9

VARIABLE GEOMTRY PRESSURE CONTROL DAMPERS

APPLICATIONS

PRESSURE CONTROL

VOLUME CONTROL

ADVANTAGES

LINEAR CHARACTERISTICS

LOW NOISE

ELECTRIC & PNEUMATIC

NO REGULAR MAINTENANCE

PRESSURE SENSOR AND CONTROLLERS AVAILABLE

CKARD

OMFORT CONTROL

INTRODUCTION

The RICKARD VARIABLE GEOMETRY Pressure Control Dampers have been designed to enable supply air duct pressure to be accurately controlled. His facility is required in Variable Air Volume Variable Geometry systems as VAV diffusers are sized and set to operate at a constant pressure, independent of air flow. Important factors in PCD design are linear operation, reliability of air flow and, unlike opposed bladed types, low noise regeneration from maximum to minimum flow rates.

The RICKARD PCD has excellent linearity as is borne out by extensive tests. Many types of damper are produced by various manufacturers. Opposed blade dampers are particularly common and there are several variations on the “butterfly-valve” type. While these dampers are well suited to many applications, none of them is ideal for duct static pressure control as their transfer characteristics are not linear.

In any damper, noise regeneration is a function of pressure drop and air velocity, which may be countered by fitting a downstream sound attenuator. For more information on PCD noise control, please contact our nearest sales office.

PUBLICATION 2007-9/1

DAMPER SELECTION

Usually dampers are sized simply to match the duct into which they will be fitted. Generally, this is an adequate selection method but, under certain circumstances it can lead to difficulties. Normally the air velocities in an air conditioning ducting at full volume should be between 6m/s and 9m/s. If velocities outside these limits are used, or if there are any substantial restrictions such as silencers, filters or multiple bends and transformation pieces in the ducting, then a closer examination of the situation is recommended.

DIMENSIONS & CONFIGURATIONS

The PCD may be manufactured to any size required, both in terms of the width and the height of the unit. Although the standard depth is 150mm, this too may be varied to suit any requirements, but may not be less than 150mm. When damper widths exceed 1000mm, the aluminium blades split and a mullion is fitted down the centre of the casing. In this case two actuators would be fitted, one for each section. A damper of say 1200mm x 1200m would consist of four sections, each 600mm x 600mm and each having its own actuator. The standard PCD would be manufactured with sheet metal flanges to be drilled for fixing purposes by the air conditioning contractor. Please note that the PCD must be installed with the actuator on the downstream side of the vanes.

TIGHT SHUT-OFF PCD DAMPERS

In some system designs (usually the smaller type) only very low leakage levels may be tolerated from the bypass pressure control dampers. If this facility is a requirement, a tight shut-off PCD, which will ensure that maximum possible volume of supply air is available, may be specified.

ACTUATION

The RICKARD PCD may be supplied suitable for either electric or pneumatic actuation. When the electric option is selected, the PCD is supplied with one or more Lindrive actuators.

The Lindrive actuator requires a 24V AC signal for operation and has a linear, or push-pull, type action. The pneumatic actuator normally fitted would have a pressure control range of 5-10psig and may be direct or reverse acting.

PRESSURE CONTROL

The RICKARD PCD may be supplied with electronic pressure controls. The controller would normally be mounted within an enclosure fitted to the side of the damper casing, while the pressure sensor would be supplied loose, to be fitted to the ducting in a suitable position by the air conditioning contractor. The interconnecting cable between the controller and the sensor forms part of the RICKARD supply and although the standard length supplied is 20m, additional cable may be supplied if required. As an alternative, the pressure controller may be supplied loose, suitable for mounting in a remote switchboard. For details of this option, please contact your nearest RICKARD representative.

CONTROL OPTION

The standard RICKARD pressure controller requires a 230V AC power supply and would be supplied complete with a PVC insulated power cable and plug top. A 230/24V AC transformer is built into the controller.

PRESSURE SENSOR

The pressure sensor is supplied loose and is easily fitted to the duct on site. Drill a 10mm hole in the wall of the duct to accept the sensing probe and fix the sensor by means of two self-tapping screws. Ensure that the sensing probe protrudes into the air stream and is not obstructed by internal duct lining or any other such obstruction.

PRESSURE INDICATION

For ease of adjustment during commissioning, the RICKARD pressure controller has the facility to accept a plug-in indicating meter.

FACE-AND-BYPASS DAMPER CONTROL

The RICKARD pressure controller may be used to control more than one damper, as in the case of a face-and-bypass damper. In this case two actuators will simply be wired in the opposite sense so that the one damper drives open while the other drives shut.

COMMISSIONING PROCEDURE

The function of a PCD is to maintain a constant pressure in the system regardless of flow. This constant pressure is to allow the VAV Variable Geometry diffusers to operate correctly as they are all sized and set to deliver design volumes at a specific duct static pressure.

For the commissioning technique to be useful, it should firstly be established that the thermostat/controllers are set at a realizable temperature. If the temperature set point requires more of the air conditioning system than the design conditions allow, the system may never perform satisfactorily.

METHOD

For each pressure control damper and associated duct, select the diffuser which requires the highest neck total pressure to enable it to supply maximum design air volume and drive this diffuser to fully open. Also drive all control dampers to fully open, then drive the other diffusers until design maximum air is leaving the air handling unit and is being distributed uniformly throughout the conditioned space. At this stage the diffuser neck total pressure at fully open diffusers will be on or slightly above their respective maximum air requirements. Adjust the duct static pressure controllers until the diffuser which needs the highest neck pressures have sufficient pressure available. At this stage the system is commissioned, but it may be tested by monitoring duct pressure while changing the air flows around the system. In a satisfactorily operating system one would expect duct pressure to vary by 7% to 10% as air flows vary from 30% to 100%. Please note that these commissioning recommendations do not check a system for all faults. It is intended only to set up and test the pressure controls and, to a lesser extent, the diffusers. Gross system faults, such as disconnected or ruptured flexible ducting will not be traced using this method.