

**FLOWAIR**



**KTB / KTS / BUFFER**

**EN STEERING SYSTEMS LEO KM**

Technical data  
User manual

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## 1. General Information

For a mixing chamber Leo KM are available two sets of control systems: KTB and KTS. Those sets are a complete control system which protects and steers water heater and mixing chamber. The difference between KTS and KTB is type of attached actuator. Those sets gives listed below possibilities:

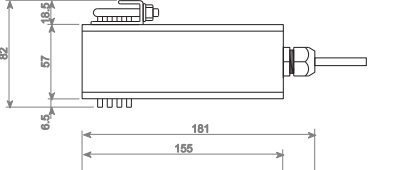
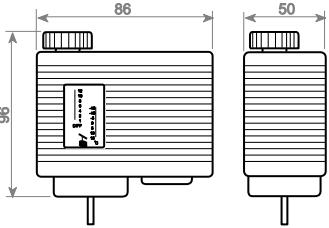
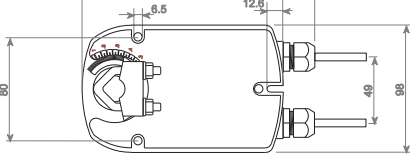
- regulation of mixing chamber dampers. KTB – ON/OFF, KTS – stepless positioning of dampers.
- connecting with exhaust fan\*\*. Its air volume is automatically controlled taking into account point of damper openness and air volume of Leo water heater\*.
- anti freeze protection of heat exchanger;
- connecting the valve\*\* and room thermostat\*\*, it make possibilities to keep pre-set temperature in the area.
- connecting pressure switch\*\*, it controls mixing chambers filter pollution;
- operating in MASTER – SLAVE mode, it gives possibilities to operate several (maximum 9) units in SLAVE mode of KTE, controlled by one set in MASTER mode of KTE.
- operating by the buffer. This option gives possibilities to control 5 units by one KTE control box.

⚠ KTB and KTS-sets are dedicated for mixing chamber Leo KM. For correctness operating Leo KMFB, Leo KMFS should be fitted with a proper control system for water heater: either S or M-type controls

\*in case of use S – type units (operate with maximum air volume) or M – type units (various air volume)

\*\*optional equipment of KTB/KTS-sets.

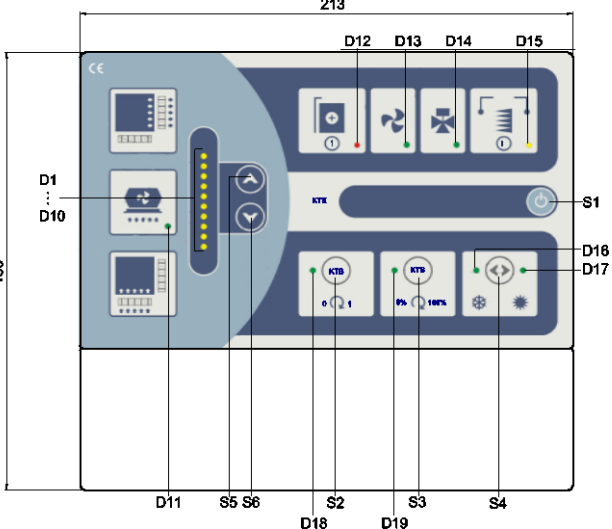
## 2. Components of KTB/KTS-sets

Type of set	Picture	Model	Describe	Type of set	picture	Model	Describe
KTB		<b>SP ON/OFF</b>	<b>Actuator of dampers with return spring ON/OFF operating</b> Power supply: AC 24V 50/60 Hz Cables: 2 x 0,5mm <sup>2</sup> Power consumption: 5W – operating, 2,5W – STB IP/Insulation class: IP54 Operational temperature range: -30°C ÷ +50°C	KTB / KTS		<b>TPR</b>	<b>Anti freeze thermostat with capillary</b> IP/Insulation class: IP20 Default mode: ON: 2°C OFF: 3,5°C Range: -18°C ÷ +15°C Δt [K]: 1,5 Length of capillary: 2m
KTS		<b>SP 0-10</b>	<b>Actuator of dampers with return spring. Stepless 0-10 V operating</b> Power supply: AC 24V 50/60 Hz Cables: 4 x 0,5mm <sup>2</sup> Power consumption: 2,5W – operating, 1W – STB IP/Insulation class: IP54 Operational temperature range: -30°C ÷ +50°C				

## 2. Components of KTB/KTS-sets

Type of set	Picture	Model	Description
KTB / KTS		<b>KTE</b>	<p><b>Control box</b></p> <p>Control box is dedicated for one unit Leo KM. It supply fan of the water heater, exhaust fan and additional peripherals of equipment. KTE lead alarm in case of pollution of filters, dangerous freezing of heat exchanger.</p> <p>Power supply: 230V/50Hz; IP/Insulation class: IP54; Weight: 2 kg</p> <p><b>X1, X2, X3</b> - power strip</p> <p><b>X1</b></p> <p><b>PWR IN</b> – KTE Power supply 230VAC <b>PWR AGW</b> – water heater fan power supply, 2,5A, 230VAC <b>PWR WD</b> – exhaust fan power supply, 5A, 230VAC</p> <p><b>X2</b></p> <p><b>VAGW</b> – valve actuator power supply 0,3A, 230VAC <b>AGWS.A, AGWS.B</b> – start switch of water heater fan <b>Ain1, GND</b> – KTS SLAVE <b>DSUP, GDN, Aout_A</b>, – damper actuator 24V, 0-10V signal <b>Aout_B, GND</b> – connecting of exhaust fan inverter <b>PRDN, GND</b> – connecting of pressure switch PF ON/OFF</p> <p><b>X3</b></p> <p><b>WDS.A, WDS.B</b> – start switch of exhaust fan inverter <b>KTB, GND</b> – KTB SLAVE <b>GDN, Ain0</b> – connecting VNT20/VNTLCD <b>FRDN, GND</b> – connecting anti freeze thermostat TPR <b>RTDN, GND</b> – connecting room thermostat RA/RD</p> <p><b>X4</b> – MASTER – SLAVE mode switch;</p> <p><b>X5</b> – <b>OUT</b> – air volume of exhaust fan, depending on openness of mixing chamber and air volume of water heater fan. Leo in M-type controlled by VNT20 or VNTLCD; <b>INT</b> – air volume of exhaust fan depending of mixing chamber openness only.</p>

## 2. Components of KTB/KTS-sets

Type of set	Picture	Model	Description
KTB / KTS		<b>KTE</b>	<p>Function switch</p> <p>S1 – main switch  S2 – KTB mode switch  S3 – KTS mode switch  S4 – Winter / summer mode switch  <b>S5/S6</b> – KTB – open/close mixing chamber  – KTS – adjusting of mixing chamber opening.</p> <p>Signal Leds</p> <p><b>D1...D10</b> – yellow</p> <p>KTB mode:  <b>D1 Led on</b> – mixing chamber is open;  <b>D1 Led flashing</b> – thermostatic mode, temperature is reached, mixing chamber is closed, in case of drop temperature, the mixing chamber will be opened.  <b>D10 Led on – mixing chamber is closed</b>  <b>D10 Led flashing</b> – thermostatic mode, temperature is reached, mixing chamber is closed, in case of drop temperature, the mixing chamber will stay closed.</p> <p>KTS mode:  <b>D1...D10 Led on</b> – number of LED being on inform about opening level of the mixing chamber in range 0-100%  <b>D1...D10 Led flashing</b> – number of flashing LED inform about opening level of the mixing chamber; thermostatic mode, temperature is reached, mixing chamber is closed, in case of drop temperature, the mixing chamber will be opened with set level (numbers of flashing Led)  <b>D11</b> – green Led, exhaust fan operating (WD).  <b>D12</b> – red Led, anti freeze alarm.  <b>D13</b> – green Led, water heater fan operating (AGW).  <b>D14</b> – green Led:  KTE is on – Led on when valve is open;  KTE is off – flashing Led inform about standby operating.  <b>D15</b> – yellow Led, high pollution of filters .  <b>D16</b> – green LED:  Led on – winter mode, continuously mode  Led flashing - winter mode, thermostatic mode  <b>D17</b> – green LED, Summer mode  <b>D18</b> – green LED, KTB mode on  <b>D19</b> – green LED, KTS mode on.</p>

