



اصفهان دما  
ISFAHAN DAMA Co.

# UNIT HEATER



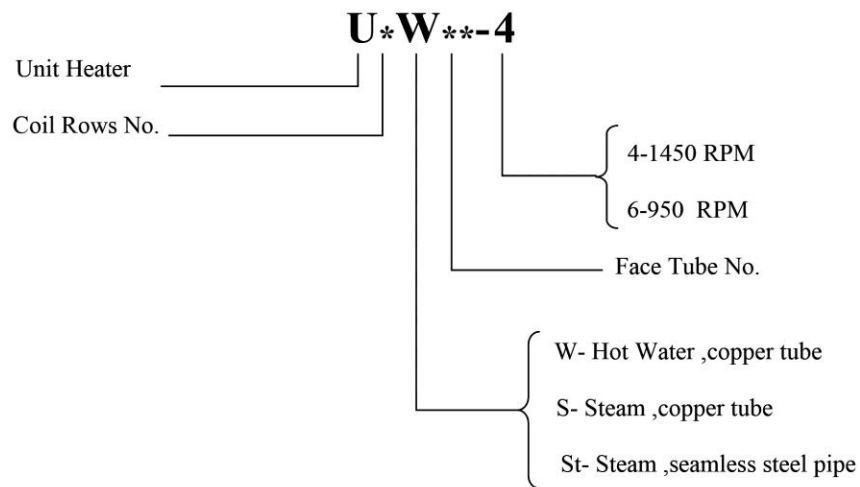
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#### Nomenclature



## UNIT HEATER

### Introduction :

Unit Heaters supply warm air by using hot water or steam which is available from central mechanical room. Unit Heaters are used in large buildings such as industrial areas, sport halls, green rooms and public buildings. Room temperature is controlled by thermostat. Units are manufactured in 7 models and capacities from 20 to 400 MBH.

### Features:

#### Structure:

Main structure is made of anodized aluminum special profiles, erected by proper corners.

**Body :** Panels are made of steel sheets with proper thickness. They are powder coating painted. Adjustable damper is installed in air outlet side to control air stream, and local heating if required.

**Fans:** fans are direct drive and axial flow propeller type. All fans are balanced to lower operating noise and vibration. Fans are ILKA design and high efficiency made by Damandeh Co.

**Coils:** coils are made by copper tubes and aluminum fins, 8 fins / inch for lower air and water friction losses. Coils made of seamless or galvanized steel pipe with aluminum fins are optional parts.

## یونیت هیتر

### معرفی :

یونیت هیتر دستگاهی است که هوارا به وسیله آب داغ یا بخار که از موتورخانه مرکزی تأمین می‌شود گرم می‌کند. یونیت هیتر برای فضاهای بزرگ از قبیل : سالن های کارخانه ها ، سالن های ورزشی ، گلخانه ها و اماکن عمومی قابل استفاده است. کنترل و تنظیم دمای محیط به وسیله ترموستات امکان پذیر است. این دستگاه ها در 7 مدل و در ظرفیت های 20-400 MBH تولید میگردد.

### قسمت های اصلی دستگاه :

#### سازه :

سازه اصلی دستگاه از پروفیل های آلومینیوم آنودایز با گوشه های مخصوص مناسب آن ساخته شده است.

**بدنه :** بدنه دستگاه از ورق فولادی با ضخامت مناسب ساخته شده که با رنگ پودری کوره ای الکترواستاتیک رنگ آمیزی می گردد. در خروجی هوا پره های قابل تنظیم جهت هدایت هوا و گرمایش موضعی نصب شده است.

**فن :** فن دستگاه به طور مستقیم با الکتروموتور کوپله شده و دارای پروانه اکسیال بالانس شده جهت کاهش صدا و لرزش دستگاه می باشد. این نوع فن ها طرح ایلکا با راندمان بالا و ساخت شرکت دمنده می باشند.

**کویل :** کویل دستگاه از لوله های مسی و فین آلومینیومی با آرایش 8 فین در اینچ ساخته شده که باعث کاهش افت فشار هوا و آب در دستگاه می گردد. کویل های ساخته شده از لوله مانسمان یا گالوانیزه با فین آلومینیومی نیز در دستگاه قابل نصب است

### Equipment Selection

#### Hot Water

**Example 1:**

**Given :**

Estimated heating load	117000 Btu/hr
Entering air temp.	70 °F
Entering water temp.	170°F
Ware flow rate	14 GPM
Altitude	Sea level

**Determine :**

- Unit model No.
- Actual capacity
- Final air temp

**Solution:**

From table 3 correction factor (F1) is obtained as 0.825 and from table 4, alt.Corr. factor F(3) is 1.0 .

