

MINIB TRENCH HEATERS

INSTALLATION, OPERATION
AND MAINTENANCE



SPCC

MINIB REGULATION

Installation, commissioning and operation

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Introduction

This handbook shall provide the user of MINIB controlled heating systems general information about connection, commissioning and using of the MINIB heating controlled systems. The handbook does not substitute the service of the professional service technician with the necessary knowledge and examination from the Decree no. 50/78Coll. on Work Safety in Electrotechnology.

Safety information

The MINIB controlled heating systems are designed so that the convectors and most of other auxiliary elements operate with the safe power supply voltage 12V.

Elements that operate with the voltage higher than 50V are provided with the certificate from the testing institute. It especially concerns the isolating transformers and thermostats that are designed for direct connection to the low voltage distribution network.

Assembly and installation of all electrical parts operating with the low voltage (typically a.c. voltage 230V) must be made by worker with the electro technical qualification and with valid examination from the Decree no. 50/78Coll. on Work Safety in Electrotechnology.

Installation of components operating with the safe voltage 12V is also recommended to be made by professional in order to follow the proper dimensioning and marking of connecting wires and to observe further safety regulations!

Characteristics

MINIB heating systems MINIB uses a change of the speed of blowing fans for controlling the heating output. Depending on the type of used motors the rotation speed is controlled either by steps through the change of a.c. power supply voltage, or by d.c. control analogue signal from the operating control unit or DC-BLOK module, which enables interlocking of the fan operations according to temperature of the heating water.

The control of asynchronous motors with another method than with the step change of the supply voltage is difficult (especially when the quiet operation is required), and therefore there is used either manual switching of supply voltage branches, or these branches are switched through contacts of auxiliary relays. The convectors with a.c. motors are marked as „**AC series convectors**“

The control of d.c. motors is much easier comparing to a.c. motors. These motors can be also controlled with the change of supply voltage either by steps, i.e. similarly as a.c. motors, or continuously. In this case the d.c. voltage is changed through the transistor power module, which is controlled with the signal from the operating control panel. Convectors with the d.c. motors equipped only with the rectifier, which can be control through the step change of the supply a.c. voltage, are marked as „**DC series convectors**“. Convectors with the d.c. motors

equipped besides the rectifier with the power module, which can be controlled through analogue signal, are marked as „**DC-IQ series convectors**“.

DC-IQ series convectors must be used for all types of control systems that enable automatic speed control and/or at least interlocking of fan functions according to temperature of heating water (DC-BLOK).

Dimensioning

Feeding and control of blowing fans require the installation of electrical distribution of the supply voltage. In view of the fact that there is used the safe supply voltage of 12V A.C, it is necessary to dimension the input cable line for higher current and thus to secure a sufficiently low voltage loss at the ends of the cable line to convectors for achievement of necessary output power of motors, especially at convectors with a.c. motors. The voltage loss should not exceed ca. 1V. It is convenient to feed each convector through the individual cable line from the power supply source (usually from the transformer) at feeding more convectors.

During calculation, it is necessary to consider the total length of the power supply loop, i.e. including the cable line sector to the connected thermostat. It is necessary to take into an account that the current flows through both directions of each cable line sector, i.e. that each cable line sector must be calculated twice into the total length of the loop. Then the cable line to the thermostat is loaded by current of all branches from all convectors, and from this reason it should be as shortest as possible and there should be used the wire with the cross section corresponding to the considered higher current load.

Then it is possible to set up the cross section of wires of the cable line from the determined length of the power supply loop, specific resistance of the copper wire and permitted voltage loss.

Example:

Task:

Specific resistance of the copper is 0.0175 [Ohm*mm²/m]; cable line length from the transformer to the convector is 6 [m]; cable line length from the transformer to the thermostat is 2 [m]; there is used one two-meter convector with two a.c. motors with the total apparent input 100 [VA]; permitted voltage loss is 1V.

Calculation:

Current of the power supply loop = Input power of motors / Supply voltage

$$I_{AC} = 100 / 12 = 8.3 \text{ [A]}$$

Permitted resistance of the power supply loop = Permitted loss / Current supply loop

$$R_{max} = 1 / 8.3 = 0.12 \text{ [Ohm]}$$

Cross section of the cable line wire = Copper specific resistance * 2 * Total length of the cable line / Permitted resistance

$$S_{CU} = 0.0175 * 2 * 8 / 0.12 = \mathbf{2.3 \text{ [mm}^2\text{]}}$$

Therefore it means there can be used the cable with the cross section of the wire as closest to a higher cross section in series, i.e. for example CYKY 2x2.5 for the considered cable line.

If there are fed the convectors with d.c. motors, it is obvious that thanks to their significantly lower consumption you can use the wires with much smaller cross section or much longer cable line sectors can be reached. If there was used two-meter convector of DC series in the above mentioned example with the listed input 14W, then the cable line way could be up to 6-times longer or there could be used the cable with six-times smaller wire cross-section, i.e. any communication cable 2x0.5.

Basic elements of MINIB control systems

As every controlled system, the control systems are formed with the control members = convectors, controller = thermostat and auxiliary circuits such as the power-supply unit or control panel or another elements enabling the control of the controlled system.

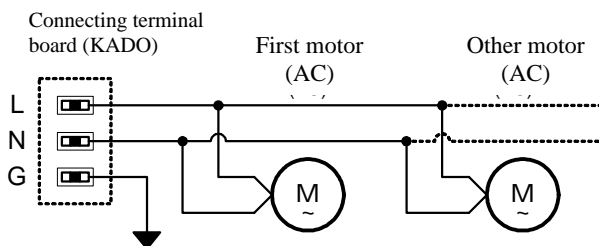
Convectors

AC series convectors

AC series convectors are equipped with alternating-current one-phase motors with the short-circuit armature. The motors have the modified characteristics in order to achieve the required speed dependence on the supply voltage at load characteristics of the tangential fan. There are used two types of motors. The motors of the first type are designed for the convectors with the wheel diameter 50 mm. They have a relatively high apparent input up to 50 VA. The active input is ca. 33 W in this case. The motors of the other type are designed for the convectors with the wheel diameter 30 mm. They have also a high apparent input ca. 20 VA. The active input is ca. 15 W in this case. The efficiency of both motors is very low. The rotation speed is controlled through the change of the A.C. supply voltage. The use of pulse converters is not effective and it significantly increases the motor noisiness. Therefore these motors can be only controlled by switching of taps on the isolating transformer.

The connection of the convector is very easy. The motors are connected with two poles directly to the main connecting terminal board of the convector.

Internal wiring diagram of the AC series convectors



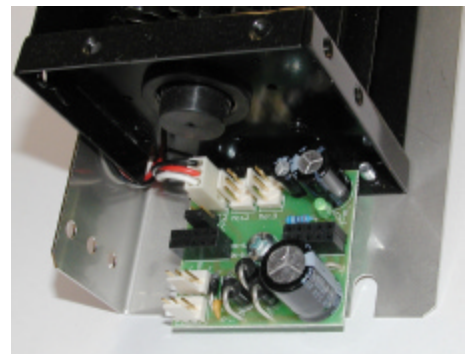
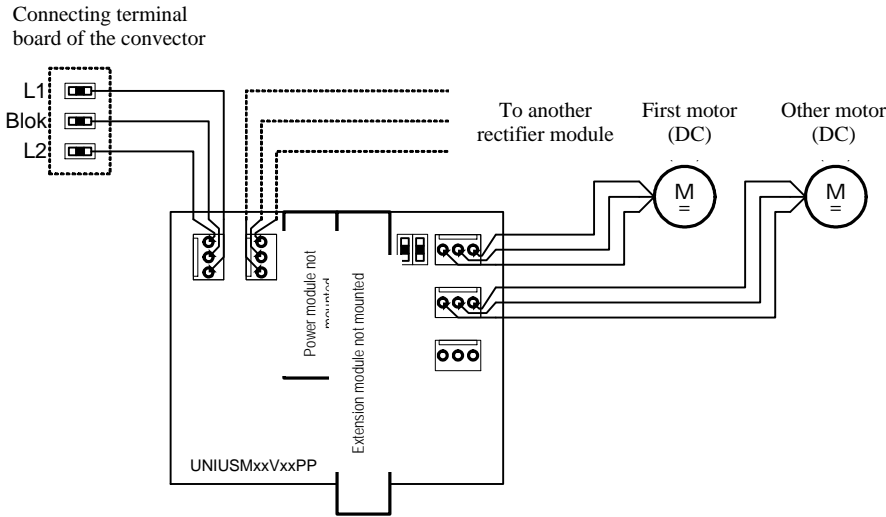
DC series convectors

DC series convectors are equipped with the direct-current brushless motors. The motors almost have the linear rotation characteristics in dependence on the supply voltage of the type $N = a \cdot U - b$. Motors according to types operate with the voltage from 3.3 to 5 V. The maximum supply voltage is 12 V. The rectifier unit is added to the fan set so the fan set can be used without any further modification as the direct substitution of the fan set with the A.C. motors. The advantage is a several times lower consumption. There are available two basic sizes of motors. Larger motors are designed for the convectors with the wheel diameter 50 mm and have 10 W at maximum at voltage 12 V. Smaller motors are designed for convectors with the wheel diameter 30 mm and have 4 W at maximum at voltage 12 V.

The motor speed can be controlled through the change of supply voltage and voltage changes can be achieved with the different method either directly through the voltage change of the power supply unit, i.e. for example by tap switching of the supply and isolating transformer, or through the power module with the transistor, which enables the voltage control directly in the fan set by low-power electrical signal. The fan set can be also powered with the D.C. voltage and it does not matter on polarity of the connected voltage thanks to the used rectifier.

The connection of the convector is very easy. Motors are connected through three-wire cable with the connector to the rectifying module and the module is connected through another three-wire cable with the connector to the main terminal board of the convector.

Internal wiring diagram of DC series convector

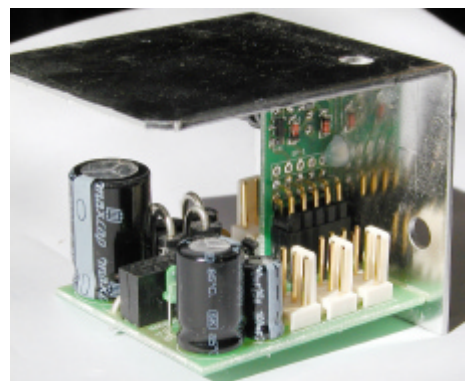
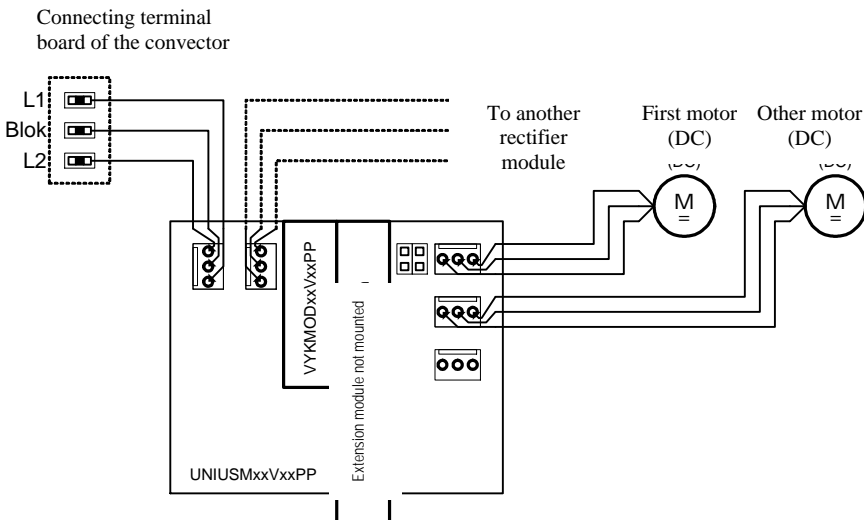


The rectifier module UNIU SMxxVxxPP rectifies the supply voltage for motors. If the power module is not used, there must be linked the couple of jumpers on this module (They are connected from the production).

DC-IQ convectors

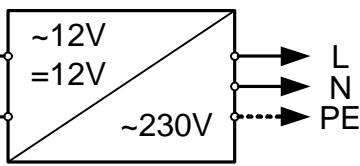
DC-IQ convectors are quite identical with the DC series convectors regarding the mechanical design. But there is additionally inserted the so-called power module VYKMODxxVxxPP into the universal rectifier module, which includes the transistor power unit. This enables controlling the supply voltage of motors by low-power control signal BLOK. The signal is supplied to the middle connecting terminal of the main terminal board of the convector. When more convectors is jointly controlled in the group, there must be also interconnected middle terminals of main terminal boards of all convectors in the group besides the side terminals of main terminal boards of convectors, which are used for feeding the convectors, and eventually there must be also interconnected the relevant middle terminal on the main terminal board of the control panel if the control panel is used in the selected type of regulation. The wires that are always connected to side terminals of main terminal boards of convectors can be mutually crossed.

Internal wiring diagram of DC-IQ series convectors



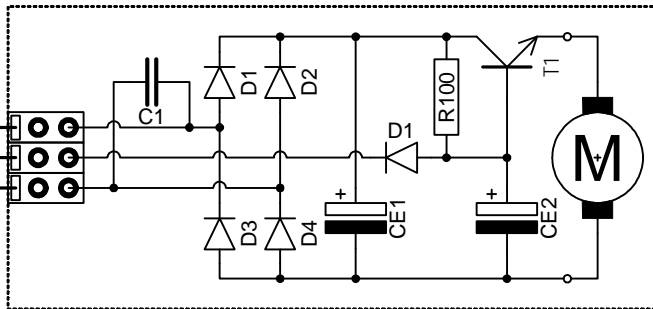
Principle wiring diagram of the MINIB bus for the fan control

Power supply unit -

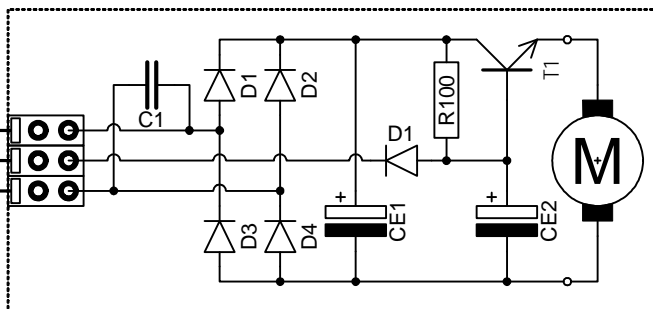


It is possible to use either the isolating transformer with the a.c. output voltage 12V, or the d.c. power supply with the voltage 12V. The power supply can be also used for energizing another elements of the control system. The side wires of the bus can be arbitrarily crossed.

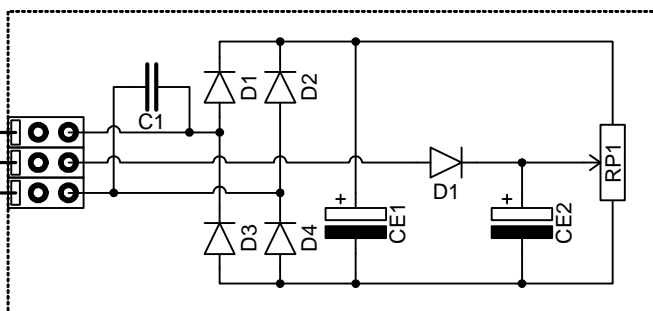
Power modules -



Principle wiring connection of the so-called emitter follower. The connection has a high input resistance and enables to use a low-power control signal. The filtration capacitor CE2 provides a correct function of the follower at using the a.c. power supply as well. One control panel can control up to ten power modules. The power modules can be configured so that the output voltage of the follower can be set for any level during absence of the control signal. Then the output voltage can be only decreased by control signal. Diode D1 secures both power modules not to interact each other.

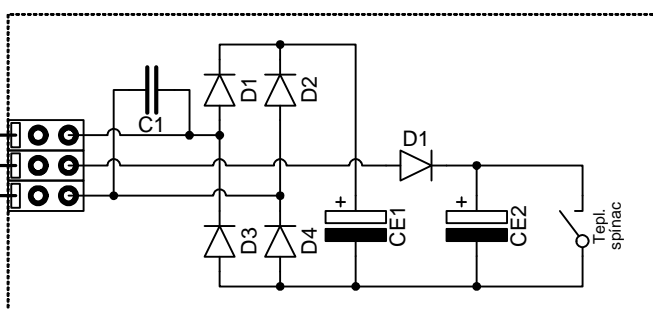


Control panel -



the principle wiring connection of the control panel can be represented by the ideal potentiometer. In fact, there can be connected more control elements to the bus as for example the lock-in module and the signal with the lowest level will be always effective. Otherwise the control elements are not influenced. That is secured through the diode D1. Therefore the control signal is called as the interlocking signal.

