

# OPTIMA Compact

DN10-DN50

## Application

OPTIMA Compact pressure independent balancing & control valve (PIBCV) is used in heating and cooling systems in applications with Fan Coil Units, Chilled Beams or other terminal unit applications.

OPTIMA Compact provides modulating control with full authority regardless of any fluctuations in the differential pressure of the system.

OPTIMA Compact combines an externally adjustable automatic balancing valve, a differential pressure control valve and a full authority modulating control valve.

OPTIMA Compact makes it simple to achieve 100% control of the water flow in the building, while creating high comfort and energy savings at the same time.

An additional benefit is that no balancing is required if further stages are added to the system, or if the dimensioned capacity is changed.

Energy saving due to optimal control, lower flow and pump pressure. Maximized  $\Delta T$  due to faster response and increased system stability.



## Benefits

### Design

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

### Installation

- No further regulating valves required in the distribution pipework when OPTIMA Compact is installed at terminals.
- 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

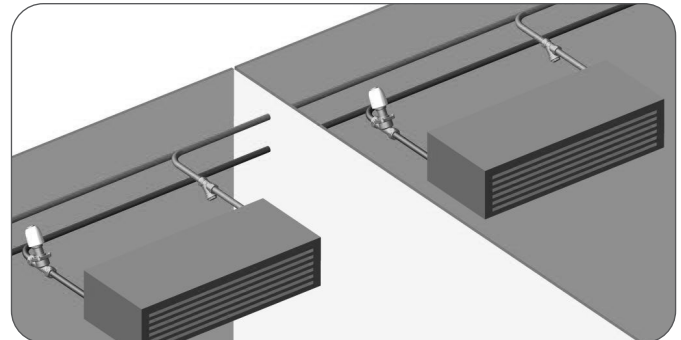
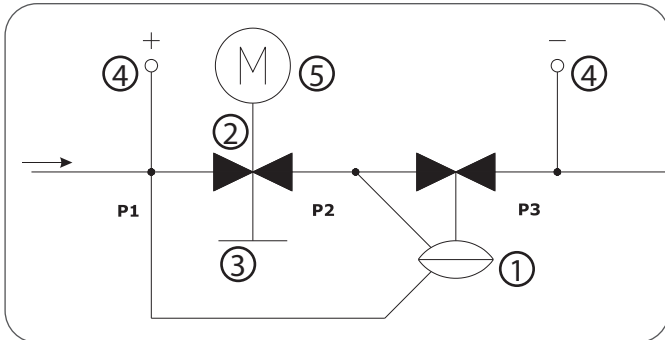
- High comfort for the end-users due to high precision temperature control
- Longer life due to less movements of the actuator

## Features

- The presetting function has no impact on the stroke; Full stroke modulation at all times, regardless the 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
- Compatible with thermic actuators On/Off or 0-10V, normally closed. Also compatible with motoric actuators 0-10V, (Linear or Logarithmic) or 3 point control
- Differential pressure operating range up to 800 kPa
- High flows with 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
- Rangeability > 100:1

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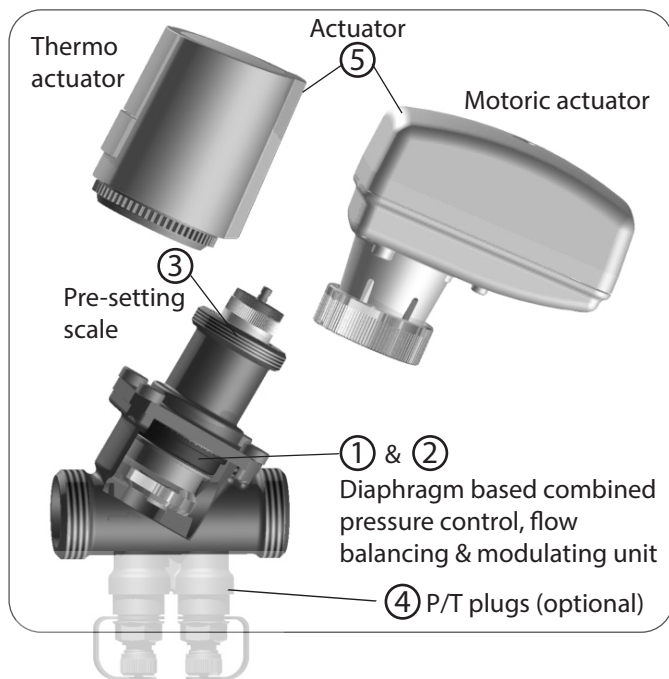


## Design

The design of OPTIMA Compact combines high performance with small size and compact construction.

