Vallox Digit 2 SE

• 1.09.391E
• 30.4.2010
• Code 3550 SE
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DIGIT SED
ELECTRONIC CONTROLLER WITH LCD DISPLAY

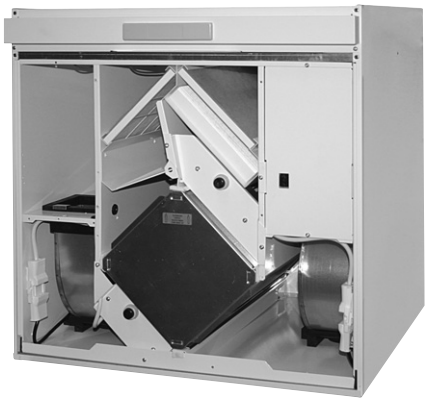




DIGIT2 SE MLV R
(liquid radiator model)

Models:

DIGIT2 SE R
DIGIT2 SE L
DIGIT2 SE VKL R
DIGIT2 SE VKL L
DIGIT2 SE MLV R
DIGIT2 SE MLV L



DIGIT2 SE R
(electric radiator model)

TECHNICAL SPECIFICATION

- Supply and extract air ventilation with heat recovery
- Silent operation
- Energy-efficient unit; high-efficiency cross-flow cell
- Electronic DIGIT SED control or wireless remote monitoring (option)
- Week clock control
- Humidity control (option)
- Carbon dioxide control (option)
- Maintenance reminder
- Summer/winter automation
- Fireplace/booster switch function
- Good filtering
- Fixed air flow measuring outlets
- MLV model especially designed for use with ground heat systems
- Easy and quick installation

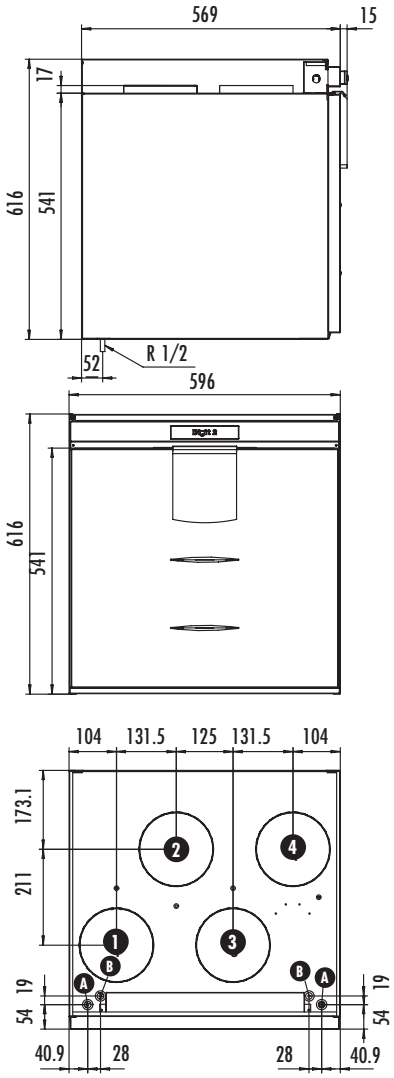
Electrical connection		230 V, 50 Hz
Class of protection		IP34
Fans	Extract air 210 kW 0.91 A (AC)	120 dm^3/s (120 Pa)
	Supply air 210 W, 0.91 A (AC)	110 dm^3/s (100 Pa)
Heat recovery		Cross-flow cell, $\eta > 60\%$
VALLOX DIGIT2 SE		2.7 kW, 12.0 A
	Preheating unit	Electric 1200 W, 5.2 A
	Post-heating unit	Electric 1200 W, 5.2 A
VALLOX DIGIT2 SE VKL		1.55 kW, 6.7 A
	Preheating unit	Electric 1200 W, 5.2 A
	Post-heating unit	VKL water radiator
VALLOX DIGIT2 SE MLV		0.35 kW, 1.5 A
	Preheating unit	MLV liquid radiator
	Post-heating unit	VKL water radiator
Filters	Supply air	G3 and F7
	Extract air	G3
Weight		71 kg
Ventilation adjustment options		Control panel control
		Week-clock control
		CO_2 and %RH control (option)
		Wireless remote control (option)
Options		CO_2 sensor
		%RH sensor
		Wireless remote control
		Filter guard (supply and/or extract air)
		LON converter
		Ceiling mounting
		Attic floor penetration

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VALLOX DIGIT2 SE/VKL/MLV

DIMENSIONS AND MAIN PARTS

Dimensions and duct outlets



Duct outlets
Inner diameter of collar
ø 160 mm + connector outlets

Model R
1. Supply air to the dwelling
2. Extract air from the dwelling
3. Outdoor air to the unit
4. Exhaust air outside

Model L
1. Exhaust air outside
2. Outdoor air to the unit
3. Extract air from the dwelling
4. Supply air to the dwelling

A. Supply liquid/water
B. Return liquid/water

VALLOX DIGIT2 SE models
Code: 3550 SE

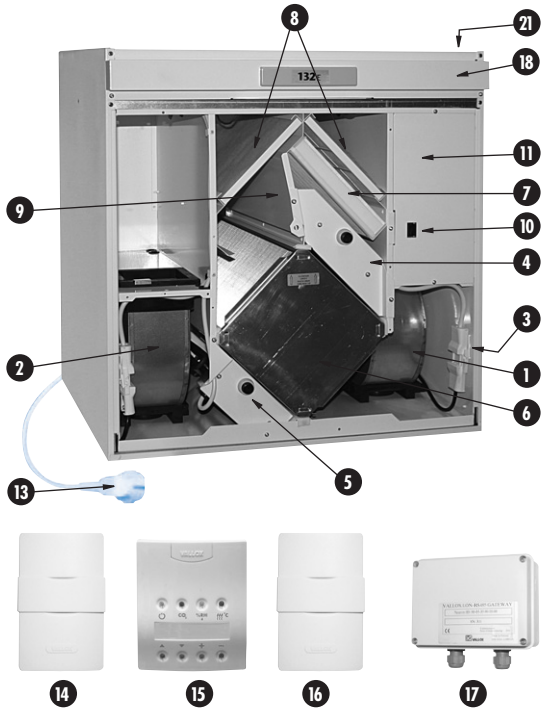
VALLOX DIGIT2 SE
- Preheating radiator: electric, 1200 W
- Post-heating radiator: electric, 1200 W

VALLOX DIGIT2 SE VKL
- Preheating radiator: electric 1200 W
- Post-heating radiator: VKL water radiator

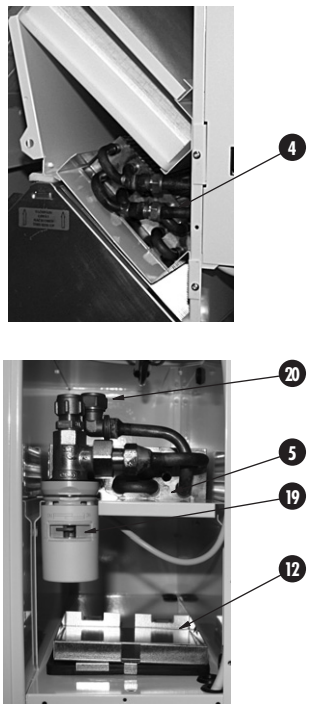
VALLOX DIGIT2 SE MLV
- Preheating radiator: MLV liquid radiator
- Post-heating radiator: VKL water radiator

The letter L or R after the name of the unit indicates whether the unit is left- or right-handed.

The picture shows VALLOX DIGIT2 SE model R (electric radiator model).



VKL/MLV model units



Main parts

1. Extract air fan 210 W/0.92 A, alternating current (AC)
2. Supply air fan 210 W/0.92 A, alternating current (AC)
3. Electrical quick-connect terminal for fan
4. Preheating unit (electric 1.2 kW or liquid)
5. Post-heating unit (electric 1.2 kW or water)
6. Heat recovery cell
7. Outdoor air filter F7
8. Outdoor and extract air prefilter G3
9. Summer/winter damper
10. Maintenance switch
11. Connection box cover plate
12. Self-actuated one-way dampers (only in VKL and MLV models)
13. Plug 1.8 m
14. Humidity sensor (option)
15. Control panel
16. CO_2 sensor (option)
17. LON converter (option)
18. Air flow measuring outlets (behind cover plate)
19. Water radiator actuator/valve
20. Connection ø 12
21. MLV connection ø 10 cu

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PERFORMANCE

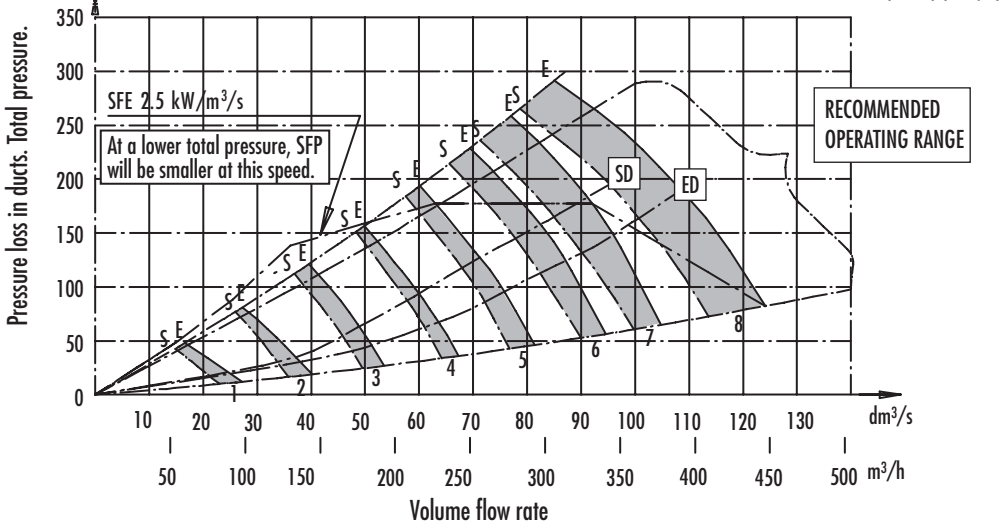
Air flows/DIGIT2 SE (electric radiator unit, winter setting)

E = Extract air fan
S = Supply air fan

ED and SD are examples of pressure losses in supply and extract ducts

SFP (Specific Fan Power) guideline value < 2.5 (kW/m³/s)

$$SFP = \frac{\text{Input power (total) (W)}}{\text{Air flow (max.) (dm}^3\text{/s)}}$$

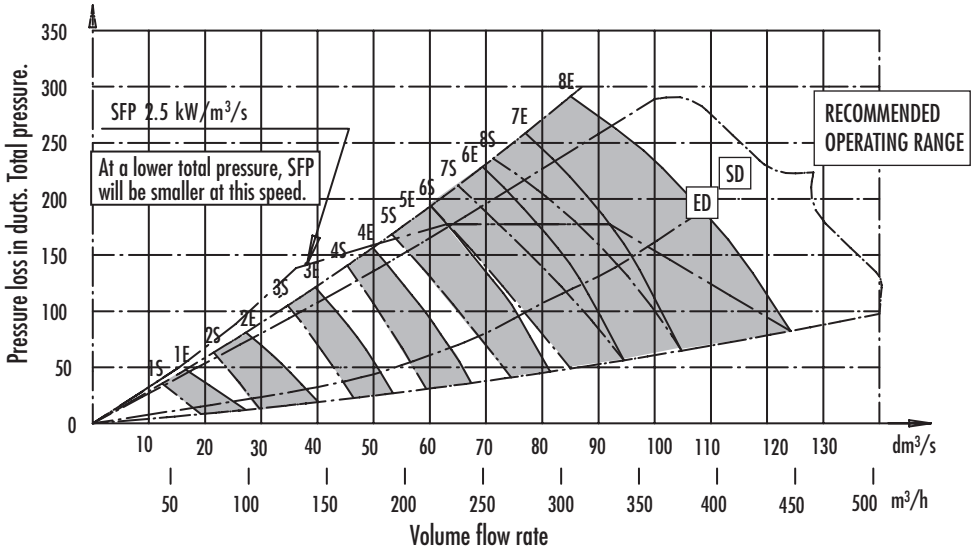


Air flows/DIGIT2 SE VKL (liquid radiator unit, winter setting)

