

## UG-40 Governor

### Lever or Dial Type Speed Setting with Adjustable Droop

#### APPLICATIONS

UG-40 governors are used for speed or load control of larger dual fuel, diesel, or gas engines or steam turbines with governor drive speeds of 350 to 1050 or 550 to 1300 rpm.

Governors with lever speed setting are primarily used for propulsion engines. Dial or motor speed setting is primarily used for power-generation installations.

All UG-40 governors have adjustable compensation. A pointer on the governor sets and indicates the amount of compensation. Compensation allows isochronous speed control. Compensation is temporary. A needle valve sets the speed at which compensation is removed from the governor speed setting. Special damped ballheads and spring-driven drives are available for engines with rough governor drives.

Droop is available in UG-40 Governors to allow load sharing between multiple engines or power generation against an infinite bus.

UG-40s have internal, self-contained oil supplies. The governors provide 38° of output shaft travel. Recommended usable rotation is 2/3 of the maximum, or 25°.

#### DESCRIPTION

##### Lever Governor

Engine speed on the Lever governor is set with a speed shaft having almost 90° rotation for the full speed range. Droop is adjustable from



Isochronous to 7.5% over the 38° of output on the high-speed governor and from Isochronous to 9.5% over the full output travel of the low-speed governor.

Lever governors are "reversible," allowing use with reversing engines.

##### Dial Governor

Speed reference is set from a manual dial or with an optional speed-setting motor, mounted on top of the governor.

Droop is adjustable over the complete 38° terminal shaft rotation from 0 to 17.5% on the low speed governor. Load Limit is set with an indicator dial to limit terminal shaft travel in the increase fuel direction.

The Dial governor is "reversible" allowing use with reversing engines.

- Isochronous or Droop Control
- Dashpot Compensation
- Adjustable Load Limit
- Lever, Motor, or Pneumatic Speed Settings
- Solid or Damped Ballhead
- Self Contained Oil Sump
- Over 40 Ft-Lbs of Work

## OPTIONAL FEATURES

A number of special shutdown devices are available for both UG 40 governors. Electric shutdown solenoids are available in either the de-energize or energize type. Pressure actuated air, oil, or water shutdown units are also available. These units operate with pressures of 69, 138, or 414 kPa (10, 20, or 60 psi).

A booster servomotor can be used to supply pressure oil to the governor at the instant starting air is supplied to the engine where quick engine starts are required. A booster conserves starting air for the engine. It also improves maneuverability of vessels using direct reversible engines.

Special solid or spring-driven, vibration-damping ballhead assemblies can help match the UG-40 governor to a particular engine. Pilot valve bushing can have special

"chopper" porting for slow response in acceleration. Normal porting is either 2 slotted or 8 round. Contact Woodward to exactly match the bushing and ballhead with the engine being controlled.

Weatherproof cases are available to reduce contamination of the self contained oil sump.

An electric synchronizing motor may be mounted on top of the dial governor for remote speed control to match frequencies of an engine-driven alternator to other units of a system. Motors are available for all popular voltages.

Governor speed can be monitored by using a tachometer and a magnetic pickup mounted on the governor. The pickup unit is available in a regular or explosion-proof model.

Reduced compensation is available when the compensation on a standard governor is too large to match the characteristics of the prime mover.

## OPTIONAL FEATURES SPECIFICATIONS

### SPEED SETTING

Dial Type .....	Manual speed setting with dial or remote with motor of 12, 24, 32, 48, 64, or 125 Vdc; 115 or 220/250 Vac/Vdc universal.
Lever Type .....	Speed is set by rotation of speed setting shaft on governor. Lever is normally attached to the speed setting shaft and rotation is determined by cable to remote speed setting location.

