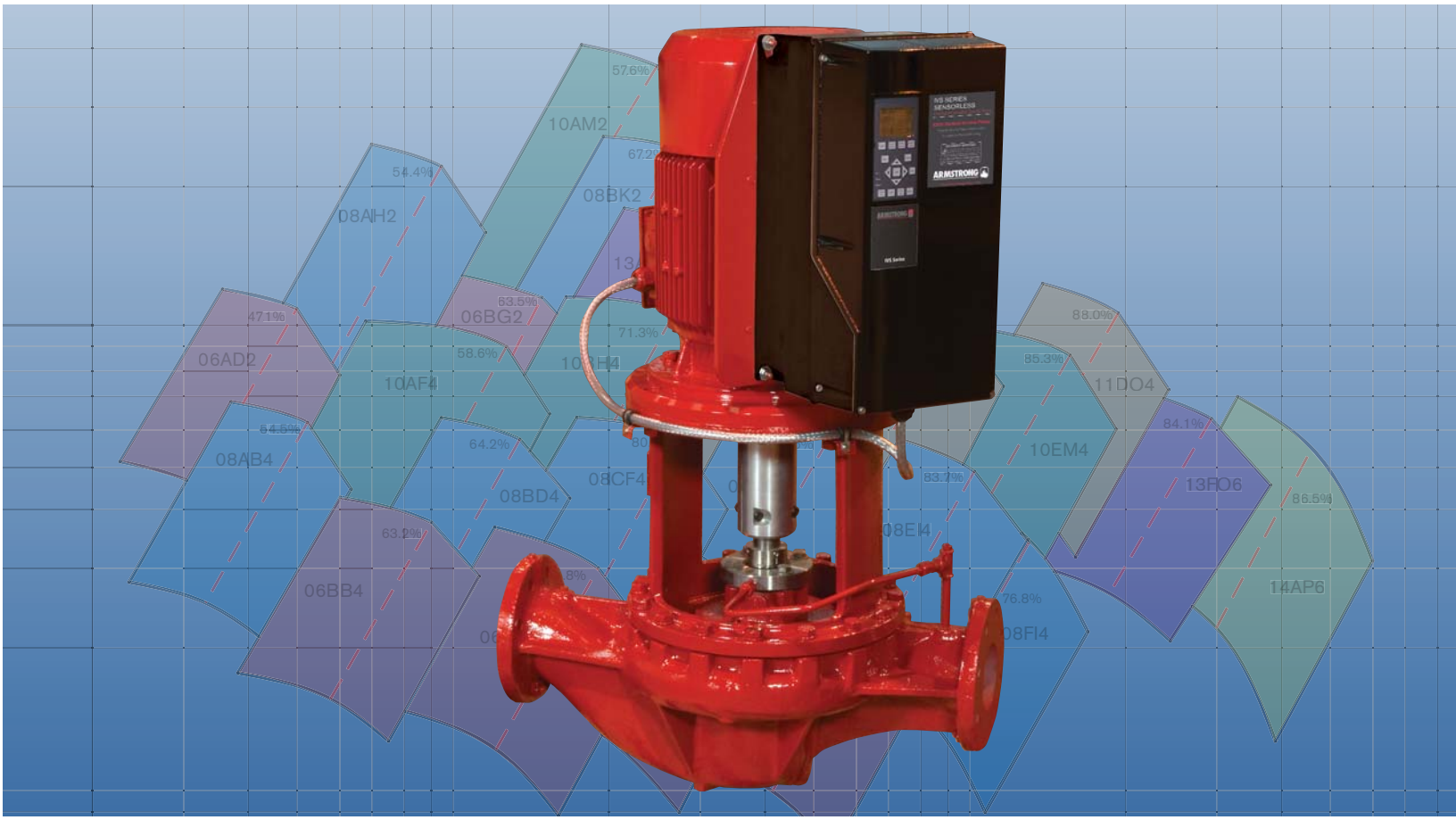
Design Envelope HVAC Pumps

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 BAS. Single pumps or duty/stand-by 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

