FLOWAIR
intelligent air flow

LEO FS FAN HEATERS

LEO KMFS VENTILATION UNITS

LEO FS
LEO KMFS

2015

TABLE OF CONTENTS

GENERAL CHARACTERISTICS

	FS	KMFS
Heating capacity (kW)	5–19	5–15
Air flow (m^3/h)	230–1750	230–1150
Weight (kg)	13,8–16,8	32,0–35,0
Colour	grey	
Casing	antistatic ABS	

LEO FS | KMFS fan heaters are designed to operate indoors. They can be used for heating the buildings with small and medium cubic measure. Casing made of durable plastic, air blades made of anodized aluminium and modern design enable to install them in representative rooms like: restaurants, pubs, shops etc.

LEO KMFS

is equipped with mixing chamber, which enables to supply the fresh air into the room. It is the simpliest mechanical ventilation system.

There are two types of units available:

LEO FS M | KMFS M

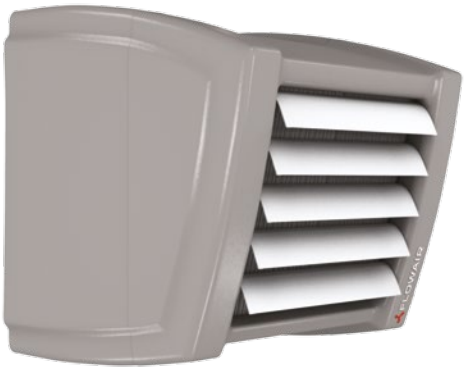
heater with energy-efficient fan with EC motor, controlled by external 0-10V signal. It provides stepless air flow regulation in 0-100% range (VNTLCD, VNT20 control panels);

LEO FS S/V | KMFS S/V

heater with standard fan. It provides air flow control by transformer fan speed regulators (TRs, TR, TRd).

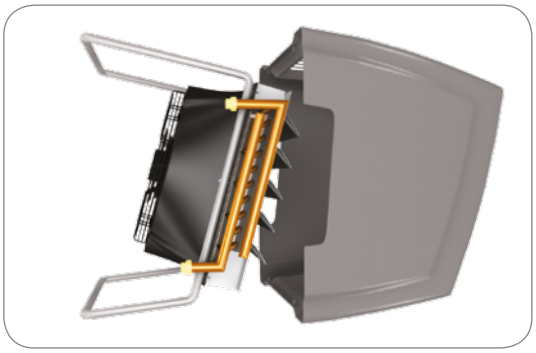
FS

KMFS



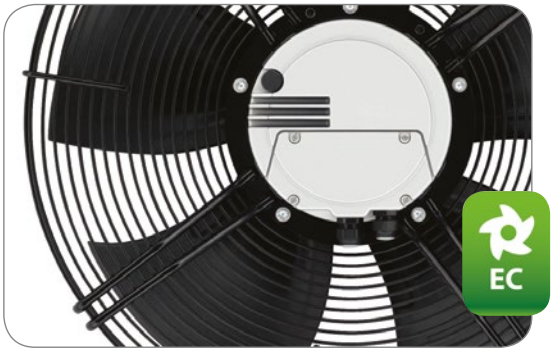
CASING

Is made of durable plastic - ABS. It fully covers all of the water and electrical connections, which makes the unit very aesthetic.



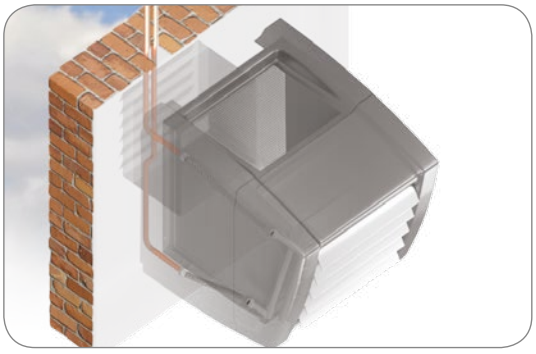
EASY INSTALLATION

Light construction and integrated installation console provide easy and quick installation of the unit. There is no need to use any additional brackets or supporting structures.



FAN

LEO FS type M units are equipped with energy-efficient EC fan, which power consumption is only 57,5W. This type of fan ensures big savings during unit's operation.



REGULATION OF AIR VOLUME SUPPLY

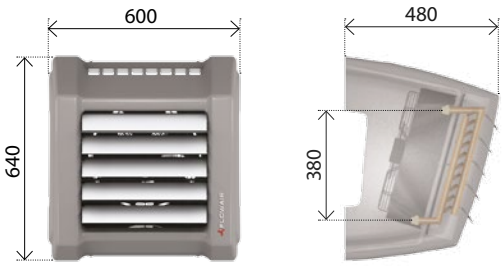
LEO KMFS heating and ventilation unit ensures mechanical ventilations of the room. Semicircular throttle with stepless regulation in the 0-100% range ebables to change the amount of fresh air supplied into the room.

AIR FILTERS

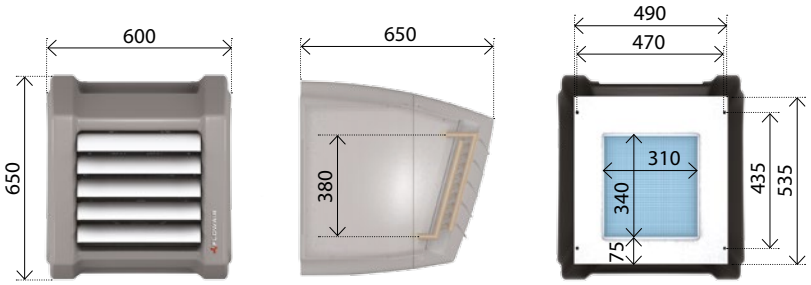
Fresh and used air inlets in LEO KMFS are equipped with EU2 air filters which protect the unit againts contamination.

DIMENSIONS

LEO FS



LEO KMFS



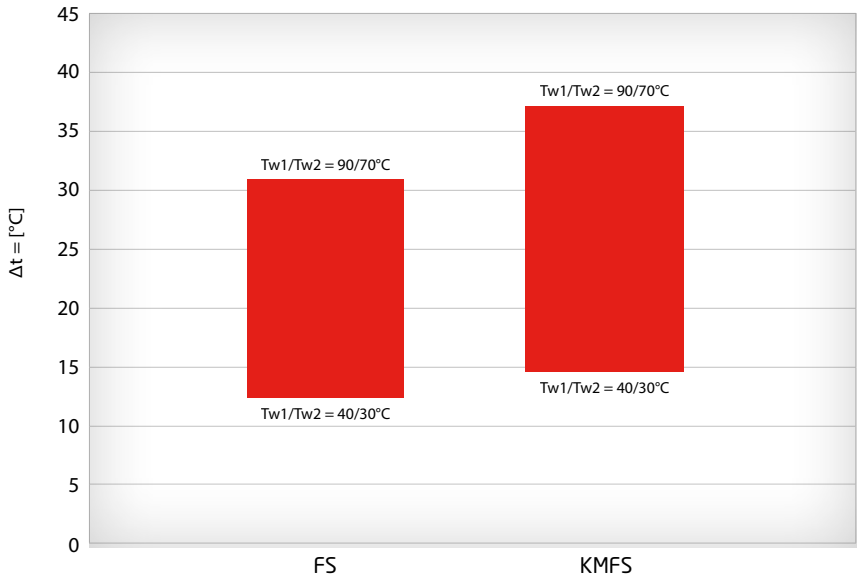
TECHNICAL DATA

	FS S	FS V	FS M	KMFS S	KMFS V	KMFS M
Fan	LEO FS|KMFS S/V - axial, single phase, AC LEO FS|KMFS M - axial with electronically commutated (EC) motor, single phase, AC					
Max. air flow [m³/h]	1750			1150		
Power supply [V/Hz]	230/50					
Max. current consumption [A]	0,4	0,55	0,25	0,4	0,55	0,25
Max. power consumption [W]	92	123	57,5	92	123	57,5
IP / Insulation class	54/F					
Max. acoustic pressure level* [dB(A)]	45,0					
Max. air stream range** [m]	12,0			8,0		
Heat exchanger	Cu – Al., two row					
Nominal heating capacity***[kW]	19,4			15,3		
Air temperature rise (ΔT)*** [°C]	31,0			37,0		
Max. water temperature [°C]	95,0					
Max. water pressure [MPa]	1,6					
Connection [”]	½					
Casing	ABS plastic					
Colour	grey					
Air filter	-			panel, EU2		
Place of installation	indoors					
Max. ambient temperature [°C]	50,0					
Installation position	vertical, on the wall					
Unit weight [kg]	13,8	14,6	13,8	32,0	33,8	32,0
Weight of unit filled with water [kg]	15,0	15,8	15,0	33,2	35,0	33,2

* Acoustic pressure level measured in the room with average sound absorption, capacity 1500 m³, at distance of 5m from the unit.
** Horizontal range of isothermal stream at velocity boundary equal to 0,5 m/s.
*** At max. air flow stream, inlet/outlet water temperature 90/70°C, inlet air temperature 0°C.

AIR TEMPERATURE RISE

FS | KMFS

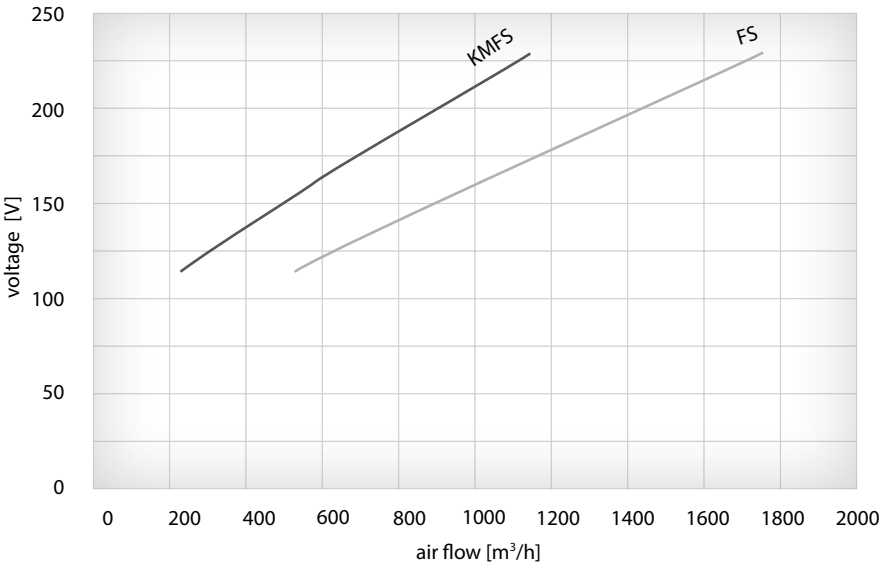


Air temperature rise at unit's maximum air flow. Inlet air temperature 0°C.

Tw1/Tw2 - inlet/outlet water temperature.

AIR FLOW REGULATION

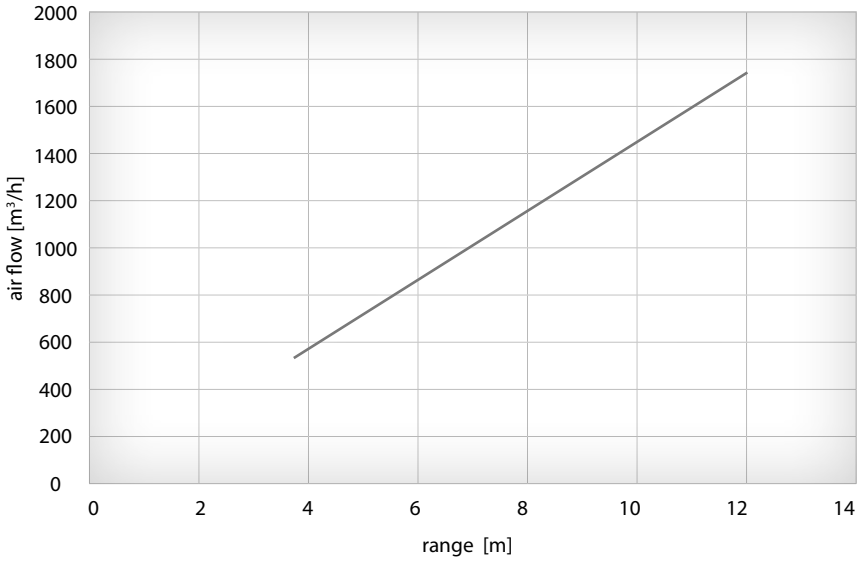
FS | KMFS



HORIZONTAL RANGE OF AIR STREAM

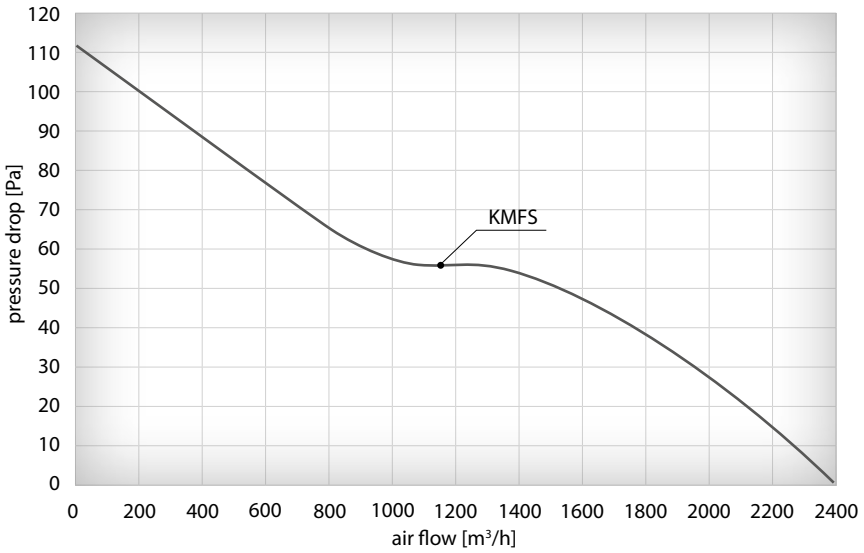
ISOTHERMAL

FS | KMFS



Horizontal range of isothermal stream (at velocity boundary equal to 0,5 m/s).

KMFS

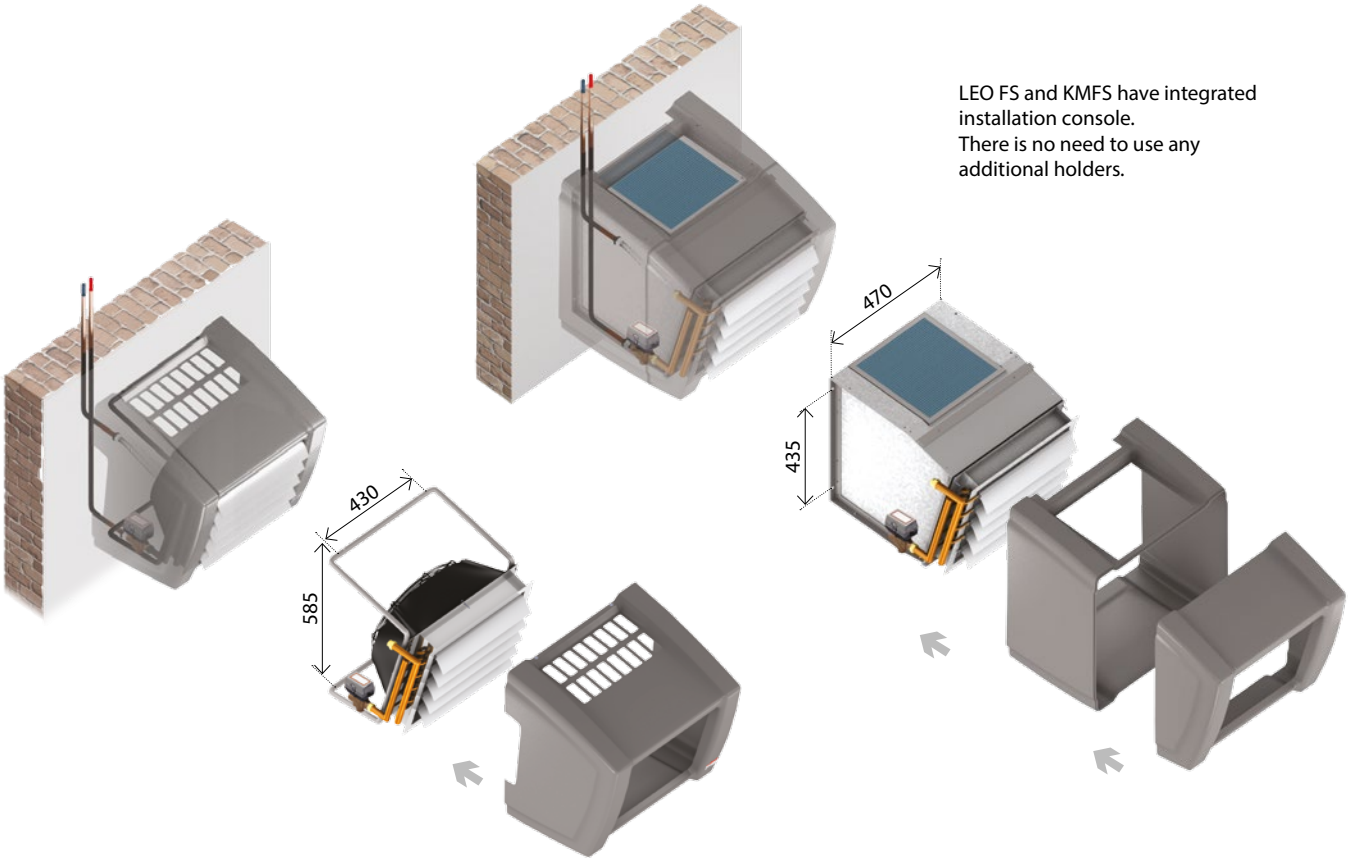


Operation point of the unit.

