



VOLCANO

Water air heater





01

VTS GROUP

- 1.1 VTS: number 1 in the world
- 1.2 3 pillars of success



02

VOLCANO

- 2.1 VOLCANO water heaters
 - Modernity
 - Innovation
 - Energy efficiency
- 2.2 Assembly
- 2.3 VOLCANO VR-D destratifier
- 2.4 Controls



03

TECHNICAL PARAMETERS

- 3.1 Device type series
- 3.2 Air speed in a distance function
- 3.3 Technical parameters
- 3.4 Pipeline parameters



04

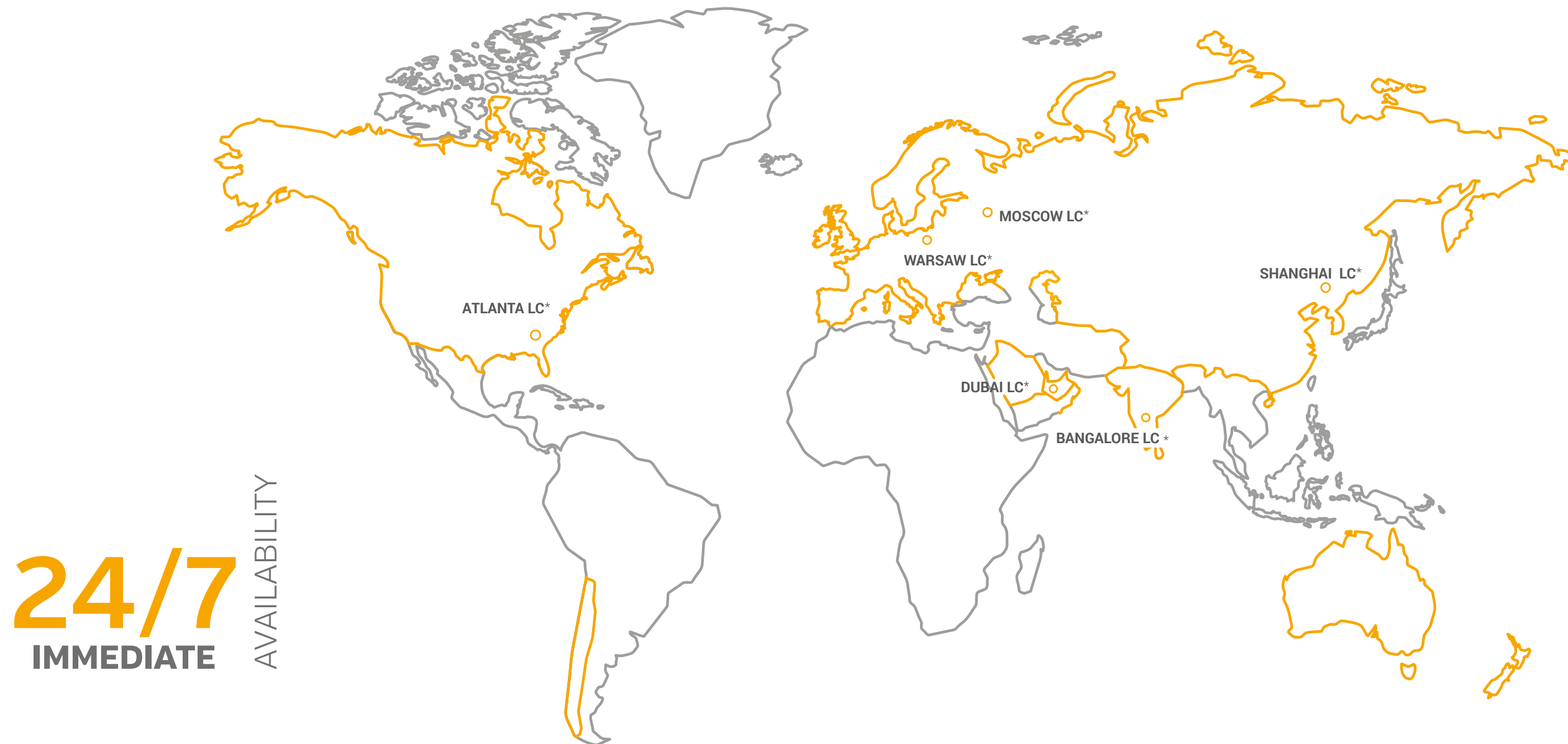
FAQ

- 4.1 FAQ: devices

VTS GROUP – The manufacturer of technologically advanced devices for the HVAC industry by applying innovative technologies in the field of design research, production, and logistics.

OUR MISSION

no. 1 MANUFACTURER
IN THE WORLD



24/7
IMMEDIATE
AVAILABILITY

* Logistics center





3 PILLARS OF SUCCESS

The highest quality of products. The best prices on the market. The shortest delivery times. These three pillars of our market policy are why VTS is always one step ahead worldwide.

Following the best world practices from the automotive industry, VTS has created a network of 6 efficient production & logistics centers (**Atlanta, Dubai, Moscow, Shanghai, Warsaw, Bangalore**) to guarantee the shortest delivery times on the market, regardless of your location.

Mass production scale of universally repeatable devices allows VTS to offer them in **the most competitive price, while maintaining the highest quality.**

A multi-level control system allows VTS to offer the longest standard, **a 3-year warranty for devices on the market.**

24/7 AVAILABILITY
IMMEDIATE

6 CENTERS

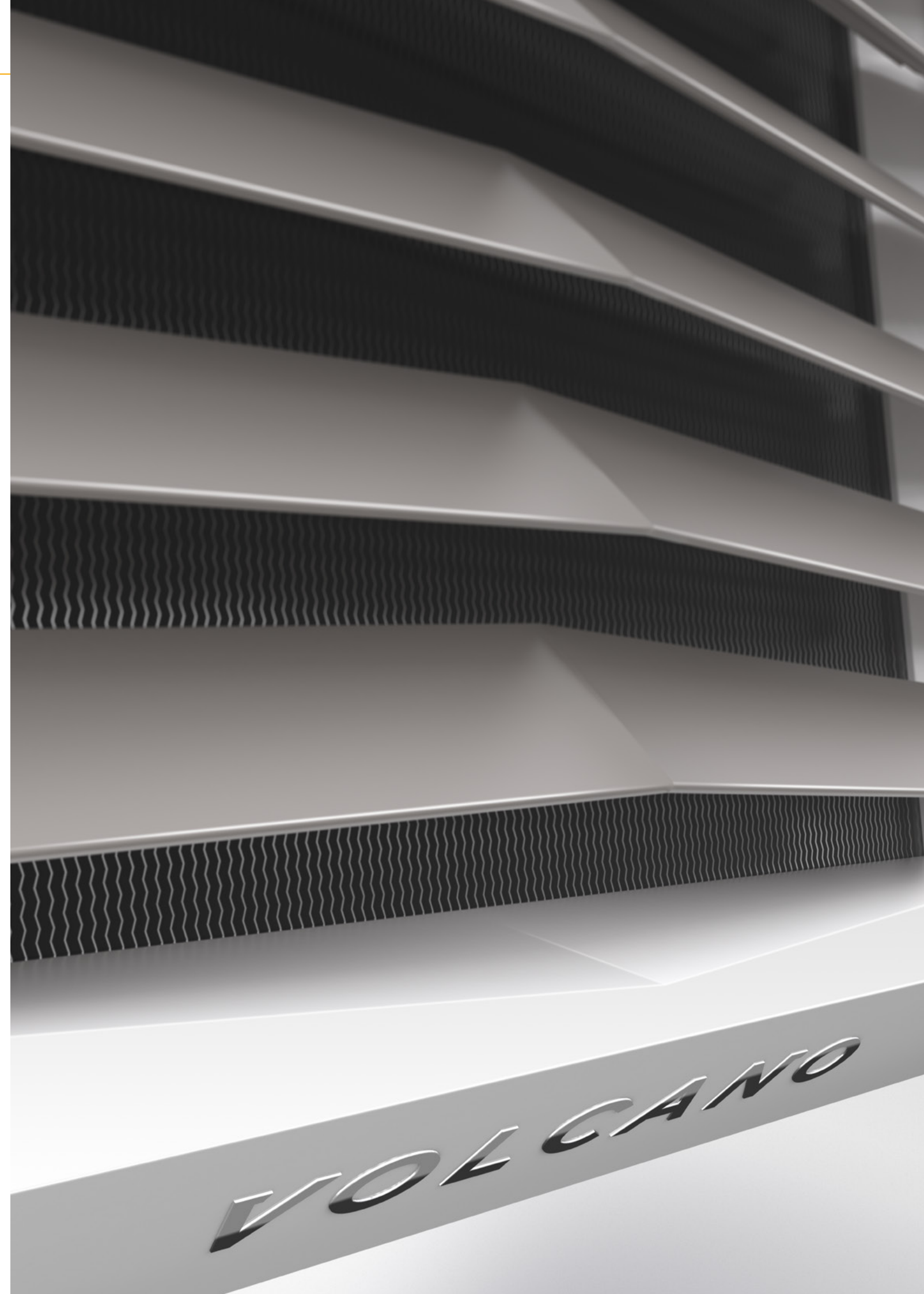
LOGISTICS

\$ competitive
PRICE

OVER 100 000
 SOLD EQUIPMENT
UNITS ANNUALLY

 **THE HIGHEST**
QUALITY

3 YEAR **GUARANTEE**
FOR EACH
DEVICE



VOLCANO

The Volcano air heaters are a new generation of devices, combining innovative technical solutions with a modern pattern design. Our precisely executed and light housing resembles the beautiful diamond shape; ideal in its simplicity. The character of the device is emphasized by the composition of the selected materials and dynamically shaped air guide vane.



