





## Application

The basic purpose of air curtains is to prevent air from undesired exchange (draught) through an open door connecting two rooms with different climatic parameters. In most cases, they are installed at the main entrance of a building but sometimes they need to be applied indoors between two rooms with different purposes, i.e. temperatures. Such an invisible barrier is realized by directing the air flow of an appropriate velocity into the visible plate below the opening. The barrier protects interiors from ingression of outdoor cold or wam air, dust, insects, unpleasant smell and other pollutants (Fig. 1.1). Moreover, additional heating of the air flow (electric or hot water heaters) is able to satisfy most thermal needs of the rooms protected by air curtains whereas an installed filter ensures continuous indoor air purification. Air curtains are mostly installed above the entrance by means of visible or suspended ceiling installation and are characterized by simple mounting and maintenance during exploitation. The application of air curtains is multiple and their usefulness is evident in the following effects:

- Controlling energy expenses as result of heating/ cooling
- Preventing air from dust, insect and smoke ingression through an open door
- Stabilizing microclimatic conditions by blocking cold or warm air penetration

Another important effect of air curtains is cancelling temperature delayering, e.g. during the heating season warm air raises to higher zones of a room due to lift whereas cold air stays in lower zones of the room.





It brings to subjective feeling of cold, especially on legs while the air above the movement zone remains hot. On such occasion not much will be achieved if the effect of heating is increased. Since air curtains are installed at heights above the movement zone, they intake warm air and direct it at high velocities to lower zones making a macro-whirlpool in the entire room (Fig. 1.2). Equalizing the temperatures of higher and lower zones neutralizes the feeling of cold and, simultaneously, need for additional heating. Finally air curtains are economical due to their low energy consumption.



Figure 1.2 - Protecting a room from cold outdoor air penetration and cancelling temperature delaying



#### Description and Marking

Klimaoprema Quant Line air curtains are designed for simple installation, handling and maintenance while high quality components therefor guarantee functionality, reliability and longevity. The main characteristics of air curtains Quant Line are the following:

- All models available lengths between 1 and 1,7 m.
- Opening heights range from 2 to 5 metara.

• Models without heater (N), with an electric (E) or with a hot water (W) heater are all available (models with an electric heater are supplied without an air filter).

- Control panels are equipped with a three speed fan controller and a double electric heating mode.
- Available air flow regulation through special outflow blades.
- · Possible harmonization with a door opening level.
- Various suspension elements as well as other installation and connecting elements make mounting simple and quick.

The basic components and corresponding charactheristics: Air curtain casings are made of sheet steel, powder coated in basic RAL 9010 colour (white). Simple mounting provides a quick and easy approach and demounting of all the components. Air curtain casings are labeled with the protection class IP 20. Fans are constructed radially and contain an installed electric motor actuator. The wings are angled and do not produce much noise. Ventilators are labelled with the protection class IP 42 and are supplied with single-phase actuators containing self-greasing bearings which enable quiet and long-term work without maintenance. Electric heaters are made of highly alloyed steel with brass blades in order to increase the total area. They are distributed evenly through an outlet area, which enables high quality transmission of heat and the maximum shelflife. The power of electric heaters is selected according to the flow keeping the supply air temperature optimal. The protective border thermostat switches air curtains off if the casing temperature exceeds 95°C. Hot water heaters consist of copper pipes with aluminium blades. The mechanical expansion of the copper pipes ensures maximum heat transmission from the heating medium to the supply air. Heaters are in fact heat exchangers designed for water as a heating medium up to 100°C. Heaters have been tested at 25 bar. Filters (EU2) are made of solid polyurethane foam and can be easily demounted for control examination by frontal mask opening and wired holder removal. Regarding cleaning, filters are simply blown through by means of compressed air or washed with solution with mild detergent concetration. In the end, they are washed out with water jet and then dried.

#### Ordering key

Series typ	e GRAND SONATA	GRAND	- 25	- 20	- F	- E	- 12
Installatio	n height 25 - 2,0-2,5 [m]* 35 - 3,0-3,5 [m] 45 - 4,0-4,5 [m]						
Unit width	10 = 1 [m] 20 = 2 [m]						
Installatio	n type F - free hanging C - ceiling						
Heater typ	be N - without heater E - electric heater** W - water heater						
Electric h	eater rated power						

\* Sonata series only in version 25

\*\* Rated power is listed on pages 11 and 16



Sonata series





SONATA series air curtains as a part of the Klimaoprema Quant Line program are meant for installation in spaces with high estetic requirements. With their oval casing and inbuilt halogen lamps the curtains will elegantly fit into facilities such as hotels, banks, showrooms etc. Apart from white colour (RAL 9010), casings come in red (RAL 2000), yellow (RAL 1021) and grey (RAL 9006) metallic colour.

