

MANUAL AND AUTOMATIC Δ T WATER CONTROLS

FOR FRESHWATER CELLS

REPORT TO PROJECT M - NO. ABA-13
STANFORD UNIVERSITY SUBCONTRACT S-128
UNDER A.E.C. CONTRACT AT(04-3)-363

Submitted by

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FOR KLYSTRON TEST CELLS

INTRODUCTION

Reference K. B. Mallory's memo of 1 June 1961 to Gail Rogers, Plant Engineering, Project M, concerning an automatic temperature controlled system for klystron test cells.

Gail Rogers requested the Aetron-Blume-Atkinson Instrument Group conduct an investigation of a manual or automatic control system. This report has been generated to satisfy AEC project requirements and Stanford's request.

This report concludes the investigation and no further effort will be expended unless requested.

SLAC AHO 1991-012B14

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MANUAL

The schematic diagram of the system, as shown in Figure 1, is one water circuit with a flow rangeability of 5 to 1, used for varying the load differential temperature by manually regulating the water flow rate.

The system comprises the following:

1. Manual flow control valve
2. Flow indicator in gpm
3. Two (2) resistance-type elements
4. ΔT indicator
5. Four (4) quick connect couplings

The bench will be a portable unit with 2 swivel and 2 non-swivel manual brake-type casters. Physical size shall be as determined by the number of water circuits which will be required. A single circuit will require a bench approximately 24 inches long and a height of approximately 66 inches. Quick connect couplings will be used for water supply and return connections and for load supply and return connections.

Accuracy of the system will be 1/4% full scale (0-50° F. ΔT) to provide 2% indicated accuracy at the 5° F. differential temperature.

The total estimated cost of a one circuit unit, with the bench size being capable of 2 additional circuits, is \$3,461.00.

The total estimated cost of a one circuit unit, with bench capabilities limited to one circuit, is \$2,961.00.

AUTOMATIC

The schematic diagram of the system, as shown in Figure 2, is one water circuit with a flow rangeability of 5 to 1 and a ΔT of 5° to 50° F., used for varying the load differential temperature by automatic flow and temperature cascaded controllers. The flow rate only, can be controlled by manual switch-over from the cascade system.

The system comprises the following:

1. ΔT temperature recording controller
2. Flow recording controller (gpm) (cascade system)
3. Flow transmitter (ΔP)
4. ΔT converter
5. Two (2) resistance-type elements
6. Four (4) quick connect couplings

The bench will be a portable unit with 2 swivel and 2 non-swivel manual brake-type casters. Physical size shall be as determined by the number of water circuits which will be required. A single circuit will require a bench approximately 22 inches long and a height of approximately 66 inches. Quick connect couplings will be used for water supply and return connections and for load supply and return connections.

Accuracy of the system will be $1/4\%$ full scale ($0-50^{\circ}$ F. ΔT) to provide 2% indicated accuracy at the 5° F. differential temperature.

The total estimated cost of a one circuit unit, with the bench size being capable of 2 additional circuits, is \$6,774.00.

The total estimated cost of a one circuit unit, with bench capabilities limited to one circuit, is \$6,274.00.

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