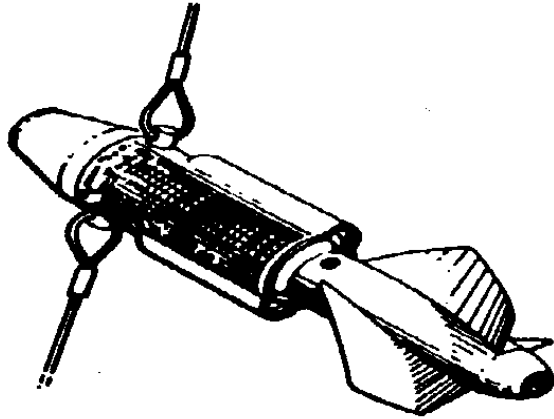


General Oceanics Digital Flowmeter Mechanical and Electronic Operators Manual



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Model 2030 Series

Mechanical Flowmeters

! Small and lightweight general purpose impeller instruments for use anywhere (in rivers, estuaries, canals, sewage outfalls, pipes, harbor entrances, offshore sites) and in association with plankton nets and other samplers. Balanced (in water) for dynamic stability. Unlimited depth capability (free-flooding).

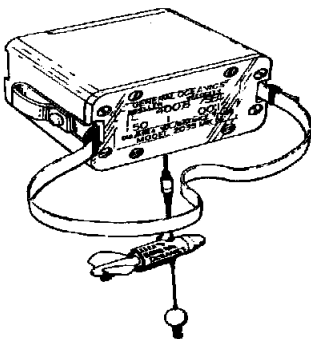
! Universal bridle mounting allows single- point connection for towing or 2-point connection within net mount.

Model 2030R is a standard flowmeter. Model 2030R6 uses a high-resolution rotor for low-speed applications. Model 20307 uses seven digits to extend distance measurement from 14.5 to 145 nautical miles.

! Response with standard rotor (2030R) threshold, approximately 10 cm/sec. (1/5 knots). Speed range approximately 10 cm/sec (1/5 knot) to 7.9 meters/sec. (15 knots)

! Response with optional rotor (2030R6) threshold, approximately 6 cm/sec. (3/25 knot). Speed range approximately 6 cm/sec. (3/25 knot) to 100 cm/sec. (2 knot)

Note: Low speed rotor rotates in counterclock wise direction.

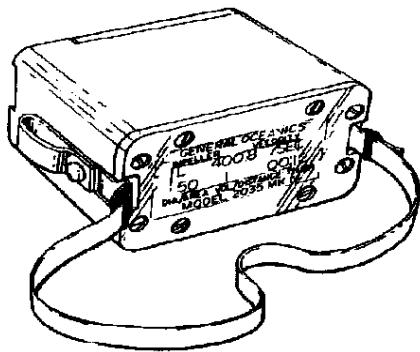


Model 2031H Series Real-Time

Electronic Flowmeters

! Same uses as model 2030 series, but in addition to mechanical count, the 2031H and 2031HR6 (low-speed) models use 2 rare earth magnets which actuates a solid- state hall-effect generator, creating a signal for processing by the 2035mk4 readout.

! Standard order of electronic flowmeter includes rotor (specify standard or low speed rotor), bridle and connecting cable. Order readout (model 2035MK4) additionally.



Model 2035 MK4

Data Acquisition Readout

- ! Hand held (2.1 lbs. .98kg) battery-operated data display and acquisition readout converts signals from the 2031H series flowmeters.
- ! Processed speed signal appears in (user programmable) cm/sec., ft/sec., or knots in addition to total volume or distance and elapsed time.
- ! Full-scale range to 100cm/sec.
- ! Comes with 10 meter cable, additional lengths available.



Flowmeter Software

- ! This software allows users of our 2031H electronic flowmeter to use their own DOS-based computer as a display and data logging device. The software provides a real-time display of date and time, elapsed time, speed, distance, and volume in user selectable units of measurement. The 2035DS package includes software, 9v battery, and 30 ft. of underwater cable.

