

Crisis management of Waterworks Emergency Service Unit

~ Quick Response and Prompt Securement of
Water Supply in the Event of Disaster ~

Wataru Kiga :

The Director at Liaison and Coordination of Water
Distribution Facilities, Construction, Water Supply
Division, Bureau of Waterworks Tokyo Metropolitan
Government.

【Today's Agenda】

1. Task of Waterworks Emergency Service Unit
2. Securing water supply routes
3. Summary

1. Task of Waterworks Emergency Service Unit

① Response at the time of an earthquake disaster



Various types of training
Technical support to each department

management department

② Response at the time of an unexpected accident

Training at normal times



1. Task of Waterworks Emergency Service Unit

⊖Response at the time of an unexpected accident

Emergency water supply
Initial PR activity
Information communication
support



Water Truck
(2t)



Loud Speaker
Vehicles



Special Emergency
Vehicle

1. Task of Waterworks Emergency Service Unit

Training at normal times

Participate in disaster prevention drills



Tokyo Metropolitan
Gov. disaster
prevention drill



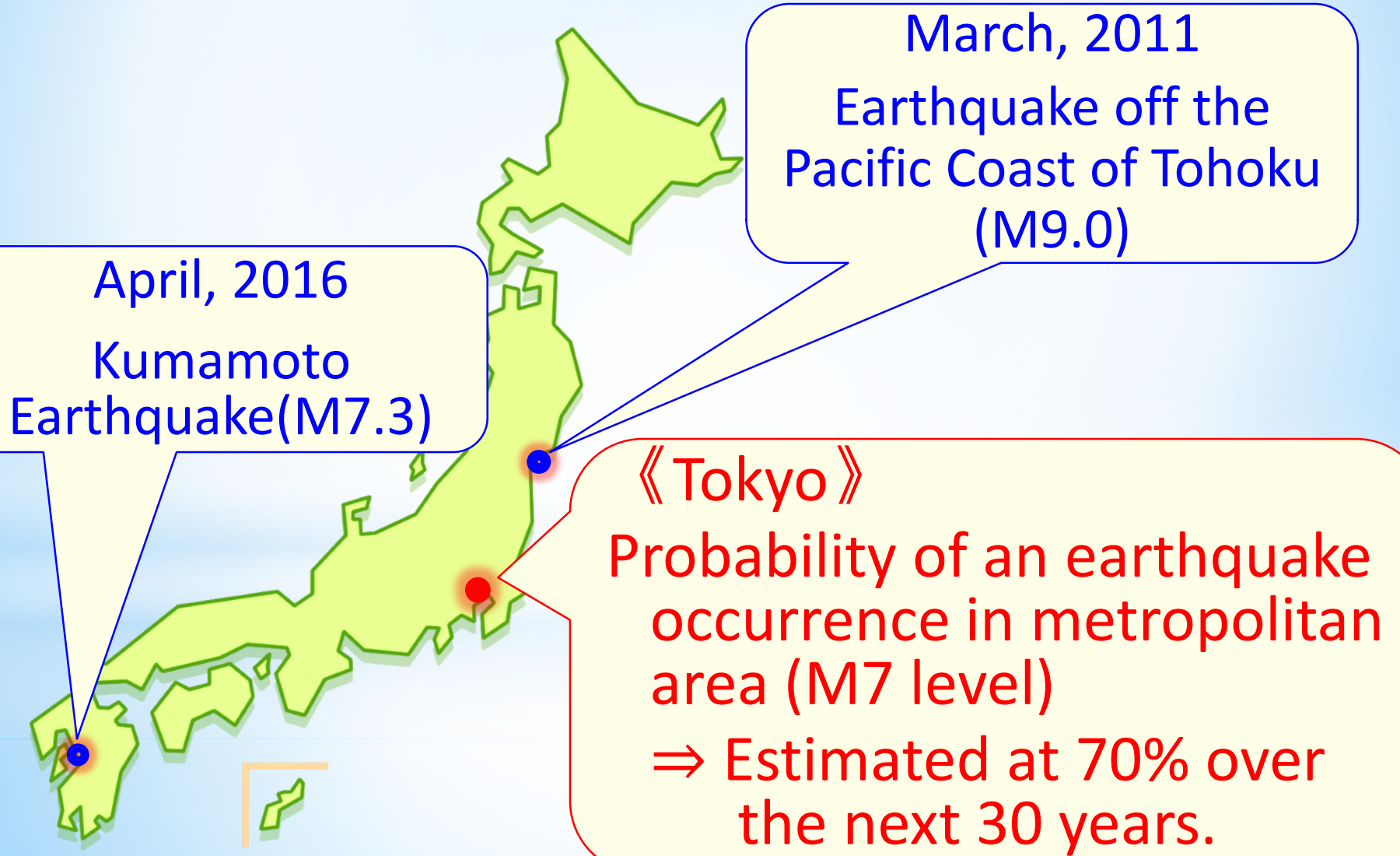
Islands disaster
prevention drill



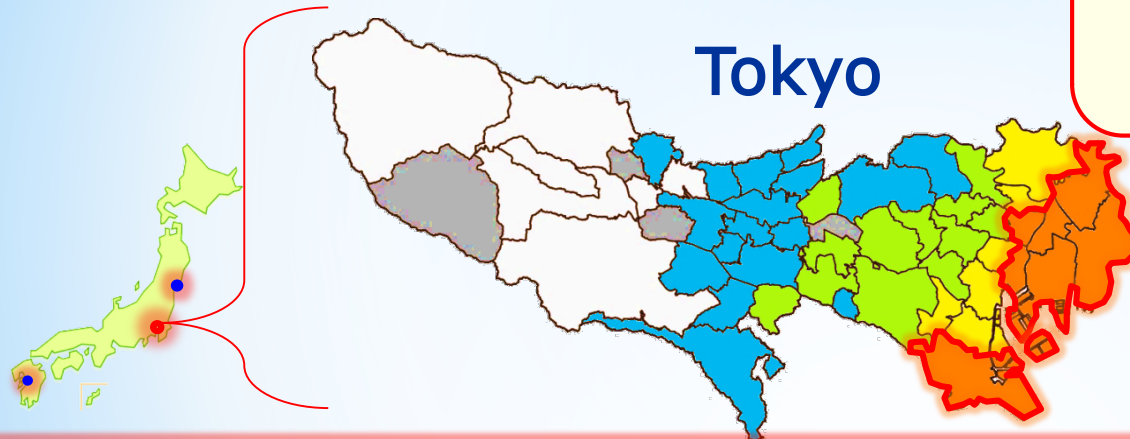
Disaster
prevention event

