

Frese OPTIMA Compact DN50-DN200 - pressure independent balancing & control valve

Application

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

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

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

Frese 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 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 - always one
- Flexibility if the system is modified after the initial installation

Installation

- No further regulating valves required in the distribution pipework when Frese OPTIMA Compact 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

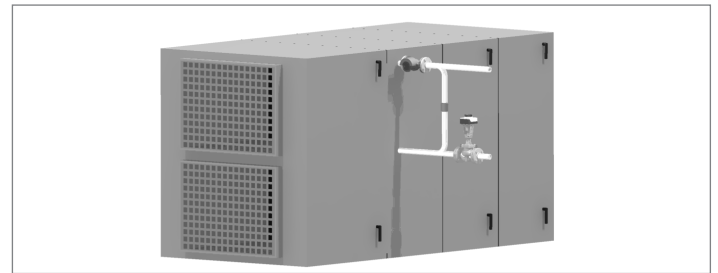
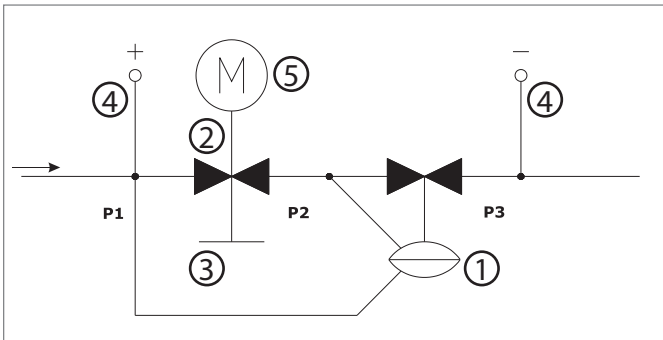
- High comfort for the end-users due to high precision temperature control
- Longer life due to less movements of the actuator



Features

- The presetting function has no impact on the stroke; Full stroke modulation at all times, regardless the preset flow
- 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
- 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

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Function

Frese 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 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 Frese OPTIMA Compact (DN50 to DN200) can operate to a maximum differential pressure of 800 kPa (8 bar)

Close Off Pressure

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

DN50 to DN125: 800 kPa - based on 800N actuator force
 DN150 to DN200: 800 kPa - based on 1500N actuator force

Manual Operation

Actuators

The actuator can be operated by the red manual handle.

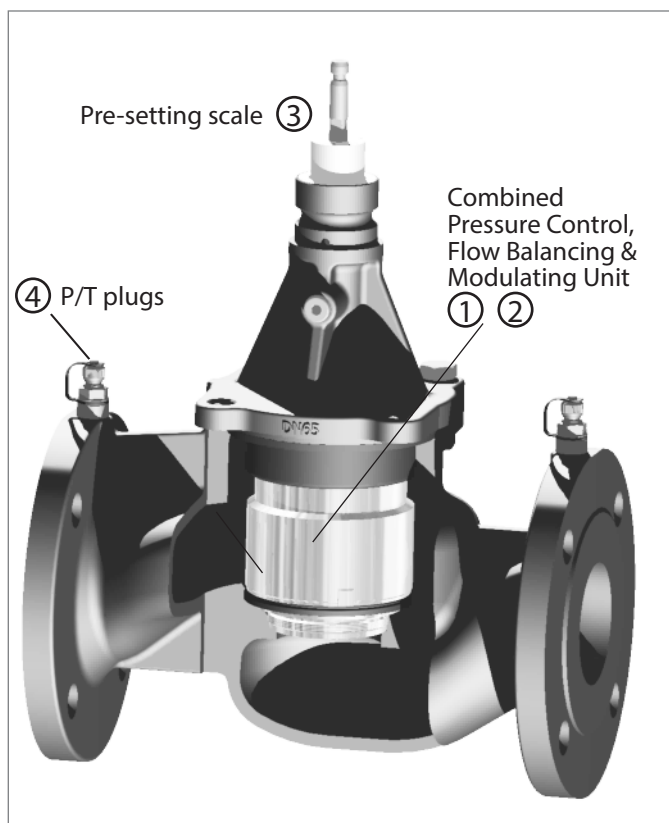
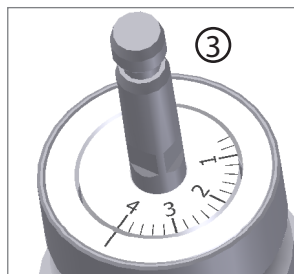


Design

The design of Frese OPTIMA Compact 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



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Operation principle

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

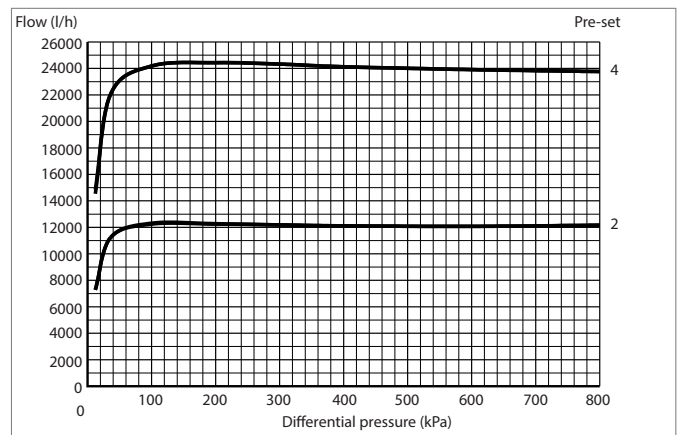
With the Frese OPTIMA Compact there are two independent movements for the presetting and the modulating function. During presetting, the inlet area moves radially without interfering with the length of the stroke. During modulating, the inlet area moves axial taking advantage of the full stroke.

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: 24000 l/h, 12000 l/h



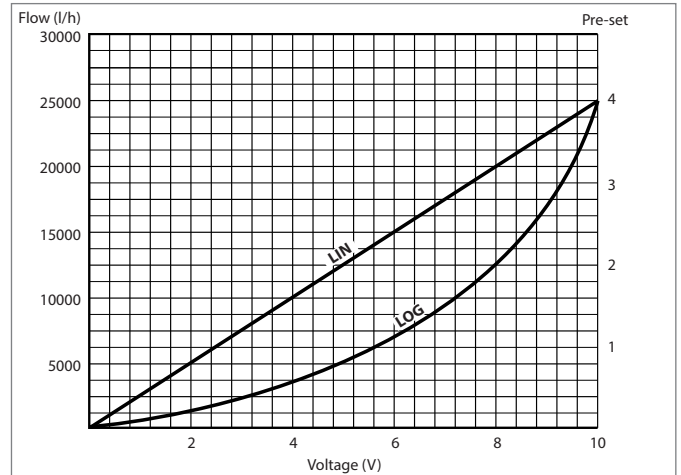
Flow rate vs. Voltage

Preset flow: 25000 l/h

Valve Characteristic:

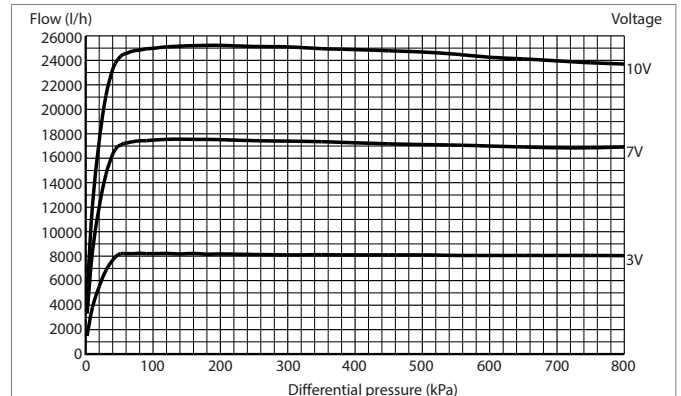
Frese OPTIMA Compact valve design has a linear control characteristic. The control characteristic is independent of the flow setting and available pressure.

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
(Linear actuator characteristic)



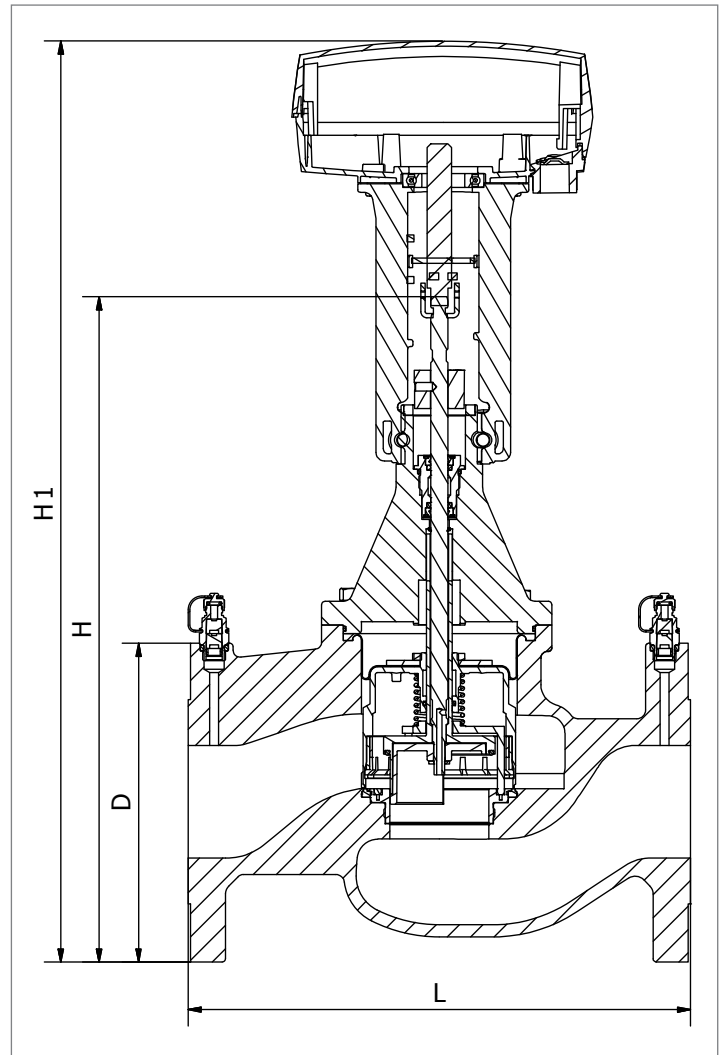
Frese OPTIMA Compact DN50-DN200 - pressure independent balancing & control valve