Lock-in module -



the principle wiring connection of the lock-in module can be represented by temperature-controlled switches.

Note: The used wiring connection of the bus does not allow to reach a high accuracy of the motor speed control. But the reached accuracy is sufficient for the control of blowing fans of heating systems. When the d.c. supply voltage is used, the error is influenced by variance of the voltage loss on the rectifier diodes and individual diodes D1. When the a.c. supply voltage is used, the accuracy is additionally affected by impulse load of rectifier diodes and that the diodes carry the current for a relatively short time and the control signal is just defined at the moment of the current flow through rectifier diodes. But a high input resistance of the power emitter follower and filtration capacitors CE2 significantly limit this deficiency of the selected bus connection. The advantage is the simple design of the bus and high resistance to the faulty wire connection. The maximum error of such connected bus is smaller than ca. 5%..

Convector MASTER DC-IQ

The convector is identical with the convector DC-IQ, but in the scope of final assembly there is inserted the module DC-BLOK (see hereinafter) into the selected convector, which secures interlocking of blowing fans in dependence on the temperature of heating water. The convector with this module is called as the MASTER convector. The use of the lock-in module is independent on the type of automatic regulation, but the DC-IQ series convectors must be used. The wiring connection is shown on the system of convectors equipped with the regulation F – see hereinafter.

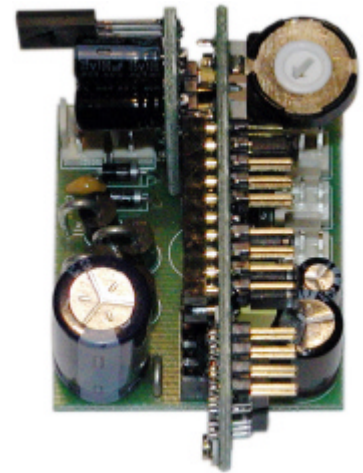
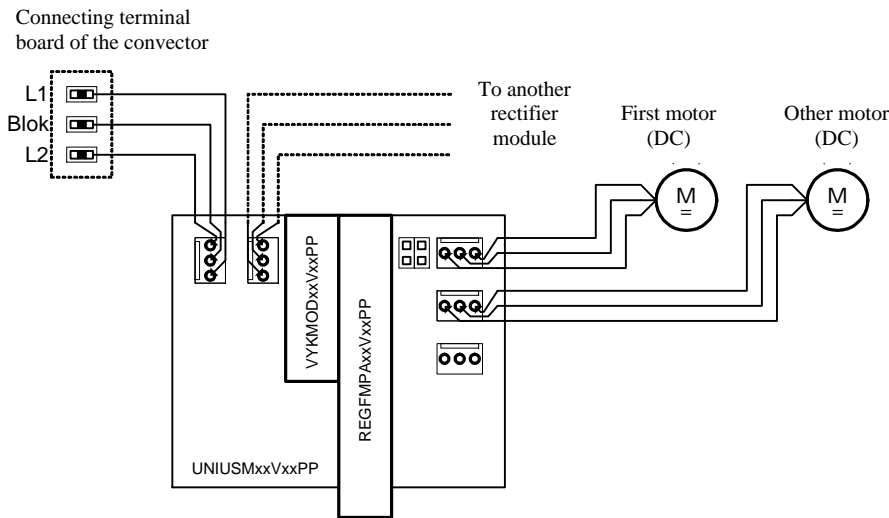
DC-IQ series convectors with regulation F

DC-IQ series convectors with regulation F are mechanically identical with the DC series convectors. But in addition they are fitted with the module REGFMPAxxVxxPP comparing to the DC and DC-IQ series. This module enables the remote control of the convector with two logic signals or serial-transmitted data command at the length of 1 Byte.

Two logic signals define four states, i.e. STOP, Mode I., Mode II. and Mode III. Therefore there can be provided the four-level speed control and the actual fan speed can be continuously set for every mode. This control method is convenient for superior control systems with simple relay or transistor (Open Collector) control members.

The serial data transmission is of the type SPI (synchronous data transmission with the data line and clock) or UART (asynchronous transmission through one line). The transmission speed is 2400Bd. This control method enables the continuous fan speed control. The fan speed characteristic can be linearized with the setting of minimum, middle and maximum speed.

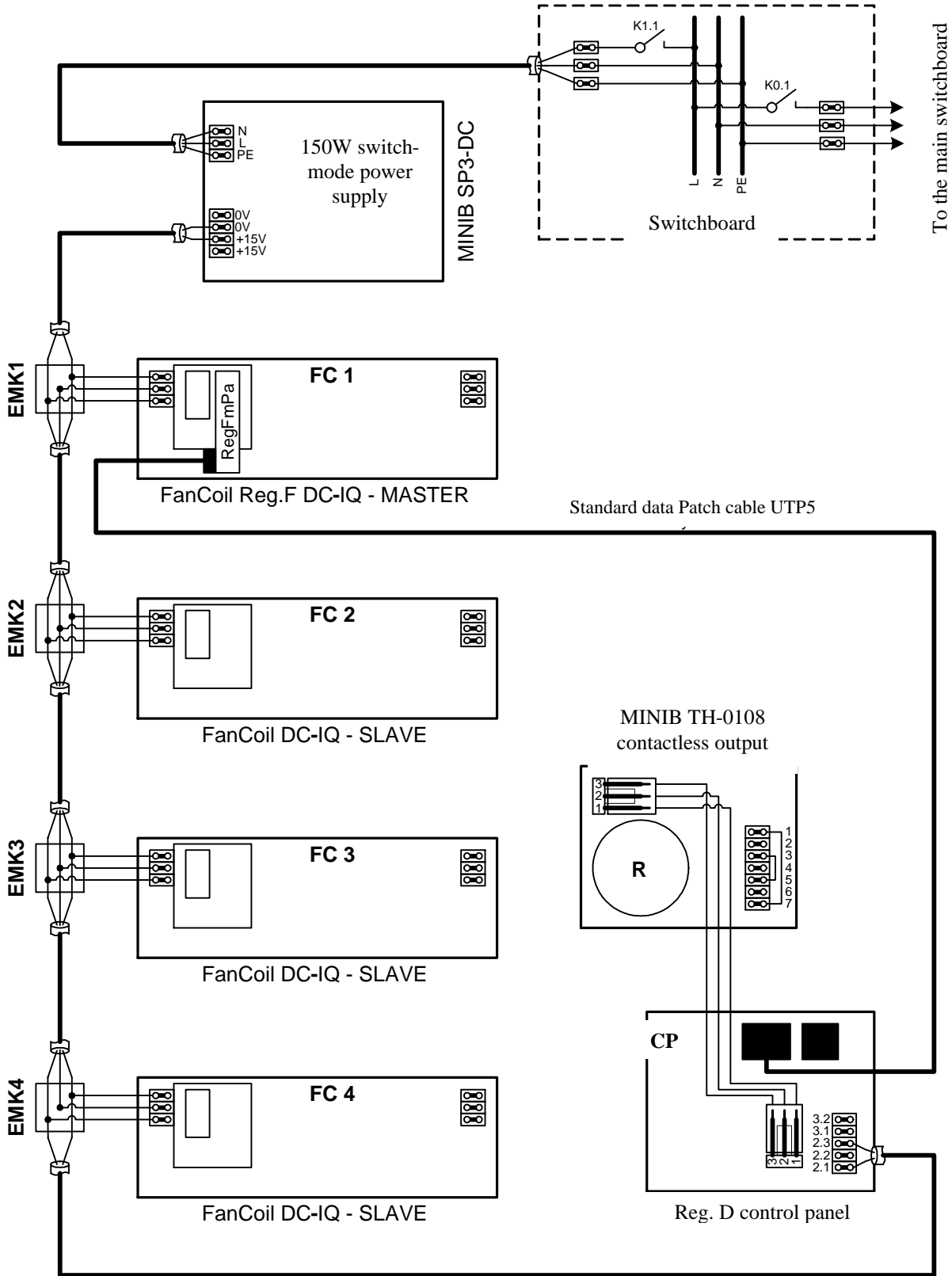
Internal wiring diagram of DC-IQ series convectors with regulation F



Convector MASTER DC-IQ with regulation F

DC-IQ series convectors with regulation F can be used for all individually installed convectors or such a convector can be connected as the so called MASTER convector with the inserted control unit for regulation F, which can control up to ca. 10 convectors SLAVE of the type DC-IQ. All convectors are interconnected with three-wire cable line in such case just as at the standard regulation of DC-IQ series convectors. The convectors are controlled with the same control signal, i.e. the blowing fans of the same type almost turn with the same speed.

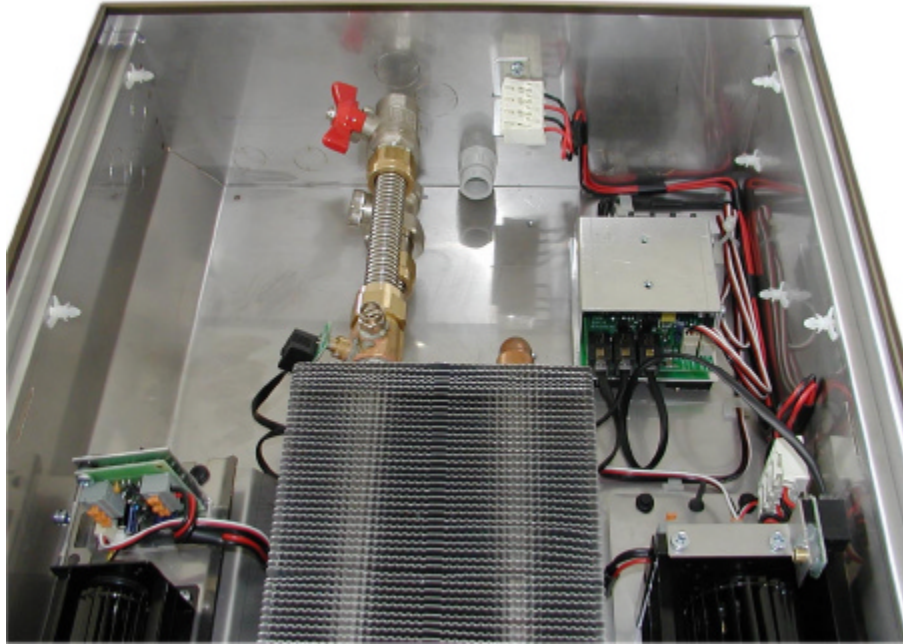
The example of the connection of DC-IQ series convertors with regulation F in the MASTER mode and with DC-IQ SLAVE convertors (with the control system D)



Note: Connection of the DC-IQ MASTER series convertor with DC-IQ SLAVE convertors is practically the same, but the control panel for regulation D or E is directly connected to the three-wire bus (terminals 2.1, 2.2, 2.3) including the middle wire, which transmits the control, respectively interlocking signal. Then the data cable is not used. Selected wiring diagrams are listed in the enclosure.

MT-2 series convectors

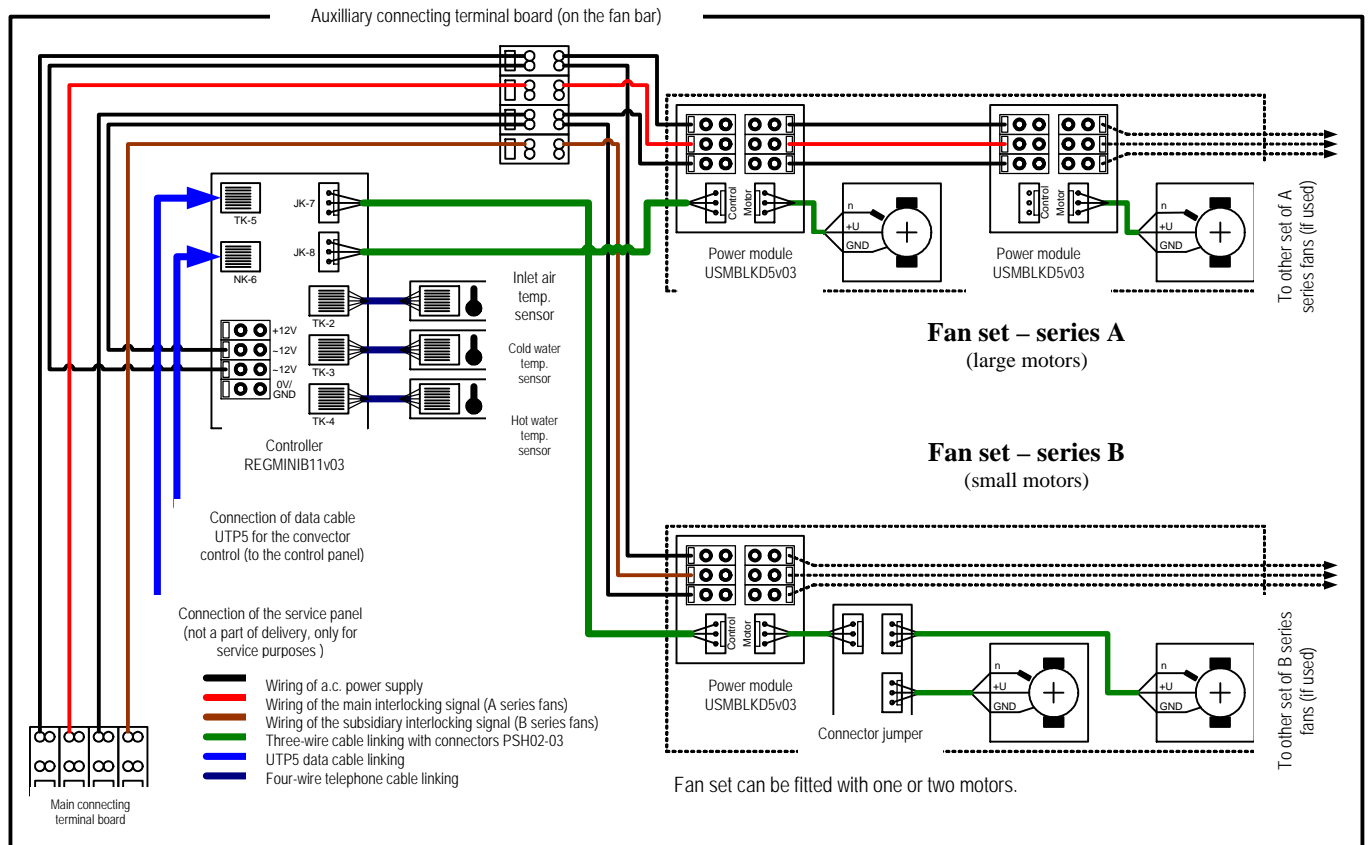
MT-2 series convectors are special high-power convectors with their own microprocessor control. The control module REGMINIB11vXXPP secures speed setting of two sets of blowing fans and controls a direction of output airflow. This module enables a remote control of the convector with two logic signals. Two logic signals define four states, i.e. STOP, Mode I, Mode II. and Mode III. The convector MT-2 supports the four-level regulation. But the specific rotation speed is controlled through its own control module REGMINIB11vXXPP.



