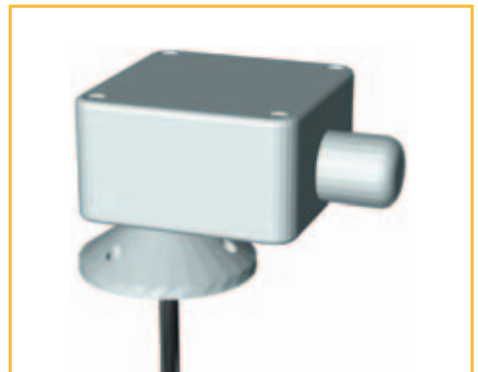
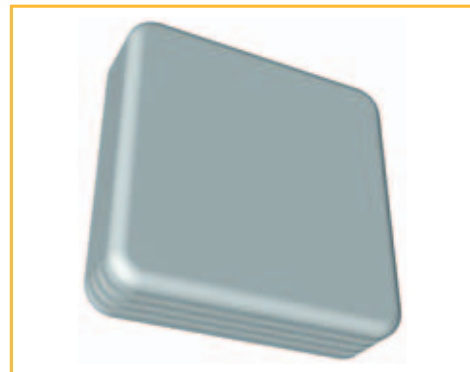


# E O K O



Electric heater



## EOKO electric heaters offer the following significant advantages

- A possibility of a faulty installation into the piping is removed.
- Installation is independent from direction of air flow.
- Installation box can be in any position with any sizes.
- High performance even for small dimensions.
- Standard outlet air temperature of +50°C.

## Construction

The box of the electric heater is made from galvanized sheet and heating elements are made from stainless steel. The electric box on the heater contains connecting terminal blocks, two thermostats, and cabling of rods according to the wiring diagram. The output regulator is inbuilt into the D type. Circular connecting necks are equipped with rubber liners thus excellent tightness of the connection with piping is secured. Standard electric protection degree is IP 43.

## Regulation

Heaters are supplied in three types B, C, and D differing in their electric equipment. All three types are equipped with an in-built safety thermostat with automatic reset and with an emergency thermostat with manual reset in order to secure safety. These thermostats are not connected in the safety circuit of the heater of the B type. Own regulation or external electronic pulse regulation of output must be supplied to the B and C types. This regulation is inbuilt in the D type heaters.

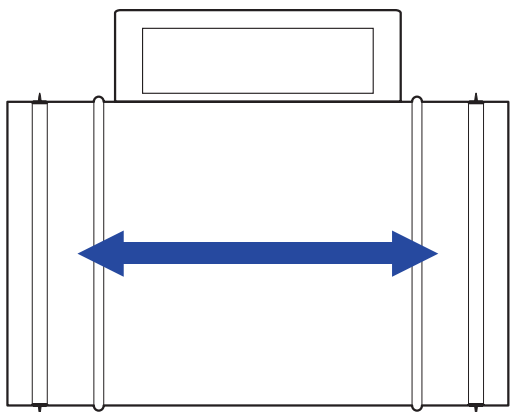
The advantages of pulse regulation are a highly exact maintenance of the temperature set and a minimum failure rate.

External sensors and external control are supplied to the performance regulators as accessories.

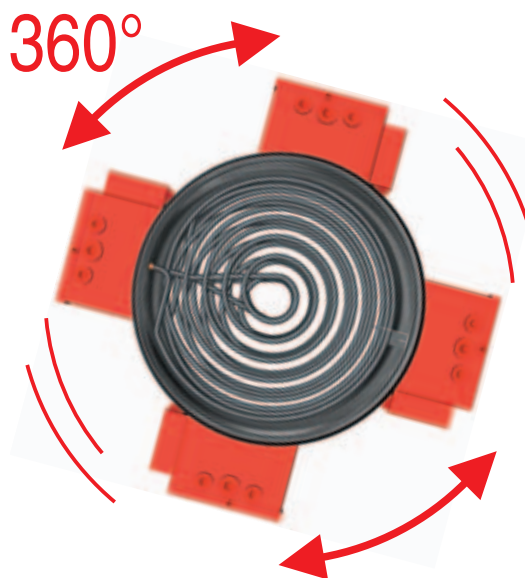
Sensing units of airflow in the ducting and a differential manometer are supplied in order to increase operation safety.

## Installation

EOKO type heaters enable installation in any working position into the HVAC duct system. Direction of airflow through the heater does not matter neither. Distances of the heater from the bend, fan, or valve, etc. in the duct must be at least twice the size of a connecting diameter. The heater must be installed so that it enables free and safe access to the electric box. Installation into the ducting is executed just by inserting connecting necks. Tightness is secured by a rubber liner.



Both directions air flow possibility



Installation in any position

## Heat exchanger output calculation

Necessary electric output of the heater is calculated according to the following formula:

$$P = Q \times 0,36 \times \Delta t$$

P = output in Watts

Q = airflow in m<sup>3</sup>/h

Δt = required air heating in °C

## Over-heating protection

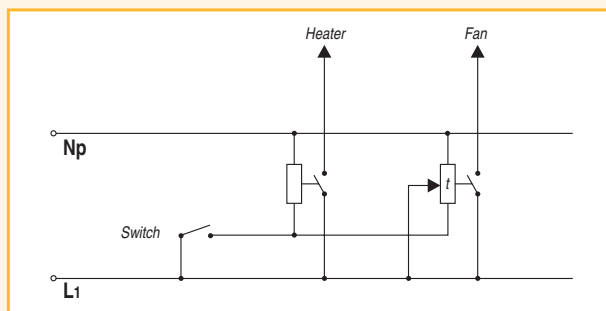
All heaters of EOKO type have two safety thermostats inbuilt.

- The first one is a failure thermostat. Failure means an increase in the outlet air temperature above 60°C. This thermostat is equipped with an automatic reset and will disconnect feeding of electric elements after reaching the air outlet temperature of +60°C (±15%). After cooling the heater (2-5 minutes), thermostat automatically switches on.
- The second one is an emergency thermostat. Emergency means a situation where the heater is on and the air does not flow through the piping. This thermostat is equipped with a manual reset and will disconnect feeding of electric elements after reaching the air outlet temperature of +120°C (±15%). In this case it is necessary to find out the reason of the failure and to restart the heater manually.

These thermostats are not connected into the safety circuit of the heater of the B type, see electric wiring diagram, page x. The supplier of an electric part solves their connection within control of the exchanger. Both thermostats are connected in the series in the control circuit of the exchanger feeding at types C and D, see electric wiring diagram at the end of this catalogue..

## Air velocity

Connecting the electric exchanger must avoid its switching on when minimum air flow through the heater is not secured. Minimum permitted air velocity in the nominal section of the heater must never drop under 2 m/s. An optimal solution is to connect the switching on of the exchanger with an air flow velocity sensing unit in the duct or with a differential manometer. The fundamental requirement is to connect the exchanger operation with the fan operation. In order to increase lifetime of the heater it is recommended that heating elements are cooled for 30 seconds after switching the heater off. The heater is dimensioned in a standard way for a maximum outlet air temperature of +50°C.



## Certification

All types correspond to the European standards, which is expressed by a CE sign.

## Possibility of all types

Type	Connected thermostats	Internal regulation	External regulation	External switches
B	no	no	yes	yes
C	yes	no	yes	yes
D	yes	yes	no	yes

## Heaters without an inbuilt regulation

Users with own control system use heaters of the B and C types. B type can be used for any regulation. It is suitable to use the C type with electronic pulse regulation.

