

CMR CONTROLS

AIR MANAGEMENT SYSTEMS



PRESSURE - VELOCITY - VOLUME SENSORS

MEASUREMENT - MONITORING - CONTROL

CMR CONTROLS Ltd
Precision Air Pressure and Volume Sensors

22 Repton Court Repton Close
Basildon Essex SS13 1LN GB
Web www.cmr-controls.com

Phone +44 (0) 1268 287222
Fax +44 (0) 1268 287099
Mail sales@cmr-controls.com



CMR TRANSDUCER MANUFACTURING

Quality, Service and Support is our strength



The CMR Pressure Transducer

CMR has been manufacturing pressure and velocity transducer for 30 years. The CMR pressure transducer is based on variable reluctance and measures the displacement of a precision diaphragm by means of frequency change, which means it is not affected by humidity and can withstand a high concentration of formaldehyde. The displacement of the diaphragm is only 0.00015 mm for 0.1Pa or 0.15mm for 100Pa measurement and therefore no air volume is required. This means the transducer is capable of measuring pressures up to 200m distance utilising the CMR colour coded PVC tubing without losing its accuracy.

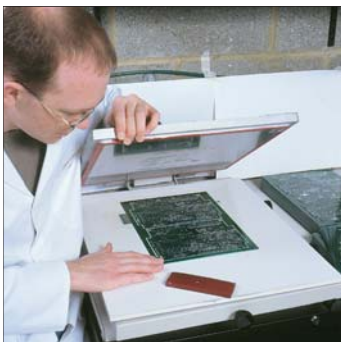
CMR Transducers



CMR Sensing Coil Manufacture

The high precision sensing coils have thousands of turns of copper wire which is thinner than hair. The coils are matched and utilised as pairs. The one coil is positive and the other coil is negatively excited, and hence they are self compensating during temperature changes. This makes the CMR transducer unique as the sensor will not drift away from its design. In fact, the older the sensor gets, the better the performance and repeatability becomes.

CMR Coil Winding



CMR PCB Assembly Preparation

The electronic circuit boards are designed by CMR and the PCB is built to conform to environmental issues. Once the bare PCB is ready it is inspected by CMR and special solder screens are used to prepare the PCB for automatic placement of the components. The latest solder technology is used to guaranty perfect solder joints. The solder paste used does not need a board washing process after using the re-flow solder machine. This makes this solder process extremely environmentally friendly.

PCB Solder Preparation



CMR Surface Mount Pick and Place Machines

CMR populates the PCBs on the latest Pick and Place SMD machine, which can place up to 4500 components per hour. The advantage of the machine is that CMR can manufacture a single or many thousands of electronic boards. The machine is easily programmed and incorporates a complete stock control system. All components are on automatic feeders fitted all around the machine allowing fast and reliable manufacturing output. This facility allows CMR to be flexible to manufacture any sensor just in time.

Electronic Assembly

The pressure sensors are designed and manufactured by CMR

CMR ASSEMBLY AND CALIBRATION

Calibrations are traceable to International standards

CMR Sensor Production

The transducer and electronic circuit board are inspected before they are matched to fit together. A pre-calibration is carried out to test the complete assembly for linearity and repeatability. Once the pressure sensor is assembled and has passed a pre-qualifying test, it is ranged for its operating pressure and calibrated to provide 0..10V, 4..20mA and modbus over its published pressure range. A final test stage confirms the correct functioning of the complete sensor assembly.



Sensor Assembly

CMR Temperature Compensation Systems

Once the sensor assembly is ranged and tested, it is placed into one of the CMR climate chambers which can hold a large quantity of sensors at any one time. The chamber is fully computerised and each sensor is connected to an especially designed micro processor which drives the temperature of the chamber from 10°C to 50°C in 10° stages and then back again. During the temperature cycles, the temperature drift of each CMR pressure sensor is measured and finally compensated automatically, without opening the climate chamber. After several hours the sensors are ready for final mounting into enclosures.



Climate Chamber

CMR Calibration to International traceable Standards

Finally, the CMR pressure sensors are calibrated against automatic precision calibrators. All CMR laboratory calibrators are traceable to all national standards and are calibrated by the national laboratory and are certified. During calibration of the CMR sensors, a multi point certificate is produced indicating the actual pressure injected and the relative measurement output of the CMR sensor. Once the sensor has passed, the certificate is printed and is filed at CMR and a copy is provided with the order as standard. Each sensor has its unique serial number and a copy of the calibration certificate can be obtained from CMR at any time.



