50 Hz

AFLC Series

HIGH EFFICIENCY WET ROTOR CIRCULATORS
FOR HEATING AND COOLING SYSTEMS

ErP 2009/125/EC

Cod. 191007461 Rev.D Ed.08/2013

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AFLC SERIES
PRODUCT RANGE CHART

TYPE	Version		Power supply		Pump coupling		Temperature of pumped liquid			Ambient temperature		Protection class
	Single	Twin	Single-phase 230 V 50 Hz	Three-phase 400 V 50 Hz	Threaded	Flanged	+15°C ÷ +70°C	-15°C ÷ +90°C	+15°C ÷ +110°C	Max 30°C	Max 40°C	IP 42
AFLC 30-120 (Modbus)	•		•		•				•	•		•
AFLC (G) 32-120 (Modbus)	•	•	•						•	•		•
AFLC (G) 40-120 (Modbus)	•	•	•			•			•	•		•
AFLC 50-90 (Modbus)	•		•			•			•	•		•
AFLC (G) 50-140 (Modbus)	•	•	•			•			•	•		•
AFLC 65-90 (Modbus)	•		•			•		•		•		•
AFLC 65-120 (Modbus)	•		•			•		•		•		•
AFLC 30-120 (Modbus)	•		•		•			•			•	•
AFLC (G) 32-120 (Modbus)	•	•	•					•			•	•
AFLC (G) 40-120 (Modbus)	•	•	•			•		•			•	•
AFLC 50-90 (Modbus)	•		•			•		•			•	•
AFLC (G) 50-140 (Modbus)	•	•	•			•		•			•	•
AFLC 65-90 (Modbus)	•		•			•	•				•	•
AFLC 65-120 (Modbus)	•		•			•	•				•	•

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High efficiency variable speed circulators

AFLC Series

MARKET SECTORS

COMMERCIAL AND INDUSTRIAL

APPLICATIONS

- Water circulation in heating and cooling systems.
- Pumping of hot/cold liquids, chemically or mechanically non-aggressive, non-explosive, without solids or fiber matter.

SPECIFICATIONS

PUMP

- **Flow rate**: up to 60 m^3/h.
- **Head**: up to 12 m.
- **Maximum operating pressure**: 10 bar (PN10).
- **Minimum operating pressure**: 0,5 bar.
- **Impeller**: made of cast iron (except for AFLC 30-120, AFLC(G) 32-120 made of composite material).
- **Temperature of pumped liquid**:

MODELS	AMBIENT TEMPERATURE	LIQUID TEMPERATURE*
30-120, 32-120, 40-120	30° C	+15°C ÷ +110°C
50-90, 50-140	40° C	+15°C ÷ +90°C
65-90, 65-120	30° C	+15°C ÷ +90°C
	40° C	+15°C ÷ +70°C

* Non-freezing, non-condensing.

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MOTOR

- Permanent magnet wet rotor type motor, with bearings lubricated by the pumped liquid. Built-in automatic motor protection with isothermal probes (with external relay, terminals accessible from the terminal board).
- Single-phase 230 V 50 Hz power supply.
- Motor-mounted inverter, with selector switch for mode and operating parameter selection and terminal board for cable connection.
- **Insulation class** 155 (F).
- **Protection class** IP 42.

CONSTRUCTION CHARACTERISTICS

- Electric circulator pumps with in-line suction and discharge ports, designed for direct installation onto piping, DN 32, 40, 50, 65, 80 mounting flanges and 2" threaded connection (AFLC 30-120).
- According to EN standards 60335-1, 60335-2-51, 61000-6-2, 61000-6-3, 16297-1, 16297-2.
- Single or twin pump design. The two pumps can operate separately or in parallel in the following manner:
  - Separately: both differential pressure and controlled speed can be selected.
  - Parallel: controlled speed regulation only (speed selection from 1 to 4).
- Rotor shaft made of perforated stainless steel. By enabling water circulation this design ensures:
  – continuous degassing of the rotor chamber, with no need to perform this operation manually during startup;
  – bearing lubrication.

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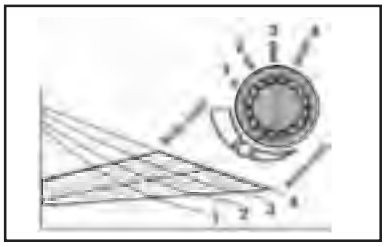
- 3 modes of regulation:
  - Differential pressure.
  - Controlled speed from 1 to 4.
  - From remote via 0-10 V signal.
  - From remote via Modbus (see "Modbus version").
- On the terminal box 2 LED indicate the running status:
  - Green LED: normal operation.
  - Red LED: failure detected by the electronics or remote start/stop disconnected.

Control modes



- Differential pressure - selectable from the knob on the ter.
  Thanks to the losses compensation system of the electronics, the controller adjusts the circulator's differential pressure to match the required flow.
- Controlled speed.
  The motor running speed is fixed at the value set with the selector between 1 and 4.
- 0-10 V signal.
  The speed can be controlled infinitely from remote between minimum speed (0 V) and maximum speed (10 V).
- Additional signals available:
  - Remote start-stop function.
  - Alarm function.

Modbus version.

The Modbus version includes all the features of the standard version described above and it additionally supports RS-485 settings. The RS-485 signal allows the connection of the circulator to a BMS system or a PLC.

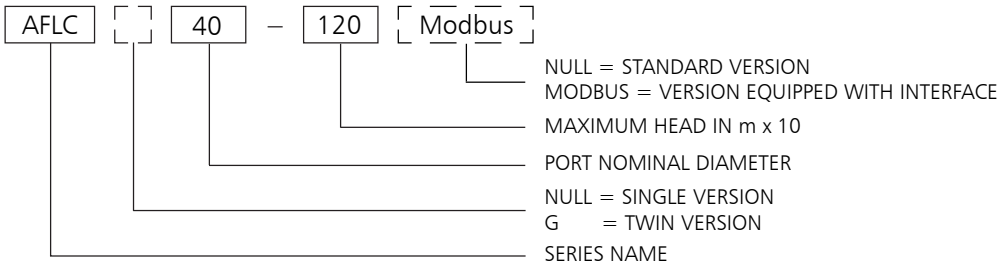
ACCESSORIES

- Blind flanges.
- Counterflanges.

INSTALLATION

- Suitable for installation in horizontal or vertical piping, in any position provided that motor axis is horizontal.
- Never install the circulator with the terminal box under the motor(s) (6 o'clock).
- For the twin design installed on horizontal piping, periodic changeover is recommended in order to prevent the formation of water pockets at the top; as an alternative, install an air bleed valve on the flange.
- For installation onto vertical piping the flow should always be upward. If not it is recommended to install an air venting point in the higher point of the circuit at the suction side.

AFLC SERIES
IDENTIFICATION CODE



EXAMPLE : AFLCG 40-120

AFLC electronic circulator series, twin version, port nominal diameter = 40, max head = 12 m.

TABLE OF MATERIALS

PART	MATERIAL
Pump body	Cast iron
Impeller up to AFLC(G) 32-120	Composite material
Impeller from AFLC(G) 40-120	Cast iron
Shaft	Stainless steel
Jacket	Stainless steel
Bearings	Graphite
Gaskets	EPDM

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Regulations (EC) n. 641/2009 and (EU) n. 622/2012 – Annex I – point 2 (Product information requirements)

a) Energy efficiency index: see the EEI column in the tables in the Hydraulic performance section.
b) "The benchmark for most efficient circulators is EEI ≤ 0,20".
c) Information relevant for disassembly, recycling or disposal at end-of-life: observe the current laws and by-laws governing sorted waste disposal. Consult the product operating manual.
d) Information for circulators specifically designed to potable water uses: note not applicable to these products.

