CONNECT + CONTROL

Pegler Yorkshire

DIFFERENTIAL PRESSURE CONTROL VALVE

PUTTING YOU IN CONTROL

Ballorex Delta

Pegler Yorkshire

PUTTING YOU IN CONTROL

Diverse industry expertise combined with cutting-edge technological innovation mean Pegler Yorkshire's Control solutions help you overcome unique challenges and meet the highest standards in both performance and system aesthetics.

PERFORMANCE WITH PRECISION

Pegler Yorkshire's **Control** products enable you to balance precision flow control, energy efficiency and comfort through innovative products and systems that ensure building performance criteria are met and the resulting installation is easy, efficient and economical to operate.

Our comprehensive **Terrier**, **Meibes** and **Ballorex** product ranges offer proven energy saving solutions, exceptional accuracy and optimised system performance – so, whatever your project or challenge, you can be sure you'll always be in control.

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With over 100 years of manufacturing and innovation combined with extensive industry knowledge and worldwide market experience, Pegler Yorkshire offers the most advanced and complete **Connect & Control** systems on a global scale.

As one of Britain's largest and most respected manufacturers and suppliers of products for the plumbing and heating industries, Pegler Yorkshire is confident we can provide you with all the controls, connections and support your project requires.

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CONTENTS

Pegler Yorkshire is pleased to be associated with several influential industry organisations:

Association of Plumbing and Heating Contractors

The Bathroom Manufacturers Association

The UK Copper Board

Heating and Ventilating Contractors Association

The Brass Page for specifiers, designers, engineers and manufacturers

British Plumbing Employers Council

British Electrotechnical Allied Manufacturers Association

Construction Products Association

The Copper Development Association

Scottish and Northern Ireland Plumbing Employers Federation

Builders Merchants Federation

Institute of Plumbing

The UK District Energy Association

The Chartered Institution of Building Services Engineers

Ballorex Delta

1. INTRODUCTION

At Pegler Yorkshire we are constantly striving to develop system solutions that meet the changing needs of installers, contractors and specifiers alike. The Pegler Yorkshire range of commissioning valves comprises a number of products for a broad spectrum of applications across the commercial sector.

Pegler Yorkshire valves provide one of the most comprehensive ranges of products on the market today. Users of Pegler Yorkshire valves can be confident that they are purchasing an established product range with a proven reputation for quality and reliability.

Differential Pressure Control Valve (DPCV)

DN 15 - 50
1/2 - 2"

Differential Pressure Control Valve (DPCV)

DN 65 - 80
2½ - 3"

1.1 DESCRIPTION

DN 15-80

The Ballorex Delta is a differential pressure control valve used in hydronic heating or cooling systems. By ensuring a constant differential pressure across motorized or static balancing valves, the Ballorex Delta valve provides the conditions necessary to achieve the desired flow distribution in a system. The Ballorex Delta valve eliminates also noise nuisance caused by high differential pressure across radiator thermostats, two-way control valves or other components in a system.

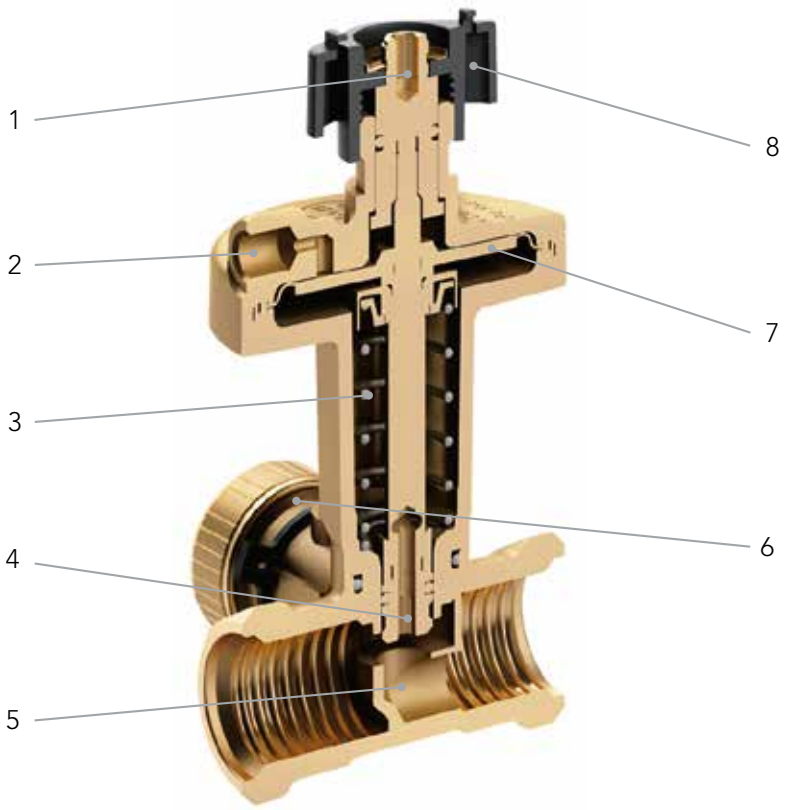
1.2 BENEFITS

- Wide setting range for different applications: 5-25 kPa, 20-40 kPa, 20-65 kPa, 35-75 kPa, 60-100 kPa
- Ensures correct balance regardless of pressure fluctuations in the system
- Eliminates noise problems
- Shut-off and draining functions (DN 15-50 valves)
- Can be installed directly onto bends and reducers
- Compact design ensures flexible installation
- Robust construction, pressure class PN25
- Accurate and easy setting of designed flow in combination with Ballorex Venturi
- Possible to do project handovers in stages due to zone balancing
- Partial close-downs can be done easily without influencing other parts of the system
- Easy commissioning saves time and money
- No unnecessary energy consumption, better thermal comfort
- Spring housing dismounted making installation in restricted spaces or onto compact units easier (DN 65-80 valves)

1.3 DESIGN

DN 15-50

The Ballorex Delta is installed in the return line. The supply line pressure is channelled above the diaphragm of the Ballorex Delta valve through a capillary tube, connected to a partner valve like the Ballorex Venturi, or in some instances just to a T-piece in the system. When system pressure increases, it also increases above the internal diaphragm of the Ballorex Delta, forcing the spindle downwards and thereby closing the valve gradually. As a result a constant pressure drop is obtained across the circuit controlled by the Ballorex Delta.

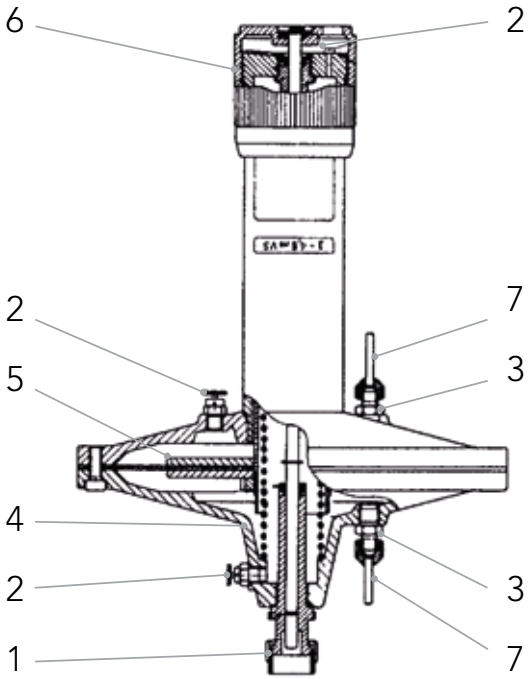


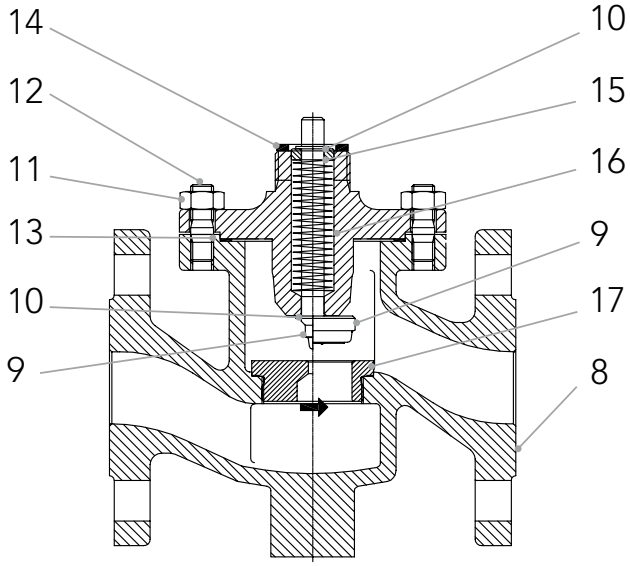
1. Spindle for setting (Allen key)
2. Connection of capillary tube
3. Variable ΔP spring
4. Pressure relieved valve cone
5. Valve seat
6. Drain valve and pressure measuring
7. Rolling diaphragm
8. Handle for system isolation

INTRODUCTION

DN 65-80

The Ballorex Delta is installed either in the supply or the return line. The supply line pressure is channeled above the diaphragm and the return line pressure under the diaphragm, through capillary tubes. One capillary tube can be connected to a partner valve like the Ballorex Venturi or to a T-piece in the system, and the other capillary tube to the flange of the Ballorex Delta valve. When system pressure increases, it also increases above the internal diaphragm of the Ballorex Delta, forcing the cone downwards and thereby closing the valve gradually. The result is a constant pressure drop obtained across the circuit controlled by the Ballorex Delta. Without the actuator the valve is held in an open position by means of a spring. With force applied on the spindle, the valve will close.





1. Union nut for valve
2. Venting
3. Nipple for capillary tube
4. Diaphragm housing
5. Diaphragm
6. Regulating knob
7. Capillary tube
8. Valve housing
9. Valve cone
10. Locking ring
11. Nut
12. Stud bolt
13. Gasket
14. Gasket for actuator
15. Disc
16. Spring
17. Valve seat

1.4 PRESSURE BALANCING

DN 15-50

The Ballorex Delta is provided with a selection of different pressure ranges. Depending on the application type the Ballorex Delta is factory pre-set at:

- 10 kPa - actuator 5-25 kPa for Ballorex Delta DN 15 - 50
- 30 kPa - actuator 20-40 kPa for Ballorex Delta DN 15 - 50
- 40 kPa - actuator 20-65 kPa for Ballorex Delta DN 15 - 32
- 60 kPa - actuator 35-75 kPa for Ballorex Delta DN 40 - 50
- 80 kPa - actuator 60-100 kPa for Ballorex Delta DN 50

An Allen key is used for differential pressure setting of the Ballorex Delta. The black handle enables flow isolation.

By using an Allen key any setting within the differential pressure range can be provided. The flow is isolated by rotating the black handle.

DN 65-80

The Ballorex Delta is provided with a selection of actuators for different pressure ranges. Depending on the actuator type the Ballorex Delta is factory pre-set at:

- 50 kPa - actuator 20-80 kPa for Ballorex Delta DN 65 - 80
- 100 kPa - actuator 70-130 kPa for Ballorex Delta DN 65 - 80

The Ballorex Delta with an integrated regulating knob for differential pressure setting.

By rotating the regulating knob any setting within the differential pressure range can be provided.

1.5 WITH PARTNER VALVE

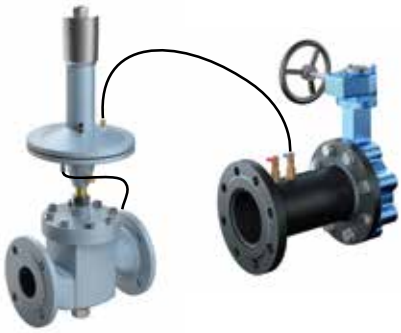
DN 15-50

The Ballorex Delta valve can also be used in combination with the Ballorex Venturi with drain, as a partner valve. In this case the capillary tube is connected to the Ballorex Venturi installed in the supply line. The pre-setting of the differential pressure is made as mentioned above, while the design flow can be easily and precisely set when measuring the direct flow – utilising the unique measuring feature of the Ballorex Venturi. When the Ballorex Venturi is used as a partner valve it is always in the circuit controlled by the Ballorex Delta valve. The pressure loss across the Ballorex Venturi must therefore be added to the pressure loss in the controlled circuit and needs to be taken into account when setting the Ballorex Delta valve. The Ballorex Delta can also be installed in combination with the Ballorex Basic with drain to maintain constant differential pressure, service the controlled part of the system and measure the flow.

