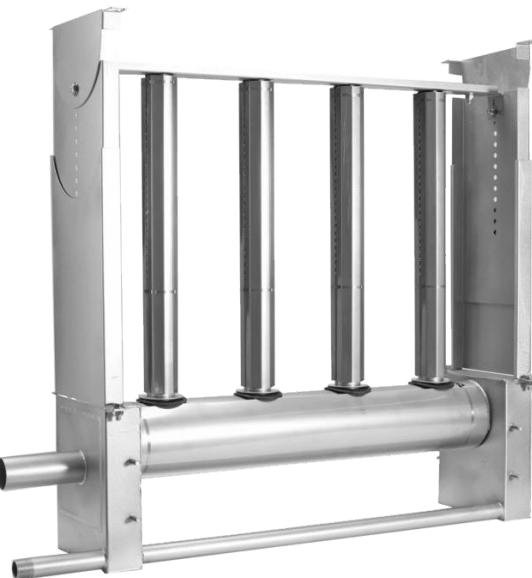


Your guide to selecting and specifying Nortec SAM-e Short Absorption Manifolds!



SAM-e

Engineering Manual

Includes technical specifications, guidelines, and options for selection and application of SAM-e and Mini SAM-e Short Absorption Manifolds

Thank you for choosing Nortec.

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Nortec Short Absorption Manifold (SAM-e)

The SAM-e is Nortec's best performing steam absorption system for use in Air Handling Units and duct systems where short steam absorption distance is critical.

Precisely controlled clean steam is distributed uniformly into the air stream by the SAM-e without any condensate spray. Steam distribution takes place via distributor tubes with integrated nozzles. The steam is kept dry as condensate is drained through the main header.

The stainless steel distribution tubes are typically mounted vertically but may also be mounted horizontally (10° slope) for vertical airflow applications. The distribution tubes come equipped with evenly-spaced stainless steel nozzles, providing optimum steam distribution.

The nozzles extend into the center of the distribution tube ensuring only condensate-free steam is released. Condensate drains out of the distribution tubes through the header, eliminating the need for jacketed tubes. A permanent bond between the nozzle and distribution tube is made when the nozzle is pressed into the tube. The nozzles and tubes have the same thermal expansion characteristics guaranteeing a permanent union. The precise manufactured orifices ensure consistent output from each nozzle.

Features

- Inlets/Outlets located on same side, one access point required.
- All stainless steel distributors and nozzles ensure permanent bond.
- Stainless steel header with rubber grommet seals for easy installation of distribution tubes.
- Tubes available in 409 or 304 stainless steel to fit every budget.
- Available with optional stainless steel insulating shielding for increased energy efficiency and decreased condensate losses.
- Adjustable mounting frame available for quick and easy installation.
- Available with 3", 6", 9", or 12" center to center distributor spacing – (SAM-e).
- Available in 3" and 6" center to center distributor spacing - (mini SAM-e).
- Atmospheric or pressure steam source.
- Ten-year limited warranty (two years on tube coupling seals).

 **Note:** SAM-e Header / Separator assembly distributes the steam evenly along its length and allows condensate to settle for easy removal through the trap.



Figure 1: SAM-e

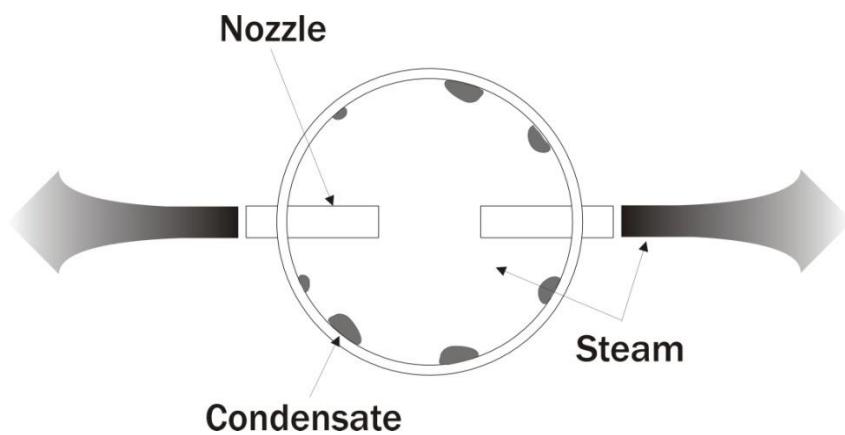


Figure 2: Cross-section of distributor pipe

Determining the Steam Absorption Distance

 **Note:** Visit www.humidity.com to download our Humidification Engineering & Loadsizing Program (H.E.L.P.) to help calculate absorption distances.

A certain amount of time is required for complete absorption when injecting steam into the air.

During this time, steam moves a fixed distance from the distribution manifold before it is fully absorbed into a moving air stream.

The absorption distance is the distance required for steam to be fully absorbed by the airstream. Identifying this distance is essential to ensure that unabsorbed steam does not condense on downstream components.

The system should be designed to eliminate the possibility of wetting internal components by positioning the manifold in an optimum location and by maximizing the available distance for steam absorption.

Shorter absorption is not always desirable. Sizing a SAM-e to produce unnecessarily short absorption distances may result in increased condensate losses and require a larger humidifier to compensate. It is important to balance available absorption distance with SAM-e capacity.

Absorption distance may be calculated visiting nortechelp.com.

Additional Information

Data is based on velocities between 200 fpm (1 m/s) and 2500 fpm (12.7 m/s).

Available absorption distance: the distance between SAM-e and first obstruction (coil, elbow, damper, etc.) that steam may contact. Traces of steam may pass this obstruction, but will not condense, leaving obstructions dry.

Absorption distance is a function of various conditions including; duct temperature, duct humidity level, duct static pressure, and air flow rate. Changes in duct geometry, flow rates, or flow conditions will require recalculating SAM-e performance. It is always recommended to size SAM-e to “worst case” conditions.

Static Air Pressure

Table 1 shows the static pressure loss created by a SAM-e in various velocities.

Table 1: Air Pressure Loss in AHU / Duct

Air Velocity [fpm (m/s)]	Air Pressure Loss [in(mm) of water column]			
	SAM-e Tube Spacing			
	3" (762 mm)	6" (152 mm)	9" (229 mm)	12" (305 mm)
500 (2.5)	0.01 (0.3)	0.01 (0.3)	No measurable data	
750 (3.8)	0.03 (0.8)	0.01 (0.3)		
1000 (5.1)	0.05 (1.3)	0.02 (0.5)		
1250 (6.4)	0.07 (1.8)	0.03 (0.8)		
1500 (7.6)	0.09 (2.3)	0.04 (1.0)	0.01 (0.3)	0.01 (0.3)
1750 (8.9)	0.10 (2.5)	0.06 (1.5)	0.01 (0.3)	0.01 (0.3)
2000 (10.2)	0.12 (3.0)	0.08 (2.0)	0.01 (0.3)	0.01 (0.3)

Condensate Losses

Some of the steam generated by NORTEC humidifiers will condense due to SAM-e. To compensate for this loss in capacity, calculated humidification load must be increased accordingly. Please refer to Table 2.

Nortec recommends the installation of a condensate drain on the steam-line run prior to entering the SAM-e. This will prevent condensate from the lines from entering the SAM-e.

Table 2: Condensate Loss for Un-insulated SAM-e

Air Velocity [fpm (m/s)]	Condensate Losses [% of Maximum Capacity]			
	Atmospheric Steam		Pressurized Steam	
	55°F (13°C)	70°F (21°C)	55°F (13°C)	70°F (21°C)
500 (2.5)	15%	12%	8%	5%
1000 (5.1)	20%	15%	10%	7%

Note: These values may increase or decrease due to many unknown conditions or variables. This is only a guideline.



The SAM-e is available with optional stainless steel insulation for headers and tubes. Insulation is desirable to reduce air-stream heat gain, reduce condensate losses, and improve energy efficiency. Please refer to Table 3 when estimating condensate losses with insulated SAM-e's.

Table 3: Condensate Loss for Insulated SAM-e

Air Velocity [fpm (m/s)]	Condensate Losses [% of Maximum Capacity]			
	Atmospheric Steam		Pressurized Steam	
	55°F (13°C)	70°F (21°C)	55°F (13°C)	70°F (21°C)
500 (2.5)	5%	4%	6%	3%
1000 (5.1)	10%	8%	8%	5%



Note: These values may increase or decrease due to many unknown conditions or variables. This is only a guideline.

Correct Choice of Product Applications (within SAM-e)

The SAM-e has been designed exclusively for use in building ventilation duct systems where short absorption is critical. Nortec offers various humidification technologies to suit virtually all applications and can recommend the most appropriate system for each case.

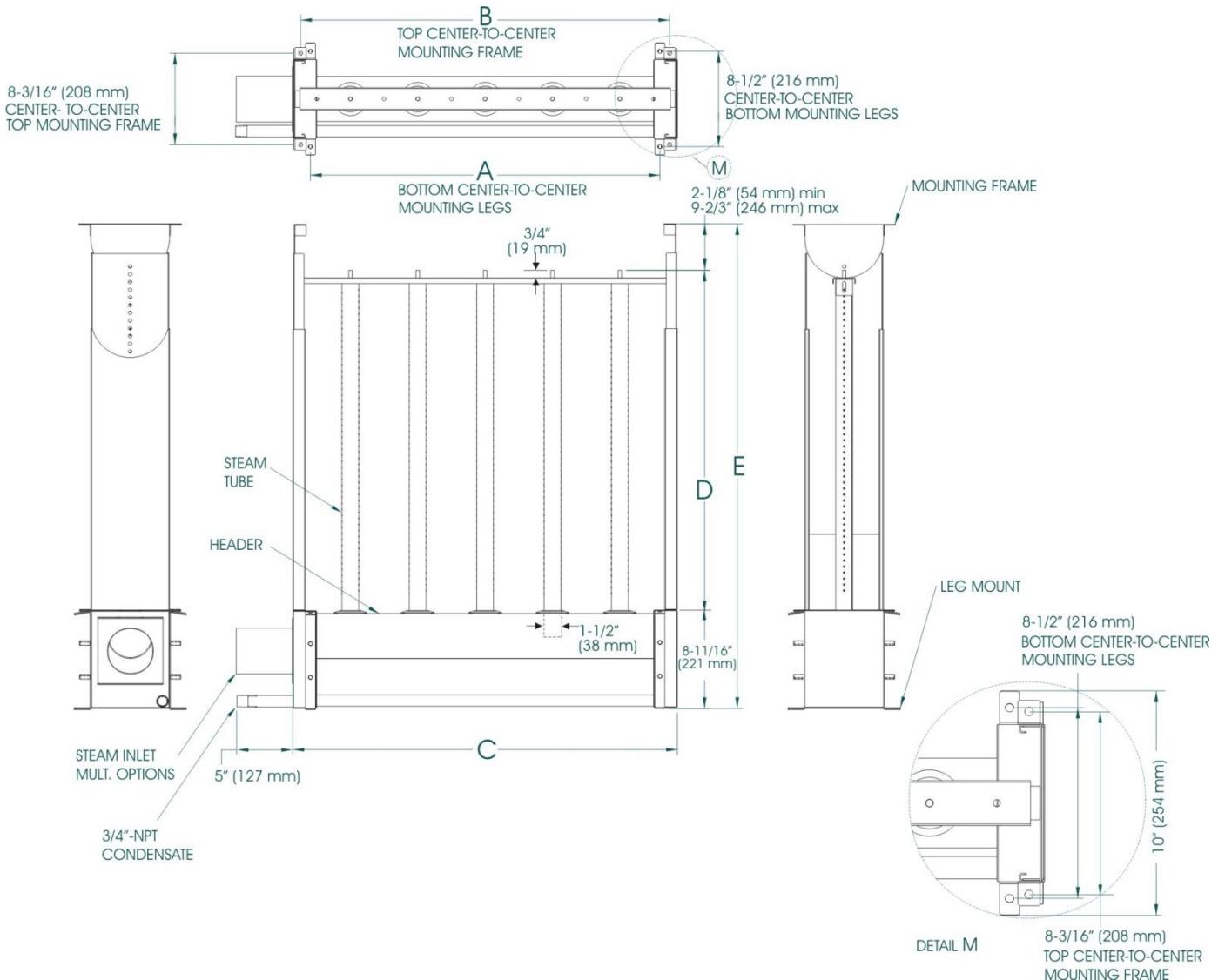


Figure 3: General SAM-e Dimensions

Table 4: SAM-e Dimensions – Width

Duct Width		Dimension A Frame Width - Bottom		Dimension B Frame Width - Top		Dimension C Header Assembly Width	
in	mm	in	mm	in	mm	in	mm
18	457	13.1	333	14.9	378	16.3	413
24	610	19.1	486	20.9	530	22.3	57
30	762	25.1	638	26.9	683	28.3	72
36	914	31.1	791	32.9	835	34.3	87
42	1067	37.1	943	38.9	987	40.3	102
48	1219	43.1	1095	44.9	1140	46.3	117
54	1372	49.1	1248	50.9	1292	52.3	133
60	1524	55.1	1400	56.9	1445	58.3	148
66	1676	61.1	1553	62.9	1597	64.3	163
72	1829	67.1	1705	68.9	1749	70.3	178
78	1981	73.1	1857	74.9	1902	76.3	194
84	2134	79.1	2010	80.9	2054	82.3	209
90	2286	85.1	2162	86.9	2207	88.3	224
96	2438	91.1	2315	92.9	2359	94.3	239
102	2591	97.1	2467	98.9	2511	100.3	255
108	2743	103.1	2619	104.9	2664	106.3	270
114	2896	109.1	2772	110.9	2816	112.3	285
120	3048	115.1	2924	116.9	2969	118.3	300
126	3200	121.1	3077	122.9	3121	124.3	316
132	3353	127.1	3229	128.9	3273	130.3	331
138	3505	133.1	3381	134.9	3426	136.3	346
144	3658	139.1	3534	140.9	3578	142.3	361

Table 5: SAM-e Dimensions – Height

Duct Height		Dimension D Steam Tube Height		Dimension E Min. Minimum Overall Height		Dimension E Max. Maximum Overall Height	
in	mm	in	mm	in	mm	in	mm
18	457	5.5	140	17	432	24.7	627
24	610	11.5	292	23	584	30.7	779
30	762	17.5	445	29	737	36.7	931
36	914	23.5	597	35	889	42.7	1084
42	1067	29.5	749	41	1041	48.7	1236
48	1219	35.5	902	47	1194	54.7	1389
54	1372	41.5	1054	53	1346	60.7	1541
60	1524	47.5	1207	59	1499	66.7	1693
66	1676	53.5	1359	65	1651	72.7	1846
72	1829	59.5	1511	71	1803	78.7	1998
78	1981	65.5	1664	77	1956	84.7	2151
84	2134	71.5	1816	83	2108	90.7	2303
90	2286	77.5	1969	89	2261	96.7	2455
96	2438	83.5	2121	95	2413	102.7	2608
102	2591	89.5	2273	101	2565	108.7	2760
108	2743	95.5	2426	107	2718	114.7	2913
114	2896	101.5	2578	113	2870	120.7	3065
120	3048	107.5	2731	119	3023	126.7	3217
126	3200	113.5	2883	125	3175	132.7	3370
132	3353	119.5	3035	131	3327	138.7	3522
138	3505	125.5	3188	137	3480	144.7	3675
144	3658	131.5	3340	143	3632	150.7	3827

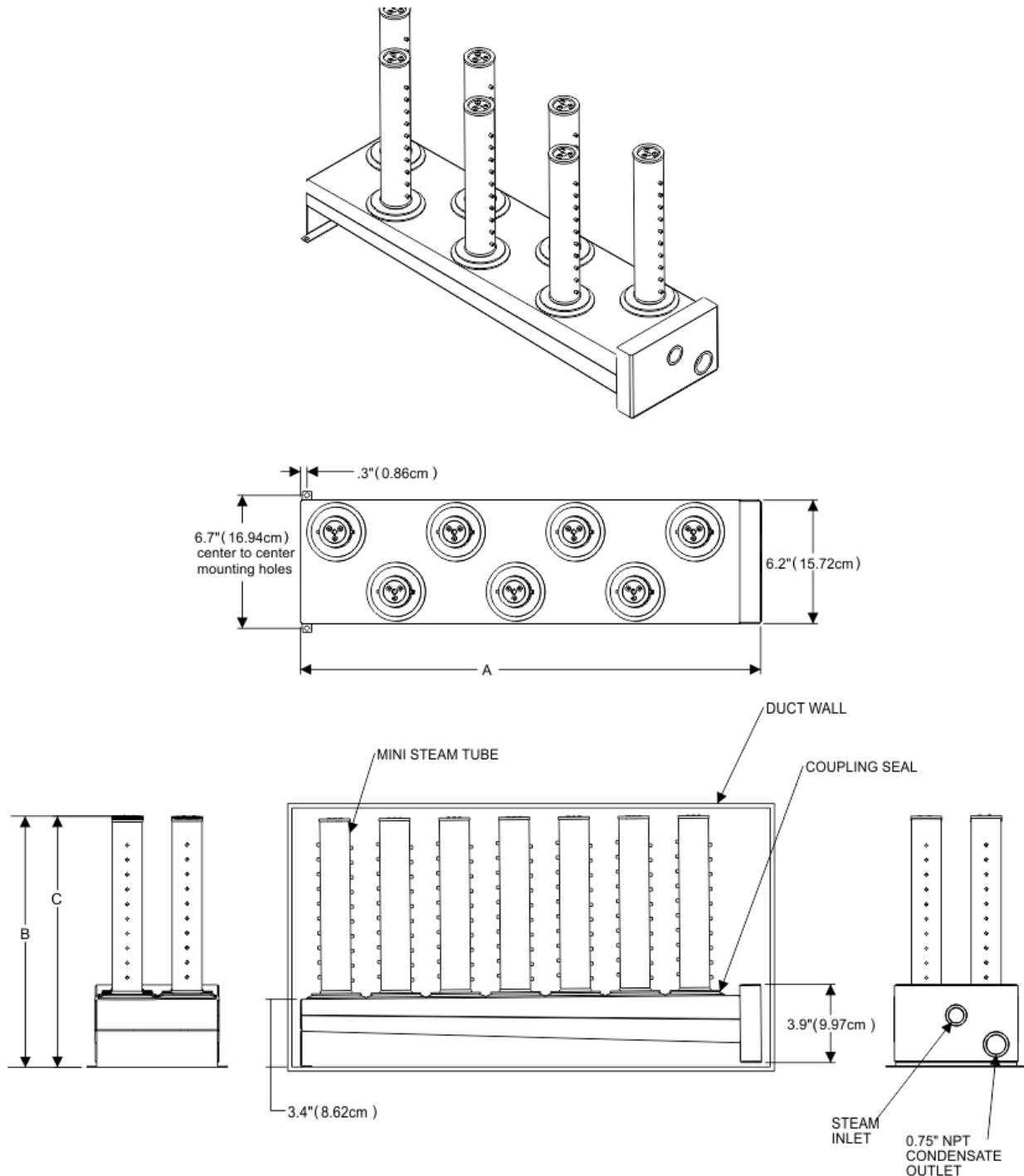


Figure 4: General Mini SAM-e Dimensions

Table 6: Mini SAM-e Dimensions – Width

Duct Width		Dimension A	
in	mm	in	mm
12	305	11.1	281
18	457	17.1	433
24	610	23.1	586

Table 7: Mini SAM-e Dimensions – Height

Duct Height		Dimension B		Dimension C	
in	mm	in	mm	in	mm
8	203	7.9	200	4.4	113
10	254	9.9	251	6.4	164
12	305	11.9	302	8.4	214
14	356	13.9	352	10.4	265
16	406	15.9	403	12.4	316
18	457	17.9	454	14.4	367
20	508	19.9	505	16.4	418
22	559	21.9	556	18.4	468
24	610	23.9	606	20.4	519

Product Selection

Step 1 – SAM-e Header Selection

Nortec offers a range of manifolds to cover various capacities and duct sizes. The absorption distance and capacity required determines the center-to-center spacing between each steam tube. There are four options: 3" (76 mm) or 6" (152 mm) or 9" (229 mm) or 12" (305 mm). Mini SAM-e's are only available with 3" and 6" spacing. The smaller the spacing, the more tubes the header can accommodate, thus giving a better absorption distance and greater capacity, but at the cost of higher condensate losses.

The header / separator remain the same for atmospheric or pressurized steam, and for vertical or horizontal flow applications.

Atmospheric manifolds with a capacity over 801 lb/hr (362 kg/hr) include a second steam inlet on the header. Consult factory submittal drawings for specific details.

Select the header part number associated with your duct or air handling unit's width.

For example, if duct width is 80" (2032 mm), select part number 1503279 for 3" (76 mm) center-to-center spacing.

Some smaller duct sizes are too small to accommodate a full-size SAM-e, and a Mini SAM-e must be used. As a rule-of-thumb, when duct width is less than 30" (762mm), a Mini SAM-e is the best choice.

Air Handling Unit (AHU) Installation

In some *LiveSteam* installations where there is no available room to install steam components such as F&T traps, separator, etc., a stand may be ordered. Stands are available in 12- or 20- inch heights, and allow traps and components to be installed in the duct along with the SAM-e. If a stand is required, the overall height of the SAM-e must be reduced by the height of the selected stand. This enables proper steam tube selection. SAM-e width must also be reduced to allow components to fit in the duct beside the SAM-e. Please refer to *LiveSteam Engineering Manual* for component sizes.

Table 8: SAM-e Stand Kits

Dimension A [in (mm)]	Part Number
12" (305)	1509947
20" (508)	1509948

Note: Refer to SAM-e submittal drawings for more information. All stand kits are complete with both left and right stands and required fasteners.



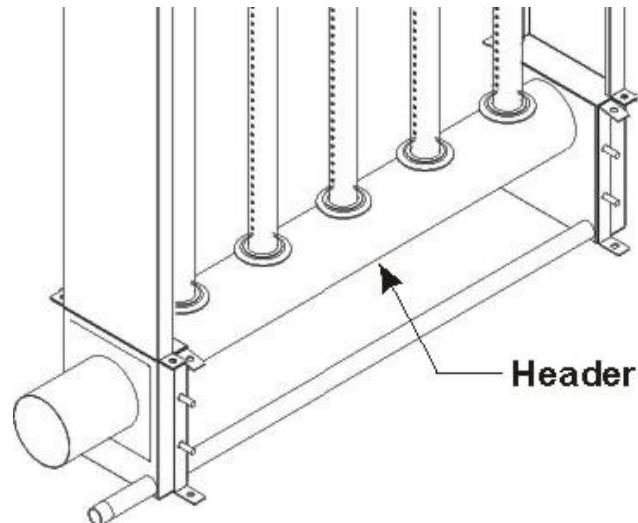


Figure 5: Header / Separator Assembly

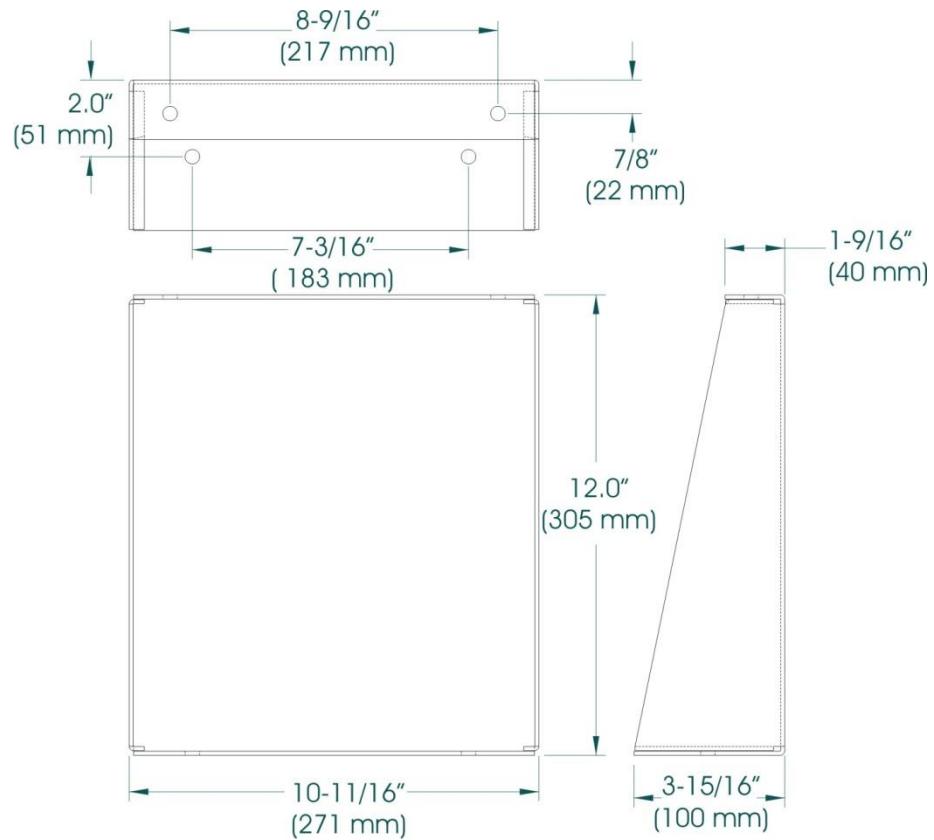


Figure 6: SAM-e Stand

Table 9: SAM-e Header / Separator Assembly, Atmospheric Steam – 3" Centers

ATMOSPHERIC STEAM – 3" HEADERS						
Duct Width [in (mm)]	Steam Tube Qty	Header Part Number	Maximum Capacity Atmospheric Steam [lb/hr (kg/hr)]			
			Type A	Type B	Type B+	Type C
18 (457)	3	1503269	45 (20)	105 (48)	165 (75)	225 (102)
24 (610)	5	1503270	75 (34)	175 (79)	275 (125)	375 (170)
30 (762)	7	1503271	105 (48)	245 (111)	385 (175)	525 (238)
36 (914)	9	1503272	135 (61)	315 (143)	495 (225)	675 (306)
42 (1067)	11	1503273	165 (75)	385 (174)	605 (274)	800 (363)
	<i>Double Inlet</i>	1503291	-	-		825 (374)
48 (1219)	13	1503274	195 (88)	455 (206)	715 (324)	800 (363)
	<i>Double Inlet</i>	1503292	-	-		975 (442)
54 (1372)	15	1503275	225 (102)	525 (238)	800 (363)	-
	<i>Double Inlet</i>	1503293	-	-	825 (374)	1125 (510)
60 (1524)	17	1503276	255 (116)	595 (270)	800 (363)	-
	<i>Double Inlet</i>	1503294	-	-	935 (424)	1200 (544)
66 (1676)	19	1503277	285 (129)	665 (301)	800 (363)	-
	<i>Double Inlet</i>	1503295	-	-	1045 (474)	1200 (544)
72 (1829)	21	1503278	315 (143)	735 (333)	800 (363)	-
	<i>Double Inlet</i>	1503296	-	-	1155 (524)	1200 (544)
78 (1981)	23	1503279	345 (156)	800 (363)	-	-
	<i>Double Inlet</i>	1503297	-	805 (365)	1200 (544)	-
84 (2134)	25	1503280	375 (170)	800 (363)	-	-
	<i>Double Inlet</i>	1503298	-	875 (396)	1200 (544)	-
90 (2286)	27	1503281	405 (183)	800 (363)	-	-
	<i>Double Inlet</i>	1503299	-	945 (428)	1200 (544)	-
96 (2438)	29	1503282	435 (197)	800 (363)	-	-
	<i>Double Inlet</i>	1503300	-	1015 (460)	1200 (544)	-
102 (2591)	31	1503283	465 (211)	800 (363)	-	-
	<i>Double Inlet</i>	1503301	-	1085 (492)	1200 (544)	-
108 (2743)	33	1503284	495 (224)	800 (363)	-	-
	<i>Double Inlet</i>	1503302	-	1155 (523)	1200 (544)	-
114 (3048)	35	1503285	525 (238)	800 (363)	-	-
	<i>Double Inlet</i>	1503303	-	1200 (544)	-	-
120 (3048)	37	1503286	555 (251)	800 (363)	-	-
	<i>Double Inlet</i>	1503304	-	1200 (544)	-	-
126 (3200)	39	1503287	585 (265)	800 (363)	-	-
	<i>Double Inlet</i>	1503305	-	1200 (544)	-	-
132 (3353)	41	1503288	615 (279)	800 (363)	-	-
	<i>Double Inlet</i>	1503306	-	1200 (544)	-	-
138 (3505)	43	1503289	645 (292)	800 (363)	-	-
	<i>Double Inlet</i>	1503307	-	1200 (544)	-	-
144 (3658)	45	1503290	675 (306)	800 (363)	-	-
	<i>Double Inlet</i>	1503308	-	1200 (544)	-	-
144+	Consult Factory					

Table 10: SAM-e Header / Separator Assembly, Pressure Steam – 3" Centers

PRESSURE STEAM – 3" Headers						
Duct Width [in (mm)]	Steam Tube Qty	Header Part Number	Maximum Capacity Pressure Steam [lb/hr (kg/hr)]			
			Type A	Type B	Type B+	Type C
18 (457)	3	1503269	45 (20)	105 (48)	165 (75)	225 (102)
24 (610)	5	1503270	75 (34)	175 (79)	275 (125)	375 (170)
30 (762)	7	1503271	105 (48)	245 (111)	385 (175)	525 (238)
36 (914)	9	1503272	135 (61)	315 (143)	495 (225)	675 (306)
42 (1067)	11	1503273	165 (75)	385 (174)	605 (274)	825 (374)
48 (1219)	13	1503274	195 (88)	455 (206)	715 (324)	975 (442)
54 (1372)	15	1503275	225 (102)	525 (238)	825 (374)	1125 (510)
60 (1524)	17	1503276	255 (116)	595 (270)	935 (424)	1275 (578)
66 (1676)	19	1503277	285 (129)	665 (301)	1045 (474)	1425 (646)
72 (1829)	21	1503278	315 (143)	735 (333)	1155 (524)	1575 (713)
78 (1981)	23	1503279	345 (156)	805 (365)	1265 (574)	1745 (790)
84 (2134)	25	1503280	375 (170)	875 (396)	1375 (624)	1875 (849)
90 (2286)	27	1503281	405 (183)	945 (428)	1485 (674)	2025 (917)
96 (2438)	29	1503282	435 (197)	1015 (460)	1595 (723)	2175 (985)
102 (2591)	31	1503283	465 (211)	1085 (492)	1705 (773)	2325 (1053)
108 (2743)	33	1503284	495 (224)	1155 (523)	1815 (823)	2475 (1121)
114 (3048)	35	1503285	525 (238)	1225 (555)	1925 (873)	2625 (1189)
120 (3048)	37	1503286	555 (251)	1295 (587)	2035 (923)	2775 (1257)
126 (3200)	39	1503287	585 (265)	1365 (618)	2145 (973)	2925 (1325)
132 (3353)	41	1503288	615 (279)	1435 (650)	2255 (1023)	3075 (1393)
138 (3505)	43	1503289	645 (292)	1505 (682)	2365 (1073)	3200 (1450)
144 (3658)	45	1503290	675 (306)	1575 (713)	2475 (1123)	3200 (1450)
144+ (3658+)	Consult Factory					

