



Blancett[®]
Turbine Flow Meters

Turbine Flow Meter

B1500



Badger Meter

TRB-UM-01798-EN-03 (October 2019)

User Manual

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SAFETY INFORMATION

The installation of the Blancett B1500 flow meters must comply with all applicable federal, state, and local rules, regulations and codes.

Failures to read and follow these instructions can lead to misapplication or misuse of the Blancett B1500 flow meters, resulting in personal injury and damage to equipment.

Safety Symbol Explanations



Indicates a hazardous situation, which, if not avoided, will result in death or serious personal injury.



Indicates a hazardous situation, which, if not avoided, could result in death or serious personal injury.



Indicates a hazardous situation, which, if not avoided, could result in minor or moderate personal injury or damage to property.

UNPACKING AND INSPECTION

Upon opening the shipping container, visually inspect the product and applicable accessories for any physical damage such as scratches, loose or broken parts, or any other sign of damage that may have occurred during shipment.

NOTE: If damage is found, request an inspection by the carrier's agent within 48 hours of delivery and file a claim with the carrier. A claim for equipment damage in transit is the sole responsibility of the purchaser.

DESCRIPTION

Blancett B1500 flow meters are precisely manufactured and calibrated instruments used in accurate rate-of-flow and total-flow measurement.

The flow meter mounts directly in the flow line and consists of a cylindrically bored housing, a flow straightener and turbine assembly, and a magnetic pickup, as shown in *Figure 1*.

The magnetic pickup is located directly above the turbine, near the downstream end of the flow meter. The flow straightener and turbine assembly is retained in the housing by a snap ring and can be easily removed for cleaning and further disassembly.

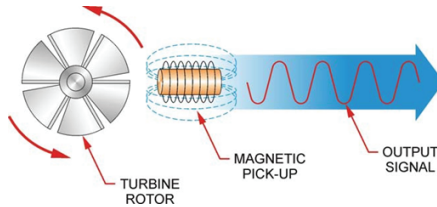


Figure 1: Turbine flow meter

Blancett B1500 flow meters are provided with flow straighteners at the downstream and upstream ends. The flow straighteners diminish any turbulence created by the turbine. Other physical differences are illustrated in exploded views. See *Figure 1*.

Fluid passing through the meter causes the rotor and bearing to revolve at a speed directly proportional to fluid velocity. As each rotor blade passes the pickup, it varies the pickup's reluctance, producing an output signal. Since turbine speed is directly proportional to fluid velocity, signal frequency is similarly proportional to the volumetric rate-of-flow. The output signal can be fed into various types of instruments, such as indicators, frequency converters, counters, recorders and controllers to indicate the rate-of-flow.

The Blancett B1500 flow meter is designed to provide a high frequency output voltage at the maximum of their flow range. This high frequency signal improves resolution and the standardized output permits several overlapping range flow meters to be connected in series to one indicating instrument. Data concerning extended ranges, specific output voltage and other frequency ranges is available from the factory.

INSTALLATION

1. Check the flow meter internally for foreign material and make sure the turbine rotor spins freely prior to installation.
2. Install a minimum of 10 pipe diameters of straight pipe or tube in the same size as the flow meter on the upstream side, and 5 diameters on the downstream side to avoid creating turbulence in the liquid, which can cause incorrect flow meter output. If space prohibits the use of these straight sections, install the piping to produce as straight and smooth a flow as possible.
3. Flush the flow metering pipe line. Debris such as dirt, grease, piping compounds, weld slag, rust, shavings and the like could be unknowingly contained within the diameter of the piping system. Failure to remove these contaminants may damage the internal components of the flow meter and other system components.
4. Install the flow meter with the flow arrow, etched on the exterior of the meter body, pointing in the direction of fluid flow.
5. Install a mesh strainer upstream before operation of the flow meter if particles are present. See *"Filtration Recommendation"* on page 13.

CAUTION

BLEED ALL AIR AND VAPOR FROM THE LIQUID AFTER INSTALLING OR REINSTALLING A FLOW METER.

6. Start flow slowly to avoid sending a "slug" of high velocity air or vapor through the flow meter and causing it to over-speed. Start required flow after flow meter is full of liquid. Aerated liquids flowing through a flow meter will result in incorrect flow rates.
7. The pipe containing the flow meter should be completely filled at all times to avoid corrosion. If a process shutdown is required where the pipe is partially or fully empty, remove and clean the meter. See *"Cleaning"* on page 8.

