

Technical documentation

# **VOLCANO**

VOLCANOVR Mini  
VOLCANOVR Mini 3  
VOLCANO VR1  
VOLCANO VR2  
VOLCANO VR3  
VOLCANO VR4  
VOLCANO VR-D Mini  
VOLCANOVR-D

Check us on



VOLCANO VR Mini VOLCANO VR Mini 3  
VOLCANO VR1 VOLCANO VR2  
VOLCANO VR3 VOLCANO VR4  
VOLCANO VR-D Mini VOLCANO VR-D

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## 1. INTRODUCTION

### 1.1 PRECAUTIONS, REQUIREMENTS, RECOMMENDATIONS

Read the documentation carefully, install and use the equipment according to the specifications, and follow all the safety regulations in order to ensure proper and safe use of the device. Any use that is incompatible with these instructions can cause serious injuries. Restrict access by unauthorized persons and train the operational personnel. The term **operational personnel** refers to people who are suitably trained and have appropriate experience and knowledge of relevant norms, documentation and occupational health and safety regulations, and are authorized to conduct the required work and can identify possible threats and avoid them. This operation and maintenance manual, which is delivered with the device, includes detailed information on all possible configurations of the heaters, examples of their assembly, start, use, repair and maintenance. To operate this device correctly, this manual includes instructions sufficient for qualified personnel. **The documentation should be placed close to the device for ease of access by the service team. The manufacturer reserves the right to introduce changes to the manual or the specifications of the device, which may alter its operation, without prior notice. VTS POLSKA Sp. z o.o. shall not be held liable for current maintenance, servicing, programming, damage caused by standstill of the device awaiting warranty service, any damage to customer's possessions other than the device, or faults resulting from the wrong assembly or use of the device.**

### 1.2 TRANSPORT

Prior to the installing and taking the device out of the cardboard box, it is required to check whether the cardboard box has not been damaged in any way and/or the adhesive tape (installed at the company) has not been broken off or cut. It is recommended to check whether the device's casing has not been damaged in transport. Should any of the above situation occur, please contact us through telephone or e-mail: Tel. 0 801 080 073, email: vts.pl@vtsgroup.com, fax: (+48) 12 296 50 75. **The device should be transported by two people. Use appropriate tools, when transporting the device, so as to avoid the damaging of goods and potential hazard to health.**

### 1.3 INITIAL STEPS TAKEN BEFORE THE INSTALLATION

Record the **serial number** of the device in the warranty card, prior to the commencement of the installation process. **It is required to properly fill-in the warranty card, after the completion of the assembly.** Prior to the commencing of any installation or maintenance work, it is required to disconnect power supply and protect it against unintentional activation.

## 2. STRUCTURE, INTENDED USE, PRINCIPLE OF OPERATION

### 2.1 INTENDED USE

VOLCANO VR has been designed to ensure ease of use and optimum performance.

The device is available in eight versions:

- VOLCANO VR Mini (3-20 kW, 2100 m<sup>3</sup>/h)
- VOLCANO VR Mini (4-27 kW, 2000 m<sup>3</sup>/h)
- VOLCANO VR 1 (5-30 kW, 5300 m<sup>3</sup>/h)
- VOLCANO VR 2 (8-50 kW, 4850 m<sup>3</sup>/h)
- VOLCANO VR 3 (13-75 kW, 5700 m<sup>3</sup>/h)
- VOLCANO VR 4 (10-90kW, 5300 m<sup>3</sup>/h)
- VOLCANO VR-D Mini (2330 m<sup>3</sup>/h)
- VOLCANO VR-D (6500 m<sup>3</sup>/h)

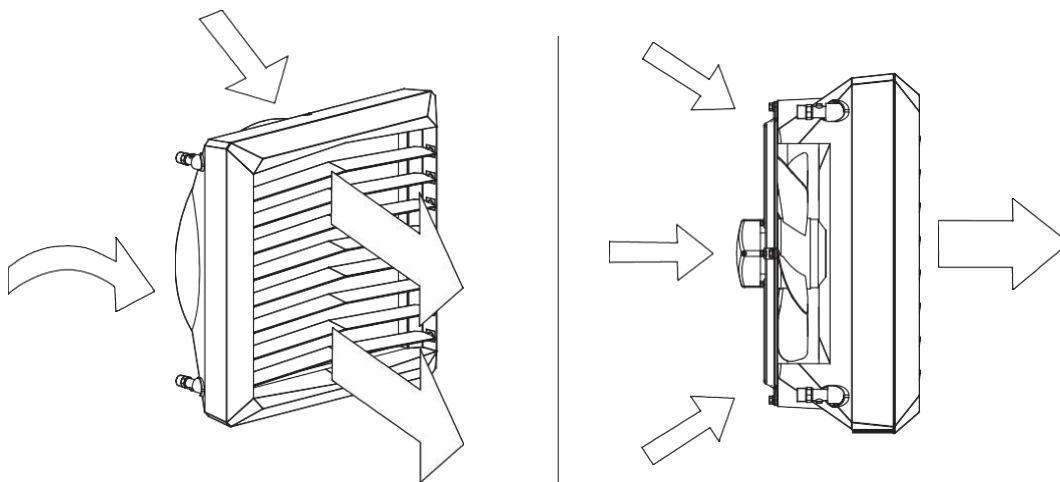
VOLCANO combines state-of-the-art technology, innovative design and high effectiveness. Unique technical solutions such as the design of the heat exchanger, improved fan and increased range of air stream, allow the VOLCANO heater to achieve optimal heating power, perfect for the size and type of room. **APPLICATION:** production halls, warehouses, wholesale outlets, sports facilities, greenhouses, supermarkets, church buildings, farm buildings, workshops, health care facilities, pharmacies, hospitals. It is allowed to use Volcano air heaters in rooms with high humidity (without condensation) i.e. car washes, provided that the unit is not exposed to direct impact of the water stream. Prohibition of using Volcano air heaters in rooms with aggressive environment (i.e. high concentration of ammonia) that can cause corrosion of aluminium or copper.

**MAIN ADVANTAGES:** high effectiveness, low maintenance costs, full parameter control, easy and quick assembly.

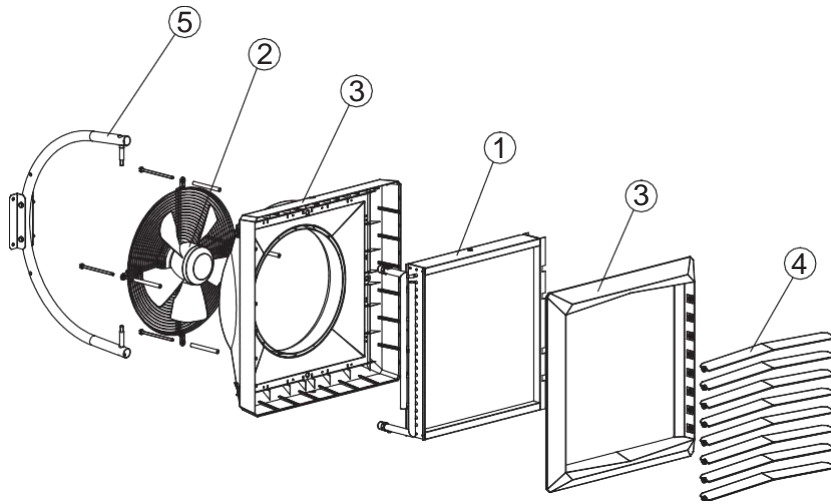
### 2.2 PRINCIPLE OF OPERATION

The heating medium (hot water) gives up heat to the heat exchanger using a highly developed heat exchanger, ensuring great heating power (Volcano VR Mini – 3-20 kW, VR Mini 3 – 4-27 kW, VR 1 – 5-30 kW, VR 2 – 8-50 kW, VR 3 – 13-75 kW, VR 4 – 10-90 kW). A highly effective axial fan (1000-5700 m<sup>3</sup>/h) draws air in from the room, pumps it through the heat exchanger and then sends it back into the room.

Volcano VR-D and VR-D Mini de-stratifies the heated air from the sub-ceiling zone to the above-ground zone. Hot air exhaust results in a leveling of the temperature gradient in particular air layers and contributes to reducing the costs of heating by lowering the temperature in the ceiling zone, thus limiting heat loss through the roof. The Volcano VR-D and VR-D Mini de-stratifier will be the most effective in combination with VR Mini, VR Mini 3, VR1, VR2, VR3 and VR4 air heaters. Cooperation of both of these device types will allow for achieving optimal temperature comfort fast due to the support of the heating system through more efficient distribution of hot air.



**2.3 DEVICE STRUCTURE (VOLCANO)**



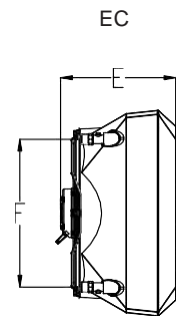
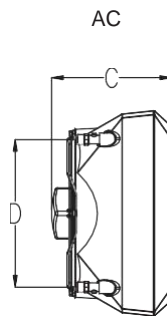
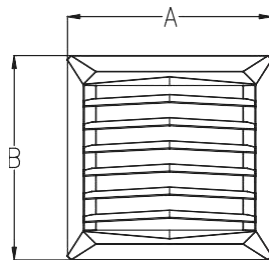
- 1. HEAT EXCHANGER;
- 2. AXIAL FAN;
- 3. COVER;
- 4. AIR GUIDES;
- 5. SAMPLE CONSOLE

1. **EN: HEAT EXCHANGER:** maximum parameters of a heating medium for a heat exchanger are: 130°C, 1,6MPa. Aluminium and copper construction using copper tubes, coil pipe and aluminium lamellas. Connecting ferrules (male thread 3/4") are on the back panel of the unit. Our series of types includes a single-row heat exchanger in VOLCANO VR1 and two-row heat exchanger in VOLCANO VR Mini/VR2 and in VOLCANO VR3/VR Mini 3 three-row heatexchanger and four-row heat exchanger in VOLCANO VR4. The glycol concentration in the heating medium can be up to 50%.
2. **AXIAL FLOW FAN:** maximum working temperature is 60°C, nominal power supply voltage is 230V/50Hz. AC Engine protection is IP54, insulation class F for EC motors IP is 54. Air feed is performed by the axial flow fan, which is secured with a protective grate. Adequate blade profile and proper bearings guarantee silent and unfailing operation of the device. High engine power allows for achieving high efficiency at low power consumption rates, maintaining full air feed regulation. Properly profiled housing lowers the noise emission levels, which makes the device particularly user-friendly, suitable for buildings with higher acoustic requirements.
3. **HOUSING:** consists of the body and the front panel, made of high quality plastic guaranteeing compatibility with devices powered by heating medium with temperature parameter up to 130°C (for VOLCANO VR4 up to 100 °C!). Volcano VR-D and Volcano VR-D Mini operates circulation air, improving its distribution and performing the de-stratification function.
4. **AIR GUIDES:** allow the hot air stream to be directed in 4 directions. Optimum air stream range and direction are achieved through the special fan blade profile.
5. **ASSEMBLY CONSOLE:** an element of additional equipment - its ergonomic, light structure allows for rotating the device on the horizontal plane for -60°+0+60°, to direct the stream of hot air wherever it is necessary.