SONATA series air curtains are represented by models 2510 i 2517 with hot water (W) or an electric (E) heater. At special request devices without a heater (N) are also available.

Model	Туре	Air flow rate (m³/h)		Sound power level (dB(A))		Current (A) (max)	Power supply V/Ph/Hz		
	Ν	1700	1550	1300				1,1	220/1/50
SONATA 2510	W	1600	1400	1100	54	50	43		220/1/30
	Е	1700	1550	1300				10,2	400/+N/50
	Ν	2650	2100	1500				1,5	220/1/50
SONATA 2517	W	2500	1900	1200	56	53	48		220/1/30
	Е	2650	2100	1500				17,0	400/+N/50
SONATA 2520	Ν	3400	3100	2600				1,5	220/1/50
	W	3200	2800	2200	59	55	50		220/1/30
	Е	3400	3100	2600				20,1	400/+N/50

Air flow, noise, heat output with a hot water heater and supply air temperature



Air flow rate (m <sup>3</sup> /h)								
- /-		16	00	14	00	1100		
	tu (°C)	t <sub>i</sub> (°C)	Q (kW)	t <sub>i</sub> (°C)	Q (kW)	t <sub>i</sub> (°C)	Q (kW)	
	0	32,9	17,5	34,6	16,3	37,5	14,3	
	∆p (kPa)	4,	3	3	,8	3	,0	
	Φ (l/h)	77	73	7.	19	63	32	
	10	38,5	15,2	40,0	14,3	42,5	12,4	
90° / 70°	∆p (kPa)	3,3		2	,9	2	,3	
	Φ (l/h)	670		623		549		
	20	44,1	12,8	45,3	12,0	47,4	10,5	
	∆p (kPa)	2,	.4	2	,1	1	,7	
	Φ (l/h)	56	66	52	28	45	56	
	0	28,1	15,0	29,5	13,9	32,1	12,2	
	∆p (kPa)	3,3		2	,8	2	,2	
	Φ (l/h)	65	57	6	12	53	38	
	10	33,7	12,6	34,9	11,7	37,0	10,3	
80° / 60°	∆p (kPa)	2,	4	2	,1	1	,6	
	Φ (l/h)	55	10.0	5	16	4	04	
	20	39,2	10,2	40,2	9,6	41,87	8,4	
	$\Delta p$ (KPa)	I,	0	1,4		I,I		
	Φ (Ι/Π)	20.5	10.0	21.5	10.2		0 0	
	U An (kPa)	20,5	0	21,J 5	0	23,33	7	
	$\Delta p (kra)$	0, QF	3 50	0,9		7	, <i>1</i> 77	
	10	26.1	8.6	26.8	8.0	28.3	7.0	
55° / 45°	An (kPa)	4	3	3	.8	3	.0	
	$\Phi(l/h)$	74	16	69	94	610		
	20	31,5	6,2	32,1	5,7	33,1	5,1	
	∆p (kPa)	2,	3	2	,1	1	,6	
	Φ (l/h)	53	38	50	01	44	41	