ENERGY-SAVING EC
MOTORS



THREE-ROW WATER
EXCHANGERS



BIM COMPATIBLE
REVIT® FILES



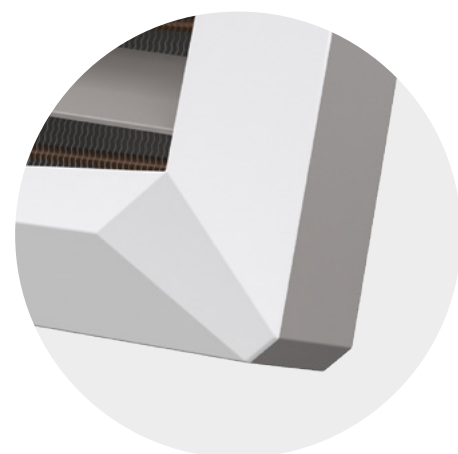
UNBEATABLE
PRICE



| Modernity

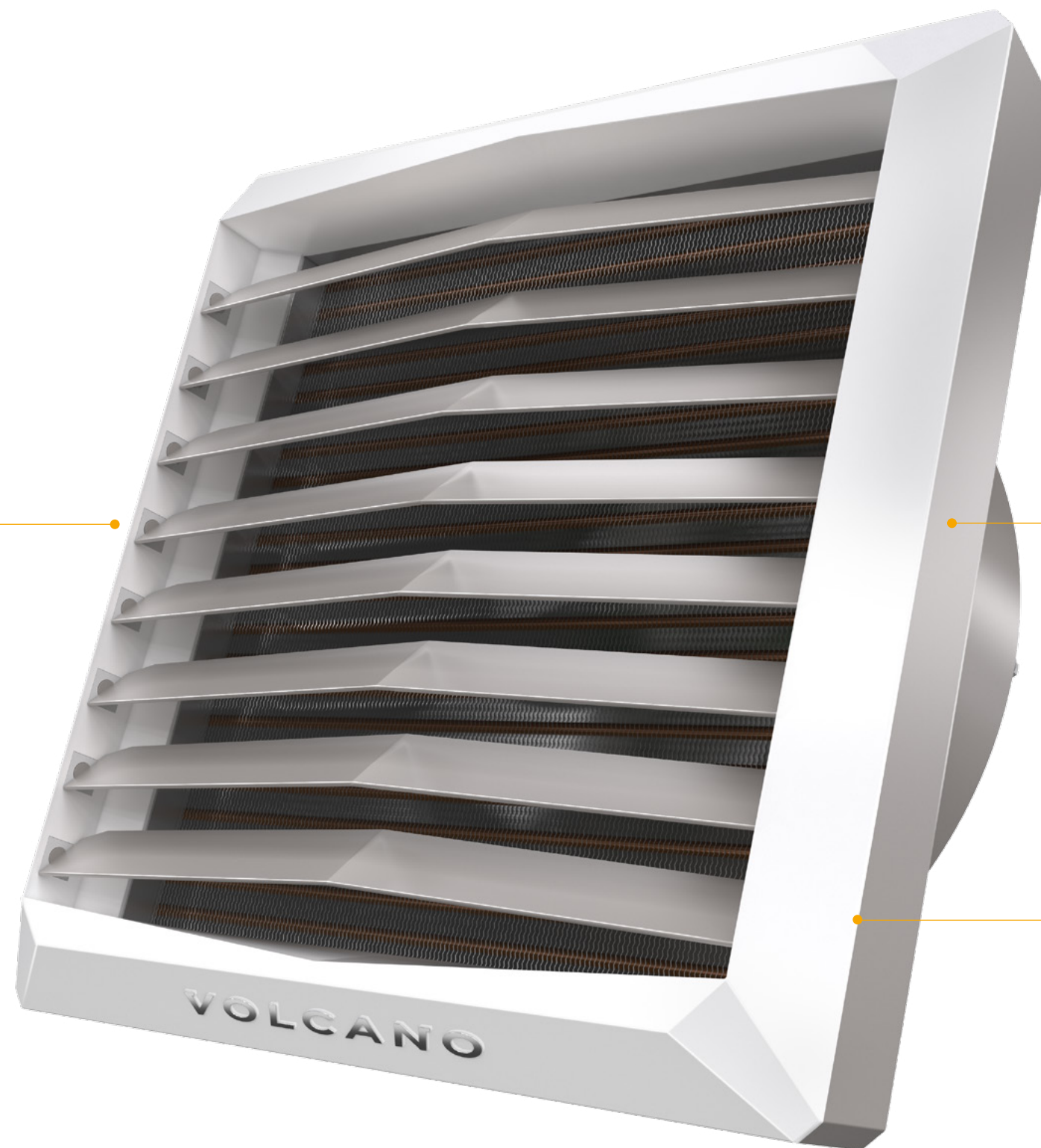
DESIGN

Highly developed casing form guarantees optimal exchanger surface exposure while hiding all structural elements.



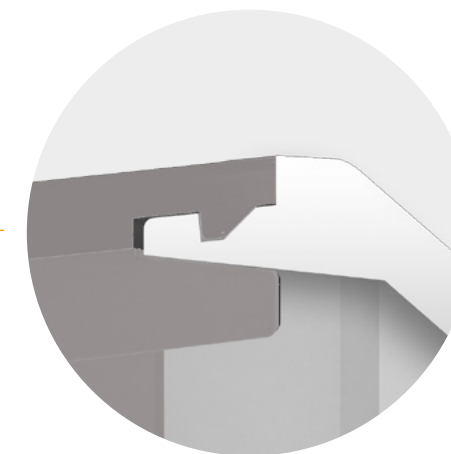
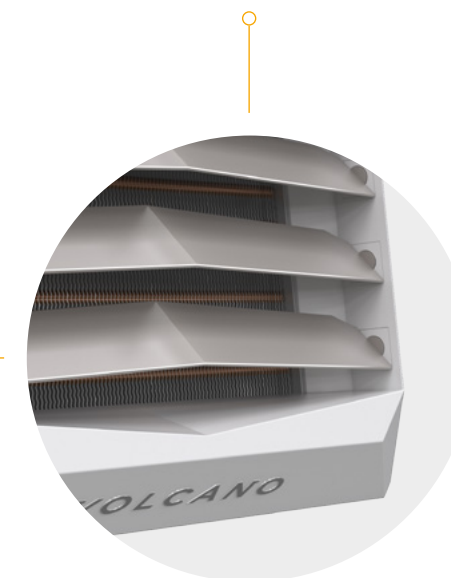
SHAPE AND COLOR

The light and clean casing lines, combined with a universal color palette, provide for harmonious adaptation to every room type.



MATERIAL

Made of the highest class ABS with an anti-UV pigment mixture. The casing is characterized by high mechanical strength, durability, and resistance to high temperatures. The material used guarantees unchangeable aesthetics, easy to clean surfaces and long-term durability certified by warranty for the casing.



SMART LOCK

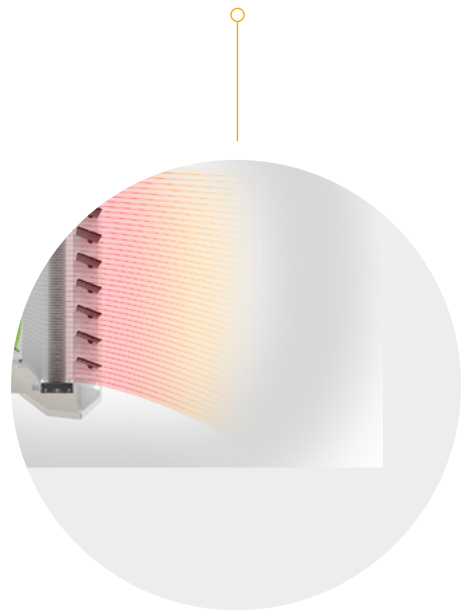
Our patented locking system guarantees a durable and precise fit for all casing elements.



