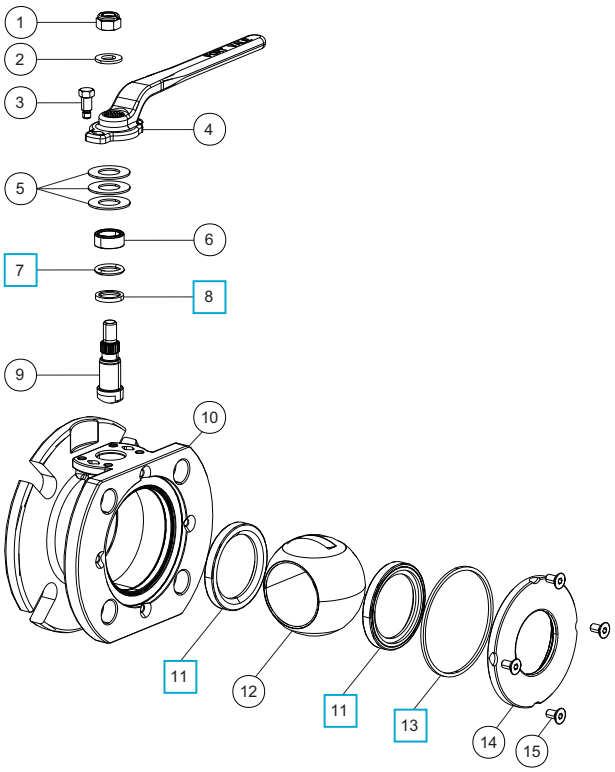
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DN50 Ball Valve with Inlet Seal Clamp

Part No: 370/0760X/XX

Parts Drawing



Parts List

Item	Description	Part No.	
1	M10 self-lock nut	5112-008	
2	M10 washer	5113-009	
3	Stop pin	370/0107	
4	Handle	370/0125	
5	Belleville washer (3)	5113-038	
6	Stuffing collar	370/0103	
7	PTFE O ring	5005-688	☐
8	Bottom bearing	370/0104	☐
9	Spindle	370/0120	
10	Body ***Note**	370/N761XX	
11	PTFE main seal (2)	370/0102	☐
12	Ball	370/3301	
13	Body seal	370/0106	☐
14	Seal carrier clamp	370/0762	
15	6mm countersunk bolt (4)	5111-018	

NOTE: The specification changes the Part No.

Seal Kit

Description	Part No.
All parts marked ☐ in the Parts List	370/015SK

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DN80 Ball Valve with Inlet Seal Clamp

Part No: 360/6100X/XX



Part No. 360/6100X/BB shown

Specification

Nominal size
DN80

Tank connection
Flanged: a selection is available - Refer to Table 2 on the next page

Outlet/process connection
Flanged: a selection is available - Refer to Table 3 on the next page

Options
Left or right hand operation

Materials
Contact parts: 316 stainless steel
Main seal: PTFE

Alternatives are available, refer to the Design Options page

Design Conditions

Weight:	13.6 Kg
Design Pressure (MAWP):	7 Bar
Test Pressure:	12.9 Bar
Design Temperature Min:	-40°C
Design Temperature Max:	200°C

NOTE: The Design Conditions and Section View dimensions are for the specified part number only.

Design Code
BS EN 14432

Range

Description	Part No.
Left hand operated ***Note**	360/6100L/XX
Right hand operated ***Note**	360/6100R/XX

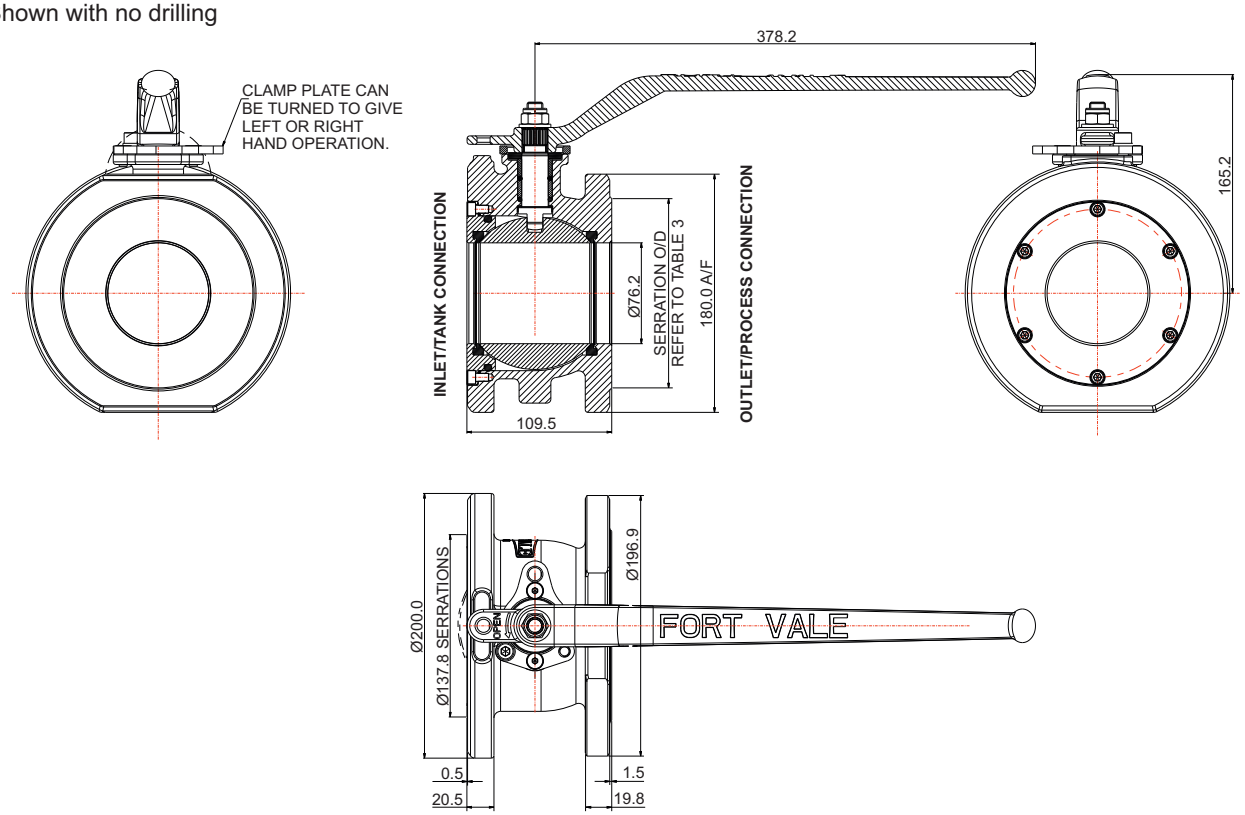
NOTE: The specification changes the Part No. Refer to the next page

Related Parts

Please refer to Fort Vale for Related Parts.

Section View

Shown with no drilling



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Part Number Code: 360/6100X / X X

Valve Operation
Refer to Table 1

Inlet Flange Drilling
Refer to Table 2

Outlet Flange Drilling
Refer to Table 3

Table 1: Valve Operation

Description	Part No.
Left hand operated	360/6100L/XX
Right hand operated	360/6100R/XX

Table 2: Inlet Flange Drilling

Inlet Holes	Hole Ø (mm)	Hole PCD (mm)	Code
0 holes	N/A	N/A	0
6 holes	14	168.3	A
8 holes	18	160.0	B
4 holes	17	160.0	C
8 slots	18 wide	159.0 to 168.0	D
4 holes and 6 holes	18 14	160.0 168.3	E

Refer to Figure 1 on the next page for more information.