1. Introduction

The Model 2030 series Digital, Mechanical Flowmeter is a compact, general purpose instrument for flow measurements in rivers, estuaries, canals, sewage outfalls, and offshore applications. It is ideal for use with plankton nets or other samplers, to determine the water volume associated with each tow. Please read Section 4 for calculating numbers.

The Flowmeter incorporates a precision molded rotor coupled directly to a six digit counter which registers each revolution of the rotor and displays it as an automobile odometer does. The counter is located within the body of the instrument and is read through clear plastic wall. The flowmeter is properly balanced to maintain horizontal position when suspended from the towing bridle at speed.

The Model 2031H Electronic Flowmeter incorporates the features of the standard 2030R, together with a Hall Effect Magnetic Switch, which produces a 9 volt square wave signal output (to the readout) for each half revolution of the rotor. The 2031H is used in conjunction with the Model 2035MK4 Data Acquisition Readout which provides a remote display of current speed in meter/second. The readout automatically converts the flowmeter counter rotations to a current speed.

Both the 2030R and the 2031H Flowmeters can be fitted with the interchangeable large diameter, 2 bladed rotor for measuring low velocity flows.

2. Preparing The Flowmeter For Use

(Refer to diagram for part number).

- A. Remove the pan head stainless steel screw #30, which is located at the back of the flowmeter on the end plate #16. This screw hole provides access to the inside, for injecting tap water or silicon fluid with the supply syringe.
- B. Fill the syringe provided, with tap water. Hold the flowmeter nose down and inject with tap water until full. Little or no air should be visible. **CAUTION: DO NOT USE DISTILLED WATER!** The filled housing helps reduce the osmotic pressure differential and the pressure change during towing.
- C. Replace the panhead screw (with O-ring seal) after filling.
- D. **ENSURE THAT THE ROTOR SET SCREW IS TIGHT BEFORE DEPLOYMENT.**
- E. Immediately place into use. This is important since the flowmeter is not designed to be water tight and therefore will leak, creating an air bubble inside. At very low speeds this air bubble will tend to tilt the flowmeter away from the water-flow axis, thus providing readings which will be in error. The error produced by placing and recovering the flowmeter in the water is negligible if the sampling time is relatively long.
- F. After use the flowmeter should be flushed clean (sect. 5) because the majority of tap water has been exchanged with the ambient water, such as dirty, polluted or salt water. If not properly cleaned, a residue will build up on the gear counter assembly and throw the calibration off.

3. Uses of the flowmeter

The 2030R and 2031H Flowmeters are also designed to be used in towed plankton net systems. A bridle, composed of two monofilament lines attach the flowmeter to the plankton net mouth ring, across the center.

Some low velocity investigations may require that the flowmeter be prevented from tilting away from the axis of the water flow. This is done by adding a weight to one of the bridle lines allowing it to hang freely below the flowmeter with the other bridle line being fixed to the point of suspension.

Special care should be taken when beginning measurements. The flowmeters are bi-directional. That is, the rotor will turn in either direction along with the counter. It is therefore critical that the operator be aware that the flowmeter is always pointed into the flow direction for accurate readings.

General Oceanics does not provide a method for locking down the flowmeters from turning in a current. The flowmeters begin rotating as soon as they enter the water and continue until removed. Therefore the operator must either control the rotation or add a correction factor for the calculations to avoid additional counting when entering and exiting the water.

4. Calculations

10 counts are equal to 1 rotor revolution on the graphic labels on all flowmeters. The cts/sec. Is “counts per second” and must not be used as revolutions per second for calculations.

ROTOR CONSTANTS: Standard Speed Rotor Constant = 26,873
 Low Speed Rotor Constant R6 = 57,560
 (R2) Low Speed Rotor Constant = 51,020
 Speed Curve See Page 11