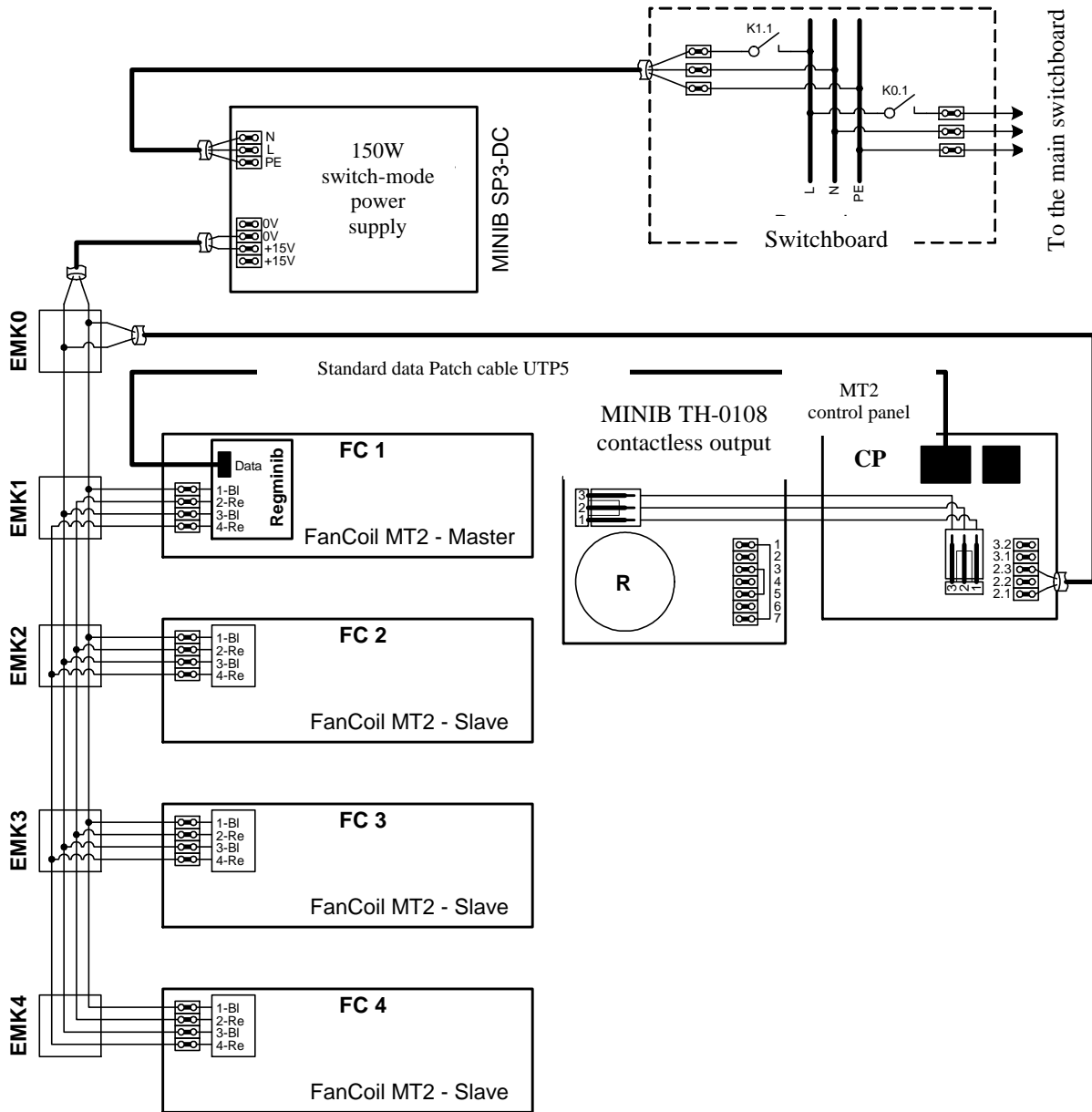
Convector MASTER MT-2

MT-2 series convectors are produced up to length of 2m. If it is necessary to provide a larger length of convectors, one convector can be connected as so called MASTER, which can control other convectors MT-2-SLAVE that are not equipped with their own control unit but they work as same as the convector MT-2 MASTER. There can be controlled up to 5 SLAVE convectors. In such case all convectors are interconnected with the four-wire cable line. SLAVE convectors are internally connected as same as the MASTER convector, but of course there are not connected jumpers directing to the controller REGMINIB11vXX.

Wiring connection of convectors MT2-MASTER



Connection of MT-2 MASTER series convectors with convectors MT-2 SLAVE



Interlocking module DC-BLOK

The DC-BLOK module is designed for interlocking the fan speed if there is not reached the minimum temperature of heating water. DC-BLOK can be only used for DC-IQ series convectors, which are equipped with the power module. Besides the temperature sensor, which shall be mounted on the fit of brass pipe ends of the heat exchanger or into the soldered bored cylinder on the elbow pipe of the heat exchanger, the DC-BLOK is ready for the connection of the light sensor (phototransistor). This sensor can evaluate the daily time and the DC-BLOK can decrease the night fan speed to the preset level. But this function is not used at the present types of regulation because there is mostly used the light sensor in the control panel.

The DC-BLOK is connected through the three-wire cable either to the connector on the module of the universal rectifier, or it can be directly connected to the main terminal board of the convector. The interlocking signal is marked BLOK, power supply wires are marked ~12Va, ~12Vb.

Attention! If the convectors are also used for summer additional cooling, respectively blowing off of the room, it is necessary to put the DC-BLOK out of operation because the cool water would not allow fans to start turning. It is sufficient to disconnect the wire of the control signal BLOK from the DC-BLOK.

Fig. of the module DC-BLOK with the temperature sensor and connecting cable



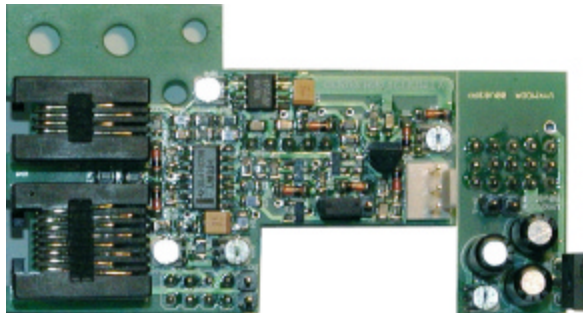
Extension module EXTMOD2F (being prepared since IV. quarter of the year 2005)

The module EXTMOD2F is designed for detecting of heating water temperature and for interlocking of fan rotations if the proper temperature of heating water is not reached. It means that the heating water must have either a higher temperature than the minimum temperature sufficient for heating, or it must have a lower temperature than the temperature sufficient for cooling. The module EXTMOD2F can be especially used for convectors of DC and DC-IQ series. Besides the temperature sensor, which shall be mounted on the fit of brass pipe ends of the heat exchanger or into the soldered bored cylinder on the elbow pipe of the heat exchanger, the module EXTMOD2F is equipped with the connector for connection of the auxiliary locking relay and so that it can be also used for DC series convectors and for interlocking of fans of AC series convectors with a.c. motors in the special connection.

The extension module EXTMOD2F provides the control unit of regulation F the information about heating water temperature at DC-IQ-F series convectors, which can be transmitted to the superior control system.

The module EXTMOD2F is designed directly for inserting into connectors on the board of the universal rectifier UNIUSMxxVxx. The module EXTMOD2F has its own power part and in case of the use with DC-IQ convectors the original power module shall be removed. Then it is possible to break off the power part on the module EXTMOD2F at DC or AC series convectors. (But it is necessary to add the module of the universal rectifier into the convector at AC series convectors.)

Fig. of the module EXTMOD2F



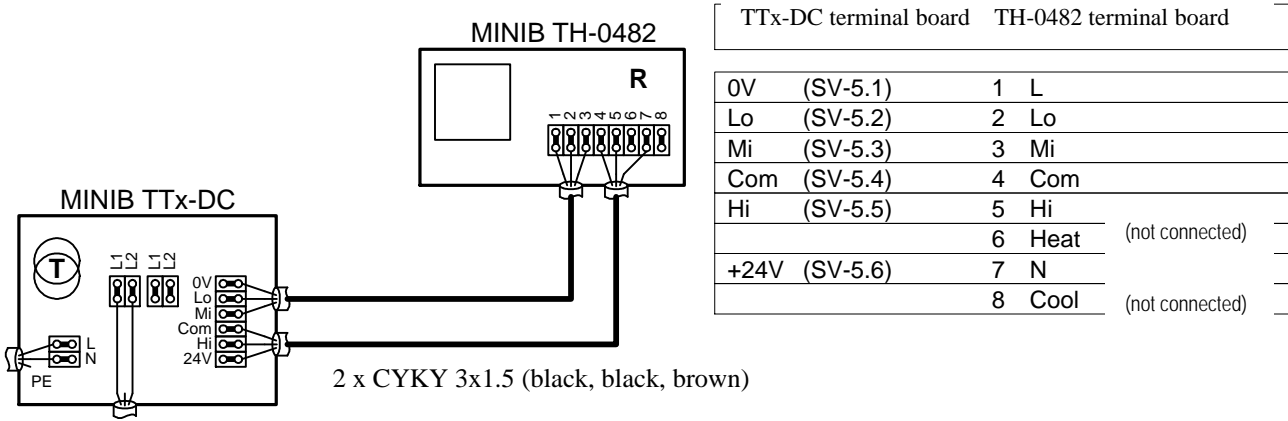
Thermostat TH-0482

Thermostat is designed for the C type regulation. The thermostat enables the manual switching of three speed levels. The thermostat enables the setting of weekly programs for heating. The thermostat is powered with the auxiliary voltage 24 V from the supply and isolating transformer TTx-DC. The thermostat is to be connected directly to the determined terminal board in the transformer TTx-DC. Contacts of switches and thermostat relay can switch the current up to 16 A, but thanks to dimensioning of the isolating transformer the maximum load current is only ca. 4 A or 8 A according to the used transformer TT0-DC or TT1-DC.

Fig. of the thermostat



Connection of the thermostat and supply transformer TTx-DC

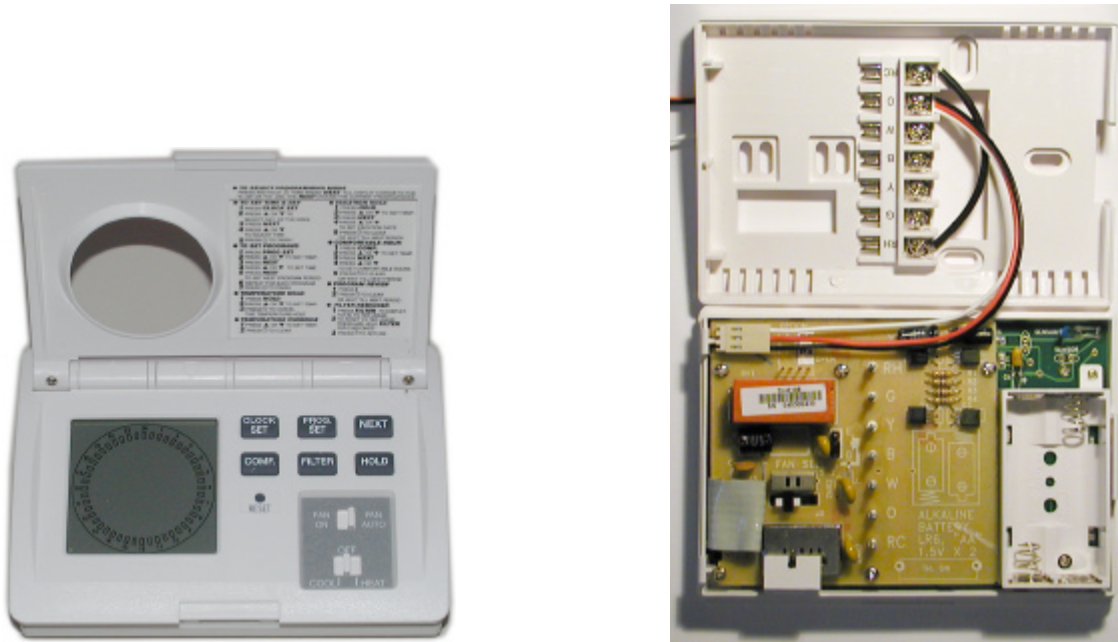


Thermostat TH-0108

The thermostat is designed especially for automatic controls of the type D, E, E.1, F, MT-2. The thermostat enables the setting of weekly programs for heating. The thermostat is powered from its own batteries. The thermostat is to be connected with three-wire cable directly to the three-pole needle connector in the control panel. Contacts of switches and relay of the thermostat TH-0108 can directly switch only the current 2 A at maximum voltage 24 V_{AC}.

Therefore the thermostat can be also used for direct switching on the short line of convectors with d.c. motors (see the wiring connection for regulation A and B). But the length of DC convectors is 3 m at maximum. Switches and contacts of the thermostat TH-0108 can be used with an advantage for the control of other elements of the heating system (e.g. heating water solenoid valves, pumps or heating boilers) at IQ control systems, which use the contactless control of the control panel. But these elements must be designed for the control with the safe voltage 12 V or 24 V.

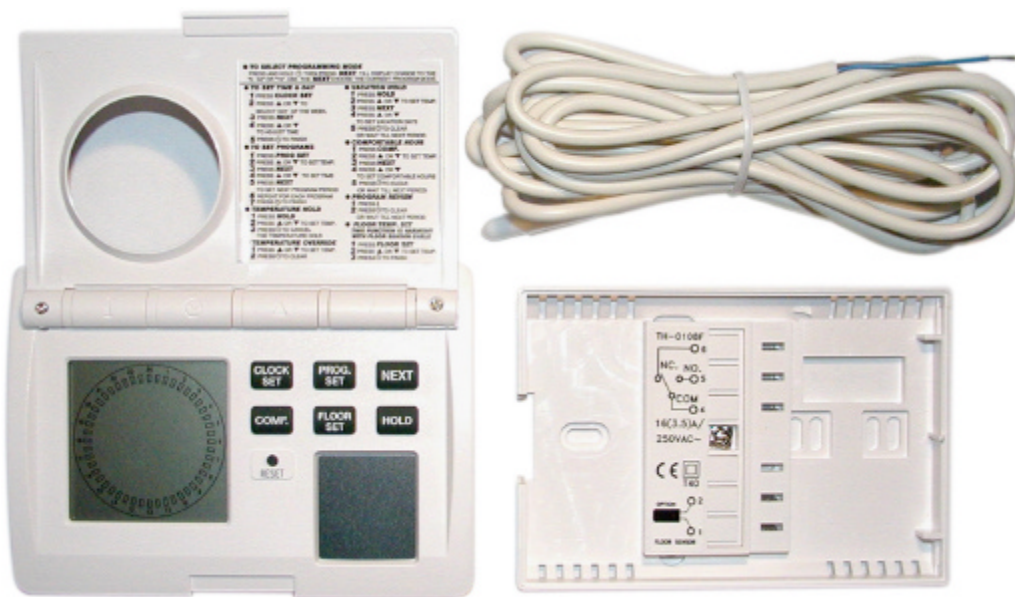
Fig. of the thermostat TH-0108 and connection of the connecting cable between the thermostat and control panel



Thermostat TH-0108F

The thermostat is designed for the automatic control systems of the type B.1 and E.1, which are used for the control of convectors with a.c. motors. These convectors are mostly placed into wet areas with a possibility to be flooded with water. In order to protect the thermostat itself and especially its supply batteries against high moisture, this thermostat is equipped with the external temperature sensor that shall be placed into the reference point of the room. The thermostat body can be placed to any place out of the direct effect of moisture. The cable length of the external sensor can be up to 5 metres. The thermostat is not equipped with any other switches. The thermostat enables the setting of weekly programs for heating. The thermostat is powered with two pencil batteries. Relay contacts of the thermostat TH-0108F can switch the current up to 16 A at the operative voltage up to 230 V AC, and therefore it is recommended to switch the primary supply voltage of the isolating transformer for large fan sets with a.c. motors. (Regulation B.1). Thermostat contacts in the control system of the type E.1 are not loaded either with the current, or voltage and there is used only a capability of the thermostat TH-0108F to be able operate with the external temperature sensor in this type of regulation. (If the thermostat in the specific connection was not exposed to high moisture, it would be possible to use the thermostat TH-0108 with the contactless output for the regulation E.1 as well).

Fig. of the thermostat TH-0108F



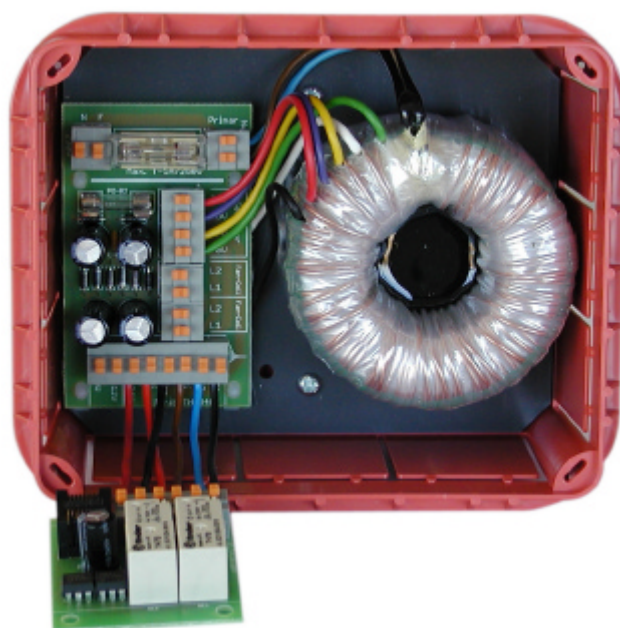
Isolating transformers TTx

Isolating transformers with a higher output power TT3 (250 VA) and TT5 (330 VA). The transformers have taps with the voltage 7 V, 9 V and 12 V. They are placed in the electrical installation box designed for embedding under the plaster. In the box, there is placed the terminal board with the tube fuse for the connection of the supply voltage 230 V and the terminal board, to which are connected taps of secondary winding of the transformer. The transformer is equipped with the reversible thermal fuse against overloading (it is placed in the winding).