INSTALLATION

INTEGRATED INSTALLATION CONSOLE

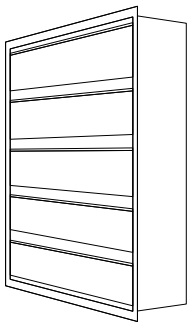
LEO FS and KMFS have integrated installation console.
There is no need to use any additional holders.



ACCESSORIES

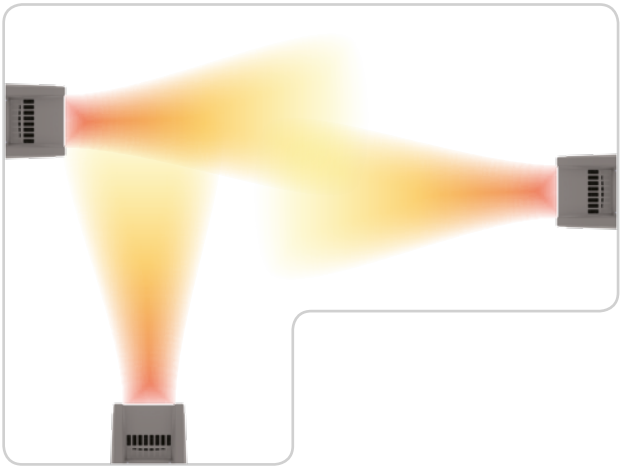
WALL-MOUNTED AIR INLET

Wall-mounted air inlet
is equipped with galvanized net and fixed shutter, which protect air inlet against rain, snow etc.

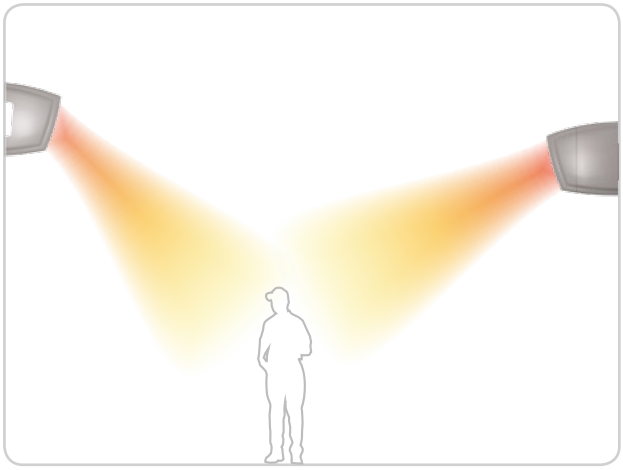


INSTALLATION OPTIONS

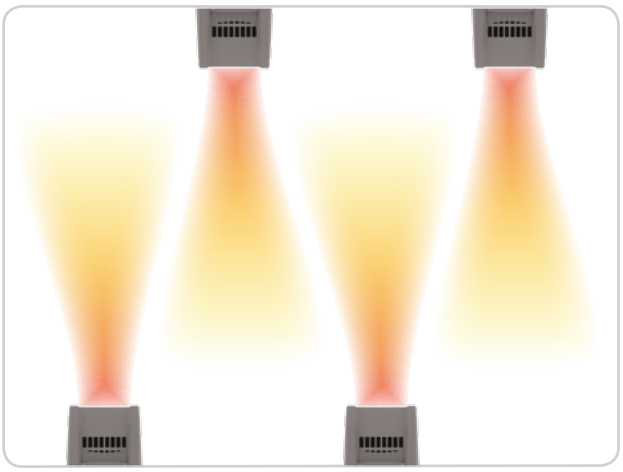
INSTALLATION TIPS



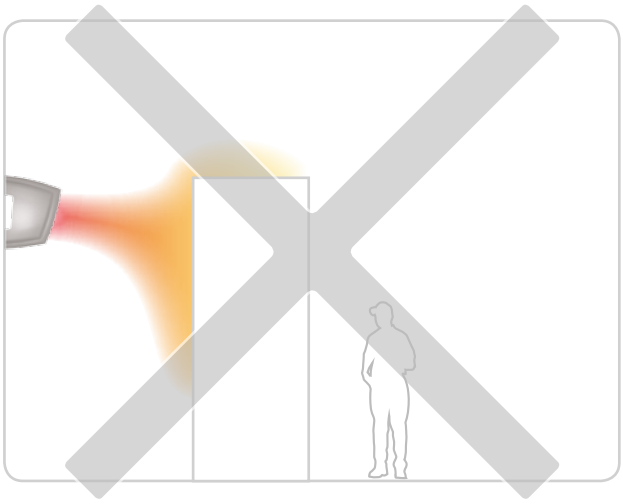
Steady air circulation should be provided in the entire room.



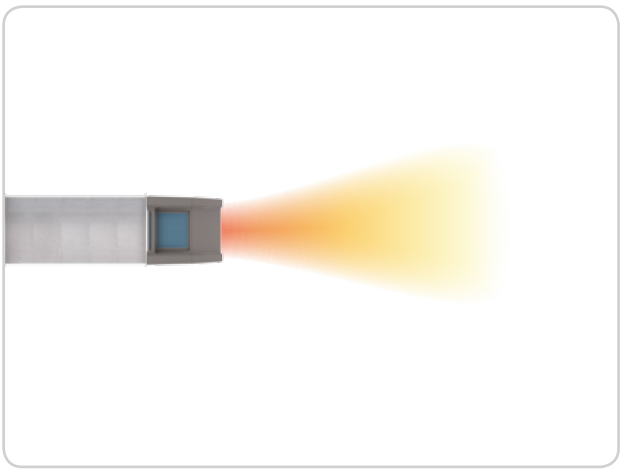
Correctly installed heaters should direct the air to the occupied zone.



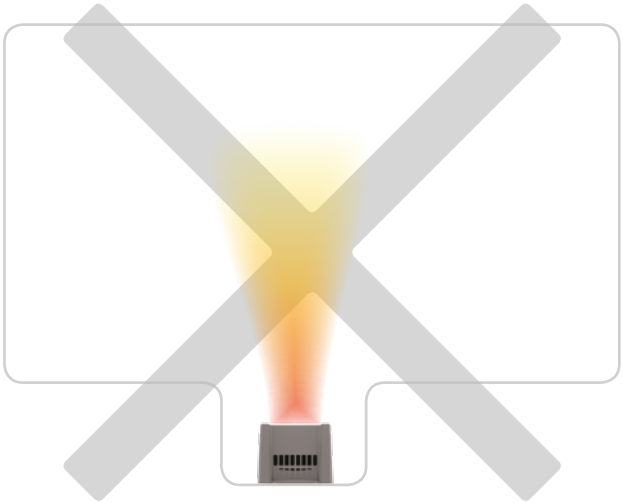
Heaters installed on the opposite walls should be overlapped.



Air flow stream should not be limited.



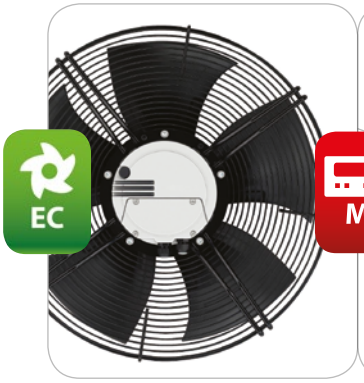
Fresh air can be delivered to the unit by the straight air ducts.



Air inlet should not be limited.

LEO FS CONTROL SYSTEMS

MODULATED CONTROL SYSTEM



SRQ2d
two-way valves with actuator

SRQ3d
three-way valves with actuator

VNT20
control panel with built-in room thermostat

VNTLCD
control panel with weekly programmer and built-in room thermostat

PT-1000 IP65
wall-mounted temperature sensor IP65

It is is energy-efficient heating system prepared for buildings with medium and big cubic measure. Airflow and heating capacity are automatically controlled depending on actual temperature - air flow is adjusted to current heat demand. Control panel (VNTLCD or VNT20) automatically and stepless change the speed of the fan according to difference between air temperature set on panel and measured by air temperature sensor.

This control system works perfectly with modern gas boilers, which have modulated gas burners. When measured air temperature is close to air temperature set on the control panel, there is lower demand on heat. In this situation gas boiler reduces its power and saves gas fuel.

FEATURES:

Low thermal inertia.

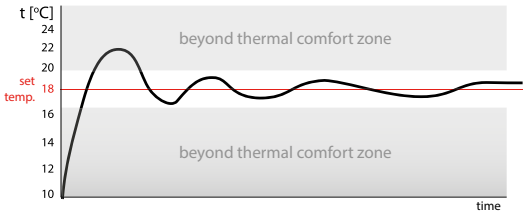
Lower power consumption due to EC fans.

Better thermal comfort due to maintaining set temperature.

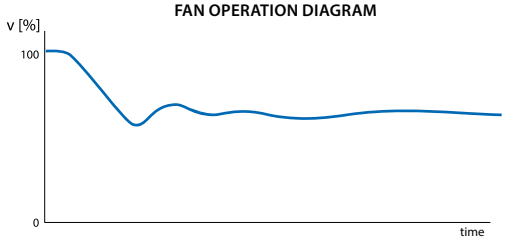
Less noise due to as low fan revs as possible.

Possibility to control up to 10 units with one control panel.

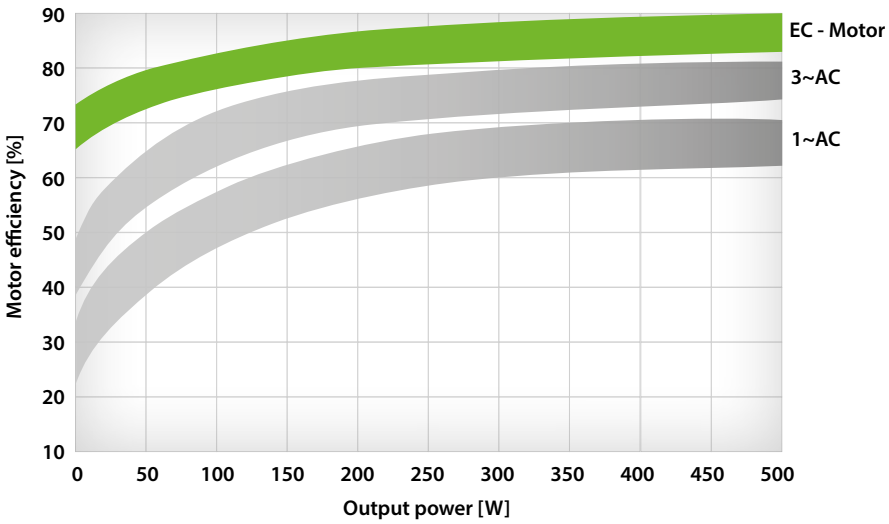
TEMPERATURE DIAGRAM



FAN OPERATION DIAGRAM



EC FAN

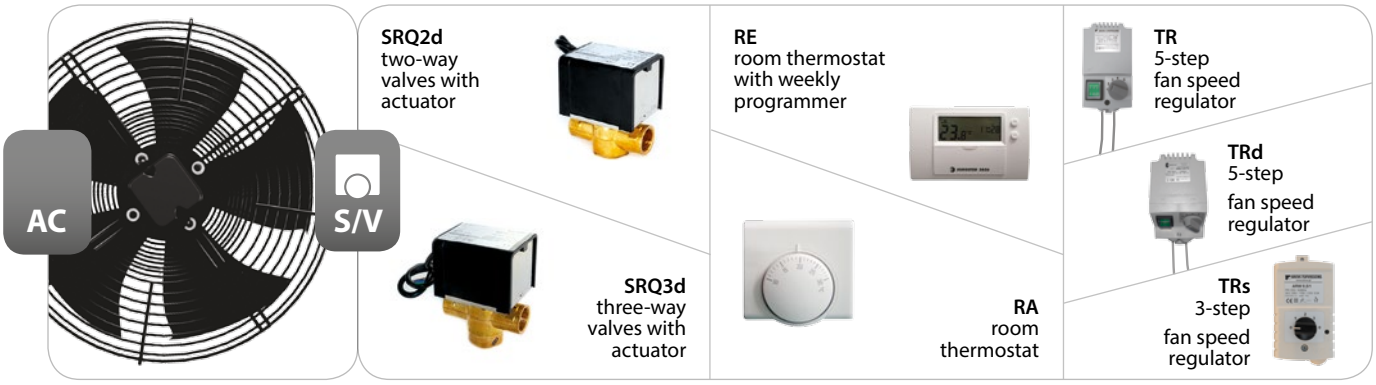


MOTOR EFFICIENCY

Electronically commutated motors have efficiency of 95%. This result was achieved thanks to reduction of losses associated with motor slip and special construction of the motor.

High efficiency is also maintained during the regulation - up to 60%. Standard electric motors have efficiency at 20%-40% level.

ON/OFF CONTROL SYSTEM

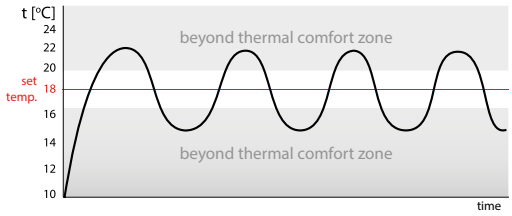


It is the simplest ON/OFF regulation system. Fan heater is controlled by room thermostat, which turns on the unit (or/and opens the valve) when measured temperature drops below set temperature. Air flow is regulated by transformer regulator.

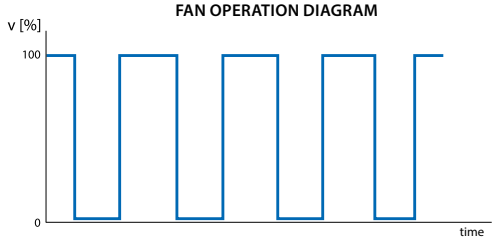
It is most commonly used in objects, where independent and simply regulation of every single unit is needed.

FEATURES:
Low thermal inertia.
Low investment costs.
Easy to use.
Independent regulation of every single unit.
Gradual regulation of air flow.

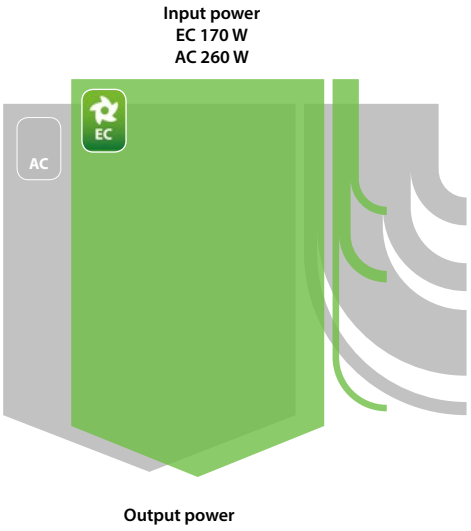
TEMPERATURE DIAGRAM



FAN OPERATION DIAGRAM



EC FAN

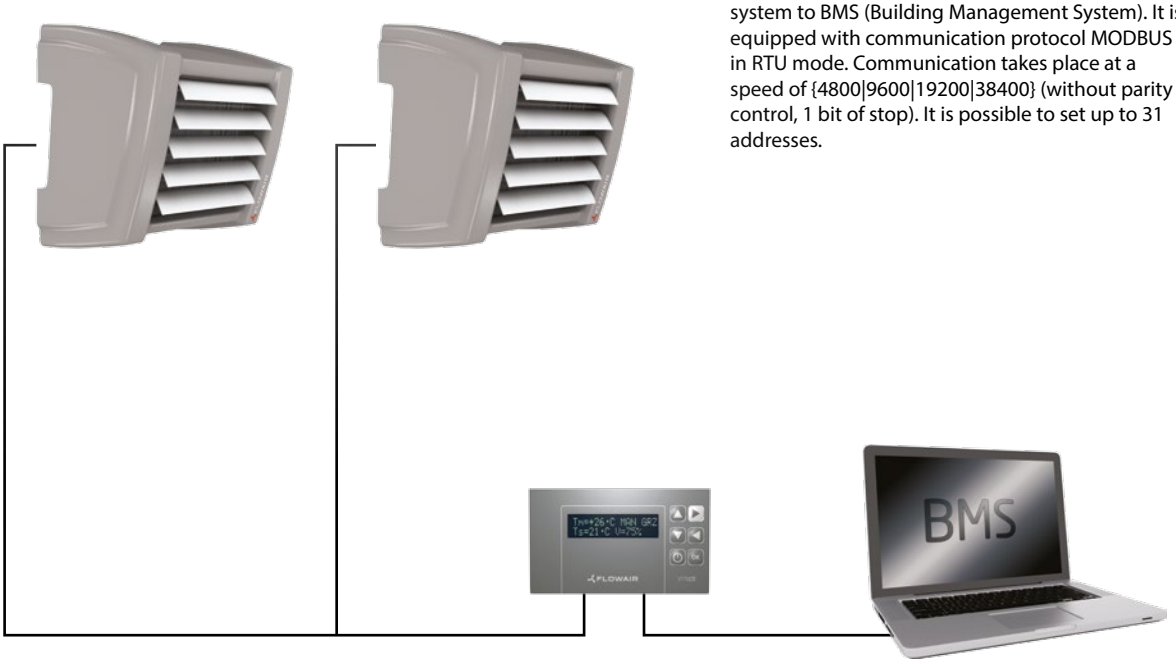


AC	EC	
17 W	5 W	Laminar losses
17 W	7 W	Losses in winding
40 W	0 W	Slip losses
8 W	4 W	Control losses
82 W	16 W	Total losses

ENERGY SAVINGS

LEO FS | KMFS heaters, equipped with fans with EC motors, reduce energy costs by 40%. Such large savings are possible through high efficiency of the fan, achieved by elimination of slip and construction losses.

