# ORIFICE AND NOZZLE FLOW CALCULATOR
Model M.18

This calculator determines the flow rates of fluids through the various types of flow measuring nozzles and orifices, including: Orifice Plates, Nozzles, Venturi Nozzles, Venturi Tubes, Pitot Tubes, Quarter Circle Orifice Plates, Conical Entrance Orifice Plates.

The rates of Flow are calculated in accordance with the standard flow formula:
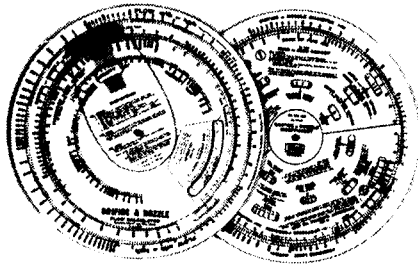
$$W = 1890 \, C \, d^2 \sqrt{hp}$$

where W = mass flow, lb./h
  d = orifice or nozzle throat diameter, inches
  h = pressure difference p.s.i.
  p = density of fluid upstream, lb./ft³
  c = overall orifice or nozzle co-efficient

Liquids, Gases or Steam are handled with equal facility, the flow being obtained in terms of either volume or mass whichever is desired. The Flow Coefficient of the various recommended orifice or nozzles vary according to type, diameter, and the relative size of pipe in which they are fitted. The reverse side of the calculator determines these coefficients for liquid flows and also the correction which may be necessary for gas flows to allow for expansion should the pressure loss across the orifice or nozzle be large.

Gas densities in Kg/m³ are quickly obtained for any gas according to pressure, temperature and specific gravity, a special section being provided for this purpose. This considerably facilitates the calculation of gas flows. An instruction booklet is included with each calculator, giving additional information, examples, and particulars of the slight correction necessary for very low Reynolds Numbers and rough pipes.

Scale Ranges
Pipe bore: 2" to 50"
Orifice diameter: .25" to 20"
Flow Rate: 40 to 3,000,000 ft³/h or lb/h
8" Diameter
Metric model also available

STREAMLINE (LAMINAR) FLOW CALCULATOR
Model M.6

This instrument is designed to solve the streamline flow formula applicable to the flow of more viscous liquids such as fuel oils, lubricating oils, syrups, etc. through pipe lines and also the flow of liquids of low viscosity in small pipes. The latest design includes viscosity conversion scales for Redwood, Saybolt, Engler and Centistokes.

Scale Ranges:
Liquid Flow   .001 to 15,000 g.p.m. Pipe Dia. 0.1" to 13"
      .001 to 15,000 tons/hr.
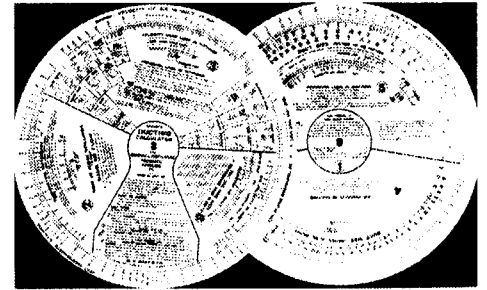Pressure Drop   .01 to 600 lbs./sq. in.
Metric model also available   Length 6 to 3,000 ft.
5-5/8" Diameter

DUCTING CALCULATOR
Model M.12

A complete calculator for determining duct sizes, velocities and pressure losses for large or small ducting systems passing either warm or cold air. It is double sided and divided into sections which handle all aspects of duct sizing calculations. It gives answers for either round, square or rectangular ducts.

Velocity: One section of the calculator gives the velocity in the duct or sizes the duct for any specific velocity requirement.

Pressure Losses: A separate section deals with the pressure loss in the straight portions of the duct.

Pressure Loss in Fittings: On many installations a large proportion of the pressure loss occurs in the various bends, branches, and other fittings and a section deals specifically with this giving the loss in velocity heads for a wide variety of fittings and providing scales to convert this to actual pressure loss.

Warm Air Heating: This section gives the volume of air required for warm air heating according to the heat requirements and the temperature differential between warm air and the room. In addition a further section gives heat losses from the surface of the ducting carrying warm air.

Duct sizes up to 100" diameter and the equivalent rectangular or square. Metric Model also available.
7-5/8" Diameter

TANK CAPACITY CALCULATOR
Model F.11
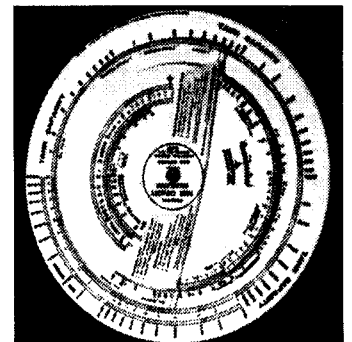
Calculates capacities of rectangular and cylindrical tanks or containers in Cu. Yards, Cu. meters, Cu. feet, gallons, gallons (Imp.) and litres. To operate, it is only necessary to set the scales to the known sizes of the container and read off the cubic capacity in any required units. Alternatively, the scales are set to the known cubic capacity or volume and the container sizes may then be determined.

Special section covers part-full horizontal cylindrical tanks filled to any level.

Capacity Range
Tank length: 1 ft to 250 ft.
Tank width: 1 ft to 250 ft.
Tank depth: 4 in. to 100 ft.
Diameter: 4 in. to 100 ft.
Volume: 0.1 to 10,000,000 (cu. ft. gals, or litres.)

7-1/2" Diameter