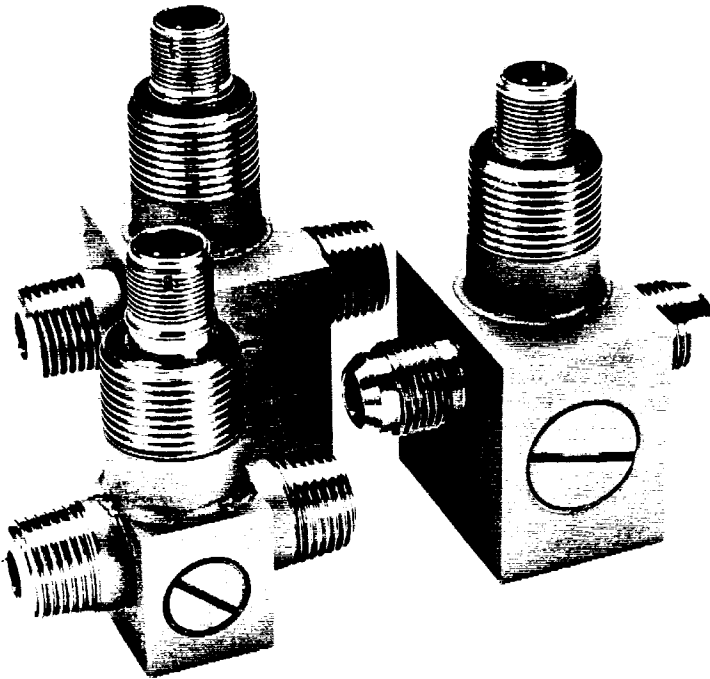
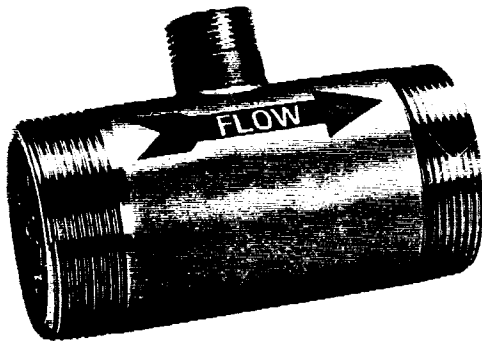


# User's Guide



<http://www.omega.com>  
e-mail: [info@omega.com](mailto:info@omega.com)

## **FTB-900/FTB-9500 SERIES Precision Turbine Flowmeters**



**OMEGAnet<sup>SM</sup> On-Line Service**  
<http://www.omega.com>

**Internet e-mail**  
[info@omega.com](mailto:info@omega.com)

### **Servicing North America:**

**USA:**  
ISO 9001 Certified

One Omega Drive, Box 4047  
Stamford, CT 06907-0047  
Tel: (203) 359-1660  
e-mail: [info@omega.com](mailto:info@omega.com)

FAX: (203) 359-7700

**Canada:**

976 Bergar  
Laval (Quebec) H7L 5A1  
Tel: (514) 856-6928  
e-mail: [canada@omega.com](mailto:canada@omega.com)

FAX: (514) 856-6886

### **For immediate technical or application assistance:**

**USA and Canada:** Sales Service: 1-800-826-6342 / 1-800-TC-OMEGA<sup>SM</sup>  
Customer Service: 1-800-622-2378 / 1-800-622-BEST<sup>SM</sup>  
Engineering Service: 1-800-872-9436 / 1-800-USA-WHEN<sup>SM</sup>  
TELEX: 996404 EASYLINK: 62968934 CABLE: OMEGA

**Mexico and  
Latin America:**

Tel: (95) 800-TC-OMEGA<sup>SM</sup>  
En Español: (203) 359-1660 ext: 2203

FAX: (95) 203-359-7807  
e-mail: [espanol@omega.com](mailto:espanol@omega.com)

### **Servicing Europe:**

**Benelux:**

Postbus 8034, 1180 LA Amstelveen, The Netherlands  
Tel: (31) 20 6418405  
Toll Free in Benelux: 06 0993344  
e-mail: [nl@omega.com](mailto:nl@omega.com)

FAX: (31) 20 6434643

**Czech Republic:**

Ostravska 767, 733 01 Karvina  
Tel: 42 (69) 6311899  
e-mail: [czech@omega.com](mailto:czech@omega.com)

FAX: 42 (69) 6311114

**France:**

9, rue Denis Papin, 78190 Trappes  
Tel: (33) 130-621-400  
Toll Free in France: 0800-4-06342  
e-mail: [france@omega.com](mailto:france@omega.com)

FAX: (33) 130-699-120

**Germany/Austria:**

Daimlerstrasse 26, D-75392 Deckenpfronn, Germany  
Tel: 49 (07056) 3017  
Toll Free in Germany: 0130 11 21 66  
e-mail: [germany@omega.com](mailto:germany@omega.com)