Table 3: Outlet Flange Drilling

Outlet Holes	Hole Ø (mm)	Hole PCD (mm)	Serrations O/D (mm)	Code
0 holes	N/A	N/A	143.0	0
4 open slots	18 wide	160.0 to O/D	138.0	A
8 holes	18	160.0	138.0	B
8 slots	18 wide	152.4 to 160.0	130.0	C
4 holes and 4 holes	18 M16	160.0 160.0	143.0	D
4 slots	18 wide	146.0 to 160.0	127.0	E
4 holes and 4 holes	18 M16	160.0 160.0	143.0	F
8 holes and 4 holes	18 18	160.0 152.4	130.0	G
8 holes	M16	160.0	143.0	H
4 holes and 4 holes	18 18	160 152.4	127.0	I
4 slots and 4 holes	18 wide M16	146.0 to 160.0 160.0	127.0	J

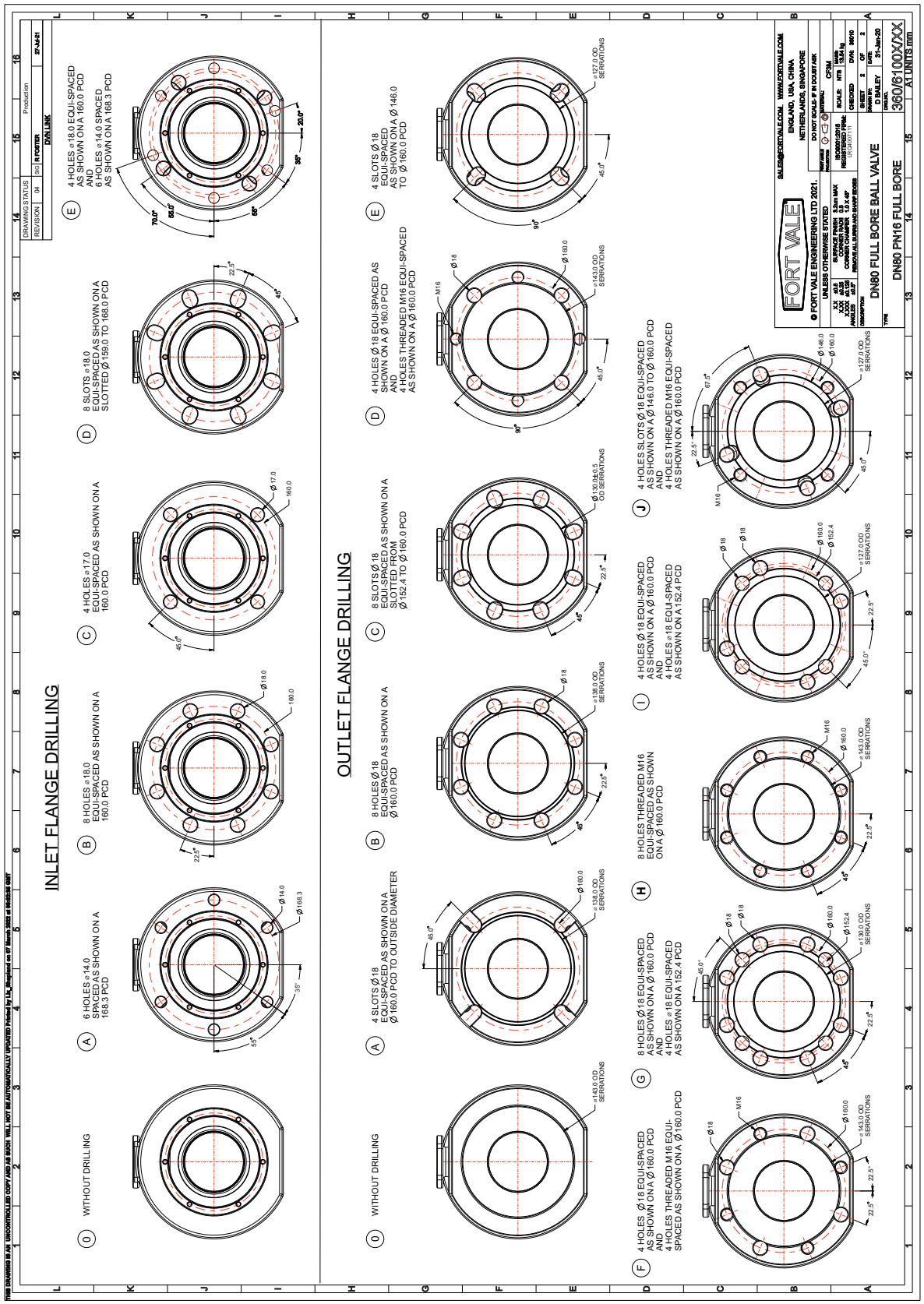
Refer to Figure 1 on the next page for more information.

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Figure 1

Uncontrolled Copy of Drawing 360/6100X/XX - Inlet/Outlet Flange Information



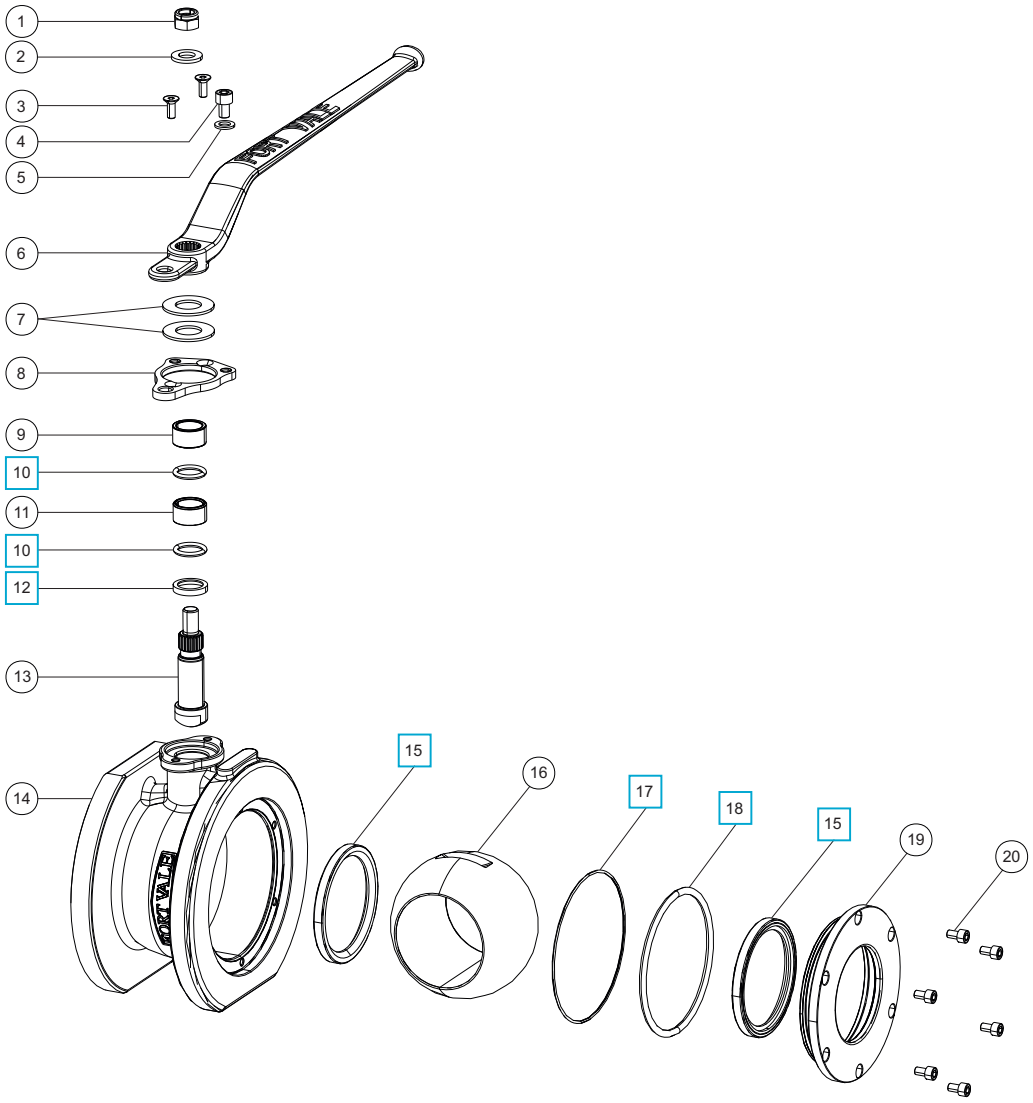
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DN80 Ball Valve with Inlet Seal Clamp

Part No: 360/6100X/XX

Parts Drawing



Parts List

Item	Description	Part No.	
1	M12 self-lock nut	5112-007	
2	M12 washer	5123-003	
3	M6 countersunk bolt (2)	5111-030	
4	M8 cap screw	5111-215	
5	M8 spring washer	5113-003	
6	Handle	360/3416	
7	Belleville washer (2)	5113-041	
8	Stop plate	360/6111	
9	Top stuffing collar	360/3412	
10	PTFE O ring (2)	5005-113	☐
11	Bottom stuffing collar	360/3413	
12	Bottom bearing	360/3421	☐
13	Spindle	360/3422	
14	Body ***Note**	360/6110/XX	
15	PTFE main seal (2)	360/3402	☐
16	Ball	360/3401	

Parts List

Item	Description	Part No.	
17	PTFE O ring	ORB544P0	☐
18	Fortyt O ring	ORB347F0	☐
19	Seal carrier clamp	360/6105	
20	M6 cap screw (6)	5111-061	

NOTE: The specification changes the Part No.

