OPTIMA
- Pressure independent control & balancing valve

Application

OPTIMA pressure independent control valve (PICV) is used in heating and cooling systems in applications with Fan Coil Units, Air Handling Units or other terminal unit applications.

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

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

OPTIMA 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 ΔT due to faster response and increased system stability.

Benefits

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

Installation
- No further regulating valves required in the distribution pipework when Frese OPTIMA 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
- Removable cartridge solution simplifies flushing procedure
- 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.

- Flushing through the valve is possible due to the removable cartridge feature

- Electrical actuator 0-10 V and 3 point control, normally closed

- Differential pressure operating range up to 400 kPa

- High flows with minimal required differential pressure due to advanced design of the valve

- More accurate control due to long 5.5 mm stroke

- Higher presetting precision due to stepless analogue scale

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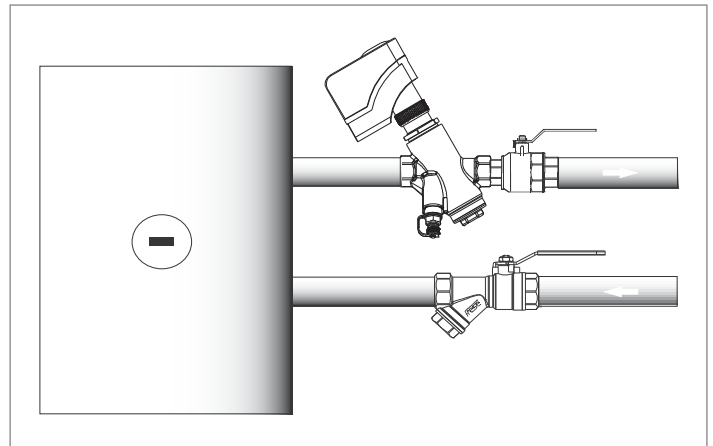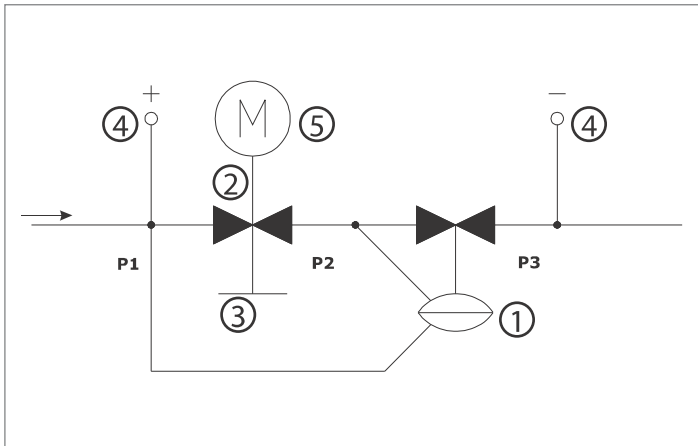
Design

The design of   OPTIMA combines high performance with small size and compact construction. The main components of the valve are:

①   The pressure control cartridge

②   The modulating control component

③   The presetting scale (not accessible when the actuator is mounted)

④   The P/T plugs (optional)

⑤   The electrical actuator
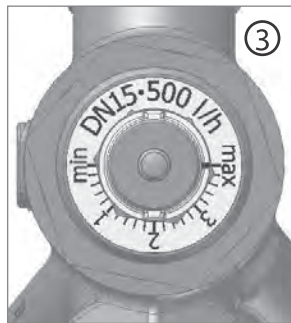
Function

The   OPTIMA is delivered with a commissioning cap allowing the flow to pass through the valve before the actuator is installed. The commissioning cap and cartridge features allow flushing through the valve before commissioning the system.

⚠️

During flushing the valve must be held in fully open position by the comissioning cap. The diaphragm can be damaged by not following this procedure

After flushing, the pressure control cartridge can be reinserted into the valve and the commissioning cap can be discarded allowing the user to adjust the presetting dial to the design flow. 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.

Manual operation

DN15-DN32
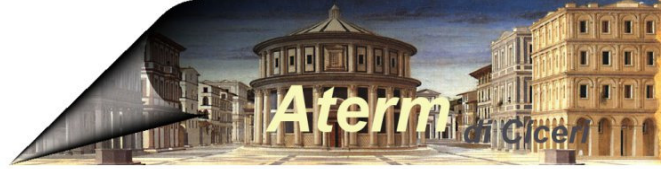The actuator can then be operated manually with the help of a 3mm hex key.