FAX: 49 (07056) 8540

**United Kingdom:**  
ISO 9002 Certified

25 Swannington Road,  
Broughton Astley, Leicestershire,  
LE9 6TU, England  
Tel: 44 (1455) 285520  
FAX: 44 (1455) 283912

P.O. Box 7, Omega Drive,  
Irlam, Manchester,  
M44 5EX, England  
Tel: 44 (161) 777-6611  
FAX: 44 (161) 777-6622

Toll Free in England: 0800-488-488  
e-mail: [uk@omega.com](mailto:uk@omega.com)

It is the policy of OMEGA to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

The information contained in this document is believed to be correct but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

**WARNING:** These products are not designed for use in, and should not be used for, patient connected applications.

## TABLE OF CONTENTS

<b>PAGE</b>	<b>DESCRIPTION</b>
1	Forward
2	Pre-Installation Inspection, Installation
3	Installation (continued)
4	Typical Meter Runs
5	Typical Flowstraightener Section
6	1/4" - 5/8" Assembly Procedure
7	3/4 & UP Assembly Procedure
8	Assembly Procedure
9	Assembly Procedure

## FORWARD

### A. PRINCIPLE OF OPERATION

1. The Precision Turbine Flowmeter is a volumetric flow measuring device.
2. The flowing fluid engages the vaned rotor causing it to rotate at an angular velocity proportional to the Flow Rate.
3. The angular velocity of the rotor results in the generation of an electrical signal (AC sine wave type). Summation of the pulsing electrical signal relates directly to the Flow Rate.
4. The differential pressures developed across the Turbine Flowmeter balances out normal downstream thrust loads, thus eliminating the need for thrust bearings over the rated range of the meter.
5. The vaned rotor is the only moving part of the Flowmeter.

### B. PHYSICAL DESCRIPTION

Refer to Assembly procedures in this manual for the identification of major parts of a typical PRECISION TURBINE FLOWMETER.

### C. ELECTRICAL DESCRIPTION

The pickup coil furnished with each PRECISION TURBINE FLOWMETER is a sensing device that converts the change of magnetic flux from a permanent magnet produced by the revolving rotor into an AC sine wave.

#### 1. Pickup Coil Types-

Two Types of Pickup Coils are available:

**Standard:** Variable Reluctance-Generating Pickups contain a permanent magnet and associated wire-wound coil. The movement of the magnetic material of the rotor blade across the coil tip produces an AC signal within the coil winding.

**Optional:** Inductance-Generating pickups contain a wire-wound coil suitably fixed within a hermetically sealed housing. The movement of a permanent magnet embedded in a rotor produces an AC signal within the coil winding.

2. Pickup Coil Output - The generated AC sinewave is transmitted via 2 wire shielded cable that minimizes external interference.
3. Your Pickup Coil - Has been selected to best suit your particular application. The reluctance coil provides the highest full scale frequency and a lesser signal/noise ratio. The inductance coil has a higher signal/noise ratio and a lower full scale frequency.

## PRE-INSTALLATION INSPECTION

A. Your PRECISION TURBINE FLOWMETER is a measuring instrument capable of providing you with high precision performance over a long period. It should be treated with care and not subjected to rough handling.

1. Unpack carefully and verify the information contained on the packing slip for proper MODEL Number, SERIAL Number, and CALIBRATION Data.
2. Remove the instrument from the plastic packaging and remove the endfitting protectors from the meter housing.
3. Visually inspect the entire unit. Any visible damage should be reported to the OMEGA Customer Service Department immediately.
4. Replace the end fitting protectors and return the Flowmeter to its plastic packaging. The unit may thus be stored indefinitely until installed.

## INSTALLATION

### A. GENERAL PROCEDURE

1. Meter Position - FLOWMETERS are normally calibrated in a horizontal attitude. Best correlation of calibration, therefore, occurs when installed and operated in this position. Meters may, however, be operated satisfactorily in any position.
2. Flow Direction - ALL PRECISION TURBINE FLOWMETERS are marked "IN" and "OUT" and have an arrow to indicate the proper direction of the flow. (BI-Directional Flowmeters Excluded)
3. Meter Location -
  - A. Relative - When it is expected that flow will be intermittent, the meter should not be mounted at a low point in the piping system. Solids which settle or congeal in the meter may affect the meter performances.
  - B. Tolerance to Mechanical Vibration - Although the PRECISION TURBINE FLOWMETER is designed for rugged service, meter life may be increased by location in a minimum vibration area.
  - C. Tolerance to Electrical Interference - In order to achieve optimum electrical signal output from the Flowmeter, consideration must be given to its isolation from ambient electrical interference such as nearby motors, transformers, and solenoids. (Section IV Maintenance Electrical)
4. System Pressure -
  - A. Minimum Operation Pressure - A minimum operating pressure should be maintained to preclude a change in the calibration factor due to various types of two phase phenomena. The minimum operating pressure is a function of the vapor pressure of the fluid and the presence of other dissolved gases. Maintenance of the system back pressure serves to avoid cavitation of fluid separation.