BMS PROGRAMMING



VNTLCD control panel enables to connect the system to BMS (Building Management System). It is equipped with communication protocol MODBUS in RTU mode. Communication takes place at a speed of {4800|9600|19200|38400} (without parity control, 1 bit of stop). It is possible to set up to 31 addresses.

Address	Parameter	Access	[bit]	Parameter range		Scale factor	Unit	Description
				Min	Max			
0x00	INT_SENS	R	[0-15]	-	-	1/16	C	Temperature of internal sensor
0x01	EXT_SENS	R	[0-15]	-	-	1/16	C	Temperature of external sensor including temperature correction
0x02	PROCESS_TEMP	R	[0-15]	-	-	1/16	C	Temperature input to the regulator
0x03	DIG_OUT	R	[8-15]	0	1	1	-	Status of heating/cooling relay
	ANALOG_OUT		[1-7]	2	11	1/11	V	Output voltage on AOUT contact
0x04	CURR_SPEED	R	[8-15]	0	99	1	%	Current speed of fans
	TAF_SET_TEMP		[0-7]	0	12	1	C	Temperature of antifreeze protection
0x05	TZAD_SET_TEMP	R	[8-15]	5	50	1	C	Set temperature
	CRS1_T1		[7]	0	1	1	-	Status of selected master sensor 0 - internal sensor 1 - external sensor
	CRS1_MODE2		[6]	0	1	1	-	Status of operation mode 0:0 - heating 0:1 - ventilation 1:0 - cooling 1:1 - empty
	CRS1_MODE1		[5]	0	1	1	-	
	CRS1_MODE0		[4]	0	1	1	-	Status of control 0 - manual control 1 - automatic control
	CRS1_CAL_FORCE_RUN		[3]	0	1	1	-	Status of unit's operation in programmer mode 0 - STOP 1 - START
	CRS1_RUN		[2]	0	1	1	-	Status of unit's operation 0 - STOP 1 - START
	CRS1_REG_AFTm		[1]	0	1	1	-	Status determining activation of antifreeze protection 0 - Tm<TAF 1 - Tm>TAF
	CRS1_REG_AF		[0]	0	1	1	-	Status of antifreeze protection 0 - OFF 1 - ON
0x06	CRS2_REG	R	[8]	0	1	1	-	Status of fan's operation in manual mode 0 - continuous operation 1 - thermostatic operation
	LCD_CONTRAST		[0-7]	1	8	1	-	Contrast of the display
0x07	LCD_BACKLIGHT	R	[0-15]	1	8	1/256	-	Brightness of the display's background

Address	Parameter	Access	[bit]	Parameter range		Scale factor	Unit	Description
				Min	Max			
0x08	TZAD_MANUAL	R	[8-15]	5	50	1	C	Set temperature in manual mode
	TZAD_AUTO		[0-7]	5	50	1	C	Set temperature in automatic mode
0x09	VSPEED_HI	R	[8-15]	30	99	1	%	Upper limit of fans speed
	VSPEED_LO		[0-7]	30	99		%	Lower limit of fans speed
0x0A	ALARM_ID	R	[8-15]	0	1	1	-	Unit's internal error alarms (broken solder joints, communication errors)
	VSPEED_CORR		[0-7]	0	30	1	%	Correction of fans speed
0x0B	TEMP_CORR	R	[0-15]	-9	9	1/16	C	Temperature correction of external sensor
0x0C	PLANT_COEFF	R	[0-15]	1	5	1	-	Status of temperature regulator setting
0x0D	VSPEED_MANUAL	R	[8-15]	0	99	1	%	Fans speed in manual mode
	VSPEED_AUTO		[0-7]	0	99	1	%	Fans speed in automatic mode
0x0E	VSPEED_AF	R	[8-15]	0	99	1	%	Fans speed when antifreeze protection is active
0x0F	CRS3_REG	R	[8-10]	0	1	1	-	Status of programmer 0 - OFF 1 - 1d 2 - 5d + 2d 3 - 7d
	SOFT_VER		[0-7]	-	-	-	-	Software version
0x10	TEMP_HIST_HI	R	[8-15]	-2	2	1	C	Upper limit of temperature hysteresis.*
	TEMP_HIST_LO		[0-7]	-2	2	1	C	Lower limit of temperature hysteresis.*
0x11	DATE_REG1	R	[8-15]	2000	2099	-	-	Current year
	DATE_REG2		[0-7]	1	12	-	-	Current month
0x12	DATE_REG3	R	[8-15]	1	31	-	-	Current day
	TIME_REG1		[0-7]	1	23	-	h	Hour
0x13	TIME_REG2	R	[8-15]	0	59	-	m	Minutes
	CURR_ZONE		[0-7]	0	6	-	-	Number of active time zone for weekly programmer
0x14	-	RW	[12-15]	-	-	-	-	-
	SET_REG1.COM_PRA-CA_WENT		[11]	0	1	1	-	Selection of fans operation in manual mode 0 - continuous operation 1 - thermostatic operation
	SET_REG1.COM_T1		[10]	0	1	1	-	Selection of master sensor 0 - internal sensor 1 - external sensor
	SET_REG1.COM_MODE0		[9]	0	1	1	-	Selection of control 0 - manual control 1 - automatic control
	SET_REG1.COM ctrlSTART_bit		[8]	0	1	1	-	Turning on the unit via COM connector 0 - ON 1 - OFF
	TAF_SET_TEMP_WR		[0-7]	0	12	1	C	Setting of antifreeze protection temperature Tf
0x15	TZAD_MANUAL_WR	RW	[8-15]	5	50	1	C	Setting of set temperature Ts in manual mode
	TZAD_AUTO_WR		[0-7]	5	50	1		Setting of set temperature Ts in automatic mode
0x16	VSPEED_MANUAL_WR	RW	[8-15]	1	99	1	%	Setting of fans speed V in manual mode
	PLANT_COEFF_WR		[0-7]	1	5	1	-	Setting of temperature regulator
0x17	SEL_CALENDAR_TYPE	RW	[8-10]	0	1	1	-	Selection of programmer mode 0:0:0 - OFF 0:0:1 - 1d 0:1:0 - 5d + 2d 0:1:1 - 7d

* TEMP_HIST_HI = (MSB - 100) / 10
* TEMP_HIST_LO = (LSB - 100) / 10

MODULATED CONTROL SYSTEM

Category	Symbol	Picture	Technical data
0-10V controllers	VNTLCD control panel with weekly programer and built-in room thermostat p. 25 p. 26		Power supply: 230 V 50 Hz Protection degree: IP20 Temperature adjustment range: +5 … +50°C Operating temperature range: -10 … +60°C Output control signal: analog 0-10 V Way of control: buttons, LCD display Velocity control range: 0-100 % Temperature sensor: built-in (optional PT-1000) Contacts load: inductive 3 A, resistance 8 A Dimensions (HxWxL): 70x120x25 mm Max. wire diameter: 2 mm²
	VNT20 control panel with built-in room thermostat p. 25 p. 26		Power supply: 230 V 50 Hz Protection degree: IP20 Temperature adjustment range: +5 … +35°C Operating temperature range: -10 … +60°C Output control signal: analog 0-10 V Way of control: buttons, LED display Velocity control range: 0-100% Temperature sensor: built-in (optional PT-1000) Contacts load: inductive 3 A, resistance 8 A Dimensions (HxWxL): 70x120x25 mm Max. wire diameter: 2 mm²
additional equipment	PT-1000 IP65 wall-mounted temperature sensor IP65		Protection degree: IP65 Operating temperature range: -50...+110 °C Max. wire diameter 2 mm²
	R10 signal splitter		Protection degree: IP54 Operating temperature range: 0 … +40°C Max. wire diameter: 2 mm²

MODULATED / ON/OFF CONTROL SYSTEM

Category	Symbol	Picture	Technical data
valves	SRQ2d-1/2 two-way valve 1/2" with actuator		Protection degree: IP20 Power supply: 200-240 V 50/60 Hz Max. water temperature: +93°C Max. operating pressure: 1,6 MPa Kvs: 3,0 m³/h Installation: on water outlet pipe Opening/closing time: 18s/5s Dimensions (HxWxL): 108x86x66 mm
	SRQ3d-1/2 zthree-way valve 1/2" with actuator		Protection degree: IP20 Power supply: 200-240 V 50/60 Hz Max. water temperature: +93°C Max. operating pressure: 2,0 MPa Kvs: 3,4 m³/h Installation: on water inlet pipe Opening/closing time: 18s/5s Dimensions (HxWxL): 118x86x66 mm

<table>
<tr><th>Category</th><th>Symbol</th><th>Picture</th><th>Technical data</th></tr>
<tr><td rowspan="2">thermostats</td><td>RA
room thermostat</td><td>  </td><td>Temperature adjustment range: +10 … +30°C
Operating temperature range: 0 … +40°C
Protection degree: IP30
Contacts load: inductive 3 A, resistance 10 A
Dimensions (HxWxL): 84x84x40 mm
Max. wire diameter: 2,5 mm²</td></tr>
<tr><td>RE
room thermostat with
weekly programmer</td><td>  </td><td>Temperature adjustment range: +5 … +45°C
Operating temperature range: -10 … +50°C
Protection degree: IP20
Contacts load: inductive 3,5 A, resistance 16 A
Power supply: 2x1,5V AA batteries
Dimensions (HxWxL): 86x138x25 mm
Max. wire diameter: 2 mm²</td></tr>
<tr><td rowspan="2">fan speed
regulators</td><td>TRs
3-step fan
speed regulator
p.25 p.26</td><td>  </td><td>Power supply: 230V 50/60 Hz
Protection degree: IP54
Operating temperature range: 0 … +40°C
Steps of regulation:
<table>
<tr><td>step</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td colspan="4">Ur [V] / Ir [A]</td></tr>
<tr><td>TRs</td><td>110/0,6</td><td>170/0,6</td><td>230/0,6</td></tr>
</table>
Weight: 0,6 kg
Dimensions (HxWxL): 115x70x55 mm
Max. wire diameter: 2,5 mm²

TRs works with:
LEO FS | KMFS - 1 unit</td></tr>
<tr><td>TR / TRd
5-step fan
speed regulator
p.25 p.26</td><td> 
  </td><td>Power supply: 230V 50/60 Hz
Protection degree: IP54
Operating temperature range: 0 … +40°C
Steps of regulation:
<table>
<tr><td>step</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td colspan="6">Ur [V] / Ir [A]</td></tr>
<tr><td>TR</td><td>115/1,5</td><td>135/1,5</td><td>155/1,5</td><td>180/1,5</td><td>230/1,5</td></tr>
<tr><td>TRd</td><td>115/3,3</td><td>135/3,3</td><td>155/3,3</td><td>180/3,5</td><td>230/3,5</td></tr>
</table>
Weight: TR: 1,5 kg; TRd: 2,7 kg
Dimensions (HxWxL): TR: 165x75x60 mm
TRd: 185x102x100 mm
Max. wire diameter: 2,5 mm²

TR works with:
LEO FS | KM FS - up to 3 units

TRd works with:
LEO FS | KMFS - up to 6 units</td></tr>
</table>

KTS

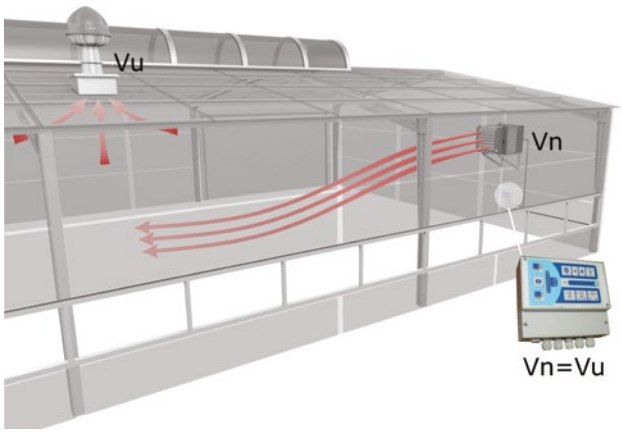
Power, control and protection system designed for mixing chamber working with fan heater.

Features:

- Stepless regulation of air throttles opening in 0-100% range.
- Antifreeze protection of unit's heat exchanger.
- Possibility to connect optional elements, e.g. room thermostat, valve, pressure switch, which improve unit's functionality.
- Regulation of roof fans operation according to chamber's opening degree and LEO heater air flow.

KTS + LEO KMFS + UVO

the simplest, complete mechanical ventilation system.

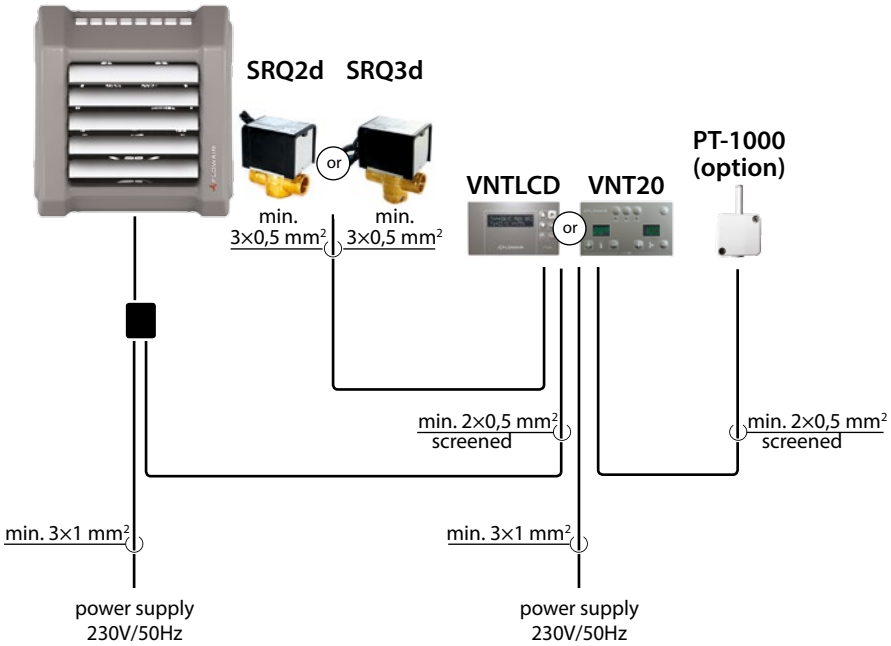


LEO KMFS CONTROL SYSTEM COMPONENTS

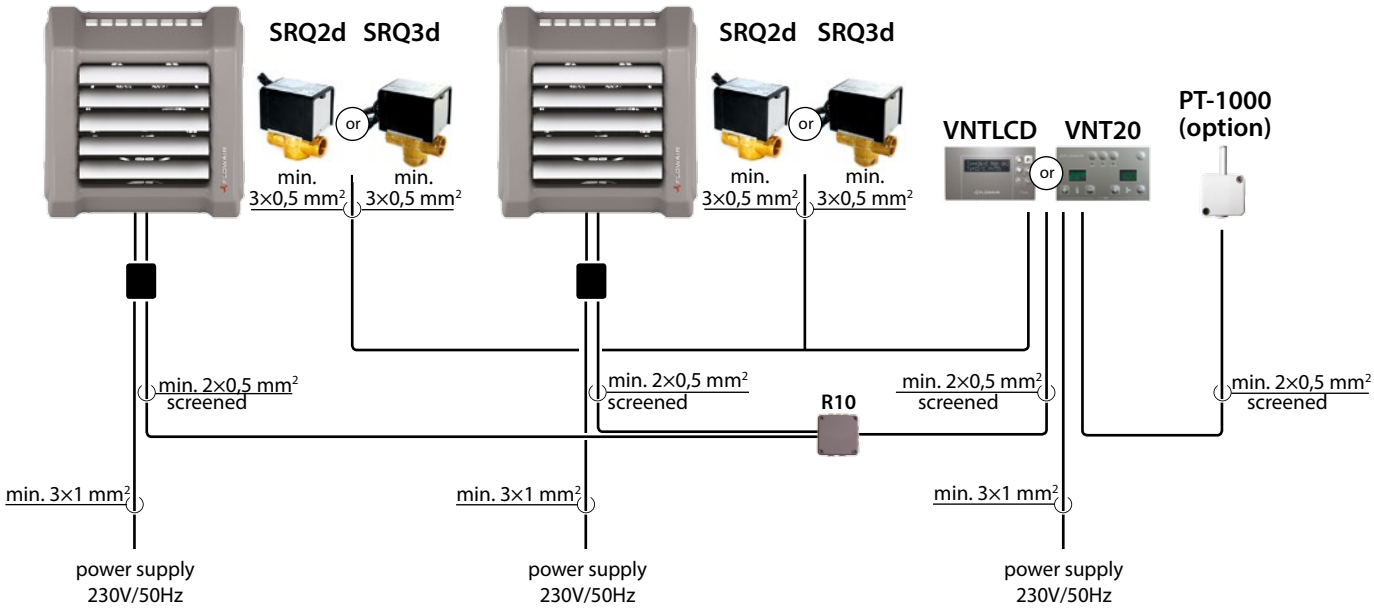
	Symbol	Picture	Technical data
KTS	KTE control board		Power supply: 230V/50Hz Protection degree: IP54 Weight: 2 kg Power supply of heater's fan: max. 2,5 A, 230 VAC Power supply of single phase roof fans: max. 5 A, 230 VAC Power supply of valve actuator: max. 0,3 A, 230 VAC Max. wire diameter: 2,5 mm²
	SP 0-10V throttles actuator with continous operation returning spring		Power supply: AC 24 V 50/60 Hz, DC24 V Wires: 4 x 0,5 mm² Power consumption: 2,5 W – operation, 1 W – stand-by Protection degree: IP54 Operating temperature range: -30...+50°C
	TPR antifreeze thermostat with capillary		Protection degree: IP54 Factory settings: turn on at 2°C, turn off at 3,5°C Regulation range: -18...+15°C Δt [K]: 1,5 Length of capillary: 2 m
DSS2e-bis fan speed regulator			Power supply: 230V/50Hz Protection degree: IP20 Operating temperature range: -10 … +50°C Max. operating current: 1,5 A Way of control: PWM
BUFFER			This is the system, which splits control signals from KTE board. It is also the power supply system for LEO heaters and roof fans. Use of buffer makes possible to control up to 5 units with one KTE control board. Additionaly, buffer has warning lights, which inform about filters contamination, atifreeze alarm or roof fan malfunction for each unit separately. Power supply: 230V/50Hz Protection degree: IP54 Weight: 3 kg Power supply of heater's fan: max. 2,5 A, 230 VAC Power supply of single phase roof fans: max. 3 A, 230 VAC Power supply of valve actuator: max. 1 A, 230 VAC Max. wire diameter: 2,5 mm²

KTS control system is designed for mixing chamber. For effective operation of the unit it is necessary to choose the right control system for fan heater: ON/OFF Control System or Modulated Control System. More information - see LEO FS control systems.