The Ballorex Delta combined with the Ballorex Venturi as a partner valve.

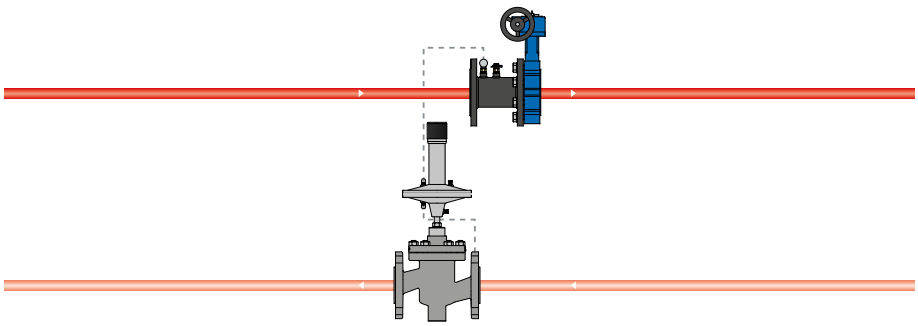
DN 65-80

Ballorex Delta can be used in combination with a Ballorex Venturi with drain, as a partner valve. In this case one capillary tube is connected to the Ballorex Venturi and the other capillary tube to the flange of the Ballorex Delta. The pre-setting of the differential pressure is set by use of the regulating knob on the Ballorex Delta valve and the design flow is then set on the Ballorex Venturi valve.



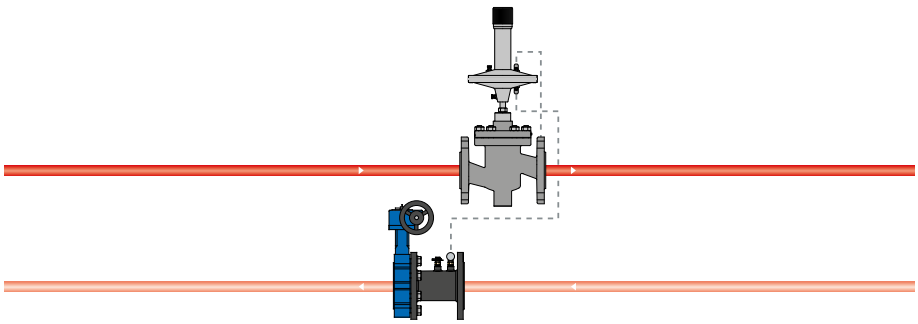
The Ballorex Delta combined with a Ballorex Venturi as a partner valve.

When the Ballorex Venturi is used as a partner valve and installed in the supply line, it is within the circuit controlled by the Ballorex Delta. In this case the pressure loss across the Ballorex Venturi valve adds to the pressure loss in the controlled circuit and needs to be taken into account when setting the Ballorex Delta valve.



The Ballorex Delta DN 65 - 80 can be installed in the return line. Pressure loss across the Ballorex Venturi (partner valve) is added to the pressure loss in the controlled circuit.

When the Ballorex Venturi is used as a partner valve and installed in the return line, it is outside the circuit controlled by the Ballorex Delta. Consequently its pressure loss is not taken into account when setting the Ballorex Delta.



The Ballorex Delta DN 65 - 80 can be installed in the supply line. Pressure loss across the Ballorex Venturi (partner valve) is not added to the pressure loss in the controlled circuit.

1.6 MOUNTING

Ballorex Delta DN15-50

The Ballorex Delta valve must always be installed in the return line. No straight piping is required before and after the Ballorex Delta. It can be installed directly on bends and flexible hoses, etc.

System flushing is to be done before the capillary tube is mounted. The capillary tube is connected onto the Ballorex partner valve (or a T-piece) on the supply side. It has to be flushed to ensure that there is no air left. The capillary tube is then mounted onto the Ballorex Delta and thus the differential pressure controller is active.

The setting of the differential pressure is done by using an Allen key and counting the number of complete turns. The turns are to be performed clockwise, from the first (pre-set) position of:

- 5.0 kPa for Ballorex Delta 5-25 kPa
- 20 kPa for Ballorex Delta 20-40 kPa
- 14 kPa for Ballorex Delta 20-65 kPa
- 35 kPa for Ballorex Delta 35-75 kPa
- 60 kPa for Ballorex Delta 60-100 kPa

The setting tables indicate how many turns of the (4 mm) Allen key are required to achieve the desired Ballorex Delta setting. No more turns than stated in the tables must be performed counting from the first position.

When using a flowmeter the differential pressure across the riser or zone can be determined. After connecting the flowmeter to the high pressure port on the Ballorex Venturi and to the drain valve of the Ballorex Delta, the manometer will display the pressure drop across the riser and the partner valve. When a Ballorex Venturi is used as a partner valve, its pressure drop is always included in the circuit controlled by the Ballorex Delta valve.

When the system is pressure tested, the capillary tube must be connected and all valves in the circuit after the Ballorex Delta valve opened. This is required to secure the same static pressure on both sides of the diaphragm in order to avoid damaging the differential pressure controller.

Maximum test pressure is 25 bar.

Isolation of the system flow by means of the Ballorex Delta is done by turning the black handle clockwise until the valve is fully closed. To avoid damaging the differential pressure controller during isolation the pressure drop across the valve should never exceed 250 kPa. An alternative is to dismount the capillary tube on one side before isolating the valve to protect the differential pressure controller. When valves are shut off, the secondary side of the system can be drained through the 3/4" externally threaded drain valve on the Ballorex Delta. The end cap needs to be removed, hose attached and the ball valve opened to enable draining.

Ballorex Delta DN65-80

An arrow on the Ballorex valve housing indicates the flow direction to be respected.

The Ballorex Delta can be installed in any position in the return or in the supply line.

No straight piping is required before and after the Ballorex Delta. It can be installed directly on bends and flexible hoses, etc.

System flushing and pressure testing is to be done before the actuator and the capillary tubes are mounted. The Ballorex Delta is normally open when the actuator is not mounted.

Maximum system pressure is 16 bar.

After the installation of the actuator and the capillary tubes, the diaphragm chamber has to be vented by bleeding through the vent plugs.

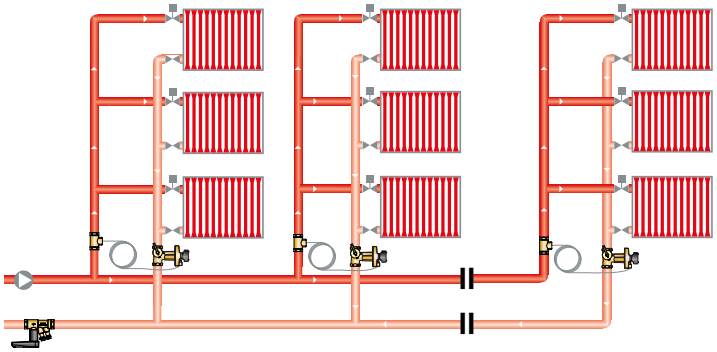
The setting of the differential pressure is done by turning the regulating knob. The edge of the knob indicates the required differential pressure on the actuator scale.

When using a flowmeter the differential pressure across the riser or zone can be determined. After connecting the flowmeter to the high pressure port on the partner valve (Ballorex Venturi) and to the, provided as an accessory, drain valve installed in a T-piece, the flowmeter will display the pressure drop in the controlled circuit.

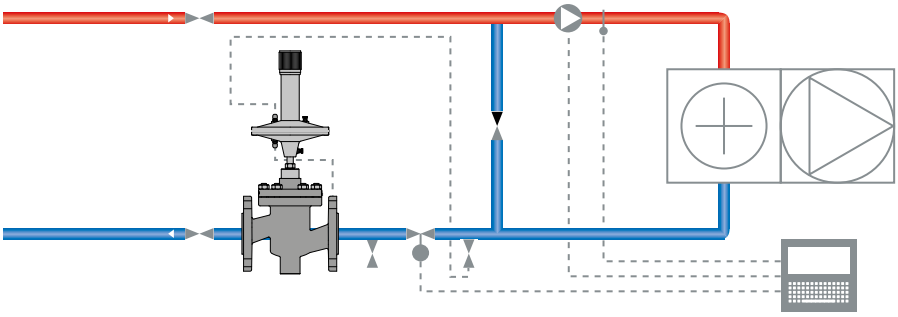
The Ballorex Delta valve does not incorporate a shut off function. It is recommended to install isolation valves to be able to service the controlled circuit.

1.7 OPERATION

Depending on the application, the Ballorex Delta can either be used as a zone valve placed in risers or branches controlling a constant pressure difference across multiple terminal units, or as a terminal unit valve ensuring the required pressure drop across each terminal unit at all loads.

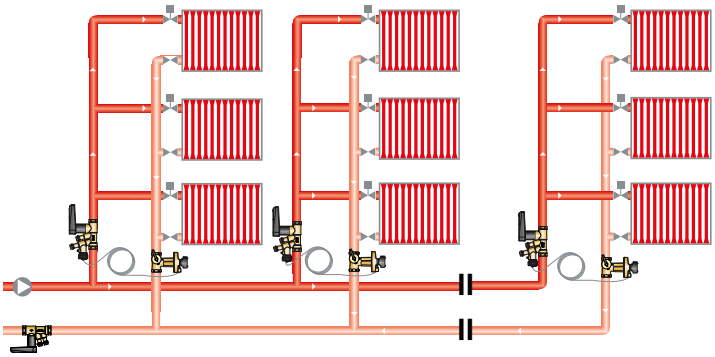


Radiator heating system with presettable thermostatic radiator valves.



The Ballorex Delta provides constant differential pressure across a motorized valve on a terminal unit.

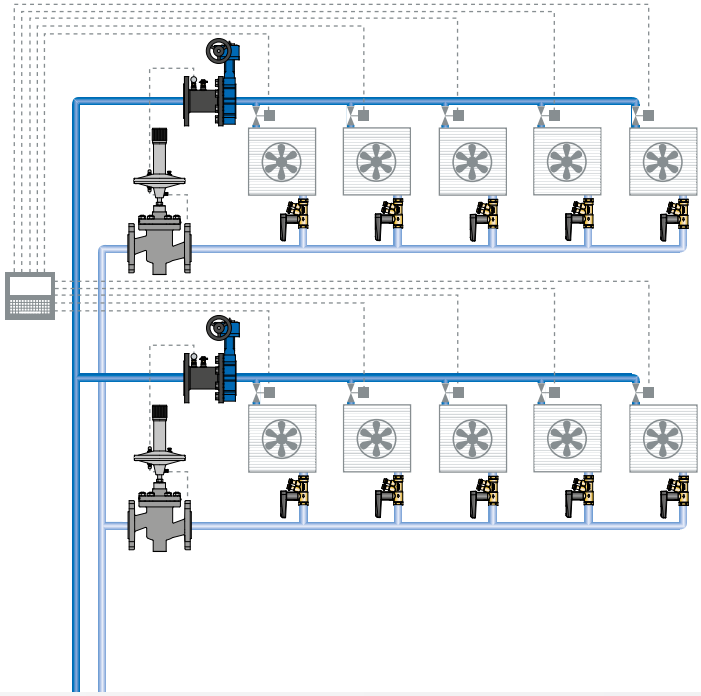
When the Ballorex Delta valve is installed in combination with Ballorex Venturi, the valves can be used as both a constant pressure regulator and as a maximum flow limiter. This ensures each zone or terminal unit the required pressure drop and that the designed flow will never be exceeded.



Radiator heating system with non-presettable thermostatic radiator valves.

Such a solution is widely used in radiator heating systems with non-presettable thermostatic radiator valves.

Ballorex Delta along with Ballorex Venturi can be used to limit maximum flow in long branches with several terminal units. The flow distribution among the terminal units is ensured by the proper commissioning of static balancing valves and the operation of motorized valves.



System with terminal units controlled by a Ballorex Delta and balanced by a Ballorex Venturi.

