

# ARMSTRONG



## 4302 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 the 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. With IVS Sensorless control there is no need to source, install or wire a system feedback sensor. The integrated IVS Sensorless software controls the system as efficiently as a unit with remotely installed sensor control. However, the IVS accomplishes this without any external sensors, other than the control valves modulating to satisfy the environmental settings in the conditioned spaces.

The Design Envelope HVAC Pump 4302 IVS also provides built-in redundancy with duty/standby or two parallel operating units in a single pipe. The individual units can be controlled easily through the building BAS to alternate for service distribution, start and stop in a duty/standby configuration, or run in parallel for load distribution under peak system demands.

## ► 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 - integrated Sensorless VFD controller fits within the footprint of the pump
- The dual casing of the 4302 IVS replaces two pumping units and uses less floor space

## ► Increased Energy Savings

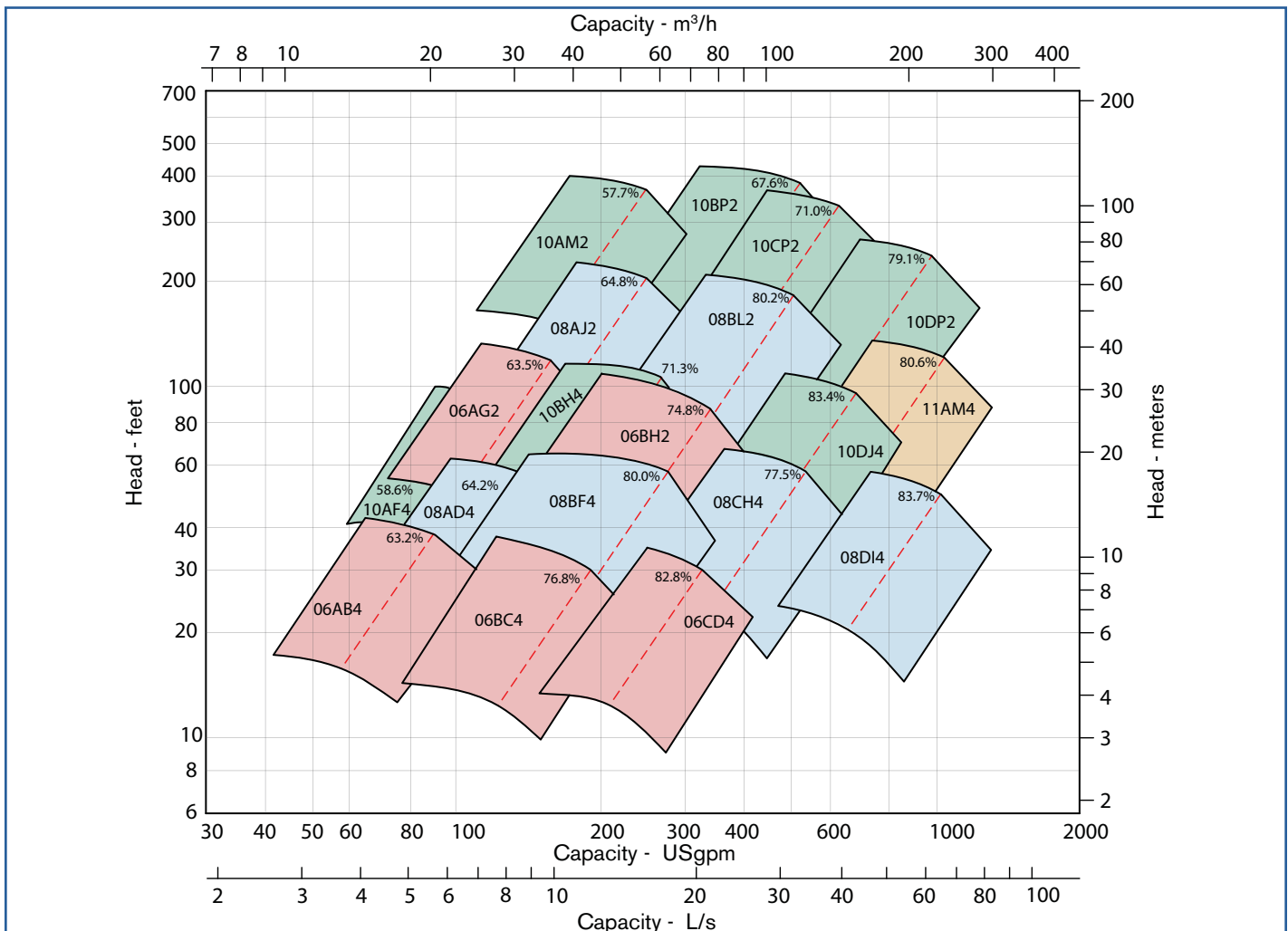
- Armstrong Design Envelope 4302 IVS pumps provide all the savings of variable-speed pumping with a reduced installation cost
- VFD is optimized to the motor at the factory, ensuring perfect integration and peak performance
- Control curve optimization mitigates the energy lost when using an incorrectly placed sensor
- Range of units available makes for 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
- Pump seals can be serviced without removing the motor or drive
- Single source of responsibility for 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 4302 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.

