

DESIGN OF A NEW CONTROLLER FOR VACUUM INTERLOCK SYSTEM AT BARC-TIFR PELLETRON ACCELERATOR FACILITY

#M. L. Yadav, Ramlal, U.V.Matkar, R.N.Lokare, M. Ekambaram, P.V.Gudekar
S.C.Sharma, A.K.Gupta, P.V.Bhagwat and R.K.Choudhury
Nuclear Physics Division, BARC, Mumbai-85

Introduction

The BARC-TIFR Pelletron Accelerator Facility [1] has been operational for last twenty two years with progressively increased efficiency. The entire beam transport line is maintained under ultra high vacuum (UHV), Turbo Pumps, Getter and Ion Pumps are being used to maintain UHV in beam transport line. Safety of the pumps is ensured by interlocking operation of gate valves with the safe vacuum level.

A new type of controller has been designed using CMOS ICs' for vacuum interlock system. Three pneumatically controlled UHV gate valves can be operated from this unit. This unit is interfaced with a multi cold cathode controller (Pfeiffer make) unit and accordingly generates signal to operate three gate valves. This paper presents the design features of the controller and its utilization

FEATURES

- There are separate push switches and LED indication for each pneumatic valve, indicating the status (open/close) of each individual pneumatic valve.
- Separate indications are provided for the status of vacuum gauges. There are separate indications for mode of gauges (nlk/bypass).
- When the vacuum is better than preset value, then only the pneumatic valves can be operated.
- In case of power failure or vacuum failure, all pneumatic valves will get closed automatically. After power resumption, the required pneumatic valve can be actuated after getting better vacuum than the preset value.
- The control of each valve is independent to each other. In the system the design is based on CMOS ICs
- logic, therefore power consumption is relatively less.

CIRCUIT DESCRIPTION

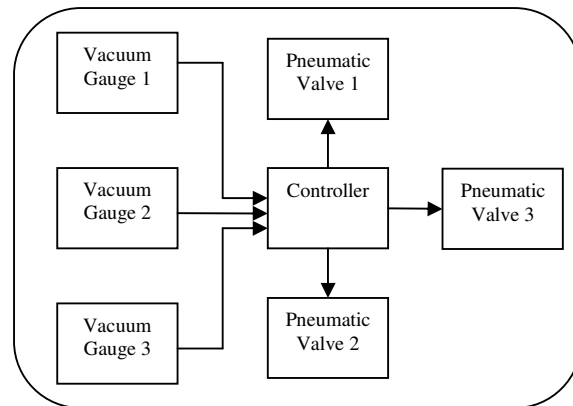
The present design basically consists of CMOS logic gates, flip-flops and electromechanical relays. Power requirement is +12VDC @ 500mA maximum. There are total six pres to on push switches for open and close operation. Three DPDT switches are used for the selection of nlk/bypass mode.

The input to the OR gate is coming from the close or open contact from the vacuum gauge and push switch.

#mlyadav@tifr.res.in

This gate will give either low or high output depending upon the status of its vacuum gauge. If the vacuum is better than preset value then output of the OR gate will be at low state. This low signal is given to the set input to the flip-flop after inverting through a switch. At this state vacuum valve can be opened. When the output of the OR gate is high then this will reset the flip flop and valve cannot be operated.

Block Diagram



UTILISATION

Controller is installed for 6M Irradiation setup [2] of BARC –TIFR Pelletron Accelerator Facility. It provides additional safety for accelerator during Liquid Samples Irradiation.

CONCLUSION

The present system is easy for maintenance and user friendly. Since CMOS Logic is used power consumption is relatively less. The system has been commissioned and working satisfactory.

REFERENCES

- [1] P.V.Bhagwat, et al. "Status report of BARC-TIFR Pelletron Accelerator Facility" InPAC-2006,
- [2] S.C. Sharma, Ramjilal, N.G.Ninawe, A.Shanbag, C.Sunil, M.L.Yadav,P.V.Bhagwat & R.K.Choudhury "Liquid Target Assembly for 6M Irradiation Setup- BARC-TIFR Pelletron Accelerator Facility: Design and Testing" DAE Symposium on Nuclear Physics-2010, BITS,Pilani