

DPC-310 FUME HOOD CONTROL SYSTEM

- Ultra low actual face velocity measurement
- Millisecond response time of the control
- Excellent measurement sensor repeatability
- Total air tight shut off capability
- Pressure independent damper control
- Long term velocity measurement stability
- Ultra low hysteresis of the control action
- Remote access to DPC via Operator Panel
- Operator Panel with alarms and exhaust
- Modbus rtu Communication to BMS and PLC's
- After Sales Service is provided by CMR
- 24 month warranty
- 30 Years field application experience

The DPC-310 has been especially designed for Fume Hood control operation to fit any fume cupboard manufacturers equipment and is ready for installation as a complete factory commissioned system.

The most important advantage is that it can control any type of fume hood without the need to connect to moving sash parts such as drive mechanisms, sash position sensors or the fitting of sash height measurement potentiometers.

The DPC-310 FC-Controller measures the differential pressure between the fume hood inner body and the Laboratory which is a very low pressure of 0.15 Pa. This measurement is converted into a velocity, which represents 0.50 m/s face velocity.

The measurement tubes are connected to the DPC without any wiring of an independent sensor. The DPC-310 maintains 0.50 m/s linear face velocity at all times regardless of the sash type, vertical or horizontal, with or without sliding windows. This means the sash can be closed down to 10mm or opened to 500mm or higher and the face velocity will remain at 0.50 m/s. The set point is user adjustable from 0.30 to 1.00 m/s.

The velocity measurement is factory calibrated and only a check has to be carried out to issue a site certificate. All the face velocity calibration can be done via the operator keyboard panel without a lap top or climbing to the top section where the controller is located.

The DPC-310 should be mounted on top of the Fume Hood close to the Valve which has a fast acting actuator. The DPC-310 unit is normally powered by 230Vac and pre-wired. 24Vac and 110Vac is also available.

A modbus rtu communication is standard, so that the complete system can be monitored and commanded via the local BMS or PLC control system. The valves are supplied in sizes of 160, 200,250,315 and 400 mm Ø without flanges.

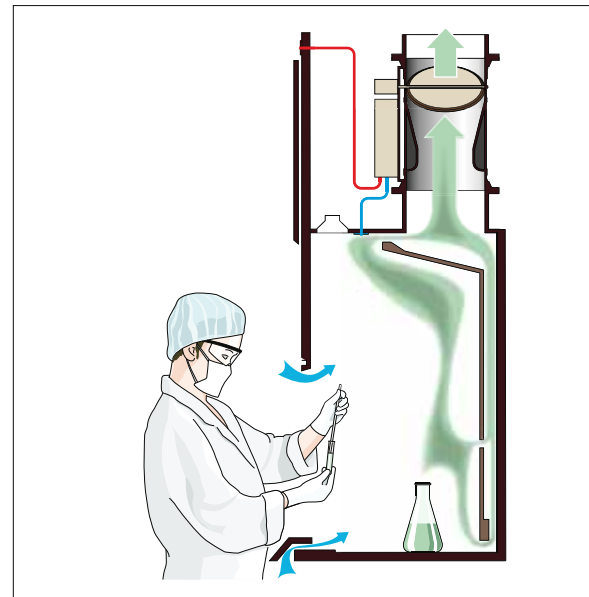
Night set back set points are programmable i.e. 0.30m/s and normally set points can be adjusted up to 1m/s and emergency exhaust functions can go up to 2m/s.

The operators control panel is fitted to the front on the side or below the tray of fume hood and the actual face velocity and alarms, actual extract volume, position of damper, and face velocity is displayed.

An emergency exhaust button is there to exhaust quickly in case of spillage. Custom panels are CMR's speciality.



DPC-310 Controller without Keyboard



DPC-310 Fume Hood Air Pattern Control



CMR Fume Hood Controllers in operation

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DPC-310 CONTROLLING THE PPR VALVE

PPR VALVE

The PPR Fume Extract Valve is made of PPs and is circular. Alternatively the VVR range of valves can be manufactured in galvanised steel with PUR and epoxy coated or stainless steel to suit many applications. The actuator is factory fitted to the valve and fully tested and ready for installation. The sizes available are 160, 200, 250, 315 and 400mmØ.

All CMR valves are airtight to DIN 1946 T4 if Flanges are fitted. The CMR range of actuators are able to drive the valve to a total shut off position, which is of great advantage in case of maintenance or isolation work to be carried out. All CMR Valves work up to 1000 Pa duct pressure. The Valve is totally pressure independent and shall adjust to provide a constant face velocity at fluctuating extract pressure. The Valve sizes should be selected so that at maximum design duty the velocity should not be more than 6m/s at minimum sash height.