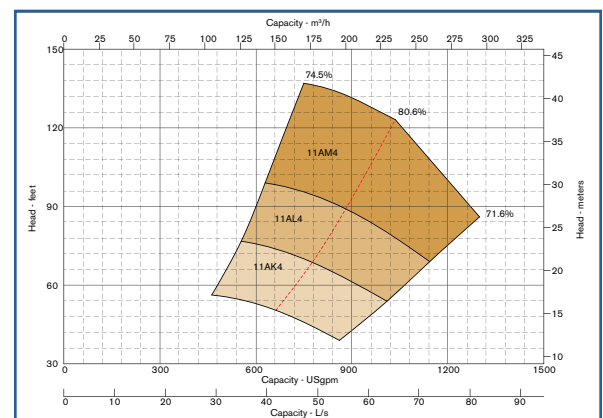
# Design Envelope - 4302 IVS



Design Envelope HVAC Pumps - 4302 IVS duty/standby envelopes illustrated. The flow is doubled in parallel operation.

## ► 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



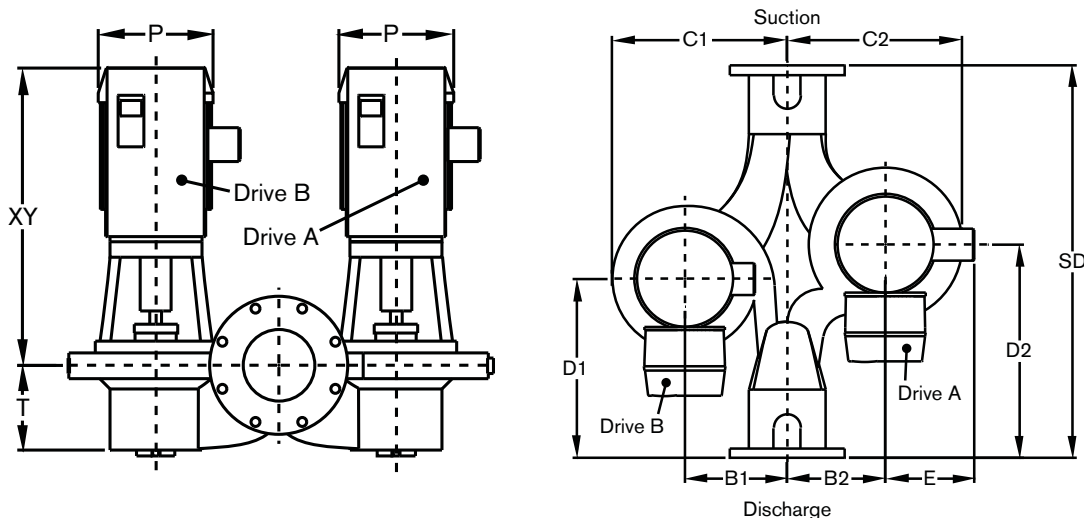
Duty/standby Design Envelope - 4302 IVS 11AM4

