

Automatic control

Automatic control of kitchen ventilation

The automatic control of kitchen ventilation is an optional accessory of kitchen hoods of the DiNER, STANDARD, and VARIANT types, as well as the SKV large-area-kitchen exhaust ceilings.

The microprocessor control system enables economical ventilation operation depending on actual heat production of kitchen appliances and prevents neekonomickému fan operation during cooking off-hours or during lower heat gain. Basic principle of the automatic control is temperature monitoring in the kitchen area and above appliances. If no setpoint offset exists, fans run only at minimum speed to satisfy basic kitchen air change and gas appliances operation is permitted. When temperature rises 3 to 7 K above setpoint the exhaust and supply fan automatically runs at higher speed. After further temperature rise both fans run at maximal speed. When temperature decreases the fan speed automatically reduces, possibly switches to basic speed, the minimum air change.

By changing supply and exhaust fan speed of the DiNER type hood the automatic control also provides freeze-up protection of a built-in heat recovery core.

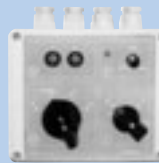
System assembly

The automatic control system consist of the following components:

- **RG** junction box
- **OP** control panel
- **SM** microprocessor module

The **RG** junction box includes fusing, main switch, power switching devices and other devices based on a type of controls B or C (see table). The RG junction boxes are available in wall-mounted design, with IP 54 and may be installed in mechanical rooms, corridors, storages, etc., close to fans, but always outside a kitchen area.

The **OP** control panel includes an operation mode power selector switch (O - AUT - MAN - I - II), lighting switch and operation indication LED. It can also include an optional dirty-filters alarm LED, fan thermal protection or inverter



Kitchen automatic control

multifunction alarm, by-pass controller, heating controller, as well as a potentiometer for supply air temperature or room temperature setting (external heating unit ventilator). The OP control panels are available in a plastic box in wall-mounted design with IP 43. They are to be installed in kitchen area.

The **SM** microprocessor module includes terminals to connect hood lighting, microprocessor control module, operation and freeze protection temperature sensors, possibly other sensors based on hood type. The SM modules are available in a plastic box with IP 54 installed firmly above the hood.

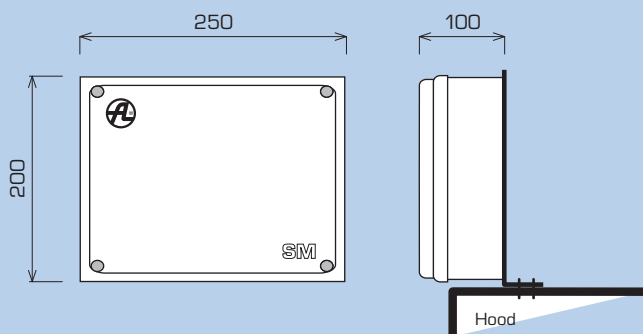
Non-standard assembly

A unique control system can be designed based on request - e.g. for several hoods with only one fan, multi-speed systems, etc.

Advantages of the automatic control

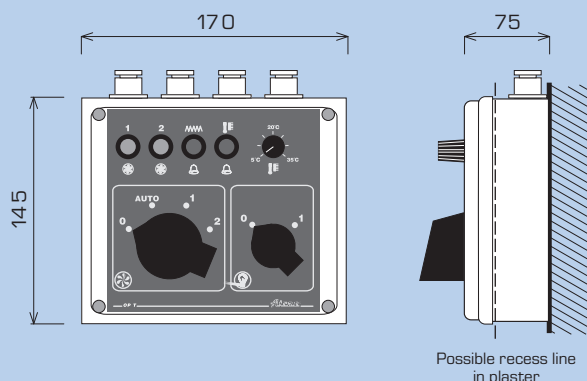
The automatic control is characterized by highly economical operation, short pay-back period and ability to help to provide perfect kitchen indoor air quality.

SM MICROPROCESSOR MODULE



Location: Standardly placed on top or front of a hood (Diner). It may be placed on side or on a wall on request.