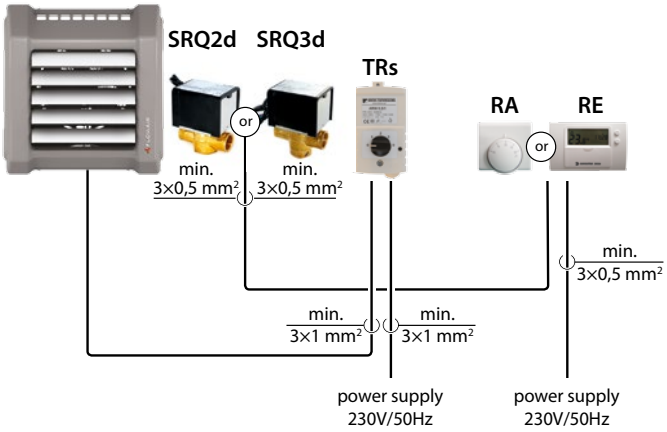
• VNTLCD (VNT20) controls the valve and the fan speed



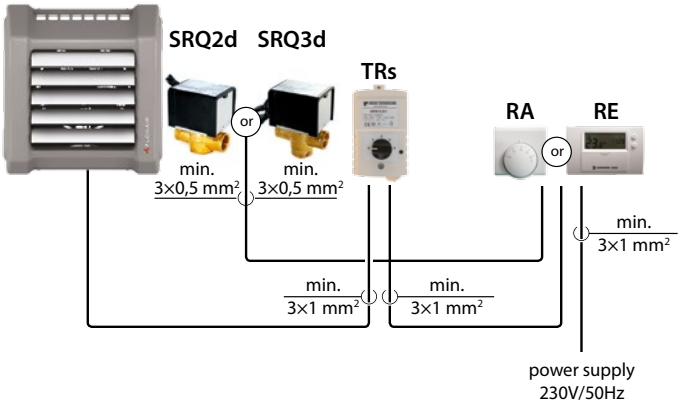
• VNTLCD (VNT20) controls valve and fan speed
• possibility to control up to 10 units by one controller using R10 signal splitter



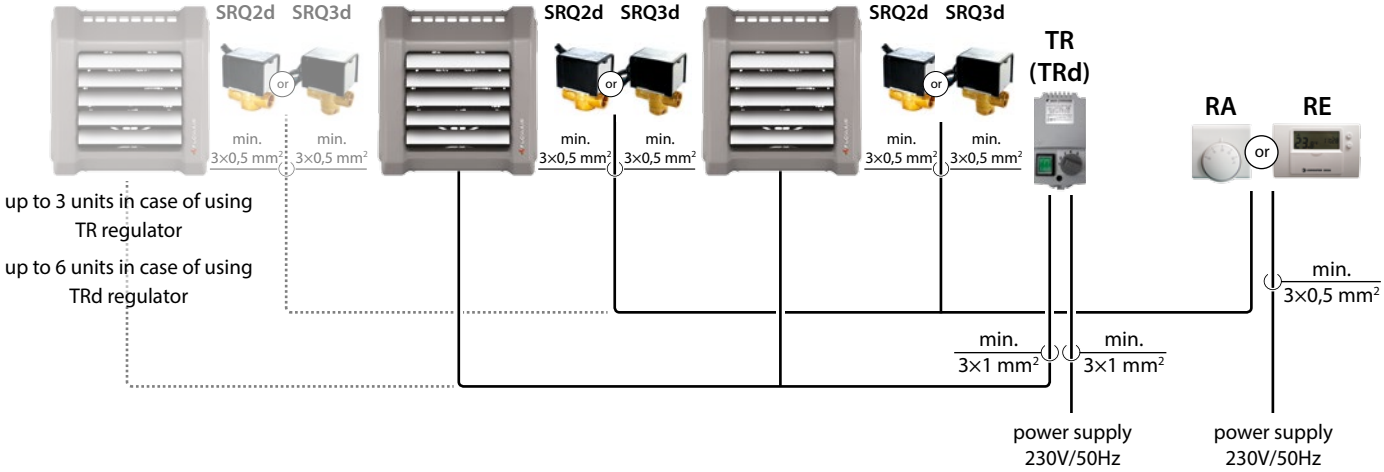
- RA (RE) thermostat controls SRQ valve
- TRs speed regulator enables 3-step fan speed regulation



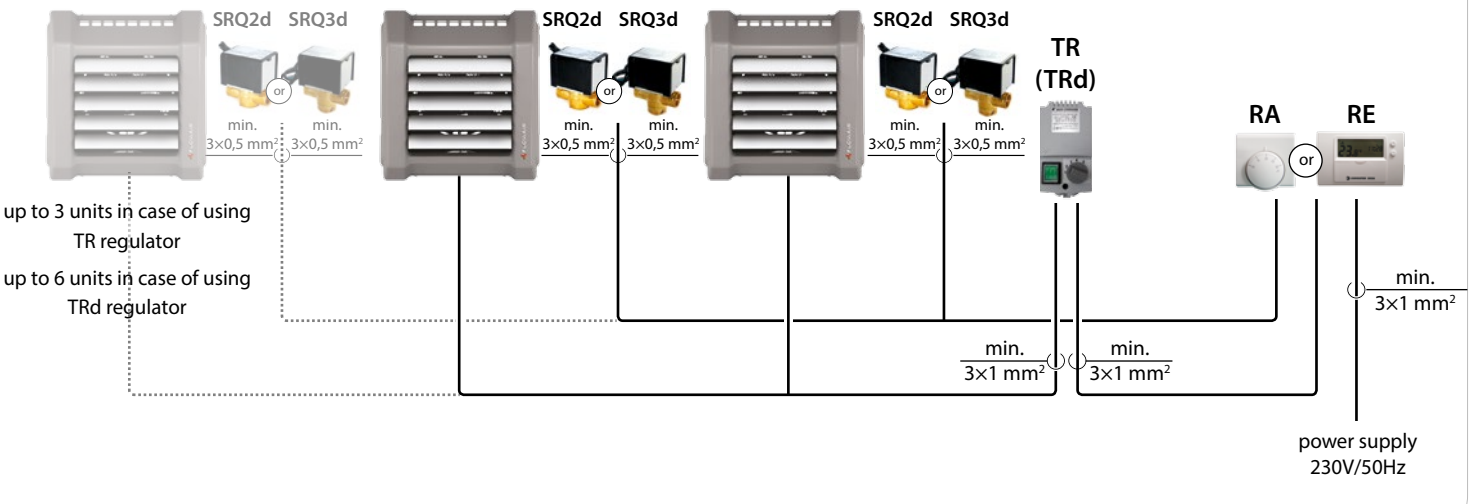
- RA (RE) thermostat controls SRQ valve and TRs speed regulator
- TRs speed regulator enables 3-step fan speed regulation



- RA (RE) thermostat controls SRQ valves
- TR (TRd) speed regulator enables 5-step fans speed regulation

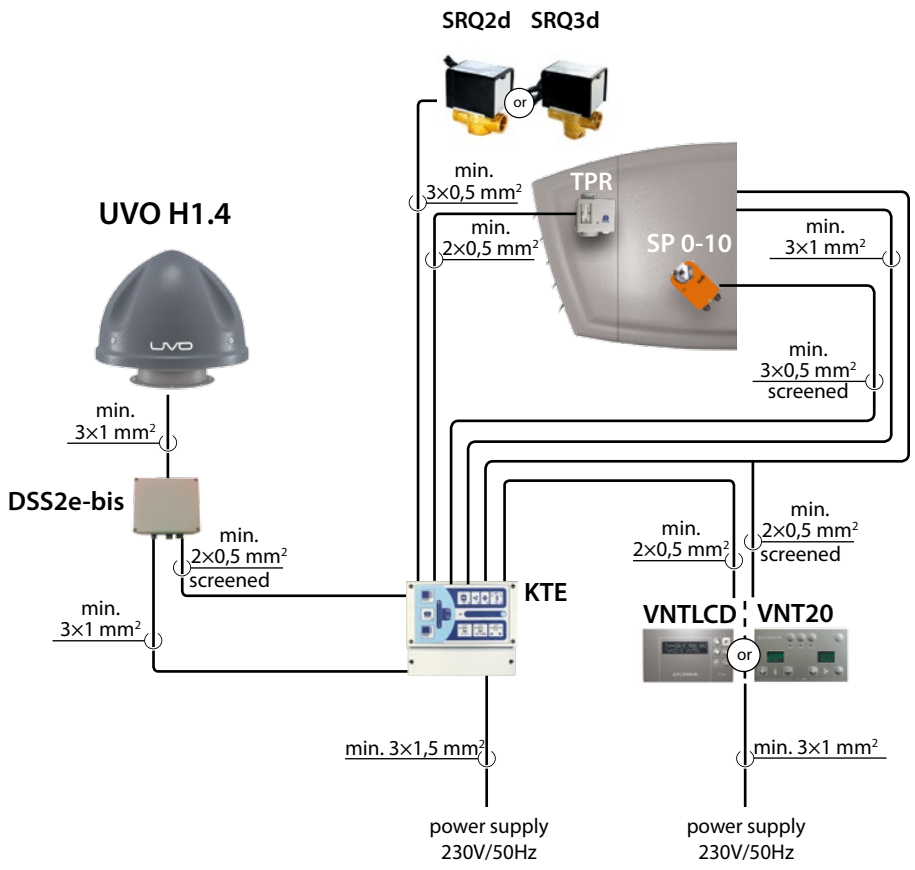


- RA (RE, R55) thermostat controls SRQ valves and TR (TRd) speed regulator
- TR (TRd) speed regulator enables 5-step fans speed regulation

