

Original Operating Instructions

Mechanical Ventilation Heat Recovery Unit NOVUS (F) 300 / 450



*NOVUS 300
*NOVUS F 300
*NOVUS 450

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Index

0	Preamble	6
0.1	Validity.....	6
0.2	Target group.....	6
1	Introduction	7
1.1	Warranty and Liability	7
1.1.1	Warrant Terms	7
1.1.2	Liability	7
1.2	Safety	7
1.2.1	Intended use	7
1.2.1.1	Heat recovery unit NOVUS	7
1.2.1.2	Control unit.....	8
1.2.2	Qualification of the target group	8
1.2.2.1	Operators	8
1.2.2.2	Qualified personnel	8
1.3	Notes on safety	8
1.3.1	Safety appliances and measures.....	8
1.3.2	Used symbols.....	8
2	Hints for the operator and the qualified personnel	9
2.1	Product description	9
2.1.1	Type plate	10
2.1.2	Requirements on the assembly site.....	11
2.1.3	Frost protection	11
2.1.4	Joint operation with heat-producing appliances.....	11
2.2	Available control modules	11
2.2.1	LED control panel	11
2.2.1.1	Operating functions LED control panel	12
2.2.1.2	Signalling of operating and error conditions	13
2.2.2	TFT touch panel.....	14
2.2.2.1	Operating function and signalling of the TFT touch panel	15
2.3	Menu structure of the TFT touch panel.....	17
2.3.1	Main menu Information	18
2.3.1.1	Submenu Current message	18
2.3.1.2	Submenu Last messages	18
2.3.1.3	Submenu Fan speeds	18
2.3.1.4	Submenu Current status of the device	18
2.3.1.5	Submenu software versions.....	18
2.3.1.6	Submenu Connected devices	18
2.3.1.7	Submenu Filter run-time	18
2.3.1.8	Submenu Operating hours.....	18
2.3.2	Main menu Settings	18
2.3.2.1	Submenu Fan speeds.....	18
2.3.2.2	Submenu Filter.....	19
2.3.2.3	Submenu Frost protection.....	19
2.3.2.4	Submenu Automatic.....	20
2.3.2.4.1	Automatic timing.....	20
2.3.2.4.2	Automatic sensor	21
2.3.2.5	Submenu Date/Time	22
2.3.2.6	Submenu Choose language	22
2.3.2.7	Submenu By-pass.....	22
2.3.2.8	Submenu Screen dimming.....	23
2.3.2.9	Submenu Key lock	23
2.3.2.10	Submenu Supplementary heating	23

2.3.2.11	Submenu Flap of the Geothermal Heater Exchanger (GHE)	23
2.3.2.12	Submenu Cooling brine defroster	24
2.3.3	Boost ventilation mode with external boost ventilation sensing device	24
2.4	Maintenance by the operator	24
2.4.1	Replacement of the filter	24
2.4.2	Resetting the filter run-time	27
2.4.2.1	Resetting the filter run-time by means of the LED control panel	27
2.4.2.2	Resetting the filter run-time by means of the TFT touch panel.....	27
2.4.3	What to Do in the Event of a Failure?	28
2.5	Disposal.....	28
3	Hints for qualified personnel	29
3.1	Prinzipal configuration of the system	29
3.2	Installation requirements	29
3.2.1	Transport and packing	30
3.2.2	Checking of the scope of delivery	30
3.3	Mounting.....	30
3.3.1	Wall mounting	30
3.3.2	Mounting on a mounting frame	32
3.3.3	Air duct connection.....	34
3.3.4	Connection of the Condensate Drain	35
3.4	Electrical connections	37
3.4.1	Connection of the adapter board	38
3.4.2	Connection of the TFT touch panel.....	38
3.4.3	Connection of several TFT touch panels	39
3.4.4	Connection of the LED control panel	40
3.4.5	Connection of external boost ventilation switch.....	40
3.4.6	Connection of external sensors	40
3.4.7	Connection status relay.....	41
3.4.8	Connection external release	41
3.4.9	Connection digital inputs or outputs.....	41
3.4.10	Operation without a control unit connected.....	42
3.5	Commissioning of the NOVUS.....	42
3.5.1	Operational readiness	42
3.5.2	Adjusting the air volume flow	42
3.5.2.1	Adjustment of the nominal air flow with TFT touch panel	42
3.5.2.2	Adjustment of the nominal air flow with LED control panel.....	44
3.5.3	Adjustment of the Valves	44
3.6	Menu settings by qualified personnel / service staff	45
3.6.1	Main menu Setup	45
3.6.1.1	Submenu Frost protection.....	45
3.6.1.2	Submenu Fan speeds.....	46
3.6.1.3	Submenu Supplementary heating.....	47
3.6.1.4	Submenu By-pass.....	47
3.6.1.5	Submenu Flap of the geothermal heat exchanger (GHE)	49
3.6.1.6	Submenu Reset factory data.....	49
3.7	Maintenance and repair by qualified personnel	49
3.7.1	Inspecting and cleaning the heat exchanger	49
3.7.2	Replacement of the heat exchanger type	52
3.7.3	Inspection and cleaning of the integrated defroster (option).....	52
3.8	Visualisation of errors and error treatment.....	53
3.8.1	Error signalling by means of the LED control panel.....	53
3.8.2	Visualisation of errors with the TFT touch panel.....	53
3.9	Technical description	55
3.9.1	Types of device	55
3.9.2	Designs	55

3.9.3	Technical specification NOVUS (F) 300	55
3.9.4	Technical specification NOVUS (F) 450	57
3.9.5	Dimensional sketch	59
3.9.6	Plant 1 circuit diagram NOVUS.....	60
3.9.7	Plant 2 circuit diagram NOVUS with integrated defroster.....	61
3.9.8	Plant 3 Terminal scheme of through terminal X10.....	62

Appendix:

Check List A Maintenance Works of the User
 Check List B Maintenance Works of skilled Personnel
 Air Flow Report
 Commissioning and Handover Certificate
 EC Declaration of Conformity NOVUS (F) 300/450 series

0 Preamble

*Thank you for deciding on the **heat recovery unit NOVUS (F) 300/450**.*

0.1 Validity

This document applies to the following types of devices:

- NOVUS (F) 300 series
- NOVUS (F) 450 series

The types of device NOVUS (F) 300 series and NOVUS (F) 450 series, are hereinafter referred to under the common product name NOVUS, unless details are for type differentiation.

The heat recovery unit (HRU) NOVUS has been built according to the current state of the art and the acknowledged rules on safety. The device is subject to permanent improvement and development. Therefore, your device may differ slightly from the instructions.

In order to guarantee a safe, appropriate and economic operation of the heat recovery unit NOVUS, please observe and comply with all information and notes on safety in this operating manual.

Subject of this operating manual is the heat recovery unit NOVUS in different design variants. Possible accessories are only described insofar as it is necessary for the appropriate operation. Please see the particular manuals for further information on accessories.

0.2 Target group

The operating manual is intended for operators and qualified personnel. The activities may only be carried out by personnel having a corresponding formation and being sufficiently qualified for the respective work.

Besides the general section 1 Introduction, this manual consists of:

- A part for the operator and qualified personnel → section 1 and 2
- A part specifically intended for qualified personnel → section 1 and 3

1 Introduction

This section contains general information on the heat recovery unit NOVUS.

1.1 Warranty and Liability

1.1.1 Warrant Terms

Our “General Terms and Conditions” apply to the NOVUS in their respectively valid version. The warranty is determined by the legal warranty terms. It solely applies to the replacement of material and does not include the service. It only applies if it is proven that maintenance is carried out by qualified personnel in accordance with our regulations.

The warranty shall expire once/ when:

- the warranty period has elapsed;
- the device is operated without original PAUL-filters;
- parts are installed which were not delivered by the manufacturer;
- the device is improperly used;
- the defects occur due to incorrect connection, improper use or soiling of the system;
- unauthorised changes or modifications on the plant are made.

1.1.2 Liability

The NOVUS was developed and manufactured for use in so-called comfort ventilation systems. Any other use is considered as “improper use” and can result in damages to the NOVUS or in personal injuries, for which the manufacturer cannot be made liable. The manufacturer is not liable for any damage, which is due to the following causes:

- Non-observance of the notes on safety, operation and maintenance, stated in this manual;
- The installation was not performed according to the regulations;
- Mounting of the spare parts, which were not delivered and prescribed by the manufacturer;
- The defects occur due to incorrect connection, improper use or soiling of the system;
- The warranty period has elapsed;
- Normal wear.

1.2 Safety

Please always observe the safety instructions in this operating manual. The non-observance of the safety instructions, warning notices, notes and instructions can lead to injuries or damages to the NOVUS.

1.2.1 Intended use

This device is not intended to be used, maintained or cleaned by persons (including children) with limited physical, sensory or mental aptitude or without sufficient experience and/or knowledge, unless they are supervised by a person responsible for safety or have received instructions by that person on how to use, maintain and clean the device. Children must not play with the device.

1.2.1.1 Heat recovery unit NOVUS

The heat recovery unit can be used for controlled ventilation in living and office areas (with reservations in the industrial sector) at usual interior air humidity of approx. 40 – 70 % r. F., temporarily up to approx. 80 % r. F. Any other use is considered as being diverted from the intended use. The heat recovery unit is not designed to discharge excessive air humidity, especially in the first utilisation phase of new buildings.

For safety reasons, it is not permitted to modify the product or to install parts which are not expressly recommended for this product or distributed by PAUL Wärmerückgewinnung GmbH. Only use the NOVUS in accordance with the information contained in the enclosed documentation and the standards and directives valid on site:

- Do not mount the device in explosion-prone areas;
- Do not use the device to exhaust inflammable or explosive gases;

Lethal voltages occur inside the NOVUS:

- Only operate the device with the casing cover being mounted;

The specifications mentioned in this document must not be changed:

- The instructions for regular checking and maintenance of the device must be strictly complied with;
- Any modification of the NOVUS is prohibited;

All enclosed documentation is a part of the product:

- Read and observe the documentation;
- Store the documentation in such a way that they are accessible at any time.

1.2.1.2 Control unit

By means of the control units TFT touch panel or LED control panel, you configure and operate the system from a central point. Both control units are exclusively suitable for indoor use.

1.2.2 Qualification of the target group

1.2.2.1 Operators

Operators must be instructed by qualified personnel:

- Instruction on risks when handling electrical devices;
- Instruction on the operation of the system;
- Instruction on the maintenance of the NOVUS;
- Knowledge and observance of this manual with all notes on safety.

1.2.2.2 Qualified personnel

Qualified personnel must possess the following qualifications:

- Training in dealing with dangers and risks by the installation and operation of electric devices;
- Training for the installation and commissioning of electrical equipment;
- Knowledge and attention of the building, security and installation rules valid on the spot of the appropriate municipalities, the waterworks and power plant and other official rules and directives;
- Knowledge and observance of this document with all safety notices.

Only a recognized specialist is, unless otherwise specified in this manual, entitled the NOVUS to install, connect, bring into service and maintain.

1.3 Notes on safety

1.3.1 Safety appliances and measures

- Do not operate the NOVUS without having connected air ducts with a minimum length of 900 mm;
- The casing of the NOVUS cannot be opened without tools;
- Before opening the casing, the device must be disconnected from the power supply;
- When working on electronic parts of the device, and antistatic wrist strap must be worn.

1.3.2 Used symbols

This manual contains the following advisory and safety symbols:



Special notice!



Caution, risk of:

- Damages to the device or the system

- Impairment of the device's operation, if the instructions are not strictly complied with.



Caution, risk of:

- Injury of the operator or the qualified personnel

2 Hints for the operator and the qualified personnel

This section describes how to use the NOVUS.

2.1 Product description

The NOVUS is a ventilation device with heat recovery for healthy, balanced and energy-saving comfort ventilation. A comfort ventilation system consists in exhausting stale, odorous air for example from the kitchen, the bathroom, W.C.s and in introducing an equal quantity of fresh air into living rooms, bedrooms and children's rooms.

In the NOVUS 300 series and NOVUS 450 series are designed with patented reverse flow channel heat exchanger of plastic for the heat recovery. The NOVUS F 300 series and NOVUS F 450 series are equipped with a membrane moisture heat exchanger (enthalpy exchanger) which, due to its physical properties, is not only able to transfer heat, but also moisture. The casing is made of powder-coated sheet metal with anthracite colouring. The internal lining made of high-quality polypropylene provides the necessary heat insulation and device noise protection.

The NOVUS has a sensor-regulated motor-driven by-pass flap. The summer and winter by-pass is an additional circulation duct, which (temporarily) prevents the heat transmission between the exhaust and supply air. The by-pass works automatically.

The two types of device NOVUS (F) 300 - series and NOVUS (F) 450 – series can optionally be delivered being equipped ex works with an integrated defroster heater.

The NOVUS includes two maintenance-free 230 Vac radial fans with the integrated power supply unit and electronic commutation. The volume flow constant fans keep the air quantity at a constant speed for each selected fan rotary speed. The air quantity is also not affected by soiled filters.

One filter each for the intake air and the extract are installed in the device. They consist of a synthetic woven filter medium with a frame made of polypropylene. Filters of the filter class F7 in pollen filter quality can be optionally used for the outside air.

Access to the filtering is done on the colored (RAL3020) maintenance flap of the front panel.

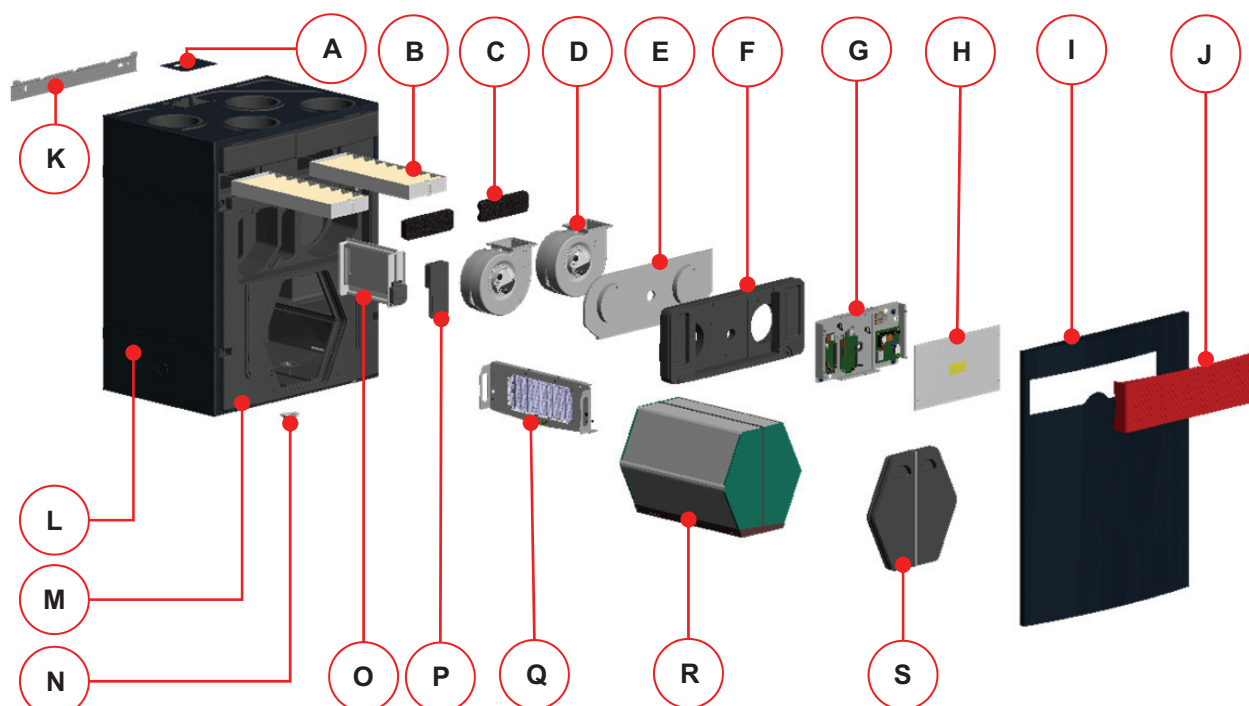


Fig 1: Main components HRU NOVUS

Item	Designation
A	Interface sheet with IEC connector and RJ45 jack
B	Filter (2x)

C	Filter cover caps
D	Fans (2x)
E	Seal fan cover
F	EPP fan cover
G	Carrier plate with control boards
H	Plastic cover plate for control
I	Front hood
J	Maintenance flap
K	Mounting sheet
L	Casing made of coated steel sheet
M	EPP moulded parts
N	Screw connection condensate connection
O	Motor-driven by-pass flap
P	EPP by-pass cover
Q	Internal defroster with PTC heating elements (optional)
R	Heat exchanger with condensate pan
S	EPP heat exchanger cover with sealing mat and strap

Tab. 1: Main components NOVUS

2.1.1 Type plate

The type plate clearly identifies the product. The information on the name plate are required for the safe use of the product and regarding service queries. The type plate is located on the side of the air connections of the HRU. The type plate must be permanently attached to the product.



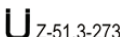


    		PAUL Wärmerückgewinnung GmbH August-Horch-Straße 7 08141 Reinsdorf	
Wärmerückgewinnungsgerät		Made in Germany	
NOVUS 300	Version RECHTS	230 V	
	Version LINKS	50 Hz	
Serien-Nummer: - 02	Bauart LIEGEND	IP 40	
Baujahr:	50 / 52 kg	0,6 / 6,3 A	

Fig 2: Name plate NOVUS 300




  		PAUL Wärmerückgewinnung GmbH August-Horch-Straße 7 08141 Reinsdorf	
Wärmerückgewinnungsgerät		Made in Germany	
NOVUS F 300	Version RECHTS	230 V	
	Version LINKS	50 Hz	
Serien-Nummer: - 02	Bauart LIEGEND	IP 40	
Baujahr:	50 / 52 kg	0,6 / 6,3 A	

Fig 3: Name plate NOVUS F 300




  		PAUL Wärmerückgewinnung GmbH August-Horch-Straße 7 08141 Reinsdorf	
Wärmerückgewinnungsgerät		Made in Germany	
NOVUS 450	Version RECHTS	230 V	
NOVUS F 450	Version LINKS	50 Hz	
Serien-Nummer: - 02	Bauart LIEGEND	IP 40	
Baujahr:	50 / 52 kg	1,6 / 7,2 A	

Fig 4: Name plate NOVUS (F) 450

2.1.2 Requirements on the assembly site

The heat recovery unit is suitable for being mounted in frost-free interior areas. The indoor-climate ambient conditions must not permanently exceed 70 % r. F. at 22 °C.

2.1.3 Frost protection

The NOVUS is equipped with automatic frost protection which prevents that the heat exchanger freezes at very low outside air temperatures. Depending on the set frost protection mode, the fans are temporarily switched off when falling below the threshold values of the device intake air limit temperature. With regard to the NOVUS-series with integrated defroster, a PTC heater battery is activated when falling below the threshold values of the device outside air limit temperature. However, if it is fallen below the threshold values despite the heat quantity supplied by the integrated defroster, the fans are temporarily switched off as well.

The automatic frost protection for monitoring the supply air temperature serves as freezing protection of an optional downstream hydraulic heater battery and temporarily switches off the fans when falling below the threshold values of the limit temperature for the supply air.

2.1.4 Joint operation with heat-producing appliances

In case of simultaneous operation with heat-producing appliances, e.g. chimneys, the corresponding standards and regulations must be complied with by the qualified personnel. The joint operation of indoor air-dependant heat-producing appliances and ventilation plants requires an appropriate safety device (differential pressure switch) or a plant-specific measure, in the event that dangerous negative pressures can be generated in the installation room of the heat-producing appliance during operation. The NOVUS is set up for the joint operation with heat-producing appliances.

2.2 Available control modules

The NOVUS can be equipped with the following control panels:

- Control unit LED control panel (w x h x d in mm: 80 x 80 x 12)
- Control unit TFT touch panel (w x h x d in mm: 102 x 78 x 14)
- External boost ventilation switch (any number, potential-free)
- External sensors with sensor signal 0-10 V or 4-20 mA



The ventilation device can be operated with up to 3 control units type TFT touch panel or without control panel. A TFT touch panel is recommended for commissioning!

These control modules are explained in more detail in the following sections.

2.2.1 LED control panel

The LED control panel has 7 symbolized short-stroke keys. By pressing a key or key combination, the corresponding operations are performed. The active mode of operation is signaled by means green or red LED.