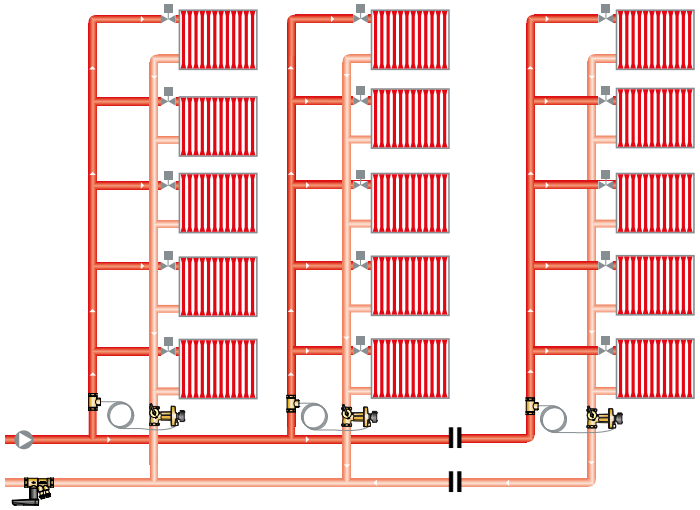
As Ballorex Delta ensures the required differential pressure for a circuit under all loads, it is possible to do project handovers in stages due to zone balancing – saving both time and money spent on re-commissioning. In practice parts of a building can be taken into use gradually as it is completed ensuring a cost effective handover of the entire project. Partial close-downs can also be done easily without influencing other parts of the system.

The Ballorex Delta will ensure no overflows and thereby no unnecessary energy consumption, and it will eliminate noise problems, providing a perfectly controlled system.

Ballorex Delta

2. APPLICATIONS

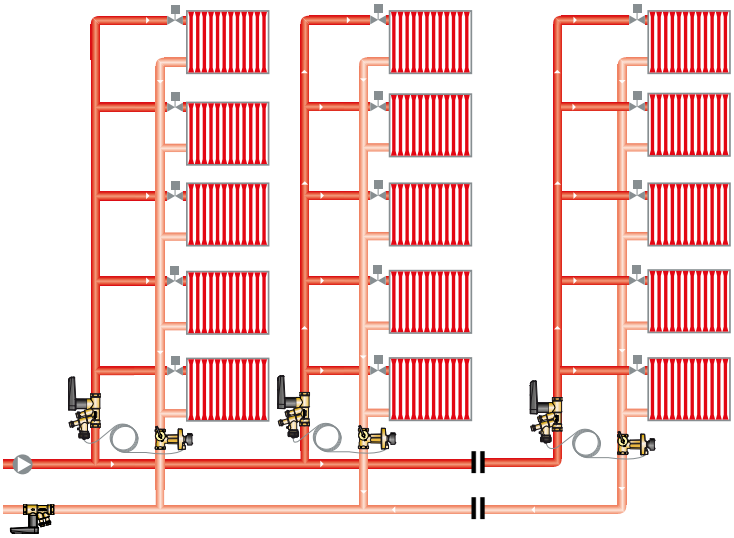
DN 15-50



Application 1 - Heating system with pre-settable thermostatic radiator valves.

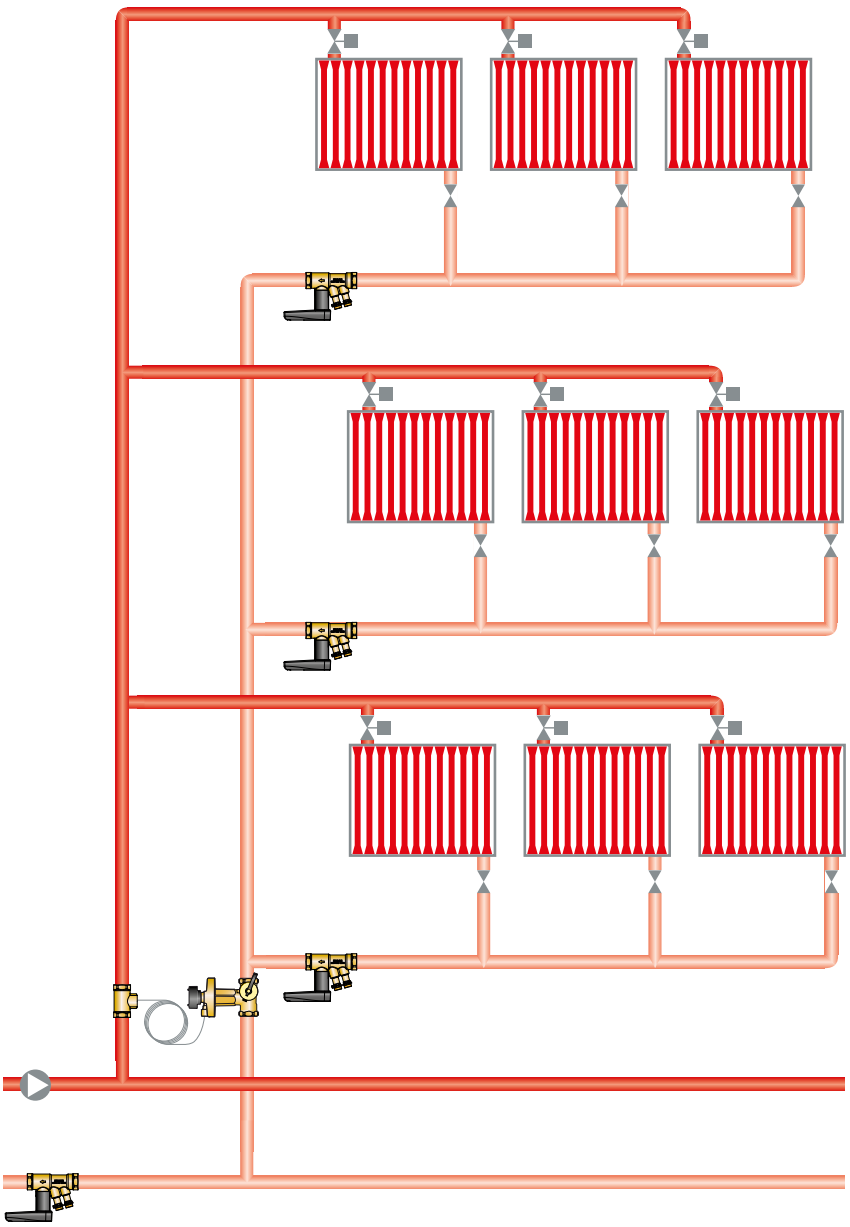
Differential pressure across the circuits is stabilised by using Ballorex Delta valves.

In systems with pre-settable thermostatic radiator valves (TRV), the stabilised differential pressure allows optimum conditions to control the room temperature. By pre-setting the TRV valves, flow is limited and overflow situations are avoided. Noise problems are at the same time also eliminated when using Ballorex Delta valves.



Application 2 - Heating system with non-presettable thermostatic radiator valves.

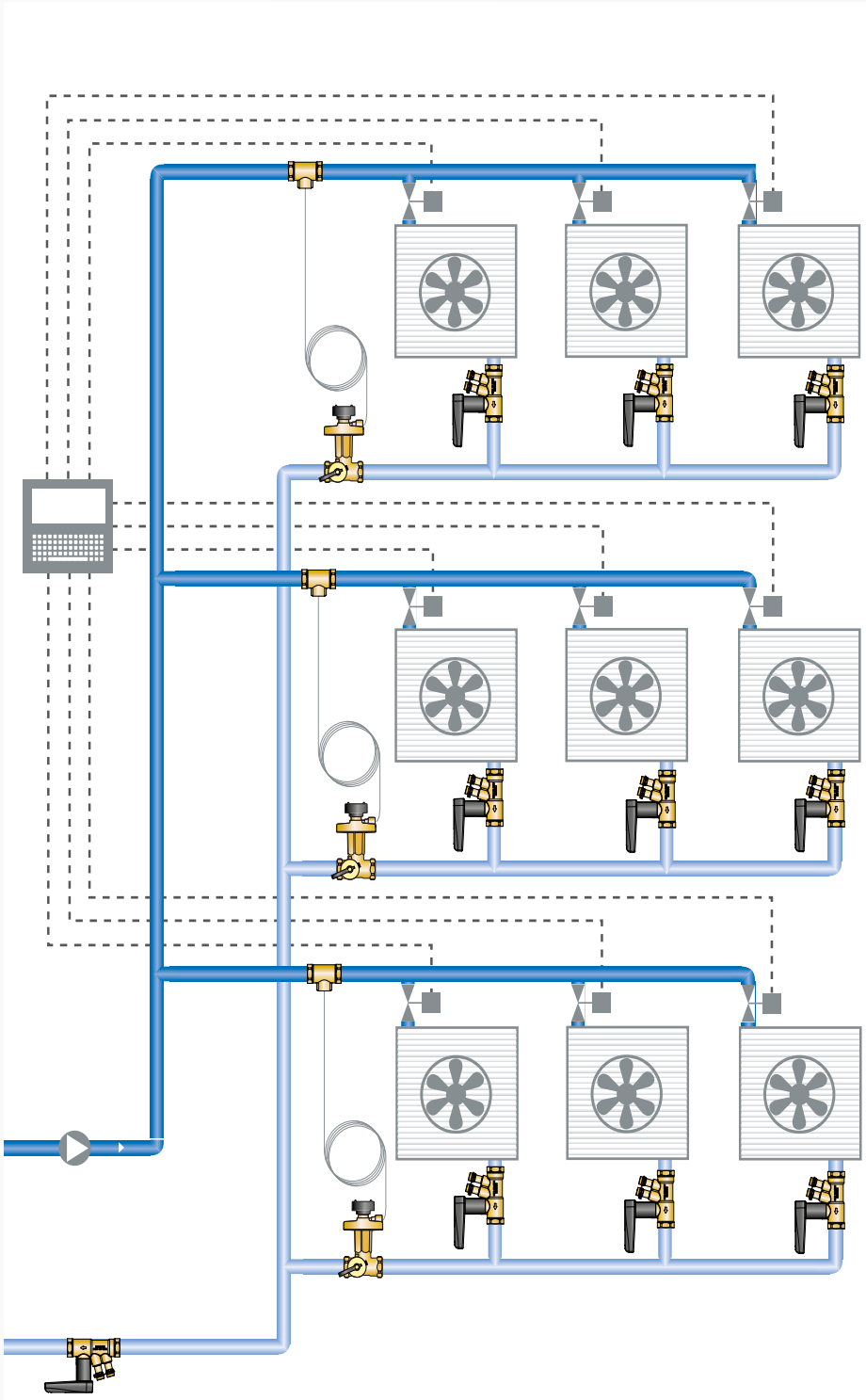
Differential pressure across the circuits is stabilised using Ballorex Delta valves. Some systems are equipped with non-presettable thermostatic radiator valves (TRV). Such installations are hard to regulate properly, and significant overflow situations can occur. The Ballorex Delta will stabilise the differential pressure across a circuit and provide proper conditions to control the room temperature. When installed with a Ballorex Venturi as partner valve, the maximum flow can be limited to design flow rate. Overflow situations in the circuit are thereby avoided. This will not provide the correct distribution of flow among the radiators, but it will improve the system performance substantially. Noise nuisances are at the same time also eliminated when using Ballorex Delta valves.



Application 3 - Heating system with differential pressure control valves on risers and manual balancing valves on sub-circuits.

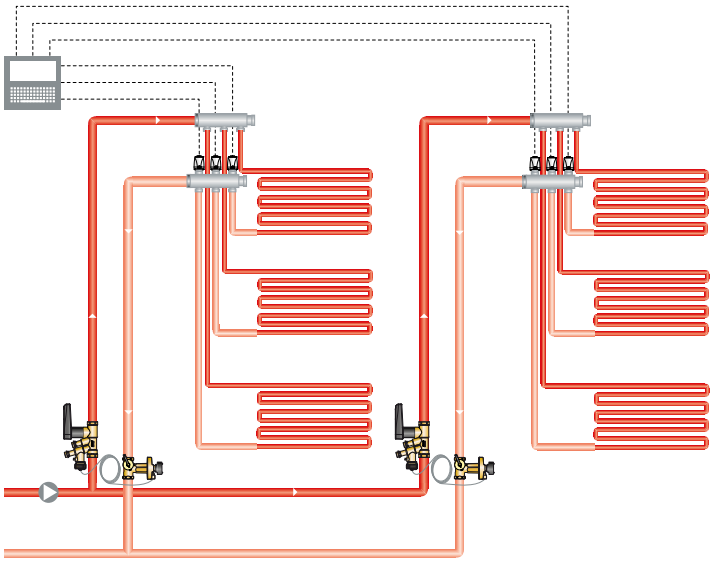
A Ballorex Delta on each riser provides a stable differential pressure from the main pipe to the risers and to the sub-circuits. A Ballorex Venturi on each sub-circuit prevents overflow situations.