NOTE: The meter is not recommended for long periods of over-speeding. Over-speeding increases the amount of pressure drop across the meter and significantly reduces the life of the bearing and rotor assembly. The maximum amount of over-speeding for any given meter is 150% of its capacity.

DISASSEMBLY

1. Firmly hold the flow meter and, using tweezers, carefully remove internal snap ring from the upstream end.
2. Use long nose pliers to grasp one vane of the flow straightener and gently pull the flow straightener and rotor assembly from the body. Use a slight twisting motion.
3. Press down on the hub to relieve spring pressure on the C-washer and remove with tweezers or thin-nosed pliers.
4. Remove hub, spring and spacer.
5. Carefully remove the rotor from the shaft.
6. Remove the snap ring from the side of the bearing and push the bearing out of the rotor.

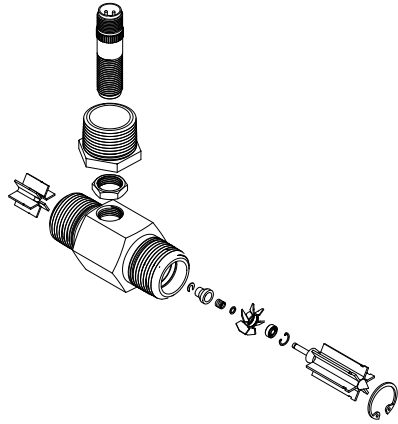


Figure 2: B1500 turbine flow meter

CLEANING

Immerse all parts, except the pickup, in a clean, filtered solvent suitable for removing residue from the liquid used with the flow meter. If necessary, use a soft bristle brush.

If there is foreign matter in the ball bearings, soak the bearings in the solvent for approximately 10 minutes and then dry with filtered compressed air. Do not use excessive air pressure.

NOTE: Do not sonic clean the bearings.

CAUTION

EXERCISE EXTREME CARE DURING THE CLEANING PROCESS SO NONE OF THE PARTS ARE DROPPED, SCRATCHED OR DAMAGED IN ANY WAY. DO NOT ATTEMPT TO FURTHER POLISH ANY OF THE PARTS, ESPECIALLY THE ROTOR.

Cleaning a Turbine Meter after Water Calibration and/or Service

NOTE: When cleaning flow meters, keep the body, sleeve and pickup together. The sleeve is fitted to the body and the pickup has a protruding pin. Replacement pickups are supplied with a nut and have no protruding pin.

1. Remove the meter from the line and let all excess water drip out.
2. Fill the meter with alcohol, at least 50% Isopropyl, Ethyl or Methyl, and let it stand for 5 minutes.
3. Discard the alcohol and let the meter dry for 2 minutes.
4. Fill the meter with MIL-C-7024 Type 2 calibration fluid, or similar solvent, and let it stand for 1 minute.

5. Discard the calibration fluid and flush the meter with an approved fluorocarbon solvent, such as Isotron.

NOTE: If this procedure is not possible, make sure the turbine meter is always filled with water when not in use, to prevent internal wetted parts from being exposed to air.

CAUTION

DO NOT INTERCHANGE FLOW METER PARTS OTHER THAN BEARINGS AND RETAINING RINGS. THIS PRECAUTION IS NECESSARY TO PRESERVE LINEARITY AND REPEATABILITY.

REASSEMBLY

Reassembly is the reverse of disassembly except for the following:

- On flow meters where shaft bearings are provided with a retainer, always install with the retainer flange facing upstream.
- Inspect the rotor for markings as shown in *Figure 3* to indicate flow direction before assembly.
- Flow meters that have broached slots in the body for flow straightener vanes should be carefully assembled.
- Align the straightener vanes with the slots and push gently until the assembly is seated.

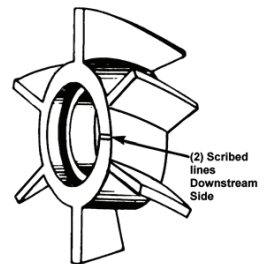


Figure 3: Scribed lines

CALIBRATION DATA



Certificate of Calibration



8635 Washington Ave • Racine, WI 53406 • Phone: 1-877-243-1010 • Fax: 1-800-245-3569 • info@blancett.com

Model #	B150-501-NPT	Cal Date:	9/9/2015
Serial #	*****	Customer Re-Cal Date:	
Signal:	MAG	Lab Temp:	75 Deg F
Calibration Procedure:	FDP-002	Lab Relative Humidity:	27%
Calibration Tech:	Eddie		
Fluid Specifications:	MIL-C-7024 TY II	Specific Gravity:	0.762
Temperature (F):	80	Viscosity (CSTKS):	1.12
Notes, Adjustments & Repairs	In Tolerance: Meet +/- 0.5% Linearity from 0.2 – 3.0 GPM Nominal K-Factor in GPM =		