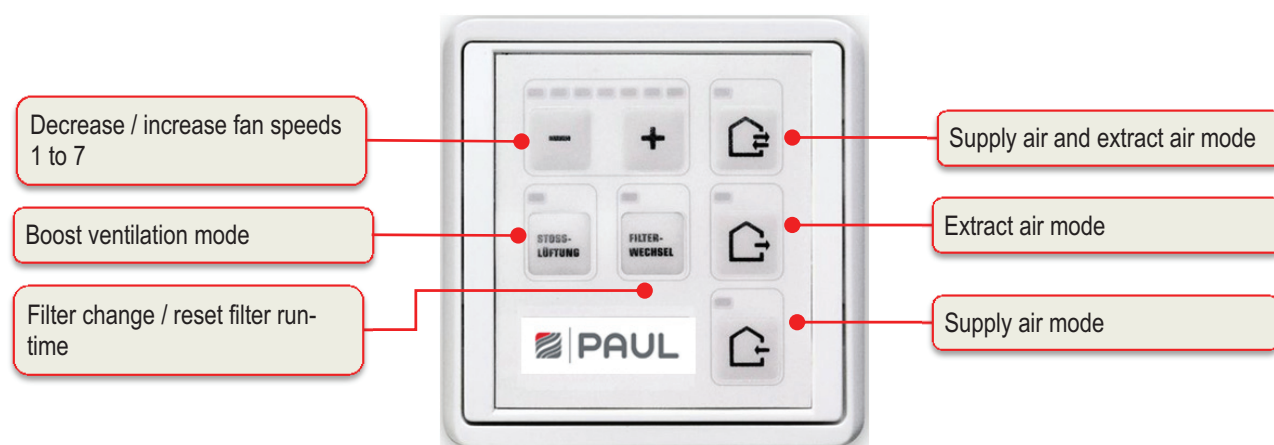






















Fig 5: Control and information fields of the LED control panel

2.2.1.1 Operating functions LED control panel

Symbol	Designation	Explanation
	Key Supply air and extract air mode	By pressing this key, the supply and extract air mode are set.
	Key Extract air mode	By pressing this key, only the extract air mode is set. The supply air mode is switched off.  <i>If the ventilation device is operated with a heat-producing appliance, this key must be permanently deactivated! The simultaneous operation of ventilation plant and heat-producing appliance requires increased safety-related requirements <u>for negative pressure monitoring</u> with a switch-off function for the ventilation device.</i>
	Key Supply air mode	By pressing this key, only the supply air mode is set. The exhaust air mode is switched off.
	Key Decrease fan speed	By pressing this key, the fan speed is gradually decreased.
	Key Increase fan speed	By pressing this key, the fan speed is gradually increased.
	Key Boost ventilation mode	By pressing this key, the boost ventilation is activated for 15 minutes in the supply air and extract air mode at the fan speed 7. After the expiration of the boost ventilation time, the previously active operating mode is activated. By pressing another function key, the boost ventilation mode can be cancelled at any time.
	Key Reset filter run-time	For cyclic filter checking, an operating hours counter is integrated in the control. The key Reset filter run-time is used for resetting the filter run-time.
	Key combination activation / deactivation standby mode	By means of the standby function, the ventilation device is switched to an energy-saving mode. By pressing the – key several times until LED L1 goes off as well, the standby mode is activated. This state is signalled by the periodic blinking of the LED L8. When pressing the + key, the standby mode is terminated and the fan speed 1 is set. LED L1 is lit.
	Key combination configuration mode for joint operation with heat-producing appliance	By pressing the key combination for at least 3 s, the exhaust air mode is permanently deactivated. This state is signalled by the LEDs L8+L11+L12, L8 and L12 being lit, L11 blinking 2x and then remaining <u>off</u> . This signalling is only visible if the key combination is held down. An actuation of the key Exhaust air mode in deactivated condition leads to three short blinking of the LED L11, in order to signal the deactivated condition. If the key combination is pressed once again for at least 3 s, the key lock is deactivated. The change is signalled by the LEDs L8+L11+L12, L8 and L12 being switched on, L11 blinking 2x and then remaining <u>on</u> . This signalling is only visible if the key combination is held down. In this way, the extract air mode is possible again.  <i>The key Reset filter change must always be pressed in the first place!</i>

 ... 	Key combination configuration mode upper temperature threshold of by-pass	<p>By pressing the key combination for at least 3 s, the configuration mode upper temperature threshold of By-pass is activated and the LEDs L8 and L10 are blinking.</p> <p>By means of the keys, only the upper temperature threshold for the opening of the by-pass can be adjusted in dependency on the extract air temperature between 21°C (LED L1) and 27°C (LED L7). The lower threshold has a fixed pre-set value of 18°C. After the repeated actuation of the key combination for at least 3 sec, the setting is applied and the configuration mode upper temperature threshold of by-pass is closed.</p>
 ... 	Keys for setting upper temperature threshold of by-pass	
 ... 	Key combination configuration mode imbalance	<p>By pressing the key combination for at least 3 s, the configuration mode imbalance is activated and the LEDs L10 and L12 are blinking. By means of the keys for balance setting, the balance of the fan speed which was active during the activation of the configuration mode imbalance can now be adjusted in steps of 5 %. The balance setting is not carried out separately for each fan speed, but jointly for groups of fan speeds.</p> <p>The adjustable range is from -15 % (L1) to + 15 % (L7). In centre position (L4), the supply and extract air fans run at the same rotation speed. After having actuated the key combination once again, the setting is accepted and the configuration mode imbalance is terminated.</p>
 ... 	<p>Keys for balance setting</p> <ol style="list-style-type: none"> 1. Group fan speeds <1+2> 2. Group fan speeds <3+4+5> 3. Group fan speeds <6+7> 	<p> The key Reset filter change must always be pressed in the first place!</p>

Tab. 2: Operating functions of the LED control panel

2.2.1.2 Signalling of operating and error conditions

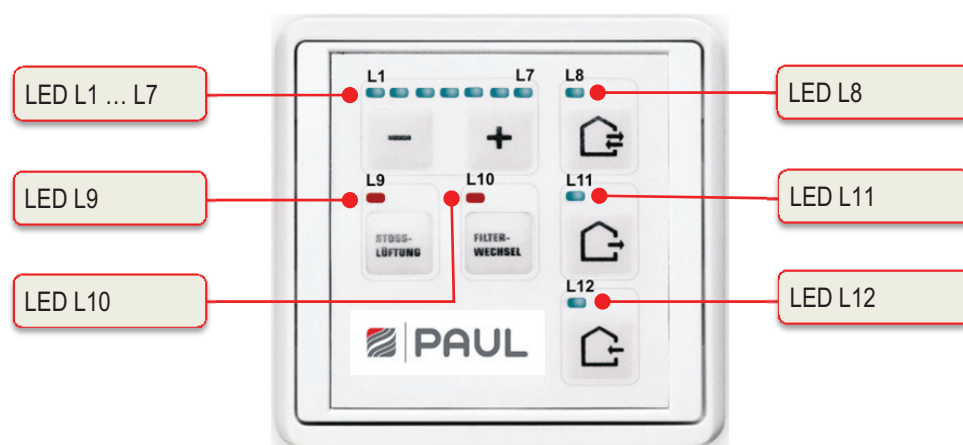


Fig 6: LED signalling of the LED control panel

LED signalling	Function / meaning
LED lamp display L1 ... L7	<p>No LED \triangleq fan speed 0 (fan off, standby)</p> <p>1 LED (L1) \triangleq fan speed 1</p> <p>2 LEDs (L1 + L2) \triangleq fan speed 2</p> <p>... etc.</p> <p>7 LEDs (L1 + L2 + ... + L7) \triangleq fan speed 7</p>
L1 + L7 are lit	No external release: fan off

L8 is lit	Supply and extract air mode
L8 blinks	Error sensor: Fans are switched off, by-pass closes
L8 flashes	Standby mode active
L8 + L10 blink	Configuration mode for upper temperature threshold of by-pass (display only during the configuration phase)
L8 + L11 + L12 blinken	General error, the error number is displayed in a binary form by means of the LEDs L1 to L7 (see Tab. 38 in section 3.8.1)
L8 + L12 are lit + L11 blinks 2x and then remains off	Configuration mode for joint operation with heat-producing appliance (display only during the configuration phase)
L9 is lit	Boost ventilation mode (L1 + L2 + L3 + L4 + L5 + L6 + L7 blink)
L10 is lit	Filter run-time has expired
L10 flashes	The remaining filter run-time is ≤ 10 days
L10 + L12 blink	Configuration mode balancing for the selected fan speed (display only during the configuration phase)
L11 is lit	Extract air mode
L11 blinks	Error fan 1 resonance: Fans are switched off, by-pass closes
L11 blinks briefly 3x	Extract air mode deactivated (key Exhaust air mode locked, configuration for joint operation with heat-producing appliance active)
L12 is lit	Supply air mode
L12 blinks	Error fan 2 resonance: Fans are switched off, by-pass closes

Tab. 3: Assignment of functions of the LED signalling

2.2.2 TFT touch panel

The 3.5" TFT display of the touch panel is operated by touching the symbolised buttons with the fingers. The display of the active operating mode and the corresponding button are signalled in colour. The start menu is configured as follows.

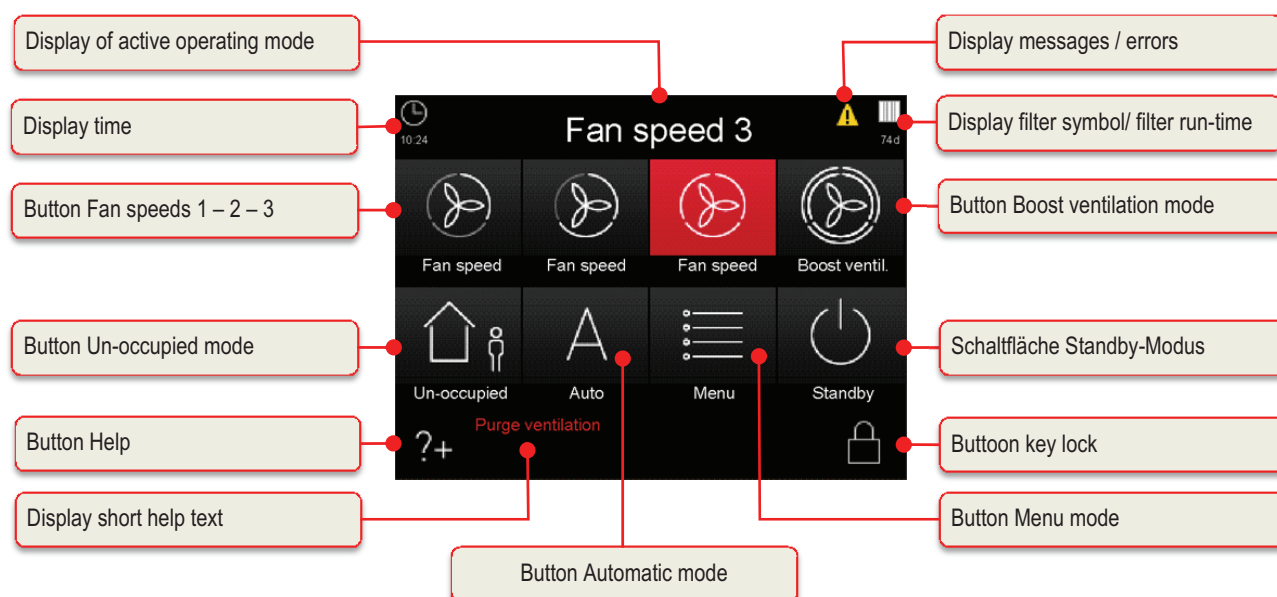






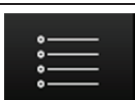


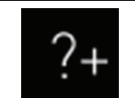


















Fig 7: Buttons and information fields of the touchpad

2.2.2.1 Operating function and signalling of the TFT touch panel

Symbol	Designation	Explanation
-	Fan speed 0 (FS0)	The fans stand still. This fan speed is used in the functions Automatic timing mode and Un-occupied mode.
	Button Fan speed 1 (FS1)	By touching this button, the lowest permanent fan speed 1 is set.
	Button Fan speed 2 (FS2)	By touching this button, the medium permanent fan speed 2 is set. This fan speed is adjusted by the service technician during commissioning of the device in the setup menu. A balance between the supply and the extract air fan is adjusted.
	Button Fan speed 3 (FS3)	By touching this button, the highest permanent fan speed 3 is set.
	Button Boost ventilation mode	By touching this button, the boost ventilation mode is set. An automatic timing programme starts where the fan speed 3 is active during a pre-settable period of time (standard: 15 min factory setting).
	Button Un-occupied mode	By touching this button, the un-occupied mode is set. For non-occupation, a reduced ventilation intensity can be set for humidity protection by activating the un-occupied mode. In order to terminate this function, another button must be pressed.
	Button Automatic mode	The automatic mode has 2 automatic functions – automatic timing and automatic sensor. The manual settings are deactivated by touching the button.
	Automatic timing mode	By means of the automatic timing mode, different fan speeds (FS0, FS1, FS2 or FS3) can be defined for every day of the week with a resolution of 15 minutes. This “fan speed week profile” can be configured and individually adjusted in the menu Settings/submenu Automatic timing.
	Automatic sensor mode	The automatic sensor mode regulates the fans according to a pre-settable linear characteristic curve depending on an analogue indoor air quality sensor (also CO ₂ , air humidity and temperature combined).
	Button Menu mode	By touching this button, you reach the information, setting and setup menu.
	Button Standby mode	By means of the standby function, the ventilation device is switched into an energy-saving mode. In standby mode, the power consumption of the entire device decreases to less than 1 W. The screen display gets dark; however, the touchpad remains active in order to “wake up” the system. One touch of the touchpad suffices to terminate the standby mode.  According to DIN 1946-6, during the heating period, the plant must be in operation for at least 12 h/d and must not be switched off longer than 1 h each time!
	Button Help	By touching this button, you are redirected to a context-sensitive help menu. If this key is grey, no help text is stored.

	Button Activate key lock	By touching this button, the touchpad is deactivated, except for this button. The screen is dimmed and becomes inactive (cleaning status).
	Button Deactivate key lock	If it is touched again and held down (for approx. 2-3 s) you reach the start menu again.
	Button Checkmark	By touching this button, the desired or available parameter is selected or confirmed.
	Button Enter	By touching this button, it is possible to navigate in the different submenus. Changed parameters are copied into the memory.
	Button Cancel / back	By touching this button, you change from a menu into the next higher menu level without copying possibly changed data.
	Signalling messages	A flashing yellow warning triangle at the upper right edge symbolizes a piece of information or an error. These are registered in the menu Information/Current Message and errors additionally in the menu Information/Last Message.
  	Signalling filter symbol / filter run- time	For cyclic filter checking, an operating hours counter is integrated in the control. The operating hours are subtracted from the preset filter run-time by counting backwards and are displayed in days below the filter symbol. The filter symbol colour changes from white to yellow when the filter run-time is ≤ 10 d and from yellow to red when the filter run-time has expired. In case the filter run-time has expired, the message "Replace filter" is generated.
 	Buttons + / -	By touching these buttons, values can be changed in the menus (e.g. fan speeds in steps of 1% or the time in steps of minutes or seconds).  The data is not copied until the Enter button is touched!
   	Buttons Navigation	By pressing the Navigation buttons left/right and up/down, it is possible to navigate in the menus in order to select the desired parameter in the respective menu level. If more than one value can be set in one menu (e.g. for date and time: day, month, year, hours, minutes), it is possible to select the single values to be modified by means of the Navigation buttons and to modify them by pressing + / -.

Tab. 4: Operating functions and signalling of the TFT touch panel

2.3 Menu structure of the TFT touch panel

The menu structure is made up of the start menu and three main menus (information, settings and setup). When activating the TFT touch panel, the start menu is displayed. The main menus are each divided up into submenus, allowing the access to information or parameter changes.

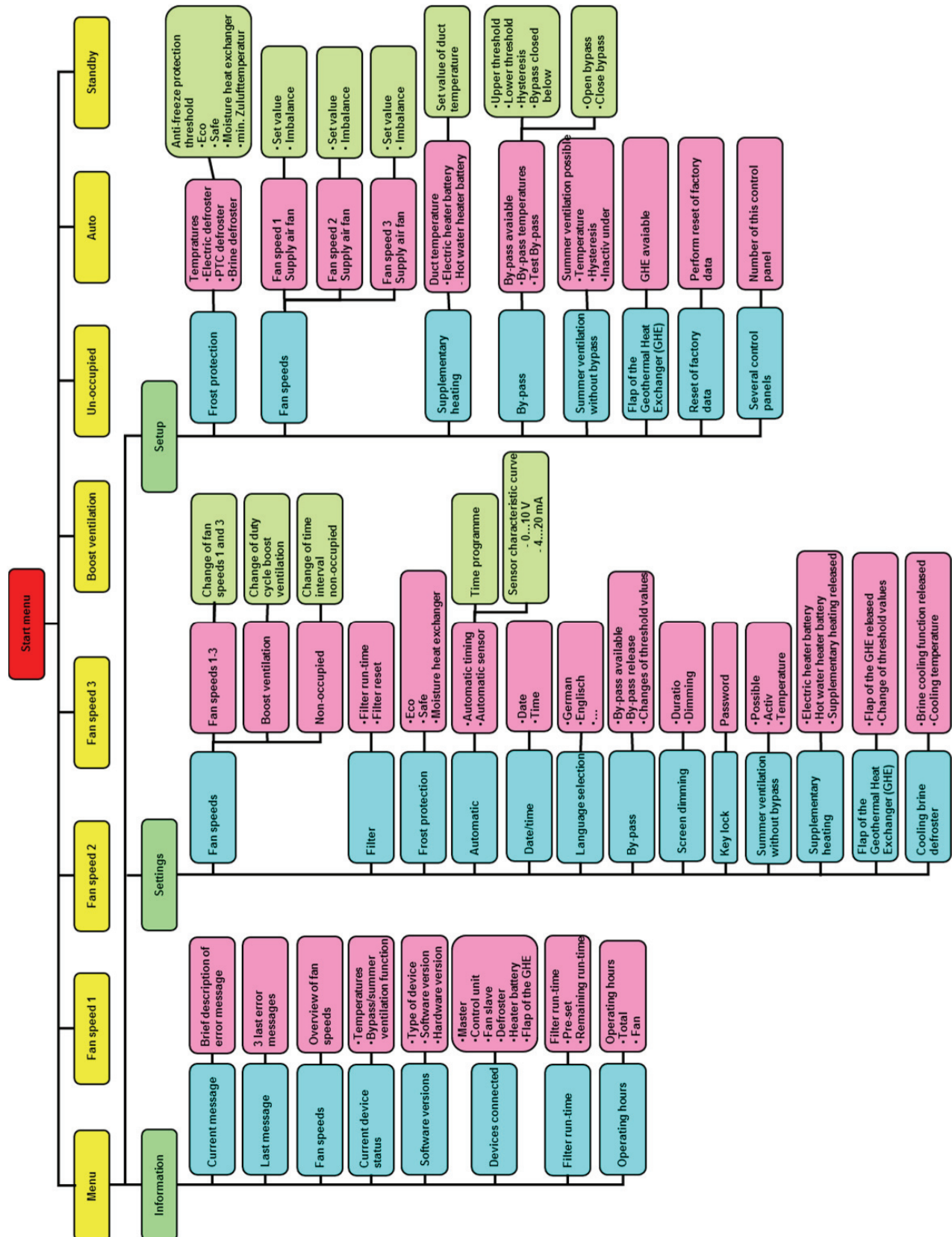


Fig 8: Menu structure of the TFT touch panel

2.3.1 Main menu Information

The main menu **Information** is divided into eight submenus. In the submenus, information on the current device status as well as selected factory pre-sets (e.g. type of device) are visualised. Using the navigation buttons, the respective menu is selected and called up with the Enter key.

2.3.1.1 Submenu Current message

Here, a piece of information (e. g. Replace filter) or an error (e.g. Broken sensor) are displayed as current message. In addition to this display, a yellow warning triangle flashes in the upper right edge of the screen. Only error messages generally lead to switching off the fans.

2.3.1.2 Submenu Last messages

Here, the last three errors that occurred are registered in compliance with the event with date and time. In addition to this indication, a yellow warning triangle is flashing at the right upper margin of the screen.

2.3.1.3 Submenu Fan speeds

Here, the percentage adjustments of the three fan speeds 1, 2 and 3 (FS1, FS2 and FS3) as well as the pressed times for un-occupied and boost ventilation are indicated.

2.3.1.4 Submenu Current status of the device

Here, the current device-related supply air temperature and intake air temperature as well as the by-pass status (closed / open) for devices with by-pass flap or the summer ventilation status (inactive / active) for devices without by-pass flap are displayed

2.3.1.5 Submenu software versions

In this menu, the devices which are actually connected to the bus and which were identified are displayed by means of checkmark symbols.

2.3.1.6 Submenu Connected devices

In this menu, the devices which are actually connected to the device-internal BUS and which were identified are displayed by means of checkmark symbols.

2.3.1.7 Submenu Filter run-time

Here, the pressed filter run-time and the current remaining run-time of the filter are indicated. The filter run-time is decremented daily.

2.3.1.8 Submenu Operating hours

The following information is displayed:

- Overall operating hours (time during which the device is connected to the power supply)
- Operating hours of the fans (time during which the fans are operating)

2.3.2 Main menu Settings

In the main menu **Settings**, changes by the user are possible which primarily serve the individual adjustment to the own comfort. Using the navigation buttons, the respective submenu is selected and called up with the Enter key, whereby only submenus with text highlighted in red can be parameterised.







The settings in the submenu are only applied after having touched Enter!

2.3.2.1 Submenu Fan speeds

Using the navigation buttons, the following can be selected and set here:

- Fan speed 1 and fan speed 3 (in 1 %-steps)
- Duration of the boost ventilation (in 5 min-steps)
- Ventilation intensity for non-occupation (FS1 in min/h)




Symbol	Designation	Explanation / actions
	Button Fan speed 1 (FS1)	Using the button Fan speed 1, activate FS1 and parameterise it with the navigation buttons. Setting range: 17 % < FS1 < FS2
	Button Fan speed 3 (FS3)	Using the button Fan speed 3, activate FS3 and parameterise it with the navigation buttons. Setting range: FS2 < FS3 < 100 %
	Duration boost ventilation	Settings: 15 min ... 120 min, whereby the air volume flow of the boost ventilation corresponds to fan speed 3.
	Ventilation intensity for the duration of non-occupation for humidity protection	Settings: 15 min/h, 30 min/h, 45 min/h, whereby the ventilation intensity of the active duration of the time interval corresponds to fan speed 1.

Tab. 5: Parameterisation submenu fan speeds

2.3.2.2 Submenu Filter

The following can be set / read here:

- Filter run-time in 10-day-steps
- Current remaining run-time of the filter
- Retting of the filter run-time and the counter for exceeding the filter run-time




Symbol	Designation	Explanation / actions
	Duration of the filter run-time	Setting: 30 d ... 180 d, using the navigation buttons whereby a maximum filter run-time of 90 days is recommended.
	Remaining run-time of the filter	Display of the current remaining run-time of the filter
	Display field Reset filter run-time	Using the button Checkmark and Enter, the filter run-time can be reset to the pre-set value.