Final Calibration

CMR Portable Calibrator with Traceable Calibration Certificate

CMR manufactures automatic calibrators with mains and battery operation. The CAL 150 has a built in automatic pump which is under software control and any CMR sensor can be calibrated. It measures rising and falling pressures and has built in auto zero. The ideal tool to calibrate sensors which need traceable certificates to national or international standards. It can also be used for tube testing and pressure switch adjustments. The CAL 150 can measure differential pressure which means all CMR flow measurement devices or pitot tubes can be connected to read air volumes.



CAL150 Calibrator

CMR Sensors are supplied with calibration certificates for easy validation

CMR AIR PRESSURE TRANSMITTERS

Precision low air pressure measurement and alarming



P-Sensor

The P-Sensor can measure and control positive or negative static or differential air pressure. It is used in clean rooms, industrial processes, research laboratories and large office buildings where accuracy, repeatability as well as traceable calibration certificates are needed. A keyboard, display and auto-zero is standard. The ranges start at 10 Pa and go up to 7,500 Pa. The outputs are 0..10V, 4..20mA and modbus, ideal for monitoring and controlling.



V-Sensor

The V-Sensor is like the P-Sensor with additional functions such as a remote display as well as an alarm output which makes it an ideal standalone pressure alarm system. The main advantage is that the display on the keyboard, remote display and the scada or BMS display is identical. There is also one change over volt free alarm relay and a sounder with a mute button on the keyboard. A PID control output is on separate terminals.



DPM-Sensor

The DPM is for panel mounting. It is like the P-Sensor or V-Sensor but has an additional relay which can provide low and high, or a low and high alarm on one relay and a remote sounder output on the second relay. It has pressure diverting valves onboard as an optional to make calibration easier without removing tubes. It is ideal for monitoring, alarming and controlling of sterile research and manufacturing areas as well as process control applications.



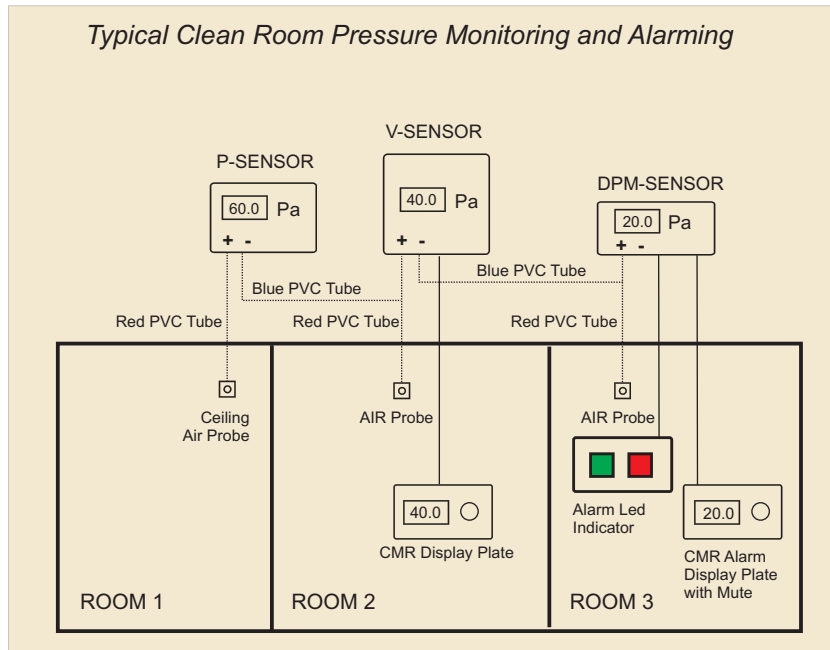
Tubes + Fittings



Ceiling Air Probe



Air Probe Plate



Remote Display



Two way led alarm



Four way led alarm

The sensor ranges are from +/- 10 Pa and outputs of 0-10V, 4-20mA and modbus rtu

DPM PRESSURE VELOCITY SENSOR

With high and low alarms and control output function



DPM-Sensor

The DPM measures air pressure as well as air volume. One relay is used as low and high alarm led output and the other to switch on a remote alarm sounder. Both have programmable time delays. A mute input via keyboard or remote switch shall silence the internal and external sounder.

