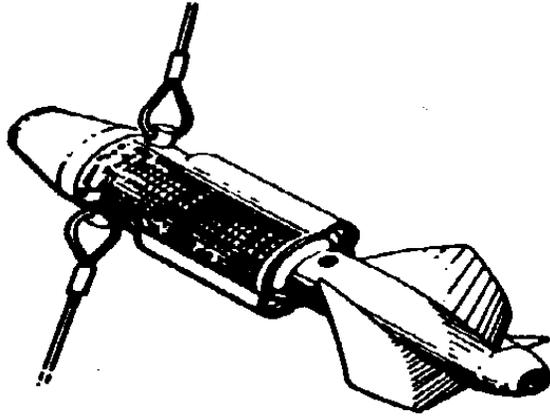


General Oceanics Digital Flowmeter Mechanical and Electronic Operators Manual



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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).

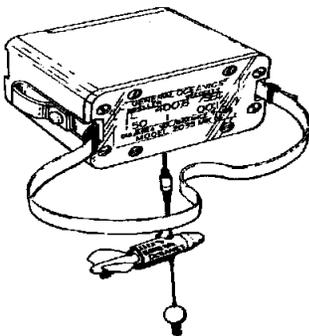
! Universal bridle mounting allows single- point connection for towing or 2-point connection within net mount.

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.

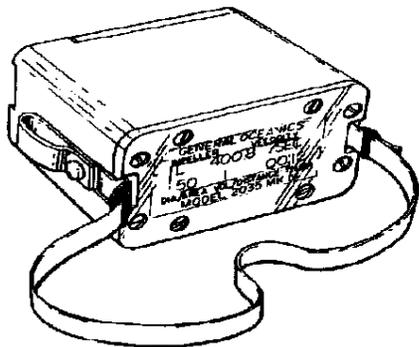


