391-2000-IFU v01
Issued; 2025-01-07

MEDICVENT

Cleaning air in healthcare

901112 Central system Smart

Installation, operation and maintenance

Series 1-

- **This manual is intended for systems with part numbers 901112 and serial numbers starting with 1-.**
- **Before the system is put into operation, this manual must be studied in detail.**
- **Only MEDICVENT authorized personnel may perform repairs and adjustments on this equipment.**
- **For repairs, only MEDICVENT original parts may be used.**
- **MEDICVENT reserves the right to make changes regarding design and use without prior notice.**

Medicvent AB

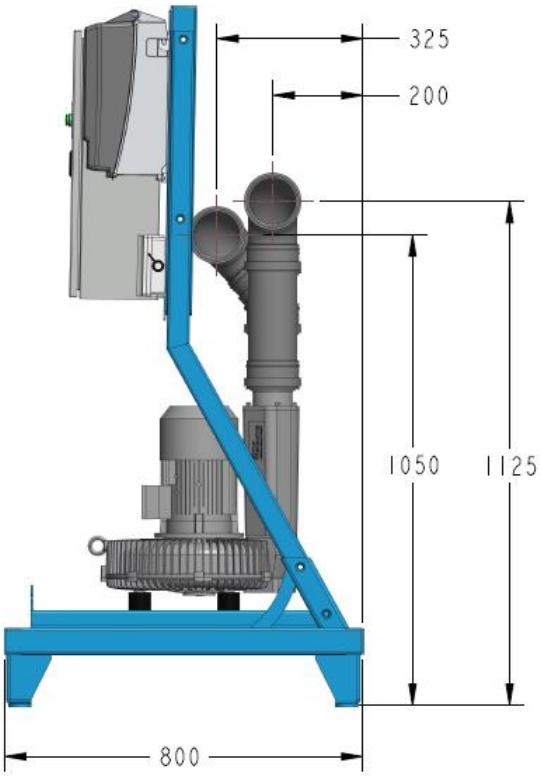
Pendelgatan 3
90422 Umeå

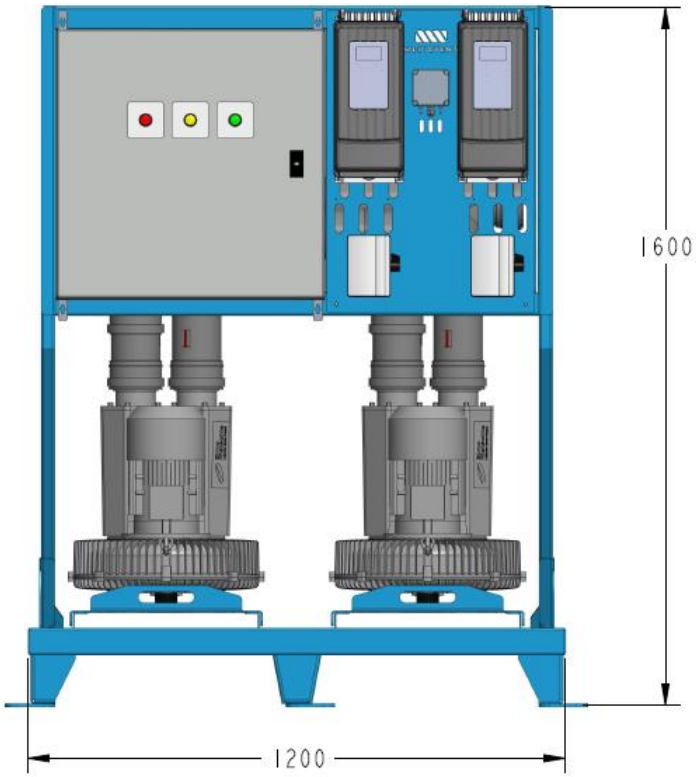
Tel: 090-127500
Email: info@medicvent.se
Web: www.medicvent.se

Content

Technical data

Voltage:	400 V AC, 50 Hz 3-fas +N +PE
Recommended Fuse:	3P C16A
Power Rating Fan Motors:	2x2,5 kW
Rated Current Fan Motors:	2x5 A
Max airflow with -100% redundancy:	280 m³/h @ -50 hPa
	250 m³/h @ -100 hPa
Vacuum:	0 – -100 hPa
Sound pressure level (1 motor at 50Hz):	64 dbA
Sound pressure level (max):	67 dbA
Pipe connection:	2xØ110 mm
Weight:	250 kg
Dimensions (LxDxH):	1200 x 800 x 1600 mm