Seal Kit

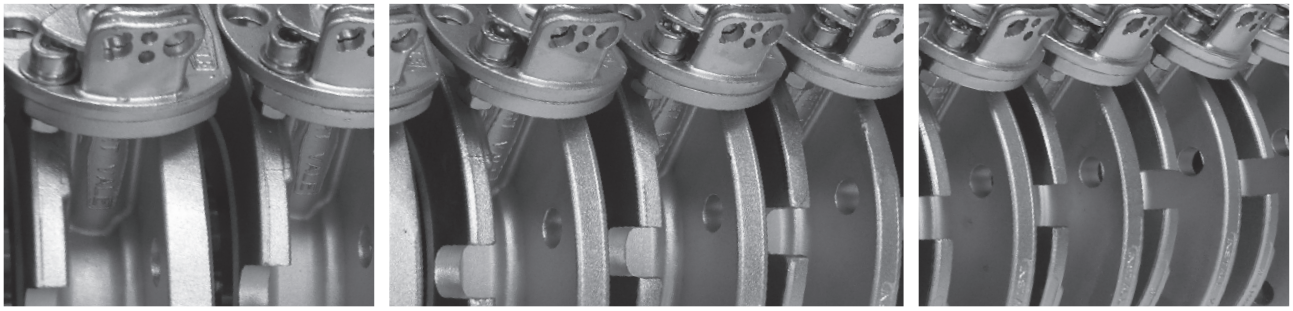
Description	Part No.
All parts marked ☐ in the Parts List	360/61SK

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Top Discharge Provision



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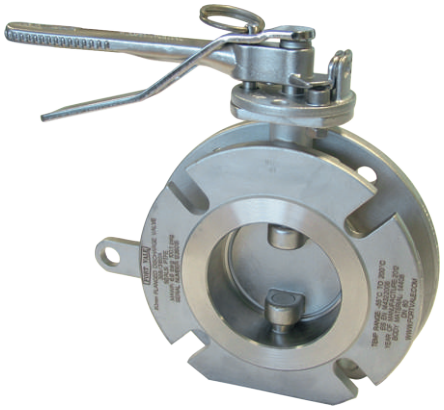
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3" Flanged Widdop Butterfly Valve

Part No: 368/3160A



Specification

Nominal size
80mm

Tank connection
Flanged: 6 x 14mm holes on a 168mm PCD

Outlet/Process connection
Flanged: 4 x open slots on a 146mm minimum PCD

Properties
Left hand operated, handle with TIR and padlock slots

Materials
Contact parts: 316 stainless steel
Main seal: PTFE

Alternatives are available, refer to the Design Options page

Design Conditions

Weight:	7.0 Kg
Design Pressure (MAWP):	6.9 Bar
Test Pressure:	12.6 Bar
Design Temperature Min:	-55°C
Design Temperature Max:	200°C

NOTE: The Design Conditions and Section View dimensions are for the specified part number only.

Design Code
BS EN14432

Design Approvals
Lloyds Register of Shipping
Rijksdienst
SNCF
RMRS

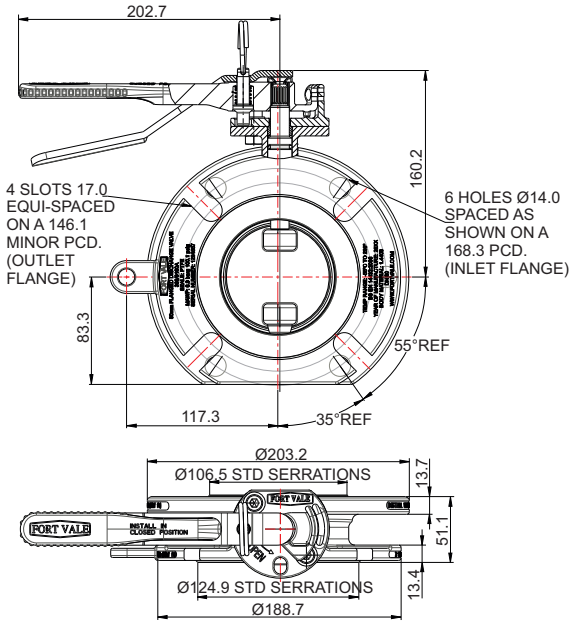
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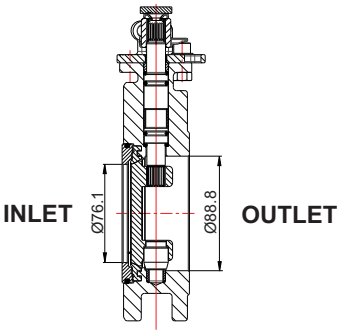
Description	Part No.
Standard specification	368/3160A
Inlet flange dual drilled: 4 hole/4 hole	368/3180A
Inlet flange dual drilled: 6 hole/4 hole	368/3280A

Related Parts

Description	Part No.
Tank weld-in flange	368/0800
CNAF/PTFE syphon tube inlet gasket	5005-222
Syphon tube	368/0810
Stud kit	312/1000
CNAF/PTFE inlet gasket	5005-169
Solid PTFE outlet gasket	5005-417
Dished blind flange	312/0022CM
Pivot pin for blind flange	368/7506

Section View





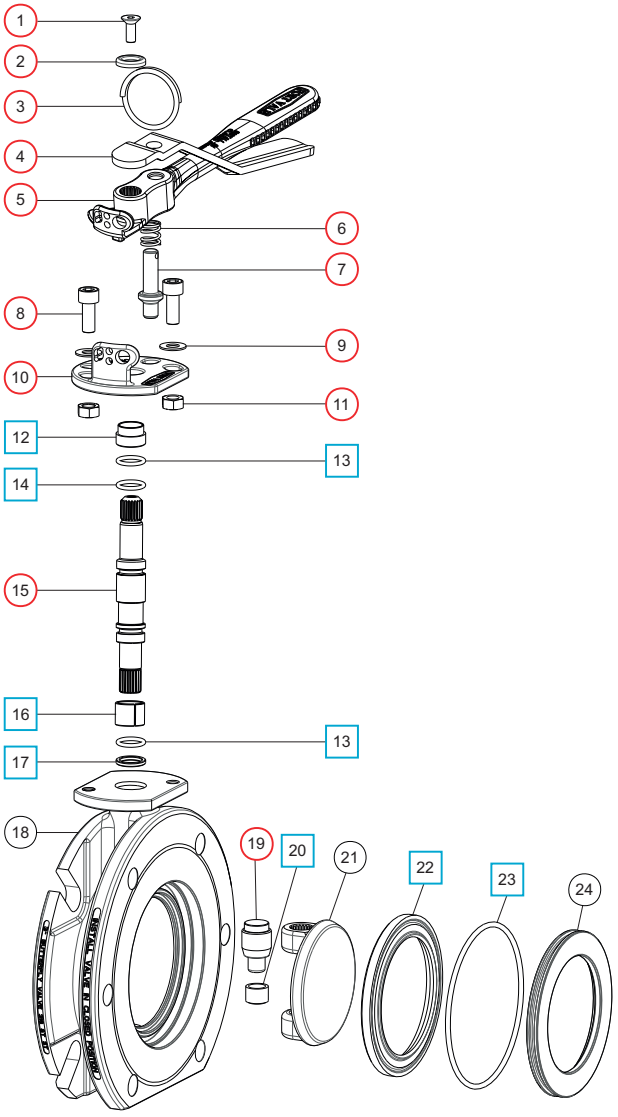
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3" Flanged Widdop Butterfly Valve

Part No: 368/3160A

Parts Drawing



Parts List

Item	Description	Part No.	
1	M6 set screw	5111-030	○
2	Washer	20370	○
3	Split ring	368/0011	○
4	Operating lever	368/9837	○
5	Handle	368/0050	○
6	Handle location spring	368/0012	○
7	Handle location pin	368/0010	○
8	M8 cap screw (2)	5111-255	○
9	M8 plain washer (2)	5113-005	○
10	Stuffing clamp	368/0040	○
11	M8 full nut (2)	5112-001	○
12	PTFE stuffing clamp bush	368/0301	□ ○
13	PTFE O ring (2)	20363	□ ○
14	Viton O ring	20361	□ ○
15	Spindle	368/0200	○
16	Split bearing	252/0517	□ ○
17	PTFE spindle seat	368/0009	□ ○
18	Body	368/9141	
19	Bottom spindle	368/0036	○
20	PTFE bottom bush	368/0035	□ ○
21	Closure plate	368/0400	
22	PTFE main seal	368/0002	□ ○
23	Nitrile O ring	5005-342	□ ○
24	Seal clamp plate	368/9148	

Seal Kit

Description	Part No.
All parts marked □ in the Parts List	368/00SK

Repair Kit

Description	Part No.
All parts marked ○ in the Parts List	368/316RKA

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3" Flanged Widdop Butterfly Valve - Dual Drilled Inlet

Part No: 368/3280A



Specification

Nominal size
80mm

Tank connection
Dual-drilled flange: 6 x 14mm holes on a 168.3mm PCD & 4 x 18mm holes on a 160mm PCD

Outlet/Process connection
Flanged: 4 x open slots on a 146mm minimum PCD

Properties
Left hand operated, handle with TIR and padlock slots

Materials
Contact parts: 316 stainless steel
Main seal: PTFE

Alternatives are available, refer to the Design Options page

Design Conditions

Weight:	6.9 Kg
Design Pressure (MAWP):	6.9 Bar
Test Pressure:	10.35 Bar
Design Temperature Min:	-40°C
Design Temperature Max:	200°C

NOTE: The Design Conditions and Section View dimensions are for the specified part number only.