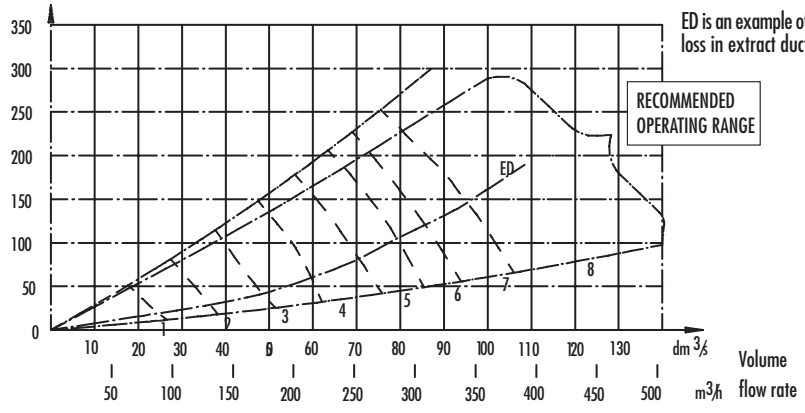
E = Extract air fan
S = Supply air fan

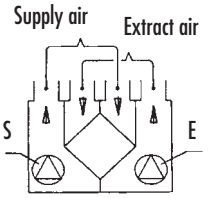
ED and SD are examples of pressure losses in supply and extract ducts

SFP (Specific Fan Power) guideline value < 2.5 (kW/m³/s)



Extract air flow during heat recovery bypass (summer setting)





Measuring points after the connection outlet. Fan curves indicate the total pressure available for duct losses.

Fan speeds	Control voltage (V)	Fan input power W
1	60	42
2	80	67
3	100	97
4	120	130
5	140	167
6	160	205
7	180	242
8	230	315

NOTE!
If the unit has a post-heating radiator, it must be selected when the system is adjusted.

Air flow measurement outlets



The fixed air flow measurement outlets are located behind the cover plate.

You can measure the total pressure of the supply and extract air ductwork at the measurement outlets using a pressure gauge.

Compare the pressure readings with the air volume curves to see unit air flows at various adjustment positions.

The red measurement hose gives the pressure reading for the supply air ductwork and the black hose the pressure reading for the extract air ductwork. Observe unit model and setting (summer or winter).

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PERFORMANCE

Sound values		Sound power level from the ventilation unit to supply air ducts by octave band Lw, dB								Sound power level from the ventilation unit to extract air ducts by octave band Lw, dB							
		ADJUSTMENT POSITION / AIR FLOW								ADJUSTMENT POSITION / AIR FLOW							
	AP	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
	qV, dm³/s	15,2	25,8	36,1	48,3	59,2	70,5	79,1	89,8	23,7	33,3	42,2	54,5	68,5	82,7	92,1	109,0
Medium frequency of the octave band, Hz	63	64,1	68,7	71,2	74,4	73,3	77,0	77,2	78,2	50,3	56,3	63,4	66,8	66,3	64,1	70,2	70,4
	125	52,3	58,4	62,6	68,0	68,3	69,5	70,6	72,8	39,4	50,0	56,7	61,4	62,9	63,4	65,2	66,9
	250	42,8	49,7	54,8	58,1	61,1	63,7	65,3	67,5	31,6	39,8	47,0	52,1	55,4	59,9	60,0	62,2
	500	42,8	46,6	51,0	54,0	56,8	59,1	61,0	63,5	30,3	34,3	40,2	44,2	46,7	48,7	50,6	52,9
	1000	39,8	51,1	52,9	55,6	58,0	59,2	60,3	61,8	25,9	34,2	39,4	42,7	45,0	46,8	48,1	50,2
	2000	29,4	37,3	43,8	48,1	51,6	55,0	58,4	61,0	17,4	27,0	33,9	38,9	42,3	45,0	47,1	49,5
	4000	24,6	32,9	39,4	43,8	47,0	49,9	51,9	54,3			25,2	31,5	34,4	37,1	39,2	41,9
	8000		23,2	31,5	39,4	42,8	45,8	47,9	50,7					24,3	26,5	32,5	36,3
	L_W, dB	64,4	69,2	71,9	75,5	74,9	78,0	78,5	79,8	50,8	57,3	64,4	68,0	68,2	69,1	71,8	72,5
	L_{WA}, dB(A)	44,7	52,6	55,9	59,3	61,7	63,7	65,5	67,6	32,1	39,5	45,9	50,1	52,5	54,2	56,1	58,2

	A-weighted sound pressure level dB (A) coming from the unit through the envelope in rooms where the unit has been installed (10 m² sound absorption)							
	ADJUSTMENT POSITION / AIR FLOWS (supply / extract)							
AP	1	2	3	4	5	6	7	8
supply/extract, dm³/s	20,3 / 23,2	32,1 / 35,1	44,5 / 47,8	56,8 / 61,2	68,4 / 74,4	78,4 / 86,2	86,2 / 95,7	97,3 / 109,0
L_{pA}, dB(A)	11,8	23,7	28,9	32,8	36,2	38,5	40,7	42,9

Digit2 SE

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VALLOX DIGIT2 SE/VKL/MLV

VALLOX DIGIT SED CONTROL PANEL

Control

VALLOX DIGIT SE can be controlled with the control panel coming with the unit (3 at most) and with optional CO_2 (5 at most) and %RH sensors (2 at most). Fan speeds of the unit can be controlled via remote monitoring with a voltage or current signal. In case of disturbances, a potential-free relay contact signal is issued.

With an optional VALLOX LON converter, the whole operation of the unit can be controlled via remote monitoring.

Week clock control

The week clock in the control panel of the unit can be used to programme the desired fan power option (1…8) for each hour in the day.

Control panel

1. **Start button**
   With this button, you switch the unit on and off. When the indicator is lit, the unit is on.
2. **Carbon dioxide adjustment**
   With this button, you set carbon dioxide adjustment on and off. When the indicator is lit, the adjustment is on.
3. **Humidity adjustment**
   With this button, you set humidity adjustment on and off. When the indicator is lit, the adjustment is on.
4. **Post-heating**
   With this button, you set post-heating on and off. When the indicator is lit, post-heating is on. The summer function is active when the indicator is not lit.
5. **Scrolling up**
   With this button, you can scroll the displays upward.
6. **Scrolling down**
   With this button, you can scroll the displays downward.
7. **Increase button**
   With this button, you can increase values.
8. **Decrease button**
   With this button, you can decrease values.



Keyboard

3	Fan speed (3).		Maintenance reminder alert.
21 C	Supply air temperature (21 °C).		Fireplace / booster switch on. The fireplace / booster switch is activated in this display by simultaneously pressing down the + and – buttons for 2 seconds.
	Post-heating is on.		
10:20	Time.		
	Filter guard alert.		Week clock control on.

Fan speed can be changed in this display with the + and – buttons



Main display

Mounting, removing and wiring of control panel

The control panel is wired straight from the electrical connection box. The control panel can also be connected in series with a CO_2 sensor or another control panel. (See External electrical connections on page 8).

Control panel addresses

If two or more control panels are connected to the system, the addresses of the control panels need to be changed.

E.g. 3 control panels.

- Connect the first control panel to the unit and change its address to 3.
- Connect the second control panel to the unit and change its address to 2.
- Connect the third control panel and make sure that its address is 1.

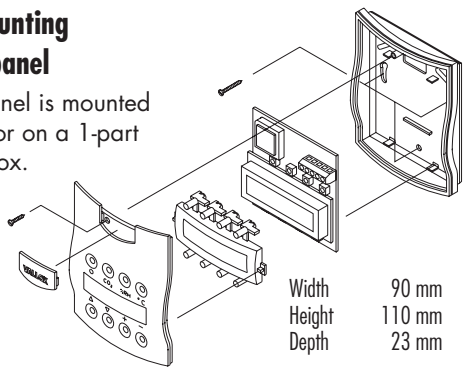
If control panels have the same address, they go to bus fault state. In this case, remove one of the control panels and change the address of the other panel. The above mentioned situation can arise in connection with the later installation of an additional control panel.



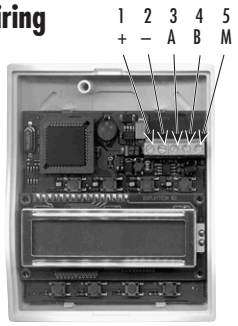
Panel address
1

Surface mounting of control panel

A control panel is mounted on the wall or on a 1-part instrument box.



Wiring



Electronics board of control panel

Cable:
NOMAK 2 x 2 x 0.5 mm² + 0.5 mm²

NOTE!
Faulty coupling of the (+) wire destroys the control panel!

1 = orange 1	= +	} ca. 21 VDC
2 = white 1	= –	
3 = orange 2	= A	
4 = white 2	= B	
5 = metal	= signal ground	

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SENSORS

HUMIDITY SENSORS

- When mounting two or more humidity sensors, connect them to the terminal block of the connection box by connecting the first humidity sensor to %RH1, in place of the 6K8resistor in the terminal block (remove the resistor in this case), and the second humidity sensor to %RH2. See the electrical diagram.



CARBON DIOXIDE SENSORS

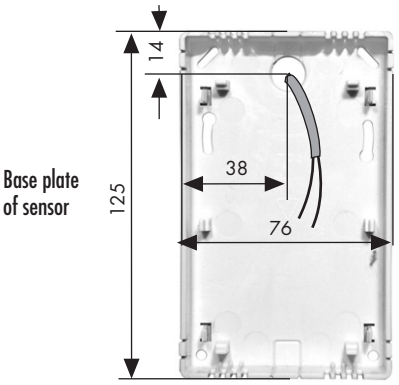
- Carbon dioxide sensors are connected individually.
- When the first carbon dioxide sensor has been connected to the system, the unit is switched on. After this, the unit gives the sensor an address. Follow the same steps for other carbon dioxide sensors.



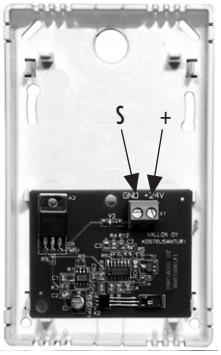
Mounting and wiring of humidity sensor

The sensor is wired straight from the electrical connection box of the unit.

Surface mounting



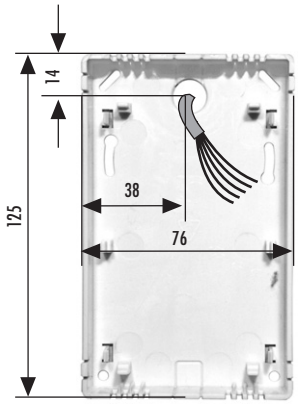
Wiring



Mounting and wiring of carbon dioxide sensor

The CO_2 sensor is connected directly from the connection box of the unit, or in series with another CO_2 sensor or control panel (see External electrical connections on page 8).

Surface mounting



Base plate of the CO_2 sensor

Wiring



Cable:
NOMAK 2 x 2 x 0.5 mm² + 0.5 mm²

NOTE!