Isolating transformers TTx-DC

Isolating transformers TT0-DC (50 VA) and TT1-DC (100 VA) are designed for heating systems with d.c. motors. The transformers have taps with the voltage 5.5 V, 7 V, 9 V, 12 V and 14 V. They are placed in the electrical installation box designed for embedding under the plaster. In the box, there is also placed the printed circuit board with all necessary terminal boards, i.e. the terminal board for the connection of the supply voltage 230 V, the terminal board for the connection of the primary winding of the transformer and three selected taps of the secondary winding of the transformer, the terminal board for the connection of two branches of convectors (2x L1/L2), the terminal board for the connection of the thermostat and the terminal board for the output of auxiliary supply voltage 12 V and 24 V. There are also tube fuses on the printed circuit board. One fuse is connected in the primary winding circuit of the transformer and the other one is designed for the protection of auxiliary electronic circuits on the printed circuit board (auxiliary supply voltage 12 V and 24 V).

Fig. of the transformer TT1-DC with the inserted relay module for regulation E.1

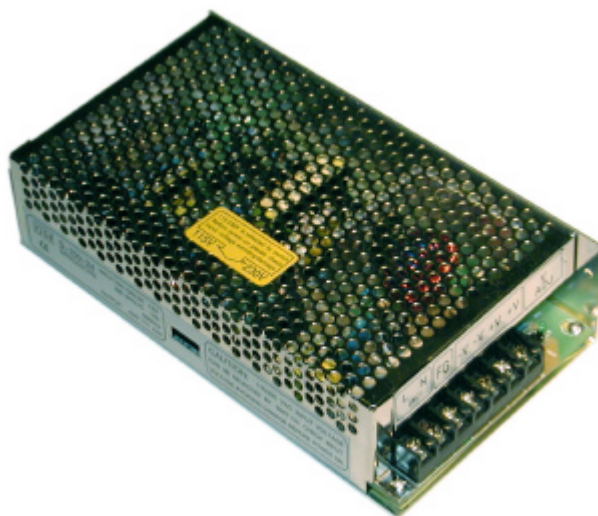


Switch-mode direct-current power-supply units SPx

There can be used switch-mode d.c. power-supply units 12 V resp. 15 V for selected types of regulation. The switch-mode power-supply units can be supplied in the power series of 50 W, 100 W and 150 W. You can use them for powering the convectors with d.c. motors!

Power-supply units are protected against the shortage at the output and against the heat overload. These power-supply units are convenient especially for DC-IQ series convectors with the regulation E, D, F and MT-2.

Fig. of the switch-mode power-supply unit



Attention: installation of all components connected to a higher voltage than the safe voltage (i.e. mostly 230 V) must be only performed by person with electrical qualification – graduation at the Secondary School of Electrical Engineering and valid qualification tests according to the Decree no. 50.

Relay modules

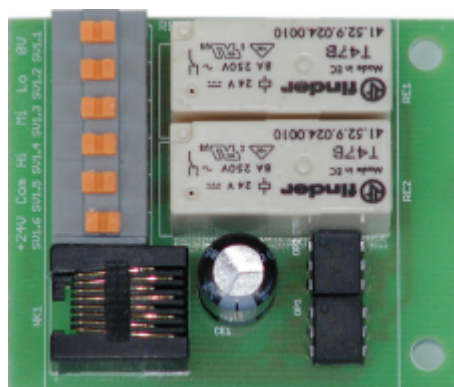
Relay modules are switch-mode modules designed especially for switching of winding taps of the isolating transformer. These modules are mostly installed from the production in boxes with isolating transformers. Switching of the relay is controlled with the low-power d.c. current (the current of the control signal is 5 to 20 mA at the voltage 5 V of the control signal). If there is only available the voltage control signal higher than 5 V, it is necessary to put in series the limiting resistor, whose value is ca. 220 Ohms per each 1 V, by which the voltage of the control signal is higher than 5 V.

There are used the modules REL3EDU000v01 for the supply and isolating transformers TT2 and TT5. The supply transformers with these relay modules are marked as TT3-E.1 or TT5-E.1.

There are used the modules RELDUAL000v01 for the supply and isolating transformers TT1-DC. The transformers with installed relay modules are not specially marked because they are always inserted in the set of basic regulation E.1 (output power 100 VA), which is designed for convectors with a.c. motors up to the maximum length of 2 m.

Relay modules can be also used for the control of other heating system elements such as electrically controlled valves for heating water etc. The extended connection with relay modules is not described in this handbook because there exist a lot of variants convenient only for specific projects.

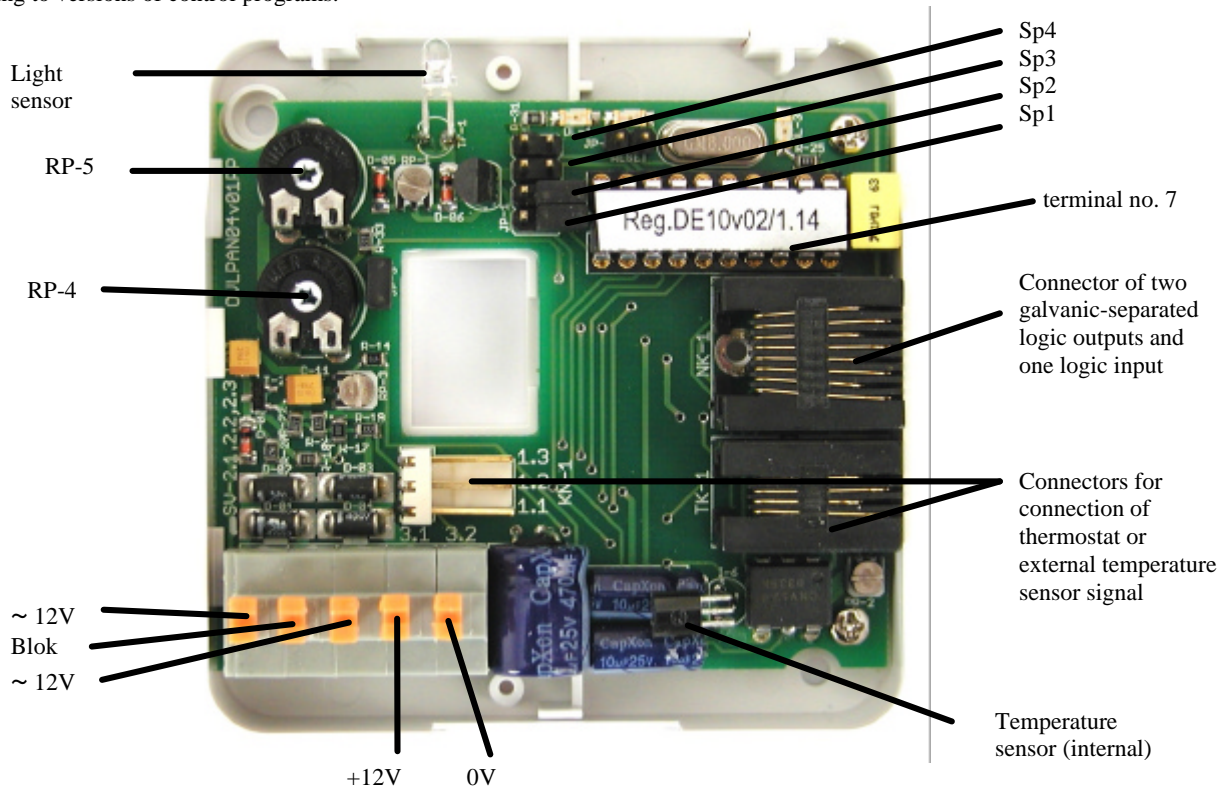
Fig. of the relay module RELDUAL000v01



Control panels

Control panels are the part of IQ control systems. They are used for the control of the fan speed of convectors according to the operating conditions. The control panel is equipped with the control microprocessor, level sensor of the ambient lighting, ambient temperature sensor, setting components and connecting connectors for the connection of the thermostat, supply voltage and output of the interlocking signal and also for the linking with the relay control module. All sensors need not be used in individual types of regulation. The linking connector Sp1 and Sp2 enable to select the operating mode of the control panel according to the type of the heated space. The linking connector Sp3 and Sp4 are designed for service purposes and enable to set the selected parameters of the control program. The description of the function is mostly listed in the assembly manual of the relevant type of regulation. The potentiometer RP-4 enables setting the limit of maximum revolutions that will be never exceeded. At the same time this potentiometer in the service mode serves for setting the value of the selected parameter. The potentiometer RP-5 serves for setting the decisive level of ambient lighting for the day/night mode.

The control panel is also equipped with signalling diodes. The green LED diode mostly signals the standby condition. The orange LED diode signals the switching on of the fans and the red diode is used for signalling the connection of the data cable to the connector of logic inputs, respectively it enables the signalling of the statute of the device connected to this connector. But the use of signalling diodes can differ according to versions of control programs.



Preparation for installation of the control system

Prior to installation of the control system elements it is necessary to secure the proper assembly of convectors and connection of terminal boards in convectors and electric installation boxes with proper cables or wires. There can occur inconsiderate handling with convectors during their assembly. Therefore it is convenient to install electric components of convectors and the control system in the last phase of the heating system installation, when any general work, especially bricklaying is not expected in the place of installation in order not to cause their damage. Installation of electric components and connecting cables or wires is performed according to selected wiring diagrams of regulation. But the designer can also select another connection. The suitable wire dimensioning is to be selected by the designer of the heating system. It is necessary to consider the power requirements of individual elements of the heating system and requirements for electric safety of the system. The manufacturer of convectors and the supplier of control elements are not liable for incorrectly processed projects.

Installation of control elements of MINIB control systems

Control elements of MINIB control systems can be divided into two groups.

- 1) The first group are the elements that are to be mounted on the wall, respectively on the standard electrical installation boxes placed under the plaster and the power-supply units placed in the electrical installation boxes designed for embedding into the wall or for placement in the switchboard. The installation procedure is done through the standard method and needed cables and wires including cables and wires to individual convectors are installed between individual elements.
- 2) The elements are directly placed in the convectors in the second group. It especially concerns the universal rectifier module, power module, interlocking module from the temperature of heating water and eventually other control and regulation components in the convectors designed for the connection to the central control systems of buildings, or convectors with air automatic air flow control of the MT-2 type. These components are mostly installed into the convectors directly in the production, but in some cases when there cannot be guaranteed that the installed convectors will not be flooded by water or filled with rubble it is convenient to remove these components (and eventually also the whole fan sets) and re-install them at debugging of heating control systems.

Connection of convectors

Convectors are connected through terminal boards. The terminal boards are different for individual types of convectors.

AC series convectors

The convectors are to be connected through the KADO terminal board. It concerns the covered terminal board, which has screw-type terminals for connecting wires. The internal installation wires for connection of a.c. motors are connected through faston terminals. Faston terminal springs are pressed on the internal connecting wires. The regulation of the type REG-B.1, REG-E.1, REG-E.1-TT3 or REG-E.1-TT5 is convenient for convectors with A.C. motors, which are especially designed for the wet environment.

TE series convectors

The convectors are to be connected through the KADO terminal board. It concerns the covered terminal board, which has screw-type terminals for connecting wires. The internal installation wires for connection of a.c. motors and heating elements are connected through faston terminals. Faston terminal springs are pressed on the internal connecting wires. The earthing conductor (PE) is only used for these convectors. TE series convectors use the power supply voltage of 230 V. This voltage is also used for blowing fans. Convectors can be only controlled by switching the power supply voltage.

The suitable regulation is the regulation with the thermostat, which has the switching contacts dimensioned for the corresponding output power and voltage such as the thermostat TH-0108F. The isolating transformer is not used. But there must be used auxiliary contactors for extensive heating systems.

Attention: installation of these convectors can be made only by a person with corresponding electrical qualification!

DC series convectors

Convectors are to be connected through the three-pole terminal board with self-locking terminals. Both side terminals are always designed for the connection of the supply voltage 12 V (alternating or direct). The middle terminal is not used at the DC series even if the internal connection of this terminal board with the rectifier module UNIUSM01Vxx is mostly made with the three-wire cable. The colour wire marking of this cable is not decisive (the white and black wire are mostly used for the supply voltage, red middle wire is designed for the interlocking signal, but which is not used in this series of DC convectors).

The convenient control systems for DC series convectors are: REG-A and REG-C.

DC-IQ series convectors

Convectors are to be connected through the three-pole terminal board with self-locking terminals. Both side terminals are always designed for the connection of the supply voltage 12 V (alternating or direct). The middle terminal is used for the control signal „BLOK“. It is so called the bus connection of convectors. The connection of the main connecting terminal board with the rectifier module UNIUSM01Vxx is made with the three-wire cable. The colour wire marking of this cable has not a decisive significance. Side wires, mostly black or white, are always used for the supply voltage and the middle wire, mostly red, is designed for the interlocking signal.

DC series convectors equipped with the rectifier module UNIUSM01Vxx can be changed to DC-IQ series convectors by simple inserting of the power module.

DC-IQ series convectors can be also added for the control module REGFmPa0xVxx. The convectors equipped with the control module REGFmPa0xVxx can be controlled for example with the superior central control system for buildings. The control module REGFmPa0xVxx also enables to add another functions of the convector such as the control of heating water valves, measurement of heating water temperature and it is possible modify the operating mode of the convector and etc. according to the value of this temperature.

The convenient control systems for DC-IQ series convectors are: REG-B and REG-D, REG-E.

MASTER

Always one of DC-IQ series convectors, which are connected in one control circuit, is equipped with the lock-in module DC-BLOK that secures the fans not to start turning if the heating water is cool. This convector is then called MASTER convector. It can be selected any convector in the control circuit but there is usually selected the convector that is the most distant from the source of heating water. The module DC-BLOK is connected to the three-wire bus and both side wires are used for the power supply and the middle wire serves for the interlocking signal „BLOK“.

MASTER F

One of the convectors – MASTER – is equipped with the lock-in module DC-BLOK and in every control circuit with DC-IQ convectors there can be used one DC-IQ-F convector, which is then the MASTER F convector and can use the properties of this series of convectors (the control through the central control system, measurement of heating water temperature, adaptive operating mode etc.). The other DC-IQ series convectors have the fan speed controlled as same as the MASTER-F convector (of course without a possibility of the valve control or measurement of heating water temperature – there is assumed the common valve control for this control circuit and the measured data about heating water temperature is common for the whole control circuit).

MT-2 convectors

The connection of MT-2 convectors is special. The convectors are to be connected through the four-pole self-locking terminal board. There are internally connected four wires into the terminal board in the order „black, red, black, red“. The terminals with connected black wires are designed for the connection of the supply voltage 12 V (it is recommended to use the direct-current supply voltage and it does not matter, what is the polarity). The red wires are designed for the linking of control signals for both lines of fans between convectors. The convectors in one control circuit are interconnected through the bus. The connection order of red wires must be kept. The power-supply wires (black) can be crossed and therefore there can be used for example the four-wire cable with two black wires, one blue and one brown wire for interconnection of convectors. There must used one convector MT-2 MASTER in every control circuit and other convectors are of the type MT-2 SLAVE. The MASTER convector is equipped with the unit REGMINIB11Vxx and temperature sensors. The internal wiring of the MT-2 convector including the interconnection of the control circuit has been already listed in previous chapters.

There can be only used the regulation REG-MT-2 for regulation of MT-2 convectors.

Regulation wiring diagrams

Regulation A

Characteristics

Regulation REG-A is the simplest and at the same time the cheapest type of regulation, which can be used for the power control of MINIB convectors.

The regulation can be used in connection with standard types of MINIB convectors with alternating and direct current motors.

There is used the standard thermostat for this regulation. The cheapest variant is the mechanical thermostat, for example with the bimetal thermostwitch.

The regulation uses two states, i.e. ON/OFF. The fan revolutions in the switched on state are given by connection of convectors to the convenient voltage tap of the isolating transformer.

Regulation characteristics

Regulation REG-A is the simplest type of regulation with the simple mechanical thermostat. The thermostat has the temperature of switching adjustable by change of the bimetal switching spring. That is made through the calibrated screw wheel. The temperature setting is less accurate. Hysteresis of switching on and switching off the bimetal switching contact. The hysteresis is mostly ca. 1°C. By this way it is secured that the thermostat does not switch on and off in too fast sequence. The time of the thermostat switching-on and switching-off is very dependent on the space characteristics and power output of convectors. The switch-on time in the stable condition should not be shorter than approx. 4 minutes at the properly dimensioned output power so that the boiler could operate in the economical and energy-saving operating mode at the same time. Too short switch-on time means that the heat output of convectors is too high. On the contrary too long switch-on time (longer than ca. 1 hour) means that the heat output is not sufficient as same as too short switch-off time, which can be hardly changed for this type of regulation.