## Heaters with internal an inbuilt regulation

Usage of these heaters is highly advantageous especially due to:

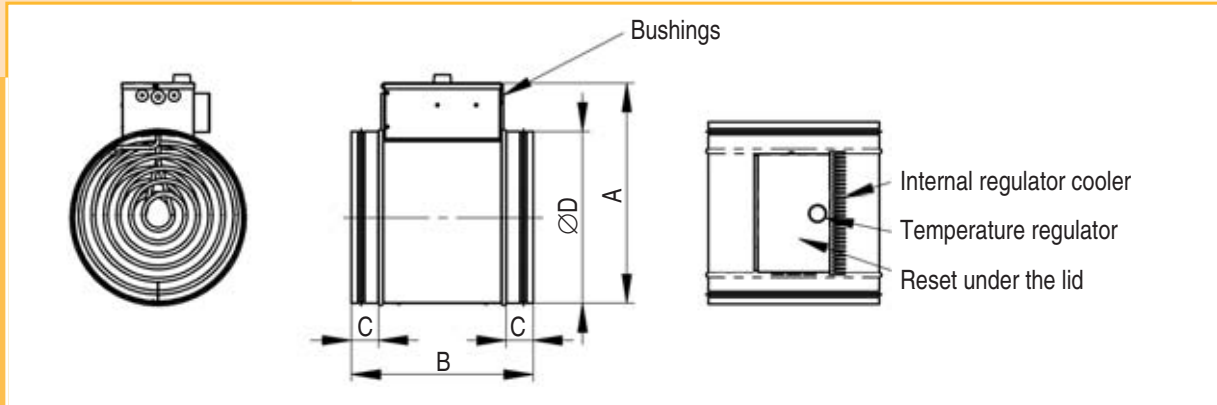
- Minimum costs on installation
- Easy installation with small amount of cabling necessary
- Minimization of danger of faulty connection of the exchanger

Heaters with an inbuilt regulation are heaters of the D type. Air temperature desired can be set by a control button on the electric box of the heater. Sensing of temperature is secured by external sensors. A CKT channel or a CPT space sensors. The third external piece of equipment is a control with an internal CPTO sensor. Sensors and the control are not part of the supply of the heater.



## Technical data

All types of the heater are supplied in types B, C, and D.



Type	Nominal diameter [mm]	Output [kW]	Connection [type]	Current [A]	Air flow Min. [m³/h]	Dimensions [mm]				Weight [kg]
						A	B	C	D	
EOKO-100-0,4-1	100	0,4	parallel	1,7	24	185	325	40	100	2,0
EOKO-100-0,8-1	100	0,8	parallel	3,5	47	185	325	40	100	2,1
EOKO-100-1,2-1	100	1,2	parallel	5,2	71	185	325	40	100	2,3
EOKO-100-1,6-1	100	1,6	parallel	7,0	94	185	380	40	100	2,7
EOKO-125-0,5-1	125	0,5	parallel	2,2	29	225	325	40	125	2,6
EOKO-125-0,8-1	125	0,8	parallel	3,5	47	225	325	40	125	2,6
EOKO-125-1,2-1	125	1,2	parallel	5,2	71	225	325	40	125	2,7
EOKO-125-1,6-1	125	1,6	parallel	7,0	94	225	325	40	125	2,8
EOKO-125-2,4-1	125	2,4	parallel	10,4	141	225	325	40	125	3,1
EOKO-150-0,8-1	150	0,8	parallel	3,5	47	250	380	40	150	3,6
EOKO-150-1,2-1	150	1,2	parallel	5,2	71	250	380	40	150	3,6
EOKO-150-1,6-1	150	1,6	parallel	7,0	94	250	380	40	150	3,9
EOKO-150-2,4-1	150	2,4	parallel	10,4	141	250	380	40	150	3,9
EOKO-150-2,4-3	150	2,4	star	3,5	141	250	380	40	150	5,1
EOKO-150-3,4-2	150	3,4	parallel	8,5	200	250	380	40	150	4,4
EOKO-150-5-2	150	5	parallel	12,5	295	250	380	40	150	4,9
EOKO-150-5,1-3	150	5,1	delta	7,4	300	250	380	40	150	5,8
EOKO-150-6-2	150	6	parallel	15,0	353	250	460	40	150	5,8
EOKO-160-0,8-1	160	0,8	parallel	3,5	47	260	380	40	160	3,0
EOKO-160-1,2-1	160	1,2	parallel	5,2	71	260	380	40	160	3,0
EOKO-160-1,6-1	160	1,6	parallel	7,0	94	260	380	40	160	3,3
EOKO-160-2,4-1	160	2,4	parallel	10,4	141	260	380	40	160	3,3
EOKO-160-2,4-3	160	2,4	star	3,5	141	260	380	40	160	4,5
EOKO-160-3,4-2	160	3,4	parallel	8,5	200	260	380	40	160	3,8
EOKO-160-5-2	160	5	parallel	12,5	295	260	380	40	160	4,3
EOKO-160-5,1-3	160	5,1	delta	7,4	300	260	380	40	160	5,2
EOKO-160-6-2	160	6	parallel	15,0	353	260	460	40	160	5,0
EOKO-200-0,8-1	200	0,8	parallel	3,5	47	300	380	40	200	3,1
EOKO-200-1,2-1	200	1,2	parallel	5,2	71	300	380	40	200	3,1
EOKO-200-1,6-1	200	1,6	parallel	7,0	94	300	380	40	200	3,6
EOKO-200-2-1	200	2	parallel	8,7	118	300	380	40	200	3,5
EOKO-200-3-1	200	3	parallel	13,0	177	300	380	40	200	3,6
EOKO-200-3,4-2	200	3,4	parallel	8,5	200	300	380	40	200	4,4
EOKO-200-3,6-3	200	3,6	star	5,2	212	300	380	40	200	4,8
EOKO-200-5-2	200	5	parallel	12,5	295	300	380	40	200	4,4
EOKO-200-5,1-3	200	5,1	delta	7,4	300	300	380	40	200	6,1
EOKO-200-6-2	200	6	parallel	15,0	353	300	380	40	200	5,4
EOKO-200-6-3	200	6	star	8,7	353	300	380	40	200	6,1
EOKO-200-7,5-3	200	7,5	delta	10,8	442	300	380	40	200	6,1