The differential pressure limitation function of the Ballorex Delta valve will furthermore prevent noise problems in the system.



Application 4 - Cooling system with differential pressure control valves on branches and manual balancing valves on terminal units.

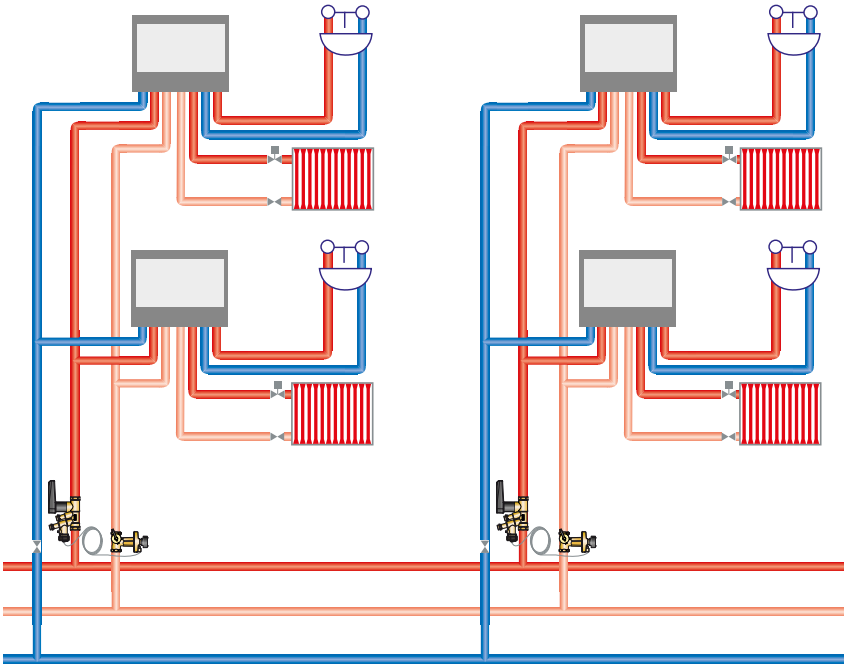
In a system with a high concentration of small terminal units, the differential pressure can be stabilised across a group of terminal units using the Ballorex Delta. Ballorex Venturi on each terminal unit limit at the same time the flow according to design conditions. The differential pressure control of the Ballorex Delta valve will furthermore prevent noise problems in the system.



Application 5 - Underfloor heating system.

In a system with several underfloor heating manifolds the differential pressure is stabilized by use of Ballorex Delta on each branch. The flow adjustment in one manifold will not affect the flow in the remaining manifolds.

Ballorex Venturi will ensure the designed flow in every manifold. As a result of this, system commissioning is easy, allowing time and cost savings, and the design flow is never exceeded.

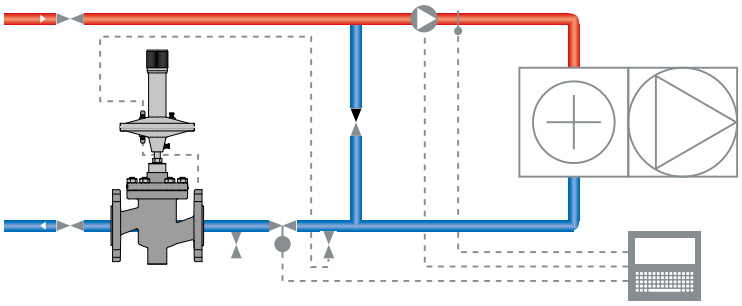


Application 6 - HIV and district heating system.

Ballorex Delta can be installed in systems with flat stations. In this type of application flow fluctuations, due to a significant difference between heat consumption for domestic hot water production and for heating purpose, is a typical problem. By installing Ballorex Delta the differential pressure is stabilized in every section of the system. The Ballorex Delta ensures that a changed flow in one section of the system does not affect the flow and operation of the remaining part of the system. The same function as above applies to district heating systems. Ballorex Delta installed in district heating substations will provide stable working conditions for motorized valves on heat exchangers. As a result motorized valves operate only in reference to the changing heat load and not to compensate for fluctuating pressure in the district heating system.

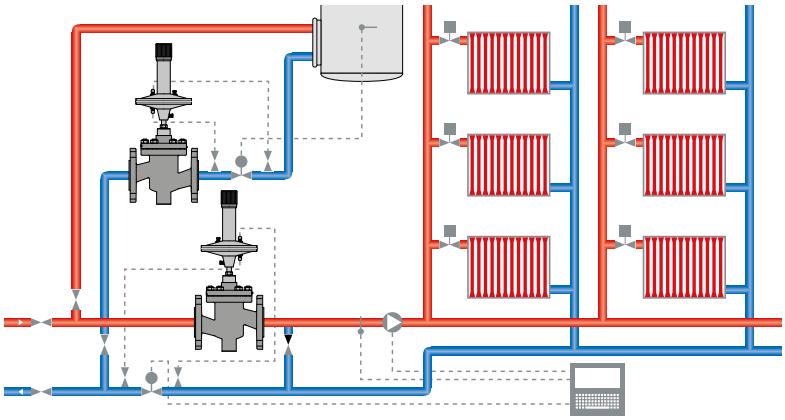
DN 65-80

The Ballorex Delta DN 65 and DN 80 can be used in applications 1-8 as well as in the following ones:



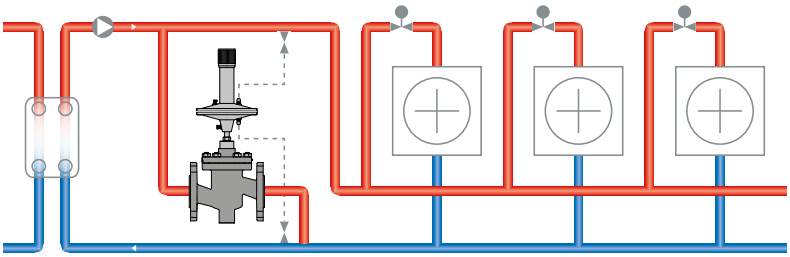
Application 7 - Precise temperature control in air handling units .

When temperatures have to be kept within close limits like in ventilating plants, control may be difficult if the differential pressure in the system is not constant. This may be overcome by installing a Ballorex Delta which stabilizes the differential pressure across the motorized valve. As a result the motorized valve reacts only on temperature signals and not on pressure fluctuations.



Application 8 - Precise temperature control in domestic water and central heating systems.

The Ballorex Delta valve will in a hot water tank circuit (heat exchanger) or in a central heating system maintain a constant differential pressure across the motorized valve. By providing a stable working condition the motorized valve reacts only on the temperature signal and does not have to compensate for pressure fluctuations.



Application 9 - Pressure relief by pump or supply and return line by-pass.

The Ballorex Delta can be used in by-pass around pumps or across the supply and return lines of a circuit. This prevents the pump from working against a dead head when all the subcircuits are closed down.

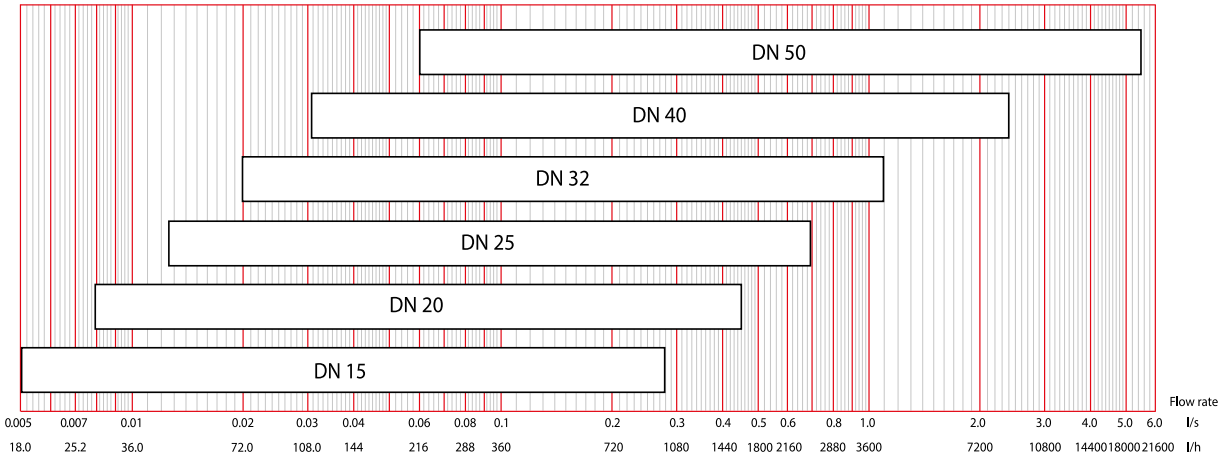
The Ballorex Delta can be installed in the return or the supply line. Installation in the return line is preferable where there is a risk of air in the system, and in high buildings where the pressure in the return pipe does not considerably exceed the static pressure. For low buildings (and high pressures) it is preferable to install the Ballorex Delta in the supply line to reduce the pressure in terminal units.

