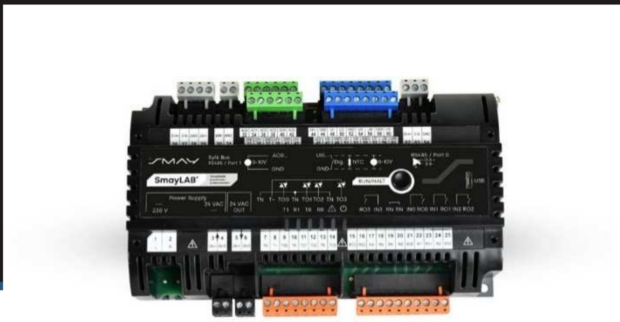
LR(S)
SYSTEM CONTROLLER



Description:
The controller is intended for controlling VAV regulators in laboratories. Depending on the application used, it can control the air supply intake and exhaust, as well as fume hoods.

Intended Use

Depending on the application and software loaded into the memory, the controller can control the following:

- LR002 local exhaust system controller – max. 5 stations
- LR102 room controller – 1 VAV controller for the air supply line, 1 controller for the exhaust line and 3 local exhaust systems, flow balancing, pressure correction
- LR202 fume hood controller – a fume hood, VAV controller for the air supply line, a controller for the exhaust line and 2 local exhaust systems
- LRS203 fume hood controller – single fume hood, VAV controller for the air supply line and a controller for the exhaust line
- LRS204 fume hood controller – fume hood and local exhaust system
- LRS205 room controller – air supply line, exhaust line, pressure correction

Essential Parameters of the Controller

- Power supply voltage 24 V AC or 230 V AC
- Two RS485 ports
- HMI (RJ45) and a PC (USB) may be connected locally
- Operating range from 0 to +50 °C

Design

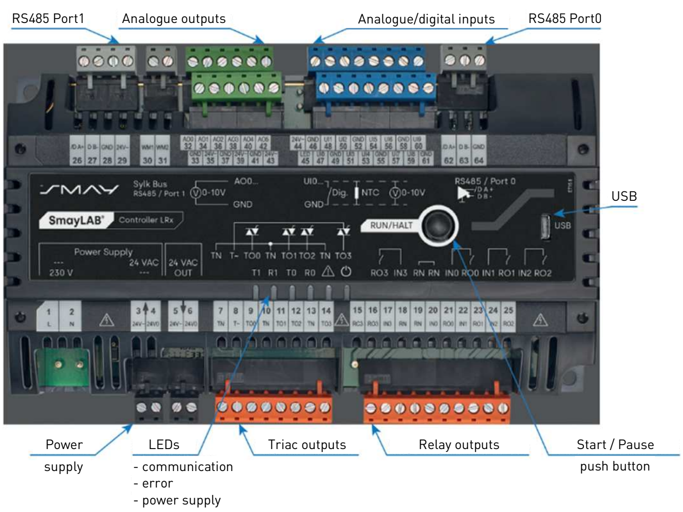


Figure 1. SmayLAB system controller.

Controller Dimensions

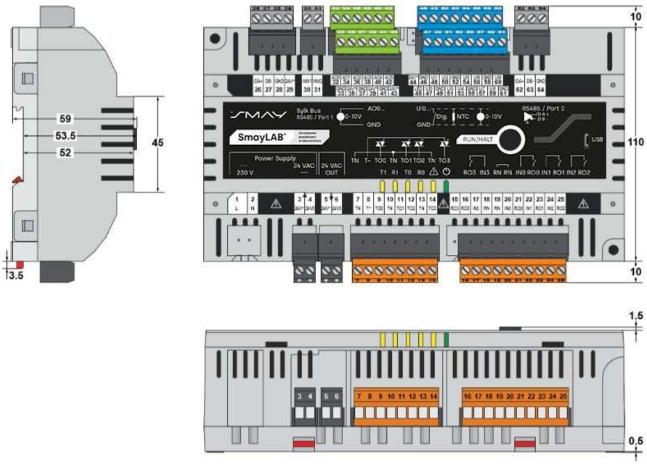


Figure 2. LRx controller dimensions.

