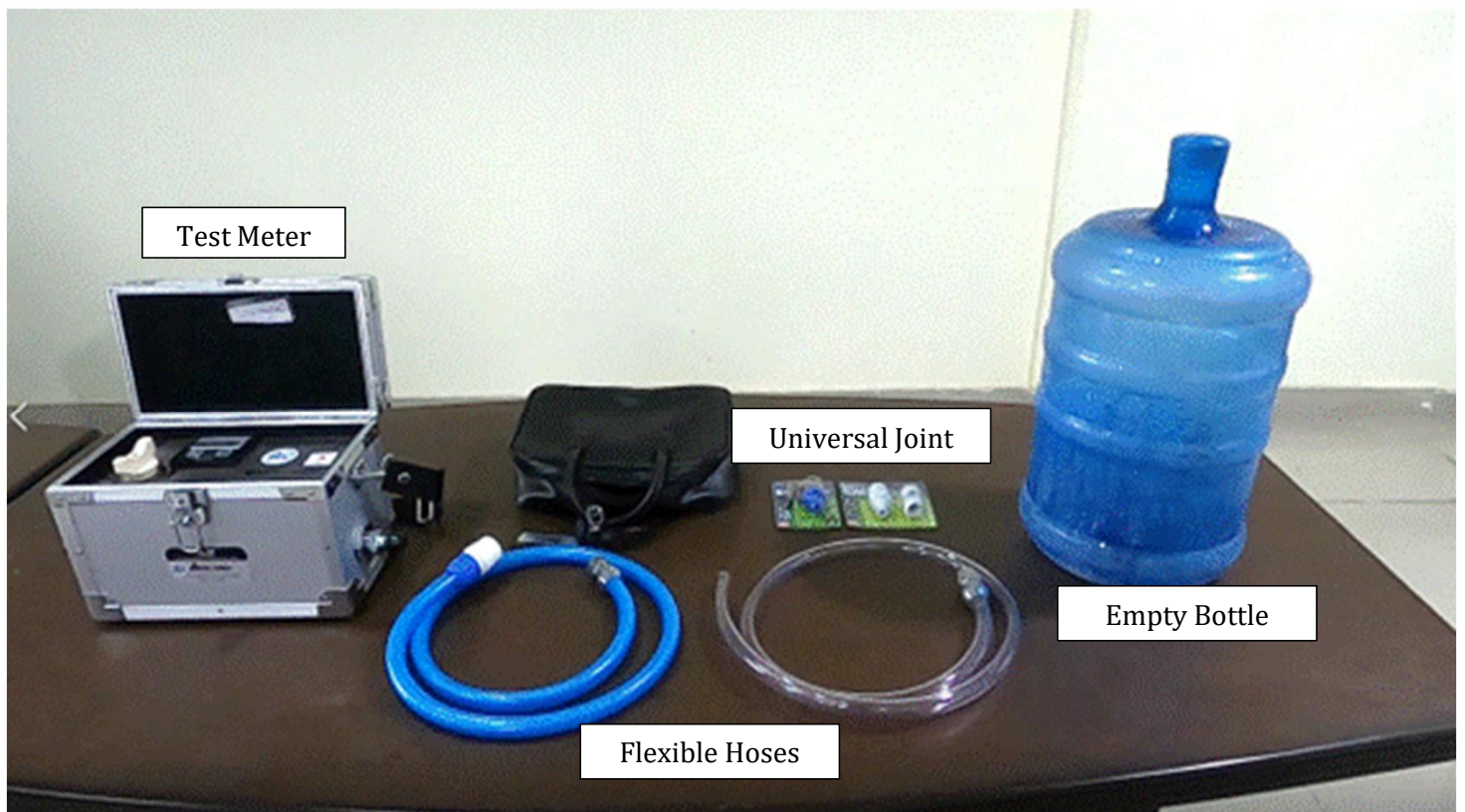


Standard Operating Procedure of Test Meter (TR-IV)

Preparation of items before going to the site

Necessary items



General requirement of customer meter

[KUKL Standard for Volumetric Water Meter (Rotary Piston)

DN15mm (1/2 inch)

R=160

Q1: 15.625 L/h (0.26 L/min)

Q2: 25 L/h (0.42 L/min)

Q3: 2.5 m³/h (41.67 L/min)

Q4: 3.125 m³/h (52.08 L/min)