- B. Maximum Meter Pressure - Safe working pressure for the flowmeter is determined by the size and type of connecting fitting used, and the materials of construction. Consult the factory for specifications for your particular model.

## **B. PIPING**

1. General Piping Consideration - As explained in the FORWARD, the fluid moving through the flowmeter engages the angled blades of the turbine rotor. Thus the rotational velocity of the rotor is a function of the fluid velocity and the blade angle engagement. Swirl present in the fluid ahead of the meter can change the effective angle of the engagement and, therefore, cause a deviation from the supplied calibration (done under controlled flow conditions). Proper installation of the Flowmeter minimizes the harmful effects of fluid swirl.
2. The Metering Location - That section of the pipe immediately preceding, including, and following the flowmeter is known as the "THE METERING LOCATION". Three typical metering arrangements are described in the proceeding section of this manual. Each is designed to minimize fluid swirl. A flow straightener is also shown and should be used where installation does not allow the otherwise straight run of pipe upstream of the meter. PLEASE NOTE: The required lengths of pipe are given in pipe diameters and represent the minimum distances between piping components that are recommended to eliminate flow disturbances.
3. Meter-by-Pass - Where possible, such as in a new piping system, it is advisable to include a valved by-pass around the Flowmeter. However, the by-pass connections are not to be placed within the recommended metering run.
4. Line Purge - In a newly installed piping system, or one in which fittings have disturbed, the line should be flushed thoroughly to minimize possible damage to the flowmeter from foreign materials prior to installing the instrument.

## **C. ELECTRICAL CONNECTION**

The Standard PRECISION TURBINE FLOWMETER pickup coil is designed to mate with an MS3106-10SL-4S connector. A two-wire shielded cable should be used to lead from the connector to the electronic instrument in use. The cable shield is connected (grounded) to the appropriate connector on the display unit ONLY, in order to minimize ground-loop and interface difficulties. The connection cable should be located away from power lines whenever possible.

Precautions should be taken when removing, or installing the pickup coil. Any physical damage such as bent threads or twisted Leads are not covered by the warranty.

# 3 TYPICAL METERING RUNS

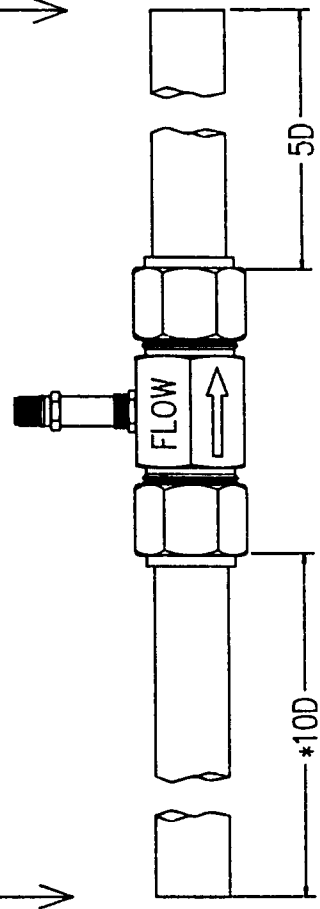
FILE: \OMEGA\OMEGA-P.DWG

METERING LOCATION

DOWNSTREAM  
PIPE FITTING IMMEDIATELY  
PRECEDING METERING LOCATION

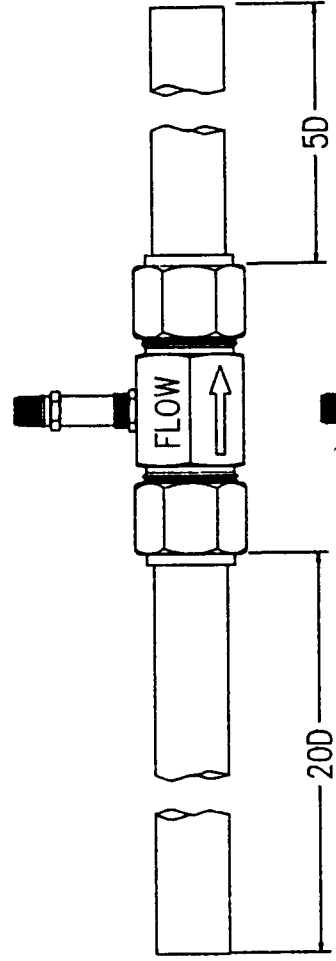
UPSTREAM  
PIPE FITTING IMMEDIATELY  
PRECEDING METERING LOCATION.

