



# *Insty-Pac Steam Humidifiers*

The new PURE Humidifier Company Insty-Pac (patent no. 6,065,740) steam injection humidifier is “job-engineered” to assure highly efficient steam release into the air stream. Each humidifier is designed for your specific capacity, steam pressure, and duct size requirements. The Insty-Pac multiple tube humidifier is designed to achieve the shortest possible dissipation distances in the industry which will meet the most demanding applications.

High quality control valves and actuators assure accurate response and metering of steam flow. If you prefer to use your own valves and actuators, we will factory mount them for you. If you have a preference for certain valve/actuator combinations, we can usually supply them with the humidifier. Just another way we “job-engineer” the humidifiers to meet your needs.

Only high quality, corrosion resistant stainless steel is used in the construction of the header/separator and injection tubes.

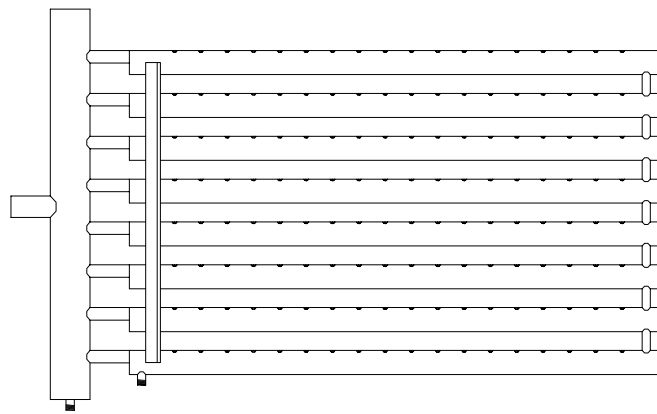
Steam jacketing around the inner tubes means a minimal amount of condensate is produced. Only *PURE* steam is delivered, free of water or particulate matter.

The all-welded design eliminates the use of o-rings and couplings that may cause leakage and maintenance. The Insty-Pac is designed with punched orifices and is maintenance free. The header/separator is designed to remove condensate before it enters the tubes. The tube-within-a-tube design means the desired steam jacket is hot only during a call for humidity, eliminating additional unwanted heat gain when no humidification is required. The increased steam jacketing area provides a hotter tube which delivers *PURE* steam free of condensate.

The header/separator is designed with internal baffling and a stainless steel screen to provide even and quiet steam flow to all tubes. The Insty-Pac can work with either atmospheric or pressurized boiler steam.

A variety of piping options gives you the flexibility of installing the Insty-Pac humidifier in confined spaces. The header/separator can be installed inside or outside the ductwork without the use of blank-off plates. The Insty-Pac requires only one side of the AHU/duct be accessed for supply and condensate piping.

The versatility of the Insty-Pac humidifier will allow you to design them into any system simply, efficiently, and reliably.





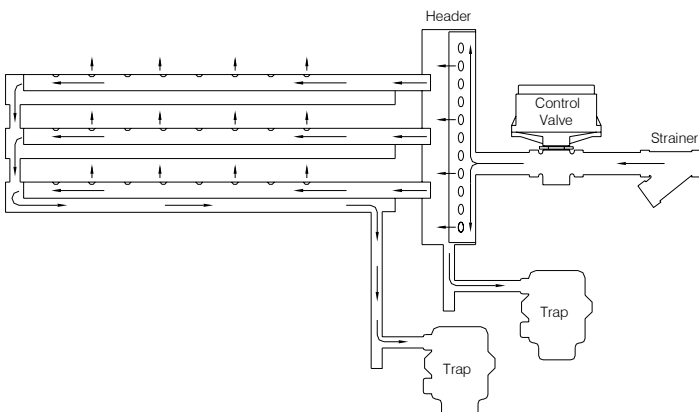
All PURE Humidifier Company Insty-Pac (patent no. 6,065,740) steam injection humidifiers are designed with steam jacketed injection tubes and a steam header/separator. Used in combination with each other, these components ensure the delivery of condensate-free, PURE steam, into the air stream.