Design Code
BS EN14432

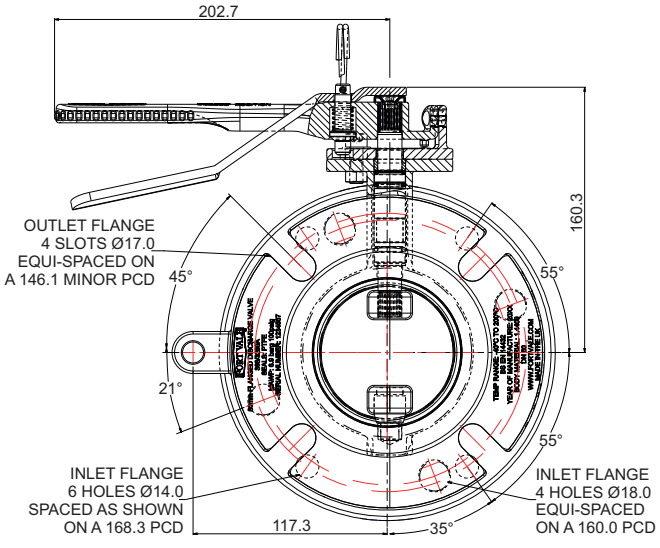
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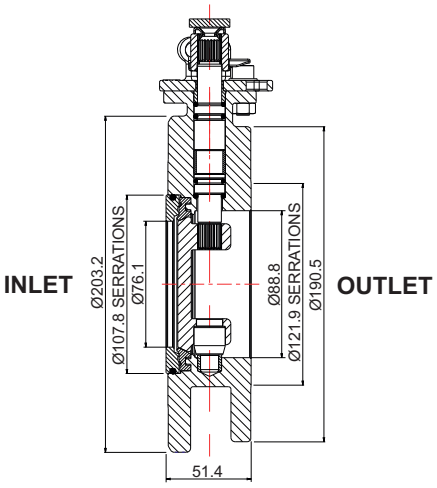
Description	Part No.
Inlet flange dual drilled: 6 hole/4 hole	368/3280A
Inlet flange dual drilled: 4 hole/4 hole	368/3180A
Inlet flange with flat, drilled 6 holes	368/3160A

Related Parts

Description	Part No.
CNAF/PTFE dual drilled inlet gasket	5005-770
CNAF/PTFE 6 hole inlet gasket	5005-222
CNAF/PTFE 4 hole inlet gasket	5005-034
Solid PTFE outlet gasket	5005-417
Dished blind flange	312/0022CM
Pivot pin for blind flange	368/7506

Section View





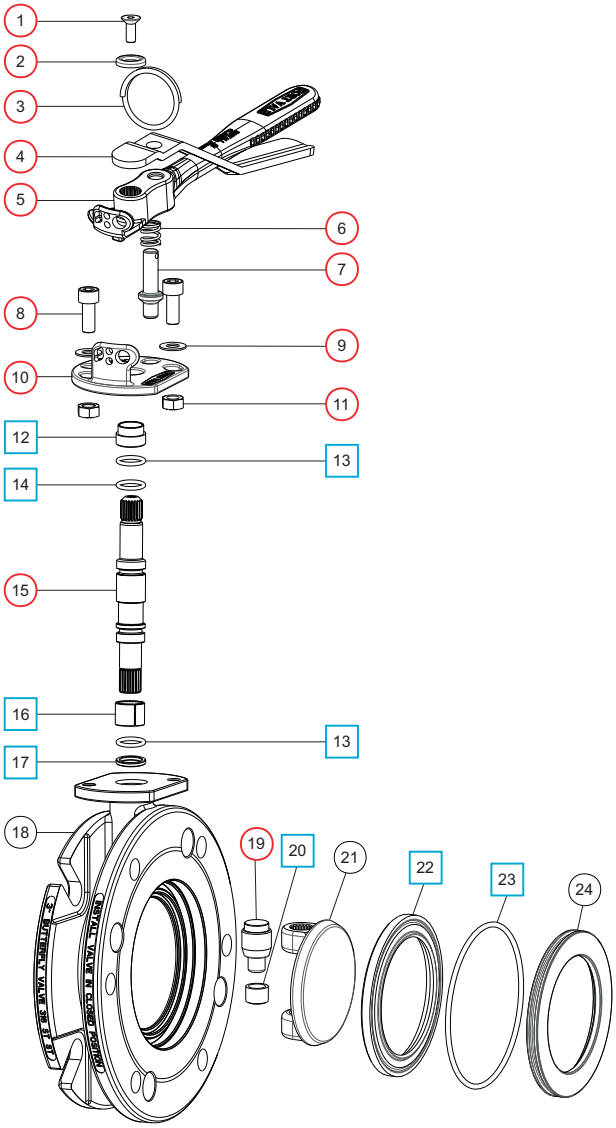
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3" Flanged Widdop Butterfly Valve - Dual Drilled Inlet

Part No: 368/3280A

Parts Drawing



Parts List

Item	Description	Part No.	
1	M6 set screw	5111-030	○
2	Washer	20370	○
3	Split ring	368/0011	○
4	Operating lever	368/9837	○
5	Handle	368/0050	○
6	Handle location spring	368/0012	○
7	Handle location pin	368/0010	○
8	M8 cap screw (2)	5111-255	○
9	M8 plain washer (2)	5113-005	○
10	Stuffing clamp	368/0040	○
11	M8 full nut (2)	5112-001	○
12	PTFE stuffing clamp bush	368/0301	□ ○
13	PTFE O ring (2)	20363	□ ○
14	Viton O ring	20361	□ ○
15	Spindle	368/0200	○
16	Split bearing	252/0517	□ ○
17	PTFE spindle seat	368/0009	□ ○
18	Body	368/9192	
19	Bottom spindle	368/0036	○
20	PTFE bottom bush	368/0035	□ ○
21	Closure plate	368/0400	
22	PTFE main seal	368/0002	□ ○
23	Nitrile O ring	5005-342	□ ○
24	Seal clamp plate	368/9148	

Seal Kit

Description	Part No.
All parts marked □ in the Parts List	368/00SK

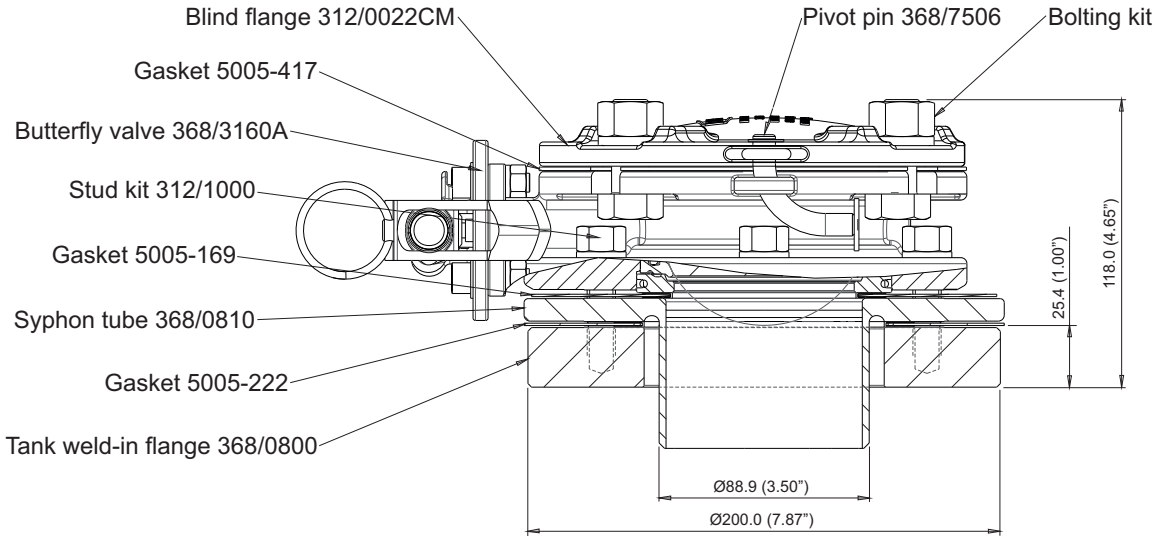
Repair Kit

Description	Part No.
All parts marked ○ in the Parts List	368/316RKA

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Example: 3" Flanged Butterfly Valve Top Discharge Assembly



