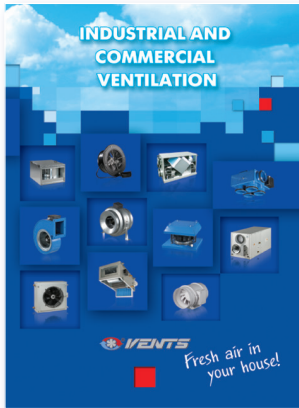


AUTOMATIC CONTROL SYSTEMS



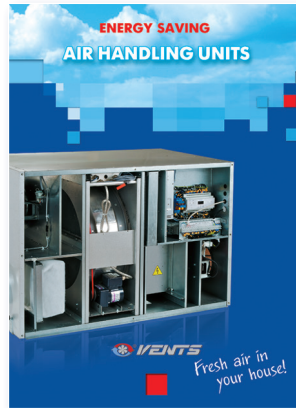
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Fresh air in
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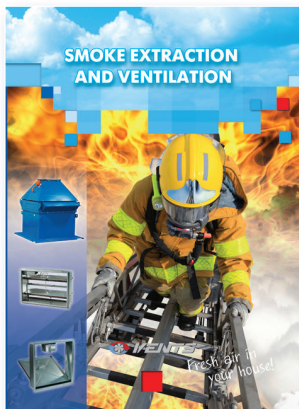
Industrial and commercial ventilation
(Catalogue no. 1)

Industrial and commercial ventilation components - fans for round and rectangular ducts, sound-insulated, axial and roof fans, air handling units with heat recovery, air heating units, accessories.



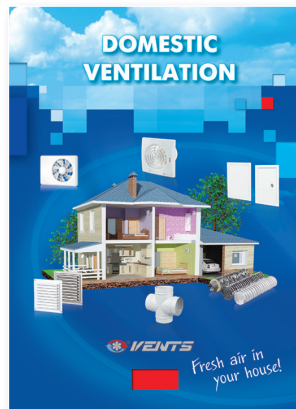
Energy saving ventilation
Air handling units
(Catalogue no. 2)

Energy saving supply and exhaust units and air handling units with heat recovery with air capacity up to 6500 m³/h.



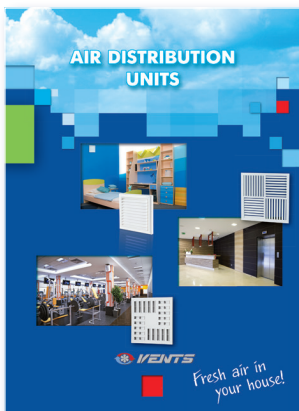
Smoke extraction and ventilation
(Catalogue no. 5)

Smoke protection systems of buildings and premises.



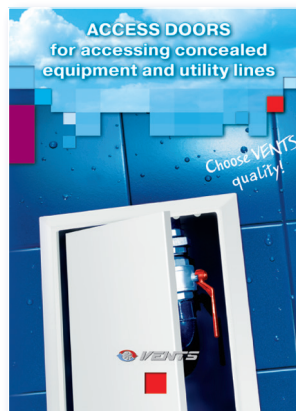
Domestic ventilation
(Catalogue no. 6)

Domestic ventilation: fans, mono-pipe exhaust kitchen and bathroom fans, air distribution units, air ducts and fittings, access doors, ventilation kits.



Air distribution units
(Catalogue no. 9)

Plastic and metal air distribution products (grilles, disk valves, diffusers, etc.) for ventilation, air conditioning and heating.



Access doors
(Catalogue no. 10)

Plastic and metal access doors for accessing concealed equipment and utility lines. Special offers for ceramic tiles.



Spirally wound ducts
(Catalogue no. 13)

SPIROVENT spiral seam vent ducts and fittings of 100 to 1600 mm diameter.



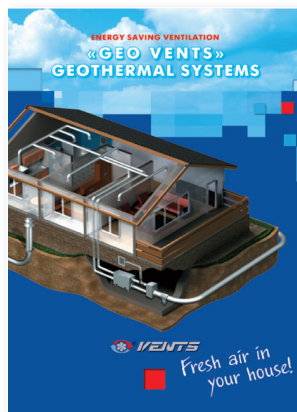
Flexible ducts and fittings for ventilation, air conditioning and heating
(Catalogue no. 14)

Flexible and semi-flexible air ducts made of polymeric materials, aluminium, galvanized or stainless steel, metal fittings for ventilation, air conditioning, heating, gas handling and abrasive particles aspiration.



**Air handling units
AirVENTS
(Catalogue no. 3)**

Energy saving air handling units with air flow up to 40 000 m³/h, for use in large residential, industrial and commercial objects.



**Energy saving ventilation
Geothermal systems
GEO VENTS
(Catalogue no. 4)**

Energy saving system GEO VENTS with use of the earth's surface layers heat. High ventilation system energy efficiency and low operating costs.



**Domestic fans
(Catalogue no. 7)**

Domestic fans with air flow up to 365 m³/h with extra functions: timer, humidity sensor, motion sensor, etc. Applied for premises up to 30 m².



**VENTS VN
Mono-pipe exhaust ventilation
(Catalogue no. 8)**

Exhaust ventilation in houses with mono-pipe ventilation system based on VENTS VN fans.



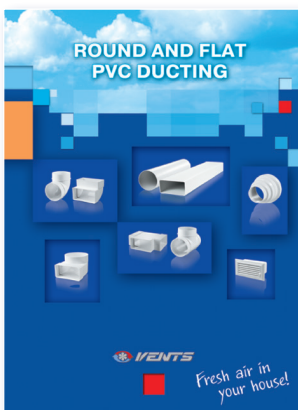
**Energy saving ventilation. Single room energy recovery ventilators MICRA.
(Catalogue no.11)**

MICRA single room ventilators with energy regeneration for efficient ventilation and lowest investments in ready-built and brand new premises.



**VENTS presentation catalogue
(Catalogue no.12)**

VENTS mission is to bring fresh air to your house and surround you with the world of comfortable microclimate.



**Round and flat PVC ducting
(Catalogue no. 15)**

Flat and round PVC ducts PLASTIVENT for ventilation of residential, office and commercial premises and connection of exhaust ventilation equipment (kitchen extractors, hoods, exhaust boxes, etc). Wide product range of fittings.



**Energy saving ventilation. Single room energy recovery ventilators TwinFresh.
(Catalogue no.16)**

Single room reverse ventilators with energy regeneration TwinFresh for efficient ventilation and lowest investments in ready-built and brand new premises.





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NM24A-TP
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UET control unit
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SENSORS AND CONTROL SIGNALS

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Automatic control systems

WELCOME TO THE WORLD OF VENTS!



- The company's product range includes over 50,000 items
- Over the years the company has produced 100 million fans
- The production facilities spread across 150,000 square meters of territory
- The company employs more than 3,500 professionals involved in the entire life cycle of creating ventilation equipment – from concept to high-tech product
- Among other assets the facilities include the climatic equipment research and development centre and a suite of state-of-the-art laboratories manned by 200 engineers
- The company utilises the latest metal and polymer processing technology
- 99% of our products are made in-house
- We are the only company in the industry which develops and builds 85 % of its ventilation equipment components

Being the world's ventilation leader VENTS offers a wide range of cutting-edge ventilation equipment to satisfy most demanding customers. Since the inception, the company's products have become popular in more than 100 countries worldwide while the VENTS brand has earned a solid reputation for quality, reliability and innovation. Every tenth domestic fan in the world rolled off the assembly line of the VENTS factory. Every time you buy a product carrying the VENTS

brand you can be confident that you have made the right choice. Thanks to a comprehensive range of ventilation equipment for home, commercial and industrial applications you can always find the necessary equipment and components to suit your needs. The climatic engineering and design solutions department is tasked with developing bespoke ventilation and air conditioning systems for even the most challenging projects.

Technology of the future

The VENTS factory is not just about state-of-the-art production lines equipped with processing machines from the leading global suppliers. Today this is a full-on research and development facility spreading across 150,000 square metres of territory which includes a climatic equipment research and development centre and a comprehensive suite of state-of-the-art laboratories.

The full-time staff of more than 200 engineers are continuously seeking to improve the VENTS products. The company utilises cutting-edge metal and polymer processing technology manufacturing 99% of its products in-house.

We are the only company in the industry which develops and builds 85 % of its ventilation equipment components including electric motors, heat exchangers as well as control and automation equipment.



Getting better every day

The world of today is nothing but stable or permanent. Each day the market comes up with new expectations with regards to ventilation equipment quality and performance. Therefore, VENTS places a strong emphasis on constant development and improvement.

To this end the company has adopted a policy which includes continuous upgrades to its process equipment fleet, implementing the latest in manufacturing technology, and holding regular training workshops for its staff. Not only does this help us keep abreast with the times – these efforts help us to exceed our customers' expectations.



Uncompromising quality

VENTS maintains a stringent quality control system to make sure that its products always meet most demanding international standards as confirmed by numerous certificates issued by the world's largest and most reputable organisations for quality control. The VENTS production process is certified according to ISO 9001:2015 international

standard for quality management systems of organizations and enterprises. The company operates in accordance with all the applicable environmental standards and continuously implements new technology in order to ensure compliance with the latest environmental regulations.

Energy efficiency and energy saving

Energy resources are finite and costly. This is why energy-saving is among the company's top priorities. We pay a special attention to using heat and electricity in the most efficient manner which helps us reduce the environmental footprint of the manufacturing process and develop

more competitive products. The outstanding energy efficiency and low power consumption of our ventilation equipment are achieved by using high-performance EC motors and heat exchangers.

Human resources: a valuable asset



Besides maintaining technical leadership and developing new technology the company also values the people that it owes its success to.

Today VENTS employs more than 3,500 professionals involved in the entire life cycle of ventilation equipment creation – from concept to high-tech product. The company strives to create a comfortable working environment for its employees to maximise their performance and encourage their professional and personal development.

Responsible corporate citizen



Being a responsible corporate citizen VENTS takes an active part in various academic and charity initiatives. The company has a long history of cooperation with a number of educational establishments extending its support to talented youth.

The company takes an active part in student competitions and workshops sharing its wealth of practical knowledge and providing access to state-of-the-art ventilation equipment. The company employees participate in a range of charitable events and sporting competitions on a regular basis.

Following the customer's lead

VENTS uses its extensive research and technical capabilities to develop bespoke ventilation products and solutions for its customers from around the world.

Our products have earned a reputation for reliability being used in polar regions and in the Sahara desert, in the jungle of South-Eastern Asia and in the Pamir mountains.

Wherever our customers are they can always depend on prompt delivery thanks to our worldwide network of strategically located logistics centres.

The company's newest arrivals are presented by its engineers at numerous international exhibitions every year.



Welcome to the world of modern ventilation by VENTS!

INTRODUCTION

General concepts and principles of ventilation systems automation

Modern ventilation systems go much further beyond ensuring proper air exchange in the serviced spaces by helping maintain the necessary parameters of the air environment such as temperature, humidity, CO₂ concentration and air supply. Today these parameters are controlled and regulated completely automatically without human intervention.

Ventilation system relies on automatic control subsystems for:

- measuring and controlling the vital parameters
- regulating heat interchange processes and air supply
- controlling the equipment actuators
- generating equipment status signals protecting the equipment in emergency situations.

Proper ventilation system operation as well as its energy efficiency and the precision of maintaining mission-critical parameters depend on the regulation algorithm in use and the hardware functionality of the automation system.

The ventilation system control algorithm ensures adjustment of the ambient air parameters according to the user-defined air supply settings in consideration of the equipment thermal and electric output.

Parameter measuring, control and regulation are ensured by means of logical devices such as circuit boards and controllers with pre-configured control firmware designed for each specific ventilation unit type.

Parameter regulation duties are performed by various servomechanisms such as damper actuators, mixing unit valves, electric heater power controllers, frequency converters and fan motor speed switches.

Parameter control and measurement are ensured by temperature, humidity, CO₂ concentration sensors as well as differential pressure switches and protection thermostats. Multi-level control systems utilize actuators with feedback signal logic for position or status control.

Automatic control systems rely on two types of signal: discrete (digital) and analogue. A discrete signal corresponds to the presence or absence of the controlled parameter or sends a command to execute or abort a certain function.

Discrete input signals in ventilation equipment control systems reflect the status of pressure relay, thermostat and power equipment switch contacts.

Discrete output signals are implemented in the form of a logical device relay contacts which apply voltage to air damper actuators (open/close) as well as to activation signals for frequency converters and the compressor-condenser unit of the freon air cooler.

An analogue signal characterizes the controlled parameter level or the amount of parameter change required.

Analogue input signals are used to provide sensor feedback or send temperature change commands from a remote control panel.

The analogue signals sent to a logical device inputs take form of a certain resistance, 0..10 V voltage or 4...20 mA current.

Analogue output signals are sent to actuators to change the position of a plate heat exchanger dampers or enable recirculation, control mixing unit valves or the output frequency of a rotary heat exchanger frequency converter as well as regulate the compressor-condenser unit output.

Analogue output signals take form of 0...10 V voltage or 4...20 mA current.

Let us take a closer look at the control system operation principle using the examples of a supply ventilation system equipped with a water heater and a combined supply and exhaust unit equipped with a plate heat exchanger, an electric heater and a direct-action cooler.

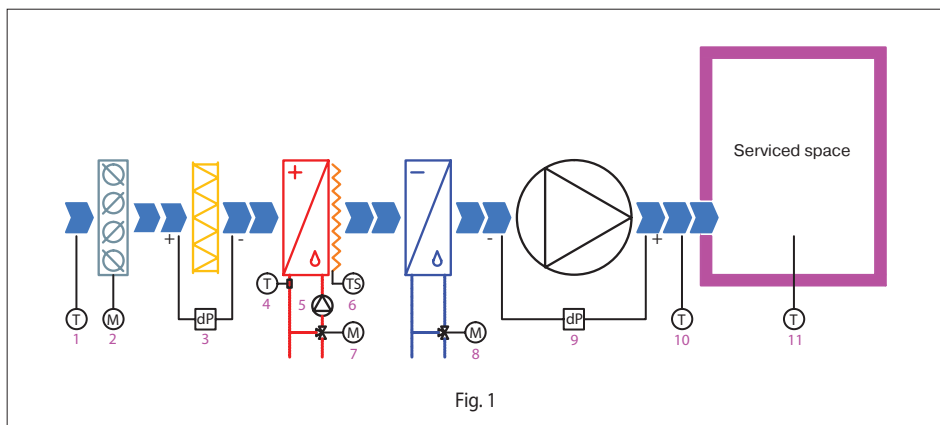
A supply ventilation unit control system has three operation modes: the winter mode, the summer mode and the standby mode.

Switching between the summer and the winter modes is enabled according to the feedback from outdoor temperature sensor 1 (Fig.1).

When the outdoor air temperature falls below the pre-set mode switching threshold the system changes to the winter mode and vice versa when the temperature increases to the appropriate level.

The system is activated according to a pre-programmed operation schedule or by pressing the «Start» button on the control box or the remote control panel.

Supply air handling unit with a water heater and a water cooler



Summer operation mode

On receiving the «Start» signal, the logical device (LD) queries the available inputs for any emergency messages and applies voltage to actuator 2 of the outdoor air damper. After the damper position hold time, the LD applies voltage to the contactor or sends the activation signal to the fan motor frequency converter.

Fan control is enabled by differential pressure switch 9 which compares the pressure measured upstream and downstream of the fan.

If the differential pressure switch contact does not close during the fan start delay time, the LD will shut down the system and generate a fan alarm.

Some of the LDs used in our systems allow setting a user-defined fan start delay value. After the fan has started and the differential pressure signal has been received, the control system enters the temperature control mode using a setpoint defined in the LD menu or via the remote control panel.

The temperature can be regulated in three ways:

- by supply air temperature
- by indoor air temperature
- cascade regulation

Temperature regulation according to the supply air temperature relies on temperature sensor 10 installed in the air duct downstream of the supply ventilation unit.

Temperature regulation according to the indoor air temperature is implemented by means of temperature sensor 11 installed in the serviced space.

Cascade regulation involves comparing the supply air temperature against the indoor air temperature to generate the actuating signal in consideration of the system response delay.

This regulation method is considered most acceptable and energy-efficient as it enables the regulator to promptly respond to air temperature fluctuations and minimise deviations from the setpoint value.

When the measured air temperature exceeds the setpoint value, the LD sends a 0...10 V or 4...20 mA analogue control signal to actuator 8 of the three-way coolant valve which opens thus increasing the coolant flow through the water cooler (Fig. 2). The valve control signal value and, respectively, the coolant flow rate are directly proportional to the difference between the measured temperature and the air temperature setpoint.

After the air temperature drops to the setpoint value, the three-way valve reduces the coolant flow through the water cooler or shuts completely (Fig. 3).

When a direct-action cooler is used a discrete (i.e. ON/OFF) or an analogue signal is sent to the compressor and condenser unit which regulates the coolant temperature.

Winter operation mode

Upon receiving the «Start» signal, the LD measures the heat-transfer agent temperature at the water heater output using the feedback from return water temperature sensor 4.

If the air heater warm-up temperature is lower than the setpoint, the LD applies voltage to the heat-transfer agent circulation pump contactor 5 and the 10 V control signal until the three-way valve opens completely to warm-up the water heater.

On elapsing of the warm-up time (2...3 minutes) and provided that the return water temperature is above the warm-up setpoint value, the LD applies voltage to ambient air damper actuator 2.

After the damper position hold time, the LD applies voltage to the contactor or sends the activation signal to the fan motor frequency converter.

After the fan has started and the differential pressure signal has been received, the control system enters the temperature control mode based on the setpoint value.

When the measured air temperature drops below the setpoint value, the LD sends an analogue signal to actuator 7 of the return heat-transfer agent three-way valve which opens thus increasing the water flow through the water heater (Fig. 4).

The valve control signal value and, respectively, the heat-transfer agent flow rate are directly proportional to the difference between the measured temperature and the air temperature setpoint.

Once the air temperature has risen to the setpoint value, the three-way valve reduces or re-directs the heat-transfer agent flow into the internal circuit (Fig. 5).

The heat-transfer agent circulation is characterised with constant fluid circulation in the water heater to prevent its freezing.

For this purpose the circulation pump should not be disabled in the winter operation mode.

Additional freeze protection is provided by the return water temperature sensor and capillary thermostat 6.

If the return water temperature drops below the return water setpoint value, the LD shuts down the system, opens the three-way valve to maximum water flow and generate a water heater freezing alarm.

The system responds similarly to receiving a signal from the capillary thermostat which prevents water heater freezing in the event of a rapid water temperature drop.

Ventilation systems with a water heater should be equipped with the ambient air damper actuator with a return spring in order to prevent freezing in the event of a power outage during the system operation.

Differential pressure switch 3 enables air filter contamination control.

Standby mode

In the standby duty mode the automatic control system maintains the heat-transfer agent temperature in the heater while the ventilation unit is off.

The temperature setpoint values are programmed via the LD menu and depend on the ambient air temperature.

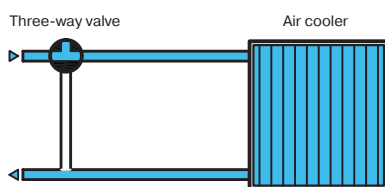


Fig. 2

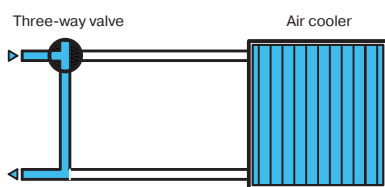


Fig. 3

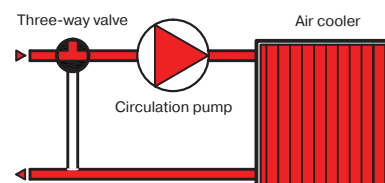


Fig. 4

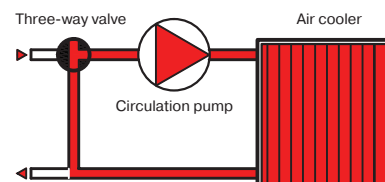


Fig. 5

Supply and exhaust air handling unit with a plate heat exchanger, an electric heater and a freon cooler

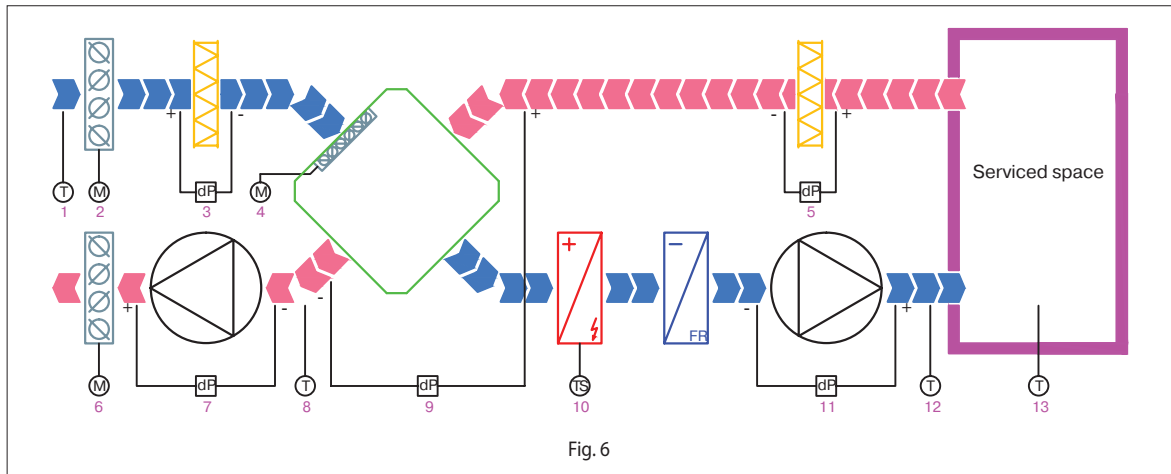


Fig. 6

The supply and exhaust air handling unit ensures proper air exchange in the serviced spaces.

In units with heat exchangers the supply air is pre-heated upstream of the main heater by transferring the exhaust heat energy in order to reduce the main heat-transfer agent flow rate or electric energy consumption.

During the inter-season the heat exchanger power should be sufficient to warm up the supply air without engaging the main heater.

Summer operation mode

On receiving the «Start» signal, the logical device (LD) queries the inputs for any alarm messages and applies voltage to inputs 2 and 6 (Fig. 6) of the outdoor and exhaust air dampers.

After holding the dampers open for the pre-programmed period of time the LD applies voltage to contactors or sends the actuating signal to the frequency converters of the supply and exhaust fan motors.

Once the LD has received the fan start-up signals from differential pressure switches 7 and 11, the control system enters the temperature control mode according to the pre-set value.

If the measured air temperature exceeds the setpoint, the LD sends a discreet or analogue control signal to the compressor-condenser unit which regulates the temperature of the coolant passing through the air evaporator-cooler unit.

When the air temperature drops to the setpoint value, the LD deactivates the CCU control signal while maintaining the activation/deactivation time intervals required for the normal operation of the CCU compressor.

Heat exchanger actuator control is not available in the summer mode.

The regulated value is measured by supply air temperature sensor 12 or serviced space air temperature sensor 13.

The indoor temperature sensor is also built into the remote control panel.

The system can also use room thermostats for reference signal input.

Winter operation mode

According to the control system operation algorithm, the priority temperature regulation device is actuator 4 of the heat exchanger bypass damper.

When the measured air temperature drops below the setpoint value, the LD sends an analogue control signal to the heat exchanger damper actuator which closes the bypass section enabling supply and extract air flow directly through the heat exchanger section.

However, if the supply air temperature fails to reach the setpoint value programmed in the control algorithm the LD energizes the contactor or sends an analogue signal to the electric heater regulator.

The electric heater may have several cascades depending on the output capacity. Electric heater protection thermostats 10 with +50 °C and +90 °C setpoints provide overheating protection.

Upon thermostat activation, the LD disables the heater and generates an overheating alarm.

The fans run during the entire cool-down time (2...3 minutes) and then the ventilation unit shuts down.

Heater forced-air cooling is also enabled in the event of the unit shutdown while the heater is on.

The heater cool-down time is user-adjustable via the LD menu.

Cascade regulation is used to control the heat exchanger damper actuator using the feedback from extract air temperature sensor 6 and supply air temperature sensor 12. Sensor 8 measuring the air temperature downstream of the heat exchanger or differential pressure switch 9 are installed to protect the heat exchanger against freezing by blocking the air flow.

In the event of imminent freezing, the control system disables the supply fan and shuts the outdoor air damper.

The heat exchanger is defrosted by above-zero extract air passing through its plates.

The analogue heat exchanger control signal may control a rotary heat exchanger drive or the actuator of a glycolic heat exchanger three-way valve.

Both plate and rotary heat exchangers feature identical freeze protection.

Differential pressure switches 3 and 5 ensure supply and extract air filter contamination control.

The operation of supply and exhaust air handling units equipped with a mixing chamber is based on air recirculation between the serviced space and the ventilation unit.

This approach allows significant reduction of the main heat-transfer agent flow rate due to the proximity of the extract air temperature to the setpoint value.

The amount of ambient air fed into the mixing chamber depends on the user-adjustable air temperature setpoint.

The control algorithm provides for inverse engagement of the ambient air damper and the mixing chamber damper actuators.

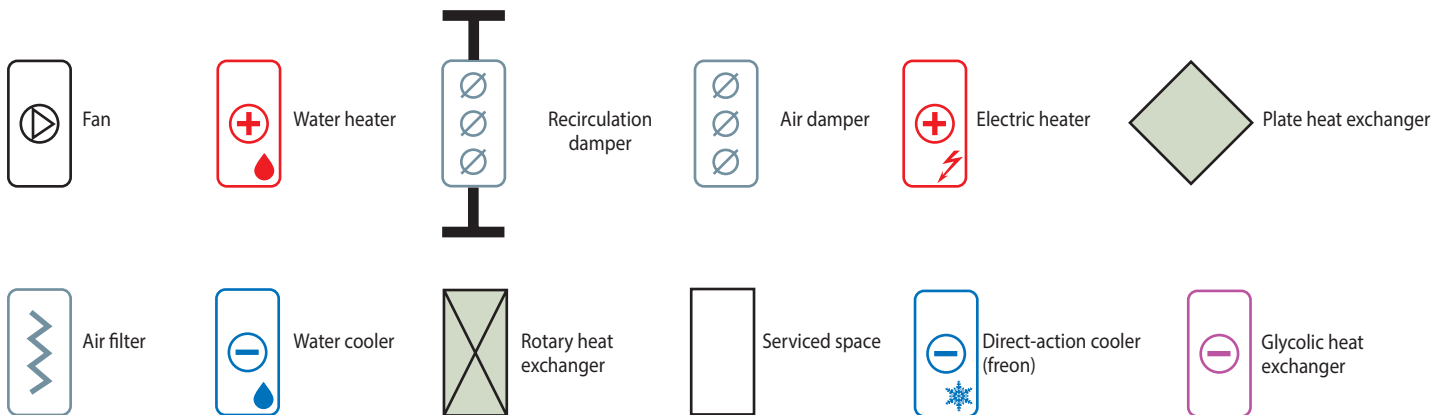
In addition to that, the damper positions can be programmed via the LD menu.

Characteristics of automatic control systems used with air handling units

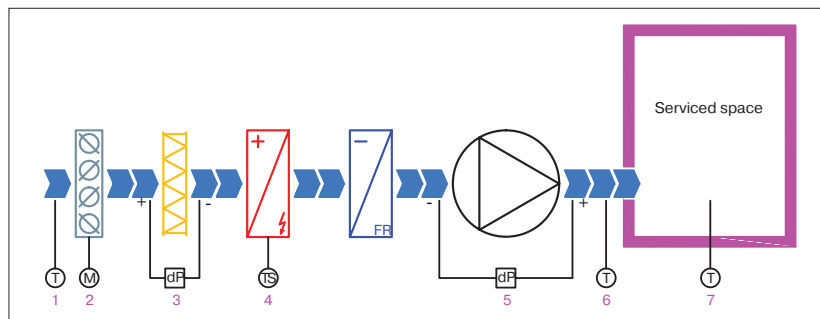
- Fan operation control (by pressure differential, frequency converter or motor thermal contact signal).
- Fan speed control (for air handling units with frequency converters or step controllers).
- Scheduled system operation.
- 0...10 V water heater output control.
- Water heater freeze protection with the thermostat and return water temperature sensor.
- Water heater warm-up.
- 0...10 V water or freon cooler output control.
- Compressor-condenser unit (CCU) protection from an excessive number of start-up attempts.
- Stepless electric heater output control.
- Electric heater overheating protection.
- Electric heater forced-air cooling.
- Plate, rotary or water heat exchanger actuator and mixing chamber damper control.
- Supply air temperature control.
- Indoor air temperature control (cascade regulation).
- Filter contamination control (by pressure differential).
- Summer, winter and standby operation modes.

Principal functional diagrams of air handling units

Graphical actuator symbols used in the diagrams

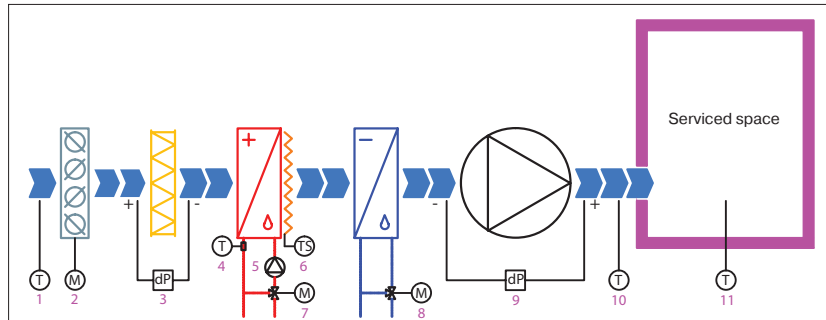


Supply air handling unit with an electric heater and a freon cooler



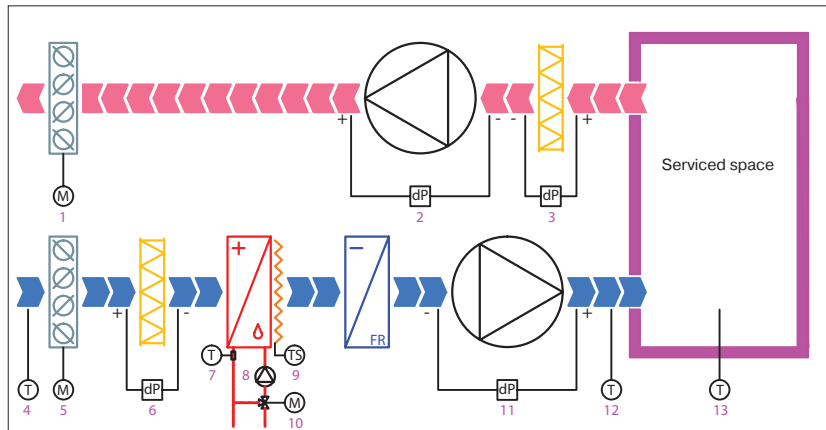
- 1 – Outdoor air temperature sensor
- 2 – Air damper actuator (24 V or 220 V)
- 3 – Differential pressure switch (filter contamination control)
- 4 – Electric air heater (EAH) overheating protection thermostats (50 °C and 90 °C)
- 5 – Differential pressure switch (fan operation control)
- 6 – Duct temperature sensor
- 7 – Indoor temperature sensor or remote control panel

Supply air handling unit with a water heater and a water cooler



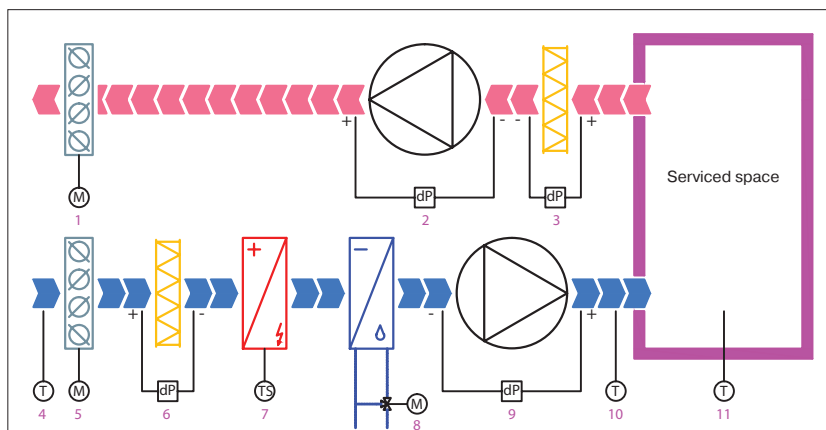
- 1 – Outdoor air temperature sensor
- 2 – Air damper actuator (24 V or 220 V)
- 3 – Differential pressure switch (filter contamination control)
- 4 – Return water temperature sensor
- 5 – Mixing unit circulation pump
- 6 – Air heater freeze protection thermostat
- 7, 8 – Three-way valve actuator (with 0...10 V analogue control)
- 9 – Differential pressure switch (fan operation control)
- 10 – Duct temperature sensor
- 11 – Indoor temperature sensor or room thermostat

Supply and exhaust air handling unit with a water heater and freon cooler



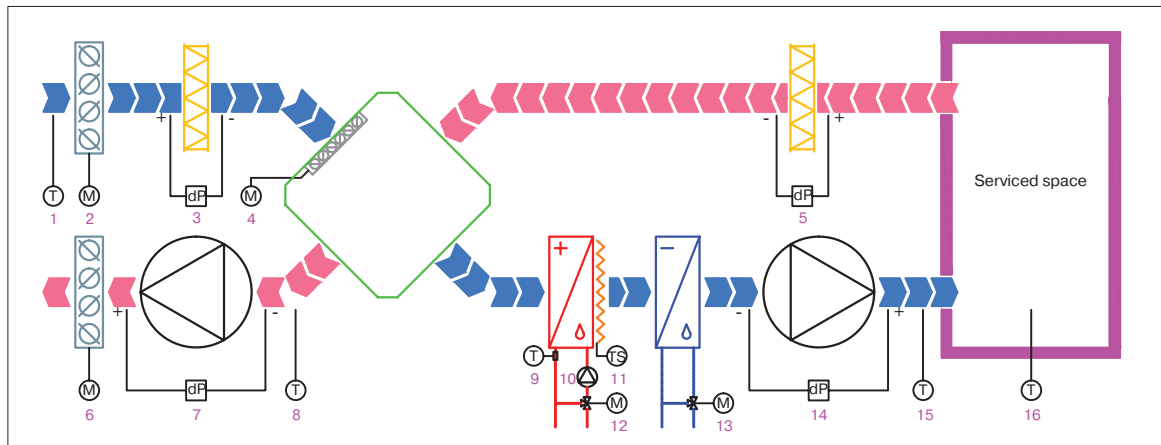
- 1, 5 – Air damper actuator (24 V or 220 V)
- 2, 11 – Differential pressure switch (fan operation control)
- 3, 6 – Differential pressure switch (filter contamination control)
- 4 – Ambient air temperature sensor
- 7 – Return water temperature sensor
- 8 – Mixing unit circulation pump
- 9 – Air heater freeze protection thermostat
- 10 – Three-way valve actuator (with 0...10 V analogue control)
- 12 – Duct temperature sensor
- 13 – Indoor temperature sensor or remote control panel

Supply and exhaust air handling unit with an electric heater and freon cooler



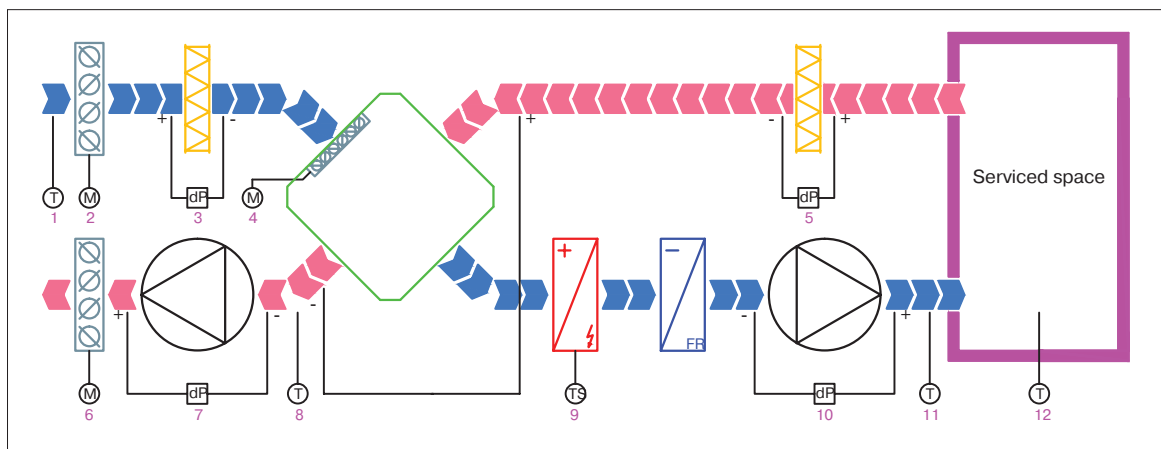
- 1, 5 – Air damper actuator (24 V or 220 V)
- 2, 9 – Differential pressure switch (fan operation control)
- 3, 6 – Differential pressure switch (filter contamination control)
- 4 – Outdoor air temperature sensor
- 7 – Electric air heater (EAH) overheating protection thermostats (50 °C and 90 °C)
- 8 – Three-way valve actuator (with 0...10 V analogue control)
- 10 – Duct temperature sensor
- 11 – Indoor temperature sensor or remote control panel

Supply and exhaust air handling unit with a plate heat exchanger, water heater and water cooler



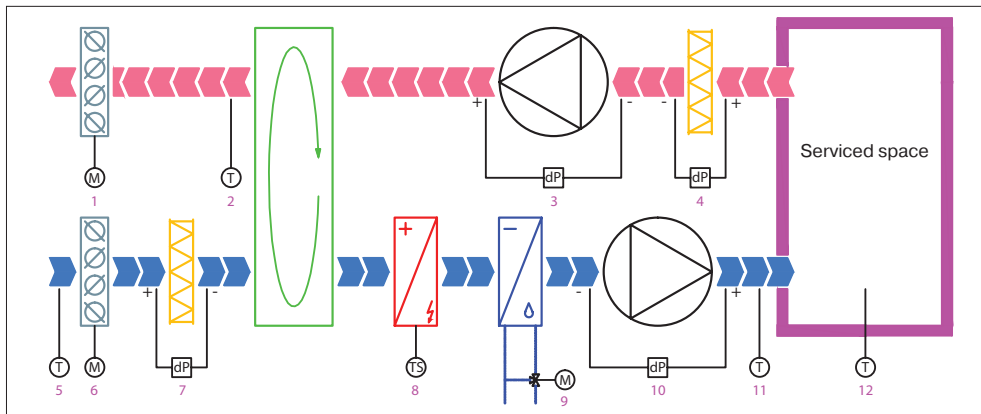
- | | |
|--|--|
| 1 – Outdoor air temperature sensor | 9 – Return water temperature sensor |
| 2, 6 – Air damper actuator (24 V or 220 V) | 10 – Mixing unit circulation pump |
| 3, 5 – Differential pressure switch (filter contamination control) | 11 – Air heater freeze protection thermostat |
| 4 – Bypass damper actuator (with 0...10 V analogue control) | 12, 13 – Three-way valve actuator (with 0...10 V analogue control) |
| 7, 14 – Differential pressure switch (fan operation control) | 16 – Indoor temperature sensor or remote control panel |
| 8, 15 – Duct air temperature sensor | |

Supply and exhaust air handling unit with a plate heat exchanger, electric heater and freon cooler



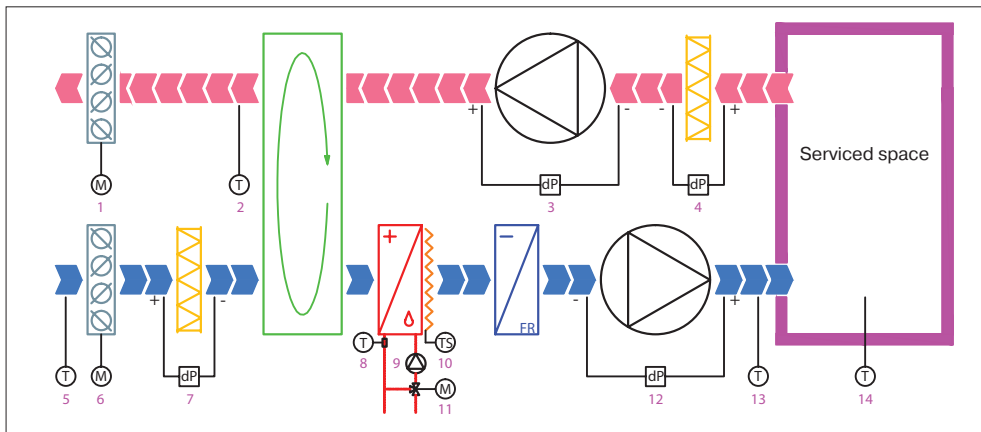
- | | |
|--|--|
| 1 – Outdoor air temperature sensor | 7, 10 – Differential pressure switch (fan operation control) |
| 2, 6 – Air damper actuator (24 V or 220 V) | 8, 11 – Duct air temperature sensor |
| 3, 5 – Differential pressure switch (filter contamination control) | 9 – Electric air heater (EAH) overheating protection thermostats (50 °C and 90 °C) |
| 4 – Bypass damper actuator (with 0...10 V analogue control) | 12 – Indoor temperature sensor or remote control panel |

Supply and exhaust air handling unit with a rotary heat exchanger, electric heater and water cooler



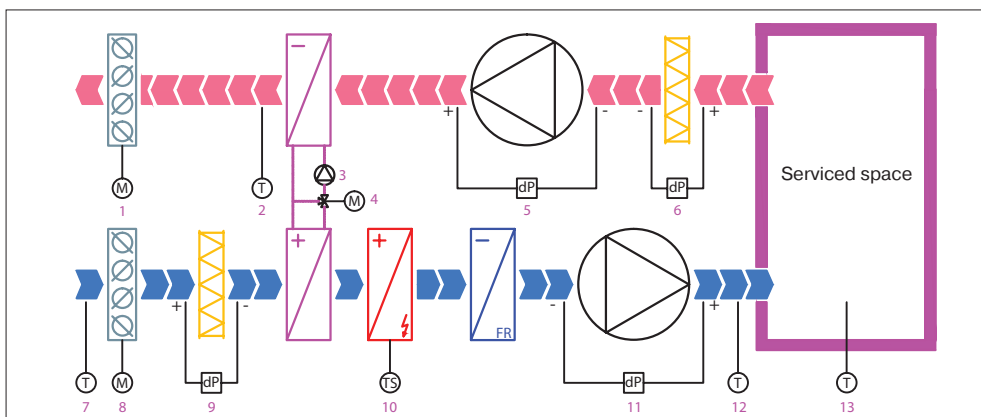
- | | |
|--|--|
| 1, 6 – Air damper actuator (24 V or 220 V) | 5 – Outdoor air temperature sensor |
| 2, 11 – Duct temperature sensor | 8 – Electric air heater (EAH) overheating protection thermostats (50 °C and 90 °C) |
| 3, 10 – Differential pressure switch (fan operation control) | 9 – Three-way valve actuator (with 0...10 V analogue control) |
| 4, 7 – Differential pressure switch (filter contamination control) | 12 – Indoor temperature sensor or remote control panel |

Supply and exhaust air handling unit with a rotary heat exchanger, water heater and freon cooler



