Ballorex® Venturi
3.1 Introduction

Ballorex Venturi

Fixed Orifice Double Regulating Valve (FODRV)

DN 15 - 600 1/2 - 24”

Ballorex Venturi description

The Ballorex Venturi is a range of manual balancing valves used in water-based heating and cooling systems to ensure an evenly distributed flow in zones, branches, risers and terminal units. Applications are typically central, district heating or cooling systems as well as fan coil units in multi-storey and high-rise buildings.

The Ballorex Venturi valve is compact having flow measuring, regulation and isolation functions all in one unit. The range consists of valves in sizes DN 15 - 50, manufactured in dezincification resistant brass (DR), to valves in sizes DN 65 - 600, manufactured in steel and cast iron.

The Ballorex Venturi has a built-in Venturi nozzle for accurate measuring. This design provides the Ballorex Venturi with consistent measuring accuracy tolerances within ±3%, and the Ballorex Venturi is more accurate than variable orifice double regulating valves.

Because of the higher accuracy and low pressure loss, the Ballorex Venturi is more efficient for reduced energy consumption when heating and cooling systems are balanced.

Ballorex Venturi benefits

Valves DN 15 - 600:
» Extensive product range from DN 15 - 600
» Constant measuring accuracy tolerances within ±3%
» Flow verification insensitive to system debris
» One constant Kvm value indicated on valv
» Simultaneous measuring and regulation

Ballorex® Venturi
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Ballorex Venturi benefits

Valves DN 15 - 50:
» Fast and easy setting using an Allen key
» Setting scale precise and easy to read
» No change in setting when isolated and reopened
» Isolation simply done by a quarter turn of the valve handle
» Easy identification of open or isolated position
» No need for straight piping when installed
» Installation directly onto bends, reducers and flexible hoses
» Installation possible in all positions
» Prefabricated insulation fast and easy to apply
» Insulation possible before commissioning

Ballorex Venturi design

The pre-setting of Ballorex Venturi DN 15 - 50 is done by setting the regulating needle which operates independently of the shut-off function. In that way the valve setting is kept intact when the valve is isolated and re-opened.

The differential pressure is measured for flow verification across the built-in Venturi nozzle having a constant Kvm value. The Kvm value of Ballorex Venturi only has to be entered once in the flowmeter during system commissioning.

In comparison the Kv value of variable orifice double regulating valves is changed every time the setting is altered. The new setting is in this case read from the handle scale and entered in the flowmeter every time a new flow has to be measured.

1 - Venturi nozzle
2 - Ball for isolation
3 - Regulating needle
4 - Handle to shut off valve
5 - Operation of regulation needle
6 - Measuring points for flow meter connection

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The pre-setting of the Ballorex Venturi DN 65 - 600 is done by setting the butterfly valve to the required position. The butterfly valve is fitted with a Venturi nozzle. Similarly to the Ballorex Venturi DN 15 - 50 the differential pressure is measured across the Venturi nozzle where the Kvm value is constant and not affected when the setting is changed.

1 - Setting wheel
2 - Setting scale with memory stop
3 - Gearbox
4 - Butterfly valve
5 - Measuring point
6 - Venturi nozzle

The butterfly valve is provided with a gearbox with memory stop. When the required setting of the valve is achieved, the memory stop is locked and the setting is fixed.

The Ballorex Venturi valves are optionally provided with a drain valve. The drain can be rotated 360° at any time, which proves to be particularly useful during the servicing of the system. The drain can also be used to connect a capillary tube from the Ballorex Delta differential pressure control valve. Such a valve combination ensures constant differential pressure and maximum flow limitation in the controlled part of the system.

Ballorex Venturi with drain valve.

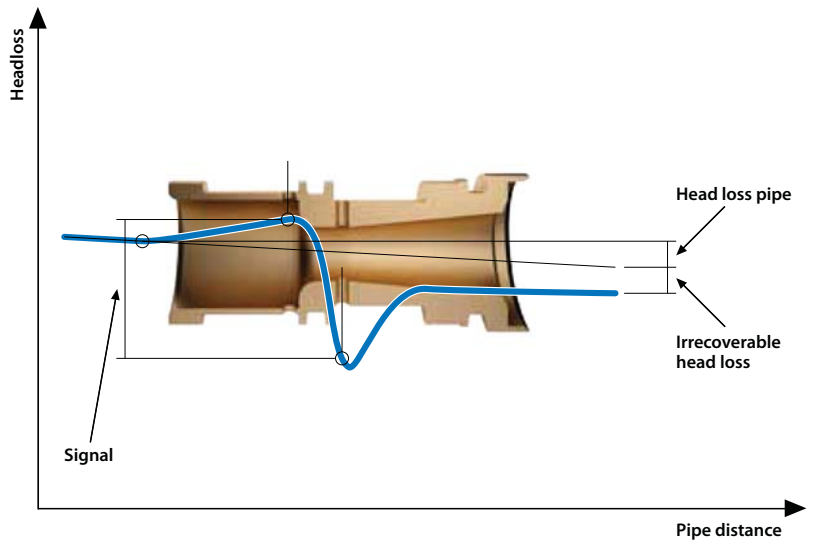
There are two different drain types for the Ballorex Venturi range. The valves DN 15 - 50 use Combi Drain Midi and the Ballorex Venturi DN 65 - 600 use Combi Drain Maxi.

Ballorex® Venturi
3.1 Introduction

Venturi nozzle principle

The integrated Venturi nozzle enables direct flow measuring across the Ballorex Venturi valve. The direct flow measurement allows a precise valve setting and easy trouble shooting.

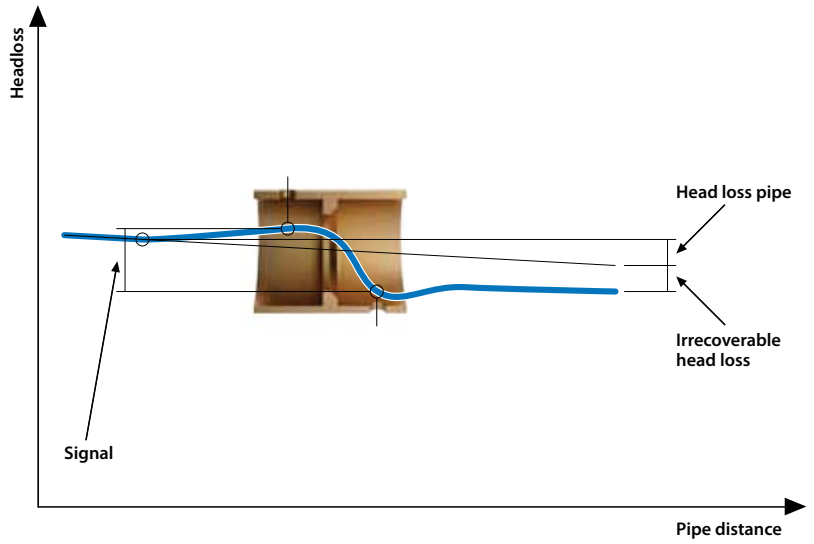
The Venturi nozzle exploits Bernoulli's principle stating that fluid speeds up as it moves through a constricted space; as the speed of the fluid increases, its pressure drops.