WIDE OPEN VALVE (GATE OR PLUG)  
OR  
SHARP RIGHT ANGLE BEND  
(MITERED ELBOW)  
OR  
STRAIGHT RUN OF PIPE

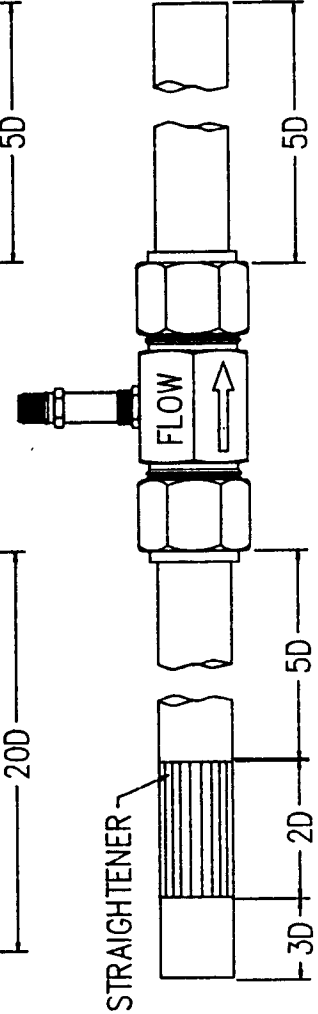


ANY FITTING, VALVE OR  
PIPE RUN

LONG RADIUS BENDS  
OR  
SMOOTH ELBOW

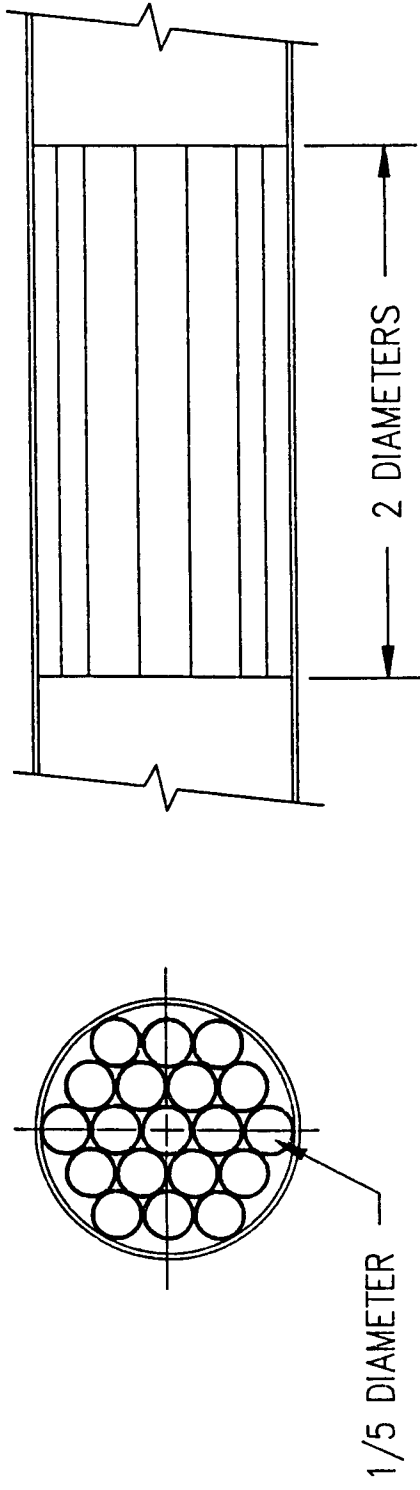


TWO ELBOWS  
OR  
PARTIALLY OPEN  
VALVES OF ANY TYPE.



\* MINIMUM LENGTHS OF STRAIGHT  
PIPE REQUIRED EXPRESSED IN  
NOMINAL PIPE DIAMETERS.

# TYPICAL FLOW STRAIGHTENER SECTION



FLOW STRAIGHTENER— A FULL CLUSTER OF THIN WALL TUBES FIXED WITHIN A SECTION OF PIPE.

THE LENGTH OF THE INTERNAL TUBES IS EQUAL TO 2 DIAMETERS OF OUTER PIPE.  
THE DIAMETER OF INTERNAL TUBES IS EQUAL TO APPROXIMATELY 1/5 THE INSIDE DIAMETER OF OUTER PIPE. THIS REQUIRES 18 TO 20 SUCH TUBES.

FILE: \OMEGA\OMEGA-F.DWG



OMEGA  
 MODEL FB900-1-01  
 DATE 5-5-87  
 DRAWN BY  
 CHECKED BY  
 REV. 1  
 DATE

ITEM	DESCRIPTION	QTY.
A	BEARING	2
B	ROTOR	1
C	CONE/CLIP ASSY.	2
D	SHAFT	1
1A	CARBIDE SLEEVE	1
1B	GRAPH. SLEEVE	1
1C	TEFLON SLEEVE	1
2	CARBIDE JOURNAL	1