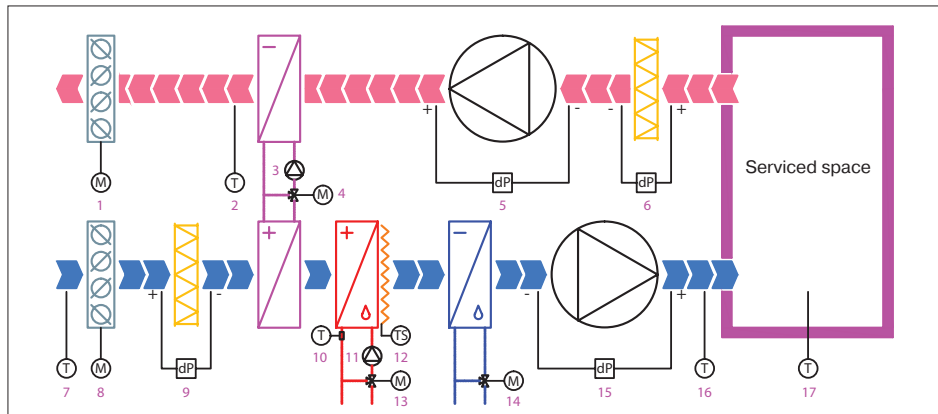
- | | |
|--|--|
| 1, 6 – Air damper actuator (24 V or 220 V) | 8 – Return water temperature sensor |
| 2, 13 – Duct temperature sensor | 9 – Mixing unit circulation pump |
| 3, 12 – Differential pressure switch (fan operation control) | 10 – Air heater freeze protection thermostat |
| 4, 7 – Differential pressure switch (filter contamination control) | 11 – Three-way valve actuator (with 0...10 V analogue control) |
| 5 – Outdoor air temperature sensor | 14 – Indoor temperature sensor or remote control panel |

Supply and exhaust air handling unit with a glycolic heat exchanger, electric heater and freon cooler



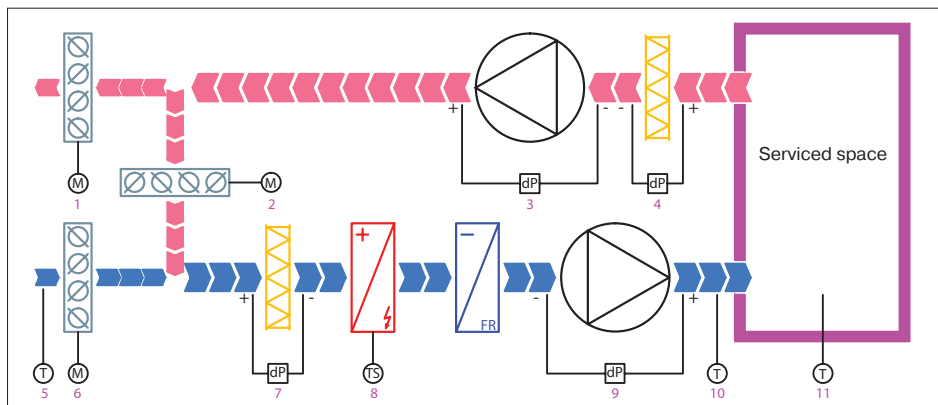
- | | |
|---|---|
| 1, 8 – Air damper actuator (24 V or 220 V) | 6, 9 – Differential pressure switch (filter contamination control) |
| 2, 12 – Duct temperature sensor | 7 – Outdoor air temperature sensor |
| 3 – Mixing unit circulation pump | 10 – Electric air heater (EAH) overheating protection thermostats (50 °C and 90 °C) |
| 4 – Three-way valve actuator (with 0...10 V analogue control) | 13 – Indoor temperature sensor or remote control panel |
| 5, 11 – Differential pressure switch (fan operation control) | |

Supply and exhaust air handling unit with a glycolic heat exchanger, water heater and water cooler



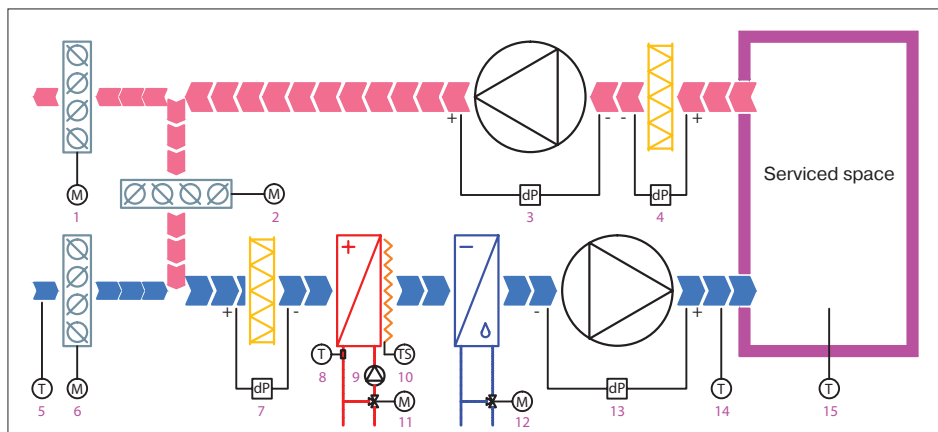
- | | |
|---|--|
| 1, 8 – Air damper actuator (24 V or 220 V) | 6, 9 – Differential pressure switch (filter contamination control) |
| 2, 16 – Duct temperature sensor | 7 – Outdoor air temperature sensor |
| 3, 11 – Mixing unit circulation pump | 10 – Return water temperature sensor |
| 4, 13, 14 – Three-way valve actuator (with 0...10 V analogue control) | 12 – Air heater freeze protection thermostat |
| 5, 15 – Differential pressure switch (fan operation control) | 17 – Indoor temperature sensor or remote control panel |

Supply and exhaust air handling unit with a recirculation function, electric heater and freon cooler



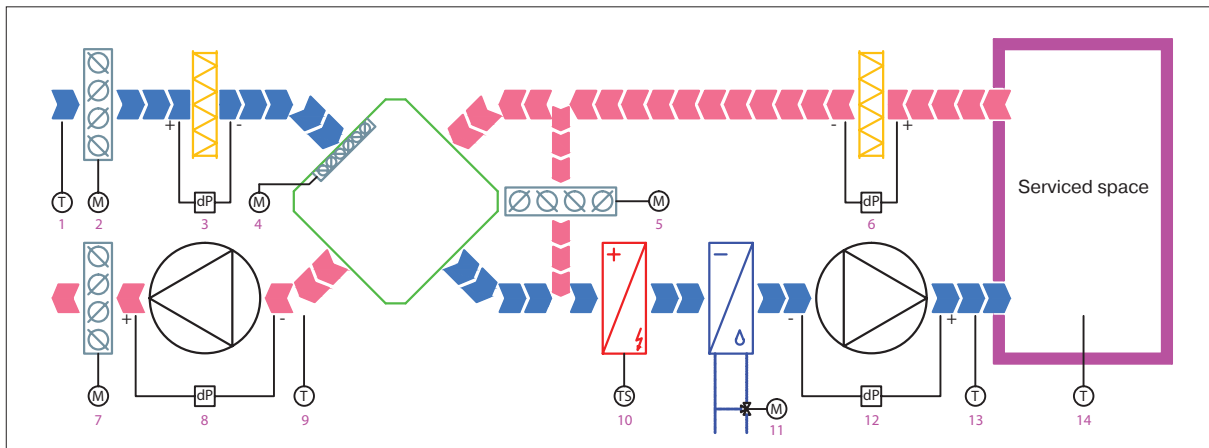
- | | |
|--|--|
| 1, 6 – Air damper actuator (24 V or 220 V) | 5 – Outdoor air temperature sensor |
| 2 – Recirculation damper actuator (with 0...10 V analogue control) | 8 – Electric air heater (EAH) overheating protection thermostats (50 °C and 90 °C) |
| 3, 9 – Differential pressure switch (fan operation control) | 10 – Duct temperature sensor |
| 4, 7 – Differential pressure switch (filter contamination control) | 11 – Indoor temperature sensor or remote control panel |

Supply and exhaust air handling unit with a recirculation function, water heater and water cooler



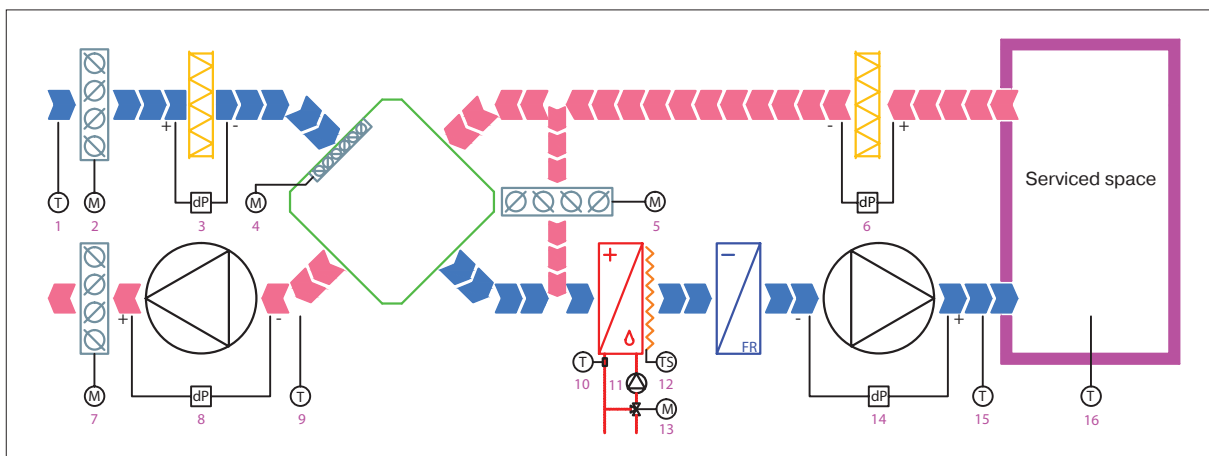
- | | |
|--|--|
| 1, 6 – Air damper actuator (24 V or 220 V) | 9 – Mixing unit circulation pump |
| 2 – Recirculation damper actuator (with 0...10 V analogue control) | 10 – Air heater freeze protection thermostat |
| 3, 13 – Differential pressure switch (fan operation control) | 11, 12 – Three-way valve actuator (with 0...10 V analogue control) |
| 4, 7 – Differential pressure switch (filter contamination control) | 14 – Duct temperature sensor |
| 5 – Outdoor air temperature sensor | 15 – Indoor temperature sensor or remote control panel |
| 8 – Return water temperature sensor | |

Supply and exhaust air handling unit with a plate heat exchanger, recirculation function, electric heater and water cooler



- 1 – Outdoor air temperature sensor
- 2, 7 – Air damper actuator (24 V or 220 V)
- 3, 6 – Differential pressure switch (filter contamination control)
- 4 – Bypass damper actuator (with 0...10 V analogue control)
- 5 – Recirculation damper actuator (with 0...10 V analogue control)
- 8, 12 – Differential pressure switch (fan operation control)
- 9, 13 – Duct temperature sensor
- 10 – Electric air heater (EAH) overheating protection thermostats (50 °C and 90 °C)
- 11 – Three-way valve actuator (with 0...10 V analogue control)
- 14 – Indoor temperature sensor or remote control panel

Supply and exhaust air handling unit with a plate heat exchanger, recirculation function, water heater and freon cooler



- 1 – Outdoor air temperature sensor
- 2, 7 – Air damper actuator (24 V or 220 V)
- 3, 6 – Differential pressure switch (filter contamination control)
- 4 – Bypass damper actuator (with 0...10 V analogue control)
- 5 – Recirculation damper actuator (with 0...10 V analogue control)
- 8, 14 – Differential pressure switch (fan operation control)
- 9, 15 – Duct temperature sensor
- 10 – Return water temperature sensor
- 11 – Mixing unit circulation pump
- 12 – Air heater freeze protection thermostat
- 13 – Three-way valve actuator (with 0...10 V analogue control)
- 16 – Indoor temperature sensor or remote control panel

SL series control boxes



Control boxes in polymer casings for direct-flow and combined supply and exhaust air handling units with plate heat exchangers.

The control system is based on SYNERGY VS-01 freely configurable controller.

Maximum fan drive power – 11 kW.

Maximum electric heater power – 25 kW.

SN series control boxes



Control boxes in polymer casings for direct-flow and combined supply and exhaust air handling units with a plate or rotary heat exchanger and a mixing chamber.

The control system is based on Aeroclim 8-sv and Aeroclim 9-sv freely configurable controllers.

Maximum fan drive power – 11 kW.

Maximum electric heater power – 50 kW.

SR series control boxes



Control boxes in metal casings for direct-flow and combined supply and exhaust air handling units with a plate, rotary or glycolic heat exchanger and a mixing chamber.

The control system is based on Freemax MX-s2 freely programmable controller.

Maximum fan drive power – 22 kW.

Maximum electric heater power – 240 kW.

SRC series control boxes



Control boxes in metal casings for custom-built round air handling units with a water heater or an electric heater.

The control system is based on ARCON-34 freely configurable controller.

SRVZ series control boxes



Control boxes in metal casings for PVZ air curtains without a heater, with a water heater or an electric heater.

The control system is based on a relay circuit or ARCON-34 freely configurable controller.

The curtain can be enabled/disabled by means of a limit switch.

SL series control boxes

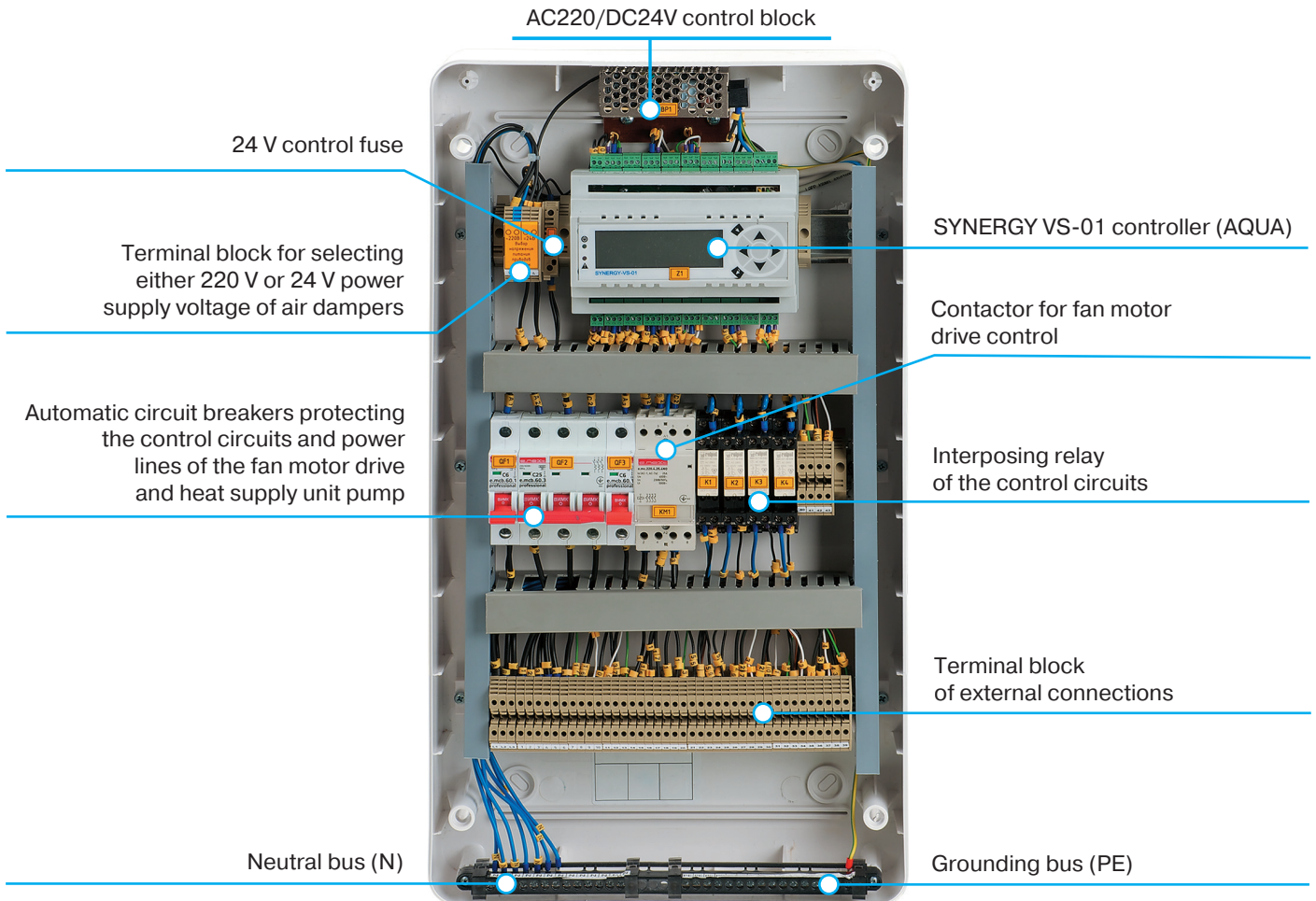


- The boxes are used to control supply and combined supply and exhaust air handling units with a water heater or an electric heater and a water or freon cooler.
- The control system is based on SYNERGY VS-01 freely configurable controller.
- The control and protection functions are implemented by means of relay and contactor circuits using modular switching and protection equipment.
- Each box is equipped with the appropriate number of temperature sensors (NTC type).
- The casing is rated IP40 (IP65 upgrade available on request).
- Box dimensions:
HxWxD: 535x290x102 mm (36 modules)
HxWxD: 535x398x102 mm (54 modules)

Control boxes for units with a water heater

SL-AQUA-0.55-f

Control box type	Heater type: water	Maximum fan power: 0.55 kW	Enabling signal for frequency converter connection
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The box is designed for automatic control of a direct-flow or combined supply and exhaust air handling unit (including those equipped with plate heat exchangers) with a water heater and a water or freon cooler.

The box has automatic circuit breakers protecting the control circuits and supply lines of the power equipment, a power supply unit for 24 V control circuits, and a terminal block for connecting sensors and actuators.

The box is also equipped with 220 V and 24 V for connecting air damper actuators.

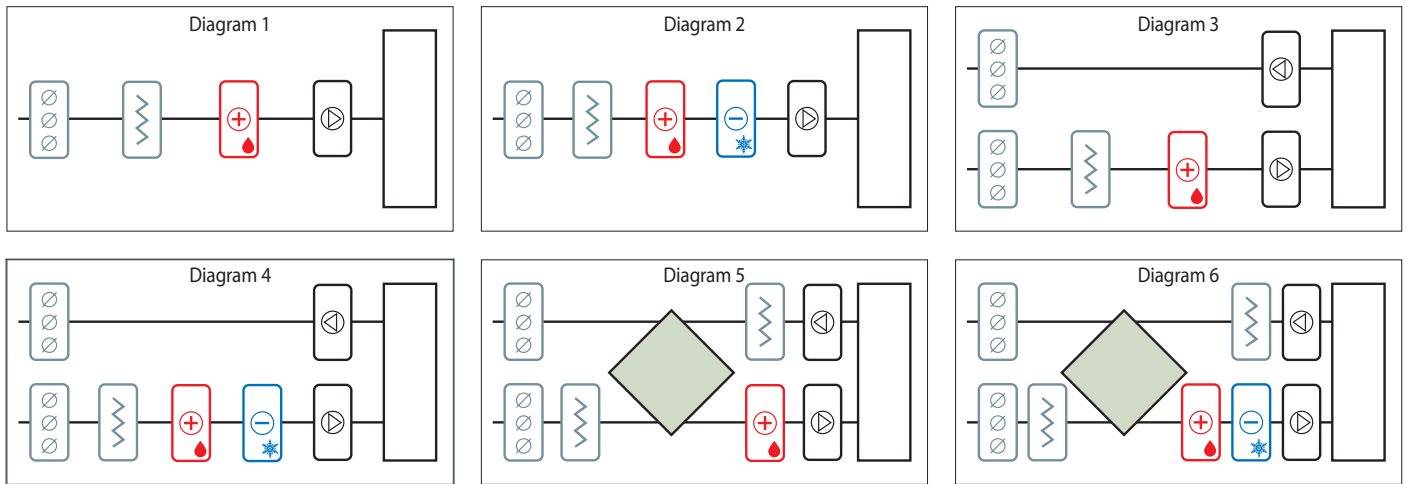
Supply air temperature regulation is provided by SYNERGY VS-01 controller by means of the pre-installed sensors and control of the heat supply unit three-way valve.

The controller supports connection of the optional remote control panel for

monitoring the system performance and changing parameters.

The terminals for sending enabling signals to frequency converters provide fan motor drive control.

The boxes with direct fan motor drive control are equipped with contactors.



SYNERGY VS-01 (AQUA) freely configurable controller

Running a configuration optimized for control and protection of the equipment of an air handling unit with a water heater. The ventilation unit status is displayed on an LCD screen with an English interface.

Functions	SL-AQUA-xx	SL-AQUA-xx-f
Typical mounting layout	1-6	1-6
Fans		
Operation control	●	●
Switching ON/OFF	●	●
Stepless fan speed control		●
Plate heat exchanger		
Freeze protection	●	●
Bypass damper control	●	●
Water heater		
0...10 V control signal	●	●
Protection by return water temperature	●	●
Protection by thermostat feedback	●	●
Preheating	●	●
Filters		
Clogging control	●	●
Additional features		
230 V or 24 V damper drive connection	●	●
CCU control	●	●
Weekly timer	●	●
Remote control panel connection	●	●

● standard function ● option

Optional equipment



Air damper actuator (with a return spring)



F-3000 freeze protection thermostat



DTV 500 differential pressure switch



USWK heat supply mixing unit



SYNERGY-SP-01 remote control panel

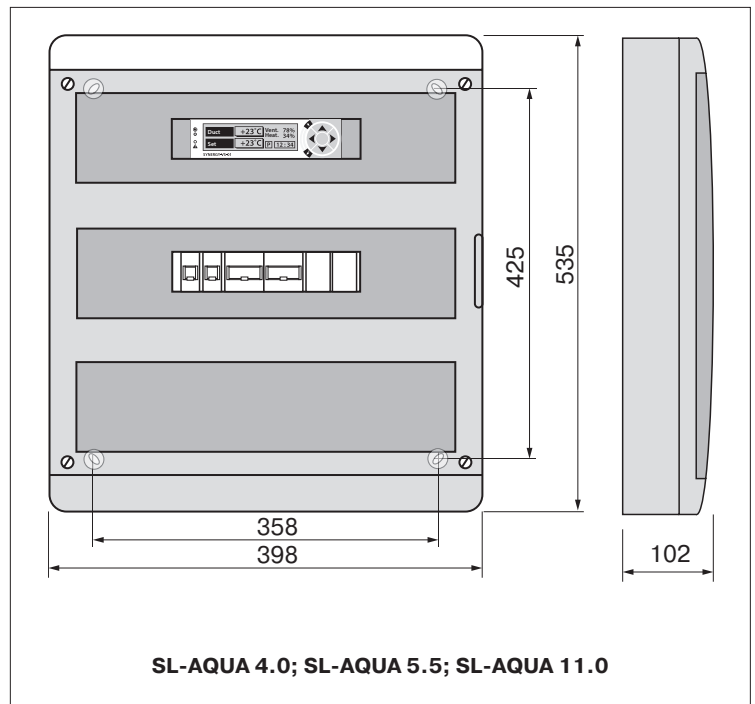
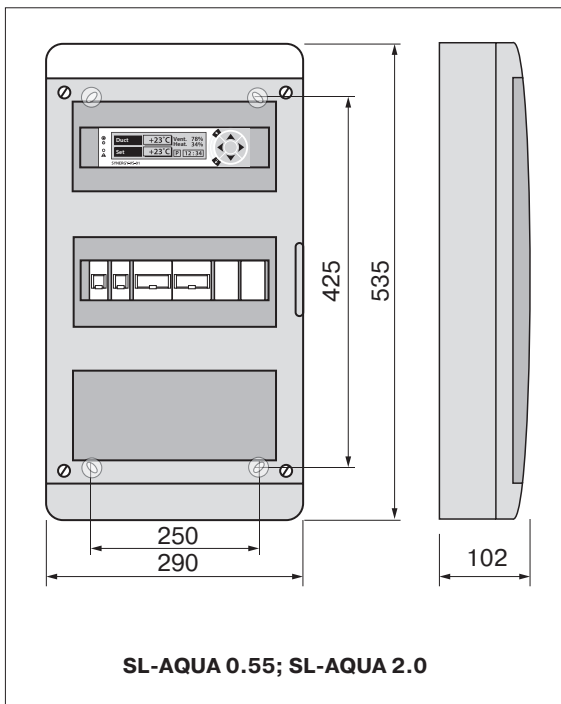


FC-51 frequency converter

Brief characteristics of the boxes

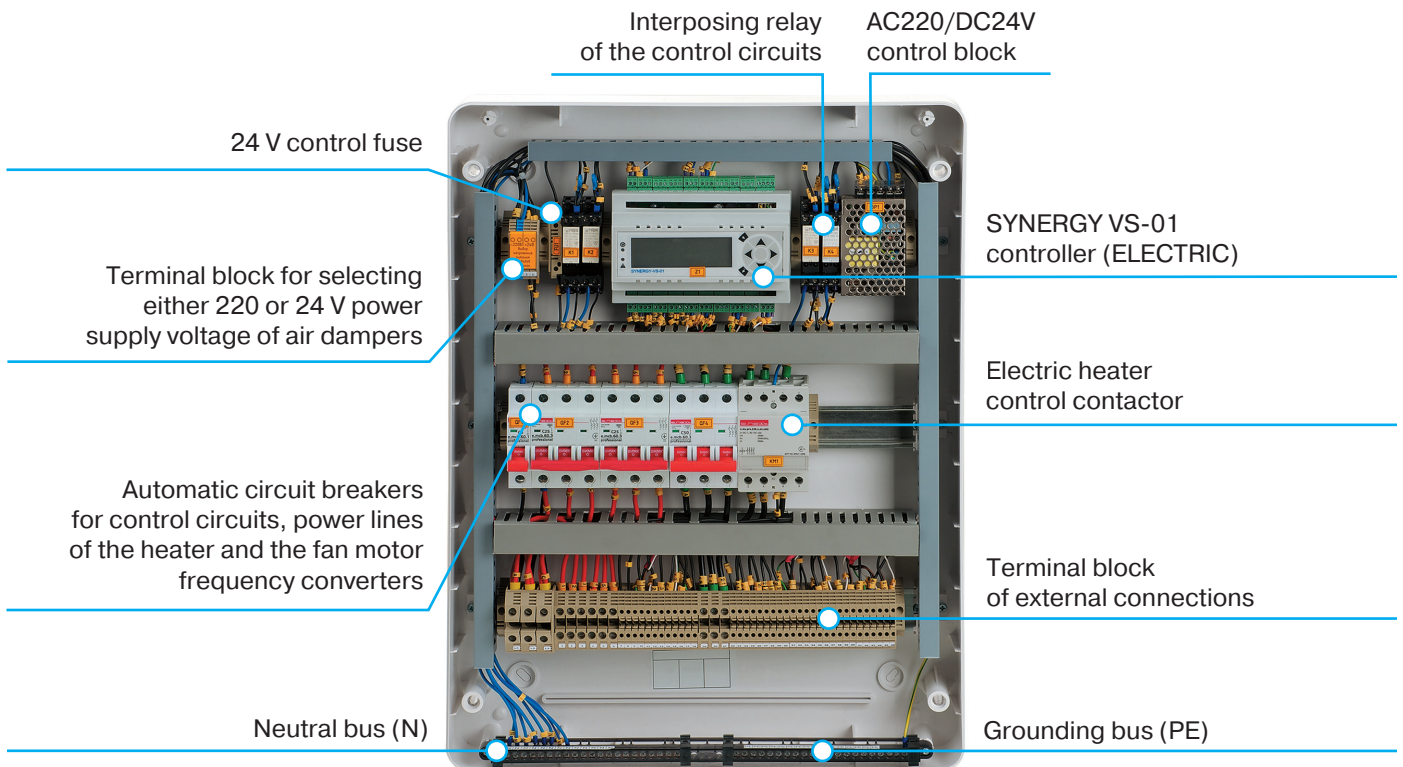
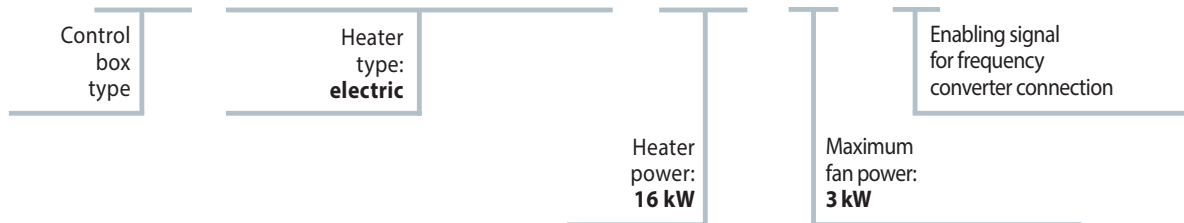
Box type	Heat exchanger	Heater	Maximum motor power	Switching and protective equipment of the actuator
SL-AQUA-0.55	no, plate	water	1 phase, AC/EC, up to 0.55 kW	relay
SL-AQUA-2.0			1-3 phases AC/EC up to 2.0 kW	16 A automatic circuit breaker and a contactor
SL-AQUA-4.0			1-3 phases AC/EC up to 4.0 kW	25 A automatic circuit breaker and a contactor
SL-AQUA-11.0			3 phases AC/EC up to 11.0 kW	40 A automatic circuit breaker and a contactor
SL-AQUA-5.5f			3 phases, AC up to 5.5 kW for a frequency converter	25 A automatic circuit breaker and an enabling signal
SL-AQUA-11.0f			3 phases, AC up to 11.0 kW for a frequency converter	50 A automatic circuit breaker and an enabling signal

Overall dimensions [mm]



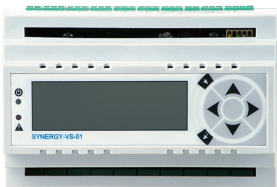
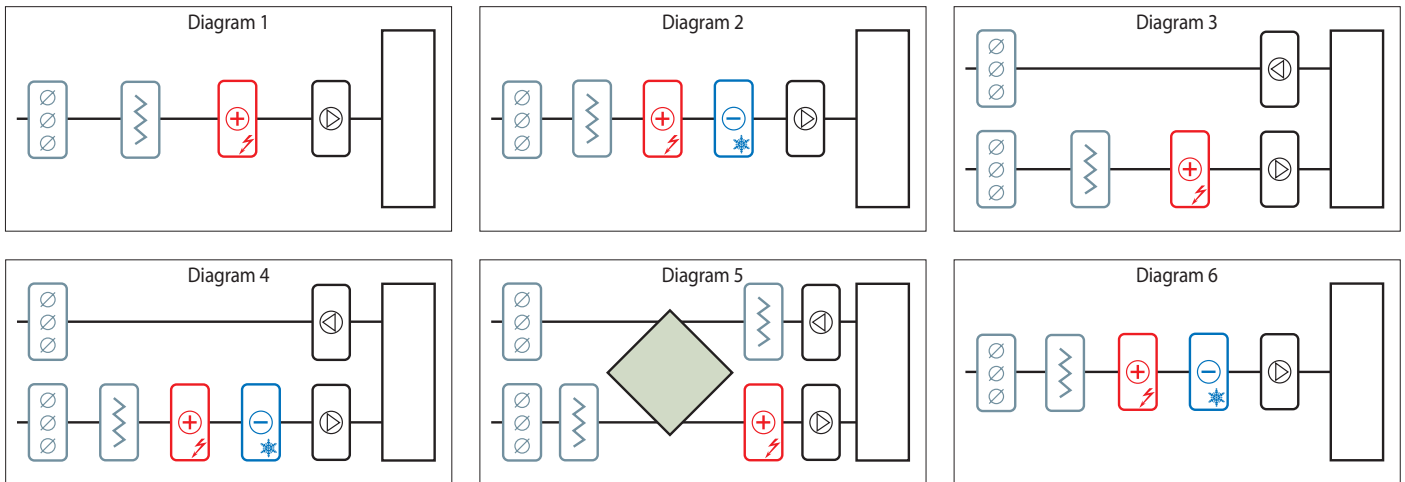
Control boxes for units with an electric heater

SL-ELECTRIC-16-3-f



The box is designed for automatic control of a direct-flow or combined supply and exhaust air handling unit (including those equipped with plate heat exchangers) with an electric heater and a water or freon cooler. The box has automatic circuit breakers protecting the control circuits and supply lines of the power equipment, a power supply unit for 24 V control circuits, and a terminal block for connecting sensors and actuators. The box is also equipped with 220 V and 24 V for connecting air damper actuators. Supply air temperature regulation is provided by SYNERGY VS-01 controller by means of the pre-installed sensors and heater contactor control.

The controller supports connection of the optional remote control panel for monitoring the system performance and changing parameters. The terminals for sending enabling signals to frequency converters provide fan motor drive control. The boxes with direct fan motor drive control are equipped with contactors.



SYNERGY VS-01 (ELECTRIC) freely configurable controller

The configuration is optimized for control and protection of the equipment of an air handling unit with an electric heater. The ventilation unit status is displayed on an LCD screen with an English interface. The box can also be controlled via the optional remote control panel.

Functions	SL-ELECTRIC-xx	SL-ELECTRIC-xx-f
Typical mounting layout	1-6	1-6
Fans		
Operation control	●	●
Switching ON/OFF	●	●
Stepless fan speed control		●
Plate heat exchanger		
Freeze protection	●	●
Bypass damper control	●	●
Electric heater		
Stepless fan speed control	●	●
EAH forced-air cooling	●	●
Overheating protection	●	●
Filters		
Clogging control	●	●
Additional features		
230 V or 24 V damper drive connection	●	●
CCU control	●	●
Weekly timer	●	●
Remote control panel connection	●	●

● standard function ● option

Optional equipment



Air damper actuator



DTV 500 differential pressure switch



SYNERGY-SP-01 remote control panel



RNS-16 and RNS-25 heater output controller

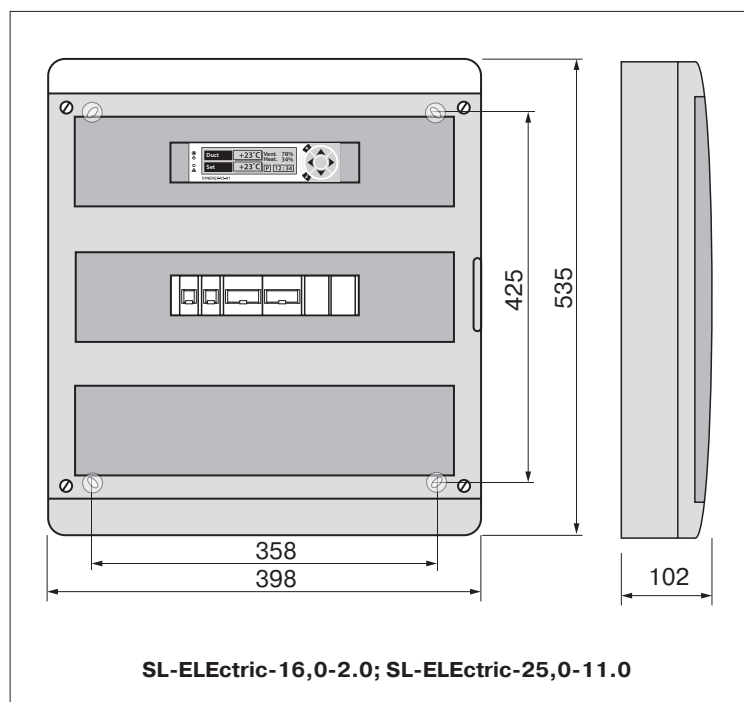
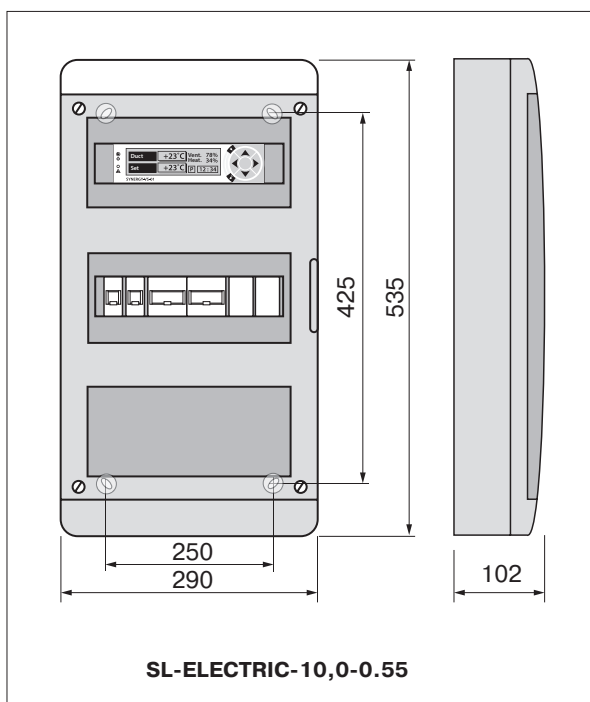


FC-51 frequency converter

Brief characteristics of the boxes

Box type	Heat exchanger	Heater	Maximum motor power	Switching and protective equipment of the actuator
SL-Electric-10,0-0.55	no, plate	electric, up to 10 kW	1 phase, AC/EC, up to 0.55 kW	relay
SL-Electric-16,0-2.0		electric, up to 16 kW	1-3 phases AC/EC up to 4.0 kW	16 A automatic circuit breaker and a contactor
SL-Electric-25,0-4.0		electric, up to 25 kW	1-3 phases AC/EC up to 4.0 kW	25 A automatic circuit breaker and a contactor
SL-Electric-25,0-11.0		electric, up to 25 kW	3 phases AC/EC up to 11.0 kW	40 A automatic circuit breaker and a contactor
SL-Electric-25,0-5.5f		electric, up to 25 kW	3 phases, AC up to 5.5 kW for a frequency converter	25 A automatic circuit breaker and an enabling signal
SL-Electric-25,0-11.0f		electric, up to 25 kW	3 phases, AC up to 11.0 kW for a frequency converter	50 A automatic circuit breaker and an enabling signal

Overall dimensions [mm]



SN series control boxes

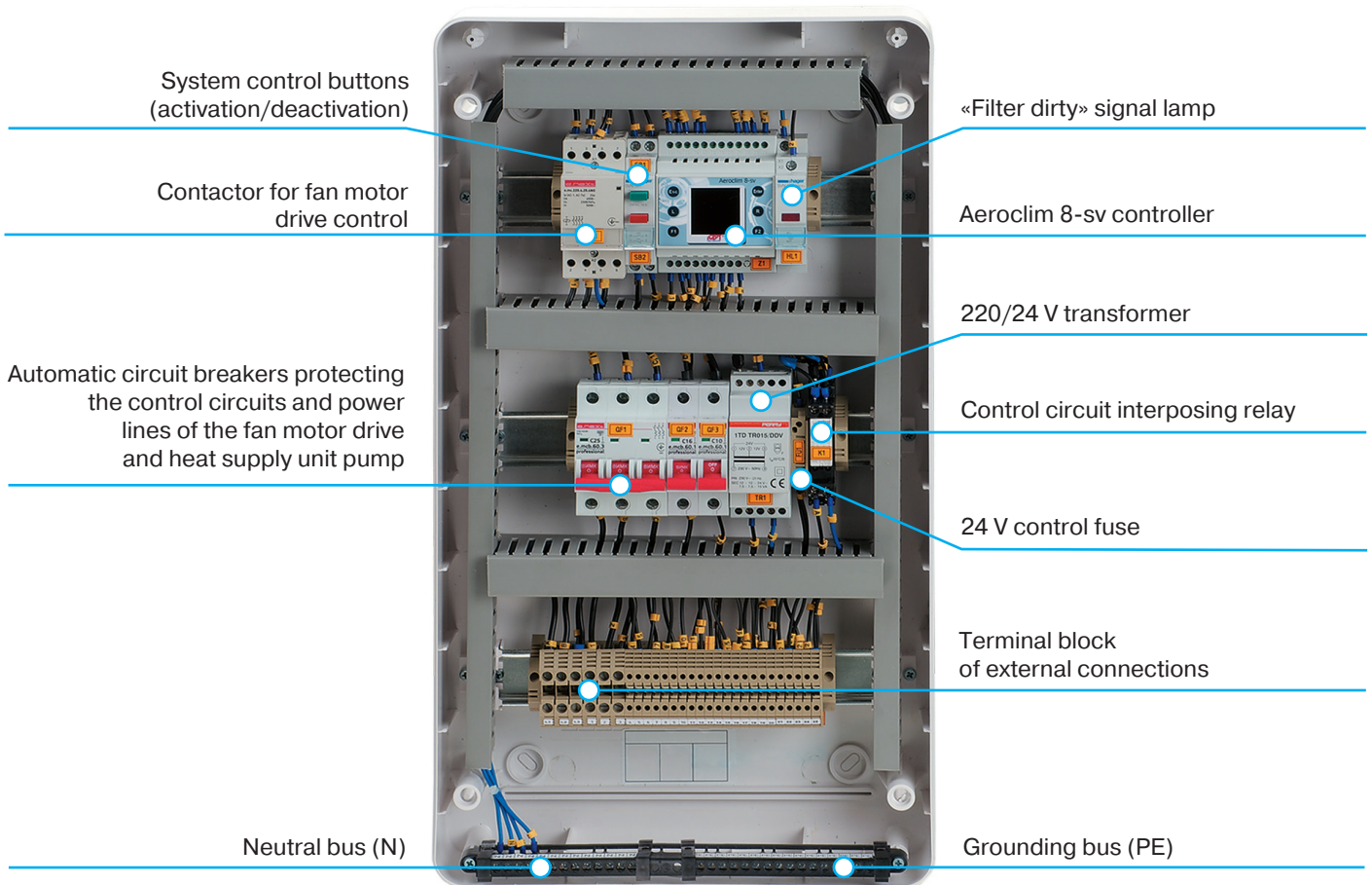


- The boxes are used to control supply and combined supply and exhaust air handling units with a water heater or an electric heater and a water or freon cooler.
 - The control system is based on SYNERGY VS-01 freely configurable controller.
 - The control and protection functions are implemented by means of relay and contactor circuits using modular switching and protection equipment.
 - Each box is equipped with the appropriate number of temperature sensors (NTC type).
 - The casing is rated IP40 (IP65 upgrade available on request)
- Box dimensions:
HxWxD: 535x290x102 mm (36 modules)
HxWxD: 535x398x102 mm (54 modules)

Control boxes for units with a water heater

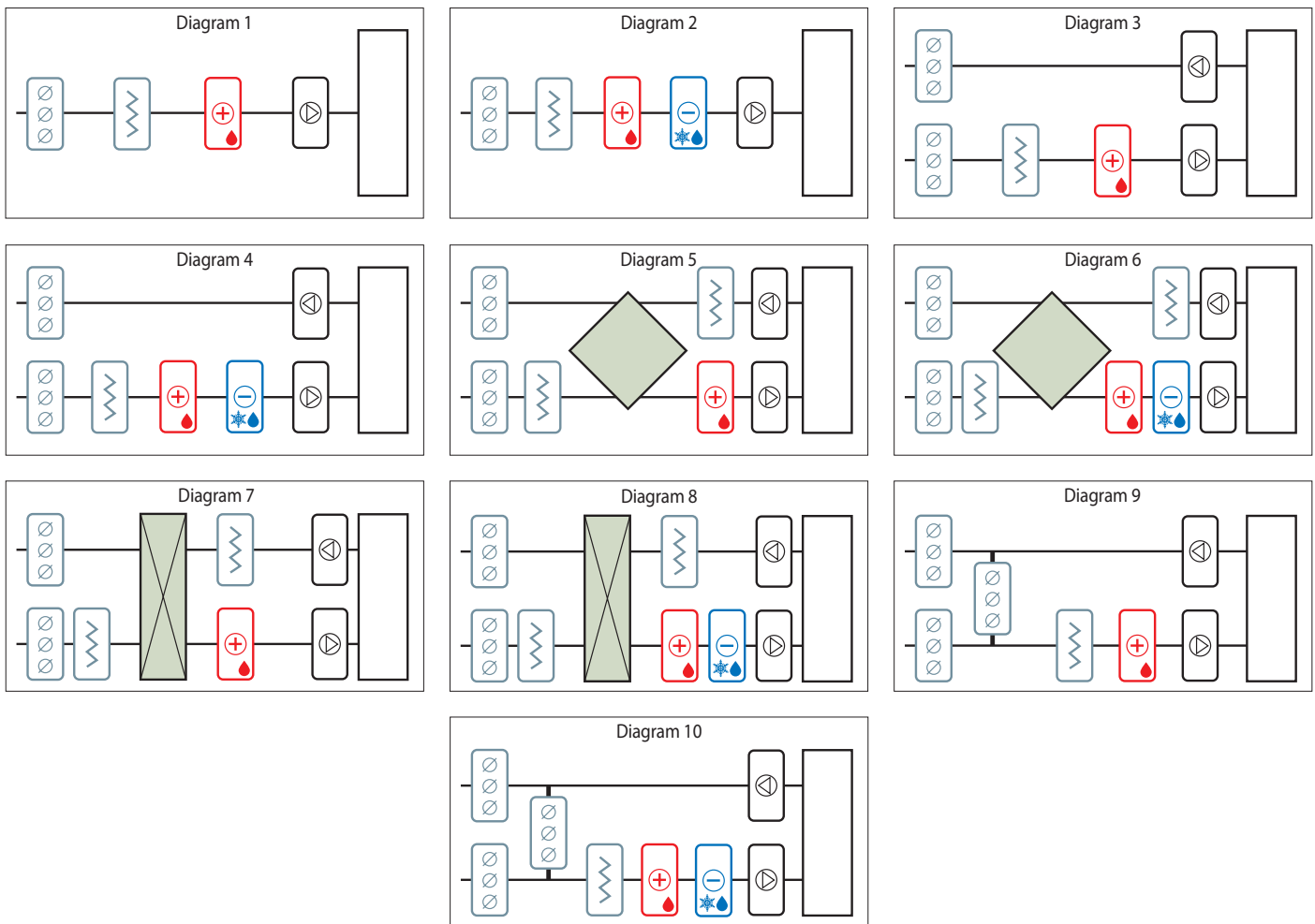
SN-V010-R-P-3P

Control box type	Heater type: water	Cooler type: V – water R – DX cooler (freon) 0 – no control	Fan drive type: _ – enabling signal for frequency converter connection 3F – 3-phase, no speed regulation 3P – 3-phase (380), stepless speed regulation
	Control type: 010 – analogue, 0-10 V 3T0 – 3-point	Heat exchanger type: P – plate heat exchanger R – rotary heat exchanger C – mixing chamber 0 – no heat exchanger	



The box is designed for automatic control of a direct-flow or combined supply and exhaust air handling unit (including those equipped with plate or rotary heat exchangers and mixing chambers) with a water heater and a water or freon cooler. The box has automatic circuit breakers protecting the control circuits and supply lines of the power equipment, a power transformer for 24 V control circuits and a terminal block for connecting sensors and actuators. Supply air temperature regulation is provided by Aeroclim 8-sv or Aeroclim 9-sv controller (depending on the air handling unit configuration) by means of the pre-installed sensors and the three-way valve of the heat supply unit.