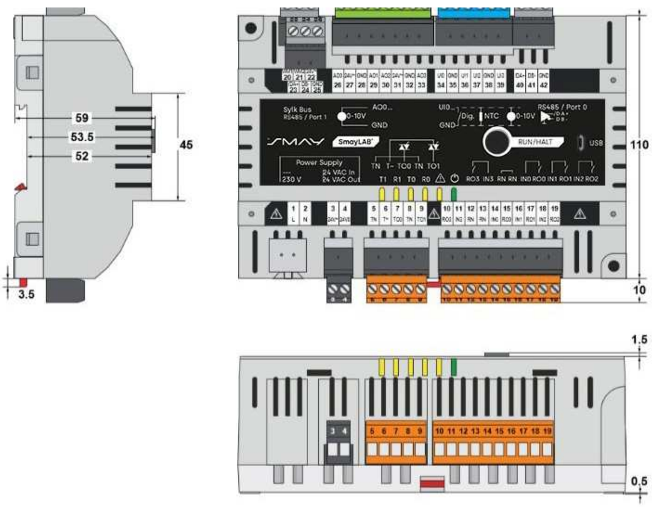
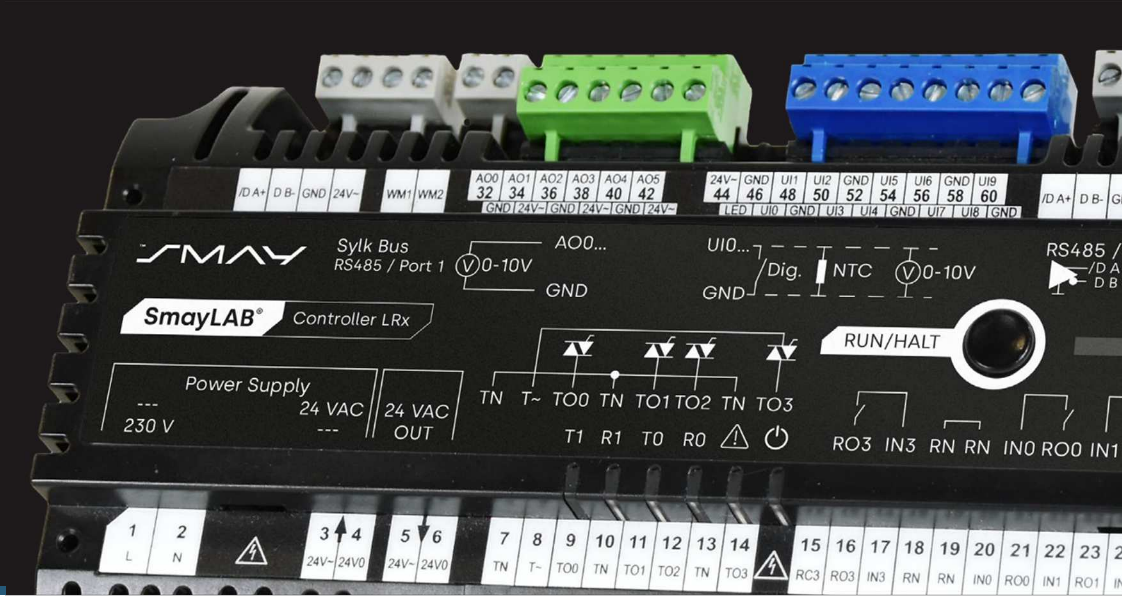


Figure 3. LRSx controller dimensions.



Housing Dimensions

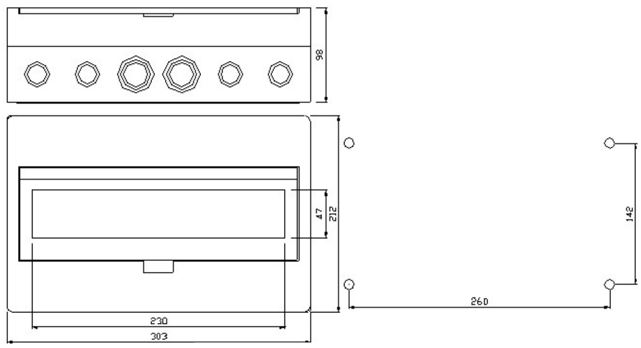


Figure 4. Housing dimensions.

