



VariPro

Room controller

Installation and Operation Manual



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Approvals and version history

REVISION	DATE	DESCRIPTION OF CHANGE	APPROVED BY
A	06.08.2021	First issue	MH

Contents

1	General	5
1.1	About this manual	5
1.2	Guarantee	5
1.3	Inspection of the controller	5
2	Safety	7
2.1	General safety instructions	7
2.2	Safety-related signs	7
2.3	Safety symbols	7
3	Controller overview	9
3.1	Introduction of the controller	9
3.2	Operating principle of the controller	9
3.3	Using the controller menus	10
3.3.1	Control modes	11
4	Connections	12
4.1	Connections overview	12
4.2	Connections between the VariPro room controller and the fan coil units	12
4.2.1	Connection using cables with RJ-9 connectors	13
4.2.2	Connection using screw connectors	14
5	Installation	15
5.1	Installation	15
6	Commissioning	20
6.1	Using the Start Up Wizard	20
6.1.1	Scanning units manually	21
6.2	Configurations	21
6.3	Identifying the units	22
7	Alarms	23
7.1	List of alarms	23
7.1.1	Adjusting the filter cleaning reminder	23
7.1.2	Resetting the filter cleaning reminder	24
8	Controller menus	25
8.1	Main menu	25
8.2	Energy menu / Fan energy	25
8.3	Service menu	26
8.4	Unit settings	26
8.5	Unit menu	27
8.6	Controller settings	28
8.7	Modbus	28
8.8	Alarms	29
8.9	Testing	29
8.10	Screen	29
9	Bus structure	30
9.1	Overview of the bus structure	30
9.2	Connecting the controller in a building management system via a Modbus protocol	31

9.3	Control modes through the bus	31
9.4	Alarms received through the bus.....	31
10	Troubleshooting.....	32
10.1	Troubleshooting.....	32
11	Modbus registers	33
11.1	Modbus registers	33
12	Technical data	35
12.1	Technical data	35

1 General

1.1 About this manual

This manual is for controllers with software version 0.36

When operating the controller, always follow the precautionary instructions related to each component as well as the regulations and recommendations given by the local authorities.

The controller must be installed, operated, and maintained by a professional and in such a way that it does not cause danger to humans, the environment, or the controller itself. The controller must not be used for other than its intended purposes without a written consent from the manufacturer.



NOTICE

Before you start to install or operate the system, read this manual carefully and familiarize yourself with all of the instructions.

Keep the manual for later reference.

1.2 Guarantee

The guarantee for this controller is based on Chiller Oy's terms of guarantee.

The guarantee becomes void, if:

- the product is modified or repaired without a written consent from Chiller Oy
- the controller parameters are modified without permission
- the configuration of the controller is changed
- the installation site, controller connections, or installation procedures do not follow these instructions
- the instructions in this manual are not followed.

The guarantee does not cover damages, if:

- the user does not follow the manufacturer's instructions
- the controller is used in a way that it is not designed for and that causes damage to the controller.

Note! Warranty claims are processed only, if the complete type and serial numbers of the units connected to the controller are notified to the manufacturer in written form.

1.3 Inspection of the controller

The controllers are shipped from the factory as assembled and tested.

When you receive the controller:

1. Inspect the delivery against the order.
2. Verify that the contents of the delivery meet the order.

3. Inspect all the delivered controllers carefully.
 - a. If the controllers have transport damages, notify the expeditor and the seller of the controllers.
 - b. Record the transport damages on the bill of freight.
 - c. Send a complaint about the damages to the transport company within 24 hours of delivery.

2 Safety

2.1 General safety instructions

This controller is designed so that it does not expose people to hazard or risk, provided that:

- The controller is installed, operated, and maintained according to the instructions in this manual.
- No structural changes are made to the controller.

2.2 Safety-related signs

These are the safety-related signs used in this manual.



DANGER

DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.



WARNING

WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.



CAUTION

CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

Note! Notes are used to indicate important information and useful tips.

2.3 Safety symbols

Hazard symbols

These symbols indicate a hazardous situation or action. Symbols are used to warn of situations, which can cause environmental damage and personal injury.

	General warning sign
	Electrical hazard

Prohibited action symbols

These symbols are used in warnings and notifications to indicate an action that should not be taken. The prohibited action symbols are shown below.

	Limited or restricted access
	Do not touch

Mandatory action symbols

These symbols are used in warnings and notifications to indicate an action that must be taken. The mandatory action symbols are shown below.

	Read the manual or instructions
---	---------------------------------

3 Controller overview

3.1 Introduction of the controller

Chiller's VariPro is a bus-based room controller designed for adjusting room temperature. It is used to control GRAND VariPro, BOX VariPro and STUDIO VariPro fan coils that are based on EC technology and equipped with a VariPro control card.

The VariPro room controller has two RS-485 interfaces, and it can be connected to any building management system based on the Modbus RTU protocol.



3.2 Operating principle of the controller

Using the VariPro room controller you can set the temperature of a room with 0,5 °C precision. The in-built temperature sensor of the controller continually measures the temperature of a room with 0,1 °C precision. The required cooling power control for the fan coil unit is calculated by the temperature differential between the measured and set room temperatures. The method of control is PI control. First, the power is increased by the amount calculated from the differential (relative control P). After this, power increase continues automatically, until the differential decreases (integrative part I). This means that the temperature in the room is decreasing. When the set temperature is reached, the relative control part P is reset. The accumulated integrative part I stays as a constant while the room temperature is at the set temperature. If the room temperature continues to decrease, the integrative part is decreased. If the room temperature continues to increase, the integrative part is increased.

The functioning of the control algorithm aims to keep a balance where the cooling power in the room and the heating load annul each other. Because of different and variable heating loads, the balance is reached with different cooling power levels even if the set temperature remains the same. In terms of the control algorithm, changes in the set temperature and the heating load correspond to each other. A change in either one starts the control, and a new balance is sought. The same operating principle applies for the heating mode, only the control directions are reversed.

3.3 Using the controller menus

The menus available with the VariPro room controller vary based on the system configuration. This manual describes all the menus in detail.