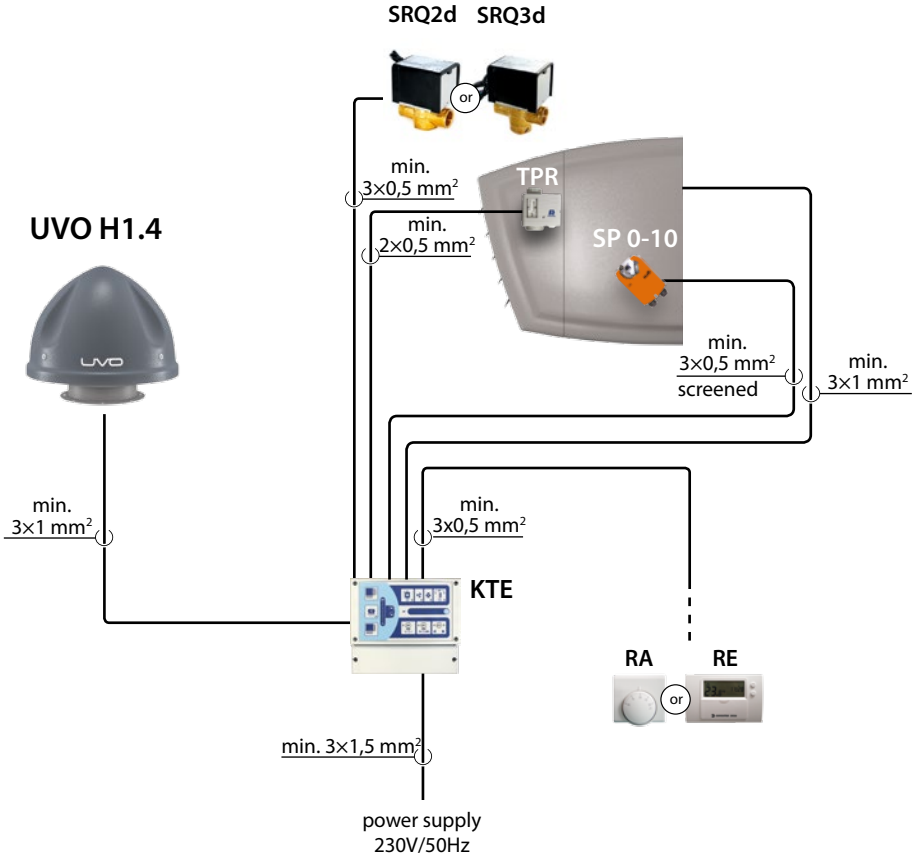


CONNECTION DIAGRAM FOR LEO KMFS

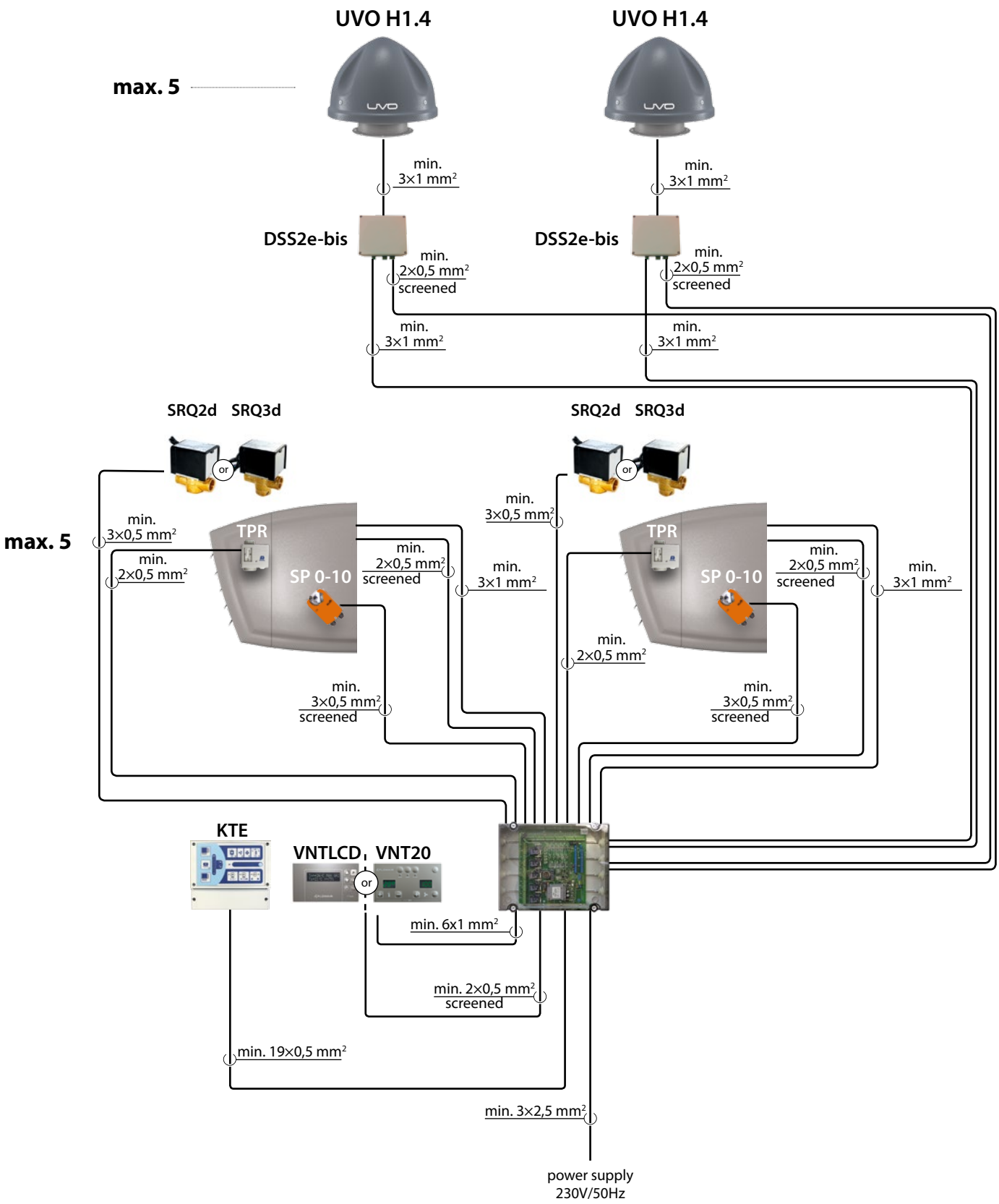
KTS SYSTEM - MODULATED SYSTEM



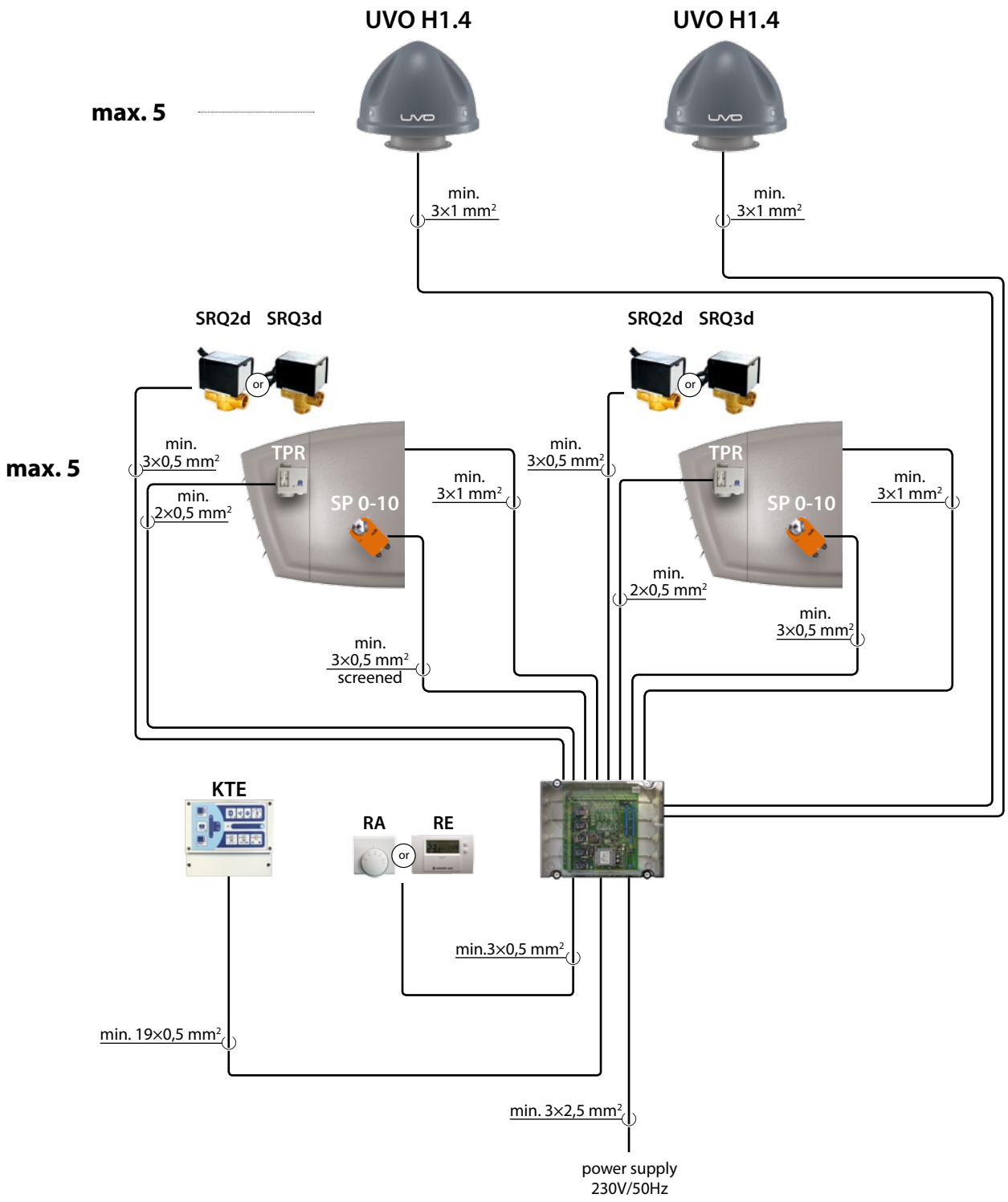
KTS SYSTEM - ON/OFF SYSTEM



KTS SYSTEM - MODULATED SYSTEM + BUFFER



KTS SYSTEM - ON/OFF SYSTEM + BUFFER



H3.0

H1.4

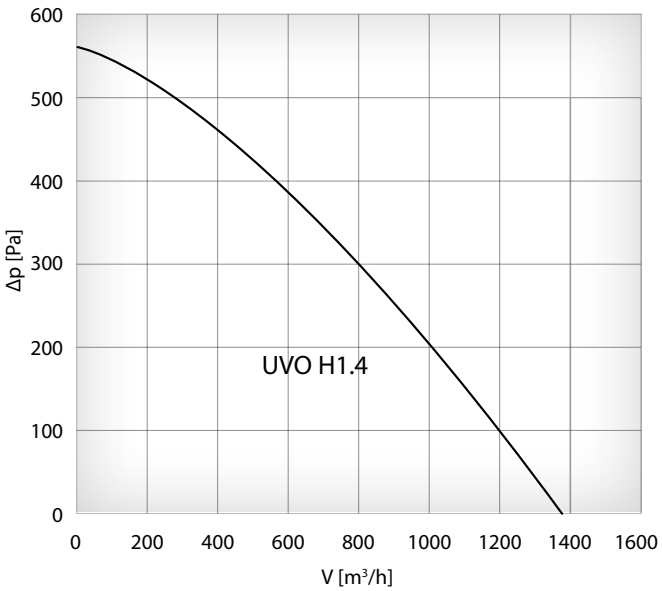
UVO H is a group of roof fans with horizontal air outlet. They are designed for ventilation of any type of rooms. Their main function is to remove used air from the room.

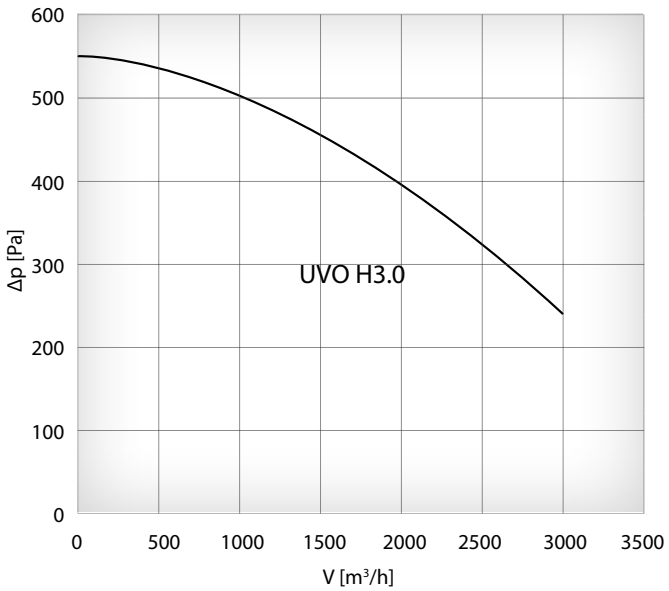
TECHNICAL DATA

			UVO H1.4	UVO H3.0
Max. air flow stream [m³/h]			1400	3000
Revs [min⁻¹]			2600	3000
Power supply* [V]			230	Y - 3 x 400 Δ - 3 x 230
Max. current consumption [A]			0,7	Y - 1,33 Δ - 2,3
Max. power consumption [W]			160	550
IP			44	54
Max. underpressure [Pa]			550	520
Max. air temperature [°C]			40	60
Max. air contamination [g/m³]			0,3	
Casing			ABS plastic	
Colour			grey	
Weight [kg]			8,0	20,0
Max. acoustic pressure level [dB(A)]	inlet	1 m	65,7	74,0
		5 m	54,9	60,0
	outlet	1 m	70,0	80,0
		5 m	61,0	70,0

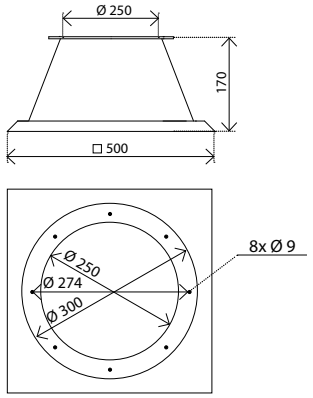
* UVO H 3.0 motor winding is originally in star connection (Y) for 3x400V power supply. If you connect the fan to 3x230V power supply, winding connection must be changed to delta (Δ) (eg. In case of use of FAL-0,75 frequency inverter).

AIR FLOW CHARACTERISTIC

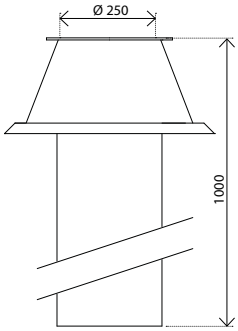




HPD



HPDr



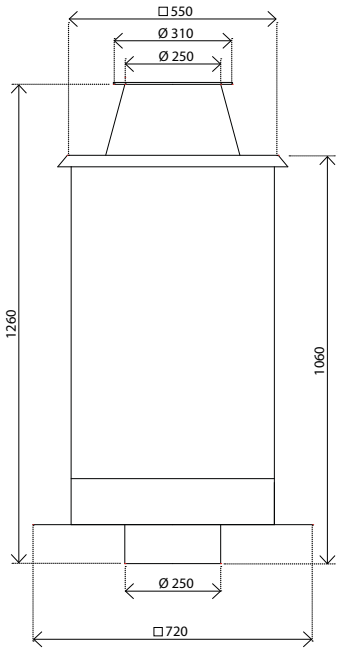
HPD – ROOF BASE

Material: galvanized sheet steel
Weight: 3,5 kg

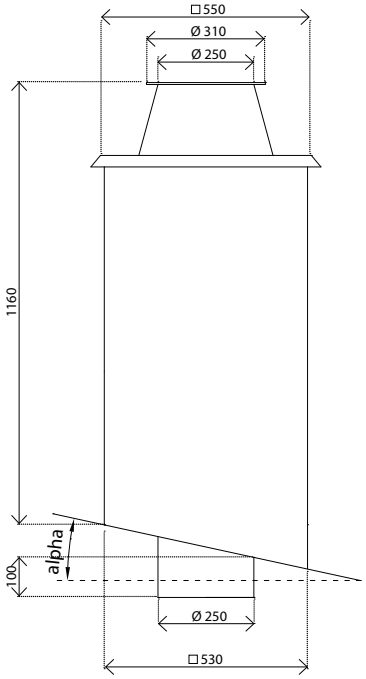
HPDr – ROOF BASE WITH SPIRO PIPE

Material: galvanized sheet steel
Weight: 7,6 kg

HPDT



HPDTs



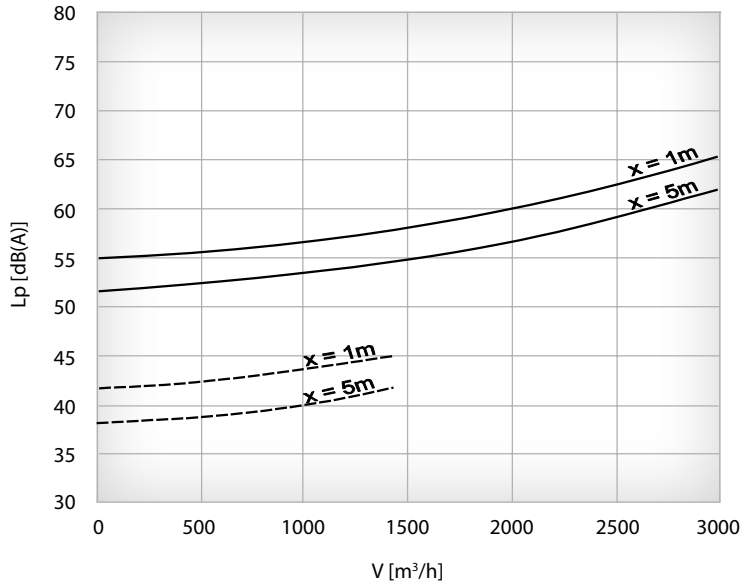
HPDT – DAMPING ROOF BASE FOR FLAT ROOFS

Material: galvanized sheet steel
Weight: 46 kg

HPDTs – DAMPING ROOF BASE FOR PITCHED ROOFS

Material: galvanized sheet steel
Weight: 41 kg

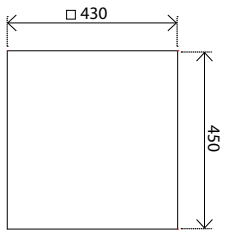
Alpha angle - base trim angle according to the slant of the roof - given when ordering



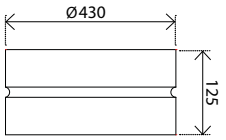
Acoustic characteristic of fan with damping roof base (HPDT, HPDTs)

ROOF BASES

CB



PZ



CB - SHEET SOCKET FOR PITCHED ROOFS

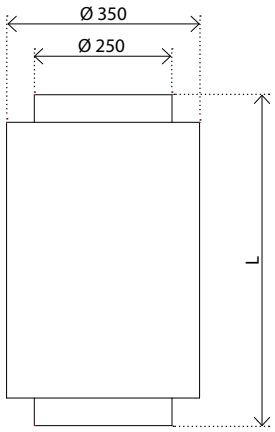
Material: galvanized sheet steel
Weight: 6,6 kg

It is used to install roof bases for pitched roofs HPD and HPDr. Socket needs to be cut at an angle corresponding to the slant of the roof.

PZ - RETURN THROTTLE

Material: galvanized sheet steel
Weight: 0,5 kg

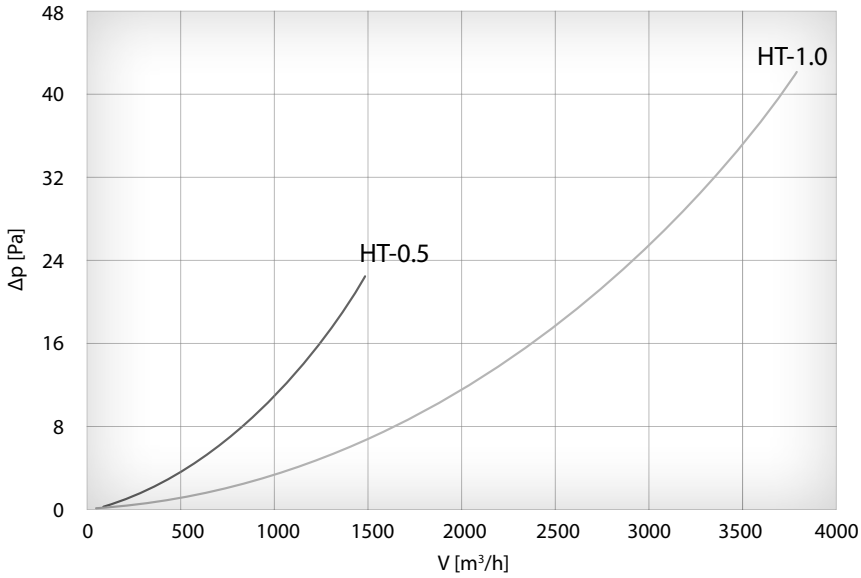
SILENCER



HT-0.5 / HT-1.0 AIR DUCT SILENCER

Length (L): HT-0.5 - 0,5 m
HT-1.0 - 1,0 m
Weight: HT-0.5 - 9,0 kg
HT-1.0 - 16,0 kg

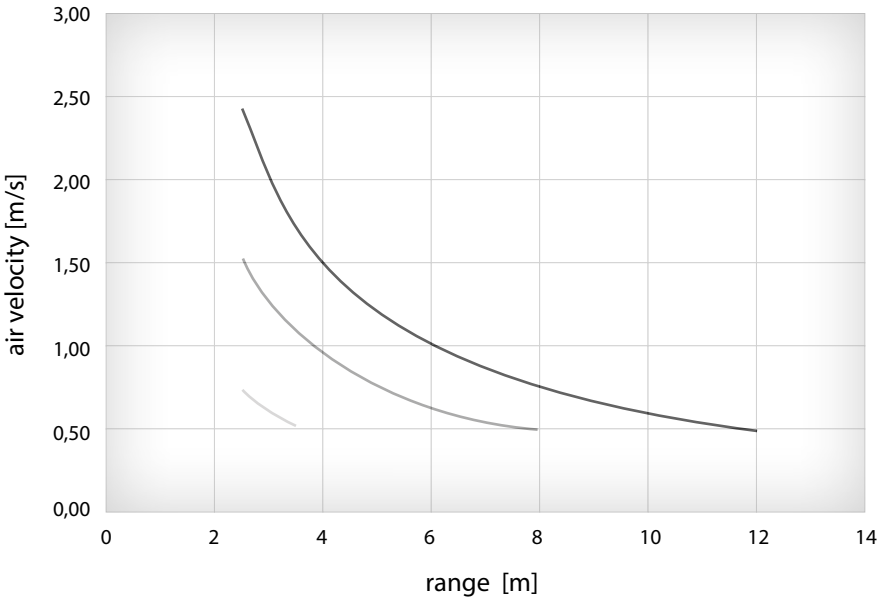
Sound suppresion [dB]				
	63 Hz	**125 Hz**	**250 Hz**	**500 Hz**
HT-0.5	1	2	5	13
HT-1.0	1	3	8	21
	1000 Hz	**2000 Hz**	**4000 Hz**	**8000 Hz**
HT-0.5	16	18	13	6
HT-1.0	31	31	19	6



