Welcome to the

SPX Flow Technology APV Product Training

Location Mexico/Brazil
August 21-25

The APV Valve Family

Material basics

Steel material: product wetted = AISI 316L
non product wetted AISI 304

Seal material : EPDM (standard) , Code 93
VMQ (Silicon) , Code 13
FPM (Viton) , Code 73
HNBR , Code 33

Available in Sizes

DIN: DN10 – DN250 Metric Sizes

ISO: 1” - 6” OD Tube

Surface finish

ID Polished to Ra ≤ 1.6 µm / 32Ra µin. (150 grit)

OD Satin or 150 grit polished

Product line pressure

Max. 10 bar

Max. Temperature

135°C / 275°F (short term) 140°C /

Valve operators

Pneumatic Actuator

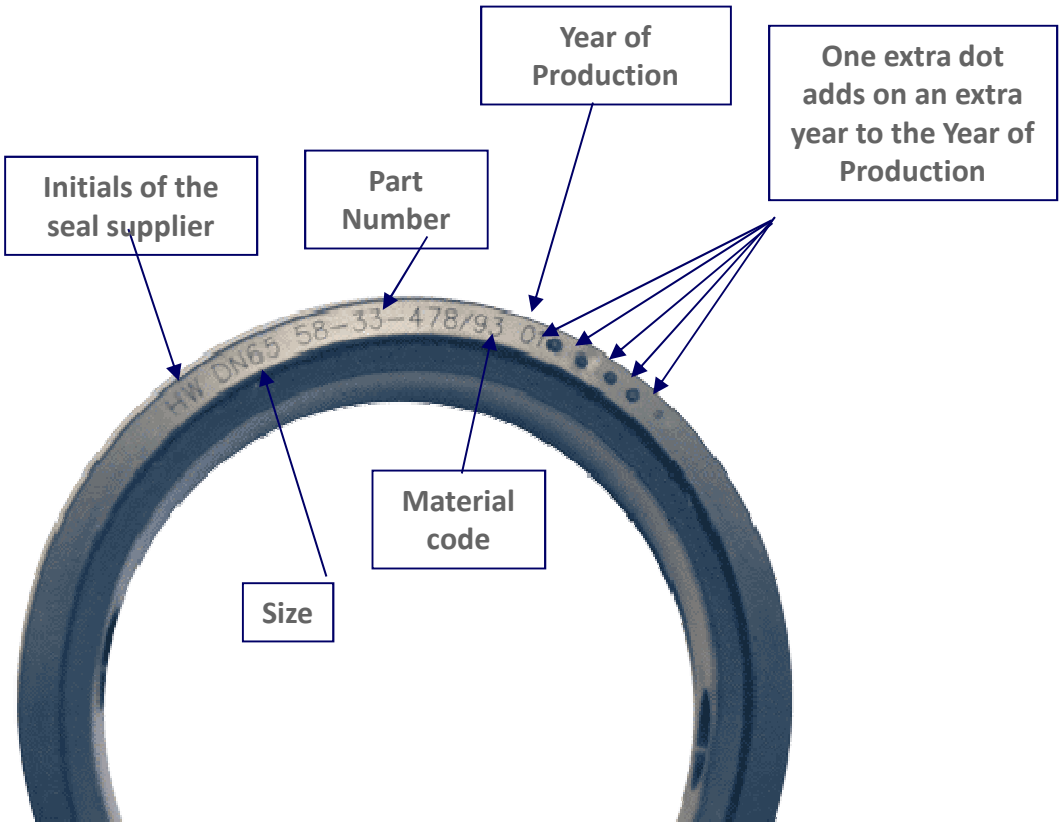
option for manual operator

Various Seal Options

EPDM	HNBR	FPM	VMQ
Code 93	Code 33	Code 73	Code 13

Rubber seal materials conform to FDA 21 CFR 177.2600

DELTA SV/SVS
- Customer benefits Maintenance

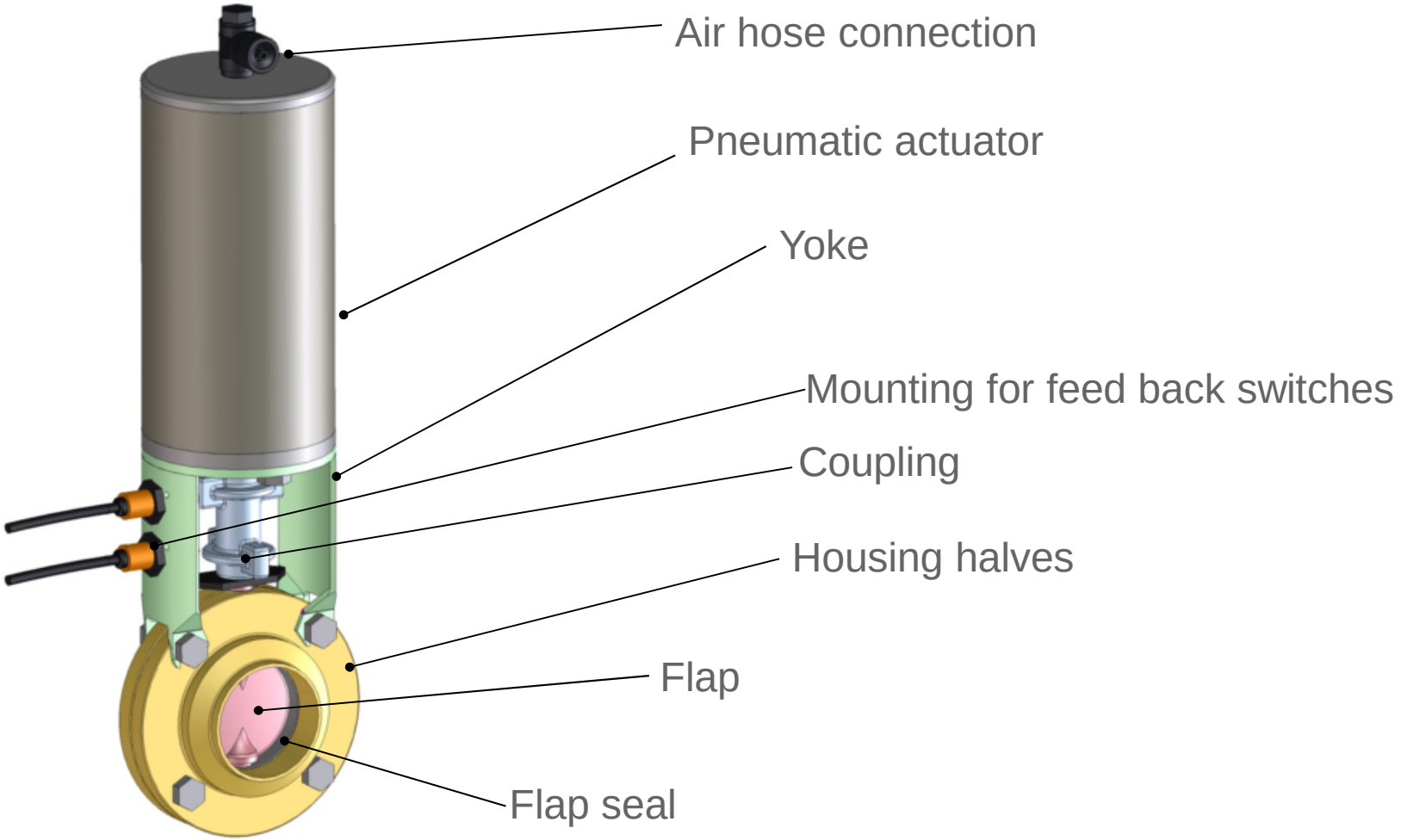


- Easy identification of seals; APV part numbers stamped on seals
- Identification of valve
- SVS valve can be easily removed from process line for servicing
- Few connecting items i.e. screws etc.
- Standard tools required for dismantling
- No tool required for replacing butterfly disc seal

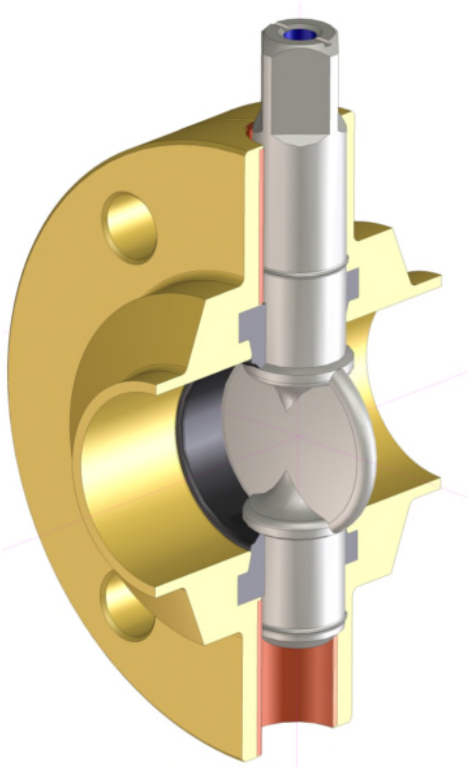
SPX FOOD+BEVERAGE

•DELTA SV/SVS Butterfly Valves

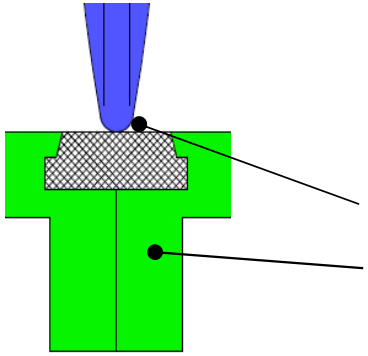
DELTA SV Butterfly Valves



DELTA SV Design Details



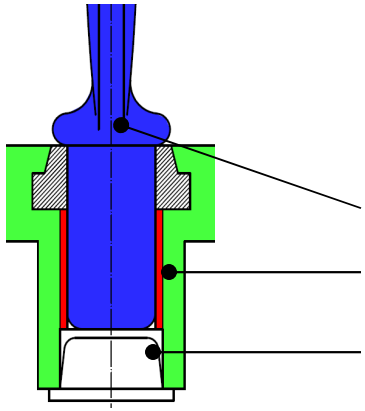
Product wetted area



Sealing

Flap

Flap seal (T-profile)



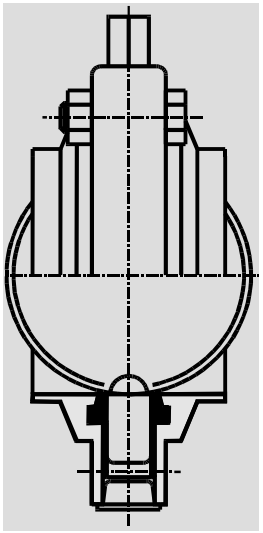
Shaft guidance

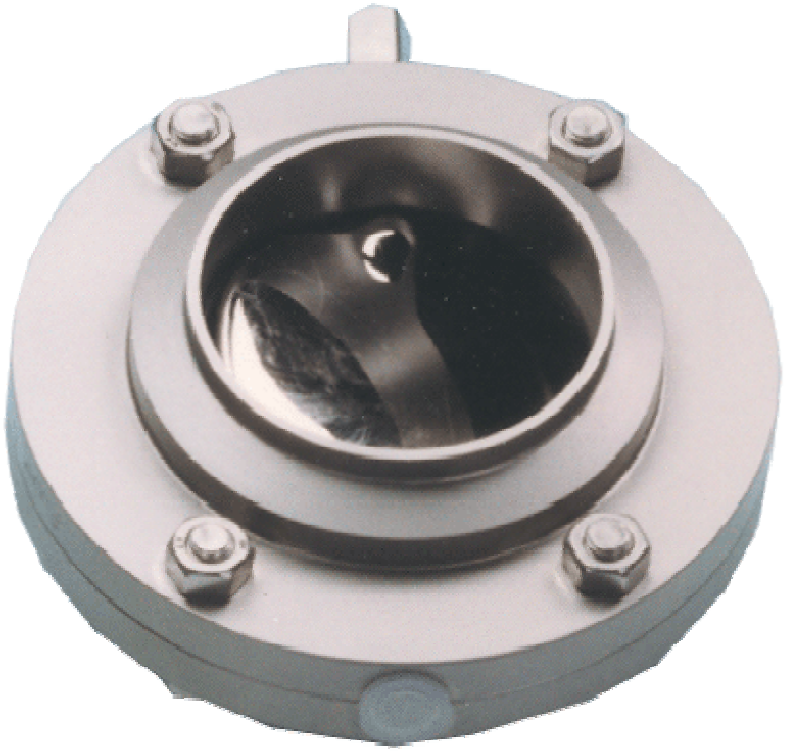
Flap

Flap seal

Bearing

DELTA SV



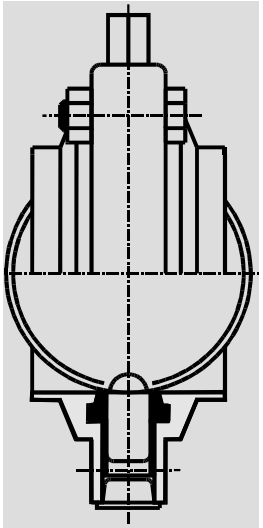


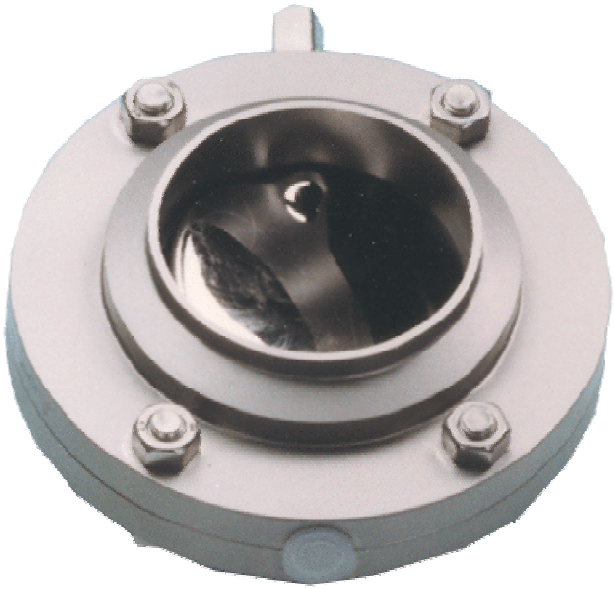
DELTA SV
2-piece flange design

Available in Sizes:
ISO : 1” - 4” OD Tube
DIN : DN25 – 150

Product line pressure:
max. 10 bar / 145 psi

DELTA SV - Options





Available connections

Weld ends

Male end DIN

Female end DIN

ISS / IDF

RJT

ISO-Clamp / Tri-Clamp

SMS: (Swedish Milk Standard)

SV - Description

Abbreviations used in product description:

1S;2G:
one side with male end,
one with but weld end

1K;2G:
one side with female end,
one with male end

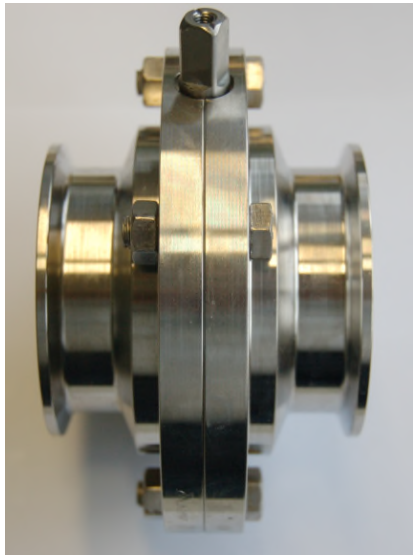
1S;2K:
one side with but weld end
one with female end

SV - Description

Abbreviations used in product description:

1S;2S:
both sides with
butt weld ends

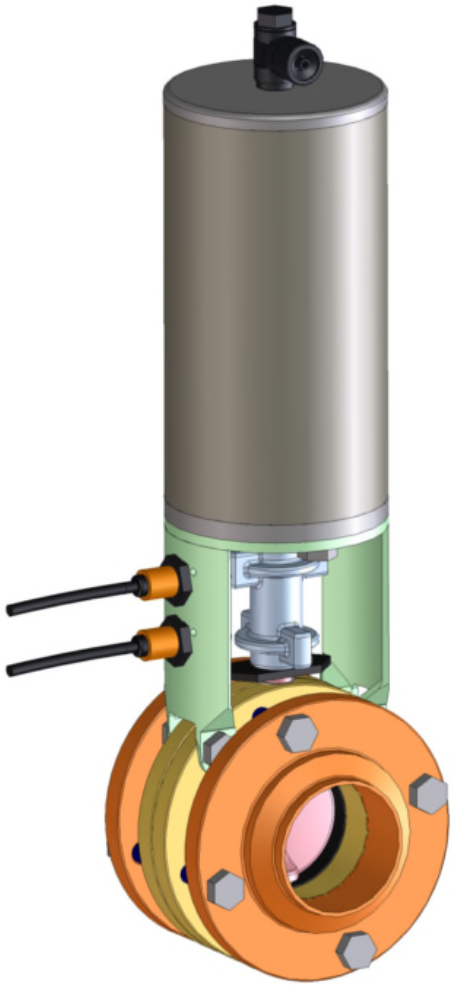
1 + 2 CL:
both sides with
clamp ferrule

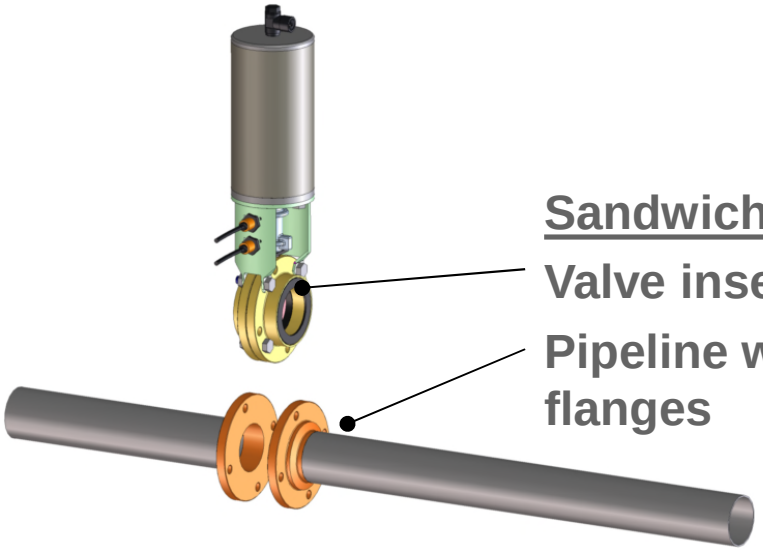


1G;2G:
both sides with
male end

F : flanged (e.g. DELTA SV-1F)
SMS: (Swedish Milk Standard)

DELTA SVS Design Details

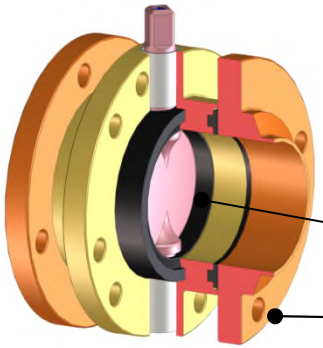




Sandwich Design

Valve insert

Pipeline with flanges

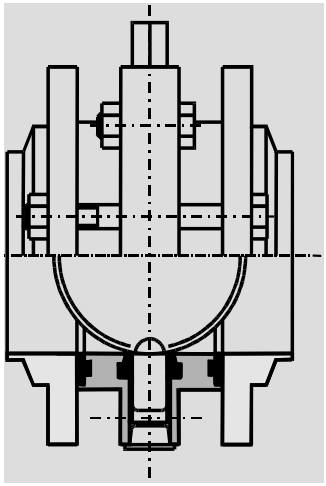


Flange Sealing

T - profile seal

Pipeline flange

DELTA SVS



4-piece flange design

Available in Sizes:

ISO : 1” - 6” OD Tube

DIN : DN25 – 250

Metric Sizes

Product line pressure: max. 10 bar / 145 psi

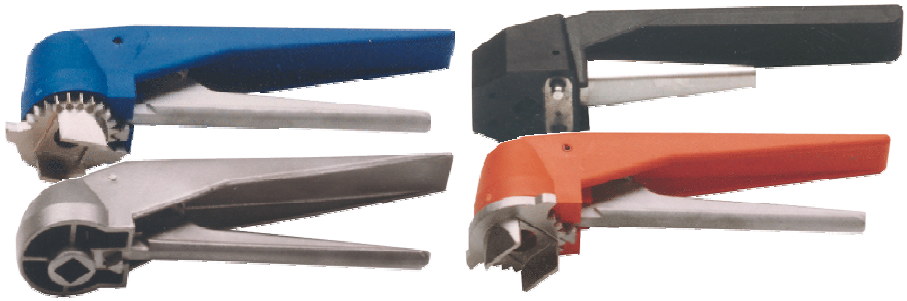
Available connection: but weld end only

Valve Operators

Manual Handle

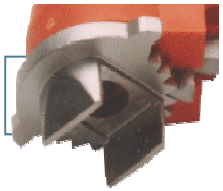
1” - 4” / DN25 - 100:

•ON/OFF – standard (black)



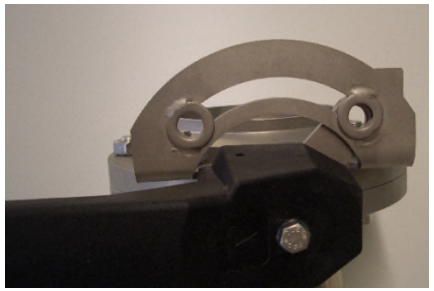
OPTIONS

•Multi-position options (7 positions)
•Setting device for infinite positions
•Proximity switch feedback device
•Locking device

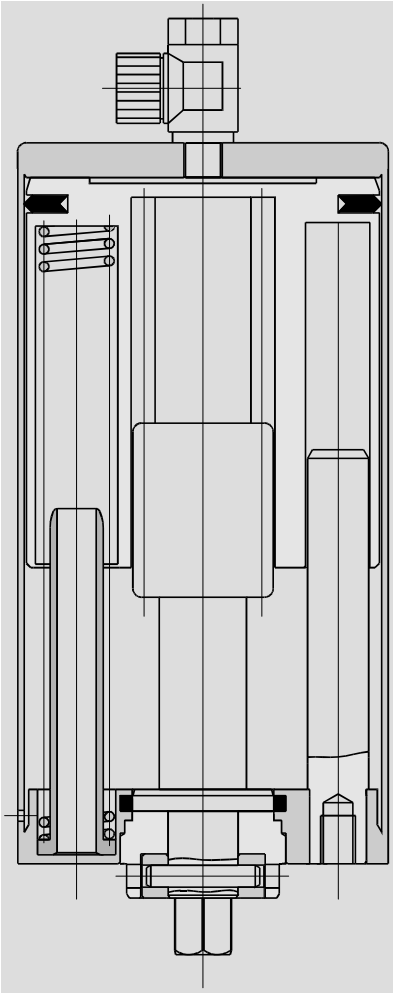


DN125 – 250

•5 positions (stainless steel)



Valve Operators



Pneumatic Actuator

3 sizes covering the whole range:

DN25-100 + 1”-4” OD Tube

DN125 + DN150 Metric Sizes

DN200 + DN250 Metric Sizes

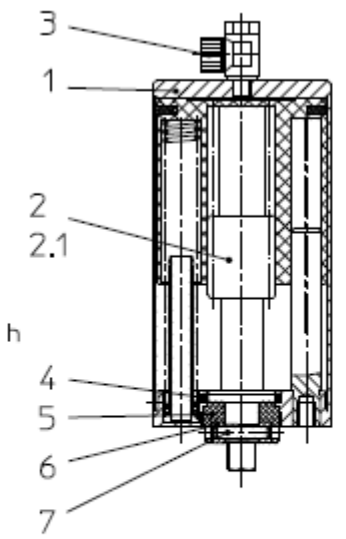
Fully welded

Maintenance free

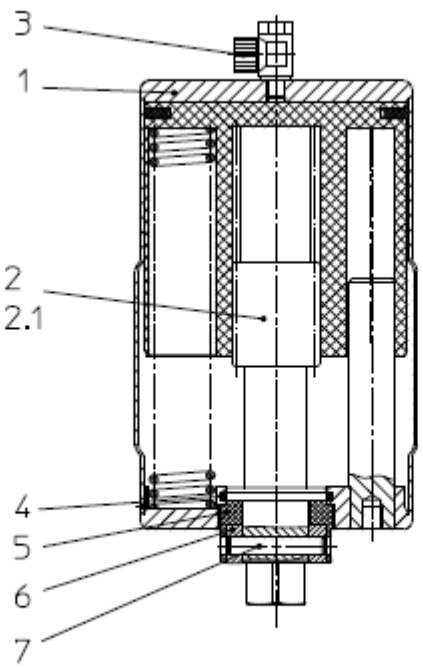
5-year-warranty

Quarter turn actuator standard

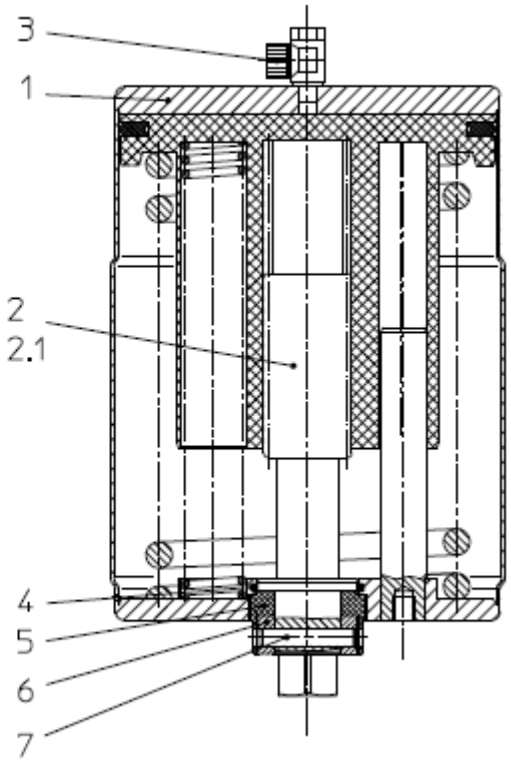
DRAT K080



DRAT K125

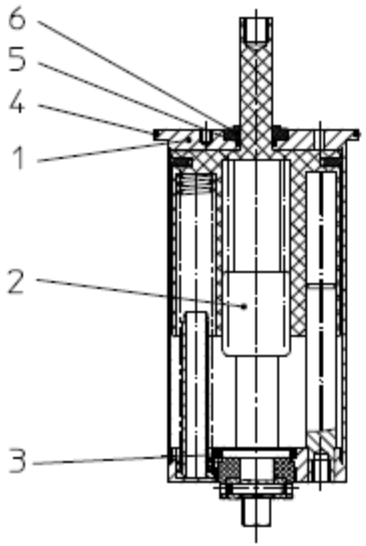


DRAT K180

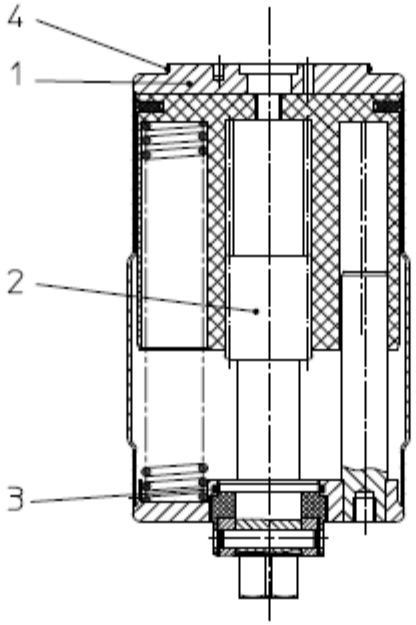


Quarter turn actuator for control unit

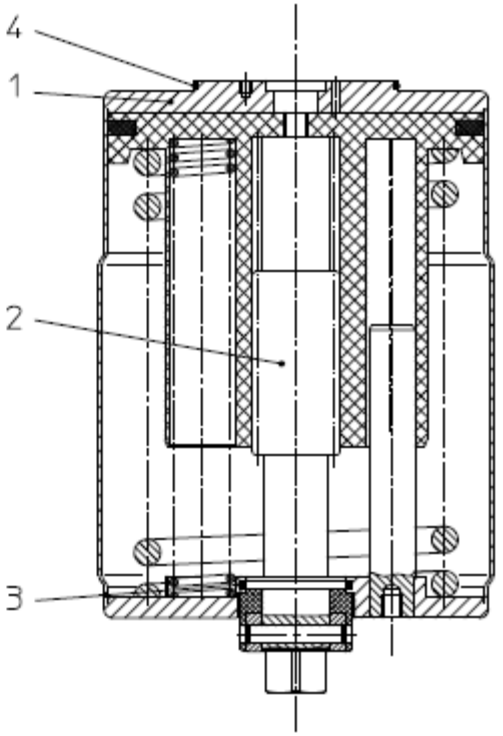
DRAT K080-RM



DRAT K125-RM

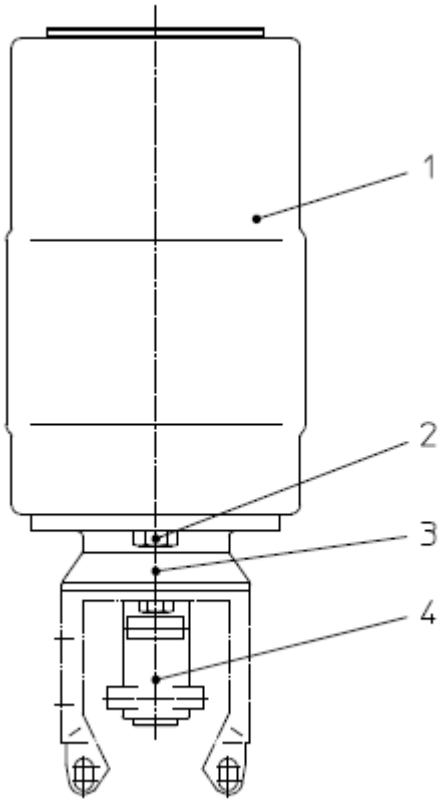


DRAT K180-RM

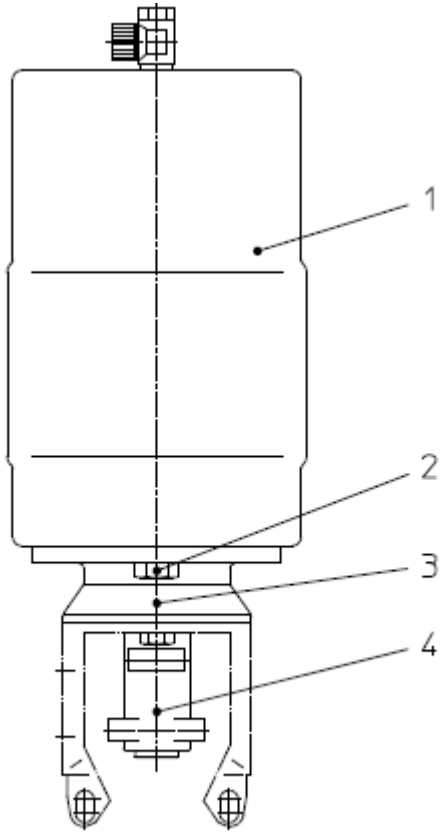


Conversion kit K080 to K125

Actuator for CU

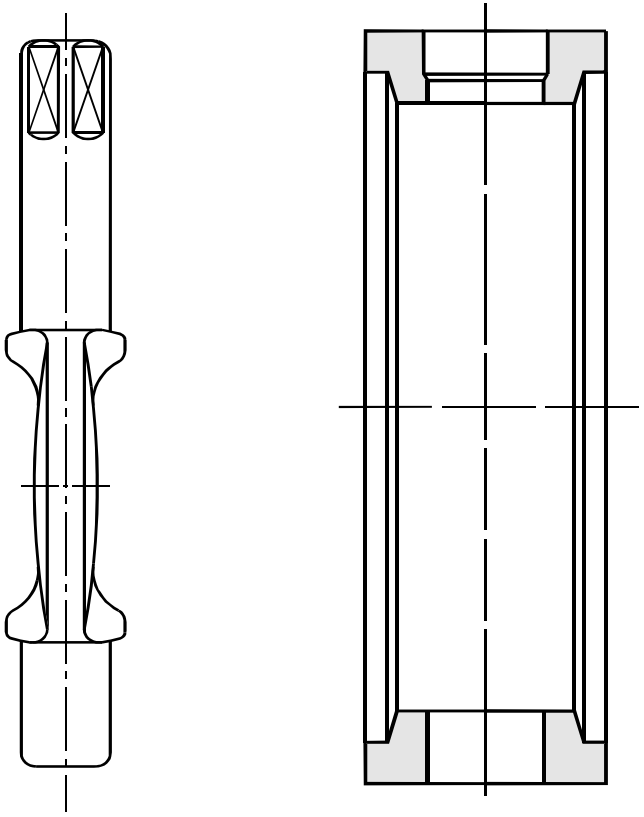


Actuator standard



In case the K080 actuator of a 4“ / DN100 NO is not strong enough to close the valve the above conversion kit can be used.

DELTA SV/SVS –
Customer benefits



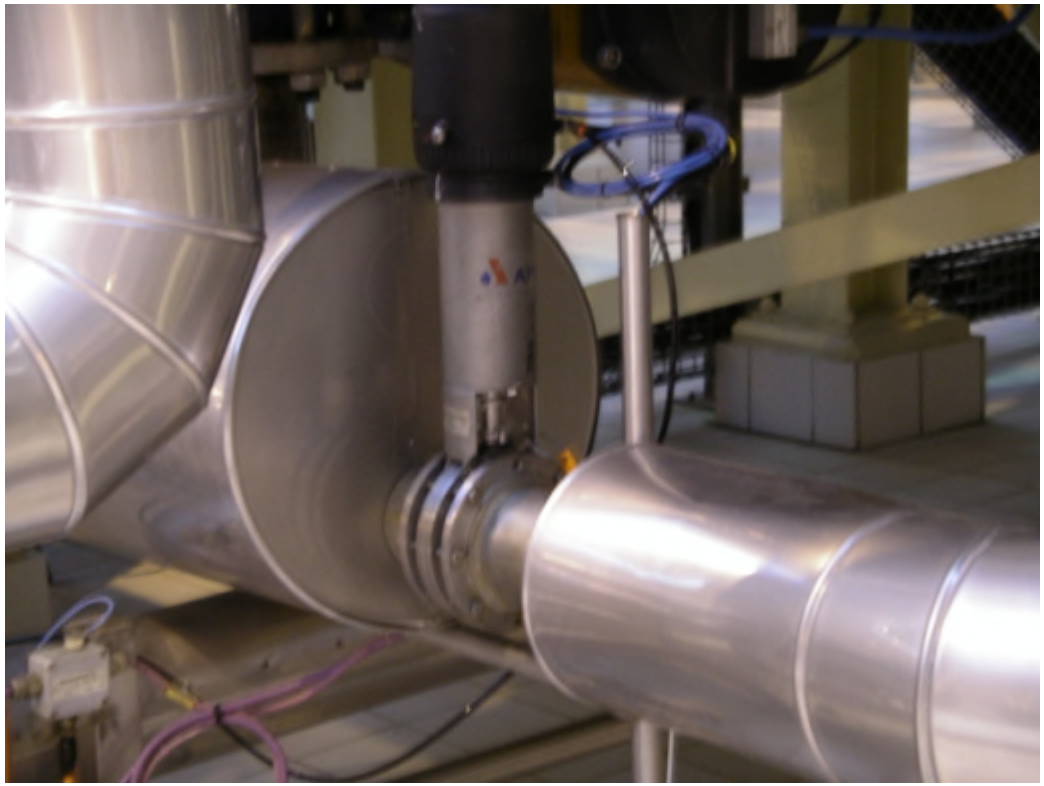
- Profile Seal
- Full vacuum tight
- Shaft bearings top and bottom
- Disk profile
- Maintenance free actuator
- Constant torque actuator

DELTA SV/SVS – Application

Example where a SVS-butterfly valve should NOT be used.

In such applications the SV-butterfly valve should be used instead.