A. DISTANCE in meters = $\frac{\text{Difference in COUNTS (X) Rotor Constant}}{999999}$

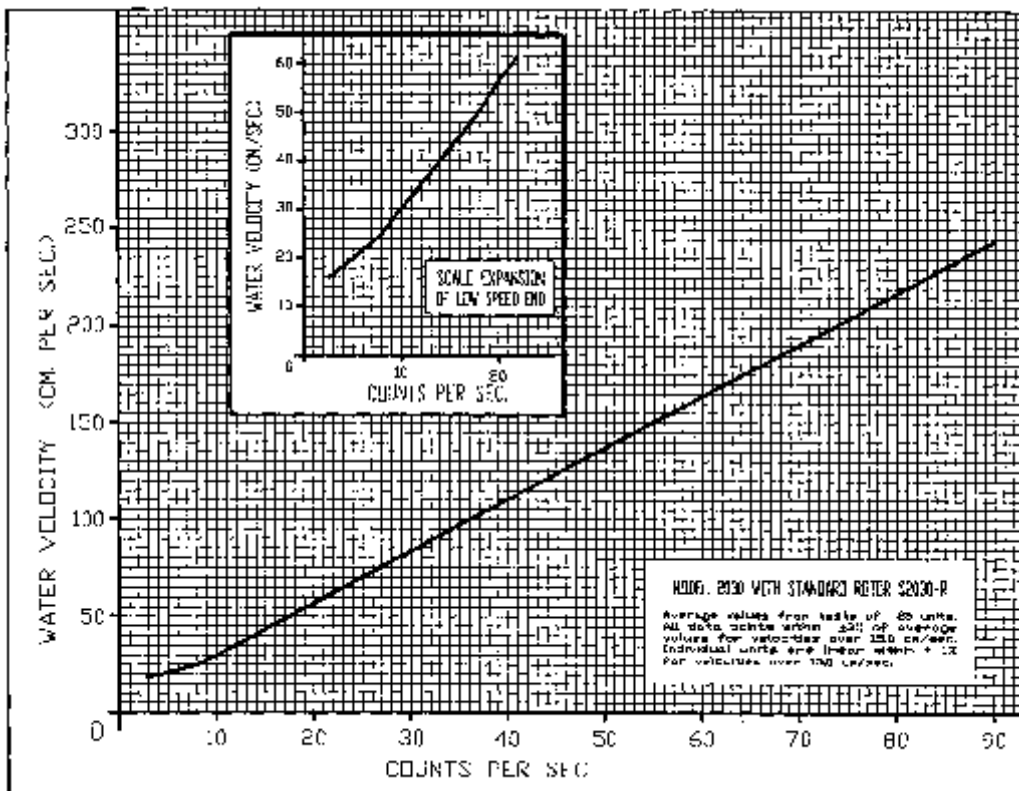
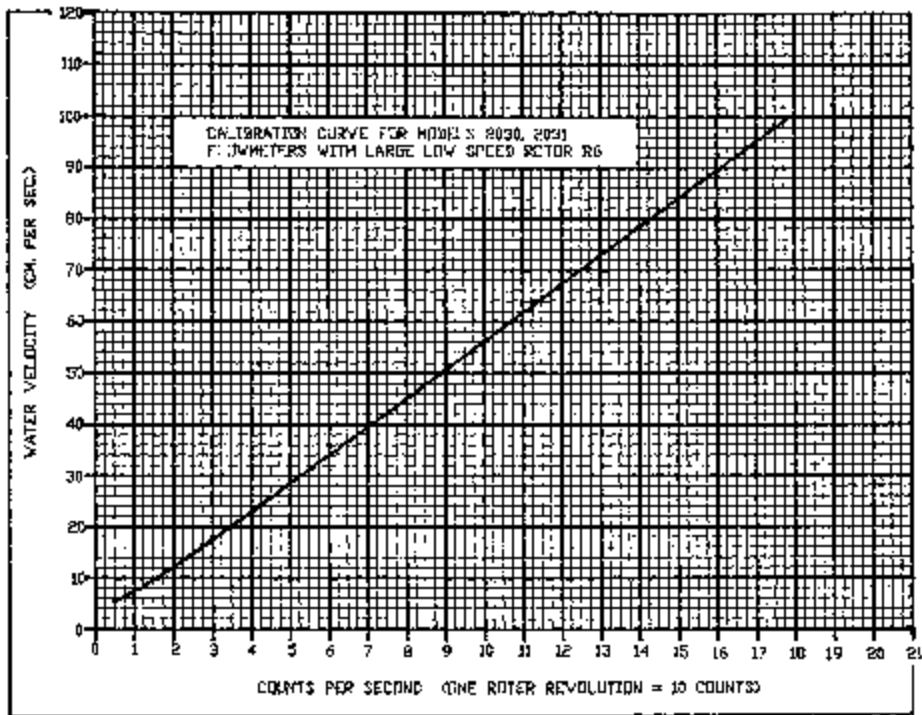
(Example: Where the graph may indicate 100 cts/sec this is also equal to 10 revolutions/sec). Therefore please ensure the correct units are being used when measuring and calculating.