Tab. 6: Parameterisation submenu filter

2.3.2.3 Submenu Frost protection

Here, the frost protection mode can be set using the navigation buttons:

- Eco
- Safe
- Moisture heat exchanger (enthalpy exchanger) with own anti-freeze protection threshold

Symbol	Designation	Explanation / actions
	Display field Frost protection mode Eco	In this "eco mode" however, there is a residual risk of freezing of the heat exchanger. The energy required for frost protection is lower.
	Display field Frost protection mode Safe	In the "safe" mode, freezing of the heat exchanger is absolutely prevented. The energy required for frost protection is higher.
	Display field Frost protection mode Moisture heat exchanger	In the mode Moisture heat exchanger, freezing of an enthalpy exchanger (membrane moisture heat exchanger) is basically prevented.

Tab. 7: Parameterisation submenu frost protection







2.3.2.4 Submenu Automatic

Two operating modes are provided in the automatic mode:

- Automatic timing
- Automatic sensor

The desired operating mode of the automatic mode is selected using the navigation buttons (red background of the text) and by setting the checkmark, and confirmed with Enter.

2.3.2.4.1 Automatic timing

Symbol	Designation	Explanation / actions
	Button Calendar	By touching the button Calendar, a weekday (Mo...Su) or a group of weekdays (Mo-Fr; Sa-Su) is selected, the desired fan speed is preselected.
	Button Fan speed 0 (FS0)	The fans stand still.
	Button Fan speed 1 (FS1)	Reduced ventilation
	Button Fan speed 2 (FS2)	Nominal ventilation
	Button Fan speed 3 (FS3)	Purge ventilation
	Cursor	The cursor marks the time in the ¼-hour-range. Using the navigation buttons, the cursor is navigated across the time slot in which the selected fan speed shall be active.

Tab. 8: Parameterisation automatic timing

By selecting a group of days (e.g. Mon-Fri), the change data are assigned to each day of the group. Thus, the settings for the group "Mon-Fri" are then identical to the days "Mon", "Tue"... "Fri" (or group "Sat-Sun" identical to days "Sat", "Sun"). In order to operate the plant with fan speed profiles and time profiles that differ from day to day, the profile of the respective day ("Mon"... "Sun") must be changed. Possibly further changes in the groups "Mon-Fri" or "Sat-Sun" overwrite the previously made settings of the individual days again!

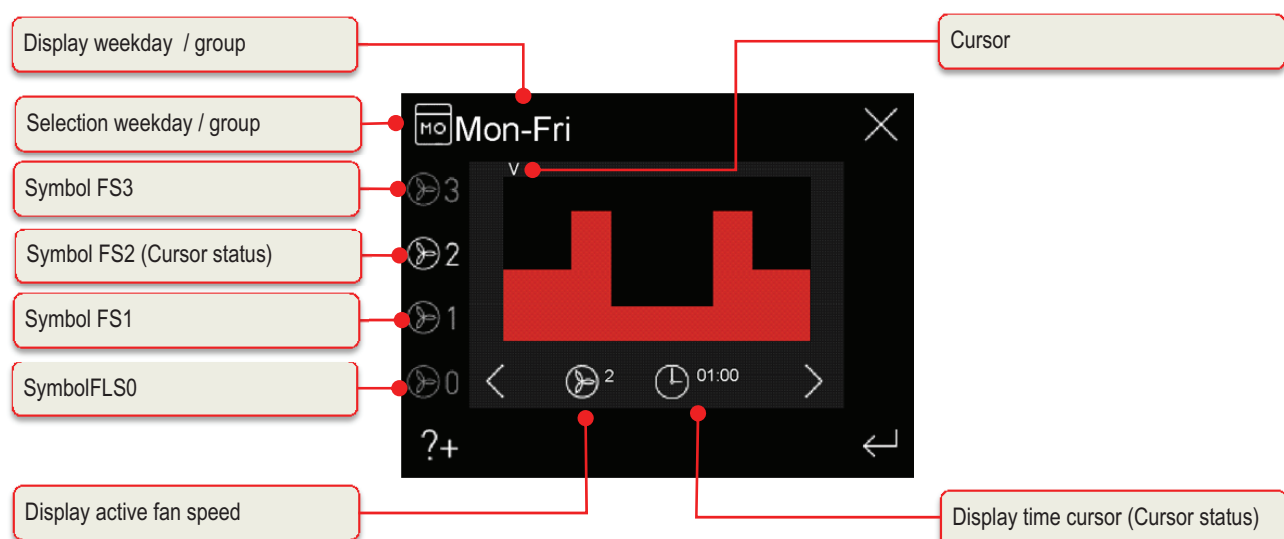


Fig 9: Automatic timing factory setting, group weekdays Mon-Fri

Fan speed (FS)	Time slot (time 0 ⁰⁰ - 24 ⁰⁰)	
FS1		8 ³⁰ - 16 ⁰⁰
FLS2	0 ⁰⁰ - 8 ⁰⁰	16 ⁰⁰ - 24 ⁰⁰
FLS3	8 ⁰⁰ - 8 ³⁰	

Tab. 9: Time slot factory setting, group weekdays Mo-Fr

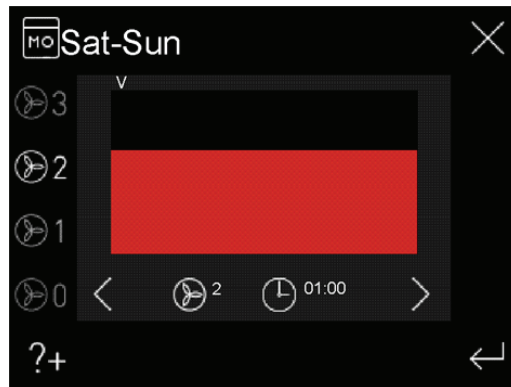


Fig 10: Automatic timing factory setting, group weekdays Sat-Sun

Fan speed (FS)	Time slot (time 0 ⁰⁰ - 24 ⁰⁰)
FS2	0 ⁰⁰ - 24 ⁰⁰

Tab. 10: Time slot factory setting, group weekdays San-Sun



The factory setting of the automatic timing can only be reactivated via the main menu Setup.

If the operating mode “Automatic timing” is active in automatic mode, the active fan speed (FS 1-3 only) is, in accordance with the time slot, visualised in grey on the start menu in addition to the icon Automatic mode.

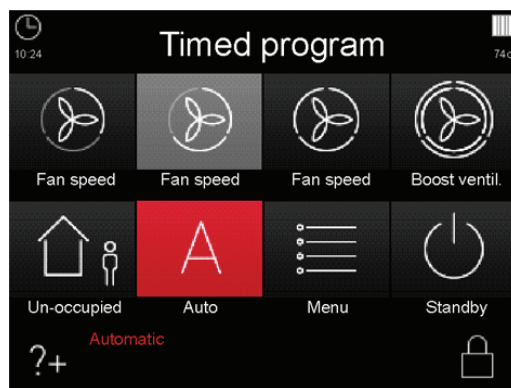


Fig 11: Automatic mode automatic timing with active fan speed FS2

2.3.2.4.2 Automatic sensor

The operating mode **Automatic sensor** of the automatic mode requires the connection of an external air quality / CO₂ or humidity sensor to the control of the ventilation device. The analogue signal of the sensor is taken as control signal for the fan rotary speed of the ventilation device. When applying several sensors in one ventilation plant, the output signal of a maximum value module is used for the control of the ventilation device.

At first, using the navigation buttons (red background of the text) and by setting the checkmark, it is selected whether the sensor has a current output or voltage output (current: 4...20 mA, voltage: 0...10 V), and this is confirmed with Enter. Subsequently, the lower point (range start parameter p1) and the upper

point (range stop parameter p2) of a linear characteristic curve for the fan speed are parameterized between 17 % and 100 %. Using the navigation buttons, the characteristic variables (red background of the text) to be parameterised can be selected and the values can be set using the buttons + / -.

Symbol	Designation	Output signal sensor	
		0 ... 10 V characteristic curve	4 ... 20 mA characteristic curve
p1	Characteristic curve start value	Umin (V) \triangleq n_min (%)	Imin (mA) \triangleq n_min (%)
p2	Characteristic curve end value	Umax (V) \triangleq n_max (%)	Imax (mA) \triangleq n_max (%)

U-n- Characteristic curve graph

I-n- Characteristic curve graph

Tab. 11: Parameterisation automatic sensor

Plausibility check for sensors with current output:

- Concerns the analogue input on the master (terminal X2.7 / X2.8)
- Error message if a value of 0-0.3 mA is applied at the input for more than 1s
- Reset error if I > 3.5 mA for at least 1 s

2.3.2.5 Submenu Date/Time

In this menu, date and time are set.

Using the navigation buttons, the characteristic variables (red background of the text) to be parameterised can be selected and the values can be set using the buttons + / -.

2.3.2.6 Submenu Choose language

In this menu, the language for the TFT touch panel can be selected with the navigation buttons.

2.3.2.7 Submenu By-pass

In this menu, an existing by-pass is displayed. The function of the by-pass can be activated or deactivated. The release of by-pass function is selected using the navigation buttons (red background of the text) and by setting the checkmark, and is confirmed with Enter. Furthermore, the temperature thresholds for opening and closing the by-pass flap can be selected using the navigation buttons (red background of the text) and can be set using the buttons + / -.

Abbreviation	Designation	Explanation / actions
x_ext_max	Maximum extract air temperature	Setting range upper threshold: 20 °C...30 °C The by-pass opens when the extract air temperature exceeds the upper threshold value, and the intake air temperature is lower than the extract air temperature.
x_ext_min	Minimum extract air temperature	Setting range lower threshold: 13 °C...19.5 °C The by-pass also opens when the extract air temperature falls below the upper threshold value, and the intake air temperature is higher than the extract air temperature.

Tab. 12: Parameterisation temperature thresholds by-pass






In order to avoid drafts resulting from a supply air temperature too low, the by-pass remains closed below an intake air limit temperature. The limit value of the intake air temperature can be set in the main menu setup between 12 °C ... 20 °C (factory setting 13 °C).

The upper threshold value should be 2 K above the average room heating temperature.

2.3.2.8 Submenu Screen dimming

In this menu, an individual screen brightness and the duration until the occurrence of dimming after non-operation can be set using the navigation buttons.



- Duration until dimming in 1 min-steps
- Dimming in 5 %-steps

Symbol	Designation	Explanation / actions
	Duration until dimming	Settings: 1 min ... 10 min, until activation of dimming after last operation of the TFT-touch panel
	Degree of dimming	Settings: 5 % ... 95 %, relating to the basic brightness when the screen is active
	Button Light bulb	Using this button, the set dimming can be tested. The screen is dimmed for 5 seconds according to setting.

Tab. 13: Parameterisation screen dimming

2.3.2.9 Submenu Key lock

The user interface of the TFT touch panel can be deactivated with a password-protected key lock.

Symbol	Designation	Explanation / actions
	Password prompt	Entry of the password <11111> and confirmation with Enter. On the touch pad, "Key lock" is displayed as current status.
	Button Deactivate key lock	After touching the button, the user is prompted to enter the password for the deactivation of the key lock. Entry of the password <11111> and confirmation with Enter.

Tab. 14: Activation / deactivation key lock

2.3.2.10 Submenu Supplementary heating

In this menu, an optionally available supplementary heating module (electric heater battery or hot water heater battery) is displayed. The function of the supplementary heating can be activated or deactivated. The release supplementary heating is selected using the navigation buttons (red background of the text) and by setting the checkmark, and is confirmed with Enter.

2.3.2.11 Submenu Flap of the Geothermal Heater Exchanger (GHE)

In this menu, an optionally available flap of the geothermal heat exchanger is displayed. The function of the flap of the geothermal heat exchanger can be activated or deactivated. The release flap of the geothermal heat exchanger is selected using the navigation buttons (red background of the text) and by setting the checkmark, and is confirmed with Enter. Furthermore, the temperature thresholds for switching of the flap of the geothermal heat exchanger can be selected using the navigation buttons (red background of the text) and can be set using the buttons + / -.

Abbreviation	Designation	Explanation / actions
x_out_max	Maximum outside temperature	Setting range upper threshold: 15 °C...30 °C If the intake temperature is above the set threshold value, the flap of the geothermal heat exchanger opens the intake air duct for cooling the intake air. → cooling function
x_out_min	Minimum outside temperature	Setting range lower threshold: -10 °C...14.5 °C If the intake temperature is below the set threshold value, the flap of the geothermal heat exchanger opens the intake air duct for heating the intake air. → frost protection function

Tab. 15: Parameterisation Temperature thresholds flap of the geothermal heat exchanger

2.3.2.12 Submenu Cooling brine defroster

In this menu, an optionally available brine defroster is displayed. The cooling function of the brine defroster can be activated or deactivated. The release of the brine defroster is selected using the navigation buttons (red background of the text) and by setting the checkmark, and is confirmed with Enter. Furthermore, the temperature threshold for the cooling function can be selected using the navigation buttons (red background of the text) and can be set using the buttons + / -.

Abbreviation	Designation	Explanation / actions
x_bdt	Temperature brine defroster	Setting range: 15 °C...30 °C If the outside temperature is above the set threshold value, the brine defroster is activated for cooling the intake air. → cooling function

Tab. 16: Parameterisation temperature threshold brine defroster

2.3.3 Boost ventilation mode with external boost ventilation sensing device

In most cases, boost ventilation sensing devices are mounted in exhaust air rooms such as bathrooms, W.C.s or kitchens in order to activate temporary maximum ventilation in these rooms for fast discharge of increased moisture and odours.

When operating this control element, the functional properties and visualisations described for the boost ventilation mode with LED control panel or TFT touch panel are generated. The boost ventilation mode is started again at each activation and interrupts the current operating mode for the duration set. Following this, the device switches back to the previously active operating mode. Manually switching the operating mode by means of connected control panels stops the boost ventilation function.

2.4 Maintenance by the operator

Maintenance of the ventilation device and plant by the operator is limited to the periodic change of the filters and cleaning of the supply and exhaust air valves. The filter must be checked every 3 months and changed if necessary, however, at least every 6 months.

In this context, also check other filters available inside the ventilation plant and change them if necessary. A replacement or cleaning of the filter mats at the exhaust air valves (e.g. bathroom, kitchen, W.C.s) should be carried out every 2 – 3 months or at your own discretion when checking the degree of soiling.



If maintenance work is not carried out regularly, this impairs the functioning of the comfort ventilation in the long term!

2.4.1 Replacement of the filter



The plant must not be operated without filter. During filter replacement and maintenance work, the ventilation device must be switched off!

Two high-quality original PAUL filters are installed inside the NOVUS, which is recognisable by the imprinted PAUL logo. The filters can be purchased online from PAUL Wärmerückgewinnung GmbH at

www.paul-lueftung-shop.de. After the corresponding message of the control panel or after visualisation of a programmed digital output signal, the filters in the NOVUS shall be checked. In order to do so, proceed as follows:

1. Switch the device to standby mode or disconnect it from the power supply.
2. Pull the maintenance flap **A** with the magnetic clamps from the front panel.

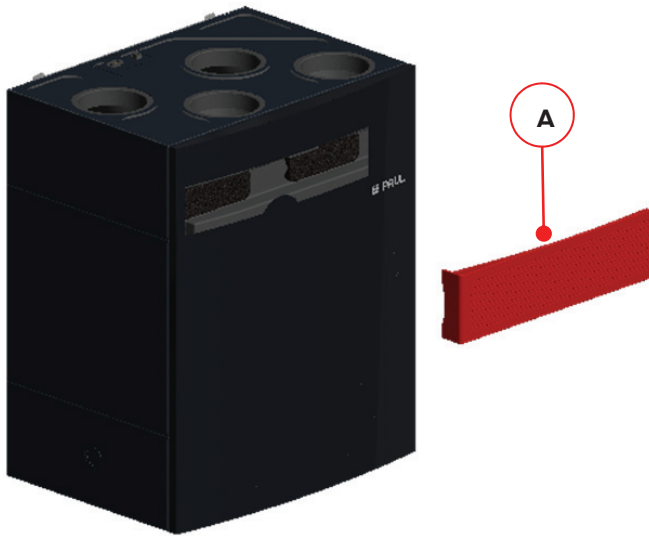


Fig 12: Removing the maintenance flap from the front panel

3. Pull the filter cover cap **B** out of the filter slide-in compartment. In order to do so, put the finger in the respective recessed grip **C** of the filter cover cap.

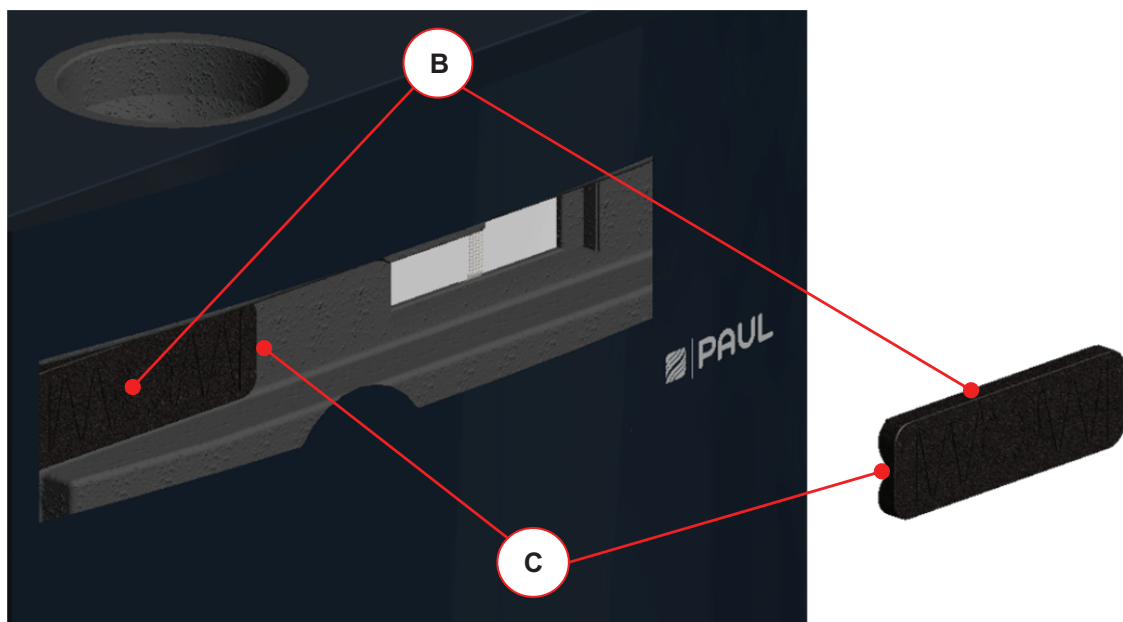


Fig 13: Removal of the filter cover cap

4. Pull the filters **D** out of the filter slide-in compartments by means of the filter strap **E**.

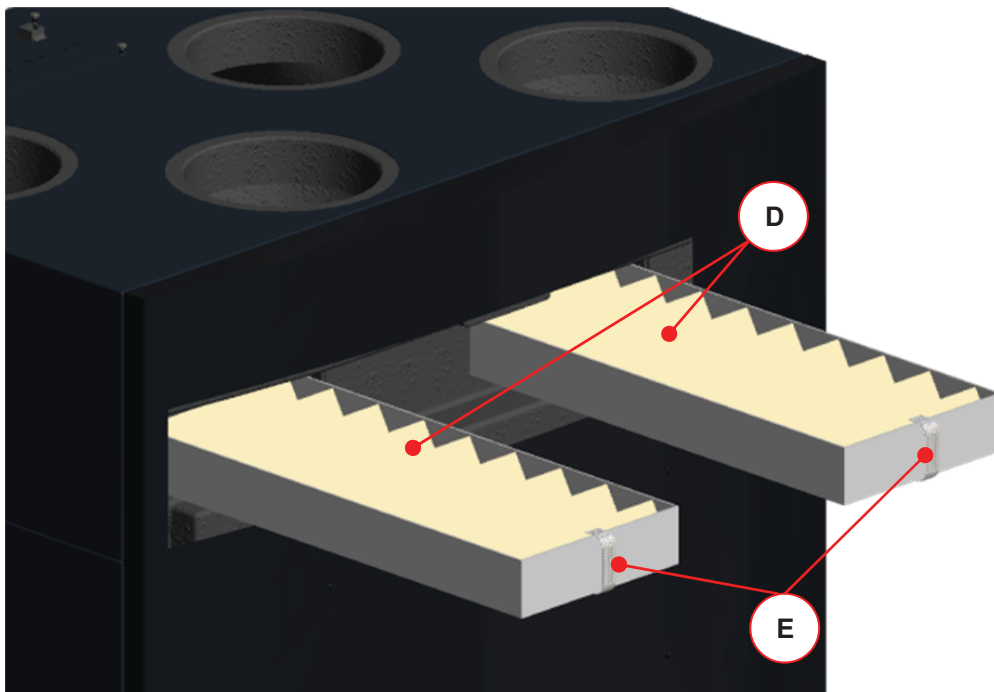


Fig 14: Removal of the filter

5. Push the new filters in the filter slide-in compartments with regard to the flow direction **F**.



The filters are marked with an arrow according to the required flow direction.!

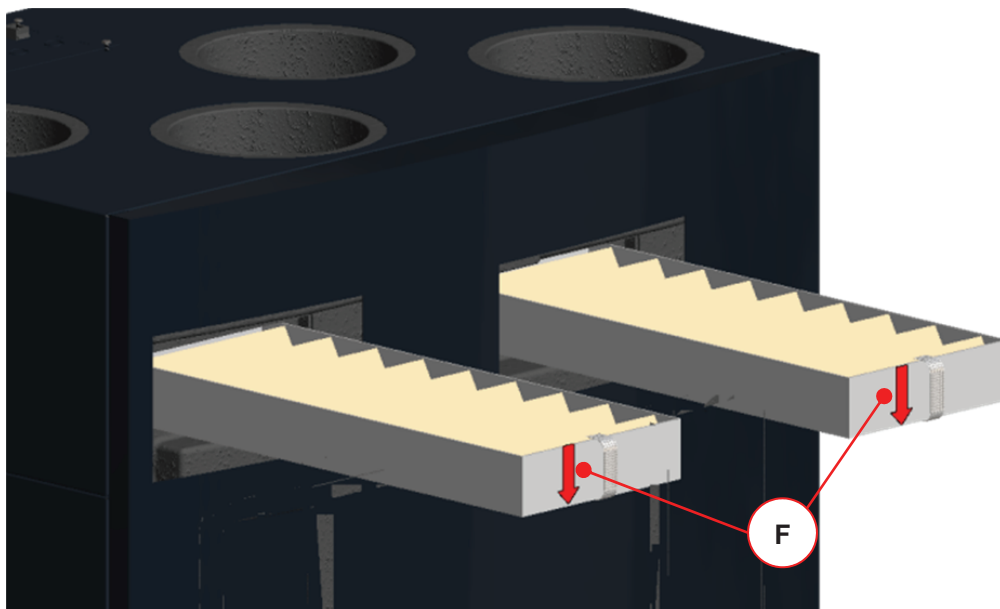




Fig 15: Install the new filter



Pollen filters are to be inserted in the filter slide-in compartment of the intake air connection according the device version (see type plate) and marked with the

symbol   !