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AFLC(G) SERIES (SINGLE VERSION, SINGLE-PHASE) HYDRAULIC PERFORMANCE TABLE

PUMP TYPE	EEI ≤	POWER ABSORBED		CURRENT ABSORBED		SPEED	Q = DELIVERY										
							l/s 0	1,4	2,2	2,8	4,2	5,6	6,9	8,3	9,7	11,1	13,9
		MIN	MAX	MIN	MAX		m^3/h 0	5	8	10	15	20	25	30	35	40	50
230V 50Hz	(1)	W	W	A	A		H = TOTAL HEAD METRES COLUMN OF WATER										
AFLC 30-120 (Modbus)	0,27	30	340	0,25	2,10	1	6,4	5,5	3,3								
						2	7,2	6,3	4,2	2,2							
						3	8,2	7,3	5,3	3,3							
						4	12,4	8,8	6,1	4,0							
						max	5,3	8,8	6,1	4,0							
AFLC(G) 32-120 (Modbus)	0,27	25	350	0,21	2,30	1	5,3	4,4	3,2	2,1							
						2	6,5	5,8	4,5	3,2							
						3	7,5	6,8	5,5	4,2							
						4	11,7	8,3	6,1	4,7							
						max	5,3	8,3	6,1	4,7							
AFLC(G) 40-120 (Modbus)	0,27	27	450	0,22	2,70	1	4,4	3,6	2,8								
						2	6,6	5,4	4,5	3,9							
						3	9,6	8,2	7,1	6,2							
						4	12,6	11,4	9,1	7,3							
						max	6,9	10,6	9,1	7,3							
AFLC 50-90 (Modbus)	0,27	25	350	0,21	2,30	1	5,3	4,8	4,2	3,7	2,0						
						2	6,8	6,0	5,4	4,9	3,3						
						3	8,0	7,1	6,4	5,8	4,1	2,1					
						4	9,9	8,2	7,3	6,8	5,2	3,3					
						max	3,9	6,8	7,3	6,8	5,2	3,3					
AFLC(G) 50-140 (Modbus)	0,27	60	700	0,40	4,50	1	4,8	4,8	4,5	4,2	3,0						
						2	6,3	6,2	6,0	5,7	4,5	2,9					
						3	7,2	7,2	6,9	6,6	5,5	3,8					
						4	14,1	11,2	9,8	8,9	6,9	4,9	2,8				
						max	6,0	11,2	9,8	8,9	6,9	4,9	2,8				
AFLC 65-90 (Modbus)	0,27	60	700	0,40	4,50	1	4,2	4,2	4,2	4,1	3,9	3,4	2,7	1,8			
						2	5,3	5,3	5,3	5,2	4,9	4,5	3,8	2,9			
						3	6,0	6,1	6,0	6,0	5,7	5,3	4,6	3,8	2,6		
						4	9,0	8,2	7,7	7,4	6,6	5,7	4,8	3,8	2,7		
						max	3,7	5,3	6,3	7,0	6,6	5,7	4,8	3,8	2,7		
AFLC 65-120 (Modbus)	0,27	100	1400	0,90	9,50	1	5,1	5,1	5,1	5,0	4,7	4,1	3,4	2,4			
						2	6,6	6,6	6,6	6,5	6,2	5,6	4,9	4,0	2,9		
						3	8,0	8,1	8,1	8,0	7,7	7,1	6,4	5,5	4,4	3,1	
						4	12,1	11,7	11,4	11,1	10,4	9,5	8,4	7,2	5,9	4,4	
						max	5,8	7,5	8,6	9,3	10,4	9,5	8,4	7,2	5,9	4,4	

Performances according to standards EN 16297-2.

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(1) Energy efficiency index.

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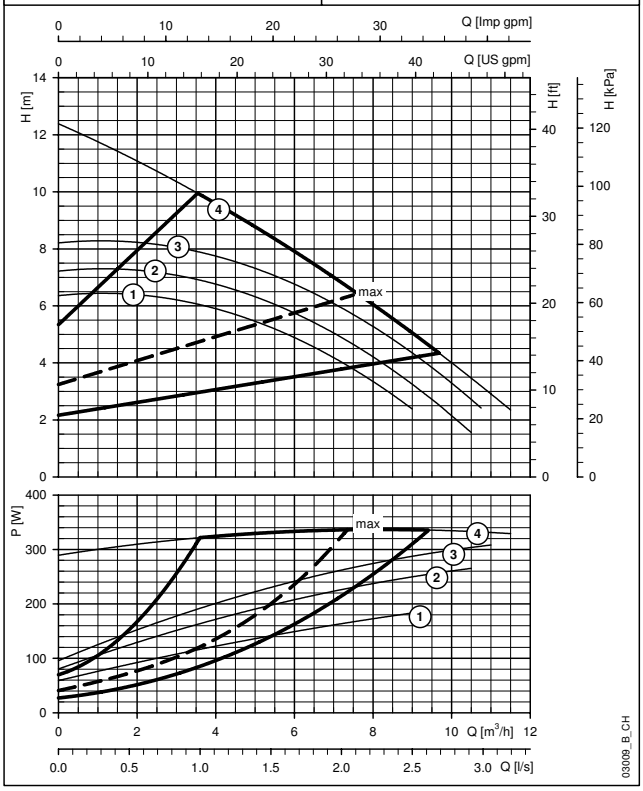
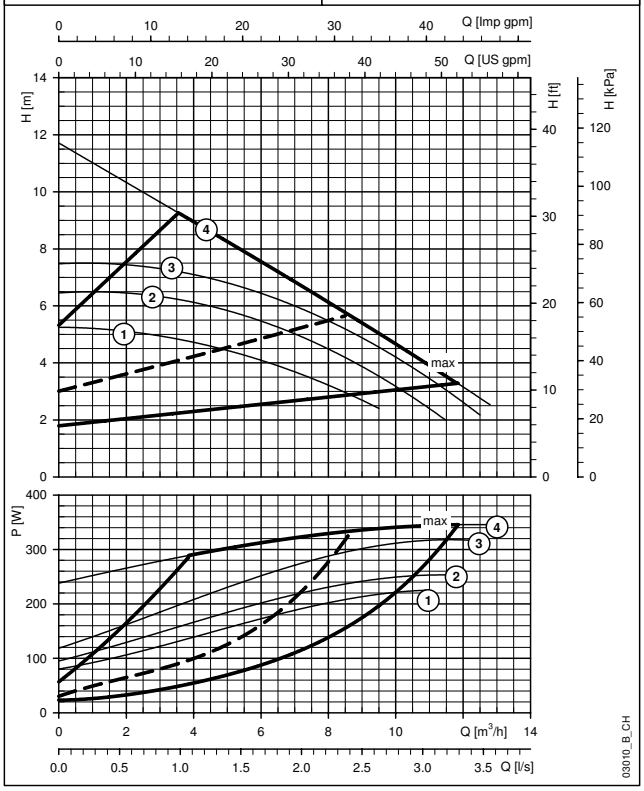
AFLC(G) SERIES
SINGLE VERSION, SINGLE-PHASE OPERATING CHARACTERISTICS