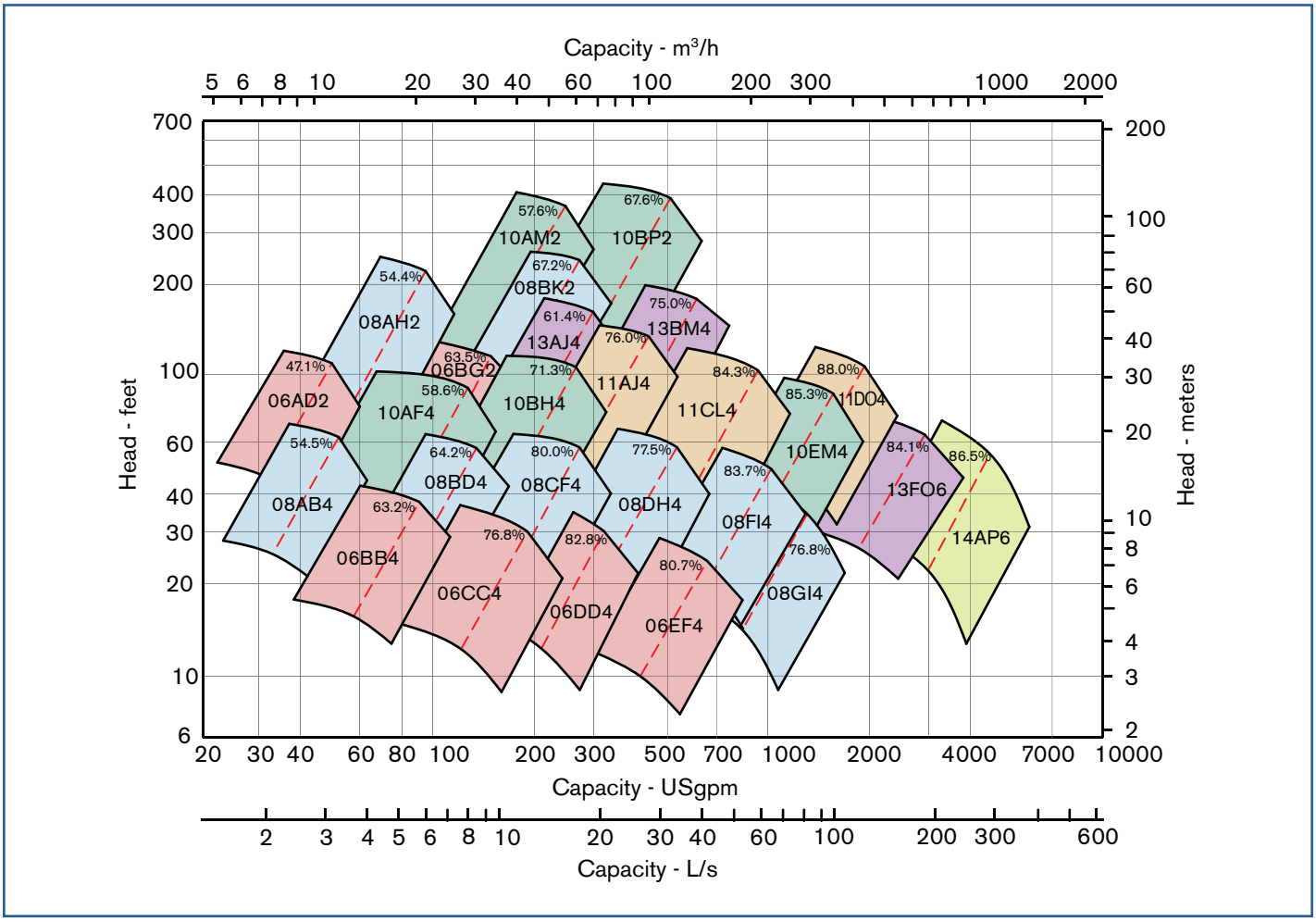
- Armstrong Design Envelope 4300 IVS pumps provide all the savings of variable-speed pumping with a reduced installation cost
- VFD is optimized to the motor at the factory, ensuring perfect integration and peak performance
- Control curve optimization mitigates the energy lost when using an incorrectly 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 Minimization

- Integration of the 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 Automation Systems (BAS)

All this value is integrated into one small pumping package for any motor size up to 75hp (55kW), available in all common 3 phase voltages. 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 NEMA premium, open drip-proof (ODP) or totally enclosed fan cooled (TEFC) motors and NEMA/UL Type 12 (IP55) VFD enclosures. Units larger than 75hp (55kW) are supplied with the drives shipped loose for on-site wiring.

