

Frese OPTIMA Compact NPT 1/2" to 2" - 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 Fan Coil Units, Chilled Beams or other terminal unit applications.

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 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

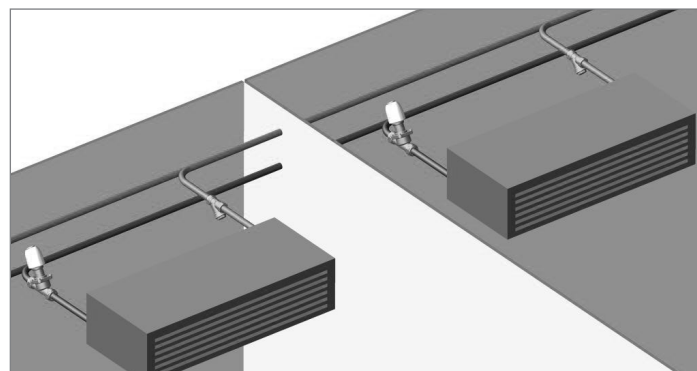
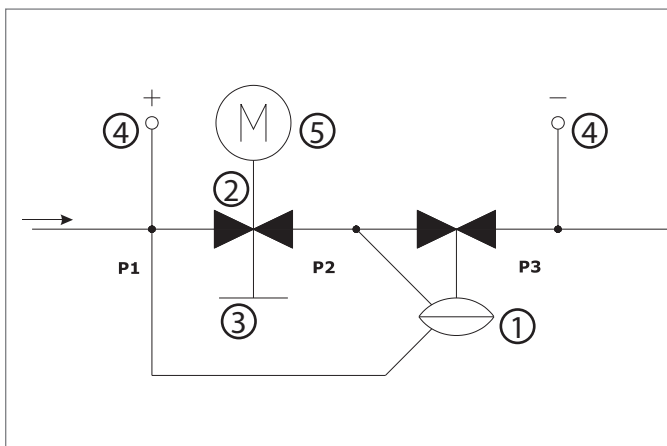
- High comfort for the end-users due to high precision temperature control
- Longer life due to less movements of the actuator



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.
- Thermic actuator On/Off or 0-10V, normally closed.
- Motoric actuator 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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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 (1/2" to 2") can operate to a maximum differential pressure of 800 kPa (8 bar)

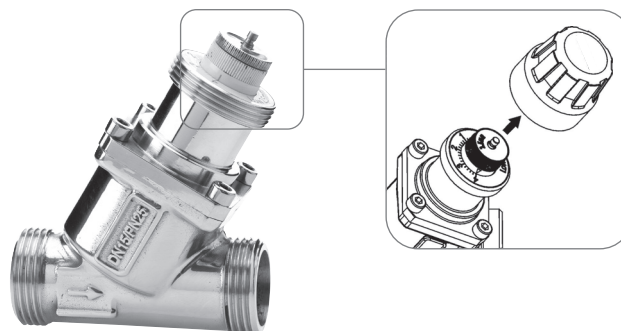
Close Off Pressure

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

- 1/2" to 1": 600 kPa (6 bar) - based on 100N actuator force
- 1" L to 1-1/4": 800 kPa (8 bar) - based on 100N actuator force
- 1-1/2" to 2": 800 kPa (8 bar) - based on 400N actuator force

Isolation

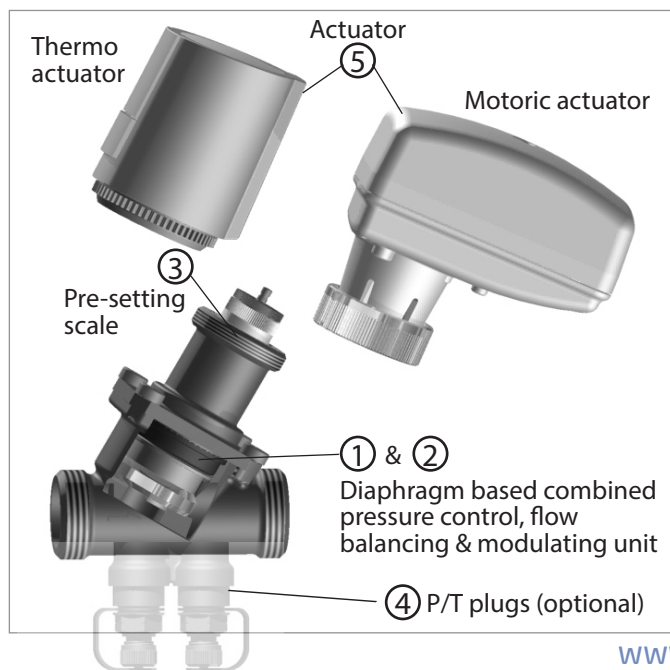
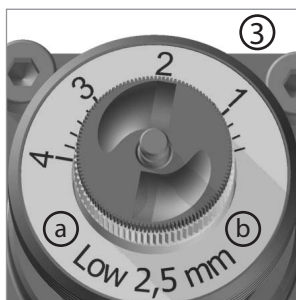
When fitted with the isolation cap (1/2" to 1-1/4" only), the Frese OPTIMA Compact is capable of isolation to 10 bar.



Design

The design of Frese 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 (Optional)
- 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.

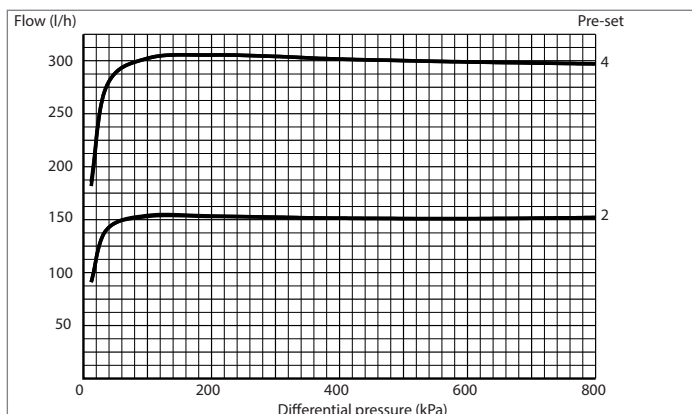
With the Frese OPTIMA Compact, there are two independent movements for the presetting and the modulating function. During presetting, the inlet area moves radially without interfering with the length of the stroke. During modulating, the inlet area moves axial taking advantage of the full stroke.

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.

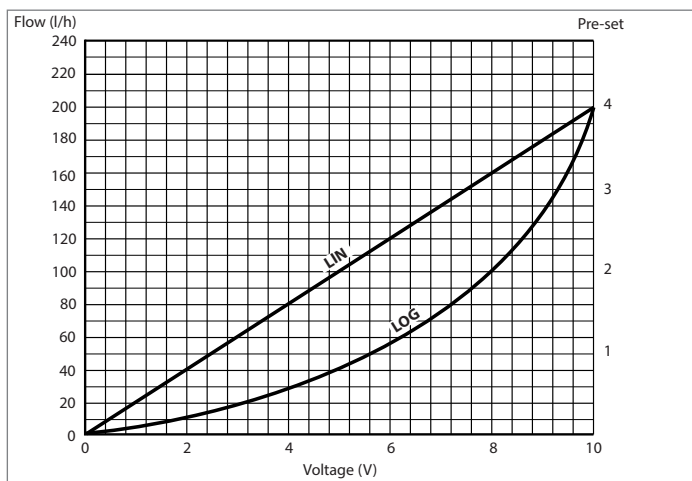
Flow rate vs. Differential Pressure

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



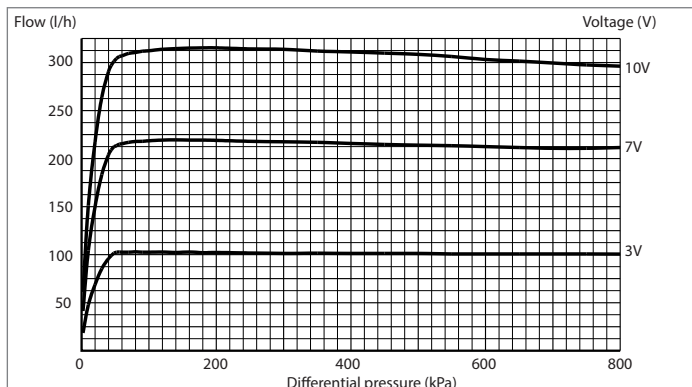
Flow rate vs. Voltage

Preset flow: 200 l/h



Flow rate vs. Differential Pressure

Voltage: 10V, 7V, 3V



Frese OPTIMA Compact NPT 1/2" to 2" - pressure independent balancing & control valve

