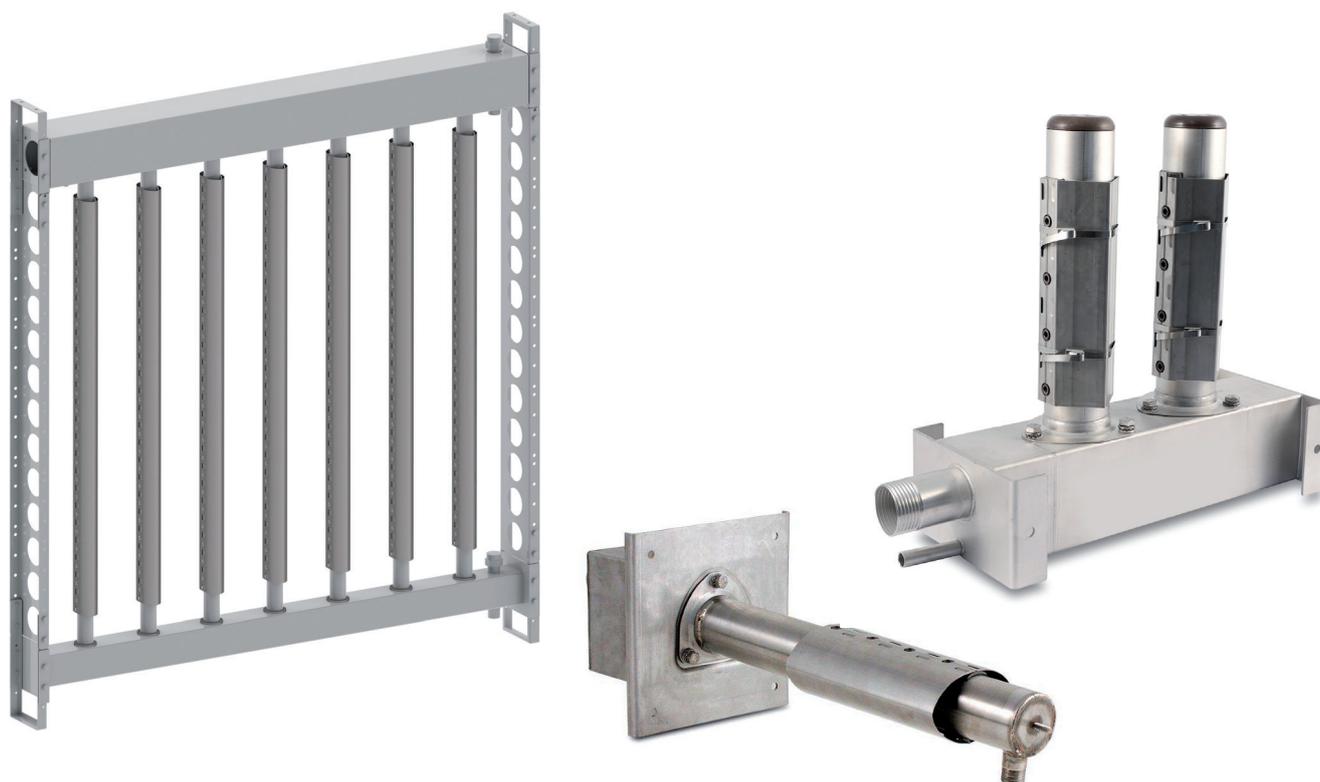


ultimateSAM

ITA Sistema di umidificazione ultimateSAM

ENG Direct Steam Humidification System

CAREL



ITA Manuale d'uso

ENG User manual

**LEGGI E CONSERVA
QUESTE ISTRUZIONI**
→ **READ AND SAVE
THESE INSTRUCTIONS** ←

  **NO POWER
& SIGNAL
CABLES
TOGETHER**
READ CAREFULLY IN THE TEXT!

Integrated Control Solutions & Energy Savings

GENERAL WARNINGS

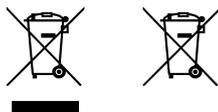


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Intended use

- USAM distributors are not CE marked. It is the customer's responsibility to carefully evaluate how the product is used, in relation to the requirements concerning special environments and/or processes (e.g. heavy industry, medical, marine environments, railway, etc.), which fall outside of the conditions of use specified by CAREL.
- The environmental conditions must correspond to the values specified on the rating plate.
- The product can only be used for the functions contemplated in its design. CAREL declines all liability for any improper use of the product.
- Observe the standards in force in the place where the humidifier is installed.
- The humidifier must be installed out of the reach of children and animals.
- Do not install and use the product near objects that may be damaged when in contact with water (or condensate). CAREL declines all liability for direct or indirect damage following water leaks from the humidifier.
- Do not use corrosive chemicals, solvents or aggressive detergents to clean the inside and outside parts of the humidifier, unless specifically indicated in the user manual.
- Installation, use and maintenance must be carried out by qualified personnel who are aware of the necessary precautionary measures and are able to carry out the appropriate operations.
- Only water with the characteristics indicated in this manual must be used to produce humidity.
- All work must be carried out according to the instructions specified in this manual and on the labels affixed to the appliance. All uses/modifications not permitted by the manufacturer are illegal. CAREL declines all liability for any illegal use of the product.

CAREL adopts a policy of continual development; consequently, CAREL reserves the right to make changes and improvements to any component described in this document without prior warning. The technical specifications shown in the manual may be changed without prior warning. The liability of CAREL in relation to its products is specified in the CAREL general contract conditions (see the website www.carel.com) and/or by specific agreements with customers; specifically, to the extent where allowed by applicable legislation, in no case will CAREL, its employees or subsidiaries/affiliates be liable for any lost earnings or sales, losses of data and information, damage to things or people, costs of replacement goods or services, downtime or any direct, indirect, incidental, actual, punitive, exemplary, special or consequential damage of any kind whatsoever, whether contractual, extra-contractual or due to negligence, or any other liabilities deriving from the installation or use of the product, even if CAREL or its subsidiaries/affiliates are warned of the possibility of such damage.



Disposal: information for users

The humidifier is made up of metal (steel) parts and plastic parts. For disposal, refer to local regulations in the place of installation.

Warranty: the warranty does not include consumables.

Approval: the quality and safety of CAREL products are guaranteed by the ISO 9001 certified design and production system, as well as by the ETL mark.

SAFETY INSTRUCTIONS

Safety instructions are required by law. These are intended to ensure safety in the workplace and prevent accidents.

Purpose

To comply with the national and local regulations in force for the prevention of personal and third-party injuries.

Symbols used

The symbols used to represent hazards correspond to the warning messages specified in accordance with EN 82079-1 (and ANSI Z535.6):

DANGER: Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING: Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION: Indicates a hazardous situation which, if not avoided, may result in light or moderate injury.

NOTICE: Indicates a potentially hazardous situation which may cause damage to surrounding property and equipment.

Unit management

Do not carry out any work that compromises the safety of the steam distributor. Follow all safety instructions and warnings marked on the unit. In the event of a malfunction or power failure, immediately switch the unit off and prevent it from being switched on again. Repair any faults promptly.

Operation of the unit

WARNING: Burn hazard!

The steam distributor contains high-temperature components. For electrode in the event of leaks or component faults, uncontrolled release of steam at 100°C/212°F may be possible. Switch the unit off immediately.

NOTICE: Risk of damage to the appliance!
The appliance may be damaged if switched on repeatedly following an unrepaired fault. Repair any malfunctions promptly.
Regularly check that all safety and monitoring devices are working properly. Do not remove or disable the safety devices.

NOTICE: Possibility of water leaks due to faulty connections or malfunctions.
Water is continuously and automatically fed into and drained by the humidifier. The connections and components that carry water and steam must be regularly checked to ensure they are working perfectly.

Assembly, disassembly, maintenance and repair of the unit

NOTICE
Make sure that it is not affected by dripping water in the site of installation.

Installation of the steam distributor in a place without a water drainage system requires the presence of safety devices that, in the event of water leaks, can safely shut off the water supply to the humidifier.

- Only use original spare parts.
- After any repairs, make sure that safe operation of the unit is checked by qualified personnel.

Connection or installation of additional components is only allowed with the written authorisation of the manufacturer.

WARNING

Do not install the steam distributor on top of electrical devices such as fuse boxes, household appliances, etc. In the event of water leaks, this may damage the electrical equipment below.

Water leaks may cause leakage current. Observe the safety rules when working on parts that may be live.
Responsibility for intrinsically safe installation of the steam distributor lies with the company that carried out installation.

Disposal after decommissioning

NOTICE: The system manager is responsible for disposal of the appliance's components as specified by law. See 1.2.

Content

1. INTRODUCTION AND ASSEMBLY 7

1.1	ultimateSAM Humidification System (SA*)	7
1.2	Distributor dimensions and weights	7
1.3	Opening the packaging	8
1.4	Assembling the SA****2** frame	8
1.5	Inserting and attaching uprights	9
1.6	Positioning	10
1.7	Mounting	10
1.8	Upright steam flow-rate	14

2. STEAM INLET CONNECTIONS 15

2.1	Inlet adapters (SAKI*****)	15
2.2	Installing inlet adapters	16
2.3	Steam inlet connection between ultimateSAM and valve flange (SAKI*****)	16

3. DRAIN CONNECTIONS 17

3.1	Installing P-traps on header drains	17
3.2	Trap, strainer, and separator kits for distributor inlets connected to pressurized steam supplies	17
3.3	Inlet drains for distributors connected to atmospheric steam supplies	18
3.4	Condensate drain for SA0 (single-pipe) (optional, sold separately)	19

4. STEAM SUPPLY CONNECTIONS 20

4.1	Control valves (SAKV*****) kits for pressurized steam supplies	20
4.2	Fitting kits (SAKR*****) for threaded control valves	20
4.3	Kit attuatori per valvole di regolazione	20
4.4	Connecting pressurized steam to an ultimateSAM distributor	21
4.5	Connecting atmospheric steam to a bottom-feed ultimateSAM distributor	21

5. OPERATION 22

6. TROUBLESHOOTING 22

6.1	Water is spitting from the nozzles on the uprights	22
6.2	Steam does not discharge from the distributors when the valve is open	22
6.3	Steam valve will not open	22
6.4	Steam valve will not close	22
6.5	Steam valve is leaking	22
6.6	Humidity exceeds set point	22
6.7	Humidity remains below set point	22
6.8	Condensate in duct	23
6.9	Steam leaks from P-traps	23

7. MAINTENANCE 23

8. SPARE PARTS 23

8.1	Adjustable feet Kit for SAB* / SAT*	23
8.2	Corner Kit for SAB*	23
8.3	Retainer ring kit for SAB*	24
8.4	Gaskets kit	24
8.5	Filter "Y" kit	24
8.6	Condensate drain separator Kit	24
8.7	F&T Condensate drain Kit	24
8.8	Inverted bucket condensate drain Kit	25
8.9	Spare upright kit, SA0 (single-pipe) versions	25
8.10	Spare manifold kit, SA0 (single-pipe) versions	25
8.11	Spare valve actuator kit	25

1. INTRODUCTION AND ASSEMBLY

1.1 ultimateSAM Humidification System (SA*)

Each UltimateSAM Humidification System consists of the following:

- humidifier steam distributor;
- components for pressurised steam, such as: actuators, valves, strainers and steam traps (sold separately);
- a controlling humidistat and/or sensor (sold separately);
- other optional equipment that may be required.

1.2 Distributor dimensions and weights

1.2.1 Dimensions and weights of the SAB* / SAT* and distributors

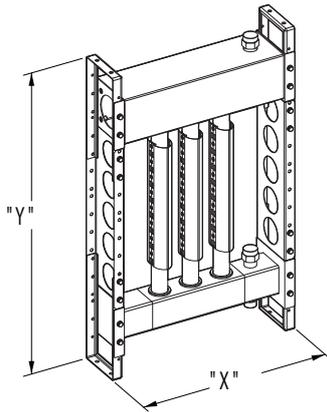


Fig. 1.a

The system for identifying the humidifier steam distributor is shown in Table 1.b. The table also provides the width (Dimension "X") and height (Dimension "Y"). The depth is 133 mm (5¼"), for the large models. The depth is 124 mm (4.8") for the "Small" models. NOTE: The height dimension assumes that the bottom pedestals are in the factory-assembled position (see section 1.4 for details on other pedestal heights).

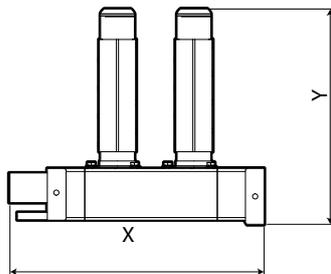


Fig. 1.b

The weights of the various distributor configurations, including the frame, are shown on Table 1.a. The table shows weights for only the smallest and largest width and height distributors. A complete weight table for all width and height codes can be found in the "Technical specifications" manual.