The main components of the valve are:

- ① Differential pressure control
- ② Modulating control component
- ③ Presetting scale (not accessible when the actuator is mounted)
  - (a) Flow range: Low-High
  - (b) Stroke: 2.5 - 5.0 - 5.5mm
- ④ P/T Plugs
- ⑤ Actuator



## Function

OPTIMA Compact 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 table. 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 (DN10 to DN50) can operate to a maximum differential pressure of 800 kPa (8 bar)

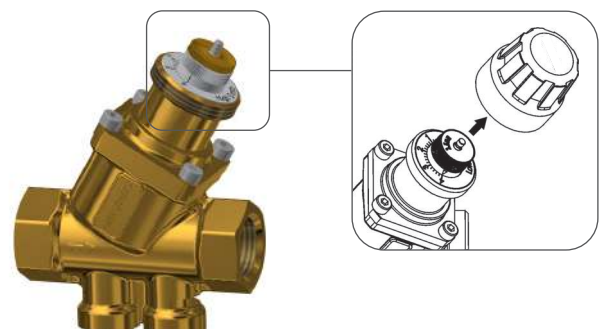
## Close Off Pressure

OPTIMA Compact is capable of closing against the following differential pressures to EN 1349 Class IV:

- DN10 to DN25: 600 kPa (6 bar) - based on 100N actuator force
- DN10 to DN25: 800 kPa (8 bar) - based on 160N actuator force
- DN25L to DN32: 800 kPa (8 bar) - based on 100N actuator force
- DN40 to DN50: 800 kPa (8 bar) - based on 400N actuator force

## Isolation

When fitted with the isolation cap (DN10 to DN32 only), the OPTIMA Compact is capable of isolation to 10 bar.



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## Operation principle

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

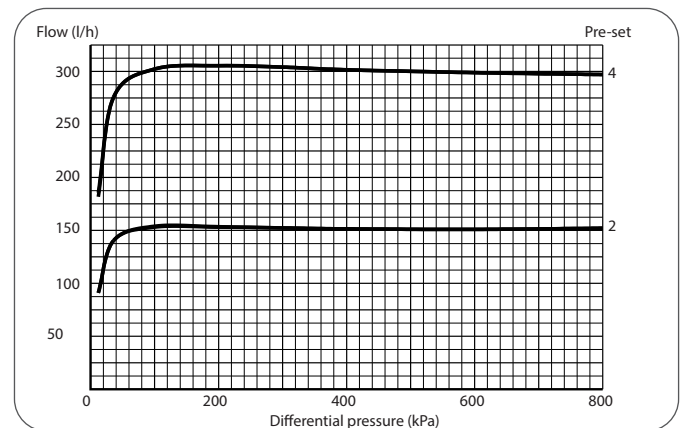
With the OPTIMA Compact there are two independent movements for the presetting and the modulating function. During presetting, the inlet area moves radially without interfering with the length of the stroke. During modulating, the inlet area moves axial taking advantage of the full stroke.

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.