Innovation

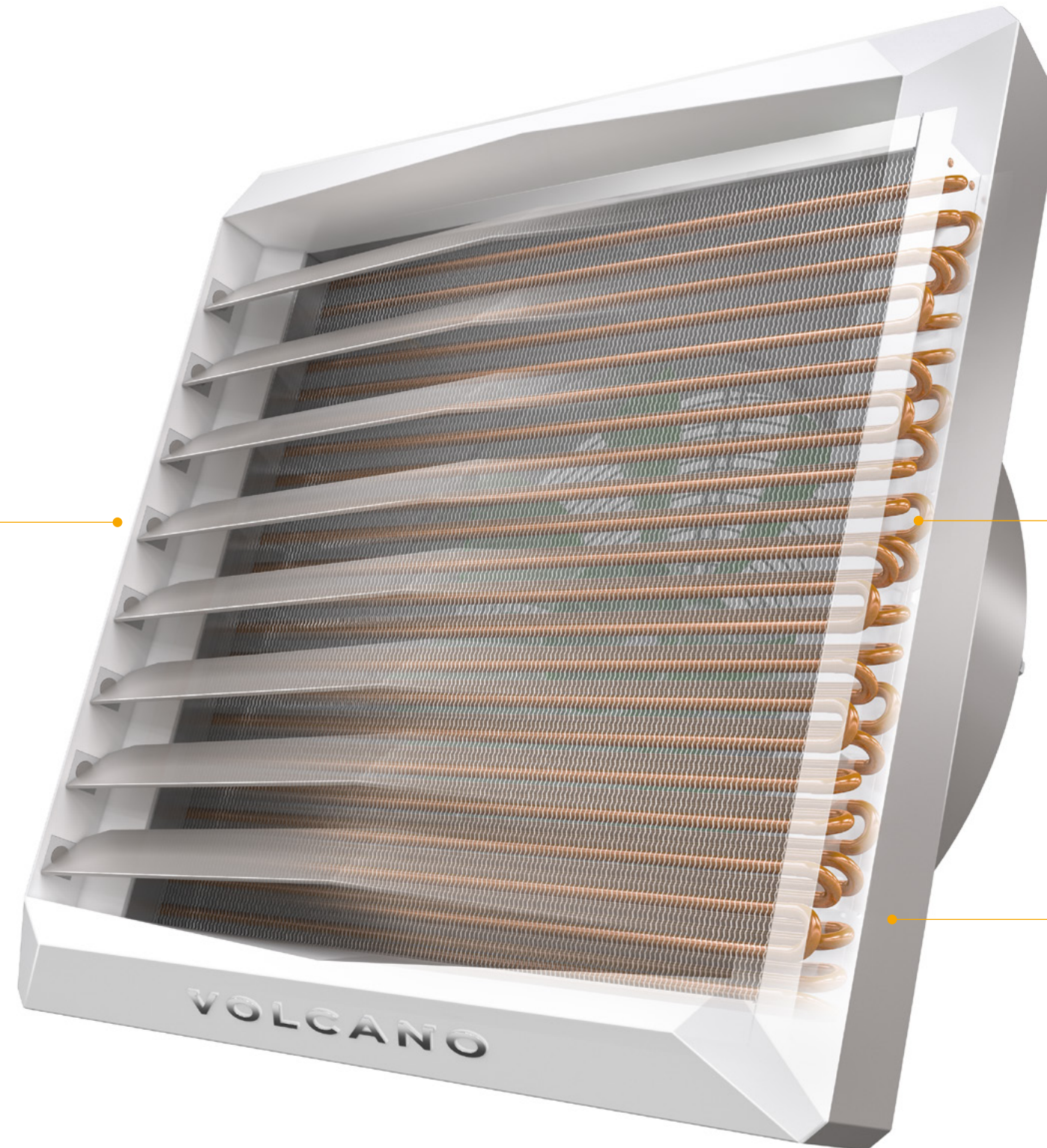
AIR GUIDE VANES

An innovative blade mount solution allows for their individual adjustment and stable positioning. The guide vane profile guarantees minimum air flow resistance rates.



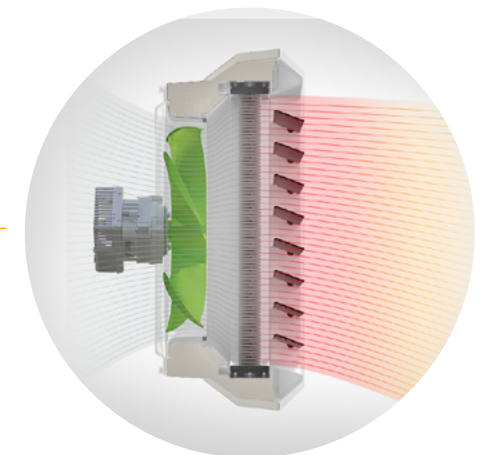
DIFFUSER

The design of the diffuser guarantees total integration with the rear section of the housing and the fan.



HEAT EXCHANGERS

- 1,2, and 3 row heaters featuring increased heat capacities to guarantee optimal matches of heating power to requirements of various facilities;
- Enhanced heat transfer surface and ability to work with low temperatures agents;
- All exchangers are tested to guarantee 100% verification of tightness.



MAXIMUM AIR OUTPUT WITHOUT ANY POWER LOSS

Our ideally matching fan casing and a dedicated diffuser provide for equal distribution of air speed in the exchanger, to guarantee small flow resistance rates and full use of the exchanger's power output.



| Energy efficiency

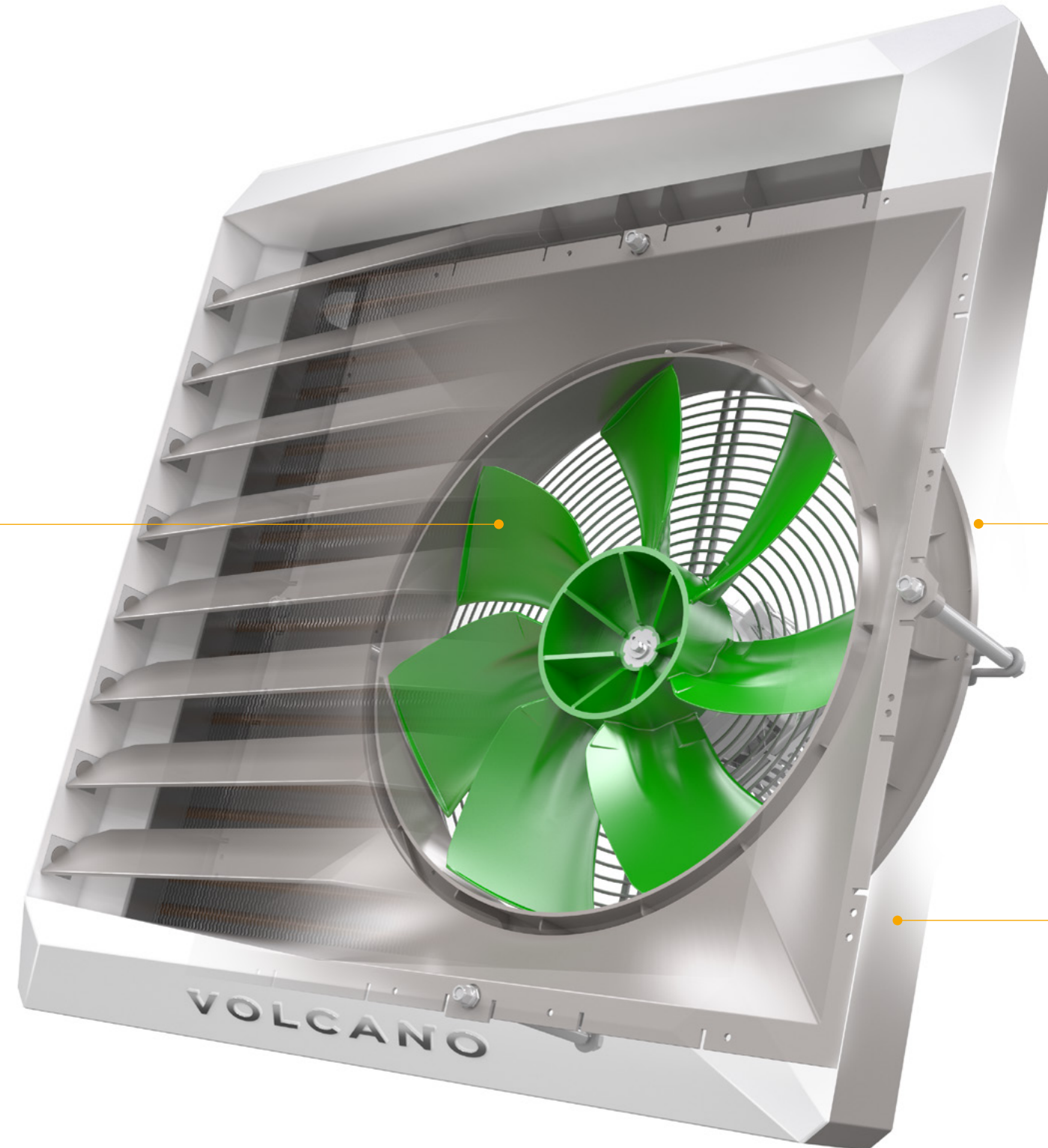
EFFICIENT FANS

Optimized profile and increased blade surfaces guarantee low usage costs and quiet operation.