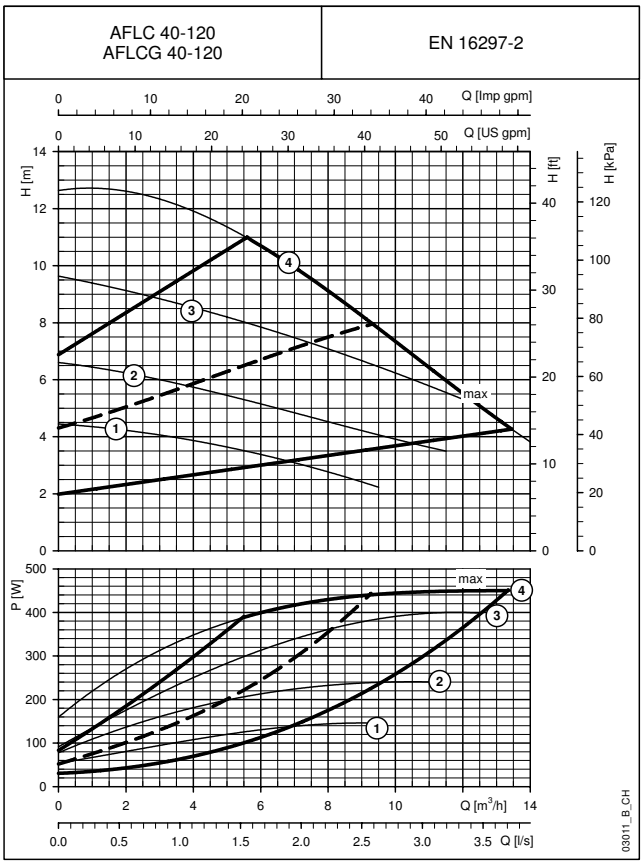
AFLC 30-120 | EN 16297-2



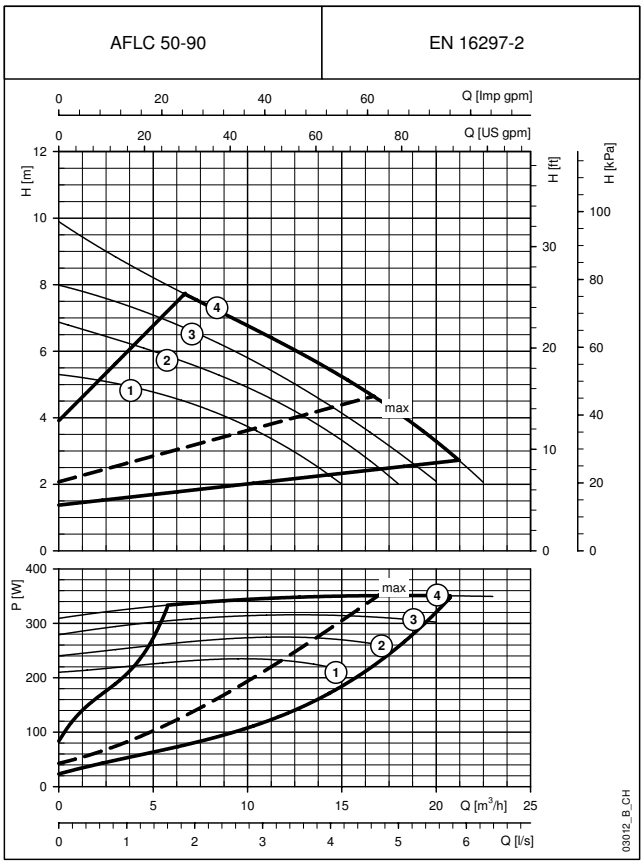
AFLC 32-120
AFLCG 32-120 | EN 16297-2



AFLC 40-120
AFLCG 40-120 | EN 16297-2



AFLC 50-90 | EN 16297-2

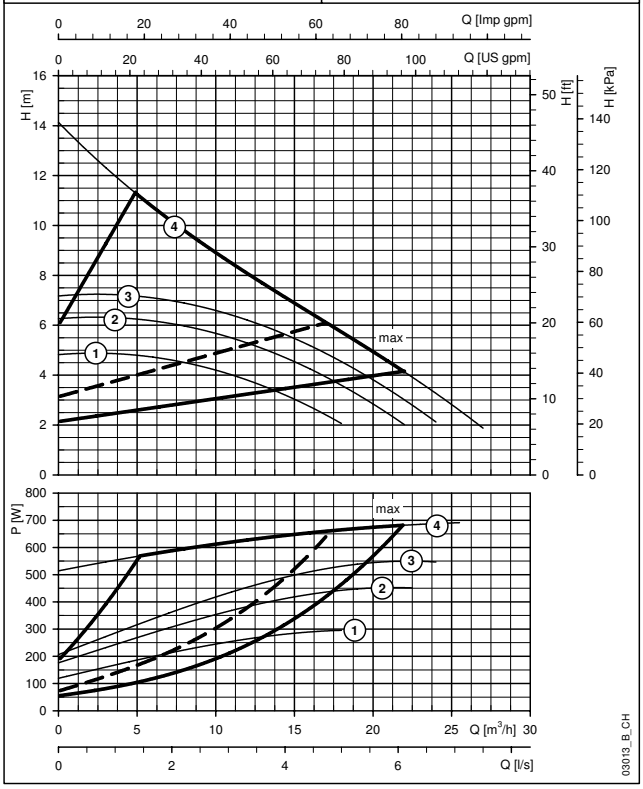


These performances are valid for liquids with density $\rho = 1.0$ Kg/dm^3 and kinematic viscosity $\nu = 1$ mm^2/sec.

AFLC(G) SERIES
SINGLE VERSION, SINGLE-PHASE OPERATING CHARACTERISTICS

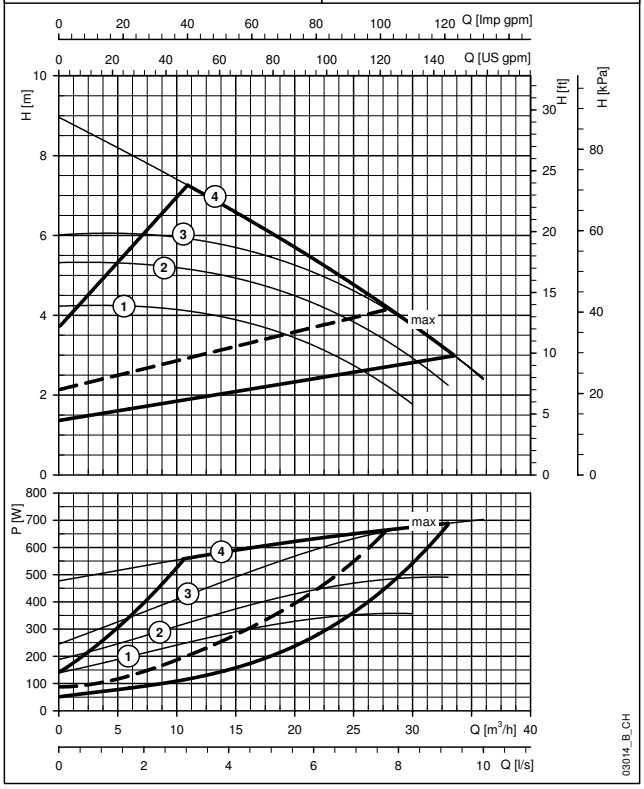
AFLC 50-140
AFLCG 50-140

EN 16297-2



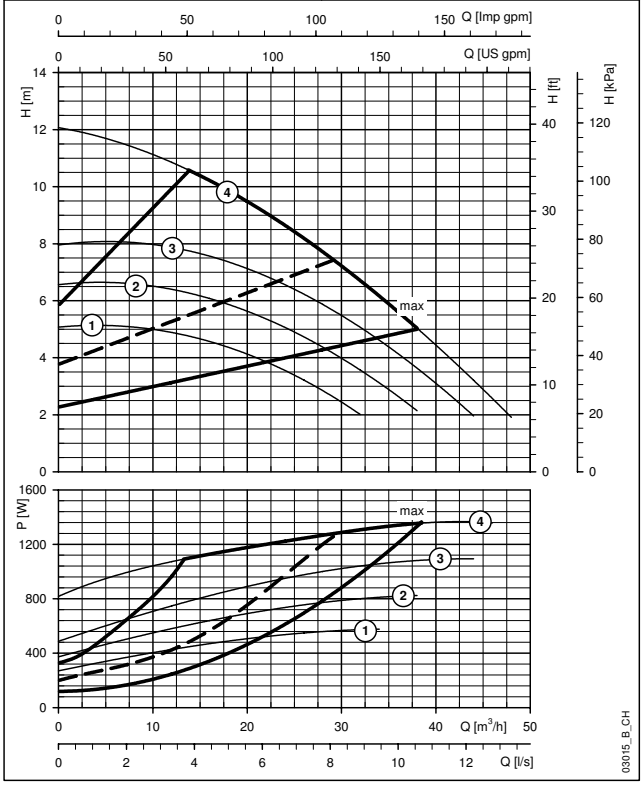
AFLC 65-90

EN 16297-2



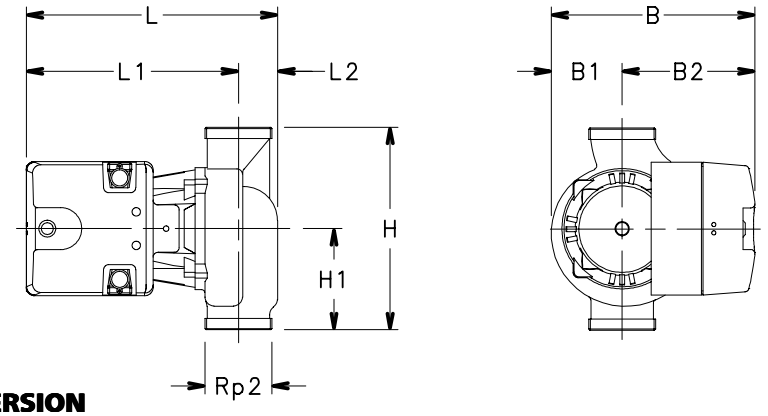
AFLC 65-120

EN 16297-2



These performances are valid for liquids with density ρ = 1.0 Kg/dm³ and kinematic viscosity ν = 1 mm²/sec.