**2.4 OVERALL DIMENSIONS (VOLCANO VR Mini, VR Mini 3, VR1, VR2, VR3, V4, VR-D Mini, VR-D)**

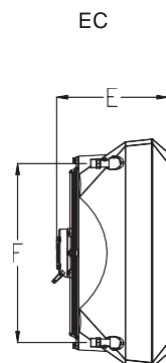
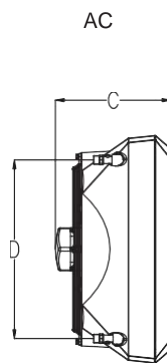
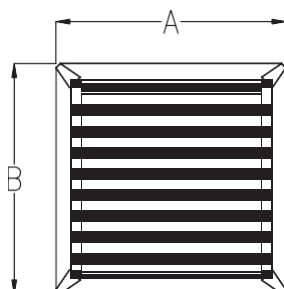
**VOLCANO VR Mini, VR-D Mini/Mini 3**

Marks	L [mm]
A	530
B	530
C	310
D	381
E	300
F	381



**VOLCANO VR1, VR2, VR3, VR4, VR-D**

Marks	L [mm]
A	700
B	700
C	355
D	550
E	350
F	550



### 3. TECHNICAL DATA

#### HEATING POWER

$T_z$  – inlet water temperature;  $T_p$  – outlet water temperature;  $T_{p1}$  – inlet air temperature;  $T_{p2}$  – outlet air temperature;  $P_g$  – heating capacity;  $Q_w$  – water flow;  $Q_p$  – air flow rate;  $\Delta p$  – pressure drop in the heat exchanger

Volcano VR Mini																	
Parameters $T_z/T_p$ [°C]																	
		90/70 [°C]				80/60 [°C]				70/50 [°C]				50/30 [°C]			
$T_{p1}$ [°C]	$Q_p$ [m³/h]	$P_g$ [kW]	$T_{p2}$ [°C]	$Q_w$ [m³/h]	$\Delta p$ [kPa]	$P_g$ [kW]	$T_{p2}$ [°C]	$Q_w$ [m³/h]	$\Delta p$ [kPa]	$P_g$ [kW]	$T_{p2}$ [°C]	$Q_w$ [m³/h]	$\Delta p$ [kPa]	$P_g$ [kW]	$T_{p2}$ [°C]	$Q_w$ [m³/h]	$\Delta p$ [kPa]
0	2100	20.7	29.5	0.92	13.9	17.9	25.4	0.79	10.7	15.1	21.4	0.66	7.9	9.2	13.1	0.4	3.4
	1650	18.1	32.6	0.8	10.7	15.6	28.2	0.69	8.3	13.1	23.7	0.58	6.1	8	14.6	0.35	2.6
	1100	14.1	38.3	0.63	6.8	12.2	33.2	0.54	5.3	10.3	27.9	0.45	3.9	6.3	17.2	0.28	1.7
5	1650	16.9	35.6	0.75	9.5	16.6	28.6	0.73	9.3	13.7	24.5	0.6	6.6	7.6	16.1	0.34	2.5
	2100	19.4	32.6	0.86	12.3	14.5	31.1	0.64	7.2	12	26.6	0.53	5.2	6.8	17.4	0.3	2
10	1100	13.3	40.9	0.59	6	11.3	35.8	0.5	4.6	9.4	30.5	0.41	3.3	5.4	19.6	0.23	1.3
	2100	18.1	35.7	0.8	10.8	15.3	31.7	0.67	8	12.4	27.6	0.54	5.5	6.4	19.1	0.28	1.7
	1650	15.8	35.5	0.7	8.4	13.3	34.1	0.59	6.2	10.8	29.5	0.47	4.3	5.6	20.1	0.24	1.4
15	1100	12.4	43.5	0.55	5.3	10.4	38.3	0.46	3.9	8.5	33	0.37	2.8	4.4	21.9	0.19	0.9
	2100	16.8	38.8	0.74	9.4	13.9	34.8	0.61	6.7	11	30.7	0.48	4.4	4.9	22	0.22	1.1
	1650	14.6	41.4	0.65	7.3	12.1	37	0.54	5.2	9.6	32.4	0.42	3.5	4.3	22.8	0.19	0.9
20	1100	11.5	46.1	0.51	4.6	9.5	40.9	0.42	3.3	7.6	35.5	0.33	2.2	3.3	24.1	0.15	0.5
	2100	15.5	41.9	0.69	8	12.6	37.9	0.56	5.6	9.7	33.7	0.42	3.5	3.3	24.7	0.14	0.5
	1650	13.5	44.3	0.6	6.2	11	39.8	0.48	4.3	8.4	35.2	0.37	2.7	2.8	25.1	0.12	0.4
	1100	10.6	48.6	0.47	4	8.6	43.4	0.38	2.8	6.6	38	0.29	1.8	1.9	25.2	0.08	0.2

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$T_z$  – inlet water temperature;  $T_p$  – outlet water temperature;  $T_{p1}$  – inlet air temperature;  $T_{p2}$  – outlet air temperature;  $P_g$  – heating capacity;  $Q_w$  – water flow;  $Q_p$  – air flow rate;  $\Delta p$  – pressure drop in the heat exchanger

Volcano VR Mini 3																	
Parameters $T_z/T_p$ [°C]																	
		90/70 [°C]				70/50 [°C]				45/35 [°C]				40/30 [°C]			
$T_{p1}$ [°C]	$Q_p$ [m³/h]	$P_g$ [kW]	$T_{p2}$ [°C]	$Q_w$ [m³/h]	$\Delta p$ [kPa]	$P_g$ [kW]	$T_{p2}$ [°C]	$Q_w$ [m³/h]	$\Delta p$ [kPa]	$P_g$ [kW]	$T_{p2}$ [°C]	$Q_w$ [m³/h]	$\Delta p$ [kPa]	$P_g$ [kW]	$T_{p2}$ [°C]	$Q_w$ [m³/h]	$\Delta p$ [kPa]
0	2000	26.7	37.0	1.20	23.8	19.5	27.0	0.90	14.5	13.3	18.5	1.30	32.5	11.5	16.0	1.10	25.8
	1550	22.6	40.3	1.00	17.7	16.5	29.5	0.70	10.8	11.3	20.1	1.10	24.1	9.7	17.4	0.90	19.1
	1000	16.7	46.2	0.70	10.4	12.3	33.8	0.50	6.4	8.3	23.0	0.80	14.2	7.2	19.9	0.70	11.2
5	2000	24.9	40.0	1.10	20.9	17.7	29.9	0.80	12.3	11.5	21.2	1.10	25.2	9.8	18.7	0.90	19.1
	1550	21.0	43.1	0.90	15.6	14.9	32.2	0.70	9.1	9.7	22.7	0.90	18.7	8.2	20.0	0.80	14.2
	1000	15.5	48.7	0.70	9.1	11.1	36.2	0.50	5.4	7.2	25.2	0.70	11.0	6.1	22.1	0.60	8.3
10	2000	23.0	43.0	1.00	18.3	15.9	32.7	0.70	10.1	9.8	24.0	0.90	18.8	8.0	21.4	0.80	13.4
	1550	19.5	45.9	0.90	13.6	13.4	34.8	0.60	7.5	8.2	25.2	0.80	14.0	6.7	22.4	0.60	10.0
	1000	14.3	51.1	0.60	8.0	9.9	38.5	0.40	4.4	6.1	27.4	0.60	8.2	5.0	24.2	0.50	5.8
15	2000	21.3	45.9	0.90	15.9	14.1	35.5	0.60	8.2	8.0	26.6	0.80	13.2	6.2	24.0	0.60	8.6
	1550	17.9	48.6	0.80	11.8	11.9	37.4	0.50	6.1	6.8	27.7	0.70	9.8	5.2	24.8	0.50	6.4
	1000	13.2	53.5	0.60	6.9	8.8	40.6	0.40	3.6	5.0	29.5	0.50	5.70	3.9	26.2	0.40	3.70
20	2000	19.4	48.7	0.90	13.6	12.3	38.2	0.50	6.4	6.2	29.2	0.60	8.50	4.4	26.5	0.40	4.70
	1550	16.4	51.2	0.70	10.0	10.4	39.8	0.50	4.8	5.3	30.0	0.50	6.30	3.7	27.0	0.40	3.50
	1000	12.1	55.7	0.50	5.9	7.7	42.7	0.30	2.8	3.9	31.4	0.40	3.70	2.7	27.9	0.30	2.00

VOLCANO VR Mini VOLCANO VR Mini 3  
 VOLCANO VR1 VOLCANO VR2  
 VOLCANO VR3 VOLCANO VR4  
 VOLCANO VR-D Mini VOLCANO VR-D

$T_z$  – inlet water temperature;  $T_p$  – outlet water temperature;  $T_{p1}$  – inlet air temperature;  $T_{p2}$  – outlet air temperature;  $P_g$  – heating capacity;  $Q_w$  – water flow;  $Q_p$  – air flow rate;  $\Delta p$  – pressure drop in the heat exchanger

