



**FloClean  
Sanitary Flow Meter**



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**NOTE:** *Blancett reserves the right to make any changes or improvements to the product described in this manual at any time without notice.*

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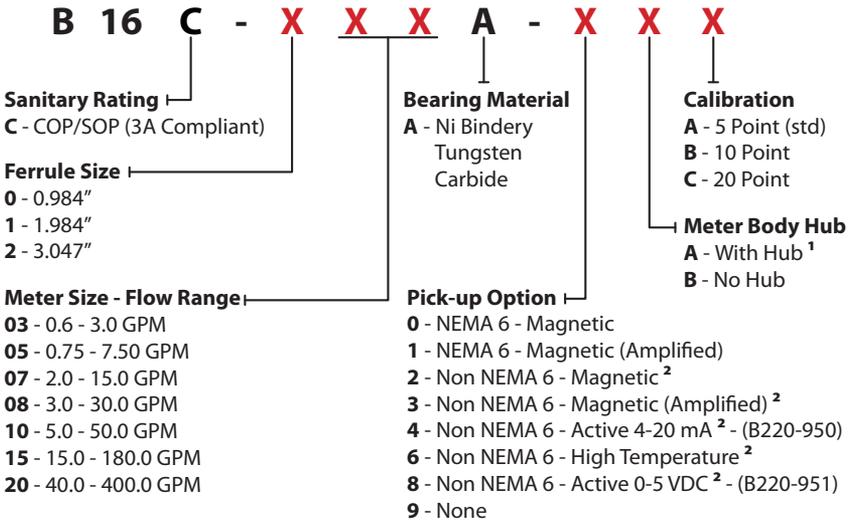
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# INTRODUCTION

The Blancett FloClean turbine flow meter is designed with wear resistant moving parts to provide trouble-free operation and long service life. The durable 316L stainless steel construction provides a cost efficient flow measurement system that offers excellent accuracy and repeatability. The FloClean turbine meter repair kit is designed for easy field service of a damaged flow meter, rather than replacing the entire flow meter. See the **Appendix** for repair kit information.

## SERIES INFORMATION



<sup>1</sup> 1/2" NPT hub for Body Size 0; 1" NPT hub for Body sizes 1 and 2

<sup>2</sup> Indoor use only

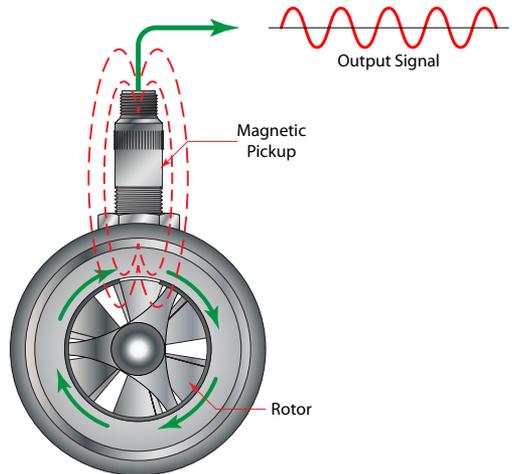
**FIGURE 1 - MODEL CONSTRUCTION SCHEMA**

FLOCLEAN FLOW RATE CHART			
Ferrule Size	Flow Ranges		K factor Pulses/Gal
	GPM	LPM	
0.984"	0.6 - 3.0	2.3 - 11.4	20,000
0.984"	0.75 - 7.5	2.8 - 28.4	13,000
0.984"	2.0 - 15.0	7.5 - 56.8	2,750
1.984"	0.75 - 7.5	2.8 - 28.4	13,000
1.984"	2.0 - 15.0	7.5 - 56.8	2,750
1.984"	3.0 - 30.0	11.4 - 113.5	2,686
1.984"	5.0 - 50.0	19.0 - 190.0	870
1.984"	15.0 - 180.0	56.8 - 681.4	330
3.047"	40.0 - 400.0	151.4 - 1514.2	52

