

# HEDLAND®

## Model 1100 Turbine Flow Meter

### INSTALLATION & INSTRUCTION MANUAL



8635 Washington Avenue  
Racine, Wisconsin 53406  
Tel: 800-433-5263 or 262-639-6770  
Fax: 800-245-3569 or 262-639-2267  
[www.hedland.com](http://www.hedland.com)





# TABLE OF CONTENTS

<b>Introduction.....</b>	<b>4</b>
<b>Operating Principle .....</b>	<b>4</b>
<b>Specifications .....</b>	<b>6</b>
<b>Installation.....</b>	<b>7</b>
<b>Operational Start-up.....</b>	<b>10</b>
<b>Troubleshooting .....</b>	<b>11</b>
<b>Part Number Information .....</b>	<b>12</b>
<b>Repair Kit Information.....</b>	<b>13</b>
<b>Statement of Warranty .....</b>	<b>14</b>

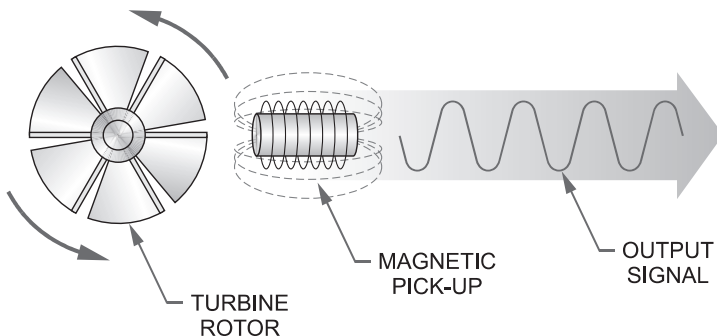
# INTRODUCTION

The Model 1100 Turbine Flow Meter is designed to withstand the demands of the most rigorous flow measurement applications. Originally developed for the secondary oil recovery market, the Model 1100 is an ideal meter for liquid flow measurement on or off the oil field.

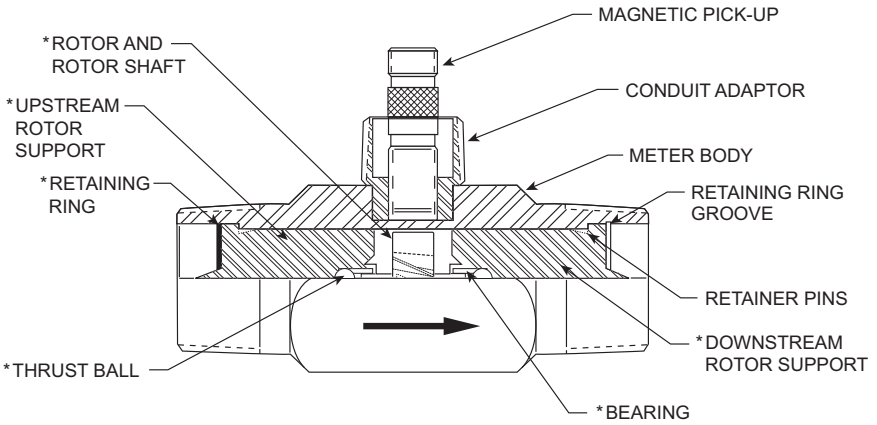
The meter features a rugged 316 stainless steel housing and rotor support assemblies, CD4MCU stainless steel rotor, and abrasive-resistant tungsten carbide rotor shaft and journal bearings. Model 1100 maintains measurement accuracy and mechanical integrity in the corrosive and abrasive fluids commonly found in oil field water flood projects and many industrial applications.

## OPERATING PRINCIPLE

Fluid entering the meter passes through the inlet flow straightener which reduces its turbulent flow pattern and improves the fluid's velocity profile. Fluid then passes through the turbine, causing it to rotate at a speed proportional to the fluid velocity. As each turbine blade passes through the magnetic field at the base of the transducer, an AC voltage pulse is generated in the pick-up coil. (See **Figure 1.**) These pulses produce an output frequency proportional to the volumetric flow through the meter. The output frequency is used to represent flow rate and/or totalization of fluid passing through the turbine flow meter.