EFFICIENT MOTORS

Energy-saving EC motors provide an optimal match of operating parameters for each device, while maintaining minimum electricity consumption levels.



FULL RECYCLING

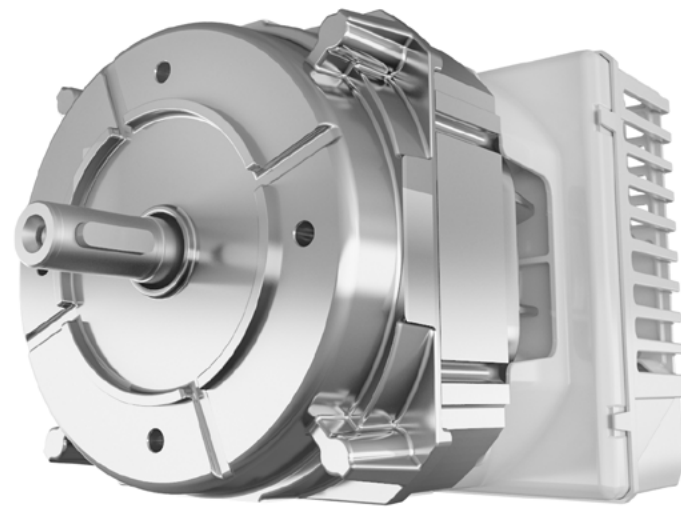
The device is environmentally-friendly. 100% of materials used can be recycled.



ENERGY-SAVING REGULATION

EC motors guarantee maximum unit efficiency at reduced rotations. Stepless rotation regulation is now available for EC motors.

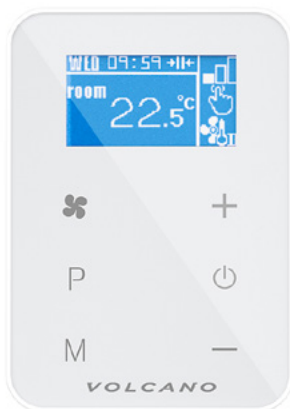
The Volcano air heater with EC motor



ENERGY EFFICIENCY

- Higher efficiency throughout the adjustment range in comparison to regular motors.
- Excellent durability.
- Low maintenance costs.
- Possibility of connecting directly to BMS system.
- Silent with considerable rates of rotation .
- Adjustment of fan rates rotation with 0-10V DC signal.

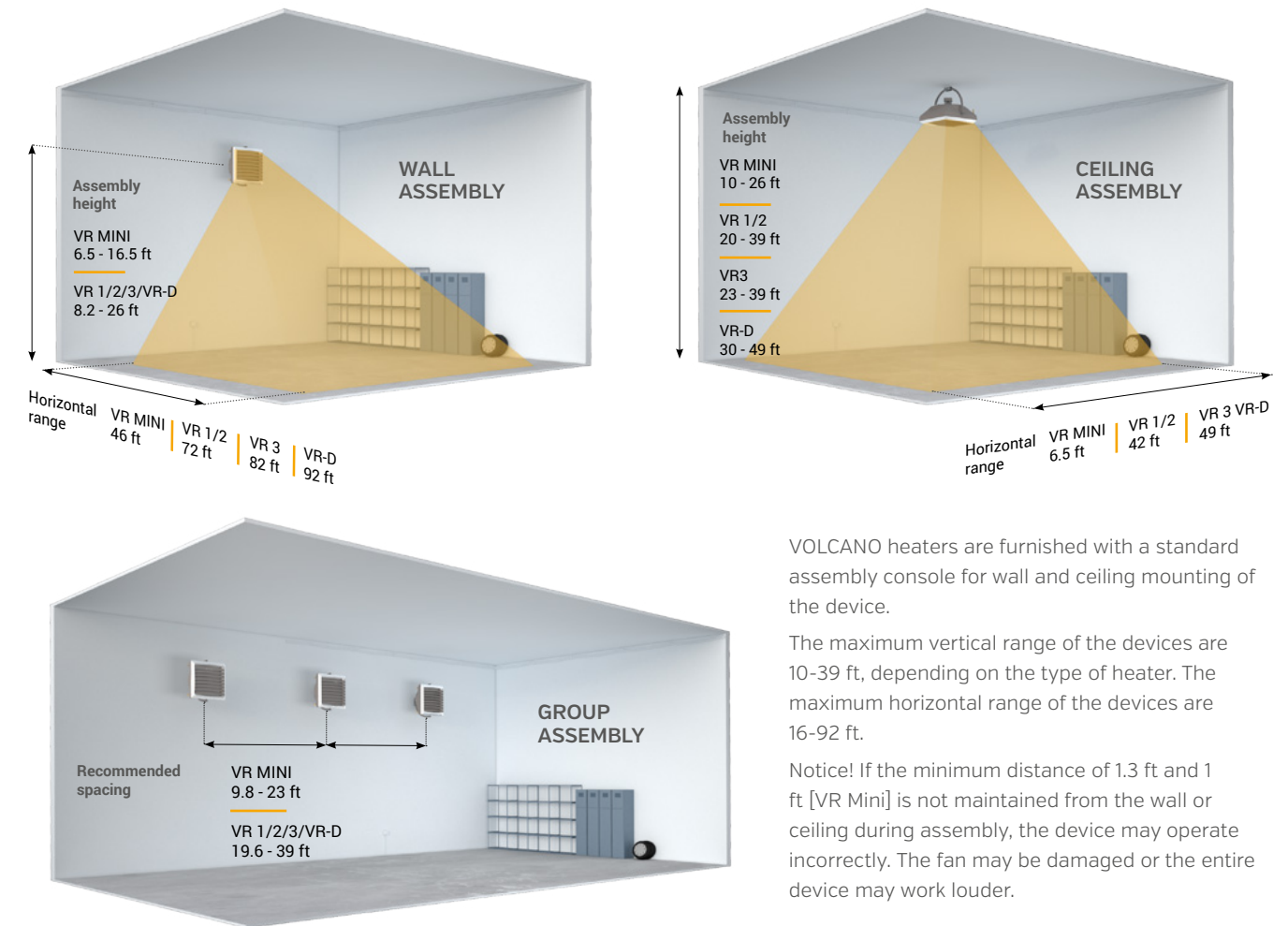
COMFORT AND FLEXIBILITY



Microprocessor controller of unit heater

- Cooperation with external temperature sensors.
- Heaters working time calendar for workdays and weekends.
- Working in BMS systems.
- Possibility of working in automatic and 3-level mode of speed control.
- Up to 8 heaters can be connected to one controller!

Assembly

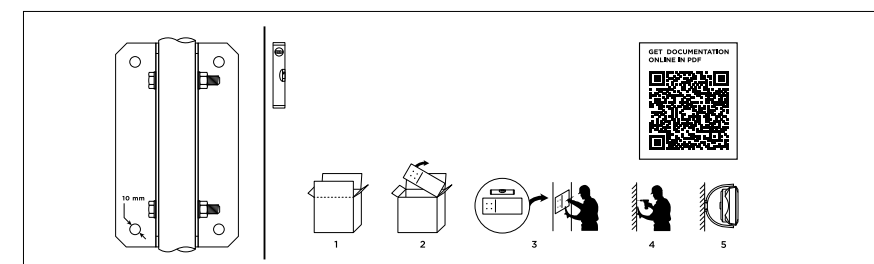


VOLCANO heaters are furnished with a standard assembly console for wall and ceiling mounting of the device.

