Design Envelope HVAC Pumps

ARMSTRONG

4300 IVS Pumping Units with Integral Sensorless Control or for Remote IPS Control

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The Design Envelope is your Safety Net

The Armstrong Design Envelope is a pre-set arrangement of the most efficient pump selections for a given capacity range. The Design Envelope approach to system selection allows you to reduce design risk and avoid costs from equipment change orders. By calculating your preliminary design requirements, then selecting a Design Envelope with sufficient comfort zone around the preliminary design point, your pump selection will be future-proofed against possible design omissions or system changes during construction and over the life of the building.

There is no longer a need to oversize your initial design point. The Design Envelope functions as a safety net for any anticipated system changes due to as-built design, building envelope adjustments, tenant demographic changes, or changes in building usage.

Specifying an oversized pumping unit typically results in lower efficiency under actual operating conditions. Select the appropriate Design Envelope and be assured that the Armstrong variable speed pumping units will deliver excellent efficiency throughout the entire Design Envelope and the operating range of the unit.

Using the Design Envelope approach, you can select and specify the Design Envelope that suits your current and anticipated needs. Multiple pumps may be controlled with remote sensors and IPS controller or external signal, such as BMS. Single pumps or duty/standby can be controlled by integrated Sensorless control where there is no system feedback sensor to be sourced, installed or wired. The onboard IVS Sensorless software controls the system as efficiently as a unit with remotely installed sensor control, without the cost or problems of supplying and installing the sensor itself.

▶Capital and Installation Costs are Reduced

- ▶Reduced capital cost - no differential pressure sensor to purchase
- ▶Reduced installation cost - no mounting of variable frequency drive (VFD) and no sensor installation or wiring
- ▶Reduced commissioning cost - no sensor positioning issues or installation errors to slow down the process
- ▶Reduced plant room space cost - both the VIL pump and the VFD fit within the footprint of the pump

▶Increased Energy Savings

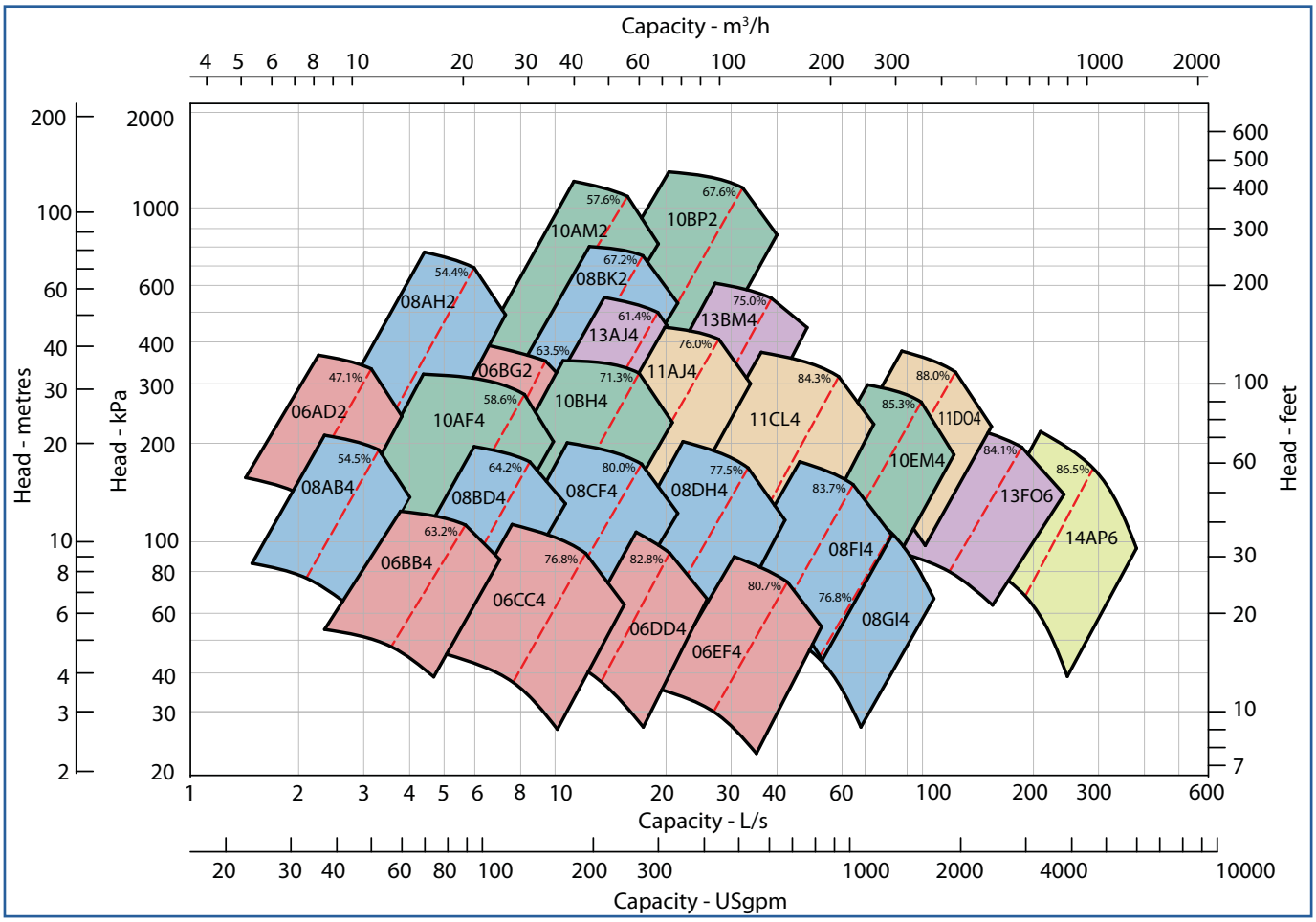
- ▶Armstrong Design Envelope 4300 IVS pumps provide all the savings of variable speed pumping with a reduced installation cost
- ▶VFD is optimised to the motor at the factory, ensuring perfect integration and peak performance
- ▶Control curve optimisation mitigates the energy lost when using an incorrectly placed sensor
- ▶Range of units available permits simple matching of flow and head requirements and an easy retrofit process for replacing constant-speed pumps