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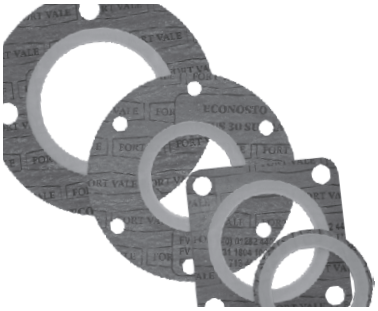
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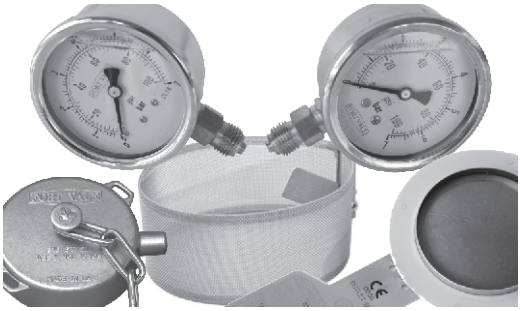
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Accessories







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¾” BSPT Steam Tell-Tale Valve

Part No: 56/0XXX0



Specification

Nominal size
DN20

Tank connection
¾” BSPT (taper)

Set pressure
From 3 PSI to 150 PSI (0.21 Bar to 10.34 Bar)

Materials
Contact parts: 316 stainless steel
Pressure O ring: Viton

Alternatives are available, refer to Range

Design Conditions

Weight:	0.1 Kg
Design Pressure (MAWP):	10.3 Bar
Design Temperature Max:	200°C

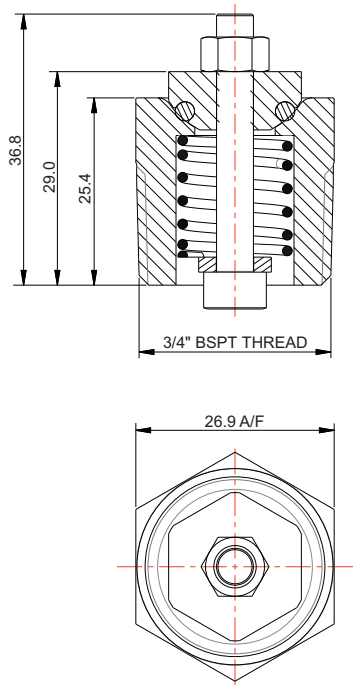
NOTE: The Design Conditions and Section View dimensions are for the specified part number only.

Range

Description	Part No.
Standard specification	56/0XXX0
With TIR tab on valve body	56/0XXX0T
¾” NPTM connection	52/0XXX0

NOTE: The pressure setting changes the Part No.

Section View



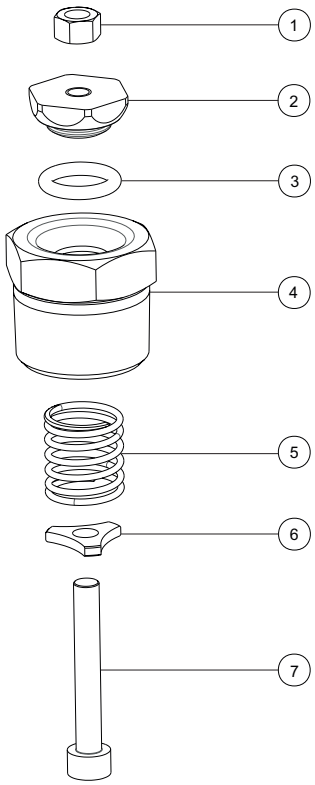
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¾” BSPT Steam Tell-Tale Valve

Part No: 56/0XXX0

Parts Drawing



Parts List

Item	Description	Part No.
1	M5 nut	5112-010
2	Poppet head	54/00003
3	Viton O ring	5005-650
4	Body	54/00001
5	Spring *Note	5104-XXXA
6	Spring locator	54/00002
7	M5 cap screw	5111-128

NOTE: The pressure setting changes the Part No.

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¾” BSPT Steam Relief Valve

Part No: 58/0XXX00



Specification

Nominal size
DN20

Tank connection
¾” BSPT (taper)

Set pressure
From 5 PSI to 225 PSI (0.34 Bar to 15.52 Bar)

Materials
Contact parts: 316 stainless steel
Pressure O ring: Viton GFLT

Alternatives are available, refer to Range

Design Conditions

Weight:	0.6 Kg
Design Pressure (MAWP):	16.5 Bar
Design Temperature Min:	-40°C
Design Temperature Max:	200°C

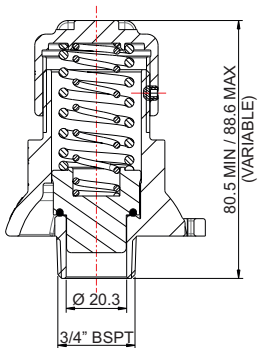
NOTE: The minimum re-seal temperature is -25°C.
The Design Conditions and Section View dimensions are for the specified part number only.

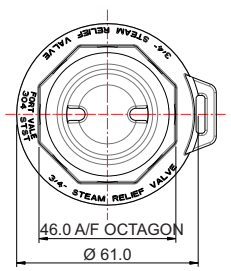
Range

Description	Part No.
Standard specification	58/0XXX00

NOTE: The pressure setting changes the Part No.

Section View





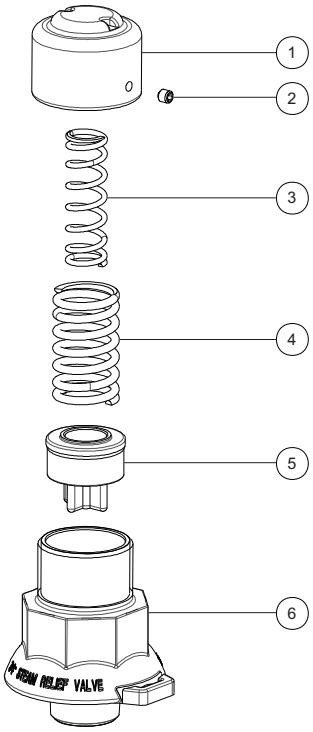
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¾” BSPT Steam Relief Valve

Part No: 58/0XXX00

Parts Drawing



Parts List

Item	Description	Part No.
1	Cap	58/03650
2	Set screw	5121-001
3	Inner spring ***Note**	5104-90XX
4	Outer spring ***Note**	5104-9XXX
5	Poppet assembly with Viton GFLT seal ***Note**	58/0362X
6	Body	58/03640

NOTE: The pressure setting changes the Part No.

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Threaded Blank Caps

Accessories & Spare Parts



Specification

Caps are supplied with a washer and a security wire or heavy duty chain as standard.

Nominal sizes
From ½" to 4"

Thread options
BSP, NPT, NPSL

Material options
Cap: stainless steel, aluminium
Washer: PTFE, leather

If the type you need is not shown, please contact us.

Stainless Steel Caps - BSP Thread

Supplied as standard with a PTFE washer and a stainless steel chain or wire to prevent loss/theft.

Size	Wire or Chain	Part No.
½" BSP	Wire	10316PS
¾" BSP	Chain	10306PS
1" BSP	Chain	10305PS
1½" BSP	Chain	10300PS
2" BSP	Chain	10301PS
2½" BSP	Wire	10302PS
3" BSP	Chain	10303PS
4" BSP	Wire	10304PSC

Spare Parts - Washers

Description	Part No. Leather	Part No. PTFE
½" washer	-	10335P
¾" washer	10331L	10331P
1" washer	10319L	10319P
1½" washer	10326L	10326P
2" washer	10327L	10327P
2½" washer	10328L	10328P
3" washer	10329L	10329P

NPT & NPSL Caps

Supplied as standard with a washer and a chain to prevent loss/theft.

Size	Cap	Washer	Chain	Part No.
1½" NPT	st/st	PTFE	st/st	10300NPTP
2" NPT	st/st	PTFE	st/st	10301NPTP
3" NPSL	st/st	PTFE	st/st	425/3240
3" NPT	aluminium	leather	brass	10711NPT

Aluminium Caps - BSP Thread

Supplied as standard with a leather washer and a brass chain to prevent loss/theft.

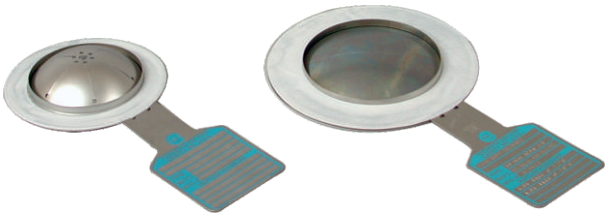
Size	Part No.
¾" BSP	10706AL
1" BSP	10707AL
1½" BSP	10708AL
2" BSP	10709AL
2½" BSP	10710AL
3" BSP	10711AL

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Burst Discs

Accessories & Spare Parts





Specification

Our range of non-fragmenting burst discs is compatible with Fort Vale relief valves and accessories. If you have other manufacturer's equipment, please contact us.