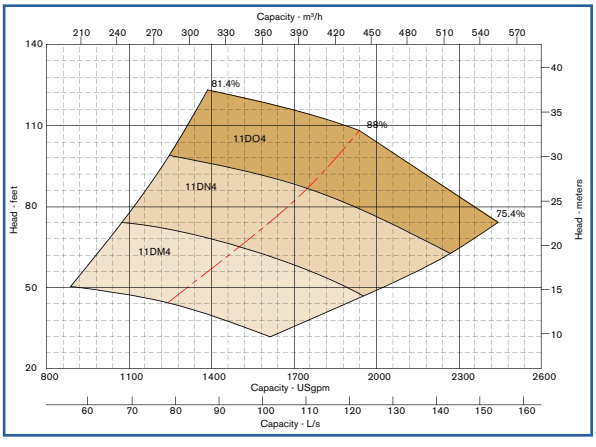
Design Envelope - 4300 IVS



Design Envelope HVAC Pumps - 4300 IVS Envelopes

▶ 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



Design Envelope - 4300 IVS 11DO4

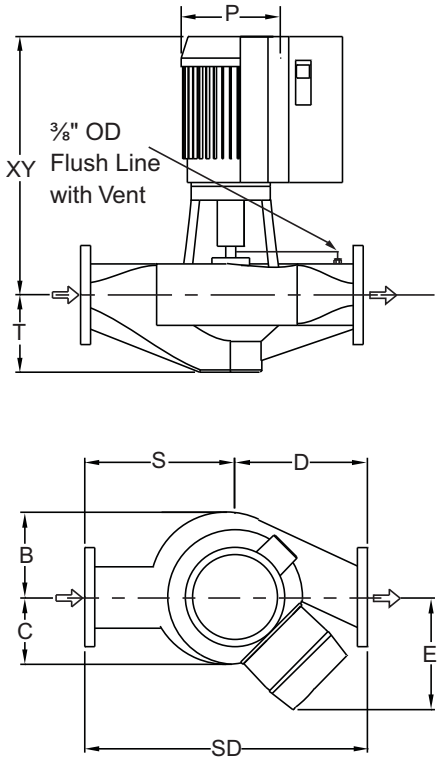
Armstrong's ACE Online will also help you select the most appropriate DE unit using a similar process.