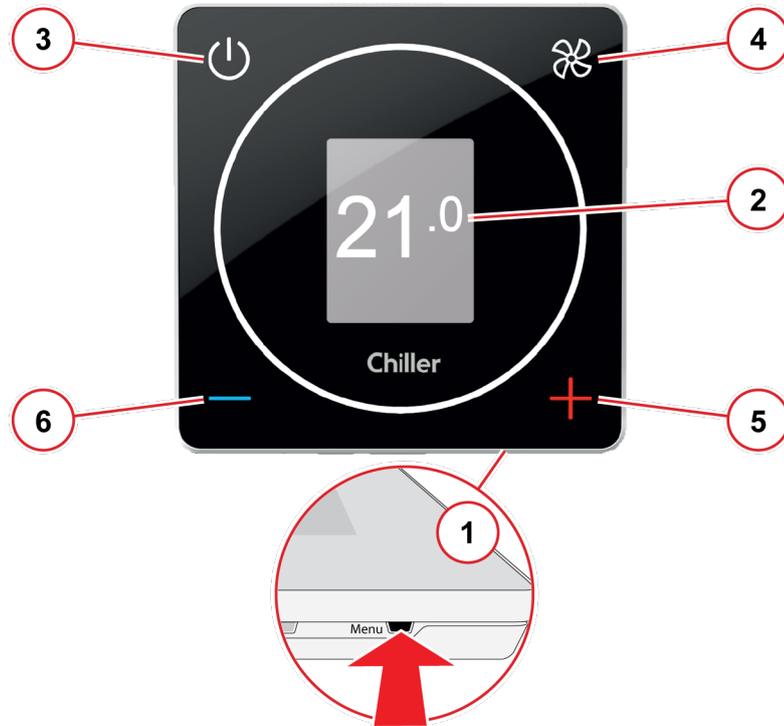


Figure 1: Using the controller menus

- 1 **Accessing the menus**
Access and browse the menus by pressing the **Menu** button on the lower edge of the controller with a thin, pointed object.
- 2 **Showing the menus**
The menus are displayed in sections on the area marked gray.

Browsing the menus

To browse the menus, use the buttons on the controller as follows:

- 3  Back / Cancel
- 4  Enter / Select
- 5  Move down in the menus / Increase value
- 6  Move up in the menus / Decrease value

3.3.1 Control modes

- **Normal:** This is the standard operation mode of the controller.
- **Away:** The controller monitors an expanded dead zone in the **Away** mode. This helps to save energy.

4 Connections

4.1 Connections overview

The VariPro room controller is intended for use with the VariPro controller card. The controller card is compatible with GRAND VariPro, BOX VariPro and STUDIO VariPro units.

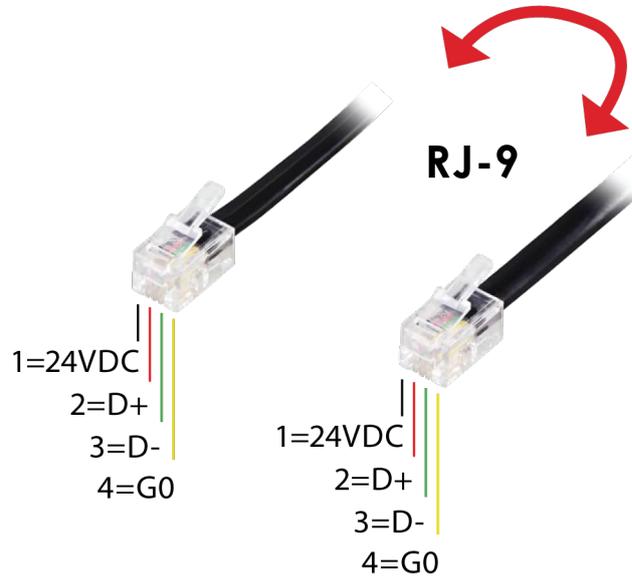
Note! Project-specific wiring diagrams are always provided with the fan coil unit.

4.2 Connections between the VariPro room controller and the fan coil units

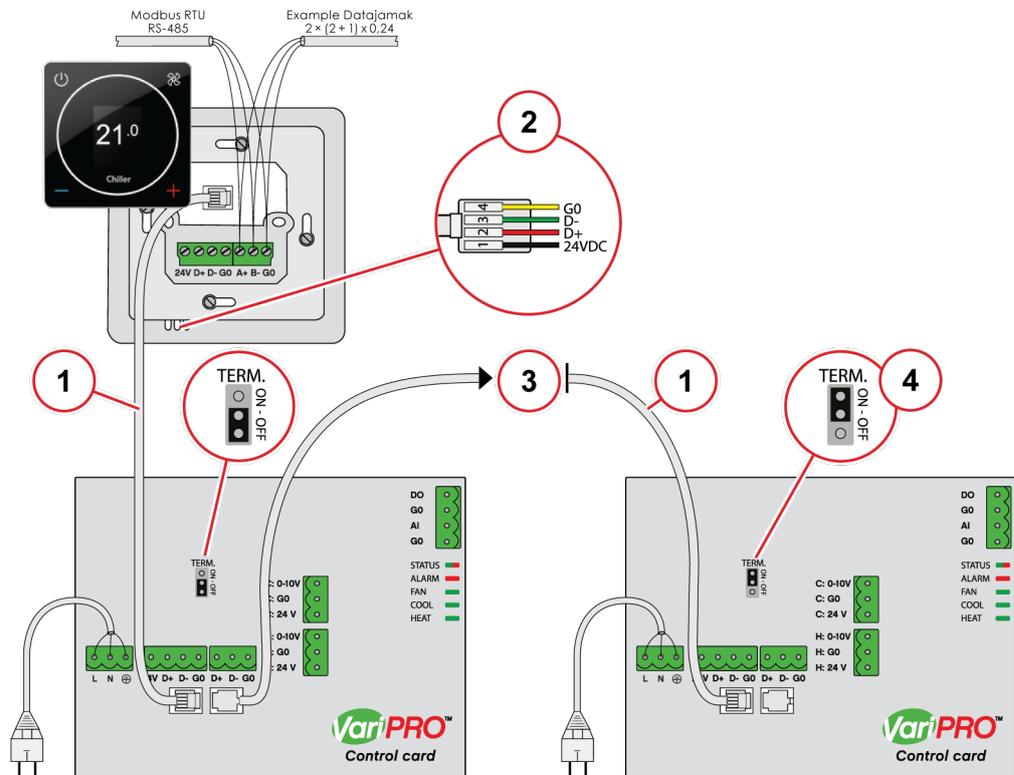
There are two ways to connect a VariPro room controller. Both connection terminals are factory-installed on the controllers and units.

4.2.1 Connection using cables with RJ-9 connectors

Note! Always check the wiring when using 4P4C connectors for the connection. Use a straight-through cable, not a twisted cable.



Note! Termination (DET A and DET B): Termination is only done for the last unit.