The maximum vertical range of the devices are 10-39 ft, depending on the type of heater. The maximum horizontal range of the devices are 16-92 ft.

Notice! If the minimum distance of 1.3 ft and 1 ft [VR Mini] is not maintained from the wall or ceiling during assembly, the device may operate incorrectly. The fan may be damaged or the entire device may work louder.

ASSEMBLY TEMPLATE



Each VOLCANO air heater package has a printed template representing the spacing of boreholes and a leveling line to facilitate the mount of the console to the wall. Simply cut the template out of the cardboard lid and proceed with assembly.





VOLCANO VR-D

Destratifier



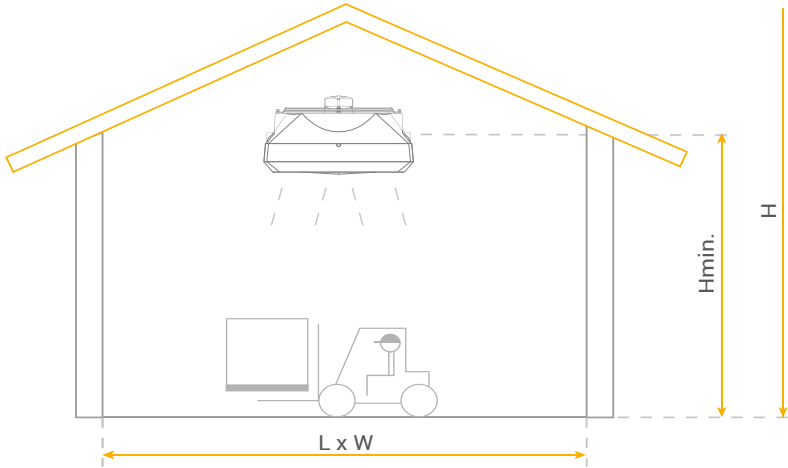
Parameter	—	VOLCANO VR-D
Maximum air output	CFM	3826
Maximum horizontal air range	ft	92
Maximum vertical air range	ft	15
Device weight	lbs	49
Power supply voltage	V/Hz	1 ~ 110/60 / 1 ~ 240/60
Motor power EC	HP	0.48
Rated current EC	A	1.7
Rated motor rotational speed EC	rpm	1380
Protection rating EC	IP	44

Selection method in terms of room size:



Assembly height should be no less than 3/4 of the height of the room, measuring from the floor.
An example calculation of the minimal VOLCANO VR-D destratifier assembly height:
 $H_{MIN} = \frac{3}{4} \times H$
In a room of H=20ft, the minimal VOLCANO VR-D destratifier assembly height will be:
 $H_{MIN} = \frac{3}{4} \times 20 \text{ ft} = 15 \text{ ft}$

Description:

H - height
L - length
W - width

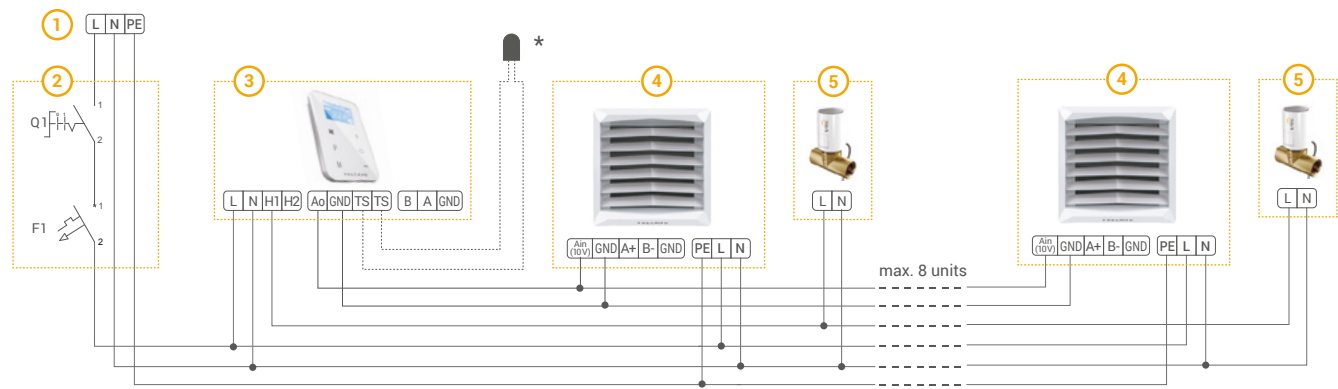


Controls

Parameters			Parameters			
Model	-	Controller Volcano EC	Valve with actuator (VA-VEH202TA)			
VTS product number	-	1-4-0101-0457				
Motor support	-	EC				
Power supply voltage	V/ph/Hz	~120/1/60 / ~240/1/60	VTS product number	1-2-1204-2019		
Permissible load	A	1A for 110-240V 0,015A for 0-10V	Power supply voltage	V/ph/Hz	~120/1/60 / ~240/1/60	
Setting range	°F	41...104	Power consumption	W	1	
Work mode	---	Manual / automatic	Connection	"	3/4	
Hourly-weekly calendar	---	Yes	Kvs flow ratio	gpm	19.82	
Clock	---	Yes	Opening/ closing time	min.	3/3	
Temperature measurement	---	Integrated in the device	Protection rating	IP	54	
The possibility of connecting a separate temperature sensor	pcs.	1 or 4				
Output signal	---	0-10V DC				
Protection rating	IP	30				

Cooperation of controller with water heaters		
Model		Controller Volcano EC
VTS article No.		1-4-0101-0457
Cooperation with motors		
VR Mini	pcs.	8
VR1	pcs.	8
VR2	pcs.	8
VR3	pcs.	8
VR-D	pcs.	8

EXAMPLE CONNECTION DIAGRAM OF VOLCANO EC



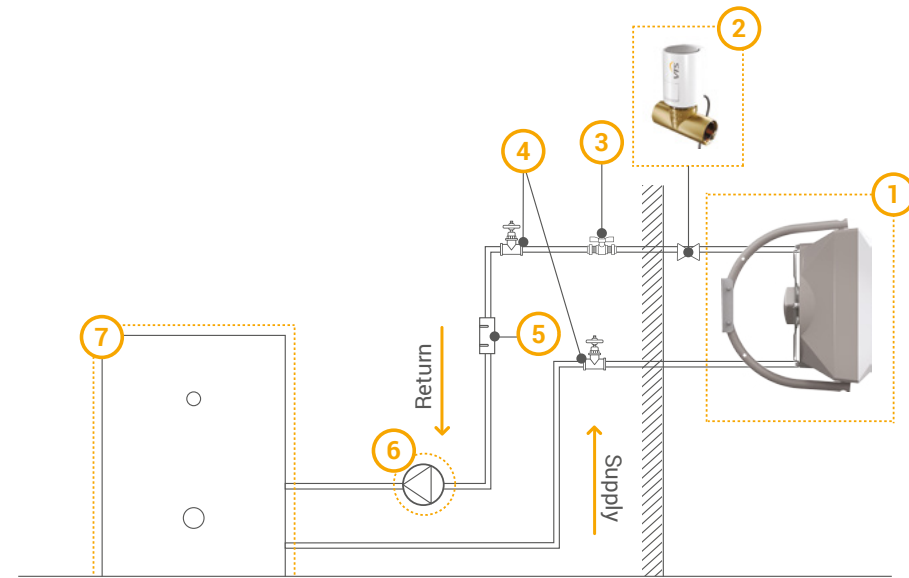
1. Power supply 120V/60 Hz or 240V/60 Hz.
2. Main switch, fuses.
3. Volcano EC controller.

4. Volcano VR Mini, VR1, VR2, VR3, (possibility of connecting 8 units to one controller).
5. Valve with actuator.

* Temperature sensor installed optionally

ALL EC HEATERS ARE CHARACTERIZED BY THEIR EASE AND SIMPLICITY OF CONNECTION

EXAMPLE OF A HYDRAULIC SYSTEM



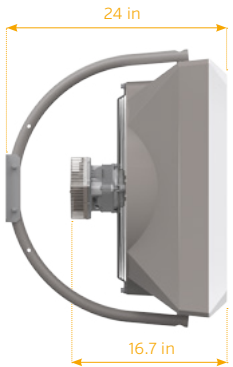
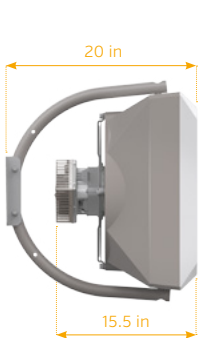
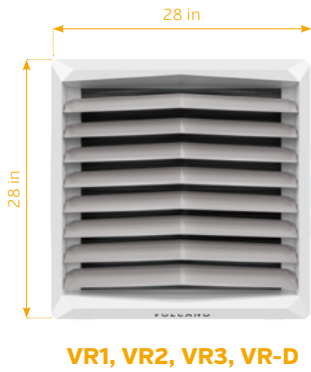
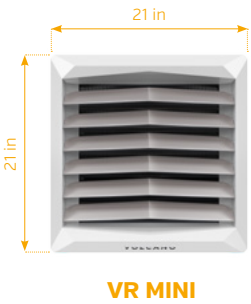
1. Unit heater.
2. Valve with actuator.
3. Vent valve.
4. Cut-off valve.