**TABLE 1 - FLOCLEAN FLOW RATE CHART**

## THEORY OF OPERATION

Liquids moving through the turbine flow meter causes the rotor to turn at a speed proportional to the flow rate. The rotor blade cuts the magnetic field that surrounds the magnetic pick-up, which in turn generates a frequency output signal that is directly proportional to the volumetric flow rate (**Figure 2**). The signal is used to represent flow rate and/or totalization of a liquid passing through the turbine flow meter and is always expressed as the number of electric pulses that the meter produces per unit of volume. This value, called the K factor, is constant over each flow meter's range and is unique to the meter.



**FIGURE 2 - THEORY OF OPERATION**

# INSTALLATION INSTRUCTIONS

## PLUMBING

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 must be free of any large particles that may obstruct spinning of the rotor. If particles are present, a mesh strainer should be installed.

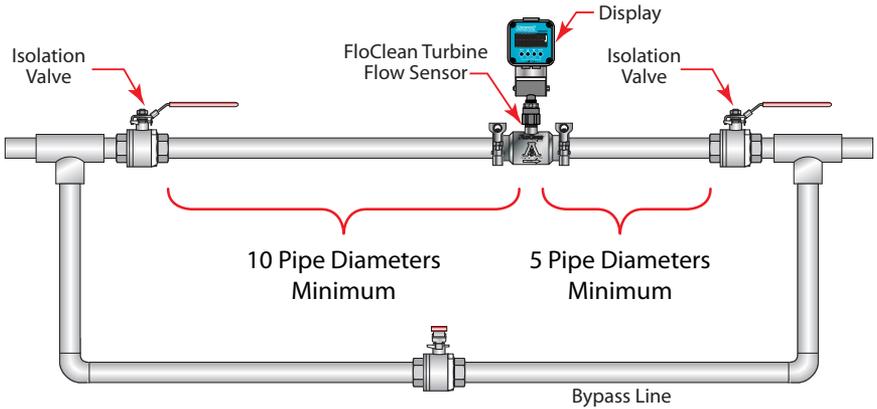
If small particles are present in the fluid, Blancett recommends that a strainer be installed upstream of the meter. See **Table 2** for filtration recommendations.

Bore Size	Ferrule Size	Strainer Size	Clearance
3/8"	0.984"	60 × 60	.0092
1/2"	0.984"	60 × 60	.0092
3/4"	0.984"	60 × 60	.0092
1/2"	1.984"	60 × 60	.0090
3/4"	1.984"	60 × 60	.0092
7/8"	1.984"	60 × 60	.0092
1"	1.984"	60 × 60	.0092
1 1/2"	1.984"	20 × 20	.0340
2"	3.047"	10 × 10	.0650

**TABLE 2 - FILTRATION RECOMMENDATIONS**

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

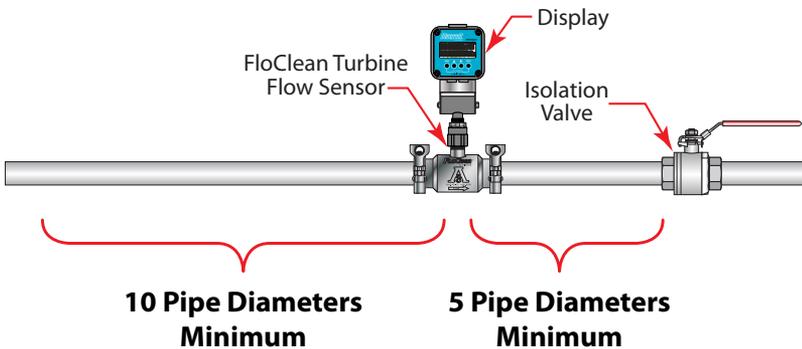
The preferred plumbing setup is one containing a by-pass line that allows meter inspection and repair without interrupting flow. See **Figure 3**. If a by-pass line is not utilized, it is important that all control valves be located downstream of the flow meter. See **Figure 4**.