Type	Nominalr diameter [mm]	Output [kW]	Connection [type]	Current [A]	Air flow Min. [m³/h]	Dimensions [mm]				Weight [kg]
						A	B	C	D	
EOKO-250-1,5-1	250	1,5	parallel	6,5	88	350	380	40	250	3,3
EOKO-250-2-1	250	2	parallel	8,7	118	350	380	40	250	3,8
EOKO-250-3-1	250	3	parallel	13,0	177	350	380	40	250	3,8
EOKO-250-4,5-3	250	4,5	star	6,5	265	350	380	40	250	5,1
EOKO-250-6-3	250	6	star	8,7	353	350	380	40	250	6,6
EOKO-250-6-2	250	6	parallel	15,0	353	350	380	40	250	4,8
EOKO-250-7,5-3	250	7,5	delta	10,8	442	350	380	40	250	6,4
EOKO-250-9-3	250	9	delta	13,0	530	350	380	40	250	6,6
EOKO-315-1,5-1	315	1,5	parallel	6,5	88	415	380	60	315	4,8
EOKO-315-2-1	315	2	parallel	8,7	118	415	380	60	315	5,3
EOKO-315-3-1	315	3	parallel	13,0	177	415	380	60	315	5,3
EOKO-315-3-2	315	3	parallel	7,5	177	415	380	60	315	5,3
EOKO-315-5-2	315	5	parallel	12,5	295	415	380	60	315	6,4
EOKO-315-6-2	315	6	parallel	15,0	353	415	380	60	315	6,4
EOKO-315-6-3	315	6	star	8,7	353	415	380	60	315	8,2
EOKO-315-7,5-3	315	7,5	delta	10,8	442	415	380	60	315	8,2
EOKO-315-9-3	315	9	delta	13,0	530	415	380	60	315	8,2
EOKO-315-12-3	315	12	delta	20,0	707	415	380	60	315	9,2
EOKO-355-2-1	355	2	parallel	8,7	118	455	380	60	355	5,7
EOKO-355-3-2	355	3	parallel	7,5	177	455	380	60	355	5,7
EOKO-355-5-2	355	5	parallel	12,5	295	455	380	60	355	6,7
EOKO-355-6-2	355	6	parallel	15,0	353	455	380	60	355	6,7
EOKO-355-6-3	355	6	star	8,7	353	455	380	60	355	8,5
EOKO-355-7,5-3	355	7,5	delta	10,8	442	455	380	60	355	8,5
EOKO-355-9-3	355	9	delta	13,0	530	455	380	60	355	8,5
EOKO-355-12-3	355	12	delta	20,0	707	455	495	60	355	10,9
EOKO-355-15-3	355	15	delta	21,7	884	455	495	60	355	12,9
EOKO-400-2-1	400	2	parallel	8,7	118	500	380	60	400	6,1
EOKO-400-3-2	400	3	parallel	7,5	177	500	380	60	400	6,1
EOKO-400-5-2	400	5	parallel	12,5	295	500	380	60	400	7,1
EOKO-400-6-2	400	6	parallel	15,0	353	500	380	60	400	7,1
EOKO-400-6-3	400	6	star	8,7	353	500	380	60	400	8,9
EOKO-400-7,5-3	400	7,5	delta	10,8	442	500	380	60	400	8,9
EOKO-400-9-3	400	9	delta	13,0	530	500	380	60	400	8,9
EOKO-400-15-3	400	15	delta	21,7	884	500	495	60	400	13,4
EOKO-450-9-3	450	9	delta	13,0	530	550	460	60	450	11,3
EOKO-450-12-3	450	12	delta	17,3	707	550	460	60	450	11,3
EOKO-450-18-3	450	18	delta	26,0	1060	550	460	60	450	15,3
EOKO-450-24-3	450	24	delta	34,6	1414	550	460	60	450	15,3
EOKO-500-9-3	500	9	delta	13,0	530	600	460	60	500	11,9
EOKO-500-12-3	500	12	delta	17,3	707	600	460	60	500	11,9
EOKO-500-18-3	500	18	delta	26,0	1060	600	460	60	500	16,0
EOKO-500-24-3	500	24	delta	34,6	1414	600	460	60	500	16,0
EOKO-560-9-3	560	9	delta	13,0	530	660	460	60	560	13,1
EOKO-560-12-3	560	12	delta	17,3	707	660	460	60	560	13,1
EOKO-560-18-3	560	18	delta	26,0	1060	660	460	60	560	17,8
EOKO-560-24-3	560	24	delta	34,6	1414	660	460	60	560	17,8
EOKO-630-9-3	630	9	delta	13,0	530	730	460	60	630	14,6
EOKO-630-12-3	630	12	delta	17,3	707	730	460	60	630	14,6
EOKO-630-18-3	630	18	delta	26,0	1060	730	460	60	630	20,0
EOKO-630-24-3	630	24	delta	34,6	1414	730	460	60	630	20,0

## Range of air heaters

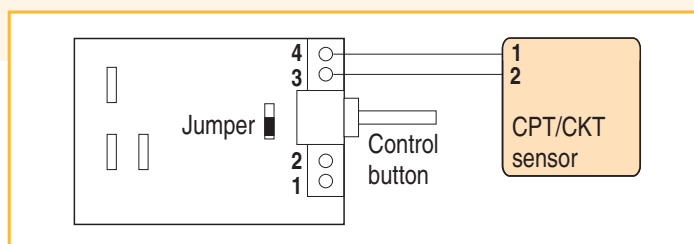
Air heater			Heating elem. Voltage [V]	Diameters [mm]											
Output [kW]	Voltage [V]	Phase [ks]		100	125	150/160	200	250	315	355	400	450	500	560	630
0,4	230	1	230	1x 0,4											
0,5	230	1	230		1x 0,5										
0,8	230	1	230	2x 0,4	1x 0,8	1x 0,8	1x 0,8								
1,0	230	1	230												
1,2	230	1	230	3x0,4	1x 1,2	1x 1,2	1x 1,2								
1,5	230	1	230					1x 1,5	1x 1,5						
1,6	230	1	230	4x0,4	2x 0,8	2x 0,8	2x 0,8								
2,0	230	1	230				1x 2,0	1x 2,0	1x 2,0	1x 2,0	1x 2,0				
2,4	230	1	230		3x0,8	2x 1,2									
3,0	230	1	230				1x3,0	2x 1,5	2x 1,5						
3,0	400	2	400					1x 3,0		1x 3,0					
3,4	400	2	400			2x 1,7	2x 1,7								
5,0	400	2	400			2x 2,5	2x 2,5	2x 2,5	2x 2,5	2x 2,5					
6,0	400	2	400			2x 3,0	3x 2,0	2x 3,0	2x 3,0	2x 3,0	2x 3,0				
2,4	400	3	230			3x 0,8									
3,0	400	3	230												
3,6	400	3	230				3x 1,2								
4,5	400	3	230					3x 1,5							
6,0	400	3	230				3x 2,0	3x 2,0	3x 2,0	3x 2,0	3x 2,0				
9,0	400	3	230									3x3,0	3x 3,0	3x 3,0	3x 3,0
12,0	400	3	230									3x4,0	3x 4,0	3x 4,0	3x 4,0
15,0	400	3	230												
18,0	400	3	230									6x 3,0	6x 3,0	6x 3,0	6x 3,0
24,0	400	3	230									6x 4,0	6x 4,0	6x 4,0	6x 4,0
5,1	400	3	400			3x 1,7	3x 1,7								
7,5	400	3	400				3x2,5	3x2,5	3x 2,5	3x 2,5	3x 2,5				
9,0	400	3	400					3x 3,0	3x 3,0	3x 3,0	3x 3,0				
12,0	400	3	400						4x3,0	4x3,0					
15,0	400	3	400							6x 2,5	6x 2,5				

### Sensors and control usage

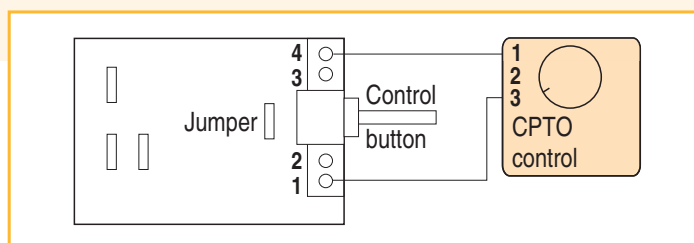
#### A) for internal 1- and 2-phase regulators

The following can be connected to these regulators:

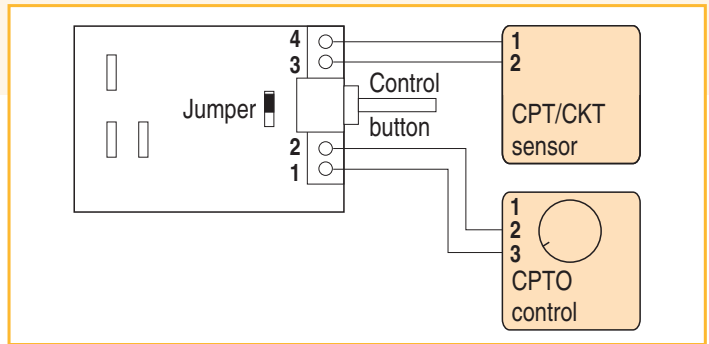
- One of the sensors - either a CKT channel sensor for sensing air temperature in the inlet or outlet duct; in this case it is more suitable to place it in the outlet duct; or a CPT space sensor for sensing temperature in the referential space. It is necessary that the jumper is set in the regulator according to the picture for this configuration.