Calibration Results (Initial Calibration)

Test Point #	Frequency Hz	Flow Rate GPM	Freq./Visc Hz/cstk	K Factor pul/gal	Flow Rate LPM	Mass Flow PPH	Linear COEFF.
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

Standards Used in Calibration

Standard #	Description	Serial #	ReCal Date
FDI-180	30 GPM Liquid Prover	NA	8/12/2018
FDI-180 Cart	30 GPM Cart - mA, Vdc, Frequency, Temp	N/A	6/2/2016

The instrument referenced above was calibrated using standards traceable to the National Institute of Standards and Technology. Calibration reports for references maintained by Badger Meter, Inc. are available upon request to the customer of this calibration report. The volumetric flow rates reported are within a best uncertainty of +/- .037% of reading (Represents an expanded uncertainty using a coverage factor, k = 2, at an approximate level of confidence of 95%) and applies to calibration equipment only and +/- 0.02% reading uncertainty of the UUT(Unit Under Test).

I certify the accuracy of this Calibration Report: Andrew Yec Calibration Engineer
Name Title Signature

End of Report

Doc Nbr: CRF-002 Rev: G
Report #:195165 - 1509000019 Page 1 of 1

Figure 4: Calibration certification

K-Factor

The calibration data supplied with a B1500 flow meter is shown in *Figure 4*. Correct application of a B1500 flow meter requires consideration of many important factors. Because of the wide variation of possible applications, detailed data for liquid flow models only is given in this manual. For special requirements, consult the factory.

Pressure Rating

Flange flow meters are rated for service pressure according to ANSI ratings for the flanges used. Operation at temperatures above 200° F (93° C) decreases the connection rating because of lowered stress capabilities of the metal.

Liquid Formula

$$GPM = (Hertz \times 60) \div K$$

$$PPH = \frac{Hertz \times 3600 \times 8.328 \times S.G.}{K}$$

$$Time\ Base\ in\ Seconds = \frac{Engg.\ Units\ GPM - PPH}{Hertz}$$

Figure 5: Calculating flow rates in different units

RECALIBRATION

- Recalibration is not necessary following a cleaning operation or the replacement of bearings, snap rings, springs or spacers.
- Recalibrate the flow meter if the rotor hub, or rotor and flow straightener assembly is replaced.
- Flow meters may be recalibrated by the user if the facilities are available, or they may be returned to the factory. Yearly calibration is recommended.
- When the flow meter is set up for recalibration, allow the fluid to circulate for 5 minutes before beginning the calibrating runs.

TROUBLESHOOTING

Issue	Possible Cause	Remedy
Meter indicates higher flow than actual	Cavitation	Increase back pressure
Meter indicates high flow	Dirt blocking flow area rotor	Clean meter; add filter
Meter indicates low flow	Dirt dragging rotor	Clean meter; add filter
Meter indicates low flow	Worn bearing	Replace bearing; recalibrate when required
Meter indicates low flow	Viscosity higher than calibrated	Change temperature; change fluid; recalibrate meter
Erratic system indication; meter alone works well	Ground loop is shielding	Ground shield one place only Watch for internal electronic instrument grounds
No flow indication; full flow of fluid opened into dry meter; impact of fluid on rotor causes bearing separation	Fluid shock. New bearing failed	Move meter to position where it is full of fluid at start-up
Erratic indication at low flow; good indication at high flow	Low instrument sensitivity; 10 mV rms turbine signal is being lowered by loading of electronics or instrumentation cannot sense low level signals	Amplify signal
No flow indication	Faulty pickup	Replace pickup; recalibrate as necessary
System works perfectly, except indicates lower flow over entire range	Bypass flow, leak	Eliminate bypass valves, leak Faulty solenoid valves
Meter indicating high flow; upstream piping at meter smaller than meter	Fluid jet impingement on rotor Critical in gas	Change piping
Opposite effects as above	Viscosity lower than calibrated	Change temperature; change fluid; recalibrate meter
Mass flow indication wrong Turbine meter is volumetric; density correction is electronic; must change with temperature	Wrong fluid density Critical in gas	Check fluid, electronics
Erratic or wrong indication of flow	Loose pickup	Tighten pickup
Indicates high flow two hours after installing new bearing.	Bearing wear-in; small meters critical	Recalibrate; 20...30 min. run-in is required to stabilize friction
Cannot reach maximum flow rate; meter selection was with Delta-P at 0.75 sp. gr., now using on 1.0 sp. gr. Delta-P is proportional to specific gravity	High pressure drop	Install larger meter
Does not repeat at low flows; repeats at high flows	System resolution readability	Increase resolution, for example: 1 out of 100 = 1% 1 out of 1000 = 0.1%