DELTA SV/SVS –
Application



Typical example of a
SVS-butterfly valve application

DELTA SV/SVS – KIT

KITS - SV1/SVS1F

Valves are also supplied as kits (unassembled):

–Quick delivery

–Special prices

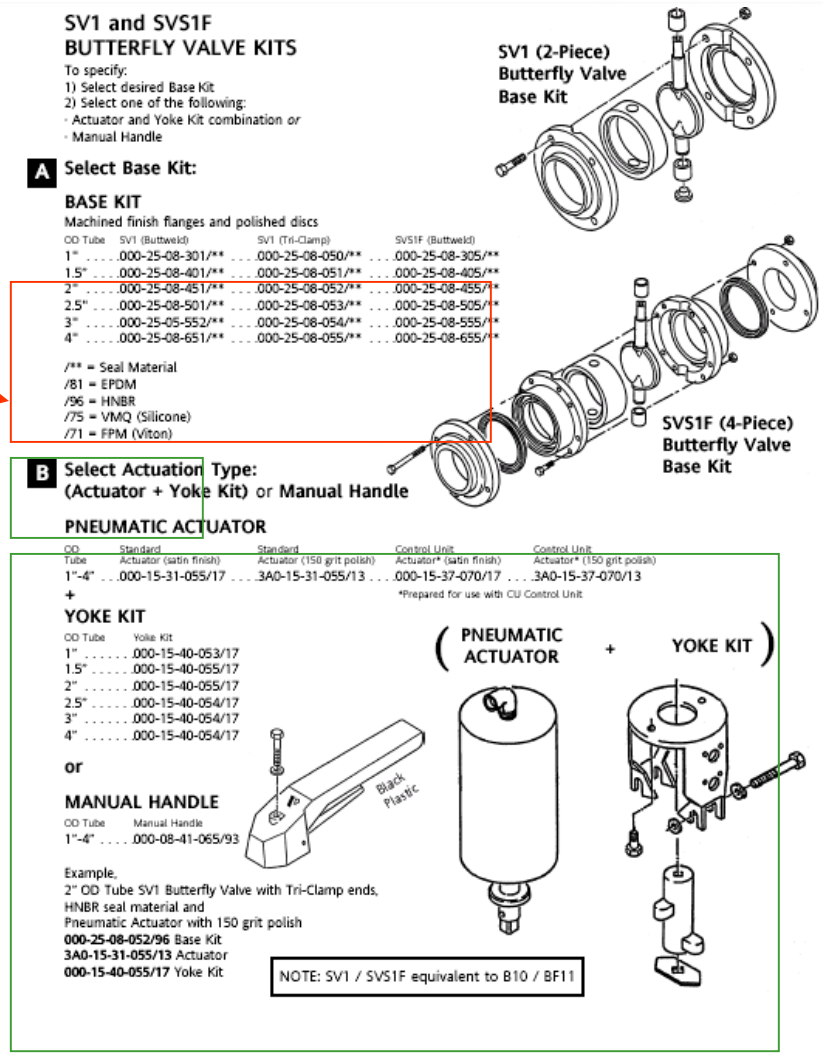
DELTA SV/SVS – KIT

HOW TO ORDER KITS:

1. Select base kit: SV1 (buttweld or TC) or SVS1F
2. Select elastomer
3. Select actuation type: pneumatic or manual

Pneumatic actuator: - Satin or polish. To couple to control unit or not (different part).

When ordering a pneumatic actuator, you must order a yoke kit



SV1 and SVS1F BUTTERFLY VALVE KITS

To specify:
1) Select desired Base Kit
2) Select one of the following:
- Actuator and Yoke Kit combination *or*
- Manual Handle

A Select Base Kit:

BASE KIT
Machined finish flanges and polished discs

OD Tube	SV1 (Buttweld)	SV1 (Tri-Clamp)	SVS1F (Buttweld)
1"	000-25-08-301/**	000-25-08-050/**	000-25-08-305/**
1.5"	000-25-08-401/**	000-25-08-051/**	000-25-08-405/**
2"	000-25-08-451/**	000-25-08-052/**	000-25-08-455/**
2.5"	000-25-08-501/**	000-25-08-053/**	000-25-08-505/**
3"	000-25-05-552/**	000-25-08-054/**	000-25-08-555/**
4"	000-25-08-651/**	000-25-08-055/**	000-25-08-655/**

/** = Seal Material
/81 = EPDM
/96 = HNBR
/75 = VMQ (Silicone)
/71 = FPM (Viton)

SV1 (2-Piece) Butterfly Valve Base Kit

SVS1F (4-Piece) Butterfly Valve Base Kit

B Select Actuation Type: (Actuator + Yoke Kit) or Manual Handle

PNEUMATIC ACTUATOR

OD Tube	Standard Actuator (satin finish)	Standard Actuator (150 grit polish)	Control Unit Actuator* (satin finish)	Control Unit Actuator* (150 grit polish)
1"-4"	000-15-31-055/17	3A0-15-31-055/13	000-15-37-070/17	3A0-15-37-070/13

*Prepared for use with CU Control Unit

+

YOKE KIT

OD Tube	Yoke Kit
1"	000-15-40-053/17
1.5"	000-15-40-055/17
2"	000-15-40-055/17
2.5"	000-15-40-054/17
3"	000-15-40-054/17
4"	000-15-40-054/17

or

MANUAL HANDLE

OD Tube	Manual Handle
1"-4"	000-08-41-065/93

Black Plastic

(PNEUMATIC ACTUATOR + YOKE KIT)

Example,
2" OD Tube SV1 Butterfly Valve with Tri-Clamp ends,
HNBR seal material and
Pneumatic Actuator with 150 grit polish
000-25-08-052/96 Base Kit
3A0-15-31-055/13 Actuator
000-15-40-055/17 Yoke Kit

NOTE: SV1 / SVS1F equivalent to B10 / BF11

Do you have any questions?

DELTA SW4 Valve Stop and Change-Over Valve

Launched 1998

1” – 6” OD Tube

DN25-DN150

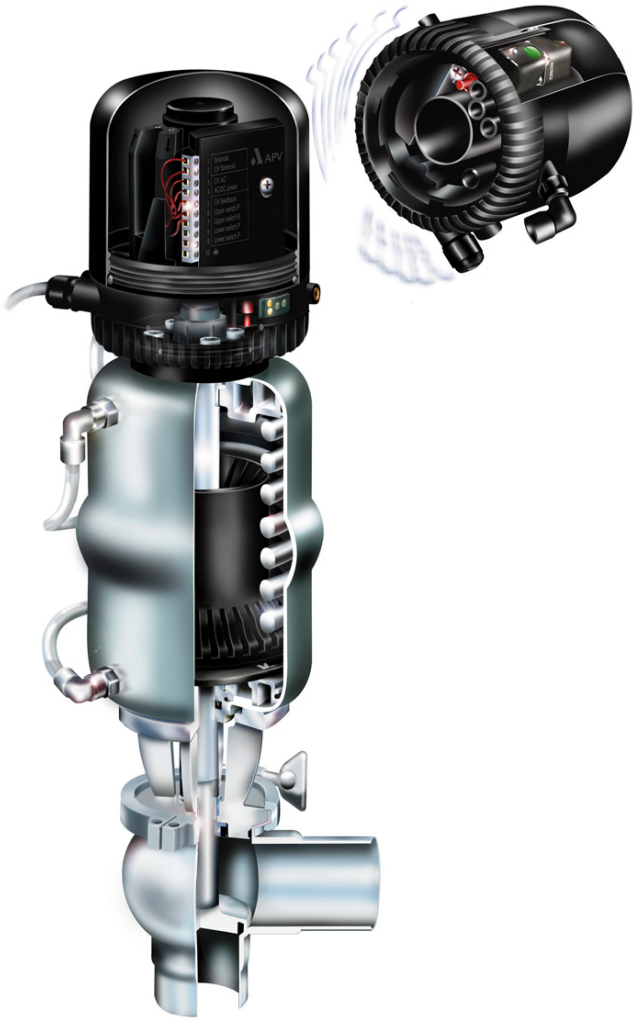
Launched 2005

½” – ¾” OD Tube

DN10-20

DELTA SW4 Valve – The Product

Shut-off valve



DELTA SW4 Valve – The Product

Available in Sizes

DIN: DN10 – DN150 Metric Sizes
ISO: 1” - 4” OD Tube

Material

Product-wetted parts: AISI 316L / 1.4404
Other stainless steel parts: AISI 304 / 1.4301

Surface finish

ID Polished to Ra ≤ 1.6 µm / 32Ra µin. (150 grit)
OD Satin or 150 grit polished

Product line pressure

Max. 10 bar

Max. Temperature

135°C / 275°F (short term) 140°C / 302 °F

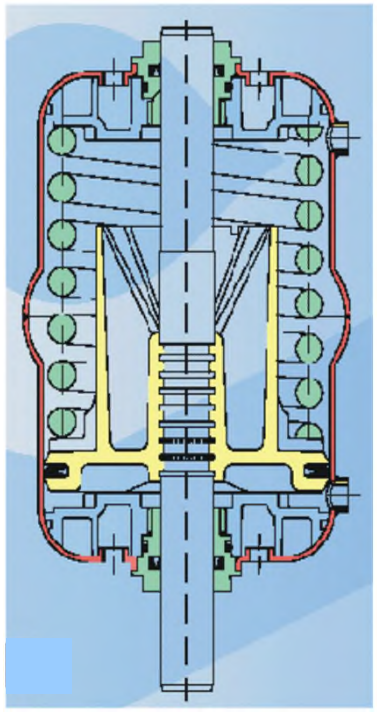
Valve operators

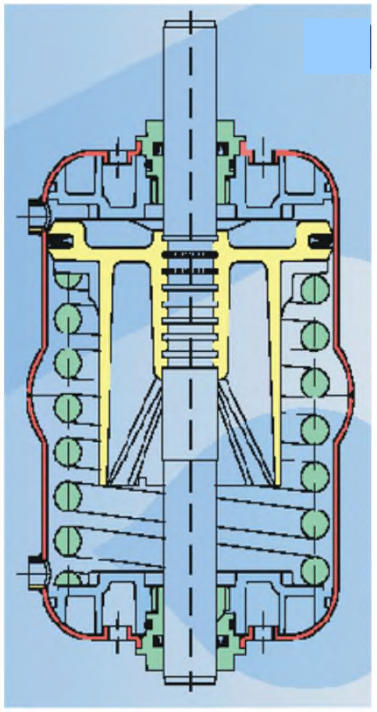
Pneumatic Actuator option for manual operator

DELTA SW4 Valve – The Product

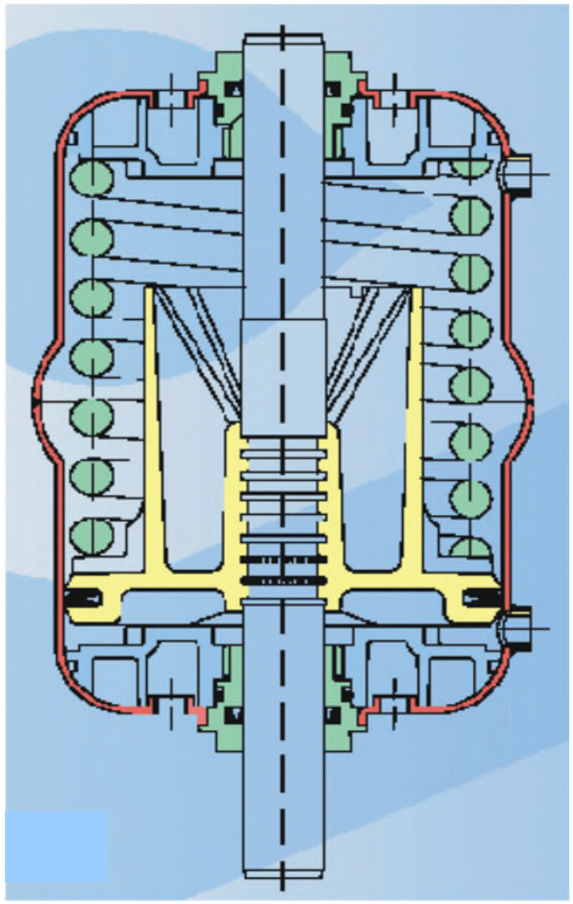
SW4 Standard ACTUATOR

- **Stroke**
  31 mm nominal
- **Required air pressure**
  6 - 8 bar (88 - 120 psi)
- **Sizes**
  A, B and C size actuators cover range from DN25 – DN100 / 1” - 4” OD Tube and are interchangeable (with corresponding guide rod).
- **Construction**
  Fully-welded, maintenance free
- **Orientation**
  Can be reversed from NC to NO or vice versa
- **Warranty**
  5 years





DELTA SW4 Valve – The Product



SWL4 Long Stroke ACTUATOR

- **Stroke:**

  B size = 51 mm (2 inch) nominal (for 2” and 2.5” valves);

  C size = 75 mm (3 inch) nominal (for 3” and 4” valves*)

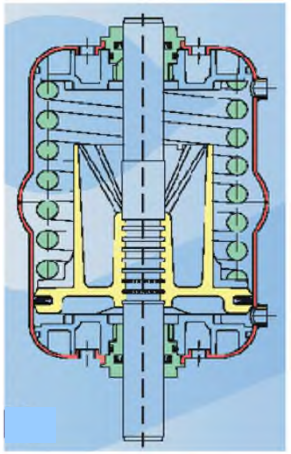
- **Required air pressure:**
  6 - 8 bar (88 - 120 psi)
- **Sizes:**

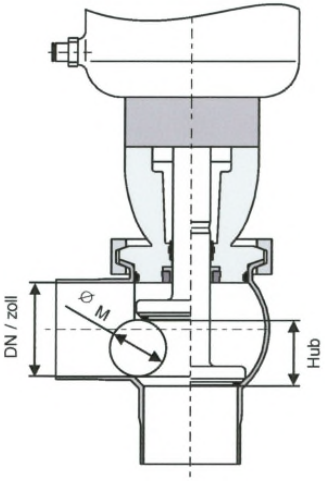
B and C size actuators cover range from DN50 – DN100 / 2” - 4” OD Tube and are not interchangeable due to difference in stroke lengths.

- **Construction:**
  Fully-welded, maintenance free
- **Orientation:**
  Can be reversed from NC to NO or vice versa
- **Warranty:**
  5 years

*Can also be used on 6”T valves to provide longer stroke -- Contact Factory

DELTA SW4 Valve – The Product



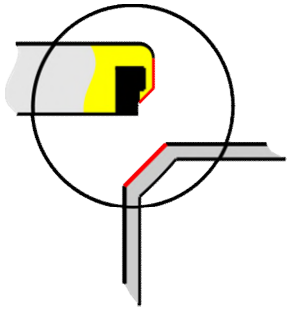


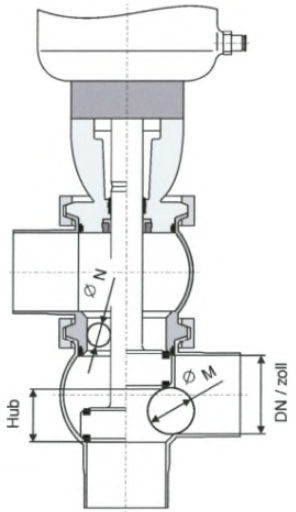
Einsitzventil
DELTA SW4 - Langhubausführung

Hub und freier Querschnitt in mm		
	Einsitzventil SW41,42 SWE41,42,43,44	
DN	Hub	Ø M
50	36	31
65	48	43
80	62	58
100	72	67
zoll		
2"	36	31
2,5"	48	43
3"	62	58
4"	72	67

Einsitzventil
DELTA SW4 - Standardausführung

Hub und freier Querschnitt in mm		
	Einsitzventil SW41,42 SWE41,42,43,44	
DN	Hub	Ø M
25	12	9,5
40	25	20
50	28	23
65	28	23
80	28	23
100	28	23
zoll		
1"	12	9,5
1,5"	25	20
2"	28	23
2,5"	28	23
3"	28	23
4"	28	23





Umschaltventil
DELTA SW4 - Langhubausführung

Hub und freier Querschnitt in mm			
	Umschaltventil SW43,44,47,48 SWE45,46		
DN	Hub	Ø M	Ø N
50	33	31	15
65	45	43	23
80	59	58	30,5
100	69	67	40
zoll			
2"	33	31	15
2,5"	45	43	20
3"	59	58	26,5
4"	69	67	40

Einsitzventil
DELTA SW4 - Standardausführung

Hub und freier Querschnitt in mm		
	Einsitzventil SW41,42 SWE41,42,43,44	
DN	Hub	Ø M
25	12	9,5
40	25	20
50	28	23
65	28	23
80	28	23
100	28	23
zoll		
1"	12	9,5
1,5"	25	20
2"	28	23
2,5"	28	23
3"	28	23
4"	28	23

DELTA SW4 Valve – The Product

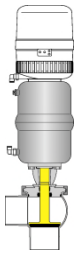
SW4 D Size ACTUATOR

- **Stroke**
  44 mm / 1.75” nominal
- **Required air pressure**
- 6 - 8 bar (88 - 120 psi)
- **Sizes**
  D size actuator available for 6” OD Tube (DN125 and DN150) only.
- **Construction**
  Fully-welded, maintenance free
- **Orientation**
  Can be reversed from NC to NO or vice versa
- **Warranty**
  5 years

DELTA SW4 Valve – Interchangeable Actuators

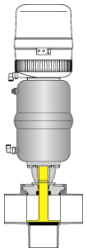
DELTA SW4 – Body Styles - Standard Shut-off and Divert

SW41



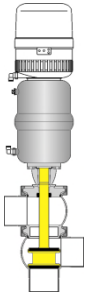
SW41

SW42



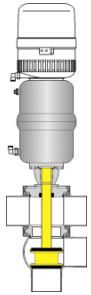
SW42

SW43



SW43

SW44



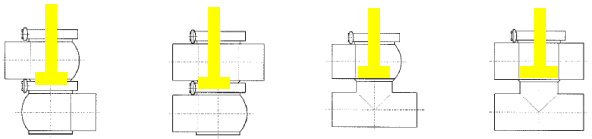
SW44

APV Single seat shut-off and change over valve
SW4 / SWE4 / SWS4 / SWT4

Tankboden-Ventil

Shut-off valve

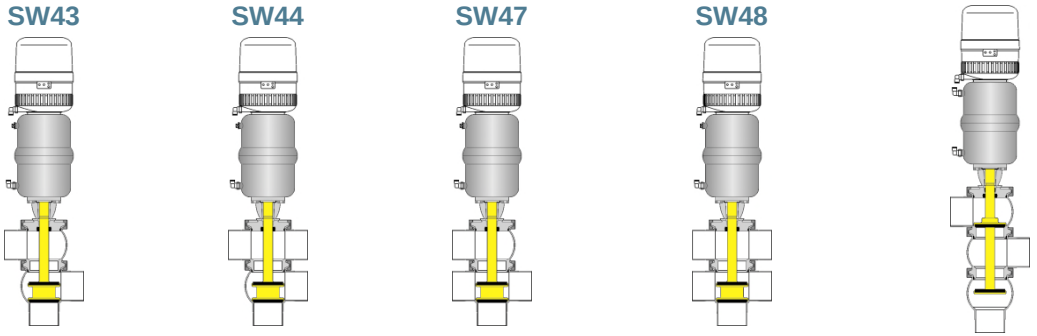
SWE41 SWE42 SWE43 SWE44



„E“=> vertical connection ports only,best suitable for valve cluster

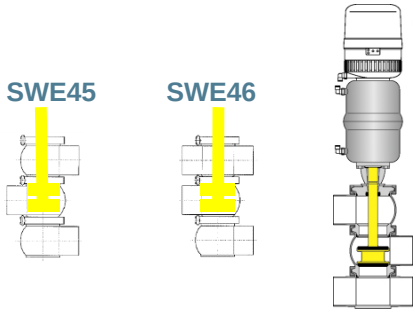
Single seat change over valve

SW43 SW44 SW47 SW48 SWS45



E“=> vertical connection ports only,best suitable for valve cluster

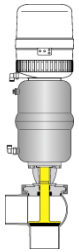
SWE45 SWE46 SWE47



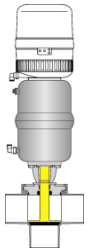
APV Einsitz-Absperr- und Umschaltventile SW4 / SWE4 / SWS4 / SWT4

Einsitz-Absperrventile / Single seat shut-off valve

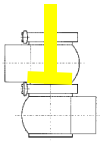
SW41



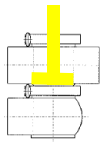
SW42



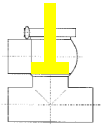
SWE41



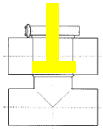
SWE42



SWE43



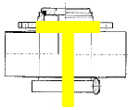
SWE44



Tankboden-Ventil
tank bottom valve

SWT41

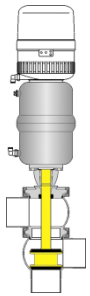
SWT42



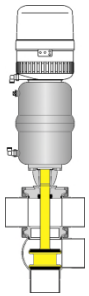
„E“=> horizontale Stutzen vorzugsweise zum Bau von Ventilknoten
„E“=> horizontal ports preferred for making valve manifolds

Einsitz-Umschaltventile / Single seat change over valve

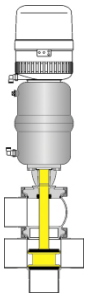
SW43



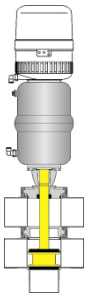
SW44



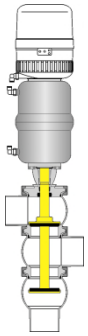
SW47



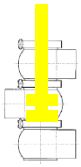
SW48



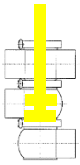
SWS45



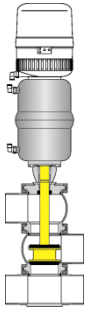
SWE45



SWE46

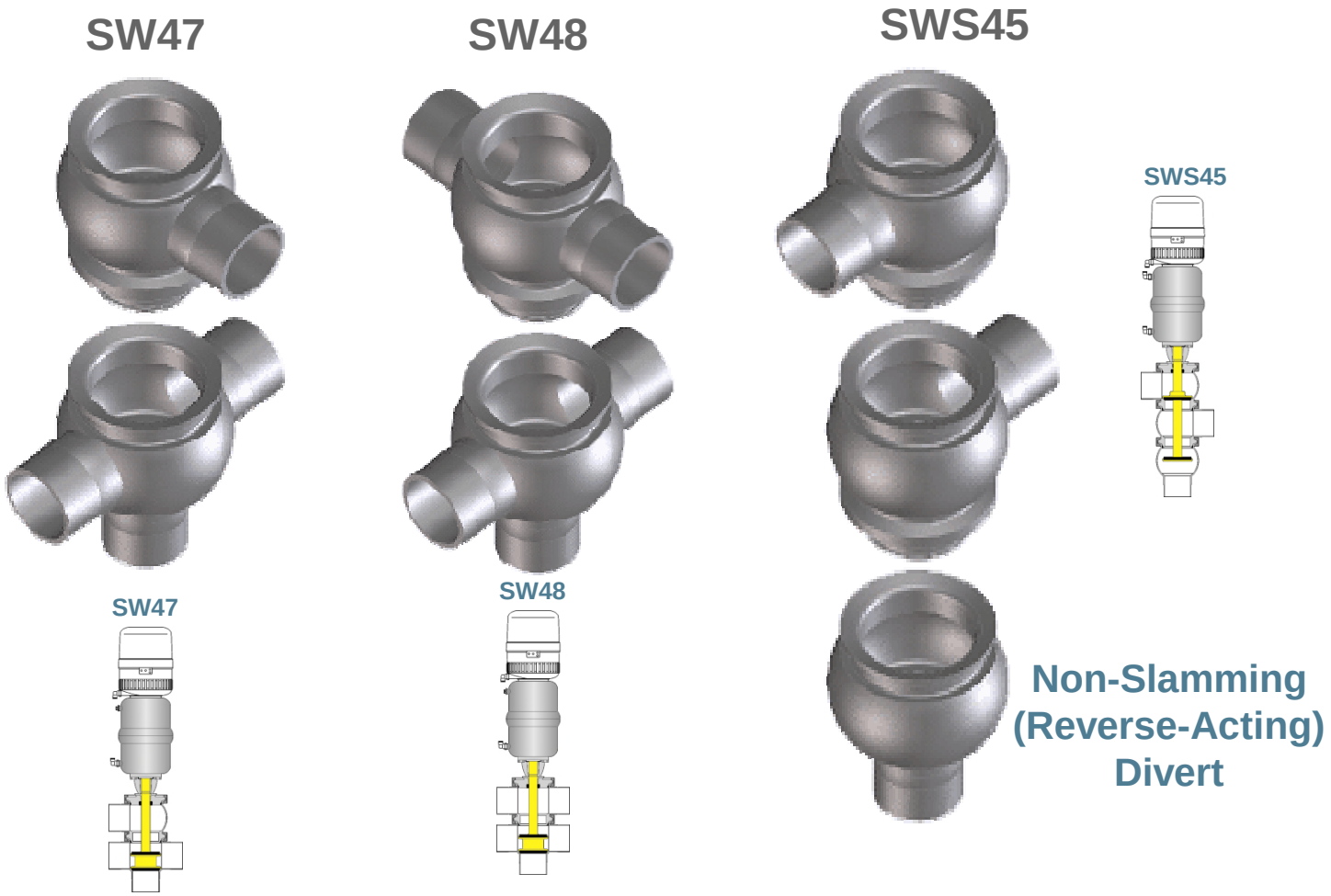


SWE47



„E“=> horizontale Stutzen vorzugsweise zum Bau von Ventilknoten
„E“=> horizontal ports preferred for making valve manifolds

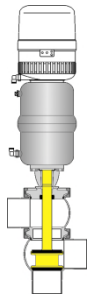
DELTA SW4 – Body styles - Other Shut-off and Divert



DELTA SW4 – Body styles - Other Shut-off and Divert

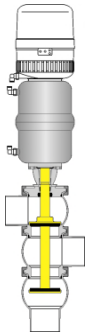
SW43

SW43



SWS45

SWS45

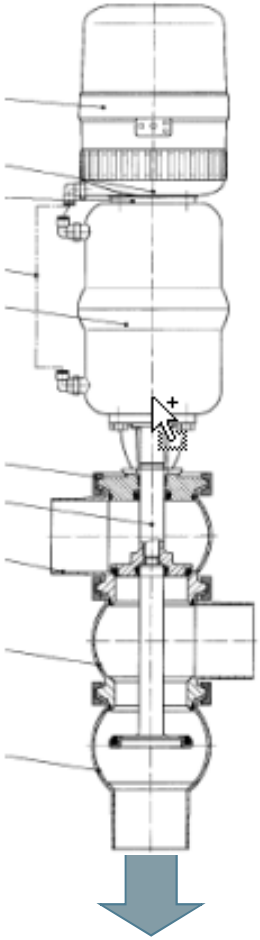


Non-Slamming (Reverse-Acting) Divert

DELTA SW4 - Distribution vs converging

Distribution_Valve

SWS45



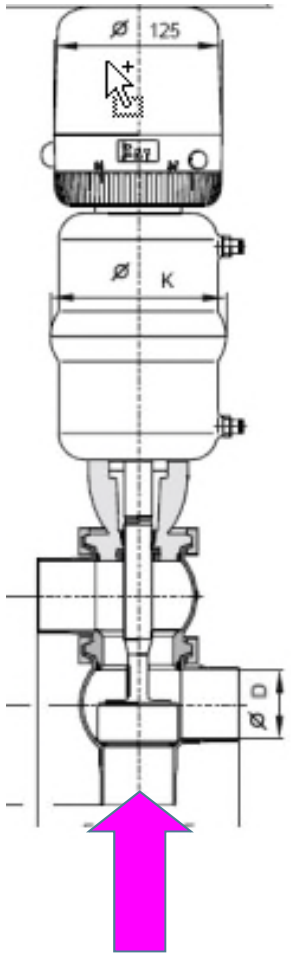
Out II

In

Out I

Converging Valve

SW43



In II

Out

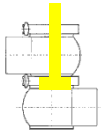
In I

DELTA SW4 – Body styles - Matrix-Style

SPX

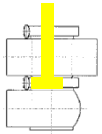
SWE 41

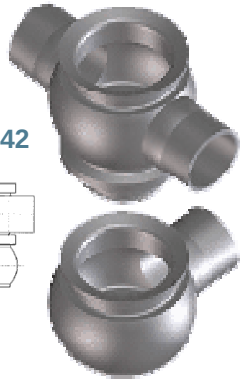
SWE41



SWE 42

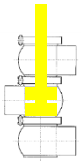
SWE42





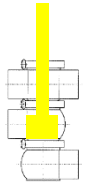
SWE 45

SWE45



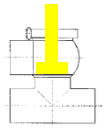
SWE 46

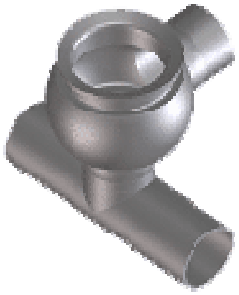
SWE46



SWE 43

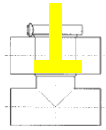
SWE43



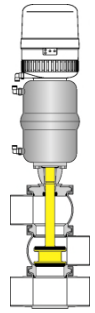


SWE 44

SWE44

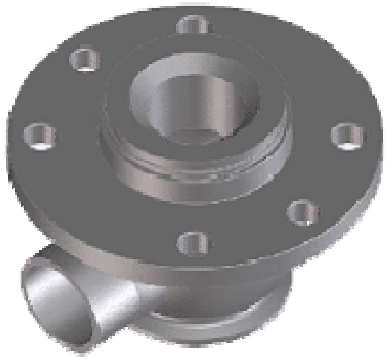


SWE47



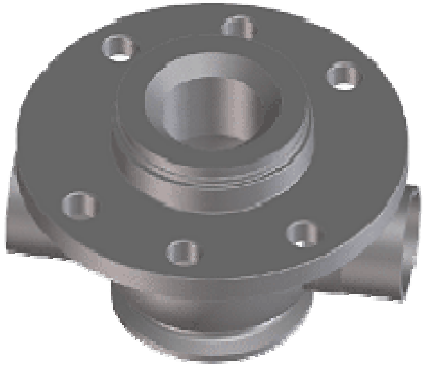
DELTA SW4 – Body styles - Tank Outlet

SWT 41

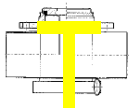


SWT41

SWT 42



SWT42



DELTA SW4 Valve - Options

- Stroke Limitator (infinitely variable)
- Crank handle for manual operation
- Oil damp cylinder
- Steam barrier
- Long stroke
- Tangential inlet / outlet
- Proximity holder
- Tank outlet version
- 3.1B certificate
- 3A version

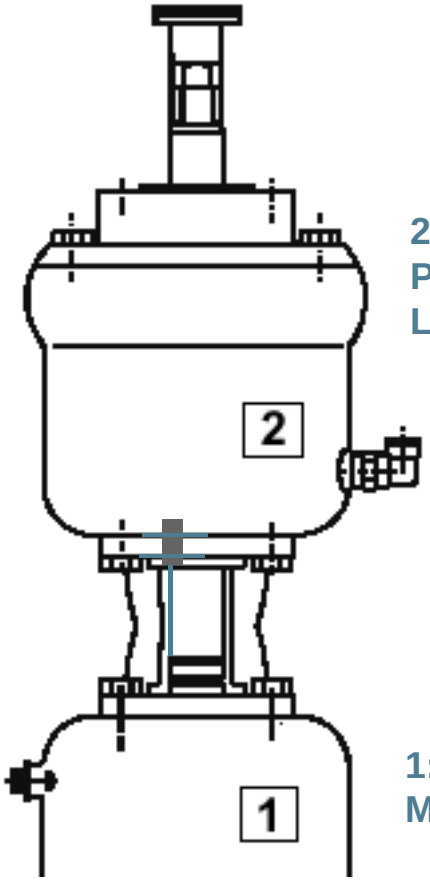
DELTA SW4 Valve - Options

OTHER OPTIONS

Adjustable Position Stop

- For fluid process applications requiring a middle “stop” position in-between the extreme open and closed valve positions.
- Mid-position can be manually set at any point between 0- 100% of the full stroke.
- The valve must be configured as normally closed and operation requires an additional air supply.

DELTA SW4 Valve - Options



2:
Pneumatic Stroke Limitation actuator

1:
Main actuator

Adjustable Position Stop *(continued)*

Operation: Actuate valve from open position to mid-position

Desired Valve Position	Step
Open	Operate Main Actuator with compressed air to the lower air fitting
Mid-Position	A) Maintain air supply to Main Actuator
	B) Operate Pneumatic Stroke Limitation Actuator with compressed air
	C) Remove compressed air supply to Main Actuator
Closed	Remove compressed air supply to Pneumatic Stroke Limitation Actuator

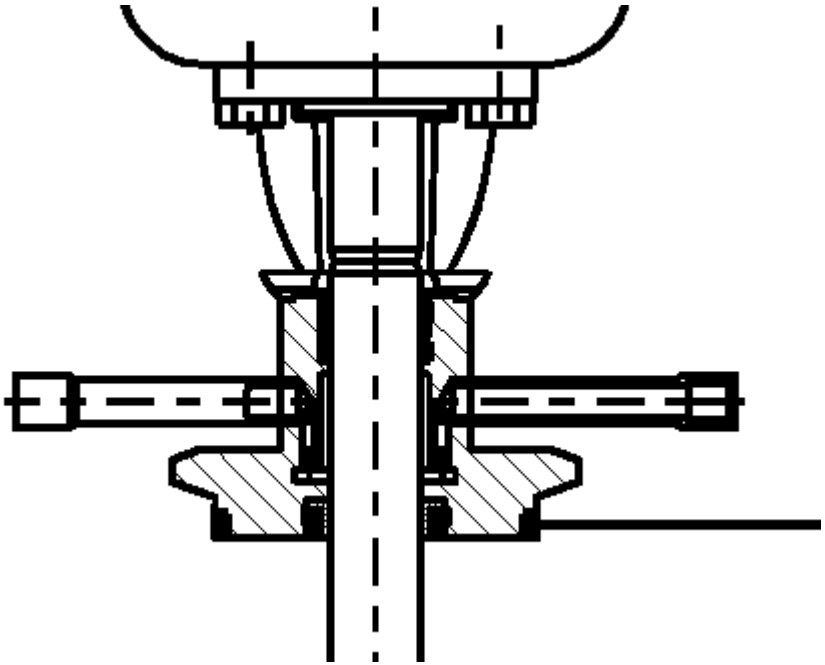
Operation: Actuate valve from normally closed position to mid-position

Desired Valve Position	Step
Closed	Both Main Actuator and Pneumatic Stroke Limitation Actuator are depressurized
Mid-position	Operate Pneumatic Stroke Limitation Device with compressed air

OTHER OPTIONS

Steam Barrier Connections for Shaft Seal

- Provides in and out connections to provide steam barrier around shaft seal



DELTA SW4 Valve – Seals

SEAL MATERIALS

Housing and Seat Seals

•EPDM (standard), FPM (Viton), VMQ* (Silicone) or HNBR

Note: If VMQ is selected, housing seals are EPDM

Shaft Seals

•PTFE/EPDM (standard), PTFE/FKM (Viton), PTFE/VMQ (Silcone), PTFE/HNBR

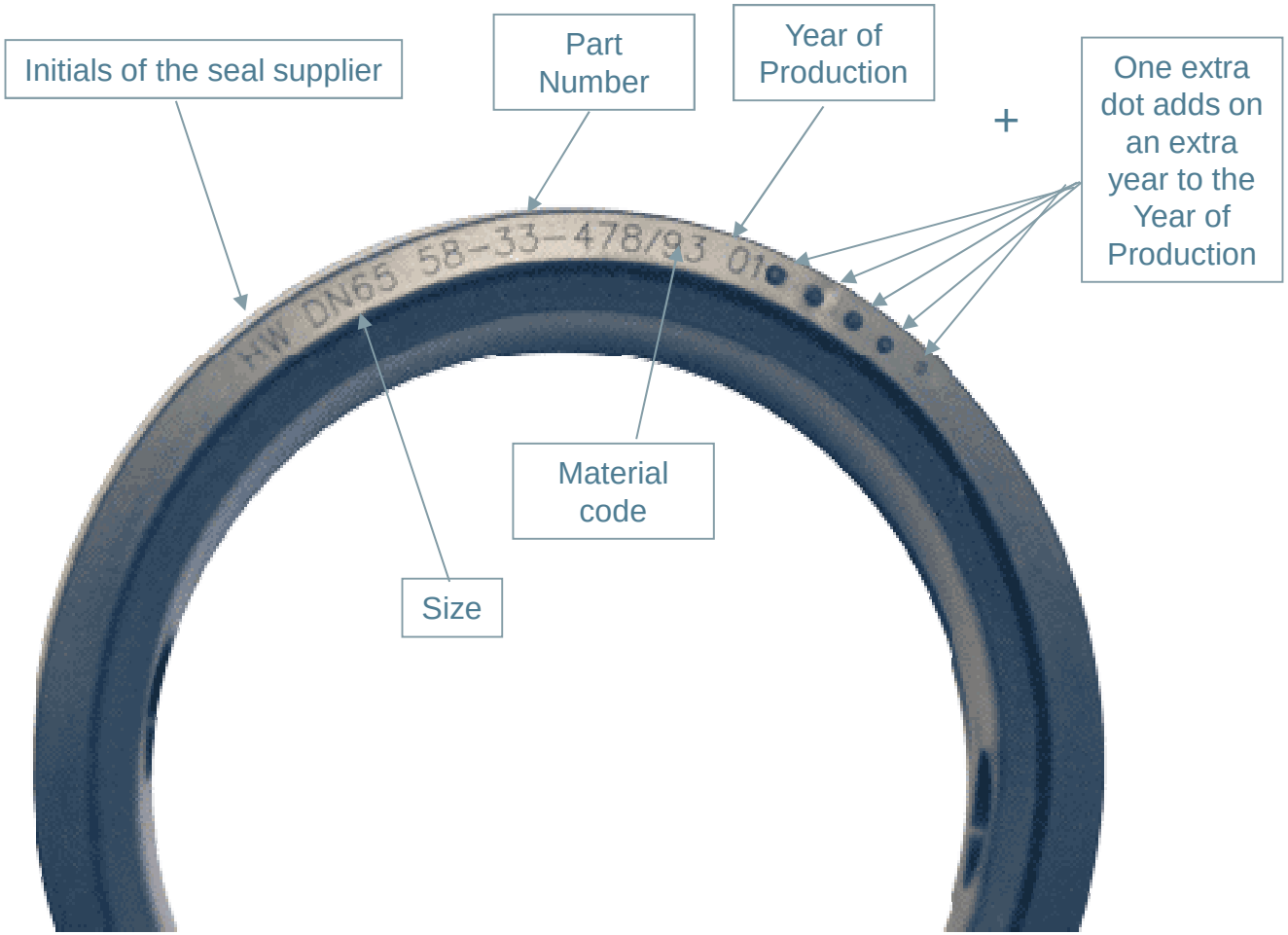
Sanitary

•All elastomer and plastic seal materials conform to FDA and 3-A requirements

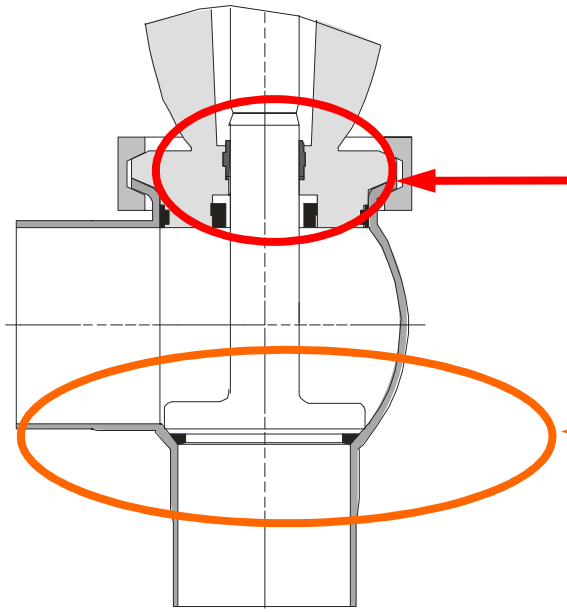
Identification

•Seals are individually molded or etched with base part number and year of manufacture. Material type is based on part number ending (/13, /33, /73, /93 etc.).

