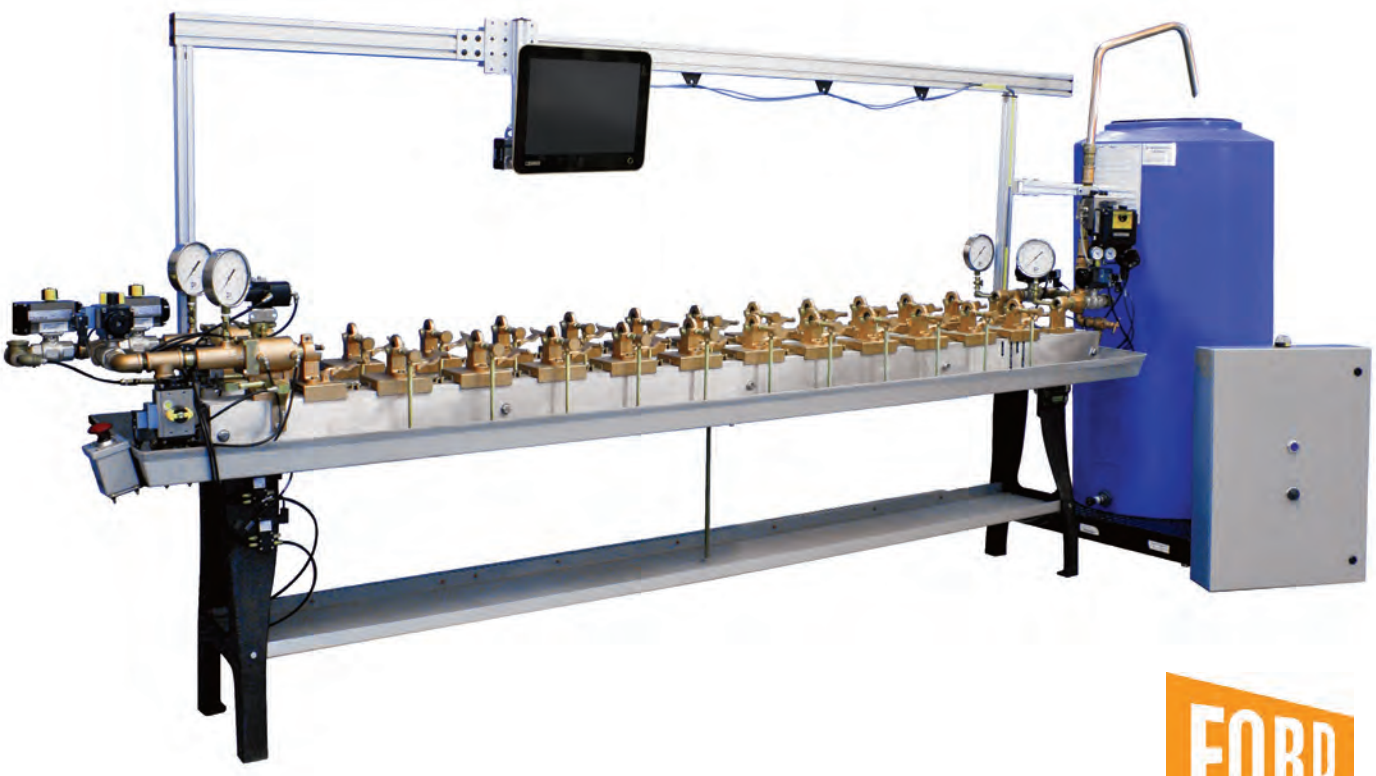
06/17/25

THE FORD METER BOX COMPANY, INC.
CERTIFIED TO ISO 9001:2015
10004466

Ford Meter Box® Test Bench Operating Instructions



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Introduction to Testing & Ford Test Benches

For more than 100 years, Ford Meter Box has been the leading manufacturer of water meter test benches. From the time of our first patent, granted in 1916, we have designed and hand-built the finest and most accurate water meter testing equipment available. If your utility is considering the creation or upgrade of a meter test facility, let our many years of experience guide you in making your equipment decisions.

The following pages offer information on meter testing and instructions on the operation of Ford test benches & accessories.

The Value of Unregistered Water

Sales Price of Water		$3.00 per 1000 Gallons			$4.00 per 1000 Gallons			$5.00 per 1000 Gallons		
Volume-Gallons		10,000	50,000	100,000	10,000	50,000	100,000	10,000	50,000	100,000
	4%	$ 1.20	$6.00	$12.00	$ 1.60	$8.00	$16.00	$ 2.00	$10.00	$20.00
	6%	1.80	9.00	18.00	2.40	12.00	24.00	3.00	15.00	30.00
	8%	2.40	12.00	24.00	3.20	16.00	32.00	4.00	20.00	40.00
UNDER-	10%	3.00	15.00	30.00	4.00	20.00	40.00	5.00	25.00	50.00
REGISTRATION	12%	3.60	18.00	36.00	4.80	24.00	48.00	6.00	30.00	60.00
PERCENT	14%	4.20	21.00	42.00	5.60	28.00	56.00	7.00	35.00	70.00
	16%	4.80	24.00	48.00	6.40	32.00	64.00	8.00	40.00	80.00
	18%	5.40	27.00	54.00	7.20	36.00	72.00	9.00	45.00	90.00
	20%	6.00	30.00	60.00	8.00	40.00	80.00	10.00	50.00	100.00

The Value of Unregistered Water

Testing a water meter is very simple. It consists of checking the registration of the meter against the actual volume of water passing through the meter, as measured in an accurate volumetric tank or weighed on accurate scales.

The table above shows the value of water unregistered by meters with various percentages of slowness, and differing amounts of water drawn through the meter. In this example, water is valued at $3.00 to $5.00 per thousand gallons.

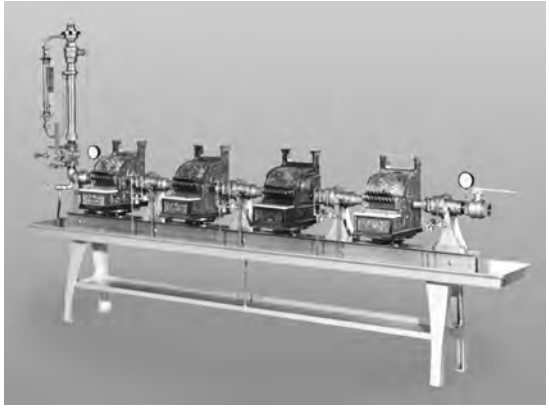
According to the table, with water at $3.00 per thousand gallons, the return on investment for testing and repairing a meter 4% slow will be only $12.00 with every 100,000 gallons of water used. It would take a large and active account to make frequent testing pay under these conditions.

On the other hand, with water at $5.00 per thousand gallons, a meter failing to register 20% of the water passing through it would lose $100 for the water works industry for every 100,000 gallons. Under these conditions, testing will have a much better return on investment.

Surcharge for Sewage

The practice of charging for sewage disposal and treatment as a percentage of the water bill puts additional emphasis on meter accuracy. Surcharges can be as high as 150% of the water bill, with 100% surcharges common.

If a municipality has a surcharge of 100%, the effect is that the water meter is measuring the bill for sewage service in addition to its normal function of metering water. With a water rate of $3.00 per thousand gallons and a surcharge of 100%, the meter is, in effect, measuring $6.00 of revenue — all the more reason for accuracy.



Principle and Practice in Water Meter Testing

Meter accuracy may be defined as the quotient obtained by dividing the quantity registered during a test by the actual volume of water. Thus a meter registering nine gallons when 10 gallons pass through it has an accuracy of 9/10, or 90%. A meter registering 51 cubic feet on an actual volume of 50 cubic feet is 51/50, or 102% accurate. Meter accuracy is often expressed in percentage fast or slow. Thus a meter that records 95 gallons when 100 gallons are run through it under-registers or is slow by 5%. A meter registering 102 gallons on the same volume would be 2% fast. It is better; however, to express accuracy in actual terms, which would be 95% and 102% in these cases.

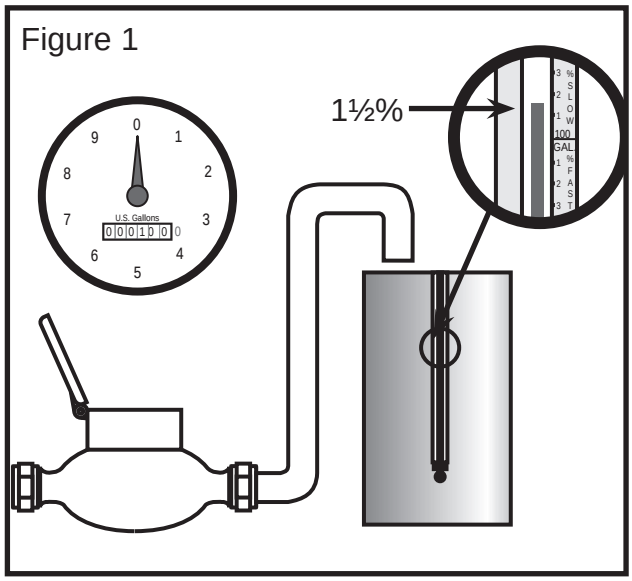
The Two Ways Calibrated Tanks Can Be Used

When testing a single meter with a Ford® calibrated tank, there is a choice in the method and procedure. When the meter has a small test hand, the better procedure is to stop the flow when the meter indicates the passage of the test volume, such as one cubic foot, 10 gallons, or 10 cubic feet. Thus the test hand makes one or more complete revolutions and is stopped exactly on a mark (see Figure 1). The percentage accuracy of the meter is then read directly from the water level in the gauge glass of the calibrated tank as shown in the drawing.

It may be a little confusing to think that a water level above 100% in the tank indicates a slow meter. However, this is true because the meter has failed to register the amount of water that has passed through it. The meter has under-registered, or is slow, by the percentage shown on the gauge strip.

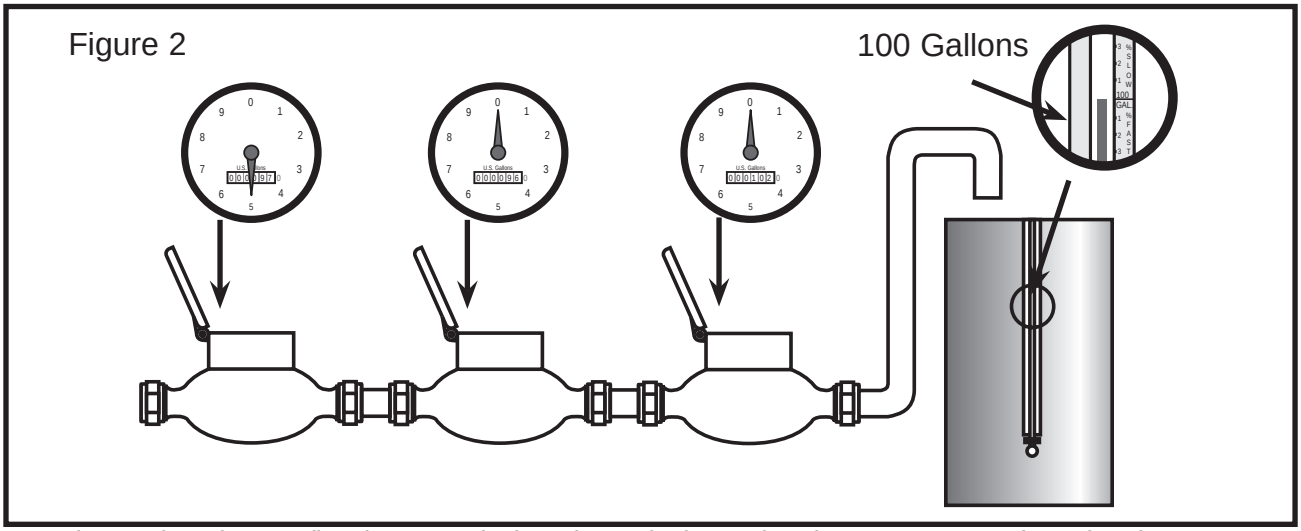
When testing two or more meters in series, the test flow is stopped when the tank gauge indicates the desired water level (see Figure 2). Then the accuracy of each meter is calculated by dividing the reading of the tank volume as described above and shown in Figure 2.

Figure 1



When testing one meter at a time, the accuracy can be read directly from the tank if it is calibrated in percentages. In testing the above meter, the flow was stopped when the meter showed a registration of 100 gallons; the tank gauge shows the meter to be 98-1/2% accurate or 1-1/2% slow.

Figure 2



In series testing, the test flow is stopped when the tank shows that the correct test volume has been run through the meters. In the above example, there are 100 gallons in the tank and the meters read, from left to right, 97-1/2 gallons, 96 gallons and 102 gallons. In other words, these meters are registering 97-1/2%, 96% and 102%.

The Advantages of Series Testing

How many meters should be tested in series?

Except in small meter shops where only a few meters are tested in a day, the advantages of series testing justify the small additional cost for the equipment and space required.

In series testing, two or more meters are connected in line. The same water is run through all the meters and measured in a tank, and the time for testing is the same as for one meter. The economical number of meters to test in series depends on the following factors:

1. *The number of meters to be tested in one day* – It may be cost-saving for a small utility to accumulate meters for several weeks and then test in series, depending on factors below.

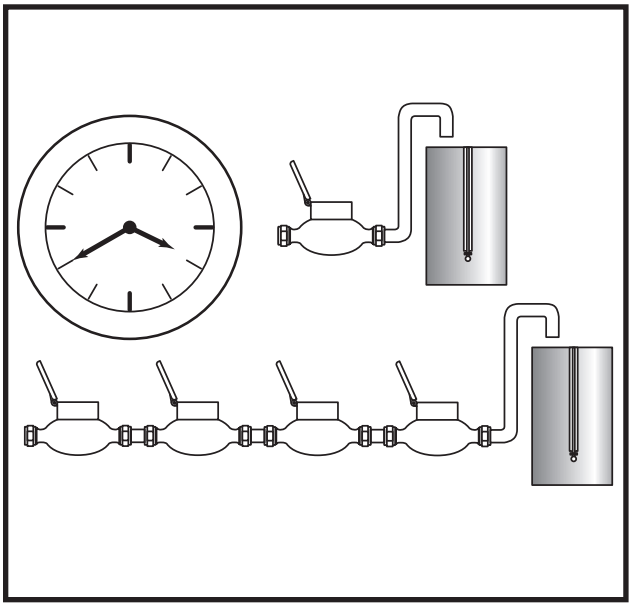
2. *The additional cost of the added equipment and space required* – The cost for multiple units on test benches is nominal. Meter shops usually have the space for a multiple unit test bench. Multiple unit benches can decrease the time and expense otherwise required to test each meter individually. Series testing pays a good return on the investment.

3. *The water pressure available* – There should be enough water pressure to provide an ample flow through all meters to flush out air and offer a reasonable rate for the high-flow test, refer to AWWA M6 testing criteria.

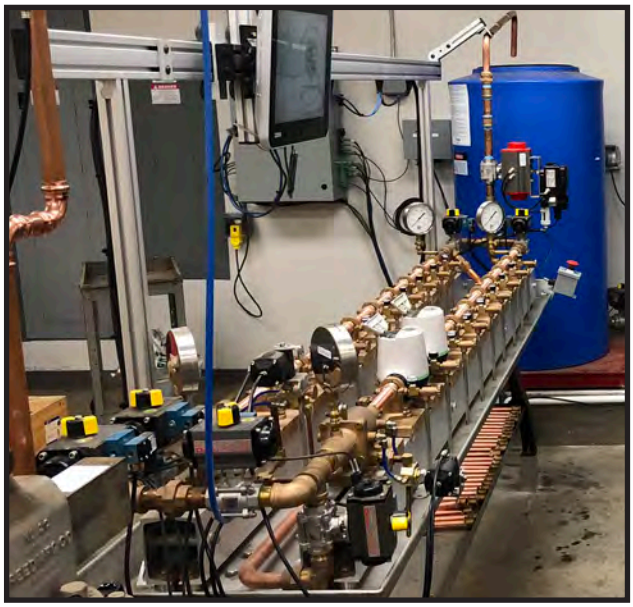
4. *The value of the water and manpower saved* - Some meter shops repump water for testing as an economy measure. In one meter shop the switch from a 5-unit to a 10-unit bench increased production of the department over 40% and paid a magnificent return on the added investment.

There is no good rule of thumb to apply in deciding on the correct number of meters to be tested in series because of the above variables. It might be considered good practice and good economics to start with one testing unit for every five meters to be tested in a day, gradually decreasing the ratio to 10 units for 100 meters.

For testing a very large number of meters, both Standard and Indianapolis Test Benches are available with two rows of test units, with each row having separate piping and valves. Either row may run separately or both in series. As many as 24 meters can be tested at one time, dependent on water service and meter pressure loss.



The same water and tank will test two, four, eight or more meters in the same time as one meter. The savings in series testing can be substantial and can provide an exponential return on the modest additional investment.



Indianapolis Test Benches can be manufactured to test up to twenty-four 5/8" or 5/8" x 3/4" meters in series.

Test Bench Overview

Ford Standard Test Bench

- Available in a single row or double row configuration
- For testing 5/8", 5/8" x 3/4", 3/4" and 1" meters
- Adapters available for testing larger meters
- Hand-wheel clamping of each meter

Ford Indianapolis Test Bench

- Available in a single row or double row configuration
- For testing 5/8", 5/8" x 3/4", 3/4" and 1" meters
- Adapters available for testing larger meters
- Hydraulic clamping of all meters

Note: The Double Row Indianapolis Test Bench is plumbed so two rows can be tested in series, or each row tested separately.

The 110 or 112 Indianapolis Test Bench can be used for efficient testing of 1" and smaller meters. The 110ITB style bench holds six 1", seven 3/4", or ten 5/8" or 5/8" x 3/4" meters. The 112ITB style bench holds eight 1", ten 3/4", or twelve 5/8" or 5/8" x 3/4" meters. All adapters are included, and the benches can be changed from one size to another in less than five minutes. Each change must be complete; these benches are not functional with a mixture of meter sizes.

Ford Akron Test Bench

- Designed for testing 1-1/4", 1-1/2" and 2" meters
- 1-1/4" meter adapters sold separately
- Optional adapters available to test smaller or larger meters
- Includes an adjustable plate for supporting and positioning meters

Options Available for Ford Test Benches

Calibrated Water Tanks
Ford offers a wide variety of water tanks for use with test benches.

Auto-Stop
Designed to automate testing operations and provide a wide range of flow tests on water meter test benches, Ford offers the Auto-Stop. Performing up to three user-adjusted flow rate tests, the Auto-Stop utilizes control panel toggles to stop and start tests as well as drain the test tank. With sensors on each tank, the test is terminated automatically once the water level reaches pre-set tank levels.

Tester Clamp
The optional Tester Clamp quickly adapts to any Ford Test Bench to allow for testing large meters at flow rates up to 36 gpm. Order catalog number TC for Standard or Indianapolis Benches and TC-A for Akron Benches.

AMSII
Automate the testing process with the next generation Automated Measuring System (AMS). This valuable innovation revolutionizes meter testing by automating manual operations. Order by adding “-AMSII” to the end of the part number. See catalog section K or contact factory for more information.

Extended Length Discharge Pipe
For positioning water tanks further from the bench, an optional 24" long discharge pipe is available. Order catalog number 9558. To order a standard
18" long discharge pipe, use catalog number 9557.

Operating Instructions for Standard Test Benches

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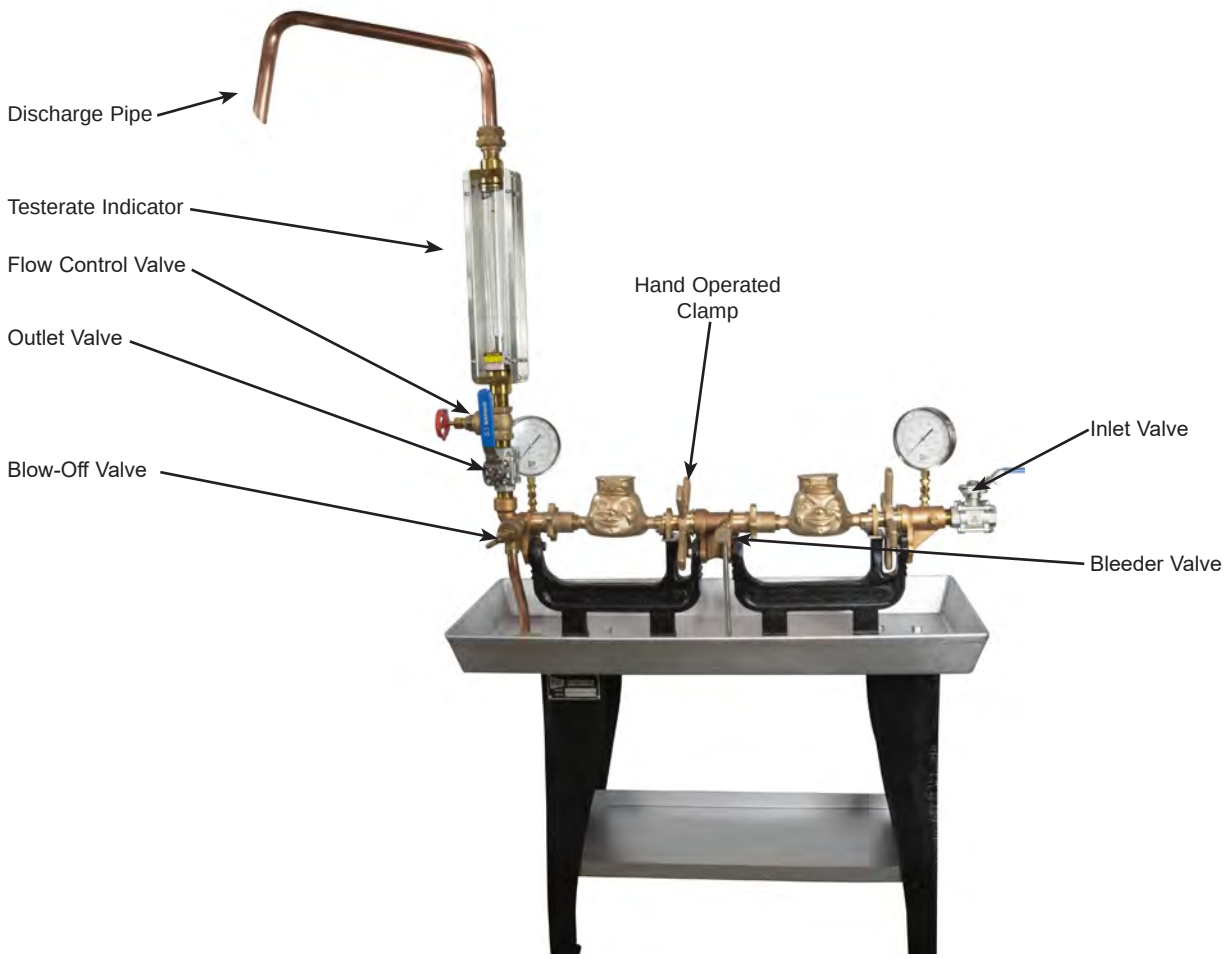
Operating Instructions for Standard Test Benches

The Ford Meter Box Company would like to congratulate you on the purchase of a Ford Standard Test Bench for testing 5/8" through 1" water meters. This guide is designed to provide an understanding of, and instructions for, Standard Test Bench operation.