The heat output of convectors can be changed by changing the fan speed through the connection of convectors to the transformer tap with a higher or lower voltage.

Wiring connection of regulation REG-A

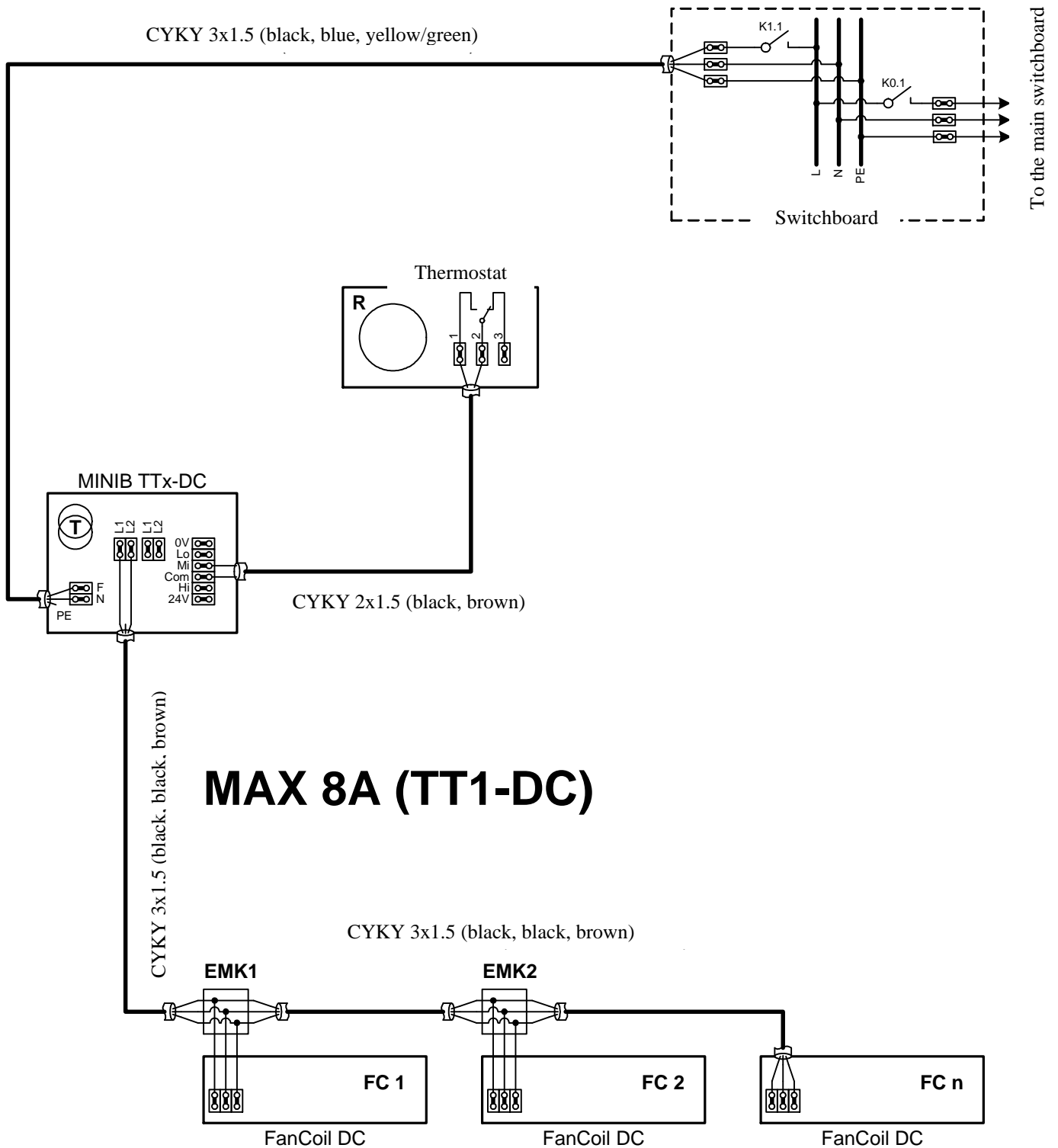
The wiring connection of regulation REG-A is on the enclosed wiring diagram. The switching contact of the thermostat can be connected either in series with the primary winding of the isolating transformer REG-A-TTx (the contact should disconnect the phase), or it can be connected in series with the secondary winding, respectively with the corresponding tap of the isolating transformer. In this case it is convenient to use the isolating transformers TT-0(1)-DC, where the terminal board is prepared for the connection of convectors and the thermostat. The convectors are to be connected to terminals L1/L2, and the thermostat contact is always to be connected with one pole to the terminal COM and with the other pole to one of terminals Lo, Mi, Hi, to which are connected three taps of the isolating transformer (mostly 7V, 9V, 12V). Be careful for exceeding the current and voltage load of the thermostat switching contact. The selection of connection of the switching contact to the primary or secondary circuit of the isolating transformer depends on the required power output of connected convectors and from it arising requirements put on the switching characteristics of the contact.

If the contact is connected in the primary circuit of the isolating transformer, the thermostat must be approved for the usage with the distribution main voltage and installation must comply with requirements for electrical safety.

REG-A wiring diagram

Regulation A with transformer TTx-DC

Recommended for the simplest regulation of convertors with D.C. motors.



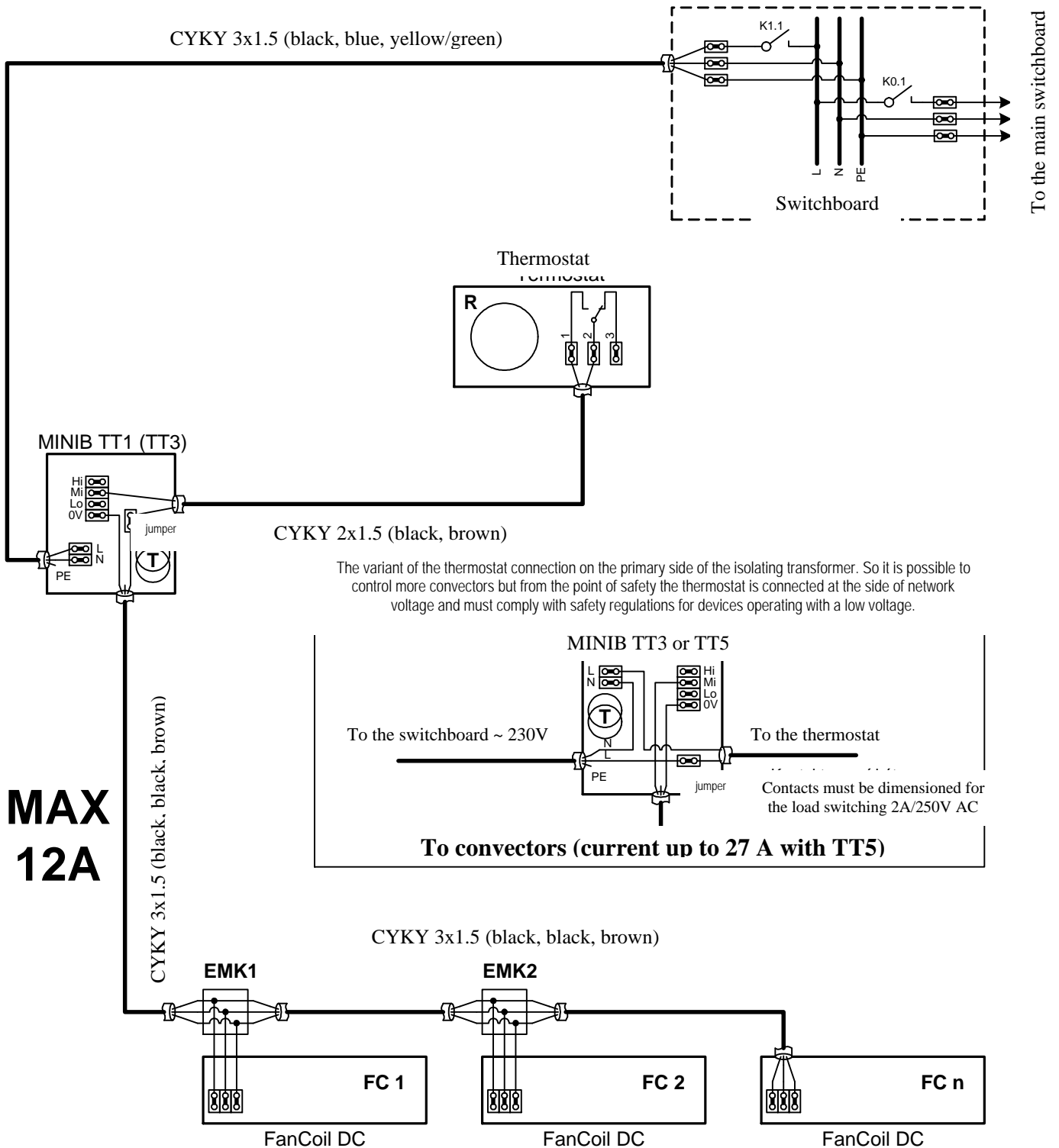
The convertors can be connected in series if the distance from the transformer is small. The Y-connection is convenient when the distance, resp. the distance of the most distant convertors exceeds 20 m.

Tapping can be made in the electrical installation box EMK in the wall or through WAGO terminals directly under the convertor cover.

Wires of the side terminals can be crossed. Middle terminals can remain unconnected. If the middle terminals are linked, there can be only interconnected the middle terminals. When the cable with colours "black", "black", "brown" is used, use the brown wire for interconnection of middle terminals of the convertors.

Regulation A with transformer TTx

Recommended for the simplest regulation of convectorors with D.C. motors.



The convectorors can be connected in series if the distance from the transformer is small. The Y-connection is convenient when the distance, resp. the distance of the most distant convectorors exceeds 20 m.

Tapping can be made in the electrical installation box EMK in the wall or through WAGO terminals directly under the convector cover.

Wires of the side terminals can be crossed. Middle terminals can remain unconnected. If the middle terminals are linked, there can be only interconnected the middle terminals. When the cable with colours "black", "black", "brown" is used, use the brown wire for interconnection of middle terminals of the convectorors.

Regulation B

Characteristics

Regulation REG-B is the basic type of regulation. It is designed for the control of MINIB convectors with the direct-current DC resp. DC-IQ series motors.

The regulation uses the programmable thermostat MINIB TH-0108 with the battery power supply. The thermostat enables to set a weekly program.

The regulation has two states „ON“/„OFF“.

Regulation characteristics

Regulation REG-B is the simple type of regulation with the programmable electronic thermostat. The thermostat enables the setting of up to weekly heating programs with accurate temperature setting. Besides the hysteresis of switching-off and switching-on, which can be selected (0.5°C or 1°C), there is also secured the minimum switch-on and switch-off time, and therefore the boiler is protected against inconvenient operating modes. When the heat output is properly dimensioned, the switch-on time in the stable condition should not be shorter than ca. 4 minutes and then the boiler can operate in the economical and energy-saving operating mode at the same time. Too short switch-on time means that the heat output of convectors is too high. On the contrary too long switch-on time (longer than ca. 1 hour) means that the heat output is not sufficient as same as too short switch-off time.

If there are used DC-IQ series convectors, which are equipped with power modules, the lock-in DC-BLOK module can be also used. The module can be placed into any convector. But it is usually put into the convector that is the most distant from the source of heating water.

Wiring connection of regulation REG-B

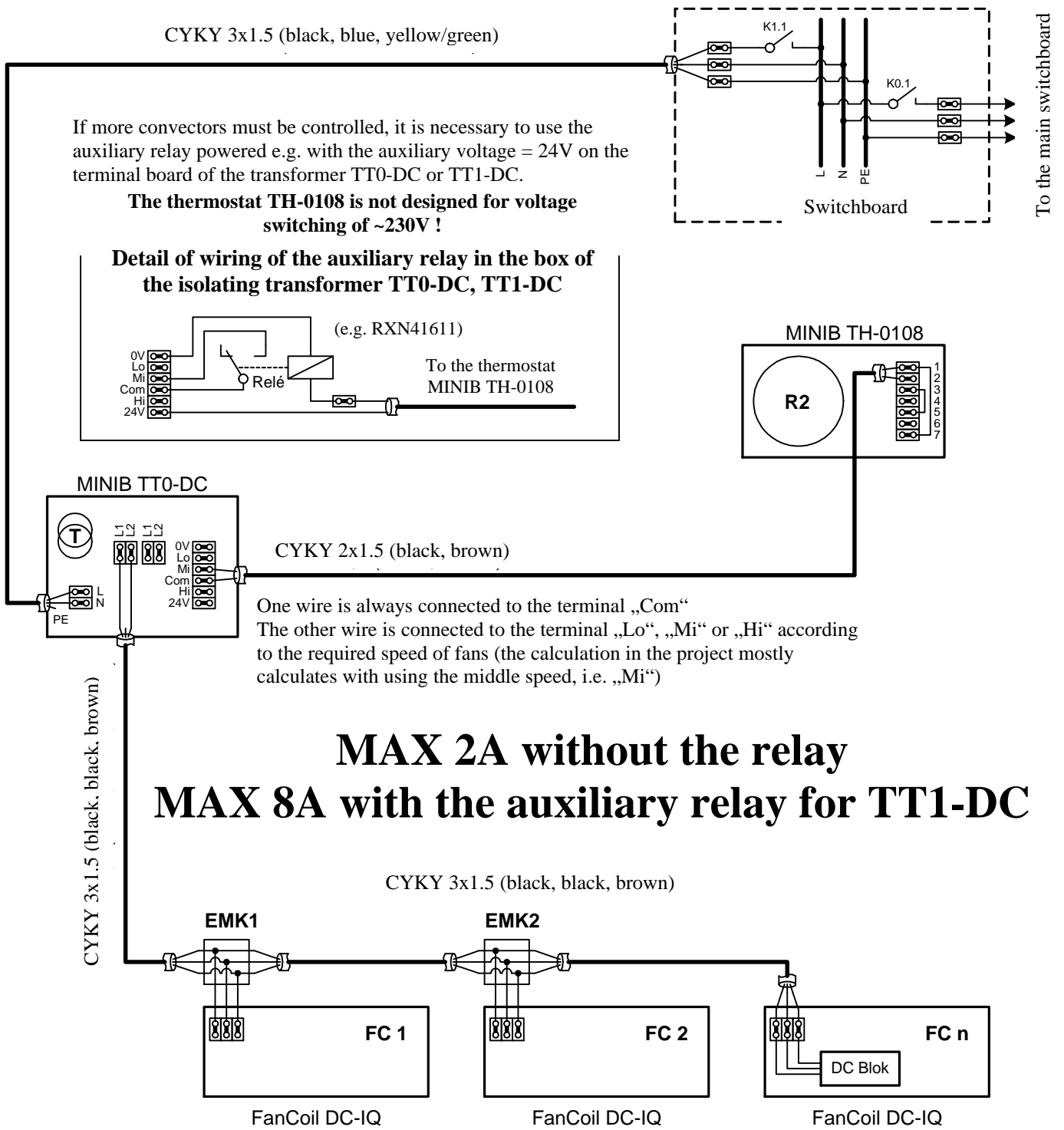
The wiring connection of regulation REG-B is on the enclosed wiring diagram. The switching contact of the thermostat is connected either with one pole directly to taps of the isolating transformer (Lo, Mi, Hi) and with the other pole to the common terminal (COM) on the terminal board designed for the connection of the thermostat in the transformer TTx-DC, or there is used the auxiliary relay as it is indicated in the wiring diagram. The relay can be placed directly in the box of the isolating transformer.

The convectors are to be connected to terminals L1/L2 on the terminal board in the box of the isolating transformer.

REG-B wiring diagram

Regulation B

Regulation with the programmable thermostat for the simple control of convectorors with d.c. motors up to the current load of ca. 2A, i.e. the convector length of max. 3m. The auxiliary relay must be used for the control of more convectorors.



The convectorors can be connected in series if the distance from the transformer is small. The Y-connection is convenient when the distance, resp. the distance of the most distant convectorors exceeds 20 m. Tapping can be made in the electrical installation box EMK in the wall or through WAGO terminals directly under the convector cover.

Wires of the side terminals can be crossed. Middle terminals can remain unconnected. If the middle terminals are linked, there can be only interconnected the middle terminals. When the cable with colours „black“, „black“, „brown“ is used, use the brown wire for interconnection of middle terminals of the convectorors.