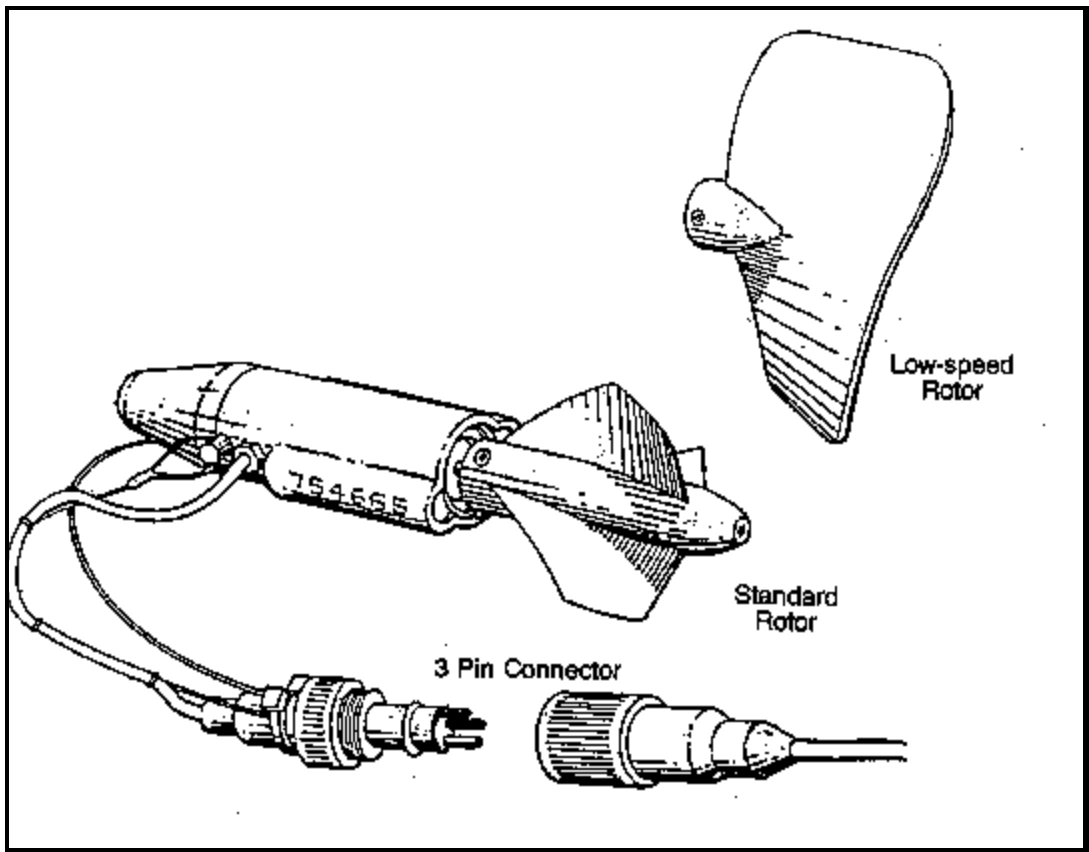
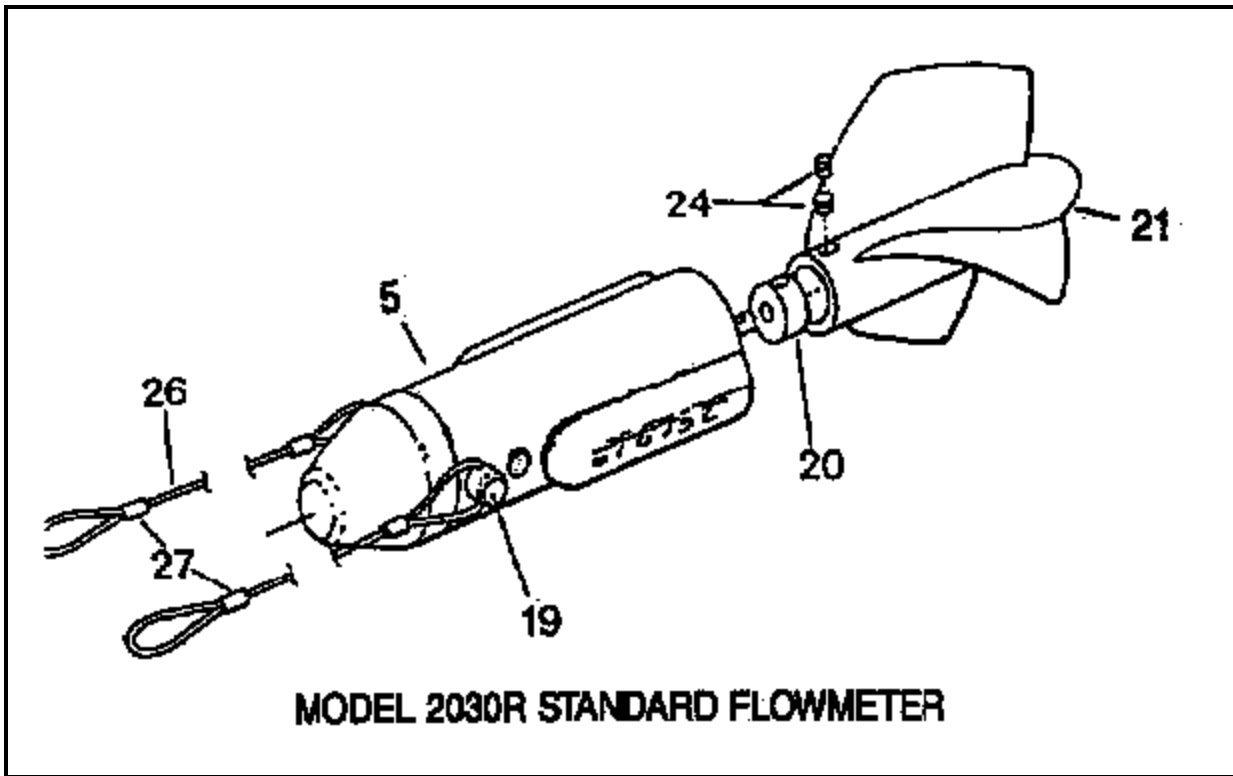
B. SPEED in cm/sec = $\frac{\text{Distance in meters (X) 100}}{\text{Time in seconds}}$