Table 11: SAM-e Header / Separator Assembly, Atmospheric Steam – 6" Centers

ATMOSPHERIC STEAM – 6" HEADERS						
Duct Width [in (mm)]	Steam Tube Qty	Header Part Number	Maximum Capacity Atmospheric Steam [lb/hr (kg/hr)]			
			Type A	Type B	Type B+	Type C
18 (457)	2	1503309	30 (14)	70 (32)	110 (50)	150 (68)
24 (610)	3	1503310	45 (20)	105 (48)	165 (75)	225 (102)
30 (762)	4	1503311	60 (27)	140 (63)	220 (100)	300 (136)
36 (914)	5	1503312	75 (34)	175 (79)	275 (125)	375 (170)
42 (1067)	6	1503313	90 (41)	210 (95)	330 (150)	450 (204)
48 (1219)	7	1503314	105 (48)	245 (111)	385 (175)	525 (238)
54 (1372)	8	1503315	120 (54)	280 (127)	440 (200)	600 (272)
60 (1524)	9	1503316	135 (61)	315 (143)	495 (225)	675 (306)
66 (1676)	10	1503317	150 (68)	350 (159)	550 (249)	750 (340)
72 (1829)	11	1503318	165 (75)	385 (174)	605 (274)	800 (363)
	Double Inlet	1503331	-	-	-	825 (374)
78 (1981)	12	1503319	180 (82)	420 (190)	660 (299)	800 (363)
	Double Inlet	1503332	-	-	-	900 (408)
84 (2134)	13	1503320	195 (88)	455 (206)	715 (324)	800 (363)
	Double Inlet	1503333	-	-	-	975 (442)
90 (2286)	14	1503321	210 (95)	490 (222)	770 (349)	800 (363)
	Double Inlet	1503334	-	-	-	1050 (476)
96 (2438)	15	1503322	225 (102)	525 (238)	800 (363)	-
	Double Inlet	1503335	-	-	825 (374)	1125 (510)
102 (2591)	16	1503323	240 (109)	560 (254)	800 (363)	-
	Double Inlet	1503336	-	-	880 (399)	1200 (544)
108 (2743)	17	1503324	255 (116)	595 (270)	800 (363)	-
	Double Inlet	1503337	-	-	935 (424)	1200 (544)
114 (3048)	18	1503325	270 (122)	630 (271)	800 (363)	-
	Double Inlet	1503338	-	-	990 (449)	1200 (544)
120 (3048)	19	1503326	285 (129)	665 (301)	800 (363)	-
	Double Inlet	1503339	-	-	1045 (474)	1200 (544)
126 (3200)	20	1503327	300 (136)	700 (317)	800 (363)	-
	Double Inlet	1503340	-	-	1100 (499)	1200 (544)
132 (3353)	21	1503328	315 (143)	735 (333)	800 (363)	-
	Double Inlet	1503341	-	-	1155 (524)	1200 (544)
138 (3505)	22	1503329	330 (149)	770 (349)	800 (363)	-
	Double Inlet	1503342	-	-	1200 (544)	-
144 (3658)	23	1503330	345 (156)	805 (365)	800 (363)	-
	Double Inlet	1503343	-	-	1200 (544)	-
144+ (3658+)	Consult Factory					

Table 12: SAM-e Header / Separator Assembly, Pressure Steam – 6" Centers

PRESSURE STEAM – 6" Headers						
Duct Width [in (mm)]	Steam Tube Qty	Header Part Number	Maximum Capacity Pressure Steam [lb/hr (kg/hr)]			
			Type A	Type B	Type B+	Type C
18 (457)	2	1503309	30 (14)	70 (32)	110 (50)	150 (68)
24 (610)	3	1503310	45 (20)	105 (48)	165 (75)	225 (102)
30 (762)	4	1503311	60 (27)	140 (63)	220 (100)	300 (136)
36 (914)	5	1503312	75 (34)	175 (79)	275 (125)	375 (170)
42 (1067)	6	1503313	90 (41)	210 (95)	330 (150)	450 (204)
48 (1219)	7	1503314	105 (48)	245 (111)	385 (175)	525 (238)
54 (1372)	8	1503315	120 (54)	280 (127)	440 (200)	600 (272)
60 (1524)	9	1503316	135 (61)	315 (143)	495 (225)	675 (306)
66 (1676)	10	1503317	150 (68)	350 (159)	550 (249)	750 (340)
72 (1829)	11	1503318	165 (75)	385 (174)	605 (274)	825 (374)
78 (1981)	12	1503319	180 (82)	420 (190)	660 (299)	900 (408)
84 (2134)	13	1503320	195 (88)	455 (206)	715 (324)	975 (442)
90 (2286)	14	1503321	210 (95)	490 (222)	770 (349)	1050 (476)
96 (2438)	15	1503322	225 (102)	525 (238)	825 (374)	1125 (510)
102 (2591)	16	1503323	240 (109)	560 (254)	880 (399)	1200 (544)
108 (2743)	17	1503324	255 (116)	595 (270)	935 (424)	1275 (578)
114 (3048)	18	1503325	270 (122)	630 (271)	990 (449)	1350 (612)
120 (3048)	19	1503326	285 (129)	665 (301)	1045 (474)	1425 (646)
126 (3200)	20	1503327	300 (136)	700 (317)	1100 (499)	1500 (680)
132 (3353)	21	1503328	315 (143)	735 (333)	1155 (524)	1575 (713)
138 (3505)	22	1503329	330 (149)	770 (349)	1210 (549)	1650 (748)
144 (3658)	23	1503330	345 (156)	805 (365)	1265 (574)	1725 (782)
144+ (3658+)	Consult Factory					

Table 13: SAM-e Header / Separator Assembly, Atmospheric Steam – 9" Centers

ATMOSPHERIC STEAM – 9" HEADERS						
Duct Width [in (mm)]	Steam Tube Qty	Header Part Number	Maximum Capacity Atmospheric Steam [lb/hr (kg/hr)]			
			Type A	Type B	Type B+	Type C
36 (914)	3	1506789	45 (20)	105 (48)	165 (75)	225 (102)
48 (1219)	5	1506790	75 (34)	175 (79)	275 (125)	375 (170)
60 (1524)	6	1506791	105 (48)	245 (111)	385 (175)	525 (238)
72 (1829)	7	1506792	135 (61)	315 (143)	495 (225)	675 (306)
84 (2134)	9	1506794	165 (75)	385 (174)	605 (274)	800 (363)
96 (2438)	10	1506795	195 (88)	455 (206)	715 (324)	800 (363)
108 (2743)	11	1506796	225 (102)	525 (238)	800 (363)	-
	Double Inlet	1506807	-	-	825 (374)	1125 (510)
120 (3048)	13	1507729	255 (116)	595 (270)	800 (363)	-
	Double Inlet	1506808	-	-	935 (424)	1200 (544)
132 (3353)	14	1507730	285 (129)	665 (301)	800 (363)	-
	Double Inlet	1506809	-	-	1045 (474)	1200 (544)
144 (3658)	15	1507731	315 (143)	735 (333)	800 (363)	-
	Double Inlet	1507732	-	-	1155 (524)	1200 (544)
144+ (3658+)	Consult Factory					

Table 14: SAM-e Header / Separator Assembly, Pressure Steam – 9" Centers

PRESSURE STEAM – 9" Headers						
Duct Width [in (mm)]	Steam Tube Qty	Header Part Number	Maximum Capacity Pressure Steam [lb/hr (kg/hr)]			
			Type A	Type B	Type B+	Type C
36 (914)	3	1506789	45 (20)	105 (48)	165 (75)	225 (102)
48 (1219)	5	1506790	75 (34)	175 (79)	275 (125)	375 (170)
60 (1524)	6	1506791	105 (48)	245 (111)	385 (175)	525 (238)
72 (1829)	7	1506792	135 (61)	315 (143)	495 (225)	675 (306)
84 (2134)	9	1506794	165 (75)	385 (174)	605 (274)	825 (374)
96 (2438)	10	1506795	195 (88)	455 (206)	715 (324)	975 (442)
108 (2743)	11	1506796	225 (102)	525 (238)	800 (363)	1125 (510)
120 (3048)	13	1507729	255 (116)	595 (270)	800 (363)	1275 (578)
132 (3353)	14	1507730	285 (129)	665 (301)	800 (363)	1425 (646)
144 (3658)	15	1507731	315 (143)	735 (333)	800 (363)	1575 (713)
144+ (3658+)	Consult Factory					

Table 15: SAM-e Header / Separator Assembly, Atmospheric Steam – 12" Centers

ATMOSPHERIC STEAM – 12" HEADERS						
Duct Width [in (mm)]	Steam Tube Qty	Header Part Number	Maximum Capacity Atmospheric Steam [lb/hr (kg/hr)]			
			Type A	Type B	Type B+	Type C
36 (914)	3	1506797	45 (20)	105 (48)	165 (75)	225 (102)
48 (1219)	4	1506798	60 (27)	140 (63)	220 (100)	300 (136)
60 (1524)	5	1506799	75 (34)	175 (79)	275 (125)	375 (170)
72 (1829)	6	1506800	90 (41)	210 (95)	330 (150)	450 (204)
84 (2134)	7	1506801	105 (48)	245 (111)	385 (175)	525 (238)
96 (2438)	8	1506802	120 (54)	280 (127)	440 (200)	600 (272)
108 (2743)	9	1506803	135 (61)	315 (143)	495 (225)	675 (306)
120 (3048)	10	1506804	150 (68)	350 (159)	550 (249)	750 (340)
132 (3353)	11	1506805	165 (75)	385 (174)	605 (274)	800 (363)
	<i>Double Inlet</i>	1506810	-	-	-	825 (374)
144 (3658)	12	1506806	180 (82)	420 (190)	660 (299)	800 (363)
	<i>Double Inlet</i>	1506811	-	-	-	900 (408)
144+ (3658+)	Consult Factory					

Table 16: SAM-e Header / Separator Assembly, Pressure Steam – 12" Centers

PRESSURE STEAM – 12" Headers						
Duct Width [in (mm)]	Steam Tube Qty	Header Part Number	Maximum Capacity Pressure Steam [lb/hr (kg/hr)]			
			Type A	Type B	Type B+	Type C
36 (914)	3	1506797	45 (20)	105 (48)	165 (75)	225 (102)
48 (1219)	4	1506798	60 (27)	140 (63)	220 (100)	300 (136)
60 (1524)	5	1506799	75 (34)	175 (79)	275 (125)	375 (170)
72 (1829)	6	1506800	90 (41)	210 (95)	330 (150)	450 (204)
84 (2134)	7	1506801	105 (48)	245 (111)	385 (175)	525 (238)
96 (2438)	8	1506802	120 (54)	280 (127)	440 (200)	600 (272)
108 (2743)	9	1506803	135 (61)	315 (143)	495 (225)	675 (306)
120 (3048)	10	1506804	150 (68)	350 (159)	550 (249)	750 (340)
132 (3353)	11	1506805	165 (75)	385 (174)	605 (274)	825 (374)
144 (3658)	12	1506806	180 (82)	420 (190)	660 (299)	900 (408)
144+ (3658+)	Consult Factory					

Step 2 – Steam-Tube Selection

Constructed of 1.5" (38 mm) OD 304 (or optional 409) stainless steel tubing, the steam tubes accommodate duct-heights between 18" (457 mm) and 144" (3658 mm). For smaller duct applications, a Mini SAM-e accommodate sizes from 12" (305 mm) wide x 8" (203 mm) high. Nozzles draw hot, dry steam from the center of the tube, eliminating the need for jacket-heating or a temperature switch. Condensate drains vertically down the tube walls into the header, where it is removed through the condensate drain port. NORTEC's unique "slip-in" installation method makes for quick and effortless assembly.

Selection

There are four types of steam tubes, each with a different capacity. Tube capacity is limited by the number of nozzles. Tubes are selected to meet a load by multiplying the number of tubes for a given header spacing by their respective capacity.

To minimize condensate losses, ensure that total steam-tube capacity is sized to closely match calculated load requirements, as opposed to maximum humidifier capacity.

Table 17: Steam Tube Type and Capacity

Steam Tube Type	Capacity [lb/hr (kg/hr)]
A	15 (7)
B	35 (16)
B+	55 (25)
C	75 (34)

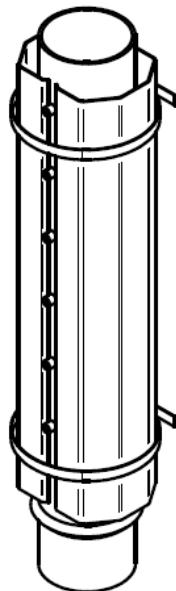


Figure 11: Mini SAM-e Tube Insulation

Table 18: 304 Stainless Steel Tubes

In-Duct Height Including Header [in (mm)]	TYPE A 15 lb/hr (7 kg/hr)	TYPE B 35 lb/hr (16 kg/hr)	TYPE B+ 55 lb/hr (25 kg/hr)	TYPE C 75 lb/hr (34 kg/hr)	Dimension L [in (mm)]	In-duct Optional Mounting Frame	Steam Tube Profile	
6 (152)	1503388	N/A	N/A	N/A	5.5 (140)	1504697		
12 (305)	1503389	1503411	N/A	N/A	11.5 (292)			
18 (457)	1503390	1503412	1509391	N/A	17.5 (445)	1503469		
24 (610)	1503391	1503413	1509392	1503440	23.5 (597)			
30 (762)	1503392	1503414	1509393	1503441	29.5 (749)	1503470		
36 (914)	1503393	1503415	1509394	1503442	35.5 (902)			
42 (1067)	1503394	1503416	1509395	1503443	41.5 (1054)			
48 (1219)	1503395	1503417	1509396	1503444	47.5 (1207)			
54 (1372)	1503396	1503418	1509397	1503445	53.5 (1369)	1503471		
60 (1524)	1503397	1503419	1509398	1503446	59.5 (1511)			
66 (1676)	1503398	1503420	1509399	1503447	65.5 (1664)			
72 (1829)	1503399	1503421	1509400	1503448	71.5 (1815)			
78 (1981)	1503400	1503422	1509401	1503449	77.5 (1969)			
84 (2134)	1503401	1503423	1509402	1503450	83.5 (2121)			
90 (2286)	1503402	1503424	1509403	1503451	89.5 (2273)	1503472		
96 (2438)	1503403	1503425	1509404	1503452	95.5 (2426)			
102 (2591)	1503404	1503426	1509405	1503453	101.5 (2578)			
108 (2743)	1503405	1503427	1509406	1503454	107.5 (2731)			
114 (2896)	1503406	1503428	1509407	1503455	113.5 (2883)			
120 (3048)	1503407	1503429	1509408	1503456	119.5 (3035)			
126 (3200)	1503408	1503430	1509409	1503457	125.5 (3188)			
132 (3353)	1503409	1503431	1509410	1503458	131.5 (3340)			

Table 19: 409 Stainless Steel Tubes

In-Duct Height Including Header [in (mm)]	TYPE A 15 lb/hr (7 kg/hr)	TYPE B 35 lb/hr (16 kg/hr)	TYPE B+ 55 lb/hr (25 kg/hr)	TYPE C 75 lb/hr (34 kg/hr)	"L" Dimension [in (mm)]	In-duct Optional Mounting Frame	Steam Tube Profile	
6 (152)	2533935	N/A	N/A	N/A	5.5 (140)	1504697		
12 (305)	2533936	2533957	N/A	N/A	11.5 (292)			
18 (457)	2533937	2533958	2534011	N/A	17.5 (445)	1503469		
24 (610)	2533938	2533959	2534012	2533982	23.5 (597)			
30 (762)	2533939	2533960	2534013	2533983	29.5 (749)	1503470		
36 (914)	2533940	2533961	2534014	2533984	35.5 (902)			
42 (1067)	2533941	2533962	2534015	2533985	41.5 (1054)			
48 (1219)	2533942	2533963	2534016	2533986	47.5 (1027)			
54 (1372)	2533943	2533964	2534017	2533987	53.5 (1369)	1503471		
60 (1524)	2533944	2533965	2534018	2533988	59.5 (1511)			
66 (1676)	2533945	2533966	2534019	2533989	65.5 (1664)	1503472		
72 (1829)	2533946	2533967	2534020	2533990	71.5 (1815)			
78 (1981)	2533947	2533968	2534039	2533991	77.5 (1969)	1503472		
84 (2134)	2533948	2533969	2534021	2533992	83.5 (2121)			
90 (2286)	2533949	2533970	2534022	2533993	89.5 (2273)	1503472		
96 (2438)	2533950	2533971	2534023	2533994	95.5 (2426)			
102 (2591)	2533951	2533976	2534024	2533995	101.5 (2578)	1503472		
108 (2743)	2533952	2533977	2534025	2533996	107.5 (2731)			
114 (2896)	2533953	2533978	2534026	2533997	113.5 (2883)	1503472		
120 (3048)	2533954	2533979	2534027	2533998	119.5 (3035)			
126 (3200)	2533955	2533980	2534028	2533999	125.5 (3188)	1503472		
132 (3353)	2533956	2533981	2534029	2534000	131.5 (3340)			

Step 3 – SAM-e Steam Inlet Configuration Selection

Pressurized Steam (*LiveSteam*)

The steam inlet is determined by the size of the selected steam valve from the *LiveSteam Engineering Manual* (25xxxxx) or from the H.E.L.P. Software (Humidification Engineering & Loadsizing Program). From Table 20, select the steam inlet diameter.

Table 20: Inlet Configuration for Pressure Steam Units

SAM-e Steam Inlet	Part Number 5" Long	Part Number 10" Long	Part Number 12" Long
½" NPT	1503473	1509483	1509484
¾" NPT	1503474	1509485	1509486
1" NPT	1503475	1509487	1509488
1-¼" NPT	1503476	1509489	1509490
1-½" NPT	1503477	1509491	1509492
2" NPT	1503478	1509493	1509494
2-½" NPT	1509444	1509495	1509496

Atmospheric Steam (NH, GS, SE)

The steam inlet is determined by the selected humidifier. Refer to corresponding humidifier manual to determine required steam outlet size.

Table 21: Inlet Configuration for Atmospheric Steam Units

Kit	SAM-e Steam Inlet (OD)	Capacity [lb/hr]	Part Number 5"/10"/12" Long
1	1-¾"	100	1503479/ 1509497/ 1509498
2	2 x 1-¾"	200	1503480/ 2526031/ 2526032
3	3 x 1-¾"	300	1503481/ 2526033/ 2526034
4	4 x 1-¾"	400	1503482/ 2526035/ 2526036
5	5 x 1-¾"	500	1503483/ 2526037/ 2526039
6	6 x 1-¾"	600	1503484/ 2526040/ 2526041
7	7 x 1-¾"	700	1503485/ 2526042/ 2526043
8	8 x 1-¾"	800	1503486/ 2526044/ 2526045
23	3"	300	1506999/ 1509499/ 1509500
24	4"	600	1507001/ 1509501/ 1509502
25	3" + 4"	800	1507002/ 2526046/ 2526047
26	2 x 4" (Single-inlet header)	800	1507003/ 2526048/ 2526049
27	2 x 4" (Double-inlet header)	1200	1507004/ 2526050/ 2526051
30	3 x 4" (Double-inlet header)	1200	1509089/ 2526056/ 2526057
28	3" to 1-¾"	100	1509087/ 2526052/ 2526053
29	4" to 3"	300	1509088/ 2526054/ 2526055

 **Note:** For more options, refer to SAM-e Submittal Drawings, Form #XX-248. Refer to Appendix 1 Adapter Configurations for more information.

Mini SAM-e

Table 22: Mini SAM-e Headers / Separator Assembly – 3" Centers

Duct Width [in (mm)]	Steam Tube Qty	Inlet	Header Part Number	Max. Capacity Atmospheric or Pressurized Steam [lb/hr (kg/hr)]		
				MA	MB	MC
12 (305)	3	0.5" NPT	2577686	30 (14)	60 (27)	90 (41)
12 (305)	3	0.75" NPT	2577687	30 (14)	60 (27)	90 (41)
12 (305)	3	1" NPT	2577688	30 (14)	60 (27)	90 (41)
12 (305)	3	1.75" OD	2577689	30 (14)	60 (27)	90 (41)
12 (305)	3	2x1.75" OD	2577690	30 (14)	60 (27)	90 (41)
12 (305)	3	3" OD	2577889	30 (14)	60 (27)	90 (41)
12 (305)	3	0.875" OD	2577691	30 (14)	60 (27)	90 (41)
18 (457)	5	0.5" NPT	2577698	50 (23)	100 (45)	150 (68)
18 (457)	5	0.75" NPT	2577699	50 (23)	100 (45)	150 (68)
18 (457)	5	1" NPT	2577700	50 (23)	100 (45)	150 (68)
18 (457)	5	1.75" OD	2577701	50 (23)	100 (45)	150 (68)
18 (457)	5	2x1.75" OD	2577702	50 (23)	100 (45)	150 (68)
18 (457)	5	3" OD	2577891	50 (23)	100 (45)	150 (68)
18 (457)	5	0.875" OD	2577703	50 (23)	100 (45)	150 (68)
24 (609)	7	0.5" NPT	2577710	70 (32)	140 (64)	210 (95)
24 (609)	7	0.75" NPT	2577711	70 (32)	140 (64)	210 (95)
24 (609)	7	1" NPT	2577712	70 (32)	140 (64)	210 (95)
24 (609)	7	1.75" OD	2577713	70 (32)	140 (64)	210 (95)
24 (609)	7	2x1.75" OD	2577714	70 (32)	140 (64)	210 (95)
24 (609)	7	3" OD	2577893	70 (32)	140 (64)	210 (95)
24 (609)	7	0.875" OD	2577715	70 (32)	140 (64)	210 (95)

Table 23: Mini SAM-e Headers / Separator Assembly – 6" Centers

Duct Width [in (mm)]	Steam Tube Qty	Inlet	Header Part Number	Max. Capacity Atmospheric or Pressurized Steam [lb/hr (kg/hr)]		
				MA	MB	MC
12 (305)	2	0.5" NPT	2577692	20 (9)	40 (18)	60 (27)
12 (305)	2	0.75" NPT	2577693	20 (9)	40 (18)	60 (27)
12 (305)	2	1" NPT	2577694	20 (9)	40 (18)	60 (27)
12 (305)	2	1.75" OD	2577695	20 (9)	40 (18)	60 (27)
12 (305)	2	2x1.75" OD	2577696	20 (9)	40 (18)	60 (27)
12 (305)	2	3" OD	2577890	20 (9)	40 (18)	60 (27)
12 (305)	2	0.875" OD	2577697	20 (9)	40 (18)	60 (27)
18 (457)	3	0.5" NPT	2577704	30 (14)	60 (27)	90 (41)
18 (457)	3	0.75" NPT	2577705	30 (14)	60 (27)	90 (41)
18 (457)	3	1" NPT	2577706	30 (14)	60 (27)	90 (41)
18 (457)	3	1.75" OD	2577707	30 (14)	60 (27)	90 (41)
18 (457)	3	2x1.75" OD	2577708	30 (14)	60 (27)	90 (41)
18 (457)	3	3" OD	2577892	30 (14)	60 (27)	90 (41)
18 (457)	3	0.875" OD	2577709	30 (14)	60 (27)	90 (41)
24 (609)	4	0.5" NPT	2577716	40 (18)	80 (36)	120 (54)
24 (609)	4	0.75" NPT	2577717	40 (18)	80 (36)	120 (54)
24 (609)	4	1" NPT	2577718	40 (18)	80 (36)	120 (54)
24 (609)	4	1.75" OD	2577719	40 (18)	80 (36)	120 (54)
24 (609)	4	2x1.75" OD	2577720	40 (18)	80 (36)	120 (54)
24 (609)	4	3" OD	2577894	40 (18)	80 (36)	120 (54)
24 (609)	4	0.875" OD	2577721	40 (18)	80 (36)	120 (54)

Table 24: Mini SAM-e Tubes (Only available in 304 Stainless Steel)

Duct Height Including Header [in (mm)]	TYPE MA 10 lb/hr (4.5 kg/hr)	TYPE MB 20 lb/hr (9 kg/hr)	TYPE MC 30 lb/hr (14 kg/hr)	In-duct Mounting Frame	"L" Dimension [in (mm)]
8 (203)	1509788	N/A	N/A	Not Required	4.5 (114)
10 (254)	1509789	N/A	N/A		6.5 (165)
12 (305)	1509790	1509797	1509804		8.5 (216)
14 (366)	1509791	1509798	1509805		10.5 (267)
16 (406)	1509792	1509799	1509806		12.5 (318)
18 (457)	1509793	1509800	1509807		14.5 (368)
20 (508)	1509794	1509801	1509808		16.5 (419)
22 (559)	1509795	1509802	1509809		18.5 (470)
24 (600)	1509796	1509803	1509810		20.5 (521)

Select Options

Tube Insulation

For increased energy efficiency, reduced condensate losses, and reduced airstream heat gain, tube insulation may be added as a factory installed option. For optimal effectiveness, use tube insulation in conjunction with header insulation.

Tube insulation consists of two 304 stainless steel shields clamped onto the distributor tubes. They form an insulating air gap around the tube while leaving a small gap for the nozzles to release steam. Contact and heat-transfer between insulating shields and tube is limited by using an angled ‘knife edge’ as the only point of contact, minimizing surface area for conductive heat transfer. The air gap reduces heat losses via conduction and convection, while the reflective surface minimizes heat losses through radiation.

When ordering tube insulation, order in lengths to match selected tubes. For example:

Tubes: 11x 1503415 - Steam Tube, SAM-e, 36" Type B, 304SS (48" in-duct height)

Corresponding Insulation: 11x 2538849 – Tube Insulation, SAM-e, 36"

Table 25: SAM-e Tube Insulation

Part Number	Description	Corresponding In-duct Height (See Table 6 and 7)[in (mm)]
2538844	Tube Insulation, SAM-e 6"	18 (457)
2538845	Tube Insulation, SAM-e 12"	24 (610)
2538846	Tube Insulation, SAM-e 18"	30 (762)
2538847	Tube Insulation, SAM-e 24"	36 (914)
2538848	Tube Insulation, SAM-e 30"	42 (1067)
2538849	Tube Insulation, SAM-e 36"	48 (1219)
2538850	Tube Insulation, SAM-e 42"	54 (1372)
2538851	Tube Insulation, SAM-e 48"	60 (1524)
2538852	Tube Insulation, SAM-e 54"	66 (1676)
2538853	Tube Insulation, SAM-e 60"	72 (1829)
2538854	Tube Insulation, SAM-e 66"	78 (1981)
2538855	Tube Insulation, SAM-e 72"	84 (2134)
2538856	Tube Insulation, SAM-e 78"	90 (2286)
2538857	Tube Insulation, SAM-e 84"	96 (2438)
2538858	Tube Insulation, SAM-e 90"	102 (2743)
2538859	Tube Insulation, SAM-e 96"	108 (2743)
2538860	Tube Insulation, SAM-e 102"	114 (2896)
2538861	Tube Insulation, SAM-e 108"	120 (3048)
2538862	Tube Insulation, SAM-e 114"	126 (3200)
2538863	Tube Insulation, SAM-e 120"	132 (3353)
2538864	Tube Insulation, SAM-e 126"	138 (3505)
2538865	Tube Insulation, SAM-e 132"	144 (3658)

Table 26: Mini SAM-e Tube Insulation

Part Number	Description	Corresponding In-duct Height (See Table 12) [in (mm)]
2538866	Tube Insulation, Mini SAM-e 5"	8 (203)
2538867	Tube Insulation, Mini SAM-e 7"	10 (254)
2538868	Tube Insulation, Mini SAM-e 9"	12 (305)
2538869	Tube Insulation, Mini SAM-e 11"	14 (366)
2538870	Tube Insulation, Mini SAM-e 13"	16 (406)
2538871	Tube Insulation, Mini SAM-e 15"	18 (457)
2538872	Tube Insulation, Mini SAM-e 17"	20 (508)
2538873	Tube Insulation, Mini SAM-e 19"	22 (559)
2538874	Tube Insulation, Mini SAM-e 21"	24 (600)

Header Insulation

For increased energy efficiency, reduced condensate losses, and reduced airstream heat gain, header insulation may be added as a factory installed option. For optimal effectiveness, use header insulation in conjunction with tube insulation.

Header insulation consists of a stainless steel shield that is clamped onto the distributor header, leaving a small gap for the steam tubes to protrude. Contact and heat-transfer between the insulating shield and the tube is prevented by using strips of synthetic foam insulation. The resulting air gap around the header reduces heat losses via conduction and convection, while the reflective surface minimizes heat loss through radiation.

When ordering header/separator insulation for the SAM-e, order insulation lengths to match header/separator lengths. For example:

Header: 1503316 – Header /Separator SAM-e 60", 6"-centers

Insulation: 2538917 – Header/Separator Insulation, SAM-e 60"

Table 27: SAM-e Header/Separator Insulation

Part Number	Description
2538910	Header/Separator Insulation, SAM-e 18"
2538911	Header/Separator Insulation, SAM-e 24"
2538912	Header/Separator Insulation, SAM-e 30"
2538913	Header/Separator Insulation, SAM-e 36"
2538914	Header/Separator Insulation, SAM-e 42"
2538915	Header/Separator Insulation, SAM-e 48"
2538916	Header/Separator Insulation, SAM-e 54"
2538917	Header/Separator Insulation, SAM-e 60"
2538918	Header/Separator Insulation, SAM-e 66"
2538919	Header/Separator Insulation, SAM-e 72"
2538920	Header/Separator Insulation, SAM-e 78"
2538921	Header/Separator Insulation, SAM-e 84"
2538922	Header/Separator Insulation, SAM-e 90"
2538923	Header/Separator Insulation, SAM-e 96"
2538924	Header/Separator Insulation, SAM-e 102"
2538925	Header/Separator Insulation, SAM-e 108"
2538926	Header/Separator Insulation, SAM-e 114"
2538927	Header/Separator Insulation, SAM-e 120"
2538928	Header/Separator Insulation, SAM-e 126"
2538929	Header/Separator Insulation, SAM-e 132"
2538930	Header/Separator Insulation, SAM-e 138"
2538931	Header/Separator Insulation, SAM-e 144"

When ordering header insulation for the SAM-e with an atmospheric header 801-1200 lb/hr (dual inlet), order insulation lengths to match header lengths. For example:

Header: 1503336 - Header/Separator SAM-e 102" Atmospheric, 801-1200 lb/hr, 6"- centers

Insulation: 2539696 – Header/Separator Insulation, 801-1200, SAM-e 108"

Table 28: Header/Separator Insulation for Atmospheric SAM-e, 801-1200 lb/hr

Part Number	Description
2539685	Header/Separator Insulation 801-1200, SAM-e 42"
2539686	Header/Separator Insulation 801-1200, SAM-e 48"
2539687	Header/Separator Insulation 801-1200, SAM-e 54"
2539688	Header/Separator Insulation 801-1200, SAM-e 60"
2539689	Header/Separator Insulation 801-1200, SAM-e 66"
2539690	Header/Separator Insulation 801-1200, SAM-e 72"
2539691	Header/Separator Insulation 801-1200, SAM-e 78"
2539692	Header/Separator Insulation 801-1200, SAM-e 84"
2539693	Header/Separator Insulation 801-1200, SAM-e 90"
2539694	Header/Separator Insulation 801-1200, SAM-e 90"
2539695	Header/Separator Insulation 801-1200, SAM-e 102"
2539696	Header/Separator Insulation 801-1200, SAM-e 108"
2539697	Header/Separator Insulation 801-1200, SAM-e 114"
2539698	Header/Separator Insulation 801-1200, SAM-e 120"
2539699	Header/Separator Insulation 801-1200, SAM-e 126"
2539700	Header/Separator Insulation 801-1200, SAM-e 132"
2539701	Header/Separator Insulation 801-1200, SAM-e 138"
2539702	Header/Separator Insulation 801-1200, SAM-e 144"

When ordering header insulation for the Mini SAM-e, order header / separator insulation to match the length and tube spacing. For example:

Header: 2577701 – Header/Separator Mini SAM-e 18", 3"-centers, 1.75" inlet

Insulation: 2576887 – Header/Separator Insulation, Mini SAM-e 18", 3"-centers

Table 29: Mini SAM-e Header/Separator Insulation

Part Number	Description
2576885	Header/Separator Insulation, Mini SAM-e 12", 3"-centers
2576887	Header/Separator Insulation, Mini SAM-e 18", 3"-centers
2576889	Header/Separator Insulation, Mini SAM-e 24", 3"-centers
2576886	Header/Separator Insulation, Mini SAM-e 12", 6"-centers
2576888	Header/Separator Insulation, Mini SAM-e 18", 6"-centers
2576890	Header/Separator Insulation, Mini SAM-e 24", 6"-centers

Mounting Frames

Mounting frames are required for all vertical duct applications. They provide the necessary support to allow the SAM-e to be mounted in a vertical flow duct.