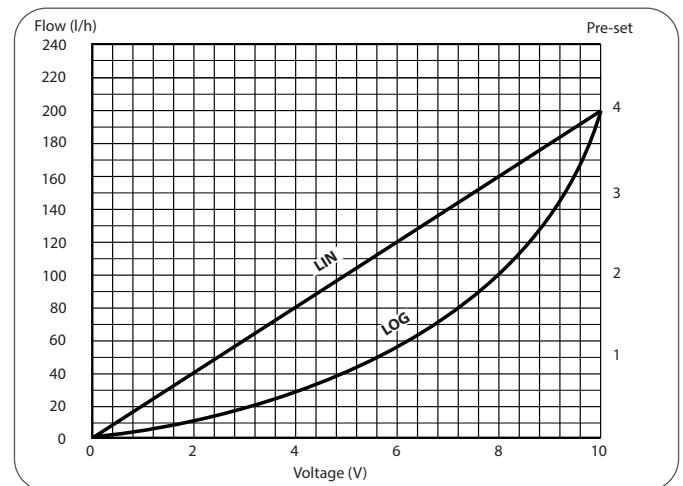
## Flow rate vs. Differential Pressure

**Preset flow: 300 l/h, 150 l/h**



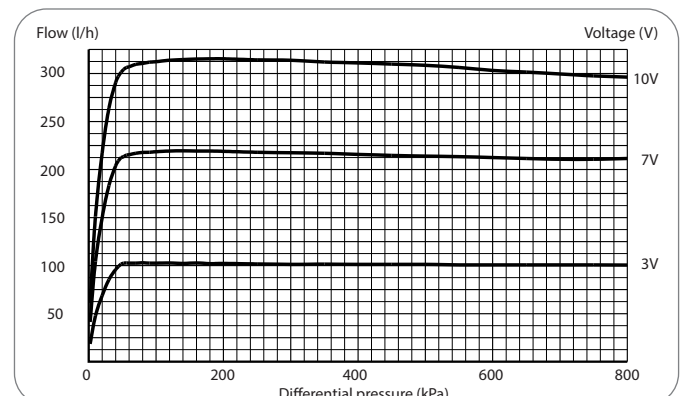
## Flow rate vs. Voltage

**Preset flow: 200 l/h**



## Flow rate vs. Differential Pressure

**Voltage: 10V, 7V, 3V**

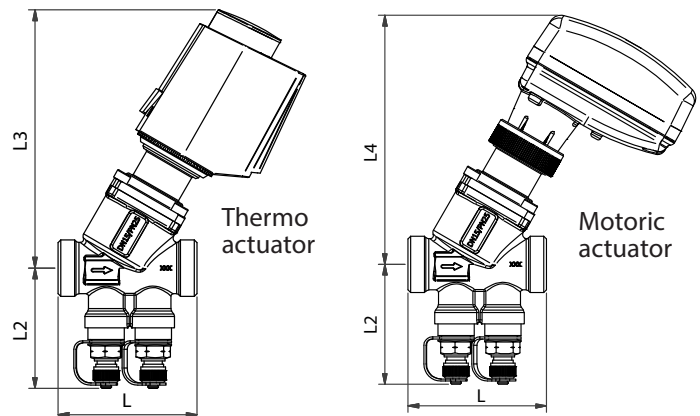
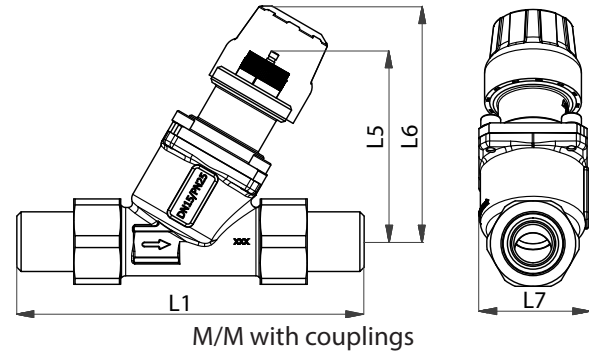


# OPTIMA Compact

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Technical data · DN10 - DN50

- Valve housing:**  
**DN10-15-20-25-32** DZR Brass CW602N  
**DN40-50** Ductile Iron GJS-400
- DP controller:** PPS 40% glass
- Spring:** Stainless steel
- Diaphragm:** HNBR
- O-rings:** EPDM
- Pressure class:** PN25
- Max. differential pressure:** 800 kPa
- Needles for DP measurement:** Max diameter,  $\varnothing 3.2$  mm  
Length, 25 - 40 mm
- Thread:** ISO 228
- Medium temperature range:** -10°C to 120°C
- When used at temperatures below 0°C, a stem heater must be used, to prevent ice on the spindle**