	Weight in kg (lb)	
	Height Code	
	A	Q
SABA*SI3*0	7.5 (17)	21.0 (46)
SABA*LI3*0	8.0 (18)	22.5 (50)
SABA*HI3*0	8.5 (19)	25.5 (56)
SABR*SI3*0	44.0 (97)	126.0 (277)
SABR*LI3*0	46.0 (101)	139.5 (307)
SABR*HI3*0	47.5 (105)	202.5 (446)
SATA*SI3*0	10.0 (22)	23.0 (51)
SATA*LI3*0	10.0 (22)	24.5 (54)
SATA*H3*0	10.5 (23)	28.0 (62)
SATR*SI3*0	55.0 (121)	137.0 (301)
SATR*LI3*0	56.5 (124)	150.0 (330)
SATR*H3*0	58.5 (129)	213.5 (470)

Tab. 1.a

SA X X X X X X X 0
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

① ID prefix						
② Steam inlet type	B= Bottom feed T=Top feed D= Dual inlet					
③ Width	Code	Dimension "X" mm (in)	No. of uprights			
			304 mm (12") distance	152mm (6") spacing	76mm (3") spacing	102 mm (4") spacing
	A=	447 (17.75)		2	3	
	B=	599 (23.75)	2	3	5	
	C=	751 (29.75)		4	7	
	D=	903 (35.75)	3	5	9	
	E=	1055 (41.75)		6	11	
	F=	1207 (47.75)	4	7	13	
	G=	1359 (53.75)		8	15	
	H=	1511 (59.50)	5	9	17	
	I=	1663 (65.50)		10	19	
	J=	1815 (71.50)	6	11	21	
	K=	1967 (77.50)		12	23	
	L=	2119 (83.50)	7	13	25	
	M=	2271 (89.50)		14	27	
	N=	2423 (95.50)	8	15	29	
	O=	2575 (101.50)		16	31	
	P=	2727 (107.50)	9	17	33	
	Q=	2879 (113.50)		18	35	
	R=	3031 (119.50)	10	19	37	
	S=	340.1 (13.38)				2
	T=	442.1 (17.40)				3
	U=	544.1 (21.42)				4
	V=	646.1(25.43)				5
	W=	748.1 (29.45)				6
④ Height:	Code	Dimension "Y" mm (in)				
		Lower inlet	Upper inlet			
	A=	598 (23.75)	749 (29.50)			
	B=	750 (29.75)	901 (35.50)			
	C=	902 (35.75)	1053 (41.50)			
	D=	1054 (41.50)	1205 (47.50)			
	E=	1206 (47.50)	1357 (53.50)			
	F=	1358 (53.50)	1509 (59.50)			
	G=	1510 (59.50)	1661 (65.50)			
	H=	1662 (65.50)	1813 (71.50)			
	I=	1814 (71.50)	1965 (77.50)			
	J=	1966 (77.50)	2117 (83.50)			
	K=	2118 (83.50)	2269 (89.50)			
	L=	2270 (89.50)	2421 (95.50)			
	M=	2422 (95.50)	2573 (101.50)			
	N=	2574 (101.50)	2725 (107.50)			
	O=	2726 (107.50)	2877 (113.50)			
	P=	2878 (113.50)	3029 (119.50)			
	Q=	3030 (119.50)	3181 (125.25)			
	R=	289.3 (11.38) / 295.2 (11.6) - if digit 9 = U				
	S=	441.3 (17.37) / 447.2 (17.6) - if digit 9 = U				
	*= SAB**M*3*0 only lower inlet					
⑤ Uprights:	Code	Spacing mm (in)"	OD mm (in)			
	S=	152 (6.00)	35 (1.50)			
	L=	152 (6.00)	45 (1.75)			
	H=	76 (3.00)	35 (1.50)			
	M=	102 (4)	45 (1.75)			
	A=	304 (12)	35 (1.50)			
	B=	304 (12)	45 (1.75)			
⑥ Insulation:	I= insulated uprights with nozzles					
	N= uninsulated uprights without nozzles					
A= insulated uprights with nozzles - USAM Small - Ø 40 inlet						
B= insulated uprights with nozzles - USAM Small - 1" G inlet						
C= insulated uprights with nozzles - USAM Small - 1" NPT inlet						
⑦ Frame:	0= no frame, unassembled					
	1= no frame, assembled					
2= with frame, unassembled						
3= with frame, assembled						
4= With frame assembled, inlet steam of 40mm, bracket for to fix into the UTA L=125mm						
5= With frame assembled, inlet steam of 80mm, bracket for to fix into the UTA L=125mm						
6= With frame assembled, inlet steam of 80mm e manifold kit 2X1, bracket for to fix into the UTA L=125mm						
7= With frame assembled, inlet steam of 80mm e manifold kit 4X1, bracket for to fix into the UTA L=125mm						
S= Seismic kit						

⑧	Drain:	U= ¾ NPT male (US e Canada) O= ¾ G male (all excepted US and Canada) Nota: Codes SAB**M*3*0 have condensate drain Ø 10 mm smooth, on input flange
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⑨	---	---
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Tab. 1.b

For additional dimensions regarding features on the distributor, like drain locations, see the "Technical specifications" manual. See other sections of this manual for details on other ultimateSAM items, such as valves and traps.

Note: some models/versions are specific for certain markets, and consequently are not available in some countries. The flanged accessories are not available for North America. Contact the CAREL sales network for availability.

1.2.2 Dimensions and weights of the SA0 (single-pipe) distributor

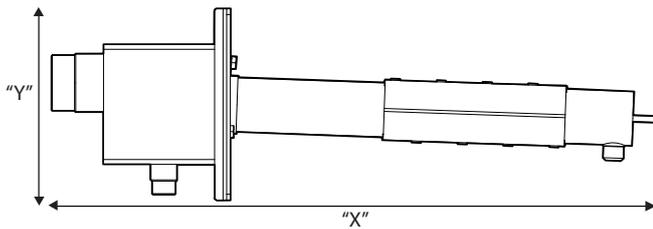


Fig. 1.c

The system used to identify the distributor is shown in Table 1.b. The table shows the widths (dimension "X") and heights (dimension "Y").

SA	0	*	*	L	*	0	*	0
1	2	3	4	5	6	7	8	9

Tab. 1.c

1	ID prefix		
2	Feed type:	0	Single-pipe (single-upright)
3	Width:	Code	Dimension "X" [mm (in)]
		A	A = 503mm (19.7in)
		B	B = 655 mm (25.7in)
		C	C = 807 mm (31.7in)
		D	D = 959 mm (37.7in)
		E	E = 1111 mm (43.7in)
		F	F = 1263 mm (49.7in)
		G	G = 1415 mm (55.7in)
		H	H = 1567 mm (61.7in)
		I	I = 1719 mm (67.7in)
		J	J = 1871 mm (73.7in)
		K	K = 2023 mm (79.7in)
		L	L = 2175 mm (85.7in)
		Z	Z = 427 mm (16.8in) for SA0***** SMALL
4	Single-upright selection mm (in)	Code	Dimension "Y" [mm (in)]
		A	A = single upright 160 mm (6.3 in)
5	Type of upright (diameter) mm (in)	L	L = 45 (1.75) OD
6	Insulation:	I	I = insulated uprights with nozzles
7	Frame:	0	0 = no frame, unassembled
8	Drain	U	U = ½" Male NPT
		O	O = ½" Male Gas

Tab. 1.d

For other distances and measurements relating to the distributor see the "Technical specifications" manual. See the remaining sections of this manual for details on the other components of the ultimateSAM system.

1.3 Opening the packaging

- Make sure the humidifier is intact upon delivery and immediately notify the transporter, in writing, of any damage that may be due to careless or improper transport.
- Open the shipping container and check contents for damage. If the humidifier is shipped unassembled, be sure to locate all of the components.
- Move the humidifier to the site of installation before removing internal packaging. For some installations, assembly may need to take place inside the AHU.

NOTE: READ THE FOLLOWING SECTIONS ON POSITIONING AND ASSEMBLY BEFORE PROCEEDING WITH INSTALLATION.

1.4 Assembling the SA*****2** frame

1.4.1 Assembling the frame, SAB/SAT versions

An unassembled frame is shipped with any SA*****2** ultimateSAM distributor. The frame consists of the following:

- 2 bottom supports (a) (if a drain trap needs to be installed inside the duct underneath the bottom manifold, the optional supports may be required)
- 2 Side channels (c);
- 4 Corner brackets (d) used on bottom feed system;
- 1 Top channel (e) used on bottom feed system;
- 2 Top brackets (a) used on top feed system;
- Fasteners (M6x10 bolts with locking and flat washers).

Assemble (but do not tighten) the following parts described in steps A-D, using the fasteners provided:

- Fasten the bottom pedestals (a) to the bottom header (b). The choice of pedestal mounting position depends on the location of the condensate drain for the bottom header.
 - If an elbow will be attached to the drain, use the mounting holes for "standard position." (Fig.1.c) This is the height at which factory-assembled distributors are built (as pictured on the front cover).
 - If the drain will pass through a hole in the bottom of the duct, use the mounting holes that provide minimum clearance ("minimized position").
 - If the drain is to be installed inside the duct or AHU, use the optional mounting stand (SAKS010000) to provide up to 386mm (15") clearance. (Fig.1.d)
 - Fasten the side channels (c) to the bottom pedestals (a).
 - If assembling a bottom feed system [SAB*****2**], insert retaining rings into the top channel of the frame. Fasten the corner brackets to the side channels. Fasten the top channel to the corner brackets. (Fig.1.e)
 - If assembling a dual feed system [SAT*****2**], fasten the top header (f) and brackets (a) to the side channels. (Fig.1.f).
- Tighten the screws with a tightening torque of 7-8 Nm (5-6 ft lb), making sure that the components are assembled square;

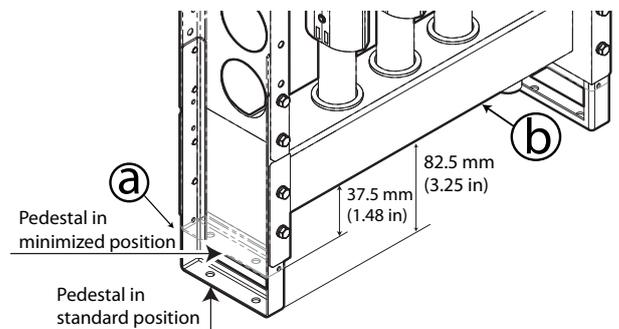
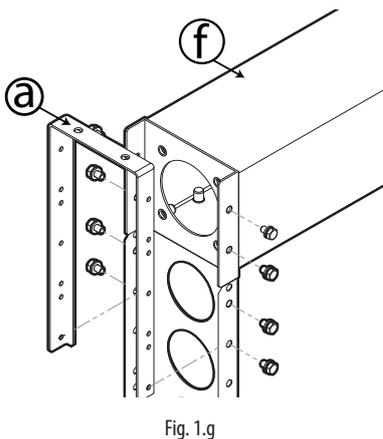
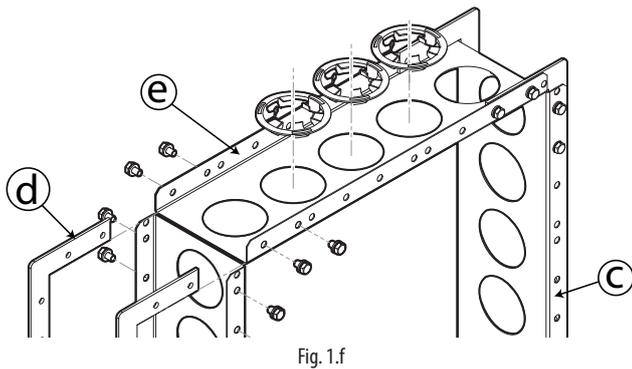
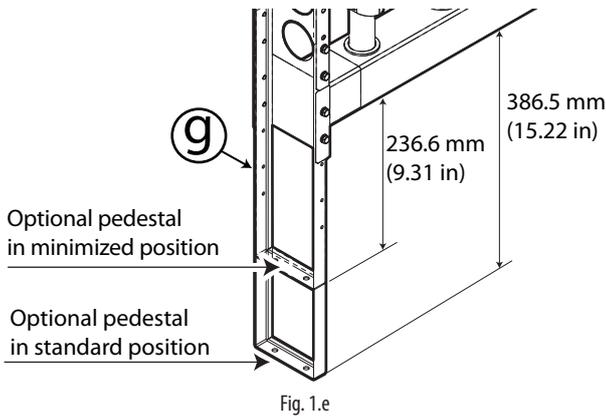


Fig. 1.d



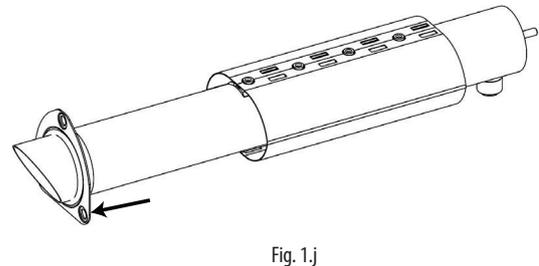
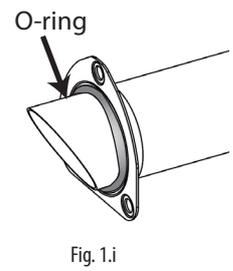
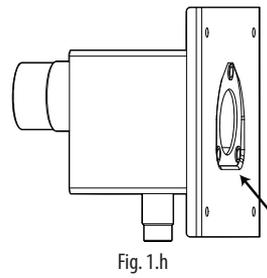
1.4.2 Assembling the frame, SA0 (single-pipe) versions

The ultimateSAM version SA0***** distributors are supplied with a frame to be assembled, which comprises the following components:

- manifold with support flange
- upright
- flange gasket
- upright o-ring
- fastening elements (screws)

To assemble the SA0 distributor, proceed as follows:

- place the upright into the opening on the manifold and align the holes on the flange with those on the manifold.
- Fasten the flange to the manifold by tightening the screws to 7-8 Nm (5-6 ft lb). Use the fastening elements supplied. Before assembly, make sure that the o-ring is correctly inserted between the flange and the manifold..
- Remove the plastic clamps on the upright insulation (only needed for transport).

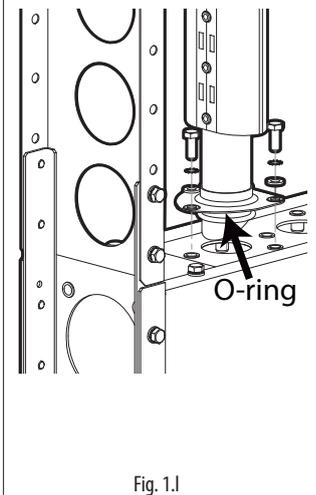
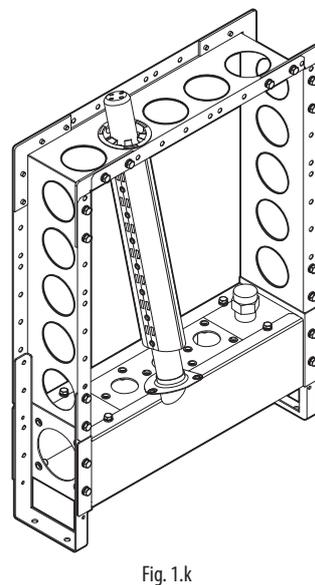


NOTE: The SABSRM*3*0, SABTRM*3*0, SABURM*3*0, SABVRM*3*0, SABWRM*3*0, SABSSM*3*0, SABTSM*3*0 distributors do not come with a frame.