DN40-DN50
The actuator can be operated manually by adjusting handle

Note
If the operation is performed manually without disconnecting from the power, the supply must be disconnected and then reconnected, whereby the actuator will start the calibration process and correctly adjust itself.
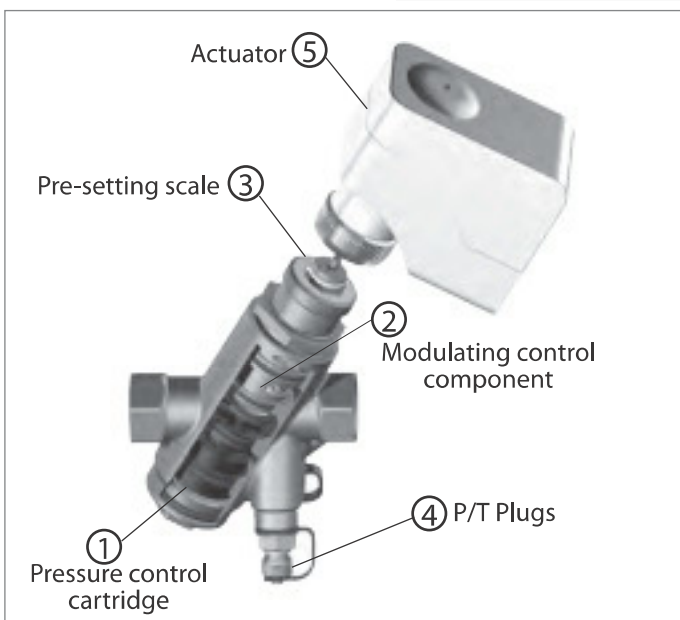
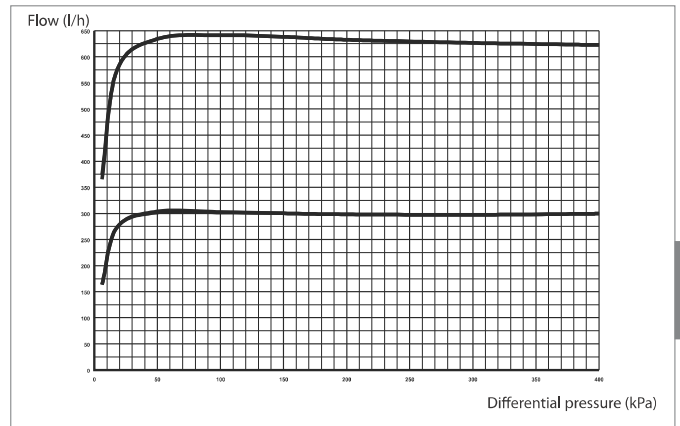# OPTIMA
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Operation principle

The innovative design of OPTIMA introduces a modulating control component that retains 100% authority at all times. With the OPTIMA, there are two independent movements for the presetting and the modulating function. During pre-setting, 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. In the example below,the flow is modulated throughout the full range from 10 to 0V regardless of the preset flow (i.e. 625 l/h or 300 l/h).

Whilst the control component provides proportional modulation irrespective of the preset flow, the automatic balancing cartridge 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 400kPa.
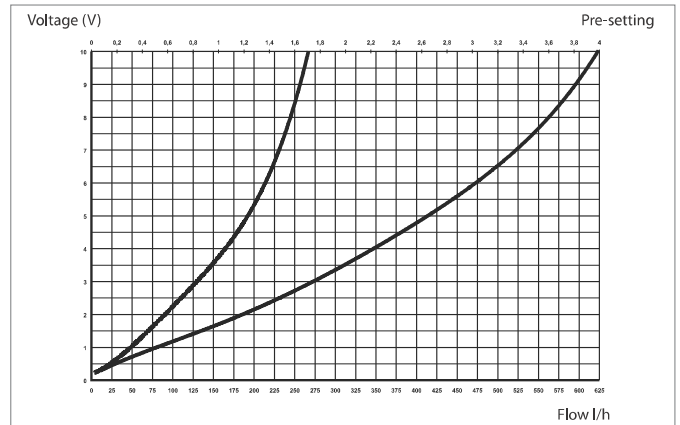
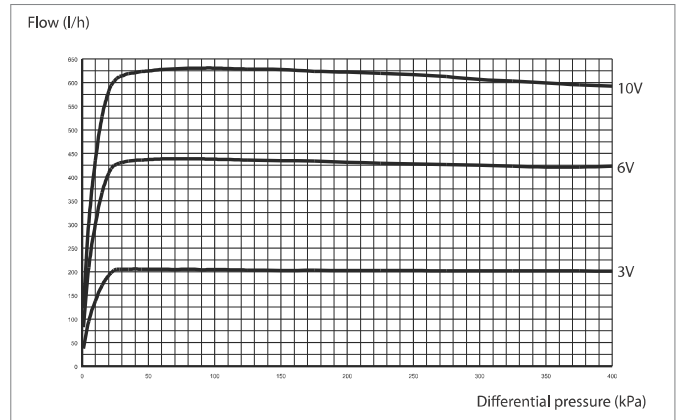## Flow rate vs. Differential Pressure

(Preset flow: 625 l/h, 300 l/h)

Flow rate vs. Voltage

(Preset flow: 625 l/h, 300 l/h)

## Flow rate vs. Differential Pressure

(Voltage: 10V, 6V, 3V)

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Technical data

Valve

Valve housing and flow setting: DZR Brass, CW602N
DP controller: PPS 40% glass
Spring: Stainless steel
Diaphragm: HNBR
O-rings: EPDM
Pressure class: PN25
Max. differential pressure: 400 kPa
Medium temperature range: 0^0C to 120^0C