DELTA SW4 Valve – Seals



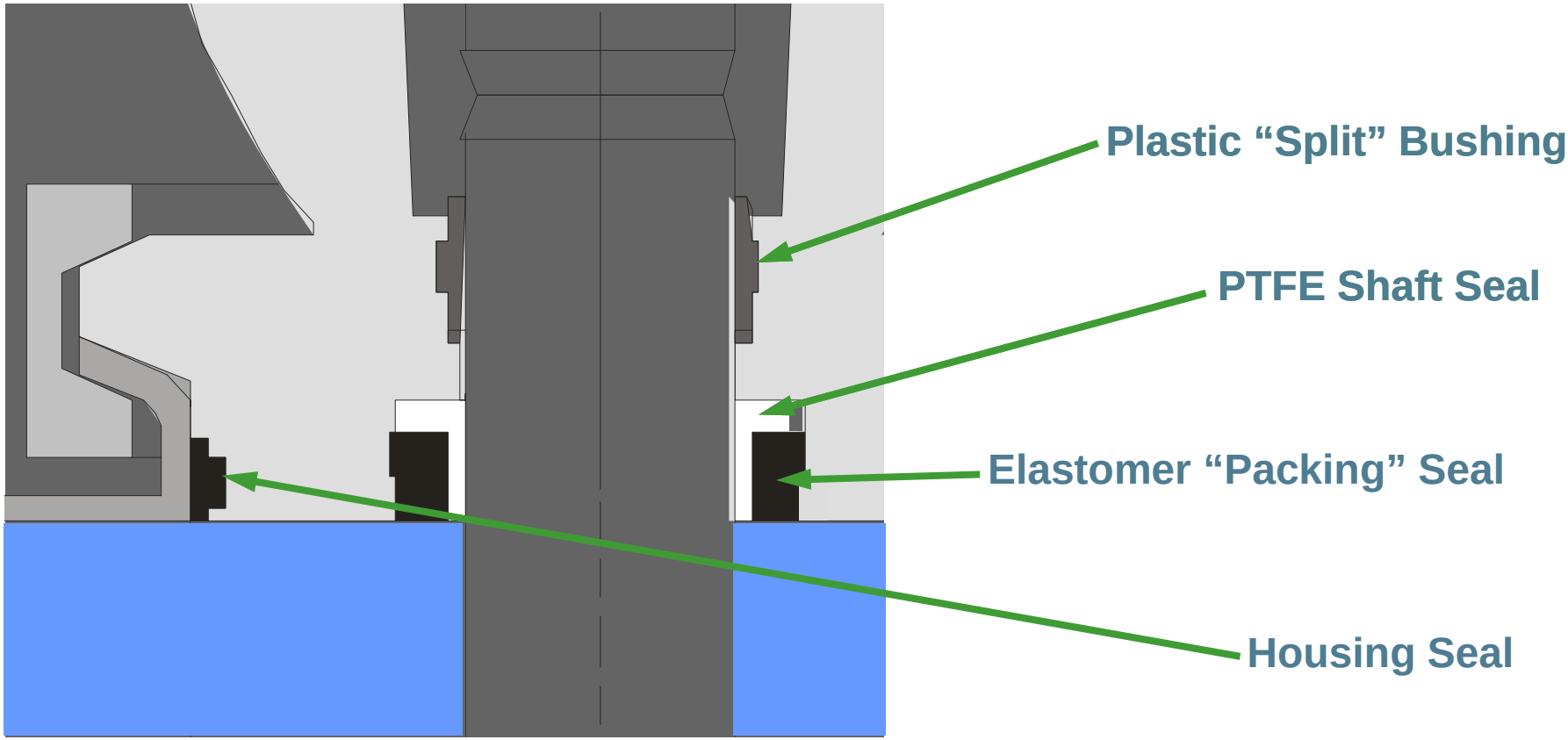
SEAL DESIGN



PTFE/Elastomer
Shaft Seals

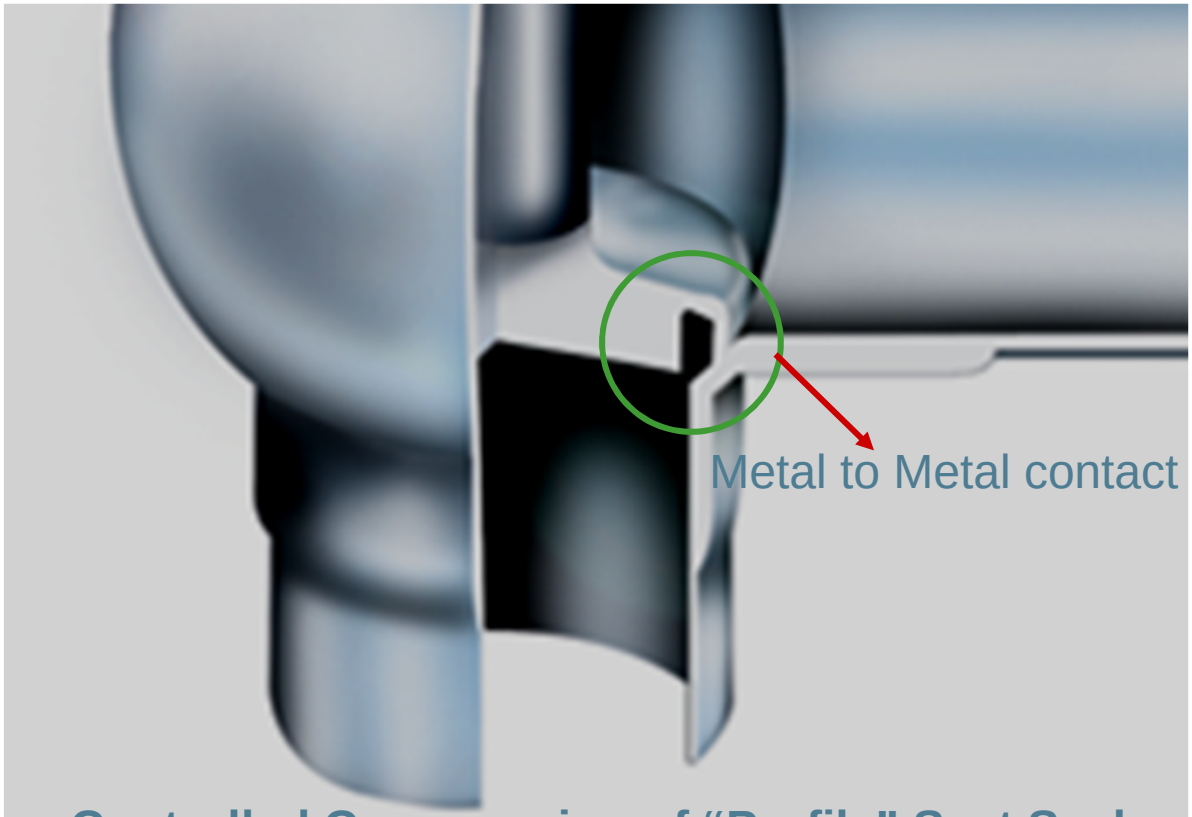
Controlled Compression
of Seat Seals

SEAL DESIGN


Plastic “Split” Bushing
PTFE Shaft Seal
Elastomer “Packing” Seal
Housing Seal

DELTA SW4 Valve – Seals

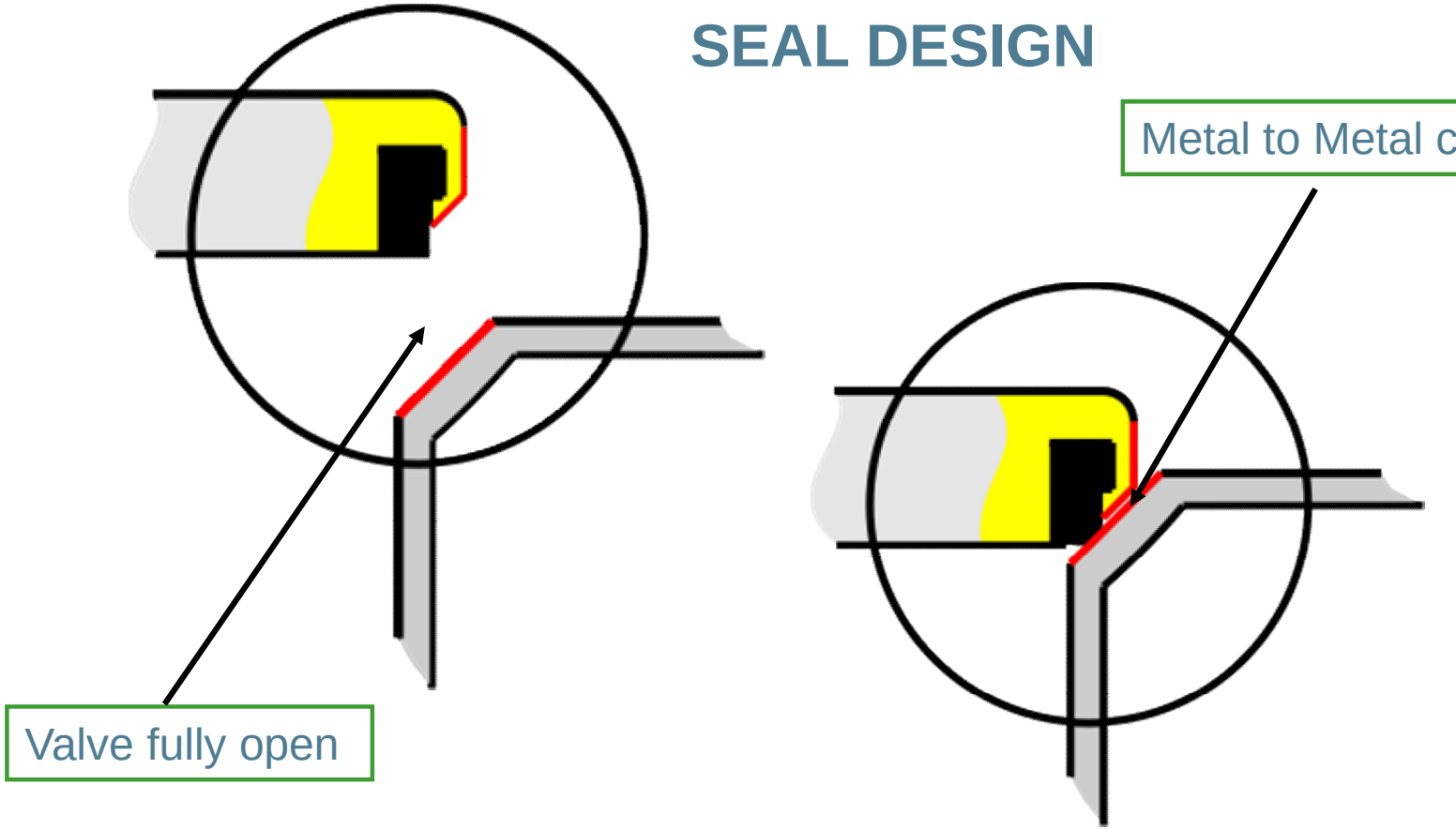
SEAL DESIGN



Controlled Compression of “Profile” Seat Seals

DELTA SW4 Valve – Seals

SEAL DESIGN



DELTA SW4 Valve – Control Units

DELTA CU3

DELTA CU3 Valve-Net

DELTA CU4

DELTA SW4 Valve – Control Units/Feedback

CONTROL/FEEDBACK OPTIONS

Control Unit

Solenoid & valve position indication:

- APV Delta CU4 Direct Connect
- APV Delta CU3 Valve-Net Profibus
- APV Delta CU3 Valve-Net DeviceNET
- APV Delta CU4 AS-interface

Above items with or without NOT Element (provides automatic air assist to back side of
piston to increase product holding pressure)

Feedback only: 1 or 2 proximity switches:
- Proximity Holder (shown at right)

DELTA SW4 Valve - Service

- **Minimal number of gaskets**
- **Few parts**
- **Maintenance-free actuator**

DELTA SW4 Valve - Service

- **To secure a quick and safe mounting of the seat seal an assembly tool is available.**

- **Its use is strongly recommended**

DELTA SW4 Valve – Service

Easy handling and maintenance

- Clamp closure system between housing and yoke
- Different actuator sizes available
- Simple hexagon nut as shaft coupling
- Actuator prepared for spring open/spring closed
- Maintenance-free actuator
- Low weight
- Molded elastomer seals, easy to identify

FEATURES AND BENEFITS

General

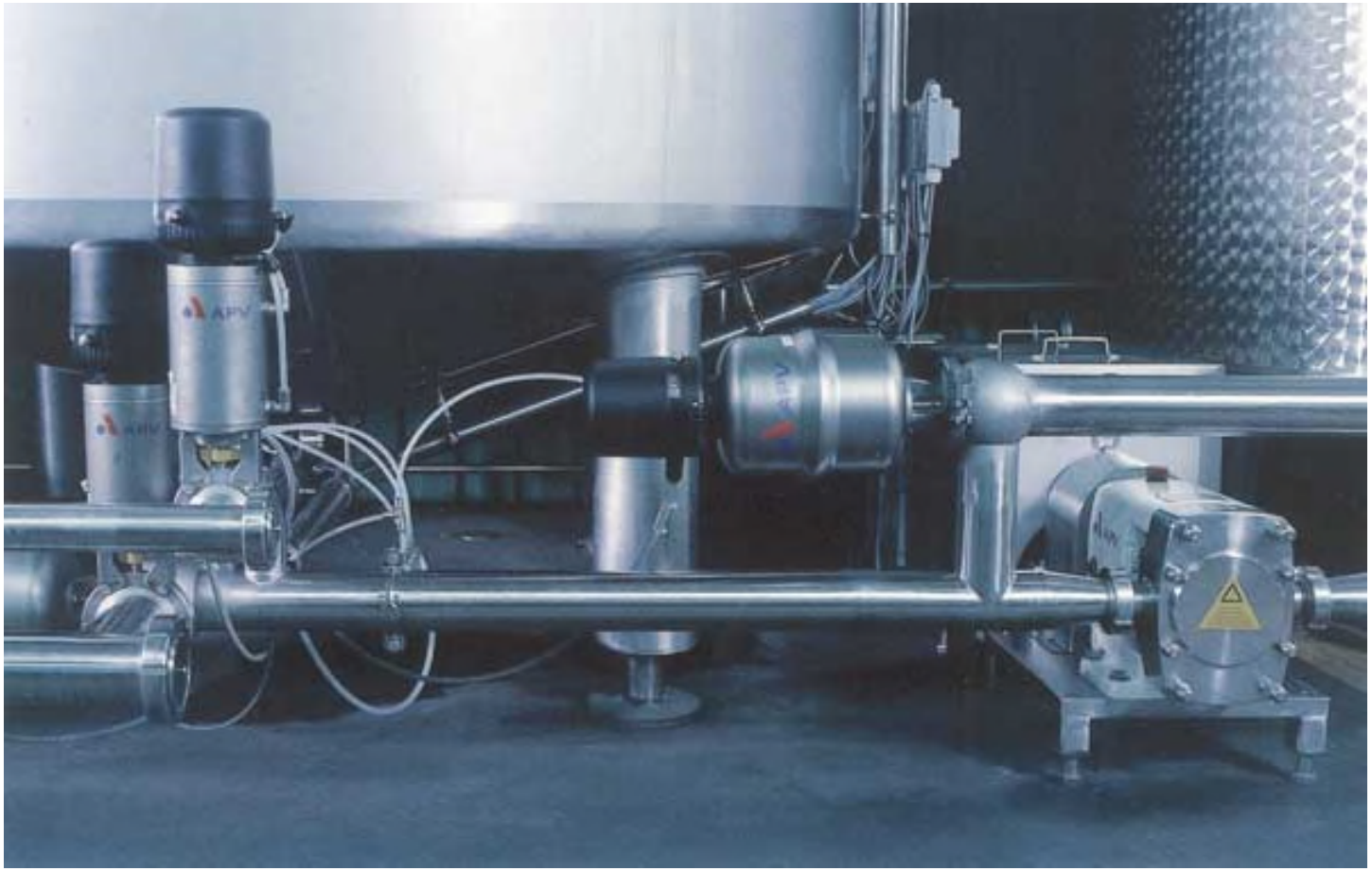
Strong valve housings
PTFE shaft seal with elastomer backing
Metallic stop in valve seat area allows controlled compression of seat seal and fixed locations for sensing of valve position
Maintenance-free reversible actuator
Low weight

Sanitary design

•Authorized to carry the 3-A symbol and a member of the USDA Dairy Accepted Equipment List
•Conforms to EHEDG test procedures
•Ball-shaped housing design enhances cleanability without
•"dome or sump" areas
•Fully drainable
•"Profile" seal design ensures seal grooves are completely filled (no gaps or spaces to clean behind)

USDA Dairy

DELTA SW4 Valve – The Application



DELTA SW4 Valve – The Application

Can be used as by-pass valve

Is widely used in all industries

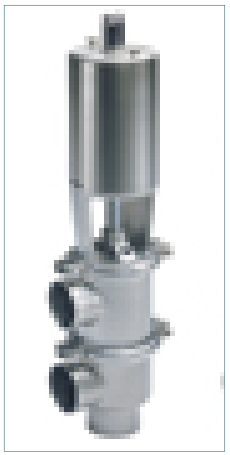
For a wide range of products

Yoghurt, beer, milk, cheese, ice cream, softdrinks

DELTA SW4 Valve – The Positioning

DELTA SW4 Valve – The Competition

Unique Single Seat Valve



SRC Valve

Ecovent N

SVP

DELTA SW4 Valve – The Competition

APV versus Alfa

The Alfa actuator is not fully welded and has to be checked every two years

Safety issue: The APV valve cannot be taken apart by coincident

The APV valve is approx. X % cheaper than the Alfa valve

APV versus Südmo

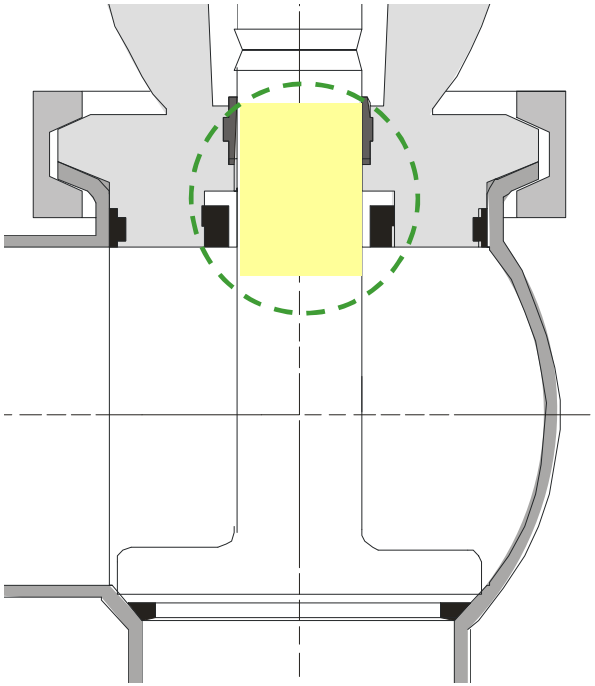
Do you have any questions?

I think it is time for a brake now.

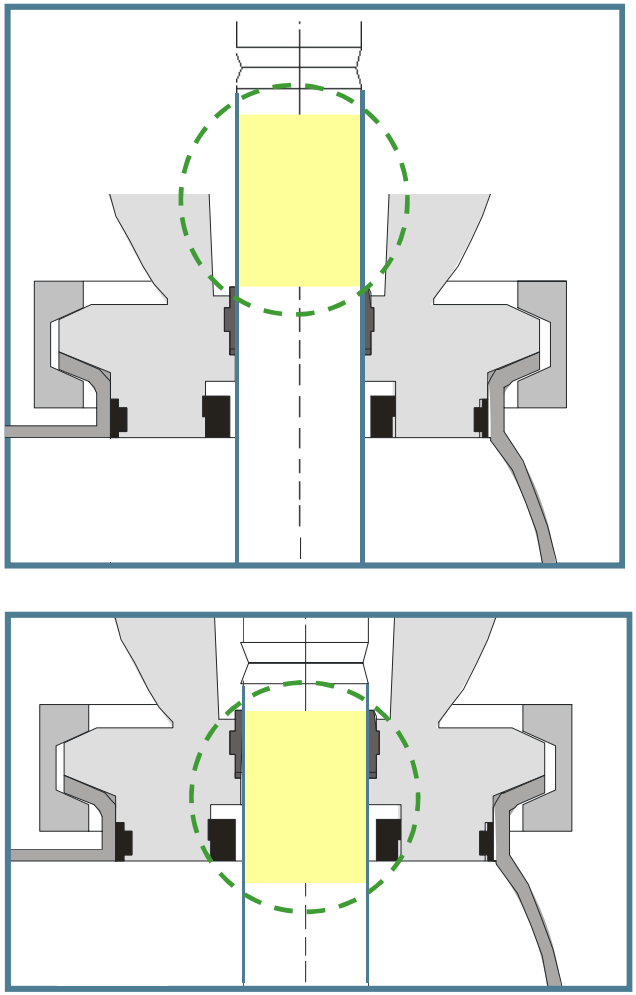
DELTA MS4 MSP4

ASEPTIC SINGLE SEAT VALVE

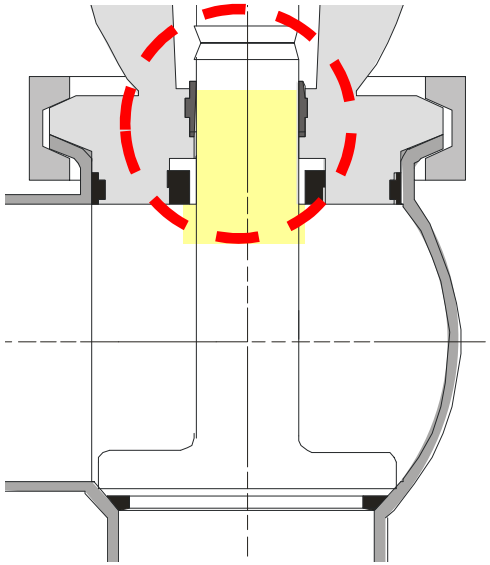
DELTA MS4/MSP4 -Standard
vs. Aseptic Single Seat Valves



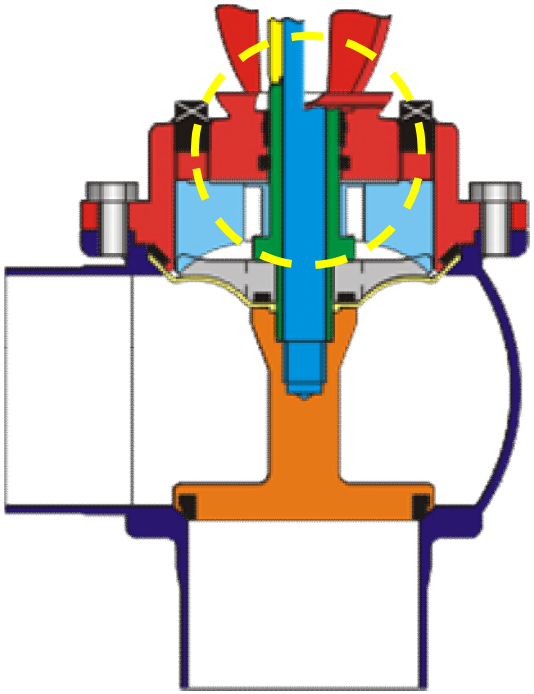
SW4 Single Seat Shut-off Valve



Standard vs.
Aseptic Single Seat Valves

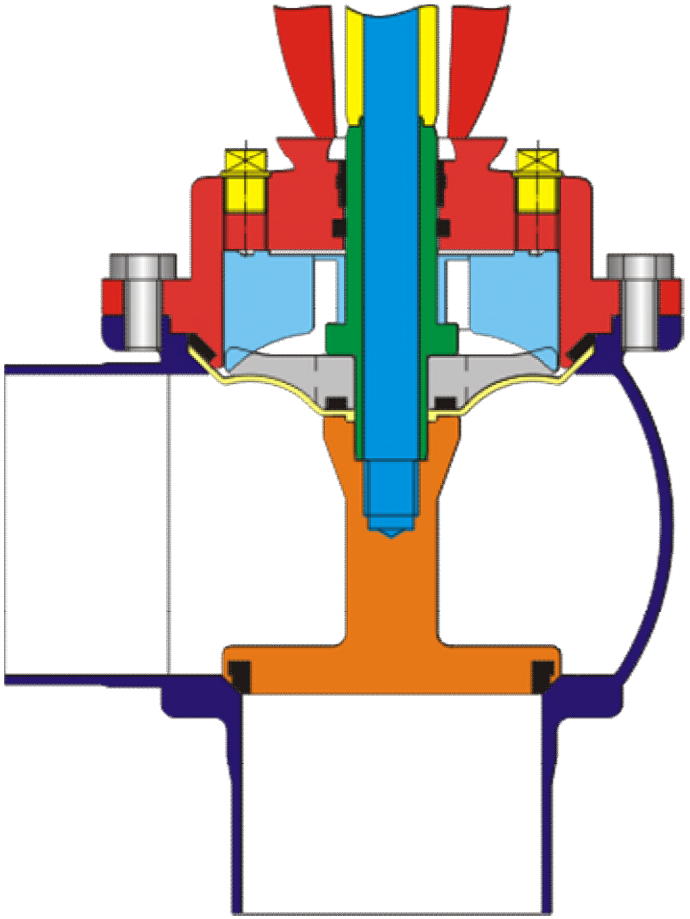


SW4



MS4

DELTA MS4/MSP4



DELTA M4/MP4 - components

DELTA M4

- Rubber supported flat TFM membrane

DELTA MP4

- TFM membrane, shaft & cone all in one piece

DELTA MF4

- With stainless steel bellow

DELTA MS4/MSP4 PRODUCT DESCRIPTION

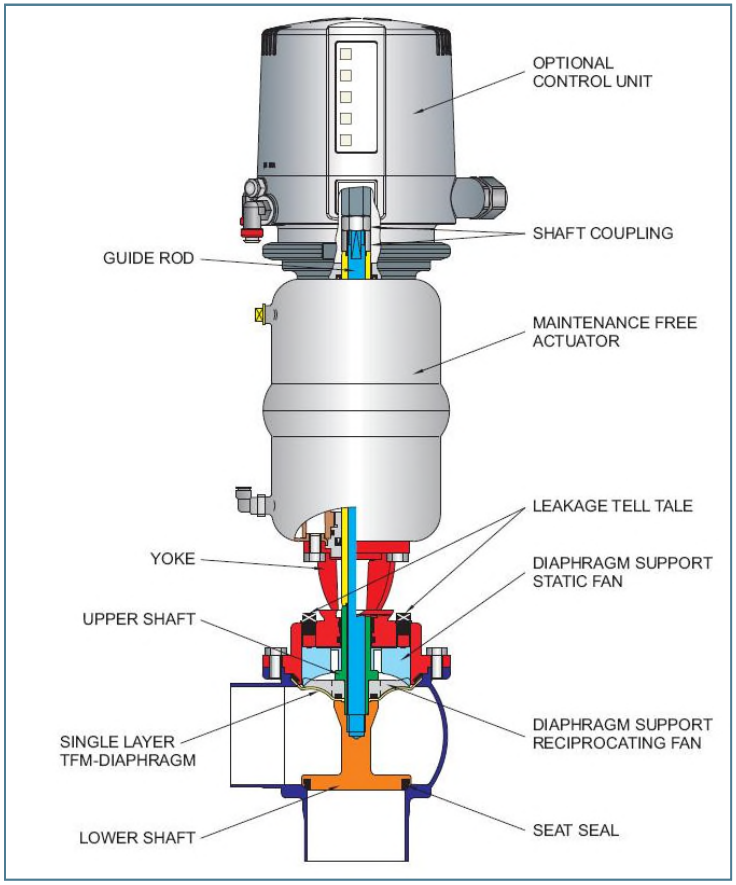
What is DELTA MS4 and MSP4?

The DELTA MS4 and MSP4 aseptic single seat valves are designed for applications in the food, beverage, dairy, pharmaceutical and chemical industries.

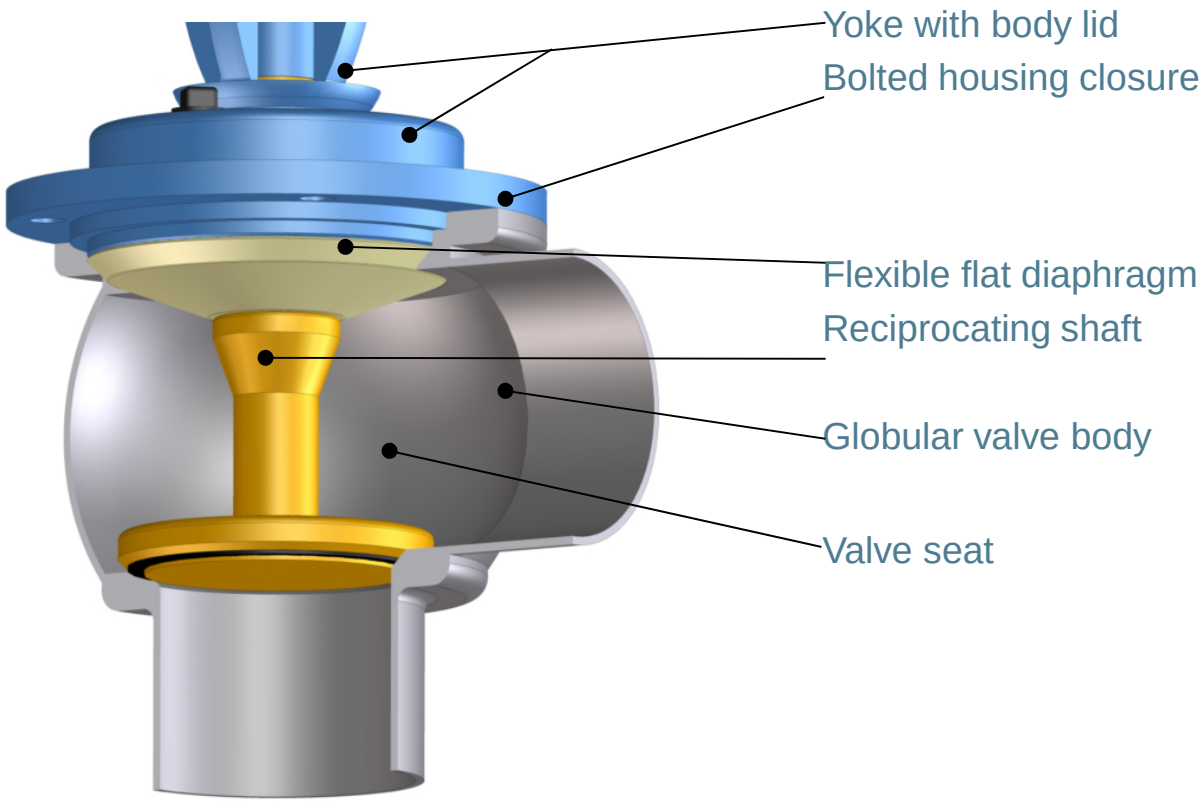
The housing is made of high resistant stainless steel AISI 316L with a product wetted surface finish of Ra 0,8 µm. All other non-product wetted stainless steel parts are made of stainless steel AISI 304.

The DELTA MSP4 valve has been developed especially for applications where elastomers are not accepted in the product wetted areas.

The DELTA MS4 and MSP4 valves are available in shut-off and change over design. It is also available as tank outlet valve.



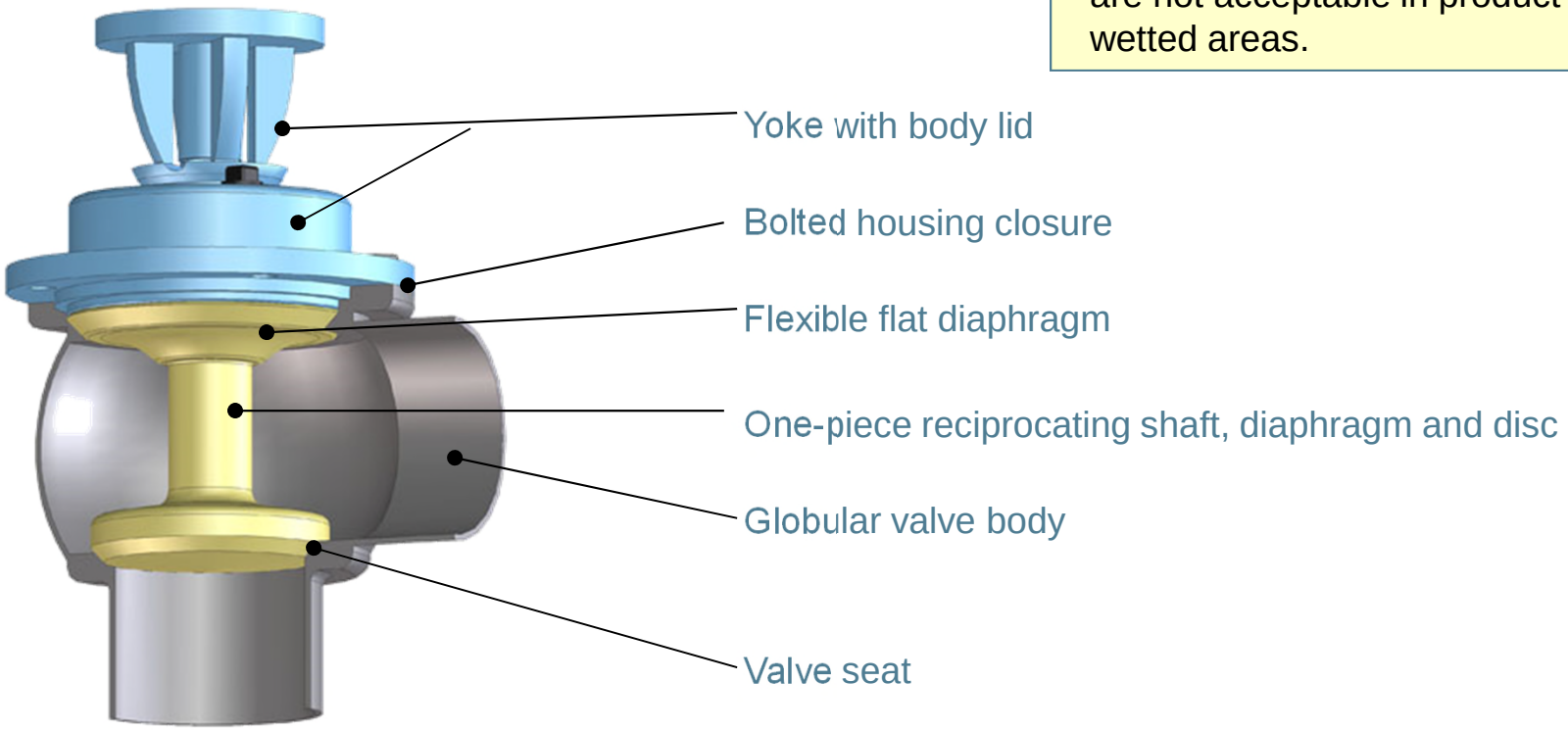
DELTA MS4 Aspetic Single Seat Valve



DELTA MS4/MSP4 PRODUCT DESCRIPTION

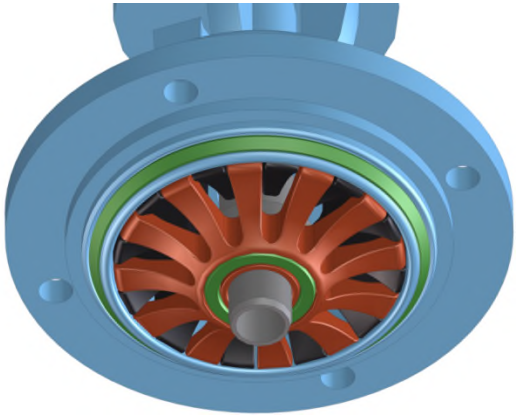
DELTA MSP4 Aspetic Single Seat Valve

The DELTA MSP4 valve has been developed especially for applications where elastomers are not acceptable in product wetted areas.

