

Product introduction for
PetitLOGGER
GL100-WL
Remote Monitoring with Internet
(vol 1, rev 1.0)



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Outline

- **Demand for the remote monitoring of the measurement data**

Requirement of remote monitoring of the measurement data is increased for grasping status of facility or equipment located at different place, such as monitoring environmental conditions for agricultural facilities or monitoring operating conditions of equipments at factory.

Currently the Internet are popular, remote monitoring of measurement data system is able to be constructed easily.

GL100-WL has function to connect with wireless LAN (WLAN), but it is not able to connect to the Internet directly. For creating remote monitoring system with GL100 using the Internet, equipments as the router and various service that related the Internet are required.

This document is described an overview of the network construction for remote monitoring.

It is required the cooperation of IT experts for constructing the network. For example, a worker who works in the farm may not be able to build a remote monitoring system in alone.

It would be important to provide an overview information for network construction to the end-user in order to satisfy the customer requirements.

By the way, in Japan, Graphtec will provide a set that contains the equipment and services necessary to build networks for remote monitoring to end users. However, this set cannot be exported overseas because it contains a service contract with the mobile data communication carrier in Japan.

However, distributor provides the information of necessary equipment or services for building the remote monitoring system on the basis of this article to the user, it would be useful for increasing the enquiry of the GL100.

GL100-WL network connection

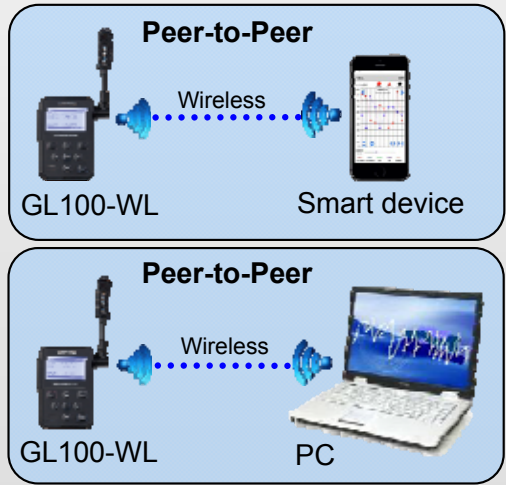
• Supporting the network of various configurations

The GL100-WL has a wireless communication function corresponding to the wireless LAN (WLAN). It is able to connect to a PC or smart device using a wireless communication function. The GL100 can be connected to a PC or smart device in a variety of network configurations as the local area network and the wide area network that uses the Internet.

The data measured by GL100 is able to display on a PC or smart device using softwares, and also the GL100 settings can be changed.

