OPTIMA Compact Ultra · DN50-DN125
Pressure Independent Balancing & Control Valve

Application

The OPTIMA Compact Ultra pressure independent balancing & control valve (PIBCV) is used in heating and cooling systems in applications with Air Handling Units, Heat Exhangers or Mixing Circuits.

OPTIMA Compact Ultra is a supplement to the standard OPTIMA Compact with a slimmer design and lighter housing for easier handling and installation.

The reduced size makes mounting easier in confined spaces, and reduces the need for flange reducers in the piping system, as the valve and pipe sizes can be the same.

OPTIMA Compact Ultra provides the same hydraulic control and modulating advantages as the standard OPTIMA Compact series.

Benefits

Design
- Less time to define the necessary equipment for a hydraulic balanced system (only flow data is required)
- No need to calculate valve authority - always one
- Flexibility if the system is modified after the initial installation

Installation
- Lower weight and smaller outer dimensions makes installation easier
- More flow variants to match the required flows in the application
- No further regulating valves required in the distribution pipework when OPTIMA Compact Ultra is installed at the units
- Total number of valves minimized due to the 3-in-1 design
- Minimized commissioning time due to automatic balancing of the system
- No minimum straight pipe lengths required before or after the valve

Operation
- High comfort for end-users due to high precision temperature control
- Longer life due to less movements of the actuator

Features

- The presetting function has no impact on the stroke; Full stroke modulation at all times, regardless of the preset flow
- Regulation characteristic remains unchanged regardless of preset flow
- The constant differential pressure across the modulating control component guarantees 100% authority
- Automatic balancing eliminates overflows, regardless of fluctuating pressure conditions in the system
- Motoric actuator 0-10 V and 3 point control
- Differential pressure operating range up to 800 kPa
- Minimal required differential pressure due to advanced design of the valve
- Small dimensions due to compact housing
- Higher presetting precision due to stepless analogue scale
- Rangeabililty > 100:1

OPTIMA Compact Ultra · DN50-DN125
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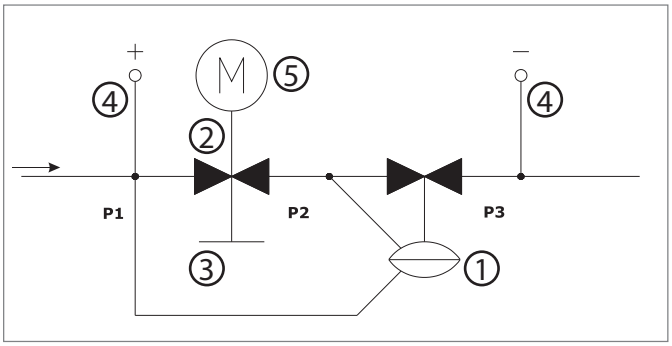


Design

The design of OPTIMA Compact Ultra combines high performance and a compact design.
The main components of the valve are:

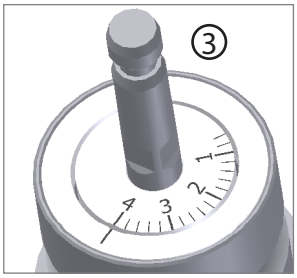
① Differential pressure control

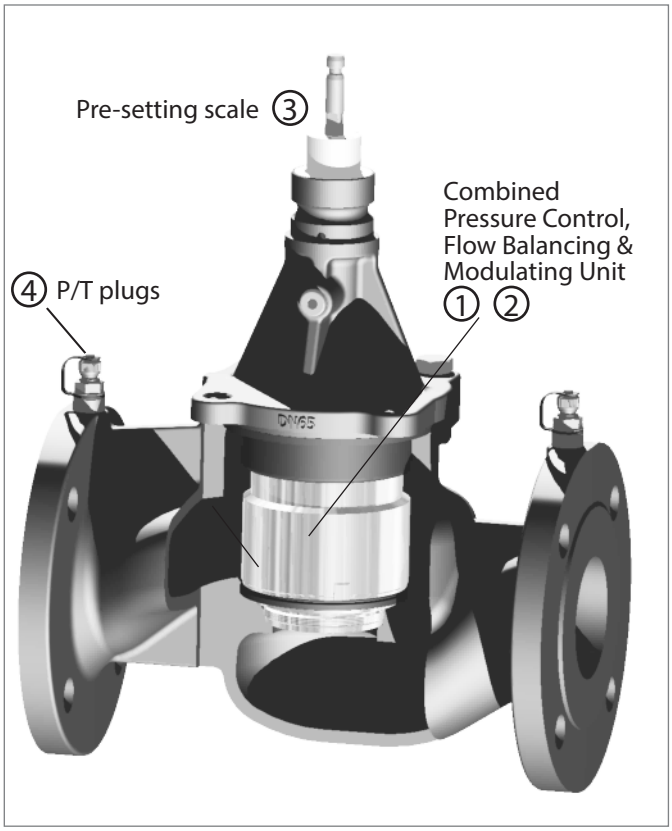
② Modulating control component

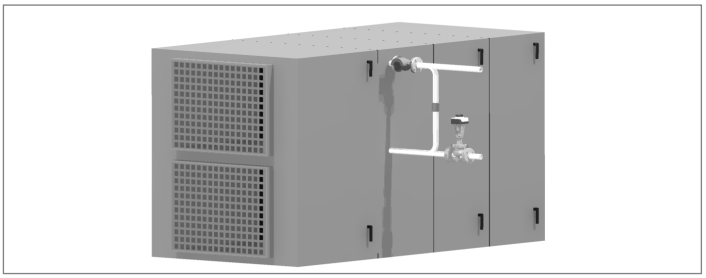
③ Presetting scale

④ P/T Plugs

⑤ Actuator







Function

OPTIMA Compact Ultra can be flushed and commissioned before the actuator is installed.

The presetting of the dial is user-friendly requiring only a simple flow vs. presetting graph.

Once the flow is set, the actuator can be mounted and the valve ready to operate.

For lowest energy consumption, check the differential pressure at the index valve to set the pump at minimum speed.

Operating Pressure

The OPTIMA Compact Ultra (DN50 to DN125) can operate to a maximum differential pressure of 800 kPa (8 bar)

Close Off Pressure

The OPTIMA Compact Ultra (DN50-DN125) is capable of closing against a differential pressure of 800 kPa to EN 1349 Class IV.

Manual Operation

Actuators
The actuators can be operated by the manual handle. **(5)**

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Operation principle

The innovative design of OPTIMA Compact Ultra features a modulating control component that retains 100% authority at all times.

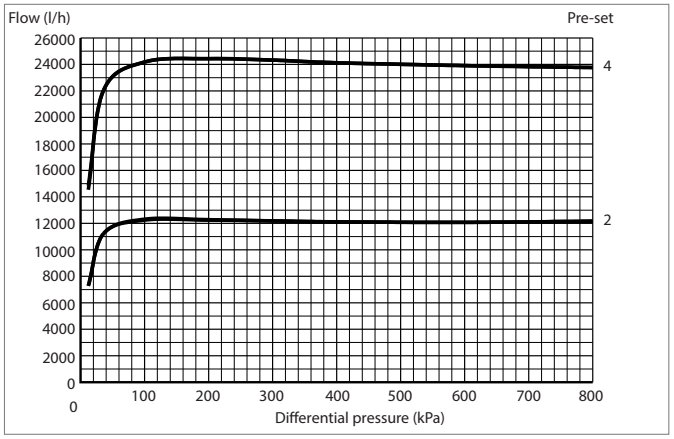
With the OPTIMA Compact Ultra there are two independent movements for the presetting and the modulating function. During presetting, the inlet area moves radially without interfering with the length of the stroke. During modulating, the inlet area moves axial taking advantage of the full stroke.

Whilst the control component provides proportional modulation irrespective of the preset flow, the automatic balancing guarantees that the flow will never exceed the maximum preset flow.

Regardless of pressure fluctuations in the system, the maximum flow is kept constant up to a maximum differential pressure of 800 kPa.