WARNING: A burst disc decreases the air flow capacity of a relief valve. Calculate to make sure that the decreased flow will give sufficient protection to your tank/system. Refer to Fort Vale for more information.

Nominal sizes

65mm XL, 80mm XL, 89mm, 250mm
Other sizes are available, please contact us.
NOTE: 65mm XL/80mm XL discs replace the original 65mm/80mm discs. We do not recommend 65mm/80mm discs with Fort Vale relief valves.

Disc options

Forward Acting: a cross-scored solid metal disc
Forward Composite: a multi-layered disc for burst settings of less than 3.67 Bar
Reverse Acting: compatible with gas service

Materials

65XL/80XL/89mm: PTFE/316 stainless steel/Nickel
250mm: PTFE/316 stainless steel
Other materials are available, refer to next page.

65mm XL Burst Discs

Compatible with general purpose tank containers and road tankers.

Burst Pressure Bar	Burst Temperature °C	Part No.
2.28	20	862/X0228020B
2.41	20	862/X0241020B
2.69	20	862/X0269020B
3.10	20	862/X0310020B
3.67	20	862/X0367020A
4.10	20	862/X0410020A
4.40	20	862/X0440020A
4.84	20	862/X0484020A

NOTE: The specification changes the part no.

80mm XL Burst Discs

Compatible with general purpose tank containers and road tankers.

Burst Pressure Bar	Burst Temperature °C	Part No.
3.67	20	864/X0367020A
4.10	20	864/X0410020A
4.84	20	864/X0484020A

NOTE: The specification changes the part no.

89mm Reverse Acting Burst Discs

Compatible with compressed liquefied gas tank containers.

Burst Pressure Bar	Burst Temperature °C	Part No.
12.10	55	864/X1210055GX
15.00	55	864/X1500055GX
22.00	55	864/X2200055GX
27.50	55	864/X2750055GX
34.50	55	864/X3450055GX

NOTE: The specification changes the part no.

250mm Standard Burst Discs

Compatible with hydrogen peroxide service.

Burst Pressure Bar	Burst Temperature °C	Part No.
4.50	20	865/A0450020AD
4.50	60	865/A0450060AD
6.00	20	865/A0600020AD

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Example: 8 6 X / X 0484 020 X X

Disc Size

862/	65mm XL
864/	80mm XL or 89mm Reverse Acting

Disc Manufacturer

A	CDC (Continental Disc Corporation)
B	BS&B Safety Systems
C	Schlesinger

Burst Pressure in kPa

0484	484 kPa (4.84 Bar)

Burst Temperature in °C

020	20°C

Disc Type

A	Forward Acting (ICON)
B	Forward Composite (PC-SERT)
G	Reverse Acting: Gas service

Special Material/Service: Disc Type A & B Only

Note:	No number = Standard Material/Service
1	PFA Lined
2	PTFE Lined
3	Tantalum
4	Alloy 600
5	Oxygen Cleaned
6	High Temperature 250°
7	Titanium
8	Standard 30° Angle
9	Monel ®
A	Inconel ® / 316TI
B	Nickel
C	Hastelloy ® C276
D	Standard + Handling Support
E	Monel ® Fluoro Coated

Special Material/Service: Disc Type G Only

Note:	No number = Standard Material/Service
1	Hastelloy ® / PTFE
2	Monel ®
3	Tantalum
4	Alloy 400
5	Alloy 600
6	Monel ® 400 / Sigma ® 500

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Document Holders

Accessories & Spare Parts



Specification

Nominal sizes
75mm and 110mm

Body material options
Opaque plastic
Transparent plastic

Fixing bracket options
Plastic
Stainless steel

Cap
All document holders are supplied with a plastic cap as standard which is attached by a stainless steel wire to prevent loss/theft.

Document Holders

Size	Body	Brackets	Part No.
75mm	Opaque	Plastic	360/1101
75mm	Transparent	Plastic	360/1101T
75mm	Opaque	St/steel	360/1101ABSS
75mm	Transparent	St/steel	360/1101TBSS
110mm	Transparent	Plastic	460/1101T
110mm	Transparent	St/steel	460/1101TBSS

Spare Parts - Plastic Caps

All caps are supplied with a stainless steel cable.

Size	Part No.
75mm	360/1010
110mm	460/1010

Spare Parts - Fixing Brackets

Size	Material	Part No.
75mm	Plastic	360/1007
75mm	Stainless steel	360/1007SS
110mm	Plastic	460/1007
110mm	Stainless steel	460/1007SS

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Fusible Link Assembly

Part No: 324/5760



Specification

A fusible link assembly automatically closes a footvalve if there is a fire. The device is installed onto the tank frame and attaches to the footvalve remote closure cable. The fusible element will melt at 100°C. This makes the spring-loaded chain operate the remote closure cable to close the footvalve.

Compatibility
All tank designs and most types of footvalve

Material
304/316 stainless steel

Design Conditions

Weight:	0.5 Kg
Fusible Element:	
Operating Temperature:	100°C
Maximum Load:	18.14 Kg

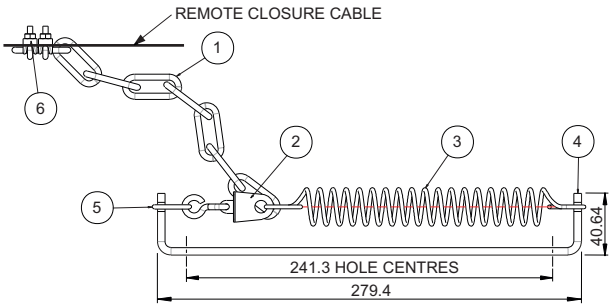
NOTE: The Design Conditions and Section View dimensions are for the specified part number only.

Approvals
Complies with US DOT CFR49 - Ch. 178275 [d]

Related Parts

Description	Part No.
2.5mm 7x7 strand st/st wire, 6.5m length	6110-022
Remote closure tension spring	5104-203
Footvalve handle remote operating lever	324/7610

Parts Drawing



Parts List

Item	Description	Part No.
1	Stainless steel chain	6128-016
2	100°C fusible element	324/5616
3	Tension spring	252/3272
4	Remote closure bracket	324/5765
5	Solid ring	613/6150
6	Wire clamp (2)	324/5341

Important Precautions

- A fusible element is designed for a straight pull load. It is not compatible with a radial or twisting load.
- Keep the fusible link assembly in a cool, dry area.
- Do not use the fusible element where the load or temperature will be more than 18.14 Kg and 100°C.
- Do not apply paint or a coating material to the fusible element as this can prevent correct operation.
- Do not apply cleaning chemicals to the fusible element. Cover the element with a clean, wet cloth during cleaning.
- If the fusible link is installed in an atmosphere that can cause stress/strain/corrosion of surfaces, replace the fusible link at least annually if the fusible link shows signs of stress/strain/corrosion.
- Attach the remote closure wire to the chain using cable clamps. There must be the minimum possible amount of slack on the chain when the valve is in the open position.

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Flame Arresters



Specification

A relief valve flame arrester attaches around the ports of the relief valve body. It prevents an external flame from being transmitted into the tank on relief valves with a vacuum setting of ≤ 0.21 Bar (6"Hg).

For relief valves with a vacuum setting of > 0.21 Bar (6"Hg), a flame arrester is frequently used to prevent debris from going into the tank through the relief valve.

Nominal sizes
Compatible with 1", 1½" 2½", 65mm and 80mm relief valves

Material
Stainless steel

WARNING: If you install a flame arrester, it will decrease the air flow capacity of the relief valve. Thus, you must calculate to make sure that the decreased air flow capacity of the relief valve and flame arrester will give sufficient protection to your vessel/system. Refer to Fort Vale for more information.

Flame Arresters

Each flame arrester is compatible for the specified relief valve type only. Flame arresters are not interchangeable between relief valve types.

IMPORTANT: Refer to the air flow decrease data for your valve type. (See **WARNING**)

Compatible Relief Valve	Air Flow Decrease	Part No.
1" Minnow	17% to 20%	179/0300
1½" Twinact	See Note	200/5000
2½" Twinact	See Note	130/5000
2½" & 65mm Super Maxi	1%	176/2900
80mm Hyper Maxi	5.4%	176/2920

NOTE: For the air flow decrease data for Twinact relief valves, please contact Fort Vale.

Debris Protection - Gauzed Cowl

Part No: 176/6000



Specification

A gauzed cowl attaches to the 65mm Super Maxi relief valve cap. It is used to prevent debris from going into the tank through the relief valve.

Nominal sizes
Compatible with a 65mm/2½" Super Maxi relief valve only

Material
Stainless steel

CAUTION: If you install a gauzed cowl onto a Super Maxi relief valve, it can decrease the relief valve air flow capacity. Refer to Fort Vale for more information.