**Figure 1**  
*Schematic illustration of electric signal  
generated by rotor movement*



NOTE: \* INDICATES PARTS CONTAINED IN REPAIR KITS

**Figure 2**  
*Typical cross-section of HB110-375 through  
 HB111-121 turbine flow meter*

# SPECIFICATIONS

## MATERIALS of CONSTRUCTION:

**Body:** 316 Stainless Steel

**Rotor:** CD4MCU Stainless Steel

**Rotor Support and Bearings:** 316 Stainless Steel

**Rotor Shaft:** Tungsten Carbide

## OPERATING LIMITATIONS:

**Temperature:** -150 °F to +350 °F (-101 °C to +177 °C)

The meter should not be subjected to temperatures above +350 °F (+177 °C), or below -150 °F (-101 °C) or the freezing point of the metered liquid. High temperatures will damage the magnetic pick-up, while lower temperatures will limit the rotation of the rotor.

**Pressure:** Maximum pressure ratings as follows:

5,000 psi – all NPT meters up to 2"

800 psi – all grooved end meters

**Note:** Consult factory for pressure ratings for flanged meters.

**WARNING:** *Pressure in excess of allowable rating may cause the housing to burst and cause serious personal injury.*

**Accuracy:** ±1.0% of reading for ¾" and larger meters  
±1.0% of reading over the upper 70% of the measuring range for ⅜" and ½" meters

**Repeatability:** ±0.1%

**Calibration:** Water (NIST Traceable Calibration)

**Corrosion:** All Hedland Model 1100 turbine meters are constructed of stainless steel and tungsten carbide. The operator must ensure that the operating fluid is compatible with these materials. Incompatible fluids can cause deterioration of internal components and cause a reduction in meter accuracy.

## **Pulsation and**

**Vibration:** Severe pulsation and mechanical vibration will affect accuracy and shorten the life of the meter.

**Filtration:** If small particles are present in the fluid, Hedland recommends that a strainer be installed upstream of the meter. (See **Table 1** on page 8 for filtration recommendations.)

## **REPAIR KIT:**

The Model 1100 Turbine Flow Meter Repair Kit is designed for easy field service of a damaged flow meter, rather than replacing the entire flow meter. (See **Appendix C** on page 13 for repair kit information.) Repair parts are constructed of stainless steel alloy and tungsten carbide and are factory calibrated to ensure accuracy throughout the entire flow range. Each kit is complete and includes the calibrated K-factor which is used to recalibrate the flow monitor or other electronics to provide accurate output data.

## **INSTALLATION INSTRUCTIONS**

Prior to installation, the flow meter should be checked internally for foreign material and to ensure the turbine rotor spins freely. Fluid lines should also be checked and cleared of all debris.

The flow meter must be installed with the flow arrow, etched on the exterior of the meter body, pointing in the direction of fluid flow. Though the meter is designed to function in any position it is recommended, where possible, to install horizontally with the magnetic pick-up facing upward.

The liquid being measured should be free of any large particles that may obstruct rotation of the rotor. If particles are present, a mesh strainer should be installed upstream before operation of the flow meter. (See **Table 1** on page 8.)

Part Number	Strainer Mesh	Clearance	Filter Size
HB110-375	60 × 60	.0092	260 Micron
HB110-500	60 × 60	.0092	260 Micron
HB110-750	60 × 60	.0092	260 Micron
HB110-875	60 × 60	.0092	260 Micron
HB111-110	60 × 60	.0092	260 Micron
HB111-115	20 × 20	.0340	.86mm
HB111-120	10 × 10	.0650	1.6mm
HB111-121	20 × 20	.0340	.86mm
HB111-130	8 × 8	.0900	2.3mm
HB111-140	10 × 10	.0650	1.6mm
HB111-160	4 × 4	.1875	4.8mm
HB111-180	8 × 8	.0900	2.3mm
HB111-200	4 × 4	.1875	4.8mm

**Table 1**  
*Filtration recommendations*

The preferred plumbing setup is one containing a by-pass line that allows meter inspection and repair without interrupting flow. If a by-pass line is not utilized, it is important that all control valves be located downstream of the flow meter. (See **Figures 3 and 4** on page 9.)

