

OPTIMA Compact

Veriflow-series, DN10-DN50

Application

OPTIMA Compact, Veriflow-series 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.

The unique P/T plug design allows for both flow verification and verification of minimum differential pressure across the whole valve for optimal pump energy saving.

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

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

OPTIMA Compact, Veriflow-series 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 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, Veriflow-series 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

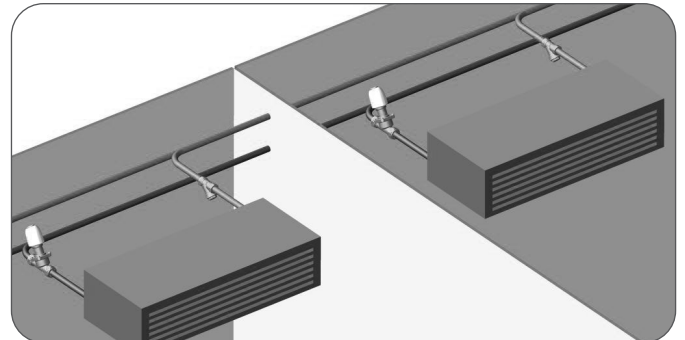
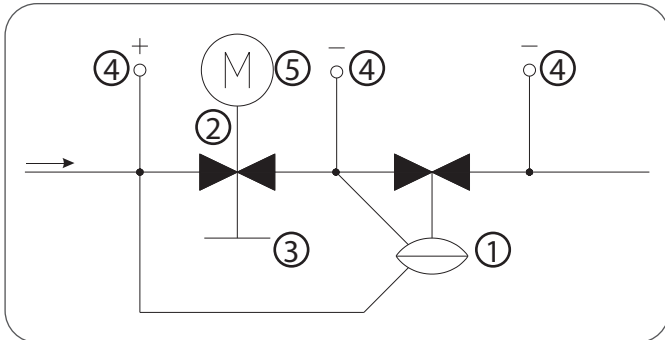
- High comfort for the end-users due to high precision temperature control
- Longer life due to less movements of the actuator

Features

- Verification of flow and minimum differential pressure due to unique P/T plug design
- 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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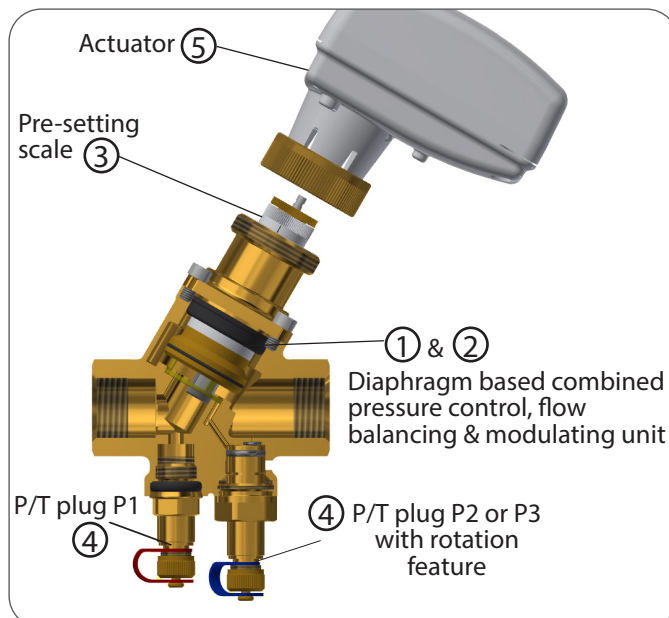
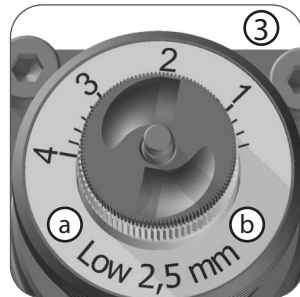


Design

The design of OPTIMA Compact, Veriflow-series 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, Veriflow-series 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, Veriflow-series (DN10 to DN50) can operate to a maximum differential pressure of 800 kPa (8 bar)