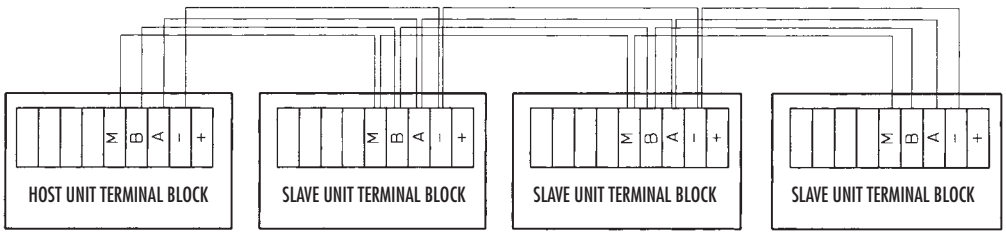
Faulty coupling of the (+) wire destroys the carbon dioxide sensor!

1 = orange 1 = +
2 = white 1 = – } ca. 21 VDC
3 = orange 2 = A
4 = white 2 = B
5 = metal = signal ground

Electronics card of the CO_2 sensor (model may vary)

Connecting two or more units (slave unit)

Connect slave units as specified in the adjoining connection instructions. Slave units do not operate independently, but follow the instructions received from the host unit. Neither control panel nor sensors must be connected to a slave unit.



NOTE! + wire must not be connected to a SLAVE UNIT.

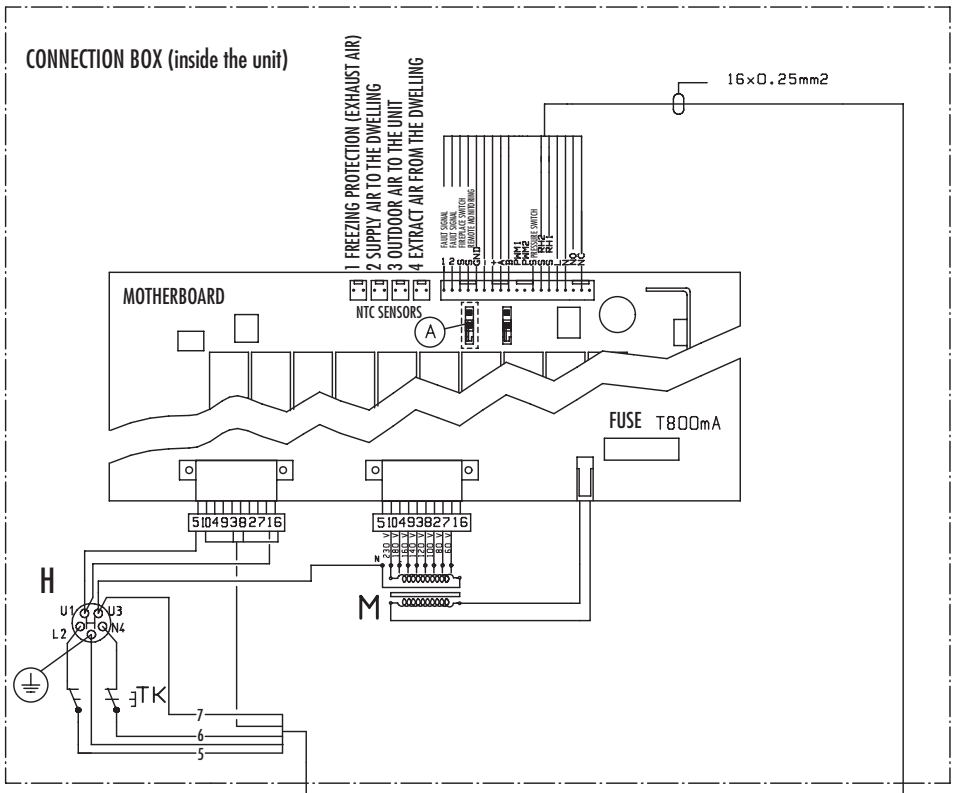
SLAVE UNIT must not have a 6K8 resistor in place.

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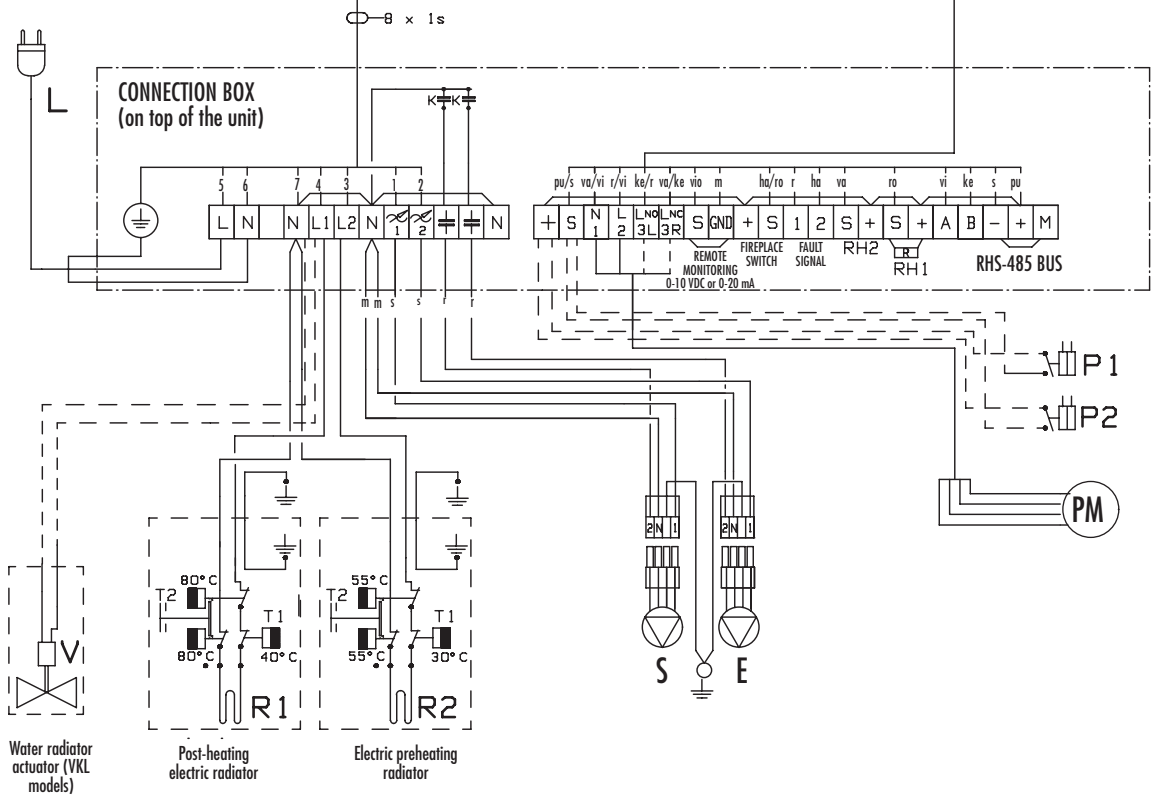
VALLOX DIGIT2 SE/VKL/MLV

INTERNAL ELECTRICAL DIAGRAM

Internal electrical connection VALLOX DIGIT2 SE



S = Supply air fan
E = Extract air fan
M = Autotransformer with protective voltage coil
K = Capacitor
H = Interference suppressor
L = Earthed wire
SS = Safety switch
V = Water radiator actuator/valve
T1 = Safety thermostat of heating radiator
T2 = Overheating protector 2 pcs
R1 = Post-heating radiator
R2 = Preheating radiator
PM = Damper motor 21 V DC
P1 = Filter guard, option (supply)
P2 = Filter guard, option (extract)

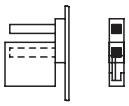


DAMPER MOTOR CONNECTION
3R = R model
3L = L model

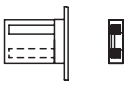
Wire colours
s = blue
m = black
r = brown
vi = green
ke = yellow
pu = red
ro = rose
va = white
ha = grey
vio = violet

A FAN CONTROL WITH VOLTAGE/CURRENT SIGNAL SELECTION WITH JUMPER A

USE OF JUMPER IN VOLTAGE SIGNAL CONTROL (FACTORY SETTING)



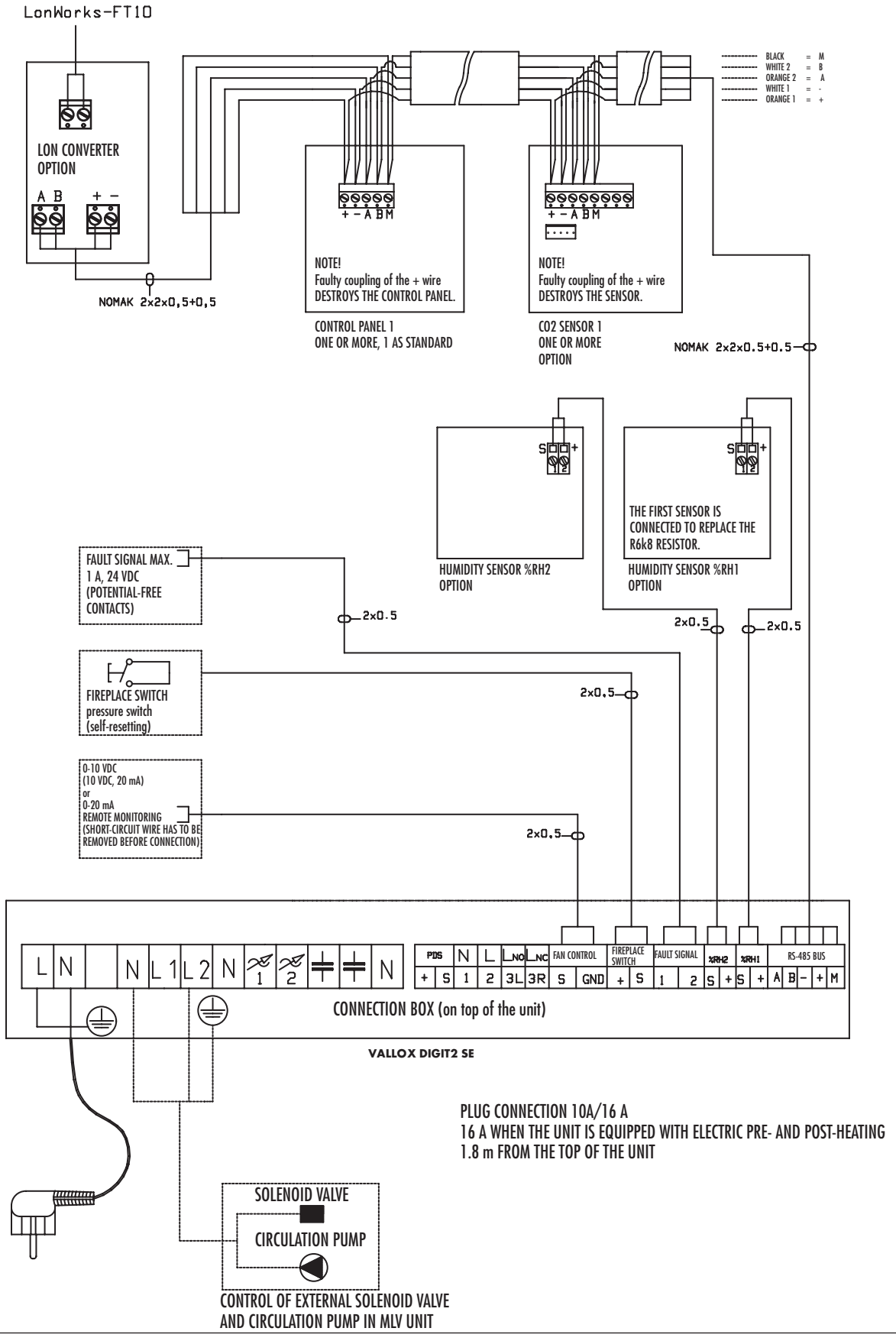
USE OF JUMPER IN CURRENT SIGNAL CONTROL



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EXTERNAL ELECTRICAL DIAGRAM

External electrical connection VALLOX DIGIT2 SE

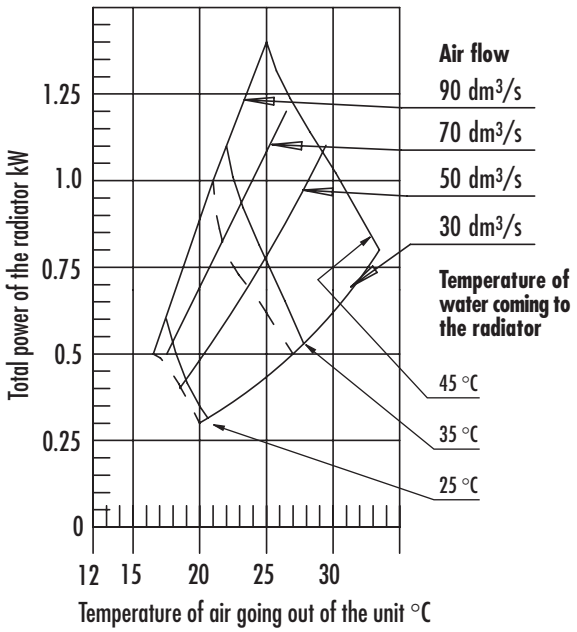


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POST-HEATING/VKL RADIATOR PERFORMANCE

