

TECHNICAL INFORMATION

Pressure independent control balancing valves CIM 776 and CIM 777

Description

Balancing valves **Cim 776** and **Cim 777** are designed for automatic balancing of heating and cooling installations, regardless pressure fluctuations under service, which might occur due to flow rate changes in the installation.

Thanks to their unique design, these valves are able to perform the following functions:

- **REGULATION**: selection of required flow rate within the operating range.
- **CONTROL**: constant flow rate independent of pressure fluctuations.
- **MODULATION**: “Full authority” flow rate modulation for temperature control (**Cim 777 series**).



Fig 1

Automatic balancing valves **Cim 776** and **Cim 777** are made of “CR – Corrosion Resistant” brass according to ISO 228 standard and are suitable for working pressure up to 25 bar, within the temperature range from 0°C up to +120°C.

Cim 776 e **Cim 777** ranges are available with two pressure levels:

- “Low Flow”: from 78 l/h up to 1722 l/h;
- “High Flow”: from 244 l/h up to 8586 l/h.

They are available in sizes from DN15 up to DN50 (up to DN25 for “Low Flow” version only) and work properly within a differential pressure operating range between minimum values as specified in “Graphs and Tables” section of this brochure, and the maximum value of 400 KPa.

The main features of balancing valves **Cim 776** and **Cim 777** are the following:

- Easy required flow rate selection using presetting dial.
- Automatic balancing in the event of fluctuating pressure conditions in system branches.
- Flow rate modulation along the whole electric actuator stroke.
- Flexibility if the system is modified after the first installation.
- Reduction of balancing costs, improved energy saving and high environmental comfort.
- Easy flushing procedure thanks to quick and simple removal of differential pressure control cartridge placed inside valve body.
- Reduced installation dimensions thanks to compact valve construction, which does not require inlet and outlet straight pipelines to stabilize the flow.

Installation procedure

Before installation of **CIM 776** and **Cim 777**, check that inside the valve and the pipes there are no foreign matters which might damage the tightness of the valve.

Burr pipe connections after having threaded them and distribute the sealing material on pipe threads only and not on valve threads.

Make sure that required flow rate is within operating range of the valve. Valves may be installed either on horizontal or vertical pipelines with the electric actuator faced-up and following the arrow direction casted on the valve body, which shall be the same as the flow one.

For assembly purposes, use a spanner, not a pipe wrench, by applying necessary working torque only on the valve end nearest the pipe. This helps get a firmer grip and avoids potential damages to valve body. Make sure that pipe threading length is not longer than valve threads.

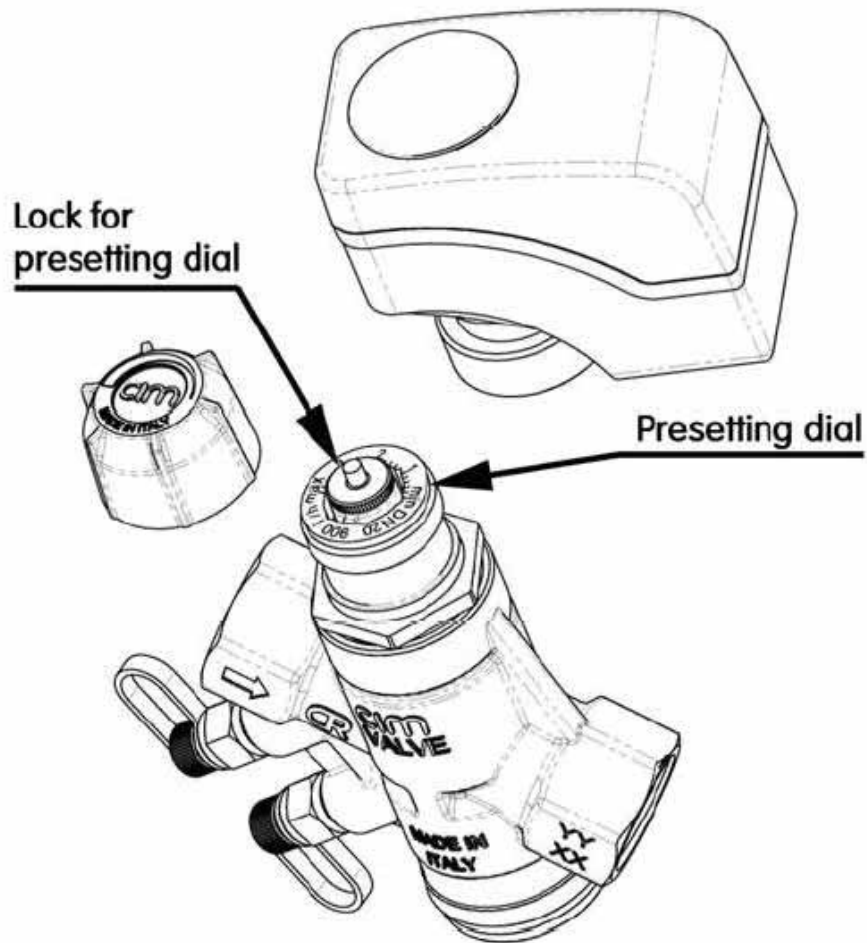
The valve is supplied with a cap allowing (when screwed) the manual opening of the valve.

After DPC cartridge removal and manual full opening of the valve, it is possible to flush the system branch where the valve is installed; when flushing process is over, reposition the DPC control cartridge.

Balancing process

Take the plastic cap screwed on the upper part of the valve off. Turn the presetting dial device (see picture 2) and match the black mark on the swivel part with the value stated on the fixed part of said device (min., 1, 2, 3, max), which shall correspond to required flow rate.

The relation between flow rate and values shown on the presetting dial device are given by the tables stated on following pages of this brochure (see "Graphs and Tables").



Picture 2

Using the differential manometer **Cim 726**, check that the differential pressure is higher or the same as the minimum value reported in said tables. The differential manometer interfaces with the balancing valve through two sensors placed in the binder points of the valve.

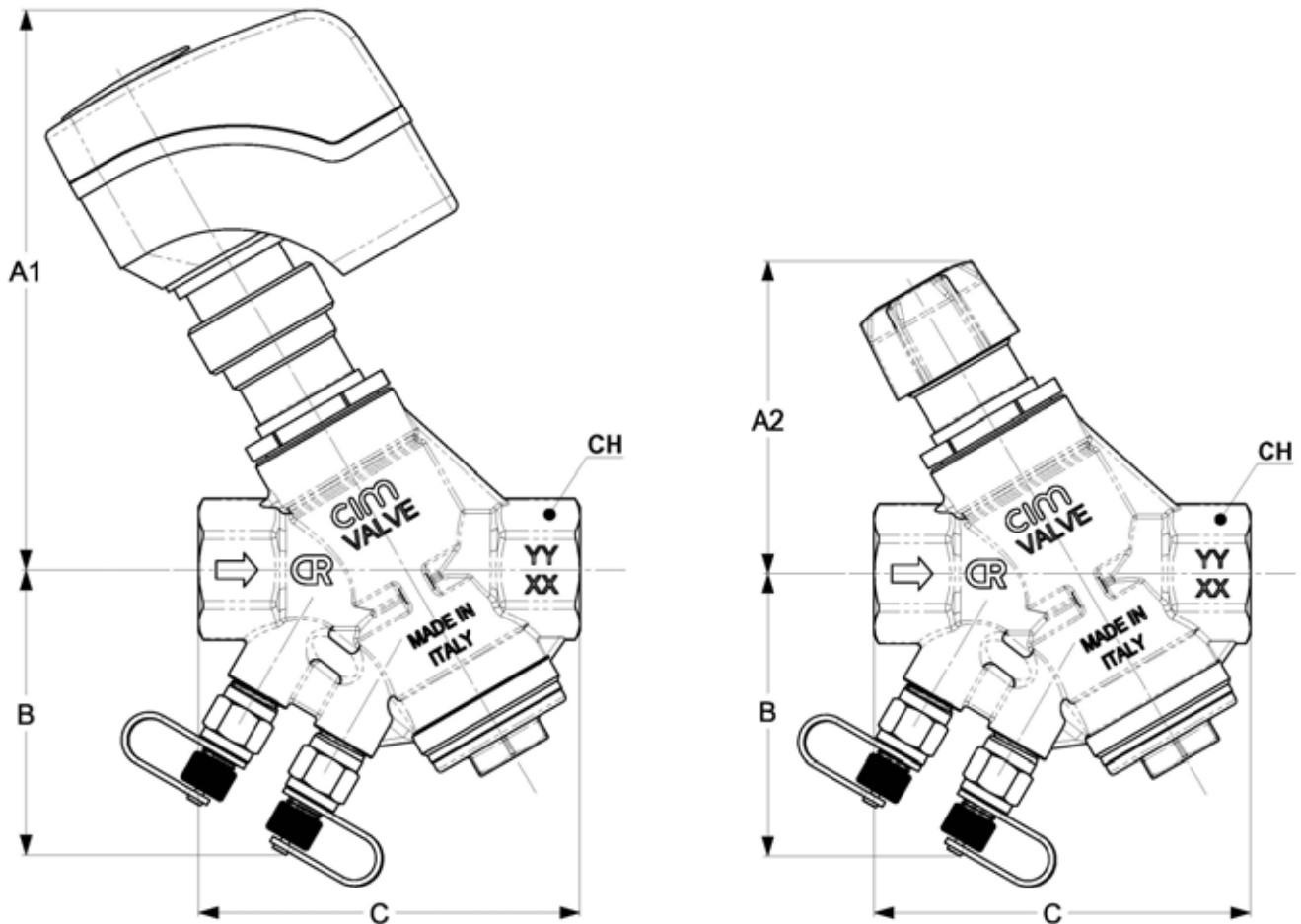
When balancing is achieved, screw the lock for presetting dial completely, preventing any unintentional rotation.