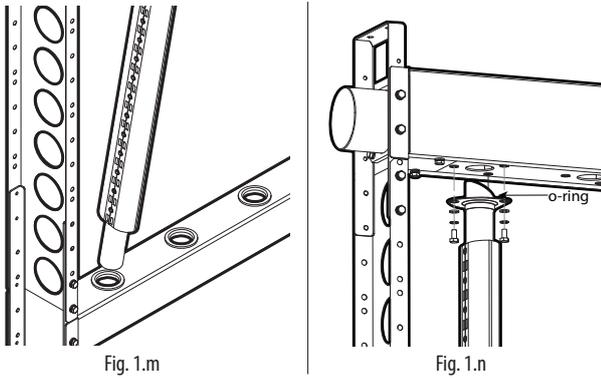
1.5 Inserting and attaching uprights

For a bottom feed distributor,

- Tilt the upright, inserting it into the retaining ring in the top bracket. (Fig.1.J)
- Continue sliding the upright upward until the bottom of the upright can be inserted into the hole in the bottom header.
- Using 7-8 Nm torque (5-6 ft lb), secure the flange of the upright to the bottom header using the fasteners provided. Before tightening, check to ensure the o-ring is in the proper position between the flange and distributor. (Fig.1.k)
- Continue until all uprights are installed.



- For a top feed distributor,
 - Check that the upper flange with o-ring is properly positioned on the upright.
 - Tilt the upright, inserting it into the gasket in the bottom header (Fig.1.l). **Note:** if necessary, use water in order to insert upright into gasket;
 - Continue sliding the upright downward until the top of the upright can be inserted into the opening in the top header.
 - Before tightening, check to ensure the o-ring is in the proper position between the flange and distributor. (Fig.1.m)
 - Using 7-8 Nm torque (5-6 ft lb), secure the top flange to the top header using the fasteners provided.
 - Continue until all uprights area installed.



Note: The SABSRM*3*0, SABTRM*3*0, SABURM*3*0, SABVRM*3*0, SABWRM*3*0, SABSSM*3*0, SABTSM*3*0 distributors are supplied already assembled.

1.6 Positioning

- Determine the proper position for the ultimateSAM distributor in the duct or AHU. (Fig.1.o) Most steam absorption problems are the result of improper positioning.
- Check that the clearance between the distributor and downstream components is not less than the absorption distance of distributor. Refer to the design manual for information on absorption distances for the ultimateSAM distributor.

- Examine all accessories shipped with the distributor. These accessories may influence the positioning and mounting of the distributor as they can facilitate the connection of the steam supply and drains to the distributor. For additional information on these accessories, see the appropriate sections in the manual.
- Before mounting the distributor to the duct or AHU, review the sections of the manual dealing with inlet and drain connections as these connections may need to pass through the walls of the duct.

Possible locations for the distributor:

- BEST: locate distributor far enough from fan to avoid turbulence. Maintain adequate evaporation distance.
- GOOD: provided there is enough distance from the distributor to the fan inlet for proper evaporation.
- OK: provided there is enough distance from the distributor to the heating coil for proper evaporation (particularly if the heating coil is electric)
- POOR: workable only if the cooling coil is inactive during humidifier operation. An active cooling coil will remove the moisture the humidifier is trying to put in.
- POOR: same problems as C&D plus the air may be very cold, increasing evaporation distance or causing condensation.
- POOR: same problems as C, D, & E plus the filters may get wet producing an unsafe condition with growth of biologicals.
- POOR: only workable if the system is 100% recirculated air with no exhaust.

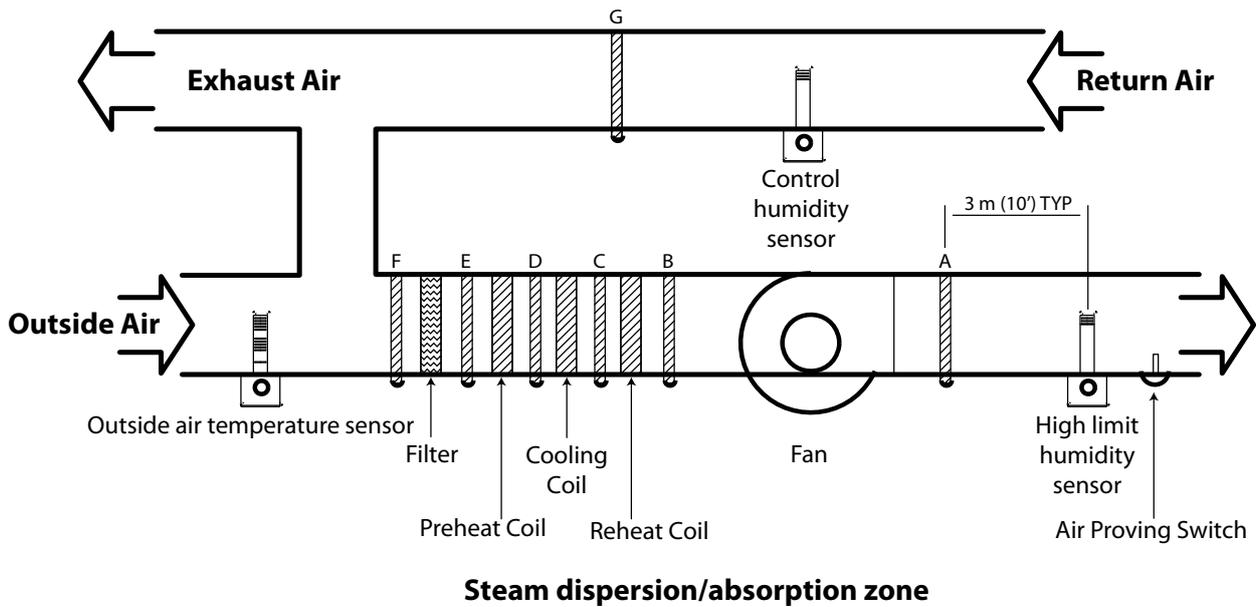
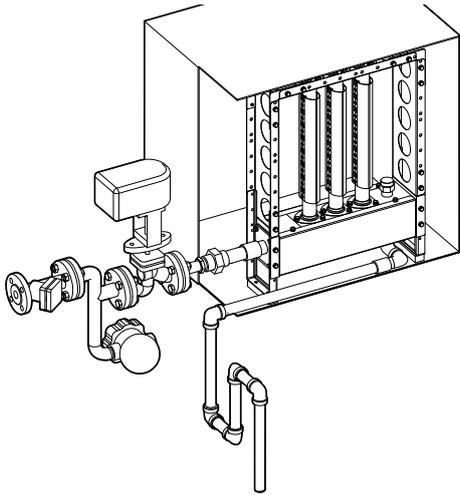


Fig. 1.o

1.7 Mounting

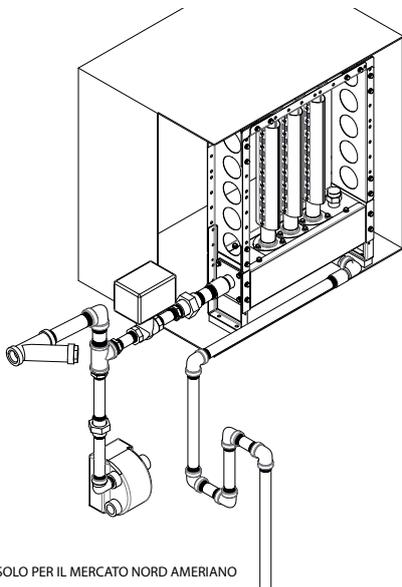
Before mounting the distributor to the duct or AHU, be sure to review the information in the "Positioning" section of the manual. (See section 1.6.) Check that the structural integrity of the duct or AHU is sufficient to support the weight of the distributor where the bottom brackets are located. Reinforce these areas if necessary. Weight tables are provided in section 9.1 of the manual. Center the distributor within the duct as much as possible.

1.7.1 Mounting SAB/SAT models



NON APPLICABILE PER IL MERCATO NORD AMERICANO

Fig. 1.p



SOLO PER IL MERCATO NORD AMERICANO

Fig. 1.q

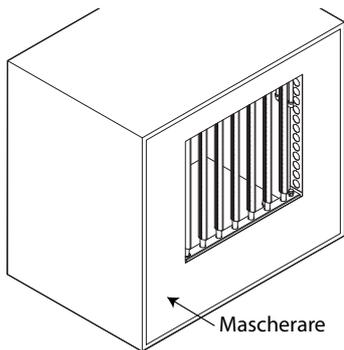


Fig. 1.r

Nota: The inlet adapter, control valve, actuator, trap, and strainer shown above are available as options. The "P" drains are not provided as part of the ultimateSAM system.

- Attach any optional inlet and/or drain connections to the distributor that will need to pass through the wall of the duct. (Fig.1.p) See section 2 for information in inlet connections. See section 3 for information on drain connections.
- Unless the distributor has been assembled inside the duct or AHU, cut an opening in the duct through which the distributor can be inserted. The opening can be in either the side or bottom of the duct, depending on accessibility.

- Cut out any additional openings in the duct or AHU as needed for the inlet and/or drain connections.
- If desired, shim the inlet side of the distributor so that condensate in the header with flow toward the drain pipe. A 1% grade (~1 cm per meter, ~1/8" per foot) is suggested.
- Secure the bottom pedestals to the duct.
- Secure the top corners of the side channels to the walls of the duct or AHU.
- Face off all sides of the duct, as necessary, so that air flow is directed through the uprights as much as possible. (Fig.1.r)

ultimateSAM small mounting

a. installation of ultimateSAM small inside a duct:

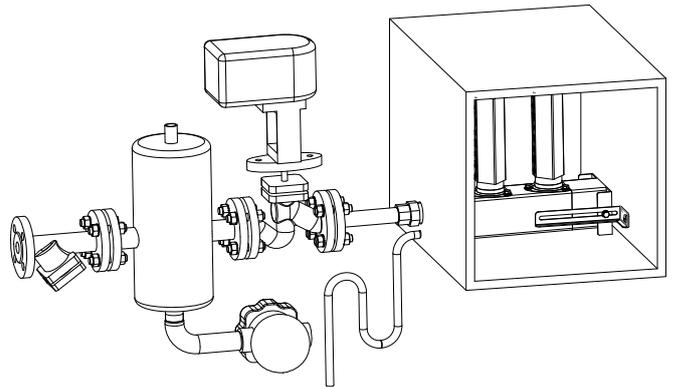


Fig. 1.s

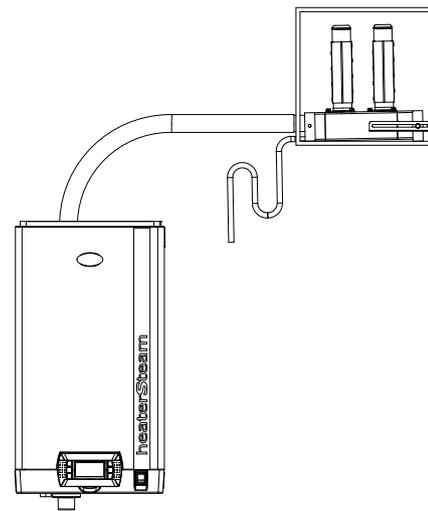


Fig. 1.t

b. condensate drain and steam inlet for ultimateSAM small:

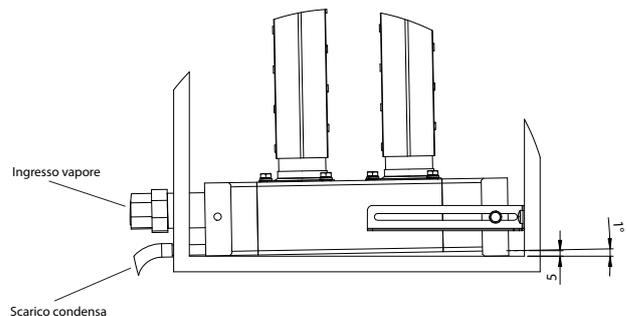


Fig. 1.u

How to fix ultimateSAM small in the AHU/duct

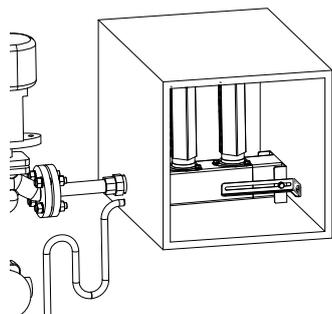
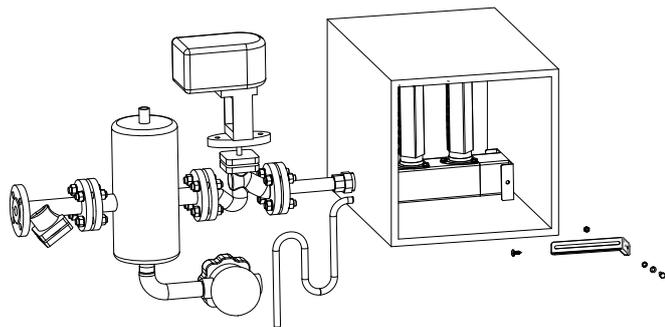


Fig. 1.v

UltimateSAM small dimensions for ambient application

The ultimateSAM small is supplied with steam connection and condensate drain. In the case of atmospheric application (with humidifier) the steam inlet is smooth and 40mm in diameter.