PICKUP COIL

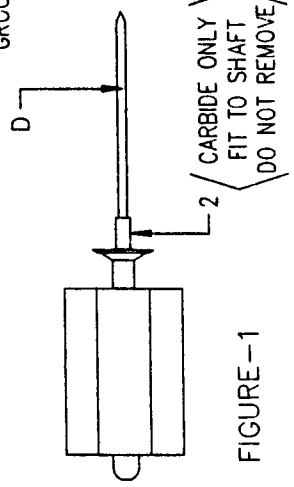
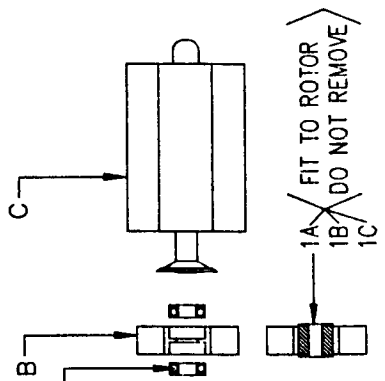
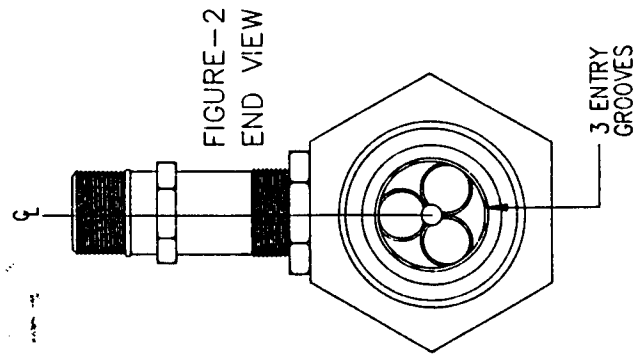


FIGURE-1

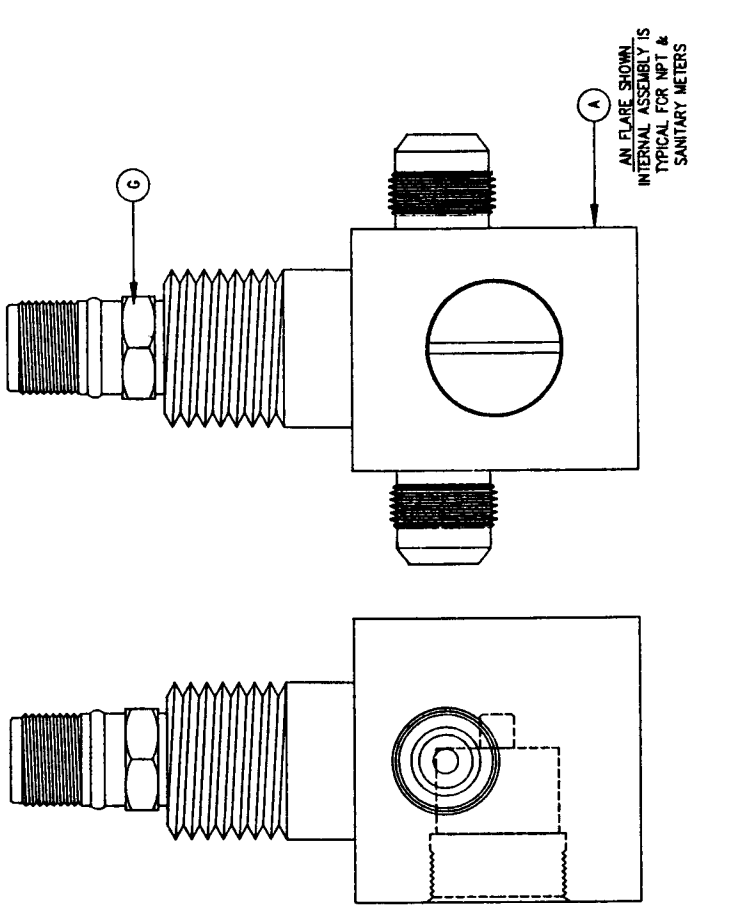
DISASSEMBLY PROCEDURE

FOR BALL BEARING (STANDARD)	FOR SLEEVED BEARING (OPTIONAL)
<ol style="list-style-type: none"> <li>1. INSERT EXTRACTION TOOL INTO END OF CLIP/CONE ASSY. ROTATE SLOWLY AND CAREFULLY UNTIL IT IS DIRECTLY IN LINE WITH ENTRY GROOVES. EXTRACT WITH A PARALLEL PULLING MOTION.</li> <li>2. REMOVE BEARINGS AND ROTOR.</li> <li>3. REMOVE OTHER CLIP/CONE ASSY. AS INDICATED IN STEP-1. LEAVE SHAFT INTACT.</li> <li>4. REVIEW PARTS FOR DAMAGE- CHECK BEARINGS THOROUGHLY.</li> </ol>	<p>BEFORE BEGINNING- ASSEMBLY MUST GO BACK TOGETHER THE EXACT WAY IT CAME OUT.</p> <ol style="list-style-type: none"> <li>1. INSERT EXTRACTION TOOL INTO END OF CLIP/CONE ASSY. ROTATE SLOWLY AND CAREFULLY UNTIL IT IS DIRECTLY IN LINE WITH ENTRY GROOVES. EXTRACT WITH A PARALLEL PULLING MOTION.</li> <li>2. REMOVE ROTOR CAREFULLY-BEARING SHOULD NOT BE REMOVED FROM ROTOR.</li> <li>3. REMOVE OTHER CLIP/CONE ASSY. AS INDICATED IN STEP-1. LEAVE SHAFT INTACT.</li> <li>4. REVIEW PARTS FOR DAMAGE- CHECK BEARING FOR CRACKS, CHIPS, AND GROOVES. CLEAN OFF ALL DEBRIS BEFORE REASSEMBLING.</li> </ol>