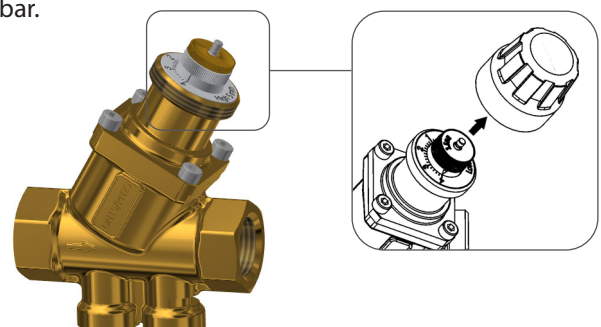
Close Off Pressure

OPTIMA Compact, Veriflow-series 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, Veriflow-series is capable of isolation to 10 bar.



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Operation principle

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

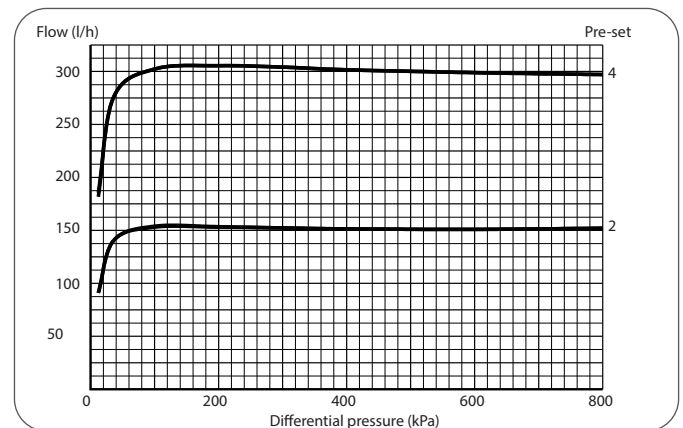
With the OPTIMA Compact, Veriflow-series there are two independent movements for the presetting and the modulating function. During presetting, the inlet area moves radially without interfering with the length of the stroke. During modulating, the inlet area moves axial taking advantage of the full stroke.

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.