System description

Description

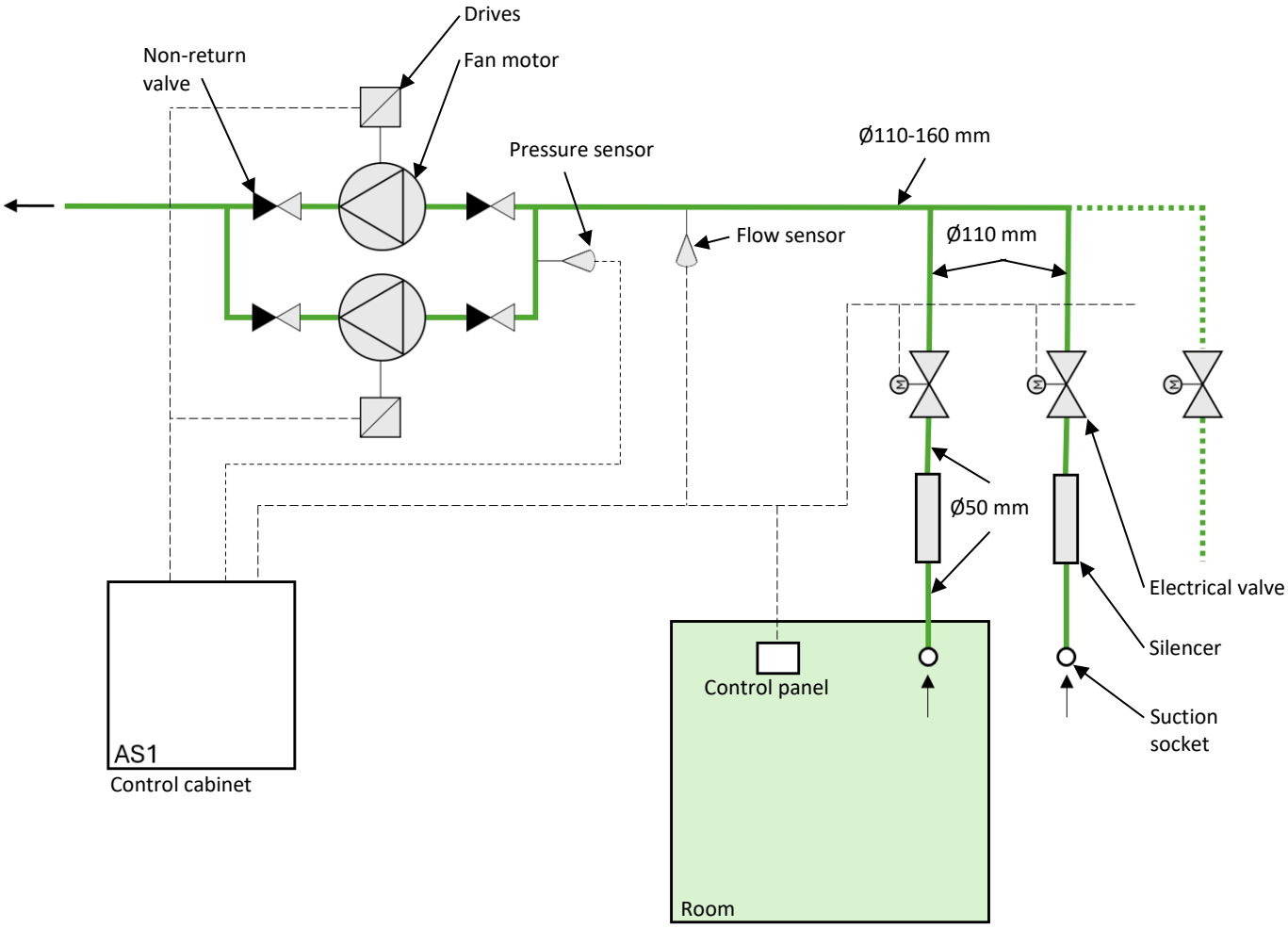
Medicvent's Central System Smart is a pressure-controlled system with flow compensation. The fan system consists of two exhaust fans, two frequency inverters and associated control cabinet, all mounted on a common chassis. The fans are connected by a common pipe system with non-return valves. The fan system uses electrical valves with integrated non-contact flow measurement for each extraction point and one or more control panels for each valve. Communication between fan systems, electrical valves and control panels takes place via Modbus.

Central System Smart monitors the flow demand that exists and compensates the pressure setpoint based on this to achieve the most energy-efficient operation possible.

Central system Smart works with a primary and a secondary exhaust fan, where the secondary the fan only assists when needed or if the primary fan is taken out of service. Primary and secondary fan are automatically switched weekly to use both fans approximately equally.

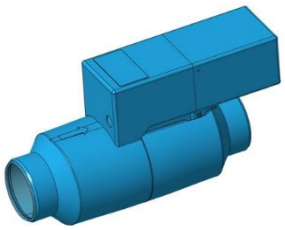
Central System Smart is fully automatic and built for continuous operation. The system offers potential-free connections for operating indication as well as A and B alarms.

Overview



Components

In addition to the fan system, Medicvent Central System Smart requires the following system components to function as intended.

Article:	Description:	
190024	**Main pipe flow sensor** Measures total airflow in the main pipe	
100234	**Electrical valve SMART** Used to regulate the flow to the respective suction outlet.	
190022	**Control panel Display DM/SG** Used for selecting and adjusting the flow to suction outlets for flue gases and double masks.	
532019	**Silencer** Connection Diameter Ø50 mm.	
532030-DM	**Suction socket with lid** For double mask extraction	
532030-SG	**Suction socket with lid** For Smoke extraction	

Installation

Placement

1. The system should be placed on a flat surface indoors, in a fan room or in another suitable area where the temperature does not exceed 35°C.

   NOTE! The fan system must not be located in the same space as gas supply systems or pressurized gas cylinders.

   Once the system is in place, it should be bolted to the ground through the fold-out mounting loops [Figure 1] located under each foot of the chassis.
   At least 1 meter of service space is recommended in front of the system and 0.5 meters on the side where the pipe connection takes place [Figure 2].