### 3. Optional equipment for KTB and KTS-sets

Type of set	Picture	Model	Description
<b>KTB / KTS</b>	<p>The diagram illustrates the internal wiring of the Buffer unit. It features several terminal blocks labeled Y1 through Y6. Y1 is a power strip with 10 terminals, Y2 has 5 terminals, Y3 has 25 terminals, Y4 has 10 terminals, Y5 has 10 terminals, and Y6 has 2 terminals. Power strips L1-L17 are distributed throughout the unit, with L1-L5 being red LEDs, L6-L10 being red LEDs, L11-L15 being yellow LEDs, and L16-L17 being green LEDs. Components include five Leo water heaters (AGW1-AGW5), five exhaust fans (WD1-WD5), five valve actuators (VAG1-VAG5), and five dampers (KM1-KM5). A thermostat (T) and a pressure sensor (P) are also shown. The bottom section contains a large terminal block with labels for various components like AGW1-WD1-KM1, AGW2-WD2-KM2, etc., and a PEN L terminal block.</p>	<b>Buffer</b>	<p>Buffer is a distributor of supplying and steering signals.</p> <p>It supplies fan of Leo water heater and exhaust fan. Buffer gives also signals of various dangerous: filters high pollution, anti freeze alarms and failure of exhaust fan (equipped with external TK). It is possible to connect up to 5 units.</p> <p>Power supply 230V/50Hz IP/Insulation class: IP 54 Weight: 3kg</p> <p>Max current Water heater AGWi – 2,5A Exhaust fan WDi – 3A Valve actuator VAGi– 1A</p> <p>Power Strip: Y1 – power strip supplying exhaust fans (WD1 ÷ WD5), valves actuators (VAG1 ÷ VAG5), fan of Leo water heaters LEO (AGW1 ÷ AGW5); Y2 – power supply connectors Y3 – power strip of steering signals to exhaust fans (WD1 ÷ WD5), fan of Leo water heaters LEO (AGW1 ÷ AGW5) and dampers actuators (KM1 ÷ KM5); Y4 – KTE connectors; Y5 - power strip for VNT20/VNT LCD controllers Y6 – external temperature sensor PT-1000 connectors.</p> <p>Signal Leds: L1...L5 – red Led, thermal overload relays failure of exhaust fans equipped with external TK (WD1 ÷ WD5); L6...L10 – red Led, anti freeze protection alarm of Leo water heaters (AGW1 ÷ AGW5); L11...L15 – yellow Led, high pollution of mixing chamber filters (KM1 ÷ KM5); L16 – green Led, thermostat signal – heating L17 – green Led, supplying of buffer signal.</p>

### 3. Optional equipment for KTB and KTS-sets

Type of set	Picture	Model	Description
KTB / KTS		RA	<b>Room thermostat</b> Temperature range: +10 ... +30°C Operational temperature range: 0 ... +40°C IP/Insulation class: IP30 Max current: inductive 3A, resistive 10A
		RD	<b>Room thermostat with weekly programmer</b> Temperature range: +5 ... +28°C co 0,5°C Operational temperature range: 0 ... +50°C IP/Insulation class: IP30 Supply: batteries 2x1,5V AA Max current: inductive 2A, resistive 5A
		VNT20	<b>Control panel with built-in room thermostat</b> Power supply: 230V 50Hz Output steering signal: analogue 0 - 10V Temperature range: +5 ... +35°C Regulating method: potentiometer Regulating range: 0 – 100% Operational temperature range: -10 ... +60°C Temperature sensor: internal (optional. PT-1000) IP/Insulation class: IP20 Max current of valve actuator: inductive 3A, resistive 8A
		VNTLCD	<b>Control panel with room thermostat, weekly calendar and display</b> Power supply: 230V 50Hz Output steering signal: analog 0 - 10V Temperature range: +5 ... +35°C Regulating method: buttons, display LCD Regulating range: 0 – 100% Operational temperature range: -10 ... +60°C Temperature sensor: built in (available optional external PT-1000) IP/Insulation class: IP20 Max current of valve actuator: inductive 3A, resistive 8A


### 3. Optional equipment for KTB and KTS-sets


Type of set	Picture	Model	Description																								
KTB / KTS		TR / TRd	<p><b>5-step fan speed regulator</b></p> <p><b>Power supply:</b> 230V 50/60Hz  <b>IP/Insulation class:</b> IP54  <b>Operating temperature range:</b> 0 ... +40°C  <b>Steps:</b></p> <table border="1"> <thead> <tr> <th></th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td></td> <td colspan="5" style="text-align: center;">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>70 /1,5</td> <td>85 /1,8</td> <td>105/2,2</td> <td>145/2,7</td> <td>230/3,0</td> </tr> </tbody> </table> <p><b>Weight:</b> TR - 1,5kg; TRd - 2,5kg  <b>Current:</b> TR – 1,5A; TRd – 3,0A</p>		1	2	3	4	5		Ur [V] / Ir [A]					TR	115/1,5	135/1,5	155/1,5	180/1,5	230/1,5	TRd	70 /1,5	85 /1,8	105/2,2	145/2,7	230/3,0
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	SRV2d	<p><b>Two way valve 3/4" with actuator</b></p> <p><b>IP/Insulation class:</b> IP44  <b>Power supply:</b> 200 – 240V 50/60Hz  <b>Maximum water temperature:</b> +130°C  <b>Maximum water pressure:</b> 1,6MPa  <b>Kvs:</b> 5  <b>Install:</b> return pipe  <b>Full opening time:</b> 2,5min.</p>																									
	PF	<p><b>Pressure switch</b></p> <p><b>IP/Insulation class:</b> IP54  <b>Operating temperature range:</b> -20...+60°C  <b>Pressure range:</b> 30 – 500Pa  <b>Maximum pressure:</b> 50kPa</p>																									

## 4. KTB-set

### 4.1 Operating

At first start of KTE all Leds are flashing, than flashing alternating only D18 and D19. Now should be chosen KTB mode of operating by S2 button.


 In case of wrong choice of operating mode (KTB/KTS), KTE should be reset. To reset press at one time buttons S5, S6 and S1 and keep pushed until Leds D18 and D19 starts flashing again. Now choose correct mode.

 KTB mode is fit to operate with SP ON/OFF actuator

At start of KTB button S1 Led D14 is flashing. That signal means that control system operates in standby mode. Anti freeze protection is still working, all settings are kept.

#### **BALANCE OF AIR VOLUME IN CASE OF CONNECTED EXHAUST FAN.**

If exhaust fan is connected, control set will balance it air volume depending of Leo KM mixing chamber opening. If water heater is switched on and mixing chamber Leo KM – exhaust fan operate. In case when the mixing chamber is closed or water heater fan is stopped the exhaust fan stay switched off.

 In case of operating exhaust fan with Leo S-type units, the fan of water heater should operate with maximum air volume and switch X5 pre-set at INT. In case of operating exhaust fan with Leo M-type it is possible to choose various air volume, switch X5 has to be pre-set at OUT, exhaust fan have to be equipped with regulator with 0-10V control signal.


KTB-set make possibilities to use both 1 or 3 phase motors in exhaust fan:

- **Maximum current of 1-phase fan 230V:** 1kW for connected directly or by transformer.
- **Maximum current of 3-phase fan 3 x 230V:** 1kW for 3-phase controlled by 1-phase inverter (INPUT 1x230VAC, OUTPUT 3x230VAC), it can be supplied by KTE.
- **3-phase Exhaust fan 3 x 400V:** has to be supplied externally of KTE. In that case obligatory is contactor whose starts fan operating.