DN15-DN32

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
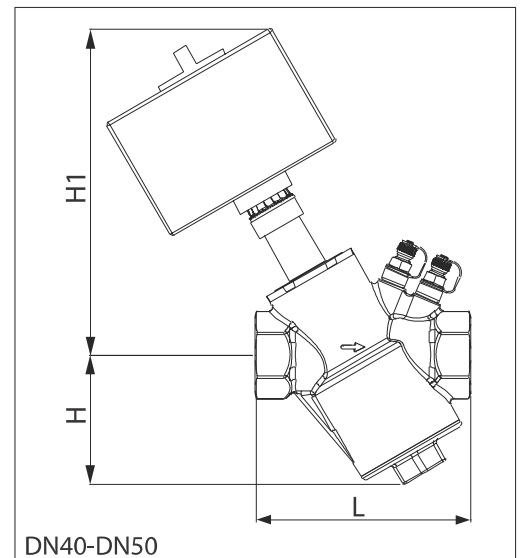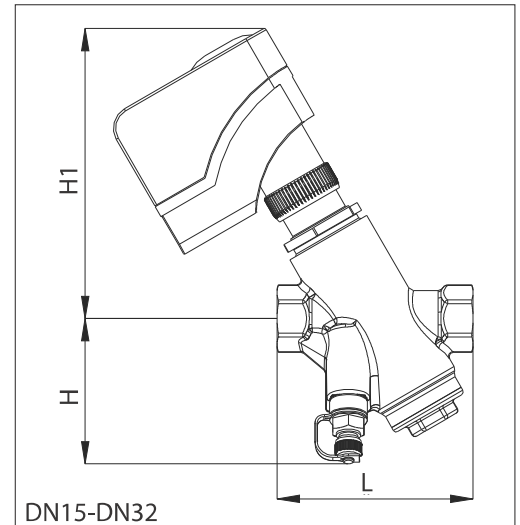
DN40-DN50

Technical data

Dimension			DN15	DN20	DN25	DN32	DN40	DN50
Flow rate	l/s	LF	0.022 - 0.174	0.036 - 0.292	0.064 - 0.478	0.129 - 0.849	0.562 - 1.974	0.612 - 2.385
		HF	0.068 - 0.479	0.081 - 0.566	0.081 - 0.566			
	l/h	LF	78 - 625	131 - 1050	231 - 1722	465 - 3056	2022 - 7105	2204 - 8586
		HF	244 - 1724	292 - 2039	292 - 2039			
	gpm	LF	0.34 - 2.76	0.58 - 4.63	1.02 - 7.59	2.05 - 13.47	8,90 - 31.28	9,70 - 37.80
		HF	1,08 - 7.60	1.29 - 8.99	1.29 - 8.99			
Kvs	m³/h	LF	1.6	2.6	4.3	7.2	13.9	15,2
		HF	4.1	4.3	4.3			
Dimension mm	L		88	88	92	128	144	155
	H		65	65	66	72	87	93
	H1		145	145	145	152	219	225
Weight	kg		0.90	0.91	1,00	1.52	2.55	3.20

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Technical data

Actuator DN15-DN32

Characteristics:	Electrical, modulating, normally closed
Protection class:	IP 40 to EN 60529
Frequency:	50/60 Hz
Control signal:	0-10V DC, or 3 position
Actuating force:	250 N
Stroke:	5.5 mm
Running time:	150s 3 position/75s 0-10V & 2-10V
Ambient operating conditions:	+1^{0}C to 50^{0}C
Manual operation:	3 mm hexagonal key
Cable length:	1,5 m
Weight:	350 g

Modulating actuator 24V AC-DC / 0-10 V DC / 75s	53-1045
Modulating actuator 24 V AC / 3 pos / 150 s	53-1046
Modulating actuator 230 V AC / 3 pos. / 150 s	53-1047
Modulating actuator 24V AC-DC / 2-10 V DC / 75s	53-1050
Modulating actuator 24V AC-DC / 0-10 V DC / 75s (Equal percentage)	53-1055

Actuator DN40-DN50

Characteristics:	Electrical, modulating, normally closed
Protection class:	IP 54 to EN 60529
Frequency:	50 Hz
Control signal:	0-10V DC, or 3 position
Actuating force:	400 N
Stroke:	6.5 mm
Running time:	170 s/43 s
Ambient operating conditions:	-5^{0}C to 50^{0}C
Manual operation:	Manual adjusting handle
Cable:	Not included
Weight:	600 g

Modulating actuator 24 V AC / 0-10V DC / 43s	53-1052
Modulating actuator 24 V AC / 3 pos / 43s	53-1053
Modulating actuator 230 V / 3 pos. / 170s	53-1054

Product program

OPTIMA							
		DN15	DN20	DN25	DN32	DN40	DN50
P/T Plugs		(LF) 53-1090 (HF) 53-1094	(LF) 53-1091 (HF) 53-1095	(LF) 53-1092 (HF) 53-1096	53-1093	53-1097	53-1098
Plugs		(LF) 53-1080 (HF) 53-1084	(LF) 53-1081 (HF) 53-1085	(LF) 53-1082 (HF) 53-1086	53-1083	53-1087	53-1088