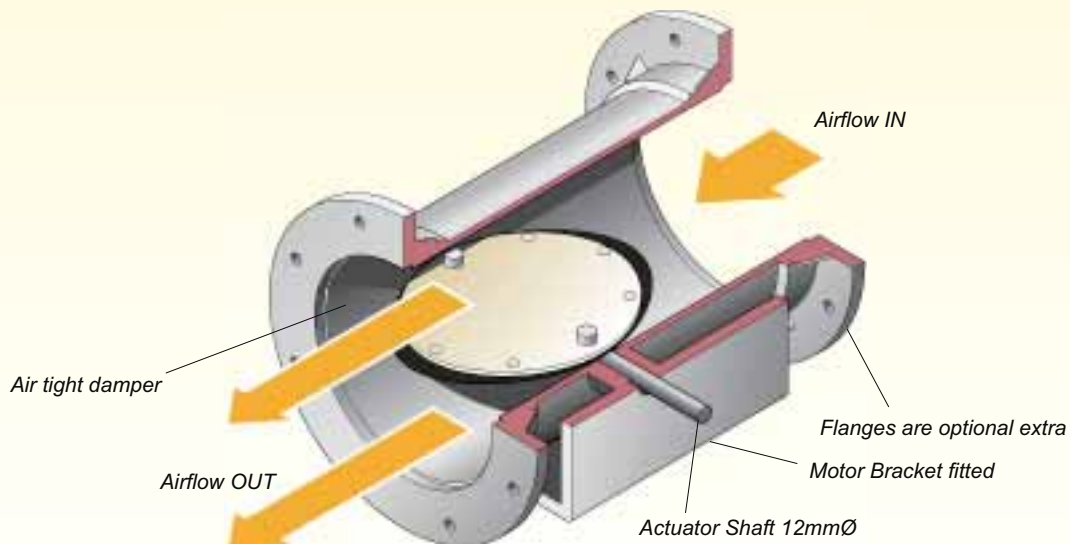
Valve Body Construction

The PPR Valve is manufactured to the highest engineering precision with CNC machines. The valve is manufactured from a pipe extrusion with all cut outs for the damper blade axle and the tube fittings. Damper Bearings are formed and welded into the body. All connections are welded. The damper blade consists of discs with a seal. A heavy duty drive shaft is fitted onto the valve blade and is then embedded into air tight bearings on both sides of the valve to provide smooth action with very low torque. All components which are in the air stream are either PPs or PPs coated. The blade and drive shaft are designed for very fast motor rotation i.e. 1 second from open to closed position.



