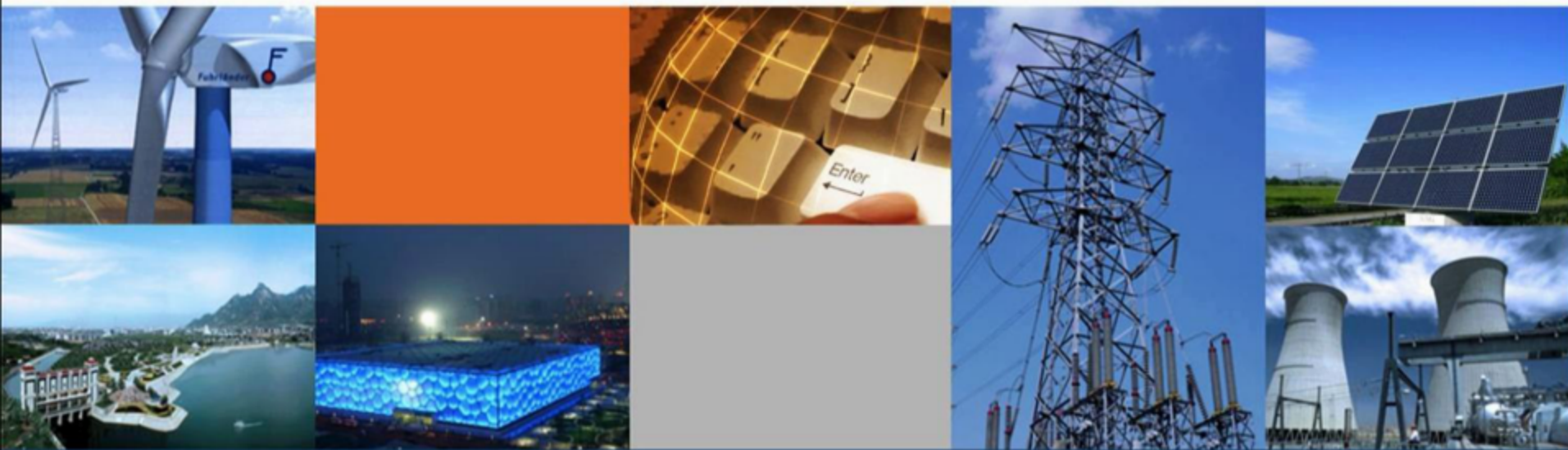


# Location System of Electric Identifiers of CK-GTR650 Pipelines

August 2016



**YANZEO**

**CHENKONG**  
晨控自动化



**I**

**Difficulty and Meaning of Underground Pipeline Management**

**II**

**Solutions**

**III**

**Cases**

# Meanings of Underground Pipeline Management

With the rapid development of economy and acceleration of urban construction pace, pipelines including gas, water supply and electricity in municipal pipeline network are becoming larger and more complex. The comprehensive pipeline management level of a city directly reflects its development level and potential. Additionally, due to requirement of national strategy, various major cities have successively started to implement the overhead network project, which requires a sustainably-developing informatization scientific method to cooperate with the project implementation due to its large scale.



electric cables- "lifeline" of cities



"30% equipment and 70% searching" is the conclusion for urgent repair of electric cable failure, which reflects:

- large amount of time is spent on location searching of pipelines;
- failure urgent repair depends too much on experience of repair personnels;
- scientific methods lack in urgent repair sites.



# Difficulties of Electric Cable Management



complex sites

➤As for daily management, it is hard to realize tangible regular patrol inspection.

➤The responsibility of patrol inspection can not be implemented clearly.

➤Accidents usually occur suddenly. In urgent repair for large-scale power-off and electricity use of key users, senior management personnels are shouldering huge working pressure



terrible environment



accident uncontrollability



repair urgency



## File Materials

- inaccurate records
- drawings that cannot completely accord with the reality
- some underground facilities that are not marked on the map
- waste underground facilities

*informatization management of underground pipelines demands immediate attention!*



## Environment

- complex underground facilities
- changes in urban landscapes
- soil conditions and types
- loss of original marks
- limits of urban appearance planning

## Personnel&Technology

- limits of location technology level and experience
- application of new materials
- alternation of maintenance personnels



