

## Functions and Specification

### ACP 5

ACP 5 is a central controller that can manage individual or group of maximum of 256 units in one space.  
ACP 5 can monitor or control the units installed in each room of a building from a place such as building management office or school administration office.

**[ACP 5 Functions]**

- ➔ Environment Setting Function using External Buttons
- ➔ Web Server Embedded Function
- ➔ Devices that can be interfaced

**[ACP 5 Components]**

- ➔ Components

**[Name of Each Part of ACP 5]**

- ➔ Name of Each Part

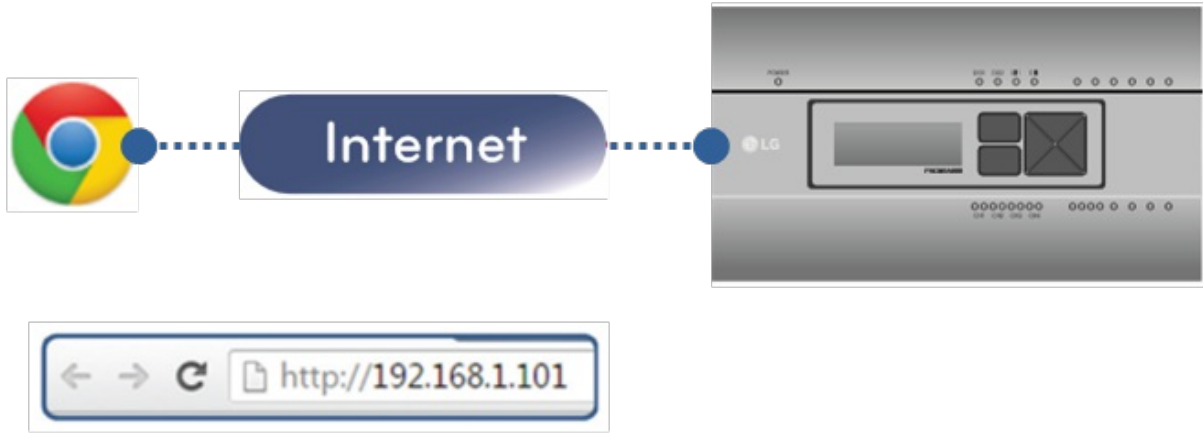
**[ACP 5 Hardware Specification]**

- ➔ Hardware Specification



Web Server Embedded Function

Without installing a separate program, you can use web browser to input IP address of ACP 5 in the address window to access ACP 5 web server for device control and monitoring.



- Control of Max. of 256 air conditioner units
- Error and Operation Status Monitoring
- Peak/Demand Power Control
- System Setting Function

Devices that can be interfaced

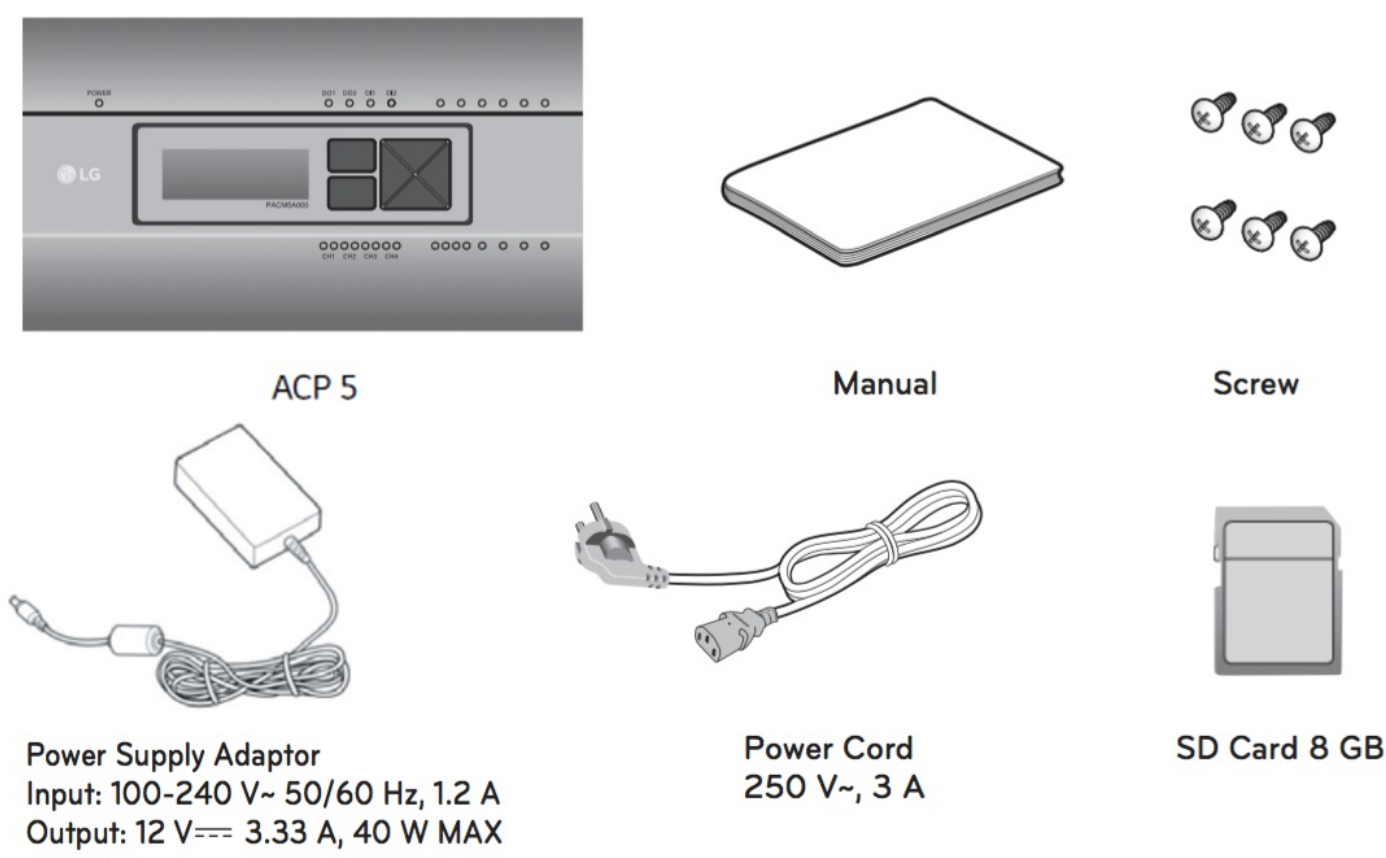
The devices of ACP 5 that can be interfaced are as follows.