1. Customer wiring
2. RJ-9 10 m cable included in delivery
3. Max. 9 units
4. Last unit only

4.2.2 Connection using screw connectors

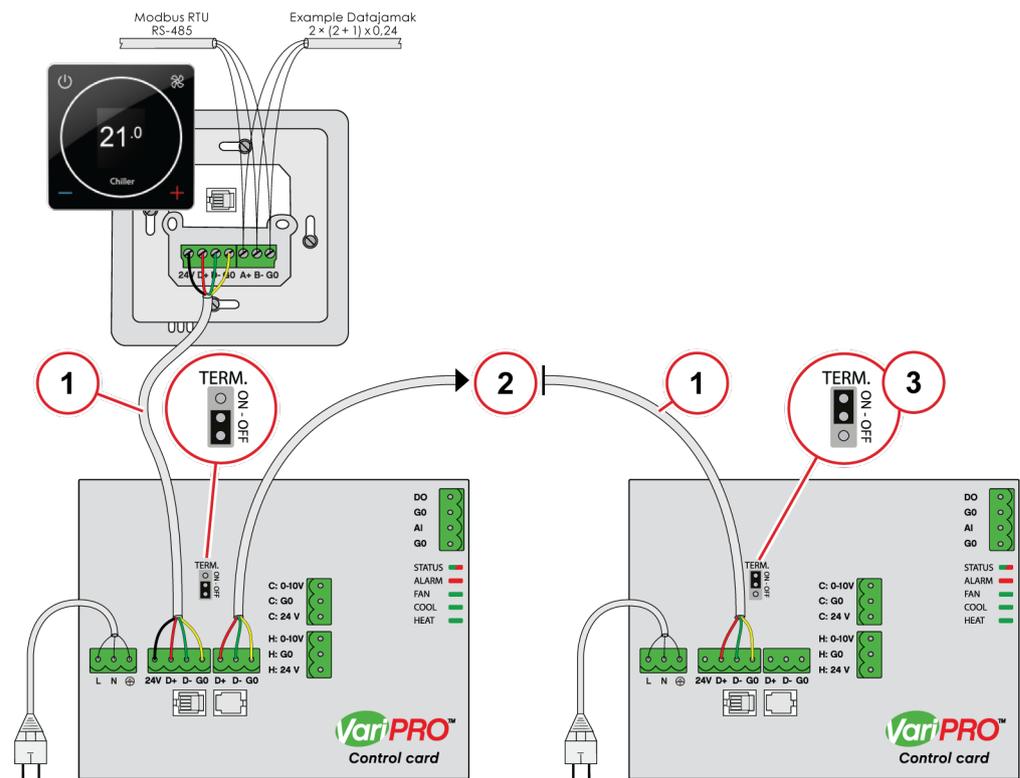


CAUTION

Do not install cabling in a location where it can be exposed to electromagnetic disturbances.

Recommended maximum cable length between the controller and the unit or units is 10 m. Using a screened twisted pair cable is recommended.

Note! Termination (DET A and DET B): Termination is only done for the last unit.



1. Customer wiring
2. Max. 9 units

3. Last unit only

5 Installation

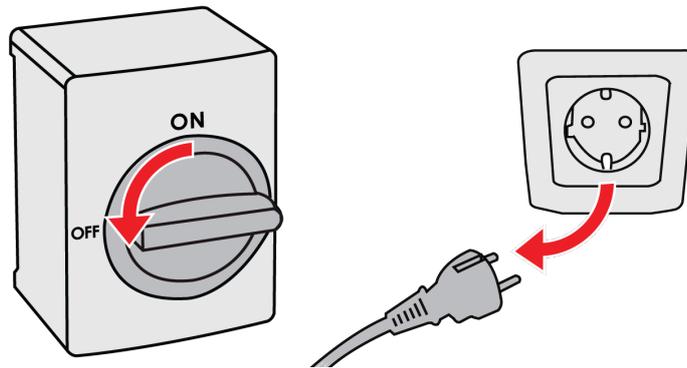
5.1 Installation



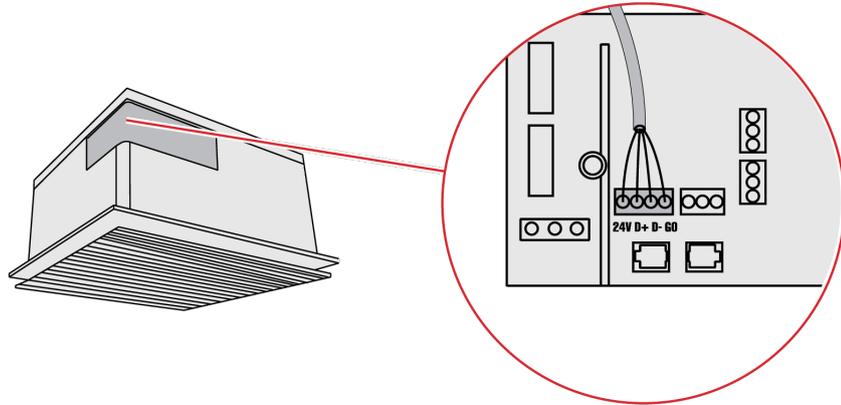
DANGER

Make sure that the unit is de-energized.

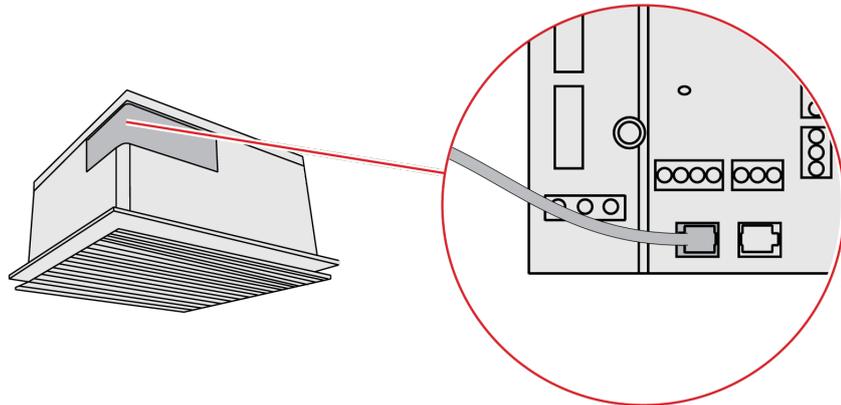
1. Switch off the power supply to the units.



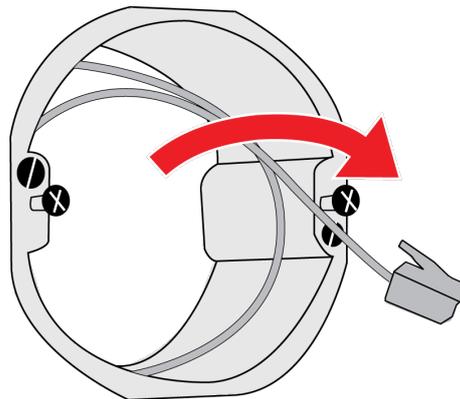
2. Connect the cables to the unit.
 - a. Option 1: Standard communications cable.



- b. Option 2: Premade RJ-9 quick connector.