### GOVERNOR DRIVE

Drive Shaft .....	Standard 1.125 inch - 48 S.A.E. serration or optional .187 wide x .094 deep x 1.500 long keyway on .625 dia. shaft to carry gear held by .625-18 castle nut. (All dimensions in inches.)
Drive Power Requirement .....	1/2 HP at normal speed and temperature.
Rotation .....	CW or CCW

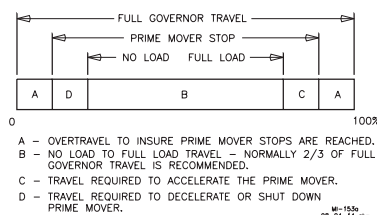
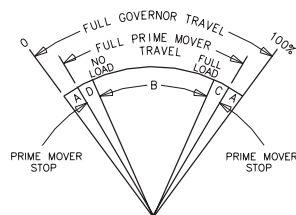
### SPEED RANGES

Low Speed Governor .....	350 to 1050 rpm maximum. Recommended constant speed operation 800 to 1050 rpm at rated engine speed
High Speed Governor .....	550 to 1300 rpm maximum. Recommended constant speed operation 950 to 1300 rpm at rated engine speed
Steady State Speed Band .....	±0.25% of rated speed
References .....	Manual 03039 <i>UG-40 Governors</i>

## SPECIFICATIONS

### OUTPUT

Terminal Shaft .....	SAE 0.750 inch - 48 serration. May extend from either or both sides of the governor.
Linkage .....	The relationship between engine-torque output and governor terminal-shaft travel should be linear. This is very important for gas or dual-fuel engines.



Maximum work capacity over full governor travel of 38 degrees is 7.95 kg-m (57.5 ft-lbs). See above for recommended governor output travel. In special applications min and max prime mover stops may be outside the governor stops.

## **PILOT VALVE**

Plunger Movement.....	Balanced between ballhead centrifugal force and speeder-spring force. Compensation and Load Limit both effect relationship between ballhead force and pilot-valve-plunger location.
Bushing.....	The pilot-valve bushing is rotated to overcome friction between the bushing and plunger. Porting in the bushing can be designed to match characteristics of particular engines or governor drives.

## **HYDRAULIC SYSTEM**

Governor Oil.....	Self-contained sump, 6-quart capacity. SAE 10 to SAE 50 is recommended with a viscosity of 100 to 300 SUS at operating temperature.
Pressure.....	1724 kPa (250 psi) maintained by relief valve in the accumulator system.

## **DROOP AND COMPENSATION**

Droop.....	Droop is adjustable. All percentages are based on total speed change between no load and full load across 38° of terminal-shaft travel. Actual droop will be less since full travel is not recommended.
Dial Governor.....	0 to 14.0% at 1000 rpm (high-speed governor), 0 to 17.5% at 800 rpm (low-speed governor).
Lever Governor (optional).....	0 to 7.5% at 1000 rpm (high-speed governor), 0 to 9.5% at 800 rpm (low-speed governor).
Compensating Adjustment.....	Exterior adjustment can be used while governor is controlling engine operation. Adjustment determines amount of offspeed which occurs with load changes.
Needle Valve Adjustment.....	Effective needle valve opening of up to 3 turns is made in conjunction with compensating adjustment. Adjustment of the needle valve determines the duration of offspeeds which occur with load changes.

## **OPERATING TEMPERATURE**

.....	-29 to 99 °C (-20 to 210 °F). Oil must be matched with operating temperatures. The selection of the proper oil to match governor operating conditions is important. Manual 03039 UG 40 Dial and Lever Governors has extensive information on the selection and maintenance of the oil used in the governor.
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## **GOVERNOR CONSTRUCTION**

Case, Base, and Cover.....	Cast iron. Interior parts are made of stainless steel, steel, and case-hardened steel as needed to provide the longest lasting construction.
Weight and Installation.....	Dial Type: 45 kg (100 pounds), 46.3 kg (102 pounds) with synchronizing motor.
.....	Lever Type: 43 kg (95 pounds). Selection of options can effect weight.

## **INSTALLATION**

Configuration.....	Vertical to 45° (servo down).
Studs.....	1.3 cm (0.500 inch) diameter (4), not furnished.