▶ Design Envelope Data - 4300 IVS

Curve No.	Size	Power hp (kW)	Dimensions - inches (mm)									Weight lbs (Kg)
			B	C	D	S	T	SD	E Max	P	XY	
06AC2	1.5x1.5x6 (40-150)	2 (1.5)	4.53 (115)	4.53 (115)	7.25 (184)	7.00 (178)	4.25 (108)	14.25 (362)	12.83 (326)	7.28 (185)	20.50 (521)	185 (84)
06AD2	1.5x1.5x6 (40-150)	3 (2.2)	4.53 (115)	4.53 (115)	7.25 (184)	7.00 (178)	4.25 (108)	14.25 (362)	13.71 (348)	9.56 (243)	26.39 (670)	210 (95)
06BA4	2x2x6 (50-150)	1 (0.75)	4.63 (118)	4.50 (114)	7.00 (178)	8.00 (203)	4.88 (124)	15.00 (381)	12.83 (326)	7.28 (185)	20.53 (521)	190 (86)
06BB4	2x2x6 (50-150)	1.5 (1.1)	4.63 (118)	4.50 (114)	7.00 (178)	8.00 203)	4.88 (124)	15.00 (381)	12.83 (326)	7.28 (185)	20.53 (521)	190 (86)
06BF2	2X2X6 (50-150)	5 (4)	4.63 (118)	4.50 (114)	7.00 (178)	8.00 (203)	4.88 (124)	15.00 (381)	13.71 (348)	9.56 (243)	26.42 (671)	225 (102)
06BG2	2X2X6 (50-150)	7.5 (5.5)	4.63 (118)	4.50 (114)	7.00 (178)	8.00 (203)	4.88 (124)	15.00 (381)	16.59 (421)	11.25 (286)	29.16 (741)	280 (127)
06CA4	3x3x6 (80-150)	1 (0.75)	5.80 (147)	4.65 (118)	8.25 (210)	9.75 (248)	6.06 (154)	18.00 (457)	12.83 (326)	7.28 (185)	20.53 (521)	210 (95)
06CB4	3x3x6 (80-150)	1.5 (1.1)	5.80 (147)	4.65 (118)	8.25 (210)	9.75 (248)	6.06 (154)	18.00 (457)	12.83 (326)	7.28 (185)	20.53 (521)	210 (95)
06CC4	3x3x6 (80-150)	2 (1.5)	5.80 (147)	4.65 (118)	8.25 (210)	9.75 (248)	6.06 (154)	18.00 (457)	12.83 (326)	7.28 (185)	20.53 (521)	210 (95)
06DB4	4x4x6 (100-150)	1.5 (1.1)	6.88 (175)	5.50 (140)	10.00 (254)	12.00 (305)	8.00 (203)	22.00 (559)	12.83 (326)	7.28 (185)	20.78 (528)	250 (114)
06DC4	4x4x6 (100-150)	2 (1.5)	6.88 (175)	5.50 (140)	10.00 (254)	12.00 (305)	8.00 (203)	22.00 (559)	12.83 (326)	7.28 (185)	20.78 (528)	250 (114)
06DD4	4x4x6 (100-150)	3 (2.2)	6.88 (175)	5.50 (140)	10.00 (254)	12.00 (305)	8.00 (203)	22.00 (559)	13.71 (348)	9.56 (243)	26.67 (677)	275 (125)
06EC4	6x6x6 (150-150)	2 (1.5)	8.48 (215)	6.33 (161)	12.00 (305)	17.50 (445)	9.68 (246)	29.50 (749)	13.35 (339)	8.63 (219)	24.30 (617)	390 (177)
06ED4	6x6x6 (150-150)	3 (2.2)	8.48 (215)	6.33 (161)	12.00 (305)	17.50 (445)	9.68 (246)	29.50 (749)	14.03 (356)	10.38 (264)	28.81 (732)	415 (189)
06EF4	6x6x6 (150-150)	5 (4)	8.48 (215)	6.33 (161)	12.00 (305)	17.50 (445)	9.68 (246)	29.50 (749)	14.03 (356)	10.38 (264)	28.81 (732)	425 (193)
08AA4	1.5x1.5x8 (40-200)	1 (0.75)	5.80 (147)	5.80 (147)	8.00 (203)	8.00 (203)	4.80 (122)	16.00 (406)	12.83 (326)	7.28 (185)	20.53 (521)	200 (91)
08AB4	1.5x1.5x8 (40-200)	1.5 (1.1)	5.80 (147)	5.80 (147)	8.00 (203)	8.00 (203)	4.80 (122)	16.00 (406)	12.83 (326)	7.28 (185)	20.53 (521)	200 (91)
08AF2	1.5x1.5x8 (40-200)	5 (4)	5.80 (147)	5.80 (147)	8.00 (203)	8.00 (203)	4.80 (122)	16.00 (406)	13.71 (348)	9.56 (243)	26.42 (671)	235 (107)
08AG2	1.5x1.5x8 (40-200)	7.5 (5.5)	5.80 (147)	5.80 (147)	8.00 (203)	8.00 (203)	4.80 (122)	16.00 (406)	16.59 (421)	11.25 (286)	29.16 (741)	290 (132)