3. PRODUCT FINDER

3.1 PRODUCT FINDER

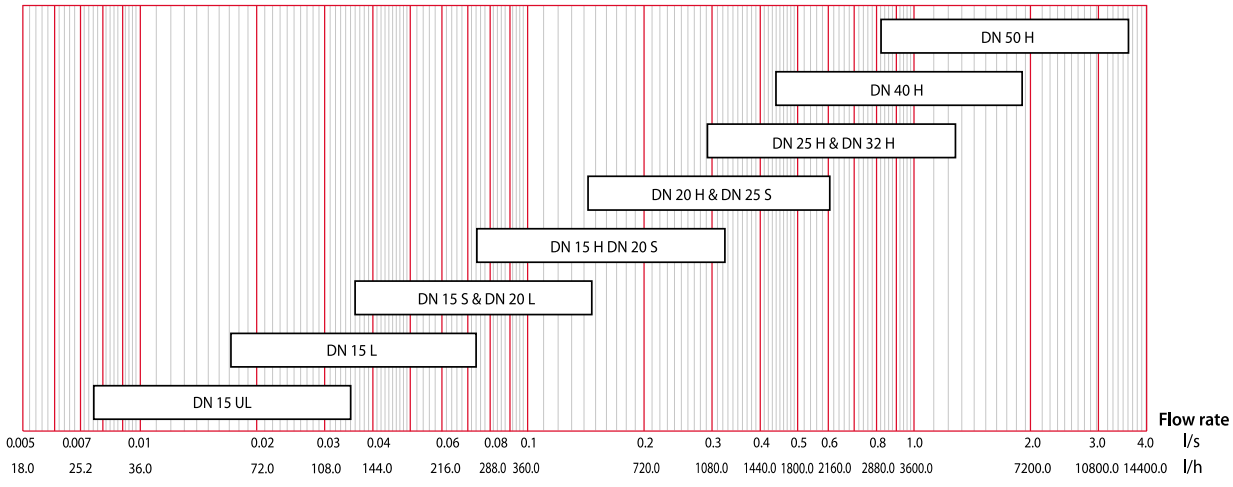
Ballorex Delta DN 15-50

Ballorex Delta



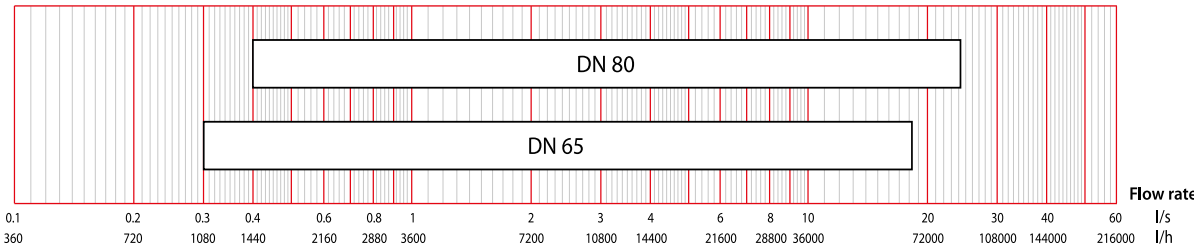
Ballorex Delta DN 15-50

Ballorex Venturi – partner valve to Ballorex Delta

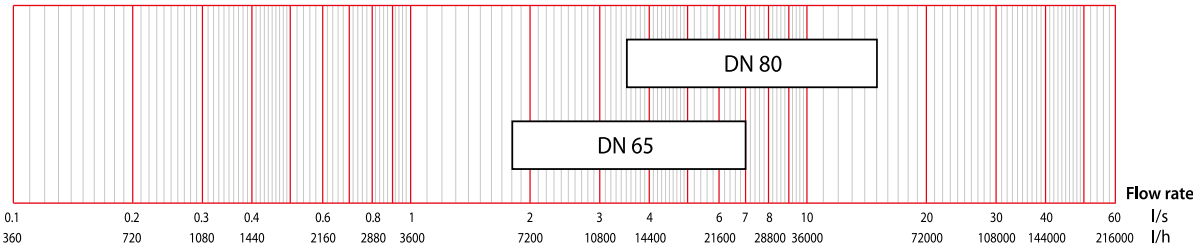


Ballorex Delta DN 65-80

Ballorex Delta



Ballorex Venturi – partner valve to Ballorex Delta



Ballorex Delta Flow range		Dimension	Differential pressure setting range kPa	Factory setting [kPa]
l/s	l/h			
0.005-0.222	18-800	DN 15	5-25	10
0.010-0.281	36-1010		20-40	
0.010-0,360	36-1290		20-65	
0.007-0.347	28-1250	DN 20	5-25	
0.016-0.439	56-1580		20-40	30
0.016-0560	56-2020		20-65	...
0.013-0.556	45-2000	DN 25	5-25	
0.025-0.703	89-2530		20-40	
0.025-0896	89-3230		20-65	
0.019-0.875	70-3150	DN 32	5-25	
0.039-1.11	141-3980		20-40	
0.039-1.41	141-5080		20-65	
0.031-1.39	112-5000	DN 40	5-25	
0.062-1.76	224-6330		20-40	
0.082-2.41	296-8660		35-75	60
0.062-2.78	224-10000	DN 50	5-25	
0.124-3.51	447-12650		20-40	
0.164-4.81	592-17320		35-75	
0.215-5.56	775-20000		60-100	80
0.289-14.4	1040-51880	DN 65	20-80	50
0.539-18.4	1940-66130		70-130	
0.397-19.9	1430-71550	DN 80	20-80	
0.689-25.3	2480-87640		70-130	100

4. COMMISSIONING PRODUCTS

925 Differential Pressure Controller

Ballorex Differential Pressure Controller. ISO 7/1 Parallel threads.

- 5-25 kPa
- Threaded, Press, Press Union Connection
- DN 15 - DN 50

927 Differential Pressure Controller

Ballorex Differential Pressure Controller. ISO 7/1 Parallel threads.

- 35-75 kPa
- Threaded

926 Differential Pressure Controller

Ballorex Differential Pressure Controller. ISO 7/1 Parallel threads.

- 20-40 kPa
- 20-65 kPa
- Threaded, Press, Press Union Connection

928 Differential Pressure Controller

Ballorex Differential Pressure Controller. ISO 7/1 Parallel threads.

- 60-100 kPa
- Threaded

929 Delta Differential Pressure Controller

TD66 Ballorex Delta DP Differential Pressure Control Valve.

- 20-80 kPa
- 70-136 kPa

900PD Partner Valve

Ballorex Ventura Partner Valve with drain parts DZR.

- DN 15 - DN 50
- Threaded, Press

930 Delta Differential Pressure Controller

Ballorex Delta DP Differential Pressure Control Valve.

- Flanged

900PDXS & Partner Valve

Ballorex Ventura Partner Valve with drain connection, cast iron.

- DN 65 - DN 80
- Flanged

5. PRODUCT DATA SHEET

5.1 VALVE SIZING

The available flow ranges in reference to the required differential pressure settings on the Ballorex Delta are specified in the tables.

DN 15 - female/female

Setting kPa	Min. flow l/h	Max. flow l/h
5	18	358
6	20	392
7	21	423
8	23	453
9	24	480
10	25	506
11	27	531
12	28	554
13	29	577
14	30	599
15	31	620
16	32	640
17	33	660
18	34	679
19	35	697
20	36	716
21	37	733
22	38	750
23	38	767
24	39	784
25	40	800

Setting kPa	Min. flow l/h	Max. flow l/h
20	36	716
21	37	733
22	38	750
24	39	784
25	40	800
26	41	816
27	42	831
29	43	862
30	44	876
31	45	891
33	46	919
34	47	933
35	47	947
37	49	973
38	49	986
39	50	999
40	51	1010

Setting kPa	Min. flow l/h	Max. flow l/h
20	36	716
23	38	767
26	41	816
29	43	862
32	45	905
35	47	947
38	49	986
41	51	1024
44	53	1061
47	55	1097
50	57	1131
53	58	1165
56	60	1197
59	61	1229
62	63	1260
65	64	1290

The Ballorex Delta can be combined with the Ballorex Venturi to provide constant differential pressure in the controlled part of the system as well as to to ensure the option of limiting the maximum flow.
For more details the application examples must be consulted.

Partner valve	Flow range		Dimension	Description
	l/s	l/h		
	0.0076-0.035 0.0172-0.074 0.036-0.148 0.074-0.325	27-126 62-266 130-530 267-1170	DN 15UL DN 15L DN 15S DN 15H	Ballorex Venturi with drain. Flow diagrams can be found in chapter 3.1 - 22-23ww

DN 15 - male/male

Setting kPa	Min. flow l/h	Max. flow l/h
5	18	358
6	20	392
7	21	423
8	23	453
9	24	480
10	25	506
11	27	531
12	28	554
13	29	577
14	30	599
15	31	620
16	32	640
17	33	660
18	34	679
19	35	697
20	36	716
21	37	733
22	38	750
23	38	767
24	39	784
25	40	800

Setting kPa	Min. flow l/h	Max. flow l/h
15*	31	620
16*	32	640
18*	34	679
19*	35	697
20	36	716
21	37	733
23	38	767
24	39	784
25	40	800
26	41	816
28	42	847
29	43	862
30	44	876
31	45	891
33	46	919
34	47	933
35	47	947
36	48	960
38	49	986
39	50	999
40	51	1010

* The nominal differential pressure setting range is 20-40 kPa, however 15 kPa - 19 kPa is also achievable.

The Ballorex Delta can be combined with the Ballorex Venturi to provide constant differential pressure in the controlled part of the system as well as to to ensure the option of limiting the maximum flow. For more details the application examples must be consulted.

Partner valve	Flow range		Dimension	Description
	l/s	l/h		
	0.0076-0.035 0.0172-0.074 0.036-0.148 0.074-0.325	27-126 62-266 130-530 267-1170	DN 15UL DN 15L DN 15S DN 15H	Ballorex Venturi with drain. Flow diagrams can be found in chapter 3.1 - 22-23

DN 20 - female/female

Setting kPa	Min. flow l/h	Max. flow l/h
5	28	559
6	31	612
7	33	661
8	35	707
9	38	750
10	40	791
11	41	829
12	43	866
13	45	901
14	47	935
15	48	968
16	50	1000
17	52	1030
18	53	1060
19	54	1090
20	56	1120
21	57	1150
22	59	1170
23	60	1200
24	61	1230
25	63	1250

Setting kPa	Min. flow l/h	Max. flow l/h
20	36	716
21	37	733
22	38	750
24	39	784
25	40	800
26	41	816
27	42	831
29	43	862
30	44	876
31	45	891
33	46	919
34	47	933
35	47	947
37	49	973
38	49	986
39	50	999
40	51	1010

Setting kPa	Min. flow l/h	Max. flow l/h
20	36	716
23	38	767
26	41	816
29	43	862
32	45	905
35	47	947
38	49	986
41	51	1024
44	53	1061
47	55	1097
50	57	1131
53	58	1165
56	60	1197
59	61	1229
62	63	1260
65	64	1290

The Ballorex Delta can be combined with the Ballorex Venturi to provide constant differential pressure in the controlled part of the system as well as to to ensure the option of limiting the maximum flow. For more details the application examples must be consulted.

Partner valve	Flow range		Dimension	Description
	l/s	l/h		
	0.036-0.148 0.074-0.325 0.142-0.603	130-530 267-1170 511-2170	DN 20L DN 20S DN 20H	Ballorex Venturi with drain. Flow diagrams can be found in chapter 3.1 - 30-31

DN 25 - female/female

Setting kPa	Min. flow l/h	Max. flow l/h
5	45	894
6	49	980
7	53	1060
8	57	1130
9	60	1200
10	63	1270
11	66	1330
12	69	1390
13	72	1440
14	75	1500
15	77	1550
16	80	1600
17	82	1650
18	85	1700
19	87	1740
20	89	1790
21	92	1830
22	94	1880
23	96	1920
24	98	1960
25	100	2000

Setting kPa	Min. flow l/h	Max. flow l/h
20	89	1790
22	94	1880
24	98	1960
26	102	2040
28	106	2120
30	110	2190
32	113	2260
34	117	2330
36	120	2400
38	123	2470
40	126	2530

Setting kPa	Min. flow l/h	Max. flow l/h
20	89	1789
23	96	1918
26	102	2040
29	108	2154
32	113	2263
35	118	2366
38	123	2466
41	128	2561
44	133	2653
47	137	2742
50	141	2828
53	146	2912
56	150	2993
59	154	3072
62	157	3150
65	161	3225

The Ballorex Delta can be combined with the Ballorex Venturi to provide constant differential pressure in the controlled part of the system as well as to to ensure the option of limiting the maximum flow.
For more details the application examples must be consulted.

Partner valve	Flow range		Dimension	Description
	l/s	l/h		
	0.142-0.603 0.29-1.25	511-2170 1044-4500	DN 25S DN 25H	Ballorex Venturi with drain. Flow diagrams can be found in chapter 3.1 - 38

DN 32 - female/female

Setting kPa	Min. flow l/h	Max. flow l/h
5	70	1410
6	77	1540
7	83	1670
8	89	1780
9	95	1890
10	100	1990
11	104	2090
12	109	2180
13	114	2270
14	118	2360
15	122	2440
16	126	2520
17	130	2600
18	134	2670
19	137	2750
20	141	2820
21	144	2890
22	148	2960
23	151	3020
24	154	3090
25	158	3150

Setting kPa	Min. flow l/h	Max. flow l/h
20	141	2820
22	148	2960
24	154	3090
26	161	3210
28	167	3330
30	173	3450
32	178	3560
34	184	3670
36	189	3780
38	194	3880
40	199	3980

Setting kPa	Min. flow l/h	Max. flow l/h
20	141	2817
23	151	3021
26	161	3212
29	170	3393
32	178	3564
35	186	3727
38	194	3884
41	202	4034
44	209	4179
47	216	4319
50	223	4455
53	229	4586
56	236	4714
59	242	4839
62	248	4961
65	254	5079

The Ballorex Delta can be combined with the Ballorex Venturi to provide constant differential pressure in the controlled part of the system as well as to to ensure the option of limiting the maximum flow. For more details the application examples must be consulted.

Partner valve	Flow range		Dimension	Description
	l/s	l/h		
	0.29-125	1044-4500	DN 32H	Ballorex Venturi with drain. Flow diagrams can be found in chapter 3.1 - 44

DN 40 - female/female

Setting kPa	Min. flow l/h	Max. flow l/h
5	112	2240
6	122	2450
7	132	2650
8	141	2830
9	150	3000
10	158	3160
11	166	3320
12	173	3460
13	180	3610
14	187	3740
15	194	3870
16	200	4000
17	206	4120
18	212	4240
19	218	4360
20	224	4470
21	229	4580
22	235	4690
23	240	4800
24	245	4900
25	250	5000

Setting kPa	Min. flow l/h	Max. flow l/h
20	224	4470
21	229	4580
22	235	4690
23	240	4800
24	245	4900
25	250	5000
26	255	5100
27	260	5200
28	265	5290
29	269	5390
30	274	5480
31	278	5570
32	283	5660
33	287	5750
34	292	5830
35	296	5920
36	300	6000
37	304	6080
38	308	6160
39	312	6250
40	316	6330

Setting kPa	Min. flow l/h	Max. flow l/h
35	296	5920
37	304	6080
39	312	6250
41	320	6400
43	328	6560
45	335	6710
47	343	6860
49	350	7000
51	357	7140
53	364	7280
55	371	7420
57	377	7550
59	384	7680
61	391	7810
63	397	7940
65	403	8060
67	409	8190
69	415	8310
71	421	8430
73	427	8540
75	433	8660

The Ballorex Delta can be combined with the Ballorex Venturi to provide constant differential pressure in the controlled part of the system as well as to to ensure the option of limiting the maximum flow. For more details the application examples must be consulted.