The DPM is a unique instrument for monitoring, alarming, controlling and remote indicating. A compact central monitoring system which can be connected to clean rooms, laboratories and manufacturing areas at a distance of over 200m. It has all the signal outputs for any scada or BMS system.

All DPM instruments are calibrated to traceable international standards and are supplied with calibration certificates and validation documents.

CMR manufactures standalone monitoring panels with up to thirty DPM pressure, velocity or air volume sensors fitted to the front door. Colour coded PVC tube can be connected onto barbed nipples situated at the top of the panel. The tubing can be configured to either measure room differential pressure or static pressure against a common datum, air volumes or air change rates and HEPA Filter pressures.

The Panel is supplied complete with power supply, fuses and output terminals ready for connections to a central scada system. Output signals are programmable and can also be used for chart recorders, local process applications and control of damper motors or fan speed. The panels are factory tested, calibrated, validated and ready for installation on site.

Future calibration is easy as all DPM's are in a central location. As an option, calibration nipples can be fitted above each instrument and having the optional isolation valves in the DPM, no tubing needs to be removed during calibration.



DPM Monitoring Panel

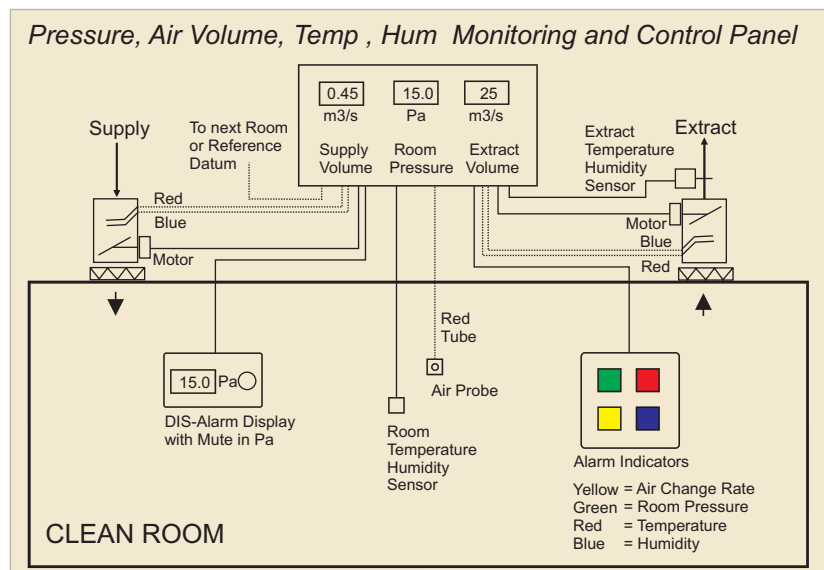
A Typical Monitoring Application

The supply air volume or air change rate is measured, alarmed and controlled continuously.

The room pressure is measured via the Air Probe against an adjacent room or a reference and is alarmed and displayed on the remote alarm display. It can also control the room pressure.

The extract air volume, HEPA filters as well as temperature and humidity can be monitored and alarmed.

Large colour alarm indicator led's and a common sounder shall alert the clean room operators.



Complete factory calibrated and validated monitoring system ready for installation

CMR AIR VOLUME TRANSMITTERS

For clean rooms, laboratories and general ventilation systems



P-Sensor

The P-Sensor is a velocity and volume transmitter and it works in conjunction with all the CMR veloprobes, velogrids, oval flow probes and venturis to measure duct volumes for monitoring and controlling of fans and dampers. The P-Sensor has a linear volume output and the duct width and height, density and k-factor can be entered through the keyboard. The sensor can display m/s, m³/s, m³/h, l/s, airchange rate or simply differential pressure in Pa.



V-Sensor

The V-Sensor is like the P-Sensor with additional functions such as a remote display as well as an alarm output. The advantage is that the display on the keyboard, remote display and the scada or BMS display is identical. There is also one change over volt free alarm relay as well as an on-board sounder with a mute button on the keyboard. 0..10V, 4..20mA and modbus are provided on separate terminals for monitoring and PID control.