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

Dim.	DN10	DN15		DN20		DN25/DN25L		DN32		DN40	DN50	
Thread	M/M G 1/2	M/M G 3/4	F/F G 1/2	M/M G 1	F/F G 3/4	M/M G 1-1/4	F/F G 1	M/M G 1-1/2	F/F G 1-1/4	F/F G 1-1/2	F/F G 2	
Length	L	65	65	75	70	79	78/ <b>104</b>	83/ <b>100</b>	104	104	138	138
	L1	114	122	-	131	-	-	-	-	-	-	-
	L2	57	57	57	57	57	59/ <b>63</b>	59/ <b>63</b>	68	68	71	77
	L3	121	121	121	121	121	124/ <b>139</b>	124/ <b>139</b>	139	139	-	-
	L4	117	117	117	117	117	120/ <b>135</b>	120/ <b>135</b>	135	135	264	264
	L5	68	68	68	68	68	68/ <b>85</b>	68/ <b>85</b>	85	85	143	143
	L6	83	83	83	83	83	83/ <b>100</b>	83/ <b>100</b>	100	100	-	-
Weight kg	Basic	0.36	0.38	0.42	0.40	0.45	0.51/ <b>1.02</b>	0.55/ <b>1.04</b>	1.17	1.17	-	-
	P/T	0.45	0.47	0.52	0.50	0.54	0.62/ <b>1.12</b>	0.65/ <b>1.14</b>	1.27	1.27	3.28	3.71

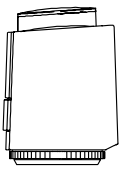
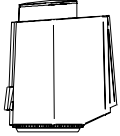
## Flow

Dim.	DN10 - DN15		DN15 - DN20		DN20	DN25	DN25L	DN32	DN40	DN50	
Type	Low		High		High	Low	High	-	-	-	
Stroke	mm	2.5	5.0	2.5	5.0	5.5	5.5	5.5	15	15	
Flow	l/h	30 - 200	65 - 370	100 - 575	220 - 1,330	300-1,800	280-1,800	600-3,609	550-4,001	1,370-9,500	1,400-11,500
	l/s	0.008-0.056	0.018-0.103	0.028-0.160	0.061-0.369	0.083-0.500	0.078-0.500	0.167-1.003	0.153-1.111	0.381-2.639	0.389-3.194
	gpm	0.13 - 0.88	0.29 - 1.63	0.44 - 2.53	0.97 - 5.85	1.32-7.93	1.23-7.93	2.64-15.89	2.42-17.62	6.03-41.83	6.16-50.63

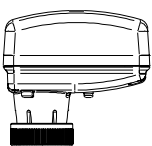
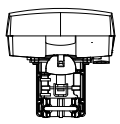
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## Thermic Actuators Normally Closed DN10 - DN32

	Valve dimension [Valve stroke]	Control signal	Item number [Supply Voltage]
	DN10-DN20 [2.5 mm]	On/Off	48-5525 [24 V AC/DC]
			48-5526 [230 V AC]
	DN10-DN32 [5.0 mm / 5.5 mm]	On/Off	48-5527 [24 V AC/DC]
			48-5528 [230 V AC]
	DN10-DN32 [2.5 mm / 5.0 mm / 5.5 mm]	0-10 V	48-5529 [24 V AC]
	DN10-DN32 [2.5 mm / 5.0 mm / 5.5 mm]	0-10 V	48-5529-1 [24 V DC]

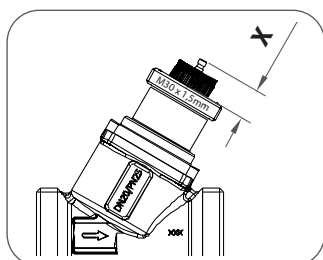
## Motoric Actuators DN10 - DN50

	Valve dimension [Valve stroke]	Control signal	Item number [Supply Voltage]
	DN10-DN32 [5.0 mm / 5.5 mm]	0-10 V / 4-20 mA	53-1180 [24 V AC/DC]
	DN10-DN32 [2.5 mm / 5.0 mm / 5.5 mm]	3-pos / On/Off	53-1181 [24 V AC]
	DN10-DN32 [2.5 mm / 5.0 mm / 5.5 mm]	3-pos / On/Off	53-1182 [230 V AC]
	DN10-DN32 [2.5 mm]	0-10 V / 4-20 mA	53-1183 [24 V AC/DC]
	DN10-DN32 [2.5 mm / 5.0 mm / 5.5 mm]	0-10 V / 4-20 mA	53-1184 [24 V AC/DC]
	DN40-DN50 [15 mm]	0-10 V / 3-pos	53-1296 [24 V AC/DC]

### Actuator specifications:

The full actuator range and detailed specifications can be found on the [OPTIMA Compact actuator WEB-page](#).