The terminals for sending enabling signals to frequency converters provide fan motor drive control. The boxes with direct fan motor drive control are equipped with contactors. The system is activated/deactivated by means of the buttons installed directly into control box. Air filter condition is controlled by means of the signal lamps.



Aeroclim 8-sv freely configurable controller

The unit is designed to control a supply ventilation unit equipped with a heating section, a cooling section or a steam humidifier with the function of maintaining supply air temperature and humidity (indoor air). The settings are made by choosing the necessary equipment set (system configuration) in the controller menu.



Aeroclim 9-sv freely configurable controller

The unit is designed to control a supply ventilation unit equipped and a heating section with a steam humidifier to maintain the supply air temperature and humidity (indoor air) or a combined supply and exhaust air handling unit equipped with a heating and a cooling section, a heat exchanger (rotary or plate type, and a mixing chamber) to maintain the supply air temperature parameters (indoor air). The settings are made by choosing the necessary equipment set (system configuration) in the controller menu.

Functional capabilities of control boxes (DX cooler)

Functions	SN-V010-R-O	SN-V010-R-O-3F	SN-V010-R-O-3P	SN-V010-R-P	SN-V010-R-P-3F	SN-V010-R-P-3P	SN-V010-R-R	SN-V010-R-R-3F	SN-V010-R-R-3P	SN-V010-R-C	SN-V010-R-C-3F	SN-V010-R-C-3P
Typical mounting layout	1-4	1-4	1-4	5-6	5-6	5-6	7-8	7-8	7-8	9-10	9-10	9-10
Controller	Aeroclim 8-sv						Aeroclim 9-sv					
Fans												
Actuator power supply		●	●		●	●		●	●		●	●
Operation control	●	●	●	●	●	●	●	●	●	●	●	●
Switching ON/OFF	●	●	●	●	●	●	●	●	●	●	●	●
Stepless fan speed control	●		●	●		●	●		●	●		●
Water heater												
0...10 V control signal	●	●	●	●	●	●	●	●	●	●	●	●
Protection by return water temperature	●	●	●	●	●	●	●	●	●	●	●	●
Protection by thermostat feedback	●	●	●	●	●	●	●	●	●	●	●	●
Preheating	●	●	●	●	●	●	●	●	●	●	●	●
DX cooler												
0...10 V control signal	●	●	●	●	●	●	●	●	●	●	●	●
Plate heat exchanger												
Freeze protection (by temperature sensor feedback)				●	●	●						
Rotary heat exchanger												
Actuator power output							●	●	●			
Freeze protection							●	●	●			
0...10 V control signal							●	●	●			
Mixing chamber												
0...10 V control signal										●	●	●
Air filters												
Clogging control	●	●	●	●	●	●	●	●	●	●	●	●
Additional features												
230 V damper actuator connection	●	●	●	●	●	●	●	●	●	●	●	●
Weekly timer	●	●	●	●	●	●	●	●	●	●	●	●
Remote control panel connection	●	●	●	●	●	●	●	●	●	●	●	●

● standard function ● option

Box functionality (water cooler)

Functions	SN-V010-V-O	SN-V010-V-O-3F	SN-V010-V-O-3P	SN-V010-V-P	SN-V010-V-P-3F	SN-V010-V-P-3P	SN-V010-V-R	SN-V010-V-R-3F	SN-V010-V-R-3P	SN-V010-V-C	SN-V010-V-C-3F	SN-V010-V-C-3P
Typical mounting layout	1-4	1-4	1-4	5-6	5-6	5-6	7-8	7-8	7-8	9-10	9-10	9-10
Controller	Aeroclim 8-sv			Aeroclim 9-sv								
Fans												
Actuator power supply		●	●		●	●		●	●		●	●
Operation control	●	●	●	●	●	●	●	●	●	●	●	●
Switching ON/OFF	●	●	●	●	●	●	●	●	●	●	●	●
Stepless fan speed control	●		●	●		●	●		●	●		●
Water heater												
0...10 V control signal	●	●	●	●	●	●	●	●	●	●	●	●
Protection by return water temperature	●	●	●	●	●	●	●	●	●	●	●	●
Protection by thermostat feedback	●	●	●	●	●	●	●	●	●	●	●	●
Preheating	●	●	●	●	●	●	●	●	●	●	●	●
Water cooler												
0...10 V control signal	●	●	●	●	●	●	●	●	●	●	●	●
Plate heat exchanger												
Freeze protection (by temperature sensor feedback)				●	●	●						
Rotary heat exchanger												
Actuator power output							●	●	●			
Freeze protection							●	●	●			
0...10 V control signal							●	●	●			
Mixing chamber												
0...10 V control signal										●	●	●
Air filters												
Clogging control	●	●	●	●	●	●	●	●	●	●	●	●
Additional features												
230 V damper actuator connection	●	●	●	●	●	●	●	●	●	●	●	●
Weekly timer	●	●	●	●	●	●	●	●	●	●	●	●
Remote control panel connection	●	●	●	●	●	●	●	●	●	●	●	●

● standard function ● option

Optional equipment



Air damper actuator
(with a return spring)



Indoor temperature
sensor (Pt1000 type)



DTV 500 differential
pressure switch



USWK heat supply
mixing unit



FC-51 frequency
converter

Control boxes for units with an electric heater

SN-E016-R-P-3P

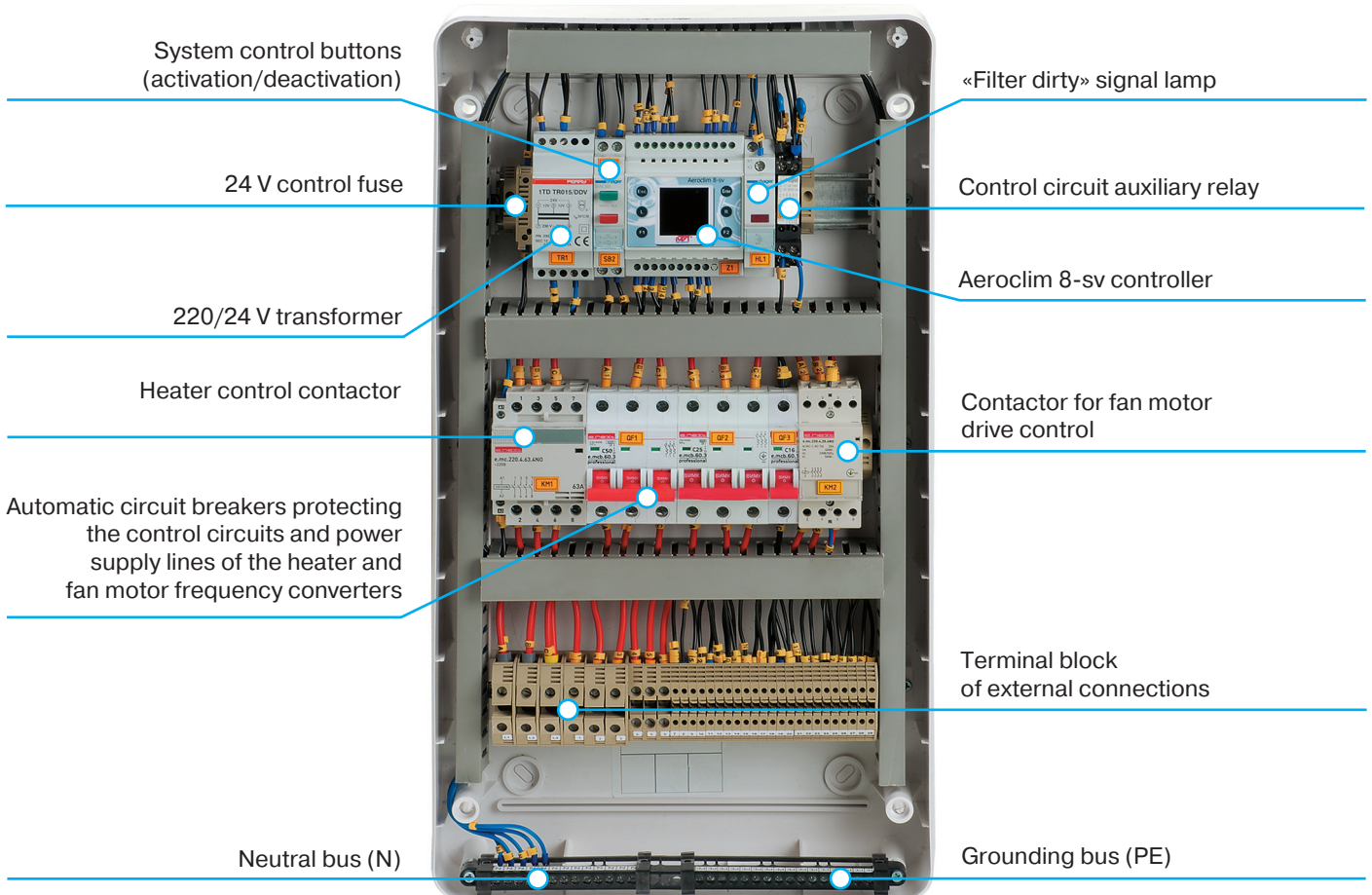
Control
box type

Heater type:
electric
Heater power:
0.16-16 kW

Cooler type:
V – water
R – DX cooler
(freon)
0 – no control

Heat exchanger type:
P – plate heat exchanger
R – rotary heat exchanger
C – mixing chamber
0 – no heat exchanger

Fan drive type:
_ – enabling signal
for frequency converter connection
3F – 3-phase, no speed regulation
3P – 3-phase (380), stepless speed
regulation



The box is designed for automatic control of a direct-flow or combined supply and exhaust air handling unit (including those equipped with plate or rotary heat exchangers and mixing chambers) with an electric heater and a water or freon cooler. The box has automatic circuit breakers protecting the control circuits and supply lines of the power equipment, a power transformer for 24 V control circuits and a terminal block for connecting sensors and actuators. Supply air temperature regulation is provided by Aeroclim 8-sv or Aeroclim 9-sv controller (depending on the air handling unit configuration) by means of the pre-installed sensors and the heater contactor.

The heater is connected directly to box terminals or with an optional power controller. The analogue output signal is used for stepless control. The terminals for sending enabling signals to frequency converters provide fan motor drive control. The boxes with direct fan motor drive control are equipped with contactors. The system is activated/deactivated by means of the buttons installed directly into control box. Air filter condition is controlled by means of the signal lamps.



Aeroclim 8-sv freely configurable controller

The unit is designed to control a supply ventilation unit equipped with a heating section, a cooling section or a steam humidifier with the function of maintaining supply air temperature and humidity (indoor air). The settings are made by choosing the necessary equipment set (system configuration) in the controller menu.



Aeroclim 9-sv freely configurable controller

The unit is designed to control a supply ventilation unit equipped and a heating section with a steam humidifier to maintain the supply air temperature and humidity (indoor air) or a combined supply and exhaust air handling unit equipped with a heating and a cooling section, a heat exchanger (rotary or plate type, and a mixing chamber) to maintain the supply air temperature parameters (indoor air). The settings are made by choosing the necessary equipment set (system configuration) in the controller menu.

Functional capabilities of control boxes (DX cooler)

Functions	SN-Exx-R-O	SN-Exx-R-O-3F	SN-Exx-R-O-3P	SN-Exx-R-P	SN-Exx-R-P-3F	SN-Exx-R-P-3P	SN-Exx-R-R	SN-Exx-R-R-3F	SN-Exx-R-R-3P	SN-Exx-R-C	SN-Exx-R-C-3F	SN-Exx-R-C-3P
Typical mounting layout	1-4	1-4	1-4	5-6	5-6	5-6	7-8	7-8	7-8	9-10	9-10	9-10
Controller	Aeroclim 8-sv						Aeroclim 9-sv					
Fans												
Actuator power supply		●	●		●	●		●	●		●	●
Operation control	●	●	●	●	●	●	●	●	●	●	●	●
Switching ON/OFF	●	●	●	●	●	●	●	●	●	●	●	●
Stepless fan speed control	●		●	●		●	●		●	●		●
Electric heater												
Step fan speed control	●	●	●	●	●	●	●	●	●	●	●	●
Stepless fan speed control	●	●	●	●	●	●	●	●	●	●	●	●
EAH forced-air cooling	●	●	●	●	●	●	●	●	●	●	●	●
Overheating protection	●	●	●	●	●	●	●	●	●	●	●	●
DX cooler												
0...10 V control signal	●	●	●	●	●	●	●	●	●	●	●	●
Plate heat exchanger												
Freeze protection (by temperature sensor feedback)				●	●	●						
Rotary heat exchanger												
Actuator power output							●	●	●			
Freeze protection							●	●	●			
0...10 V control signal							●	●	●			
Mixing chamber												
0...10 V control signal										●	●	●
Air filters												
Clogging control	●	●	●	●	●	●	●	●	●	●	●	●
Additional features												
230 V damper actuator connection	●	●	●	●	●	●	●	●	●	●	●	●
Weekly timer	●	●	●	●	●	●	●	●	●	●	●	●
Remote control panel connection	●	●	●	●	●	●	●	●	●	●	●	●

● standard function ● option

Box functionality (water cooler)

Functions	SN-Exx-V-O	SN-Exx-V-O-3F	SN-Exx-V-O-3P	SN-Exx-V-P	SN-Exx-V-P-3F	SN-Exx-V-P-3P	SN-Exx-V-R	SN-Exx-V-R-3F	SN-Exx-V-R-3P	SN-Exx-V-C	SN-Exx-V-C-3F	SN-Exx-V-C-3P
Typical mounting layout	1-4	1-4	1-4	5-6	5-6	5-6	7-8	7-8	7-8	9-10	9-10	9-10
Controller	Aeroclim 8-sv						Aeroclim 9-sv					
Fans												
Actuator power supply		●	●		●	●		●	●		●	●
Operation control	●	●	●	●	●	●	●	●	●	●	●	●
Switching ON/OFF	●	●	●	●	●	●	●	●	●	●	●	●
Stepless fan speed control	●		●	●		●	●		●	●		●
Electric heater												
Step fan speed control	●	●	●	●	●	●	●	●	●	●	●	●
Stepless fan speed control	●	●	●	●	●	●	●	●	●	●	●	●
EAH forced-air cooling	●	●	●	●	●	●	●	●	●	●	●	●
Overheating protection	●	●	●	●	●	●	●	●	●	●	●	●
Water cooler												
0...10 V control signal	●	●	●	●	●	●	●	●	●	●	●	●
Plate heat exchanger												
Freeze protection (by temperature sensor feedback)				●	●	●						
Rotary heat exchanger												
Actuator power output							●	●	●			
Freeze protection							●	●	●			
0...10 V control signal							●	●	●			
Mixing chamber												
0...10 V control signal										●	●	●
Air filters												
Clogging control	●	●	●	●	●	●	●	●	●	●	●	●
Additional features												
230 V damper actuator connection	●	●	●	●	●	●	●	●	●	●	●	●
Weekly timer	●	●	●	●	●	●	●	●	●	●	●	●
Remote control panel connection	●	●	●	●	●	●	●	●	●	●	●	●

● standard function ● option

Optional equipment



Air damper actuator



Indoor temperature sensor (Pt1000 type)



DTV 500 differential pressure switch



RNS-16 and RNS-25 heater output controller



FC-51 frequency converter

SN-E control boxes

Box type	Number of heater stages	Heater power	Dimensions [mm] HxWxD
SN-E016-R(V)-0	1	16 kW	535x290x102
SN-E016-R(V)-P	1	16 kW	535x290x102
SN-E016-R(V)-R	1	16 kW	535x290x102
SN-E016-R(V)-C	1	16 kW	535x290x102
SN-E025-R(V)-0	1	25 kW	535x290x102
SN-E025-R(V)-P	1	25 kW	535x290x102
SN-E025-R(V)-R	1	25 kW	535x290x102
SN-E025-R(V)-C	1	25 kW	535x290x102
SN-E032-R(V)-0	2	32 kW	535x398x102
SN-E032-R(V)-P	2	32 kW	535x398x102
SN-E032-R(V)-R	2	32 kW	535x398x102
SN-E032-R(V)-C	2	32 kW	535x398x102
SN-E050-R(V)-0	2	50 kW	535x398x102
SN-E050-R(V)-P	2	50 kW	535x398x102
SN-E050-R(V)-R	2	50 kW	535x398x102
SN-E050-R(V)-C	2	50 kW	535x398x102
SN-E045-R(V)-0	3	45 kW	535x398x102
SN-E045-R(V)-P	3	45 kW	535x398x102
SN-E045-R(V)-R	3	45 kW	535x398x102
SN-E045-R(V)-C	3	45 kW	535x398x102

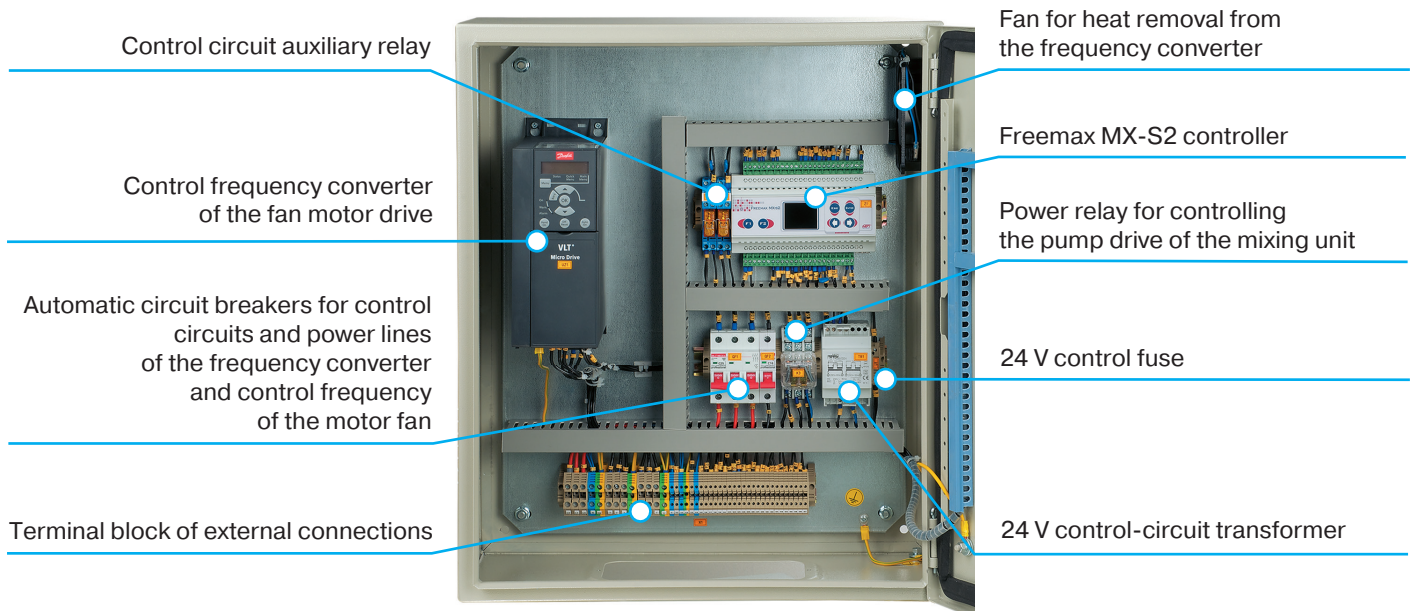
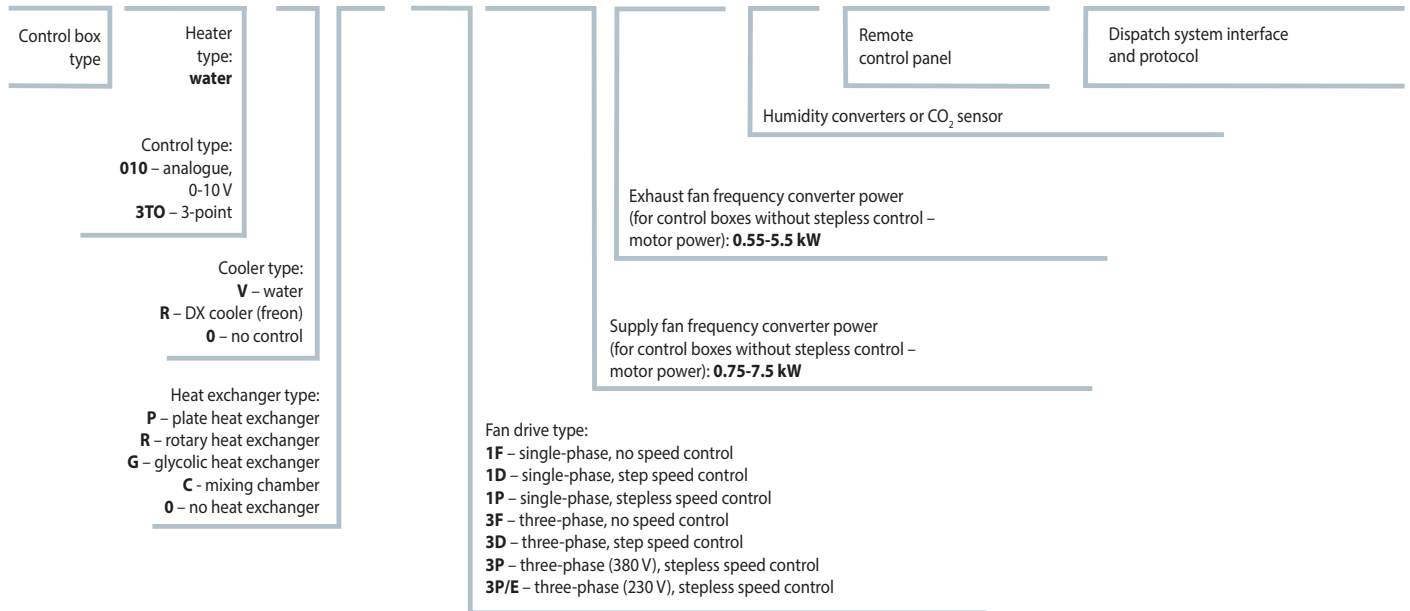
SR series control boxes



- The boxes are used to control direct flow and combined supply and exhaust air handling units with a water heater or an electric heater and a water or freon cooler.
- The control system is based on Freemax MX-s2 controller.
- The control and protection functions are implemented by means of relay and contactor circuits using modular and industrial switching and protection equipment.
- Each box is equipped with the appropriate number of temperature sensors (Pt1000 type).
- The casing is rated IP54 (IP65 with frequency converters).
- Box dimensions depend on number of electric heater stages, availability and power of frequency converters.

Control boxes for units with a water heater

SR-V010-R-P-3P075/055-VF-AirEL-S-RS485-Lon



The box is designed for automatic control of a direct-flow or combined supply and exhaust air handling unit (including those equipped with plate, rotary or glycolic heat exchangers and mixing chambers) with a water heater and a water or freon cooler.

The box has automatic circuit breakers protecting the control circuits and supply lines of the power equipment, a power supply unit for 24 V control circuits, and a terminal block for connecting sensors and actuators.

Supply air temperature regulation is provided by Freemax MX controller by means of the pre-installed sensors and control of the heat supply unit three-way valve.

The controller can be included to the dispatch system with standard interfaces and data communication protocols.

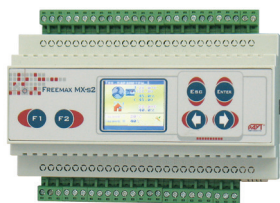
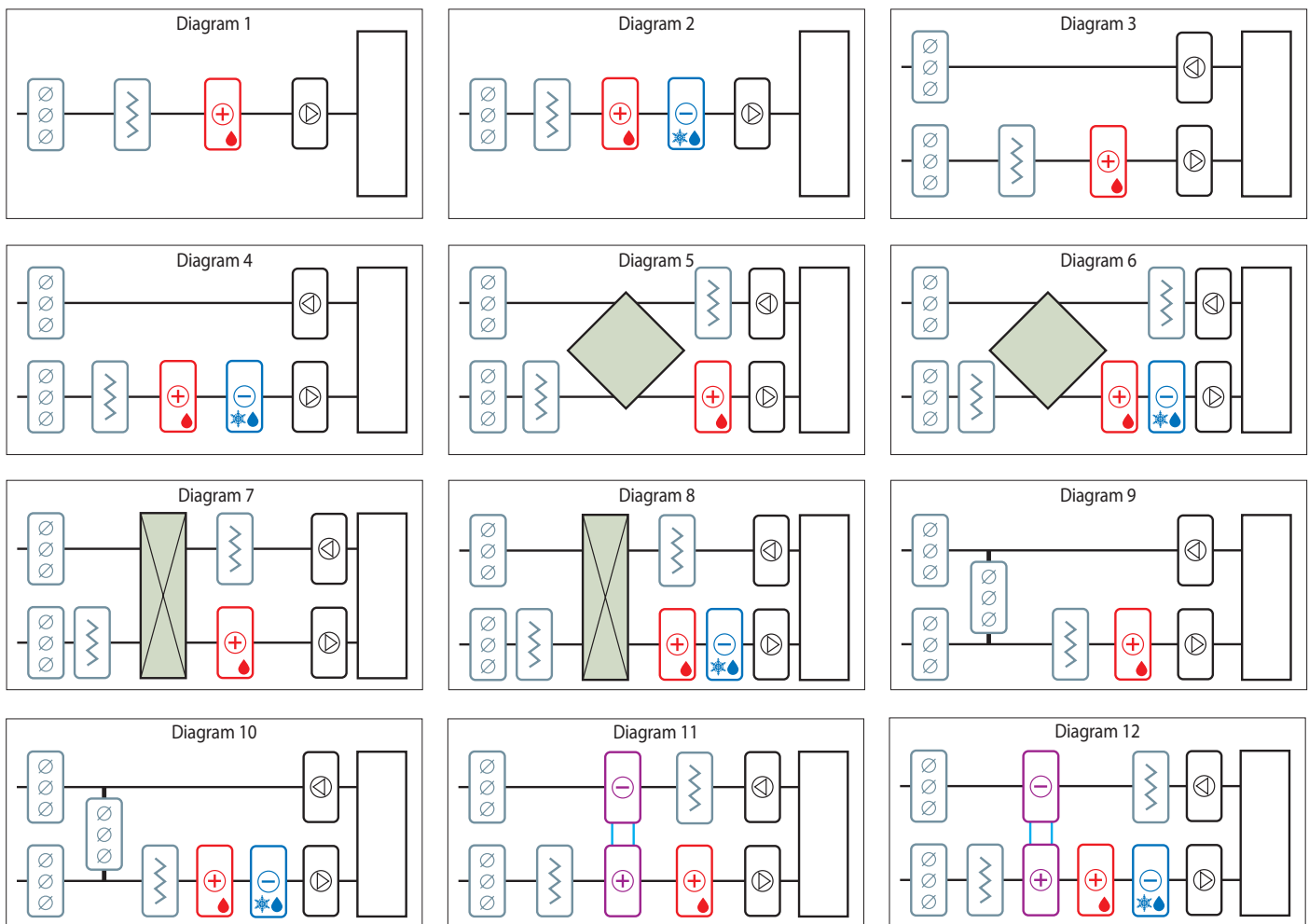
To control the fan motor drives, the control boxes are equipped with contactors for direct control or frequency converters for stepless control.

Drive output frequency manual controllers, on/off buttons and control indicator lamps are installed on the door of the control box.

Heat removal from the frequency converters is carried out by the forced air exchange system of the control box internal space.

Control system allows connection of a remote control panel, humidity and CO₂ sensors.

By the Customer request it is possible to produce non-standard control boxes according to customer features of power equipment, air handling unit configuration. It is also possible to replace component parts with the devices from other manufacturers.



Freemax MX-S2 freely programmable controller

The unit is designed to control a supply or supply and exhaust air handling in accordance with a specially created algorithm for each unit type.

Incorporates different communication interfaces for use in dispatch systems.

Functional capabilities of control boxes (DX cooler)

Functions	SR-V010-R-0-1D008	SR-V010-R-0-1D008/008	SR-V010-R-0-3F(E)xx	SR-V010-R-0-3P(E)xx	SR-V010-R-0-3P(E)xx/xx	SR-V010-R-0-3PECxx	SR-V010-R-0-3PECxx/xx	SR-V010-R-P-1D008/008	SR-V010-R-P-3F(E)xx	SR-V010-R-P-3P(E)xx	SR-V010-R-P-3PECxx/xx	SR-V010-R-R-1D008	SR-V010-R-R-3F(E)xx/xx	SR-V010-R-R-3P(E)xx/xx	SR-V010-R-R-3PECxx/xx	SR-V010-R-C-1D008/008	SR-V010-R-C-3F(E)xx/xx	SR-V010-R-C-3P(E)xx/xx	SR-V010-R-C-3PECxx/xx	SR-V010-R-G-1D008/008	SR-V010-R-G-3F(E)xx/xx	SR-V010-R-G-3P(E)xx/xx	SR-V010-R-G-3PECxx/xx
Typical mounting layout	1-4	1-4	1-4	1-4	1-4	1-4	1-4	5-6	5-6	5-6	5-6	7-8	7-8	7-8	7-8	9-10	9-10	9-10	9-10	11-12	11-12	11-12	11-12
Fans																							
Operation control	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Switching ON/OFF	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Step control supply ventilation	●	●						●				●				●				●			
Step control exhaust ventilation		●						●				●				●				●			
Stepless control supply ventilation				●	●	●	●			●	●			●	●			●	●			●	●
Stepless control exhaust ventilation					●		●			●	●			●	●			●	●			●	●
Water heater																							
0...10 V control signal	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Protection by return water temperature	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Protection by thermostat feedback	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Preheating	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
DX cooler																							
Discrete control signal	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
0...10 V control signal	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Plate heat exchanger																							
Freeze protection (by temperature sensor feedback)								●	●	●	●												
Rotary heat exchanger																							
Actuator power output												●	●	●	●								
Freeze protection												●	●	●	●								
0...10 V control signal												●	●	●	●								
Mixing chamber																							
0...10 V control signal																●	●	●	●				

Functions	SR-V010-R-0-1D008	SR-V010-R-0-1D008/008	SR-V010-R-0-3F(E)xx	SR-V010-R-0-3P(E)xx	SR-V010-R-0-3P(E)xx/xx	SR-V010-R-0-3PECxx	SR-V010-R-0-3PECxx/xx	SR-V010-R-P-1D008/008	SR-V010-R-P-3F(E)xx	SR-V010-R-P-3P(E)xx	SR-V010-R-P-3PECxx/xx	SR-V010-R-R-1D008	SR-V010-R-R-3F(E)xx/xx	SR-V010-R-R-3P(E)xx/xx	SR-V010-R-R-3PECxx/xx	SR-V010-R-C-1D008/008	SR-V010-R-C-3F(E)xx/xx	SR-V010-R-C-3P(E)xx/xx	SR-V010-R-C-3PECxx/xx	SR-V010-R-G-1D008/008	SR-V010-R-G-3F(E)xx/xx	SR-V010-R-G-3P(E)xx/xx	SR-V010-R-G-3PECxx/xx		
Typical mounting layout	1-4	1-4	1-4	1-4	1-4	1-4	1-4	5-6	5-6	5-6	5-6	7-8	7-8	7-8	7-8	9-10	9-10	9-10	9-10	11-12	11-12	11-12	11-12		
Glycolic heat exchanger																									
Pump power output																						●	●	●	●
Freeze protection																						●	●	●	●
0...10 V control signal																						●	●	●	●
Air filters																									
Clogging control	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Signaling and status display																									
Running signal (green light indicator)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Alarm signal (red light indicator)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Additional features																									
230 V damper actuator connection	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Weekly timer	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Control panel connection	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Tripping signal from the automatic fire alarm system	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
LCD display with an English language interface	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Dispatching*	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

● standard function ● option

*RS485, Ethernet, TP/TF-10 interfaces
ModBus-RTU, ModBus-TCP, LonTalk protocols

Functional capabilities of control boxes (water cooler)

Functions	SR-V010-V-0-1D008	SR-V010-V-0-1D008/008	SR-V010-V-0-3F(E)xx	SR-V010-V-0-3P(E)xx	SR-V010-V-0-3P(E)xx/xx	SR-V010-V-0-3PECxx	SR-V010-V-0-3PECxx/xx	SR-V010-V-P-1D008/008	SR-V010-V-P-3F(E)xx/xx	SR-V010-V-P-3P(E)xx/xx	SR-V010-V-P-3P(E)xx/xx	SR-V010-V-R-1D008/008	SR-V010-V-R-3F(E)xx/xx	SR-V010-V-R-3P(E)xx/xx	SR-V010-V-R-3PECxx/xx	SR-V010-V-C-1D008/008	SR-V010-V-C-3F(E)xx/xx	SR-V010-V-C-3P(E)xx/xx	SR-V010-V-C-3PECxx/xx	SR-V010-V-G-1D008/008	SR-V010-V-G-3F(E)xx/xx	SR-V010-V-G-3P(E)xx/xx	SR-V010-V-G-3PECxx/xx
Typical mounting layout	1-4	1-4	1-4	1-4	1-4	5-6	5-6	5-6	5-6	5-6	7-8	7-8	7-8	7-8	7-8	9-10	9-10	9-10	9-10	9-10	11-12	11-12	11-12
Fans																							
Operation control	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Switching ON/OFF	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Step control supply ventilation	●	●						●				●				●				●			
Step control exhaust ventilation		●						●				●				●				●			
Stepless control supply ventilation				●	●	●	●			●	●			●	●			●	●			●	●
Stepless control exhaust ventilation				●		●				●	●			●	●			●	●			●	●
Water heater																							
0...10 V control signal	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Protection by return water temperature	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Protection by thermostat feedback	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Preheating	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Water cooler																							
0...10 V control signal	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Plate heat exchanger																							
Freeze protection (by temperature sensor feedback)								●	●	●	●												
Rotary heat exchanger																							
Actuator power output												●	●	●	●								
Freeze protection												●	●	●	●								
0...10 V control signal												●	●	●	●								
Mixing chamber																							
0...10 V control signal																●	●	●	●				

Functions	SR-V010-V-0-1D008	SR-V010-V-0-1D008/008	SR-V010-V-0-3F(E)xx	SR-V010-V-0-3P(E)xx	SR-V010-V-0-3P(E)xx/xx	SR-V010-V-0-3PECxx	SR-V010-V-P-1D008/008	SR-V010-V-P-1D008/008	SR-V010-V-P-3F(E)xx/xx	SR-V010-V-P-3P(E)xx/xx	SR-V010-V-P-3P(E)xx/xx	SR-V010-V-R-1D008/008	SR-V010-V-R-3F(E)xx/xx	SR-V010-V-R-3P(E)xx/xx	SR-V010-V-R-3PECxx/xx	SR-V010-V-C-3F(E)xx/xx	SR-V010-V-C-3P(E)xx/xx	SR-V010-V-C-1D008/008	SR-V010-V-C-3PECxx/xx	SR-V010-V-G-1D008/008	SR-V010-V-G-3F(E)xx/xx	SR-V010-V-G-3P(E)xx/xx	SR-V010-V-G-3PECxx/xx
Typical mounting layout	1-4	1-4	1-4	1-4	1-4	5-6	5-6	5-6	5-6	5-6	7-8	7-8	7-8	7-8	7-8	9-10	9-10	9-10	9-10	9-10	11-12	11-12	11-12
Glycolic heat exchanger																							
Pump power output																						●	●
Freeze protection																						●	●
0...10 V control signal																						●	●
Air filters																							
Clogging control	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Signaling and status display																							
Running signal (green light indicator)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Alarm signal (red light indicator)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Additional features																							
230 V damper actuator connection	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Weekly timer	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Control panel connection	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Tripping signal from the automatic fire alarm system	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
LCD display with an English language interface	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Dispatching*	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

● standard function ● option

*RS485, Ethernet, TP/TF-10 interfaces
ModBus-RTU, ModBus-TCP, LonTalk protocols

SR SERIES CONTROL BOXES

Optional equipment



Air damper actuator
(with a return spring)



Indoor temperature
sensor (Pt1000 type)



DTV 500 differential pressure
switch



USWK heat supply
mixing unit



AirEL-SA remote
control panel



FC-51 frequency
converter



CO₂ concentration sensor



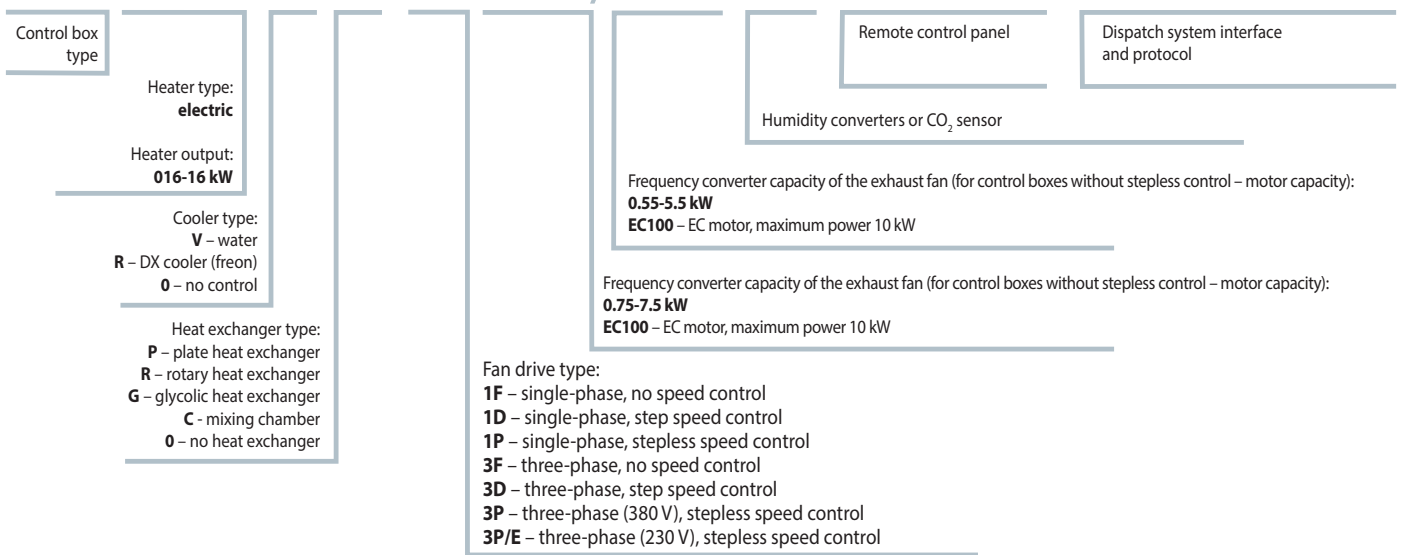
Humidity control sensor



Dispatching system

Control boxes for units with an electric heater

SR-E016-R-P-3P075/055-VF-AirEL-S-RS485-Lon



The box is designed for automatic control of a direct-flow or combined supply and exhaust air handling unit (including those equipped with plate or rotary heat exchangers and mixing chambers) with an electric heater and a water or freon cooler.

The box has automatic circuit breakers protecting the control circuits and supply lines of the power equipment, a power supply unit for 24 V control circuits, and a terminal block for connecting sensors and actuators.

Supply air temperature regulation is provided by FREEMAX MX controller by means of the pre-installed sensors and control of the heater section switching units.

The first heating section is controlled by means of a noncontact power relay via a PWM signal converted from an 0-10 V analogue signal in a special module. Sections 2-8 (depending on motor power) are controlled by the contactors.

The contactor for stress relief after switching the air handling unit off is installed in the power circuit of Section 1.

The controller can be included to the dispatch system with standard interfaces and data communication protocols.