DPM-Sensor

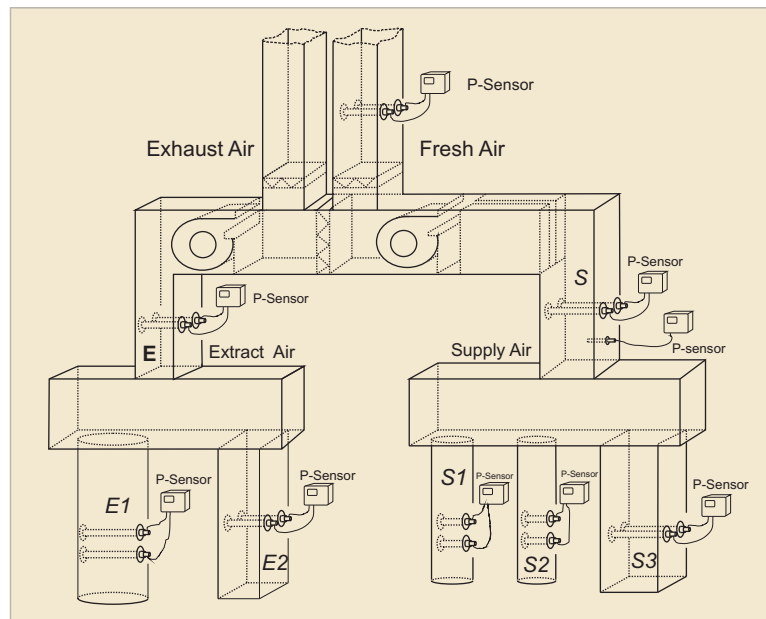
The DPM is for panel mounting. It is like the P-Sensor or V-Sensor but has an additional relay which can provide low and high, or a low and high alarm on one relay and a remote sounder output on the second relay. It has pressure diverting valves onboard as an optional to make calibration easier without removing tubes. It is ideal for monitoring, alarming and controlling of air volumes in clean rooms, laboratories as well as in any ventilation system.

Air Volume Measurement

The Veloprobe and P-Sensor air-volume sensor combination is used to measure the total supply, extract and fresh air volume in large air handling systems. Individual supply and extract ducts are also measured to provide correct air volumes to all parts of the building. The drawing shows a typical air distribution duct system the control function could be in many ways i.e.

$S = E$ plus minus offset,
or $S1+S2+S3 = E1+E2$ plus-minus offset.

CMR manufactures the Veloprobes, Velogrids, Flow Probes, Attenuator Oval Flow Probes and Venturis to any size and materials such as stainless, aluminum and PPs Plastic and provides a complete design survey and site commissioning.



The sensor ranges can be adjusted to Pa, m/s, m³/s, m³/h, l/s and air change rate.

CMR AIR VOLUME DUCT SENSORS

For accurate and repeatable air velocity pressure measurement



CMR Stainless Veloprobes

The Veloprobes are the most used duct velocity pressure sensors. The simple mounting is ideal for new and retro-fit installation. Four holes have to be drilled into the existing duct work and the veloprobes are lined up across the duct and secured by four flanges. The veloprobes have a number of averaging sensing points across the duct width on the impact and static ports. Both sensing tubes can be rotated to suit the air flow direction for improved accuracy



Velogrid Air Volume Station

The Velogrid consists of a duct frame which is made to measure in increments of 100mm in height and 50mm in width. The length is always 200mm. The duct flange is standard. The probes cover up to appr. 25% of the duct height which means, if the duct is 1000mm high, there shall be ten probes with a total of 80 averaging points to measure the impact pressure and two averaging static pressure points which together provide the velocity pressure.



Oval Flowprobe for Attenuators

The Oval Flowprobes are made in aluminum and have a number of averaging sensing points for impact and static pressure sensing. They are normally fitted into air handling unit silencers and are made to measure. Each air passage way should be fitted with one probe to provide an excellent average. A number of different brackets can be supplied to fit them in between the attenuator pods. Red and blue PVC tube interconnects the probes.