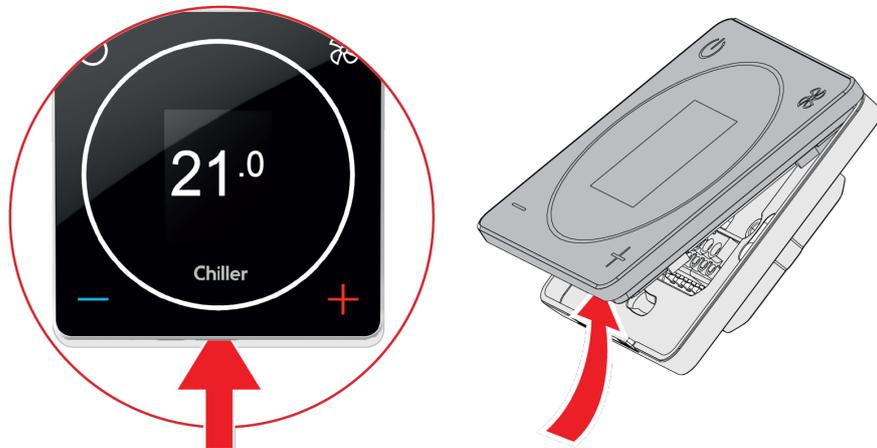


3. Attach the wires in the installation box.



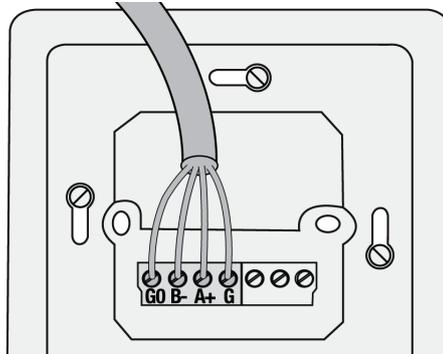
Note! Quick installation using an RJ-9 cable or screw terminal.

4. Attach the controller's bottom plate to the installation box. The attaching requires opening the front panel. Open the front panel by pushing the **Open** button on the bottom of the panel with a thin, pointed object and gently lifting the bottom edge of the control panel.

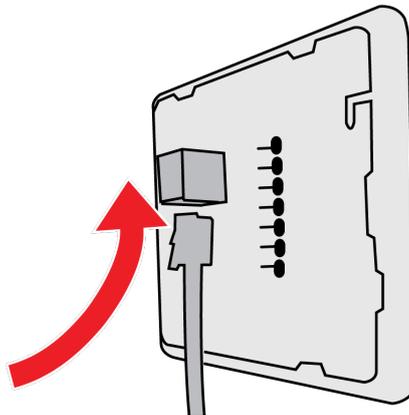


Note! Only one controller can be connected to one group of units.

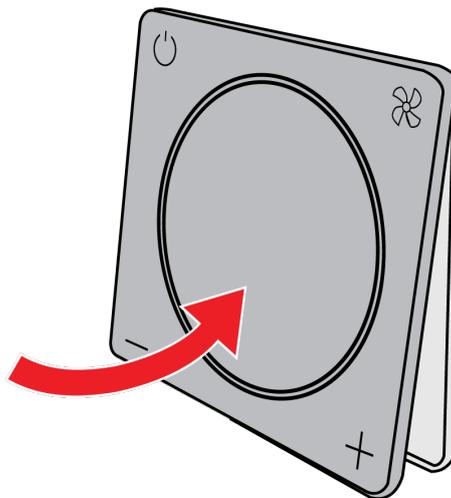
5. Connect the cables to the controller.
 - a. Option 1: Connect wiring to the bottom plate using a standard communications cable.



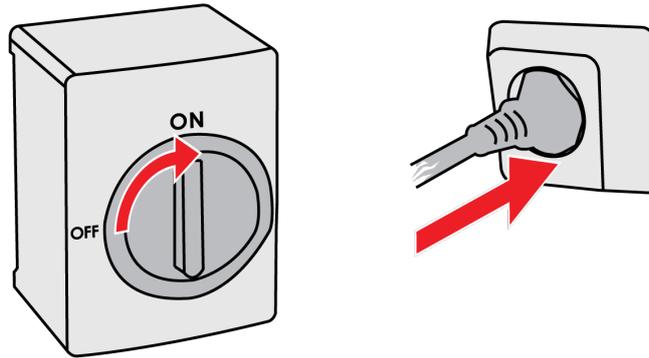
- b. Option 2: Connect the cable directly to the controller using a premade RJ-9 quick connector.



6. Attach the controller's display.



7. Switch on the power supply to the units.



Continue to the commissioning stage in *Section 6.1 Using the Start Up Wizard*.

6 Commissioning

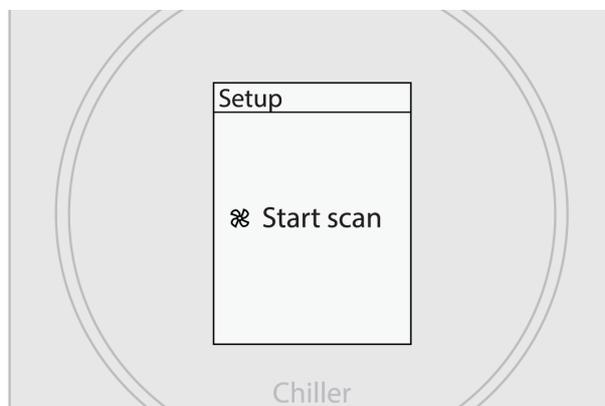
6.1 Using the Start Up Wizard

Commissioning the VariPro controller is easy: The Start Up Wizard guides you through the first step, and the units detected are then automatically configured. The various control modes can be defined after that.

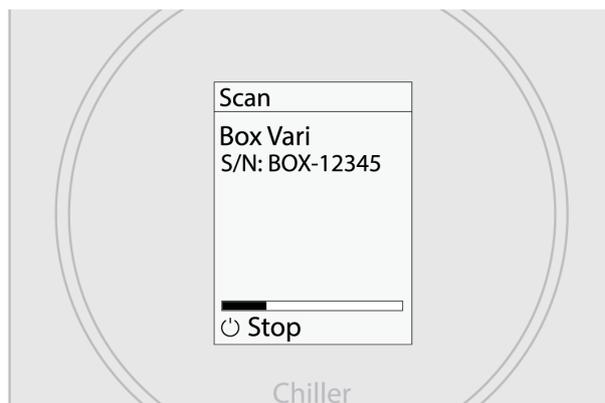
The Start Up Wizard is started automatically when the controller is turned on for the first time.

*Note! If you need to start the Start Up Wizard again later, select **Unit settings**→**Scan** from the controller's menu.*

1. Select **FAN** to begin scanning.



2. Wait for the scanning result.



3. Verify that all the installed units were found. Select **FAN** to finish setup.



4. The system is now ready for use.



6.1.1 Scanning units manually

A manual scan is needed if units are added to or removed from the system. A manual scan is also recommended in case there is a problem with the connected units that requires troubleshooting.

1. Enter the main menu by selecting **Menu**.
2. Select **Unit settings**.
3. Select **Scan**.

6.2 Configurations

When the controller informs that it has detected XX units, it configures its operation mode according to the unit configuration.

- **Cooling:** Unit(s) configured for cooling.
- **Heating:** Unit(s) configured for heating.
- **Cooling & heating:** Unit(s) configured for cooling and heating.
- **Cooling & rad. heating:** Unit(s) configured for cooling, with external radiator heating.