Air flow resistance in silencers

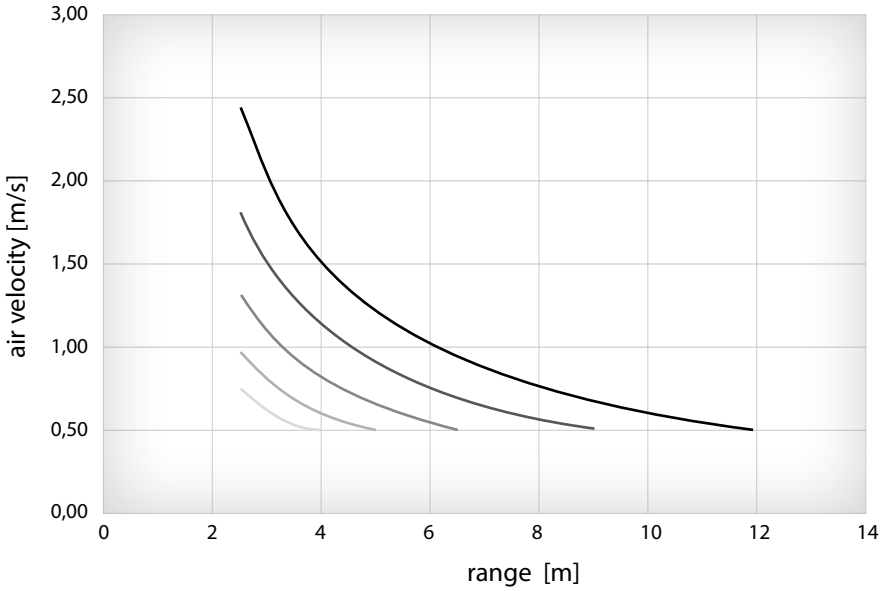
VELOCITY OF THE AIR FLOW

LEO FS



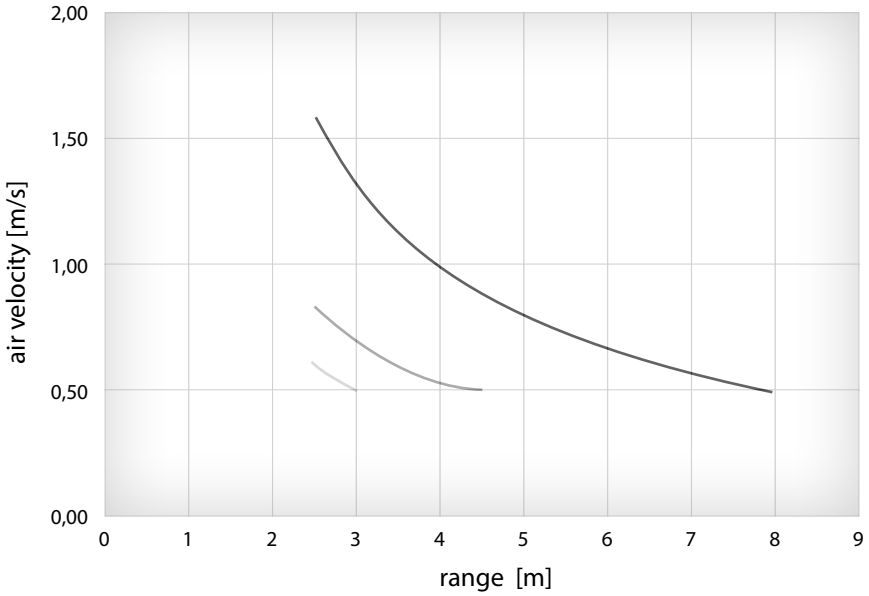
1st step - TRs or 45% of air flow set on VNTLCD/VNT20
2nd step - TRs or 70% of air flow set on VNTLCD/VNT20
3rd step - TRs or 100% of air flow set on VNTLCD/VNT20

LEO FS



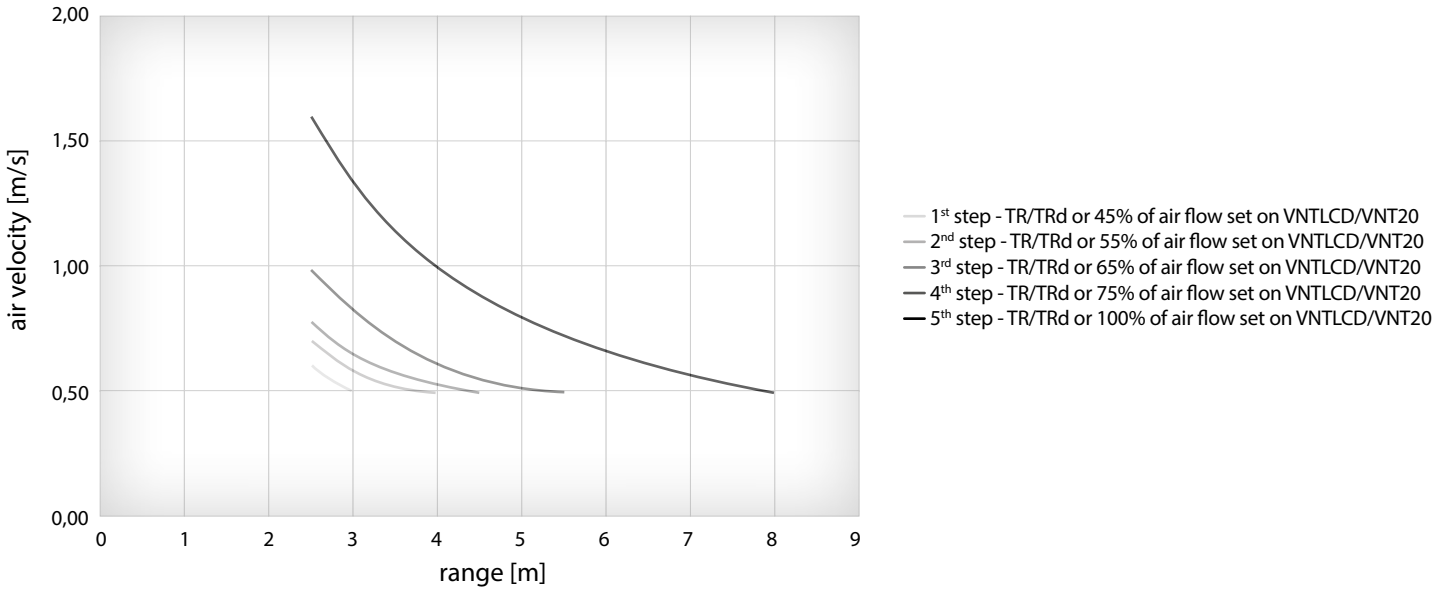
1st step - TR/TRd or 45% of air flow set on VNTLCD/VNT20
2nd step - TR/TRd or 55% of air flow set on VNTLCD/VNT20
3rd step - TR/TRd or 65% of air flow set on VNTLCD/VNT20
4th step - TR/TRd or 75% of air flow set on VNTLCD/VNT20
5th step - TR/TRd or 100% of air flow set on VNTLCD/VNT20

LEO KMFS



1st step - TRs or 45% of air flow set on VNTLCD/VNT20
2nd step - TRs or 70% of air flow set on VNTLCD/VNT20
3rd step - TRs or 100% of air flow set on VNTLCD/VNT20

VELOCITY OF THE AIR FLOW



AIR FLOW REGULATION - TECHNICAL DATA

LEO FS M | KMFS M - air flow regulation by the VNTLCD/VNT20							
Setting of VNTLCD/VNT20		**45%**	**55%**	**65%**	**70%**	**75%**	**100%**
Air flow [m³/h]	FS M	530	690	940	1100	1250	1750
	KMFS M	230	370	530	600	710	1150
Power consumption [W]	FS M KMFS M	35	46	57,5	57,5	57,5	57,5
Acoustic pressure level [dB(A)]*	FS M KMFS M	34	38	40	41	42	45

LEO FS S/ V | KMFS S/V - air flow regulation by the TRs				
Step of TRs		**1st step**	**2nd step**	**3rd step**
Air flow [m³/h]	FS S/V	530	1100	1750
	KMFS S/V	230	600	1150
Power consumption [W]	FS S/V KMFS S/V	33/60	68/93	92/123
Acoustic pressure level [dB(A)]*	FS S/V KMFS S/V	34	41	45

LEO FS S/V | KMFS S/V - air flow regulation by the TR (TRd)						
Step of TR (TRd)		**1st step**	**2nd step**	**3rd step**	**4th step**	**5th step**
Air flow [m³/h]	FS S/V	530	690	940	1250	1750
	KMFS S/V	230	370	530	710	1150
Power consumption [W]	FS S/V KMFS S/V	34,5/63	47,5/74	62/85	72/99	92/123
Acoustic pressure level [dB(A)]*	FS S/V KMFS S/V	34	38	40	42	45

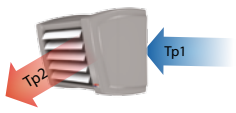
* Acoustic pressure level measured in the room with average sound absorption, capacity 1500m³, at distance of 5m from the unit.

Air flow regulation by the TRs regulator or by the VNTLCD/VNT20 control panel

Tp1	PT	Qw	Δpw	Tp2	Tp1	PT	Qw	Δpw	Tp2	Tp1	PT	Qw	Δpw	Tp2	Tp1	PT	Qw	Δpw	Tp2
°C	kW	l/h	kPa	°C	°C	kW	l/h	kPa	°C	°C	kW	l/h	kPa	°C	°C	kW	l/h	kPa	°C
1st step - TRs or 45% of air flow set on VNTLCD/VNT20 / V=530 m³/h																			
Tw1/Tw2 = 90/70°C					**Tw1/Tw2 = 80/60°C**					**Tw1/Tw2 = 70/50°C**					**Tw1/Tw2 = 70/40°C**				
0	9,1	404	1,4	47,5	0	7,8	342	1,1	40,5	0	6,4	280	0,8	33,5	0	4,3	124	0,2	23,5
5	8,4	372	1,3	49,5	5	7,1	311	0,9	42,5	5	5,7	249	0,7	35,0	5	3,8	111	0,2	26,0
10	7,7	341	1,1	51,5	10	6,4	281	0,8	44,5	10	5,0	218	0,5	37,0	10	3,4	98	0,1	28,5
15	7,0	310	0,9	53,5	15	5,7	251	0,6	46,5	15	4,3	187	0,4	38,5	15	2,9	85	0,1	31,0
20	6,4	280	0,8	55,5	20	5,0	221	0,5	48,0	20	3,6	155	0,3	40,0	20	2,5	72	0,1	33,5
Tw1/Tw2 = 60/40°C					**Tw1/Tw2 = 50/40°C**					**Tw1/Tw2 = 40/30°C**									
0	4,9	213	0,5	25,5	0	5,0	434	1,9	26,0	0	3,6	310	1,1	18,5					
5	4,1	179	0,4	27,0	5	4,3	375	1,4	28,0	5	2,9	248	0,7	20,0					
10	3,2	140	0,3	27,5	10	3,6	317	1,1	30,0	10	2,1	178	0,4	21,5					
15	2,7	118	0,2	30,0	15	3,0	258	0,7	31,5	15	1,6	136	0,3	23,5					
20	2,2	98	0,1	32,5	20	2,3	197	0,5	32,5	20	1,1	96	0,1	26,0					
2nd step - TRs or 70% of air flow set on VNTLCD/VNT20 / V=1100 m³/h																			
Tw1/Tw2 = 90/70°C					**Tw1/Tw2 = 80/60°C**					**Tw1/Tw2 = 70/50°C**					**Tw1/Tw2 = 70/40°C**				
0	14,5	642	3,4	38,0	0	12,4	545	2,6	32,5	0	10,2	447	1,9	26,5	0	7,5	218	0,5	21,0
5	13,4	592	2,9	40,5	5	11,3	496	2,2	35,0	5	9,1	399	1,5	29,0	5	6,4	186	0,4	22,5
10	12,3	544	2,5	43,5	10	10,2	448	1,8	37,5	10	8,0	352	1,2	31,5	10	5,1	148	0,3	24,0
15	11,2	496	2,1	46,0	15	9,1	401	1,5	40,0	15	7,0	305	0,9	34,0	15	4,0	116	0,2	26,0
20	10,2	449	1,8	48,5	20	8,1	355	1,2	42,5	20	5,9	258	0,7	36,5	20	3,3	98	0,1	29,0
Tw1/Tw2 = 60/40°C					**Tw1/Tw2 = 50/40°C**					**Tw1/Tw2 = 40/30°C**									
0	7,9	346	1,2	20,5	0	8,0	693	4,3	21,0	0	5,8	502	2,5	15,0					
5	6,8	298	0,9	23,0	5	6,9	600	3,3	23,5	5	4,7	409	1,7	17,5					
10	5,7	249	0,7	25,5	10	5,9	509	2,5	26,0	10	3,6	314	1,1	20,0					
15	4,5	197	0,4	27,5	15	4,8	418	1,7	28,0	15	2,3	203	0,5	21,5					
20	3,1	133	0,2	28,5	20	3,8	328	1,1	30,5	20	1,5	131	0,2	24,0					
3rd step - TRs or 100% of air flow set on VNTLCD/VNT20 / V=1750 m³/h																			
Tw1/Tw2 = 90/70°C					**Tw1/Tw2 = 80/60°C**					**Tw1/Tw2 = 70/50°C**					**Tw1/Tw2 = 70/40°C**				
0	19,4	873	5,9	31,5	0	16,9	741	4,5	26,5	0	13,9	608	3,2	22,0	0	10,9	316	1,0	17,0
5	18,3	806	5,1	34,5	5	15,4	676	3,8	29,5	5	12,4	544	2,6	25,0	5	9,3	271	0,8	20,0
10	16,8	741	4,4	37,5	10	13,9	611	3,2	33,0	10	11,0	480	2,1	28,0	10	7,7	225	0,6	22,5
15	15,3	676	3,7	40,5	15	12,5	548	2,6	35,5	15	9,5	417	1,6	31,0	15	5,9	173	0,3	25,0
20	13,9	613	3,1	43,5	20	11,0	485	2,1	38,5	20	8,1	355	1,2	33,5	20	4,0	116	0,2	26,5
Tw1/Tw2 = 60/40°C					**Tw1/Tw2 = 50/40°C**					**Tw1/Tw2 = 40/30°C**									
0	10,9	473	2,1	17,5	0	10,9	945	7,6	17,0	0	7,9	686	4,4	12,5					
5	9,4	409	1,6	20,0	5	9,4	820	5,9	20,0	5	6,5	561	3,1	15,5					
10	7,9	345	1,2	23,0	10	8,0	696	4,4	23,0	10	5,0	436	2,0	18,0					
15	6,4	280	0,8	25,5	15	6,6	573	3,1	26,0	15	3,5	306	1,0	21,0					
20	4,8	210	0,5	28,0	20	5,2	452	2,0	29,0	20	1,2	158	0,3	23,0					

For operating parameters concerning other water temperatures, please contact Sales Office.

V – air flow
PT – heating capacity
Tp1 – inlet air temperature
Tp2 – outlet air temperature
Tw1 – inlet water temperature
Tw2 – outlet water temperature
Qw – water flow rate in heat exchanger
Δpw – water pressure drop in heat exchanger