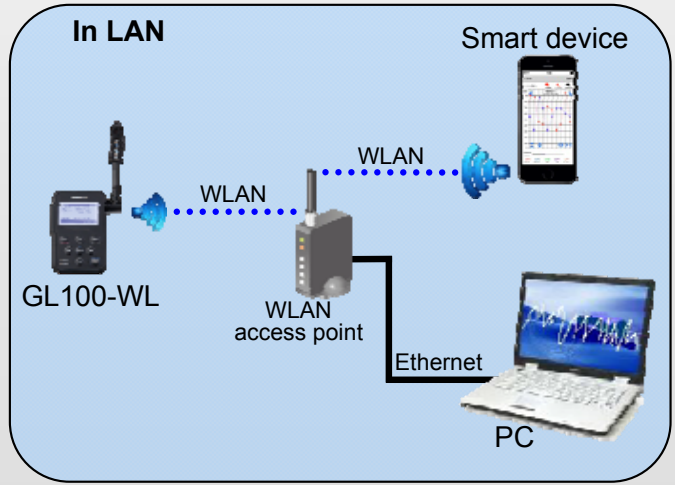
Configuration Case 1

Direct connection on a local area



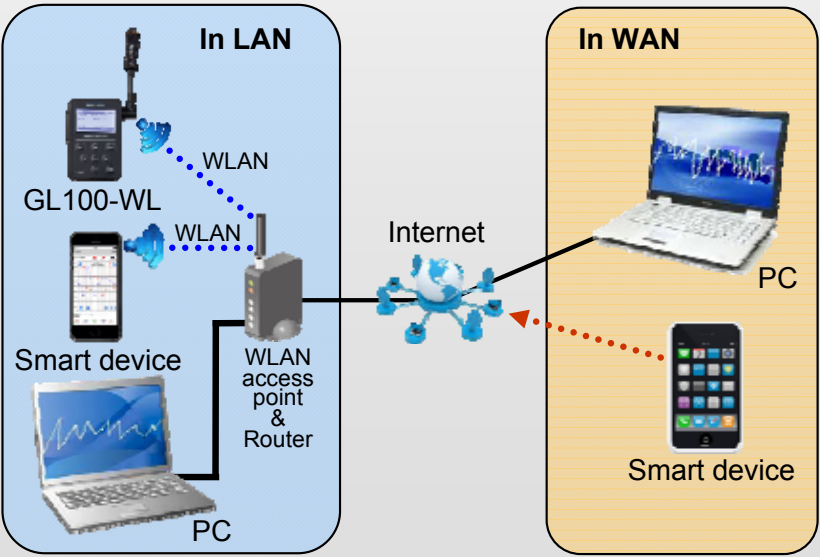
Configuration Case 2

Network connections within a local area



Configuration Case 3

Wide area network connection using the Internet



Note: GL100 does not have the ability to connect to a public data lines such as 3G or 4G. Router is required in order to connect to the Internet.

Remote monitoring with the GL100-WL

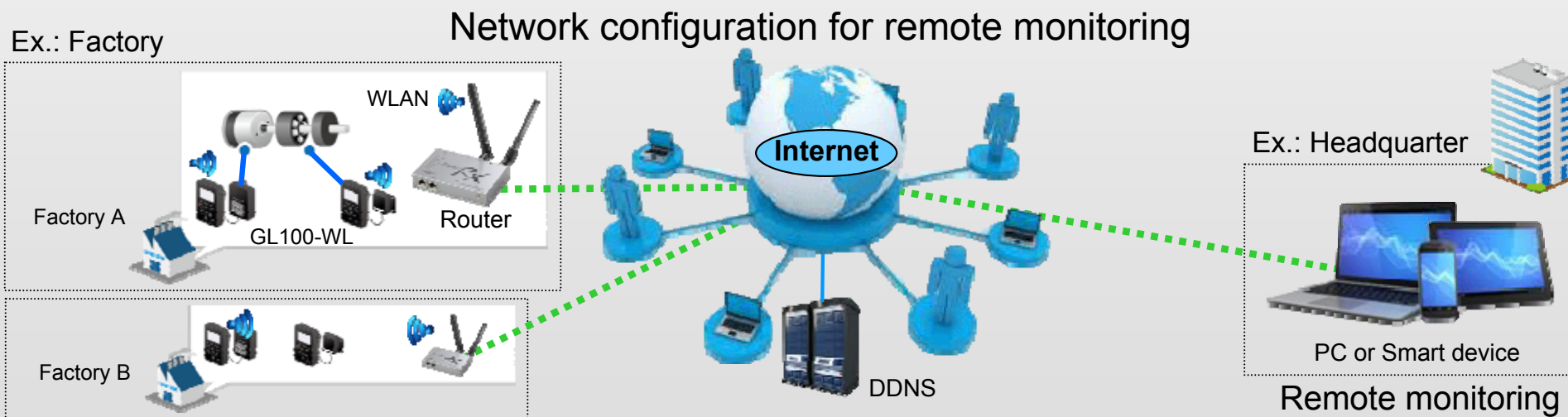
• Remote monitoring

It is able to make a remote monitoring of measurement data by connecting the GL100 to a wide area network using the Internet.

It is useful to check the status of facilities in different locations, such as monitoring environmental conditions for agricultural facilities or monitoring operating conditions of equipments at factory.