So, Corrected capacity=141818 Btu/hr  
From table 7 Unit model U3W16 is selected.

The following data is obtained:

Air flow through unit	2600 CFM
Leaving air temp	120 °F
Water P.D.	0.63 F.t
Capacity	162177 Btu/hr

Actual leaving air temperature is calculated as bellow :

$$t_2 = t_1 + \frac{\text{Btu/hr}}{1.08 \times \text{CFM}}$$

$$t_2 = t_1 + \frac{133796}{1.085 \times 2600} = 70 + 47.4=117.4 \text{ } ^\circ\text{F}$$

#### Steam

**Example 2:**

**Given :**

Estimated heating load	117000 Btu/hr
Entering air temp.	70 °F
Steam pressure available	20 Psig
Altitude	Sea level

**Determine :**

- Unit model No.
- Actual capacity
- Final air temp

**Solution:**

From table 2 correction factor (F2) is derived as 0.98 and Altitude Correction Factor (F3) is 1.0 .So, Corrected capacity=119387 Btu/hr

From table 11 Unit model U2S14 is selected.

The following data is obtained:

Air flow through unit	2000 CFM
Leaving air temp	128 °F
Condensate	156 lb/hr
Capacity	147578 Btu/hr

Actual leaving air temperature is calculating as bellow :

$$t_2 = t_1 + \frac{\text{Btu/hr}}{1.08 \times \text{CFM}}$$

$$t_2 = 70 + \frac{144626}{1.085 \times 2000} =70 + 66.6=136.6 \text{ } ^\circ\text{F}$$

**Table : 1** **PROPERTIES OF STEAM**

Pressure Psig	Temp. °F	Latent Heat BTU/Lb	Pressure Psig	Temp. °F	Latent Heat BTU/Lb	Pressure Psig	Temp. °F	Latent Heat BTU/Lb	Pressure Psig	Temp. °F	Latent Heat BTU/Lb
0	212.0	970.3	32	276.8	926.6	66	312.6	899.9	100	337.9	880.0
2	218.5	966.2	34	279.4	924.7	68	314.4	898.6	103	339.8	878.5
4	224.4	962.4	36	281.9	922.9	70	316.0	897.3	106	341.7	876.9
5	227.2	960.6	38	284.3	921.1	72	317.7	896.0	109	343.6	875.4
6	229.8	958.8	40	286.7	919.3	74	319.3	894.8	112	345.4	873.9
8	234.8	955.6	42	289.0	917.6	76	320.9	893.5	115	347.2	872.5
10	239.4	952.5	44	291.3	915.9	78	322.4	892.3	118	348.9	871.0
12	243.7	949.6	46	293.5	914.3	80	323.9	891.1	121	350.7	869.6
14	247.8	946.8	48	295.6	912.7	82	325.4	889.9	124	352.4	868.2
16	251.6	944.2	50	297.7	911.2	84	326.9	888.8	127	354.0	866.9
18	255.3	941.7	52	299.7	909.7	86	328.4	887.6	130	355.7	865.5
20	258.8	939.3	54	301.7	908.2	88	329.8	886.5	133	357.3	864.1
22	262.1	936.9	56	303.6	906.7	90	331.2	885.4	136	358.9	862.9
24	265.3	934.7	58	305.5	905.3	92	332.5	884.3	139	360.4	861.5
26	268.3	932.5	60	307.3	903.9	94	333.9	883.2	142	362.0	860.3
28	271.3	930.5	62	309.1	902.5	96	355.2	882.1	145	363.5	859.0
30	274.1	928.5	64	310.9	901.2	98	336.6	881.1	150	365.9	856.9