Volcano VR1																	
Parameters $T_z/T_p$ [°C]																	
		90/70 [°C]				80/60 [°C]				70/50 [°C]				50/30 [°C]			
$T_{p1}$ [°C]	$Q_a$ [m³/h]	$P_g$ [kW]	$T_{p2}$ [°C]	$Q_w$ [m³/h]	$\Delta p$ [kPa]	$P_g$ [kW]	$T_{p2}$ [°C]	$Q_w$ [m³/h]	$\Delta p$ [kPa]	$P_g$ [kW]	$T_{p2}$ [°C]	$Q_w$ [m³/h]	$\Delta p$ [kPa]	$P_g$ [kW]	$T_{p2}$ [°C]	$Q_w$ [m³/h]	$\Delta p$ [kPa]
0	5300	29.9	16.8	1.33	26	25.8	14.5	1.14	20	21.7	12.2	0.95	14.6	13.2	7.5	0.58	6.2
	3900	25.4	19.4	1.12	19.1	21.9	16.7	0.97	14.7	18.4	14.1	0.81	10.8	11.3	8.6	0.49	4.6
	2800	21.2	22.6	0.94	13.6	18.3	19.5	0.81	10.5	15.4	16.4	0.68	7.8	9.4	10.1	0.41	3.3
5	5300	28	20.8	1.24	23	23.9	18.4	1.05	17.3	19.7	16.1	0.87	12.3	11.3	11.3	0.49	4.6
	3900	23.8	23.2	1.05	16.9	20.3	20.5	0.9	12.8	16.8	17.8	0.74	9.1	9.6	12.3	0.42	3.4
	2800	19.9	26.2	0.88	12.1	16.9	23.1	0.75	9.1	14	19.9	0.62	6.6	8	13.6	0.35	2.5
10	5300	26.1	24.7	1.16	20.2	22	22.4	0.97	14.8	17.8	20	0.78	10.2	9.2	15.2	0.4	3.2
	3900	22.2	27	0.98	14.9	18.7	24.3	0.82	10.9	15.1	21.6	0.66	7.6	7.9	16	0.34	2.4
	2800	18.5	29.7	0.82	10.6	15.6	26.6	0.69	7.8	12.7	23.5	0.56	5.4	6.6	17	0.29	1.8
15	5300	24.2	28.6	1.07	17.5	20	26.3	0.88	12.5	15.8	23.9	0.7	8.2	7.2	19	0.31	2
	3900	20.5	30.7	0.91	12.9	17	28	0.75	9.2	13.5	25.3	0.59	6.1	6.1	19.7	0.27	1.5
	2800	17.2	33.3	0.76	9.2	14.2	30.2	0.63	6.6	11.3	27	0.5	4.4	5.1	20.4	0.22	1.1
20	5300	22.2	32.5	0.99	15	18.1	30.2	0.8	10.3	13.8	27.8	0.61	6.4	5	22.8	0.22	1.1
	3900	18.9	34.5	0.84	11.1	15.4	31.8	0.68	7.6	11.8	29	0.52	4.8	4.2	23.2	0.18	0.8
	2800	15.8	36.8	0.7	7.9	12.9	33.7	0.57	5.5	9.9	30.5	0.43	3.5	3.5	23.7	0.15	0.6

$T_z$  – inlet water temperature;  $T_p$  – outlet water temperature;  $T_{p1}$  – inlet air temperature;  $T_{p2}$  – outlet air temperature;  $P_g$  – heating capacity;  $Q_w$  – water flow;  $Q_p$  – air flow rate;  $\Delta p$  – pressure drop in the heat exchanger

Volcano VR2																	
Parameters $T_z/T_p$ [°C]																	
		90/70 [°C]				80/60 [°C]				70/50 [°C]				50/30 [°C]			
$T_{p1}$ [°C]	$Q_a$ [m³/h]	$P_g$ [kW]	$T_{p2}$ [°C]	$Q_w$ [m³/h]	$\Delta p$ [kPa]	$P_g$ [kW]	$T_{p2}$ [°C]	$Q_w$ [m³/h]	$\Delta p$ [kPa]	$P_g$ [kW]	$T_{p2}$ [°C]	$Q_w$ [m³/h]	$\Delta p$ [kPa]	$P_g$ [kW]	$T_{p2}$ [°C]	$Q_w$ [m³/h]	$\Delta p$ [kPa]
0	4850	50.1	30.7	2.21	23.8	43.1	26.5	1.9	18.3	36.2	22.3	1.59	13.5	22.3	13.7	0.97	5.7
	3600	41.9	34.7	1.86	17.2	36.5	30	1.6	13.3	30.5	25.3	1.34	9.8	18.8	15.6	0.82	4.2
	2400	32.7	40.6	1.45	10.8	28.3	35.2	1.25	8.4	23.9	29.7	1.05	6.2	14.8	18.4	0.64	2.7
5	4850	46.7	33.7	2.07	21.1	39.9	29.5	1.76	15.9	33.1	25.3	1.45	11.4	19	16.7	0.83	4.3
	3600	39.3	37.5	1.74	15.2	33.6	32.8	1.48	11.5	27.9	28.1	1.22	8.3	16.1	18.3	0.7	3.1
	2400	30.6	43.1	1.36	9.6	26.2	37.6	1.16	7.3	21.8	32.1	0.96	5.3	12.6	20.7	0.55	2
10	4850	43.6	36.8	1.93	18.5	36.7	32.6	1.62	13.6	29.8	28.4	1.31	9.4	15.6	19.6	0.68	3
	3600	36.6	40.4	1.62	13.4	30.9	35.6	1.36	9.9	25.2	30.9	1.11	6.8	13.2	21	0.58	2.2
	2400	28.6	45.5	1.27	8.4	24.2	40	1.07	6.3	19.7	34.5	0.87	4.4	10.4	22.9	0.45	1.4
15	4850	40.4	39.8	1.79	16	33.5	35.6	1.48	11.5	26.6	31.3	1.17	7.6	12.2	22.5	0.53	1.9
	3600	34	43.1	1.51	11.6	28.2	38.4	1.25	8.3	22.4	33.6	0.99	5.5	10.3	23.5	0.45	1.4
	2400	26.5	48	1.18	7.3	22.1	42.5	0.98	5.3	17.6	36.9	0.77	3.5	8	25	0.35	0.9
20	4850	37.2	42.8	1.65	13.7	30.3	38.6	1.34	9.5	23.3	34.3	1.02	5.9	8.4	25.2	0.37	1
	3600	31.3	45.9	1.39	10	25.5	41.1	1.13	6.9	19.7	36.3	0.86	4.3	7	25.8	0.31	0.7
	2400	24.5	50.4	1.09	6.3	20	44.8	0.88	4.4	15.5	39.2	0.68	2.8	5.3	26.6	0.23	0.4



$T_z$  – inlet water temperature;  $T_p$  – outlet water temperature;  $T_{p1}$  – inlet air temperature;  $T_{p2}$  – outlet air temperature;  $P_g$  – heating capacity;  $Q_w$  – water flow;  $Q_p$  – air flow rate;  $\Delta p$  – pressure drop in the heat exchanger

Volcano VR3																	
Parameters $T_z/T_p$ [°C]																	
$T_{p1}$ [°C]	$P_g$ [kW]	90/70 [°C]				90/70 [°C]				90/70 [°C]				90/70 [°C]			
		$P_g$ [kW]	$P_g$ [kW]	$P_g$ [kW]	$P_g$ [kW]	$P_g$ [kW]	$P_g$ [kW]	$P_g$ [kW]	$P_g$ [kW]	$P_g$ [kW]	$P_g$ [kW]	$P_g$ [kW]	$P_g$ [kW]	$P_g$ [kW]	$P_g$ [kW]	$P_g$ [kW]	$\Delta p$ [kPa]
0	5700	75.1	39	3.31	32.6	64.5	33.8	2.85	25.1	54.3	28.4	2.39	18.4	33.6	17.6	1.46	7.8
	4100	60.6	44.1	2.69	22.0	52.5	38.2	2.32	17.1	44.3	32.2	1.95	12.5	27.5	20.0	1.20	5.4
	3000	49.5	49.2	2.19	15.0	42.9	42.7	1.89	11.6	36.3	36.1	1.59	8.6	22.6	22.5	0.98	3.7
5	5700	69.9	41.6	3.10	28.9	59.8	36.3	2.64	21.7	49.6	31.0	2.18	15.5	28.7	20.0	1.25	5.8
	4100	56.8	46.3	2.52	19.5	48.7	40.4	2.15	14.8	40.5	34.4	1.78	10.6	23.5	22.1	1.02	4.0
	3000	46.4	51.1	2.06	13.3	39.8	44.6	1.76	10.1	33.1	37.9	1.46	7.3	19.3	24.2	0.84	2.8
10	5700	65.2	44.1	2.89	25.3	55.0	38.8	2.43	18.6	44.8	33.4	1.97	12.8	23.7	22.4	1.03	4.1
	4100	53	48.6	2.35	17.1	44.9	42.6	1.98	12.7	36.6	36.6	1.61	8.8	19.4	24.1	0.84	2.8
	3000	43.3	53.1	1.92	11.7	36.7	46.5	1.62	8.7	30.0	39.8	1.32	6.1	15.9	25.8	0.69	2.0
15	5700	60.4	46.6	2.68	21.9	50.2	41.3	2.22	15.7	40.0	35.9	1.76	10.3	18.4	24.6	0.80	2.6
	4100	49.2	50.8	2.18	14.9	41.0	44.8	1.81	10.7	32.7	38.8	1.44	7.1	15.1	26.0	0.66	1.8
	3000	40.2	55.0	1.78	10.2	33.6	48.4	1.48	7.4	26.8	41.6	1.18	4.9	12.4	27.3	0.54	1.2
20	5700	55.6	49.1	2.47	18.8	45.4	43.8	2.00	13.0	35.0	38.3	1.54	8.1	12.8	26.7	0.56	1.3
	4100	45.3	53.0	2.01	12.8	37.1	47.0	1.64	8.9	28.7	40.9	1.26	5.6	10.4	27.5	0.45	0.9
	3000	37.1	56.9	1.64	8.8	30.4	50.2	1.34	6.1	23.6	43.4	1.04	3.9	8.3	28.2	0.36	0.6

$T_z$  – inlet water temperature;  $T_p$  – outlet water temperature;  $T_{p1}$  – inlet air temperature;  $T_{p2}$  – outlet air temperature;  $P_g$  – heating capacity;  $Q_w$  – water flow;  $Q_p$  – air flow rate;  $\Delta p$  – pressure drop in the heat exchanger