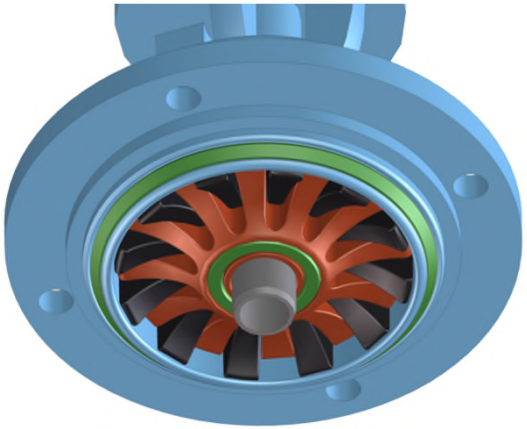


DELTA MS4/MSP4 PRODUCT DESCRIPTION

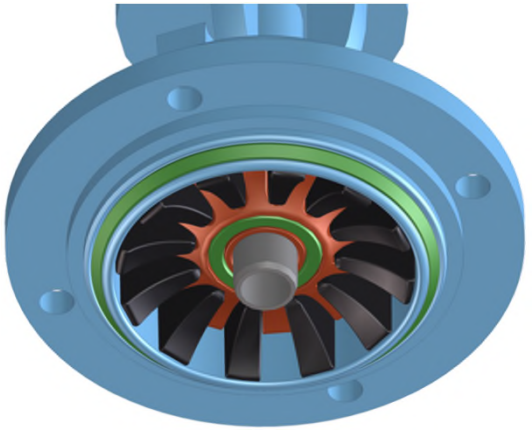
Diaphragm support by static fan cage (black) and reciprocating fan (red)



Fan in lower position
(valve closed)

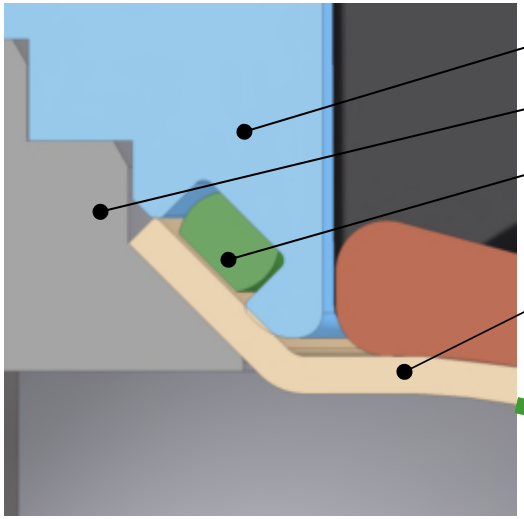


Fan in middle position
(valve half open)

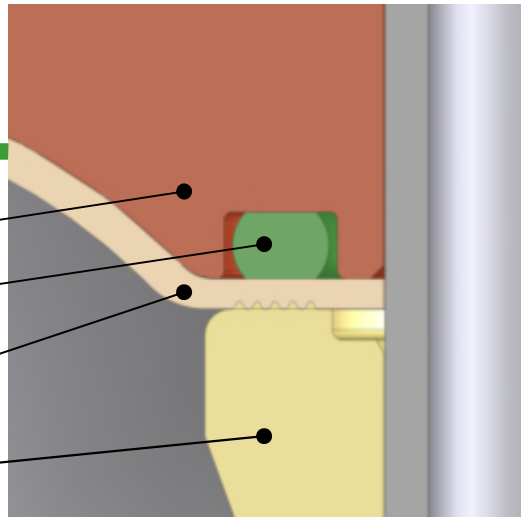


Fan in top position
(valve fully open)

Sealing



Outside sealing of valve body to diaphragm



Inside sealing of diaphragm to reciprocating shaft

Technical data - DELTA MS4/MSP4

Sizes	DN25, DN40, DN50, DN65, DN80, DN100 1", 1,5", 2", 2,5", 3", 4"
Housing configurations	DELTA MS4: MS41 (L), MS42 (T), MSE41 (KLL), MSE42 (KTL), MSE43 (KLT), MSE44 (KTT), MSES45 (LLS), MST 41 (L), MST42 (T) DELTA MSP4: MSP41 (L), MSP42 (T), MSPE41 (KLL), MSPE42 (KTL), MSPE43 (KLT), MSPE44 (KTT), MSPT 41 (L), MSPT42 (T)
Line pressure	Max. 10 bar
Operating temperature	Max. 135° C
Sterilisation temperature	140° C EPDM, HNBR (Short term)
Control air pressure	Min. 6 bar, max. 8 bar
Product wetted parts Non product wetted parts	AISI 316 L / 1.4404 AISI 304 / 1.4301
Seal material	Seat seal: EPDM, HNBR, Viton or VMQ Diaphragm + Diaphragm shaft MSP4: PTFE-TFM 1705

Features and Benefits

GLOBAL INFRASTRUCTURE X PROCESS EQUIPMENT X DIAGNOSTIC TOOLS

DELTA MS4/MSP4 FEATURES AND BENEFITS

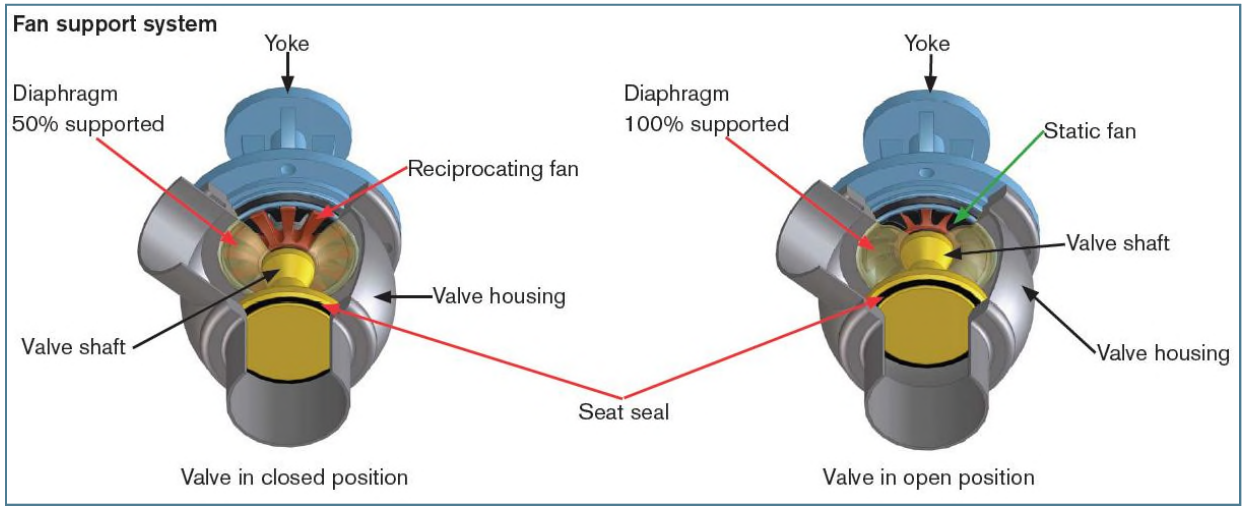
Selling points at a glance

- Suitable for all kind of media used in food and pharmaceutical industries
- Reliable design
- High pressure capability
- High temperature capability
- Long diaphragm lifetime
- A variety of valve body configurations enables efficient system designs
- Leakage detectable immediately
- Easy and cost effective maintenance
- Meeting strictest hygienic demands
- 3A and EHEDG approved
- Upgrading DELTA M4 to DELTA MS4 and DELTA MP4 to DELTA MSP4 possible

DELTA MS4/MSP4 FEATURES AND BENEFITS

Design features

Feature >	*Advantages >*	*Benefits*
▪ Diaphragm fan support	▪ This unique feature relieves process pressure on the diaphragm	▪ Significantly extend diaphragm lifetime ▪ Production can also be run up to 10 bar



DELTA MS4/MSP4 FEATURES AND BENEFITS

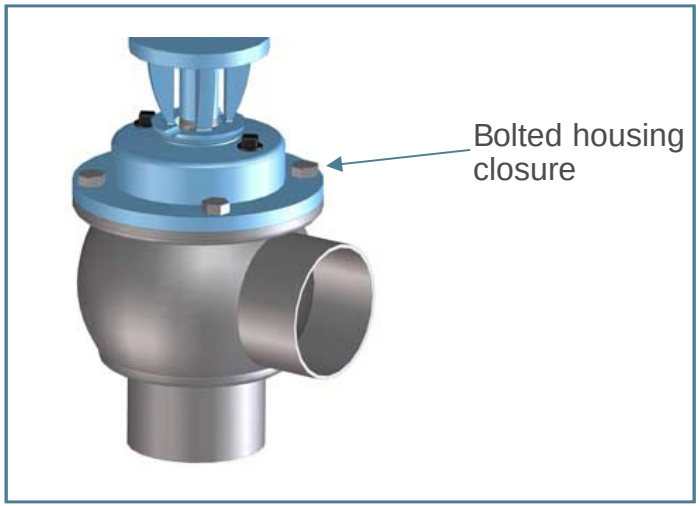
Design features

Feature >	*Advantages >*	*Benefits*
▪ Single layer PTFE diaphragm  	▪ The flatness of the design minimizes product wetted surface	▪ The single layer PTFE diaphragm is built for reliability ▪ It ensures smooth product flow and reduces pressure drops ▪ The single layer PTFE diaphragm is very flexible and can be used even for high-fiber products avoiding the problems when using a bellow ▪ Reduces cleaning time and consumption of CIP agents ▪ Production can also be run up to 10 bar
	▪ The single layer PTFE diaphragm is very strong and robust	▪ In contrast to standard elastomers, the single layer PTFE diaphragm enables the use of a variety of cleaning agents and products and higher temperatures

DELTA MS4/MSP4 FEATURES AND BENEFITS

Design features

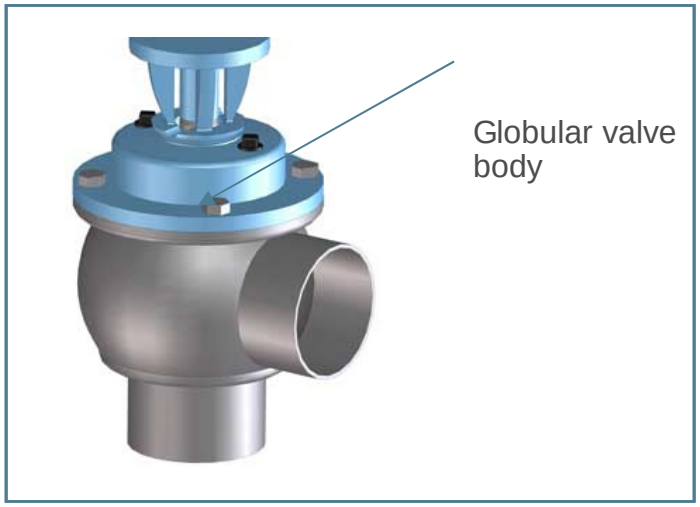
Feature >	*Advantages >*	*Benefits*
▪ Bolted housing closure	▪ Ensures tight sealing	▪ Retightening of the housing closures is not necessary– not even after many SIP cycles



DELTA MS4/MSP4 FEATURES AND BENEFITS

Design features

Feature >	*Advantages >*	*Benefits*
▪ Globular valve body	▪ Open geometry and easy accessibility without any dead ends or air pockets	▪ No contamination and long CIP times ▪ Efficient sterilization



DELTA MS4/MSP4 FEATURES AND BENEFITS

Design features

Feature >	*Advantages >*	*Benefits*
▪ Versatile valve body configurations	▪ The variety in valve body configurations ensures the right body for any installation	▪ Eliminating the need for additional valves due to incomplete body configurations


MS41


MS42


MST41


MST42


MSE41


MSE42


MSE43


MSES44


MSES45


MSES46


MSES47


MSES48

DELTA MS4/MSP4 FEATURES AND BENEFITS

Upgrading Delta M3 and Delta M4 valves

Available conversion kits enable easy upgrading of the installed base of Delta M4 and M3 valves. By replacing existing parts with the parts listed below the valve is converted to a DELTA MS4 valve – A valve which can handle higher pressure and with a longer life time of the diaphragm.

Upgrading DELTA M4 to DELTA MS4:

A DN25, DN40, DN50, DN80, 1", 1½", 2", 3" (10 bar)
=> Item 1-9 and 16 to be upgraded

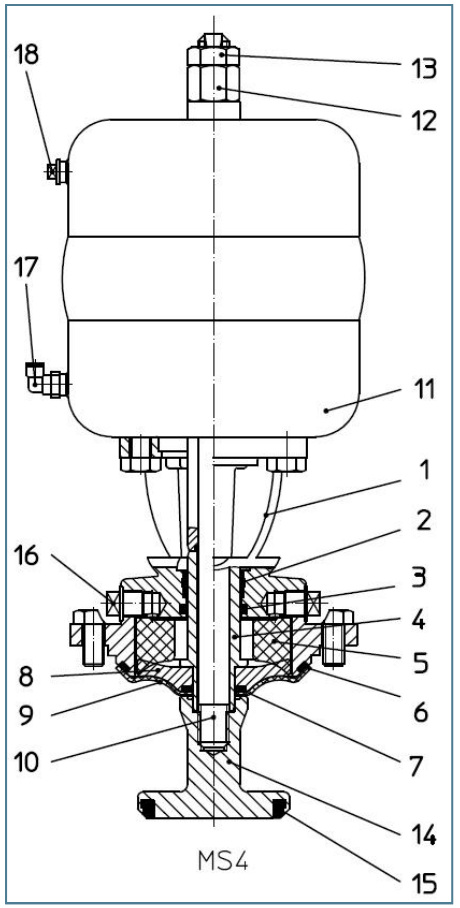
B DN65, 2½" (5 bar)
=> Item 1-10 and 16 to be upgraded

C DN65, 2½" (10 bar)
=> Item 1-11 and 16 to be upgraded

D DN100, 4" (6 bar)
=> Item 1-10 and 16 to be upgraded

Upgrading M3 to MS4:

A 2½", 3"
=> Item 1-18 to be upgraded



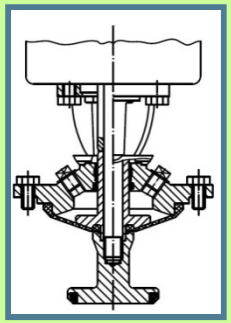
DELTA MS4/MSP4 FEATURES AND BENEFITS

Upgrading DELTA M3 and DELTA M4

Conversion kits available:

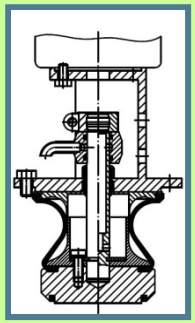
The same valve body design is used for DELTA MS4, DELTA M4 and DELTA M3.

DELTA M4



DN	actu -ator	ref.-No.: 3A0/standard design	ref.-No.: 3A0/satin	ref.-No.: 000/satin
25, 1"	act.ø74 p=10bar	3A0 39-32-001/43 H323873	3A0 39-32-001/47 H321525	000 39-32-001/47 H323879
40, 50 1,5", 2"	act.ø110 p=10bar	3A0 39-32-002/43 H323874	3A0 39-32-002/47 H321526	000 39-32-002/47 H323880
65, 2,5"	act.ø110 p=5bar	3A0 39-32-003/43 H323875	3A0 39-32-003/47 H321527	000 39-32-003/47 H323881
65, 2,5"	act.ø165 p=10bar	3A0 39-32-007/43 H324825	3A0 39-32-007/47 H324824	000 39-32-007/47 H324823
3"	act.ø165 p=10bar	3A0 39-32-004/43 H323876	3A0 39-32-004/47 H321528	000 39-32-004/47 H323882
80	act.ø165 p=10bar	3A0 39-32-005/43 H323877	3A0 39-32-005/47 H321529	000 39-32-005/47 H323883
100, 4"	act.ø165 p=6bar	3A0 39-32-006/43 H323878	3A0 39-32-006/47 H321530	000 39-32-006/47 H323884

DELTA M3

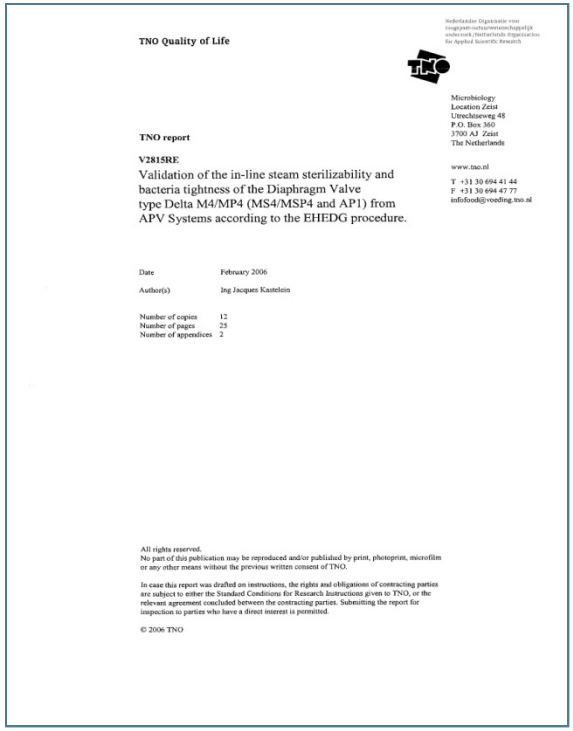


DN	ref.-No.: 3A0/standard design	ref.-No.: 3A0/satin	ref.-No.: 000/satin
25			
1"			
40, 1,5"			
50, 2"			
65			
2,5"		3A0 39-35-739/_	
3"		3A0 39-35-740/_	
80			
100, 4"			

Conversion kits other sizes will be created on request.

DELTA MS4/MSP4 FEATURES AND BENEFITS

Certification



TNO Quality of Life

Microbiology
Location Zeist
Utrechtseweg 48
P.O. Box 360
3700 AJ Zeist
The Netherlands

www.tno.nl

T +31 30 694 41 44
F +31 30 694 47 77
infofood@voeding.tno.nl

TNO report

V2815RE

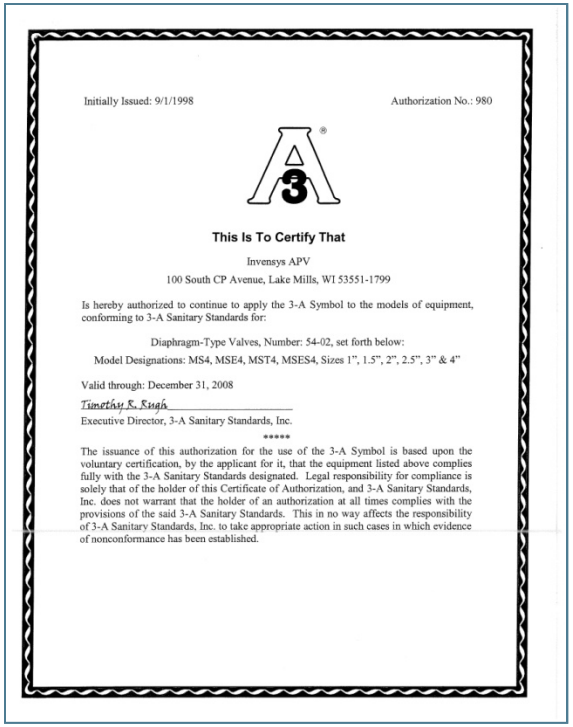
Validation of the in-line steam sterilizability and bacteria tightness of the Diaphragm Valve type Delta M4/MP4 (MS4/MSP4 and AP1) from APV Systems according to the EHEDG procedure.

Date February 2006

Author(s) Ing Jacques Kastelein

Number of copies 12
Number of pages 25
Number of appendices 2

EHEDG approval



Initially Issued: 9/1/1998 Authorization No.: 980

This Is To Certify That

Invensys APV

100 South CP Avenue, Lake Mills, WI 53551-1799

Is hereby authorized to continue to apply the 3-A Symbol to the models of equipment, conforming to 3-A Sanitary Standards for:

Diaphragm-Type Valves, Number: 54-02, set forth below:

Model Designations: MS4, MSE4, MST4, MSES4, Sizes 1", 1.5", 2", 2.5", 3" & 4"

Valid through: December 31, 2008

Timothy S. Singh

Executive Director, 3-A Sanitary Standards, Inc.

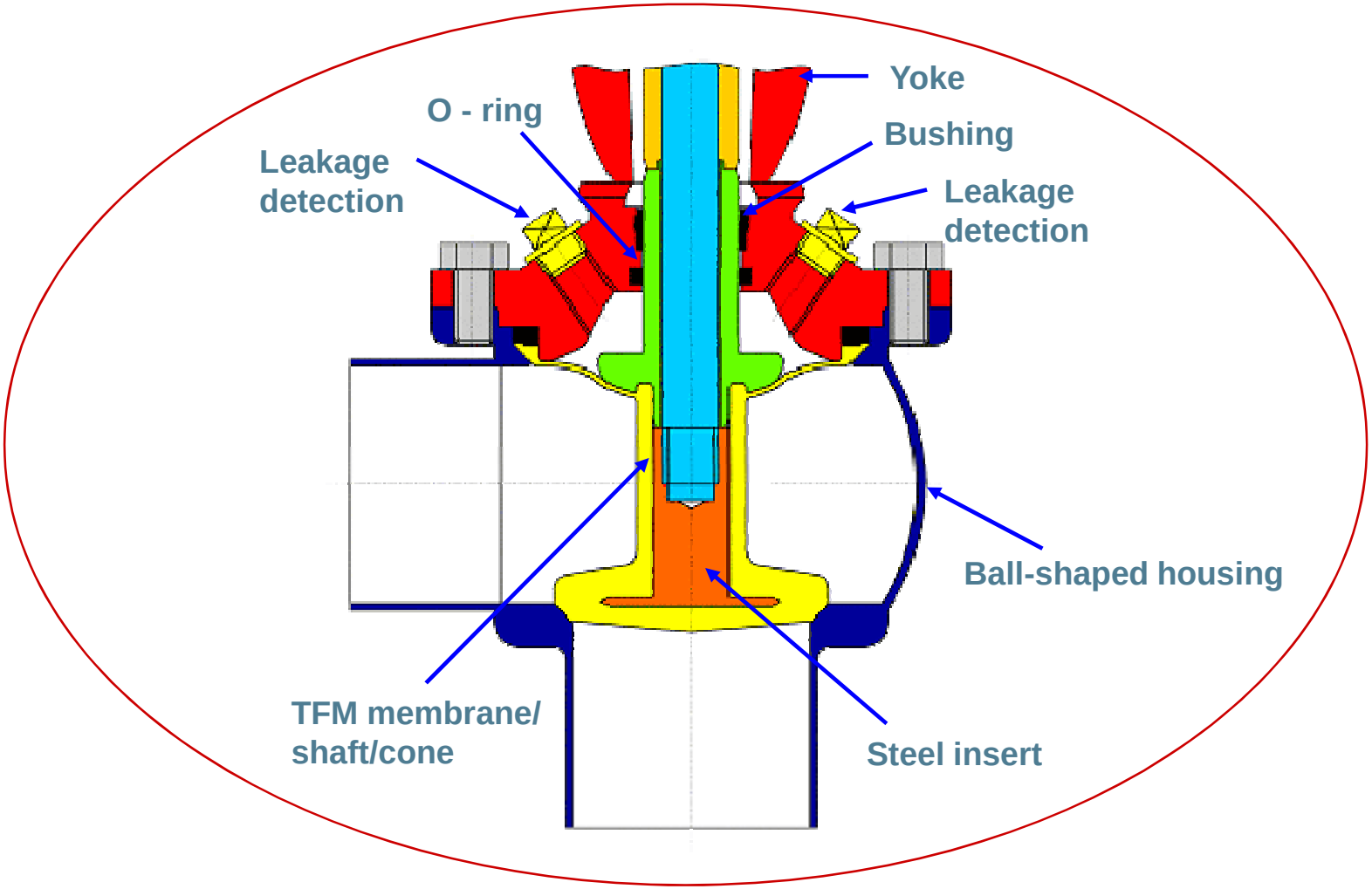
*****

The issuance of this authorization for the use of the 3-A Symbol is based upon the voluntary certification, by the applicant for it, that the equipment listed above complies fully with the 3-A Sanitary Standards designated. Legal responsibility for compliance is solely that of the holder of this Certificate of Authorization, and 3-A Sanitary Standards, Inc. does not warrant that the holder of an authorization at all times complies with the provisions of the said 3-A Sanitary Standards. This in no way affects the responsibility of 3-A Sanitary Standards, Inc. to take appropriate action in such cases in which evidence of nonconformance has been established.

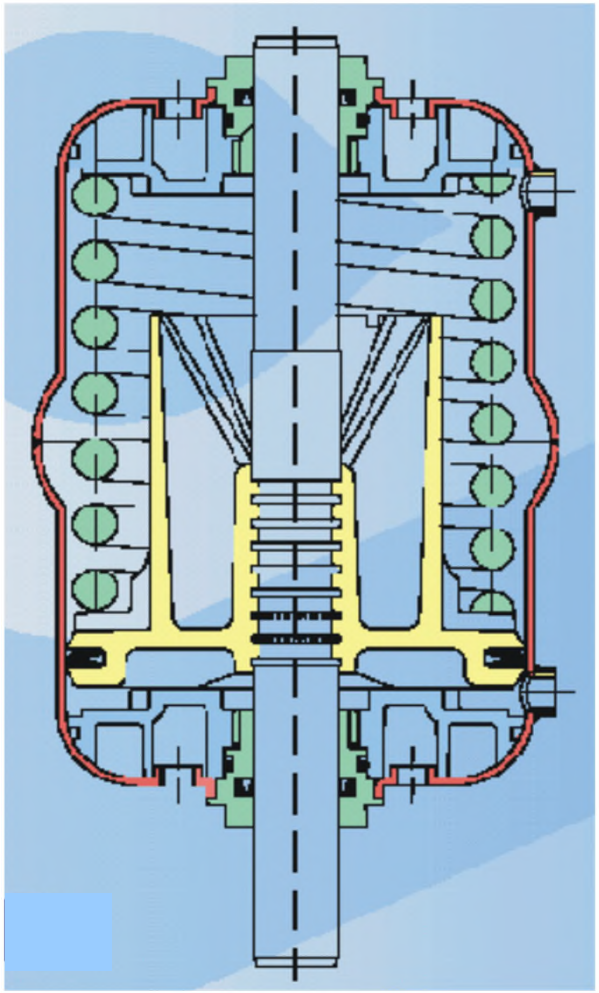
3A approval

Certificates available on the Fluid Handling database

DELTA M4/MP4 – MP4 cut away drawing



DELTA MS4/MSP4 – Actuator



- **Stroke**
  Available in Standard Stroke only

- **Required air pressure**
  6 - 8 bar (88 - 120 psi)

- **Sizes**
  A, B and C size actuators cover full range

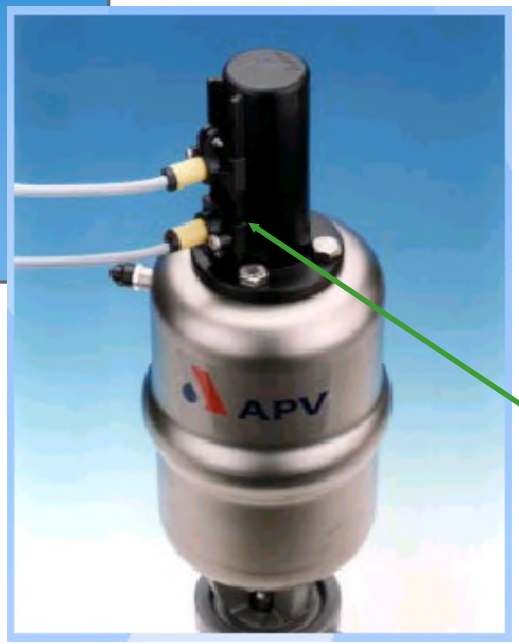
not recommended to interchange actuators & valve sizes

- **Construction**
  Fully-welded, maintenance free

- **Orientation**
  Can be reversed from NC to NO or vice versa

- **Warranty**
  5 years

DELTA MS4/MSP4 – Control Units/Feedback



CONTROL/FEEDBACK OPTIONS

Control Unit

Solenoid & valve position indication:

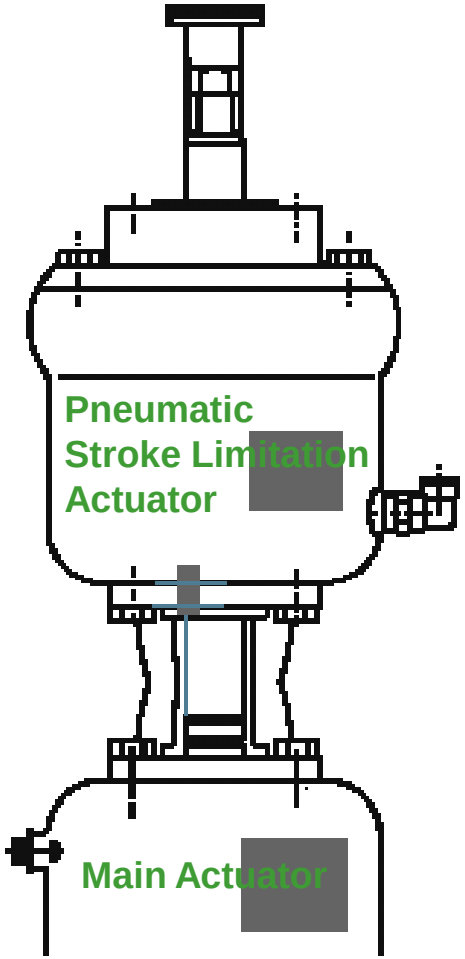
- APV Delta CU4 Direct Connect
- APV Delta CU3 Valve-Net Profibus
- APV Delta CU3 Valve-Net DeviceNET
- APV Delta CU4 AS-interface

Above items with or without NOT Element (provides automatic air assist to back side of piston to increase product holding pressure)

Feedback only: For 1 or 2 proximity switches:

- Proximity Holder (shown at right)

DELTA MS4/MSP4 – Options



Adjustable Position Stop

- For fluid process applications requiring a middle “stop” position in-between the extreme open and closed valve positions.
- Mid-position can be manually set at any point between 0- 100% of the full stroke.
- The valve must be configured as normally closed and operation requires an additional air supply.

Note: See SW4 section for more details.

DELTA MS4/MSP4 – Service

- **Minimal number of gaskets/seals**
- **Membrane is easily removed and replaced**
- **Maintenance-free actuator**
- **To secure a quick and safe mounting of seat seal an assembly tool is available.**

Its use is strongly recommended

DELTA MS4/MSP4 – customer benefits

General

- Strong valve housings
- Metallic stop in valve seat area allows controlled compression of seat seal and fixed locations for sensing of valve position
- No re-tightening of the housing closures
- Maintenance-free reversible actuator
- Low weight
- Long life time of sterile barrier - several hundred thousand strokes
- Easy leakage detection on the housing lid

Sanitary design

- ***Authorized to carry the 3-A symbol (MS4 coming soon)***
- Conforms to EHEDG test procedures
- Ball-shaped housing design enhances cleanability without ”dome or sump” areas
- Fully drainable
- ***Efficient sterilisation due to open geometrie***
- ”Profile” seal design ensures seal grooves are completely filled (no gaps or spaces to clean behind)
- Flat membrane design

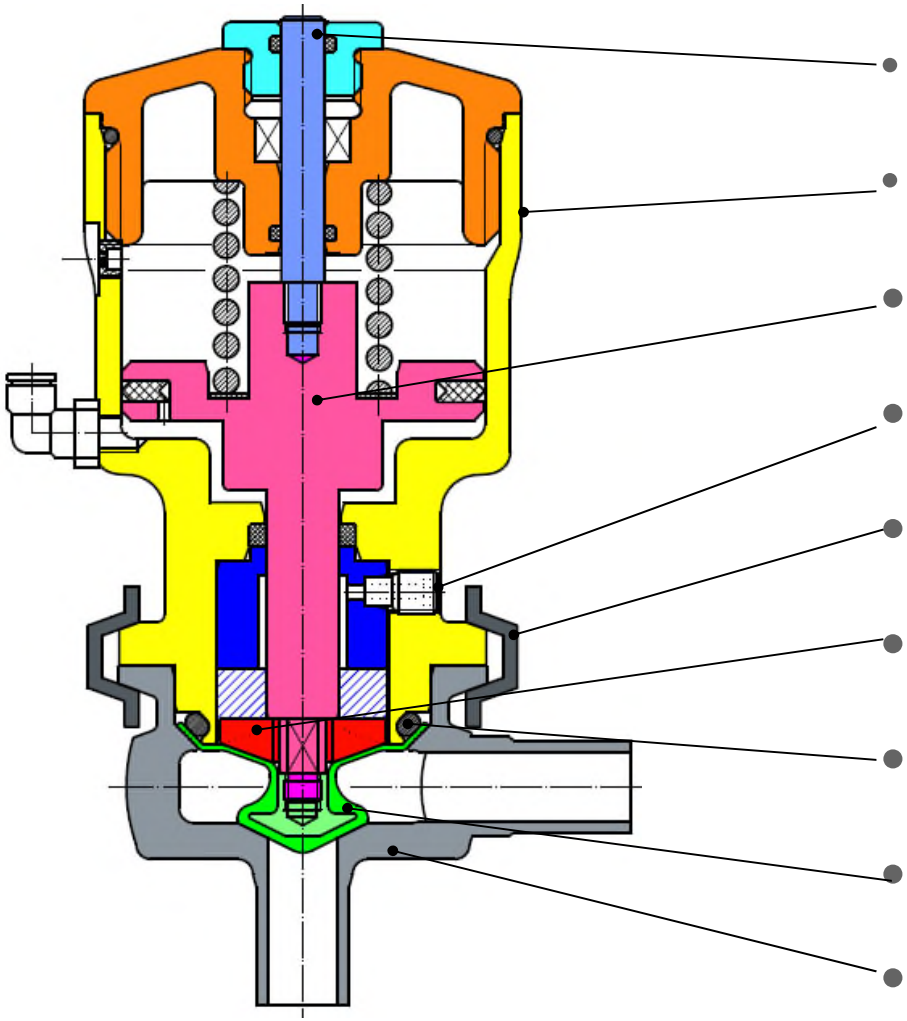
I am pretty sure you have some questions?

DELTA AP1 Aseptic fractional size valve

DELTA AP1

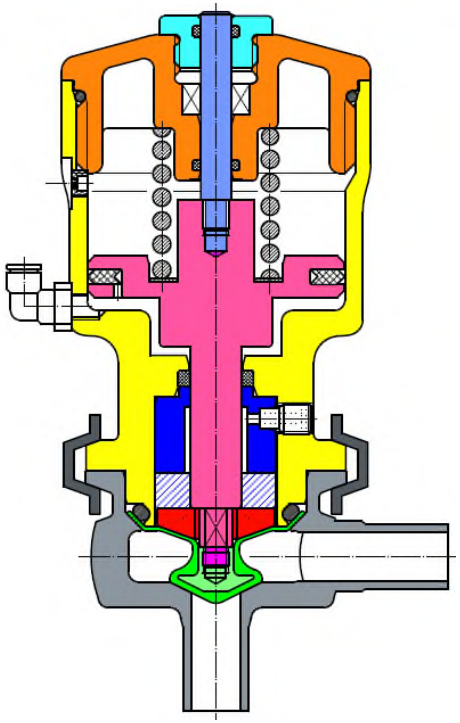
Hand Operated Version Pneumatic Version

DELTA AP11 – FS (NC) - Design Survey



- Position indicator
- Pneumatic actuator
- Actuator shaft
- Leakage detection
- Clamp housing closure
- Fan diaphragm support
- Body sealing
- Diaphragm insert (PTFE)
- Valve body

DELTA AP11 – FS (NC) - Features



Clamp housing closure – for simple installation and service

Flexible flat diaphragm sealing insert - for open geometry product flow and excellent cleanability.

PTFE TFM 1705 (FDA 21CRF177.1550, USP Class VI) diaphragm material.

Diaphragm fan support – for robust and long lasting sealing lifetime.