**CAUTION:** *Damage can be caused by striking an empty meter with a high velocity flow stream.*

This is true with any restriction in the flow line that may cause the liquid to flash. If necessary, air eliminators should be installed to ensure that the meter is not incorrectly measuring entrained air or gas.

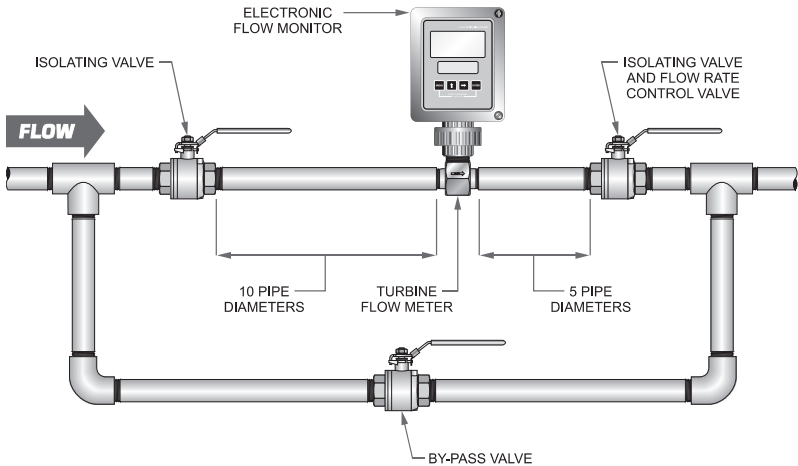
It is recommended that a minimum length of straight pipe, equal to ten (10) pipe diameters, be installed on the upstream side and five (5) pipe diameters on the downstream side of the flow meter. Otherwise, meter accuracy may be affected. Piping should be the same size as the meter bore or threaded port size.



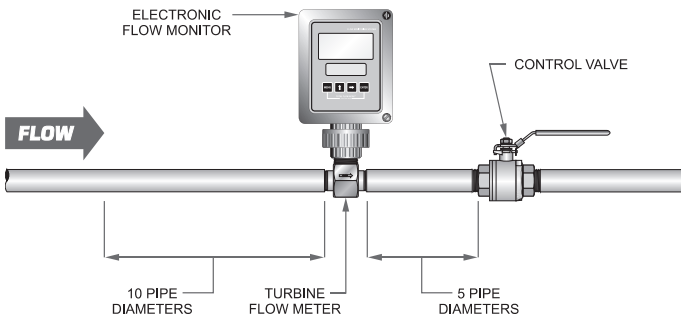
Do not locate the flow meter or connection cable close to electric motors, transformers, sparking devices, high voltage lines, or place connecting cable in conduit with wires furnishing power for such devices. These devices can induce false signals in the flow meter coil or cable, causing the meter to read inaccurately.

If problems arise with the flow meter and monitor, consult **Appendix A** (Troubleshooting Guide) on page 11. If further problems arise, consult the factory.

If the internal components of the turbine flow meter are damaged beyond repair, turbine meter repair kits are available. Information pertaining to the turbine meter repair kits is referenced in **Appendix C** on page 13.



**Figure 3**  
*Meter installation utilizing a by-pass line*



**Figure 4**  
*Meter installation without utilizing a by-pass line*

## OPERATIONAL START-UP

The following steps should be followed when installing and starting the meter.

**WARNING:** *Make sure that fluid flow has been shut off and pressure in the line released before attempting to install the meter in an existing system.*

1. After meter installation, close the isolation valves and open the by-pass valve. Flow liquid through the by-pass valve for sufficient time to eliminate any air or gas in the flow line.