Device	ACP 5
AC Ez(Touch)	o
Simple Central Controller	o
AC Smart 5	o
AC Manager 5	o
Air conditioner	o
ERV	o
Heating	o
AHU	o
Chiller	o (with chiller option S/W applied)
EXP. I/O	o
Air purifier	o
Demand Controller	o

Components

The components of the following figure are included in ACP 5 package box.

Open the package box, and check if all corresponding components are included.



Note

Components or options may differ from the actual product picture.

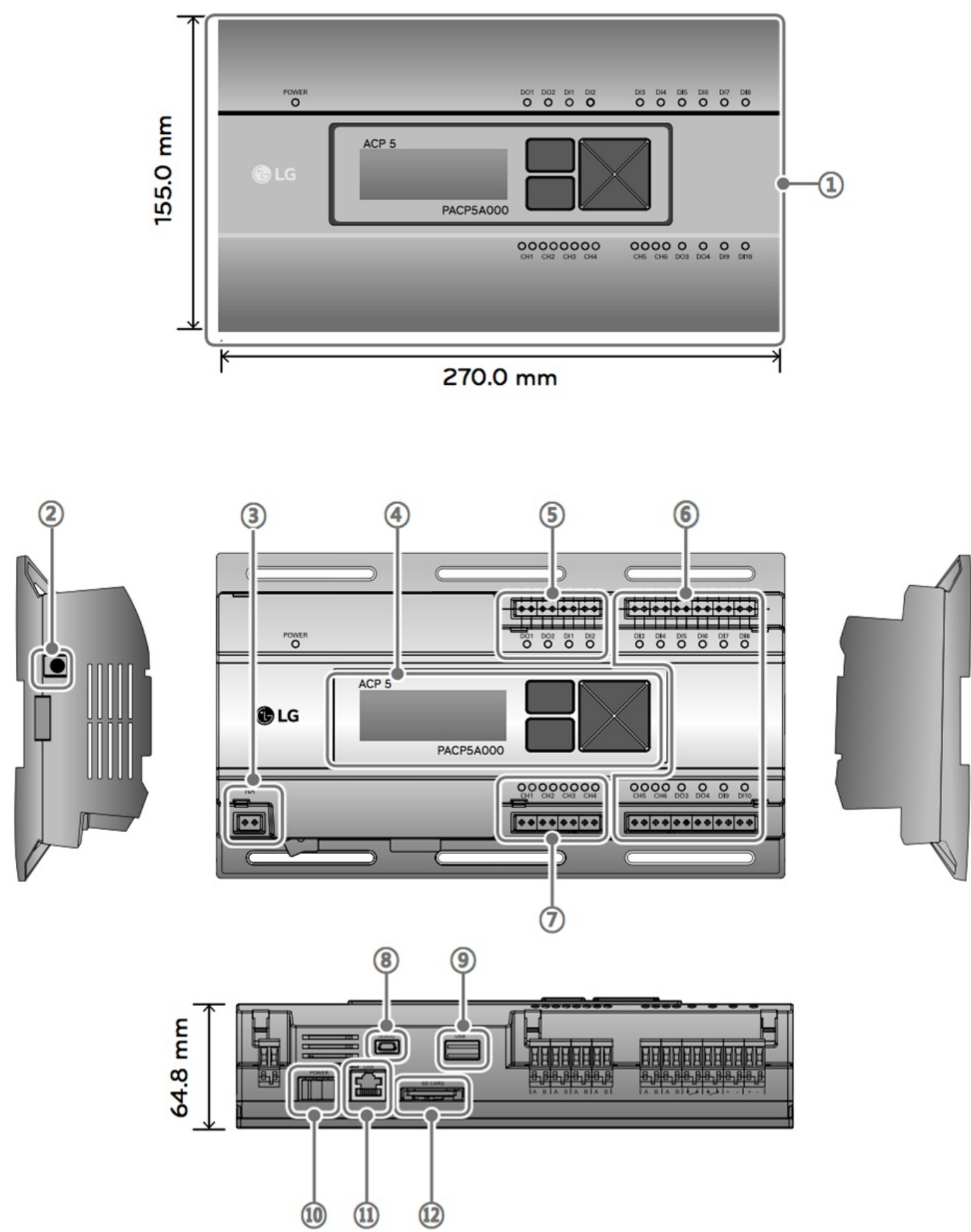
Caution

The SD card provided by our company is for backup and restoration of data when service is provided by qualified service engineer. Do not use on other purpose.



Name of Each Part


ACP 5 is composed as the following form.



No.	Category	Contents
①	Cover	Front cover of ACP 5
②	Adaptor connection jack	Jack for DC 12 V to connect to the power supply adaptor
③	Power port	24 V~ port for power connection (not supported by DC 12 V model)
④	Buttons and LCD	Buttons and LCD to set network environment and to display other information
⑤	Basic external input/output signal connectors	Connection ports to connect to external input/output signals (DI:2, DO:2)
⑥	Optional input/output and RS-485 communication port	Connection port to connect to external input/output signals and RS-485 communication port for external expansion. (8 DI's, 2 DO's, 2 RS-485 communication ports)
⑦	RS-485 communication port	RS-485 communication ports to connect to air conditioner and ERV equipment (4 in total)
⑧	Mini USB port	USB to Serial port for software debugging
⑨	USB port	For software update and data backup
⑩	Power switch	Switch to turn on or off the power of ACP 5
⑪	Ethernet port	Ethernet port to connect to internet and AC Manager IV
⑫	SD card slot	For RS-485 communication data backup.

Hardware Specification

ACP 5 hardware specification is as follows.

Category	Contents
Boundary of usage temperature	0 °C ~ 40 °C
Rated Voltage	DC 12V 
Rated Current	Max 2.3A
Communication ports	<ul style="list-style-type: none"><li>• Ethernet 10 / 100 BASE-T</li><li>• USB : USB Host (SW upgrade, data backup)</li><li>• mini USB : Device (Debug)</li><li>• RS-485 communication ports 6EA</li><li>• SD card slot (For data backup, RS-485 communication data backup)</li></ul>
External input/output ports	DI 10 EA, DO 4 EA
LED	27 EA (power and communication status)
LCD	20×4 Character-LCD (network environment setting and information display)

## Installation and Setting

It describes ACP 5 Installation and Setting Method.