OPTIMA
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OPTIMA DN15, Low Flow
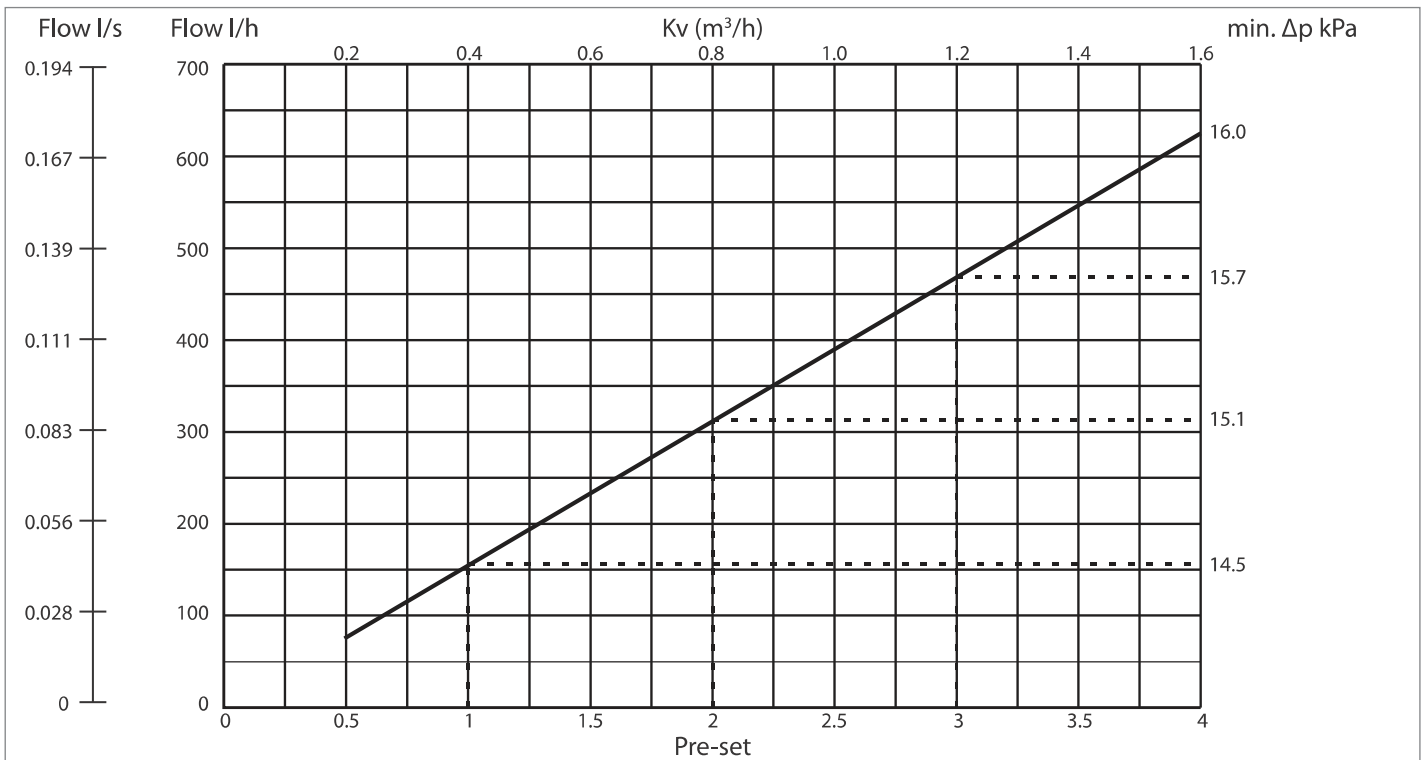
OPTIMA DN15, High Flow
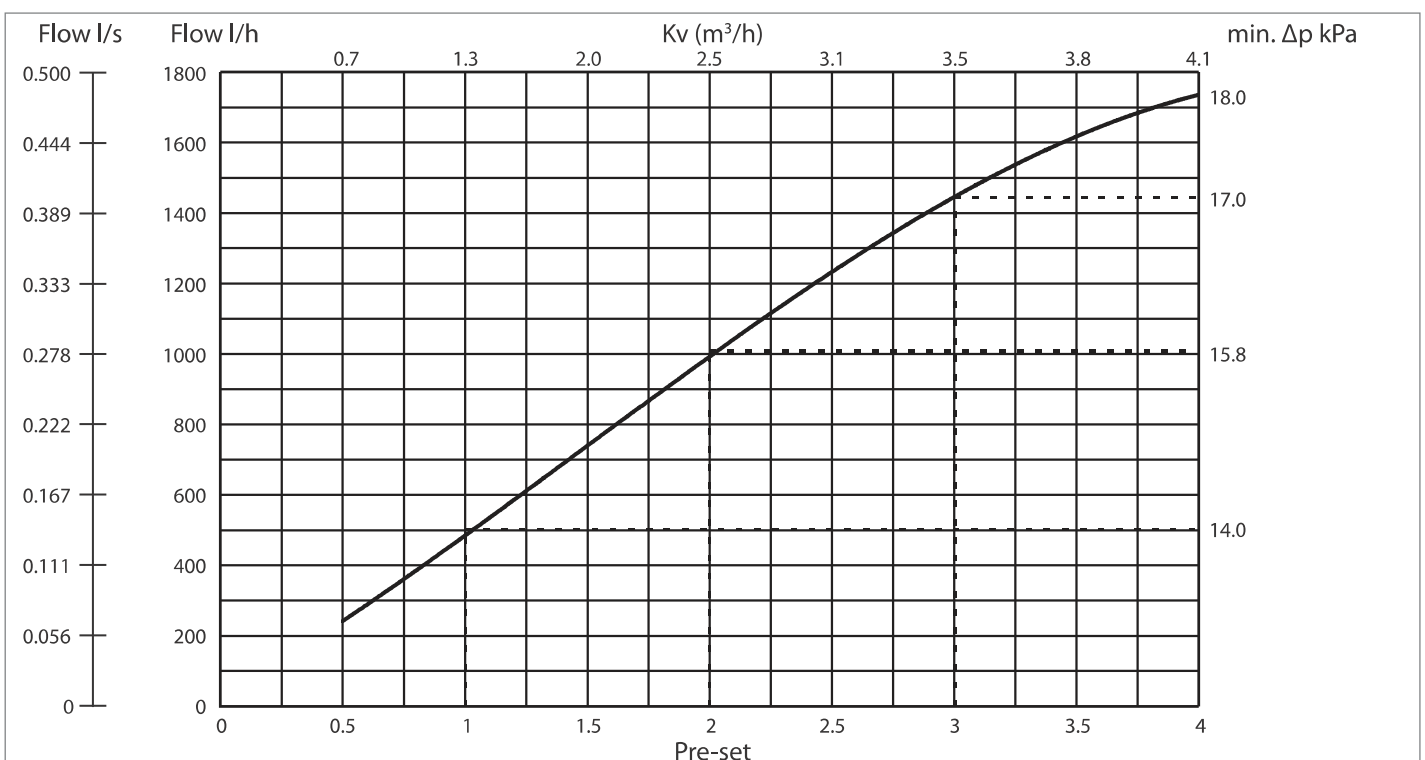
OPTIMA
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OPTIMA DN20, Low Flow