Technical data

Valve housing:

1/2", 3/4", 1", 1-1/4"
1-1/2", 2"

DP controller:

Spring:

Diaphragm:

O-rings:

Pressure class:

Max. differential pressure:

Medium temperature range:

Thread

DZR Brass

Ductile Iron

PPS 40% glass

Stainless steel

HNBR

EPDM

PN25

800 kPa

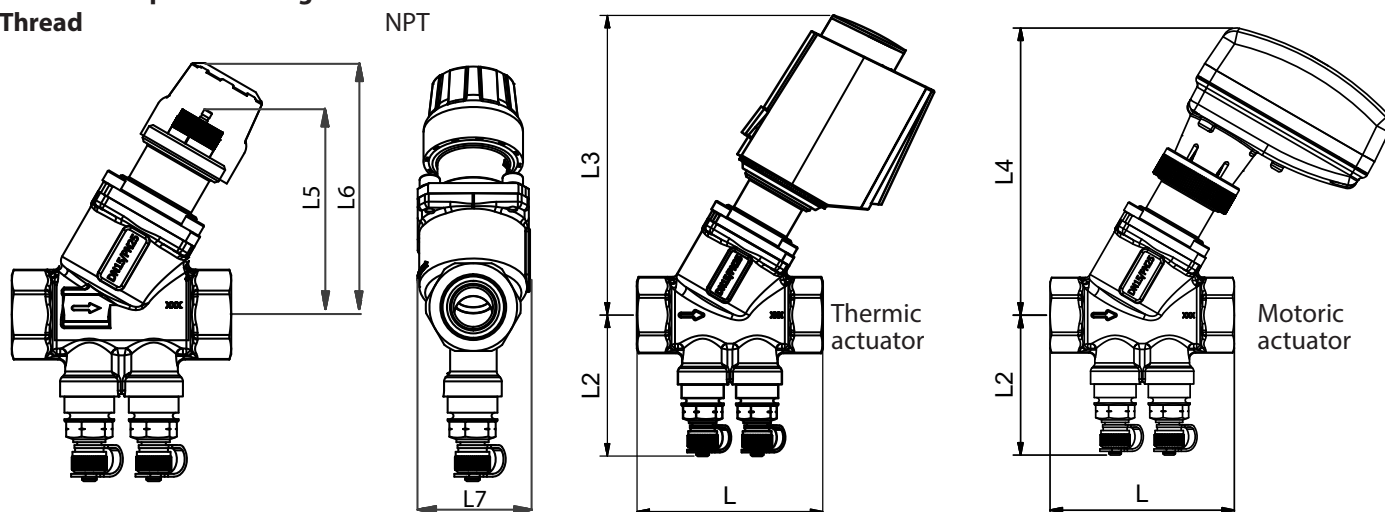
0°C to 120°C

NPT

The pipe system shall be properly ventilated to avoid risk of air pockets. Glycolic mixtures up to 50% are applicable (both ethylene and propylene).

Recommendation: Water treatment to VDI 2035.

Frese A/S can accept no responsibility if another actuator is used instead of the Frese actuator.



Dimension & Weight

Dim.		1/2"	3/4"	1"/1"L	1-1/4"	1-1/2"	2"
Thread		G 1/2	G 3/4	G 1	G 1-1/4	G 1-1/2	G 2
Length mm	L	75	79	83/ 100	104	138	138
	L2	57	57	59/ 63	68	71	77
	L3	121	121	124/ 139	139	-	-
	L4	117	117	120/ 135	135	264	264
	L5	68	68	68/ 85	85	143	143
	L6	83	83	83/ 100	100	-	-
	L7	38	38	38/ 63	63	90	90
Weight kg		0.52	0.54	0.65/ 1.14	1.27	3.28	3.71

Flow

Dim.		1/2"		1/2" - 3/4"		3/4"	1"	1"L	1-1/4"	1-1/2"	2"
Type		Low		High		High	Low	High	-	-	-
Stroke	mm	2.5	5.0	2.5	5.0	5.5	5.5	5.5	5.5	15	15
Flow	l/h	30 - 200	65 - 370	100 - 575	220 - 1330	300-1800	280-1800	600-3609	550-4001	1370-9500	1400-11500
	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

Frese OPTIMA Compact NPT 1/2" to 2" - pressure independent balancing & control valve

Technical data actuators 1/2", 3/4", 1", 1-1/4"

Characteristics:	Thermic, normally closed
Protection class:	IP 54 to EN 60529
Frequency AC:	50/60 Hz
Control signal:	0-10V AC/DC or On/Off
Actuating force:	100 N
Stroke:	2.5 - 5.0 - 5.5 mm
Running time:	30 s/mm 0-10V/180 s On/Off
Ambient operating conditions:	0°C to 60°C
Cable length:	1.0 m
Weight:	100 g

On/Off actuator 2.5 mm stroke, 24V AC/DC/ On/Off 180s	48-5525
On/Off actuator 2.5 mm stroke 230V AC/ On/Off 180s	48-5526
On/Off actuator 5.0-5.5 mm stroke, 24V AC/DC/ On/Off 180s	48-5527
On/Off actuator 5.0-5.5 mm stroke 230V AC/ On/Off 180s	48-5528
Modulating actuator 2.5-5.0-5.5 mm stroke 24V AC/0-10V DC 30 s/mm	48-5529

Characteristics:	Motoric, modulating
Protection class:	IP 43 to EN 60529
Frequency AC:	50/60 Hz
Control signal:	0-10V DC or 3 position
Actuating force:	120 N
Stroke max:	5.5 mm (Dip switch setting 2.5-5.0-5.5mm)
Running time 5.5 mm:	75 s 0-10V / 150 s 3-pos
Ambient operating conditions:	+1°C to 50°C
Cable length:	1.5 m
Weight:	215 g

Modulating actuator 5.0 - 5.5 mm, 24V AC/DC/ 0-10V DC/ 8 s/mm	53-1180
Modulating actuator 2.5 - 5.0 - 5.5 mm, 24 V AC/ 3 pos / 13 s/mm	53-1181
Modulating actuator 2.5 - 5.0 - 5.5 mm, 230 V AC/ 3 pos. / 13 s/mm	53-1182
Modulating actuator 2.5 mm, 24V AC/DC/ 0-10V DC/ 8 s/mm	53-1183



Technical data actuator 1-1/2", 2" - actuator included with the valve

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:	400 N
Stroke max:	32 mm, selfcalibrating
Running time:	60 s
Ambient operating conditions:	-10°C to 50°C
Manual operation:	Manual handle
Cable:	Not included
Weight:	1.80 kg



Frese OPTIMA Compact NPT 1/2" to 2" - pressure independent balancing & control valve

Actuator requirements 1/2", 3/4", 1", 1-1/4"

Dimension "X" in closed position

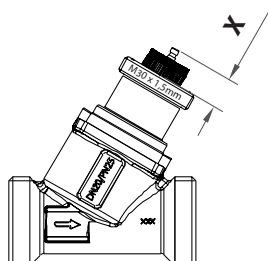
2.5 mm stroke = 11.4 mm

5.0 mm stroke = 9.3 mm

5.5 mm stroke = 8.8 mm

Actuator minimum force: 100N

Actuator connection: M30 x 1,5mm



Combination matrix: Frese OPTIMA Compact 1/2", 3/4", 1", 1-1/4" / Actuators

Frese OPTIMA Compact can be combined with both Thermo actuators and Motoric actuators.