- CPTO control - it senses temperature in the referential room and at the same time it enables the temperature to be set. In this case, the control button on the regulator is put out of operation. For this category, it is necessary to set the jumper in the regulator according to the picture.



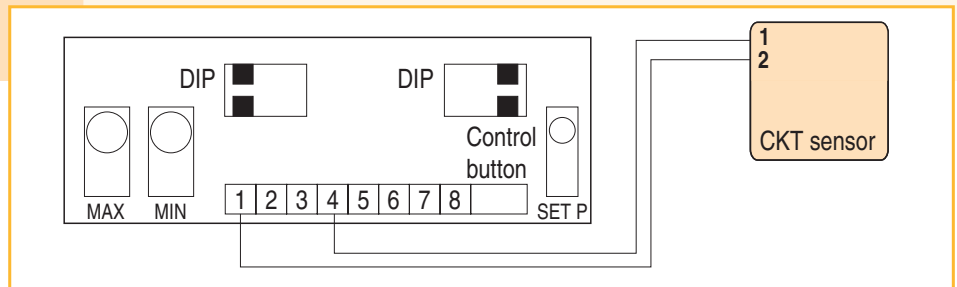
- **The control and one of the sensors** - in this case, the CPT/CKT sensor connected senses the temperature and the control functions only as a remote setting of the temperature. In this case, the control button on the regulator is put out of operation. For this configuration, it is necessary to set the jumper in the regulator according to the picture.



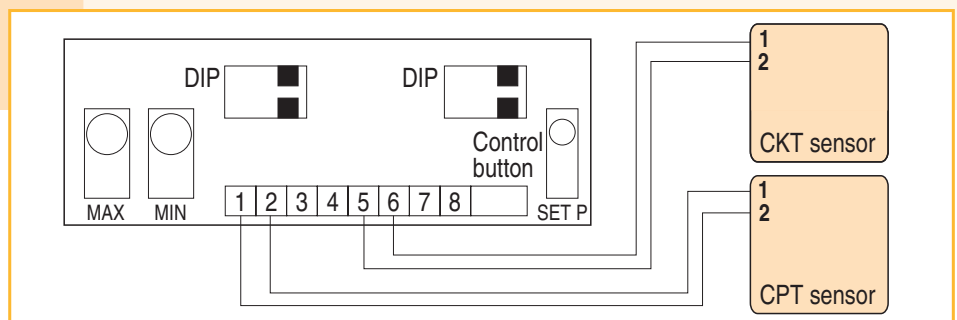
### B) for internal 3-phase regulators

It is possible to connect the following equipment to this regulator:

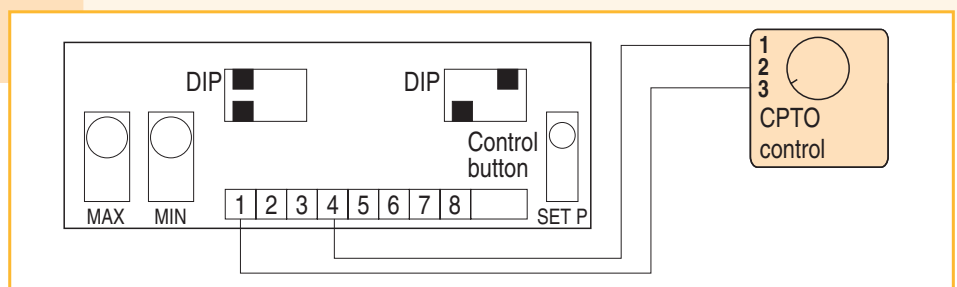
- **One of the sensors** - either a CKT channel sensor for sensing air temperature in the inlet or outlet piping; in this case it is more suitable to place it in the outlet piping; or a CPT space sensor for sensing temperature in the referential space. It is necessary that the DIP is set in the regulator according to the picture for this configuration.



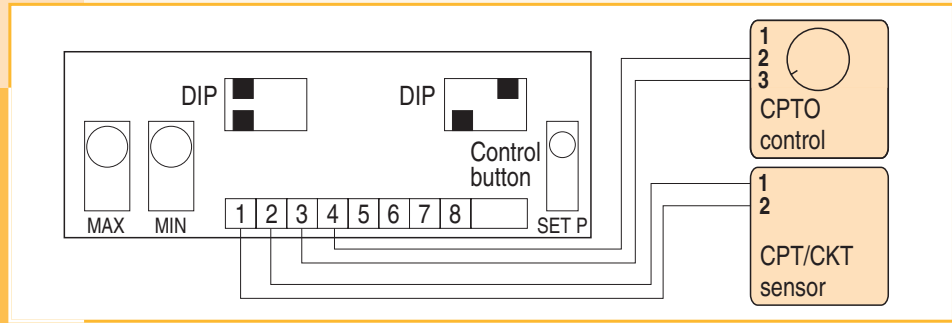
- **Both sensors at the same time** - a CPT space sensor senses temperature in the referential room and it is the control sensor. The CKT channel sensor senses temperature in the inlet piping and according to its data the inlet air temperature is kept between the maximum and minimum set. In this case, the channel sensor must be placed in the inlet air conduct because the regulator keeps the temperature in the channel between the minimum and maximum set on the basis of its data - see picture. The minimum can be set in the range from +5 to +15°C and the maximum can be set in the range from +30 to +50°C. The function of limit values is highly advantageous since it prevents inlet of air too cool or too hot to the aerated space. Example: Should there be an efficient source of heat in the room that would affect the space sensor, it may happen that the regulator would decrease the inlet air temperature. In winter it could cause that, based on this criterion, the temperature of inlet air coming to the room could be of +5°C. The minimum is set for the temperature of +15°C and maximum for +35°C from the production. For this configuration, it is necessary to set the DIP in the regulator according to the picture.