Flow through a Venturi nozzle provides a strong measuring signal.

A significant part of the pressure loss is rebuilt at the outlet part of the Venturi nozzle.

The differential pressure across the Venturi nozzle is measured where the pressure is at its highest and lowest. The trumpet shape of the Ballorex Venturi nozzle recovers a substantial part of the pressure, providing a strong measuring signal at a low total pressure drop.



Flow through a traditional fixed or variable orifice offers a low measuring signal.

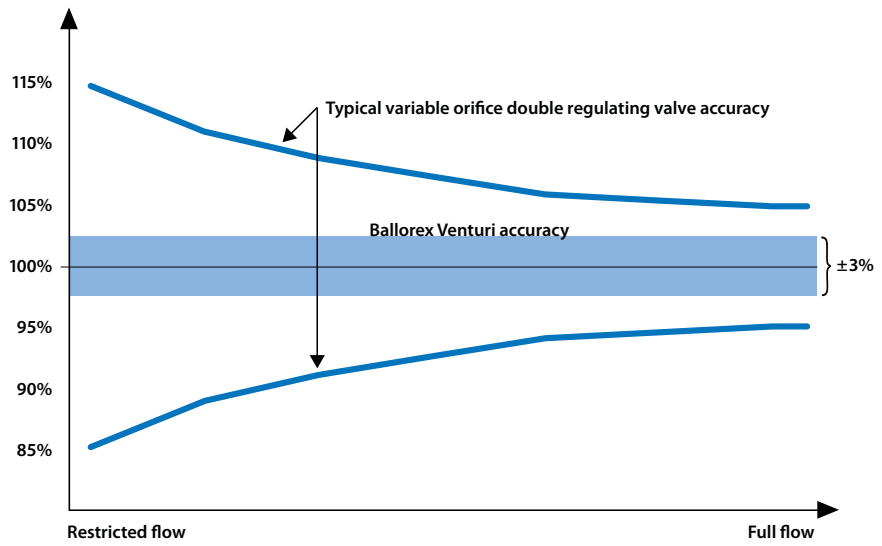
Compared to a standard variable orifice double regulating valve the Venturi nozzle provides a 10 times stronger signal at the same pressure drop. The measuring accuracy thereby becomes significantly greater.

Ballorex Venturi measuring accuracy

Changing the valve setting does not affect the direct flow measurement as the Kvm value of the Venturi nozzle, between the measuring points, remains constant.

Using a flowmeter the Ballorex Venturi Kvm value is entered only once to achieve the flow reading. If the valve setting is changed, the new flow will be displayed directly since the Kvm value remains constant and only the differential pressure changes.

The Ballorex Venturi as a fixed orifice double regulating valve has consistent measuring accuracy within ±3% in the whole setting range of the valve. This feature is an important asset of the Ballorex Venturi compared to variable orifice double regulating valves where accuracy is reduced as the valve closes.



The Ballorex Venturi measuring accuracy tolerance is constantly within ±3% compared to variable orifice valves having a variable measuring accuracy tolerance of ±15%.

The Ballorex Venturi nozzle provides the most accurate measuring available in the market.

Ballorex® Venturi
3.1 Introduction

Ballorex Venturi flow balancing

The Ballorex Venturi valve is provided with measuring points for differential pressure measurement using any flowmeter.

The setting of the Ballorex Venturi is easily done using an Allen key. By rotating the Allen key in the valve handle the regulating needle inside the valve moves and changes the setting accordingly. The precise digital setting scale on top of the handle displays the setting which is easy to read even from a distance.

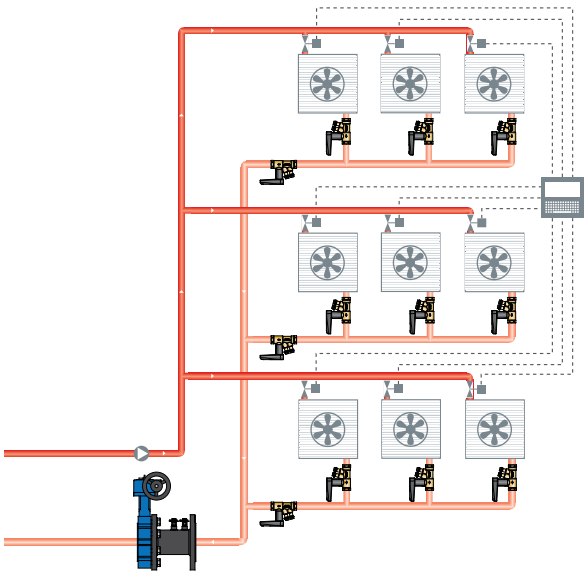
Ballorex provides a dedicated balancing computer, having all Ballorex valves data pre-stored.

Hoses with needles are connected to the measuring points of the Ballorex Venturi for differential pressure measurement. This can be converted into flow reading in the balancing computer.

For flow measurement the flowmeter is connected to the measuring points of the valve and the Ballorex Venturi in question is chosen from the displayed list. The flow is thereafter displayed directly.

Ballorex Venturi operation

The Ballorex Venturi can be used as a stand alone valve to provide the desired flow distribution within the controlled system. The valve is typically installed at terminal units, on branches, zones and main distribution pipes.



The Ballorex Venturi valve can be used as a stand alone valve for flow balancing.

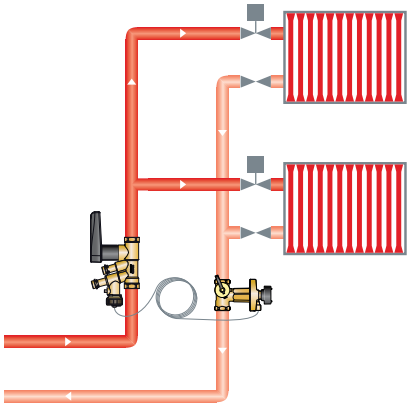
Ballorex® Venturi
3.1 Introduction

The optional drain valve of the Ballorex Venturi ensures at the same time the possibility of system draining or of connecting a capillary tube from a Ballorex Delta differential pressure control valve.