**FIGURE 3 - INSTALLATION WITH BY-PASS LINE**

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.



**FIGURE 4 - INSTALLATION WITHOUT A BY-PASS LINE**

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.

## CAUTION

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

If problems arise with the flow meter and monitor, consult the Troubleshooting Guide in the **Appendix**. If further problems arise, consult the factory.

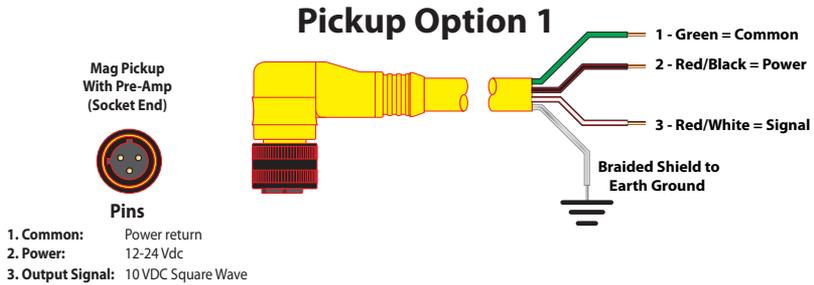
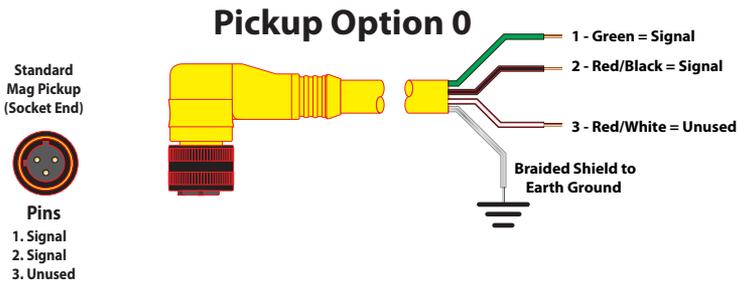
If the internal components of the turbine flow meter are damaged, turbine meter repair kits are available. Information pertaining to the turbine meter repair kits is referenced starting on **page 14**.

## WIRING

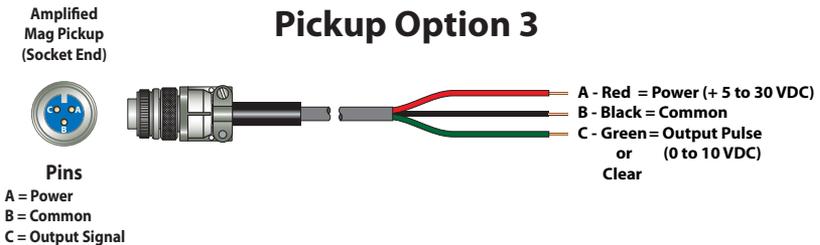
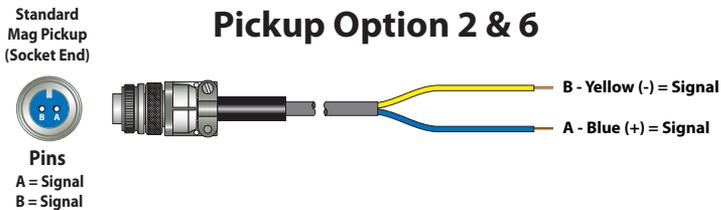
Typical wiring configurations for the available pickup options are shown in **Figures 5, 6, and 7**.