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

## ► Design Envelope Data - 4302 IVS

Model No.	Size	Motor hp (kW)	Dimensions - inches (mm)														Weight - lbs (kg)	
			C1	C2	D1	D2	B1	B2	T	SD	ODP motors with UL Type 12 drives			TEFC motors with UL Type 12 drives			OPD	TEFC
											P	E	XY	P	E	XY		
06AA4	3x3x6 (80-150)	1 (0.75)	10.38 (264)	10.50 (267)	10.13 (257)	10.13 (257)	5.87 (149)	5.88 (149)	4.87 (124)	18.25 (464)	8.63 (219)	4.12 (105)	22.03 (560)	7.28 (185)	6.09 (155)	20.53 (521)	330 (149.7)	330 (149.7)
06AB4	3x3x6 (80-150)	1.5 (1.1)	10.38 (264)	10.50 (267)	10.13 (257)	10.13 (257)	5.87 (149)	5.88 (149)	4.87 (124)	18.25 (464)	8.63 (219)	4.12 (105)	22.03 (560)	7.28 (185)	6.09 (155)	20.53 (521)	330 (149.7)	330 (149.7)
06AD2	3x3x6 (80-150)	3 (2.2)	10.38 (264)	10.50 (267)	10.13 (257)	10.13 (257)	5.87 (149)	5.88 (149)	4.87 (124)	18.25 (464)	8.63 (219)	4.12 (105)	22.03 (560)	9.56 (243)	7.50 (191)	26.42 (671)	330 (149.7)	380 (172.3)
06AF2	3x3x6 (80-150)	5 (4)	10.38 (264)	10.50 (267)	10.13 (257)	10.12 (257)	5.88 (149)	5.88 (149)	4.87 (124)	18.25 (464)	10.38 (264)	6.84 (174)	26.54 (674)	9.56 (243)	7.50 (191)	26.42 (671)	360 (163.3)	400 (181.4)
06AG2	3x3x6 (80-150)	7.5 (5.5)	10.38 (264)	10.50 (267)	10.13 (257)	10.12 (257)	5.88 (149)	5.88 (149)	4.87 (124)	18.25 (464)	10.38 (264)	6.84 (174)	26.54 (674)	11.25 (286)	8.25 (210)	29.16 (741)	380 (172.3)	470 (213.2)
06BA4	4x4x6 (100-150)	1 (0.75)	12.13 (308)	12.63 (321)	13.84 (352)	13.84 (352)	6.81 (173)	6.81 (173)	5.80 (147)	26.63 (676)	8.63 (219)	4.12 (105)	22.03 (560)	7.28 (185)	6.09 (155)	20.53 (521)	380 (172.3)	380 (172.3)
06BB4	4x4x6 (100-150)	1.5 (1.1)	12.13 (308)	12.63 (321)	13.84 (352)	13.84 (352)	6.81 (173)	6.81 (173)	5.80 (147)	26.63 (676)	8.63 (219)	4.12 (105)	22.03 (560)	7.28 (185)	6.09 (155)	20.53 (521)	380 (172.3)	380 (172.3)
06BC4	4x4x6 (100-150)	2 (1.5)	12.13 (308)	12.63 (321)	13.84 (352)	13.84 (352)	6.81 (173)	6.81 (173)	5.80 (147)	26.63 (676)	8.63 (219)	4.12 (105)	22.03 (560)	7.28 (185)	6.09 (155)	20.53 (521)	380 (172.3)	380 (172.3)
06BF2	4x4x6 (100-150)	5 (4)	12.13 (308)	12.63 (321)	13.84 (352)	13.84 (352)	6.81 (173)	6.81 (173)	5.80 (147)	26.63 (676)	10.38 (264)	6.84 (174)	26.54 (674)	9.56 (243)	7.50 (191)	26.42 (671)	410 (185.9)	450 (204.1)
06BG2	4x4x6 (100-150)	7.5 (5.5)	12.13 (308)	12.63 (321)	13.84 (352)	13.84 (352)	6.81 (173)	6.81 (173)	5.80 (147)	26.63 (676)	10.38 (264)	6.84 (174)	26.54 (674)	11.25 (286)	8.25 (210)	29.16 (741)	430 (195.0)	520 (235.8)