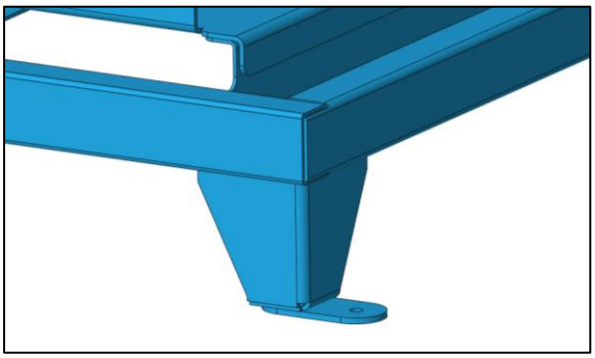


Fig. 1 Mounting loop

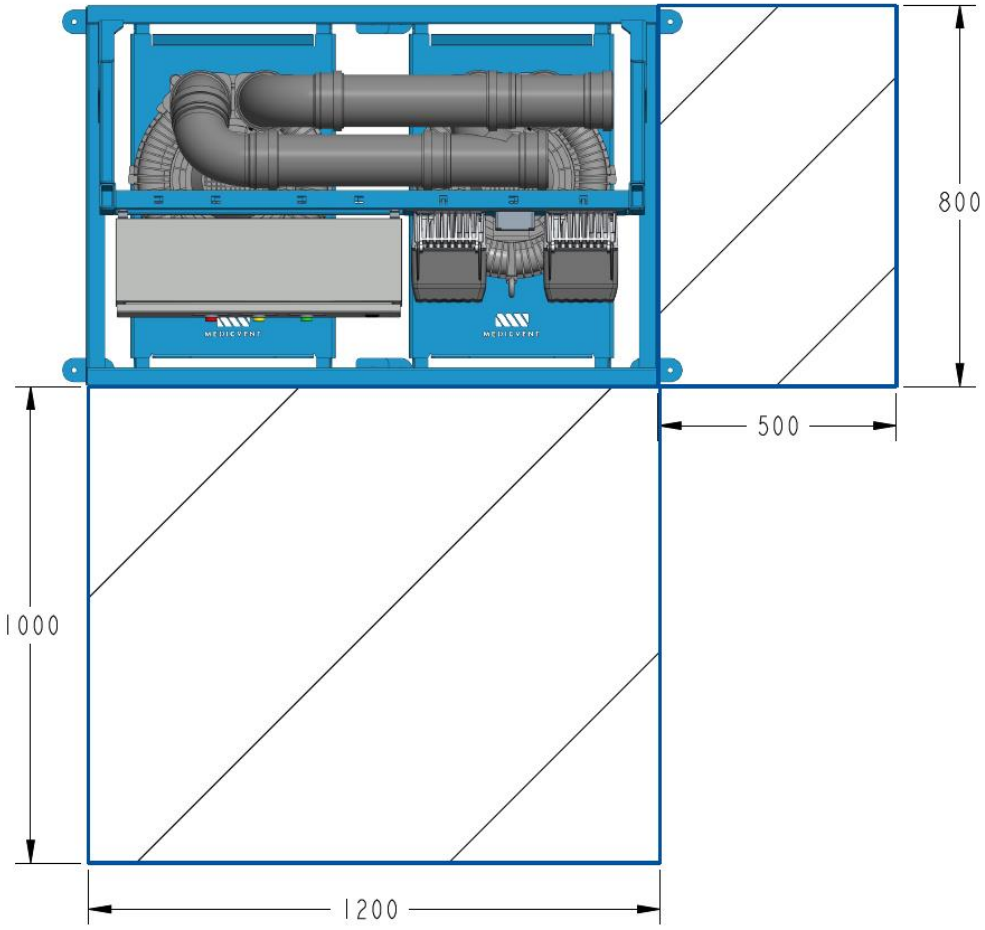


Fig. 2 Service area

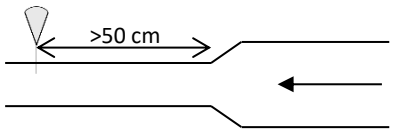
Pipe connection

1. The fan system is connected to the supply and exhaust pipe with Ø110mm sockets. The fan systems connection sleeves are marked with in- and outgoing arrows.
   Before connecting the supply pipe, it must be ensured that the pipe system is free of loose material that can be sucked into the fans.
   The factory standard is that the pipe connection is on the right side of the system when viewed from the front. However, it is possible to lift off and turn the pipes so that the connection takes place on the left side instead.
   For instructions regarding piping, see Annex I.

   NOTE! Pipes must be installed correctly, otherwise unclean air will be blown through the system to the operating theatres.

1. Flow sensor for the main pipe (Article 190024) must be installed in the pipe system supply air pipe near the fan system. The flow sensor is supplied with Ø110mm pipe connections. Check that the flow sensor is mounted in the correct flow direction.

   NOTE! The flow sensor requires at least 50 cm of straight pipe without throttling before the sensor in the flow direction.



Electrical connections

All electrical connections should be carried out according to the wiring diagram attached to the system.

Power supply

Central fan system Smart shall be connected to a backup power system with a 5-conductor system (3 phases +N +PE) on the terminal block L1, L2, L3, N, PE in control cabinet. The electricity supply to the system must be free of harmonics and other disturbances.

The priority of the system in the backup power system is determined by the end user after the required risk analysis (non-life support systems)

Communication

Communication between the components of the extraction system (e.g. flow sensors, electrical valves and control panels) takes place via the protocol Modbus RTU with physical interface RS485.

All equipment mounted on the chassis is connected upon delivery. Other equipment must be connected in series on a common loop (see wiring diagram in control cabinet). These devices normally also receive their electricity supply from the control cabinet via the loop. If the extraction system contains more than 10 individual extraction points or if the length of the loop causes a voltage drop of 4V or more , an additional voltage supply is recommended on the loop. The recommended cable type is Medicvent article 100222 (2x1.5 mm^2 + 2x2x0.5 mm^2). Orange pairs of cables should be available as a backup in the main loop and used as a return of RS485+/- in cases where, for example, control panels are mounted in anaesthesia or surgical pendulums, see Figure 3.

NOTE! It is not permitted to create a star network out to several units from a junction box.
Exceptions to this can be made for the connection of electrical valves when the cable length does not exceed 1 meter, see Fig. 4.