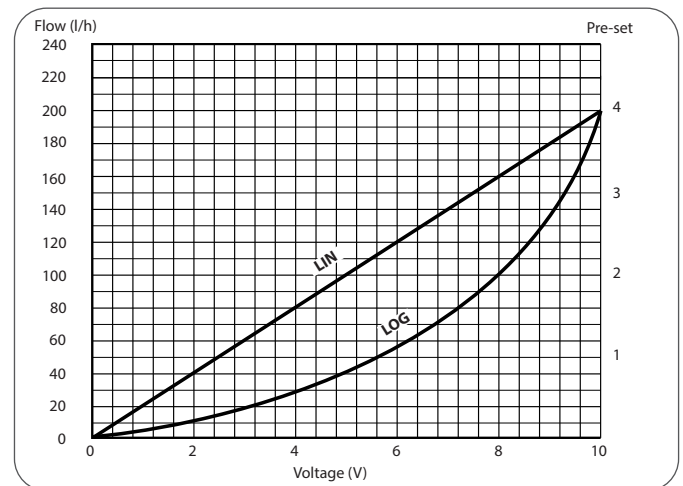
Flow rate vs. Differential Pressure

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



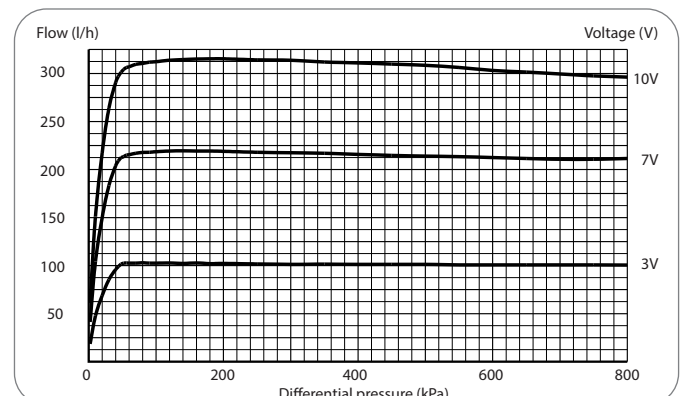
Flow rate vs. Voltage

Preset flow: 200 l/h



Flow rate vs. Differential Pressure

Voltage: 10V, 7V, 3V

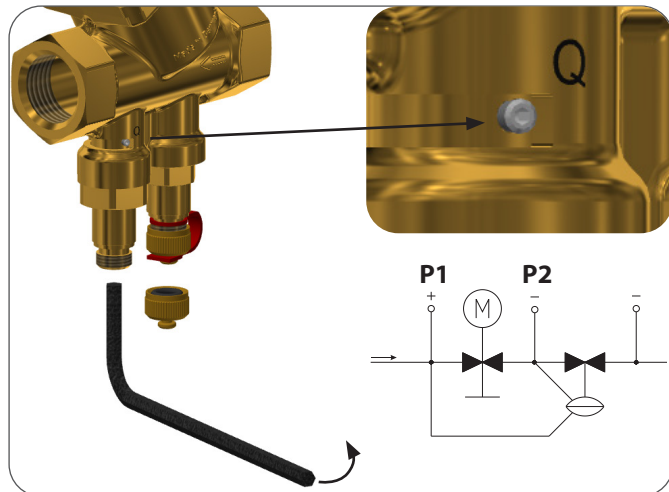


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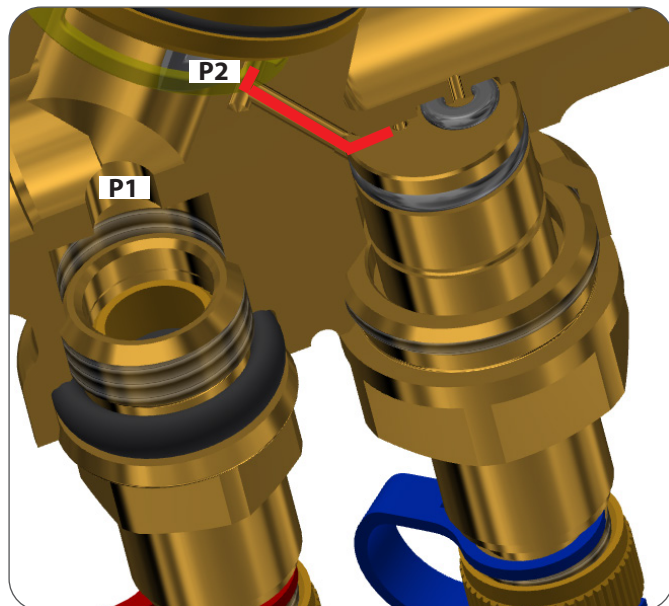
OPTIMA Compact, Veriflow-series design for flow and pressure measurement

Flow measurement



To measure the flow, insert a 4mm hexagonal key in the blue P/T plug and turn clockwise until the indicator reaches the end stop marked **Q**.

Place the manometer connection needles in the red and blue P/T plugs.



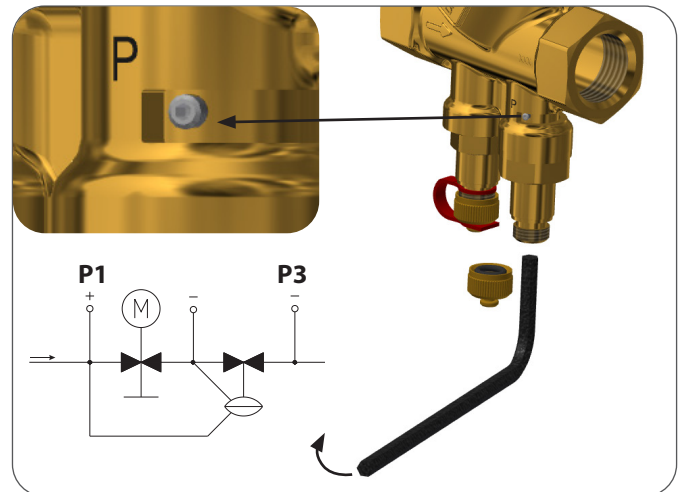
Now the manometer measures the differential pressure (P1-P2) across the KV presetting and the flow can be calculated by the formulars below.