Screw the plastic cap completely to open the valve and achieve the required flow rate (**Cim 776**) or, alternatively, assemble the electric actuator for modulating purposes (**Cim 777**).

Maintenance

As a rule, the balancing valve does not need any maintenance. In case of replacement or need of disassembling of some components of the valve, f.i. for flushing the cartridge of differential pressure, make sure that the installation is not under service or pressure.

The following table shows the dimensions of the full range of valves **Cim 777** and **Cim 776**.



Picture 3

DN	A1	A2	B	C	CH
1/2"	138	81	72	95,5	27
3/4"	138	81	72	96,5	32
1"	138	81	72	102,5	39
1"1/4	144	87	76	128	49
1"1/2	219	120	87	144	54
2"	225	130	93	155	68

Operation principles

Regulation

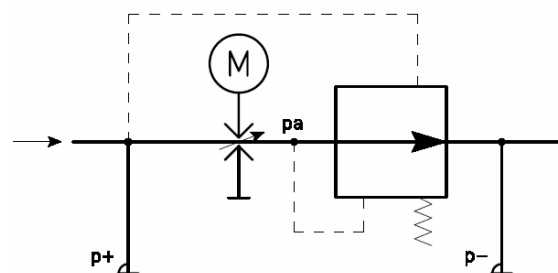
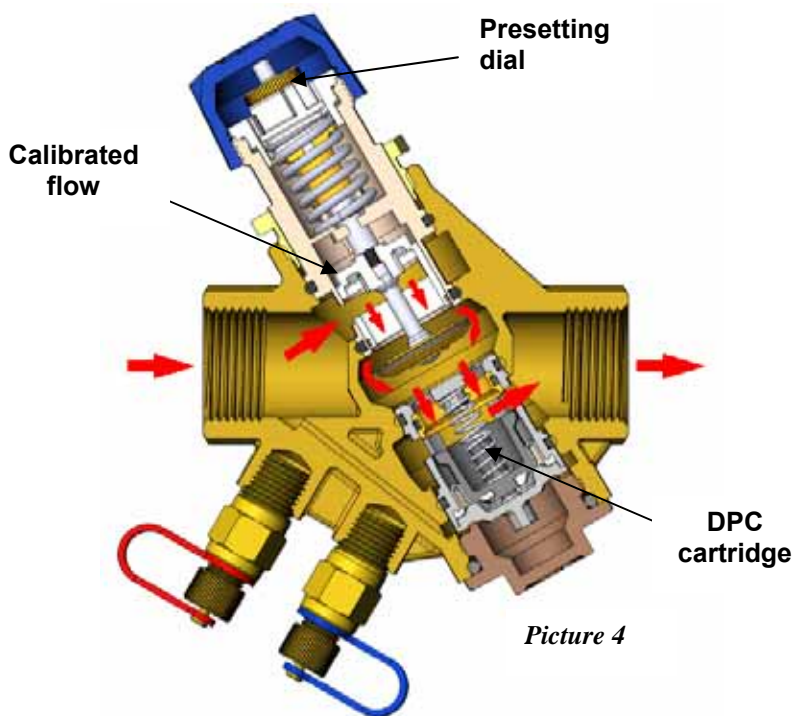
When electric actuator or plastic cap is missing, the valve is normally closed by a swing. On the contrary, if plastic cap is screwed or electric actuator installed therein, they win the force of the swing and open the valve (see picture 4). The inlet water goes through a modulating control component whose geometry can be modified by turning the presetting dial, according to the required flow rate in the system branch where the valve is installed.

Control

Two different pressures operate on the DPC cartridge. The first one is transmitted through the passage connecting the valve inlet to the lower section of "p+" cartridge (see hydraulic scheme picture 5); the second one is registered at valve outlet by the flow rate selecting device "pa". In order to keep constant the difference between the mentioned pressures, the DPC cartridge obturator operates by closing the water outlet bore to reach the preset flow rate, regardless of fluctuating pressure conditions of the system.

Modulation

The electrical actuator performs the modulating function changing the section of flow passage. When continuous modulation is carried out, the temperature is kept under control. **Cim 777** keeps the same obturator stroke, regardless of the presetting dial position. With continuous modulation, control is excellent even with small flow opening. This eliminates on/off effect.



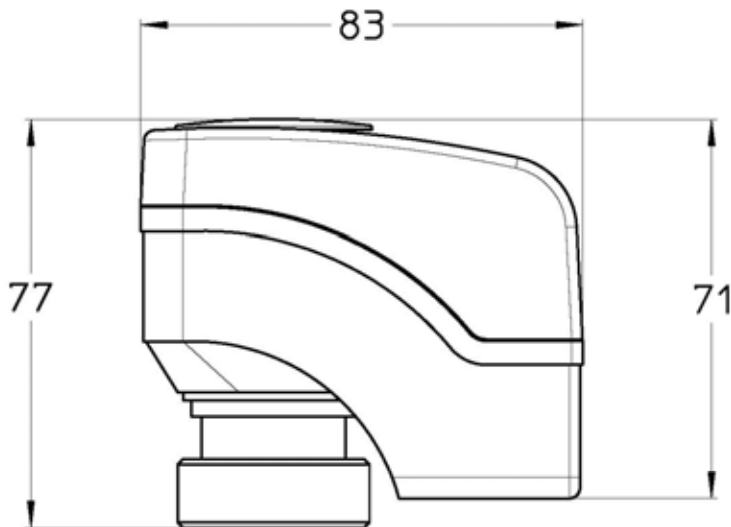
Electric actuators for Cim 777 DN15÷DN32

Three types of electric actuator are available, as follows:

- **Cim EMV210/145:** 24VAC - proportional;
- **Cim EMV210/146:** 24VAC – 3 positions;
- **Cim EMV210/147:** 230VAC – 3 positions.

Their main features are the following:

- Maximum stroke: 5,5 mm;
- 3 positions or 0..10Vdc control signal;
- Swivel nut easy assembling;
- Manual operation by 3mm hexagonal key;
- Short circuit resistance;
- Protection against polarity reversal.