Flow l/s	Flow l/h		Kv (m³/h)							min. Δp kPa

OPTIMA DN20, High Flow

Flow l/s	Flow l/h		Kv (m³/h)							min. Δp kPa
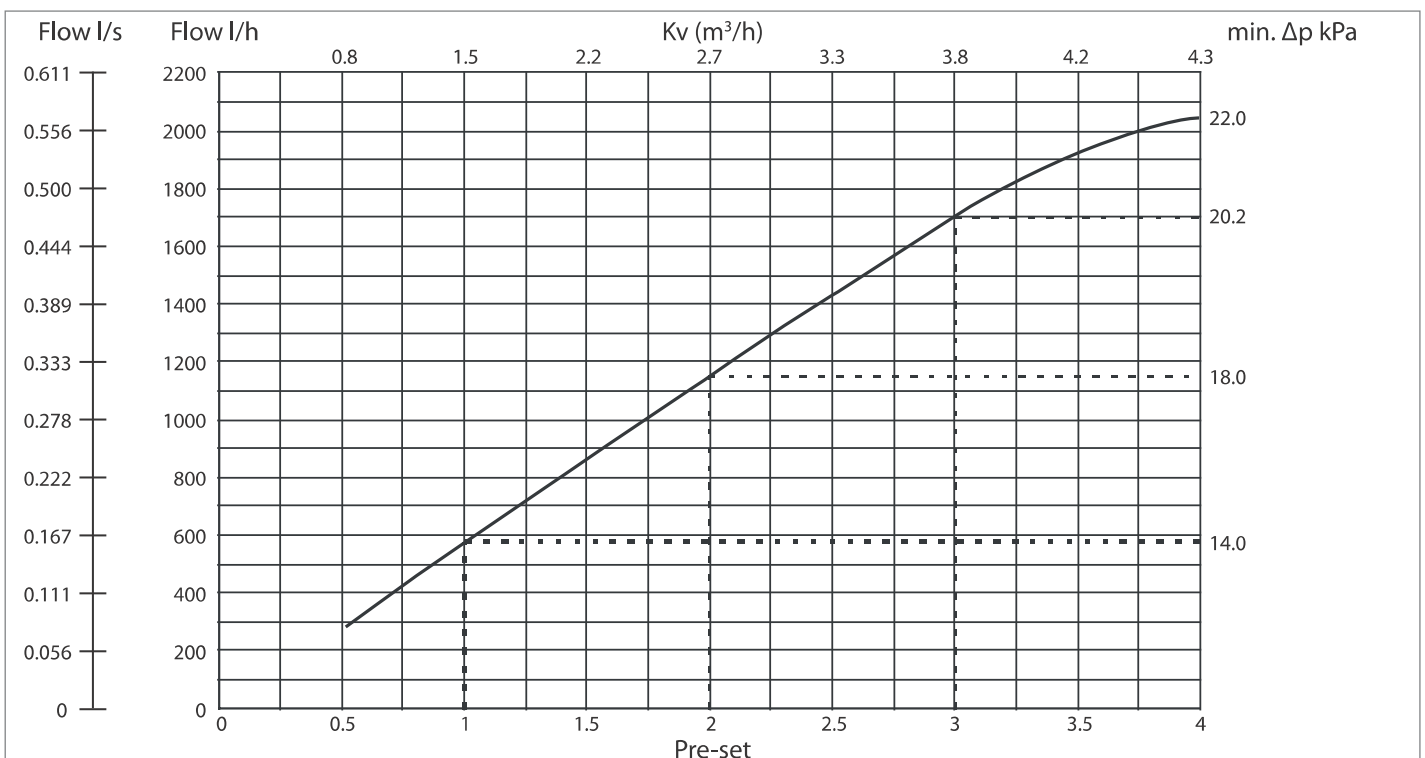
OPTIMA
- Pressure independent control & balancing valve