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Standard Pressure Gauge



Tell-Tale Pressure Gauge



Specification

We supply standard pressure gauges and tell-tale pressure gauges. Tell-tale pressure gauges have a secondary pointer to indicate if there has been an increase in pressure, even if the pressure subsequently decreases.

All pressure gauges have a ¼" BSP bottom connection and are glycerine filled.

Pressure range options
0-6 Bar, 0-10 Bar, 0-16 Bar, 0-40 Bar

Material options - internal parts
Brass, stainless steel

Standard Pressure Gauge

Pressure Range Bar	PSI	Internal Parts	Part No.
0-6	0-90	Brass	921/06BBSP
0-6	0-90	St/steel	920/06BBSP
0-10	0-150	Brass	921/10BBSP
0-10	0-150	St/steel	920/10BBSP
0-40	0-580	St/steel	920/40BBSP

Tell-Tale Pressure Gauge

Pressure Range Bar	PSI	Internal Parts	Part No.
0-6	0-90	Brass	921/06TTBBSP
0-6	0-90	St/steel	920/06TTBBSP
0-10	0-150	Brass	921/10TTBBSP
0-10	0-150	St/steel	920/10TTBBSP
0-16	0-230	St/steel	920/16TTBBSP
0-40	0-580	St/steel	920/40TTBBSP

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Analogue Temperature Gauge - Capillary



Specification: Analogue

Temperature range options
-20°C to 160°C
-20°C to 200°C
NOTE: The temperature range refers to the capillary or probe only

Temperature sensor options
2500mm capillary
250mm stainless steel tube with brass thermowell probe

Gauge fill options
Silicone oil filled
Not filled

Analogue Temperature Gauge - Probe

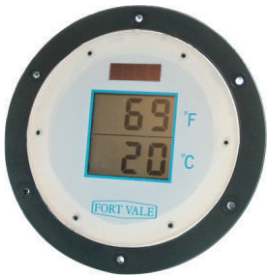


Analogue Temperature Gauges

Temperature Range °C	Temperature Range °F	Capillary or Probe	Oil Filled	Part No.
-20 to 200	-4 to 392	Capillary	Yes	922/TEMP200
-20 to 160	-4 to 320	Capillary	Yes	922/TEMP160
-20 to 200	-4 to 392	Probe	No	922/TEMPT200
-20 to 160	-4 to 320	Probe	No	922/TEMPT160

NOTE: The temperature range refers to the capillary/probe only.

Digital Temperature Gauge - Capillary



Specification: Digital

Temperature range options
-200°C to 250°C
NOTE: The temperature range refers to the capillary or probe only

Temperature sensor options
1000mm capillary

Digital Temperature Gauge

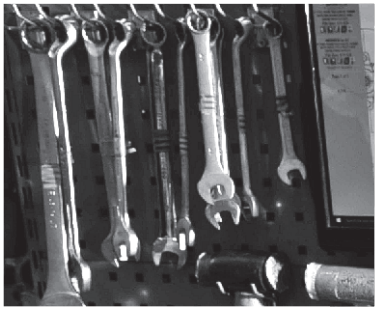
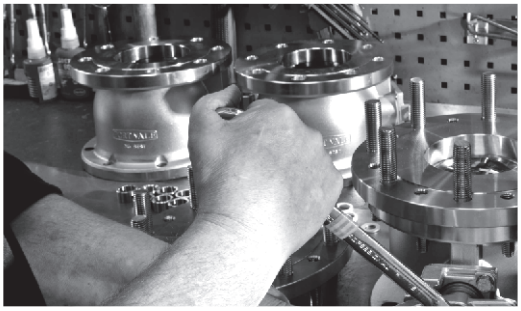
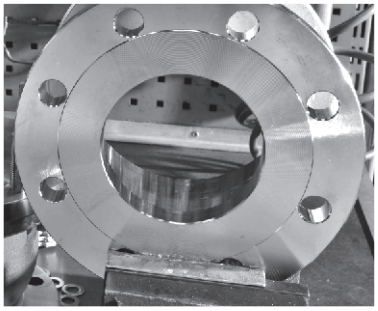
Temperature Range °C	Temperature Range °F	Capillary or Probe	Part No.
-200 to 250	-328 to 482	Capillary	922/TEMPDIGI250

NOTE: The temperature range refers to the capillary/probe only.

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After Sales Service

We offer a refurbishment and repair services for all our valves. We can also provide you with technical support if you want to do your own maintenance. Please contact us for more information about maintenance instruction manuals and special tools and equipment.

We keep a wide range of spare parts and ancillary items in stock at our Fort Vale worldwide locations. We also have authorised distributors around the world who can supply you with replacement and consumable parts, and help you with after sales service.

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We supply a range of special tools and repair kits to do scheduled maintenance and repair procedures to our valves.

We recommend that you use the correct special tools to help you do maintenance and repairs quickly and easily without causing damage to the valve or the new spare parts.

A selection of step-by-step maintenance instruction manuals is also available, please contact us.

CAUTION: Valve maintenance and repair can be dangerous. To do maintenance, you must have experience and qualifications related to valve installation on pressure vessels and systems.

Relief Valve Pressure/Vacuum Test Rig

Part No: 400/8000



Specification

You can use the relief valve test rig to test the pressure and vacuum setting of Hyper Maxi, Super Maxi, Twinact, Uniact, Minnow and Steam relief valves.

Valve connection
2½" BSP: We supply adaptors to change to other BSP and flanged connections

Test rig supply connection
¼" BSP female socket

Test range
From -0.7 Bar to 6.9 Bar (-10 PSI to 100 PSI)

Related documents
Operating Instructions: OPIN26. Please contact us

Footvalve & Relief Valve Seat Repair Kit

Part No: 3" Kit - 400/2600
Part No: 4" Kit - 400/2900



Specification

You can use the seat repair kit to re-surface the seating face of a valve if there is damage caused by corrosion.

Compatible
3" Kit: compatible with 2½" Super Maxi relief valve and 3" Cleanflow and Highlift footvalves
4" Kit: compatible with 4" Cleanflow & Highlift footvalves

Connection
Compatible with power tools with a ½" chuck

Kit contents
Selection of grinding and polishing discs
Selection of face-forming tools
Instruction manual

Related documents
Operating Instructions: 3" Kit OPIN70, 4" Kit OPIN77. Please contact us.

Spare Parts: Grinding Discs

Description	Part No. 3"	Part No. 4"
Box of 100 x 60 grit	400/2610	400/2615
Box of 100 x 80 grit	400/2620	400/2625
Box of 100 x 180 grit	400/2630	400/2635
Box of 100 x 500 grit	400/2640	400/2645

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Relief Valve Tool Kits

Description	Part No.
Test rig adaptor flange: Adapts 2½"BSP to 3"ASA150, DIN65 PN10 & DIN80 PN6	425/1000
C spanner: To install/remove Twinact relief valves	400/3000
C spanner: To install/remove Super Maxi relief valves	400/3001
Tightening tool for MKIII Super Maxi relief valves	400/8380
Tool kit: 1½" & 2½" Twinact valves	400/1000
Tool kit: 65mm & 80mm Super Maxi & Hyper Maxi relief valves	400/8300



Footvalve Tool Kits

Description	Part No.
Tool kit: 3" Cleanflow footvalve	400/2150
Tool kit: 3" MKIII Highlift footvalve	400/2455
Tool kit: 3" MK1 Highlift footvalve	400/2450



Ball Valve Tool Kits

Description	Part No.
Spindle O ring stuffing tool: 1½" MKIII airline ball valve - 530/type	FIX/A/0075/2
Tool kit: 1½" MKII airline ball valve - 353/type	400/2500
Tool kit: 3" ball valve spindle O ring tools - 360/5XXX type valves	400/2200STK
Tool kit: 3" ball valve - 360/0000 type valves, pre-2003	400/2200



Butterfly Valve Tool Kits

Description	Part No.
Tool kit: 2" butterfly valve	400/2300
Tool kit: 3" butterfly valve	400/2700

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Flange Bolting

CAUTION: Weld-distortion and too much tightening force will cause damage to a flange.

It is important not to cause damage to weld-in flanges and mating flanges. If a flange is damaged it will not give a satisfactory seal when a gasket and secondary mating flange is installed.

Bolt-stress can decrease after initial tightening. The cause can be deformation of the gasket material, particularly with soft materials such as a CNAF/PTFE envelope gasket.

Best procedure recommends that, after initial bolting, the flange joint is tightened again after a period of time. Most gasket manufacturers advise a period of 24 hours. ASME PCC-1-2000 GUIDELINES FOR PRESSURE BOUNDARY BOLTED FLANGE JOINT ASSEMBLY advises a minimum period of 4 hours.

Bolt torque calculations are based on a flat flange to within 0.15mm.

Recommended bolt torque values will be reduced if a lubrication is used.