The design of the valve, combined with the Frese actuator, produces a perfect control characteristic that utilises the full control range of the system.

					Thermo Actuators				Motoric Actuators			
												
					On/Off		0.....10V		0.....10V		3-pos	
NPT	Type	Stroke	Flow l/h	Dim								
 	1/2" LOW 2.5	2.5	30-200	1/2"	•	•			•	•		•
	1/2" LOW 5.0	5.0	65-370	1/2"			•	•	•		•	•
	1/2" HIGH 2.5	2.5	100-575	1/2"	•	•			•	•		•
	1/2" HIGH 5.0	5.0	220-1330	1/2"			•	•	•		•	•
	3/4" HIGH 2.5	2.5	100-575	3/4"	•	•			•	•		•
	3/4" HIGH 5.0	5.0	220-1330	3/4"			•	•	•		•	•
	3/4" HIGH 5.5	5.5	300-1800	3/4"			•	•	•		•	•
	1" LOW 5.5	5.5	280-1800	1"			•	•	•		•	•
	1" L HIGH 5.5	5.5	600-3609	1"			•	•	•		•	•
	1-1/4" 5.5	5.5	550-4001	1-1/4"			•	•	•		•	•

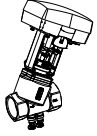
Frese OPTIMA Compact NPT 1/2" to 2" - pressure independent balancing & control valve

Types and operation data actuator 1-1/2" to 2"

Type	Valve Dimension	Function	Supply voltage	Power Consumption
Type-01	1-1/2" to 2"	0-10 V / 3-pos	24 V AC +/-25% 24V DC +/- 10%	6 VA (*30VA)

*) Max consumption - for transformer sizing

Product programme

Dim.	Type	Flow l/h	 NPT PT plugs excl. actuator	 NPT PT plugs incl. actuator
1/2"	Low 2.5 mm	30-200	53-1390	-
	Low 5.0 mm	65-370	53-1391	-
	High 2.5 mm	100-575	53-1392	-
	High 5.0 mm	220-1330	53-1393	-
3/4"	High 2.5 mm	100-575	53-1394	-
	High 5.0 mm	220-1330	53-1395	-
	High 5.5 mm	300-1800	53-1369	-
1"	Low 5.5 mm	280-1800	53-1389	-
1"L	High 5.5 mm	600-3609	53-1396	-
1-1/4"	5.5 mm	550-4001	53-1397	-
1-1/2"	15 mm	1370-9500	53-1398	53-1398-01
2"	15 mm	1400-11500	53-1399	53-1399-01