Ford meter testing equipment is hand-built and calibrated in the U.S.A. It is important to adhere to the following instructions to ensure an accurate and long life for the bench. After reading the instructions, please direct all questions to The Ford Meter Box Company or an authorized Ford distributor.

Visit www.fordmeterbox.com to view the relevant catalog section, price book, submittals, and videos.

Please contact Ford Meter Box via e-mail testbench@fordmeterbox.com or phone 260-563-3171 for additional information or inquiries.



Operating Instructions for Standard Test Benches

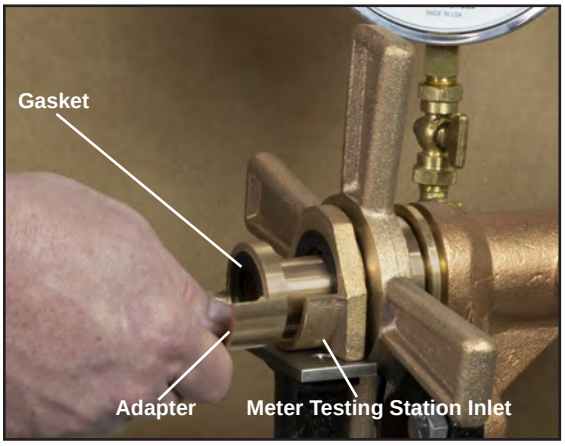


Figure 1 - Install meter adapters and gaskets

Figure 2 - Install water meter

Figure 3 - Insert idlers in empty stations

1 – Meter Installation

1.1 If testing water meters smaller than 1", install appropriately sized adapters and gaskets for the meter size you plan to test in the inlet and outlet of each meter testing station [Fig. 1]. See page 16 for gasket and adapter installation instructions.

Note: All meters must be the same size (diameter), type and displacement unit during a test sequence.

1.2 Install meters in each station, [Fig. 2] ensuring they match the flow direction of the bench. If testing fewer meters than the full capacity of the bench, insert similarly sized idlers in the remaining stations [Fig. 3].

1.3 Clamp meters in place with hand-operated handles [Fig. 2].

Operating Instructions for Standard Test Benches

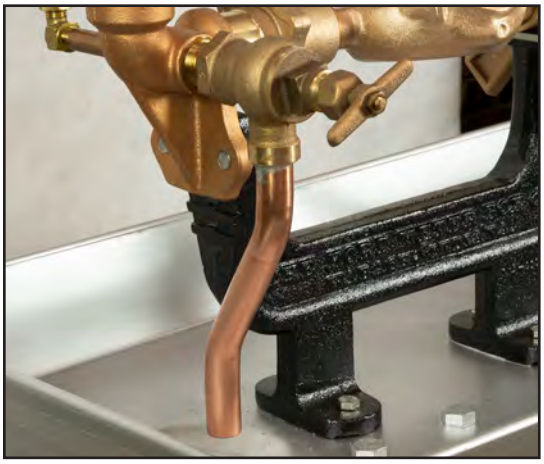


Figure 4 - Pressure Blow-Off Valve

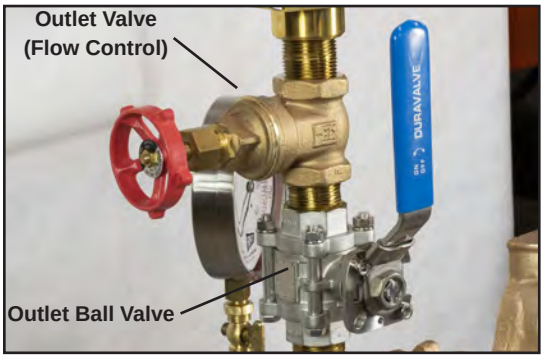


Figure 5 - Bench Outlet Valves (outlet ball valve is shown in open position)

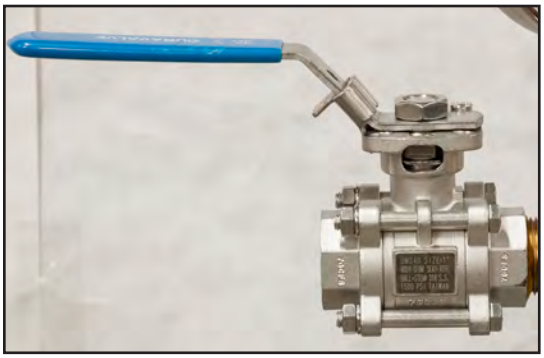


Figure 6 - Bench Inlet Ball Valve (shown in open position)

2 – Air Purge

2.1 Open pressure blow-off valve at outlet of bench [Fig. 4] by rotating tee-handle counter-clockwise.

2.2 Close bench outlet ball valve [Fig. 5] by turning handle to a position where it is perpendicular to plumbing.

2.3 Close bench outlet valve (flow control valve) [Fig. 5] by rotating handle clockwise.

2.4 Open bench inlet ball valve [Fig. 6] by turning handle to a position where it is parallel to plumbing to purge all air from meters. You should see water flowing through pressure blow-off valve.

2.5 Close pressure blow-off valve [Fig. 4] by rotating handle clockwise. You should not see water flowing.

2.6 Open bench outlet ball valve [Fig. 5] by turning handle to a position where it is parallel to plumbing. You should not see water flowing.

2.7 Slowly open bench outlet valve [Fig. 5] by rotating hand-wheel counter-clockwise to purge air from remainder of system. You should see water flowing through testerate indicator. Air has been purged when you no longer see air bubbles in this flow.

2.8 Close bench outlet ball valve [Fig. 5] by turning handle to a position where it is perpendicular to plumbing once all air has been purged.

CAUTION: The Testerate Indicator is a delicate instrument and is easily damaged by abuse or improper use. One of the common ways to damage the Testerate Indicator is to have the blow-off valve closed when the inlet valve is opened. This compresses the air in the meters. If the outlet valve is then opened abruptly, the compressed air rushes through the Testerate Indicator causing violent movement of the rotor inside the glass gauge tube. This could cause damage to the indicator. When operating the test bench, make sure the blow-off valve is open while opening the inlet valve. Do not close the blow-off valve until the system has purged itself of air. When opening the outlet valve to purge air from the rest of the system, do so slowly as some air will remain between the outlet valve and Testerate Indicator.

Operating Instructions for Standard Test Benches

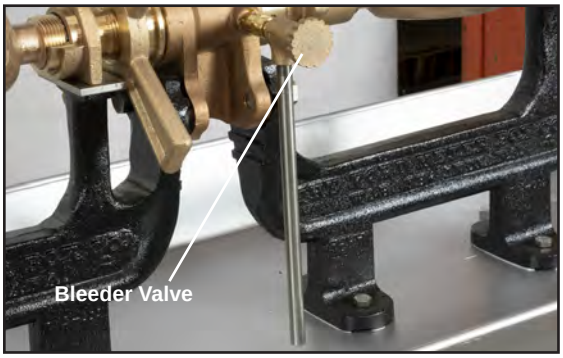


Figure 7 - Bleeder Valve

3 – Bench Preparation for Testing

3.1 Adjust each meter readout to an easily recorded value using bleeder valves [Fig. 7]. Adjust the outlet/last meter first, moving to the next (upstream) meter with each successive adjustment.

Note: Bleeder Valves allow water to flow through every meter upstream of valve. The purpose is to adjust meter readouts to easily recorded values before beginning test.

3.2 Always verify tank is empty before starting a water meter test. This will ensure accurate results.

3.3 Verify tank drain valve is closed.

Operating Instructions for Standard Test Benches

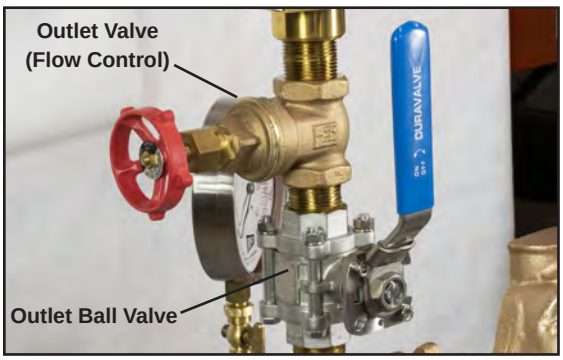


Figure 8 - Bench Outlet Valves (outlet ball valve is shown in open position)

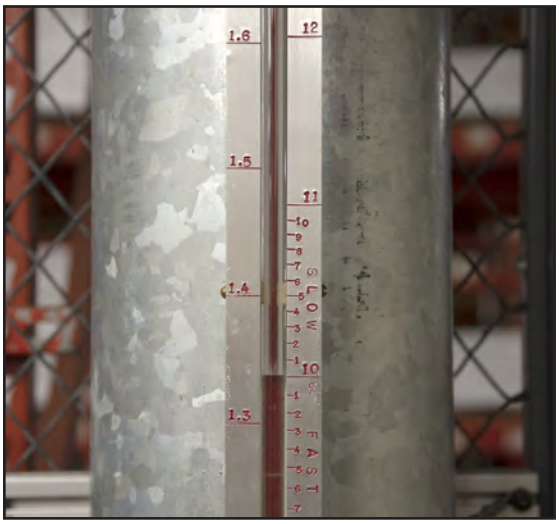


Figure 9 - Calibrated test tank sight glass and rail markings

4 – Meter Testing

4.1 Record beginning meter readings for each individual meter.

4.2 Open bench outlet ball valve [Fig. 8] by turning handle to a position where it is parallel to plumbing to begin test.

4.3 Close bench outlet ball valve [Fig. 8] by turning handle to a position where it is perpendicular to plumbing to end test when desired volume of water is observed in calibrated tank [Fig. 9].

4.4 Record ending meter readings for each individual meter.

4.5 Repeat steps 4.1-4.4 for each test.

Operating Instructions for Standard Test Benches

Figure 10 - Bench Inlet Ball Valve (shown in open position)

5 – Meter Release

5.1 Verify the test is complete, the bench outlet ball valve [Fig. 8] is closed and ending meter readings have been recorded for each individual meter.

5.2 Close bench inlet ball valve [Fig. 10] by turning handle to a position where it is perpendicular to plumbing.

5.3 Open pressure blow-off valve [Fig. 11] at outlet of bench by rotating tee-handle counter-clockwise to vent pressure.

Note: Pressure blow-off valve should remain open until water ceases to flow from it in order to minimize water spillage when unclamping and removing meters.

5.4 Unclamp meters using hand-operated handles [Fig. 12].

5.5 Return to meter installation (Section 1) and repeat as necessary.

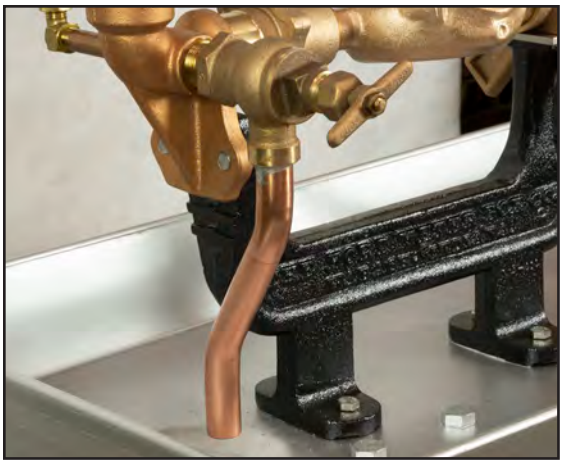


Figure 11 - Pressure Blow-Off Valve

Figure 12 - Hand-Operated Handles

Installation Instructions for Gaskets and Adapters (Standard Test Bench)

For 5/8" Meters

To set the bench to hold full 5/8" meters (7" long):

1. Remove all screw-in adapters from testing stations.
2. Remove all slide adapters from testing stations.
3. Install 5/8" slide adapters and gaskets (9581) in inlet of each meter testing station.
4. Install 5/8" screw-in adapters and gaskets (9580) in outlet of each meter testing station.
5. See note below.

For 5/8"x3/4" Meters

To set the bench to hold full 5/8"x3/4" meters (7" long):

1. Remove all screw-in adapters from testing stations.
2. Remove all slide adapters from testing stations.
3. Install 5/8"x3/4" slide adapters and gaskets (9583) in inlet of each meter testing station.
4. Install 5/8"x3/4" screw-in adapters and gaskets (9582) in outlet of each meter testing station.
5. See note below.

For 3/4" Meters

To set the bench to hold full 3/4" meters (9" long):

1. Remove all screw-in adapters from testing stations.
2. Remove all slide adapters from testing stations.
3. Install 3/4" slide adapters and gaskets (9583) in inlet of each meter testing station.
4. Install 3/4" screw-in adapters and gaskets (9584) in outlet of each meter testing station.
5. See note below.

For 1" Meters

To set the bench to hold full 1" meters (10-3/4" long):

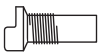
1. Remove all screw-in adapters from testing stations.
2. Remove all slide adapters from testing stations.
3. See note below.

Note: Use appropriately sized idlers in place of meters when testing less than maximum number or for set-up purposes. Use 5/8"x3/4" idlers when testing 5/8" meters.

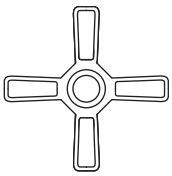
Parts for Standard Test Benches

Catalog Number	Description	Illustration Code
9552-NL	1" Inlet Ball Valve	
9553-NL	1" x 1" Outlet Ball Valve	
KTI	KTI Testerate Indicator	
9557-NL	18" Swinging Discharge Pipe (standard length)	
9558-NL	24" Swinging Discharge Pipe	
9560	Pressure Gauge only, 0-200 psi (1400 KPA)	
9561	Pressure Gauge with Nipple and Petcock	
9562-S-A	Blow-off Valve and Discharge Tube for Standard or Akron Bench	
9563-LR	Inlet Piece with Expansion Connection / left-to-right flow	
9563-RL	Inlet Piece with Expansion Connection / right-to-left flow	
9564-LR	90º Outlet Piece with sides tapped for blow-off valve and pressure gauge / left-to-right flow	
9564-RL	90º Outlet Piece with sides tapped for blow-off valve and pressure gauge / right-to-left flow	
9565-LR	Intermediate Piece with Expansion Connection and Bleeder Valve Assembly / left-to-right flow	
9565-RL	Intermediate Piece with Expansion Connection and Bleeder Valve Assembly / right-to-left flow	
9566-S	Bleeder Valve Assembly with Screw, O-ring & Drain Tube (for Standard Test Bench)	**G**
9567-NL	Bleeder Valve Screw with O-ring	**H**
9568-67-NL	Bleeder Valve Body with Screw and O-ring	**H, I**
ORING-650012-EP	O-ring for Bleeder Valve Screw	
9568-NL	Bleeder Valve Body Only (with Plastic Seat)	**I**
9569	Drain Tube Only for Bleeder Valve (for Standard and Indianapolis Test Benches)	**J**
9570	Expansion Connection Barrel Piece Only	**A**
9571	Expansion Connection Hand-wheel Only	**B**
9572	Beveled Gland Ring	**C**
GT-62	Beveled Rubber Expansion Connection Gasket (replaces beveled leather gasket)	**D**
GT-166	Rubber Gasket for 5/8" Meters	
GT-118	Rubber Gasket for 5/8" x 3/4" or 3/4" Meters (priced from Section E)	
GT-124	Rubber Gasket for 1" Meters (priced from Section H)	
9578	Tester Yoke only	
9579	Set of adapters for 5/8", 5/8" x 3/4" & 3/4" Meters (per tester unit)	
9580	5/8" Screw-in Adapter for Standard Test Bench	**E**
9581	5/8" Slide Adapter for Standard Test Bench	**F**
9582	5/8" x 3/4" Screw-in Adapter for Standard Test Bench	**E**
9583	5/8" x 3/4" and 3/4" Slide Adapter for Standard Test Bench	**F**
9584	3/4" Screw-in Adapter for Standard Test Bench	**E**
9586	Set O-ring Gaskets for KTI Standard Testerate Indicator	
9731	Nylon Seat for Bleeder Valve Assembly	

Parts Illustrations and Codes



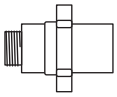
A
Barrel



B
Hand-Wheel

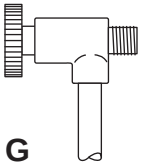
C
Gland Ring

D
Gasket

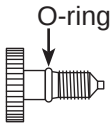


E
Screw-in Adapter

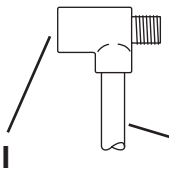
F
Slide Adapter



G
Bleeder Valve Assembly



H
Bleeder Valve Screw



I
Bleeder Valve Body Only

J
Bleeder Valve Drain Tube

Operating Instructions for Indianapolis Test Benches

CONTENTS page

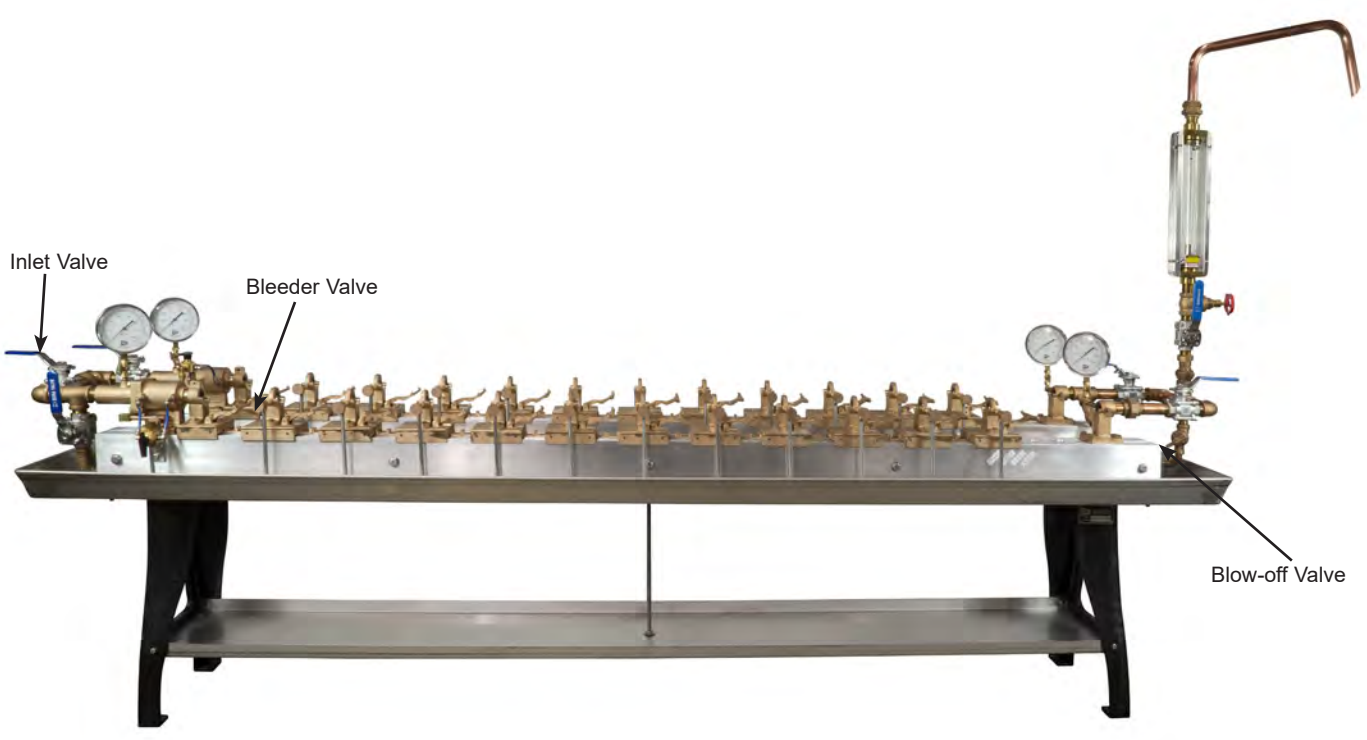
Operating Instructions for Indianapolis Test Benches

The Ford Meter Box Company would like to congratulate you on the purchase of a Ford Indianapolis Test Bench for testing 5/8" through 1" water meters. This guide is designed to provide an understanding of, and instructions for, the Indianapolis Test Bench operation.

Ford meter testing equipment is hand-built and calibrated in the U.S.A. It is important to adhere to the following instructions to ensure an accurate and long life for the bench. After reading the instructions, please direct all questions to The Ford Meter Box Company or an authorized Ford distributor.

Visit www.fordmeterbox.com to view the relevant catalog section, price book, submittals, and videos.

Please contact Ford Meter Box via e-mail at testbench@fordmeterbox.com or phone 260-563-3171 for additional information or inquiries.