Technical data DN50 - DN80

Valve

Valve housing:	GJL-250 PN16 GJS-400 PN25
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

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-DN80

Dim.		DN50	DN65	DN80
		ISO	ISO	ISO
Dimensions mm	L	230	290	310
	H	367	384	413
	H1	508	525	554
	D	165	185	200
Weight kg	PN16	13.9	18.5	24.8
	PN25	13.7	18.9	26.8

Flow

Dim.		DN50		DN65		DN80	
Type		LF	HF	LF	HF	LF	HF
Flow	m ³ /h	2.48 - 15.00	3.92 - 24.00	4.38 - 25.00	5.95 - 35.00	5.34 - 34.00	7.02 - 43.00
	l/s	0.689 - 4.167	1.089 - 6.667	1.216 - 6.945	1.654 - 9.724	1.484 - 9.450	1.951 - 11.954
	gpm	10.92 - 66.03	17.28 - 105.65	19.27 - 110.06	26.21 - 154.11	25.53 - 149.78	30.92 - 189.47

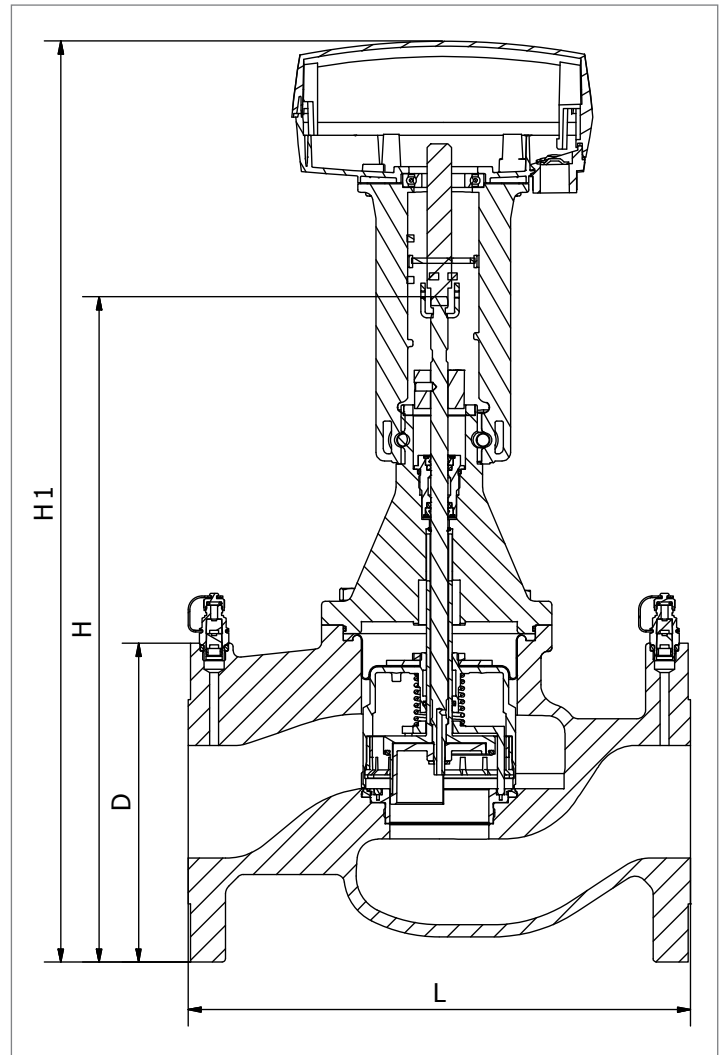
Frese OPTIMA Compact DN50-DN200 - pressure independent balancing & control valve

Technical data DN100 - DN150

Valve

Valve housing DN100 & 150:	GJS-400 PN16/PN25
Valve housing DN125:	GJL-250 PN16 GJS-400 PN25
DP controller:	Stainless steel
Spring:	Stainless steel
Diaphragm:	Reinforced EPDM
O-rings:	EPDM
Pressure class:	PN16/25
Stroke	40 mm DN100-125 43 mm DN150
Flange connections:	ISO 7005-2 / EN 1092-2
Max. differential pressure:	800 kPa
Medium temperature range	
DN100-DN150 (PN16) :	-10°C to 120°C
DN100-DN125 (PN25) :	-10°C to 120°C
DN150 (PN25) :	-10°C to 110°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 DN100 - DN150

Dim.		DN100	DN125	DN150
		ISO	ISO	ISO
Dimensions mm	L	350	400	480
	H	566	608	676
	H1	700	747	768
	D	235	270	285
Weight kg	PN16	48.5	69.7	96.1
	PN25	48.5	69.7	96.1

Flow

Dim.		DN100		DN125		DN150	
Type		LF	HF	LF	HF	LF	HF
Flow	m ³ /h	12.1 - 68.0	14.8 - 90.0	18.5 - 110.0	23.0 - 135.0	25.6 - 148.0	32.0 - 195.0
	l/s	2.917 - 19.444	3.750 - 25.000	5.139 - 30.556	6.389 - 37.500	7.111 - 41.110	8.889 - 54.168
	gpm	46.23-308.20	59.44-396.26	81.45-484.32	101.26-594.39	112.71-651.59	140.89-858.56

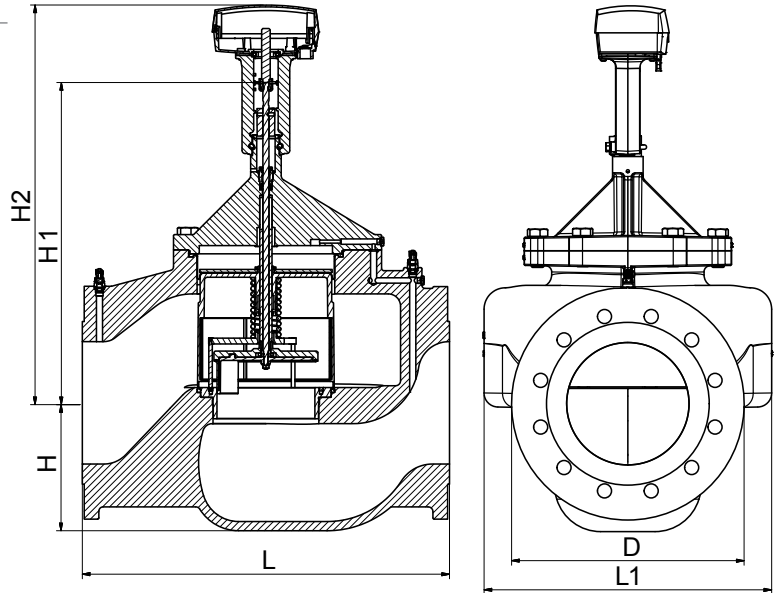
Frese OPTIMA Compact DN50-DN200 - pressure independent balancing & control valve

Technical data DN200

Valve

Valve housing:	GJS-400 PN16/PN25
DP controller:	Stainless steel
Spring:	Stainless steel
Diaphragm:	Reinforced EPDM
O-rings:	EPDM
Pressure class:	PN16/25
Stroke DN200	43 mm
Flange connections:	ISO 7005-2/EN 1092-2
Max. differential pressure:	800 kPa
Medium temperature range:	0°C to 110°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 DN200

Dim.		DN200
		ISO
Dimensions mm	L	600
	L1	470
	H	209
	H1	524
	H2	650
	D	380
Weight kg		175

Flow

Dim.		DN200	
Type		LF	HF
Flow	m ³ /h	95 - 210	130 - 280
	l/s	26.39 - 58.33	36.11 - 77.78
	gpm	418 - 925	572 - 1233

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Technical data actuators

Characteristics:	Electrical, modulating, normally closed
Protection class:	IP 54 to EN 60529
Frequency:	50/60 Hz
Supply voltage:	24V AC
Control signal:	0-10V DC or 3 position
Actuating force:	800 N/1500 N
Stroke max:	52 mm, selfcalibrating
Running time:	30 s
Ambient operating conditions:	-10°C to 50°C
Manual operation:	Manual handle
Cable:	Not included
Weight:	1.80 kg