#### **OPERATING MODE:**

KTB-set has two mode of it operate: Winter and summer, chosen by S4 button.

- 1) **SUMMER MODE** – chosen by S4 button, signalized by D17. In that mode operates only fan, valve is closed. By opened mixing chamber air is brought to the room without warming up. When mixing chamber is closed, air is circulated in the room without heating
- 2) **WINTER MODE** - chosen by S4 button, signalized by D16. In that mode operate fan and depending of room temperature valve. In Winter mode are available additional two option: CONTIUNOSLY and THERMOSTATIC
  - a) **CONTIUNOSLY** (default mode) - D16 Led on. After reaching pre-set temperature the valve and mixing chamber are closed. Fan operates circulating air. When temperature drops below pre-set value, valve and mixing chamber are opened. There is available set causes not-closing mixing chamber after reaching temperature. For choose that option – after reaching temperature closing valve and mixing chamber, open dampers by S5 button manually, that set will be memorized.
  - b) **THERMOSTATIC** – D16 Led flashing. After reaching pre set temperature valve and mixing chamber are closed, fan is stopped. Signalized by flashing D1 (mixing chamber was open) or D10 (mixing chamber was close). When temperature drops below pre-set value, set back to previous operating.

 It is not recommended to open the mixing chamber in CONTIUNOSLY mode when temperature outside is below 7°C, it may causes alarm of anti freeze protection.

Default mode is CONTIUNOSLY, signalized by D16 Led on. For switch THERMOSTATIC ↔ CONTIUNOSLY, should be press S2 and S4 buttons and keep approximately 6s.

 while changing mode THERMOSTATIC ↔ CONTIUNOSLY on KTB-set, same setting should be set on VNT20/ VNTLCD.



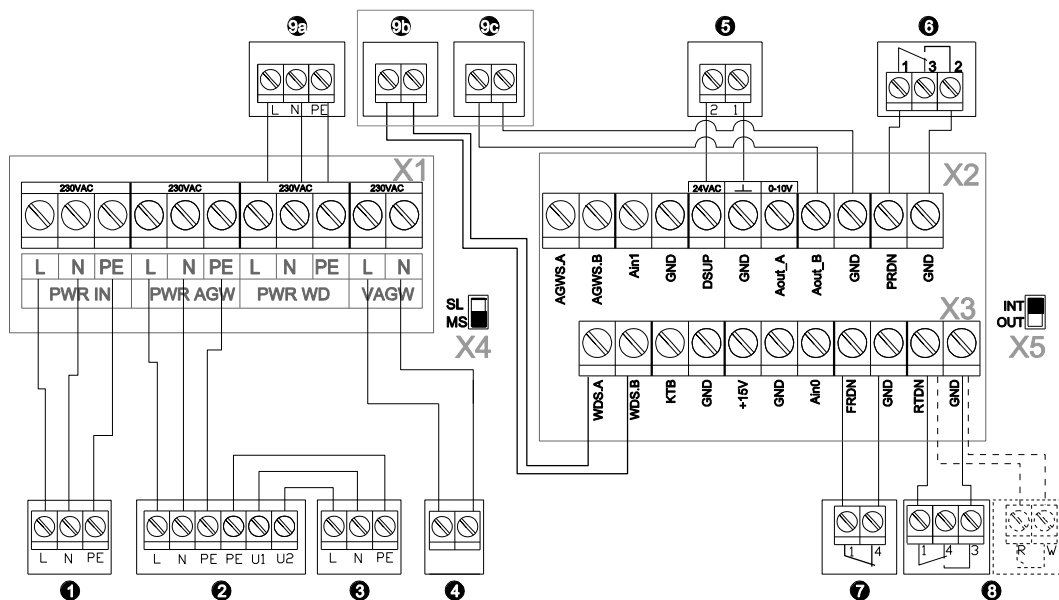
## 4. KTB-set

### ALARMS.

**Filter pollution** – D15 Led on. Fan is stopped. Filters are polluted.

**Anti freeze protection** – D12 Led on. While warmed up outlet temperature of air doesn't approach 7 °C TPR anti freeze thermostat signalize failure. Mixing chamber is closed, valve opened and fan stopped. After increasing temperature KTB-set start normal operate after 3 minutes.

### 4.2 Connecting Leo KM S with KTB-set



1. Supply 230V/50Hz (cables OMY 3x2,5mm<sup>2</sup>)
2. Fan speed regulator TR\* (cables OMY 3x1mm<sup>2</sup>)
3. Water heater fan (cables OMY 3x1mm<sup>2</sup>)
4. Valve actuator SRV2d\* (cables OMY 2x1mm<sup>2</sup>)
5. Damper actuator SP ON/OFF (cables OMY 2x0,5mm<sup>2</sup>)
6. Pressure switch PF\* (cables OMY 2x0,5mm<sup>2</sup>)
7. Anti freeze thermostat TPR (cables OMY 2x0,5mm<sup>2</sup>)
8. Room thermostat RA (RD)\* (cables OMY 2x0,5mm<sup>2</sup>)
- 9a. 1-phase exhaust fan supply\* or 1-phase inverter\* (cables OMY 3x1mm<sup>2</sup>)
- 9b. Inverter contactor\* (cables OMY 2x0,5mm<sup>2</sup>)
- 9c. Output control signal for inverter\* (cables LIYCY 2x0,5mm<sup>2</sup>)

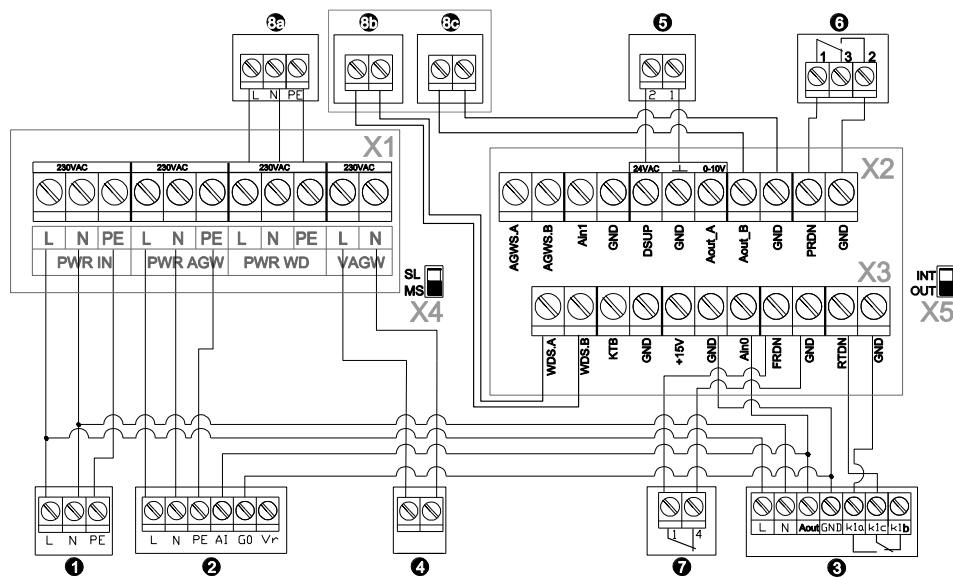
\*Optional equipment.

⚠ In case of operating exhaust fan with Leo S-type units, the fan of water heater should operate with maximum air volume (5<sup>th</sup> step on TR) and switch X5 pre-set at INT.

For length of cables above 100 [m], recommended diameter of cables should be reviewed.