### Actuator requirements · DN10 - DN32



Dimension "X" in closed position:

- 2.5 mm stroke = 11.4 mm
- 5.0 mm stroke = 9.3 mm
- 5.5 mm stroke = 8.8 mm

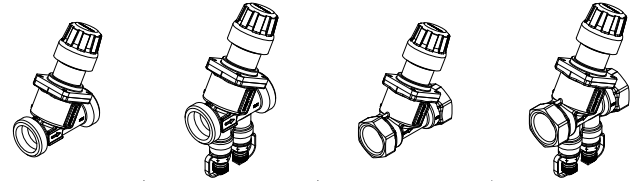
Actuator minimum force: 100N

Actuator connection: M30 x 1,5mm

# OPTIMA Compact


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## Product Programme





Dim.	Type	Flow l/h	Flow l/s	M/M	M/M, PT plugs	F/F	F/F, PT plugs
DN10	Low 2.5 mm	30-200	0.008-0.056	53-1300	53-1320	-	-
	Low 5.0 mm	65-370	0.018-0.103	53-1309	53-1329	-	-
DN15	Low 2.5 mm	30-200	0.008-0.056	53-1302	53-1322	53-1342	53-1362
	Low 5.0 mm	65-370	0.018-0.103	53-1310	53-1330	53-1350	53-1370
	High 2.5 mm	100-575	0.028-0.160	53-1304	53-1324	53-1344	53-1364
	High 5.0 mm	220-1,330	0.061-0.369	53-1305	53-1325	53-1345	53-1365
DN20	High 2.5 mm	100-575	0.028-0.160	53-1312	53-1332	53-1352	53-1372
	High 5.0 mm	220-1,330	0.061-0.369	53-1308	53-1328	53-1348	53-1368
	High 5.5 mm	300-1,800	0.083-0.500	53-1311	53-1331	53-1318	53-1338
DN25	Low 5.5 mm	280-1,800	0.078-0.500	53-1317	53-1337	53-1319	53-1339
DN25L	High 5.5 mm	600-3,609	0.167-1.003	53-1313	53-1333	53-1353	53-1373
DN32	5.5 mm	550-4,001	0.153-1.111	53-1314	53-1334	53-1354	53-1374
DN40	15 mm	1,370-9,500	0.381-2.639	-	-	-	53-1375-01
DN50	15 mm	1,400-11,500	0.389-3.194	-	-	-	53-1376-01

## Accessories

	Frese no.	Product	Dimension	Thread	Material
	43-1330	Couplings 2 pcs, incl gasket	DN10	G 1/2 - R3/8	DZR Brass, CW602N
	43-2330		DN15	G 3/4 - R1/2	
	43-3330		DN20	G 1 - R3/4	

	Frese no.	Product	Dimension	Purpose	Material
	38-0857	Insulation	DN10-15-20	For heating applications only	EPP, Max temperature 120°C
	38-0858		DN25		
	38-0859		DN25L-32		
	38-0878		DN40-50		

	Frese no.	Product	Type	Suitable for valves	Suitable for actuators
	58-8956	Stem Heater	24 V AC/DC, 10 W	DN10-DN32	All variants DN10- DN32
	58-8951	Stem Heater	24 VAC, 50 W	DN40-DN50	Type-01 to Type-07