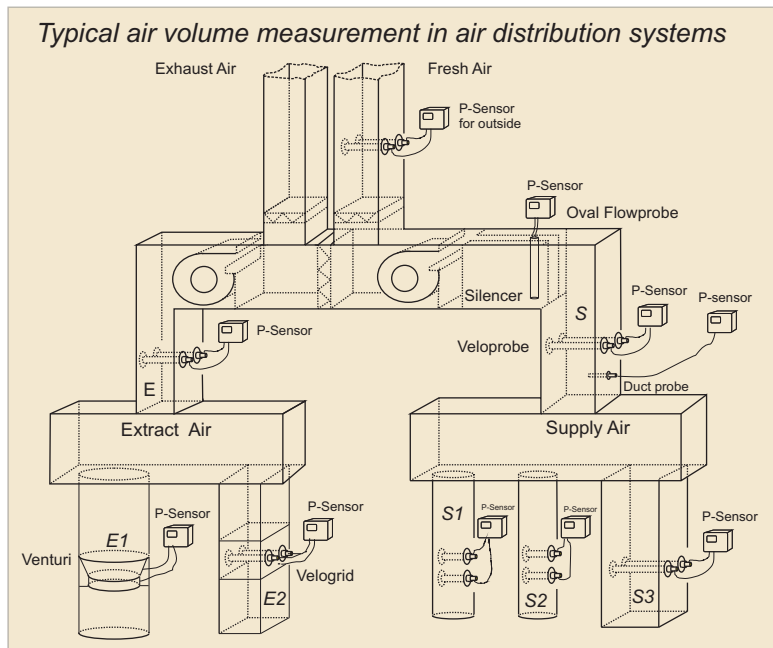
Venturi



Duct Probes



Tube Fittings



Oval Flowprobe



Multipoint Probe



Single End Probe

Made to measure duct velocity pressure sensors 2.5 m/s - 5 m/s - 20m/s up to 130 m/s

DPC AIR MANAGEMENT CONTROL

Compact with built in pressure and air volume sensors



DPC210 Precision Controller

The DPC-210 has one and the DPC-220 has two built-in pressure transducers which can be scaled in pressure or volume. There is a positive and negative pressure connection to measure static or differential pressure. It can be scaled in Pa, m/s, m³/s and m³/h and the control output is Tri-State, 0..10V or 4..20mA suitable to control damper motors and fans. Adjustments can be made via the keyboard, remote operator panel or from the BMS via the modbus communication.



VAV Venturi Valve

The CMR galvanised valve can be supplied with or without a venturi air volume measurement device built in. The valve has a neoprene seal and can therefore be shut off to DIN 1946, Part 3. The actuator is factory fitted and tested and the rotation speed is 30s for 0..90°, but 5s up to 90s are available. The valves are made in 80,100, 150,160, 200, 250, 315, 355 and 400mm Ø. The valve size and Venturi volume factor can easily be entered into the DPC sensor to display and control volume.



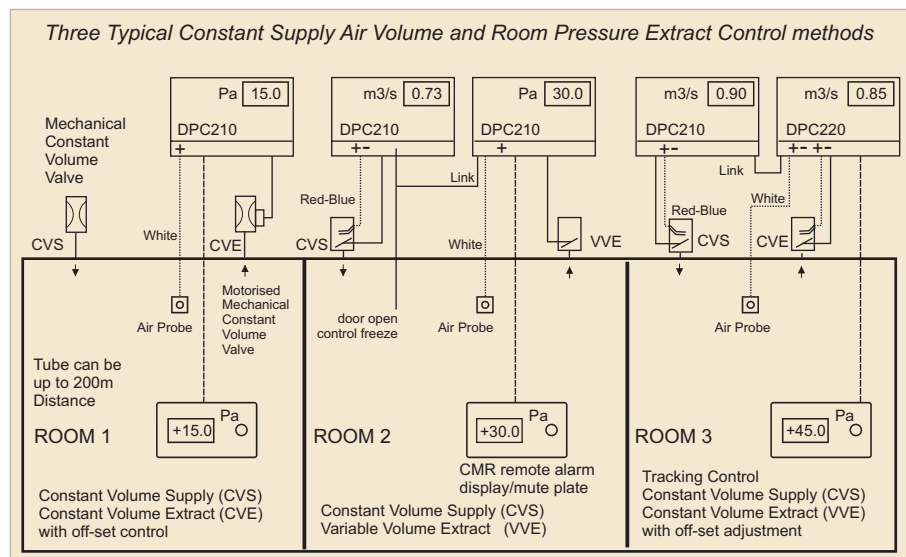
Fast Airtight Damper

The CMR galvanised dampers are manufactured in increments of 100mm in height and 50mm in width. They are air tight to DIN 1946 Part3. The mounting frame is made to industry's standard. Each damper blade is driven by an aluminium wheel. A sturdy axle and bracket secures the CMR fast acting actuator. The standard speed is 30s, but 5s up to 90s for 0..90° are available. Heavy duty bearings and Teflon seals as well as external linkage drives can be supplied on request.

Room-1 has a fixed constant volume supply valve. The extract valve has an actuator which the DPC210 controls to achieve room pressure.