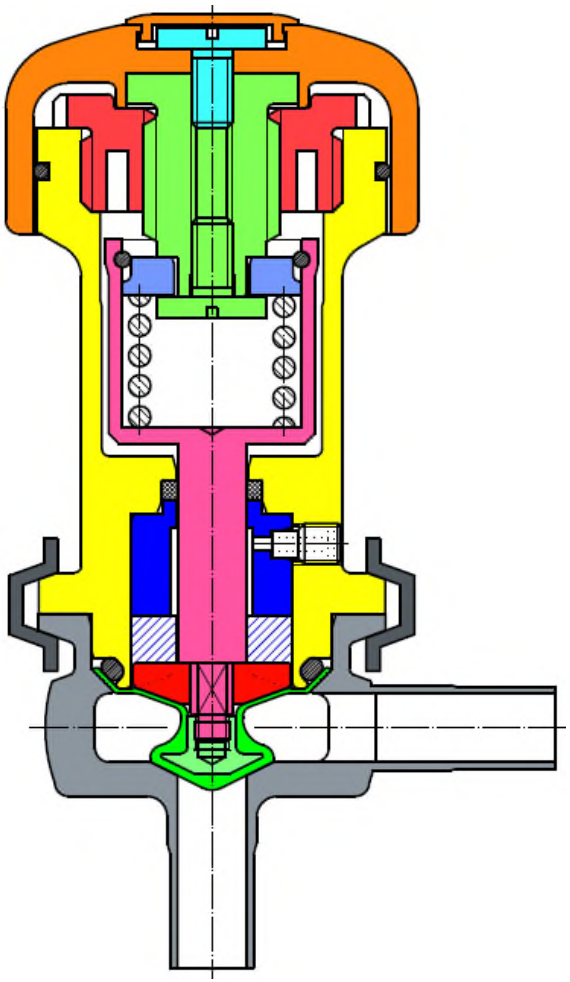
Body sealing with metallic stop – to avoid sealing overstress.

Globular valve body with circular seat face - for low flow resistance.

3.1 EN 10204 marking of valve bodies.

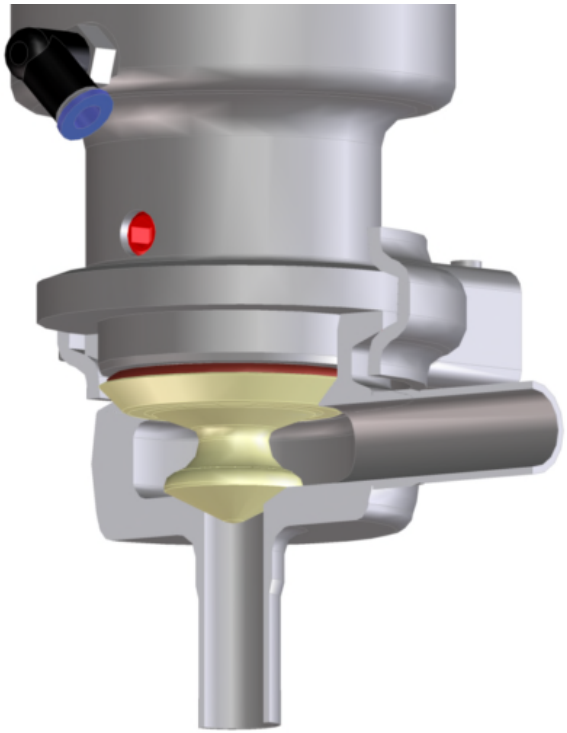
Various valve body configurations – for compact and economic system integration with minimum dead legs.

DELTA AP11 – H (manual) - Features

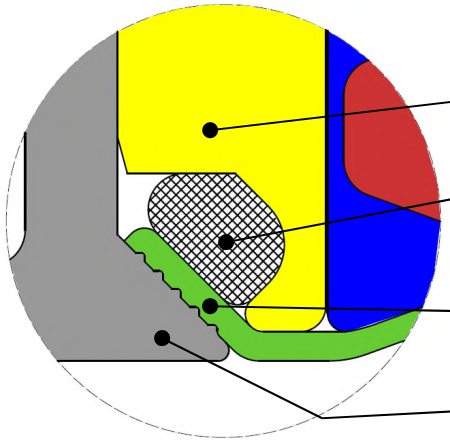


- Same features as pneumatic actuator version AP11 – FS
- Limited seat compression by defined spring load on hand actuator – to prevent damage of the diaphragm and allow maximum lifetime.

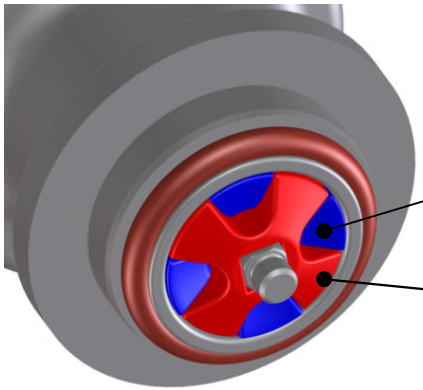
DELTA AP1 – Design Details



Product wetted area



Valve body sealing



Fan support for diaphragm

DELTA AP1 - Technical Data

•Operating conditions:

•Max. operating pressure 10 bar
•Max. operating temperature 135°C, 150°C short time SIP

Materials:

Valve body 1.4435 with 3.1 EN10204

Diaphragm insert PTFE TFM 1705 (FDA 21CRF177.1550, USP Class VI)

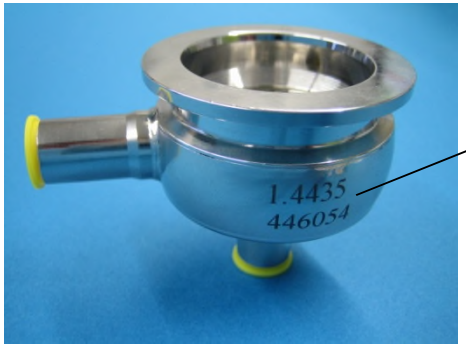
•Surfaces:
•Valve body product wetted surface Ra < 0,5µm

•Body styles:
•Pipeline and tank bottom versions L and T ports

•Ports:
•Butt-weld connections DIN11850:
•DN10 (Ø12*1), DN15 (Ø18*1.5), DN20 (Ø23*1.5), DN1/2”(Ø12,7*1,6)
•Clamp ISO2852, Clamp DIN32676

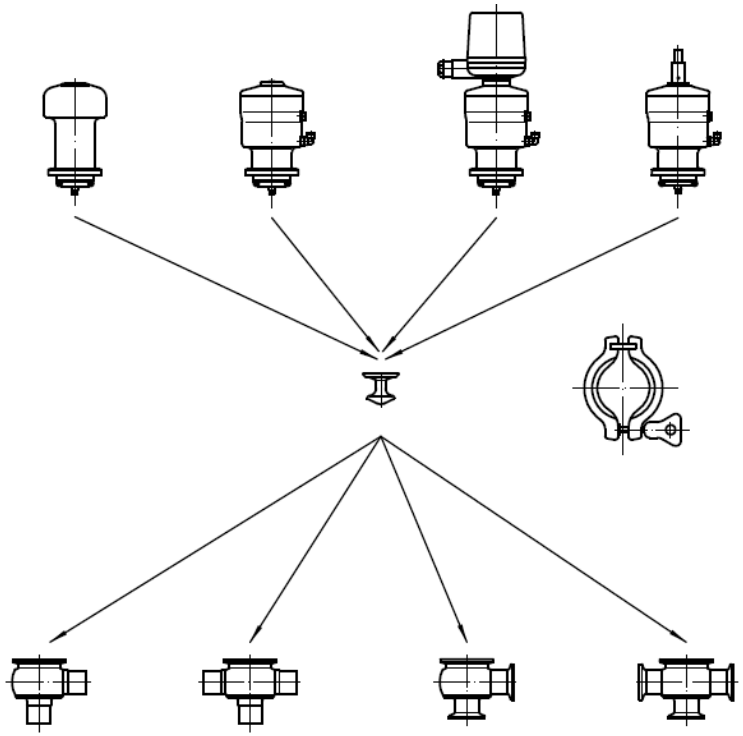
•Actuation:
•Pneumatic actuator spring to close / spring to open or Hand actuator

DELTA AP1 Technical data - Techno

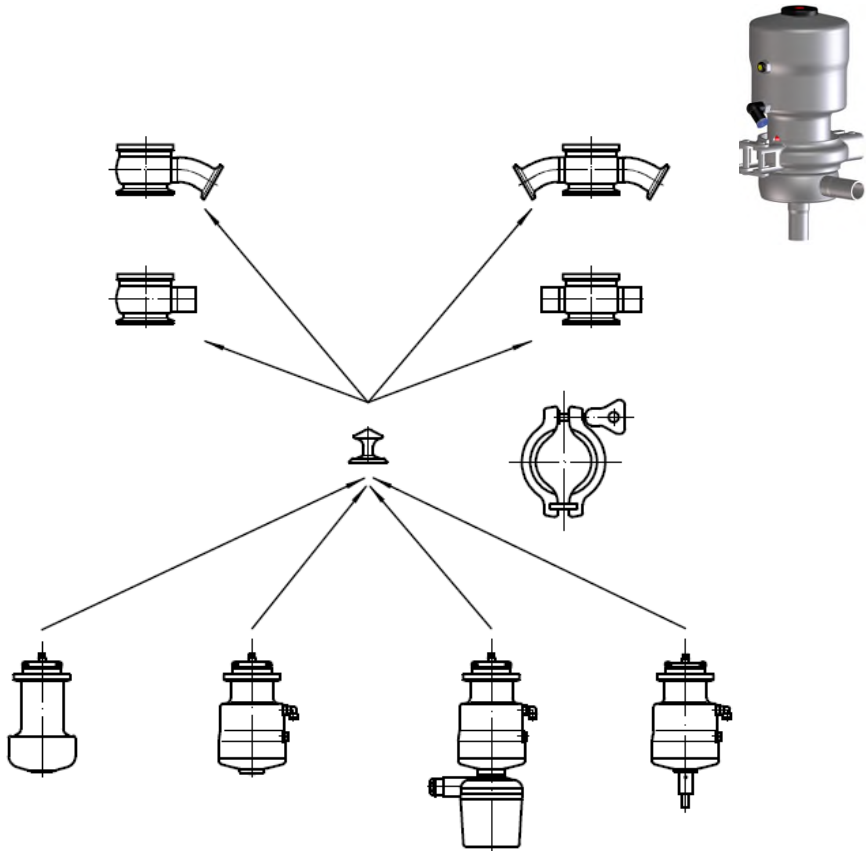


3.1 certification for full traceability

DELTA AP1 - Modular Parts System



Pipework Version



Tankbottom Version

DELTA AP1 - Economy Version

DELTA AP1 - Certifications

EHEDG and 3A

Test reports available upon request !

TNO Quality of Life

Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek/Netherlands Organisation for Applied Scientific Research

Microbiology
Location Zeist
Utrechtseweg 48
P.O. Box 360
3700 AJ Zeist
The Netherlands

www.tno.nl

T +31 30 694 41 44
F +31 30 694 47 77
infofood@voeding.tno.

TNO report

V2815RE

Validation of the in-line steam sterilizability and bacteria tightness of the Diaphragm Valve type Delta M4/MP4 (MS4/MSP4 and AP1) from APV Systems according to the EHEDG procedure.

Date February 2006

Author(s) Ing Jacques Kastelein

Number of copies 12
Number of pages 25
Number of appendices 2

TNO Quality of Life

Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek/Netherlands Organisation for Applied Scientific Research

Microbiology
Location Zeist
Utrechtseweg 48
P.O. Box 360
3700 AJ Zeist
The Netherlands

www.tno.nl

T +31 30 694 41 44
F +31 30 694 47 77
infofood@voeding.tno.nl

TNO report

V98.629RE

Validation of the in-place cleanability of the Diaphragm Valve type Delta M4/MP4 (MS4/MSP4 and AP1) from APV Systems according to the EHEDG procedure.

Date February 2006

Author(s) Ing Jacques Kastelein

Number of copies 12
Number of pages 22
Number of appendices 2

DELTA AP1 - High Polish Version

Outside surface Mirror Polish

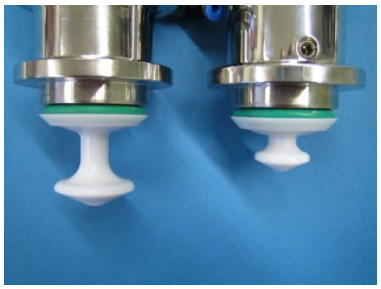
DELTA AP1 - Feedback options

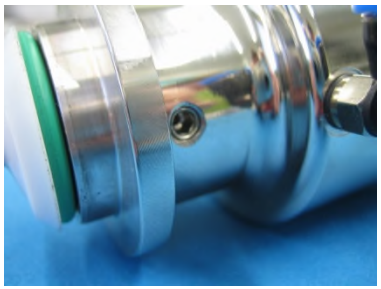
Option – drain valve

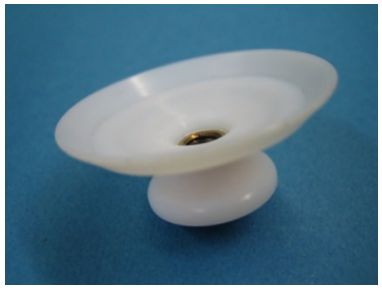
Aseptic drain valve to the APV W+ Pump

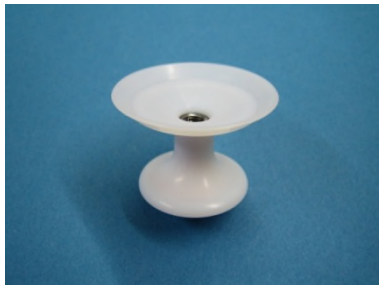
Welded directly onto the pump housing and the clamp ring is avoided

DELTA AP1 - Parts

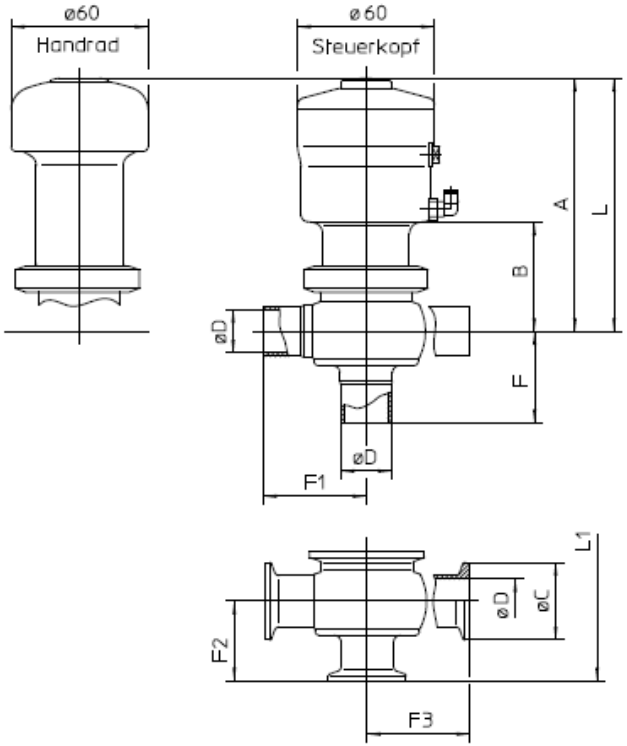




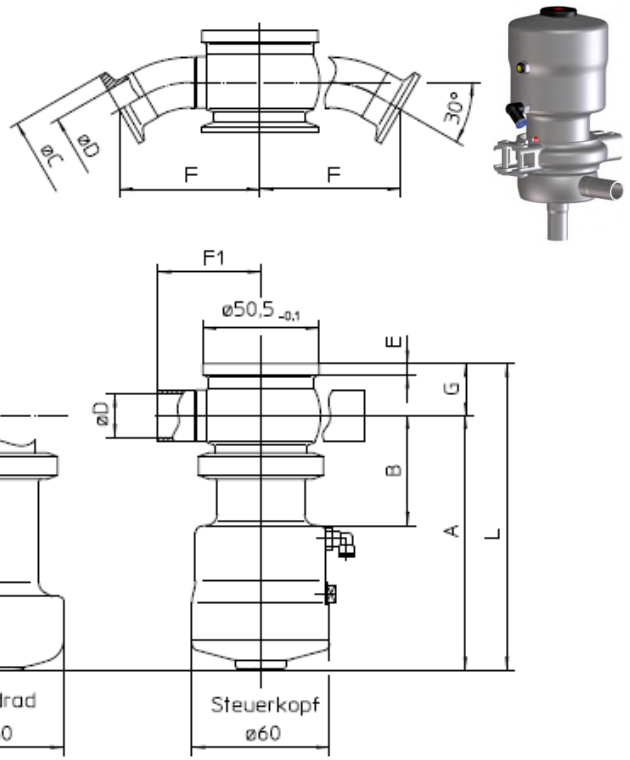




DELTA AP1 - Dimensions



DN	øD	F	F1	F2	F3	A	B	øC	L	L1
1/2"	9,5	30	45	19,5	41	105	43	25	135	124,5
10	10	30	45	19,5	41	105	43	25	135	124,5
15	16	35	45	30	45	108	46	34	153	138
20	20	40	45	35	45	110	48	34	155	145



DN	øD	F	F1	A	B	øC	E	G	L
1/2"	9,5	53,5	45	105	43	25	2,5	17,5	122,5
10	10	53,5	45	105	43	25	2,5	17,5	122,5
15	16	59	45	108	46	34	3	18,7	123,7
20	20	61	45	110	48	34	5	22,8	132,8

We should have a 10 minutes brake.

DELTA RUF3 - VPN

DELTA RUF3 **VPN**

DELTA RUF3 - VPN

VPN is a clamped type and available in: Inch: 1” - 4”
DN: 25 - 100

Internal finish: Ra ≤ 1.6µm
External finish: Bright

3A: not available

Internal finish: Ra ≤ 0.8µm
External finish: Bright

RUF3 is a flanged type and available in: Inch: 1” - 4”
DN: 25 - 150

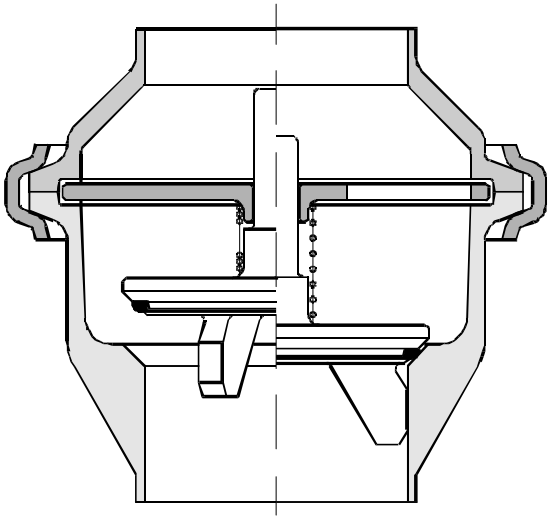
Internal finish: Ra ≤ 1.6µm
External finish: Glass blasted

Material:
- Product wetted parts: Stainless steel AISI 316L / Werkstoff Nr. 1.4404
- Other parts: Stainless steel AISI 304 / Werkstoff Nr. 1.4301

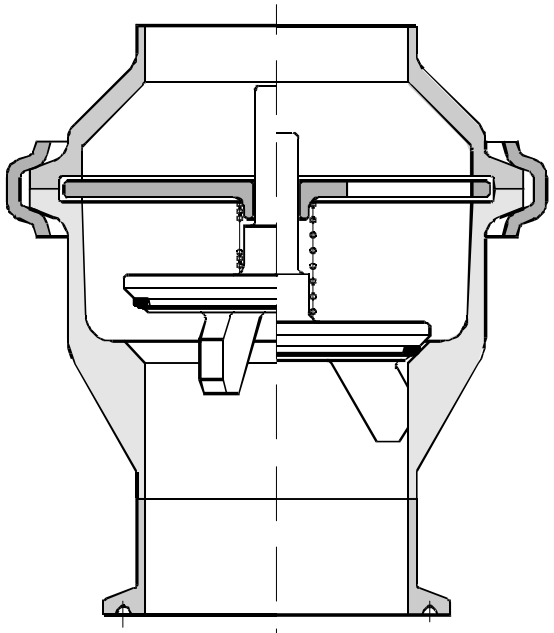
Max. product line pressure: 10 bar

The non-return valve opens when the pressure below the valve stem is higer than the counter pressure.

The built-in spring closes the valve and thereby prevents back-flow.



VPN Standard



VPN 3A execution
No longer available

DELTA RUF3 - VPN

RUF3

- EPDM
- Silicone
- FPM
- HNBR - not for DN125 and 150 mm

VPN

- EPDM !! ONLY !!

DELTA RUF3 - VPN

VPN

- Easy maintenance - only few spare parts
- No special tools required

RUF3

- Very easy maintenance due to inter-flange design
- No special tools required

DELTA RUF3 - VPN

- Avoid any backflow of product in pipelines
- Can be welded directly into pipelines
- Minimum pressure drop
- CIP suitable design
- Minimum pick-up pressure of 0.04 - 0.05 bar
- Few parts
- Simple construction

Do you have any questions?

DELTA UF/UFR

October 31, 2012

DELTA UF-UFR – technical data

Sizes and finish

Inch: 1” - 4”

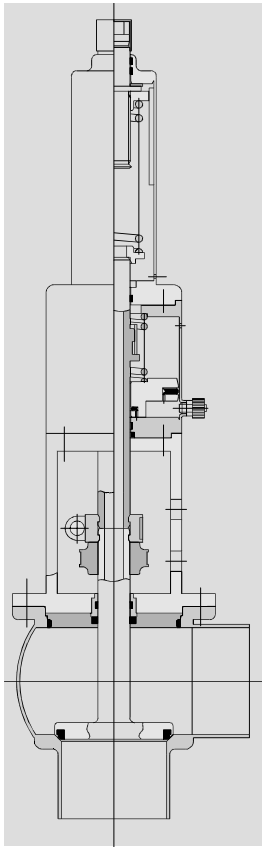
DN: 25 - 100

Internal finish: Ground, Ra ≤ 1.6µm
External finish: Glass blasted

Material:

- **Product-wetted parts: Stainless steel AISI 316L / 1.4404**
- **Other parts: Stainless steel AISI 304 / 1.4301**

DELTA UF-UFR – pressure range



Pressure range:

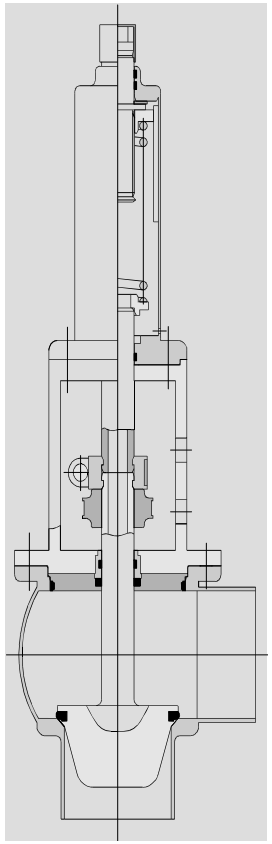
UF

DN/Inch	25/1” - 80/3”	100/4”
Bar	0 - 10 bar	0 - 8.3 bar

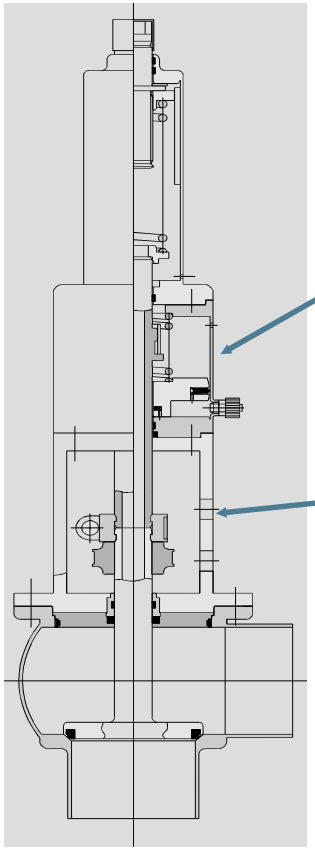
Pressure range:

UFR

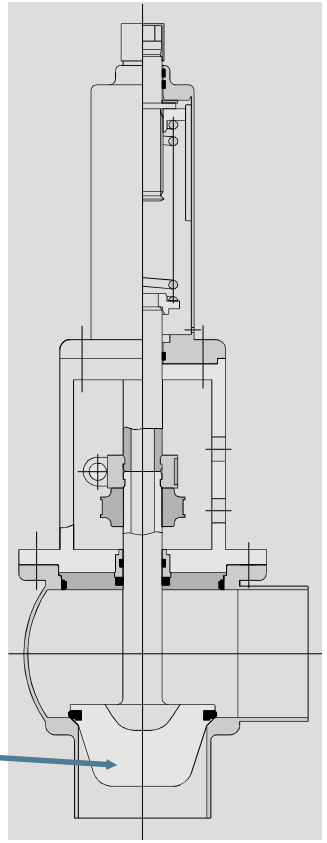
DN/Inch	25/1” - 80/3”	100/4”
Bar	0 - 10 bar	0 - 7.7 bar



DELTA UF-A / UFR-A - seat lift actuator



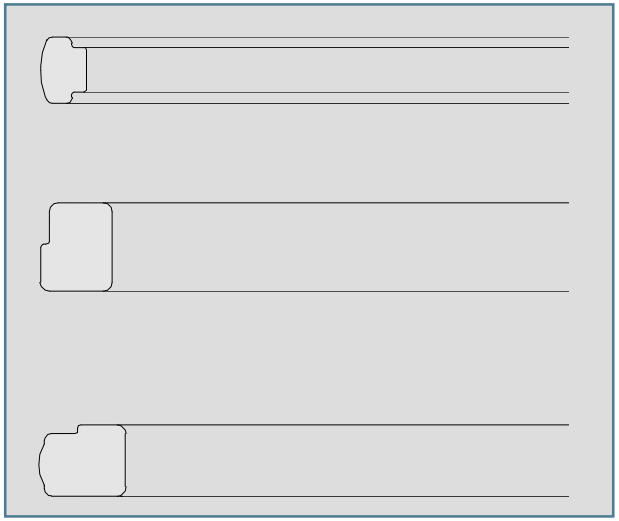
- **Seat-lift actuator (UF-A / UFR-A)**
- **Feed-back switches in yoke**
- **Modulating cone**



DELTA UF/UFR – profile seals

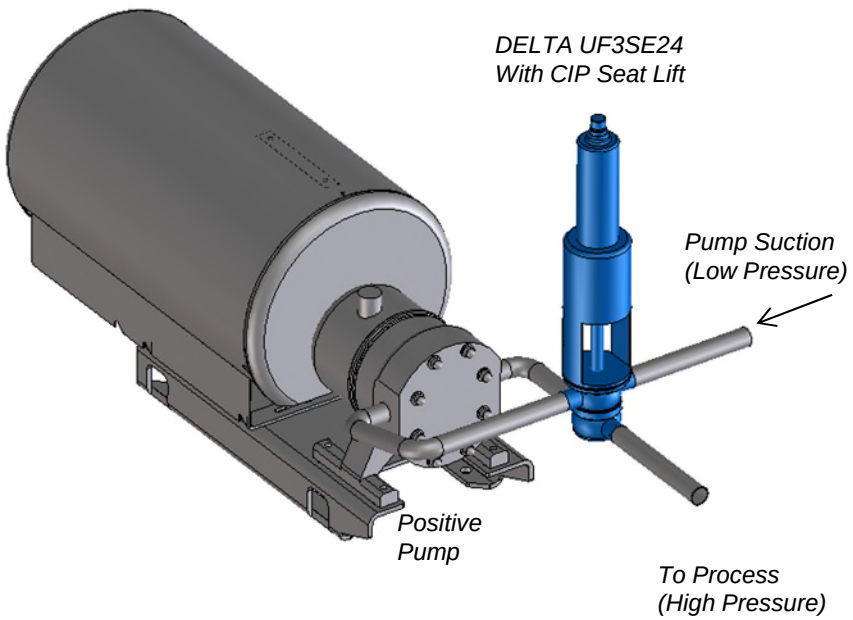
Profile seals:
- **EPDM**
- **FPM**
- **Silicone**
- **Viton**

All sealing materials meet the requirements of FDA



DELTA UF3 SE24-A

Cross Flow Operation with Positive Displacement Pump

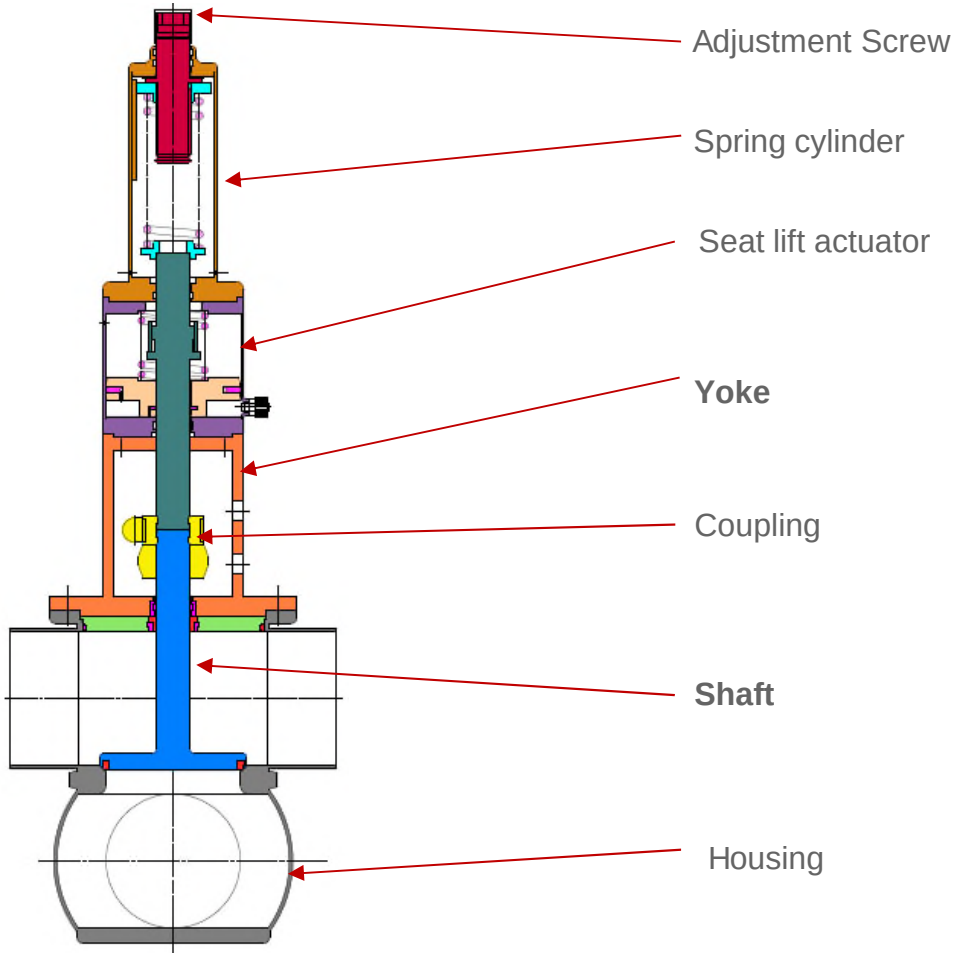


Key features of the process design with the integrated cross flow valve body:

- Protect downstream equipment from over pressure.
- Protect PD-pump from over pressure.
- Due to the cross body design, the complete piping system is integrated into the CIP flow.
- During CIP, the relief valve is opened to allow a high flow rate. The positive displacement pump is cleaned in the bypass.
- No dead legs during production as a separate relief path is avoided.

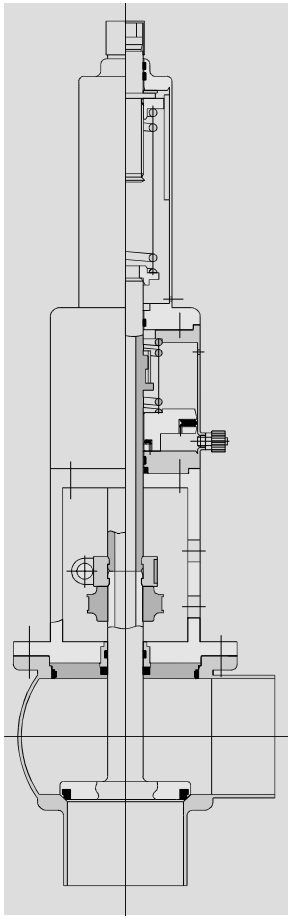
DELTA UF3 SE24-A

Cross Sectional Drawing DELTA UF3 SE24 - A



DELTA UF/UFR – customer benefits

- **Easy to service**
- **Few gaskets**
- **To secure a quick and safe mounting of seat seal an assembling tool is available**
- **Maintenance-free seat-lift actuator (UF-A / UFR-A)**



DELTA UF/UFR - customer benefits

- **Ball-shaped valve body with smooth passages (no sump, no dome)**
- **No stroke limitation by the seat-lift actuator during CIP**
- **Profile seals with identification**
- **Metallic stop as protection against wear of seat seal**
- **3A certified**

Do you have any questions?