By combining Ballorex Venturi and a Ballorex Delta in a system branch with terminal units, pressure fluctuations from the remaining part of the system will be eliminated within the controlled part of the branch. The designed flow set on the Ballorex Venturi will at the same time never be exceeded due to the constant differential pressure regulation performed. System commissioning comprising Ballorex Venturi in combination with a Ballorex Delta is quick and cost efficient.

The Ballorex Venturi can be used as a partner valve to the Ballorex Delta differential pressure control valve.

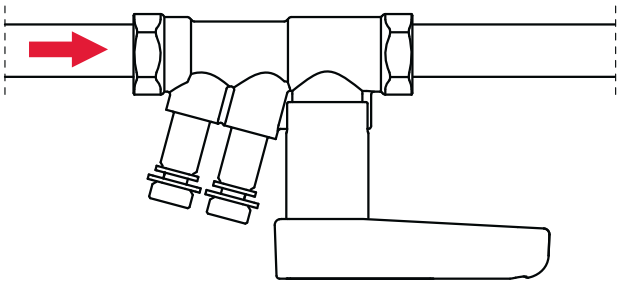
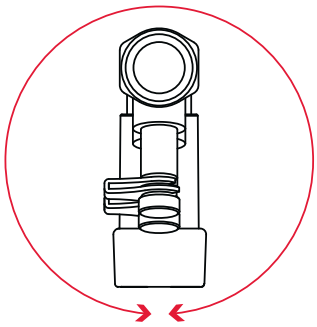
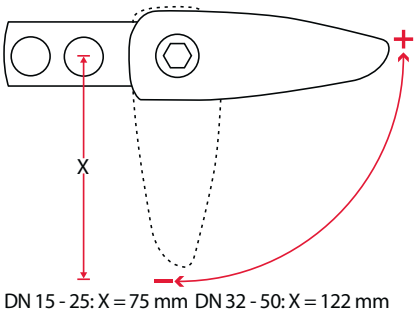
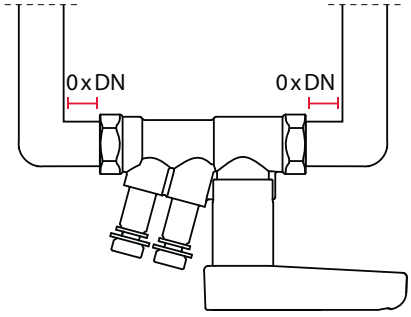
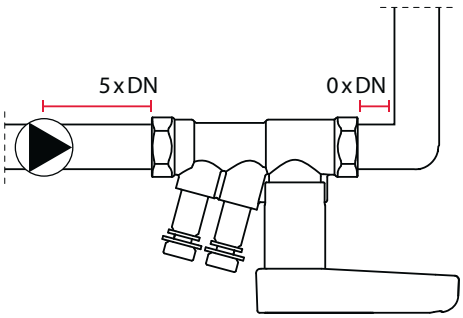
The capillary tube is connected to the drain valve mounted before the regulating needle of the Ballorex Venturi, and thus the valve is inside the circuit controlled by the Ballorex Delta.
The pressure loss across the Ballorex Venturi then needs to be taken into account when setting the Ballorex Delta differential pressure control valve.



The Ballorex Venturi is always inside the circuit controlled by the Ballorex Delta and the pressure loss is therefore to be added to the required differential pressure in the controlled circuit when setting the Ballorex Delta valve.

Ballorex® Venturi
3.1 Mounting instructions

Mounting instructions DN 15 - 50

	An arrow on the Ballorex Venturi housing indicates the flow direction to be respected.
	Ballorex Venturi can be orientated 360° around the pipe axis.
 DN 15 - 25: X = 75 mm DN 32 - 50: X = 122 mm	Installation space is required to ensure the 90° isolation.
	0 × DN straight piping is required. The Ballorex Venturi can be mounted directly onto bends, reducers, flexible pipes etc.
	5 × DN straight piping is required when the valve is mounted directly after the system pump.

Ballorex

Ballorex® Venturi
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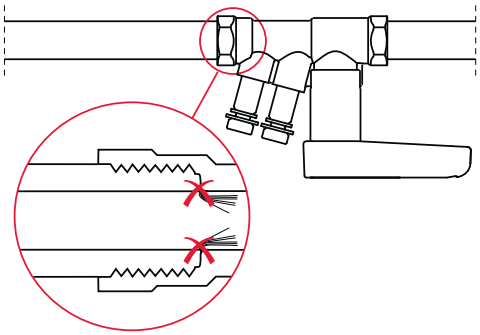
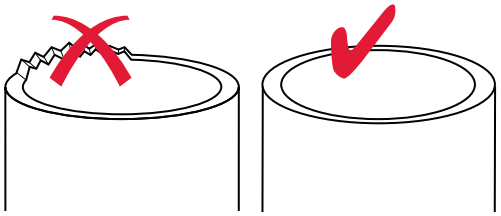
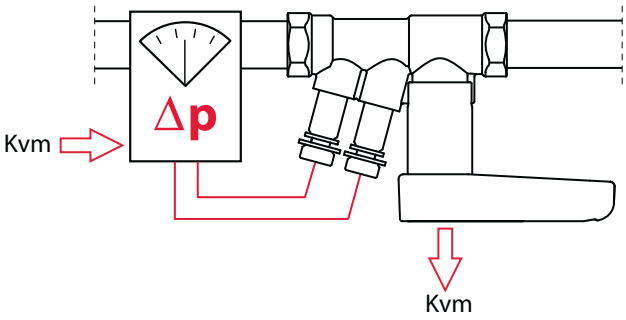
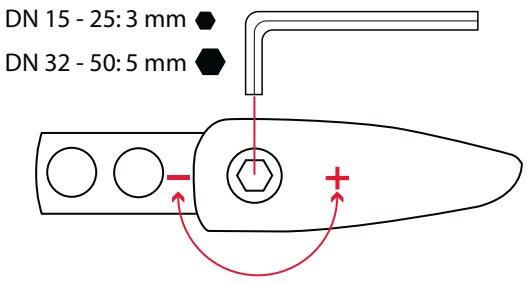
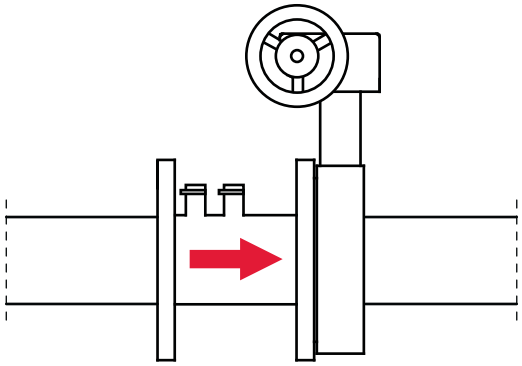
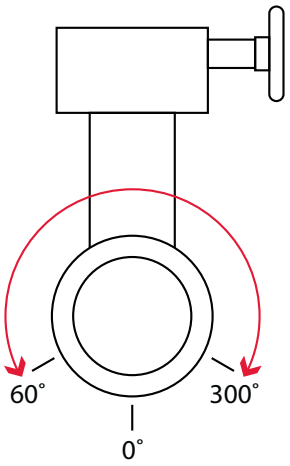
	Loose hemps must not hang into the pipe.
	Deburring of pipe ends is required to prevent system clogging.
	A Ballorex balancing computer with pre-stored Ballorex valves data can be used for flow verification. When using any other flowmeter, the Ballorex Venturi Kvm value stated on the valve handle is entered once only to obtain the correct flow reading.
	Setting the valve is easily done using an Allen key. The valve is adjusted until the required flow is displayed on the flowmeter.