Remote monitoring
At any time,
From anywhere,

- Digital display of current measurement value
- Waveform display of the captured data (replay only)
- Start or stop for capturing
- Changing settings of sampling interval
- Mail reception (alarm, scheduled mail)



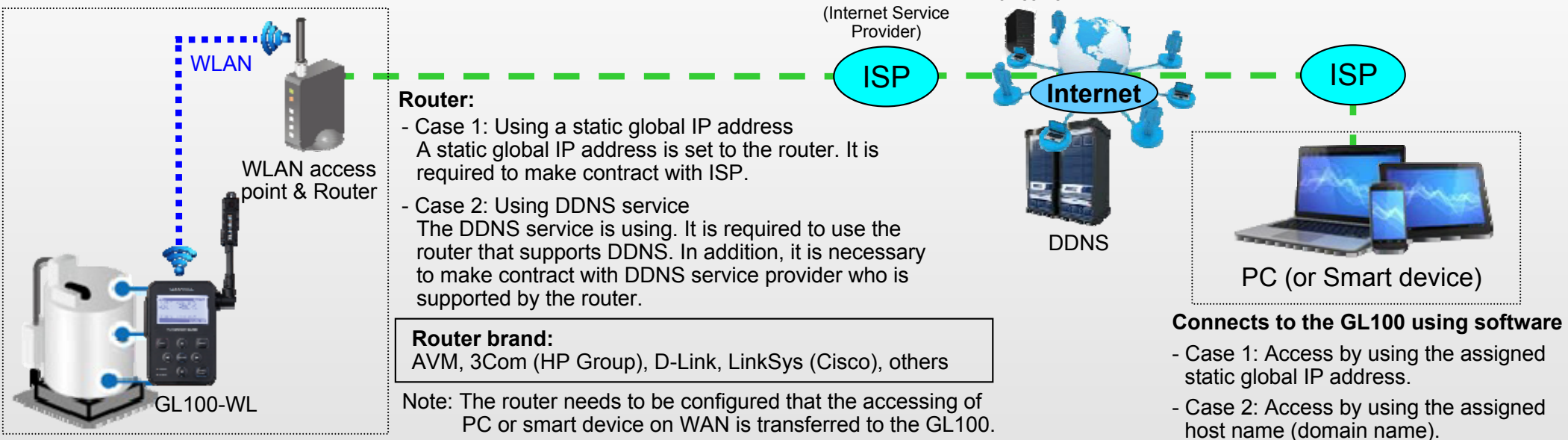
Note: 1. Setting up the static global IP address or DDNS service on a router is required. If it can not be set, receiving email is only available.

2. It is not recommended to store the data measured by GL 100 to PC in real time. Data transfer rate is greatly affected by communication traffic on the network including the Internet. Data may not be delivered to PC through the network within the required time.

Construction of the network for remote monitoring

• Network as connecting to the Internet using a broadband data communication line

To build a wide area network using a router connected to the Internet by broadband connection. The GL100 is able to connect to PC or smart device connected to the Internet by setting the router to the specific conditions. This network configuration is effective to grasp the operating status of the equipment on facility such as factories.



Case 1

Required item	Description
Router	Compatible to the data communication line used.
PC, Smart Device	Able to connect to the Internet, and to use the software.
Communication line	Contract to use data communication line. (broadband connection)
Static global IP address	Contracts with the ISP for using the static IP address.
Internet connection	Contracts with ISP for connecting to the Internet.

