

Elster AMCO Water evolution™ Mobile Wireless Meter Reading System

an Overview



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1. Introduction

Radio interrogation of meters is now the most widely used Automated Meter Reading (AMR) technology in the world. Elster AMCO Water has developed automated metering systems that enable both fixed network and mobile data gathering. The Elster AMCO Water evolution™ mobile AMR and fixed network AMI are the most cost-effective and efficient solutions for automating the collection of meter readings and for the detection of leaks and tampering.

This document focuses on the Elster AMCO Water mobile AMR systems. Two methods of mobile data collection, also referred to as interrogation, are available: evoWalk™ and evoDrive™. The evoWalk interrogator employs a ruggedized handheld field unit that is a radio-enabled PC. The meter reader uses the evoWalk unit to walk throughout the water service area to automatically collect readings along the route. The evoDrive interrogator uses a ruggedized notebook PC and a mobile transceiver unit that are installed in a vehicle to drive a route and rapidly collect meter data. Each meter is paired with an evolution Radio Transceiver Module (evoRTM™) endpoint that transmits the meter data to the mobile collector system on demand.



Data Analysis					
	 Operations	 Reports	 Utility	 Billing	 Customer Service
Data Collection	evoWalk System: <ul style="list-style-type: none"> ◆ Completely Unlicensed 902 - 928MHz ◆ Full 2-Way Communications ◆ Datalogging last 35 days of daily readings 			evoDrive System: <ul style="list-style-type: none"> ◆ Licensed Wake Up – 952 or 956 MHz ◆ Response - Unlicensed 902 - 928MHz ◆ 2 way Capable w/ Datalogging last 35 days of daily readings 	
evoRTM Endpoints	 Residential / Suburban	 Residential / City	 Commercial		
Fully migrateable from mobile AMR to fixed network AMI without system change out					



2. evolution Radio Transceiver Modules

The basis for all of Elster AMCO Water AMR systems is the evolution Radio Transceiver Module (evoRTM Endpoint) that is connected to each meter either directly or through a short interconnecting cable. The Elster AMCO Water evoRTM Endpoint is a sealed unit that is suitable for installation above-grade or in a pit environment.

All evoRTM Endpoints are powered by a lithium battery that provides exceptionally long life and reliability. To further maximize battery life the evoRTM Endpoint only transmits its readings when it recognizes its specific 'wake-up', which is an FCC-licensed frequency and identification number.

When the specific FCC licensed frequency signal is received, the evoRTM Endpoint transmits the current register reading along with the status of all flags including residual leak, burst leak, tamper/communications error, and backflow (encoder type meters only).

Additionally, the evoRTM stores 35 register readings, at daily intervals, which can be acquired to gain a full months profile of meter readings. This information can be helpful in settling customer disputes, more accurate move-in/move-out readings, and analyzing usage in district metering applications for tracking lost water.

The accuracy and reliability of transmitted data is ensured in three ways:

- The evoRTM Endpoint only replies after detection of its unique 'wake-up call' containing its serial number.
- The evoRTM Endpoint will send its reply several times, each on different channels, in a pseudo random sequence in order to avoid interferers on any specific channel.
- The evoRTM Endpoint transmits an error-detection code with the meter data that is used by the interrogator to confirm that the data has been received without errors.

Data collected by an evoWalk or evoDrive interrogator are validated, audited and stored for uploading to the Route Manager software later, after the route is covered.



Integral Unit



**evoRTM
Endpoint**



3. evoDrive Mobile Collector system

The evoDrive Mobile Collector system is made up of the following components:

- Mobile transceiver unit
- Ruggedized notebook PC with touch screen
- evoDrive Software with Mapping
- Two antennas
- Bluetooth GPS receiver
- Route file transferred from Route Manager
- USB Flash drive for file transfer

evoDrive mobile transceiver unit

The evoDrive Mobile Transceiver is a Radio Frequency (RF) drive-by interrogator that transmits an FCC-licensed wake-up signal to evoRTM Endpoints which respond by sending back the meter reading and the status of all alarms.

After the wake-up frequency is received by an evoRTM Endpoint, the following data is sent back to the mobile transceiver as the vehicle is driving by:

- Current meter reading
- Leak detection status – Residual (drip) or Burst Leakage
- Tamper/Communications Error Status
- Battery Warning Status
- Reverse Flow (encoder type register only)

This collected data is passed to the evoDrive notebook PC where it is stored in a file.

evoDrive ruggedized notebook PC

The ruggedized notebook PC, with its evoDrive software, touch screen and mapping capabilities, provides an interactive graphical user interface for the operator.