Model 2031H Series Real-Time

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, 9 pin serial connector, 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 = $\frac{\text{Difference in COUNTS (X) Rotor Constant}}{999999}$

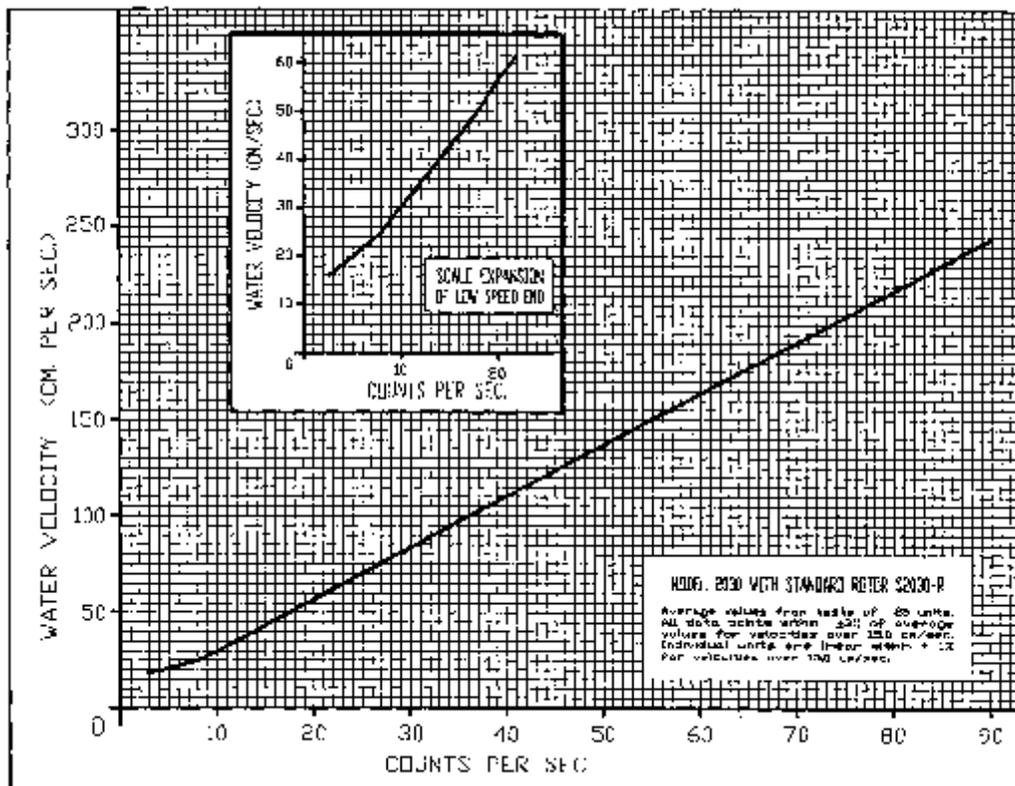
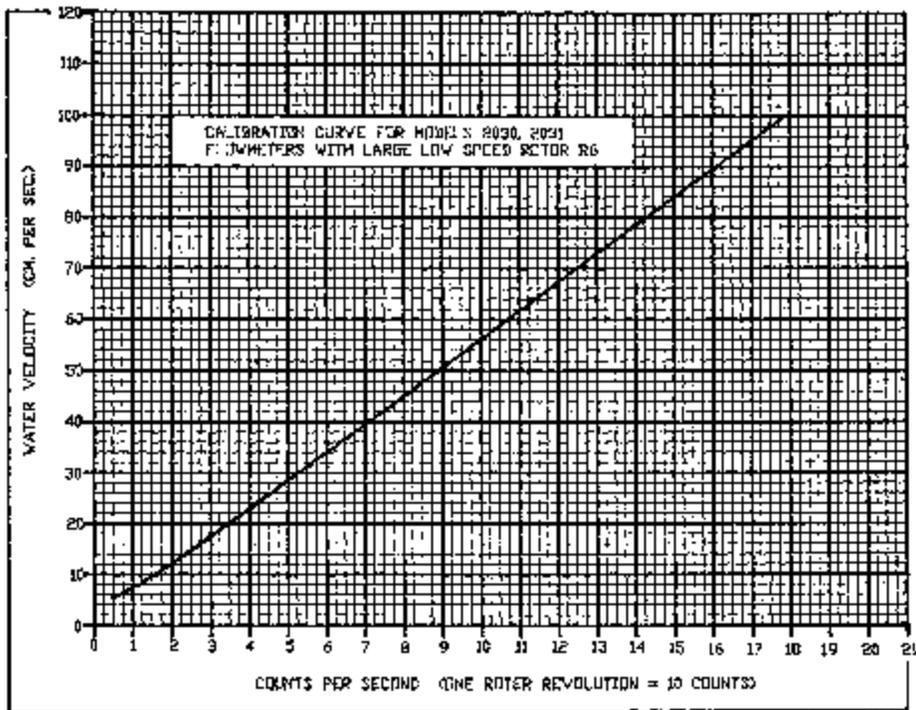
(Example: Where the graph may indicate 100 cts/sec this is also equal to 10 revolutions/sec). Therefore please ensure the correct units are being used when measuring and calculating.