OPTIMA DN25, Low Flow
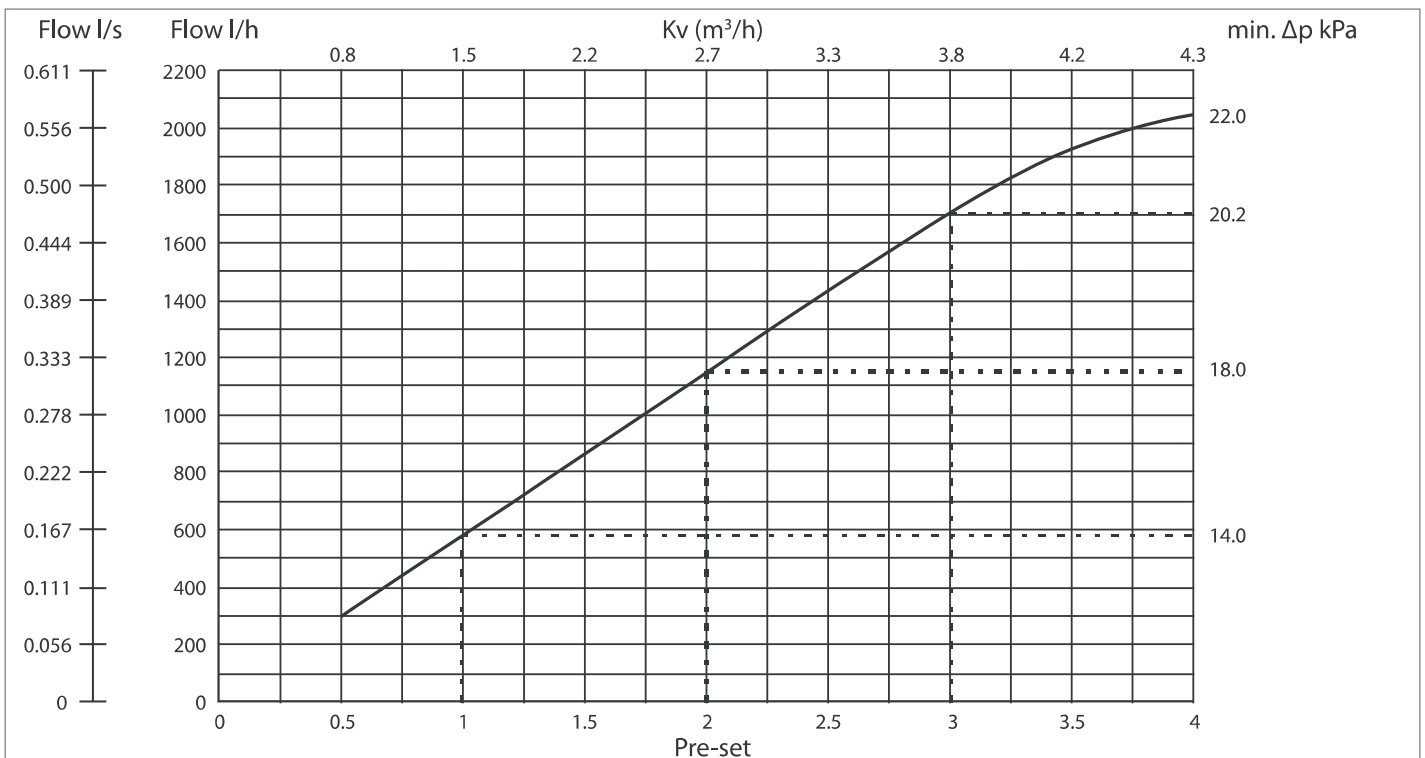
Flow l/s	Flow l/h		Kv (m³/h)					min. Δp kPa
		0.6	1.3	2.0	2.6	3.2	3.7	4.1	4.3

Pre-set

OPTIMA DN25, High Flow

Flow l/s	Flow l/h		Kv (m³/h)					min. Δp kPa
		0.8	1.5	2.2	2.7	3.3	3.8	4.2	4.3

Pre-set

OPTIMA
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OPTIMA DN32

Chart axes — Flow l/s, Flow l/h (left), Kv (m³/h) (top: 1.3, 2.4, 3.5, 4.5, 5.5, 6.2, 6.8, 7.2), min. Δp kPa (right: 18.0, 17.0, 16.0, 14.5), Pre-set (bottom: 0, 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4)

OPTIMA DN40

Chart axes — Flow l/s, Flow l/h (left), Kv (m³/h) (top: 5.1, 8.7, 11.2, 12.8, 13.6, 13.8, 13.8, 13.9), min. Δp kPa (right: 26, 25, 22.5, 20, 18, 16.5, 16), Pre-set (bottom: 0, 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4)

OPTIMA
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OPTIMA DN50, High Flow