Voltage: 230VAC; 24VAC;

Frequency: 50/60 Hz;

Manual operation: 3 mm hexagonal key;

Cable length : 1,5 metres;

Protection Class: IP 40 according to EN 60529;

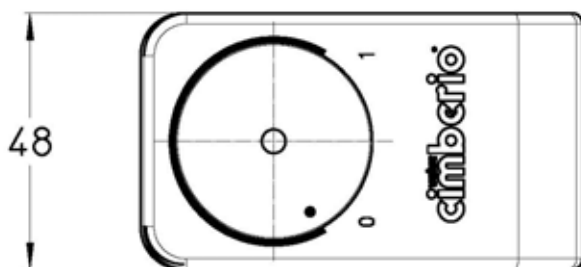
Ambient operating conditions: 1°C ÷ 50°C; warehousing -5°C ÷ 50°C;

Weight: 350 grms.;

Actuating force: 250 N;

Input impedance: > 100 k Ohm (DC 0-10v);

Actuating time: 150s for 3 positions version; 75s for proportional 0-10V version.



Picture 6

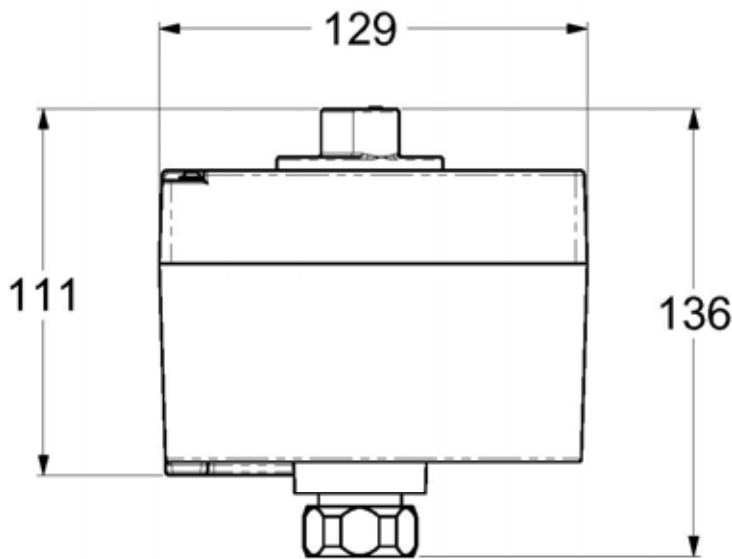
Electric actuator for Cim 777 DN40÷DN50

Three types of electric actuator are available, as follows:

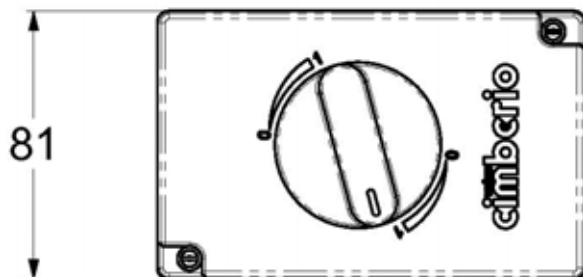
- **Cim EMV210/148:** 24VAC - proportional;
- **Cim EMV210/149:** 24VAC – 3 positions;
- **Cim EMV210/150:** 230VAC – 3 positions.

Their main features are the following :

- Maximum stroke : 6,5 mm;
- 3 positions or 0..10Vdc control signal;
- Swivel nut easy assembling;
- Manual operation by a regulating knob.



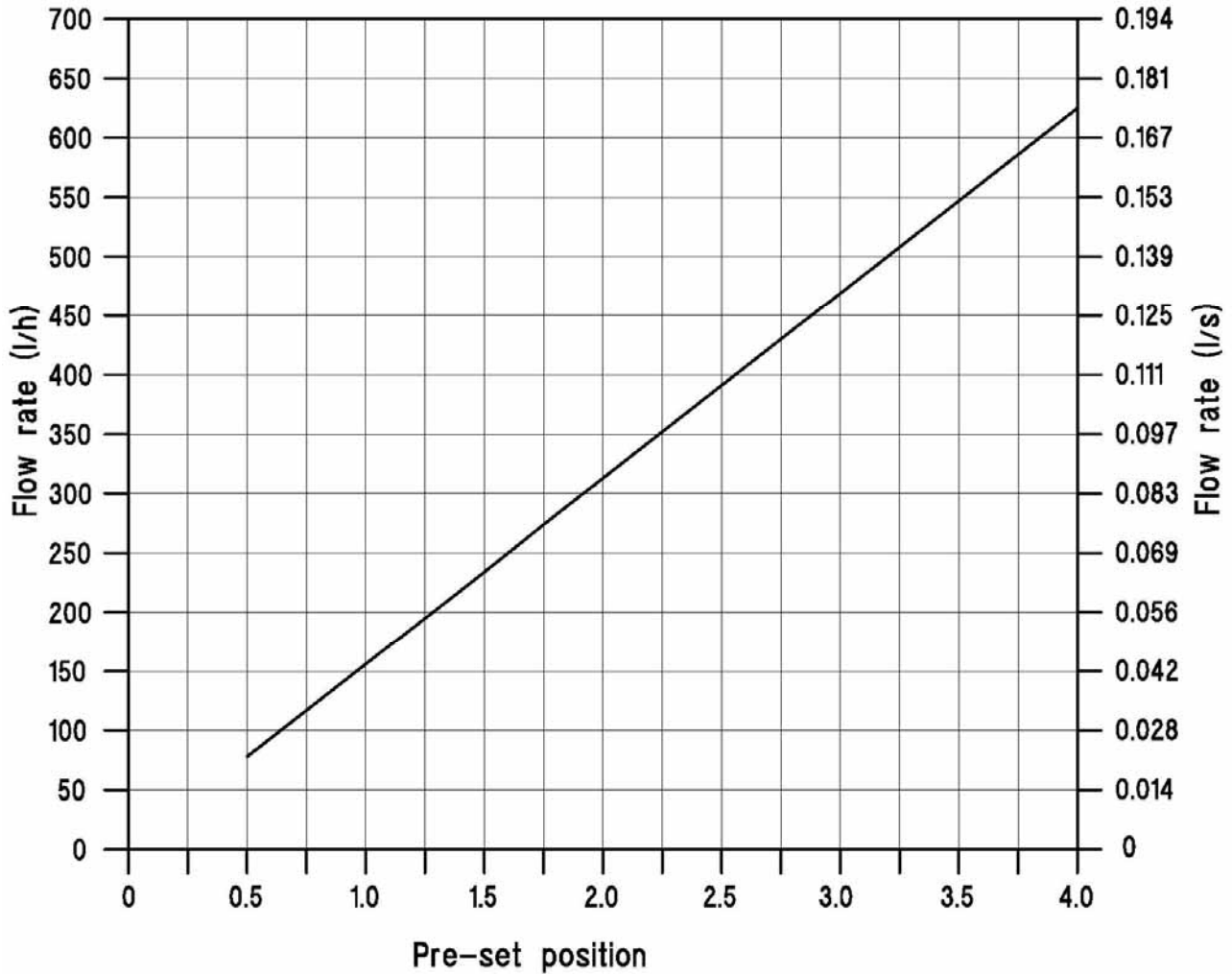
Voltage: 230VAC; 24VAC;
Frequency: 50 Hz;
Manual operation: regulating knob;
Cable length: wireless;
Protection Class: IP 54 according EN 60529;
Ambient operating conditions: -5°C ÷ 50°C; warehousing -5°C ÷ 50°C;
Weight: 450 grms.;
Actuating force: 400 N;
Input impedance: > 100 k Ohm (DC 0-10v);
Actuating time: 170s for 3 positions version; 43s for 0-10V proportional version.