DELTA PR2 / PRD2

PR2

PRD2

DELTA PR2 / PRD2

PR 22:
In-line principle

Inch:1” - 4”
DN: 25 - 125

DELTA PR2 / PRD2

PRD20:

On-line principle, e.g. tank bottom

With steam connection

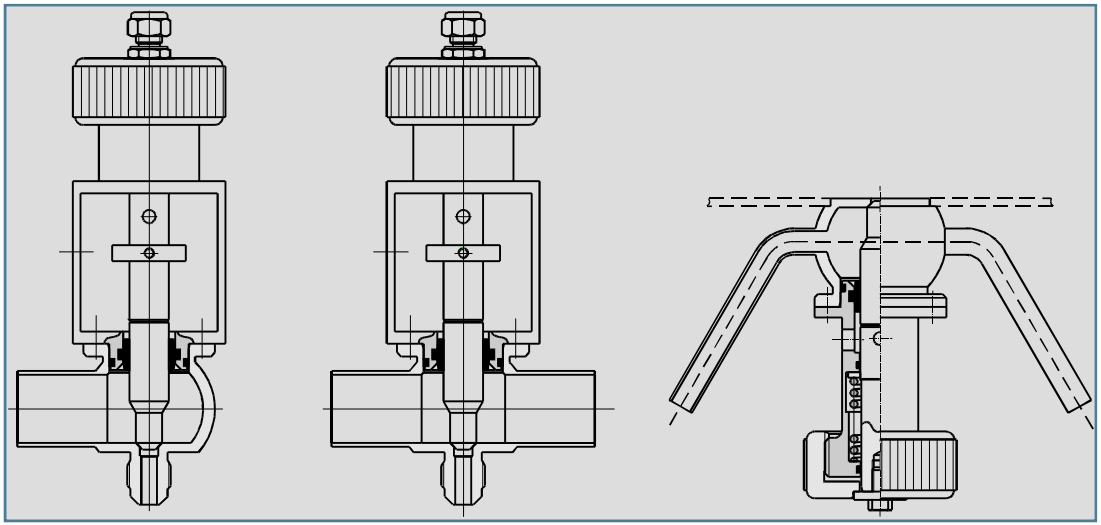
DN 25

DELTA PR2 / PRD2 – technical data

Internal finish: Polished and turned Ra ≤ 1.6µm
External finish: Glass blasted, satin finish

Material:
- **Wetted parts:** Stainless steel AISI 316L / Werkstoff Nr. 1.4404
- **Other parts:** Stainless steel AISI 304 / Werkstoff Nr. 1.4301

Max. temperature 135°C CIP (short term): 140°C



PR21-FS-H / 1s PR22-FS-H / 1s + 2s PRD20-FH

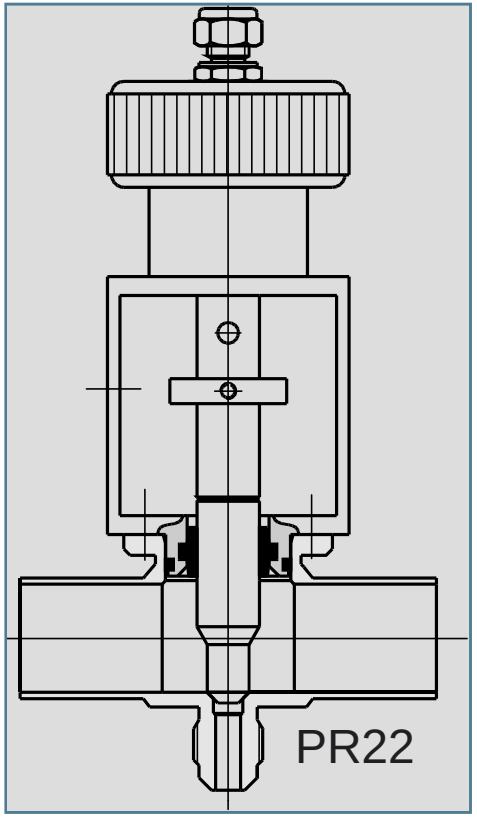
DELTA PR2 / PRD2 - technical data

Both valves are available either with pneumatically or manually controlled actuator

The pneumatically controlled actuator can also be operated manually

Actuator:

- **Fully welded**
- **5 years guarantee**
- **Required air pressure: 6 - 10 bar**



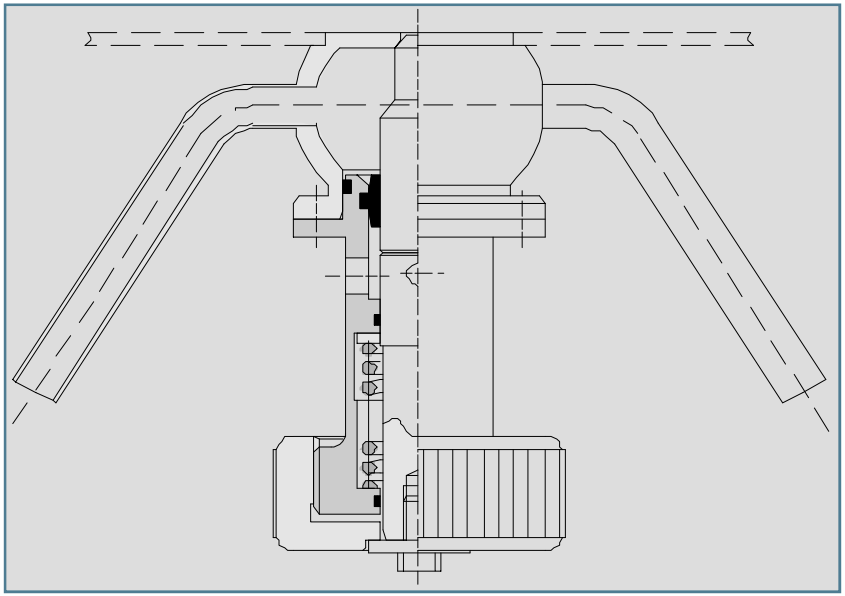
DELTA PR2 / PRD2 – options

PR2

- **Drain pipe**
- **Drain pipe for high pressure**

PR2 and PRD2

- **Valve position indicator can be installed in yoke of pneumatic and manual actuator**



PRD2

DELTA PR2 / PRD2 – seal material

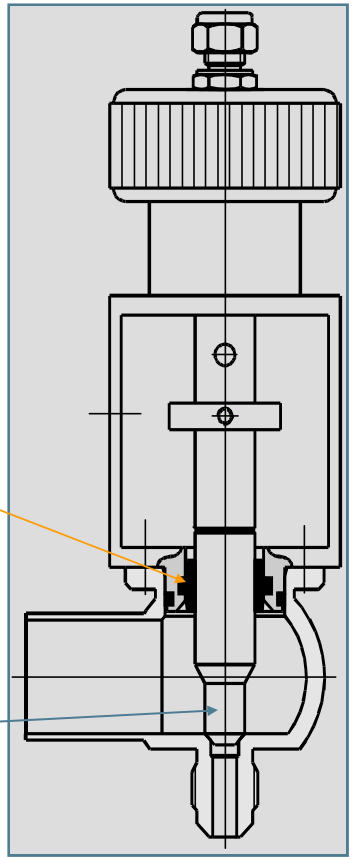
Profile seals

Standard:
EPDM

Option:
Silicone
FPM

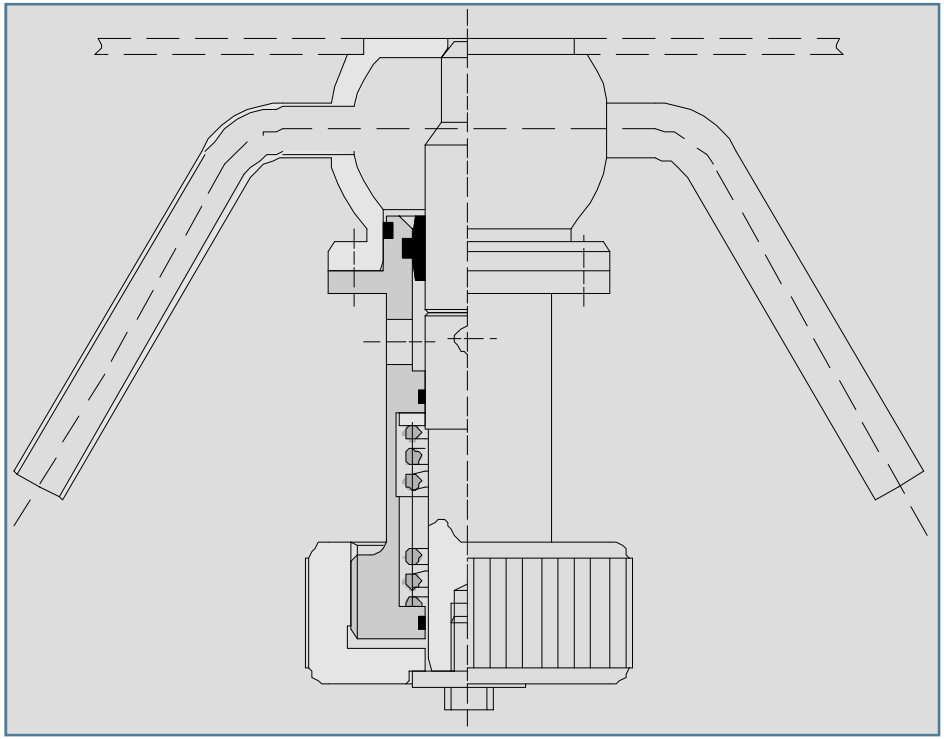
All sealing materials meet the requirements of FDA

Valve shaft: PTFE



DELTA PR2 / PRD2 – customer benefits

- **Few seals**
- **Quick and easy changing of the Teflon valve shaft**
- **Reliable operation due to controlled spring force**



DELTA PR2 / PRD2 – customer benefits

- **Teflon shaft eliminates any infection risk**
- **No additional elastomer seat-seal necessary**
- **No pressure drop due to full diameter**
- **Proper cleaning due to bodies without sump and dome, and no crevices**
- **Drain pipe can be flame sterilised**
- **Identification of seals**

PRD can be steam sterilised before sampling

PR22

PRD2

Should I expect any question ?

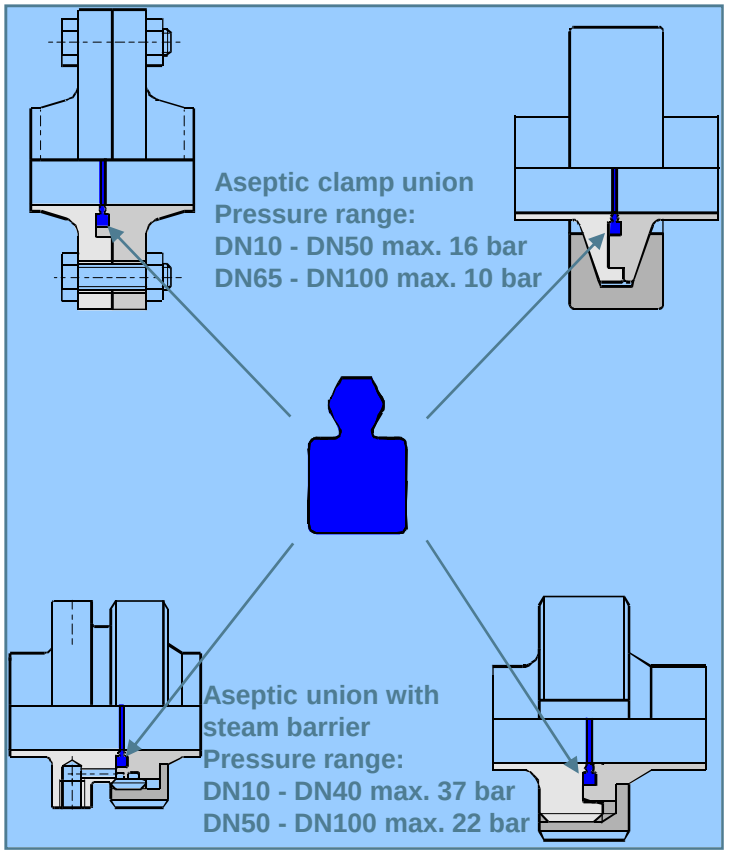
DELTA aseptic fitting

DELTA aseptic fitting

- High level of safety, great reliability, simple cleaning and handling
- Minimum contact surface of seal lip with product space (s = 1mm)
- Maximum pressing of the sealing lip against the internal diameter
- Controlled compression of seal
- Identification of seal
- Is suitable for CIP and SIP

DELTA aseptic fitting – aseptic seal design

Aseptic flange connection
Pressure range:
DN10 - DN100 max. 10 bar

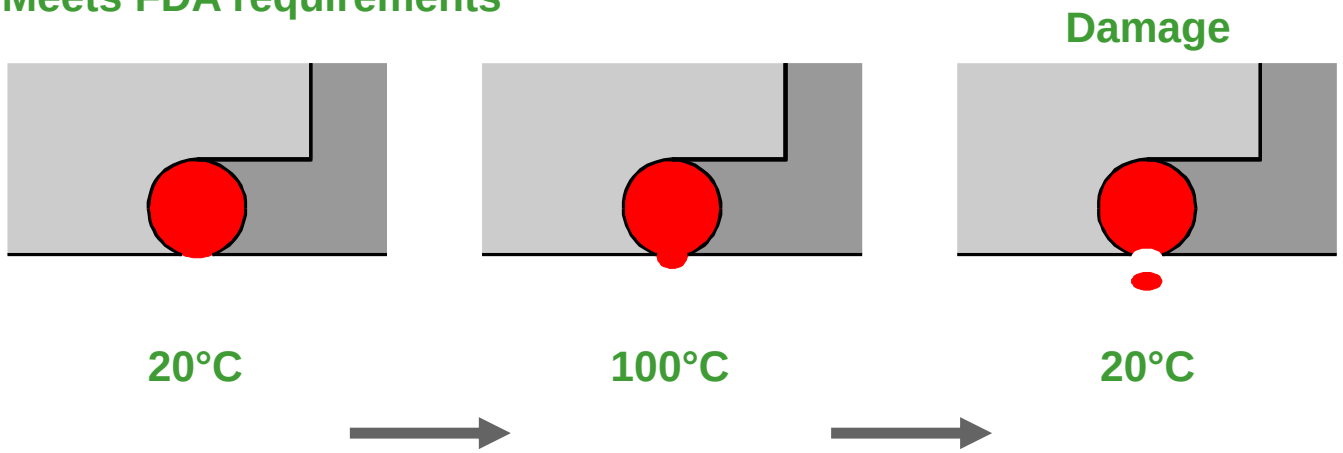


Aseptic union:
Pressure range:
DN10 - DN40 max. 40 bar
DN50 - DN100 max. 25 bar

DELTA aseptic fitting – customer benefits

Profile seal:
- **EPDM**
- **Silicone**
- **FPM**

Meets FDA requirements



Damage to an O-ring gasket due to thermal effects

DELTA aseptic fitting – technical data

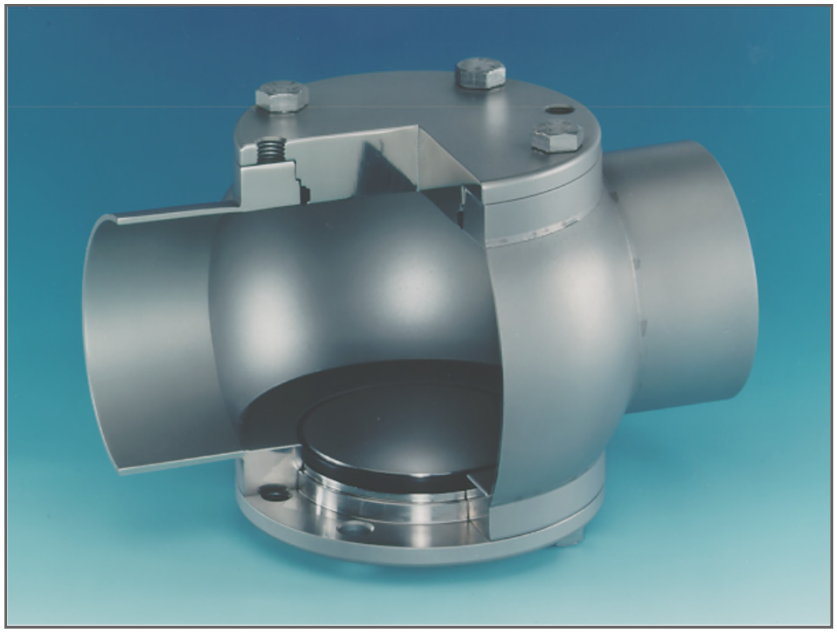
DN10 - DN100
Inch: 1” - 4”

Internal finish: Ra ≤ 0.8µm
External finish: Bright

Material:
Wetted parts: Stainless steel AISI 316L / 1.4404
Other parts: Stainless steel AISI 304 / 1.4301

3.1.B certificates can be supplied

DELTA In-line measuring



DELTA In-line measuring - examples

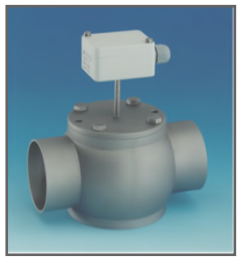
Measuring transmitter for the following process parameters:

PRESSURE

- **Pressure gauge for in situ display**
- **Pressure transmitter with analogue output, 4-20 mA**

TEMPERATURE

- **Thermometer for in situ display**
- **Temperature sensor PT100**
- **Optional with transmitter 4-20mA**



DELTA In-line measuring - examples

FLOW
- **Flow controller**
- **Inductive flow meter (insertion device)**

CONDUCTIVITY
- **Inductive conductivity transmitter**

LEVEL
- **Liquifant**

DELTA In-line measuring - examples

SIGHT GLASS
- **Optional with light as an option**

OPTICAL SENSOR
- **Turbidity-, colour-, density-measuring transmitter**

DELTA In-line measuring - examples

ULTRASONIC
- **Concentration-, gravity measuring**

OXYGEN (dissolved)
- **Insertion device**

DELTA In-line measuring - seals

Profile seals

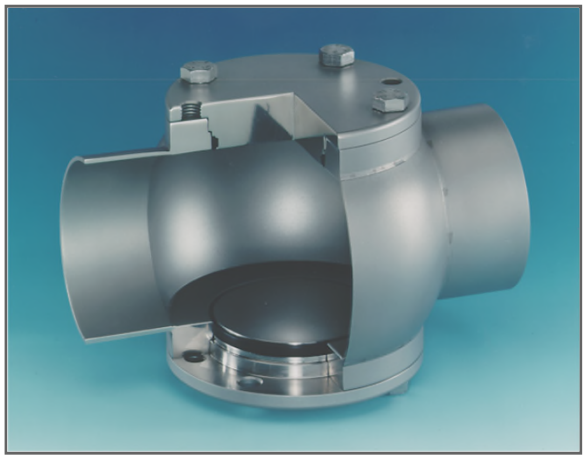
Standard:
- **EPDM**

Option:
- **Silicone**
- **FPM**
- **HNBR**

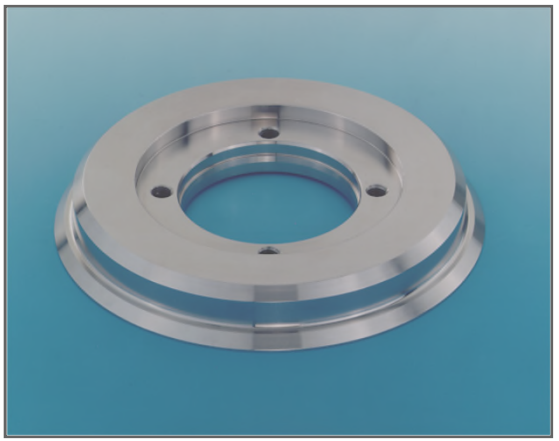
All sealing materials meet the requirements of FDA

DELTA In-line measuring – customer benefits

- **Total cleanability due to perfectly smooth surfaces**
- **Crevice-free profile sealing eliminates any risk of infection**
- **All inline housings will accomodate two measuring instruments at a time**
- **Gentle product treatment due to ball shaped housing**
- **Connecting flanges independent of housing size**
- **Profile seals with identification**



“Inline housing”



“Welding flange for tank installation”

DELTA SI2 – Safety valve for pressure vessels

DELTA SI2 - technical features

Available in sizes : DIN : 25 – 100 mm

Adjustable safety pressure 0.3 - 10 bar / 5 – 146 psi for liquids and gases (others on request)

Spring operated

Standard seat-lifting device for cleaning is pneumatically operated (option: manual seat lift)

Internal finish: Electro polished Ra ≤ 0.8µm / 32µinch
External finish: Steel blasted, satin finish

Material:
- **product-wetted parts: Stainless steel AISI 316L / 1.4404**
- **other parts: Stainless steel AISI 304 / 1.4301**
- **seat-lift cover: Polyamide**

Max. temperature 135°C CIP (short term): 140°C

DELTA SI2 – opening and closing points

The valve opens when the tank pressure exceeds the pre-set safety value by more than 10%.
e.g. Pre-set pressure 2,2 bar / 31,9 psi valve is fully open at 2,42 bar / 35,1 psi

Gasses:

The valve closes when the tank pressure drops 10% below the pre-set safety pressure
e.g. Pre-set pressure 2,2 bar / 31,9 psi the valve is again fully closed at 1,98 bar / 28,7 psi

Liquids:

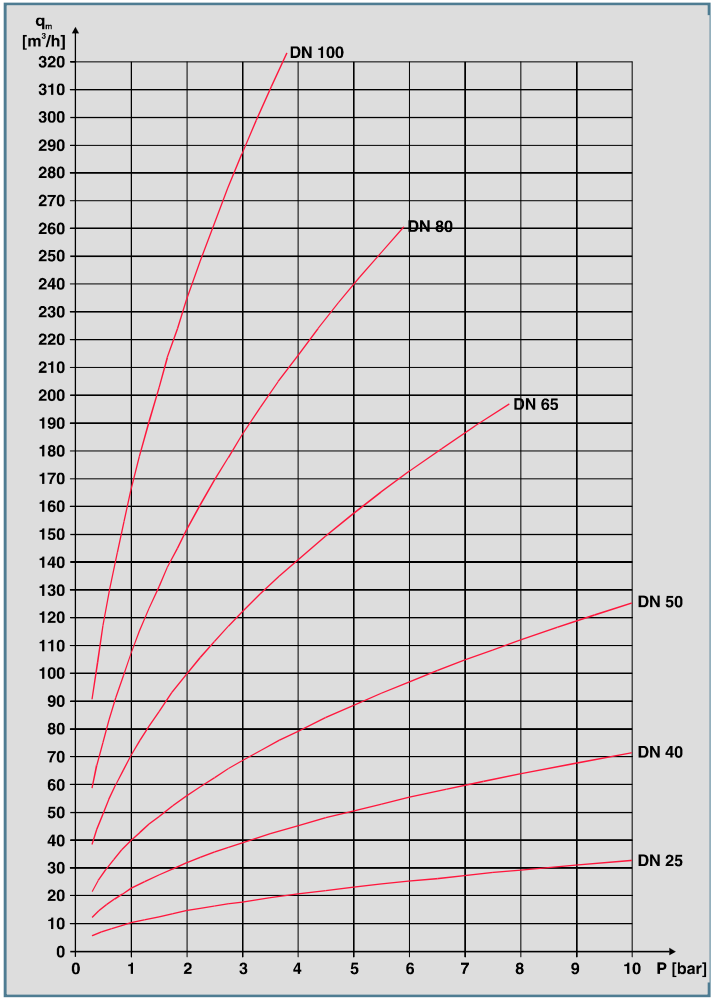
The valve closes when the tank pressure drops 20% below the pre-set safety pressure
e.g. Pre-set pressure 2,2 / 31,9 psi bar the valve is again fully closed at 1,76 bar / 25,5 psi

It is important that the operating pressure is lower than the pressure at which the valve closes again.

Required air pressure for seat-lift actuator: 6 - 10 bar / 86 – 146 psi

DELTA SI2 – flow chart for water

Characteristics



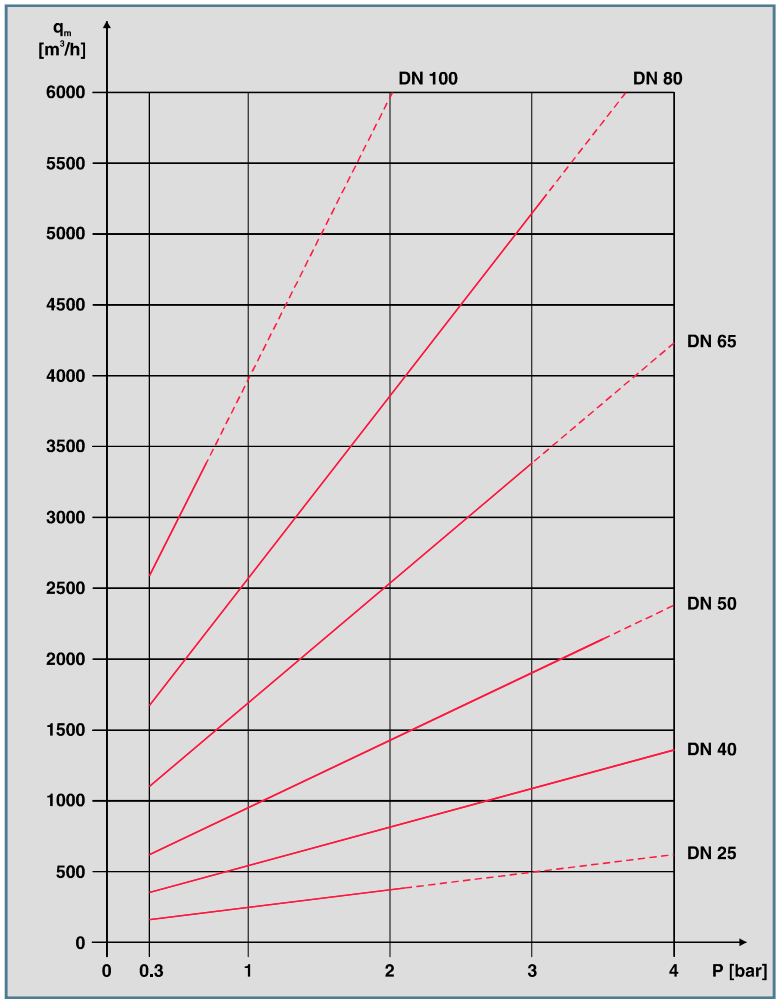
Water

20°C / 68°F

αw = 0.49

DELTA SI2 – flow chart for air

Characteristics



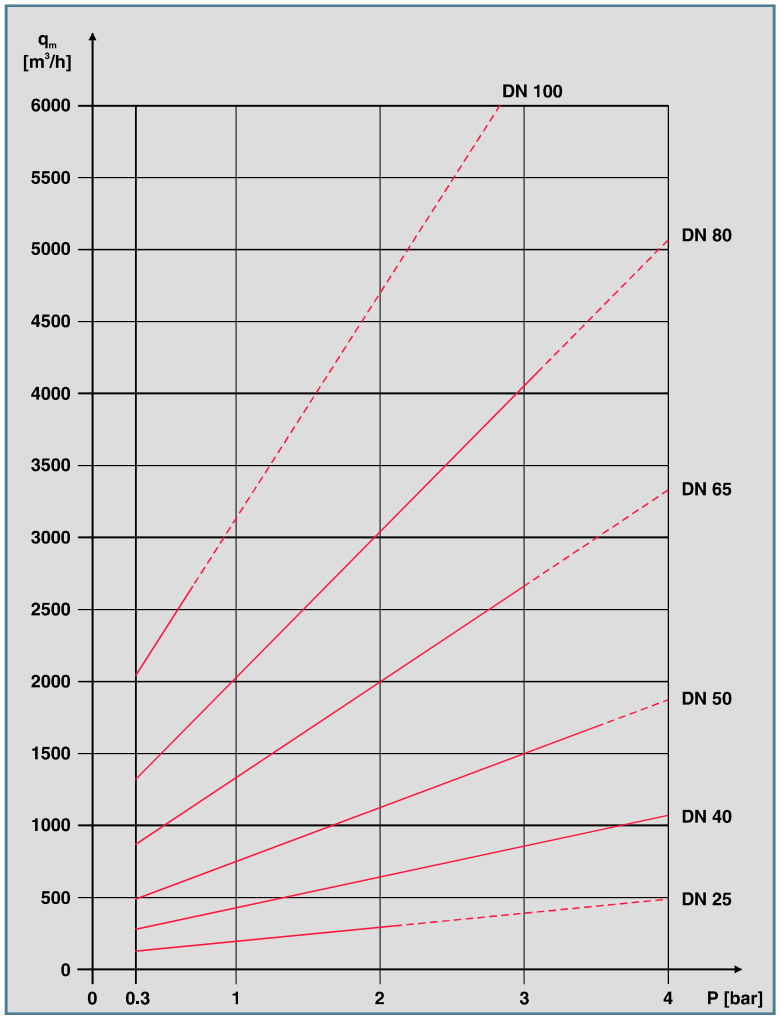
Air: 1013.25 mbar / 14,7 psi

0°C / 32°F

αw = 0.44

DELTA SI2 – flow chart for CO^2

Characteristics



CO^2: 1013.25 mbar / 14,7 psi

0°C / 32°F

$\alpha w = 0.44$

DELTA SI2 – options

- **Manual seat-lift actuator**
- **Proximity switches for feed back indication of seat-lift**
- **CIP spray nozzle**

DELTA SI2 – seal material

Profile seals

Standard:

- **EPDM, PTFE**

Option:

- **VMQ, PTFE**
- **FPM, PTFE**

All sealing materials meet the requirements of FDA

DELTA SI2 – customer benefits

- Few seals .
- Seal replacement possible without removing the lead-seal
- Maintenance of actuating elements during valve operation
  - full function is guaranteed
- Seat-lift actuator serviceable

DELTA SI2 – customer benefits

- **The valve DELTA SI2 is approved for both fluid and gasses, according to German TÜV**
- **Easy identification of seals**
- **Hygienic design**
- **Optimal cleaning facilities**
- **Inner surface Ra ≤ 0.8µm / 32µinch**
- **Quick and easy changing of seals**

Tank-top

Do you have any questions?

DELTA VRA / VRAH

DELTA VRA / VRAH – technical data

Available in sizes (only in metric sizes DIN):

DELTA VRA:	DELTA VRAH (hanging design):
DN50, 100, 150	DN100

Both valves do come with seat lift actuator as standard

Internal finish:	Polished and turned Ra ≤ 1.6µm / 32 Ra µin
External finish:	Glass blasted, satin finish

Material:

Product-wetted parts:	Stainless steel AISI 316L / 1.4404
Other parts:	Stainless steel AISI 304 / 1.4301

Max. temperature 135°C	CIP (short term): 140°C

DELTA VRA / VRAH – technical data

Minimum pressure of response		Throughput with vacuum 100mm WC	200mm WC
VRAH DN100	Vacuum 20mm WC	250m3/h	350m3/h
VRA	Can be set from Vacuum 35mm WC to vacuum 60mm WC		
DN50		70m3/h	98m3/h
DN100		280m3/h	390m3/h
DN150		640m3/h	890m3/h

DELTA VRA / VRAH – technical feature

The valve opens when a vacuum of a certain pressure occurs in the tank

The valve is closed through the spring-pressure only when there is no longer
vacuum present

The valve is fitted with an integrated cleaning nozzle to clean the valve seat

Required air pressure for seat-lift actuator:

4 - 10 bar / 60 – 150 psi

DELTA VRA / VRAH – seal material

Standard:
- **EPDM**

Option:
- **VMQ**
- **FPM**

All sealing materials meet the requirements of FDA

DELTA VRA / VRAH – customer benefits

- **Only one seal**
- **Seat-lift actuator fully welded, maintenance free**
- **Quick and easy adjustment of pick-up pressure (DELTA VRA)**

DELTA VRA / VRAH – customer benefits

- Gas tight design
- Easy identification of seals
- No shaft bearing in product area
- Proper cleaning of housing due to built-in spray nozzle
- Fully drainable without dead spaces
- Optimal cleaning facilities due to ball-shaped housing
- No dripping or splashing of fluids during cleaning due to the drip tray
- Proximity switches can be installed for feed back of seat-lift

DELTA VRA / VRAH – Control Questions

What is the basic function of the vaccum valve DELTA VRAH/VRA ?

To control the pressure inside a tank
To protect a tank from vaccum damage during emptying of a tank

What is the difference between the DELTA VRAH and VRA?

The way of installation, one is hanging the other one is installed upright

The VRAH is only available in DN100, the VRAH in DN50, DN100 and DN150

The VRAH has a fixed response point, the VRAH can have the response point set between 35 mm – 60 mm WC vacuum

The seat lift actuator is:

standard feature
available as an option

DELTA RG4

DELTA RG4 – The Product

Available in sizes

- ISO: 1” - 4” OD Tube
- DIN: DN25 - DN125 Metric Sizes

Actuator

- Pneumatic Diaphragm Actuator from Samson

Integrated design: Type 3277
Namur design: Type 271

Control Signal options

- P/P Pneumatic 0,2 – 1 bar (3-15 psig)

Samson Type P675

- I/P Electro-Pneumatic (4-20 mA)

Integrated design Samson type IP3767 or new type IP3730
Namur design Samson type IP376

others on request
(Profibus, ASi-bus)

DELTA RG4 – The Product

Control Characteristic options

- Linear
- Equal Percentage

Option

- 3A execution
- Aseptic versions:

RGMS4 with diaphragm like DELTA MS4 valve

RG4DPF with steam barrier

DELTA RG4 – The Product

Internal finish

Electro polished , Ra ≤ 0,8µm / Ra ≤ 32 Ra µin. (150 grit or better)

External finish

Glass blasted, satin finish or 150 grit polish

Material

Product wetted parts: Stainless steel AISI 316L / 1.4404
Other parts: Stainless steel AISI 304 / 1.4301

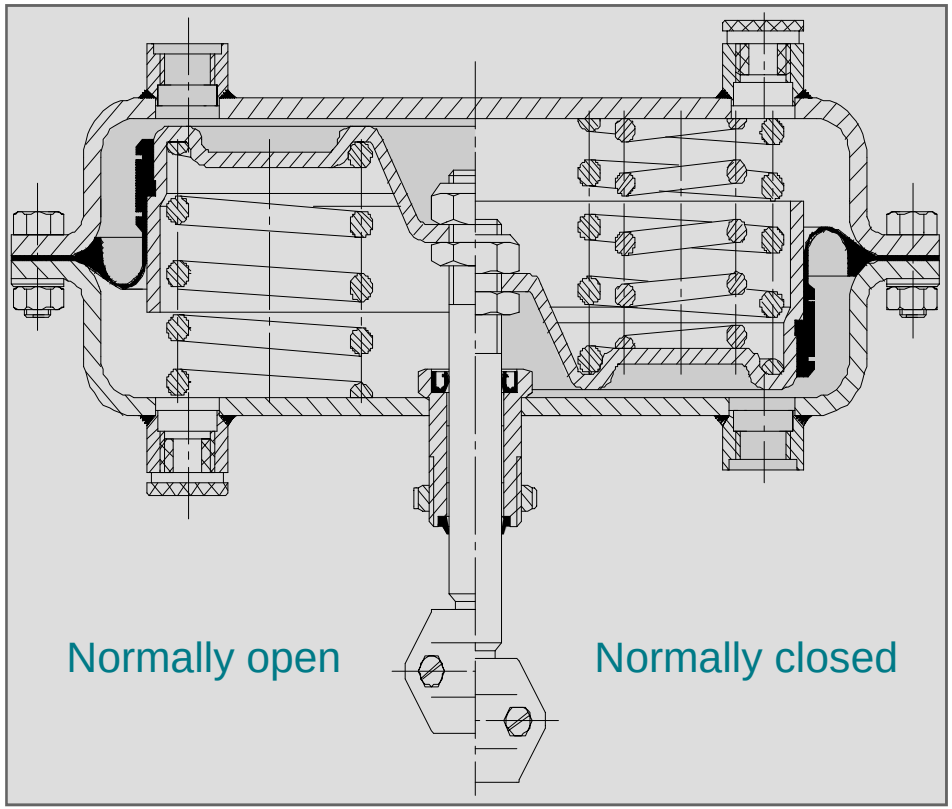
- **Diaphragm actuator and positioner varnished (beige)**

Max. product line pressure

1”/25 - 2.5”/65	**25 bar / 362 psig**
3”/80 - 4”/100	**16 bar / 230 psig**
DN 125	**10 bar / 145 psig**

Max. temperature 135°C CIP (short term): 140°C

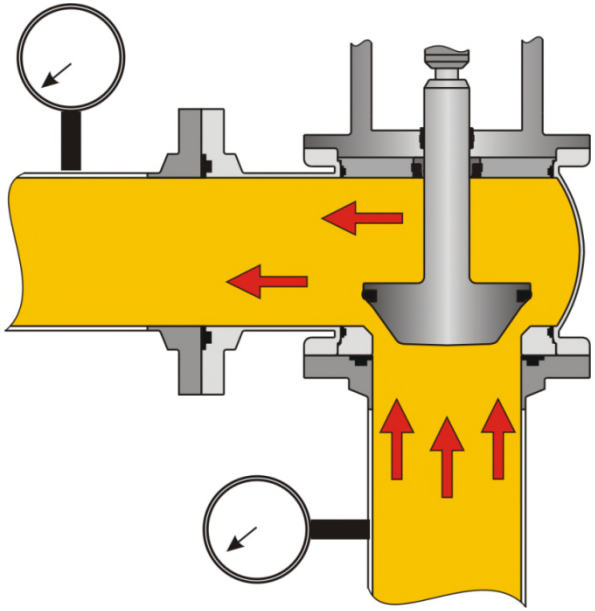
DELTA RG4 – Diaphragm actuator



Samson type MAT 271

The operation mode can easily be changed from normally closed to normally open by reversing the spring pack inside the diaphragm actuator

DELTA RG4 – Function

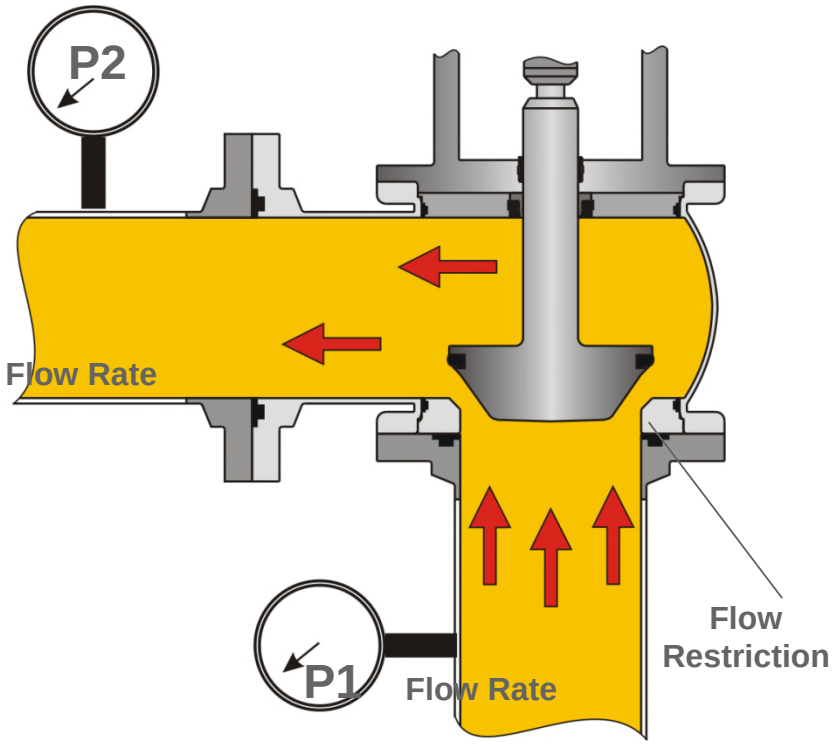


Single Seat valves, such as the DELTA SW4 and DELTA MS4 valves, are either fully open or fully closed.

In contrast, the position of the valve stem in a regulating valve is adjusted based on the control signal it receives.

Thus, the function of a regulating valve is to maintain a desired process pressure or flow rate condition.

DELTA RG4 – Function



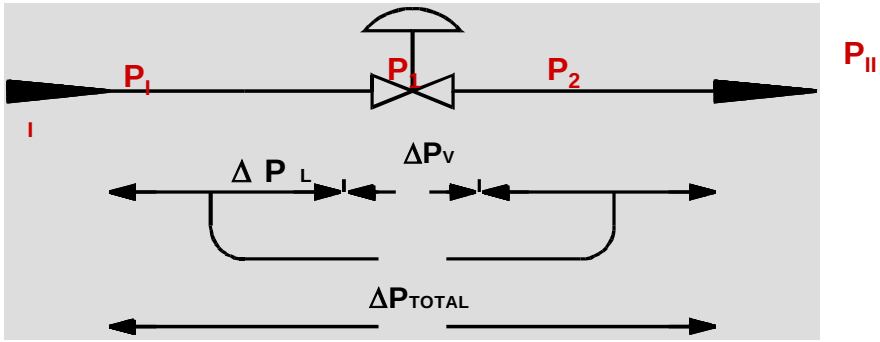
Controlling either of these process conditions – pressure or flow rate -- is dependent upon the maintaining a relationship between flow rate, the pressure drop through the valve and the specific gravity of the product.

Any restriction placed in the flow path will have a Flow Coefficient value (C_v) value that will range from 0 (fully closed) to a maximum value (fully open).

Thus, process control using a Regulating Valve depends upon selecting the correct restriction (valve plug) for the application.

DELTA RG4 – Function

The valve in the piping system



The regulating valve is integrated in a system of pressure producers (pumps etc.) and resistors (pipeline, baffles etc.)