Ballorex® Venturi
3.1 Mounting instructions

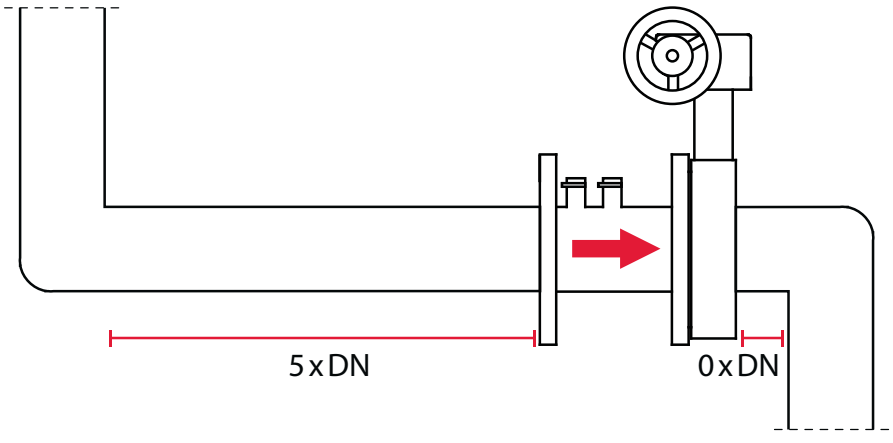
Mounting instructions DN 65 - 600



An arrow on the Ballorex Venturi tube indicates the flow direction to be respected.

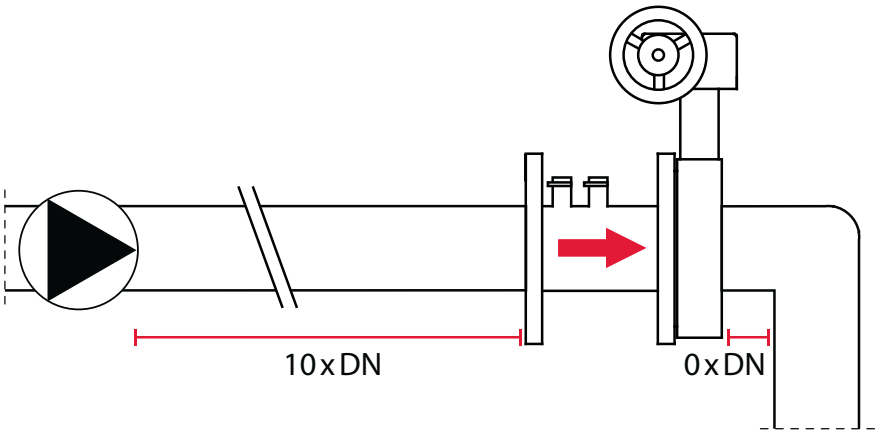


Ballorex Venturi can be installed with the gearbox pointing in any direction. However, if the gearbox is mounted pointing downwards, it is assumed that there are no impurities in the system to affect the performance of the valve. If there is a risk of impurities, it is recommended to install the gearbox in an angle from 60° to 300°.

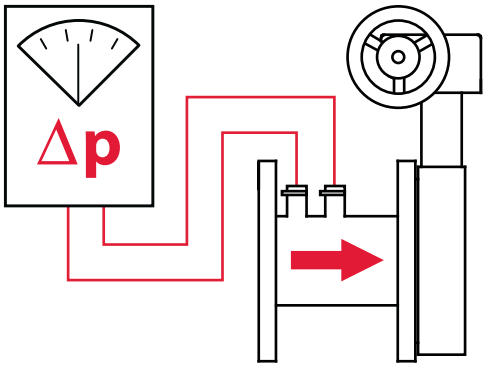


It is recommended to provide a straight pipe length of minimum 5 × DN pipe diameter before the valve. There are no minimum requirements for straight lengths of pipe after the valve.

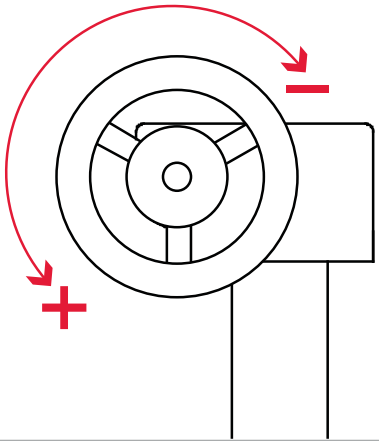
Ballorex® Venturi
3.1 Mounting instructions



If a pump is installed immediately in front of the valve, a straight pipe of 10 × DN pipe diameter is required. There are no requirements for straight pipe lengths after the valve.