OP SERIES CONTROL PANEL



Location: In kitchen area, approx. 1 300 to 1 500 mm high
Protection: IP 43

Non-standard design: ask the manufacturer

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RG2 JUNCTION BOX

RG NOMENCLATURE

RG 2 - 230V - B - 9,0A / 400V - B - 6,8A +

JUNCTION BOX NAME

RG1 – only exhaust fan control
RG2 – supply and exhaust fan simultaneous control

POWER SUPPLY – supply fan

230 V – 1-phase 230 V, 50 Hz
400 V – 3-phase 400 V, 50 Hz

CONTROL TYPE – supply fan

B, C (see table)

NOMINAL CURRENT – supply fan in A

POWER SUPPLY – exhaust fan

230 V – 1-phase 230 V, 50 Hz
400 V – 3-phase 400 V, 50 Hz

CONTROL TYPE – exhaust fan

B, C, (see table)

NOMINAL CURRENT – exhaust fan in A

REHEAT, COOLING, ACCESSORY

(See table and price list)

Used fans

For its economy function the kitchen automatic control uses three-speed fans.

For this reason fans enabling speed control, i.e. multi-speed fans or speed-control fans must be used.

Example of suitable fans:

1) 1-phase, voltage-control fans (**DUPLEX** units with 1-phase fans, some Elektrodesign fans of the CVAB, ILB, VDA series; Remak RP, RQ, RF fans; Systemair KE, RS, RSI, CE, CKS, TFE, TOE, TFEQ fans and others) – **B** type control

2) 3-phase, marked as voltage-control fans (**DUPLEX** units with 3-phase fans, some Elektrodesign fans of the ILT, VDA series; Remak RF, RP, RQ, RF fans; Systemair KD, KDRD, KT, RS, RSI, KTEX, CT, CKS, TFD, TOD, TFDQ, TFDX fans and others) – cheaper voltage-based control – **B** type control

3) 3-phase, common design, voltage-control fans (e.g. Alteko H fans of the RFC, RFE, TERNO series); inverter (frequency changer) required – more expensive control – the manufacturer does not recommend – **C** type control
náročnější regulace – výrobce nedoporučuje – typ regulace **C**

RG-2 - 230 V	fan control with 1-phase motor
	B voltage-control fan (e.g. DUPLEX), max. nominal current 9,0 A
	C inverter control; standard junction box analog output 0 - 10 V to control the inverter (*)
RG-2 - 400 V	fan control with 3-phase motor
	B voltage-control fan (e.g. DUPLEX), max. nominal current 14,5 A
	C inverter control; standard junction box analog output 0 - 10 V to control the inverter (*)
REHEAT	– optional accessories – hot-water or electric heating coil control (not with the DiNER hoods!)
	T type – basic on-off selector switch control (electric control) – for a hot-water coil with the RS-TPO kit supply air temperature setpoint may be set on a thermostatic valve – for an electric coil in basic design supply air temperature setpoint may be set right on coil's thermostat
	ROT type – a comfort remote supply air temperature control via a potentiometer (digital control) – for a hot-water reheat add the RMT module to the RG junction box – for an electric reheat the EPO heating coil with the RME built-in module is required
REHEAT COOLING	– optional accessories – hot-water coil, DX or chilled-water coil control (not with the DiNER hoods !)
	– the RG junction box is fitted with a digital controller with a display enabling to set all parameters – possibility to choose between supply air temperature control (monitored by the NS 120 duct sensor) or room temperature control (monitored either by the NS 100 room sensor or the NS 120 exhaust duct sensor); digital controller enables automatic by-pass damper control as well
ATYP	– nonstandard layout on request (e.g. multi-hood splitter damper control, cascade control, etc.)

*) the inverter is not standardly supplied

OP CONTROL PANELS

OP	order no. A410001	– fan control, lighting control, error and dirty-filter alarm
OP-T	order no. A410002	– fan control, lighting control, heating switch, error and dirty-filter alarm
OP-ROT	order no. A410003	– fan control, lighting control, temperature setting
OP-B	order no. A410004	– fan control, lighting control and by-pass control (e.g. DUPLEX units)
OP-T-B	order no. A410005	– fan control, lighting control, heating switch and by-pass switch (e.g. DUPLEX units)
OP-ROT-B	order no. A410006	– fan control, lighting control, temperature setting and by-pass switch (e.g. DUPLEX units)
OP-TCH	order no. A410009	– fan control, lighting control, temperature setting (for a junction box with a cooling digital controller)
OP atyp	–	– functions based on request (e.g. damper control, multi-hood lighting, etc.)