Room-2 has an adjustable constant volume supply valve driven by a DPC210 and an extract valve driven on room pressure by a DPC210.

Room-3 has a constant volume supply and a constant volume extract with tracking control. The room pressure resets the extract volume set point to achieve room pressure.



Accurate supply air volume and room pressure damper controls

DPC CLEAN ROOM CONTROL PANEL

Control system with separate panel mount DPM Sensors



DPC200 Controller and DPM110 Pressure Sensor

The DPC200 has no built in pressure sensor and is normally used with sensors mounted in the field or with DPM instruments in standard CMR control panels as illustrated here. The DPC200 reads in the actual pressure or velocity signal from the DPM and has a set point adjustment and can control damper actuators or fan speed controls. A manual override set point can be adjusted to position the damper to a fixed position in case of maintenance or emergency breakdown. A door interlock switch freezes all dampers in position when doors are opened, to protect the product and clean room.

The DPC200 control panel has been designed to make installations of clean room air control extremely easy. The DPC's are mounted on the backplate and the DPM pressure volume sensors are mounted into the front door. All pressure connections are on the top and the CMR PVC tube can run up to 200m to the actual rooms and ducts. The panel is fitted with a power supply and fuses ready for connections to the mains. There are six control loops per panel and if the supply must also be controlled then three complete rooms can be controlled. If the supply has a mechanical constant volume valve then six rooms can be controlled. Additional terminals are provided to connect the CMR panel to a PLC or BMS system, which can interface to provide remote set points, auto or manual setting, read in the actual pressure or velocity and read in the position of the Damper actuator. A digital connection in Modbus rtu is standard. The Panel is factory tested and comes complete with calibration certificates and installation instructions. The DPM's on the front door shall be engraved to specifications supplied.

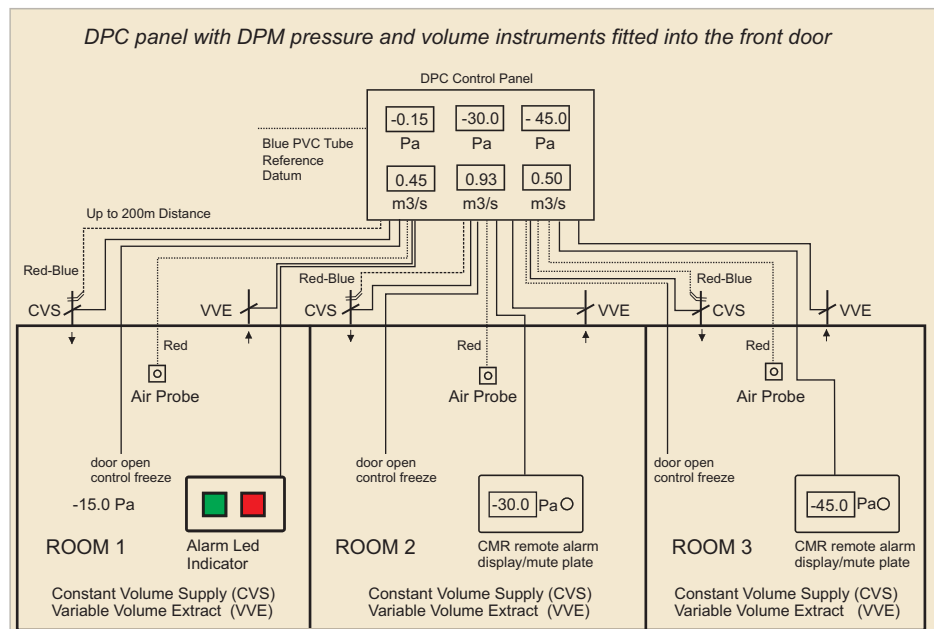


DPC Control Panel

Each room has a constant volume supply venturi valve which is connected to a DPM. A DPC controls the constant air volume into the rooms providing the required air changes rates.

The pressure is sensed via the air probe connected to a DPM and driving the extract valve with a DPC until the set point of the room is achieved.

Pressure alarm plates and alarm Led indicators warn the operator of a failure. Door interlock switches are fitted to lock the dampers in position when opened.