**CAUTION:** *High velocity air or gas may damage the internal components of the meter.*

2. Open upstream isolating valve slowly to eliminate hydraulic shock while charging the meter with the liquid. Open the valve to full open.
3. Open downstream isolating valve to permit meter to operate.
4. Close the by-pass valve to a full closed position.
5. Adjust the downstream valve to provide the required flow rate through the meter. Note: The downstream valve may be used as a control valve.

## APPENDIX A TROUBLESHOOTING GUIDE

<b>Trouble</b>	<b>Possible Cause</b>	<b>Remedy</b>
Meter indicates higher than actual flow rate	<ul style="list-style-type: none"> <li>• Cavitation</li> <li>• Debris on rotor support</li> <li>• Build up of foreign material on meter bore</li> <li>• Gas in liquid</li> </ul>	<ul style="list-style-type: none"> <li>• Increase back pressure</li> <li>• Clean meter</li> <li>• Clean meter</li> <li>• Install gas eliminator ahead of meter</li> </ul>
Meter indicates lower than actual flow rate	<ul style="list-style-type: none"> <li>• Debris on rotor</li> <li>• Worn bearing</li> <li>• Viscosity higher than calibrated</li> </ul>	<ul style="list-style-type: none"> <li>• Clean meter and add filter</li> <li>• Clean meter and add filter</li> <li>• Recalibrate monitor</li> </ul>
Erratic system indication, meter alone works well (remote monitor application only)	Ground loop in shielding	Ground shield one place only. Look for internal electronic instrument ground. Reroute cables away from electrical noise.
Indicator shows flow when shut off	Mechanical vibration causes rotor to oscillate without turning	Isolate meter
No flow indication, full or partial open position	Fluid shock, full flow into dry meter or impact caused bearing separation or broken rotor shaft	Rebuild meter with repair kit and recalibrate monitor. Move to location where meter is full on start-up or add downstream flow control valve.
Erratic indication at low flow, good indication at high flow	Rotor has foreign material wrapped around it	Clean meter and add filter
No flow indication	Faulty pick-up	Replace pick-up
System works perfect, except indicates lower flow over entire range	By-pass flow, leak	Repair or replace by-pass valves, or faulty solenoid valves
Meter indicating high flow, upstream piping at meter smaller than meter bore	Fluid jet impingement on rotor	Change piping
Opposite effects of above	Viscosity lower than calibrated	Change temperature, change fluid or recalibrate meter