Option Number	Description	Number of Pins
0	NEMA 6 - Magnetic	3
1	NEMA 6 - Magnetic (Amplified)	3
2	Non NEMA 6 - Magnetic	2
3	Non NEMA 6 - Magnetic (Amplified)	3
4	Non NEMA 6 - Active (4-20 mA)	5
6	Non NEMA 6 - Magnetic (High Temperature)	2
8	Non NEMA 6 - Active (0-5 VDC)	5
9	No Pickup	N/A

**TABLE 3 - PICKUP OPTIONS**



**FIGURE 5 - WIRING FOR NEMA 6 MAGNETIC PICK-UPS**



**FIGURE 6 - WIRING FOR NON-NEMA 6 MAGNETIC PICK-UPS**

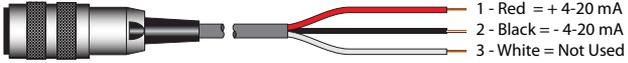
Active Sensor  
4-20 mA  
(Socket End)



**Pins**

- 1 = Loop (+)
- 2 = Loop (-)
- 3 = N/C
- 4 = N/C
- 5 = N/C

## Pickup Option 4



- 1 - Red = + 4-20 mA
- 2 - Black = - 4-20 mA
- 3 - White = Not Used

Active Sensor  
0 - 5 VDC  
(Socket End)



**Pins**

- 1 = + 10 to 30 VDC
- 2 = 0 - 5 VDC Output
- 3 = Ground
- 4 = N/C
- 5 = N/C

## Pickup Option 8



- 1 - Red = + 10 - 30 VDC
- 2 - Black = 0 - 5 VDC Output
- 3 - White = Ground

**FIGURE 7 - WIRING FOR ACTIVE MAGNETIC PICK-UPS**

## OPERATIONAL START-UP

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

### **WARNING**

**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.
- 2) Open upstream isolating valve slowly to eliminate hydraulic shock while charging the meter with the liquid. Open the valve to full open.