C. VOLUME cubic meters = $\frac{3.14 (X) (\text{Net Diameter})^2 (X) \text{Distance}}{4}$

5. Repairs and Maintenance

For Storage , the flowmeter must be thoroughly flushed to remove any salt deposits. The flushing should first be done with a mixture of white vinegar and tap water. This solution should be left in the flowmeter for a few hours. Flowmeters that have been damaged or do not keep an accurate count should be returned to General Oceanics for a repair estimate. Please include a “letter of work” and a purchase order number with any equipment sent back. All Flowmeters are covered by 1 year warranty against defects in materials and workmanship.

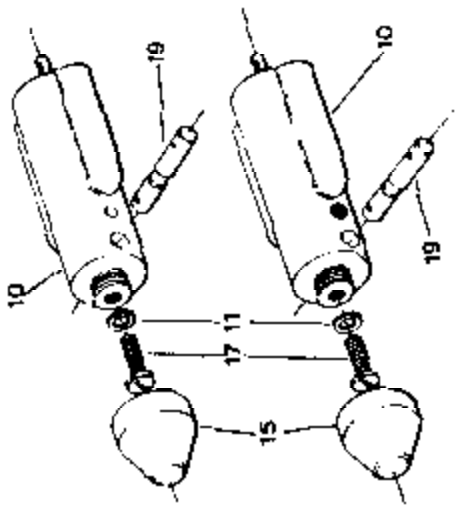
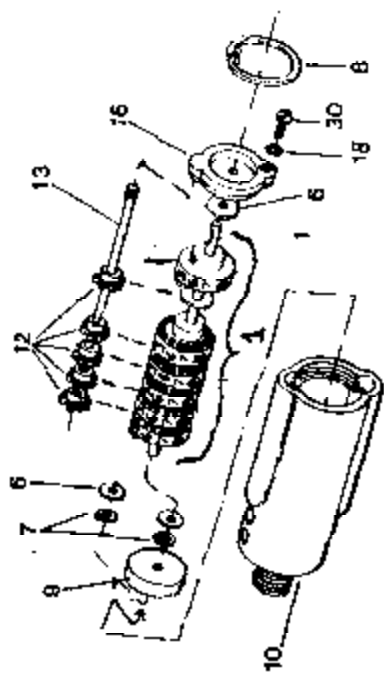
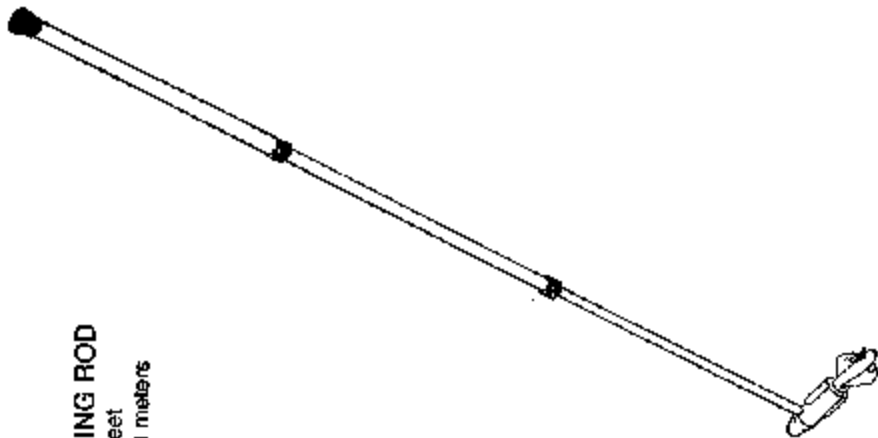




(Optional)

2030W - WADING ROD

Extendable 3-8 feet
1-2.8 meters



ELECTRONIC FLOWMETER PARTS
2031H

| PART NO. | DESCRIPTION | QTY. |
|-----------|--------------------------------------|-------|
| 1 | COUNTER ASSY. | 1,000 |
| 7 | WHEEL ASSY. 6 FIGURE | 2,000 |
| 13 | MAGNET 1/8 DIA X .14" NG RARE EARTH | 1,000 |
| 12 | PINION SHAFT | 5,000 |
| 8 | PINION GEAR | 1,000 |
| 9 | WASHER, S/S VR#11071 619 KT | 1,000 |