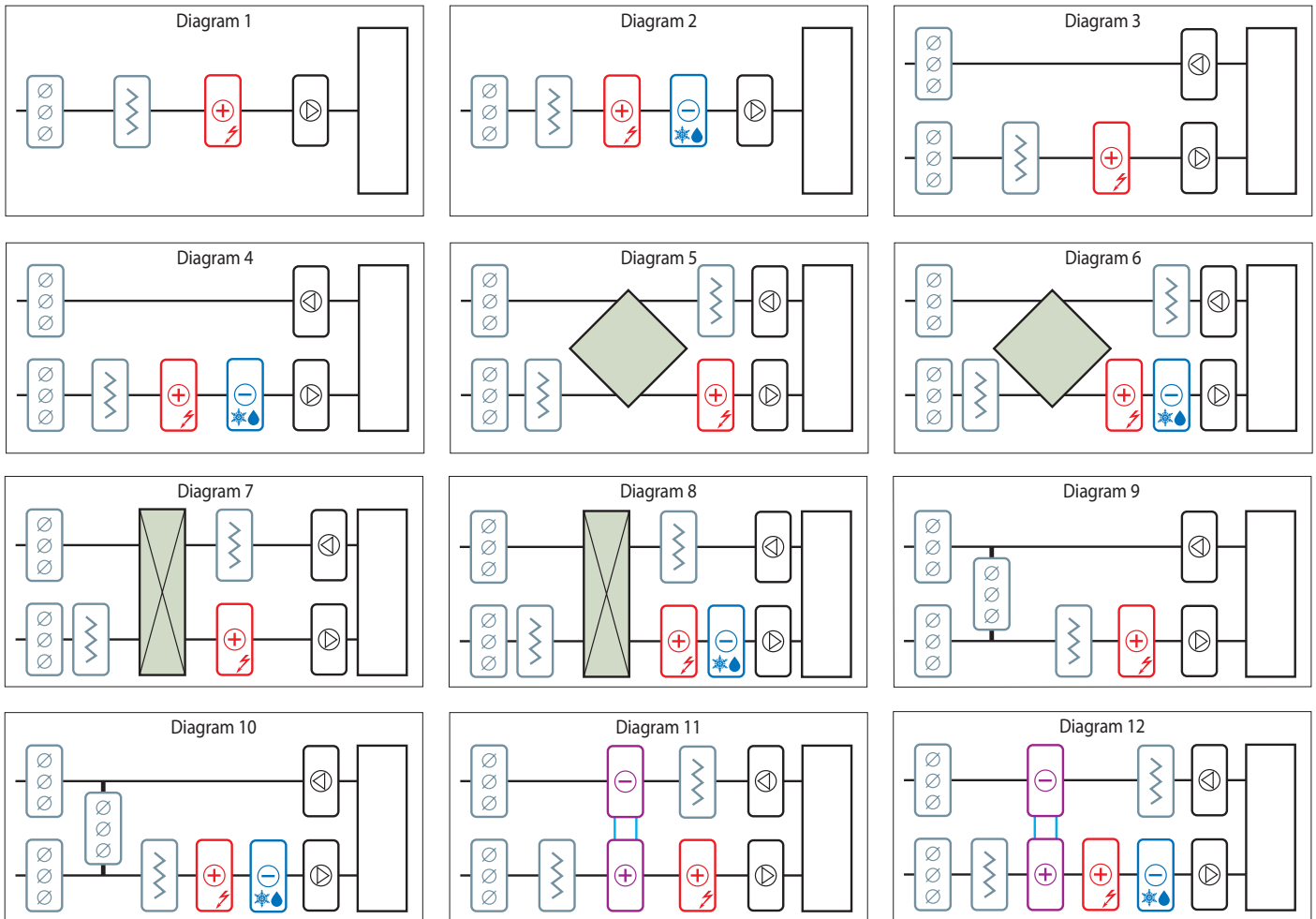
To control the fan motor drives the control boxes are equipped with contactors for direct control or frequency converters for stepless control.

Drive output frequency manual controllers, on/off buttons and control indicator lamps are installed on the door of the control box.

Heat removal from the frequency converters is carried out by the forced air exchange system of the control box internal space.

Control system allows connection of a remote control panel, humidity and CO₂ sensors.

By the Customer request it is possible to produce non-standard control boxes according to customer features of power equipment, number of heater stages, air handling unit configuration. It is also possible to replace component parts with the devices from other manufacturers.



Functional capabilities of control boxes (DX cooler)

Functions	SR-Exx-R-0-1D008	SR-Exx-R-0-1D008/008	SR-Exx-R-0-3F(E)xx	SR-Exx-R-0-3P(E)xx	SR-Exx-R-0-3P(E)xx/xx	SR-Exx-R-0-3PECxx	SR-Exx-R-0-3PECxx/xx	SR-Exx-R-P-1D008/008	SR-Exx-R-P-3F(E)xx/xx	SR-Exx-R-P-3P(E)xx/xx	SR-Exx-R-P-3PECxx/xx	SR-Exx-R-R-1D008/008	SR-Exx-R-R-3F(E)xx/xx	SR-Exx-R-R-3P(E)xx/xx	SR-Exx-R-R-3PECxx/xx	SR-Exx-R-C-1D008/008	SR-Exx-R-C-3F(E)xx/xx	SR-Exx-R-C-3P(E)xx/xx	SR-Exx-R-C-3PECxx/xx	SR-Exx-R-G-1D008/008	SR-Exx-R-G-3F(E)xx/xx	SR-Exx-R-G-3P(E)xx/xx	SR-Exx-R-G-3PECxx/xx	
Typical mounting layout	1-4	1-4	1-4	1-4	1-4	1-4	1-4	5-6	5-6	5-6	5-6	7-8	7-8	7-8	7-8	9-10	9-10	9-10	9-10	11-12	11-12	11-12	11-12	
Fans																								
Operation control	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Switching ON/OFF	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Step control supply ventilation	●	●						●								●					●			
Step control exhaust ventilation		●						●								●					●			
Stepless control supply ventilation				●	●	●	●			●	●				●	●			●	●			●	●
Stepless control exhaust ventilation				●		●				●	●				●	●			●	●			●	●
Electric heater																								
Step fan speed control	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Stepless fan speed control (1st stage)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
EAH forced-air cooling	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Overheating protection	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
DX cooler																								
Discrete control signal	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
0...10 V control signal	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Plate heat exchanger																								
Freeze protection (by temperature sensor feedback)								●	●	●	●									●	●	●		
Rotary heat exchanger																								
Actuator power output												●	●	●	●									
Freeze protection												●	●	●	●									
0...10 V control signal												●	●	●	●									
Mixing chamber																								
0...10 V control signal																●	●	●	●					

Functions	SR-Exx-R-0-1D008	SR-Exx-R-0-1D008/008	SR-Exx-R-0-3F(E)xx	SR-Exx-R-0-3P(E)xx	SR-Exx-R-0-3P(E)xx/xx	SR-Exx-R-0-3PECxx	SR-Exx-R-0-3PECxx/xx	SR-Exx-R-P-1D008/008	SR-Exx-R-P-3F(E)xx/xx	SR-Exx-R-P-3P(E)xx/xx	SR-Exx-R-P-3PECxx/xx	SR-Exx-R-R-1D008/008	SR-Exx-R-R-3F(E)xx/xx	SR-Exx-R-R-3P(E)xx/xx	SR-Exx-R-R-3PECxx/xx	SR-Exx-R-C-1D008/008	SR-Exx-R-C-3F(E)xx/xx	SR-Exx-R-C-3P(E)xx/xx	SR-Exx-R-C-3PECxx/xx	SR-Exx-R-G-1D008/008	SR-Exx-R-G-3F(E)xx/xx	SR-Exx-R-G-3P(E)xx/xx	SR-Exx-R-G-3PECxx/xx	
Typical mounting layout	1-4	1-4	1-4	1-4	1-4	1-4	1-4	5-6	5-6	5-6	5-6	7-8	7-8	7-8	7-8	9-10	9-10	9-10	9-10	11-12	11-12	11-12	11-12	
Glycolic heat exchanger																								
Pump power output																								
Freeze protection																								
0...10 V control signal																								
Air filters																								
Clogging control	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Signaling and status display																								
Running signal (green light indicator)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Alarm signal (red light indicator)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Additional features																								
230 V damper actuator connection	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Weekly timer	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Remote control panel connection	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Tripping signal from the automatic fire alarm system	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
LCD display with an English language interface	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Dispatching*	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

● standard function ● option

*RS485, Ethernet, TP/TF-10 interfaces
ModBus-RTU, ModBus-TCP, LonTalk protocols

Functional capabilities of control boxes (Water cooler)

Functions	SR-Exx-V-0-1D008	SR-Exx-V-0-1D008/008	SR-Exx-V-0-3F(E)xx	SR-Exx-V-0-3P(E)xx	SR-Exx-V-0-3P(E)xx/xx	SR-Exx-V-0-3PECxx	SR-Exx-V-0-3PECxx/xx	SR-Exx-V-P-1D008/008	SR-Exx-V-P-3F(E)xx/xx	SR-Exx-V-P-3P(E)xx/xx	SR-Exx-V-P-3PECxx/xx	SR-Exx-V-R-1D008/008	SR-Exx-V-R-3F(E)xx/xx	SR-Exx-V-R-3P(E)xx/xx	SR-Exx-V-R-3PECxx/xx	SR-Exx-V-C-1D008/008	SR-Exx-V-C-3F(E)xx/xx	SR-Exx-V-C-3P(E)xx/xx	SR-Exx-V-C-3PECxx/xx	SR-Exx-V-G-1D008/008	SR-Exx-V-G-3F(E)xx/x	SR-Exx-V-G-3P(E)xx/xx	SR-Exx-V-G-3PECxx/xx
Typical mounting layout	1-4	1-4	1-4	1-4	1-4	1-4	1-4	5-6	5-6	5-6	5-6	7-8	7-8	7-8	7-8	9-10	9-10	9-10	9-10	11-12	11-12	11-12	11-12
Fans																							
Operation control	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Switching ON/OFF	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Step control supply ventilation	●	●						●				●				●				●			
Step control exhaust ventilation		●						●				●				●				●			
Stepless control supply ventilation				●	●	●	●			●	●			●	●			●	●			●	●
Stepless control exhaust ventilation					●		●			●	●			●	●			●	●			●	●
Electric heater																							
Step fan speed control	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Stepless fan speed control (1st stage)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
EAH forced-air cooling	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Overheating protection	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Water cooler																							
0...10 V control signal	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Plate heat exchanger																							
Freeze protection (by temperature sensor feedback)								●	●	●	●									●	●	●	
Rotary heat exchanger																							
Actuator power output												●	●	●	●							●	●
Freeze protection												●	●	●	●							●	●
0...10 V control signal												●	●	●	●							●	●
Mixing chamber																							
0...10 V control signal																●	●	●	●				
Glycolic heat exchanger																							
Pump power output																					●	●	●
Freeze protection																					●	●	●
0...10 V control signal																					●	●	●

Functions	SR-Exx-V-0-1D008	SR-Exx-V-0-1D008/008	SR-Exx-V-0-3F(E)xx	SR-Exx-V-0-3P(E)xx	SR-Exx-V-0-3P(E)xx/xx	SR-Exx-V-0-3PECxx	SR-Exx-V-0-3PECxx/xx	SR-Exx-V-P-1D008/008	SR-Exx-V-P-3F(E)xx/xx	SR-Exx-V-P-3P(E)xx/xx	SR-Exx-V-P-3PECxx/xx	SR-Exx-V-R-1D008/008	SR-Exx-V-R-3F(E)xx/xx	SR-Exx-V-R-3P(E)xx/xx	SR-Exx-V-R-3PECxx/xx	SR-Exx-V-C-1D008/008	SR-Exx-V-C-3F(E)xx/xx	SR-Exx-V-C-3P(E)xx/xx	SR-Exx-V-C-3PECxx/xx	SR-Exx-V-G-1D008/008	SR-Exx-V-G-3F(E)xx/x	SR-Exx-V-G-3P(E)xx/xx	SR-Exx-V-G-3PECxx/xx	
Typical mounting layout	1-4	1-4	1-4	1-4	1-4	1-4	1-4	5-6	5-6	5-6	5-6	7-8	7-8	7-8	7-8	9-10	9-10	9-10	9-10	11-12	11-12	11-12	11-12	
Air filters																								
Clogging control	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Signaling and status display																								
Running signal (green light indicator)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Alarm signal (red light indicator)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Additional features																								
230 V damper actuator connection	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Weekly timer	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Remote control panel connection	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Tripping signal from the automatic fire alarm system	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
LCD display with an English language interface	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Dispatching*	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

● standard function ● option

*RS485, Ethernet, TP/TF-10 interfaces
ModBus-RTU, ModBus-TCP, LonTalk protocols

Optional equipment



Air damper actuator



Indoor temperature sensor (Pt1000 type)



DTV 500 differential pressure switch



AirEL-SA remote control panel



CO₂ concentration sensor



FC-51 frequency converter



Humidity control sensor



Dispatching system

SR-E control boxes

Type	Number, power of heater stages Type of control: A – stepless D – on/off	Ingress protection	Type	Number, power of heater stages Type of control: A – stepless D – on/off	Ingress protection
SR-E013-R(V)-x-1D008	1Ax13 kW	IP54	SR-E026-R(V)-x-1D008	1Ax26 kW	IP54
SR-E013-R(V)-x-1D008/008	1Ax13 kW	IP54	SR-E026-R(V)-x-1D008/008	1Ax26 kW	IP54
SR-E013-R(V)-x-3F(E)xx	1Ax13 kW	IP54	SR-E026-R(V)-x-3F(E)xx	1Ax26 kW	IP54
SR-E013-R(V)-x-3P(E)xx	1Ax13 kW	IP20	SR-E026-R(V)-x-3P(E)xx	1Ax26 kW	IP20
SR-E013-R(V)-x-3P(E)xx/xx	1Ax13 kW	IP20	SR-E026-R(V)-x-3P(E)xx/xx	1Ax26 kW	IP20
SR-E013-R(V)-x-3PECxx	1Ax13 kW	IP54	SR-E026-R(V)-x-3PECxx	1Ax26 kW	IP54
SR-E013-R(V)-x-3PECxx/xx	1Ax13 kW	IP54	SR-E026-R(V)-x-3PECxx/xx	1Ax26 kW	IP54
SR-E039-R(V)-x-1D008	1Ax39 kW	IP54	SR-E060-R(V)-x-1D008	1Ax24+2Dx24 kW	IP54
SR-E039-R(V)-x-1D008/008	1Ax39 kW	IP54	SR-E060-R(V)-x-1D008/008	1Ax24+2Dx24 kW	IP54
SR-E039-R(V)-x-3F(E)xx	1Ax39 kW	IP54	SR-E060-R(V)-x-3F(E)xx	1Ax24+2Dx24 kW	IP54
SR-E039-R(V)-x-3P(E)xx	1Ax39 kW	IP20	SR-E060-R(V)-x-3P(E)xx	1Ax24+2Dx24 kW	IP20
SR-E039-R(V)-x-3P(E)xx/xx	1Ax39 kW	IP20	SR-E060-R(V)-x-3P(E)xx/xx	1Ax24+2Dx24 kW	IP20
SR-E039-R(V)-x-3PECxx	1Ax39 kW	IP54	SR-E060-R(V)-x-3PECxx	1Ax24+2Dx24 kW	IP54
SR-E039-R(V)-x-3PECxx/xx	1Ax39 kW	IP54	SR-E060-R(V)-x-3PECxx/xx	1Ax24+2Dx24 kW	IP54
SR-E078-R(V)-x-1D008	1Ax36+1Dx36 kW	IP54	SR-E100-R(V)-x-1D008	1Ax24+3Dx24 kW	IP54
SR-E078-R(V)-x-1D008/008	1Ax36+1Dx36 kW	IP54	SR-E100-R(V)-x-1D008/008	1Ax24+3Dx24 kW	IP54
SR-E078-R(V)-x-3F(E)xx	1Ax36+1Dx36 kW	IP54	SR-E100-R(V)-x-3F(E)xx	1Ax24+3Dx24 kW	IP54
SR-E078-R(V)-x-3P(E)xx	1Ax36+1Dx36 kW	IP20	SR-E100-R(V)-x-3P(E)xx	1Ax24+3Dx24 kW	IP20
SR-E078-R(V)-x-3P(E)xx/xx	1Ax36+1Dx36 kW	IP20	SR-E100-R(V)-x-3P(E)xx/xx	1Ax24+3Dx24 kW	IP20
SR-E078-R(V)-x-3PECxx	1Ax36+1Dx36 kW	IP54	SR-E100-R(V)-x-3PECxx	1Ax24+3Dx24 kW	IP54
SR-E078-R(V)-x-3PECxx/xx	1Ax36+1Dx36 kW	IP54	SR-E100-R(V)-x-3PECxx/xx	1Ax24+3Dx24 kW	IP54
SR-E117-R(V)-x-1D008	1Ax36+2Dx36 kW	IP54	SR-E156-R(V)-x-1D008	1Ax36+3Dx36 kW	IP54
SR-E117-R(V)-x-1D008/008	1Ax36+2Dx36 kW	IP54	SR-E156-R(V)-x-1D008/008	1Ax36+3Dx36 kW	IP54
SR-E117-R(V)-x-3F(E)xx	1Ax36+2Dx36 kW	IP54	SR-E156-R(V)-x-3F(E)xx	1Ax36+3Dx36 kW	IP54
SR-E117-R(V)-x-3P(E)xx	1Ax36+2Dx36 kW	IP20	SR-E156-R(V)-x-3P(E)xx	1Ax36+3Dx36 kW	IP20
SR-E117-R(V)-x-3P(E)xx/xx	1Ax36+2Dx36 kW	IP20	SR-E156-R(V)-x-3P(E)xx/xx	1Ax36+3Dx36 kW	IP20
SR-E117-R(V)-x-3PECxx	1Ax36+2Dx36 kW	IP54	SR-E156-R(V)-x-3PECxx	1Ax36+3Dx36 kW	IP54
SR-E117-R(V)-x-3PECxx/xx	1Ax36+2Dx36 kW	IP54	SR-E156-R(V)-x-3PECxx/xx	1Ax36+3Dx36 kW	IP54
SR-E200-R(V)-x-1D008	1Ax24+7Dx24 kW	IP54	SR-E240-R(V)-x-1D008	1Ax30+7Dx30 kW	IP54
SR-E200-R(V)-x-1D008/008	1Ax24+7Dx24 kW	IP54	SR-E240-R(V)-x-1D008/008	1Ax30+7Dx30 kW	IP54
SR-E200-R(V)-x-3F(E)xx	1Ax24+7Dx24 kW	IP54	SR-E240-R(V)-x-3F(E)xx	1Ax30+7Dx30 kW	IP54
SR-E200-R(V)-x-3P(E)xx	1Ax24+7Dx24 kW	IP20	SR-E240-R(V)-x-3P(E)xx	1Ax30+7Dx30 kW	IP20
SR-E200-R(V)-x-3P(E)xx/xx	1Ax24+7Dx24 kW	IP20	SR-E240-R(V)-x-3P(E)xx/xx	1Ax30+7Dx30 kW	IP20
SR-E200-R(V)-x-3PECxx	1Ax24+7Dx24 kW	IP54	SR-E240-R(V)-x-3PECxx	1Ax30+7Dx30 kW	IP54
SR-E200-R(V)-x-3PECxx/xx	1Ax24+7Dx24 kW	IP54	SR-E240-R(V)-x-3PECxx/xx	1Ax30+7Dx30 kW	IP54

SRC series control boxes (for custom-built round air handling units)



■ Application

SRC control boxes are designed to control custom-built round-section supply and combined supply and exhaust air handling units as well as implementing algorithms for supply air temperature regulation and protecting the air handling unit component equipment.

There are two types of control boxes available for air handling units with electric heaters:

SRC-x/x with discrete EAH control by means of a contactor.

SRC-x/x-U with analogue EAH control by means of 0...10 V signal supplied to the respective input terminals of the NK-U control unit.

SRC-V010 are designed for air handling units with round-section NKV water heaters.

All SRC control boxes are capable of controlling supply fans or supply and exhaust fans.

The boxes are compatible with air handling units equipped with the following fan series: TT, TT PRO, TT Silent-M, VKP, VK, VKM, VKMz, VKMI, VKM EC, KSA, KSB, KSD, VKOM, VKF E (see the VENTS INDUSTRIAL VENTILATION catalogue).

■ Design

The control boxes are enclosed in an IP54 metal casing and utilize modular and industry-standard switching and protective devices.

The control system is based on the ARCON-34 logical device which enables supply air temperature regulation according to a pre-set value and provides electric or water heater protection.

The systems enables single-speed fan drive control.

To control the air flow rate, the fans have to be equipped with RS controllers.

SRC-E3.4/1-U

Control box type

Heater type:
E – electric
V010 – water

Electric heater control type:
 _ – discrete (on/off)
U – analogue (0...10 V)

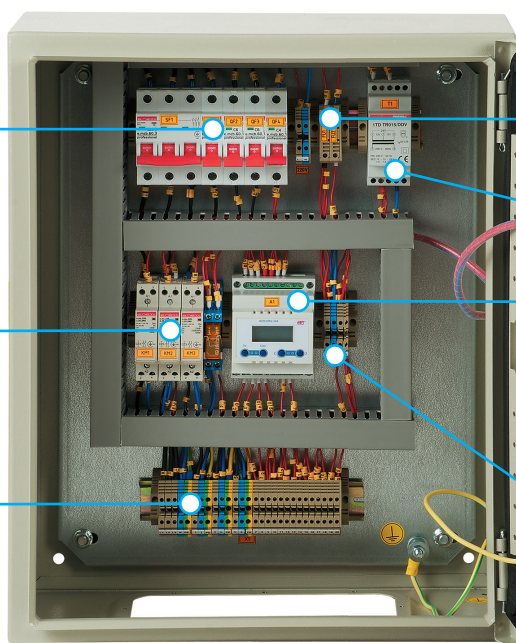
Electric heater power:
3.4 – 34 kW

Air heater supply current phases:
1; 3

Automatic circuit breakers protecting the control circuits and power supply lines of the heater and fan drives

Heater control and fan drive control contactors

Terminal block of external connections



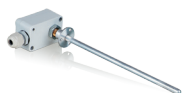
24 V control fuses

220/24 V transformer

ARCON-34 controller

Terminal block for selecting either 220 or 24 V power supply voltage of air dampers

Accessories



STa-01 duct temperature sensor



F-3000 freeze protection thermostat

Optional equipment



CM24 (230) or TF24 (230) damper actuator



Speed controller



DTV 500 differential pressure switch

Table: SRC control compatibility with air handling units with electric air heaters

EAH type	SRC-E2.4/1	SRC-E3.4/1	SRC-E9/3	EAH type	SRC-E2.4/1	SRC-E3.4/1	SRC-E9/3
NK 100-0.6-1	●			NK 250-2,0-1	●		
NK 100-0.8-1	●			NK 250-2,4-1	●		
NK 100-1.2-1	●			NK 250-3,0-1		●	
NK 100-1.6-1	●			NK 250-3.6-3			●
NK 100-1.8-1	●			NK 250-6,0-3			●
NK 125-0.6-1	●			NK 250-9,0-3			●
NK 125-0.8-1	●			NK 315-1.2-1	●		
NK 125-1.2-1	●			NK 315-2,0-1	●		
NK 125-1.6-1	●			NK 315-2,4-1	●		
NK 125-2,4-1	●			NK 315-3.6-3			●
NK 150-1.2-1	●			NK 315-6,0-3			●
NK 150-1.7-1	●			NK 315-9,0-3			●
NK 150-2,0-1	●						
NK 150-2,4-1	●						
NK 150-3,4-1		●					
NK 150-3.6-3			●	EAH type	SRC-E3.4/1-U	SRC-E9/3-U	
NK 150-5.1-3			●	NK 150-3,4-1 U	●		
NK 150-6,0-3			●	NK 160-3,4-1 U	●		
NK 160-1.2-1	●			NK 200-3,4-1 U	●		
NK 160-1.7-1	●			NK 250-3,0-1 U	●		
NK 160-2,0-1	●			NK 150-3.6-3 U			●
NK 160-2,4-1	●			NK 150-5.1-3 U			●
NK 160-3,4-1		●		NK 150-6,0-3 U			●
NK 160-3.6-3			●	NK 160-3.6-3 U			●
NK 160-5.1-3			●	NK 160-5.1-3 U			●
NK 160-6,0-3			●	NK 160-6,0-3 U			●
NK 200-1.2-1	●			NK 200-3.6-3 U			●
NK 200-1.7-1	●			NK 200-5.1-3 U			●
NK 200-2,0-1	●			NK 200-6,0-3 U			●
NK 200-2,4-1	●			NK 250-3.6-3 U			●
NK 200-3,4-1		●		NK 250-6,0-3 U			●
NK 200-3.6-3			●	NK 250-9,0-3 U			●
NK 200-5.1-3			●	NK 315-3.6-3 U			●
NK 200-6,0-3			●	NK 315-6,0-3 U			●
NK 250-1.2-1	●			NK 315-9,0-3 U			●

SRVZ series control boxes (air curtains control)



■ Application

SRVZ control boxes are designed to control air curtains (without a heater), implement temperature regulation algorithms (with heaters) and protect the air curtain component equipment.

■ Design

The control boxes (CB) are enclosed in a metal casing and utilize modular and industry-standard switching and protection devices.

The control boxes for air curtains without a heater comprise a relay circuit that enables single-speed fan drive control, air filter contamination control, as well as variable frequency drive protection against overloading and short-circuit currents.

The units also provide visual warnings for emergency conditions.

The control boxes for air curtains with electric heaters are based on a logical device that enables air flow temperature regulation based on a pre-set value as well as EAH air cooling and overheating protection.

There are two control box types available for air curtains with water heaters:

SRVZ -x-Vk based on a logical device. Analogue control with two-way valve and temperature setup via the logical device menu.

SRVZ -x-Vr based on a relay circuit with the use of a wall-mounted temperature controller. Discrete electromagnetic valve control and temperature setup with a regulator knob.

All the control boxes enable two ways of air curtain control: using the buttons on the door of the control box or by means of the end switch on the gate or the door.

Single-speed fan drive control.

To control the air flow rate depending on the fan shaft speed the fan has to be equipped with a step or variable frequency drive controller.

SRVZ-1-Vk

Number of air curtains (AC)
per doorway:
1 – one
2 – two

Control device type:
k – controller
g – temperature
regulator

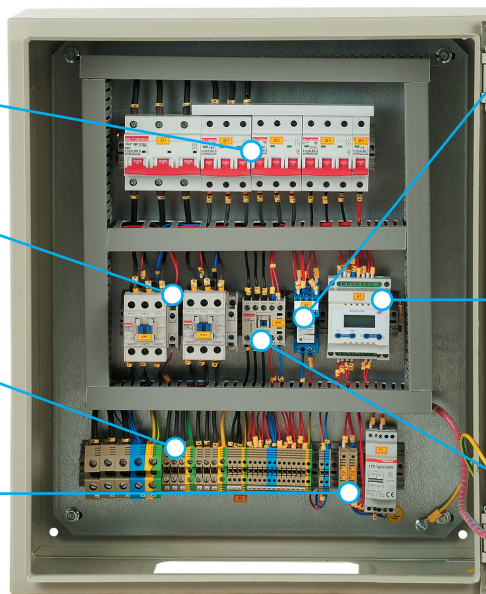
Heater type:
O – no heater
E21 – electric,
power 21 kW
V – water

Automatic circuit breakers protecting
the control circuits and power
supply lines of the heater and fan drives

Heater control contactors

Terminal block
of external connections

24 V control fuses



Interposing relay of the control circuits

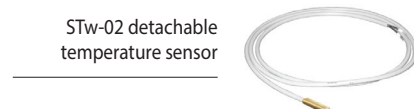
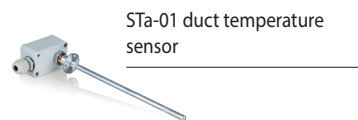
ARCON-34 controller

Fan drive control contactor

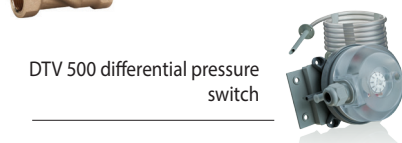
Table: control box compatibility with air curtains

EAH type	Air curtains without a heater (one per doorway)			
	PVZ 600x350	PVZ 700x400	PVZ 800x500	PVZ 900x500
SRVZ-1-0	●	●	●	●
Air curtains without a heater (two per doorway)				
	PVZ 600x350	PVZ 700x400	PVZ 800x500	PVZ 900x500
SRVZ-2-0	●	●	●	●
EAH air curtains (one per doorway)				
	PVZ 600x350	PVZ 700x400	PVZ 800x500	PVZ 900x500
SRVZ-1-E21	●			
SRVZ-1-E36		●	●	
SRVZ-1-E45				●
EAH air curtains (two per doorway)				
	PVZ 600x350	PVZ 700x400	PVZ 800x500	PVZ 900x500
SRVZ-2-E21/21	●			
SRVZ-2-E36/36		●	●	
SRVZ-2-E45/45				●
Water heater air curtains (one per doorway)				
	PVZ 600x350	PVZ 700x400	PVZ 800x500	PVZ 900x500
SRVZ-1-Vk	●	●	●	●
SRVZ-1-Vr	●	●	●	●
Water heater air curtains (two per doorway)				
	PVZ 600x350	PVZ 700x400	PVZ 800x500	PVZ 900x500
SRVZ-2-Vk	●	●	●	●
SRVZ-2-Vr	●	●	●	●

Accessories



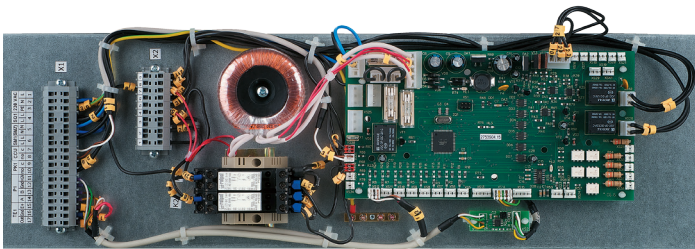
Optional equipment



Control modules for single-block ventilation units*

*The information in this section regarding the characteristics and functions of control modules is provided for general guidance only. The control modules are only available as components of single-block air handling units.

Control modules for single-block units without a heater

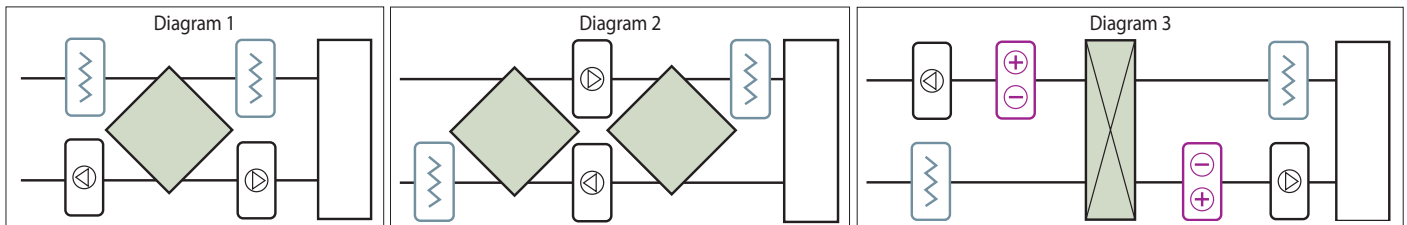


The control modules are based on fixed-configuration electronic circuits for each type of an air handling unit to implement all the necessary control and protection functions.
















The control module casings enable indoor or outdoor applications depending on the air handling unit type.

The module casings for outdoor applications are IP20 compliant.

The delivery set includes a 10 m cable for control panel connection.



CONTROL MODULES FOR SINGLE-BLOCK VENTILATION UNITS

Functions	VUT (VUE)...P mini	VUT...V (H) mini	VUT2 (VUE2)(VUTE2)...P	VUT...H	VUE2...P EC Comfo	VUT2 (VUE2)(VUTE2)...P EC	VUT2 (VUE2)(VUTE2)...PU EC	VUT...V (H) mini EC Comfo	VUT...H EC	VUT...H EC Comfo	VUT...V ECA11	VUT...V ECA14	VUT...VB(PB) ECA11	VUT...VB(PB) ECA14	VUT R...TN H (EH)EC
Typical mounting layout	1	1	2	1	2	2	2	1	1	1	1	1	1	1	3
Logical device	no	no	control board	no	control board	control board	control board	control board	no	control board	control board	control board	control board	control board	Care!pCO ₂ controller
Fans															
Three-speed control	●		●	●	●	●	●	●		●	●	●	●	●	●
0...10 V stepless control		●							●						
Plate heat exchanger															
Freeze protection	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●*
Bypass damper													●	●	
Filters															
Clogging control					●	●	●	●		●	●	●	●	●	●
Additional features															
230 V damper actuator connection					●	●	●	●	●	●					●
CO ₂ concentration sensor			●		●					●	●	●	●	●	
Humidity sensor			●		●					●	●	●	●	●	
Weekly timer					●					●	●		●		●
Tripping signal from the automatic fire alarm system					●					●	●		●		●
Control panel connection	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Connection to the PC for adjustment of functions (USB)												●		●	
Control panel type	A3 	A1 	A13 	A3 	A6 	A5 	A5 	A5 	A2 	A6 	A11 	A14 	A11 	A14 	A17 or A18 

● standard function ● option

*rotor rotation stop

Optional equipment



CO₂ concentration sensor (discrete output)



Humidity control sensor (discrete output)

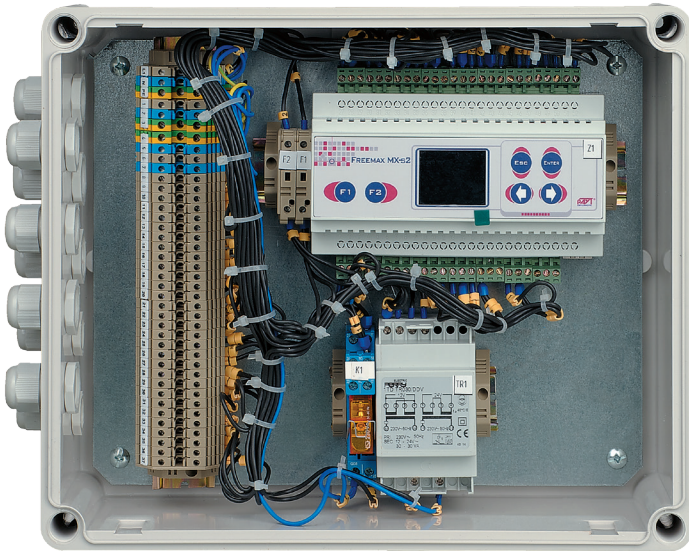


Air damper actuator

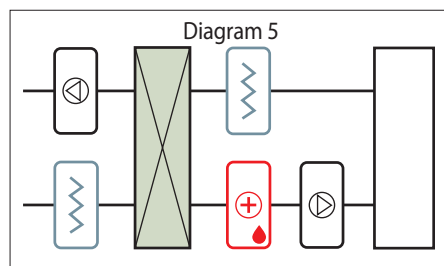
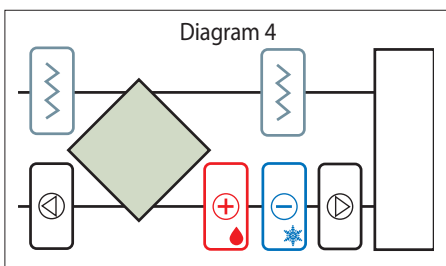
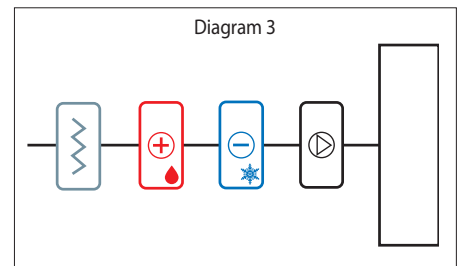
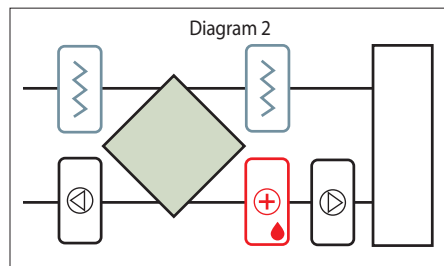
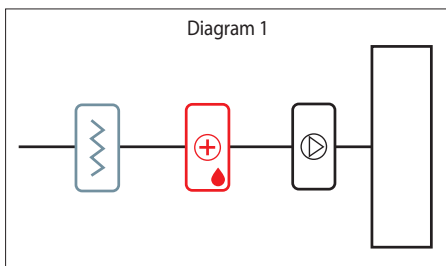








Speed controller, control panel

Control modules for units with a water heater



The control modules are based on fixed-configuration electronic circuits or Freemax freely-programmable controllers for each type of an air handling unit to implement all the necessary control and protection functions. The control module casings enable indoor or outdoor applications depending on the air handling unit type. The module casings for outdoor applications are IP20 compliant. The delivery set includes a 10 m cable for control panel connection.



Functions	PA...W	MPA...W	VUT...WH EC	VUT...PW EC	VUT...WH	VUT...RWH EC
Typical mounting layout	1 / 3	1 / 3	2	2 / 4	2 / 4	5
Logical device	Freemax MX-S2 controller	Freemax MX-S2 controller	Freemax mini controller	Control board	Freemax MX-S2 controller	Carel pCO5 compact controller
Fans						
Operation control	●	●				
Three-speed control	●	●	●	●	●	●
Plate heat exchanger						
Freeze protection			●	●	●	●*
Bypass damper			●	●	●	
Water heater						
0...10 V control signal	●	●	●	●	●	●
Protection by return water temperature	●	●	●	●	●	●
Protection by thermostat feedback	●	●	●	●	●	●
Preheating	●	●	●	●	●	●
Filters						
Tripping signal from the automatic fire alarm system	●	●				●
Additional features						
230 V damper actuator connection	●	●	●	●	●	●
CCU control	●	●		●	●	
Weekly timer	●	●	●	●	●	●
Outdoor air temperature sensor	●	●		●	●	●
Tripping signal from the automatic fire alarm system	●	●	●	●	●	●
Control panel connection	●	●	●	●	●	●
Control panel type	A13 	A13 	A13 	A7 or A11 	A13 	A17 or A18 

● standard function ● option

*rotor rotation stop

Optional equipment



Air damper actuator

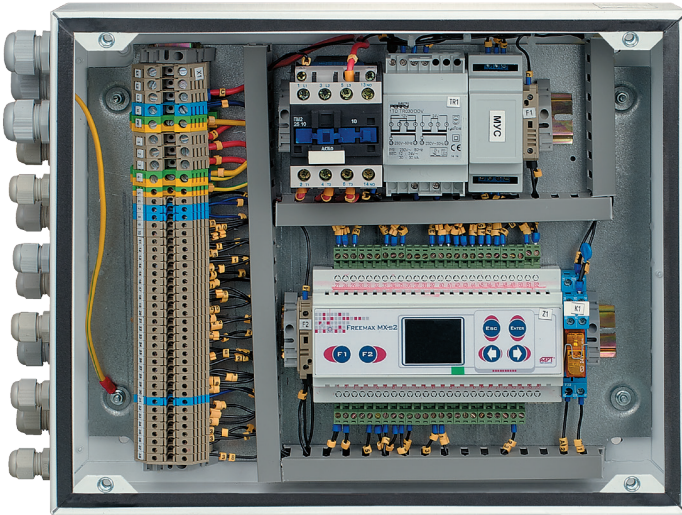


Control panel

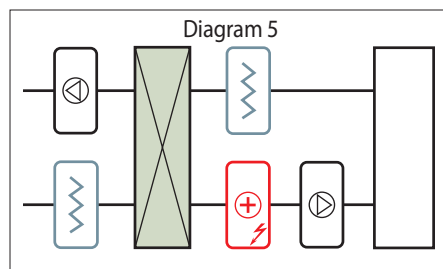
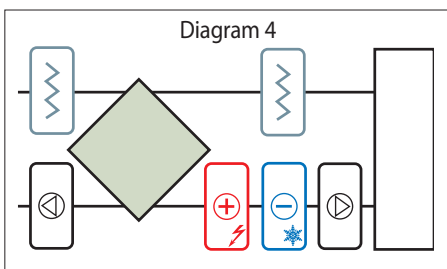
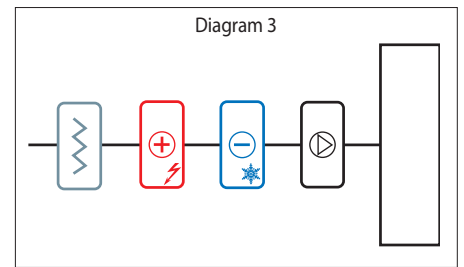
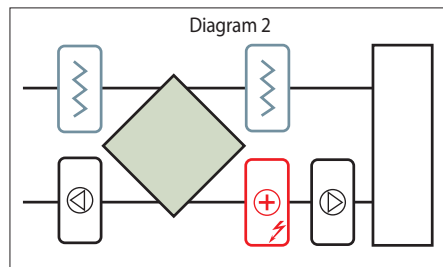
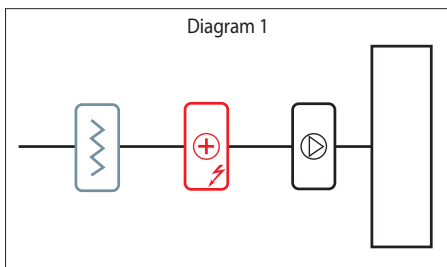


Heat supply mixing unit













Control modules for single-block units with an electric heater



The control modules are based on fixed-configuration electronic circuits or Freemax freely-programmable controllers for each type of an air handling unit to implement all the necessary control and protection functions. The control module casings enable indoor or outdoor applications depending on the air handling unit type. The module casings for outdoor applications are IP20 compliant. The delivery set includes a 10 m cable for control panel connection.



