



Electronic Marker Systems

REFINED MARKER TECHNOLOGY FOR

UNDERGROUND UTILITIES

DIG SAFE. DIG RIGHT. SAVE TIME.

Mark and Locate ALL Buried Services:

Water / Gas / Comms / Electric / Transport & more



- EML100



TEMPO
COMMUNICATIONS

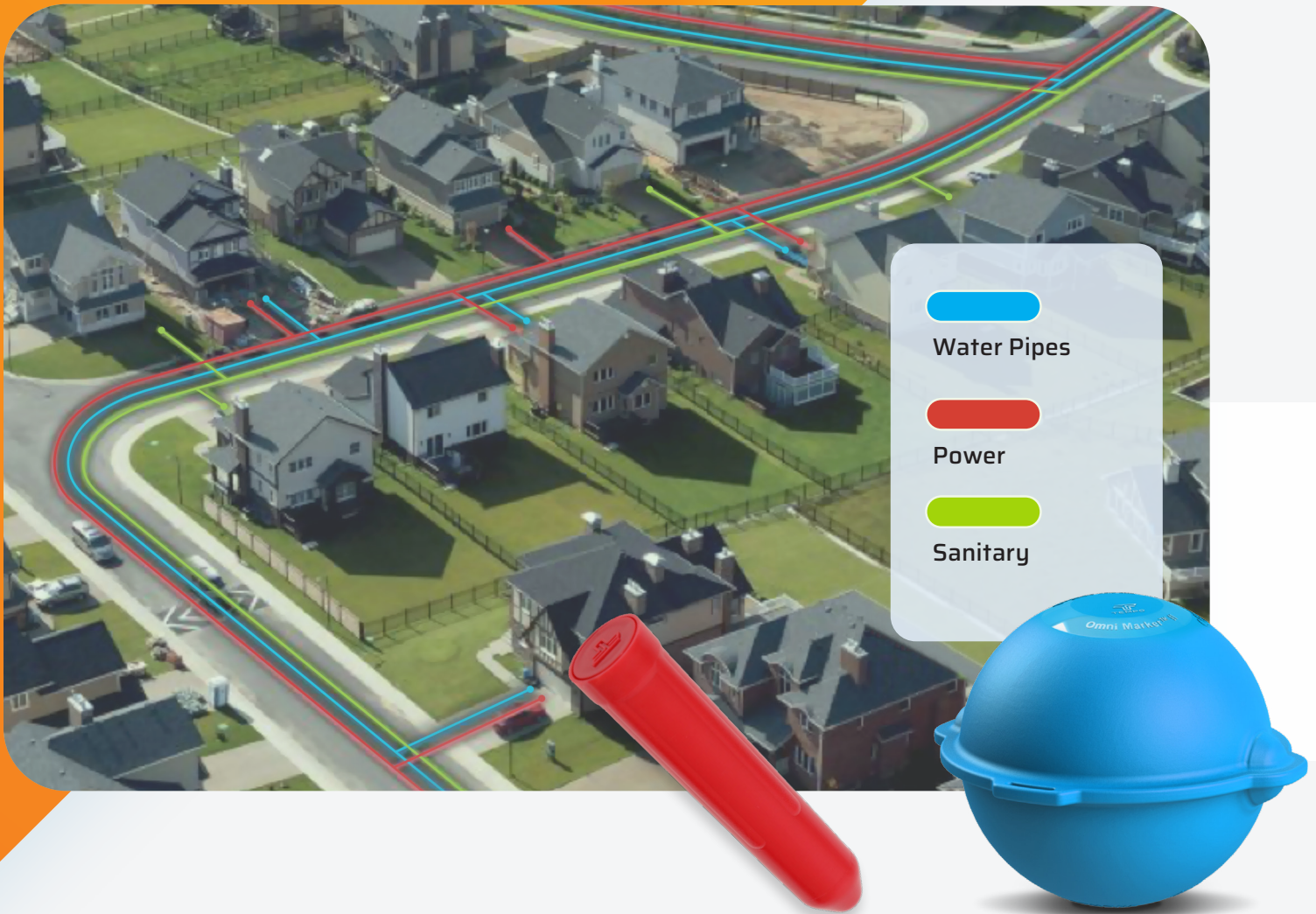
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MARKING, DETECTING & MAPPING YOUR NETWORKS



A marker for your site's essential needs

The need to increase safety during works and preserve buried assets.