Power Supply

Controller: LRx02/230, LRS20x/230	
Supply voltage:	230 V AC +10% / -15%
Frequency:	50/60 Hz
Maximum power consumption (without load):	8 W
Maximum power consumption (under load):	18 W
Maximum current at the controller output:	300 mA

Controller: LRx02/24, LRS20x/24	
Supply voltage:	24 V AC ±20%
Frequency:	50/60 Hz
Maximum current consumption (without load):	300 mA
Maximum current consumption (under load):	900 mA
Maximum current at the controller output:	600 mA

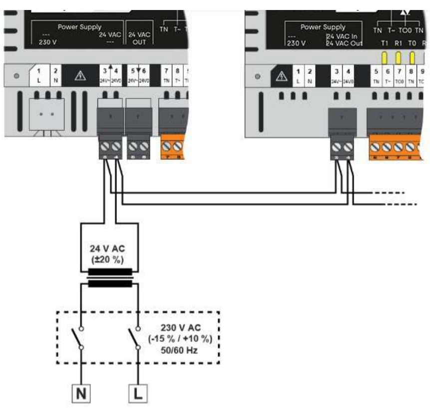


Figure 5. 24 V AC controller power supply.

Relay Outputs

Relay		Type 1	Type 2
		Monostable relay, NO contact	
Relay number	**LRx02**	RO1, RO2	RO0, RO3
	LRS20x	RO0, RO1, RO2	RO3
Minimum load		5 V AC, 100 mA	24 V AC, 40 mA
Switch voltage range		5 to 253 V AC	24 to 253 V AC
Current at continuous load 250 V AC (cosφ=1)		4 A	10 A
Current at continuous load 250 V AC (cosφ=0.6)		4 A	10 A
Starting current (20 ms)		-	80 A

Digital inputs

Digital inputs	
Binary signal 0/1	Potential-free contacts
Sampling voltage/current	DC 24 V / 0.1 mA
Delay	12 ms

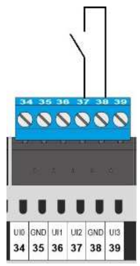


Figure 6. Digital input connection.

Digital and analogue inputs are protected against 29 V AC and 30 V DC voltage.

Analogue Outputs

Outputs	AO0, AO1	AO2, AO3, AO4, O5
Output voltage	0 to 10 V	
Output current	0 to 10 mA	0 to 1 mA
Minimum accuracy	±150 mV	
Maximum ripple voltage	±100 mV	

Communication

The controller has two RS-485 outputs with the ability of defining controller network addresses.

Port 0 is intended for connecting controllers in a line topology with an LR102M or LR202M controller as the master device. Port 1 is used for connecting a fume hood panel or for communication with the BMS (LR102M controller).

Communication parameters

Maximum line length: 1,000 m

Number of stations: 11

Cable: two-core, twisted, shielded, at least 0.5 mm cross-section, grounded at one end only.

> **!** If multiple controllers communicate with each other, one of them must be set as the master device with loaded LR102M or LR202M application. Add M letter to the application name in the order code.

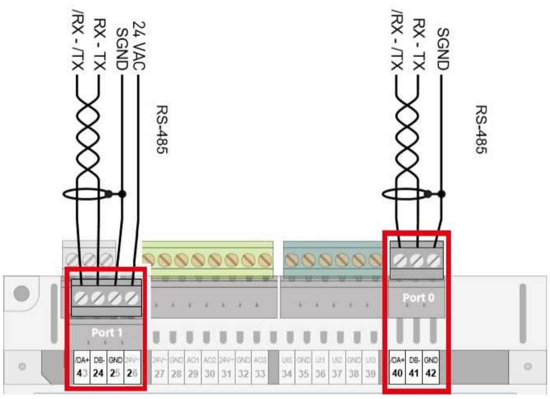


Figure 7. Port connection to communication lines.

USB

USB type:	Type-B socket
Connection cable:	standard USB

Device Status – LEDs

Application activated:	Green LED on
Application stopped:	Yellow LED on

Housing

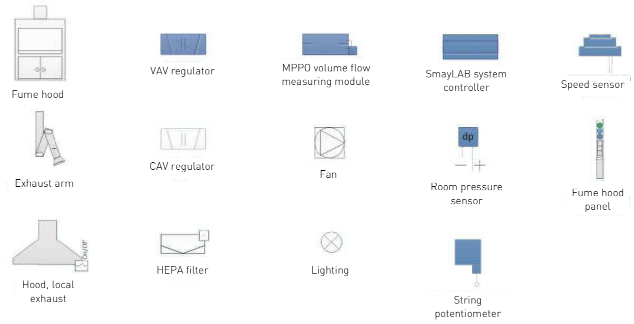
It is possible to fit the controller with additional housing.

ELEGANT RN 1/12 IP 40 (N+PE)

Figure 8. Controller housing.