PPR Valve without Flanges but with Motor Bracket

PPR - Valve made of PPs with optional flanges welded on each end



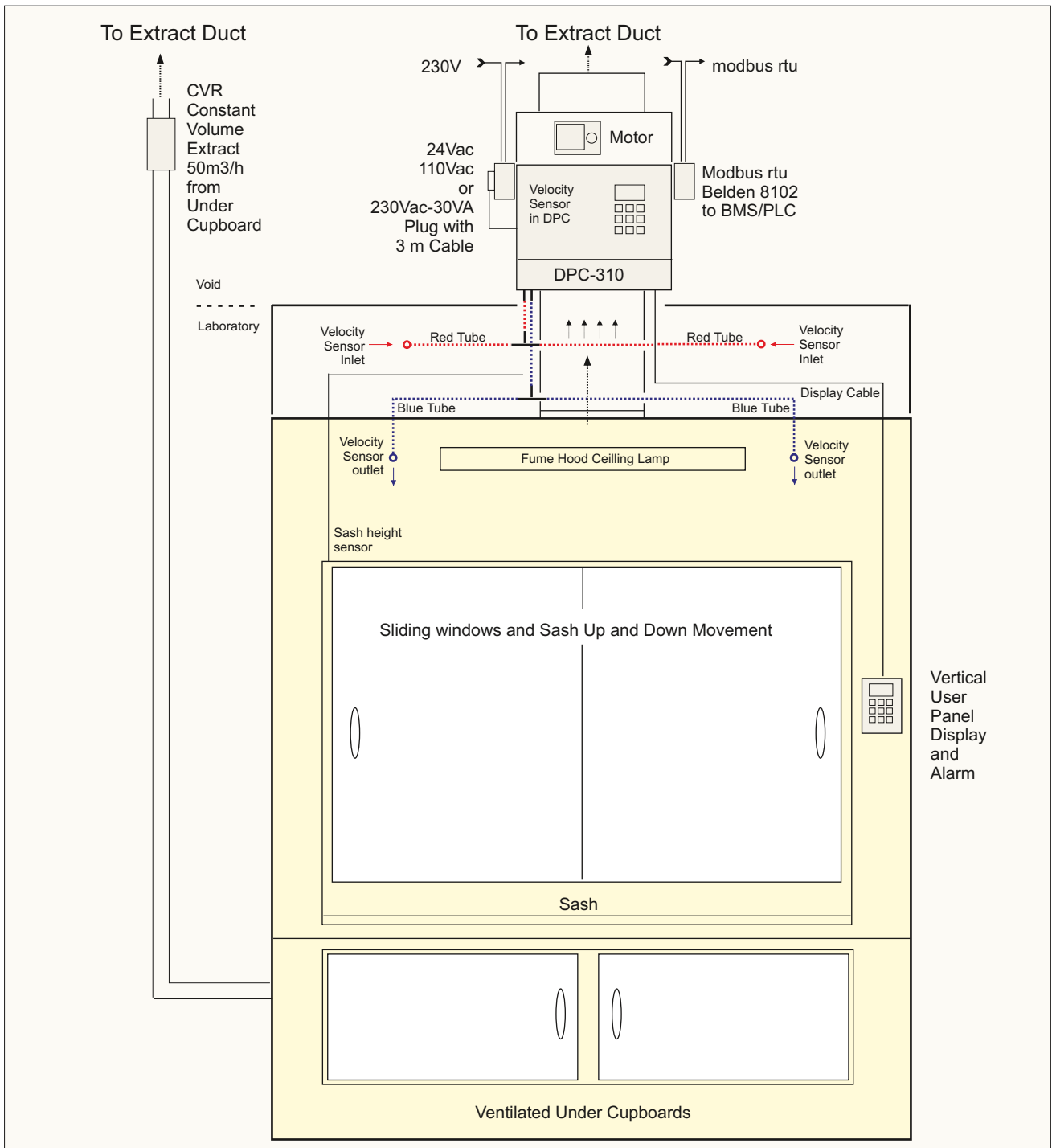
DPC-310 FUME HOOD VAV CONTROL

CMR FACE VELOCITY SENSOR

The CMR Sash face velocity sensor is a unique electronic velocity measuring device which works on the principle of differential pressure measurement between inside the Fume Cupboard and the laboratory. It is built into the DPC-310 Controller. The sampling points shall be installed by drilling and fitting a CMR Bulkhead into the top inside ceiling of the Fume Hood. An equal length of blue PVC tubing is connected to either Bulkhead and a T-Piece and is then connected to the negative port of the DPC-310. The bulkheads and tubing for the face velocity sensing can either be installed by the Fume Hood manufacturer or it can be installed easily on site. The negative suction within the Fume Cupboard pulls a sample of the air through the CMR Precision Sensor via two sampling point on the top front face of the Fume Hood which is connected via a red PVC tube to a Bulkhead and the DPC-310.

The air, which is drawn from the clean Laboratory air is filtered by a CMR particle filter which is totally maintenance free. The sensing element heats the sampled air to 160°C on a ceramic base and by means of differential temperature measurement the face velocity is determined and scaled. Micron dust particles will be burnt off and therefore the sensor shall never contaminate.

The CMR face velocity sensor provides an output signal which represents the front face velocity of the sash. The CMR sensor is linear over a range of 0.30 to 1.00 m/s over any sash height between 10mm and 500mm or higher. The installation is extremely easy and can be done on site on any Fume Hood Make. For maximum energy saving it is essential that the Fume Cupboard is well sealed between the Glass front and the top compartment of the Fume Cupboard.



DPC-310 FUME HOOD

DESCRIPTIONS

CMR Series Actuators

The CMR fast running actuators are 3s for 0-90° with 8Nm and are supplied for valves up to 400mm Ø. They are the most popular actuators to work in conjunction with the DPC-310 Controllers. The actuators are 24Vac/dc with an input signal of 2..10V and a position feed back of 2..10V. The angle of rotation can be mechanically as well as electrically limited on either side. The actuator drive has the latest technology and is equipped with a hi-tech electric motor which can withstand the extreme movements of opening and closing the damper.

DPC-310 CONTROLLER

The Power Supply can be 24, 110 or 230Vac 50/60Hz and shall be fitted with a plug and cable to suit any Country. The power can also be connected directly to terminals inside the controller. All fuses and power supplies to operate the controller, motor and display plate are incorporated within the controller. The controllers have no front control panel or display but it has a clear window lid and is IP65.

REMOTE DISPLAY OPERATOR PANEL

The buzzer and all functions are built into the remote alarm display plate and can be fitted on the fume cupboard front. Custom made designs to suit the clients fume cupboards are available from CMR. The remote keyboard is connected via a single multi core cable from the DPC-310 and is easily fitted on site. The Operator Display panel has an emergency exhaust key and a mute alarm key. All measurements are indicated on the LCD display such as actual face velocity i.e. 0.50 m/s, set point, position of damper, software version and node address.

There is a HAND/AUTO button and when selecting the Hand position the valve can be opened or closed via the up and down keys. This is ideal for maintenance or other shut down purposes. A low and high alarm threshold set point can be adjusted. A built in timer times out the low or high alarm and switches on a red LED on the keyboard. A mute key is fitted to mute the alarm either momentary or permanently. All parameters can be adjusted via the keyboard, which is operator password protected

SASH HIGH SENSOR

The sash high sensor is easily connected and the Fume Hood manufacturer normally has a sash high built in digital switch which can be connected into the DPC-310

AUTOMATIC SASH OPENING - CLOSING

If the Fume hood is equipped with an automatic sash drive open or close system via a proximity sensor then the DPC-310 has a digital input in order to re-set the face velocity set point from 0.50m/s to 0.30m/s to reduce the air extract volume for energy saving.