SM MICROPROCESSOR MODULES

SM 1	– includes hood lighting terminals, microprocessor control module terminals, temperature and freeze protection sensors – designed for wall-mounted hoods with length L < 4 500 mm and mid-sized hoods with length L < 2 500 mm
SM 2	– same function as the SM 1, includes additional temperature sensors (8 sensors in total) – designed for wall-mounted hoods with length L > 4 500 mm, mid-sized hoods with length L > 2 500 mm, SKV ceilings with 4 exhaust ducts
2x SM2	– pair of the SM 2 modules designed for large-area SKV exhaust ceilings with 5 to 8 exhaust ducts
XM1	– additional terminal box to connect two SM2 modules

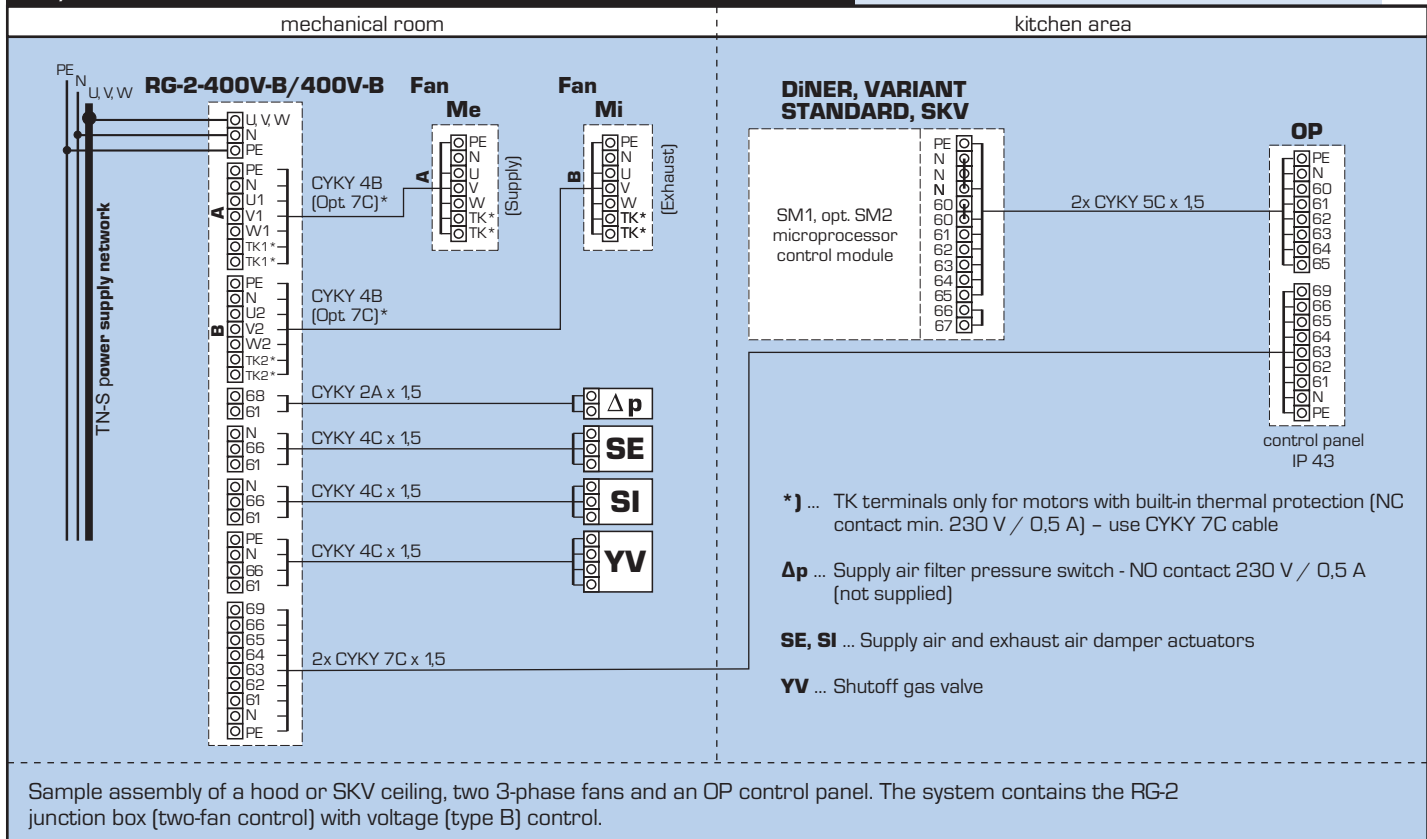
STANDARD SAMPLES

The samples below are just to show basic wiring principles of different systems. Specific wiring diagram always is supplied with the respective equipment. To select the right controls, use our specialized "Kitchen ventilation" or "DOPLEX units" selection software.