Applications

Key



APK 002

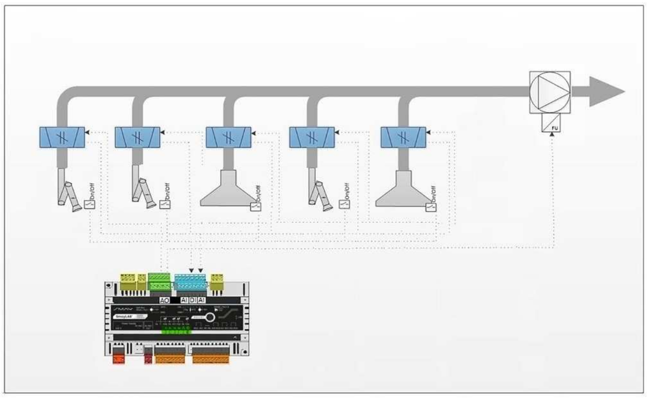


Figure 9. Example of using a ventilation hood fan inverter to ensure required airflow. The inverter control depends on the number of active ventilating hoods. It is possible to define the percentage value of the control signal for each controller. Airflow control by means of the VAV device, the set value change by means of a change-over switch.

APK 102

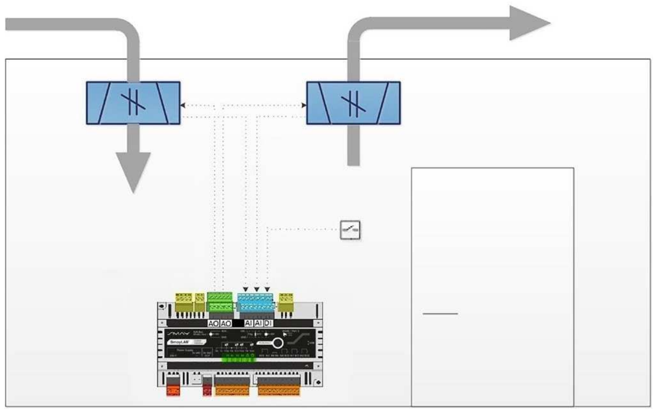


Figure 10. Airflow control via the air supply and exhaust lines by means of a VAV device; it is possible to control the number of exchange cycles via a change-over switch.

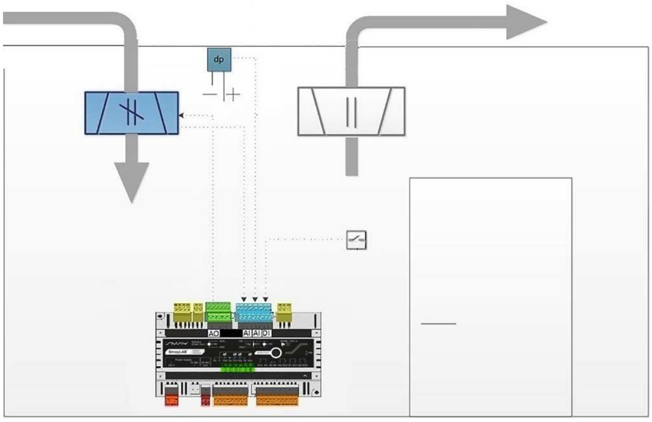


Figure 11. Pressure control in a room and airflow control via the air supply line by means of a VAV device. Ventilation hood controlled via the CAV controller.

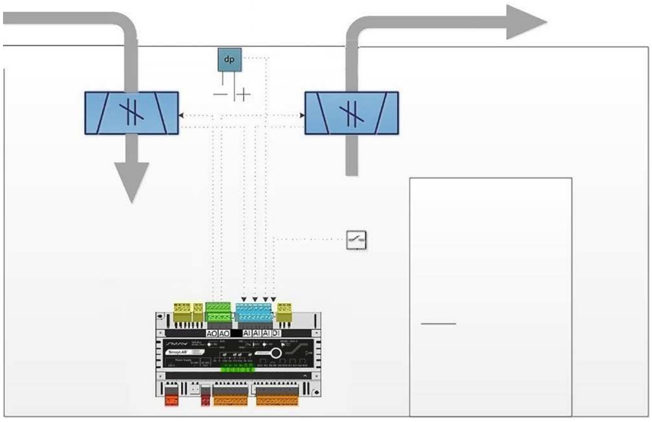


Figure 12. Pressure control in a room by means of a VAV controller via the air supply or exhaust line. Furthermore, airflow control by means of VAV controllers and monitoring of the number of exchange cycles.