MODBUS COMMUNICATION

The DPC-310 is equipped with modbus rtu and CMR provides a standard interface panel which shall communicate with all major BMS and PLC's to monitor and interrogate the CMR Fume Hood Controllers. The CMR Service Department can connect directly to the Interface panel via a VPN connection to provide fast after sales service.

Dedicated interface panels with Profinet, Profibus, Modbus IP, Bacnet IP etc. are manufactured by CMR.



CMR Compact Fast Actuator VMSM-05



DPC-310 Fume Hood Controller

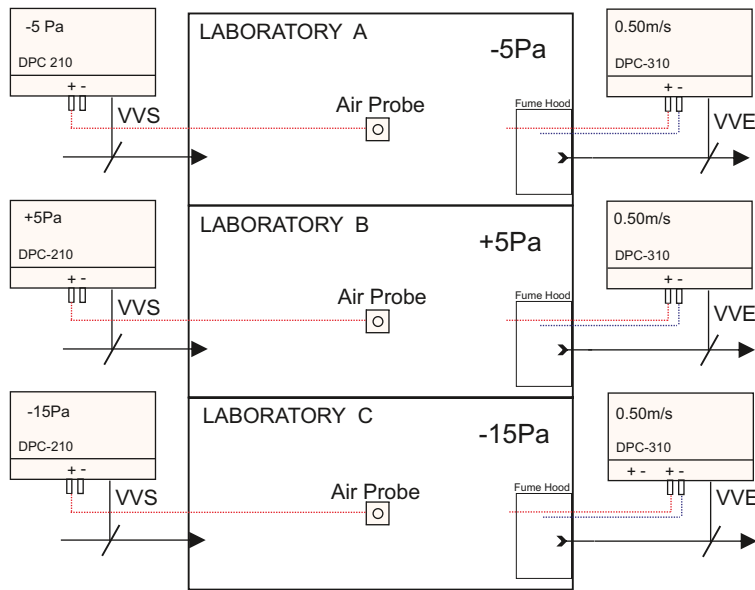


Horizontal Operator Fume Hood Display Panel

DPC-310

CONTROL APPLICATIONS

FUME HOOD VARIABLE OR CONSTANT EXTRACT CONTROL WITH SUPPLY TRACKING OR ACTIVE ROOM PRESSURE CONTROL



DPC310 and DPC220 Control

Laboratory A

The laboratory needs room pressure control of -5Pa at all times. The DPCs are working independently. The Fume extract DPC310 works as usual controlling the face velocity at 0.50m/s but the supply air DPC210 measures the room pressure and controls the valve directly to maintain the room pressure at -5Pa.

Laboratory B

The laboratory needs room pressure control of +5Pa at all times. The DPCs are working independently. The Fume extract DPC310 works as usual controlling the face velocity at 0.50m/s but the supply air DPC210 measures the room pressure and controls the valve directly to maintain the room pressure at +5Pa.

Laboratory C

The laboratory is a clean room and it needs room pressure control of -15Pa at all times. The DPCs are working independently. The Fume extract DPC310 works as usual controlling the face velocity at 0.50m/s but the supply air DPC210 measures the room pressure and controls the valve directly to maintain the room pressure at -15Pa.

The above schematic shows typical applications for the DPC controllers. The DPC is used for process and heavy duty industrial installations and they can be mounted on the valves or adjacent to the fume hood. The DPC210 can be mounted in a central control panel, which makes calibration, maintenance and validation easier in future. Commissioning is very easy via the modbus network from remote.

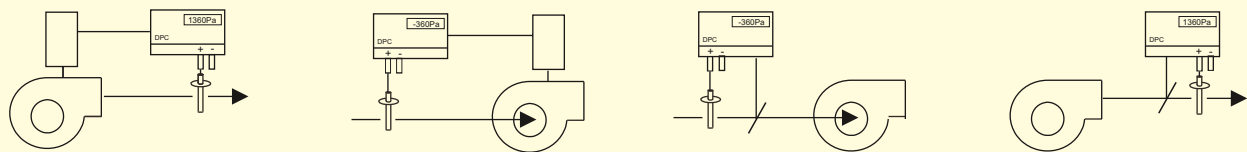
The CMR PVC tubing can be run up to 200m in length to any of the above supply DPCs and the Laboratory pressure air duct probes. The DPCs is a standard controller which can be configured to provide variable volume supply measuring room pressure.

The CMR dampers and valves are fitted with CMR fast and heavy duty actuators and the mechanical connections and the gearboxes have been designed for continuous high torque and speed action. All DPCs can be connected to BMS, SCADA or PLC computer systems to read in the pressures, velocities and feedbacks and write set points, night set backs etc.