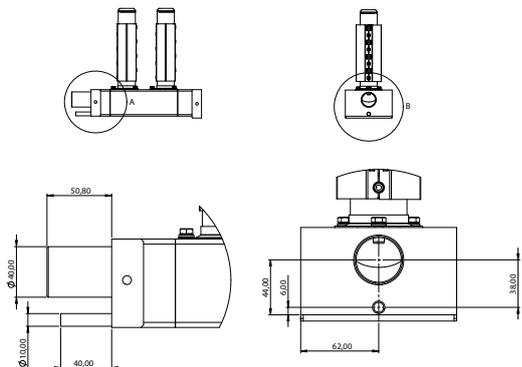


Fig. 1.w

UltimateSAM small dimensions for pressurized steam application

The ultimateSAM small is supplied with steam connection and condensate drain. In the case of pressurized steam, the steam inlet is with a GAS or NPT type connection depending on the reference market.

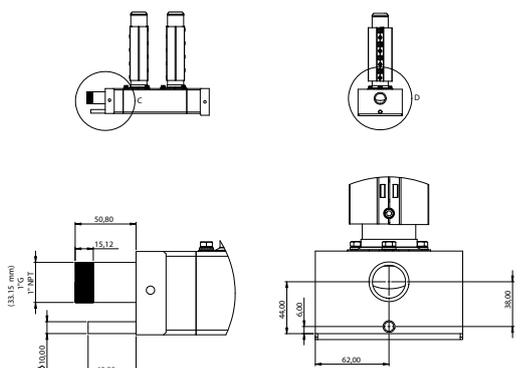


Fig. 1.x

Mounting SA0 (single-pipe) versions)

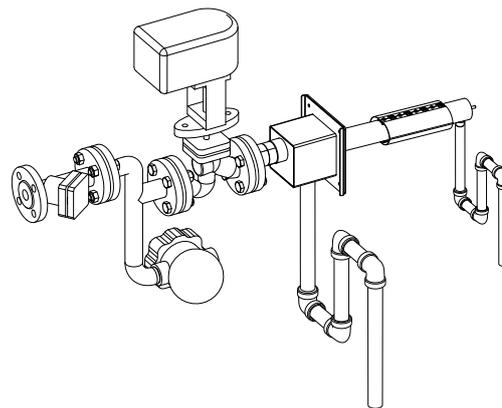


Fig. 1.y

Installation with manifold outside the duct

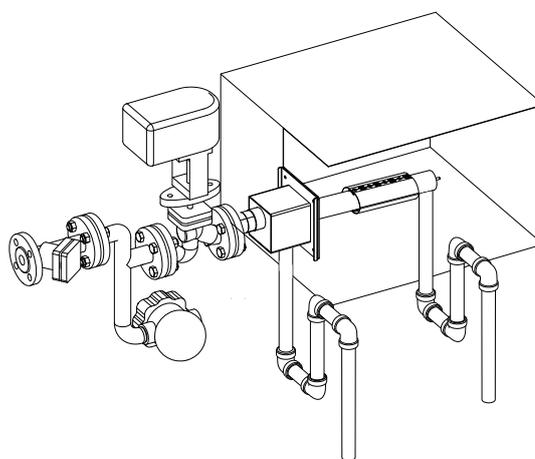


Fig. 1.z

Follow the installation procedure described below:

1. assemble the SA0 steam distributor (see paragraph 1.4.2 Assembling the frame, SA0 versions);
2. apply the drilling template to the duct where the steam distributor will be installed;
3. drill the required holes;
4. insert the gasket and rest it against the support flange;
5. insert the fastening screws to secure the support flange;
6. place the upright in the 100 mm opening made in the duct;
7. fasten the support flange screws to 7-8Nm (5-6ft), using the fastening elements supplied;
8. If necessary, secure the end of the upright.

See "SA0 installation procedure - manifold outside of AHU - with AHU wall cover kit" at the end of the manual for details.

Installation inside the air handling unit

Follow the installation procedure described below:

- assemble the SA0 steam distributor (see paragraph 1.4 Assembling the frame, SA0);
 - prepare the suitably sized and spaced supports so as to fasten the support flange and the end of the upright (supports not supplied);
- If necessary, secure the end of the upright.

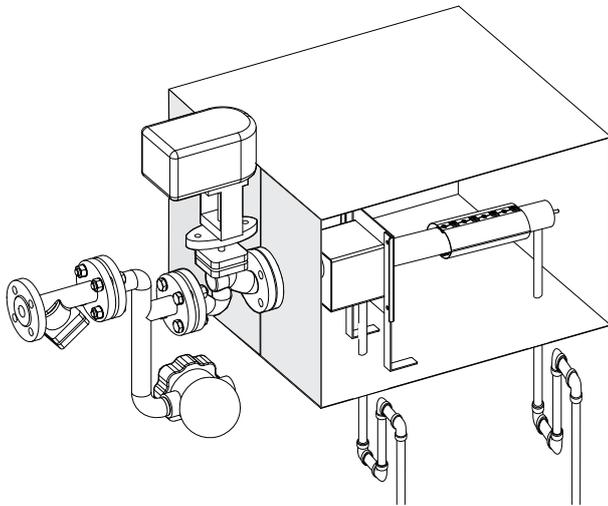
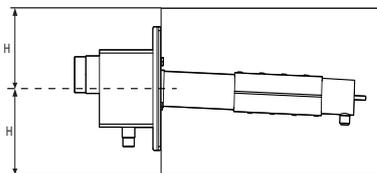


Fig. 1.aa

1.7.2 SA0 (single-pipe) minimal clearances

Correct installation of the SA0 distributor means allowing for certain minimum clearances.

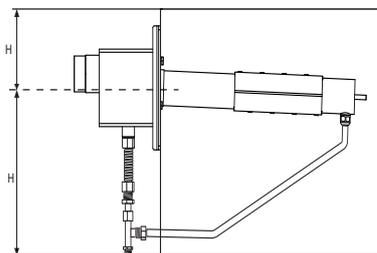


Effective single upright flow-rate $\leq 50\text{kg/h}$ (110lb/h) -> H=150mm (5.9in)

Minimum AHU height: 300mm (11.8in)

Effective single upright flow-rate $> 50\text{kg/h}$ (110lb/h) -> H=200mm (7.9in)

Minimum AHU height: 400mm (15.8in)



Effective single upright flow-rate $\leq 50\text{kg/h}$ (110lb/h)

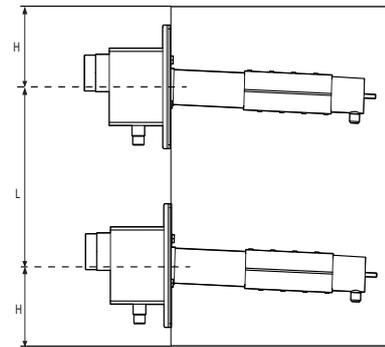
H=150mm (5.9in) L=250mm (9.8in)

Minimum AHU height: 400mm (15.8in)

Effective single upright flow-rate $> 50\text{kg/h}$ (110lb/h)

H=150mm (5.9in) L=250mm (9.8in)

Minimum AHU height: 450mm (17.7in)



Effective single upright flow-rate $\leq 50\text{kg/h}$ (110lb/h)

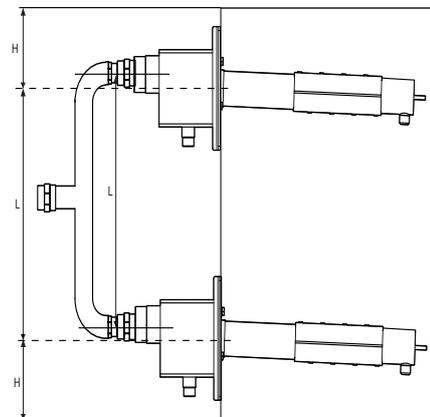
H=150mm (5.9in) L=160mm (6.3in)

Minimum AHU height: 460mm (18.1in)

Effective single upright flow-rate $> 50\text{kg/h}$ (110lb/h)

H=200mm (7.9in) L=200mm (7.9in)

Minimum AHU height: 600mm (23.6in)



SAKD051000 kit:

(centre distance 235mm(9.3in))

Effective single upright flow-rate $\leq 50\text{kg/h}$ (110lb/h)

H=150mm (5.9in) L=160mm (6.3in)

Minimum AHU height: 535mm (21.1in)

Effective single upright flow-rate $> 50\text{kg/h}$ (110lb/h)

H=200mm (7.9in) L=200mm (7.9in)

Minimum AHU height: 635mm (25.0in)

SAKD052000 kit:

(centre distance 420mm(16.5in))

Effective single upright flow-rate $\leq 50\text{kg/h}$ (110lb/h)

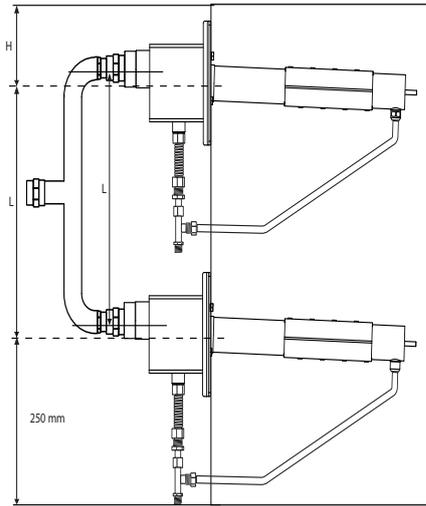
H=150mm (5.9in) L=420mm (16.5in)

Minimum AHU height: 720mm (28.3in)

Effective single upright flow-rate $> 50\text{kg/h}$ (110lb/h)

H=200mm (7.9in) L=420mm (16.5in)

Minimum AHU height: 820mm (32.3in)



SAKDOS2000 kit:

(centre distance 420mm(16.5in))

Effective single upright flow-rate ≤ 50kg/h (110lb/h)

H=150mm (5.9in) L=420mm (16.5in)

Minimum height: 820mm (32.3in)

Effective single upright flow-rate > 50kg/h (110lb/h)

H=200mm (7.9in) L=420mm (16.5in)

Minimum height: 870mm (34.3in)

For steam flow-rates less than or equal to 50kg/h (for single upright):

H = 150 mm; U = 160 mm;

For steam flow-rates starting from 50kg/h (excluded) (for single upright):

H = 200 mm; U = 200 mm.

Leave at least 25 mm (1") free space between the device and the wall of the duct.

1.8 Upright steam flow-rate

The uprights on the ultimateSAM come in two different diameters. In the "S" configuration (6th digit of the ultimateSAM code) the diameter of the uprights is 35 mm (1.37"), to increase flow-rate on single uprights there is also the "L" configuration (6th digit of the ultimateSAM code) in which the diameter of the uprights is 45 mm (1.77").

1.8.1 Steam flow-rate, SAB/SAT versions

For ultimateSAM multi-upright models (SAB/SAT), the maximum steam flow-rate for each upright also depends on the configuration of the ultimateSAM. In fact, with top feed the upright steam flow-rate increases as condensate flows in the same direction as draining. Below are the flow-rates for the two versions.

Upright configuration	Type "S"	Type "L"
Upright diameter	35 mm (1.37")	45 mm (1.77")
Maximum single upright flow-rate in the ultimateSAM SAB* configuration	10 kg/h (22 lb/h)	16.7 kg/h (37 lb/h)
Maximum single upright flow-rate in the ultimateSAM SAT* configuration	30 kg/h (66 lb/h)	50 kg/h (110 lb/h)

Tab. 1.e

Upright configuration	Type "M"	Type "M"
Upright diameter Ø	45 mm (1.77") - 8 nozzles	45 mm (1.77") - 16 nozzles
Maximum single upright flow-rate in configuration ultimateSAM SAB* (Small)	7.5 kg/h (16.5 lbs/h):	15 kg/h (33 lbs/h):

Tab. 1.f

1.8.2 Steam flow-rate, SA0 (single-pipe) versions

For ultimateSAM SA0 (single-pipe) versions, the flow-rate of the distribution pipe depends on the application being developed. At atmospheric pressure, i.e. when the distributor is supplied by a steam humidifier, 50 kg/h (110 lb/h) is the maximum steam flow-rate (maximum 20 kg/h (44 lb/h) for codes SA0AA***** and SA0BA*****). This physical limit relates to the backpressure that would be generated in the steam humidifier located upstream of the ultimateSAM SA0 distributor.

If the steam inlet is pressurised (pressure higher than 0 bars: 0.1 to 4 bars (1.45-58 psi), the maximum load allowed for each upright increases with the length of the SA0 upright (see the table below for the flow-rates).

Table of steam flow-rates for ultimateSAM SA0 versions:

code	Upright length mm (in)	Maximum steam flow-rate at atmospheric pressure (SA0 supplied by steam humidifier) kg/h (lb/h)	Maximum steam flow-rate with pressurised steam 0.1-4bars (1.45-58 psi) kg/h (lb/h)	Minimum width of the duct mm (inches)
SA0AALI0*0	358 (14.1)	20 (44)	20 (44)	383 (15.1)
SA0BALI0*0	510 (20.1)	20 (44)	30 (66)	535 (21.1)
SA0CALI0*0	662 (26.1)	50 (110)	50 (110)	687 (27.0)
SA0DALI0*0	814 (32.0)	50 (110)	60 (132)	839 (33.0)
SA0EALI0*0	966 (38.0)	50 (110)	70 (154)	991 (39.0)
SA0FALI0*0	1118 (44.0)	50 (110)	80 (176)	1143 (45.0)
SA0GALI0*0	1270 (50.0)	50 (110)	90 (198)	1295 (51.0)
SA0HALI0*0	1422 (56.0)	50 (110)	100 (220)	1447 (57.0)
SA0IALI0*0	1574 (62.0)	50 (110)	110 (242)	1599 (63.0)
SA0JALI0*0	1726 (68.0)	50 (110)	120 (264)	1751 (68.9)
SA0KALI0*0	1878 (73.9)	50 (110)	130 (286)	1903 (74.9)
SA0LALI0*0	2030 (79.9)	50 (110)	140 (308)	2055 (80.9)

Tab. 1.g

2. STEAM INLET CONNECTIONS

2.1 Inlet adapters (SAKI*****)

2.1.1 Steam inlet adapters (SAKI*****)

The choice of inlet connections for the ultimateSAM distributor is shown in Figure 2.a. The choices include:

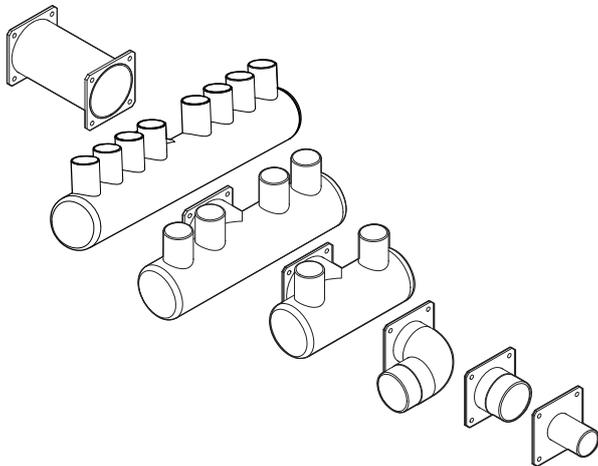
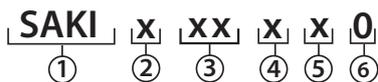


Fig. 2.a

- For atmospheric steam delivery systems,
 - 8-to-1, 4-to-1 and 2-to-1 adapters for 40 mm (1.6") pipes;
 - Single connection for 80 mm (3 1/8") ID steam hose
- For pressurized steam delivery systems,
 - Straight or elbow threaded pipe connections (1", 1 1/2", 2", and 2 1/2" size)
- 150mm (6") Inlet Extension (if needed to pass through the duct wall, either with or without a condensate drain fitting (3/4" male threaded pipe)

The codes for inlet adapter kits are shown in Table 2.a. Each inlet kit includes the following:

- inlet adapter
- gasket
- fastening elements.