Flow (l/s)	Flow (l/h)				Kv (m³/h)					min. Δp kPa
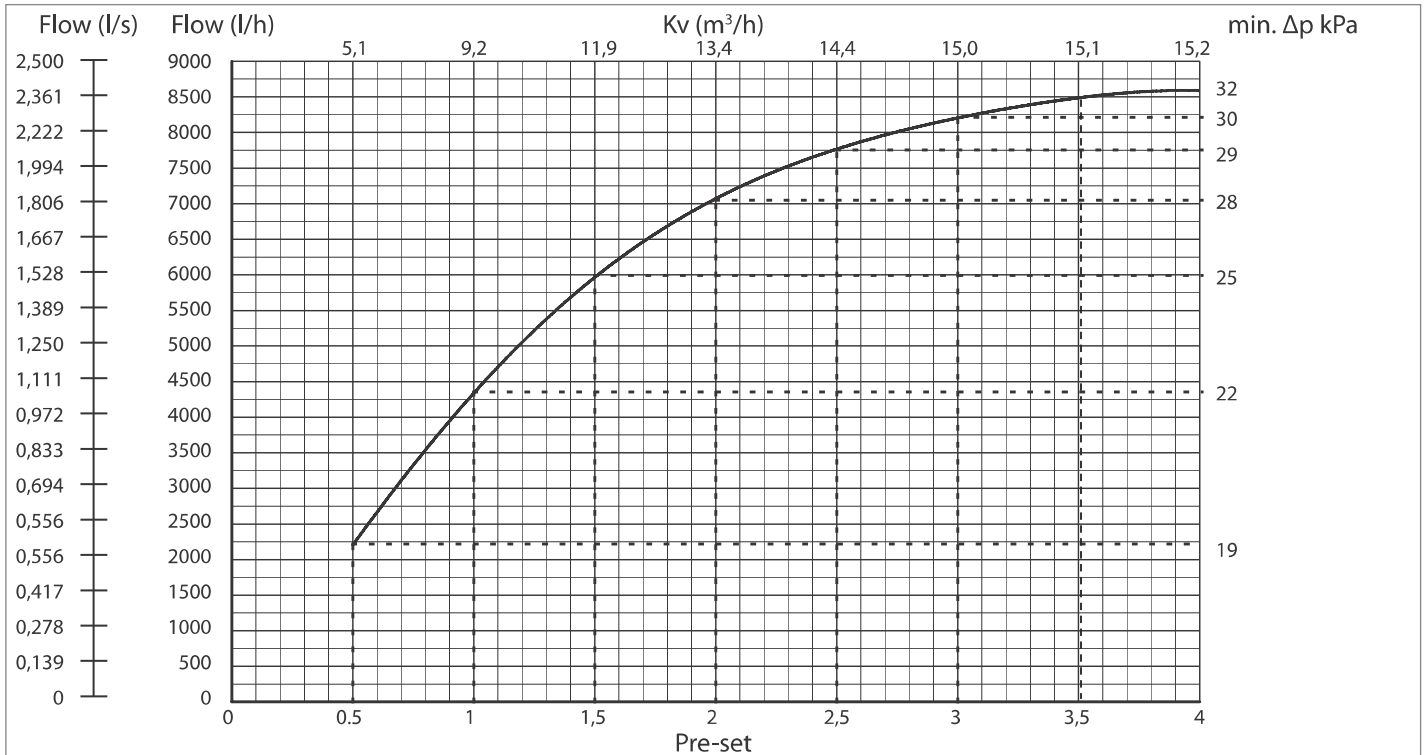
Setting and Flow

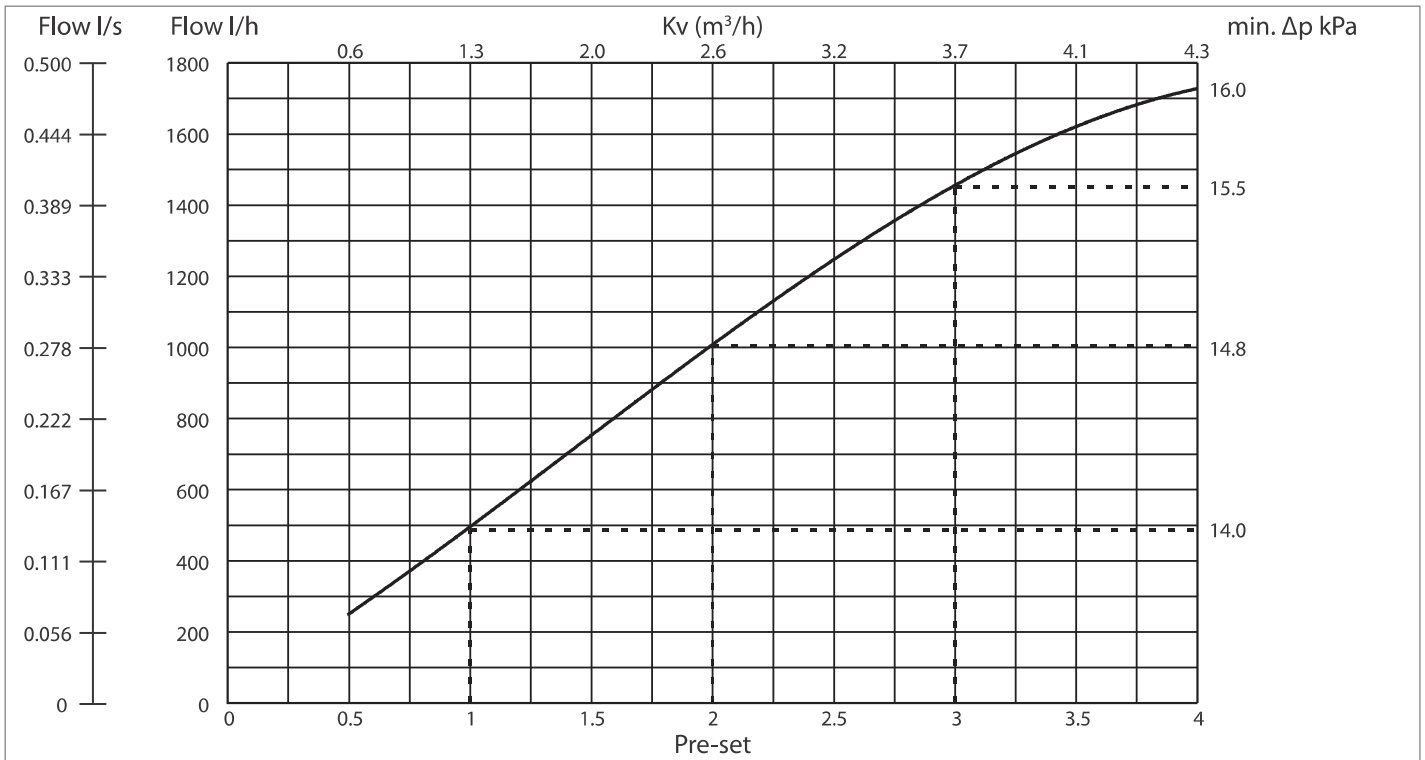|	OPTIMA DN15 Low Flow			OPTIMA DN15 High Flow			OPTIMA DN20 Low Flow		
Pre-set	Flow l/h	Flow l/s	Flow gpm	Flow l/h	Flow l/s	Flow gpm	Flow l/h	Flow l/s	Flow gpm
0,50	78	0,022	0,34	244	0,068	1,08	131	0,036	0,58
0,75	117	0,033	0,52	372	0,103	1,64	197	0,055	0,87
1,00	156	0,043	0,69	501	0,139	2,20	263	0,073	1,16
1,25	195	0,054	0,86	630	0,175	2,77	328	0,091	1,44
1,50	234	0,065	1,03	759	0,211	3,34	394	0,109	1,73
1,75	274	0,076	1,20	886	0,246	3,90	459	0,128	2,02
2,00	313	0,087	1,38	1009	0,280	4,44	525	0,146	2,31
2,25	352	0,098	1,55	1128	0,313	4,97	591	0,164	2,60
2,50	391	0,109	1,72	1241	0,345	5,46	656	0,182	2,89
2,75	430	0,119	1,89	1347	0,374	5,93	722	0,201	3,18
3,00	469	0,130	2,06	1444	0,401	6,36	788	0,219	3,47
3,25	508	0,141	2,24	1532	0,426	6,74	853	0,237	3,76
3,50	547	0,152	2,41	1609	0,447	7,08	919	0,255	4,04
3,75	586	0,163	2,58	1673	0,465	7,37	984	0,273	4,33
4,00	625	0,174	2,75	1724	0,479	7,59	1050	0,292	4,62