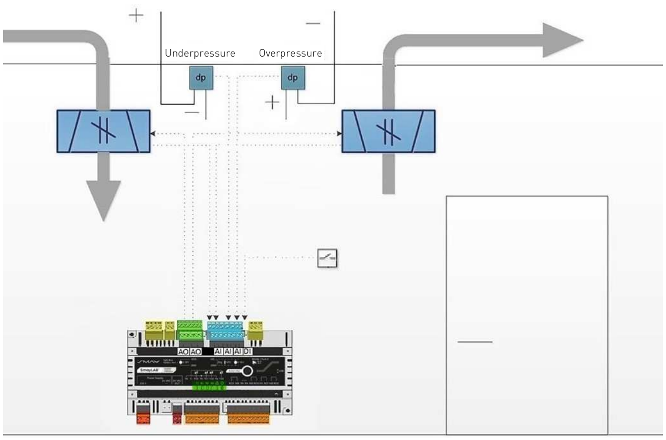


Figure 13. Overpressure control in a room by means of a VAV controller via the air supply line and underpressure control via the exhaust line. Furthermore, airflow control by means of VAV controllers and monitoring of the number of exchange cycles.
Switching between the control of overpressure and underpressure.

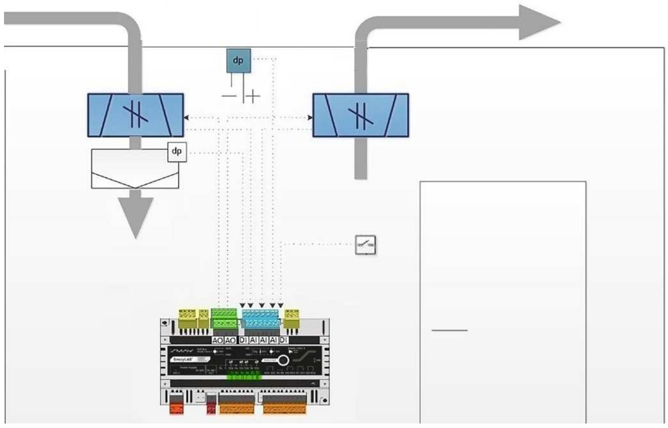


Figure 14. Example of a clean room using a HEPA filter connected to the controller to indicate when the filter is dirty.

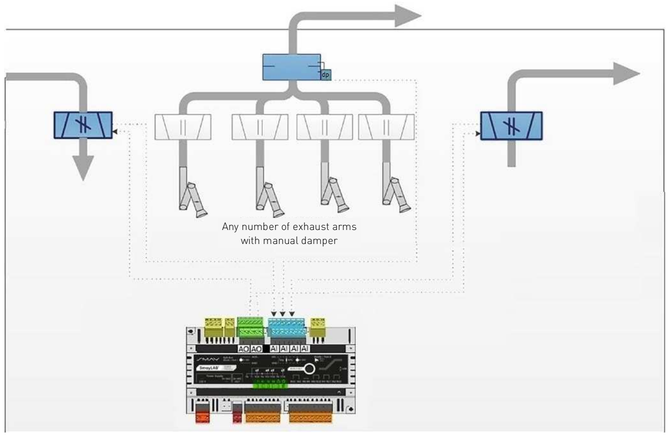


Figure 15. Example of using the MPPO module for exhaust arms with a manual shut-off damper.

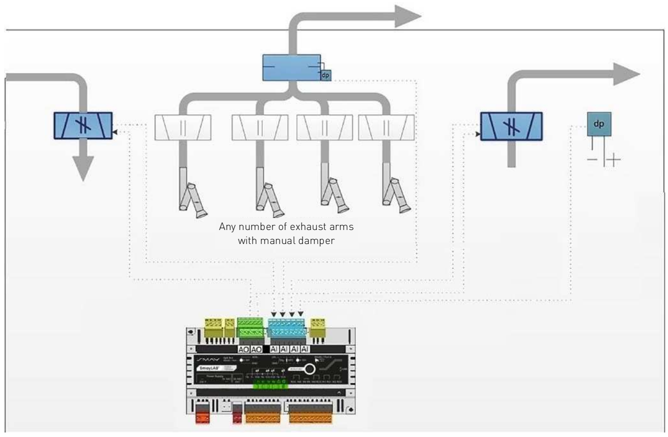


Figure 16. Example of using the MPPO module for ventilation hoods with a mechanical/manual damper; it is also possible to control the pressure.