Volcano VR4																	
Parameters $T_z/T_p$ [°C]																	
$T_{p1}$ [°C]	$Q_p$ [m³/h]	90/70 [°C]				70/50 [°C]				45/35 [°C]				35/25 [°C]			
		$P_g$ [kW]	$T_{p2}$ [°C]	$Q_w$ [m³/h]	$\Delta p$ [kPa]	$P_g$ [kW]	$T_{p2}$ [°C]	$Q_w$ [m³/h]	$\Delta p$ [kPa]	$P_g$ [kW]	$T_{p2}$ [°C]	$Q_w$ [m³/h]	$\Delta p$ [kPa]	$P_g$ [kW]	$T_{p2}$ [°C]	$Q_w$ [m³/h]	$\Delta p$ [kPa]
0	5300	88,6	43,3	3,70	143,8	61,6	32,1	2,70	102,9	41,0	21,4	3,60	153,0	30,3	15,8	2,60	112,6
	3950	69,4	47,5	3,00	105,1	50,5	35,2	2,20	72,4	33,6	23,5	2,90	128,0	24,8	17,4	2,10	79,0
	2850	57,7	52,2	2,40	76,4	40,1	38,9	1,80	48,3	26,6	25,8	2,30	85,8	19,7	19,1	1,70	52,9
5	5300	77,3	46,1	3,40	114,6	56,0	34,7	2,50	87,1	35,6	23,9	3,10	118,0	24,9	18,2	2,20	79,5
	3950	63,2	50,0	2,80	91,5	45,9	37,7	2,00	61,3	29,1	25,7	2,50	100,0	20,4	19,5	1,80	56,1
	2850	50,1	54,5	2,20	67,4	36,5	41,0	1,60	40,9	23,1	27,8	2,00	66,7	16,2	21,0	1,40	3,5
10	5300	71,7	48,7	3,20	106,8	50,5	37,3	2,20	72,6	30,2	26,3	2,60	97,1	19,6	20,5	1,70	51,7
	3950	58,6	52,5	2,60	88,8	41,4	40,0	1,80	51,1	24,7	27,9	2,10	65,2	16,0	1,4	1,40	36,5
	2850	46,4	56,5	2,10	59,0	32,9	43,0	1,40	34,1	19,6	29,7	1,70	50,3	12,7	22,8	1,10	24,4
15	5300	66,2	51,3	2,90	99,9	45,0	39,7	2,00	59,3	24,8	28,6	2,20	75,9	14,0	22,7	1,20	29,1
	3950	54,1	54,8	2,40	77,1	36,9	42,2	1,60	41,8	20,4	30,0	1,80	53,4	11,5	23,5	1,00	20,6
	2850	42,8	58,7	1,90	51,2	29,3	44,9	1,30	27,9	16,2	31,5	1,50	35,60	9,4	24,4	0,80	13,70
20	5300	60,6	53,8	2,70	84,5	39,6	42,1	1,70	47,3	19,5	30,9	1,70	49,70	9,4	24,7	0,70	11,70
	3950	49,6	57,1	2,20	66,2	32,5	44,3	1,40	33,3	16,0	32,0	1,40	35,00	7,7	25,1	0,60	8,40
	2850	39,3	60,7	1,70	43,9	25,8	46,7	1,10	22,3	12,7	33,2	1,10	23,40	6,4	25,6	0,50	5,50

NOTE Data concerning VOLCANO working parameters for a heating agent with a different temperature can be provided upon request

VOLCANO VR Mini VOLCANO VR Mini 3  
 VOLCANO VR1 VOLCANO VR2  
 VOLCANO VR3 VOLCANO VR4  
 VOLCANO VR-D Mini VOLCANO VR-D

## COOLING POWER

$T_z$  – inlet water temperature;  $T_p$  – outlet water temperature;  $T_{p1}$  – inlet air temperature;  $T_{p2}$  – outlet air temperature;  $P_g$  – cooling capacity;  $Q_p$  – air flow rate

VOLCANO VR4			
Parameters $T_z/T_p$ [°C]			
7/12 [°C]			
$T_{p1}$	$Q_p$	$P_g$ [kW]	$T_{p2}$
[°C]	[m³/h]		[°C]
25	5300	15,3	14,0
	3950	12,9	11,5
	2850	10,5	15,4
23	5300	14,0	14,8
	3950	11,9	14,0
	2850	9,4	13,6
20	5300	9,8	14,5
	3950	8,0	14,0
	2850	6,3	13,4
18	5300	8,7	13,2
	3950	7,1	12,7
	2850	5,6	12,2

VOLCANO VR Mini 3			
Parameters $T_z/T_p$ [°C]			
7/12 [°C]			
$T_{p1}$	$Q_p$	$P_g$ [kW]	$T_{p2}$
[°C]	[m³/h]		[°C]
25	2000	4,5	18,5
	1550	3,8	3,6
	1000	2,7	17,4
23	2000	3,8	17,3
	1550	3,2	16,9
	1000	2,3	16,3
20	2000	2,7	16,1
	1550	2,1	16,0
	1000	1,6	15,4
18	2000	1,9	15,5
	1550	1,6	15,0
	1000	1,3	14,2

## MAIN PARAMETERS TABLE

Parameter	Unit of measure	VOLCANO	VOLCANO	VOLCANO	VOLCANO	VOLCANO	VOLCANO	VOLCANO	VOLCANO	
		VR Mini	VR Mini 3	VR1	VR2	VR3	VR4	VR-D Mini	VR-D	
Number of rows in the heater		2	3	1	2	3	4	---	---	
Maximum air flow rate	m³/h	2100	2000	5300	4850	5700	5300	2330	6500	
Heating power range	kW	3-20	4-27	5-30	8-50	13-75	10-90	-	-	
Maximum temperature of the heating agent	°C	130						100	-	-
Maximum operating pressure*	MPa	1,6						-	-	
Maximum horizontal air stream range	m	14	14	23	22	25	23	16	28	
Maximum vertical air stream range	m	8	8	12	11	12	12	10	15	
Water capacity	dm³	1,12	1,48	1,25	2,16	3,10	4,13	-	-	
Ferrule diameter	"	3/4						-	-	
Weight of the device AC/EC	kg	13/14	14/15	21/21	21,5/21,5	25,5/24,5	27/26,5	18/15,5	10,6/8	
Power supply voltage	V/Hz	1 ~ 230/50								
Motor power AC	kW	0,115		0,28		0,45		1,115	0,45	
Motor current AC	A	0,53		1,3		1,95		0,53	1,95	
Motor speed AC	rpm	1450		1380				1450	1400	
Motor IP AC/EC	---	54								
Motor power EC	kW	0,095		0,25		0,37		0,095	0,37	
Motor current EC	A	0,51		1,3		1,7		0,51	1,7	
Motor speed EC	rpm	1200		1430		1400		1200	1380	

EN



		Volcano VR Mini			Volcano VR Mini 3		
fan speed		III	II	I	III	II	I
air flow	m <sup>3</sup> /h	2100	1650	1100	2000	1550	1000
noise level for Volcano AC*	dB(A)	52	42	29	52	41	29
noise level for Volcano EC*	dB(A)	50	40	27	50	39	27
AC motor electric power**	W	115	68	48	115	68	48
EC motor electric power**	W	95	56	39	95	56	39
electricity consumption**	W	91	32	5	91	32	5
horizontal air stream range	m	14	8	5	14	8	5
vertical air stream range	m	8	5	3	8	5	3

		Volcano VR 1			Volcano VR 2		
fan speed		III	II	I	III	II	I
air flow	m <sup>3</sup> /h	5300	3900	2800	4850	3600	2400
noise level for Volcano AC*	dB(A)	56	51	40	56	51	40
noise level for Volcano EC*	dB(A)	54	49	38	54	49	38
AC motor electric power**	W	280	220	190	280	220	190
EC motor electric power**	W	250	190	162	250	190	162
electricity consumption**	W	202	75	41	226	89	45
horizontal air stream range	m	23	20	15	22	19	14
vertical air stream range	m	12	9	7	11	8	6

		Volcano VR 3			Volcano VR 4		
fan speed		III	II	I	III	II	I
air flow	m <sup>3</sup> /h	5700	4100	3000	5300	3950	2850
noise level for Volcano AC*	dB(A)	57	51	45	56	51	41
noise level for Volcano EC*	dB(A)	55	49	43	54	49	39
AC motor electric power**	W	410	320	245	410	320	245
EC motor electric power**	W	370	285	218	370	285	218
electricity consumption**	W	355	123	55	355	123	55
horizontal air stream range	m	25	22	17	23	20	15
vertical air stream range	m	12	9	7	12	9	7

		Volcano VR-D Mini			Volcano VR-D		
fan speed		III	II	I	III	II	I
air flow	m <sup>3</sup> /h	2330	1830	1220	6500	4600	3400
noise level for Volcano AC*	dB(A)	49	39	27	58	52	45
noise level for Volcano EC*	dB(A)	50	40	27	56	50	43
AC motor electric power**	W	115	68	48	410	320	245
EC motor electric power**	W	95	56	39	370	285	218
horizontal air stream range	m	16	10	7	28	24	19
vertical air stream range	m	10	7	5	15	11	9

\* reference conditions: room volume 1500m<sup>3</sup>, measurement taken at distance of 5m.

\*\* EC motor electric power for the air flow mentioned in the table

\*\*\* standard laboratory conditions

#### 4. ASSEMBLY

**NOTE** Installation location should be suitably selected with special consideration of potential loads and vibrations.

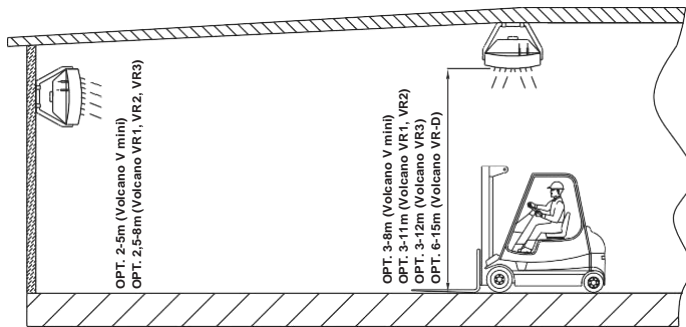
Prior to any installation or maintenance works, disconnect the device from the power supply and secure it against accidental power-up.

Use filters in the hydraulic system. Before you connect the hydraulic lines (especially supply lines) to the device, you should clean/rinse the installation by draining two litres out of it.

**NOTE** It is necessary to maintain a minimum distance of 0.4m from the wall or the ceiling; otherwise the device can malfunction, the fan can be damaged or its operating noise can increase.