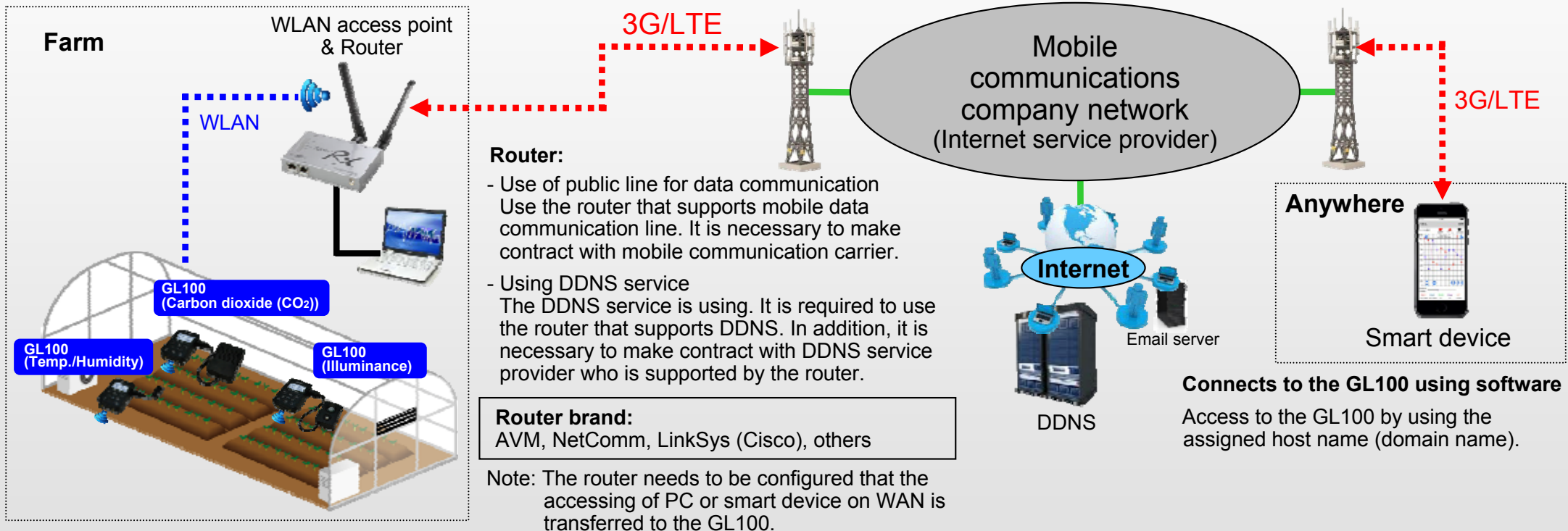
Case 2

Required item	Description
Router	Compatible to the data communication line and DDNS.
PC, Smart Device	Able to connect to the Internet, and to use the software.
Communication line	Contract to use data communication line. (broadband connection)
Internet connection	Contracts with ISP for connecting to the Internet.
DDNS service	Contracts with provider for using the DDNS service.

Construction of the network for remote monitoring

• Network as connecting to the Internet using the mobile data communication line

When the M2M (Machine-to-Machine) router that supports the mobile data communication is used, the network is able to be created in the wide range of situations. This network configuration is effective to grasp the environmental conditions for agricultural facilities such as greenhouses.



Required item	Description
M2M (Machine-to-Machine) router	Compatible to the mobile data communication line and DDNS.
Smart Device	Able to connect to the Internet using to the mobile communication line, and to use the software.
Data communication line	Contracts with communication carrier for using data communication line.
DDNS service	Contracts with provider for using the DDNS service.

Construction of the network for remote monitoring

• Setting of the router

It is required to set the router function that transfers the communication from the device on the WAN (Wide Area Network) including the Internet to a device in the LAN (Local Area Network). Its functions are the DDNS, Port Forwarding, Inbound Filtering, and other.

Setting of DDNS

It is required to make contract with the DDNS service provider, and then the user name / password / host name are obtained from the provider after contract is made.

The information will be set to the router corresponding to the DDNS service.

Note: The DDNS service provider corresponding to the router is different by the router. It is necessary to get information of DDNS service provider from the router manufacturer. The manufacturer of the router might provide the DDNS services.

Open the DDNS Service Settings screen of the router. Method of opening the setting screen and the setting screen vary by the router manufacturer.