Please use the KV-signal values from the tables page 8-9.

Flow Calculation

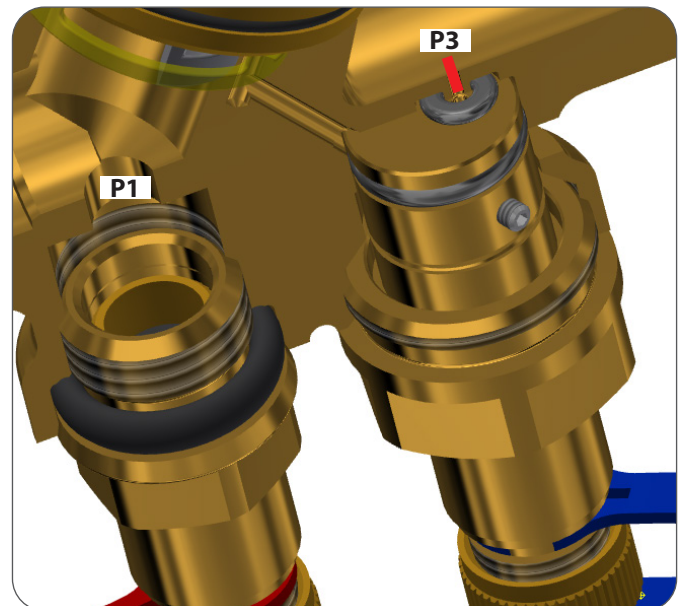
$Q = K_v \cdot \sqrt{\Delta p}$	$Q = \text{m}^3/\text{h}$ $\Delta p = \text{Bar}$
$Q = K_v \cdot 100 \cdot \sqrt{\Delta p}$	$Q = \text{l}/\text{h}$ $\Delta p = \text{kPa}$
$Q = \frac{K_v}{36} \cdot \sqrt{\Delta p}$	$Q = \text{l}/\text{s}$ $\Delta p = \text{kPa}$

Minimum ΔP measurement



To measure the minimum differential pressure, insert a 4mm hexagonal key in the blue P/T plug and turn anticlockwise until the indicator reaches the end stop marked **P**.

Place the manometer connection needles in the red and blue P/T plugs.



Now the manometer measures the differential pressure (P1-P3) across the total valve and the pump pressure can be optimized for pump energy saving.

Please use the required minimum differential pressure for the nominal flow in the tables page 8-9 or use the Frese APP.

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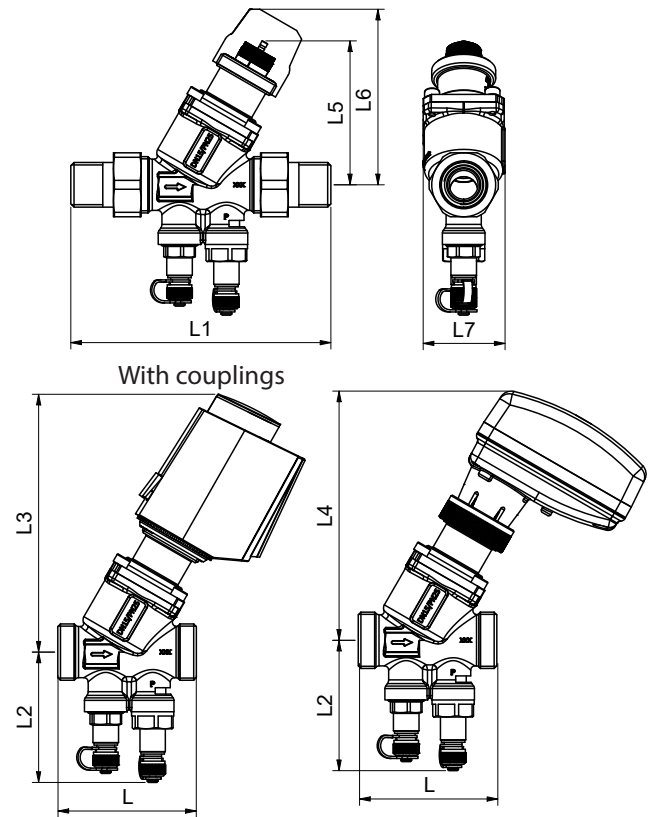
Veriflow-series, DN10-DN50

