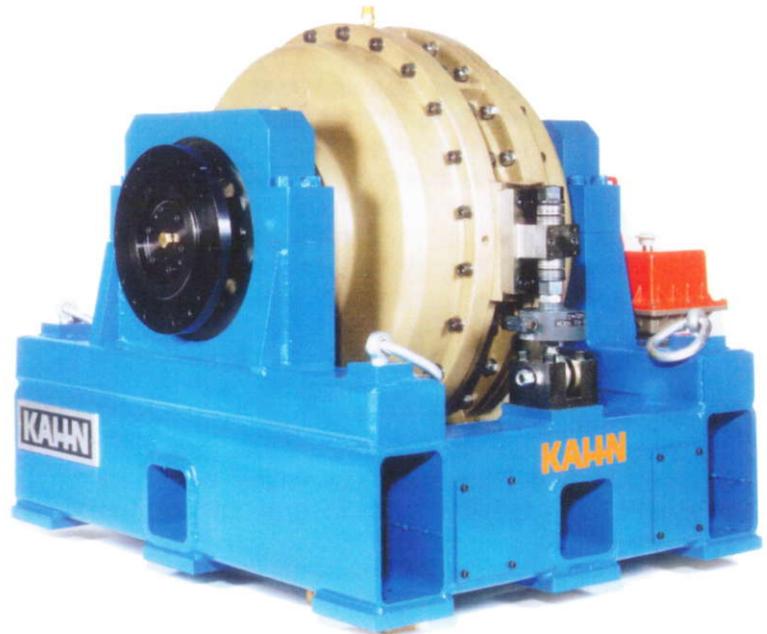


### SERIES 302 LOW-SPEED, HIGH-TORQUE HYDRAULIC DYNAMOMETERS

Developed for steady-state and transient performance testing of large industrial and marine diesel engines, turboprop engines and heavy electric motors, the Kahn Series 302 product line includes three models capable of absorbing up to 6600 hp (4900 kW) and operating at rotational speeds up to 4000 rpm.

Using the same design as the proven, reliable single-rotor Series 301 dynamometers, the double-rotor Series 302 offer long service life coupled with minimum maintenance requirements. All units are fully compatible with advanced, fast-response FADEC (Full Authority Digital Electronic Control) engine control systems and meet or exceed the test specifications of all current turboprop engines, including the following:

Allison GMA2100, T56, Garrett TPE331/T76, General Electric T64, CT7, Pratt & Whitney PT6A, PW100, Rolls Royce Dart, Tyne, Turbomeca Astazou, Bastan.



#### DESIGN BENEFITS

Designed and built to meet the most demanding engine test requirements, the Kahn Series 302 dynamometers offer a number of important design benefits:

- Easy to install and to operate.
- Tough nickel-aluminum-bronze power elements provide superior resistance to cavitation and corrosion.
- Vaned power elements absorb full power in both directions of rotation.
- Inherently steep, open-loop torque speed characteristic assures stable steady-state operation.
- Low moments of inertia and small internal water volumes permit rapid transient response.
- Grease lubrication eliminates environmental hazards associated with oil-mist lubrication.
- Simple, utilitarian design concept, eliminating selective assembly procedures and cumbersome hydraulic or heat shrink fits, permits easy overhaul by the user with minimum downtime.
- Built-in flexible o-ring joints assure high torque measurement accuracy.

#### SPECIFICATIONS

Model	Max Power hp	Max. Speed rpm	Max. Torque ft.lb	Dry Weight lbs
302-220	2700	4000	9000	1950
302-280	4400	3300	18000	2900
302-350	6600	2600	35000	4500

#### POWER ABSORPTION MECHANISM

The power output from the engine is absorbed by water vortices generated in the pockets between rotor and stator vanes. The resulting drag applies a moment to the dynamometer housing which is measured by a strain-gage load cell mounted to the torque arm.

Absorbed power varies with rotational speed and with the mass of water contained in the rotor chambers. With fully filled rotor chambers, absorbed power increases and decreases with the third power of speed. The amount of water in the dynamometer is modulated with the inlet and outlet control valves.

## CONSTRUCTION

Derived from the proven, reliable Kahn Series 301, the Series 302 hydraulic dynamometers are designed and built for long service life and ease of overhaul. Each unit features two sets of power elements (rotors and stators) capable of fully bidirectional operation.

In contrast to other hydraulic dynamometers which use less expensive materials such as cast steel or ductile cast iron, the Series 302 are equipped with power elements made from tough nickel-aluminum-bronze castings. Because of its outstanding resistance to cavitation and corrosion, the same material is used for the manufacture of marine propellers. The shaft and other rotating components are manufactured from high-strength, corrosion-resistant stainless steels.