Types and operation data actuators

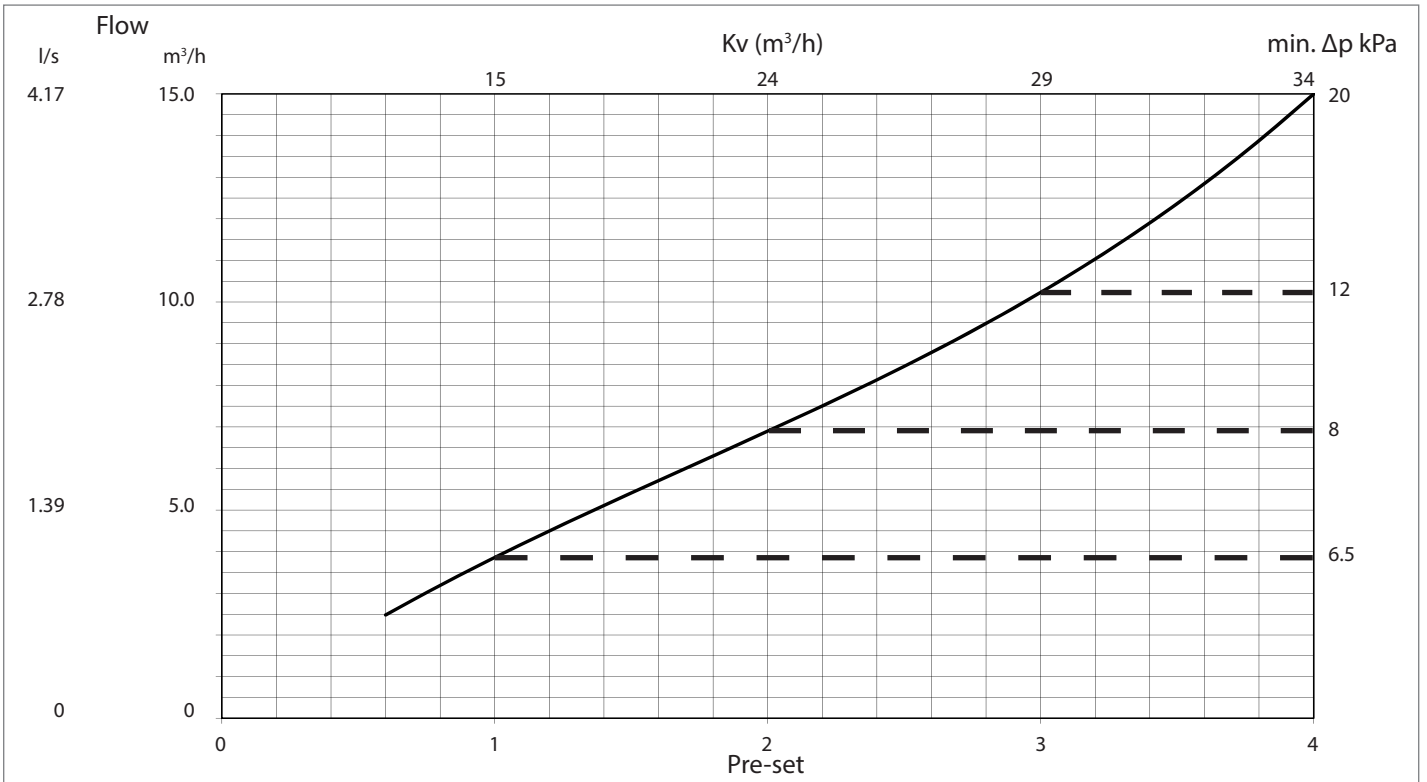
Type	Valve Dimension	Function	Supply voltage	Power Consumption
Type-02	DN50-125	0..10 V / 3-pos	24 V AC +25%/- 35%	15 VA
Type-03	DN150-200	0..10 V / 3-pos	24 V AC +25%/- 20%	24 VA

Product program

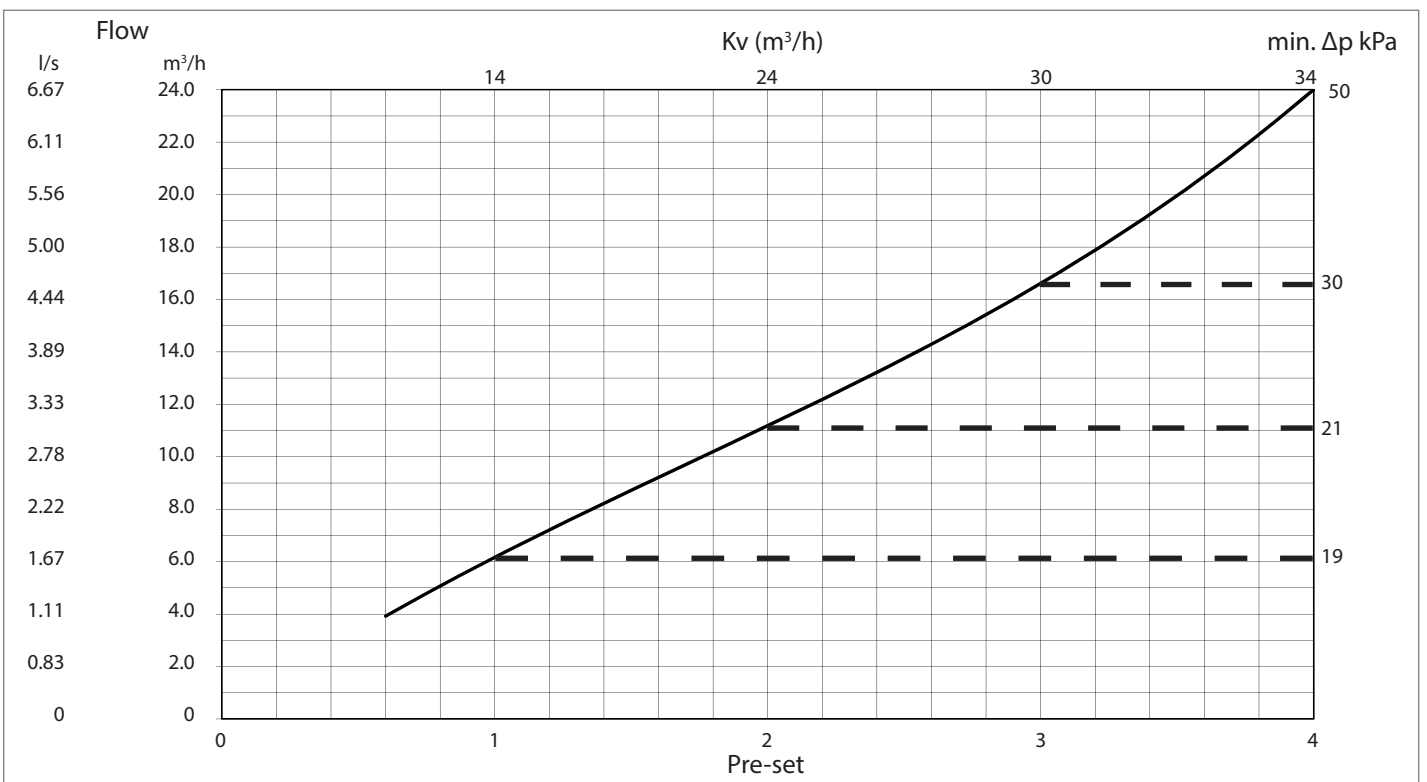
Dim.	Type	Flow m ³ /h	PN16	PN25
DN50	Low Flow	2.5 - 15.0	53-1200-02	53-1220-02
	High Flow	3.9 - 24.0	53-1210-02	53-1230-02
DN65	Low Flow	4.4 - 25.0	53-1201-02	53-1221-02
	High Flow	5.9 - 35.0	53-1211-02	53-1231-02
DN80	Low Flow	5.3 - 34.0	53-1202-02	53-1222-02
	High Flow	7.0 - 43.0	53-1212-02	53-1232-02
DN100	Low Flow	12.1-68.0	53-1203-02	53-1223-02
	High Flow	14.8-90.0	53-1213-02	53-1233-02
DN125	Low Flow	18.5-110.0	53-1204-02	53-1224-02
	High Flow	23.0-135.0	53-1214-02	53-1234-02
DN150	Low Flow	25.6-148.0	53-1205-03	53-1225-03
	High Flow	32.0-195.0	53-1215-03	53-1235-03
DN200	Low Flow	95.0 - 210.0	53-1206-03	53-1226-03
	High Flow	130.0 - 280.0	53-1216-03	53-1236-03

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Frese OPTIMA Compact Low Flow DN50

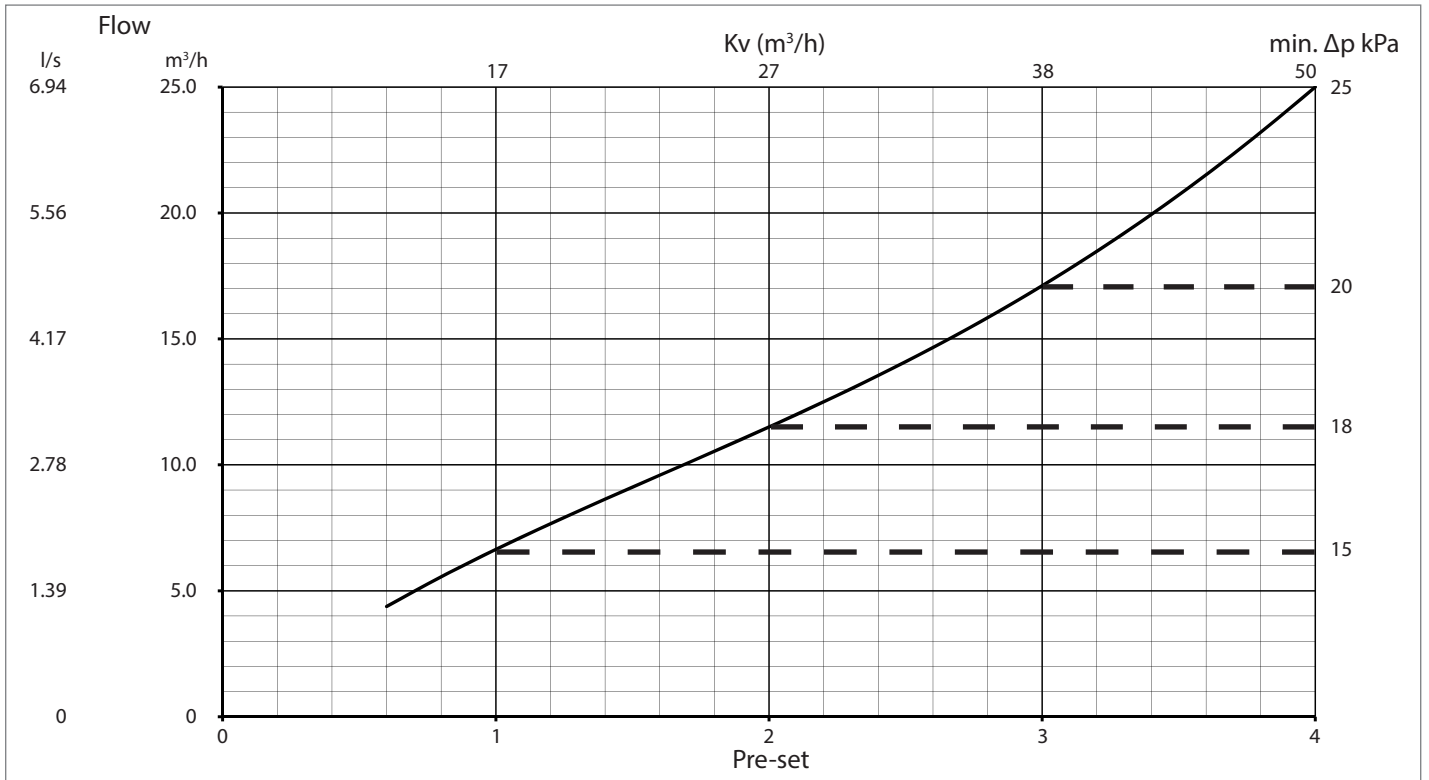


Frese OPTIMA Compact High Flow DN50

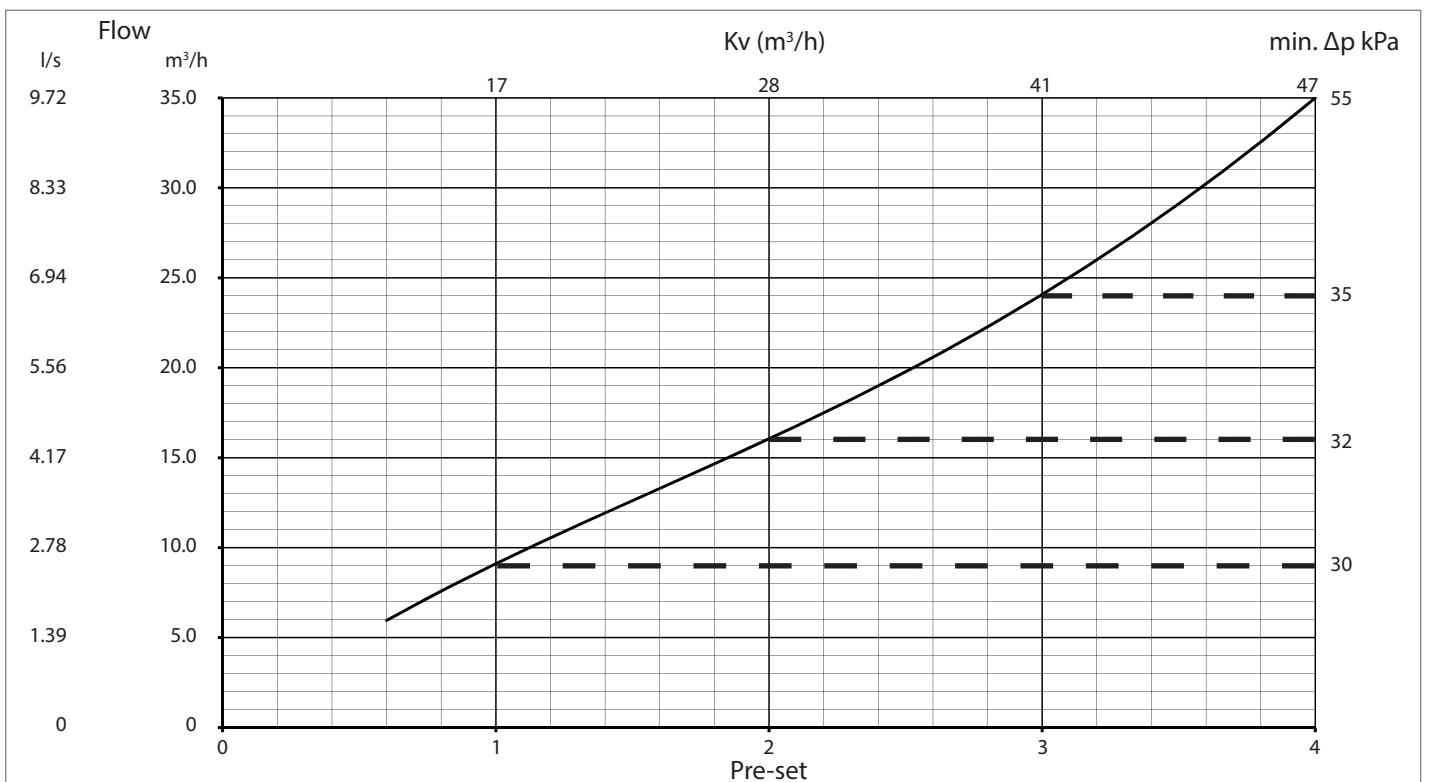


Frese OPTIMA Compact DN50-DN200 - pressure independent balancing & control valve

Frese OPTIMA Compact Low Flow DN65

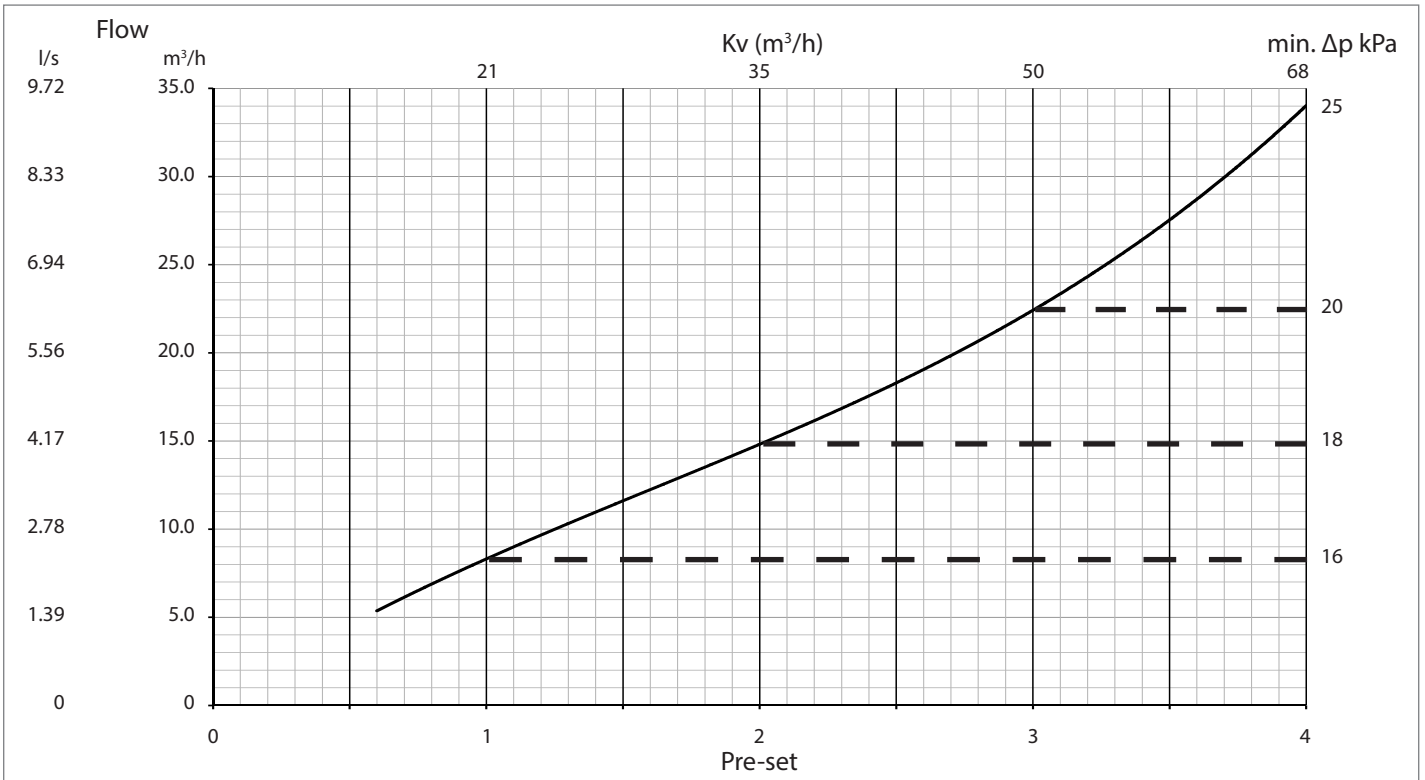


Frese OPTIMA Compact High Flow DN65

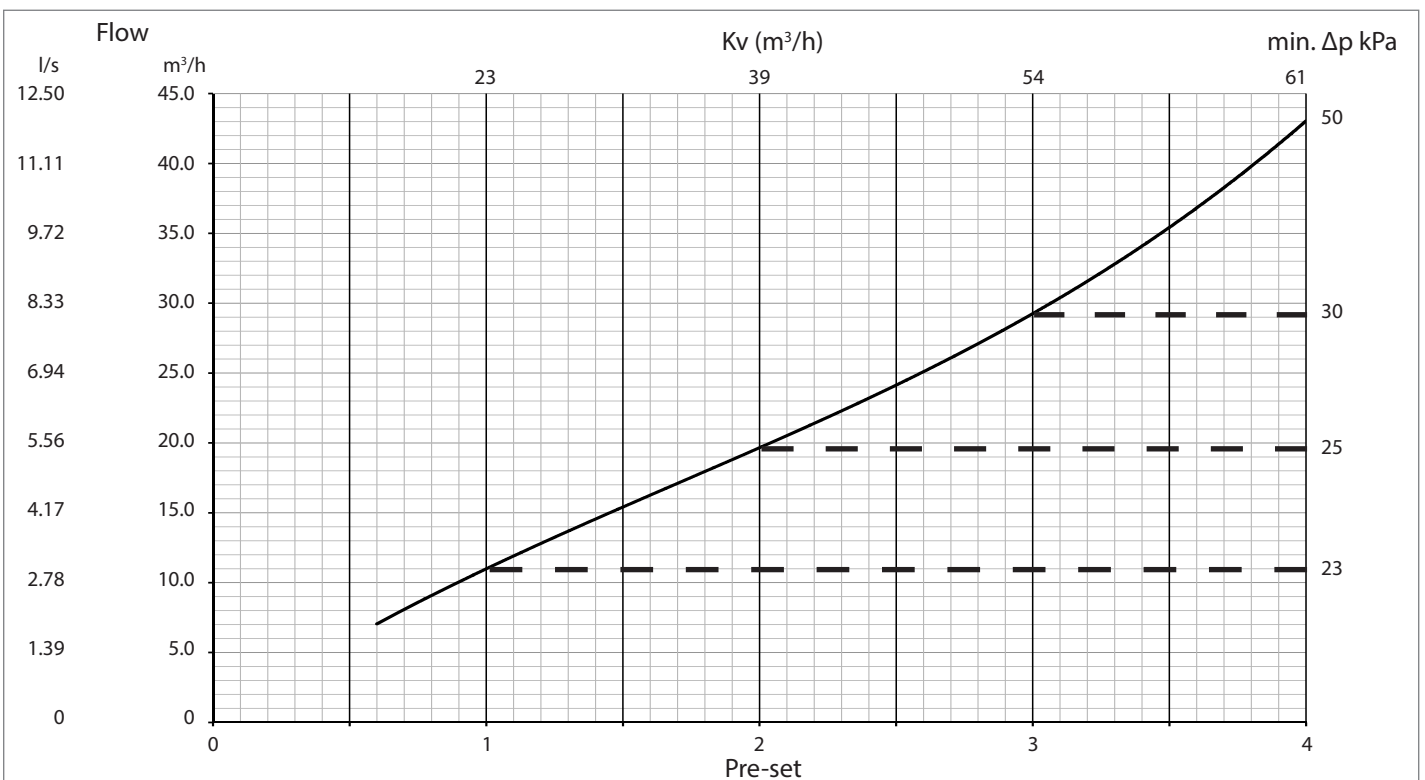


Frese OPTIMA Compact DN50-DN200 - pressure independent balancing & control valve

Frese OPTIMA Compact Low Flow DN80

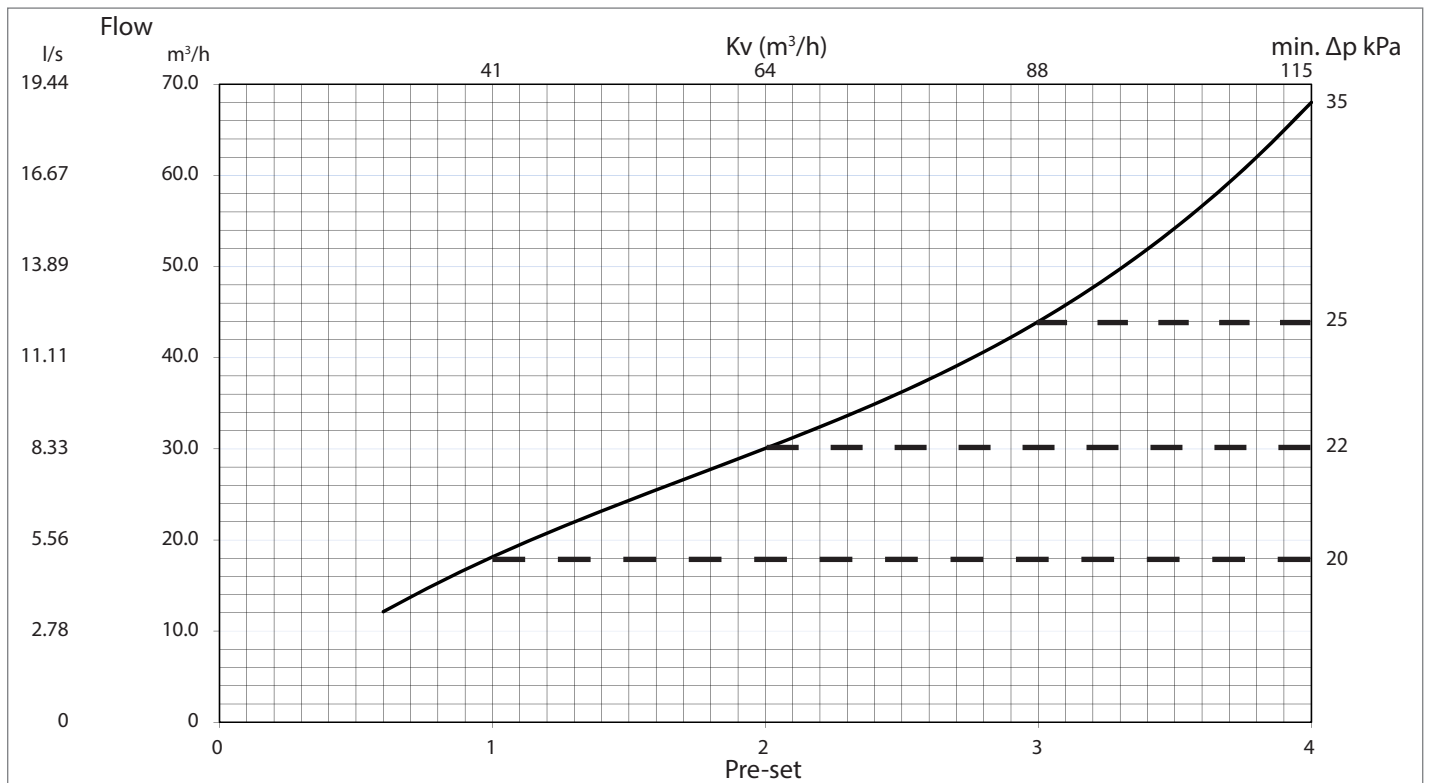


Frese OPTIMA Compact High Flow DN80

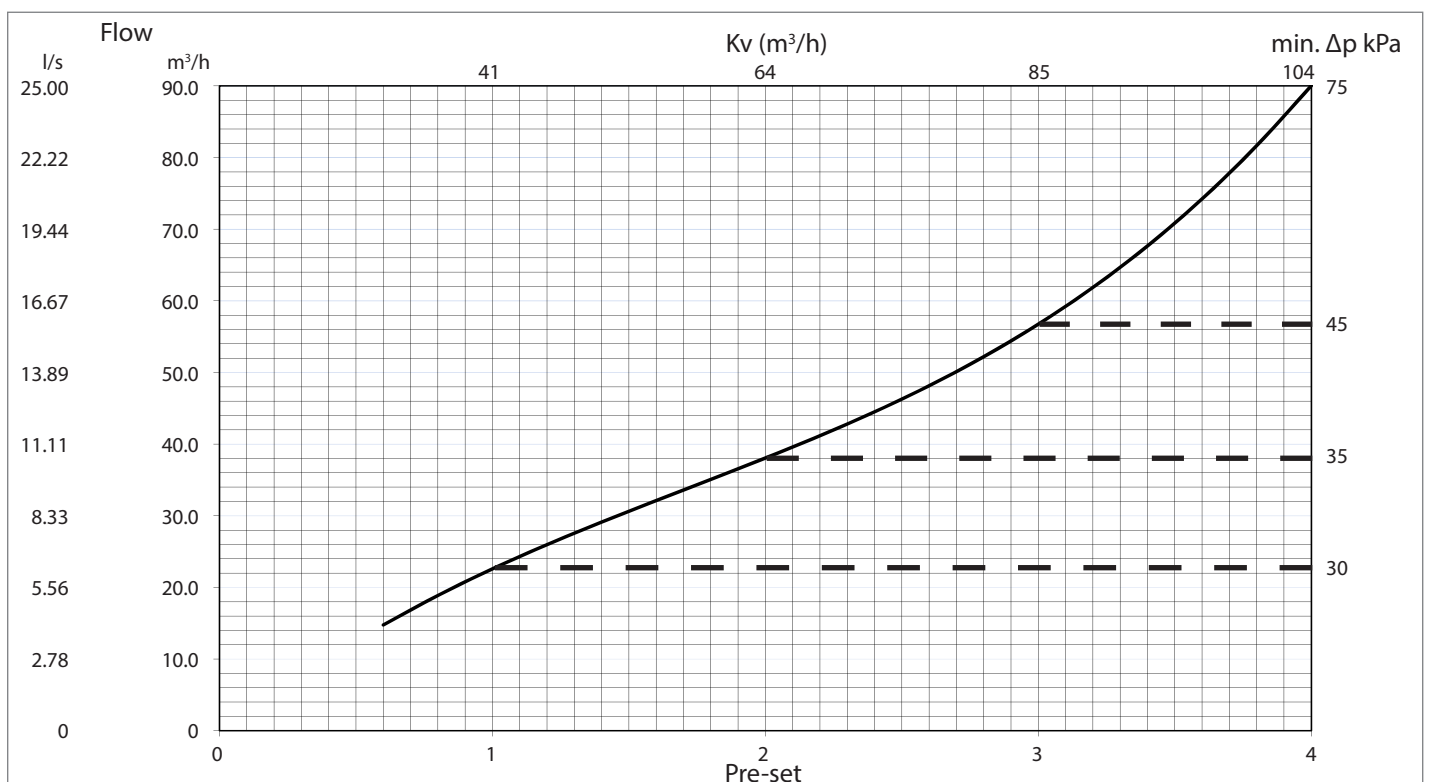


Frese OPTIMA Compact DN50-DN200 - pressure independent balancing & control valve

Frese OPTIMA Compact Low Flow DN100

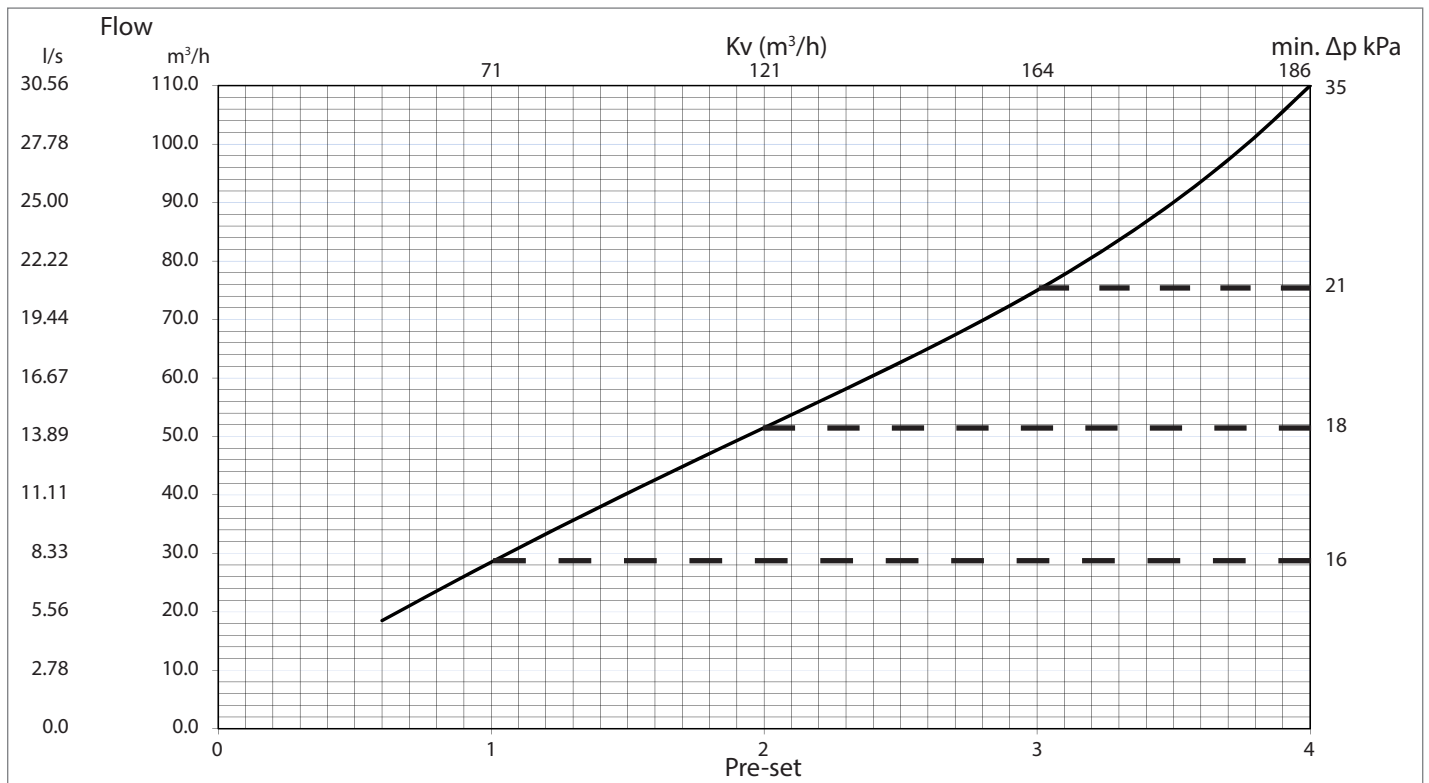


Frese OPTIMA Compact High Flow DN100

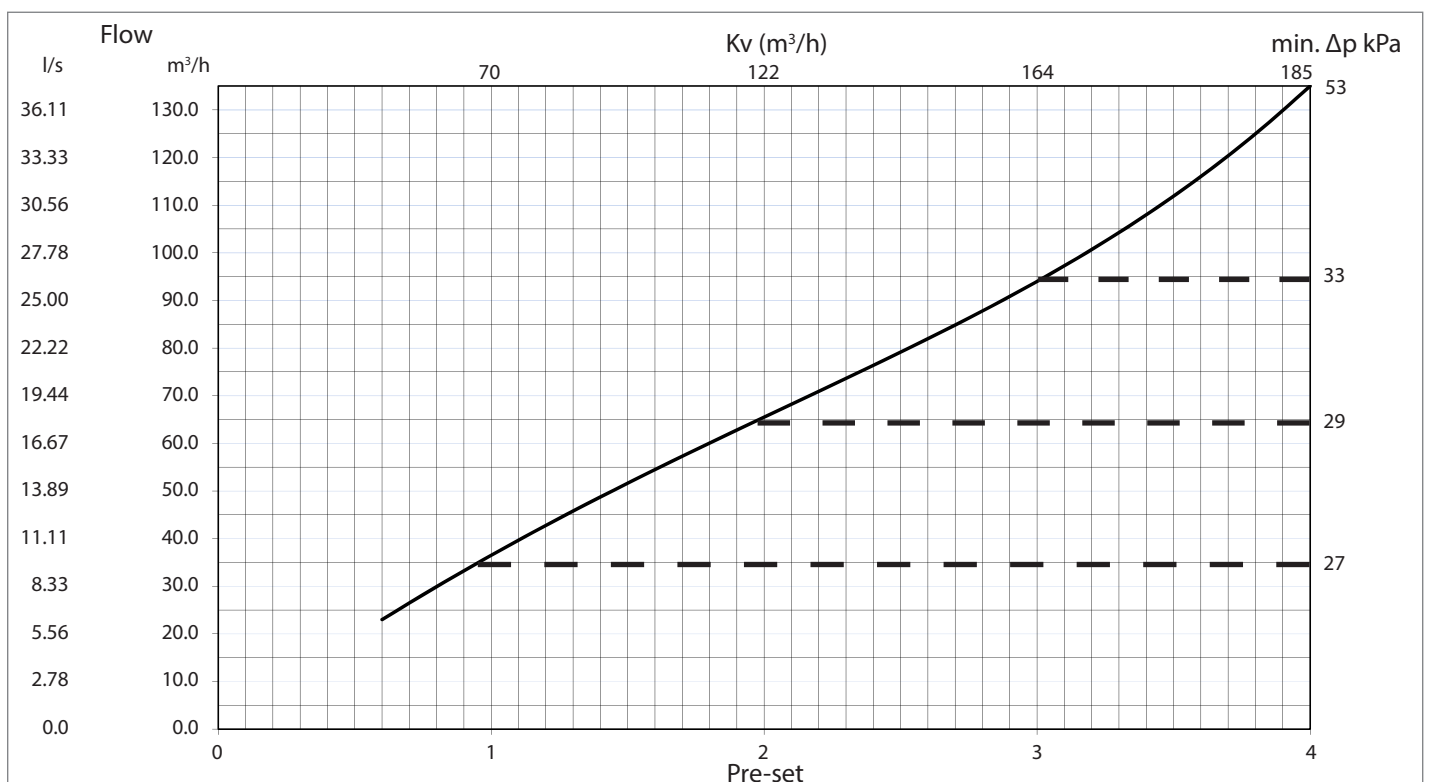


Frese OPTIMA Compact DN50-DN200 - pressure independent balancing & control valve

Frese OPTIMA Compact Low Flow DN125

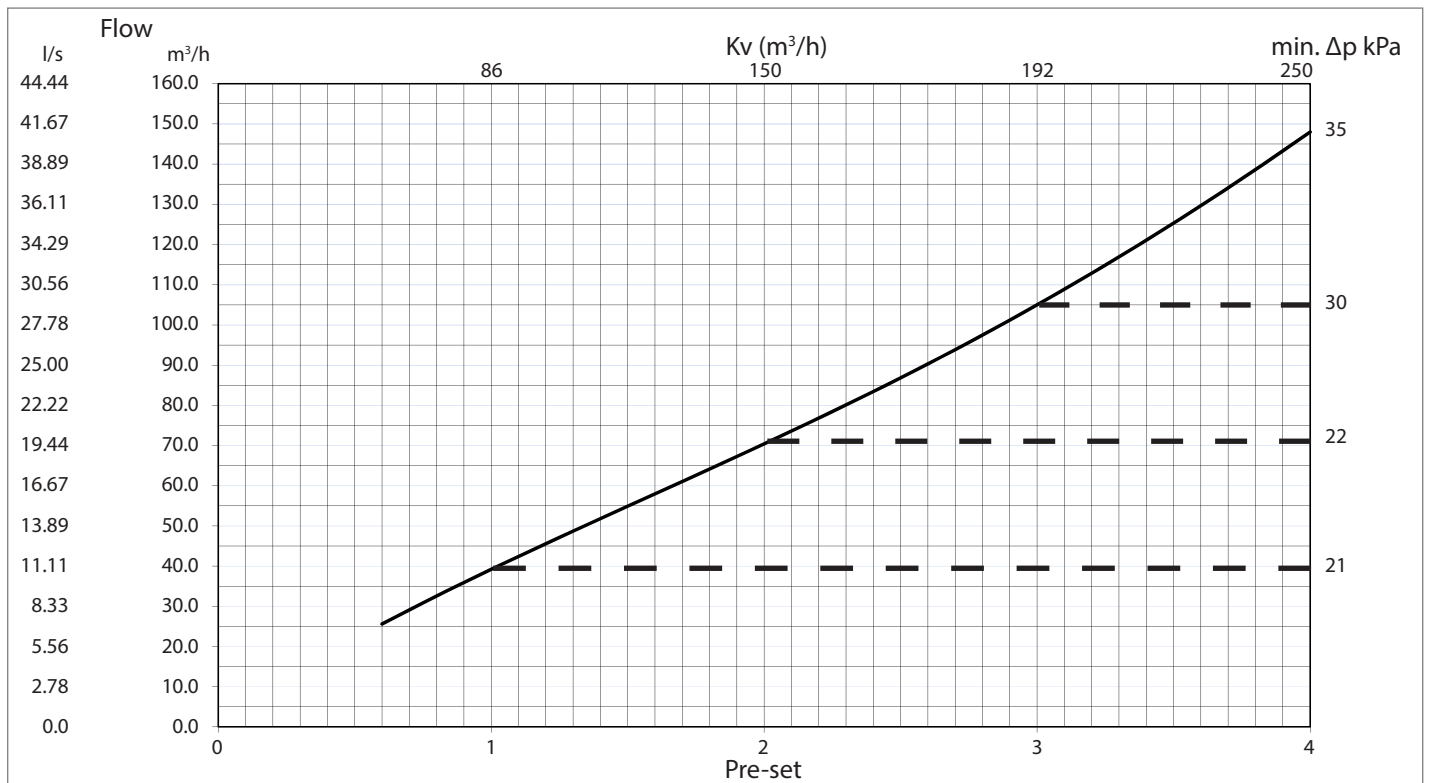


Frese OPTIMA Compact High Flow DN125

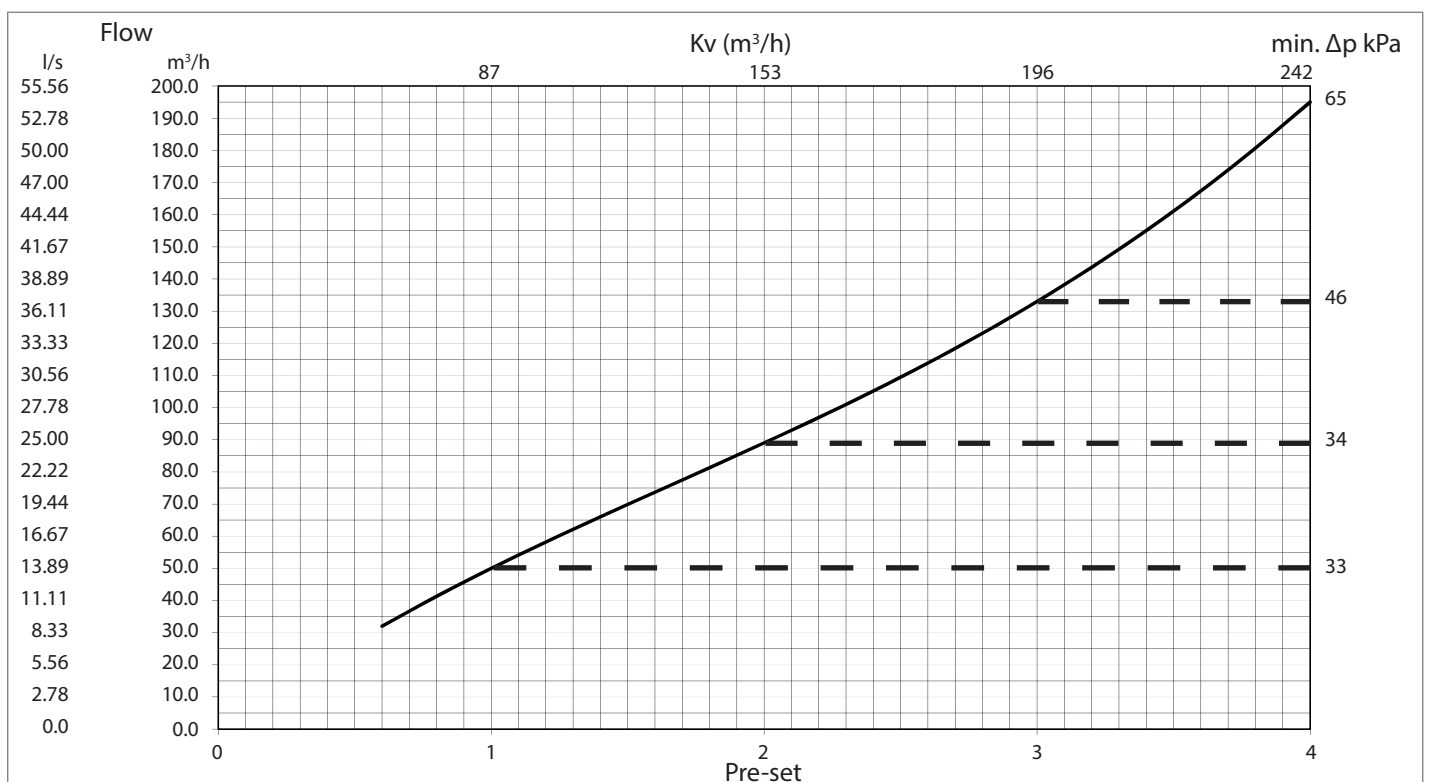


Frese OPTIMA Compact DN50-DN200 - pressure independent balancing & control valve

Frese OPTIMA Compact Low Flow DN150

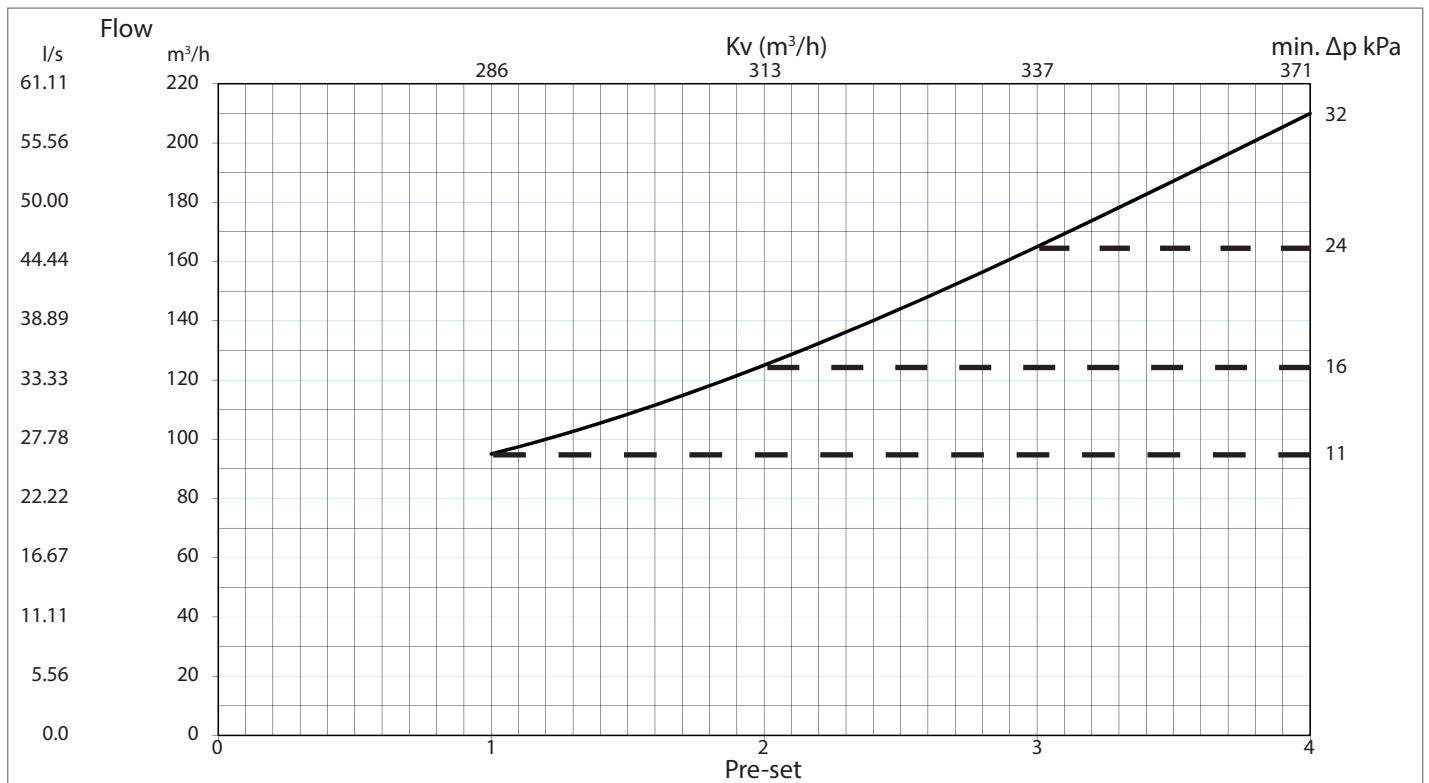


Frese OPTIMA Compact High Flow DN150

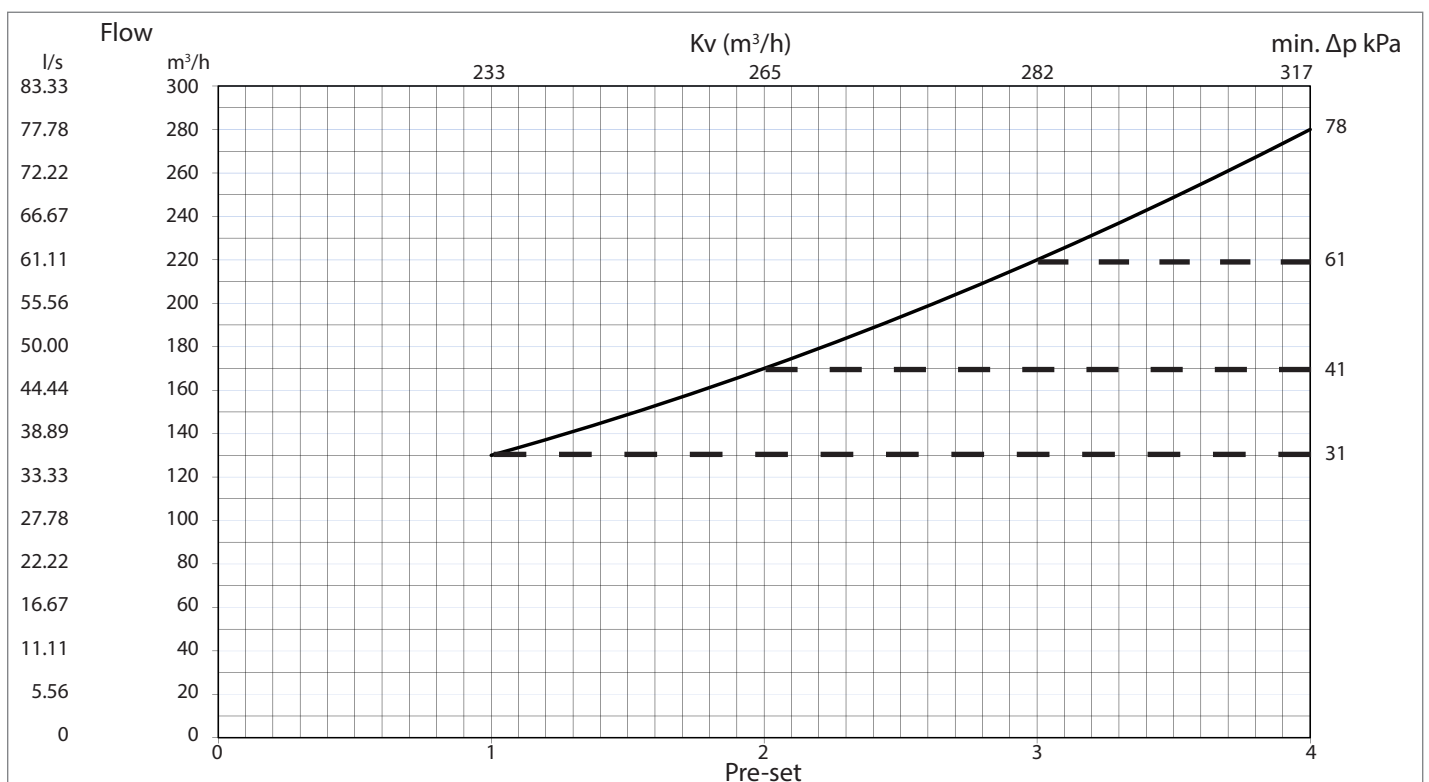


Frese OPTIMA Compact DN50-DN200 - pressure independent balancing & control valve

Frese OPTIMA Compact Low Flow DN200



Frese OPTIMA Compact High Flow DN200