08AH2	1.5x1.5x8 (40-200)	10 (7.5)	5.80 (147)	5.80 (147)	8.00 (203)	8.00 (203)	4.80 (122)	16.00 (406)	16.59 (421)	11.25 (286)	29.16 (741)	305 (139)
08BB4	2x2x8 (50-200)	1.5 (1.1)	5.80 (147)	5.80 (147)	8.50 (216)	9.50 (241)	5.20 (132)	18.00 (457)	12.83 (326)	7.28 (185)	20.53 (521)	220 (100)
08BC4	2x2x8 (50-200)	2 (1.5)	5.80 (147)	5.80 (147)	8.50 (216)	9.50 (241)	5.20 (132)	18.00 (457)	12.83 (326)	7.28 (185)	20.53 (521)	220 (100)
08BD4	2x2x8 (50-200)	3 (2.2)	5.80 (147)	5.80 (147)	8.50 (216)	9.50 (241)	5.20 (132)	18.00 (457)	13.71 (348)	9.56 (243)	26.42 (671)	245 (111)
08BI2	2x2x8 (50-200)	15 (11)	5.80 (147)	5.80 (147)	8.50 (216)	9.50 (241)	5.20 (132)	18.00 (457)	17.42 (442)	13.38 (340)	34.10 (866)	395 (180)
08BJ2	2x2x8 (50-200)	20 (15)	5.80 (147)	5.80 (147)	8.50 (216)	9.50 (241)	5.20 (132)	18.00 (457)	17.42 (442)	13.38 (340)	34.10 (866)	420 (191)
08BK2	2x2x8 (50-200)	25 (18.5)	5.80 (147)	5.80 (147)	8.50 (216)	9.50 (241)	5.20 (132)	18.00 (457)	20.73 (527)	15.31 (389)	43.36 (1101)	480 (218)
08CC4	3x3x8 (80-200)	2 (1.5)	6.75 (171)	5.80 (147)	10.00 (254)	12.00 (305)	6.31 (160)	22.00 (559)	12.83 (326)	7.28 (185)	20.53 (521)	250 (114)
08CD4	3x3x8 (80-200)	3 (2.2)	6.75 (171)	5.80 (147)	10.00 (254)	12.00 (305)	6.31 (160)	22.00 (559)	13.71 (348)	9.56 (243)	26.42 (671)	275 (125)
08CF4	3x3x8 (80-200)	5 (4)	6.75 (171)	5.80 (147)	10.00 (254)	12.00 (305)	6.31 (160)	22.00 (559)	13.71 (348)	9.56 (243)	26.42 (671)	285 (130)
08DF4	4x4x8 (100-200)	5 (4)	8.00 (203)	6.31 (160)	11.00 (279)	14.00 (356)	8.00 (203)	25.00 (635)	13.71 (348)	9.56 (243)	26.57 (675)	335 (152)
08DG4	4x4x8 (100-200)	7.5 (5.5)	8.00 (203)	6.31 (160)	11.00 (279)	14.00 (356)	8.00 (203)	25.00 (635)	16.59 (421)	11.25 (286)	29.32 (745)	390 (177)
08DH4	4x4x8 (100-200)	10 (7.5)	8.00 (203)	6.31 (160)	11.00 (279)	14.00 (356)	8.00 (203)	25.00 (635)	16.59 (421)	11.25 (286)	29.32 (745)	405 (184)
08FG4	6x6x8 (150-200)	7.5 (5.5)	9.75 (248)	7.50 (191)	13.50 (343)	19.50 (495)	10.38 (264)	33.00 (838)	16.59 (421)	11.25 (286)	29.76 (756)	490 (223)
08FH4	6x6x8 (150-200)	10 (7.5)	9.75 (248)	7.50 (191)	13.50 (343)	19.50 (495)	10.38 (264)	33.00 (838)	16.59 (421)	11.25 (286)	29.76 (756)	505 (230)
08FI4	6x6x8 (150-200)	15 (11)	9.75 (248)	7.50 (191)	13.50 (343)	19.50 495)	0.38 (264)	33.00 (838)	17.42 (442)	13.38 (340)	34.70 (881)	575 (261)
08GG4	8x8x8 (200-200)	7.5 (5.5)	11.37 (289)	8.43 (214)	16.00 (406)	2.00 (559)	12.43 (316)	38.00 (965)	16.93 (430)	12.13 (308)	33.00 (838)	740 (336)
08GH4	8x8x8 (200-200)	10 (7.5)	11.37 (289)	8.43 (214)	16.00 (406)	22.00 (559)	12.43 (316)	38.00 (965)	16.93 (430)	12.13 (308)	33.00 (838)	755 (343)
08GI4	8x8x8 (200-200)	15 (11)	11.37 (289)	8.43 (214)	16.00 (406)	22.00 (559)	12.43 (316)	38.00 (965)	17.42 (442)	13.38 (340)	38.00 (965)	825 (375)