# SONATA 2510W

# SONATA 2517W

Air flow rate (m³/h)								
т /т	<b></b> (0 <b>0</b> )	25	500	1	900	1200		
l <sub>u</sub> /l <sub>i</sub>	u ( C)	t <sub>i</sub> (°C)	Q (kW)	t <sub>i</sub> (°C)	Q (kW)	t <sub>i</sub> (°C)	Q (kW)	
	0	36,8	30,8	40,9	25,9	48,5	18,6	
	∆p (kPa)	1	7,4	1	12,6	6	,8	
	Φ (l/h)	13	361	1	142	82	21	
	10	42,1	26,9	45,6	22,6	52,22	16,2	
90° / 70°	∆p (kPa)	13,6			9,8	5,3		
	Φ (l/h)	1187		9979		717		
	20	47,3	23,0	50,28	19,3	55,88	13,9	
	∆p (kPa)	10,1		7,3		3,9		
	Φ (l/h)	1(	013	5	852	6	13	
	0	31,7	26,6	35,3	22,3	41,8	16,1	
	Δp (kPa)	13,5			9,7	5	,3	
	Φ (l/h)	07.0	169	10.0	981	45.50	J6	
0.00 / 0.00		37,0	22,6	40,0	19,0	45,56	13,7	
$00^{\circ} / 00^{\circ}$	$\Delta p (KPa)$	IU			1,Z	3	,9 11	
	20	42.2	18.7	44.6	15 7	49.2	11 3	
	An (kPa)	72,2	7 0	,0	5 1	-13,2	8	
	Φ (l/h)		20	690		497		
	0	22,9	19,2	25,5	16,1	30,2	11,6	
	∆p (kPa)	2	7,7	20,0		10.9		
	Φ (l/h)	16	677	1	1406		10	
	10	28,2	15,3	30,17	12,8	33,9	9,2	
55° / 45°	∆p (kPa)	1	8,1	1	13,1	7,1		
	Φ (l/h)	13	330	1	116	8	)2	
	20	33,3	11,2	34,8	9,4	37,52	6,8	
	Δp (kPa)	10	0,3		7,4	4	,1	
	Φ (l/h)	9	80	6	823	59	92	



#### SONATA 2520W

Air flow rate (m <sup>3</sup> /h)								
т/т	<b>a</b> (0 <b>0</b> )	25	00	1	900	1200		
י <sub>ע</sub> / יי	u ( 0)	t <sub>i</sub> (°C)	Q (kW)	t <sub>i</sub> (°C)	Q (kW)	t <sub>i</sub> (°C)	Q (kW)	
	0	36,8	30,8	40,9	25,9	48,5	18,6	
	∆p (kPa)	17	7,4	1	2,6	6	,8	
	Φ (l/h)	13	61	1	142	8	21	
	10	42,1	26,9	45,6	22,6	52,22	16,2	
90° / 70°	∆p (kPa)	13	3,6	ç	9,8	5	.3	
	Φ (l/h)	1187		9979		717		
	20	47,3	23,0	50,28	19,3	55,88	13,9	
	∆p (kPa)	1(	),1	1	7,3	3	,9	
	Φ (l/h)	10	13	8	352	6	13	
	0	31,7	26,6	35,3	22,3	41,8	16,1	
	∆p (kPa)	13,5		Ç	9,7	5	,3	
	Φ (l/h)	11	69	<u> </u>	981	7	06	
000 / 000	10 A.a. (LDa)	37,0	22,6	40,0	19,0	45,56	13,7	
$00^{\circ} / 00^{\circ}$	$\Delta \mu (KPa)$	10			1,2	601		
	20	/2.2	18.7	44.6	15.7	/0.2	11 3	
	An (kPa)	72,2	0	,,U	5 1		8	
	$\Phi$ (l/h)	8	20	690		497		
	0 0	22,9	19,2	25,5	16,1	30,2	11,6	
	∆p (kPa)	27	7,7	20,0		10,9		
	Φ (l/h)	16	77	1-	406	10	)10	
	10	28,2	15,3	30,17	12,8	33,9	9,2	
55° / 45°	∆p (kPa)	18	3,1	1	3,1	7,1		
	Φ (l/h)	13	30	1	116	07.50	02	
	20 A.p. (kDa)	33,3	11,2	34,8	9,4	37,52	b,ð 1	
	<u>Ф (кра)</u>	10	1,3 80		7,4 202	4	02	
	Φ (l/h)	980		823		592		

# Description:

- $T_{\rm u}/T_{\rm i}$ - inlet/outlet water temperature
  - intake air temperature
    exit air temperature
- t<sub>u</sub> t<sub>i</sub> Q - heat output
- Δp
   pressure drop on water side