Ford, Ford Meter Box and Uni-Flange are trademarks of The Ford Meter Box Company, Inc. registered in the U.S.

Operating Instructions for Indianapolis Test Benches

Figure 1 - Install meter adapters and gaskets

Figure 2 - Install water meter

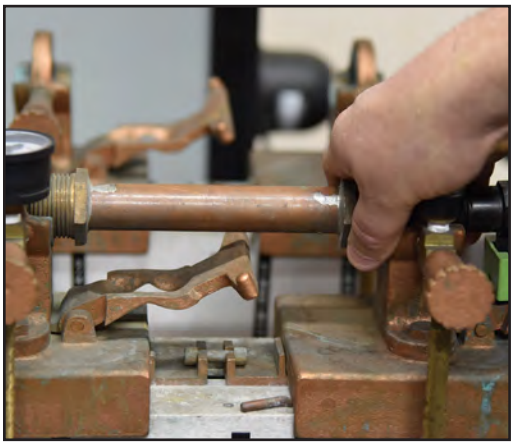


Figure 3 - Insert idlers in empty stations

1 – Meter Installation

1.1 If testing water meters smaller than 1", install adapters and gaskets for the meter size you plan to test in the inlet and outlet of each testing unit [Fig. 1]. See page 25 for size specific gasket and adapter installation instructions.

Note: All meters must be the same size (diameter), type and displacement unit during a test sequence.

1.2 Set meters in each meter testing station, [Fig. 2] ensuring they match the flow direction of the bench. If testing fewer meters than the full capacity of the bench, insert similarly sized idlers in the remaining stations [Fig. 3]. Exception: If testing 5/8" meters, use 5/8"x3/4" idlers to fill bench capacity.

1.3 Clamp meters in place using the four-way valve that operates the hydraulic clamping cylinder [Fig 4].

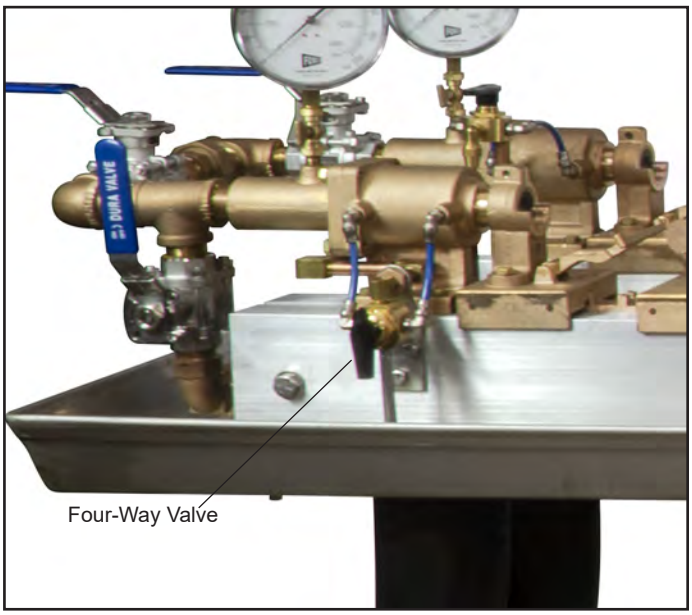


Figure 4 - Four-Way Valve

Operating Instructions for Indianapolis Test Benches

Figure 5 - Pressure Blow-Off Valve

Figure 6a - Testerate Indicator Valve Assembly (outlet ball valve is shown in the open position)

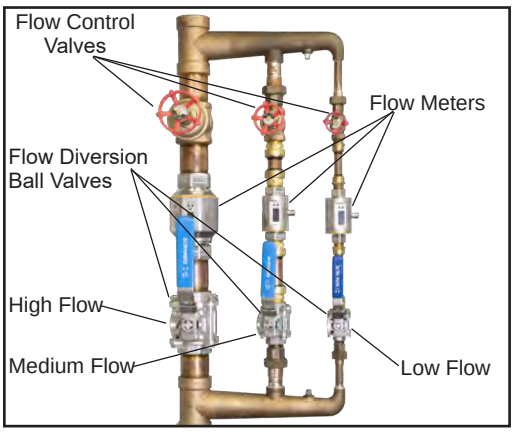


Figure 6b - IDIO Outlet Assembly (flow diversion ball valves are shown in the open positions)

2 – Air Purge

2.1 Open pressure blow-off valve at outlet of bench [Fig. 5] by rotating tee-handle counterclockwise.

2.2a Testerate Indicator Outlet – Close bench outlet ball valve [Fig. 6a] by turning handle to a position where it is perpendicular to plumbing.

2.2b IDIO Outlet – Close flow diversion ball valves [Fig. 6b] by turning handles to a position where they are perpendicular to plumbing.

2.3a Testerate Indicator Outlet – Close bench outlet valve (flow control valve) [Fig. 6a] by rotating hand-wheel clockwise.

2.3b IDIO Outlet – Close flow control valves [Fig. 6b] by rotating hand-wheels clockwise.

2.4 Open bench inlet ball valve [Fig. 7] by turning handle to a position where it is parallel to plumbing to purge all air from meters. You should see water flowing through pressure blow-off valve.

2.5 Close pressure blow-off valve [Fig. 5] by rotating tee-handle clockwise. You should not see water flowing.

2.6a Testerate Indicator Outlet – Open bench outlet ball valve [Fig. 6a] by turning handle to a position where it is parallel to plumbing. You should not see water flowing.

2.6b IDIO Outlet – Open high flow diversion ball valve [Fig. 6b] by turning handle to a position where it is parallel to plumbing. You should not see water flowing.

CAUTION: The Testerate Indicator is a delicate instrument and is easily damaged by abuse or improper use. One of the common ways to damage the Testerate Indicator is to have the blow-off valve closed when the inlet valve is opened. This compresses the air in the meters. If the outlet valve is then opened abruptly, the compressed air rushes through the Testerate Indicator causing violent movement of the rotor inside the glass gauge tube. This could cause damage to the indicator. When operating the test bench, make sure the blow-off valve is open while opening the inlet valve. Do not close the blow-off valve until the system has purged itself of air. When opening the outlet valve to purge air from the rest of the system, do so slowly as some air will remain between the outlet valve and Testerate Indicator.

Operating Instructions for Indianapolis Test Benches

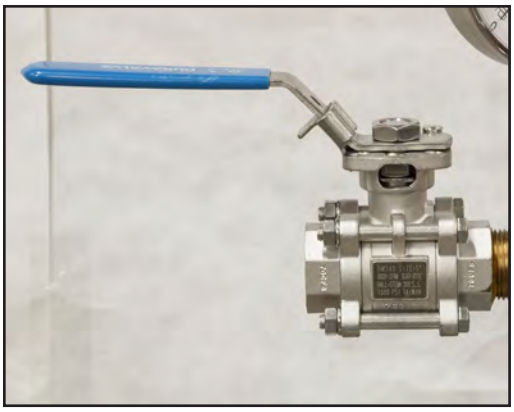


Figure 7 - Bench Inlet Ball Valve (shown in open position)

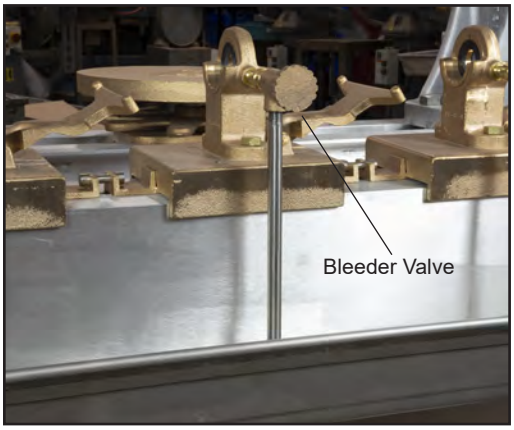


Figure 8 - Bleeder Valve

2 – Air Purge

2.7a Testerate Indicator Outlet – Slowly open bench outlet valve [Fig. 6a] by rotating hand-wheel counter-clockwise to purge air from remainder of system. You should see water flowing through testerate indicator. Air has been purged when you no longer see air bubbles in this flow.

2.7b IDIO Outlet – Slowly open high flow control valve [Fig. 6b] by rotating hand-wheel counter-clockwise to purge air from remainder of system. You should see water flowing from discharge pipe.

2.8a Testerate Indicator Outlet – Close bench outlet ball valve [Fig. 6a] by turning handle to a position where it is perpendicular to plumbing once all air has been purged.

2.8b IDIO Outlet – Close high flow diversion ball valve [Fig. 6b] by turning handle to a position where it is perpendicular to plumbing once all air has been purged.

2.9b IDIO Outlet – Repeat steps 2.6b-2.8b for medium and low flows.

3 – Bench Preparation for Testing

3.1 Adjust each meter readout to an easily recorded value using bleeder valves [Fig. 8]. Adjust the outlet/last meter first, moving to the next (upstream) meter with each successive adjustment.

Note: Bleeder valves allow water to flow through every meter upstream of valve. The purpose is to adjust meter readouts to easily recorded values before beginning test.

3.2 Drain calibrated tank if necessary.

3.3 Verify tank drain valve is closed.

Operating Instructions for Indianapolis Test Benches

Figure 9a - Testerate Indicator Valve Assembly (outlet ball valve is shown in the open position)

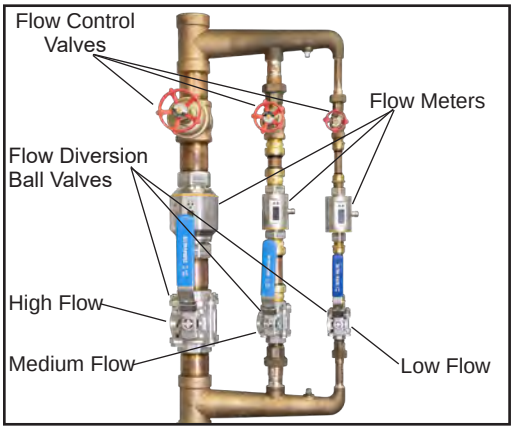


Figure 9b - IDIO Outlet Assembly (flow diversion ball valves are shown in the open positions)

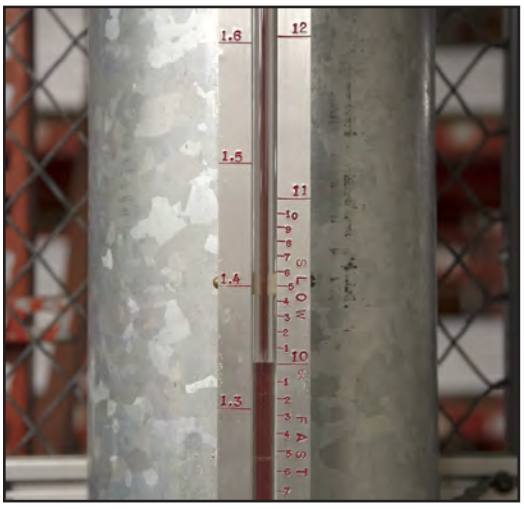


Figure 10 - Calibrated test tank sight glass and rail markings

4 – Meter Testing

4.1 Record beginning meter readings for each individual meter.

4.2a Testerate Indicator Outlet – Open bench outlet ball valve [Fig. 9a] by turning handle to a position where it is parallel to plumbing to begin test.

4.2b IDIO Outlet – To start the high flow test, open the high flow diversion ball valve [Fig. 9b] by rotating handle to a position where it is parallel with plumbing.

4.3a Testerate Indicator Outlet – Close bench outlet ball valve [Fig. 9a] by turning handle to a position where it is perpendicular to plumbing to end test when desired volume of water is observed in calibrated tank [Fig. 10].

4.3b IDIO Outlet – Stop the test by closing high flow diversion ball valve [Fig. 9] when desired volume of water is observed in calibrated tank by rotating handle to a position where it is perpendicular to plumbing.

4.4 Record ending meter readings for each individual meter.

4.5a Testerate Indicator Outlet – Repeat steps 4.1a-4.4a for each test.

4.5b IDIO Outlet – Repeat steps 4.1b-4.4b for medium flow and low flow tests.

Operating Instructions for Indianapolis Test Benches

Figure 11 - Bench Inlet Ball Valve (shown in open position)

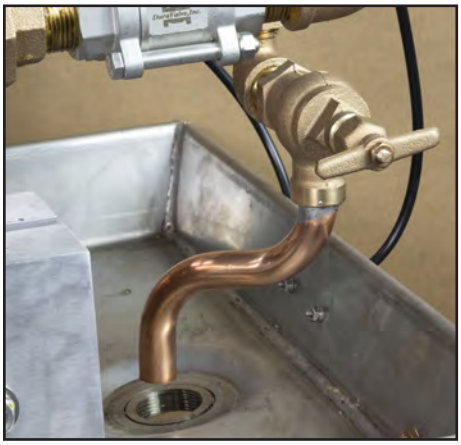


Figure 12 - Pressure Blow-Off Valve

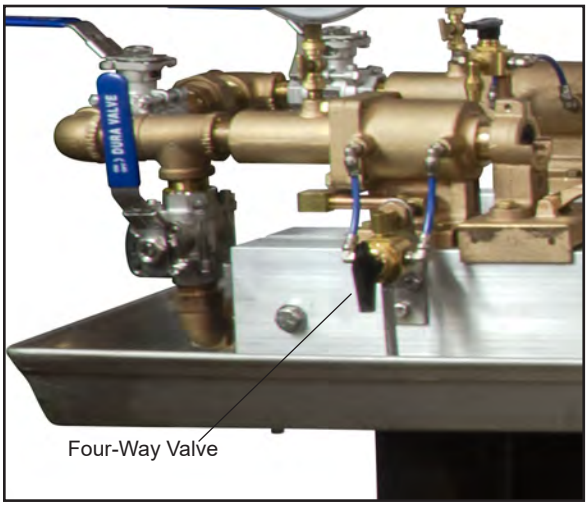


Figure 13 - Four-Way Valve

5 – Meter Release

5.1 Verify test is complete, bench outlet ball valve [Fig. 9] is closed and meter readings have been recorded for each individual meter.

5.2 Close bench inlet ball valve [Fig. 11] by turning handle to a position where it is perpendicular to plumbing.

5.3 Open pressure blow-off valve [Fig. 12] at outlet of bench by rotating tee-handle counter-clockwise to vent pressure.

Note: Pressure blow-off valve should remain open until water ceases to flow from it in order to minimize water spillage when unclamping and removing meters.

5.4 Unclamp meters using four-way valve [Fig. 13].

5.5 Return to meter installation (Section 1) and repeat as necessary.

Installation Instructions for Gaskets and Adapters (Indianapolis Test Bench)

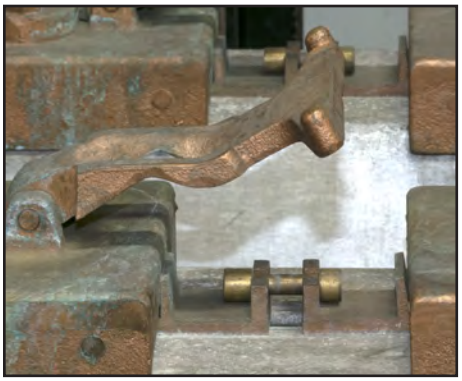


Figure 14 - Links between Dolly Boxes

Figure 15 - Dolly Box Removal Hole

For 5/8" Meters

To set the bench to hold full 5/8" meters (7-1/2" long):

1. Check that the appropriately sized adapters are firmly in place in the dolly saddles.
2. Check that all gaskets are in place.
3. Place appropriately sized adapter in the saddle at the outlet end of the bench.
4. Use the short links between all dolly boxes.
5. Place the L-shaped holdback pin into the hole marked 5/8" or 5/8" x 3/4" on the top of the channel track near the outlet end.
6. Place meters in position.
7. See note below.

For 5/8" x 3/4" Meters

To set the bench to hold full 5/8" x 3/4" meters (7-1/2" long):

1. Remove the 5/8" adapters (using a pick or a punch in the hole) and insert the 3/4" ring saddles and gaskets.
2. Place the holdback pin into the hole that is marked 5/8" or 5/8" x 3/4".
3. Use the short links between all dolly boxes [Fig. 14].
4. Check that all gaskets are in place.
5. Place meters in position.
6. See note below.

For 3/4" Meters

To set the bench to hold full 3/4" meters (9" long):

1. Remove holdback pin from the hole in the top of the channel track. Next, remove all connecting links from between the dolly boxes. (Note that the short links are used with 5/8" or 5/8" x 3/4" meters, medium links with the 3/4" meters, and the long links with 1" meters.)
2. Slide two dolly boxes toward the outlet end of the channel track and lift them off. Dolly boxes will lift off channel track when their drain pipe is aligned with the words “Removal Hole” [Fig. 15] marked on the channel track.
3. Place medium length links between the dolly boxes remaining on the channel track [Fig. 14].
4. Replace holdback pin in the hole marked 3/4".
5. Put the 3/4" adapters and gaskets in position to hold 3/4" meters properly.
6. Place meters in position.
7. See note below.

Note: Use idlers in place of meters when testing less than the maximum number or for set-up purposes. Use 5/8" x 3/4" idlers when testing 5/8" meters.

Installation Instructions for Gaskets and Adapters (Indianapolis Test Bench) (continued)

Figure 15 - Dolly Box Removal Hole

For 1" Meters

To set the bench to hold full 1" meters (10-3/4" long):

1. Remove the holdback pin from the hole in the top of the channel track. Remove all the connecting links from between the dolly boxes.
2. Remove a total of three dolly boxes by sliding them toward the outlet end of the channel track and lifting them off. Dolly boxes will lift off channel track when their drain pipe is aligned with the words “Removal Hole” marked on the channel track [Fig. 15].
3. Place the longest links between the dolly boxes [Fig. 14].
4. Replace the holdback pin in the hole marked 1".
5. Remove all the adapters and place 1" gaskets in position.
6. Use the special idler pipe in the last open unit at the outlet of the test bench.
7. Place meters in position.
8. See note below.

Note: Use idlers in place of meters when testing less than the maximum number or for set-up purposes. Use 5/8" x 3/4" idlers when testing 5/8" meters.

Parts for Indianapolis Test Benches

The following parts are the same as on Standard Benches: 1" Inlet and Outlet Valves, Testerate Indicator and parts, Swinging Discharge Pipe, Pressure Gauge, Bleeder Valve Bodies, Blow-off Valve, Rubber Gaskets, Pans and Legs.

Catalog Number	Description
9562-I-NL	Blow-Off Valve and Discharge Tube for Indianapolis Bench
9566-I	Bleeder Valve Assembly with Screw, O-ring & Drain Tube (for Indianapolis Test Bench)
ORING-650012-EP	O-ring for Bleeder Valve Screw
9569	Drain Tube only for Bleeder Valve (for Standard and Indianapolis Test Benches)
9588	Short Dolly Assembly
9592-1-LR	Indpls. Clamping Cylinder, less four-way valve and piping, for 5/8" Bench, left-to-right flow
9592-1-RL	Indpls. Clamping Cylinder, less four-way valve and piping, for 5/8" Bench, right-to-left flow
9592-2-LR	Indpls. Clamping Cylinder, less four-way valve and piping for 5/8" x 3/4" and 3/4" Bench, left-to-right flow
9592-2-RL	Indpls. Clamping Cylinder, less four-way valve and piping for 5/8" x 3/4" and 3/4" Bench, right-to-left flow
9592-4-LR	Indpls. Clamping Cylinder, less four-way valve and piping for 1" Bench, left-to-right flow
9592-4-RL	Indpls. Clamping Cylinder, less four-way valve and piping for 1" Bench, right-to-left flow
9710	Set of O-rings for Indianapolis Clamping Cylinder
9593	Four-Way Control Valve with Handle for Hydraulic Cylinder, less piping
9594-I	Four-Way Control Valve with Handle for Hydraulic Cylinder with piping for Indianapolis Bench
9726-NL	5/8" Split Ring Adapter for outlet end
9711-NL	5/8" Split Ring Adapter for 1" Indpls.
9712-NL	5/8" x 3/4" & 3/4" Split Ring Adapter for 1" Indpls.
9721-NL	5/8" C-715 Meter Adapter
9722-NL	3/4" C-715 Meter Adapter

Operating Instructions for Akron Test Benches

CONTENTS page

Operating Instructions for Akron Test Benches

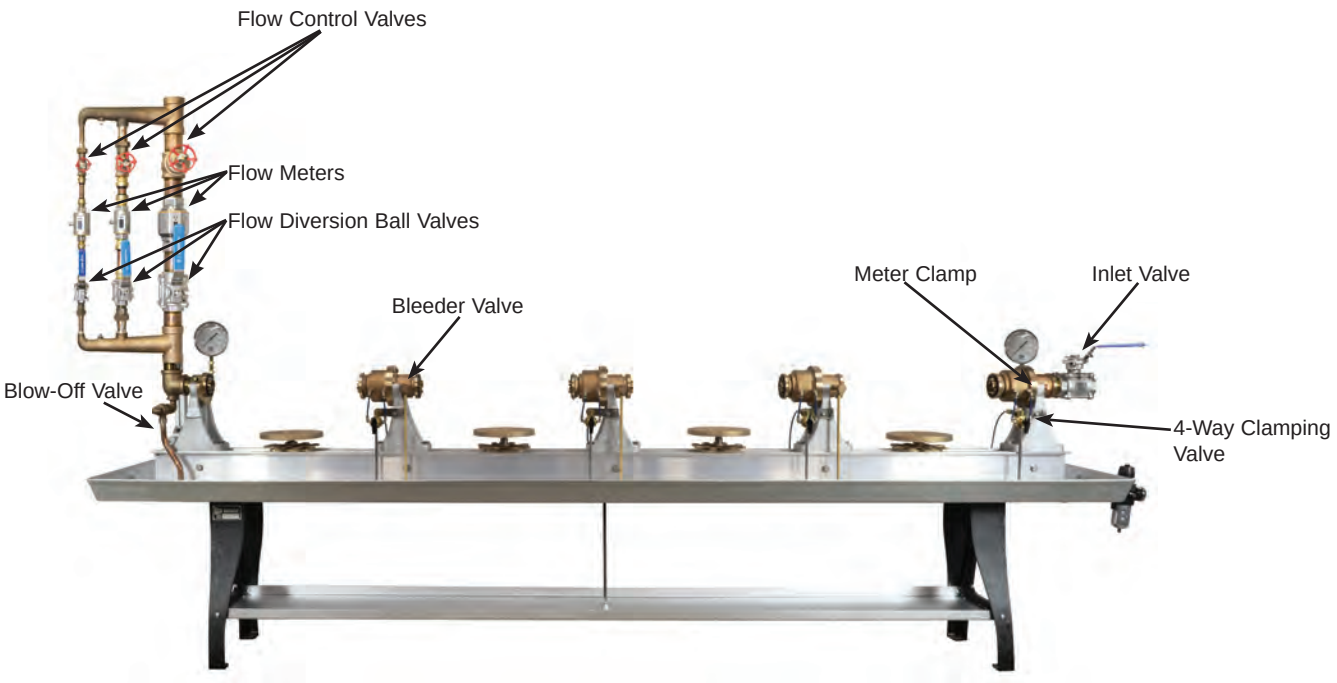
The Ford Meter Box Company would like to congratulate you on the purchase of a Ford Akron Test Bench for testing 1-1/4" through 2" water meters. This guide is designed to provide an understanding of, and instructions for, Akron Test Bench operation.