Unclear cartography, old uncharted connections, etc. and lack of knowledge of the location of underground networks can lead to considerable damage every year: pollution of the environment, health risks for workers, disruption to residents, floods, electrocution, etc.

Plastic pipes and other non-conductive services are especially difficult to locate normally, but with markers you can quickly and easily resolve all these issues.

Legislation around the world is getting tighter regarding street-works.



France

Building without destroying is the objective of the NF S70-003 Standard. In force in France since July 2012, it oversees the preparation and execution of works carried out near underground and overhead networks.



UK

In the UK the Health and Safety Executive publish guidance note HSG47 that clearly sets out requirements to carry out risk assessment including paper and physical survey of the site before digging. Check with LSBUD and directly with utilities and survey the site thoroughly.



North America & Australia

In North America and Australia, there are various “dial before you dig” laws and “job ticketing” schemes operated nationally, by states and cities. All aiming to reduce disruption and ensure that the best possible practices are followed.



Main challenge for network operators facing these new standards:

- *Increase safety during works*
- *Project site delays*
- *Preserve buried assets*
- *Costs management*
- *Environmental protection*
- *Resident impact*



A marker for each type of network

Drinking water, gas, telecommunications, sanitation, electricity, lighting, etc.

Passive markers are an essential tool for network asset management. They are buried alongside new networks as they are deployed or during maintenance work.

Used for marking the network and its key points (connections, elbow, depth or direction change), they have demonstrated their unique ability to precisely locate and identify the network location regardless of the type of the soil in which they are buried (earth, sand, concrete, etc.).

Passive markers can be identified in the presence of power supply networks, metal pipes, grids and other passive markers, provided that the installation conditions are met.

Red for electricity, blue for water, etc. these markers with several different colors and frequencies save time, optimize human and material resources and help avoid costly maintenance errors.



REFINED MARKER TECHNOLOGY FOR EVERY APPLICATION

Passive markers: Precision localization, over 1.50 m deep.



How does the marker work?

The passive marker uses a magnetic antenna. It consists of an inductive coil acting as an antenna and capacitance allowing the LC circuit to resonate at the precise working frequency. Tempo Communications markers are passive antennas with no power or active components. The marker derives its energy from the magnetic field of the detector.

Their housing is made of the same high-density polyethylene as the majority of buried plant, very robust, waterproof, and resistant to the action of chemicals and temperature hazards. The markers are interoperable since they operate on well-defined frequencies according to industry standards: 145.7 kHz for drinking water, 101.4 kHz for telecommunications, 83 kHz for gas, etc.