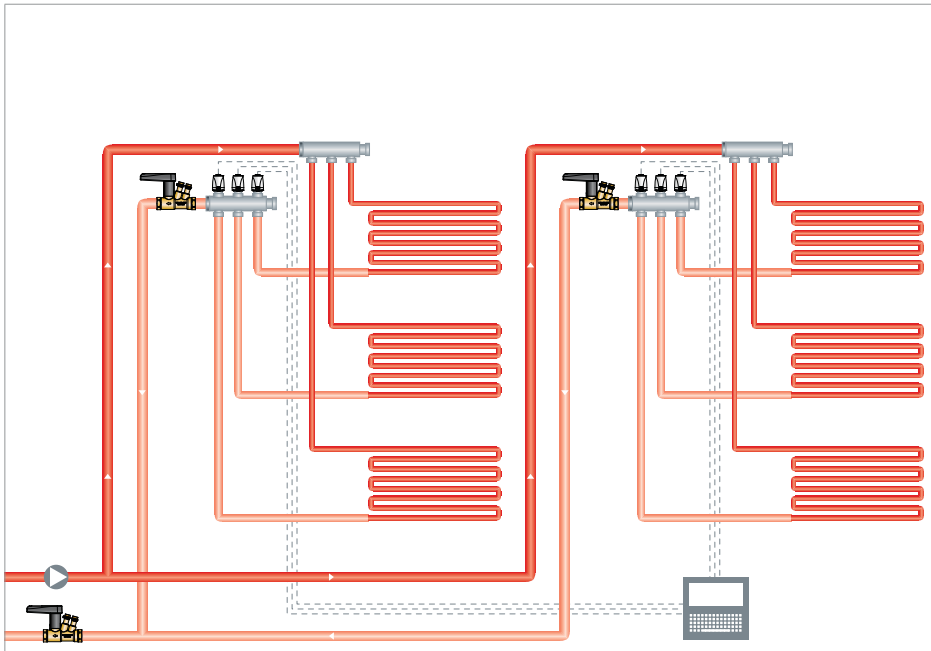


A Ballorex balancing computer with pre-stored Ballorex valves data can be used for flow verification. When using any other flowmeter, the Ballorex Venturi Kvm value stated on the Venturi tube is entered once only to obtain the correct flow reading.



The flow rate is adjusted by rotating the handle on the gearbox.
The flow rate increases by rotating the handle to the left (counter-clockwise) and is reduced by rotating it to the right (clockwise).

Ballorex® Venturi
3.1 Applications

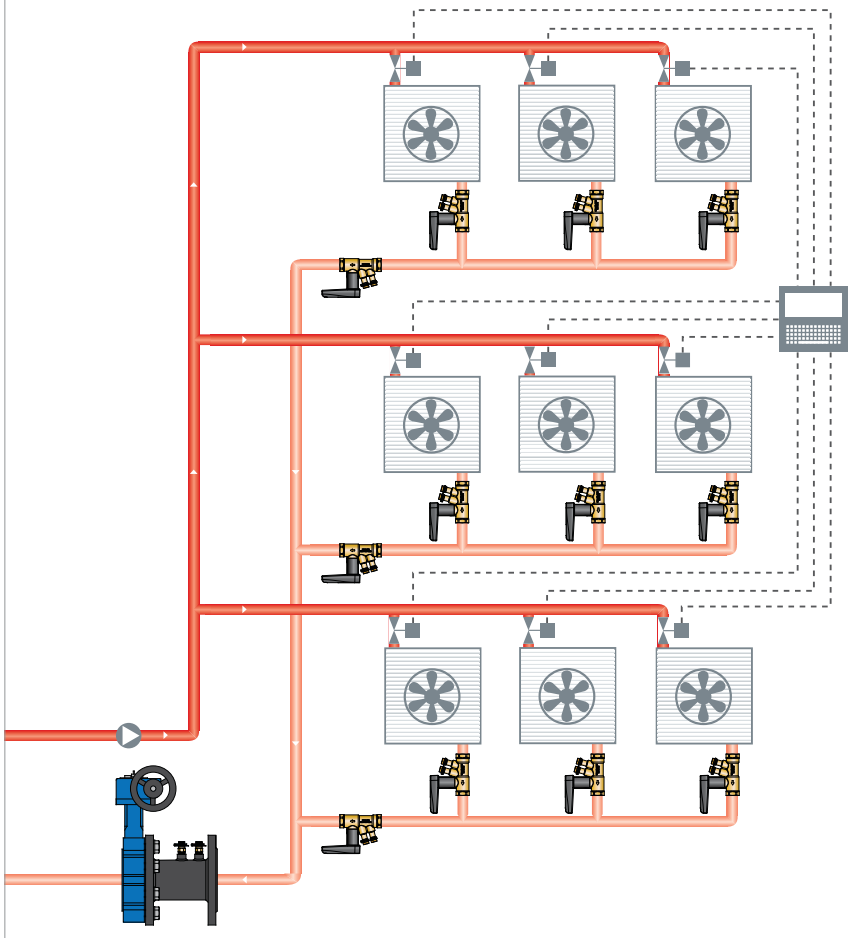


Application 1 - Underfloor heating

In an underfloor heating system the Ballorex Venturi valves ensure the required flow distribution to all manifolds.

Actuators connected to the BMS system or a room thermostat control the flow in each loop by opening or closing two-way valves in reference to the room air temperature.

The flow and temperature is controlled to ensure the required indoor thermal comfort.