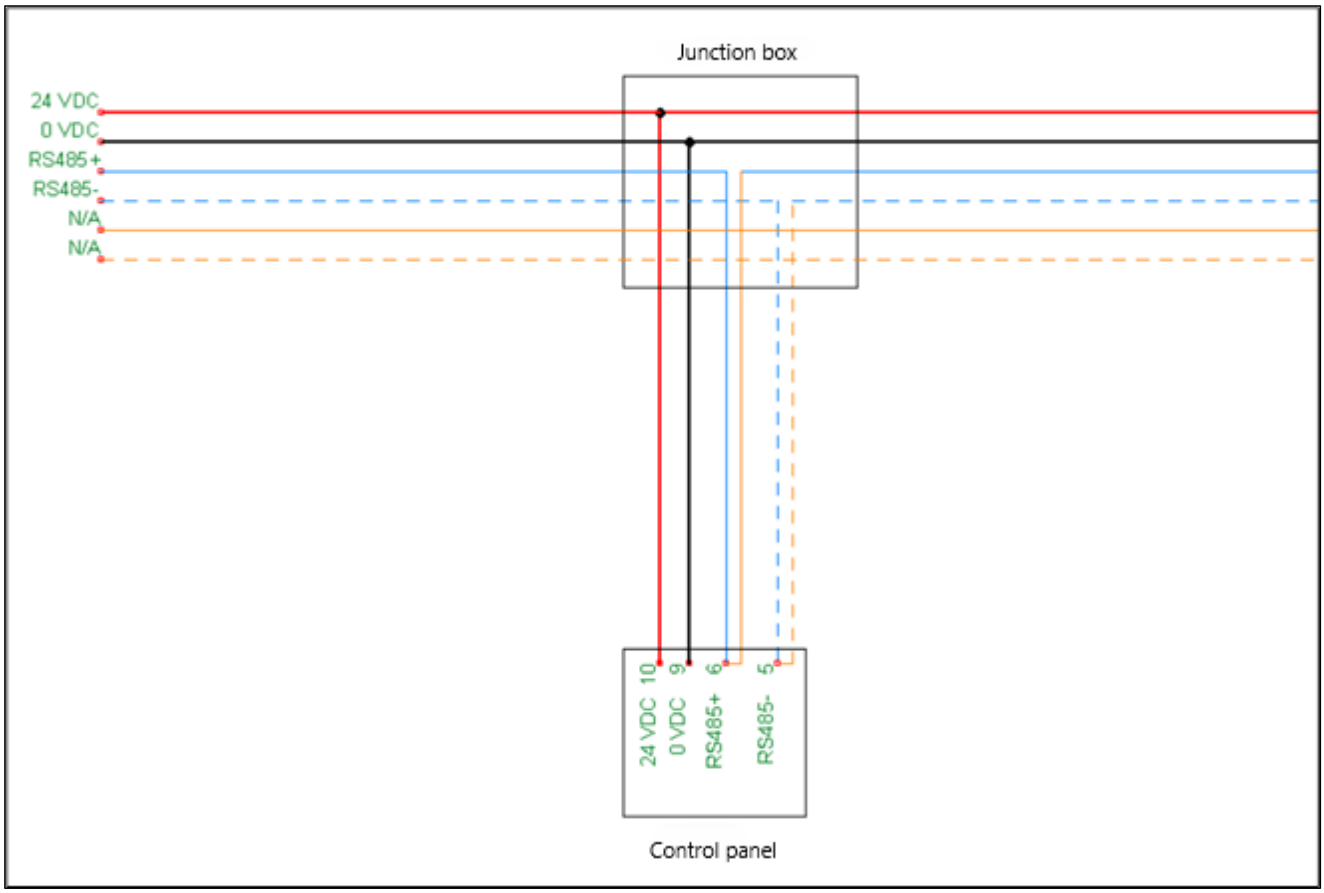


Figure 3, Connection of control panel mounted in, for example, anaesthesia or surgeon's pendulum

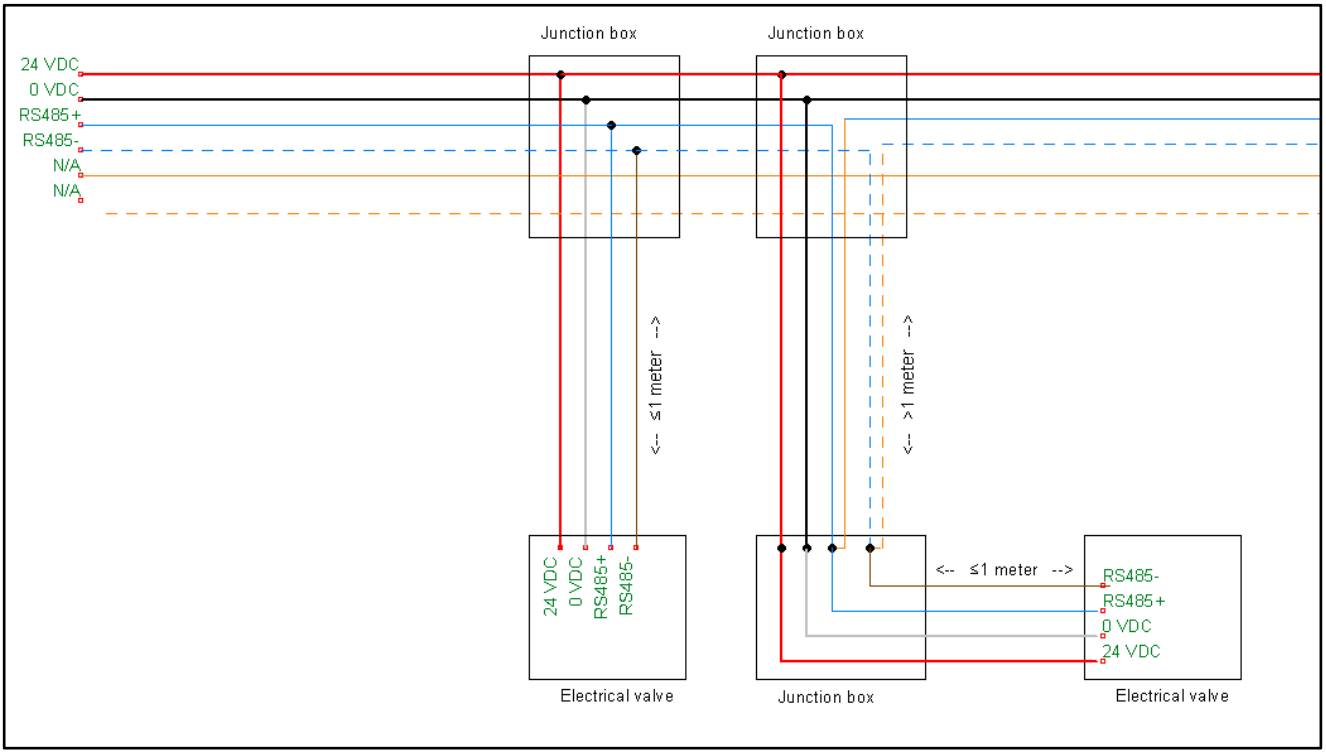


Fig. 4, Connecting electrical valves

Alarms and operating signals

Central System Smart offers potential-free contacts for operating indication as well as Alarm-A and Alarm-B. For connection in the control cabinet, refer to the wiring diagram attached to the system. Acknowledgement of alarms takes place automatically when the fault has been fixed.

Detailed alarms can be checked in the fan system's operating picture (see Troubleshooting).

Operation Indication

The relay contact for operating indication is closed as long as the system is able to maintain the desired negative pressure (normally closed). The signal is also indicated by a green light on the control cabinet during normal operation. If the signal for the operation indication drops, this will also be shown with a warning symbol and error code E1 on all control panels.

Alarm-A

The relay contact for Alarm-A opens when there is a serious fault in the system (normally closed). Alarm-A must be addressed urgently to maintain system function.

The following are examples of errors that result in Alarm-A;

- Blown fuse in control cabinet

- Communication fault with control panel, electrical valve or frequency converter

- Faulty pressure sensor

In the event of a fault on the electrical valve, the warning symbol and error code E2 are shown on the control panel belonging to the affected socket.

Alarm-B

Relay contact for Alarm-B opens when there is a non-serious fault in the system (normally closed).

The following are examples of errors that result in Alarm-B;

-The system is forced to fan 1 or 2 via switch DO1 in control cabinet.
-Abnormal pressure deviation (IsValue/Setpoint).

Modbus

The system can also act as a Modbus slave under a superior control system for building operations via Modbus TCP. Start and stop of the system, operating indications and specified alarms can then be communicated via Modbus.

The system is connected to the local network via a network socket on the left side of the control cabinet seen from the front. The system is set to obtain the IP address automatically via DHCP and the Modbus slave then communicates on port 502.

Contact Medicvent for a list of current Modbus registries.

Remote access

Central System Smart can be connected to the internet to enable remote access to the system. The system is connected via network cable, sockets for network connection are located on the left side of the control cabinet when viewed from the front. Connection can be made either to the building's fixed internet connection or to a modem for mobile data. The system is set to obtain the IP address automatically via DHCP. To enable remote access to the system, a port forwarding must be made from an external port to the system's port 443.

Commissioning

The commissioning of Central System Smart shall be carried out by Medicvent or by a distributor authorized by Medicvent.