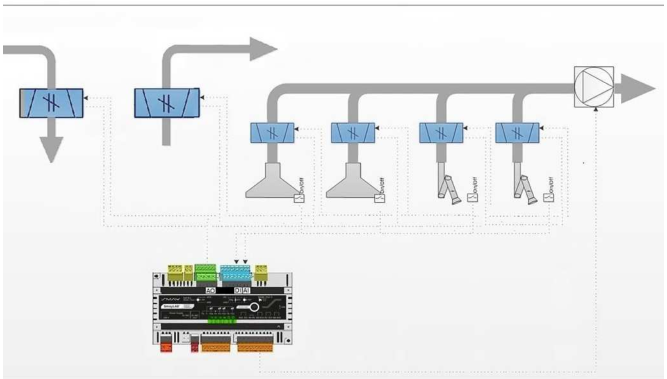


Figure 17. Example of controlling the air supply, ventilation hood and four local exhaust systems. Changing the set value of ventilation hoods by means of a change-over switch. It is possible to turn a fan on by means of a relay.

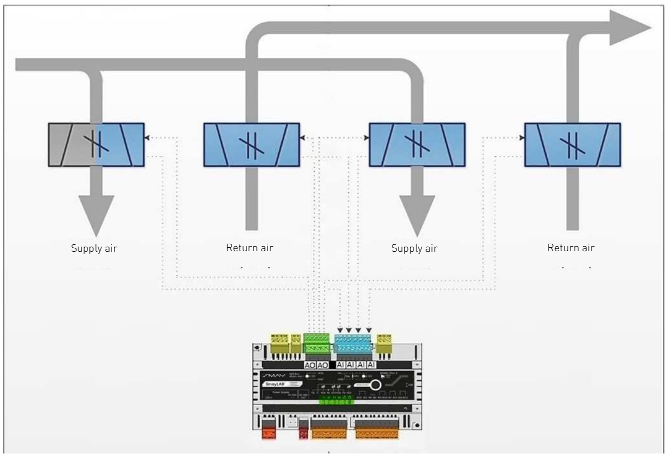


Figure 18. Cascade control of two air supply and exhaust controllers by means of a single controller. Ability to define the VAV device for the cascade operation.

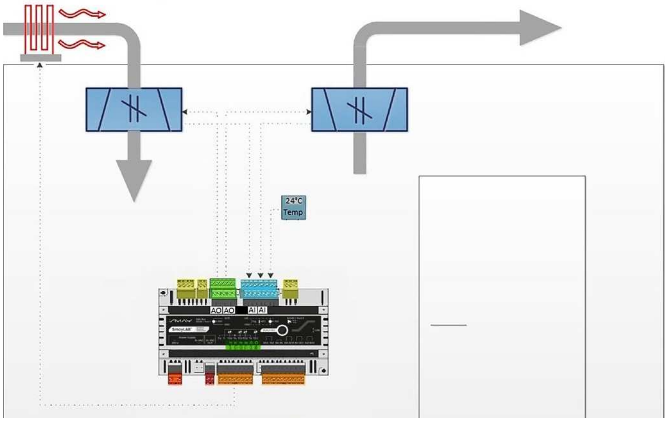


Figure 19. Duct air heater control.

APK 202

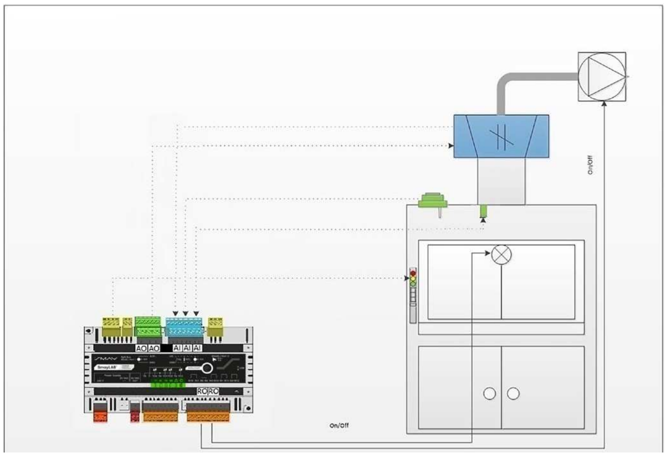


Figure 20. A fume hood with the airflow rate control carried out by the VAV device, airflow rate measurement at the fume hood window by means of a speed sensor; it is also possible to turn on the exhaust fan (via a contactor) and the light in the fume hood. Recommended for fume hoods with a combined window or a horizontally slidable window. Temperature measurement in a fume hood.