**[Installation Order]**

- ➔ Order of ACP 5 Installation

**[Installation and Cable Connection]**

- ➔ Fixing to wall
- ➔ Mounting on DIN RAIL
- ➔ Connecting Ethernet cable (LAN cable)

**[LCD Environment Setting]**

- ➔ LCD Environment Setting

**① Network Address Setting[Network Info]**

- ➔ Network Address Setting Method
- ➔ IP Address Setting
- ➔ Using Dynamic IP with DHCP
- ➔ Check the access

**② [Function]**

- ➔ Software Update
- ➔ DB back up
- ➔ DB recover

## Order of Installation

To use ACP 5, it shall be installed in the following order.

**STEP 1.** Check points during the ACP 5 installation

Before installing the ACP 5, check the cautions.

**STEP 2.** Study the cable connections diagram of the entire system.

Study the cable connection diagram of the site where the ACP 5 is installed.

**STEP 3.** Set the indoor unit address

Set the address of the ACP 5 not to be overlapped with the connecting indoor unit.

**STEP 4.** Set PI485 and connect cables

Set DIP switch of PI485 correctly, and connect RS-485 communication cable.

**STEP 5.** ACP 5 Installation and Cable Connection

Install ACP 5 and connect network and other cables.

**STEP 6.** ACP 5 Network Address Setting

Set the network address to be able to access the ACP 5 through internet.

**STEP 7.** Set web GUI access environment

Set the access environment in web GUI, which is the operation program of the ACP 5.

**STEP 8.** Input indoor unit and ERV information

Input and save device information in Web GUI, which is ACP 5 operating program.

**STEP 9.** Check Web GUI Control/Monitoring

Access to Web GUI, which is ACP 5 operating program, and check if control/monitoring are properly carried out.

### Caution

- **ACP 5 Installation**

**The ACP 5 installation work needs the professional technique. Therefore, the installation described in this chapter should be performed by the certified installation professional.**

**For questions and requests with regard to the installation, please contact the service center or installation specialty store approved by LG.**



Usage (PC)

- ➔ LogIn / LogOut
- ➔ Account
- ➔ Dashboard

[Control]

- ➔ Device Control
- ➔ Schedule Control
- ➔ InterLocking
- ➔ Time limit control

[Energy]

- ➔ Energy Usage
- ➔ Energy Navigation
- ➔ Peak demand control

[History]

- ➔ Operation History
- ➔ Energy Navigation History
- ➔ Operation Trend
- ➔ Cycle

[Setting]

- ➔ Device setting
- ➔ Group Setting
- ➔ System Setting
- ➔ Network Setting
- ➔ Error Notice Setting
- ➔ Administrator Setting
- ➔ Additional User Setting
- ➔ Advance Setting
- ➔ TMS Setting
- ➔ BACnet/Modbus Setting



You can access to the product with IP address in internet address window to use various central control functions.

Note

- Chrome browser is recommended for web control.
- For access to web, IP address needs to be set.
- At the time of the first access, you need to set password of the manager account.
- On every 90 days, popup is provided to change password.  
For personal information protection and safe service usage, please change password periodically.

Login

Login method is as follows.

1. Please input IP address of the product in the internet address window.
2. Input ID and password in the login window and click **[Login]** button.

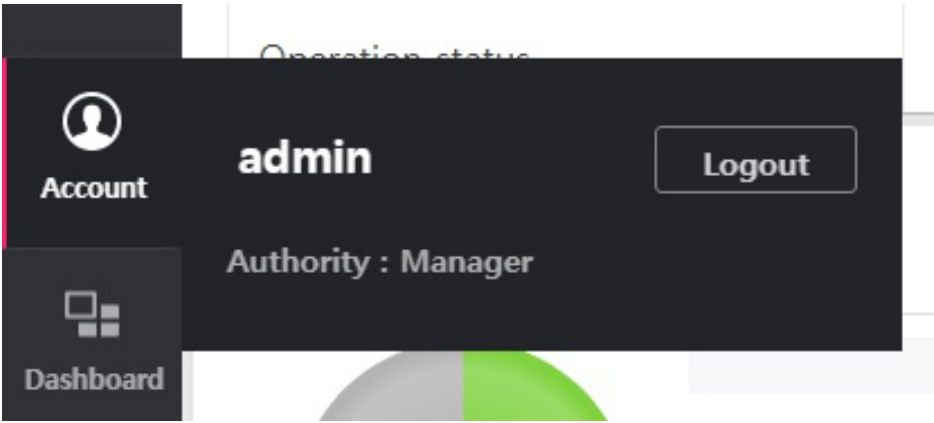
LogOut

Logout method is as follows.

1. In menu, click **[Account]** menu.
2. In Account information window, click **[Logout]** button.

Account

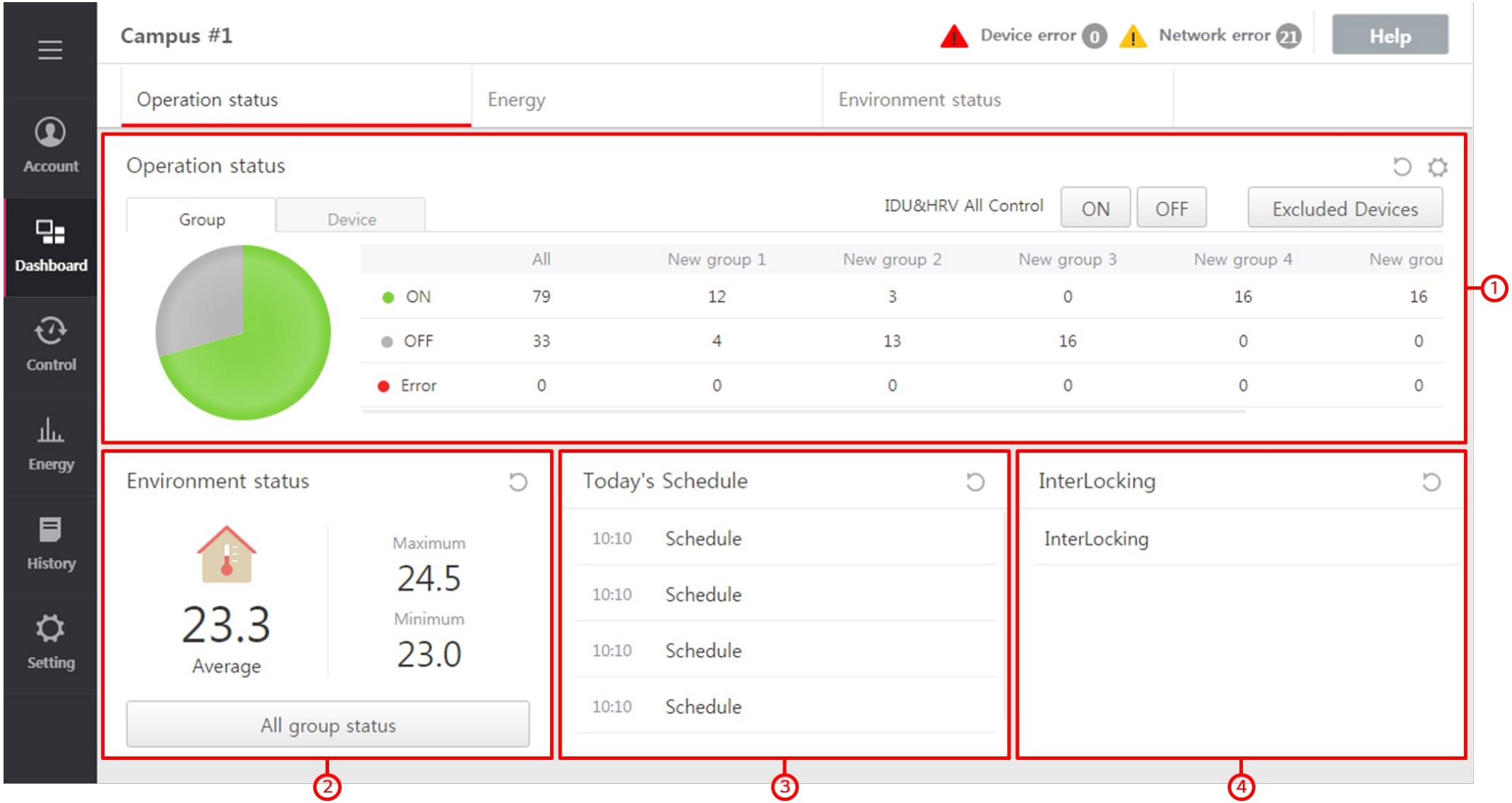
You can check the information of the currently logged in account.