Flow rate vs. Differential Pressure

Preset flow: 24000 l/h, 12000 l/h



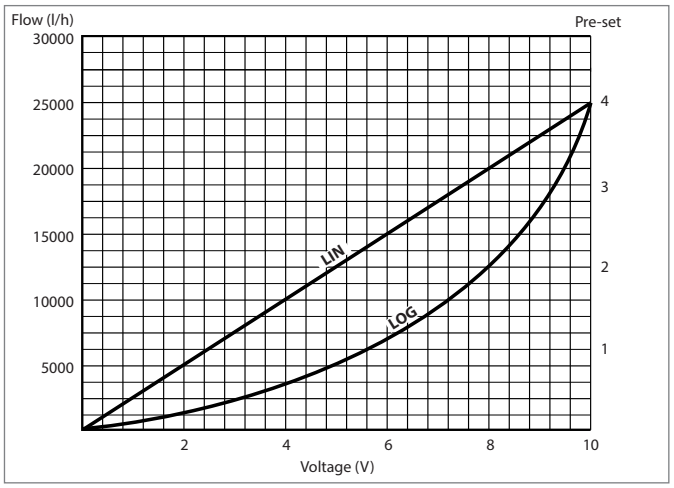
Flow rate vs. Voltage

Preset flow: 25000 l/h

Valve Characteristic:

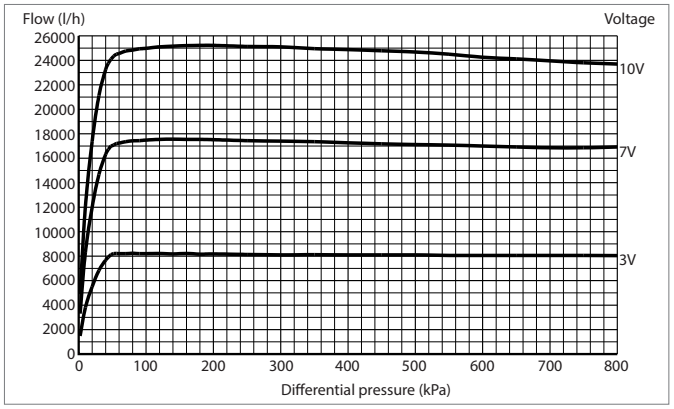
OPTIMA Compact Ultra valve design has a linear control characteristic. The control characteristic is independent of the flow setting and available pressure.

Because of the independent characteristic the actuator setting can be used to change the valve response from linear to logarithmic (Equal Percentage).



Flow rate vs. Differential Pressure

Voltage: 10V, 7V, 3V
(Liniar actuator characteristic)

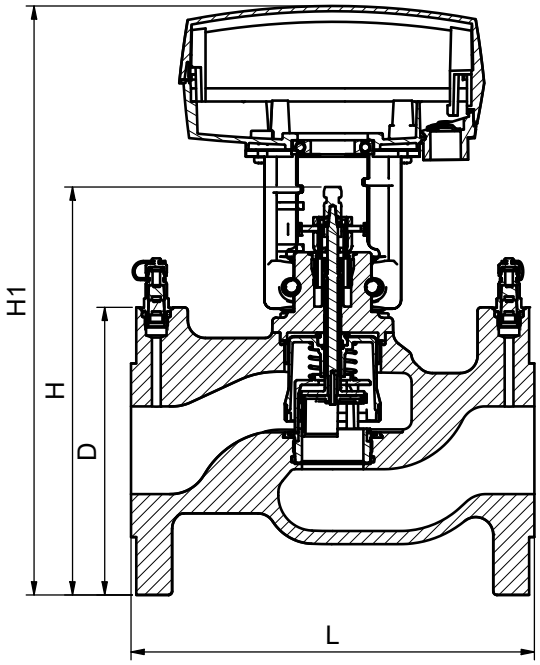


OPTIMA Compact Ultra · DN50-DN125
Pressure Independent Balancing & Control Valve

Technical data DN50

Valve

Valve housing:	Ductile Iron GJS-400
Valve cover:	DZR brass CW602N
DP controller:	PPS 40% glass
Spring:	Stainless steel
Diaphragm:	HNBR
O-rings:	EPDM
Pressure class:	PN16/25
Stroke:	15 mm
Flange connections:	ISO 7005-2 / EN 1092-2
Max. differential pressure:	800 kPa
Medium temperature range:	0°C to 120°C
With stem heater mounted:	-10°C to 120°C



The pipe system shall be properly ventilated to avoid risk of air pockets. Glycolic mixtures up to 50% are applicable (both ethylene and propylene). Frese A/S can accept no responsibility if another actuator is used instead of the Frese actuator. Recommendation: Water treatment to VDI 2035.