Technical data · DN10 - DN50

- Valve housing:**
DN10-15-20-25-32 DZR Brass
DN40-50 Ductile Iron or DZR Brass
- 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	78/104	83/100	104	104	138	138
	L1	114	122	-	131	-	-	-	-	-	-	-
	L2	61	61	61	61	61	63/67	63/67	72	72	75	81
	L3	121	121	121	121	121	124/139	124/139	139	139	-	-
	L4	117	117	117	117	117	120/135	120/135	135	135	264	264
	L5	68	68	68	68	68	68/85	68/85	85	85	143	143
	L6	83	83	83	83	83	83/100	83/100	100	100	-	-
L7	38	38	38	38	38	38/63	38/63	63	63	90	90	
Weight kg	0.45	0.47	0.52	0.50	0.54	0.62/1.12	0.65/1.14	1.27	1.27	3.28	3.71	

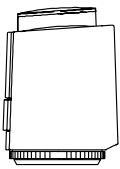
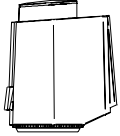
Flow

Dim.	DN10-DN15	DN10-DN20	DN15-DN20			DN25	DN25L	DN32	DN40	DN50	
Type	Low		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

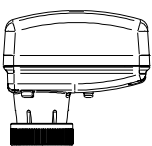
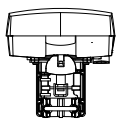
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Thermic Actuators Normally Closed DN10 - DN32

	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]

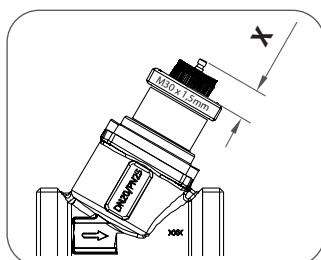
Motoric Actuators DN10 - DN50

	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 [5.0 mm / 5.5 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

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Product Programme



Dim.	Type	Flow l/h	Flow l/s	M/M	F/F
DN10	Low 2.5 mm	30-200	0.008-0.056	53-5320	-
	Low 5.0 mm	65-370	0.018-0.103	53-5329	-
DN15	Low 2.5 mm	30-200	0.008-0.056	53-5322	53-5362
	Low 5.0 mm	65-370	0.018-0.103	53-5330	53-5370
	High 2.5 mm	100-575	0.028-0.160	53-5324	53-5364
	High 5.0 mm	220-1,330	0.061-0.369	53-5325	53-5365
	High 5.5 mm	300-1,800	0.083-0.500	53-5326	53-5366
DN20	Low 5.0 mm	65-370	0.018-0.103	53-5335	53-5340
	High 2.5 mm	100-575	0.028-0.160	53-5332	53-5372
	High 5.0 mm	220-1,330	0.061-0.369	53-5328	53-5368
	High 5.5 mm	300-1,800	0.083-0.500	53-5331	53-5338
DN25	Low 5.5 mm	280-1,800	0.078-0.500	53-5337	53-5339
DN25L	High 5.5 mm	600-3,609	0.167-1.003	53-5333	53-5373
DN32	5.5 mm	550-4,001	0.153-1.111	53-5334	53-5374
DN40	15 mm	1,370-9,500	0.381-2.639	-	53-5375 Ductile Iron
					53-5378 DZR Brass
DN50	15 mm	1,400-11,500	0.389-3.194	-	53-5376 Ductile Iron
					53-5379 DZR Brass

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/Max temp.
	38-0857	Insulation	DN10-15-20	For heating applications only	EPP / 120 °C
	38-0858		DN25		
	38-0859		DN25L-32		
	38-0878		DN40-50		EPE / 90 °C

	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

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Setting and Flow

Valve size	Low 2.5 - DN10/DN15					Low 5.0 - DN10/DN15/DN20					
	Pre-set	Flow l/h	Flow l/s	Flow gpm	Min.Δp kPa	KV-signal	Flow l/h	Flow l/s	Flow gpm	Min.Δp kPa	KV-signal
0.5	30	0.008	0.13	14	0.121						
0.6	35	0.010	0.15	14	0.124	65	0.018	0.29	15	0.134	
0.8	45	0.012	0.20	14	0.136	83	0.023	0.37	15	0.184	
1.0	54	0.015	0.24	14	0.153	101	0.028	0.44	15	0.231	
1.2	64	0.018	0.28	15	0.174	119	0.033	0.52	15	0.275	
1.4	74	0.020	0.32	15	0.198	137	0.038	0.60	15	0.317	
1.6	83	0.023	0.37	15	0.224	155	0.043	0.68	15	0.357	
1.8	93	0.026	0.41	15	0.250	173	0.048	0.76	16	0.397	
2.0	103	0.029	0.45	15	0.277	191	0.053	0.84	16	0.436	
2.2	113	0.031	0.50	15	0.303	209	0.058	0.92	16	0.475	
2.4	122	0.034	0.54	15	0.328	226	0.063	1.00	16	0.515	
2.6	132	0.037	0.58	15	0.352	244	0.068	1.08	16	0.555	
2.8	142	0.039	0.62	15	0.375	262	0.073	1.15	16	0.595	
3.0	151	0.042	0.67	15	0.397	280	0.078	1.23	16	0.636	
3.2	161	0.045	0.71	15	0.418	298	0.083	1.31	17	0.677	
3.4	171	0.047	0.75	16	0.439	316	0.088	1.39	17	0.718	
3.6	181	0.050	0.79	16	0.460	334	0.093	1.47	17	0.760	
3.8	190	0.053	0.84	16	0.482	352	0.098	1.55	17	0.800	
4.0	200	0.056	0.88	16	0.506	370	0.103	1.63	17	0.839	

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	KV-signal	Flow l/h	Flow l/s	Flow gpm	Min.Δp kPa
0.6	100	0.028	0.44	15	0.250	220	0.061	0.97	16	0.595
0.8	128	0.036	0.56	15	0.314	285	0.079	1.26	17	0.755
1.0	156	0.043	0.69	15	0.378	351	0.097	1.54	17	0.913
1.2	184	0.051	0.81	16	0.442	416	0.116	1.83	17	1.07
1.4	212	0.059	0.93	16	0.507	481	0.134	2.12	18	1.23
1.6	240	0.067	1.06	16	0.574	546	0.152	2.41	18	1.39
1.8	268	0.074	1.18	16	0.642	612	0.170	2.69	19	1.55
2.0	296	0.082	1.30	17	0.713	677	0.188	2.98	19	1.71
2.2	324	0.090	1.42	17	0.786	742	0.206	3.27	20	1.88
2.4	351	0.098	1.55	17	0.860	808	0.224	3.56	20	2.04
2.6	379	0.105	1.67	17	0.936	873	0.242	3.84	20	2.21
2.8	407	0.113	1.79	17	1.01	938	0.261	4.13	20	2.38
3.0	435	0.121	1.92	18	1.09	1004	0.279	4.42	21	2.55
3.2	463	0.129	2.04	18	1.17	1069	0.297	4.71	21	2.72
3.4	491	0.136	2.16	18	1.24	1134	0.315	4.99	21	2.88
3.6	519	0.144	2.29	18	1.31	1199	0.333	5.28	21	3.03
3.8	547	0.152	2.41	18	1.38	1265	0.351	5.57	21	3.18
4.0	575	0.160	2.53	19	1.44	1330	0.369	5.85	22	3.31