Air flow regulation by the TR/TRd regulator or by the VNTLCD/VNT20 control panel

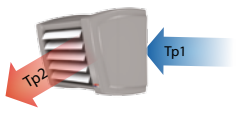
Tp1	PT	Qw	Δpw	Tp2	Tp1	PT	Qw	Δpw	Tp2	Tp1	PT	Qw	Δpw	Tp2	Tp1	PT	Qw	Δpw	Tp2
°C	kW	l/h	kPa	°C	°C	kW	l/h	kPa	°C	°C	kW	l/h	kPa	°C	°C	kW	l/h	kPa	°C
1st step - TR/TRd or 45% of air flow set on VNTLCD/VNT20 / V=530 m³/h																			
Tw1/Tw2 = 90/70°C					**Tw1/Tw2 = 80/60°C**					**Tw1/Tw2 = 70/50°C**					**Tw1/Tw2 = 70/40°C**				
0	9,1	404	1,4	47,5	0	7,8	342	1,1	40,5	0	6,4	280	0,8	33,5	0	4,3	124	0,2	23,5
5	8,4	372	1,3	49,5	5	7,1	311	0,9	42,5	5	5,7	249	0,7	35,0	5	3,8	111	0,2	26,0
10	7,7	341	1,1	51,5	10	6,4	281	0,8	44,5	10	5,0	218	0,5	37,0	10	3,4	98	0,1	28,5
15	7,0	310	0,9	53,5	15	5,7	251	0,6	46,5	15	4,3	187	0,4	38,5	15	2,9	85	0,1	31,0
20	6,4	280	0,8	55,5	20	5,0	221	0,5	48,0	20	3,6	155	0,3	40,0	20	2,5	72	0,1	33,5
Tw1/Tw2 = 60/40°C					**Tw1/Tw2 = 50/40°C**					**Tw1/Tw2 = 40/30°C**									
0	4,9	213	0,5	25,5	0	5,0	434	1,9	26,0	0	3,6	310	1,1	18,5					
5	4,1	179	0,4	27,0	5	4,3	375	1,4	28,0	5	2,9	248	0,7	20,0					
10	3,2	140	0,3	27,5	10	3,6	317	1,1	30,0	10	2,1	178	0,4	21,5					
15	2,7	118	0,2	30,0	15	3,0	258	0,7	31,5	15	1,6	136	0,3	23,5					
20	2,2	98	0,1	32,5	20	2,3	197	0,5	32,5	20	1,1	96	0,1	26,0					
2nd step - TR/TRd or 55% of air flow set on VNTLCD/VNT20 / V=690 m³/h																			
Tw1/Tw2 = 90/70°C					**Tw1/Tw2 = 80/60°C**					**Tw1/Tw2 = 70/50°C**					**Tw1/Tw2 = 70/40°C**				
0	11,0	484	2,0	44,0	0	9,4	411	1,5	37,5	0	7,7	336	1,1	31,0	0	5,4	156	0,3	23,0
5	10,1	446	1,7	46,0	5	8,5	374	1,3	39,5	5	6,8	300	0,9	33,0	5	4,3	126	0,2	24,5
10	9,3	409	1,5	48,5	10	7,7	337	1,1	42,0	10	6,0	264	0,7	35,0	10	3,8	111	0,1	26,5
15	8,5	373	1,3	50,5	15	6,7	302	0,9	44,0	15	5,2	228	0,6	37,0	15	3,3	97	0,1	29,0
20	7,6	338	1,1	53,0	20	6,1	266	0,7	46,0	20	4,4	191	0,4	38,5	20	2,8	82	0,1	31,5
Tw1/Tw2 = 60/40°C					**Tw1/Tw2 = 50/40°C**					**Tw1/Tw2 = 40/30°C**									
0	5,9	259	0,7	24,0	0	6,0	522	2,6	24,0	0	4,3	376	1,5	17,5					
5	5,1	221	0,5	25,5	5	5,2	451	2,0	26,0	5	3,5	303	1,0	19,5					
10	4,1	180	0,4	27,0	10	4,4	382	1,5	28,0	10	2,6	226	0,6	21,0					
15	3,1	135	0,2	28,0	15	3,6	313	1,0	30,0	15	1,8	155	0,3	22,5					
20	2,5	111	0,2	31,0	20	2,8	242	0,7	32,0	20	1,3	109	0,2	25,5					
3rd step - TR/TRd or 65% of air flow set on VNTLCD/VNT20 / V=940 m³/h																			
Tw1/Tw2 = 90/70°C					**Tw1/Tw2 = 80/60°C**					**Tw1/Tw2 = 70/50°C**					**Tw1/Tw2 = 70/40°C**				
0	13,5	594	2,9	39,5	0	11,7	504	2,2	34,0	0	9,5	413	1,6	28,0	0	6,9	200	0,5	21,5
5	12,4	548	2,5	42,0	5	10,5	459	1,9	36,5	5	8,4	369	1,3	30,5	5	5,8	169	0,3	23,5
10	11,4	503	2,2	44,5	10	9,4	415	1,6	39,0	10	7,4	325	1,0	32,5	10	4,4	128	0,2	23,5
15	10,4	458	1,8	47,0	15	8,5	371	1,3	41,0	15	6,4	281	0,8	35,0	15	3,8	110	0,2	26,5
20	9,4	415	1,5	50,0	20	7,5	328	1,0	43,5	20	5,4	238	0,6	37,0	20	3,2	93	0,1	30,0
Tw1/Tw2 = 60/40°C					**Tw1/Tw2 = 50/40°C**					**Tw1/Tw2 = 40/30°C**									
0	7,3	320	1,0	21,5	0	7,4	641	3,8	21,5	0	5,4	464	2,2	15,5					
5	6,3	275	0,8	24,0	5	6,4	555	2,9	24,0	5	4,4	377	1,5	18,0					
10	5,3	229	0,6	26,0	10	5,4	471	2,2	26,5	10	3,3	288	0,9	20,0					
15	4,1	179	0,4	27,5	15	4,4	387	1,5	29,0	15	2,1	179	0,4	21,5					
20	2,9	127	0,2	29,0	20	3,5	302	1,0	31,0	20	1,4	125	0,2	24,5					
4th step - TR/TRd or 75% of air flow set on VNTLCD/VNT20 / V=1250 m³/h																			
Tw1/Tw2 = 90/70°C					**Tw1/Tw2 = 80/60°C**					**Tw1/Tw2 = 70/50°C**					**Tw1/Tw2 = 70/40°C**				
0	17,1	755	4,5	34,5	0	14,6	641	3,5	29,5	0	12,0	526	2,5	24,0	0	8,9	260	0,7	19,5
5	15,8	697	3,9	37,5	5	13,3	584	2,9	32,0	5	10,7	470	2,0	27,0	5	7,7	225	0,6	21,5
10	14,5	640	3,3	40,0	10	12,0	528	2,4	35,0	10	9,5	415	1,6	29,5	10	6,4	186	0,4	23,5
15	13,2	584	2,8	43,0	15	10,8	473	2,0	38,0	15	8,2	360	1,3	32,5	15	4,4	128	0,2	24,5
20	12,0	529	2,4	46,0	20	9,5	419	1,6	40,5	20	7,0	306	1,0	35,0	20	3,7	107	0,2	27,5
Tw1/Tw2 = 60/40°C					**Tw1/Tw2 = 50/40°C**					**Tw1/Tw2 = 40/30°C**									
0	9,4	409	1,6	19,0	0	9,4	816	5,8	19,0	0	6,8	592	3,4	13,5					
5	8,1	353	1,3	21,5	5	8,1	708	4,5	21,5	5	5,6	484	2,4	16,5					
10	6,8	296	0,9	24,0	10	6,9	600	3,3	24,5	10	4,3	374	1,5	19,0					
15	5,5	238	0,6	26,5	15	5,7	494	2,3	27,0	15	3,0	257	0,8	21,5					
20	3,9	171	0,4	28,5	20	4,5	388	1,5	29,5	20	1,7	145	0,3	23,5					
5th step - TR/TRd or 100% of air flow set on VNTLCD/VNT20 / V=1750 m³/h																			
Tw1/Tw2 = 90/70°C					**Tw1/Tw2 = 80/60°C**					**Tw1/Tw2 = 70/50°C**					**Tw1/Tw2 = 70/40°C**				
0	19,4	873	5,9	31,5	0	16,9	741	4,5	26,5	0	13,9	608	3,2	22,0	0	10,9	316	1,0	17,0
5	18,3	806	5,1	34,5	5	15,4	676	3,8	29,5	5	12,4	544	2,6	25,0	5	9,3	271	0,8	20,0
10	16,8	741	4,4	37,5	10	13,9	611	3,2	33,0	10	11,0	480	2,1	28,0	10	7,7	225	0,6	22,5
15	15,3	676	3,7	40,5	15	12,5	548	2,6	35,5	15	9,5	417	1,6	31,0	15	5,9	173	0,3	25,0
20	13,9	613	3,1	43,5	20	11,0	485	2,1	38,5	20	8,1	355	1,2	33,5	20	4,0	116	0,2	26,5
Tw1/Tw2 = 60/40°C					**Tw1/Tw2 = 50/40°C**					**Tw1/Tw2 = 40/30°C**									
0	10,9	473	2,1	17,5	0	10,9	945	7,6	17,0	0	7,9	686	4,4	12,5					
5	9,4	409	1,6	20,0	5	9,4	820	5,9	20,0	5	6,5	561	3,1	15,5					
10	7,9	345	1,2	23,0	10	8,0	696	4,4	23,0	10	5,0	436	2,0	18,0					
15	6,4	280	0,8	25,5	15	6,6	573	3,1	26,0	15	3,5	306	1,0	21,0					
20	4,8	210	0,5	28,0	20	5,2	452	2,0	29,0	20	1,2	158	0,3	23,0					

Air flow regulation by the TRs regulator or by the VNTLCD/VNT20 control panel

Tp1	PT	Qw	Δpw	Tp2	Tp1	PT	Qw	Δpw	Tp2	Tp1	PT	Qw	Δpw	Tp2	Tp1	PT	Qw	Δpw	Tp2
°C	kW	l/h	kPa	°C	°C	kW	l/h	kPa	°C	°C	kW	l/h	kPa	°C	°C	kW	l/h	kPa	°C
1st step - TRs or 45% of air flow set on VNTLCD/VNT20 / V=230 m³/h																			
Tw1/Tw2 = 90/70°C					**Tw1/Tw2 = 80/60°C**					**Tw1/Tw2 = 70/50°C**					**Tw1/Tw2 = 70/40°C**				
-25	7,0	311	0,9	52	-25	6,3	275	0,8	44	-25	5,5	239	0,6	35	-25	4,4	128	0,2	23
-22	6,8	299	0,8	53	-22	6,0	264	0,7	44	-22	5,2	228	0,6	36	-22	4,2	122	0,2	24
-20	6,6	291	0,8	53	-20	5,8	256	0,7	45	-20	5,0	220	0,5	36	-20	4,1	118	0,2	25
-15	6,2	272	0,7	55	-15	5,4	237	0,6	46	-15	4,6	201	0,4	37	-15	3,7	108	0,2	27
-10	5,7	253	0,6	56	-10	5,0	219	0,5	48	-10	4,2	183	0,4	38	-10	3,4	98	0,1	29
-5	5,3	234	0,5	58	-5	4,6	201	0,4	49	-5	3,8	165	0,3	39	-5	3,1	89	0,1	31
0	4,9	216	0,5	59	0	4,2	183	0,4	50	0	3,4	147	0,3	40	0	2,8	80	0,1	33
5	4,5	199	0,4	60	5	3,8	165	0,3	51	5	2,9	128	0,2	41	5	2,4	71	0,1	35
10	4,1	182	0,3	61	10	3,4	148	0,3	52	10	2,6	111	0,2	42	10	2,1	62	0,1	37
15	3,7	165	0,3	62	15	3,0	131	0,2	53	15	2,3	98	0,1	43	15	1,9	54	0,1	38
20	3,4	148	0,2	63	20	2,6	113	0,2	53	20	2,0	85	0,1	45	20	1,6	45	0,1	40
Tw1/Tw2 = 60/40°C					**Tw1/Tw2 = 50/40°C**					**Tw1/Tw2 = 40/30°C**									
-25	4,6	201	0,5	25	-25	4,7	404	1,6	26	-25	3,9	334	1,2	17					
-22	4,3	189	0,4	26	-22	4,4	382	1,5	27	-22	3,6	313	1,1	18					
-20	4,2	182	0,4	27	-20	4,2	368	1,4	27	-20	3,4	298	1,0	18					
-15	3,7	162	0,3	27	-15	3,8	333	1,2	29	-15	3,0	263	0,8	19					
-10	3,2	141	0,3	28	-10	3,4	298	1,0	30	-10	2,6	227	0,6	20					
-5	2,9	126	0,2	29	-5	3,0	264	0,8	30	-5	2,2	190	0,5	21					
0	2,6	113	0,2	31	0	2,7	231	0,6	32	0	1,9	161	0,3	22					
5	2,3	99	0,1	33	5	2,3	197	0,5	33	5	1,6	135	0,2	24					
10	2,0	86	0,1	35	10	1,9	162	0,3	33	10	1,3	109	0,2	26					
15	1,7	74	0,1	36	15	1,5	133	0,2	34	15	1,0	84	0,1	27					
20	1,4	61	0,1	38	20	1,2	108	0,2	36	20	0,7	60	0,1	29					
2nd step - TRs or 70% of air flow set on VNTLCD/VNT20 / V=600 m³/h																			
Tw1/Tw2 = 90/70°C					**Tw1/Tw2 = 80/60°C**					**Tw1/Tw2 = 70/50°C**					**Tw1/Tw2 = 70/40°C**				
-25	13,0	573	2,7	37	-25	11,6	508	2,3	30	-25	10,1	442	1,8	23	-25	8,6	251	0,7	16
-22	12,5	552	2,6	38	-22	11,1	487	2,1	31	-22	9,6	422	1,7	24	-22	8,2	237	0,6	17
-20	12,2	537	2,4	39	-20	10,8	473	2,0	32	-20	9,3	408	1,6	25	-20	7,8	228	0,6	18
-15	11,4	503	2,2	41	-15	10,0	439	1,7	34	-15	8,6	375	1,4	27	-15	7,1	205	0,5	20
-10	10,6	469	1,9	43	-10	9,3	406	1,5	37	-10	7,8	343	1,2	29	-10	6,2	182	0,4	21
-5	9,9	436	1,7	46	-5	8,5	374	1,3	39	-5	7,1	311	1,0	31	-5	5,4	157	0,3	23
0	9,1	404	1,4	48	0	7,8	342	1,1	41	0	6,4	280	0,8	33	0	4,4	128	0,2	23
5	8,4	372	1,3	50	5	7,1	311	0,9	43	5	5,7	249	0,7	35	5	3,9	114	0,2	26
10	7,7	341	1,1	52	10	6,4	281	0,8	45	10	5,0	218	0,5	37	10	3,4	99	0,1	28
15	7,0	310	0,9	54	15	5,7	251	0,6	46	15	4,3	187	0,4	39	15	2,9	85	0,1	31
20	6,4	280	0,8	56	20	5,0	221	0,5	48	20	3,6	155	0,3	40	20	2,5	72	0,1	34
Tw1/Tw2 = 60/40°C					**Tw1/Tw2 = 50/40°C**					**Tw1/Tw2 = 40/30°C**									
-25	8,6	376	1,4	16	-25	8,6	747	4,9	16	-25	7,2	620	3,7	9					
-22	8,2	356	1,3	17	-22	8,1	708	4,5	17	-22	6,7	582	3,3	10					
-20	7,9	342	1,2	18	-20	7,8	682	4,2	18	-20	6,4	556	3,0	11					
-15	7,1	310	1,0	20	-15	7,1	618	3,5	20	-15	5,7	494	2,4	13					
-10	6,4	277	0,8	22	-10	6,4	555	3,9	22	-10	5,0	432	1,9	15					
-5	5,6	245	0,7	24	-5	5,7	494	2,3	24	-5	4,3	371	1,5	17					
0	4,9	213	0,5	26	0	5,0	434	1,9	26	0	3,6	310	1,1	19					
5	4,1	179	0,4	27	5	4,3	375	1,4	28	5	2,9	248	0,7	20					
10	3,2	140	0,3	27	10	3,6	317	1,1	30	10	2,1	178	0,4	21					
15	2,7	118	0,2	30	15	3,0	258	0,7	31	15	1,6	136	0,3	24					
20	2,2	98	0,1	33	20	2,3	197	0,5	33	20	1,1	96	0,1	26					

For operating parameters concerning other water temperatures, please contact Sales Office.

V – air flow
PT – heating capacity
Tp1 – inlet air temperature
Tp2 – outlet air temperature
Tw1 – inlet water temperature
Tw2 – outlet water temperature
Qw – water flow rate in heat exchanger
Δpw – water pressure drop in heat exchanger



Air flow regulation by the TRs regulator or by the VNTLCD/VNT20 control panel																			
Tp1	PT	Qw	Δpw	Tp2	Tp1	PT	Qw	Δpw	Tp2	Tp1	PT	Qw	Δpw	Tp2	Tp1	PT	Qw	Δpw	Tp2
°C	kW	l/h	kPa	°C	°C	kW	l/h	kPa	°C	°C	kW	l/h	kPa	°C	°C	kW	l/h	kPa	°C
3rd step - TRs or 100% of air flow set on VNTLCD/VNT20 / V=1150 m³/h																			
Tw1/Tw2 = 90/70°C					Tw1/Tw2 = 80/60°C					Tw1/Tw2 = 70/50°C					Tw1/Tw2 = 70/40°C				
-25	21,6	952	6,9	22	-25	19,2	843	5,7	17	-25	16,8	735	4,6	12	-25	14,5	421	1,7	7
-22	20,8	917	6,5	24	-22	18,4	810	5,3	19	-22	16,0	702	4,2	14	-22	13,7	399	1,5	8
-20	20,3	894	6,2	25	-20	17,9	787	5,0	20	-20	15,5	680	4,0	15	-20	13,2	384	1,4	9
-15	19,0	838	5,5	28	-15	16,7	732	4,4	23	-15	14,3	626	3,4	18	-15	12,0	348	1,2	12
-10	17,7	783	4,8	31	-10	15,4	678	3,8	26	-10	13,1	573	2,9	20	-10	10,8	313	1,0	15
-5	16,5	729	4,2	34	-5	14,2	625	3,3	29	-5	11,9	522	2,5	23	-5	9,5	277	0,8	18
0	15,3	676	3,7	37	0	13,1	573	2,8	31	0	10,8	471	2,0	26	0	8,3	242	0,6	20
5	14,1	624	3,2	40	5	11,9	522	2,4	34	5	9,6	420	1,7	29	5	7,0	205	0,5	22
10	13,0	572	2,7	42	10	10,7	472	2,0	37	10	8,5	371	1,3	31	10	5,6	164	0,3	24
15	11,8	522	2,3	45	15	9,6	423	1,6	39	15	7,3	321	1,0	34	15	4,1	120	0,2	25
20	10,7	472	1,9	48	20	8,5	374	1,3	42	20	6,2	272	0,8	36	20	3,4	100	0,1	29
Tw1/Tw2 = 60/40°C					Tw1/Tw2 = 50/40°C					Tw1/Tw2 = 40/30°C									
-25	14,4	626	3,5	6*	-25	14,3	1245	12,5	6*	-25	11,9	1034	9,3	1*					
-22	13,6	593	3,2	8	-22	13,6	1180	11,4	8	-22	11,2	971	8,3	3*					
-20	13,1	582	3,0	9	-20	13,1	1138	10,6	9	-20	10,7	930	7,6	5*					
-15	11,9	519	2,5	12	-15	11,9	1033	8,9	12	-15	9,5	827	6,2	7					
-10	10,7	467	2,1	15	-10	10,7	930	7,4	15	-10	8,4	726	4,9	9					
-5	9,5	416	1,7	18	-5	9,5	829	6,0	18	-5	7,2	627	3,8	12					
0	8,4	365	1,3	20	0	8,4	730	4,7	20	0	6,1	529	2,8	15					
5	7,2	314	1,0	23	5	7,3	633	3,7	23	5	5,0	431	1,9	17					
10	6,0	263	0,7	25	10	6,2	536	2,7	25	10	3,8	332	1,2	20					
15	4,8	210	0,5	27	15	5,1	441	1,9	28	15	2,5	221	0,6	21					
20	3,2	138	0,2	28	20	4,0	346	1,2	30	20	1,6	136	0,3	24					

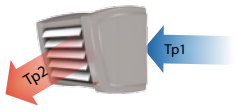
* too low outlet air temperature - not allowed.