SPECIFICATIONS

Performance	Accuracy	± 0.5% of reading with single K-factor; 0.25% with B3000 linearization
	Repeatability	± 0.02% of reading
	Response Time	2...3 ms (at 1.2 cSt)
Materials of Construction	Body	316 stainless steel
	Shafts	316 stainless steel
	Rotors	17-4 PH stainless steel
	Bearing	Ceramic

Flow Ranges

Part Number	Flow Range gpm (lpm)	ΔP at 10:1 * psid (kg/cm ²)	K-Factor** pulses/US gal (pulses/L)
B150-501-xxx	0.25...2.50 (0.9...9.5)	3.5 (0.25)	28,800 (7910)
B150-502-xxx	0.5...5.0 (1.9...18.9)	4.5 (0.32)	14,400 (3805)
B150-503-xxx	0.75...7.50 (2.8...28.4)	6.0 (0.42)	9600 (2536)
B150-625-xxx	1.25...12.50 (4.7...47.3)	5.0 (0.35)	5760 (1522)
B150-750-xxx	2.5...25.0 (9.5...94.6)	5.0 (0.35)	2800 (761)
B150-110-xxx	5.0...50.0 (18.9...189.3)	5.0 (0.35)	1440 (380)
B150-125-xxx	7.5...75.0 (28.3...283.9)	5.5 (0.39)	960 (254)
B150-115-xxx	12.5...125.0 (47.3...473.2)	6.0 (0.42)	576 (152)
B150-120-xxx	25...250.0 (94.6...946.4)	6.5 (0.46)	288 (76)

*Pressure drop is based on using MIL-PRF-17024E, Type II at 77° F (25° C), with a specific gravity of 0.77

**K-factor will vary slightly from meter to meter

Filtration Recommendation

Part Number	Filter Rating	
B150-501-xxx	25...40 microns	
B150-502-xxx		
B150-503-xxx		
B150-625-xxx	NPT	40...75 microns
	F15	25...40 microns
B150-750-xxx	40...75 microns	
B150-110-xxx		
B150-125-xxx		
B150-115-xxx		
B150-120-xxx		

Pressure Ratings

NPT End Fittings

Part Number	Nominal Pipe Size	Male	
		psig	bar
B150-501-NPT	0.25 in. (6.4 mm)	5922	408
B150-502-NPT	0.37 in. (9.5 mm)	4700	324
B150-503-NPT	0.50 in. (12.7 mm)	4418	305
B150-625-NPT	0.75 in. (19.1 mm)	4136	285
B150-750-NPT	0.75 in. (19.1 mm)	4136	285
B150-110-NPT	1.00 in. (25.4 mm)	4042	278
B150-125-NPT	1.25 in. (31.8 mm)	4700	324
B150-115-NPT	1.50 in. (38.1 mm)	4230	291
B150-120-NPT	2.00 in. (50.8 mm)	3666	253

NOTES:

1. Pressure ratings listed are for temperatures up to 100° F (37.8° C).
2. Pressure rating is calculated with an allowable stress value of 20,000 psi (1378 bar) for 316 SS per pressure piping code ASME B31.3.
3. Chart is displaying safe working pressure, in accordance with power piping code ASME B31.1.

Flange End Fittings (in accordance with ASME B16.5 Standards)

ANSI Flange	PSIG	Bar
150#	275	19

NOTES:

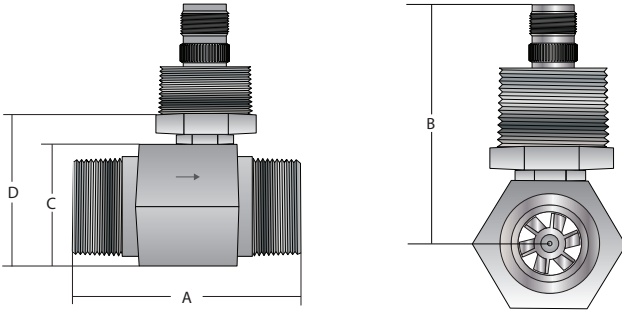
1. Specifications from maximum non-shock allowable working pressure in psig at 100° F (37.8° C) or less.
2. Stainless steel 316A-181 material.