Valve size	High 5.5 - DN15/DN20					Low 5.5 - DN25				
	Pre-set	Flow l/h	Flow l/s	Flow gpm	Min.Δp kPa	KV-signal	Flow l/h	Flow l/s	Flow gpm	Min.Δp kPa
0.6	300	0.083	1.32	18	0.675	280	0.078	1.23	15	0.647
0.8	395	0.110	1.74	21	0.849	356	0.099	1.57	16	0.770
1.0	480	0.133	2.11	22	1.03	430	0.119	1.89	16	0.916
1.2	558	0.155	2.46	23	1.22	502	0.139	2.21	16	1.08
1.4	632	0.176	2.78	23	1.41	574	0.159	2.53	17	1.26
1.6	704	0.196	3.10	23	1.61	647	0.180	2.85	17	1.46
1.8	776	0.216	3.42	23	1.81	722	0.201	3.18	17	1.66
2.0	850	0.236	3.74	23	2.01	800	0.222	3.52	18	1.88
2.2	927	0.258	4.08	23	2.21	881	0.245	3.88	19	2.09
2.4	1008	0.280	4.44	24	2.41	967	0.269	4.26	20	2.31
2.6	1094	0.304	4.82	26	2.61	1057	0.294	4.65	21	2.52
2.8	1185	0.329	5.22	27	2.80	1151	0.320	5.07	22	2.73
3.0	1280	0.356	5.64	29	2.99	1250	0.347	5.50	24	2.93
3.2	1380	0.383	6.07	32	3.17	1353	0.376	5.96	26	3.13
3.4	1483	0.412	6.53	34	3.34	1460	0.406	6.43	29	3.32
3.6	1589	0.441	6.99	37	3.51	1571	0.436	6.92	32	3.49
3.8	1695	0.471	7.46	39	3.66	1685	0.468	7.42	35	3.65
4.0	1800	0.500	7.93	40	3.80	1800	0.500	7.93	39	3.80