5. Filter.
6. Circulation pump.
7. Boiler.

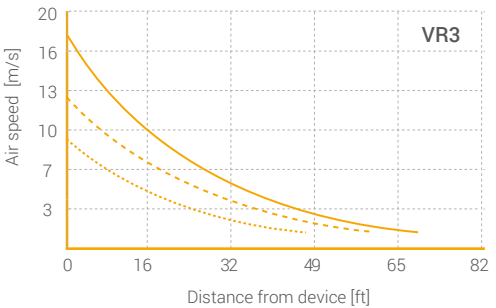
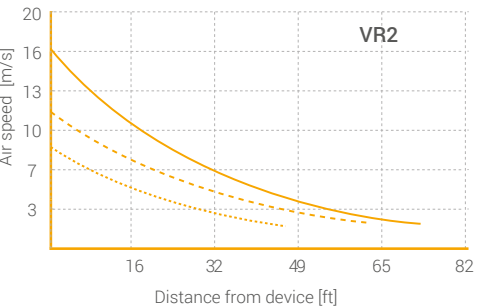
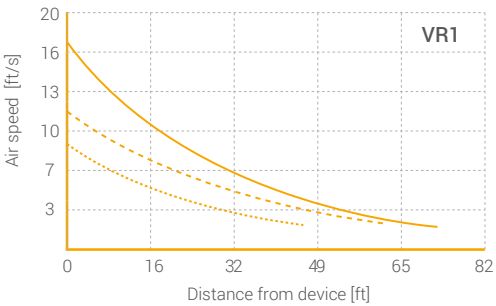
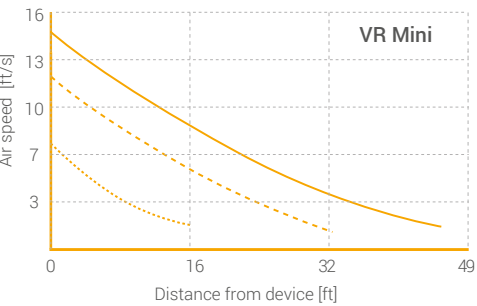
Device type series

VOLCANO	VR Mini	VR1	VR2	VR3	VR-D
HEATING POWER RANGE	10-68 MBH	17-102 MBH	27-171 MBH	44-256 MBH	—
MAXIMUM AIR OUTPUT*	1236 CFM	3119 CFM	2855 CFM	3355 CFM	3826 CFM
HORIZONTAL RANGE (MAX.)	46 ft	75 ft	72 ft	82 ft	92 ft
VERTICAL RANGE (MAX.)	26 ft	39 ft	36 ft	39 ft	49 ft

* maximum speed 1.5 ft/s



Air speed in the distance function





Technical parameters

Parameter	Unit	VOLCANO VR MINI	VOLCANO VR1	VOLCANO VR2	VOLCANO VR3	VOLCANO VR-D
		EC	EC	EC	EC	EC
VTS product number		1-4-0101-0455	1-4-0101-0442	1-4-0101-0443	1-4-0101-0444	1-4-0101-0450
Number of heater rows	-	2	1	2	3	---
Maximum air output	CFM	1236	3119	2855	3355	3826
Heating power range	MBH	10-68	17-102	27-171	44-256	---
Maximum temperature of heating medium	°F	200				---
Maximum working pressure	psi	232				---
Maximum horizontal air range	ft	46	75	72	82	92
Maximum vertical air rage	ft	26	39	36	39	49
Water capacity	in³	68	76	131	188	---
Connection stub pipe diameter	"	3/4				---
Device weight (without water) EC	lbs	30	46	47	54	34
Power supply voltage	V/ph/Hz	120/1/60 or 240/1/60				
EC motor power	HP	0.12	0.33		0.48	
EC motor rated current	A	0.51	1.3		1.7	
EC motor rotations	rpm	1450	1430		1400	
EC motor protection rating	IP	44				
Casing color palette		Front: RAL 9016 Traffic White, rear + console: RAL 7036 Platinum Gray, fan (EC): RAL 6038 Green				

PIPELINE DIAMETERS*

Number of heaters connected to the main line**	VR Mini		VR1		VR2		VR3	
	Max water flow [GPM]	Pipeline diameter ["]	Max water flow [GPM]	Pipeline diameter ["]	Max water flow [GPM]	Pipeline diameter ["]	Max water flow [GPM]	Pipeline diameter ["]
1	0.5	3/4	0.8	3/4	1.3	3/4	1.9	3/4
2	1.1	3/4	2.6	3/4	2.6	1	3.9	1 1/4
3	1.6	1	3.6	1	3.6	1 1/4	5.8	1 1/2
4	2.2	1	5.2	1	5.2	1 1/4	7.8	1 1/2
5	2.7	1	6.5	1 1/4	6.5	1 1/2	9.8	2
6	3.2	1 1/4	7.8	1 1/4	7.8	1 1/2	11.7	2
7	3.8	1 1/4	9.1	1 1/4	9.1	2	13.7	2 1/2
8	4.4	1 1/4	10.4	1 1/2	10.4	2	15.6	2 1/2
9	4.9	1 1/4	11.7	1 1/2	11.7	2	17.5	2 1/2
10	5.4	1 1/4	13	1 1/2	13	2 1/2	19.5	3

* Pipeline diameters selected for maximum water flow rate up to 8 ft/s
** Heaters connected successively to one main line

VOLCANO VR MINI

FAN SPEED		III	II	I
Fan output	CFM	1236	971	647
Noise level for heaters with EC motors*	dB(A)	50	40	27
EC motor power**	HP	0.12	0.07	0.05
Horizontal range	ft	46	26	16
Vertical range	ft	26	16	10

VOLCANO VR1

FAN SPEED		III	II	I
Fan output	CFM	3119	2295	1648
Noise level for heaters with EC motors*	dB(A)	54	49	38
EC motor power**	HP	0,33	0,25	0,21
Horizontal range	ft	75	66	49
Vertical range	ft	39	30	23

VOLCANO VR2

FAN SPEED		III	II	I
Fan output	CFM	2855	2119	1413
Noise level for heaters with EC motors*	dB(A)	54	49	38
EC motor power**	HP	0,33	0,25	0,21
Horizontal range	ft	72	62	46
Vertical range	ft	36	26	20

VOLCANO VR3

FAN SPEED		III	II	I
Fan output	CFM	3355	2413	1766
Noise level for heaters with EC motors*	dB(A)	55	49	43
EC motor power**	HP	0.48	0.37	0.28
Horizontal range	ft	82	72	56
Vertical range	ft	39	30	23

VOLCANO VR-D

FAN SPEED		III	II	I
Fan output	CFM	3826	2707	2001
Noise level for heaters with EC motors*	dB(A)	56	50	43
EC motor power**	HP	0.48	0.37	0.28
Horizontal range	ft	92	79	62
Vertical range	ft	49	36	30

* reference conditions: 52.950 ft room volume, measurement performed at 16 ft
** EC motor electric power for the air flow mentioned in the tables