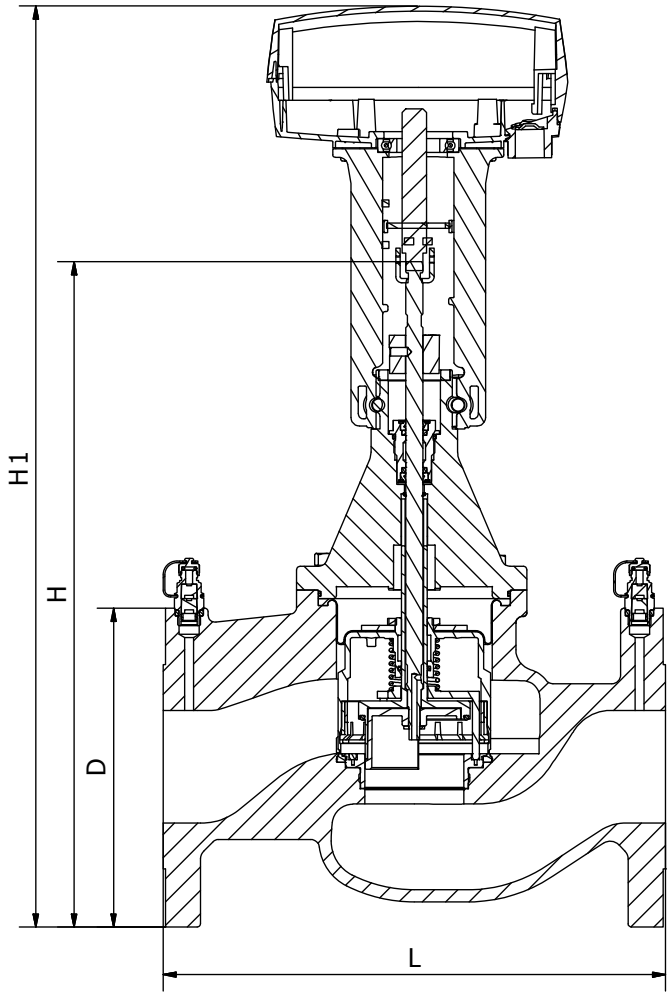
		Dimension & Weight DN50
Dim.		DN50
Dimensions [mm]	L	230
	H	233
	H1	340
	D	165
Weight [kg]	PN16	10.7
	PN25	10.7

OPTIMA Compact Ultra · DN50-DN125
Pressure Independent Balancing & Control Valve

Technical data DN65 - DN100

Valve

Valve housing & cover:	Ductile Iron GJS-400
DP controller:	Stainless steel
Spring:	Stainless steel
Diaphragm:	Reinforced EPDM
O-rings:	EPDM
Pressure class:	PN16/25
Stroke:	20 mm
Flange connections:	ISO 7005-2 / EN 1092-2
Max. differential pressure:	800 kPa
Medium temperature range:	0°C to 120°C
With stem heater mounted:	-10°C to 120°C



The pipe system shall be properly ventilated to avoid risk of air pockets. Glycolic mixtures up to 50% are applicable (both ethylene and propylene). Frese A/S can accept no responsibility if another actuator is used instead of the Frese actuator. Recommendation: Water treatment to VDI 2035.