Selection of Flow Range to be tested

Understanding about water meter accuracy

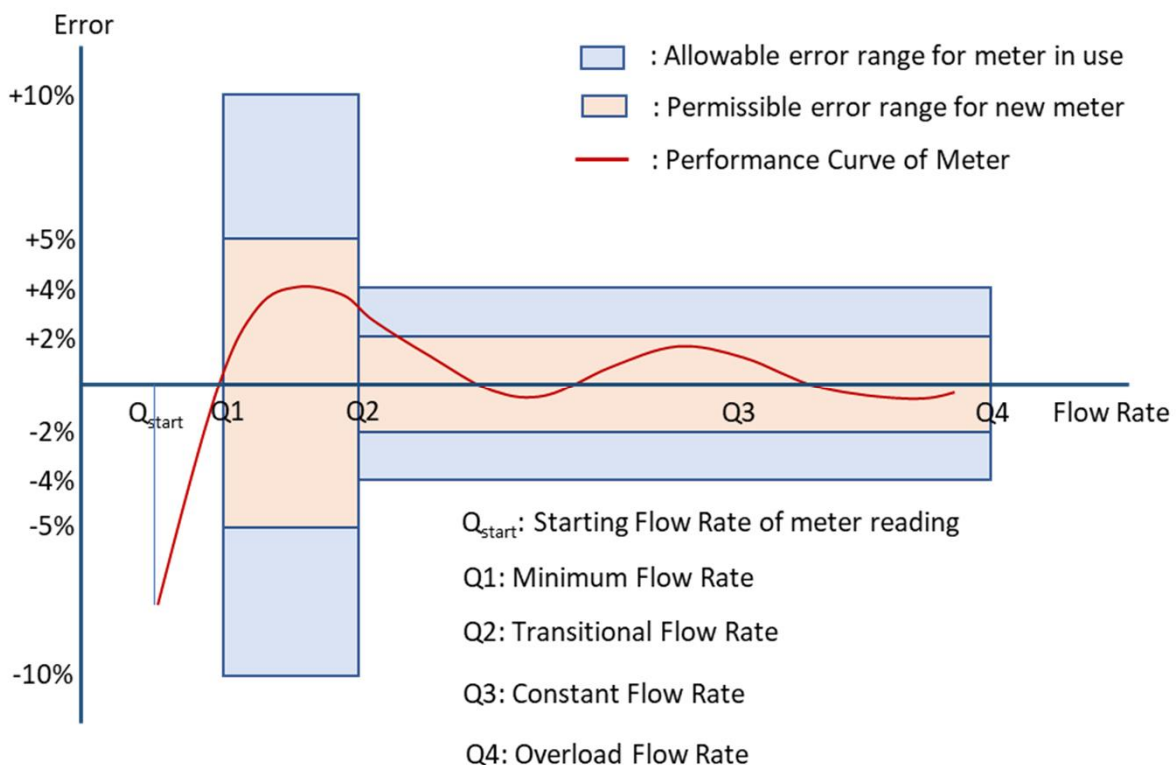
Tester is required to know how the accuracy of meter is defined by ISO or other international standards.

- ◆ The maximum flow rate of which the accuracy is guaranteed within permissible error range. This flow rate is called Q3.
- ◆ The minimum flow rate of which the accuracy is guaranteed within permissible error range. This flow rate is called Q1.
- ◆ The quality of meter is defined with R value calculated as $Q3/Q1$.
- ◆ If the meter complies with the ISO4064 standard, it guarantees an instrumental error of $\pm 5\%$ when $Q1 \leq Q < Q2$ and $\pm 2\%$ when $Q2 \leq Q \leq Q4$ as the inherent error of the meter.
- ◆ On the other hand, for a meter that is in use by customer, twice the above error is allowed.

[Allowable error of meter in use]