OPTIMA
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Setting and Flow

OPTIMA DN20 High Flow

Pre-set	Flow l/h	Flow l/s	Flow gpm
0,50	292	0,081	1,28
0,75	435	0,121	1,91
1,00	577	0,160	2,54
1,25	719	0,200	3,17
1,50	863	0,240	3,80
1,75	1007	0,280	4,43
2,00	1152	0,320	5,07
2,25	1296	0,360	5,70
2,50	1437	0,399	6,33
2,75	1573	0,437	6,92
3,00	1700	0,472	7,48
3,25	1815	0,504	7,99
3,50	1913	0,531	8,42
3,75	1990	0,553	8,76
4,00	2039	0,566	8,98

OPTIMA DN25 Low Flow

Flow l/h	Flow l/s	Flow gpm
231	0,064	1,02
357	0,099	1,57
486	0,135	2,14
617	0,171	2,72
749	0,208	3,30
878	0,244	3,87
1005	0,279	4,43
1128	0,313	4,96
1244	0,346	5,48
1352	0,376	5,95
1452	0,403	6,39
1540	0,428	6,78
1615	0,449	7,11
1676	0,466	7,38
1722	0,478	7,58

OPTIMA DN25 High Flow

Flow l/h	Flow l/s	Flow gpm
292	0,081	1,28
435	0,121	1,91
577	0,160	2,54
719	0,200	3,17
863	0,240	3,80
1007	0,280	4,43
1152	0,320	5,07
1296	0,360	5,70
1437	0,399	6,33
1573	0,437	6,92
1700	0,472	7,48
1815	0,504	7,99
1913	0,531	8,42
1990	0,553	8,76
2039	0,566	8,98

OPTIMA DN32

Pre-set	Flow l/h	Flow l/s	Flow gpm
0,50	465	0,129	2,05
0,75	692	0,192	3,05
1,00	921	0,256	4,05
1,25	1150	0,319	5,06
1,50	1377	0,382	6,06
1,75	1600	0,444	7,04
2,00	1816	0,504	7,99
2,25	2024	0,562	8,91
2,50	2221	0,617	9,78
2,75	2405	0,668	10,59
3,00	2574	0,715	11,33
3,25	2726	0,757	12,00
3,50	2858	0,794	12,58
3,75	2969	0,825	13,07
4,00	3056	0,849	13,45

OPTIMA DN40

Flow l/h	Flow l/s	Flow GPM
2022	0,562	8,90
2825	0,785	12,44
3538	0,983	15,58
4179	1,161	18,40
4758	1,322	20,95
5279	1,466	23,24
5741	1,595	25,27
6139	1,705	27,03
6470	1,797	28,48
6729	1,869	29,62
6916	1,921	30,44
7033	1,954	30,96
7090	1,969	31,21
7105	1,974	31,28
7105	1,974	31,28

OPTIMA DN50

Flow l/h	Flow l/s	Flow GPM
2204	0,612	9,70
3325	0,924	14,64
4337	1,205	19,09
5218	1,449	22,97
5963	1,657	26,25
6577	1,827	28,95
7070	1,964	31,12
7459	2,072	32,84
7766	2,157	34,19
8009	2,225	35,25
8024	2,279	36,11
8362	2,323	36,81
8486	2,357	37,36
8568	2,380	37,72
8586	2,385	37,80