Preparations

Before commissioning can take place, the following points must be met;

1. The fan system must be in its final place and bolted to the floor (see Placement, page 7).
2. The fan system's power supply should be connected and active (see Power Supply, page 8)
3. The pipework must be complete up to the Suction socket (see Pipe connection, page 8).
4. Main channel flow sensor should be fitted (see Pipe connection page 8).
5. Electrical valves must be mounted in the pipe to the respective suction socket (see 410-2000-IFU).
6. Control panels must be mounted adjacent to the respective suction socket (see 346-2000-IFU).
7. Flow sensors, electrical valves and control panels must be connected to the communication loop (see Communication, page 8).

Operating Modes

Central System Smart is built for continuous operation and constantly adapts to the current operating situation. The fan system automatically restarts after a power loss.

The possibility of manual start and stop of the fan system is available, both through the connection of a potential-free relay and via Modbus.

Central System Smart switches automatic operation between the two fan motors. In the event of service or repair in the system, the priority fan motor can be set manually via switch DO1 in the control cabinet.

System login

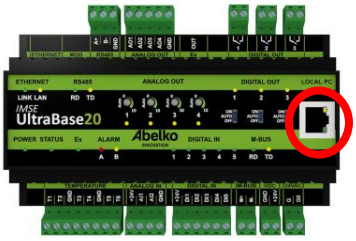
Central system Smart is regulated and monitored by a control system.

This system manages:

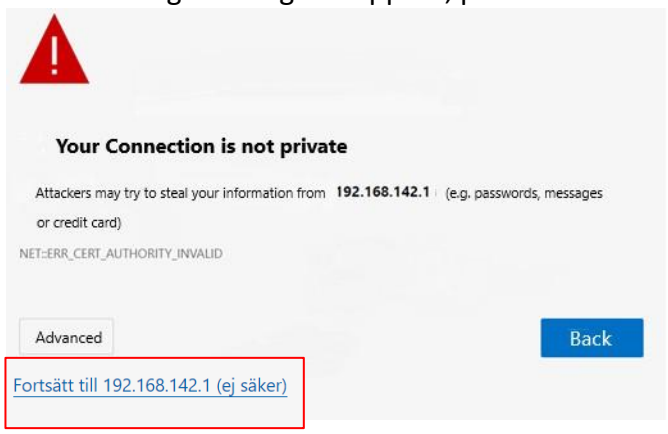
- System Settings
- Uptime measurement
- Connected Device Control
- System logs
- User profiles

The user can log into the system with a computer and network cable to get information out of the system. The procedure for this is as follows:

1. Connect computer and network cable to socket inside control cabinet



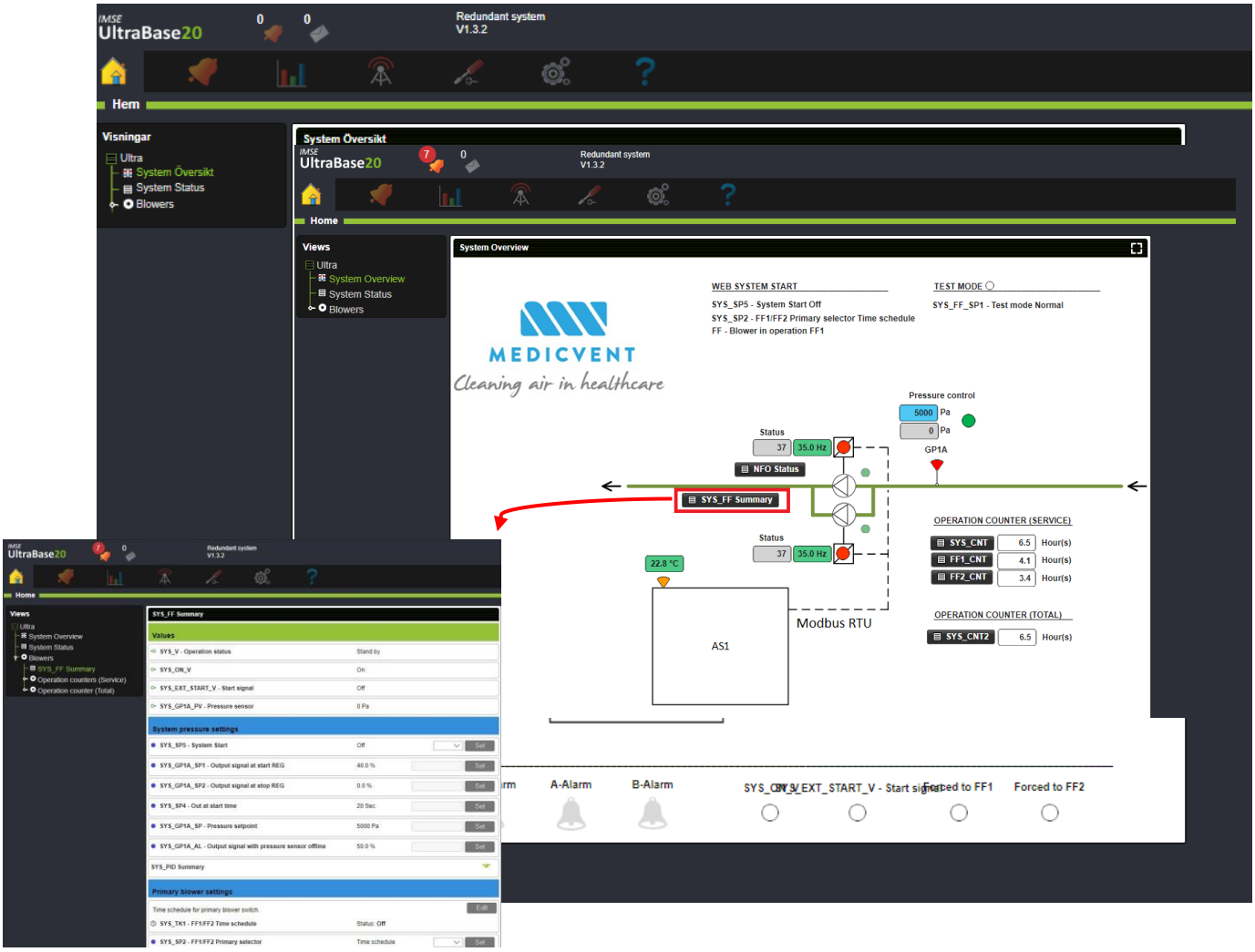
2. Launch your computer browser and type in this address https://192.168.142.1
3. The following warning will appear, press Advanced and Continue