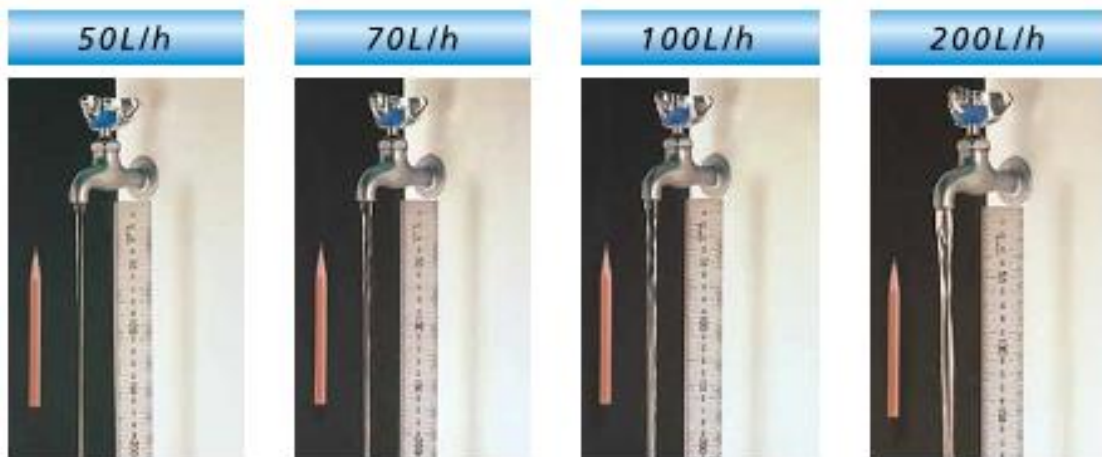
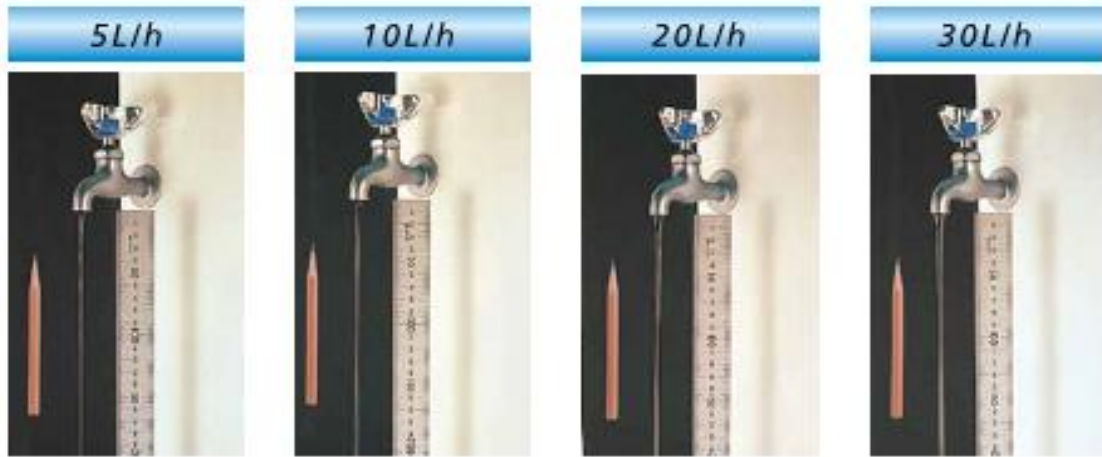
Flow rate $Q1 \leq Q < Q2$: within $\pm 10\%$

Flow rate $Q2 \leq Q < Q4$: within $\pm 4\%$



Selection of Flow Range to be tested

Image of Water Flow Rate



Format of Test Record

Date:

Meter Number:

Customer Name:

Customer ID:

Items	Flow Range		
	Extremely Low	Low	Middle
Flow rate			
Target Flow Rate for Test	15 - 25 L/h (0.25-0.4 L/min)	100 L/h (1.7 L/min)	200 L/h (3.3 L/min)
Required Water Volume for Test	2 Litter	10 Litter	20 Litter
Flow Rate in Test	L/min	L/min	L/min
Initial Reading of Customer Meter	L	L	L
Final Reading of Customer Meter	L	L	L
Counted Water Volume of Customer Meter (A)	L	L	L
Counted Water Volume of Test Meter (B)	L	L	L
Elapsed Time	min	min	min
Difference of Water Volume (A - B)	L	L	L
Instrumental Error of Test Meter (C) (Value indicated in the certificate)	No value	%	%
Current Error of Customer Meter (A - B) / B x 100 + C	%	%	%
Allowable Error Range	+/-10%	+/-4%	+/-4%
Evaluation	<input type="checkbox"/> OK / <input type="checkbox"/> NG	<input type="checkbox"/> OK / <input type="checkbox"/> NG	<input type="checkbox"/> OK / <input type="checkbox"/> NG