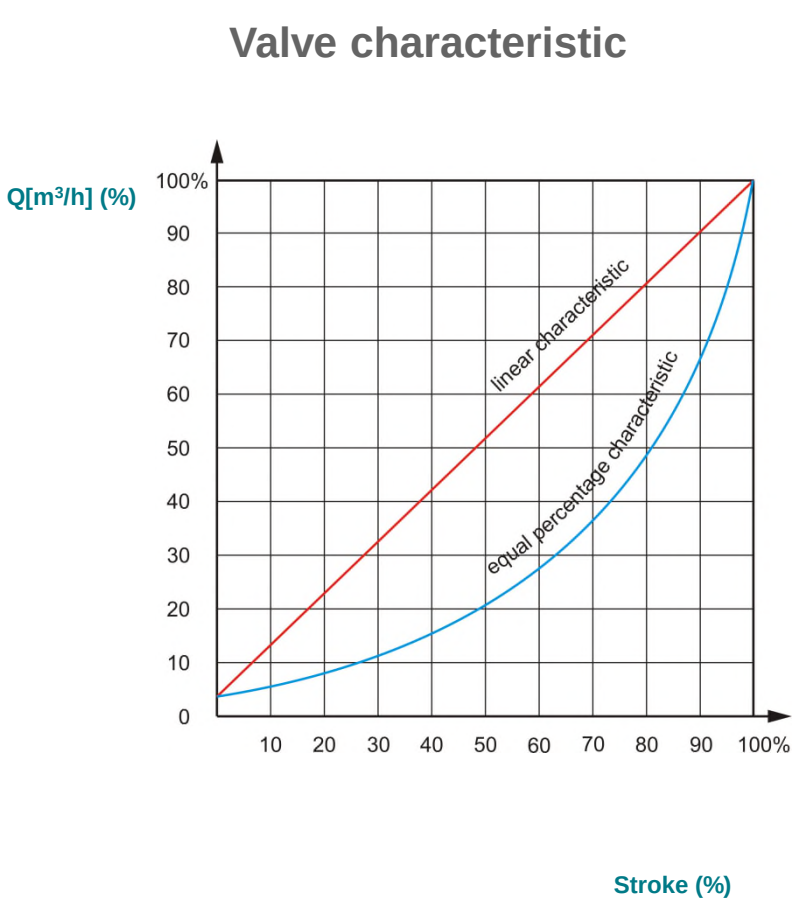
Generally, in these systems, linear flow characteristics with constant reinforcement via the whole stroke area is strived for.

The regulating valve will influence the system according to its characteristics.

In principle, distinction is made between 2 basic characteristics:

The linear- and the equal-percentage type.

DELTA RG4 – Linear - Equal percentage



The linear type

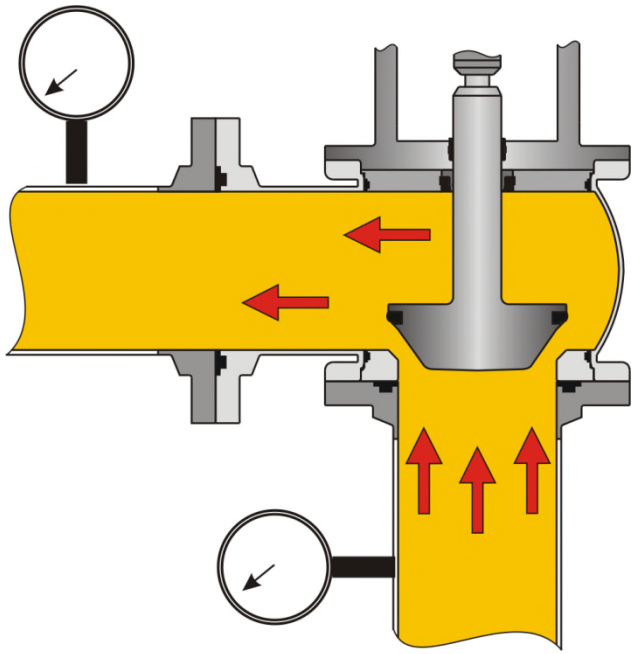
is characterized by the feature that equal stroke changes are direct proportional to equal changes in Kv-values.

The equal-percentage type

is characterized by the feature that equal stroke changes will correspond to equal-percentage changes of the respective Kv-value.
(A certain stroke change will result in a small flow change with small Kv-values and, accordingly, in case of large Kv-values in a large change of flow.)

In practice, by the steady change of the operating conditions, operating characteristics are created from the basic characteristics.

DELTA RG4 - Specification

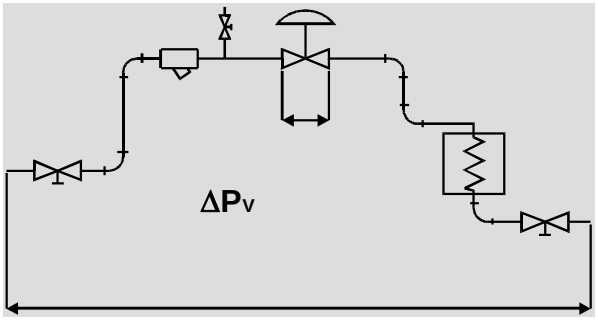


$$C_v = \frac{GPM}{\sqrt{(P1 - P2)/Specific\ Gravity}}$$

Once the desired Cv value has been determined, select a valve size/Cv combination that will allow your valve to operate ideally between 50%-70% open during normal processing. This will prevent the valve from cavitating at the lower end, while allowing some flexibility at the upper end.

DELTA RG4

Selection of linear or equal percentage regarding the complete process loop

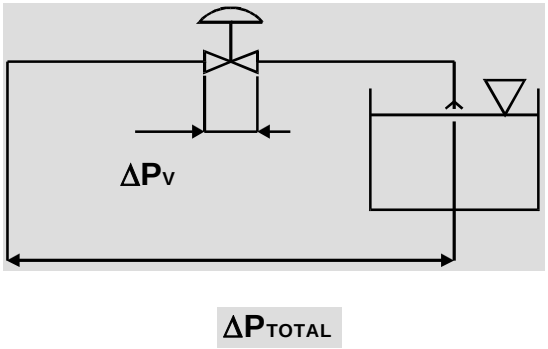


$$\frac{\Delta P_V}{\Delta P_{TOTAL}} \leq 0.5$$

Equal percentage

Few changes of differential pressures, high pressure drop across the valve, pressure control

With insufficient information on the total system best option

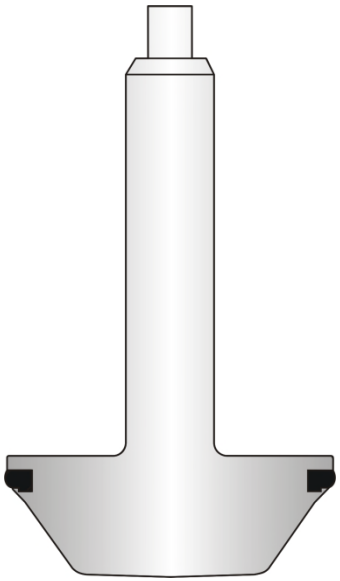


$$\frac{\Delta P_V}{\Delta P_{TOTAL}} > 0.5$$

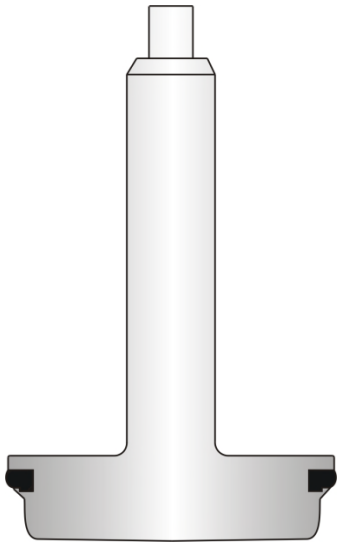
Linear

Quantity / Volume regulations
Very fast regulations

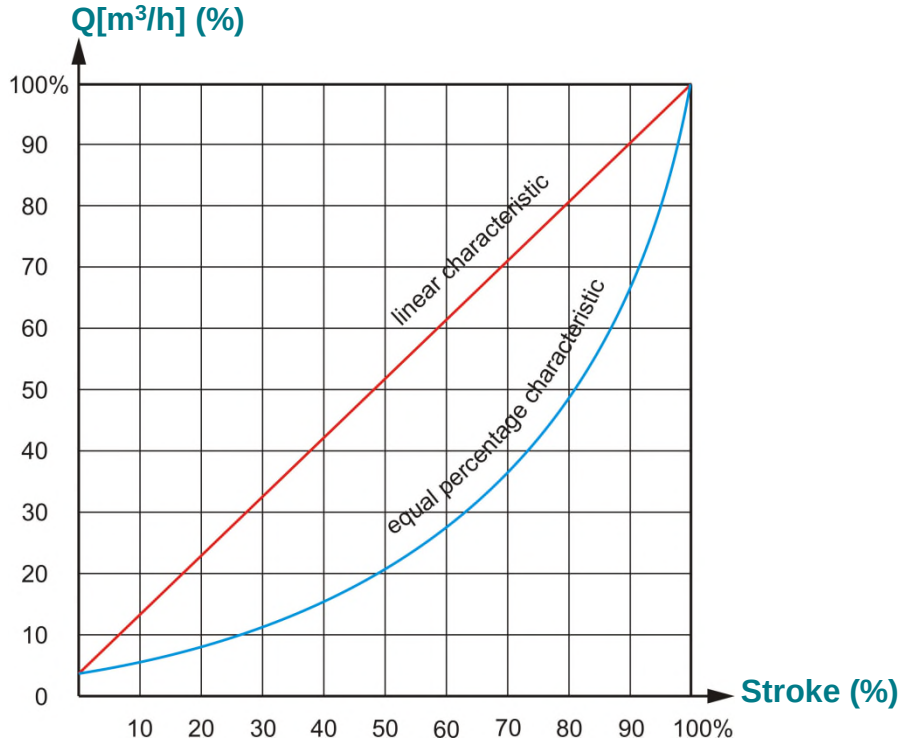
LINEAR VS. EQUAL PERCENTAGE



Linear characteristic



Equal percentage characteristic



DELTA RG4 –
Pneumatic Vs. Electro-Pneumatic Input

In each case, a signal is required to tell the positioner the what stroke position the valve should be in (between 0-100% of full stroke).

Typical pneumatic (P) control input is 0,2 – 1 bar / 3-15psig

0,2 bar / 3psi = 0% open (valve begins to open)
0,6 bar / 9psi = 50% stroke
1 bar / 15psi = 100% stroke (valve is fully open)

Typical current (I) control input is 4-20mA

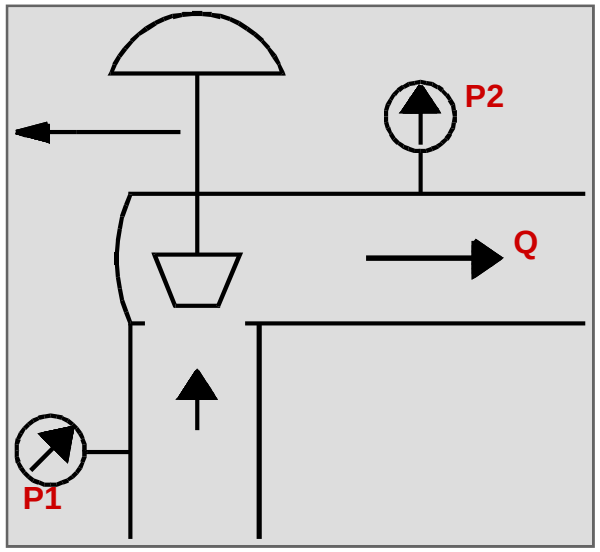
4 mA = 0% open (valve begins to open)
12 mA = 50% stroke
20 mA = 100% stroke (valve is fully open)

The second P in I/P or P/P is the supply pressure (actuator force) required in each case to drive the valve stem to it's requested position.

DELTA RG4 – Technical data

Inch / DN	1" / 25	1,5" / 40	2" / 50	2,5" / 65	3" / 80	4" / 100	125	150
Kvs value (m^3/h)	0,25* / 0,3	2,5 / 2,93	6,3 / 7,4	16 / 18,7	40 / 46,8	63 / 73,7	100 / 117	160 / 187,2
Cv values (GPM)								
	0,4* / 0,47	2,5 / 2,93	10 / 11,7	25 / 29,3	63 / 73,7	100 / 117	160 / 187,2	250 / 292,5
	0,63* / 0,74	4 / 4,7	16 / 18,7	40 / 46,8	100 / 117	160 / 187,2	250 / 292,5	400 / 468
	1,03* / 1,17	6,3 / 7,4	25 / 29,3	63 / 73,7				
	1,6* / 1,87	10 / 11,7	40 / 46,8					
	2,5 / 2,93	16 / 18,7						
	4 / 4,7	25 / 29,3						
	6,3 / 7,4							
	10 / 11,7							
Stroke (mm)	15	15	15	15	15	15	15/30	30
Seat size ø (mm)	4	13	26	38	50	66	81	100
	8	26	38	50	66	81	100	125
	13	38	50	66	72,9	100	125	150
	26				81			
* Metallic stop								

DELTA RG4 – Kv value calculation



p1 = pressure before valve (bar)
p2 = pressure after valve (bar)
□p = p1-p2 pressure difference (bar)
Q = flow (m^3/h)
rho = density (kg/m^3)

Kv =Q x □ rho /(1000 x (p1-p2))
Rough formula of calculation for the flow of liquids

The Kv-value is a standarized unit.
It is the measured flow (Q) of water in (m^3/h) at a pressure difference of 1 bar, at the respective stroke.
The Kvs-value represents the flow at a nominal stroke of 100 %.

Conversion of units:

Kvs (m^3/h) = 0.86 x Cv (U.S. gallons/min)
1.17 x Kvs (m^3/h) = Cv (U.S. gallons/min)

DELTA RG4 - Options

Free choice between linear or equal percentage characteristics

Flow divider for noise reduction

Aseptic version with:
Diaphragm (DELTA RGMS4)
Steam barrier

Different types of positioners available

Optional valve cone with metallic stop

Two optional house configurations
L-type
T-type
LL-type (mixing)

DELTA RG4 – Seal material

Housing and Seat Seals

EPDM (standard)

Option

VMQ (Silicone), FPM (Viton), HNBR

Shaft Seals

EPDM/PTFE (standard)

Option

VMQ (Silicone)/PTFE, FPM (Viton)/PTFE, HNBR/PTFE

RGMS4 diaphragm

PTFE (TFM)

Note: If VMQ is selected, housing seals are EPDM

All sealing materials meet the requirements of FDA

DELTA RG4 – Valve specifying

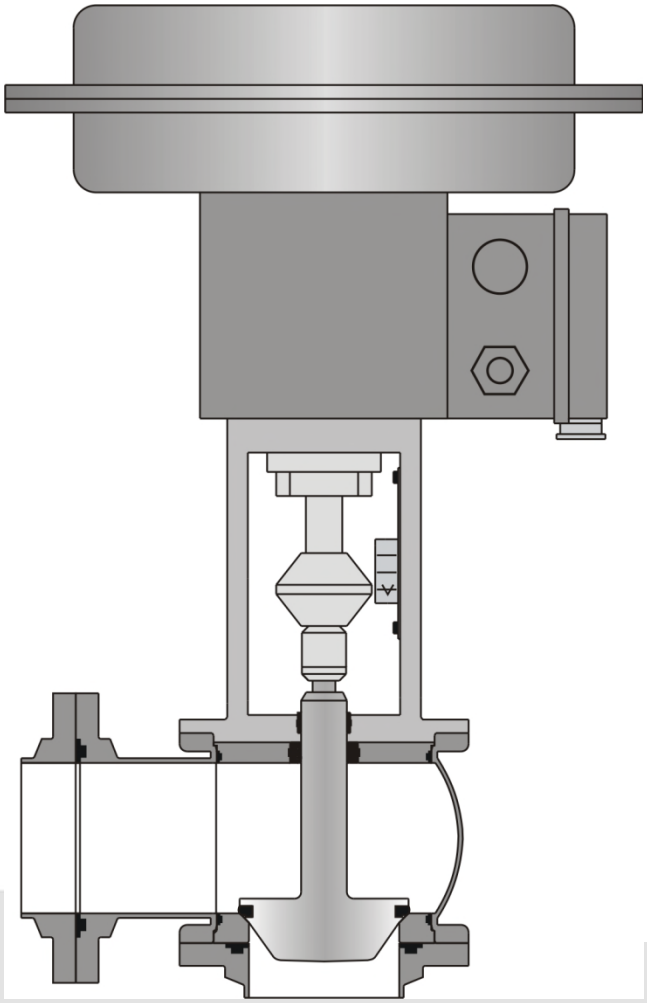
Specification: Modulating Valves

Customer:			
Name:	Date:		
Housing type:	RG41 Standard L-type ☐	RG42 T-type ☐	RG43 Mixing valve ☐
Diameter:	Product type:	Seal material:	EPDM ☐ VMQ ☐ HNBR ☐ FPM ☐
Characteristics:	linear ☐ - equal-percentage ☐		
Options:	Aseptic designs: • RGM4 (with membrane) ☐ • RG4DFF (with steam barrier) ☐		
	- with noise reduction ☐		
	- with metal stop ☐		
Membrane actuator: (Samson)	Normal position:	spring to close ☐ spring to open ☐	
	MAT 3277 ☐ Integrated design		MAT 271 ☐ according to Namur
Positioner: (Samson)	IP 3767 electro-pneumatic signal: 4 - 20 mA ☐	IP 3730 – 0 electro-pneumatic signal: 4 – 20 mA ☐	IP 4763 el.-pneum. signal: 4 – 20 mA ☐
	P 3766 pneumatic signal: 0.2 - 1.0 bar ☐	IP 3730 – 2 electro-pneumatic signal: 4 – 20 mA ☐	IP 4765 pneum. signal: 0.2 – 1.0 bar ☐
	IP 3780 Hart Protocol signal: 4 – 20 mA ☐	IP 3730 – 3 Hart Protocol signal: 4 – 20 mA ☐	
	IP 3785 Profibus PA ☐	IP 3730 – 4 Profibus PA ☐	
	IP 3785 Foundation Fieldbus ☐	IP 3730 – 5 Foundation Fieldbus ☐	

Technical Parameter		Minimum	Maximum	Normal
Flow rate	Q (m³/h, kg/h)			
Inlet pressure	p_1 (bar abs.)			
Outlet pressure	p_2 (bar abs.)			
Temperature	t (°C)			
Density	ς (kg/m³)			
Viscosity	ϒ (cSt) η (cP)			
CIP flow rate	Q (m³/h, kg/h)			

DELTA RG4 – customer benefits

DELTA RG4 with actuator MAT 3277 and integrated positioner



Few seals
– low maintenance costs

Soft seat seal
– no additional shut-off valve needed

Delivery with mating flanges
– easy service & maintenance

Quick and easy change of valve characteristics without special tools
– high flexibility when Kv value changes

Easy removal of valve insert (only 4 bolts)
– easy maintenance

DELTA RG4 – customer benefits

Ball-shaped valve body

- gentle treatment of product and reliable cleaning (no sump, no dome)

Open valve design

- different types of positioners available

Seals are individually molded and etched with base part number and year of manufacture. Material type is based on part number ending (VMQ = /13, HNBR = /33, FPM =/73, EPDM = /93)

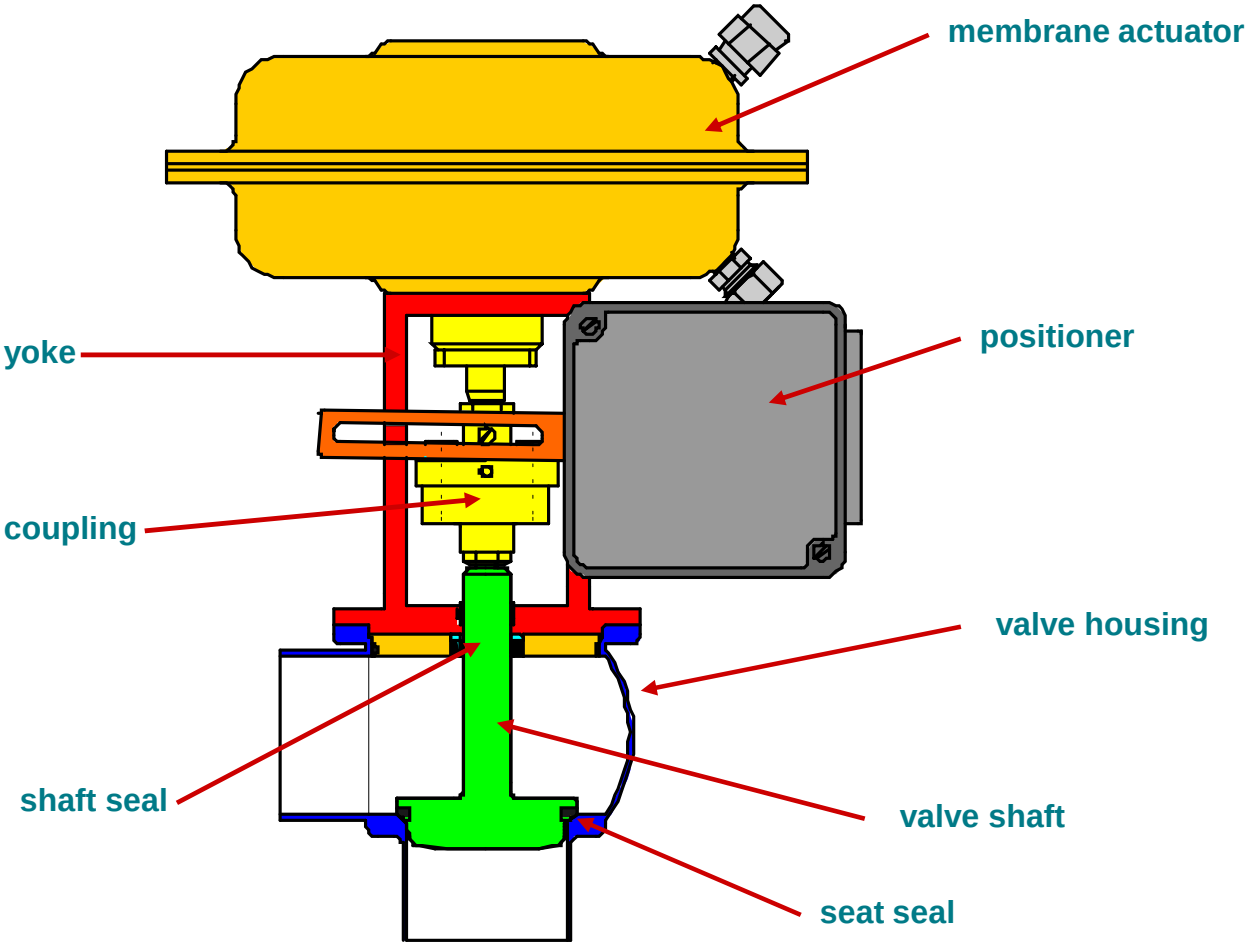
- no risk of using wrong seal material

DELTA RGE4

GLOBAL INFRASTRUCTURE X PROCESS EQUIPMENT X DIAGNOSTIC TOOLS

APV
AN SPX BRAND

DELTA RGE4 - Description



DELTA RGE4 – Technical data

Available in sizes:	**DIN: DN 25 – 100** **ISO: 1”– 4” OD Tube**
Nominal pressure ranges:	**DN25-65, 1”- 2,5” OD Tube PN25** **DN80-100, 3”+ 4” OD Tube PN16**
Materials:	**Product-wetted parts 1.4404 / AISI 316L** **Other parts 1.4301 / AISI 304**
Seals:	**EPDM, HNBR, VMQ (Silicon)** **All sealing materials meet the requirements of FDA**
Surfaces:	**inner - ground, turned Ra< 1,6µm** **outer - glass blasted, satin finish**
Product temperature:	**135°C EPDM, HNBR**
Sterilization temp.:	**140°C (short time)**

DELTA RGE4 – Technical data

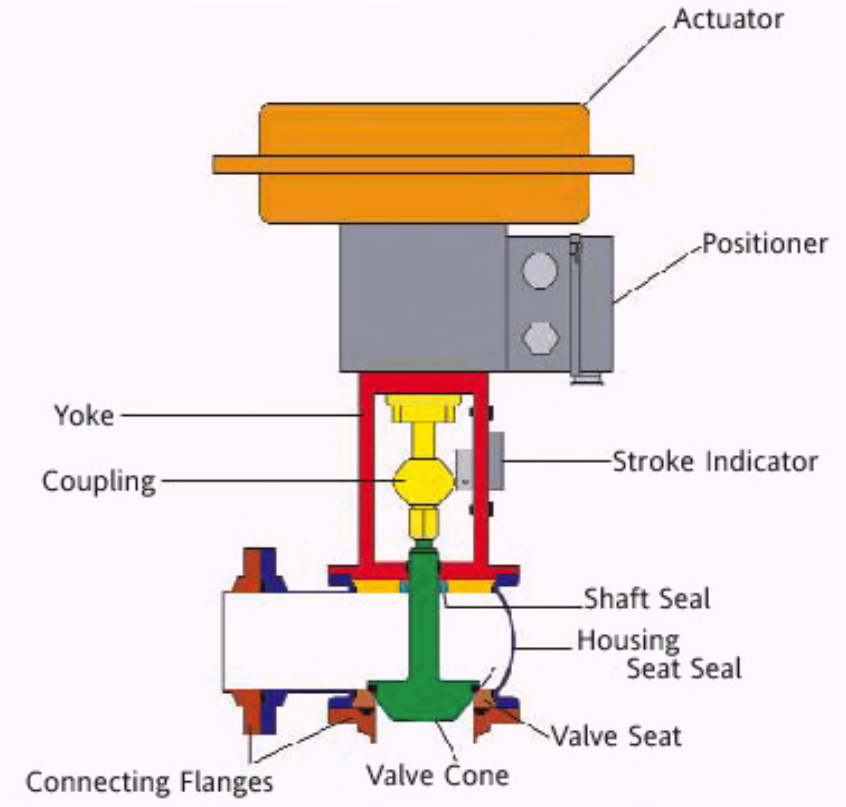
DN	OD Tube	KVS values (m^3/h)	CV values (U.S. gallons/min)	Actuator PU (cm^2)	Max. differential pressure (bar) Max. differential pressure (psi)	
					Normally closed	Normally open
25	1	6,3 / 10	7,4 / 11,7	127	25 / 362	25 / 362
40	1,5	16 / 25	18,7 / 29,3	127	18 / 261	25 / 362
	1,5	2,5 / 4,0 / 6,3 / 10	2,9 / 4,7 / 7,4 / 11,7	127	25 / 362	25 / 362
40	1,5	16 / 25	18,7 / 29,3	252	25 / 362	25 / 362
50	2	40	46,8	252	22 / 319	25 / 362
65	2,5	63	73,7	252	13 / 188	25 / 362
80		100	117	252	9 / 130	16 / 232
80		100	117	350	16 / 232	16 / 232
	3	80	93,6	252	9 / 130	16 / 232
	3	80	93,6	350	16 / 232	16 / 232
100	4	160	187,2	252	6 / 87	16 / 232
100	4	160	187,2	350	9 / 130	16 / 232

DELTA RGE4 - Actuator / Positioner options

The regulating valves DELTA RGE4 are available in the following designs:

Actuator:	**membrane actuator, normally open/normally closed**	
	manual actuator	
Positioner:	**pneumatic**	**0,1-1 bar**
	electro-pneumatic	**4-20mA**
Characteristics:	**linear or equal-percentage**	
Options:	**aseptic design with steam barrier**	
	3A execution	

DELTA RGE4 - RGE4 vs. RG4



RGE4 vs. RG4

RG4

The DELTA RG4 valve offers following:

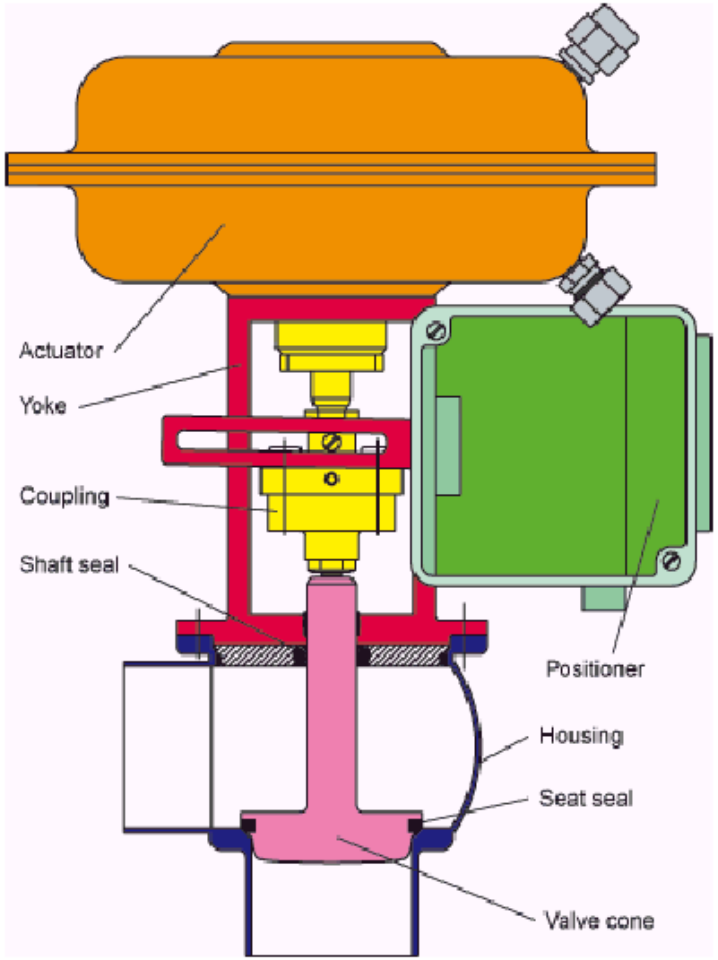
Integrated actuator/positioner

Interchangeable Cv trim

Wide variety of Cv values available, especially in the lower Cv ranges

Flange fittings are standard

DELTA RGE4 - RGE4 vs. RG4



RGE4 vs. RG4

RGE4

The RGE4 valve was developed to offer a cost effective option to the RG4, while still providing a high end control valve:

Actuator and positioner are separate

Selected Cv range or ranges for each valve port size

Standard valve body

DELTA RGE4 - Valve sizing

Spezifikation: Regelventile RGE4-FOXBORO

specification: modulating valves

APV Rosista GmbH D-56425 Urmo

Kunde: customer		
Aussteller: name	Datum: date	
Bauform: housing type	RGE41 Standard L-type ☐	RGE42 T-Ausf. T-type ☐
Membranantrieb: diaphragm actuator Schmidt Arm.	MAT PU Grundstellung: normal position	-MFS federschließend (spring closing) ☐ -MFH federöffnend (spring opening) ☐
Stellungsregler: positioner FOXBORO Eckardt	Namur-Ausführung: according to Namur	SRI 986 elektro-pneum. Signal: 4...20 mA ☐ SRP 981 pneumatisch Signal: 0,2...1,0 bar ☐
	Sonderausführungen: options	- split-range . . . . . mA ☐ - ex-geschützt (ex-proof) ☐ - . . . . . ☐
Kennlinienform: characteristic	- linear - gleichprozentig	(linear) ☐ (equal perc.) ☐
Medium: medium	Dichtungsmaterial: seal material	- EPDM ../93 ☐ - Silikon ../13 ☐ - FPM ../73 ☐

Nennweite: diameter: . . . . . (DN ; T)		Minimum	Maximum	Normal
Durchfluss flow rate	Q (m^3/h ; kg/h)			
Eingangsdruck inlet pressure	p_1 (bar abs.)			
Ausgangsdruck outlet pressure	p_2 (bar abs.)			
Temperatur temperature	t (°C)			
Dichte density	ϱ (kg/m^3)			
Viskosität viscosity	ν (cSt) η (cP)			
CIP - Menge CIP - flow rate	Q (m^3/h ; kg/h)			

25.1.1999 L.K.

DELTA RGE4 – phase out VPR

The old PASILAC modulating valve type VPR has been phased out on 1st November 1999

Spare parts will still be available until 1st November 2009

We consider gaskets as normal consumable spare parts

Valve bodies, valve shafts are not typical spare parts like consumable spare parts and hence can be ordered only on special request and availability provided. In some cases a new valve may be the cheaper solution.

SPX®

INFRASTRUCTURE | PROCESS SOLUTIONS | DIAGNOSTIC SYSTEMS

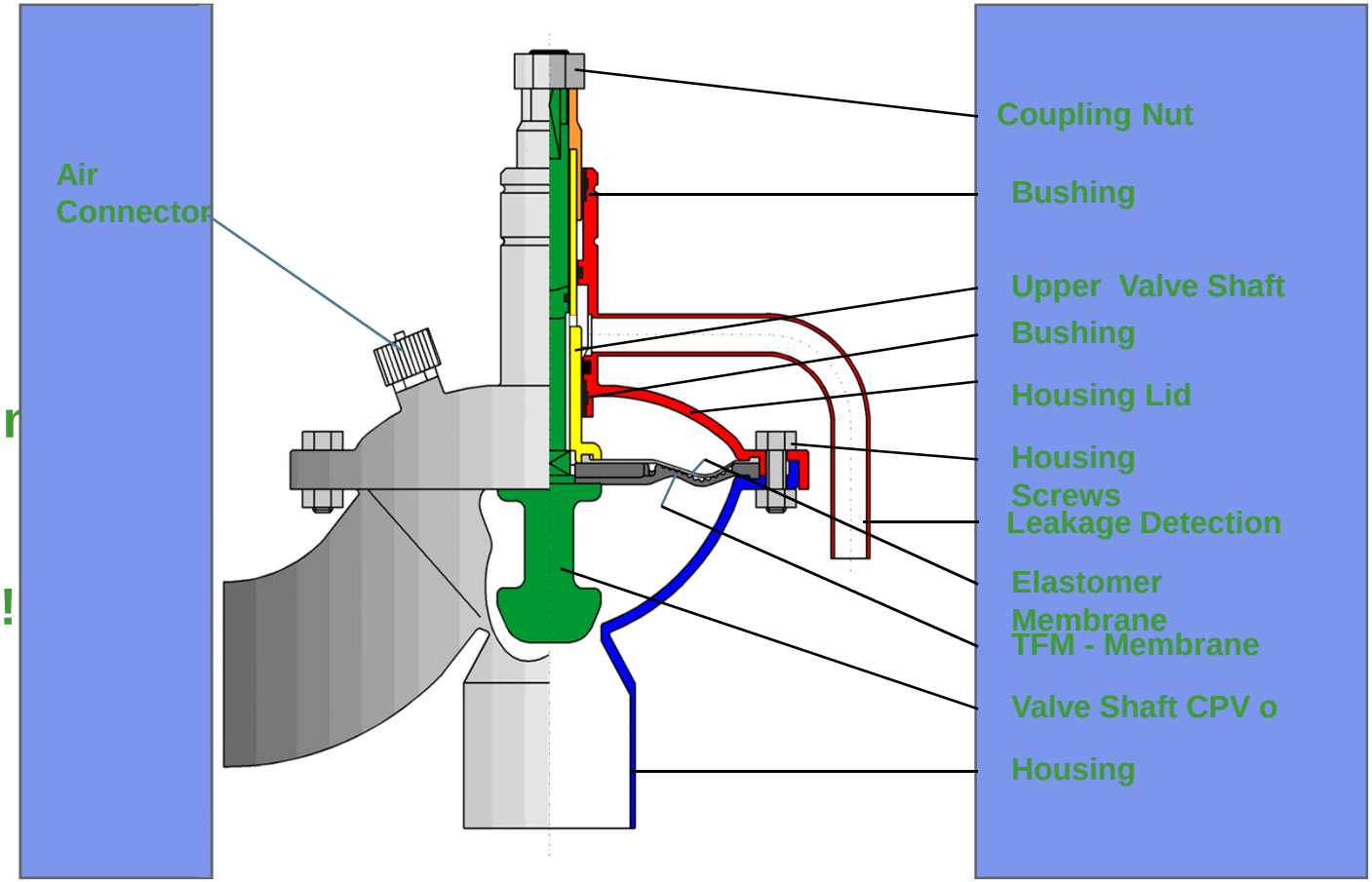
DELTA CPV

DELTA CPV – technical data

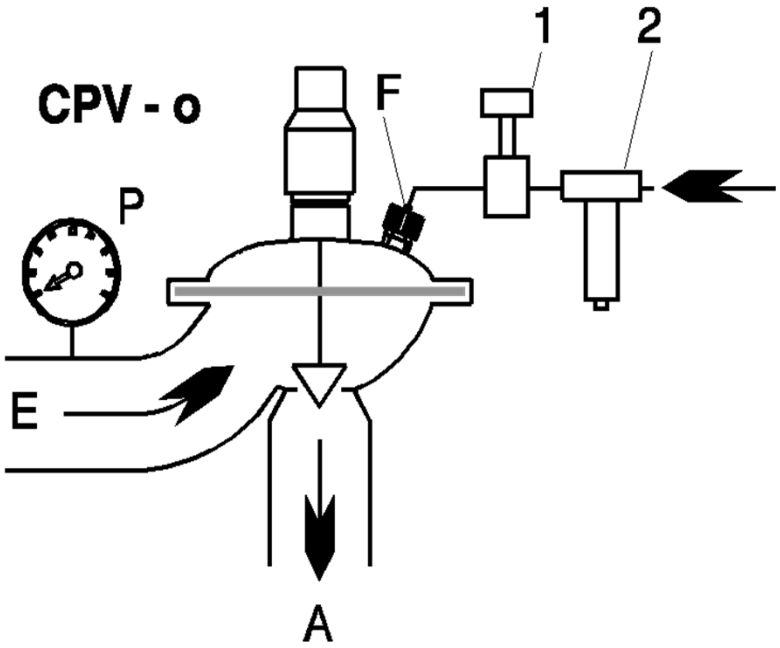
Available in sizes:	**ISO: 2”OD Tube and DIN: DN50 Metric sizes**
Working pressure:	**up to 7 bar (101.5 psi)**
Max. operating pressure :	**10 bar (145 psi) (avoid pressure hammer !)**
Max. supply air pressure:	**6 bar (87 psi) (applies to booster too)**
Temperature:	**Max. Operating 135°C (275°F)** **Short term 140°C (284°F)**
Air connection:	**G1/8“**
Materials:	**Product wetted parts AISI 316L** **Membrane product-wetted side TFM (Hostaflon)** **air side EPDM**

DELTA CPV – cut-away drawing

Simple design also suitable for aseptic applications !