Außenluft
Intake air
Air extérieur

6. Insert the filter cover caps. Make sure that the recessed grips of both filter cover caps face each other in the filter slide-in compartment.

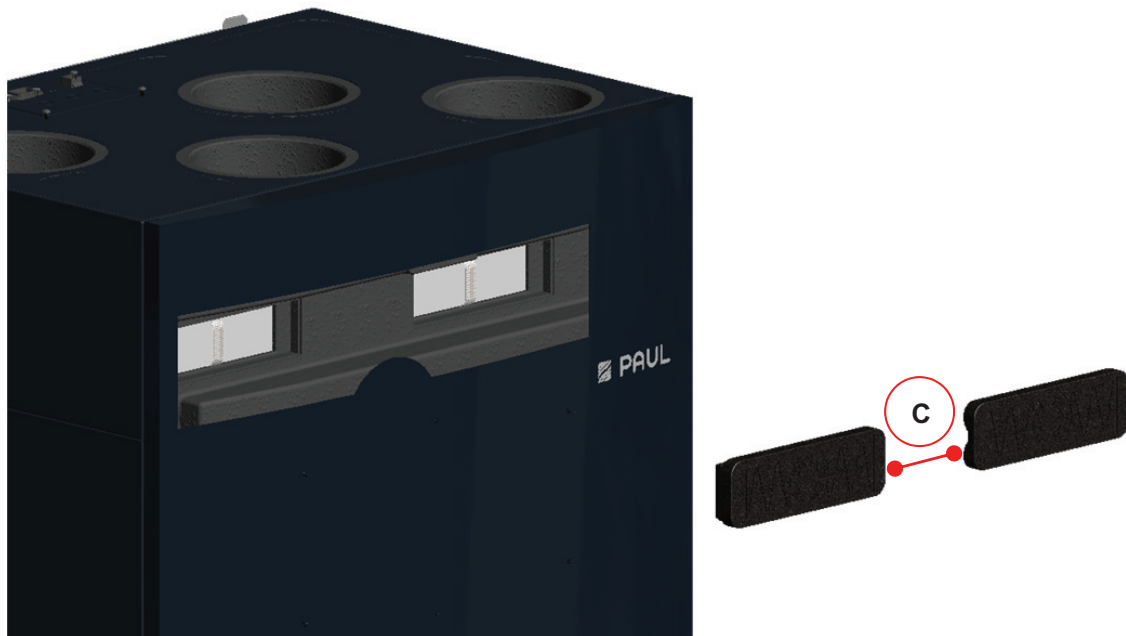




Fig 16: Position when the recessed grips of the filter cover caps face each other

7. Close the inspection opening of the front hood with maintenance flap.
8. Re-establish the mains connection

2.4.2 Resetting the filter run-time


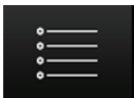
Once the filter has been changed, the counter for the filter run-time must be reset. Resetting the filter run-time can be performed using the respectively connected control unit or the digital input signal (programmable with PC software as special solution).









2.4.2.1 Resetting the filter run-time by means of the LED control panel

Symbol	Designation	Explanation / actions
	LED 10 Signalling Filter run-time	When the LED 10 lights up, the filter run-time has expired and a filter check shall be performed.
	Key Reset Filter run-time	By pressing this key for at least 3 s, the filter run-time is reset. The LED 10 goes off. The timer starts the set filter run-time.

Tab. 17: Resetting the filter run-time by means of the LED control panel

2.4.2.2 Resetting the filter run-time by means of the TFT touch panel

Symbol	Designation	Explanation / actions
	Signalling Filter run-time expired	In case the filter run-time has expired, the message "Replace filter" is generated, signalling that the filter must be checked.
	Button Menu mode	By touching the button Menu mode, you reach the main menus

		Buttons Navigation	Select the main menu Settings by touching the Navigation buttons and confirm by pressing the Enter button.
		Buttons Navigation	Select the submenu Filter by touching the Navigation buttons and confirm by pressing the Enter button.
		Button Checkmark	By touching the Checkmark button, resetting of the filter run-time is selected.
		Button Enter	Confirm by pressing the Enter button.
		Button Cancel / back	By touching the Cancel / back button, exit the menu levels until the start menu appears.

Tab. 18: Step sequence resetting the filter run-time by means of the TFT touch panel



All maintenance work performed must be documented in check list A!

2.4.3 What to Do in the Event of a Failure?

Please contact the installer immediately in the event of a failure. Make a note of the error display and the failure code respectively. Also note down the type of your NOVUS, for that purpose, see type plate on the side of the device.

The mains connection must always be available, unless the NOVUS must be put out of operation due to a serious failure, maintenance work or for other imperative reasons.



As soon as a power disconnection has been performed, the living space is not mechanically ventilated anymore. This may cause moisture and mould problems in the living space. Therefore, the long-term shutdown of the NOVUS has to be avoided!

For the period of absence, the plant should be operated at the lowest fan speed or in the un-occupied mode!

2.5 Disposal

When the life time cycle of your NOVUS has expired, the company PAUL Wärmerückgewinnung GmbH offers you free take-back. If you do not make use of the possibility of feedback of recyclable product parts into the cycle of materials, we would like to remind you that the NOVUS must not be disposed of in the normal household garbage. For this kind of disposal, please obtain information on the possibilities of reuse of components or the eco-friendly treatment of the materials from you community.

3 Hints for qualified personnel

This section describes how to install and commission the NOVUS, how to analyse errors and how to carry out special maintenance work.

3.1 Prinzipal configuration of the system

CAPTION:

T1 Sensor - device-internal temperature sensor
T2 Sensor - device-internal temperature sensor
T3 Sensor - device-internal temperature sensor
T4 Sensor - device-internal temperature sensor
T5 Sensor outside temperature
T6 Sensor brine defroster
T7 Sensor supplementary heater battery temperature
T8 Sensor room temperature thermostat
x_out outside temperature
x_int intake air temperature
x_sup supply air temperature
x_ext extract air temperature
x_exh exhaust air temperature
x_bdt inlet temperature brine defroster
x_shb outlet temperature supplementary heater battery
x_rth temperature of the thermostat

Note:

The internal temperature sensors T1...T4 are interpreted as follows by the software of the fan controller:

	version LEFT	version RIGHT
intake air	T1	T3
supply air	T2	T4
extract air	T3	T1
exhaust air	T4	T2

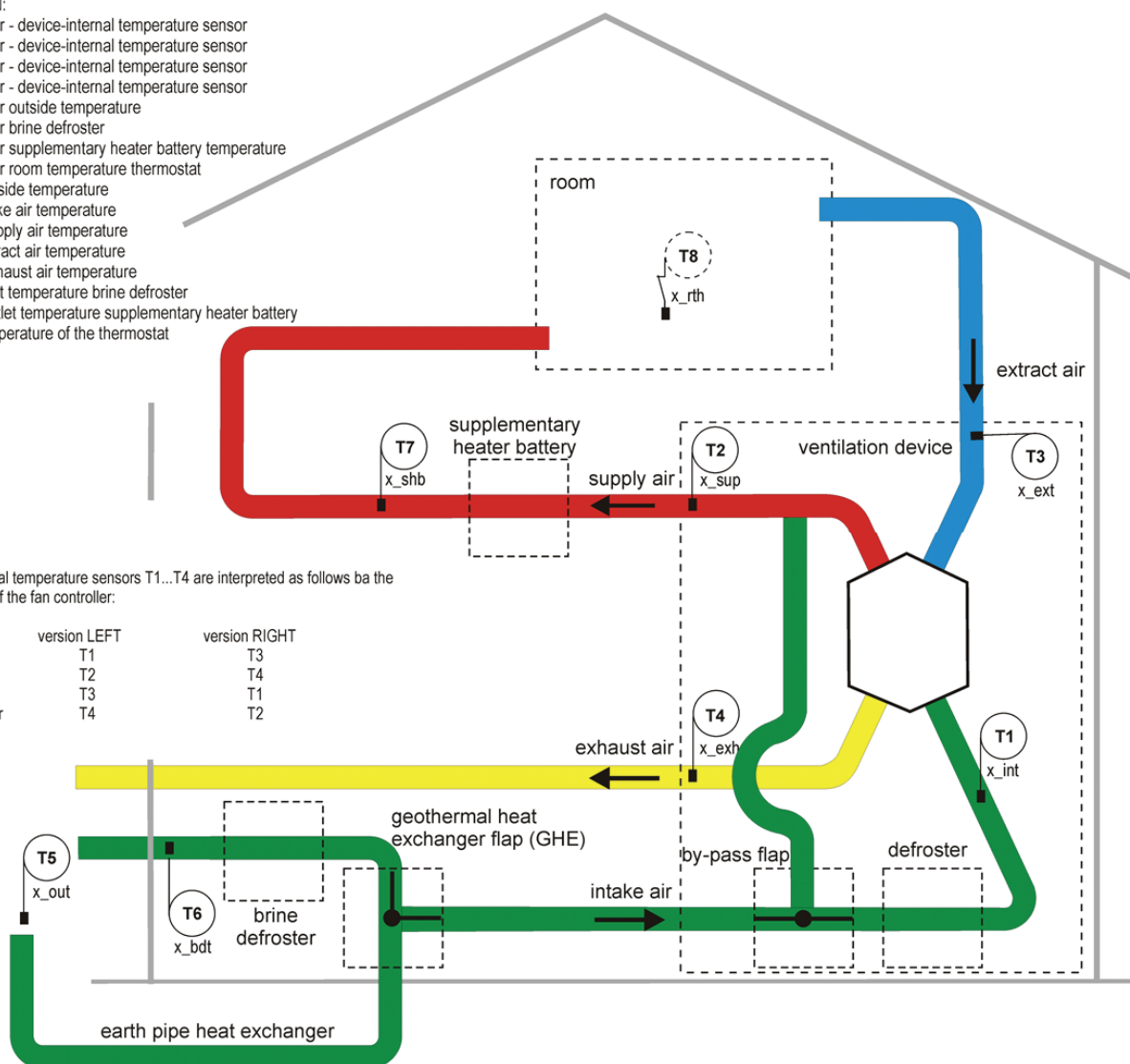


Fig 17: General system outline with MVHR NOVUS and integrated defroster, version LEFT



The basic configuration of the system is universally valid and does not represent the system outline of the project-related ventilation plant! It is designed for representation of the plant-specific system structure for sensors and ventilation equipment.

3.2 Installation requirements

For proper installation, the following requirements must be fulfilled:

- Assembly in accordance with the general and on-site safety and installation instructions, amongst others of the electric power station and water works as well as in accordance with the instructions contained in this operating manual.
- Frost-free room in the interior
- Voltage supply 230 Vac, 50-60 Hz

- Sufficient space for air duct connections and maintenance work

3.2.1 Transport and packing

Proceed with care when transporting and unpacking the NOVUS.



The packaging of the device may only be removed immediately before assembly! Prior to and during assembly interruptions, the open air duct connection stubs must be protected against ingress of construction dust and moisture!

3.2.2 Checking of the scope of delivery

If you detect any damages or incompleteness to/of the delivered product, please contact the supplier immediately. The scope of delivery includes:

- HRU NOVUS,
Check the type plate and make sure that it is the correct device (type / version / design);
- Mounting sheet with 2 pieces of self-adhesive rubber buffer;
- 230 V power cable with IEC power connector;
- CAT5 cable;
- Adapter plate;
- Box adapter board made of transparent plastic;
- Control panel (type of order dependent);
- Operating manual;
- Mounting frame (option).

3.3 Mounting

The NOVUS has to be mounted according to its design (HORIZONTAL or VERTICAL). Check the required load capacity of the wall construction (dead load of the NOVUS: 50 kg) and the safe mounting option of the mounting sheet when mounting it to a wall. We recommend the usage of the mounting frame (available as an option) for the installation on the floor if the walls are unsuitable. That way, potential transmissions of structure-born noise are avoided as well as it can be.



Ensure that a minimum clearance of 1 meter remains in front of the NOVUS for subsequent maintenance works.

3.3.1 Wall mounting

Thereby, processed the wall mounting as follows:

1. Mount the delivered mounting sheet **A** with the tongues **B**, which point upwards, horizontally to the wall. Take advantage of the long-quercher **C** for fixation by suitable fastening material.

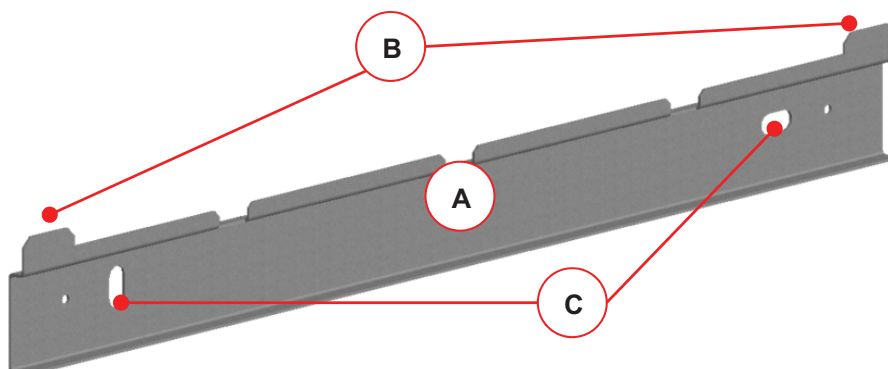


Fig 18: Mounting sheet for wall mounting

2. Note depending on the installation location, the required minimum clearances to finished floor!

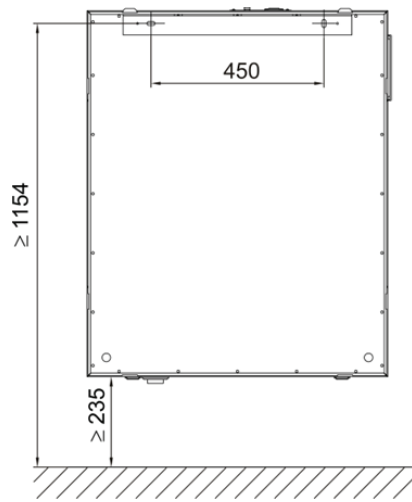


Fig 19: Vertical wall mounting (RIGHT version)

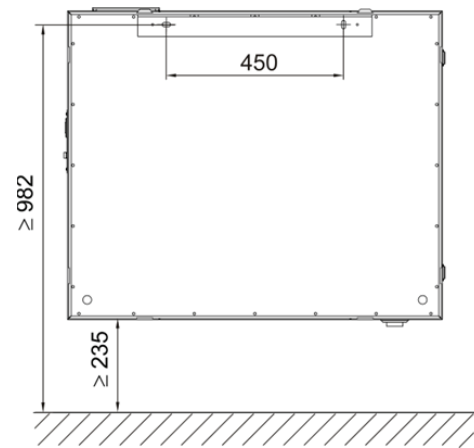


Fig 20: Horizontal wall mounting (HORIZONTAL - RIGHT version)

3. Glue each piece of the enclosed, self-adhesive rubber buffer **D** in the bottom corner region on the rear panel of the device.

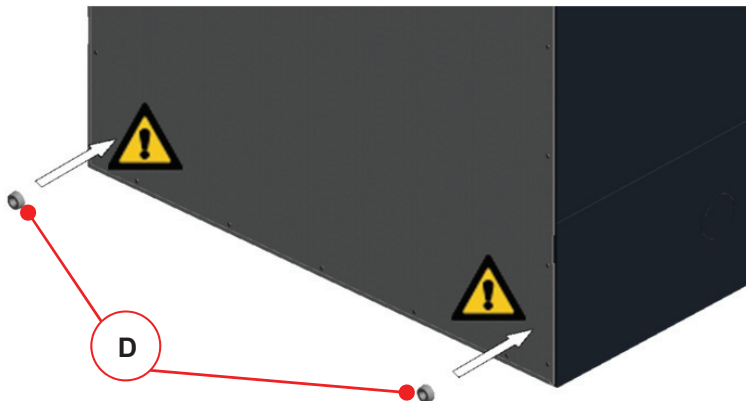


Fig 21: Mounting of the rubber puffer

4. Hang the NOVUS on the mounting sheet by hooking the tongues **B** in the slot openings **E** each of which are situated at the top of the fold of the rear panel.

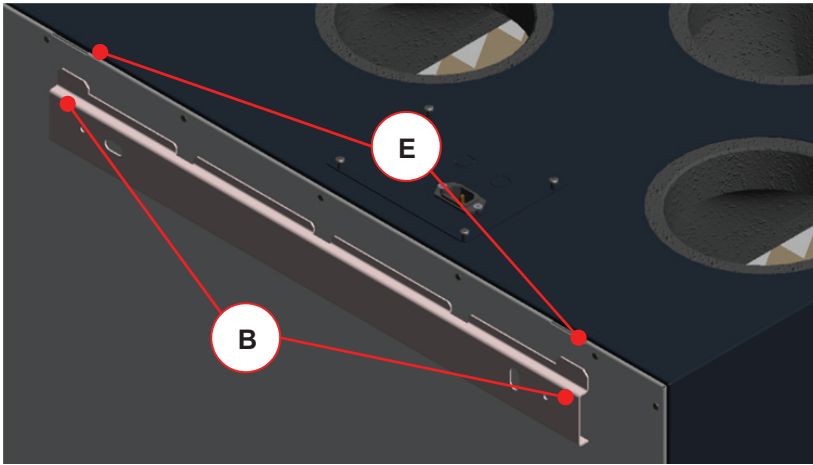


Fig 22: Hanging into the mounting sheet

3.3.2 Mounting on a mounting frame

The area of the mounting frame has dimensions of 620 x 480 mm and is vertically adjustable between 280 mm and 320 mm using mounting frame feet. The mounting frame consists of two long side parts with the frame feet and two short side parts



Fig 23: Parts of the mounting frame

Mount the individual parts of the mounting frame in accordance with the figures. Thereby, proceed as follows:

1. The short side part is vertically offset and to set at right angles to the long side part in direction of arrow.

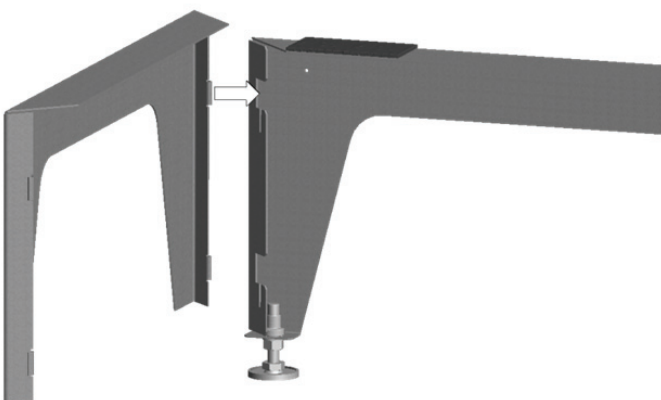


Fig 24: Put together the footboards

2. The tongues **A** of the short part are snapped into guiding slots **B** of the long part to fix both parts together in direction of the arrow..

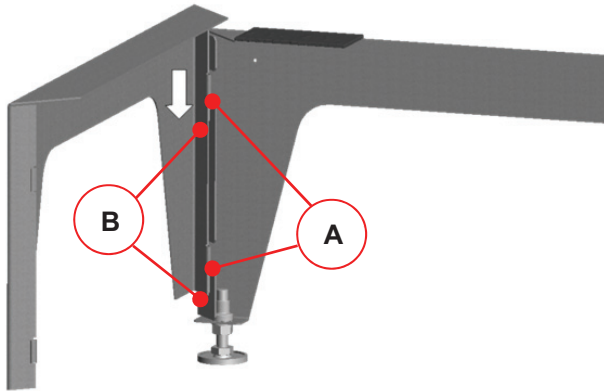


Fig 25: Fixing of the footboards

3. Now insert both the other two footboards together.

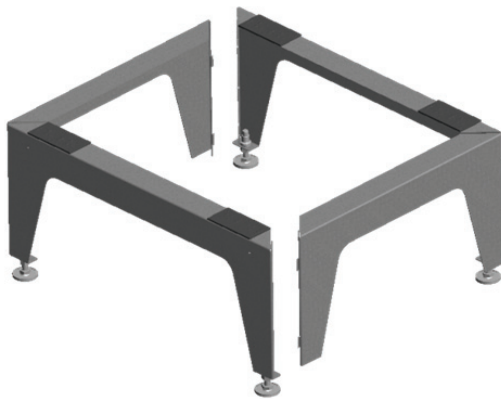


Fig 26: Each two together fixed footboards

4. Mount the mounting sheet **C** with the tongues, which point upwards, to a long side part of the mounting frame **F**. In doing so, screw both of the sheet metal screws **D** in the designated bore holes **E** of the side part.

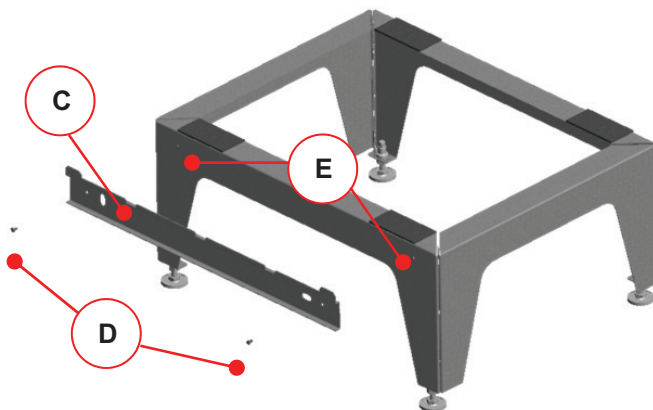


Fig 27: Screwing of the mounting sheet to the mounting frame

5. Now adjust the completed mounting frame perpendicularly and stably to the designated floor space via the height-adjustable feet **F** of the mounting frame.