   Φ
   heat exchanger water flow rate

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Heater -4,5

**AIR CURTAINS SONATA** 

Heat output and air temperature increase with electric air heating

- heat output / electric heater rated power

# Description

Q

the speed controller on control panel										
			Air temperature increase			Air	flow rate [m	1³/h]	Max. current [A]	
Model	Туре	Q **[kW]	*	*	*	*	*	*	Vent.	Heate
	Ν	-	-	-	-				1,1	-
SONATA	F3	1,5	3,3	4,1	6,1				11	15
2510	LJ	3	6,5	8,3	6,1**	1700	1550	1300	1,1	4,5
2010	EG	3	6,5	8,2	12,3				11	0.1
EU	LU	6	13,1	16,4	12,3**				1,1	5,1
	Ν	-	-	-	-		2100		1,5	-
SONATA	E5	2,5	3	3,7	4,5	2650			15	7.6
2517		5	6,1	7,4	4,5**			1500	1,0	1,0
2317	E10	5	6,1	7,4	9,1				15	15.0
	LIU	10	12,1	14,9	9,1**				1,0	10,2
	Ν	-	-	-	-	3400			1,5	-
сомата	F6	4		7	4,5		3100		15	0.1
2520	LU	6	6,1	7,4	4,5**			2600	1,0	5,1
2320	E10	10	6,1	7,4	9,1				15	18.2
	EIZ	12	1,1	14,9	9,1**				1,5	10,2

(\*) Numbers with the E mark represent the maximum heat output of a particular air curtain model; e.g. Sonata 2510E2 represents a device with installed power of 2 (kW). The table shows the electric heater power of each model in two levels - according to the control panel. (\*\*) When selecting the lowest velocty, the device automatically reduces the heater run to the first level.

Dimensions



	Dimensions [mm]				
Model	Α	В	Type (N)	Type (E)	Type (W)
SONATA 2510	1084	900	54	57	6
SONATA 2517	1779	1595	76	84	90
SONATA 2520	2079	1595	76	84	90



#### Control

GRAND and SONATA air curtains are controlled by a control panel placed on a wall. The panel below outlines all available functions.

Depending on a series (GRAND/SONATA) or a device type (hot water/electric heater) some buttons may be left out.



After assembling the control panel according to the given scheme and connecting it to the corresponding voltage, red LED next to the main switch ON/OFF flashes. The switch ON/OFF switches the device ON/OFF. Mode selection is initiated by pressing the button PROGRAMME. In general, there are two modes available - manual and automatic.

• The manual mode provides triple speed run fun by pressing the button PROGRAMME. Air curtains with electric

heaters are equipped with two heater power levels initiated by the button HEATER. When the device runs at the lowest speed, the second heater level is automatically reduced to the first level.

• Automatic mode reflects in connection to the door opening switch. It means that the device reacts to opening the door above which it is installed. There are two installation modes:



**a.** In the automatic mode denoted by the symbol () the device keeps being switched off until the door opens. Then, it is actuated at a maximum fan speed and remains active for 30 sec after the door closes. If the door during those 30 sec opens again, the device keeps running at the maximum speed until the next door closing after which it waits for another 30 sec to be switched off. Such a mode enables energy-saving since the device remains switched off while the door is being closed.

**b.** In the automatic mode denoted by the symbol () the device runs at the first fan speed. When the door opens, the third (maximum) fan speed is actuated and, like in case under (a.), the maximum fan speed remains switched on for 20 sec after the door closes. If the device is supplied with electric heaters, this mode sets the device into the continuous first heater level run. the mode provides continuous heating of the room which air curtains are installed into.

When switching off the device (switch ON/OFF) supplied with electric heaters, the ventilator (fan) keeps running for another 60 sec in order to cool electric heaters - if the heaters have been previously

turned on. Also, the mode prior to switching off is memorized, so that it is actuated again when the device is switched on for the next time. The buton LIGHT is intended for switching on/off halogen bulbs (2x20W) regarding SONATA series and it does not depend on a main switch position ON/OFF. In case of multiple air curtain installation one control panel can be connected up to 16 devices according to the enclosed electrical shemes.

#### Control panel dimensions:



Through the installed adjustable blades on the supply air opening, it is possible to direct the air flow.





#### Thermal regulation

The regulation of hot water air curtains is carried out with regard to the supply air temperature and room temperature. The supply air temperature is set in the device itself in the range from 30° to 50°C. The desired room temperature is set on a room thermostat which is connected to the control panel. When doing so, the position of the room thermostat does not have to be compatible with the position of the control panel but it should be placed in accordance with the manual

The scheme below shows two modes of hot water regulation:

- (a) air curtains in the heating system,
- (b) air curtains in the heating and cooling system.