1. Enter the details of users and log in

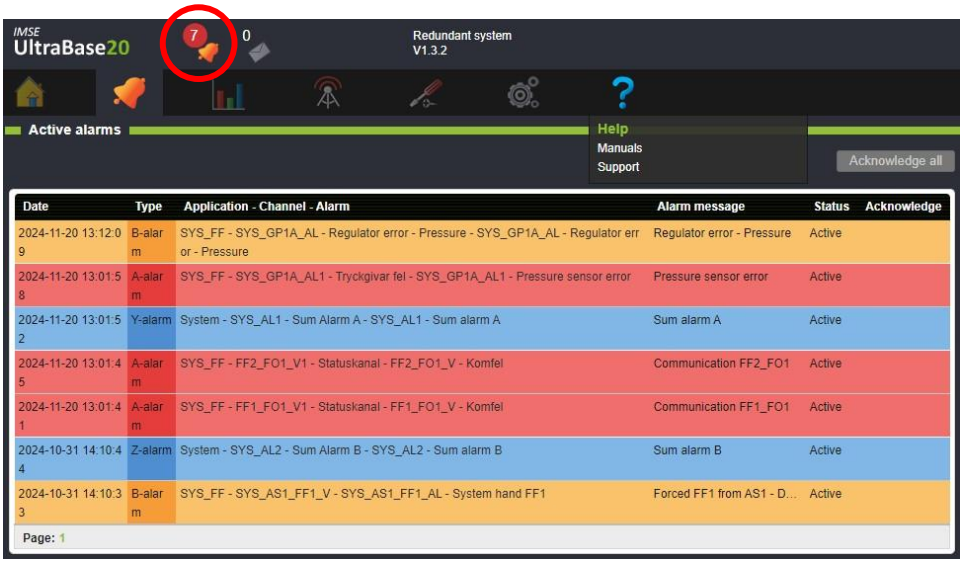
System image

The system overview image presents a graphical system status in real time. The black buttons lead to sub-pages with more information.



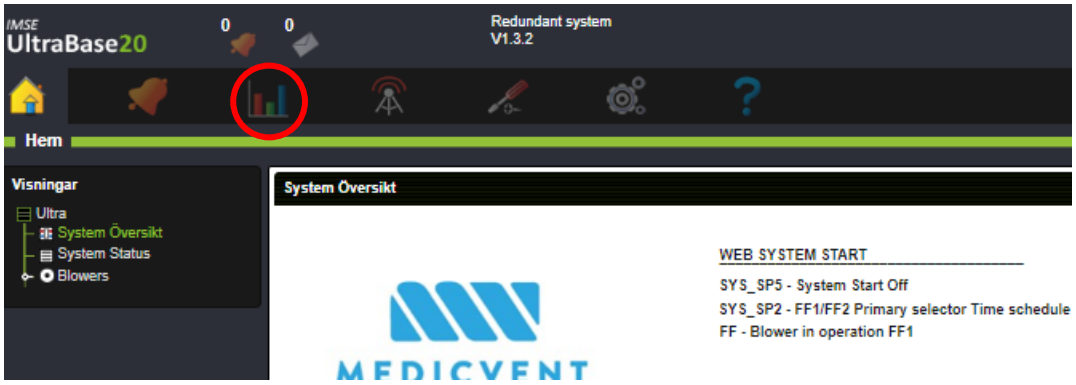
Alarm

Active alarms are shown by clicking on the notification with the alarm bell. Alarms cannot be acknowledged manually, acknowledgement is done automatically when error is fixed.



Logged data

Some information about the operation of the system is kept in logs. These can be accessed by clicking on the Data tab.



Examples of different types of data that can be logged;

- System flow
- Flow per outlet
- Utilization rate of each fan motor

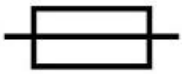
Troubleshooting

If the system gives one of the sum alarms, Alarm A or Alarm B, more detailed troubleshooting needs to be performed. If the fan system is connected to a superior control system for building operation via Modbus, exact fault codes can be read out via the parent system.

If the fan system does not have the connection above, error codes can be retrieved directly from the fan system control system (see System login).

Contact Medicvent and provide the current error code for suggested measures.

Symbols

	Refer to instruction Manual/booklet
	Caution, risk of electric shock
	Protective earth (ground).
	Alternating current
	Fuse
	WEEE Waste Electrical and Electronic Equipment To be handed in for recycling

Annex I – Pipe Installation

It is important not to create unnecessary noise and flow resistance in the pipe system and then it is advantageous to use PP plastic pipes.

Pipe connections with rubber seals should be used to simplify installation and to be able to easily change and adjust the installation for the best flow and lowest noise.

To prevent the rubber seals from loosening and sliding into connections or damaging leaks, all pipes must be cut as perpendicular as possible and deburred on the inside and outside.

When assembling, always use lubricant on the rubber seals.

All connections must be inserted to the bottom so that the joint is as smooth as possible.

All piping must be as straight as possible.

Sharp angles must not be used. To minimize pressure drop, it is better to use 2 x 45° bends instead of 1 x90° bend.

Electrical valves are mounted as close to the suction socket as possible to reduce the risk of measurement errors in flow measurement. Refer to separate installation instructions for electrical valves (410-2000-IFU).

Silencers must be mounted between the electrical valve and the suction socket, preferably as close to the suction sockets as possible.

On page 17 you can find examples of recommended connections.