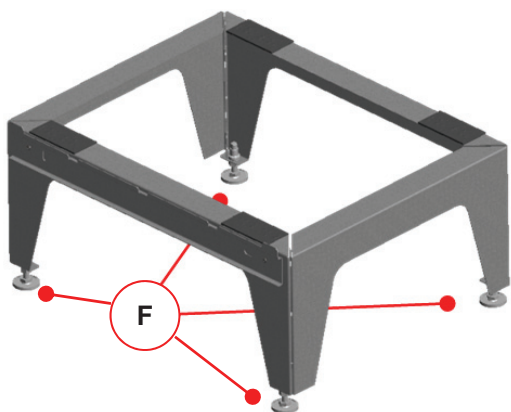


Fig 28: Adjust the mounting frame

6. Put the NOVUS on the mounting frame by hooking the tongues in the bottom slot openings of the rear panel. See Fig 22.

3.3.3 Air duct connection

Observe the following points when mounting the air ducts:

- Mount the air duct types of the ventilation device to the connector stubs in accordance with the present LEFT or RIGHT device version (see tag next to the cover sheet control).

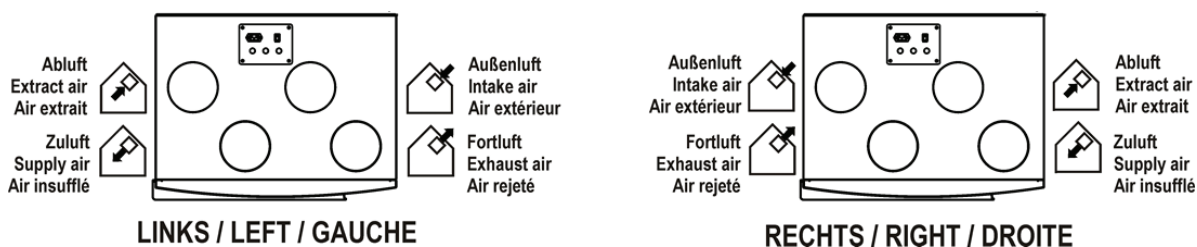


Fig 29: Layout air ducts version LEFT and version RIGHT

- Use air duct material with air resistance as low as possible, and connect the ventilation components air-tight among each other;
- The connection stubs of the device are made of EPP and have sleeve dimensions DN 160;
- The intake air and exhaust air ducts must be insulated in such a way that they are vapour-diffusion tight;
- In the event that a low point is unavoidable when installing the exhaust air duct from the device's exhaust air stub to the exhaust air outlet, a connection for condensate drain must be provided at that point;
- A straight pipe routing of the exhaust air from the device connection stub to the roof hood should be avoided, since during defrosting of possible ice formations, they might fall onto the blades of the exhaust air fan and cause damage to these blades;

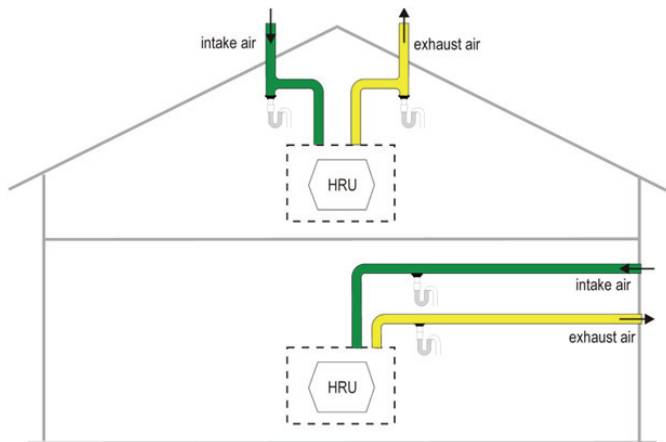


Fig 30: Arrangement drainage of the intake air duct and exhaust air duct

- If a silencer is provided at the exhaust air stub, it must be guided upwards by means of a bend in order to protect it against drenching caused by condensate returning from the exhaust air duct.
- If the exhaust air is guided over the roof, this guidance must be equipped with a double-wall or insulated roof lead-through. Thus, condensate formation between the roof boards is prevented.
- For the supply and extract air ducts, we recommend a thermal and vapour resistant insulation in order to avoid unnecessary temperature loss both in summer and winter.

3.3.4 Connection of the Condensate Drain

The warm extract air is cooled by the intake air in the heat exchanger. Thus, the moisture of the room air condenses in the heat exchanger. The condensate which forms in the heat exchanger is conducted to the siphon. The connector **A** of the condensate drain has an external thread of 1¼ inch. It is situated at the bottom side of the NOVUS in accordance with the respective device version.

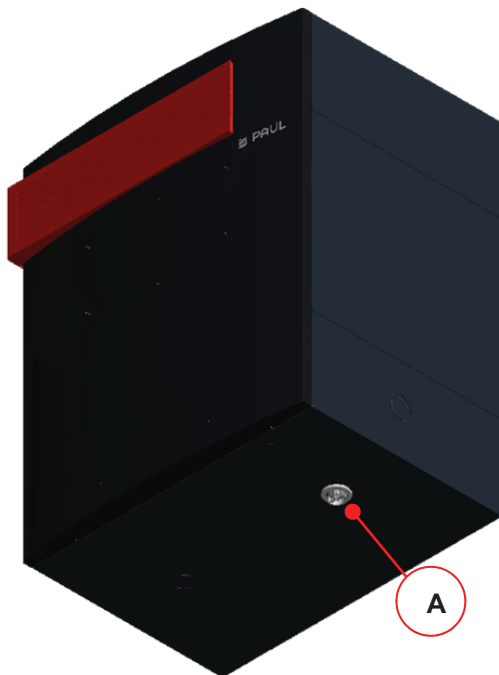


Fig 31: Connector of the condensate drain version RIGHT, VERTICAL

A siphon has to be mounted to the 1¼-inch external thread of the condensate connection stub in such a way that the minimum (60 mm) requirements of the liquid gauge heights are met in accordance with the schematic diagram.

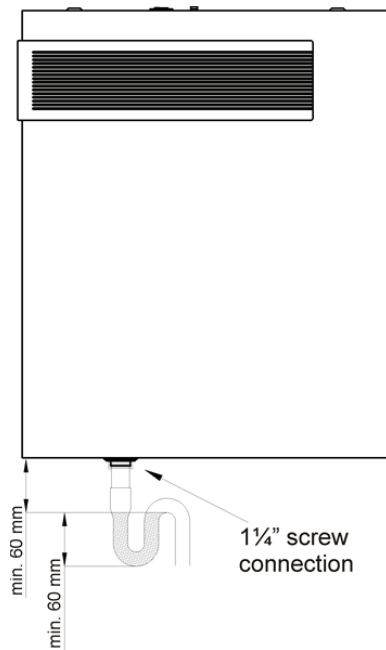


Fig 32: Condensate connection
(Version LEFT, VERTICAL)

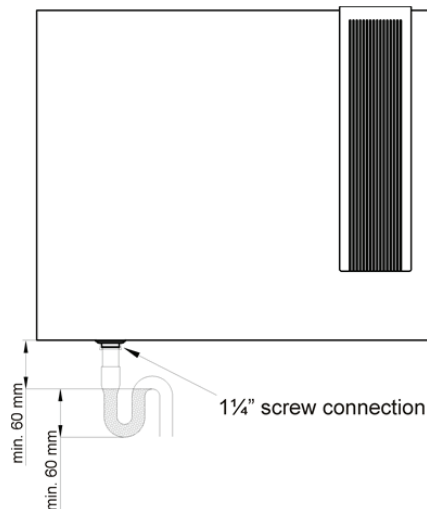


Fig 33: Condensate connection
(Version RIGHT, HORIZONTAL)



The condensate drain must not be directly connected to the sewage system (e.g. finishing freely in a hopper with a siphon at the sewer).

Siphons can dry up! Water has to be refilled if:

- the device is commissioned
- the siphon makes noises (slurping)



Ein dry siphon is recommended by PAUL Wärmerückgewinnung GmbH, particalur when using the enthalpy exchanger! (no limitation of the functionality if drying up)

3.4 Electrical connections



Electrical connections must be established in accordance with the applied standards to electrical equipment and only by qualified personnel!

The electrical power supply of the NOVUS is provided via the 3-pole plug connection **A** of a lower power device by means of the power cable. The CAT5 network cable is connected to the RJ45 jack **B**. Both plug connections are arranged on the surface of the device on the interface sheet **D**. The interface sheet is fastened with 4 **E** screws. Analogue and digital input and output signals of sensors (e.g. room air quality sensors) or actuators (e.g. intermitting ventilation sensing devices) are applied to the through terminal X10 **C** which is internally connected via a 10-wire cable to the respective terminal points of the master controller. The through terminal X10 is meant to be a transfer point and is situated underneath the interface sheet. In doing so, the 4 screws have to be loosened and the cables of the sensors / actuators have to be conducted through the cable glands. The cable bushings pre-cut in the interface sheet must be broken out as needed and the cables of the sensors / actuators must be guided through cable glands M16.

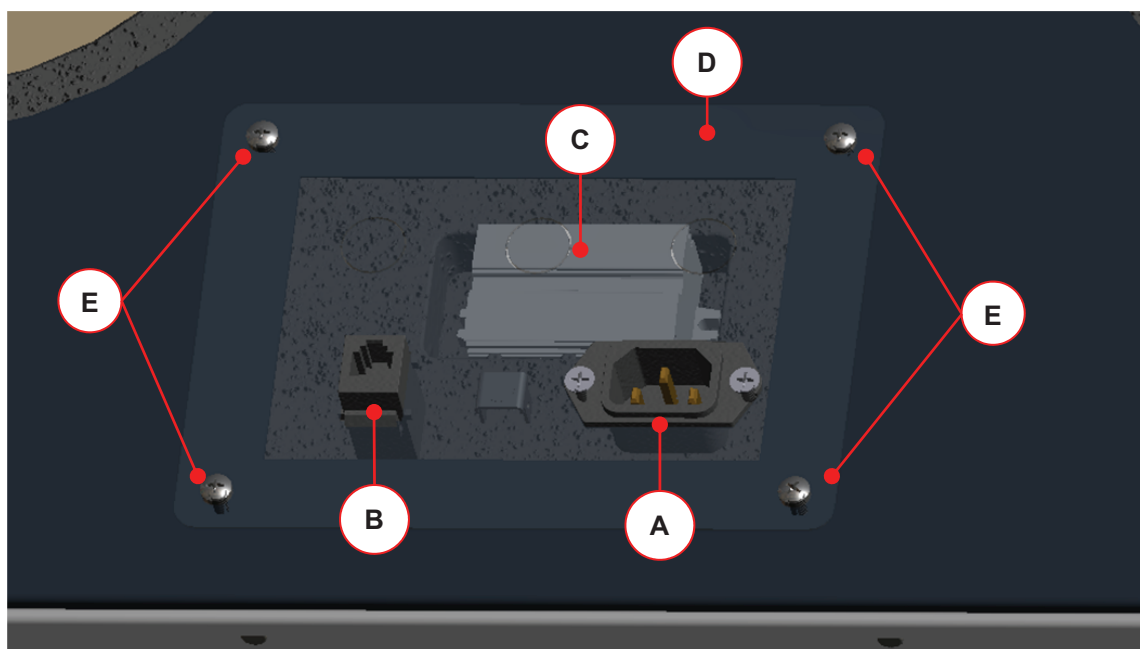


Fig 34: Electrical connections

Position	Designation
A	3-pole IEC connector
B	RJ45 jack
C	Through terminal X10
D	Interface sheet
E	Screw (4x)
-	Plant 1 Circuit diagram NOVUS
-	Plant 2 Circuit diagram NOVUS with integrated defroster
-	Plant 3 Terminal scheme through terminal X10

Tab. 19: Overview of the electrical connections



The RJ45 jacks are exclusively serve the components of the internal RS485-BUS! Any other usage results in the damage of the control modules!

3.4.1 Connection of the adapter board

The adapter board with the 2-fold RJ45 plug connection and the 5-pole screw terminal X1 is used for communication of the modules via the internal RS485-BUS. The CAT5 network cable establishes the internal connection between the RJ45 jack of the NOVUS and one of the two RJ45-jack of the adapter board.

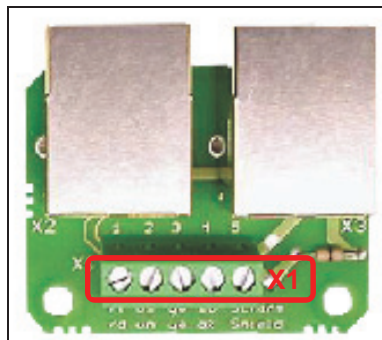


Fig 35: Adapter board

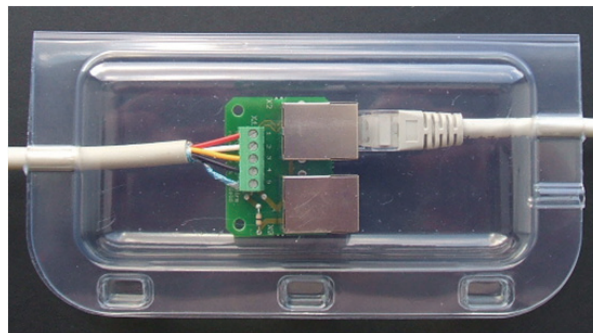


Fig 36: Casing for adapter board

A screened 4-wire cable is connected to the 5-pole screw terminal of the adapter board. This cable connects the adapter board to the 5-pole screw terminal of the control unit's adapter board. In order to be protected against error voltage, short circuit and dust, the adapter board must be mounted into the casing made of transparent plastic. The cables connected to the adapter board must be placed into the cable troughs of the casing and are fastened by means of the 3-fold click lock of the hinged cover. It is recommended to use a cable of the type J-Y(ST)Y 2x2x0.6 LG internal cable with a colour coding according to VDE0815.

Terminal X1 (adapter board / control unit)	Wire	Signal
X1.1	red	24P
X1.2	white	RX
X1.3	yellow	TX
X1.4	black	GND
X1.5	aluminium-coloured	screen

Tab. 20: Terminal assignment for terminal X1 adapter board and terminal X1 control unit

3.4.2 Connection of the TFT touch panel

The comfort edition of the control panel, as a TFT touch panel with a stainless steel frame, is designed for an in-wall installation.

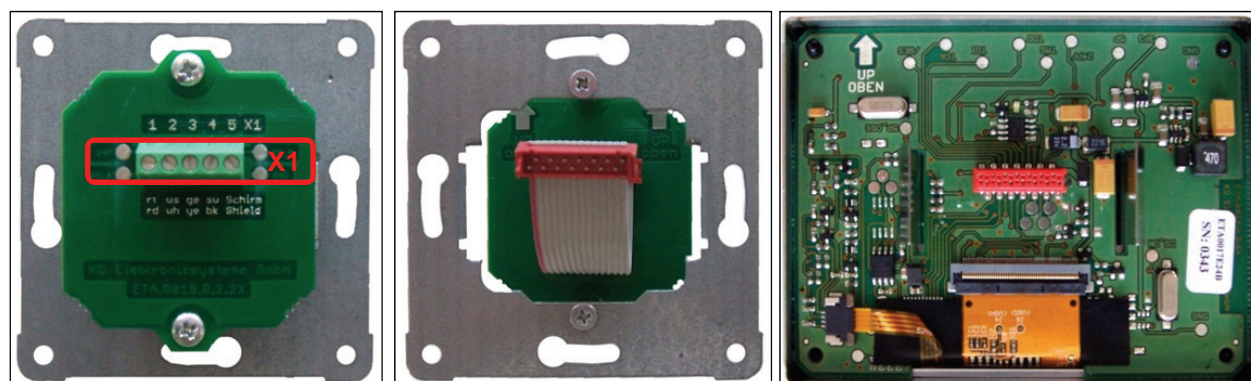


Fig 37: Adapter board with terminal X1 on an in-wall base plate; ribbon cable of the adapter board; board of the TFT touch panel (from left to right)

The cable of the type J-Y(ST)Y 2x2x0.6 must be connected to the terminal X1 of the adapter board acc. Tab. 20. The ribbon cable connects the adapter board to the board of the TFT touch panel.



The connectors of the ribbon cable which are protected against polarity reversal must be carefully plugged into the jacks of the respective boards!

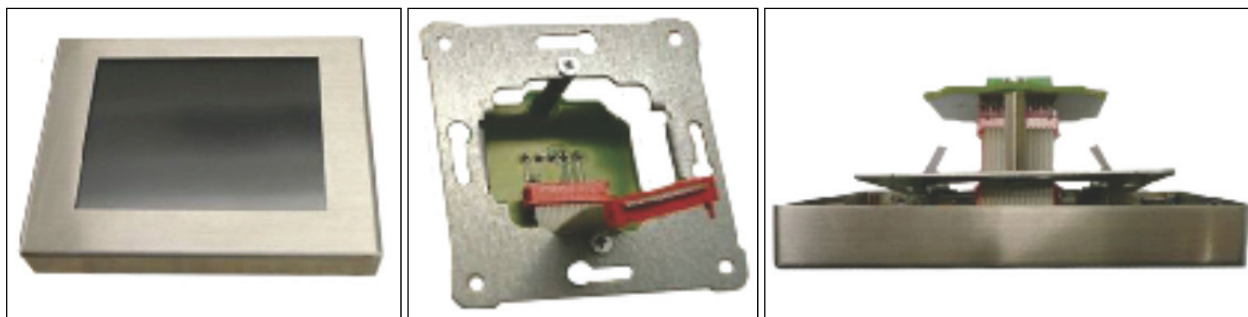


Fig 38: Touchpad with stainless steel frame; ribbon cable of the control unit adapter; Touchpad engaged in the in-wall base plate (from left to right)

The smaller side of the stainless steel frame of the ready-made TFT touch panel has to point upwards. In doing so, the control unit adapter and the in-wall base plate have to be positioned in such a way that the ribbon cable of the control unit adapter, which is arched downward, is plugged in the TFT touch panel. The spring steel clips, which are mounted to the rear side of the control unit, grasp the in-wall base plate and pull the stainless steel frame of the control unit tightly to the wall.

3.4.3 Connection of several TFT touch panels

It is possible to connect up to three TFT touch panels as control units for the ventilation device. On the hardware side, the TFT touch panels shall be connected in parallel to the terminal X1 of the adapter board according to conductor assignment Tab. 20. The TFT touch panels shall be successively commissioned and re-addressed (factory setting default address = 1). Addressing of the TFT touch panels is performed at software level in the setup/submenu Several control panels.

Symbol	Designation	Explanation / actions
Address two TFT control panels		Connect the first TFT touch panel
	Button Menu mode	By touching the button Menu mode, you reach the main menus.
	Buttons Navigation	By touching the navigation buttons, select the main menu setup and confirm with Enter.
	Button Password	Password prompt Enter the password _ _ _ _ _ and confirm with Enter.
	Buttons Navigation	By touching the navigation buttons, select the submenu Several control panels and confirm with Enter.
	Buttons Navigation	By touching the navigation buttons, select the address number 2 and confirm with Enter.
		Connect the second TFT touch panel Sequence of steps for software addressing not applicable since address number = 1 (factory setting)
Address three TFT control panels		Connect second TFT touch panel Perform the sequence of steps for software addressing as before, assign address number 3.

Connect third TFT touch panel
Sequence of steps for software addressing not applicable since
address number = 1 (factory setting)

Tab. 21: Sequence of steps connection / addressing of several TFT control panels



The connection of several control panels with the same address number results in a communication error!



The operation mode of the ventilation device is based on the last input instruction at one of the TFT touch panels connected.

3.4.4 Connection of the LED control panel

The operation of the ventilation device is only possible with a control unit type LED control panel. For the LED control panel in the design of the *PEHA* switch range, both on-wall and in-wall installation is possible.

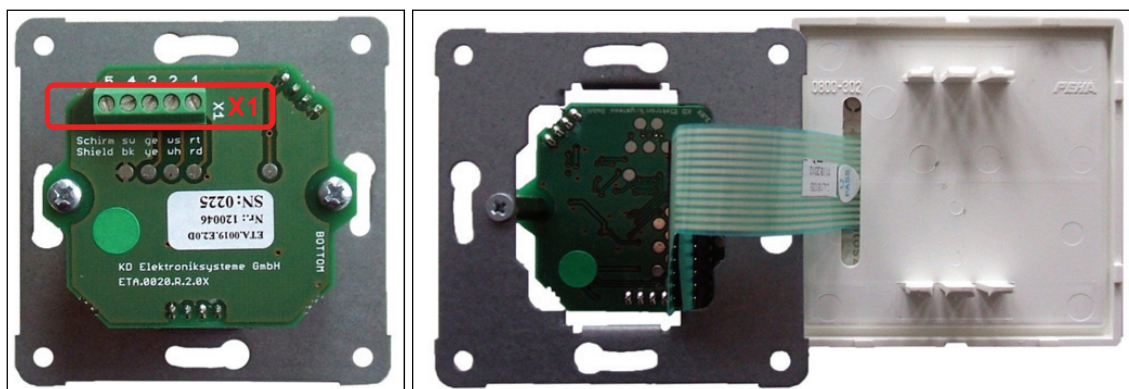


Fig 39: Adapter board with terminal X1 on an in-wall base plate; ribbon cable of the adapter board; rear panel LED key-pad (from left to right)

The cable of the type J-Y(ST)Y 2x2x0.6 must be connected to the terminal X1 or the adapter board in accordance with tab. Tab. 20. The ribbon cable connects the adapter board with the board of the LED key-pad.