REASSEMBLY PROCEDURE

FOR BALL BEARING (STANDARD)	FOR SLEEVED BEARING (OPTIONAL)
<p>NOTE: IF ANY PART APPEARS DAMAGED "DO NOT REASSEMBLE". CALL FLOW DEPT. FOR INSTRUCTIONS</p> <ol style="list-style-type: none"> <li>1. INSERT CLIP/CONE ASSY. WITH SHAFT INTO ENTRY GROOVES AS FAR AS IT WILL GO. WITH EXTRACTION TOOL ROTATE CLIP/CONE ASSY. SLOWLY IN THE POSITION ILLUSTRATED IN FIG. 2.</li> <li>2. FROM OPPOSITE END OF HOUSING, INSERT BEARING. (CLOSED SIDE DOWN) CAREFULLY INSERT ROTOR WITH OTHER BEARING IN TACT. NOTE: BE SURE THE "IN" MARK ON THE ROTOR COINCIDES WITH THE "IN" MARK ON THE OUTSIDE OF THE HOUSING.</li> <li>3. INSERT OTHER CONE/CLIP ASSY. REPEATING STEP 1.</li> </ol>	<p>NOTE: IF ANY PART APPEARS DAMAGED "DO NOT REASSEMBLE". CALL FLOW DEPT. FOR INSTRUCTIONS</p> <ol style="list-style-type: none"> <li>1. INSERT CLIP/CONE ASSY. WITH SHAFT INTO ENTRY GROOVES AS FAR AS IT WILL GO. WITH EXTRACTION TOOL ROTATE CLIP/CONE ASSY. SLOWLY IN THE POSITION ILLUSTRATED IN FIG. 2.</li> <li>2. FROM OPPOSITE END OF HOUSING, INSERT ROTOR CAREFULLY. NOTE: BE SURE THE "IN" MARK ON THE ROTOR COINCIDES WITH THE "IN" MARK ON THE OUTSIDE OF THE HOUSING.</li> <li>3. INSERT OTHER CONE/CLIP ASSY. REPEATING STEP 1.</li> <li>4. FOR LIQUID APPLICATIONS: INTERNALS WORK BEST WHEN WET.</li> </ol>

DATE	REV	REVISION RECORD	AUTH	DR	CK



**SLEEVED BEARING INTERNALS**  
This assembly references all Model Numbers with Graphite (GS), Teflon (TS), Carbide (CS) and Fluorocarbon (FS) sleeved bearing designator.

DESIGNATOR	DESCRIPTION	QTY
A	HOUSING	1
B	SCREW PLUG	1
C-2	RETAINER	1
D-1	ROTOR/BEARING ASSY.	1
F-2	SHAFT	1
G	PICKUP COIL	1
H	O-RING ****	1

**BALL BEARING INTERNALS**  
This assembly references all Model Numbers with Teflon Ball (TB), Hard Ball (HB) and Cryst Ball (CB) bearing designator.

DESIGNATOR	DESCRIPTION	QTY
A	HOUSING	1
B	SCREW PLUG	1
C-1	RETAINER	1
D	ROTOR	1
E	BEARING	2
F-1	SHAFT	1
G	PICKUP COIL	1
H	O-RING ****	1

\*\*\*\* CONSULT FACTORY FOR O-RING MATERIALS AND INSTALLATION.

**DISASSEMBLY PROCEDURE**

- BALL BEARING (STANDARD)**
- 1) WITH A SCREW DRIVER, REMOVE SCREW PLUG.
  - 2) INSERT 4-40 SCREW INTO EITHER OF THE TAPPED HOLES ON THE FACE OF THE RETAINER AND EXTRACT FROM HOUSING.
  - 3) REMOVE BEARINGS AND ROTOR - IT IS NOT NECESSARY TO REMOVE THE SHAFT.
  - 4) REVIEW ALL PARTS FOR DAMAGE.  
A. CHECK BEARINGS THOROUGHLY.  
B. CHECK O-RING FOR CRACKS AND NICKS. REPLACE IF EVIDENT.