No.	Item	Description	Setting example
1	DDNS Service	Select the available DDNS service provider	DynDNS.org
2	User Name	User name that is registered in the DDNS service provider (It is required for accessing the DDNS server.)	graphtec
3	Password	Password that is registered in the DDNS service provider (It is required for accessing the DDNS server.)	graphtec123456
4	Host Name	Name that is registered in the DDNS service provider	graphtec.dyndns.org

<Setting Example>

1. The DDNS service is provided by the DynDNS.
2. Registered username and password is; User Name: "graphtec", Password: "graphtec123456".
3. Registered host name is the "graphtec".

Construction of the network for remote monitoring

Setting of Port Forwarding on the router

Access from the device on WAN is forwarded to the device on LAN by setting of the Port Forwarding on the router. The GL100 in the LAN needs to be registered to the router as a device that receives communications from the WAN. The port forwarding is also referred to as Virtual Server.

Open the Port Forwarding settings screen of the router. Method of opening the setting screen and the setting screen vary by the router manufacturer.

Set the following items.

It needs to be registered each GL100 individually to Port Forwarding setting when multiple units are connected to the LAN. The port number corresponding to each GL100 is necessary to be used in the software.

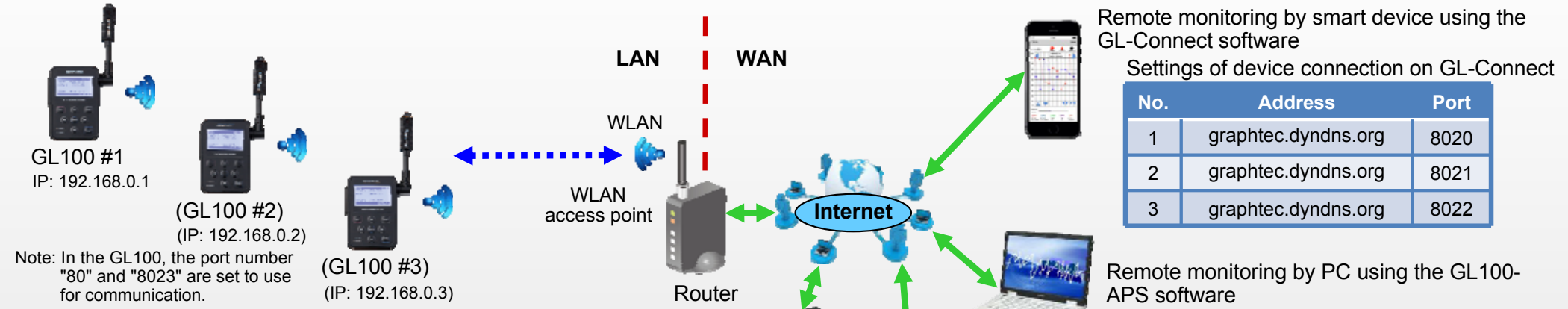
No.	Item	Description	Setting example
1	Interface, Name, Application	Name of intended use (arbitrarily set, or select from a menu)	Mobile communication terminal
2	Protocol	Set the protocol that is to be used for access from the WAN side	All (most common), TCP
3	Public Port (start-end)	Set the port number that is used on the software of the WAN side to access (Set the port number for each GL100 when multiple GL100 are used.)	When single GL100 is used; 80 or 8023 (depending to used software.) When multiplen GL100 are used; 8020, 8021, 8022, or other
4	Server IP Address	Set the IP address of the GL100	192.168.0.1
5	Server Port (Private Port)	Set the port number that is used on the GL100 (When the GL-Connect software is used, the port number is the 80. When GL100-APS software is used, the port number is the 8023.)	80 or 8023
6	Inbound Filter	Set a condition for accepting the access from the WAN side	Allow All (most common)

Note: When multiple GL 100 is used, the port number needs to be set a separate number for each software. There is port number that is determined the purpose of use by the de facto industry standard. It is not recommended to use that number. List of port numbers are posted on the IANA Web site.

Construction of the network for remote monitoring

Setting example of Port Forwarding on the router and setting of software

The following is an example of settings for the software and router port forwarding for remote monitoring.