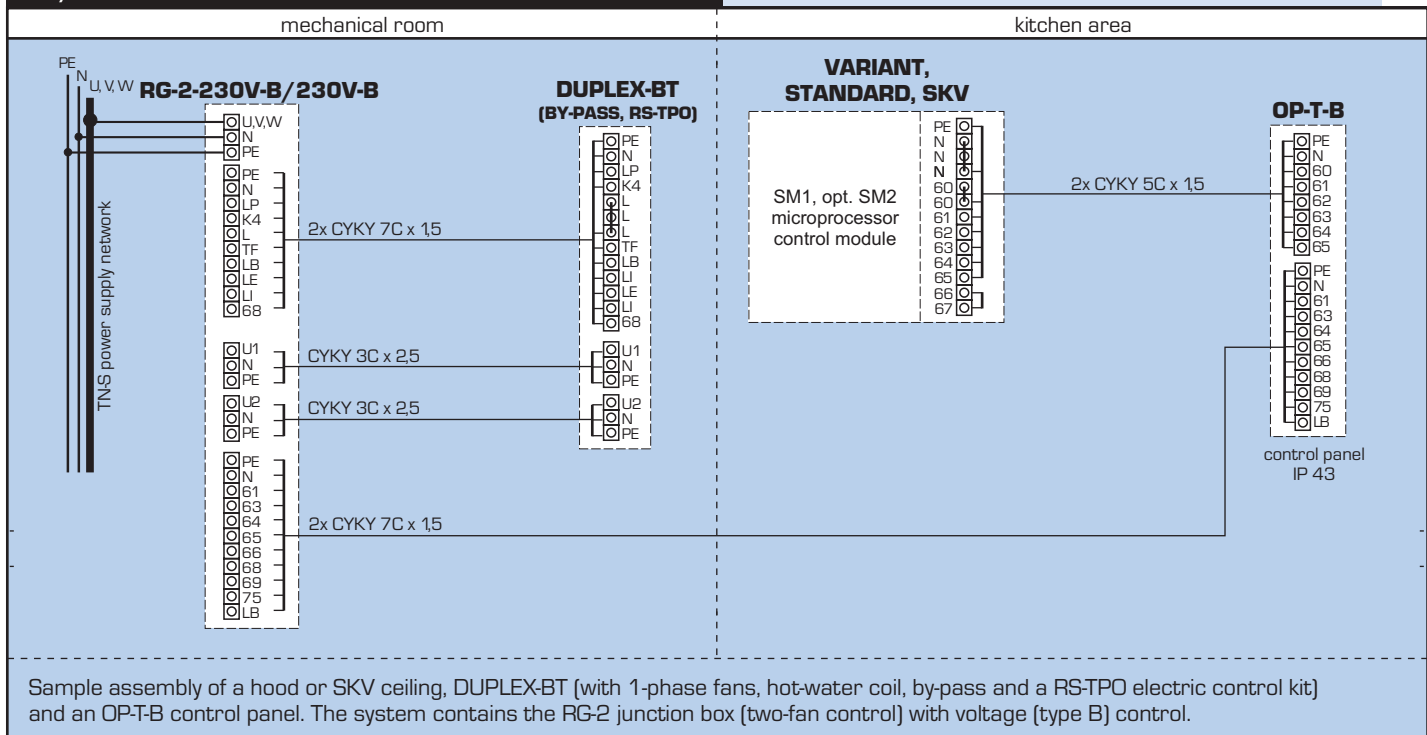
For control systems always observe the following rules:

- link terminals with the same labelling
- linking cables are not supplied; determine unlisted wire gauge according to motor power input and placement
- when an inverter is used (config. C) run main power supply separately from other cables and use sheilded cables for power supply to the **Me** and **Mi** fans when longer than approx. 4 m
- motors with 1-phase inverters to be wired to 3x230 V delta power supply

1 / HOOD OR SKV CEILING WITH TWO 3-PHASE FANS

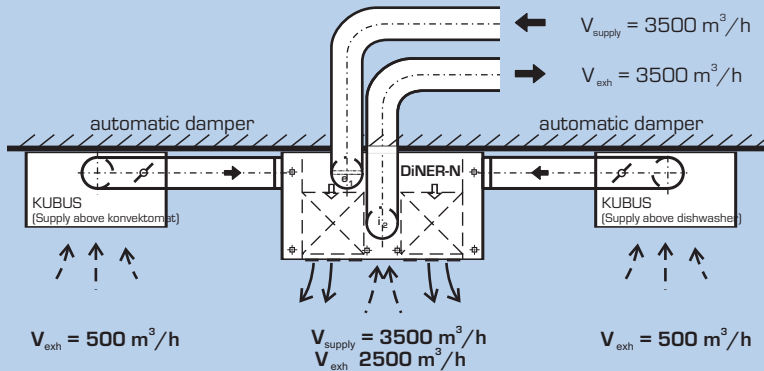


2 / HOOD OR SKV CEILING WITH DUPLEX-BT



SAMPLE CONTROL SYSTEMS, ECONOMY

1/ CONNECTING AUXILIARY KUBUS HOODS TO THE DINER KITCHEN HOOD



Often, there are cases where an equipment is installed outside a cooking center – it is mostly a convectomat, dishwasher etc.