Mounting frames may also be desirable in horizontal flow duct applications with high velocities, where additional support is desired, or where it is only possible to secure the SAM-e to the ceiling and floor.

When ordering mounting frames, select the frame with a size range that includes the SAM-e tube length (see Table 6 & 7 "Dimension L"). Mounting frames are available in galvanized and 304 stainless steel.

Table 30: SAM-e Mounting Frames

Part Number	Description
1504697	Mounting frame, SAM-e, 9" to 15"
1503469	Mounting frame, SAM-e, 16" to 27"
1503470	Mounting frame, SAM-e, 28" to 51"
1503471	Mounting frame, SAM-e, 52" to 99"
1503472	Mounting frame, SAM-e, 100" to 147"
2521402	Mounting frame, SAM-e, 9" to 15", SS
2521403	Mounting frame, SAM-e, 16" to 27", SS
2521404	Mounting frame, SAM-e, 28" to 51", SS
2521405	Mounting frame, SAM-e, 52" to 99", SS
2521406	Mounting frame, SAM-e, 100" to 147", SS

Installation Drawings

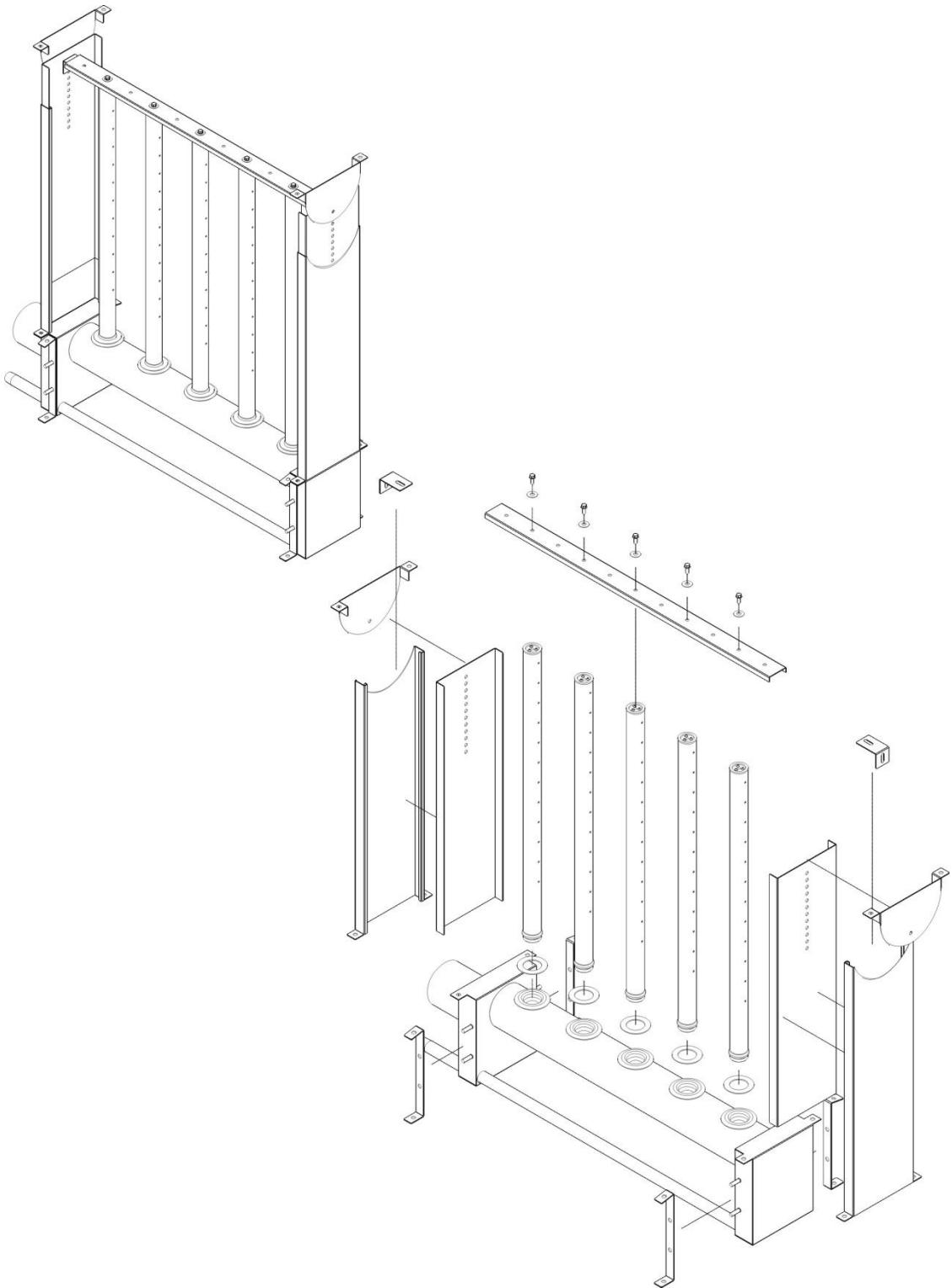
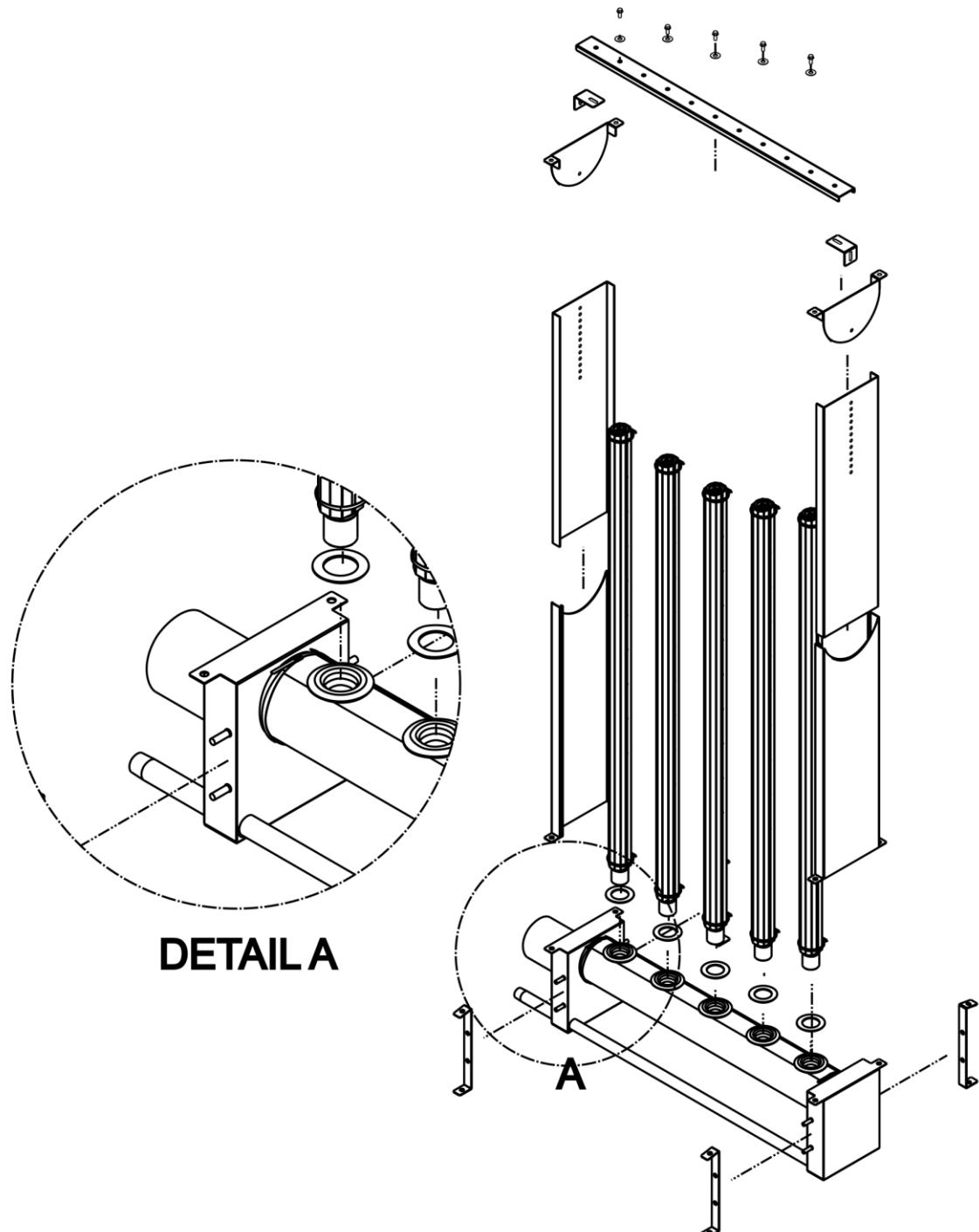


Figure 8: SAM-e Exploded View



SAM-e Insulated Exploded View

Figure 9: SAM-e Insulated Exploded View

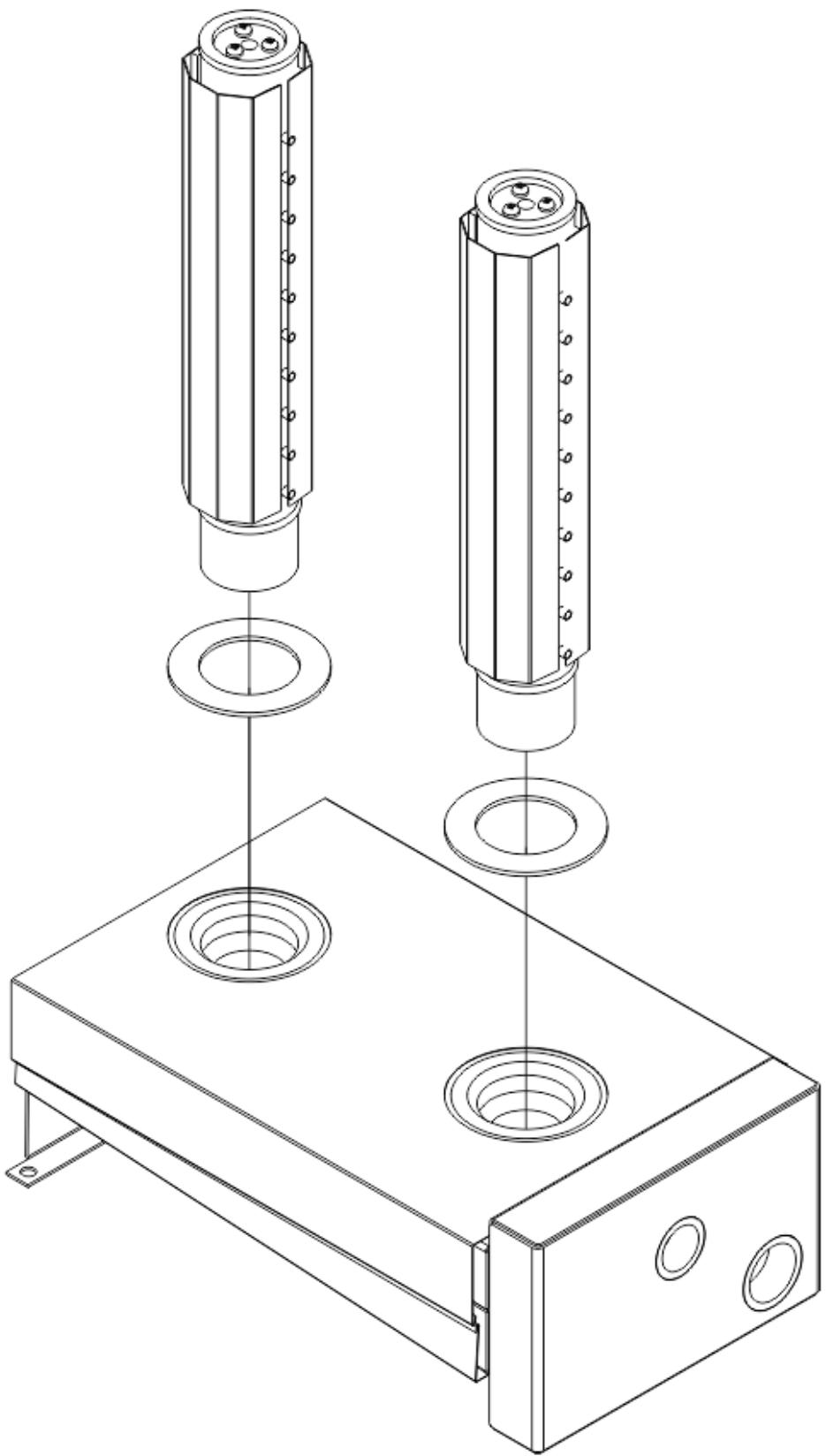
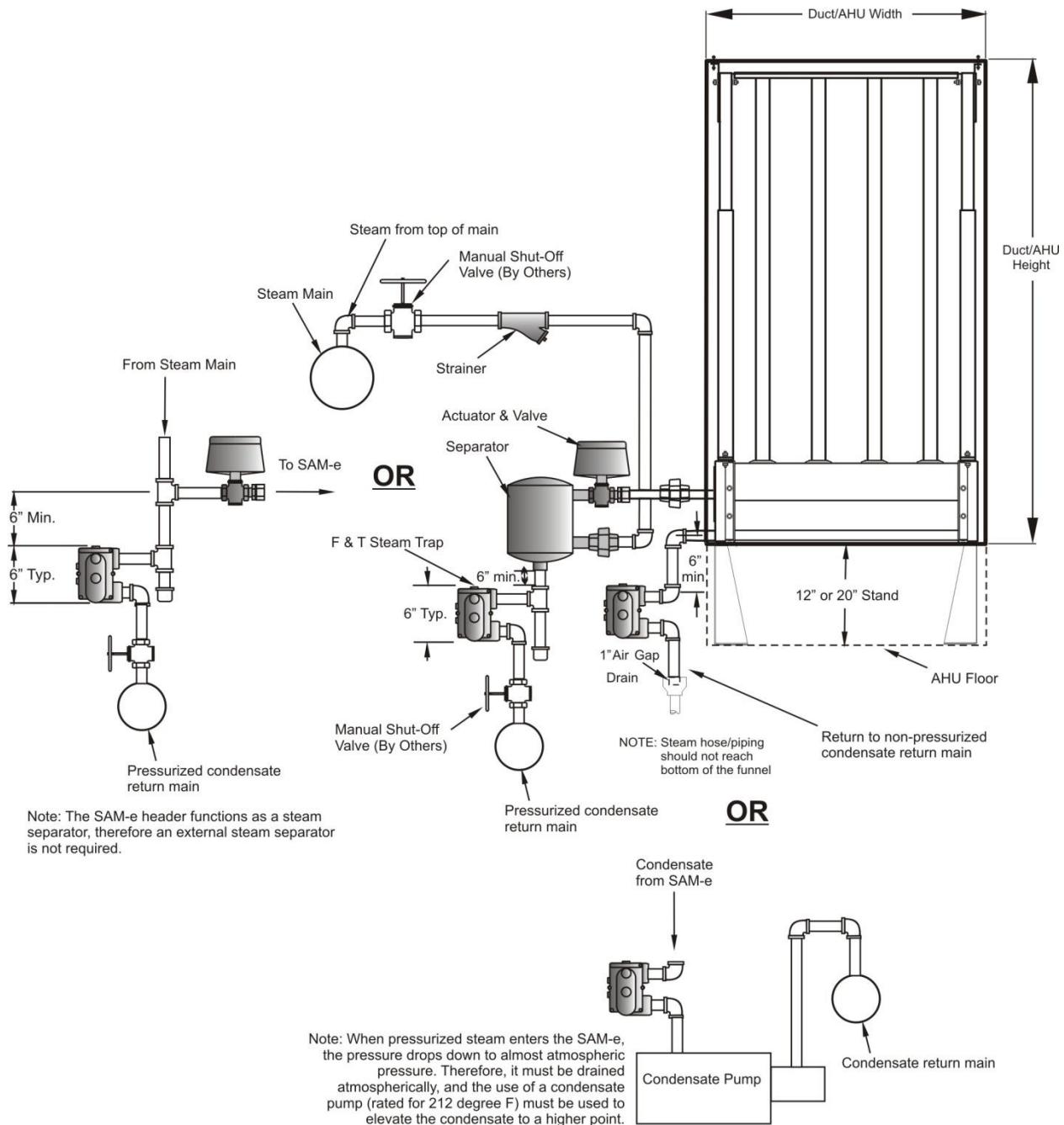


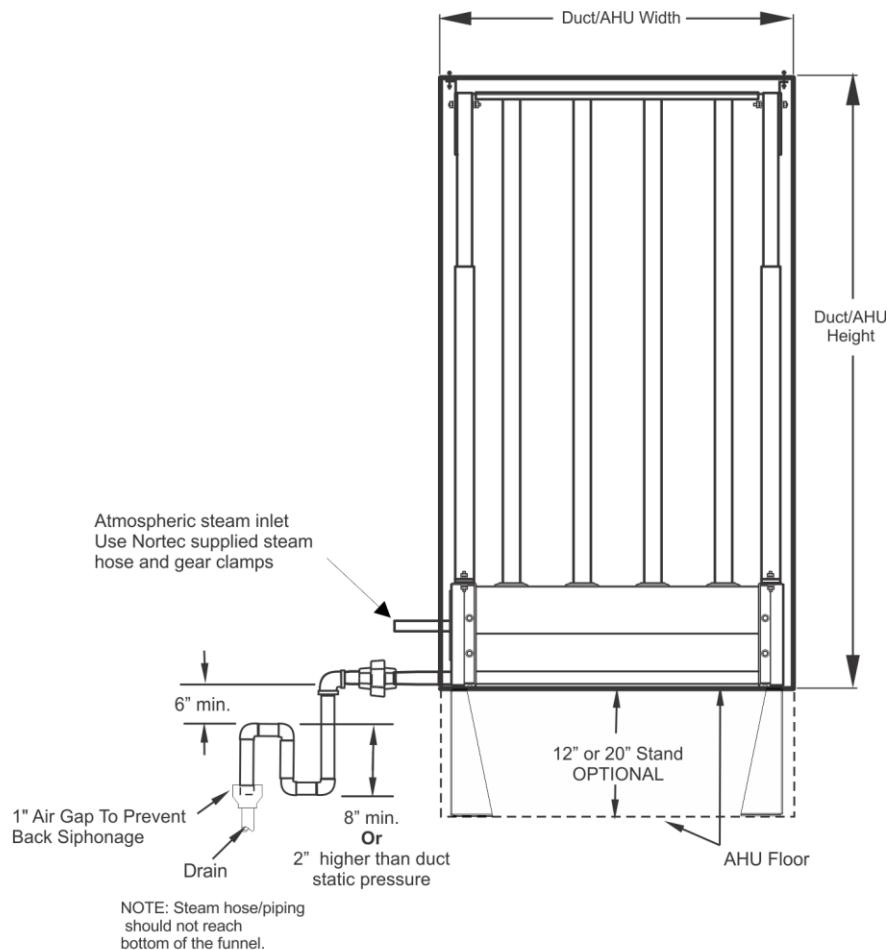
Figure 10: Mini SAM-e Insulated Exploded View



Note: The SAM-e header functions as a steam separator, therefore an external steam separator is not required

Figure 11: Typical SAM-e Installation for Pressurized Steam Applications

Note: The SAM-e header functions as a steam separator, therefore an external steam separator is not required



Drain Water Cooler Option:

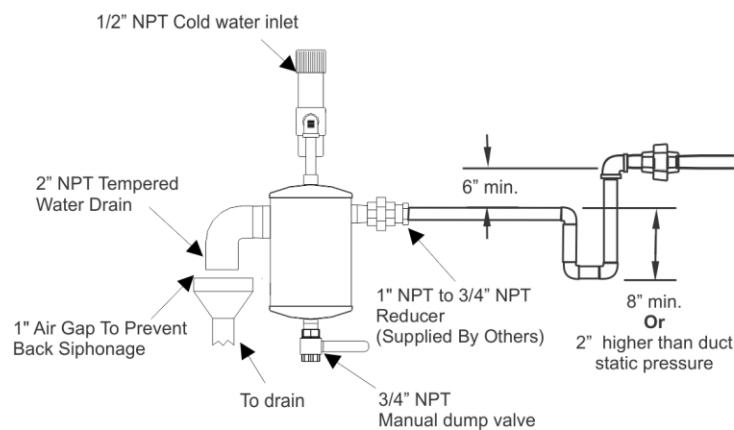
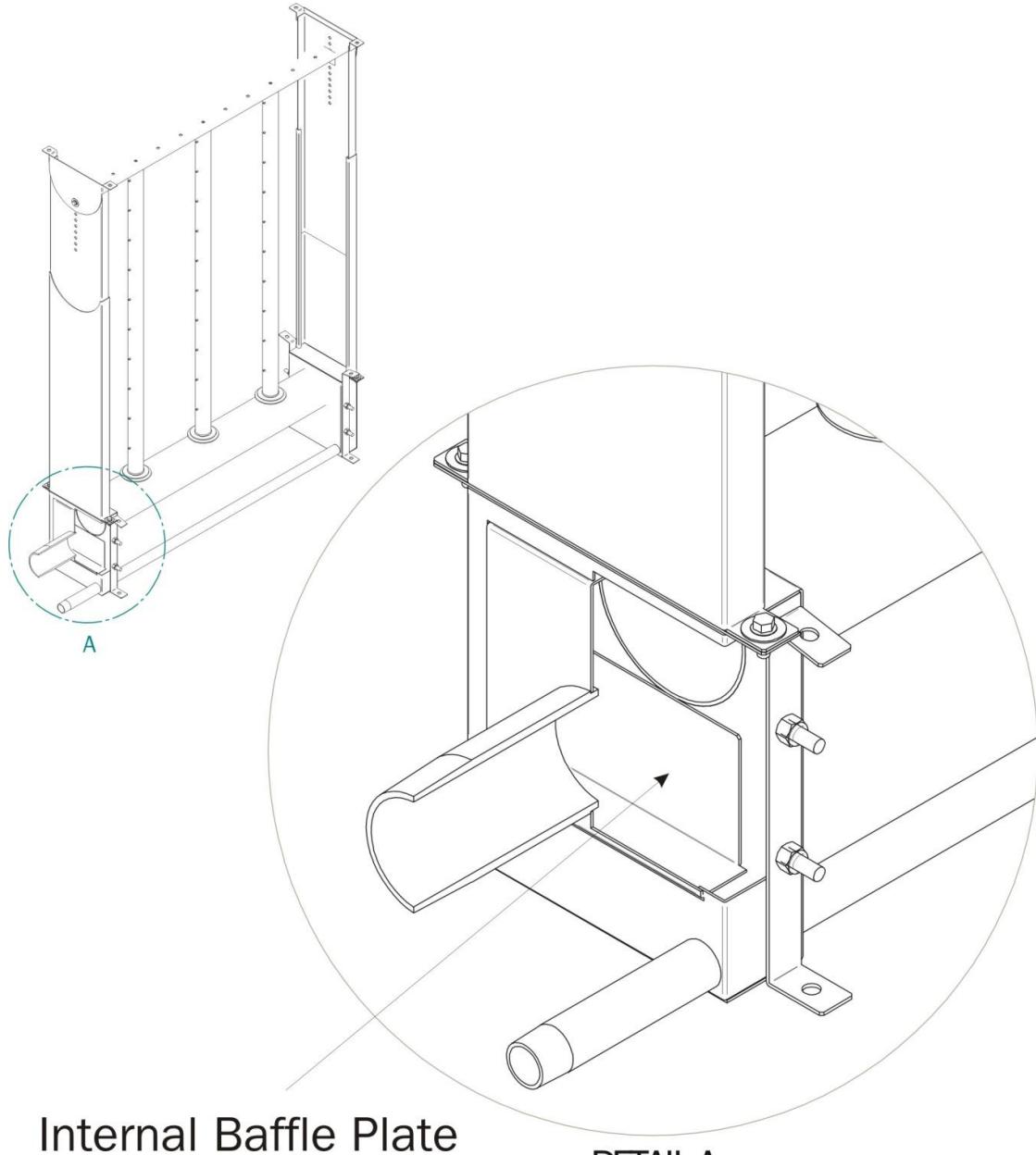


Figure 12: Typical SAM-e Installation for Atmospheric Steam Applications



Internal Baffle Plate DETAIL A

All pressurized SAM-e inlet kits come with a standard internal baffle plate. The baffle plate redirects the flow of steam causing condensate to ‘fall out’, eliminating the need to install an external steam separator.

Figure 13: SAM-e Internal Baffle Plate

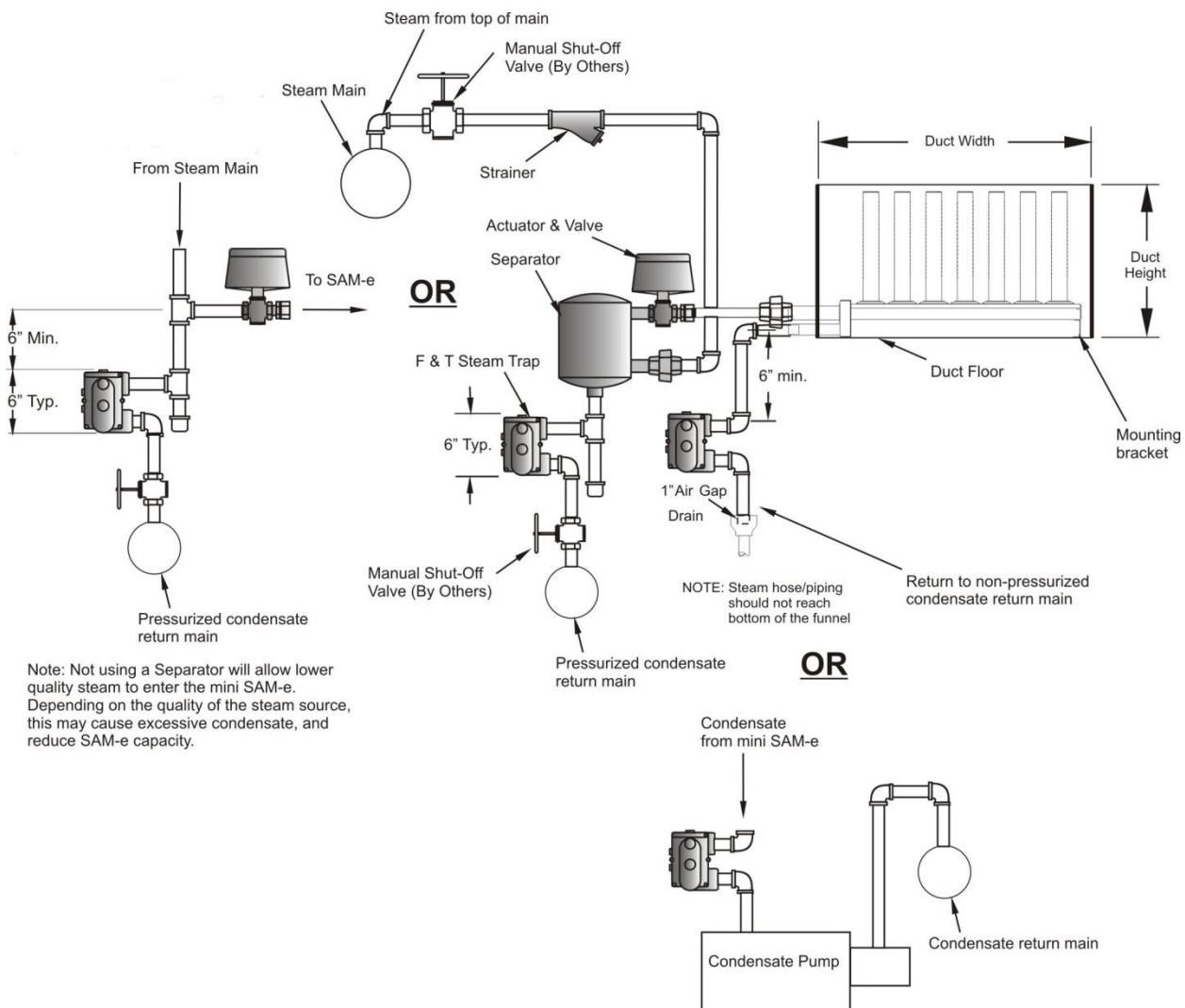
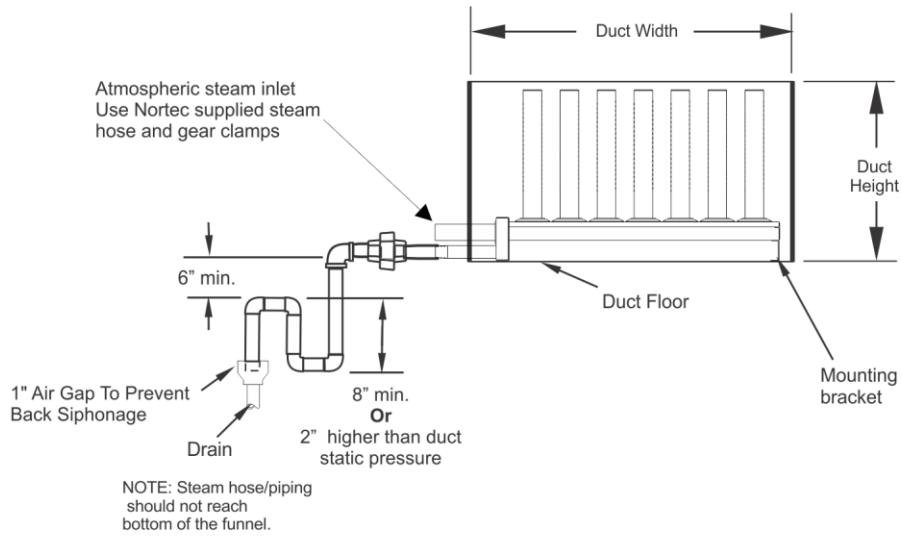


Figure 14: Typical Mini SAM-e Installation for Pressurized Steam Applications



Drain Water Cooler Option:

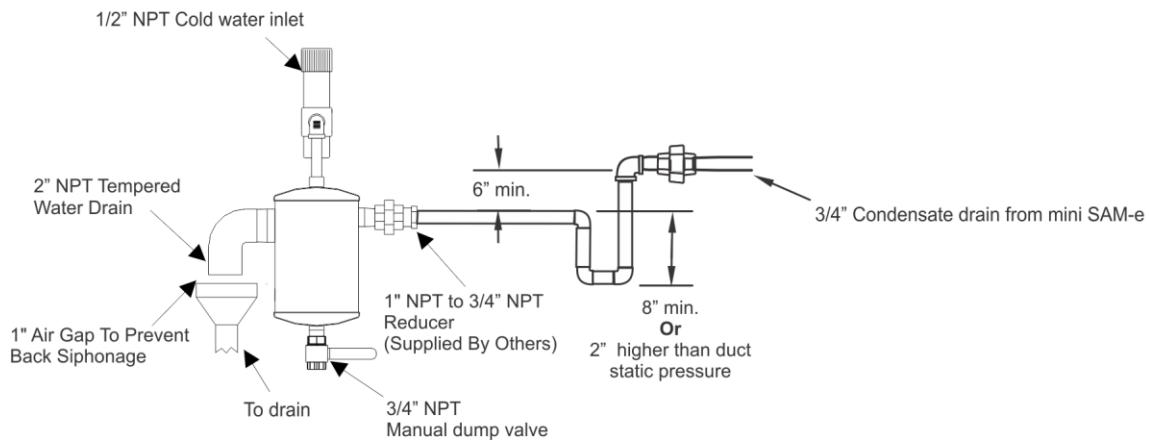


Figure 15: Typical Mini SAM-e Installation for Atmospheric Steam Applications

Specification

1. GENERAL

A. Work Included

- (1) NORTEC Short Absorption Manifold (Humidifier Steam Dispersion Panel) - SAM-e Humidifier[s], and Mini Short Absorption Manifold (Humidifier Steam Dispersion Panel) – Mini SAM-e Humidifier[s] as indicated on drawing[s] and as indicated on schedule[s].
- (2) Complete and operable humidification system [which meets applicable building codes].
- (3) Equipment start-up and project inspection by qualified factory trained representative.

