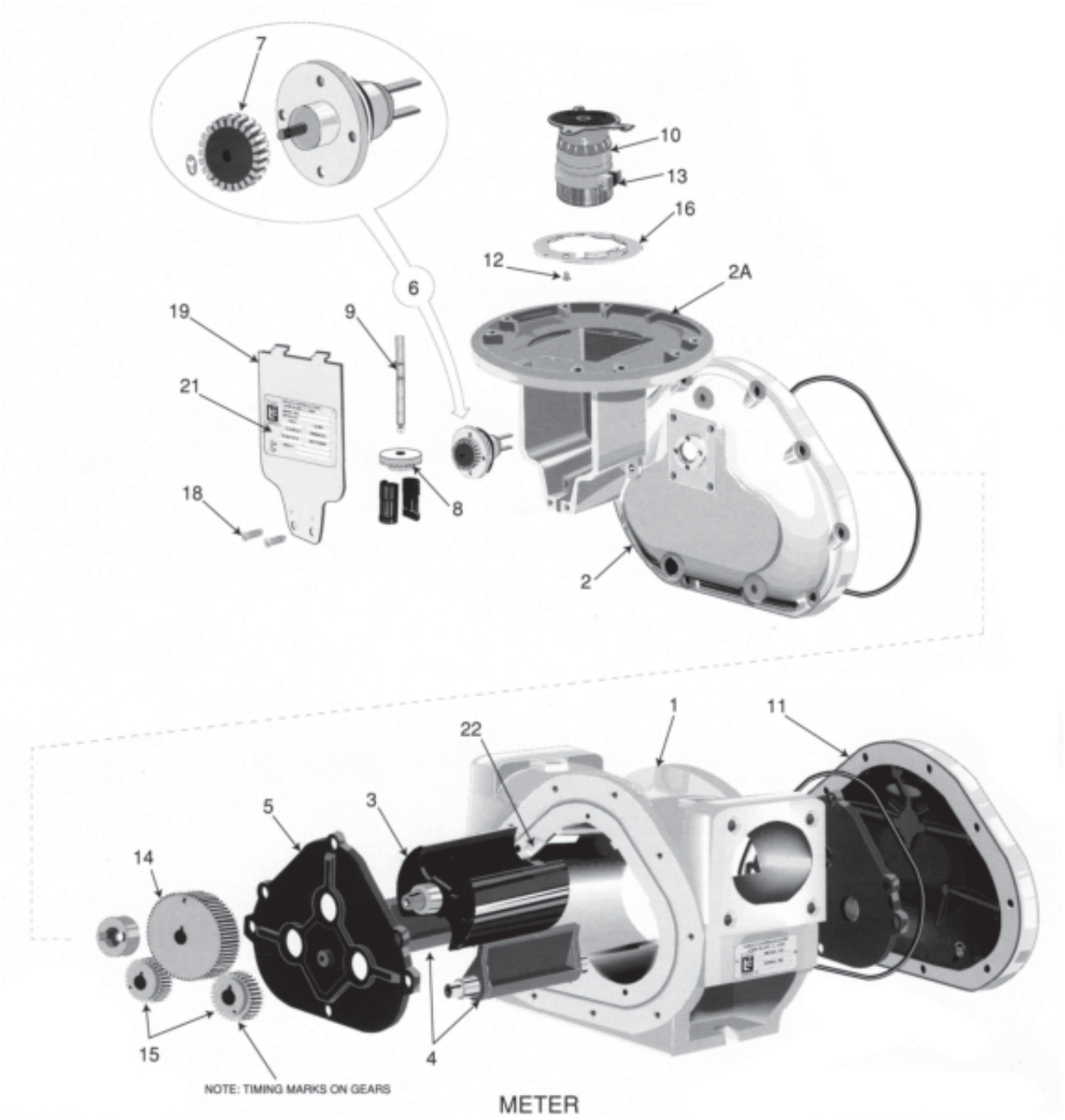
The Liquid Controls Meter

LIQUID CONTROLS
A Unit of IDEX Corporation
IDEX CORPORATION

The Liquid Controls meter is a positive displacement meter designed to meet the wide range of metering applications encountered in the petroleum production, pipeline, refining and marketing, chemical processing, pharmaceutical, paint, solvent, food processing, aircraft fueling, military fuel servicing and agricultural fields.