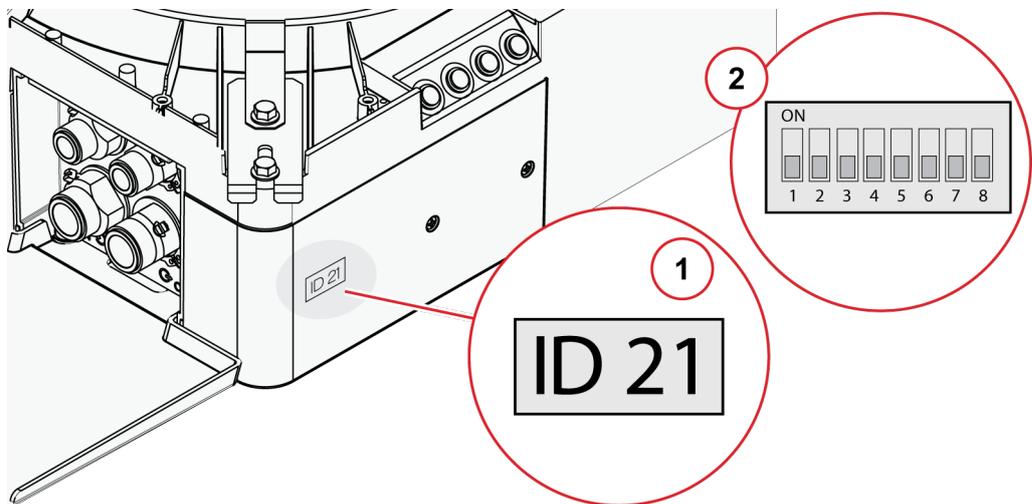
6.3 Identifying the units

Each unit is identified at the factory with a factory setting, which is the last two digits of the serial number of the unit. The factory setting is valid when the Modbus ID DIP switches on the VariPro control card are set to 00000000. When using the VariPro controller, changing the unit's address is not normally required.

The factory setting of the unit address is the last two digits of the serial number:

- 01 = address 1
- 02 = address 2
- ...
- 00 = address 100

The label on the unit's electrical box cover shows the unit ID set at the factory.



1. Identification sticker

2. DIP switch

Note! Two units connected to the same controller must have different addresses. If two units have the same address, set the address of one of the units manually.

The units can be identified manually by adjusting the DIP switch on the VariPro control card.

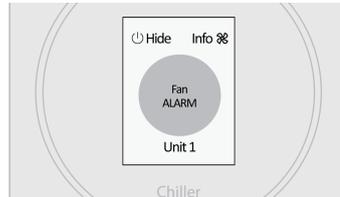
The address is set according to the binary system from left to right: 1, 2, 4, 8, 16, 32, 64, 128. For example, if you want to set the unit address to 9, push up DIP switches 1 and 4 (1+8=9).

Note! The unit must be powered off and on again for the address change to take effect.

7 Alarms

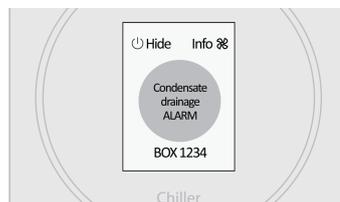
7.1 List of alarms

Fan alarm



The fan alarm is activated if RPM information is not received from the fan. When the alarm is active, the status of the fan and cooling valve operation is set to 0%.

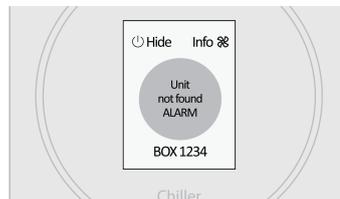
Condensate drainage alarm



The condensate drainage alarm is activated when the condensate water level exceeds its maximum limit. When the alarm is active, the status of the fan and cooling valve operation is set to 0%.

(Only with units with an integrated condensate pump or a condensate level alarm option.)

Communication failure alarm



The communication failure alarm is activated if the controller fails to communicate with the VariPro unit.

Filter cleaning reminder



The filter cleaning reminder is displayed when the fan has been running for a certain amount of hours (default is 8000 h).

7.1.1 Adjusting the filter cleaning reminder

1. Adjust the maximum limit value from the controller's settings by selecting **Unit settings**→**Unit XX**→**Filter timer limit**.

Set the limit to 0 to disable the reminder.

Note! Note that the recommended service interval set for the filter in the operation manual still applies.

7.1.2 Resetting the filter cleaning reminder

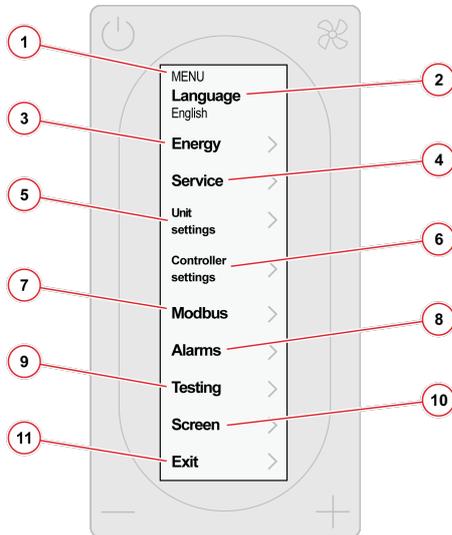
1. Reset the filter hours by selecting **Unit settings**→**Unit XX**→**Reset**.

Note! If there are several units connected to the system, you need to reset the timer for each of the units separately.

2. Go back to the unit settings by selecting **Scan**.
3. After the scan is completed, select **Alarms**→**Clear**.

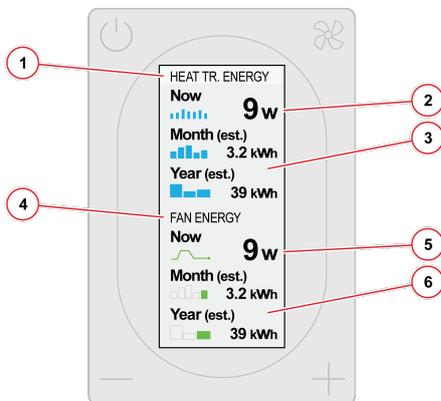
8 Controller menus

8.1 Main menu



1. Main menu
2. Change the language of the menu. Options are English and Finnish.
3. See Section 8.2 Energy menu / Fan energy
4. See Section 8.3 Service menu
5. See Section 8.4 Unit settings
6. See Section 8.6 Controller settings
7. See Section 8.7 Modbus
8. See Section 8.8 Alarms
9. See Section 8.9 Testing
10. See Section 8.10 Screen
11. Exit the menu.

8.2 Energy menu / Fan energy

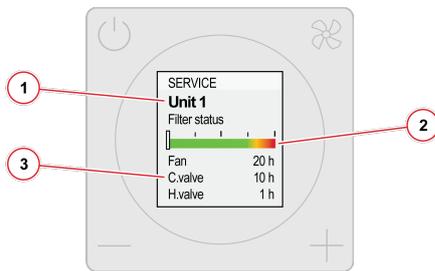


1. Heat transfer energy menu (only available with pressure independent valves)
2. Calculated heat transfer energy
3. Estimated monthly/annual heat transfer energy
4. Fan energy menu
5. The fan's calculatory electricity consumption
6. The fan's estimated monthly/annual electricity consumption

The **Heat transfer menu** (settings 1–3) is shown only if the flow data is available and the temperature sensors are connected to water pipes.

