

An Innovative Solution for the Reduction of Apparent Losses

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Under-registration of low flow rates is the main reason for apparent water losses. The UFR is an innovative product that reduces apparent water losses by changing the flow regime of low flow rates through the water meter. The UFR has been successfully tested and inspected worldwide.

World water consumption is increasing with the rise in population growth and technological development, while, at the same time, potable water resources are diminishing. There is a vital need for finding innovative solutions to reduce water losses in water supply systems. Most water meters are unable to measure flow rates less than 12 liters per hour. An innovative solution is the UFR (Unmeasured-flow Reducer), a product from A.R. I. Flow Control Accessories. Its main purpose is to reduce apparent water losses by changing the flow regime of low flow rates passing through the water meter. As a result, there is a reduction in the volume of immeasurable water and the domestic water meter is now capable of measuring water leaks.

International case studies

The main purpose of the case studies was to answer the following questions:

1. Can a water meter measure all flow rates?
2. Can the UFR reduce the unmeasured flow?
3. Is the contribution of the UFR to the flow registration of the water meter significant?

A statistical test is conducted to find out if there is unmeasured flow passing through the water meter at low flow rates.

Pilot field test methodology

In order to determine the contribution of the UFR the following steps are taken:

1. Selection of a DMA (district metered area) consisting of reasonable number of meter connections with a single feeding source with a main master meter.
2. Establishing the current water loss without the UFR by comparing the reading of the main meter with the sum of the domestic meters. The readings should be taken at long enough intervals and there should be no significant differences in the time the readings are taken in order to reduce differences resulting from additional consumption during a period of time readings were taken. AMR system enables collecting the readings from all meters at the same time is much more preferable.
3. Installation of UFR - and re-measuring the difference between the readings of the main meter and the sum of the domestic meters.

Case Study – Larnaca, Cyprus

This case study was conducted in Larnaca, Cyprus from October 2006 to December 2006. The DMA contains a variety of households: private houses, buildings and houses with roof tanks. The water meters in this DMA are as shown in figure 1 .

Distribution Water meters types

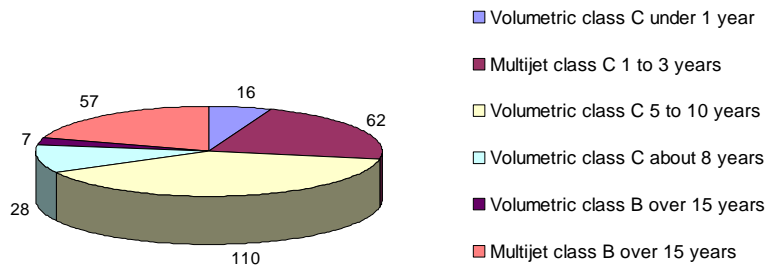


Figure 1.: Distribution of Water meters types in the DMA

Weekly readings were taken before and after the installation of the UFR. According to table 1 the contribution of the UFR was 9.93%.

	With UFR	Without UFR	DIFFERENCE
Area 1 consumer meters Total (Consumption)	3242.84	3066.48	
Area 1 bulk meter total (Demand)	3556.00	3667.00	
Not registered water in M ³	313.16	600.52	287.36
Not registered water as a percentage of the total Demand	8.81%	16.38%	7.57%
Not registered water as a percentage of the total Consumption	9.66%	19.58%	9.93%

Table1: Larnaca results with and without UFR

Case Study – Malta

The national water utility in Malta identified a small zone for pilot study purposes. The zone was chosen in accordance with the ages of the water meters in the zone, allowing for a normal distribution of meter ages with an average of five years in age. Poezija zone has 26 domestic consumers with volumetric class D (Qn=1 m³/hr) water meters and roof tanks on the buildings (figure 2). The UFR units increased the metered volume of water by a substantial 5.5% to 6% of the water supplied to the zone (Table 2).

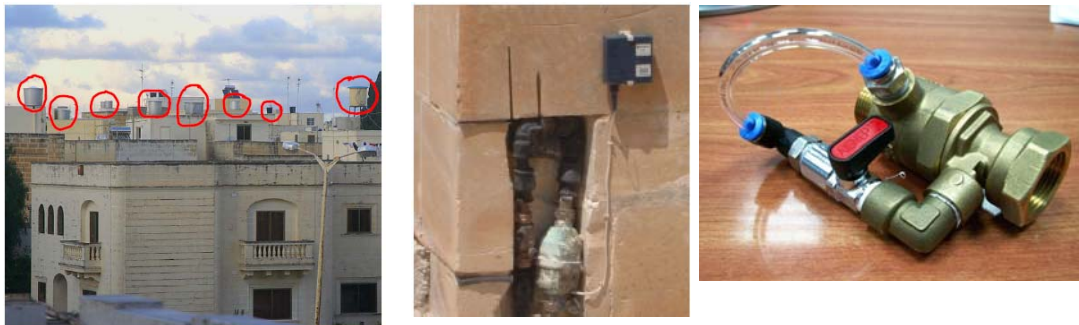


Figure 2: The pilot zone (left) where the UFR (right) was installed in Malta

Test No.	Global % Under-registration Vs. Master Meter		% Overall improvement
	Without UFR's	With UFR's	
1	18.1	12.1	6
2	26.7	21.2	5.5
3	28	22.2	5.8

Table 2: Effect of UFR's on Water Meter Under-Registration

Conclusions

Leakages and other unmeasured water flows at low flow rates were found in many of the households tested. The UFR succeeded in the reduction of unmeasured flow and was found very effective in reducing apparent losses. The UFR had a significant effect on the flow registration of the water meter. The UFR increased the water meter registration by 5% to 10%.

**Dr. Sharon Yaniv is a surge analysis specialist, giving lectures and seminars on surge, air valve placing and sizing on pipelines as well as dealing with water loss issues. Before joining A.R.I.Flow Control Accessories in 2007 she was Teaching Assistant in Hydraulics and Fluid Mechanics at the Faculty of Civil and Environmental Engineering, Unit of Environmental Water Resources Engineering at Technion – Israel Institute of Technology.