**Table : 2** **HOT WATER CORRECTION FACTOR**

E.A.T. °F	ENTERING WATER TEMPERATURE										
	150	160	170	180	190	200	210	220	230	240	250
30	1.035	1.115	1.210	1.295	1.380	1.465	1.545	1.640	1.720	1.810	1.895
40	0.940	1.025	1.105	1.195	1.275	1.360	1.440	1.535	1.620	1.700	1.785
50	0.840	0.930	0.950	1.090	1.175	1.265	1.345	1.430	1.510	1.600	1.690
60	0.743	0.835	0.920	1.000	1.080	1.165	1.240	1.325	1.405	1.500	1.580
70	0.650	0.745	0.825	0.905	0.980	1.070	1.150	1.235	1.315	1.395	1.480
80	0.570	0.650	0.735	0.815	0.895	0.980	1.060	1.140	1.220	1.300	1.380
90	0.475	0.560	0.640	0.720	0.805	0.885	0.965	1.050	1.130	1.210	1.280
100	0.395	0.475	0.560	0.710	0.790	0.875	0.955	1.035	1.115	1.115	1.185

**Table : 3** **STEAM CORRECTION FACTOR**

E.A.T. °F	STEAM PRESSURE PSIG															
	0	2	5	10	15	20	30	40	50	60	70	80	90	100	125	150
30	1.00	1.04	1.08	1.15	1.21	1.25	1.34	1.41	1.47	1.52	1.57	1.62	1.65	1.68	1.75	1.84
40	0.93	1.30	1.01	1.08	1.12	1.20	1.26	1.35	1.40	1.45	1.50	1.55	1.58	1.62	1.67	1.77
50	0.87	0.90	0.95	1.02	1.07	1.11	1.20	1.25	1.34	1.38	1.42	1.48	1.51	1.54	1.61	1.68
60	0.79	0.84	0.85	0.94	1.00	1.06	1.11	1.19	1.24	1.32	1.35	1.40	1.44	1.48	1.52	1.60
70	0.74	0.78	0.82	0.89	0.98	0.98	1.06	1.10	1.18	1.23	1.28	1.33	1.36	1.40	1.44	1.52
80	0.68	0.72	0.76	0.83	0.88	0.96	0.98	1.05	1.09	1.16	1.21	1.26	1.30	1.32	1.36	1.46
90	0.62	0.66	0.70	0.76	0.81	0.88	0.94	0.96	1.04	1.07	1.15	1.20	1.23	1.26	1.30	1.38
100	0.56	0.60	0.64	0.70	0.75	0.81	0.86	0.92	0.95	1.02	1.06	1.13	1.17	1.20	1.23	1.32

**Table : 4** **Altitude Correction Factot**

Altitude Ft	0	2000	4000	6000	8000	10000
Factor	1	0.98	0.95	0.93	0.90	0.88

**Table : 5**

**HOT WATER  
2 ROW COIL  
1450 RPM**

Model NO.	CFM	Dia.	W.	V	AMP.	L.A.T °F	GPM	L.W.T °F	P.D. Ft.	BTU/hr
U2 W8	650	300	180	380	0.44	98	3	162	0.13	26206
						102	4	165	0.23	28722
						104	5	167	0.36	30530
U2 W10	1000	350	200	380	0.5	101	5	162	0.34	43591
						103	6	164	0.48	45948
						105	7	166	0.65	47824
U2 W12	1500	400	215	380	0.5	103	8	162	0.34	68124
						104	9	164	0.43	70259
						105	10	165	0.53	72083
U2 W14	2000	450	370	380	0.75	104	10	161	0.5	92182
						106	12	163	0.7	96548
						107	14	165	0.95	99957
U2 W16	2600	500	700	380	1.3	105	14	162	0.51	124934
						107	16	163	0.64	128865
						108	18	165	0.8	132122
U2 W18	3400	500	700	380	1.3	106	18	161	0.75	163922
						107	20	163	0.92	167856
						108	22	164	1.1	171237
U2 W20	4200	600	710	380	1.3	106	22	161	1.1	204904
						107	25	163	1.1	210629
						109	28	164	1.3	215387

**Table : 6**

**HOT WATER  
2 ROW COIL  
950 RPM**

Model NO.	CFM	Dia.	W.	V	AMP.	L.A.T °F	GPM	L.W.T °F	P.D. Ft.	BTU/hr
U2 W8	450	300	90	220	0.43	107	3	165	0.13	22512
						111.5	4	167	0.23	24302
						114	5	169	0.36	25553
U2 W10	800	350	100	220	0.48	107	5	164	0.34	39570
						109	6	166	0.48	41476
						111	7	167	0.65	42976
U2 W12	1100	400	110	220	0.52	111	8	165	0.34	58978
						112	9	166	0.43	60538
						113	10	167	0.53	61857
U2 W14	1500	450	175	220	0.8	111	10	163	0.5	80589
						113	12	166	0.7	83820
						115	14	167	0.95	86321
U2 W16	2000	500	170	220	0.7	112	14	164	0.51	109976
						114	16	165	0.64	112944
						115	18	167	0.8	115387
U2 W18	2500	500	170	220	0.7	114	18	164	0.76	140773
						115	20	165	0.92	143593
						116	22	166	1.1	145997
U2 W20	3300	600	300	220	1.5	113	22	163	1.1	181814
						114	25	165	1.1	186225
						115	28	166	1.34	189864

Based on : 60 °F E.A.T. – 180 °F E.W.T

HOT WATER  
3 ROW COIL  
1450 RPM

Table : 7

Model NO.	CFM	Dia.	W.	V	AMP.	L.A.T °F	GPM	L.W.T °F	P.D. Ft.	BTU/hr
U3 W8	650	300	180	380	0.44	111	3	156	0.15	34602
						116	4	161	0.27	37786
						119	5	164	0.41	40020
U3 W10	1000	350	200	380	0.5	115	5	157	0.37	57180
						118	6	159	0.53	60131
						120	7	162	0.72	62449
U3 W12	1500	400	215	380	0.5	117	8	157	0.41	89053
						119	9	159	0.51	91732
						120	10	161	0.62	93994
U3 W14	2000	450	370	380	0.75	118	10	155	0.57	120109
						120	12	159	0.81	125563
						122	14	161	1.09	129769
U3 W16	2600	500	700	380	1.3	120	14	156	0.63	162177
						121	16	159	0.78	167085
						123	18	161	0.98	171095
U3 W18	3400	500	700	380	1.3	120	18	156	0.91	212653
						122	20	158	1.11	217575
						123	22	159	1.32	221772
U3 W20	4200	600	710	380	1.3	121	22	155	1.25	265329
						122	25	158	1.32	272505
						124	28	160	1.63	278412

HOT WATER  
3 ROW COIL  
950 RPM

Table : 8

Model NO.	CFM	Dia.	W.	V	AMP.	L.A.T °F	GPM	L.W.T °F	P.D. Ft.	BTU/hr
U3 W8	450	300	90	220	0.43	122	3	160	0.15	29175
						127	4	164	0.27	31296
						131	5	167	0.41	32740
U3 W10	800	350	100	220	0.48	122	5	159	0.37	51311
						125	6	162	0.53	53609
						127	7	164	0.72	55387
U3 W12	1100	400	110	220	0.52	126	8	161	0.41	75817
						128	9	162	0.51	77659
						130	10	164	0.62	79201
U3 W14	1500	450	175	220	0.8	127	10	159	0.57	103413
						129	12	162	0.81	107241
						131	14	164	1.09	110156
U3 W16	2000	500	170	220	0.7	128	14	159	1.03	140756
						130	16	162	0.78	144271
						131	18	163	0.98	147125
U3 W18	2500	500	170	220	0.7	130	18	160	0.51	179598
						131	20	161	1.10	182926
						132	22	163	1.33	185728
U3 W20	3300	600	300	220	1.5	128	22	158	1.25	232467
						130	25	161	1.32	237728
						131	28	162	1.63	242032

Based on : 60 °F E.A.T. – 180 °F E.W.T

**Table :9** STEAM  
1 ROW COIL  
1450 RPM

Model NO.	CFM	Dia.	W.	V	AMP.	L.A.T ° F	Cond. Lb/hr	BTU/hr
U1 S8	650	300	180	380	0.44	96	27	25248
			135	220	0.68			
U1 S10	1000	350	200	380	0.5	96	41	38881
			160	220	0.78			
U1 S12	1500	400	215	380	0.5	95	60	56964
			175	220	0.8			
U1 S14	2000	450	370	380	0.75	95	81	76468
			370	220	1.8			
U1 S16	2600	500	700	380	1.3	95	105	99406
			650	220	3.2			
U1 S18	3400	500	700	380	1.3	95	135	127758
			650	220	3.2			
U1 S20	4200	600	710	380	1.3	95	166	157551
			630	220	3.2			

**Table :10** STEAM  
1 ROW COIL  
950 RPM

Model NO.	CFM	Dia.	W.	V	AMP.	L.A.T ° F	Cond. Lb/hr	BTU/hr
U1 S8	450	300	90	220	0.43	102	22	20665
U1 S10	800	350	100	220	0.48	100	36	34478
U1 S12	1100	400	110	220	0.52	101	51	48209
U1 S14	1500	450	175	220	0.8	100	69	65497
U1 S16	2000	500	170	220	0.7	100	91	86338
U1 S18	2500	500	170	220	0.7	100	115	108347
U1 S20	3300	600	300	220	1.5	99	146	138557

Based on : 60°F E.A.T- 15 Psig Steam pressure



**Table :11** STEAM  
2 Row coil  
1450 RPM

Model No.	CFM	Dia.	W.	V	AMP.	L.A.T °F	Cond. Lb/hr	BTU/hr
U2 S8	650	300	180	380	0.44	129	51	48606
			135	220	0.68			
U2 S10	1000	350	200	380	0.5	129	79	74842
			160	220	0.78			
U2 S12	1500	400	215	380	0.5	128	116	110049
			175	220	0.8			
U2 S14	2000	450	370	380	0.75	128	156	147578
			370	220	1.8			
U2 S16	2600	500	700	380	1.3	128	203	191846
			650	220	3.2			
U2 S18	3400	500	700	380	1.3	127	261	247210
			650	220	3.2			
U2 S20	4200	600	710	380	1.3	127	322	304935
			630	220	3.2			

**Table :12** STEAM  
2 Row coil  
950 RPM

Model No.	CFM	Dia.	W.	V	AMP.	L.A.T °F	Cond. Lb/hr	BTU/hr
U2 S8	450	300	90	220	0.43	139	41	38611
U2 S10	800	350	100	220	0.48	135	69	65216
U2 S12	1100	400	110	220	0.52	136	96	90904
U2 S14	1500	450	175	220	0.8	136	131	123589
U2 S16	2000	500	170	220	0.7	136	173	163260
U2 S18	2500	500	170	220	0.7	136	216	204730
U2 S20	3300	600	300	220	1.5	134	278	263320

Based on : 60°F E.A.T- 15 Psig Steam pressure

**Table : 13** STEAM  
3 Row coil  
1450 RPM

Model NO.	CFM	Dia.	W.	V	AMP.	L.A.T ° F	Cond. Lb/hr	BTU/hr
U3 S8	650	300	180	380	0.44	150	67	63324
			135	220	0.68			
U3 S10	1000	350	200	380	0.5	150	103	97489
			160	220	0.78			
U3 S12	1500	400	215	380	0.5	149	152	143856
			175	220	0.8			
U3 S14	2000	450	370	380	0.75	149	204	192720
			370	220	1.8			
U3 S16	2600	500	700	380	1.3	149	265	250530
			650	220	3.2			
U3 S18	3400	500	700	380	1.3	148	342	325657
			650	220	3.2			
U3 S20	4200	600	710	380	1.3	148	422	399333
			630	220	3.2			

**Table : 14** STEAM  
3 Row coil  
950 RPM

Model NO.	CFM	Dia.	W.	V	AMP.	L.A.T ° F	Cond. Lb/hr	BTU/hr
U3 S8	450	300	90	220	0.43	161	52	48940
U3 S10	800	350	100	220	0.48	157	88	83568
U3 S12	1100	400	110	220	0.52	158	123	116157
U3 S14	1500	450	175	220	0.8	157	167	158021
U3 S16	2000	500	170	220	0.7	157	221	209145
U3 S18	2500	500	170	220	0.7	157	277	262097
U3 S20	3300	600	300	220	1.5	155	358	338876