Regulation C

Characteristics

REG-C regulation is the popular type of regulation designed for controlling the output power of MINIB convectors with DC series direct-current motors.

The regulation can be also used in the connection with MINIB convectors with a.c. motors at observing output power conditions (100 VA), which are designed for the wet environment.

The regulation uses the programmable thermostat MINIB TH-0482. The thermostat enables three-level manual selection of operating fan speed. But the thermostat requires the auxiliary supply voltage 24 V, which is provided from the isolating transformer TT_x-DC.

The regulation has two states „ON“/„OFF“.

Regulation characteristics

Regulation REG-C is the simple type of regulation with the programmable electronic thermostat. The thermostat enables the setting of up to weekly heating programs with accurate temperature setting. Besides the hysteresis of switching-off and switching-on, which can be selected (0.5°C or 1°C), there is also secured the minimum switch-on and switch-off time, and therefore the boiler is protected against inconvenient operating modes. When the heat output is properly dimensioned, the switch-on time in the stable condition should not be shorter than ca. 4 minutes and then the boiler can operate in the economical and energy-saving operating mode at the same time. Too short switch-on time means that the heat output of convectors is too high. On the contrary too long switch-on time (longer than ca. 1 hour) means that the heat output is not sufficient as same as too short switch-off time. But thanks to three-level regulation it is possible to select more convenient heat output through the switch at this type of regulation REG-C. That is the main advantage comparing to the regulation REG-A. Contacts of the thermostat TH-0408 are dimensioned up to the current 16 A.

Wiring connection of regulation REG-C

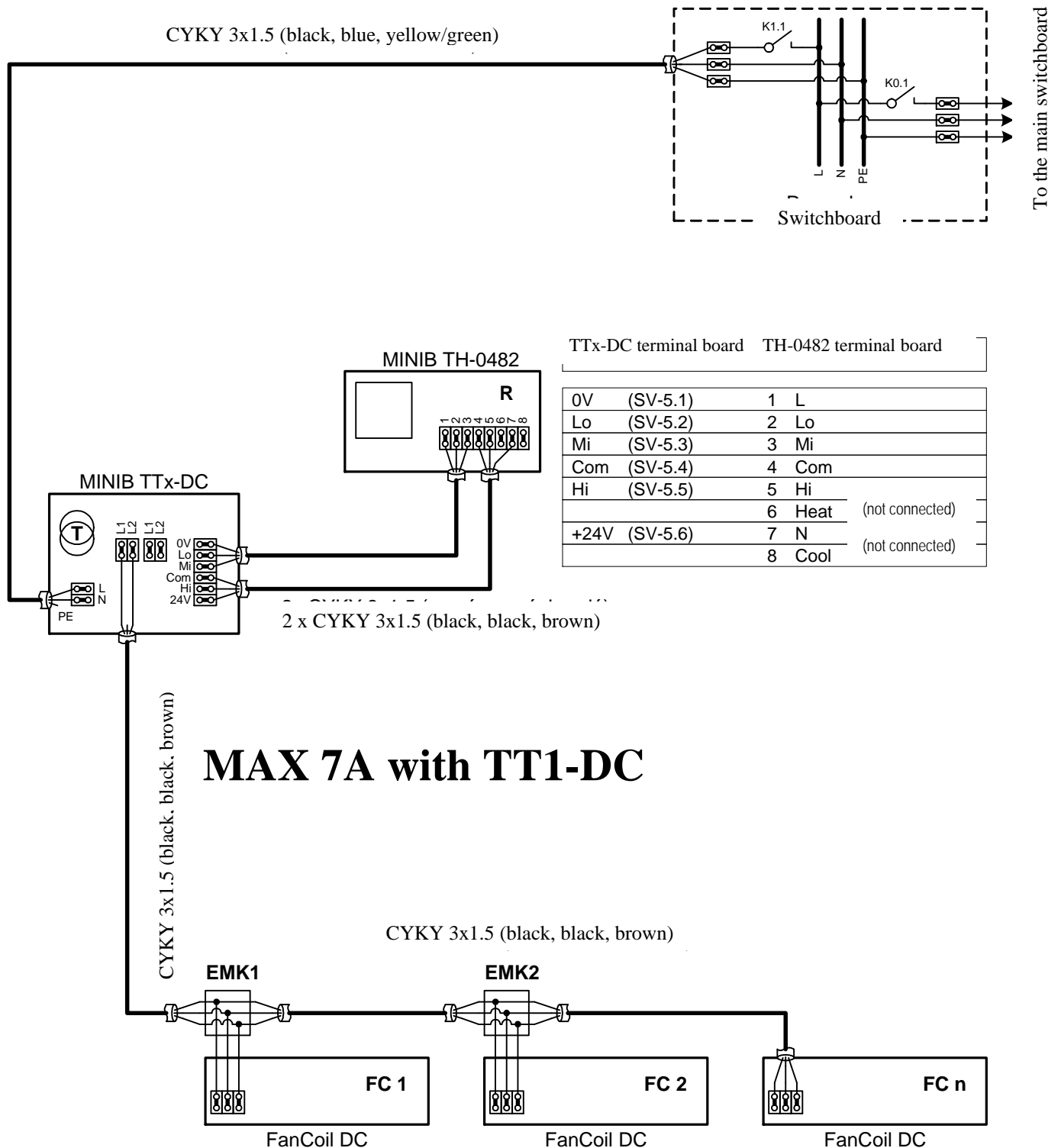
The wiring connection of regulation REG-C is on the enclosed wiring diagram. The interconnection of terminals on the terminal boards of the isolating transformer and on the terminal board of the thermostat TH-0482 is exactly set in the listed table.

Convectors are to be connected to the terminals L1/L2 on the terminal board in the box of the isolating transformer.

REG-C wiring diagram

Regulation C

Regulation with the programmable thermostat for the simple control of convectors with manual three-level setting of fan speed with d.c. motors. The maximum current load is 7 A, i.e. the convector length with d.c. motors is max. 12 m.



The convectors can be connected in series if the distance from the transformer is small. The Y-connection is convenient when the distance, resp. the distance of the most distant convectors exceeds 20 m. Tapping can be made in the electrical installation box EMK in the wall or through WAGO terminals directly under the convector cover.

Wires of the side terminals can be crossed. Middle terminals can remain unconnected. If the middle terminals are linked, there can be only interconnected the middle terminals. When the cable with colours "black", „black“, „brown“ is used, use the brown wire for interconnection of middle terminals of the convectors.

Regulation D

Characteristics

REG-D regulation is the special type of regulation designed for the automatic power control of MINIB convectors with DC-IQ series d.c. motors.

The regulation uses the programmable thermostat MINIB TH-0108 with the battery power supply. The control signal from the thermostat is linked to the control panel. The control signal can be of the contact type signal (in case that there will not used the thermostat TH-0108 with the contactless output) or contactless if the supplied thermostat TH-0108 with the contactless output is used.

The regulation has four states, i.e. besides the state „OFF“ there are available other three states „ON“ with different rotating speed. The rotating speed is set through the control panel and revolutions of all three-speed levels can be continuously set in the service mode of the control panel. The speed level is automatically selected according to the ratio of the switch-off and switch-on time of the thermostat.

Regulation characteristics

REG-D regulation is the automatic regulation with the programmable electronic thermostat. The thermostat enables the setting of up to weekly heating programs with accurate temperature setting. Besides the hysteresis of switching-off and switching-on, which can be selected (0.5°C or 1°C), there is also secured the minimum switch-on and switch-off time, and therefore the boiler is protected against inconvenient operating modes. When the heat output is properly dimensioned, the switch-on time in the stable condition should not be shorter than ca. 4 minutes and then the boiler can operate in the economical and energy-saving operating mode at the same time. Too short switch-on time means that the heat output of convectors is too high. On the contrary too long switch-on time (longer than ca. 1 hour) means that the heat output is not sufficient as same as too short switch-off time. But thanks to automatic four-level regulation made through the control pane it is automatically selected the optimal heat output at this type of regulation REG-D. At this type of regulation, the fans can rotate even if the thermostat signal is in the switched-off state. This will occur in the case that the switch-off time in previous cycles was very short, i.e. the space got cold very fast!

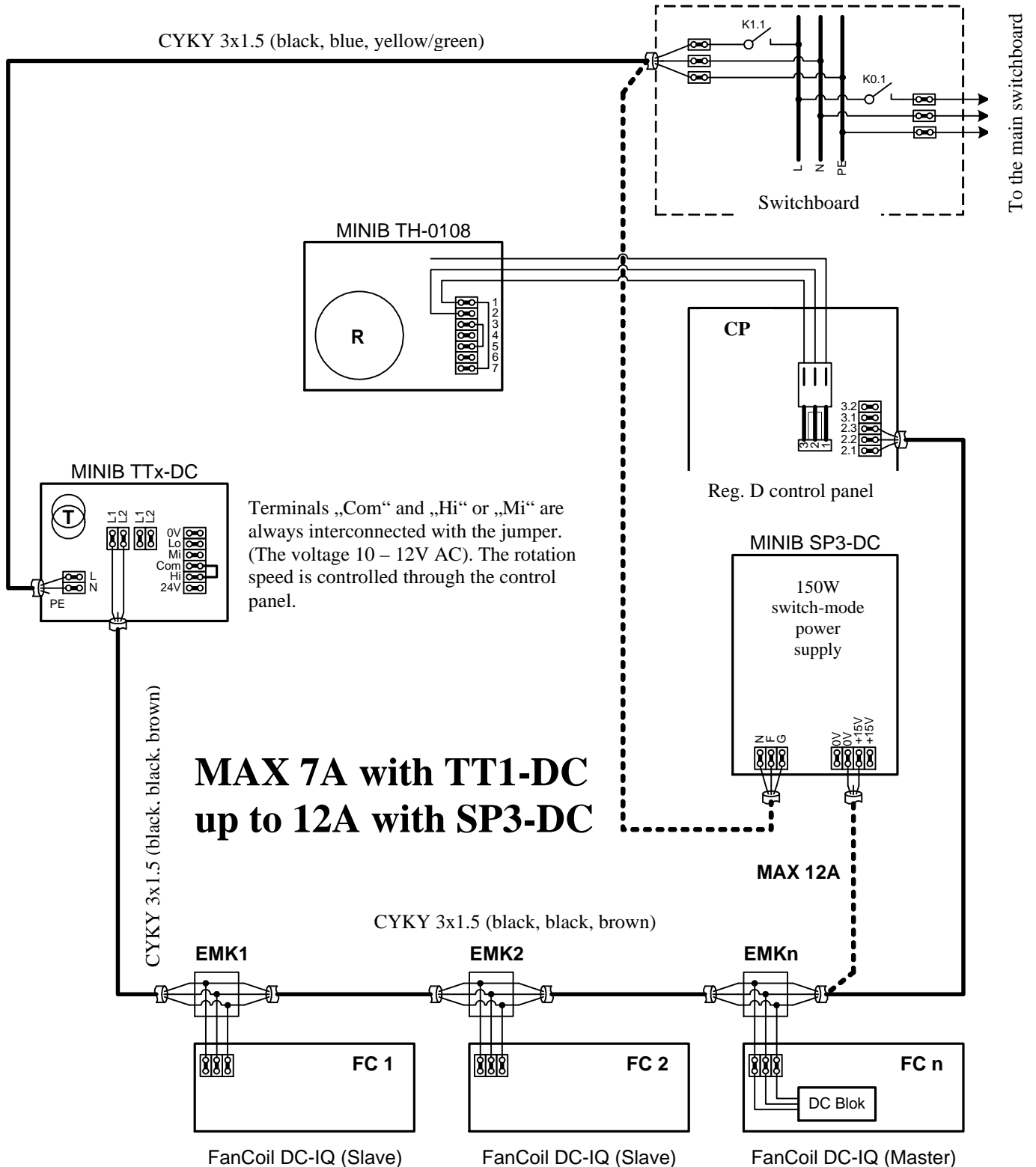
Wiring connection of regulation REG-D

The wiring connection of regulation REG-D is on the enclosed wiring diagram. The switching contact of the thermostat is connected to the control panel, which selects the optimum speed level according to the time and ratio of switching-on/switching-off of the thermostat contact. The control panel is directly connected to the connecting three-wire bus of convectors. There can be used for power supplying of convectors and the control panel either the isolating transformer TTx-DC, or the switch-mode power supply unit SPx. The system function is not affected by selection of power supply.

REG-D wiring diagram

Regulation D

Automatic multi-level regulation with the programmable thermostat for the control of converters with d.c. motors. The maximum current load is 12 A. The convector length is max. 20 m.



The convectors can be connected in series if the distance from the transformer is small. The Y-connection is convenient when the distance, resp. the distance of the most distant convectors exceeds 20 m.

Tapping can be made in the electrical installation box EMK in the wall or through WAGO terminals directly under the convector cover.

Wires of the side terminals can be crossed. Middle terminals can remain unconnected. If the middle terminals are linked, there can be only interconnected the middle terminals. When the cable with colours "black", "black", "brown" is used, use the brown wire for interconnection of middle terminals of the convectors.

Regulation E

Characteristics

REG-E regulation is the special type of regulation designed for the automatic power control of MINIB convectors with DC-IQ series d.c. motors.

The regulation uses the programmable thermostat MINIB TH-0108 with the battery power supply. The control signal from the thermostat is linked to the control panel. The control signal is contactless but there must be used the supplied thermostat TH-0108 with the contactless output.

The regulation of fan revolutions is continuous. The rotating speed is set through the control panel and revolutions of every operating mode can be continuously set in the service mode of the control panel. The speed is automatically selected in the selected range according to the speed of temperature growth at switch-on of the thermostat and according to the daily time (according to the level of ambient lighting).

Regulation characteristics

REG-E regulation is the automatic regulation with the programmable electronic thermostat. The thermostat enables the setting of up to weekly heating programs with accurate temperature setting. Besides the hysteresis of switching-off and switching-on, which can be selected (0.5°C or 1°C), there is also secured the minimum switch-on and switch-off time, and therefore the boiler is protected against inconvenient operating modes. When the heat output is properly dimensioned, the switch-on time in the stable condition should not be shorter than ca. 4 minutes and then the boiler can operate in the economical and energy-saving operating mode at the same time. Too short switch-on time means that the heat output of convectors is too high. On the contrary too long switch-on time (longer than ca. 1 hour) means that the heat output is not sufficient as same as too short switch-off time. But thanks to automatic setting of revolutions through the control panel it is automatically selected the optimal heat output at this type of regulation REG-E. The initial revolutions of regulation can be selected through jumpers Sp1 and Sp2.

There is set the lowest value of initial revolutions from the production. You can continuously set initial revolutions of all four modes in the service mode. It is possible to set automatic decrease of rotating speed in the night by change of switching level for day/night lighting.

But the function for decreasing of revolutions in the night is put out of operation from the production because the lighting level is very individual in the very wide range!