Frese OPTIMA Compact DN50-DN200 - pressure independent balancing & control valve

Setting and Flow DN50-DN65-DN80

Pre-set	OPTIMA Compact DN50 LF			OPTIMA Compact DN50 HF		
	Flow m ³ /h	Flow l/s	Flow gpm	Flow m ³ /h	Flow l/s	Flow gpm
0.6	2.5	0.689	10.92	3.9	1.090	17.28
0.8	3.2	0.887	14.06	5.1	1.410	22.34
1.0	3.9	1.073	17.01	6.2	1.713	27.15
1.2	4.5	1.250	19.81	7.2	2.003	31.75
1.4	5.1	1.420	22.51	8.2	2.285	36.21
1.6	5.7	1.586	25.14	9.2	2.560	40.57
1.8	6.3	1.750	27.74	10.2	2.833	44.90
2.0	6.9	1.916	30.36	11.2	3.107	49.24
2.2	7.5	2.084	33.03	12.2	3.386	53.66
2.4	8.1	2.258	35.79	13.2	3.672	58.20
2.6	8.8	2.441	38.69	14.3	3.970	62.92
2.8	9.5	2.635	41.76	15.4	4.283	67.88
3.0	10.2	2.842	45.04	16.6	4.614	73.13
3.2	11.0	3.065	48.57	17.9	4.967	78.72
3.4	11.9	3.306	52.40	19.2	5.346	84.72
3.6	12.8	3.569	56.56	20.7	5.753	91.17
3.8	13.9	3.855	61.09	22.3	6.192	98.13
4.0	15.0	4.167	66.03	24.0	6.667	105.65

Pre-set	OPTIMA Compact DN65 LF			OPTIMA Compact DN65 HF		
	Flow m ³ /h	Flow l/s	Flow gpm	Flow m ³ /h	Flow l/s	Flow gpm
0.6	4.4	1.216	19.27	6.0	1.654	26.21
0.8	5.6	1.544	24.47	7.6	2.108	33.41
1.0	6.6	1.846	29.25	9.1	2.530	40.09
1.2	7.7	2.129	33.73	10.5	2.929	46.42
1.4	8.6	2.399	38.02	11.9	3.314	52.52
1.6	9.6	2.663	42.21	13.3	3.692	58.52
1.8	10.5	2.927	46.39	14.7	4.072	64.53
2.0	11.5	3.195	50.63	16.0	4.458	70.66
2.2	12.5	3.472	55.03	17.5	4.858	76.99
2.4	13.5	3.763	59.64	19.0	5.277	83.63
2.6	14.7	4.071	64.52	20.6	5.719	90.63
2.8	15.8	4.400	69.73	22.3	6.188	98.07
3.0	17.1	4.753	75.32	24.1	6.688	105.99