Do not pull the ribbon cable off the adapter board, but put the LED control panel diagonally through the *PEHA* frame!

3.4.5 Connection of external boost ventilation switch

The boost ventilation mode can be activated by actuating one or more boost ventilation switches connected in parallel. The switches which are usually installed in the design of the respectively used switch range are triggered when the boost ventilation mode is activated. The potential-free connection between the sensor and the through terminal X10 is established by means of a cable with at least 2 wires (recommendation: cable type J-Y(ST)Y 2x2x0.6). The introduction of the cable in the NOVUS is realised in one of the pre-cut cable bushings.

Through terminal X10	Wire cable boost ventilation switch
X10.4	Wire 1
X10.5	Wire 2 (GND)

Tab. 22: Terminal assignment connection boost ventilation switch

3.4.6 Connection of external sensors

The operating mode **Automatic sensor** auf the automatic mode is controlled by an analogue sensor signal which is generated by one or more sensors. The connection between the sensor module and the

through terminal X10 is established by means of the cable prescribed for the transmission of the sensor signal. The introduction of the cable into the NOVUS is realised in one of the pre-cut cable bushings.

Through terminal X10	Wire cable sensor module
X10.6 (analogue input1)	Wire 1 (sensor signal 0-10 V or 4-20 mA)
X10.7 (GND)	Wire 2 (GND)

Tab. 23: Terminal assignment connection analogue sensor signal

3.4.7 Connection status relay

A status relay on the master controller indicates the operating status of the fans (factory setting).

Fan off: Contacts open
Fan on: Contacts closed

Through terminal X10	Contact designation
X10.1	Normally open contact status relay (max. 24 V switching voltage)
X10.2	Change over contact status relay (max. 24 V switching voltage)

Tab. 24: Terminal assignment connection status relay

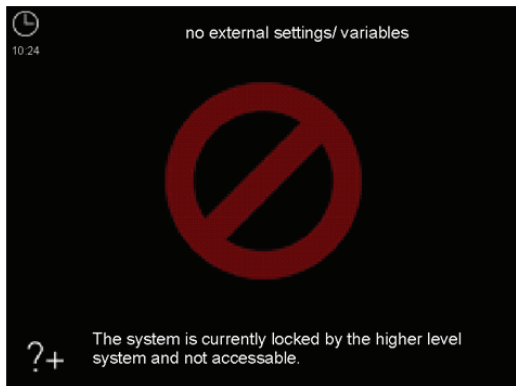
3.4.8 Connection external release

The operation of the system can be released or locked by an external release signal. The potential-free release contacts are on the through terminal X10 and are bridged by the factory.

Through terminal X10	Contact designation
X10.5	External release
X10.6	External release (GND)

Tab. 25: Terminal assignment connection external release

In case of removal of the bridge and no external release, the following visualisations are generated:

TFT touch panel	LED control panel
	L1 and L7 light up

Tab. 26: Visualisation no external release

3.4.9 Connection digital inputs or outputs

The digital inputs or outputs DIO1 and DIO2 can only be programmed with the configuration software. The following parameterisations are set by the factory:

DIO1: Activate automatic mode (as digital input signal)

DIO2: Message in general (as digital output signal)
Only DIO1 is connected to the through terminal X10.

Through terminal X10	Contact designation
X10.7	Digital input or output 1 (can be parameterized)
X10.8	Digital input or output 1 (GND)

Tab. 27: Terminal assignment digital inputs or outputs

3.4.10 Operation without a control unit connected

When operating the ventilation device without control panel, the control operates according to the operating mode set last.



The control panel may only be disconnected from the BUS in de-energised condition. Disconnection during the operation results in a communication error!

3.5 Commissioning of the NOVUS

3.5.1 Operational readiness



Operational readiness is ensured if the requirements acc. to country-specific regulations are met. For that purpose, cleanliness of the air duct material, the availability, correct installation and operational readiness of the entire ventilation equipment provided for the plant must be particularly ensured.



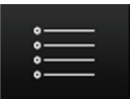


Check all safety-relevant parts and perform a functional test!






3.5.2 Adjusting the air volume flow

After having verified the operational readiness, the NOVUS can be commissioned as follows. The ventilation device is configured according to plant design for the total intake air volume flow with nominal ventilation. This nominal air volume flow is parameterised in accordance with the characteristic curves of the charts 1 and 2 (with control unit TFT touch panel) in the setup / submenu Fan speeds or according to Tab. 29 (with control unit LED control panel).

3.5.2.1 Adjustment of the nominal air flow with TFT touch panel

For adjustment of the ventilation unit, the fan speed 2 (FS 2) for nominal air flow is set. The following settings have to be made using the TFT touch panel:

Symbol	Designation	Explanation / actions
	Button Menu mode	Connect the first TFT-touch panel
	Buttons Navigation	By touching the button Menu mode, you reach the main menus.
	Button Password	By touching the navigation buttons, select the main menu setup and confirm with Enter.

	Buttons Navigation	By touching the navigation buttons, select the submenu Fan speeds and confirm with the Enter button.
	Button Fan speed 2 (FS2)	Activate the fan speed 2 (FS2) by touching the corresponding button.
	Buttons Navigation	Parameterise fan speed 2 (FS3) in accordance with characteristic curves for the nominal air volume flow Graph 1 (NOVUS F 300), graph 2 (NOVUS F 450)
	Button Enter	Confirm by touching the Enter button.
	Button Cancel / back	By touching Cancel / back button, exit the menu levels until the start menu appears.

Tab. 28: Step sequence adjustment of the nominal air flow by means of the TFT touch panel



The values for balancing are factory-set and should only be modified if necessary.

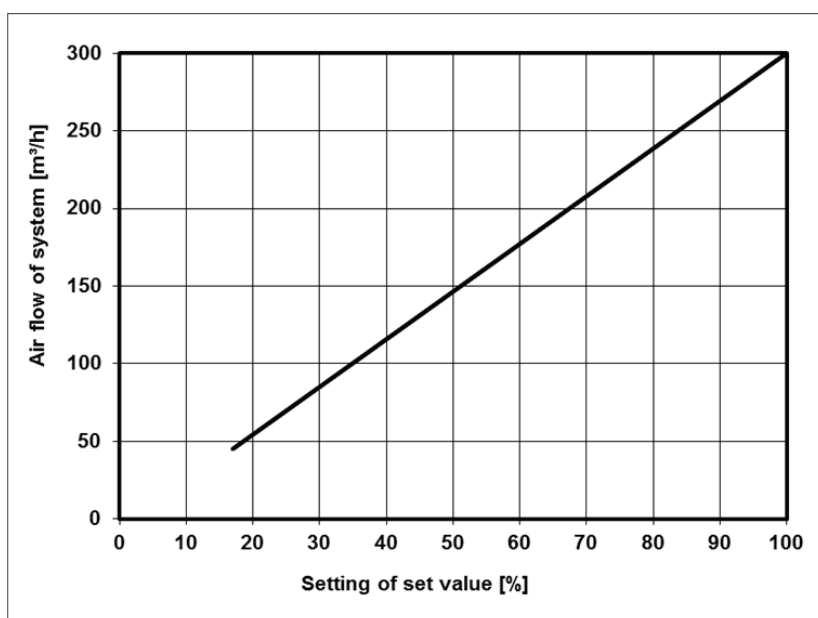


Fig 40: Chart 1, setting values nominal air flow NOVUS (F) 300 with fan speed 2 (FS2)

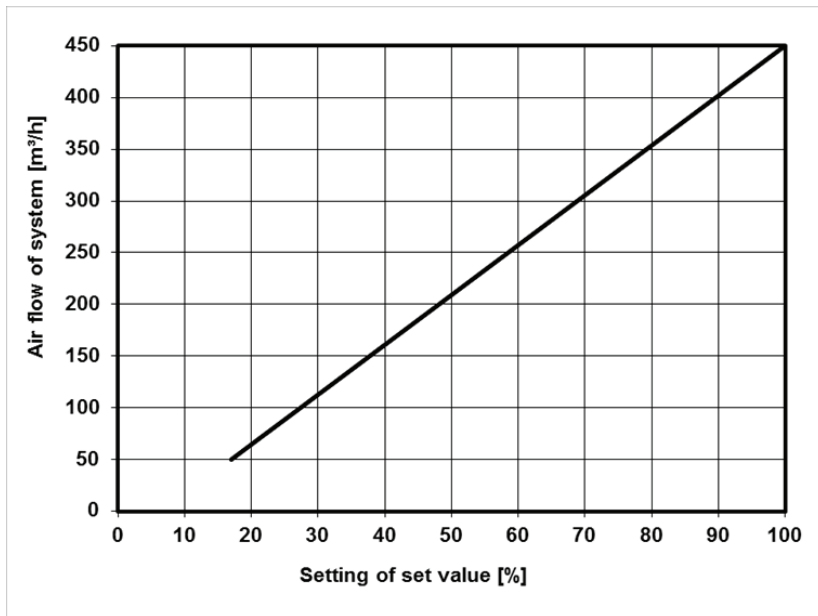


Fig 41: Chart 2, setting values nominal air flow NOVUS (F) 450 with fan speed 2 (FS2)

3.5.2.2 Adjustment of the nominal air flow with LED control panel

For adjusting the ventilation plant, the speed of the LED control panel which corresponds to the settings of set value. The seven steps of the LED control panel are factory-set values of the fans according to tab. 14. Correspond to the adjusted level for the nominal air flow rate has the nearest set value from chart 1, Fig 40 or chart 2 Fig 41. During the adjustment of the valves, this fan speed is maintained.

Fan speed level	Setting of set value [%]		Setting of set value [%]	
	Version LEFT		Version LEFT	
LED control panel	NOVUS (F) 300	NOVUS (F) 450	NOVUS (F) 300	NOVUS (F) 450
1	17	25	17	20
2	29	39	29	32
3	41	50	44	43
4	53	61	57	53
5	65	74	70	65
6	74	84	81	74
7	100	100	100	100

Tab. 29: Setting values nominal air volume flow

3.5.3 Adjustment of the Valves



Make sure that the supply and extract air valves are open as much as possible at the beginning of the volume flow measurement.

- Set the fans to nominal air volume flow.
- Adjustment of the air volume flows to the air valves by means of a volume flow hood and an anemometer (see air volume log)
- Adjustment of the air gap on the valve must not be too narrow – aerodynamic noises! Better: Adjustment of a lower fan output or restriction of the volume flow in the pipeline (installation of a throttle flap or throttle foam insert)
- Readjustment of the valves
- Locking of the adjusted positions of the valves and flaps
- Recording of the adjusted air quantity and all further adjustments in the designated documentations

3.6 Menu settings by qualified personnel / service staff



The password-protected parameters may only be changed by a competent expert or service staff!

3.6.1 Main menu Setup

The main menu **Setup** is divided in eight submenus. The access to the submenus is password-protected.

Symbol	Designation	Explanation / actions
	Button Menu mode	By touching the button Menu mode, you reach the main menus.
	Buttons Navigation	By touching the navigation buttons, select the main menu setup and confirm with Enter.
	Button Password	Password prompt Enter the password _ _ _ _ and confirm with Enter.
	Buttons Navigation	By touching the navigation buttons, select the respective submenu and confirm with Enter.

Tab. 30: Sequence of steps access main menu setup








The settings in the submenu are only applied if Enter is touched!

3.6.1.1 Submenu Frost protection

The following settings are made in the submenu Frost protection:

- Parameterisation of the temperatures, () values factory setting:
 - Anti-freeze protection threshold intake air eco (-2.0 °C)
 - Anti-freeze protection threshold intake air safe (0.0 °C)
 - Anti-freeze protection threshold intake air moisture heat exchanger (-8.0 °C)
 - Anti-freeze protection threshold minimum supply air temperature (5.0 °C)
- Selection of the type of defroster heater
 - Electric defroster
 - PTC defroster
 - Brine defroster

Symbol	Designation	Explanation / actions
	Buttons Navigation	Temperatures Select by touching the navigation buttons (red background of the text) and confirm with Enter.
	Buttons Navigation	Anti-freeze protection thresholds Using the navigation buttons, the characteristic variables (red background of the text) to be parameterised can be selected and the values can be set using the buttons + / -.
	Buttons Enter Cancel / back	Confirm by touching the Enter button. By touching the Cancel / back button, exit the menu level.

 	Buttons Navigation	Selection Type defroster heater Select the respective type by touching the navigation buttons (red background of the text).
 	Button Checkmark	By touching the Checkmark button, the type of defroster heater is selected.
	Button Cancel / back	By touching the Cancel / back button, exit the menu levels until the start menu appears.

Tab. 31: Parameterisation submenu frost protection








When falling below an anti-freeze protection threshold, an existing anti-freeze protection component is activated. If it remains falling below the anti-freeze protection threshold, this leads to switching off of the fans and an error message.

3.6.1.2 Submenu Fan speeds

In the submenu fan speeds, settings regarding the fan output and balancing can be made. for all three fan speeds. The supply air fans are parameterised separately for each fan speed in steps of 1% between 17 %...100 & %. If necessary, balancing for each fan speed is performed by adjusting the exhaust air fan in the range -50 % ... +50 %. A varying fan output (imbalance) is calibrated by the service technician depending on the configuration of the system and is determined by means of the balance control.



Any change of the fan output via the main menu Settings can lead to a shift of the balance behaviour, in particular at the upper and lower limits of the fan characteristic curve.












Symbol	Designation	Explanation / actions
	Button Fan speed 1 (FS1)	Using the button Fan speed 1, activate the FS 1 and parameterise it with the navigation buttons. Setting range: 17 % < FS1 < FS2 Using the buttons + / -, an imbalance can be set.
	Button Fan speed 2 (FS2)	Using the button Fan speed 2, activate the FS 2 and parameterise it with the navigation buttons. Setting: FS2 = Nominal air volume flow Using the buttons + / -, an imbalance can be set.
	Button Fan speed 3 (FS3)	Using the button Fan speed 3, activate the FS 3 and parameterise it with the navigation buttons. Setting range: FS2 < FS3 < 100 % Using the buttons + / -, an imbalance can be set.
 	Buttons Enter Cancel / back	Confirm by touching the Enter button. By touching the Cancel / back button, exit the menu level.

Tab. 32: Parameterisation submenu fan speeds

3.6.1.3 Submenu Supplementary heating

The following settings are made in the submenu supplementary heating:

- Parameterisation of the duct temperature
- Selection of the type of supplementary heater battery
 - Electric heater battery
 - Hot water heater battery









Symbol	Designation	Explanation / actions
 	Buttons Navigation	Duct temperature Select by touching the navigation buttons (red background of the text) and confirm with Enter.
 	Buttons + / -	Using the buttons + / -, set the duct temperature.
 	Buttons Enter Cancel / back	Confirm by touching the Enter button. By touching the Cancel / back button, exit the menu level.
 	Buttons Navigation	Selection Type supplementary heater battery Select the respective type by touching the navigation buttons (red background of the text).
 	Button Checkmark	By touching the Checkmark button, the type of supplementary heater battery is selected.
	Button Cancel / back	By touching the Cancel / back button, exit the menu levels until the start menu appears.



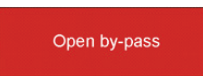
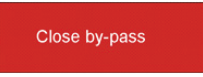

Tab. 33: Parameterisation submenu supplementary heating

3.6.1.4 Submenu By-pass

The following settings are made in the submenu By-pass

- By-pass available;
- By-pass temperatures, () values factory setting:
 - high threshold (25,0 °C)
 - lower threshold (18,0 °C)
 - Hysteresis (0,5 K)
 - By-pass closed below (13,0 °C)
- Test by-pass

Symbol	Designation	Explanation / actions
 	Button Checkmark	By touching the Checkmark button, an available bypass flap is released.
 	Buttons Navigation	By-pass temperatures Select by touching the navigation buttons (red background of the text) and confirm with Enter.
 	Buttons + / -	Using the buttons + / -, set the selected parameter of the by-pass temperatures.
 	Buttons Enter Cancel / back	Confirm by touching the Enter button. By touching the Cancel / back button, exit the menu level.

 	Buttons Navigation	Test by-pass Select the respective type by touching the navigation buttons (red background of the text).
	Button Open by-pass	By touching the button Open by-pass, the by-pass flap is positioned in OPEN position.
	Button Close by-pass	By touching the button Close by-pass, the by-pass flap is positioned in CLOSE position.
	Button Cancel / back	By touching the Cancel / back button, exit the menu levels until the start menu appears.

Tab. 34: Parameterisation submenu by-pass




The following switch conditions OPEN / CLOSED are provided for the by-pass (example for **LEFT version**):

Parameter	Description / value	
T1:	Temperature of the intake air (x_int) on the sensor T1 in the device	
T3:	Temperature of the extract air (x_ext) on the sensor T3 in the device	
x_ext_min:	Lower temperature threshold for extract air	
x_ext_max:	High temperature threshold for extract air	
x_int_min:	Lower threshold for intake air	
H_ext:	Hysteresis of switching thresholds for extract air	
Function	Switching conditions	
By-pass OPEN,	if: $T1 < T3 \ \& \ T1 > x_int_min \ \& \ T3 > x_ext_max + H_ext$	-> cooling
	or: $T1 > T3 \ \& \ T3 < x_ext_min - H_ext$	-> heating
Example 1 -> cooling		
	T1 (intake air) = 21 °C, T3 (extract air) = 27 °C	x_ext_min = 18,0 °C
	$21 < 27 \ \& \ 21 > 15 \ \& \ 27 > 24+0,5$	x_ext_max = 24,0 °C
		H_ext = 0,5 K
Example 2 -> heating		
	T1 (intake air) = 24 °C, T3 (extract air) = 16 °C	x_int_min = 15 °C
	$24 > 16 \ \& \ 16 < 18-0,5$	
By-pass CLOSED,	if: $T1 < T3 \ \& \ T3 < x_ext_max - H_ext$	-> heating
	or: $T1 > T3 \ \& \ T3 > x_ext_min + H_ext$	-> re-cooling
Example 3 -> heating		
	T1 (Außenluft) = 12 °C, T3 (Abluft) = 22 °C	x_abl_min = 18,0 °C
	$12 < 22 \ \& \ 22 < 24 - 0,5$	x_abl_max = 24,0 °C
		H_abl = 0,5 K
Example 4 -> re-cooling		
	T1 (intake air) = 28 °C, T3 (extract air) = 24 °C	
	$28 > 24 \ \& \ 24 > 18 + 0,5$	

Tab. 35: Switching requirements OPEN / CLOSED for the by-pass flap

3.6.1.5 Submenu Flap of the geothermal heat exchanger (GHE)




In this menu, it is specified whether a flap of the geothermal heat exchanger is available.

Symbol	Designation	Explanation / actions
 	Button Checkmark	By touching the button Checkmark, an available flap of the geothermal heat exchanger is released.
	Button Cancel / back	By touching the Cancel / back button, exit the menu levels until the start menu appears.

Tab. 36: Parameterisation flap of the geothermal heat exchanger

3.6.1.6 Submenu Reset factory data

In the submenu Reset factory data, the device can be reset to factory data.

Symbol	Designation	Explanation / actions
 	Button Checkmark	By touching the button Checkmark, the plant is reset to factory data.
	Button Cancel / back	By touching the Cancel / back button, exit the menu levels until the start menu appears.

Tab. 37: Reset factory data

3.7 Maintenance and repair by qualified personnel



If regular maintenance work is not performed at the NOVUS, this impairs the functioning of the comfort ventilation.

The maintenance and repair by qualified personnel should only be carried out by a maintenance service on the basis of a maintenance contract. The maintenance and repair measures for the NOVUS include the inspection and cleaning of the fans and the heat exchanger. Cleaning of the heat exchanger is carried out depending on the degree of soiling; the maintenance interval should not exceed two years.



The maintenance work performed must be documented in check list B!

3.7.1 Inspecting and cleaning the heat exchanger

In order to do so, proceed as follows:

1. Disconnect the NOVUS from the power supply.
2. Pull the maintenance flap **A** with the magnetic clamps from the front panel.

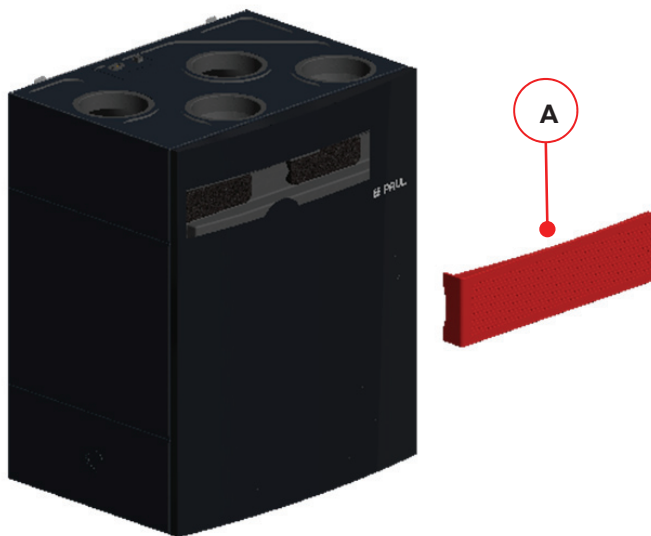


Fig 42: Removing the maintenance flap from the front panel

3. According to the sequence of steps, pull the front hood in the area of the two spring shackles (on the front bottom side of the device) off the device by approx. 5 cm first. Then, slide the front hood towards the supply air duct connections out of the slotted openings (on the front surface of the device).