VALLOX DIGIT2 SE/performance of VKL post-heating radiator

Power of VKL water radiator

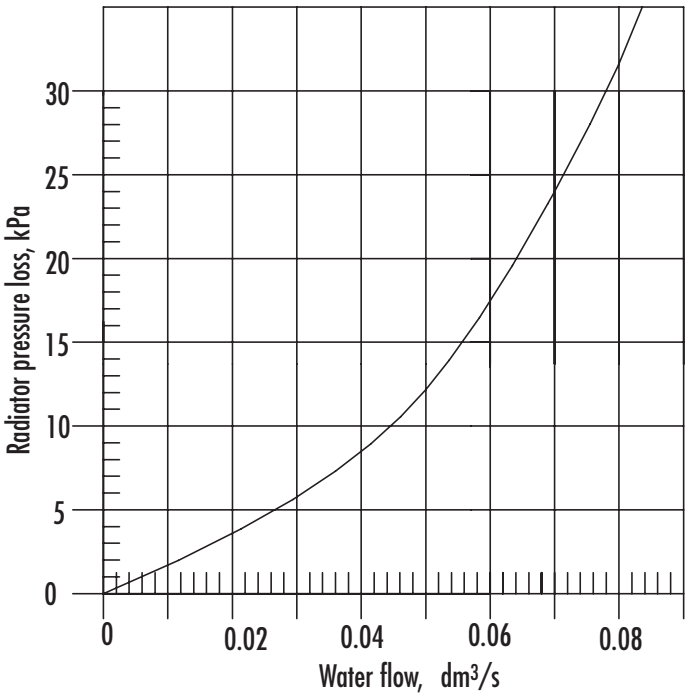


Temperature of air coming to the radiator 12 °C

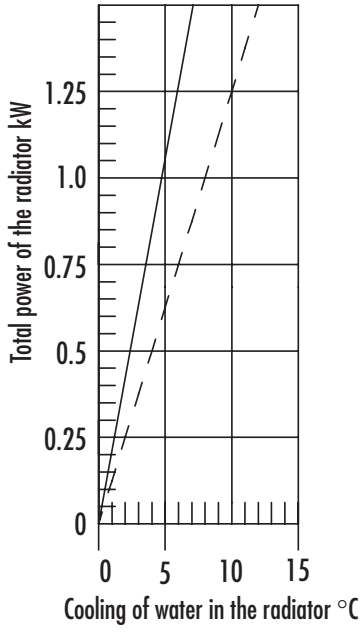
liquid flow 0.05 dm³/s

liquid flow 0.03 dm³/s

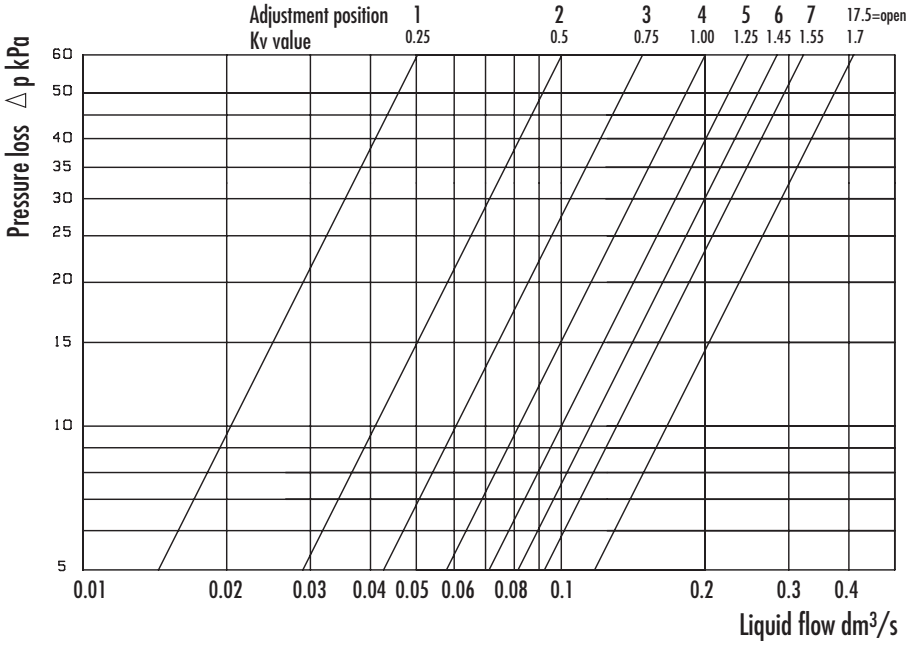
Pressure loss in VKL water radiator



Cooling of water in the radiator



Pressure loss in the valve



Temperature of air coming to the radiator 12 °C

liquid flow 0.05 dm³/s

liquid flow 0.03 dm³/s

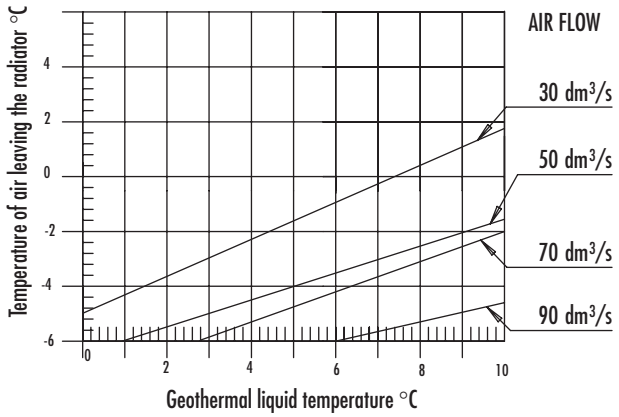
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POST-HEATING/MLV RADIATOR PERFORMANCE

Performance of VALLOX DIGIT2 SE MLV heating/cooling radiator

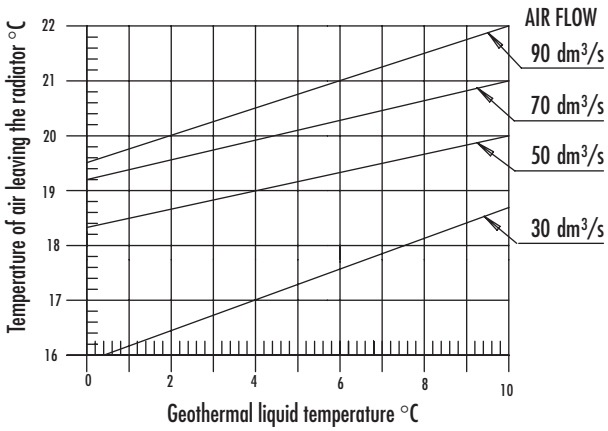
MLV RADIATOR HEATING POWER

Ethanol 30%, flow rate 0.07dm³/s
Incoming air -12°C

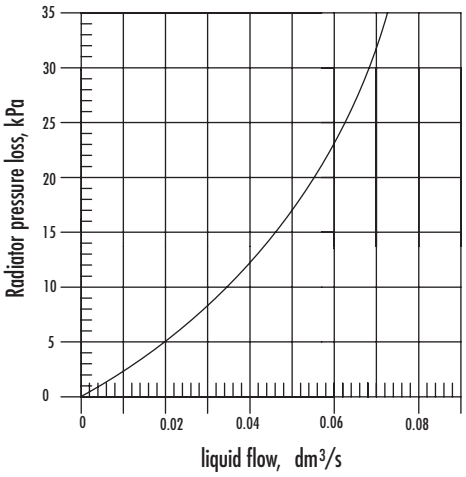


MLV RADIATOR COOLING POWER (1.5…2.5 kW)

Ethanol 30%, flow rate 0.07 dm³/s
Incoming air 28 °C, relative humidity RH 60%



MLV RADIATOR PRESSURE LOSS

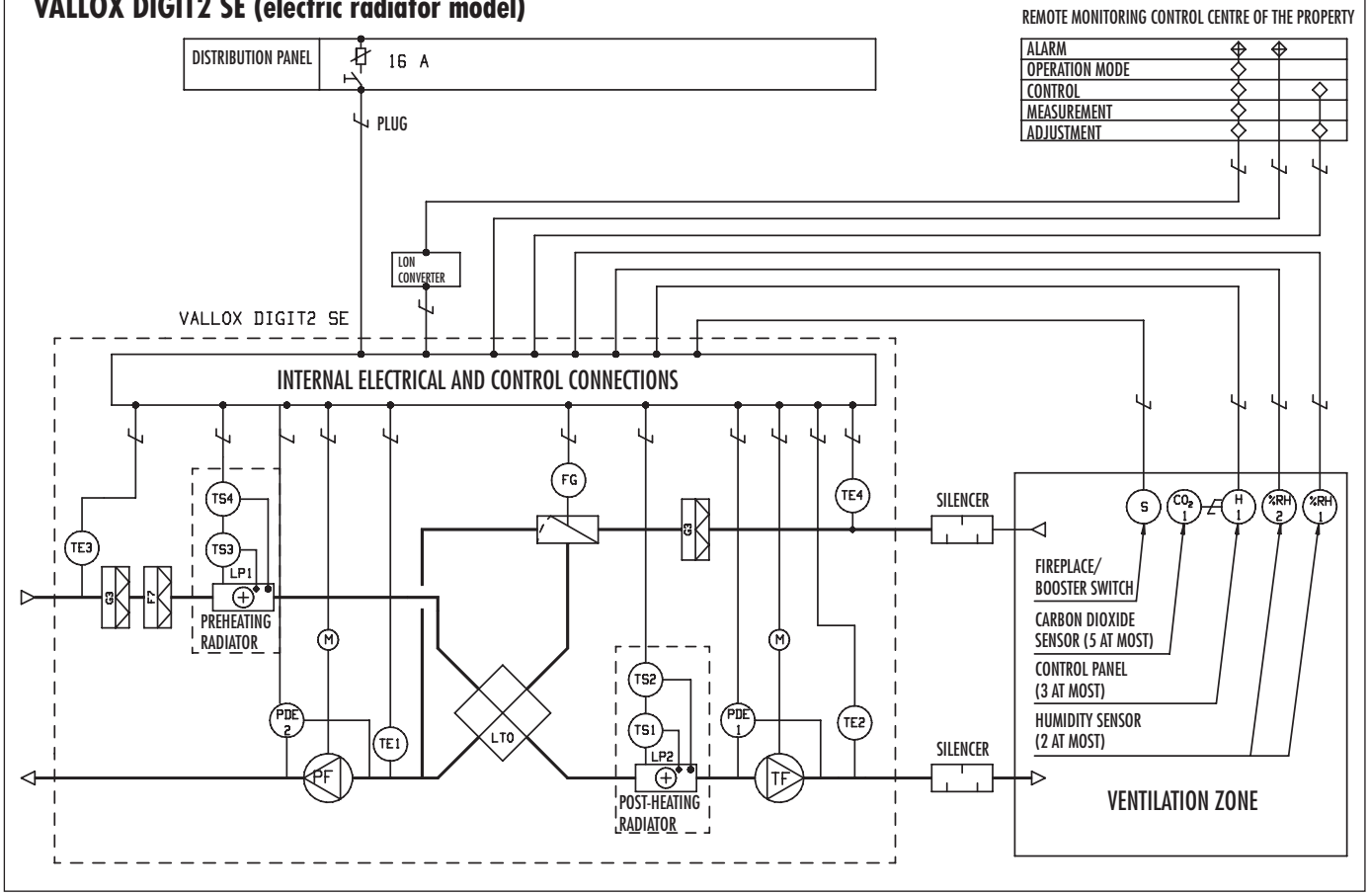


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VALLOX DIGIT2 SE/VKL/MLV

CONTROL DIAGRAM/ELECTRIC RADIATOR

VALLOX DIGIT2 SE (electric radiator model)