You can check the current operation status and energy usage trend of the equipment installed in the product.

Operation status

It describes the dash board's current operation status tab composition and functions.



No.	Category	Contents
①	Operation status	<p>Check operation status (ON/OFF/Error) of the equipment installed in the product</p> <p>[group]</p> <ul style="list-style-type: none"><li>Checking of operation status of each management group designated by user</li></ul> <p>[device]</p> <ul style="list-style-type: none"><li>Check operation status of each device designated by the user</li></ul> <p>All indoor units and ERV ON / OFF control</p> <ul style="list-style-type: none"><li>All indoor units and ERV ON / OFF control</li><li>When exception device is registered, it is excluded from overall control</li></ul>
②	Environment status	Checking of average indoor temperature, Max./Min. indoor temperature and group
③	Today's Schedule	Checking today's schedule list
④	InterLocking	Checking of InterLocking list

[Widget setting]

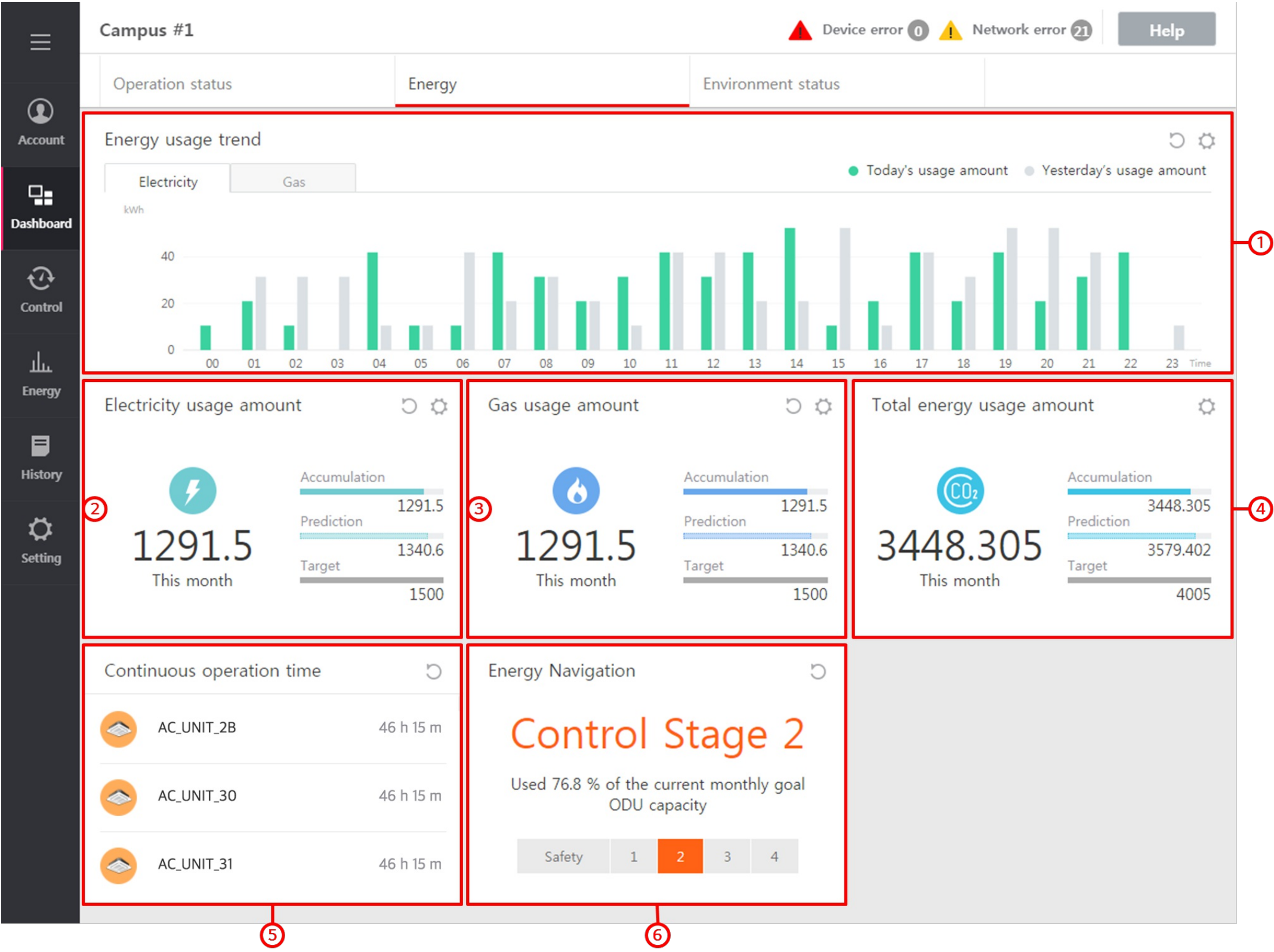
You can select the monitoring setting through each widget of the dash board.