①	ID prefix	Description
②	Style:	E = Threaded Elbow P = Threaded Male Pipe T = Straight Tube X = Extension
③	Size:	40 = 40mm 44 = 1" 64 = 1 1/2" 80 = 80mm 84 = 2" 94 = 2 1/2"
④	Inlets:	1 = Single 2 = Double 4 = Quad 8 = Inlets
⑤	Region:	U = North America 0 = Other
⑥	---	---

Tab. 2.a

For installations requiring an extended inlet for the distributor, a 150 mm (6") extension adapter (SAKIX80100) is also available. The extension adapter has the same mounting flange on both ends.

Specifics regarding the inlet connection on available inlet adapters are shown in Table 2.b. For weights and dimensions of the adapters, see the "Technical specifications" manual.

Inlet Size	Inlet connections			
	Style, Region Codes			
	****E***O* ****P***O* "	****T***O*	****P***U*	****E***U*
"SAKI*401*0 SAKI*402*0 SAKI*404*0"	n/a	for 40 mm ID hose	n/a	n/a
SAKI*441*0	G male	n/a	NPT male	NPT female ¹
SAKI*641*0	G male	n/a	n/a	n/a
SAKI*801*0	n/a	for 80 mm ID hose ²	n/a	n/a
SAKI*841*0	G male	n/a	NPT male	NPT female ¹
SAKI*941*0	G male	n/a	n/a	n/a

Tab. 2.b

¹ The SAKIE***U* consists of an SAKIP***U* with a female pipe elbow attached.

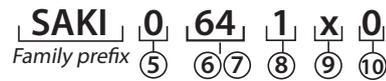
² 80mm ID steam hose can slide over the OD of 3" copper tubing.

2.1.2 Steam inlet adapters for SA0 (single-pipe)

The ultimateSAM SA0 has a steam inlet with 1 1/2" GAS or 1 1/2" NPT (American market) fitting. When supplied with pressurised steam no adapters need to be used, simply connect the steam inlet on the manifold to a 1 1/2" GAS (1 1/2" NPT) pipe.

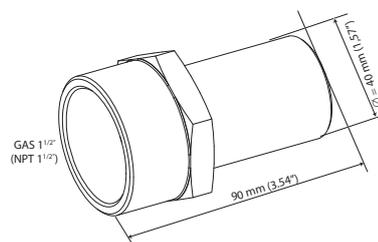
If the distributor is supplied with steam at atmospheric pressure, a stainless steel adapter is available for installation directly on the manifold inlet. This adapter features GAS or NPT female thread. The adapter guarantees connections to 40 mm rubber hoses; secure the hoses to the adapter using a clamp.

The codes for the steam inlet kits are shown in Table 2.a.



Pos.	Meaning	Option	Description
⑤	type	0	For SA0*
⑥-⑦	dimension	48	1" NPT
			2" NPT
		64	1 1/2"
⑧	number of inputs	1	Single
⑨	Region	U	North America (NPT)
		0	Other (GAS)
⑩	Free	0	

Tab. 2.c



For the dimensions and weights of the adapters, see the "Technical specifications" manual.

2.1.3 Steam inlet adapters

The USAM "Small" versions are equipped with Ø 40 mm (atmospheric applications), 1" G threaded / 1" NPT threaded (pressure applications) steam inlets.

All models for atmospheric applications are supplied with a 30/40 mm adapter kit (including metal hose clamps and Ø 40 mm steam tube section).

USAM Small models: SABSRM*3*0, SABTRM*3*0, SABURM*3*0, SABVRM*3*0, SABWRM*3*0, SABSSM*3*0, SABTSM*3*0.

2.2 Installing inlet adapters

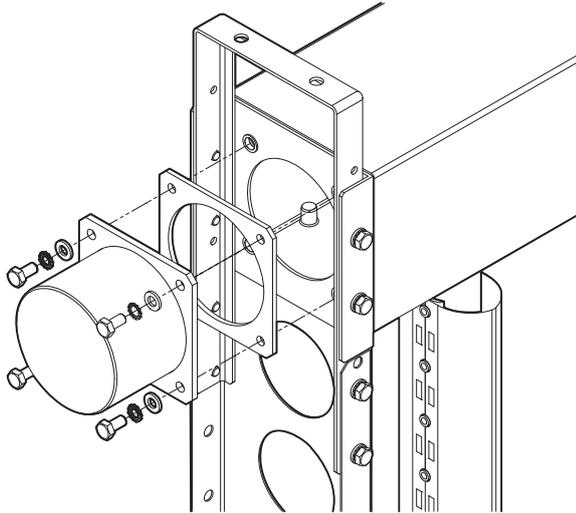
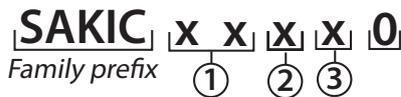


Fig. 2.b

- If installing an inlet extension,
 - a. Place the gasket on the face of the header's inlet.
 - b. Using 7-8 Nm torque (5-6 ft lb), secure the extension adapter to the header using the fasteners provided in the kit containing the inlet adapter that will be secured to the extension.
- Place the gasket on the face of the inlet of the header or extension.
- Using 7-8 Nm torque (5-6 ft lb), secure the inlet adapter using the fasteners provided. (Fig.2.b) If the inlet adapter is being attached to an inlet extension, use the fasteners included in the extension kit to secure the inlet adapter.
- To connect the steam supply to the distributor, see section 4 for further information.

2.3 Steam inlet connection between ultimateSAM and valve flange (SAKI*****)

Connection kits are available for ultimateSAM between the distributor steam inlet and the valve flange. These kits vary depending on the distributor steam inlet connection and valve nominal diameter.



Pos.	Meaning	Opt.	Description
①	Type of connection	64	1 1/2"
		84	2"
		94	2 1/2"
②	Nominal diameter	A	DN 15
		B	DN 20
		C	DN 25
		D	DN 32
		E	DN 40
		F	DN 50
		G	DN 65
③	Region	U	North America
		0	Other

Tab. 2.d

The kits are available in AISI 316 stainless steel

The kit codes specified in Table 2.e comprise:

- gasket (1);
- flange (2);
- adapter (6);
- pipe (3, 5);
- joint (4);

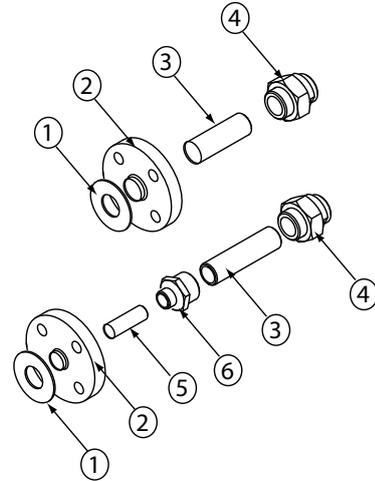


Fig. 2.c

Code	Description	NOTE
SAKIC64A00	ultimateSAM valve connection kit (DN15 - 1" 1/2)	also used with SA0*
SAKIC64B00	ultimateSAM valve connection kit (DN20 - 1" 1/2)	
SAKIC64C00	ultimateSAM valve connection kit (DN25 - 1" 1/2)	
SAKIC64D00	ultimateSAM valve connection kit (DN32 - 1" 1/2)	
SAKIC64E00	ultimateSAM valve connection kit (DN40 - 1" 1/2)	
SAKIC64F00	ultimateSAM valve connection kit (DN50 - 1" 1/2)	
SAKIC84B00	ultimateSAM valve connection kit (DN20 - 2")	
SAKIC94C00	ultimateSAM valve connection kit (DN25 - 2" 1/2)	
SAKIC94D00	ultimateSAM valve connection kit (DN32 - 2" 1/2)	
SAKIC94E00	ultimateSAM valve connection kit (DN40 - 2" 1/2)	
SAKIC94F00	ultimateSAM valve connection kit (DN50 - 2" 1/2)	
SAKIC94G00	ultimateSAM valve connection kit (DN65 - 2" 1/2)	

Tab. 2.e

The minimum distance to allow for correct connection inside the AHU is D= 100 mm (3.93 in) (Fig. 2.d)

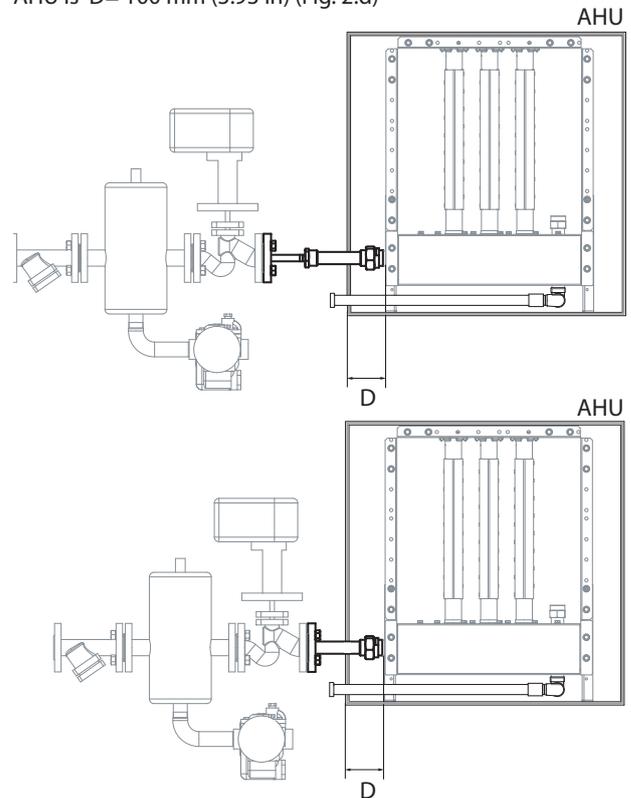


Fig. 2.d

The pipe x is used to pass through the insulating panel on the AHU.

3. DRAIN CONNECTIONS

3.1 Installing P-traps on header drains

A condensate trap should be installed on the 3/4" pipe connection provided on the bottom of each header. The connection is 3/4" male NPT for North American markets and 3/4" Gas for the other regions (for the SA0 single-pipe: 1/2" GAS or 1/2" NPT). Given the minimal pressure inside the header, a P-trap is generally suitable for the header drains. The fittings and pipe for the P-trap (shown in Fig.3.a) are not included with the ultimateSAM distributor.

If P-traps are used on the drains, the seal height should be sufficient such that the water column creates a pressure at least 500 Pa (50 mm or 2" H2O) greater than the static pressure in the header. (Refer to the design manual for more information on static pressure of the header.) While a seal height of 150mm (6") is adequate for most installations where the condensate trap drains into a sump inside the duct, check the design manual for details on the back pressure generated by distributor being installed.

Note: Check local requirements regarding the minimum recommended seal height and drop height for the installation.

SAB/SAT Models

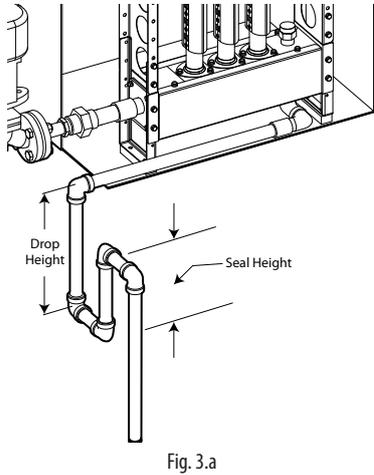


Fig. 3.a

SA0 Models

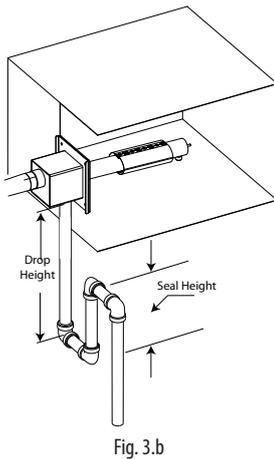


Fig. 3.b

Note: The fittings and pipe for the condensate drain shown in Fig.3.a and 3.b are not included with the ultimateSAM distributor.

If the P-trap empties outside the duct or AHU as shown in Fig.3.a, the seal height and drop height must allow for the static pressure inside the duct or AHU in addition to the static pressure in the header. If the space limits the seal height for the condensate drain, a different type of trap, e.g., F&T (float and thermostatic) trap could be used, or a distributor having a lower backpressure could be selected.