## APPENDIX B

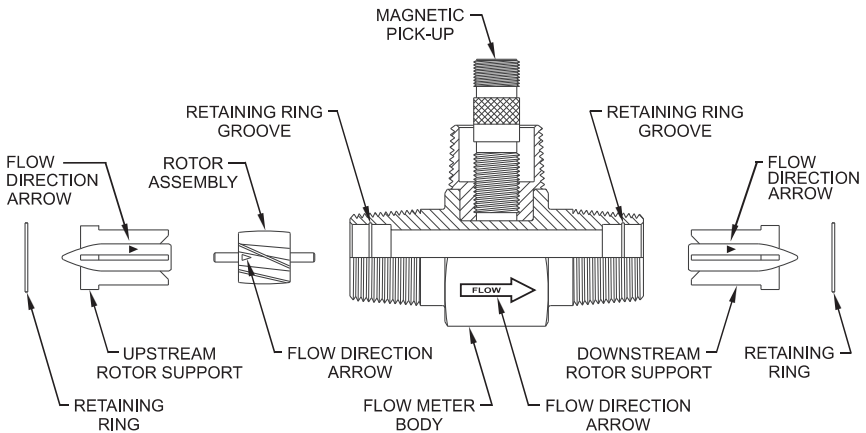
### PART NUMBER INFORMATION

Part Number	Meter Size	Flow Ranges		
		GPM	BPD	M <sup>3</sup> /D
HB110-375	3/8"	0.6 - 3	20 - 100	3.3 - 16
HB110-500	1/2"	0.75 - 7.5	25 - 250	4.1 - 41
HB110-750	3/4"	2 - 15	68 - 515	10.9 - 81.75
HB110-875	7/8"	3 - 30	100 - 1,000	16 - 160
HB111-110	1"	5 - 50	170 - 1,700	27.25 - 272.5
HB111-115	1-1/2"	15 - 180	515 - 6,000	82 - 981
HB111-121	2" Low	15 - 180	515 - 6,000	82 - 981
HB111-120	2"	40 - 400	1,300 - 13,000	218 - 2,180
HB111-130	3"	60 - 600	2,100 - 21,000	327 - 3,270
HB111-140	4"	100 - 1,200	3,400 - 41,000	545 - 6,540
HB111-160	6"	200 - 2,500	6,800 - 86,000	1,090 - 13,626
HB111-180	8"	250 - 3,500	12,000 - 120,000	1,363 - 19,076
HB111-200	10"	500 - 5,000	17,000 - 171,000	2,725 - 27,252

# APPENDIX C

## REPAIR KIT INFORMATION

Flow Meter Size	Repair Kit Fits Meter Part Number	Repair Kit Part Number
3/8"	HB110-375	HB251-102
1/2"	HB110-500	HB251-105
3/4"	HB110-750	HB251-108
7/8"	HB110-875	HB251-109
1"	HB111-110	HB251-112
1-1/2"	HB111-115	HB251-116
2" Low	HB111-121	HB251-116
2"	HB111-120	HB251-120
3"	HB111-130	HB251-131
4"	HB111-140	HB251-141
6"	HB111-160	HB251-161
8"	HB111-180	HB251-181
10"	HB111-200	HB251-200
Standard Magnetic Pick-up	All Meter Sizes	HB111109



**Figure 5**  
*Typical turbine meter component directory*

## STATEMENT OF WARRANTY

Hedland Flow Meters, Division of Racine Federated Inc. warrants to the end purchaser, for a period of one year from the date of shipment from the factory, that all flow meters manufactured by it are free from defects in materials and workmanship. This warranty does not cover products that have been damaged due to defects caused by misapplication, abuse, lack of maintenance, modified or improper installation. Hedland's obligation under this warranty is limited to the repair or replacement of a defective product, at no charge to the end purchase, if the product is inspected by Hedland and found to be defective. Repair or replacement is at Hedland's discretion. A return goods authorization (RGA) number must be obtained from Hedland before any product may be returned for warranty repair or replacement. The product must be thoroughly cleaned and any process chemicals removed before it will be accepted for return.

The purchaser must determine the applicability of the product for its desired use and assumes all risks in connection therewith. Hedland assumes no responsibility or liability for any omissions or errors in connection with the use of its products. Hedland will under no circumstances be liable for any incidental, consequential, contingent or special damages or loss to any person or property arising out of the failure of any product, component or accessory.

All expressed or implied warranties, including **the implied warranty of merchantability and the implied warranty of fitness for a particular purpose or application are expressly disclaimed** and shall not apply to any products sold or services rendered by Hedland.

The above warranty supersedes and is in lieu of all other warranties, either expressed or implied and all other obligations or liabilities. No agent or representative has any authority to alter the terms of this warranty in any way.



# HEDLAND®

**8635 Washington Avenue • Racine, Wisconsin 53406**

**Tel: 800-433-5263 or 262-639-6770**

**Fax: 800-245-3569 or 262-639-2267**

**[www.hedland.com](http://www.hedland.com)**

**RFI** Racine Flow Meter Group *Blancaf* **DYNASONICS Flo-tech HEDLAND PRESO racine**

HEDLAND is a registered trademark of Racine Federated Inc.

UL is a registered trademark of Underwriters Laboratories.

© 2010 Racine Federated Inc.

Printed in USA  
Form No. HB110-001 01/10