▶Project Risk Minimisation

- ▶Integration of VFD reduces the risk of RFI/EMC (radio frequency interference/electromagnetic compatibility) problems
- ▶VFD is matched to the pump, reducing commissioning delays
- ▶Single source of responsibility for the variable speed pumping unit
- ▶Easily connects to Building Management Systems (BMS)

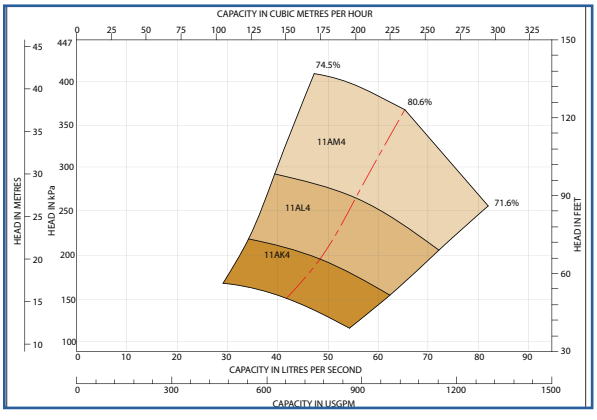
All this value is integrated into one small pumping package for any motor size up to 55kW (75hp). The Series 4300 pump, motor and VFD (integrated VFD and Sensorless controls on IVS models) are assembled as a complete pumping package, ready to install in the piping, wire and start for immediate operation. All IVS pumping units incorporate energy efficient totally enclosed fan cooled (TEFC) motors and IP55 VFD enclosures. Units larger than 55kW (75hp) are supplied with the drives shipped loose for on-site wiring.