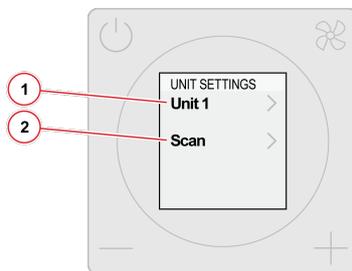
The **Fan energy** (settings 4–6) menu is shown only if the electricity consumption of the fan controlled by the CC card is available.

8.3 Service menu



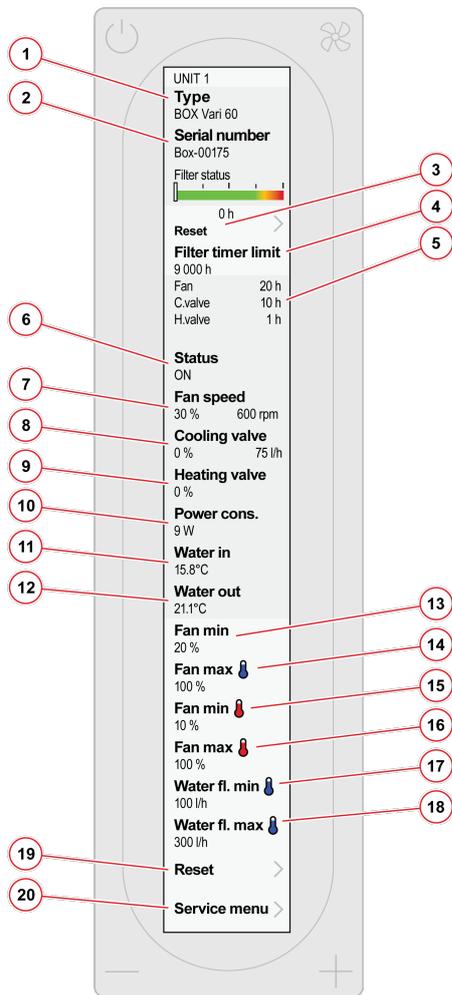
1. The unit connected to the controller
2. Filter status
3. Operating hours of the components

8.4 Unit settings



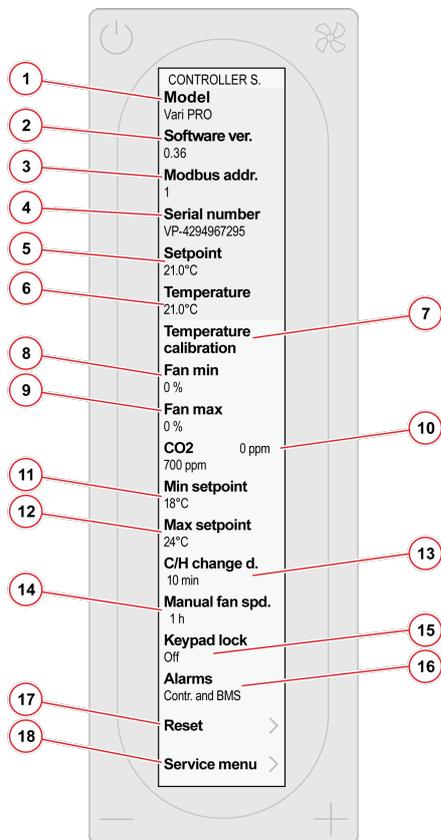
1. The units connected to the controller. The number after **Unit** indicates the unit address.
2. Rescan the controller bus.

8.5 Unit menu



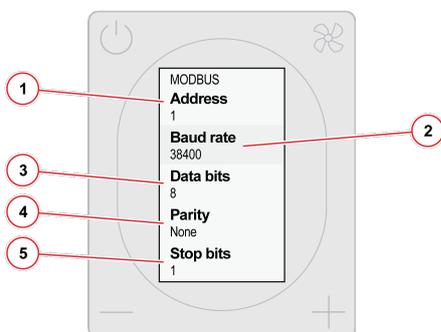
1. Unit type
2. Unit serial number
3. Reset the filter timer.
4. Set the filter timer limit.
5. Operating hours of the components
6. Operating status of the unit
7. Current fan speed (scaled to the maximum)
8. Relative position of the cooling valve
9. Relative position of the heating valve
10. Calculated current electrical power consumption
11. Temperature of incoming water
12. Temperature of outgoing water
13. Fan's minimum speed at cooling
14. Fan's maximum speed at cooling
15. Fan's minimum speed at heating
16. Fan's maximum speed at heating
17. Minimum cooling liquid flow (pressure independent valves only)
18. Maximum cooling liquid flow (pressure independent valves only)
19. Reset the unit settings to factory defaults.
20. Go to the Service menu (for service personnel only).

8.6 Controller settings



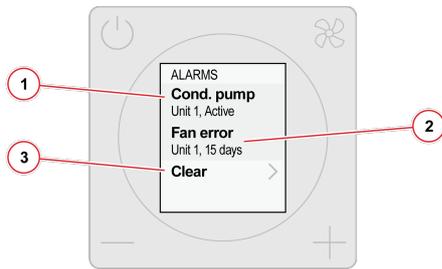
1. Controller model
2. Controller software version
3. Controller Modbus address
4. Controller serial number
5. Current temperature setpoint
6. Current room temperature
7. Set the temperature offset.
8. Minimum fan speed on AUTO mode
9. Maximum fan speed on AUTO mode
10. Measured CO2 concentration (only with CO2 measurement option)
11. Minimum selectable setpoint
12. Maximum selectable setpoint
13. Delay between cooling and heating
14. Timer until the fan speed goes back to automatic (1 - 15 h, or no limit)
15. Set the keypad lock on or off.
16. Determine whether alarms are shown in the controller or only in the BMS and alarm menus.
17. Reset the controller settings.
18. Go to the Service menu (service personnel only).

8.7 Modbus



1. Modbus address
2. Data Baud rate (9600 / 19200 / 38400)
3. Data bits (8)
4. Parity (Odd / Even / None)
5. Stop bits (1 or 2)

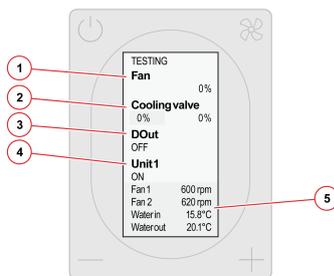
8.8 Alarms



1. Active alarm
2. Alarm history
3. Clear alarm history.

8.9 Testing

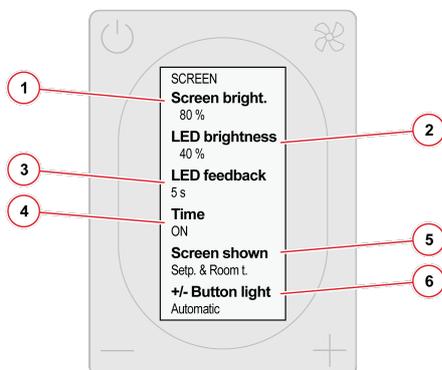
*Note! Use the **Testing** menu to test individual components of the unit or to open the valves during de-airing.*



1. Set fan speed.
2. Set cooling valve control output.
3. Set digital output state.
4. Show the status of the unit.
5. Unit measurements

*Note! The unit returns to normal operation when you exit the **Testing** menu. Any manual settings made in the **Testing** menu are reverted within 24 hours, even if you do not exit the **Testing** menu. For more information, see Section 10.1 Troubleshooting.*

8.10 Screen



1. Set the brightness of the controller's screen.
2. Set the brightness of the controller's LED lights.
3. Set how long the LED ring remains lit (5s / 10s / always on / always off)
4. Show the estimated time to reach the setpoint on home screen (ON/OFF).
5. Home screen type (setpoint + current temp / setpoint / symbols only)
6. Button lights (always on / automatic)

9 Bus structure

9.1 Overview of the bus structure

The VariPro controller is equipped with RS-485 interfaces. The controller uses a Modbus RTU protocol, and, in total, 125 controllers can be connected to one branch.