DPC clean room control panel for centralised pressure and air volume control

DPC FUME CUPBOARD VAV CONTROL

With built in ultra low face velocity and extract volume sensor

The DPC-320 Fume Cupboard Face Velocity controller maintains 0.50 m/s linear face velocity at all times regardless of the sash type, vertical or horizontal. This means the sash can be closed down to 10mm or opened to 500mm and the face velocity will remain at 0.50 m/s. The set point is user adjustable from 0.35 to 1.00 m/s. All alarm levels can be adjusted and remote mute, total shut off, hand position can be connected to the BMS via Modbus rtu. An emergency exhaust panic button is standard in case of chemical spillage to provide user safety. The DPC has a second sensor which measures the extract volume and a maximum extract volume can be adjusted. If the sash is fully opened only the max. volume will be extracted. The DPC-320 is factory tested and pre-commissioned and works on any make of Lab Hoods.

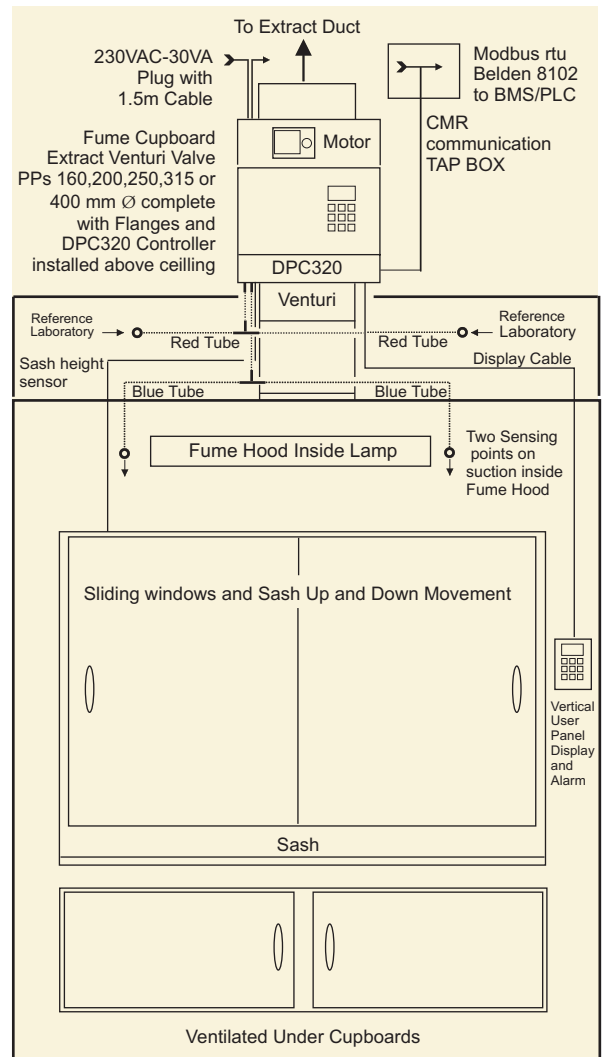


DPC-320 Fume Cupboard Controller



Typical Fume Cupboard

A typical fume hood extract system in a laboratory. When the sash is lifted the DPC senses the incoming velocity and controls the VAV extract valve instantly to provide 0.5m/s at all times. The operator panel is a horizontal type and is mounted below the sash. Face Velocity and extract volume alarms are standard.



PPs VAV Valve

The PPS air valve is air tight and a venturi volume measurement is built in. The response time is milliseconds. The valve can be shut off air tight. The controller can be built on top and is fully wired, factory tested and ready commissioned.



Horizontal Display

The remote operator panel displays face velocity, extract volume, position of valve, low velocity or extract volume alarm as well as sash high alarm. An emergency exhaust button is fitted. Calibration is carried out through the remote keyboard.

Fume hood face velocity or sash height control with volume limiting

LAB EXTRACT AND SUPPLY CONTROL

A compact independent controller with BMS and PLC interface

The DPC-220 is the most versatile controller. It has two pressure sensors built in which can be scaled either in Pa, m³/s or m³/h. The control can be selected from Static pressure control, volume control or volume tracking control. The power supply is normally 230VAC and it can drive the most powerful AST motor with 20Nm for the general extract and supply make up air. The DPC can read in the velocity pressure of the Velogrids, PPs Veloprobes and venturis and convert this into volume flow. A modbus rtu communication port is available for the host DPC to send and receive data for the BMS or Central PLC control.

The Laboratory below has seven Fume hoods with VAV controls. They have a min extract rate of 200m³/h therefore a total min of 1400m³/h. The General Extract DPC measures the Fume Hood Extract total with a Velogrid and adjusts the general Extract proportional. The min Supply into the Lab must be 1800m³/h and as the Lab must always be negative, the general extract will adjust itself to 600m³/h, therefore the total extract is now 2000m³/h and the supply adjusts itself to 1800m³/h to keep the Lab negative.