## 4. KTB-set

### 4.3. Connecting Leo KM M with KTB-set



1. Supply 230V/50Hz (cables OMY 3x2,5mm<sup>2</sup>)
2. Fan speed regulator with built in DSS2e fan speed regulator (supply cables OMY 3x1mm<sup>2</sup> signal cables LIYCY 2x0,5mm<sup>2</sup>)
3. VNT20/LCD control panel (cables OMY 2x1mm<sup>2</sup>, signal cables LIYCY 2x0,5mm<sup>2</sup>, valve actuator OMY 2x0,5mm<sup>2</sup>)
4. Valve actuator SRV2d\* (supply cables OMY 2x1mm<sup>2</sup>)
5. Damper actuator SP ON/OFF (cables OMY 2x0,5mm<sup>2</sup>)
6. Pressure switch PF\* (cables OMY 2x0,5mm<sup>2</sup>)
7. Anti freeze thermostat TPR (cables OMY 2x0,5mm<sup>2</sup>)
- 8a. 1-phase exhaust fan supply\* or 1-phase inverter\* (cables OMY 3x1mm<sup>2</sup>)
- 8b. Inverter contactor\* (cables OMY 2x0,5mm<sup>2</sup>)
- 8c. Output control signal for inverter\* (cables LIYCY 2x0,5mm<sup>2</sup>)

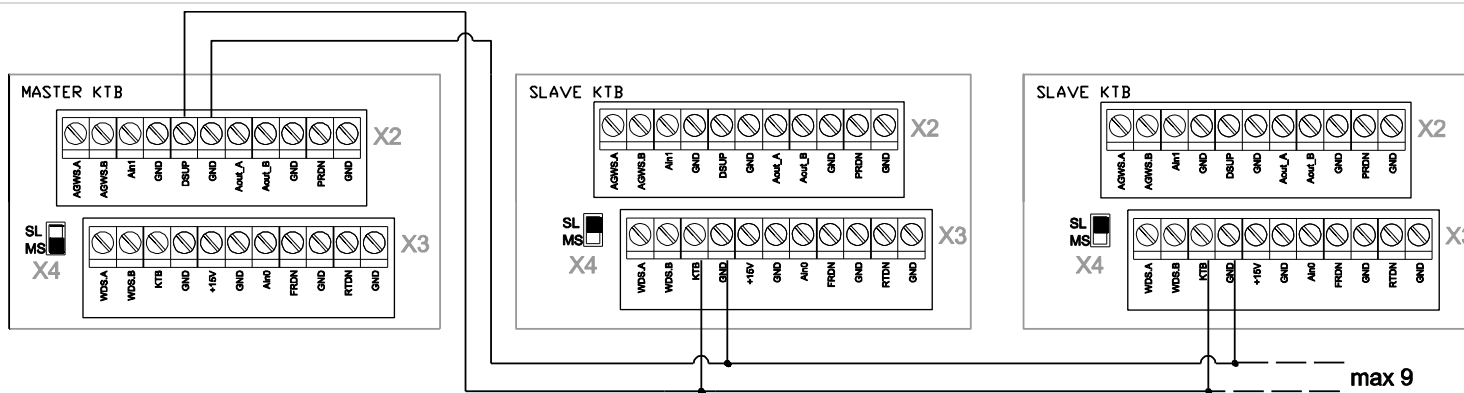
\*Optional equipment.

Switch X5 should to be set at OUT position.

For length of cables above 100 [m], recommended diameter of cables should be reviewed

### 4.4. Connecting KTB-sets in MASTER-SLAVE mode


MASTER-SLAVE mode gives possibilities to control several KTB-Sets in SLAVE mode by one KTB-set in MASTER mode. In MASTER-SLAVE mode can operate maximum 10 units (1 x MASTER, 9 x SLAVE). Each unit should be equipped with KTB-set, valve with actuator, thermostat and fan speed regulator. X4 switch has to be set on MS position in MASTER KTB-set, other has to be set on SL position in SLAVE (D18 Led flashing).




## 5. KTS-set

### 5.1. Operating

At first start of KTE whole Leds are flashing, than flashing alternating only D18 and D19. Now should be chosen KTS mode by S2 button.


 In case of wrong choice of operating mode (KTB/KTS), KTE should be reset. To reset press at one time buttons S5, S6 and S1 and keep pushed until Leds D18 and D19 starts flashing again. Now choose correct mode.

 KTS mode is fit to operate with SP 0-10 stepless actuator

At start of KTS button S1, D14 Led flashing. That signal mean that KTE control system operates in standby mode. Anti freeze protection still working, all settings are kept.

#### BALANCE OF AIR VOLUME IN CASE OF CONNECTED EXHAUST FAN

If exhaust fan is connected, control set will balance it air volume depending of Leo KM mixing chamber opening. If water heater is switched on and mixing chamber Leo KM opened – exhaust fan operates. In case when the mixing chamber is closed or water heater fan is stopped the exhaust fan stay switched off.

 In case of operating exhaust fan with Leo S-type units, the fan of water heater should operate with maximum air volume and switch X5 pre-set at INT. In case of operating exhaust fan with Leo M-type it is possible to choose various air volume, switch X5 has to be pre-set at OUT, exhaust fan have to be equipped with regulator with 0-10V control signal.

KTB-set make possibilities to use both 1 or 3 phase motors in exhaust fan:

- **Maximum current of 1-phase fan 230V:** 1kW for connected directly or by transformer.
- **Maximum current of 3-phase fan 3 x 230V:** 1kW for 3-phase controlled by 1-phase inverter (INPUT 1x230VAC, OUTPUT 3x230VAC), it can be supplied by KTE.
- **3-phase Exhaust fan 3 x 400V:** has to be supplied externally of KTE. In that case obligatory is contactor whose starts fan operating.


#### OPERATING MODE:

KTB-set has two mode of it operate: Winter and summer, chosen by S4 button.

- 1) **SUMMER MODE** – chosen by S4 button, signalized by D17 Led on. In that mode operates only fan, valve is closed. By opened mixing chamber air is brought to the room without warming up. When mixing chamber is closed, air is circulated in the room without heating
- 2) **WINTER MODE** - chosen by S4 button, D16 Led on signalize that setting. In that mode operate fan and valve actuator (valve depending of room temperature). In Winter mode are available additional two option: CONTIUNOSLY and THERMOSTATIC
  - a) **CONTIUNOSLY** (default mode) - , D16 Led on. After reaching pre-set temperature the valve is closed and mixing chamber is positioned at pre-set minimum value of opening (default set 20%). Fan operates with pre-set by user air volume. When temperature drops below pre-set value, valve opens and mixing chamber are opening with earlier (maximal) position. There are possibilities to change those minimal and maximal position of opening mixing chamber in various status. For change point of opening set new value on KTE panel by buttons S5/S6 when several status are present (unreached temperature, reached temperature), that set will be memorized.
  - b) **THERMOSTATIC** – Led D16 flashing. After reaching pre set temperature valve and mixing chamber are closed, fan is stopped. Signalized by flashing D1 (mixing chamber was open) or D10 (mixing chamber was close). When temperature drops below pre-set value, set back to previous operating.

 while changing mode THERMOSTATIC ↔ CONTIUNOSLY on KTS-set, same setting should be set on VNT20/ VNTLCD.

Default mode is CONTIUNOS, signalized by D16 Led on. For switch THERMOSTATIC ↔ CONTIUNOSLY, should be press S2 and S4 buttons and keep approximately 6s.

 It is not recommended to open the mixing chamber in CONTIUNOSLY mode when temperature outside is below 7°C, it may causes alarm of anti freeze protection.