3.2 Trap, strainer, and separator kits for distributor inlets connected to pressurized steam supplies

For installations in which the ultimateSAM distributor is supplied with pressurized steam, a trap and strainer are required at the inlet of the control valve. A variety of trap and strainer kits are available as accessories. (Fig.3.b-c)

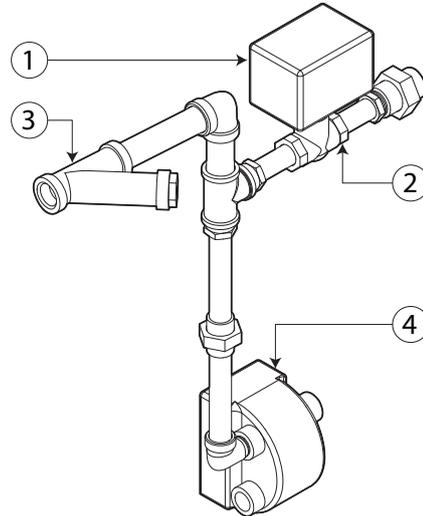


Fig. 3.c

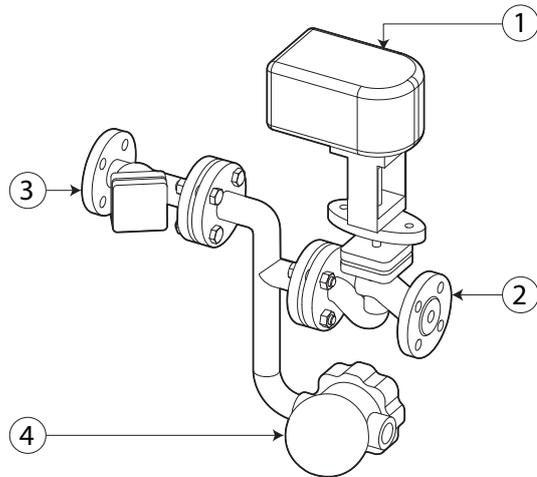


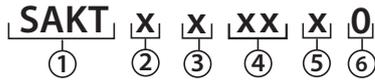
Fig. 3.d

- ① Actuator
- ② Valve
- ③ Y Strainer/Filter
- ④ Float and Thermostatic trap

The system for identifying trap, strainer, and drain accessories is shown in Table 3.a.

Note: Not all of the possible combinations shown on the table are available.

A complete list of available kits, as well as information on other features, is provided in Tab.3.b.



① ID prefix	
② Material:	F = Iron S = SS
③ Type:	S = Condensate separator T = Trap & strainer assembly
④ Size:	15 = DN 15 flange 20 = DN 20 flange 25 = DN 25 flange 32 = DN 32 flange 40 = DN 40 flange 44= 1" pipe thread 50= DN 50 flange 65= DN 65 flange 84= 2" pipe thread
⑤ Region:	U = North America 0 = Other
⑥ ---	---

Tab. 3.a

Table 3.b provides a complete listing of all of the traps, strainers, and other accessories available for the use with the ultimateSAM distributor. In addition, the table provides information on the size and type of inlet-outlet connection for each accessory.

Inlet-Outlet Connections

Size	Material, Type, Region Codes		
	****FT**0*	****FT**U*	****ST**U*
SAKT**15*0	Flange DN 15	n/a	n/a
SAKT**20*0	Flange DN 20	n/a	n/a
SAKT**25*0	Flange DN 25	n/a	n/a
SAKT**32*0	Flange DN 32	n/a	n/a
SAKT**40*0	Flange DN 40	n/a	n/a
SAKT**44*0	n/a	1"NPT Female	1"NPT Female
SAKT**50*0	Flange DN 50	n/a	n/a
SAKT**65*0	Flange DN 65	n/a	n/a
SAKT**84*0	n/a	2"NPT Female	2"NPT Female

Tab. 3.b

Before installing an optional flanged trap and strainer kit, be sure that the flange size matches the flange on the control valve. For an optional threaded trap and strainer kit, be sure that the kit is properly sized for the control valve. (Refer to the design manual for more information.)

Table 3.c lists the items and quantity of threaded fittings that are included in each threaded trap and strainer kit. Flanged trap and strainer kits are fully integrated. See Figure 3.c, and section 9, Figure 9.x -Trap, strainer, and separator kits for more details.

Item List for SAKT*T**U0

Item (NPT)	SAKT*T44*0	SAKT*T84*0
Y-type strainer	1 (1")	1 (1")
F&T trap	1 (3/4")	1 (3/4")
Bushing F-M (size)	1 (3/4"x1")	1 (3/4"x2")
Elbow F-M (size)	1 (3/4")	1 (3/4")
Elbow F-F (size)	1 (1")	1 (2")
Nipple M-M (size)	2 (3/4"x6") 1 (1"x3") 1 (1"x6")	2 (3/4"x6") 1 (2"x3") 1 (2"x6")
Tee F-F-F (size)	1 (1")	1 (2")
Union F-F (size)	1 (3/4"x3/4")	1 (3/4"x3/4")

Tab. 3.c

3.3 Inlet drains for distributors connected to atmospheric steam supplies

When used with an atmospheric humidifier, as shown in (Fig.3.e and Fig. 3.f), an inlet trap may not be needed on the ultimateSAM distributor. In a typical installation, the condensate in the connecting hose drains back to the humidifier. In special situations when the condensate cannot drain back to the humidifier, an inlet trap may be needed to prevent significant amounts of condensate from entering the distributor.

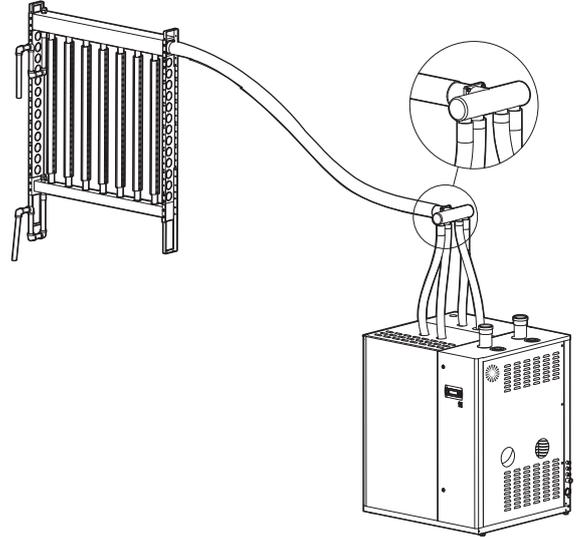


Fig. 3.e

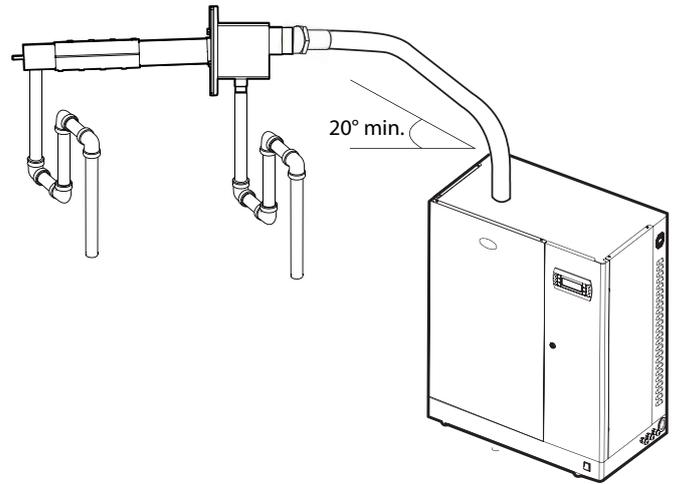


Fig. 3.f

Nota: The adapters and steam hoses shown above are available as options. The "P" drains are not provided as part of the ultimateSAM system.

3.4 Condensate drain for SA0 (single-pipe) (optional, sold separately)

The single-pipe version SA0 features two condensate drains: the first on the 1/2" (GAS or NPT) steam inlet manifold and the second at the end of the 3/8" (GAS or NPT) uprights.

Fig.3.g illustrates the typical connection using two condensate drain traps.

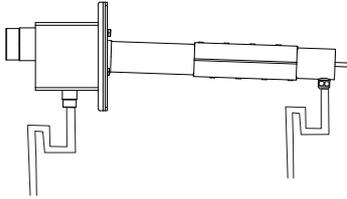
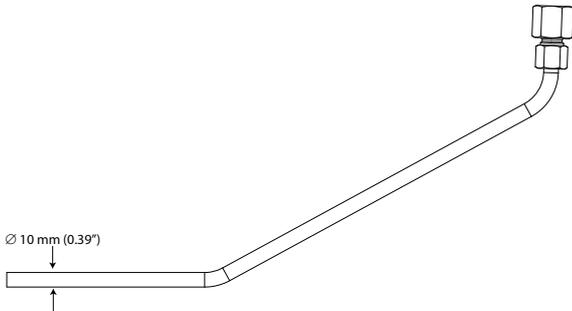


Fig. 3.g

A condensate drain pipe for draining outside of the AHU/duct is also as an option (Fig. 3.h)

To install this, make a hole in the duct as shown on the drilling template. The outside diameter of the condensate drain pipe is 10 mm.

SAKC x **S** **10** x **0**
 Family prefix ⑤ ⑥ ⑦⑧ ⑨ ⑩



Pos.	Meaning	Option	Description	Condensate drain to fit on the SA0 single pipe
⑤	Upright length (in)	A	A= 358 (14)*	SA0AALI0*0
		B	B= 510 (20)*	SA0BALI0*0
		C	C= 662 (26)*	SA0CALI0*0
		D	D= 814 (32)*	SA0DALI0*0
		E	E=966 (38)*	SA0EALI0*0
		F	F= 1118 (44)*	SA0FALI0*0
		G	G= 1270 (50)*	SA0GALI0*0
		H	H= 1422 (56)*	SA0HALI0*0
		I	I= 1574 (62)*	SA0IALI0*0
		J	J= 1726 (68)*	SA0JALI0*0
		K	K= 1878 (74)*	SA0KALI0*0
L	L= 2030 (80)*	SA0LALI0*0		
⑥	Material	S	S = Stainless steel	
⑦-⑧	OD mm (in)	10	10= 10 mm (0.40) OD.	
⑨	Region	0	Other (GAS)	
		U	North America (NPT)	
⑩	Free	0		

Tab. 3.d

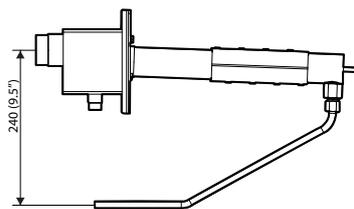


Fig. 3.h

In order to have just one condensate drain point, use kit SAKCOST000 (Fig.3.i). This kit is used to connect the manifold condensate drain to the upright condensate drain pipe (fig.3.k)



Fig. 3.i

SAKTBH0000

It is possible to connect the thermostatic drain SAKTBH0000 (fig.3.j) (optionally supplied) directly to the condensate drain pipe. The kit SAKTBH0000 must be installed horizontally (fig. 3.k).

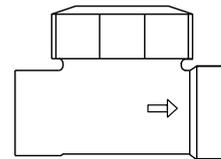


Fig. 3.j

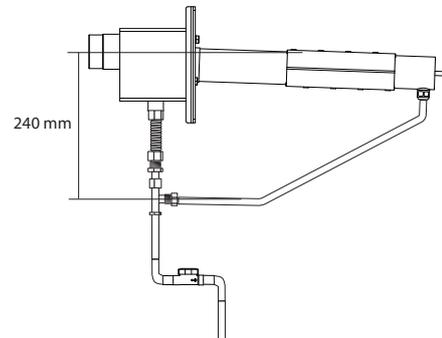
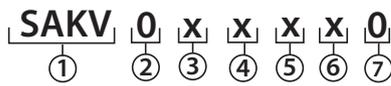


Fig. 3.k

4. STEAM SUPPLY CONNECTIONS

4.1 Control valves (SAKV*****) kits for pressurized steam supplies

A control valve is needed to regulate the flow of pressurized steam to an ultimateSAM distributor. Actuators for the control valve are sold separately. If a valve and actuator kit was not ordered with the ultimateSAM distributor, refer to the design manual for information on how to size and select a control valves and actuators. Information on actuators is provided in section 4.2. The codes for valve kits are shown in table 4.a.



①	ID prefix	
②	0	0
③	Material	F = Cast iron S = Stainless steel 0 = Brass (only for North America)
④	Operating pressure	0 = Up to 1 bar (15psi) (only for North America) H = 1-4 bars (15-50psi) (only for North America) F = 0.1-4 bars (1.45-50psi)
⑤	Nominal size Kv (EU) Cv (US)	A= 0.4 B= 0.63 C= 1 D= 1.6 E= 2.5 F= 4 G= 6.3 H= 10 I= 16 J= 25 K= 40 L= 63
⑥	Region	U = North America 0 = Other
⑦	---	---

Tab. 4.a

Specifics regarding the inlet connection on available control valves are shown in Table 4.b.

Valve Size	Inlet-Outlet Connections		
	Material, Pressure, Region Codes		
	****FH*0* - ****SF*0*	****00*U*	****0H*U*
SAKV**C*0	Flange DN 15	½" NPT Fem.	½" NPT Fem.
SAKV**D*0	Flange DN 15	½" NPT Fem.	½" NPT Fem.
SAKV**E*0	Flange DN 15	½" NPT Fem.	½" NPT Fem.
SAKV**F*0	Flange DN 15	½" NPT Fem.	½" NPT Fem.
SAKV**G*0	Flange DN 20	¾" NPT Fem.	¾" NPT Fem.
SAKV**H*0	Flange DN 25	1" NPT Fem.	1" NPT Fem.
SAKV**I*0	Flange DN 32	1¼" NPT Fem.	1¼" NPT Fem.
SAKV**J*0	Flange DN 40	1½" NPT Fem.	1½" NPT Fem.
SAKV**K*0	Flange DN 50	2" NPT Fem.	not available
SAKV**L*0	Flange DN 65	not available	not available

Tab. 4.b

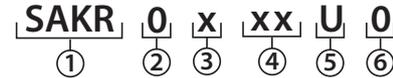
If the inlet pressure to the control valve is greater than 0.7 bar (10 psig), the valve may generate significant noise due to the near sonic velocity of the steam. (See section 6.1 of the design manual for more information.) Because the noise and coincident vibration may shorten valve life, frequent inspections of the valve may be required.