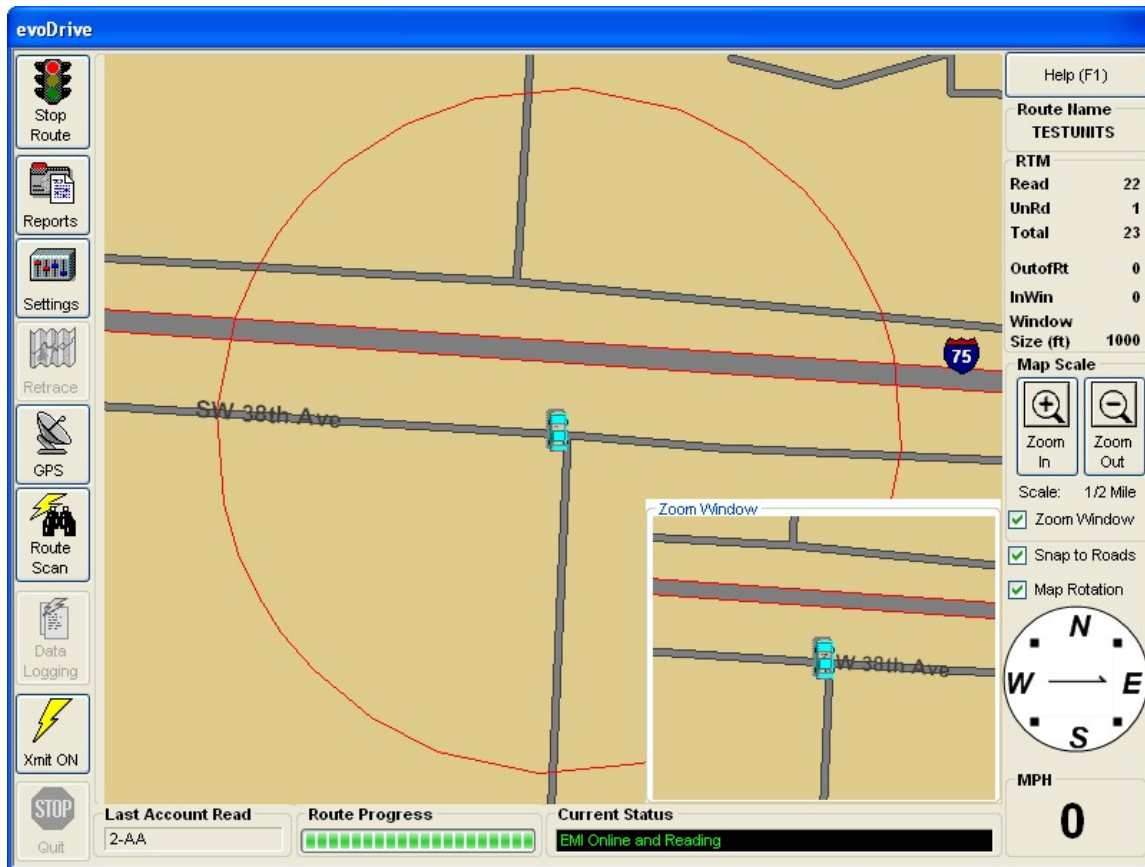
While moving through the area in which meters are to be read (the route), the notebook PC is Bluetooth-linked to a real-time GPS tracking



- 1 evoDrive Mobile Transceiver
- 2 evoDrive notebook PC
- 3 evoDrive application
- 4 Antennas
- 5 GPS
- 6 USB flash drive



system to keep track of its geographical position. This helps ensure that meters will be read efficiently, and that all meters have been read before the evoDrive system has moved out of the area.



evoDrive user interface

Using GPS, the interactive display shows real-time street maps marking the location of the meters and the vehicle as it moves through the route. The graphical representation of the evoRTM/meter on the display changes color as each meter is read by the Mobile Transceiver. Using this information, the user may make adjustments to the driving route to improve reading efficiencies and to ensure that all meters have been read before leaving the route.

Information about each account (e.g., serial number, addresses, reading, latitude, longitude, status, reading date and time, and current distance from the mobile transceiver) can be displayed either in real-time reports or retrieved individually by the evoRTM Endpoint's serial number or simply by touching the evoRTM Endpoint on the touch-sensitive screen (optional).