The LC meter consists of a housing in which three rotors turn in synchronized relationship within three cylindrical bores with no metal-to-metal contact in the metering element. No contact means no wear, no wear means no increase in clearances, no increase in clearances means no increase in slippage, no increase in slippage means no deterioration in accuracy. Optional accessories include strainers, air eliminators, preset counters, valves, temperature volume compensators, large numeral counters and ticket printers.

Meter



METER

1. Meter Body
2. Counter End Cover
2a. Register Mounting Adapter
3. Blocking Rotor
4. Displacement Rotor
5. Bearing Plate
6. Packing Gland
7. Packing Gland Pinion
8. Adjuster Drive Shaft Gear
9. Adjuster Drive Shaft
10. Adjuster
11. Rear Cover
12. Adjuster Mounting Screw
13. Adjuster Locking Screw
14. Blocking Rotor Gear
15. Displacement Rotor Gear
16. Adjuster Mounting Plate
18. Adjuster Cover Screws
19. Adjuster Cover
21. Specification Plate
22. Bleed Hole

The meter body (1), the counter end cover (2) and the rear cover (11) form the pressure containing vessel. The meter body (1) and the two bearing plates (5) form the housing of the metering chamber (element). The bleed holes (22) in the meter body (1) permits filling of the cover cavities, providing hydraulic balance and preventing deflection of the bearing plates which might cause inaccuracies due to clearance changes or binding in running fits.

The blocking rotor (3) and the two displacement rotors (4) are journaled at either end and supported by the bearing plates (5) through which the rotor shafts protude. At one end of the blocking rotor is a timing gear (14). At one end of each of the displacement rotors is a pinion (15). The displacement rotor pinions have half the number of teeth of the blocking rotor gear. The blocking rotor (3) and the displacement rotors (4) are locked in timed relation so that the displacement rotors (4) make two revolutions for each single revolution of the blocking rotor (3). The displacement per revolution of the device is equivalent to the volume of the semi-circular bores of the measuring chamber being swept twice by each displacement rotor. At any position in the cycle the meter body (1), the blocking rotor (3) and at least one of the displacement rotors (4) form a continuous capillary seal between the unmetered upstream product and the metered downstream product.

The hydraulically balanced blocking rotor (3) is exposed to inlet pressure on one side and outlet pressure on the other side, producing no resultant force to cause rotation. The active displacement rotor (4) is exposed to the same differential in liquid pressure and produces torque about its axis driving the blocking rotor (3) and the inactive displacement rotor (4). This true rotary motion is transmitted through the packing gland (6), the face gear (8), the adjuster drive shaft (9) and the non-cyclic adjuster (10) to the register stack. This non-cyclic output means consistent accuracy, since the register indication is in precise agreement with the actual volume throughput at any given instant.

Throughout the metering element the mating surfaces are either flat surfaces or cylindrical faces and sections that are most accurately machined. These relatively simple machining operations, plus the fact that there is no oscillating or reciprocating motion within the device, permits extremely close and consistent tolerances within the LC meter.

Because the dynamic force exerted by the product flowing through the meter is at right angles to the faces of the displacement rotors, and because the meter is designed so that the rotor shafts are always in a horizontal plane, there is no axial thrust. Therefore, with no need for thrust washers or thrust bearings, the rotors automatically seek the center of the stream between the two bearing plates eliminating wear between the ends of the rotors and the bearing plates. The clearance between the rotor journals and the bearings is about 0.0005” (0.0127 mm) and the clearance between the rotors and the bores within which they turn is about 0.002” (0.0508 mm). It is not possible for the rotors to contact or rub against the metering element bores until bearing/journals have worn another .0005”. The oversize design of the sleeve bearings, as well as the specially selected materials from which they are made, assure maximum throughput before wear takes place. No metal-to-metal contact within the metering element means no wear, no wear means no increase in slippage, and no increase in slippage means no deterioration in accuracy.

As a result the LC meter provides unequalled accuracy, long operating life, and unusual dependability.