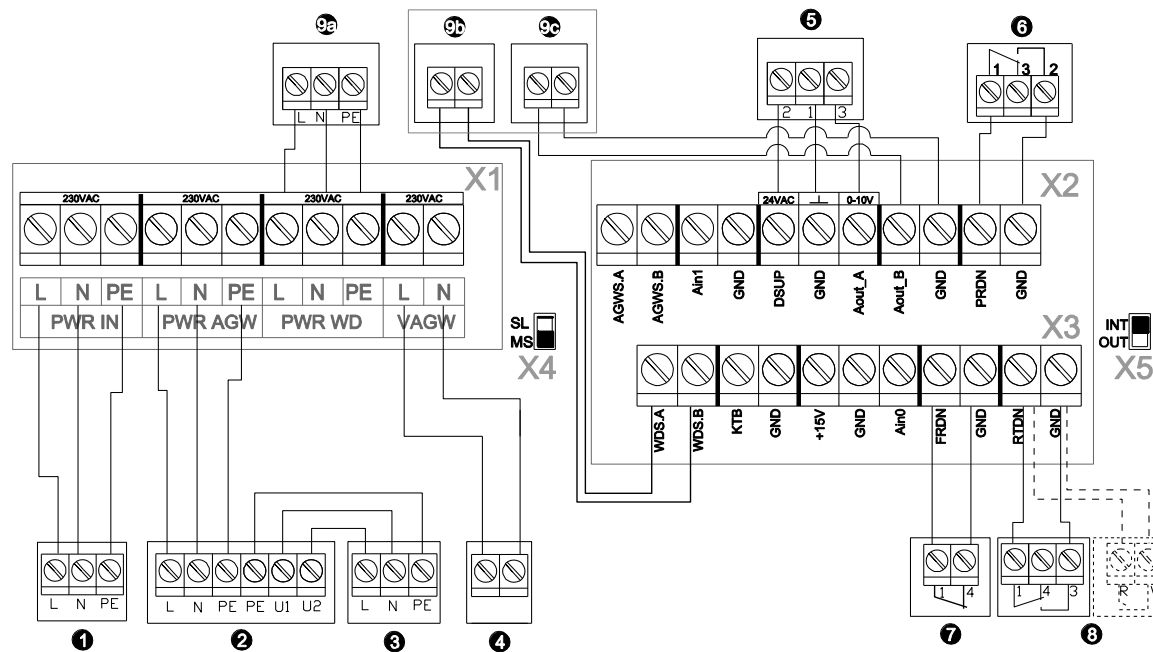
## 5. KTS-set

### ALARMS.

**Filter pollution** – D15 Led on. Fan is stopped. Filters are polluted.

**Anti freeze protection** – D12 Led on. While warmed up outlet temperature of air doesn't approach 7 °C TPR anti freeze thermostat signalize failure. Mixing chamber is closed, valve opened and fan stopped. After increasing temperature KTB-set start normal operate after 3 minutes

### 5.2. Connecting Leo KM S with KTS-set



1. supply 230V/50Hz (cables OMY 3x2,5mm<sup>2</sup>)
2. Fan speed regulator TR\* (cables OMY 3x1mm<sup>2</sup>)
3. Water heater fan (cables OMY 3x1mm<sup>2</sup>)
4. Valve actuator SRV2d\* (cables OMY 2x1mm<sup>2</sup>)
5. Damper actuator SP 0-10 (cables LIYCY 3x0,5mm<sup>2</sup>)
6. Pressure switch PF\* (cables OMY 2x0,5mm<sup>2</sup>)
7. Anti freeze thermostat TPR (cables OMY 2x0,5mm<sup>2</sup>)
8. Room thermostat RA (RD)\* (cables OMY 2x0,5mm<sup>2</sup>)
- 9a. 1-phase exhaust fan supply\* or 1-phase inverter\* (cables OMY 3x1mm<sup>2</sup>)
- 9b. Inverter contactor\* (cables OMY 2x0,5mm<sup>2</sup>)
- 9c. Output control signal for inverter\* (cables LIYCY 2x0,5mm<sup>2</sup>)

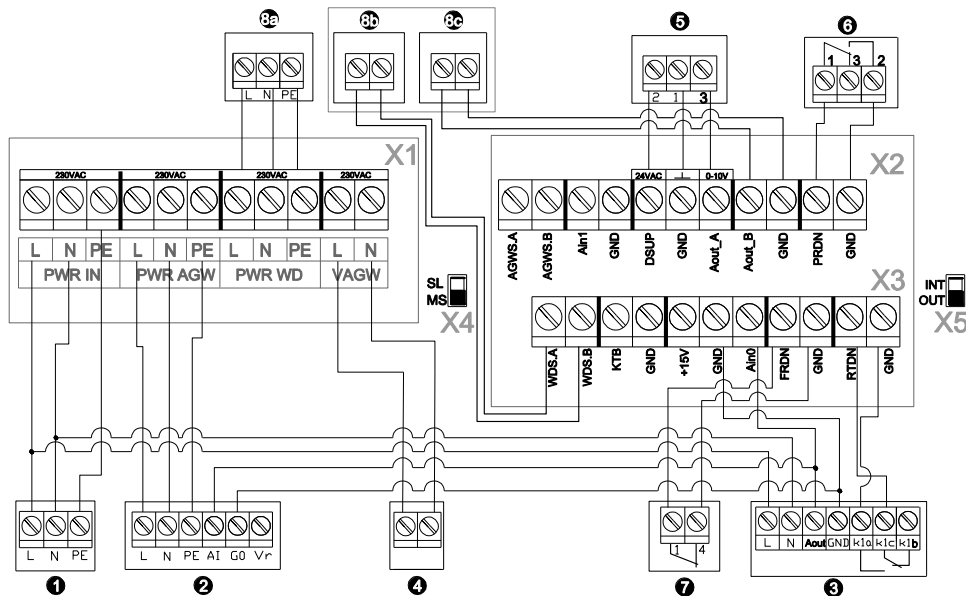
\*Optional equipment.

⚠ In case of operating exhaust fan with Leo S-type units, the fan of water heater should operate with maximum air volume (5<sup>th</sup> step on TR) and switch X5 pre-set at INT.

For length of cables above 100 [m], recommended diameter of cables should be reviewed

## 5. KTS-set

### 5.3. Connecting Leo KM M with KTS-set



1. Supply 230V/50Hz (cables OMY 3x2,5mm<sup>2</sup>)
2. Fan speed regulator with built in DSS2e fan speed regulator (supply cables OMY 3x1mm<sup>2</sup> signal cables LIYCY 2x0,5mm<sup>2</sup>)
3. VNT20/VNTLCD control panel (cables OMY 2x1mm<sup>2</sup>, signal cables LIYCY 2x0,5mm<sup>2</sup>, valve actuator OMY 2x0,5mm<sup>2</sup>)
4. Valve actuator SRV2d\* (supply cables OMY 2x1mm<sup>2</sup>)
5. Damper actuator SP 0-10 (cables LIYCY 3x0,5mm<sup>2</sup>)
6. Pressure switch PF\* (cables OMY 2x0,5mm<sup>2</sup>)
7. Anti freeze thermostat TPR (cables OMY 2x0,5mm<sup>2</sup>)
- 8a. 1-phase exhaust fan supply\* or 1-phase inverter\* (cables OMY 3x1mm<sup>2</sup>)
- 8b. Inverter contactor\* (cables OMY 2x0,5mm<sup>2</sup>)
- 8c. Output control signal for inverter\* (cables LIYCY 2x0,5mm<sup>2</sup>)

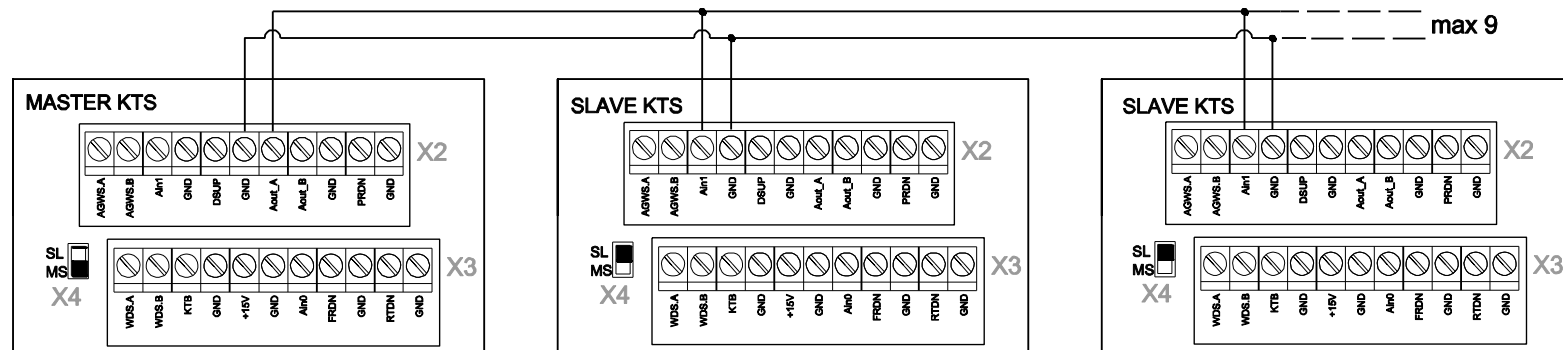
\*Optional equipment.