In case of BMS computer failure, the DPC reverts back to its default set points, a vital advantage in critical manufacturing processes. All DPCs have control freeze and timed release when Laboratory doors are opened and closed. CMR provides a complete commissioning and site calibration service.

TYPICAL STATIC PRESSURE AND CONSTANT FAN SPEED AND VOLUME DAMPER CONTROL APPLICATIONS

STATIC PRESSURE CONTROL



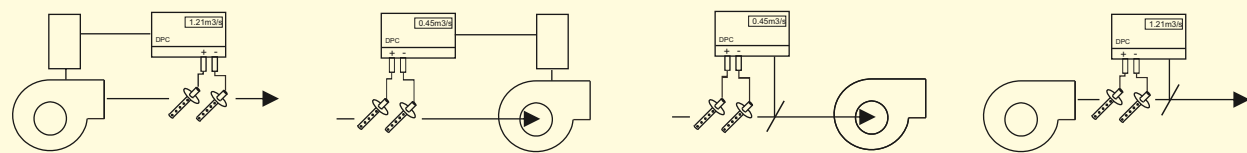
Supply Fan Speed Control

Extract Fan Speed Control

Extract Damper Control

Supply Damper Control

CONSTANT VOLUME CONTROL



Supply Volume Fan Control

Extract Volume Fan Control

Extract Volume Damper Control

Supply Volume Damper Control

DPC-310

USER OPERATOR PANEL

There is no Keyboard-Display fitted on the front of the controller. The remote Operator Panel provides this interface.

CONTROL VALUE LCD

This LCD display indicates the actual Face Velocity across the sash of the fume cupboard.

CONTROL SET POINT

The control set point of the face velocity is set to 0.50 m/s. The set point is displayed in the lower left corner.

LOW FACE VELOCITY ALARM

The low alarm set point can be set to 0.40 m/s. If the velocity is lower than 0.40 m/s than it shall alarm after a time out. The internal timer is adjustable from 1 - 300s which means the alarm buzzer and light switches on after i.e. 20 seconds of the air flow being lower than 0.40m/s.

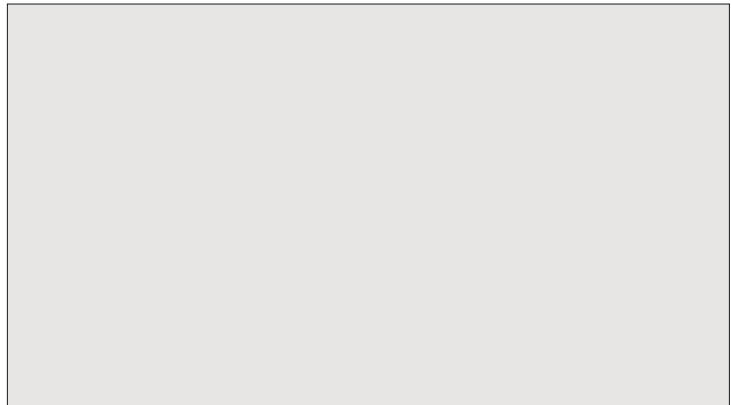
MUTE ALARM

The BELL button is the mute button and by pressing it the buzzer shall switch off.

The alarm can be permanently muted via the parameter set up which is password protected.

CAL ON REMOTE DISPLAY PLATE

If the CAL is switched to ON the valve motor stops operating and the damper position is locked in the last position. The tubes can now be removed from the velocity sensor and calibration work can be carried out safely.



DPC-310 Controller Front Pane - Display and keyboard is optional

AUTO OPERATION

The auto switch shall switch the fume cupboard controller in automatic control if it was switched to HAND. which means the valve motor works on face velocity control.

HAND OPERATION

If the switch is set to HAND position, the valve motor can be positioned with the UP and DOWN arrow keys which program the manual set point to any position from fully closed at 0% to fully open at 100%.

FAN BUTTON

This is an optional switch to power up a ventilator

PROGRAM BUTTON

This is used to enter the parameters into the controller and is password protected.

REMOTE FUME CUPBOARD DISPLAY AND ALARM CONTROLS

ALL HEALTHY

The green light is normally on if there are no alarms present. I.e. the face velocity is normal and there is no sash high alarm then the green light is switched on.

SASH HIGH

If the sash high proximity switch is fitted then the yellow light would be used for the sash high alarm and the low velocity alarms would work in parallel.

MUTE ALARM

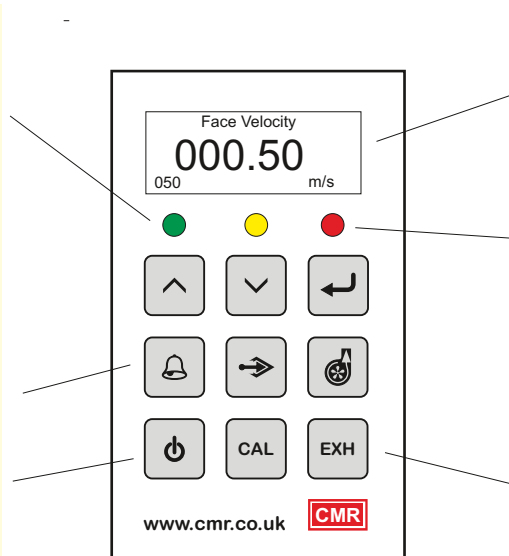
By pressing the BELL button the alarm can be muted.