With the Insty-Pac, steam enters the humidifier through the strainer and is stopped at the humidifier control valve.

On a call for humidity, the control valve opens and allows the proper quantity of steam to flow into the header/separator. The unique baffle design within the header performs two tasks: First, the direction of the steam is changed which causes the condensate to “fall out”; Second, the steam flows through the orifices in the baffle plate assuring equal delivery of condensate-free steam to each injection tube. The steam then travels through the jacketed inner tube. After traveling through the inner tube the steam fills the outer jacket area, thus preheating the inner tube and reducing the amount of condensate formed in the system. Any condensate formed in the inner tube is allowed to flow with the path of the steam and drains into the outer tube. The condensate is then drained from the outer tube at the drain line that connects the jackets together. Condensate is removed from the assembly by the factory supplied steam trap. The PURE steam is then emitted from the inner tube, through the job-engineered orifices, and into the air stream.

An added benefit of the unique Insty-Pac design is that the steam jacketing is hot only during a call for humidity, eliminating unwanted heat gain when no humidification is required.

**Figure A—Insty-Pac Tube**



## Specification Sample

### **Insty-Pac Humidifier**

1. The humidifier shall be capable of removing condensate from the steam by means of a stainless steel supply header/separator, for the purpose of providing condensate-free steam.
2. The header/separator shall be designed with an internal baffle to assure equal steam flow to the injection tubes. The header/separator shall include an internal stainless steel screen to prevent objectionable noise due to pressure drop across the valve.
3. Steam shall be injected into the air stream through round stainless steel, steam jacketed injection tubes. The tubes shall be steam jacketed to assure condensate-free vapor. The jacketing shall only be hot during a call for humidity, eliminating unwanted heat gain when no humidification is required. The steam emission ports shall be precision punched and shall be of sufficient size and number to provide constant and uniform distribution of the steam over the entire width of the duct.
4. Injection tubes shall be completely factory assembled and welded to a stainless steel header/separator, ready for installation and piping connections.
5. The assembly shall be an all-welded design eliminating the use of o-rings and couplings that may cause leakage and on-going maintenance.
6. The humidifier shall be designed so that only one side of the AHU/duct is accessed for supply and condensate piping. An air blank-off plate shall not be required.
7. A normally closed control valve shall have modified linear flow characteristics to assure enhanced control at low demand, shall close off against the steam and shall be of sufficient capacity as required. The valve operator pneumatic modulating (standard) or electric modulating (optional) shall be supplied by PURE Humidifier Company.
8. The humidifier shall be supplied with float and thermostatic condensate traps (shipped loose), pipeline strainer (shipped loose), and duct plates (to seal completely at duct opening).
9. The humidifier shall be a PURE Humidifier Company humidifier as manufactured by PURE Humidifier Company, Chaska, Minnesota.



**Recommended Quantity of Insty-Pac Injection Tubes**

When steam is emitted from the injection tubes, it immediately condenses into tiny water droplets. As the steam (fog) travels downstream, the air slowly absorbs the condensed steam until all the water droplets have changed state back to a gas. Dissipation distance is defined as the distance downstream from the face of the Insty-Pac tubes, wherein the visible condensed steam (fog) has been re-evaporated to the extent that wetting will not occur on solid objects such as coils, dampers, fans, etc.

In many installations a single injection tube will provide the dissipation distance required. However, there are applications where the conditions necessitate the use of an Insty-Pac humidifier to achieve a shorter dissipation distance.

To prevent condensation on in-duct objects, such as dampers, coils, filters, or turning vanes, it is very important that the dissipation distance be shorter than the distance from the humidifier to the in-duct object.

The Insty-Pac Dissipation Chart should be consulted to determine the quantity of injection tubes required to meet the dissipation distance needed. The relative humidity entering the humidifier and the relative humidity leaving the humidifier will be required to determine tube centers on the Insty-Pac Dissipation Chart.