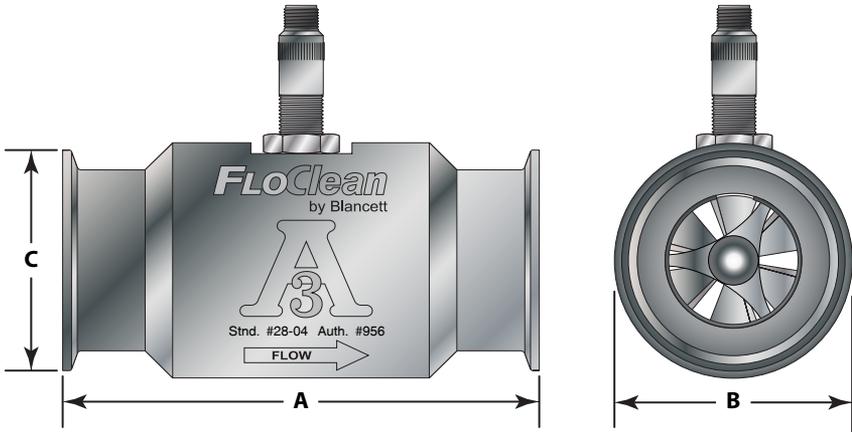
### **CAUTION**

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

- 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.*

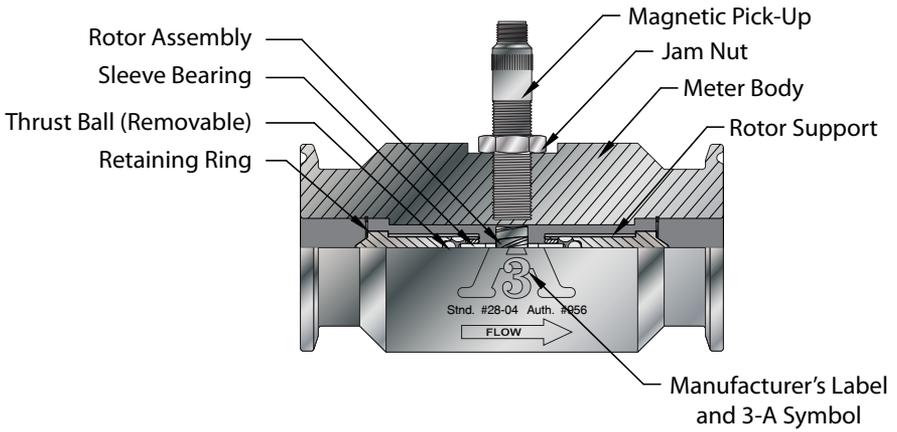
## DIMENSIONS/DRAWINGS



**FIGURE 8 - DIMENSIONS**

Part No.	<u>A</u> Length In (mm)	<u>B</u> Width In (mm)	<u>C</u> Ferrule Size In (mm)
B16C-0XXA-XXX	3.00 (76.2)	1.46 (37.1)	0.984 (25.0)
B16C-1XXA-XXX	4.00 (101.6)	2.00 (50.8)	1.984 (50.4)
B16C-1XXA-XXX <sup>1</sup>	6.25 (158.8)	2.33 (59.2)	1.984 (50.4)
B16C-2XXA-XXX	6.50 (165.1)	3.20 (81.3)	3.047 (77.4)
<sup>1</sup> 15.0 - 180.0 GPM flow range only.			

**TABLE 4 - DIMENSIONS**



***B16C 3-A Series (COP/SOP) FloClean Meters***

***FIGURE 9 - FLOCLEAN CROSS SECTIONS***

# METER REPAIR AND CLEANING

## REPAIR KITS

Each FloClean repair kit is factory calibrated to ensure accuracy throughout the entire flow range. Each kit is complete and includes a new K factor, which is the calibrated number of pulses generated by each gallon of liquid. This K factor will be used to recalibrate the monitor or other electronics to provide accurate output data.

### Turbine Repair Kits Part Numbers

Bore Size	Ferrule Size	Repair Kit Fits Meter Part Number	Repair Kit Part Number
3/8"	0.984"	B16C-003A-XXX	B16C-K03A
1/2"	0.984"	B16C-005A-XXX	B16C-K05A
3/4"	0.984"	B16C-007A-XXX	B16C-K07A
1/2"	1.984"	B16C-105A-XXX	B16C-K05A
3/4"	1.984"	B16C-107A-XXX	B16C-K07A
7/8"	1.984"	B16C-108A-XXX	B16C-K08A
1"	1.984"	B16C-110A-XXX	B16C-K10A
1 1/2"	1.984"	B16C-115A-XXX	B16C-K15A
2"	3.047"	B16C-220A-XXX	B16C-K20A