Switch X5 should to be set at OUT position.

For length of cables above 100 [m], recommended diameter of cables should be reviewed

### 5.4. Connecting KTS-sets in MASTER-SLAVE mode

MASTER-SLAVE mode gives possibilities to control several KTB-sets in SLAVE mode by one KTB-set in MASTER mode. In MASTER-SLAVE mode can operate maximum 10 units (1 x MASTER, 9 x SLAVE). Each units should be equipped with KTB-set, valve with actuator, thermostat and fan speed regulator. X4 switch has to be set on MS position in MASTER KTB-set, other has to be set on SL position in SLAVE (D18 Led flashing).




## 6. Operating KTB and KTS-sets with buffer

### 6.1. Operating

#### GENERAL INFORMATION.

Buffer is a distributor of supplying and steering signals. It supplies fan of Leo water heater and exhaust fan. For example to complete one full set for five units is needed:

- 1 x Buffer
- 1 x KTS or KTB-set (KTB/KTS-set including anti freeze thermostat, damper actuator, KTE)
- 4 x damper actuator (ON/OFF or stepless depending of KTB/KTS-set)
- 4 x anti freeze thermostat
- 1 x VNT20/VNTLCD control panel in M-type units or RA, RD with S-type units.
- 1 x PT 1000 – external temperature sensor.
- 1 or 5 valve with actuator (depending of used solution on pipelines)

 While operating with buffer SUMMER mode is unavailable.

#### MOUNTING


While mounting buffer it is needed to do it with proper care. Buffer and KTE signalize various statuses in one time and because of that those units should be mounted close together.

#### CONNECTING OF EXHAUST FAN

It is possible to connect 1- or 3-phase exhaust fan.

- **Maximum current of 1-phase fan 230V:** 0,7kW for connected directly or by transformer.
- **Maximum current of 3-phase fan 3 x 230V:** 0,7kW for 3-phase controlled by 1-phase inverter (INPUT 1x230VAC, OUTPUT 3x230VAC), it can be supplied by buffer.
- **3-phase exhaust fan 3 x 400V:** has to be supplied externally of buffer. In that case obligatory is contactor whose starts fan operating.

#### ALARMS

 In case of operating Buffer + KTE, all alarms are lead and signalized in buffer.

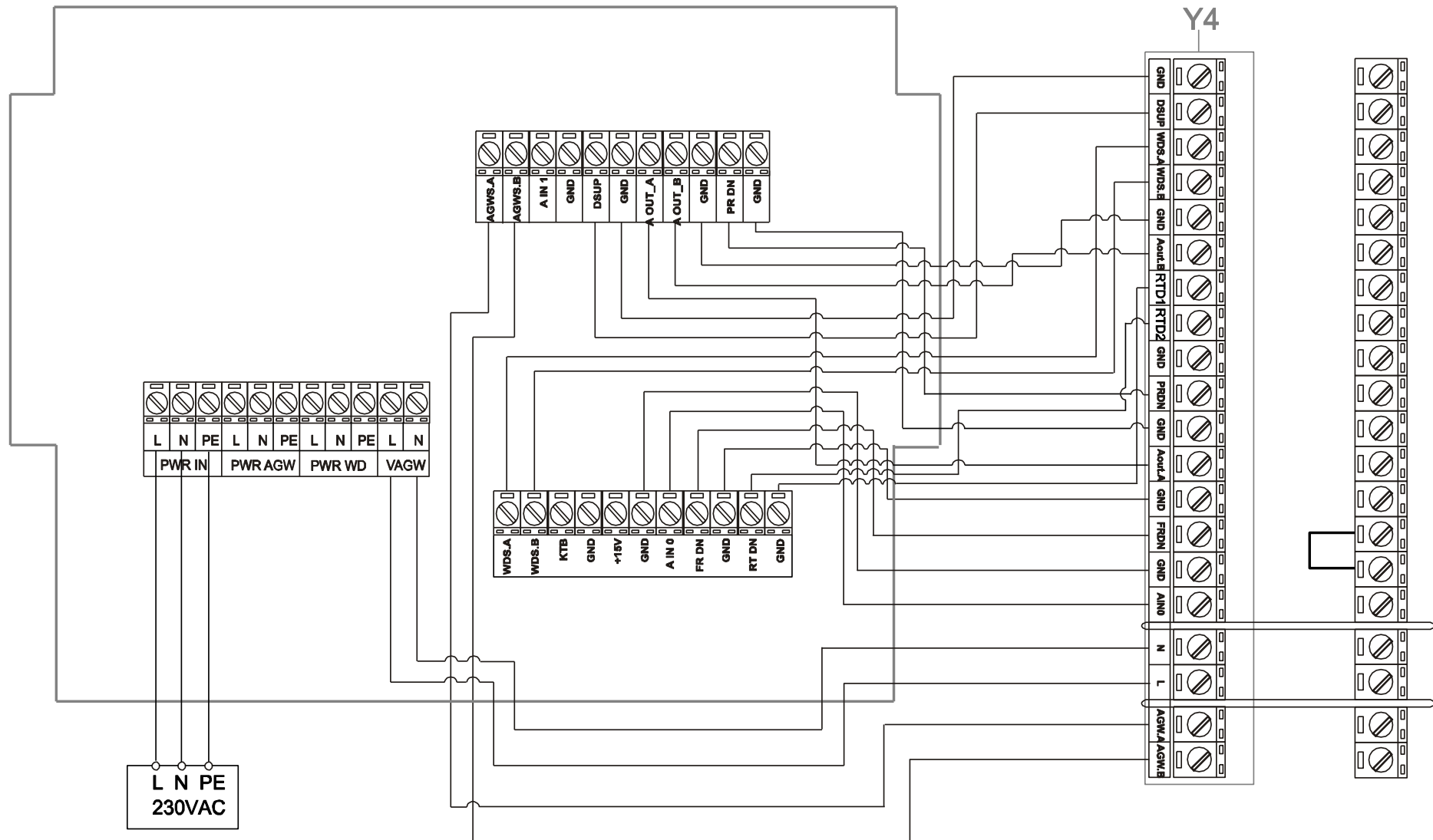
**Filter pollution alarm** – each unit has separately signalization by L11 – L15 Led. Filters are polluted. Operating isn't stopped.

**Anti freeze protection alarm** - each unit has separately signalization by L6 – L10 Led. All mixing chamber are closed, valves opened. Exhaust fan and water heater fan are stopped only in units witch failure. Other units operate normally. After reaching above 7 °C on TPR (recommended setting anti freeze thermostat). Units operate with alarm status next 3 minutes and back to ordinary operating.

**Exhaust fan alarm** – is available only in case of connecting external TK of exhaust fan. Each unit has separately signal by L1-L5 Leds, exhaust fan is stopped where the alarm was occurred.