The market urgently requires solutions to problems above

**professional technology methods**

# Advantages of RFID Electric Identification Management

- immediate site location and immediate determination of cable property when failure occurs
- clear responsibility of daily scheduling objectives
- tangible patrol inspection and complete implementation of patrol responsibility
- global management of basic database for decision-making and professional analysis
- simple on-site operation



the whole-process data management in the office



marks are accurately distributed to each cable

序号	名称	位置	日期	备注
1	110KV母线	110KV母线	2014-09-21 10:00	
2	110KV母线	110KV母线	2014-09-21 10:00	
3	110KV母线	110KV母线	2014-09-21 10:00	
4	110KV母线	110KV母线	2014-09-21 10:00	
5	110KV母线	110KV母线	2014-09-21 10:00	
6	110KV母线	110KV母线	2014-09-21 10:00	
7	110KV母线	110KV母线	2014-09-21 10:00	
8	110KV母线	110KV母线	2014-09-21 10:00	
9	110KV母线	110KV母线	2014-09-21 10:00	
10	110KV母线	110KV母线	2014-09-21 10:00	
11	110KV母线	110KV母线	2014-09-21 10:00	
12	110KV母线	110KV母线	2014-09-21 10:00	
13	110KV母线	110KV母线	2014-09-21 10:00	
14	110KV母线	110KV母线	2014-09-21 10:00	
15	110KV母线	110KV母线	2014-09-21 10:00	
16	110KV母线	110KV母线	2014-09-21 10:00	
17	110KV母线	110KV母线	2014-09-21 10:00	
18	110KV母线	110KV母线	2014-09-21 10:00	
19	110KV母线	110KV母线	2014-09-21 10:00	
20	110KV母线	110KV母线	2014-09-21 10:00	

decision data support



# Electric Identification and Location System CK-GTR650 Underground Pipelines



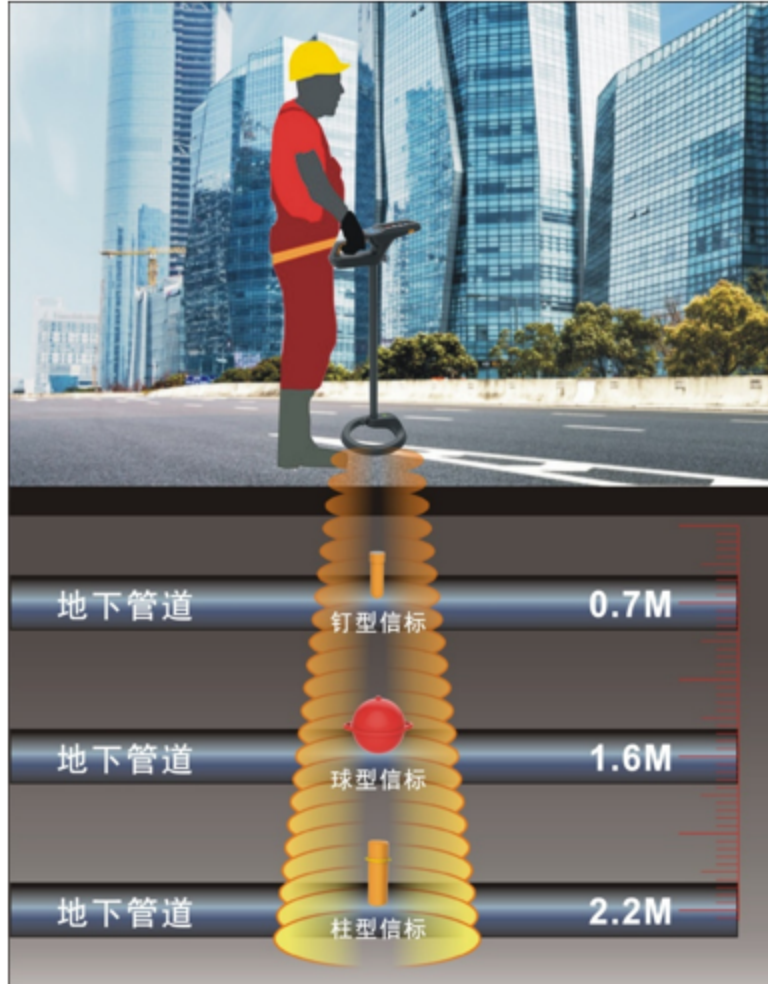
informatization management of  
underground pipelines  
accurate location of underground  
pipelines

enhancement of digging security  
management of underground  
pipelines

guarantee of accurate digging  
reduction of digging areas

electricity; communication; water drainage; water supply; CATV; gas; common use

# Principles RFID Electric Identification and Location



underground pipelines  
nail-shaped beacon  
ball-shaped beacon  
column-shaped beacon