Parts list VALLOX DIGIT2 SE (electric radiator model)

Code	Name	Technical data (factory settings in parentheses)	Standard/ Option
CO_2	Carbon dioxide sensor Carbon dioxide control	Adjustment range 500…2000 ppm (900) Adjustment interval 1…15 min. (10)	Option
G3	Filter	Supply air, extract air	Standard
F7	Filter	Supply air	Standard
FG	Damper motor	Automatic heat recovery bypass 24 V, 0.5 W, 2 Nm	Standard
H	Control panel	User interface	Standard
LP1	Preheating unit	Electric radiator 1.2 kW	Standard
LP2	Post-heating unit	Electric radiator 1.2 kW	Standard
LTO1	Heat recovery cell	Cross-flow, efficiency = 60%	Standard
PDE1	Pressure difference switch Pressure guard on the supply air side	Adjustment range 0...500 Pa (320)	optiol
PDE2	Pressure difference switch Pressure guard on the extract air side	Adjustment range 0...500 Pa (320)	option
PF1	Extract air fan AC	qv = 120 dm³/s (120 Pa)	Standard
%RH	Humidity sensor Humidity control	Automatic/Adjustment range 1…99% (99) Adjustment interval 1...15 min. (10)	Option

Code	Name	Technical data (factory settings in parentheses)	Standard/ Option
TE1	Temperature sensor, heat recovery cell antifreeze, preheating control	Exhaust air temperature Adjustment range –6...+15 °C (HR bypass) Adjustment range –6…+15 °C (preheating)	Standard
TE2	Temperature sensor	Supply air temperature	Standard
TE3	Temperature sensor	Outdoor air temperature	Standard
TE4	Temperature sensor	Extract air temperature	Standard
TF	Supply air fan AC	qv = 110 dm³/s (100 Pa)	Standard
TS1	Overheat protection for the heating element	Automatic + 40 °C	Included in LP2
TS2	Overheat protection for the heating element	Manually reset, +80 °C	Included in LP2
TS3	Overheat protection for the heating element	Automatic + 30 °C	Included in LP1
TS4	Overheat protection for the heating element	Manually reset, +55 °C	Included in LP1
S	Fireplace/booster switch function Selectable as either a fireplace or booster switch function	In the controller Separate switch	Standard Option
LON	LON converter	Remote monitoring control	Option

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DESCRIPTION OF OPERATION/ELECTRIC RADIATOR

Control of operation

Power supply to the unit can be controlled with a contactor in the distribution panel if needed, e.g. with a timer programme. After starting, the unit first operates at minimum power. After that power is adjusted based either on the measurement data from air quality sensors and/or on manual control at the control panel.

Fan speed adjustment

Manual control

Fan speed of the ventilation unit is controlled in 8 steps at control panel **H**.

Week-clock control

Fan speed of the ventilation unit is controlled in 8 steps using the week clock in control panel **H**. The week clock can be used to programme the desired fan power option and the setpoint for supply air temperature for each day of the week and each hour in the day.

Carbon dioxide and humidity control

The fan capacity of the ventilation unit is controlled in multiple steps depending on loads, and based on the measurement results of the air quality sensors (CO_2 and %RH sensors) located in the ventilation zone. The aim is to keep carbon dioxide and/or humidity content below the threshold set at control panel **H**. It is also possible to select an automatic search for the humidity content setpoint at control panel **H**. One or more modes of control may be used simultaneously – the mode demanding boosting is the dominant one. Fan speed varies depending on load between the base and maximum fan speeds. The base and maximum fan speeds can be set at the desired level at control panel **H**.

Control through voltage or current signal

The fan power of the ventilation unit is controlled in 8 steps with a voltage signal of 0...10 VDC, or with a current signal of 0...20 mA. However, fan power cannot be raised above the set maximum fan speed. Voltage or current signal control is used to control base fan speed. This means that fan speed can be raised when necessary, but not lowered, by the manual, CO_2 and %RH controls.

Voltage and current signal values (selection in the motherboard)

Voltage values for each fan speed:			Current signal values for each fan speed:		
0	0.20...1.25	VDC	0	0.5...2.5	mA
1	1.75...2.25	VDC	1	3.5...4.5	mA
2	2.75...3.25	VDC	2	5.5...6.5	mA
3	3.75...4.25	VDC	3	7.5...8.5	mA
4	4.75...5.25	VDC	4	9.5...10.5	mA
5	5.75...6.25	VDC	5	11.5...12.5	mA
6	6.75...7.25	VDC	6	13.5...14.5	mA
7	7.75...8.25	VDC	7	15.5...16.5	mA
8	8.75...10.00	VDC	8	17.5...20.0	mA

Supply air temperature

Supply air temperature can be controlled with either constant temperature control or cascade control.

Supply air constant temperature control

The control unit directs the operation of post-heating unit **LP2** on the basis of the measurement data given by temperature sensor **TE2**, aiming at keeping supply air temperature at the temperature value set on control panel **H** (+10…+30 °C).

Supply air cascade control

The control unit directs the operation of post-heating unit **LP2** on the basis of the measurement data given by extract air sensor **TE4**, aiming at keeping extract air temperature at the temperature value set on control panel **H** (+10…+30 °C).

Heat recovery bypass

Heat recovery is enabled whenever post-heating has been switched on. Automatic heat recovery bypass is active whenever post-heating has been switched off and outdoor temperature exceeds the setpoint (to be set between 0 and +25 °C). In this case, the control unit directs the operation of damper motor **FG** on the basis of measurement results given by outdoor temperature sensor **TE3** and extract air temperature sensor **TE4**. The aim is to get as cool supply air to the ventilation zone as possible. Heat recovery is, however, on whenever outdoor temperature is below the limit set, or whenever outdoor air is warmer than extract air.

Heat recovery antifreeze

The control centre of the unit controls the operation of preheating unit **LP1** on the basis of the measurement data of temperature sensors **TE1** and **TE3,** preventing freezing alerts and the stopping of supply air fan **TF**. If the capacity of preheating unit **LP1** is not sufficient or it is not on, the control centre keeps stopping supply air fan **TF** on the basis of the measurement data on temperature sensor **TE1** and **TE3**, thus preventing the heat recovery cell from freezing. As soon as the risk passes, the fan restarts automatically. The threshold temperature (-6...+15 °C) and the difference area (1 ...10 °C) for antifreeze can be set at control panel **H**. When fan **TF** stops, power supply from radiator **LP1** is stopped and post-heating radiator **LP2** continues to heat.

For preheating to work, its threshold temperature has to be set at least one degree higher than the threshold temperature controlling fan stopping. Temperatures are adjusted at control panel **H**.

Overheat protection for the heating element

Overheat protection thermostats **TS1** and **TS2** monitor the surface temperature of heating unit **LP2** and overheat protection thermostats **TS3** and **TS4** that of **LP1**. If surface temperature exceeds the threshold, overheat protection is triggered and power supply to the heating unit is stopped. Overheat protection for **TS1** and **TS3** is reset automatically, whereas overheat protection for **TS2** and **TS4** is reset manually.

Alarms

Pressure difference switches **PDE1** and **PDE2** monitor the pressure difference on the supply and extract air sides. If the pressure difference rises too high because of dirty filters or clogged ducts, an alarm will be issued. This is indicated by a symbol (⛒) in the main display of the control panel. If the unit is not equipped with pressure difference switches, the symbol (🔧) appearing in the main display of the control panel reminds of the need of servicing the unit. The reminder interval can be set at 1…15 months. The factory setting is 4 months. This function is always active.

The fault signal relay in the unit gives potential-free alarm indications on the following fault conditions:

- Alarm of high carbon dioxide content (> 5000 ppm) switches the relay at 1-second intervals.
- In other fault situations, such as sensor faults, the contacts of the relay close.

Booster or fireplace switch function

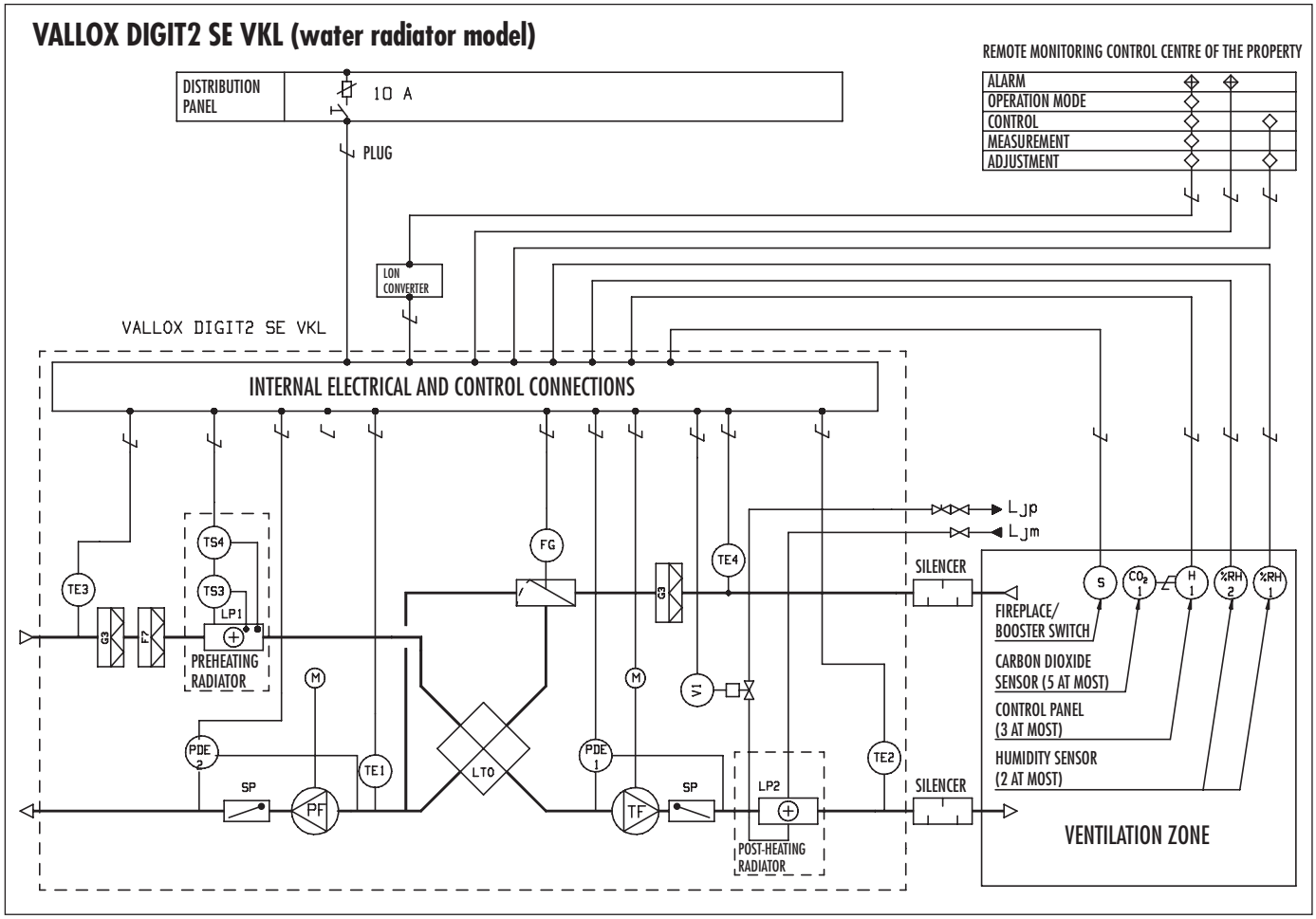
The booster or fireplace switch function of the ventilation unit is controlled either at control panel **H** and/or separate switch **S**, which can be connected to the connection box of the unit. The mode of operation of the switch is selected at control panel **H**. The booster switch function raises fan speed to the set maximum fan speed for 45 minutes. The fireplace switch stops the extract air fan for 15 minutes and produces overpressure in the ventilation zone. LON remote monitoring control can be implemented with a VALLOX LON converter. (See a separate brochure.)