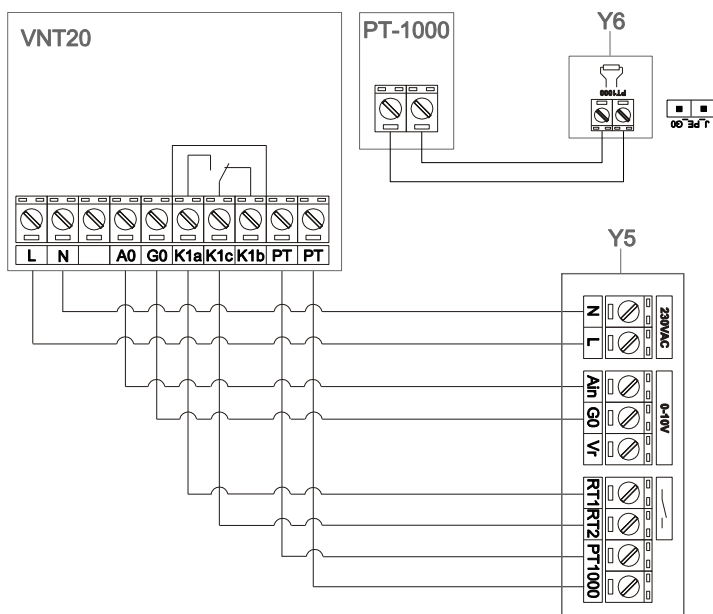
## 6. Operating KTB, KTS-sets with the buffer

### 6.2. Connecting KTE to the buffer

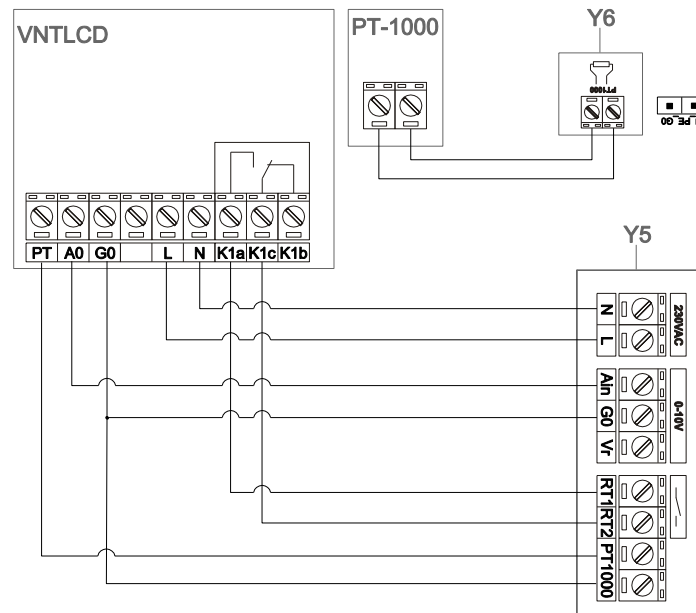


## 6. Operating KTB, KTS-sets with the buffer

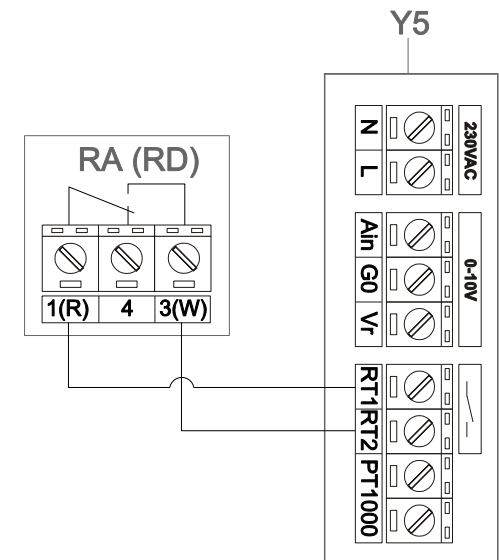
### 6.3. Connecting VNT20 and PT - 1000 to the buffer



### 6.4. Connecting VNTLCD and PT - 1000 to the buffer



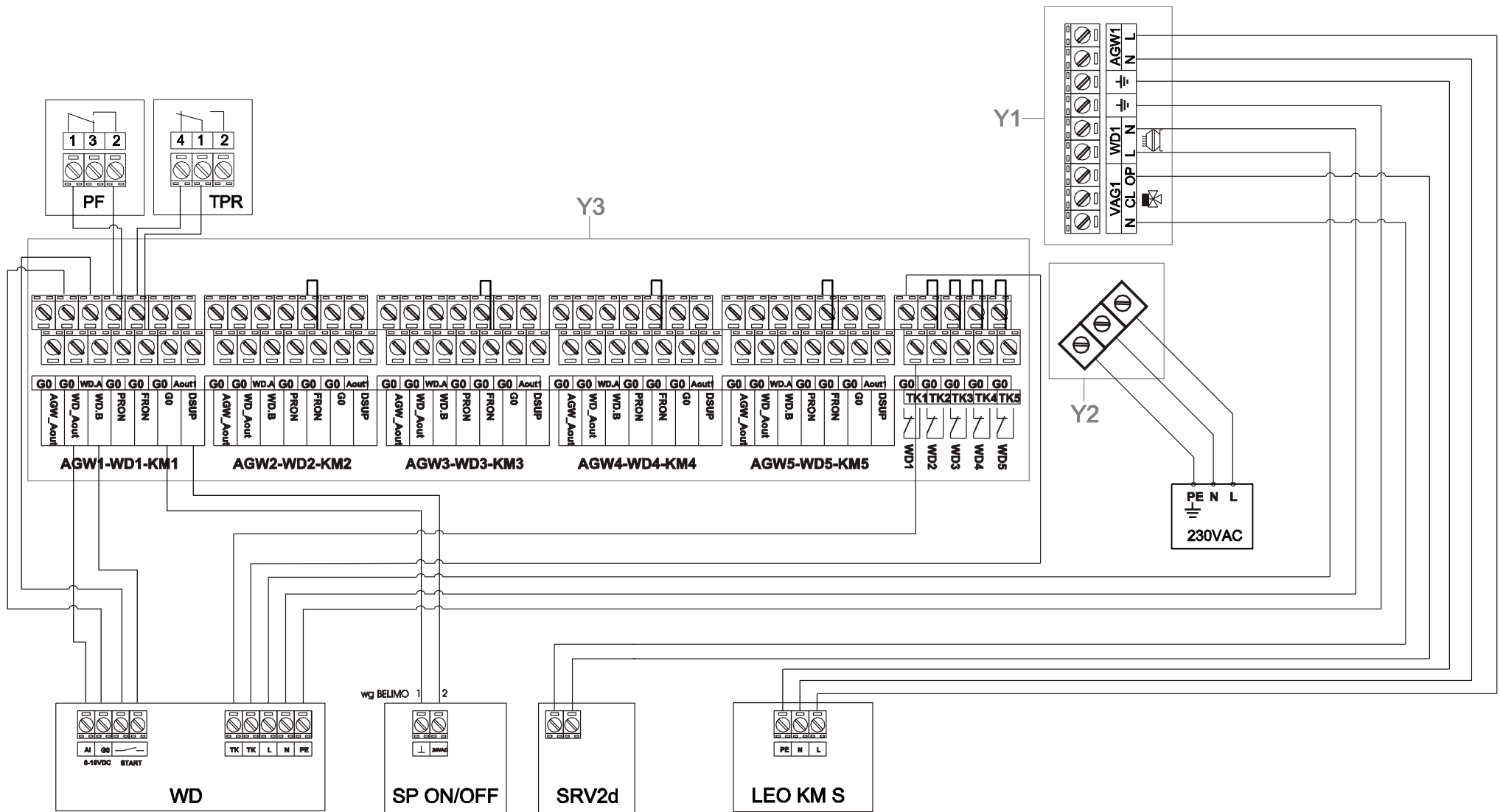
### 6.5. Connecting RA or RD to the buffer