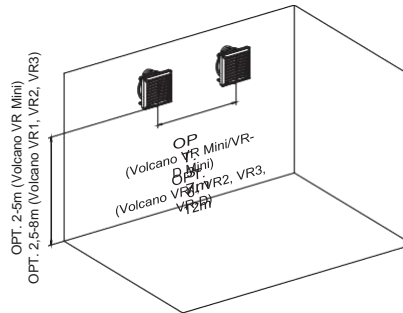
If the device will be installed on a wall or under a ceiling, observe the following factors:

##### mounting height

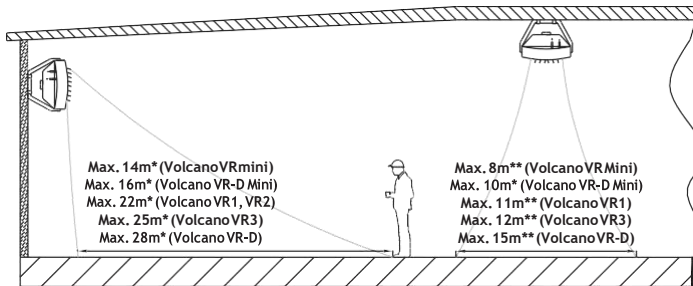


\* for vertical air guides adjustment

distance between units – recommended distance 6-12m (Volcano VR1, VR2, VR3), 3-7m (Volcano VR Mini), in order to ensure even hot air diffusion



##### range of air stream



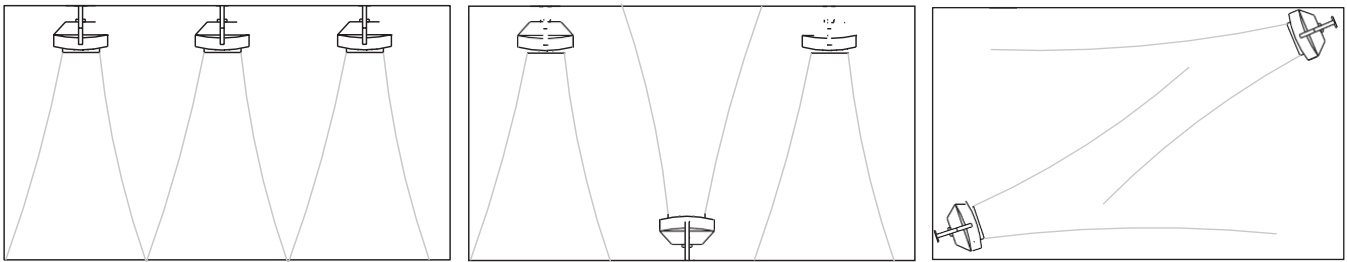
\* for horizontal air guide adjustment

\*\* for symmetric air guide adjustment at an angle of 45°

- device noise level (depending on acoustic characteristics of a room)
- operation mode of the heating device, e.g. it can also operate as an air mixing device preventing air stratification
- direction of air distribution should be controlled in a way that prevents draughts. Air stream must not be directed at walls, brackets, girders, cranes, shelves, machines, etc.

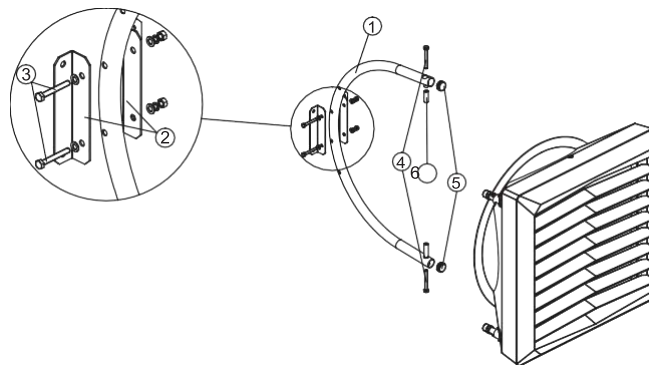
Examples of arrangement of air heating units mounted on a wall

Top view



#### 4.1 INSTALLATION WITH A BRACKET

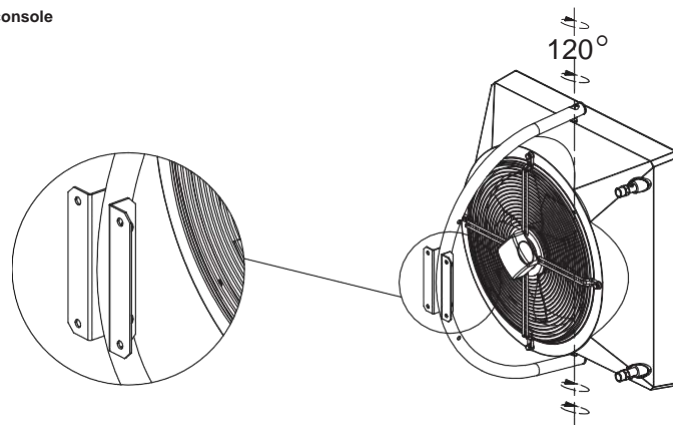
The bracket is optional. In order to attach a bracket to the device, use crown drill bits to drill holes in the top and bottom panels of the heating unit (in places marked by 6), and insert sleeves into the holes. Slide holder arms onto the sleeves. Insert M10 screws into the top and bottom sleeves, and fix the bracket position in relation to the heater while tightening the screws. When you adjust the device in the right position, fit plugs onto the bracket.



The bracket unit consists of:

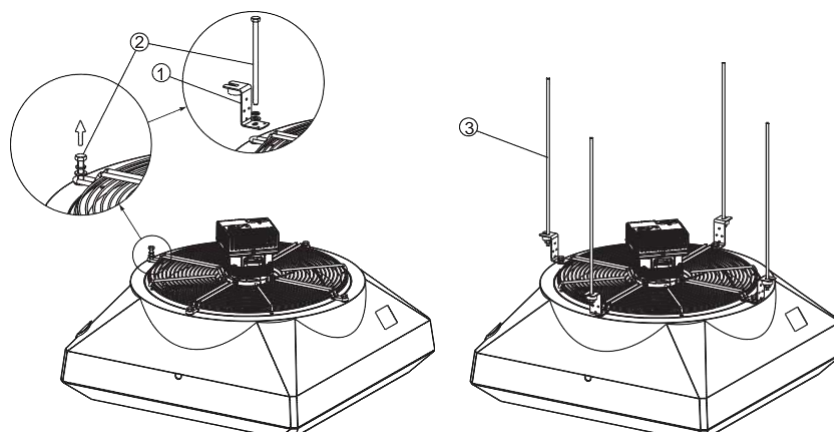
1. ARM (1 piece); 2. HOLDER; 3. M10 SCREW WITH A WASHER AND NUT FASTENING THE CLAMP (2 sets); 4. M10 SCREW FASTENING THE HOLDER TO THE UNIT HEATER (2 pieces); 5. PLUG (2 pieces); 6. MOUNTING SLEEVE (2 pieces)

Rotation of the device when mounted on a console



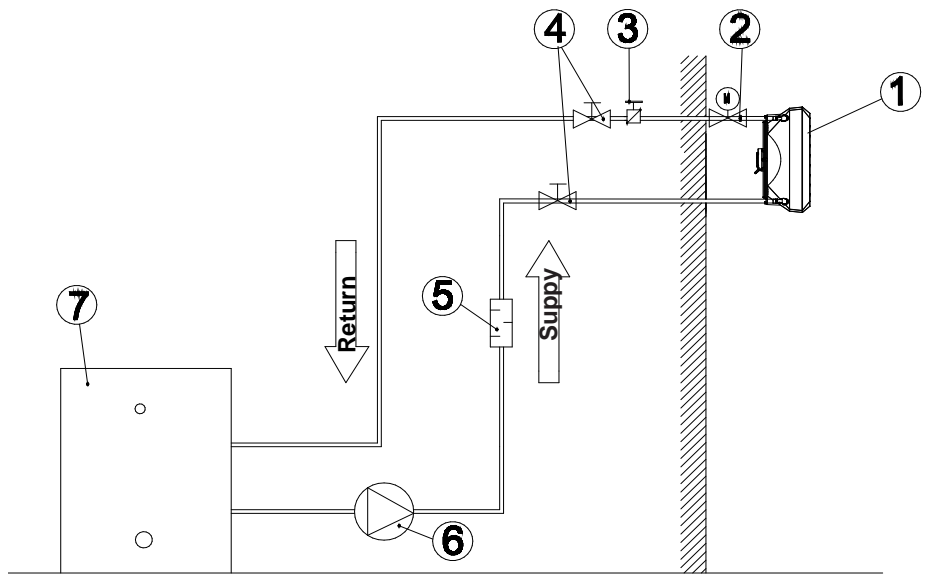
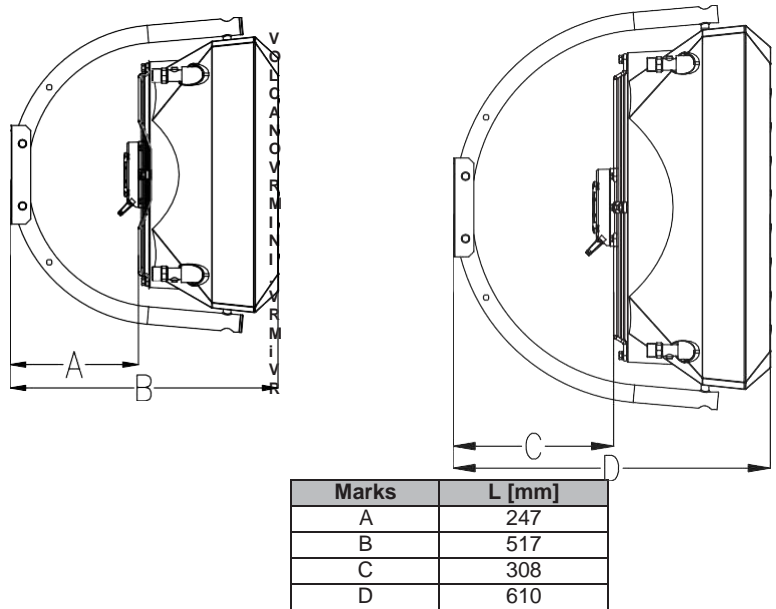
#### 4.2 INSTALLATION IN HORIZONTAL POSITION

Volcano units can be also installed in a horizontal position. To suspend the unit, special holders (1) have to be used. In order to install the holders, remove the screw (2) fixing the fan grid, install holder (1) and screw the screw (2) in. Repeat for the remaining screws. **Do not unscrew all screws at the same time!**



### 4.3 INSTALLATION INSTRUCTIONS AND MOUNTING DISTANCES

**Installation of the heating medium supply system** While installing the piping for the heating medium, secure the exchanger connection against twisting 1. The piping should not overload the heater connections. It is possible to connect the piping with flexible connections (adjustable angle of the airflow).