For information about the weight, dimensions, construction materials, and rangeability of each valve, see the "Technical specifications" manual.

4.2 Fitting kits (SAKR*****) for threaded control valves

Nota: For flanged control valves, the installer must provide the appropriate fittings and piping to connect the valve to the ultimateSAM distributor.

For control valves having threaded connections, optional fitting kits are available to facilitate the connection of the valve to both the distributor inlet and the steam traps and strainers (section 4.3). The codes for the fitting kits are shown in table 4.c.



①	Prefisso	
②	0	0
③	Materiale	F = Ghisa S = Inox
④	Taglia	24= ½" Tubo 34= ¾" Tubo 44= 1" Tubo 54= 1 ¼" Tubo 64= 1 ½" Tubo 84= 2" Tubo
⑤	Mercato	U = North America
⑥	---	---

Tab. 4.c

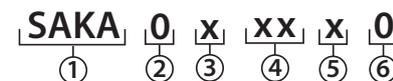
Both iron and stainless steel fitting kits for the North American region have NPT threads. The list of threaded pipe fittings provided in each kit is shown in table 4.d.

Fitting List for SAKR***U0			
Pipe Size (NPT)	Bushing F-M (size)	3" Nipple M-M (size)	Union F-F (size)
*****24**	2 (½"x1")	2 (1/2")	1 (1")
*****34**	2 (¾"x1")	2 (3/4")	1 (1")
*****44**	n/a	2 (1")	1 (1")
*****54**	2 (1¼"x2")	2 (1 1/4")	1 (2")
*****64**	2 (1½"x2")	2 (1 1/2")	1 (2")
*****84**	n/a	2 (2")	1 (2")

Tab. 4.d

4.3 Kit attuatori per valvole di regolazione

Each control valve needs an actuator to control its motion. The system for identifying actuator kits is shown in Table 4.e. **Note:** Not all of the possible combinations shown on the table are available. Tables 4.f and 4.g indicate which electronic or pneumatic actuator can be paired with which control valve.



①	ID prefix	
②	0	0
③	Type:	E = Electronic P = Pneumatic
④	Identifer:	01 Sequential # 02 ---
⑤	Region:	U = North America 0 = Others
⑥	---	---

Tab. 4.e

Valve Size	Electronic actuator selection			
	Material, Region Codes			
	****FH*0*	****SF*0*	****00*U*	****0H*U*
SAKV**A*0	not avail.	not avail.	SAKAE001U0	not avail.
SAKV**B*0				
SAKV**C*0	SAKA0E0200	SAKA0E0300	SAKAE001U0	SAKAE002U0
"SAKV**D*0	SAKA0E0200	SAKA0E0300	SAKAE001U0	SAKAE002U0
SAKV**E*0				
SAKV**F*0	SAKA0E0200	SAKA0E0300	SAKAE001U0	SAKAE002U0
SAKV**G*0	SAKA0E0200	SAKA0E0300	SAKAE001U0	SAKAE002U0
SAKV**H*0	SAKA0E0200	SAKA0E0300	SAKAE001U0	SAKAE002U0
SAKV**I*0	SAKA0E0200	SAKA0E0300	SAKAE002U0	SAKAE002U0
"SAKV**J*0	SAKA0E0200	SAKA0E0300	SAKAE002U0	not available
SAKV**K*0				
SAKV**L*0	SAKA0E0200	SAKA0E0300	not available	not available

Tab. 4.f

Nota: for valve types "*****FH*0*" the actuator is included in the valve kit, so the code (SAKAE00200) indicated above is to be used when ordering a spare actuator only.

Pneumatic Actuator Selection			
Valve Size	Material, Pressure, Region Codes		
	*****F0*0*	*****00*U*	*****0H*U*
SAKV0**A*0	n/a	SAKAP001U0	n/a
SAKV0**B*0	n/a	SAKAP001U0	SAKAP002U0
SAKV0**C*0			
SAKV0**D*0			
SAKV0**E*0			
SAKV0**F*0	n/a	SAKAP001U0	SAKAP003U0
SAKV0**G*0			
SAKV0**H*0			
SAKV0**I*0	n/a	SAKAP002U0	SAKAP003U0
SAKV0**J*0	n/a	SAKAP002U0	SAKAP003U0
SAKV0**K*0	n/a	SAKAP003U0	n/a
SAKV0**L*0	n/a	n/a	n/a

Tab. 4.g

For weights and dimensions of the actuators, see the "Technical specifications". This section also provides information regarding control signal requirements for the actuators.

4.4 Connecting pressurized steam to an ultimateSAM distributor

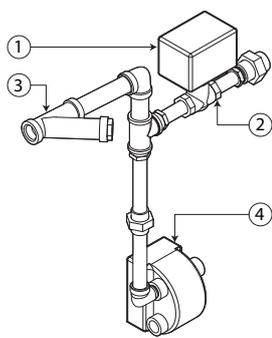


Fig. 4.a

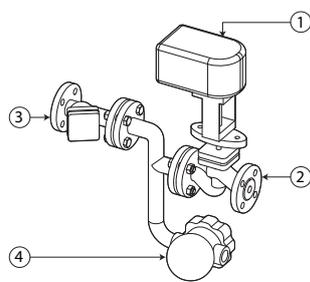


Fig. 4.b

- For threaded control valves, SAKV*****U*, with an optional fitting kit, SAKR*****U*, attach the fittings to the valve as shown in figure 4.a.
- Attach the ⊕ optional actuator, SAKA***** to the ⊙ control valve.
- Connect the valve/actuator assembly to the inlet adapter on the distributor header. For optimal performance, the valve should be attached directly to the inlet. If a connecting pipe is needed between the valve and inlet, the length of the pipe should be as short as possible. The actuator should be oriented in the upright position. See figures 1.k and 4.c.
- Assemble the fittings and components included in the optional ⊕ trap and ⊙ strainer kit, ⊕SAKT*****, and attach the trap assembly to the valve. For steam operation, strainers should be installed in the horizontal position, although it is acceptable to mount the strainer pointing downward. The horizontal position prevents water from collecting in the bonnet thereby reducing the risk of airborne droplets.

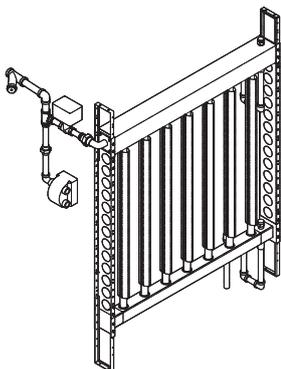


Fig. 4.c

Nota: The "P" drains shown above are not provided as part of the ultimateSAM system.

4.5 Connecting atmospheric steam to a bottom-feed ultimateSAM distributor

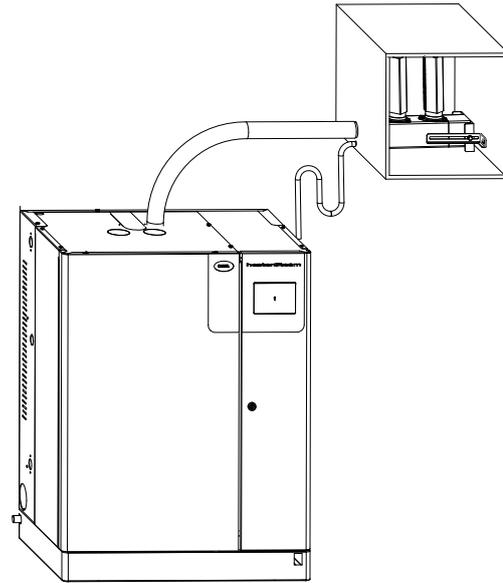


Fig. 4.d

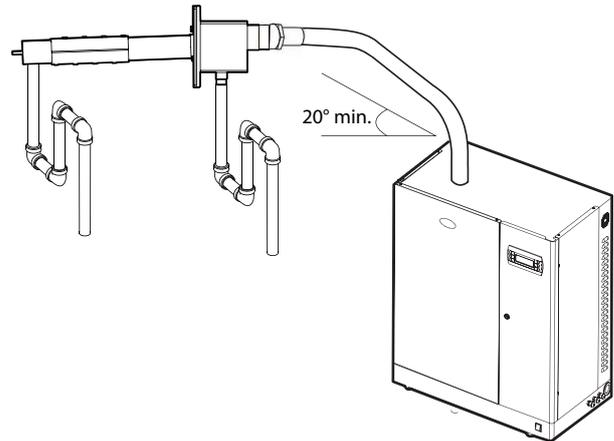


Fig. 4.e

Nota: The adapters and steam hoses shown above are available as options. The "P" drains are not provided as part of the ultimateSAM system.

- The distributor should be positioned at a height above the humidifier so that condensate drains back to the humidifier.
 1. If using flexible steam hose to connect the distributor to the humidifier, a minimum angle of 20° should be allowed from humidifier outlet to distributor inlet.
 2. If using rigid steam pipe to connect the distributor to the humidifier, the pipe should have a minimum 1% grade (~1 cm per meter, ~1/8" per foot) to allow for proper drainage back to the humidifier.
- If using a dual or quad inlet adapter, the 150mm (6") inlet extension is recommended. Install the extension inlet to the header. Connect the steam hose from the humidifier such that inlet adapter, making sure that the hose is sloped so that most of the condensate returns to the humidifier.

5. OPERATION

Operationally, the ultimateSAM Humidification System discharges steam into the duct or air handler. The method by which the steam discharge is controlled depends upon whether the steam comes from a pressurized source or an atmospheric source. For pressurized steam supplies, the steam flow rate is controlled by the valve/actuator. The control valve opens or closes in response to a control signal that is sent to the actuator. Both electronic and pneumatic actuators are configured so that there is a linear relationship between the steam flow rate and the control signal.

For atmospheric steam supplies, the flow rate is controlled by the rate at which the humidifier produces steam. All of the steam generated by the humidifier is discharged by the ultimateSAM distributor into the duct or AHU.

The control signal for the actuator or atmospheric humidifier is either generated by a humidistat or a humidity sensor and controller. The controller can be either stand-alone or part of a Building Automation System.

6. TROUBLESHOOTING

6.1 Water is spitting from the nozzles on the uprights.

1. The header P-traps are not draining. Clean and check plumbing. Check that height of trap exceeds the static pressure of the duct/AHU, especially if under negative pressure.
2. The steam trap on the valve/trap assembly is not functioning. Clean or replace.
3. The steam line has been taken from the bottom of the steam source or is not sloped properly. Change line to take off from the top and check proper slopes.
4. The steam main is overloaded with water. Locate cause and Correct if necessary.
5. Check valve sizing to maximum distributor capacity. Resize valve within distributor capacity.

6.2 Steam does not discharge from the distributors when the valve is open.

1. Verify that valve is open. Correct if necessary.
2. Verify that steam is available and valves are open. Correct if necessary.
3. Verify that the steam pressure has not changed. Too high pressure could jam the valve.
4. Carefully place a mirror or metal object close to one of the steam discharge slots. If it fogs, steam is discharging, but evaporating very quickly. No problem. NEVER PLACE YOUR HAND OVER OR NEAR THE STEAM DISCHARGE NOZZLES.
5. The Y-strainer may be clogged. Clean or replace.

6.3 Steam valve will not open

1. Verify power or air pressure to the valve actuator. Correct if necessary.
2. Verify control signal or pressure range to the valve actuator. Correct if necessary.
3. Verify control signal polarity to the valve actuator. Correct if necessary.
4. Remove actuator and test to see if it operates. Valve may be jammed - clean or replace.
5. Verify that the steam pressure has not changed. Too high pressure could jam the valve.
6. Verify proper valve orientation - electric valves must face up.

6.4 Steam valve will not close

1. Verify control signal to the valve actuator. Correct if necessary.
2. Verify control signal polarity to the valve actuator. Correct if necessary.
3. Remove actuator and test to see if it operates. Valve may be jammed - clean or replace.
4. Verify that the steam pressure has not changed. Too high pressure could jam the valve.
5. Verify proper valve orientation - electric valves must face up.

6.5 Steam valve is leaking

1. Verify full range control signal to the valve actuator. Correct if necessary.
2. Verify control signal polarity to the valve actuator. Correct if necessary.
3. Remove actuator and test to see if it operates. Valve may be jammed - clean or replace.
4. Verify that the steam pressure has not changed. Too high pressure could jam the valve.

6.6 Humidity exceeds set point

1. Verify full range control signal to the valve actuator is compatible. Correct if necessary.
2. Verify control signal polarity to the valve actuator. Correct if necessary.
3. Check calibration of controller. Correct if necessary.
4. Insure humidity sensors are installed correctly and not located in drafts (wall). Correct if necessary.
5. Remove actuator and test to see if it operates. Valve may be jammed - clean or replace.
6. Verify that the steam pressure has not changed. Too high pressure could cause valve to leak.
7. Verify stable boiler pressure. Wide swings in pressure could be fighting the humidity controls.
8. From BAS system, change to P type control (not PI or PID).

6.7 Humidity remains below set point

1. Verify full range control signal to the valve actuator is compatible. Correct if necessary.
2. Verify control signal polarity to the valve actuator. Correct if necessary.
3. Check calibration of controller. Correct if necessary.
4. Insure humidity sensors are installed correctly and not located in drafts (wall). Correct if necessary.
5. Remove actuator and test to see if it operates. Valve may be jammed - clean or replace.
6. Verify that the steam pressure has not changed. Too high pressure could jam valve. Too low will not meet capacity.
7. Verify stable boiler pressure. Wide swings in pressure could be fighting the humidity controls.
8. From BAS system, change to P type control (not PI or PID).
9. Check that air flow switch is not fluttering. Correct if necessary.
10. Check that hi-limit controller is not located too close to steam discharge distributors. Correct if necessary.
11. Humidifier is undersized. Check humidity load calculations.