The rotor assembly is supported by two grease-packed, spring-preloaded precision ball bearings. Through the use of advanced, highly water-resistant high-speed greases, Kahn has eliminated the environmental hazards associated with oil-mist lubrication. To assure smooth, vibration-free operation, the rotor assembly is dynamically balanced in accordance with high-speed turbine requirements (ANSI Standard S2.19-1975, Grade 2.5).

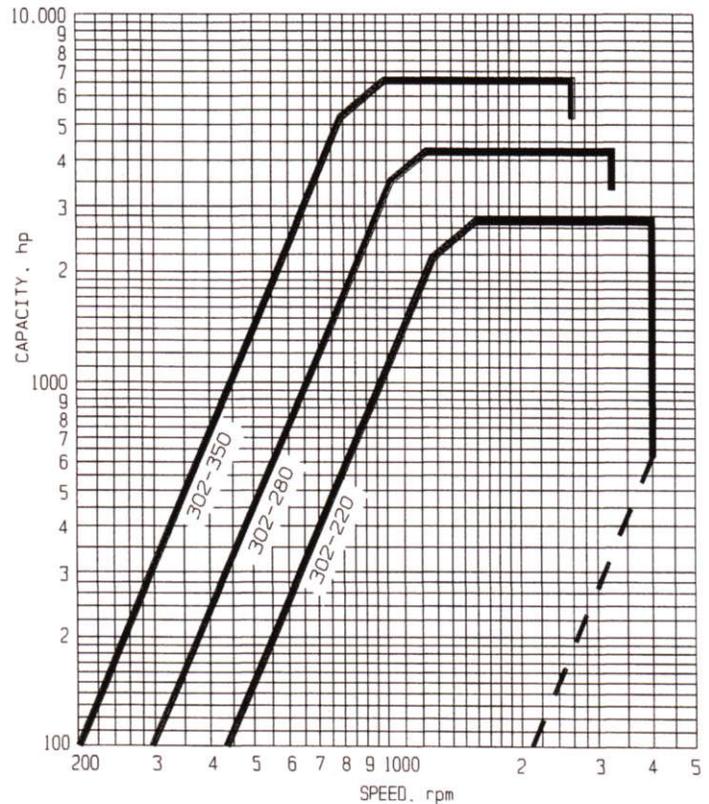
Sealing between rotor chambers and bearings is accomplished with maintenance-free, multi-stage labyrinth seals. Use of soft seal liners permits minimum seal clearances.

Manufactured from rigid, structural steel tubing, the dynamometer base is equipped with integral trunnion mounts. The dynamometer housing is supported in the base by rugged, tapered roller type trunnion bearings. Their high rigidity and excellent resistance to brinelling provides smooth, vibration-free operation and long service life under the most severe operating conditions.

Flexible o-ring joints, connecting the water inlet and outlet ports on the base with the dynamometer housing, assure high torque measurement accuracy. This design configuration also permits mounting the dynamometer control valves in an easily accessible location directly to the water inlet and outlet flanges on the dynamometer base.

Featuring an integrated stator/housing design concept, the Series 302 dynamometers consist of less than 35 components (excluding assembly hardware). In contrast to other low-speed, high-torque dynamometers which require selective assembly procedures and feature cumbersome hydraulic or heat shrink fits, the Series 302 do not need to be returned to the factory for overhaul. Their simple, utilitarian design requires only minimum maintenance and allows easy overhaul by the user in the field, saving money and downtime.

## OPERATING RANGE



## FACILITY REQUIREMENTS

A continuous flow of water through the dynamometer is required to provide resistance to rotation and to remove the heat generated by the power absorption process. Depending primarily on absorbed power and allowable temperature rise, typical water flow requirements range from 4 gal/hr hp (20 l/hr kW) for waste water systems to 6 gal/hr hp (30 l/hr kW) for recirculating water systems.

The following water flow rate and temperature data apply for installations using a recirculating water system with an evaporative cooling tower:

Specific Water Flow Rate	6.0 gal/hr hp (30 l/hr kW)
Water Supply Pressure	50 psig (3.5 bar)
Water Supply Temperature	90°F (32°C)
Water Discharge Temperature	140°F (60°C)
Filtration	340 micron

NOTE: The information included herein was correct at the time of publication and supersedes all previous data. It is our policy to continually improve our products to insure even better performance. Consequently, current Kahn products may incorporate modifications not shown on these pages.