AFLC SERIES
DIMENSIONS AND WEIGHTS



AFLC 30-120
THREADED VERSION

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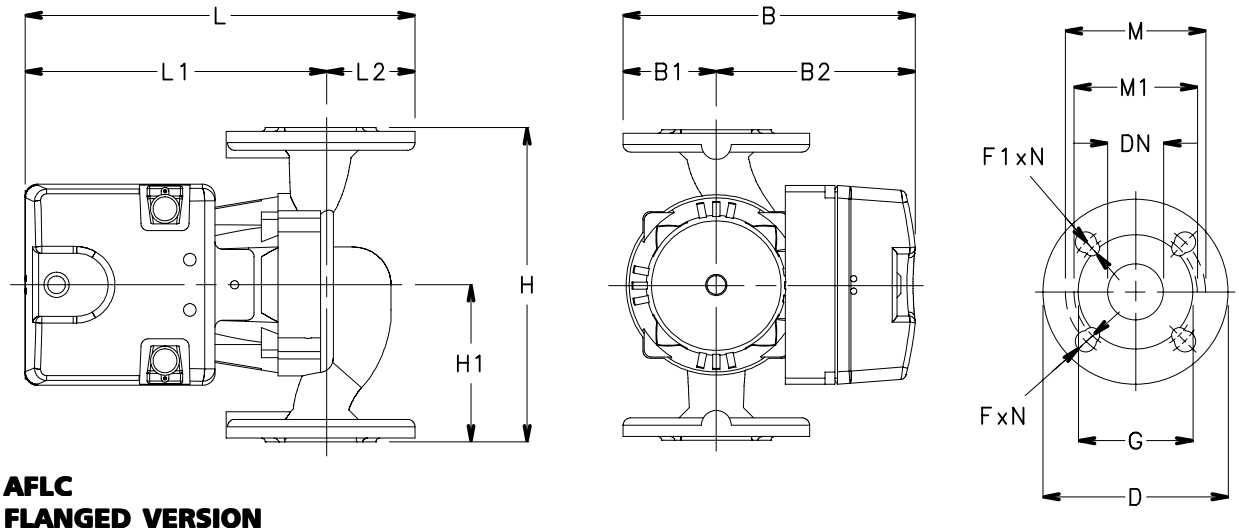

AFLC
FLANGED VERSION

PUMP DIMENSIONS FLANGES

	DIMENSIONS (mm)				HOLES			
DN	ø D	ø G	ø M	ø M1	ø F	ø F1	N°	PN
32	140	78	100	90	19	14	4	6 / 10
40	150	90	110	100	19	14	4	6 / 10
50	165	102	125	110	19	14	4	6 / 10

	DIMENSIONS (mm)				HOLES			
DN	ø D	ø G	ø M	ø M1	ø F	ø F1	N°	PN
65	185	126	145	130	19	14	4	6 / 10
80	200	140	160	-	19	-	8	10

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DIMENSIONS AND WEIGHTS TABLE

PUMP TYPE	DIMENSIONS (mm)									WEIGHT
SINGLE-PHASE	B	B1	B2	H	H1	L	L1	L2	DN	kg
AFLC 30-120	225	75	150	180	90	265	230	35	-	8,6
AFLC 32-120	220	70	150	220	125	285	215	70	32	12,8
AFLC 40-120	225	75	150	250	125	290	215	75	40	12,8
AFLC 50-90	255	95	160	280	140	300	225	75	50	13,5
AFLC 50-140	255	95	160	280	140	320	235	85	50	19,6
AFLC 65-90	270	105	165	340	170	315	230	85	65	25,5
AFLC 65-120	285	105	180	340	170	328	235	93	65	36,5

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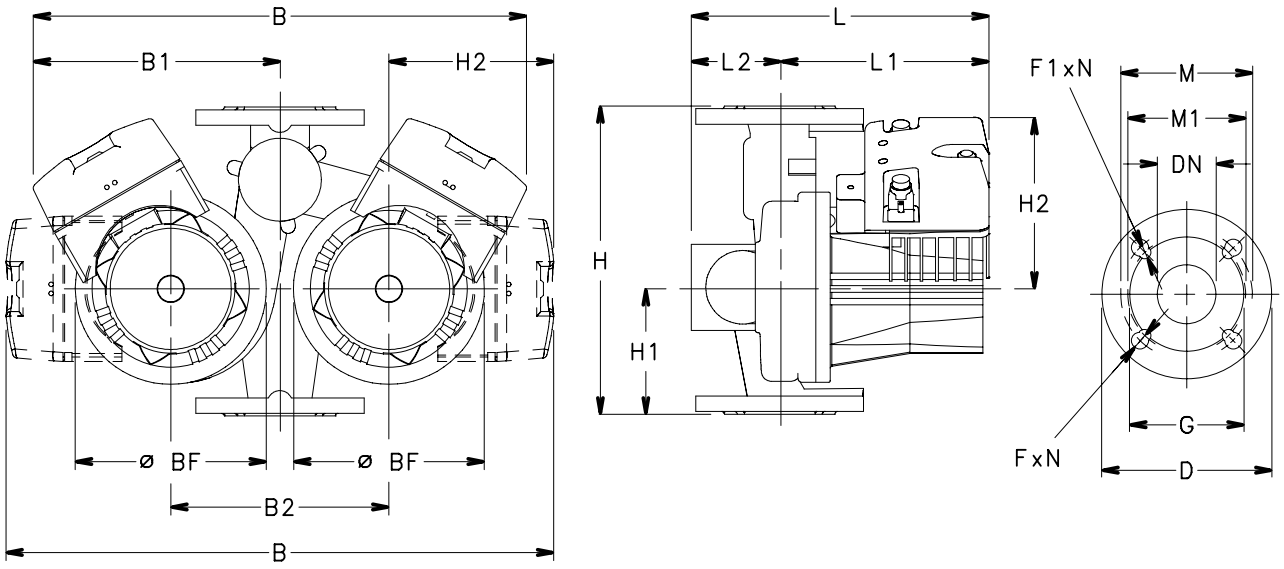
AFLCG SERIES
DIMENSIONS AND WEIGHTS



PUMP DIMENSIONS FLANGES

	DIMENSIONS (mm)				HOLES			
DN	ø D	ø G	ø M	ø M1	ø F	ø F1	N°	PN
32	140	78	100	90	19	14	4	6 / 10
40	150	90	110	100	19	14	4	6 / 10
50	165	102	125	110	19	14	4	6 / 10