**TABLE 5 - B16C 3-A SERIES (COP/SOP) FLOCLEAN METERS**

## SERVICE PROCEDURES

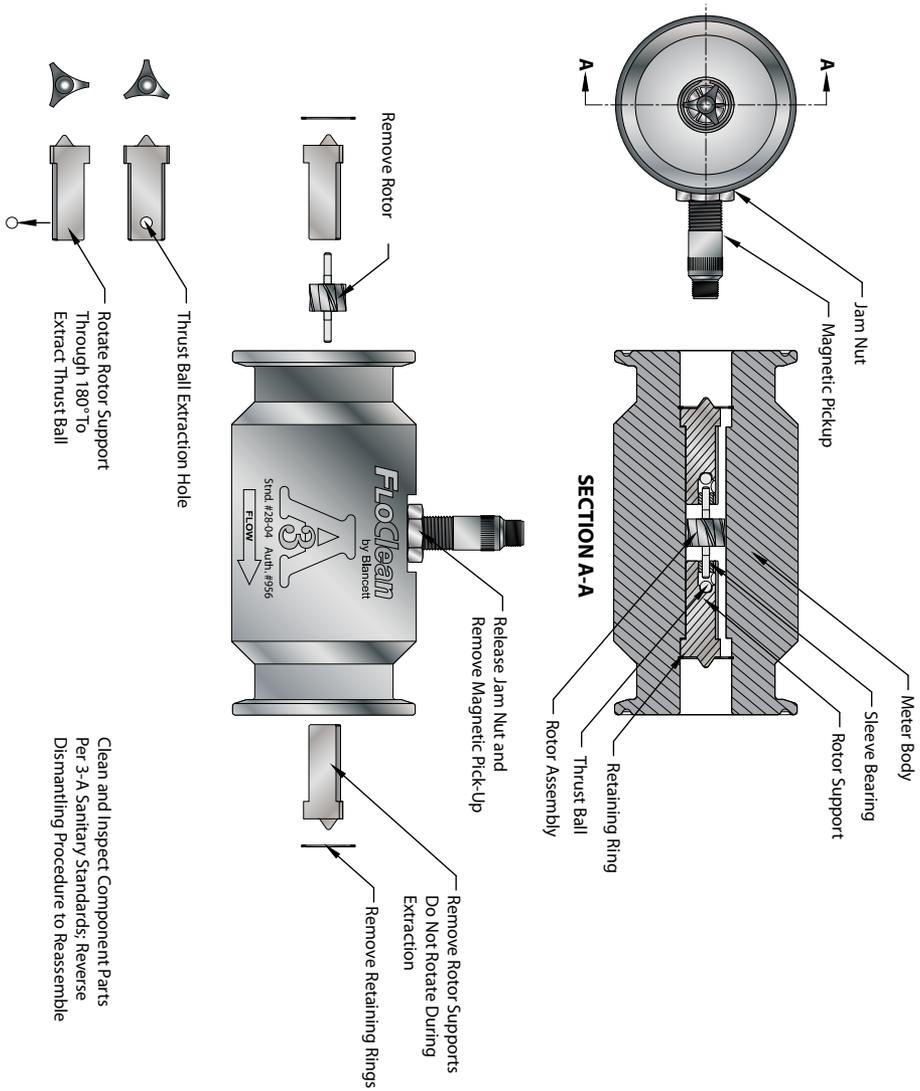
### **WARNING**

**WARNING:** High-pressure leaks are dangerous and cause personal injury. Make sure that fluid flow has been shut off and pressure in the line released before attempting to remove the meter

### 3-A Turbine Disassembly and Cleaning Procedure

**NOTE:** Refer to **Figure 10** for relative positions of repair kit components.

- 1) Remove the magnetic pick-up from the meter body to avoid damage during procedure.
- 2) Remove the retaining ring from one end of the meter.
- 3) Keeping the meter upright (pick-up port at the top), remove the rotor support from the body taking care not to rotate it in the process. If the rotor support is jammed in the body, use a pair of pliers or vice grips to break it free.
- 4) Hold the rotor support over a suitable container and rotate it through 180°. The thrust ball will drop out. Take care not to lose the ball.
- 5) Remove the rotor assembly.
- 6) Remove the second retaining ring from the opposite side of the meter.
- 7) Repeat steps 3 and 4 for the remaining rotor support.
- 8) Identify parts and flow direction to match with original meter body.
- 9) Clean and/or sanitize parts to meet appropriate sanitary standards.



**FIGURE 10 - B16C 3-A SERIES FLOCLEAN EXPLODED VIEW**

## B16C Series (COP/SOP) - 3-A Turbine Installation

**NOTE:** This procedure applies to installation of replacement turbine repair kits and re-installation of cleaned or sanitized turbine



**IMPORTANT:** Before reassembly, note there are weep holes on each rotor support, these weep holes must be facing down toward the bottom of the meter body when installed.

The meter must be reassembled with the arrowheads on the rotor pointed in the direction of fluid flow. The magnetic pick-up side of the body signifies the up position. This is the position that the repair kit was calibrated, and this is the position to be used to ensure meter accuracy. Due to the polished surfaces, there are no arrows on the rotor support to indicate which rotor support is to be placed upstream or downstream. Please install the repair kit as it was received in the box, using the arrow on the rotor to determine the placement of the rotor support.