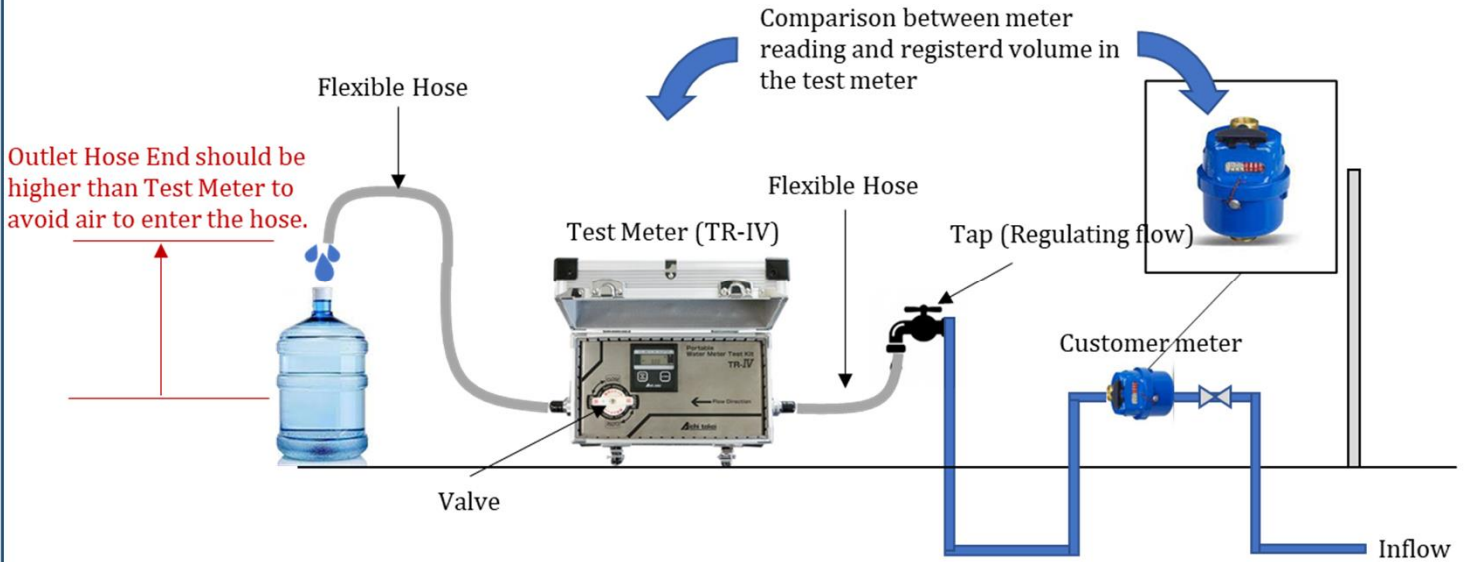
Signature by Customer

Signature by KUKL Tester

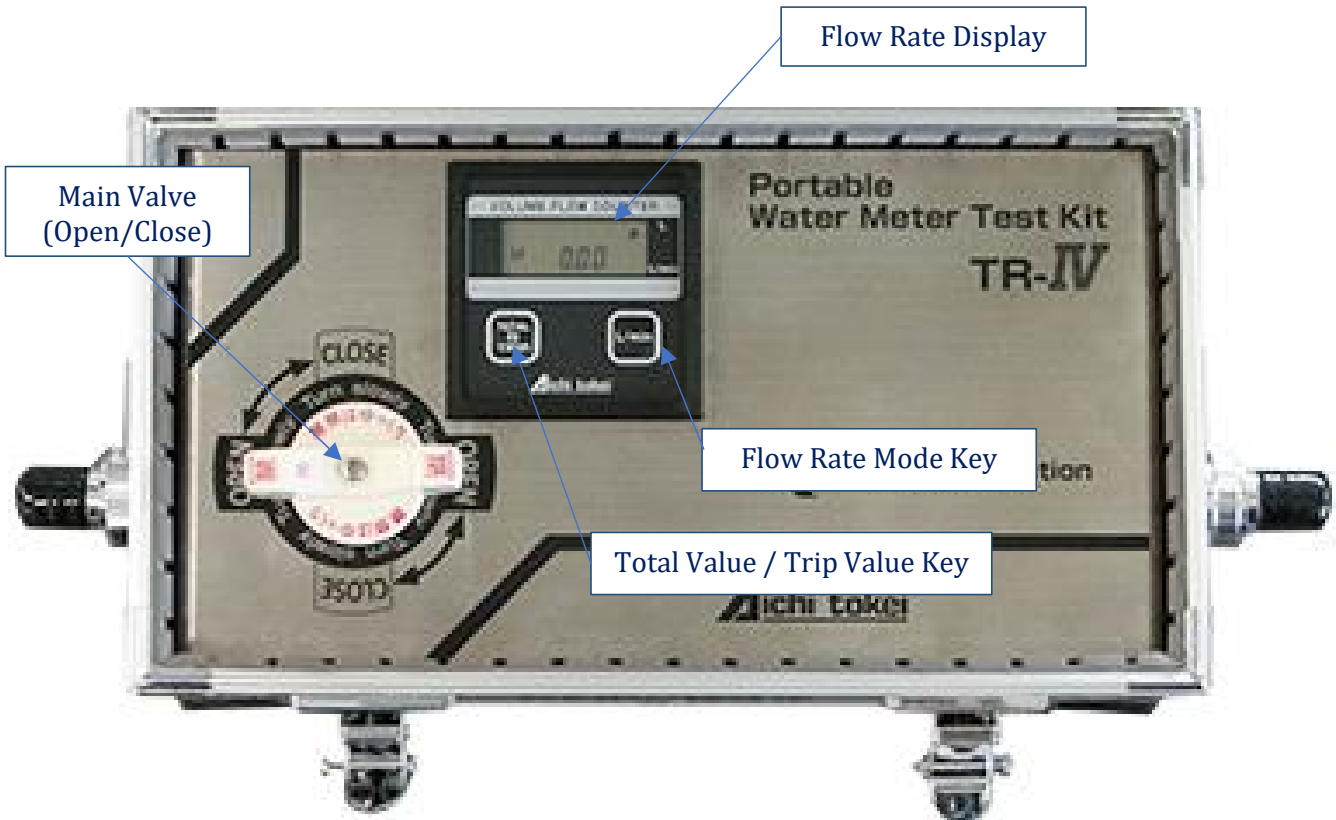
(Name)