Ford meter testing equipment is hand-built and calibrated in the U.S.A. It is important to adhere to the following instructions to ensure an accurate and long life for the bench. After reading the instructions, please direct all questions to The Ford Meter Box Company or an authorized Ford distributor.

Visit www.fordmeterbox.com to view the relevant catalog section, price book, submittals, and videos.

Please contact Ford Meter Box via e-mail testbench@fordmeterbox.com or phone 260-563-3171 for additional information or inquiries.

Note: 1-1/4" meter adapters sold separately.



Operating Instructions for Akron Test Benches

Figure 1 - Install meter adapters and gaskets

1 – Meter Installation

1.1 If testing water meters smaller than 2", install properly sized adapters and gaskets for the meter size to be tested in the inlet and outlet of each meter testing station [Fig. 1]. See page 34 for adapter configurations for Akron Test Benches.

Note: All meters must be the same size (diameter), type and displacement unit during a test sequence.

1.2 Install meters in each meter testing station, [Fig. 2] ensuring they match the flow direction of the bench. If testing fewer meters than the full capacity of the bench, insert idler adapters (part number HT-30-NL) [Fig. 3] into each end of the empty stations before installing idlers [Fig. 4] in the remaining stations.

1.3 Clamp each meter/idler in place using the four-way clamping valves [Fig. 3] that operate each of the hydraulic clamping cylinders.

1.4 Double-check to ensure all meters/idlers and adapters are in proper position and securely clamped in place.

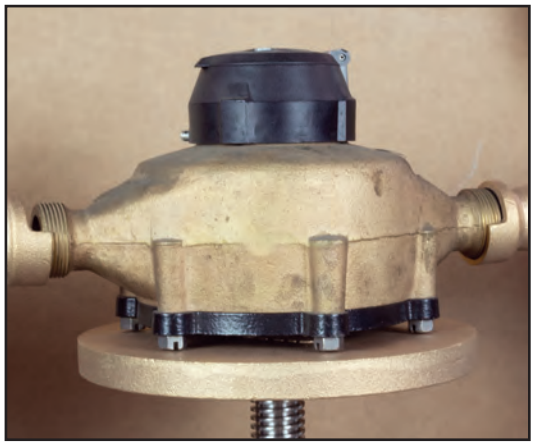


Figure 2 - Install water meter

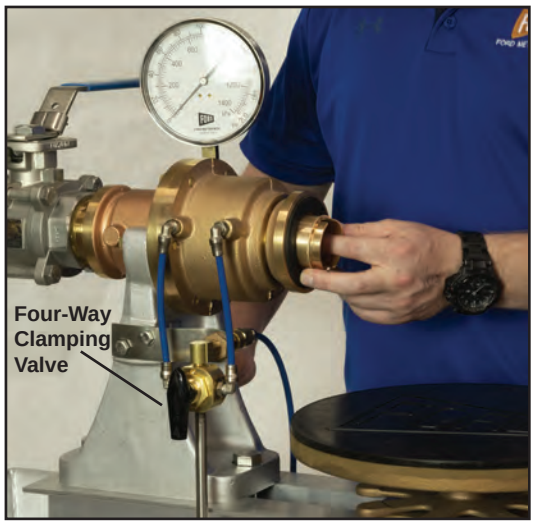


Figure 3 - Insert idler adapters into each end of empty stations

Figure 4 - Insert idlers in empty stations

Operating Instructions for Akron Test Benches

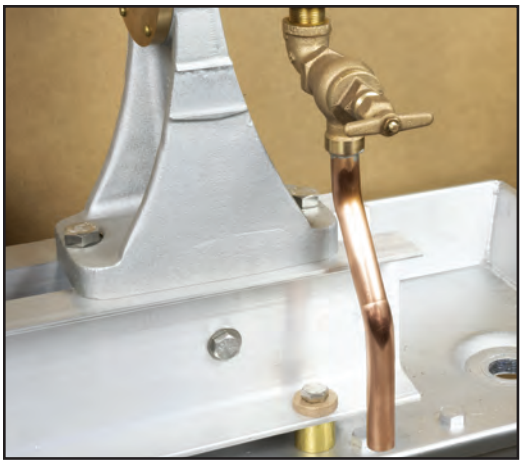


Figure 5 - Pressure Blow-Off Valve

2 – Air Purge

2.1 Close pressure blow-off valve at outlet of bench [Fig. 5] by rotating tee-handle clockwise.

2.2 Close flow diversion ball valves [Fig. 6] by rotating handles to a position where they are perpendicular to plumbing.

2.3 Close flow control valves [Fig. 6] by rotating handles clockwise.

2.4 Open bench inlet ball valve [Fig. 7] by rotating handle to a position where it is parallel with plumbing. You should not see water flowing.

2.5 Open high flow diversion ball valve [Fig. 6] by rotating handle to a position where it is parallel with plumbing. You should not see water flowing.

2.6 Open high flow control valve [Fig. 6] by rotating hand-wheel counter-clockwise until desired flow rate is displayed on the high flow meter. You should see water flowing from discharge pipe.

2.7 Once air has been purged, close high flow diversion ball valve [Fig. 6] by rotating handle to a position where it is perpendicular to plumbing.

2.8 Repeat steps 2.5-2.7 for medium and low flows.

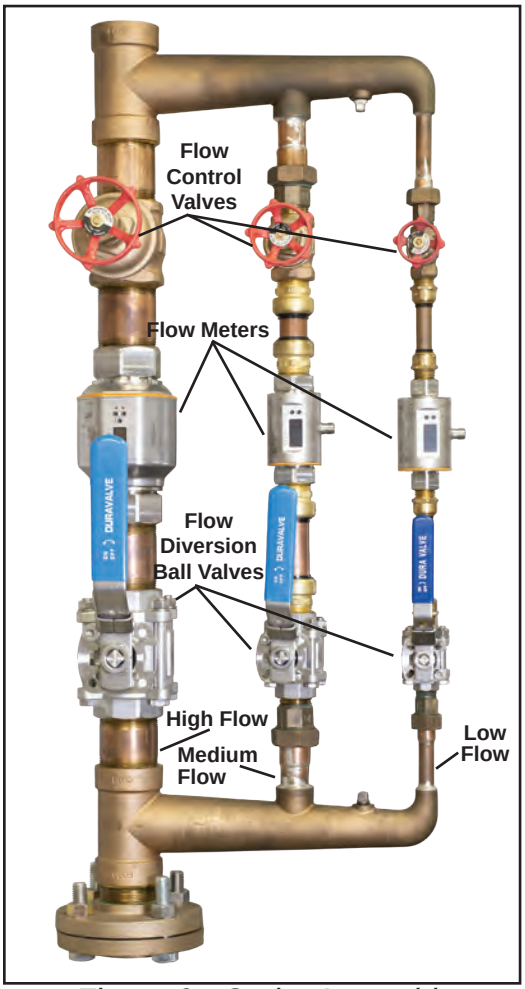


Figure 6 - Outlet Assembly (Flow diversion ball valves are shown in the open positions)

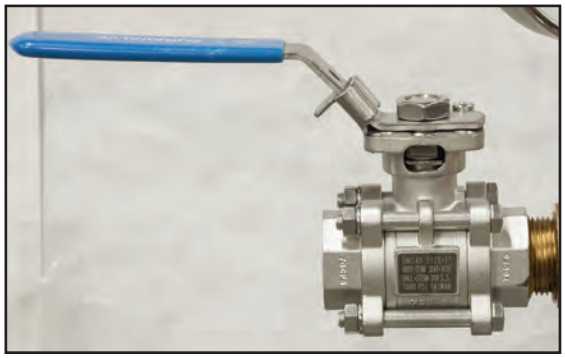


Figure 7 - Bench Inlet Ball Valve (shown in the open position)

Operating Instructions for Akron Test Benches

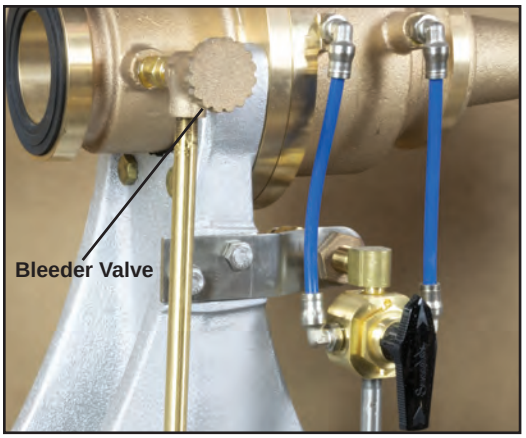


Figure 8 - Bleeder Valve

3 – Bench Preparation for Testing

3.1 Adjust each meter readout to an easily recorded value using bleeder valves [Fig. 8]. Adjust the outlet/last meter first, moving to the next (upstream) meter with each successive adjustment.

Note: Bleeder valves allow water to flow through every meter upstream of valve. The purpose is to adjust meter readouts to easily recorded values before beginning test.

3.2 Drain calibrated tank if necessary.

3.3 Verify tank drain valve is closed.

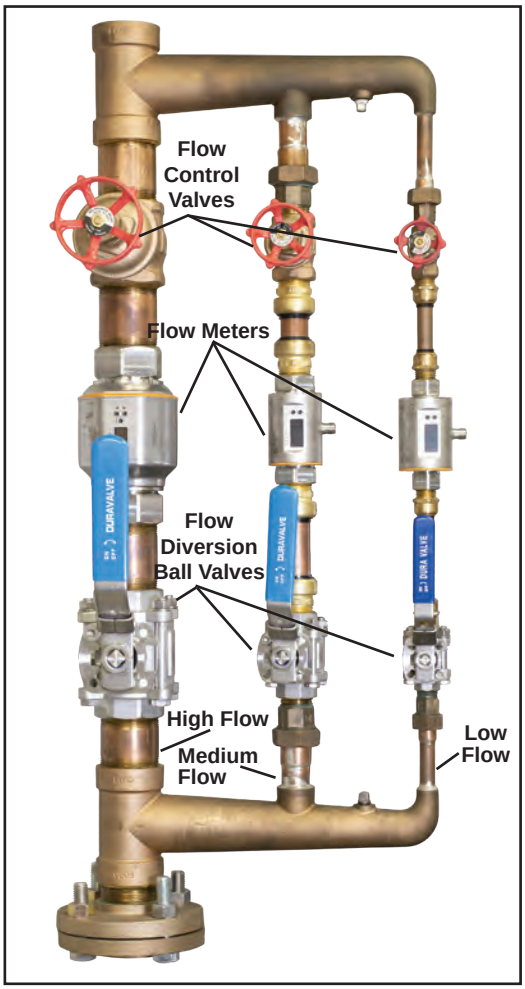


Figure 9 - Flow Diversion Ball Valves

4 – Meter Testing

4.1 Record beginning meter readings for each individual meter.

4.2 To start the high flow test, open the high flow diversion ball valve [Fig. 9] by rotating handle to a position where it is parallel with plumbing.

4.3 Stop the test by closing high flow diversion ball valve [Fig. 9] when desired volume of water is observed in calibrated tank by rotating handle to a position where it is perpendicular to plumbing.

4.4 Record ending meter readings for each individual meter.

4.5 Repeat steps 4.1-4.4 for medium flow and low flow tests.

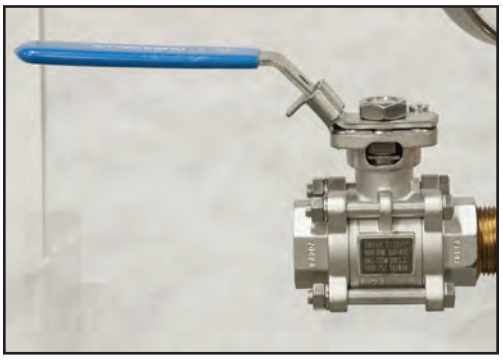


Figure 10 - Bench Inlet Ball Valve (shown in open position)

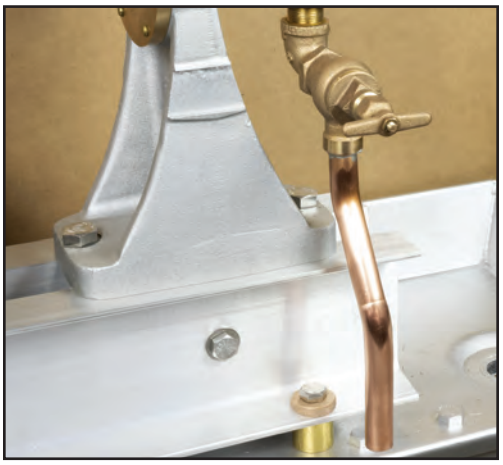


Figure 11 - Pressure Blow-Off Valve

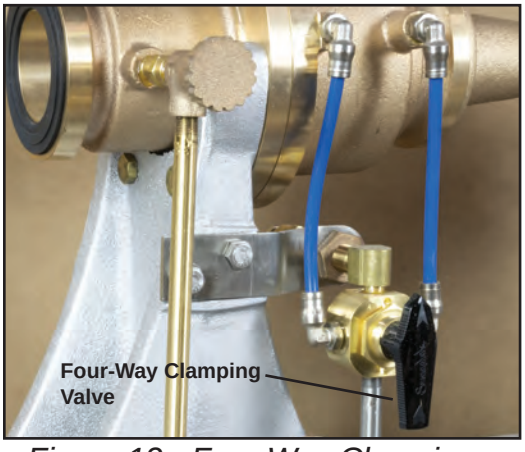


Figure 12 - Four-Way Clamping Valve

5 – Meter Release

5.1 Verify test is complete, flow diversion ball valves [Fig. 9] are closed and ending meter readings have been recorded for each individual meter.

5.2 Close bench inlet ball valve [Fig. 10] by turning handle to a position where it is perpendicular to plumbing.

5.3 Open pressure blow-off valve [Fig. 11] at outlet of bench by rotating tee-handle counter-clockwise to vent pressure.

Note: Pressure blow-off valve should remain open until water ceases to flow from it in order to minimize water spillage when unclamping and removing meters.

5.4 Unclamp meters using four-way clamping valves [Fig. 12].

5.5 Return to meter installation (Section 1) and repeat as necessary.

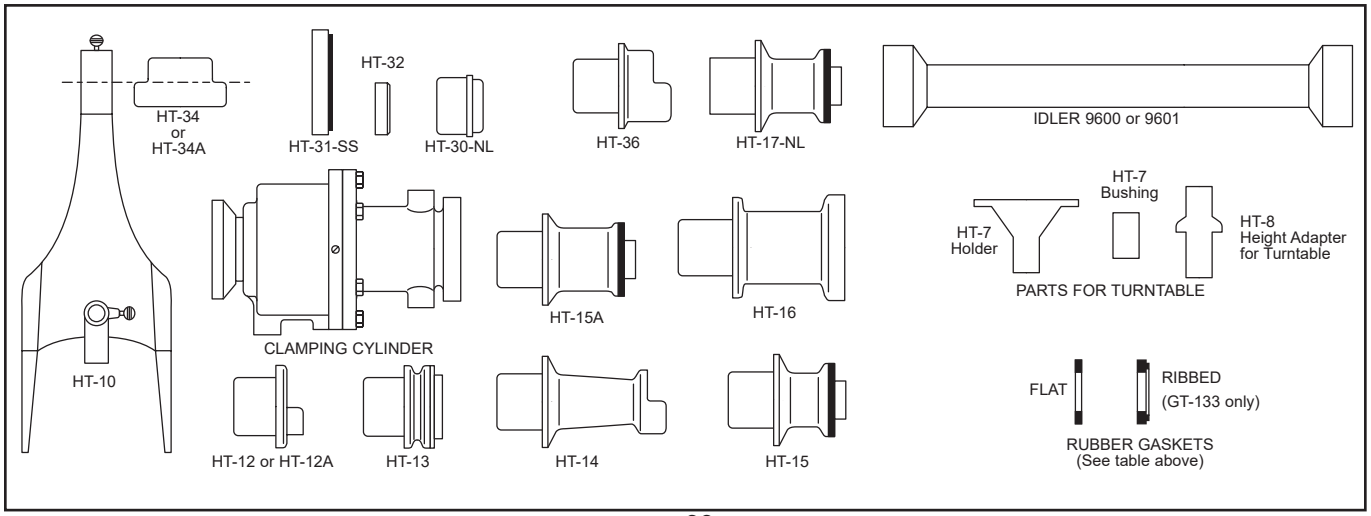
Meter Adapters for Akron Test Benches

Catalog Number	Description	Approx. Wt. Lbs.
HT-30-NL	Centering Adapter for 2" flanged meter	0.3
HT-13	Adapter for 2" tapped meter	1.3
HT-15	Adapter for 1-1/2" flanged meter*	1.3
HT-32	Centering Adapter for 1-1/2" tapped meter - used on nose of HT-15	0.1
HT-17-NL	Adapter for 1-1/4" flanged meter*	1.6
HT-15A	Adapter for 1-1/4" tapped meter*	1.8
HT-36	Adapter for 1-1/4" or 1x1-1/4" meter with male threads	1.3
HT-14	Adapter for 1" meter*	1.8
HT-10	Slide Saddle Holder. Used for 5/8" & 5/8" x 3/4" meters to test two in each unit. Holder rests on aluminum channels	6.3
HT-34	Slide Saddle for 5/8" meters. Fits into HT-10*	1.3
HT-34A	Slide Saddle for 5/8" x 3/4" and 3/4" meters. Fits into HT-10*	1.2
HT-12	Adapter for 5/8" meters*	0.4
HT-12A	Adapter for 5/8" x 3/4" and 3/4" meters*	1.3
9726-NL	Adapter for 5/8" meters. Fits into HT-12A and HT-34A*	0.1
HT-16	Adds 3-3/4" extra length. Used if piston travel is insufficient for clamping*	3.2
HT-16-10	Adapter for 2" flange meter used opposite of HT-16*	2.7
HT-31-SS	Adds 1/2" extra length. Used if piston travel is insufficient for clamping*	0.8

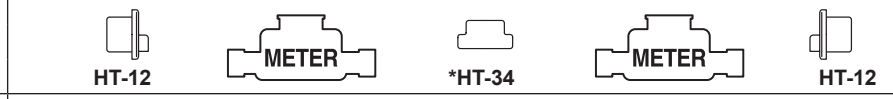
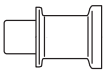
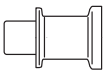
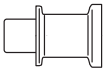
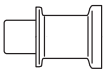
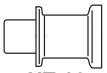
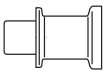
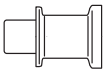
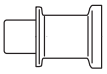
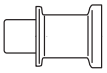
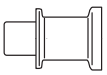
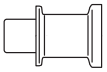
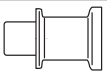
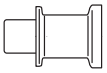
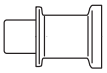
*Gaskets included for meter end(s) of adapters, spacers and slide saddles.

Gaskets for Akron Meter Adapters

Catalog Number	Description	Dimensions
GT-133	Rubber Gasket for HT-16 & for clamping cylinder	2-1/8" x 3-1/4" x 3/8"
GT-134	Rubber Gasket for HT-13	2-3/16" x 2-7/8" x 1/4"
GT-139	Rubber Gasket for HT-17-NL	1-7/32" x 2-1/8" x 5/16"
GT-129	Rubber Gasket for HT-15 and HT-15A	1-15/32" x 2-3/8" x 5/16"
GT-124	Rubber Gasket for HT-14	1-1/16" x 1-21/32" x 1/8"
GT-118	Rubber Gasket for HT-12A and HT-34A	13/16" x 1-11/32" x 1/8"
GT-166	Rubber Gasket for HT-12 and HT-34	11/16" x 1-7/64" x 1/8"
GT-132	Rubber Gasket for HT-31-SS	2" x 3-1/4" x 1/8"
GT-128	Rubber Gasket for HT-36	1-1/4" x 1-29/32" x 1/8"



Adapter Configurations for Akron Test Benches

Meter		For “S” Style, 17"	Add HT-16 For “L” Style, 21"
Size	Length		
5/8"	7-1/2"		
5/8" x 3/4"	7-1/2"		
**3/4"	9"		N/A
***3/4"	9"		
1"	10-3/4"		
1"x1-1/4"	10-3/4"		
1-1/4" male	11-1/2"		
1-1/4" tapped	11-1/4"		
1-1/4" flange	12"		
1-1/2" male	12-5/16"		
1-1/2" tapped	12-5/8"		
1-1/2" flange	13"		
2" flange (turbine)	10"		
2" tapped	15-1/4"		
2" flange	17"		

* HT-34 and HT-34A require HT-10. See page 33.

** For “S” Style Akron Test Benches only.

*** For “L” Style Akron Test Benches only.

NOTE: The Akron Test Bench is made in “S” Style for 17" meters and “L” Style for 21" meters.