TOGGLE SWITCH = VALVE SHUT

When this button is pressed it shall drive the valve to closed and by pressing the switch again it shall open the valve. The lower bottom left corner of the LCD shall show 'SHUT' if valve is closed.

NOTE:

This switch can also be used for custom applications



GRAPHIC LCD DISPLAY

The LCD display indicates the actual face velocity on the sash. The indicator gets all the information from the DPC-310 controller. The Velocity indicator is scaled in m/s. The display is slower to indicate than the control action as dampening is programmed into the LCD.

ALARM

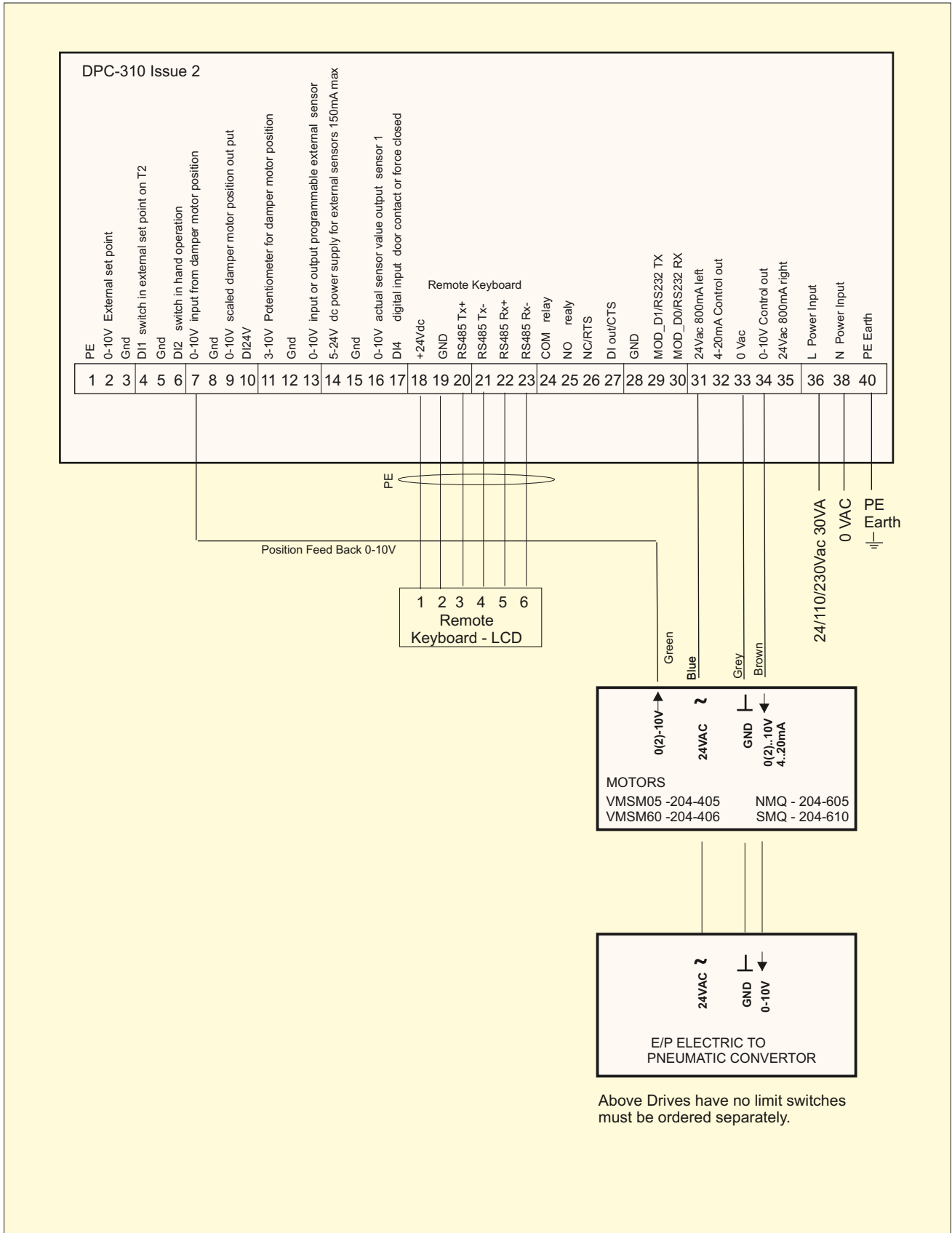
The red Alarm Light shall come on in case the face velocity is lower than the alarm set points. The buzzer shall come on as well if not permanently muted. When pressing the BELL button the buzzer can be muted and also reset if the alarm has been set to latching