PART NUMBER CONSTRUCTION

Model			
Blancett B1500 Turbine Flow Meter	B150		
Meter Size			
1/4 in. (6.3 mm) Bore 1/2 in. (12.7 mm) End Fitting			501
3/8 in. (9.5 mm) Bore 1/2 in. (12.7 mm) End Fitting			502
1/2 in. (12.7 mm) Bore 1/2 in. (12.7 mm) End Fitting			503
5/8 in. (15.9 mm) End Fitting			625
3/4 in. (19.0 mm) End Fitting			750
1 in. (25.4 mm) End Fitting			110
1-1/4 in. (31.7 mm) End Fitting			125
1-1/2 in. (38.1 mm) End Fitting			115
2 in. (50.8 mm) End Fitting			120
End Fitting			
National Pipe Thread			NPT
150# ANSI Rasied Face Flange			F15

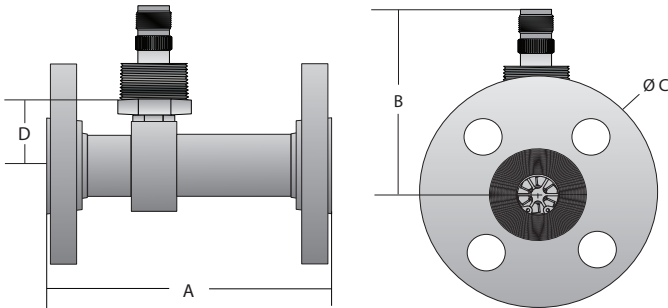
DIMENSIONS

NPT End Fitting



Part Number	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)
B150-501-NPT	2.70 (68.6)	2.52 (64.0)	1.12 (28.5) Square Body	1.62 (40.9)
B150-502-NPT	2.70 (68.6)	2.52 (64.0)	1.12 (28.5) Square Body	1.62 (40.9)
B150-503-NPT	2.70 (68.6)	2.62 (66.5)	1.12 (28.5) Square Body	1.62 (40.9)
B150-625-NPT	3.29 (83.6)	2.62 (66.5)	1.25 (31.8) Square Body	1.75 (44.5)
B150-750-NPT	3.29 (83.6)	2.72 (69.1)	1.25 (31.8) Square Body	1.75 (44.5)
B150-110-NPT	3.78 (96.0)	2.82 (71.6)	1.63 (41.4) Hex Body	2.13 (54.1)
B150-125-NPT	4.23 (107.4)	2.92 (74.2)	1.88 (47.8) Hex Body	2.38 (60.5)
B150-115-NPT	4.67 (118.6)	3.12 (79.2)	2.25 (57.2) Hex Body	2.75 (69.9)
B150-120-NPT	5.89 (149.6)	3.32 (84.3)	2.75 (69.9) Hex Body	2.75 (69.9)

Flange End Fitting



Size	A	B	C	D
B150-501-F15	5.00 in. (127.0 mm)	2.52 in. (64.0 mm)	3.50 in. (88.9 mm)	1.03 in. (26.7 mm)
B150-502-F15	5.00 in. (127.0 mm)	2.52 in. (64.0 mm)	3.50 in. (88.9 mm)	1.06 in. (26.9 mm)
B150-503-F15	5.00 in. (127.0 mm)	2.62 in. (66.5 mm)	3.50 in. (88.9 mm)	1.12 in. (28.4 mm)
B150-625-F15	5.50 in. (139.7 mm)	2.62 in. (66.5 mm)	3.50 in. (88.9 mm)	1.19 in. (30.2 mm)
B150-750-F15	5.50 in. (139.7 mm)	2.72 in. (69.1 mm)	3.88 in. (99.6 mm)	1.26 in. (32.0 mm)
B150-110-F15	5.50 in. (139.7 mm)	2.82 in. (71.6 mm)	4.25 in. (107.9 mm)	1.37 in. (34.8 mm)
B150-125-F15	6.00 in. (152.4 mm)	2.92 in. (74.2 mm)	4.62 in. (117.3 mm)	1.49 in. (37.8 mm)
B150-115-F15	6.00 in. (152.4 mm)	3.12 in. (79.2 mm)	5.00 in. (127.8 mm)	1.61 in. (40.9 mm)
B150-120-F15	6.50 in. (165.1 mm)	3.32 in. (84.3 mm)	6.00 in. (152.4 mm)	1.84 in. (46.7 mm)

Control. Manage. Optimize.

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