- 1) If required by process procedures the meter should be cleaned prior to installation into the piping system.
- 2) Drop a thrust ball into a rotor support through the hole provided in the side. Insert rotor support into the meter body. Keep the thrust bearing hole pointed upwards to keep the ball in place.
- 3) Secure a retaining ring in the groove provided. Be sure that the retaining ring is completely installed in the groove.
- 4) Drop a thrust ball into second rotor support through the hole provided in the side. Locate the rotor in the support sleeve bearing. Insert rotor support and rotor into the meter body and the first support sleeve bearing. Keep the thrust bearing hole pointed upwards to keep the ball in place.
- 5) Secure the second retaining ring in the groove provided. Be sure that the retaining ring is completely installed in the groove.

### CAUTION

**CAUTION:** Excess air pressure may damage the rotor and bearings by overs-pin

- 6) Check the meter by blowing air through the assembly. If the rotor does not turn freely, the meter should be disassembled and checked for anything that would obstruct movement of the rotor.
- 7) Install the magnetic pick-up.

**NOTE:** *After installing the new repair kit, the electronics will need re-calibration. Refer to the electronics' installation and operation manual. If there are any questions on re-calibration, contact Blancett at 1.800.235.1638 or contact the manufacturer of the associated electronics.*

## SPECIFICATIONS

Physical	
<b>Body/Internal Wetted Parts</b>	316L Stainless Steel
<b>Bearings</b>	Nickel Bindery Tungsten Carbide
<b>Turbine</b>	Nickel Plated CD4MCU Stainless Steel
<b>Shaft</b>	Nickel Bindery Tungsten Carbide
<b>Connections</b>	Sanitary Clamp Ends
Electrical	
<b>Pick-Up (option 0)</b>	NEMA 6; -150 °F to 300 °F (-100 °C to 149 °C) <b>NOTE:</b> For other pick-up options, see <b>page 8</b>
Accuracy	
<b>Accuracy</b>	±1% of reading
<b>Repeatability</b>	±0.1%
Certifications	
	
Construction	
<b>Temperature</b>	-150 °F to +300 °F (-101 °C to +149 °C) The meter should not be subjected to temperatures above +300 °F (+149 °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.
<b>Pressure Rating</b>	1000 psi maximum (rating based on Tri-Clamp® sanitary connection)
<b>Corrosion</b>	Contact Blancett to determine if operating liquid is compatible with materials of construction. Incompatible fluids could deteriorate internal parts and cause the meter to read inaccurately.

Specifications are subject to change without notice.

# APPENDIX

TROUBLESHOOTING GUIDE		
Trouble	Possible Cause	Remedy
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>• Install new repair kit</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

# 3-A CERTIFICATE

INITIALLY ISSUED: 3/19/1998

AUTHORIZATION NO.: 956



## THIS IS TO CERTIFY THAT

**Blancett Division of Racine Federated, Inc.**  
8635 Washington Avenue, Racine, WI 53406

Is hereby authorized to continue to apply the  
3-A Symbol to the models of equipment, conforming to 3-A Sanitary Standards for:

**Flow Meters, Number: 28-04,**  
set forth below

**B16C-003A-xxx, B16C-005A-xxx, B16C-007A-xxx, B16C-105A-xxx, B16C-107A-xxx,  
B16C-108A-xxx, B16C-110A-xxx, B16C-115A-xxx, B16C-220A-xxx.**

VALID THROUGH: **December 31, 2012**

Timothy R. Rugh  
Executive Director, 3-A Sanitary Standards, Inc.

The issuance of this authorization for the use of the 3-A Symbol is based upon the voluntary certification, by the applicant for it, that the equipment listed above complies fully with the 3-A Sanitary Standards designated. Legal responsibility for compliance is solely that of the holder of this Certificate of Authorization, and 3-A Sanitary Standards, Inc. does not warrant that the holder of an authorization at all times complies with the provisions of the said 3-A Sanitary Standards. This in no way affects the responsibility of 3-A Sanitary Standards, Inc. to take appropriate action in such cases in which evidence of nonconformance has been established.

