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AUTOMATED SYSTEM OF TEMPERATURE STABILIZATION FOR CRYOGENIC IONIZATION CHAMBER

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The system is intended for the automatic program-controlled regulation and stabilisation of gas temperature in the cryogenic ionization chamber (CIC). It permits to make precision measurement of the temperature dependence of the resonance mechanism of forming mesic-molecule. [1]

The system contains two independent branches of temperature regulation: cooling and heating branches. These two branches are placed on the upper and lower flanges of the chamber. The heating branches of upper and lower flanges are independent. The system is controlled by the computer (IBM PC) with an interface plate and electronic block.

The interface plate consists of:
1. Parallel port
2. Pulse duration modulators
3. Counter
4. Channel of the apparatus interface IEE-488.

The electronic block consists of:
1. Power unit
2. Valves operation block
3. Power amplifiers
4. Generator current source for temperature transducers
5. Analog Frequency converter
6. Digital eight-channel multiplexer.

The system is operated by following manner:
Analog signal from temperature transducers TS1, TS3 is transformed to frequency and then comes across the multiplexer to the counter.

The temperature proportional frequency signal goes to the computer, where it is compared with the setting control point of temperature. The error signal acts as the pilot signal which optimizes cooling or heating parameters by means of giving liquid Helium into the heat-exchangers of chamber flanges (UH-E, LH-E), and heating by current the upper and low flanges of chamber, so that the difference of temperatures between upper and lower flanges must be minimal. The stabilisation of temperature is made by means of special computer program on proportional integral-difference regulation.

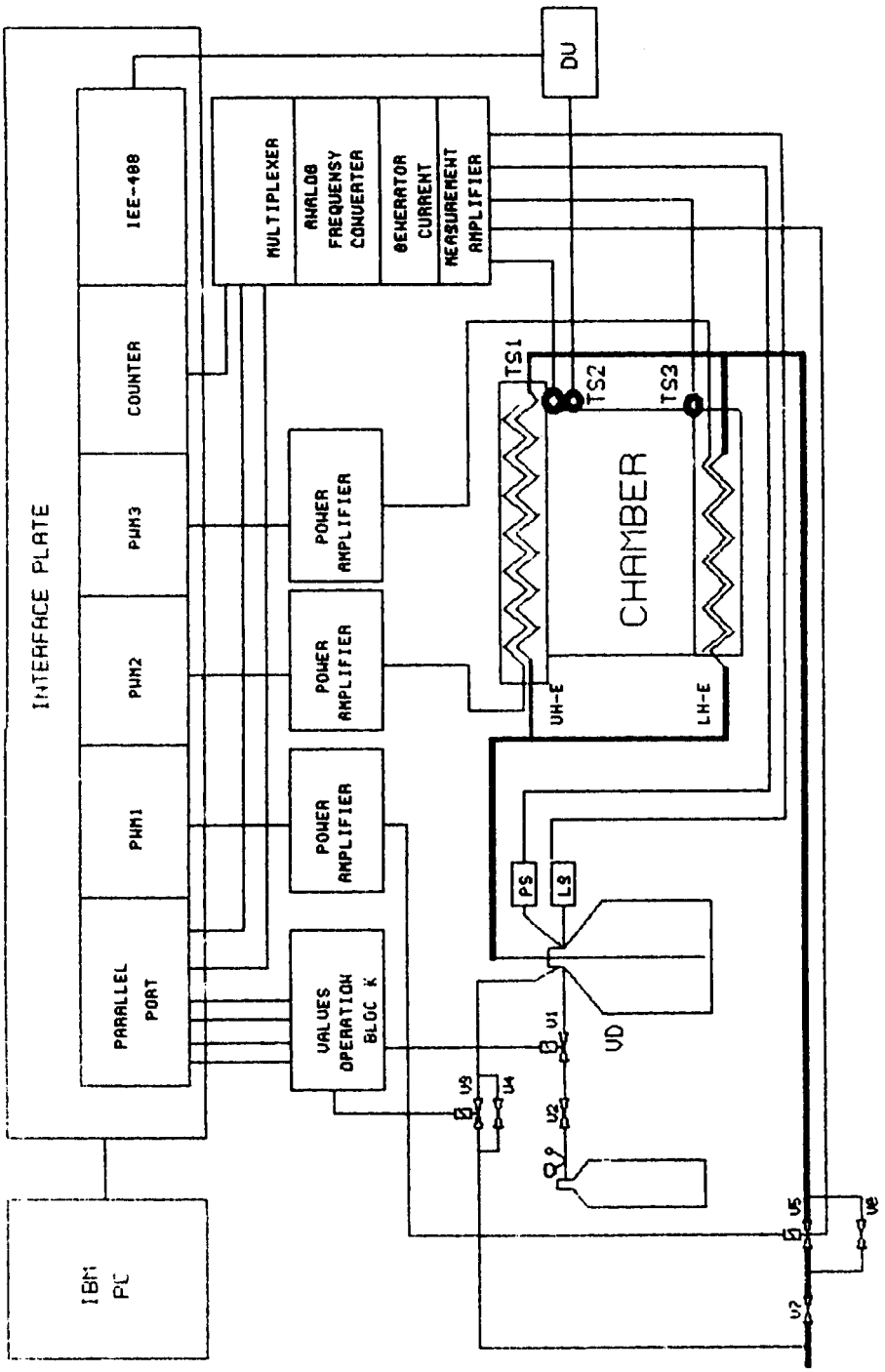

Fig. Functional circuit of automated system for requlation and stabilysation gas temperature in ionization chamber

The pressure in volume VD determines the outlet of cooling gas. The operating program is provided for minimization of the outlet of cooling gas by means of variation of four parameters:

1. The pressure in volume VD
2. Cooling upper and lower flanges
3. Heating upper and lower flanges
4. Regulation of gas flow.

The program is written in PASCAL. There is a possibility to control the level of liquid Helium in volume VD by means of the levelmeter LS, the pressure in VD by the pressure-meter PS and gas temperature by means of transducer TS2 and digital voltmeter DV. The pressure is throwed off by the emergency valve V3. The manual controlled valves V2,V4,V6,V7 are used for the changing the volume VD.

Operating characteristics of system:

1. Operating temperature interval 30 - 400 K
2. Relative control accuracy of gas temperature + 0,07 K per day duration
3. The temperature difference between upper and lower flanges of chamber 0,1 K
4. Absolute accuracy measurement of temperature + 0,15 K.

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THE ABSORPTION METHOD AND SETUP OF HIGH-PURITY ETHANE PRODUCING

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Introduction

An implementation of gas detectors such as drieft chambers (DC) [1,2] in experimental high energy physics is gaining acceptance. The quality of its operating in many respects is determine by a parameters of gas mixture and presence of impurities (especially electricaly negative one).

It is well known [1,2] that a choosing of gas mixture in DC is a sufficiently difficult problem which is determined both by the experimental conditions and properties of gas. Usually on deciling of optimal gas mixture the mine characteristics of gas (electron drieft velosity,gas gate, diffusion coefficients, an electron affinity etc.) are taken into account. Moreover the cost and availability of gas are taken into consideration also. Very so often a gas mixture based on Argon with different organic admixture are used under operating of DC. Argon