Class: 4th Stage
Subject: Control Lab
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(Control laboratory)

Experiment No. 00(8)

(Study of Air Flow Control)

Prepared by
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Exp.No.8:- Study of Air Flow Control

Unit Objective:-

At the completion of this unit you will be able to observe how air flow can be controlled by the use of flow sensor.

Equipment:-

NO.	Name	Quantity
1	Compressor	1
2	Control process trainer	1
3	Leads	10 or more
4	Digital voltmeter	1

Experiment content:-

For calibration of air flow sensor keep V1, V3 and V5 fully open and V2, V4 fully closed. Connect the turbine flow sensor to signal conditioning panel EMT9 using 5-pin DIN male connector. Connect the tag no. 14 of EMT9 to 8^{th} of EMT8 and 15 of EMT9 to 9^{th} of EMT8. By keeping control valve fully open make the compressor ON. Adjust AFR1 air pressure using knob on AFR1 about 1.4 bars seeing dial on pressure gauge. Do not connect I to P, 4 to 20 mA supply. Now adjust AFR2 air flow such that the rotameter shows 0 LMP by using knob on AFR2. Now adjust the output of tag no 14 of signal condition panel =0 V for 0 LPM of air flow. Now increase the flow of AFR2 such that the rotameter shows 50 LPM. Now adjust the output of tag no 14 of signal condition panel =2.5 V for 50 LPM of air flow using span pot VR10. Repeat the above procedure 2-3 times and confirm zero and span. Apply the same procedure for FS2 air flow sensor by opening valve V2 and AFR3.

Airflow process variable is fast changing hence the airflow process goes from one steady state to another steady state within short time. Also airflow oscillates with very small amplitude. Thus if we give larger gain values in PID action then airflow variation may become oscillatory.

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Procedure:-

1. For input output curve plotting keep V1, V3 and V5 fully open and V2, V4 fully closed.
2. Connect the turbine flow sensor to signal conditioning panel EMT9 using 5-pin DIN male connector.
3. By keeping control valve fully open make the compressor ON.
4. Adjust AFR1 air pressure using knob on AFR1 about 1.4 bars seeing dial on pressure gauge.
5. Now increase the flow of AFR2 from 0-50 every step 10 degree using knob on AFR2.
6. Note down the output of tag 16 on EMT9 and DPM display. Fill the following table.

SR.NO.	Rotameter reading in LPM	Voltage at tag NO.14	Rotameter reading in DPM
1	0		
2	10		
3	20		
4	30		
5	40		
6	50		

Conclusion:-

When the flow in rotameter reading increase the voltage shows in voltmeter will be increase too. Because the flow sensor can sense the air flow by variable resistance, this variable resistance will effect on voltage in tag no. 14 when the flow is change.

Discussion:-

- Explain briefly how to control air flow in control process trainer.