NEXT TPV INSPECTION/REPORT DUE: **March 2016**

**FIGURE 11 - 3-A CERTIFICATE**

# NOTES



## Badger Meter Warranty FloClean Sanitary Flow Meter

### PRODUCTS COVERED

The Badger Meter warranty shall apply to the Blancett FloClean Flow Meter ("Product").

### MATERIALS AND WORKMANSHIP

Badger Meter warrants the Product to be free from defects in materials and workmanship for a period of 12 months from the original purchase date.

### PRODUCT RETURNS

Product failures must be proven and verified to the satisfaction of Badger Meter. The Badger Meter obligation hereunder shall be limited to such repair and replacement and shall be conditioned upon Badger Meter receiving written notice of any asserted defect within 10 (ten) days after its discovery. If the defect arises and a valid claim is received within the Warranty Period, at its option, Badger Meter will either (1) exchange the Product with a new, used or refurbished Product that is at least functionally equivalent to the original Product, or (2) refund the purchase price of the Product. DO NOT RETURN ANY PRODUCT UNTIL YOU HAVE CALLED THE BADGER METER CUSTOMER SERVICE DEPARTMENT AND OBTAINED A RETURN AUTHORIZATION.

Product returns must be shipped by the Customer prepaid F.O.B. to the nearest Badger Meter factory or distribution center. The Customer shall be responsible for all direct and indirect costs associated with removing the original Product and reinstalling the repaired or replacement Product. A replacement Product assumes the remaining warranty of the original Product or ninety (90) days from the date of replacement, whichever provides longer coverage.

### LIMITS OF LIABILITY

This warranty shall not apply to any Product repaired or altered by any Product other than Badger Meter. The foregoing warranty applies only to the extent that the Product is installed, serviced and operated strictly in accordance with Badger Meter instructions. The warranty shall not apply and shall be void with respect to a Product exposed to conditions other than those detailed in applicable technical literature and Installation and Operation Manuals (IOMs) or which have been subject to vandalism, negligence, accident, acts of God, improper installation, operation or repair, alteration, or other circumstances which are beyond the reasonable control of Badger Meter.

With respect to products not manufactured by Badger Meter, the warranty obligations of Badger Meter shall in all respects conform and be limited to the warranty extended to Badger Meter by the supplier.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS AND IMPLIED WARRANTIES WHATSOEVER, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (except warranties of title).

Any description of a Product, whether in writing or made orally by Badger Meter or its agents, specifications, samples, models, bulletins, drawings, diagrams, engineering sheets or similar materials used in connection with any Customer's order are for the sole purpose of identifying the Product and shall not be construed as an express warranty. Any suggestions by Badger Meter or its agents regarding use, application or suitability of the Product shall not be construed as an express warranty unless confirmed to be such, in writing, by Badger Meter.

### EXCLUSION OF CONSEQUENTIAL DAMAGES AND DISCLAIMER OF OTHER LIABILITY

Badger Meter liability with respect to breaches of the foregoing warranty shall be limited as stated herein. Badger Meter liability shall in no event exceed the contract price. BADGER METER SHALL NOT BE SUBJECT TO AND DISCLAIMS: (1) ANY OTHER OBLIGATIONS OR LIABILITIES ARISING OUT OF BREACH OF CONTRACT OR OF WARRANTY, (2) ANY OBLIGATIONS WHATSOEVER ARISING FROM TORT CLAIMS (INCLUDING NEGLIGENCE AND STRICT LIABILITY) OR ARISING UNDER OTHER THEORIES OF LAW WITH RESPECT TO PRODUCTS SOLD OR SERVICES RENDERED BY BADGER METER, OR ANY UNDERTAKINGS, ACTS OR OMISSIONS RELATING THERETO, AND (3) ALL CONSEQUENTIAL, INCIDENTAL AND CONTINGENT DAMAGES WHATSOEVER.



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