electric beacon  
marker

detecting antenna

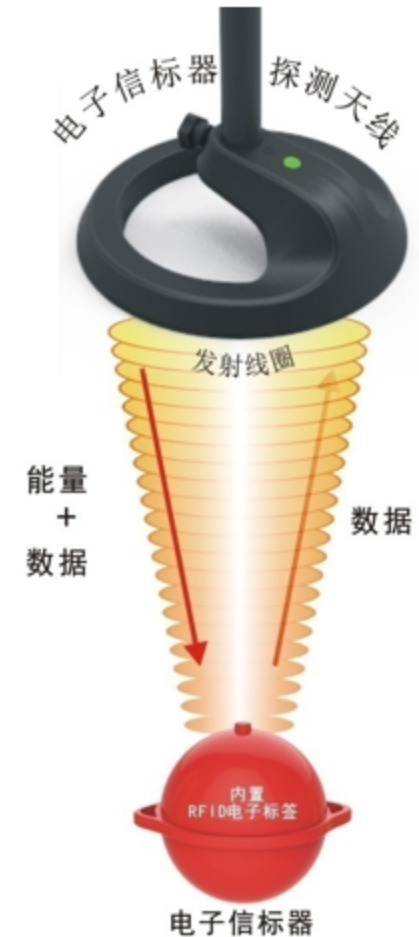
transmitter coil

energy+data

data

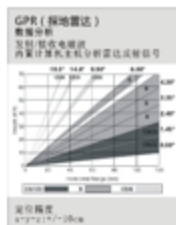
internal RFID  
electric beacons

electric beacon  
markers



RFID electric beacons are pre-buried near pipelines;  
Electric beacons work passively without batteries;  
Service life surpasses 50 years.

# Comparison Among Three Major Underground Pipeline Detection Technology



GPR (Ground Penetrating Radar)  
data analysis  
launch/receive electromagnetic waves  
internal computer host that analyzes radar  
reflection signal  
location accuracy

GPR (探地雷达)  
土壤类型  
适合各种土壤  
需要专用天线,  
校准效果取决于覆盖土层类型  
(覆盖土层材质影响波速度)

识别功能  
无

主要应用  
适合各种行业, 对体积较小的目标  
物体不适合, 探测目标区域不能有  
复杂地下管网

GPR (Ground Penetrating Radar)  
soil type  
be suitable for various soil  
need special antenna  
calibration effects depend on the type of  
covering soil (covering soil material  
influences wave velocity)  
identification function  
none  
major application  
be suitable for various industries; be not  
suitable for targeted objects with smaller  
sizes; complex underground pipeline network  
should not exists in targeted detection region



pipeline localizer  
data analysis  
the strength of the maximum magnetic field  
signal above measured pipelines is measured  
to determine the location of central axis  
location accuracy

管线定位仪  
土壤类型  
适合各种土壤  
但不适用存在严重电磁场干扰的土壤

识别功能  
无

主要应用  
适合各种行业, 但非金属管道,  
塑料管道不适用  
在管道中插入非金属定位探头需要安排  
停运; 新设施工中非常容易损坏  
非金属管道里的失踪线

pipeline localizer  
soil type  
be suitable for various soil  
be not suitable for soil with severe  
electromagnetic field interference  
identification function  
none  
major application  
be suitable for various industries; be not suitable  
for metal and plastic pipelines  
suspension needs to be arranged for insertion of  
non-metal localization detectors into pipelines;  
missing lines in non-metal pipelines are quite  
vulnerable to damages in new construction



RFID data beacon marker  
data analysis  
abundant information stored in RFID  
electric marks is read according to diameter  
location accuracy

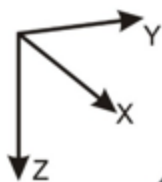
RFID数据信标器  
土壤类型  
适合各种土壤

识别功能  
有

主要应用  
所有类型管材, 所有尺寸的管径,  
各种特征, 如阀门、三通、拐弯等  
探测信标时无需安排管线停运,  
并且可以直接读出管径类型, 行业,  
维护记录等信息

RFID data beacon marker  
soil type  
be suitable for various soil  
identification function  
exists  
major application  
pipeline materials of all types; pipeline  
diameter of all sizes; various  
characteristics, such as valve, triplet and  
turning points;  
pipeline suspension is not necessary in  
beacon detection; information like  
pipeline types and industrial maintenance  
records can be directly read