GL100 #1
IP: 192.168.0.1

(GL100 #2)
(IP: 192.168.0.2)

(GL100 #3)
(IP: 192.168.0.3)

Note: In the GL100, the port number "80" and "8023" are set to use for communication.

Remote monitoring by smart device using the GL-Connect software
Settings of device connection on GL-Connect

No.	Address	Port
1	graphtec.dyndns.org	8020
2	graphtec.dyndns.org	8021
3	graphtec.dyndns.org	8022

Remote monitoring by PC using the GL100-APS software

Settings of device connection on GL100-APS

No.	Product	Connection	IP address	Port
1	GL100	LAN	graphtec.dyndns.org	8023
2	GL100	LAN	graphtec.dyndns.org	8024
3	GL100	LAN	graphtec.dyndns.org	8025

Setting example of Port Forwarding

Using the GL-Connect software, or the own software utilized the HTTP

No.	Public Port (start-end)	Protocol	IP address	Port (start-end)	Inbound filter
1	8020-8020	TCP	192.168.0.1	80-80	Allow all
2	8021-8021	TCP	192.168.0.2	80-80	Allow all
3	8022-8022	TCP	192.168.0.3	80-80	Allow all

Using the GL100-APS software

No.	Public Port (start-end)	Protocol	IP address	Port (start-end)	Inbound filter
1	8023-8023	TCP	192.168.0.1	8023-8023	Allow all
2	8024-8024	TCP	192.168.0.2	8023-8023	Allow all
3	8025-8025	TCP	192.168.0.3	8023-8023	Allow all

Note: 1. The "Public Port" is the port used by the software on the WAN.
2. The "IP address" and "Port" are used by GL100 in the LAN.
3. Setting screen and term vary by the router.

Remote monitoring by the own software utilized the HTTP
Settings of device connection

No.	Address	Port
1	graphtec.dyndns.org	8020
2	graphtec.dyndns.org	8021
3	graphtec.dyndns.org	8022

Note: - It is able to connect one smart device and one PC simultaneously.
- It is not able to connect multiple smart devices or multiple PC simultaneously.

When single GL100 is used, settings on column of number 1 are used.

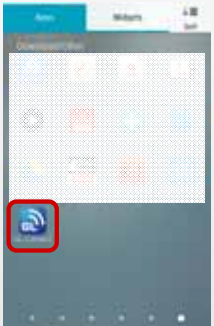
Remote monitoring by smart devices

• Registering the GL100 to the application software GL-Connect on the smart devices

When the DDNS is used with the GL100, the GL100 needs to be added manually to the device list on the GL-Connectio software. After connection is established, the GL100 is able to use as same as GL100 that is locally connected.

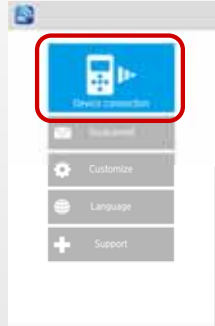
Registers the GL100 to be used the DDNS

1. Start the GL-Connect software



Tapping the "GL-Connect" icon.

2. Start the Device connection



Tapping the "Device connection".

3. Start the "Manual Addition+"



Tapping the "Manual Addition+".

4. Set the information of DDNS



No.	Item	Description	Example settings
1	Device name	Set any device name. It is displayed on the device list.	GL100 Farm #1
2	Address http://	Enter the host name that is registered in the DDNS service provider.	graphtec.dyndns.org
3	Port	Set the port number that is set on the router as public port to this column.	80

Set the information of three items shown above. Then tap the "Add".

5. Displaying the added GL100



GL100 to use the DDNS is displayed in the device list.

Remote monitoring by smart devices

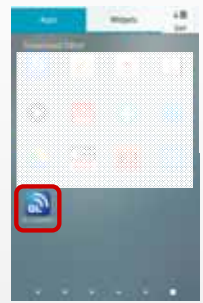
Monitoring the measured data using the smart device with the GL-Connect software

Connects the GL100 that the DDNS is used, and then monitors the measurement.