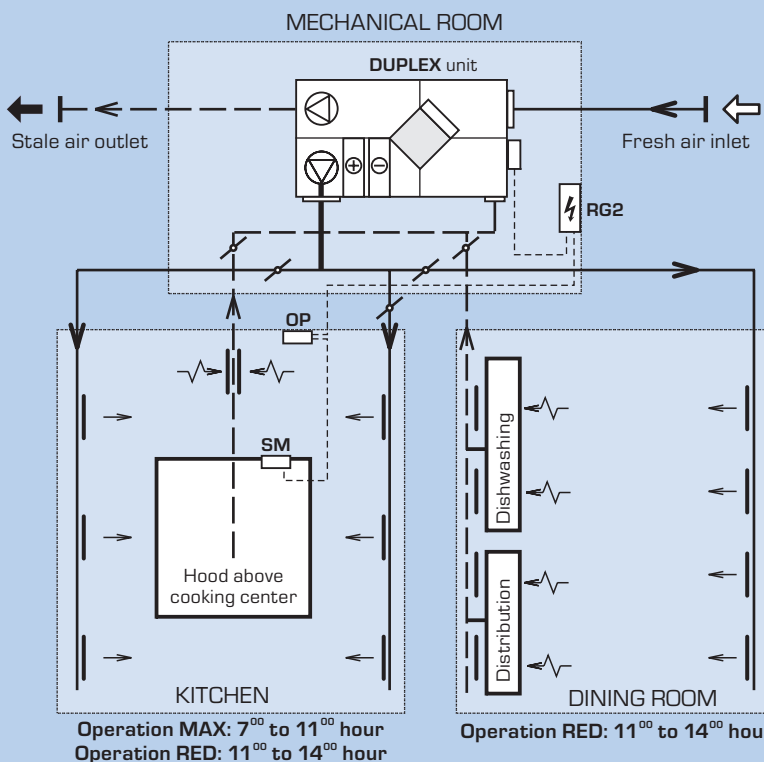
A so called auxiliary hood may be placed over such an appliance and connected via a duct with a damper to a main DiNER-type heat recovery hood utilizing recovered heat from the appliance.

Control principle

The DiNER hood contains the SM automatic control module and RG junction box. The whole system is controlled by the OP panel.

Auxiliary hood dampers with actuators are controlled by simple switches located near appliances under hoods (possibly interlocked).

2/ ZONED VENTILATION OF KITCHEN AND DINING ROOM



For school dining rooms and other kitchens with similar operation type a zoned ventilation system is suitable.

A common air-handling unit ventilates kitchen area as well as the meal distribution and dining areas. Its airflow switches according to occupancy and time schedule of both zones. Usually, between approx. 7⁰⁰ and 11⁰⁰ only kitchen area is ventilated, from 11⁰⁰ partially kitchen area and simultaneously dining and dishwashing areas are ventilated (with reduced airflow).

Control principle

The DiNER hood contains the SM automatic control module and RG junction box. The whole system is controlled by the OP panel with the following selectable operating modes:

- 0 - AHU off
- AUT. - automatic mode, the AHU is controlled by temperature sensors
- RUČ. - manual mode, the AHU runs at minimum airflow
- 1 - the AHU runs at reduced airflow
- 2 - the AHU runs at maximum airflow

OPERATION ECONOMY OF AUTOMATIC CONTROL

The correct selected automatic control should mainly exclude human factor reducing energy consumption of fan operation and ventilation air reheat.

The chart shows electric energy consumption based on ventilation rate and operation mode. The chart does not include energy saving required for air reheat!!

Calculations were made with the following parameters:

air system parameters: $D_p = 550$ Pa, fan efficiency 0,55, operation period 300 days / year, automatic control reduces airflow in 70 % of operation period to 45 % N_{max}

Conclusion

Economic payback on investment in the ATREA automatic control is within one year in common cases.