# OPTIMA Compact

## DN10-DN50

### Setting and Flow

Valve size	Low 2.5 - DN10/DN15				Low 5.0 - DN10/DN15				
	Pre-set	Flow l/h	Flow l/s	Flow gpm	Min.Δp kPa	Flow l/h	Flow l/s	Flow gpm	Min.Δp kPa
0.5	30	0.008	0.13	14					
0.6	35	0.010	0.15	14	65	0.018	0.29	15	
0.8	45	0.012	0.20	14	83	0.023	0.37	15	
1.0	54	0.015	0.24	14	101	0.028	0.44	15	
1.2	64	0.018	0.28	15	119	0.033	0.52	15	
1.4	74	0.020	0.32	15	137	0.038	0.60	15	
1.6	83	0.023	0.37	15	155	0.043	0.68	15	
1.8	93	0.026	0.41	15	173	0.048	0.76	16	
2.0	103	0.029	0.45	15	191	0.053	0.84	16	
2.2	113	0.031	0.50	15	209	0.058	0.92	16	
2.4	122	0.034	0.54	15	226	0.063	1.00	16	
2.6	132	0.037	0.58	15	244	0.068	1.08	16	
2.8	142	0.039	0.62	15	262	0.073	1.15	16	
3.0	151	0.042	0.67	15	280	0.078	1.23	16	
3.2	161	0.045	0.71	15	298	0.083	1.31	17	
3.4	171	0.047	0.75	16	316	0.088	1.39	17	
3.6	181	0.050	0.79	16	334	0.093	1.47	17	
3.8	190	0.053	0.84	16	352	0.098	1.55	17	
4.0	200	0.056	0.88	16	370	0.103	1.63	17	

Valve size	High 2.5 - DN15/DN20				High 5.0 - DN15/DN20				
	Pre-set	Flow l/h	Flow l/s	Flow gpm	Min.Δp kPa	Flow l/h	Flow l/s	Flow gpm	Min.Δp kPa
0.6	100	0.028	0.44	15	220	0.061	0.97	16	
0.8	128	0.036	0.56	15	285	0.079	1.26	17	
1.0	156	0.043	0.69	15	351	0.097	1.54	17	
1.2	184	0.051	0.81	16	416	0.116	1.83	17	
1.4	212	0.059	0.93	16	481	0.134	2.12	18	
1.6	240	0.067	1.06	16	546	0.152	2.41	18	
1.8	268	0.074	1.18	16	612	0.170	2.69	19	
2.0	296	0.082	1.30	17	677	0.188	2.98	19	
2.2	324	0.090	1.42	17	742	0.206	3.27	20	
2.4	351	0.098	1.55	17	808	0.224	3.56	20	
2.6	379	0.105	1.67	17	873	0.242	3.84	20	
2.8	407	0.113	1.79	17	938	0.261	4.13	20	
3.0	435	0.121	1.92	18	1004	0.279	4.42	21	
3.2	463	0.129	2.04	18	1069	0.297	4.71	21	
3.4	491	0.136	2.16	18	1134	0.315	4.99	21	
3.6	519	0.144	2.29	18	1199	0.333	5.28	21	
3.8	547	0.152	2.41	18	1265	0.351	5.57	21	
4.0	575	0.160	2.53	19	1330	0.369	5.85	22	

Valve size	High 5.5 - DN20				Low 5.5 - DN25				
	Pre-set	Flow l/h	Flow l/s	Flow gpm	Min.Δp kPa	Flow l/h	Flow l/s	Flow gpm	Min.Δp kPa
0.6	300	0.083	1.32	18	280	0.078	1.23	15	
0.8	395	0.110	1.74	21	356	0.099	1.57	16	
1.0	480	0.133	2.11	22	430	0.119	1.89	16	
1.2	558	0.155	2.46	23	502	0.139	2.21	16	
1.4	632	0.176	2.78	23	574	0.159	2.53	17	
1.6	704	0.196	3.10	23	647	0.180	2.85	17	
1.8	776	0.216	3.42	23	722	0.201	3.18	17	
2.0	850	0.236	3.74	23	800	0.222	3.52	18	
2.2	927	0.258	4.08	23	881	0.245	3.88	19	
2.4	1008	0.280	4.44	24	967	0.269	4.26	20	
2.6	1094	0.304	4.82	26	1057	0.294	4.65	21	
2.8	1185	0.329	5.22	27	1151	0.320	5.07	22	
3.0	1280	0.356	5.64	29	1250	0.347	5.50	24	
3.2	1380	0.383	6.07	32	1353	0.376	5.96	26	
3.4	1483	0.412	6.53	34	1460	0.406	6.43	29	
3.6	1589	0.441	6.99	37	1571	0.436	6.92	32	
3.8	1695	0.471	7.46	39	1685	0.468	7.42	35	
4.0	1800	0.500	7.93	40	1800	0.500	7.93	39	