The difference from the first case reflects in the presence of an adjoining changeover thermostat. The air curtains with water heat exchanger are not designed for air cooling, so it is inevitable to stop water flow through the device in the cooling period. Measuring the supply pipe temperature a changeover thermostat detects the winter (heating) and summer (cooling) period. If the water temperature decreases below 19°C, the thermostat switches off the electrothermic actuator which, then, shuts the valve. If the water temperature incereases above 30°C the thermostat is actuated again. A changeover thermostat has to be placed on a pipe with regular water flow, which, in mosta cases, means the use of a switch valve. If it is not in case, once the valve is switched off, it could not be switched on again. However, in such cases the use of a straight way valve (control valve) is possible if next to it there

for the relevant room temperature measuring. Based on the temperature settings stated here in above, the automatic control of hot water air curtains regulates the electrothermic actuator. The actuator contains ON/OFF control but due to a long period during which the valve remains shut (about 2 minute) the valve regulation is almost continuous.



is the main pipeline with continuous water flow which a changeover thermostat would be placed onto. The actuator site does not necessarily have to be next to the device but it can be hidden in a suspend ceiling or displaced in another room where it will not esthetically disturb the installation site. The regulation of air curtains with electric heaters is carried out only in regard with the room temperature, which requires the installation of a room thermostat and its connection to the control panel according to the corresponding electrical schemes. All additional elements necessary for the thermal regulation of air curtains are shown in the section ADDITIONAL EQUIPMENT.



Free hanging and ceiling installation





# Discharge display







#### Maintenance



• Although the device has been switched off by the main switch, some components are still charged. Therefore, one shall switch off voltage on the main switchboard

• Besides filter cleaning no special maintenance is necessary. The device may be cleaned by a dry or wet cloth with respect to the fact that powered components must not be touched.

• Depending on a dirt level the air filter (or more often: air pollution level) shall be cleaned or replaced at least once in three months. If not, the air flow and heat output significantly decrease.

• The filter can be accessed by opening the frontal mask and removing wired holder. Regarding cleaning, filters are simply blown through by

#### FAILURES, CAUSES AND ELIMINATION MODES



In case of any failures (water leakage, unusual sound and smell, lack of heating etc.) one shall contact proffessional maintenance personnel.

means of compressed air or washed out with solution with mild detergent concentration. In the end, they are washed out with water jet and then dried.



• The heater surface (also when the device is switched off) must not be touched by bare hands due to a burn hazard.

It is particularly related to the cases when the device has been installed according to the manual.

Fault	Possible causes	Fault correction
Controller is ON, but the device is not working	Faulty connection between controller and device	Check controller wire layout
The device is working but airflow is too low	Low fan speed	Select higher speed setting
	Clogged filter	Clean filter
	Voltage drop	Supply standard voltage
The device is working but airflow is too cold	Temperature set-point too low	Set higher set-point
	System water temperature too low	Check hot water system
	Electric heaters shut down by safety thermostat	Find and repair cause for safety thermostat shut down and reset it
	Room thermostat temperature set too low .	Set higher room temperature
		,



Maintenance shall be exclusively done by producer's personnel or trained personnel of a licensed agent.

Prior to maintenance, the device shall be detached from the main voltage and protected from unauthorized switching-on the main voltage.



#### Working conditions package, transport and storage

Air curtains are designed for installation and work in dry interiors with a temperature from -10 to +40 °C and air pollutant amount (dust, chemical vapour) within the valid standards for occupied zones.

Air curtains are initally wrapped in PE foil and then put into cardboard package supported by Styrofoam/cardboard inserts. The package is used exclusively for protection during transportation to installation sites and may be removed only immediately before installation.

If a device in package falls down, it can be damaged. Therefore, device transportation shall be protected from

#### Accessories

Following accessories are available for air curtains:

downfalls and rolling. Air curtains may only be lifted by especially designed (forklift, crane) devices with a focus on their capacity. The data on the weight of particular air cuirtains model are stated in this manual.

In case of transportation damage one should report it to a responsible shipping company. If there is a suspicion of damage, the device must not be used. Air curtains may be stored only in rooms protected from external influences with a maximum palette height of 1.5 m.

Code	Name	Code	Name
ZZ-M1	Air curtain controller	ZZ-M6	"Changeover" thermostat
ZZ-M 2	Room thermostat	ZZ-M7	Flexibile coupling (select 3/4" or 1")
ZZ-M 3	Flat valve (select 3/4" or 1")	ZZ-M8	Thread rod M8 with coupling nuts
ZZ-M4	Split valve (select 3/4" or 1")	ZZ-M9	End switch
ZZ-M5	Electrothermic valve drive		



# Wiring scheme



klimaoprema

T T 1 2 3 4

Φ

\* \* \*

Room thermostat

°C