HALLIKAINEN Instruments
INDUSTRIAL and SCIENTIFIC
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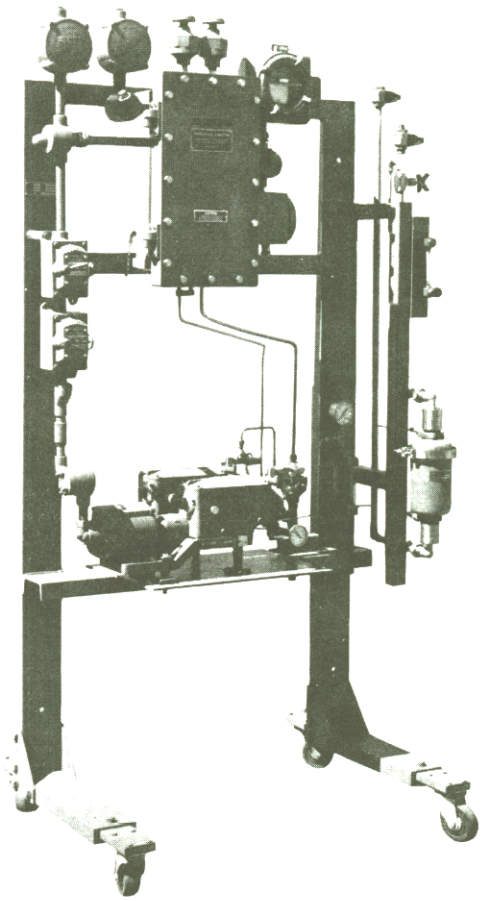
DISTILLATION ANALYZER

Percent Recovered, 5% to End Point

Model 1463



INTRODUCTION

The Model 1463 DISTILLATION ANALYZER continuously measures the percent recovered boiling point temperatures of petroleum products from the 5% point to the end point in the temperature range of 150° to 700° F. Fast response time, excellent repeatability and simplicity of design combine to provide an instrument ideally suited for continuous monitoring of refinery streams.

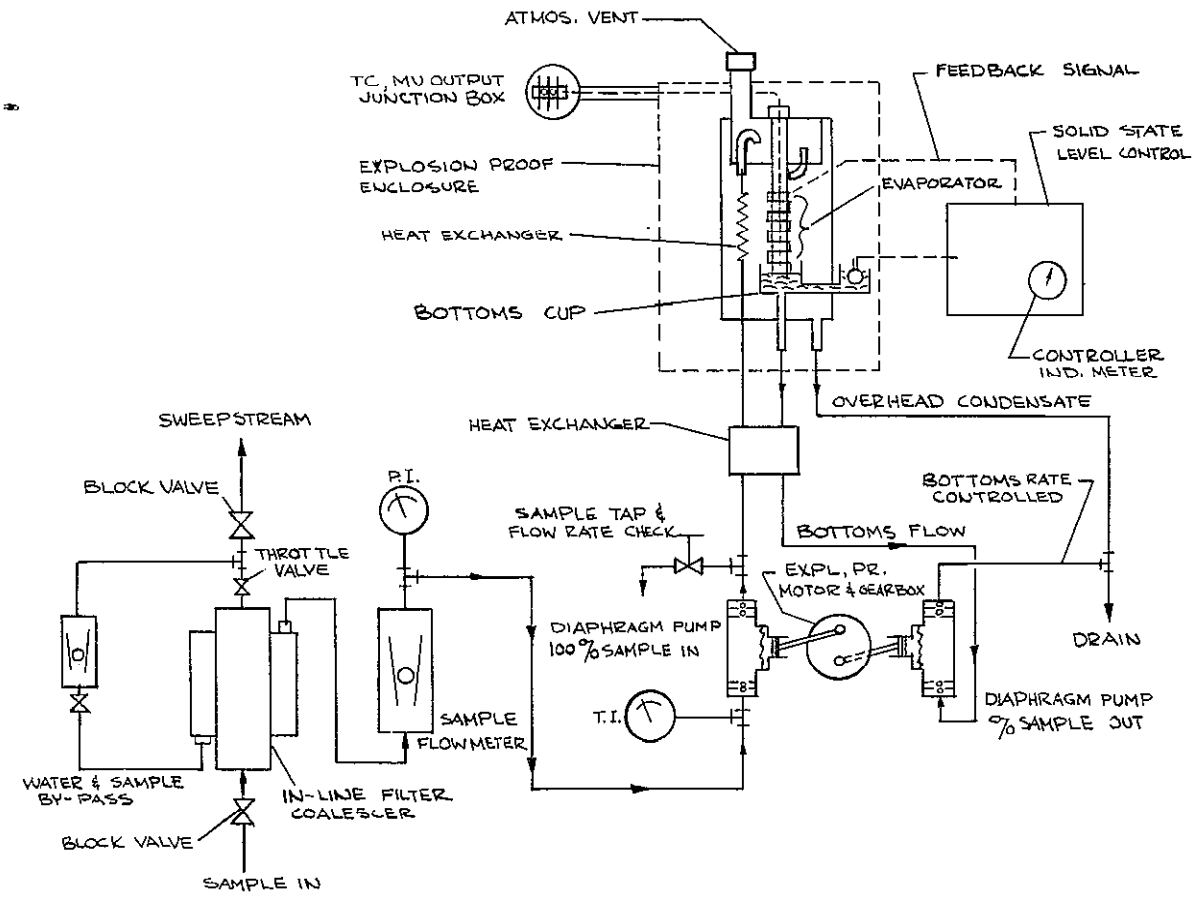
The capability of selecting any boiling point between the 5% and end point without the need to add or change components makes this the most versatile boiling point analyzer available. The simplicity of design and reliable solid state electronics eliminate most of the costly down time.