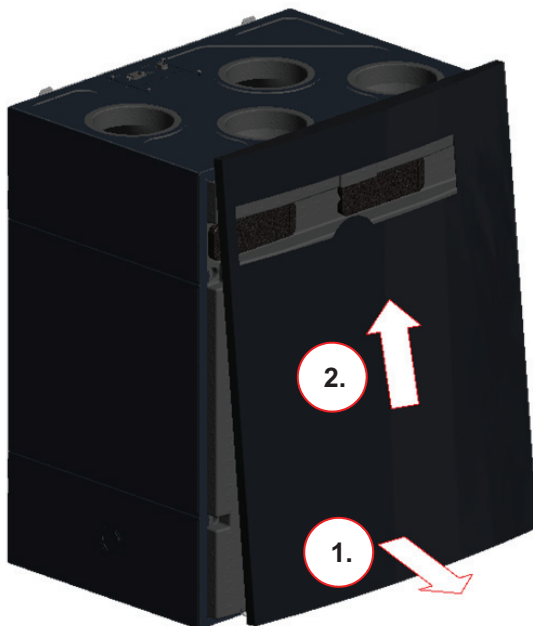


Fig 43: Removal of the front hood

4. Pull the EPP foam cover **C** of the heat exchanger by means of the strap **B** out of the foam housing. In doing so, grasp the strap on the fastening in the area of the recessed grips of the foam covering holder.

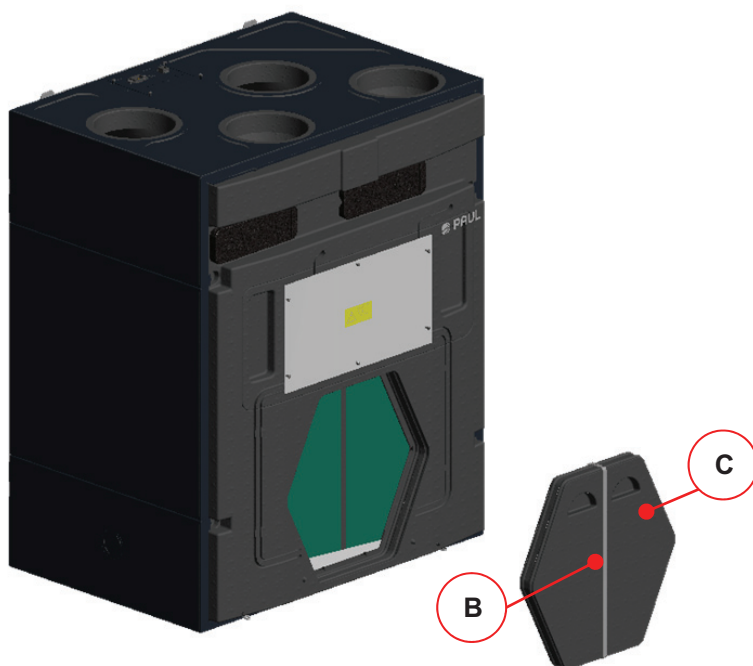


Fig 44: Removing the EPP foam cover of the heat exchanger

5. Now pull the heat exchanger **D** by means of the strap **E** from the EPP housing.

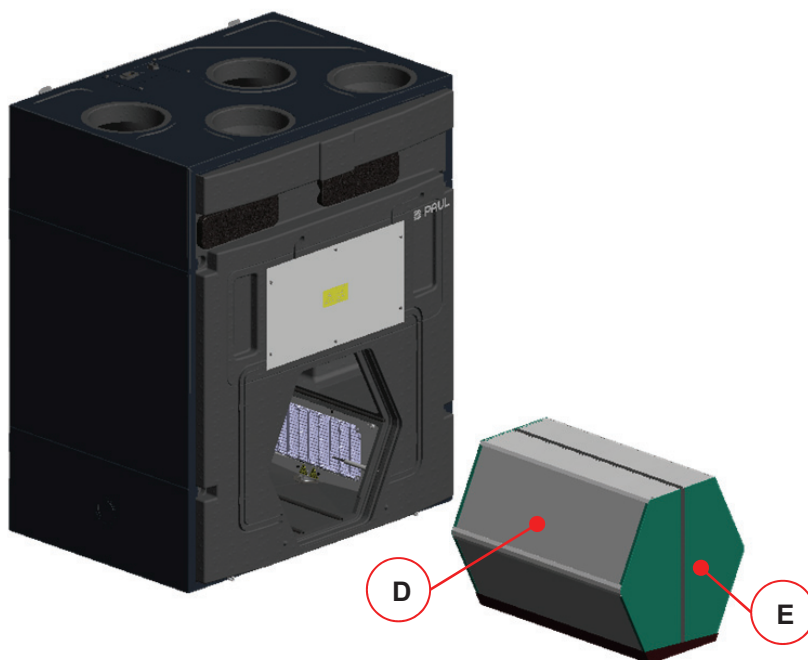


Fig 45: Pulling the heat exchanger

6. Clean the heat exchanger as following:
 - Dip the heat exchanger into warm water several times (max. 40 °C).
 - Subsequently, thoroughly rinse the heat exchanger using warm tap water (max. 40°C).



As a general rule, do not use any aggressive or dissolvent detergents!

- For drying, position the heat exchanger in such a way that existing residual water can run out of the openings.
- Let the heat exchanger run completely dry before reinstalling it.



Hints for proper cleaning can also be found at the manufacturer's website (www.paul-lueftung.de).

7. Installation of the heat exchanger



Please note when installing the heat exchanger!

On the bottom of the heat exchanger is a condensate pan **F** with two cut-outs. When inserting the heat exchanger into the unit, please assure that the two cut-outs of the condensate pan point to the condensate outlet **G**!

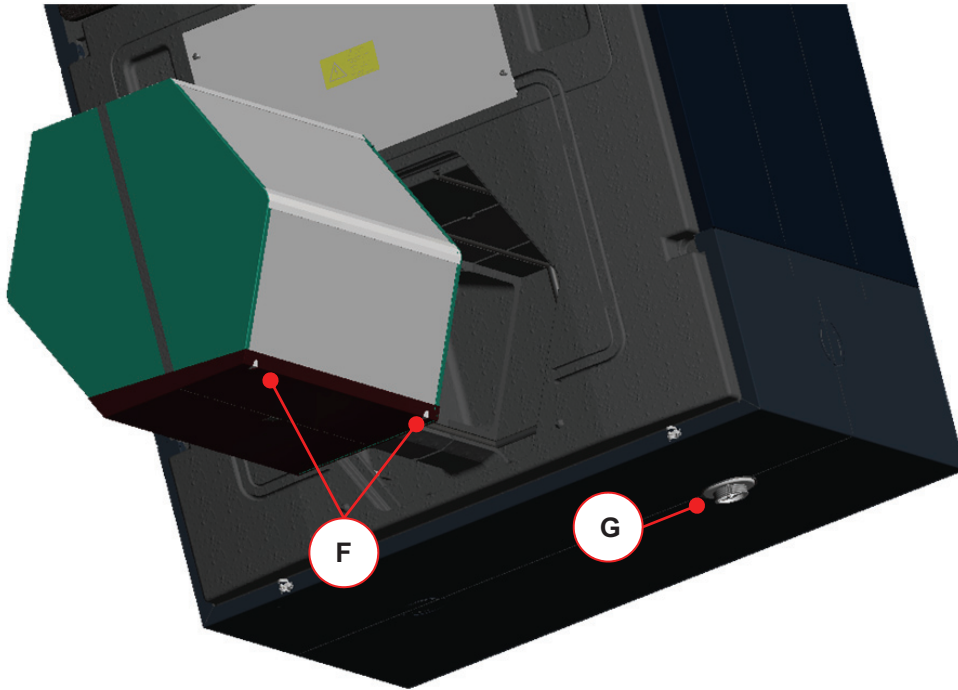


Fig 46: Position of the condensate pan when inserting the heat exchanger into the HRU

8. Afterwards, mount all parts in reverse order.
9. Re-establish the mains connection.

3.7.2 Replacement of the heat exchanger type

The NOVUS can be equipped and operated with two different heat exchanger types:

- Cross-counter flow channel heat exchanger made of plastic (standard heat exchanger)
- Cross-counter flow enthalpy exchanger (membrane moisture heat exchanger)

1. Perform the work steps 1. to 5. pursuant to 3.7.1
2. Insert the respective heat exchanger type considering the notes on Fig 46 and perform the work steps 7. to 9. pursuant to 3.7.1.
3. Parameterise the frost protection mode pursuant to 2.3.2.3 in the menu Settings / submenu Frost protection for the respective heat exchanger type.



Only the frost protection modes Eco and Safe may be set for a standard heat exchanger!

3.7.3 Inspection and cleaning of the integrated defroster (option)

1. Perform the work steps 1. to 5. pursuant to 3.7.1.
2. Suck away the PTC-heating elements using an appropriate suction nozzle.



Do not touch any parts of the defroster with your hands, and do not damage the temperature sensor while cleaning!

3. Insert the heat exchanger considering the notes on Fig 46 and perform the work steps 7. to 9. pursuant to 3.7.1.

3.8 Visualisation of errors and error treatment

The device control is equipped with an internal system for error detection.. The visualisation of the error messages and the error forecast is made according to the display possibilities of the connected control panel.

In response to an error condition, the fans are switched off and a by-pass available is closed.

3.8.1 Error signalling by means of the LED control panel

The visualisation of errors with the LED-control panel is carried out on the basis of 2.2.1.2. In addition to the signalling of the error conditions, an LED coding, which does binary present the meaning of the error, is generated by means of the LEDs L1...L7. Information on checking / measures for a possible elimination of the error condition are given in Tab. 39.

The following LED combinations for the display of the error coding marked with "x" apply:

LED combinations							Error message	Possible cause
L1	L2	L3	L4	L5	L6	L7		
x		x					Supply air temperature too low	Supply air temperature < setpoint
x			x				Error by-pass	No end position, by-pass not working
x	x		x	x		x	BUS version incompatible	Software versions of the components not compatible
		x	x	x		x	Too many devices connected	Too many components connected to the BUS
x		x	x	x		x	Fan slave not connected	Lack of BUS-communication
	x	x	x	x		x	Communication error of the fan slave	Lack of BUS-communication
x	x	x	x	x		x	Communication error of the defroster	Lack of BUS-communication
					x	x	Communication error of the heater battery	Lack of BUS-communication
x					x	x	Comm. error flap of the geothermal heat exchanger	Lack of BUS-communication
	x				x	x	Comm. error general	Lack of BUS-communication
x	x				x	x	Heating does not switch off	Error BUS-thermostat
	x		x	x			General control unit error	Lack of BUS-communication with control unit

Tab. 38: Overview binary error coding with LED-control panel

3.8.2 Visualisation of errors with the TFT touch panel

The visualisation of errors with the TFT touch panel is done in the plain text display of the error message. In the main menu Information / Last message, the last three errors that occurred are registered in compliance with the event with date and time. In addition to this display, a yellow warning triangle flashes in the upper right edge of the screen.

The following plain text displays of the error message are visualised:

Message on display	Possible cause	Control / Action
Error sensor 1	Sensor break or short circuit temperature sensor Version LEFT T1 Version RIGHT T3	Check or replace sensor
Error sensor 2	Sensor break or short circuit temperature sensor Version LEFT T2 Version RIGHT T4	Check or replace sensor
Error sensor 3	Sensor break or short circuit temperature sensor Version LEFT T3 Version RIGHT T1	Check or replace sensor
Error sensor 4	Sensor break or short circuit temperature sensor Version LEFT T4 Version RIGHT T2	Check or replace sensor
Supply air temperature too low	Minimum supply air temperature < setpoint;	Supply air temperature > setpoint + 1 K
Intake air temperature too low	Current intake air temperature < setpoint; longer than 30 minutes	Intake air temp > setpoint; control after 1 h
Error fan 1 Hall	Version LEFT; supply fan speed does not report Version RIGHT, exhaust fan speed does not report	manual adjustment of fan speed
Error fan 2 Hall	Version LEFT; exhaust fan speed does not report Version RIGHT, supply fan speed does not report	manual adjustment of fan speed
Error by-pass	No end position, by-pass not working	Test by-pass
BUS version incompatible	Software versions of the components not compatible	Replace software versions
Too many devices connected	Too many components connected to the BUS	Remove surplus components
Fan slave not connected	Lack of BUS-communication	Fan slave connected
Communication error fan slave	Lack of BUS-communication	Check BUS-communication
Comm. error defroster	Lack of BUS-communication	Check BUS-communication
Comm. error heater battery	Lack of BUS-communication	Check BUS-communication
Comm. error flap of the geothermal heat exchanger	Lack of BUS-communication	Check BUS-communication
Comm. error general	Lack of BUS-communication	Disconnection from power supply, then restart
Heating does not switch off	Error BUS-thermostat	Replace BUS-thermostat
General control unit error	Lack of BUS-communication with control unit	Check BUS-communication

Tab. 39: Overview visualisation of errors and error treatment with TFT touch panel

3.9 Technical description

3.9.1 Types of device







NOVUS 300/450 - series

Ventilation unit with counter flow channel heat exchanger of plastic

NOVUS F 300/450 - series

Ventilation unit with counter flow enthalpy exchanger with polymer membrane

3.9.2 Designs

	Version LEFT		Version RIGHT	
Layout air connection				
Construction type				
	VERTICAL	HORIZONTAL - LEFT	VERTICAL	HORIZONTAL - RIGHT

Tab. 40: Overview types of versions

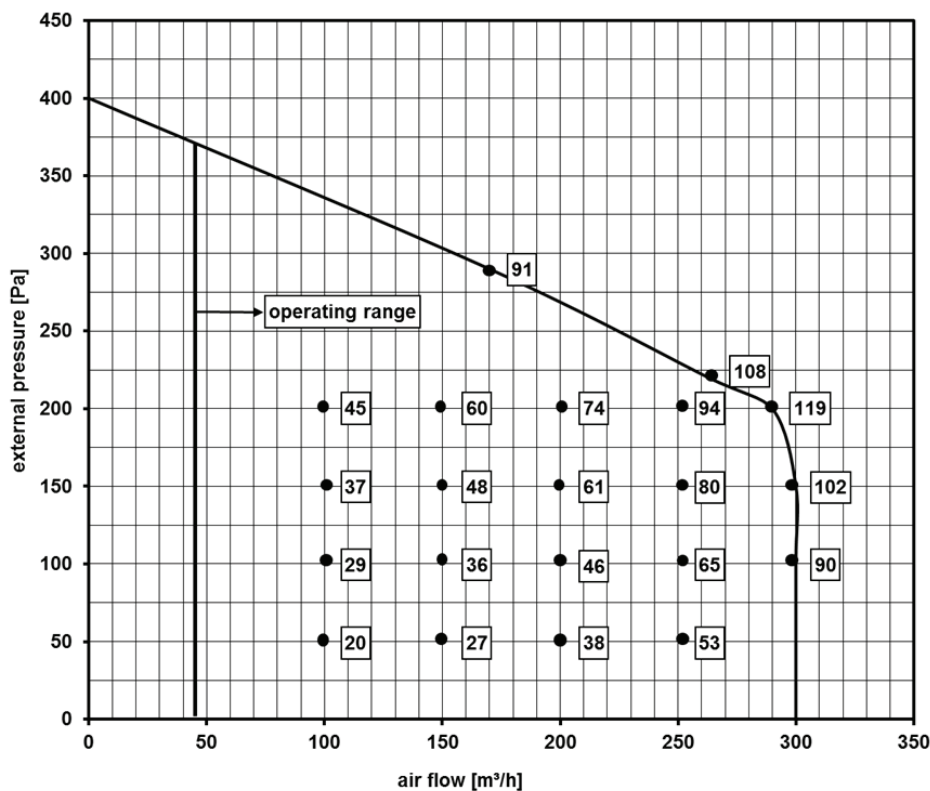
3.9.3 Technical specification NOVUS (F) 300

General specification	Description / value
Type of heat exchanger	Counter flow channel heat exchanger of plastic (NOVUS 300 - Serie) Counter flow enthalpy exchanger with polymer membrane (NOVUS F 300 - series)
Casing / internal lining	Steel sheet galvanised, powder-coated, thermal bridge-free; internal lining made of expanded polypropylene EPP for thermal and sound insulation
Pipe connections	DN 160 (sleeve dimension)
Weight	50 kg / 52 kg (without / with defroster)
Electrical connection	230 Vac, 50-60 Hz; 2 m power cable with plug connection of a low power device
Connected load	0,14 kW / 1,44 kW (without / with defroster)
Protection class	I
Degree of protection	IP 40
Limitations of use	-20 bis 40 °C
Assembly site	Frost-free interior area; Ambient conditions: < 70 % r. F. at 22 °C
Installation position	Vertical or horizontal wall mounting or on mounting frame (Option)

Operating data	Value	
Air flow	45 to 300 m³/h	
Efficiency criterion	0,24 Wh/m³ (at 200 m³/h / 100 Pa); NOVUS 300 0,26 Wh/m³ (at 200 m³/h / 100 Pa); NOVUS F 300	
Heat recovery rate acc. PHI	93 % (at 200 m³/h / 100 Pa); NOVUS 300 84 % (at 200 m³/h / 100 Pa); NOVUS F 300	
Heat recovery rate acc. DIN 4719	116 % (at 200 m³/h / 100 Pa); NOVUS F 300	
Sound, device emission (acc. to DIN EN ISO 3743-1, distance of 3 m)	21 dB(A) (at 200 m³/h / 100 Pa) 26 dB(A) (at 300 m³/h / 100 Pa)	
Certificates / Approvals	NOVUS 300	NOVUS F 300
	Passivhouse-certificate	Passivhouse-certificate
	Certificate Norme France	Certificate acc. DIN 4719
	Certificate acc. NBN EN 308	
	Declaration acc. energiecluster.ch	
	DIBt-Zulassung AbZ Z-51.3-273	

Tab. 41: Technical specification NOVUS (F) 300

Characteristic curve with chosen information on the electric power consumption



Please note:

The numerical values of the p-V characteristic curve which are illustrated in the chart indicate the power consumption in [W] in the respective operating points

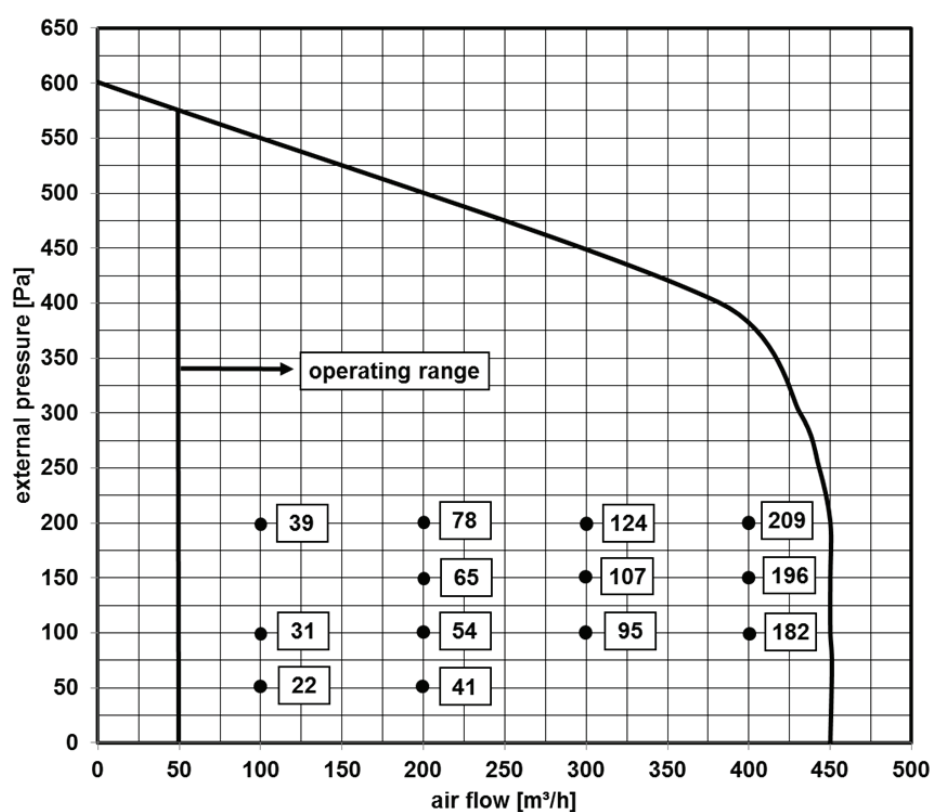
Tab. 42: Chart 3, p-V characteristic curve NOVUS 300 without integrated defroster

3.9.4 Technical specification NOVUS (F) 450

General specification	Description / value
Type of heat exchanger	Counter flow channel heat exchanger of plastic (NOVUS 450 - Serie) Counter flow enthalpy exchanger with polymer membrane (NOVUS F 450 - series)
Casing / internal lining	Steel sheet galvanised, powder-coated, thermal bridge-free; internal lining made of expanded polypropylene EPP for thermal and sound insulation
Pipe connections	DN 160 (sleeve dimension)
Weight	50 kg / 52 kg (without / with defroster)
Electrical connection	230 Vac, 50-60 Hz; 2 m power cable with plug connection of a low power device
Connected load	0,36 kW / 1,66 kW (without / with defroster)
Protection class	I
Degree of protection	IP 40
Limitations of use	-20 to 40 °C
Assembly site	Frost-free interior area; Ambient conditions: < 70 % r. F. at 22 °C
Installation position	Vertical or horizontal wall mounting or on mounting frame (Option)
Operating data	Value
Air flow	50 to 450 m³/h
Efficiency criterion	0,29 Wh/m³ (at 285 m³/h / 100 Pa); NOVUS 450
Heat recovery rate acc. PHI	89 % (at 285 m³/h / 100 Pa); NOVUS 450
Heat recovery rate acc. DIN 4719	116 % (at 200 m³/h / 100 Pa); NOVUS F 450
Sound, device emission (acc. to DIN EN ISO 3743-1, distance of 3 m)	25 dB(A) (bei 250 m³/h / 100 Pa) 36 dB(A) (bei 450 m³/h / 169 Pa)
Certificates / Approvals	NOVUS 450
	Passivhouse-certificate
	Certificate acc. NBN EN 308

Tab. 43: Technical specification NOVUS (F) 450

Characteristic curve with chosen information on the electric power consumption



Please note:

The numerical values of the p-V characteristic curve which are illustrated in the chart indicate the power consumption in [W] in the respective operating points

Tab. 44: Chart 4, p-V characteristic curve NOVUS 450 without integrated defroster