3.2	18.5	5.132	81.33	26.0	7.222	114.45
3.4	19.9	5.539	87.78	28.0	7.791	123.47
3.6	21.5	5.976	94.71	30.2	8.397	133.08
3.8	23.2	6.445	102.13	32.5	9.042	143.29
4.0	25.0	6.945	110.06	35.0	9.724	154.11

Pre-set	OPTIMA Compact DN80 LF			OPTIMA Compact DN80 HF		
	Flow m ³ /h	Flow l/s	Flow gpm	Flow m ³ /h	Flow l/s	Flow gpm
0.6	5.3	1.484	23.53	7.0	1.951	30.92
0.8	6.9	1.906	30.21	9.0	2.513	39.83
1.0	8.3	2.301	36.48	11.0	3.043	48.23
1.2	9.6	2.677	42.44	12.8	3.547	56.23
1.4	10.9	3.040	48.19	14.5	4.034	63.94
1.6	12.2	3.396	53.83	16.2	4.510	71.48
1.8	13.5	3.751	59.46	18.0	4.982	78.96
2.0	14.8	4.113	65.19	19.6	5.457	86.49
2.2	16.2	4.486	71.11	21.4	5.943	94.19
2.4	17.6	4.878	77.32	23.2	6.446	102.17
2.6	19.1	5.295	83.93	25.1	6.973	110.53
2.8	20.7	5.744	91.04	27.1	7.533	119.40
3.0	22.4	6.230	98.74	29.3	8.131	128.88
3.2	24.3	6.760	107.15	31.6	8.775	139.09
3.4	26.4	7.341	116.35	34.1	9.473	150.15
3.6	28.7	7.978	126.46	36.8	10.230	162.15
3.8	31.2	8.679	137.57	39.8	11.055	175.22
4.0	34.0	9.450	149.78	43.0	11.954	189.47

Frese OPTIMA Compact DN50-DN200 - pressure independent balancing & control valve

Setting and Flow DN100-DN125-DN150

Pre-set	OPTIMA Compact DN100 LF			OPTIMA Compact DN100 HF		
	Flow m ³ /h	Flow l/s	Flow gpm	Flow m ³ /h	Flow l/s	Flow gpm
0.6	12.1	3.369	53.41	14.8	4.100	64.99
0.8	15.3	4.247	67.32	18.9	5.246	83.15
1.0	18.1	5.040	79.88	22.6	6.276	99.48
1.2	20.8	5.764	91.36	26.0	7.216	114.37
1.4	23.2	6.439	102.06	29.1	8.090	128.22
1.6	25.5	7.083	112.26	32.1	8.924	141.44