Based on : 60°F E.A.T- 15 Psig Steam pressure

### DIMENSIONS

#### HOT WATER and L.P.ST. COPPER TUBE

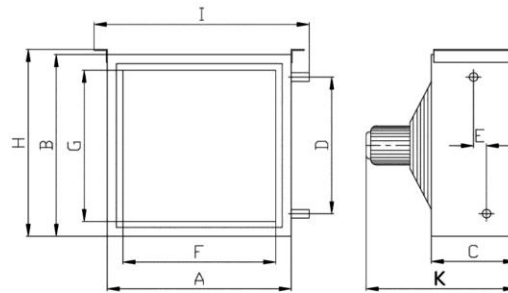


Table : 15

Model	A	B	C	D	E	F	G	H	I	K	Connections			Weight Kg.
											Hot water	Steam	Cond.	
U2W8	520	490	400	290	38	325	325	500	630	545	1"	1"	1"	26.5
U3W8														
U1S8														
U2S8														
U3S8														
U2W10	600	560	400	357	47	400	400	570	710	562	1 1/4"	1 1/4"	1"	33.2
U3W10														
U1S10														
U2S10														
U3S10														
U2W12	680	640	400	433	47	480	480	650	790	540	1 1/4"	1 1/4"	1"	39.7
U3W12														
U1S12														
U2S12														
U3S12														
U2W14	760	710	400	510	47	550	550	720	860	545	1 1/4"	1 1/2"	1"	46.5
U3W14														
U1S14														
U2S14														
U3S14														
U2W16	840	790	400	580	53	630	630	800	940	540	1 1/2"	2"	1 1/4"	55.0
U3W16														
U1S16														
U2S16														
U3S16														
U2W18	910	860	400	655	53	705	705	870	1020	540	1 1/2"	2"	1 1/4"	66.0
U3W18														
U1S18														
U2S18														
U3S18														
U2W20	990	940	400	730	53	780	780	950	1100	562	1 1/2"	2"	1 1/4"	77.5
U3W20														
U1S20														
U2S20														
U3S20														

## STEAM

 2 Row coil - 1450 RPM  
 1/2" Seamless steel pipe

Table : 16

Model NO.	CFM	Dia.	W.	V	AMP.	L.A.T °F	Cond. Lb/hr	BTU/hr
U2 St7	650	300	180	380	0.44	137	65	54541
			135	220	0.68			
U2 St9	1000	350	200	380	0.5	139	90	85488
			160	220	0.78			
U2 St11	1500	400	215	380	0.5	138	134	126825
			175	220	0.8			
U2 St12	2000	450	370	380	0.75	136	175	165286
			370	220	1.8			
U2 St14	2600	500	700	380	1.3	137	230	217295
			650	220	3.2			
U2 St16	3400	500	700	380	1.3	136	298	281884
			650	220	3.2			
U2 St18	4200	600	710	380	1.3	137	370	349998
			630	220	3.2			

Based on : 60°F E.A.T- 15 Psig Steam pressure

## DIMENSIONS

### STEAM SEAMLESS STEEL PIPE

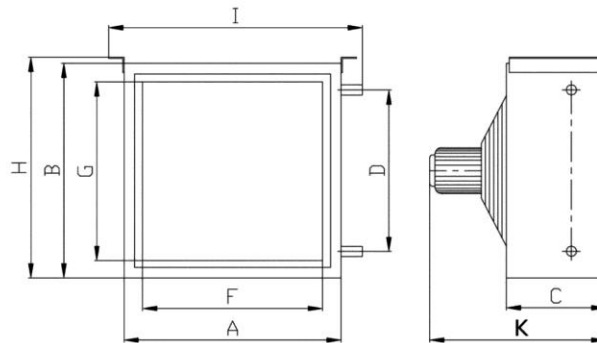
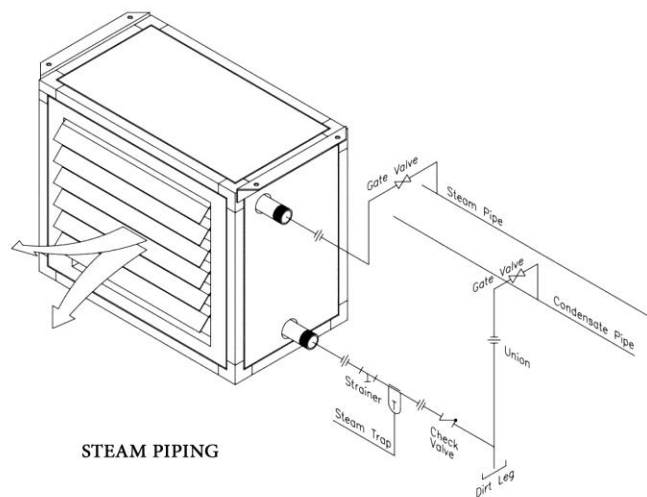
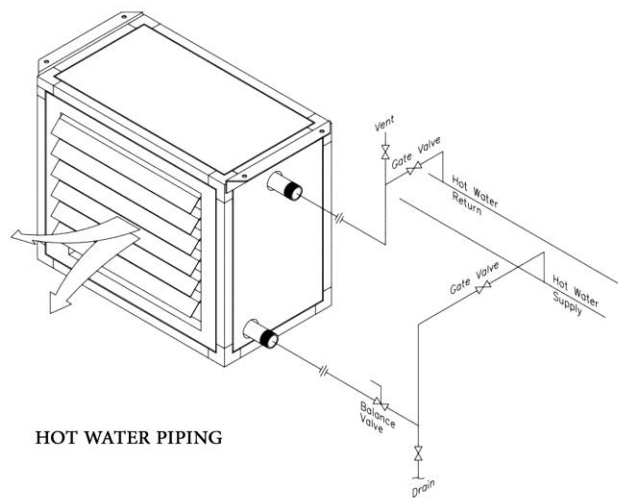