Figure 21. A fume hood with the airflow rate controlled by the VAV device, airflow rate measurement at the fume hood window via a speed sensor and the window position measurement by means of a string potentiometer. This solution provides very stable and reliable operation, independently of the fume hood window design. Due to a double-measurement system, it ensures a high-level of security if one of them fails. It is also possible to turn on the light in the fume hood and to generate the activation signal for the exhaust fan by means of relay outputs. Fume hood fan inverter control.

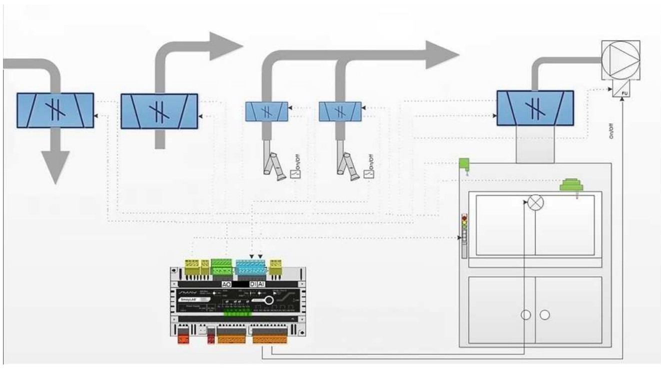


Figure 22. Example of the ability of controlling the air balance In a room with the single fume hood, air supply, exhaust and two local exhaust systems by means of a single controller. The system provides maximum installation cost savings. Fume hood fan inverter control.

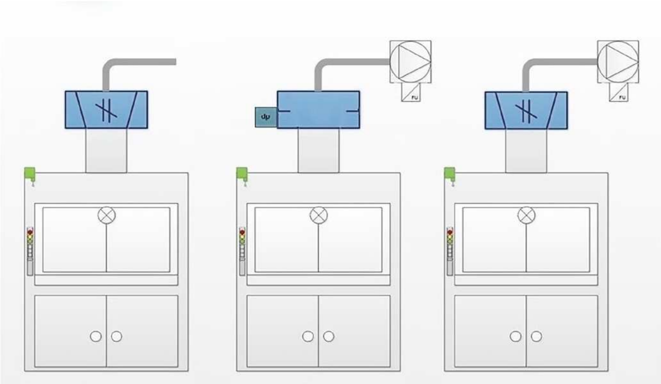


Figure 23. The airflow rate set value is controlled by a string potentiometer at the fume hood window. On the left, the airflow is controlled by the VAV. Then, an example of the airflow rate measurement by means of the MPPO module and fume hood fan inverter control. On the right, control is by means of the VAV controller with an additional fume hood fan inverter control to eliminate throttling.

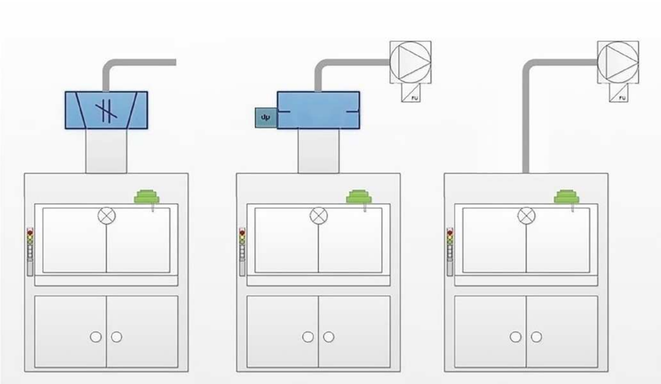


Figure 24. The airflow rate is controlled at the window with a speed sensor installed in the fume hood, as well as the airflow rate selection on the basis of a PI regulator. From the left, control is by means of the VAV device. Then the airflow rate measurement is by means of the MPPO module and controlled with a fume hood fan inverter. On the right, the airflow rate is controlled by means of a fume hood fan inverter.