Parts for Akron Test Benches

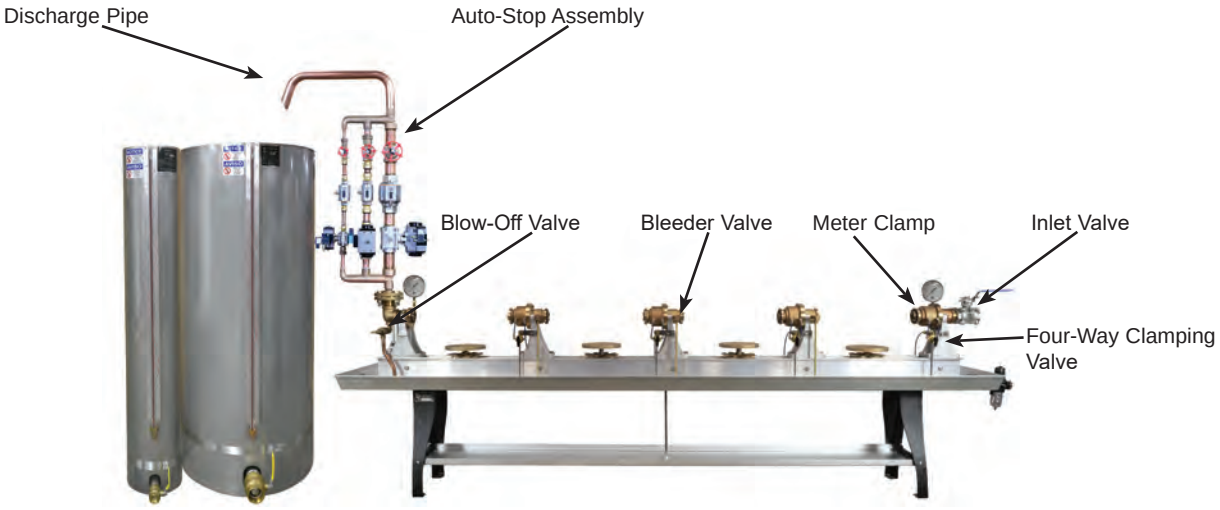
9562-S-A-NL	Blow-Off Valve and Discharge Tube for Standard or Akron Bench
9566-A	Bleeder Valve Assembly with Screw, O-ring and Drain Tube for Akron Bench
ORING-650012-EP	O-ring for Bleeder Valve Screw
9569-A	Drain Tube Only for Akron Bench Bleeder Valve
9555	Box Stick Lubricant for 2" Nordstrom® Valve (20 pcs.)
TB-NV-7-DV	2" Inlet Valve or Outlet Flow Control Valve
9598-LR	Inlet Clamping Cylinder, less pressure gauge, four-way control valve and piping, for left-to-right flow
9598-RL	Inlet Clamping Cylinder, less pressure gauge, four-way control valve and piping, for right-to-left flow
9599-LR	Intermediate Clamping Cylinder, less bleeder valve, four-way control valve and piping, for left-to-right flow
9599-RL	Intermediate Clamping Cylinder, less bleeder valve, four-way control valve and piping, for right-to-left flow
9600-NL	2" Idler (for 'S' Akron Test Benches)
9601-NL	2" Idler (for 'L' Akron Test Benches)
9602	Set O-rings for Akron Clamping Cylinder
9595-NL	2" Swivel Union only for Discharge Pipe
SDP-7	2" Swing Discharge Pipe 24" reach (complete with swivel union)
9593	Four-way Control Valve for Hydraulic Cylinder, less piping
9594-A	Four-way Control Valve for Hydraulic Cylinder with piping for Akron Bench
TB-ADIO-LR	Digital Indicator Outlet for Akron Test Benches with Left to Right Flow
TB-ADIO-RL	Digital Indicator Outlet for Akron Test Benches with Right to Left Flow
9620-NL	2" Ball Valve for Legacy Double Range Testerate Indicator (KTIDR obsoleted by TB-ADIO-xx)
TC-A	Tester Clamp for Akron Bench (approx. wt. lbs. - 135.0)

Operating Instructions for Test Benches with Auto-Stop

Ford meter testing equipment is hand-built and calibrated in the U.S.A. It is important to adhere to the following instructions to ensure an accurate and long life for the bench. After reading the instructions, please direct all questions to The Ford Meter Box Company or an authorized Ford distributor.

Visit www.fordmeterbox.com to view the relevant catalog section, price book, submittals, and videos.

Please contact Ford Meter Box via email testbench@fordmeterbox.com or phone 260-563-3171 for additional information or inquiries.



Akron Test Bench with Auto-Stop

CONTENTS page

Operating Instructions for Test Benches with Auto-Stop

Figure 1 - Control Box

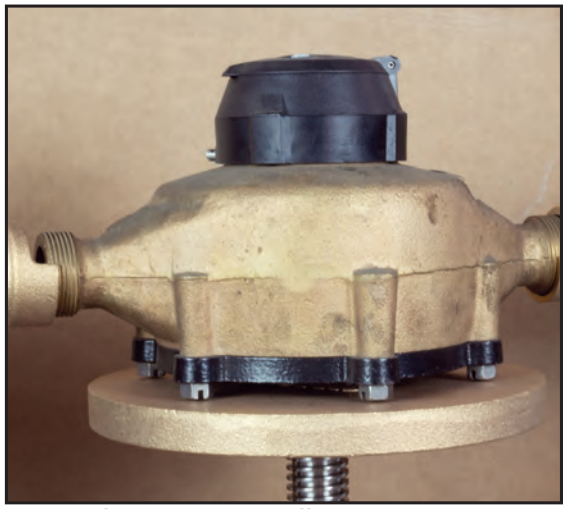


Figure 2 - Install water meter


Figure 3 - Insert idlers in empty stations

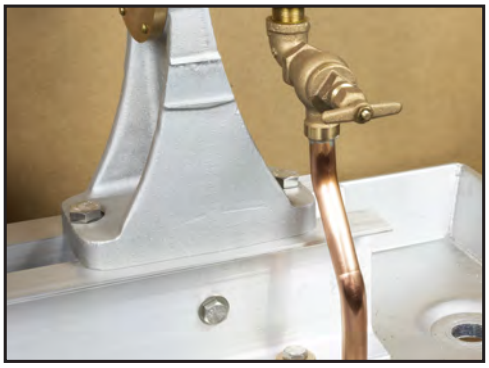


Figure 4 - Pressure Blow-Off Valve

1 – Startup

1.1 Rotate the On-Off switch located on the Control Box [Fig. 1] clockwise to the “ON” position.

2 – Meter Installation

2.1 Insert gaskets and adapters for the size and type of meter to be tested in each station. (See page 16 for Standard bench, page 25 for Indianapolis bench or page 34 for Akron bench.)

Note: All meters must be the same size (diameter) type and displacement unit during a test sequence.

2.2 Install meters in each meter testing station [Fig. 2], ensuring they match the flow direction of the bench and properly sized adapters are used. See pages 11 and 16 for Standard bench, pages 20 and 25 for Indianapolis bench or pages 29 and 34 for Akron bench. If testing fewer meters than the full capacity of the bench, insert similarly sized idlers in the remaining stations [Fig. 3].

Exception: If testing 5/8" meters, use 5/8"x3/4" idlers to fill bench capacity.

2.3 Using the instructions for the bench type being used (see page 11 for Standard bench, page 20 for Indianapolis bench or page 29 for Akron bench), activate the meter clamping mechanisms and ensure all meters/idlers are set in proper position and securely clamped in place.

2.4 Double-check to ensure all meters/idlers are set in proper position and securely clamped in place. Close all bleeder valves and the pressure blow-off valve [Fig. 4] by rotating handles in the clockwise direction.

Operating Instructions for Test Benches with Auto-Stop

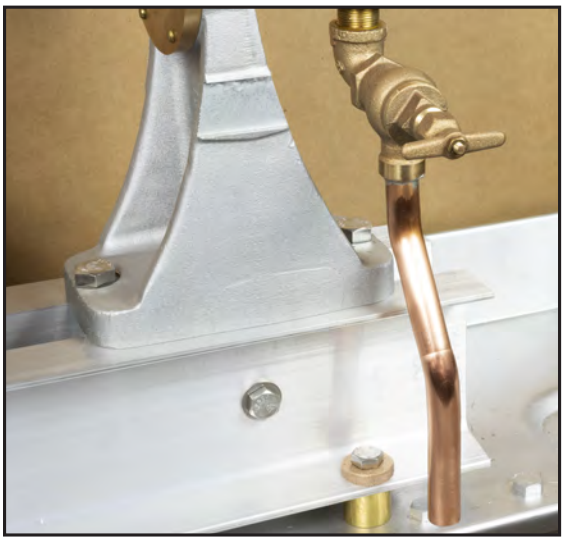


Figure 5 - Pressure Blow-Off Valve

3 – Flow Rate Adjustment

Note: If valves and sensors are already configured for desired flow rates and test volumes, proceed to Step 5 on page 46.

3.1 Position discharge pipe outlet above the high flow (larger) test tank.

3.2 Close pressure blow-off valve [Fig. 5] by rotating tee-handle clockwise.

3.3 Close flow control valves [Fig. 6] by rotating hand-wheels clockwise.

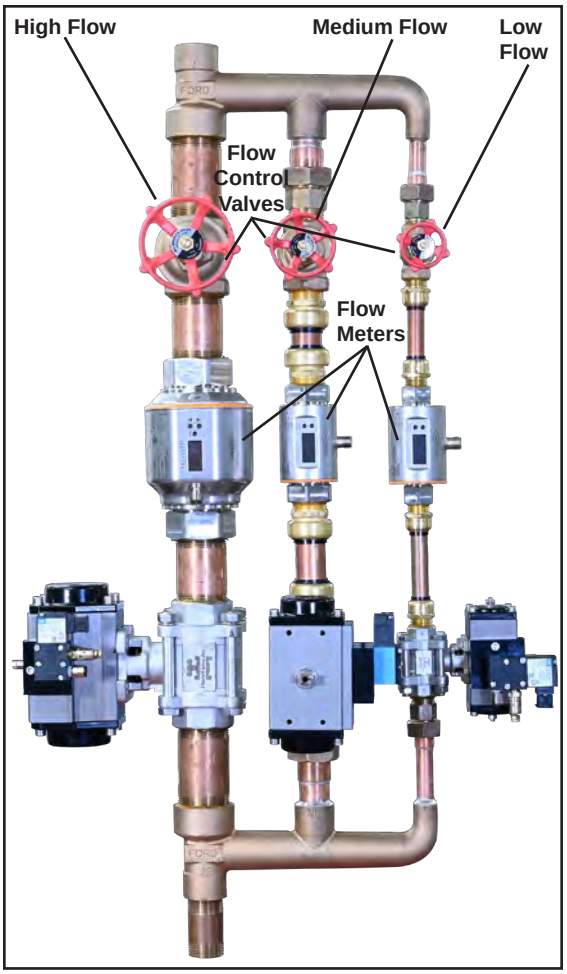


Figure 6 - Auto-Stop Assembly

Operating Instructions for Test Benches with Auto-Stop

Figure 7 - Control Panel

Figure 8 - Bench Inlet Ball Valve (shown in the open position)

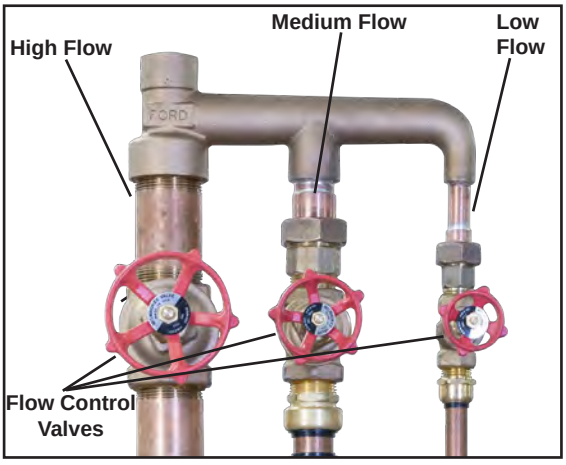


Figure 9 - Flow Control Valves

3 – Flow Rate Adjustment (continued)

3.4 Open high flow diversion valve by rotating flow control selection switch to “HIGH” position [Fig. 7].

3.5 Slowly open bench inlet ball valve [Fig. 8] by turning handle to a position where it is parallel to plumbing.

3.6 Press “PURGE” button [Fig. 7].

3.7 Slowly open high flow control valve [Fig. 9] by rotating hand-wheel counter-clockwise until desired flow rate is displayed on the high flow meter.

3.8 After allowing water to flow for one minute to purge entrapped air, close outlet valve by pressing the “PURGE” button [Fig. 7].

3.9 If not equipped with powered drain valve, manually drain tank.

3.10 Rotate flow control selections with to desired flow rate and repeat steps 3.6-3.9 for medium and low flow rates.

Operating Instructions for Test Benches with Auto-Stop

Figure 10 - Control Panel

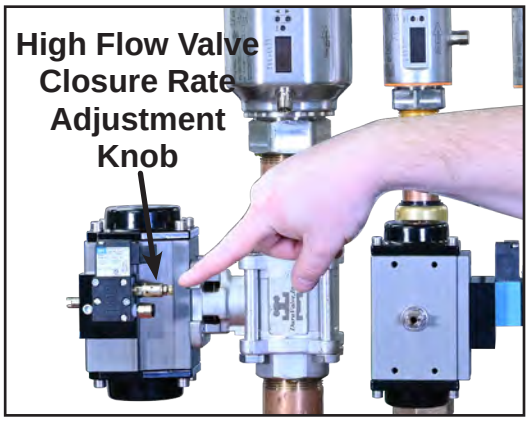


Figure 11 - High Flow Valve Closure Rate Adjustment

Figure 12 - Example: water over-run = 3/4"

4 – Auto-Stop Sensor & Valve Closure Rate Adjustments

(High Flow)

4.1 Position discharge pipe outlet above the high flow tank.

4.2 Rotate flow control selection switch to “HIGH” position.

4.3 Rotate sensor selection switch [Fig. 10] to “SENSE 2”.

4.4 Adjust valve closure rate on high flow valve to slowly and smoothly close the valve to prevent water hammer.

Loosen the high flow valve closure rate adjustment screw lock nut. Rotate the high flow valve closure rate adjustment screw [Fig. 11] clockwise to decrease valve closure speed. If the high flow valve closure rate adjustment screw is over-rotated in the clockwise direction, the valve will fail to open/close. If this occurs, rotate the high flow valve closure rate adjustment screw counter-clockwise to increase valve closure speed.

4.5 Press “START” button and allow tank to fill at the normal test rate to the desired water level.

4.6 Once water reaches desired level, immediately press “STOP” button.

4.7 Measure water over-run [Fig. 12].

Operating Instructions for Test Benches with Auto-Stop

Figure 13 - Example: offset over-run = 3/4"

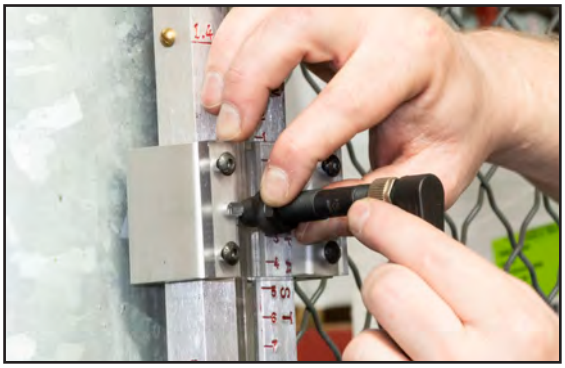


Figure 14 - Gently secure sensor in place.

4 – Auto-Stop Sensor & Valve Closure Rate Adjustments (continued)

4.8 Drain the tank until the water level is at the desired water level minus the over-run measured previously [Fig. 13].

Note: If the valve closure rate is altered, a new over-run setting will need to be established.

4.9 Slide “SENSE 2” (high flow sensor) down the sight glass until the yellow light on the sensor is activated.

4.10 Secure “SENSE 2” in place by evenly tightening (clockwise) the screws on the bracket [Fig. 14]. Do not over-tighten. Over-tightening the bracket screws may damage the sight glass.

4.11 Open drain and allow tank water level to drop well below the sensor.

4.12 Press the “START” button and check for proper operation of “SENSE 2” when the water level engages the sensor.

If water volume is not reaching desired level, perform a minute adjustment by rotating high flow valve closure rate adjustment screw clockwise to decrease valve closure speed. If the high flow valve closure rate adjustment screw is over-rotated in the clockwise direction, the valve will not open/close. If this occurs, rotate the high flow valve closure rate adjustment screw counterclockwise, reposition the “SENSE 2” proximity sensor higher on the tank and return to step 4.8.

If water volume is exceeding desired level, perform a minute adjustment by rotating the valve closure rate adjustment screw counterclockwise to increase valve closure speed. If correct level cannot be set by adjusting the valve closure rate adjustment screw, adjust sensor and return to step 4.8.

Operating Instructions for Test Benches with Auto-Stop

4 – Auto-Stop Sensor & Valve Closure Rate Adjustments (continued)

4.13 When valve closure rate is set to desired speed, tighten the high flow valve closure rate adjustment screw lock nut.

(Medium Flow)

4.14 Position discharge pipe outlet over the medium/low flow tank.

4.15 Rotate flow control selection switch to “MED”.

4.16 Rotate sensor selection switch [Fig. 10] to “SENSE 1”.

4.17 Repeat steps 4.2-4.13 to adjust the valve closure rate on the medium flow valve to close the valve as fast as possible while still preventing water hammer.

Discharge pipe outlet will remain positioned over the medium/low flow tank during this process.

Flow control selector switch will remain on “MED” during this process.

Sensor selector switch will remain on “SENSE 1” during this process.

(Low Flow)

4.18 Verify discharge pipe outlet is positioned over the medium/low flow tank.

Operating Instructions for Test Benches with Auto-Stop

4 – Auto-Stop Sensor & Valve Closure Rate Adjustments (continued)

4.19 Rotate flow control selection switch to “LOW”.

4.20 Verify sensor selection switch is in “SENSE 1” position.

4.21 Repeat steps 4.2-4.13 to adjust the valve closure rate on the low flow valve so that water stops at the same point as the previously adjusted medium flow valve.

Discharge pipe outlet will remain positioned over the medium/low flow tank during this process.

Flow control selector switch will remain on “LOW” during this process.

Sensor selector switch will remain on “SENSE 1” during this process.

(Adjustment Verification)

4.22 Position discharge pipe outlet over the high flow tank.

4.23 Rotate flow control selection switch to “HIGH”.

4.24 Rotate sensor selection switch [Fig. 10] to “SENSE 2”.

Operating Instructions for Test Benches with Auto-Stop

4 – Auto-Stop Sensor & Valve Closure Rate Adjustments (continued)

4.25 Press the “START” button to check for proper operation of “SENSE 2” when the water level engages the sensor.

4.26 Position discharge pipe outlet over the medium/low flow tank.

4.27 Rotate flow control selection switch to “MED”.

4.28 Rotate sensor selection switch [Fig. 10] to “SENSE 1”.

4.29 Press the “START” button to check for proper operation of “SENSE 1” when the water level engages the sensor.

4.30 Open drain and allow tank water level to drop well below the sensor.

4.31 Verify discharge pipe outlet is positioned over the medium/low flow tank.

4.32 Rotate flow control selection switch to “LOW”.

4.33 Verify sensor selection switch is in “SENSE 1” position.

4.34 Press the “START” button to check for proper operation of “SENSE 1” when the water level engages the sensor.

4 – Auto-Stop Sensor & Valve Closure Rate Adjustments (continued)

4.35 If additional fine-tuning adjustments are needed, refer to high flow valve closure rate adjustment (Section 4.1), medium flow valve closure rate adjustment (Section 4.14) or low flow valve closure rate adjustment (Section 4.18) and repeat as necessary until desired results are obtained.

4.36 Completely drain tank(s).

Auto-Stop setup is now complete. You are now ready to begin testing water meters.

Operating Instructions for Test Benches with Auto-Stop

Figure 15 - Bench Inlet Ball Valve (shown in the open position)

Figure 16 - Control Panel

5 – Air Purge

Note: Skip Step 5 and proceed to Step 6 if you completed Steps 3 and 4.

5.1 Position discharge pipe outlet above the high flow (larger) tank.

5.2 Open the bench inlet ball valve [Fig. 15] by turning handle to a position where it is parallel to plumbing.

5.3 Open the high flow valve by rotating flow control selection switch to the “HIGH” position [Fig. 16].

5.4 Press the “PURGE” [Fig. 16] button to begin water flow allowing any entrapped air to escape the system. After several seconds, the water flowing from the discharge pipe should start to clear as the entrapped air is purged from the system. When the water flows clear, close the outlet valve by pressing the “PURGE” button [Fig. 16].

5.5 Manually drain tank if not equipped with powered drain valve.

5.6 Repeat Steps 5.3-5.5 for the medium and low flow valves.

You are now ready to begin testing meters.

Operating Instructions for Test Benches with Auto-Stop

Figure 17 - Control Panel

6 – Meter Testing

6.1 Record water meter reading(s) before beginning test. This will ensure an accurate comparative result once tests are completed.

Note: Always ensure discharge pipe outlet is positioned above tank that correlates with desired test flow rate before beginning.

6.2 Rotate the flow control selection switch to the desired flow rate to be tested.

6.3 Rotate the sensor selection switch the sensor associated with the selected flow rate. (“SENSE 1” = “MED” and “LOW”, “SENSE 2” = “HIGH”)

Note: Make sure all flow rates and Auto-Stop closure rate adjustments are properly set (see Flow Rate Adjustment - Section 3 and Auto-Stop closure rate adjustments - Section 4).

6.4 Press the “START” [Fig. 17] button.

6.5 A test can be stopped at any point by pressing the “STOP” button [Fig. 17].

6.6 Record ending readings on the water meters. Comparing the ending meter readings to the pretest reading with the amount of water in the tank will provide the test results.