➔ Operation status Widget

Energy

It describes the dash board's energy tab composition and functions.





No.	Category	Contents
①	Energy usage trend	Checking of daily, monthly, and yearly trend of electricity/gas usage amount
②	Electricity usage amount	Checking of electricity usage amount accumulation, forecast, and goal
③	Gas usage amount	Checking of gas usage amount accumulation, forecast, and goal
④	Total energy usage amount	Checking of total energy usage amount accumulation, forecast, and goal
⑤	Continuous operation time	Check continuous operation time ranking of indoor unit
⑥	Energy Navigation	Check energy navigation status

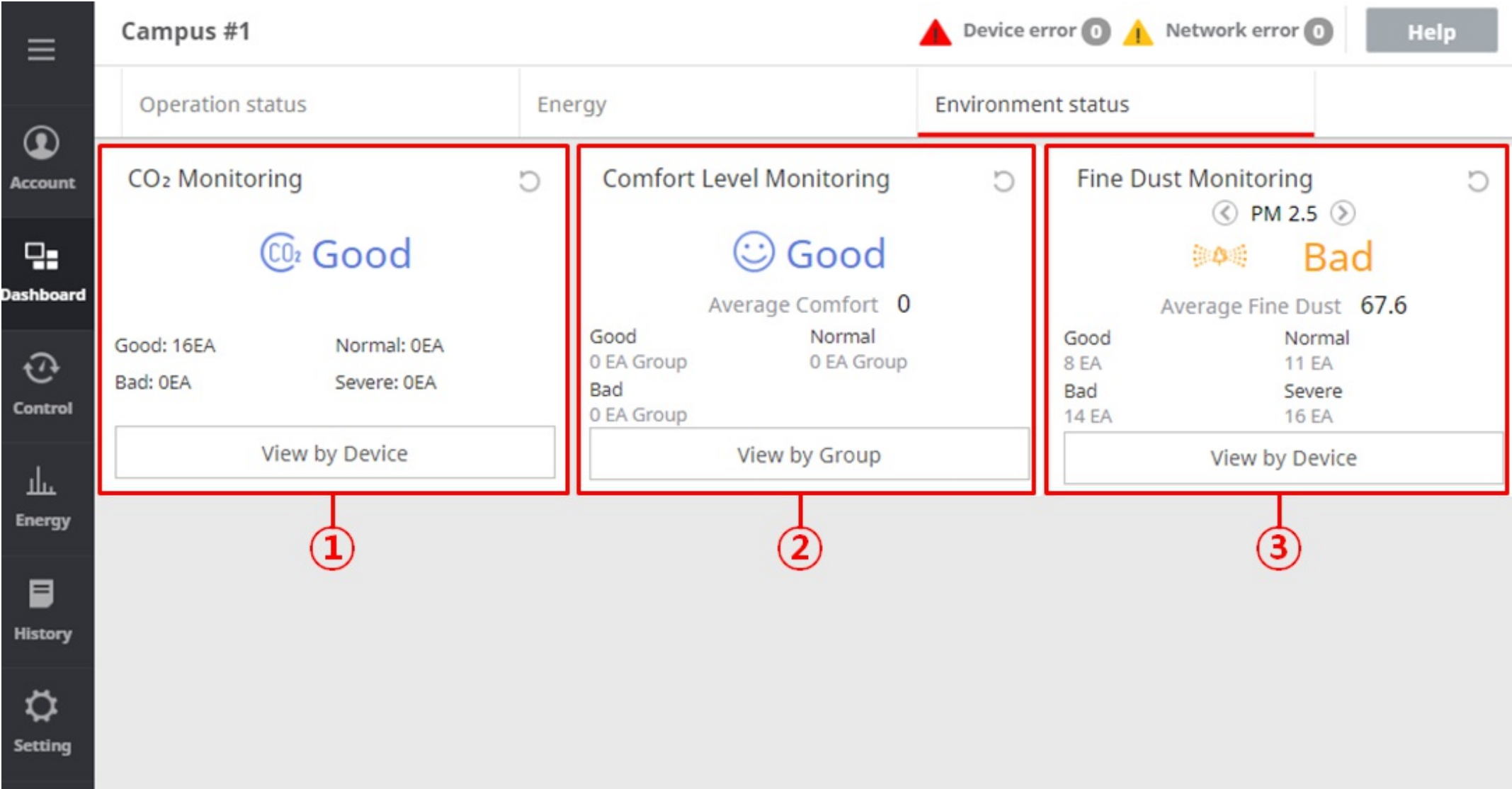
[Widget setting]

You can select the monitoring setting through each widget of the dash board.

- ➔ Energy usage trend Widget
- ➔ Electricity usage amount Widget
- ➔ Gas usage amount Widget
- ➔ Total energy usage amount Widget