APK 203

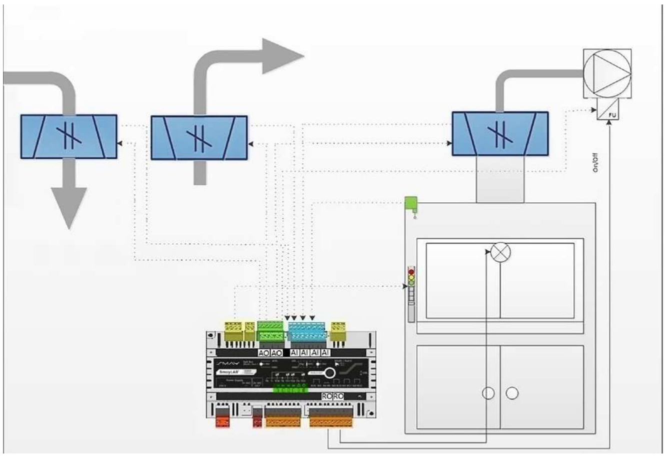


Figure 25. A fume hood with the airflow rate control carried out by means of the VAV device and the window position measurement by means of a string potentiometer; it is also possible to turn on the exhaust fan (via a contactor) and light in the fume hood. It is possible to control the fume hood fan inverter. Supply and exhaustion of air is controlled by a VAV device.

APK 204

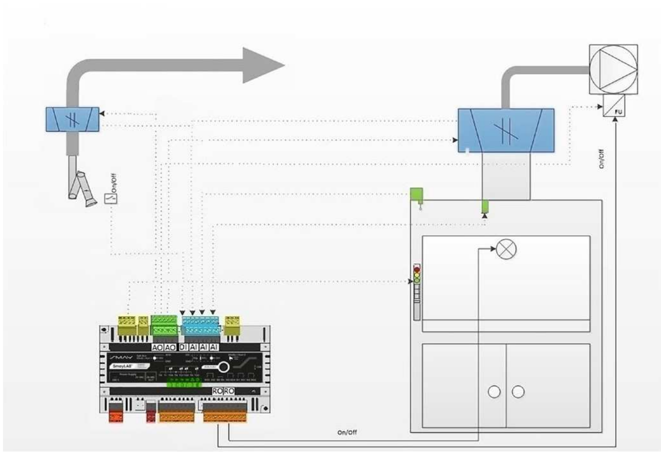


Figure 26. A fume hood with the airflow rate control carried out by means of the VAV device and the window position measurement by means of a string potentiometer; it is also possible to turn on the exhaust fan (via a contactor) and light in the fume hood. It is possible to control the fume hood fan inverter. Additional control of a local exhaust system.

Communication

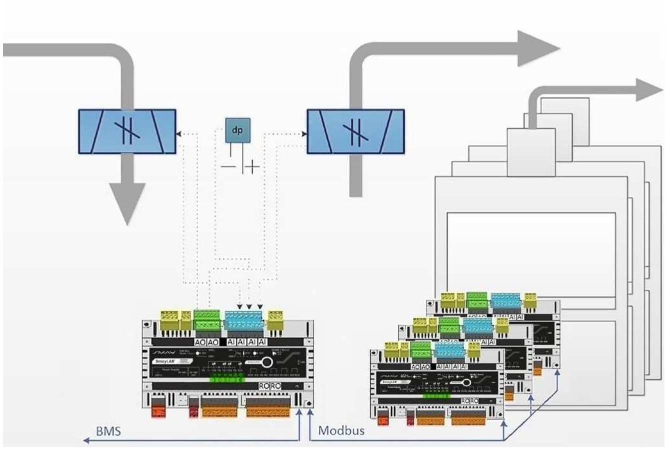


Figure 27. Example of a room with the airflow rate control at the air supply and kitchen ventilation hood lines, pressure control and compensation of the air being extracted by the fume hoods. It is possible to connect to the BMS.

LR(S) – System Controller

When ordering, please provide information as follows:

LR(S) <X>/<Z>-<U> <N>

Where:

X	Application type*	
		LRS
	203	**- Fume hood + room application**
	204	- Fume hood application
	205	- Room application
		LR
	002	- Ventilation hood application
	102M	**- Room application (Master)**
	102	- Room application
	202M	- Fume hood + room application (Master)
	202	- Fume hood + room application
Z	Power Supply	
	24	**24 V AC power supply**
	230	230 V AC power supply
U	Housing*	
	none	**- No housing**
	B	- Plastic housing
N	Station address	
	from 1 to 10	**- Slave controller number in a single LAN**
	from 11	- Master controller number in a building

* Optional values, if not specified, the default values will be used

Order example: **LR102M/24-B**