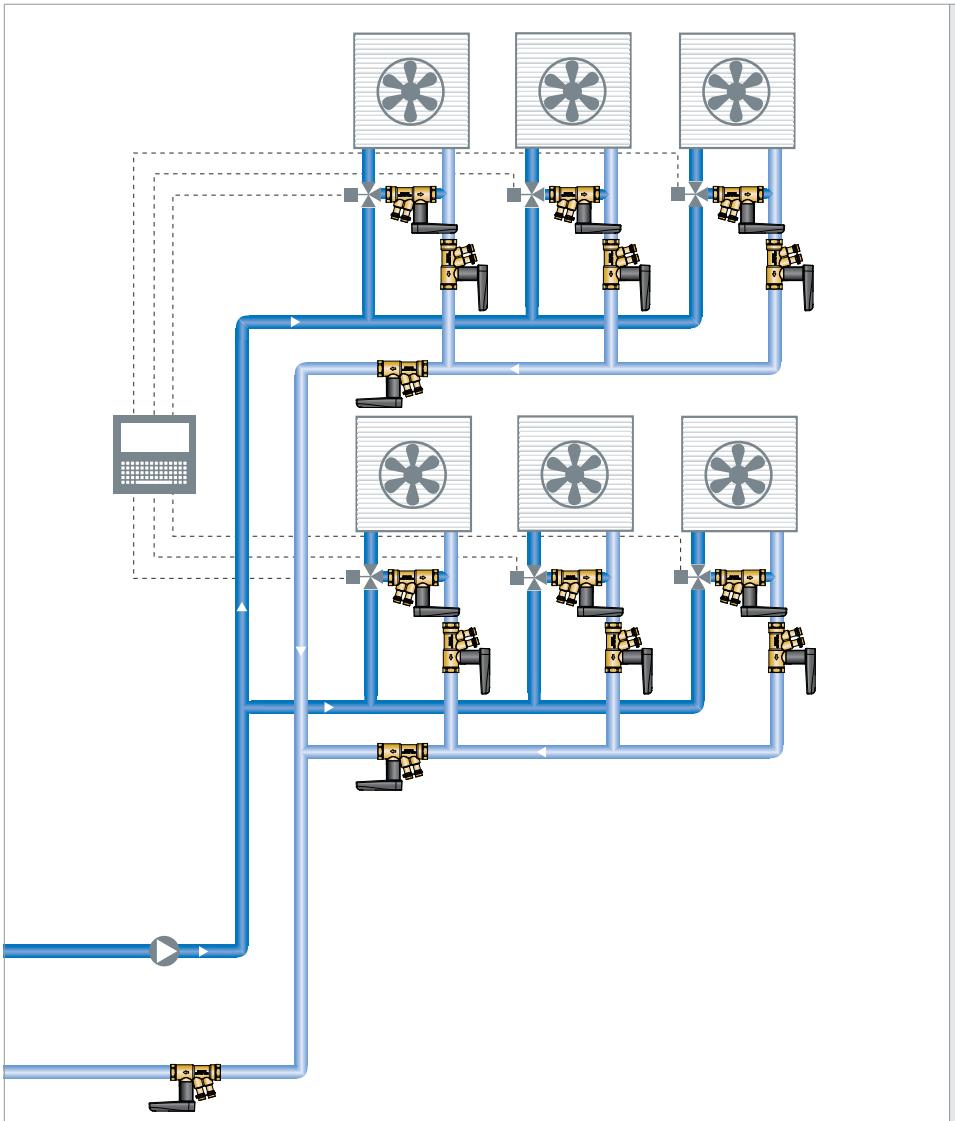
Application 2 - Variable flow system

In variable flow systems, with two-way motorized valves, the Ballorex Venturi provides hydronic balance and ensures that all units receive sufficient flow at maximum load (sizing) conditions.

Actuators installed on two-way motorized valves are connected to a room thermostat or the BMS system to control the flow in each unit (such as a fan coil, air heater, radiant panel, and other).

By opening or closing the two-way valves in reference to the air temperature, the required indoor thermal comfort is achieved.

3.1 Applications



Application 3 - Constant flow system

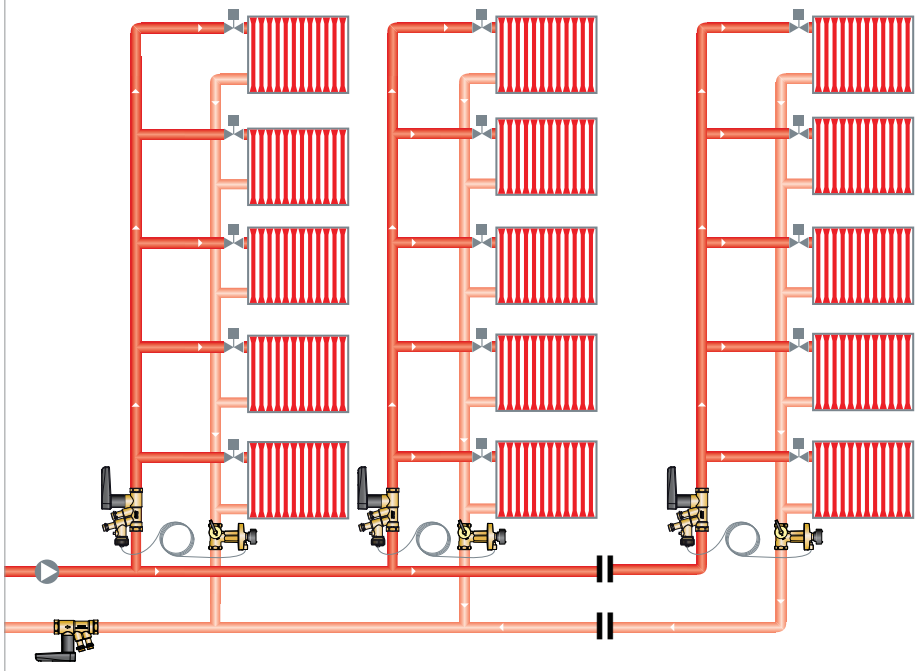
In constant flow systems, with three-way motorized valves, the Ballorex Venturi provides hydronic balance and ensures that all units receive sufficient flow in all load conditions.

The Ballorex Venturi ensures the same pressure loss in the branch with the terminal unit regardless of the three-way valve position.

Actuators installed on three-way motorized valves are connected to a room thermostat or the BMS system to control the flow in each unit (such as a fan coil, air heater, radiant panel, and other).

By opening or closing the three-way valves in reference to the air temperature, the required indoor thermal comfort is achieved.

Ballorex® Venturi
3.1 Applications

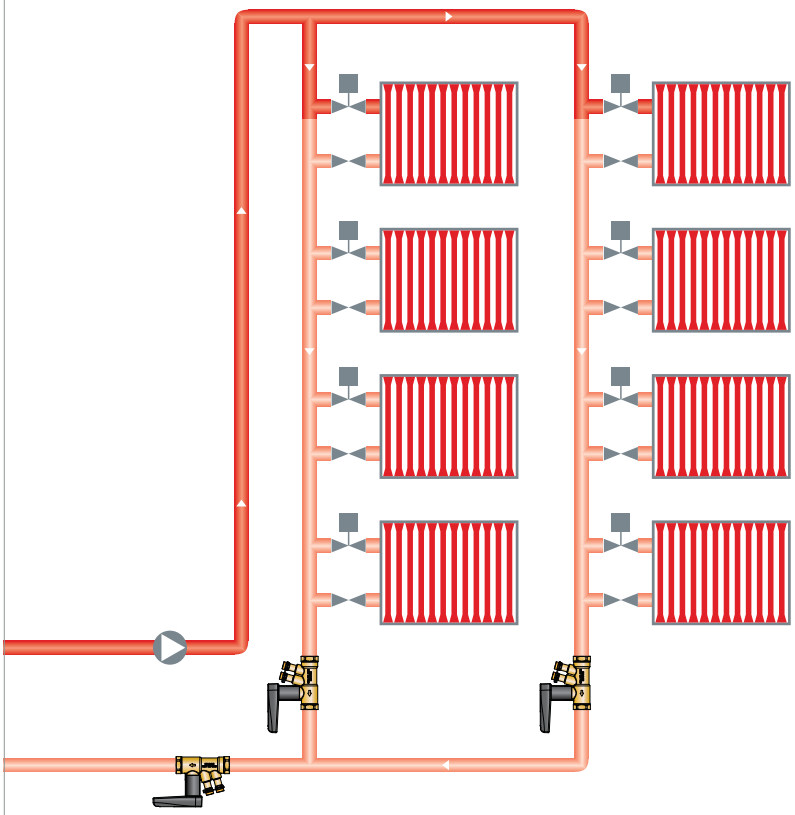


Application 4 - Central heating system with differential pressure control valves

The Ballorex Venturi and the Ballorex Delta differential pressure control valve installed in a central heating system branch with radiators or other terminal units, ensure that pressure fluctuations from the remaining part of the system are avoided within the branch.
Stable pressure and constant flow conditions are thereby ensured.
Noise nuisance caused by high differential pressure across radiator thermostats, two-way control valves and other components in the system are at the same time eliminated.