Environment status

It describes the composition and functions of dash board environment status tab




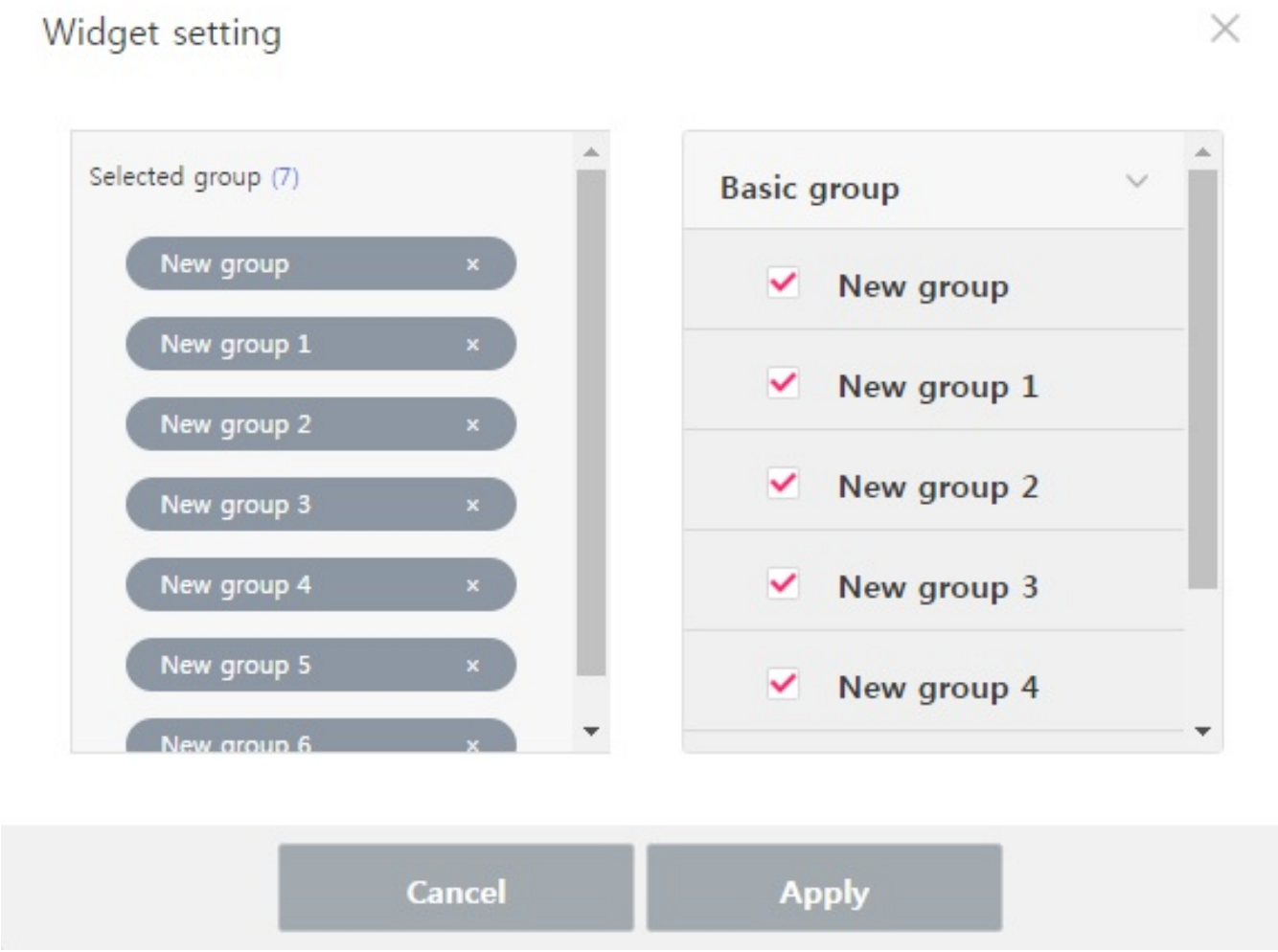
No.	Category	Contents
-----	----------	----------

①	CO <sub>2</sub> monitoring	Check CO <sub>2</sub> status of registered ERV
②	Comfort Level Monitoring	Check registered indoor unit's pleasantness status
③	Fine dust monitoring	Check registered indoor unit, air purifier's fine dust status Fine dust is classified to PM10, PM2.5, and PM1.0, and it indicates each status and concentration

## Operation status Widget

You can set the group to monitor the operation status.


1.
- In the left menu tab, click **[Dashboard] > [Operation status]** menu.
  - The current operation status screen is displayed.
2.
- Click the current operation status screen's  button.
  - The Widget setting screen is displayed.

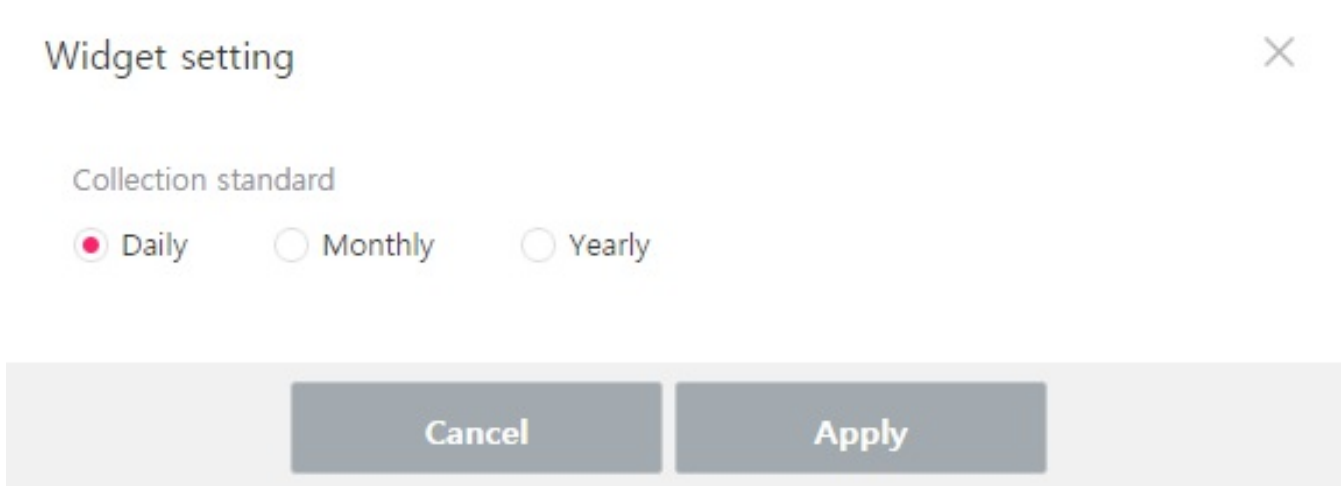


3.
- Select the group to monitor the operation status.
4.
- When selection is completed, click **[Apply]** button.

## Energy usage trend Widget

You can select the standard for energy usage amount trend monitoring collection.


1.
- In the left menu tab, click **[Dashboard]** > **[Energy]** menu.
  - The energy screen is displayed.
2.
- Click the energy usage trend screen's  button.
  - The Widget setting screen is displayed.