Accessories

Insulation - for heating applications only

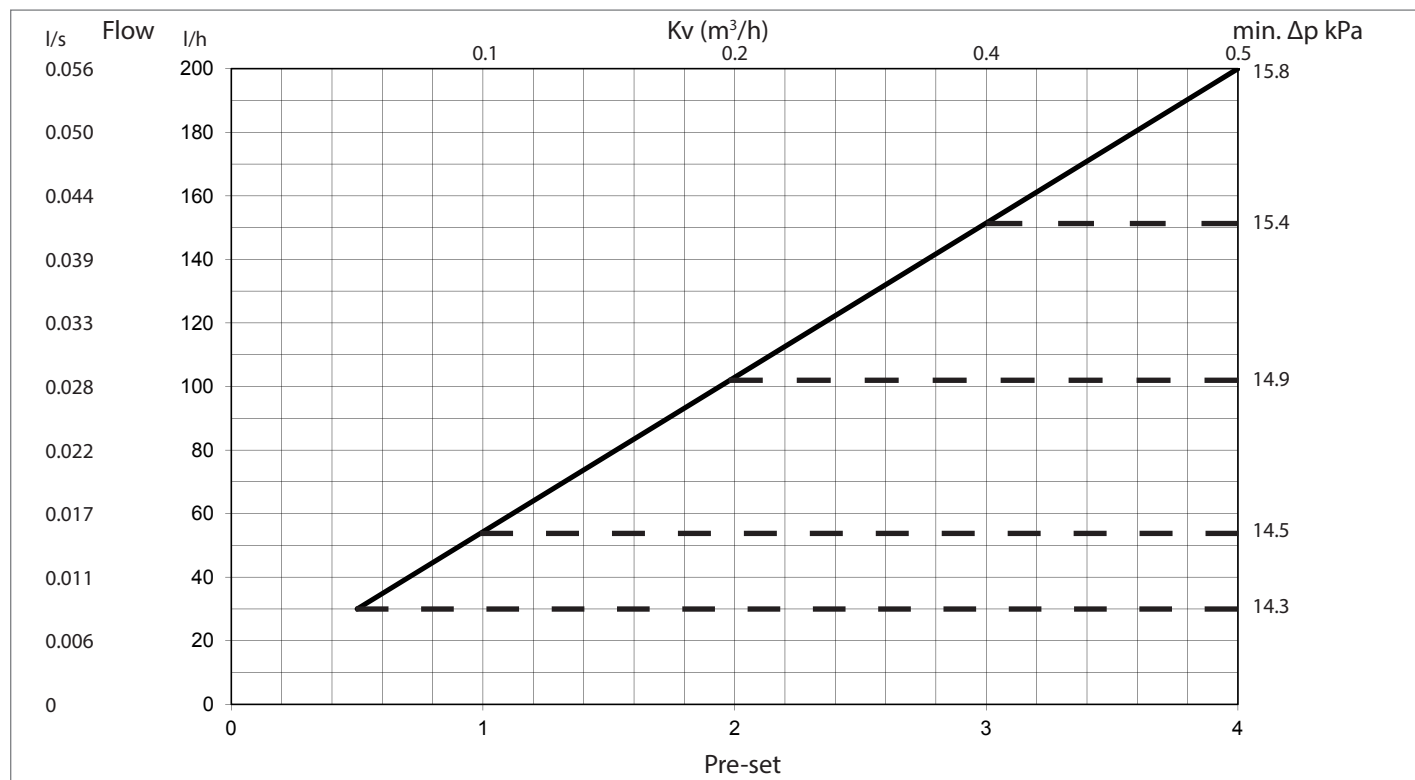
Material: EPP, Max temperature 120°C



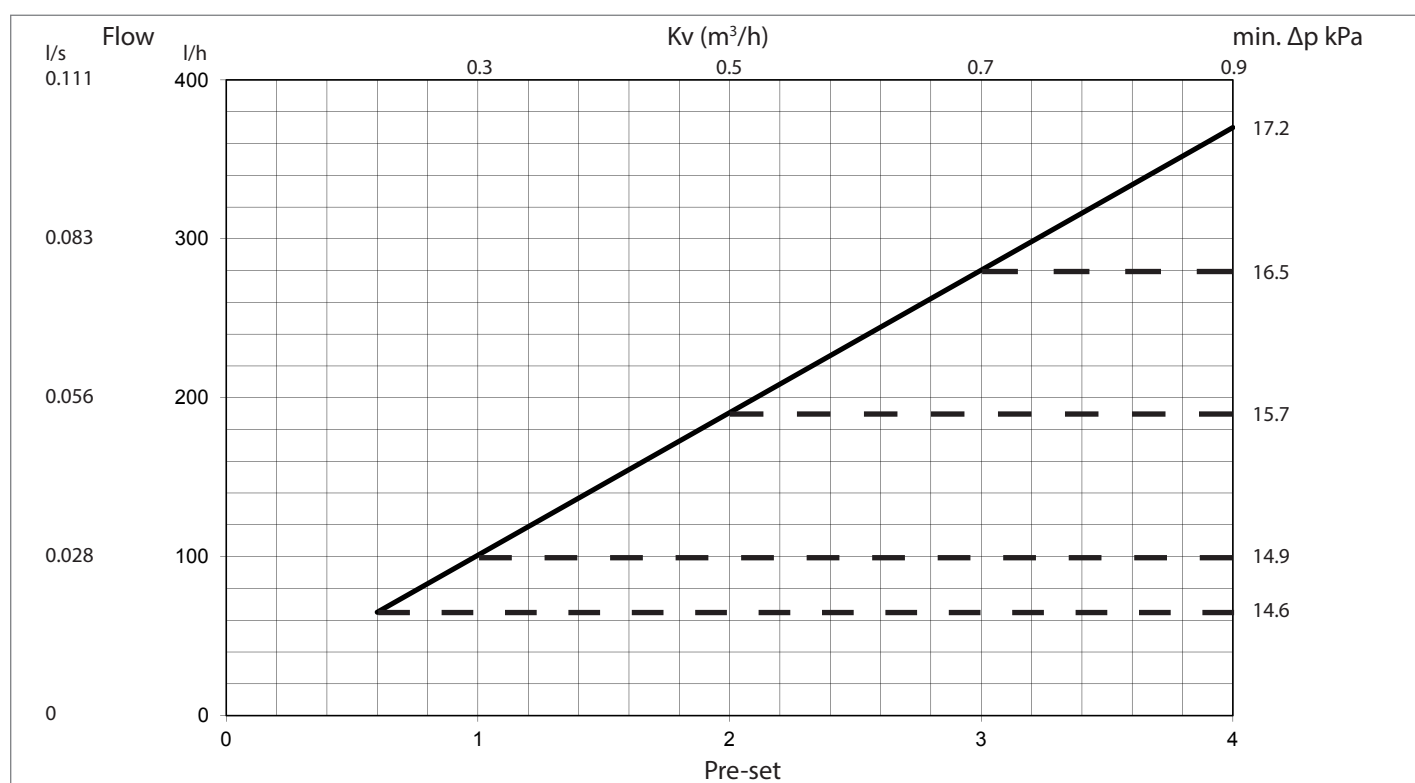
Dim.	
1/2", 3/4"	38-0857
1"	38-0858
1"L, 1-1/4"	38-0859

Frese OPTIMA Compact NPT 1/2" to 2" - pressure independent balancing & control valve

Frese OPTIMA Compact · Low 2.5 1/2"

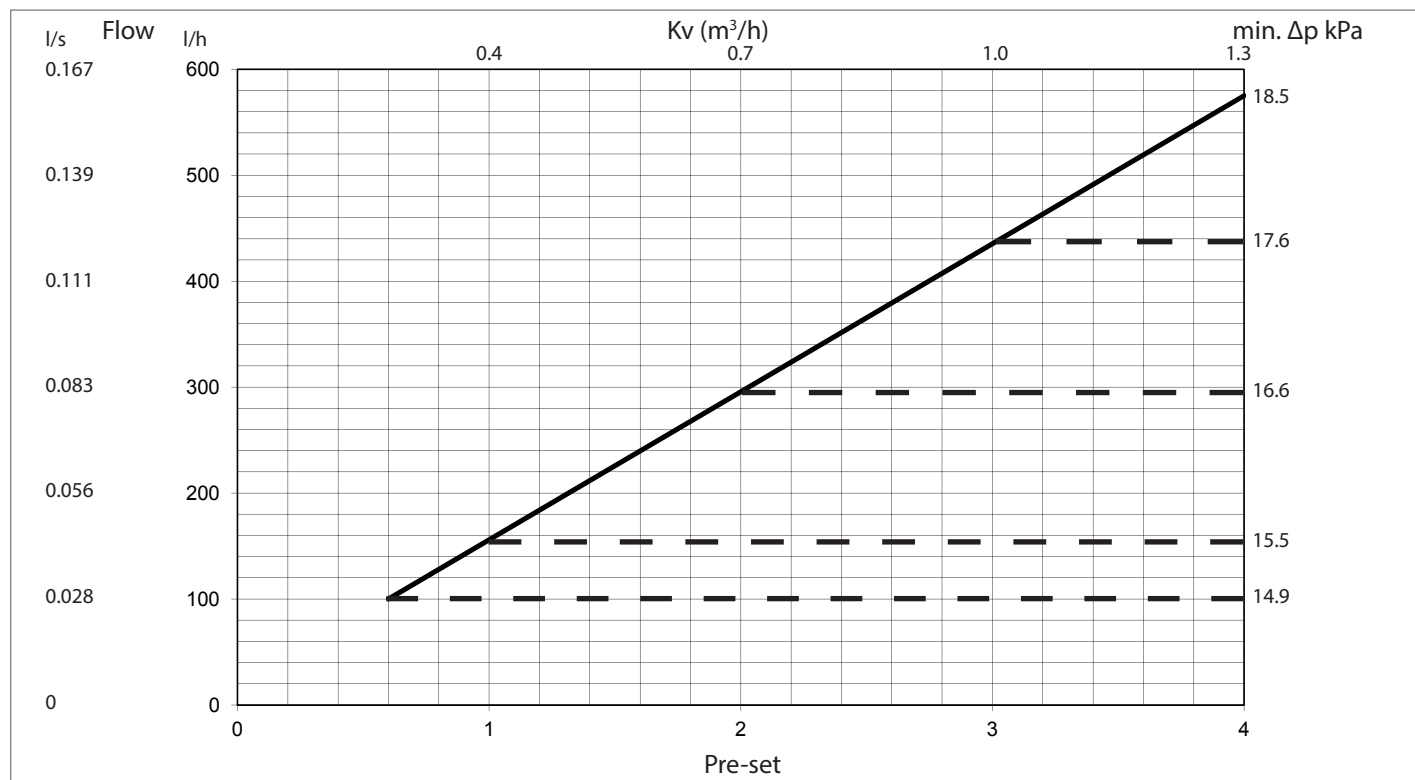


Frese OPTIMA Compact · Low 5.0 1/2"