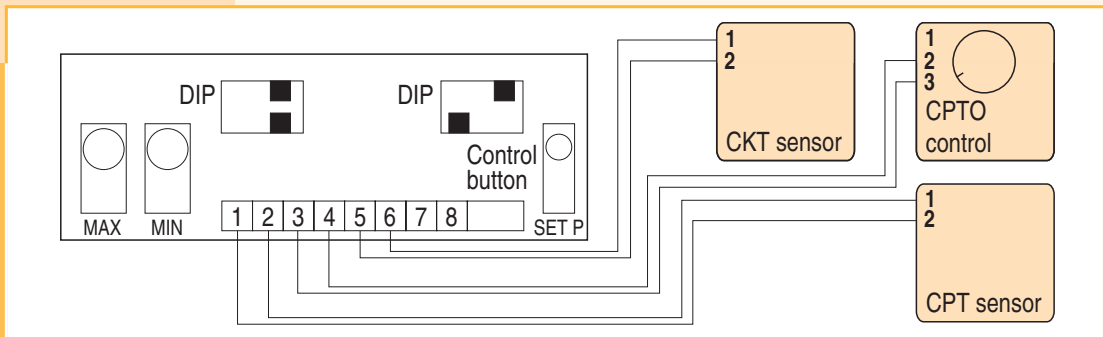
- **The CPTO control** - it senses the temperature in the referential room and at the same time it enables its setting in the range from 0 to 30. In this case, the control button on the regulator is put out of operation. For this configuration, it is necessary to set the DIP in the regulator according to the picture x.



- **The control and one of the sensors** - in this case, the temperature is sensed by a connected CKT/CPT sensor and the CPTO control functions only as a remote setting of the temperature (the sensor in the control is out of operation). The control button on the regulator is put out of operation in this case. For this configuration, it is necessary to set the DIP in the regulator according to the picture.

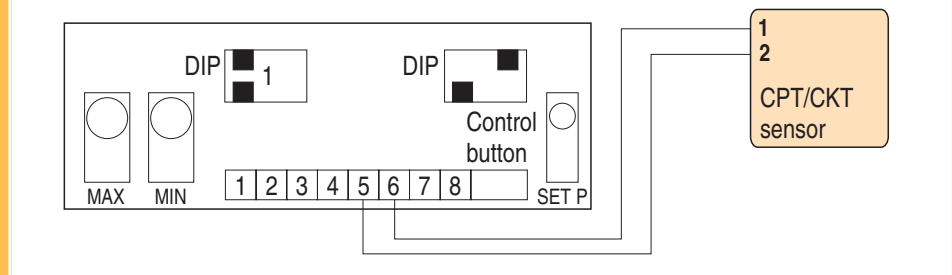
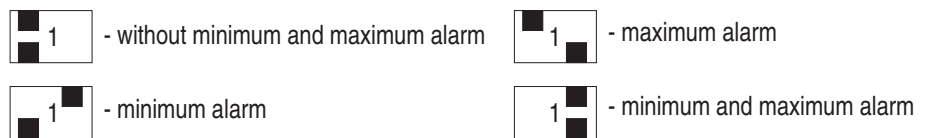


- **The control and both sensors at the same time** - the CPT space sensor senses the temperature in the referential room and it is the control sensor. The CKT channel sensor senses the temperature in the inlet duct and, according to its data, the regulator maintains the inlet air temperature between the maximum and minimum set (see point 2). The CPTO control functions only as a remote setting of required temperature (the sensor in the control is out of operation). The control button on the regulator is put out of operation in this case. For this configuration, it is necessary to set the DIP in the regulator according to the picture.



## Programming

In the case the CKT channel and the CPT space sensors are connected at the same time, it is possible to programme both regulator types. Programming is executed by the DIP switch on the regulator board according to the attached scheme.