CONTROL MODULES FOR SINGLE-BLOCK VENTILATION UNITS

Functions	PA...E	MPA...E	VPA	VUT...EH	VUT...EV mini EC	VUT...EVK mini EC	VUT...E2V EC	VUT...EH EC ECO	VUT...U (EU) EC	VUT...PE EC	VUT...EH EC	VUT R...EH EC
Typical mounting layout	1 / 3	1	1	2	2	2	2	2	2	2 / 4	2	3
Logical device	Freemax MX-S2 controller	Control board	Control board	Control board	Control board	Control board	Control board	Control board	Control board	Control board	Control board	Carel pCO5 compact controller
Fans												
Operation control	●	●										
Three-speed control	●	●	●	●	●	●	●	●	●	●	●	●
Heat exchanger												
Freeze protection				●	●	●	●	●	●	●	●	●*
Bypass damper				●				●	●	●	●	
Electric heater												
Step fan speed control												
Stepless fan speed control	●	●	●	●	●	●	●	●	●	●	●	●
EAH forced-air cooling	●	●	●	●	●	●	●	●	●	●	●	●
Overheating protection	●	●	●	●	●	●	●	●	●	●	●	●
Filters												
Clogging control	●	●	●	●	●	●	●		●	●	●	●
Additional features												
230 V damper actuator connection	●	●	●	●	●	●	●	●	●	●	●	●
CCU control	●									●		
Weekly timer	●	●	●	●	●	●	●	●	●	●	●	●
CO ₂ concentration sensor		●	●		●	●	●					
Humidity sensor		●	●		●	●	●	●		●		
Tripping signal from the automatic fire alarm system	●	●	●		●	●	●			●		
Control panel connection	●	●	●	●	●	●	●	●	●	●	●	●
Control panel type	A13	A8	A8	A8	A6	A6	A6	A11	A6	A7 or A11	A8	A17 or A18
												

Optional equipment



CO₂ concentration sensor (discrete output)



Humidity control sensor (discrete output)



Air damper actuator













Control panel

● standard function ● option

*rotor rotation stop

Control panels for single-block units

Design.	Image	Type	Functions
1	2	3	4
A1		RS-1-400	<ul style="list-style-type: none"> ■ Turning the unit on/off. ■ Ventilation mode selection: stepless fan speed control. ■ Heat exchanger freeze protection by switching off the supply fan for the defrosting period.
A2		R-1/010	<ul style="list-style-type: none"> ■ Turning the unit on/off. ■ Ventilation mode selection: stepless fan speed control. ■ Heat exchanger freeze protection by switching off the supply fan for the defrosting period.
A3		P3-1-300	<ul style="list-style-type: none"> ■ Turning the unit on/off. ■ Ventilation mode selection – three speeds: low, medium, high. ■ Heat exchanger freeze protection by switching off the supply fan for the defrosting period.
A4		SP3-1	<ul style="list-style-type: none"> ■ Turning the unit on/off. ■ Ventilation mode selection – three speeds: low, medium, high. ■ Heat exchanger freeze protection by switching off the supply fan for the defrosting period.
A5		R3/010 T	<ul style="list-style-type: none"> ■ Turning the unit on/off. ■ Ventilation mode selection – three speeds: low, medium, high. ■ Minimum mode setup in the range of 7 pre-set speeds. ■ Filter replacement indication.
A6			<ul style="list-style-type: none"> ■ Turning the unit on/off. ■ Three fan speeds. Each speed is adjusted in setup mode. ■ Switching between heat recovery and kitchen hood operation modes. ■ Filter contamination control by fan operating time. ■ Setting week-scheduled operation of the unit.
A7		PU JK01	<ul style="list-style-type: none"> ■ Turning the unit on/off. ■ Three fan speeds. Each speed is adjusted in setup mode. ■ Turning the heater on/off. ■ Turning the timer on/off. ■ Manual opening/closing of plate heat exchanger bypass damper. ■ Filter contamination control by fan operating time. ■ Setting week-scheduled operation of the unit.
A8		LCD	<ul style="list-style-type: none"> ■ Turning the unit on/off. ■ Maintaining the pre-set room temperature according to the control panel sensor feedback – stepless heating capacity control. ■ Speed selection: low, medium, high. ■ Day- and week-scheduled operation. ■ Filter contamination control by fan operating time.
A9		SAS908 electric heater	<ul style="list-style-type: none"> ■ Turning the unit on/off. ■ Room temperature indication. ■ Speed selection: low, medium, high. ■ Supply and exhaust fan speed can be adjusted from 0 to 100 % for each of 3 speeds during the system set-up. ■ Maintaining the pre-set room temperature according to the control panel sensor feedback – stepless heating capacity control.










Design.	Image	Type	Functions
1	2	3	4
A10		SAS908 water heater	<ul style="list-style-type: none"> ■ Turning the unit on/off. ■ Room temperature indication. ■ Speed selection: low, medium, high. ■ Supply and exhaust fan speed can be adjusted from 0 to 100 % for each of 3 speeds during the system set-up. ■ Maintaining the pre-set room temperature according to the control panel sensor feedback: controlling the circulation pump and the heat medium regulating valve.
A11		PU SENS01	<ul style="list-style-type: none"> ■ Turning the unit on/off. ■ Maintaining pre-set room or duct temperature. ■ Control on feedback from humidity sensor integrated into the control panel. ■ Speed selection: low, medium, high. ■ Day- and week-scheduled operation. ■ Optional electric heater control and protection. ■ Filter contamination control by fan operating time. ■ Alarm messages display.
A12		SRS-1	<ul style="list-style-type: none"> ■ Turning the unit on/off. ■ Speed control of single-phase voltage-controlled fans.
A13		AC208EM2	<ul style="list-style-type: none"> ■ Turning the unit on/off. ■ Fan speed setting. ■ Speed selection: auto, high, medium, low. ■ Operation mode control: heating, cooling, ventilation. ■ Control mode selection: manual control or week-scheduled operation. ■ Temperature setting functions.
A14			<ul style="list-style-type: none"> ■ Turning the unit on/off. ■ Speed selection: low, medium, high. ■ Manual opening/closing of bypass damper. ■ Filter maintenance indication. ■ Alarm indication.
A15			<ul style="list-style-type: none"> ■ Turning the unit on/off. ■ Speed selection: low, medium, high. ■ Manual opening/closing of bypass damper. ■ Filter maintenance indication. ■ Alarm indication.
A16		Synergy SP-01	<ul style="list-style-type: none"> ■ Turning the unit on/off. ■ Room air temperature indication. ■ Speed selection: low, medium, high. ■ Supply and exhaust fan speed can be adjusted from 0 to 100 % for each of 3 speeds during the system set-up. ■ Setting of room air temperature. ■ Filter contamination control by fan operating time. ■ Day- and week-scheduled operation. ■ Alarm messages display.
A17		Carel th-Tune	<ul style="list-style-type: none"> ■ Turning the unit on/off. ■ Fan speed selection. ■ Unit operation mode selection. ■ Setting of room air temperature. ■ Day- and week-scheduled operation. ■ Room air temperature display. ■ Supply air temperature display. ■ Set temperature display. ■ Generalized alarm signal display.
A18		Carel PGD1	<ul style="list-style-type: none"> ■ Turning the unit on/off. ■ Fan speed selection. ■ Unit operation mode selection. ■ Setting of room air temperature. ■ Day- and week-scheduled operation. ■ Room air temperature display. ■ Supply air temperature display. ■ Outdoor air temperature sensor display. ■ Display of temperature downstream of the heat exchanger. ■ Set temperature display. ■ Alarm messages display. ■ Changing user settings.

Optional equipment

Optional equipment

Speed controllers, speed switches and temperature controllers

Model		Phase	Current	Protection	Casing	Functions
Sensor speed controller						
SRS-1		single phase	up to 1 A	IP30	Plastic casing with fixing lugs for flush mounting	Smooth fan speed control, integrated switch.
Thyristor speed controller						
RS-1-300		single phase	up to 1.5 A	IP40	Plastic casing for flush mounting	Smooth fan speed control with built-in switch.
RS-1-400			up to 1.8 A	IP40		
RS-1 N (V)		single phase	up to 1.0 A	IP44	Plastic casing for flush or surface mounting	Smooth fan speed control with built-in switch.
RS-1,5 N (V)			up to 1.5 A			
RS-2 N (V)			up to 2.0 A			
RS-2,5 N (V)			up to 2.5 A			
RS-0,5-PS		single phase	0.1 – 0.5 A	IP44	Plastic casing for flush or surface mounting	Smooth fan speed control with built-in switch, minimum speed setting.
RS-1,5-PS			0.15 – 1.5 A			
RS-2,5-PS			0.25 – 2.5 A			
RS-4,0-PS			0.4 – 4.0 A			
RS-3,0-T		single phase	0.3 – 3.0 A	IP54	Plastic casing for surface mounting	Smooth fan speed control with built-in switch, minimum speed setting.
RS-5,0-T			0.5 – 5.0 A			
RS-10,0-T			1.0 – 10.0 A			
RS-3,0-TA		single phase	0.3 – 3.0 A	IP54	Plastic casing for surface mounting	Smooth fan speed control. Control input 0-10 V or 4-20 mA, built-in switch, minimum speed setting.
RS-5,0-TA			0.5 – 5.0 A			
RS-10,0-TA			1.0 – 10.0 A			
Transformer speed controllers						
RSA5E-2-P		single phase	up to 2.0 A	IP54	Plastic casing for surface mounting	Step fan speed control. Overheating motor protection, thermostat and actuator driven air shutoff damper connections. Mechanical speed switching.
RSA5E-2-M		single phase	up to 2 A	IP21	Metal casing for surface mounting	Step fan speed control. Overheating motor protection, thermostat and actuator driven air shutoff damper connections. Mechanical speed switching.
RSA5E-3-M			up to 3 A			
RSA5E-4-M			up to 4 A			
RSA5E-12-M		single phase	up to 12 A	IP44	Plastic casing for surface mounting	Step fan speed control. Overheating motor protection, thermostat and actuator driven air shutoff damper connections. Mechanical speed switching.
RSA5E-1,5-T			up to 1.5 A			
RSA5E-3,5-T			up to 3.5 A			
RSA5E-5,0-T			up to 5 A			
RSA5E-8,0-T			up to 8 A			
RSA5E-10,0-T	up to 10 A					
RSA5D-1,5-T		three-phase	up to 1.5 A	IP44	Plastic casing for surface mounting	Step fan speed control. Overheating motor protection, thermostat and actuator driven air shutoff damper connections. Mechanical speed switching.
RSA5D-3,5-T			up to 3.5 A			
RSA5D-5-M		three-phase	up to 5 A	IP44	Metal casing for surface mounting	Step fan speed control. Overheating motor protection, thermostat and actuator driven air shutoff damper connections. Mechanical speed switching.
RSA5D-8-M			up to 8 A			
RSA5D-10-M			up to 10 A			
RSA5D-12-M			up to 12.0 A			

Model		Phase	Current	Protection	Casing	Functions
Frequency speed controllers						
VFED-200-TA		three-phase	200 W / 1A	IP54	Plastic casing for surface mounting	Smooth speed control of three phase fan. Power supply 220 V, motor overheating protection. Control input 0-10 V or 4-20 mA, series port RS232, remote LED display (option).
VFED-400-TA			400 W / 2A			
VFED-750-TA			750 W / 3.5 A			
VFED-1100-TA			1.1 kW / 5.5A			
VFED-1500-TA			1.5 kW / 7.5 A			
Room thermostats						
TST-1-300			up to 1 (0.6 A)	IP40	Plastic casing for surface mounting	Temperature control in ventilation, heating and air conditioning systems. Equipped with a backlit sensor display. Automatic heating/cooling rate control.
TSTD-1-300						
Temperature controllers						
RTS -1-400		single phase	up to 2.0 A	IP40	Plastic casing for flush mounting	Temperature control in ventilation, air conditioning and heating systems. Equipped with a digital LED display. Automatic heating/cooling rate control.
RTSD -1-400						
RT-10		single phase	up to 10 A	IP40	Plastic casing for surface mounting	Temperature regulation and control of ventilation, heating and air conditioning systems. Temperature control range from +10 up to +30 °C.
Sensor speed switch						
SP3-1		single phase	up to 1 A	IP30	Plastic casing for flush mounting.	Turning the fans on/off and speed switch of multi-speed fan motors.
Speed control switches						
P2-1-300		single phase	up to 3 A	IP40	Plastic casing for flush mounting	2 speed step switching
P3-1-300						3 speed step switching
P2-5,0 N (V)		single phase	up to 5.0 A	IP40	Plastic casing for surface and flush mounting	2 speed step switching
P3-5,0 N (V)						3 speed step switching
P5-5,0 N (V)						5 speed step switching
EC motors regulators						
R-1/010		single phase	up to 1.1 mA	IP40	Plastic casing for flush mounting	Smooth control of speed, temperature and other characteristics. 0-10 V output is equipped with maximum 3 A built-in switch.
Sensors						
T-1,5N		single phase	up to 1.5 A	IP54	Plastic casing for surface mounting	Fan operation with turn-off delay timer.
TH-1,5N						Fan humidity-dependent operation.
TF-1,5N						Fan operation with photo-sensor and turn-off delay timer.
TP-1,5N						Fan operation based on motion sensor data and with a turn-off delay timer.

Detailed description of controllers and switches (images, specific features, characteristics, wiring diagrams, dimensions)

Sensor speed controller **SRS-1**



■ Application

Applied in ventilation systems for turning the fans on/off and speed control of single phase voltage controlled fan motors. Several fans can be connected to one speed controller if their total current does not exceed the maximum controller current.

■ Design

The casing is made of plastic and the sensor panel is made of hardened glass. The sensor panel has ON/OFF button for speed control from minimum to

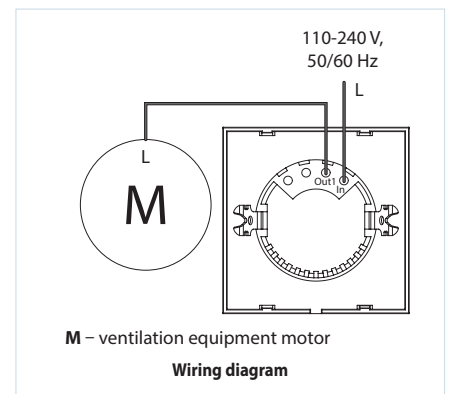
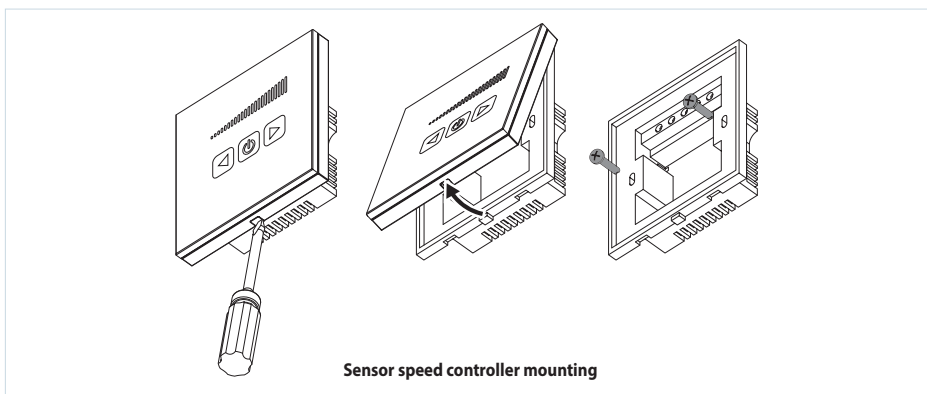
maximum. The set speed level is displayed on the LED display. The speed controller has high control accuracy.

■ Mounting

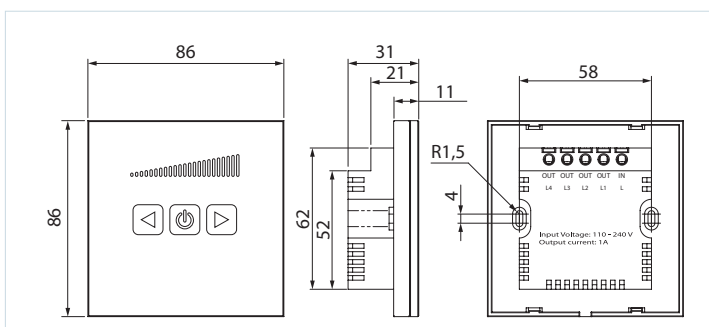
The controller is designed for indoor mounting into standard round electric junction boxes.

Technical data

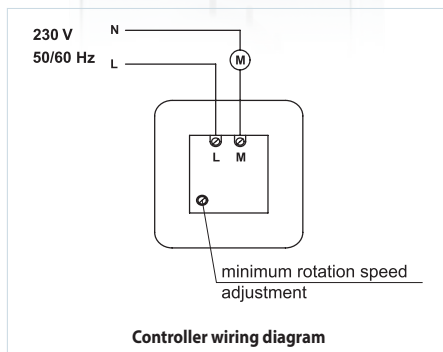
	SRS-1
Voltage [V/50 (60) Hz]	230
Maximum load current [A]	1
Cable cross section	0.35 up to 1 mm ²
Temperature range [°C]	from -10 up to +45
Humidity range	from 5 % to 80 % (no condensation)
Service life	100 000 switching operations
Protection rating	IP30
Weight [kg]	0.138



Overall dimensions [mm]



Speed controller
RS-1-300



■ **Application**

Applied in ventilation systems for switching ON/OFF and speed controlling of single phase power-controlled motors. Several fans can be operated synchronously in case their total consumption current does not exceed the maximum permissible current value.

■ **Design and control**

The controller casing is made of plastic. The controller is featured with high efficiency and control accuracy. Maximum speed can be set by turning the control knob. Regulating starts from the maximum to the minimum

voltage value for the fan stable running. The minimum speed is set by means of the potentiometer on the PCB.

■ **Protection**

The controller incorporates a thermal fuse for motor overload protection.

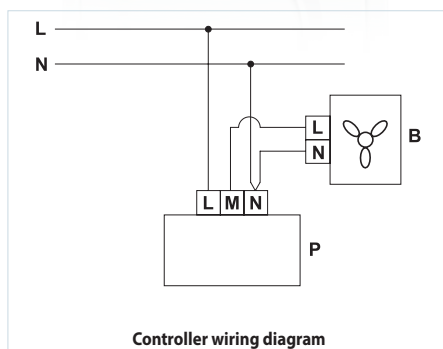
■ **Mounting**

The controller is designed for indoor mounting into special flush mounting junction box or into standard round electric junction boxes.

Technical data

	RS-1-300
Voltage [V/50 Hz]	1~ 230
Rated current [A]	1.5
Overall dimensions LxWxH [mm]	95x85x60
Maximum ambient temperature [°C]	40
Protection rating	IP40
Weight [kg]	0.11

Speed controller
RS-1-400



■ **Application**

Applied in ventilation systems for switching ON/OFF and speed controlling of single phase power-controlled motors. Several fans can be operated synchronously in case their total consumption current does not exceed the maximum permissible current value.

■ **Design and control**

The controller casing is made of plastic. The controller is featured with high efficiency and control accuracy. Switching ON/OFF by turning the control knob. Regulating starts from the minimum to the

maximum voltage value for the fan stable running. The minimum rotation speed is set by means of the potentiometer on the control board.

■ **Protection**

The controller incorporates a removable thermal fuse for motor overload protection and transient filter.

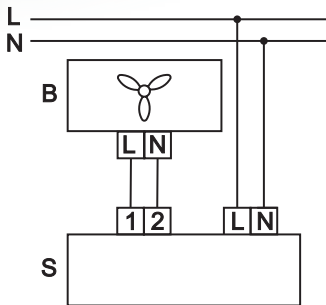
■ **Mounting**

The controller is designed for indoor wall mounting in a special surface mounting (MKN-3) or flush mounting (MKV-4) junction box (available separately) or in standard round electric junction boxes.

Technical data

	RS-1-400
Voltage [V/50 (60) Hz]	1~ 230
Rated current [A]	1.8
Overall dimensions LxWxH [mm]	78x78x63
Maximum ambient temperature [°C]	35
Protection rating	IP40
Weight [kg]	0.11

Speed controller RS...N (V)



Controller wiring diagram

Application

Applied in ventilation systems for switching ON/OFF and for controlling the speed of the single phase power-controlled motors. Several fans can be controlled synchronously in case their total current does not exceed the maximum permissible values for the controller current.

Design and control

The casing is made of plastic and is equipped with a control knob, an ON/OFF button and an alarm lamp. The controller is featured with high efficiency and control accuracy. Regulation starts from the

minimum fan stable running voltage value to the maximum one. The minimum rotation speed is set by means of the potentiometer on the control board.

Protection

Input circuit of the speed controller has a thermal fuse for overload protection. The controller is fitted with a transient filter.

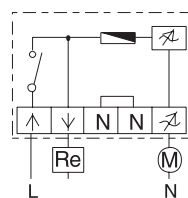
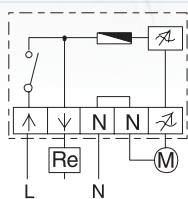
Mounting

The controller is designed for indoor wall surface mounting (H modification) or flush mounting (V modification).

Technical data

	RS-1 N (V)	RS-1,5 N (V)	RS-2 N (V)	RS-2,5 N (V)
Voltage [V/50 Hz]	1~ 230	1~ 230	1~ 230	1~ 230
Rated current [A]	1.0	1.5	2.0	2.5
Overall dimensions LxWxH [mm]	162x80x70	162x80x70	162x80x70	162x80x70
Maximum ambient temperature [°C]	40	40	40	40
Protection rating	IP44	IP44	IP44	IP44
Weight [kg]	0.3	0.3	0.3	0.3

Speed controller RS...PS



Controller wiring diagram

Application

Applied in ventilation systems for switching ON/OFF and for controlling the speed of single phase power-controlled motors. Several fans can be controlled synchronously in case their total current does not exceed the maximum permissible value of the controller current.

Design and control

The controller casing is made of plastic. The control knob is equipped with an alarm lamp. The controller is featured with high efficiency and control accuracy. Switching by means of pressing the control knob. Regulating starts from the minimum to the maximum voltage value for the fan stable running. The

minimum speed is set by means of the potentiometer on the control board. The controller is equipped with an extra 230 V terminal for connection and control of the external equipment.

Protection

Input circuit of the speed controller has a thermal fuse for overload protection. The controller is fitted with a transient filter.

Mounting

The universal design of the controller enables its wall surface (H modification) or flush mounting (V modification), suitable for installation into standard round electric junction boxes.

Technical data

	RS-0,5-PS	RS-1,5-PS	RS-2,5-PS	RS-4,0-PS
Voltage [V/50 Hz]	1~ 230	1~ 230	1~ 230	1~ 230
Minimum current [A]	0.1	0.15	0.25	0.4
Maximum current [A]	0.5	1.5	2.5	4.0
Overall dimensions LxWxH [mm]	82x82x65	82x82x65	82x82x65	82x82x65
Maximum ambient temperature [°C]	35	35	35	35
Protection rating	IP44	IP44	IP44	IP44
Weight [kg]	0.23	0.24	0.29	0.36

Speed controller
RS-...-T



■ **Application**

Applied in ventilation systems for switching ON/OFF and controlling the speed of single phase power-controlled motors. Several fans can be controlled synchronously in case their total consumption current does not exceed the maximum permissible value of the controller current.

■ **Design and control**

The controller casing is made of non-flammable thermoplastic and equipped with an ON/OFF knob with an alarm lamp. The controller is featured with high efficiency and control accuracy. Output power is controlled from 25 to 100 % depending on the control knob position. The minimum speed is set by means of the potentiometer on the control board. The controller

is equipped with an extra 230 V terminal for connection and controlling such external equipment as actuator-driven air dampers.

■ **Protection**

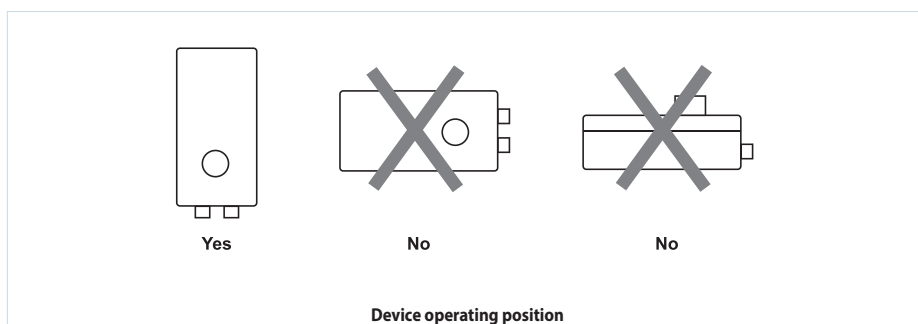
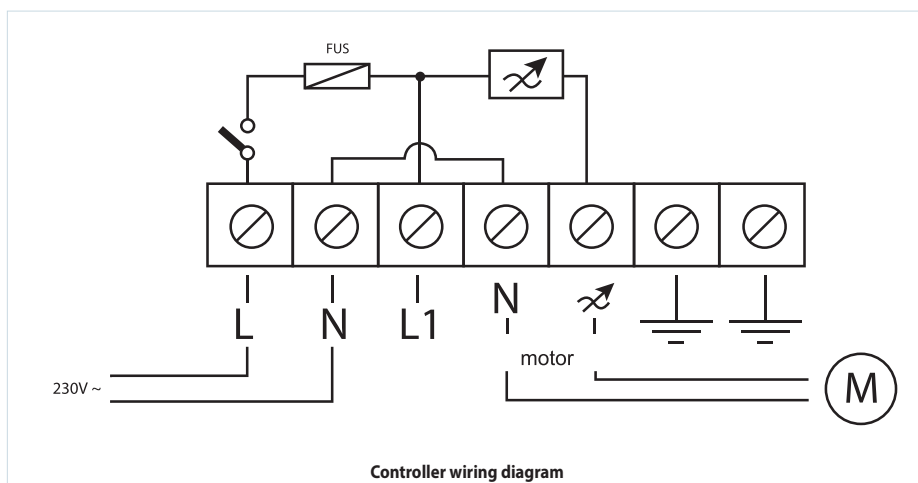
Input circuit of the speed controller has a thermal fuse for overload protection. The controller is fitted with a transient filter.

■ **Mounting**

The controller is designed for indoor mounting. Installation shall be performed with respect to the free air circulation for inner circuit cooling. The controller is for vertical installation. Do not install the controller above the heaters and in bad air convection areas.

Technical data

	RS-3,0-T	RS-5,0-T	RS-10,0-T
Voltage [V/50 Hz]	1~ 230	1~ 230	1~ 230
Minimum current [A]	0.3	0.5	1.0
Maximum current [A]	3.0	5.0	10.0
Overall dimensions LxWxH [mm]	123x191x97	123x191x97	123x191x97
Maximum ambient temperature [°C]	+5...+40	+5...+40	+5...+40
Protection rating	IP54	IP54	IP54
Weight [kg]	0.3	0.3	0.3



Speed controller RS-...-TA



■ Application

Applied in ventilation systems for switching ON/OFF and speed controlling of single phase power-controlled motors. Several fans can be operated synchronously in case their total consumption current does not exceed the maximum permissible value of the controller current.

■ Design and control

The controller casing is made of non-flammable thermoplastic and equipped with an ON/OFF knob. Output power is controlled from 25 to 100 % as a in proportion to the control signal 0...10 V or 4-20 mA over the range set during the controller adjustment. The control signal type 0...10 V or 4-20 mA is selected with the SW2 control switch located in the controller casing. Control can be performed by means of a remote control panel, i.e., R-1/010 controller. The

minimum speed is set by means of the potentiometer on the control board inside the controller. The controller is equipped with a supplementary 230 V terminal for connection and control of such external equipment as actuator driven air dampers.

■ Protection

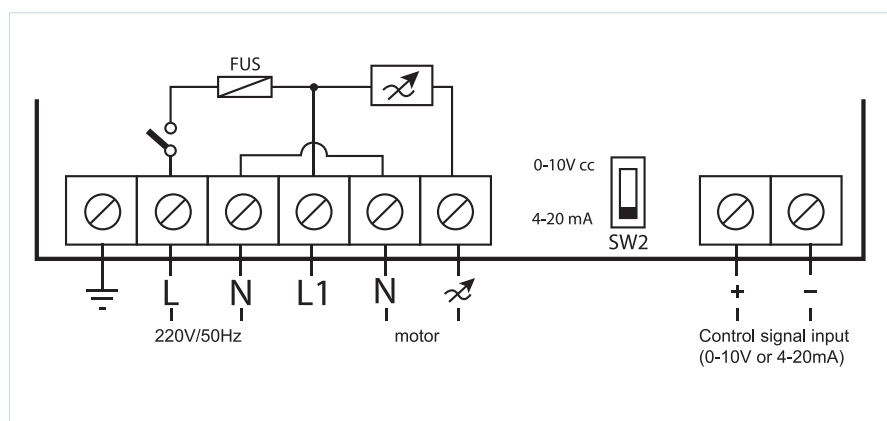
Input circuit of the speed controller has a thermal fuse for overload protection.

■ Mounting

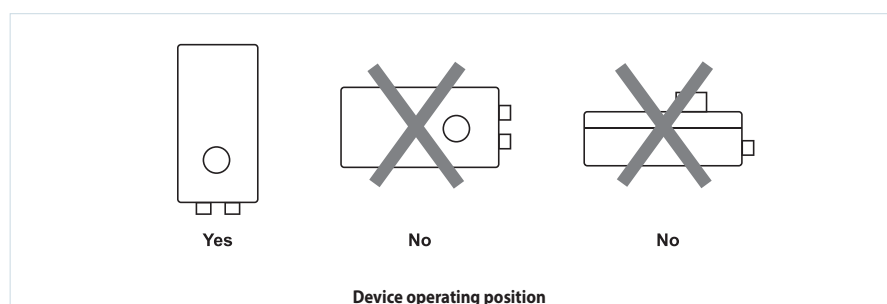
The controller is designed for indoor mounting. Installation shall be performed with respect to the free air circulation for inner circuit cooling. The controller is for vertical installation. Do not install the controller above the heaters and in bad air convection areas.

Technical data

	RS-3,0-TA	RS-5,0-TA	RS-10,0-TA
Voltage [V/50 Hz]	1~ 230	1~ 230	1~ 230
Minimum current [A]	0.3	0.5	1.0
Maximum current [A]	3.0	5.0	10.0
Overall dimensions LxWxH [mm]	180x127x95	180x127x95	180x127x95
Maximum ambient temperature [°C]	+5...+40	+5...+40	+5...+40
Protection rating	IP54	IP54	IP54
Weight [kg]	0.3	0.3	0.3



Controller wiring diagram



Device operating position

Single phase speed controller
RSA5E-2-P



Speed control enables not only selecting the comfortable ventilation mode for the periodically visited premises but reducing the energy consumption for the ventilation.

■ **Application**

The RSA5E-2-P speed controller is applied for air flow control of single phase fans by means of step motor speed control. The controller has five speeds. Speed is set by means of rotating the control knob at the casing front panel. Several fans can be controlled synchronously in case their total consumption current does not exceed the maximum permissible value of the controller current.

■ **Design**

The controller casing is made of non-flammable thermoplastic. The controller has five speeds with the output power 110 V-130 V-160 V-190 V-230 V and incorporates an ON/OFF button with an operation lamp, a control knob for speed switching and an emergency lamp. The controller has an integrated motor protection device which cuts the supply voltage to the fan if the thermal contact in the fan motor is activated. After the

temperature drops to the operating level, the motor restarts.

The controller has the following supplementary functions:

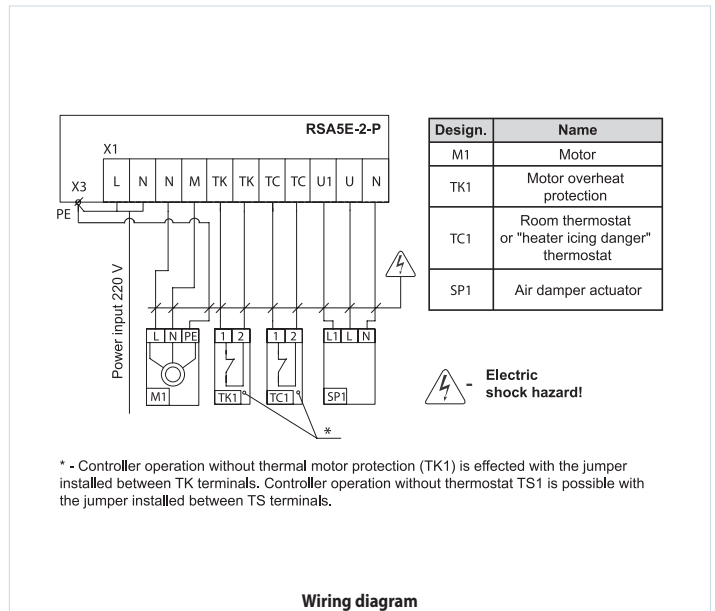
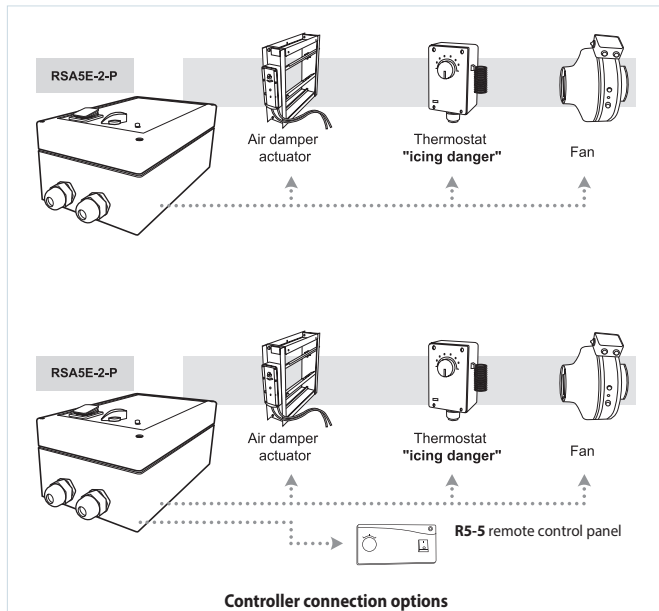
- ▶ Terminals for connection to the room thermostat or to the frost protection thermostat. In case of the circuit breaking, the power supply to the motor is disabled.
- ▶ Terminals of 230 V, maximum 2 A for connection and controlling external equipment (e. g. air damper actuators).
- ▶ A remote control panel can be optionally connected (see the connection options).

■ **Mounting**

The controller is designed for indoor mounting. Installation shall be performed with respect to the free air recirculation for inner circuit cooling.

Technical data

	RSASE-2-P
Voltage [V/50 Hz]	1~ 230
Rated current [A]	2.0
Overall dimensions LxWxH [mm]	222x120x100
Maximum ambient temperature [°C]	40
Protection rating	IP54
Weight [kg]	3.1



* - Controller operation without thermal motor protection (TK1) is effected with the jumper installed between TK terminals. Controller operation without thermostat TS1 is possible with the jumper installed between TS terminals.

Single phase speed controller RSA5E-...-M



Application

The RSA5E-...-M speed controllers are applied for air flow control of single phase fans by means of step speed control. The controller has five speeds. Speed is set by means of rotating the control knob at the casing front panel. Several fans can be controlled synchronously in case their total consumption current does not exceed the maximum permissible value of the controller current.

Design and control

The casing is made of steel with polymeric coating. The controller has five speeds with the output power 110 V-130 V-160 V-190 V-230 V (for the RSA5E-12-M modifications – 80 V-105 V-130 V-160 V-230 V). The controller incorporates an ON/OFF button with an operation lamp, a control knob for speed switching and an emergency lamp.

Protection

The integral motor protection device is included which cuts the supply voltage to the fan if the thermal contact in the fan motor is activated. After the temperature drops to the operating level, the motor restarts.

The controller has the following supplementary functions:

- ▶ terminals for connection to the room thermostat or to the icing protection thermostat. In case of circuit breaking the power supply to the motor is cut.
- ▶ terminals (230 V, maximum 2 A/3 A/4 A) for connection and controlling such external equipment as actuator driven air damper.
- ▶ provision for remote speed control (refer to the connection options).

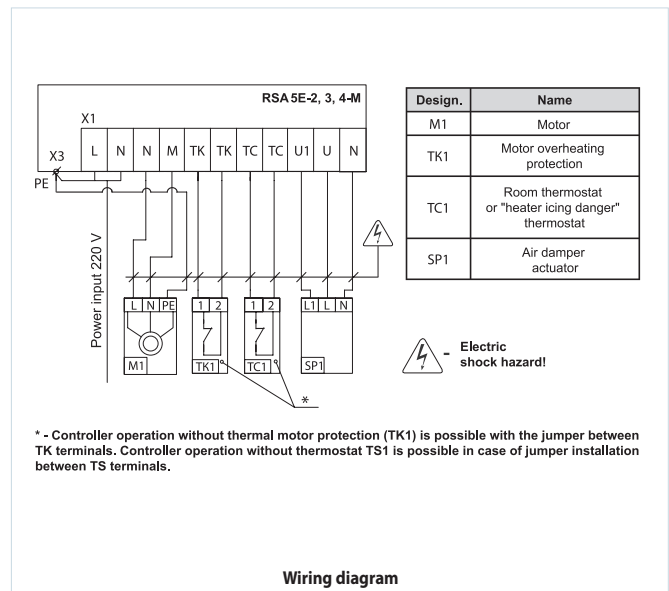
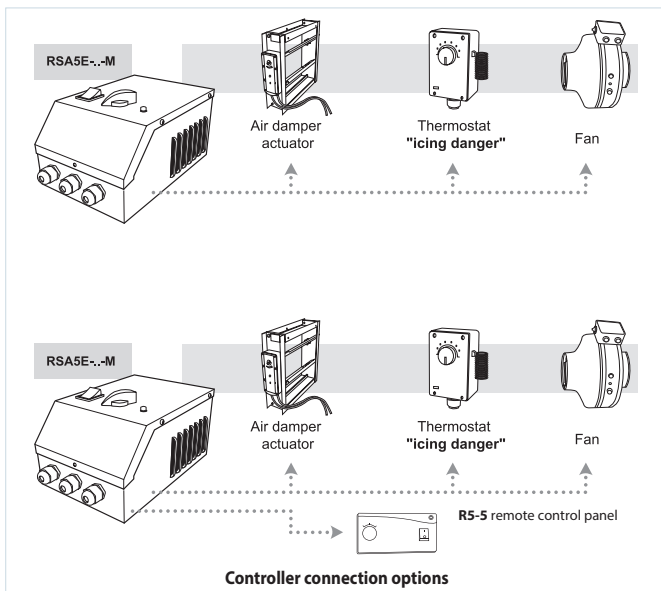
Mounting

The controller is designed for indoor mounting. Installation shall be performed with respect to the free air circulation for inner circuit cooling.

The speed controller enables not only selecting the comfortable ventilation mode for the periodically visited premises but reducing the energy consumption for the ventilation.

Technical data

	RSA5E-2-M	RSA5E-3-M	RSA5E-4-M	RSA5E-12-M
Voltage [V/50 Hz]	1~ 230	1~ 230	1~ 230	1~ 230
Rated current [A]	2.0	3.0	4.0	12.0
Overall dimensions LxWxH [mm]	226x144x120	241x164x138	241x184x132	325x250x245
Maximum ambient temperature [°C]	40	40	40	40
Protection rating	IP21	IP21	IP21	IP44
Weight [kg]	3.4	4.1	4.5	4.5



Single phase speed controller
RSA5E-...-T



■ **Application**

The RSA5E-...T speed controllers are applied for air flow control of single phase fans by means of motor step speed control. The controllers have five speeds. Speed is set by means of rotating the control knob at the casing front panel to one of five available fixed positions. Several fans can be controlled synchronously in case their total consumption current does not exceed the maximum permissible value of the controller current.

■ **Design and control**

The controller casing is made of non-flammable thermoplastic. The controller has five speeds with the output power 80 V – 105V – 130 V -160 V – 230 V an ON/OFF button with an operation lamp, a control knob for speed switching and an emergency lamp. The controller has an integrated motor protection

device which cuts the supply voltage to the fan if the thermal contact in the fan motor is activated. After the temperature drops to the operating level, the motor restarts.

The controller has the following supplementary functions:

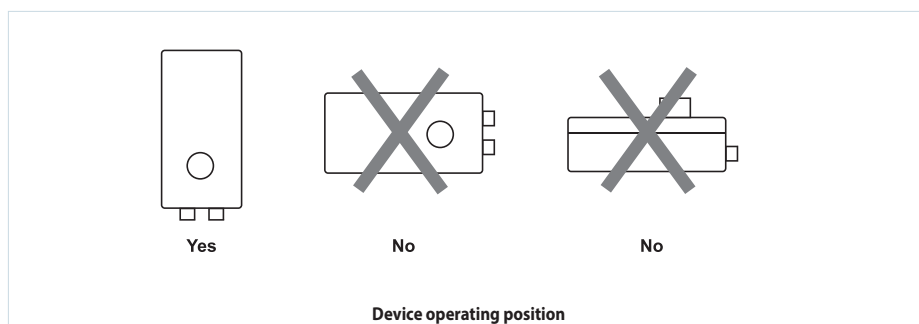
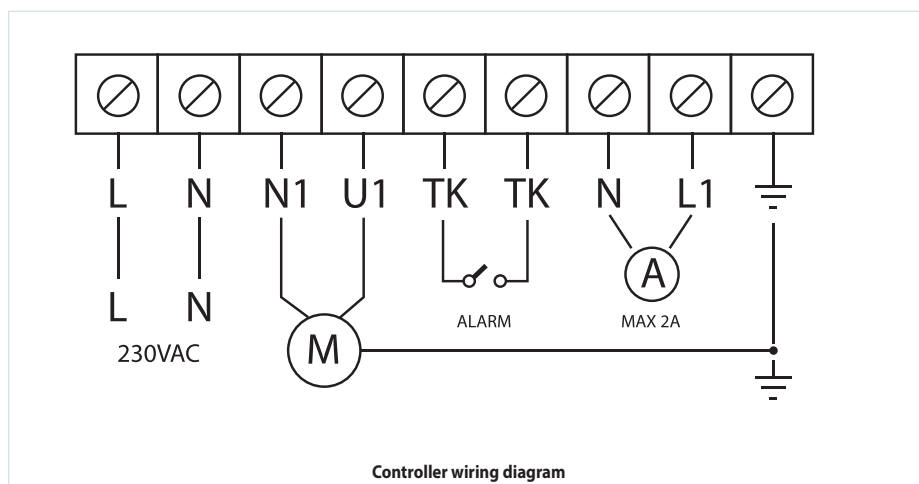
- ▶ terminals (230 V, maximum 2 A) for connection and controlling such external equipment as actuator driven air dampers.

■ **Mounting**

The controller is designed for indoor mounting. Installation shall be performed with respect to the free air recirculation for inner circuit cooling. The controller is for vertical installation. Do not install the controller above the heaters and in bad air convection areas.

Technical data

	RSA5E-1,5-T	RSA5E-3,5-T	RSA5E-5,0-T	RSA5E-8,0-T	RSA5E-10,0-T
Voltage [V/50 Hz]	1~ 230	1~ 230	1~ 230	1~ 230	1~ 230
Rated current [A]	1.5	3.5	5.0	8.0	10.0
Overall dimensions LxWxH [mm]	205x110x85	255x170x140	255x170x140	305x200x180	305x200x180
Maximum ambient temperature [°C]	+5...+35	+5...+35	+5...+35	+5...+35	+5...+35
Protection rating	IP44	IP44	IP44	IP44	IP44



Three phase speed controller **RSA5D-...-T**



Application

The RSA5D-...T series speed controllers are applied for air flow control of three phase fans by means of step speed control. The controllers have five speeds. Speed is set by means of rotating the control knob at the casing front panel to one of five available fixed positions. Several fans can be controlled synchronously in case their total consumption current does not exceed the maximum permissible value of the controller current.

Design and control

The controller casing is made of non-flammable thermoplastic. The controller has five speeds with the output power 90 V – 150 V – 200 V – 280 V – 400 V and incorporates a control knob, an operation lamp, and an emergency lamp.

The controller has an integrated motor protection device which cuts the supply voltage to the fan if the thermal contact in the fan motor is activated. After the temperature drops to the operating level, the motor restarts.

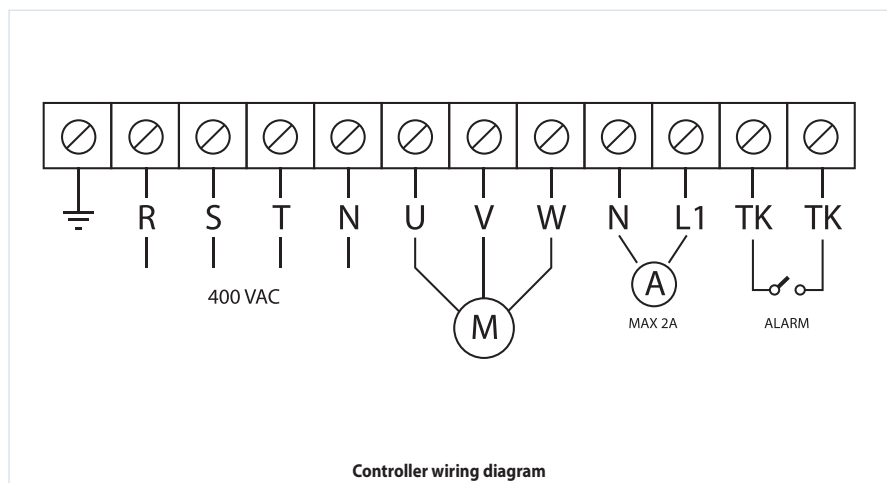
As supplementary functions the controller is fitted with terminals (230 V, maximum 2 A) for connection and controlling such external equipment as actuator driven air damper.