	DIMENSIONS (mm)				HOLES			
DN	ø D	ø G	ø M	ø M1	ø F	ø F1	N°	PN
65	185	126	145	130	19	14	4	6 / 10
80	200	140	160	-	19	-	8	10

aflc-aflcg-flangep-en_a_td

02712_B_DD

DIMENSIONS AND WEIGHTS TABLE

PUMP TYPE	DIMENSIONS (mm)											WEIGHT
	B	B1	B2	H	H1	H2	L	L1	L2	ø BF	DN	kg
AFLCG 32-120	350	180	200	220	110	160	300	230	70	135	32	21,7
AFLCG 40-120	436	218	200	250	105	170	290	215	75	135	40	22
AFLCG 50-140	490	187	200	280	120	170	318	235	82,5	161	50	34,1

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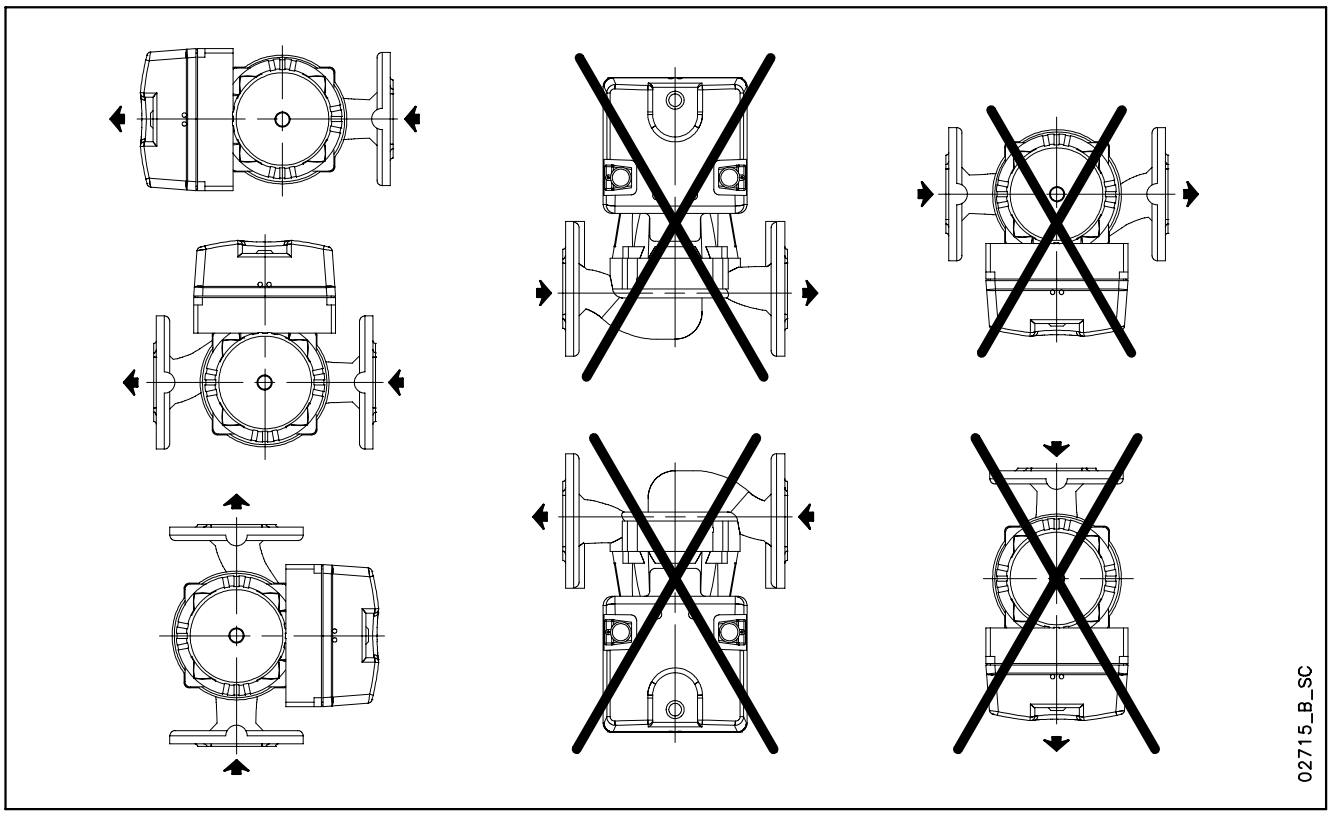
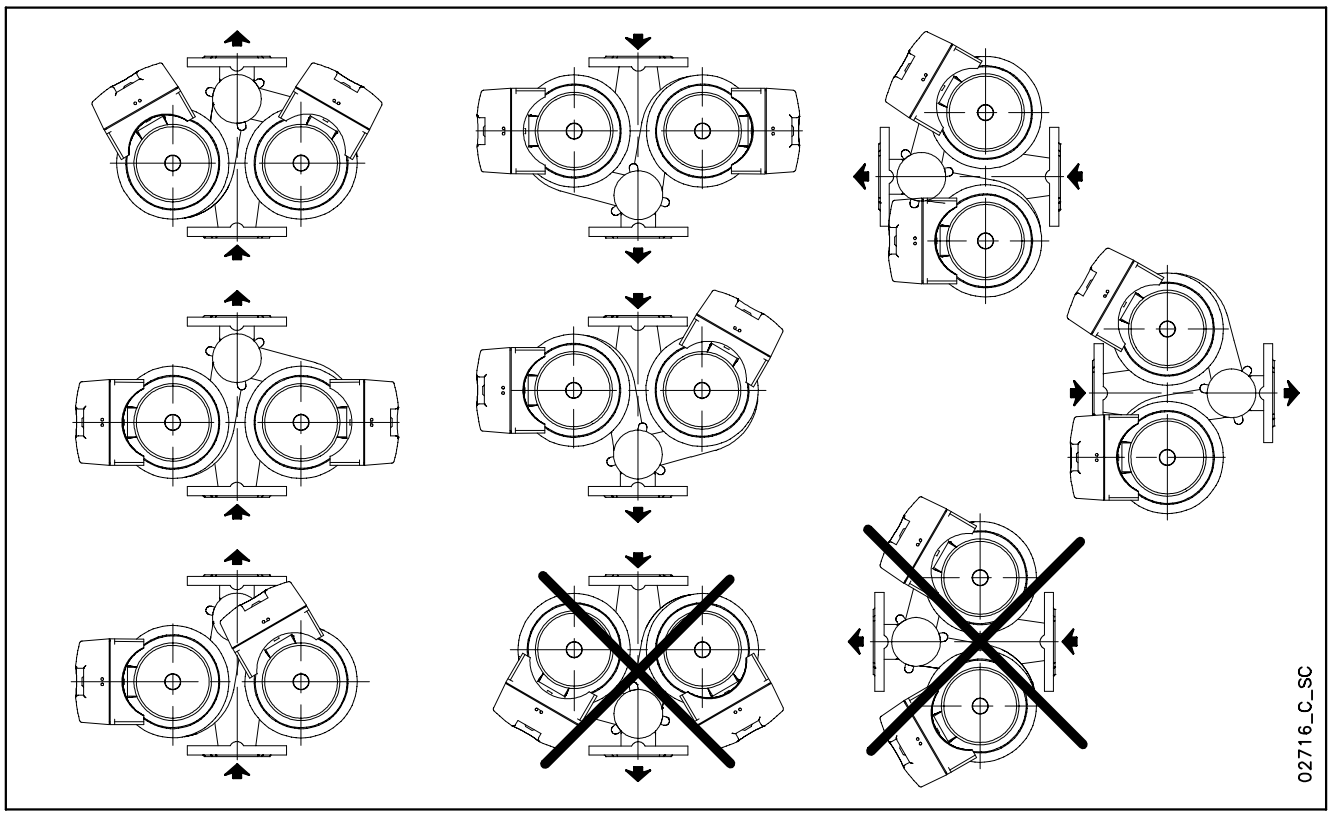
AFLC SERIES
INSTALLATION POSITIONS