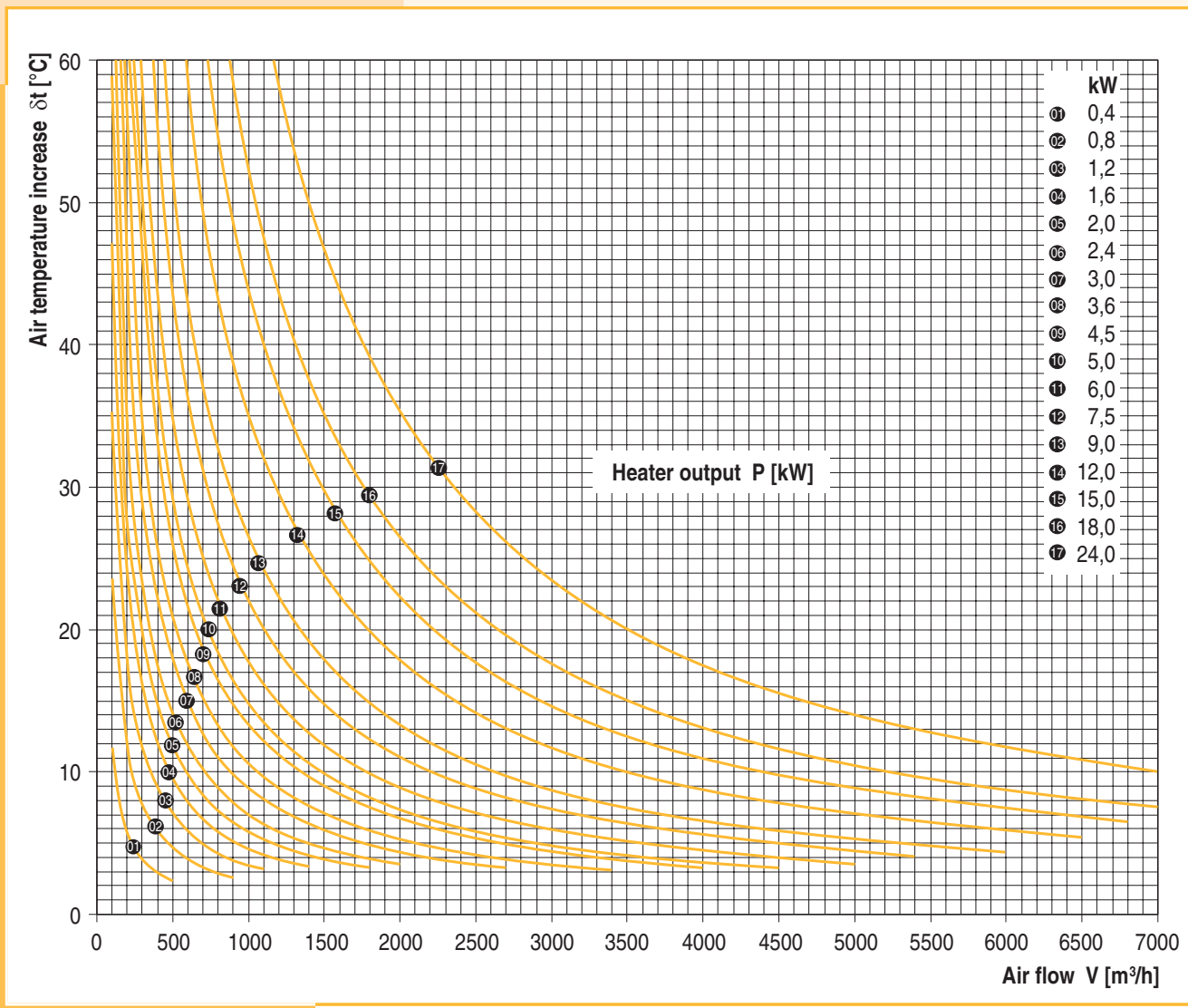


## External regulation

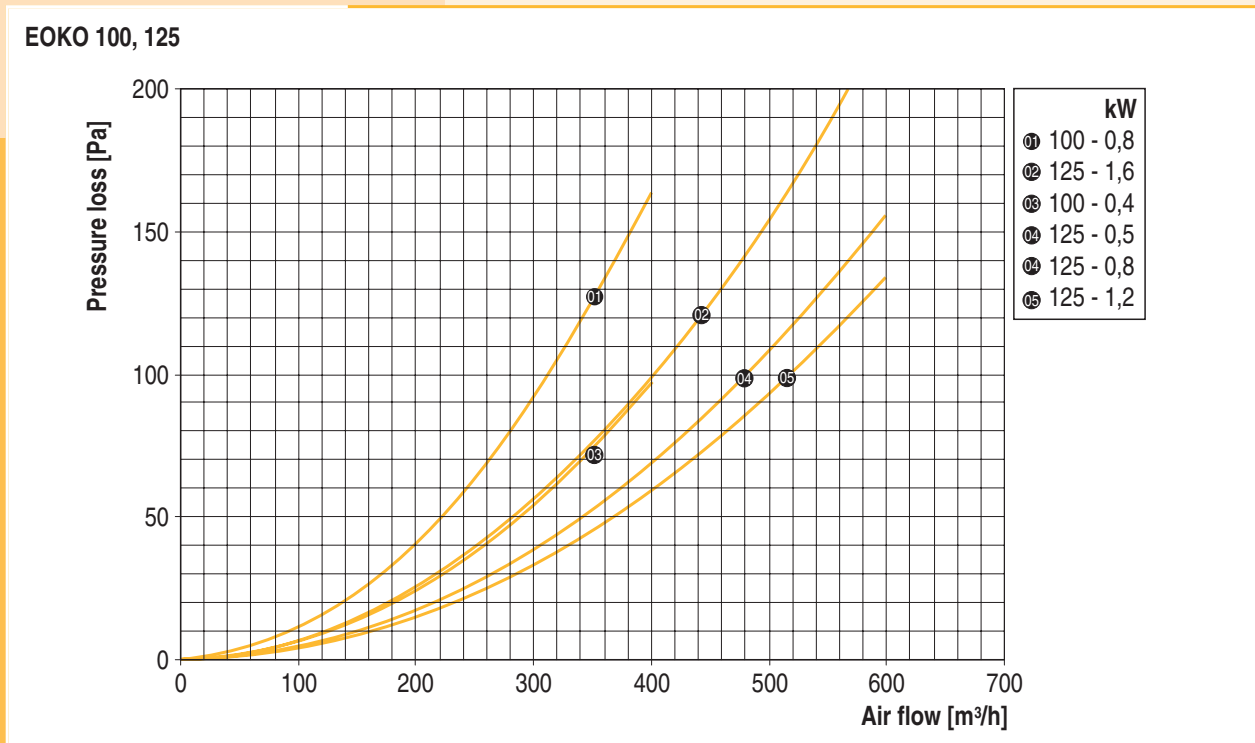
It is possible to deliver our external regulation RV-1/2 (1 and 2-phase) or RV-3 (3-phase) for heaters type B and C. External regulation gives you the same possibilities of setting like internal regulation described above.

### Diagram for determination of air temperature increase EOKO

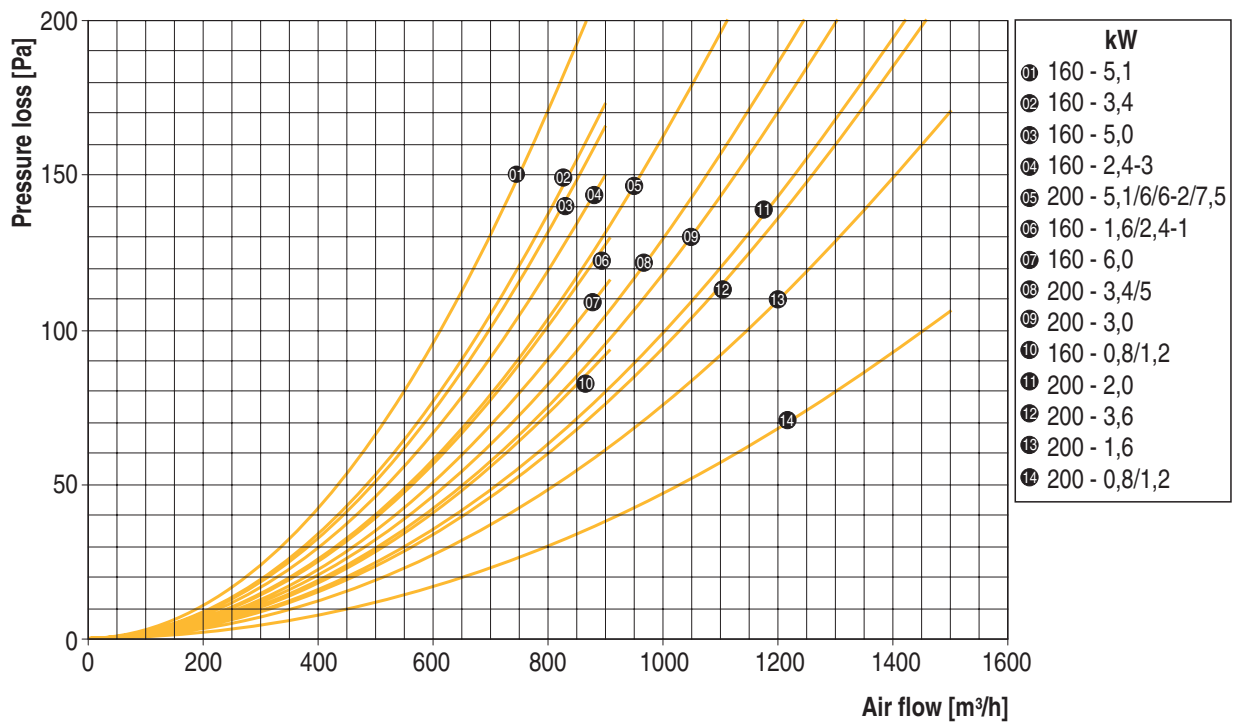
$$P[W] = V[m^3/h] \times 0,34 \times \Delta t [^{\circ}C]$$



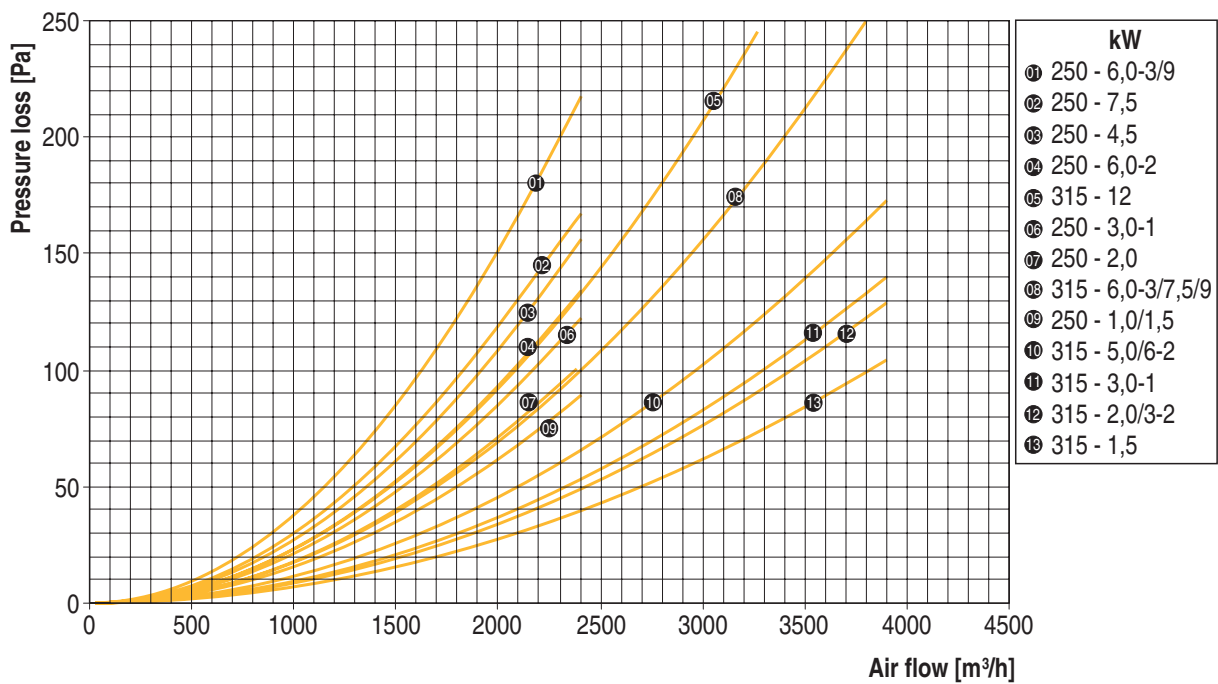
### Diagrams for determination of pressure loss EOKO