Mounting

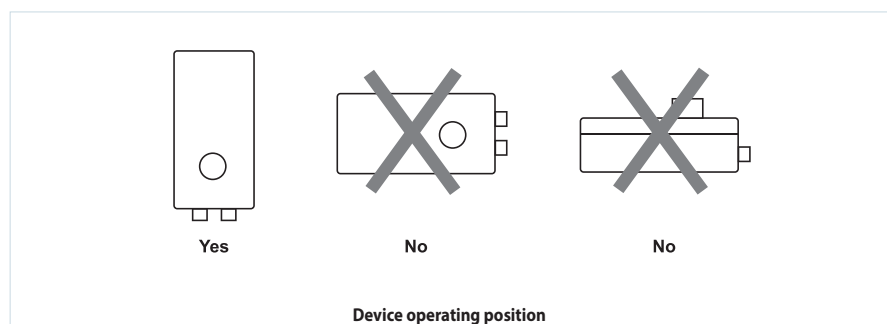
The controller is designed for indoor mounting. Installation shall be performed with respect to the free air recirculation for inner circuit cooling. The controller is for vertical installation. Do not install the controller above the heaters and in bad air convection areas.

Technical data

	RSA5D-1,5-T	RSA5D-3,5-T
Voltage [V/50 Hz]	3~ 400	3~ 400
Rated current [A]	1.5	3.5
Overall dimensions LxWxH [mm]	305x200x180	305x200x180
Maximum ambient temperature [°C]	+5...+35	+5...+35
Protection rating	IP44	IP44



Controller wiring diagram



Device operating position

Three phase speed controller RSA5D-...-M



Application

The RSA5D-...M series speed controllers are applied for air flow control of three phase fans by means of step control of motor speed. The controllers have five speeds. Speed is set by means of rotating the control knob at the casing front panel to one of five available fixed positions. Several fans can be controlled synchronously in case their total consumption current does not exceed the maximum permissible value of the controller current.

Design and control

The controller casing is made of non-flammable thermoplastic. The controller has five speeds with the output power 90 V – 150 V – 200 V – 280 V – 400 V and incorporates a speed control knob, an operation lamp and an alarm lamp to indicate the emergency operation

of the controller. The controller has built-in motor overheating protection which cuts power supply in case of exceeding the set temperature threshold. After the temperature drops to the operating level, the motor restarts.

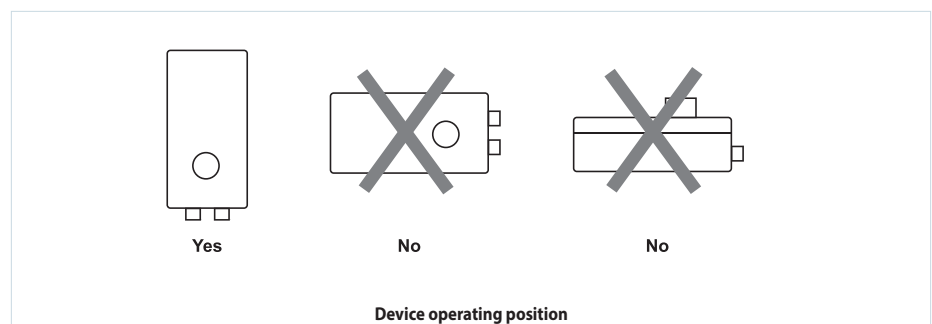
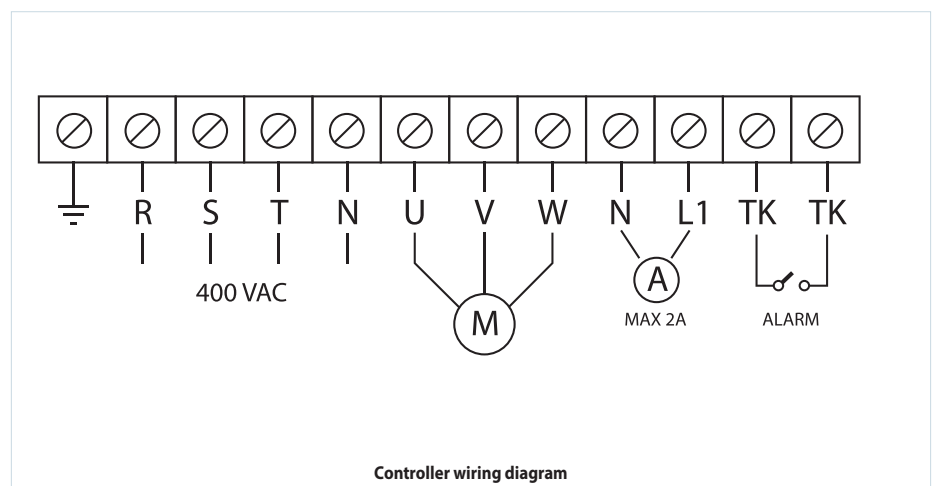
The controller is fitted with terminals (230 V, maximum 2 A) for connection and controlling such external equipment as actuator driven air damper.

Mounting

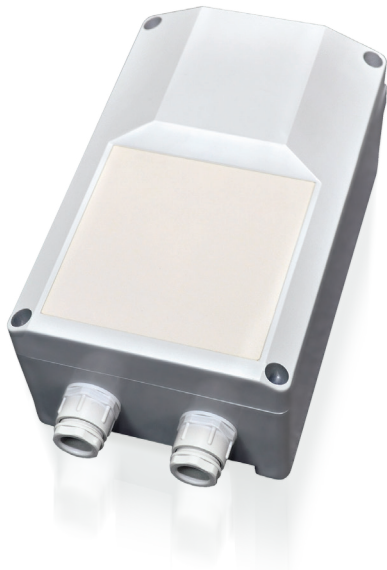
The controller is designed for indoor mounting. Installation shall be performed with respect to the free air recirculation for inner circuit cooling. The controller is for vertical installation. Do not install the controller above the heaters and in bad air convection areas.

Technical data

	RSA5D-5,0-M	RSA5D-8,0-M	RSA5D-10,0-M	RSA5D-12,0-M
Voltage [V/50 Hz]	3~ 400	3~ 400	3~ 400	3~ 400
Rated current [A]	5.0	8.0	10.0	12.0
Overall dimensions LxWxH [mm]	325x250x245	325x250x245	425x300x250	425x300x250
Maximum ambient temperature [°C]	+5...+35	+5...+35	+5...+35	+5...+35
Protection rating	IP44	IP44	IP44	IP44



Frequency speed controller VFED-...-TA



Frequency speed controllers are the energy saving devices which ensure maximum utilization of actuator power with minimum energy consumption.

■ Application

The VFED-...-TA controllers or inverters are designed for frequency control of three phase asynchronous AC motors. Speed control is effected by means of variation of supplied voltage frequency. Applied for air flow control of three phase motors.

■ Design and control

The controller casing is made of non-flammable thermoplastic. The assembly transforms voltage of 220 V, 50 Hz supply mains into output impulse voltage with the frequency 3 Hz to 400 Hz. The motor rotor is powered with simple sinusoidal current and has the rotation speed as a function of the supplied voltage frequency. Single phase 220 V, 50 Hz power

is supplied to the frequency controller inlet. Three-phase voltage with the frequency up to 400 Hz for asynchronous motor supply is generated at the controller outlet.

■ Control by means of external device

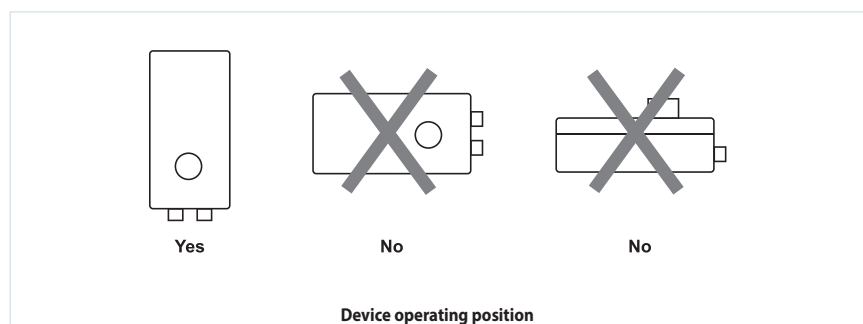
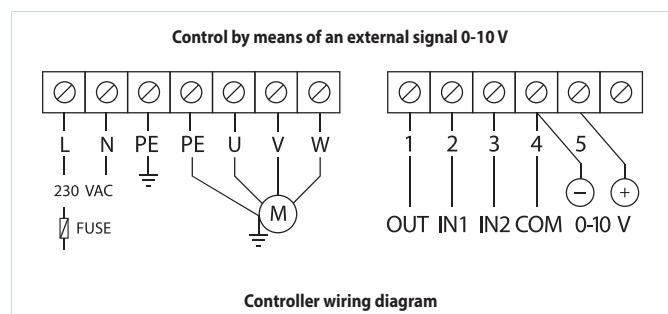
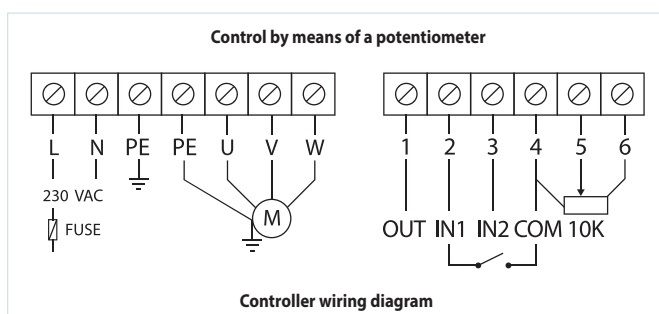
Power output variation as a function of the external control signal 0...10 V or 4-20 mA over the range set during the controller adjustment. The external device is connected through the RS-232 serial port.

■ Mounting

The controller is designed for indoor mounting. Installation shall be performed with respect to the free air circulation for inner circuit cooling. The controller is for vertical installation. Do not install the controller above the heaters and in bad air convection areas.

Technical data

	VFED-200-TA	VFED-400-TA	VFED-750-TA	VFED-1100-TA	VFED-1500-TA
Voltage supplied to the controller [V/50 Hz]	1~ 230	1~ 230	1~ 230	1~ 230	1~ 230
Voltage supplied from the controller to the electric motor [V]	3~ 230	3~ 230	3~ 230	3~ 230	3~ 230
Frequency output supplied to the motor [Hz]	from 3 to 400	from 3 to 400	from 3 to 400	from 3 to 400	from 3 to 400
Maximum load current [A]	1.0	2.0	3.5	5.5	7.5
Maximum electric motor power [W]	200	400	750	1100	1500
Maximum ambient temperature [°C]	+5...+40	+5...+40	+5...+40	+5...+40	+5...+40
Protection rating	IP54	IP54	IP54	IP54	IP54



Temperature controller
TST-1-300
TSTD-1-300



■ **Application**

Applied for temperature control in HVAC systems. Applicable for fan control as well as actuating of fan coils and air heating units driven by 230 V three-speed fans. Provides automatic air heating/cooling rate.

■ **Design and control**

The programmable thermostat with an LCD display is easy to use and provides full compatibility and precise control. The user interface is a simple and accessible menu on the LCD screen. The temperature sensor is built into the plastic control panel casing. The display shows the current indoor air temperature, the selected mode (cooling, heating or automatic) as well as the set fan speed. Fan speed can be set

manually. Provision is made for automatic control of three speed stages (high/medium/low) depending on the indoor temperature.

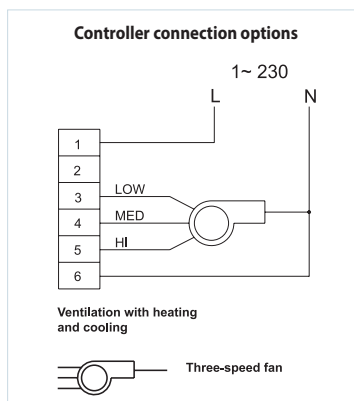
- ▶ LCD highlighting allows to use the room thermostat in low light conditions.
- ▶ Temperature control with accuracy up to 1 °C.
- ▶ The user setup saving during power cut-off.
- ▶ The model TSTD-1-300 is equipped with a remote controller.

■ **Mounting**

The room thermostat is designed for indoor flush mounting. The recommended installation height is 1.5 m above floor level. The room thermostat is not designed for installation close to windows, doors, heating or cooling devices.

Technical data

	TST-1-300	TSTD-1-300
Voltage [V/50 Hz]	1~ 230	1~ 230
Rated current [A]	1 (0.6A)	1 (0.6A)
Number of selected speeds	3	3
Temperature adjustment range [°C]	+10...+30	+10...+30
Maximum ambient temperature [°C]	40	40
Protection rating	IP40	IP40
Remote control panel	no	yes



Temperature controller RTS-1-400 RTSD-1-400



Application

Temperature control in ventilation, heating and air conditioning systems.
Compatible with fans and fan coil valves, air heating units equipped with three-speed 230 V fans.
Automatic control of heating/cooling capacity.

Design and control

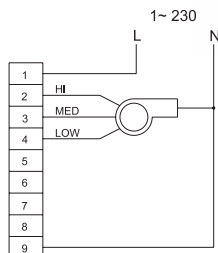
Plastic casing with a built-in temperature sensor.
The front panel incorporates an integrated LCD display and control buttons.
The display shows current and set indoor air temperature, set speed and a selected operation mode. The temperature controller may be set for cooling, heating or auto mode.
The fan speed is set manually by pressing the control buttons.

Automatic control of low/medium/high speed, depending on indoor air temperature.
Due to illuminated LCD display the temperature controller is suitable for use in bad light conditions.
Temperature control accuracy up to 1 °C.
Saving of user setting saving in case of power outage.
RTSD -1- 400 is available with a remote control.
Night operation mode. For details, refer to the night operation mode diagram.

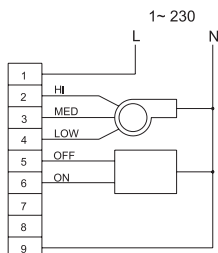
Mounting

The temperature controller is designed for indoor wall flush mounting.
The recommended installation height is 1.5 m above the floor level.
The installation place must not be close to windows, doors and heating or cooling equipment.

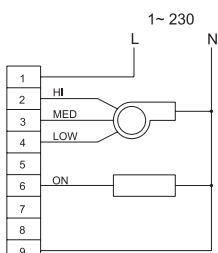
Temperature controller wiring options



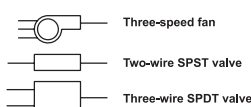
Ventilation with heating and cooling



Ventilation with heating and cooling
Three-wire SPDT valve system



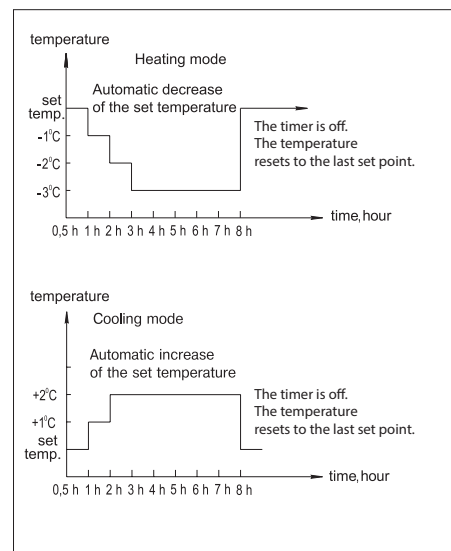
Ventilation with heating and cooling
Two-wire SPST valve system



Technical data

	RTS-1-400	RTSD-1-400
Voltage [V] at 50 Hz	1~ 230	1~ 230
Rated current [A]	2.0	2.0
Number of speeds	3	3
Temperature range [°C]	+10...+30	+10...+30
Overall dimensions LxBxH [mm]	88x88x51	88x88x51
Maximum ambient temperature [°C]	40	40
Protection	IP40	IP40
Remote control	no	yes

Operation schedule in night mode



Night mode operation

- ▶ **Operation in heating mode:** 30 minutes after activation of the night mode the indoor air temperature drops by 1 °C and by another 1 °C in the next hour. In the next hour the air temperature drops by 1 °C more and remains constant for the next 5 hours. After turning the timer off, the air temperature reaches the initial value.
- ▶ **Operation in cooling mode:** 30 minutes after activation of the night mode the indoor air temperature increases by 1 °C and by another 1 °C in the next hour and remains constant for the next 6 hours. After turning the timer off, the air temperature drops down to the initial value.

Temperature regulator
RT-10



■ **Application**

Applied for control of the set indoor temperature as well as ventilation and air conditioning systems control.

■ **Design and control**

The casing is made of high-quality durable plastic. During the temperature increase or decrease with respect to the set value, the thermostat opens or closes the contacts (the pattern is selected during

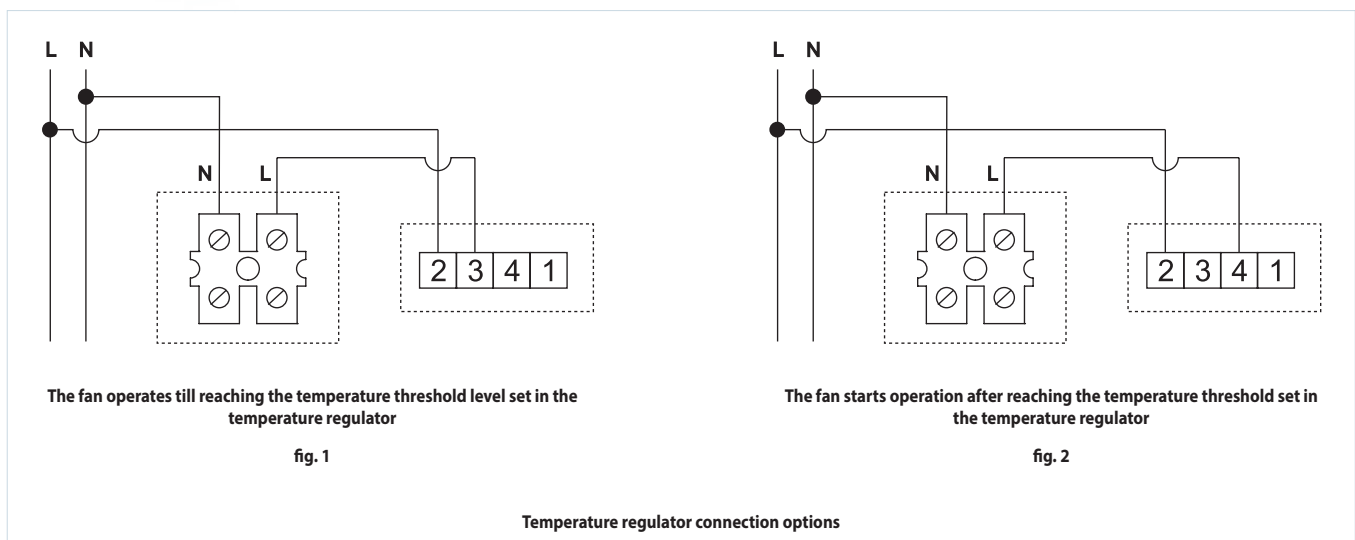
connection). The temperature adjustment range is from +10 up to +30 °C.

■ **Mounting**

The temperature regulator is designed for indoor surface mounting. The recommended installation height is 1.5 m. Do not install the temperature regulator close to windows, doors, heating or cooling devices.

Technical data

	RT-10
Voltage [V/50 (60) Hz]	1~ 220-240
Overall dimensions LxWxH [mm]	84x84x35
Maximum ambient temperature [°C]	40
Protection rating	IP40



Wiring diagram, fig. 1

- maximum current of active load no more than 10 A
- maximum current of inductive load no more than 3 A

Wiring diagram, fig. 2

- maximum current of active load no more than 6 A
- maximum current of inductive load no more than 2 A

Sensor speed switch SP3-1



Application

Applied in ventilation systems for turning the fans on/off and speed switch of multi-speed fan motors.

Design and control

The casing is made of plastic and is equipped with a sensor panel made of hardened glass. The sensor panel has three speed switch buttons. Press a respective speed button to activate a required speed of a connected ventilation unit.

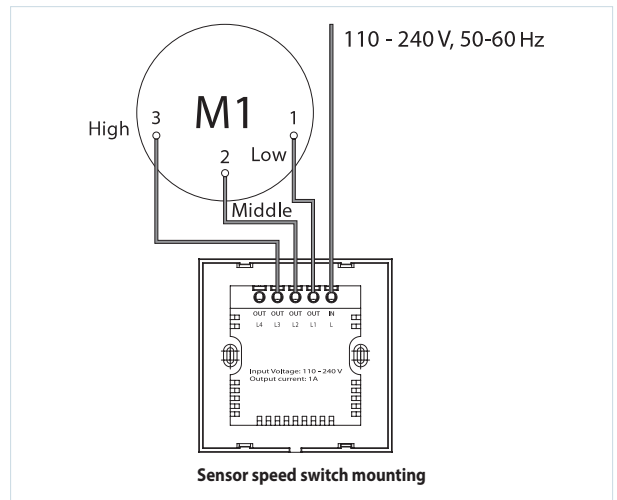
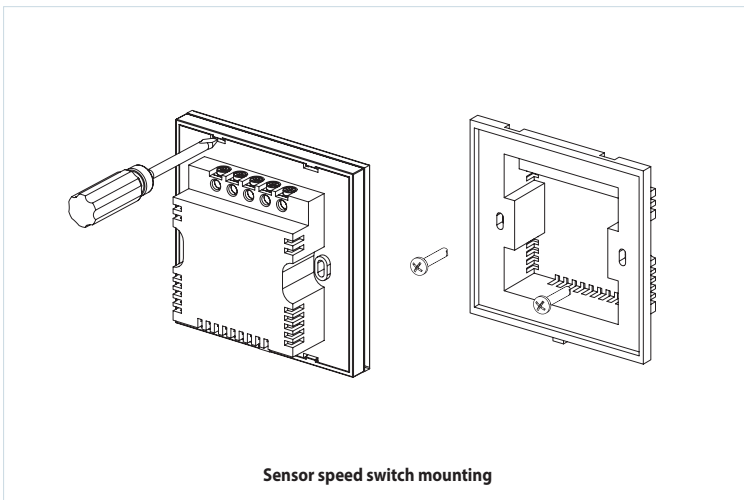
Press an activated speed button to turn the ventilation unit off. The activated speed button glows blue.

Mounting

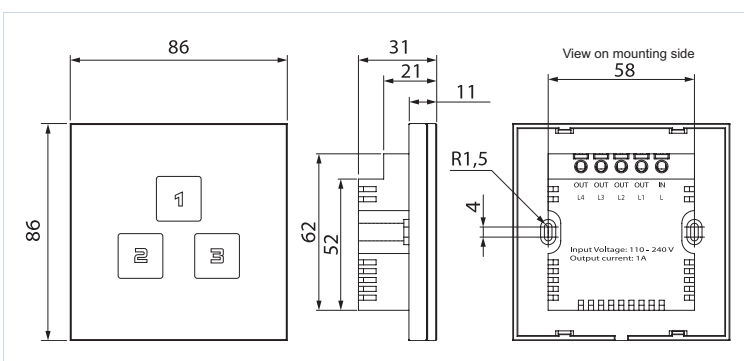
The speed switch is designed for indoor mounting into special surface mounting box MKN-5 (upon special order) or flush mounting junction box MKV-1 (included in the delivery set).

Technical data

	SP3-1
Voltage [V/50 (60) Hz]	110-240
Maximum load current [A]	1
Cable cross section	0.35 up to 1 mm ²
Temperature range [°C]	from -10 up to +45
Humidity range	from 5 % to 80 % (no condensation)
Service life	100 000 switching operations
Protection rating	IP30
Weight [kg]	0.138



Overall dimensions [mm]



SURFACE MOUNTING JUNCTION BOX



Switch
P2-1-300
P3-1-300



■ **Application**

Applied for turning the fan ON/OFF and for switching speed of fans with multi-speed motors.

■ **Design and control**

The casing is made of plastic. Provision is made for the direct switching of the motor speeds (wiring diagram 1 and 3) as well as fan switching ON and control

synchronously with lightening in the room (wiring diagram 2 and 4).

■ **Mounting**

Speed switch is designed for indoor wall mounting inside a flush mounting box MKV-2 (under separate order). It can be installed into standard round electric junction boxes.

Technical data

	P2-1-300	P3-1-300
Voltage [V/50 Hz]	1~ 230	1~ 230
Rated current [A]	3.0	3.0
Number of selected speeds	2	3
Overall dimensions LxWxH [mm]	88x88x51	88x88x51
Maximum ambient temperature [°C]	40	40
Protection rating	IP40	IP40
Weight [kg]	0.13	0.13

SWITCH CONNECTION OPTIONS

diagram 1

The fan can be manually switched ON to one of the three required speeds or switched OFF by means of external speed switch such as P3-1-300.

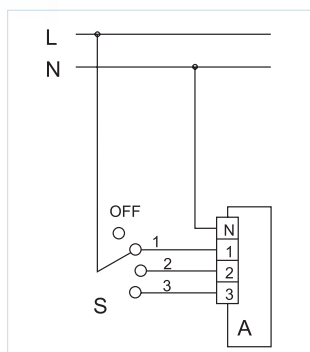


diagram 4

The fan can be manually switched ON to one of three speeds by means of the external S speed switch such as P2-1-300. When switching the fan ON, the light is switched in parallel ON. The fan can be switched OFF with parallel switching the light OFF. The fan operates both with light or without it.

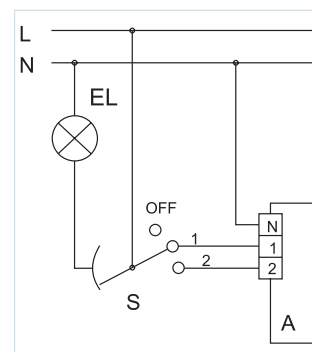


diagram 2

The fan can be manually switched ON to one of three speeds by means of such external S speed switch such as P3-1-300. When switching the fan ON, the light is switched in parallel ON. The fan can be switched OFF with parallel switching the light OFF. The fan operates both with light or without it.

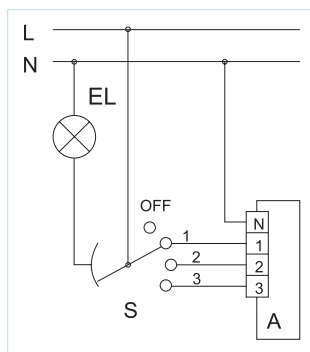
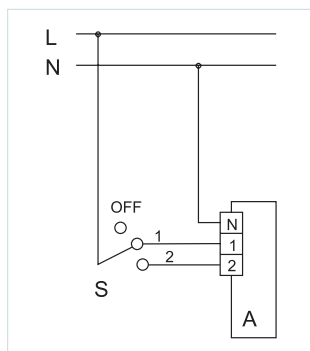


diagram 3

The fan can be manually switched ON to one of the two required speeds or switched OFF by means of the external speed switch such as P2-1-300.



FLUSH MOUNTING JUNCTION BOX



Switch
P2-5.0 N(V)
P3-5.0 N(V)
P5-5.0 N(V)



■ **Application**

Applied for turning the fan ON/OFF and for switching speed in fans with multi-speed motors.

■ **Design and control**

The switch casing is made of plastic and fitted with an ON/OFF knob with an operation lamp. The fan speeds can be switched directly or by means of the remote

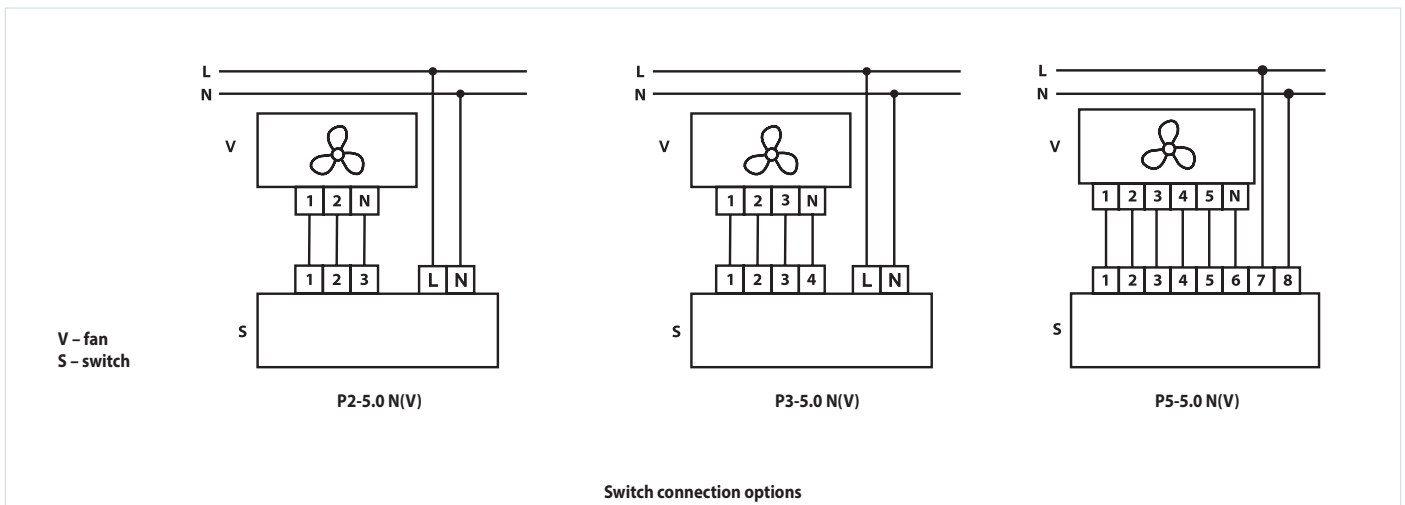
panel for speed switching for multistage transformer speed controller (e. g. P5-5.0 for a five-stage transformer speed controller).

■ **Mounting**

The universal design of the controller enables its indoor wall mounting either on a wall (H modification) or inside a wall (V modification).

Technical data

	P2-5.0	P3-5.0	P5-5.0
Voltage [V/50 Hz]	1~ 230	1~ 230	1~ 230
Rated current [A]	5.0	5.0	5.0
Number of selected speeds	2	3	5
Overall dimensions LxWxH [mm]	162x80x70	162x80x70	162x80x70
Maximum ambient temperature [°C]	40	40	40
Protection rating	IP40	IP40	IP40
Weight [kg]	0.25	0.25	0.25



Speed controller
R-1/010



■ **Application**

Applied for smooth speed control of EC motors with the control input 0-10V.

■ **Design and control**

The controller casing is made of plastic. Switching ON/OFF is effected by means of control knob rotation. The control range starts from the minimum

possible value and includes the maximum possible values.

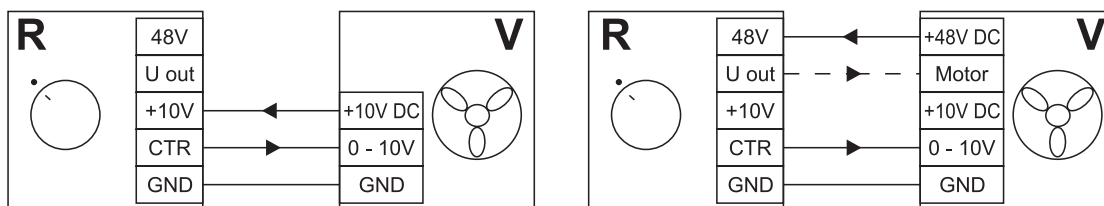
■ **Mounting**

The controller is designed for indoor mounting into special surface mounting (MKN-3) or flush mounting (MKV-4) junction box (under separate order) or into standard round electric junction boxes.

Technical data

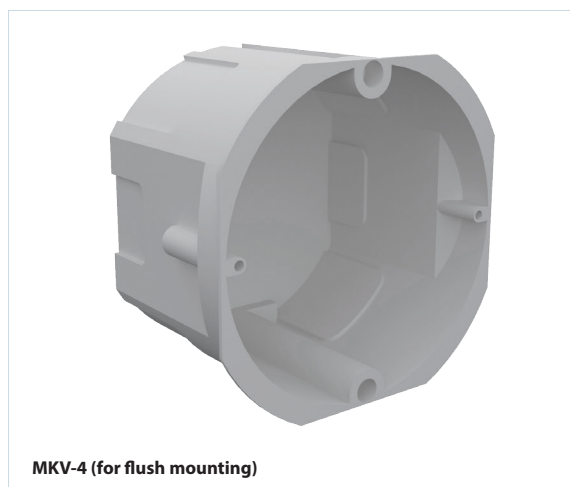
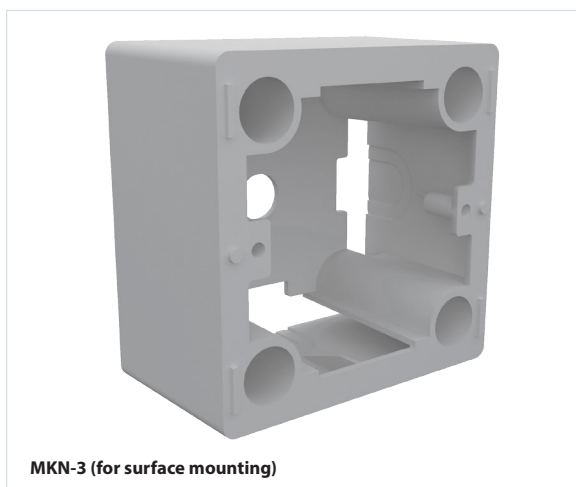
	R-1/010
Voltage [V]	10-48 VDC
Control signal [V]	0-10
Maximum current [mA]	5 mA
Overall dimensions LxWxH [mm]	78x78x63
Maximum ambient temperature [°C]	35
Protection rating	IP40
Weight [kg]	0.12

Designation key:
V – fan
R – controller R-1/010



Controller wiring diagram

MOUNTING JUNCTION BOX



Micro Drive frequency converter



■ Application

General purpose drive that can control AC motors up to 22 kW.

■ Mounting

A compact design allows side-by-side mounting without derating.

■ Minimum penetration of dust

VLT® Micro Drive is designed to keep the forced ventilation away from the electronics. Printed circuit boards are well protected inside the drive.

■ Build-in RFI

Radio disturbance from motor cables is limited with the built-in RFI filter allowing for 15 m motor cables (screened) and up to 50 m cables (unscreened). Meets EU norms.

■ In- and outputs

5 programmable digital inputs
PNP/NPN logic
Pulse input 20-5000 Hz
1 analogue input 0-20 mA
Thermistor input (analogue/digital)
1 analogue output
1 relay – 240 V, 2 A
RS 485
Modbus RTU

Control panels

Name	Ordering No.
VLT control panel LCP 11 w/o potentiometer	132BO100
VLT control panel LCP 12 with potentiometer	132BO101

Name	Ordering No.
Control panel remote mounting kit	132BO102

Frequency converter type and ordering numbers

Single-phase 200-240 V

Power [kW]	Current [A]	Ordering No.	Frame
0.18	1.2	132F0001	M1
0.37	2.2	132F0002	M1
0.75	4.2	132F0003	M1
1.5	6.8	132F0005	M2
2.2	9.6	132F0007	M3

Cabinet sizes (mounting flange incl.)

mm	M1	M2	M3	M4	M5
Height	150	176	239	292	335
Width	70	75	90	125	165
Depth	148	168	194	241	248

+ 6 mm with potentiometer

Three-phase 380-480 V

Power [kW]	Current [A]	Ordering No.	Frame
0.37	1.2	132F0017	M1
0.75	2.2	132F0018	M1
1.5	3.7	132F0020	M2
2.2	5.3	132F0022	M2
3.0	7.2	132F0024	M3
4.0	9.0	132F0026	M3
5.5	12.0	132F0028	M3
7.5	15.5	132F0030	M3
11.0	23.0	132F0058	M4
15.0	31.0	132F0059	M4
18.0	37.0	132F0060	M5
22.0	43.0	132F0061	M5

Sensor
T-1,5 N
TH-1,5 N
TF-1,5 N
TP-1,5 N



■ **T-1,5 N – run out timer**

Enables the fan operation within the set time period after pressing the knob for switching the fan OFF. After the set time from 2 to 30 minutes the fan switches automatically OFF. The run-out timer is generally applicable for the fans installed in bathrooms, WC or kitchens.

■ **TH-1,5 N – humidity sensor**

The fan with such sensor switches automatically ON in case of exceeding the set humidity level. A user can independently adjust the required humidity level based on personal preferences. The humidity sensor is generally applicable for the fans installed in the premises with increased humidity as bathrooms, kitchens, washing rooms or pools.

■ **TF-1,5 N – timer + photo sensor**

The built-in photo sensor responds to the indoor illumination rate fluctuations and has the provisions for automatic switching the fan ON accordingly. In case of light switching OFF, the fan will be switched OFF with respect to the built-in run-out timer with the time

period set between 2 to 30 minutes. In such a way the ventilation system fitted with a photo sensor is fully automated and requires no human control. The photo sensor is generally applicable for the fans installed in periodically visited premises.

■ **TP-1,5 N – infra-red sensor**

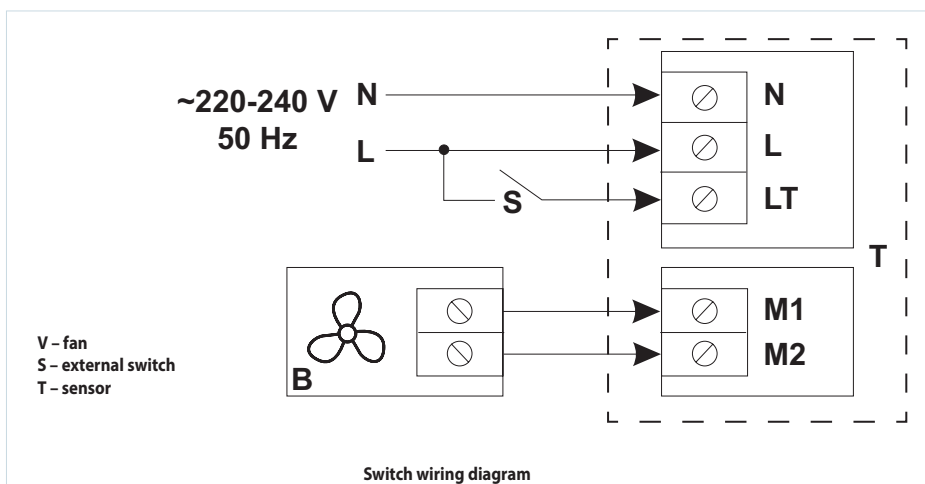
The built-in infra-red sensor responds to movement in a room and switches the fan automatically ON. If the room is empty, the fan switches OFF with respect to the built-in run-out timer adjustable between 2 to 30 minutes. In such a way the ventilation system fitted with infra-red sensor is fully automated and requires no human control. The infra-red sensor is generally applicable for the fans installed in periodically occupied spaces.

■ **Mounting**

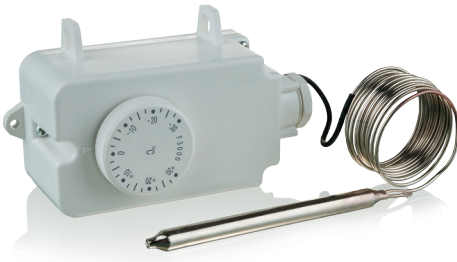
The sensors are designed for indoor wall surface installation (N modification).

Technical data

	T-1,5 N / TH-1,5 N TF-1,5 N / TP-1,5 N
Voltage [V/50 Hz]	220-240
Maximum power [VA]	330
Maximum current [A]	1.5
Overall dimensions LxWxH [mm]	162x80x70
Timer operating conditions [°C]	from 1 up to +45
Protection rating	IP30
Weight [kg]	0.400



Thermostat F-3000



■ Application

The thermostats with bridging contacts are designed for regulation of air temperature, temperature of liquids and gases and are widely used in electric water heaters, dishwashing and clothes washing machines, drying machines, electric furnaces, etc. The thermostat is used to prevent freezing of water heaters and heat exchangers according to exhaust air temperature readings.

■ Design and control

The operating logic is based on volumetric thermal extension. The thermostatic bulb is located in the copper sleeve. Liquid placed inside the thermostatic bulb is heated, expanded and its excessive volume is transferred through the capillary tube to the bellows.

The bellows are elongated and transmit force to the relay contact. Thus the set temperature is maintained in the system. The thermostat casing is made of plastic. The temperature probe is made of copper. The response temperature is set by rotation of the disk in the casing.

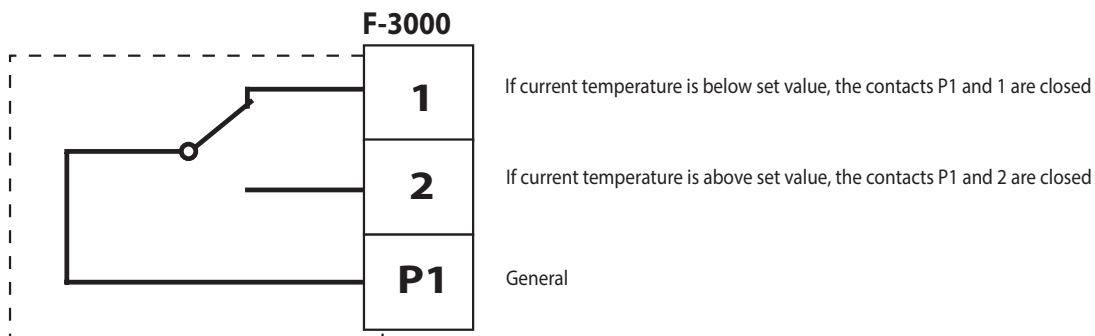
■ Mounting

The thermostat is suitable for wall surface mounting or installation in the duct in any position. The casing is fixed to the surface with screws on the front panel. The thermostatic bulb is designed for operation in temperature-controlled environment. The thermostat is connected with the thermal bellows with 1.5 m long capillary tube.

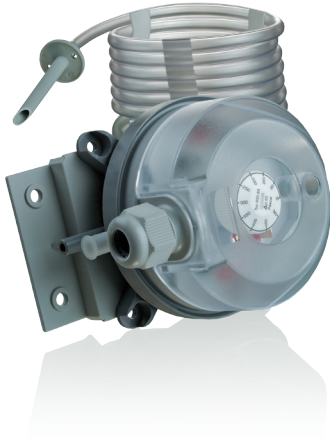
Technical data

	F-3000
Relay switching capacity	16A 230 V (active load)
Length of the capillary tube [m]	1.5
Operating temperature range [°C]	-30 up to +30
Reset mechanism	automatic
Operating pressure range [Pa]	50...500
Number of contacts	1 per switch
Protection rating	IP54

Thermostat wiring diagram



Pressostat DTV 500



■ Application

The pressure differential switch is used to determine air rarefaction or air (non-aggressive gases) pressure drop. It is used in ventilation systems to determine air filter clogging degree or belt breaking in centrifugal fans, etc.

■ Design and control

The pressostat casing is made of plastic. The pressure differential for the pressure switch actuation is set by turning the disk in the casing. The delivery set includes 2 plastic pressure outlets for pressure tap-off, PVC tubes \varnothing 5 mm and 2 m long.