Dimension & Weight DN65 - DN100

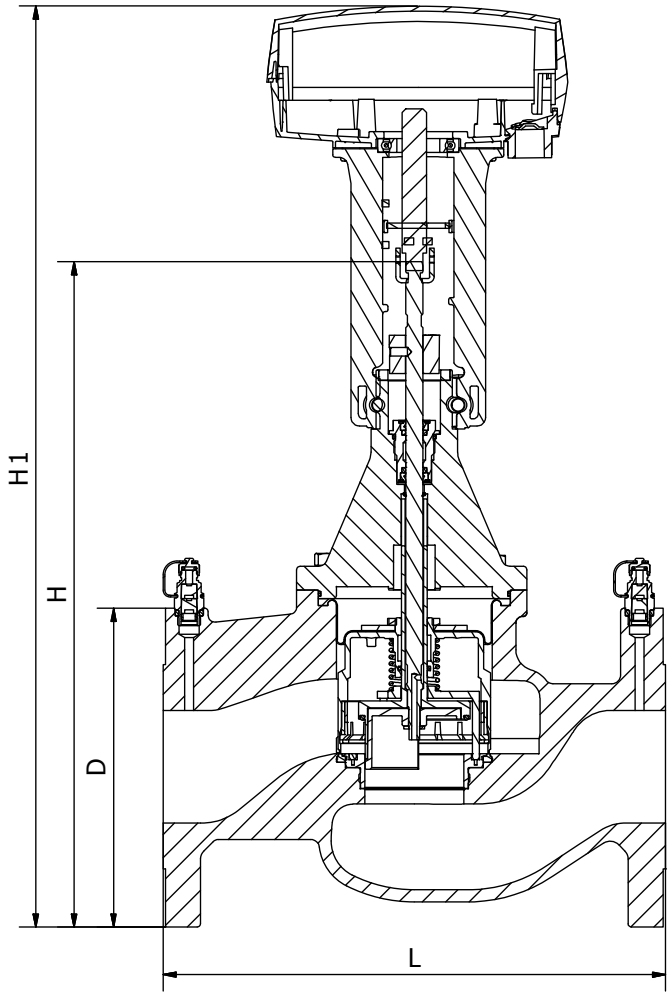
Dim.		DN65	DN80	DN100
Dimensions [mm]	L	290	310	350
	H	367	384	413
	H1	508	525	554
	D	185	200	235
Weight [kg]	PN16	17.2	23.6	41.2
	PN25	17.2	23.6	41.2

OPTIMA Compact Ultra · DN50-DN125
Pressure Independent Balancing & Control Valve

Technical data DN125

Valve

Valve housing & cover:	Ductile Iron GJS-400
DP controller:	Stainless steel
Spring:	Stainless steel
Diaphragm:	Reinforced EPDM
O-rings:	EPDM
Pressure class:	PN16/25
Stroke:	40 mm
Flange connections:	ISO 7005-2 / EN 1092-2
Max. differential pressure:	800 kPa
Medium temperature range:	0°C to 120°C
With stem heater mounted:	-10°C to 120°C



The pipe system shall be properly ventilated to avoid risk of air pockets. Glycolic mixtures up to 50% are applicable (both ethylene and propylene). Frese A/S can accept no responsibility if another actuator is used instead of the Frese actuator. Recommendation: Water treatment to VDI 2035.

		Dimension & Weight DN125
Dim.		DN125
Dimensions [mm]	L	400
	H	566
	H1	700
	D	270
Weight [kg]	PN16	69.1
	PN25	69.1

OPTIMA Compact Ultra · DN50-DN125
Pressure Independent Balancing & Control Valve

Technical data · Motoric, Modulating Actuators DN50-DN125

Characteristics: Motoric, modulating
Protection class: IP 54 to EN 60529
Frequency AC: 50/60 Hz
Supply voltage: 24V AC/DC
Control signal: 0-10V DC or 3 position
Actuating force: DN50: 400 N | DN65-DN125: 800 N
Stroke max: DN50: 32 mm | DN65-DN125: 52 mm
Running time 0-10V: DN50: 60 s | DN65-DN125: 30 s
Running time 3-pos.: 60 s or 300 s, selectable
Ambient operating conditions: -10°C to 50°C
Manual operation: Manual handle
Cable: Not included
Weight: 1.80 kg

Types and operation data

Type	Valve Dimension	Function	Supply voltage	Power Consumtion
Type-01 [53-1296]	DN50	0-10 V / 3-pos	24 V AC +/-25% 24V DC +/- 10%	6 VA (*30VA)
Type-02 [53-1297]	DN65-DN125	0-10 V / 3-pos	24 V AC +/-25% 24V DC +/- 10%	15 VA (*50VA)

*) Max consumption - for transformer sizing

Product programme · OPTIMA Compact Ultra including Motoric Modulating Actuator

Dim.	Type	Flow m^3/h	PN16	PN25
DN50	High Flow	1.4 - 11.5	53-5110-01	53-5130-01
DN65	Low Flow	3.0 - 16.0	53-5101-02	53-5121-02
	High Flow	4.2 - 24.0	53-5111-02	53-5131-02
DN80	Low Flow	4.4 - 25.0	53-5102-02	53-5122-02
	High Flow	6.0 - 35.0	53-5112-02	53-5132-02
DN100	Low Flow	5.3 - 34.0	53-5103-02	53-5123-02
	High Flow	7.0 - 43.0	53-5113-02	53-5133-02
DN125	Low Flow	12.1-68.0	53-5104-02	53-5124-02
	High Flow	14.8-90.0	53-5114-02	53-5134-02

Accessories

Frese no.	Product	Type
58-8951	Stem heater	24 VAC, 50 W

OPTIMA Compact Ultra · DN50-DN125
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Technical data · Spring Return Actuators DN50-DN125

Characteristics: Motoric, modulating, spring return
Protection class: IP 54 to EN 60529
Frequency: 50/60 Hz
Control signal: 0-10V DC or 3-point
Control signal impedance: Min. 100 kOhm (0-10V)
Actuating force: 600N / 900 N
Stroke max: 40 mm
Running time 0-10 V: 20 s
Running time 3-pos.: 60 s or 300 s, selectable
Ambient operating conditions: -10°C to 50°C
Manual operation: Hexagonal key (Included)
Cable: Not included
Weight: 2.80 kg

Types and Operation Data

Type [Item no.]	Valve Dimension	Function	Supply voltage	Power Consumtion
Type-04 [53-1950]	DN50	0..10 V / 3-point Stem up	24V AC +/-20% 50-60 Hz 24V DC +/-20%	30 VA (*50 VA)
Type-05 [53-1951]	DN50	0..10 V / 3-point Stem down	24V AC +/-20% 50-60 Hz 24V DC +/-20%	30 VA (*50 VA)
Type-06 [53-1952]	DN65-DN125	0..10 V / 3-point Stem up	24V AC +/-20% 50-60 Hz 24V DC +/-20%	30 VA (*50 VA)
Type-07 [53-1953]	DN65-DN125	0..10 V / 3-point Stem down	24V AC +/-20% 50-60 Hz 24V DC +/-20%	30 VA (*50 VA)

*) Max consumption - for transformer sizing

Product programme · OPTIMA Compact Ultra including Spring Return Actuator

Dim.	Type	Flow m³/h	Stroke	PN16	PN25
DN50	High Flow	1.4 - 11.5	15 Up	53-5110-04	53-5130-04
			15 Down	53-5110-05	53-5130-05
DN65	Low Flow	3.0 - 16.0	20 Up	53-5101-06	53-5121-06
	High Flow	4.2 - 24.0		53-5111-06	53-5131-06
	Low Flow	3.0 - 16.0	20 Down	53-5101-07	53-5121-07
	High Flow	4.2 - 24.0		53-5111-07	53-5131-07
DN80	Low Flow	4.4 - 25.0	20 Up	53-5102-06	53-5122-06
	High Flow	6.0 - 35.0		53-5112-06	53-5132-06
	Low Flow	4.4 - 25.0	20 Down	53-5102-07	53-5122-07
	High Flow	6.0 - 35.0		53-5112-07	53-5132-07
DN100	Low Flow	5.3 - 34.0	20 Up	53-5103-06	53-5123-06
	High Flow	7.0 - 43.0		53-5113-06	53-5133-06
	Low Flow	5.3 - 34.0	20 Down	53-5103-07	53-5123-07
	High Flow	7.0 - 43.0		53-5113-07	53-5133-07
DN125	Low Flow	12.1-68.0	40 Up	53-5104-06	53-5124-06
	High Flow	14.8-90.0		53-5114-06	53-5134-06
	Low Flow	12.1-68.0	40 Down	53-5104-07	53-5124-07
	High Flow	14.8-90.0		53-5114-07	53-5134-07

OPTIMA Compact Ultra · DN50-DN125
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Setting and Flow

Dim.	DN50 HF			
Pre-set	Flow m³/h	Flow l/s	Flow gpm	Min.Δp kPa
0.6	1.40	0.389	6.16	10
0.8	1.71	0.474	7.52	11
1.0	2.05	0.569	9.03	11
1.2	2.42	0.673	10.7	11
1.4	2.82	0.783	12.4	11
1.6	3.24	0.900	14.3	12
1.8	3.68	1.02	16.2	12
2.0	4.15	1.15	18.3	13
2.2	4.64	1.29	20.5	14
2.4	5.17	1.44	22.8	16
2.6	5.73	1.59	25.2	17
2.8	6.34	1.76	27.9	20
3.0	7.00	1.94	30.8	22
3.2	7.72	2.15	34.0	25
3.4	8.52	2.37	37.5	28
3.6	9.40	2.61	41.4	30
3.8	10.4	2.89	45.8	33
4.0	11.5	3.19	50.6	36

Dim.	DN65 LF				DN65 HF			
Pre-set	Flow m³/h	Flow l/s	Flow gpm	Min.Δp kPa	Flow m³/h	Flow l/s	Flow gpm	Min.Δp kPa
0.6	3.00	0.833	13.2	10	4.20	1.17	18.5	19
0.8	3.80	1.06	16.7	10	5.48	1.52	24.1	19
1.0	4.50	1.25	19.8	10	6.60	1.83	29.1	19
1.2	5.13	1.43	22.6	10	7.60	2.11	33.5	19
1.4	5.73	1.59	25.2	10	8.53	2.37	37.6	19
1.6	6.31	1.75	27.8	11	9.42	2.62	41.5	20
1.8	6.89	1.92	30.4	11	10.3	2.86	45.4	20
2.0	7.50	2.08	33.0	11	11.2	3.11	49.3	20
2.2	8.14	2.26	35.8	11	12.1	3.37	53.4	20
2.4	8.83	2.45	38.9	11	13.1	3.65	57.8	21
2.6	9.56	2.66	42.1	11	14.2	3.95	62.5	22
2.8	10.4	2.88	45.6	12	15.4	4.27	67.6	23
3.0	11.2	3.11	49.3	12	16.6	4.61	73.1	24
3.2	12.1	3.36	53.3	13	17.9	4.98	78.9	26
3.4	13.0	3.62	57.4	13	19.3	5.37	85.2	29
3.6	14.0	3.89	61.7	15	20.8	5.79	91.7	32
3.8	15.0	4.17	66.1	17	22.4	6.22	98.6	37
4.0	16.0	4.44	70.4	19	24.0	6.67	106	43

Dim.	DN80 LF				DN80 HF			
Pre-set	Flow m³/h	Flow l/s	Flow gpm	Min.Δp kPa	Flow m³/h	Flow l/s	Flow gpm	Min.Δp kPa
0.6	4.40	1.22	19.4	15	6.00	1.67	26.4	27
0.8	5.53	1.54	24.4	15	7.61	2.11	33.5	27
1.0	6.60	1.83	29.1	15	9.10	2.53	40.1	27
1.2	7.61	2.12	33.5	15	10.5	2.92	46.3	27
1.4	8.60	2.39	37.8	16	11.9	3.30	52.3	27
1.6	9.56	2.66	42.1	17	13.2	3.68	58.3	27
1.8	10.5	2.92	46.3	17	14.6	4.06	64.3	27
2.0	11.5	3.19	50.6	18	16.0	4.44	70.4	27
2.2	12.5	3.47	55.1	19	17.4	4.85	76.8	27
2.4	13.6	3.77	59.7	19	19.0	5.27	83.5	28
2.6	14.7	4.07	64.6	19	20.6	5.72	90.6	29
2.8	15.8	4.40	69.7	20	22.3	6.19	98.1	30
3.0	17.1	4.75	75.3	20	24.1	6.69	106	32
3.2	18.5	5.13	81.2	20	26.0	7.23	115	35
3.4	19.9	5.53	87.7	21	28.1	7.80	124	38
3.6	21.5	5.97	94.6	22	30.3	8.41	133	42
3.8	23.2	6.44	102	23	32.6	9.05	143	48
4.0	25.0	6.94	110	25	35.0	9.72	154	55

OPTIMA Compact Ultra · DN50-DN125
Pressure Independent Balancing & Control Valve

Setting and Flow

Dim.	DN100 LF				DN100 HF			
Pre-set	Flow m³/h	Flow l/s	Flow gpm	Min.Δp kPa	Flow m³/h	Flow l/s	Flow gpm	Min.Δp kPa
0.6	5.30	1.47	23.3	13	7.00	1.94	30.8	20
0.8	6.86	1.90	30.2	15	9.08	2.52	40.0	20
1.0	8.30	2.31	36.5	16	11.0	3.06	48.4	21
1.2	9.66	2.68	42.5	17	12.8	3.56	56.4	21
1.4	11.0	3.05	48.3	17	14.5	4.04	64.0	22
1.6	12.2	3.40	53.9	18	16.2	4.51	71.5	22
1.8	13.5	3.75	59.5	18	17.9	4.97	78.8	22
2.0	14.8	4.11	65.2	18	19.6	5.44	86.3	22
2.2	16.1	4.48	71.0	18	21.3	5.93	94.0	22
2.4	17.5	4.87	77.2	18	23.2	6.43	102	22
2.6	19.0	5.29	83.8	19	25.1	6.97	110	22
2.8	20.6	5.74	90.9	19	27.1	7.53	119	22
3.0	22.4	6.22	98.6	20	29.3	8.14	129	22
3.2	24.3	6.75	107	21	31.6	8.79	139	23
3.4	26.4	7.34	116	22	34.2	9.49	150	24
3.6	28.7	7.97	126	23	36.9	10.3	162	26
3.8	31.2	8.68	138	24	39.8	11.1	175	29
4.0	34.0	9.44	150	25	43.0	11.9	189	33

Dim.	DN125 LF				DN125 HF			
Pre-set	Flow m³/h	Flow l/s	Flow gpm	Min.Δp kPa	Flow m³/h	Flow l/s	Flow gpm	Min.Δp kPa
0.6	12.1	3.36	53.3	15	14.8	4.11	65.2	22
0.8	15.3	4.24	67.2	18	18.9	5.25	83.2	22
1.0	18.1	5.03	79.7	20	22.6	6.28	99.5	22
1.2	20.7	5.75	91.1	21	26.0	7.22	114	22
1.4	23.1	6.42	102	22	29.1	8.09	128	22
1.6	25.4	7.07	112	22	32.2	8.93	142	22
1.8	27.7	7.70	122	22	35.1	9.75	155	22
2.0	30.0	8.33	132	22	38.1	10.6	168	22
2.2	32.4	8.99	143	22	41.2	11.4	181	22
2.4	34.9	9.69	154	22	44.5	12.4	196	22
2.6	37.6	10.5	166	23	48.2	13.4	212	23
2.8	40.6	11.3	179	24	52.2	14.5	230	24
3.0	44.0	12.2	194	25	56.7	15.7	250	25
3.2	47.8	13.3	210	27	61.8	17.2	272	27
3.4	52.0	14.4	229	28	67.6	18.8	298	30
3.6	56.7	15.8	250	30	74.1	20.6	326	33
3.8	62.0	17.2	273	33	81.6	22.7	359	38
4.0	68.0	18.9	299	35	90.0	25.0	396	44

OPTIMA Compact Ultra · DN50-DN125
Pressure Independent Balancing & Control Valve

Documentation formula

Valve ID (own choice)	Valve type	Dimension	Pre-setting	Verified Δp [kPa]	Min. Δp (see flow rate graph) [kPa]	Flow

Pump type	Regulation mode	Set point
Installation		
Signature	Date	

Text for technical specifications

The length of the modulating stroke shall be independent of flow setting. The valve shall have full stroke modulating control at all flow settings and the stroke should not be restricted by the flow setting position.

The modulation and flow setting shall be one combined unit with a linear modulating motion and a rotational flow setting motion.

The valve characterization shall not be changed at different flow settings.

The combined flow setting and modulating control unit shall be pressure independent.

The Pressure Independent Control Valve shall contain a combined flow setting, differential pressure control and modulating bonnet assembly.

The valve housing shall be GJS-400.

The valve shall have a spring made of stainless steel, a Diaphragm made of Reinforced EPDM and O-rings made of EPDM.

The valve shall have flange connections according to EN 1092.

The valve shall have a maximum operating differential pressure of 800 kPa (8 Bar).

The valve shall have an external adjustable analogue step less presetting scale from minimum to maximum flow.

P/T plugs shall be available.

The valve shall be capable of closing against a maximum differential pressure of 800 kPa (8 bar) with a leakage rate at maximum 0,01% of max rated volumetric flow and comply to EN1349 Class IV.

Pressure independent control valves must be tested in accordance with the BSRIA document BTS.1 'Test Method for Pressure Independent Control Valves' and manufacturers must be able to provide the test results upon request.

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