Although the operation of the DISTILLATION ANALYZER is not a duplication of the ASTM distillation test method, the results may be readily correlated with the ASTM boiling points.

APPLICATIONS

Several typical applications for the Analyzer are listed below:

- Catalytic Reformer Feed Stocks
- Jet Fuels
- Gasolines
- Intermediate Products
- Crude Distillation
- Catalytic Cracker - Fractionation



OPERATION

The conditioned sample is metered to the Analyzer by one head of a duplex pump at a rate of 25 ml/min. Before entering the analyzer, the sample is preheated in a tube-in-tube heat exchanger. Further heating occurs in a preheating coil in the boiler. The sample expands through a check valve into the flash cup which is vented to the atmosphere, allowing highly volatile components to escape. The remaining liquid is directed onto an evaporator tube. As the sample flows down the evaporator tube, the desired percent overheads are boiled off. The residue dropping off the end of the evaporator is collected in a bottoms cup where its temperature is measured by a thermocouple. Sample in the bottoms cup is pumped off at a constant predetermined rate. The liquid level in the cup is sensed by a float to which is attached a lever whose opposite end is a light blocking shield. As the float position changes, the shield varies the amount of light reaching the photocell, thereby, changing its resistance. The photocell resistance determines the rate of charging of a capacitor which, in turn, controls the firing of a unijunction transistor. When the transistor fires, it energizes a pulse transformer, firing an SCR. The rate of charging of the capacitor determines the phase angle at which the SCR fires and, consequently, the wattage output of the heater. Changing the heater output changes the boiling rate, thereby, maintaining the liquid level in the cup.

GENERAL DESCRIPTION

The evaporator, flash cup, bottoms cup, level control cup, preheating coil and check valve are all contained within one explosion-proof housing mounted on a vertical steel frame. The lamp and photocell are contained in an explosion-proof housing adjacent to the boiler housing. Vapors are prevented from entering the photocell housing by a flexible diaphragm which also serves as the fulcrum for the float-to-light shield lever. The solid state electronics are contained in another explosion-proof housing.