Design Envelope - 4300 IVS



▶Design Envelope Selection Procedure

- ▶Mark your preliminary design flow and head requirements on the Design Envelope (DE) chart
- ▶Choose the DE that best represents your design parameters, plus a comfortable safety margin in the flow and head to cover any increases or reductions in design demand from design errors or building modifications during construction
- ▶Be assured that each DE selection retains the highest efficiency possible throughout the DE range
- ▶Specify the DE model number from the chart, noting the flow, head and efficiency values at the Best Efficiency Point (BEP) for your specification
- ▶The DE Technical Data Chart (inside spread of this brochure) details the size, power requirements, dimensions and weight of each unit



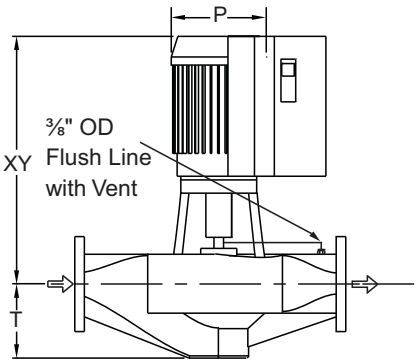
Armstrong's ACE Online will also help you select the most appropriate DE unit using a similar process.

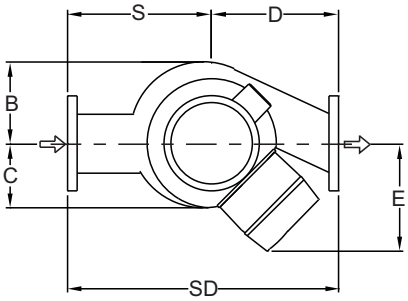
▶ Design Envelope Data - 4300 IVS

Curve No.	Size	Power kW (hp)	Dimensions in mm (inches)									Weight lbs (kg)
			B	C	D	S	T	SD	E Max	P	XY	
06AC2	40-150 (1.5x1.5x6)	1.5 (2)	115 (4.53)	115 (4.53)	184 (7.25)	178 (7.00)	108 (4.25)	362 (14.25)	- - - (- - -)	151 (5.94)	521 (20.50)	185 (84)
06AD2	40-150 (1.5x1.5x6)	2.2 (3)	115 (4.53)	115 (4.53)	184 (7.25)	178 (7.00)	108 (4.25)	362 (14.25)	- - - (- - -)	151 (5.94)	670 (26.39)	210 (95)
06BA4	50-150 (2x2x6)	0.75 (1)	118 (4.63)	114 (4.50)	178 (7.00)	203 (8.00)	124 (4.88)	381 (15.00)	- - - (- - -)	151 (5.94)	521 (20.53)	190 (86)
06BB4	50-150 (2x2x6)	1.1 (1.5)	118 (4.63)	114 (4.50)	178 (7.00)	203 (8.00)	124 (4.88)	381 (15.00)	- - - (- - -)	151 (5.94)	521 (20.53)	190 (86)
06BF2	50-150 (2x2x6)	4 (5)	118 (4.63)	114 (4.50)	178 (7.00)	203 (8.00)	124 (4.88)	381 (15.00)	- - - (- - -)	189 (7.44)	671 (26.42)	225 (102)
06BG2	50-150 (2x2x6)	5.5 (7.5)	118 (4.63)	114 (4.50)	178 (7.00)	203 (8.00)	124 (4.88)	381 (15.00)	- - - (- - -)	239 (9.41)	741 (29.16)	280 (127)
06CA4	80-150 (3x3x6)	0.75 (1)	147 (5.80)	118 (4.65)	210 (8.25)	248 (9.75)	154 (6.06)	457 (18.00)	- - - (- - -)	151 (5.94)	521 (20.53)	210 (95)
06CB4	80-150 (3x3x6)	1.1 (1.5)	147 (5.80)	118 (4.65)	210 (8.25)	248 (9.75)	154 (6.06)	457 (18.00)	- - - (- - -)	151 (5.94)	521 (20.53)	210 (95)
06CC4	80-150 (3x3x6)	1.5 (2)	147 (5.80)	118 (4.65)	210 (8.25)	248 (9.75)	154 (6.06)	457 (18.00)	- - - (- - -)	151 (5.94)	521 (20.53)	210 (95)
06DB4	100-150 (4x4x6)	1.1 (1.5)	175 (6.88)	140 (5.50)	254 (10.00)	305 (12.00)	203 (8.00)	559 (22.00)	- - - (- - -)	151 (5.94)	528 (20.78)	250 (114)
06DC4	100-150 (4x4x6)	1.5 (2)	175 (6.88)	140 (5.50)	254 (10.00)	305 (12.00)	203 (8.00)	559 (22.00)	- - - (- - -)	151 (5.94)	528 (20.78)	250 (114)
06DD4	100-150 (4x4x6)	2.2 (3)	175 (6.88)	140 (5.50)	254 (10.00)	305 (12.00)	203 (8.00)	559 (22.00)	- - - (- - -)	151 (5.94)	677 (26.67)	275 (125)
06ED4	150-150 (6x6x6)	2.2 (3)	215 (8.48)	161 (6.33)	305 (12.00)	445 (17.50)	246 (9.68)	749 (29.50)	- - - (- - -)	189 (7.44)	617 (24.30)	390 (177)
06EE4	150-150 (6x6x6)	3 (4)	215 (8.48)	161 (6.33)	305 (12.00)	445 (17.50)	246 (9.68)	749 (29.50)	- - - (- - -)	189 (7.44)	732 (28.81)	415 (189)
06EF4	150-150 (6x6x6)	4 (5)	215 (8.48)	161 (6.33)	305 (12.00)	445 (17.50)	246 (9.68)	749 (29.50)	- - - (- - -)	189 (7.44)	732 (28.81)	425 (193)