1.8	27.8	7.713	122.24	35.1	9.743	154.42
2.0	30.0	8.347	132.30	38.1	10.572	167.57
2.2	32.4	9.004	142.71	41.2	11.438	181.29
2.4	34.9	9.701	153.75	44.5	12.364	195.97
2.6	37.6	10.456	165.73	48.2	13.377	212.03
2.8	40.6	11.288	178.91	52.2	14.501	229.85
3.0	44.0	12.214	193.59	56.7	15.763	249.84
3.2	47.7	13.253	210.05	61.9	17.186	272.41
3.4	51.9	14.422	228.58	67.7	18.798	297.94
3.6	56.7	15.739	249.46	74.2	20.622	326.85
3.8	62.0	17.222	272.98	81.7	22.684	359.54
4.0	68.0	18.891	299.41	90.0	25.009	396.40

Pre-set	OPTIMA Compact DN125 LF			OPTIMA Compact DN125 HF		
	Flow m ³ /h	Flow l/s	Flow gpm	Flow m ³ /h	Flow l/s	Flow gpm
0.6	18.5	5.139	81.45	23.0	6.389	101.26
0.8	23.6	6.543	103.71	29.9	8.312	131.74
1.0	28.5	7.917	125.48	36.5	10.139	160.70
1.2	33.3	9.255	146.69	42.8	11.878	188.26
1.4	38.0	10.558	167.35	48.7	13.539	214.59
1.6	42.6	11.830	187.50	54.5	15.134	239.88
1.8	47.1	13.075	207.24	60.0	16.680	264.38
2.0	51.5	14.305	226.74	65.5	18.194	288.38
2.2	55.9	15.534	246.21	70.9	19.697	312.20
2.4	60.4	16.778	265.94	76.4	21.213	336.23
2.6	65.0	18.059	286.24	82.0	22.767	360.86
2.8	69.8	19.402	307.51	87.8	24.389	386.57
3.0	75.0	20.833	330.20	94.0	26.111	413.86
3.2	80.6	22.385	354.80	100.7	27.966	443.26
3.4	86.7	24.092	381.86	108.0	29.991	475.36
3.6	93.6	25.994	412.01	116.0	32.226	510.79
3.8	101.3	28.133	445.91	125.0	34.714	550.22
4.0	110.0	30.555	484.29	135.0	37.500	594.37

Pre-set	OPTIMA Compact DN150 LF			OPTIMA Compact DN150 HF		
	Flow m ³ /h	Flow l/s	Flow gpm	Flow m ³ /h	Flow l/s	Flow gpm