AFLCG SERIES
INSTALLATION POSITIONS



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TECHNICAL APPENDIX

VAPOUR PRESSURE
VAPOUR PRESSURE ps AND ρ DENSITY OF WATER TABLE

t	T	ps	ρ
°C	K	bar	kg/dm³
0	273,15	0,00611	0,9998
1	274,15	0,00657	0,9999
2	275,15	0,00706	0,9999
3	276,15	0,00758	0,9999
4	277,15	0,00813	1,0000
5	278,15	0,00872	1,0000
6	279,15	0,00935	1,0000
7	280,15	0,01001	0,9999
8	281,15	0,01072	0,9999
9	282,15	0,01147	0,9998
10	283,15	0,01227	0,9997
11	284,15	0,01312	0,9997
12	285,15	0,01401	0,9996
13	286,15	0,01497	0,9994
14	287,15	0,01597	0,9993
15	288,15	0,01704	0,9992
16	289,15	0,01817	0,9990
17	290,15	0,01936	0,9988
18	291,15	0,02062	0,9987
19	292,15	0,02196	0,9985
20	293,15	0,02337	0,9983
21	294,15	0,24850	0,9981
22	295,15	0,02642	0,9978
23	296,15	0,02808	0,9976
24	297,15	0,02982	0,9974
25	298,15	0,03166	0,9971
26	299,15	0,03360	0,9968
27	300,15	0,03564	0,9966
28	301,15	0,03778	0,9963
29	302,15	0,04004	0,9960
30	303,15	0,04241	0,9957
31	304,15	0,04491	0,9954
32	305,15	0,04753	0,9951
33	306,15	0,05029	0,9947
34	307,15	0,05318	0,9944
35	308,15	0,05622	0,9940
36	309,15	0,05940	0,9937
37	310,15	0,06274	0,9933
38	311,15	0,06624	0,9930
39	312,15	0,06991	0,9927
40	313,15	0,07375	0,9923
41	314,15	0,07777	0,9919
42	315,15	0,08198	0,9915
43	316,15	0,09639	0,9911
44	317,15	0,09100	0,9907
45	318,15	0,09582	0,9902
46	319,15	0,10086	0,9898
47	320,15	0,10612	0,9894
48	321,15	0,11162	0,9889
49	322,15	0,11736	0,9884
50	323,15	0,12335	0,9880
51	324,15	0,12961	0,9876
52	325,15	0,13613	0,9871
53	326,15	0,14293	0,9862
54	327,15	0,15002	0,9862

t	T	ps	ρ
°C	K	bar	kg/dm³
55	328,15	0,15741	0,9857
56	329,15	0,16511	0,9852
57	330,15	0,17313	0,9846
58	331,15	0,18147	0,9842
59	332,15	0,19016	0,9837
60	333,15	0,1992	0,9832
61	334,15	0,2086	0,9826
62	335,15	0,2184	0,9821
63	336,15	0,2286	0,9816
64	337,15	0,2391	0,9811
65	338,15	0,2501	0,9805
66	339,15	0,2615	0,9799
67	340,15	0,2733	0,9793
68	341,15	0,2856	0,9788
69	342,15	0,2984	0,9782
70	343,15	0,3116	0,9777
71	344,15	0,3253	0,9770
72	345,15	0,3396	0,9765
73	346,15	0,3543	0,9760
74	347,15	0,3696	0,9753
75	348,15	0,3855	0,9748
76	349,15	0,4019	0,9741
77	350,15	0,4189	0,9735
78	351,15	0,4365	0,9729
79	352,15	0,4547	0,9723
80	353,15	0,4736	0,9716
81	354,15	0,4931	0,9710
82	355,15	0,5133	0,9704
83	356,15	0,5342	0,9697
84	357,15	0,5557	0,9691
85	358,15	0,5780	0,9684
86	359,15	0,6011	0,9678
87	360,15	0,6249	0,9671
88	361,15	0,6495	0,9665
89	362,15	0,6749	0,9658
90	363,15	0,7011	0,9652
91	364,15	0,7281	0,9644
92	365,15	0,7561	0,9638
93	366,15	0,7849	0,9630
94	367,15	0,8146	0,9624
95	368,15	0,8453	0,9616
96	369,15	0,8769	0,9610
97	370,15	0,9094	0,9602
98	371,15	0,9430	0,9596
99	372,15	0,9776	0,9586
100	373,15	1,0133	0,9581
102	375,15	1,0878	0,9567
104	377,15	1,1668	0,9552
106	379,15	1,2504	0,9537
108	381,15	1,3390	0,9522
110	383,15	1,4327	0,9507
112	385,15	1,5316	0,9491
114	387,15	1,6362	0,9476
116	389,15	1,7465	0,9460
118	391,15	1,8628	0,9445

t	T	ps	ρ
°C	K	bar	kg/dm³
120	393,15	1,9854	0,9429
122	395,15	2,1145	0,9412
124	397,15	2,2504	0,9396
126	399,15	2,3933	0,9379
128	401,15	2,5435	0,9362
130	403,15	2,7013	0,9346
132	405,15	2,867	0,9328
134	407,15	3,041	0,9311
136	409,15	3,223	0,9294
138	411,15	3,414	0,9276
140	413,15	3,614	0,9258
145	418,15	4,155	0,9214
155	428,15	5,433	0,9121
160	433,15	6,181	0,9073
165	438,15	7,008	0,9024
170	433,15	7,920	0,8973
175	448,15	8,924	0,8921
180	453,15	10,027	0,8869
185	458,15	11,233	0,8815
190	463,15	12,551	0,8760
195	468,15	13,987	0,8704
200	473,15	15,550	0,8647
205	478,15	17,243	0,8588
210	483,15	19,077	0,8528
215	488,15	21,060	0,8467
220	493,15	23,198	0,8403
225	498,15	25,501	0,8339
230	503,15	27,976	0,8273
235	508,15	30,632	0,8205
240	513,15	33,478	0,8136
245	518,15	36,523	0,8065
250	523,15	39,776	0,7992
255	528,15	43,246	0,7916
260	533,15	46,943	0,7839
265	538,15	50,877	0,7759
270	543,15	55,058	0,7678
275	548,15	59,496	0,7593
280	553,15	64,202	0,7505
285	558,15	69,186	0,7415
290	563,15	74,461	0,7321
295	568,15	80,037	0,7223
300	573,15	85,927	0,7122
305	578,15	92,144	0,7017
310	583,15	98,70	0,6906
315	588,15	105,61	0,6791
320	593,15	112,89	0,6669
325	598,15	120,56	0,6541
330	603,15	128,63	0,6404
340	613,15	146,05	0,6102
350	623,15	165,35	0,5743
360	633,15	186,75	0,5275
370	643,15	210,54	0,4518
374,15	647,30	221,20	0,3154

G-at_npsh_b_sc

TABLE OF FLOW RESISTANCE IN 100 m OF STRAIGHT CAST IRON PIPELINE (HAZEN-WILLIAMS FORMULA C=100)