B. Quality Assurance

- (1) Manufacturer: For each product specified, provide components by same manufacturer throughout.
- (2) Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authority having jurisdiction, and marked for intended use.
- (3) Comply with ARI 640, "Standard for Commercial and Industrial Humidifiers."
- (4) Products shall be supported with a warranty that ensures the product will be free from defects in materials and workmanship for a period of ten years after shipment (with the exception of tube coupling seals: two years only).
- (5) Commissioning of a system or systems specified in this section is part of the construction process. Documentation and testing of these systems, as well as training of the Owner's operation and maintenance personnel, is required in cooperation with the Commissioning Authority. Project Closeout is dependent on successful completion of all commissioning procedures, documentation, and issue closure. Refer to Project Closeout, Section 01700, for substantial completion details. Refer to Section 01810, Commissioning, for detailed commissioning requirements.
- (6) Products specified below are to be manufactured in an ISO 9001-2000 certified facility.

C. Submittals

- (1) Submit product data under provisions of Section 15010. Include product description, model, dimensions, component sizes, rough-in requirements, service sizes, and finishes. Include rated capacities, operating weights, furnished specialties, and accessories.
- (2) Submit manufacturer's installation instructions.
- (3) Submit operation and maintenance data.
- (4) Submit coordination drawings. Detail fabrication and installation of humidifiers. Include piping details, plans, elevations, sections, details of components, and dispersion tubes. Detail humidifiers and adjacent equipment. Show support locations, type of support, weight on each support, and required clearances.
- (5) Submit wiring diagrams including power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
- (6) Submit minimum water quality requirements and water pressure requirements.

D. Extra Material

- (1) Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

E. References

- (1) ANSI/NFPA 70 - National Electrical Code.

F. Coordination

- (1) Coordinate location and installation of humidifiers in ducts and air-handling units. Revise locations and elevations to suit field conditions and to ensure proper humidifier operation.

XXXXX OR XXXXX

- (2) Coordinate location and installation of humidifier in the space it serves with the electrical, mechanical, and plumbing contractors.

2. PRODUCTS

A. Short Absorption Manifold

- (1) Short Absorption Manifold designed for atmospheric steam humidifiers or pressurized steam from a boiler, to directly inject the steam into ducted air for humidification.
 - (a) Absorption distance characteristic shall prevent water accumulation on any in-duct surfaces beyond ____in (____mm) downstream of the steam dispersion panel. (Refer to distance calculated in H.E.L.P. Software).
 - (b) Steam dispersion panel consisting of a (one) horizontal stainless steel header / separator supplying steam to a bank of closely spaced 3" (76 mm) OR 6" (152 mm) OR 9" (229 mm) OR 12" (305 mm) vertical tubes (3" (76 mm) OR 6" (152 mm) for Mini SAM-e), as necessary to meet absorption distance requirements, and to reduce condensation losses.
 - (c) Single horizontal stainless steel header to provide steam to vertical distributor tubes and to reduce condensation losses. Dual header systems creating unnecessary condensation, or systems needing to be installed on a partition or requiring blank-off plates are not acceptable.
 - (d) Header / separator design is primarily round tube to minimize pressure drop. Square headers are not acceptable. (Full-size SAM-e only).
 - (e) Slim profile rectangular profile header design minimizes pressure drop. (Mini SAM-e only).
 - (f) Steam inlet and condensate return located on the same side and at the bottom of the header to allow single point entry and floor mounting.
 - (g) Headers are of 304 stainless steel construction.
 - (h) Vertical stainless steel distribution tubes to promote condensate evacuation. Horizontal distributor tubes are not accepted.
 - (i) All tubes are available in either 409 or 304 stainless steel construction.
 - (j) Stainless steel nozzle inserts ensure condensate free steam is discharged from the center of the distribution tubes. Systems without nozzle inserts, or other than stainless steel, are not acceptable.
 - (k) Stainless steel nozzle inserts shall have metered orifices, sized to provide even distribution of the discharged steam, spaced for optimum steam absorption.

- (I) Tubes and headers shall accommodate factory installation or field retrofit of optional insulation for increased energy efficiency.

(2) Options

- (a) Tube and header insulation constructed from 304 stainless steel shielding for increased energy efficiency and reduced airstream heat gain. Stainless steel shields to be isolated from distributor using plenum rated synthetic foam strips. Insulation to provide air-gap to minimize conduction and convection, as well provide reflective surface to minimize radiating heat transfer. (Patent Pending). Un-insulated headers, or simple foam insulation not accepted.
- (b) Adjustable mounting frame available for quick and easy installation. (Does not apply for Mini SAM-e).

(3) Standard of acceptance: Nortec SAM-e.

3. EXECUTION

A. Examination

- (1) Examine ducts, air-handling units, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance.
- (2) Examine roughing-in for piping systems to verify actual locations of piping connections before humidifier installation.
- (3) Proceed with installation only after unsatisfactory conditions have been corrected.

B. Installation

- (1) Install humidifiers and steam dispersion panels per manufacturers' instructions.
- (2) Seal humidifier dispersion-tube duct penetrations with flange.
- (3) Install with required clearance for service and maintenance.

C. Testing

- (1) System verification testing is part of the commissioning process. Verification testing shall be performed by the Contractor and witnessed and documented by the Commissioning Authority. Refer to section 01810, Commissioning, for system verification tests and commissioning requirements.

XXXXX OR XXXXX

- (2) Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including piping and electrical connections. Report results in writing.
 - (a) Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - (b) Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove malfunctioning units, replace with new units, and retest.
 - (c) Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Training

- (1) Training of the Owner's operation and maintenance personnel is required in cooperation with the Commissioning Authority. Provide competent, factory authorized personnel to provide instruction to operation and maintenance personnel concerning the location, operation, and troubleshooting of the installed systems. The instruction shall be scheduled in coordination with the Commissioning Authority after submission and approval of formal training plans. Refer to System Demonstrations, section 01670, for contractor training requirements. Refer to section 01810, Commissioning, for further contractor training requirements.

XXXXX OR XXXXX

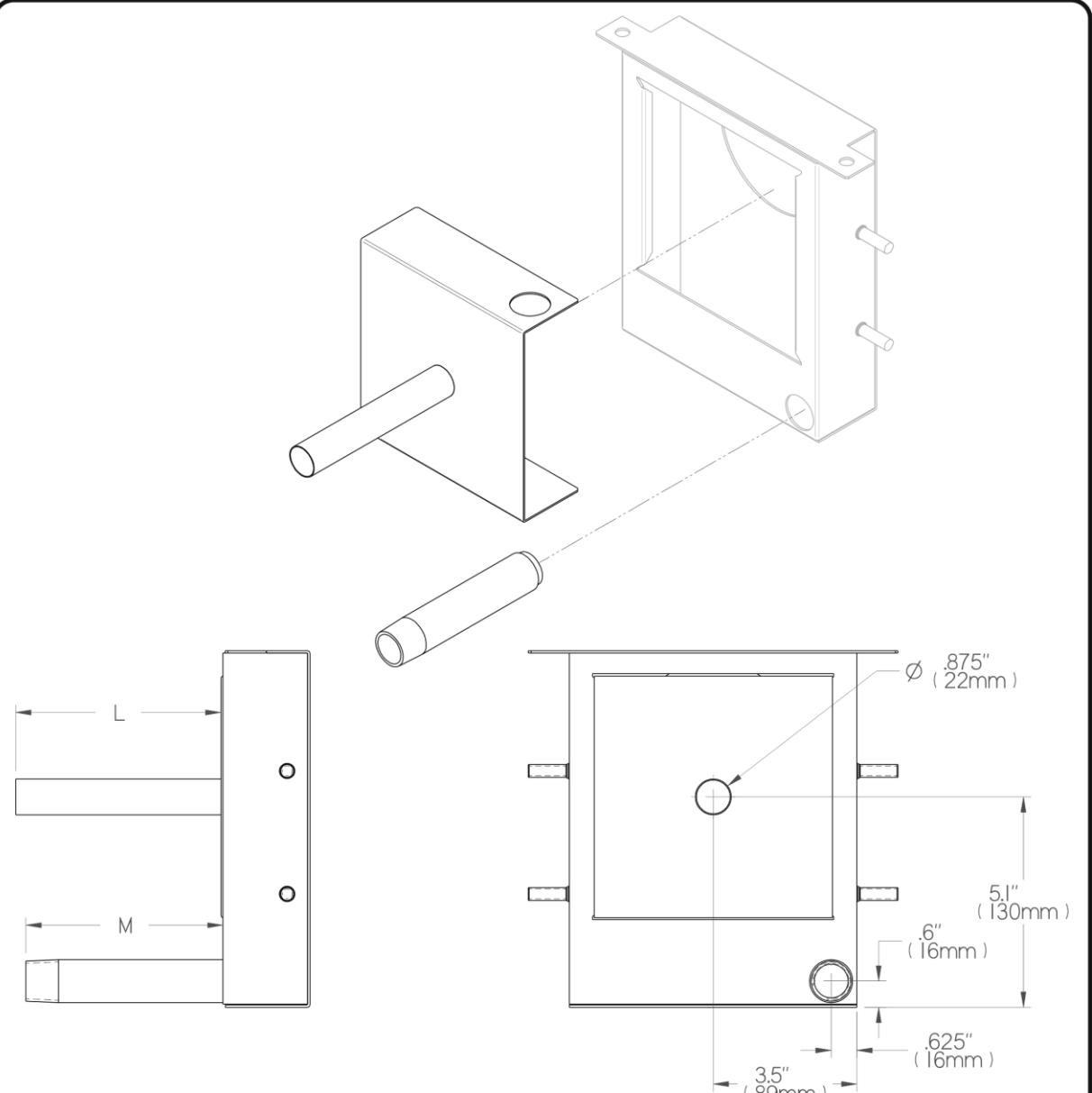
- (2) Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain humidifiers.
- (a) Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.
 - (b) Review data in maintenance manuals. Refer to Division 1 Section "Contract Closeout."
 - (c) Review data in maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data."
 - (d) Schedule training with Owner, through Architect, with at least seven days advance notice.

Appendix

Inlet Adapter Configurations



Note: For Atmospheric Steam humidifier applications, see table 8 and 13 for Pressure Steam applications

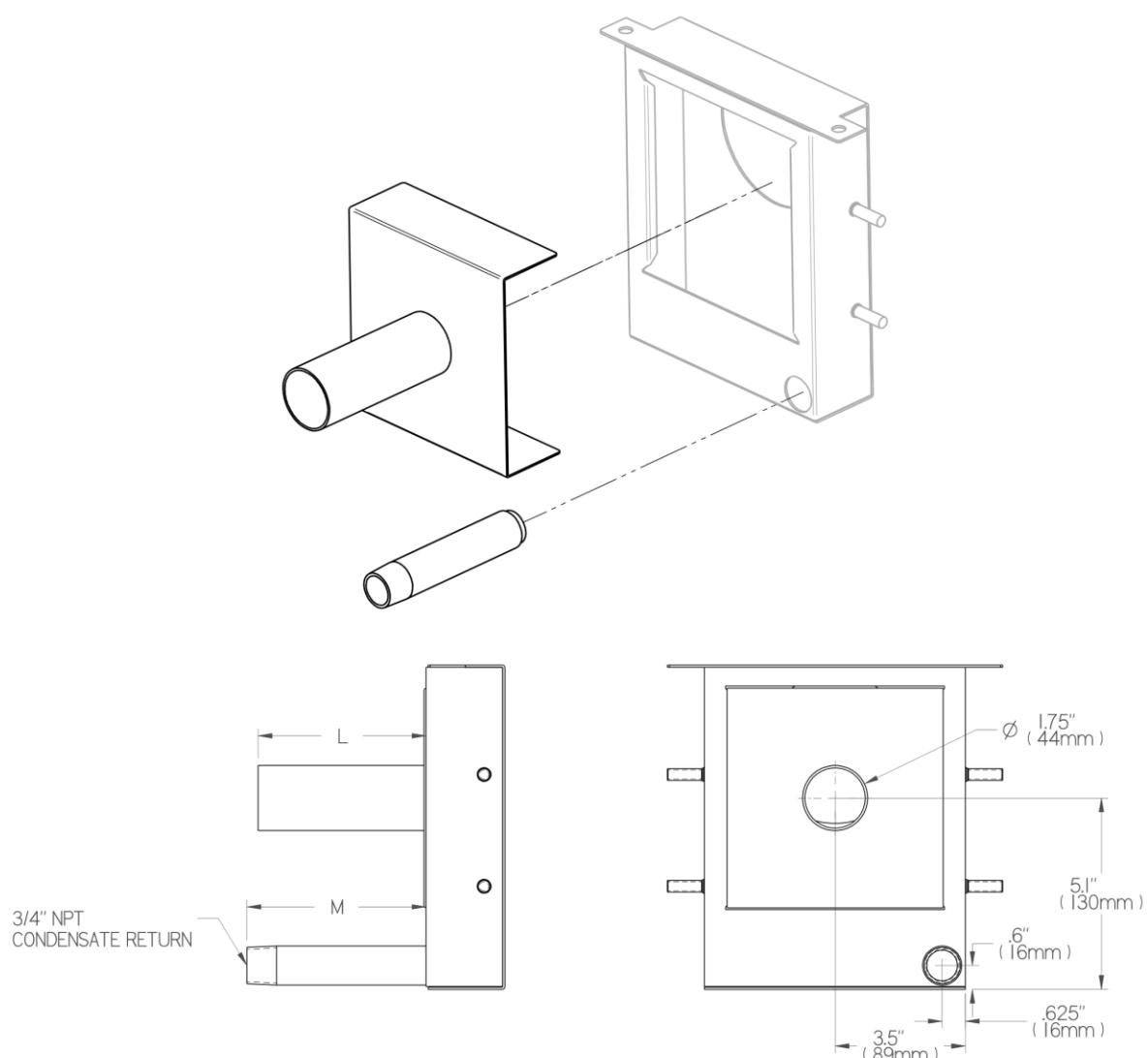


Part No.	Description	L (in. (mm))	M (in. (mm))
2530185	Inlet Adapter Kit, SAM-e, 33 lbs/hr, 7/8" x 5"	5.0 (127)	4.8 (122)
2560019	Inlet Adapter Kit, SAM-e, 33 lbs/hr, 7/8" x 10"	10.0 (254)	9.8 (249)
2560018	Inlet Adapter Kit, SAM-e, 33 lbs/hr, 7/8" x 12"	12.0 (305)	11.8 (300)



Inlet Adapter Kit, SAM-e,
33 lbs/hr, 7/8"

Figure 1: KIT 7/8 - Header and Adapter Configuration



Part No.	Description	L (in. (mm))	M (in. (mm))
1503479	Inlet Kit1, SAM-e, 1.75	4.5 (114)	4.8 (122)
1509497	Inlet Kit1, SAM-e, 1.75 ext 10	10.0 (254)	9.8 (249)
1509498	Inlet Kit1, SAM-e, 1.75 ext 12	12.0 (305)	11.8 (300)



Inlet Adapter Kit 1, SAM-e,
100 lbs/hr 1.75"

Figure 2: Kit 1 - Header and Adapter Configuration

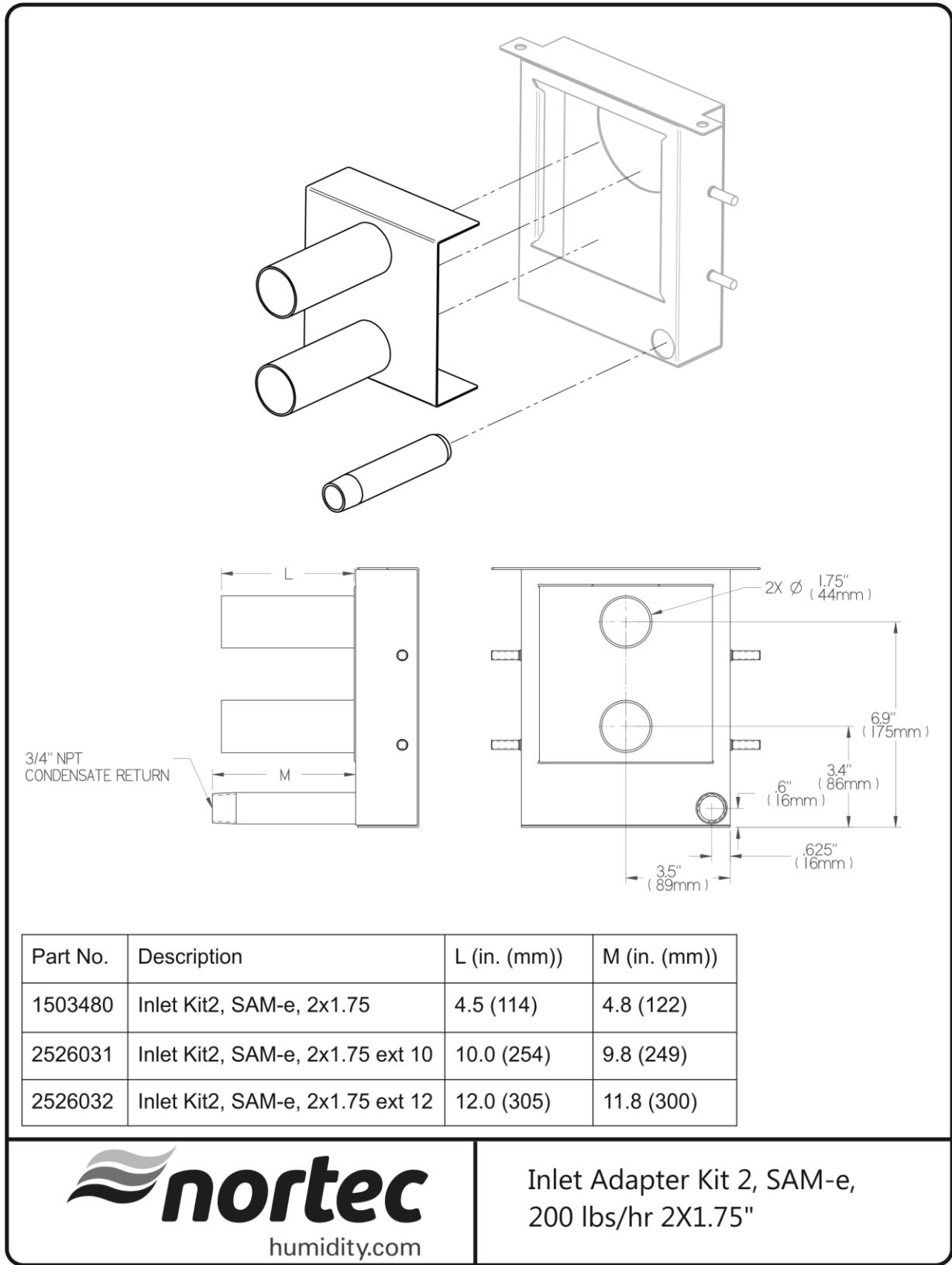
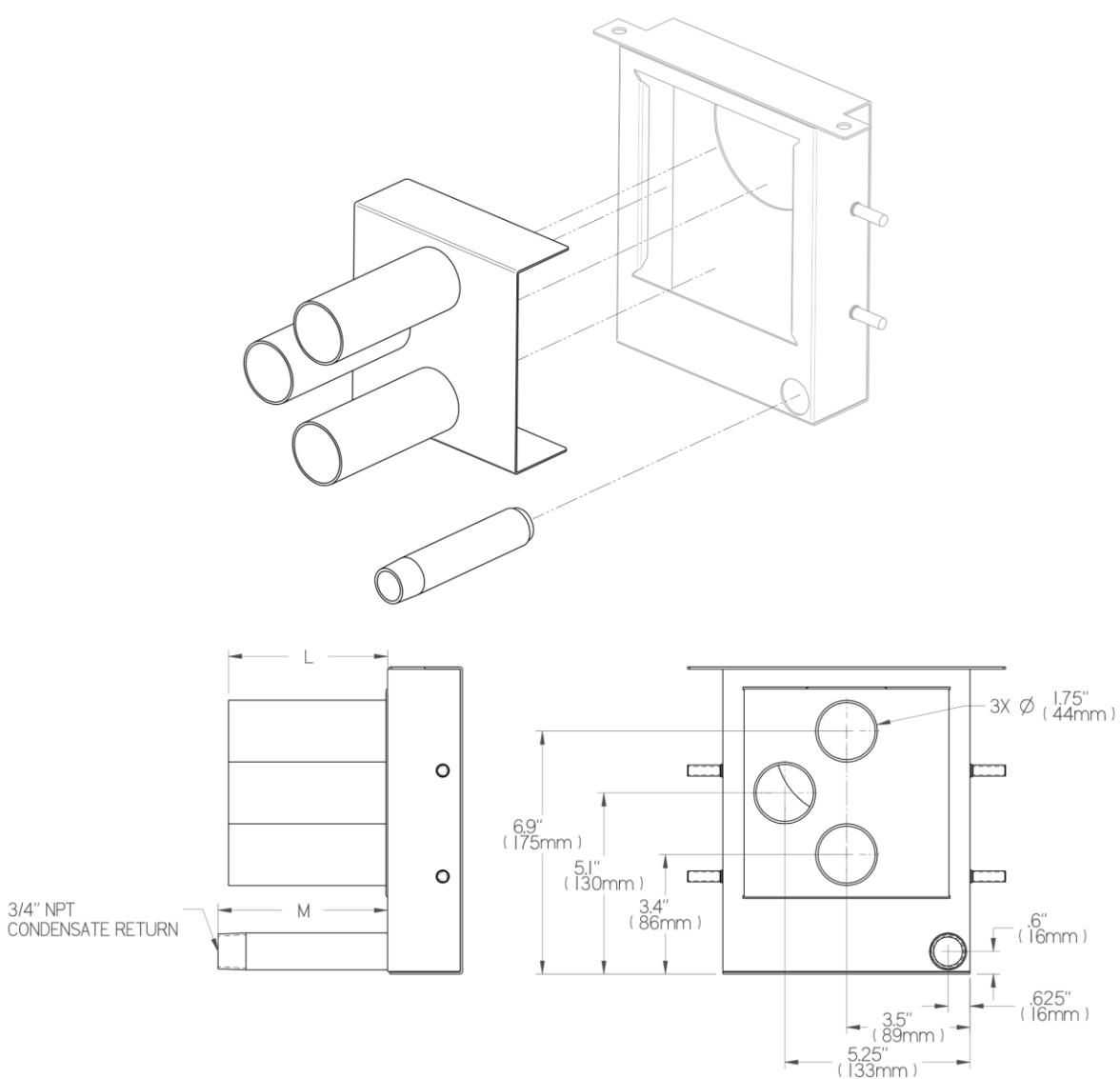


Figure 3: KIT 2 - Header and Adapter Configuration

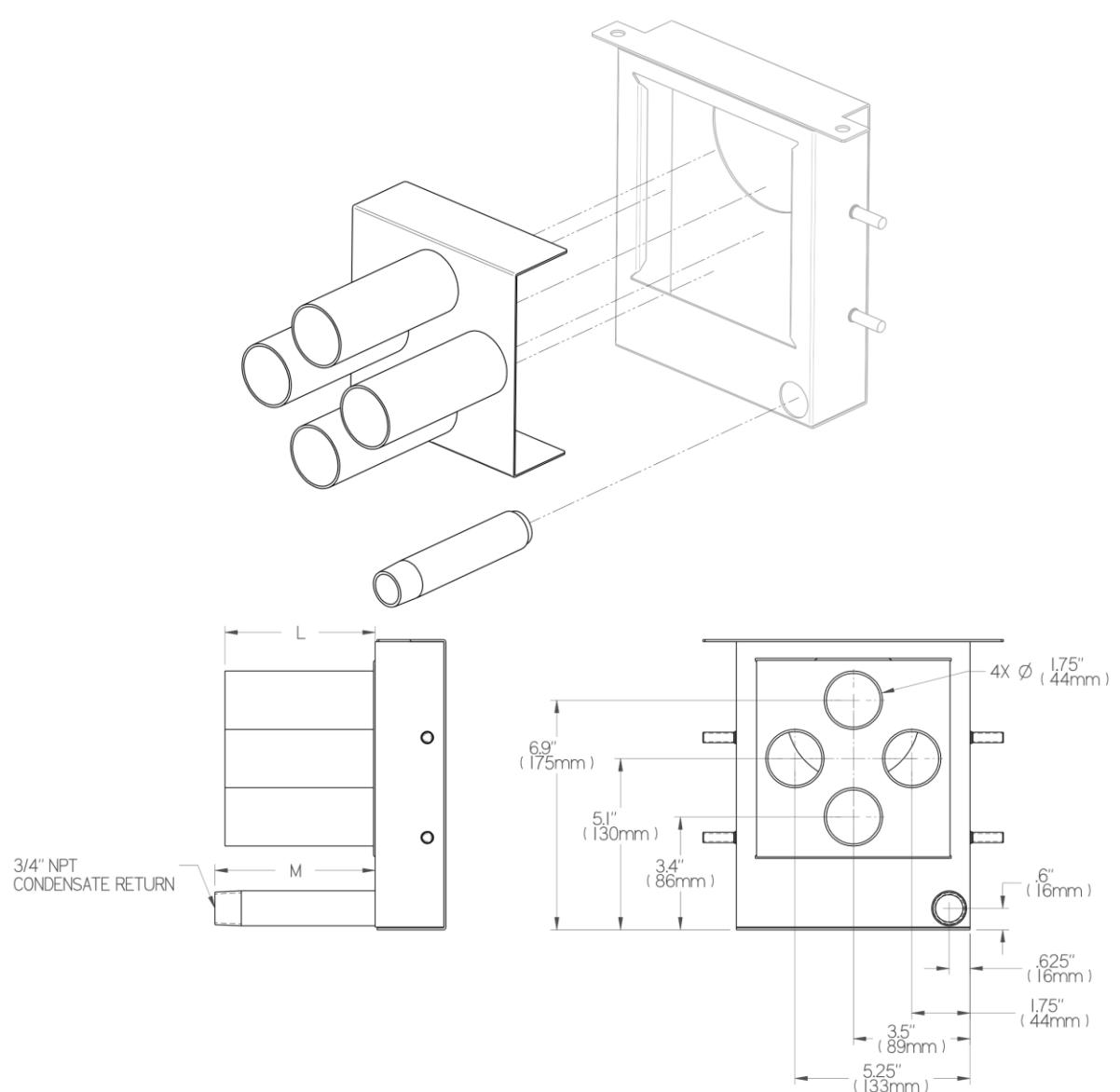


Part No.	Description	L (in. (mm))	M (in. (mm))
1503481	Inlet Kit3, SAM-e, 3x1.75	4.5 (114)	4.8 (122)
2526033	Inlet Kit3, SAM-e, 3x1.75 ext 10	10.0 (254)	9.8 (249)
2526034	Inlet Kit3, SAM-e, 3x1.75 ext 12	12.0 (305)	11.8 (300)



Inlet Adapter Kit 3, SAM-e,
300 lbs/hr 3X1.75"

Figure 4: KIT 3 - Header and Adapter Configuration

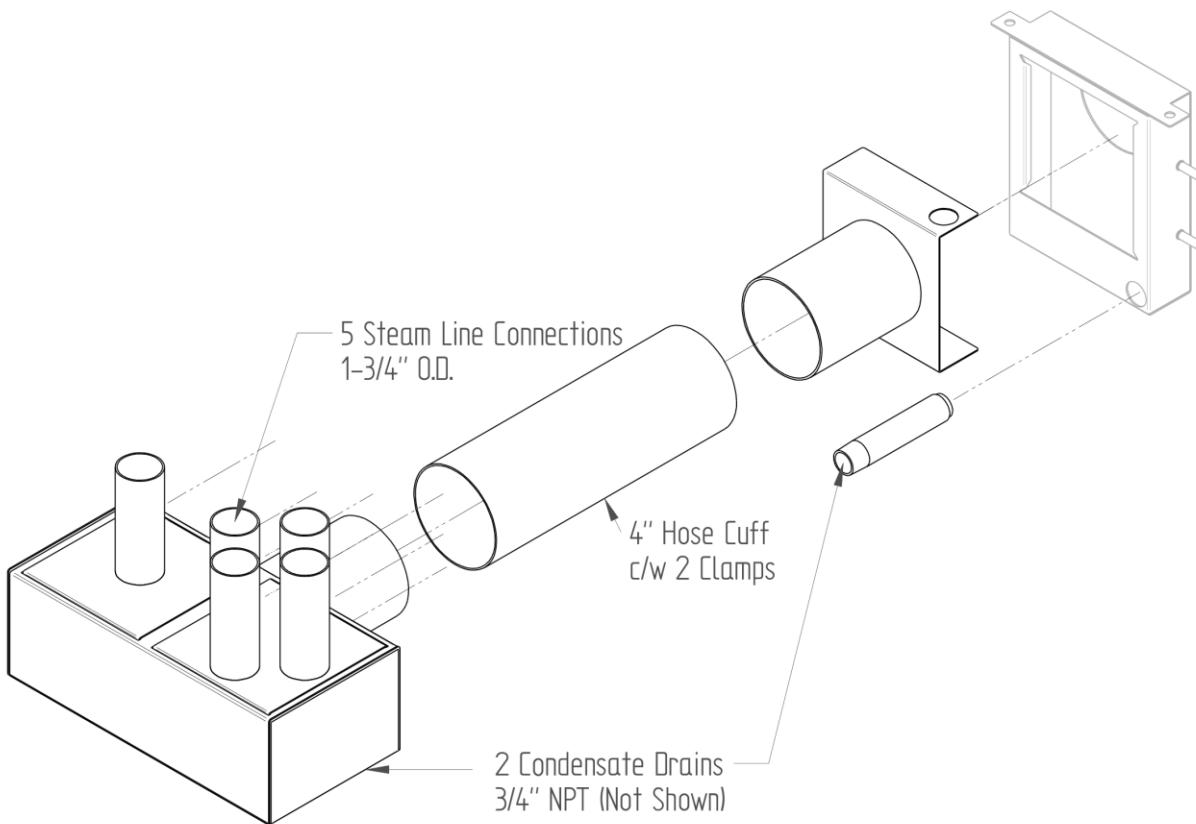


Part No.	Description	L (in. (mm))	M (in. (mm))
1503482	Inlet Kit4, SAM-e, 4x1.75"	4.5 (114)	4.8 (122)
2526035	Inlet Kit4, SAM-e, 4x1.75 ext 10	10.0 (254)	9.8 (249)
2526036	Inlet Kit4, SAM-e, 4x1.75 ext 12	12.0 (305)	11.8 (300)