Function of Test Meter

General Setting Layout



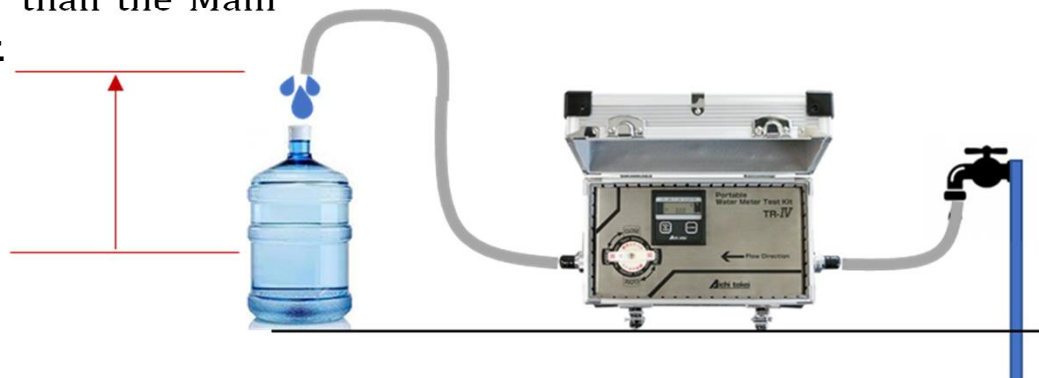
Function of Test Meter



Steps of Meter Accuracy Test

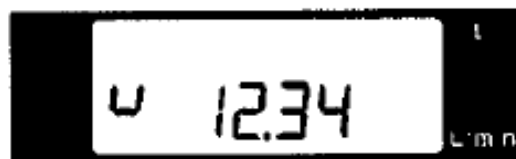
Step 1

At first, keep the outlet hose end at the level higher than the Main Body of Test Meter.



Step 2

Make sure that the display shows Instantaneous Flow Rate with a symbol “U”.



To change the flow rate mode from “Instantaneous Flow Rate” to “Hold Mode, press this key.



Step 3

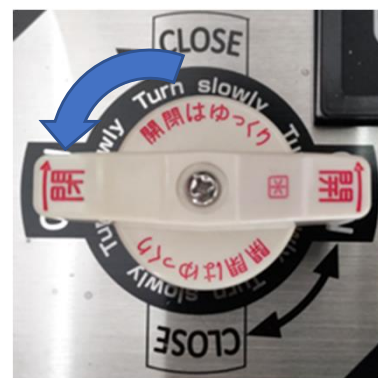
Fully open the Main Valve of Test Meter. Then adjust the flow rate throttling the tap to set the flow rate to the target flow rate.