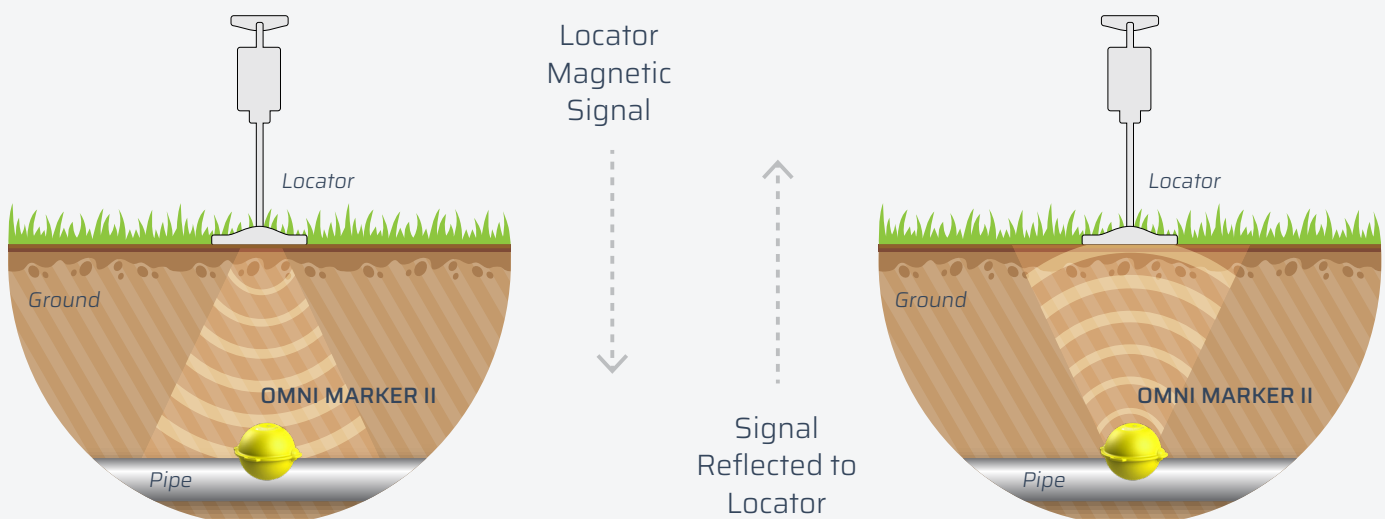
The markers are detected by induction (without

contact, from above the surface). This non-intrusive technique makes it possible to locate all pipelines, regardless of their nature. This enhances the quality of any survey carried out before work; helping to reduce confusion and enhance safety.

Marking your networks: <1%* of the overall cost of a project. Less than the cost of pulling out a pipeline!

By positioning them throughout the network and using complementary solutions (marker detector and GPS plus GIS database), they can be mapped, point by point, with GPS coordinates (X,Y) and the depth of the network (Z).

*According to studies conducted by Tempo Communications.
May be changed without notice



Omni Marker II's Self-Leveling Large Diameter Coil Structure Ensures Precise Location.



Easily Located Up To 5 ft. Away

The Omni Marker II provides a strong field that is easy to detect months or years later, with a signal peak directly above the marker for precise location within inches.

No need to stay level when buried.

The Omni Marker II's self-leveling coil assembly means you can "fit and forget". Attach the marker to the service and backfill. The coil will settle to give a precision location directly above.



Compatible with All Marker Locators

Because Omni Marker II uses industry standard frequencies, they will work with any electronic marker locating devices. Ask your sales representative about the EML100 Marker-Mate™ locator which can detect them all with it's unique "scan" mode.



Passive, High Reliability Design Assures Many Years of Service

The Omni Marker II contains no batteries or active components, and is built using the same high-reliability, long life materials as its predecessor ensuring that these markers will last as long as your buried plant.



Lightweight, with No Hazardous Chemicals

The Omni Marker II contains no potentially hazardous chemicals. This eliminates the need for material safety data sheets. Plus, the Omni Marker II's durable, lightweight design keeps your shipping and storage costs low while giving you years of reliable service.



Spike Marker's Compact Form Ensures Precise Marking In Tight Spaces.

Optional Mounting Points to Couple Directly with 7mm "Microduct Coupler"

Protection

Resonant Coil

Rugged Enclosure



↑
3.3ft
↓

Precisely Located Up To 3.3 ft. Deep

The Spike Marker provides a strong field that is easy to detect years later, with a signal peak directly above the marker for precise location within inches.



Compact and Easy to Install

The Spike Marker is small, just 20mm $\frac{3}{4}$ " diameter meaning you can "fit almost anywhere". Attach the marker to the duct or service and backfill. The coil will give a precision location directly above.