2. Securing the water supply route

2.1 Background/ Objective



Assuming that an earthquake occurred in the metropolitan area,



Water suspension ratio
is estimated to exceed
60%.

《Tokyo Metropolitan Waterworks Bureau(TMWB)》

Support lives of approx. 13 million residents in
Tokyo and the capital's central agencies by securing
water supply services

⇒ **At the time of an earthquake disaster: Securing
water supply is significantly important.**

【 Role of TMWB 】

In order to maintain functions of Tokyo

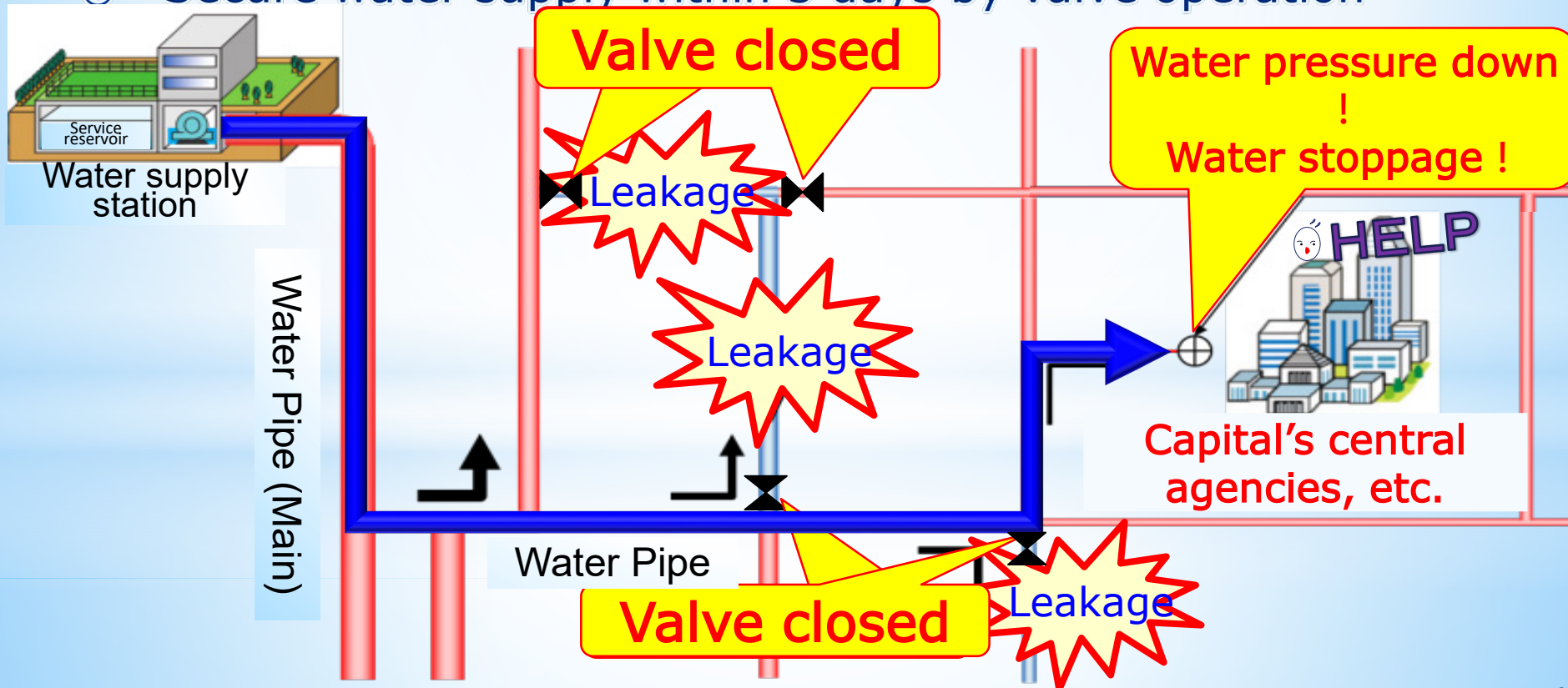
⇒ Quickly restore water supply to capital's central agencies.

《 What are capital's central agencies? 》

- Central institutions of the government with the administrative and economic sectors.
- Medical institutions and hospitals
- 140 facilities

《Securing water supply to the capital's central agencies》 (Dispatch to the site)

- ⊖ Check the water pressure
- ⊖ Investigate leakage on the supply route
- ⊗ Secure water supply within 3 days by valve operation



【Great East Japan Earthquake : Unexpected situation】

- Tried to confirm the water pressure of the central agencies of the capital ⇒
Dispatched form the office



**Heavy traffic
congestion
《Unexpected
situation》**

↓ Result...