**\*Note: When installing humidifier upstream of filters or internally insulated duct consult factory for dissipation distance required.**

**Insty-Pac Humidifier Selection**

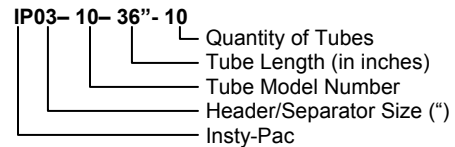
The valve package and Insty-Pac assembly are ordered separately to match the correct capacity for the Insty-Pac humidifier.

To properly select an Insty-Pac humidifier:

1. Select the correct valve package from Table 1 by referencing the steam supply pressure and humidification load required in lbs/hr.
2. Select the proper quantity of injection tubes from the Insty-Pac Dissipation Chart by referencing the tube centers required to meet the given dissipation distance. Then divide the AHU/duct height by the tube centers and subtract 2 for clearance.

Example: Tube centers required= 3"centers  
Duct height= 36"  
Injection tube quantity= (36÷3) - 2= 10 tubes

**Nomenclature Example:**



**Table 1 Insty-Pac Humidifier Valve Package Capacity in pounds per hour (lbs/hr) \* used only with boiler steam**

Model Number	Valve Cv (Size-NPT)	Steam Pressure to Humidifier Supply Connection																						
		2	3	4	5	6	7	8	9	10	11	12	13	14	15	20	25	30	35	40	45	50	55	60
BP-1	.10 (1/2")	1.6	1.9	2.3	2.6	2.8	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.3	4.4	5.1	5.7	6.3	6.8	7.3	7.7	8.1	8.5	8.9
	.22 (1/2")	3.5	4.2	5.0	5.6	6.5	6.6	7.1	7.6	8	8	9	9	10	10	11	13	14	15	16	17	18	19	20
	.40 (1/2")	6.4	7.6	9.1	10	11	12	13	14	15	15	16	16	17	18	20	23	25	27	29	31	33	34	36
	.75 (1/2")	12	14	17	19	21	23	24	26	27	28	30	31	32	33	38	43	47	50	54	57	60	63	66
	.95 (1/2")	15	18	21	24	27	29	31	33	34	36	38	39	40	42	48	54	59	64	68	72	76	80	84
	1.30 (1/2")	21	24	29	33	36	39	42	44	47	49	51	53	55	57	66	74	80	87	93	99	104	109	114
	1.75 (1/2")	28	33	40	44	49	52	56	60	63	66	69	72	74	76	88	99	107	116	124	132	139	146	153
	2.20 (1/2")	35	41	50	55	61	66	71	75	79	82	86	90	93	95	111	123	134	146	156	165	174	183	192
	2.80 (1/2")	45	53	64	70	78	84	90	96	100	104	109	114	118	121	141	157	171	186	199	210	221	233	244
3.25 (1/2")	52	61	73	82	90	96	104	110	116	121	127	132	137	140	163	181	198	214	229	244	257	270	282	
4.40 (1/2")	70	83	98	110	121	130	141	149	157	163	172	178	185	190	221	244	266	290	310	328	345	363	381	
BP-2	5.50 (3/4")	85	104	123	138	150	161	176	186	196	204	213	222	231	236	275	305	333	360	385	408	430	451	471
	6.20 (3/4")	96	117	138	155	169	182	198	210	220	230	240	250	259	265	310	343	372	403	434	459	485	508	529
	7.50 (3/4")	116	142	166	186	204	220	238	253	265	277	289	302	312	320	373	412	450	487	525	555	585	614	640
BP-3	8.20 (1")	123	155	180	204	223	240	261	275	290	303	313	328	341	349	407	443	488	529	570	603	635	668	703
	10.0 (1")	150	189	220	248	272	293	317	335	354	370	380	400	414	423	497	540	595	645	695	735	770	810	850
	12.0 (1")	180	228	264	296	326	351	378	402	422	441	456	465	492	505	595	648	714	774	828	876	Δ	Δ	Δ
BP-4	20.0 (1-1/4")	300	375	440	494	540	582	630	666	702	736	750	772	814	834	990	1060	1180	1280	1376	1460	Δ	Δ	Δ
	28.0 (1-1/2")	420	511	612	686	756	812	873	927	980	1024	1044	1075	1128	1165	1383	1484	1638	1778	1912	2044	Δ	Δ	Δ
BP-5	40.0 (2")	600	720	872	980	1080	1112	1240	1316	1392	1456	1480	1528	1592	1656	1964	2080	2320	2520	2720	2904	Δ	Δ	Δ