08AA4	40-200 (1.5x1.5x8)	0.75 (1)	147 (5.80)	147 (5.80)	203 (8.00)	203 (8.00)	122 (4.80)	406 (16.00)	- - - (- - -)	151 (5.94)	475.5 (18.72)	185 (84)
08AB4	40-200 (1.5x1.5x8)	1.1 (1.5)	147 (5.80)	147 (5.80)	203 (8.00)	203 (8.00)	122 (4.80)	406 (16.00)	- - - (- - -)	151 (5.94)	495.5 (19.51)	192 (87)
08AF2	40-200 (1.5x1.5x8)	4 (5)	147 (5.80)	147 (5.80)	203 (8.00)	203 (8.00)	122 (4.80)	406 (16.00)	- - - (- - -)	189 (7.44)	581.5 (22.89)	227 (103)
08AG2	40-200 (1.5x1.5x8)	5.5 (7.5)	147 (5.80)	147 (5.80)	203 (8.00)	203 (8.00)	122 (4.80)	406 (16.00)	- - - (- - -)	239 (9.41)	685.5 (26.99)	260 (118)
08AH2	40-200 (1.5x1.5x8)	7.5 (10)	147 (5.80)	147 (5.80)	203 (8.00)	203 (8.00)	122 (4.80)	406 (16.00)	- - - (- - -)	239 (9.41)	685.5 (26.99)	278 (126)
08BB4	50-200 (2x2x8)	1.1 (1.5)	147 (5.80)	147 (5.80)	216 (8.50)	241 (9.50)	132 (5.20)	457 (18.00)	- - - (- - -)	151 (5.94)	527 (20.75)	209 (95)
08BC4	50-200 (2x2x8)	1.5 (2)	147 (5.80)	147 (5.80)	216 (8.50)	241 (9.50)	132 (5.20)	457 (18.00)	- - - (- - -)	151 (5.94)	552 (21.73)	216 (98)
08BD4	50-200 (2x2x8)	2.2 (3)	147 (5.80)	147 (5.80)	216 (8.50)	241 (9.50)	132 (5.20)	457 (18.00)	- - - (- - -)	189 (7.44)	594 (23.39)	251 (114)
08BI2	50-200 (2x2x8)	11 (15)	147 (5.80)	147 (5.80)	216 (8.50)	241 (9.50)	132 (5.20)	457 (18.00)	389 (15.31)	303 (11.93)	913.5 (35.97)	558 (253)
08BJ2	50-200 (2x2x8)	15 (20)	147 (5.80)	147 (5.80)	216 (8.50)	241 (9.50)	132 (5.20)	457 (18.00)	389 (15.31)	303 (11.93)	913.5 (35.97)	582 (264)
08BK2	50-200 (2x2x8)	18.5 (25)	147 (5.80)	147 (5.80)	216 (8.50)	241 (9.50)	132 (5.20)	457 (18.00)	389 (15.31)	303 (11.93)	939.5 (36.99)	617 (280)
08CD4	80-200 (3x3x8)	2.2 (3)	171 (6.75)	147 (5.80)	254 (10.00)	305 (12.00)	160 (6.31)	559 (22.00)	- - - (- - -)	189 (7.44)	594 (23.39)	247 (112)
08CE4	80-200 (3x3x8)	3 (4)	171 (6.75)	147 (5.80)	254 (10.00)	305 (12.00)	160 (6.31)	559 (22.00)	- - - (- - -)	189 (7.44)	594 (23.39)	258 (117)
08CF4	80-200 (3x3x8)	4 (5)	171 (6.75)	147 (5.80)	254 (10.00)	305 (12.00)	160 (6.31)	559 (22.00)	- - - (- - -)	189 (7.44)	613 (24.13)	276 (125)
08DF4	100-200 (4x4x8)	4 (5)	203 (8.00)	160 (6.31)	279 (11.00)	356 (14.00)	203 (8.00)	635 (25.00)	- - - (- - -)	189 (7.44)	614 (24.17)	320 (145)
08DG4	100-200 (4x4x8)	5.5 (7.5)	203 (8.00)	160 (6.31)	279 (11.00)	356 (14.00)	203 (8.00)	635 (25.00)	- - - (- - -)	239 (9.41)	686.5 (27.03)	364 (165)
08DH4	100-200 (4x4x8)	7.5 (10)	203 (8.00)	160 (6.31)	279 (11.00)	356 (14.00)	203 (8.00)	635 (25.00)	- - - (- - -)	239 (9.41)	724.5 (28.52)	381 (173)
08FG4	150-200 (6x6x8)	5.5 (7.5)	248 (9.75)	191 (7.50)	343 (13.50)	495 (19.50)	264 (10.38)	838 (33.00)	- - - (- - -)	239 (9.41)	760 (29.92)	701 (318)
08FH4	150-200 (6x6x8)	7.5 (10)	248 (9.75)	191 (7.50)	343 (13.50)	495 (19.50)	264 (10.38)	838 (33.00)	- - - (- - -)	239 (9.41)	798 (31.42)	723 (328)
08FI4	150-200 (6x6x8)	11 (15)	248 (9.75)	191 (7.50)	343 (13.50)	495 (19.50)	264 (10.38)	838 (33.00)	442 (17.42)	303 (11.93)	906 (35.67)	741 (336)
08GG4	200-200 (8x8x8)	5.5 (7.5)	289 (11.37)	214 (8.43)	406 (16.00)	559 (22.00)	316 (12.43)	965 (38.00)	430 (16.93)	308 (12.13)	838 (33.00)	740 (336)
08GH4	200-200 (8x8x8)	7.5 (10)	289 (11.37)	214 (8.43)	406 (16.00)	559 (22.00)	316 (12.43)	965 (38.00)	430 (16.93)	308 (12.13)	838 (33.00)	755 (343)
08GI4	200-200 (8x8x8)	11 (15)	289 (11.37)	214 (8.43)	406 (16.00)	559 (22.00)	316 (12.43)	965 (38.00)	442 (17.42)	340 (13.38)	965 (38.00)	825 (375)