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APPLICATIONS



Non-Potable Water



Cable TV



Gas



Fiber Optic



Telephone



Sanitary



Europower



Water



Power



Precisely locate non-conductive lines

The use of polyethylene networks is widespread in the gas, water and sanitation networks. However, once deployed, their detection is nearly impossible.

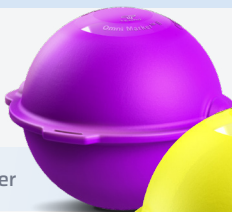
The same is true for new telecommunication networks, more specifically, fiber optic networks.

The “as-built” maps may include the network’s GPS coordinates, allowing it to be located precisely at time of installation. Do your maps get updated to allow for tectonic movement or slow landslips; which over decades can easily amount to metres of error. Also, field teams are rarely equipped with high precision GPS, the inclusion of passive markers, facilitates the precise location before digging. Get to the area with general purpose GPS and mapping, then scan

the ground for markers to precisely identify where to dig.

Resonant markers allow quick, accurate and positive identification of the network.

Non-Potable Water



Fiber Optic



Sanitary

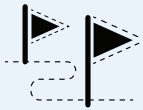




Increase the safety of your employees and preserve your assets.

The presence of passive markers also makes it possible to quickly verify the plans communicated to the field teams by the network operators, to precisely position within the network and avoid clashes with other buried utilities.

In the event of emergency work, the presence of markers is very useful, aiding the quick and easy search of all networks to avoid, and thus avoiding costly maintenance errors.



Locate notable points on the network

Whether it is gas, electricity, telecommunications, district heating or water, a network usually has some key points, which also represent weaknesses:

- Wastewater connection
- Junction boxes access chambers
- Repair or splice
- Network crossing
- Change of direction and change of level

These notable points are generally difficult if not impossible to spot from the outside by the field teams. The installation of passive markers, allows future workers to identify them quickly by differentiating them from the rest of the network.



Mapping the network at lower cost: closed trench geo-referencing

The geo-referencing of an open trench network requires the regular presence of a competent person and the availability of the appropriate equipment. This service can quickly become very expensive.

One solution: closed trench geo-referencing by positioning markers along the network during works.

This then followed, perhaps within a few weeks by a precision survey to complete the regulatory compliance of the installation and logging of the mapping surveys.

REFINED MARKER TECHNOLOGY

EASY INSTALLATIONS

Installation instructions

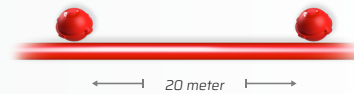
Resonant markers are best placed above or to the side, just be consistent, to a maximum depth of 1.5m (5ft) for Omni Marker or 1.0m (3.3ft) for a vertical Spike marker. Omni Markers can be fixed with one or two cable ties or using special adhesive clips. Spike marker can be pushed into backfill or can be mounted more securely with optional adaptors.

Omni Markers can be buried in any orientation as their peak sensitivity is always directly above. Spike markers however should be vertical wherever possible for maximum working depth. However, they remain reliably detectable to 2ft, 0.6m when horizontal and several customers are using them in this orientation.



Linear Runs

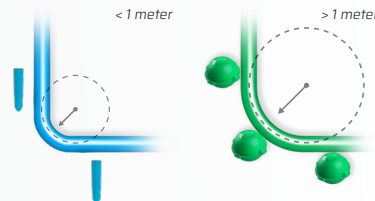
In linear runs, a marker is usually placed every 20 meters.



Radial Runs

for a radius of curvature less than 1 meter, 2 markers will be placed (most frequent cases for a connection)

for a radius of curvature greater than 1 meter 3 markers will be placed



Bypass Attachments

If there is an underground bypass attachment, a marker may be placed on the network as close as possible to the bypass attachment. It represents the starting point of the connection to the network.