- **More time than expected**

(Initial assumption of 15 hours → Took 22 hours)

【 First attempt as a water supplier in Japan 】

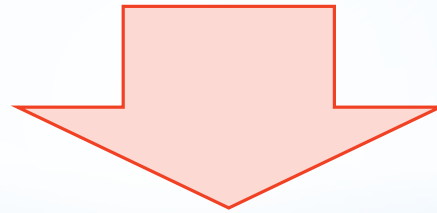
《 Unexpected situation = Proved fact 》

- Even in case of unexpected situation
 - **Important to make it possible to quickly check water pressure**
- Narrow down target facilities for staff to be dispatched
 - **Important to achieve quick recovery activities**

【 First attempt as a water supplier in Japan 】

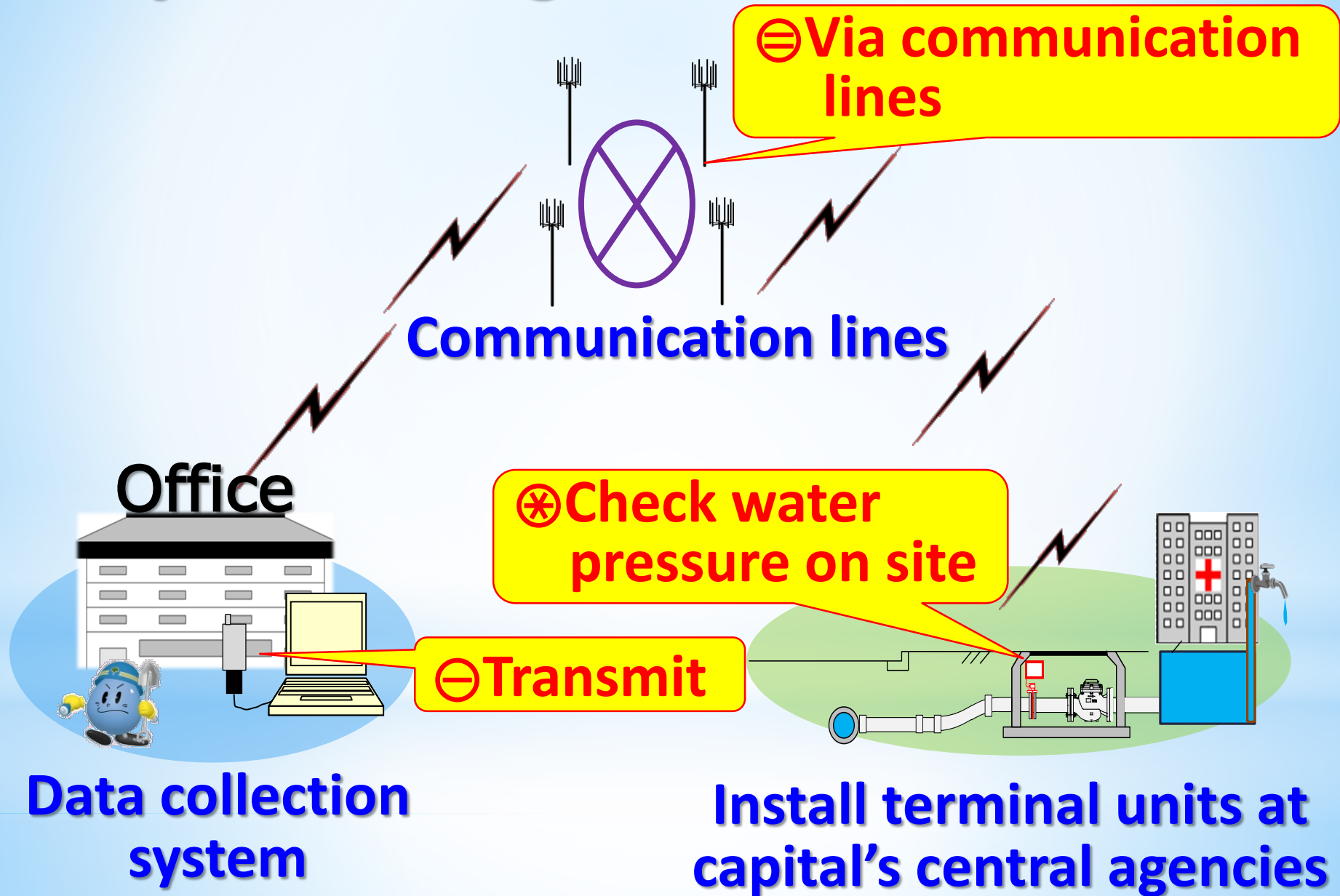
《 Measures 》

- Formulated a water pressure monitoring system for target facilities



- Introduced for the first time as a water supplier in Japan

2. System Configuration



【 ⊖ Utilization of PHS Communication Lines 】

- Communication line ⇒ Use PHS

PHS : Wireless communication line with a frequency of 1.9 GHz band

《 Reason for selecting PHS communication line 》

- Easier to secure lines (Urban area)