Curve No.	Size
10AD4	50-250 (2x2x10)
10AE4	50-250 (2x2x10)
10AF4	50-250 (2x2x10)
10AK2	50-250 (2x2x10)
10AL2	50-250 (2x2x10)
10AM2	50-250 (2x2x10)
10BF4	80-250 (3x3x10)
10BG4	80-250 (3x3x10)
10BH4	80-250 (3x3x10)
10BN2	80-250 (3x3x10)
10BO2	80-250 (3x3x10)
10BP2	80-250 (3x3x10)
10EK4	200-250 (8x8x10)
10EL4	200-250 (8x8x10)
10EM4	200-250 (8x8x10)
11AH4	100-290 (4x4x11.5)
11AI4	100-290 (4x4x11.5)
11AJ4	100-290 (4x4x11.5)
11CJ4	150-290 (6x6x11.5)
11CK4	150-290 (6x6x11.5)
11CL4	150-290 (6x6x11.5)
11DM4	200-290 (8x8x11.5)
11DN4	200-290 (8x8x11.5)
11DO4	200-290 (8x8x11.5)
13AH4	80-330 (3x3x13)
13AI4	80-330 (3x3x13)
13AJ4	80-330 (3x3x13)
13BK4	100-330 (4x4x13)
13BL4	100-330 (4x4x13)
13BM4	100-330 (4x4x13)
13FM6	300-330 (12x12x13)
13FN6	300-330 (12x12x13)
13FO6	300-330 (12x12x13)
14AN6	350-350 (14x14x14)
14AO6	350-350 (14x14x14)
14AP6	350-350 (14x14x14)