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VALLOX DIGIT2 SE/VKL/MLV

CONTROL DIAGRAM/VKL MODEL

VALLOX DIGIT2 SE VKL (water radiator model)



Parts list VALLOX DIGIT2 SE VKL (water radiator model)

Code	Name	Technical data (factory settings in parentheses)	Standard/ Option
CO_2	Carbon dioxide sensor Carbon dioxide control	Adjustment range 500…2000 ppm (900) Adjustment interval 1…15 min. (10)	Option
G3	Filter	Supply air, extract air	Standard
F7	Filter	Supply air	Standard
FG	Damper motor	HR bypass automation 24 V, 0.5 W, 2 Nm	Standard
H	Control panel	User interface	Standard
LP1	Preheating unit	Electric radiator 1.2 kW	Standard
LP2	Post-heating unit	Water radiator	Standard
LTO1	Heat recovery cell	Cross-flow, efficiency = 60%	Standard
PDE1	Pressure difference switch Pressure guard on the supply air side	Adjustment range 0...500 Pa (320)	Option
PDE2	Pressure difference switch Pressure guard on the extract air side	Adjustment range 0...500 Pa (320)	Option
PF1	Extract air fan AC	qv = 120 dm³/s (120 Pa)	Standard
%RH	Humidity sensor Humidity control	Automatic/Adjustment range 1...99% (99) Adjustment range 1...15 min. (10)	Option

Code	Name	Technical data (factory settings in parentheses)	Standard/ Option
TE1	Temperature sensor, heat recovery cell antifreeze, preheating control	Exhaust air temperature Adjustment range -6…+15 °C (HR) Adjustment range -6…+15 °C (preheating)	Standard
TE2	Temperature sensor	Supply air temperature	Standard
TE3	Temperature sensor	Outdoor air temperature	Standard
TE4	Temperature sensor	Extract air temperature	Standard
TF	Supply air fan AC	qv = 100 dm³/s (100 Pa)	Standard
V1	Water radiator actuator/valve		Standard
TS3	Overheat protection for the heating element	Automatic + 30 °C	Included in LP1
TS4	Overheat protection for the heating element	Manually reset, +55 °C	Included in LP1
S	Fireplace/booster switch function Selectable as either a fireplace or booster switch function	In the controller Separate switch	Standard Option
SP	Damper 2 pcs	Air flow operated	Standard
LON	LON converter	Remote monitoring control	Option

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DESCRIPTION OF OPERATION/VKL MODEL

Control of operation

Power supply to the unit can be controlled with a contactor in the distribution panel if needed, e.g. with a timer programme. After starting, the unit first operates at minimum power. After that power is adjusted based either on the measurement data from air quality sensors and/or on manual control at the control panel.

Fan speed adjustment

Manual control

Fan speed of the ventilation unit is controlled in 8 steps at control panel **H**.

Week-clock control

Fan speed of the ventilation unit is controlled in 8 steps using the week clock in control panel **H**. The week clock can be used to programme the desired fan power option and the setpoint for supply air temperature for each day of the week and each hour in the day.

Carbon dioxide and humidity control

The fan capacity of the ventilation unit is controlled in multiple steps depending on loads, and based on the measurement results of the air quality sensors (CO_2 and %RH sensors) located in the ventilation zone. The aim is to keep carbon dioxide and/or humidity content below the threshold set at control panel **H**. It is also possible to select an automatic search for the humidity content setpoint at control panel **H**. One or more modes of control may be used simultaneously – the mode demanding boosting is the dominant one. Fan speed varies depending on load between the base and maximum fan speeds. The base and maximum fan speeds can be set at the desired level on control panel **H**.

Control through voltage or current signal

The fan power of the ventilation unit is controlled in 8 steps with a voltage signal of 0...10 VDC, or with a current signal of 0...20 mA. However, fan power cannot be raised above the set maximum fan speed. Voltage or current signal control is used to control base fan speed. This means that fan speed can be raised when necessary, but not lowered, by the manual, CO_2 and %RH controls.

Voltage and current signal values (selection in the motherboard)

Voltage values for each fan speed:			Current signal values for each fan speed:		
0	0.20...1.25	VDC	0	0.5...2.5	mA
1	1.75...2.25	VDC	1	3.5...4.5	mA
2	2.75...3.25	VDC	2	5.5...6.5	mA
3	3.75...4.25	VDC	3	7.5...8.5	mA
4	4.75...5.25	VDC	4	9.5...10.5	mA
5	5.75...6.25	VDC	5	11.5...12.5	mA
6	6.75...7.25	VDC	6	13.5...14.5	mA
7	7.75...8.25	VDC	7	15.5...16.5	mA
8	8.75...10.00	VDC	8	17.5...20.0	mA

Supply air temperature

Supply air temperature can be controlled with either constant temperature control or cascade control.

Supply air constant temperature control

The control unit directs the operation of post-heating unit **LP2** on the basis of the measurement data given by temperature sensor **TE2**, aiming at keeping supply air temperature at the temperature value set on control panel **H** (+10…+30 °C).

Supply air cascade control

The control unit directs the operation of post-heating unit **LP2** on the basis of the measurement data given by extract air sensor **TE4**, aiming at keeping extract air temperature at the temperature value set on control panel **H** (+10…+30 °C).

Heat recovery bypass

Heat recovery is enabled whenever post-heating has been switched on. Automatic heat recovery bypass is active whenever post-heating has been switched off and outdoor temperature exceeds the setpoint (to be set at 0…+25 °C). In this case, the control unit directs the operation of damper motor **FG** on the basis of measurement results given by outdoor temperature sensor **TE3** and extract air temperature sensor **TE4**. The aim is to get as cool supply air to the ventilation zone as possible. Heat recovery is, however, on whenever outdoor temperature is below the limit set, or whenever outdoor air is warmer than extract air.

Heat recovery antifreeze

The control centre of the unit controls the operation of preheating unit **LP1** on the basis of the measurement data of temperature sensors **TE1** and **TE3**, preventing freezing alerts and the stopping of supply air fan **TF**. If the capacity of preheating unit **LP1** is not sufficient or it is not on, the control centre keeps stopping supply air fan **TF** on the basis of the measurement data on temperature sensors **TE1** and **TE3**, thus preventing the heat recovery cell from freezing. As soon as the risk passes, the fan restarts automatically. The threshold temperature (-6…+15 °C) and the difference area (1…10 °C) for antifreeze can be set at control panel **H**. When fan **TF** stops, power supply from radiator **LP1** is stopped and post-heating radiator **LP2** continues to heat.

For preheating to work, its threshold temperature has to be set at least one degree higher than the threshold temperature controlling fan stopping. Temperatures are adjusted at control panel **H**.

Overheat protection for the heating element

Overheat protection thermostats **TS3** and **TS4** monitor the surface temperature of heating unit **LP1**. If surface temperature exceeds the threshold, overheat protection is triggered and power supply to the heating unit is stopped. Overheat protector **TS3** is reset automatically and **TS4** manually.

Water radiator freezing protection

Based on the measurement data in outdoor temperature sensor **TE3** (outdoor air <0 °C) and supply air temperature sensor **TE2** (supply air <7 °C) the control centre of the unit stops fans **TF** and **PF**. Moreover, valve **V1** remains open and self-actuated dampers **SP** of the fans close. This decreases the freezing risk in the water circulating heating unit **LP2**. A freezing alert appears in the display of the control panel. The fans restart automatically and dampers **SP** open as soon as the risk of freezing passes (supply air > 10 °C).

Alarms

Pressure difference switches **PDE1** and **PDE2** monitor the pressure difference on the supply and extract air sides. If the pressure difference rises too high because of dirty filters or clogged ducts, an alarm will be issued. This is indicated by a symbol (⛝) in the main display of the control panel. If the unit is not equipped with pressure difference switches, the symbol (▼) appearing in the main display of the control panel reminds of the need of servicing the unit. The reminder interval can be set at 1…15 months. The factory setting is 4 months. This function is always active. The fault signal relay in the unit gives potential-free alarm indications on the following fault conditions:

- When the antifreeze function of the water-circulating radiator is on, the contacts of the relay close and open at a 10-second interval.
- Alarm of high carbon dioxide content (> 5000 ppm) switches the relay at 1-second intervals.
- In other fault situations, such as sensor faults, the contacts of the relay close.

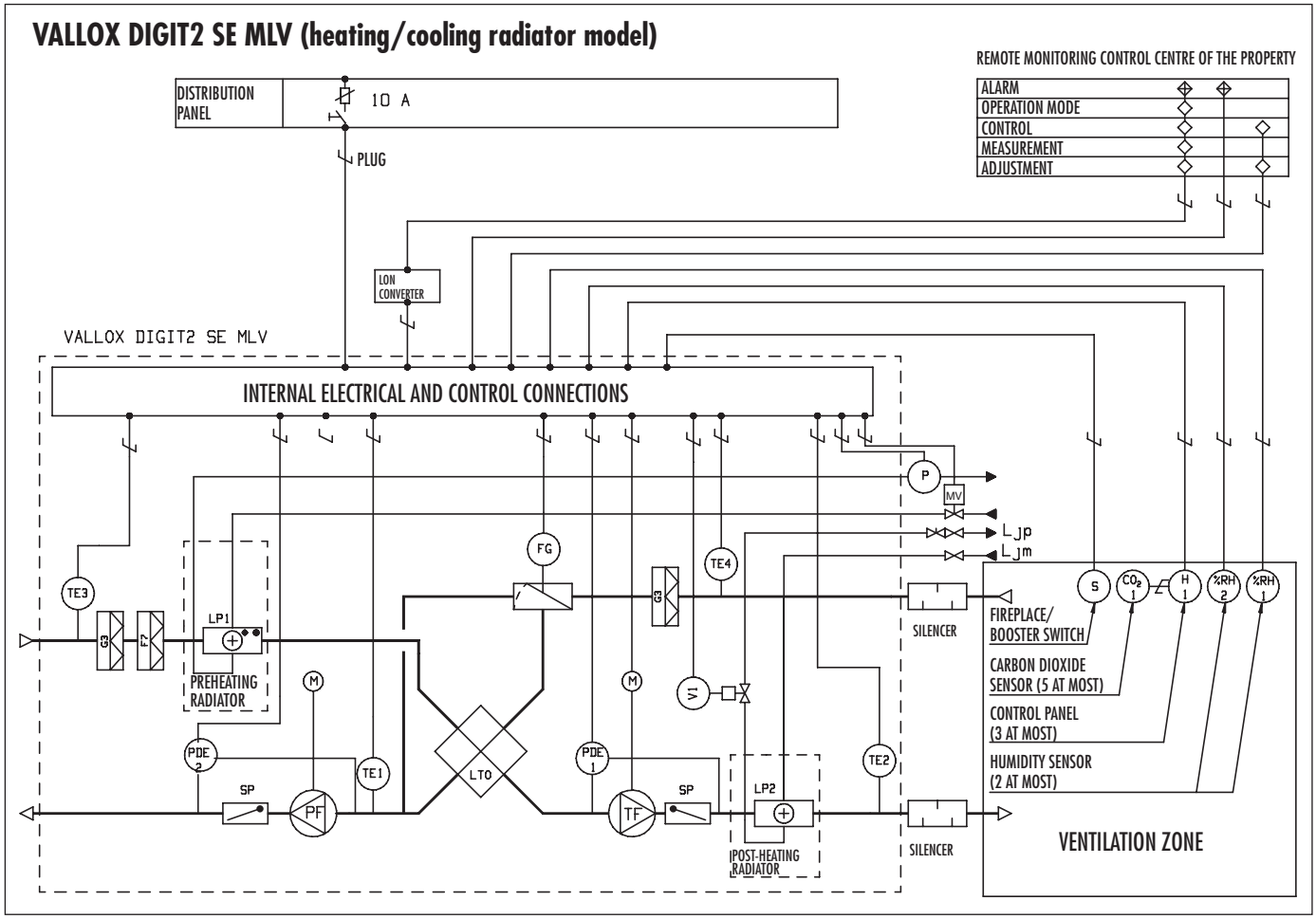
Booster or fireplace switch function

The booster or fireplace switch function of the ventilation unit is controlled either at control panel **H** and/or separate switch **S**, which can be connected to the connection box of the unit. The mode of operation of the switch is selected at control panel **H**. The booster switch function raises fan speed to the set maximum fan speed for 45 minutes. The fireplace switch stops the extract air fan for 15 minutes and produces overpressure in the ventilation zone. LON remote monitoring control can be implemented with a VALLOX LON converter. (See a separate brochure.)