**NOTE!** In case of VOLCANO VR Mini 3 and VOLCANO VR4 heaters we recommend to connect the power supply to the upper connector in order to additionally improve the heat exchanger efficiency

**EXAMPLE OF A HYDRAULIC SYSTEM:**

1. UNIT HEATER; 2. POWER-OPERATED VALVE; 3. VENT VALVE; 4. CUT-OFF VALVE; 5. FILTER; 6. CIRCULATION PUMP; 7. BOILER

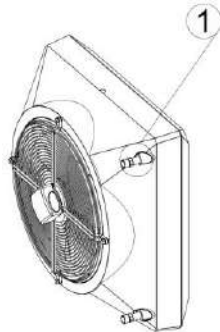
<b>Note!</b> Maximum operating pressure of the medium for water coils is 16 bar, tested pressure: 21 bar	
Requirements of the quality medium for the water coils:	
Parameter	Value
Oil and grease	< 1 mg/l
pH at 25°C	8 to 9
Residual water hardness	$[Ca^{2+}, Mg^{2+}]/[HCO_3^-] > 0.5$
Oxygen	< 0.1 mg/l (as low as possible)



#### Heater vent/ heating medium drain

The device will be vented when you loosen the upper connecting pipe. The heating medium is drained through the lower connection pipe. When starting the device after the heating agent has been drained, remember to vent the heater.

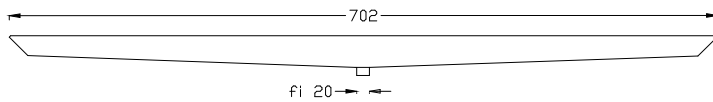
You need to pay special attention to secure the device against water accidentally getting into the heater casing during the agent draining process.



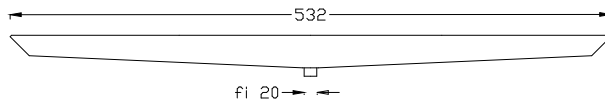
#### Drip tray installation

Units operating with chilled water in cooling mode may generate condensate. In this situation, a drip tray is recommended to collect and drain the condensate.

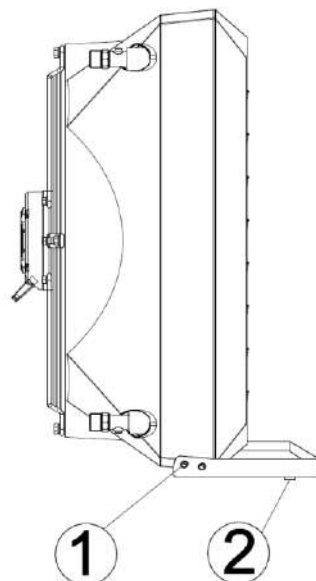
**NOTE!!** In order to limit the effect of entrainment of the condensate by the air stream it is recommended to use VOLCANO heaters operating on the maximum 2nd speed of the fan and to direct the air blades at the angle of 45° downwards



DRAIN TRAY FOR VOLCANO VR1-4



DRAIN TRAY FOR VOLCANO VR Mini / VR Mini 3



1. Secure the trays firmly to the VOLCANO housing with two M4 x 12 screws on each side of the drip tray like is shown on the picture above
2. Connect a hose to the drain hole to collect the condensate flowing from the drip tray. The rubber hose should cover the drain hole with the dimensions fi 13

VOLCANO VR Mini VOLCANO VR Mini 3  
 VOLCANO VR1 VOLCANO VR2  
 VOLCANO VR3 VOLCANO VR4  
 VOLCANO VR-D Mini VOLCANO VR-D

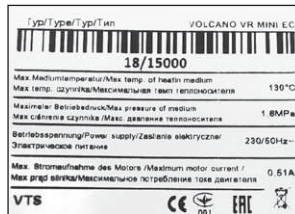
**Connecting to the power supply**

**NOTICE** The installation must be equipped with disconnectors at all power supply poles. **Recommended safety:** overload disconnector VOLCANO VR Mini, VR Mini 3, VR-D Mini – 1 A, VOLCANO VR1, VR2 – 2 A, VOLCANO VR3, VR4 VR-D - 4A) and differential current safety. VOLCANO VR Mini, VR Mini 3, VR1, VR2, VR3, VR4, VR-D (fan) are equipped with a terminal block accepting 7 x 2,5 mm<sup>2</sup> electric wires. **NOTICE** We recommend connecting the wires to the terminal block with pre-installed bushings.

VOLCANO VR Mini, VR Mini 3, VR1, VR2, VR3, VR4, VR-D/ AC	5 x 1,5mm <sup>2</sup>	
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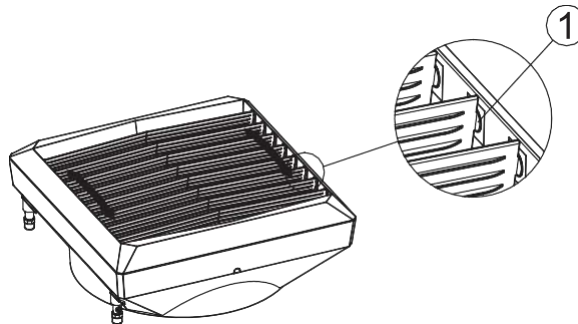
VOLCANO VR MINI, VR Mini 3, VR1, VR2, VR3, VR4, VR-D MINI, VR-D EC (NEW)	Power supply: 3 x 1,5mm <sup>2</sup> ; Control 0-10 V DC: LiYCY 2 x 0,75 mm <sup>2</sup> (shielded); Additional output +10 V DC	<table border="1"> <tr> <td>Ain</td> <td>GND</td> <td>A+</td> <td>B-</td> <td>+10V</td> <td>PE</td> <td>L</td> <td>N</td> </tr> <tr> <td>Black</td> <td>White</td> <td>Green</td> <td>Yellow</td> <td>Red</td> <td>Yellow/Green</td> <td>Brown</td> <td>Blue</td> </tr> </table>	Ain	GND	A+	B-	+10V	PE	L	N	Black	White	Green	Yellow	Red	Yellow/Green	Brown	Blue
Ain	GND	A+	B-	+10V	PE	L	N											
Black	White	Green	Yellow	Red	Yellow/Green	Brown	Blue											

Example of the nameplate, unit's equipped with new EC motor:



**Adjusting the air guides**

Volcano air guides are mounted on the pivot 1, which provides smoothly change of air direction 4. In order to change position of air blade should turn it in both hands (grasping the edges of the enclosure) to turn the blade at the same time on both pins The use of the referred version of the heating unit in objects with high humidity requires the placement of a connection terminal in a protective box ensuring IP54 protection level.



VOLCANO VR Mini, VR Mini 3 VR1, VR2, VR3, VR4, VR-D Mini, VR-D

EN

## 5. AUTOMATICS




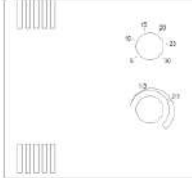
### 5.1 ELEMENTS OF AUTOMATICS

Electric connections may only be made by well-trained electricians, and according to:

- Occupational health and safety regulations
- Assembly instructions
- Technical documentation for each of the automatic elements

NOTE!: Before starting the assembly process and connecting the system, familiarize yourself with the original documentation attached to the automatic devices.