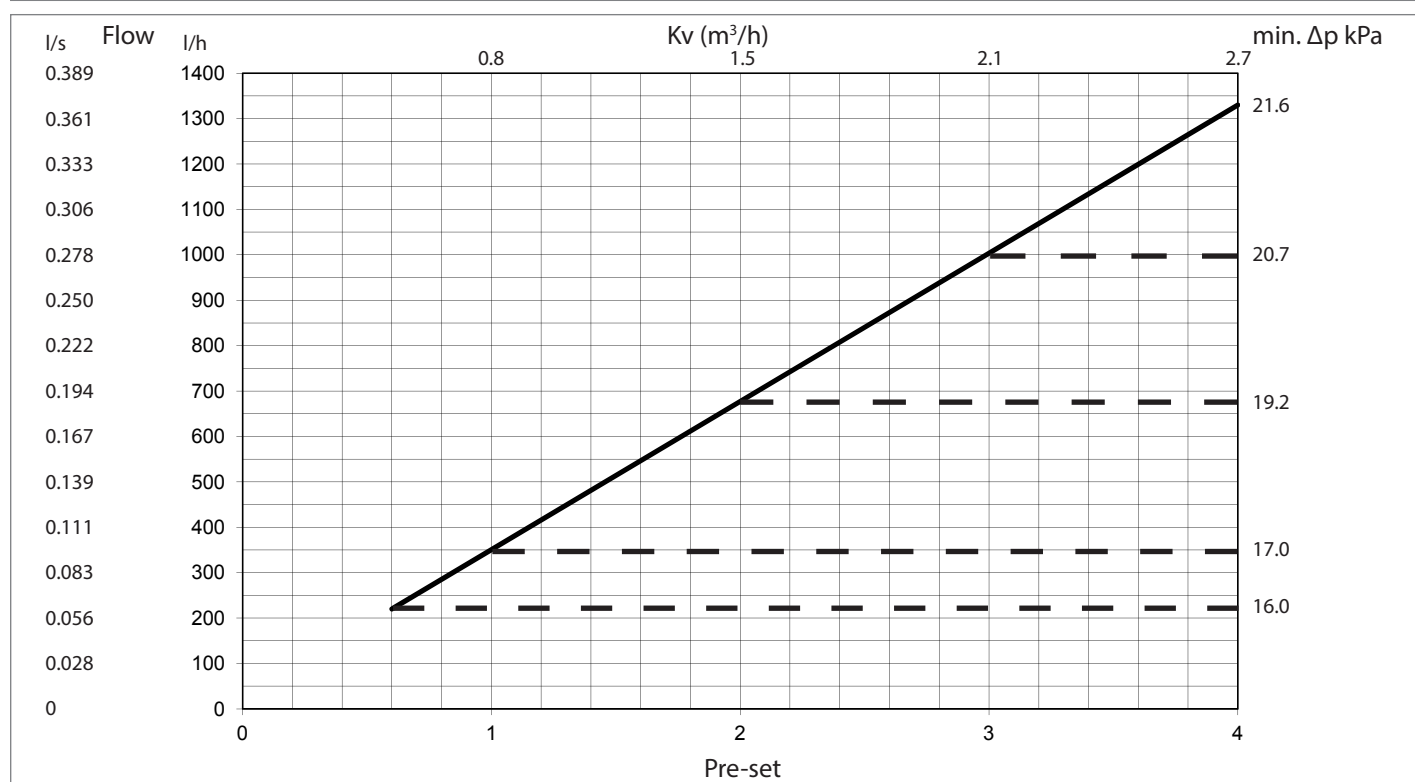


Frese OPTIMA Compact NPT 1/2" to 2" - pressure independent balancing & control valve

Frese OPTIMA Compact · High 2.5 1/2", 3/4"

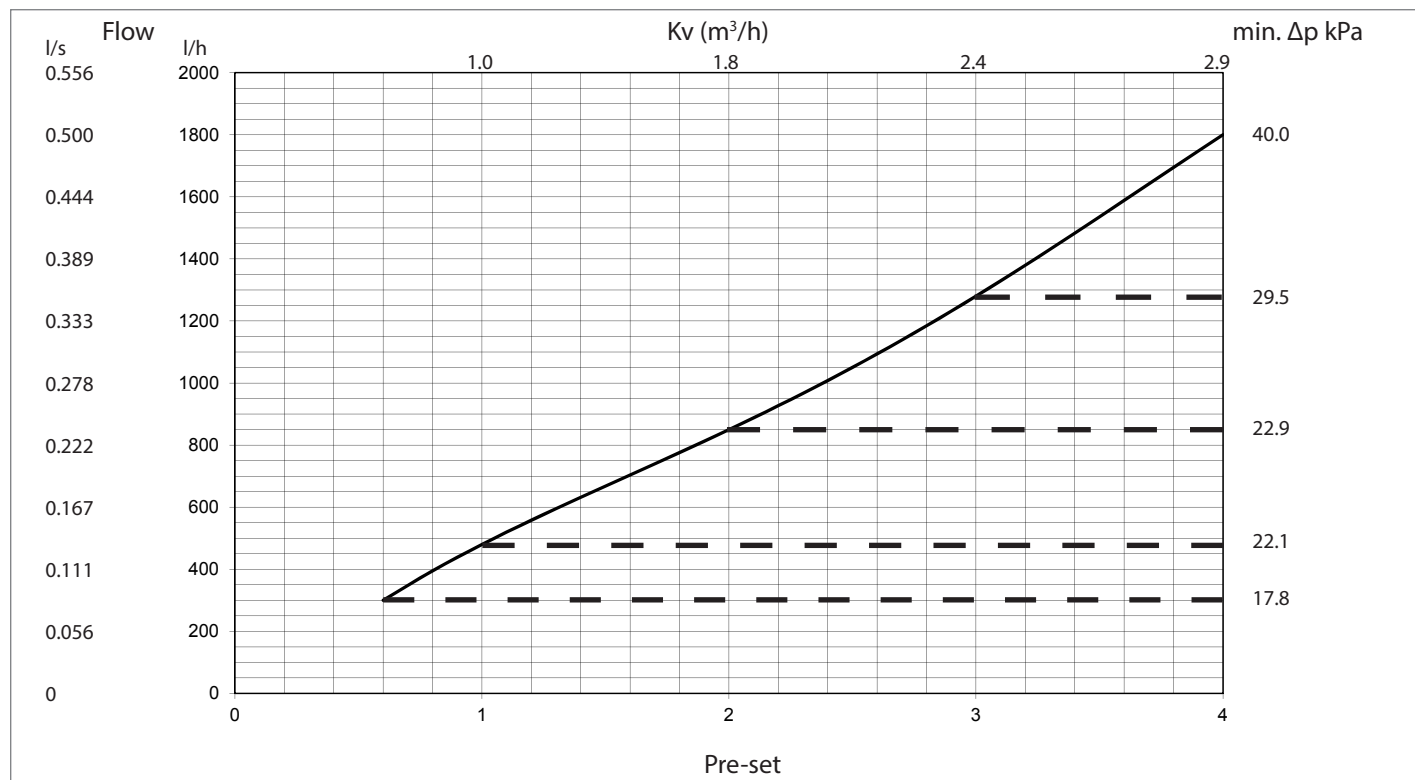


Frese OPTIMA Compact · High 5.0 1/2", 3/4"