Power	Dimensions in mm (inches)									Weight
kW (hp)	B	C	D	S	T	SD	E Max	P	XY	lbs (kg)
2.2	171	171	229	254	136	483	- - -	189	563	270
(3)	(6.75)	(6.75)	(9.00)	(10.00)	(5.35)	(19.00)	(- - -)	(7.44)	(22.16)	(123)
3	171	171	229	254	136	483	- - -	189	671	295
(4)	(6.75)	(6.75)	(9.00)	(10.00)	(5.35)	(19.00)	(- - -)	(7.44)	(26.42)	(134)
4	171	171	229	254	136	483	- - -	189	671	305
(5)	(6.75)	(6.75)	(9.00)	(10.00)	(5.35)	(19.00)	(- - -)	(7.44)	(26.42)	(139)
18.5	171	171	229	254	136	483	389	303	939.5	628
(25)	(6.75)	(6.75)	(9.00)	(10.00)	(5.35)	(19.00)	(15.31)	(11.93)	(36.99)	(285)
22	171	171	229	254	136	483	402	303	986.5	741
(30)	(6.75)	(6.75)	(9.00)	(10.00)	(5.35)	(19.00)	(15.83)	(11.93)	(38.84)	(336)
30	171	171	229	254	136	483	416	370	1041.5	864
(40)	(6.75)	(6.75)	(9.00)	(10.00)	(5.35)	(19.00)	(16.38)	(14.57)	(41.00)	(392)
4	183	174	241	292	137	533	- - -	189	604	364
(5)	(7.20)	(6.87)	(9.50)	(11.50)	(5.40)	(21.00)	(- - -)	(7.44)	(23.78)	(165)
5.5	183	174	241	292	137	533	- - -	239	686	384
(7.5)	(7.20)	(6.87)	(9.50)	(11.50)	(5.40)	(21.00)	(- - -)	(9.41)	(27.00)	(174)
7.5	183	174	241	292	137	533	- - -	239	724	401
(10)	(7.20)	(6.87)	(9.50)	(11.50)	(5.40)	(21.00)	(- - -)	(9.41)	(28.50)	(182)
37	183	174	241	292	137	533	588	370	1041.5	1023
(50)	(7.20)	(6.87)	(9.50)	(11.50)	(5.40)	(21.00)	(23.14)	(14.57)	(41.00)	(464)
45	183	174	241	292	137	533	608	370	1111.5	1153
(60)	(7.20)	(6.87)	(9.50)	(11.50)	(5.40)	(21.00)	(23.93)	(14.57)	(43.76)	(523)
55	183	174	241	292	137	533	563	440	1207.5	1340
(75)	(7.20)	(6.87)	(9.50)	(11.50)	(5.40)	(21.00)	(22.18)	(17.32)	(47.54)	(608)
18.5	292	225	432	559	248	991	527	303	967	1036
(25)	(11.50)	(8.87)	(17.00)	(22.00)	(9.75)	(39.00)	(20.73)	(11.93)	(38.07)	(470)
22	292	225	432	559	248	991	527	303	1005	1091
(30)	(11.50)	(8.87)	(17.00)	(22.00)	(9.75)	(39.00)	(20.73)	(11.93)	(39.57)	(495)
30	292	225	432	559	248	991	543	370	1055	1232
(40)	(11.50)	(8.87)	(17.00)	(22.00)	(9.75)	(39.00)	(21.39)	(14.57)	(41.55)	(559)
7.5	207	188	324	387	195	711	- - -	239	742	525
(10)	(8.13)	(7.40)	(12.75)	(15.25)	(7.69)	(28.00)	(- - -)	(9.41)	(29.22)	(239)
11	207	188	324	387	195	711	442	303	918	723
(15)	(8.13)	(7.40)	(12.75)	(15.25)	(7.69)	(28.00)	(17.42)	(11.93)	(36.14)	(328)
15	207	188	324	387	195	711	442	303	944	794
(20)	(8.13)	(7.40)	(12.75)	(15.25)	(7.69)	(28.00)	(17.42)	(11.93)	(37.17)	(360)