Table : 17

Model	A	B	C	D	F	G	H	I	K	Connections		Weight Kg.
										Steam	Cond.	
U2St7 U3St7	520	490	400	272	325	325	500	670	545	1"	1"	37.0
U2St9 U3St9	600	560	400	350	400	400	570	750	562	1 1/4"	1"	44.5
U2St11 U3St11	680	640	400	428	480	480	650	840	540	1 1/4"	1"	52.0
U2St12 U3St12	760	710	400	460	550	550	720	880	545	1 1/2"	1"	59.5
U2St14 U3St14	840	790	400	545	620	620	800	960	540	2"	1 1/4"	67.0
U2St16 U3St16	910	860	400	630	705	705	870	1050	540	2"	1 1/4"	79.5
U2St18 U3St18	990	940	400	715	790	790	950	1130	562	2"	1 1/4"	92.0

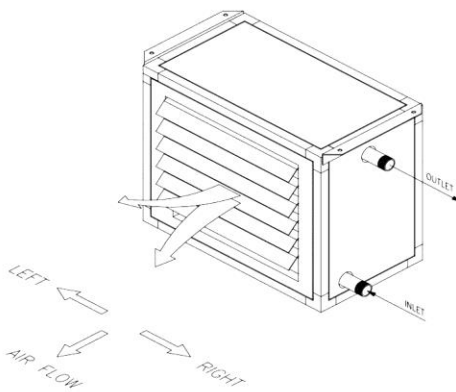
## PIPING DIAGRAM

The following diagrams are ISFAHAN DAMA recommendations  
to install unit heaters with use hot water or steam

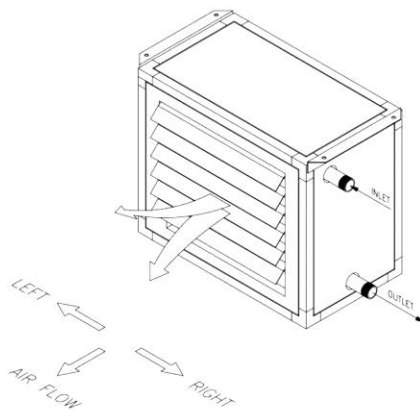


### INSTALLATION

Unit heaters piping connections maybe right side or left side, as illustrated in the following diagrams. When ordering the unit it should be specified, left or right piping connections.



### HOT WATER PIPING



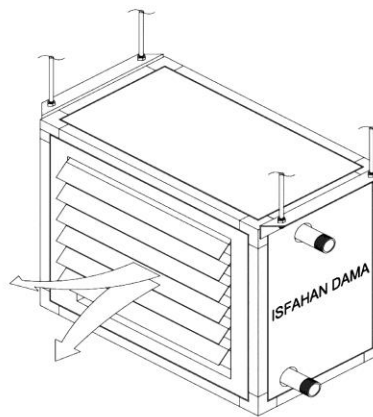
### STEAM PIPING

## INSTALLATION

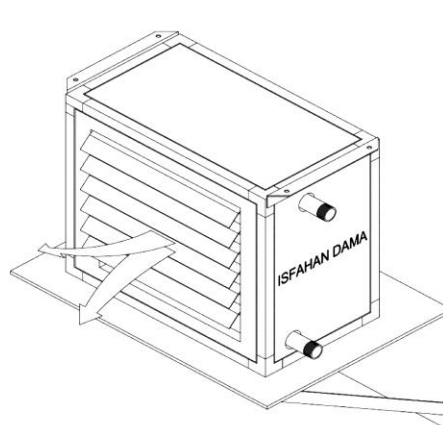
Unit heaters can be installed in the following ways, as illustrated by diagrams.

- 1- Units maybe put on a supported level.
- 2- Units maybe suspended from ceiling by rods.

**Note :** It should be considered that, the piping fittings and valves weight should not be supported by the unit



نصب با آویز از سقف



نصب روی سکو





اصفهان دما  
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