EXH/T = EMERGENCY EXHAUST

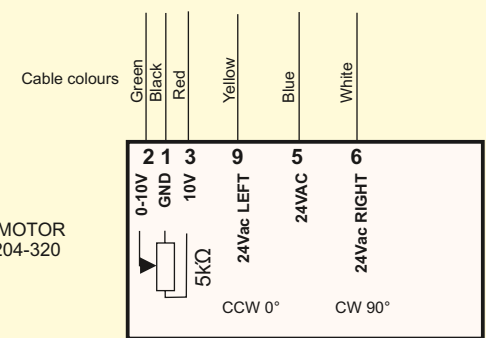
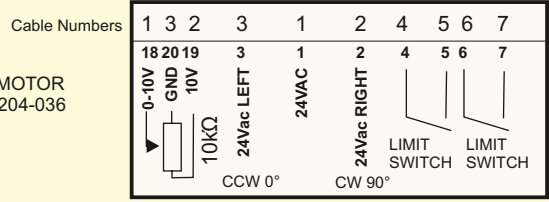
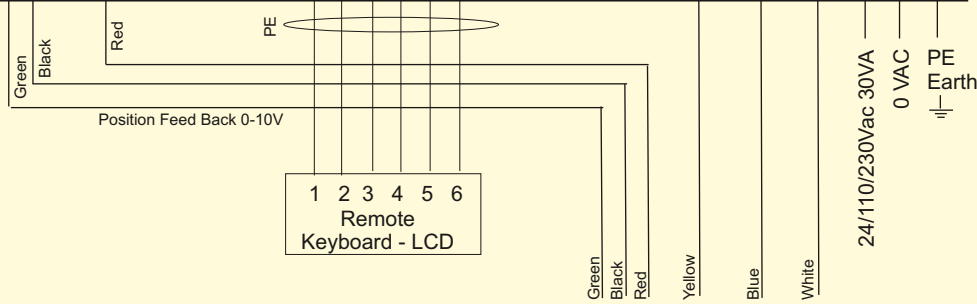
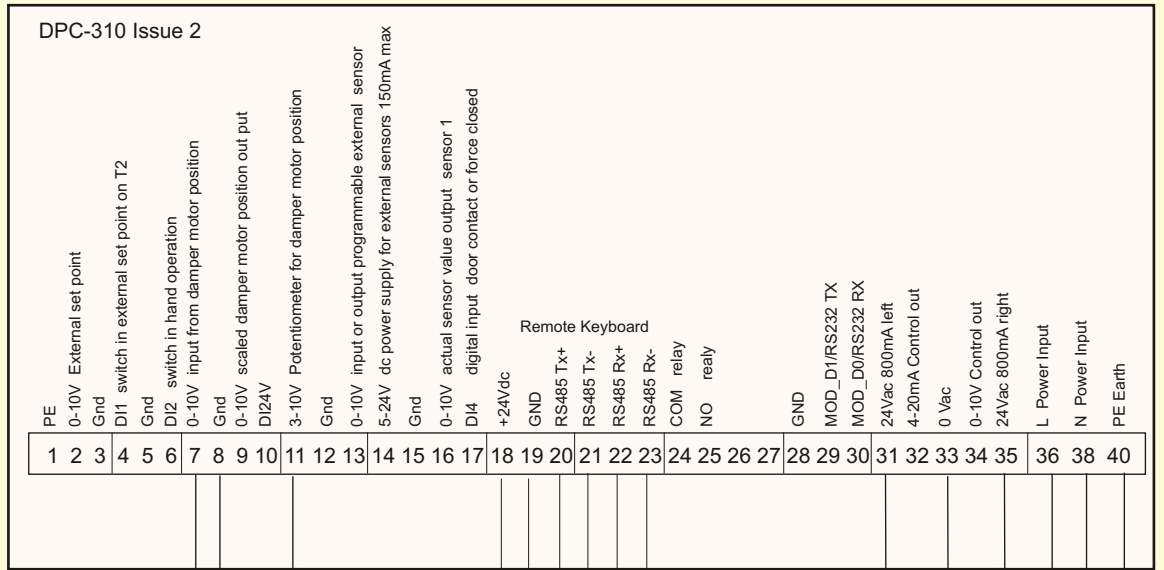
When pressing the EXH or EXT panic button, the yellow light comes on and the airflow shall increase to a pre-adjusted set point up to 1.00m/s to provide an emergency extract in case of chemical spillages in the fume cupboard. The set point can be adjusted via the keyboard. When pressing the EXH button again the yellow light will switch off and the air flow reverts back to its original set point.

DPC-310

0(2)..10V - 4..20mA ACTUATOR



DPC-310 24VAC TRI-STATE ACTUATORS



All limit switches must be adjusted to switch off motor on both sides.