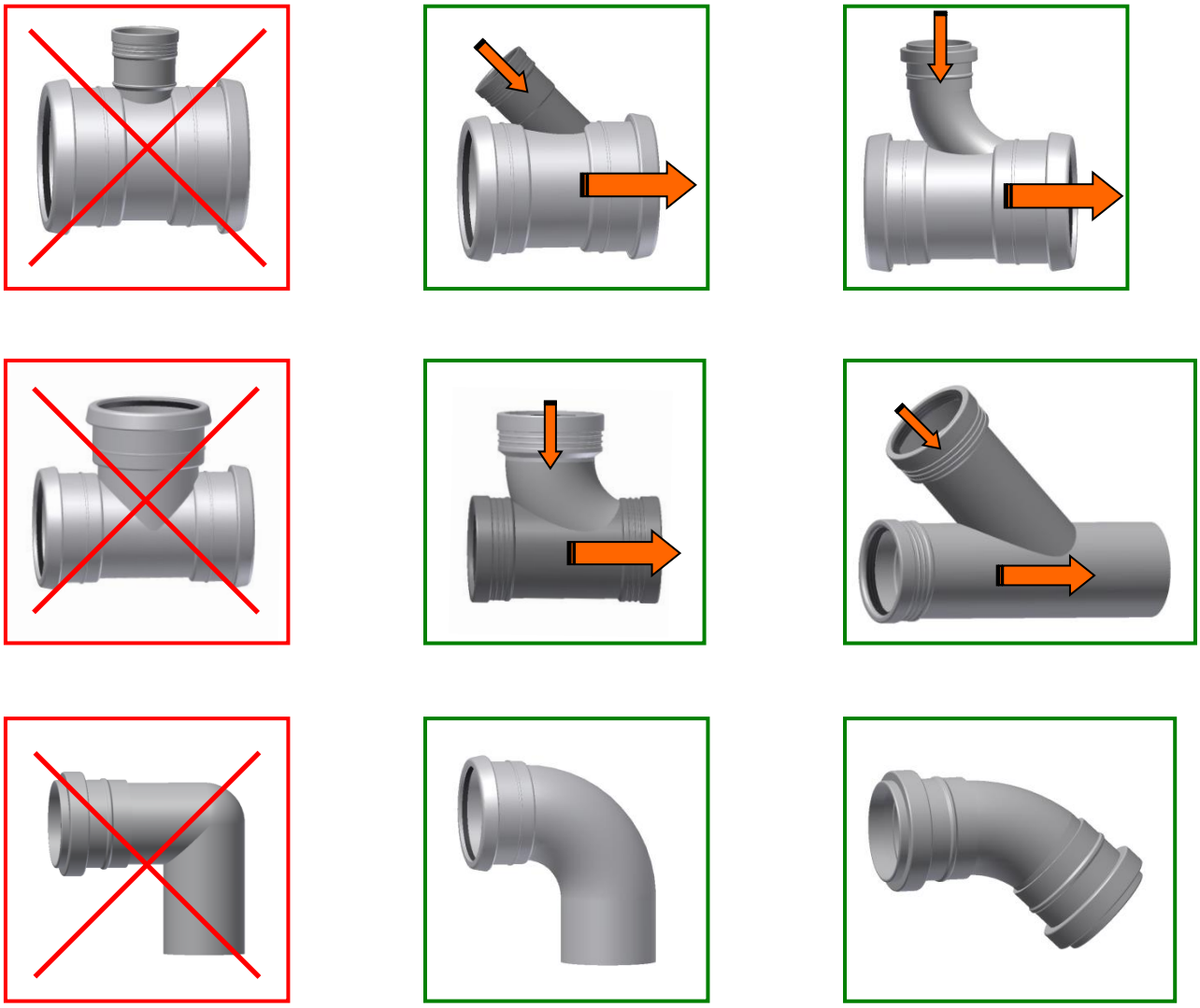
On pages 18-19 there are examples of solutions for piping.

Pipe dimensions

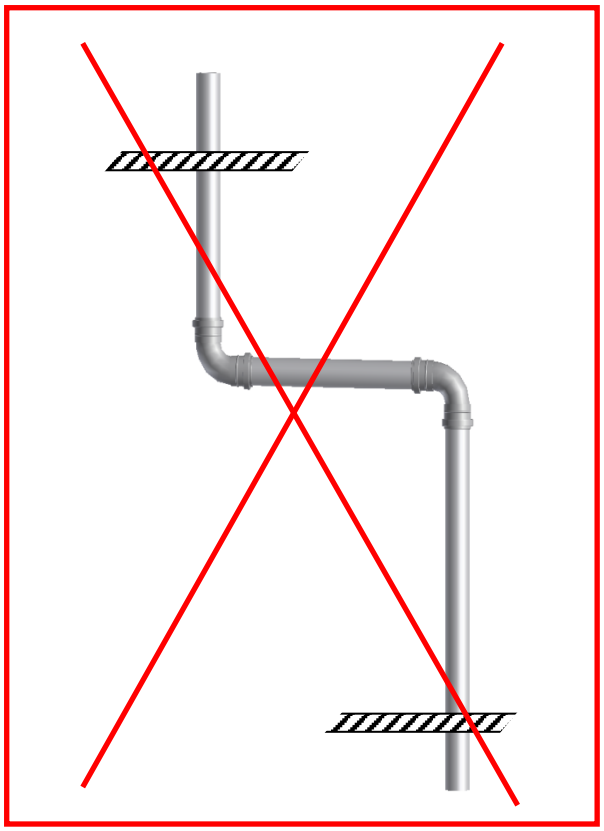
Main piping:	Ø110-160 mm*
Branch between electrical valve and suction socket:	Ø50 mm

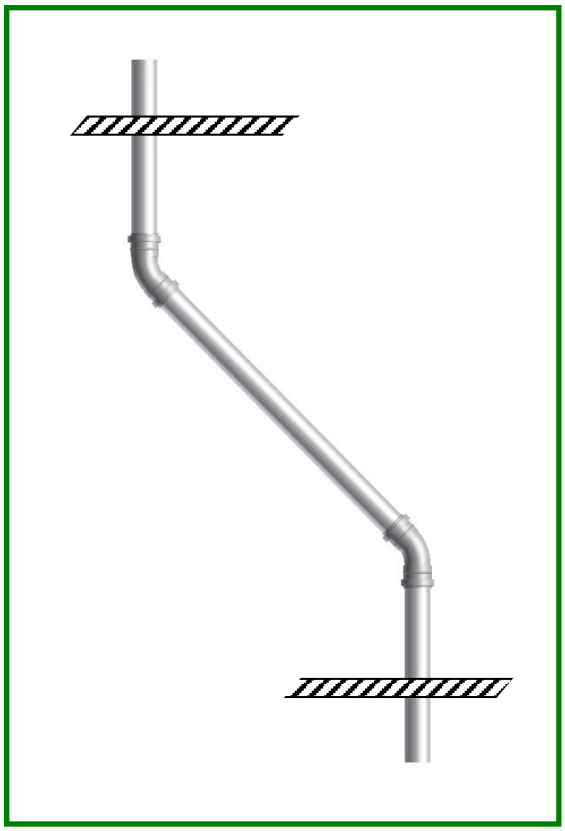
*Depending on length and design. The pressure drop in the pipe between the fan system and the socket must not exceed 2.50 hPa.