Partner valve	Flow range		Dimension	Description
	l/s	l/h		
	0.44-1.88	1584-6760	DN 40H	Ballorex Venturi with drain. Flow diagrams can be found in chapter 3.1 - 50

DN 50 - female/female

Setting kPa	Min. flow l/h	Max. flow l/h	Setting kPa	Min. flow l/h	Max. flow l/h	Setting kPa	Min. flow l/h	Max. flow l/h	Setting kPa	Min. flow l/h	Max. flow l/h
5	224	4470	20	447	8940	35	592	11830	60	775	15490
6	245	4900	21	458	9170	37	608	12170	62	787	15750
7	265	5290	22	469	9380	39	624	12490	64	800	16000
8	283	5660	23	480	9590	41	640	12810	66	812	16250
9	300	6000	24	490	9800	43	656	13120	68	825	16500
10	316	6330	25	500	10000	45	671	13420	70	837	16730
11	332	6630	26	510	10200	47	686	13710	72	849	16970
12	346	6930	27	520	10390	49	700	14000	74	860	17210
13	361	7210	28	529	10580	51	714	14280	76	872	17440
14	374	7480	29	539	10770	53	728	14560	78	883	17660
15	387	7750	30	548	10950	55	742	14830	80	894	17890
16	400	8000	31	557	11140	57	755	15100	82	906	18110
17	412	8250	32	566	11310	59	768	15360	84	917	18330
18	424	8490	33	574	11490	61	781	15620	86	927	18550
19	436	8720	34	583	11660	63	794	15880	88	938	18760
20	447	8940	35	592	11830	65	806	16130	90	949	18970
21	458	9170	36	600	12000	67	819	16370	92	959	19180
22	469	9380	37	608	12170	69	831	16610	94	970	19390
23	480	9590	38	616	12330	71	843	16850	96	980	19600
24	490	9800	39	624	12490	73	854	17090	98	990	19800
25	500	10000	40	632	12650	75	866	17320	100	1000	20000

The Ballorex Delta can be combined with the Ballorex Venturi to provide constant differential pressure in the controlled part of the system as well as to to ensure the option of limiting the maximum flow.
For more details the application examples must be consulted.

Partner valve	Flow range		Dimension	Description
	l/s	l/h		
	0.82-3.51	1044-4500	DN 50H	Ballorex Venturi with drain. Flow diagrams can be found in chapter 3.1 - 56

DN 65 - flange/flange

20-80 kPa		
Setting kPa	Min. flow l/h	Max. flow l/h
20	1040	25940
22	1090	27200
24	1140	28410
26	1180	29570
28	1230	30690
30	1270	31770
32	1310	32810
34	1350	33820
36	1390	34800
38	1430	35750
40	1470	36680
42	1500	37590
44	1540	38470
46	1570	39340
48	1610	40180

20-80 kPa		
Setting kPa	Min. flow l/h	Max. flow l/h
52	1670	41820
54	1710	42620
56	1740	43400
58	1770	44170
60	1800	44930
62	1830	45670
64	1860	46400
66	1890	47120
68	1910	47830
70	1940	48530
72	1970	49220
74	2000	49890
76	2020	50560
78	2050	51220
80	2080	51880

70-130 kPa		
Setting kPa	Min. flow l/h	Max. flow l/h
72	1970	49220
74	2000	49890
76	2020	50560
78	2050	51220
80	2080	51880
82	2100	52520
84	2130	53160
86	2150	53790
88	2180	54410
90	2200	55020
92	2230	55630
94	2250	56230
96	2270	56830
98	2300	57420

70-130 kPa		
Setting kPa	Min. flow l/h	Max. flow l/h
102	2340	58580
104	2370	59150
106	2390	59720
108	2410	60280
110	2430	60830
112	2460	61380
114	2480	61930
116	2500	62470
118	2520	63000
120	2540	63540
122	2560	64060
124	2580	64590
126	2600	65110
128	2630	65620
130	2650	66130

The Ballorex Delta can be combined with the Ballorex Venturi to provide constant differential pressure in the controlled part of the system as well as to to ensure the option of limiting the maximum flow.
For more details the application examples must be consulted.

Partner valve	Flow range		Dimension	Description
	l/s	l/h		
	1.8-7.00	650-25200	DN 65	Ballorex Venturi with Combi Drain Maxi for capillary tube connection (Combi Drain Maxi is provided as an accessory). Flow diagram – chapter 3.1 - 59-61-63
	3.5-15.0	12600-54000	DN 80	
	6.2-26.0	22300-93600	DN 100	

DN 80 - flange/flange

20-80 kPa		
Setting kPa	Min. flow l/h	Max. flow l/h
20	1430	35780
22	1500	37520
24	1570	39190
26	1630	40790
28	1690	42330
30	1750	43820
32	1810	45260
34	1870	46650
36	1920	48000
38	1970	49320
40	2020	50600
42	2070	51850
44	2120	53070
46	2170	54260
48	2220	55430

20-80 kPa		
Setting kPa	Min. flow l/h	Max. flow l/h
50	2260	56570
52	2310	57690
54	2350	58790
56	2400	59870
58	2440	60930
60	2480	61970
62	2520	63000
64	2560	64000
66	2600	64990
68	2640	65970
70	2680	66930
72	2720	67880
74	2750	68820
76	2790	69740
78	2830	70650
80	2860	71550

70-130 kPa		
Setting kPa	Min. flow l/h	Max. flow l/h
60	2480	61970
62	2520	63000
64	2560	64000
66	2600	64990
68	2640	65970
70	2680	66930
72	2720	67880
74	2750	68820
76	2790	69740
78	2830	70650
80	2860	71550
82	2900	72440
84	2930	73320
86	2970	74190
88	3000	75050

70-130 kPa		
Setting kPa	Min. flow l/h	Max. flow l/h
90	3040	75900
92	3070	76730
94	3100	77560
96	3140	78380
98	3170	79200
100	3200	80000
102	3230	80800
104	3260	81580
106	3300	82370
108	3330	83140
110	3360	83910
112	3390	84670
114	3420	85420
116	3450	86160
118	3480	86900
120	3510	87640

The Ballorex Delta can be combined with the Ballorex Venturi to provide constant differential pressure in the controlled part of the system as well as to to ensure the option of limiting the maximum flow.
For more details the application examples must be consulted.

Partner valve	Flow range		Dimension	Description
	l/s	l/h		
	1.8-7.00	650-25200	DN 65	Ballorex Venturi with Combi Drain Maxi for capillary tube connection (Combi Drain Maxi is provided as an accessory). Flow diagram – chapter 3.1 - 59-61-63
	3.5-15.0	12600-54000	DN 80	

5.2 VALVE SETTING

The Ballorex Delta DN 15 is provided with two pressure setting ranges. The pressure setting is carried out by means of an Allen key. The number of turns needed to obtain the required differential pressure setting is specified in the tables.

DN 15 - female/female

Differential pressure setting range 5-25 kPa	
Turns	kPa
0	5
1	6
2	7
3	8
4	9
5	10
6	11
7	12
8	13
9	14
10	15
11	16
12	17
13	18
14	19
15	20
16	21
17	22
18	23
19	24
20	25

Differential pressure setting range 20-40 kPa	
Turns	kPa
0	20
1	21
2	22
3	24
4	25
5	26
6	27
7	29
8	30
9	31
10	33
11	34
12	35
13	37
14	38
15	39
16	40

Differential pressure setting range 20-65 kPa	
Turns	kPa
2	20
3	23
4	26
5	29
6	32
7	35
8	38
9	41
10	44
11	47
12	50
13	53
14	56
15	59
16	62
17	65

Differential pressure setting range	Factory setting
5-25 kPa	10 kPa
20-40 kPa	30 kPa
20-65 kPa	40 kPa

Other Factory setting	
	To set the Ballorex Delta to any other setting, turn the Allen key counterclockwise till the end point is reached and the spring is completely loosened. From this point turn the Allen key clockwise the number of turns that will give the required ΔP-setting according to the tables above. 4 mm Allen key is used for differential pressure setting.

The Ballorex Delta DN 15 is provided with two pressure setting ranges. The pressure setting is carried out by means of an Allen key. The number of turns needed to obtain the required differential pressure setting is specified in the tables.

DN 15 - male/male

Differential pressure setting range 5-25 kPa	
Turns	**kPa**
0	5
1	6
2	7
3	8
4	9
5	10
6	11
7	12
8	13
9	14
10	15
11	16
12	17
13	18
14	19
15	20
16	21
17	22
18	23
19	24
20	25

Differential pressure setting range 20-40 kPa	
Turns	**kPa**
0*	15
1*	16
2*	18
3*	19
4	20
5	21
6	23
7	24
8	25
9	26
10	28
11	29
12	30
13	31
14	33
15	34
16	35
17	36
18	38
19	39
20	40

*The nominal differential pressure setting range is 20-40 kPa, however 15 kPa - 19 kPa is also achievable.

Differential pressure setting range	Factory setting
5-25 kPa	10 kPa
20-40 kPa	30 kPa

Other Factory setting	
	To set the Ballorex Delta to any other setting, turn the Allen key counterclockwise till the end point is reached and the spring is completely loosened. From this point turn the Allen key clockwise the number of turns that will give the required ΔP-setting according to the tables above. 4 mm Allen key is used for differential pressure setting.

Ballorex Delta DN 20 is provided with two pressure setting ranges. The pressure setting is carried out by means of an Allen key. The number of turns needed to obtain the required differential pressure setting is specified in the tables.

DN 20 - female/female

Differential pressure setting range 5-25 kPa	
Turns	kPa
0	5
1	6
2	7
3	8
4	9
5	10
6	11
7	12
8	13
9	14
10	15
11	16
12	17
13	18
14	19
15	20
16	21
17	22
18	23
19	24
20	25

Differential pressure setting range 20-40 kPa	
Turns	kPa
0	20
1	21
2	22
3	24
4	25
5	26
6	27
7	29
8	30
9	31
10	33
11	34
12	35
13	37
14	38
15	39
16	40

Differential pressure setting range 20-65 kPa	
Turns	kPa
2	20
3	23
4	26
5	29
6	32
7	35
8	38
9	41
10	44
11	47
12	50
13	53
14	56
15	59
16	62
17	65

Differential pressure setting range	Factory setting
5-25 kPa	10 kPa
20-40 kPa	30 kPa
20-65 kPa	40 kPa

Other Factory setting	
	To set the Ballorex Delta to any other setting, turn the Allen key counterclockwise till the end point is reached and the spring is completely loosened. From this point turn the Allen key clockwise the number of turns that will give the required ΔP-setting according to the tables above. 4 mm Allen key is used for differential pressure setting.

Ballorex Delta DN 25 is provided with two pressure setting ranges. The pressure setting is carried out by means of an Allen key. The number of turns needed to obtain the required differential pressure setting is specified in the tables.

DN 25 - female/female

Differential pressure setting range 5-25 kPa	
Turns	kPa
0	5
1	6
2	7
3	8
4	9
5	10
6	11
7	12
8	13
9	14
10	15
11	16
12	17
13	18
14	19
15	20
16	21
17	22
18	23
19	24
20	25

Differential pressure setting range 20-40 kPa	
Turns	kPa
0	20
1	22
2	24
3	26
4	28
5	30
6	32
7	34
8	36
9	38
10	40

Differential pressure setting range 20-65 kPa	
Turns	kPa
2	20
3	23
4	26
5	29
6	32
7	35
8	38
9	41
10	44
11	47
12	50
13	53
14	56
15	59
16	62
17	65

*The nominal differential pressure setting range is 20-40 kPa, however 15 kPa - 19 kPa is also achievable.