DELTA CPV – application CPV-o



1- Air Pressure Regulator

2 - Air Filter

F - Air Connector

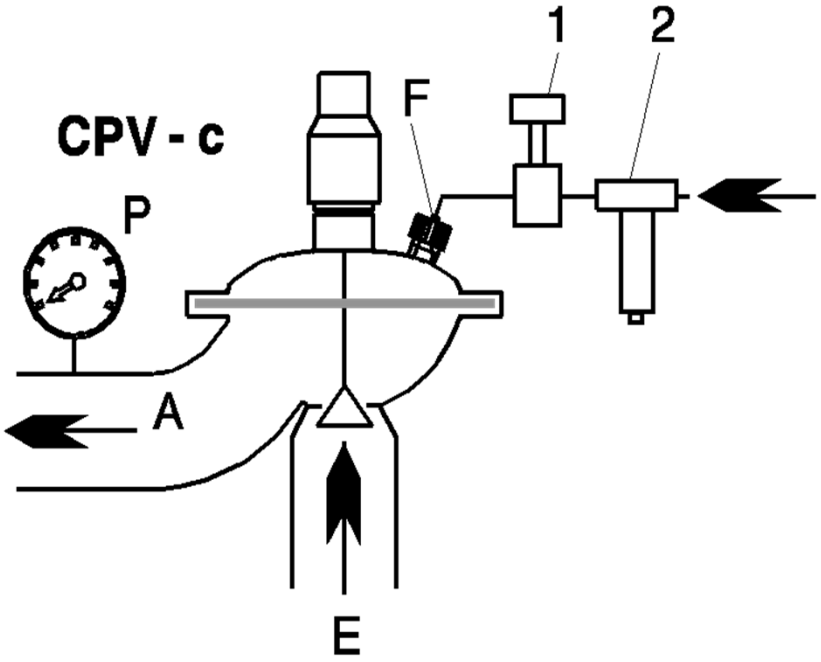
E - Product Inlet

A - Product Outlet

P - Product Pressure

- To provide a constant pressure before the valve.
- Valve opens with increasing product pressure and closes if the pressure drops.

DELTA CPV – application CPV-c



1- Air Pressure Regulator

2 - Air Filter

F - Air Connector

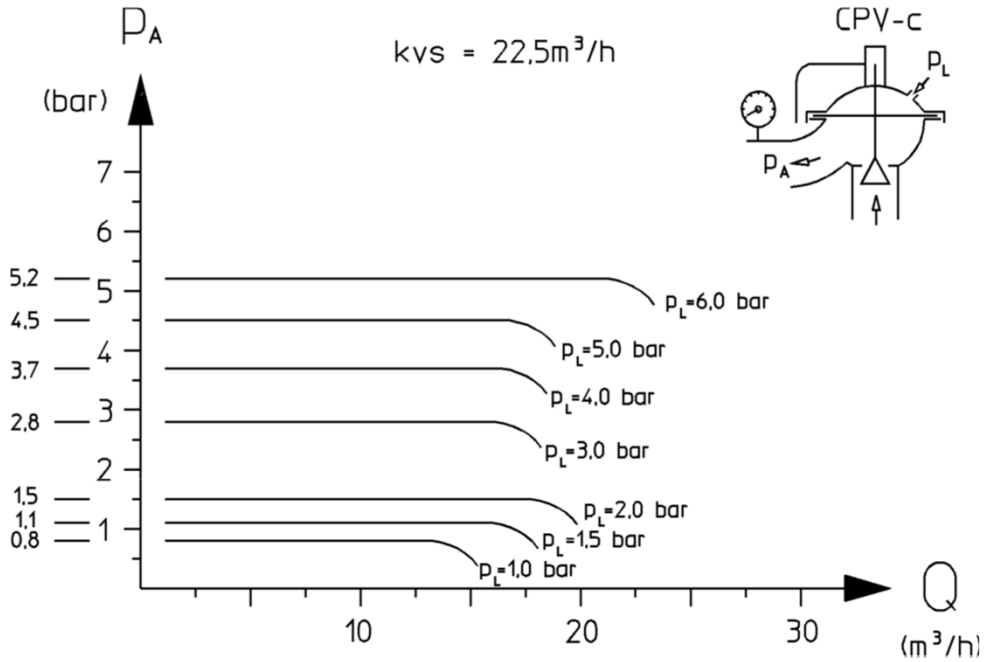
E - Product Inlet

A - Product Outlet

P - Product Pressure

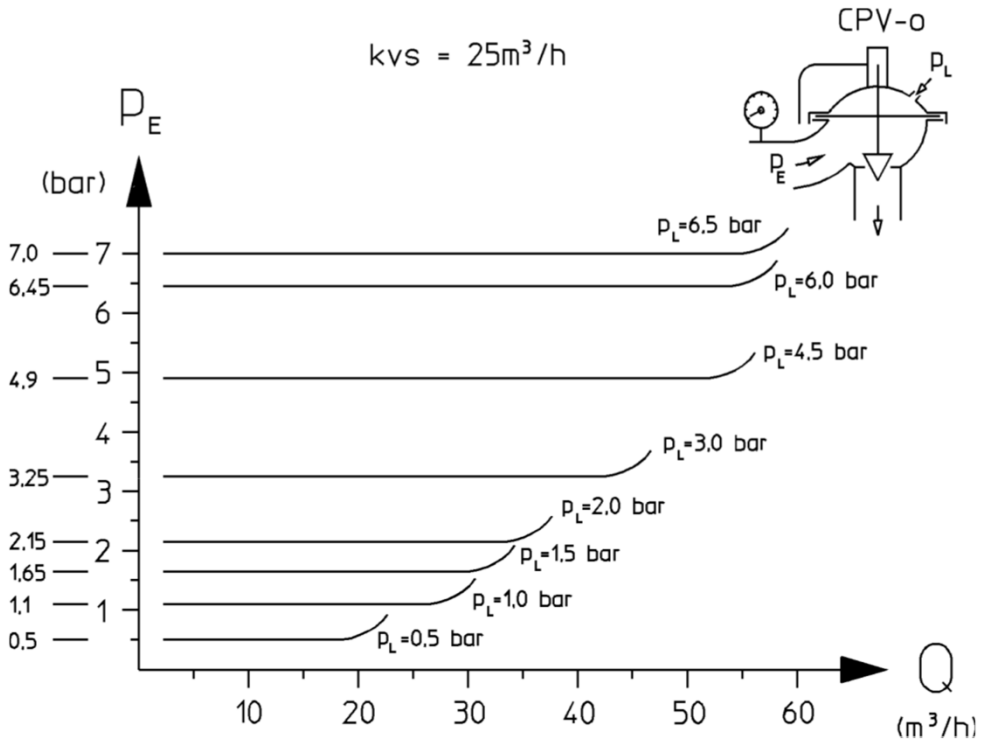
- To provide a constant pressure behind valve and opens if the pressure drops.
- Valve closes with increasing product pressure

DELTA CPV – performance curve CPV-c



The DELTA CPV-c offers a wider range of Kv values compared to the old DELTA DHM valve

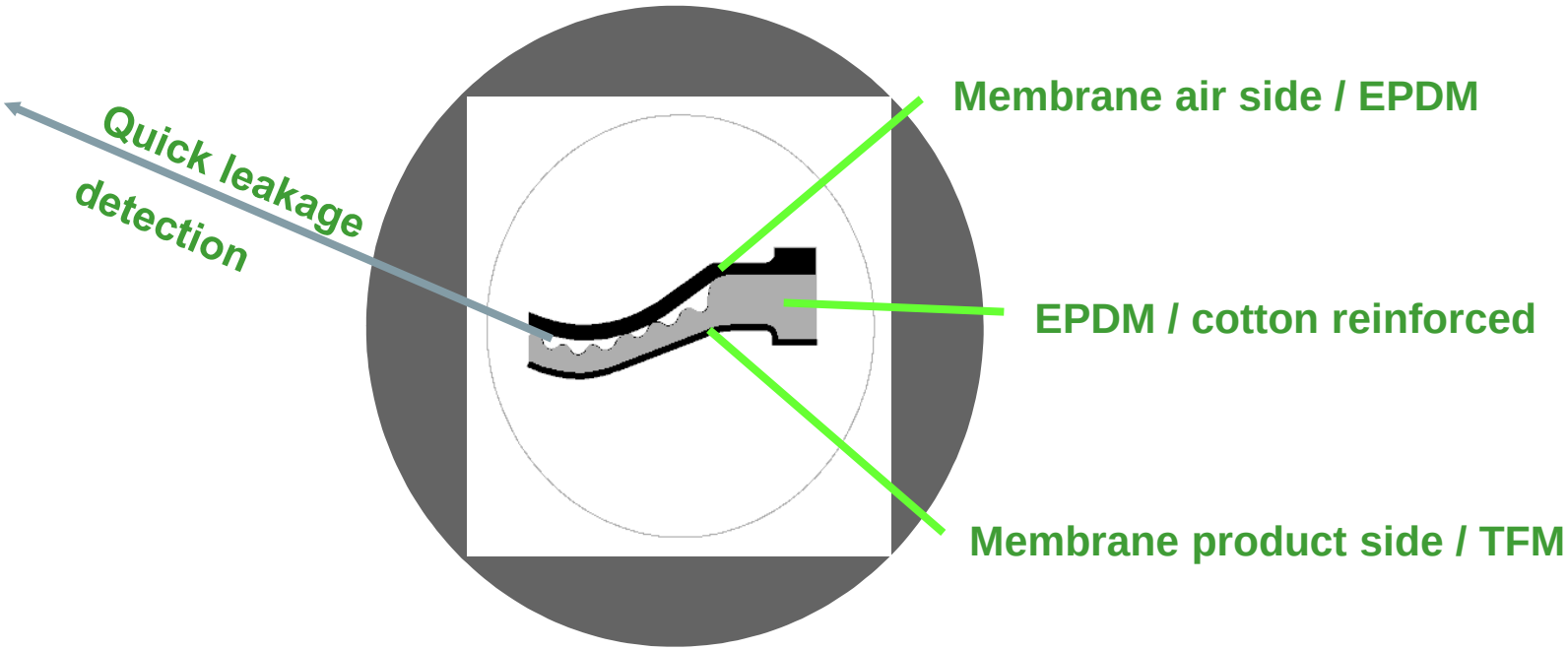
DELTA CPV– performance curve CPV-o



The DELTA CPV-o offers a wider range of Kv values compared to the old DELTA DHM valve

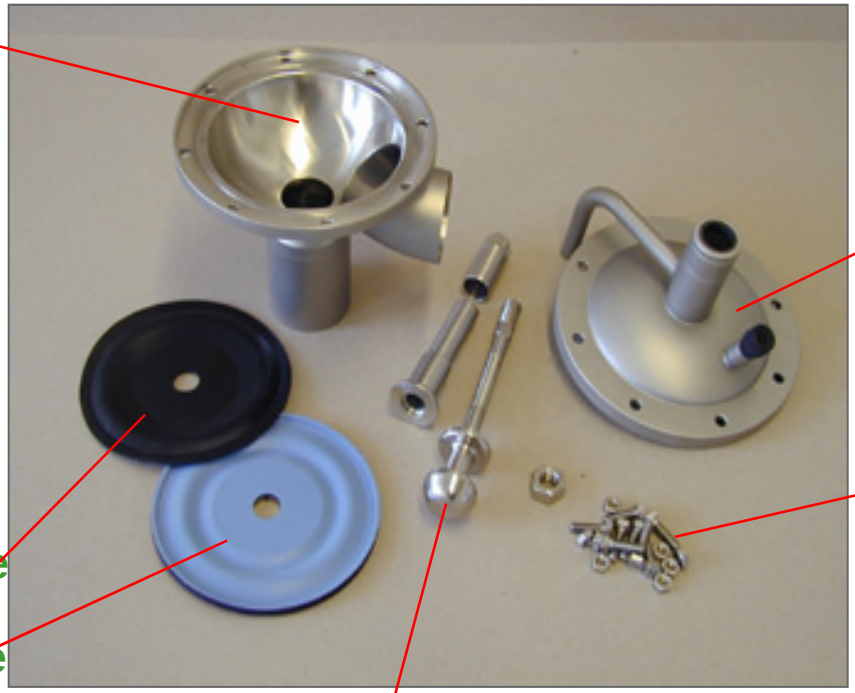
DELTA CPV – membrane design

- robust long-life flat membrane system ensures aseptic product quality



Thanks to the reliable double membrane system the valve can run for a long period without service !

DELTA CPV - components



DELTA CPV - booster

With Booster

Needed when the available air pressure is not high enough

- **to increase the operating efficiency**
- **boost factor x 1,5**

e.g. airpressure needed is 5 bar, air pressure available is 4 bar only, the booster will bost the available air pressure from 4 bar to 6 bar

DELTA CPV – customer benefits

Easy to open without special tools

DELTA CPV – customer benefits

Maximum product protection / product care

- *Round surfaces in the housing and on the modulating cone ensure minimum shear forces implied onto the product.*
- *Stable modulating quality due to precise adaptation between membrane and valve seat opening.*
- *Minimized product volume in valve housing ensures quick response time and excellent modulating accuracy.*

Long service life

- *The rubber-supported TFM membrane is optimized for long endurance lifetime.*

Excellent CIP cleanability

- *Flat TFM membrane; smooth housing surface; no dead pockets.*
- *The large kv value in the fully open valve allows for sufficient CIP throughput for pipeline cleaning.*

DELTA CPV – customer benefits

Ease of use

- *Flat membrane system with integrated leak detection for quick indication of leakage from the product side or air side*

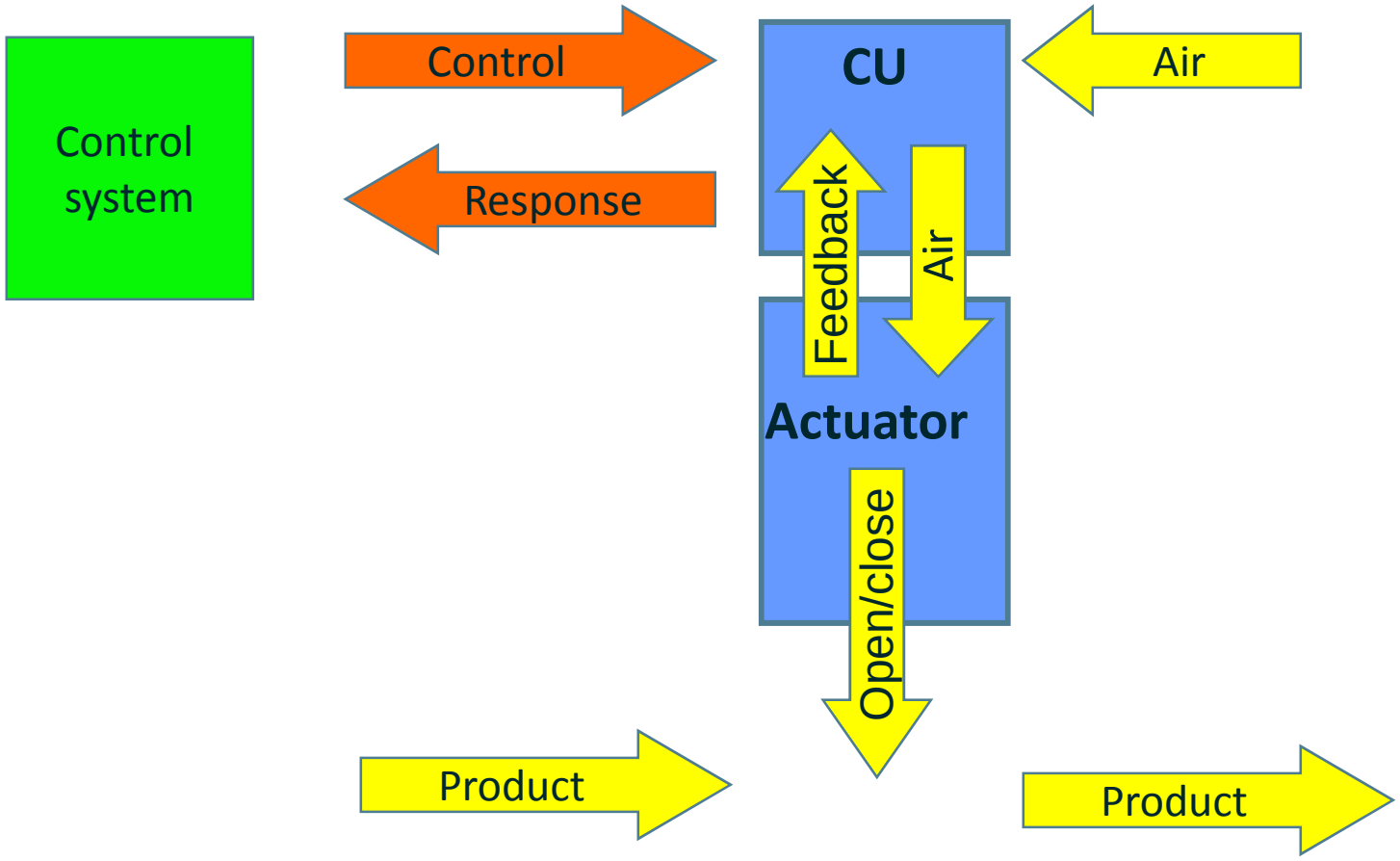
- *The large kv value ensures the modulating quality in a broad field of applications.*

- *Optional booster available to support insufficient control air pressure.*

Control of APV Process Valves with Control Units DELTA CU

APV systematic solution with DELTA Control Units

DELTA CU - how does it work



DELTA CU3 - Mechanics

- No internal air houses - injection-moulded channels
- solenoids with air throttling function (inlet and outlet)
- low power consumption (<0,7W)
- manual override / solenoid

- Electrical connection via screw terminals
- PCB potted / IP67 safety against corrosion, humidity

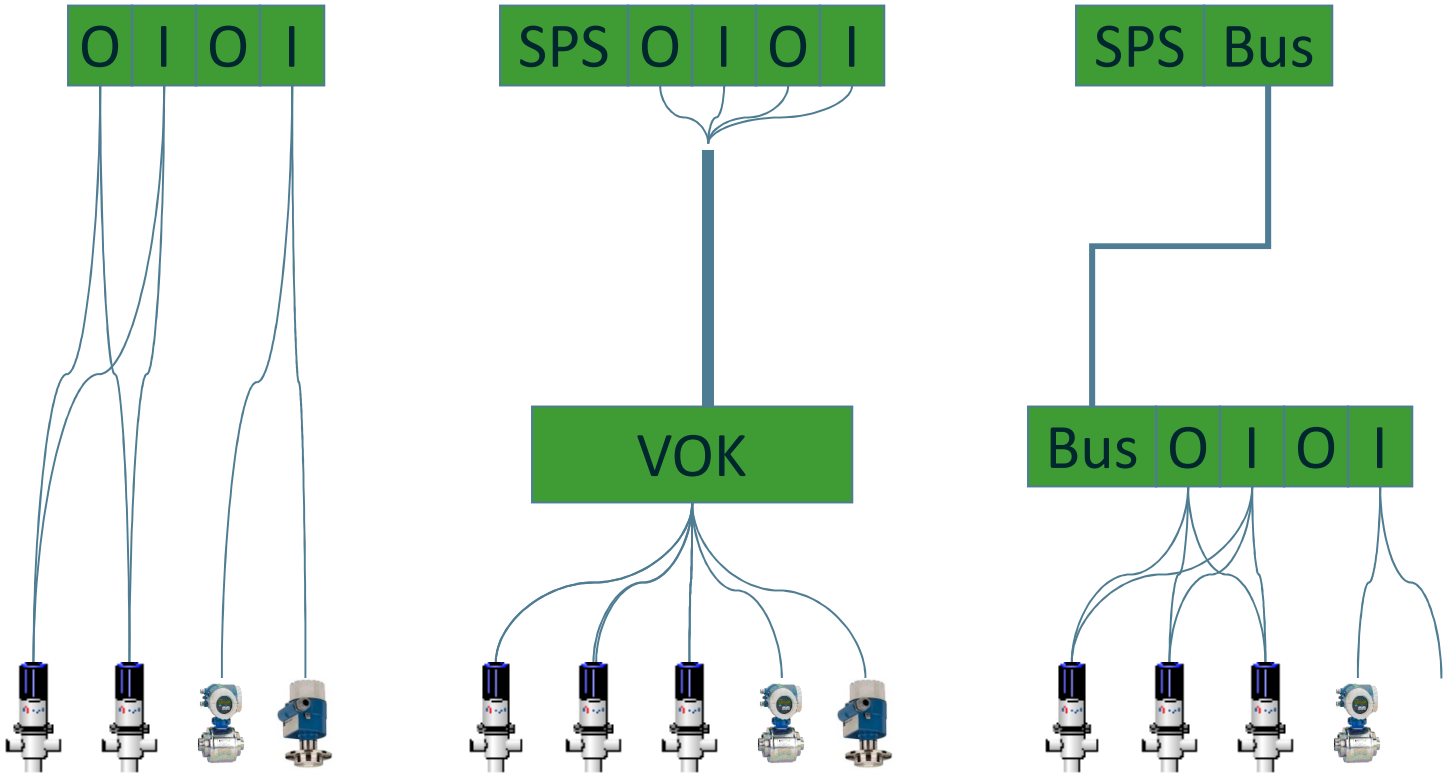
Connection type

- DELTA CU4 Direct Connect
- DELTA CU4 AS-interface
- DELTA CU3 Valve-Net Profibus
- DELTA CU3 Valve-Net DeviceNet

Variants

- 1 solenoid + Hall Sensoren
- 1 solenoid + Not - Element
- 3 solenoids + Hall Sensoren / proximity switches.
- Optional with external sensors

DELTA CU4 Direct Connect



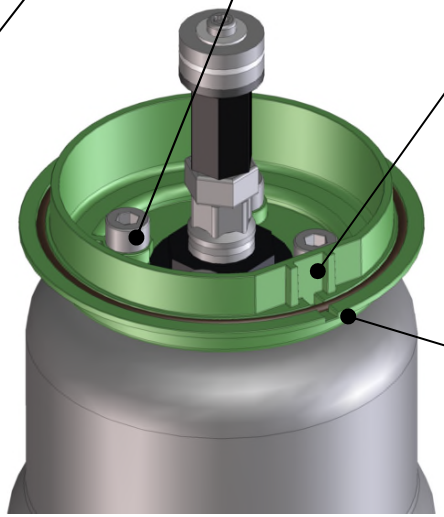
DELTA CU4 - Product description

DELTA CU4- Clamp-Connection
Base / Adaptor

Robust Clamp-connection
Self explained, reliable

Fixed Screws

Safe and easy fixing by a flat square on the adaptor



Labyrinth design avoids entrance of dust and water

Connection type based on CU3

- Valve-Net Profibus
- Valve-Net DeviceNet

Connection type based on CU4

- Direct Connect
- AS-Interface

DELTA CU3 Direct Connect Phase out

Phase out November 2008

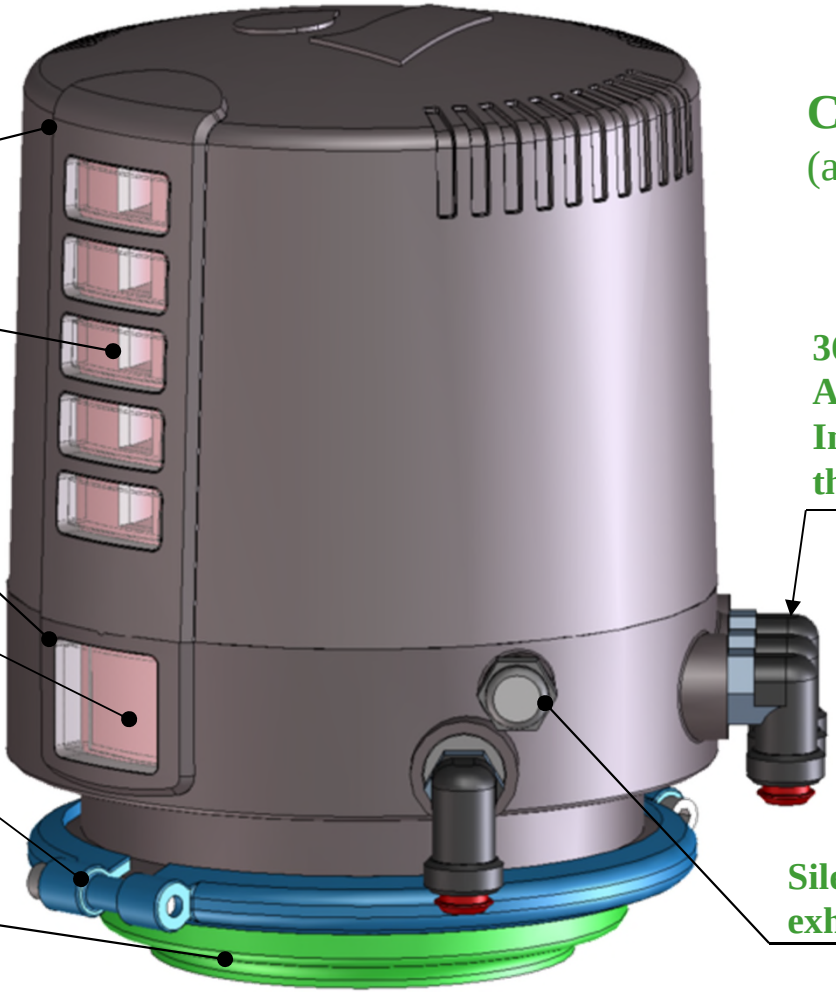
DELTA CU4 is the future control unit from APV

From November 2008 the DELTA CU4 Direct Connect will be mounted on our standard valves and will take over the DELTA CU3 Direct Connect control units.

DELTA CU4 **DELTA CU3**

- The DELTA CU3 Direct connect will become obsolete as soon as we are out of stock. This will happen during Fall 2008
- NEW!!! There will be main partnumbers for DELTA DA3+ and DELTA DE3 valves ready assembled with DELTA CU4 Direct Connect.

DELTA CU4 - Product description



Cover

LED for valve-status

Base

CU-Type window

Clamp connection

Adaptor CU4 / Valve

Cable gland
(at the backside)

360° turn able
Air-hose connection
Insert with stainless steal thread

Silencer for air exhaust

DELTA CU4 - Product description

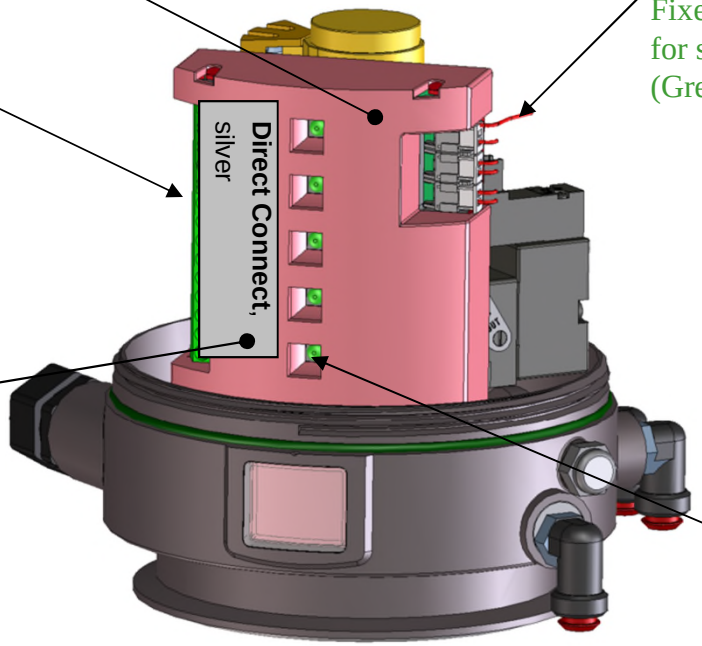
DELTA CU4 Protocols

Electronic Module

Terminal

Cable connection for solenoids

Fixed plug connections with LED for solenoid status indication (Green=ON / Actuated)



Coloured labels with description for :

Direct Connect, silver

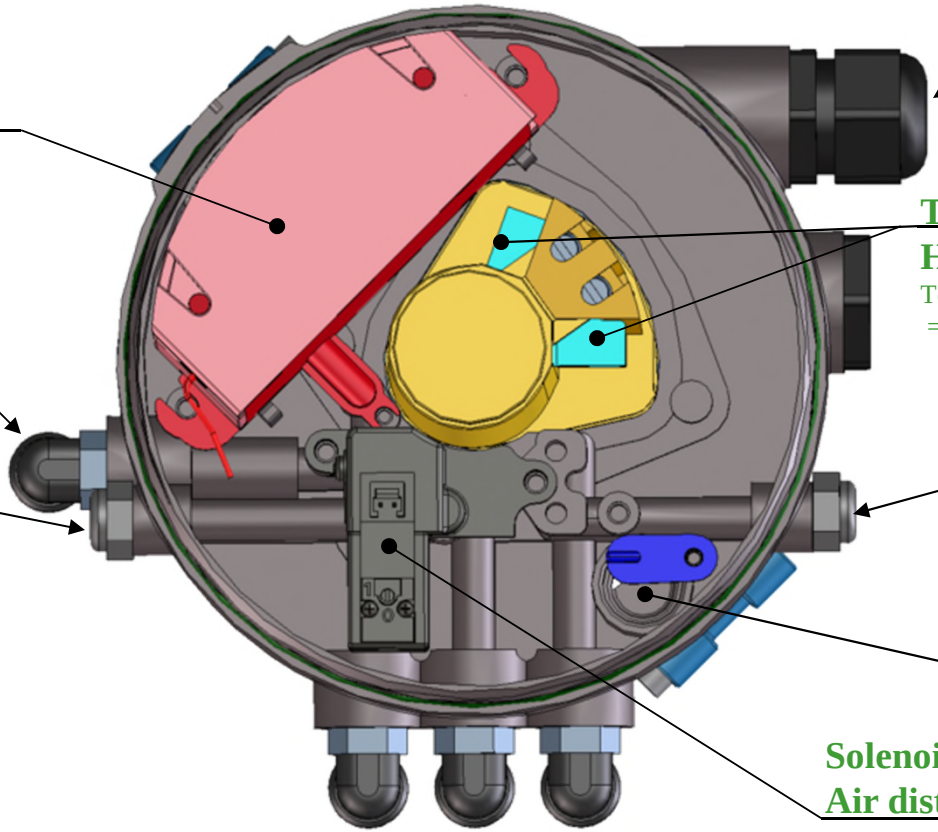
AS-interface, yellow

Diodes for valve status indication

- Valve closed
- Valve open
- Power Diagnose
- Upper seat lift (activated via solenoid)
- Lower seat lift (activated via solenoid)

DELTA CU4 - Product description

DELTA CU4 DC Features



Electronic module with LED´s and terminal

Cable gland

Air inlet with filter

Transparent Tower Hall sensors
To indicate open and close position
=>**ECONO**

Air exhaust for solenoids 1&2

Air exhaust for solenoid 3

Safety device for overpressure protection

Solenoids plus air throttles & Air distribution for max. 3solenoids

Air hose connections for the variant actuators

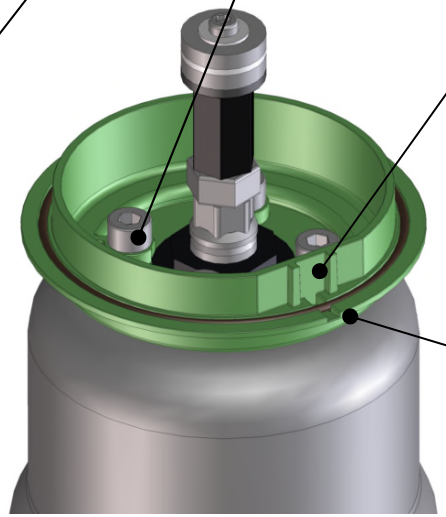
DELTA CU4 - Product description

DELTA CU4- Clamp-Connection
Base / Adaptor

Robust Clamp-connection
Self explained, reliable

Fixed Screws

Safe and easy fixing by a flat square on the adaptor



Labyrinth design avoids entrance of dust and water

Air connection with stainless steel thread insert

Old solution CU3

New solution CU4

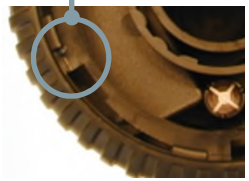
Issues:

•Plastic part did crack when tightened too hard or fitting with conical thread was used

Advantages	Benefits
▪ Long lasting tightness	▪ Saving of maintenance/re-investment costs

Robust and rigid design

Old solution CU3



Emergency in the field

New solution CU4

Issues:

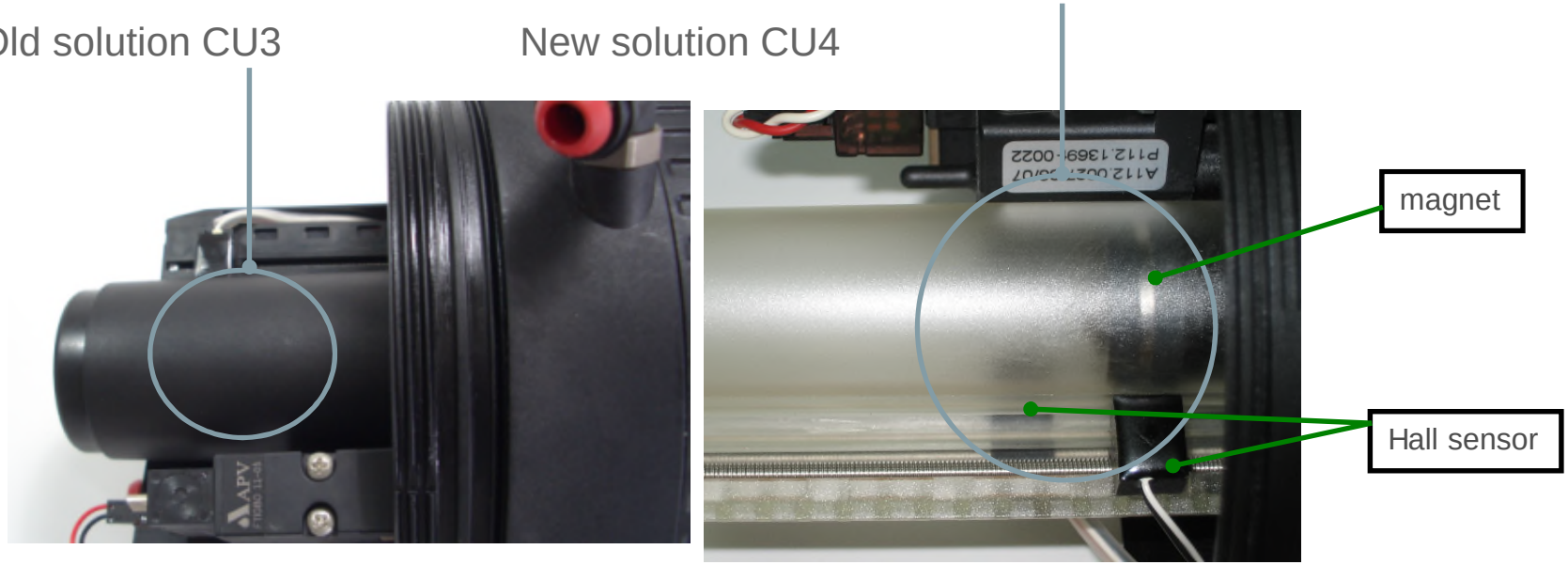
• CU3 got dislocated due to heavy vibration

Advantages	Benefits
▪ Robust clamp connection between adapter and base	▪ Resistant in harsh environment (e.g. vibration) ▪ Passed vibration resistance test

Transparent feed back tower

Old solution CU3

New solution CU4



Issues:

• Setting of hall sensors against the sensing magnet was difficult because of intransparent tower

Advantages	Benefits
▪ Facilitating adjustment of senors	▪ set up less time consuming

DELTA CU3 - Valve-Net Profibus

Valve-Net Profibus now based on the CU3 mechanical design

CU33 Valve-Net Profibus

CU31 Valve-Net Profibus