Through the interactive display, the operator can set mobile transceiver reading parameters and customize some display settings, such as when to provide audible feedback and the amount of detail to be shown on the display map. The evoDrive software maintains an audit file of operation and setting changes made over the course of a



route. This file can be replayed whenever it is desired.

The evoDrive software can process all data from the evoRTM Endpoint via the mobile transceiver, including current read along with all of the status flags.

The interactive display provides a graphical representation of the read process for each evoRTM Endpoint so the operator can quickly and easily identify route completion. The typical navigation screen items that are displayed to assist the operator include:

1. Vehicle location
2. Heading
3. Speed
4. Mobile transceiver read window
5. evoRTM Endpoints not yet 'awakened' for interrogation
6. evoRTM Endpoints read

The evoDrive Mobile Collector System provides the greatest efficiency for reading meters equipment with evoRTMs. When reading meters using the evoDrive Mobile Collector System, the driver should always comply with all posted speed limits and avoid interacting with the touch screen to ensure the safety of the driver and pedestrians.



4. evoWalk handheld system

The Elster AMCO Water evoWalk AMR system is based on a handheld mobile data collection unit running the evoWalk and evoLink software.

Each evoWalk ruggedized handheld computer runs a Microsoft® mobile operating system such as Windows® CE. The handheld device is loaded with the Elster AMCO Water evoWalk software, which enables simple and efficient meter data collection with alarm notification. The evoLink software is also loaded onto the handheld and is used for installing/replacing evoRTM Endpoints.

In addition to the evoWalk and evoLink software, the handheld computer is equipped with a radio transceiver that is used to communicate with, and automatically interrogate, evoRTM Endpoints.

Prior to walking the route, the handheld unit is loaded with the route information file, which can include the location of each account (evoRTM Endpoint). The route information file is provided via the Route Manager and is derived from the utility company's customer management and billing system.

With the route file loaded on the ruggedized handheld field unit, the meter reader simply walks through the route to automatically and effortlessly read nearby meters.

Upon returning to the utility operations center with the handheld field unit and collected route data, the route file is exported to the Route Manager, which then translates the data for the customer account management and billing system.