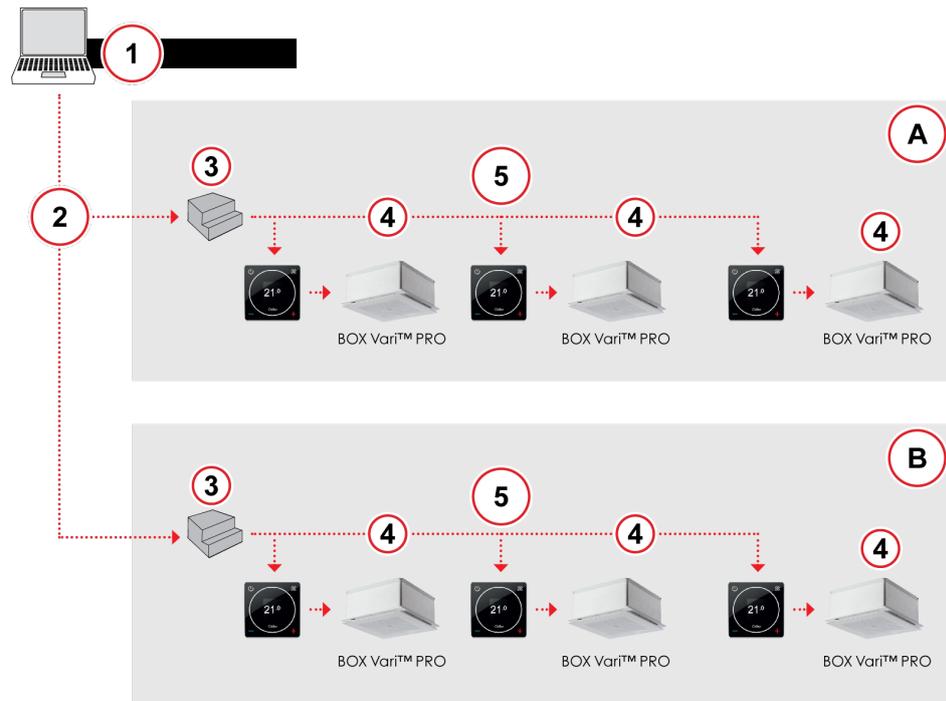
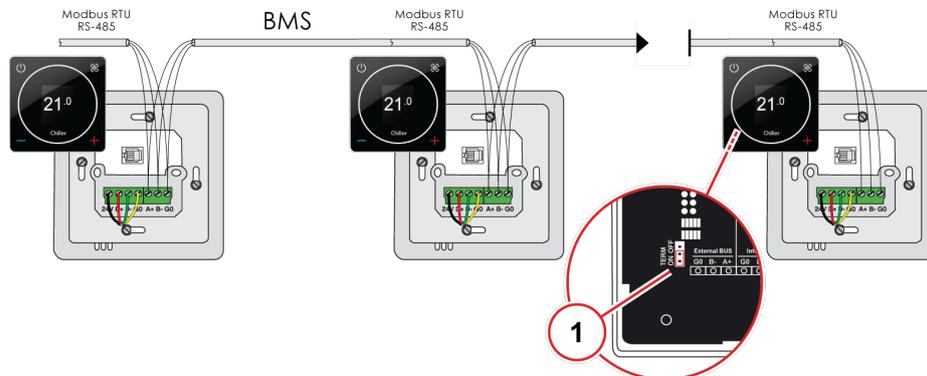


Figure 2: Operating principle of the bus structure

- | | |
|------------------------------|--|
| 1. Main control interface | 4. Max 9 units |
| 2. Ethernet (TCP/IP network) | 5. Modbus RTU (RS-485) Max 125 controllers |
| 3. Gateway | |
| A First floor | |
| B Ground floor | |

Note! Observe proper delays when communicating over Modbus. Use a polling delay of at least 200 ms. If you observe bus errors, increase the delay until there are no errors. Continuously rewrite (refresh) the desired control registers at least every 5 minutes.

9.2 Connecting the controller in a building management system via a Modbus protocol



1. Termination is only done for the last unit.

9.3 Control modes through the bus

Various control modes can be set for the controller through the bus (Holding Register 4x00001). For more information, see *Section 11.1 Modbus registers*.

- **Away:** The controller monitors an expanded dead zone in the **Away** mode. This helps to save energy. The dead zone can be adjusted via the bus by using a parameter (Holding Register 4x00202) or via the controller's settings menu.
- **Flush:** Cooling and heating controls are in full operation (100%) in the **Flush** mode. The **Flush** mode can be activated via the bus by using a parameter.
- **Test mode:** The **Test mode** has to be activated if commissioning is performed remotely. The **Test mode** allows controlling the fan and the cooling and heating valves by using parameters.

9.4 Alarms received through the bus

The controller can send indicative alarm signals also through the bus. These alarm signals do not affect the controller operation but do indicate a failure detected in the system.

- **Temperature sensor alarm:** The temperature sensor alarm indicates a failure in the incoming or outgoing water temperature sensor.

10 Troubleshooting

10.1 Troubleshooting

Issue	Solution
Rescanning the system	In case of problems, first rescan the system: 1. Select Menu → Unit settings . 2. Select Scan . 3. When the scan is complete, push the Fan button.
Restoring factory defaults to the controller	1. Select Menu → Controller settings . 2. Select Reset → Reset .
Restoring factory setting to the connected unit	Select Menu → Unit settings → Unit XX → Reset → Reset .
Changing or disabling the AUTO mode timer	By default, the fan returns to AUTO mode after 1 hour. To change the timer or to disable it: 1. Select Menu → Controller settings → Manual fan spd. . 2. Select from 1 to 15 hours or No limit .
Verifying the liquid flow	Verify the liquid flow during normal operation by noting the temperature differential between the Water in and Water out temperatures. To read the temperatures: 1. Select Unit settings → Unit XX .
Using the Testing menu during de-airing, balancing or other use during commissioning	The Testing menu operates on a 24 hour global timer, starting from the time of power on. To use the Testing menu during de-airing, balancing or other use during commissioning: 1. Turn off and turn on again the 230V power to the unit(s). 2. Select the Testing menu. Any settings made in the Testing menu are reset in 24 hours, counting from the time power was applied.