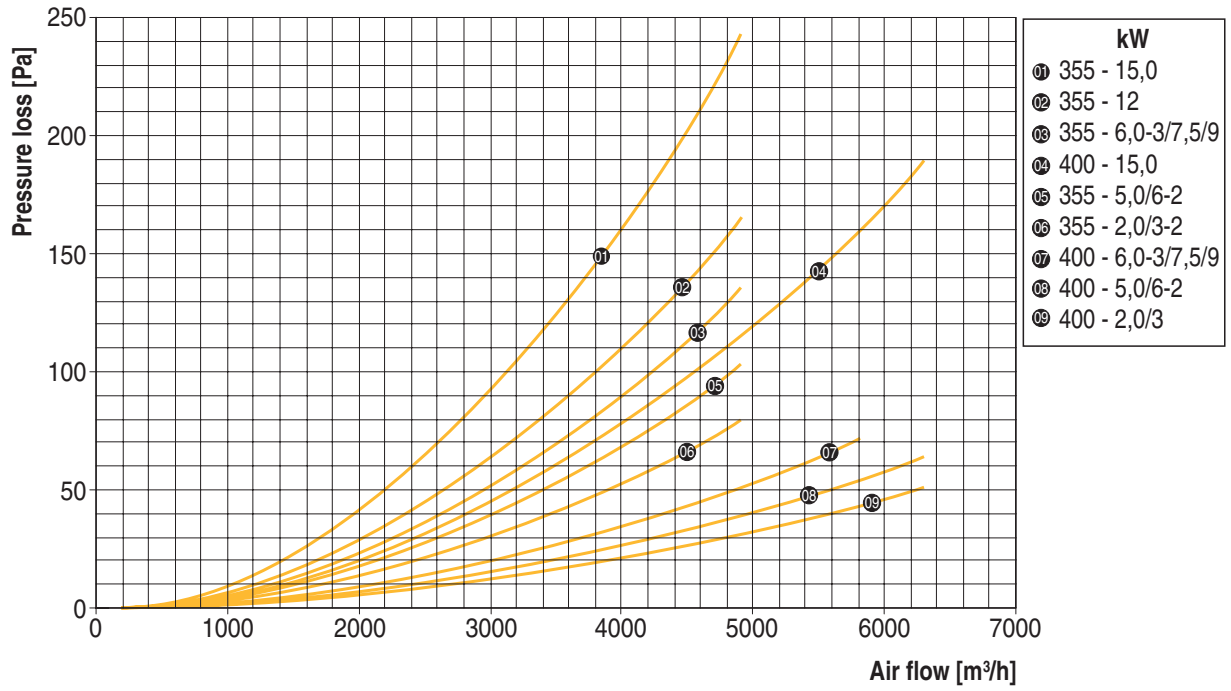
### EOKO 160, 200



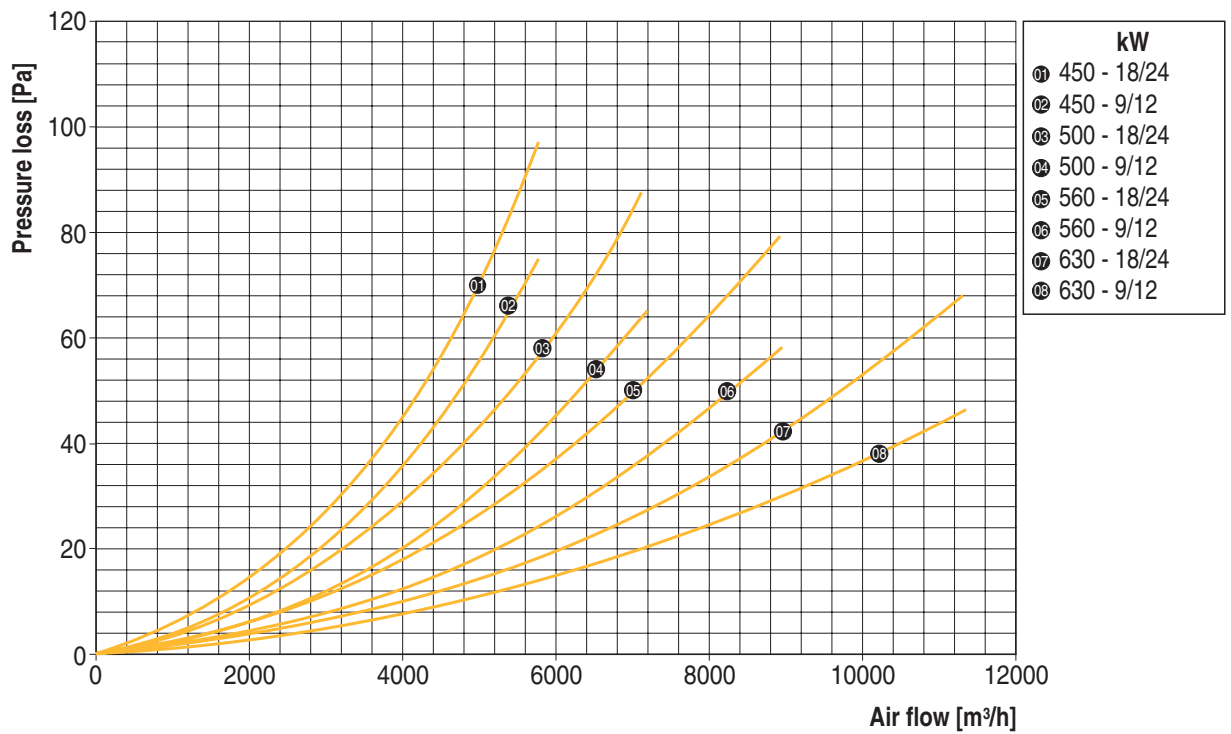
### EOKO 250, 315



### EOKO 355, 400

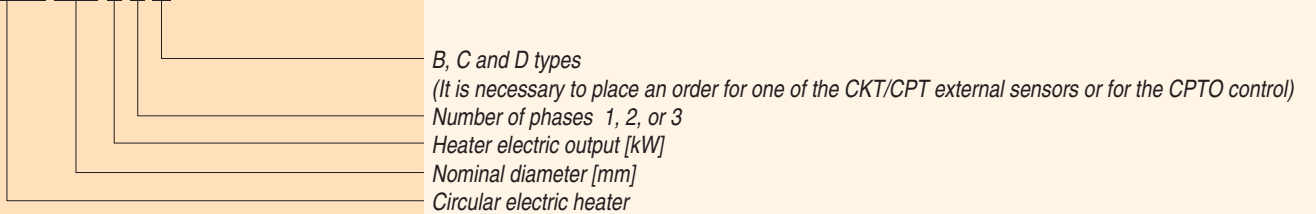


### EOKO 450, 500, 560, 600



### Key code

**EOKO-160-5-2 C**

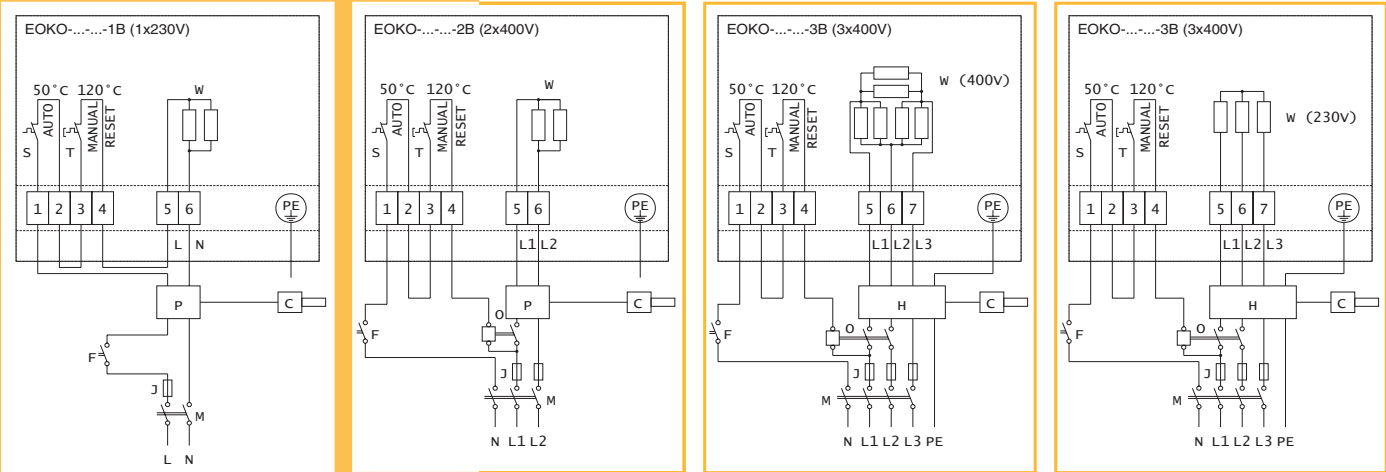


# Electric wiring diagrams

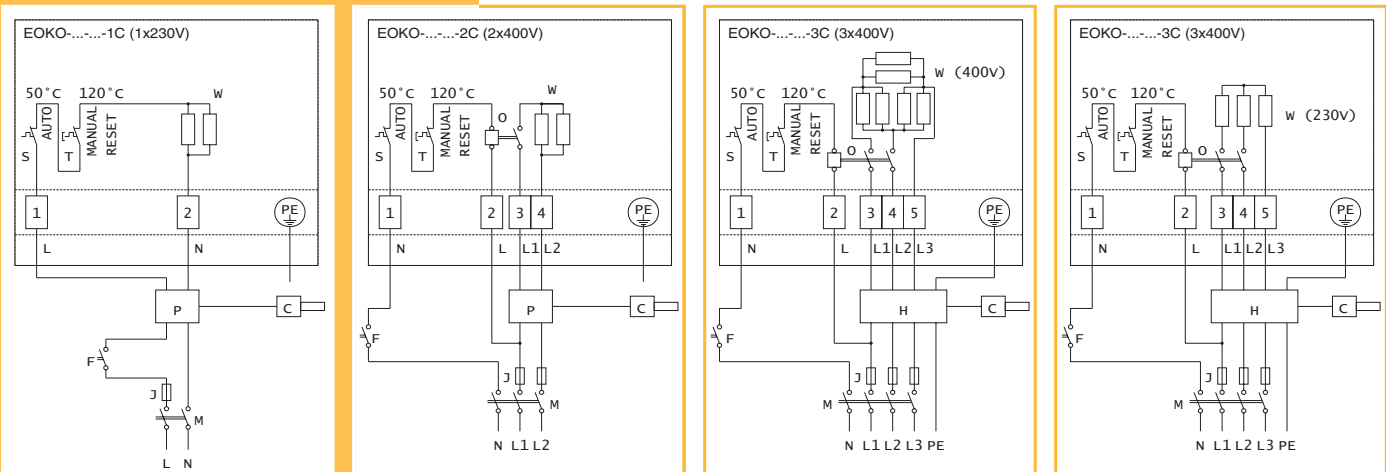
- W - heating elements
- S - safety thermostat (automatic reset)
- T - emergency thermostat (manual reset)