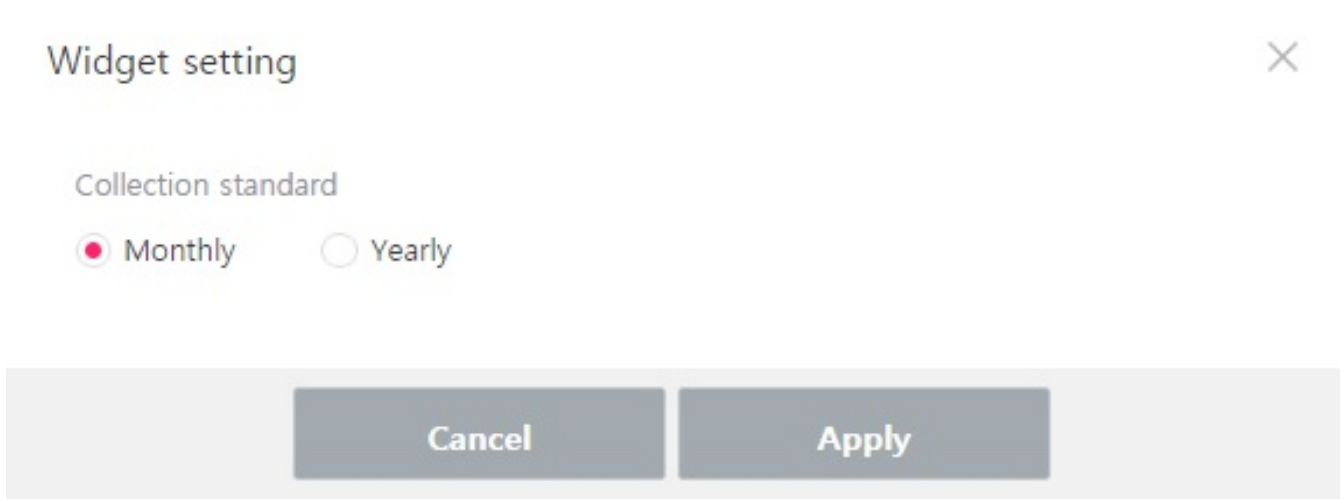


3.
- Select the collection standard(**Daily**/**Monthly**/**Yearly**).
4.
- When selection is completed, click **[Apply]** button.

## Electricity usage amount Widget

You can select the standard for the electricity usage amount collection standard.


1. In the left menu tab, click **[Dashboard]** > **[Energy]** menu.
- The energy screen is displayed.
2. Click the electricity usage amount screen's  button.
- The Widget setting screen is displayed.

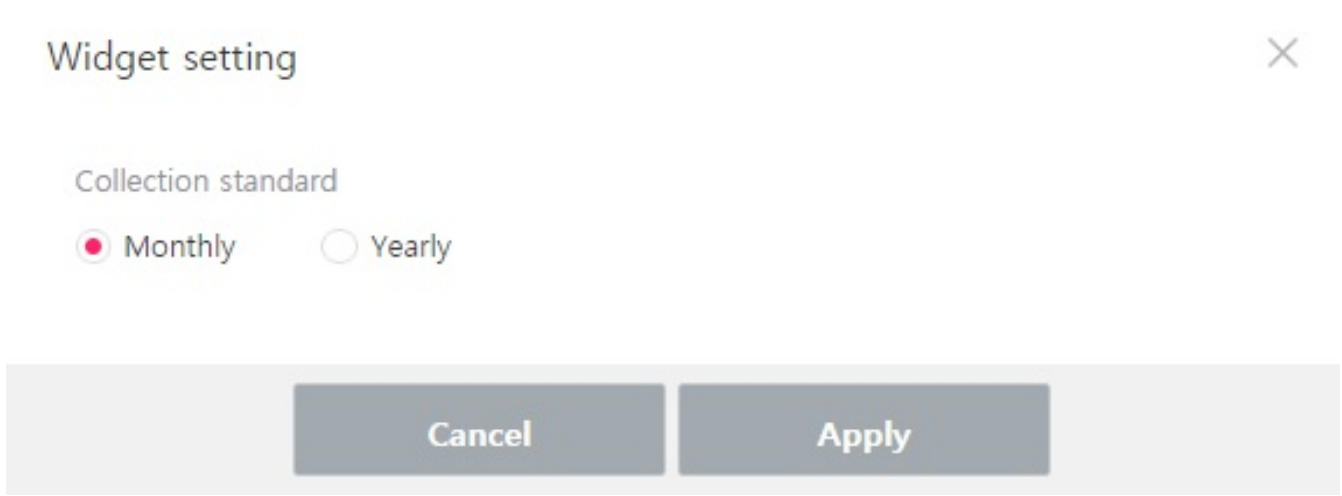


3. Select the collection standard(**Monthly/Yearly**).
4. When selection is completed, click **[Apply]** button.

### Gas usage amount Widget

You can select the standard for gas usage amount collection.


1. In the left menu tab, click **[Dashboard] > [Energy]** menu.
- The energy screen is displayed.
2. Click the gas usage amount screen's  button.
- The Widget setting screen is displayed.



3. Select the collection standard(**Monthly/Yearly**).
4. When selection is completed, click **[Apply]** button.

## Total energy usage amount Widget

You can select the display and collection standard for the total energy usage amount.

1. In the left menu tab, click **[Dashboard]** > **[Energy]** menu.
- The energy screen is displayed.
2. Click the total energy usage amount screen's  button.
- The Widget setting screen is displayed.

Widget setting

Display standard

kgCO2

kgoe

Collection standard

Monthly

Yearly

Cancel

Apply

3. Select the display standard(**kgCO<sub>2</sub>**/**kgoe**) and the collection standard(**Monthly**/**Yearly**).
4. When selection is completed, click **[Apply]** button.

## Device Control

It describes the method to control the device and to monitor the device status.