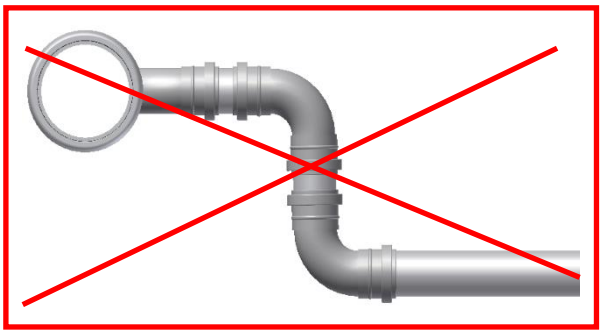
Recommended connectors

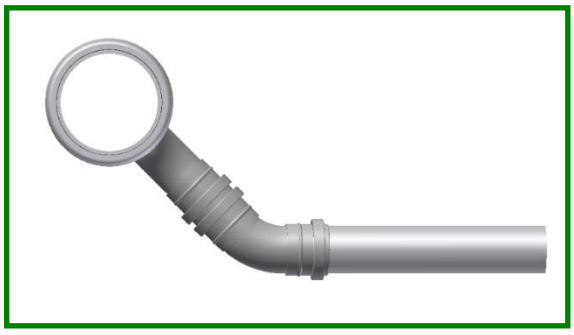


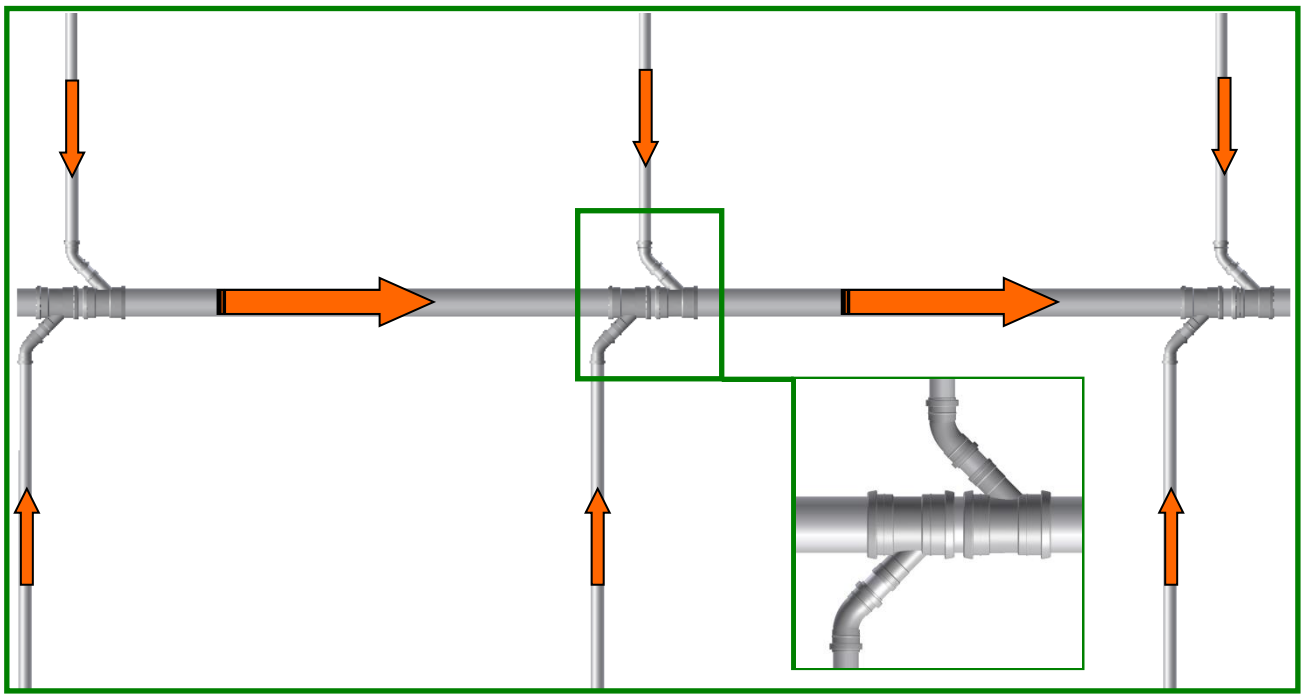
Example of piping

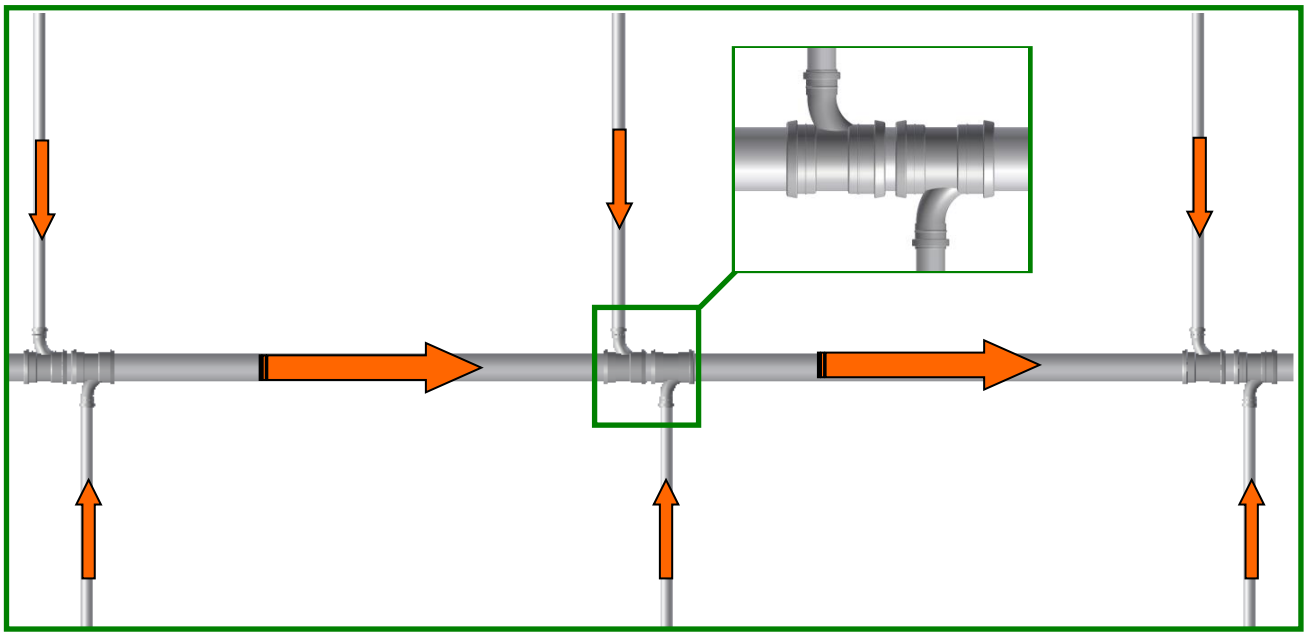












Medicvent AB

Pendelgatan 3

SE-90422 Umeå

Sweden

Phone: +46 90 12 75 00

info@medicvent.se

MEDICVENT

Cleaning air in healthcare