FLOW RATE			NOMINAL DIAMETER in mm and inches																
m^3/h	l/min		15	20	25	32	40	50	65	80	100	125	150	175	200	250	300	350	400
			1/2"	3/4"	1"	1 1/4"	1 1/2"	2	2 1/2"	3"	4"	5"	6"	7"	8"	10"	12"	14"	16"
0,6	10	v	0,94	0,53	0,34	0,21	0,13												
		hr	16	3,94	1,33	0,40	0,13												
0,9	15	v	1,42	0,80	0,51	0,31	0,20												
		hr	33,9	8,35	2,82	0,85	0,29												
1,2	20	v	1,89	1,06	0,68	0,41	0,27	0,17											
		hr	57,7	14,21	4,79	1,44	0,49	0,16											
1,5	25	v	2,36	1,33	0,85	0,52	0,33	0,21											
		hr	87,2	21,5	7,24	2,18	0,73	0,25											
1,8	30	v	2,83	1,59	1,02	0,62	0,40	0,25											
		hr	122	30,1	10,1	3,05	1,03	0,35											
2,1	35	v	3,30	1,86	1,19	0,73	0,46	0,30											
		hr	162	40,0	13,5	4,06	1,37	0,46											
2,4	40	v		2,12	1,36	0,83	0,53	0,34	0,20										
		hr		51,2	17,3	5,19	1,75	0,59	0,16										
3	50	v		2,65	1,70	1,04	0,66	0,42	0,25										
		hr		77,4	26,1	7,85	2,65	0,89	0,25										
3,6	60	v		3,18	2,04	1,24	0,80	0,51	0,30										
		hr		108	36,6	11,0	3,71	1,25	0,35										
4,2	70	v		3,72	2,38	1,45	0,93	0,59	0,35										
		hr		144	48,7	14,6	4,93	1,66	0,46										
4,8	80	v		4,25	2,72	1,66	1,06	0,68	0,40										
		hr		185	62,3	18,7	6,32	2,13	0,59										
5,4	90	v			3,06	1,87	1,19	0,76	0,45	0,30									
		hr			77,5	23,3	7,85	2,65	0,74	0,27									
6	100	v			3,40	2,07	1,33	0,85	0,50	0,33									
		hr			94,1	28,3	9,54	3,22	0,90	0,33									
7,5	125	v			4,25	2,59	1,66	1,06	0,63	0,41									
		hr			142	42,8	14,4	4,86	1,36	0,49									
9	150	v				3,11	1,99	1,27	0,75	0,50	0,32								
		hr				59,9	20,2	6,82	1,90	0,69	0,23								
10,5	175	v				3,63	2,32	1,49	0,88	0,58	0,37								
		hr				79,7	26,9	9,07	2,53	0,92	0,31								
12	200	v				4,15	2,65	1,70	1,01	0,66	0,42								
		hr				102	34,4	11,6	3,23	1,18	0,40								
15	250	v				5,18	3,32	2,12	1,26	0,83	0,53	0,34							
		hr				154	52,0	17,5	4,89	1,78	0,60	0,20							
18	300	v					3,98	2,55	1,51	1,00	0,64	0,41							
		hr					72,8	24,6	6,85	2,49	0,84	0,28							
24	400	v					5,31	3,40	2,01	1,33	0,85	0,54	0,38						
		hr					124	41,8	11,66	4,24	1,43	0,48	0,20						
30	500	v					6,63	4,25	2,51	1,66	1,06	0,68	0,47						
		hr					187	63,2	17,6	6,41	2,16	0,73	0,30						
36	600	v						5,10	3,02	1,99	1,27	0,82	0,57	0,42					
		hr						88,6	24,7	8,98	3,03	1,02	0,42	0,20					
42	700	v						5,94	3,52	2,32	1,49	0,95	0,66	0,49					
		hr						118	32,8	11,9	4,03	1,36	0,56	0,26					
48	800	v						6,79	4,02	2,65	1,70	1,09	0,75	0,55					
		hr						151	42,0	15,3	5,16	1,74	0,72	0,34					
54	900	v						7,64	4,52	2,99	1,91	1,22	0,85	0,62					
		hr						188	52,3	19,0	6,41	2,16	0,89	0,42					
60	1000	v							5,03	3,32	2,12	1,36	0,94	0,69	0,53				
		hr							63,5	23,1	7,79	2,63	1,08	0,51	0,27				
75	1250	v							6,28	4,15	2,65	1,70	1,18	0,87	0,66				
		hr							96,0	34,9	11,8	3,97	1,63	0,77	0,40				
90	1500	v							7,54	4,98	3,18	2,04	1,42	1,04	0,80				
		hr							134	48,9	16,5	5,57	2,29	1,08	0,56				
105	1750	v							8,79	5,81	3,72	2,38	1,65	1,21	0,93				
		hr							179	65,1	21,9	7,40	3,05	1,44	0,75				
120	2000	v								6,63	4,25	2,72	1,89	1,39	1,06	0,68			
		hr								83,3	28,1	9,48	3,90	1,84	0,96	0,32			
150	2500	v								8,29	5,31	3,40	2,36	1,73	1,33	0,85			
		hr								126	42,5	14,3	5,89	2,78	1,45	0,49			
180	3000	v									6,37	4,08	2,83	2,08	1,59	1,02	0,71		
		hr									59,5	20,1	8,26	3,90	2,03	0,69	0,28		
210	3500	v									7,43	4,76	3,30	2,43	1,86	1,19	0,83		
		hr									79,1	26,7	11,0	5,18	2,71	0,91	0,38		
240	4000	v									8,49	5,44	3,77	2,77	2,12	1,36	0,94		
		hr									101	34,2	14,1	6,64	3,46	1,17	0,48		
300	5000	v										6,79	4,72	3,47	2,65	1,70	1,18		
		hr										51,6	21,2	10,0	5,23	1,77	0,73		
360	6000	v										8,15	5,66	4,16	3,18	2,04	1,42		
		hr										72,3	29,8	14,1	7,33	2,47	1,02		
420	7000	v											6,61	4,85	3,72	2,38	1,65	1,21	
		hr											39,6	18,7	9,75	3,29	1,35	0,64	
480	8000	v											7,55	5,55	4,25	2,72	1,89	1,39	
		hr											50,7	23,9	12,49	4,21	1,73	0,82	
540	9000	v											8,49	6,24	4,78	3,06	2,12	1,56	1,19
		hr											63,0	29,8	15,5	5,24	2,16	1,02	0,53
600	10000	v												6,93	5,31	3,40	2,36	1,73	1,33
		hr												36,2	18,9	6,36	2,62	1,24	0,65

The hr values must be multiplied by:
0,71 for galvanized or painted steel pipes
0,54 for stainless steel or copper pipes
0,47 for PVC or PE pipes

G-at-pct-en_a_th

hr = flow resistance for 100 m of straight pipeline (m)
V = water speed (m/s)

FLOW RESISTANCE
TABLE OF FLOW RESISTANCE IN BENDS, VALVES AND GATES

The flow resistance is calculated using the equivalent pipeline length method according to the table below:

ACCESSORY TYPE	DN											
	25	32	40	50	65	80	100	125	150	200	250	300
	Equivalent pipeline length (m)											
45° bend	0,2	0,2	0,4	0,4	0,6	0,6	0,9	1,1	1,5	1,9	2,4	2,8
90° bend	0,4	0,6	0,9	1,1	1,3	1,5	2,1	2,6	3,0	3,9	4,7	5,8
90° smooth bend	0,4	0,4	0,4	0,6	0,9	1,1	1,3	1,7	1,9	2,8	3,4	3,9
Union tee or cross	1,1	1,3	1,7	2,1	2,6	3,2	4,3	5,3	6,4	7,5	10,7	12,8
Gate	-	-	-	0,2	0,2	0,2	0,4	0,4	0,6	0,9	1,1	1,3
Non return valve	1,1	1,5	1,9	2,4	3,0	3,4	4,7	5,9	7,4	9,6	11,8	13,9

G-a-pcv-en_a_th

The table is valid for the Hazen Williams coefficient C=100 (cast iron pipework);
for steel pipework, multiply the values by 1,41;
for stainless steel, copper and coated cast iron pipework, multiply the values by 1,85;
When the **equivalent pipeline length** has been determined, the flow resistance is obtained from the table of flow resistance.
The values given are guideline values which are bound to vary slightly according to the model, especially for gate valves and non-return valves, for which it is a good idea to check the values supplied by manufacturers.