3.9.5 Dimensional sketch

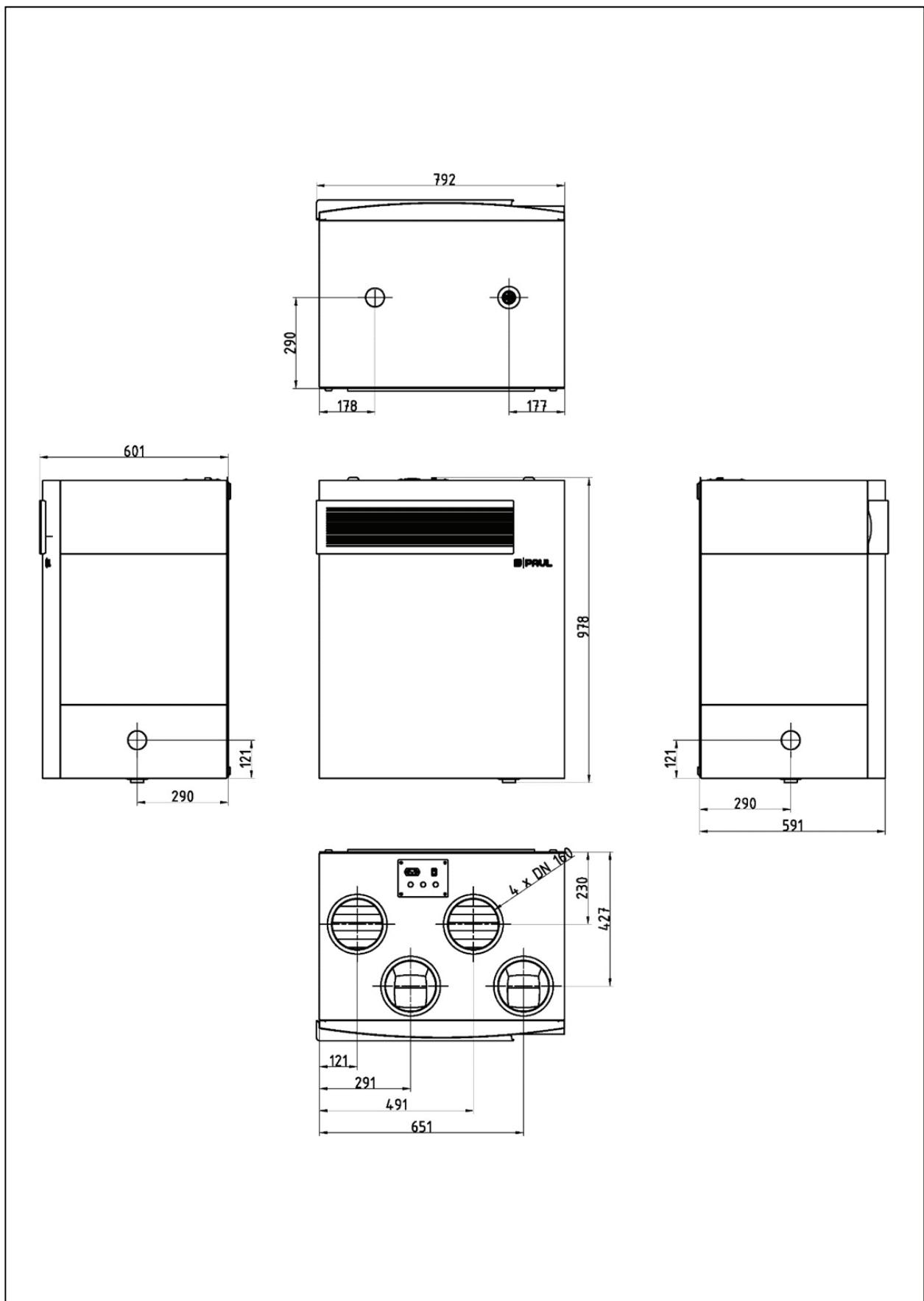
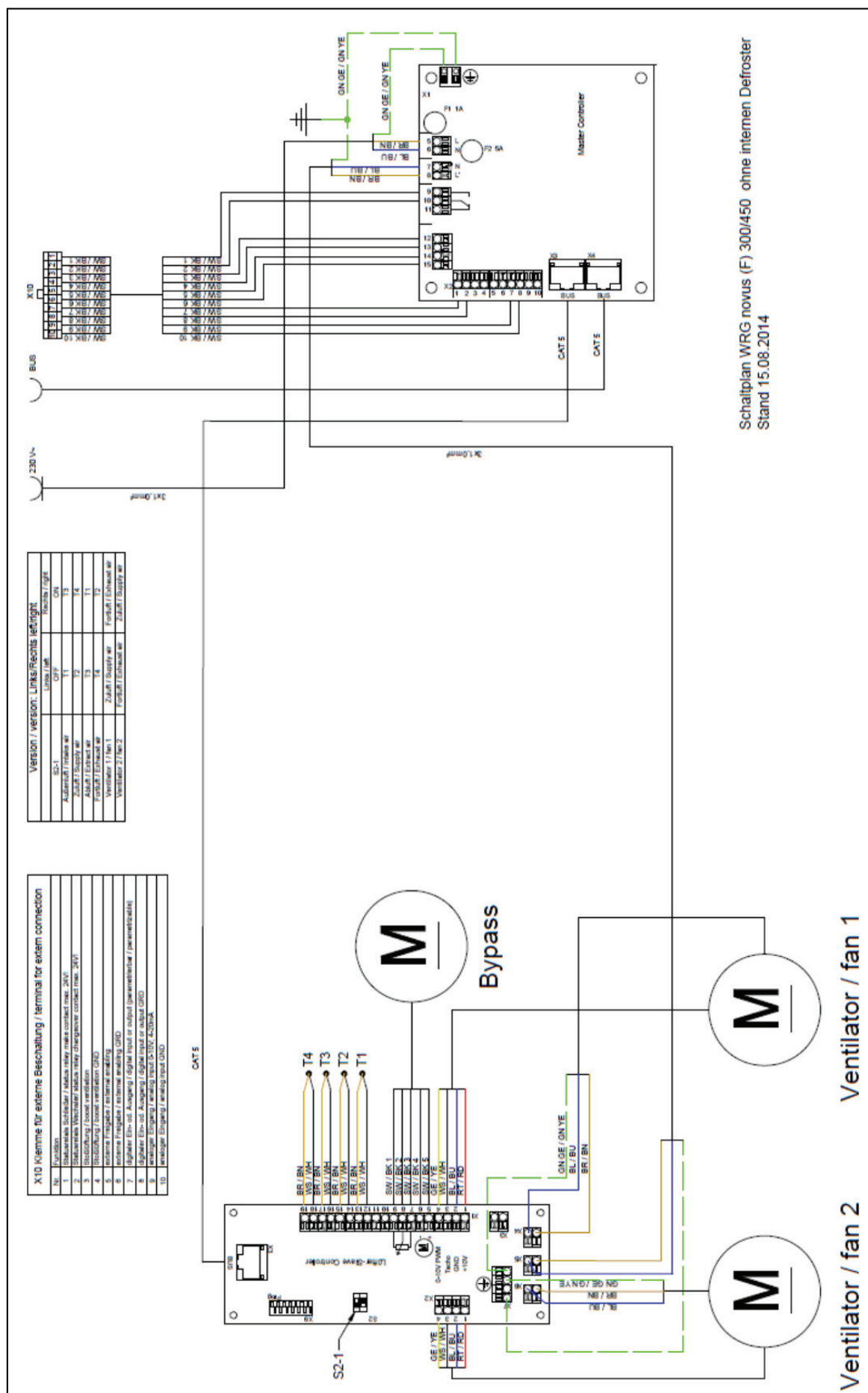


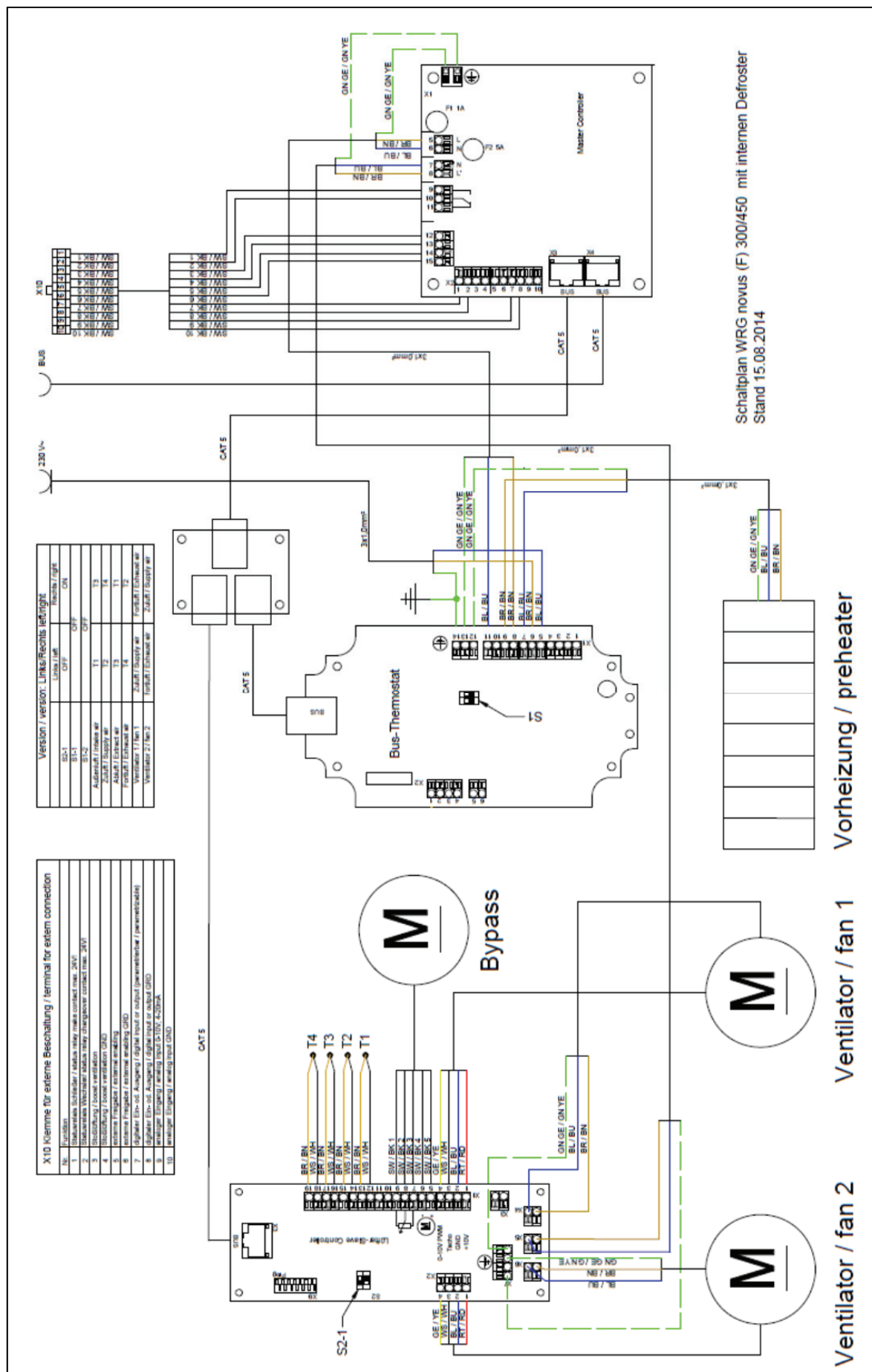
Fig 47: Dimension drawing HRU NOVUS

3.9.6 Plant 1 circuit diagram NOVUS

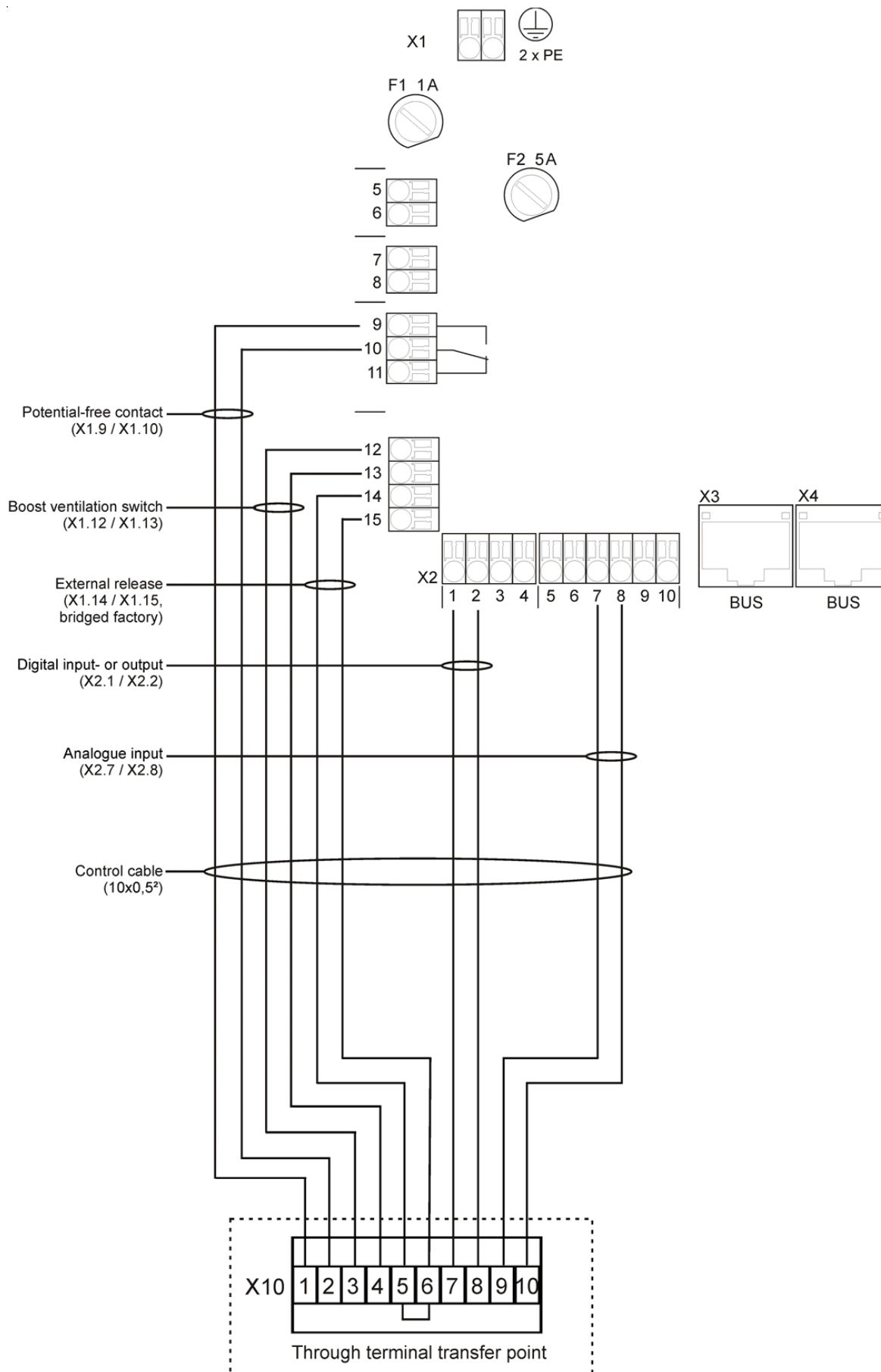



Schaltplan WRG novus (F) 300/450 ohne internen Defroster
Stand 15.08.2014

3.9.7 Plant 2 circuit diagram NOVUS with integrated defroster



3.9.8 Plant 3 Terminal scheme of through terminal X10



Date: 03/02/14 Subject to change in the interest of technical progress.	Checklist A Maintenance by customer	
---	--	---

Maintenance Work	Enter date in the quarter
-------------------------	---------------------------

1. Change both filters in the MVHR unit (change every 90 days)


Quarter Year	I	II	III	IV
201...				
201...				
201...				
201...				
201...				
201...				
202...				
202...				
202...				
202...				

2. Clean extract air prefilter / filter in extract air valves (change approx. every 2 months)

Quarter Year	I	II	III	IV
201...				
201...				
201...				
201...				
201...				
201...				
202...				
202...				
202...				
202...				

3. Change other filters in the system (outdoor air intake - also at ground heat exchanger) – all 6-12 months)


Quarter Year	I	II	III	IV
201...				
201...				
201...				
201...				
201...				
201...				
202...				
202...				
202...				
202...				

Date: 13/10/14 Subject to change in the interest of technical progress.	Checklist B Maintenance by skilled personnel	
---	---	---

Maintenance	Enter result
--------------------	--------------

- Inspection of MVHR unit based according to the currently valid national standards
- Informal report for comments on MVHR unit's condition
- Use additional sheet of paper for adding reports of subsequent years

No.	Components	Action / Interval (yearly)	Result	201...	201...	201...	201...	201...
1	Fan / MVHR unit	Components cleaned? - fans - Heat exchanger - air-contacting surfaces of the device - preheater - condensate pan, siphon,	yes / no					
		Frost protection device functional?	yes / no					
		Structure-borne-noise transmission, fixings are avoided?	yes / no					
		Preheater / vaporizer / heat exchanger are not contaminated?	yes / no					
		Status indicators are working?	yes / no					
2	Condensate drain and siphon	Working?	yes / no					
		Condensate disposal OK?	yes / no					
3	Electronic controls	Cable connections and clamp fixing secure?	yes / no					
		Control units working?	yes / no					
4	Air ducts / heat insulation	Cleaning done (if required)? Test OK?	yes / no					
		Heat insulation and vapor barrier diffusion-close OK?	yes / no					
		Flexible connections between MVHR and air ducts OK?	yes / no					
5	Ground to air heat exchanger (if available)	Changeover working?	yes / no					
		Outdoor air intake free?	yes / no					
		Condition of prefilter OK?	yes / no					
		Condensate drain OK?	yes / no					
		Cleaning of the GHE (rinsing)	yes / no					
6	Fan / MVHR unit and fireplace operating mode (if available)	Safety device with firing installation working?	yes / no					
7	Fan / MVHR unit / other filters, filter condition	Filters of correct filter class installed?	yes / no					
8	Extract air / supply air outlet Overflow air ducts	Fit and lock OK?	yes / no					
		Filter condition OK?	yes / no					
		Air flow according air flow report OK?	yes / no					
		Free cross-section?	yes / no					
9	Overflow air ducts	No structure-borne / airborne noise transmission?	yes / no					
		Safety device with firing installation working?	yes / no					

Date: 03/02/14 Subject to change in the interest of technical progress.	<h2 style="text-align: center;">Air Flow Report</h2> <h3 style="text-align: center;">Operating condition, functional check¹⁾, instruction</h3>	
---	---	---

Customer data		
Surname:	Surname:	Surname:
Street:	Street:	Street:
Construction project:		

MVHR-type:	MVHR-type:	MVHR-type:
Measured data		
Measuring equipment used:	Fault descriptions during measurement:	Indoor temperature ²⁾
		Outdoor temperature ²⁾
		Weather ²⁾


Filter condition on calibration	Supply	Extract	Building moisture condition: % RH without ventilation mode	Fan speed ratio Extract air / Supply air
clean				
used for approx. ... days				
very dirty				

Supply air				Ventilation step: %	
No.	Room description	No.		Room description	

Extract air				Ventilation step: %	
No.	Room description	No.		Room description	

Pel = W (2 fans) ¹⁾ The volumetric air flow is measured during normal MVHR operation ³⁾ as agreed. ²⁾ acc. to DIN EN 14134, Item 7.3.1.5. ³⁾ acc. to DIN EN 14134, Item 7.4.1. b) end ⁴⁾ acc. to DIN 1946-6 MVHR unit has to run continuously, except for times of maintenance or repair. Use lowest ventilation step or intermittent unoccupied program in times of absence.

⇒ The user has been instructed on the hygienic requirements ⁴⁾ for the operation of the MVHR unit ⇒ Customer has been advised that winter and summer operation influence the interior air humidity If too dry air (<30% RH → in winter) can create a moist heat exchanger transferring remedy - this can be supplied in many PAUL devices. ⇒ No parts other than genuine PAUL parts (e.g. filters) shall be used, otherwise the warranty will be void ⇒ The warranty period starts with delivery ex works Date: Signatures: <div style="text-align: right;"> Startup personnel / Plumber User </div>

Date: 03/02/14 Subject to change in the interest of technical progress.	Commissioning and handover certificate Completeness and performance verifications acc. to DIN 1946-6	
---	---	---

Customer data		
Surname:	Surname:	Surname:
Street:	Street:	Street:
Construction project:		
MVHR-type:	MVHR-type:	MVHR-type:

Completeness			
No.	Device	Ausführung	Result
1	Supply air duct	- Version as planned - Cleaning possible	yes / no yes / no
2	Supply air outlets	- Configuration as planned - Version as planned - Cleaning possible - sufficient distance from the wall	yes / no yes / no yes / no yes / no
3	Overflow air outlets	- Configuration as planned - Version as planned	yes / no yes / no
4	Extract air outlets	- Configuration as planned - Version as planned - Cleaning possible - Pre-filter provided as planned?	yes / no yes / no yes / no yes / no
5	Extract air duct	- Cleaning possible	yes / no
6	Extract air fan	- Cleaning possible	yes / no
7	Control unit	- working?	yes / no
8	Filters, optional	- Possibility to change - or clean	yes / no
9	Heat exchanger for heat recovery	- Cleaning possible	yes / no
10	Extract air heat pump, optional	- Cleaning possible	yes / no
11	Condensate drain, optional	- working?	yes / no
12	Ground to air heat exchanger, optional	- Cleaning possible	yes / no
13	Duct heater, optional	- Cleaning possible	yes / no
14	Solar panel	- Cleaning possible	yes / no
15	Documentation / manual	- available	yes / no

Function			
1	Ready to use in standard mode (nominal ventilation), as planned	Result OK further steps necessary	yes / no yes / no
2	Different modes possible, as planned	Result OK further steps necessary	yes / no yes / no
3	Power consumption	Result OK further steps necessary	yes / no yes / no

Confirmation	
<div> Date: Signature/Stamp:..... </div> <div>Startup personnel / Plumber</div>	



Michael Pitsch
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