Curve No.	Size	H
10AC4	2x2x10 (50-250)	
10AD4	2x2x10 (50-250)	
10AF4	2x2x10 (50-250)	
10AJ2	2x2x10 (50-250)	
10AK2	2x2x10 (50-250)	
10AL2	2x2x10 (50-250)	
10AM2	2x2x10 (50-250)	
10BF4	3x3x10 (80-250)	
10BG4	3x3x10 (80-250)	
10BH4	3x3x10 (80-250)	
10BN2	3x3x10 (80-250)	
10BO2	3x3x10 (80-250)	
10BP2	3x3x10 (80-250)	
10CN2	4x4x10 (100-250)	
10CO2	4x4x10 (100-250)	
10CP2	4x4x10 (100-250)	
10EK4	8x8x10 (200-250)	
10EL4	8x8x10 (200-250)	
10EM4	8x8x10 (200-250)	
11AH4	4x4x11.5 (100-290)	
11AI4	4x4x11.5 (100-290)	
11AJ4	4x4x11.5 (100-290)	
11CJ4	6x6x11.5 (150-290)	
11CK4	6x6x11.5 (150-290)	
11CL4	6x6x11.5 (150-290)	
11DM4	8x8x11.5 (200-290)	
11DN4	8x8x11.5 (200-290)	
11DO4	8x8x11.5 (200-290)	
13AH4	3x3x13 (80-330)	
13AI4	3x3x13 (80-330)	
13AJ4	3x3x13 (80-330)	
13BK4	4x4x13 (100-330)	
13BL4	4x4x13 (100-330)	
13BM4	4x4x13 (100-330)	
13FM6	12x12x13 (300-330)	
13FN6	12x12x13 (300-330)	
13FO6	12x12x13 (300-330)	
14AN6	14x14x14 (350-350)	
14AO6	14x14x14 (350-350)	
14AP6	14x14x14 (350-350)	