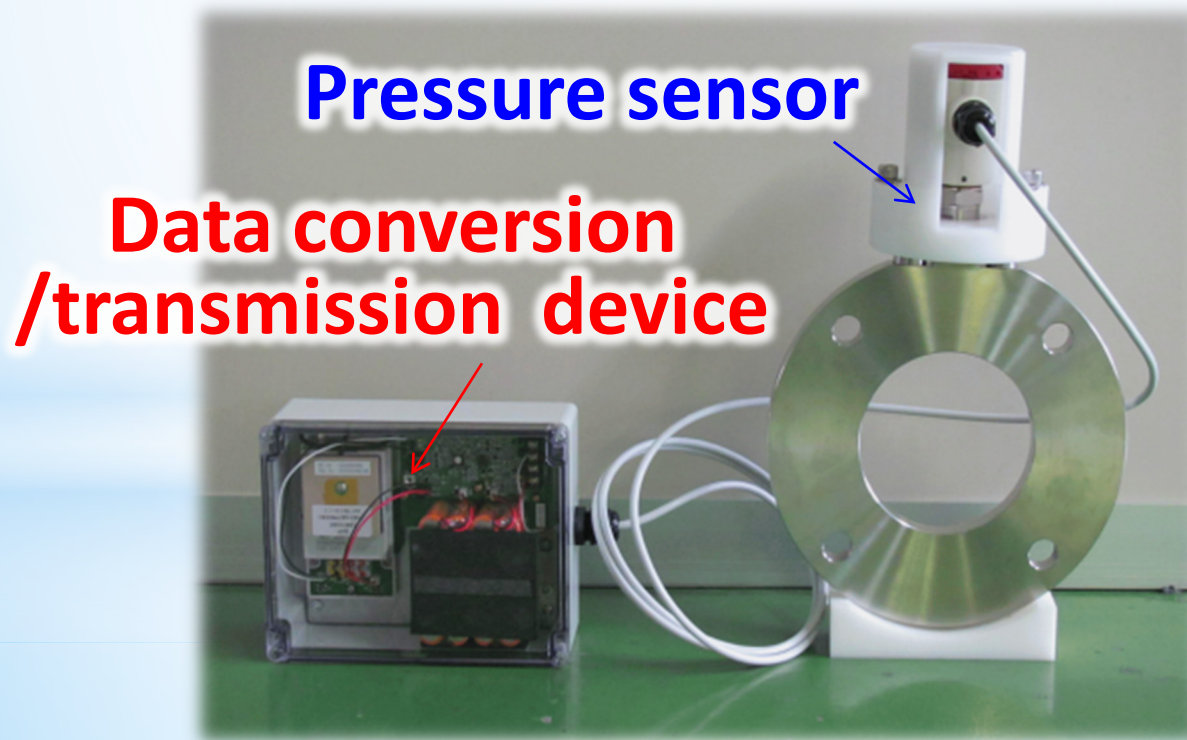
**⇒ At the time of past disasters :
No restriction was imposed for communication**

- Electric power saving, cheaper cost, low electromagnetic wave (Less impacts on medical instruments), etc.

【☉ Development of a terminal unit for checking pressure】

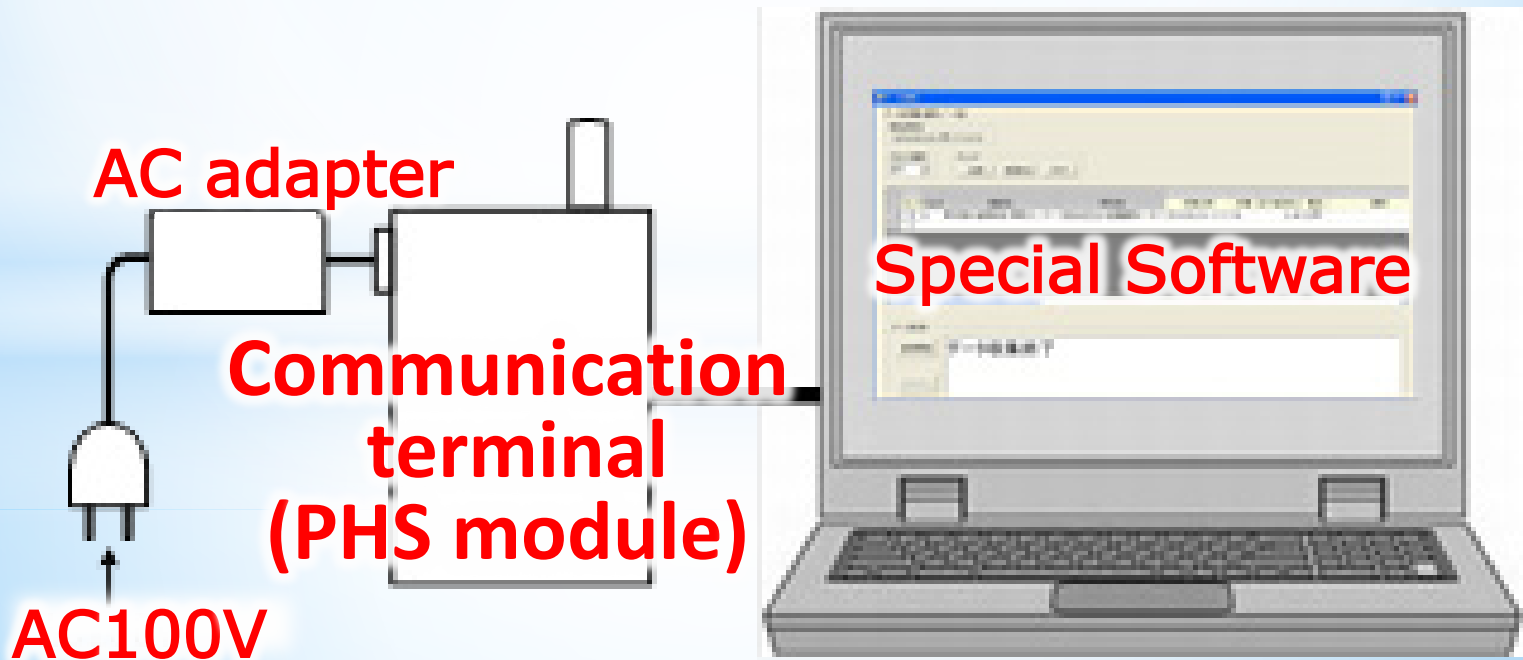
Configuration of terminal unit devices :

“Pressure sensor,” “Data conversion/
transmission apparatus”



【 ⊗ Data Collection System 】

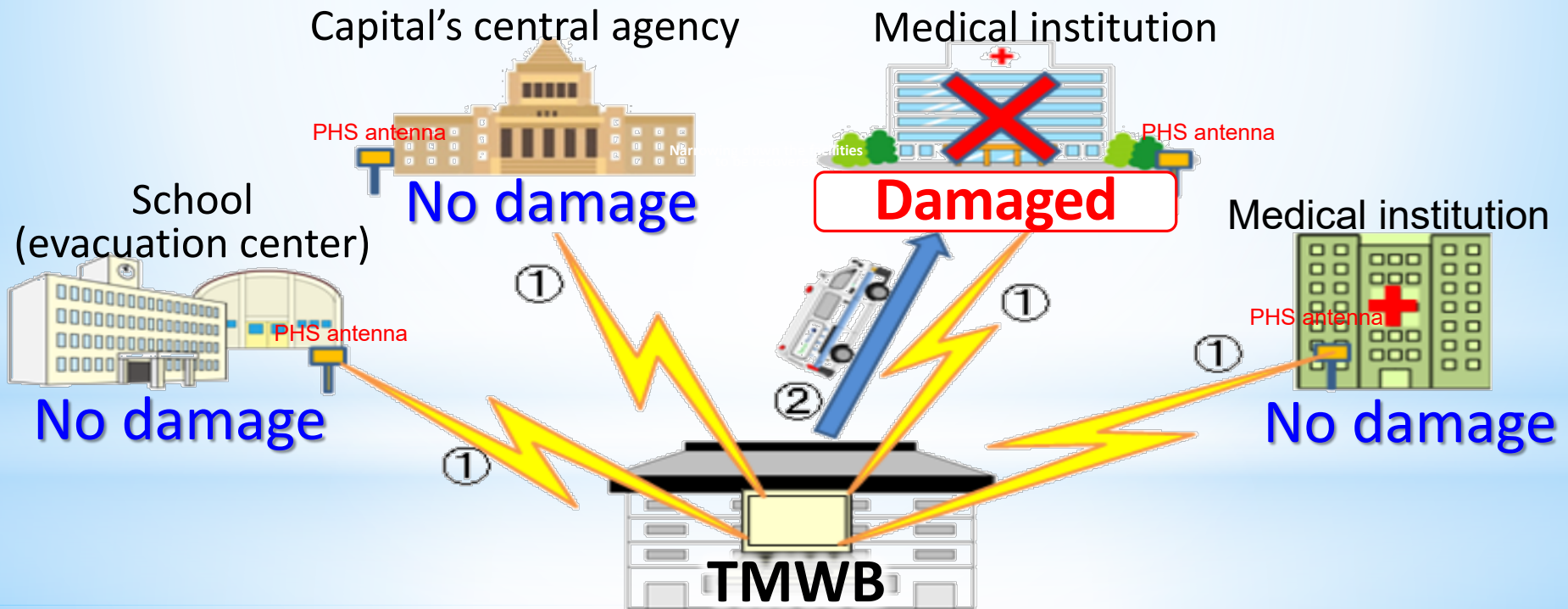
- Collective check at office: system to collect data
- System configuration: personal computer/communication terminal



3. Conclusion

【Effects of introduction of the system 1/2】

- At the time of an earthquake disaster: Quickly identify facilities with decreasing water pressure
⇒ Possible to narrow down target facilities

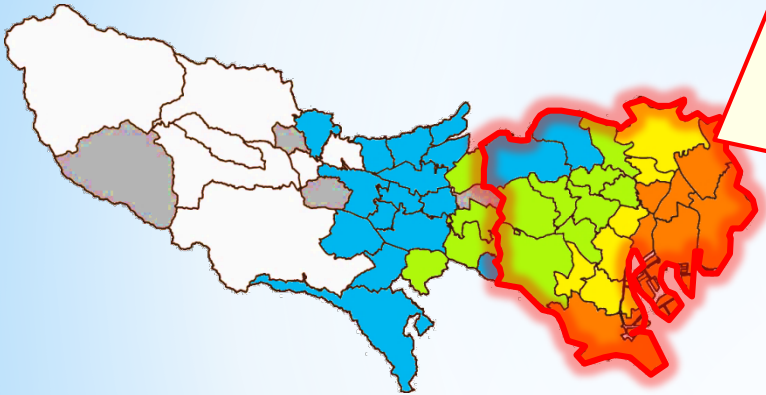


⊖ PHS communication line

Narrowing down the facilities

⊕ Going to the damaged facilities

【Effect of introducing this system 2/2】



- Metropolitan central agencies (115 facilities)
- In case of 58 facilities damaged by disaster

Before system introduction

63 hours

After system introduction

40 hours



23 hours

(Reduction by 40%)

※ Drastic time reduction expected!

【 Efforts in the future 】

- At the end of FY2017 :

Introduce it to 140 facilities of the capital's central agencies.

- Subsequently :

Introduce it to more than 800 key facilities, including medical institutions and refugee centers


(Further improvement in emergency measures)



IWA World Water Congress & Exhibition 2018 in Tokyo



謝謝你



16-21 September, 2018 @ TOKYO BIG SIGHT

**We look forward to welcoming you
at the IWA World Water Congress
& Exhibition 2018 in Tokyo !**

Auxiliary Slides

[Water pipes owned by Tokyo Metropolitan Waterworks Bureau]

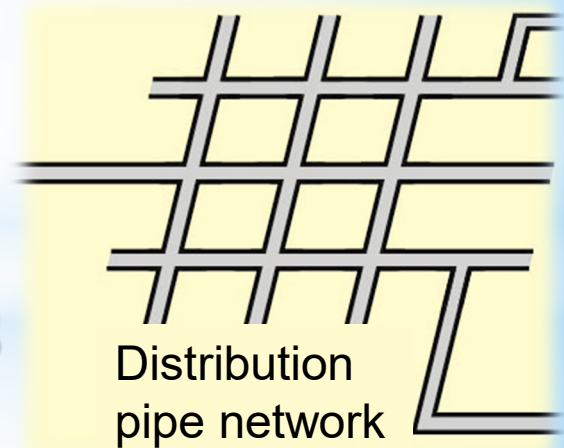
- Extension: Approximately 27,000 km

(Equivalent to approx. two thirds of the circumference of the Earth)

Water pipes are networked

↓ Even if they leak...

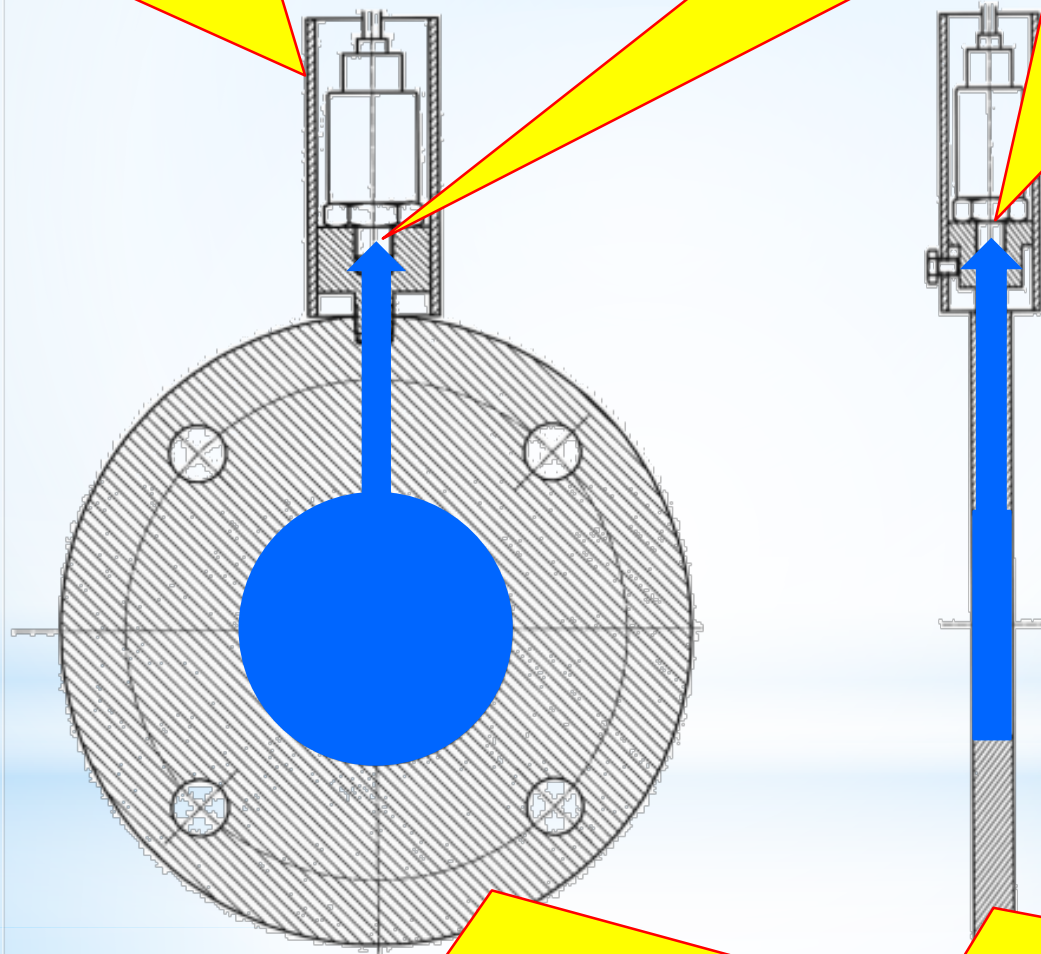
We can secure backup routes



《Pressure Sensor》

Resin protective guard

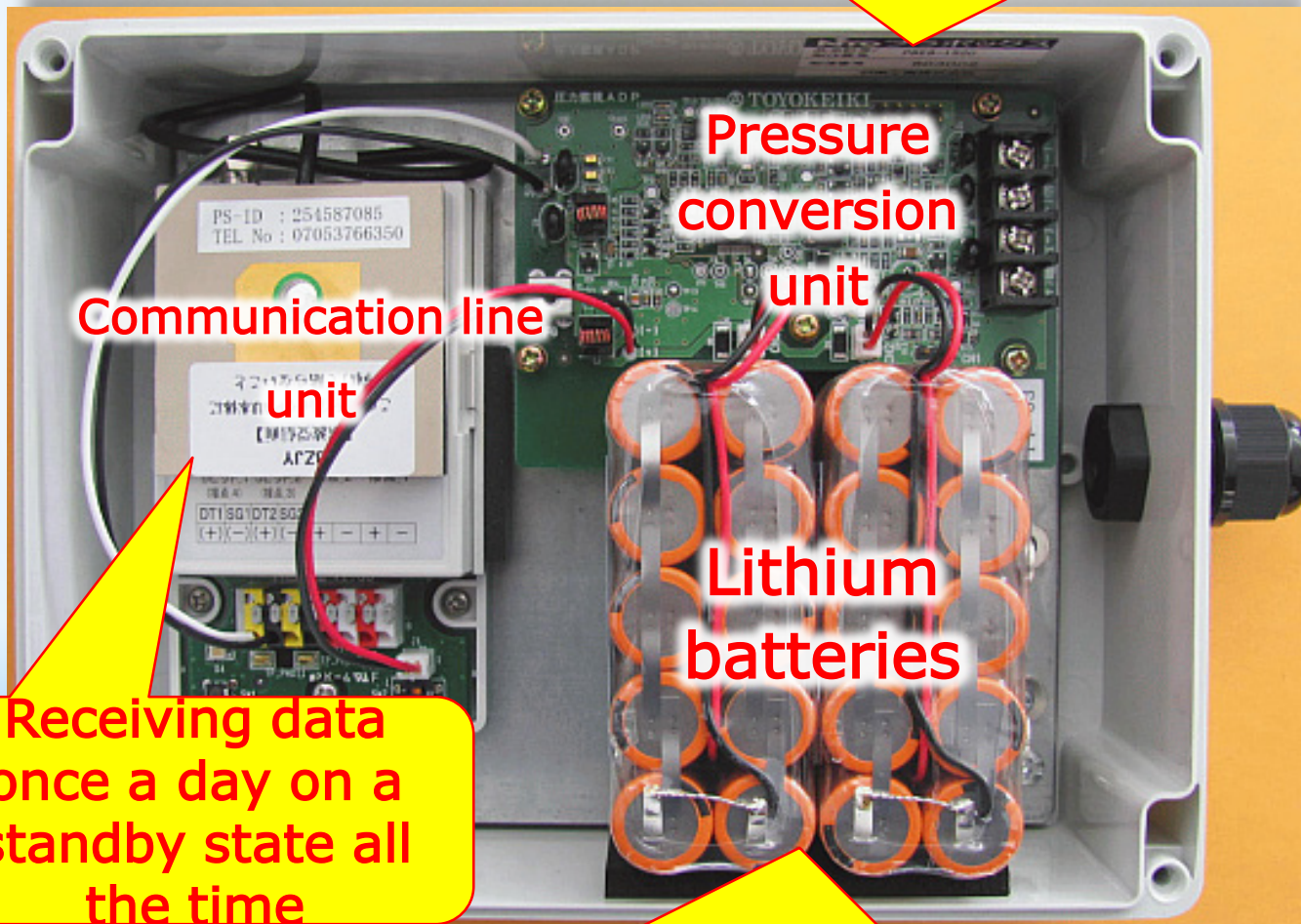
It measures pressure when water flows



It is sandwiched between the flanges of the upstream part of the meter

《Data conversion transmitter》

Resin box with waterproof property



Receiving data once a day on a standby state all the time

Battery exchange unnecessary for more than 10 years

《Software functions 1/3》

Function 1 : It is possible to collect water supply pressure values of required facilities collectively (Periodic collection at intervals of 1 min to 60 min also possible)

The screenshot shows the 'データ収集' (Data Collection) window. The title bar indicates 'データ収集'. The main window is titled 'データ収集(個別／一括)'. There are several callouts pointing to specific features:

- Collective selection:** Points to the 'チェック' (Check) button in the 'ブロック選択' (Block Selection) section.
- Setting of cyclic collection:** Points to the '周期収集' (Cyclic Collection) section, which includes a checkbox for '実行する' (Execute) and a dropdown for '間隔(分)' (Interval (min)).
- Individual selection of target facility:** Points to the 'チェック' (Check) checkbox in the first row of the facility table.

The facility table has the following columns: 施設名 (Facility Name), 所在地 (Location), 収集日時 (Collection Date/Time), 収集 (Collection), 圧力値 (MPa) (Pressure Value (MPa)), 電池 (Battery), and 備考 (Remarks). The first three rows are highlighted in yellow.

施設名	所在地	収集日時	収集	圧力値 (MPa)	電池	備考
都立墨東病院	墨田区江東橋4-23-15	2014/07/03 11:25	OK	0.23	正常	センサPHS電波微弱/
東京臨海病院	江戸川区臨海町1-4-2	2014/07/03 11:25	OK	0.21	正常	
順天堂大学医学部附属順天堂	江東区新砂3-3-20	2014/07/03 11:26	OK	0.23	正常	

At the bottom, there is a status bar with two buttons: '通信開始' (Start Communication) and '通信停止' (Stop Communication). The status text reads '周期通信-開始待ち' (Cyclic Communication - Waiting for Start).

《Software functions 2/3》

Function 2 : Supply water pressure value, remaining battery level etc. can be measured at the same time and it can be automatically saved in Excel

Water pressure
(MPa)

Remaining
battery
charge

Auto save with Excel

スケジュール											
曜日											
時刻											
ブロック	施設名	所在地	収集日時	収集	圧力値(MPa)	電池	備考	電界強度(dB)	電界強度(dB)	PHS電話番号	スケジュール
1	テスト	順天堂大学区江東区	2014/7/3 11:16	OK	0.23	正常		37	50	07053766108	日/月/火/水/木/13:00
2	テスト	都立墨東病院 墨田区	2014/7/3 11:24	OK	0.23	正常		36	29	07053766350	日/月/火/水/木/13:00
3	テスト	東京臨海病院 江戸川	2014/7/3 11:24	OK	0.22	正常		32	51	07053766108	日/月/火/水/木/13:00
4	テスト	順天堂大学区江東区	2014/7/3 11:24	OK	0.22	正常		31	47	07053766108	日/月/火/水/木/13:00
5	テスト	都立墨東病院 墨田区	2014/7/3 11:25	OK	0.23	正常		29	30	07053766350	日/月/火/水/木/13:00
6	テスト	東京臨海病院 江戸川	2014/7/3 11:25	OK	0.21	正常		37	48	07053766108	日/月/火/水/木/13:00
7	テスト	順天堂大学区江東区	2014/7/3 11:26	OK	0.23	正常		35	47	07053766108	日/月/火/水/木/13:00
8	テスト	都立墨東病院 墨田区	2014/7/3 11:30	OK	0.23	正常		35	26	07053766350	日/月/火/水/木/13:00
9	テスト	東京臨海病院 江戸川	2014/7/3 11:30	OK	0.22	正常		36	53	07053766108	日/月/火/水/木/13:00
10	テスト	順天堂大学区江東区	2014/7/3 11:30	OK	0.21	正常		31	52	07053766108	日/月/火/水/木/13:00
1	A	都立広尾病院 渋谷区	2014/7/3 11:31	NG			PHS接続失敗/	34		00000000000	
2	A	日本赤十字社 渋谷区	2014/7/3 11:31	NG			PHS接続失敗/	33		00000000001	
3	テスト	順天堂大学区江東区	2014/7/3 11:16	OK	0.23	正常		37	50	07053766108	日/月/火/水/木/金/土
4	テスト	都立墨東病院 墨田区	2014/7/3 11:24	OK	0.23	正常		36	29	07053766350	日/月/火/水/木/金
5	テスト	東京臨海病院 江戸川	2014/7/3 11:24	OK	0.22	正常		32	51	07053766108	日/月/火/水/木/金/土
6	テスト	順天堂大学区江東区	2014/7/3 11:24	OK	0.22	正常		31	47	07053766108	日/月/火/水/木/金/土
7	テスト	都立墨東病院 墨田区	2014/7/3 11:25	OK	0.23	正常		29	30	07053766350	日/月/火/水/木/金/土
8	テスト	東京臨海病院 江戸川	2014/7/3 11:25	OK	0.21	正常		37	48	07053766108	日/月/火/水/木/金/土
9	テスト	順天堂大学区江東区	2014/7/3 11:26	OK	0.23	正常		35	47	07053766108	日/月/火/水/木/金/土
10	テスト	都立墨東病院 墨田区	2014/7/3 11:30	OK	0.23	正常		35	26	07053766350	日/月/火/水/木/金

《Software functions 3/3》

Function 3: It can set automatic collection schedule function and normal water pressure range for each facility.

給水施設登録

給水施設登録

電話番号
07053766108

スケジュール収集

☒ 日 ☒ 月 ☒ 火 ☒ 水 ☒ 木 ☒ 金 ☐ 土

時刻(時:分)
11:00

正常範囲(MPa)

下限 0.17 ~ 上限

センサーレンジ(MPa)
1.00

大気圧調整値(MPa)
0.10

ブロック	施設名	所在地	PHS電話番号	スケジュール 曜日 時刻	正常(MPa) 下限 上限	備考
102	I 白鬚橋病院	墨田区東向島4-2-10				
103	J 財団法人癌研究会 有明病院	江東区有明3-10-6	000000000000			
104	J 東京臨海病院	江戸川区臨海町1-4-2	07053766108	日/月/火/水/ 11:00	0.17	
105	J 順天堂大学医学部附属順天堂	江東区新砂3-3-20	07053766108	日/月/火/水/ 11:00	0.17	
106	テスト 都立墨東病院	墨田区江東橋4-23-15	07053766350	日/月/火/水/ 13:00	0.17	
107	テスト 東京臨海病院	江戸川区臨海町1-4-2	07053766108	日/月/火/水/ 13:00	0.17	
108	テスト 順天堂大学医学部附属順天堂	江東区新砂3-3-20	07053766108	日/月/火/水/ 13:00	0.17	

スケジュール収集

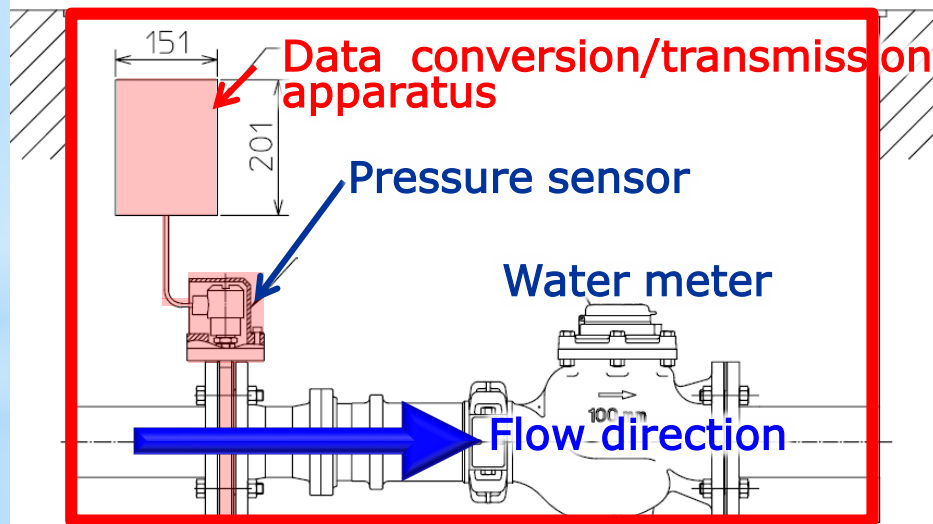
☐ 有効 ☒ 無効

登録 削除

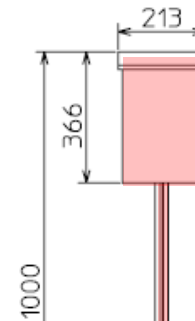
Installed outside of the water meter box

Installed inside the water meter box

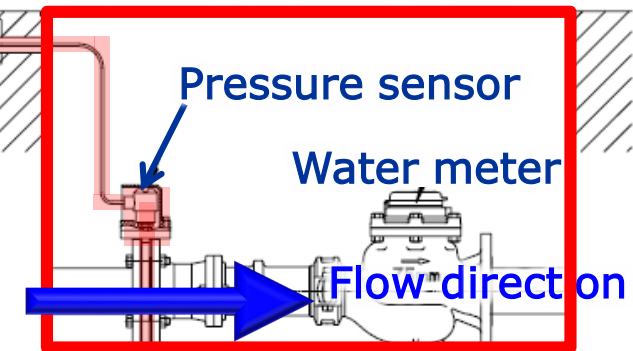
Water meter box



Data conversion/ transmission apparatus



Water meter box



【Result of network proof test 1/2】

- Conduct communication confirmation for 6,549 times in total for 3 months after installation
- At first, communication failures occurred, but as a result of adding a retry function, all communication succeeded afterwards and the success rate hit 100 %