MODEL	SCHEMAT	DANE TECHNICZNE	UWAGI
ARW 3,0/2 <sup>o</sup> (Volcano VR Mini, VR1, VR2, VR3, VR-D) VTS: 1-4-0101-0434		<b>SPEED CONTROLLER – ARW 3,0/2</b> <ul style="list-style-type: none"> <li>● Power supply voltage: 230V AC +/- 10%</li> <li>● Allowable current output: 3 A</li> <li>● Control mode: step control</li> <li>● Number of control levels: 5</li> <li>● Type of protection: IP54</li> <li>● Assembly methods: On a wall</li> <li>● Work environment parameters 0...35°C</li> </ul>	<ul style="list-style-type: none"> <li>● Do not connect more than one VOLCANO VR 1/VR 2/VR 3/VR-D device to one rotation controller and more than four VOLCANO VR Mini devices due to the values of permissible output currents.</li> <li>● Minimal distance between particular fans installed – both vertical and horizontal – 20 cm.</li> <li>● We recommend the execution of power supply connection with a min. 3 x 1.5mm<sup>2</sup> wire</li> <li>● Automation element drawings present the visualizations of model products only..</li> </ul>
ARW 0.6 VTS: 1-4-0101-0167		<b>SPEED CONTROLLER - ARW 0.6</b> <ul style="list-style-type: none"> <li>● Power supply voltage: 230V AV +/-10%</li> <li>● Allowable current output: 0.6A</li> <li>● Control mode: manual</li> <li>● Number of control levels: 3</li> <li>● Work environment parameters: 35°C</li> <li>● Type of protection: IP54</li> </ul>	<ul style="list-style-type: none"> <li>● Do not connect more than one VOLCANO VR Mini device to one controller</li> <li>● Minimal distance between particular fans installed – both vertical and horizontal – 20cm.</li> <li>● We recommend the execution of power supply connection with a min. 3 x 1.5mm<sup>2</sup> wire.</li> <li>● Automation element drawings present the visualizations of model products only.</li> </ul>
TWO-WAY VALVE WITH VR ACTUATOR VR VTS: 1-2-1204-2019		<b>TWO-WAY VALVE</b> <ul style="list-style-type: none"> <li>● Connection diameter: 3/4"</li> <li>● Operation mode: on/off</li> <li>● Maximum differential pressure 90 kPa</li> <li>● Airflow degree factor kvs: 4.5 m<sup>3</sup>/h</li> <li>● Work environment parameters: 0-60°C</li> </ul> <b>VALVE ACTUATOR</b> <ul style="list-style-type: none"> <li>● Power consumption 1 W</li> <li>● Power supply voltage: 230 V AC +/- 10%</li> <li>● Closing/opening time 3/3 min</li> <li>● Item without supply: closed</li> <li>● Type of protection: IP54</li> <li>● Work environment parameters: 0-60°</li> </ul>	<ul style="list-style-type: none"> <li>● Two-way valve should be installed on the return (outlet) pipeline.</li> <li>● Automation element drawings are only a visualisation of sample products.</li> <li>● Power connection should be done with a cable min. 2 x 0.75 mm<sup>2</sup>.</li> <li>● Automation element drawings are only a visualisation of sample products.</li> </ul>
Controller HMI VOLCANO EC VTS: 1-4-2801-0157		<b>HMI VOLCANO EC</b> <ul style="list-style-type: none"> <li>● Device operation: Touch buttons</li> <li>● Power supply: 230 V AC</li> <li>● Maximum output current for valve or valves with actuator: 3(1)A</li> <li>● Temperature measurement: -10 °C ... +99 °C ; NTC10K</li> <li>● Outputs: <ul style="list-style-type: none"> <li>- 1 analog output 0-10V (8 bit, I<sub>max</sub> = 20 mA)</li> <li>- 2 relays outputs (250 VAC, AC1 500 VA dla 230 VAC)</li> </ul> </li> <li>● Communication: Modbus RTU</li> <li>● Parameters of working environment: temperature: 0 - 60 °C, humidity: 10 - 90%, without condensation</li> <li>● Display: blue backlight</li> <li>● Dimensions: 86 mm x 86 mm x 17 mm</li> <li>● Protection level: IP20</li> </ul>	<ul style="list-style-type: none"> <li>● used for control all types of VOLCANO EC units</li> <li>● touch control panel</li> <li>● the main on / off switch (ON / OFF)</li> <li>● stepless adjustable fan speed of the EC motor</li> <li>● built-in thermostat with possibility weekly programing</li> <li>● continuous mode</li> <li>● function of heating, cooling and ventilation</li> <li>● possibility of using external temperature sensor</li> <li>● RS 485 with ModbusRTU</li> <li>● Suggested cross sections of electrical cables: <ul style="list-style-type: none"> <li>- L, N : 2x1 mm<sup>2</sup></li> <li>- H, C : 2x1 mm<sup>2</sup></li> <li>- AO, GND : 2x0,5 mm<sup>2</sup> LIICY</li> <li>- TS; TS : 2x0,5 mm<sup>2</sup> LIICY</li> <li>- RS 485 : 2x0,75 mm<sup>2</sup> LIICY</li> </ul> </li> </ul>
NTC-TEMP for HMI VR controller VTS: 1-2-1205-0007		<b>NTC TEMP SENSOR</b> <ul style="list-style-type: none"> <li>● Resistant sensing element: NTC 10K</li> <li>● Ingress protection rating: IP66</li> <li>● Mounting method: wall mounted</li> <li>● Maximum length of the signal cable: 100m</li> <li>● Parameters of the working conditions: -20...70°C</li> <li>● Temperature measurement range: -20...70°C</li> <li>● Dimensions: 36x49x71mm (w/o a probe)</li> <li>● Suggested diameter of supply cable (shielded cable) 2x 0.5mm<sup>2</sup></li> </ul>	<ul style="list-style-type: none"> <li>● NTC temperature sensor should be installed in the representative location</li> <li>● Avoid places directly exposed to sunlight, electromagnetic waves etc.</li> <li>● Automation element drawings are only a visualisation of sample products.</li> </ul>
WALL-MOUNTED WING/ VR CONTROLLER VTS: 1-4-0101-0438		<b>WALL-MOUNTED WING/VR CONTROLLER</b> <ul style="list-style-type: none"> <li>● Power supply: ~230/1/50 V/ph/Hz</li> <li>● Permissible initial current: 6(3)A</li> <li>● Range of regulation: 10-30°C</li> <li>● Accuracy of regulation: +/- 1°C</li> <li>● Level of protection: IP30</li> <li>● Assembly method: on plastered wall</li> <li>● Parameters of working environment: -10...50°C</li> </ul>	<ul style="list-style-type: none"> <li>● The maximum length of the conductor, from the curtain to the programming device is 100m</li> <li>● It is recommended to make connection using a conductor of the min. Size 5 x 1 mm<sup>2</sup> to 6 x 1 mm<sup>2</sup> depend on the option of connection (see the schemes)</li> <li>● The controller does not constitute an integral part of the curtain. It is an optional device, which may be replaced with any programming device or switch that conforms to the 60335 standard</li> <li>● Automation element drawings are only a visualisation of sample products.</li> </ul>

MODEL	SCHEMAT	DANE TECHNICZNE	UWAGI
<b>SPEED REGULATOR (0-10V)</b> VTS: 1-4-0101-0453		<b>SPEED REGULATOR (0-10V)</b> <ul style="list-style-type: none"> <li>• Power supply: ~230/1/50 V/ph/Hz</li> <li>• Permissible load: 0,02 A for 0-10 V</li> <li>• Output signal 0-10 V DC</li> <li>• Protection rating: IP30</li> </ul>	<ul style="list-style-type: none"> <li>• Power connection should be done with a cable min. 2 x 0.75 mm<sup>2</sup></li> <li>• Automation element drawings are only a visualisation of sample products.</li> </ul>
<b>POTENTIOMETER WITH THERMOSTAT VR EC VR</b> EC (0-10V) VTS: 1-4-0101-0473		<b>POTENTIOMETER WITH THERMOSTAT VR EC</b> <ul style="list-style-type: none"> <li>• Power supply: ~230/1/50 V/ph/Hz</li> <li>• Permissible load: 0,02 A for 0-10 V</li> <li>• Setting range: 5...40°C</li> <li>• Temperature measurement integrated in the device</li> <li>• Output signal 0-10 V DC</li> <li>• Protection rating: IP30</li> </ul>	<ul style="list-style-type: none"> <li>• Power connection should be done with a cable min. 2 x 0.75 mm<sup>2</sup></li> <li>• Automation element drawings are only a visualisation of sample products.</li> </ul>

#### START-UP/PUTTING INTO OPERATION

- Prior to any installation or maintenance works, disconnect the device from the power supply and secure it against accidental power-up.
- Use filters in the hydraulic system. Before you connect the hydraulic lines (especially supply lines) to the device, you should clean/rinse the installation by draining a few litres out of it.
- Install vent valves at the highest point of the installation.
- Install cut-off valves directly behind the device, so it can be easily disassembled.
- Secure the device against pressure increase according to the permitted maximum pressure value of 1.6 MPa.
- Hydraulic pipes need to be free from any stresses and loads.
- Prior to the first start-up of the heater, check the hydraulic connections (vent and collector air-tightness, installed fittings).
- Prior to the first start-up of the heater, check the electric connections (connection of automatic devices, power supply, fan).
- It is suggested to use additional external current differential protection.

**NOTE** All connections should be made according to this technical documentation and the documentation enclosed with the automatic devices.

## 5.2 OPERATION AND MAINTENANCE

- Device casing does not require any maintenance.
- Heat exchanger needs to be regularly cleaned of dirt and grease. Especially before the heating season, the heat exchanger needs to be cleaned with the use of compressed air on the side of the air guides (but the device does not need to be disassembled). Pay attention to the exchanger's lamellas, as these are delicate.
- If lamellas bend, straighten them with a special tool.
- The fan motor does not require any maintenance. It may only require cleaning of the protective mesh, fan blades and dust and grease deposits.
- If the device is not used for a long time, disconnect the voltage supply.
- Heat exchanger does not have fire protection.
- It is recommended to periodically blow through the heat exchanger, preferably with compressed air.
- The heat exchanger can freeze (fracture) when the room temperature falls below 0°C and the heating agent temperature decreases at the same time.
- The level of air pollutants should meet the criteria allowable concentrations of pollutants in indoor air, for non-industrial areas, the level of dust concentration up to 0.3 g / m<sup>3</sup>. It is forbidden to use device for the duration of the construction works except for the start-up of the system.
- The equipment must be operated in rooms used throughout the year, and in which there is no condensation (large fluctuations in temperature, especially below the dew point of the moisture content). The device should not be exposed to direct UV rays.
- **The device should be operated at the supply water temperature up to 130 °C only with working fan! For VOLCANO VR4 max. water temperature up to 100 °C**

## 6. INDUSTRIAL SAFETY INSTRUCTION

### Special instructions concerning safety NOTE

- Prior to any work connected with the device, the device must be disconnected from the power supply and be secured properly. Wait until the fan stops.
- Use stable assembly platforms and hoists.
- Depending on the heating agent temperature, piping, parts of the casing, heat exchanger surface can be very hot, even after the fan stops.
- There may be some sharp edges! During transport, use protective gloves, protective clothing and safety shoes.
- The health and safety instructions must be followed.
- Loads can be fastened only in places designed for it in a transport unit. While devices are lifted by an assembly unit, their edges need to be secured. Distribute the load evenly.
- The device needs to be protected against moisture and dirt and should be stored in rooms secured against atmospheric influences.
- Disposal: Take care to dispose of used materials, packaging material and spare parts in a safe way, one which is not harmful to the environment and is in accordance with local regulations.



## 7. TECHNICAL INFORMATION TO THE REGULATION (EU) NO 327/2011 IMPLEMENTING DIRECTIVE 2009/125/EC

Model:	VOLCANO VR Mini/ VR Mini 3	VOLCANO VR1/VR2	VOLCANO VR3/VR4
1.	27.7%	30.6%	32.3%
2.	B		
3.	Static		
4.	40		
5.	VSD-No		
6.	2016		
7.	VTS Plant Sp. z o.o., KRS 0000144190, Polska		
8.	1-2-2702-0005	1-2-2701-0291	1-2-2701-0292
9.	0,105kW, 1500m <sup>3</sup> /h, 70Pa	0,27kW, 4250m <sup>3</sup> /h, 70Pa	0,38kW, 5000m <sup>3</sup> /h, 88Pa
10.	1440RPM	1370RPM	1370RPM
11.	1,0		
12.	<p>Disassembly of the machine must be carried out and/or supervised by qualified personnel with appropriate expert knowledge.            Contact a certified waste disposal organization in your vicinity. Clarify what is expected in terms of the quality of dismantling the machine and provision of the components.            Dismantle the machine using the general procedures commonly used in mechanical engineering.</p> <p><b>WARNING</b>            Machine parts can fall. The machine is made up of heavy parts. These parts are liable to fall during dismantling. This can result in death, serious injury, or material damage.            Follow the safety rules:</p> <ol style="list-style-type: none"> <li>1. Disconnect all electrical connections.</li> <li>2. Prevent reconnection.</li> <li>3. Make sure that the equipment is at zero voltage.</li> <li>4. Cover or isolate nearby components that are still live.</li> </ol> <p>To energize the system, apply the measures in reverse order.</p> <p><b>Components:</b>            The machines consist for the most part of steel and various proportions of copper, aluminum and plastics and rubber-neoprene (seat of bearings/hub, gasket). Metals are generally considered to be unlimitedly recyclable.            Sort the components for recycling according to whether they are:            Iron and steel, aluminum, non-ferrous metal, e.g. windings (the winding insulation is incinerated during copper recycling), insulating materials, cables and wires, electronic waste (capacitor ect.), plastic parts (impeller, junction box, winding cover ect.), rubber parts (neoprene). The same goes for cloths and cleaning substances which have been used while working on the machine.            Dispose of the separated components according to local regulations or via a specialist disposal company.</p>		
13.	<p>Long failure-free operation depends on keeping the product/device/fan within performance limitations described by selection software or maintenance manual.</p> <p>For proper operation, read carefully maintenance manual, with special attention on "installation", "start-up", and "maintenance" chapters.</p>		
14.	Inlet ring, fan grid		