- Notes:**
- 1). Capacity per injection tube should not exceed 60 lbs/hr. If capacity per tube exceeds the 60 lbs/hr limit consult factory for options.
  - 2). Multiple valve packages may be required to meet specified capacity. Consult factory for verification.

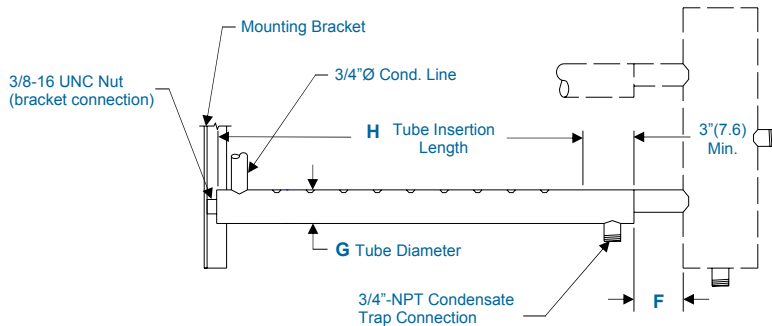


**Table 2 Header/Valve Assembly Dimensions & Weights** in inches (cm) (Ref. Fig. C)

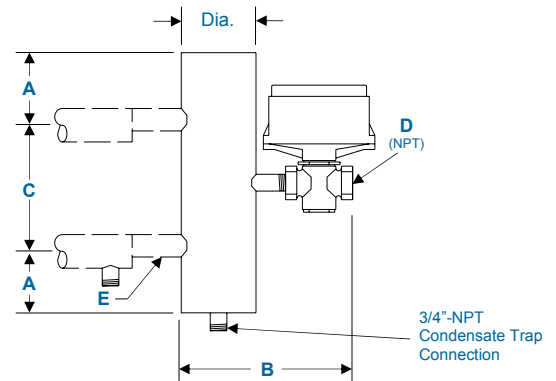
Model Number	Dim "A"†	Dim "B"†	Dim "C"	Dim "D"	Dim "E"	Strainer Size	Steam Trap
BP-1	3.0" (7.6)	8.25" (20.9)	Tube Centers	1/2"-NPT	1"Ø (2.5)	1/2"-NPT	3/4"-NPT
BP-2	3.0" (7.6)	9.25" (23.5)	Tube Centers	3/4"-NPT	1"Ø (2.5)	3/4"-NPT	3/4"-NPT
BP-3	3.0" (7.6)	10.25" (26.0)	Tube Centers	1"-NPT	1"Ø (2.5)	1"-NPT	3/4"-NPT
BP-4	3.0" (7.6)	14.0" (35.5)	Tube Centers	1-1/2"-NPT	1"Ø (2.5)	1-1/2"-NPT	3/4"-NPT
BP-5	3.0" (7.6)	15.0" (38.1)	Tube Centers	2"-NPT	1"Ø (2.5)	2"-NPT	3/4"-NPT

† Valve manufacturer, Cv, and actuator type will affect this dimension. The dimensions shown are based on an Invensys valve and pneumatic actuator.

**Fig. B- Insty-Pac Tube**



**Fig. C- Header/Valve Assembly**



**Table 3 Injection Tube Dimensions** in inches (cm) (Ref. Fig. B)

Model Number	Dim. "F"	Dim. "G"
10	3.0" (7.6)	1.5" (3.8)

**Table 5 Insertion Lengths & Unit Lengths**

Dim. "I" †† Insertion Length In inches (cm)	Assembly Weight <sup>◇</sup> (includes header) In pounds (kg)
<b>Model</b>	<b>10</b>
12" (30.5)	1.9 (.86) x Tube Qty
18" (45.7)	2.8 (1.3) x Tube Qty
24" (61.0)	3.8 (1.7) x Tube Qty
30" (76.2)	4.7 (2.1) x Tube Qty
36" (91.4)	5.7 (2.6) x Tube Qty
48" (121.9)	6.8 (3.1) x Tube Qty
60" (152.4)	8.0 (3.6) x Tube Qty
72" (182.9)	9.0 (4.1) x Tube Qty
84" (213.4)	10.2 (4.6) x Tube Qty
96" (243.8)	11.7 (5.3) x Tube Qty
108" (274.3)	13.1 (5.9) x Tube Qty
120" (304.8)	14.6 (6.6) x Tube Qty
132" (335.3)	16.0 (7.3) x Tube Qty
144" (365.8)	17.5 (7.9) x Tube Qty
156" (396.2)	Δ
168" (426.7)	Δ

**Table 4 Boiler Package (BP) Weights** in pounds (kg) (Ref. Table 1)

Model Number	BP-1	BP-2	BP-3	BP-4	BP-5
Traps (2)	18 (8.2)	18 (8.2)	18 (8.2)	18 (8.2)	18 (8.2)
Strainer	2 (.91)	3 (1.4)	4.5 (2.0)	8 (3.6)	15 (6.8)
Valve †††	2.5 (1.1)	3 (1.4)	4 (1.8)	7 (3.2)	10 (4.5)

††† The weights shown are based on a Invensys valve and pneumatic actuator.

**Table 6 Header Size** in pounds (kg) (Ref. Fig. C)

Diameter	Atmospheric	Live Steam
3" (7.6)	Up to 275 (124)	Up to 750 (340)
5" (12.7)	276 (125) and up	751 (341) and up

**Reference sheet no. IP-3 for  
Insty-Pac Humidifier capacity.**

†† Standard insertion lengths. Special tube lengths are available; consult the factory for details.

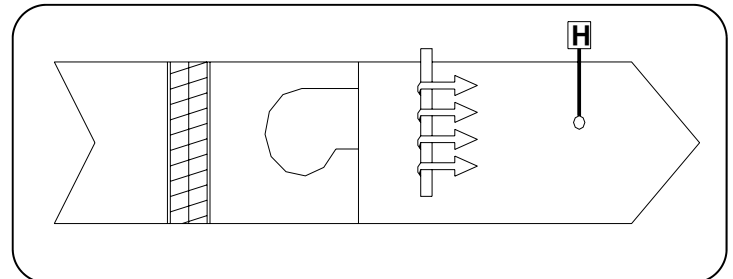
Δ Indicates a special order item; consult factory for details. Reference Fig. B for description of dimension "I"

◇ Weights shown above do not include valve, trap, or strainer, see table 4 for Boiler Package weights.



## System 1

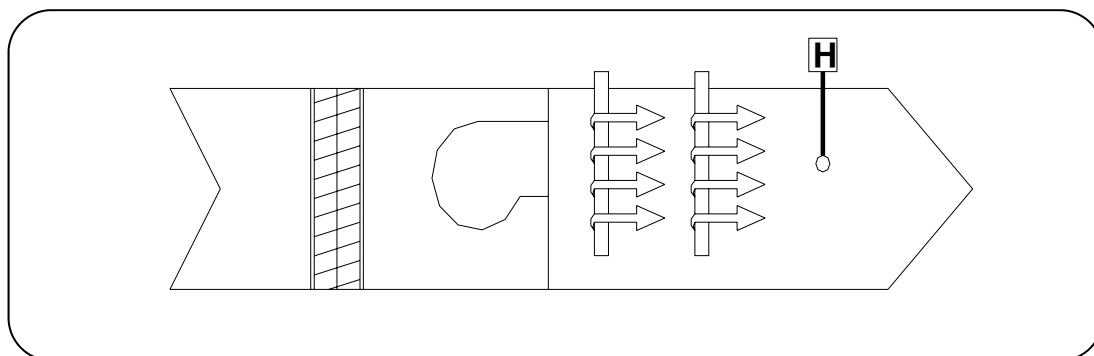
In this simple heating/ventilating system, the desired location of the humidifier is downstream from the fan. The use of a high-limit duct humidistat is recommended if operating conditions are such that saturation could be reached in the duct. The high-limit humidistat should be 12 to 14 feet (365-427 cm) downstream from the humidifier injection tube. A space humidistat controls the humidifier.



## System 2

This is a 100% outside air system with preheat and reheat coils. The desired location of the primary humidifier is downstream from the reheat coil where air temperature is highest. Where operating conditions vary considerably from design, two humidifiers may be used; control is sequenced from a single space or exhaust air duct humidistat. The first humidifier will deliver one-third of the total capacity. The second humidifier is sized for two-thirds of the total capacity. When control is sequenced in this manner, much closer control is achieved.

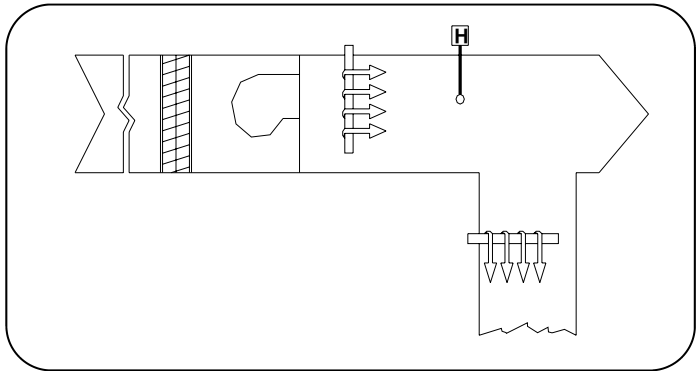
When outdoor air conditions are milder, the first humidifier will satisfy the space conditions by supplying a portion of the total design capacity. As the outside air becomes colder and humidity demand increases, the second unit begins to open in response to the additional demand. When the humidifiers are sequenced as described, much closer control is achieved over a wide range of outside air conditions and super saturation of the duct at minimum humidification load is avoided. Use of a high-limit controller is desirable.





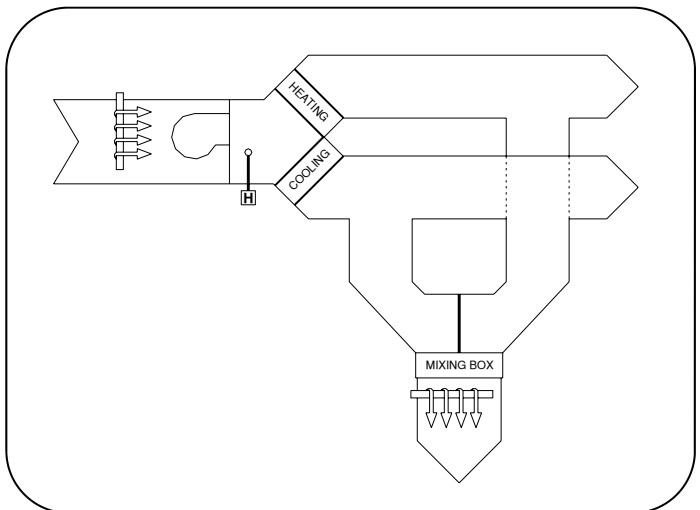
### System 3

Shown here is a 100% outside air system using a primary and secondary humidifier. In this system, the primary humidifier is controlled by a duct humidistat 12 to 14 feet (366-427 cm) downstream from the humidifier and at a level that maintains a space condition of about 35% R.H. at 70°F. The secondary humidifier is controlled by a space humidistat. The secondary unit can be sized to boost space R.H. from 35% R.H. to a higher level such as 55% R.H. Combining humidifiers in this manner allows humidity for each zone to be controlled at a level higher than would otherwise be possible.



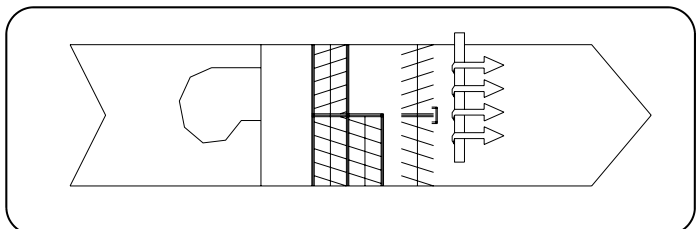
### System 4

Here is a high velocity dual duct system. In this system, best results are achieved with primary and booster humidification. The primary humidifier is located as far upstream as possible from the fan and is controlled by a duct humidistat located ahead of the hot and cold deck coils. The booster humidifier is located downstream from the mixing box and is controlled by a humidistat in the space. The primary humidifier should be located no closer than 3 feet (91 cm) from the fan and the booster humidifier no closer than 3 feet (91 cm) from the grill. In both cases, the use of multiple injection tube units should be considered.



### System 5

System 5 is a simple face and bypass unit. The humidifier is located downstream from the damper section so moisture enters the air stream in the area where best mixing and air temperature conditions exist.





## Condensate Return Line

In order for the steam trap to remove condensate, it is essential that pressure in the condensate return line be substantially below the steam pressure within the Insty-Pac. The condensate must be gravity-drained to an open drain or non-pressurized return line. In the event the return line is at a higher elevation than the steam trap and the condensate must be elevated, a condensate pump will be required.

## Proper Length Injection Tubes

For best dissipation of the steam into the air stream, always use injection tubes that fully span the widest dimension of the duct.

## Fan Interlock Switch

PURE Humidifier Company recommends the use of an air flow proving switch or fan interlock to prove air flow prior to humidifier operation. Humidifier operation without air flow will result in over saturation of the air stream. Air flow proving switches are available as optional equipment from your PURE Humidifier Company representative.

## High-Limit Humidistat

PURE Humidifier Company recommends the use of a duct high-limit humidistat to prevent humidifier operation when the duct humidity level exceeds 85% relative humidity. Humidifier operation above 85% relative humidity, can result in over saturation of the air stream. High-limit humidistats are available as optional equipment from your PURE Humidifier Company representative.

## Location of Humidifiers

Humidifiers should be located:

1. In the center of duct or air handling unit.
2. Not less than 3 feet (91.4 cm) upstream from fan inlets, tees, "ells", turning vanes, discharge grills, or other in-duct objects. Consult factory cataloged dissipation charts for exact allowable distances.
3. Not less than 10 feet (304.8 cm) upstream from high efficiency filters.
4. Not less than 10 feet (304.8 cm) upstream from humidity or temperature controllers.

## Insty-Pac Warranty

PURE Humidifier Company guarantees its products to be free from defects in material and workmanship for a period of two years from the date of shipment; provided the product is properly installed, serviced, and put into the service for which it was intended.

PURE Humidifier Company is obligated under the terms of this warranty to the repair or replacement of the defective part(s), excluding any labor charges, or to refund the purchase price at our option. PURE Humidifier Company assumes no obligation for incidental or consequential damages. The above provisions are in lieu of all other guarantees, obligations, liabilities or warranties, expressed or implied.