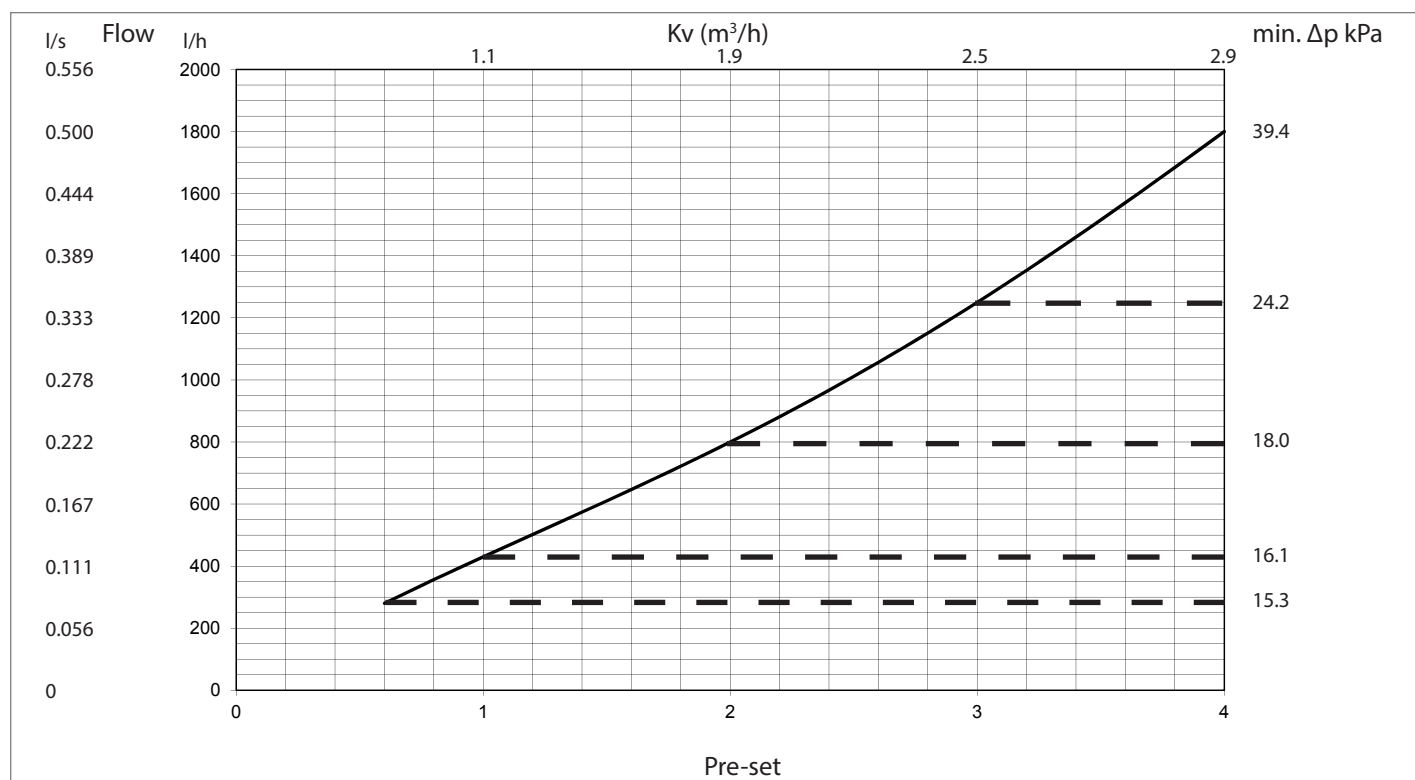


Frese OPTIMA Compact NPT 1/2" to 2" - pressure independent balancing & control valve

Frese OPTIMA Compact · High 5.5 3/4"

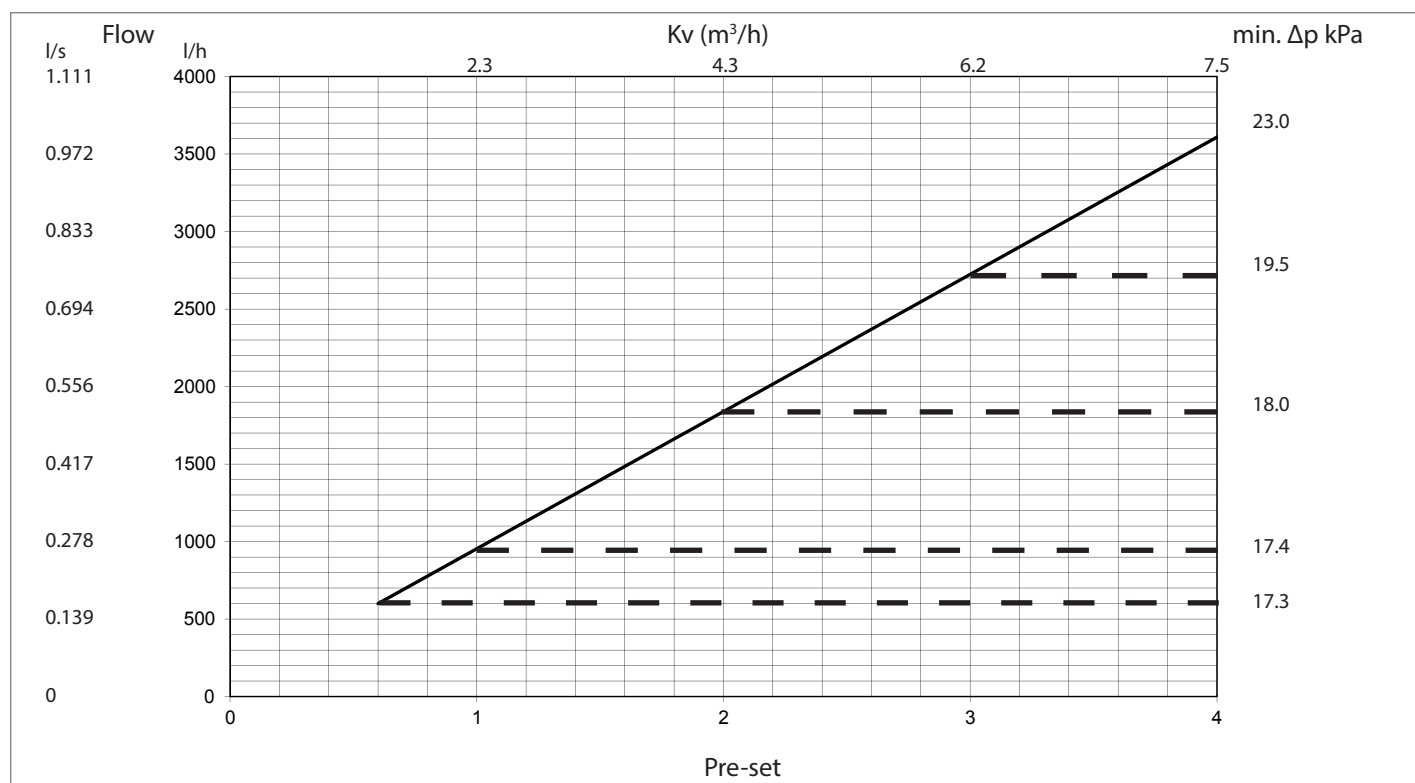


Frese OPTIMA Compact · Low 5.5 1"

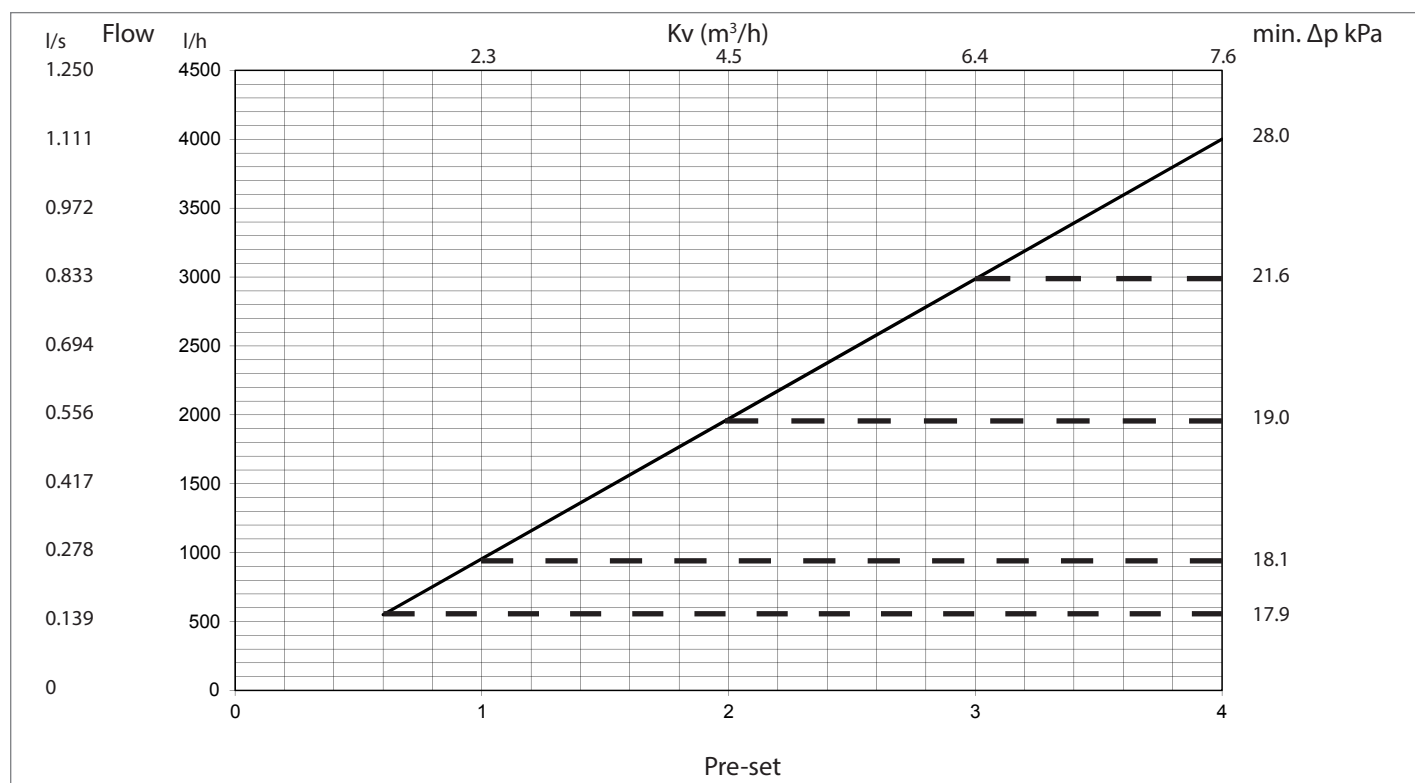


Frese OPTIMA Compact NPT 1/2" to 2" - pressure independent balancing & control valve

Frese OPTIMA Compact · High 5.5 1" L

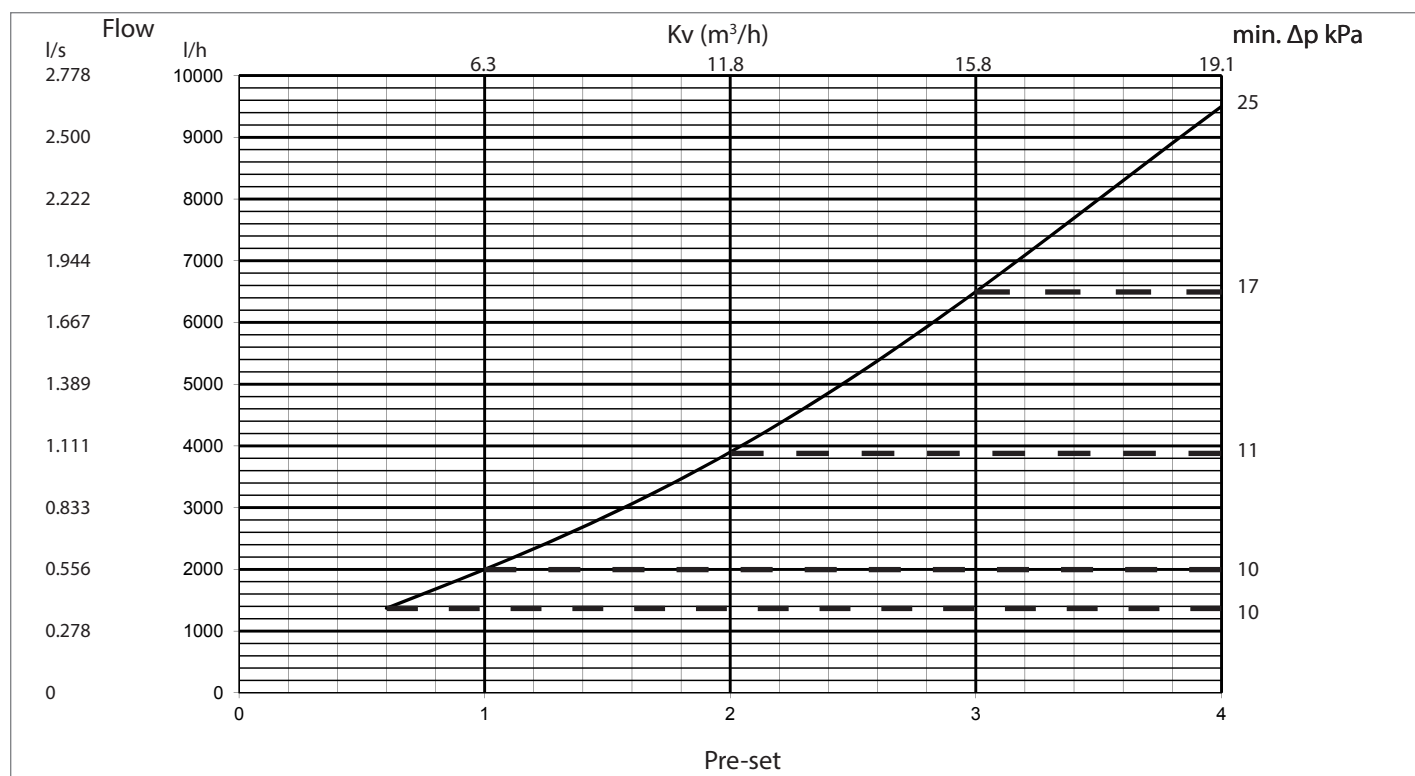


Frese OPTIMA Compact · 1-1/4"