06BH2	4x4x6 (100-150)	10 (7.5)	12.13 (308)	12.63 (321)	13.84 (352)	13.84 (352)	6.81 (173)	6.81 (173)	5.80 (147)	26.63 (676)	12.13 (308)	7.59 (193)	28.04 (712)	11.25 (286)	8.25 (210)	29.16 (741)	490 (222.2)	550 (249.4)
06CB4	6x6x6 (150-150)	1.5 (1.1)	13.63 (346)	14.31 (363)	16.81 (427)	16.81 (427)	7.39 (188)	7.39 (188)	7.75 (197)	33.50 (851)	8.63 (219)	4.12 (105)	22.28 (566)	7.28 (185)	6.09 (155)	20.78 (528)	480 (217.7)	480 (217.7)
06CC4	6x6x6 (150-150)	2 (1.5)	13.63 (346)	14.31 (363)	16.81 (427)	16.81 (427)	7.39 (188)	7.39 (188)	7.75 (197)	33.50 (851)	8.63 (219)	4.12 (105)	22.28 (566)	7.28 (185)	6.09 (155)	20.78 (528)	480 (217.7)	480 (217.7)
06CD4	6x6x6 (150-150)	3 (2.2)	13.63 (346)	14.31 (363)	16.81 (427)	16.81 (427)	7.39 (188)	7.39 (188)	7.75 (197)	33.50 (851)	10.38 (264)	6.84 (174)	26.79 (680)	9.56 (243)	7.50 (191)	26.67 (677)	510 (231.3)	530 (240.4)
08AB4	3x3x8 (80-200)	1.5 (1.1)	12.50 (318)	12.63 (321)	10.69 (272)	10.69 (272)	7.00 (178)	7.00 (178)	5.08 (129)	19.06 (484)	8.63 (219)	4.12 (105)	22.01 (559)	7.28 (185)	6.09 (155)	20.51 (521)	390 (176.9)	390 (176.9)
08AC4	3x3x8 (80-200)	2 (1.5)	12.50 (318)	12.63 (321)	10.69 (272)	10.69 (272)	7.00 (178)	7.00 (178)	5.08 (129)	19.06 (484)	8.63 (219)	4.12 (105)	22.01 (559)	7.28 (185)	6.09 (155)	20.51 (521)	390 (176.9)	390 (176.9)
08AD4	3x3x8 (80-200)	3 (2.2)	12.50 (318)	12.63 (321)	10.69 (272)	10.69 (272)	7.00 (178)	7.00 (178)	5.08 (129)	19.06 (484)	10.38 (264)	6.84 (174)	26.52 (674)	9.56 (243)	7.50 (191)	26.40 (671)	420 (190.5)	440 (199.5)
08AH2	3x3x8 (80-200)	10 (7.5)	12.50 (318)	12.63 (321)	10.69 (272)	10.69 (272)	7.00 (178)	7.00 (178)	5.08 (129)	19.06 (484)	12.13 (308)	7.59 (193)	28.02 (712)	11.25 (286)	8.25 (210)	29.14 (740)	500 (226.8)	560 (254.0)
08AI2	3x3x8 (80-200)	15 (11)	12.50 (318)	12.63 (321)	10.69 (272)	10.69 (272)	7.00 (178)	7.00 (178)	5.08 (129)	19.06 (484)	12.13 (308)	7.59 (193)	28.02 (712)	13.38 (340)	8.90 (226)	34.08 (866)	520 (235.8)	700 (317.5)
08AJ2	3x3x8 (80-200)	20 (15)	12.50 (318)	12.63 (321)	10.69 (272)	10.69 (272)	7.00 (178)	7.00 (178)	5.08 (129)	19.06 (484)	13.38 (340)	9.94 (252)	34.02 (864)	13.38 (340)	8.90 (226)	34.08 (866)	620 (281.2)	740 (335.6)
08BC4	4x4x8 (100-200)	2 (1.5)	15.09 (383)	15.63 (397)	14.84 (377)	14.84 (377)	8.75 (222)	8.75 (222)	6.28 (160)	27.63 (702)	8.63 (219)	4.12 (105)	22.03 (560)	7.28 (185)	6.09 (155)	20.53 (521)	460 (208.6)	460 (208.6)