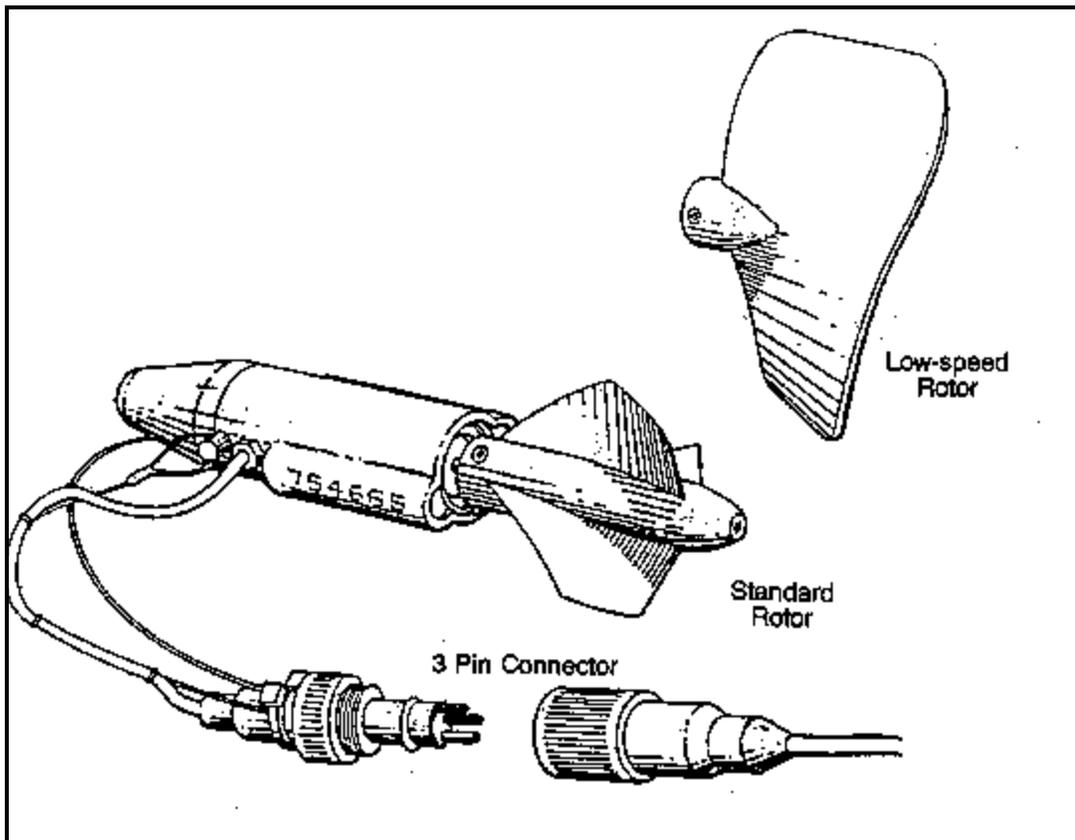
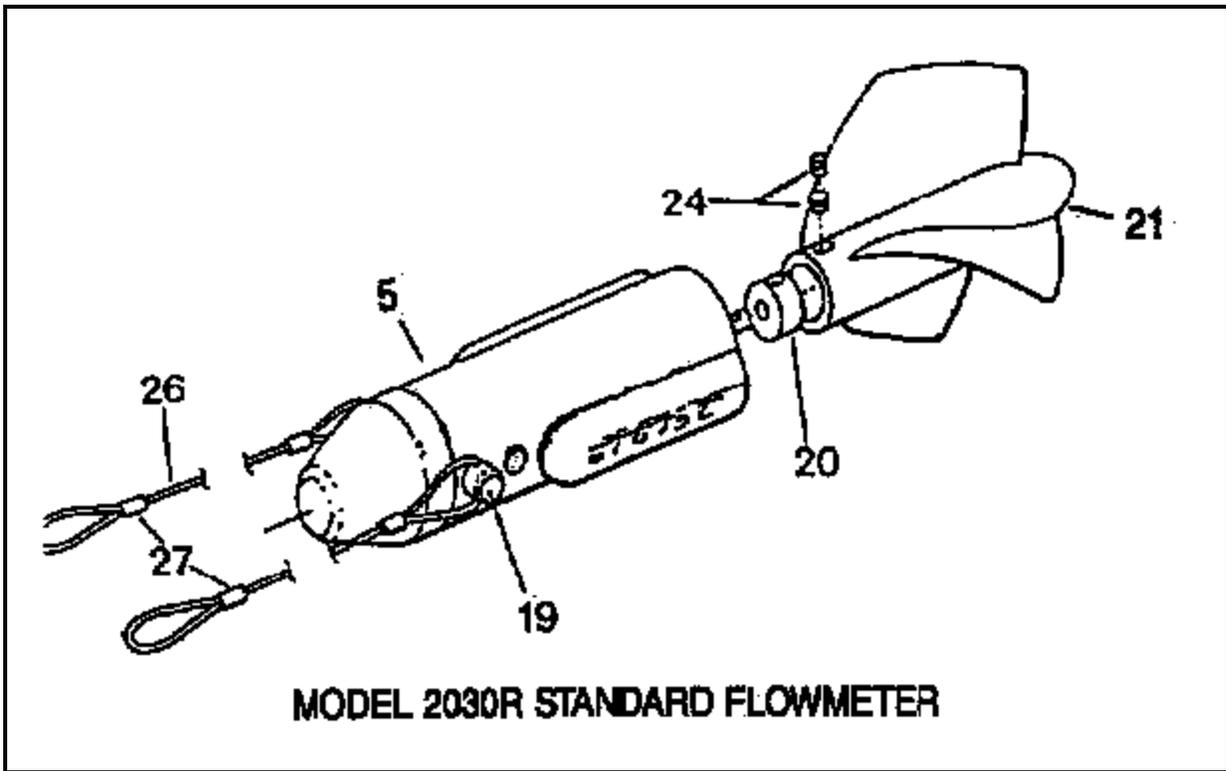
B. SPEED in cm/sec = $\frac{\text{Distance in meters (X) 100}}{\text{Time in seconds}}$