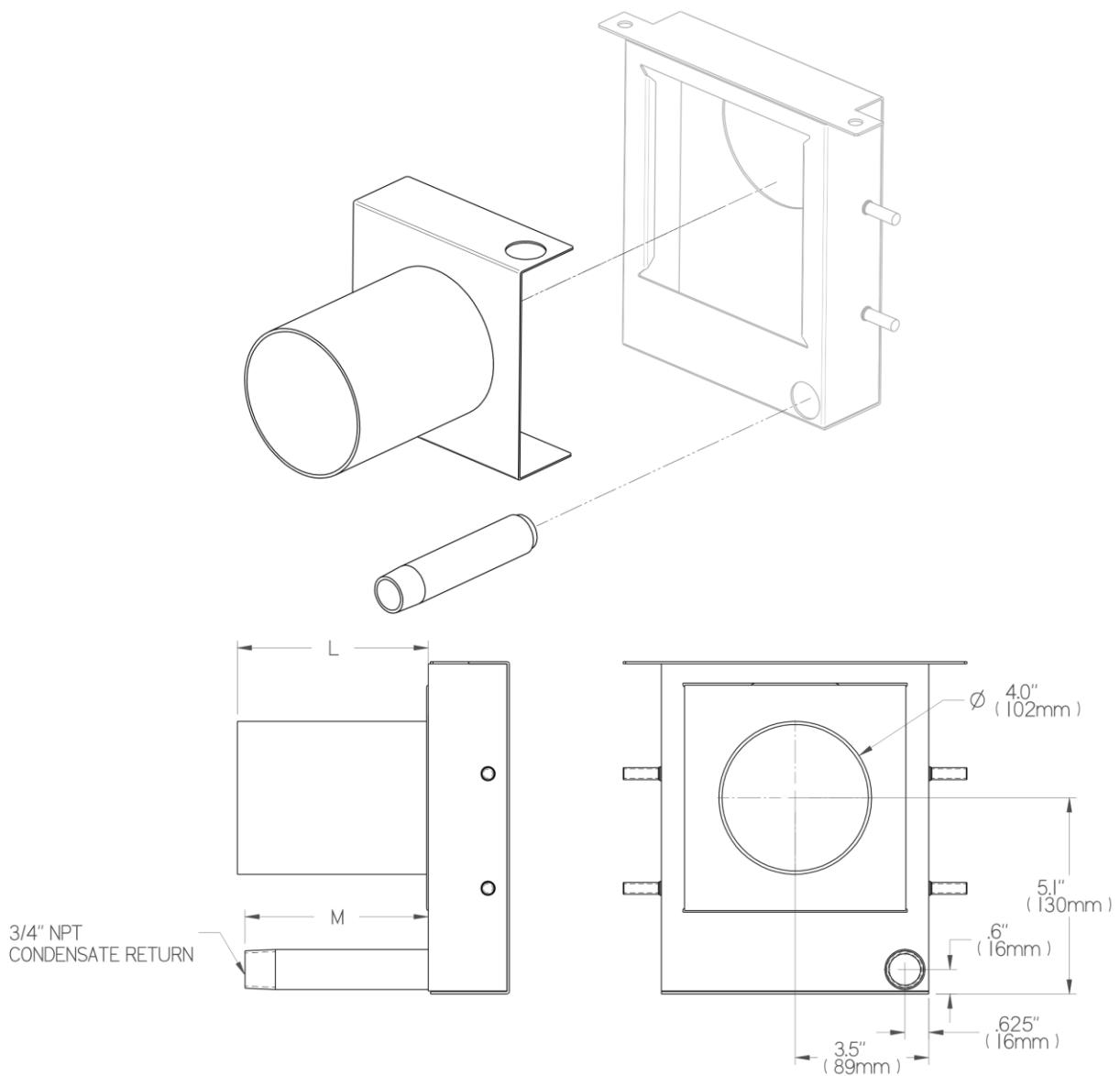
Inlet Adapter Kit 4, SAM-e,
400 lbs/hr 4X1.75"

Figure 5: KIT 4 - Header and Adapter Configuration



Inlet Adapter Kit 5, SAM-e,
500 lbs/hr 5x1.75"

Figure 6: KIT 5 - Header and Adapter Configuration

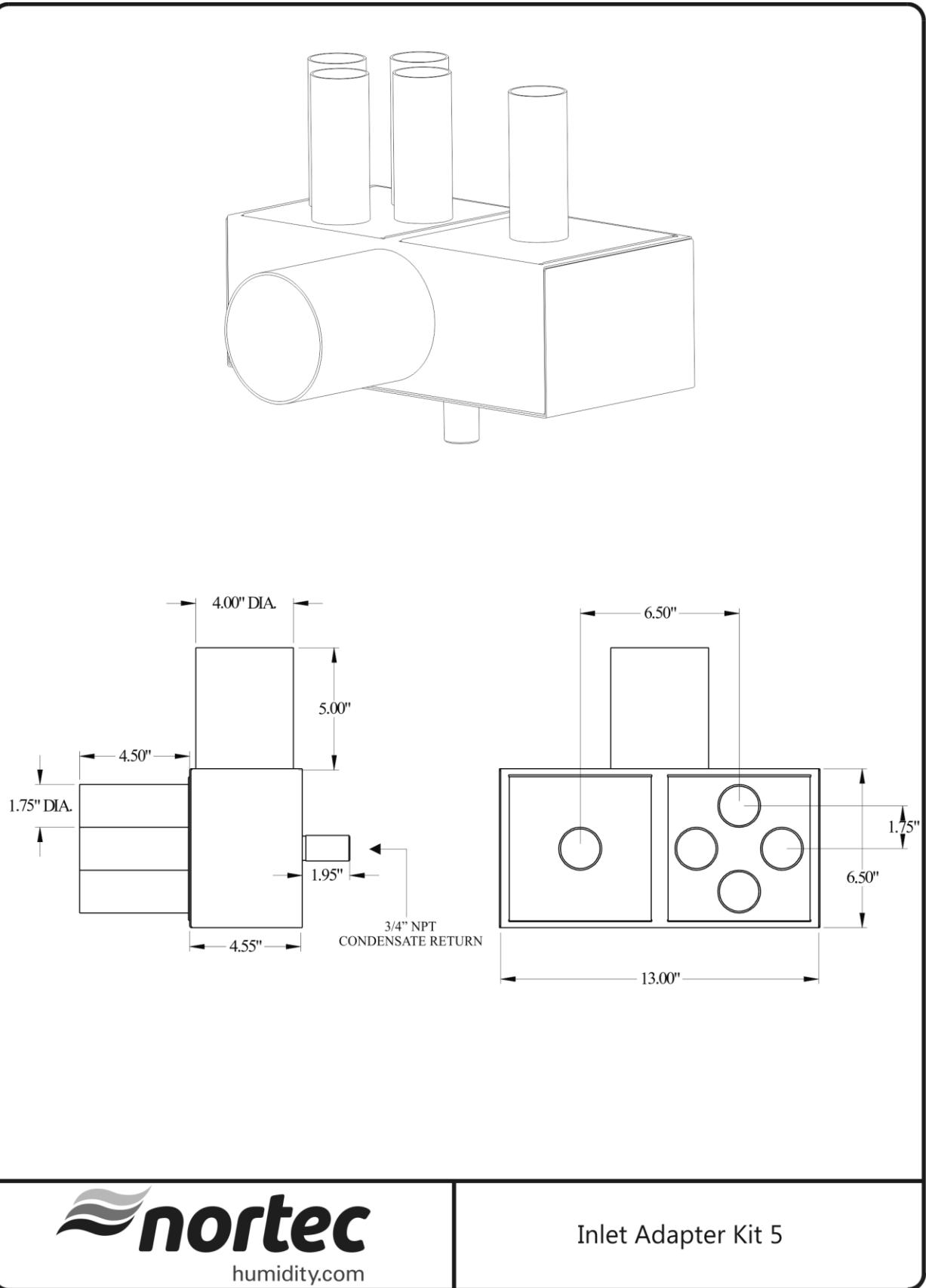


Part No.	Description	L (in. (mm))	M (in. (mm))
1503483	Kit 5, SAM-e, 5x1-3/4" x 5"	5.0 (127)	4.8 (122)
2526037	Kit 5, SAM-e, 5x1-3/4" x 10"	10.0 (254)	9.8 (249)
2526039	Kit 5, SAM-e, 5x1-3/4" x 12"	12.0 (305)	11.8 (300)


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Inlet Adapter Kit 5

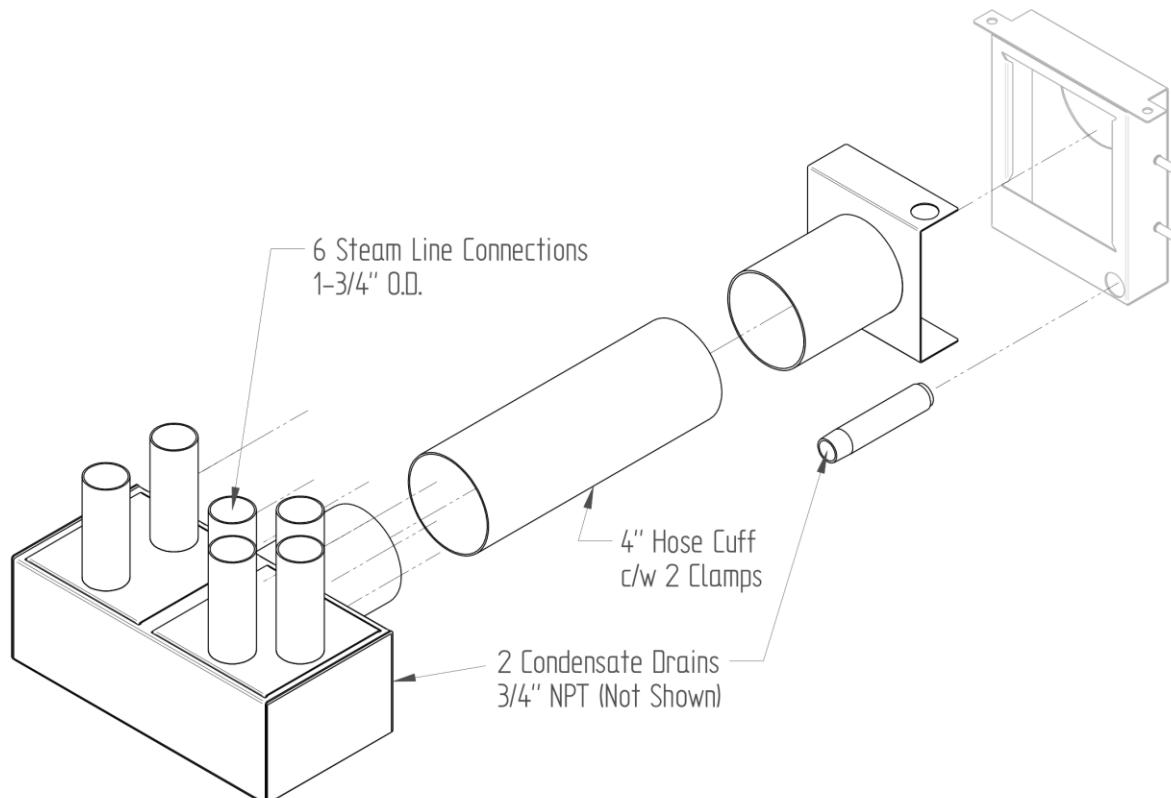
Figure 7: KIT 5 - Header and Adapter Configuration



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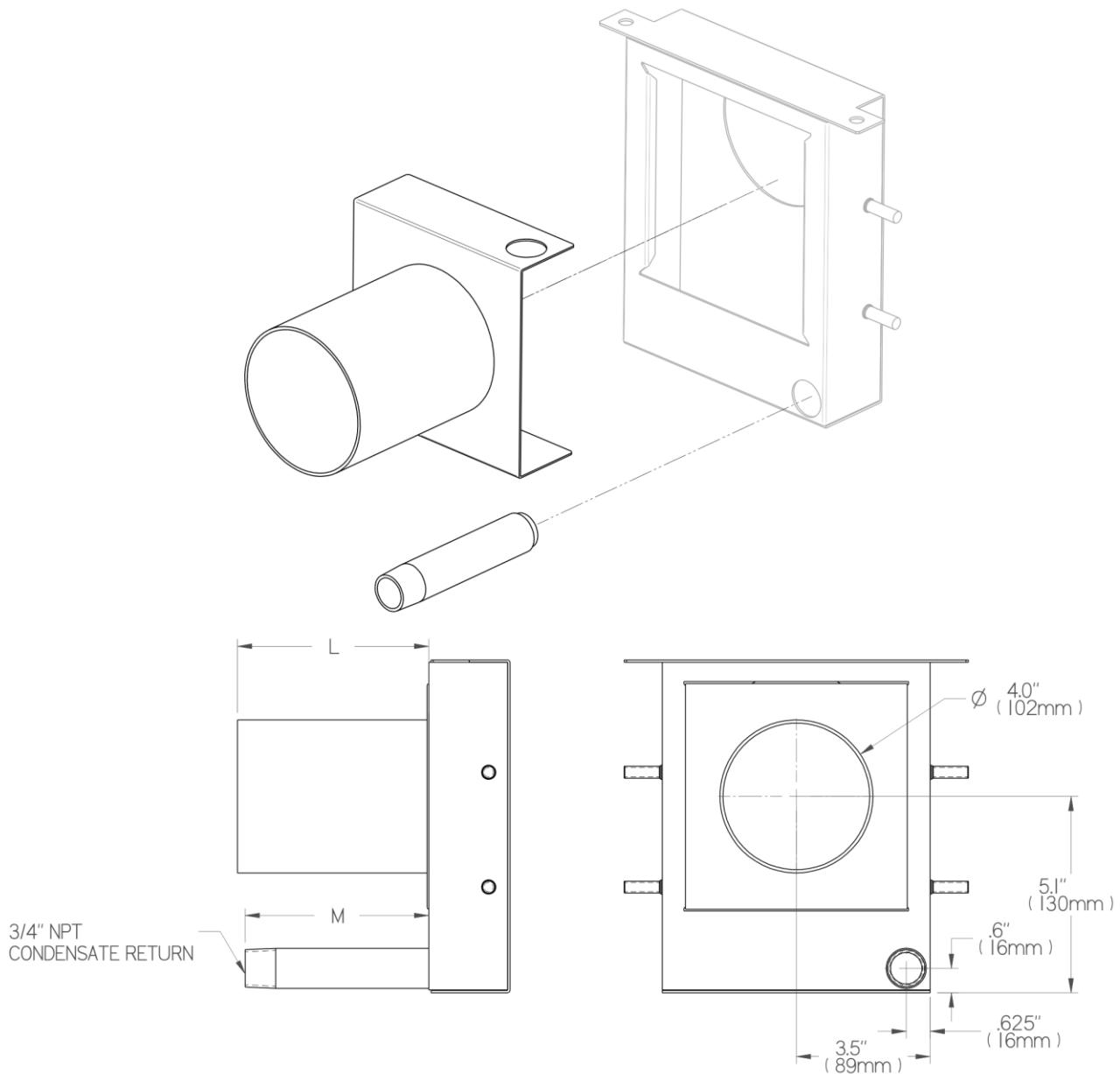
Inlet Adapter Kit 5

Figure 8: KIT 5 - Header and Adapter Configuration



Inlet Adapter Kit 6, SAM-e,
600 lbs/hr 6x1.75"

Figure 9: KIT 6 - Header and Adapter Configuration

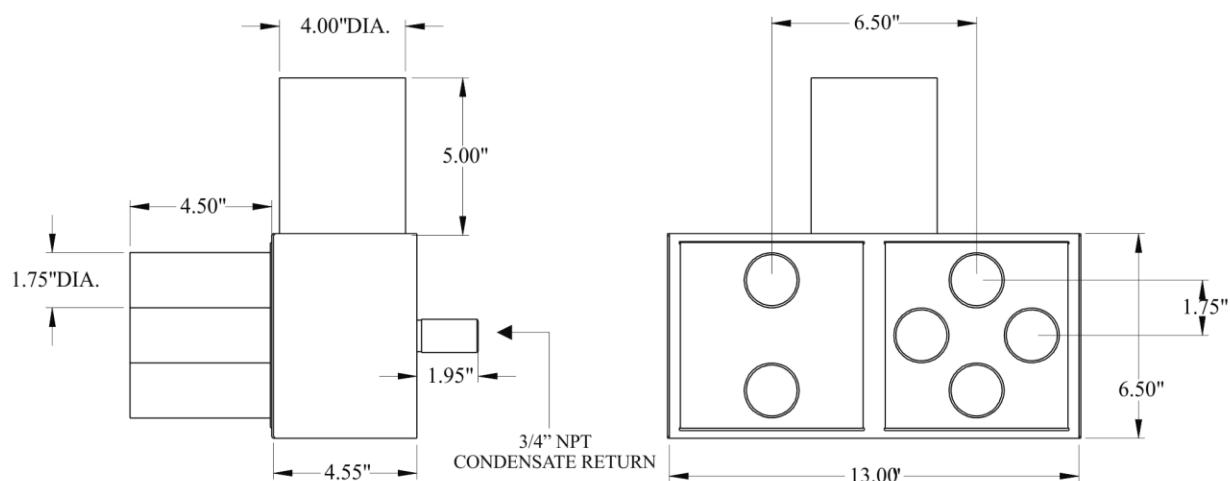
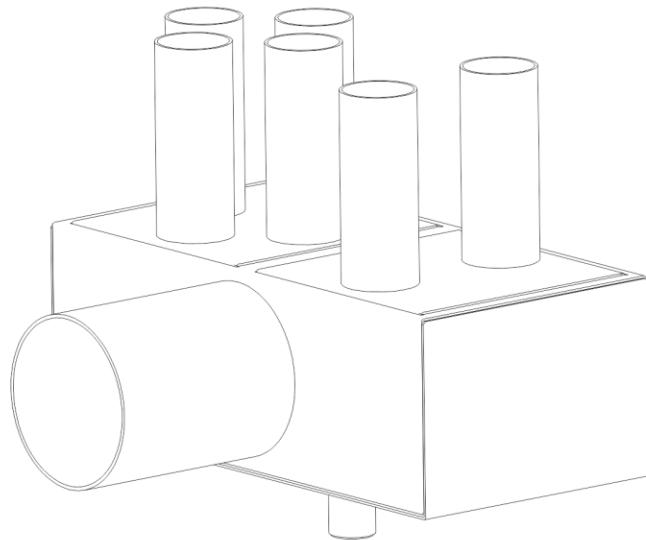


Part No.	Description	L (in. (mm))	M (in. (mm))
1503484	Kit 6, SAM-e, 6x1-3/4" x 5"	5.0 (127)	4.8 (122)
2526040	Kit 6, SAM-e, 6x1-3/4" x 10"	10.0 (254)	9.8 (249)
2526041	Kit 6, SAM-e, 6x1-3/4" x 12"	12.0 (305)	11.8 (300)



Inlet Adapter Kit 6

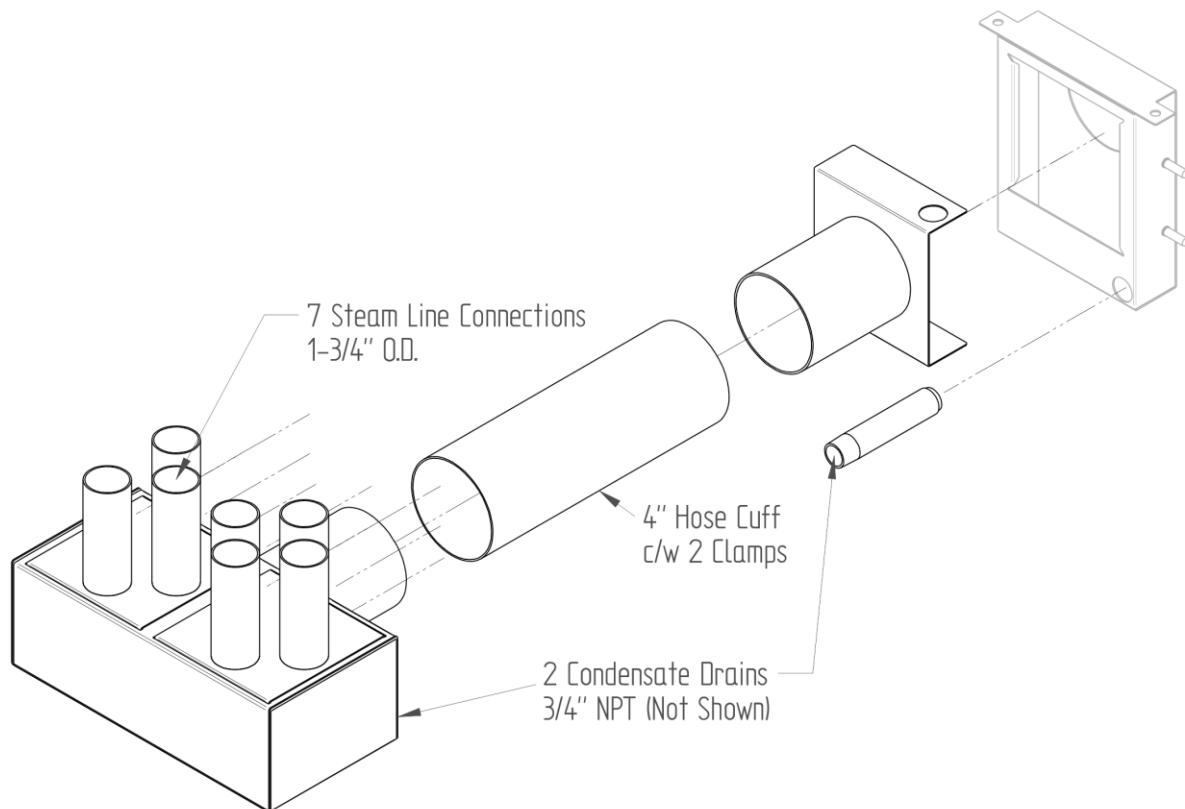
Figure 10: KIT 6 - Header and Adapter Configuration



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Inlet Adapter Kit 6

Figure 11: KIT 6 - Header and Adapter Configuration



Inlet Adapter Kit 7, SAM-e,
700 lbs/hr 7x1.75"

Figure 12: KIT 7 - Header and Adapter Configuration

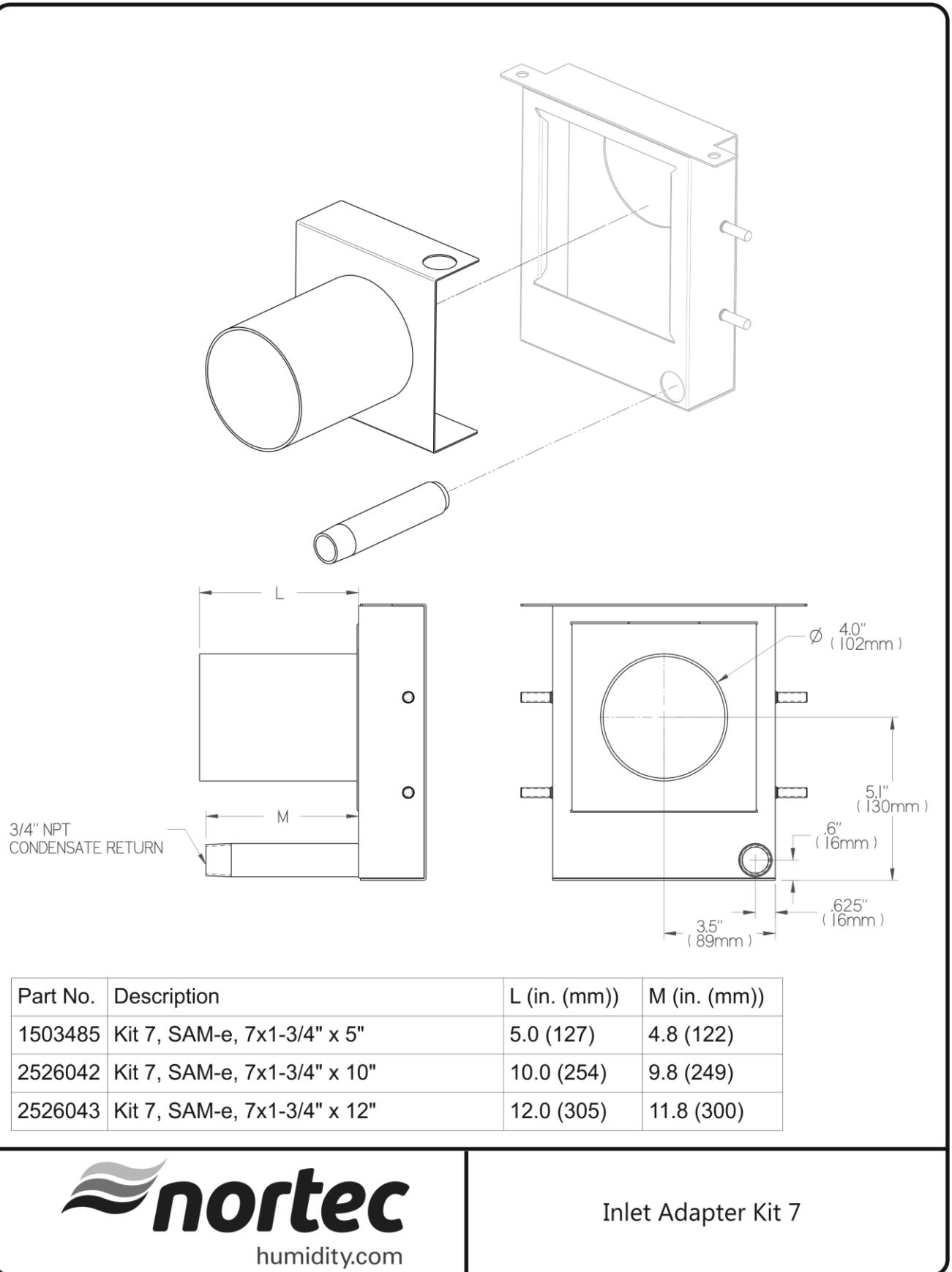
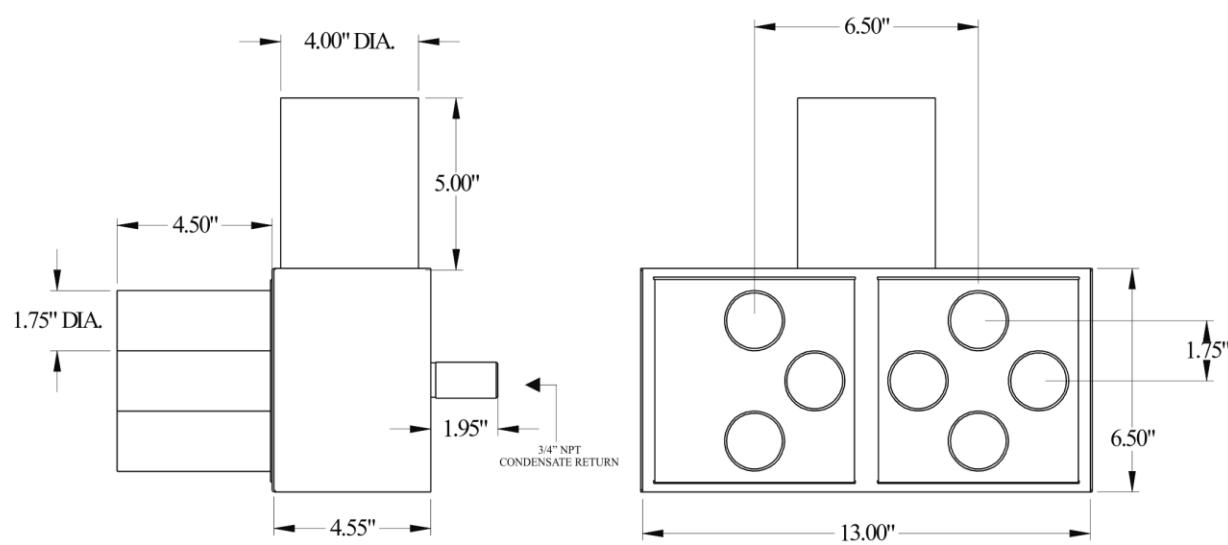
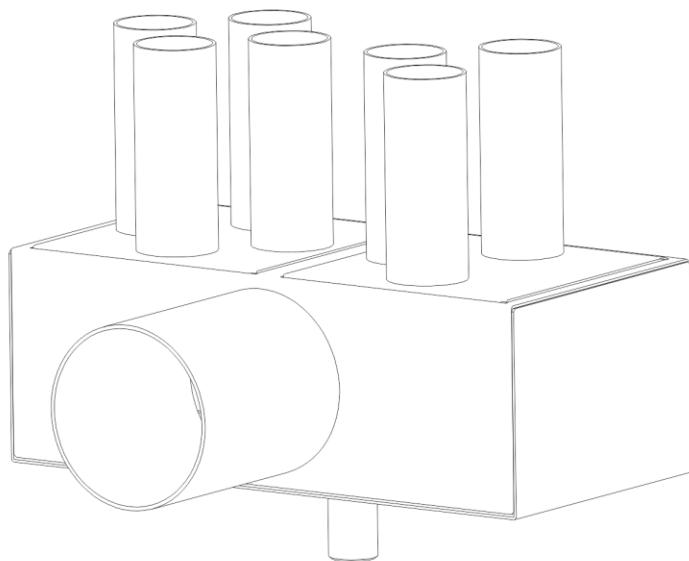