6.7 Press the “RESET” button to drain the tank and prepare the bench for the next test.

Operating Instructions for Test Benches with Auto-Stop

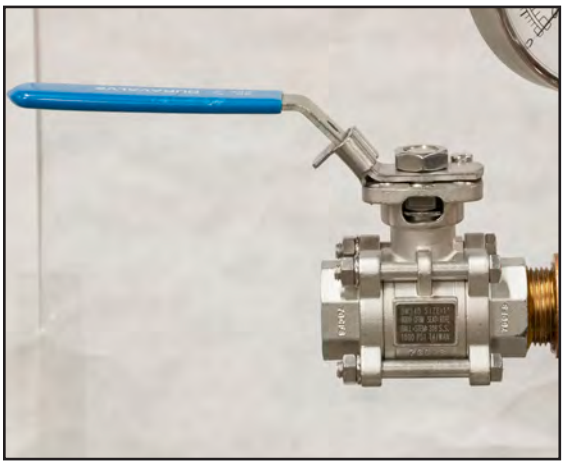


Figure 18 - Bench Inlet Ball Valve

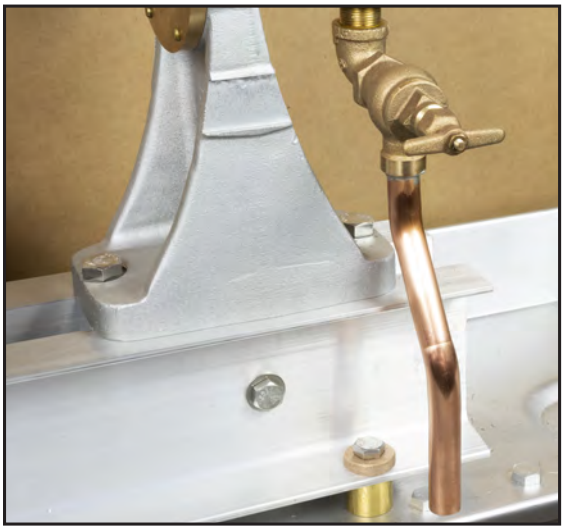


Figure 19 - Pressure Blow-Off Valve

7 – Meter Release

7.1 Close bench inlet valve [Fig. 18] by turning the handle perpendicular to the plumbing.

7.2 Open pressure blow-off valve [Fig. 19] (turn tee-handle counter-clockwise) at outlet of bench to vent pressure.

Note: Blow-off valve should remain open until water ceases to flow from it in order to minimize water spillage when unclamping and removing meters.

7.3 Unclamp and remove meters

7.4 Return to Meter Installation (Section 2, page 37) and repeat as necessary for all additional tests.

Note: When all tests are completed for day, close customer supplied air supply valve and turn control panel off by rotating knob counter-clockwise.

Operating Instructions for AMSII Test Benches

Ford meter testing equipment is hand-built and calibrated in the U.S.A. It is important to adhere to the following instructions to ensure an accurate and long life for the bench. After reading the instructions, please direct all questions to The Ford Meter Box Company or an authorized Ford distributor.

Visit www.fordmeterbox.com to view the relevant catalog section, price book, submittals, and videos.

Please contact Ford Meter Box via e-mail testbench@fordmeterbox.com or phone 260-563-3171 for additional information or inquiries.

CONTENTS page

Operating Instructions for AMSII Test Benches

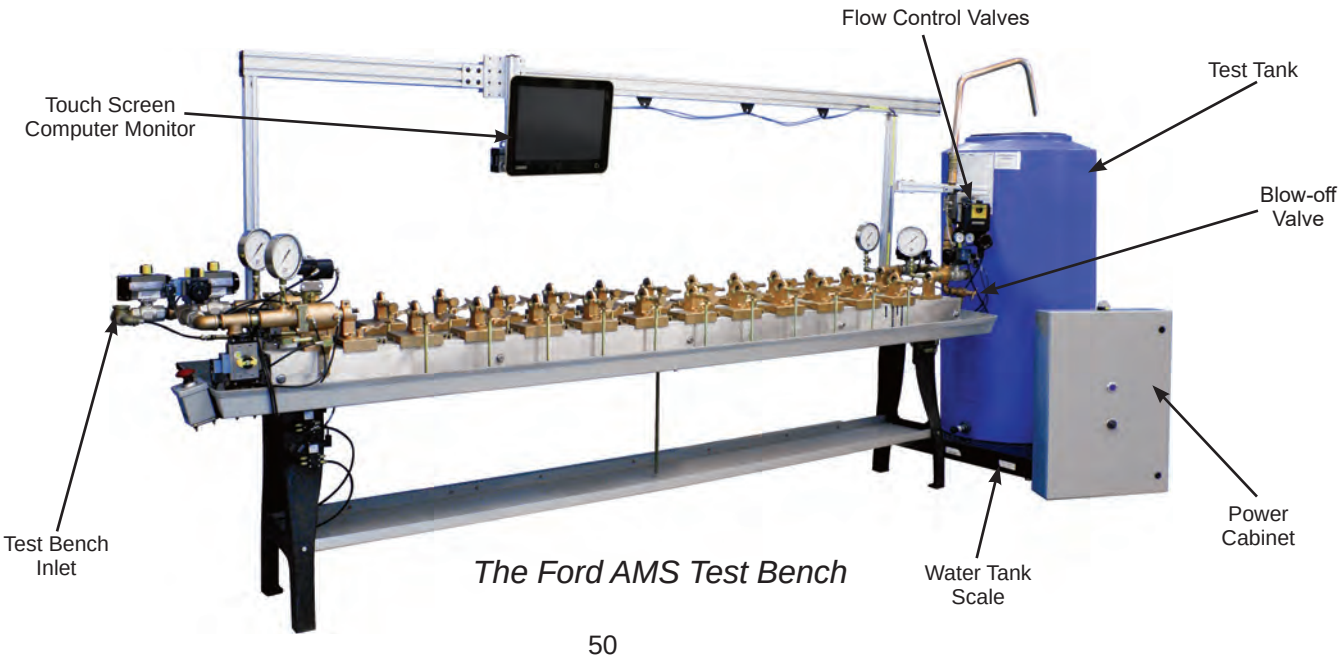
The Ford Meter Box Company would like to congratulate you on the purchase of a Ford Automated Measuring System (AMS) Test Bench. Being on the cutting edge of meter-testing technology is a priority for Ford. Another priority of ours is producing the best quality products on the market. With the AMS, you will have the best of both worlds. Some benefits of the AMS include:

- Accurate test results
- Waterproof touch-screen PC provides easy interface and step-by-step instructions
- Ability to run pre-programmed or customized tests
- Completing each initiated flow rate test without constant supervision
- Testing at high, medium and low flows
- Ability to easily interface meter test data with your computer network
- Security device with a secure internet connection to Ford Meter Box
- Single or double row test bench available
- Optional remote operation (not supplied by Ford)

The AMS combines the trusted method of weighing metered water with computer automation to ensure accurate measurements. Weighing metered water eliminates possible problems that can occur with the use of optical, mechanical or volume measuring devices. The AMS computer compensates for the weight of the tank as well as water temperature. Calculating these factors ensures the Ford AMS test bench is the most accurate water meter test system on the market today.

This guide is designed to provide an understanding of the AMS test bench operation.

Ford meter testing equipment is hand-built and calibrated in the U.S.A. It is important to adhere to the following instructions to ensure an accurate and long life for the AMS. After reading the instructions, please direct all questions to The Ford Meter Box Company or an authorized Ford distributor.



The Ford AMS Test Bench

Operating Instructions for AMSII Test Benches

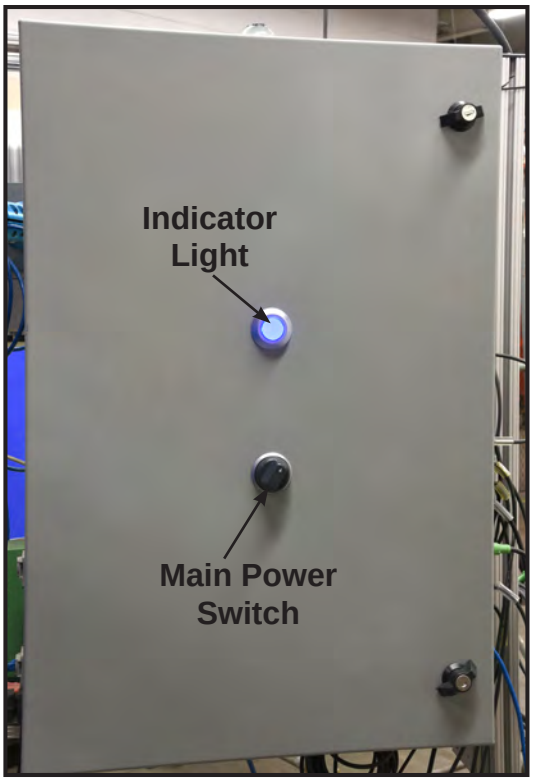


Figure 1 - Front of main power cabinet

Figure 2 - Red status light on top of the power cabinet

1 – Startup

1.1 Turn main power switch clockwise to begin startup.

Blue power indicator light [Fig. 1] will illuminate when main power is on.

Red status light on the top of the power cabinet [Fig. 2] will also illuminate during daily startup.

1.2 If computer does not power on automatically, turn computer on by depressing power button on rear of touch screen monitor (if equipped) or press the reset button on front of the panel (if equipped).

The main AMS home screen [Fig.3] will appear on touchscreen computer monitor when bench is ready for log in.

1.3 If scale is not powered on, or other issues with the scale exist, the Tank Weight pop-up screen [Fig. 4] will appear on the home page. If tank weight pop-up window can not be reset by pressing “Back” button after scale is powered on, please contact customer service.

1.4 Open customer supplied air supply valve to regulator and verify 80-90 psi pressure.

1.5 Open customer supplied water supply valve to cylinders.

1.6 If test bench is recirculating model, turn on recirculating pump.

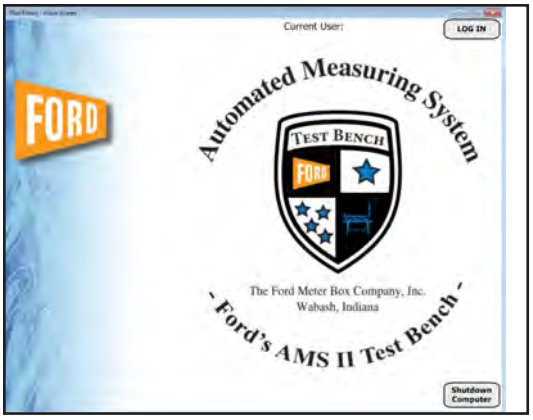


Figure 3 - Main AMS Home Screen

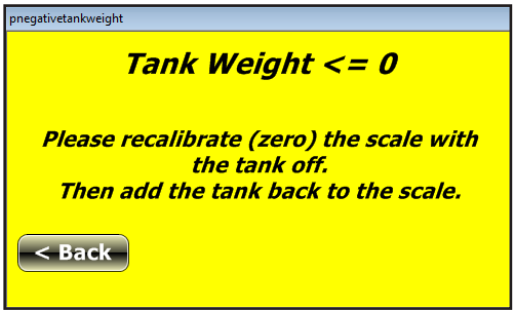


Figure 4 - Tank weight pop-up screen

Operating Instructions for AMSII Test Benches

Figure 5 - Log In Screen

2 – Log In

2.1 Select/Tap “LOG IN” button on AMS home screen (top right corner of screen).

2.2 Enter username & password [Fig. 5].

2.3 Select “OK”.

Operating Instructions for AMSII Test Benches

Figure 6 - Tap the Ford shield to begin

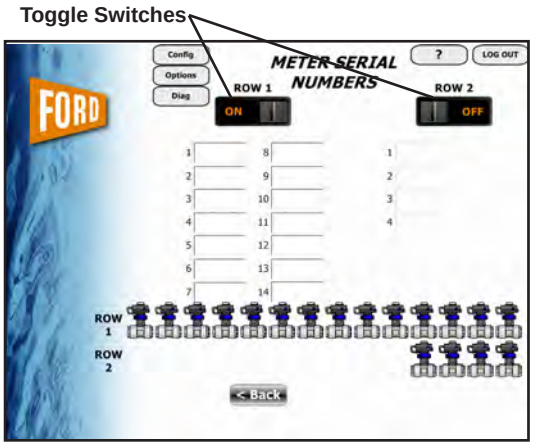


Figure 7 - Select row(s) to be tested

Figure 8 - Yellow caution light on top of the power cabinet

3 – Meter Installation

3.1 Insert adapters and gaskets for the size of meter to be tested in each station. (Indianapolis Bench, page 25, Akron Bench, page 61)

Note: All meters must be the same size (diameter), type and displacement unit during a test sequence.

3.2 Install meters in each meter testing station, ensuring proper flow direction with the bench.

For meter installation instructions, see page 20 for Indianapolis Benches and page 29 for Akron Benches.

4 – Test Initiation

4.1 Select the Ford shield on the AMS home screen [Fig. 6] to begin the test process.

4.2 Toggle “ON” each row to be tested using the toggle switches on the “METER SERIAL NUMBERS” screen [Fig. 7].

The status light on the power cabinet will illuminate yellow [Fig. 8], warning buzzer will sound and selected rows (Indianapolis bench only) will automatically clamp meters in place.

Note: Row 1 is front row, row 2 is back row. Double-check to ensure all meters/idlers and adapters are securely clamped into place.

Operating Instructions for AMSII Test Benches

Figure 9 - Read bar code on meters

Figure 10 - Manually record serial numbers (press enter upon completing a number)

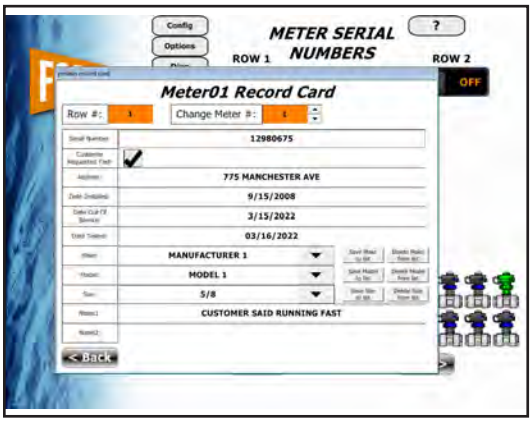


Figure 11 - Meter visualization turns from gray to green

5 – Recording Serial Numbers

5.1 Manually enter meter serial numbers by selecting the station number of meter location or use bar code reader.

Note: After entering a meter serial number, you may proceed to the next meter by toggling the arrow found to the right of the Change Meter #: Field [Fig. 11] or by selecting the Back Button on the Meter Record Card [Fig. 11].

5.2 Included bar code reader [Fig. 9] can be used to record meter serial numbers by selecting the station number of meter location and scanning bar code on meter.

5.3 When manually entering [Fig. 10] or scanning [Fig. 9] a serial number, the affected meter icon will change from gray to green [Fig. 11]. If a serial number is deleted, the affected icon will revert back to gray.

5.4 After entering all desired serial numbers [Fig. 11], press “Next.”

Note: There are many fields that can be recorded for each meter [Fig. 11] but only the serial number is required. Other information may be entered at user’s discretion.

Note: Any combination of keypad or bar code meter serial number entries can be entered.

6 – Securing Meters

6.1 Double-check to ensure all adapters, meters and idlers are securely clamped in place. Close all bleeder valves and the blow-off valve.

Operating Instructions for AMSII Test Benches

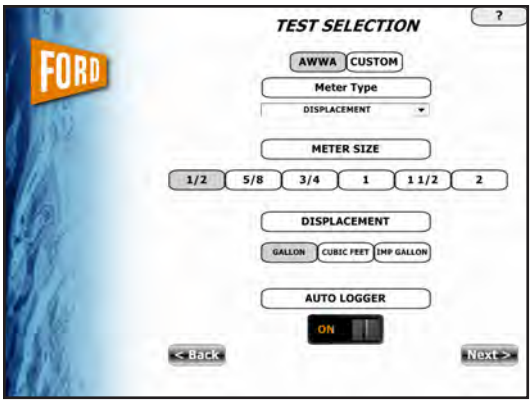


Figure 12 - Select "AWWA" or "CUSTOM"

7 – Test Selection

7A Select "AWWA" [Fig. 12] to run the standard AWWA sequence of testing.

7A.1 Select "Meter Type."

7A.2 Select "METER SIZE."

7A.3 Select displacement measurement unit.

7A.4 Select "Next" to continue.

Note: Disabling the "AUTO LOGGER" is an option. (Auto logger automatically records test data.)

Figure 13 - Selecting "CUSTOM" screen

[OPTIONAL] CUSTOM TESTS

7B Select "CUSTOM" [Fig. 12] to create your own series of tests.

7B.1 If running a previously saved test, select the test to run from the "Select Test" drop-down menu [Fig. 13] at the top of the "USER CUSTOM TEST SET-UP" screen. See Note 1 below.

7B.2 If creating a new test, enter "VOLUME", "FLOW RATE", "Meter Accuracy Low Limit" and "Meter Accuracy High Limit" for each test sequence to be included. See Note 2 below.

7B.3 Disable sequences to exclude them from your test. You may run between one and five sequences in your test. See Note 3 below.

7B.4 Select "VOLUME UNITS" from drop-down menu.

7B.5 Select "FLOW UNITS" from drop-down menu.

7B.6 Select "Next" to continue.

Note 1: Previously saved test parameters can also be loaded by selecting them from the associated drop-down menu.

Note 2: Test sequences and individual test parameters can be saved if logged in as an admin user by typing a custom name into the appropriate text box and selecting the associated save button.

Note 3: Previously saved test sequences and individual test parameters can be deleted if logged in as an admin user by selecting them from the associated drop-down menu and selecting the associated delete button.

Note 4: Test data is recorded to folder named DLoggers-Shortcut on desktop. CSV filename is LogdataIMDB.

Note 5: You must enter a test sequence name when creating a custom sequence before "Next" button will appear.

Note 6: Meter type, size and displacement unit should be printed on meter. Please refer to meter manufacturer if not.

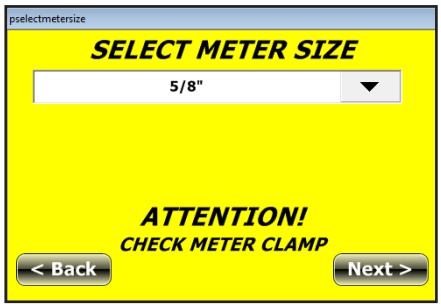


Figure 14 - Warning window

8 – Meter Clamp Verification

8.1 After selecting the tests to be run, a warning window will pop-up [Fig. 14]. Ensure that all meters are securely clamped in place. For non-automated clamping benches, be sure to clamp all meters in place according to the particular test bench directions. See page 20 for Indianapolis, and page 29 for Akron Test Benches.

8.2 After confirming that all meters are securely clamped, select the appropriate meter size from the drop down menu and select the “Next” button.

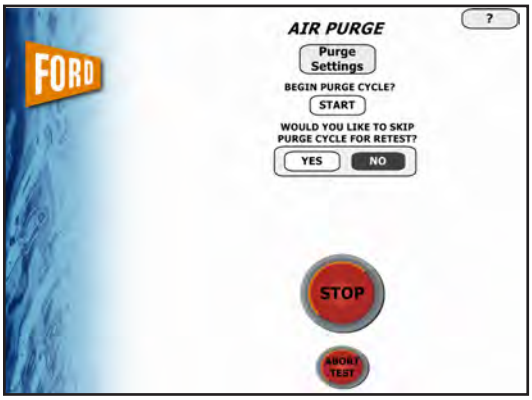


Figure 15 - Test bench air purge cycle

Figure 16 - Test bench air purge cycle complete

9 – Air Purge

9.1 Once meters are securely clamped in place and the appropriate meter size has been selected, Select the “Start” button to run the default purge cycle for the selected meter size. Select the “Purge Settings” button if you would like to customize the purge cycle volume and flow rate per meter size.

9.2 After the air purge cycle completes, the “Next” button will appear indicating that the AMS is ready to begin testing meters. Press “Next” [Fig. 16] to proceed to next step.

Note: The air purge cycle may be stopped for any reason by selecting the “STOP” button.

If the meter clamp requires releasing for meter change or other reasons, select the “STOP” on-screen button.

“ABORT TEST” button will be displayed throughout the testing process. Selecting this button will shut valves, bleed system pressure, discard test data and return to AMS home screen. System reboot will be necessary.

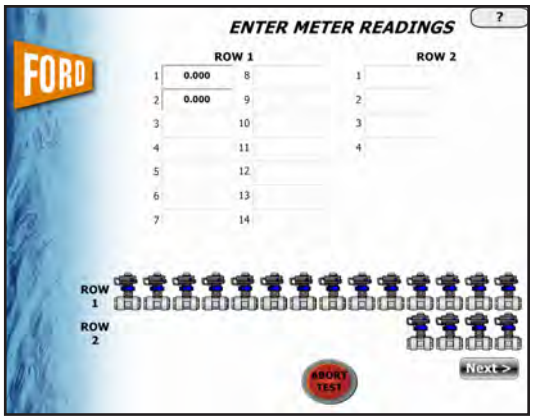


Figure 17 - Enter meter readings

10 – Recording Pretest Meter Readings

10.1 Record beginning meter readings by selecting the station number of the meter location [Fig. 17] and entering the meter value using the on-screen keyboard. [Fig. 18]

10.2 Press “Next” [Fig. 19] when complete.
If the “Next” button is not on the screen, it will appear when the recirculating pump shuts off after draining the tank (applies only to systems with a recirculating tank).