Power	Dimensions - inches (mm)									Weight
hp (kW)	B	C	D	S	T	SD	E Max	P	XY	lbs (Kg)
2	6.75	6.75	9.00	10.00	5.35	19.00	12.83	7.28	22.16	270
(1.5)	(171)	(171)	(229)	(254)	(136)	(483)	(326)	(185)	(563)	(123)
3	6.75	6.75	9.00	10.00	5.35	19.00	13.71	9.56	26.42	295
(2.2)	(171)	(171)	(229)	(254)	(136)	(483)	(348)	(243)	(671)	(134)
5	6.75	6.75	9.00	10.00	5.35	19.00	13.71	9.56	26.42	305
(4)	(171)	(171)	(229)	(254)	(136)	(483)	(348)	(243)	(671)	(139)
20	6.75	6.75	9.00	10.00	5.35	19.00	17.42	13.38	34.10	470
(15)	(171)	(171)	(229)	(254)	(136)	(483)	(442)	(340)	(866)	(214)
25	6.75	6.75	9.00	10.00	5.35	19.00	20.73	15.31	43.36	530
(18.5)	(171)	(171)	(229)	(254)	(136)	(483)	(527)	(389)	(1101)	(241)
30	6.75	6.75	9.00	10.00	5.35	19.00	20.73	15.31	43.36	620
(22)	(171)	(171)	(229)	(254)	(136)	(483)	(527)	(389)	(1101)	(282)
40	6.75	6.75	9.00	10.00	5.35	19.00	21.39	17.00	44.29	850
(30)	(171)	(171)	(229)	(254)	(136)	(483)	(543)	(432)	(1125)	(386)
5	7.20	6.87	9.50	11.50	5.40	21.00	13.71	9.56	26.42	345
(4)	(183)	(174)	(241)	(292)	(137)	(533)	(348)	(243)	(671)	(157)
7.5	7.20	6.87	9.50	11.50	5.40	21.00	16.59	11.25	29.16	400
(5.5)	(183)	(174)	(241)	(292)	(137)	(533)	(421)	(286)	(741)	(182)
10	7.20	6.87	9.50	11.50	5.40	21.00	16.59	11.25	29.16	415
(7.5)	(183)	(174)	(241)	(292)	(137)	(533)	(421)	(286)	(741)	(189)
50	7.20	6.87	9.50	11.50	5.40	21.00	23.14	17.00	44.29	995
(37)	(183)	(174)	(241)	(292)	(137)	(533)	(588)	(432)	(1125)	(452)
60	7.20	6.87	9.50	11.50	5.40	21.00	23.93	19.03	42.60	1125
(45)	(183)	(174)	(241)	(292)	(137)	(533)	(608)	(483)	(1082)	(511)
75	7.20	6.87	9.50	11.50	5.40	21.00	22.18	19.03	42.60	1130
(55)	(183)	(174)	(241)	(292)	(137)	(533)	(563)	(483)	(1082)	(514)
50	8.50	6.88	12.00	14.00	7.50	26.00	23.14	17.00	44.29	1055
(37)	(216)	(175)	(305)	(356)	(191)	(660)	(588)	(432)	(1125)	(480)
60	8.50	6.88	12.00	14.00	7.50	26.00	23.93	19.03	42.60	1185
(45)	(216)	(175)	(305)	(356)	(191)	(660)	(608)	(483)	(1082)	(539)
75	8.50	6.88	12.00	14.00	7.50	26.00	22.18	19.03	42.60	1190
(55)	(216)	(175)	(305)	(356)	(191)	(660)	(563)	(483)	(1082)	(541)
25	11.50	8.87	17.00	22.00	9.75	39.00	20.73	15.30	43.89	890
(18.5)	(292)	(225)	(432)	(559)	(248)	(991)	(527)	(389)	(1115)	(405)
30	11.50	8.87	17.00	22.00	9.75	39.00	20.73	15.31	43.89	910
(22)	(292)	(225)	(432)	(559)	(248)	(991)	(527)	(389)	(1115)	(414)
40	11.50	8.87	17.00	22.00	9.75	39.00	21.39	17.00	44.83	1200
(30)	(292)	(225)	(432)	(559)	(248)	(991)	(543)	(432)	(1139)	(545)
10	8.13	7.40	12.75	15.25	7.69	28.00	16.59	11.25	29.22	525
(7.5)	(207)	(188)	(324)	(387)	(195)	(711)	(421)	(286)	(742)	(239)
15	8.13	7.40	12.75	15.25	7.69	28.00	17.42	13.38	34.16	595
(11)	(207)	(188)	(324)	(387)	(195)	(711)	(442)	(340)	(868)	(270)
20	8.13	7.40	12.75	15.25	7.69	28.00	17.42	13.38	34.16	640
(15)	(207)	(188)	(324)	(387)	(195)	(711)	(442)	(340)	(868)	(291)
20	9.80	8.50	16.50	18.50	9.75	35.00	17.42	13.38	34.22	755
(15)	(249)	(216)	(419)	(470)	(248)	(889)	(442)	(340)	(869)	(343)
25	9.80	8.50	16.50	18.50	9.75	35.00	20.73	15.31	43.54	825
(18.5)	(249)	(216)	(419)	(470)	(248)	(889)	(527)	(389)	(1106)	(375)
30	9.80	8.50	16.50	18.50	9.75	35.00	20.73	15.31	43.54	845
(22)	(249)	(216)	(419)	(470)	(248)	(889)	(527)	(389)	(1106)	(384)
40	11.50	9.50	17.50	22.00	10.00	39.50	21.39	17.00	44.85	1250
(30)	(292)	(241)	(445)	(559)	(254)	(1003)	(543)	(432)	(1139)	(568)
50	11.50	9.50	17.50	22.00	10.00	39.50	23.14	17.00	44.85	1325
(37)	(292)	(241)	(445)	(559)	(254)	(1003)	(543)	(432)	(1139)	(602)
60	11.50	9.50	17.50	22.00	10.00	39.50	23.93	19.03	43.03	1475
(45)	(292)	(241)	(445)	(559)	(254)	(1003)	(608)	(483)	(1093)	(670)
10	8.25	8.75	12.00	13.50	6.63	25.50	16.59	11.25	31.65	505
(7.5)	(210)	(222)	(305)	(343)	(168)	(648)	(421)	(286)	(804)	(230)
15	8.25	8.75	12.00	13.50	6.63	25.50	17.42	13.38	36.59	575
(11)	(210)	(222)	(305)	(343)	(168)	(648)	(442)	(340)	(929)	(261)
20	8.25	8.75	12.00	13.50	6.63	25.50	17.42	13.38	36.59	620
(15)	(210)	(222)	(305)	(343)	(168)	(648)	(442)	(340)	(929)	(282)
25	8.25	9.20	13.50	15.50	8.06	29.00	20.73	15.31	43.41	760
(18.5)	(210)	(234)	(343)	(394)	(205)	(737)	(527)	(389)	(1103)	(345)
30	8.25	9.20	13.50	15.50	8.06	29.0	20.73	15.31	43.41	780
(22)	(210)	(234)	(343)	(394)	(205)	(737)	(527)	(389)	(1103)	(355)
40	8.25	9.20	13.50	15.50	8.00	29.00	21.39	17.00	44.97	1070
(30)	(210)	(234)	(343)	(394)	(205)	(737)	(543)	(432)	(1142)	(486)
40	16.13	11.50	24.25	22.25	11.25	46.50	22.18	19.03	52.19	2675
(30)	(410)	(292)	(616)	(565)	(286)	(1181)	(563)	(483)	(1326)	(1216)
50	16.13	11.50	24.25	22.25	11.25	46.50	23.93	19.03	52.19	2765
(37)	(410)	(292)	(616)	(565)	(286)	(1181)	(608)	(483)	(1326)	(1257)
60	16.13	11.50	24.25	22.25	11.25	46.50	24.86	21.41	57.95	3345
(45)	(410)	(292)	(616)	(565)	(286)	(1181)	(631)	(544)	(1472)	(1520)
50	20.5	13.75	27.00	25.00	13.75	52.00	23.82	18.75	57.25	3365
(37)	(521)	(349)	(686)	(635)	(349)	(1321)	(605)	(476)	(1454)	(1530)
60	20.5	13.75	27.00	25.00	13.75	52.00	24.77	21.19	62.94	3945
(45)	(521)	(349)	(686)	(635)	(349)	(1321)	(629)	(538)	(1599)	(1793)
75	20.5	13.75	27.00	25.00	13.75	52.00	23.02	21.19	62.94	3970
(55)	(521)	(349)	(686)	(635)	(349)	(1321)	(585)	(538)	(1599)	(1805)



