The heating output of convectors is controlled by opening / shutting off the heating or cooling water supply to the heat exchanger. The supply is controlled either manually (thermostatic head), or automatically by the convector electronics (electrothermic head). The output of convectors with fans is also controlled by adjusting the fan speed.

OUTPUT CONTROL – CONVECTORS FOR STANDARD (DRY) ENVIRONMENT

Since 2005 MINIB has been using 12 V DC brushless motors in its fans intended for standard environment. The advantage of these motors consists in significantly lower power consumption compared to commonly used AC motors. Moreover, the DC motors are characterized by low noise and long-term reliability.

The microprocessor speed control for DC motors with feedback is new for all control unit types. The benefits of the new solution include:

- stable output of convectors throughout their life cycle – the output does not decrease even with gradual soiling and wear of the rotating components
- optimized output setup based on requirements from the control circuits
- very silent operation at lowest speeds
- electronic isolation of the motor in the event of fan blockage (e.g., by an item that has fallen into the convector); in such case the motor is protected against overheating and damage
- simplified installation and reduced costs of the wiring

Speed control for each motor within the fan-coil is provided by an electronic unit (EB) included in the convector. In addition to mutually independent motor control, the EB circuits also monitor the control signal at their input and adjust the fan speed accordingly.

THE ELECTRONIC UNIT IS USED FOR THE FOLLOWING BASIC CONTROL TYPES:

EB-A control (heating mode)

Simple control of fan operation by a thermostat; the fan speed can be adjusted manually by the potentiometer located on the wall in the room near the thermostat. The EB electronic control unit is set up for stepless speed control. (Potentiometer can be used independently without a thermostat).

EB-B control (heating mode)

Fan speed (low, medium, high) is adjusted automatically by the firmware in the EB control unit in order to achieve required convector output. When the thermostat is turned on the speed is always set to level one. The speed is switched to a higher level always after 15 minutes of thermostat operation (without reaching the required temperature).

EB-C control (heating/cooling mode)

Fan speed (low, medium, high) is adjusted automatically by the firmware in the EB control unit in order to achieve required convector output. When the thermostat is turned on the speed is always set to level one. The speed is switched to a higher level always after 15 minutes of thermostat operation (without reaching the required temperature); the maximum speed, however, is determined by the position of the speed switch on the thermostat (e.g., TH0482).

The required control type does not have to be adjusted in any way; the unit automatically evaluates the control signal character and adjusts the fan speed control accordingly. The relevant contacts only need to be connected using a jumper in the electronic unit for stepless speed control by voltages ranging between 0 and 10 V (EB-A control or control by a superior system).

If multiple convectors are supplied from one source in a room, the control element (thermostat, potentiometer) can be connected to any convector for all control types. The parallel connection of EB inputs enables simultaneous control of convectors from any location. All control modes also enable use of 12 V DC voltage on the EB connector as a thermostat power supply, provided that the thermostat supports 12 V DC power supply (for example type TH0482).

A wireless thermostat can be used for EB-A and EB-B control modes. In such case, the thermostat-transmitter is installed at the most suitable location in the room and the receiver is located near the 230 V AC or 24 V AC power supply line, depending on the supply type required by the receiver. The switching contact of the receiver is connected to the respective control signal terminals of the nearest convector in the same manner as in the case of a conventional thermostat.

A new feature in all control types is the possibility of using electrothermic heads located on the inlet valve of the convector which - if the valves are closed by the electronic control unit – shut off the heating (cooling) water supply to the heat exchanger thus reducing the heating (cooling) output to zero (EB-A shutting off immediately, EB-B, EB-C in 30 minutes after the thermostat has been switched off). Once the heating (cooling) output is required (for example, upon thermostat switching) the valve opens automatically and the fans start.

The 12 V DC NO head can be connected directly to the terminal bar of the EB unit within the convector as it is factory-prepared for this purpose. No additional conductors are therefore required. The convector electronic control unit will take care of everything.

All control modes use an electronic temperature sensor which is adapted for use in convectors intended for both heating and cooling. When heating is required, the EB unit firmware is set to run the fans whenever the heating water temperature exceeds 30 °C. Similarly, when cooling is required, the fans run if the cooling water temperature is lower than 18 °C; the fans are idle under all other conditions.

WIRING

The electric power lines are as follows in the control types intended for heating only (EB-A, EB-B): The lines from the power source to the convectors use a CyKy 0 three-conductor cable (3x1.5mm) with black-brown-grey cores. The black and brown conductors are used for 12V AC voltage distribution from TT100, TT240 or TT300 source; the grey conductor is used for connecting the EB control inputs. In control types intended for cooling and heating (EB-C) it is necessary to use a CyKy five-conductor cable (5x1.5) in order to distribute the C-COOL and GND signals between individual EB units. The EB units must not be connected when energized!

The conductor cross-sections are chosen according to current loading and supply cable length. Thermostats are connected to the control circuits of fan-coils with any cables (including communication cables, for example) with a suitable color coding of individual conductors.

CONNECTION OF EB CONTROLS TO A NON-STANDARD THERMOSTAT CONTROLLING ADDITIONAL HEATING/COOLING EQUIPMENT – **use of the ADA-EB adaptor.**

Fan speed is controlled by 0–10 V DC voltage in all control modes. In some cases, however, it is not possible to connect fan-coil controls directly to the thermostat output terminals. This applies in particular to situations where the thermostat is supplied with 24 V AC or 230 V AC and this voltage is used to control some other system (boiler, thermal pump, etc.). In such situations it is necessary to use an ADA-EB adaptor with size (50x46x35 mm) which converts the voltage signals from 24 V AC or 230 V AC to the control voltage level suitable for the control electronics of fan-coil units (0 to 10 V DC). If the thermostat does not enable speed control it is possible to include a relay before the EB terminals and connect its contacts according to the EB-B control mode.

An example of a solution with an ADA-EB adaptor is shown in the diagram. The three-position thermostat switch provides three levels of speed control (low, middle, high). The adaptor input (Heat) is connected to the thermostat terminal whose voltage controls for example the boiler. Closing the thermostat contact activates the boiler and starts the fans in the fan-coils. The fans are idle if the switch is off or if the thermostat contact is open. The ADA-EB adaptor must not be placed directly in the convector; if the ADA-EB adaptor is used the EB control must be switched to EB-A control. The required control mode is set up using jumpers in the EB unit.

It is recommended that you consult the possibility of using and connecting an ADA-EB adaptor in all other cases with MINIB's technical or service staff.