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.

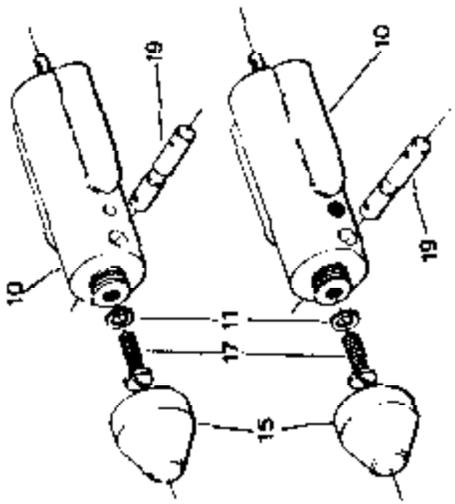
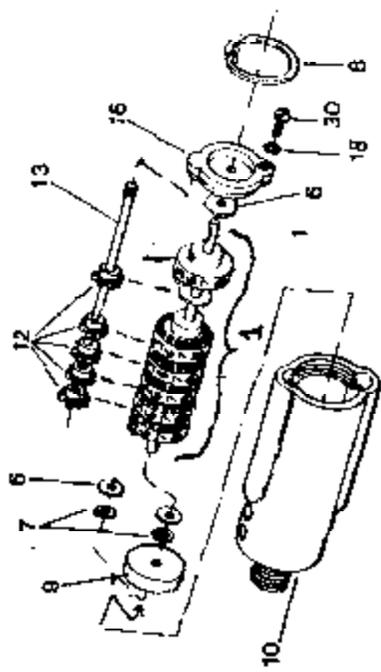
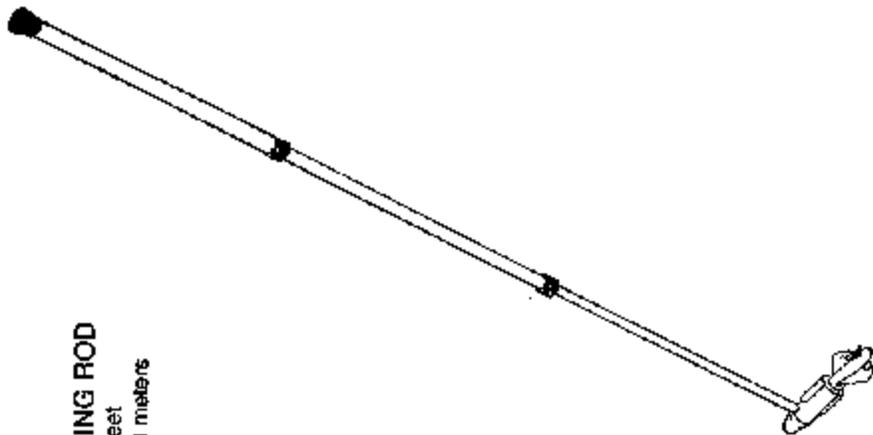




(Optional)

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	NICROPRESS 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	NICROPRESS 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

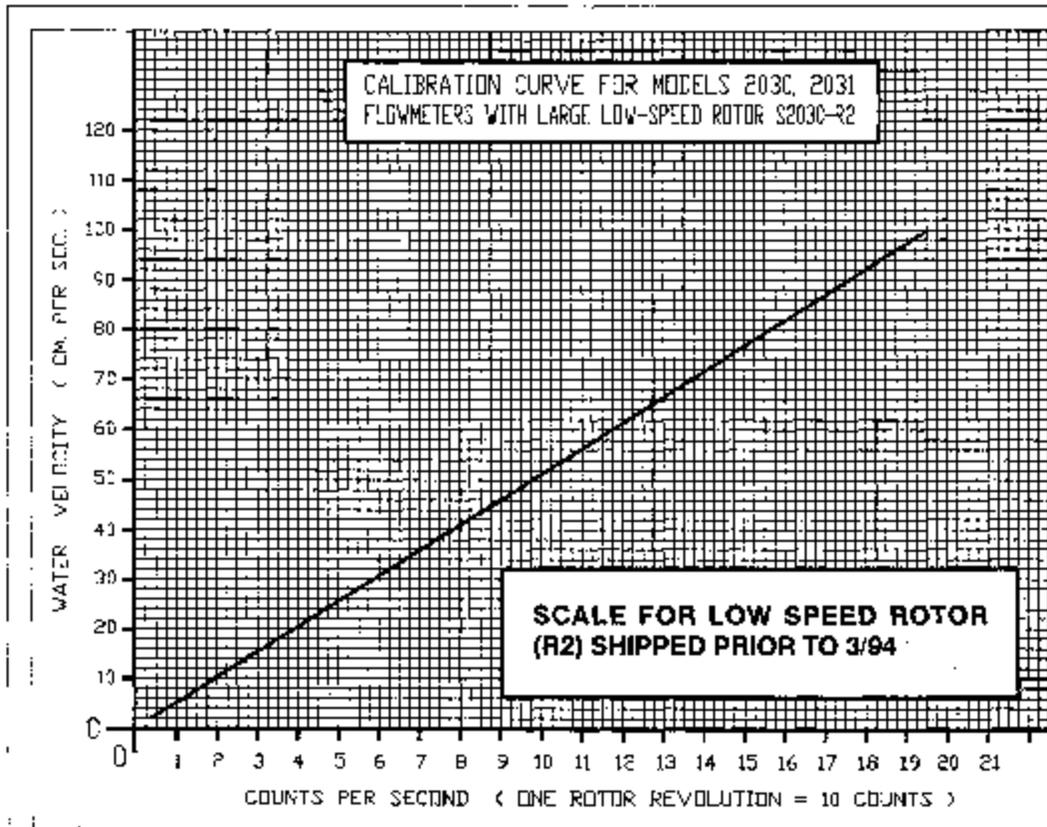
Accessories and Spare Parts

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