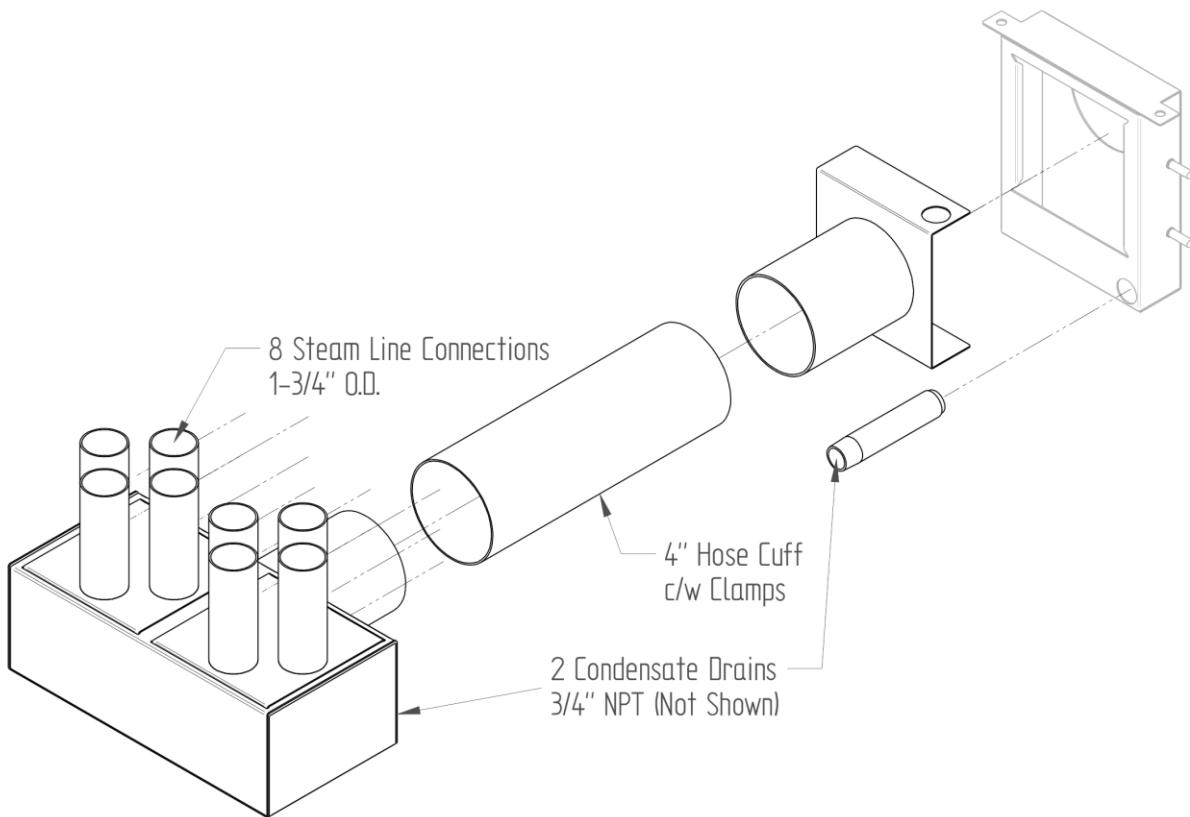
Figure 13: KIT 7 - Header and Adapter Configuration



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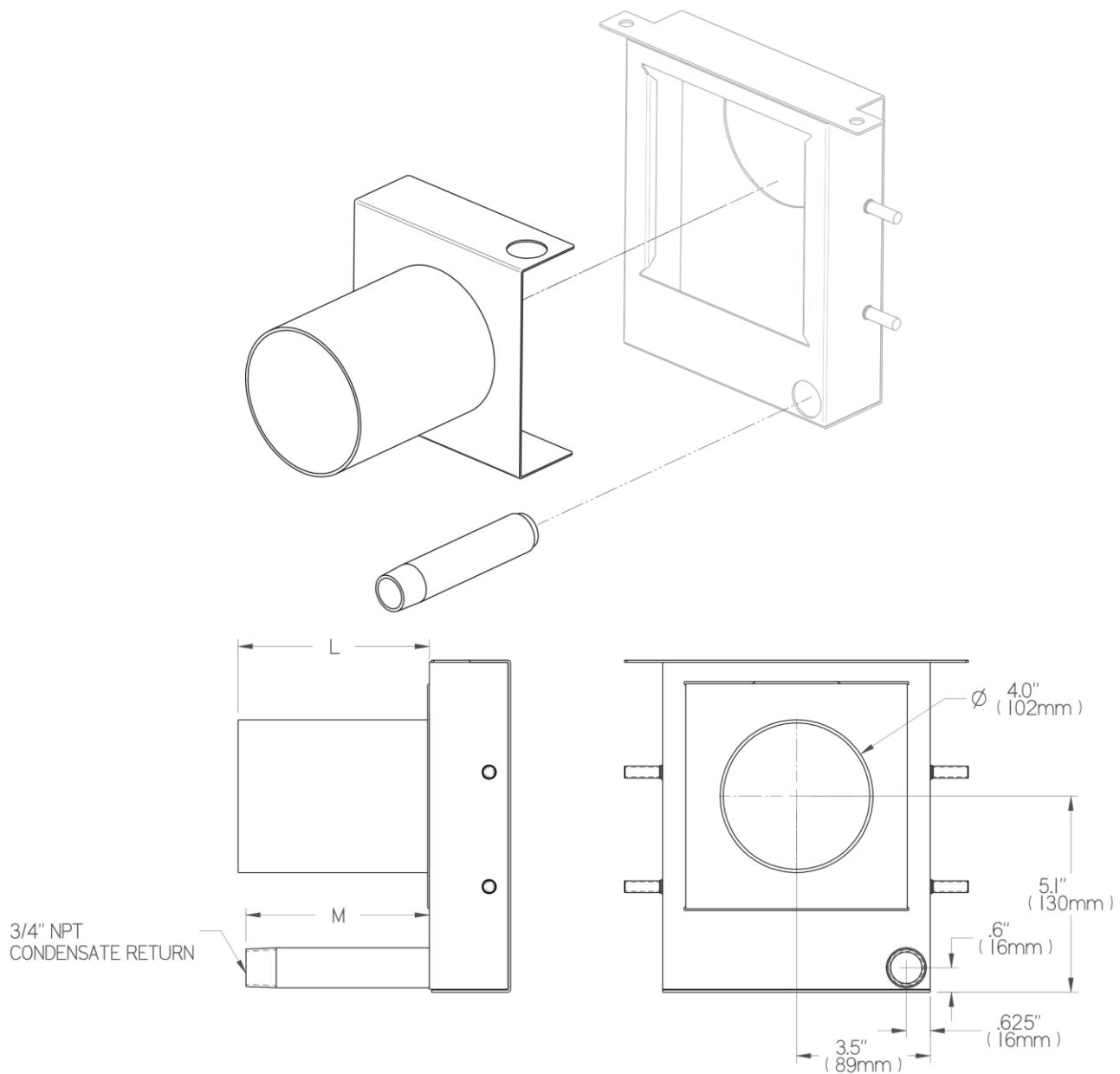
Inlet Adapter Kit 7

Figure 14: KIT 7 - Header and Adapter Configuration



Inlet Adapter Kit 8, SAM-e,
800 lbs/hr 8x1.75"

Figure 15: KIT 8 - Header and Adapter Configuration

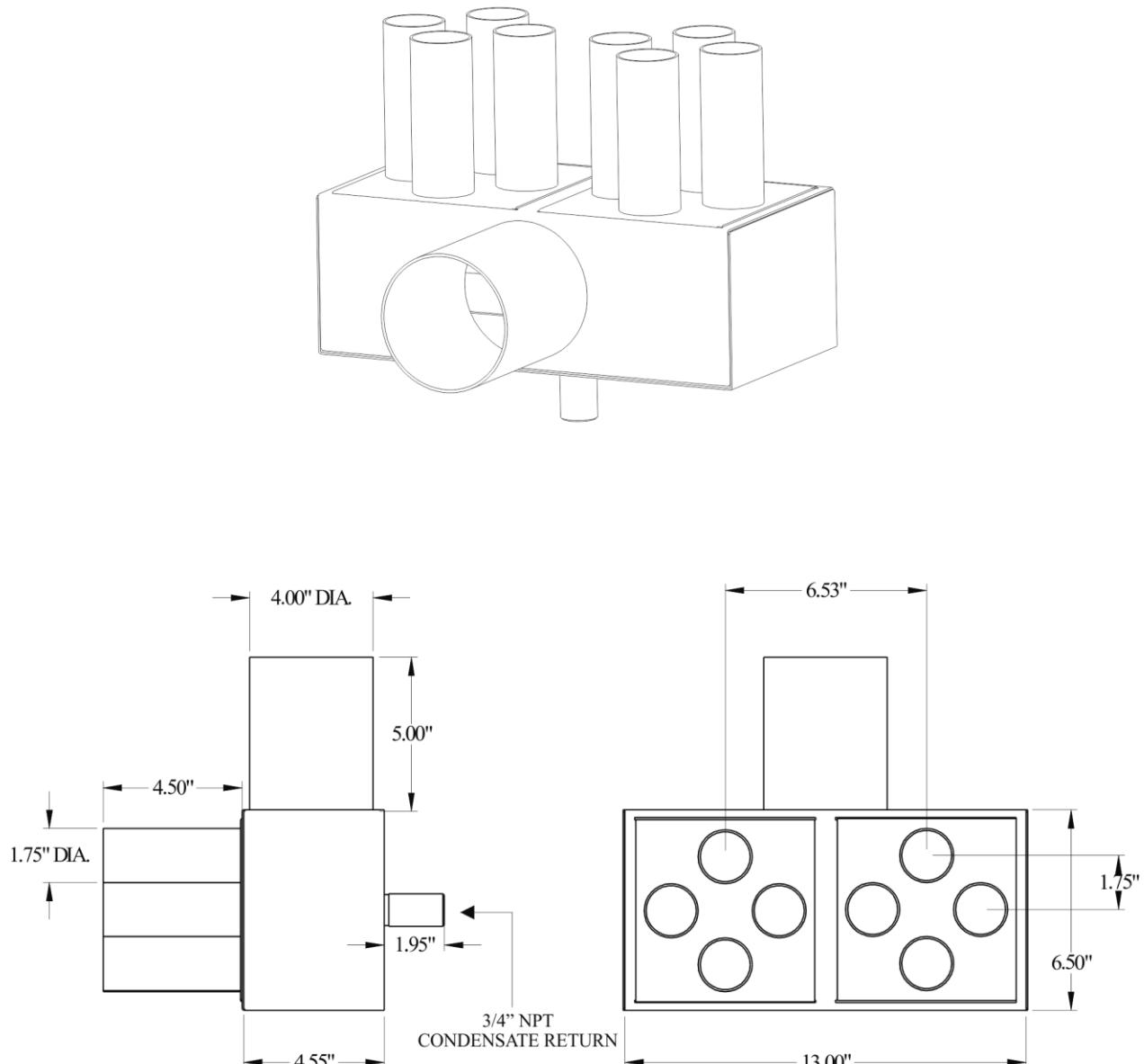


Part No.	Description	L (in. (mm))	M (in. (mm))
1503486	Kit 8, SAM-e, 8x1-3/4" x 5"	5.0 (127)	4.8 (122)
2526044	Kit 8, SAM-e, 8x1-3/4" x 10"	10.0 (254)	9.8 (249)
2526045	Kit 8, SAM-e, 8x1-3/4" x 12"	12.0 (305)	11.8 (300)



Inlet Adapter Kit 8

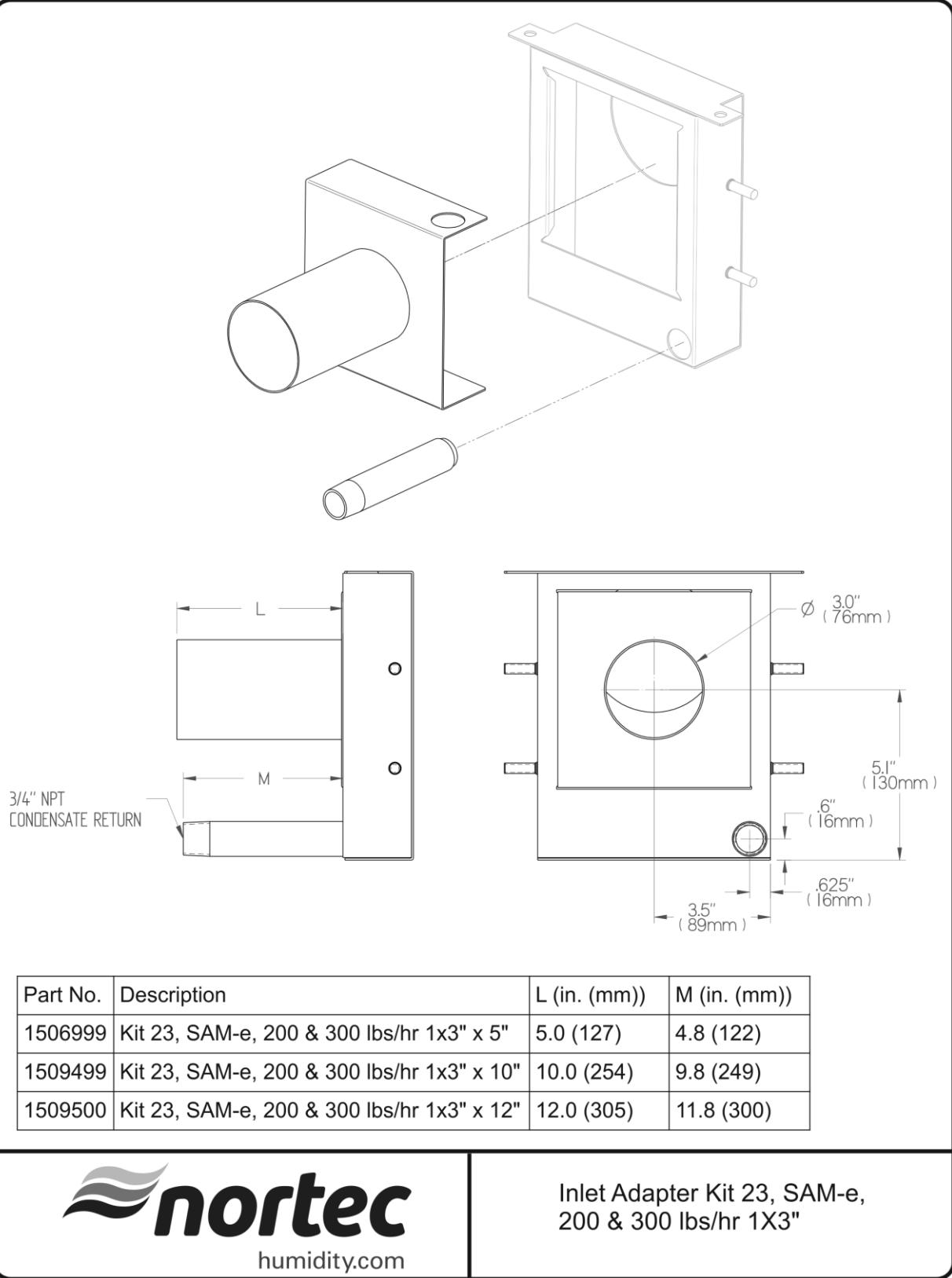
Figure 16: KIT 8 - Header and Adapter Configuration



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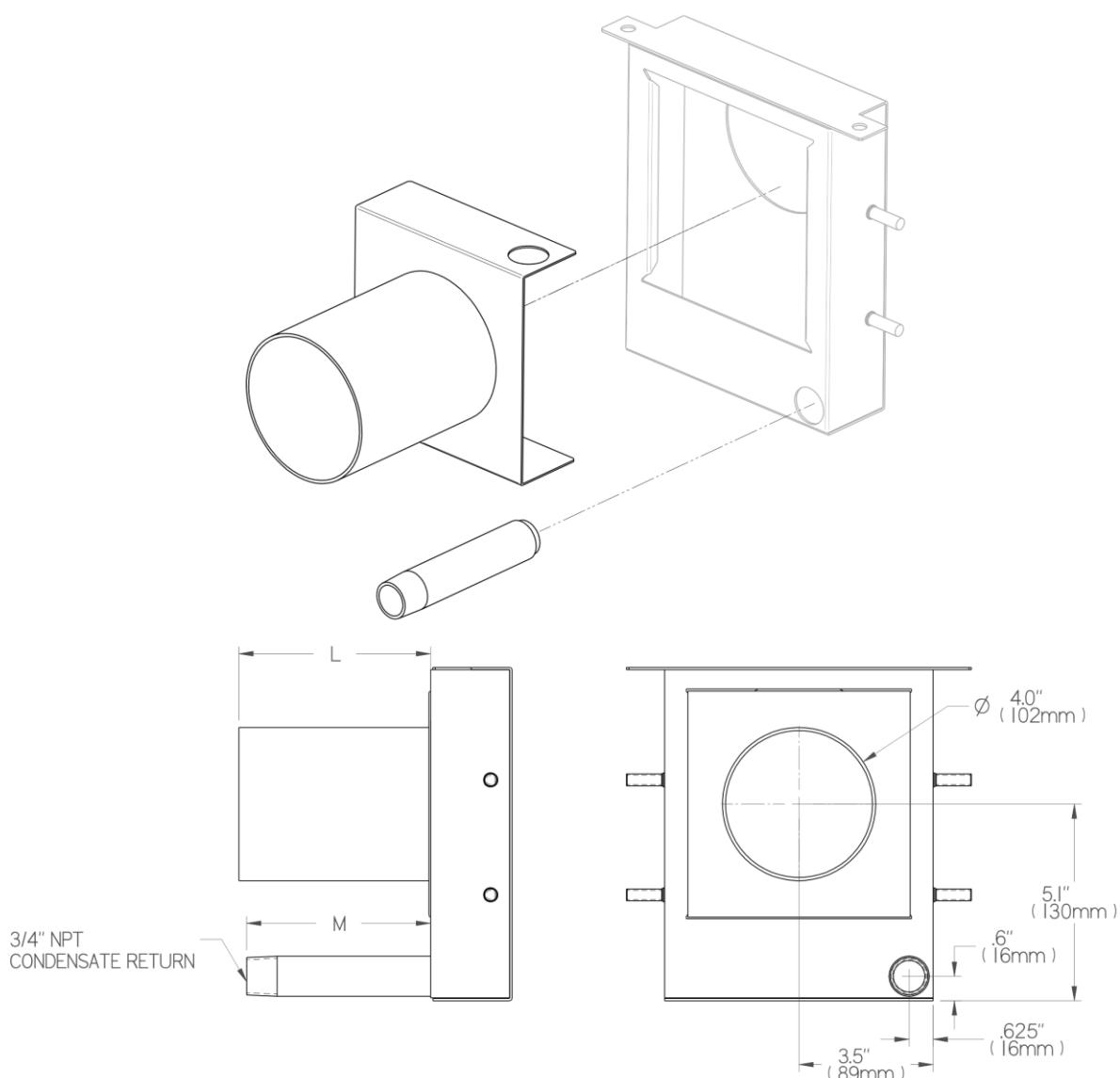
Inlet Adapter Kit 8

Figure 17: KIT 8 - Header and Adapter Configuration



Inlet Adapter Kit 23, SAM-e,
200 & 300 lbs/hr 1X3"

Figure 18: KIT 23 - Header and Adapter Configuration

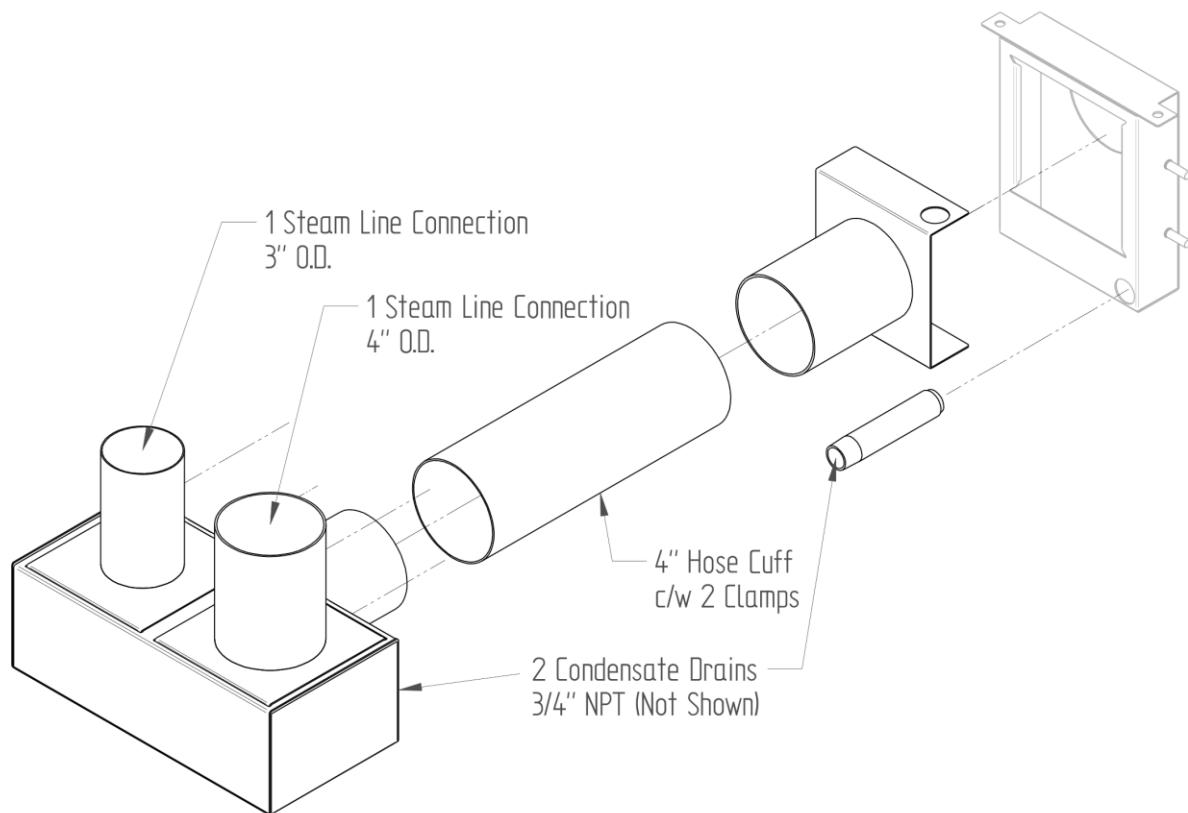


Part No.	Description	L (in. (mm))	M (in. (mm))
1507001	Kit 24, SAM-e, 400-600 lbs/hr 1x4" x 5"	5.0 (127)	4.8 (122)
1509501	Kit 24, SAM-e, 400-600 lbs/hr 1x4" x 10"	10.0 (254)	9.8 (249)
1509502	Kit 24, SAM-e, 400-600 lbs/hr 1x4" x 12"	12.0 (305)	11.8 (300)



Inlet Adapter Kit 24, SAM-e,
400-600 lbs/hr 1x4"

Figure 19: KIT 24 - Header and Adapter Configuration



Inlet Adapter Kit 25, SAM-e,
700 & 800 lbs/hr 1x3" + 1x4"

Figure 20: KIT 25 - Header and Adapter Configuration

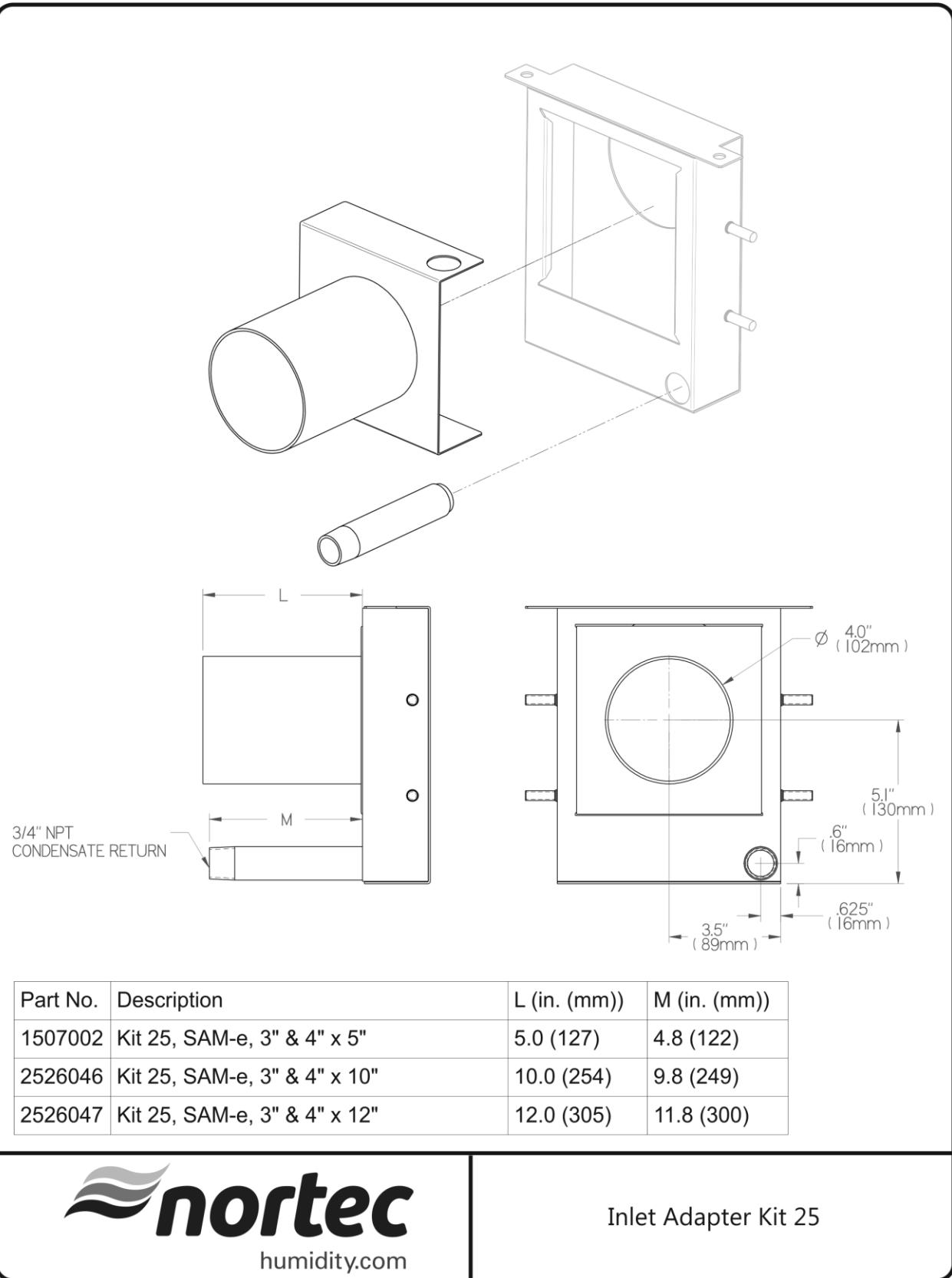
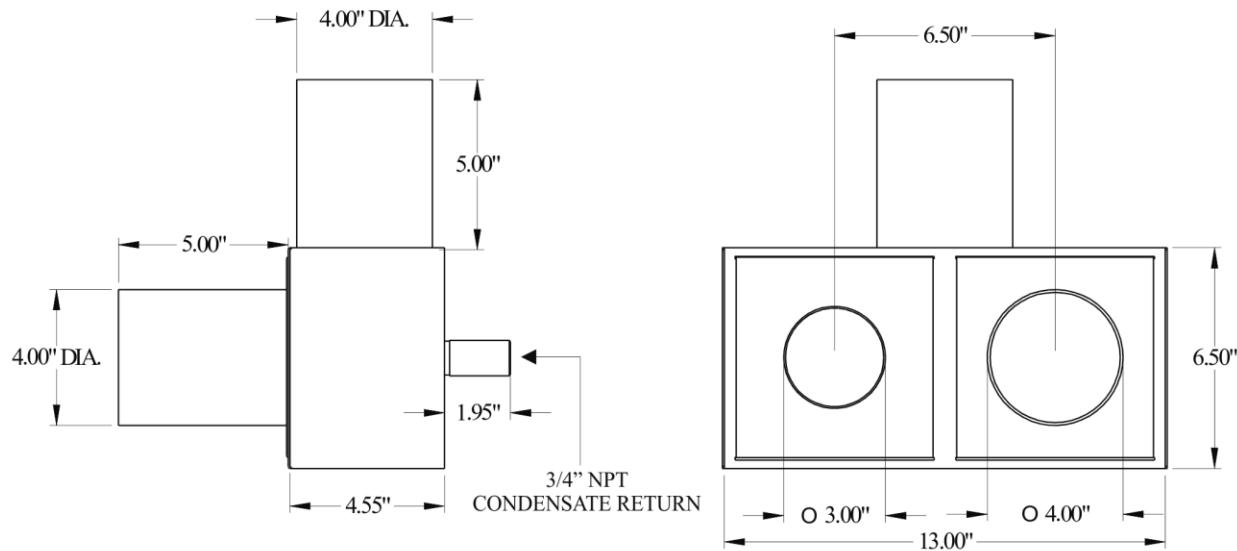
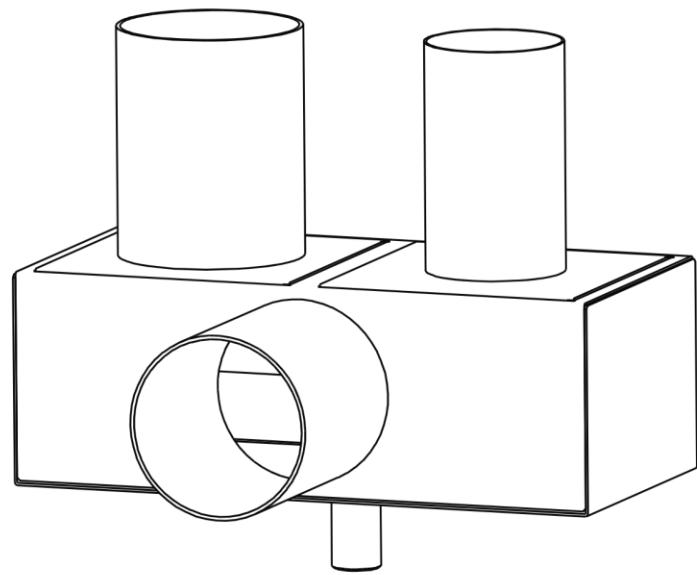