15	249	216	419	470	248	889	442	303	900	913
(20)	(9.80)	(8.50)	(16.50)	(18.50)	(9.75)	(35.00)	(17.42)	(11.93)	(35.43)	(414)
18.5	249	216	419	470	248	889	527	303	958	957
(25)	(9.80)	(8.50)	(16.50)	(18.50)	(9.75)	(35.00)	(20.73)	(11.93)	(37.72)	(434)
22	249	216	419	470	248	889	527	303	996	988
(30)	(9.80)	(8.50)	(16.50)	(18.50)	(9.75)	(35.00)	(20.73)	(11.93)	(39.21)	(448)
30	292	241	445	559	254	1003	543	370	1139	1250
(40)	(11.50)	(9.50)	(17.50)	(22.00)	(10.00)	(39.50)	(21.39)	(14.57)	(44.85)	(568)
37	292	241	445	559	254	1003	588	370	1139	1325
(50)	(11.50)	(9.50)	(17.50)	(22.00)	(10.00)	(39.50)	(23.14)	(14.57)	(44.85)	(602)
45	292	241	445	559	254	1003	608	370	1093	1475
(60)	(11.50)	(9.50)	(17.50)	(22.00)	(10.00)	(39.50)	(23.93)	(14.57)	(43.03)	(670)
7.5	210	222	305	343	168	648	- - -	239	804	505
(10)	(8.25)	(8.75)	(12.00)	(13.50)	(6.63)	(25.50)	(- - -)	(9.41)	(31.65)	(230)
11	210	222	305	343	168	648	442	303	929	575
(15)	(8.25)	(8.75)	(12.00)	(13.50)	(6.63)	(25.50)	(17.42)	(11.93)	(36.59)	(261)
15	210	222	305	343	168	648	442	303	929	620
(20)	(8.25)	(8.75)	(12.00)	(13.50)	(6.63)	(25.50)	(17.42)	(11.93)	(36.59)	(282)
18.5	210	234	343	394	205	737	527	303	1103	760
(25)	(8.25)	(9.20)	(13.50)	(15.50)	(8.06)	(29.00)	(20.73)	(11.93)	(43.41)	(345)
22	210	234	343	394	205	737	527	303	1103	780
(30)	(8.25)	(9.20)	(13.50)	(15.50)	(8.06)	(29.00)	(20.73)	(11.93)	(43.41)	(355)
30	210	234	343	394	205	737	543	370	1142	1070
(40)	(8.25)	(9.20)	(13.50)	(15.50)	(8.00)	(29.00)	(21.39)	(14.57)	(44.97)	(486)
30	410	292	616	565	286	1181	563	483	1326	2675
(40)	(16.13)	(11.50)	(24.25)	(22.25)	(11.25)	(46.50)	(22.18)	(19.03)	(52.19)	(1216)
37	410	292	616	565	286	1181	608	483	1326	2765
(50)	(16.13)	(11.50)	(24.25)	(22.25)	(11.25)	(46.50)	(23.93)	(19.03)	(52.19)	(1257)
45	410	292	616	565	286	1181	631	544	1472	3345
(60)	(16.13)	(11.50)	(24.25)	(22.25)	(11.25)	(46.50)	(24.86)	(21.41)	(57.95)	(1520)
37	521	349	686	635	349	1321	605	476	1454	3365
(50)	(20.5)	(13.75)	(27.00)	(25.00)	(13.75)	(52.00)	(23.82)	(18.75)	(57.25)	(1530)
45	521	349	686	635	349	1321	629	538	1599	3945
(60)	(20.5)	(13.75)	(27.00)	(25.00)	(13.75)	(52.00)	(24.77)	(21.19)	(62.94)	(1793)
55	521	349	686	635	349	1321	585	538	1599	3970
(75)	(20.5)	(13.75)	(27.00)	(25.00)	(13.75)	(52.00)	(23.02)	(21.19)	(62.94)	(1805)