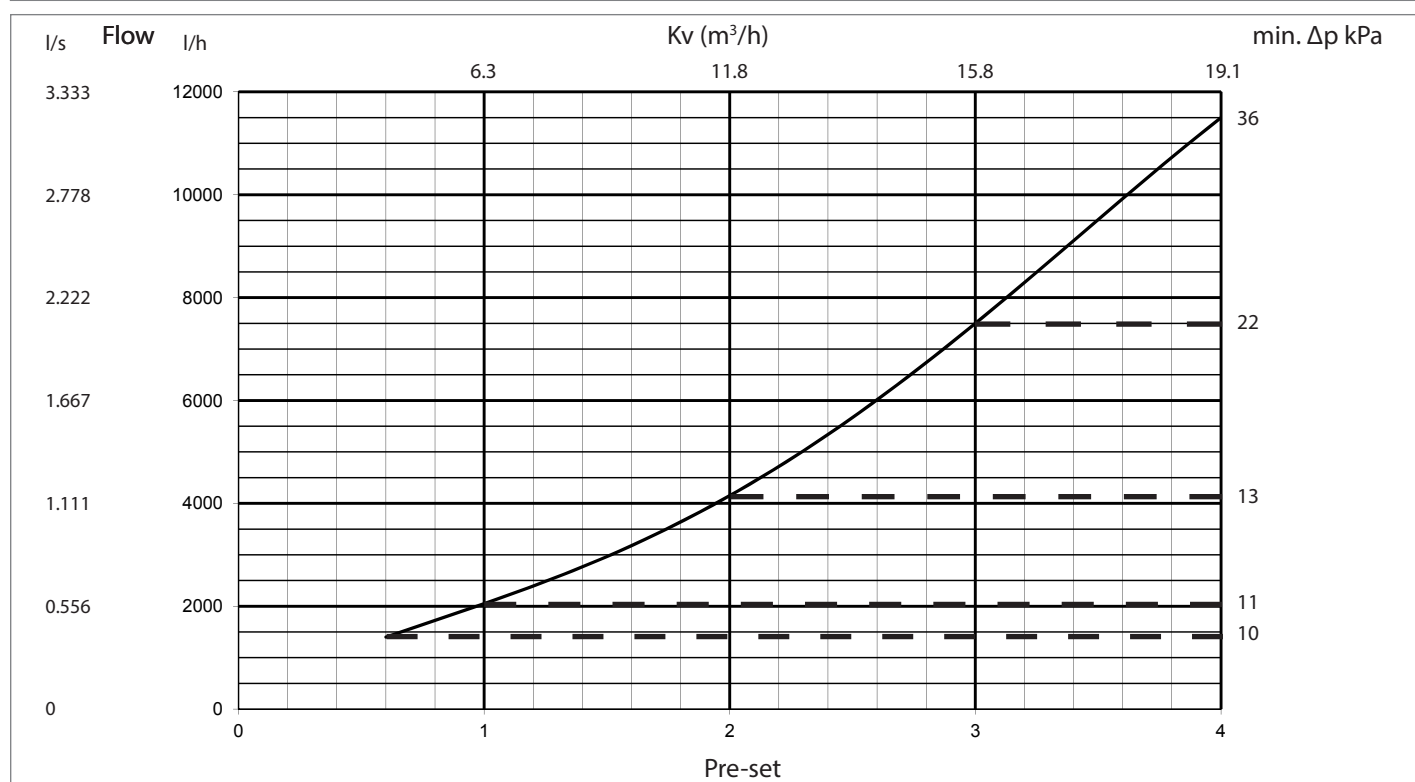


Frese OPTIMA Compact NPT 1/2" to 2" - pressure independent balancing & control valve

Frese OPTIMA Compact · 1-1/2"



Frese OPTIMA Compact · 2"



Frese OPTIMA Compact NPT 1/2" to 2"

- pressure independent balancing & control valve

Setting and Flow

OPTIMA Compact Low 2,5 1/2"				OPTIMA Compact Low 5,0 1/2"			OPTIMA Compact High 2,5 1/2", 3/4"		
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
0.5	30	0.008	0.13						
0.6	35	0.010	0.15	65	0.018	0.29	100	0.028	0.44
0.8	45	0.012	0.20	83	0.023	0.37	128	0.036	0.56
1.0	54	0.015	0.24	101	0.028	0.44	156	0.043	0.69
1.2	64	0.018	0.28	119	0.033	0.52	184	0.051	0.81
1.4	74	0.020	0.32	137	0.038	0.60	212	0.059	0.93
1.6	83	0.023	0.37	155	0.043	0.68	240	0.067	1.06
1.8	93	0.026	0.41	173	0.048	0.76	268	0.074	1.18
2.0	103	0.029	0.45	191	0.053	0.84	296	0.082	1.30
2.2	113	0.031	0.50	209	0.058	0.92	324	0.090	1.42
2.4	122	0.034	0.54	226	0.063	1.00	351	0.098	1.55
2.6	132	0.037	0.58	244	0.068	1.08	379	0.105	1.67
2.8	142	0.039	0.62	262	0.073	1.15	407	0.113	1.79
3.0	151	0.042	0.67	280	0.078	1.23	435	0.121	1.92
3.2	161	0.045	0.71	298	0.083	1.31	463	0.129	2.04
3.4	171	0.047	0.75	316	0.088	1.39	491	0.136	2.16
3.6	181	0.050	0.79	334	0.093	1.47	519	0.144	2.29
3.8	190	0.053	0.84	352	0.098	1.55	547	0.152	2.41
4.0	200	0.056	0.88	370	0.103	1.63	575	0.160	2.53
OPTIMA Compact High 5,0 1/2", 3/4"				OPTIMA Compact High 5,5 3/4"			OPTIMA Compact Low 5,5 1"		
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
0.6	220	0.061	0.97	300	0.083	1.32	280	0.078	1.23
0.8	285	0.079	1.26	395	0.110	1.74	356	0.099	1.57
1.0	351	0.097	1.54	480	0.133	2.11	430	0.119	1.89
1.2	416	0.116	1.83	558	0.155	2.46	502	0.139	2.21
1.4	481	0.134	2.12	632	0.176	2.78	574	0.159	2.53
1.6	546	0.152	2.41	704	0.196	3.10	647	0.180	2.85
1.8	612	0.170	2.69	776	0.216	3.42	722	0.201	3.18
2.0	677	0.188	2.98	850	0.236	3.74	800	0.222	3.52
2.2	742	0.206	3.27	927	0.258	4.08	881	0.245	3.88
2.4	808	0.224	3.56	1008	0.280	4.44	967	0.269	4.26
2.6	873	0.242	3.84	1094	0.304	4.82	1057	0.294	4.65
2.8	938	0.261	4.13	1185	0.329	5.22	1151	0.320	5.07
3.0	1004	0.279	4.42	1280	0.356	5.64	1250	0.347	5.50
3.2	1069	0.297	4.71	1380	0.383	6.07	1353	0.376	5.96
3.4	1134	0.315	4.99	1483	0.412	6.53	1460	0.406	6.43
3.6	1199	0.333	5.28	1589	0.441	6.99	1571	0.436	6.92
3.8	1265	0.351	5.57	1695	0.471	7.46	1685	0.468	7.42
4.0	1330	0.369	5.85	1800	0.500	7.93	1800	0.500	7.93
OPTIMA Compact High 5,5 1" L				OPTIMA Compact 1-1/4"					
Pre-set	Flow l/h	Flow l/s	Flow gpm	Flow l/h	Flow l/s	Flow gpm			
0.6	600	0.167	2.64	550	0.153	2.42			
0.8	777	0.216	3.42	753	0.209	3.32			
1.0	954	0.265	4.20	956	0.266	4.21			
1.2	1131	0.314	4.98	1159	0.322	5.10			
1.4	1308	0.363	5.76	1362	0.378	6.00			
1.6	1485	0.413	6.54	1565	0.435	6.89			
1.8	1662	0.462	7.32	1768	0.491	7.79			
2.0	1839	0.511	8.10	1971	0.548	8.68			
2.2	2016	0.560	8.88	2174	0.604	9.57			
2.4	2193	0.609	9.66	2377	0.660	10.47			
2.6	2370	0.658	10.44	2580	0.717	11.36			
2.8	2547	0.708	11.22	2783	0.773	12.26			
3.0	2724	0.757	12.00	2986	0.829	13.15			
3.2	2901	0.806	12.78	3189	0.886	14.04			
3.4	3078	0.855	13.55	3392	0.942	14.94			
3.6	3255	0.904	14.33	3595	0.999	15.83			
3.8	3432	0.953	15.11	3798	1.055	16.73			
4.0	3609	1.003	15.89	4001	1.111	17.62			

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Setting and Flow

Pre-set	OPTIMA Compact 1-1/2"			OPTIMA Compact 2"		
	Flow l/h	Flow l/s	Flow gpm	Flow l/h	Flow l/s	Flow gpm
0.6	1370	0.381	6.03	1400	0.389	6.16
0.8	1681	0.467	7.40	1724	0.479	7.59
1.0	2000	0.556	8.81	2050	0.569	9.03
1.2	2333	0.648	10.27	2393	0.665	10.54
1.4	2686	0.746	11.83	2766	0.768	12.18
1.6	3063	0.851	13.48	3178	0.883	13.99
1.8	3467	0.963	15.26	3638	1.011	16.02
2.0	3900	1.083	17.17	4150	1.153	18.27
2.2	4364	1.212	19.21	4717	1.310	20.77
2.4	4857	1.349	21.39	5339	1.483	23.51
2.6	5380	1.494	23.69	6014	1.671	26.48
2.8	5928	1.647	26.10	6737	1.871	29.66
3.0	6500	1.806	28.62	7500	2.083	33.02
3.2	7090	1.969	31.22	8295	2.304	36.52
3.4	7692	2.137	33.87	9108	2.530	40.10
3.6	8300	2.306	36.54	9925	2.757	43.70
3.8	8906	2.474	39.21	10729	2.980	47.24
4.0	9500	2.639	41.83	11500	3.194	50.63

Documentation formula

Text for technical specifications

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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