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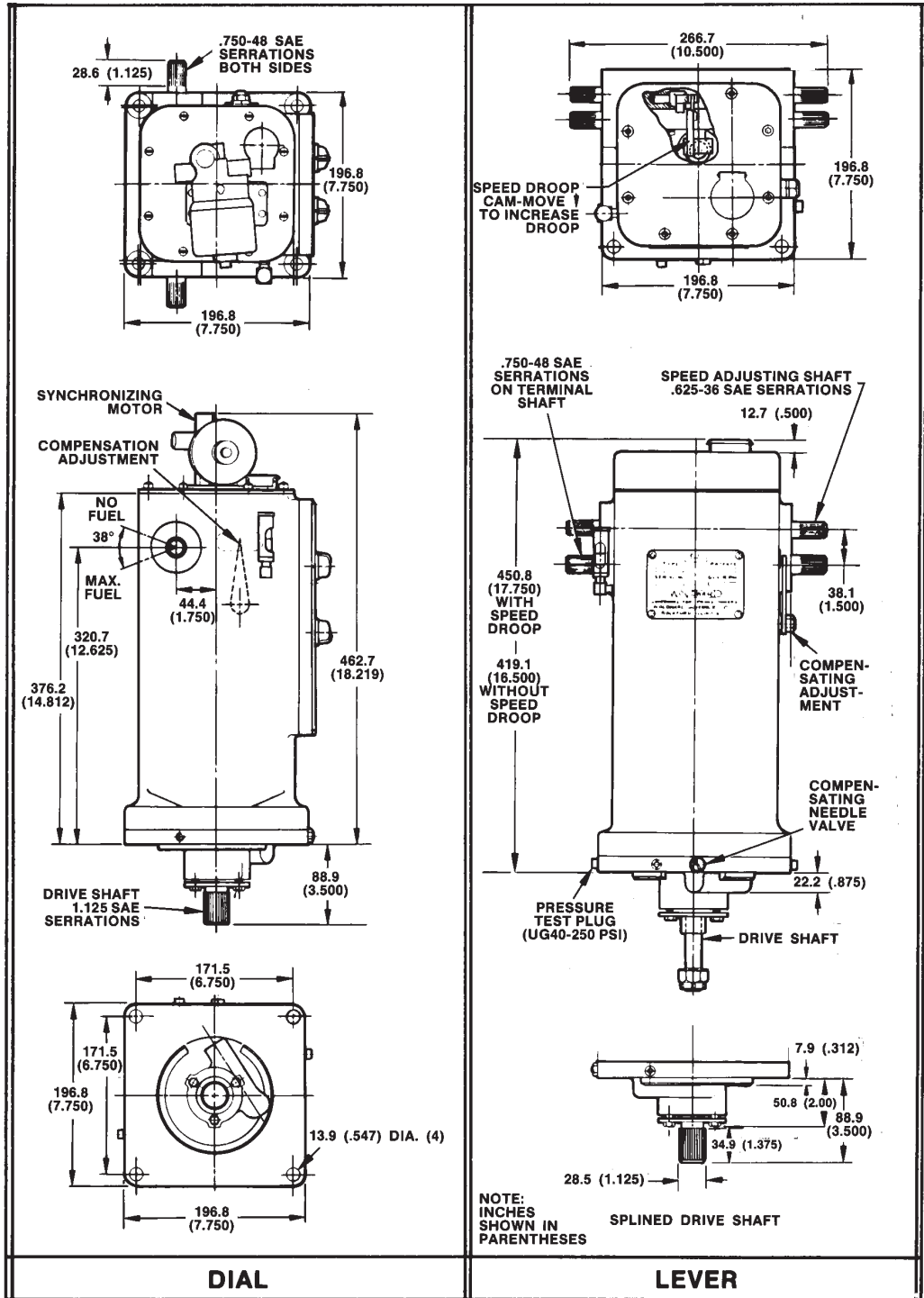


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**UG-40 GOVERNORS (DO NOT USE FOR CONSTRUCTION)**

For more information contact: