

BUSINESS AREA

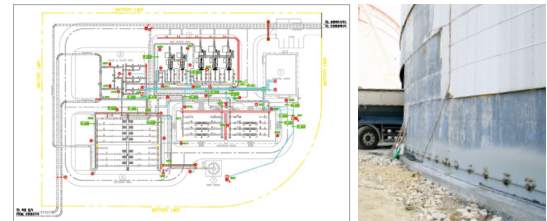
1 Safety Diagnosis

- External Corrosion Direct Assessment (ECDA) on underground pipelines
- Cathodic protection system survey & proposal of countermeasures
- Corrosivity survey of soil
- Corrosion testing & Failure Analysis
- Integrity survey for exposed pipes by MFL equipment



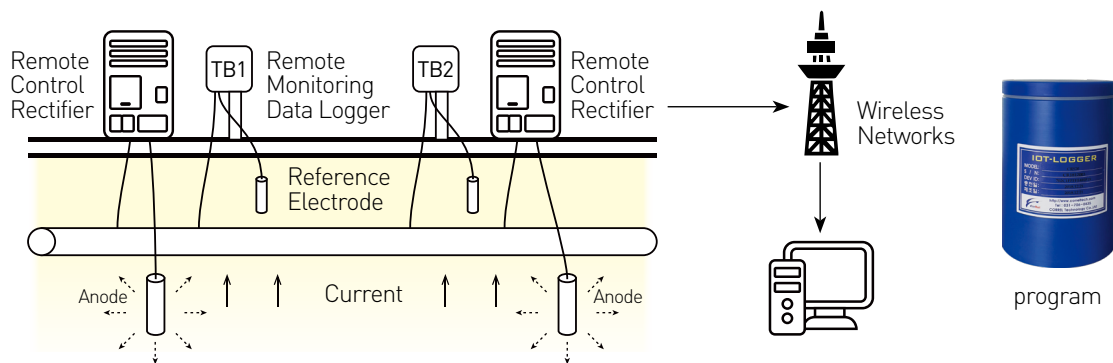
2 Cathodic protection Design & Installation

- CP design for underground pipeline, above-ground storage tank, offshore structures and so on.
- Installation of sacrificial anodes system & impressed current system



3 Smart Management System

- Cathodic protection remote controlling & monitoring system
- Remote transformer-rectifier & Remote Test Box logger
- Real time monitoring of third-party damage on underground pipelines
- Combined control multi-channel CP System for condensor & heat-exchanger in power plant
- Integrated corrosion protection system for inner/outer surface on underground water pipeline



4 Products

- CP rectifier with remote monitoring and controlling
- DCVG/CIPS equipment
- Remote data logger
- Corrosion sensors (thin-film, wire-type)



Safety Diagnosis

External Corrosion Pipeline Assessment(ECDA) on underground pipeline



Purpose

- Inspection for soundness of underground pipeline
- Direct inspection of points having a high probability on corrosion
- Provide root cause of corrosion



PRE-ASSESSMENT

- Checking prior histories about corrosion
- Classification of survey region
- Exam tool selection



INDIRECT INSPECTION

- Soil corrosivity
- Close Interval Potential Survey(CIPS)
- DC Voltage Gradient(DCVG)/PCM
- CP interference survey
- Isolation test



DIRECT INSPECTION

- Prioritization of risk grade
- Determine # of Excavation
- Excavation and Inspection



POST-ASSESSMENT

- Calculation of remaining life
- Fitness for service
- Effectiveness Validation



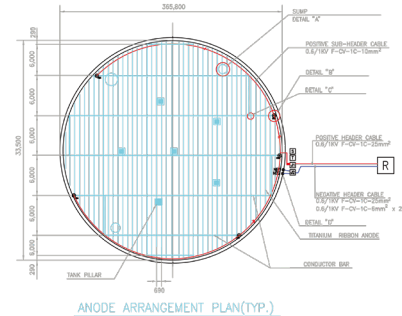
Cathodic Protection Design & Installation

Cathodic Protection

Cathodic protection (CP) is a technique used to control the corrosion of a metal surface by making it the cathode of an electrochemical cell. There are two methods of CP. One is sacrificial anode method, the other is impressed current method.

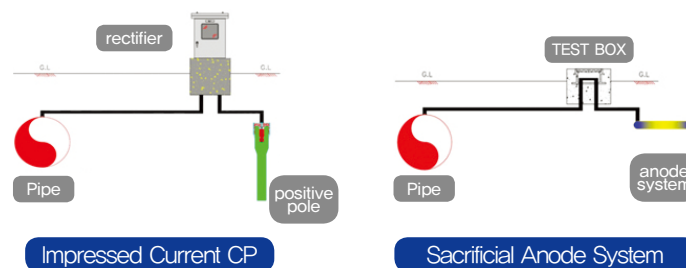
Cathodic Protection Design

Optimized CP design for anti-corrosion of buried metal structure after site survey (BEASY, CP Master)

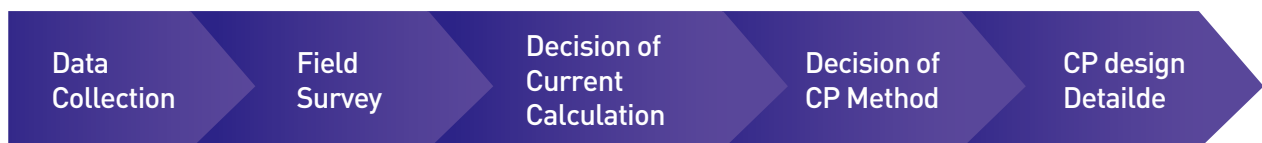


Related Structure

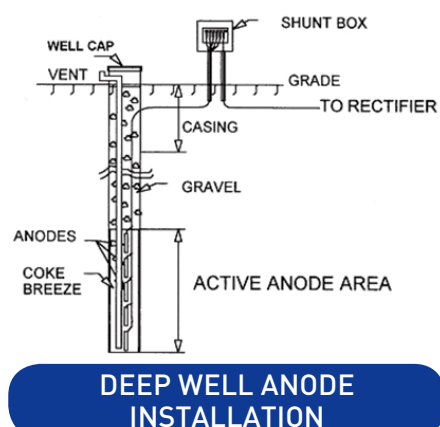
- Underground pipeline
- Heat exchanger & condenser
- Above and underground tank
- Offshore structure



Flow chart of Cathodic Protection Design



CP Installation



Smart Management System

CP Remote Monitoring / Controlling System

- **Objects**

underground pipeline,
above&underground tank,
offshore structure and so on

- **Communication**

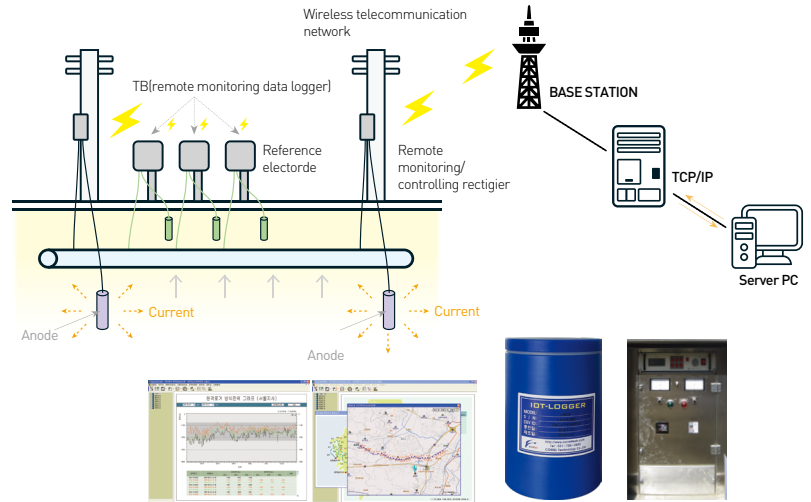
wire/wireless (CDMA, lot, bluetooth..)

- **Major Components**

- Remote transformer-rectifier
- Remote Test Box(TB) Logger
- Management S/W

- **Major Functions**

- Remote Monitoring/Controlling of CP Status
- Creating warning messages about CP potential error and CP equipments error
- Saving and analyzing CP data



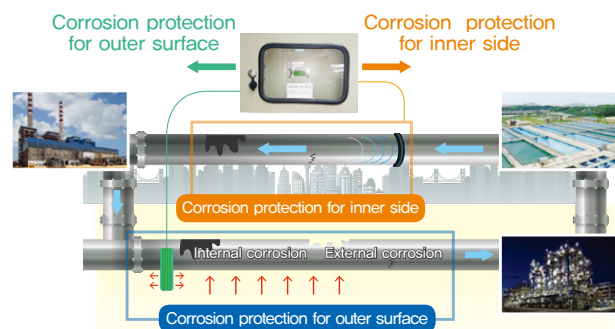
Combined control multi-channel CP System

- Same output current to all channels using potentiostatic + galvanostatic techniques
- Supplying high CP quality to the water box of condenser



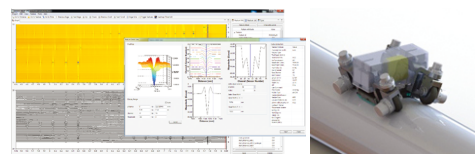
Integrated Corrosion Control system(2-in-1 system)

- Corrosion control of inner/outer surface on water pipelines
- Outer surface : cathodic protection system
- Inner surface : equipment using electro-magnetic technique



Thickness survey equipment system(Spider-MX™)

- Proved MFL(Magnetic Flux Leakage) technique
- Detecting damage points of inner/outer surface on all steel pipelines
- Remote control by wire communication
- Real time scan data transfer and display on notebook computer
- Auto linear movement control by IMU system



PRODUCTS

CP Survey Equipment (Eagle Eyed III)

- Detection of coating defects by DCVG method
- Close interval potential survey (CIPS)
- Measurement and save of CP potentials by 2CH input



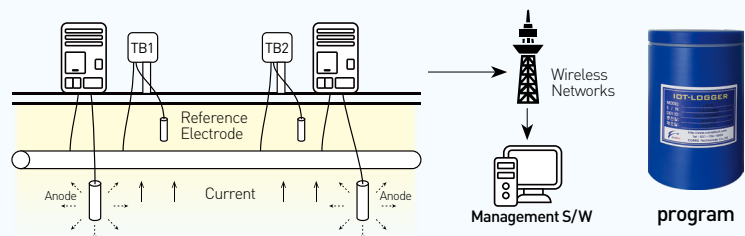
Transformer/Rectifier Unit

- Manual TRU, Auto TRU, Remote TRU
- Multi-channel TRU
- SCR type TRU, SMPS type TRU

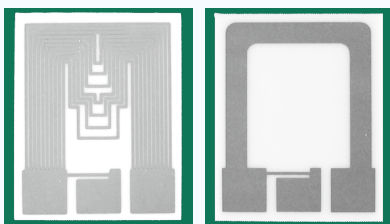


Remote Data Logger

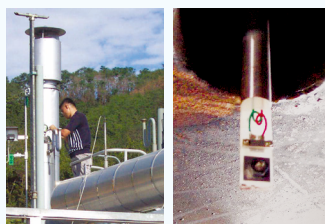
- Potential measurement and data saving
- Communication with sever computer regularly
- Power saving using sleep and wake-up technic.



Special Sensors and Probes for Corrosion Rate Measurements



Thin Film ER type sensor
Resolution < 0.01mpy



Installation example



Wire-type ER sensor
Installed beneath the AST



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