# Functions of CK-GTR650 Landmark Detector



## 定位功能

- 3维定位芯片  
XY平面位置定位：定位 $\pm 5$ cm  
Z(测深)：精度 $\pm 5$ cm
- Android 5.1操作系统，自带GPS, 4G通信，可直接在google地图上查看信标地理位置
- 有效探测深度2.2m
- 支持探测各行业地下管线
- 对覆土物条件没有要求，不受周围各种严酷环境影响

location functions

3D location chip

XY-plane location: location  $\pm 5$ cm

Z (depth): accuracy  $\pm 5$ cm

Android 5.1 operation system with GPS and 4G communication; geographical locations of beacons can be checked directly on Google Map

effective detection depth of 2.2m

support detection of underground pipelines of various industries

have no requirement for soil covering materials

is not influenced by surrounding cruel environment

# Electric Beacon Marker of GT Series

ground  
surface



nail-shaped  
electric beacon

0.7m



hard surface, such as  
tarmac  
roads and sidewalks, etc.

ball-shaped  
electric beacon

1.6m



soil surface, such as green  
belts

column-shaped  
electric beacon

2.2m



soil surface, such as fields  
and green belts

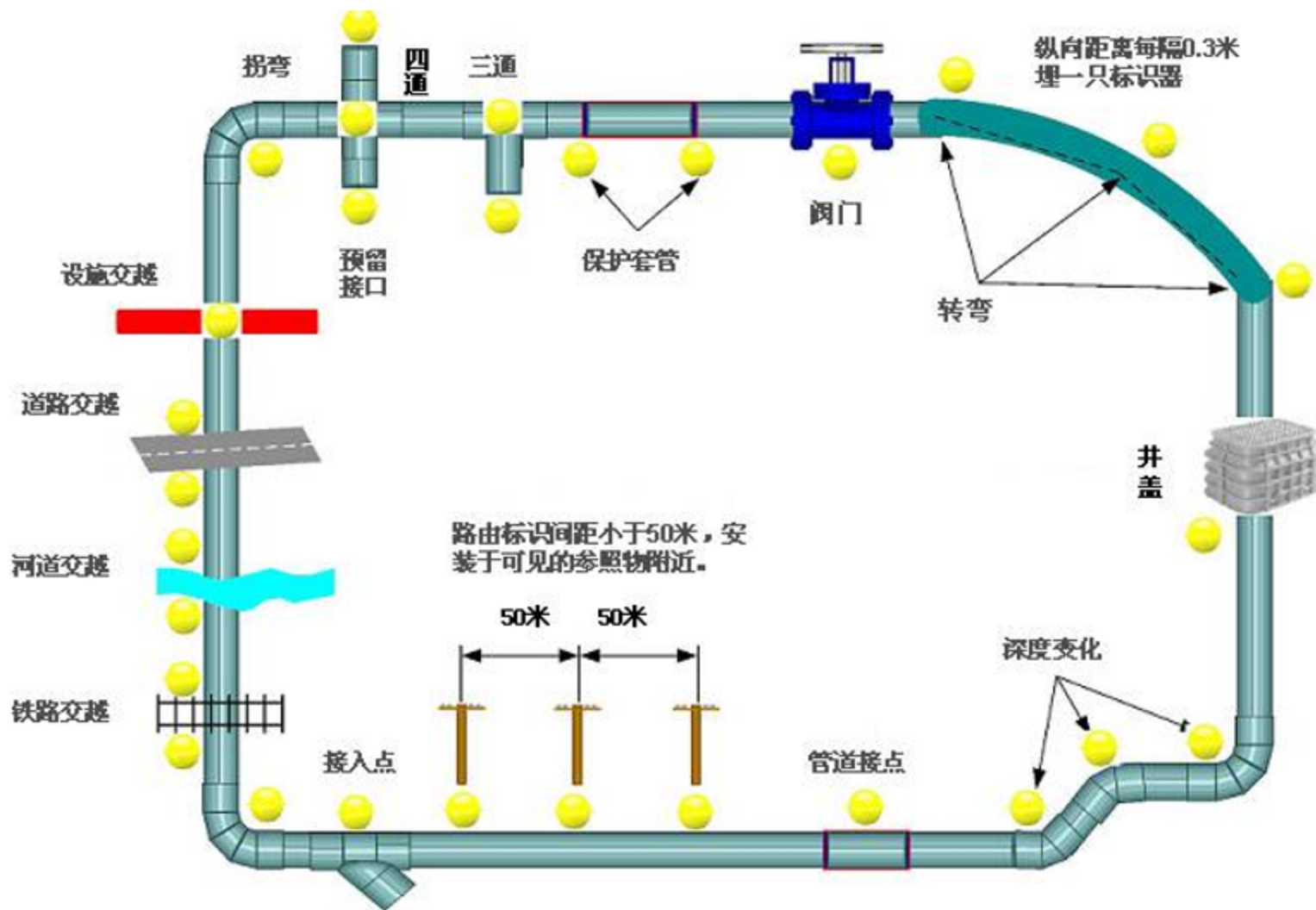
# Application System



the scheduling center



# Event Points and Buried Positions of Beacons



# Buried Setting of Beacons

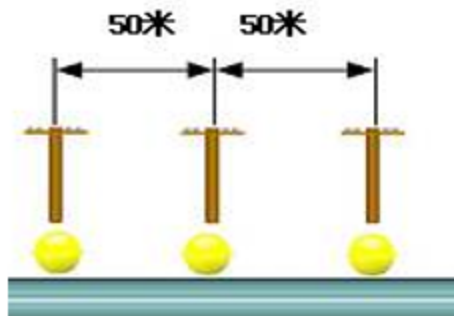
**uniform  
burying**

be suitable for  
urban pipeline  
network

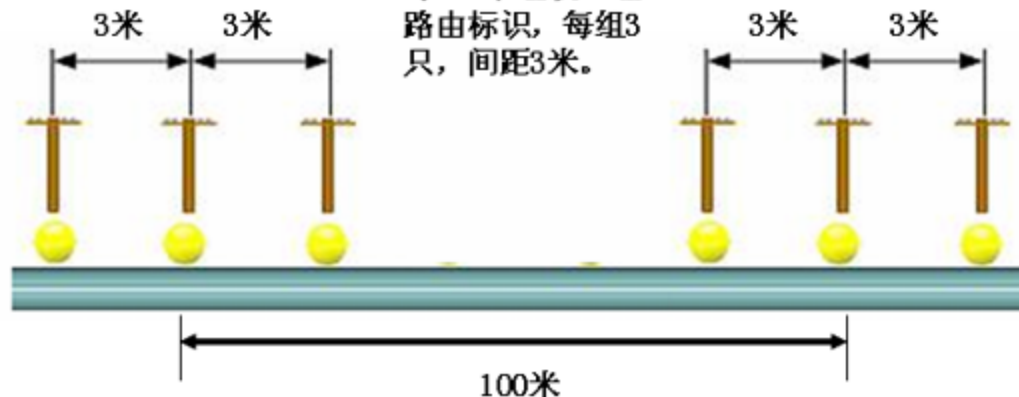
**group  
burying**

be suitable for  
long pipeline  
network

路由标识间距小于50米，安  
装于可见的参照物附近。



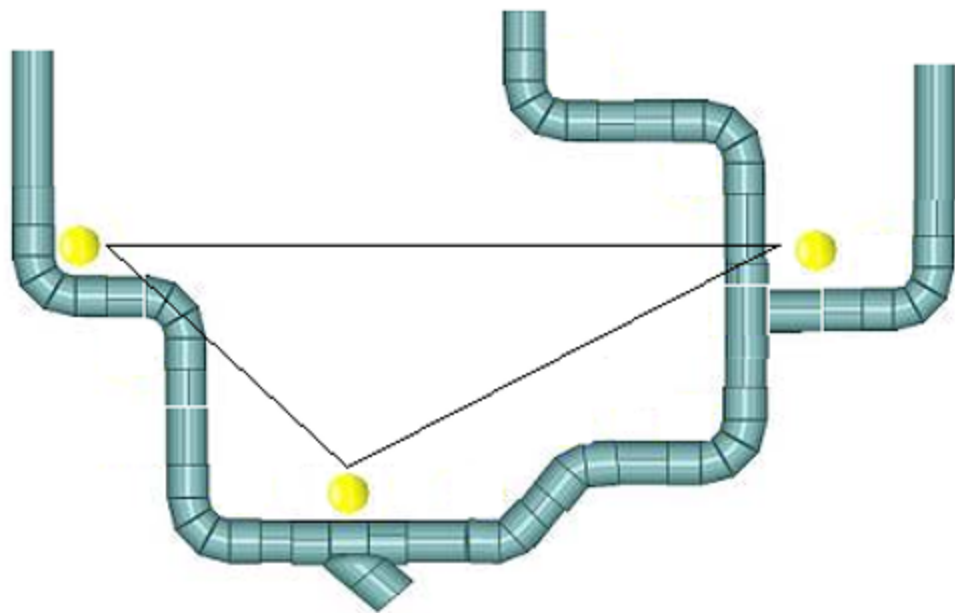
每100米埋设一组  
路由标识，每组3  
只，间距3米。





triangle  
burying

be suitable for yard  
pipeline network



suggestion: the distance between  
two beacons should surpass 5  
meters

# Cases