DESCRIPTION OF COMPONENTS

Housings—The separate housings for the boiler assembly, photocell, and electronics are explosion-proof boxes designed for use in Class 1, Group D, Division 1 areas. The housings and other components are mounted on a welded steel channel frame.

Sample Flow Control—Sample flow rate to the analyzer is maintained by one head of a duplex diaphragm-type metering pump. The removal of liquid from the bottoms cup is controlled by the second head of the same pump.

Sampling System—The sampling system supplied with the standard analyzer consists of a Hallikainen Model 1363 FILTER-COALESCER, two rotometers (one for sample flow and one for coalescer bypass), associated block and metering valves and gauges, all piped and mounted.

Filter-Coalescer—Combines the functions of filtration and coalescing in one unit. The self-cleaning filter is capable of removing particles greater than 2 microns in size. The major portion of the sample passes through the unit as a sweepstream while a fraction is routed through the combination element where it is filtered and all free water is coalesced. The coalesced water is continuously removed and returned to the sweepstream. See separate brochure for additional details.

Rotameters—Provided to measure the flow rate to the analyzer and the coalescer by-pass flow.

Boiler—The boiler assembly contains the preheating coil, back pressure valve, flash cup, evaporator and bottoms cup. The sample inlet, bottoms take-off and overhead condensation pass through connections at the bottom of the boiler. Highly volatile fractions are removed from the boiler through the explosion-proof boiler vent.

Evaporator Tube—The evaporator consists of a stainless steel tubular immersion heater wound around a stainless steel tube. The heater is rated at 350 watts at 115 volts A.C.

Thermocouple—The sheathed thermocouple is coaxial with the evaporator tube, its juction is immersed in the liquid in the bottoms cup. The thermocouple is Type J (iron constantan).

Level Detector—The light source and photocell are located in an explosion-proof enclosure adjacent to the boiler explosion-proof enclosure.

Electronics—The solid state electronics are enclosed in a separate explosion-proof box.

GENERAL SPECIFICATIONS

Percent Recovered Range - 5% to End Point.

Normal Operating Range - 150°F to 700°F.

Inlet Sample Temperature Limitations - Sample must be below its initial boiling point temperature, and, for maximum coalescer efficiency, should be as cool as possible. Maximum temperature at coalescer, 250°F. Maximum temperature at pump, 150°F. (A sample cooler can be supplied as an accessory at extra cost.)

Sample Flow Rate - approximately 25 ml/min. (approx. ½ gal/hr.)

Filter Rating - 2 microns or better.

COALESCER Water Removal Ability - All free water at the stream temperature is removed by the coalescer from the volume of sample required at the analyzer.

Materials of Construction - All metal parts in contact with the sample are stainless steel.

Recommended Installation - Overhead weather protection is desirable. Where freezing temperatures are expected, heating of the shelter is recommended.

Inlet Sample Pressure Limitations - Approximately 15 to 200 psig.

Time Constant for Step Change - Approximately one minute.

Sweepstream Sample In - 3/8" NPT female connection provided - 1/2" pipe recommended.

Sweepstream Sample Out - 3/8" NPT female connection provided - 1/2" pipe recommended.

Sample Out From Analyzer - 1/2" NPT male to sewer or recovery system.

Signal Out - Type J (iron-constantan) thermocouple 1/2" NPT female connection.

UTILITIES

Electrical - 115 volts A.C. ± 10%, 600 watts max. Connections are for 1/2-inch conduit.

Water - Used only when sample cooler is provided.

DIMENSIONS

Approx. 42 3/4" wide x 24" deep x 72 1/8" high - without horizontal feet and casters.

Approx. 42 3/4" wide x 24" deep x 77" high - with horizontal feet and casters.

NET WEIGHT

Approx. 300 lbs. without horizontal feet or casters.

GROSS SHIPPING WEIGHT

Approx. 450 lbs.