| | MAGNET HOLDER | 1,000 |
| 15 | NOSE CONE | 1,000 |
| | NOSE CONE, 2030 | 1,000 |
| 10 | HOUSING ASSY. | 1,000 |
| NOT SHOWN | HSG., FLOWMETER, HALL EFFECT | 1,000 |
| NOT SHOWN | LABEL MODEL 2032 A 2030 | 1,000 |
| NOT SHOWN | LABEL ADH. 1"X. 71-38867-2, GO, INC. | 1,000 |
| 21 | IMPELLER ASSY. | 1,000 |
| 24 | SMALL IMPELLER, 0-30 KNOTS | 1,000 |
| | SCREW, SET HEX, SOCK, 8-32 X 1/4 | 1,000 |
| 19 | LANYARD PIN ASSY. | 1,000 |
| 17 | PIN, LANYARD | 1,000 |
| 11 | SCREW, MACH, ROUND HD, M-24X3MDCRES | 1,000 |
| 27 | WASHER, INT, STAR, #10, CRESS | 1,000 |
| 26 | NICOPRESS CLAMP 1/16 COPPER | 4,000 |
| | MONOFILLINE 250LB TEST (1/16 DIA) | 3,000 |
| 16 | END PLATE ASSY. | 1,000 |
| 8 | SMALL PLASTIC END PLATE 3.50003 | 1,000 |
| 30 | RETAINING RINGS | 1,000 |
| 18 | MACH, SCREW, PH, 5-40 X 1/4, CRESS | 1,000 |
| | O-RINGS | 1,000 |
| 36 | CABLE AND SWITCH ASSY. | 1,000 |
| 31 | FLOWMETER PIG TAIL, 3 COND | 1,000 |
| 35 | HALL SENSOR UBN 30A0T SPRAGUE | 1,000 |
| 34 | LOCKING SLEEVE, 5/8" LG | 3,000 |
| 6 | CABLE TIE LOCK 8-3/4 SST25-CP | 1,000 |
| | WASHER SPLIT #6 MED SIL BRONZE | 1,000 |
| NOT SHOWN | 2030-021 | 1,000 |
| | SYRINGE 5021G, 1-1/2 | 1,000 |