6.8 Condensate in duct

1. Verify humidifier capacity versus air volume.
2. See section 6.1 in trouble-shooting section of this manual.
3. Verify that hi-limit controller is working. Correct if necessary.
4. Verify evaporation distance to obstructions or elbows. Correct if necessary.
5. Verify steam valve is not leaking. Correct if necessary.
6. Uninsulated duct may be running through an area where ambient temperature is below internal duct dew point. Insulate duct externally.

6.9 Steam leaks from P-traps.

1. Check that height of trap exceeds the static pressure of the duct/AHU, especially if under negative pressure. Correct if necessary.
2. Check valve sizing to maximum distributor capacity. Resize valve within distributor capacity.
3. Check that inlet steam pressure does not exceed the limits of the valve.

7. MAINTENANCE

The ultimateSAM distributor itself requires no regular maintenance since its design has no moving parts. It is recommended that the external surfaces of the distributor should be inspected once a year. If there is evidence of a steam leak at one of the static seals, contact CAREL.

For optional equipment, such as valves, actuators, traps, and strainers, follow the maintenance instructions in the user manuals that are provided with each of these devices. These accessories should be inspected at least once a year. For systems in which the inlet pressure to the control valve is greater than 0.7 bar (10 psig), more frequent inspections of the valve may be required. In addition, steam hoses should be inspected yearly for evidence of cracking or hardening.

8. SPARE PARTS

8.1 Adjustable feet Kit for SAB* / SAT*

Feet kit to increase the distance between the base of the ultimateSam and the duct. Fig. 8.a shows the pedestal SAKS010000 in two different positions.

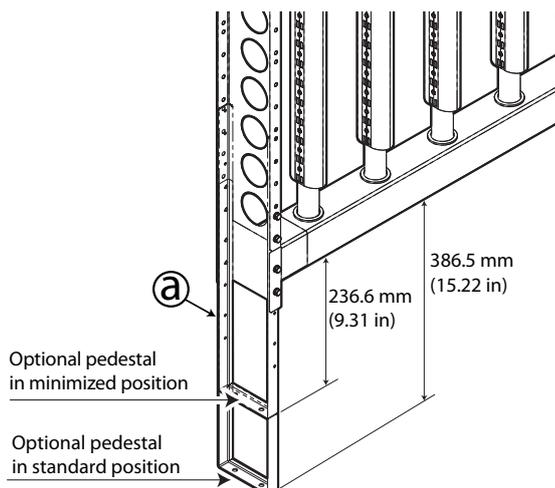
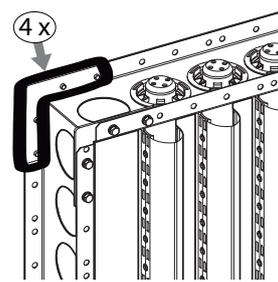


Fig. 8.a

8.2 Corner Kit for SAB*

SAKF B 0 0 0 0 0
Family prefix



- Each SAKFB00000 kit includes:
- 4 corners
 - Fastening bolts
 - Unit weight: 0.5 kg (1.1 lbs).

KIT CODE	Description	Duct height mm (in)	Weight kg (lbs)
SAKS010000	High adjustable feet kit	386.5 mm (15.2in)	0.9 (2.0 lbs)
SAKS020000	Standard adjustable feet kit	236.6 mm (9.3in)	1 (2.0 lbs)
SAKS030000	Short adjustable feet kit (version without frame)	37.5mm (1.48in)	0.8 (1.8 lbs)

Tab. 8.a

Each kit contains 2 adjustable feet and 16 screws

8.3 Retainer ring kit for SAB*

SAKF **R** **x** **0** **0** **0** **0**
 Family prefix 5 6 7 8 9 10

Pos.	Meaning	Option	Description
⑥	Size mm (in)	S	Retainer Ring for uprights O.D. 35
		L	Retainer Ring for uprights O.D. 45

Tab. 8.b

Ogni kit SAKFR*0000 include: 3pz anelli di fissaggio.

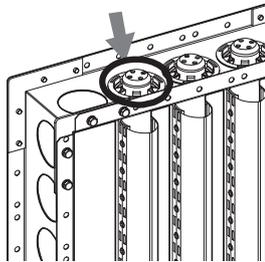


Fig. 8.c

8.4 Gaskets kit

Kit of nozzle O-rings and nozzle gaskets for manifolds with condensate drain. Kit of gaskets for steam inlet accessories

SAKG **x** **x** **0** **0** **0** **0**
 Family prefix 5 6 7 8 9 10

Pos.	Meaning	Option	Description
⑤	Type	U	U = Uprights Gasket kit
		I	I = Inlet Gasket kit
⑥	Upright size mm (in)	O	for SAKGI0000
		S	SAKGU: S = uprights O.D. 35
		L	SAKGU: L = uprights O.D. 45

Tab. 8.c

Each SAKGU*0000 kit includes: 2 O-rings; 2 gaskets for drain manifold
 Each SAKGI00000 kit includes: 2 gaskets.

8.5 Filter "Y" kit

SAKT **x** **F** **x** **x** **x** **0**
 Family prefix 5 6 7 8 9 10

Pos.	Meaning	Option	Description
⑤	Material:	F	Iron
		S	Stainless steel
⑦ - ⑧	Dimension:	15	Flange DN 15
		20	Flange DN 20
		25	Flange DN 25
		32	Flange DN 32
		34	Threaded pipe 3/4"
		40	Flangia DN 40
		44	Threaded pipe 1"
		50	Flange DN 50
		65	Flange DN 65
		84	Threaded pipe 2"
⑨	Region:	U	0 = Other
		O	U = U.S.

Tab. 8.d

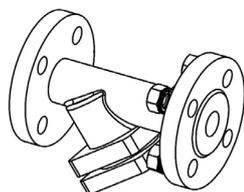


Fig. 8.d

8.6 Condensate drain separator Kit

SAKT **x** **P** **x** **x** **x** **0**
 Family prefix 5 6 7 8 9 10

Pos.	Meaning	Option	Description
⑤	Material:	F	Iron
		S	Stainless steel
⑦ - ⑧	Dimension:	15	Flange DN 15
		20	Flange DN 20
		25	Flange DN 25
		32	Flange DN 32
		34	Threaded pipe 3/4"
		40	Flangia DN 40
		44	Threaded pipe 1"
		50	Flange DN 50
		65	Flange DN 65
		84	Threaded pipe 2"
⑨	Region:	U	0 = Other
		O	U = U.S.

Tab. 8.e

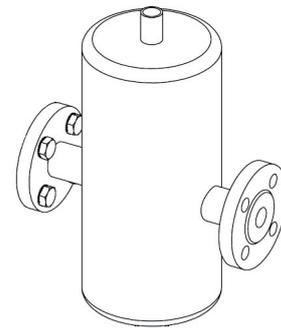


Fig. 8.e

8.7 F&T Condensate drain Kit

SAKT **x** **D** **x** **x** **x** **0**
 Family prefix 5 6 7 8 9 10

Pos.	Meaning	Option	Description
⑤	Material:	F	Iron
		S	Stainless steel
⑦ - ⑧	Dimension:	15	Flange DN 15
		20	Flange DN 20
		25	Flange DN 25
		32	Flange DN 32
		34	Threaded pipe 3/4"
		40	Flangia DN 40
		44	Threaded pipe 1"
		50	Flange DN 50
		65	Flange DN 65
		84	Threaded pipe 2"
⑨	Region:	U	0 = Other
		O	U = U.S.

Tab. 8.f

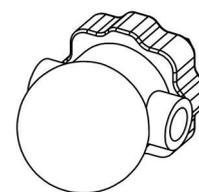


Fig. 8.f

8.8 Inverted bucket condensate drain Kit

SAKT | **X** | **B** | **X** | **X** | **X** | **0**
 Family prefix (5) (6) (7) (8) (9) (10)

Pos.	Meaning	Option	Description
⑤	Material:	F	Iron
		S	Stainless steel
⑦ - ⑧	Dimension:	15	Flange DN 15
		20	Flange DN 20
		25	Flange DN 25
		32	Flange DN 32
		34	Threaded pipe 3/4"
		40	Flangia DN 40
		44	Threaded pipe 1"
		50	Flange DN 50
		65	Flange DN 65
		84	Threaded pipe 2"
⑨	Region:	U	0 = Other
		O	U = U.S.

Tab. 8.g

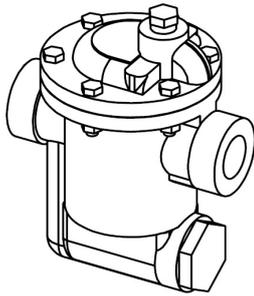


Fig. 8.g

8.9 Spare upright kit, SA0 (single-pipe) versions

SAKU | **0** | **X** | **L** | **I** | **X** | **0**
 Family prefix (5) (6) (7) (8) (9) (10)

Pos.	Meaning	Option	Description
⑤	Steam feed:	0	0= SA0*
⑥	Unit height mm (in)	A	A= 358 (14) for SA0AALIO*0
		B	B= 510 (20) for SA0BALIO*0
		C	C= 662 (26) for SA0CALIO*0
		D	D= 814 (32) for SA0DALIO*0
		E	E= 966 (38) for SA0EALIO*0
		F	F= 1118 (44) for SA0FALIO*0
		G	G= 1270 (50) for SA0GALIO*0
		H	H= 1422 (56) for SA0HALIO*0
		I	I= 1574 (62) for SA0IALIO*0
		J	J= 1726 (68) for SA0JALIO*0
		K	K= 1878 (74) for SA0KALIO*0
		L	L= 2030 (80) for SA0LALIO*0
⑦	Upright Size:	L	L= 45 (1.75)
⑧	Insulation:	I	I = insulated with nozzle inserts SA0
⑨	Region:	U	U = U.S.
		0	0 = Other
⑩	Free:	0	

Tab. 8.h

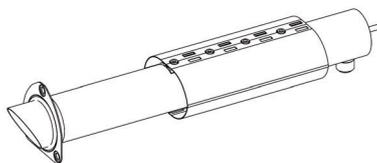


Fig. 8.h

Each SAKU0*LI*0 kit includes:

- upright;
- 1 O-ring;
- bolts for fastening the upright to the manifold.

8.10 Spare manifold kit, SA0 (single-pipe) versions

SAKM | **0** | **0** | **0** | **0** | **X** | **0**
 Family prefix (5) (6) (7) (8) (9) (10)

Pos.	Meaning	Option	Description
⑤	Steam feed:	0	0 = SA0
⑥	Unit height mm (in)	0	0 = SA0
⑦	Upright Size:	0	0 = SA0
⑧	Insulation:	0	0 = SA0
⑨	Region:	U	North America (NPT)
		0	Others (GAS)
⑩	Free:	0	

Tab. 8.i

Each SAKM0*LI*0 kit includes:

- manifold;
- gasket;
- bolts for fastening the upright to the manifold.

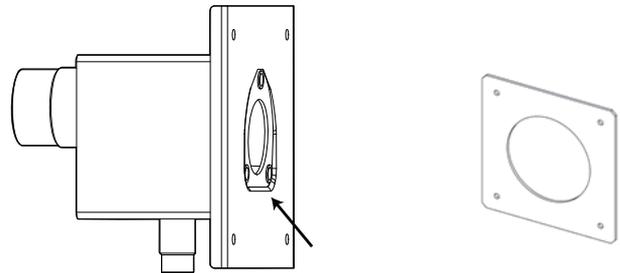


Fig. 8.i

8.11 Spare valve actuator kit

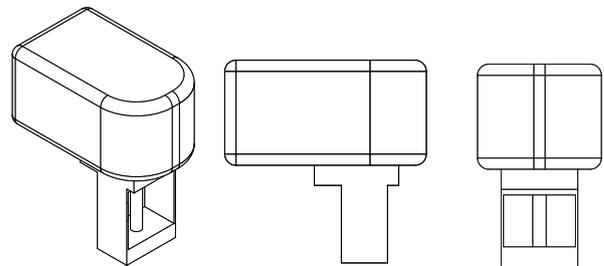


Fig. 8.j

SAKA0E0200
(for cast iron version valves)

SAKA0E0300
(for steel version valves)

- Power supply: 24V AC - 24V DC
- Control signal: 4-20 mA or 0-10V
- Nominal stroke: 20mm (0.79in)
- Degree of protection: IP66
- Ambient temperature: 0 to +55°C (32°F to 122°F)
- Spring-return to closed position during power failure
- The actuator can be installed in any position between vertical (best) and horizontal.
- Information provided by Sauter S.p.a

SA0 installation procedure - manifold outside of AHU - with AHU wall cover kit

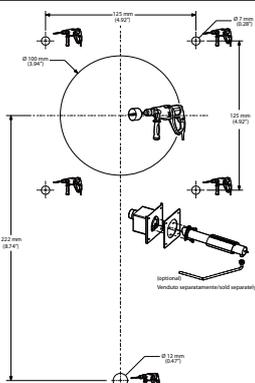
Description of the installation procedure for ultimateSAM version SA0* (single-pipe), with manifold outside of the air handling unit and installation of the wall cover kit inside the AHU.

1



Assemble the SA0 steam distributor

2



Apply drilling template to the duct where the steam distributor will be installed

3



4



Drill the necessary holes

5



6



Insert the gasket and rest it against the support flange; insert the fastening bolts to secure the support flange

7



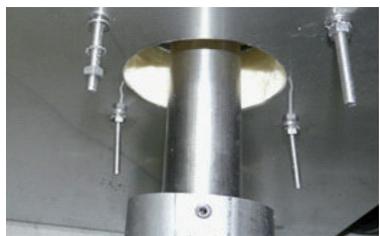
View of the bolts inserted in the support flange

8



Place the upright in the 100 mm (3.9") opening made in the duct

9



Tighten the support flange bolts to 7-8Nm (5-6ft), using the fastening elements supplied. If necessary, cut the bolts

10



View of the installation, part inside the duct: upright

11



View of the installation, part outside of the duct: manifold

12



Apply the AHU wall cover kit for SA0 (not supplied, available separately): SAKIL00000

Installation of the condensate drain kit for SA0 (single-pipe)
(optional, sold separately) SACK*510*0



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