**SLEEVED BEARING (OPTIONAL)**

- 1) WITH A SCREW DRIVER, REMOVE SCREW PLUG.
- 2) INSERT 4-40 SCREW INTO EITHER OF THE TAPPED HOLES ON THE FACE OF THE RETAINER AND EXTRACT FROM HOUSING.
- 3) REMOVE THE ROTOR/BEARING ASSEMBLY (DO NOT ATTEMPT TO REMOVE THE BEARING FROM THE ROTOR) IT IS NOT NECESSARY TO REMOVE THE SHAFT.
- 4) REVIEW ALL PARTS FOR DAMAGE.  
A. CHECK BEARINGS THOROUGHLY.  
B. CHECK O-RING FOR CRACKS AND NICKS. REPLACE IF EVIDENT.

**REASSEMBLY PROCEDURE**

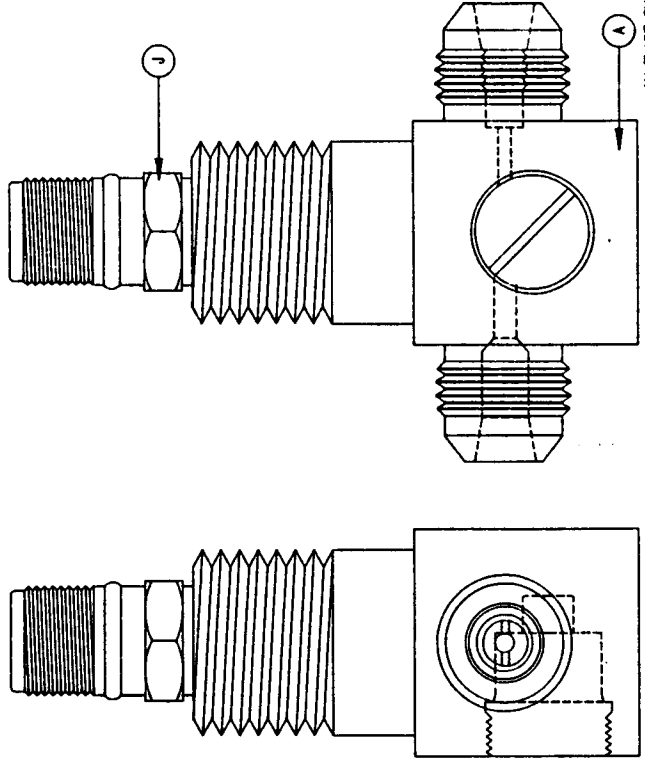
**BALL BEARING (STANDARD)**

- NOTE: If any part appears damaged, DO NOT REASSEMBLE, call Flow Dept. for instructions.
- 1) INSTALL BEARINGS IN ROTOR AND INSERT ROTOR IN HOUSING.
  - 2) INSERT RETAINER, REMOVE 4-40 SCREW.
  - 3) SCREW IN SCREW PLUG.

**SLEEVED BEARING (OPTIONAL)**

- NOTE: If any part appears damaged, DO NOT REASSEMBLE, call Flow Dept. for instructions.
- 1) PLACE ROTOR/BEARING ASSEMBLY ON SHAFT IN HOUSING.
  - 2) INSERT RETAINER, REMOVE 4-40 SCREW.
  - 3) SCREW IN SCREW PLUG.
- FOR LIQUID APPLICATIONS: INTERNALS WORK BEST WHEN WET.

DATE	REV	REVISION RECORD	AUTH	DR	CK

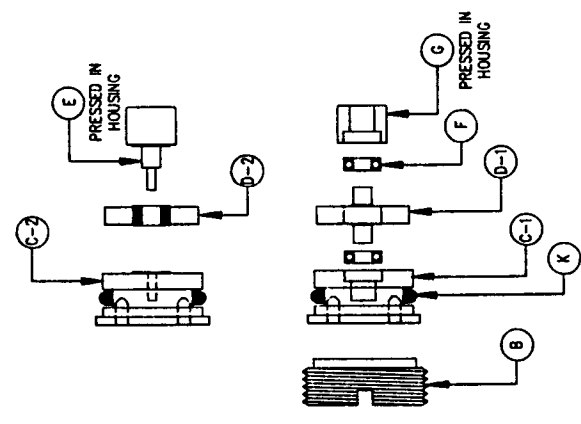


**SLEEVED BEARING INTERNALS**  
 This assembly references all Model Numbers with Graphitic (GS), Teflon (TS), Carbide (CS), and Fluorocast (FS) sleeved bearing designators.

DESIGNATOR	DESCRIPTION	QTY
A	HOUSING	1
B	SCREW PLUG	1
C-2	RETAINER	1
D-2	ROTOR/BEARING ASSY.	1
E	SHAFT	1
H	ORIFICE	1
I	ORIFICE LOCK SCREW	1
J	PICKUP COIL	1
K	O-RING ****	1

**BALL BEARING INTERNALS**  
 This assembly references all Model Numbers with Teflon Ball (TB), Metal Ball (MB) and Crys Ball (CB) bearing designators.