08BD4	4x4x8 (100-200)	3 (2.2)	15.09 (383)	15.63 (397)	14.84 (377)	14.84 (377)	8.75 (222)	8.75 (222)	6.28 (160)	27.63 (702)	10.38 (264)	6.84 (174)	26.54 (674)	9.56 (243)	7.50 (191)	26.42 (671)	490 (222.2)	510 (231.3)
08BF4	4x4x8 (100-200)	5 (4)	15.09 (383)	15.63 (397)	14.84 (377)	14.84 (377)	8.75 (222)	8.75 (222)	6.28 (160)	27.63 (702)	10.38 (264)	6.84 (174)	26.54 (674)	9.56 (243)	7.50 (191)	26.42 (671)	510 (231.3)	530 (240.4)
08BJ2	4x4x8 (100-200)	20 (15)	15.09 (383)	15.63 (397)	14.84 (377)	14.84 (377)	8.75 (222)	8.75 (222)	6.28 (160)	27.63 (702)	13.38 (340)	9.94 (252)	34.04 (865)	13.38 (340)	8.90 (226)	34.10 (866)	690 (312.9)	810 (367.3)
08BK2	4x4x8 (100-200)	25 (18)	15.09 (383)	15.63 (397)	14.84 (377)	14.84 (377)	8.75 (222)	8.75 (222)	6.28 (160)	27.63 (702)	13.38 (340)	9.94 (252)	34.04 (865)	15.31 (389)	12.00 (305)	43.36 (1101)	710 (322.0)	890 (403.6)
08BL2	4x4x8 (100-200)	30 (22)	15.09 (383)	15.63 (397)	14.84 (377)	14.84 (377)	8.75 (222)	8.75 (222)	6.28 (160)	27.63 (702)	13.38 (340)	11.75 (298)	37.23 (946)	15.31 (389)	12.00 (305)	43.36 (1101)	850 (385.5)	1030 (467.1)
08CF4	6x6x8 (150-200)	5 (4)	16.90 (429)	17.63 (448)	16.81 (427)	16.81 (427)	9.75 (248)	9.75 (248)	6.31 (160)	33.94 (862)	10.38 (264)	6.84 (174)	26.94 (684)	9.56 (243)	7.50 (191)	26.82 (681)	630 (285.7)	650 (294.8)
08CG4	6x6x8 (150-200)	7.5 (5.5)	16.90 (429)	17.63 (448)	16.81 (427)	16.81 (427)	9.75 (248)	9.75 (248)	6.31 (160)	33.94 (862)	12.13 (308)	7.59 (193)	28.44 (722)	11.25 (286)	8.25 (210)	29.57 (751)	690 (312.9)	720 (326.5)
08CH4	6x6x8 (150-200)	10 (7.5)	16.90 (429)	17.63 (448)	16.81 (427)	16.81 (427)	9.75 (248)	9.75 (248)	6.31 (160)	33.94 (862)	12.13 (308)	7.59 (193)	28.44 (722)	11.25 (286)	8.25 (210)	29.57 (751)	710 (322.0)	750 (340.1)
08DG4	8x8x8 (200-200)	7.5 (5.5)	18.50 (470)	18.60 (472)	18.50 (470)	23.00 (584)	10.00 (254)	9.00 (229)	9.46 (240)	45.50 (1156)	12.13 (308)	7.59 (193)	28.63 (727)	11.25 (286)	8.25 (210)	29.75 (756)	680 (308.4)	710 (322.0)
08DH4	8x8x8 (200-200)	10 (7.5)	18.50 (470)	18.60 (472)	18.50 (470)	23.00 (584)	10.00 (254)	9.00 (229)	9.46 (240)	45.50 (1156)	12.13 (308)	7.59 (193)	28.63 (727)	11.25 (286)	8.25 (210)	29.75 (756)	700 (317.5)	740 (335.6)
08DI4	8x8x8 (200-200)	15 (11)	18.50 (470)	18.60 (472)	18.50 (470)	23.00 (584)	10.00 (254)	9.00 (229)	9.46 (240)	45.50 (1156)	13.38 (340)	9.94 (252)	34.63 (880)	13.38 (340)	8.90 (226)	34.69 (881)	800 (362.8)	880 (399.1)

Model No.	Size	Motor hp (kW)	Dimensions - inches (mm)														Weight - lbs (kg)	
			C1	C2	D1	D2	B1	B2	T	SD	ODP motors with UL Type 12 drives			TEFC motors with UL Type 12 drives			OPD	TEFC
											P	E	XY	P	E	XY		
10AC4	3x3x10	2	15.63	15.75	10.87	15.87	9.00	9.00	5.60	25.75	8.63	4.13	22.27	7.28	6.09	20.77	530	530
	(80-250)	(1.5)	(397)	(400)	(276)	(403)	(229)	(229)	(142)	(654)	(219)	(105)	(566)	(185)	(155)	(528)	(240.4)	(240.4)
10AD4	3x3x10	3	15.63	15.75	10.88	15.87	9.00	9.00	5.60	25.75	10.38	6.84	26.77	9.56	7.50	26.65	600	620
	(80-250)	(2.2)	(397)	(400)	(276)	(403)	(229)	(229)	(142)	(654)	(264)	(174)	(680)	(243)	(191)	(677)	(272.1)	(281.2)
10AF4	3x3x10	5	15.63	15.75	10.88	15.87	9.00	9.00	5.60	25.75	10.38	6.84	26.77	9.56	7.50	26.65	620	640
	(80-250)	(4)	(397)	(400)	(276)	(403)	(229)	(229)	(142)	(654)	(264)	(174)	(680)	(243)	(191)	(677)	(281.2)	(290.2)
10AK2	3x3x10	25	15.63	15.75	10.87	15.87	9.00	9.00	5.60	25.75	13.38	9.94	34.27	15.31	12.00	43.60	820	960
	(80-250)	(18)	(397)	(400)	(276)	(403)	(229)	(229)	(142)	(654)	(340)	(252)	(870)	(389)	(305)	(1107)	(371.9)	(435.4)
10AL2	3x3x10	30	15.63	15.75	10.87	15.87	9.00	9.00	5.60	25.75	13.38	11.75	37.47	15.31	12.00	43.60	920	1100
	(80-250)	(22)	(397)	(400)	(276)	(403)	(229)	(229)	(142)	(654)	(340)	(298)	(952)	(389)	(305)	(1107)	(417.2)	(498.9)
10AM2	3x3x10	40	15.63	15.75	10.87	15.87	9.00	9.00	5.60	25.75	13.38	11.75	37.47	17.00	13.91	44.53	1080	1560
	(80-250)	(30)	(397)	(400)	(276)	(403)	(229)	(229)	(142)	(654)	(340)	(298)	(952)	(432)	(353)	(1131)	(489.8)	(707.5)
10BF4	4x4x10	5	16.45	16.56	12.50	16.50	9.50	9.50	6.47	30.00	10.38	6.84	26.85	9.56	7.50	26.73	690	710
	(100-250)	(4)	(418)	(421)	(318)	(419)	(241)	(241)	(164)	(762)	(264)	(174)	(682)	(243)	(191)	(679)	(312.9)	(322.0)
10BG4	4x4x10	7.5	16.45	16.56	12.50	16.50	9.50	9.50	6.47	30.00	12.13	7.59	28.35	11.25	8.25	29.47	750	780
	(100-250)	(5.5)	(418)	(421)	(318)	(419)	(241)	(241)	(164)	(762)	(308)	(193)	(720)	(286)	(210)	(749)	(340.1)	(353.7)
10BH4	4x4x10	10	16.45	16.56	12.50	16.50	9.50	9.50	6.47	30.00	12.13	7.59	28.35	11.25	8.25	29.47	770	810
	(100-250)	(7.5)	(418)	(421)	(318)	(419)	(241)	(241)	(164)	(762)	(308)	(193)	(720)	(286)	(210)	(749)	(349.2)	(367.3)
10BN2	4x4x10	50	16.45	16.56	12.50	16.50	9.50	9.50	6.47	30.00	14.13	12.69	38.79	17.00	13.91	44.61	1400	1850
	(100-250)	(37)	(418)	(421)	(318)	(419)	(241)	(241)	(164)	(762)	(359)	(322)	(985)	(432)	(353)	(1133)	(634.9)	(839.0)
10BO2	4x4x10	60	16.45	16.56	12.50	16.50	9.50	9.50	6.47	30.00	14.13	12.69	38.79	19.03	16.44	42.92	1460	2110
	(100-250)	(45)	(418)	(421)	(318)	(419)	(241)	(241)	(164)	(762)	(359)	(322)	(985)	(483)	(418)	(1090)	(662.1)	(956.9)
10BP2	4x4x10	75	16.45	16.56	12.50	16.50	9.50	9.50	6.47	30.00	17.68	16.19	40.23	19.03	16.44	42.92	1830	2190
	(100-250)	(55)	(418)	(421)	(318)	(419)	(241)	(241)	(164)	(762)	(449)	(411)	(1022)	(483)	(418)	(1090)	(829.9)	(993.2)
10CN2	6x6x10	50	17.63	18.63	15.50	18.75	10.00	10.00	7.66	36.00	14.13	12.69	38.48	17.00	13.91	44.29	1600	2050
	(150-250)	(37)	(448)	(473)	(394)	(476)	(254)	(254)	(195)	(914)	(359)	(322)	(977)	(432)	(353)	(1125)	(725.6)	(929.7)
10CO2	6x6x10	60	17.63	18.63	15.50	18.75	10.00	10.00	7.66	36.00	14.13	12.69	38.48	19.03	16.44	42.60	1660	2310
	(150-250)	(45)	(448)	(473)	(394)	(476)	(254)	(254)	(195)	(914)	(359)	(322)	(977)	(483)	(418)	(1082)	(752.8)	(1047.6)
10CP2	6x6x10	75	17.63	18.63	15.50	18.75	10.00	10.00	7.66	36.00	17.68	16.19	39.91	19.03	16.44	42.60	2030	2390
	(150-250)	(55)	(448)	(473)	(394)	(476)	(254)	(254)	(195)	(914)	(449)	(411)	(1014)	(483)	(418)	(1082)	(920.6)	(1083.9)
10DH4	8x8x10	10	20.56	21.00	21.00	25.00	12.00	11.50	8.85	46.00	12.13	7.59	28.00	11.25	8.25	29.13	1140	1180
	(200-250)	(7.5)	(522)	(533)	(533)	(635)	(305)	(292)	(225)	(1168)	(308)	(193)	(711)	(286)	(210)	(740)	(517.0)	(535.1)
10DI4	8x8x10	15	20.56	21.00	21.00	25.00	12.00	11.50	8.85	46.00	13.38	9.94	34.00	13.38	8.90	34.07	1240	1320
	(200-250)	(11)	(522)	(533)	(533)	(635)	(305)	(292)	(225)	(1168)	(340)	(252)	(864)	(340)	(226)	(865)	(562.4)	(598.6)
10DJ4	8x8x10	20	20.56	21.00	21.00	25.00	12.00	11.50	8.85	46.00	13.38	9.94	34.00	13.38	8.90	34.07	1260	1400
	(200-250)	(15)	(522)	(533)	(533)	(635)	(305)	(292)	(225)	(1168)	(340)	(252)	(864)	(340)	(226)	(865)	(571.4)	(634.9)
10DN2	8x8x10	50	20.56	21.00	21.00	25.00	12.00	11.50	8.85	46.00	14.13	12.69	38.45	17.00	13.91	44.26	1910	2360
	(200-250)	(37)	(522)	(533)	(533)	(635)	(305)	(292)	(225)	(1168)	(359)	(322)	(977)	(432)	(353)	(1124)	(866.2)	(1070.3)
10DO2	8x8x10	60	20.56	21.00	21.00	25.00	12.00	11.50	8.85	46.00	14.13	12.69	38.45	19.03	16.44	42.57	1970	2620
	(200-250)	(45)	(522)	(533)	(533)	(635)	(305)	(292)	(225)	(1168)	(359)	(322)	(977)	(483)	(418)	(1081)	(893.4)	(1188.2)
10DP2	8x8x10	75	20.56	21.00	21.00	25.00	12.00	11.50	8.85	46.00	17.68	16.19	39.88	19.03	16.44	42.57	2340	2700
	(200-250)	(55)	(522)	(533)	(533)	(635)	(305)	(292)	(225)	(1168)	(449)	(411)	(1013)	(483)	(418)	(1081)	(1061.2)	(1224.5)
11AK4	8x8x11.5	25	20.10	20.23	25.48	20.65	10.50	11.00	8.80	46.94	15.00	12.63	38.00	14.38	12.00	36.63	1470	1550
	(200-290)	(18)	(511)	(514)	(647)	(525)	(267)	(279)	(224)	(1192)	(381)	(321)	(965)	(365)	(305)	(930)	(666.7)	(702.9)
11AL4	8x8x11.5	30	20.10	20.23	25.48	20.65	10.50	11.00	8.80	46.94	15.00	12.63	38.00	14.38	12.00	36.63	1510	1590
	(200-290)	(22)	(511)	(514)	(647)	(525)	(267)	(279)	(224)	(1192)	(381)	(321)	(965)	(365)	(305)	(930)	(684.8)	(721.1)
11AM4	8x8x11.5	40	20.10	20.23	25.48	20.65	10.50	11.00	8.80	46.94	8.25	15.13	41.50	16.00	14.63	37.00	1820	2170
	(200-290)	(30)	(511)	(514)	(647)	(525)	(267)	(279)	(224)	(1192)	(464)	(384)	(1054)	(406)	(372)	(940)	(825.4)	(984.1)