VOLCANO VR MINI

Parameters Tz/Tp [°F]		194/158				176/140				158/122				122/86			
Tp1 [°F]	Qp [CFM]	Pg [MBH]	Tp2 [°F]	Qw [gpm]	Δp [psi]	Pg [MBH]	Tp2 [°F]	Qw [gpm]	Δp [psi]	Pg [MBH]	Tp2 [°F]	Qw [gpm]	Δp [psi]	Pg [MBH]	Tp2 [°F]	Qw [gpm]	Δp [psi]
32	1236	70.6	85.1	4.04	2.0	61.1	77.7	3.44	1.6	51.5	70.5	2.92	1.1	31.4	55.6	1.80	0.5
	971	61.8	90.7	3.52	1.6	53.2	82.8	3.07	1.2	44.7	74.7	2.54	0.9	27.3	58.3	1.57	0.4
	647	48.1	100.9	2.77	1.0	41.6	91.8	2.39	0.8	35.1	82.2	1.94	0.6	21.5	63.0	1.20	0.2
41	971	57.7	96.1	3.29	1.4	56.6	83.5	3.22	1.3	46.7	76.1	2.62	1.0	25.9	61.0	1.50	0.4
	1236	66.2	90.7	3.82	1.8	49.5	88.0	2.84	1.0	40.9	79.9	2.32	0.8	23.2	63.3	1.35	0.3
	647	45.4	105.6	2.62	0.9	38.6	96.4	2.17	0.7	32.1	86.9	1.80	0.5	18.4	67.3	1.05	0.2
50	1236	61.8	96	3.52	1.6	52.2	89.1	2.92	1.2	42.3	81.7	2.39	0.8	21.8	66.4	1.20	0.2
	971	53.9	96	3.07	1.2	45.4	93.4	2.62	0.9	36.9	85.1	2.09	0.6	19.1	68.2	1.05	0.2
	647	42.3	110	3.29	0.8	35.5	100.9	2.02	0.6	29.0	91.4	1.65	0.4	15.0	71.4	0.82	0.1
59	1236	57.3	101	3.29	1.4	47.4	94.6	2.69	1.0	37.5	87.3	2.09	0.6	16.7	71.6	0.97	0.2
	971	49.8	106	2.84	1.1	41.3	98.6	2.39	0.8	32.8	90.3	1.87	0.5	14.7	73.0	0.82	0.1
	647	39.2	115	2.24	0.7	32.4	105.6	1.87	0.5	25.9	95.9	1.42	0.3	11.3	75.4	0.67	0.1
68	1236	52.9	107	3.07	1.2	43.0	100.2	2.47	0.8	33.1	92.7	1.87	0.5	11.3	76.5	0.60	0.1
	971	46.1	111	2.62	0.9	37.5	103.6	2.09	0.6	28.7	95.4	1.65	0.4	9.6	77.2	0.52	0.1
	647	36.2	119	2.09	0.6	29.3	110.1	1.69	0.4	22.5	100.4	1.27	0.3	6.5	77.4	0.37	0.03

VOLCANO VR1

Parameters Tz/Tp [°F]		194/158				176/140				158/122				122/86			
Tp1 [°F]	Qp [CFM]	Pg [MBH]	Tp2 [°F]	Qw [gpm]	Δp [psi]	Pg [MBH]	Tp2 [°F]	Qw [gpm]	Δp [psi]	Pg [MBH]	Tp2 [°F]	Qw [gpm]	Δp [psi]	Pg [MBH]	Tp2 [°F]	Qw [gpm]	Δp [psi]
32	3119	102.6	62.2	5.83	3.8	88.0	58.1	3.44	0.67	74.0	54.0	4.19	2.1	45.0	45.5	2.54	0.9
	2295	86.7	66.9	4.94	2.8	74.7	62.1	3.07	0.57	62.8	57.4	3.59	1.6	38.6	47.5	2.17	0.7
	1648	72.3	72.7	4.11	2.0	62.4	67.1	2.39	0.48	52.5	61.5	2.99	1.1	32.1	50.2	1.80	0.5
41	3119	95.5	69.4	5.46	3.3	81.6	65.1	3.22	0.62	67.2	61.0	3.82	1.8	38.6	52.3	2.17	0.4
	2295	81.2	73.8	4.64	2.5	69.3	68.9	2.84	0.53	57.3	64.0	3.29	1.3	32.8	54.1	1.87	0.3
	1648	67.9	79.2	3.89	1.8	57.7	73.6	2.17	0.44	47.8	67.8	2.69	1.0	27.3	56.5	1.57	0.2
50	3119	89.1	76.5	5.09	2.9	75.1	72.3	2.92	0.57	60.7	68.0	3.44	1.5	31.4	59.4	1.80	0.2
	2295	75.7	80.6	4.34	2.2	63.8	75.7	2.62	0.48	51.5	70.9	2.92	1.1	27.0	60.8	1.50	0.2
	1648	63.1	85.5	3.59	1.5	53.2	79.9	2.02	0.41	43.3	74.3	2.47	0.8	22.5	62.6	1.27	0.1
59	3119	82.6	83.5	4.71	2.5	68.2	79.3	2.69	0.52	53.9	75.0	3.07	1.2	24.6	66.2	1.35	0.2
	2295	69.9	87.3	4.04	1.9	58.0	82.4	2.39	0.44	46.1	77.5	2.62	0.9	20.8	67.5	1.20	0.1
	1648	58.7	91.9	3.37	1.3	48.5	86.4	1.87	0.37	38.6	80.6	2.17	0.6	17.4	68.7	0.97	0.1
68	3119	75.7	90.5	4.34	2.2	61.8	86.4	2.47	0.47	47.1	82.0	2.69	0.9	17.1	73.0	0.97	0.1
	2295	64.5	94.1	3.67	1.6	52.5	89.2	2.09	0.40	40.3	84.2	2.32	0.7	14.3	73.8	0.82	0.1
	1648	53.9	98.2	3.07	1.1	44.0	92.7	1.65	0.34	33.8	86.9	1.87	0.5	11.9	74.7	0.67	0.03

Legend:

T_z
T_p
T_{p1}
T_{p2}

- inlet water temperature
- outlet water temperature
- inlet air temperature
- outlet air temperature

P_g
Q_p
Q_w
Δp

- heating capacity
- air flow
- water flow
- pressure drop in the heat exchanger

VOLCANO VR2

Parameters Tz/Tp [°F]		194/158				176/140				158/122				122/86			
Tp1 [°F]	Qp [CFM]	Pg [MBH]	Tp2 [°F]	Qw [gpm]	Δp [psi]	Pg [MBH]	Tp2 [°F]	Qw [gpm]	Δp [psi]	Pg [MBH]	Tp2 [°F]	Qw [gpm]	Δp [psi]	Pg [MBH]	Tp2 [°F]	Qw [gpm]	Δp [psi]
32	2855	170.9	87.3	9.72	3.5	147.1	79.7	8.38	2.7	123.5	72.1	7.03	2.0	76.1	56.7	4.26	0.8
	2119	143.0	94.5	8.15	2.5	124.5	86.0	7.03	1.9	104.1	77.5	5.91	1.4	64.1	60.1	3.59	0.6
	1413	111.6	105.1	6.36	1.6	96.6	95.4	5.54	1.2	81.6	85.5	4.64	0.9	50.5	65.1	2.84	0.4
41	2855	159.3	92.7	9.13	3.1	136.1	85.1	7.78	2.3	112.9	77.5	6.36	1.7	64.8	62.1	3.67	0.6
	2119	134.1	99.5	7.63	2.2	114.6	91.0	6.51	1.7	95.2	82.6	5.39	1.2	54.9	64.9	3.07	0.4
	1413	104.4	109.6	5.98	1.4	89.4	99.7	5.09	1.1	74.4	89.8	4.26	0.8	43.0	69.3	2.39	0.3
50	2855	61.8	98.2	8.53	2.7	125.2	90.7	7.11	2.0	101.7	83.1	5.76	1.4	53.2	67.3	2.99	0.4
	2119	53.9	104.7	7.11	1.9	105.4	96.1	5.98	1.4	86.0	87.6	4.86	1.0	45.0	69.8	2.54	0.3
	1413	42.3	113.9	5.61	1.2	82.6	104.0	4.71	0.9	67.2	94.1	3.82	0.6	35.5	73.2	1.94	0.2
59	2855	57.3	103.6	7.85	2.3	114.3	96.1	6.51	1.7	90.8	88.3	5.16	1.1	41.6	72.5	2.32	0.3
	2119	49.8	109.6	6.66	1.7	41.3	98.6	5.54	1.2	76.4	92.5	4.34	0.8	35.1	74.3	1.94	0.2
	1413	39.2	118.4	5.16	1.1	32.4	105.6	4.34	0.8	60.1	98.4	3.37	0.5	27.3	77.0	1.57	0.1
68	2855	52.9	109.0	7.26	2.0	43.0	100.2	5.91	1.4	79.5	93.7	4.49	0.9	28.7	77.4	1.65	0.1
	2119	46.1	114.6	6.13	1.5	37.5	103.6	5.01	1.0	67.2	97.3	3.82	0.6	23.9	78.4	1.35	0.1
	1413	36.2	122.7	4.79	0.9	29.3	110.1	3.89	0.6	52.9	102.6	2.99	0.4	18.1	79.9	1.05	0.06