TEMPO PRODUCTS



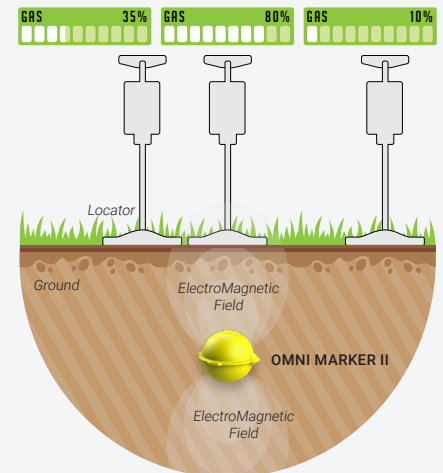
Omni Marker II: The superior “ball”

Designed for use in narrow trenches ranging from 10 cm wide to 1.50 m deep, this passive electronic marker contains a self-leveling coil.

The Omni Marker II contains a large diameter resonant coil structure. When excited by a locator at the standard frequency, these totally passive circuits produce a precise “dipole” magnetic field above and below.

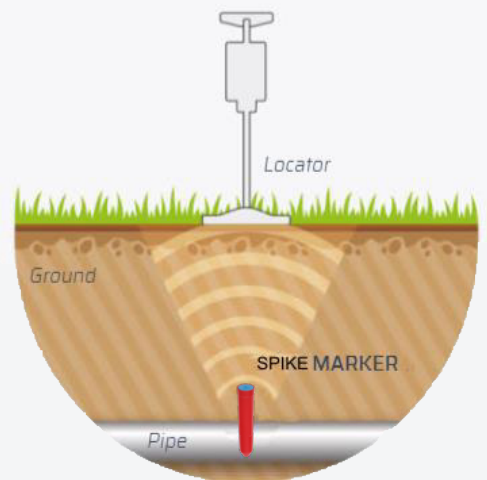
It therefore allows for a precise position, regardless of how it is placed in the ground, optimizing accuracy of location.

Lightweight and posing no risk of pollution, it is totally passive and contains no fluid, and is built with maximum durability in mind. It is designed to last as long as the underground network and can be reused if excavated.



Spike Marker:

Spike Markers are designed for marking objects buried in soil up to one meter (3.3ft) deep. This covers most utilities’ “distribution” ducts and similar applications such as cable TV drops, fiber drops, traffic light control cables, or power, gas, and district heating lines to properties. Spikes are ideal for shallow, narrow ducts where the Tempo Omni Marker II is impractical.



SPECIFICATIONS	OMNI MARKER II	SPIKE MARKER
Range	Working depth, at least 1.5m deep (Omni Marker)	1.0m deep (vertical Spike marker)
Marker Diameter	100 mm minimum	19.8 mm
Weight	0.3 lb (.15 kg) / 11.3 lbs (5.2 kg) per carton of 30	.07 lb (.03 kg)/ 3.7 lbs (1.7 kg) per carton of 50
Identification	By color	
Detection Field	Dipole magnetic field	
Case	High density polyethylene	
External Materials	High density polyethylene. Marker is waterproof and resistant to acids, alkalis and solvents. The same material as used for the majority of underground plant and accessories.	

APPLICATION	COLOR	FREQUENCY	OMNI MODEL #	SPIKE MODEL #
Non-Potable Water	Purple 	66.4 kHz	OM-01	SM11
Cable TV	Orange Black 	77.0 kHz	OM-02	SM12
Gas	Yellow 	83.0 kHz	OM-03	SM13
Fiber Optic	Yellow Black 	92.0 kHz	OM-04	SM14*
Telephone	Orange 	101.4 kHz	OM-05	SM15*
Sanitary	Green 	121.6 kHz	OM-06	SM16
Europower	Blue Red 	134.0 kHz	OM-07	SM17
Water	Blue 	145.7 kHz	OM-08	SM18
Power	Red 	169.8 kHz	OM-09	SM19

*Fiber Optic version (SM24) and Telephone version (SM25) available with 7mm coupler cap for attachment to microducts with compatible coupler.