0.6	25.6	7.111	112.71	32.0	8.889	140.89
0.8	32.6	9.049	143.42	41.3	11.480	181.96
1.0	39.2	10.889	172.59	50.0	13.889	220.14
1.2	45.6	12.660	200.66	58.2	16.162	256.16
1.4	51.8	14.389	228.06	66.0	18.341	290.70
1.6	58.0	16.100	255.18	73.7	20.468	324.42
1.8	64.1	17.815	282.37	81.3	22.583	357.94
2.0	70.4	19.555	309.95	89.0	24.723	391.86
2.2	76.8	21.337	338.20	96.9	26.922	426.71
2.4	83.4	23.177	367.36	105.2	29.214	463.04
2.6	90.3	25.088	397.65	113.9	31.630	501.33
2.8	97.5	27.081	429.24	123.1	34.198	542.04
3.0	105.0	29.166	462.28	133.0	36.945	585.59
3.2	112.9	31.348	496.87	143.6	39.897	632.37
3.4	121.1	33.632	533.07	155.1	43.076	682.75
3.6	129.7	36.021	570.94	167.4	46.502	737.05
3.8	138.7	38.515	610.46	180.7	50.194	795.57
4.0	148.0	41.110	651.59	195.0	54.168	858.56

Frese OPTIMA Compact DN50-DN200 - pressure independent balancing & control valve

Setting and Flow DN200

Pre-set	OPTIMA Compact DN200 LF			OPTIMA Compact DN200 HF		
	Flow m ³ /h	Flow l/s	Flow gpm	Flow m ³ /h	Flow l/s	Flow gpm
1.0	95	26.39	418	130	36.11	572
1.2	100	27.77	440	137	38.11	604
1.4	105	29.30	464	145	40.22	638
1.6	112	30.98	491	153	42.44	673
1.8	118	32.79	520	161	44.78	710
2.0	125	34.72	550	170	47.22	748
2.2	132	36.77	583	179	49.78	789
2.4	140	38.91	617	189	52.44	831
2.6	148	41.14	652	199	55.22	875
2.8	156	43.46	689	209	58.11	921
3.0	165	45.83	726	220	61.11	969
3.2	174	48.27	765	231	64.22	1018
3.4	183	50.74	804	243	67.44	1069
3.6	192	53.26	844	255	70.78	1122
3.8	201	55.79	884	267	74.22	1176
4.0	210	58.33	925	280	77.78	1233