## 6. Operating KTB, KTS-sets with the buffer

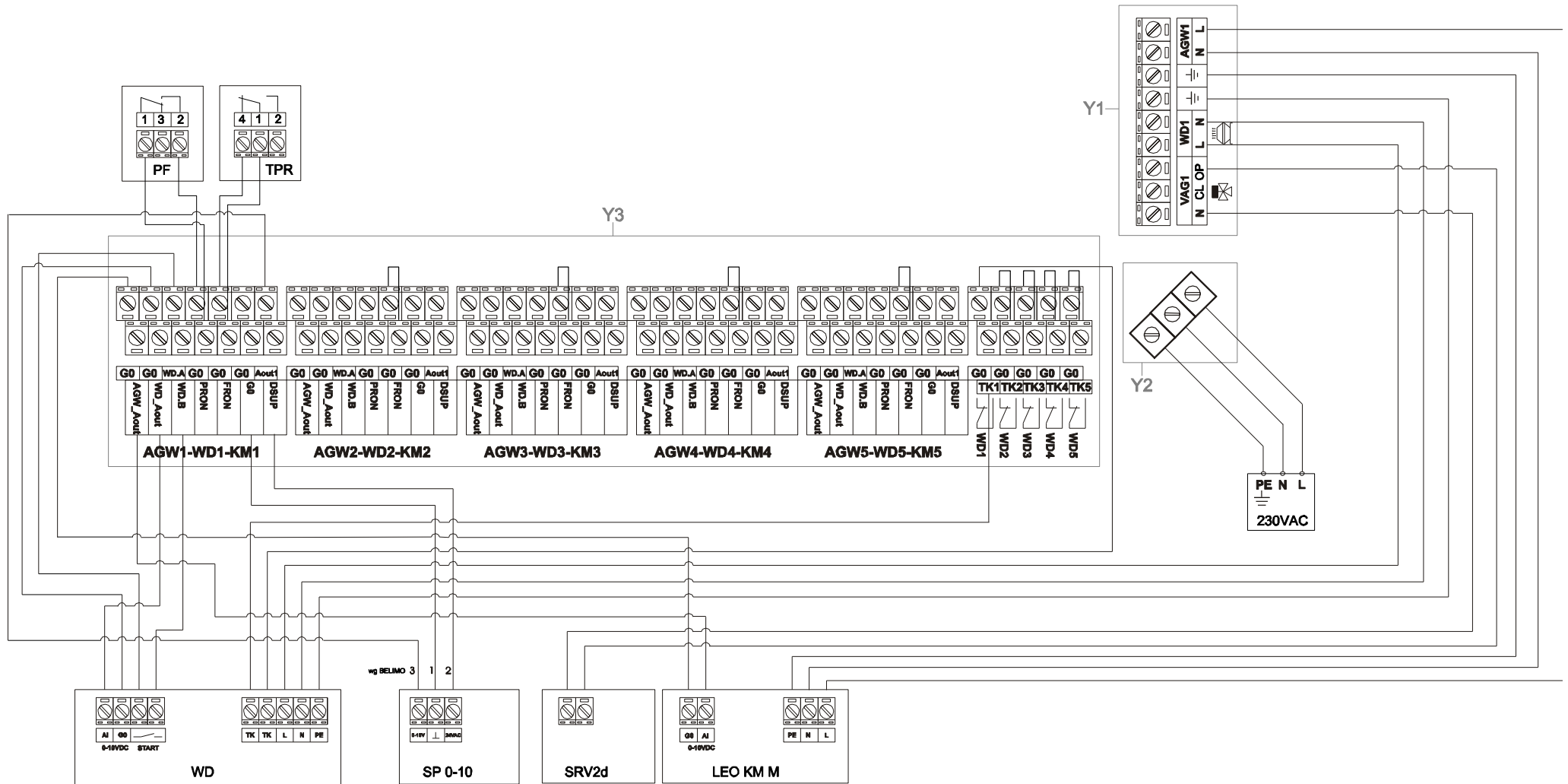
### 6.6. Connecting exhaust fan, damper actuator ON/OFF, SRV2d, TPR, PF and Leo KM S to the buffer



⚠ In case when exhaust fan is regulated by 1-phase inverter – have to be closed jumpers J, PE, GO (see page 4.)

## 6. Operating KTB, KTS-sets with the buffer

### 6.7. Connecting exhaust fan, stepless damper actuator, SRV2d, TPR, PF and Leo KM M to the buffer



⚠ In case when exhaust fan is regulated by 1-phase inverter – have to be closed jumpers J, PE, GO (see page 4.)

## 7. Cables list

For length of cables above 100 [m], recommended diameter of cables should be reviewed.

Describe	Connector	Cable
<b>Y5 – VNTLCD, VNT20</b>		
Supply VNTLCD/VNT20, 230VAC	L, N	OMY 2x1mm <sup>2</sup>
Steering signal 0-10V	Ain, G0	LIYCY 2x0,5mm <sup>2</sup>
Thermostat (closed conector)	RT1, RT2	OMY 2x0,5mm <sup>2</sup>
Sensor PT-1000	PT1000	LIYCY 2x0,5mm <sup>2</sup>
<b>Y4 – KTE IN</b>		
Supply of dampers actuator by KTE	GND, DSUP, Aout.A	LIYCY 3x0,5mm <sup>2</sup>
Contactor of exhaust fan	WDS.A, WDS.B	OMY 2x0,5mm <sup>2</sup>
Steering signal 0-10V for exhaust fan by KTE	GND, Aout.B	LIYCY 2x0,5mm <sup>2</sup>
Thermostat signal to KTE	RTD1, RTD2	LIYCY 2x0,5mm <sup>2</sup>
Pressure switch	PRDN, GND	OMY 2x0,5mm <sup>2</sup>
Anti freeze thermostat to KTE	GND, FRDN	OMY 2x0,5mm <sup>2</sup>
Analog signal output	GND, AIN0	LIYCY 2x0,5mm <sup>2</sup>
Valve actuator supply VAGW	L, N	OMY 2x0,5mm <sup>2</sup>
Contactor for air water heater	AGW.A, AGW.B	OMY 2x0,5mm <sup>2</sup>

I – units 1 to 5.

Describe	Connector	Cable
<b>Y3 – AGWi, WDi, KMi</b>		
Steering signal for air water heater	G0, AGW_Aout	LIYCY 2x0,5mm <sup>2</sup>
Steering signal for exhaust fan	G0, WD_Aout	LIYCY 2x0,5mm <sup>2</sup>
Contactor for air water heater	WD.A, WD.B	OMY 2x0,5mm <sup>2</sup>
Pressure switch	G0, PRDN	OMY 2x0,5mm <sup>2</sup>
Anti freeze protection	G0, FRDN	OMY 2x0,5mm <sup>2</sup>
Damper actuator SP 0-10	G0, Aout1, DSUP	OMY 3x0,5mm <sup>2</sup>
Damper actuator SP ON/OFF	G0, DSUP	OMY 2x0,5mm <sup>2</sup>
Thermal overload TK connector	G0, TKi	OMY 2x0,5mm <sup>2</sup>
<b>Y1 – VAGi, WDi, AGWi</b>		
Valve actuator supply VAGW	N, OP	OMY 2x0,5mm <sup>2</sup>
Exhaust fan supply	L, N, PE	OMY 3x1,5mm <sup>2</sup>
Water heater supply	L, N, PE	OMY 3x1,5mm <sup>2</sup>
<b>Y2</b>		
Buffer supply	L, NE, PE	OMY 2x2,5mm <sup>2</sup>
<b>Y6</b>		
Sensor PT-1000	PT1000	LIYCY 2x0,5mm <sup>2</sup>