STANDARD FLOWMETER PARTS
2030R

| PART NO. | DESCRIPTION | QTY. |
|-----------|---------------------------------------|-------|
| 1 | COUNTER ASSY. | 1,000 |
| 13 | WHEEL ASSY. 6 FIGURE | 1,000 |
| 12 | PINION SHAFT | 5,000 |
| 6 | PINION GEAR | 1,000 |
| | WASHER, S/S VR#11071 619 KT | 1,000 |
| 15 | NOSE CONE | 1,000 |
| | NOSE CONE, 2030 | 1,000 |
| 5 | HOUSING ASSY. | 1,000 |
| 2030-004 | HSG., FLOWMETER | 1,000 |
| 2030-020 | LABEL MODEL 2032 A 2030 | 1,000 |
| 46-2231 | LABEL ADH. 1"X. 71-38867-2, GO, INC. | 1,000 |
| 21 | IMPELLER ASSY. | 1,000 |
| 24 | SMALL IMPELLER, 0-30 KNOTS | 1,000 |
| | SCREW, SET HEX, SOCK, 8-32 X 1/4 | 1,000 |
| 19 | LANYARD PIN ASSY. | 1,000 |
| 17 | PIN, LANYARD | 1,000 |
| 11 | SCREW, MACH, ROUND HD, 10-2-40X4DCRES | 1,000 |
| 27 | WASHER, INT, STAR, #10, CRESS | 1,000 |
| 26 | NICOPRESS CLAMP 1/16 COPPER | 4,000 |
| | MONOFILLINE 250LB TEST (1/16 DIA) | 3,000 |
| 16 | END PLATE ASSY. | 1,000 |
| 8 | SMALL PLASTIC END PLATE 3.50003 | 1,000 |
| 30 | RETAINING RINGS | 1,000 |
| 18 | MACH, SCREW, PH, 5-40 X 1/4, CRESS | 1,000 |
| | O-RINGS | 1,000 |
| NOT SHOWN | 2030-021 | 1,000 |
| | SYRINGE 5021G, 1-1/2 | 1,000 |

General Oceanics Types of Flowmeter Systems

| | |
|---------|------------------------------------|
| 2030R | Mechanical, W/ Standard Rotor |
| 2030R6 | Mechanical, W / Low Velocity Rotor |
| 20207 | With 7-digit counter |
| 20307R6 | L.V. Rotor and 7-digit count. |
| 2031H | With Hall Sensor, Electronic. |
| 2031HR6 | L.V. Rotor, Hall Sensor |