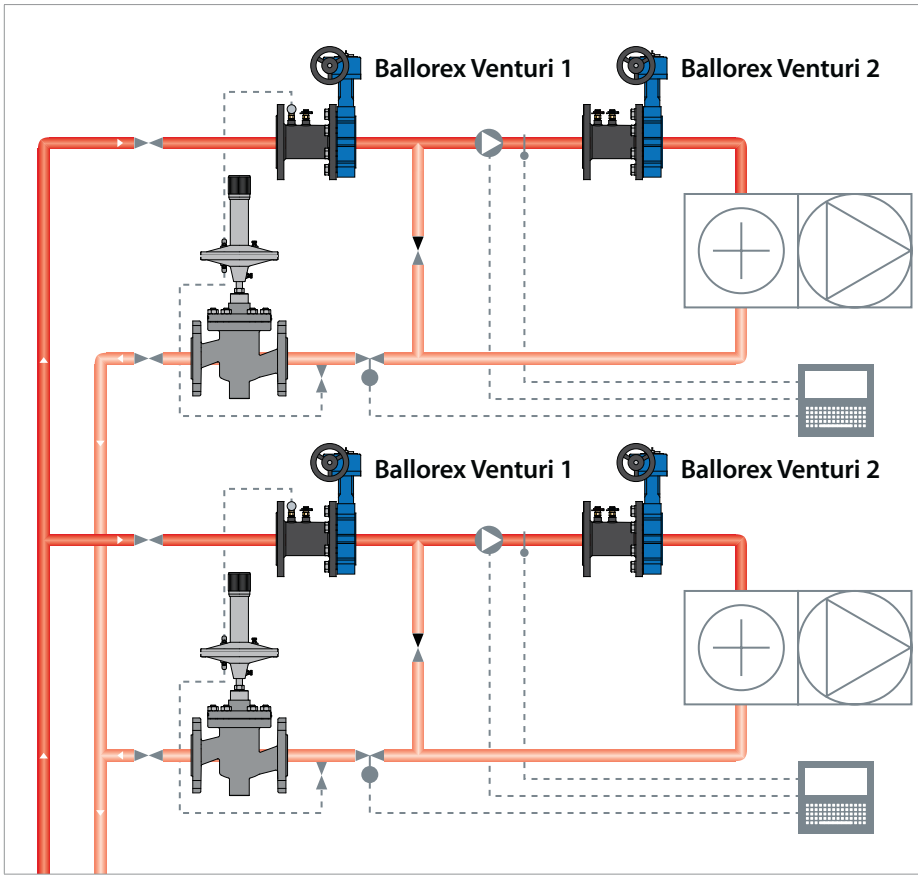
The pressure loss across the Ballorex Venturi needs to be taken into account when setting the Ballorex Delta differential pressure control valve.

Commissioning a system with Ballorex Venturi in combination with Ballorex Delta is quick and cost efficient.



Application 5 - One-pipe heating system

Ballorex Venturi valves installed in a one-pipe heating system ensure desired flow distribution through all branches and sections.



Application 6 - System with air handling units

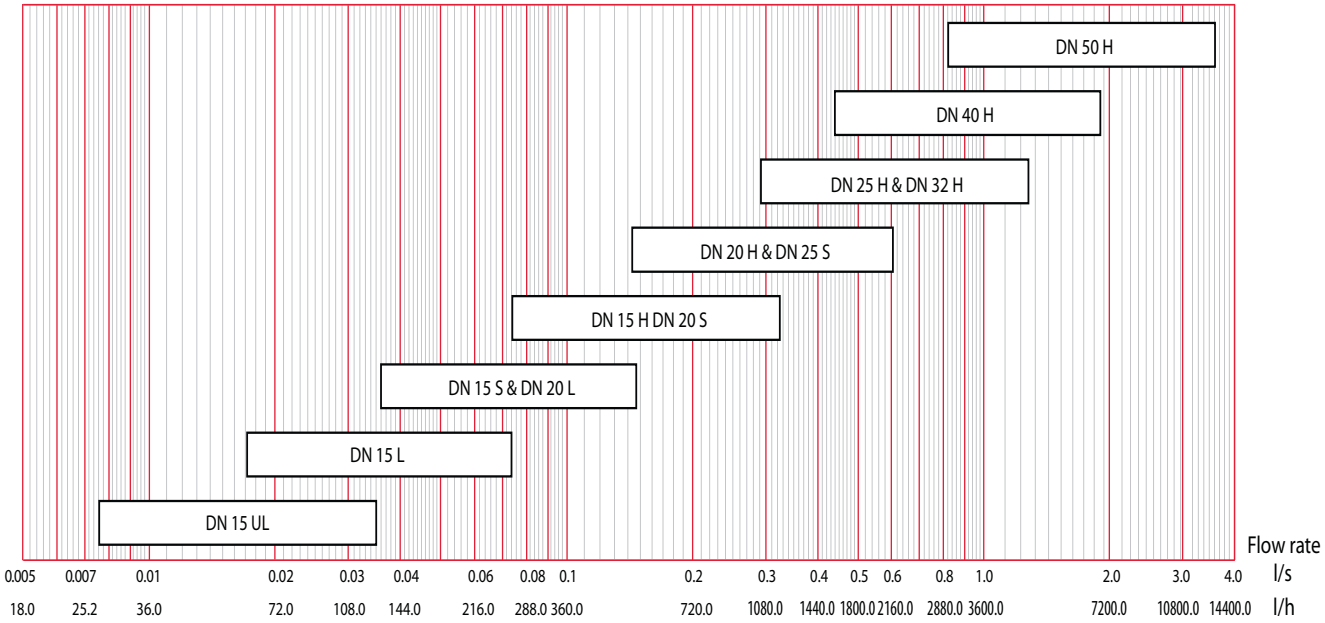
The combination of Ballorex Venturi valves installed in a system with air handling units is used for precise flow control.

Ballorex Venturi 1 with Combi Drain Maxi in combination with Ballorex Delta limits maximum (sizing) flow.

Ballorex Venturi 2 helps to tune required temperature difference between the supply and the return lines of the air handling unit.

Ballorex® Venturi
3.1 Product data sheet

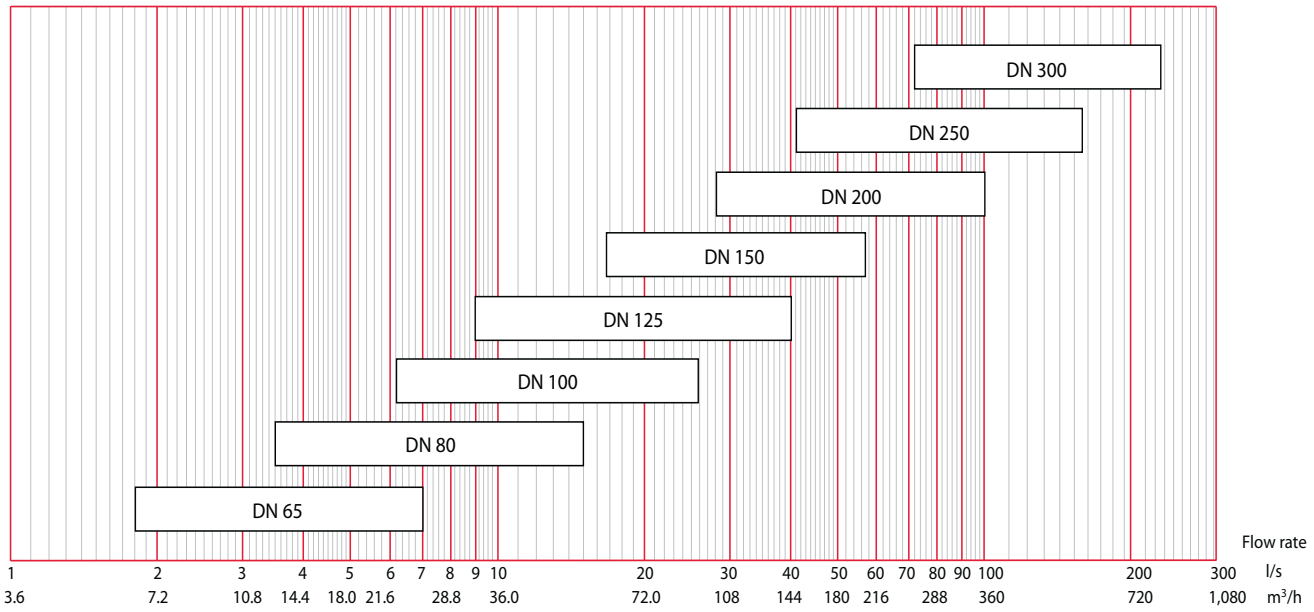
Product finder



Flow range		Kvs m^3/h	Dimension	Section
l/s	l/h			
0.0076-0.035	27-126	0.23	DN 15UL	3.1 - 22
0.0172-0.074	62-266	0.63	DN 15L	3.1 - 22
0.036-0.148	130-530	1.62	DN 15S	3.1 - 23
0.074-0.325	267-1170	2.49	DN 15H	3.1 - 23
0.036-0.148	130-530	1.43	DN 20L	3.1 - 30
0.074-0.325	267-1170	2.82	DN 20S	3.1 - 30
0.142-0.603	511-2170	5.72	DN 20H	3.1 - 31
0.142-0.603	511-2170	7.54	DN 25S	3.1 - 38
0.29-1.25	1040-4500	12.1	DN 25H	3.1 - 38
0.29-1.25	1040-4500	13.2	DN 32H	3.1 - 44
0.44-1.88	1580-6760	22.0	DN 40H	3.1 - 50
0.82-3.51	2950-12630	36.0	DN 50H	3.1 - 56

Ballorex® Venturi
3.1 Product data sheet

Product finder



Flow range		Kvs m³/h	Dimension	Section
l/s	m³/h			
1.80-7.00	6.48-25.2	78.2	DN 65	3.1 - 59
3.50-15.0	12.6-54.0	169	DN 80	3.1 - 61
6.20-26.0	22.3-93.6	360	DN 100	3.1 - 63
9.00-40.0	32.4-144	502	DN 125	3.1 - 65
16.8-57.0	60.5-205	1010	DN 150	3.1 - 67
28.0-100	101-360	1910	DN 200	3.1 - 69
41.0-157	148-565	2540	DN 250	3.1 - 71
72.0-226	259-814	4850	DN 300	3.1 - 73
126-304	454-1093	*	DN 350	-
162-394	583-1420	*	DN 400	-
201-493	723-1780	*	DN 450	-
242-602	873-2170	*	DN 500	-
333-846	1200-3040	*	DN 600	-

* Valves provided upon request

Ballorex® Venturi
3.1 Specifications

Ballorex Venturi DN 15 - 50 general specifications

1. Balancing valve with Venturi nozzle DN 15 - 50

   1.1. The Contractor must install static balancing valves with Venturi nozzle where indicated in drawings.

2. Valve Body

   2.1. The valve body must be made of hot stamped DR brass CW602N CuZn36Pb2As.

   2.2. The pressure rating must be no less than PN25.

   2.3. The valve must have regulation, isolation and flow measurement in one single unit.

   2.4. A flow arrow must be indicated in valve body.

   2.5. The regulation handle and the measuring points must be positioned on the same side of the body of the valve.

   2.6. Testing through the measuring points must be possible in all directions (360°).

3. Flow Regulation

   3.1. The flow regulation must be externally adjustable using an Allen key.

   3.2. The regulation settings must remain unchanged when the isolation (open/close function) is re-opened.

   3.3. Flow measurement must be done across a Venturi nozzle.

   3.4. Flow measurement must be possible during flow regulation.

   3.5. Flow accuracy tolerance must be within ±3% across the entire measurement range.

   3.6. The valve must have no requirements for up- or downstream straight piping.

4. Functions

   4.1. The valve must have a visible 1/4-turn open/close function.

   4.2. The valve must have 100 different setting positions.

   4.3. Kvm value and valve dimensions must be clearly marked on the handle.

Ballorex Venturi DN 65 - 600 general specifications

1. Balancing valve with Venturi orifice DN 65 - 600

   1.1. The Contractor must install static balancing valves with Venturi nozzle where indicated in drawings.

2. Valve Body

   2.1. The valve body must be made of carbon steel St. 37 and cast iron, fully lugged ASTM A 126 KL.B.

   2.2. The pressure rating must be no less than PN16 at 105°C (or 120°C).

   2.3. The valve must have regulation, isolation and flow measurement in one single unit.

   2.4. A flow arrow must be indicated in valve body.

3. Flow Regulation

   3.1. Flow regulation must be done using a butterfly valve with gearbox and memory stop.

   3.2. Flow measurement must be done across a Venturi nozzle.

   3.3. Flow measurement must be possible during flow regulation.

   3.4. Flow accuracy tolerance must be within ±3% across the entire measurement range.