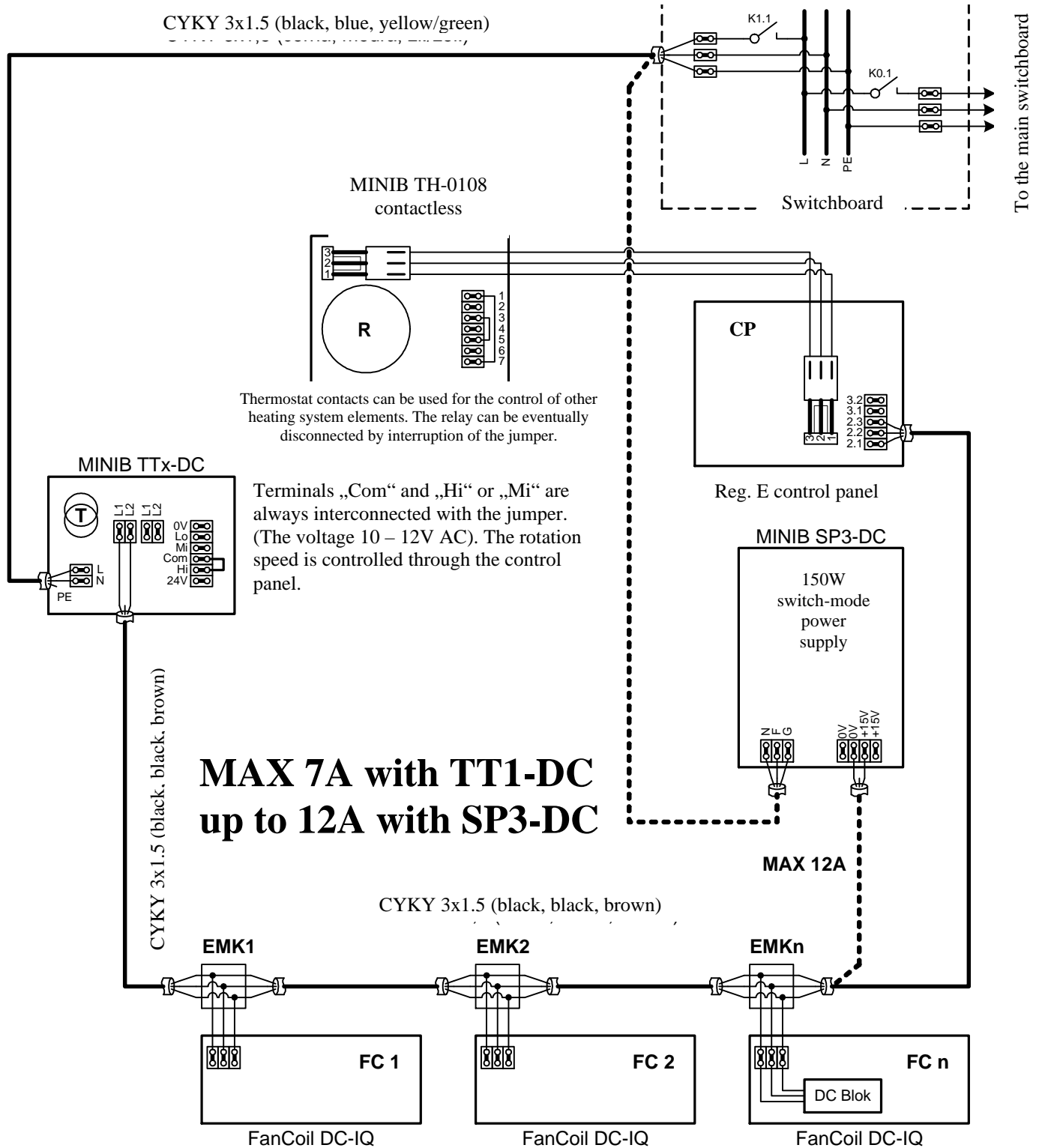
Wiring connection of regulation REG-E

The wiring connection of regulation REG-E is on the enclosed wiring diagram. The switching signal of the thermostat is linked to the control panel, which automatically selects the convenient speed level according to the temperature growth in the room. The control panel is directly connected to the connecting three-wire bus of convectors. There can be used for power supplying of convectors and the control panel either the isolating transformer TT_x-DC, or the switch-mode power supply unit SP_x. The system function is not affected by selection of power supply. The system function is not affected by selection of power supply.

REG-E wiring diagram

Regulation E

Automatic multi-level regulation with the programmable thermostat for the control of converters with d.c. motors. The maximum current load is 12 A. The convector length is max. 20 m.



The convectors can be connected in series if the distance from the transformer is small. The Y-connection is convenient when the distance, resp. the distance of the most distant convectors exceeds 20 m.

Tapping can be made in the electrical installation box EMK in the wall or through WAGO terminals directly under the convector cover.

Wires of the side terminals can be crossed. Middle terminals can remain unconnected. If the middle terminals are linked, there can be only interconnected the middle terminals. When the cable with colours “black“, „black“, „brown“ is used, use the brown wire for interconnection of middle terminals of the convectors.

Regulation F

Characteristics

REG-F regulation is the special type of the control designed for controlling the fans of MINIB DC-IQ-F convectors.

Basically it is not the regulation because the control function is taken over by the superior system of the central control of buildings. The control circuit secures the communication with the superior control system and sets the required revolutions of blowing fans of the convector. It can also measure the temperature of heating water or another temperature in the convector, e.g. outlet air, which can be transmitted to the superior control system or this data can be used as the parameter of set revolutions. The control circuit also enables to control e.g. the heating water solenoid valve.

Regulation characteristics

The control circuit of regulation REG-F enables to control revolutions of blowing fans according to commands transmitted from the superior central control system of buildings through the serial data line. Regulation characteristics are given by features of the superior central control of buildings. The control circuit also enables to control the relay module, which can control, e.g. the electrically controlled heating water valve. The control module enables to measure heating water temperature or outlet air temperature.

Wiring connection of regulation REG-F

The wiring connection of regulation REG-F is on the enclosed wiring diagram. Convectors are energized from the switch-mode power supply. Every convector is controlled individually through the so-called control member (actuator), which is mostly delivered together with the central control system of buildings.

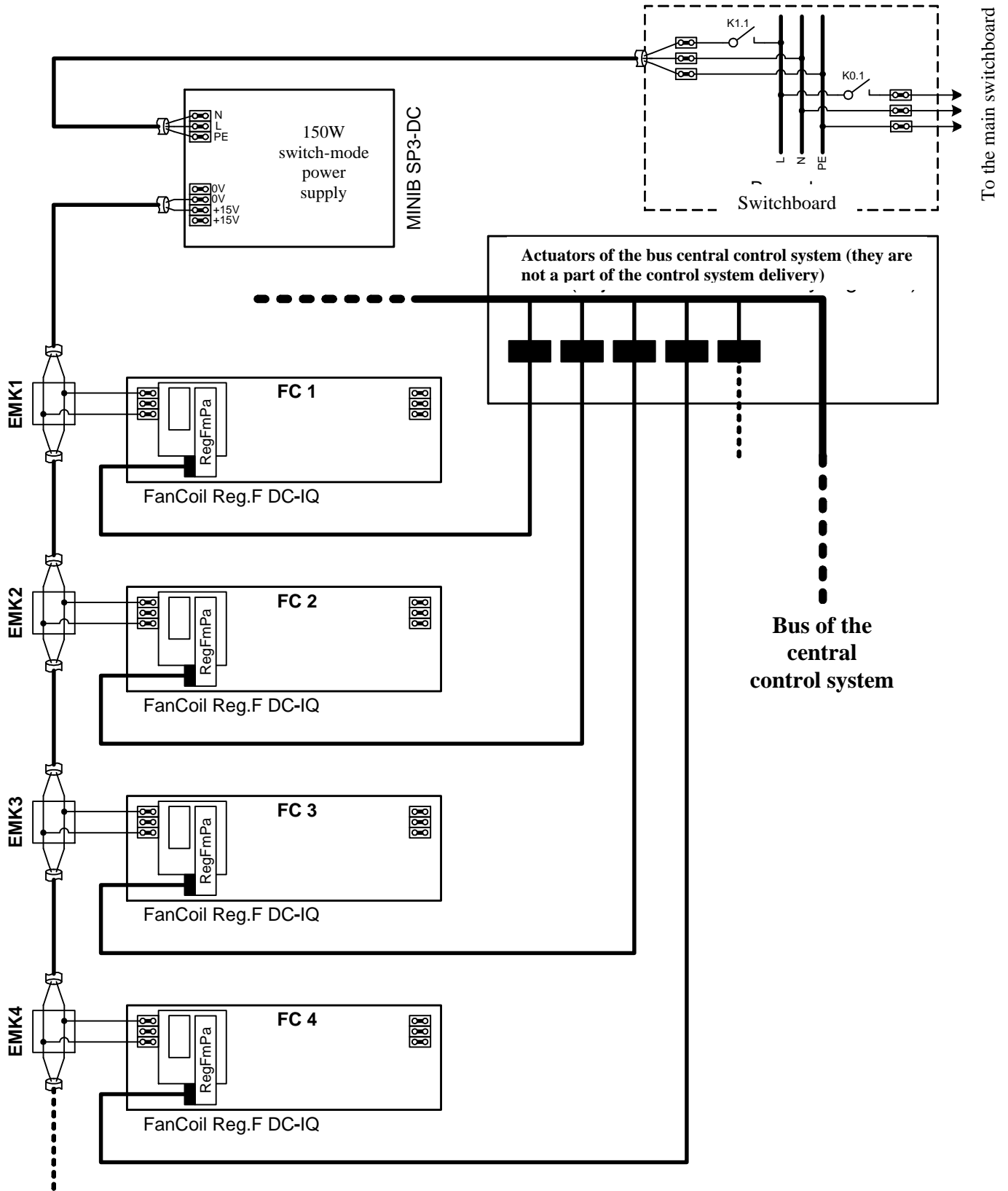
The discontinuous control can be used in the simplified version. Then the control is implemented with two logic signals that enable a selection of one from four modes, e.g. the modes: I. STOP, II. Minimum revolutions, III. Middle revolutions, IV. Maximum revolutions. (The maximum revolutions of three speed levels can be continuously set). Only one bit can be used as the feedback information from the convector to the superior control system. For example, it is possible to transmit the state „OK“/“error“ or for example, when the minimum temperature of heating water etc. is exceeded.

Furthermore the connection can be simplified so that there can be used only one convector with the control circuit of REG-F (DC-IQ-F convector) as MASTER-F in the large space MASTER-F and other convectors are only of the DC-IQ type and operate in the SLAVE mode – see previous chapters.

REG-F wiring diagram

Regulation F

Control of converters with d.c. motors and the control unit F through the building central control system. The control is implemented either by combination of two logic signals (four-level control), or by synchronous serial data line SPI (continuous control of revolutions). The maximum current load is 10 A. The converter length is max. 21 m.



Regulation MT-2

Characteristics

REG-MT2 regulation is the special type of regulation designed for the power control of MINIB MT-2 convectors. Besides the control panel of regulation REG-MT2 there is used the control controller REGMINIB11Vxx in the convector MASTER MT2.

The regulation uses the programmable thermostat MINIB TH-0108 with the battery power supply and contactless output. The control signal from the thermostat is linked to the control panel. The control signal is contactless but there must be used the supplied thermostat TH-0108 with the contactless output.

The regulation has four states, i.e. besides the state „OFF“ there are available other three states „ON“ with different rotating speed (every speed can be continuously set). The speed level is automatically selected according to the ratio of the switch-off and switch-on time of the thermostat. The control controller REGMINIB11Vxx measures the heating water temperature, outlet water temperature and inlet air temperature. Based on these temperatures there is evaluated the operating mode (HEATING, COOLING, BLOWING TO WINDOWS).

Regulation characteristics

REG-MT2 regulation is the special type of intelligent regulation with the programmable electronic thermostat. The thermostat enables the setting of up to weekly heating programs with accurate temperature setting. Besides the hysteresis of switching-off and switching-on, which can be selected (0.5°C or 1°C), there is also secured the minimum switch-on and switch-off time, and therefore the boiler is protected against inconvenient operating modes. When the heat output is properly dimensioned, the switch-on time in the stable condition should not be shorter than ca. 4 minutes and then the boiler can operate in the economical and energy-saving operating mode at the same time. Too short switch-on time means that the heat output of convectors is too high. On the contrary too long switch-on time (longer than ca. 1 hour) means that the heat output is not sufficient as same as too short switch-off time. The selection of the optimal output power of the convector is made automatically through the control panel. The controller REGMINIB11Vxx in the convector secures the direction of outlet airflow and enables the continuous pre-selection of set revolutions in all three speed modes based on measured parameters.

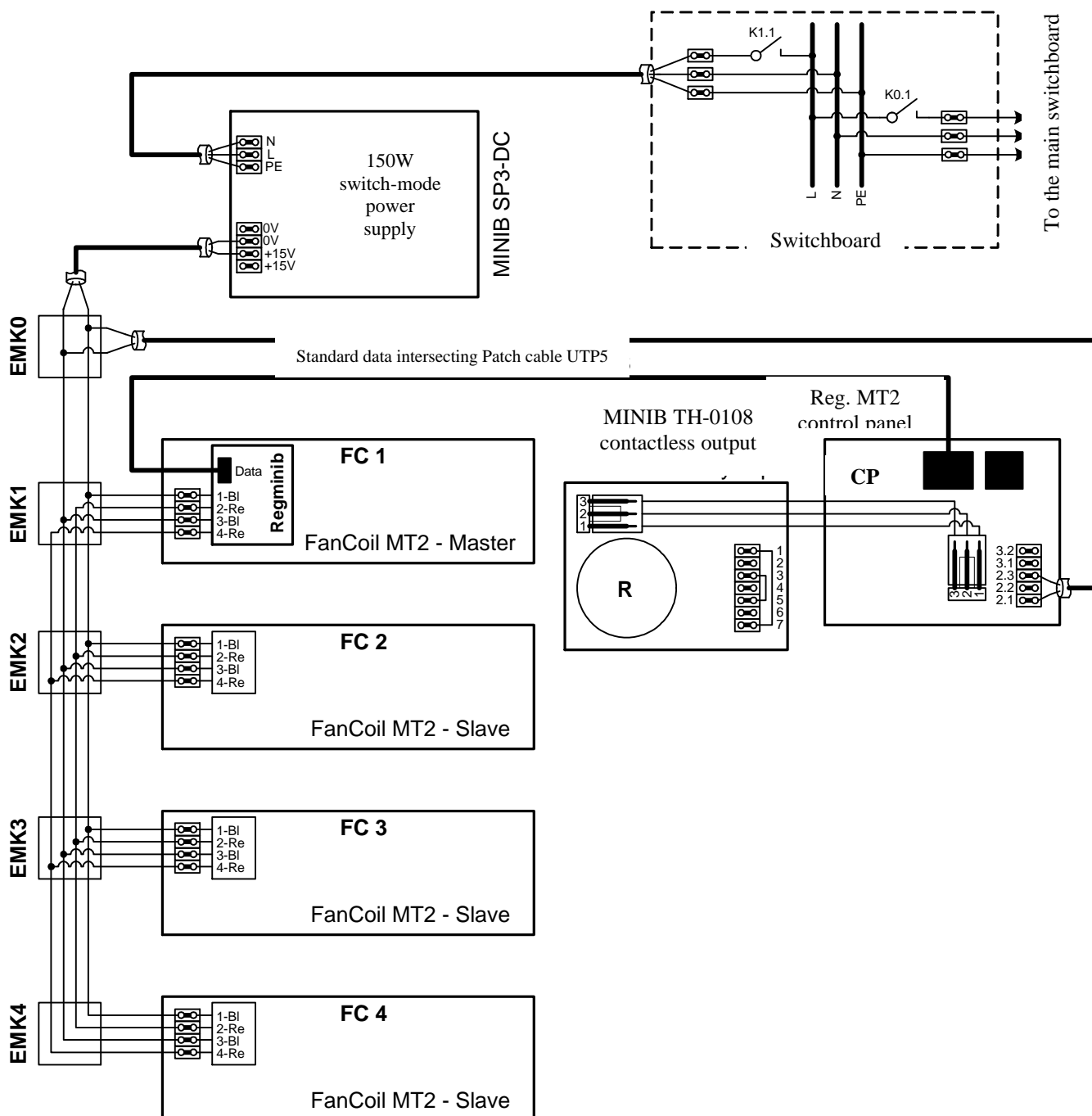
Wiring connection of regulation REG-MT2

The wiring connection of regulation REG-MT2 is on the enclosed wiring diagram.

REG-MT2 wirina diagram

Regulation of MT2 convectors in the Master / Slave mode

Control of MT2 convectors with d.c. motors and the control unit REGMINIB through the control system Reg. MT2 with the programmable thermostat. The control is implemented either by combination of two logic signals (four-level control). The maximum current load is 10 A. The convector length is max. 8 m.



Regulation B.1

Characteristics

REG-B.1 regulation is the special type of regulation designed for the power control of MINIB convectors for humid and wet environment. The regulation can be used in connection with MINIB convectors with a.c. motors, which are designed for the humid and wet environment. The regulation uses the programmable thermostat MINIB TH-0108F with the battery power supply and with a possibility of connection of the remote temperature sensor, which is placed in the reference point at the swimming pool. The regulation has two states „OFF“/„ON“. The rotating speed is set through the selected voltage tap on the isolating transformer.

Regulation characteristics

Regulation REG-B1 is the simple type of regulation with the programmable electronic thermostat. The thermostat enables the setting of up to weekly heating programs with accurate temperature setting. Besides the hysteresis of switching-off and switching-on, which can be selected (0.5°C or 1°C), there is also secured the minimum switch-on and switch-off time, and therefore the boiler is protected against inconvenient operating modes. When the heat output is properly dimensioned, the switch-on time in the stable condition should not be shorter than ca. 4 minutes and then the boiler can operate in the economical and energy-saving operating mode at the same time. Too short switch-on time means that the heat output of convectors is too high. On the contrary too long switch-on time (longer than ca. 1 hour) means that the heat output is not sufficient as same as too short switch-off time.

The optimal heat output at the regulation REG-B.1 can be chosen by selection of the convenient voltage tap on the isolating transformer.