When the sashes are lifted up, the total Extract shall increase, the General Extract shall decrease and the Supply shall track the extract always keeping the Lab negative. The Plenum pressure is controlled by a DPC adjusting the fresh air by pass damper to guarantee the stack velocity of 15m/s at all times. As the Fume Hoods close, the suction pressure increases and therefore the fresh air damper opens to maintain the stack velocity and duct pressure.

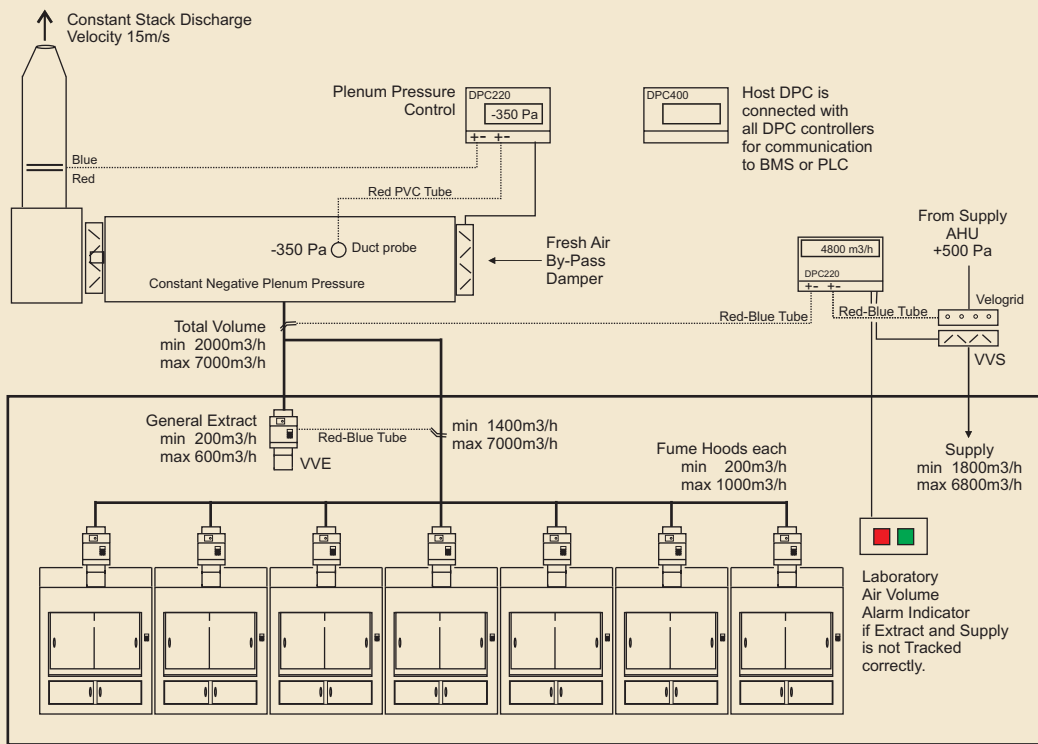


DPC-220 Controller



Velogrid

Typical Laboratory Fume Hood Extract - General Extract - Supply Air and Plenum Pressure Control



Controlling a complete laboratory and monitoring the extract and supply volumes

CMR CONTROLS

Precision Air Measurement and Control Products



P-Sensor



V-Sensor



DPM-Sensor



CAL-Calibrator



Remote Display



Alarm Indicators



Air Probes



Tube Fittings



Veloprobes



Velogrids



Flowprobes



Venturis



DPC Controllers



CAV Control Valves



VAV Control Valves



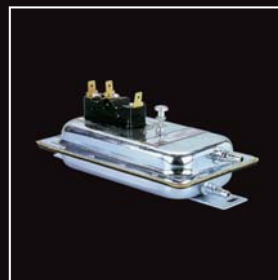
Airtight Dampers



Lab VAV Controls



Industrial Actuators



Pressure Switches



Air Control Systems

CMR CONTROLS Ltd
Precision Air Pressure and Volume Sensors

22 Repton Court Repton Close
Basildon Essex SS13 1LN GB
Web www.cmr-controls.com

Phone +44 (0) 1268 287222
Fax +44 (0) 1268 287099
Mail sales@cmr-controls.com

