Blancett®

Flow Meters

MODEL 1100 TURBINE FLOW METER

INSTALLATION & INSTRUCTION MANUAL

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INTRODUCTION

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 blades causing it to rotate at a speed proportional to the fluid velocity. As each blade passes through the magnetic field, created at the base of the pickoff transducer, AC voltage (pulse) is generated in the pick-up coil (see **Figure 1**). These impulses 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.

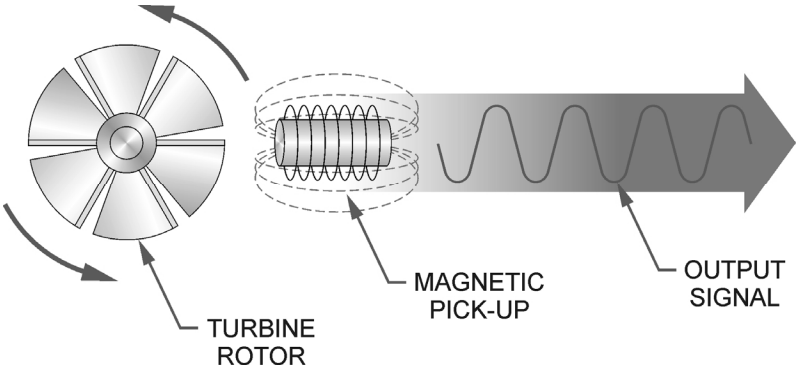

Figure 1
Schematic illustration of electric signal generated by rotor movement

TURBINE METER and REPAIR KIT

The Model 1100 Turbine Flow Meter is designed to withstand the rigorous demands of the most remote flow measurement applications. The Model 1100 Flow Meter maintains measurement accuracy and mechanical integrity in the corrosive and abrasive fluids commonly found in oil field waterflood project pipelines, in-situ mining operations, offshore facilities and plant locations. Simple to install and service, it can operate in any orientation (horizontal to vertical) as long as the "flow direction" arrow is aligned in the

same direction as the actual line flow. For optimum performance, the flow meter should be installed with a minimum of 10 diameters upstream pipe length and 5 diameters downstream pipe length.

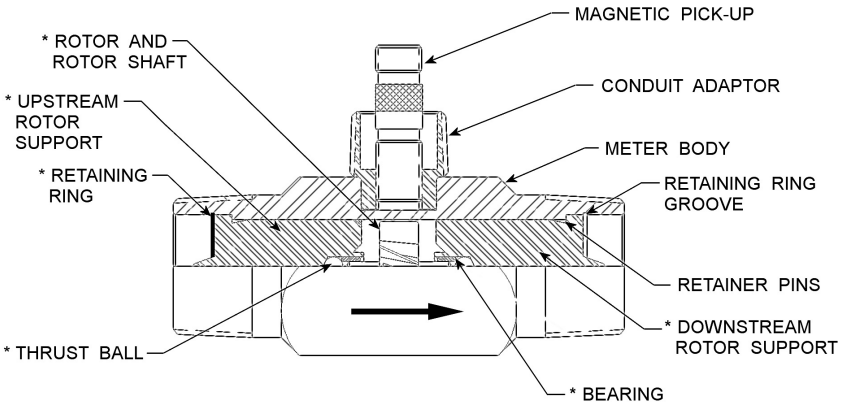

Figure 2
Typical cross-section of B110-375 through B111-121 turbine flow meter

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"
2,000 psi ─ 3" male NPT
1,500 psi ─ 4" male NPT
1,000 psi ─ 6" male NPT
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

Repeatability: ± 0.1%

Calibration: Water (NIST Traceable Calibration)

Corrosion: All Blancett 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, Blancett 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 Meter Repair Kit is designed for easy field service of a damaged flow meter, rather than replacing the entire flow meter (see Appendix B on page 12 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
B110-375	60 × 60	.0092	260 Micron
B110-500	60 × 60	.0092	260 Micron
B110-750	60 × 60	.0092	260 Micron
B110-875	60 × 60	.0092	260 Micron
B111-110	60 × 60	.0092	260 Micron
B111-115	20 × 20	.0340	.86mm
B111-120	10 × 10	.0650	1.6mm
B111-121	20 × 20	.0340	.86mm
B111-130, B311-004	8 × 8	.0900	2.3mm
B111-140, B311-084	10 × 10	.0650	1.6mm
B111-160, B311-085	4 × 4	.1875	4.8mm
B111-180	8 × 8	.0900	2.3mm
B111-200	4 × 4	.1875	4.8mm

Table 1
Strainer Mesh Installation Details

The preferred plumbing setup is one containing a by-pass line (**Figure 3** on page 10) 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 (**Figure 4** on page 10).

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, equal to ten (10) pipe diameters of straight pipe, be installed on the upstream side and five (5) 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 B** on page 12.

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.