## ► 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, m<sup>3</sup>/h) at \_\_\_\_\_ ft (m)/head. The Design Envelope shall also be capable of supplying \_\_\_\_\_ USgpm (L/s, m<sup>3</sup>/h) at \_\_\_\_\_ ft (m)/head at \_\_\_\_\_% minimum efficiency level at maximum operating speed.
2. Design Envelope HVAC units shall be 4302 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, 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 Casing - Cast iron with ANSI-125 (PN16) flanges shall be suitable for working pressure to 175 psig (12 bar) at 150°F (65°C). Ductile iron units with ANSI-250 (PN16) flanges shall be suitable for working pressures of 250 psig (17 bar) at 150°F (65°C). The 4302 IVS casing shall contain two pumping units with one of each, equally sized, ANSI flanged suction and discharge connections, drilled and tapped for seal flush and gauge connections. The 4302 IVS design must include internal valves that allow one pump to be operational while the other is isolated for service.
5. Impeller - Bronze, fully enclosed 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 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 1<sup>st</sup> Environment Class C1 (EN55011 unrestricted sales class B). The 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 and over current. Over current is not allowed, ensuring 4302 IVS units will not overload the motor at any point in the operating range of the unit.

2. The 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 and two volt-free contacts.

### 3.0 System Control

The 4302 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
- Parallel pumps with single or multiple sensor(s) system control with IPS controller

For full specification details on the Armstrong 4302 IVS control modes, performance and operating logic, visit the Armstrong web site at: [www.armstrongpumps.com](http://www.armstrongpumps.com)

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