Differential pressure setting range	Factory setting
5-25 kPa	10 kPa
20-40 kPa	30 kPa
20-65 kPa	40 kPa

Other Factory setting	
	To set the Ballorex Delta to any other setting, turn the Allen key counterclockwise till the end point is reached and the spring is completely loosened. From this point turn the Allen key clockwise the number of turns that will give the required ΔP-setting according to the tables above. 4 mm Allen key is used for differential pressure setting.

Ballorex Delta DN 32 is provided with two pressure setting ranges. The pressure setting is carried out by means of an Allen key. The number of turns needed to obtain the required differential pressure setting is specified in the tables.

DN 32 - female/female

Differential pressure setting range 5-25 kPa	
Turns	kPa
0	5
1	6
2	7
3	8
4	9
5	10
6	11
7	12
8	13
9	14
10	15
11	16
12	17
13	18
14	19
15	20
16	21
17	22
18	23
19	24
20	25

Differential pressure setting range 20-40 kPa	
Turns	kPa
0	20
1	22
2	24
3	26
4	28
5	30
6	32
7	34
8	36
9	38
10	40

Differential pressure setting range 20-65 kPa	
Turns	kPa
2	20
3	23
4	26
5	29
6	32
7	35
8	38
9	41
10	44
11	47
12	50
13	53
14	56
15	59
16	62
17	65

Differential pressure setting range	Factory setting
5-25 kPa	10 kPa
20-40 kPa	30 kPa
20-65 kPa	40 kPa

Other Factory setting	
	To set the Ballorex Delta to any other setting, turn the Allen key counterclockwise till the end point is reached and the spring is completely loosened. From this point turn the Allen key clockwise the number of turns that will give the required ΔP-setting according to the tables above. 4 mm Allen key is used for differential pressure setting.

Ballorex Delta DN 40 is provided with three pressure setting ranges. The pressure setting is carried out by means of an Allen key. The number of turns needed to obtain the required differential pressure setting is specified in the tables.

DN 40 - female/female

Differential pressure setting range 5-25 kPa	
Turns	kPa
0	5
1	6
2	7
3	8
4	9
5	10
6	11
7	12
8	13
9	14
10	15
11	16
12	17
13	18
14	19
15	20
16	21
17	22
18	23
19	24
20	25

Differential pressure setting range 20-40 kPa	
Turns	kPa
0	20
1	21
2	22
3	23
4	24
5	25
6	26
7	27
8	28
9	29
10	30
11	31
12	32
13	33
14	34
15	35
16	36
17	37
18	38
19	39
20	40

Differential pressure setting range 35-75 kPa	
Turns	kPa
2	20
3	23
4	26
5	29
6	32
7	35
8	38
9	41
10	44
11	47
12	50
13	53
14	56
15	59
16	62
17	65

Differential pressure setting range	Factory setting
5-25 kPa	10 kPa
20-40 kPa	30 kPa
35-75 kPa	60 kPa

Other Factory setting	
	To set the Ballorex Delta to any other setting, turn the Allen key counterclockwise till the end point is reached and the spring is completely loosened. From this point turn the Allen key clockwise the number of turns that will give the required ΔP-setting according to the tables above. 4 mm Allen key is used for differential pressure setting.

Ballorex Delta DN 50 is provided with four pressure setting ranges. The pressure setting is carried out by means of an Allen key. The number of turns needed to obtain the required differential pressure setting is specified in the tables.

DN 50 - female/female

Differential pressure setting range 5-25 kPa		Differential pressure setting range 20-40 kPa		Differential pressure setting range 35-75 kPa		Differential pressure setting range 60-100 kPa	
Turns	kPa	Turns	kPa	Turns	kPa	Turns	kPa
0	5	0	20	0	35	0	60
1	6	1	21	1	37	1	62
2	7	2	22	2	39	2	64
3	8	3	23	3	41	3	66
4	9	4	24	4	43	4	68
5	10	5	25	5	45	5	70
6	11	6	26	6	47	6	72
7	12	7	27	7	49	7	74
8	13	8	28	8	51	8	76
9	14	9	29	9	53	9	78
10	15	10	30	10	55	10	80
11	16	11	31	11	57	11	82
12	17	12	32	12	59	12	84
13	18	13	33	13	61	13	86
14	19	14	34	14	63	14	88
15	20	15	35	15	65	15	90
16	21	16	36	16	67	16	92
17	22	17	37	17	69	17	94
18	23	18	38	18	71	18	96
19	24	19	39	19	73	19	98
20	25	20	40	20	75	20	100

Differential pressure setting range	Factory setting
5-25 kPa	10 kPa
20-40 kPa	30 kPa
35-75 kPa	60 kPa
60-100 kPa	80 kPa

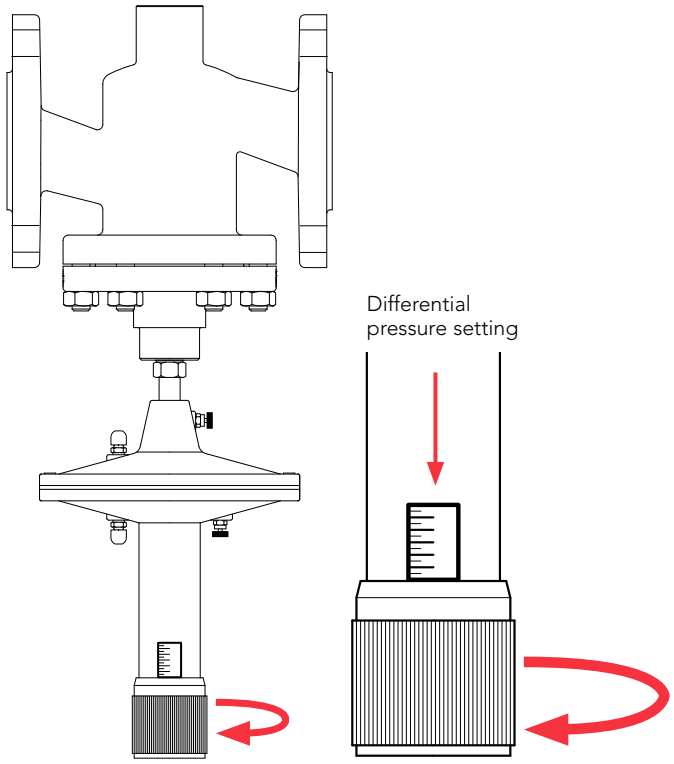
Other Factory setting	
	To set the Ballorex Delta to any other setting, turn the Allen key counterclockwise till the end point is reached and the spring is completely loosened. From this point turn the Allen key clockwise the number of turns that will give the required ΔP-setting according to the tables above. 4 mm Allen key is used for differential pressure setting.

The Ballorex Delta DN 65 is provided with two differential pressure setting ranges. The differential pressure setting is carried out by means of a regulating knob. The setting scale is clearly marked on the actuator. Any differential pressure setting can be verified by checking the position of the regulating knob edge in reference to the scale.

DN 65 - flange/flange

Differential pressure setting range	Factory setting
20-80 kPa	50 kPa
70-130 kPa	100 kPa

Other Factory setting



To set the Ballorex Delta to any other setting, turn the Allen key counterclockwise till the end point is reached and the spring is completely loosened. From this point turn the Allen key clockwise the number of turns that will give the required ΔP-setting according to the tables above. 4 mm Allen key is used for differential pressure setting.

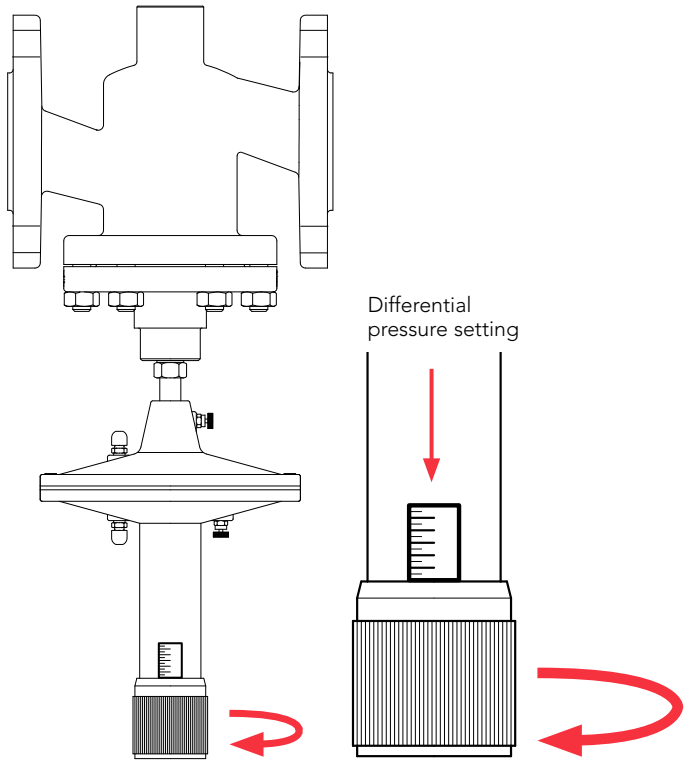
The Ballorex Delta DN 65 is provided with two capillary tubes so the valve can be installed in the supply or the return line. The valve does not offer the shut off function, thus it is recommended to install isolation valves in the system with Ballorex Delta DN 65.

The Ballorex Delta DN 80 is provided with two differential pressure setting ranges. The differential pressure setting is carried out by means of a regulating knob. The setting scale is clearly marked on the actuator. Any differential pressure setting can be verified by checking the position of the regulating knob edge in reference to the scale.

DN 80 - flange/flange

Differential pressure setting range	Factory setting
20-80 kPa	50 kPa
70-130 kPa	100 kPa

Other Factory setting



To set the Ballorex Delta to any other setting, turn the regulating knob so that the edge of the knob points to the required differential pressure on the actuator scale.

The Ballorex Delta DN 80 is provided with two capillary tubes so the valve can be installed in the supply or the return line. The valve does not offer the shut off function, thus it is recommended to install service isolation valves in the system with Ballorex Delta DN 80.

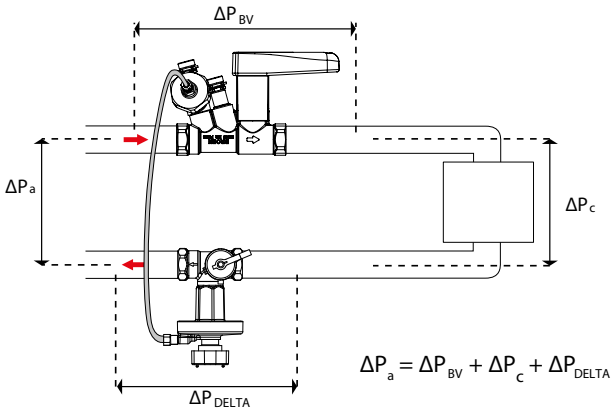
6. SIZING EXAMPLES

6.1 DN15-50

6.1.1 System with Ballorex Delta and Ballorex Venturi

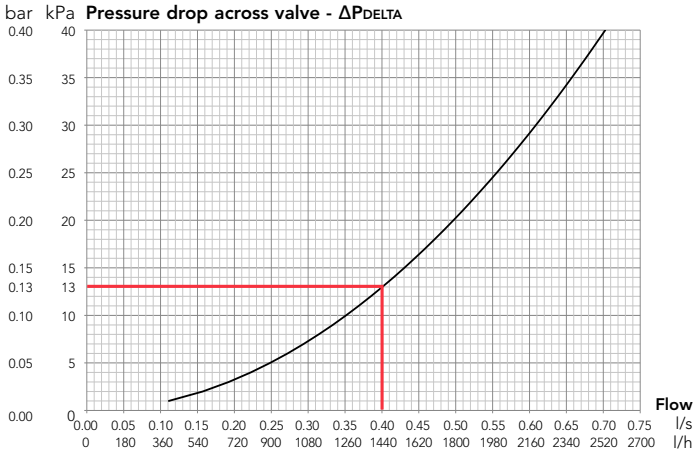
Ballorex Delta and a Ballorex Venturi partner valve is in this example sized to the following conditions:

The designed branch flow controlled by the Ballorex Delta is 0.4 l/s (1440 l/h).
The available system differential pressure (ΔPa) is 50 kPa.
The required branch differential pressure (ΔPc) is 20 kPa.