▶ Typical Specifications

1.0 Products

1. Provide Armstrong Design Envelope HVAC pump model _____. The Design Envelope shall encompass an initial design point of _____USgpm (L/s, m³/h) at _____ft (m)/head. The Design Envelope shall also be capable of supplying _____USgpm (L/s, m³/h) at _____ ft (m)/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 NEMA Premium efficiency motors and Armstrong NEMA/UL Type-12 (IP55) 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 75hp (55kW) for a self-contained pump, motor and drive combination to ensure optimum component matching and protection from motor overloading at any operating point. The pumping package shall be labeled to indicate UL 778, UL 508, CSA C22.2.14 and CSA C22.2.108 compliance.
4. Pump Construction: Pump Casing - Cast iron with ANSI-125 (PN16) flanges for working pressure to 175 psig (12 bar) at 150°F (65°C) and ductile iron with ANSI-250 (PN25) flanges for working pressures to 375 psig (25 bar) at 150°F (65°C). Suction and discharge connections shall be equally sized ANSI 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 ANSI B15.1 Sect. 8 and OSHA 1910.219 compliant 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 the 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 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 review 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. The 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, DeviceNet, Lonworks and Profibus.
3. Sensorless control software shall be available 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 sensors. 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, six programmable digital inputs, two analog inputs, one programmable analog/digital output, two volt-free contacts.

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 system (BAS) 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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