[Target Flow Rate]

1st test: 0.3 - 0.4 L/min

2nd test: 1.7 L/min

3rd test: 3.3 L/min



Steps of Meter Accuracy Test

Step 4

After adjusting the flow rate to the specific range, fully close the Main Valve of Test Meter.



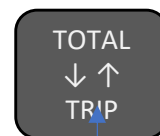
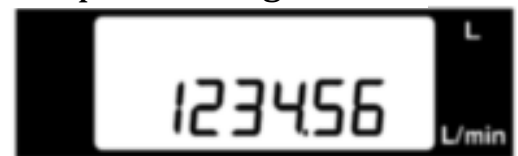
Step 5

Press [L/min] button for 3 seconds to change the display from “Instantaneous Flow Rate” to “Trip Totalizing Mode”.

This mode shows the accumulated value with 6 digits in maximum.

Then press [TOTAL/TRIP] key to set the indicated value “0”.

Trip Totalizing Mode



Press to zero-reset



3 seconds

Step 6

Check the current indicated value of customer meter and fill it in the record sheet.

This value will be “Initial Reading of Customer Meter”

This example shows
0000(m3) & 292 (L)



Steps of Meter Accuracy Test

Step 7

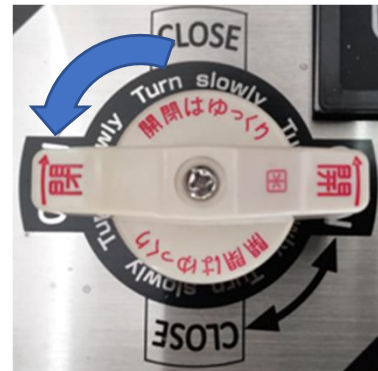
Open the shut off valve of Test Meter and start to measure the time.

Then wait until the Trip Totalizing Value shows more than specific volume as follows:

1st test: 0.3 - 0.4 L/min >>> 2 Litters

2nd test: 1.7 L/min >>> 10 Litters

3rd test: 3.3 L/min >>> 20 Litters



Step 8

When the counter reached the specific volume (2L, 10L or 20L), close the shut off valve and confirm the elapsed time of test.

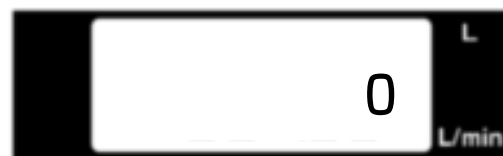


Step 9

Record the water volume shown in the display of Test Meter and fill it in the record sheet.

This value will be Counted Water Volume of Test Meter (B)

Start



Finish



Steps of Meter Accuracy Test

Step 10

Record the indicated value of customer meter and fill it in the record sheet.
This value will be “Final Reading of Customer Meter”



Step 11

Calculate the water volume that has been counted by the customer meter and fill it in the record sheet.

Counted Water Volume of
Customer Meter

=

Final Reading Value of
Customer Meter

-

Initial Reading Value of
Customer Meter

Step 12

Check the instrumental error (%) of the target flow rate range indicated in the test meter instrumental error report.

In the case of this example, the Test Meter has +1.2% of error in its indicated value in 100L/h of flow rate.

For Testing in Extremely Low Rate (0.3 - 0.4 L/min), no need to consider the instrumental error of Test Meter.

Instrumental error achievement table		
Product name	TR-IV	
Serial No.	151	
Official approval term of validity	Dec-2029	
<small>This product contains a battery powered water meter which is a specified measuring instrument.</small>		
Test date	13-Dec-2021	
Test tank	0.5m ³ tank	
Instrumental error		
High flow rate	Middle flow rate	Low flow rate
1000 L/h	200 L/h	100 L/h
16.7 L/min	3.3 L/min	1.7 L/min
- 0.4 %	+ 1.5 %	+ 1.2 %

Steps of Meter Accuracy Test

Step 13

Calculate the error of the water meter according to the formula.

$$\text{Error (\%)} = \frac{\text{Passed Water Volume of Customer Meter (A)} - \text{Passed Water Volume of Test Meter (B)}}{\text{Passed Water Volume of Test Meter (B)}} \times 100$$

+ Instrumental Error of Test Meter

Step 14

Perform Step 1 through Step 13 at different flow rates.

After finishing all the test in different flow rate, request the customer to confirm the result and fill his/her signature in the record sheet,



Step 15

Drain water accumulated in the test meter before storing Test Meter.