Model:	VOLCANO VR Mini EC/ VR Mini 3	VOLCANO VR1/VR2 EC	VOLCANO VR3/ VR4 EC
1.	28.5%	27.5%	28%
2.	B		
3.	Static		
4.	21		
5.	VSD-No		
6.	2016		
7.	VTS Plant Sp. z o.o., KRS 0000144190, Polska		
8.	1-2-2701-0304	1-2-2701-0289	1-2-2701-0290
9.	0,41kW, 2826m³/h, 145Pa	0,48kW, 4239m³/h, 124Pa	0,68kW, 6006m³/h, 128Pa
10.	1376RPM	1370RPM	1372RPM
11.	1,0		
12.	<p>Disassembly of the machine must be carried out and/or supervised by qualified personnel with appropriate expert knowledge.                      Contact a certified waste disposal organization in your vicinity. Clarify what is expected in terms of the quality of dismantling the machine and provision of the components.                      Dismantle the machine using the general procedures commonly used in mechanical engineering.</p> <p><b>WARNING</b>                      Machine parts can fall The machine is made up of heavy parts. These parts are liable to fall during dismantling. This can result in death, serious injury, or material damage.                      Follow the safety rules:</p> <ol style="list-style-type: none"> <li>1. Disconnect all electrical connections.</li> <li>2. Prevent reconnection.</li> <li>3. Make sure that the equipment is at zero voltage.</li> <li>4. Cover or isolate nearby components that are still live.</li> </ol> <p>To energize the system, apply the measures in reverse order.</p> <p><b>Components:</b>                      The machines consist for the most part of steel and various proportions of copper, aluminum and plastics and rubber-neoprene (seat of bearings/hub, gasket). Metals are generally considered to be unlimitedly recyclable.                      Sort the components for recycling according to whether they are:                      Iron and steel, aluminum, non-ferrous metal, e.g. windings (the winding insulation is incinerated during copper recycling), insulating materials, cables and wires, electronic waste (capacitor ect.), plastic parts (impeller, junction box, winding cover ect.), rubber parts (neoprene). The same goes for cloths and cleaning substances which have been used while working on the machine.                      Dispose of the separated components according to local regulations or via a specialist disposal company.</p>		
13.	<p>Long failure-free operation depends on keeping the product/device/fan within performance limitations described by selection software or maintenance manual.</p> <p>For proper operation, read carefully maintenance manual, with special attention on "installation", "start-up", and "maintenance" chapters.</p>		
14.	Inlet ring, fan grid		

- 1) general efficiency ( $\eta$ )
- 2) measurement category used to determine the energy efficiency
- 3) efficiency category
- 4) efficiency coefficient in the point of optimal energy efficiency
- 5) whether rotational speed regulation was taken into account in the calculation of fan efficiency
- 6) year of manufacture
- 7) manufacturer's name or trademark, business register number and place of manufacture
- 8) product model number
- 9) rated motor power consumption (kW), flow volume and pressure in the point of energy efficiency
- 10) rotations per minute in the point of energy efficiency
- 11) characteristic coefficient
- 12) essential information to facilitate disassembly, recycling or dispose of the product after the end of its use
- 13) essential information to minimize the effect on the environment and to guarantee optimum use period, referring to disassembly, use and technical service of the fan
- 14) description of additional elements used in determining the energy efficiency of the fan

## 8. SERVICING

### 8.1 PROCEDURES IN CASE OF DEFECTS


VR Mini, VR Mini 3, VR1, VR2, VR3, VR4, VR-D		
Problem	Check points	Description
Heat exchanger leaking	<ul style="list-style-type: none"> <li>assembly of the exchanger connections with two wrenches (adjustment), which safeguards against internal twisting of the collectors,</li> <li>Check if the leakage may be associated with mechanical damage to the exchanger,</li> <li>Vent valve or drain plug leaking,</li> <li>Heating agent parameters (pressure and temperature) – should not exceed permitted values,</li> <li>type of heating agent (it cannot be aggressive to Al and Cu),</li> <li>Circumstances when the leakage appears (e.g. during the first, tentative installation start-up, when the installation is filled up after the heating agent has been drained) and outside temperature at the time of failure (risk that the exchanger may freeze),</li> <li>Possibility of operating in aggressive conditions (e.g. high concentration of ammonia in the air in a sewage-treatment plant),</li> </ul>	Pay special attention that the exchanger may freeze during winter time. 99% of registered leakages appear during installation start-up/pressure tests. The defect can be removed by pulling back vent or drain valve.
Fan works too loud	<ul style="list-style-type: none"> <li>check the device assembly for conformity with the instructions in operation and maintenance manual (e.g. distance from wall/ceiling),</li> </ul>	min. 40 cm
	<ul style="list-style-type: none"> <li>Device appropriately level led,</li> <li>Correctness of electric connections and qualifications of the wireman,</li> <li>Inlet current parameters (e.g. voltage, frequency),</li> <li>use of rotation controller different from ARW,</li> <li>noise at lower gears (possible controller failure?),</li> <li>Noise only at higher gears (regular situation explained by aerodynamic characteristics of the device, if there outlet air chokes),</li> <li>type of other devices operating in the building (e.g. induced draught fans) – intensified noise caused by simultaneous operation of many machines,</li> <li>Does the fan rub against the casing?</li> <li>Is the fan evenly screwed to the casing?</li> </ul>	Level of operating noise of VOLCANO devices is perceived subjectively. If the device is made of plastic, it should operate quietly. It is recommended to unscrew the clamping screws and tightening them up again. If the fault does not disappear, you should make a complaint.
Fan does not work	<ul style="list-style-type: none"> <li>Correctness and quality of electric connections and qualifications of the wireman,</li> <li>Is there an additional bridge between required engine terminals (diagram in the manual) – U1 – TK (TB),</li> <li>Inlet current parameters (e.g. voltage, frequency) on the clamp block of fan engine,</li> <li>Correctness of operation of other devices installed in the building,</li> <li>Correctness of wire connections on the engine side acc. to the manual, in comparison to wires clamped in the engine terminal strip,</li> <li>PE conductor voltage (if present, may mean there is a break-down),</li> <li>Is N conductor correctly connected to the fan or ARW or is the connection of U2 clamps on the motor and ARW made correctly?</li> </ul>	Electrical connection need to be done strictly according to the drawings in the manual. If there is no bridge between U1 and TK(TB) clamps, the motor lacks thermal protection and may break – burn.
	<ul style="list-style-type: none"> <li>damage or installation of controller different from ARW,</li> </ul>	It is recommended to check the device/ speed controller by connecting the heater directly to power supply.
Damaged casing	<ul style="list-style-type: none"> <li>Circumstances when it was damaged – notes on the bill of ladings, stock issue confirmation, condition of the box,</li> </ul>	If the casing is damaged, make photos of the box and device, and photos confirming that the device serial number on the device and on the box are the same. If the device was damaged during transport, it is necessary to write down an appropriate statement by the driver, who delivered the damaged device.
ARW – rotation controller does not work/ it is burned	<ul style="list-style-type: none"> <li>Correctness – quality of electric connections (wires accurately positioned in electric clamps, cross-section and the material wires are made of) and qualifications of the wireman,</li> <li>Only 1 controller connected to 1 device,</li> <li>Inlet current parameters (e.g. voltage, frequency),</li> <li>Correctness of VOLCANO operation after connecting "in short" (skipping ARW, i.e. connections L and TB, N and U2, PE and PE) to the power network,</li> <li>Check if the user did not damage the knob, e.g. rotating it around</li> </ul>	For the TRANSRATE controller, the following must also be checked: <ul style="list-style-type: none"> <li>circuit breaker,</li> <li>correctness of connection to the SCR10 controller,</li> <li>use of shielded conductors,</li> <li>control conductors, which should be located away from the working conductors</li> </ul>
Actuator does not open the valve	<ul style="list-style-type: none"> <li>Correctness of electric connections and qualifications of the wireman,</li> <li>Correctness of the thermostat operation (characteristic tick sound during change-over),</li> <li>Inlet current parameters (e.g. voltage),</li> </ul>	The most important is to check whether the actuator responded to the electric impulse within 11s. If the motor is damaged, you need to make a complain and switch actuator operation to manual (MAN), which mechanically opens the valve.
Programmable thermostat does not send any signals to the actuator/ controls the operation of the heating system wrongly	<ul style="list-style-type: none"> <li>Correctness of electric connections and qualifications of the wireman,</li> <li>Correctness of the thermostat operation (characteristic tick sound during switch-over),</li> <li>Connecting a few motor of VOLCANO devices directly to the thermostat (permitted only if contactor is used!),</li> <li>Inlet current parameters (e.g. voltage),</li> <li>Programming method exactly the same as in the manual on <a href="http://www.vtsgroup.com">www.vtsgroup.com</a>,</li> <li>When was the last time the sensor was calibrated?</li> </ul>	RDE thermostat is powered by batteries, that need to be replaced (every 2 years). Also, the sensor needs to be periodically calibrated – detailed information can be found on: <a href="http://www.vtsgroup.com">www.vtsgroup.com</a> Complaint is unjustified, if the RDE thermostat was directly connected to the motor, without a contactor. If the sensor incorrectly measures the temperature, it should be calibrated (instructions in the catalogue).

**Complaint Form**

VTS POLSKA Sp. z o.o. Al. Grunwaldzka 472 A 80-309 Gdańsk Polska  www.vtsgroup.com						
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The company submitting the notification:
The company that installed the equipment:
Date of notification:
Type of device:
Factory number*:
Date of purchase:
Date of installation:
Place of installation:
Detailed description of defect:
Contact person:
Name and surname:
Telephone:
E-mail:

\* This field must be filled, if the complaint notification refers to the following equipment: VR Mini, VR1, VR2, VR3, VR-D.

VTS POLSKA Sp. z o.o. Al. Grunwaldzka 472 A 80-309 Gdańsk Polska  www.vtsgroup.com						
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