DPC-310

ORDER DESCRIPTION

GENERAL

CMR manufactures the DPC-310 wall mount fume hood face velocity controller to suit many applications. Because of the variety of functions and power supplies it has been necessary to design an easy to use selection table for anybody to make up a DPC-310 controller specification to satisfy a requirement. You will find all specifications available with the associated ordering Code on the DPC-310 Controller Selection Table (Page 7) . In order to select the correct part we have made up a sample selection below:

DPC-310 PART NUMBER

The DPC-310 Part Number starts with the selection of the controller type '77'.

DPC-220 Board Issue No.

The DPC-310 will have an update on the electronic board from time to time and to identify the issue No i.e. for software and hardware, this number might change. For Issue 2 the Code is '2'.
The Part Number extends to '772'

TUBE NIPPLES

The DPC-310 is normally supplied with 6 mm barbed tube nipples..
We have selected Nipple Size 6mm which has the Code 'A'.
The Part Number extends to '772A'.

SENSOR 2 RANGE

If a Sensor is not fitted then It is always '0000'
In the example we have chosen Range '0000'
The Part Number extends to '772 A 0000

UNITS OF MEASUREMENT FOR SENSOR 2

The measurement units do not exist..
The code is 'N'.
We have chosen Mode 'N'.
The Part Number extends to '772A 0000 N

SENSOR 1 RANGE

The sensor 1 is normally the controlling sensor , which measures the face velocity. The sensor is always standard 2.00 m/s .
In the example we have chosen Range '0002'
The Part Number extends to '772 A 0000 N 0002

UNITS OF MEASUREMENT FOR SENSOR 1

The measurement units are expressed in meter per second m/s.
The code is 'V'. We have chosen Mode 'V'.
The Part Number extends to '772A 0000 N 0002 V

CABLE GLANDS

The DPC-310 is normally supplied with Glands so that the motor cable, remote display plate and communication can easily be installed by an electrician to be terminated on terminals.
We have selected Glands which has the Code '0'.
The Part Number extends to '772A 0000 N 0002 V 0

POWER SUPPLY

The DPC-310 can be ordered in
24VAC with Code '3'
110VAC with Code '4'
230VAC no power cable fitted with Code '5'
230V UK complete with cable and UK plug with Code '6'
230V EU complete with cable and European plug with Code '7'

All cables are 3m long .
We have chosen 230V with cable and UK plug which has Code '6'.
The Part Number extends to '772A0000 N 0002 V 0 6.

FINAL PART NUMBER

The Part Number to order is '772A0000 N 0002 V 0 6.

Now try and select your own DPC-310 using the DPC-310 Order Selection Table.

DPC-310 FUME HOOD SPECIFICATION

Measurement Range	Sensor 1 = 0...2 m/s face velocity sensor and Sensor 2 is not fitted
Optional Range	Not applicable
Overload Capacity	To 340mBar
Media	Non Corrosive Gases such as Air,N ₂ ,O ₂ ,CO ₂ ,N ₂ O, inert Gases
Sensor 1/ 2 Type	1. Air Velocity Mass flow
AC Power Supplies	24 VAC 50/60Hz Fuse 1.0 A Wickmann
	110VAC 50/60Hz Fuse 315 mA Wickmann
	230VAC 50/60Hz Fuse 315 mA Wickmann
AC Control Output	24 VAC (internal power from isolation transformer) max 850mA (Fused 1A Wickmann)
	Triac output
DC Control Output	0(2)..10Vdc and 4..20mA
Sensor Output Voltage RL = 5kOhm min	0-10V (0...100% of Range)
	.
Hysteresis/Repeatability	0.3% Typical of Full Scale
Linearity (Accuracy)	Sensor 1 = 1% FS 2.00 m/s
Zero Drift	0.02%K (+10°C to +50°C) - 0.0% with Auto Zero
Hand - Auto Key	On Remote keyboard or Digital input on T4 external set point switch T6 change over from auto to hand
External Set Point	0...10V on T2
Position Input	0...10V on T7
Alarm Threshold	On Remote keyboard Programmable
Control Function	Off-Set - Sensitivity - Proportional Band - Timing / Integral - Ramp Speed - output Freeze
Alarm Relays	1A 24VDC / AC Low/High Alarm single pole - Buzzer and repeater single pole on-off.
Operating Temperature	+10°C to +40°C (Storage -40°C to +70°C)
Mounting Position	Vertical or Horizontal
Weight	1.5 kg
Electrical Connections	1 x 20mm 4 x 16mm Gland Internal screw Connections.
Air Tube Connections	2 x Positive and Negative Nipple 6.5mm O/D x 15mm long standard for CMR PVC tube
Communication	2 x Modbus rtu Plus Remote Keyboard Modbus rtu
Enclosure	ABS Grey with clear front Lid - Protection Class IP65.
Conformity	EN61326-1 EMC EN61010-1 SAFETY
Calibration Certificate	Factory calibration certificate