evoWalk
Handheld
Field Unit

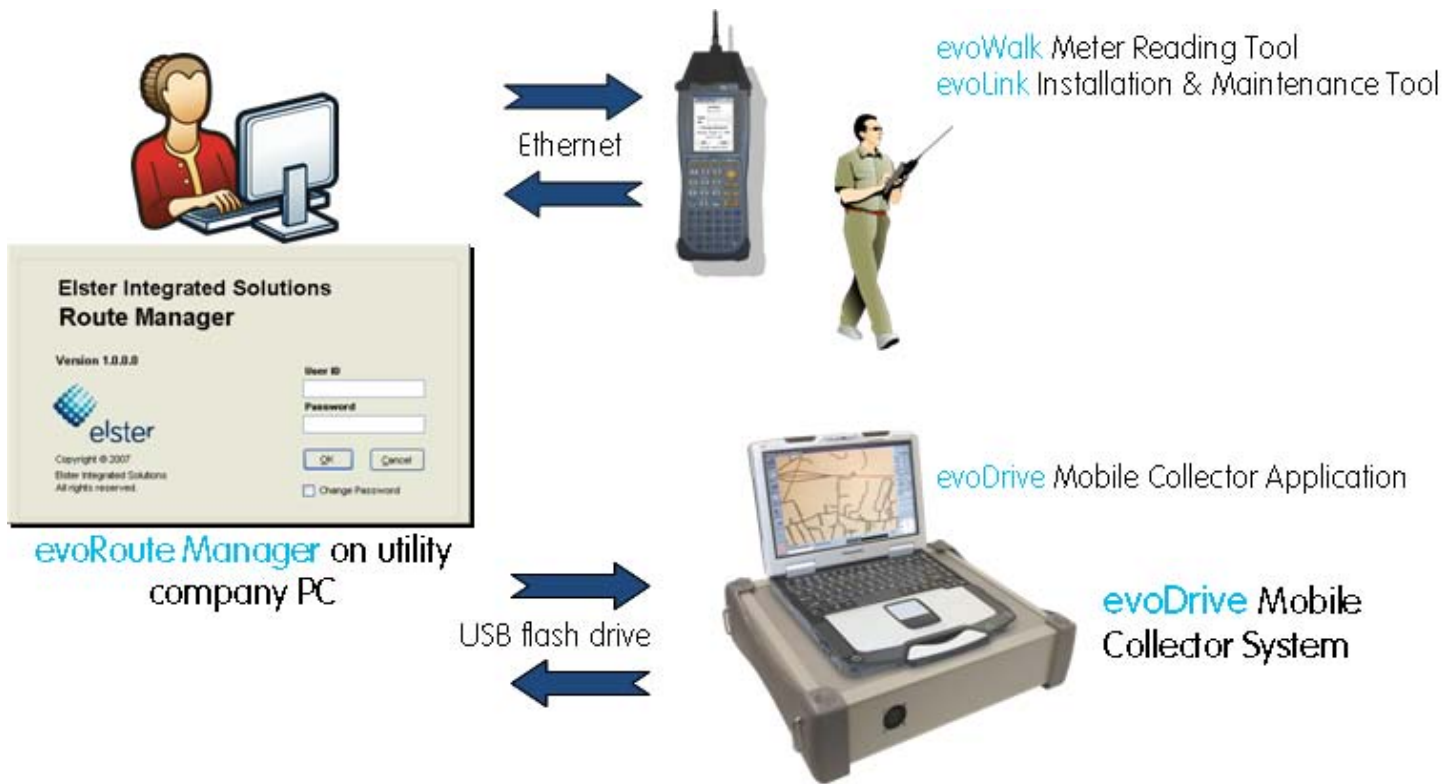


evoWalk main screen



5. evoRoute Manager software

The evoRoute Manager is the evolution mobile system software that links the evolution AMR systems with customer databases and billing systems and prepares route information for transfer to the evoWalk or evoDrive for meter reading.



Data is exchanged between the Route Manager and a Computer Information System (CIS) and billing system through route files. Route files read by the evoRoute Manager can include Electronic Meter Reading (EMR) or Touch Read, Manual Reading and Automated Meter Reading (AMR).

Routes, account data and interrogation devices are all managed through the Route Manager. Route data is transferred between the Route Manager and the evoDrive notebook PC using any removable storage media, most often a USB flash drive.



Account information can be viewed and edited through the Accounts section of the Route Manager software. This includes the manual entry of selected data. The Route Manager maintains up to 13 months of meter-reading data that can be viewed in tabular graphical formats. The Route Manager includes extensive searching and reporting capabilities including:

- System Audit Capabilities
- Skip Code, Second Trouble Code, Trouble Report, Trouble Message
- Inactive Accts Nonzero Usage Report
- Active/Inactive Accounts Support
- Active Accounts Zero Usage Report
- Detailed Reporting
- Import/Export Summary Reports
- Meter Reader Summary & Stats Report
- Monthly Reads Chart and Report

It is necessary to develop a software interface between the Route Manager and the CIS/billing system that the utility uses to accommodate the differences in record structure and content between the two software packages. The Route Manager is compatible with some of the most popular billing file formats including VRT and MVRS.

Additionally, a custom filter can be developed as a translator between the billing system and the Route Manager. This work is done in close coordination with the customer's CIS and billing system supplier. Elster AMCO Water provides the customer's CIS supplier with the Route Manager file layouts and technical assistance as necessary to complete the integration. Elster AMCO Water will test the completed interface for accuracy.



6. Service and support

Elster AMCO Water Customer Service

The Elster AMCO Water customer service team can be contacted during the following hours:

Monday through Friday – 8:00 AM to 5:00 PM EST, excluding holidays

You can reach the customer service team by calling:

1-866-896-8858

Elster AMCO Water Technical Support

Elster AMCO Water technical support specialists are a highly skilled group of individuals who have been selected for their dedication to customer satisfaction. The technical support team is on call during the following hours:

Monday through Friday – 8:00 AM to 5:00 PM EST, excluding holidays

You can reach the technical support team by calling:

1-866-896-8879

Please note: If you are calling after hours, or a technical support person is not immediately available, you will be directed to a voice mailbox. Please leave your name and number along with your question or a brief description of the issue. A tech support person will return your call as quickly as possible.

Email: techsupport@us.elster.com



7. Revision history

Issue Number	Changes	Release Date
1	Initial release	07/20/09
2	Updated AMR artwork figures and changed Route to evoRoute	

About Elster AMCO Water, Inc.

Located in Ocala, Florida, Elster AMCO Water is part of Elster, the world's largest metering and smart metering systems solutions company. Elster AMCO Water is an industry leader in the development and implementation of innovative metering and system solutions and is committed to delivering superior customer service, quality products, solutions and services to the water utility industry.

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