V – air flow
PT – heating capacity
Tp1 – inlet air temperature
Tp2 – outlet air temperature
Tw1 – inlet water temperature
Tw2 – outlet water temperature
Qw – water flow rate in heat exchanger
Δpw – water pressure drop in heat exchanger

Air flow regulation by the TR/TRd regulator or by the VNTLCD/VNT20 control panel

Tp1	PT	Qw	Δpw	Tp2	Tp1	PT	Qw	Δpw	Tp2	Tp1	PT	Qw	Δpw	Tp2	Tp1	PT	Qw	Δpw	Tp2
°C	kW	l/h	kPa	°C	°C	kW	l/h	kPa	°C	°C	kW	l/h	kPa	°C	°C	kW	l/h	kPa	°C
1st step - TR/TRd or 45% of air flow set on VNTLCD/VNT20 / V=230 m³/h																			
Tw1/Tw2 = 90/70°C					**Tw1/Tw2 = 80/60°C**					**Tw1/Tw2 = 70/50°C**					**Tw1/Tw2 = 70/40°C**				
-25	7,0	311	0,9	52	-25	6,3	275	0,8	44	-25	5,5	239	0,6	35	-25	4,4	128	0,2	23
-22	6,8	299	0,8	53	-22	6,0	264	0,7	44	-22	5,2	228	0,6	36	-22	4,2	122	0,2	24
-20	6,6	291	0,8	53	-20	5,8	256	0,7	45	-20	5,0	220	0,5	36	-20	4,1	118	0,2	25
-15	6,2	272	0,7	55	-15	5,4	237	0,6	46	-15	4,6	201	0,4	37	-15	3,7	108	0,2	27
-10	5,7	253	0,6	56	-10	5,0	219	0,5	48	-10	4,2	183	0,4	38	-10	3,4	98	0,1	29
-5	5,3	234	0,5	58	-5	4,6	201	0,4	49	-5	3,8	165	0,3	39	-5	3,1	89	0,1	31
0	4,9	216	0,5	59	0	4,2	183	0,4	50	0	3,4	147	0,3	40	0	2,8	80	0,1	33
5	4,5	199	0,4	60	5	3,8	165	0,3	51	5	2,9	128	0,2	41	5	2,4	71	0,1	35
10	4,1	182	0,3	61	10	3,4	148	0,3	52	10	2,6	111	0,2	42	10	2,1	62	0,1	37
15	3,7	165	0,3	62	15	3,0	131	0,2	53	15	2,3	98	0,1	43	15	1,9	54	0,1	38
20	3,4	148	0,2	63	20	2,6	113	0,2	53	20	2,0	85	0,1	45	20	1,6	45	0,1	40
Tw1/Tw2 = 60/40°C					**Tw1/Tw2 = 50/40°C**					**Tw1/Tw2 = 40/30°C**									
-25	4,6	201	0,5	25	-25	4,7	404	1,6	26	-25	3,9	334	1,2	17					
-22	4,3	189	0,4	26	-22	4,4	382	1,5	27	-22	3,6	313	1,1	18					
-20	4,2	182	0,4	27	-20	4,2	368	1,4	27	-20	3,4	298	1,0	18					
-15	3,7	162	0,3	27	-15	3,8	333	1,2	29	-15	3,0	263	0,8	19					
-10	3,2	141	0,3	28	-10	3,4	298	1,0	30	-10	2,6	227	0,6	20					
-5	2,9	126	0,2	29	-5	3,0	264	0,8	30	-5	2,2	190	0,5	21					
0	2,6	113	0,2	31	0	2,7	231	0,6	32	0	1,9	161	0,3	22					
5	2,3	99	0,1	33	5	2,3	197	0,5	33	5	1,6	135	0,2	24					
10	2,0	86	0,1	35	10	1,9	162	0,3	33	10	1,3	109	0,2	26					
15	1,7	74	0,1	36	15	1,5	133	0,2	34	15	1,0	84	0,1	27					
20	1,4	61	0,1	38	20	1,2	108	0,2	36	20	0,7	60	0,1	29					
2nd step - TR/TRd or 55% of air flow set on VNTLCD/VNT20 / V=370 m³/h																			
Tw1/Tw2 = 90/70°C					**Tw1/Tw2 = 80/60°C**					**Tw1/Tw2 = 70/50°C**					**Tw1/Tw2 = 70/40°C**				
-25	10,1	444	1,7	43	-25	9,0	394	1,4	36	-25	7,8	343	1,2	28	-25	6,6	192	0,4	20
-22	9,7	427	1,6	45	-22	8,6	377	1,3	37	-22	7,5	327	1,1	29	-22	6,2	181	0,4	21
-20	9,4	416	1,5	45	-20	8,3	366	1,3	38	-20	7,2	316	1,0	30	-20	6,0	173	0,4	21
-15	8,8	389	1,4	47	-15	7,7	340	1,1	40	-15	6,6	290	0,9	32	-15	5,3	154	0,3	22
-10	8,2	363	1,2	49	-10	7,2	314	1,0	41	-10	6,1	265	0,7	34	-10	4,6	133	0,2	23
-5	7,6	337	1,0	51	-5	6,6	289	0,8	43	-5	5,5	240	0,6	35	-5	4,1	118	0,2	25
0	7,1	311	0,9	53	0	6,0	264	0,7	45	0	4,9	215	0,5	37	0	3,6	106	0,2	27
5	6,5	287	0,8	54	5	5,5	240	0,6	46	5	4,4	190	0,4	38	5	3,2	94	0,1	30
10	6,0	263	0,7	56	10	4,9	216	0,5	48	10	3,8	166	0,3	39	10	2,8	82	0,1	32
15	5,4	239	0,6	58	15	4,4	192	0,4	49	15	3,2	140	0,2	40	15	2,4	71	0,1	34
20	4,9	215	0,5	59	20	3,8	169	0,3	51	20	2,6	114	0,2	41	20	2,1	60	0,1	36
Tw1/Tw2 = 60/40°C					**Tw1/Tw2 = 50/40°C**					**Tw1/Tw2 = 40/30°C**									
-25	6,7	290	0,9	20	-25	6,7	578	3,1	20	-25	5,5	480	2,3	13					
-22	6,3	274	0,8	21	-22	6,3	548	2,8	21	-22	5,2	450	2,1	14					
-20	6,1	264	0,7	22	-20	6,1	527	2,6	22	-20	5,0	430	1,9	14					
-15	5,5	238	0,6	24	-15	5,5	477	2,2	24	-15	4,4	381	1,5	16					
-10	4,9	212	0,5	25	-10	4,9	429	1,8	26	-10	3,8	332	1,2	18					
-5	4,3	186	0,4	26	-5	4,4	381	1,5	27	-5	3,3	284	0,9	19					
0	3,6	159	0,3	27	0	3,8	334	1,2	29	0	2,7	235	0,7	20					
5	3,0	132	0,2	28	5	3,3	288	0,9	30	5	2,1	180	0,4	21					
10	2,6	115	0,2	30	10	2,8	242	0,7	32	1,3	1,7	146	0,3	23					
15	2,2	98	0,1	33	15	2,2	195	0,4	33	15	1,3	112	0,2	25					
20	1,9	81	0,1	35	20	1,7	145	0,3	33	20	0,9	80	0,1	27					

For operating parameters concerning other water temperatures, please contact Sales Office.



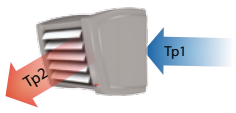
Air flow regulation by the TR/TRd regulator or by the VNTLCD/VNT20 control panel

Tp1	PT	Qw	Δpw	Tp2	Tp1	PT	Qw	Δpw	Tp2	Tp1	PT	Qw	Δpw	Tp2	Tp1	PT	Qw	Δpw	Tp2
oC	kW	l/h	kPa	oC	oC	kW	l/h	kPa	oC	oC	kW	l/h	kPa	oC	oC	kW	l/h	kPa	oC
3rd step - TR/TRd or 65% of air flow set on VNTLCD/VNT20 / V=530 m³/h																			
Tw1/Tw2 = 90/70°C					**Tw1/Tw2 = 80/60°C**					**Tw1/Tw2 = 70/50°C**					**Tw1/Tw2 = 70/40°C**				
-25	13,0	573	2,7	37	-25	11,6	508	2,3	30	-25	10,1	442	1,8	23	-25	8,6	251	0,7	16
-22	12,5	552	2,6	38	-22	11,1	487	2,1	31	-22	9,6	422	1,7	24	-22	8,2	237	0,6	17
-20	12,2	537	2,4	39	-20	10,8	473	2,0	32	-20	9,3	408	1,6	25	-20	7,8	228	0,6	18
-15	11,4	503	2,2	41	-15	10,0	439	1,7	34	-15	8,6	375	1,4	27	-15	7,1	205	0,5	20
-10	10,6	469	1,9	43	-10	9,3	406	1,5	37	-10	7,8	343	1,2	29	-10	6,2	182	0,4	21
-5	9,9	436	1,7	46	-5	8,5	374	1,3	39	-5	7,1	311	1,0	31	-5	5,4	157	0,3	23
0	9,1	404	1,4	48	0	7,8	342	1,1	41	0	6,4	280	0,8	33	0	4,4	128	0,2	23
5	8,4	372	1,3	50	5	7,1	311	0,9	43	5	5,7	249	0,7	35	5	3,9	114	0,2	26
10	7,7	341	1,1	52	10	6,4	281	0,8	45	10	5,0	218	0,5	37	10	3,4	99	0,1	28
15	7,0	310	0,9	54	15	5,7	251	0,6	46	15	4,3	187	0,4	39	15	2,9	85	0,1	31
20	6,4	280	0,8	56	20	5,0	221	0,5	48	20	3,6	155	0,3	40	20	2,5	72	0,1	34
Tw1/Tw2 = 60/40°C					**Tw1/Tw2 = 50/40°C**					**Tw1/Tw2 = 40/30°C**									
-25	8,6	376	1,4	16	-25	8,6	747	4,9	16	-25	7,2	620	3,7	9					
-22	8,2	356	1,3	17	-22	8,1	708	4,5	17	-22	6,7	582	3,3	10					
-20	7,9	342	1,2	18	-20	7,8	682	4,2	18	-20	6,4	556	3,0	11					
-15	7,1	310	1,0	20	-15	7,1	618	3,5	20	-15	5,7	494	2,4	13					
-10	6,4	277	0,8	22	-10	6,4	555	3,9	22	-10	5,0	432	1,9	15					
-5	5,6	245	0,7	24	-5	5,7	494	2,3	24	-5	4,3	371	1,5	17					
0	4,9	213	0,5	26	0	5,0	434	1,9	26	0	3,6	310	1,1	19					
5	4,1	179	0,4	27	5	4,3	375	1,4	28	5	2,9	248	0,7	20					
10	3,2	140	0,3	27	10	3,6	317	1,1	30	10	2,1	178	0,4	21					
15	2,7	118	0,2	30	15	3,0	258	0,7	31	15	1,6	136	0,3	24					
20	2,2	98	0,1	33	20	2,3	197	0,5	33	20	1,1	96	0,1	26					
4th step - TR/TRd or 75% of air flow set on VNTLCD/VNT20 / V=710 m³/h																			
Tw1/Tw2 = 90/70°C					**Tw1/Tw2 = 80/60°C**					**Tw1/Tw2 = 70/50°C**					**Tw1/Tw2 = 70/40°C**				
-25	13,0	573	2,7	37	-25	11,6	508	2,3	30	-25	10,1	442	1,8	23	-25	8,6	251	0,7	16
-22	12,5	552	2,6	38	-22	11,1	487	2,1	31	-22	9,6	422	1,7	24	-22	8,2	237	0,6	17
-20	12,2	537	2,4	39	-20	10,8	473	2,0	32	-20	9,3	408	1,6	25	-20	7,8	228	0,6	18
-15	11,4	503	2,2	41	-15	10,0	439	1,7	34	-15	8,6	375	1,4	27	-15	7,1	205	0,5	20
-10	10,6	469	1,9	43	-10	9,3	406	1,5	37	-10	7,8	343	1,2	29	-10	6,2	182	0,4	21
-5	9,9	436	1,7	46	-5	8,5	374	1,3	39	-5	7,1	311	1,0	31	-5	5,4	157	0,3	23
0	9,1	404	1,4	48	0	7,8	342	1,1	41	0	6,4	280	0,8	33	0	4,4	128	0,2	23
5	8,4	372	1,3	50	5	7,1	311	0,9	43	5	5,7	249	0,7	35	5	3,9	114	0,2	26
10	7,7	341	1,1	52	10	6,4	281	0,8	45	10	5,0	218	0,5	37	10	3,4	99	0,1	28
15	7,0	310	0,9	54	15	5,7	251	0,6	46	15	4,3	187	0,4	39	15	2,9	85	0,1	31
20	6,4	280	0,8	56	20	5,0	221	0,5	48	20	3,6	155	0,3	40	20	2,5	72	0,1	34
Tw1/Tw2 = 60/40°C					**Tw1/Tw2 = 50/40°C**					**Tw1/Tw2 = 40/30°C**									
-25	8,6	376	1,4	16	-25	8,6	747	4,9	16	-25	7,2	620	3,7	9					
-22	8,2	356	1,3	17	-22	8,1	708	4,5	17	-22	6,7	582	3,3	10					
-20	7,9	342	1,2	18	-20	7,8	682	4,2	18	-20	6,4	556	3,0	11					
-15	7,1	310	1,0	20	-15	7,1	618	3,5	20	-15	5,7	494	2,4	13					
-10	6,4	277	0,8	22	-10	6,4	555	3,9	22	-10	5,0	432	1,9	15					
-5	5,6	245	0,7	24	-5	5,7	494	2,3	24	-5	4,3	371	1,5	17					
0	4,9	213	0,5	26	0	5,0	434	1,9	26	0	3,6	310	1,1	19					
5	4,1	179	0,4	27	5	4,3	375	1,4	28	5	2,9	248	0,7	20					
10	3,2	140	0,3	27	10	3,6	317	1,1	30	10	2,1	178	0,4	21					
15	2,7	118	0,2	30	15	3,0	258	0,7	31	15	1,6	136	0,3	24					
20	2,2	98	0,1	33	20	2,3	197	0,5	33	20	1,1	96	0,1	26					

V – air flow
PT – heating capacity
Tp1 – inlet air temperature
Tp2 – outlet air temperature
Tw1 – inlet water temperature
Tw2 – outlet water temperature
Qw – water flow rate in heat exchanger
Δpw – water pressure drop in heat exchanger

Air flow regulation by the TR/TRd regulator or by the VNTLCD/VNT20 control panel																			
Tp1	PT	Qw	Δpw	Tp2	Tp1	PT	Qw	Δpw	Tp2	Tp1	PT	Qw	Δpw	Tp2	Tp1	PT	Qw	Δpw	Tp2
°C	kW	l/h	kPa	°C	°C	kW	l/h	kPa	°C	°C	kW	l/h	kPa	°C	°C	kW	l/h	kPa	°C
5th step - TR/TRd or 100% of air flow set on VNTLCD/VNT20 / V=1150 m³/h																			
Tw1/Tw2 = 90/70°C					Tw1/Tw2 = 80/60°C					Tw1/Tw2 = 70/50°C					Tw1/Tw2 = 70/40°C				
-25	21,6	952	6,9	22	-25	19,2	843	5,7	17	-25	16,8	735	4,6	12	-25	14,5	421	1,7	7
-22	20,8	917	6,5	24	-22	18,4	810	5,3	19	-22	16,0	702	4,2	14	-22	13,7	399	1,5	8
-20	20,3	894	6,2	25	-20	17,9	787	5,0	20	-20	15,5	680	4,0	15	-20	13,2	384	1,4	9
-15	19,0	838	5,5	28	-15	16,7	732	4,4	23	-15	14,3	626	3,4	18	-15	12,0	348	1,2	12
-10	17,7	783	4,8	31	-10	15,4	678	3,8	26	-10	13,1	573	2,9	20	-10	10,8	313	1,0	15
-5	16,5	729	4,2	34	-5	14,2	625	3,3	29	-5	11,9	522	2,5	23	-5	9,5	277	0,8	18
0	15,3	676	3,7	37	0	13,1	573	2,8	31	0	10,8	471	2,0	26	0	8,3	242	0,6	20
5	14,1	624	3,2	40	5	11,9	522	2,4	34	5	9,6	420	1,7	29	5	7,0	205	0,5	22
10	13,0	572	2,7	42	10	10,7	472	2,0	37	10	8,5	371	1,3	31	10	5,6	164	0,3	24
15	11,8	522	2,3	45	15	9,6	423	1,6	39	15	7,3	321	1,0	34	15	4,1	120	0,2	25
20	10,7	472	1,9	48	20	8,5	374	1,3	42	20	6,2	272	0,8	36	20	3,4	100	0,1	29
Tw1/Tw2 = 60/40°C					Tw1/Tw2 = 50/40°C					Tw1/Tw2 = 40/30°C									
-25	14,4	626	3,5	6*	-25	14,3	1245	12,5	6*	-25	11,9	1034	9,3	1*					
-22	13,6	593	3,2	8	-22	13,6	1180	11,4	8	-22	11,2	971	8,3	3*					
-20	13,1	582	3,0	9	-20	13,1	1138	10,6	9	-20	10,7	930	7,6	5*					
-15	11,9	519	2,5	12	-15	11,9	1033	8,9	12	-15	9,5	827	6,2	7					
-10	10,7	467	2,1	15	-10	10,7	930	7,4	15	-10	8,4	726	4,9	9					
-5	9,5	416	1,7	18	-5	9,5	829	6,0	18	-5	7,2	627	3,8	12					
0	8,4	365	1,3	20	0	8,4	730	4,7	20	0	6,1	529	2,8	15					
5	7,2	314	1,0	23	5	7,3	633	3,7	23	5	5,0	431	1,9	17					
10	6,0	263	0,7	25	10	6,2	536	2,7	25	10	3,8	332	1,2	20					
15	4,8	210	0,5	27	15	5,1	441	1,9	28	15	2,5	221	0,6	21					
20	3,2	138	0,2	28	20	4,0	346	1,2	30	20	1,6	136	0,3	24					

* too low outlet air temperature - not allowed.
For operating parameters concerning other water temperatures, please contact Sales Office.



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