Bolt Torque

Bolt Torque Values

Fort Vale bolt torque values are given as a reference guide only and are based on:

- the use of a CNAF/PTFE gasket.
- unlubricated fasteners.
- a flange flat to within 0.15mm.

CAUTION: If you use a different gasket material, a lubricant or a flange with distortion, you must re-calculate the torque value.

Bolt Torque Procedure

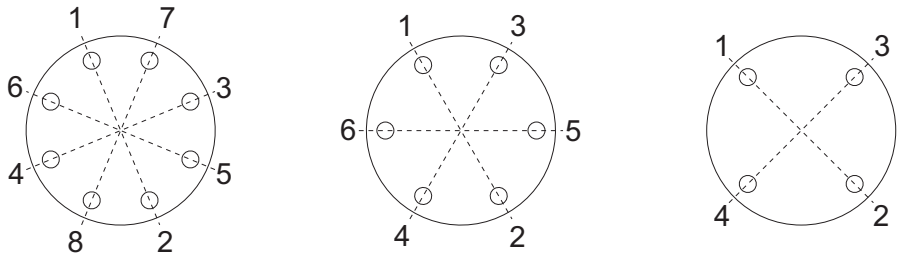
To install flanged parts correctly:

- Examine the mating flange of the part.
- If the flange is marked with a torque value, obey that torque value.
- If there is no torque value marked on the mating flange, obey the bolt torque values given in Table BT1.
- Tighten the bolts evenly in sequence. Refer to Figure BT1.
- Obey the Step Loading Procedure (ASME PCC-1-2000). Refer to the next page.

Table BT1

Thread	Torque Value
M10	30 Nm (22 lbf.ft)
M12	65 Nm (48 lbf.ft)
M16	81 Nm (60 lbf.ft)

Figure BT1



8 HOLE PATTERN **6 HOLE PATTERN** **4 HOLE PATTERN**

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Step Loading Procedure

To install flanged parts correctly, obey the Step Loading Procedure extract from ASME PCC-1-2000:

Install

Hand tighten, then “snug up” to 15 Nm (10 lbf.ft) to 30 Nm (20 lbf.ft) (not to exceed 20% of Target Torque).
Check flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening before proceeding.

Round 1

Tighten to 20% to 30% of Target Torque. Check flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening before proceeding.

Round 2

Tighten to 50% to 70% of Target Torque. Check flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening before proceeding.

Round 3

Tighten to 100% of Target Torque. Check flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening before proceeding.

Round 4

Continue tightening the bolts, but on a rotational clockwise pattern until no further nut rotation occurs at the Round 3 Target Torque value. For indicator bolting, tighten bolts until the indicator rod retraction readings for all bolts are within the specified range.

Round 5

Time permitting, wait a minimum of 4 hr and repeat Round 4; this will restore the short-term creep relaxation/embedment losses. If the flange is subjected to a subsequent test pressure higher than its rating, it may be desirable to repeat this round after the test is completed.

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Compatibility

Make sure that the function and technical specification of the valve/accessory is compatible with the vessel service conditions and the cargo. This includes, but is not limited to:

- dimensions.
- pressure/vacuum setting.
- air/vapour/liquid flow capacity.
- maximum allowable working pressure.
- test pressure.
- minimum/maximum design temperatures.
- materials of construction.

Maintenance and Inspection

Fort Vale valves and accessories have a long life if you use them correctly in compatible service conditions. It is not necessary to lubricate the parts, but we recommend that you do the inspections that follow:

Inspections at regular intervals:

1. Examine the valve to make sure there is no damage, wear or corrosion.
2. Examine the valve and adjacent area to make sure there is no leakage of cargo.
3. Examine the fasteners to make sure they are not loose.
4. Make sure the valve operates correctly.

CAUTION: If you operate the valve with very corrosive cargo, or near its temperature and/or pressure limit (very high or very low temperature and/or pressure), do the inspections more frequently.

Also, schedule regular maintenance based on how frequently the valve is used, the type of cargo and the service conditions.

Inspections after 2½ years of service or a minor incident:

1. Examine the valve to make sure there is no damage, wear or corrosion.
2. Make sure the valve operates correctly.
3. Do a pressure test on the valve.

Inspections after 5 years of service or a major incident:

1. Disassemble and clean the valve.
2. Replace all the valve seals and do a pressure test.

Replacement Parts

Do not adapt or change the valve. If you install a replacement part, it must be a genuine Fort Vale part.

WARNING: If you install a part that is not genuine, there is a risk of:

- injury to personnel.
- permanent damage to the valve.
- permanent damage to the vessel.
- valve malfunction.

External Fire

If you install the valve in an area where there is a risk of external fire, you must install compatible accessories to prevent damage to the valve.

Compatibility of Accessories

Accessory components must cause no interference with the valve's function. Accessories must be made from compatible materials that will cause no damage to the valve materials. Do not install an accessory that will cause an increased load on the valve, such as mechanical, static, dynamic or thermal load.

Mis-use

Obey the instructions and recommended procedures in the installation and operating instructions. Obey the pressure and temperature markings on the valve and on the drawing. Use the valve/accessory for its correct function only. Fort Vale accept no liability or responsibility for incorrect use of the valve/accessory.

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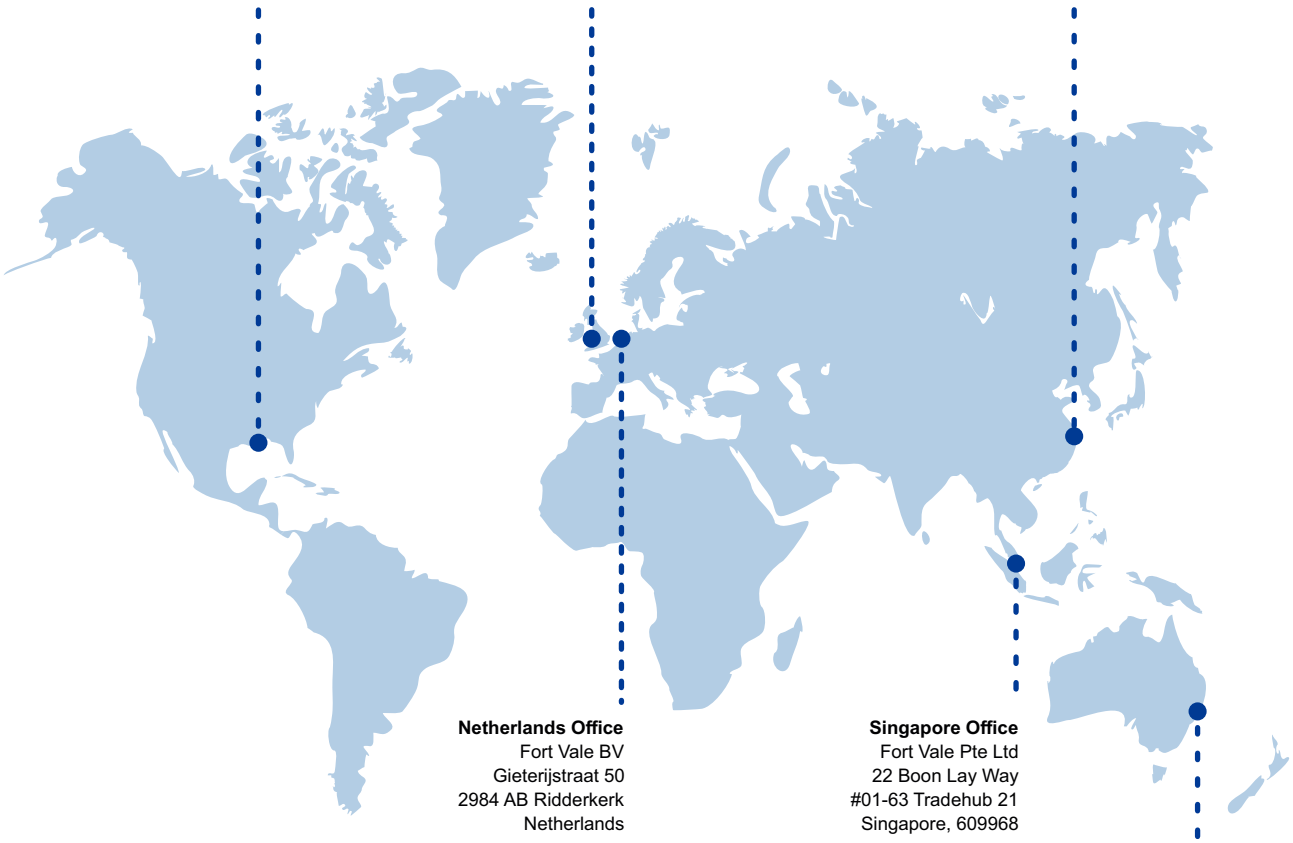
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