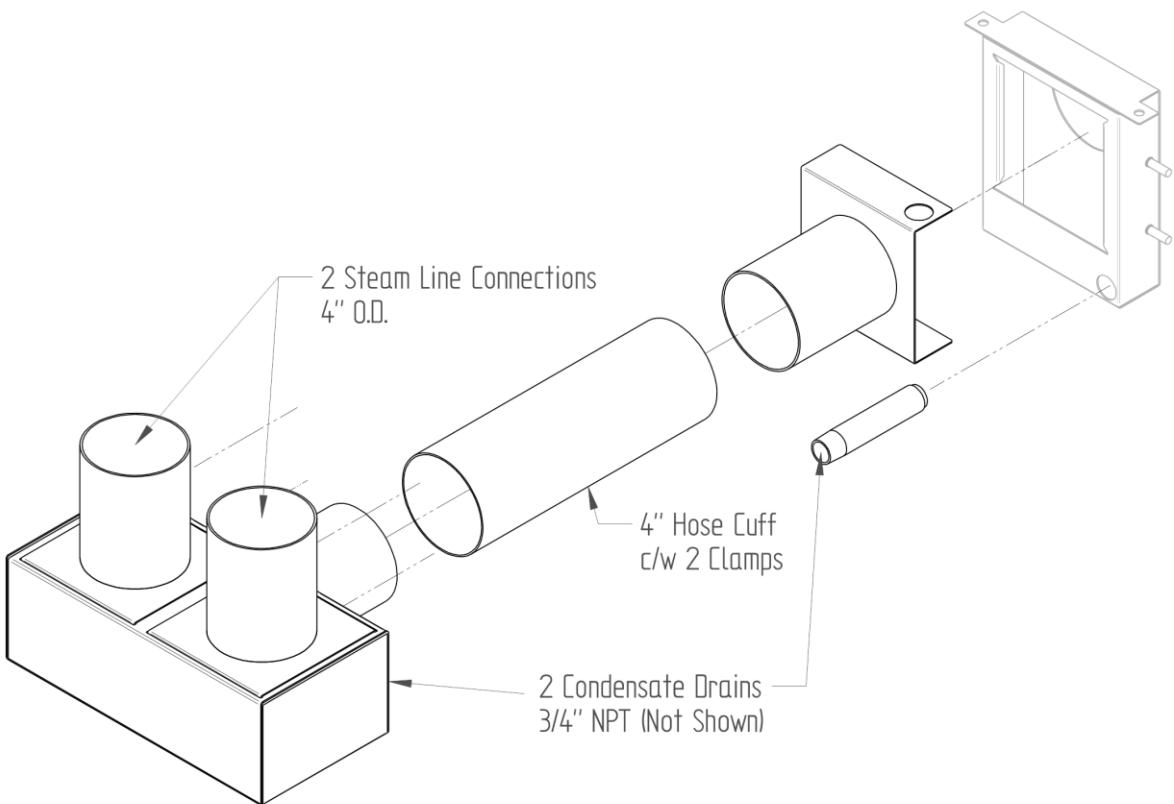
Figure 21: KIT 25 - Header and Adapter Configuration



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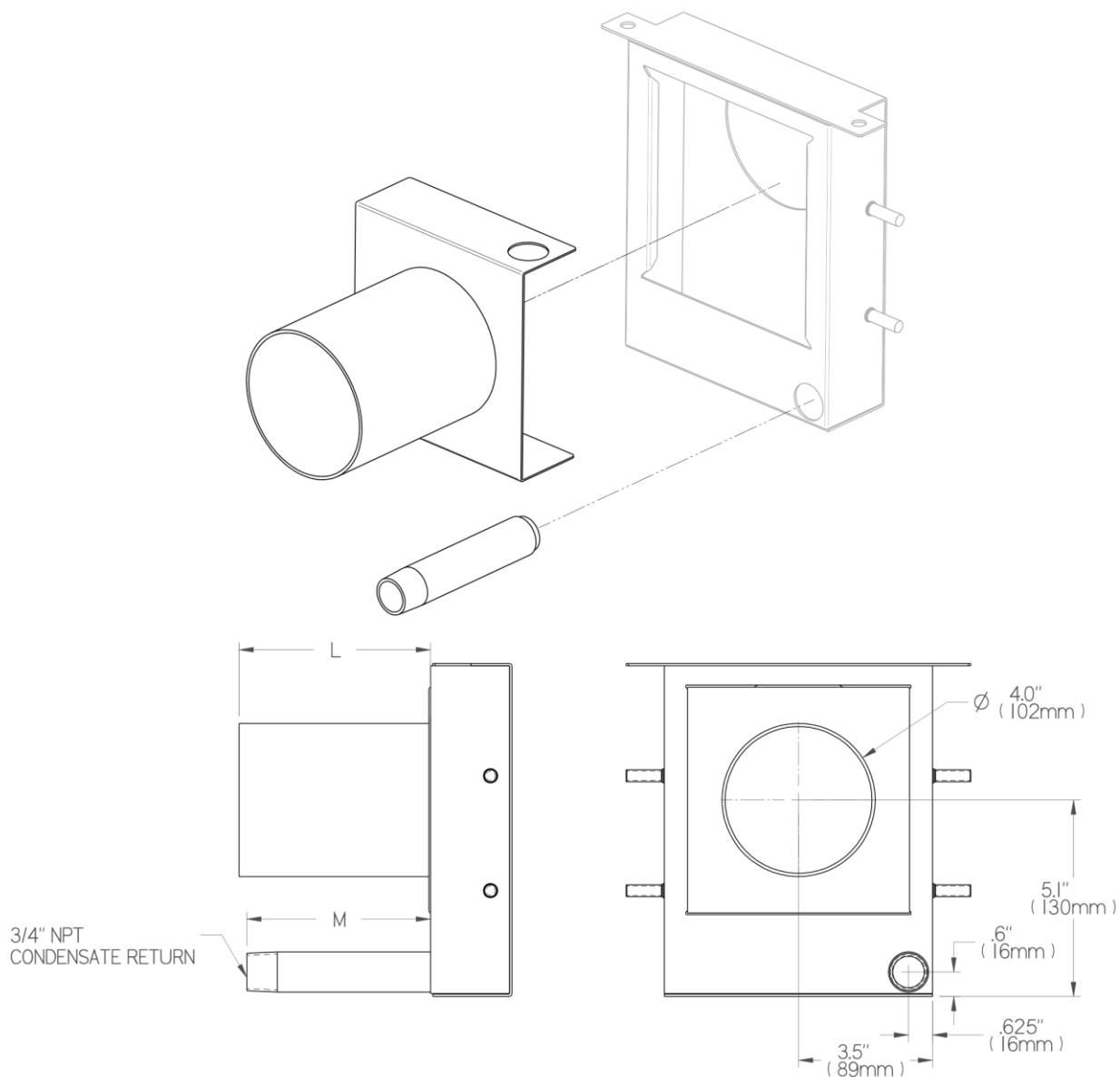
Inlet Adapter Kit 25

Figure 22: KIT 25 - Header and Adapter Configuration



Inlet Adapter Kit 26, SAM-e,
800 lbs/hr 2x4"

Figure 23: KIT 26 - Header and Adapter Configuration

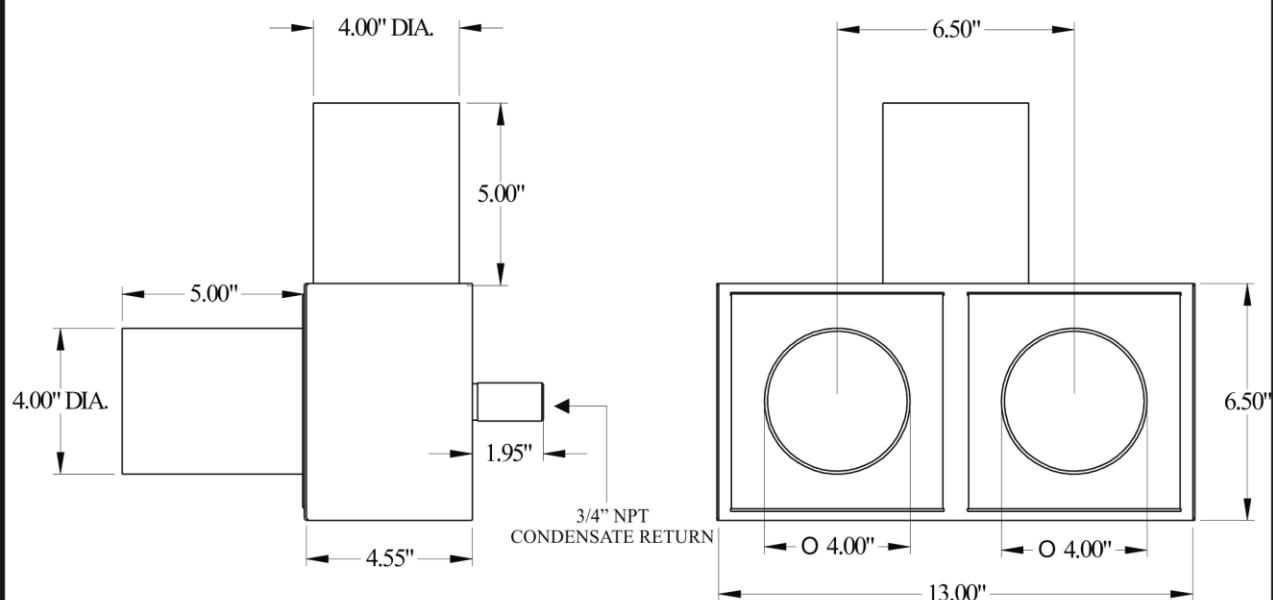
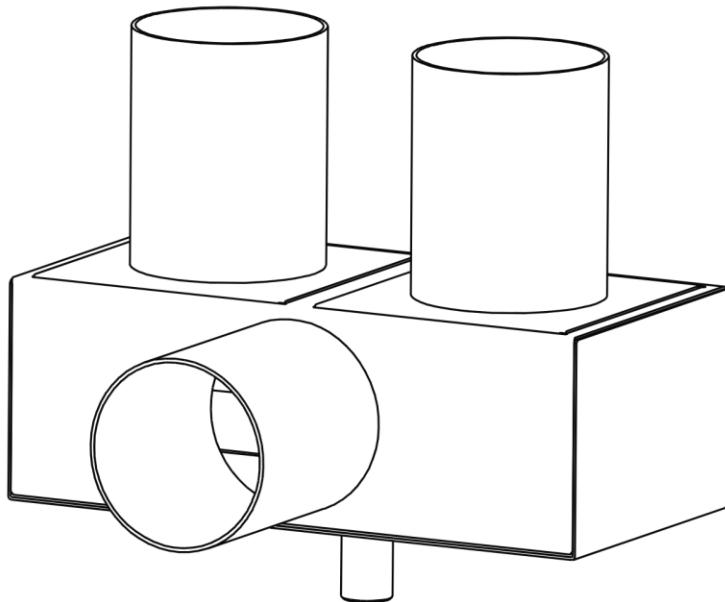


Part No.	Description	L (in. (mm))	M (in. (mm))
1507003	Kit 26, SAM-e, 2x4" x 5"	5.0 (127)	4.8 (122)
2526048	Kit 26, SAM-e, 2x4" x 10"	10.0 (254)	9.8 (249)
2526049	Kit 26, SAM-e, 2x4" x 12"	12.0 (305)	11.8 (300)



Inlet Adapter Kit 26

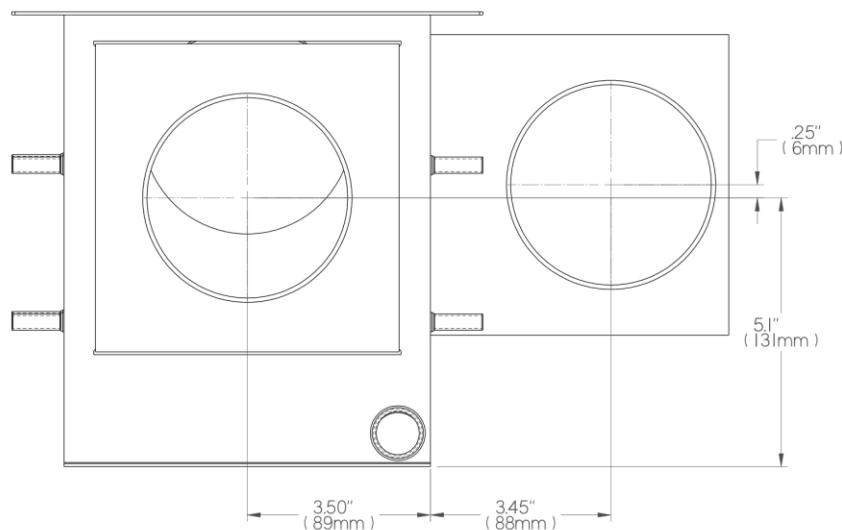
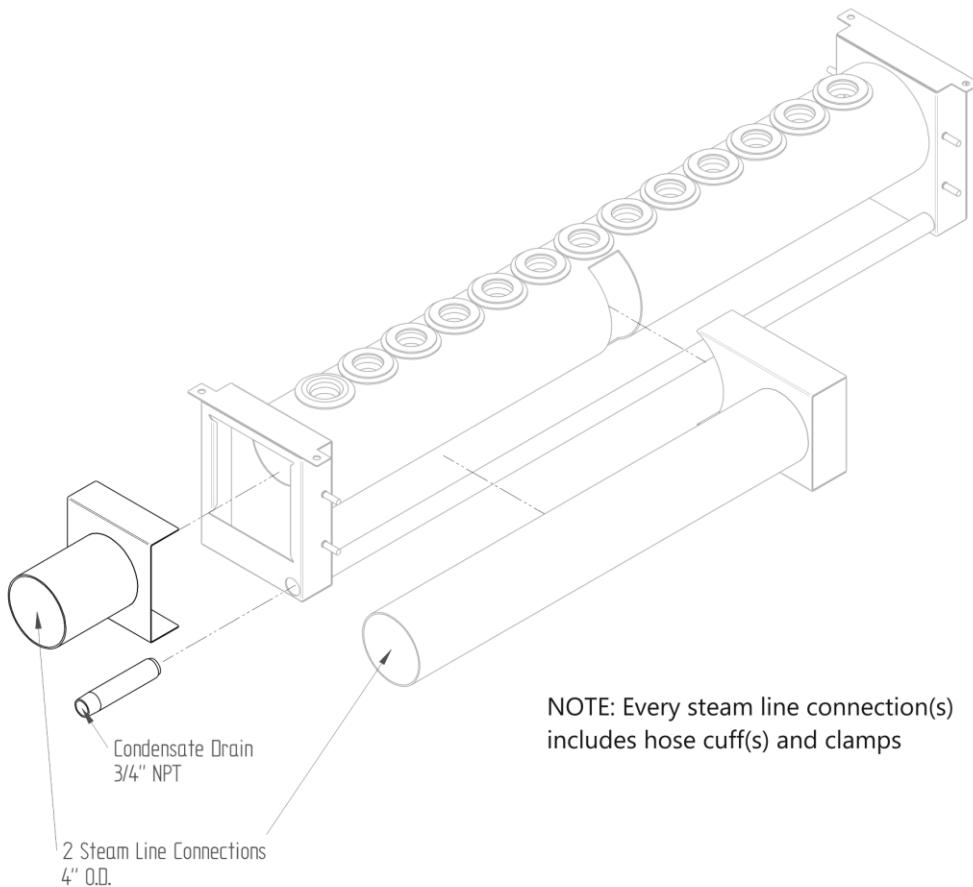
Figure 24: KIT 26 - Header and Adapter Configuration



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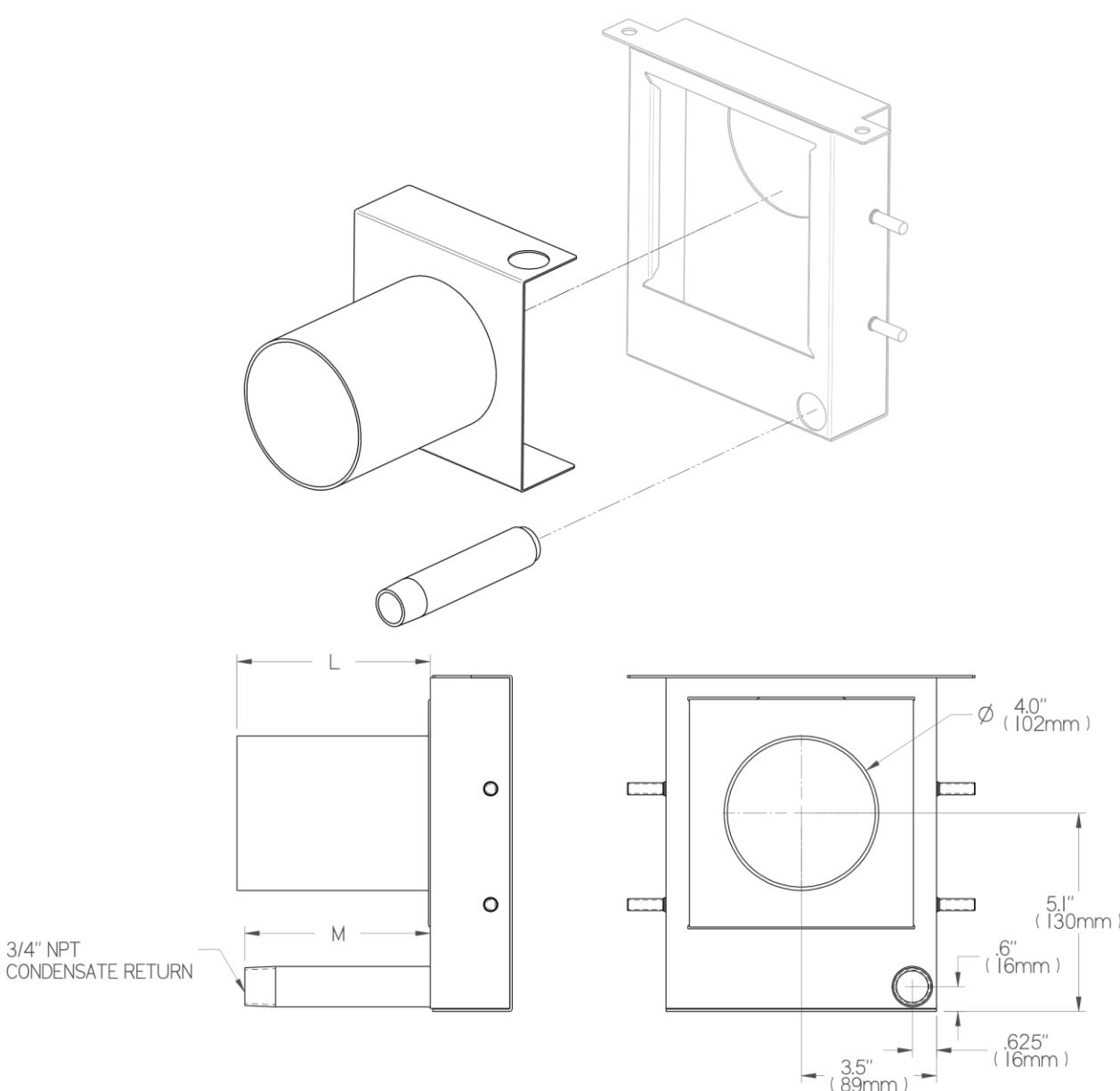
Inlet Adapter Kit 26

Figure 25: KIT 26 - Header and Adapter Configuration



Inlet Adapter Kit 27, SAM-e,
1200 lbs/hr 2x4"

Figure 26: KIT 27 - Header and Adapter Configuration



Part No.	Description	L (in. (mm))	M (in. (mm))
1507004	Kit 27, SAM-e, 2x4" x 5"	5.0 (127)	4.8 (122)
2526050	Kit 27, SAM-e, 2x4" x 10"	10.0 (254)	9.8 (249)
2526051	Kit 27, SAM-e, 2x4" x 12"	12.0 (305)	11.8 (300)



Inlet Adapter Kit 27

Figure 27: KIT 27 - Header and Adapter Configuration

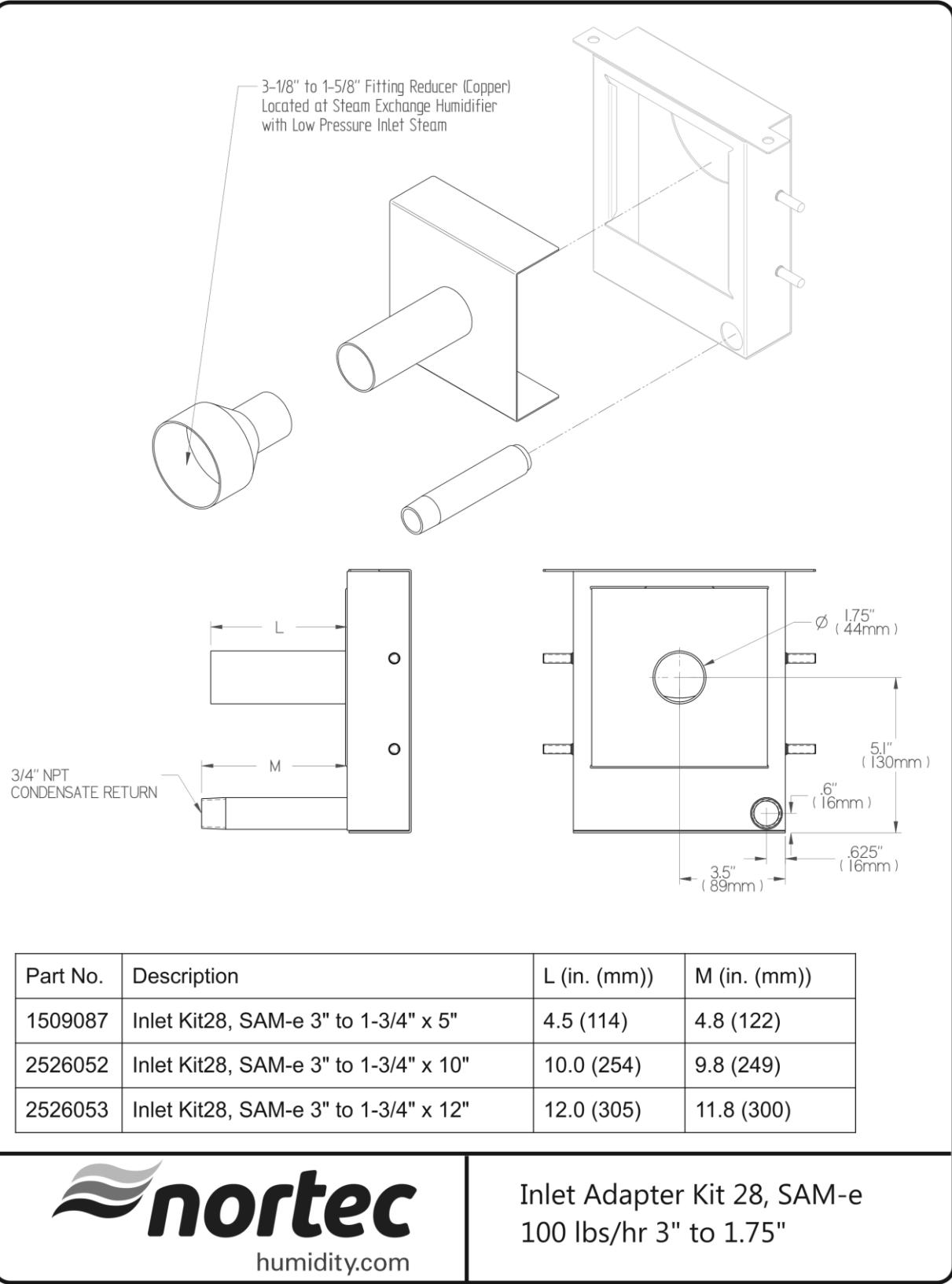


Figure 28: KIT 28 - Header and Adapter Configuration

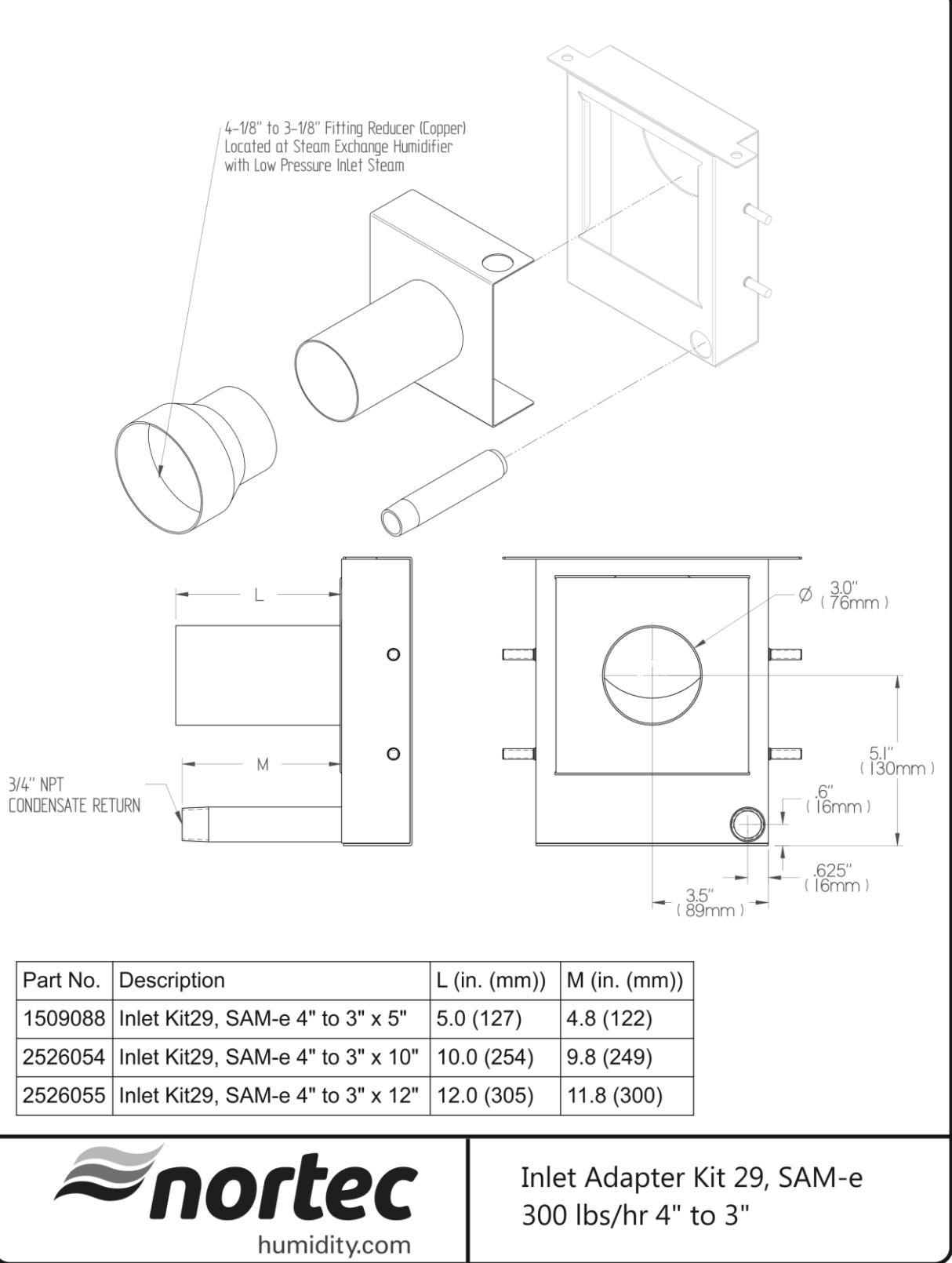
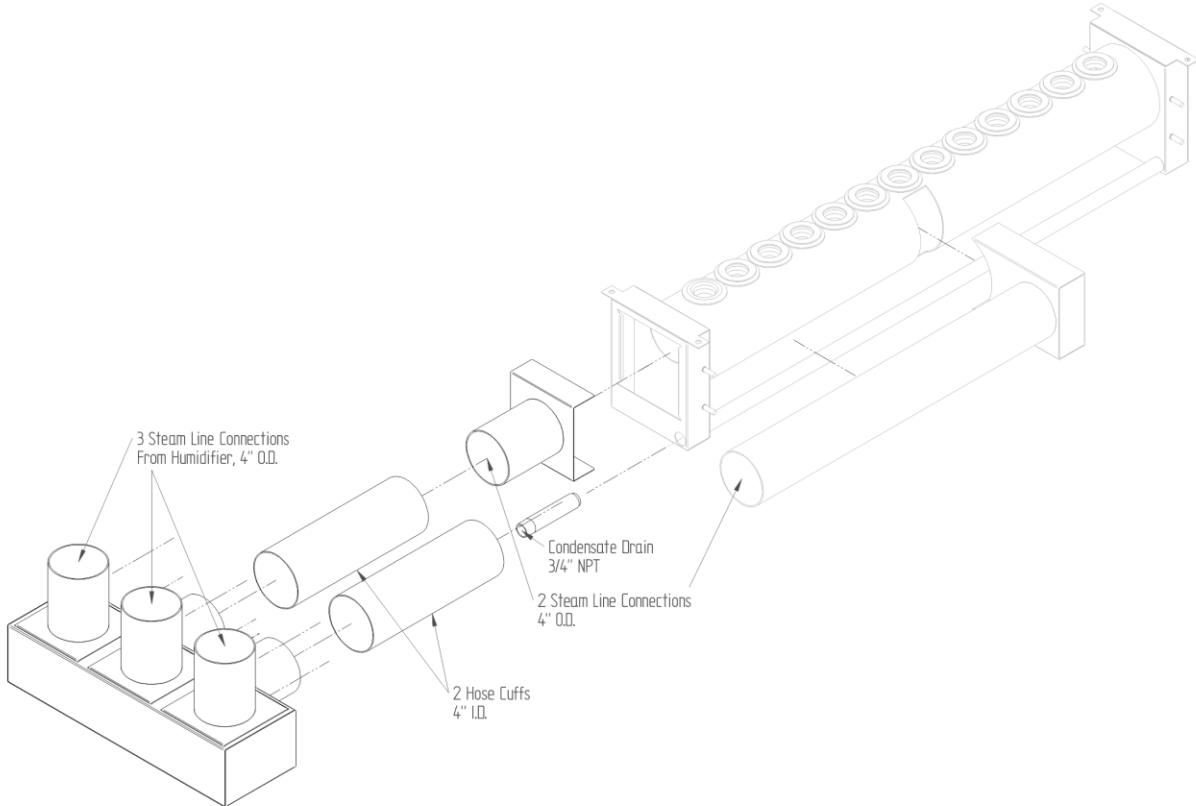