OPTIMA Compact

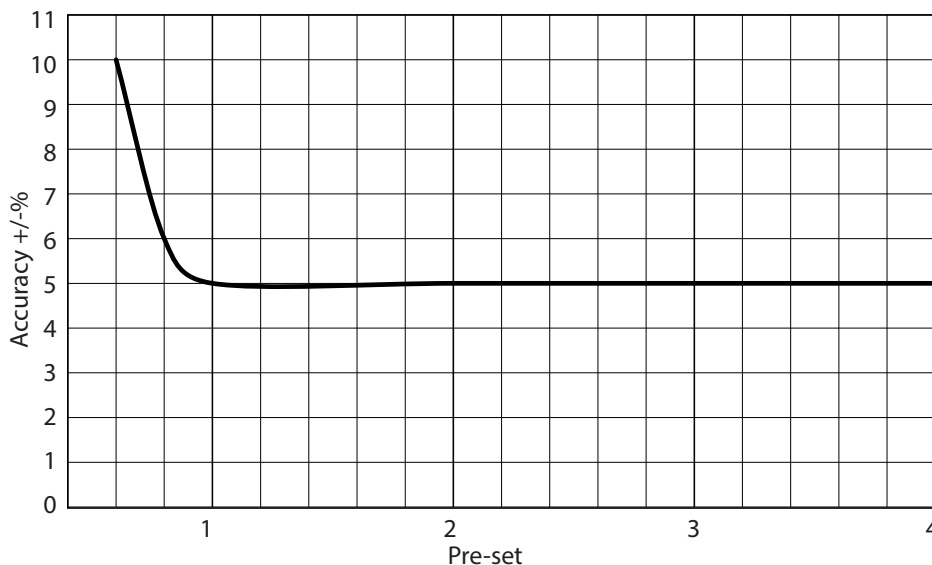
Veriflow-series, DN10-DN50

Setting and Flow

Valve size	High 5.5 - DN25L					DN32				
Pre-set	Flow l/h	Flow l/s	Flow gpm	Min.Δp kPa	KV-signal	Flow l/h	Flow l/s	Flow gpm	Min.Δp kPa	KV-signal
0.6	600	0.167	2.64	17	1.28	550	0.153	2.42	18	1.44
0.8	777	0.216	3.42	17	1.68	753	0.209	3.32	18	1.83
1.0	954	0.265	4.20	17	2.09	956	0.266	4.21	18	2.20
1.2	1131	0.314	4.98	18	2.49	1159	0.322	5.10	18	2.57
1.4	1308	0.363	5.76	18	2.89	1362	0.378	6.00	18	2.94
1.6	1485	0.413	6.54	18	3.27	1565	0.435	6.89	19	3.31
1.8	1662	0.462	7.32	18	3.65	1768	0.491	7.79	19	3.69
2.0	1839	0.511	8.10	18	4.01	1971	0.548	8.68	19	4.08
2.2	2016	0.560	8.88	18	4.37	2174	0.604	9.57	19	4.48
2.4	2193	0.609	9.66	18	4.72	2377	0.660	10.47	20	4.89
2.6	2370	0.658	10.44	19	5.07	2580	0.717	11.36	20	5.31
2.8	2547	0.708	11.22	19	5.42	2783	0.773	12.26	21	5.75
3.0	2724	0.757	12.00	20	5.78	2986	0.829	13.15	22	6.19
3.2	2901	0.806	12.78	20	6.16	3189	0.886	14.04	23	6.64
3.4	3078	0.855	13.55	21	6.56	3392	0.942	14.94	24	7.09
3.6	3255	0.904	14.33	21	7.00	3595	0.999	15.83	25	7.53
3.8	3432	0.953	15.11	22	7.49	3798	1.055	16.73	26	7.97
4.0	3609	1.003	15.89	23	8.03	4001	1.111	17.62	28	8.40

Valve size	DN40					DN50				
Pre-set	Flow l/h	Flow l/s	Flow gpm	Min.Δp kPa	KV-signal	Flow l/h	Flow l/s	Flow gpm	Min.Δp kPa	KV-signal
0.6	1370	0.381	6.03	10	4.74	1400	0.389	6.16	10	4.43
0.8	1681	0.467	7.40	10	5.82	1724	0.479	7.59	10	5.35
1.0	2000	0.556	8.81	10	6.85	2050	0.569	9.03	11	6.30
1.2	2333	0.648	10.27	10	7.86	2393	0.665	10.54	11	7.28
1.4	2686	0.746	11.83	10	8.87	2766	0.768	12.18	11	8.31
1.6	3063	0.851	13.48	10	9.89	3178	0.883	13.99	12	9.36
1.8	3467	0.963	15.26	11	10.9	3638	1.011	16.02	12	10.5
2.0	3900	1.083	17.17	11	12.0	4150	1.153	18.27	13	11.6
2.2	4364	1.212	19.21	12	13.1	4717	1.310	20.77	14	12.8
2.4	4857	1.349	21.39	13	14.3	5339	1.483	23.51	16	14.0
2.6	5380	1.494	23.69	14	15.4	6014	1.671	26.48	18	15.3
2.8	5928	1.647	26.10	15	16.7	6737	1.871	29.66	20	16.6
3.0	6500	1.806	28.62	17	17.9	7500	2.083	33.02	22	17.9
3.2	7090	1.969	31.22	19	19.2	8295	2.304	36.52	25	18.7
3.4	7692	2.137	33.87	21	20.4	9108	2.530	40.10	27	19.6
3.6	8300	2.306	36.54	22	21.7	9925	2.757	43.70	30	20.4
3.8	8906	2.474	39.21	24	22.9	10729	2.980	47.24	33	21.3
4.0	9500	2.639	41.83	25	24.1	11500	3.194	50.63	36	22.1

Flow measurement accuracy using KV-signal



When using the KV-signal for flow measurement, the accuracy is $\pm 5\%$ of the actual flow. See the curve to the left.

For flow below 200 l/h the flow measurement is accurate to ± 10 l/h.

The curve is applicable regardless of the mounting position of OPTIMA Compact, Veriflow-series.

The KV-values accuracy follows the BS 7350 standard for flow measurement devices for heating and chilled water systems.