- O - over-heating protection switch
- P - pulse 1-phase performance regulator or operational thermostat

- H - pulse 3-phase performance regulator or operational thermostat
- C - temperature sensor (space or channel), or temperature control
- F - airflow control switch (pressostat)
- M - main switch
- J - fuses

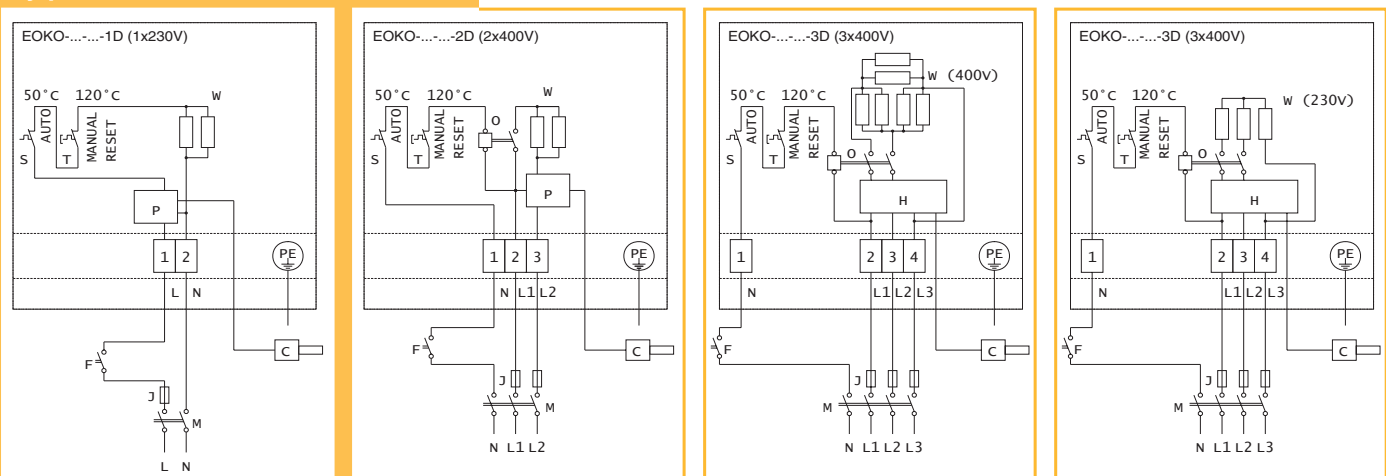
## Type B



## Type C



## Type D



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