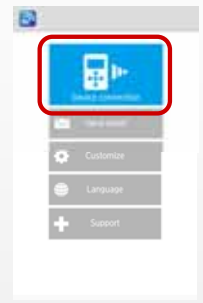
1. Sets the smart devices as can be connected to the Internet

2. Start the GL-Connect software

3. Start the device connection



Tapping the "GL-Connect" icon.



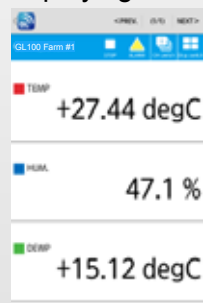
Tapping the "Device connection" button.

4. Select the registered GL100

5. Displaying the measured data by the GL100



Selects the GL100 that is registered to use the DDNS service. Then taps the "Device monitoring".



In this example, it is able to monitor the measured data as the temperature, humidity, dew-point temperature, and accumulated temperature by the GL100 with the GS-TH sensor in different location using the smart device with the GL-Connect software.

Configuration of the network



Remote monitoring by PC

Monitoring the measured data using the PC with the GL100-APS software

When the DDNS is used with the GL100, it is specified by the host name (domain name). It is directly entered to the connection screen of GL100-APS. After connection is established, the GL100 is able to use as same as GL100 that is locally connected

GL100-APS setting screen of the connection device

1. Starts the GL100-APS.
2. Open the Device Connect screen.



Sets the host name to be used in DDNS service to the column of "IP Address / Name". Sets the port number that is used in the router (public port number) to the "Port number /USB ID" column. And then click the "Connect" button.

Note: When multiple GL100 are connected to the software, each GL100 need to register separately. In this case, it is required to set a different port number to each of the GL100. It is necessary to also set the port number that is used to the router.

Monitoring measurement by the GL100-APS Note: Display screen varies by the soft mode.



Configuration of the network



Reference data

• IP address

In a network, IP addresses are used to identify the equipment. If IP addresses is not set, communication to the device cannot be made. IP address is configured four sets of three-digit number that is 0 to 255. Each device needs to have a unique IP address. (Should not exist duplicate IP addresses on the network.) The following two methods for setting the IP address is available.

- Static IP address

Fixed IP address is set in the device to connect to the network. IP address is required for all of devices that are possible to be connected to the network.

- Dynamic IP address

Network management server assign a valid IP address to a device connected to the network. IP address changes each time to connect to the network even if it is the same device. In this way, it is possible to manage the network with less IP addresses. In the Internet, dynamic IP address is used usually because devices are not always connected to the network.

• DNS (Domain Name System)

IP addresses are used to identify the equipment also in the Internet. It is hard to remember the IP address of the communication partner because it is the twelve digits number. The DNS (Domain Name System) is used as a countermeasure. The host name (domain name) is assigned to equipment to be connected to the Internet. Table of the host name (domain name) and the IP address is created in the DNS server. It is able to find IP address of the communication partner by searching the DNS server. When the host name (domain name) is entered into the Internet Explorer or application software, searching the IP address is automatically executed. (User will not be aware of the IP address search.)

• DDNS (Dynamic Domain Name System)

If dynamic IP addresses is assigned to devices connected to the internet, it is not able to find the IP address using the DNS server even if a host name is set to the device. It is because the IP address is changed. There is the DDNS as a solution. When the IP address of the device connected to the Internet is changed, a new IP address of the device is notified to the DDNS server. The table of the host name (domain name) and IP address is updated on the DDNS server using this method. IP address of the communication partner is able to find using a DDNS server. When the host name (domain name) is entered into the Internet Explorer or application software, searching the IP address is automatically executed. (User will not be aware of the IP address search.)

• Remote monitoring

When the GL 100 of different location will be connected to the application software for remote monitoring,

- In case of using the static global IP address that is assigned to the router for making connection between the internet and the LAN containing the GL100: its static IP address is used to connect the GL100 and software.
- In case of using the DDNS: the host name (domain name) is used to connect the GL100 and software.