11 Modbus registers

11.1 Modbus registers

Table 1: Register listing for unit with Vari Pro room controller

Vari Pro User Interface Register Map v 1.4					Modbus RTU RS485 Baudrate: 9k6, 19k2, 38k4 Parity: None, odd, even Stop bits: 1, 2	
	Description	Read/ Write	Min.	Max.	Unit	Note(s)
Write register 16 bit integer register						
4x00001	Application state	W				1 = Stand-by (OFF) 2 = Normal 3 = Away 4 = Flush (set cool & heat 100%) 5 = Stopped 10 = Test mode (allow cool/heat without fan)
4x00003	Fan speed control	W				0 = OFF 1–3 = Speed 4 = Auto
4x00004	Room set point, Normal	W			x10C	
4x00005	Room set point, Away	W			x10C	
Read register 16 integer register						
3x00004	Application state	R				0 = Init 1 = StandBy 2 = Normal, 3 = Away 4 = Flush 10 = Test
3x00006	Current fan control	R	0	4		0 = OFF 1–3 = Speed 4 = Auto
3x00007	Room temperature	R			°C	x10
3x00008	Current room set point	R			°C	x10
3x00009	Current fan speed	R	0	100	%	
3x00010	Cooling PID-output	R	0	100	%	
3x00011	Heating PID-output	R	0	100	%	
3x00103	Alarm “Unit 1”	R				Bit0: Condense sensor alarm Bit1: Missing RPM from fan1 Bit2: Missing RPM from fan2 Bit3: Sensor fault, water in

Vari Pro User Interface Register Map v 1.4					Modbus RTU RS485 Baudrate: 9k6, 19k2, 38k4 Parity: None, odd, even Stop bits: 1, 2	
	Description	Read/ Write	Min.	Max.	Unit	Note(s)
						Bit4: Sensor fault, water out Bit11: Parameter file Bit15: Service reminder (Filter alarm)
3x00203	Alarm “Unit 2”	R				
3x00116	Temperature water in “Unit 1”	R				X10
3x00117	Temperature water out “Unit 1”	R				X10
3x00203	Alarm “Unit 2”	R				
3x00216	Temperature water in “Unit 2”	R				X10
3x00217	Temperature water out “Unit 2”	R				X10
NOTE: <ul style="list-style-type: none"> • Poll delay 200 ms minimum (increase if bus errors). • Timeout 2000 ms. 						

12 Technical data

12.1 Technical data

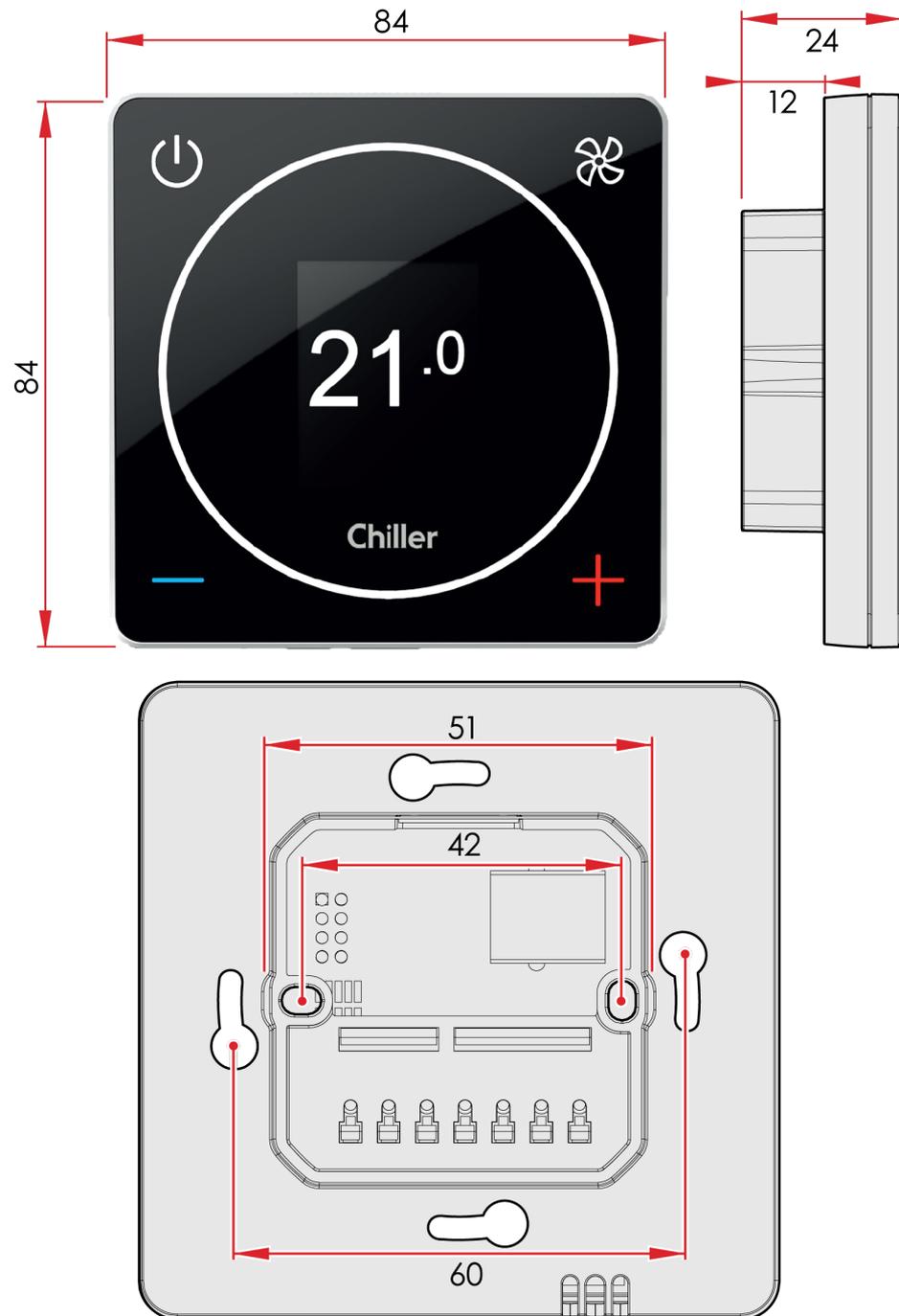


Figure 3: Main dimensions (mm)

Property	Value
Power	24Vdc. < 3VA
Setpoint	Normal state can be defined, default setting 21 °C. "Away mode" -> expanded dead zone 0...+15 °C.

Property	Value
Precision	+0,5 °C
Interfaces	Modbus RTU RS-485 for building management systems. Screw connectors (RS-485). RJ-9 quick connector (4P4C).
Installation	To the mounting box or wall surface.
Dimensions (mm)	Screen: 84x84x12 Mounting box: 42x42x24
Mounting span of screws (mm)	60

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