DESIGNATOR	DESCRIPTION	QTY
A	HOUSING	1
B	SCREW PLUG	1
C-1	RETAINER	1
D-1	ROTOR/SHAFT ASSY.	1
F	BEARING	2
G	BEARING CLIP	1
H	ORIFICE	1
I	ORIFICE LOCK SCREW	1
J	PICKUP COIL	1
K	O-RING ****	1



\*\*\*\* CONSULT FACTORY FOR O-RING MATERIALS AND INSTALLATION

**DISASSEMBLY PROCEDURE**

- BALL BEARING (STANDARD)**
- 1) WITH A SCREW DRIVER, REMOVE SCREW PLUG.
  - 2) INSERT 4-40 SCREW INTO EITHER OF THE TAPPED HOLES ON THE FACE OF THE RETAINER AND EXTRACT FROM HOUSING.
  - 3) REMOVE BEARINGS AND ROTOR/SHAFT ASSEMBLY.
  - 4) REVIEW ALL PARTS FOR DAMAGE.  
 A. CHECK BEARINGS THOROUGHLY.  
 B. CHECK O-RING FOR CRACKS AND NICKS. REPLACE IF EVIDENT.

**SLEEVED BEARING (OPTIONAL)**

- 1) WITH A SCREW DRIVER, REMOVE SCREW PLUG.
- 2) INSERT 4-40 SCREW INTO EITHER OF THE TAPPED HOLES ON THE FACE OF THE RETAINER AND EXTRACT FROM HOUSING.
- 3) REMOVE ROTOR/BEARING ASSEMBLY.
- 4) REVIEW ALL PARTS FOR DAMAGE.  
 A. CHECK BEARINGS THOROUGHLY.  
 B. CHECK O-RING FOR CRACKS AND NICKS. REPLACE IF EVIDENT.

**BALL BEARING (STANDARD)**

- NOTE: If any part appears damaged, DO NOT REASSEMBLE, call Flow Dept. for instructions.
- 1) INSERT BEARING INTO BEARING CUP.
  - 2) INSERT ROTOR/SHAFT ASSEMBLY AND BEARING.
  - 3) INSERT RETAINER AND REMOVE 4-40 SCREW.
  - 4) SCREW IN SCREW PLUG.

**SLEEVED BEARING (OPTIONAL)**

- NOTE: If any part appears damaged, DO NOT REASSEMBLE, call Flow Dept. for instructions.
- 1) PLACE ROTOR/BEARING ASSEMBLY ON SHAFT.
  - 2) INSERT RETAINER, REMOVE 4-40 SCREW.
  - 3) SCREW IN SCREW PLUG.
- FOR LIQUID APPLICATIONS: INTERVALS WORK BEST WHEN MET.



## WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA Warranty adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit should malfunction, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion; or current; heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

**OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.**

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

## RETURN REQUESTS / INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. P.O. number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. P.O. number to cover the COST of the repair,
2. Model and serial number of product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

OMEGA is a registered trademark of OMEGA ENGINEERING, INC.

© Copyright 1996 OMEGA ENGINEERING, INC. All rights reserved. This document may not be copied, photocopied, reproduced, translated, or reduced to any electronic medium or machine-readable form, in whole or in part, without prior written consent of OMEGA ENGINEERING, INC.

# Where Do I Find Everything I Need for Process Measurement and Control? OMEGA...Of Course!

## TEMPERATURE

- Thermocouple, RTD & Thermistor Probes, Connectors, Panels & Assemblies
- Wire: Thermocouple, RTD & Thermistor
- Calibrators & Ice Point References
- Recorders, Controllers & Process Monitors
- Infrared Pyrometers

## PRESSURE, STRAIN AND FORCE

- Transducers & Strain Gauges
- Load Cells & Pressure Gauges
- Displacement Transducers
- Instrumentation & Accessories

## FLOW/LEVEL

- Rotameters, Gas Mass Flowmeters & Flow Computers
- Air Velocity Indicators
- Turbine/Paddlewheel Systems
- Totalizers & Batch Controllers

## pH/CONDUCTIVITY

- pH Electrodes, Testers & Accessories
- Benchtop/Laboratory Meters
- Controllers, Calibrators, Simulators & Pumps
- Industrial pH & Conductivity Equipment

## DATA ACQUISITION

- Data Acquisition & Engineering Software
- Communications-Based Acquisition Systems
- Plug-in Cards for Apple, IBM & Compatibles
- Datalogging Systems
- Recorders, Printers & Plotters

## HEATERS

- Heating Cable
- Cartridge & Strip Heaters
- Immersion & Band Heaters
- Flexible Heaters
- Laboratory Heaters

## ENVIRONMENTAL MONITORING AND CONTROL

- Metering & Control Instrumentation
- Refractometers
- Pumps & Tubing
- Air, Soil & Water Monitors
- Industrial Water & Wastewater Treatment
- pH, Conductivity & Dissolved Oxygen Instruments