# OPTIMA Compact

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## Setting and Flow

Valve size	High 5.5 - DN25L				DN32			
	Pre-set	Flow l/h	Flow l/s	Flow gpm	Min.Δp kPa	Flow l/h	Flow l/s	Flow gpm
0.6	600	0.167	2.64	17	550	0.153	2.42	18
0.8	777	0.216	3.42	17	753	0.209	3.32	18
1.0	954	0.265	4.20	17	956	0.266	4.21	18
1.2	1131	0.314	4.98	18	1159	0.322	5.10	18
1.4	1308	0.363	5.76	18	1362	0.378	6.00	18
1.6	1485	0.413	6.54	18	1565	0.435	6.89	19
1.8	1662	0.462	7.32	18	1768	0.491	7.79	19
2.0	1839	0.511	8.10	18	1971	0.548	8.68	19
2.2	2016	0.560	8.88	18	2174	0.604	9.57	19
2.4	2193	0.609	9.66	18	2377	0.660	10.47	20
2.6	2370	0.658	10.44	19	2580	0.717	11.36	20
2.8	2547	0.708	11.22	19	2783	0.773	12.26	21
3.0	2724	0.757	12.00	20	2986	0.829	13.15	22
3.2	2901	0.806	12.78	20	3189	0.886	14.04	23
3.4	3078	0.855	13.55	21	3392	0.942	14.94	24
3.6	3255	0.904	14.33	21	3595	0.999	15.83	25
3.8	3432	0.953	15.11	22	3798	1.055	16.73	26
4.0	3609	1.003	15.89	23	4001	1.111	17.62	28

Valve size	DN40				DN50			
	Pre-set	Flow l/h	Flow l/s	Flow gpm	Min.Δp kPa	Flow l/h	Flow l/s	Flow gpm
0.6	1370	0.381	6.03	10	1400	0.389	6.16	10
0.8	1681	0.467	7.40	10	1724	0.479	7.59	10
1.0	2000	0.556	8.81	10	2050	0.569	9.03	11
1.2	2333	0.648	10.27	10	2393	0.665	10.54	11
1.4	2686	0.746	11.83	10	2766	0.768	12.18	11
1.6	3063	0.851	13.48	10	3178	0.883	13.99	12
1.8	3467	0.963	15.26	11	3638	1.011	16.02	12
2.0	3900	1.083	17.17	11	4150	1.153	18.27	13
2.2	4364	1.212	19.21	12	4717	1.310	20.77	14
2.4	4857	1.349	21.39	13	5339	1.483	23.51	16
2.6	5380	1.494	23.69	14	6014	1.671	26.48	18
2.8	5928	1.647	26.10	15	6737	1.871	29.66	20
3.0	6500	1.806	28.62	17	7500	2.083	33.02	22
3.2	7090	1.969	31.22	19	8295	2.304	36.52	25
3.4	7692	2.137	33.87	21	9108	2.530	40.10	27
3.6	8300	2.306	36.54	22	9925	2.757	43.70	30
3.8	8906	2.474	39.21	24	10729	2.980	47.24	33
4.0	9500	2.639	41.83	25	11500	3.194	50.63	36



# OPTIMA Compact

DN10-DN50

## Documentation formula

Valve ID (own choice)	Valve type	Dim.	Pre-set	Verified $\Delta p$ [kpa]	Minimum $\Delta p$ (see flowrate table) [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 hot stamped DZR brass DN10-32 and ductile iron DN40-50.

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

The valve housing shall be PN25 rated and suitable for 120°C.

The valve shall have a thread according to ISO 228.

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

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

P/T plugs shall be available as an option.

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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