▶ Typical Specifications

1.0 Products

1. Provide Armstrong Design Envelope HVAC pump model _____. The Design Envelope shall encompass an initial design point of _____L/s at _____kPa (ft)/head. The Design Envelope shall also be capable of supplying _____L/s, at _____ kPa (ft)/head at _____% minimum efficiency level at maximum operating speed.
2. Design Envelope HVAC units shall be 4300 IVS series capable of Sensorless control. The pumps shall be split-coupled type Vertical In-Line design, with rigid spacer type couplings, and supplied with high efficiency motors and Armstrong IP55 (NEMA/UL Type 12) enclosure variable speed drives. Refer to pump schedule for pump flows and heads and motor speed, enclosure and power requirements and other system conditions.
3. The drive shall be integrated with the motor on motor sizes to 55kW (75 hp) for a self-contained pump, motor and drive combination to ensure optimum component matching and protection from motor overloading at any operating point.
4. Pump Construction: Pump Casing - Cast iron with PN16 (ANSI-125) flanges for working pressure to 12 bar (175 psig) at 65°C (150°F) and ductile iron with PN25 flanges for working pressures to 25 bar at 65°C. Suction and discharge connections shall be equally sized Din flanges, and shall be drilled and tapped for seal flush and gauge connections.
5. Impeller - Bronze, fully enclosed type and dynamically balanced. Two-plane balancing is required where installed impeller diameter is less than six times the impeller width.
6. Shaft - Provide stainless steel pump shaft.
7. Coupling - Rigid spacer type of high tensile aluminum alloy with a fully enclosed guard.
8. Mechanical Seals - Shall be stainless steel multi-spring outside balanced type with Viton® secondary seal, carbon rotating face and silicon carbide stationary seat. Provide a 316 stainless steel gland plate. Design Envelope pump design must be split-coupled to allow pump mechanical seals to be serviced without disturbing the motor or pump connections.

2.0 Integrated Variable Frequency Drive (VFD)

1. VFD shall be of the VVC-PWM type providing near unity displacement power factor without the need for external power factor correction capacitors at all loads and speeds. The VFD shall incorporate DC link chokes to reduce the DC link ripple current caused by harmonic currents in the main electrical connection. The VFD shall be UL listed and CE marked showing compliance with both the EMC directive 89/336/EEC and the Low Voltage directive 72/23/EEC. RFI filters shall be incorporated within the drive to ensure it meets the emission and immunity requirements of EN61800-3 to the 1st Environment Class C1 (EN55011 unrestricted sales class B). VFD and motor protection shall include: motor phase to phase fault, motor phase to ground fault, loss of supply phase, over voltage, under voltage, motor over temperature, inverter overload, over current. Over current is not allowed ensuring 4300 IVS units will not overload the motor at any point in the operating range of the unit.
2. VFD's rated above 7.5 kW shall incorporate an integrated graphical user interface that shall provide running and diagnostic information and identify faults and status in clear English language. Faults shall be logged/recorded for interrogation at a later date. It shall be possible to upload parameters from one VFD into the non-volatile memory of a computer and download the parameters into other drives requiring the same settings. The keypad shall incorporate Hand-Off-Auto push buttons to enable switching between BMS and manual control. VFD shall incorporate a USB port for direct connection to a PC and an RS485 connection with Modbus RTU protocol. Optional protocols available shall include BACnet, and Lonworks.
3. Sensorless control software shall be supplied in the IVS unit to provide automatic speed control in variable volume systems without the need for pump mounted (internal/external) or remotely mounted differential pressure sensor. Control mode setting and minimum/maximum head set-points shall be adjustable via the built-in programming interface.
4. The VFD shall have the following additional features: Sensorless override for BMS or Armstrong IPS pump controller, manual pump control or closed loop PID control, programmable skip frequencies and adjustable switching frequency for noise/vibration control, auto alarm reset, motor pre-heat function, programmable digital inputs, analogue inputs, programmable analogue/digital output, volt-free contact.

3.0 System Control

The 4300 IVS shall be capable of operating in any of the following control modes:

- ▶ Duty/standby pumps with Sensorless control
- ▶ Duty/standby pumps with remote sensor or Building Management System (BMS) control
- ▶ Multiple pumps and multiple sensors system control with IPS Controller

For full specification details on the Armstrong 4300 IVS control modes and performance and operating logic, visit the Armstrong web site at: www.armstrongpumps.com

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