Figure 29: KIT 29 - Header and Adapter Configuration

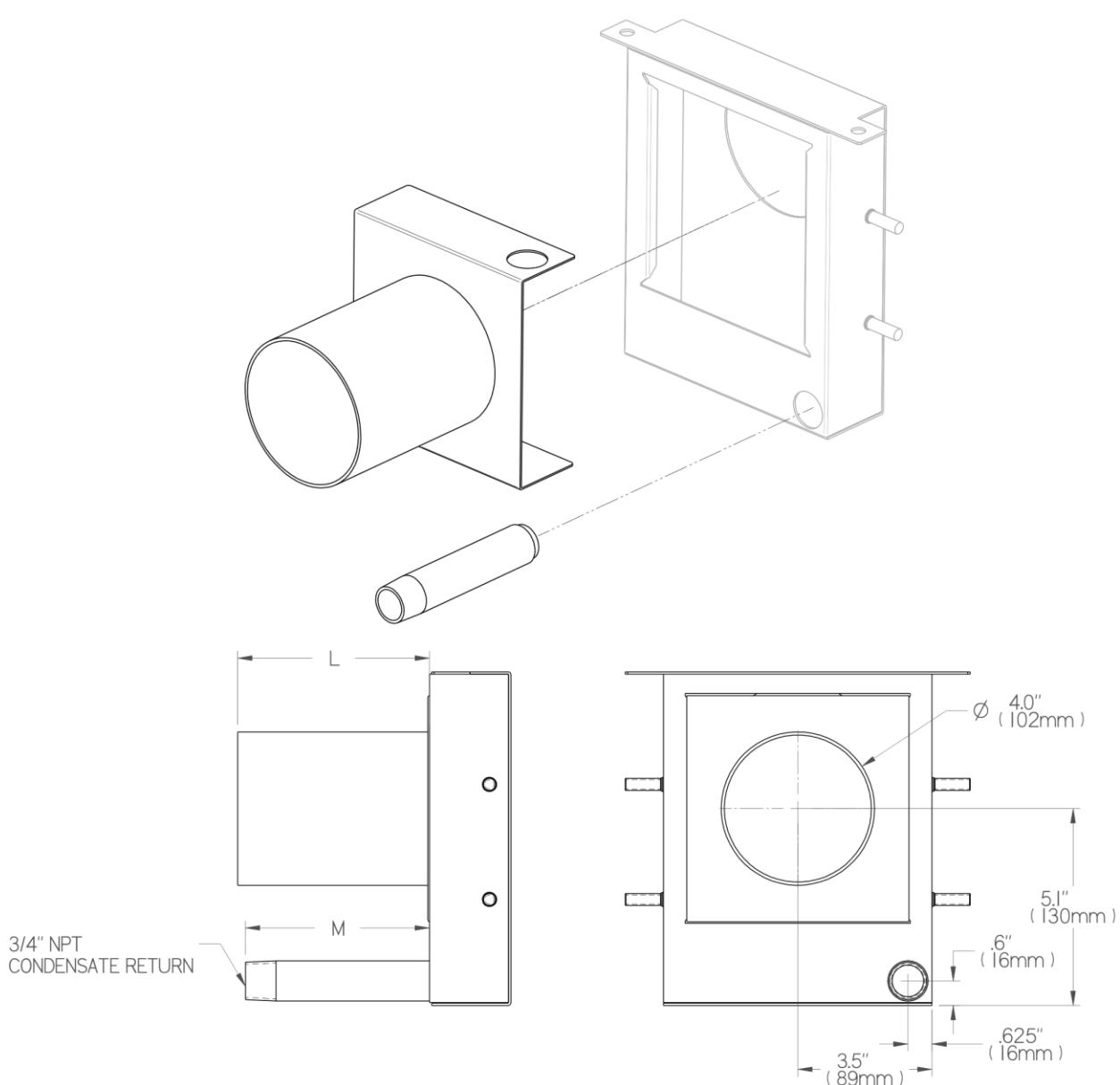


NOTE: Every steam line connection(s)
includes hose cuff(s) and clamps



Inlet Adapter Kit 30, SAM-e
1200 lbs/hr 3x4"

Figure 30: KIT 30 - Header and Adapter Configuration

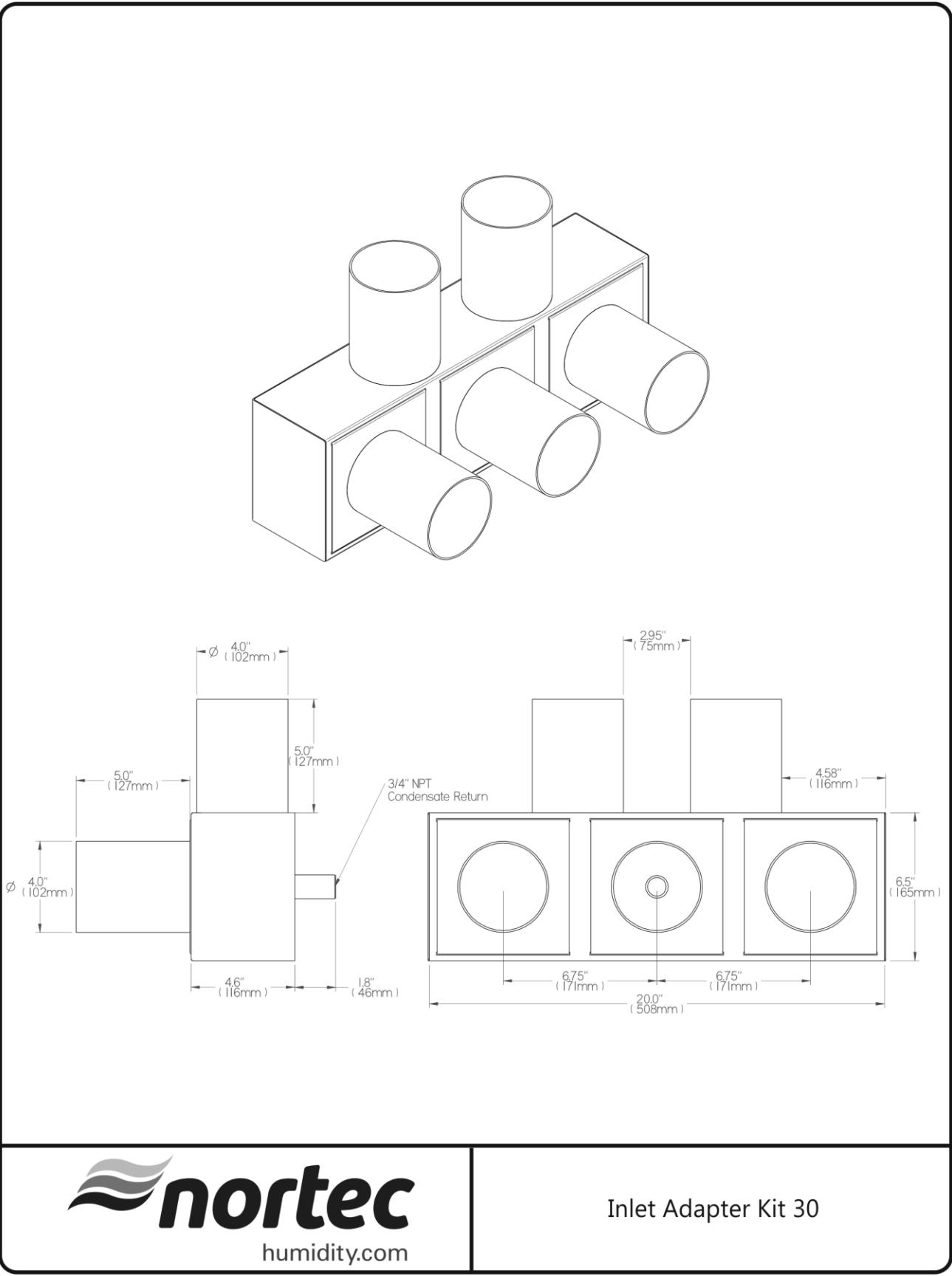


Part No.	Description	L (in. (mm))	M (in. (mm))
1509089	Kit 30, SAM-e, 3x4" x 5"	5.0 (127)	4.8 (122)
2526056	Kit 30, SAM-e, 3x4" x 10"	10.0 (254)	9.8 (249)
2526057	Kit 30, SAM-e, 3x4" x 12"	12.0 (305)	11.8 (300)



Inlet Adapter Kit 30

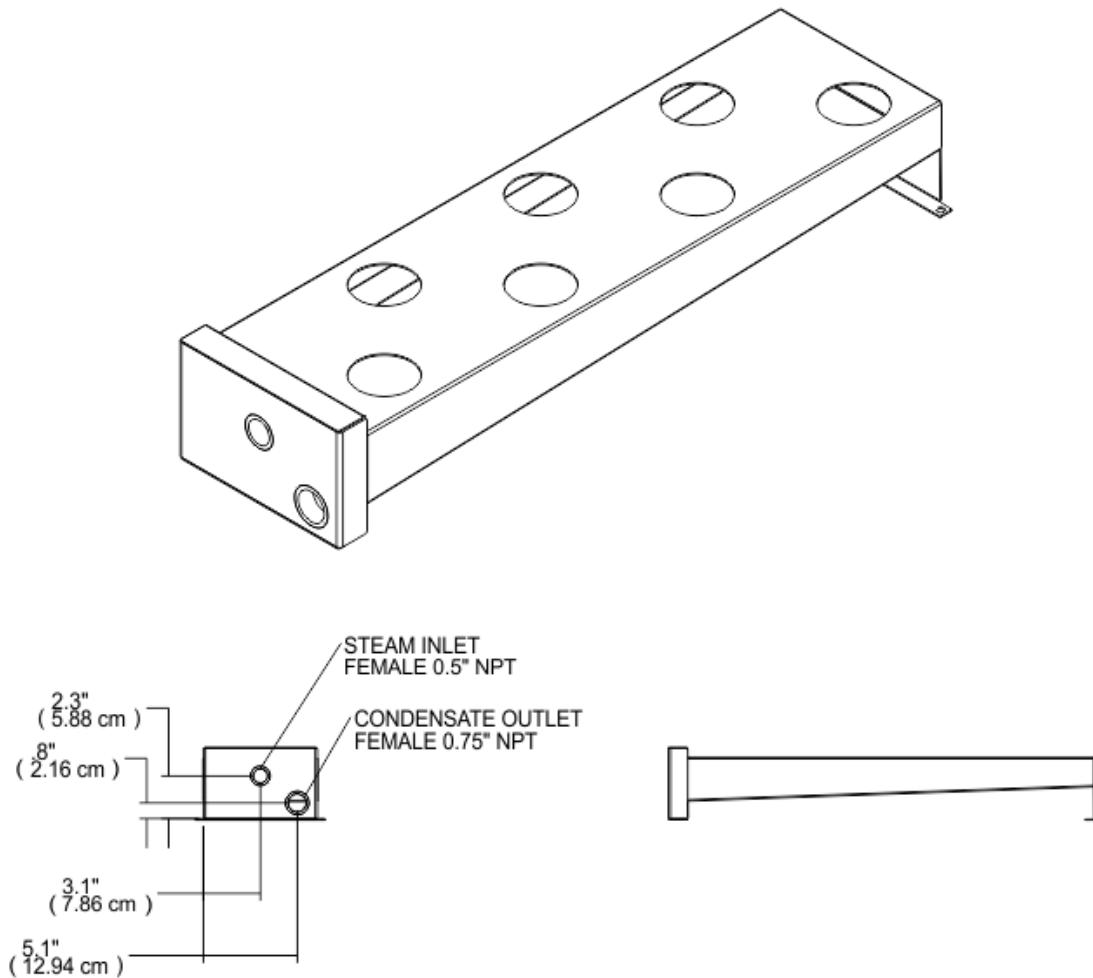
Figure 31: KIT 30 - Header and Adapter Configuration



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Inlet Adapter Kit 30

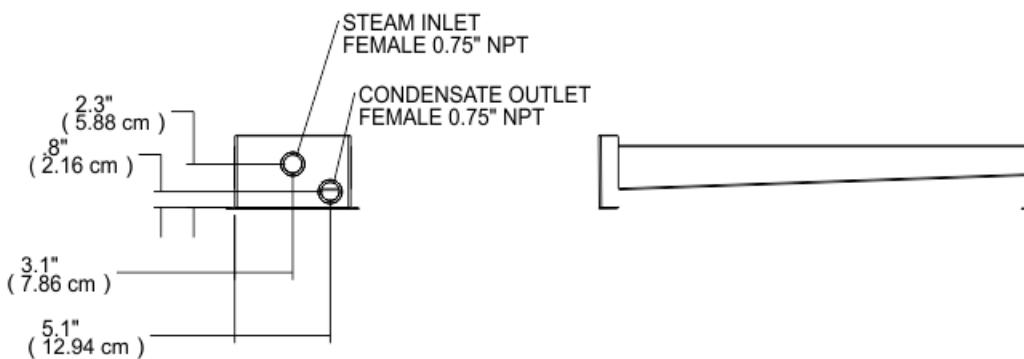
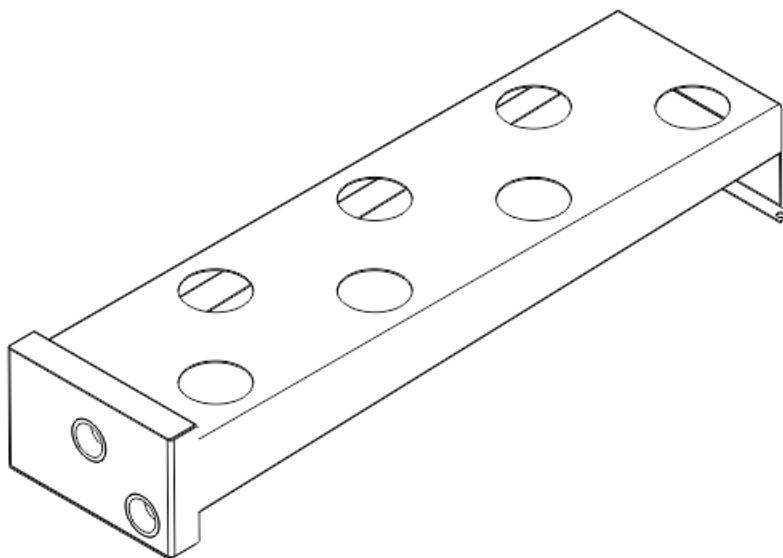
Figure 32: KIT 30 - Header and Adapter Configuration



Part No.	Description
2577686	Header mini SAM-e 12", 3" center, 0.5" NPT
2577698	Header mini SAM-e 18", 3" center, 0.5" NPT
2577710	Header mini SAM-e 24", 3" center, 0.5" NPT
2577692	Header mini SAM-e 12", 6" center, 0.5" NPT
2577704	Header mini SAM-e 18", 6" center, 0.5" NPT
2577716	Header mini SAM-e 24", 6" center, 0.5" NPT

SAM-e Mini Inlet 0.5" NPT

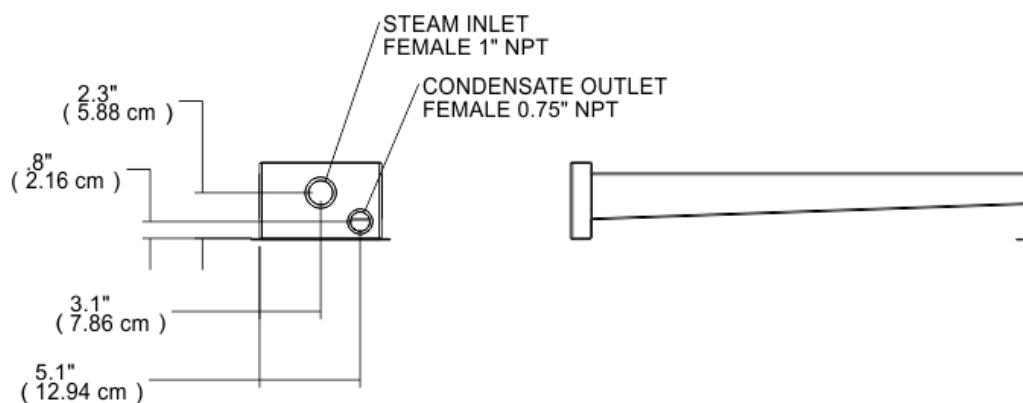
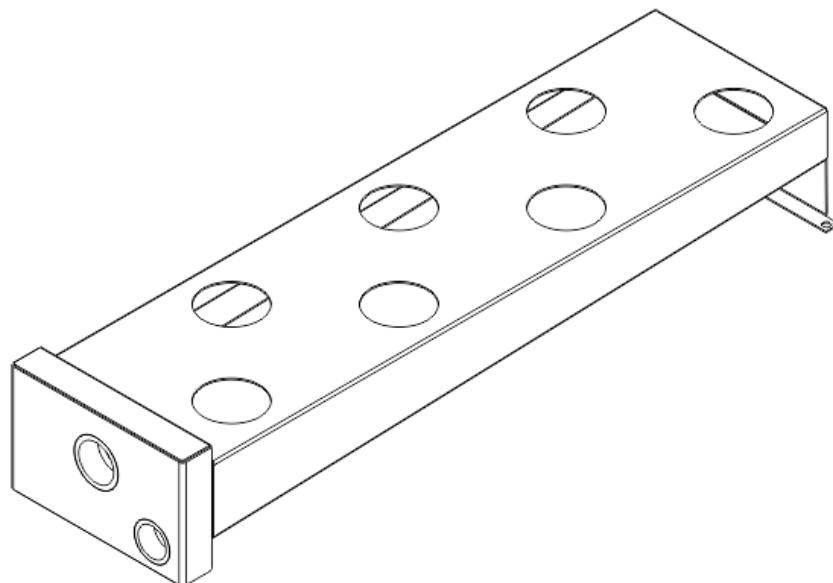
Figure 33: 0.5" NPT Mini Header and Inlet Configuration



Part No.	Description
2577687	Header mini SAM-e 12", 3" center, 0.75" NPT
2577699	Header mini SAM-e 18", 3" center, 0.75" NPT
2577711	Header mini SAM-e 24", 3" center, 0.75" NPT
2577693	Header mini SAM-e 12", 6" center, 0.75" NPT
2577705	Header mini SAM-e 18", 6" center, 0.75" NPT
2577717	Header mini SAM-e 24", 6" center, 0.75" NPT

SAM-e Mini Inlet 0.75" NPT

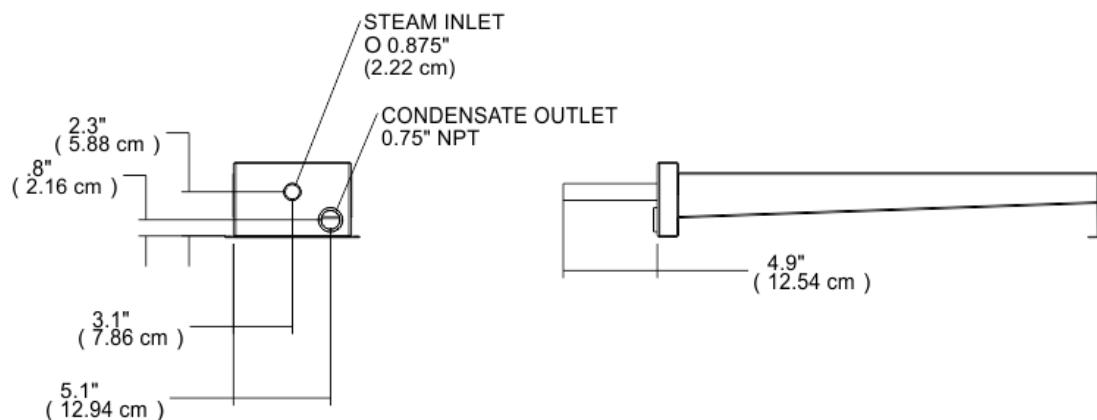
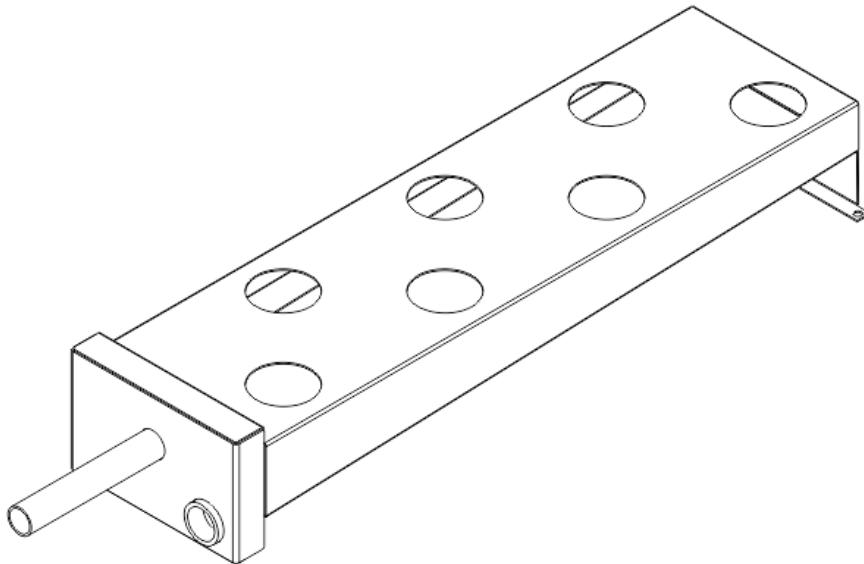
Figure 34: 0.75" NPT Mini Header and Inlet Configuration



Part No.	Description
2577688	Header mini SAM-e 12", 3" center, 1" NPT
2577700	Header mini SAM-e 18", 3" center, 1" NPT
2577712	Header mini SAM-e 24", 3" center, 1" NPT
2577694	Header mini SAM-e 12", 6" center, 1" NPT
2577706	Header mini SAM-e 18", 6" center, 1" NPT
2577718	Header mini SAM-e 24", 6" center, 1" NPT

SAM-e Mini Inlet 1" NPT

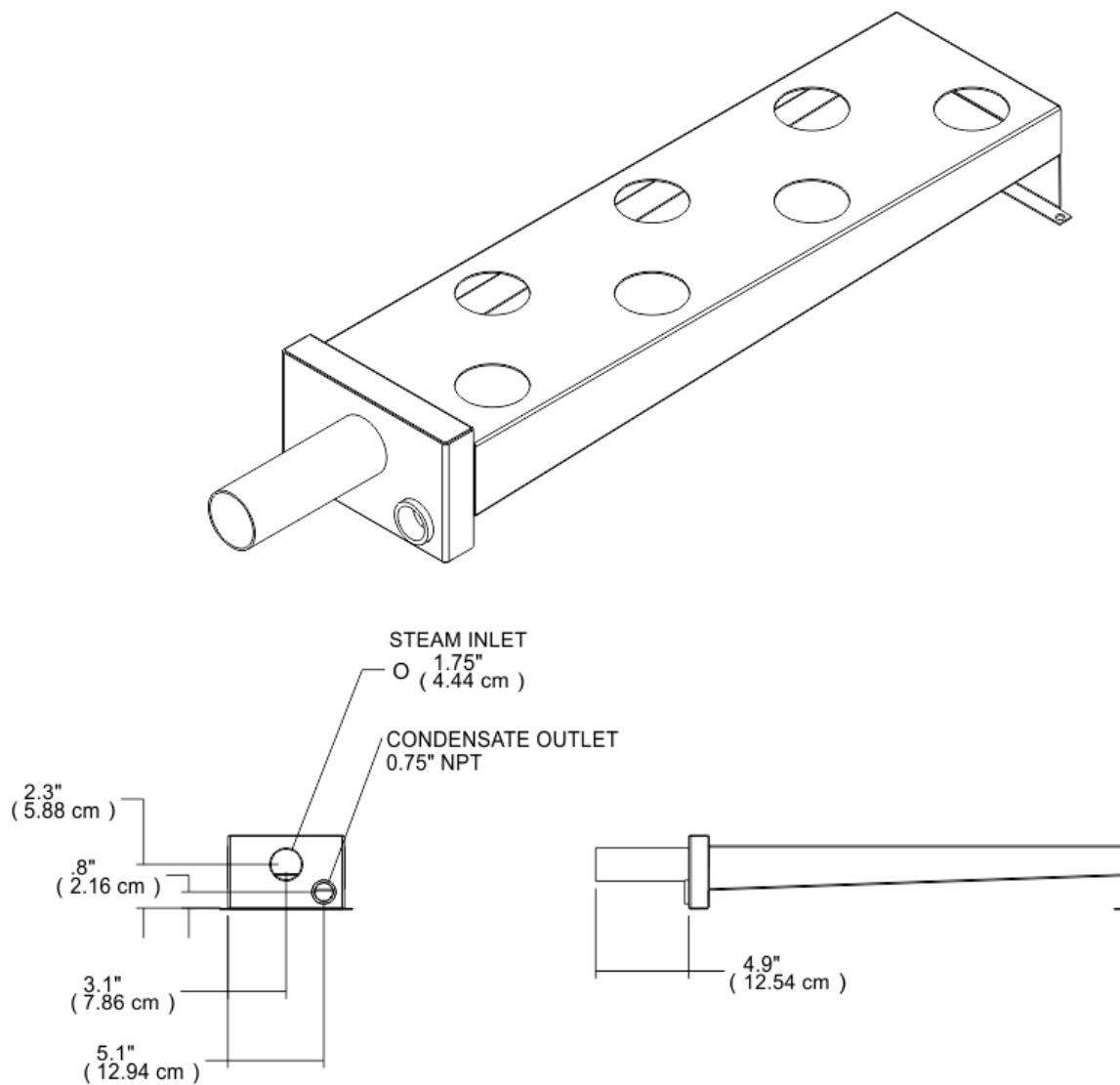
Figure 35: 1" NPT Mini Header and Inlet Configuration



Part No.	Description
2577691	Header mini SAM-e 12", 3" center, 0.875" tube
2577703	Header mini SAM-e 18", 3" center, 0.875" tube
2577715	Header mini SAM-e 24", 3" center, 0.875" tube
2577697	Header mini SAM-e 12", 6" center, 0.875" tube
2577709	Header mini SAM-e 18", 6" center, 0.875" tube
2577721	Header mini SAM-e 24", 6" center, 0.875" tube

SAM-e Mini Inlet 0.875" tube

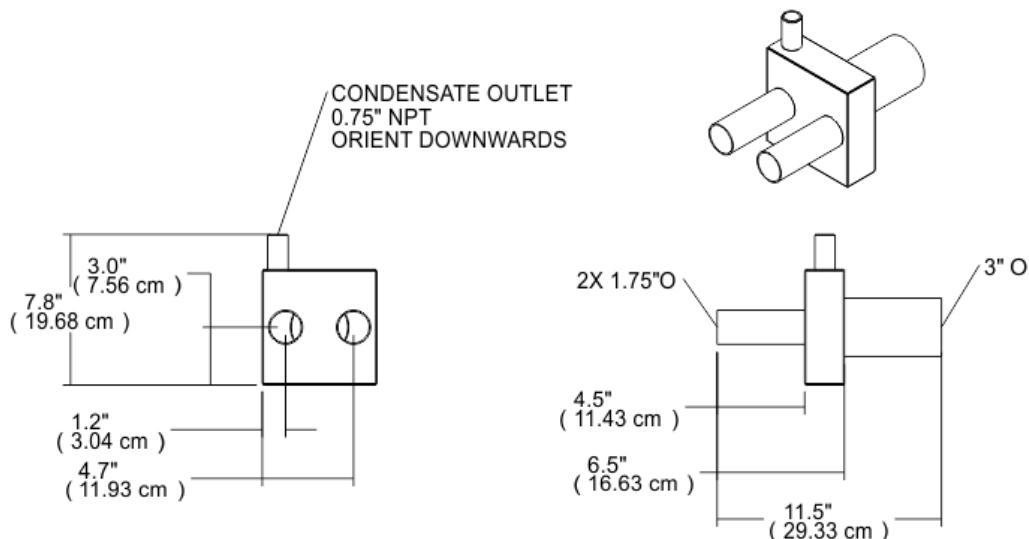
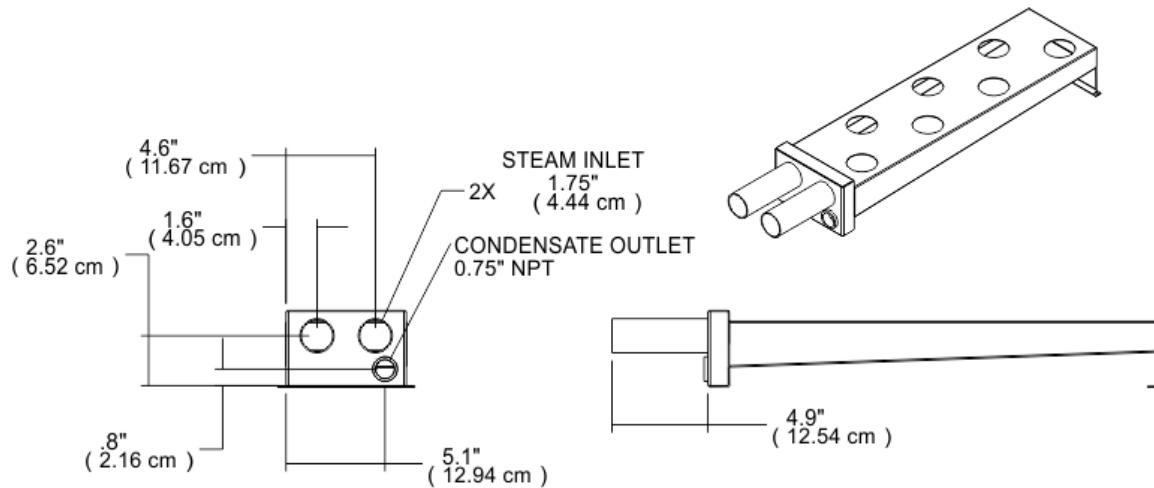
Figure 36: 0.875" Mini Header and Inlet Configuration



Part No.	Description
2577689	Header mini SAM-e 12", 3" center, 1.75" tube
2577701	Header mini SAM-e 18", 3" center, 1.75" tube
2577713	Header mini SAM-e 24", 3" center, 1.75" tube
2577695	Header mini SAM-e 12", 6" center, 1.75" tube
2577707	Header mini SAM-e 18", 6" center, 1.75" tube
2577719	Header mini SAM-e 24", 6" center, 1.75" tube

SAM-e Mini Inlet 1.75" tube

Figure 37: 1.75" Mini Header and Inlet Configuration



Part No.	Description
2577889	Header mini SAM-e 12", 3" center, 3" tube
2577891	Header mini SAM-e 18", 3" center, 3" tube
2577893	Header mini SAM-e 24", 3" center, 3" tube
2577890	Header mini SAM-e 12", 6" center, 3" tube
2577892	Header mini SAM-e 18", 6" center, 3" tube
2577894	Header mini SAM-e 24", 6" center, 3" tube

SAM-e Mini Inlet 3" tube

Figure 38: 3" Mini Header and Inlet Configuration

Warranty

NORTEC Humidity Inc. and/or NORTEC Humidity Ltd. (hereinafter collectively referred to as THE COMPANY), warrant for a period of ten years after installation, that THE COMPANY's manufactured and assembled products, not otherwise expressly warranted (with the exception of the tube coupling seals, two years only), are free from defects in material and workmanship. No warranty is made against corrosion, deterioration, or suitability of substituted materials used as a result of compliance with government regulations.

THE COMPANY's obligations and liabilities under this warranty are limited to furnishing replacement parts to the customer, F.O.B. THE COMPANY's factory, providing the defective part(s) is returned freight prepaid by the customer. Parts used for repairs are warranted for the balance of the term of the warranty on the original humidifier or 90 days, whichever is longer.

The warranties set forth herein are in lieu of all other warranties expressed or implied by law. No liability whatsoever shall be attached to THE COMPANY until said products have been paid for in full and then said liability shall be limited to the original purchase price for the product. Any further warranty must be in writing, signed by an officer of THE COMPANY.

THE COMPANY's limited warranty on accessories, not of the companies manufacture, such as controls, humidistats, pumps, etc. is limited to the warranty of the original equipment manufacturer from date of original shipment of humidifier.

THE COMPANY makes no warranty and assumes no liability unless the equipment is installed in strict accordance with a copy of the catalog and installation manual in effect at the date of purchase and by a contractor approved by THE COMPANY to install such equipment.

THE COMPANY makes no warranty and assumes no liability whatsoever for consequential damage or damage resulting directly from misapplication, incorrect sizing or lack of proper maintenance of the equipment.

THE COMPANY makes no warranty and assumes no liability whatsoever for damage resulting from freezing of the humidifier, supply lines, drain lines, or steam distribution systems.

THE COMPANY makes no warranty and assumes no liability whatsoever for equipment that has failed due to ambient conditions when installed in locations having climates below 14 °F (-10 °C) during January or above 104 °F (40 °C) during July.

THE COMPANY retains the right to change the design, specification and performance criteria of its products without notice or obligation.

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