Readout for Electronic Flowmeter 2031H and 2031HR6

2035MK IV Data Acquisition Readout

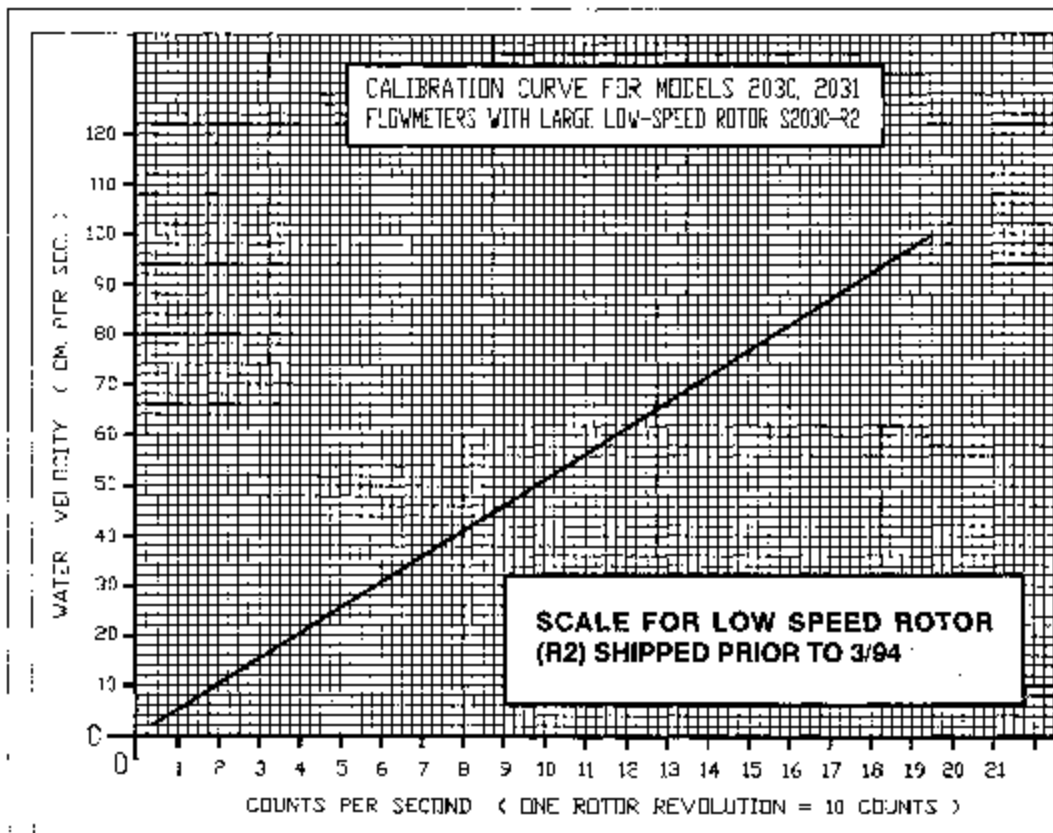
Accessories and Spare Parts

| | |
|---------|--------------------------------------|
| 203021 | Rotor, Standard |
| 203022 | Rotor, Low Speed |
| 2031RCH | Connecting Cable for 2031H, 2035HB |
| 203039 | Oil, 20cS, Pint Bottle, Silicone Oil |
| 2030W | Wading Rod– Extendable 3-8 Feet |

Extension Cables

| | |
|----------|---------------------|
| 2030HC10 | 10 Meters (33 ft.) |
| 2030HC20 | 20 Meters (66 ft.) |
| 2030HC30 | 30 Meters (99 ft.) |
| 2030HC40 | 40 Meters (132 ft.) |
| 2030HC50 | 50 Meters (165 ft.) |

Calibration : If you are interested in having an existing flowmeter re-calibrated or you would like to obtain greater accuracy than our standard, please contact us.



| USEFUL CONVERSIONS CHART | | |
|--------------------------|----------|---------------------|
| MULTIPLY | By | TO OBTAIN |
| Cubic Meters | 264.20 | Gallon |
| Cubic Meters | 35.31 | Cubic feet |
| Cubic Meters | 1.308 | Cubic yards |
| Cubic Meters | 1000.00 | Liters |
| Cubic Meters | 61023.00 | Cubic inches |
| Cubic feet | 7.481 | Gallons |
| Miles (nautical) | 6080.00 | Feet |
| Knots | 1.152 | Miles per hr. |
| Square centimeters | 0.001077 | Square feet |
| Feet per second | 0.6818 | Miles per hour |
| Centimeters per second | 0.03281 | Feet per second |
| Meters per second | 2.237 | Miles per hour |
| Meters per second | 6.00 | Kilometers per hour |