VOLUMETRIC CAPACITY

Litres per minute l/min	Cubic metres per hour m^3/h	Cubic feet per hour ft^3/h	Cubic feet per minute ft^3/min	Imp. gal. per minute Imp. gal/min	US gal. per minute Us gal./min
1,0000	0,0600	2,1189	0,0353	0,2200	**0,2642**
16,6667	**1,0000**	35,3147	0,5886	3,6662	4,4029
0,4719	0,0283	**1,0000**	0,0167	0,1038	**0,1247**
28,3168	1,6990	60,0000	**1,0000**	6,2288	7,4805
4,5461	0,2728	9,6326	0,1605	**1,0000**	1,2009
3,7854	0,2271	8,0208	0,1337	0,8327	**1,0000**

PRESSURE AND HEAD

Newton per square metre N/m^2	kilo Pascal kPa	bar bar	Pound force per square inch psi	metre of water m H_2O	millimetre of mercury mm Hg
1,0000	0,0010	1×10^{-5}	1.45×10^{-4}	1.02×10^{-4}	**0,0075**
1000,0000	**1,0000**	0,0100	0,1450	0,1020	7,5006
1×10^5	100,0000	**1,0000**	14,5038	10,1972	**750,0638**
6894,7570	6,8948	0,0689	**1,0000**	0,7031	**51,7151**
9806,6500	9,8067	0,0981	1,4223	**1,0000**	**73,5561**
133,3220	0,1333	0,0013	0,0193	0,0136	**1,0000**

LENGTH

millimetre mm	centimetre cm	metre m	inch in	foot ft	yard yd
1,0000	0,1000	0,0010	0,0394	0,0033	**0,0011**
10,0000	**1,0000**	0,0100	0,3937	0,0328	0,0109
1000,0000	100,0000	**1,0000**	39,3701	3,2808	**1,0936**
25,4000	2,5400	0,0254	**1,0000**	0,0833	0,0278
304,8000	30,4800	0,3048	12,0000	**1,0000**	**0,3333**
914,4000	91,4400	0,9144	36,0000	3,0000	**1,0000**

VOLUME

cubic metre m^3	litre litro	millilitre ml	imp. Gallon imp. gal.	US gallon US gal.	cubic foot ft^3
1,0000	1000,0000	1×10^6	219,9694	264,1720	**35,3147**
0,0010	**1,0000**	1000,0000	0,2200	0,2642	0,0353
1×10^{-6}	0,0010	**1,0000**	2.2×10^{-4}	2.642×10^{-4}	3.53×10^{-5}
0,0045	4,5461	4546,0870	**1,0000**	1,2009	0,1605
0,0038	3,7854	3785,4120	0,8327	**1,0000**	**0,1337**
0,0283	28,3168	28316,8466	6,2288	7,4805	**1,0000**

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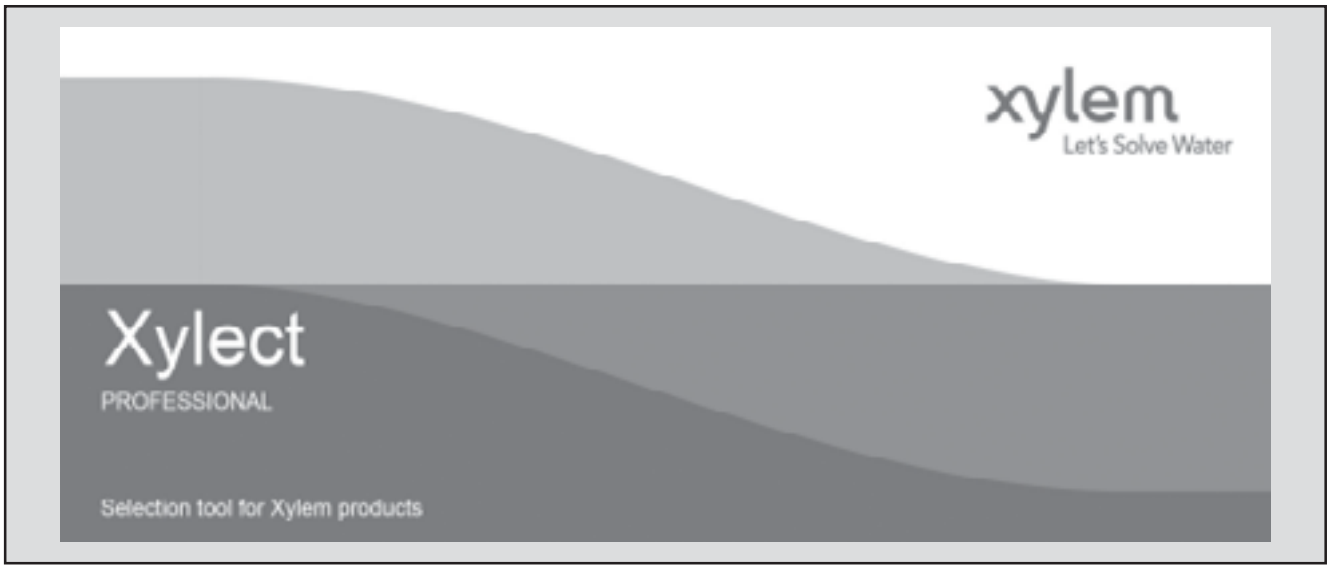
FURTHER PRODUCT SELECTION AND DOCUMENTATION

Xylect™



Xylect™ is pump solution selection software with an extensive online database of product information across the entire Lowara, and Vogel range of pumps and related products, with multiple search options and helpful project management facilities. The system holds up-to-date product information on thousands of products and accessories.

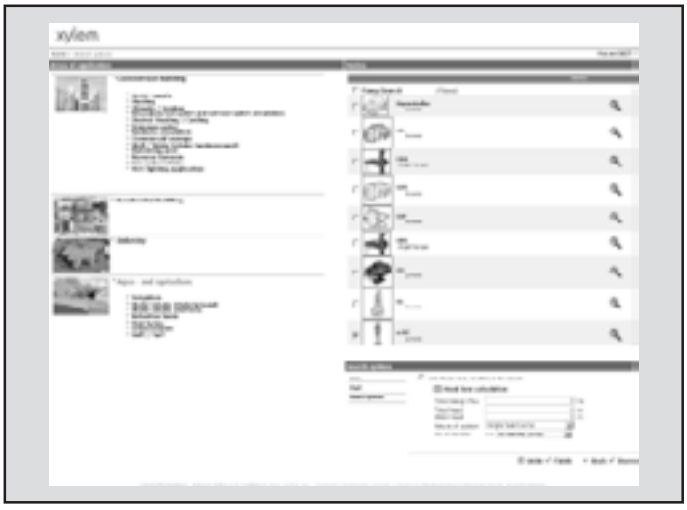
The possibility to search by applications and the detailed information output given makes it easy to make the optimal selection without having detailed knowledge about the Lowara and Vogel products.

The search can be made by:

- Application
- Product type
- Duty point

Xylect™ gives a detailed output:

- List with search results
- Performance curves (flow, head, power, efficiency, NPSH)
- Motor data
- Dimensional drawings
- Options
- Data sheet printouts
- Document downloads incl dxf files



The search by application guides users not familiar with the product range to the right choice.

FURTHER PRODUCT SELECTION AND DOCUMENTATION

Xylect™

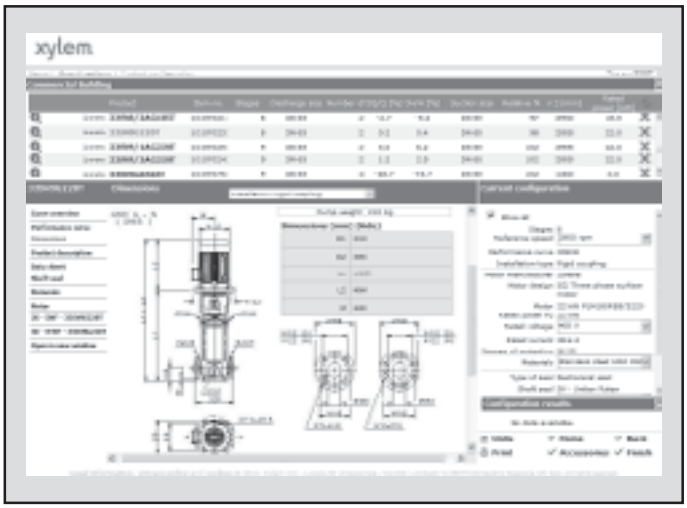
The detailed output makes it easy to select the optimal pump from the given alternatives.

The best way to work with Xylect™ is to create a personal account. This makes it possible to:

- Set own standard units
- Create and save projects
- Share projects with other Xylect™ users

Every user have a My Xylect space, where all projects are saved.

For more information about Xylect™ please contact our sales network or visit www.xylect.com.



Dimensional drawings appear on the screen and can be downloaded in dxf format.

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