Figure 18 - On-Screen keyboard

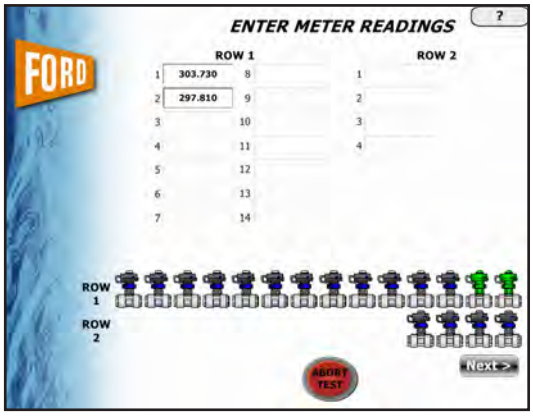


Figure 19 - Press “Next”

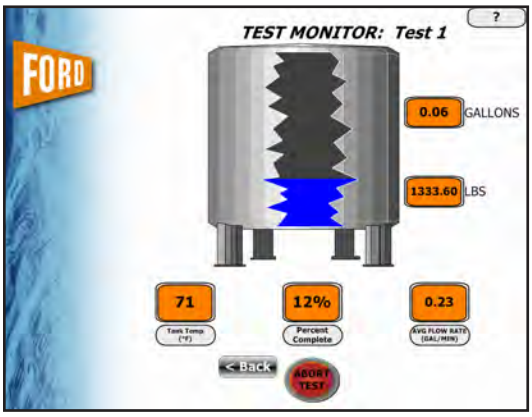


Figure 20 - Test monitor screen

11 – Test Monitor Screen

11.1 The Test Monitor Screen [Fig. 20] appears when a test is running.

When the test is complete, the indicator light on top of the power cabinet will illuminate blue [Fig. 21] indicating that attention is required to continue.

11.2 Press the on-screen “Next” button [Fig. 22] when test has completed.

Note: A standard AWWA series of tests generally run about an hour.

Figure 21 - Blue indicator light on top of the power cabinet indicating attention needed to continue

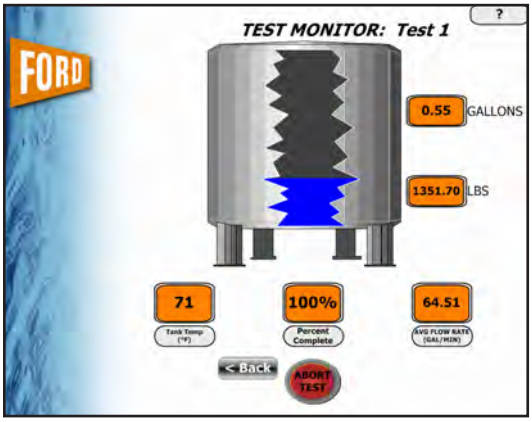


Figure 22 - Press “Next” button when test completed

Operating Instructions for AMSII Test Benches

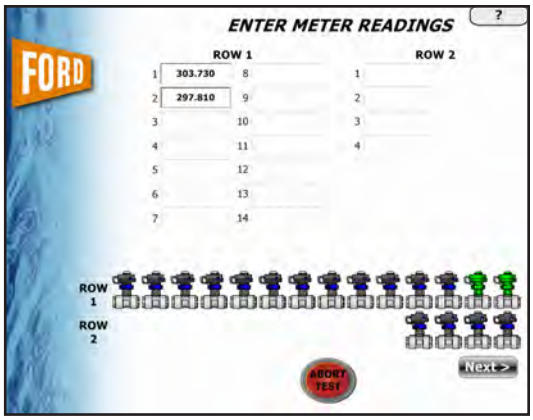


Figure 23 - Enter meter readings

Figure 24 - On-Screen keyboard

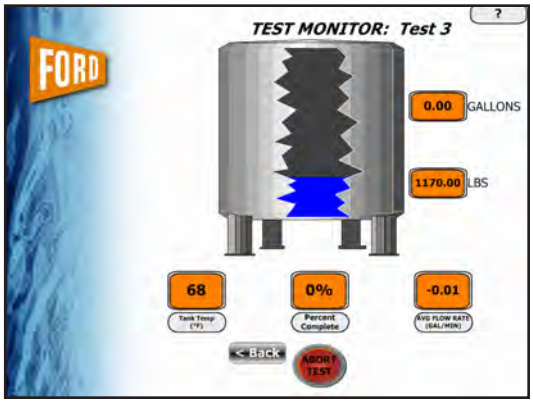


Figure 25 - Test monitor showing the next test in the queue

12 – Recording Post-Test Meter Readings

12.1 Record ending meter readings by selecting the station number of the meter location [Fig. 23] and entering the meter value using the on-screen keyboard [Fig. 24]. Press the on-screen “Next” button when finished.

13 – Subsequent Tests

13.1 The AMS will automatically advance to the next test in the queue [Fig. 25] (max. 5 tests), move the ending reading from the test just completed to the beginning reading of the next test, tare the scale, adjust the flow rate and reset the valves. After the last test in the queue is completed, record the meter readings and select the “Next” button to advance to the “TEST RESULTS” screen [Fig. 26].

Note: After the last test selected to run (1 to 5 sequential tests) is complete, the “RESULTS” button and “Next” button will advance to the results page.

Operating Instructions for AMSII Test Benches

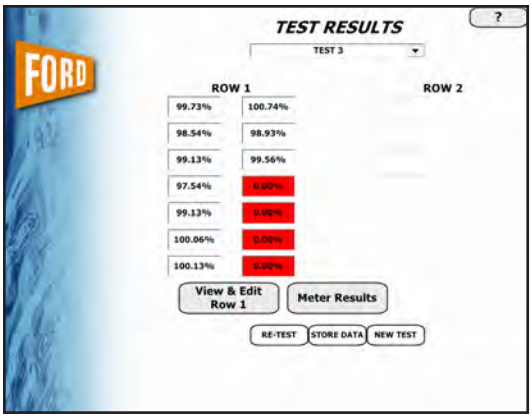


Figure 26 - View results

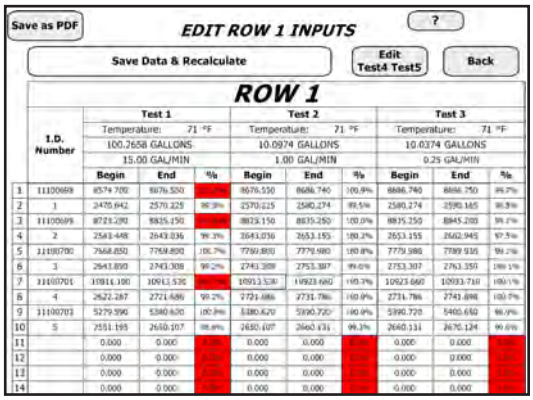


Figure 27 - Review test results

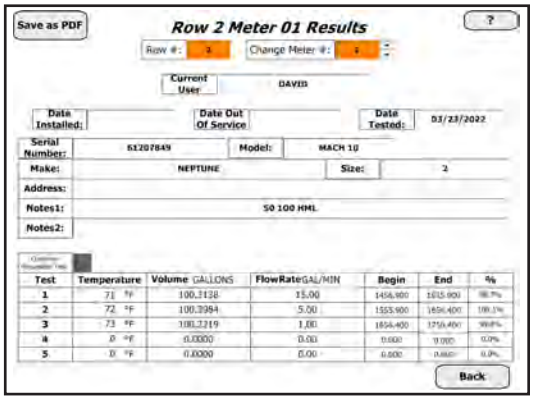


Figure 28 - Meter results

14 – Test Result Review

14.1 The “TEST RESULTS” [Fig. 26] screen allows viewing results of each individual test by selecting a desired test from the drop-down menu at the top of the screen. The results of the most recently run test will appear on the screen by default when first opened.

Note: Buttons listed below perform the described functions.
Re-Test – Discards data, saves meter serial numbers and restarts test with existing meters.
Store Data – Stores data manually.
New Test – Stores data, returns user to AMS home screen.

14.2 View all test results for a row by pressing the on-screen “View & Edit Row” buttons. The “View & Edit Row” buttons will display a table with the test data displayed for the row selected [Fig. 27].

The data in this table can be edited by selecting the desired cell(s). After editing data, tap the “Save Data & Recalculate” button at the top of the screen.

Select “Back” button to continue.

14.3 Two options to save as PDFs (if desired): View & Edit Row option “Save as PDF” button saves all results to one PDF in preset folder on desktop.

“Meter Results” button allows you to select meter by toggling the arrow found to the right of the Change Meter # field [Fig. 28] then saving results individually to PDF in preset folder on desktop.

14.4 If finished with the test, select the “NEW TEST” [Fig. 26] button to return to the main screen. Test will be saved automatically to .csv file.

Note: System will delay while saving.

Operating Instructions for AMSII Test Benches

Figure 29 - Release All Meters button

14 – Test Result Review

14.5 If not satisfied with a test result, tapping the "STORE DATA" [Fig. 26] button saves data to .csv file, if you want to maintain data. Tapping "RETEST" [Fig. 26] button can be used to test the meters again.

The serial numbers and last readings will be imported to a new test.

15 – Test Bench Shut Down

15.1 Select "RELEASE ALL METERS" on the AMS home screen [Fig. 29].

Figure 30 - Shutdown

15.2 Select "Shutdown Visu+" or "Shutdown Computer" on the AMS home screen [Fig. 30] based on preference.

15.3 Shut off water.

15.4 Shut off air.

15.5 Shut off control panel [Fig. 31].

15.6 Shut off recirculating pump (applies only to systems with recirculating tank).

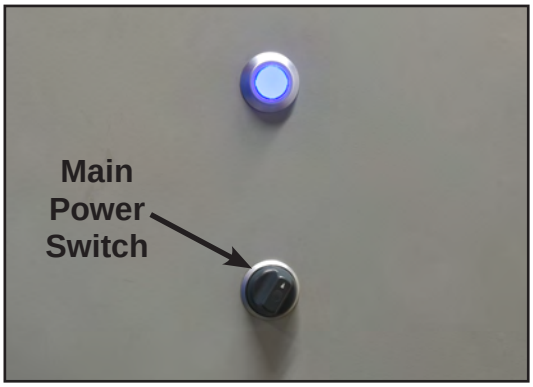


Figure 31 - Main power switch

Test Bench Maintenance

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Test Bench Maintenance

General Maintenance

Iron yoke pieces and non-moving brass parts can be painted on the outside if desired. Replace all test bench gaskets when worn. The rubber gaskets for Indianapolis and Akron Benches as well as the O-ring in the clamping cylinders, should be replaced when necessary. See page 65 for instructions on replacing clamping cylinder O-rings.

Occasionally, oil the threads of the barrel pieces and the hand-wheels of Standard Benches. A little grease or oil on the faces of the hand-wheel where it contacts the yoke shelf and packing gland improves operation. Oil applied to the pistons of the clamping cylinders of Indianapolis and Akron Benches improves the action and prolongs the life of O-rings and metal parts. Lubrication of the spring fork pivots on Indianapolis Benches and the pedestal screws on Akron Benches improves operation. Instructions for removal and cleaning of the Testerate Indicator gauge tube are on page 64.

Calibrated Tank Maintenance

If placed on any floor or base which is not substantial and is likely to settle, tanks should be occasionally replumbed. Take precaution against denting the tanks. Dents could cause inaccurate test results. Keep tanks free from debris.

With reasonable care, calibrated tanks should remain accurate indefinitely. Drain tanks when not in use. Clean the inside of glass tubes with a lime-dissolving cleanser and a small swab on a wire. If a gauge glass becomes broken, a new tube can be installed quickly and easily.

NOTE: Tanks are calibrated with O.E.M. drain valves. Alternate valve replacement may cause inaccurate test results.

Valve Maintenance

Test bench inlets and outlets have easy-operating valves. Ford Ball Valves are used wherever possible and will provide many years of maintenance-free service. The four-way control valves for clamping cylinders on Indianapolis and Akron Benches are maintenance-free; replace the valves if they leak or fail. NOTE: A four-way control valve thought to be leaking is usually the clamping cylinder O-rings, which require replacement (see page 65), and not the four-way control valve O-ring.

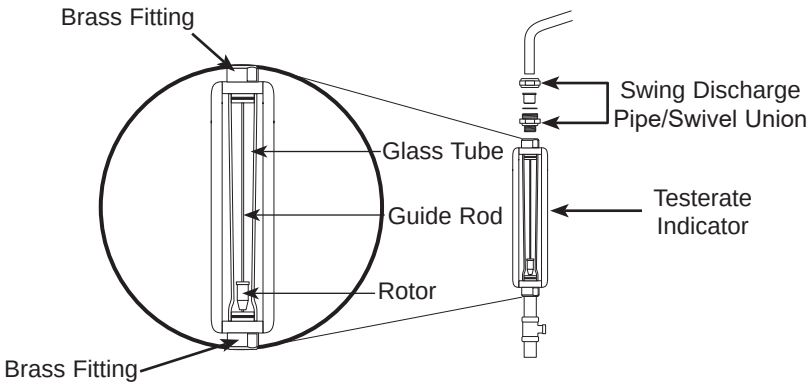
Removal and Cleaning of the Gauge Tube on Testerate Indicators

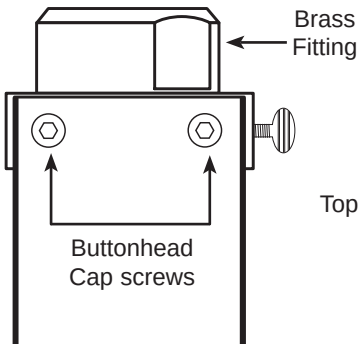
If the glass tube becomes dirty from lime, grease, rust, etc., it can easily be cleaned by following these instructions and illustrations.

1. Remove the swing discharge pipe/swivel union and the four buttonhead cap screws from the top of the Indicator assembly.
2. Pull the brass fitting from the top of the Testerate Indicator frame. The guide rod and rotor will usually remain attached to the brass fitting.
3. Pull the glass tube and rotor assembly from the top of the frame and off the bottom brass fitting. Remove, clean and reinstall the glass tube with extreme caution; the slightest bump can chip or break the glass.
4. Clean the glass tubing with a soft bristled bottle brush to prevent scratching the inside surface. A mild detergent, such as soap and vinegar, is an acceptable cleaning solution.
5. After cleaning, reassemble in the reverse order. A thin application of grease to the O-rings is recommended.

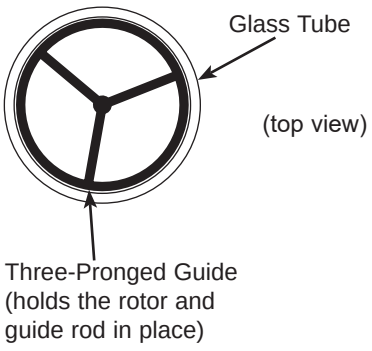
The Testerate Indicator has a length of 17-5/8". Both ends are tapped 1" I.P. thread.

Replacement tube and rotor assemblies are available for current production models. With reasonable care, the Testerate Indicator will remain accurate and in useful condition for many years. For further information, or if you have any difficulty in installing or using the Testerate Indicator, please contact The Ford Meter Box Company.





Top of Testerate Indicator (side view)



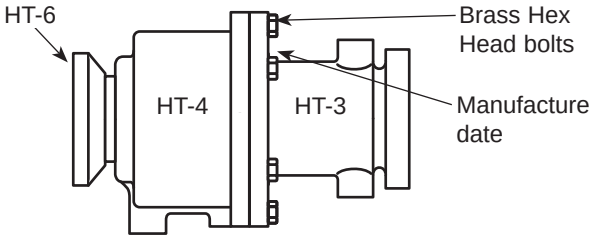
Instructions for Replacing O-rings In Akron Test Bench Cylinders / Part No. 9602

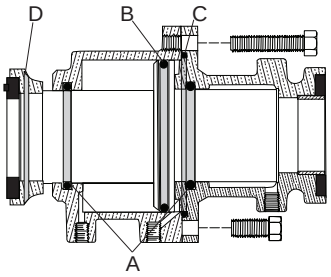
There are four O-rings and one washer which can be replaced to ensure a proper seal. The cylinder must be completely taken apart in order to replace all four O-rings.

The end piece ring (HT-6) must be removed. Cylinders purchased prior to 1990 require careful use of a soft-headed hammer to dislodge the end ring (HT-6) from the piston. On cylinders purchased after 1990, the HT-6 will easily pull off by hand. Remove the brass hex head bolts and separate the two halves (HT-4 and HT-3), then remove the piston.

Clean the cylinder and piston shaft with fine steel wool for smooth operation. Grease the replacement O-rings with a light-weight grease. Replace the O-ring on the piston (B), the O-ring in each of the halves (A) and the O-ring where the two halves meet (C). Cylinders purchased after 1990 will also have an O-ring on the HT-6 end piece ring (D).

To reassemble the cylinder, place the piston back into the HT-3 and HT-4. Replace the brass bolts. If purchased prior to 1990, the HT-6 must carefully and evenly be tapped onto the end of the piston. A block of wood is often helpful. The HT-6 will easily slide onto the end of the piston on cylinders purchased after 1990. This completes the O-ring replacement of the Akron Test Bench cylinder.





O-ring	O-ring Inside Diameter
A (2 Provided)	2.475"
B	3.6"
C	4.109"
D	2.359"

O-ring D is only available on cylinders purchased after 1990.

Instructions for Replacing O-rings In Indianapolis Test Bench Cylinders / Part No. 9710

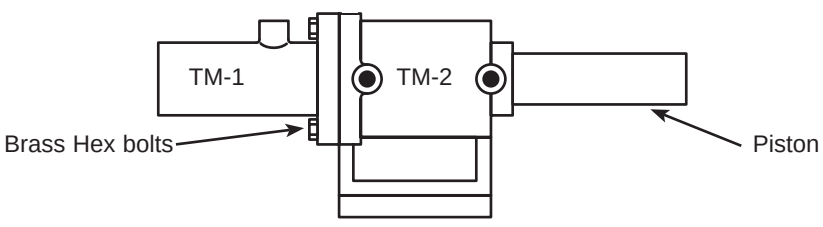
There are four O-rings and one washer which can be replaced to ensure a proper seal. The cylinder must be completely taken apart in order to replace all four O-rings.

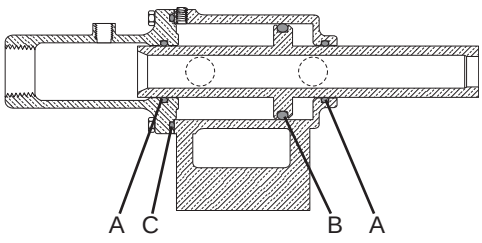
The two cylinder halves (TM-1 and TM-2) have to be separated by removing the brass hex bolts. Now separate the two halves and remove the piston.

Clean the cylinder and piston shaft with fine steel wool for smooth operation. Grease the replacement O-rings with a light-weight grease. Replace the O-ring on the piston (B), the O-ring in each of the halves (A) and the O-ring where the two halves meet (C).

To assemble the cylinder, place the piston back into the TM-2 and TM-1 very carefully not to cut the O-rings. Replace the brass bolts.

O-ring	O-ring Inside Diameter
A (Two Provided)	1.359"
B	2.1"
C	2.734"





Test Requirements for New, Rebuilt and Repaired Cold Water Meters*

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Test Requirements for New, Rebuilt and Repaired Cold Water Meters*

Size	Maximum Rate (All Meters)				Intermediate Rate (All Meters)				Minimum Rate (New and Rebuilt)				Minimum (Repaired)
	Flow Rate†	Test Quantity††		Accuracy Limits	Flow Rate**	Test Quantity††		Accuracy Limits	Flow Rate	Test Quantity††		Accuracy Limits	Accuracy Limits
in.	gpm	gal	ft^3	percent	gpm	gal	ft^3	percent	gpm	gal	ft^3	percent	percent (min)
DISPLACEMENT METERS (AWWA C700 AND C710)													
1/2	8	100	10	98.5-101.5	2	10	1	98.5-101.5	1/4	10	1	95-101	90
1/2x3/4	8	100	10	98.5-101.5	2	10	1	98.5-101.5	1/4	10	1	95-101	90
5/8	15	100	10	98.5-101.5	2	10	1	98.5-101.5	1/4	10	1	95-101	90
5/8x3/4	15	100	10	98.5-101.5	2	10	1	98.5-101.5	1/4	10	1	95-101	90
3/4	25	100	10	98.5-101.5	3	10	1	98.5-101.5	1/2	10	1	95-101	90
1	40	100	10	98.5-101.5	4	10	1	98.5-101.5	3/4	10	1	95-101	90
1-1/2	50	100	10	98.5-101.5	8	100	10	98.5-101.5	1-1/2	100	10	95-101	90
2	100	100	10	98.5-101.5	15	100	10	98.5-101.5	2	100	10	95-101	90
MULTI-JET METERS (AWWA C708)													
5/8	15	100	10	98.5-101.5	1	10	1	98.5-101.5	1/4	10	1	97-103	90
5/8x3/4	15	100	10	98.5-101.5	1	10	1	98.5-101.5	1/4	10	1	97-103	90
3/4	25	100	10	98.5-101.5	2	10	1	98.5-101.5	1/2	10	1	97-103	90
1	35	100	10	98.5-101.5	3	10	1	98.5-101.5	3/4	10	1	97-103	90
1-1/2	70	100	10	98.5-101.5	5	100	10	98.5-101.5	1-1/2	100	10	97-103	90
2	100	100	10	98.5-101.5	8	100	10	98.5-101.5	2	100	10	97-103	90
SINGLEJET METERS (AWWA C712)													
5/8	15	100	10	98.5-101.5	2	10	1	98.5-101.5	1/4	10	1	95-101.5	90
5/8X3/4	15	100	10	98.5-101.5	2	10	1	98.5-101.5	1/4	10	1	95-101.5	90
3/4	25	100	10	98.5-101.5	3	10	1	98.5-101.5	1/2	10	1	95-101.5	90
1	40	100	10	98.5-101.5	4	10	1	98.5-101.5	3/4	10	1	95-101.5	90
1-1/2	50	100	10	98.5-101.5	8	100	10	98.5-101.5	1/2	100	10	95-101.5	90
2	100	100	10	98.5-101.5	15	100	10	98.5-101.5	1/2	100	10	95-101.5	90
3	160	500	50	98.5-101.5	20	100	10	98.5-101.5	1/2	100	10	95-101.5	90
4	250	500	50	98.5-101.5	40	100	10	98.5-101.5	3/4	100	10	95-101.5	90
6	500	1000	100	98.5-101.5	60	100	10	98.5-101.5	1-1/2	100	10	95-101.5	90
FLUIDIC-OSCILLATOR METERS (AWWA C713)													
1/2	8	100	10	98.5-101.5	2	10	1	98.5-101.5	1/4	10	1	95-101.5	90
1/2X3/4	8	100	10	98.5-101.5	2	10	1	98.5-101.5	1/4	10	1	95-101.5	90
5/8	15	100	10	98.5-101.5	2	10	1	98.5-101.5	1/4	10	1	95-101.5	90
5/8X3/4	15	100	10	98.5-101.5	2	10	1	98.5-101.5	1/4	10	1	95-101.5	90
3/4	25	100	10	98.5-101.5	3	10	1	98.5-101.5	1/2	10	1	95-101.5	90
1	40	100	10	98.5-101.5	4	10	1	98.5-101.5	3/4	10	1	95-101.5	90
1-1/2	50	100	10	98.5-101.5	8	100	10	98.5-101.5	1-1/2	100	10	95-101.5	90
2	100	100	10	98.5-101.5	15	100	10	98.5-101.5	2	100	10	95-101.5	90

*A rebuilt meter is one that has had the measuring element replaced with a factory-made new unit. A repaired meter is one that has had the old measuring element cleaned and refurbished in a utility repair shop.