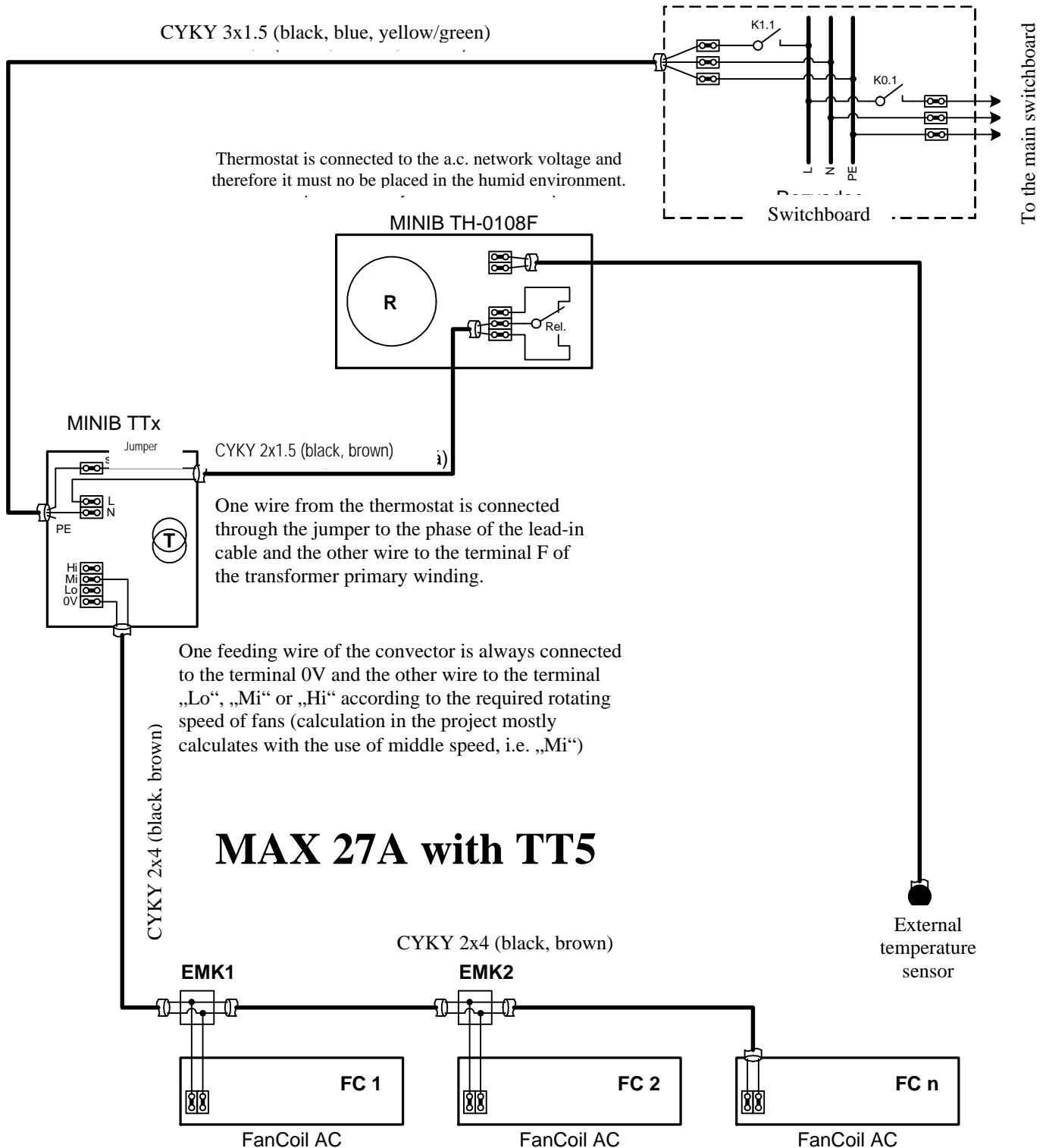
Wiring connection of regulation REG-B.1

The wiring connection of regulation REG-B.1 is on the enclosed wiring diagram. The switching contact of the thermostat switches on the supply voltage to the primary winding of the isolating transformer. It is necessary to follow the electrical safety of electric circuits (the thermostat must be placed out of the humid environment).

REG-B.1 wiring diagram

Regulation B.1 with transformer TTx

Regulation with the programmable thermostat with the external temperature sensor for the simple control of convectors with a.c. motors up to the current load of ca. 27 A, i.e. the convector length is max. 8 m.



The convectors can be connected in series if the distance from the transformer is small. The Y-connection is convenient when the distance, resp. the distance of the most distant convectors exceeds 20 m. Tapping can be made in the electrical installation box EMK in the wall or through WAGO terminals directly under the convector cover.

Wires of the convector side terminals can be crossed. Middle terminals can remain unconnected. If the middle terminals are linked, there can be only interconnected the middle terminals. When the cable with colours "black", "black", "brown" is used, use the brown wire for interconnection of middle terminals of the convectors.

Regulation E.1

Characteristics

REG-E.1 regulation is the special type of regulation designed for the power control of MINIB convectors for humid and wet environment. The regulation can be used in connection with MINIB convectors with a.c. motors, which are designed for the humid and wet environment. The regulation uses the programmable thermostat MINIB TH-0108F with the battery power supply and with a possibility of connection of the remote temperature sensor, which is placed in the reference point at the swimming pool. The regulation has three states, i.e. besides the state „OFF“ there are available other two states / „ON“ with different levels of rotating speed. The rotating speed is to be switched over by switching of taps on the isolating transformer through interlocked auxiliary relays placed in the transformer box or in the switchboard. The speed level is selected automatically according to the ratio of switch-off and switch-on time of the thermostat. Relays can be energized with the auxiliary voltage 24 V or 12 V, which are available on the terminal board of isolating transformers TTx-DC or TTx-E.1.

Regulation characteristics

Regulation REG-E1 is the automatic type of regulation with the programmable electronic thermostat. The thermostat enables the setting of up to weekly heating programs with accurate temperature setting. Besides the hysteresis of switching-off and switching-on, which can be selected (0.5°C or 1°C), there is also secured the minimum switch-on and switch-off time, and therefore the boiler is protected against inconvenient operating modes. When the heat output is properly dimensioned, the switch-on time in the stable condition should not be shorter than ca. 4 minutes and then the boiler can operate in the economical and energy-saving operating mode at the same time. Too short switch-on time means that the heat output of convectors is too high. On the contrary too long switch-on time (longer than ca. 1 hour) means that the heat output is not sufficient as same as too short switch-off time. The optimal heat output at the regulation REG-E.1 can be automatically selected thanks to three-level regulation. The fan speed in both speed levels can be selected by using the convenient voltage taps of isolating transformers.

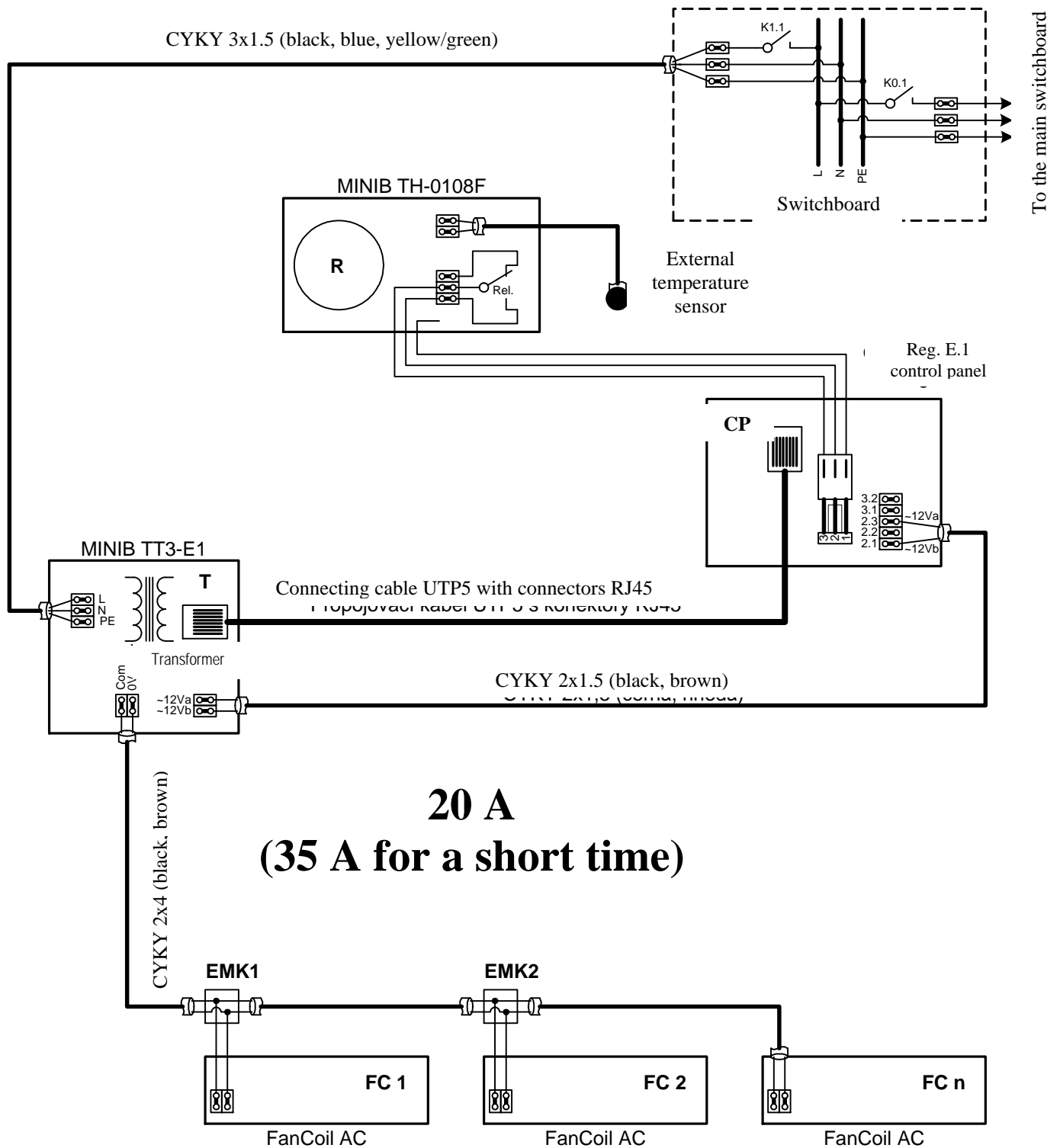
Wiring connection of regulation REG-E.1

The wiring connection of regulation REG-E.1 is on the enclosed wiring diagram. The switching contact of the thermostat is connected to the evaluation circuit of the control panel, that evaluates according to the time and ratio of switch-on / switch-off of the thermostat contact, which auxiliary relay will switch and so, which speed level will be active. There must be used isolating transformers TT3-E.1 or TT5-E.1 for regulation E.1. For the short line of convectors there can be also used the isolating transformer TT1-DC with the inserted relay module RELDUAL00V01PP.

REG-E.1 wiring diagram

Regulation E.1 (TT3-E1) - for the wet environment

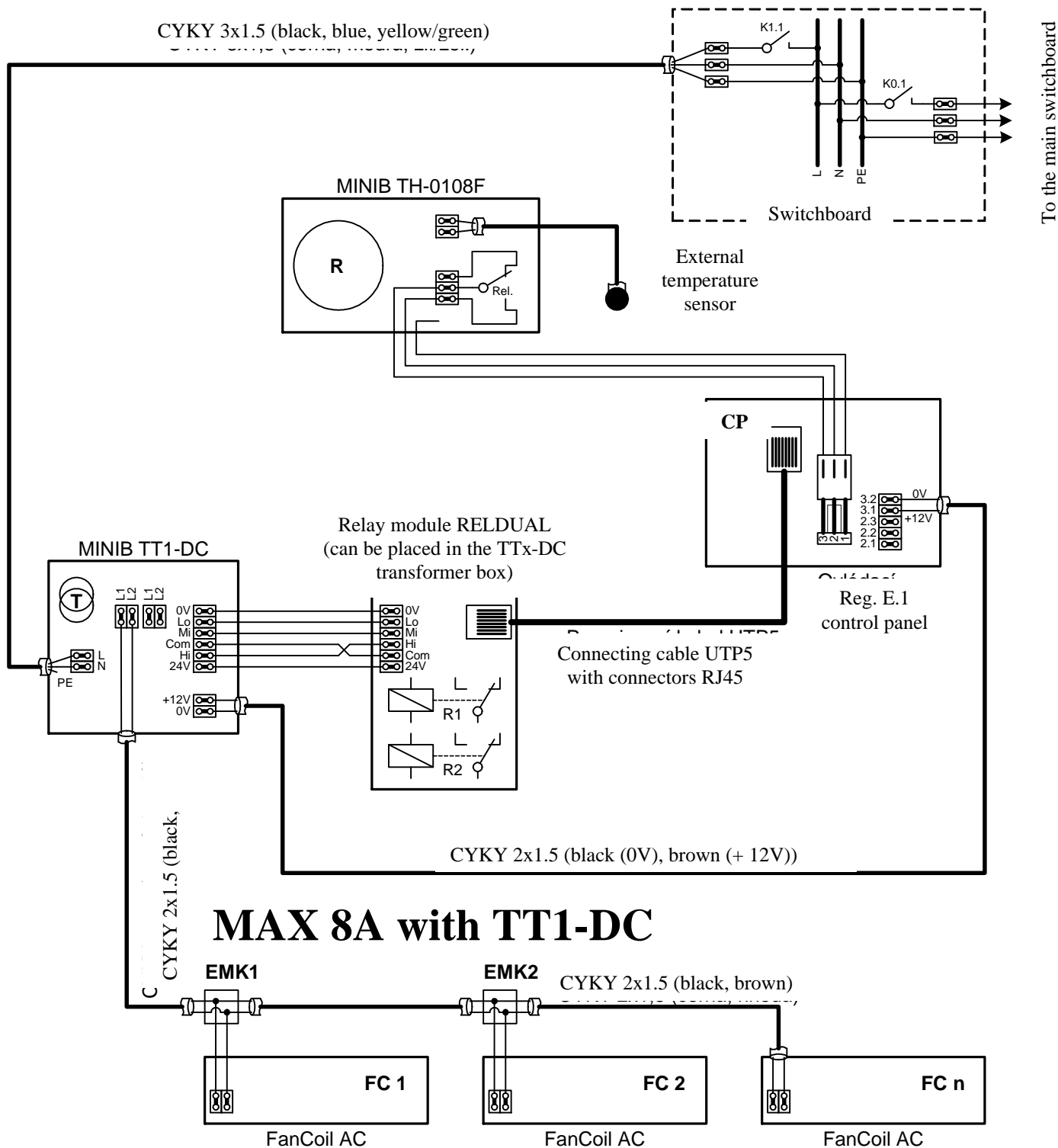
Automatic multi-level regulation with the programmable thermostat for the control of convectorors with a.c. motors. The maximum current load is 20 A, i.e. the convector length of max. 6 m.



The convectorors can be connected in series if the distance from the transformer is small. The Y-connection is convenient when the distance of the last, resp. the most distant convector exceeds 20 m. Tapping can be made in the electrical installation box EMK in the wall or through WAGO terminals directly under the convector cover.

Regulation E.1 - for the wet environment

Automatic multi-level regulation with the programmable thermostat for the control of convectorors with a.c. motors. The maximum current load is 8 A, i.e. the convector length of max. 2 m.



To the main switchboard

The convectorors can be connected in series if the distance from the transformer is small. The Y-connection is convenient when the distance of the last, resp. the most distant convector exceeds 20 m.

Tapping can be made in the electrical installation box EMK in the wall or through WAGO terminals directly under the convector cover.

Commissioning

Commissioning of all types of regulation consists in check of the connection of all components and verification of functionality of the whole heating system. Instructions for the function check are the parts of assembly instructions. During commissioning DC-IQ series convectors with the automatic regulation it is necessary to select the required operating modes through jumpers in the control panels. There is always set the mode with the lowest rotating speed from the production. But this setting meets 90% of the cases.

Operation

Operation of MINIB heating systems is basically directed to setting of thermostat programs. The detailed description of the control and setting of thermostat is listed in individual manuals for these thermostats. Other parameters are set in the scope of the system activation.

Additional connection

In the enclosure to this document there will be listed additional types of connection used in the specific projects assisted by the development department of the company MINIB. For example, it concerns the connection for the control of electrically controlled valves for heating water, boiler control etc.

Examples of wiring diagrams

In the enclosure to this document are listed special types of connection of control circuits with MINIB convectors, which were implemented in the specific projects in cooperation with the company MINIB.



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