VOLCANO VR3

Parameters Tz/Tp [°F]		194/158				176/140				158/122				122/86			
Tp1 [°F]	Qp [CFM]	Pg [MBH]	Tp2 [°F]	Qw [gpm]	Δp [psi]	Pg [MBH]	Tp2 [°F]	Qw [gpm]	Δp [psi]	Pg [MBH]	Tp2 [°F]	Qw [gpm]	Δp [psi]	Pg [MBH]	Tp2 [°F]	Qw [gpm]	Δp [psi]
32	3355	256.3	102.2	14.59	4.7	220.1	92.8	12.57	3.6	185.3	83.1	10.55	2.7	114.6	63.7	6.43	1.1
	2413	206.8	111.4	11.82	3.2	179.1	100.8	10.25	2.5	151.2	90.0	8.60	1.8	93.8	68.0	5.31	0.8
	1766	168.9	120.6	9.65	2.2	146.4	108.9	8.30	1.7	123.9	97.0	7.03	1.2	77.1	72.5	4.34	0.5
41	3355	238.5	106.9	13.61	4.2	204.0	97.3	11.59	3.1	169.2	87.8	9.58	2.2	97.9	68.0	5.54	0.8
	2413	193.8	115.3	11.07	2.8	166.2	104.7	9.50	2.1	138.2	93.9	7.85	1.5	80.2	71.8	4.49	0.6
	1766	158.3	124.0	9.05	1.9	135.8	112.3	7.78	1.5	112.9	100.2	6.43	1.1	65.9	75.6	3.67	0.4
50	3355	222.5	111.4	12.72	3.7	187.7	101.8	10.70	2.7	152.9	92.1	8.68	1.9	80.9	72.3	4.56	0.6
	2413	180.8	119.5	10.32	2.5	153.2	108.7	8.75	1.8	124.9	97.9	7.11	1.3	66.2	75.4	3.67	0.4
	1766	147.7	127.6	8.45	1.7	125.2	115.7	7.11	1.3	102.4	103.6	5.83	0.9	54.3	78.4	3.07	0.3
59	3355	206.1	115.9	11.82	3.2	171.3	106.3	9.80	2.3	136.5	96.6	7.78	1.5	62.8	76.3	3.52	0.4
	2413	167.9	123.4	9.58	2.2	139.9	112.6	8.00	1.6	111.6	101.8	6.36	1.0	51.5	78.8	2.92	0.3
	1766	137.2	131.0	7.85	1.5	114.6	119.1	6.51	1.1	91.4	106.9	5.16	0.7	42.3	81.1	2.39	0.2
68	3355	189.7	120.4	10.85	2.7	154.9	110.8	8.83	1.9	119.4	100.9	67.77	1.2	43.7	80.1	2.47	0.2
	2413	154.6	127.4	8.83	1.9	126.6	116.6	7.26	1.3	97.9	105.6	5.54	0.8	35.5	81.5	1.94	0.1
	1766	126.6	134.4	7.26	1.3	103.7	122.4	5.91	0.9	80.5	110.1	4.56	0.6	28.3	82.8	1.57	0.09

Legend:

T_z
T_p
T_{p1}
T_{p2}

- inlet water temperature
- outlet water temperature
- inlet air temperature
- outlet air temperature

P_g
Q_p
Q_w
Δp

- heating capacity
- air flow
- water flow
- pressure drop in the heat exchanger



FAQ DEVICES

1. HOW DO I CORRECTLY SELECT A VOLCANO HEATER?

Step one: determine the temperature inside the target room and its heat demand for heating purposes. Air heating is one of the most dynamic methods of heating rooms, allowing for the application of temporary (e.g. overnight) temperature lowering in the heating room and its fast heating right before use. This allows for significant reductions in heat consumption, but does not require any heating power surpluses to be added to the devices for quick heating.

Step two: determine the location of heaters and the necessary air stream range to guarantee the achievement of suitable temperatures in the areas of the room you are interested in. Notice that the air speed should not exceed the permissible values in human occupancy zones or on any other sensitive areas, e.g. in the vicinity of industrial processes.

Step three: obtain information on the temperature of the heating medium and access to the building.

Step four: Having all of the aforementioned data, take the VOLCANO catalogue and look for devices which fulfill the criteria of the required air stream and required heating power, considering the possibility of work at varying outputs (first, second or third speed). Use the charts presenting air speeds in the distance function to determine the range for each device size. Alternatively, use the chart on page 19, presenting the range for limit speed of 2 ft/s. Determine the heating power for each device speed and for various heating medium temperatures using the tables on pages 22-23.

2. KEY ADVANTAGES OF EC MOTORS.

EC motor is an electronically commutated brushless direct current motor. Compared to standard motors,

the efficiency of the EC motor is higher throughout their entire control range, which gives significant reduction in energy costs. Units equipped with these motors are characterized by excellent durability with minimal costs associated with their operation. Low noise level even with considerable rates of rotation, which has a favourable influence on acoustics of devices in which these motors are installed. Possibility of connection with the BMS system allow to control all units from one place.

3. HOW DOES EC MOTORS REGULATION WORKS?

The speed of a fan equipped with an EC motor is regulated using the 0-10 V signal. Optionally, use a simple wall-mounted potentiometer allowing for step-less efficiency change or an advanced microprocessor controller, which can carry out a series of other functions (regulation of temperature in the room, weekly program ON/OFF and working parameter settings, anti-freeze functions, etc.), apart from the 3 saved efficiency thresholds.

4. HOW SHOULD I GRADE THE DIAMETERS OF THE MAIN FEED PIPELINES WHEN CONNECTING A LARGE NUMBER OF HEATERS?

The diameter of the main pipeline should be adapted in such a manner that the water flow speed does not exceed 8 ft/s. This is caused by a compromise between investment costs related to the size of the pipes used and usage costs related to the resistance of water flow in pipelines. We recommend the following minimum pipeline diameters, depending on the number of devices and type of heaters connected to the main, according to the table on page 20.

In the case of extensive installations, i.e. when heaters are situated at least 33 ft from the heat source, the diameters of pipelines should be corrected by considering lower water flow speeds.

5. CAN I CONNECT A FEED PIPELINE TO THE UPPER HEAT EXCHANGER MANIFOLD?

Yes, you can, although a heat exchanger powered by an upper manifold will be more difficult to vent. Remember to leave sufficient space for mounting a valve actuator, which should be installed on the return stub pipe.

6. CAN I FEED VOLCANO VR MINI / VR1 / VR2/ VR3 HEATERS WITH A NON-FREEZE MEDIUM?

Yes, you can. The most frequently used non-freeze medium is a water solution of ethylene glycol. The heaters mounted in VOLCANO can support up to 50% mixtures. Make sure to check, however, if other elements of the technological heat installation (valves, pump, etc.) are adapted to work on glycol mix. To do this, check the recommendations of the manufacturers of particular components used.

Remember that the use of glycol mixes, which are usually characterized by higher viscosity and lower thermal capacity, compared to water, increases the resistance of heating medium flow and reduces the heating power of the device.

7. CAN THE VOLCANO VR MINI/VR1 / VR2/ VR3 HEATER BE USED TO COOL DOWN AIR AS WELL?

Yes, but only when the temperature of the working medium is higher than the dew point of the cooled air, since VOLCANO devices are not equipped with drip trays and we shouldn't lead to the condensation of humidity. To switch a VOLCANO device to the cooling function, connect an ice water installation. When there is the risk that the temperature of the working medium could fall below the dew point of the cooled air, make sure to build a drip tray and install it under the device. In this case, the VOLCANO device will be able to work with the horizontal air outlet only. The use of a VOLCANO device with vertical air outlet can result in flooding the fan motor or the space under the device, since mounting a drip tray in this position of the device is impossible.

VOLCANO is not equipped with a liquid trap, which is why you should always reduce its work efficiency

in the cooling mode, in order to eliminate the phenomenon of drip-trapping by the air flowing through the heat exchanger.

8. CAN VOLCANO VR MINI / VR1 / VR2 / VR3 HEATERS SUPPORT HEAT PUMPS?

Yes, VOLCANO water heaters can cooperate with heat pumps. However, when selecting the size of the device, take the low temperature of the heating medium into account. We recommend the use of heaters with large heat exchange surfaces. For this type of installation, we recommend the VR3 heater equipped with a three-row heat exchanger. Make sure to check VR Mini and VR2 with two-row heat exchangers as well.



FAQ
AUTOMATION

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VTS America Inc. | 3535 Gravel Springs Rd Ext, Suite 201 | Buford, GA 30519 | T: +470 809 6811 | america@vtsgroup.com

www.vtsgroup.com

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