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CONTROL DIAGRAM/MLV MODEL

VALLOX DIGIT2 SE MLV (heating/cooling radiator model)



VALLOX DIGIT2 SE MLV (heating/cooling radiator model)

Code	Name	Technical data (factory settings in parentheses)	Standard/ Option
CO_2	Carbon dioxide control	Adjustment range 500…2000 ppm (900) Adjustment interval 1…15 min. (10)	Option
G3	Filter	Supply air, extract air	Standard
F7	Filter	Supply air	Standard
FG	Damper motor	HR bypass automation 24 V, 0.5 W, 2 Nm	Standard
H	Control panel	User interface	Standard
LP1	Preheating unit	Liquid radiator	Standard
LP2	Post-heating unit	Water radiator	Standard
LTO1	Heat recovery cell	Cross-flow, efficiency = 60%	Standard
PDE1	Pressure difference switch unit Pressure guard on the supply air side	Adjustment range 0...500 Pa (320)	Option
PDE2	Pressure difference switch unit Pressure guard on the extract air side	Adjustment range 0...500 Pa (320)	Option
PF1	Extract air fan AC	qv = 120 dm^3/s (120 Pa)	Standard
%RH	Humidity sensor Humidity control	Automatic/Adjustment range 1...99% (99) Adjustment interval 1…15 min. (10)	Option

Code	Name	Technical data (factory settings in parentheses)	Standard/ Option
TE1	Temperature sensor, heat recovery cell antifreeze, preheating control	Exhaust air temperature Adjustment range -6...+15 °C (heat recovery cell) Adjustment range -6...+15°C (preheating)	Standard
TE2	Temperature sensor	Supply air temperature	Standard
TE3	Temperature sensor	Outdoor air temperature	Standard
TE4	Temperature sensor	Extract air temperature	Standard
TF	Supply air fan AC	qv = 100 dm^3/s (100 Pa)	Standard
V1	Water radiator actuator/valve		Standard
MV	Solenoid valve		Not included in the delivery
P	Circulation pump		Not included in the delivery
S	Fireplace/booster switch function Selectable as either a fireplace or booster switch (fireplace switch)	In the controller Separate switch	Standard Option
SP	Damper 2 pcs	Air flow operated	Standard
LON	LON converter	Remote monitoring control	Option

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DESCRIPTION OF OPERATION/MLV MODEL

Control of operation

Power supply to the unit can be controlled with a contactor in the distribution panel if needed, e.g. with a timer programme. After starting, the unit first operates at minimum power. After that power is adjusted based either on the measurement data from air quality sensors and/or on manual control at the control panel.

Fan speed adjustment

Manual control

Fan speed of the ventilation unit is controlled in 8 steps at control panel **H**.

Week-clock control

Fan speed of the ventilation unit is controlled in 8 steps using the week clock in control panel **H**. The week clock can be used to programme the desired fan power option and the setpoint for supply air temperature for each day of the week and each hour in the day.

Carbon dioxide and humidity control

The fan capacity of the ventilation unit is controlled in multiple steps depending on loads, and based on the measurement results of the air quality sensors (CO_2 and %RH sensors) located in the ventilation zone. The aim is to keep carbon dioxide and/or humidity content below the threshold set at control panel **H**. It is also possible to select an automatic search for the humidity content setpoint at control panel **H**. One or more modes of control may be used simultaneously – the mode demanding boosting is the dominant one. Fan speed varies depending on load between the base and maximum fan speeds. The base and maximum fan speeds can be set at the desired level at control panel **H**.

Control through voltage or current signal

The fan power of the ventilation unit is controlled in 8 steps with a voltage signal of 0...10 VDC, or with a current signal of 0...20 mA. However, fan power cannot be raised above the set maximum fan speed. Voltage or current signal control is used to control base fan speed. This means that fan speed can be raised when necessary, but not lowered, by the manual, CO_2 and %RH controls.

Voltage and current signal values (selection in the motherboard)

Voltage values for each fan speed:			Current signal values for each fan speed:		
0	0.20...1.25	VDC	0	0.5...2.5	mA
1	1.75...2.25	VDC	1	3.5...4.5	mA
2	2.75...3.25	VDC	2	5.5...6.5	mA
3	3.75...4.25	VDC	3	7.5...8.5	mA
4	4.75...5.25	VDC	4	9.5...10.5	mA
5	5.75...6.25	VDC	5	11.5...12.5	mA
6	6.75...7.25	VDC	6	13.5...14.5	mA
7	7.75...8.25	VDC	7	15.5..16.5	mA
8	8.75...10.00	VDC	8	17.5...20.0	mA

Supply air temperature

Supply air temperature can be controlled with either constant temperature control or cascade control.

Supply air constant temperature control

The control unit directs the operation of post-heating unit **LP2** on the basis of the measurement data given by temperature sensor **TE2**, aiming at keeping supply air temperature at the temperature value set on control panel **H** (+10…+30 °C). The cooling function of the MLV radiator starts when the post-heating radiator has been switched off and supply air temperature exceeds the setpoint for supply air.

Supply air cascade control

The control unit directs the operation of post-heating unit **LP2** on the basis of the measurement data given by extract air sensor **TE4**, aiming at keeping extract air temperature at the temperature value set on control panel **H** (+10…+30°C).

Heat recovery bypass

Heat recovery is enabled whenever post-heating has been switched on. Automatic heat recovery bypass is active whenever post-heating has been switched off and outdoor temperature exceeds the setpoint (to be set at 0…+25 °C). In this case, the control unit directs the operation of damper motor **FG** on the basis of measurement results given by outdoor temperature sensor **TE3** and extract air temperature sensor **TE4**. The aim is to get as cool supply air to the ventilation zone as possible. Heat recovery is, however, on whenever outdoor temperature is below the limit set, or whenever outdoor air is warmer than extract air.

Heat recovery antifreeze

Controlling preheating in a liquid-circulating **MLV** radiator is different from that in an electric preheating radiator. The liquid radiator switches on based on the measurement data from outdoor air temperature sensor **TE3**. The control centre of the unit starts the pump and opens the solenoid valve when post-heating is on and outdoor air temperature goes below the setpoint for preheating. The setpoint must be lower than the temperature of the liquid coming from the ground collector. If the capacity of preheating unit **LP1** is not sufficient, the control centre keeps stopping supply air fan **TF** on the basis of the measurement data on temperature sensors **TE1** and **TE3**, thus preventing the heat recovery cell from freezing. As soon as the risk passes, the fan restarts automatically. The threshold temperature (-6...+15 °C) and the difference area (1 ...10 °C) for antifreeze can be set at control panel **H**.

Water radiator freezing protection

Based on the measurement data in outdoor temperature sensor **TE3** (outdoor air <0 °C) and supply air temperature sensor **TE2** (supply air <7 °C) the control centre of the unit stops fans **TF** and **PF**. Moreover, valve **V1** remains open and self-actuated dampers **SP** of the fans close. This decreases the freezing risk in the water circulating heating unit **LP2**. A freezing alert appears in the display of the control panel. The fans restart automatically and dampers **SP** open as soon as the risk of freezing passes (supply air > 10 °C).

Alarms

Pressure difference switches **PDE1** and **PDE2** monitor the pressure difference on the supply and extract air sides. If the pressure difference rises too high because of dirty filters or clogged ducts, an alarm will be issued. This is indicated by a symbol (⋈) in the main display of the control panel. If the unit is not equipped with pressure difference switches, the symbol (▼) appearing in the main display of the control panel reminds of the need of servicing the unit. The reminder interval can be set at 1...15 months. The factory setting is 4 months. This function is always active. The fault signal relay in the unit gives potential-free alarm indications on the following fault conditions:

- When the antifreeze function of the water-circulating radiator is on, the contacts of the relay close and open at a 10-second interval.
- Alarm of high carbon dioxide content (> 5000 ppm) switches the relay at 1-second intervals.
- In other fault situations, such as sensor faults, the contacts of the relay close.

Booster or fireplace switch function

An extra switch **S** may be connected to the connection box of the ventilation unit to work as a booster or fireplace switch. The mode of operation of the switch is selected at control panel **H**. The booster switch function raises fan speed to the set maximum speed for 45 minutes. The fireplace switch stops the extract air fan for 15 minutes and produces overpressure in the ventilation zone. LON remote monitoring control can be implemented with a VALLOX LON converter. See a separate brochure.

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Location of DIGIT2 SE

DIGIT2 SE is mounted in a place where temperature does not fall below +10 °C. Without protective casing, the unit has to be located in a place with no acoustic disturbance: storerooms, utility rooms etc. DIGIT2 SE can also be located in a damp room, but not in a bathroom next to a sauna bath.

CEILING MOUNTING

VALLOX DIGIT2 SE can be equipped with an optional easy-to-use ceiling mounting plate (patent pending). The ceiling mounting plate is fixed to the ceiling with M8 thread bars. Fix the bars so that they stand the weight of the unit, i.e. approximately 71 kg.

The ceiling mounting plate has to be fixed horizontally in order to ensure that the unit will be straight. The outdoor air duct must be insulated against condensation, also between the unit and the ceiling mounting plate.

Installation

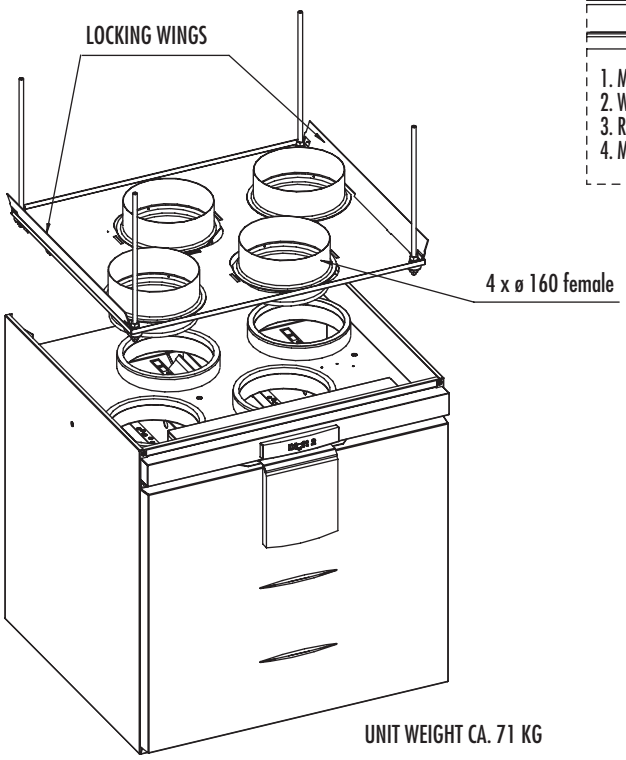
Lift the unit straight upwards, till the locking wings on the sides of the mounting plate lock into the side plates of the unit. You can detach the unit from the mounting plate by releasing the locking wings from the side plates.