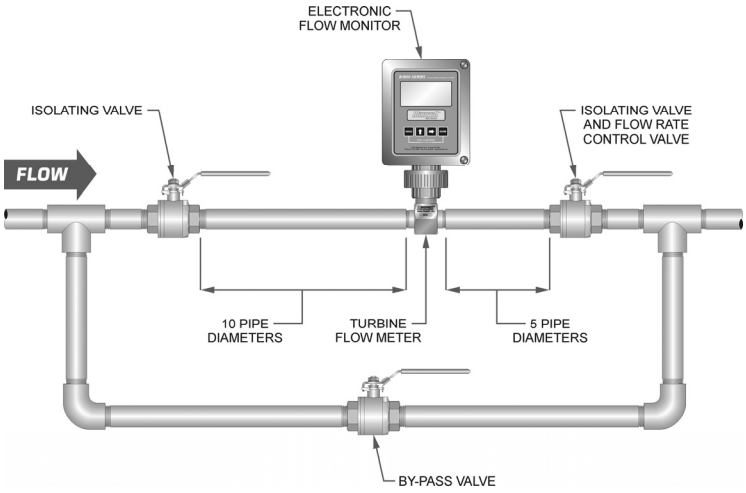

Figure 3
Meter installation utilizing a by-pass line

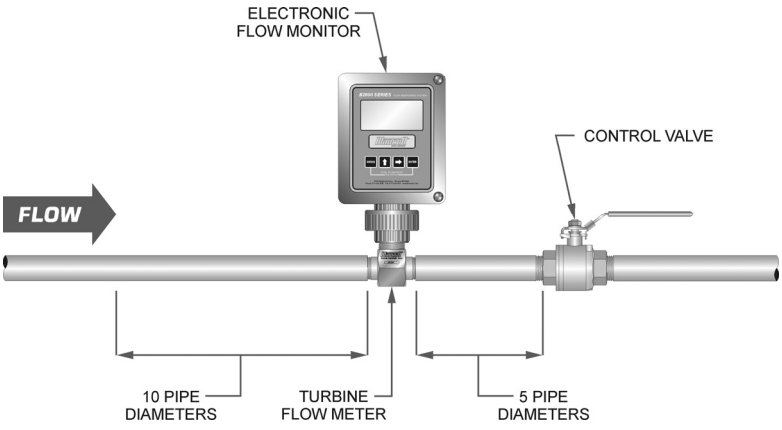

Figure 4
Meter installation without utilizing a by-pass line

APPENDIX A
TROUBLESHOOTING GUIDE

Trouble	Possible Cause	Remedy
Meter indicates higher than actual flow rate	-Cavitation	-Increase back pressure
	-Debris on rotor support	-Clean meter
	-Build up of foreign material on meter bore	-Clean meter
	-Gas in liquid	-Install gas eliminator ahead of meter
Meter indicates lower than actual flow rate	-Debris on rotor	-Clean meter and add filter
	-Worn bearing	-Clean meter and add filter
	-Viscosity higher than calibrated	-Recalibrate monitor
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
REPAIR KIT INFORMATION

Flow Meter Size	Repair Kit Fits Meter Part Number	Repair Kit Part Number
3/8"	B110-375, B110-375-1/2	B251-102
1/2"	B110-500, B110-500-1/2	B251-105
3/4"	B110-750, B110-075-1/2	B251-108
7/8"	B110-875	B251-109
1"	B111-110	B251-112
1-1/2"	B111-115	B251-116
2" Low	B111-121	B251-116
2"	B111-120	B251-120
3"	B111-130, B311-004	B251-131
4"	B111-140, B311-084	B251-141
6"	B111-160, B311-085	B251-161
8"	B111-180	B251-181
10"	B111-200	B251-200
Standard Magnetic Pick-up	All Meter Sizes	B111109

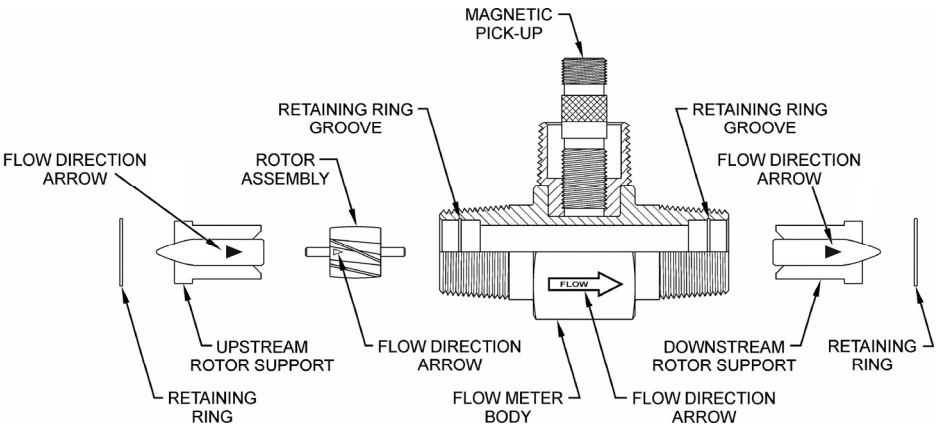

Figure 5
Typical turbine meter component directory

STATEMENT OF WARRANTY

Blancett 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. Blancett'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 Blancett and found to be defective. Repair or replacement is at Blancett's discretion. A return goods authorization (RGA) number must be obtained from Blancett 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. Blancett assumes no responsibility or liability for any omissions or errors in connection with the use of its products. Blancett 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 Blancett.

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.

NOTES

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