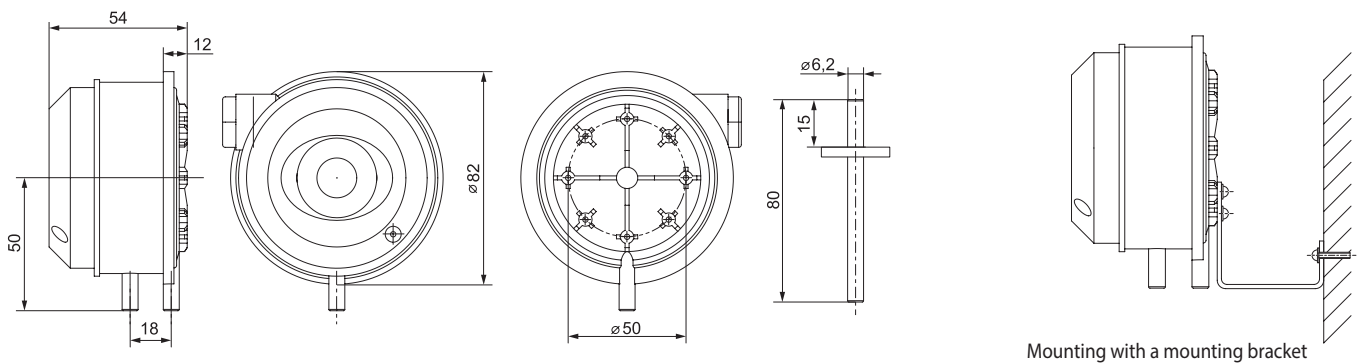
■ Mounting

The pressure switch is designed for surface wall mounting or installation into air ducts on the mounting bracket with two \varnothing 5 mm openings located at 40 mm center-to-center distance. The switch is suitable both for vertical and horizontal installation. However vertical orientation is preferable because in case of horizontal orientation the switching point will be shifted for 11 Pa. The length of pressure outlet tubes is variable but the relay actuation time increases if the tube length is above 2 m. Install the differential pressure switch above the pressure tapping points. Connect the tubes in such a way as to avoid formation of tubular loops to prevent condensate accumulation inside the tubes.

Technical data

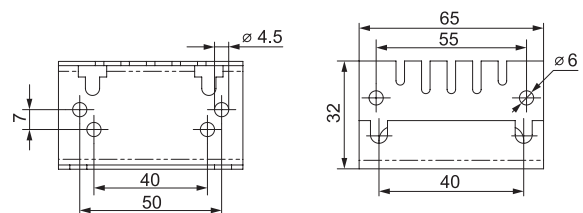
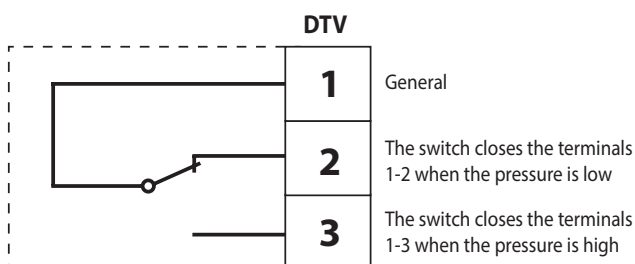
	DTV 500
Number of contacts	1
Contact data [A]	5 (0.8) 250 V AC
Reset mechanism	automatic
Pressure range [Pa]	50...500
Hysteresis loop	25 Pa +/- 8 Pa
Protection rating	IP54

Overall dimensions



Mounting with a mounting bracket

Pressostat wiring diagram



Metal mounting bracket

CO₂ sensor CO2-1



■ Application

The sensor is designed for indoor carbon dioxide concentration measurement and respective air flow regulation through the control output signal to the fan. Air flow control based on CO₂ concentration is an efficient energy saving solution.

■ Design and compatibility

The sensor has two separate outputs: a normally opened dry relay contact and an analogue output 0...10 V (this output is adjustable for 2...10 V/0...20 mA/4...20 mA). The relay output is used to turn the fan ON/OFF depending on indoor CO₂-concentration and the analogue output is used for smooth fan speed control for a fan with an EC-motor or a fan with an extra speed controller with 0-10 V input, refer to RS...TA or VFED. In case of smooth fan speed control the fan speed varies proportionally to carbon dioxide emissions. The relay and analogue outputs make the sensor compatible with

CO₂ sensor CO2-2



any ventilation system. The integrated self-calibration system ensures reliable sensor operation during the sensor service life.

■ Modifications

The sensor is available in two modifications: CO2-1 and CO2-2. The CO2-1 model incorporates LED lights for CO₂ concentration and operation buttons indicating the level of three operation modes: 1 – on, 2 – off, 3 – operation by CO₂ concentration. The button is used to switch the ventilation system on or off when CO₂-based ventilation control is not required. The CO2-2 model has no LED-lights and on/off button. The model is applied for premises requiring permanent ventilation, i.e. at school classes and other public premises.

■ Mounting and power supply

The sensor is designed for wall surface mounting. 24 VAC low current power supply. If power supply 24 V

is not available, connect the TRF plug that is offered as an accessory.

■ Accessories

Power supply unit is applied for connection of the sensor to 220 V (TRF-220/24-1.6 model) or 120 V (TRF-120/24-1.6 model) AC power mains.

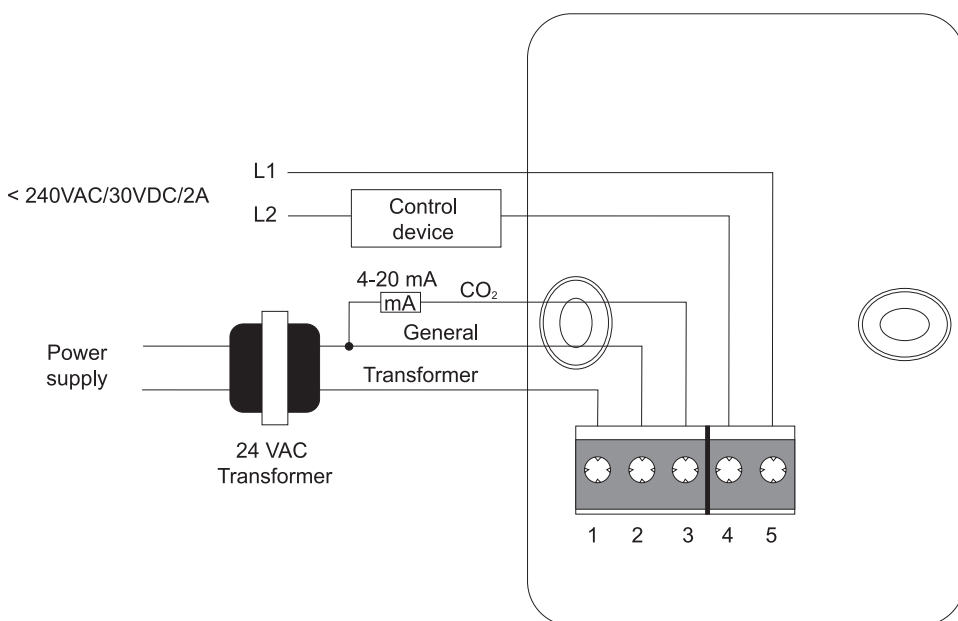


Optional equipment

Technical data




Parameters	Value
Power supply / consumption	24 VAC (50/60 Hz \pm 10 %), 24 VDC/1.6 W Max
Gas detection analyzer	Non-dispersive infrared detector (NDIR) with self-calibration system
CO ₂ measuring range	0–2.000 ppm (parts per million)
Accuracy at 25 °C, 2.000 ppm	\pm 30 ppm + 3 % of reading
Response time	maximum 2 min
Warm up time for each turning-on	2 hours (first time), 2 minutes (operation)
Analogue output	0–10 VDC (default), 4–20 mA selectable by jumpers
On/Off output	1X2A switch load Four set points selectable by jumpers
6 LED lights for CO ₂ concentration indication (for model CO2-1)	1st green indicator lights when CO ₂ concentration is below 600 ppm 1st and 2nd green indicators light when CO ₂ concentration is 600–800 ppm 1st yellow indicator lights when CO ₂ concentration is 800–1200 ppm 1st and 2nd yellow indicators light when CO ₂ concentration is 1200–1400 ppm 1st red indicator lights when CO ₂ concentration is 1400–1600 ppm 1st and 2nd red indicators light when CO ₂ concentration is above 1600 ppm
Operating conditions / storage recommendations	0–50 °C; 0–95 % RH non condensing/0–50 °C
Weight / Dimensions	0.120 kg/100 mm x 80 mm x 30 mm

Sensor wiring diagram







Air damper actuators

Electric actuators without spring return

Type	Power supply	Control	Image	Running time
2 Nm, damper area up to 0.4 m²				
CM24	24 V	Open-close, 3-point		75 s
CM230	230 V	Open-close, 3-point		75 s
5 Nm, damper area up to 1.0 m²				
LM24A-TP	24 V	Open-close, 3-point		150 s
LM24ASR-TP	24 V	modulating 0...10 V		150 s
LM230A-TP	230 V	Open-close, 3-point		150 s
LM230ASR-TP	230 V	modulating 0...10 V		150 s
10 Nm, damper area up to 2.0 m²				
NM24A-TP	24 V	Open-close, 3-point		150 s
NM24ASR-TP	24 V	modulating 0...10 V		150 s
NM230A-TP	230 V	Open-close, 3-point		150 s
NM230ASR-TP	230 V	modulating 0...10 V		150 s

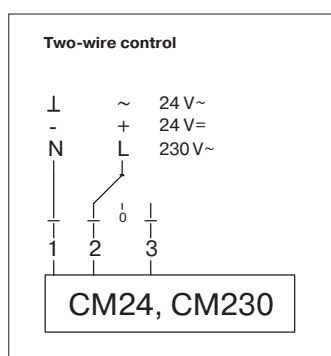
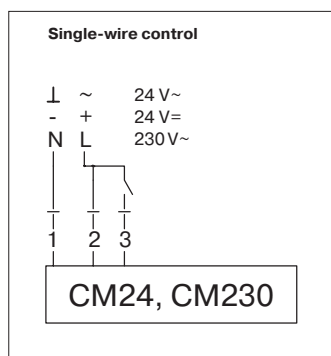
Electric actuators with a spring return

Type	Power supply	Control	Image	Running time
2,5 Nm, damper area up to 0.5 m²				
TF24	24 V	Open-close		75 s
TF230	230 V	Open-close		75 s
4 Nm, damper area up to 0.8 m²				
LM24A-TP	24 V	Open-close, 3-point		75 s
LM24ASR-TP	24 V	modulating 0...10 V		75 s
10 Nm, damper area up to 2.0 m²				
NM24A-TP	24 V	Open-close, 3-point		75 s
NM24ASR-TP	24 V	modulating 0...10 V		75 s
NM230A-TP	230 V	Open-close, 3-point		75 s
20 Nm, damper area up to 4.0 m²				
SF24A	24 V	Open-close		75 s
SF24A-SR	24 V	modulating 0...10 V		75 s
SF230A	230 V	Open-close		75 s

Damper actuator CM24 CM230



Wiring diagram



WARNING!

For **CM24**: connection via a power transformer
Several wires may be connected with respect to the power

Overall dimensions [mm]

Application

The CM series actuators with actuating torque 2 Nm are designed for controlling air dampers with cross section up to 0.4 m² installed in various ventilation and air conditioning systems.

Unit features

The actuator is easily installed directly on the damper axis. The actuator is locked with a special spindle clamp to prevent its turning-through. The electric actuator is protected against overload. The overload protection

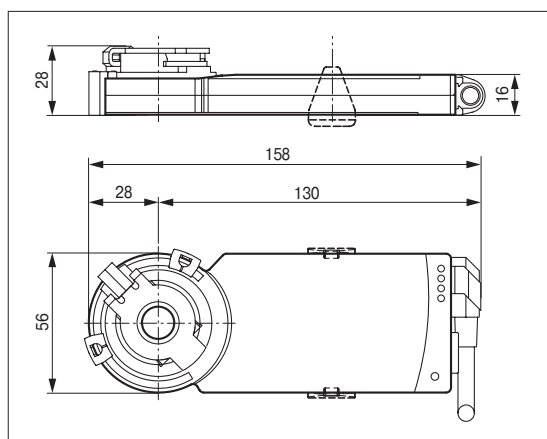
stops the actuator once it reaches the end positions. In case of installation of a magnet on the actuator housing the gear is disengaged and the damper changes into manual operation mode. The turning angle is adjusted by mechanical end stops.

Control

The three-point (two-wire) system provides control over the air flow control damper. The damper is opened or closed by a single-circuit control.

Technical data

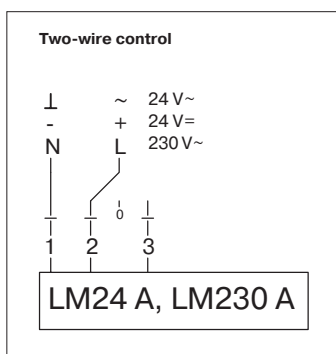
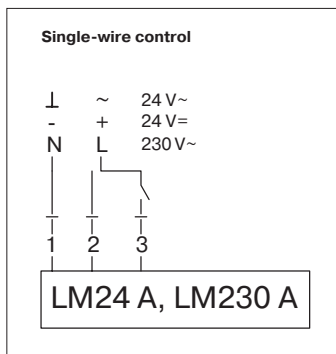
	CM24	CM230
Voltage [V]	24AC 50/60 Hz, 24DC	230AC 50/60 Hz
Nominal voltage range [V]	19.2...28.8AC 19.2...28.8DC	85...265AC
Rated power [VA]	1	2
Power consumption in operation/at rest [W]	0.5/0.5	1/1
Connecting cable	1 m long, 3 x 0.75 mm ²	
Positioning accuracy	±5 %	
Rotation direction	determined by terminal connection	
Torque [Nm]	2 (at nominal voltage)	
Rotation angle: no end stop	endless	
Rotation angle: with end stop	fixed 315°/adjustable 0...287.5° with 2.5° increment	
Running time	75 s/90°	
Position indicator	mechanical	
Ingress protection	IP54 at any mounting position	
Electrical protection class	III low voltage II totally insulated	
Operation temperature [°C]	-30...+50	
Storage temperature [°C]	-40...+80	
Ambient humidity	95 %, no condensation	
Noise level [dBA]	35	
Technical maintenance	not required	
Weight [kg]	0.13	



Damper actuator LM24A-TP LM230A-TP



Wiring diagram



WARNING!

For **LM24A**: connection via a power transformer

Several wires may be connected with respect to the power

Overall dimensions [mm]

Application

The LM series actuators with actuating torque 5 Nm are designed for controlling air dampers with cross section up to 1 m² installed in various ventilation and air conditioning systems.

Unit features

The actuator is easily installed directly on the damper axis. The actuator is locked with a special spindle clamp to prevent its turning-through. The electric actuator is protected against overload. The overload protection stops the actuator once it reaches the end positions.

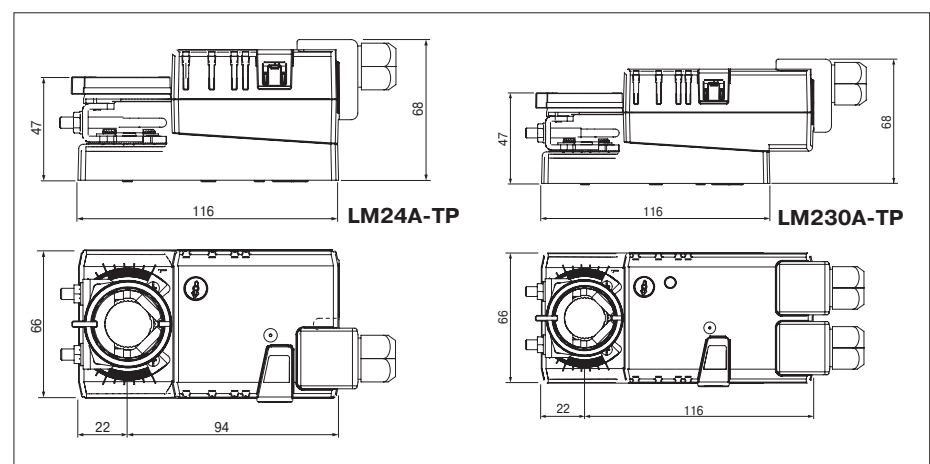
In case of pressing the button on the actuator housing the gear is disengaged and the damper changes into manual operation mode. The turning angle is adjusted by mechanical end stops.

Control

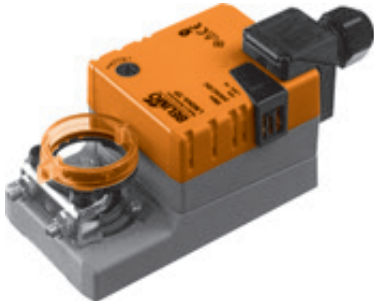
The three-point (two-wire) system provides control over the air flow control damper. The damper is opened or closed by a single-circuit control.

Technical data

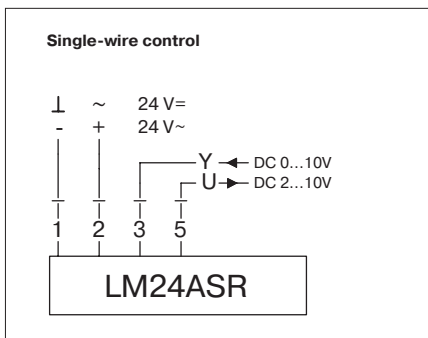
	LM24A-TP	LM230A-TP
Voltage [V]	24AC 50/60 Hz, 24DC	230AC 50/60 Hz
Nominal voltage range [V]	19.2...28.8AC 19.2...28.8DC	85...265AC
Rated power [VA]	2	4
Power consumption in operation/at rest [W]	1/0.2	1/1
Connecting cable	terminals 4 mm ²	
Rotation direction	selected by 0/1 switch positioning	
Torque [Nm]	5 (at nominal voltage)	
Rotation angle	maximum 95°, adjustable with mechanical end stops	
Running time	150 s/90°	
Position indicator	mechanical	
Ingress protection	IP54 at any mounting position	
Electrical protection class	III low voltage II totally insulated	
Operation temperature [°C]	-30...+50	
Storage temperature [°C]	-40...+80	
Ambient humidity	95 %, no condensation	
Noise level [dBA]	35	
Technical maintenance	not required	
Weight [kg]	0.5	



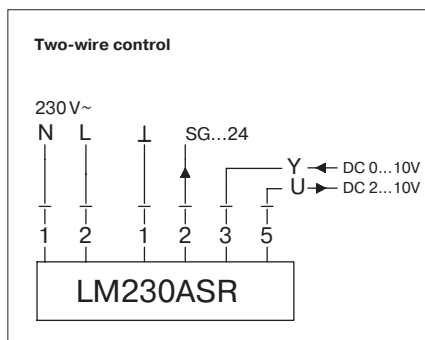
Damper actuator LM24ASR-TP LM230ASR-TP



Wiring diagram



WARNING!
For connection via a power transformer



Overall dimensions [mm]

Application

The LM series actuators with actuating torque 5 Nm are designed for controlling air dampers with cross section up to 1 m² installed in various ventilation and air conditioning systems.

Unit features

The actuator is easily installed directly on the damper axis. The actuator is locked with a special spindle clamp to prevent its turning-through. The electric actuator is protected against overload. The overload protection stops the actuator once it reaches the end positions.

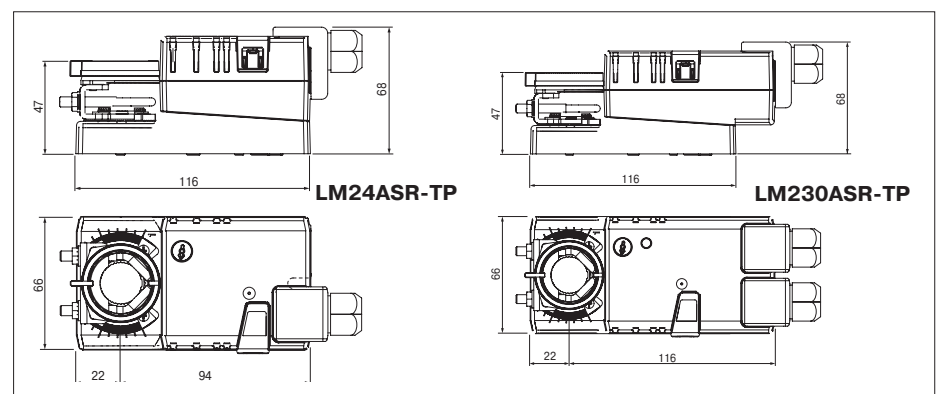
In case of pressing the button on the actuator housing the gear is disengaged and the damper changes into manual operation mode. The turning angle is adjusted by mechanical end stops.

Control

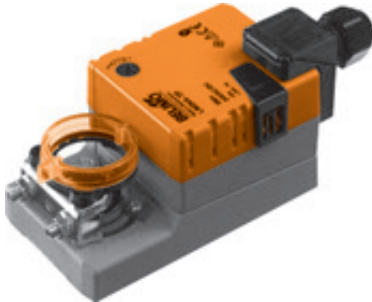
The three-point (two-wire) system provides control over the air flow control damper. The damper is opened or closed by a single-circuit control.

Technical data

	LM24ASR-TP	LM230ASR-TP
Voltage [V]	24AC 50/60 Hz, 24DC	24AC 50/60 Hz, 24DC
Nominal voltage range [V]	19.2...28.8AC 19.2...28.8DC	85...265AC
Rated power [VA]	2	4
Power consumption in operation/at rest [W]	1/0.4	1.8/1
Connecting cable	terminals 4 mm ²	
Control signal Y	0...10 V= (input resistance 100 kOhm)	
Operating range	2...10 V=	
Feedback voltage U	2...10 V=, max 1mA	
Positioning accuracy	± 5 %	
Rotation direction	selected by 0/1 switch positioning	
Mechanical control	self-resetting button	
Torque [Nm]	5 (at nominal voltage)	
Rotation angle	maximum 95°, adjustable with mechanical end stops	
Running time	150 s/90°	
Position indicator	mechanical	
Ingress protection	IP54 at any mounting position	
Electrical protection class	III low voltage II totally insulated	
Operation temperature [°C]	-30...+50	
Storage temperature [°C]	-40...+80	
Ambient humidity	95 %, no condensation	
Noise level [dBA]	35	
Technical maintenance	not required	
Weight [kg]	0.5	0.7



Damper actuator NM24A-TP NM230A-TP



■ Application

The NM series actuators with actuating torque 10 Nm are designed for controlling air dampers with cross section up to 2 m² installed in various ventilation and air conditioning systems.

■ Unit features

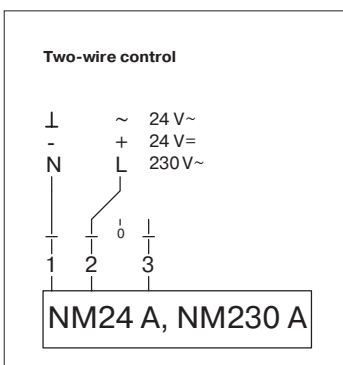
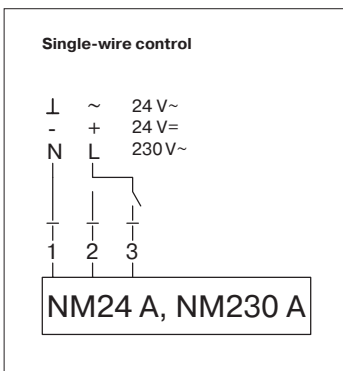
The actuator is easily installed directly on the damper axis. The actuator is locked with a special spindle clamp to prevent its turning-through. The electric actuator is protected against overload. The overload protection stops the actuator once it reaches the end positions. In case of pressing the button on the actuator housing

the gear is disengaged and the damper changes into manual operation mode. The turning angle is adjusted by mechanical end stops.

■ Control

The three-point (two-wire) system provides control over the air flow control damper. The damper is opened or closed by a single-circuit control.

Wiring diagram



WARNING!

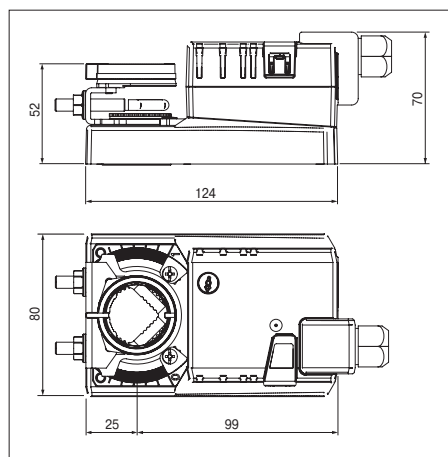
For **NM24A**: connection via a power transformer

Several wires may be connected with respect to the power

Overall dimensions [mm]

Technical data

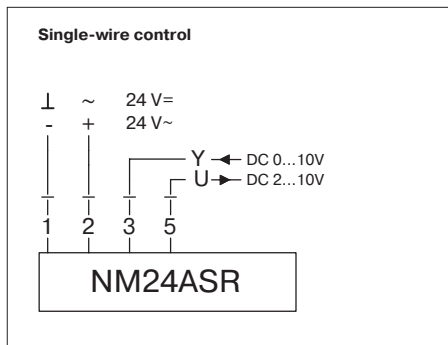
	NM24A-TP	NM230A-TP
Voltage [V]	24AC 50/60 Hz, 24DC	100...240AC 50/60 Hz
Nominal voltage range [V]	19.2...28.8AC 19.2...28.8DC	85...265AC
Rated power [VA]	4	6
Power consumption in operation/at rest [W]	1.5/0.2	2.5/0.6
Connecting cable	terminals 4 mm ²	
Rotation direction	selected by 0/1 switch positioning	
Torque [Nm]	10 (at nominal voltage)	
Rotation angle	maximum 95°, adjustable with mechanical end stops	
Running time	150 s/90°	
Position indicator	mechanical	
Ingress protection	IP54 at any mounting position	
Electrical protection class	III low voltage II totally insulated	
Operation temperature [°C]	-30...+50	
Storage temperature [°C]	-40...+80	
Ambient humidity	95 %, no condensation	
Noise level [dBA]	35	
Technical maintenance	not required	
Weight [kg]	0.75	0.8



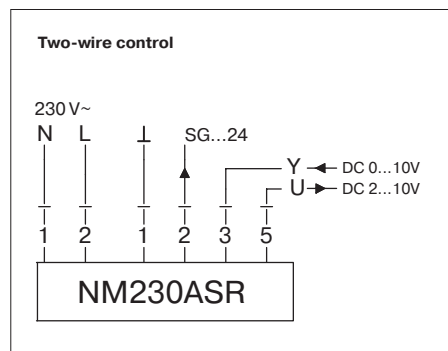
Damper actuator NM24ASR-TP NM230ASR-TP



Wiring diagram



WARNING!
For connection via a power transformer



Overall dimensions [mm]

Application

The NM series actuators with actuating torque 10 Nm are designed for controlling air dampers with cross section up to 2 m² installed in various ventilation and air conditioning systems.

Unit features

The actuator is easily installed directly on the damper axis. The actuator is locked with a special spindle clamp to prevent its turning-through. The electric actuator is protected against overload. The overload protection stops the actuator once it reaches the end positions.

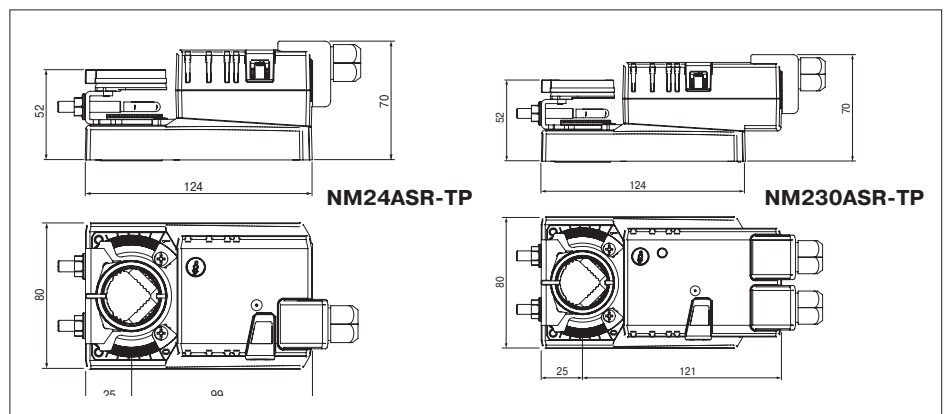
In case of pressing the button on the actuator housing the gear is disengaged and the damper changes into manual operation mode. The turning angle is adjusted by mechanical end stops.

Control

The damper actuator is controlled via standard analogue signal 0...10 V+ and moves the damper to the position corresponding to the preset signal.

Technical data

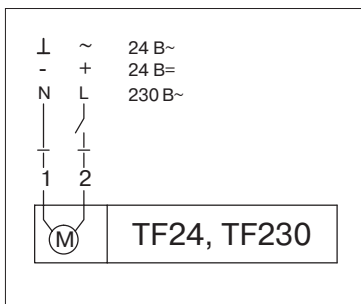
	NM24ASR-TP	NM230ASR-TP
Voltage [V]	24AC 50/60 Hz, 24DC	100...240 V~50/60 Hz
Nominal voltage range [V]	19.2...28.8AC 19.2...28.8DC	85...265AC
Rated power [VA]	4	6.5
Power consumption in operation/at rest [W]	2/0.4	3.5/1
Connecting cable	terminals 4 mm ²	
Control signal Y	0...10 V= (input resistance 100 kOhm)	
Operating range	2...10 V=	
Feedback voltage U	2...10 V=, max 1mA	
Positioning accuracy	±5 %	
Rotation direction	selected by 0/1 switch positioning	
Mechanical control	self-resetting button	
Torque [Nm]	5 (at nominal voltage)	
Rotation angle	maximum 95°, adjustable with mechanical end stops	
Running time	150 s/90°	
Position indicator	mechanical, feedback signal 2...10 V=	
Ingress protection	IP54 at any mounting position	
Electrical protection class	III low voltage II totally insulated	
Operation temperature [°C]	-30...+50	
Storage temperature [°C]	-40...+80	
Ambient humidity	95 %, no condensation	
Noise level [dBA]	35	
Technical maintenance	not required	
Weight [kg]	0.8	0.95



Damper actuator TF24 TF230



Wiring diagram



WARNING!

For **TF24**: connection via a power transformer

For **TF230**: The minimum distance between the dead contacts of the switch shall be 3 mm

Several wires may be connected with respect to the power

Application

The TF series actuators with actuating torque 2,5 Nm are designed for controlling air dampers with cross section up to 0.5 m², which fulfill the protection functions (e.g. freeze, smoke protection etc.) in various ventilation and air conditioning systems.

Unit features

The actuator is easily installed directly on the damper axis. The actuator is locked with a special spindle clamp to prevent its turning-through. The electric actuator is protected against overload. The overload protection stops the actuator once it reaches the end positions. The turning angle is adjusted by a mechanical end stop.

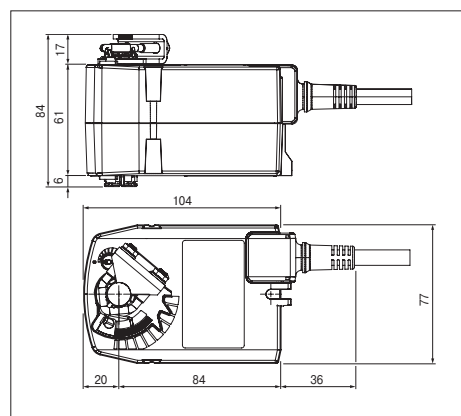
Control

When voltage is applied the actuator moves the damper to the operative position. The actuator moves the damper to the operating position at the same time as tensioning the return spring. The damper is turned back to the safety position by spring energy when the supply voltage is interrupted.

Technical data

	TF24	TF230
Voltage [V]	24AC 50/60 Hz, 24DC	230AC 50/60 Hz
Nominal voltage range [V]	19.2...28.8AC 21.6...28.8DC	85...265AC
Rated power [VA]	5	
Power consumption in operation/at rest [W]	2.5/1.5	
Connecting cable	cable 1 m, 2x0,75 mm ²	
Rotation direction	determined by L/R positioning	
Torque [Nm]	motor 2.5 (at nominal voltage) spring 2.5	
Rotation angle	maximum 95°, adjustable 37...100 % with a mechanical end stop	
Running time	motor 40...75 s (0...2 Nm) spring <25 s at -20...50 °C	
Position indicator	mechanical	
Ingress protection	IP42	
Electrical protection class	III low voltage II totally insulated	
Operation temperature [°C]	-30...+50	
Storage temperature [°C]	-40...+80	
Ambient humidity	95 %, no condensation	
Noise level [dBA]	35	
Technical maintenance	motor 50 spring 62	
Weight [kg]	0.6	

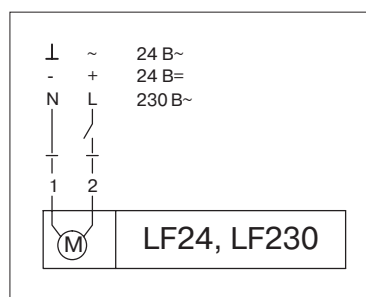
Overall dimensions [mm]



Damper actuator LF24/LF230



Wiring diagram



WARNING!

For **LF24**: connection via a power transformer

For **LF230**: the minimum distance between the dead contacts of the switch shall be 3 mm.

Several wires may be connected with respect to the power

Overall dimensions [mm]

Application

The LF series actuators with actuating torque 4 Nm are designed for controlling air dampers with cross section up to 0.8 m², which fulfill the protection functions (e.g. freeze, smoke protection etc.) in various ventilation and air conditioning systems.

Unit features

The actuator is easily installed directly on the damper axis. The actuator is locked with a special spindle clamp to prevent its turning-through. The electric actuator is protected against overload. The overload protection

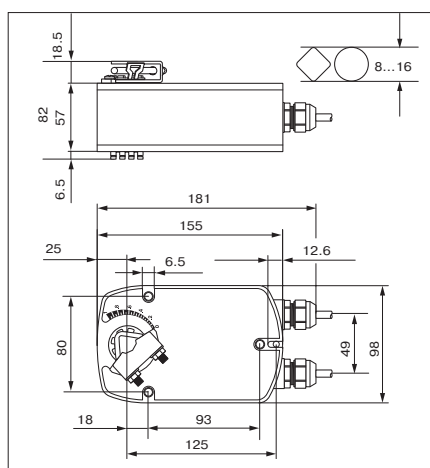
stops the actuator once it reaches the end positions. The turning angle is adjusted by a mechanical end stop.

Control

When voltage is applied the actuator moves the damper to the operative position. The actuator moves the damper to the operating position at the same time as tensioning the return spring. The damper is turned back to the safety position by spring energy when the supply voltage is interrupted.

Technical data

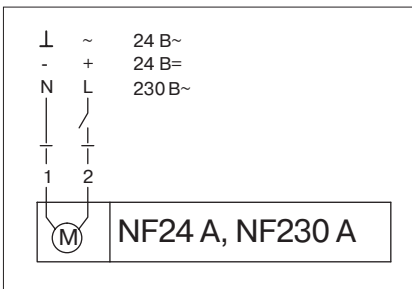
	TF24	TF230
Voltage [V]	24AC 50/60 Hz, 24DC	230AC 50/60 Hz
Nominal voltage range [V]	19.2...28.8AC 21.6...28.8DC	198...264AC
Rated power [VA]	7	
Power consumption in operation/at rest [W]	5/2.5	5/3
Connecting cable	cable 1 m, 2x0.75 mm ²	
Rotation direction	determined by L/R positioning	
Torque [Nm]	motor 4 (at nominal voltage) spring 4	
Rotation angle	maximum 95°, adjustable 37...100 % with a mechanical end stop	
Running time	motor 40...75 s (0...4 Nm) spring 20 s at -20...+50 °C/60 s at -30 °C	
Position indicator	mechanical	
Ingress protection	IP54	
Electrical protection class	III low voltage II totally insulated	
Operation temperature [°C]	-30...+50	
Storage temperature [°C]	-40...+80	
Ambient humidity	95 %, no condensation	
Noise level [dBA]	35	
Technical maintenance	motor 50 spring 62	
Weight [kg]	1.4	1.55



Damper actuator NF24A/NF230A



Wiring diagram



WARNING!

For **NF24**: connection via a power transformer

For **NF230**: the minimum distance between the dead contacts of the switch shall be 3 mm.

Several wires may be connected with respect to the power

Application

The NF series actuators with actuating torque 10 Nm are designed for controlling air dampers with cross section up to 2 m², which fulfill the protection functions (e.g. freeze, smoke protection etc.) in various ventilation and air conditioning systems.

Unit features

The actuator is easily installed directly on the damper axis. The actuator is locked with a special spindle clamp to prevent its turning-through. The electric actuator is protected against overload. The overload protection stops the actuator once it reaches the end positions. The air damper can be controlled manually using a hex wrench. It can be fixed in any position. The unit

can be unlocked either manually or automatically (via the voltage supply). The turning angle is adjusted by mechanical end stops.

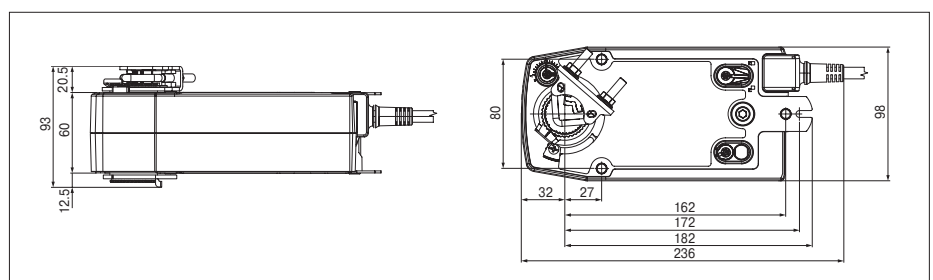
Control

When voltage is applied the actuator moves the damper to the operative position. The actuator moves the damper to the operating position at the same time as tensioning the return spring. The damper is turned back to the safety position by spring energy when the supply voltage is interrupted.

Technical data

	NF24A	NF230A
Voltage [V]	24AC 50/60 Hz, 24DC	230AC 50/60 Hz
Nominal voltage range [V]	19.2...28.8AC 21.6...28.8DC	198...264AC
Rated power [VA]	8.5	9.5
Power consumption in operation/at rest [W]	6/2.5	6/2.5
Connecting cable	cable 1 m, 2x0.75 mm ²	
Rotation direction	determined by L/R positioning	
Mechanical control	hex wrench	
Torque [Nm]	motor 10 (at nominal voltage) spring 10	
Rotation angle	maximum 95°, adjustable with mechanical end stops	
Running time	motor ≤ 75 s (0...10 Nm) spring ≤ 20 s at -20...+50 °C/60 s at -30 °C	
Position indicator	mechanical	
Ingress protection	IP54	
Electrical protection class	III low voltage II totally insulated	
Operation temperature [°C]	-30...+50	
Storage temperature [°C]	-40...+80	
Ambient humidity	95 %, no condensation	
Noise level [dBA]	motor 50 spring 62	
Technical maintenance	not required	
Weight [kg]	1.8	

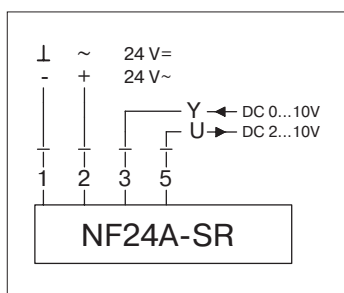
Overall dimensions [mm]



Damper actuator NF24A-SR



Wiring diagram



WARNING!

Connection via a power transformer

Overall dimensions [mm]

Application

The NF series actuators with actuating torque 10 Nm are designed for controlling air dampers with cross section up to 2 m², which fulfill the protection functions (e.g. freeze, smoke protection etc.) in various ventilation and air conditioning systems.

Unit features

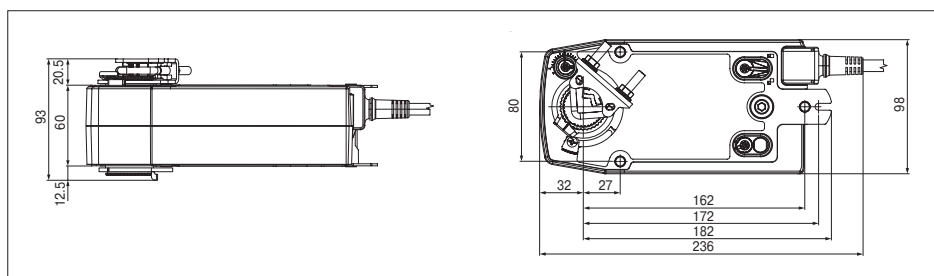
The actuator is easily installed directly on the damper axis. The actuator is locked with a special spindle clamp to prevent its turning-through. The electric actuator is protected against overload. The overload protection stops the actuator once it reaches the end positions. The turning angle is adjusted by mechanical end stops.

Control

The damper actuator is controlled via standard analogue signal 0...10 V= and moves the damper to the position corresponding to the preset signal. The actuator moves the damper to the operating position at the same time as tensioning the return spring. The damper is turned back to the safety position by spring energy when the supply voltage is interrupted.

Technical data

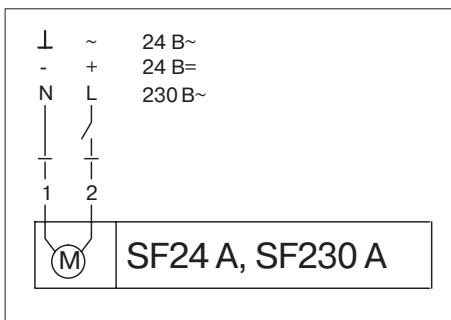
	NF24A-SR
Voltage [V]	24AC 50/60 Hz, 24DC
Nominal voltage range [V]	19.2...28.8AC 21.6...28.8DC
Rated power [VA]	5.5
Power consumption in operation/at rest [W]	3.5/2.5
Connecting cable	cable 1 m, 4x0.75 mm ²
Control signal Y	0...10 V= (input resistance 100 kOhm)
Operating range	2...10 V=
Feedback voltage U	2...10 V=, maximum 0.5 mA
Positioning accuracy	±5 %
Rotation direction	determined by L/R positioning
Mechanical control	hex wrench
Torque [Nm]	motor 10 (at nominal voltage) spring 10
Rotation angle	maximum 95°, adjustable with mechanical end stops
Running time	motor ≤ 150 s (0...10 Nm) spring ≤ 20 s at -20...+50 °C/60 s at -30 °C
Position indicator	mechanical, feedback signal 2...10 V=
Ingress protection	IP54 at any mounting position
Electrical protection class	III low voltage II totally insulated
Operation temperature [°C]	-30...+50
Storage temperature [°C]	-40...+80
Ambient humidity	95 %, no condensation
Noise level [dBA]	motor 45 spring 62
Technical maintenance	not required
Weight [kg]	1.8



Damper actuator SF24A/SF230A



Wiring diagram



WARNING!

For **SF24**: connection via a power transformer

For **SF230**: the minimum distance between the dead contacts of the switch shall be 3 mm.

Several wires may be connected with respect to the power

Overall dimensions [mm]

Application

The SF series actuators with actuating torque 20 Nm are designed for controlling air dampers with cross section up to 4 m², which fulfill the protection functions (e.g. freeze, smoke protection etc.) in various ventilation and air conditioning systems.

Unit features

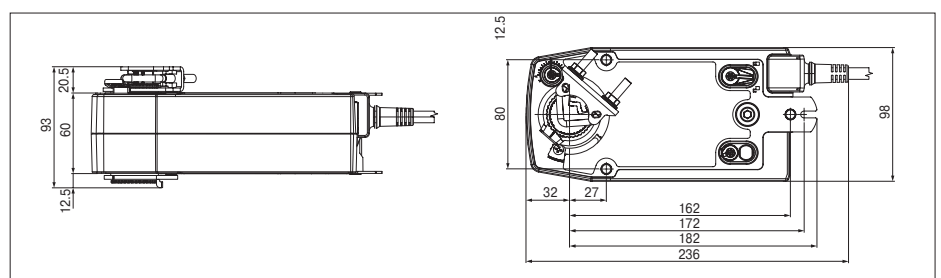
The actuator is easily installed directly on the damper axis. The actuator is locked with a special spindle clamp to prevent its turning-through. The electric actuator is protected against overload. The overload protection stops the actuator once it reaches the end positions. The air damper can be controlled manually using a hex wrench. It can be fixed in any position. The unit can be unlocked either manually or automatically (via the voltage supply). The turning angle is adjusted by mechanical end stops.