Picture 7

Graphs and Tables

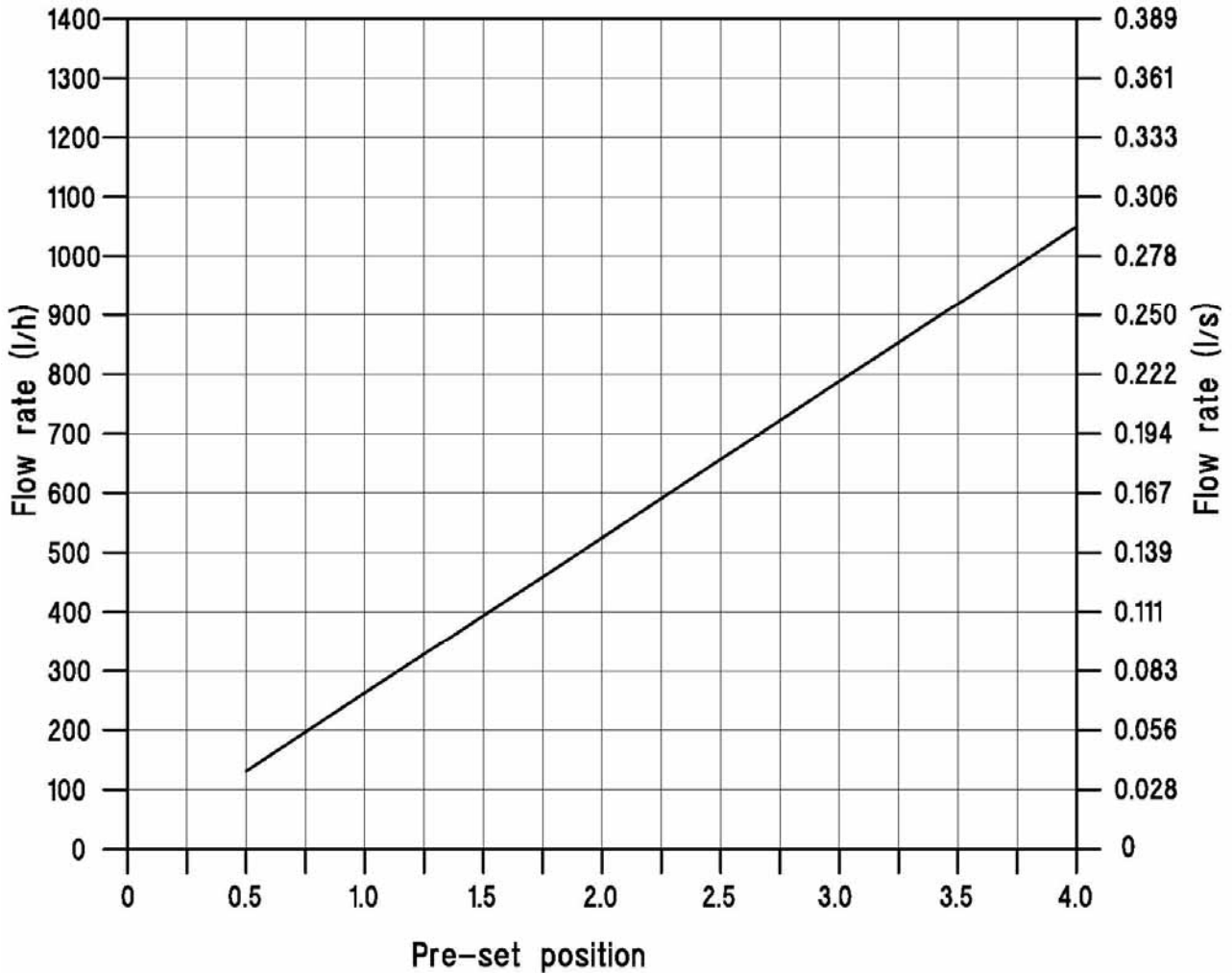
CIM 776 – CIM 777 LOW FLOW 1/2" DN 15
Flow rate according presetting dial device position



Pre-set position		0,50	0,75	1,00	1,25	1,50	1,75	2,00	2,25	2,50	2,75	3,00	3,25	3,50	3,75	4,00
FLOW RATE	l/h	78	117	156	195	234	274	313	352	391	430	469	508	547	586	625
	l/s	0,022	0,033	0,043	0,054	0,065	0,076	0,087	0,098	0,109	0,119	0,130	0,141	0,152	0,163	0,174
	gpm*	0,34	0,52	0,69	0,86	1,03	1,20	1,38	1,55	1,72	1,89	2,06	2,24	2,41	2,58	2,75
Min. Δp (KPa)		14,5	14,5	14,5	15,1	15,1	15,1	15,1	15,7	15,7	15,7	15,7	16,0	16,0	16,0	16,0
Kvs		0,21	0,31	0,41	0,50	0,60	0,70	0,81	0,89	0,99	1,08	1,18	1,27	1,37	1,47	1,57

* The "gpm" values are corresponding to US gallon per minute.

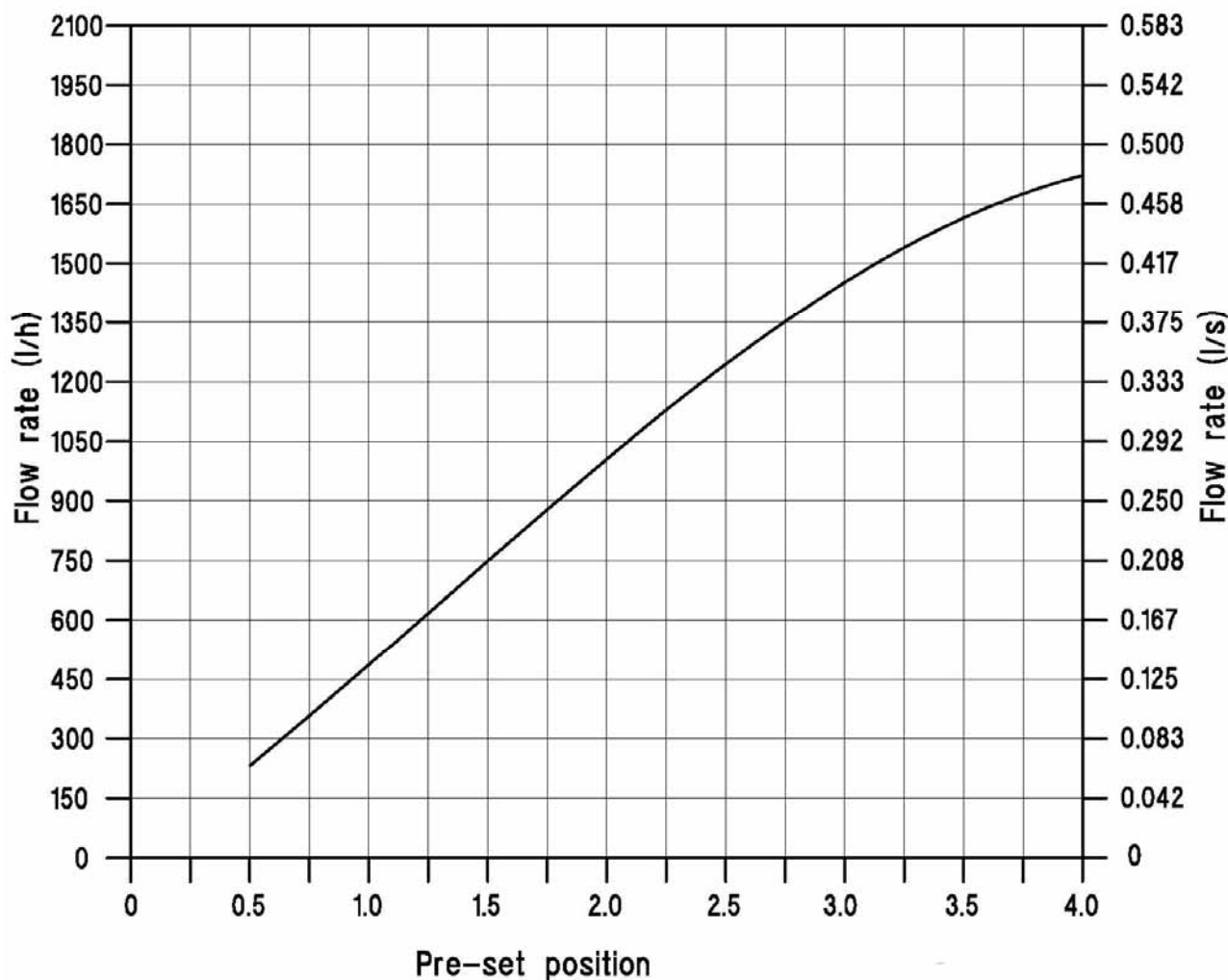
CIM 776 – CIM 777 LOW FLOW 3/4" DN 20
Flow rate according presetting dial device position



Pre-set position		0,50	0,75	1,00	1,25	1,50	1,75	2,00	2,25	2,50	2,75	3,00	3,25	3,50	3,75	4,00
FLOW RATE	l/h	131	197	263	328	394	459	525	591	656	722	788	853	919	984	1050
	l/s	0,036	0,055	0,073	0,091	0,109	0,128	0,146	0,164	0,182	0,201	0,219	0,237	0,255	0,273	0,292
	gpm*	0,58	0,87	1,16	1,44	1,73	2,02	2,31	2,60	2,89	3,18	3,47	3,76	4,04	4,33	4,62
Min. Δp (KPa)		14,5	14,5	14,5	15,1	15,1	15,1	15,1	15,7	15,7	15,7	15,7	16,0	16,0	16,0	16,0
Kvs		0,34	0,52	0,69	0,84	1,01	1,19	1,35	1,49	1,65	1,83	1,99	2,13	2,30	2,46	2,63

* The "gpm" values are corresponding to US gallon per minute.

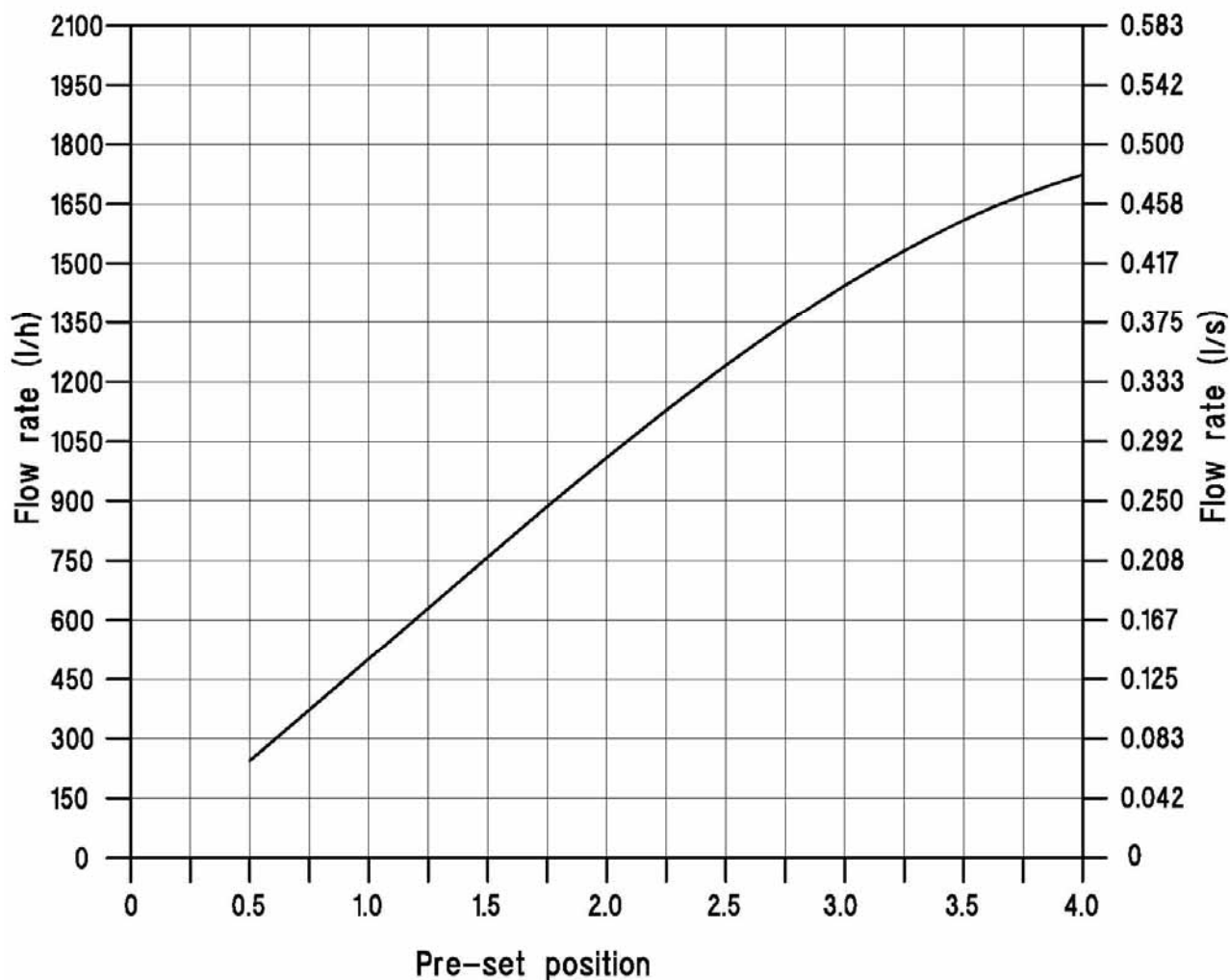
CIM 776 – CIM 777 LOW FLOW 1" DN 25
Flow rate according presetting dial device position



Pre-set position		0,50	0,75	1,00	1,25	1,50	1,75	2,00	2,25	2,50	2,75	3,00	3,25	3,50	3,75	4,00
FLOW RATE	l/h	231	357	486	617	749	878	1005	1128	1244	1352	1452	1540	1615	1676	1722
	l/s	0,064	0,099	0,135	0,171	0,208	0,244	0,279	0,313	0,346	0,376	0,403	0,428	0,449	0,466	0,478
	gpm*	1,02	1,57	2,14	2,72	3,30	3,87	4,43	4,96	5,48	5,95	6,39	6,78	7,11	7,38	7,58
Min. Δp (KPa)		14,0	14,0	14,0	14,8	14,8	14,8	14,8	15,5	15,5	15,5	15,5	16,0	16,0	16,0	16,0
Kvs		0,62	0,95	1,30	1,60	1,95	2,28	2,61	2,86	3,16	3,44	3,69	3,85	4,04	4,19	4,30

* The "gpm" values are corresponding to US gallon per minute.

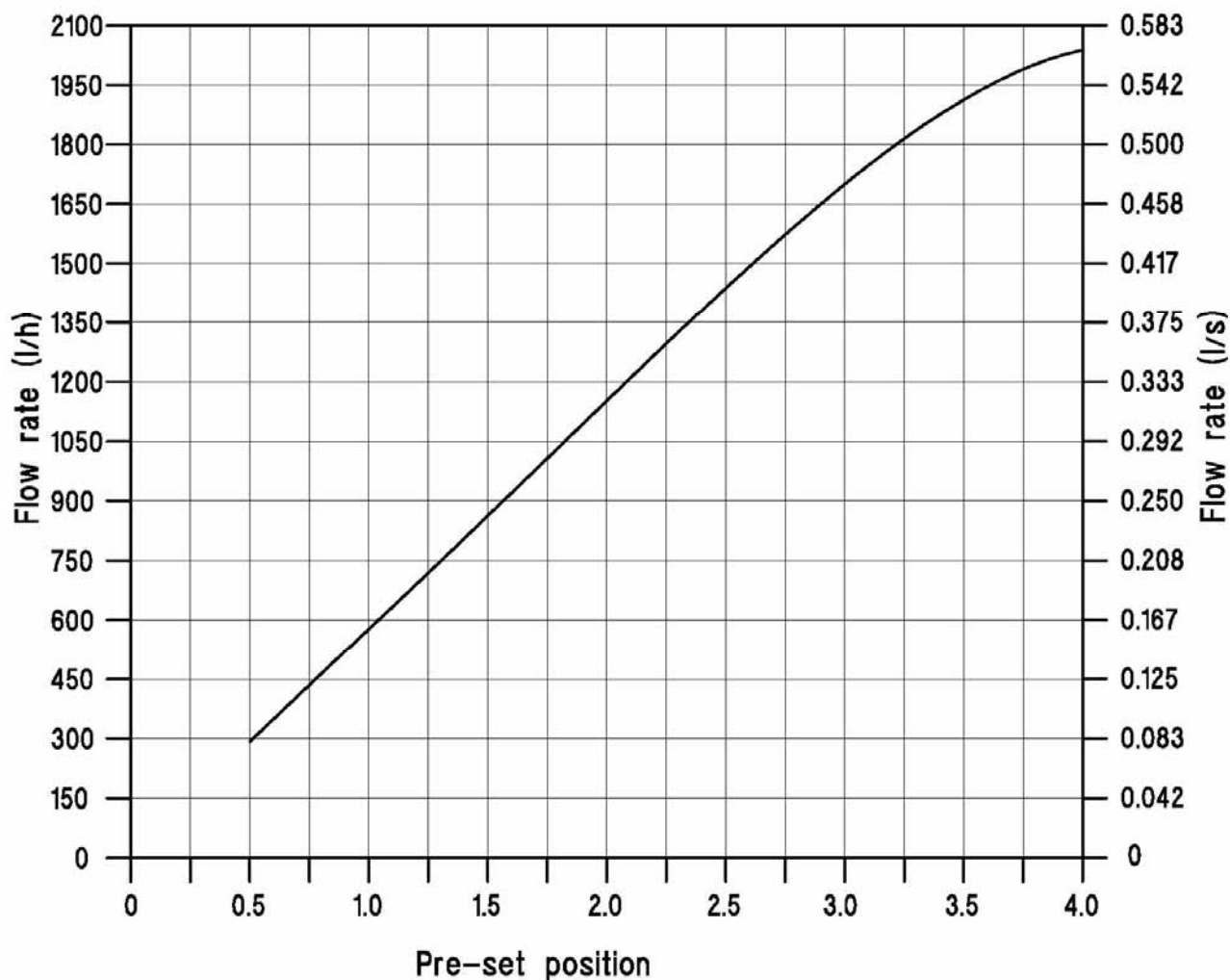
CIM 776 – CIM 777 HIGH FLOW 1/2" DN 15
Flow rate according presetting dial device position



Pre-set position		0,50	0,75	1,00	1,25	1,50	1,75	2,00	2,25	2,50	2,75	3,00	3,25	3,50	3,75	4,00
FLOW RATE	l/h	244	372	501	630	759	886	1009	1128	1241	1347	1444	1532	1609	1673	1724
	l/s	0,068	0,103	0,139	0,175	0,211	0,246	0,280	0,313	0,345	0,374	0,401	0,426	0,447	0,465	0,479
	gpm*	1,08	1,64	2,20	2,77	3,34	3,90	4,44	4,97	5,46	5,93	6,36	6,74	7,08	7,37	7,59
Min. Δp (KPa)		14,0	14,0	14,0	15,8	15,8	15,8	15,8	17,0	17,0	17,0	17,0	18,0	18,0	18,0	18,0
Kvs		0,65	0,99	1,34	1,58	1,91	2,23	2,54	2,73	3,01	3,27	3,50	3,61	3,79	3,95	4,06

* The "gpm" values are corresponding to US gallon per minute.

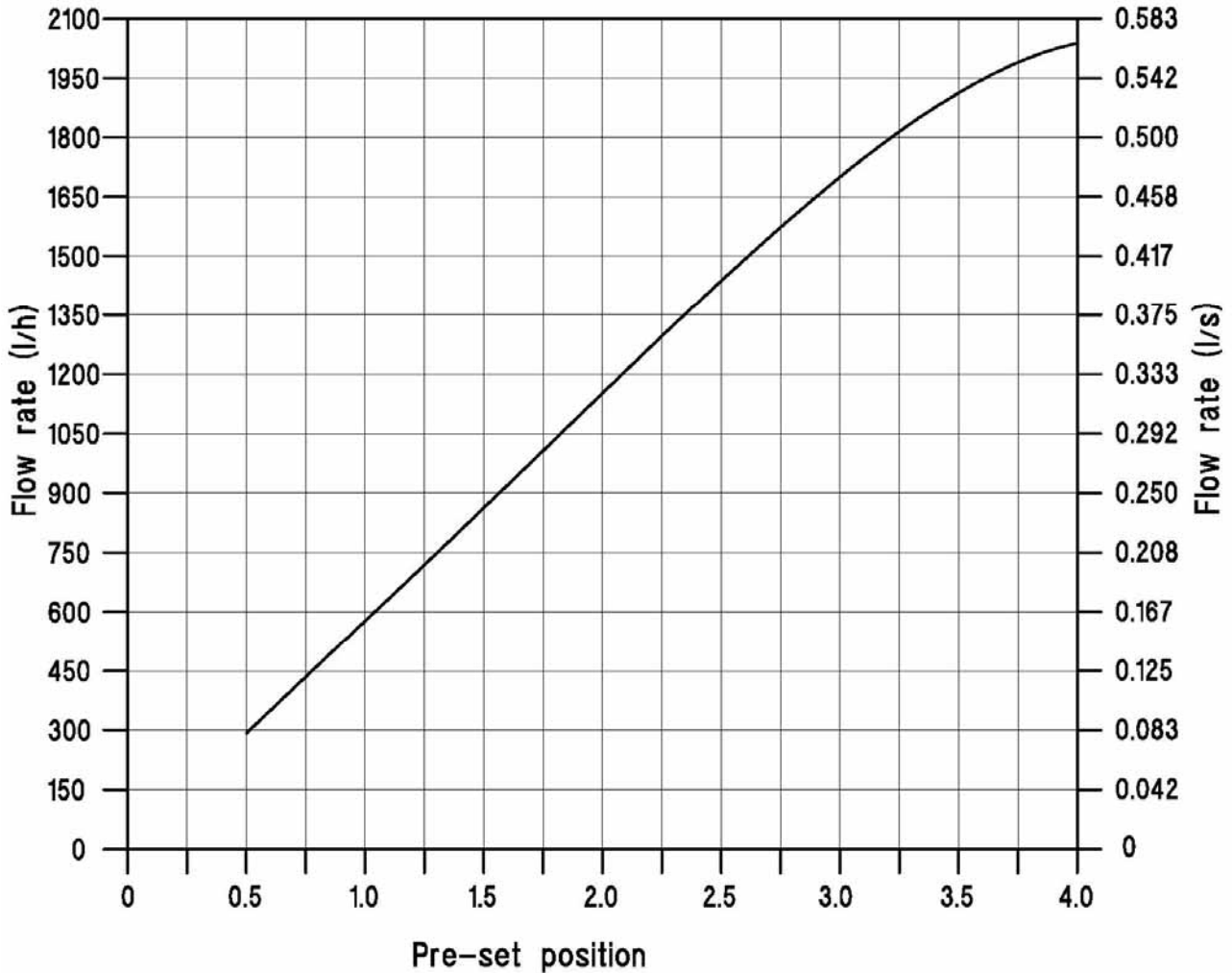
CIM 776 – CIM 777 HIGH FLOW 3/4" DN 20
Flow rate according presetting dial device position



Pre-set position		0,50	0,75	1,00	1,25	1,50	1,75	2,00	2,25	2,50	2,75	3,00	3,25	3,50	3,75	4,00
FLOW RATE	l/h	292	435	577	719	863	1007	1152	1296	1437	1573	1700	1815	1913	1990	2039
	l/s	0,081	0,121	0,160	0,200	0,240	0,280	0,320	0,360	0,399	0,437	0,472	0,504	0,531	0,553	0,566
	gpm*	1,28	1,91	2,54	3,17	3,80	4,43	5,07	5,70	6,33	6,92	7,48	7,99	8,42	8,76	8,98
Min. Δp (KPa)		14,0	14,0	14,0	18,0	18,0	18,0	18,0	20,0	20,0	20,0	20,0	22,0	22,0	22,0	22,0
Kvs		0,78	1,16	1,54	1,70	2,04	2,38	2,72	2,90	3,21	3,52	3,80	3,87	4,08	4,24	4,34

* The "gpm" values are corresponding to US gallon per minute.

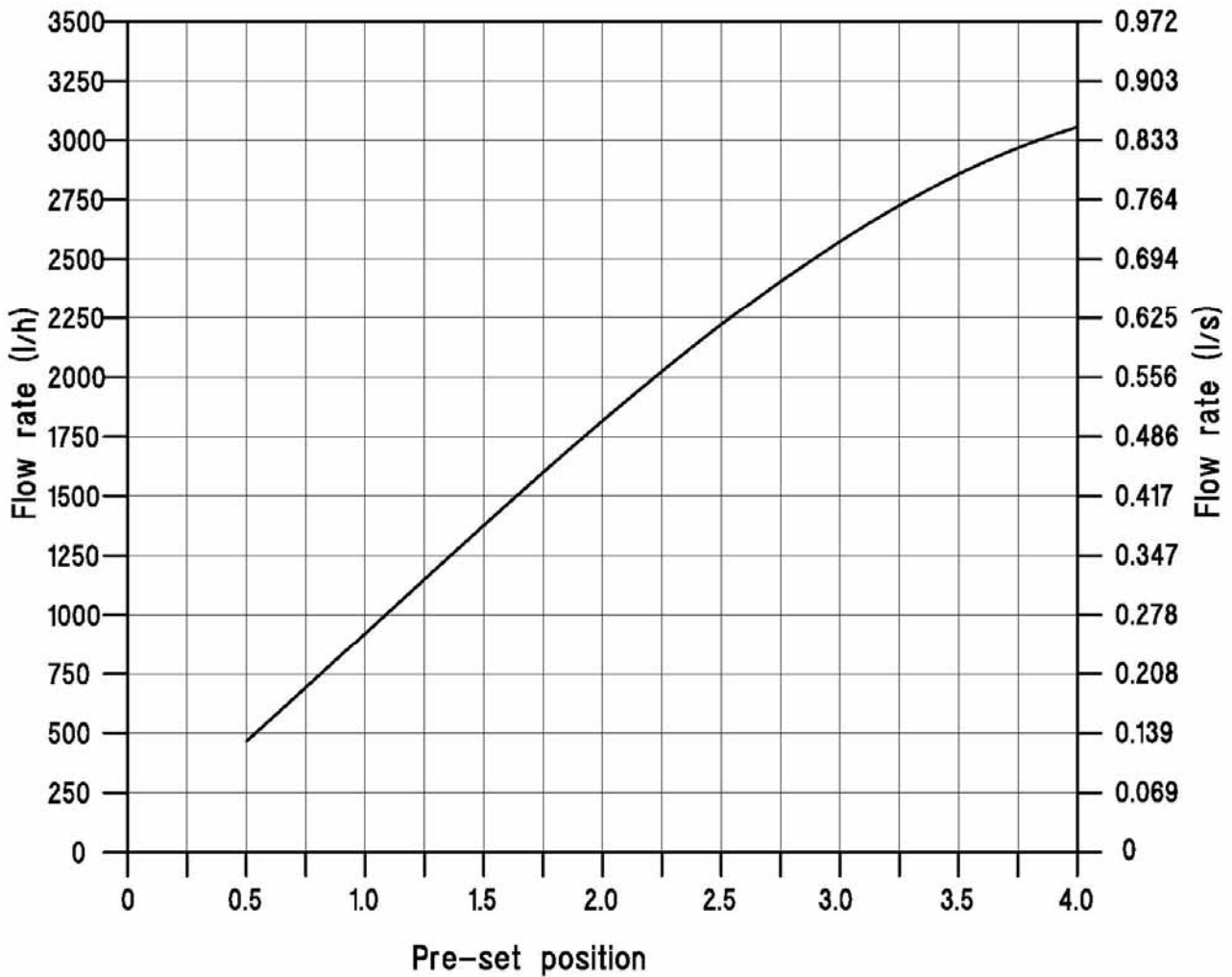
CIM 776 – CIM 777 HIGH FLOW 1" DN 25
Flow rate according presetting dial device position



Pre-set position		0,50	0,75	1,00	1,25	1,50	1,75	2,00	2,25	2,50	2,75	3,00	3,25	3,50	3,75	4,00
FLOW RATE	l/h	292	435	577	719	863	1007	1152	1296	1437	1573	1700	1815	1913	1990	2039
	l/s	0,081	0,121	0,160	0,200	0,240	0,280	0,320	0,360	0,399	0,437	0,472	0,504	0,531	0,553	0,566
	gpm*	1,28	1,91	2,54	3,17	3,80	4,43	5,07	5,70	6,33	6,92	7,48	7,99	8,42	8,76	8,98
Min. Δp (KPa)		14,0	14,0	14,0	18,0	18,0	18,0	18,0	20,0	20,0	20,0	20,0	22,0	22,0	22,0	22,0
Kvs		0,78	1,16	1,54	1,70	2,04	2,38	2,72	2,90	3,21	3,52	3,80	3,87	4,08	4,24	4,34

* The "gpm" values are corresponding to US gallon per minute.

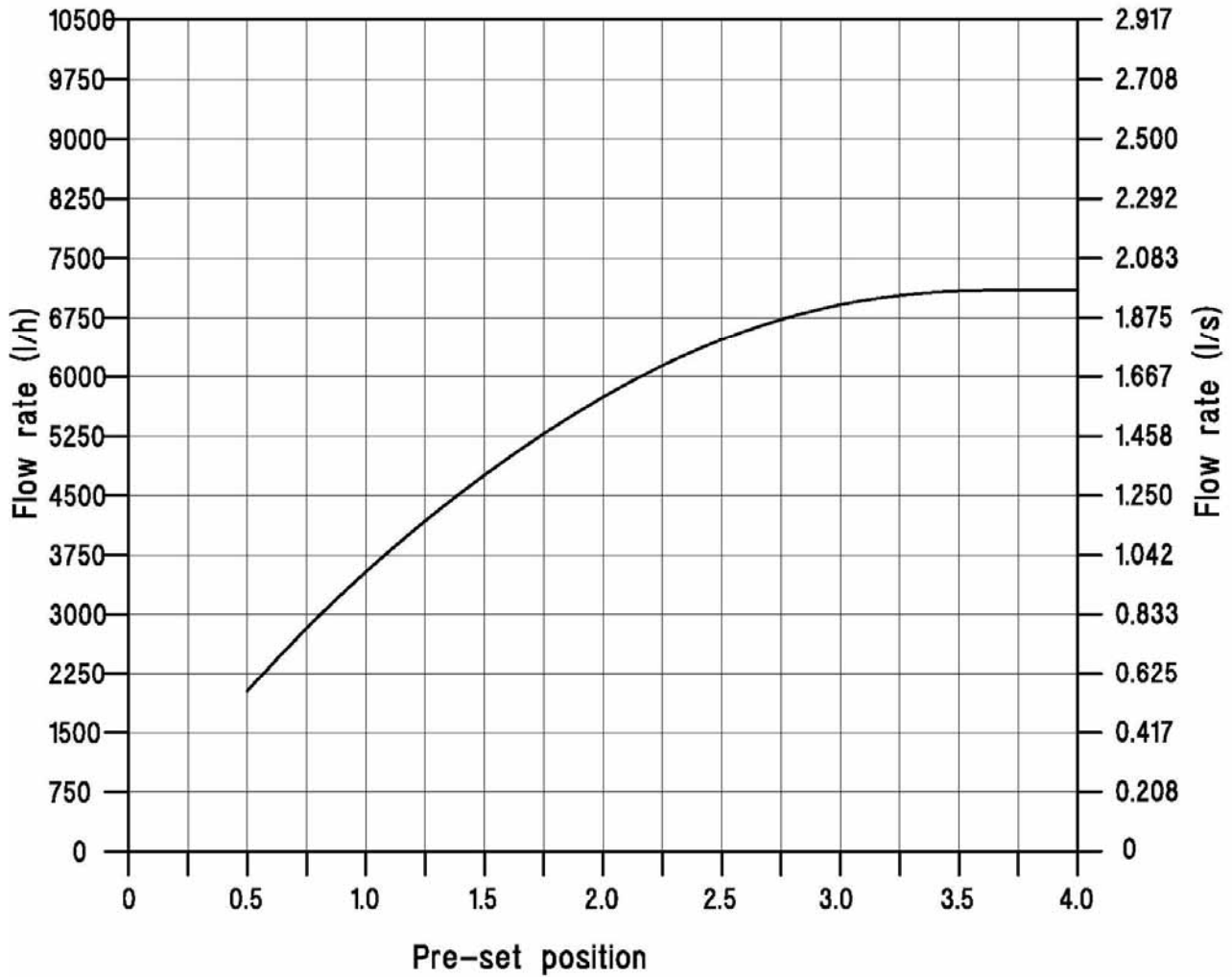
CIM 776 – CIM 777 HIGH FLOW 1”1/4 DN 32
Flow rate according to presetting dial device position