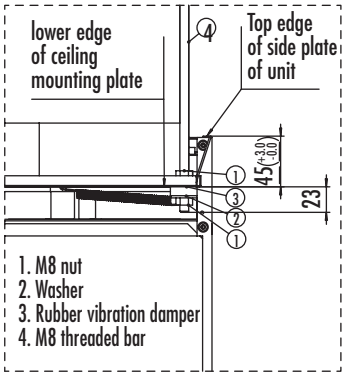
To facilitate mounting, you may use a lubricant, such as O-ring grease, in the collar seals. Mounting accessories include rubber silencers, base plates and nuts. Thread bars are not included in the delivery.

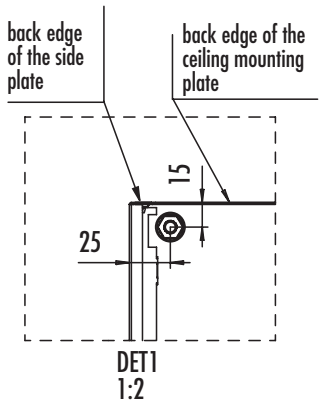


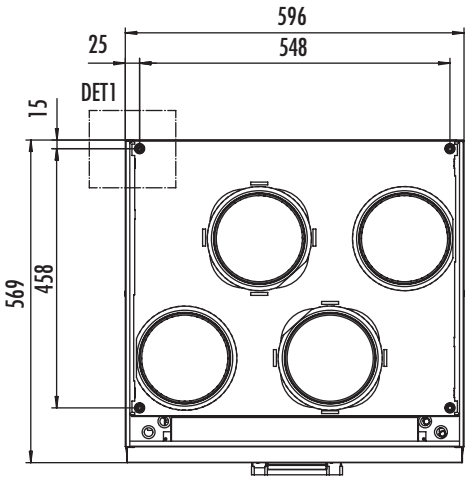
Ceiling mounting plate before fastening

Ceiling mounting of VALLOX DIGIT2 SE









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INSTALLATION/Wall mounting

Wall mounting

DIGIT2 SE is mounted on the wall with a fixing plate as shown in the adjacent figure.

Wall construction

Pay attention to the wall construction when mounting the unit. Avoid mounting the unit on a hollow, echoing dividing wall and on a bedroom wall because of sound conduction, or prevent sound conduction.

Condensing water

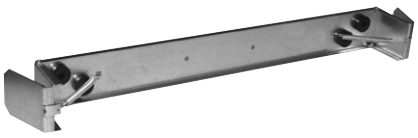
A water seal is recommended for the condensing water pipe. The condensing water pipe must have a downward slope.

The condensing water pipe must never be connected directly to the sewer.

If condensing water is led to a water seal or floor drain where also warm washing or shower water is led, VALLOX Silent water seal is recommended.

The water seal and the pipes and their parts are not included in standard delivery.

Wall mounting of VALLOX DIGIT2 SE



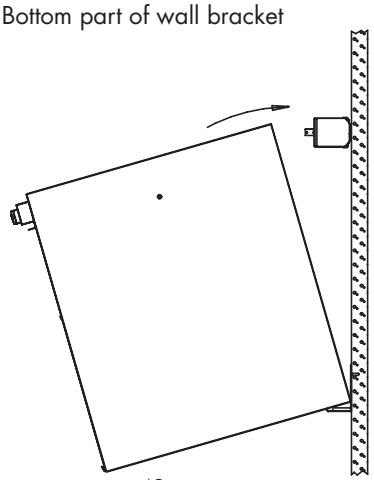
Top part of wall bracket



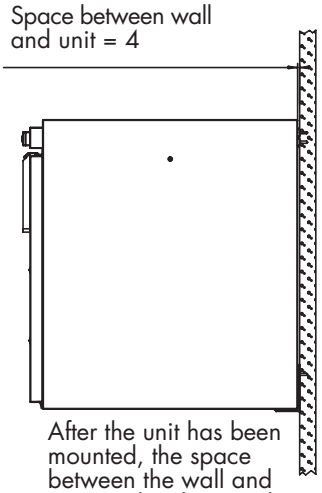
Wall bracket mounted



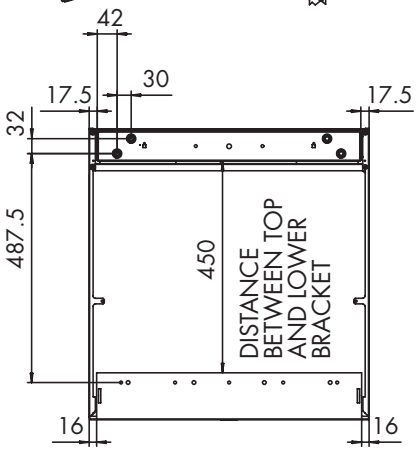
Bottom part of wall bracket

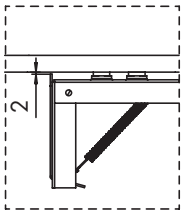


Space between wall and unit = 4

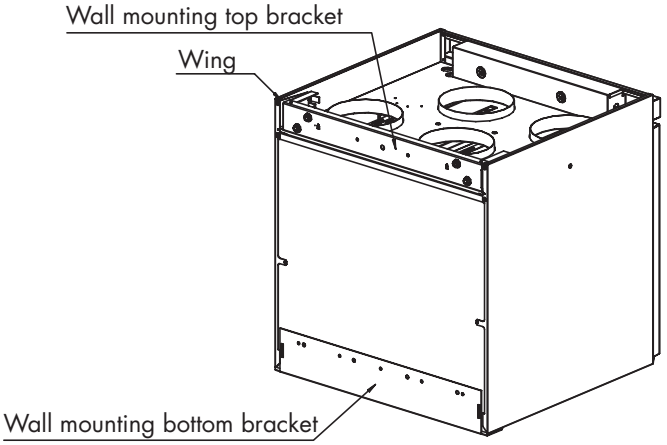


After the unit has been mounted, the space between the wall and unit can be shortened by tightening the top bracket.





Note!
Distance between straight-line wing and wall is 2 mm.



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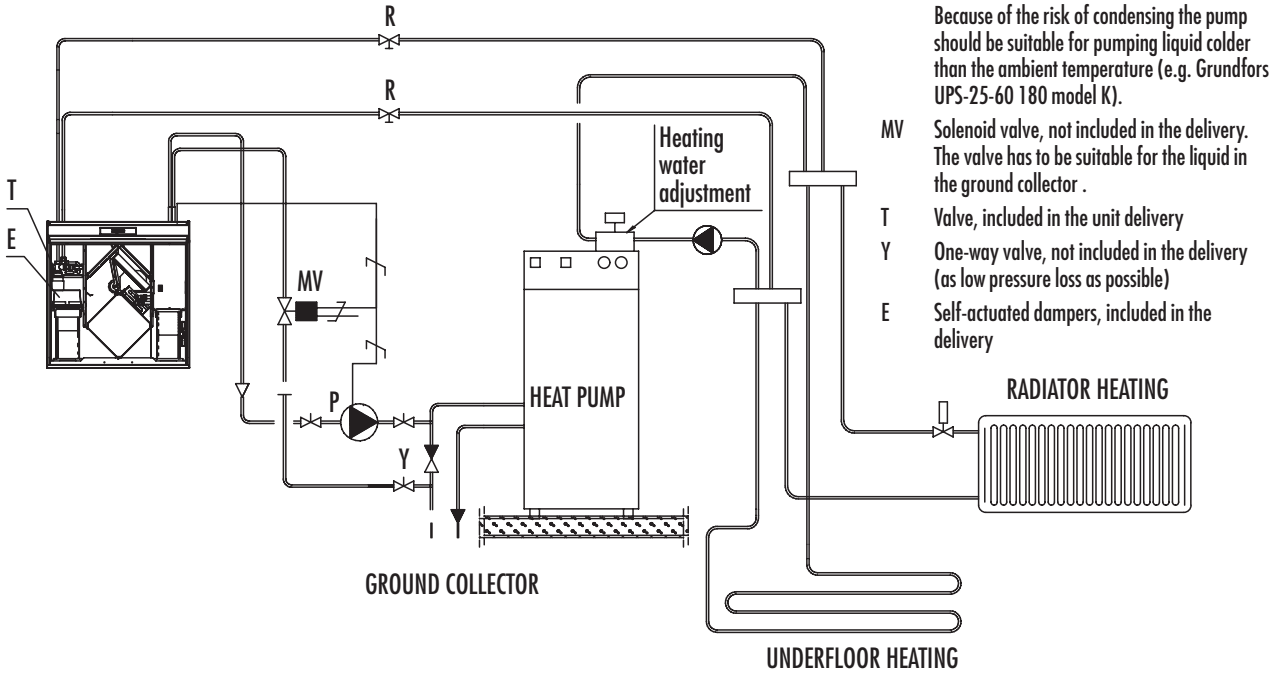
Connection of VKL post-heating radiator to underfloor heating circuit

To minimise the risk of freezing involved in the connection the system has several antifreeze functions.

1. The unit stops if supply air temperature goes below the set temperature and automatically starts as soon as temperature rises.
2. When the unit stops, the self-actuated dampers (E) close.
3. The electric valve (T) opens when the unit becomes dead.
4. The unit issues an alarm of freezing risk at the controller.

Use of VKL post-heating radiator

- The temperature of heating water shall be adjusted according to the temperature of outdoor air.
- No water must be led into the radiator of the unit until the system has been adjusted for operation and the heating network has heating on or it has been otherwise ensured that the radiator will not freeze.
- Water circulation in the heating network connected to the unit and the circulation pump must not be stopped during the heating season.
- The base volume of water flow into the radiator of the unit can be adjusted with valves (R), which can also act as stop valves (not included in the delivery)..



P Circulation pump. Size e.g. 0.07 dm³/s, 60 kPa, not included in the delivery
Because of the risk of condensing the pump should be suitable for pumping liquid colder than the ambient temperature (e.g. Grundfors UPS-25-60 180 model K).

MV Solenoid valve, not included in the delivery. The valve has to be suitable for the liquid in the ground collector .

T Valve, included in the unit delivery

Y One-way valve, not included in the delivery (as low pressure loss as possible)

E Self-actuated dampers, included in the delivery

Connection of MLV preheating/cooling radiator

The radiator is connected to the pipe coming from the ground collector. When the requirements for starting the heating or cooling function are met, the control function of the unit opens the solenoid valve (MV) and starts the pump (P).

Observe the frost resistance of the liquid used in the ground collector. Connection pipes of the MLV radiator have to be insulated against condensation.

Note! Because of the risk of humidity damage, supply air temperature in a duct with no condensation insulation should not go below +16...20 °C.

Other connections

Heat can be conducted to the post-heating radiator of DIGIT2 SE VKL in other ways than described above. It is possible to build a separate circuit for the radiator if higher power is desired, or the risk of freezing can be eliminated by using non-freezing heat transfer solution. For more information, see the instructions for VALLOX VKL connections.

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VALLOX DIGIT2 SE/VKL/MLV

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Vallox Oy • Myllykyläntie 9-11 • FI-32200 Loimaa • Tel +358-10 7732 200 • www.vallox.com

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