Control

When voltage is applied the actuator moves the damper to the operative position. The actuator moves the damper to the operating position at the same time as tensioning the return spring. The damper is turned back to the safety position by spring energy when the supply voltage is interrupted.

Technical data

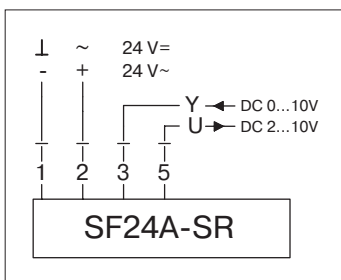
	SF24A	SF230A
Voltage [V]	24AC 50/60 Hz, 24DC	230AC 50/60 Hz
Nominal voltage range [V]	19.2...28.8AC 21.6...28.8DC	195...264AC
Rated power [VA]	7.5	18
Power consumption in operation/at rest [W]	5/2.5	6.5/3.5
Connecting cable	cable 1 m, 2x0.75 mm ²	
Rotation direction	determined by L/R positioning	
Mechanical control	hex wrench	
Torque [Nm]	motor 20 (at nominal voltage) spring 20	
Rotation angle	maximum 95°, adjustable with mechanical end stops	
Running time	motor ≤ 75 s (0...10 Nm) spring ≤ 20 s at -20...+50 °C/60 s at -30 °C	
Position indicator	mechanical	
Ingress protection	IP54	
Electrical protection class	III low voltage II totally insulated	
Operation temperature [°C]	-30...+50	
Storage temperature [°C]	-40...+80	
Ambient humidity	95 %, no condensation	
Noise level [dBA]	motor 45 spring 62	
Technical maintenance	not required	
Weight [kg]	2.1	



Damper actuator SF24A-SR



Wiring diagram



WARNING!

Connection via a power transformer

Application

The SF series actuators with actuating torque 20 Nm are designed for controlling air dampers with cross section up to 4 m² installed in various ventilation and air conditioning systems, in various ventilation and air conditioning systems.

Unit features

The actuator is easily installed directly on the damper axis. The actuator is locked with a special spindle clamp to prevent its turning-through. The electric actuator is protected against overload. The overload protection

stops the actuator once it reaches the end positions. The turning angle is adjusted by mechanical end stops.

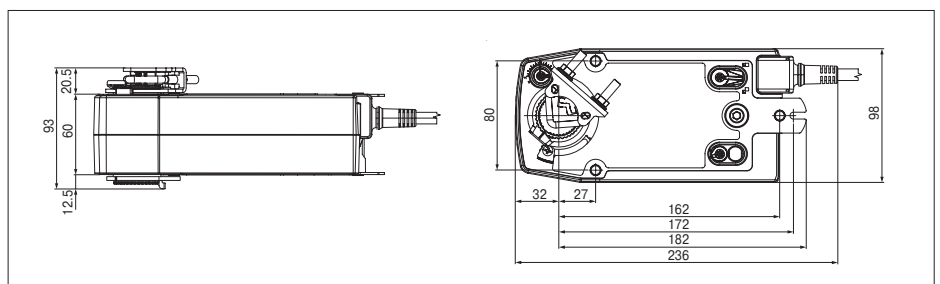
Control

The damper actuator is controlled via standard analogue signal 0...10 V+ and moves the damper to the position corresponding to the preset signal. The actuator moves the damper to the operating position at the same time as tensioning the return spring. The damper is turned back to the safety position by spring energy when the supply voltage is interrupted.

Technical data

	SF24A-SR
Voltage [V]	24AC 50/60 Hz, 24DC
Nominal voltage range [V]	19.2...28.8AC 21.6...28.8DC
Rated power [VA]	7
Power consumption in operation/at rest [W]	5/3
Connecting cable	cable 1 m, 4x0.75 mm ²
Control signal Y	0...10 V= (input resistance 100 kOhm)
Operating range	2...10 V=
Feedback voltage U	2...10 V=, maximum 0.5 mA
Positioning accuracy	±5 %
Rotation direction	determined by L/R positioning
Mechanical control	hex wrench
Torque [Nm]	motor 20 (at nominal voltage) spring 20
Rotation angle	maximum 95°, adjustable with mechanical end stops
Running time	motor ≤ 150 s (0...10 Nm) spring ≤ 20 s at -20...+50 °C/60 s at -30 °C
Position indicator	mechanical, feedback signal 2...10 V=
Ingress protection	IP54 at any mounting position
Electrical protection class	III low voltage II totally insulated
Operation temperature [°C]	-30...+50
Storage temperature [°C]	-40...+80
Ambient humidity	95 %, no condensation
Noise level [dBA]	motor 40 spring 62
Technical maintenance	not required
Weight [kg]	2.1

Overall dimensions [mm]



Series USWK



Application

The USWK mixing unit is designed for smooth heat medium flow control in ventilation systems equipped with water heaters or coolers for supply air temperature regulation. The mixing unit controls heat medium flow supplied to the water heat exchanger and in such a way maintains the supply air temperature. The USWK mixing unit is compatible with NKV water heaters, OKW duct coolers as well as all water heat exchangers (both heaters and coolers) integrated into air handling units.

Design and operating logic

Design of the USWK mixing unit is shown in Fig. 1. The circulation pump (1) of the mixing unit ensures ongoing heat medium circulation through the water heat exchanger. The heat medium regulating three-way valve (3) with electric actuator (2) is installed before the circu-

lation pump to mix the water supplied from the heating (cooling) system with the return water supplied through the recirculation pipe (4). The three-way valve is designed to provide the mixing ratio of two water streams and thus to control the heat medium temperature supplied to the water heat exchanger. The three-way valve actuator is controlled by 0-10 V output signal from the ventilation control system.

Connection to water mains

The mixing unit is connected directly to the water heat exchanger and water mains through rigid and/or flexible pipes. In case of flexible pipe connection, fix the mixing unit firmly to the wall or another rigid surface with clamps.

While installing the mixing unit keep the motor horizontal position to disable any distortions and mechanical loads from the connected pipelines the USWK unit. While connecting the mixing unit to water mains make sure of no loads and distortions that may damage the unit structure and provoke the USWK airtightness breach. While connecting the pipelines ensure their quick detachment for scheduled servicing and maintenance operations.

Electric connection

All electric installations are allowed by qualified electricians with valid permit for electric operations. Before connecting the pump make sure to have grounded it. Make steps to prevent contact with power cables.

Operating conditions

The pump motor bearings are greased by the pumped medium. The single phase pumps do not require extra overload protection and the three phase pumps must be provided with external overload protection. The maximum allowable heat medium pressure in the unit is 10 bar.

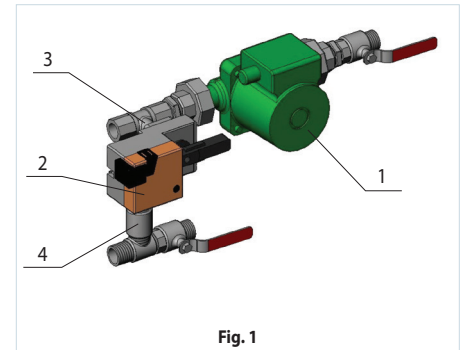
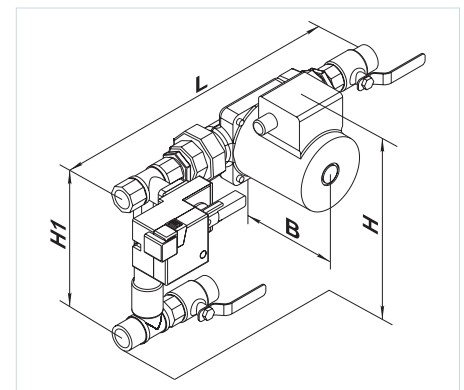


Fig. 1

Overall dimensions [mm]

Type	Dimensions [mm]				Weight [kg]
	B	H	H1	L	
USWK 3/4-4	150	290	180	460	4.1
USWK 3/4-6	150	290	180	460	4.1
USWK 1-6	175	320	210	490	6.8
USWK 1-10	175	320	210	490	6.8
USWK 1 1/4-10	175	355	240	500	7.4
USWK 1 1/4-16	175	355	240	500	7.4
USWK 1 1/2-16	266	420	255	610	23.0
USWK 1 1/2-25	266	420	255	610	23.0
USWK 2-25	312	474	290	660	31.0
USWK 2-40	312	474	290	660	31.0



Δp_{v100} – pressure loss at fully opened valve

*3-way valve $K_{vs} = \frac{V_{100}}{\sqrt{\frac{\Delta p_{v100}}{100}}}$, where V_{100} – rated water flow at Δp_{v100}

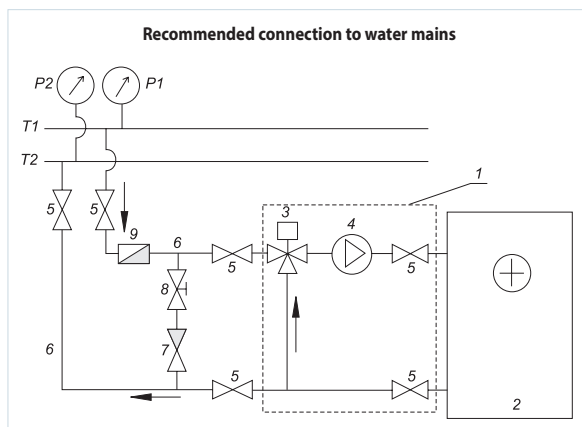
Designation key:

Series	Connecting diameter	3-way valve [Kvs]*
USWK	3/4"; 1"; 1 1/4"; 1 1/2"; 2"	4; 6; 10; 16; 25; 40

Optional equipment

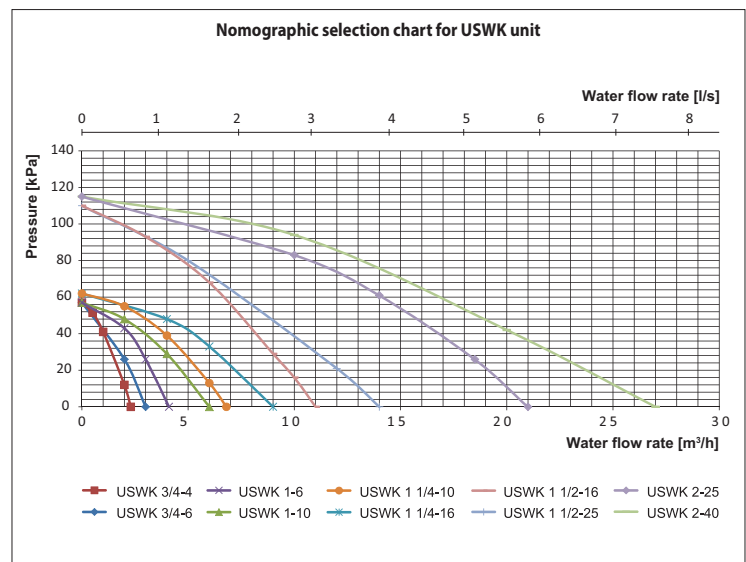
Technical data

	value	USWK 3/4-4	USWK 3/4-6	USWK 1-6	USWK 1-10	USWK 1 1/4-10	USWK 1 1/4-16	USWK 1 1/2-16	USWK 1 1/2-25	USWK 2-25	USWK 2-40
Circulation pump	–	DAB VA65/180		DAB A50/180XM		DAB A56/180XM		DAB BPH 120/250.40M		DAB BPH 120/280.50T	
Three-way valve regulation mode	–	smooth 0...10 V									
Three-way valve with electric actuator	–	Belimo R317	Belimo R318	Belimo R322	Belimo R323	Belimo R329	Belimo R331	Belimo R338	Belimo R339G	Belimo R348	Belimo R349G
Three-way valve actuator	–	Belimo LR24A-SR						Belimo NR24A-SR	Belimo SR24A-SR	Belimo NR24A-SR	Belimo SR24A-SR
Connection	–	Thread						Flange			
Three-way valve nominal diameter	–	DN 20	DN 20	DN 25	DN 25	DN 32	DN 32	DN 40	DN 40	DN 50	DN 50
Three-way valve K_{vs}	–	4	6.3	6.3	10	10	16	16	25	25	40
Maximum capacity	m ³ /h	2.3	3.0	4.1	6.0	6.8	9.0	11.0	14.0	21.0	27.0
Maximum developed head	kPa	57	57	57	57	62	62	110	110	115	115
Connecting pipe diameter	inch	3/4"	3/4"	1"	1"	1 1/4"	1 1/4"	1 1/2"	1 1/2"	2"	2"
Pumped medium temperature	°C	-10...+110						-10...+120			
Maximum glycol content in pumped medium	%	30	30	30	30	30	30	30	30	30	30
Number of pump speeds	–	3	3	3	3	3	3	3	3	3	3
Phase/ Pump voltage	V	1 ~ 230								3 ~ 400	
Maximum pump power	W	78	78	184	184	271	271	510	510	898	898



T1 and T2 – supply and return pipeline
P1 and P2 – manometers for supply and return pipelines in the water mains

- 1 – USWK (mixing unit)
- 2 – Water heater
- 3 – Three-way valve with actuator
- 4 – Circulation pump
- 5 – Shutoff valve
- 6 – Supply and return pipeline from water mains to the water heater
- 7 – Non-return valve
- 8 – Balancing valve
- 9 – Coarse filter



To select the mixing unit according to the nomographic chart, calculate the required heat medium flow through the water heat exchanger and water pressure drop (water head). These parameters are calculated according to the heating/cooling diagrams specifically for each water heat exchanger stated specifically herein.

Power controller for electric heaters **RNS**



■ Application

The RNS three-phase TRIAC power controller is designed for regulating the power output of electric heaters with load current rating up to 120 A.

■ Functional capabilities:

1. 230 V or 400 V three-phase load connection, no manual power selection required.
2. Proportional control to regulate supply air temperature.
3. Expandable with two booster heating cascades. The power output of each of the two booster cascades may not exceed the power output of the regulated heater cascade.

■ Design and control

Load commutation is carried out by the semiconductor device (triac). Load commutation is always carried out at the moment when current and voltage are equal to zero, that prevents electromagnetic interference. The RNS-16 is capable of controlling only one heating stage. The RNS-25 is capable of controlling three heating stages with the power output equal or exceeding that of the controlled stage. The power output of the first stage is controlled steplessly by switching the full load on and off.

The second and third stages are controlled in steps. To connect two extra heating cascades install an electric contactor for activating each heater cascade. For overheating protection the electric heater must be equipped with two built-in thermal contacts: TK50 with intervention temperature of +50 °C and TK90 with response temperature of +90 °C. TK50 with automatic restarting. TK90 with manual restarting. The air temperature is set by means of the built-in potentiometer or the external control device generating a 0-10 V control input for increasing the duct temperature proportionally in the range from 0 to +40 °C. The temperature sensor must be installed in the duct downstream of the heater in the direction of the air stream. Minimum distance from the temperature sensor to the heater must be at least 50 cm in order to eliminate the impact of heating element infrared rays. The control-

ler can operate in heating power output mode in disregard of the temperature sensor feedback. In this mode the heating power output is regulated in the 0 to 100 % range by means of the 0-10 V control input.

■ Mounting and set-up

1. Inspect the unit visually and check the casing for integrity.
2. Attach the controller to the mating surface by using the holes in the mounting plates of the unit.
3. Undo self-tapping screws and remove the controller front lid. If necessary, disconnect the flexible flat cable.
4. Complete the electrical connections according to the diagram. The external electrical leads are connected to the unit via screwed terminals. The cables are routed into the unit through sealed lead-ins. The external lead-in must be equipped with an automatic circuit breaker built into the stationary wiring.
5. Replace the controller front lid.
6. Apply supply voltage to the unit and start it up.
7. Press the On/Off button and set the desired temperature by turning the temperature control knob.

Technical data

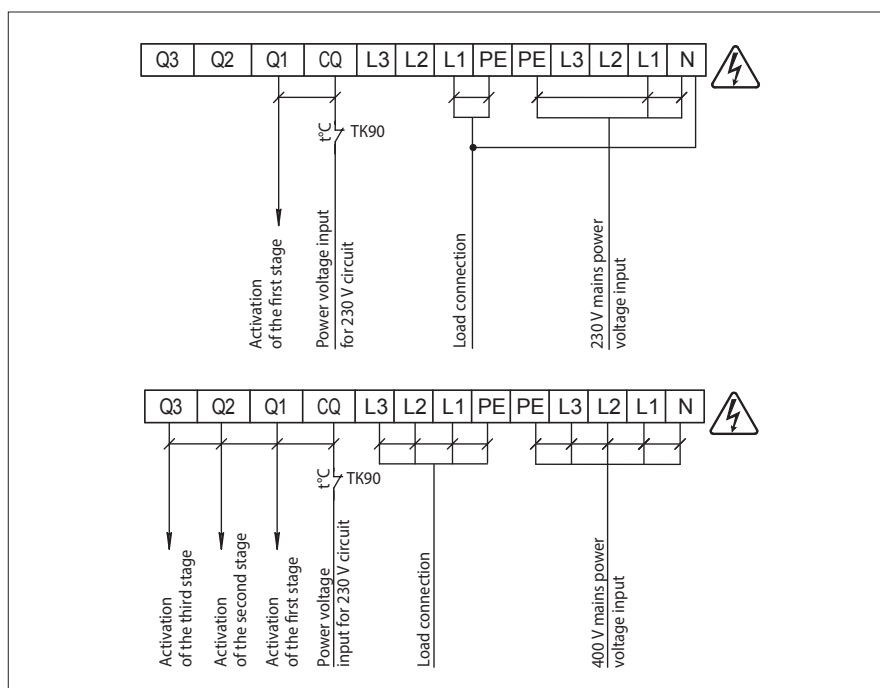
Parameters	RNS-16	RNS-25
Maximum load current (single stage) [A]	25	40
Heater power (single stage) [kW]	16	25
Maximum load current (three stages) [A]	-	120
Heater power (three stages) [kW]	-	75
Control circuit supply voltage	~230 V/50 Hz	
Nominal current of control circuit board fuse [A]	0.5	
Cross-section area of screw terminal block input pin [mm ²]	4...10	
Protection rating	IP54	
Overall dimensions [mm]	170x255x140	
Weight [kg]	1.2	
Mains parameters:		
voltage [V]	210-255, 380-415	
frequency [Hz]	50-60	
phases	1 or 3	
Operating temperature range [°C]	+5...+40	

Note: heat generated by the RNS-16 controller itself is 50 W, by the RNS-25 controller – 80 W.

Optional equipment

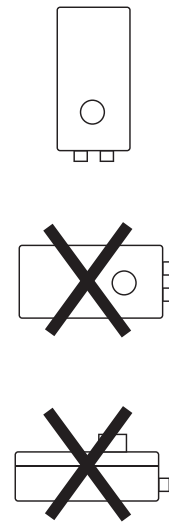
Control parameters	
Regulation time [s]	0.1 (fixed)
Cycle length [s]	1...10 (adjustable)
Indication	Power, operation and malfunction indicator
Type of temperature sensor used	LM 60
Input signal parameters [V]	0...10 (direct current)
Set temperature range [°C]	-30...+30 (adjustable)

External connections diagram

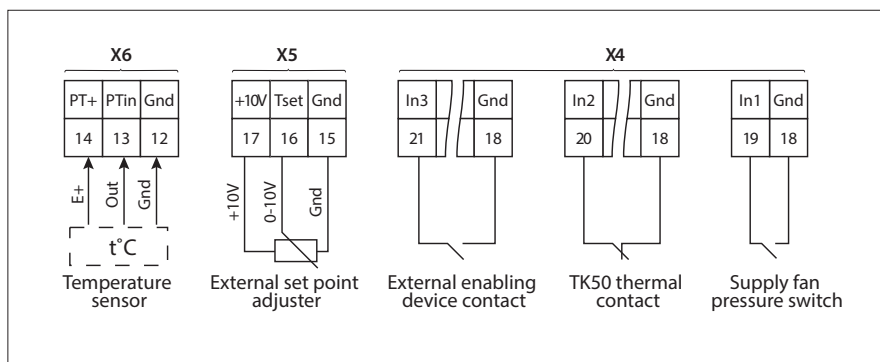


WARNING!

The controller is intended for vertical mounting only



Control unit wiring diagrams



Control unit for air heating unit
UWT



■ **Application**

The UWT control unit is used for controlling AOW series air heating (cooling) units with water heat exchangers.

■ **Design and control**

The control unit has a polymer-coated steel casing. The control unit is activated and deactivated by means of the switch with an indicator light installed on the side panel. The cables are routed into the unit through sealed lead-ins. The conductors are connected by means of bolt-down terminals. The control unit is equipped with a thermal fuse which protects the device from damage in the event of a short circuit.

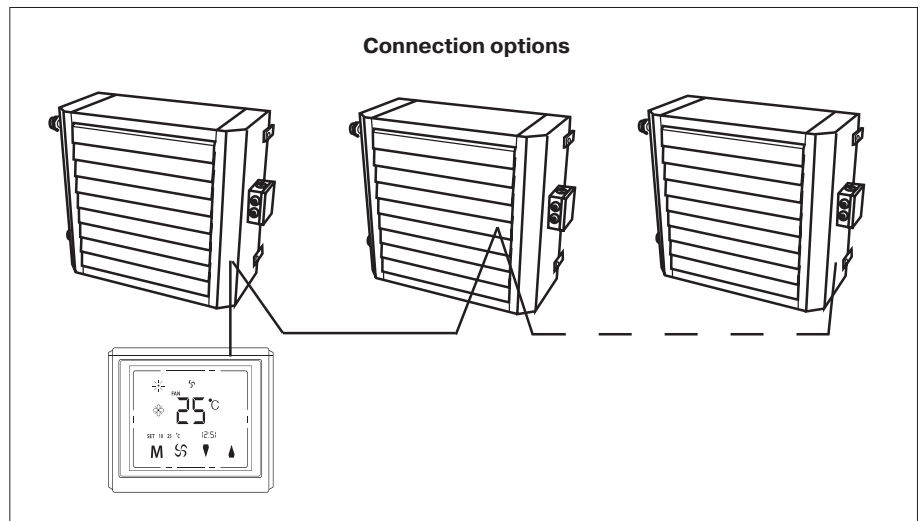
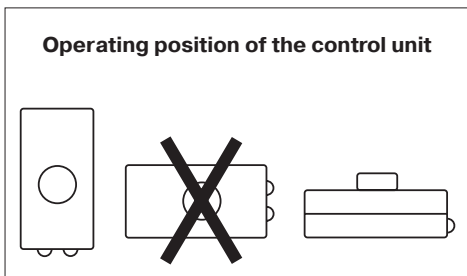
The control unit is operated in conjunction with a room thermostat (to be ordered separately). Two types of thermostats can be used: RTS (RTSD) room thermostat or TST (TSTD) room thermostat with a sensor display. Since the room thermostat measures the indoor

temperature which defines the operation mode of the heating (cooling) its location must be installed within the premises serviced by the heating (cooling) unit.

The same room thermostat can simultaneously control a group of several heating (cooling) units as may be required in case of using a number of heating (cooling) units to maintain the microclimate in a specific premise. Should this be required, connect the units as shown in Fig. 5 and Fig. 7 (Option B). One thermostat can control an unlimited number of heaters (coolers).

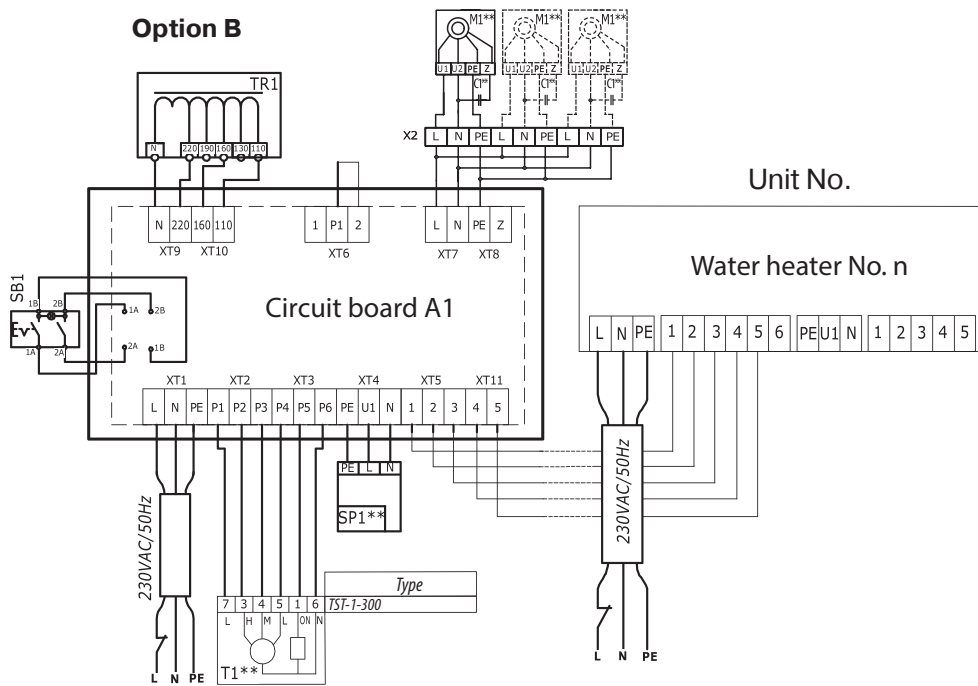
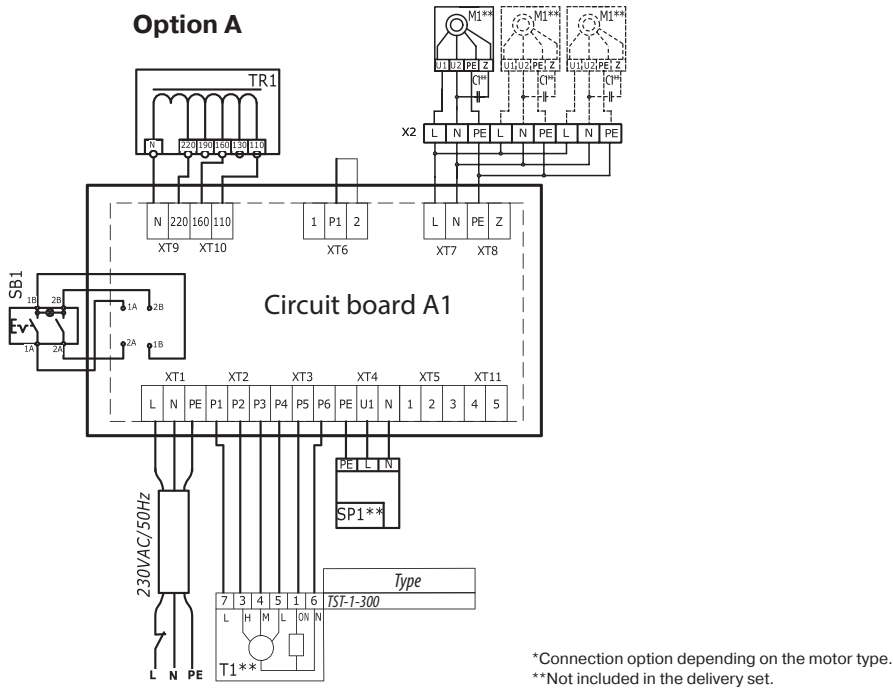
Technical data

Voltage [V/Hz]	230/50
Rated voltage supplied to fan motor	
Speed	Alternating current output voltage [V]
High – H	230
Medium -M	160
Low – L	110
Maximum current of connected fan motor	2 A
Cable cross section [mm ²]	0.5 – 2.5
Operating medium temperature [°C]	+5...+40
Protection rating	IP44
Weight [kg]	2.1



CONTROL UNITS

Wiring diagrams



Designation	Name
A1	AOW control board
C1	Condensing unit
M1	Fan electric motor
SB1	ON/OFF switch
SP1	Electric actuator, circulation pump
T1	Room thermostat
TR1	Automatic transformer 230 V 2 A

Control unit for air heating unit UET



■ Application

Designed for controlling AOE series air heating units with electric heaters.

■ Design and control

Casing made of polymer-coated steel. The control unit is activated and deactivated by means of the switch with an indicator light installed on the side panel. The power leads are routed into the control unit through sealed lead-ins.

The wires are connected to the terminal blocks according to the wiring diagram. The unit is equipped with resettable fuses for short-circuit protection and an electric motor fuse. The single-phase electric motor operation mode is selected by means of the knob on the control unit casing allowing single-speed or three-speed operation. The fan speed is controlled by means of the TRIAC controller. The electric heater is controlled by means of the TRIAC power controller.

The air stream temperature adjustment algorithm is based on the heater activation/deactivation time (full power) control depending on the specified heating requirements.

The control unit is designed for operation indoors at ambient temperatures from 0 °C to +35 °C at relative humidity of up to 80 % (at +25 °C). Ingress protection rating against access to hazardous parts and water ingress is IP44.

■ Mounting and set-up

The control unit is operated in combination with the indoor digital thermostat (not included in the delivery set) of the following two types: RTS-1-400 (RTSD-1-400) and TST-1-300 (TSTD-1-300).

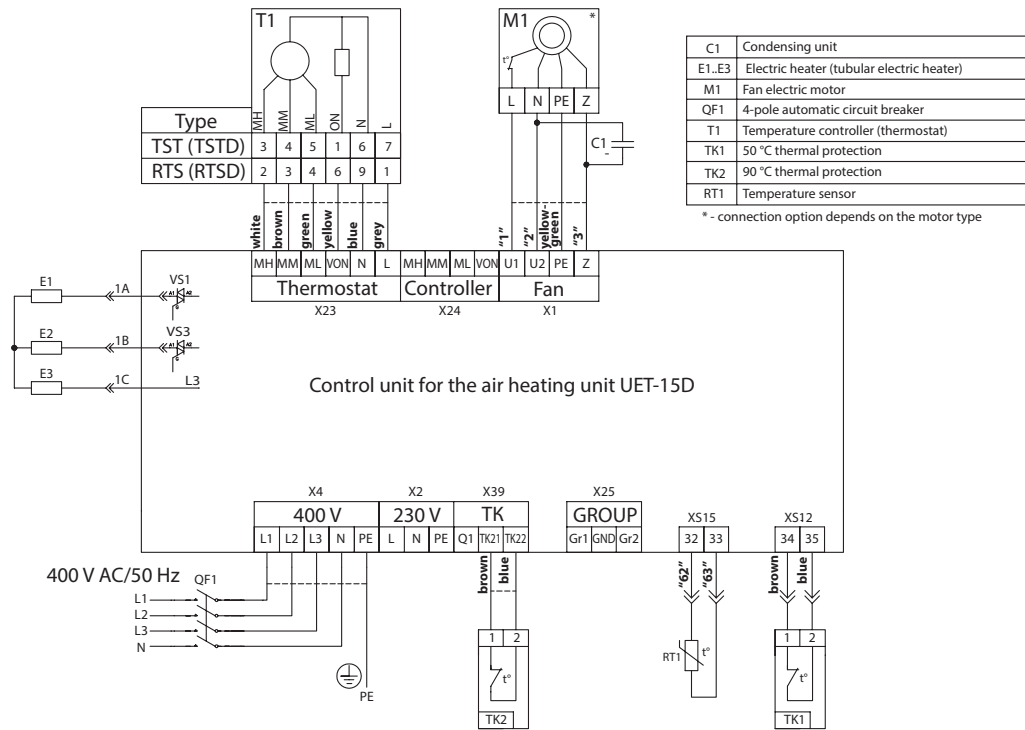
Since the digital thermostat controls the heater operation mode it must be installed on the premises being served by the heater.

The control unit is intended for connection to a three-phase 400 V/50 Hz AC mains.

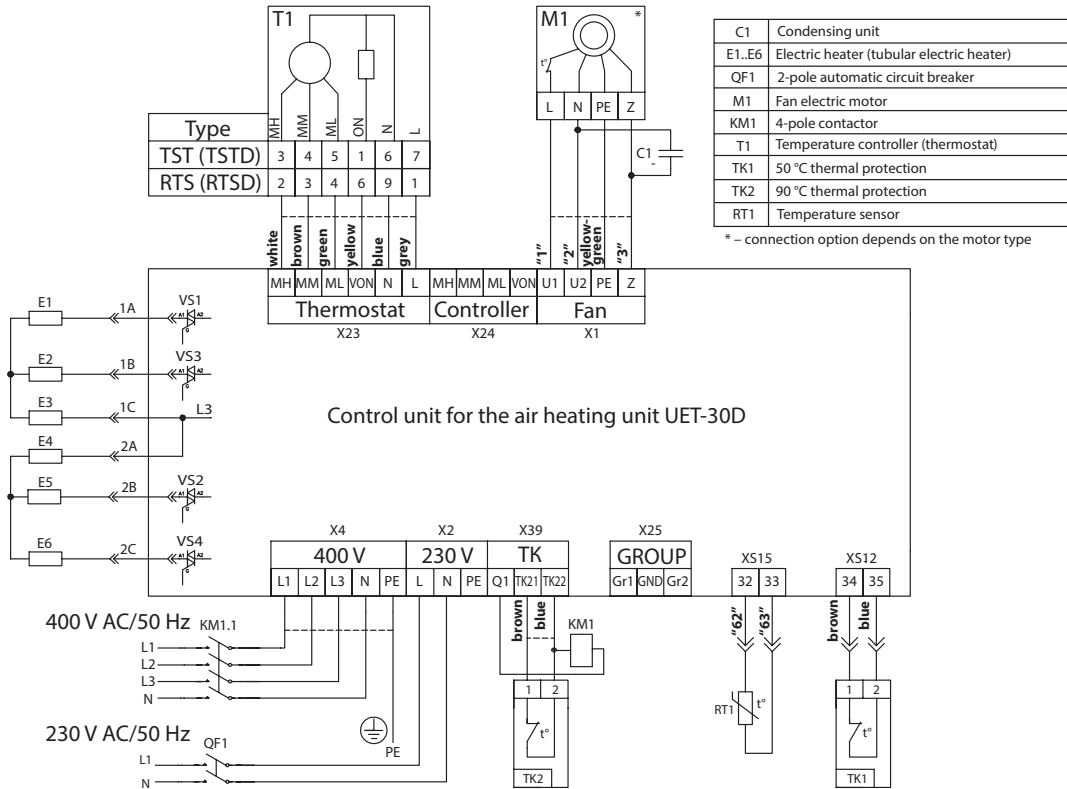
The connection must be made using durable, insulated and heat-resistant conductors (cables, wires).

Parameter	UET-15D	UET-30D
AOE air heating unit compatibility	AOE 9 AOE 12 AOE 15	AOE 18 AOE 24 AOE 30
Supply voltage, 50 Hz [V]	3 ~ 400	
Rated voltage supplied to fan motor [V]	High speed – H	230±10 %
	Medium speed – M	170±10 %
	Low speed – L	130±10 %
Fan motor maximum current [A]	1.3	
Maximum three-phase electric power input [kW]	up to 15	up to 30
Air temperature at heater outlet [°C]	40±2	
Weight [kg]	5	6

UET-15D wiring diagram



UET-30D wiring diagram



SENSORS AND CONTROL SIGNALS necessary for operation of air handling units

Control box type	Sensors														Control inputs			
	Outdoor temperature sensor	Supply air temperature sensor	Extract air temperature sensor	Air temperature sensor downstream of the heat exchanger	Return water temperature sensor	Indoor air temperature sensor	Room thermostat (for air handling units)	VN freeze protection thermostat	Supply fan differential pressure switch	Exhaust fan differential pressure switch	Outdoor air filter differential pressure switch	Extract air filter differential pressure switch	Humidity sensor	CCU control * (on/off or 220 V output)	CCU control (0... 10 V)	Heater control (0... 10 V)	Frequency converter control (enabling signal)	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
SL-AQUA-xx	●	●		●	●		●	●	●	●				●	●			
SL-AQUA-xxf	●	●		●	●		●	●	●	●				●	●		●	
SL-ELECTRIC-xx-xx	●	●		●			●		●	●				●	●			
SL-ELECTRIC-xx-xxf	●	●		●			●		●	●				●	●		●	
SN-V010-R-0	●	●			●	●		●			●			●	●		●	
SN-V010-R-0-3F	●	●	●		●	●		●	●	●	●	●		●	●			
SN-V010-R-0-3P	●	●			●	●		●			●	●		●	●			
SN-V010-R-P	●	●		●	●	●		●			●	●		●	●		●	
SN-V010-R-P-3F	●	●		●	●	●		●	●	●	●	●		●	●			
SN-V010-R-P-3P	●	●		●	●	●		●			●	●		●	●		●	
SN-V010-R-R	●	●		●	●	●		●			●	●		●	●		●	
SN-V010-R-R-3F	●	●		●	●	●		●	●	●	●	●		●	●			
SN-V010-R-R-3P	●	●		●	●	●		●			●	●		●	●		●	
SN-V010-R-C	●	●	●		●	●		●			●	●		●	●		●	
SN-V010-R-C-3F	●	●	●		●	●		●	●	●	●	●		●	●			
SN-V010-R-C-3P	●	●	●		●	●		●			●	●		●	●		●	
SN-Exx-R-0	●	●				●			●		●			●	●	●	●	
SN-Exx-R-0-3F	●	●				●			●		●	●		●	●	●		
SN-Exx-R-0-3P	●	●				●			●		●	●		●	●	●	●	
SN-Exx-R-P	●	●		●		●			●		●	●		●	●	●	●	
SN-Exx-R-P-3F	●	●		●		●			●		●	●		●	●	●		
SN-Exx-R-P-3P	●	●		●		●			●		●	●		●	●	●	●	
SN-Exx-R-R	●	●		●		●			●		●	●		●	●	●	●	
SN-Exx-R-R-3F	●	●		●		●			●		●	●		●	●	●		
SN-Exx-R-R-3P	●	●		●		●			●		●	●		●	●	●	●	
SN-Exx-R-C	●	●	●			●			●		●	●		●	●	●	●	
SN-Exx-R-C-3F	●	●	●			●			●		●	●		●	●	●		
SN-Exx-R-C-3P	●	●	●			●			●		●	●		●	●	●	●	
SR-V010-R-0-1F	●	●			●		●	●	●		●			●	●			
SR-V010-R-0-1D008	●	●			●		●	●	●		●			●	●			
SR-V010-R-0-1D008/008	●	●			●		●	●	●		●	●		●	●			
SR-V010-R-0-3Fxx	●	●			●		●	●	●		●			●	●			
SR-V010-R-0-3Fxx/xx	●	●			●		●	●	●	●	●	●		●	●			
SR-V010-R-0-3Pxx	●	●			●		●	●			●			●	●		●	
SR-V010-R-0-3Pxx/xx	●	●			●		●	●			●	●		●	●		●	
SR-V010-R-P-1Fxx/xx	●	●		●	●		●	●	●	●	●	●		●	●			
SR-V010-R-P-1D008/008	●	●		●	●		●	●	●	●	●	●		●	●			
SR-V010-R-P-3Fxx/xx	●	●		●	●		●	●	●	●	●	●		●	●			
SR-V010-R-P-3Pxx/xx	●	●		●	●		●	●			●	●		●	●		●	

Control box type	Sensors													Control inputs			
	Outdoor temperature sensor	Supply air temperature sensor	Extract air temperature sensor	Air temperature sensor downstream of the heat exchanger	Return water temperature sensor	Indoor air temperature sensor	Room thermostat (for air handling units)	VN freeze protection thermostat	Supply fan pressure switch	Exhaust fan pressure switch	Outdoor air filter differential pressure switch	Extract air filter differential pressure switch	Humidity sensor	CCU control * (on/off or 220 V output)	CCU control (0...10 V)	Heater control (0...10 V)	Frequency converter control (enabling signal)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
SR-V010-R-R-1Fxx/xx	●	●		●	●		●	●	●	●	●	●		●	●		
SR-V010-R-R-1D008/008	●	●		●	●		●	●	●		●	●		●	●		
SR-V010-R-R-3Fxx/xx	●	●		●	●		●	●	●	●	●	●		●	●		
SR-V010-R-R-3Pxx/xx	●	●		●	●		●	●			●	●		●	●		●
SR-V010-R-C-1Fxx/xx	●	●			●	●	●	●	●	●	●	●	●	●	●		
SR-V010-R-C-1D008/008	●	●			●	●	●	●	●		●	●	●	●	●		
SR-V010-R-C-3Fxx/xx	●	●			●	●	●	●	●	●	●	●	●	●	●		
SR-V010-R-C-3Pxx/xx	●	●			●	●	●	●			●	●	●	●	●		●
SR-V010-R-G-1Fxx/xx	●	●	●		●	●		●	●	●	●	●		●	●		
SR-V010-R-G-1D008/008	●	●	●		●	●		●	●		●	●		●	●		
SR-V010-R-G-3Fxx/xx	●	●	●		●	●		●	●	●	●	●		●	●		
SR-V010-R-G-3Pxx/xx	●	●	●		●	●		●			●	●		●	●		●
SR-Exxx-R-0-1F	●	●					●		●		●			●	●		
SR-Exxx-R-0-1D008	●	●					●		●		●			●	●		
SR-Exxx-R-0-1D008/008	●	●					●		●	●	●	●		●	●		
SR-Exxx-R-0-3Fxx	●	●					●		●		●			●	●		
SR-Exxx-R-0-3Fxx/xx	●	●					●		●	●	●	●		●	●		
SR-Exxx-R-0-3Pxx	●	●					●		●		●			●	●		●
SR-Exxx-R-0-3Pxx/xx	●	●					●		●		●	●		●	●		●
SR-Exxx-R-P-1Fxx/xx	●	●		●			●		●	●	●	●		●	●		
SR-Exxx-R-P-1D008/008	●	●		●			●		●		●	●		●	●		
SR-Exxx-R-P-3Fxx/xx	●	●		●			●		●	●	●	●		●	●		
SR-Exxx-R-P-3Pxx/xx	●	●		●			●		●		●	●		●	●		●
SR-Exxx-R-R-1Fxx/xx	●	●		●		●			●	●	●	●		●	●		
SR-Exxx-R-R-1D008/008	●	●		●		●			●		●	●		●	●		
SR-Exxx-R-R-3Fxx/xx	●	●		●		●			●	●	●	●		●	●		
SR-Exxx-R-R-3Pxx/xx	●	●		●		●			●		●	●		●	●		●
SR-Exxx-R-C-1Fxx/xx	●	●				●			●	●	●	●		●	●		
SR-Exxx-R-C-1D008/008	●	●				●			●		●	●		●	●		
SR-Exxx-R-C-3Fxx/xx	●	●				●			●	●	●	●		●	●		
SR-Exxx-R-C-3Pxx/xx	●	●				●			●		●	●		●	●		●
SR-Exxx-R-G-1Fxx/xx	●	●	●			●			●	●	●	●		●	●		
SR-Exxx-R-G-1D008/008	●	●	●			●			●		●	●		●	●		
SR-Exxx-R-G-3Fxx/xx	●	●	●			●			●	●	●	●		●	●		
SR-Exxx-R-G-3Pxx/xx	●	●	●			●			●		●	●		●	●		●

● - the equipment is included in the delivery ● - additional equipment

*The table shall apply to control boxes of the air handling units equipped with a water cooler, except the CCU control inputs.

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01-2016