Pre-set position		0,50	0,75	1,00	1,25	1,50	1,75	2,00	2,25	2,50	2,75	3,00	3,25	3,50	3,75	4,00
FLOW RATE	l/h	465	692	921	1150	1377	1600	1816	2024	2221	2405	2574	2726	2858	2969	3056
	l/s	0,129	0,192	0,256	0,319	0,382	0,444	0,504	0,562	0,617	0,668	0,715	0,757	0,794	0,825	0,849
	gpm*	2,05	3,05	4,05	5,06	6,06	7,04	7,99	8,91	9,78	10,59	11,33	12,00	12,58	13,07	13,45
Min. Δp (KPa)		14,5	14,5	14,5	16,0	16,0	16,0	16,0	17,0	17,0	17,0	17,0	18,0	18,0	18,0	18,0
Kvs		1,22	1,82	2,42	2,87	3,44	4,00	4,54	4,91	5,39	5,83	6,24	6,42	6,74	7,00	7,20

* The "gpm" values are corresponding to US gallon per minute.

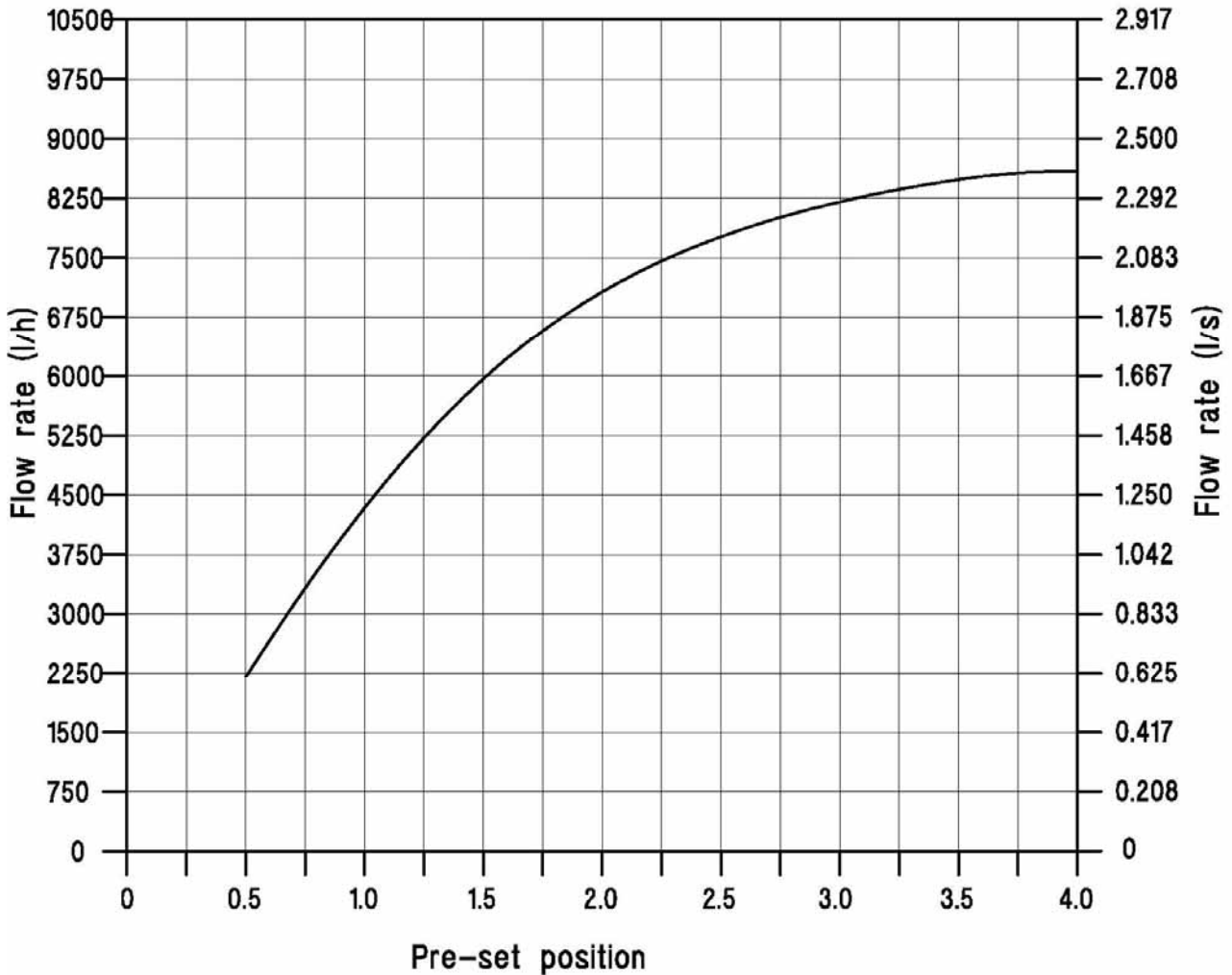
CIM 776 – CIM 777 HIGH FLOW 1”1/2 DN 40
Flow rate according to presetting dial device position



Pre-set position		0,50	0,75	1,00	1,25	1,50	1,75	2,00	2,25	2,50	2,75	3,00	3,25	3,50	3,75	4,00
FLOW RATE	l/h	2022	2825	3538	4179	4758	5279	5741	6139	6470	6729	6916	7033	7090	7105	7105
	l/s	0,562	0,785	0,983	1,161	1,322	1,466	1,595	1,705	1,797	1,869	1,921	1,954	1,969	1,974	1,974
	gpm*	8,90	12,44	15,58	18,40	20,95	23,24	25,27	27,03	28,48	29,62	30,44	30,96	31,21	31,28	31,28
Min. Δp (KPa)		16,0	16,5	16,5	18,0	18,0	20,0	20,0	22,0	22,5	24,0	25,0	26,0	26,0	26,0	26,0
Kvs		5,06	6,96	8,71	9,85	11,22	11,80	12,84	13,09	13,64	13,73	13,80	13,80	13,90	13,94	13,94

* The "gpm" values are corresponding to US gallon per minute.

CIM 776 – CIM 777 HIGH FLOW 2" DN 50
Flow rate according to presetting dial device position



Pre-set position		0,50	0,75	1,00	1,25	1,50	1,75	2,00	2,25	2,50	2,75	3,00	3,25	3,50	3,75	4,00
FLOW RATE	l/h	2204	3325	4337	5218	5963	6577	7070	7459	7766	8009	8204	8362	8486	8568	8586
	l/s	0,612	0,924	1,205	1,449	1,657	1,827	1,964	2,072	2,157	2,225	2,279	2,323	2,357	2,380	2,385
	gpm*	9,70	14,64	19,09	22,97	26,25	28,95	31,12	32,84	34,19	35,25	36,11	36,81	37,36	37,72	37,80
Min. Δp (KPa)		19,0	22,0	22,0	25,0	25,0	28,0	28,0	29,0	29,0	30,0	30,0	31,0	32,0	32,0	32,0
Kvs		5,05	7,09	9,25	10,43	11,93	12,43	13,36	13,85	14,42	14,62	14,98	15,00	15,00	15,15	15,18

* The "gpm" values are corresponding to US gallon per minute.