†These are suggested test flows and test quantities. Testing for high rates of flow can be achieved by testing the meter at 25% of the meters rating if the manufacturer's original test certificate indicates a linear curve between 25% and 100% of the rated flow range.

††Quantity should be one or more full revolutions of the test hand / initial dial (see "Maximum Indication on Initial Dial" values specified in mechanical meter standards such as ANSI/AWWA C700, C701, and so on), or a quantity not less than the "Maximum Allowable Indication on Initial Display" values specified in ANSI/AWWA C715. Quantity should result in not less than 3 minutes running. When limited test capabilities force the use of smaller test quantities, the resultant increase in total test uncertainties and errors needs to be recognized when establishing acceptance criteria tolerance.

§The bypass meter should be tested in accordance with the appropriate test requirements for the type of meter used.

**As this rate varies according to manufacturer, it should be determined for each type of meter tested.

§§Minimum test flow rates with corresponding accuracy limits in parentheses ( ) are alternative values, to accommodate concerns over test times or concerns over test benches being able to conduct testing at the smaller flow rates (without parentheses) reliably. Note that the flow rate values in parentheses are the lowest rates for the normal test limits from ANSI/AWWA C715, and as such would have accuracy limits of 98.5%−101.5%. If these flow rates in parentheses are used in Minimum Rate testing, then the recommended test flow rates for the Intermediate Rate should be twice those listed in the table. However, see the preceding footnote, detailing the preferred use of an intermediate rate determined for each specific make/model.

Metric Conversions: in. × 25.4 = mm, gal × 0.003785 = m^3, gpm × 0.2268 = m^3/h, ft^3 × 0.02831 = m^3.

Test Requirements for New, Rebuilt and Repaired Cold Water Meters*

Size	Maximum Rate (All Meters)				Intermediate Rate (All Meters)				Minimum Rate (New and Rebuilt)				Minimum (Repaired)
	Flow Rate†	Test Quantity††		Accuracy Limits	Flow Rate**	Test Quantity††		Accuracy Limits	Flow Rate	Test Quantity††		Accuracy Limits	Accuracy Limits
in.	gpm	gal	ft³	percent	gpm	gal	ft³	percent	gpm	gal	ft³	percent	percent (min)
CLASS I TURBINE METERS, VERTICAL-SHAFT TYPE (AWWA C701)													
3/4	30	100	10	98-102	3	10	1	98-102	1-1/2	10	1	98-102	–
1	50	100	10	98-102	5	10	1	98-102	2	10	1	98-102	–
1-1/2	100	500	50	98-102	10	100	10	98-102	3	100	10	98-102	–
2	160	500	50	98-102	16	100	10	98-102	4	100	10	98-102	–
3	350	1,000	100	98-102	35	100	10	98-102	6	100	10	98-102	–
4	600	1,500	200	98-102	60	100	10	98-102	8	100	10	98-102	–
6	1,250	4,000	500	98-102	125	1,000	100	98-102	15	1,000	100	98-102	–
CLASS II TURBINE METERS, IN-LINE (HIGH-VELOCITY) TYPE (AWWA C701)													
1-1/2	100	500	50	98.5-101.5					4	100	10	98.5-101.5	–
2	160	500	50	98.5-101.5					4	100	10	98.5-101.5	–
3	350	1,000	100	98.5-101.5					8	100	10	98.5-101.5	–
4	630	1,500	200	98.5-101.5					15	100	10	98.5-101.5	–
6	1,400	4,000	500	98.5-101.5					30	1,000	100	98.5-101.5	–
8	2,400	7,000	900	98.5-101.5					50	1,000	100	98.5-101.5	–
10	3,800	10,000	1,300	98.5-101.5					75	1,000	100	98.5-101.5	–
12	5,000	15,000	2,000	98.5-101.5					120	1,000	100	98.5-101.5	–
16	7,000	30,000	4,000	98.5-101.5					200	1,000	100	98.5-101.5	–
20	10,000	40,000	5,000	98.5-101.5					300	1,000	100	98.5-101.5	–
PROPELLER METERS (AWWA C704)													
2	100	300	40	98-102					45	200	25	98-102	90
3	250	800	100	98-102					80	200	25	98-102	90
4	500	1,500	200	98-102					85	250	30	98-102	90
6	1,200	2,500	300	98-102					160	500	60	98-102	90
8	1,500	3,000	400	98-102					190	500	60	98-102	90
10	2,000	4,000	500	98-102					260	500	60	98-102	90
12	2,800	6,000	800	98-102					275	750	100	98-102	90
14	3,750	8,000	1,000	98-102					350	1,000	130	98-102	90
16	4,750	10,000	1,300	98-102					450	1,500	200	98-102	90
18	5,625	12,000	1,600	98-102					550	2,000	250	98-102	90
20	6,875	15,000	2,000	98-102					650	2,500	300	98-102	90
24	10,000	20,000	2,500	98-102					1,000	4,000	500	98-102	90
30	15,000	30,000	4,000	98-102					1,600	6,000	800	98-102	90
36	20,000	40,000	5,000	98-102					2,400	7,500	1,000	98-102	90
42	28,000	40,000	5,000	98-102					2,800	10,000	1,300	98-102	90
48	35,000	50,000	6,000	98-102					3,500	12,500	1,500	98-102	90
54	45,000	60,000	8,000	98-102					5,000	16,000	2,000	98-102	90
60	60,000	70,000	9,000	98-102					6,000	20,000	2,500	98-102	90
66	75,000	80,000	11,000	98-102					7,500	25,000	3,000	98-102	90
72	90,000	90,000	12,000	98-102					9,000	28,000	3,500	98-102	90

*A rebuilt meter is one that has had the measuring element replaced with a factory-made new unit. A repaired meter is one that has had the old measuring element cleaned and refurbished in a utility repair shop.

†These are suggested test flows and test quantities. Testing for high rates of flow can be achieved by testing the meter at 25% of the meters rating if the manufacturer's original test certificate indicates a linear curve between 25% and 100% of the rated flow range.

††Quantity should be one or more full revolutions of the test hand / initial dial (see "Maximum Indication on Initial Dial" values specified in mechanical meter standards such as ANSI/AWWA C700, C701, and so on), or a quantity not less than the "Maximum Allowable Indication on Initial Display" values specified in ANSI/AWWA C715. Quantity should result in not less than 3 minutes running. When limited test capabilities force the use of smaller test quantities, the resultant increase in total test uncertainties and errors needs to be recognized when establishing acceptance criteria tolerance.

§The bypass meter should be tested in accordance with the appropriate test requirements for the type of meter used.

**As this rate varies according to manufacturer, it should be determined for each type of meter tested.

§§Minimum test flow rates with corresponding accuracy limits in parentheses ( ) are alternative values, to accommodate concerns over test times or concerns over test benches being able to conduct testing at the smaller flow rates (without parentheses) reliably. Note that the flow rate values in parentheses are the lowest rates for the normal test limits from ANSI/AWWA C715, and as such would have accuracy limits of 98.5%−101.5%. If these flow rates in parentheses are used in Minimum Rate testing, then the recommended test flow rates for the Intermediate Rate should be twice those listed in the table. However, see the preceding footnote, detailing the preferred use of an intermediate rate determined for each specific make/model.

Metric Conversions: in. × 25.4 = mm, gal × 0.003785 = m^3, gpm × 0.2268 = m^3/h, ft^3 × 0.02831 = m^3.

Test Requirements for New, Rebuilt and Repaired Cold Water Meters*

Size	Maximum Rate (All Meters)					Intermediate Rate (All Meters)				Minimum Rate (New and Rebuilt)				Minimum (Repaired)
	Flow Rate†	Test Quantity††		Accuracy Limits		Flow Rate**	Test Quantity††		Accuracy Limits	Flow Rate	Test Quantity††		Accuracy Limits	Accuracy Limits
in.	gpm	gal	ft³	percent		gpm	gal	ft³	percent	gpm	gal	ft³	percent	percent (min)
COMPOUND METERS (AWWA C702)§														
				CLASS I	CLASS II									
2	160	400	50	97-103	98.5-101.5				90-103				95-101	90
3	320	1,000	100	97-103	98.5-101.5				90-103				95-101	90
4	500	1,500	200	97-103	98.5-101.5				90-103				95-101	90
6	1,000	3,000	400	97-103	98.5-101.5				90-103				95-101	90
8	1,600	4,000	500	97-103	98.5-101.5				90-103				95-101	90
10	2,300	4,000	500	97-103	98.5-101.5				90-103				95-101	90
FIRE-SERVICE TYPE, TYPE I AND TYPE II METERS (AWWA C703) (TEST AT INTERMEDIATE RATE NOT NECESSARY.)§														
				TYPE I	TYPE II									
3	350	700	100	97-103	98.5-101.5				Not less than 85				Not less than 95	90
4	700	1,500	200	97-103	98.5-101.5									90
6	1,600	3,000	400	97-103	98.5-101.5									90
8	2,800	5,000	700	97-103	98.5-101.5									90
10	4,400	9,000	1,200	97-103	98.5-101.5									90

Size	Maximum Rate (All Meters)				Intermediate Rate (All Meters)				Minimum Rate (New and Rebuilt)				Minimum (Repaired)
	Flow Rate†	Test Quantity††		Accuracy Limits	Flow Rate**	Test Quantity††		Accuracy Limits	Flow Rate	Test Quantity††		Accuracy Limits	Accuracy Limits
in.	gpm	gal	ft³	percent	gpm	gal	ft³	percent	gpm	gal	ft³	percent	percent (min)
FIRE SERVICE TYPE, TYPE III (AWWA C703)													
3	350	700	100	98.5-101.5	10	100	10	98.5-101.5	4	100	10	95-101.5	–
4	700	1,500	200	98.5-101.5	30	500	50	98.5-101.5	10	100	10	95-101.5	–
6	1,600	3,000	400	98.5-101.5	60	1,000	100	98.5-101.5	20	1,000	100	95-101.5	–
8	2,800	5,000	700	98.5-101.5	70	1,000	100	98.5-101.5	30	1,000	100	95-101.5	–
10	4,400	9,000	1,200	98.5-101.5	110	1,000	100	98.5-101.5	35	1,000	100	95-101.5	–

*A rebuilt meter is one that has had the measuring element replaced with a factory-made new unit. A repaired meter is one that has had the old measuring element cleaned and refurbished in a utility repair shop.

†These are suggested test flows and test quantities. Testing for high rates of flow can be achieved by testing the meter at 25% of the meters rating if the manufacturer's original test certificate indicates a linear curve between 25% and 100% of the rated flow range.

††Quantity should be one or more full revolutions of the test hand / initial dial (see "Maximum Indication on Initial Dial" values specified in mechanical meter standards such as ANSI/AWWA C700, C701, and so on), or a quantity not less than the "Maximum Allowable Indication on Initial Display" values specified in ANSI/AWWA C715. Quantity should result in not less than 3 minutes running. When limited test capabilities force the use of smaller test quantities, the resultant increase in total test uncertainties and errors needs to be recognized when establishing acceptance criteria tolerance.

§The bypass meter should be tested in accordance with the appropriate test requirements for the type of meter used.

**As this rate varies according to manufacturer, it should be determined for each type of meter tested.

§§Minimum test flow rates with corresponding accuracy limits in parentheses ( ) are alternative values, to accommodate concerns over test times or concerns over test benches being able to conduct testing at the smaller flow rates (without parentheses) reliably. Note that the flow rate values in parentheses are the lowest rates for the normal test limits from ANSI/AWWA C715, and as such would have accuracy limits of 98.5%−101.5%. If these flow rates in parentheses are used in Minimum Rate testing, then the recommended test flow rates for the Intermediate Rate should be twice those listed in the table. However, see the preceding footnote, detailing the preferred use of an intermediate rate determined for each specific make/model.

Metric Conversions: in. × 25.4 = mm, gal × 0.003785 = m^3, gpm × 0.2268 = m^3/h, ft^3 × 0.02831 = m^3.

Test Requirements for New, Rebuilt and Repaired Cold Water Meters*

Size	Maximum Rate (All Meters)				Intermediate Rate (All Meters)				Minimum Rate (New and Rebuilt)				Minimum (Repaired)
	Flow Rate†	Test Quantity††		Accuracy Limits	Flow Rate**	Test Quantity††		Accuracy Limits	Flow Rate§§	Test Quantity††		Accuracy Limits§§	Accuracy Limits
in.	gpm	gal	ft³	percent	gpm	gal	ft³	percent	gpm	gal	ft³	percent	percent (min)
ELECTROMAGNETIC AND ULTRASONIC METERS FOR REVENUE APPLICATIONS, TYPE I (AWWA C715)													
1/2	8	100	10	98.5-101.5	0.35	10	1	98.5-101.5	0.11 (0.18)	10	1	95-105 (98.5-101.5)	–
5/8	15	100	10	98.5-101.5	0.4	10	1	98.5-101.5	0.13 (0.20)	10	1	95-105 (98.5-101.5)	–
3/4	25	100	10	98.5-101.5	1	10	1	98.5-101.5	0.15 (0.5)	10	1	95-105 (98.5-101.5)	–
1	40	100	10	98.5-101.5	1.5	10	1	98.5-101.5	0.3 (0.75)	10	1	95-105 (98.5-101.5)	–
1-1/2	60	100	10	98.5-101.5	4	100	10	98.5-101.5	0.6 (2)	100	10	95-105 (98.5-101.5)	–
2	100	100	10	98.5-101.5	5	100	10	98.5-101.5	1 (2.5)	100	10	95-105 (98.5-101.5)	–
3	200	500	50	98.5-101.5	15	100	10	98.5-101.5	2.5 (7.5)	100	10	95-105 (98.5-101.5)	–
4	400	1,000	100	98.5-101.5	20	500	50	98.5-101.5	3.5 (10)	300	40	95-105 (98.5-101.5)	–
6	800	2,000	200	98.5-101.5	40	1,000	100	98.5-101.5	9 (20)	300	40	95-105 (98.5-101.5)	–
8	1,000	5,000	500	98.5-101.5	80	3,000	400	98.5-101.5	18 (40)	2,000	300	95-105 (98.5-101.5)	–

*A rebuilt meter is one that has had the measuring element replaced with a factory-made new unit. A repaired meter is one that has had the old measuring element cleaned and refurbished in a utility repair shop.

†These are suggested test flows and test quantities. Testing for high rates of flow can be achieved by testing the meter at 25% of the meters rating if the manufacturer's original test certificate indicates a linear curve between 25% and 100% of the rated flow range.

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Metric Conversions: in. × 25.4 = mm, gal × 0.003785 = m^3, gpm × 0.2268 = m^3/h, ft^3 × 0.02831 = m^3.

Test Requirements for New, Rebuilt and Repaired Cold Water Meters*

Size	Maximum Rate (All Meters)				Intermediate Rate (All Meters)				Minimum Rate (New and Rebuilt)				Minimum (Repaired)
	Flow Rate†	Test Quantity††		Accuracy Limits	Flow Rate**	Test Quantity††		Accuracy Limits	Flow Rate	Test Quantity††		Accuracy Limits	Accuracy Limits
in.	gpm	gal	ft³	percent	gpm	gal	ft³	percent	gpm	gal	ft³	percent	percent (min)
ELECTROMAGNETIC AND ULTRASONIC METERS FOR REVENUE APPLICATIONS, TYPE II (AWWA C715)													
1/2	8	100	10	98.5-101.5	2	10	1	98.5-101.5	1/4	10	1	95-105	–
5/8	15	100	10	98.5-101.5	2	10	1	98.5-101.5	1/4	10	1	95-105	–
3/4	25	100	10	98.5-101.5	4	10	1	98.5-101.5	1/2	10	1	95-105	–
1	40	100	10	98.5-101.5	6	10	1	98.5-101.5	3/4	10	1	95-105	–
1-1/2	100	100	10	98.5-101.5	8	100	10	98.5-101.5	1-1/2	100	10	95-105	–
2	150	100	10	98.5-101.5	12	100	10	98.5-101.5	2	100	10	95-105	–
3	350	500	50	98.5-101.5	30	100	10	98.5-101.5	4	100	10	95-105	–
4	600	1,000	100	98.5-101.5	50	500	50	98.5-101.5	7-1/2	300	40	95-105	–
6	800	2,000	200	98.5-101.5	110	1,000	100	98.5-101.5	15	300	40	95-105	–
8	2,000	5,000	500	98.5-101.5	200	3,000	400	98.5-101.5	30	2,000	300	95-105	–
10	3,000	7,000	900	98.5-101.5	300	5,000	500	98.5-101.5	50	3,000	400	95-105	–
12	4,000	10,000	1,000	98.5-101.5	400	5,000	500	98.5-101.5	65	3,000	400	95-105	–
16	5,500	50,000	7,000	98.5-101.5	750	30,000	4,000	98.5-101.5	110	20,000	3,000	95-105	–
20	8,000	50,000	7,000	98.5-101.5	1,100	30,000	4,000	98.5-101.5	175	20,000	3,000	95-105	–

Size	Maximum Rate (All Meters)				Intermediate Rate (All Meters)				Minimum Rate (New and Rebuilt)				Minimum (Repaired)
	Flow Rate†	Test Quantity††		Accuracy Limits	Flow Rate**	Test Quantity††		Accuracy Limits	Flow Rate§§	Test Quantity††		Accuracy Limits	Accuracy Limits
in.	gpm	gal	ft³	percent	gpm	gal	ft³	percent	gpm	gal	ft³	percent	percent (min)
METERS FOR RESIDENTIAL FIRE SPRINKLER SYSTEMS IN ONE- AND TWO-FAMILY DWELLINGS AND MANUFACTURED HOMES (AWWA C714)													
3/4	25	100	10	98-102	3	10	1	98-102	1/2	10	1	95-103	90
1	40	100	10	98-102	4	10	1	98-102	3/4	10	1	95-103	90
1-1/2	50	100	10	98-102	8	100	10	98-102	1-1/2	100	10	95-103	90
2	100	100	10	98-102	15	100	10	98-102	2	100	10	95-103	90

*A rebuilt meter is one that has had the measuring element replaced with a factory-made new unit. A repaired meter is one that has had the old measuring element cleaned and refurbished in a utility repair shop.

†These are suggested test flows and test quantities. Testing for high rates of flow can be achieved by testing the meter at 25% of the meters rating if the manufacturer's original test certificate indicates a linear curve between 25% and 100% of the rated flow range.

††Quantity should be one or more full revolutions of the test hand / initial dial (see "Maximum Indication on Initial Dial" values specified in mechanical meter standards such as ANSI/AWWA C700, C701, and so on), or a quantity not less than the "Maximum Allowable Indication on Initial Display" values specified in ANSI/AWWA C715. Quantity should result in not less than 3 minutes running. When limited test capabilities force the use of smaller test quantities, the resultant increase in total test uncertainties and errors needs to be recognized when establishing acceptance criteria tolerance.

§The bypass meter should be tested in accordance with the appropriate test requirements for the type of meter used.

**As this rate varies according to manufacturer, it should be determined for each type of meter tested.

§§Minimum test flow rates with corresponding accuracy limits in parentheses ( ) are alternative values, to accommodate concerns over test times or concerns over test benches being able to conduct testing at the smaller flow rates (without parentheses) reliably. Note that the flow rate values in parentheses are the lowest rates for the normal test limits from ANSI/AWWA C715, and as such would have accuracy limits of 98.5%−101.5%. If these flow rates in parentheses are used in Minimum Rate testing, then the recommended test flow rates for the Intermediate Rate should be twice those listed in the table. However, see the preceding footnote, detailing the preferred use of an intermediate rate determined for each specific make/model.

Metric Conversions: in. × 25.4 = mm, gal × 0.003785 = m^3, gpm × 0.2268 = m^3/h, ft^3 × 0.02831 = m^3.

Ford Meter Box® Test Bench Operating Instructions

Warranty

All merchandise is warranted to be free from defects in material and factory workmanship for one year from date of shipment from our factory. We will provide, free of charge, new products in equal quantities for any that prove defective within one year from date of shipment from our factory. Manufacturer shall not be liable for any loss, damage, or injury, direct or consequential, arising out of the use of or the inability to use the product. Before using, user shall determine the suitability of the product for user's intended use and user assumes all risk and liability whatever in connection therewith. No claims for labor or consequential damage will be allowed. The foregoing may not be changed except by agreement signed by an officer of the manufacturer.

No other warranties are applicable or may be implied, including the implied warranty of merchantability and the implied warranty of fitness for particular purpose and any warranty relating to infringement or the like, all of which are disclaimed.

Please Note:
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