- Δ Pa - available differential pressure in the system
- Δ PC - differential pressure required for the branch
- Δ PBV - pressure loss across Ballorex Venturi
- Δ PDELTA - pressure loss across Ballorex Delta

The pressure loss across the Ballorex Delta valve is found in the product data sheet graphs in chapter 5.1 - 32. amic

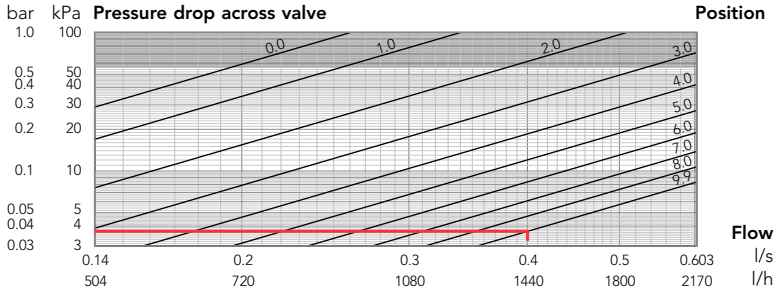


Graph for
Ballorex Delta DN 25.

Three valves (in fully open position) can provide the required flow of 0.4 l/s:
Ballorex Delta DN 20 ΔPDELTA = 33 kPa Ballorex Delta DN 25 ΔPDELTA = 13 kPa
Ballorex Delta DN 32 ΔPDELTA = 5 kPa

The suitable Ballorex Venturi partner valve is selected from the flow diagrams in chapter 3.1. It is recommended to use valves in fully open position at the required flow to reduce the pump head and save energy:

Ballorex Venturi DN 20H ΔPBV = 6.5 kPa (see chapter 3.1 - 30-31)
Ballorex Venturi DN 25S ΔPBV = 3.5 kPa (see chapter 3.1 - 38)
Ballorex Venturi DN 32H ΔPBV = 1.2 kPa (see chapter 3.1 - 44)



Graph for Ballorex Venturi DN 25S

The minimum required ΔPa for each valve set is calculated as follows: ΔPa = ΔPBV + ΔPC + ΔPDELTA

DN 20 Min. ΔPa = 6.5 kPa + 20 kPa + 33 kPa = 59.5 kPa
DN 25 Min. ΔPa = 3.5 kPa + 20 kPa + 13 kPa = 36.5 kPa
DN 32 Min. ΔPa = 1.2 kPa + 20 kPa + 5 kPa = 26.2 kPa

To ensure the best functionality of the Ballorex Delta, the smallest possible valve is selected. However, the DN 20 solution requires minimum ΔPa of 59.5 kPa to operate properly, and the system provides a ΔPa of only 50 kPa. Therefore the DN 25 valve is selected with an 20-40 kPa actuator.
The correct ΔP setting on the Ballorex Delta is: ΔPBV + ΔPc = 3.5 kPa + 20 kPa = 23.5 kPa
To make sure the Ballorex Delta valve will keep the required differential pressure (ΔPc + ΔPBV) [kPa] constant within the circuit at flow 0.4 l/s, the product data sheets must be consulted.

Setting kPa	Min. flow l/h	Max. flow l/h
20	89	1790
22	94	1880
24	**98**	**1960**
26	102	2040
30	110	2190

Extract from the Ballorex Delta DN 25 sizing table.

At a setting of 24 kPa, the available flow range is 98-1960 l/h and the design flow of 1440 l/h is within the range.Articles used:

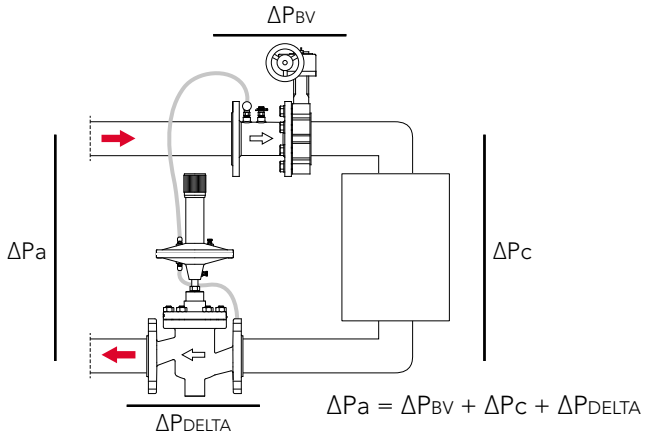
Ballorex Delta DN 25, 20-40 kPa, Article No. 80597.526
Ballorex Venturi with drain DN 25 S, Article No. 80597.537

6.2 DN 65-80

6.2.1 System with Ballorex Delta and Ballorex Venturi

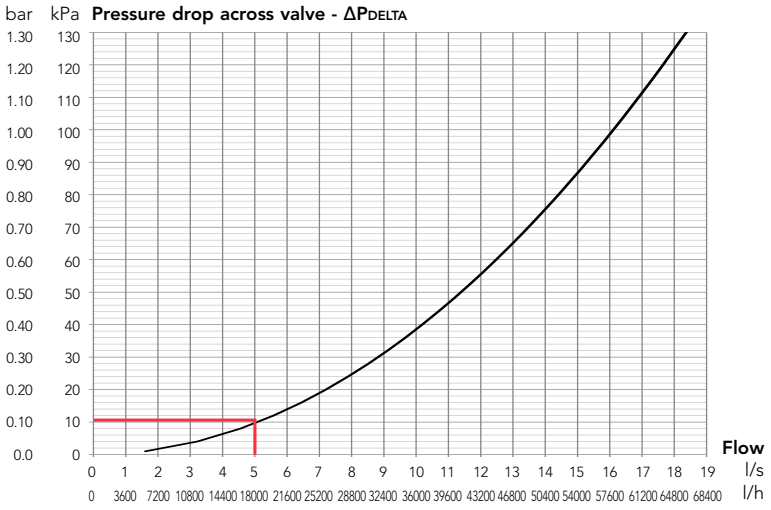
A Ballorex Delta and a Ballorex Venturi partner valve are sized to the following conditions:

The designed branch flow controlled by the Ballorex Delta is 5.0 l/s (18000 l/h).
The available system differential pressure ΔPa) is 60 kPa.
The required branch differential pressure controlled by the Ballorex Delta (ΔPc) is 40 kPa.w



- Δ Pa - available differential pressure in the system
- Δ Pc - differential pressure required for the circuit
- Δ PBV - pressure loss across partner valve (Ballorex Venturi)
- Δ PDELTA - pressure loss across the Ballorex Delta

The pressure loss across the Ballorex Delta valve is found in the product data sheet graphs in chapter 5.2 - 13.



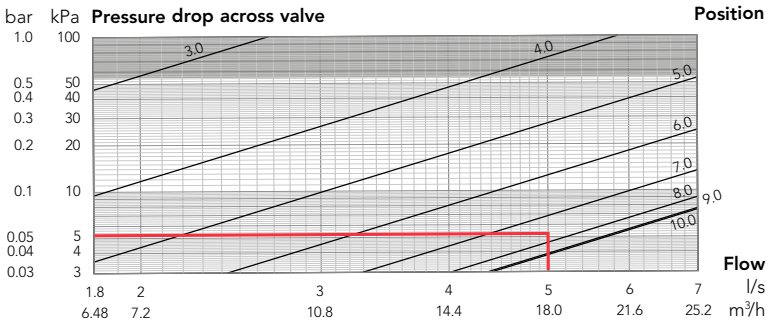
Graph for
Ballorex Delta DN 65.

Two valves (in fully open position) can provide the required flow of 5.0 l/s:

Ballorex Delta DN 65 ΔPDELTA = 10 kPa
Ballorex Delta DN 80 ΔPDELTA = 5 kPa

The suitable Ballorex Venturi partner valves are selected based on the flow diagrams in chapter 3.1. It is recommended that the valve setting at the required flow is as close to the fully open position as possible. This enables the valve to operate at the required authority, and any valve setting change will result in a high pressure loss for precise flow adjustment:

Ballorex Venturi DN 65, ΔPbv = 5.3 kPa valve fully open (see chapter 3.1 - 59)
Ballorex Venturi DN 80, ΔPbv = 4.0 kPa valve in position 3.5 (see chapter 3.1 - 61)



Graph for
Ballorex Venturi DN 65.

The minimum required ΔPa for each valve set is calculated as follows:

ΔPa = ΔPBV + ΔPc + ΔPDELTA
DN 65 Min. ΔPa = 5.3 kPa + 40 kPa + 10 kPa = 55.3 kPa
DN 80 Min. ΔPa = 4.0 kPa + 40 kPa + 5 kPa = 49.0 kPa

To ensure the best functionality of the Ballorex Delta, the smallest possible valve is selected. Therefore the DN 65 valve is selected with an actuator 20-80 kPa.
The correct ΔP setting on the Ballorex Delta valve is: ΔPBV + ΔPc = 5.3 kPa + 40 kPa = 45.3 kPa
To make sure the Ballorex Delta valve will keep the required differential pressure (ΔPc + ΔPbv) [kPa] constant within the circuit at flow Q [l/s], the product data sheets must be consulted. At the setting of 46 kPa, the available flow range is 1570 l/h to 39340 l/h and the design flow of 18000 l/h is within the range.

20-80 kPa		
Setting kPa	**Min. flow l/h**	**Max. flow l/h**
38	1430	35750
40	1470	36680
42	1500	37590
44	1540	38470
46	**1570**	**39340**

Extract of the table for
Ballorex Delta DN 65.

Ordering: Ballorex Delta DN 65, Article No.: 80597.602,
Ballorex Venturi DN 65, Article No.: 80597.471,
Combi Drain Maxi for capillary tube connection, Article No.: 80597.0204

6.3 GENERAL SPECIFICATIONS DN 15-50

1. Differential pressure control valve DN 15 - 50

1.1. The Contractor must install differential pressure control valves where indicated in drawings.

2. Function

2.1. The valve must be used to provide constant differential pressure in the controlled circuit.
2.2. Differential pressure setting must be externally adjustable.
2.3. The positioning of the valve with actuator must be possible in all directions (360° around the pipe axis).
2.4. The valve must have no requirement for straight up- or downstream piping.

3. Valve Body

3.1. The valve body must be made of hot stamped DR brass CW602N CuZn36Pb2As or of cast iron EN-GJL-250 (GG25).
3.2. The pressure rating must be no less than PN25.
3.3. The valve must comprise differential pressure control, isolation and draining in one single unit.
3.4. A flow arrow must be indicated in the valve body.
3.5. The actuator and drain valve must be positioned perpendicular to each other.
3.6. Pressure testing must be possible in all directions (360° around the pipe axis) after installing a test point cap on the drain valve.

4. Actuator

4.1. The housing of the actuator must be made of DR brass CW602N CuZn36Pb2As or of cast iron EN-GJL-250 (GG25).
4.2. The actuator must incorporate a handle for valve isolation.
4.3. The actuator must enable differential pressure setting using an Allen key.
4.4. Twenty 360° rotations of an Allen key must ensure the full differential pressure setting range..

6.4 GENERAL SPECIFICATIONS DN 65-100

1. Differential pressure control valve DN 65 - 80

1.1. The Contractor must install the differential pressure control valve where indicated in drawings.

2. Function

2.1. The valve must be used to provide constant differential pressure in the controlled circuit.

2.2. Differential pressure setting must be externally adjustable.

2.3. The positioning of the valve with actuator must be possible in all directions (360° around the pipe axis) at a temperature range up to 120°C.

2.4. The valve must have no requirement for straight up- or downstream piping.

3. Valve Body

3.1. The valve body must be made of cast iron EN-GJS-400-15.

3.2. The pressure rating must be no less than PN16.

3.3. The valve must be installed in the supply or in the return line.

3.4. A flow arrow must be indicated on the valve body.

4. Actuator

4.1. The actuator housing must be made of cast iron.

4.2. The actuator must incorporate a knob for differential pressure setting.

4.3. The differential pressure setting scale must be marked on the actuator.

4.4. The edge of the regulating knob must indicate the differential pressure setting.

4.5. Actuators with different setting ranges must be interchangeable.

7. NOTES

NOTES

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