### [Screen and Icon]

- ➔ Screen Structure and Function
- ➔ Device Icon

### [Control Window]

- ➔ Control of Each Device
- ➔ Device Information

### [Control/Monitoring]

- ➔ Control
- ➔ Monitoring

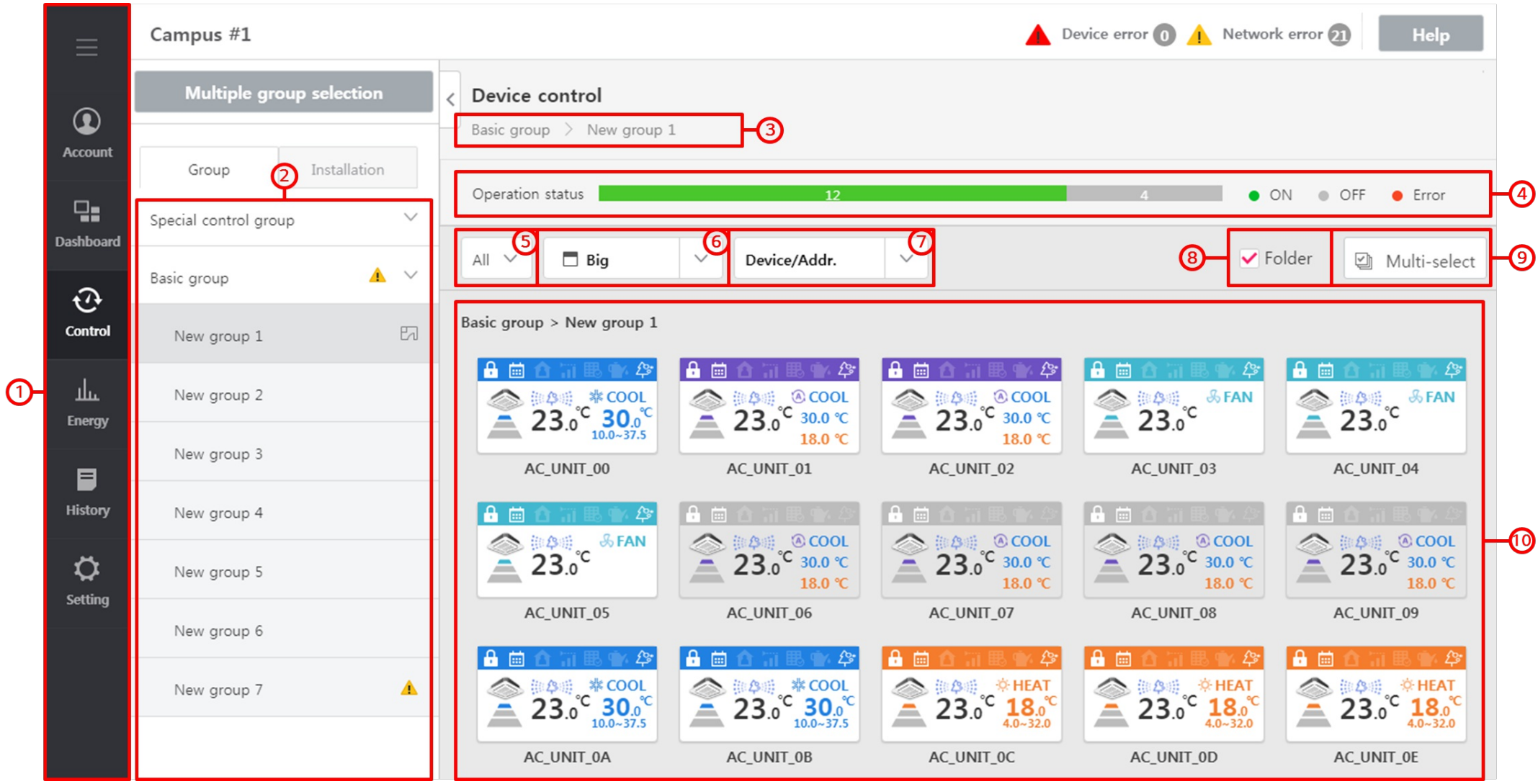
### [Drawing]

- ➔ Edit Drawing
- ➔ Delete Drawing



Screen Structure and Function

1. In the left menu tab, click [Control] > [Device control] menu.
- The device control screen is displayed.



No.	Category	Contents
①	Main Menu	Main Menu Tab
②	Group List	Check control group
③	Group Information	Group name and group location
④	Operation status	Check the devices' current operation status (ON/OFF/Error)
⑤	Filtering	Device category and device status filtering
⑥	Viewing method	Select viewing method of device icon <div><div></div> : Big</div> <div><div></div> : Small</div> <div><div></div> : List</div> <div><div></div> : Drawing</div>
⑦	Sorting device	Select the sorting method of the device <ul style="list-style-type: none"><li>Name</li><li>Device/Name</li><li>Device/Addr.</li><li>Operation</li></ul>
⑧	View folder	Check the lower level group category of the current group when it is checked
⑨	Multi-select	Select multiple devices when it is clicked
⑩	Device section	Check the information of the devices set in the group

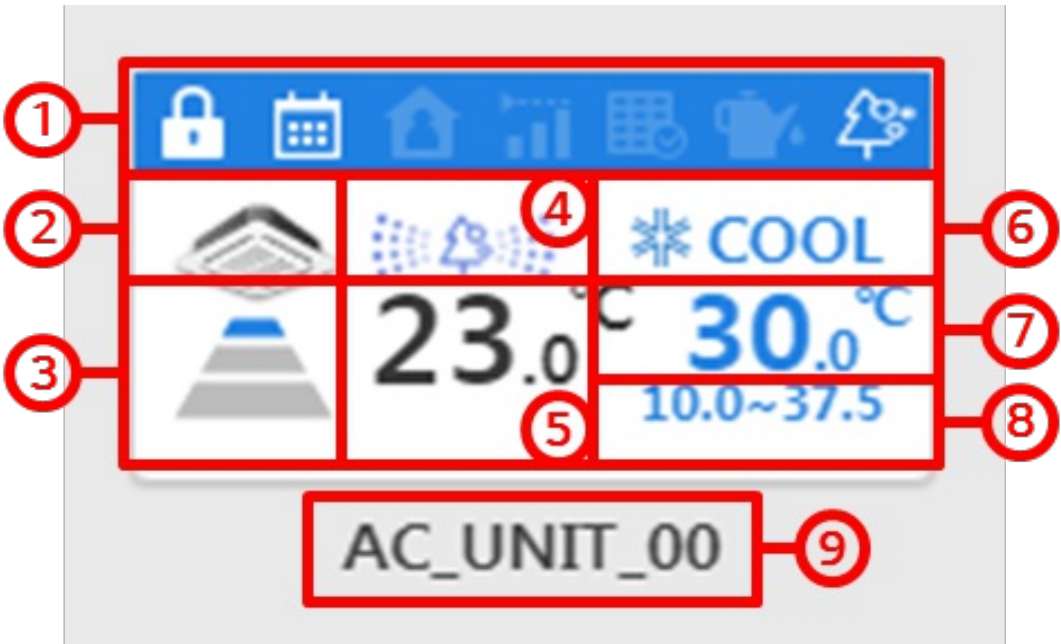
Management/installation group

1. Group
- management group set for convenience
2. Installation
- Provides the information of actually connected device

Device Icon










You can check important information of individual devices with icon.

1. Big icon



No.	Category	Contents
①	Device status indicating icon	Lock status, schedule, occupied, peak control, Filter replacement alarm, Oil replacement alarm, air cleaning
②	Device Icon	Check device icon
③	Fan speed	Check device's Fan speed
④	Fine dust status	Check fine dust status Blue (good), Green (normal), Orange (bad), Red (very bad)
⑤	Current temperature	Check current temperature
⑥	Mode	Check mode
⑦	Set temperature	Check set temperature
⑧	Set temp range	Check upper limit/lower limit temperature
⑨	Device name	Check device name

Device status indicating icon

Icon	Contents
	Lock
	Schedule
	Occupied
	Peak control
	Filter replacement alarm
	Oil replacement alarm
	Air cleaning
	Ionizer
	Airy quality sensor

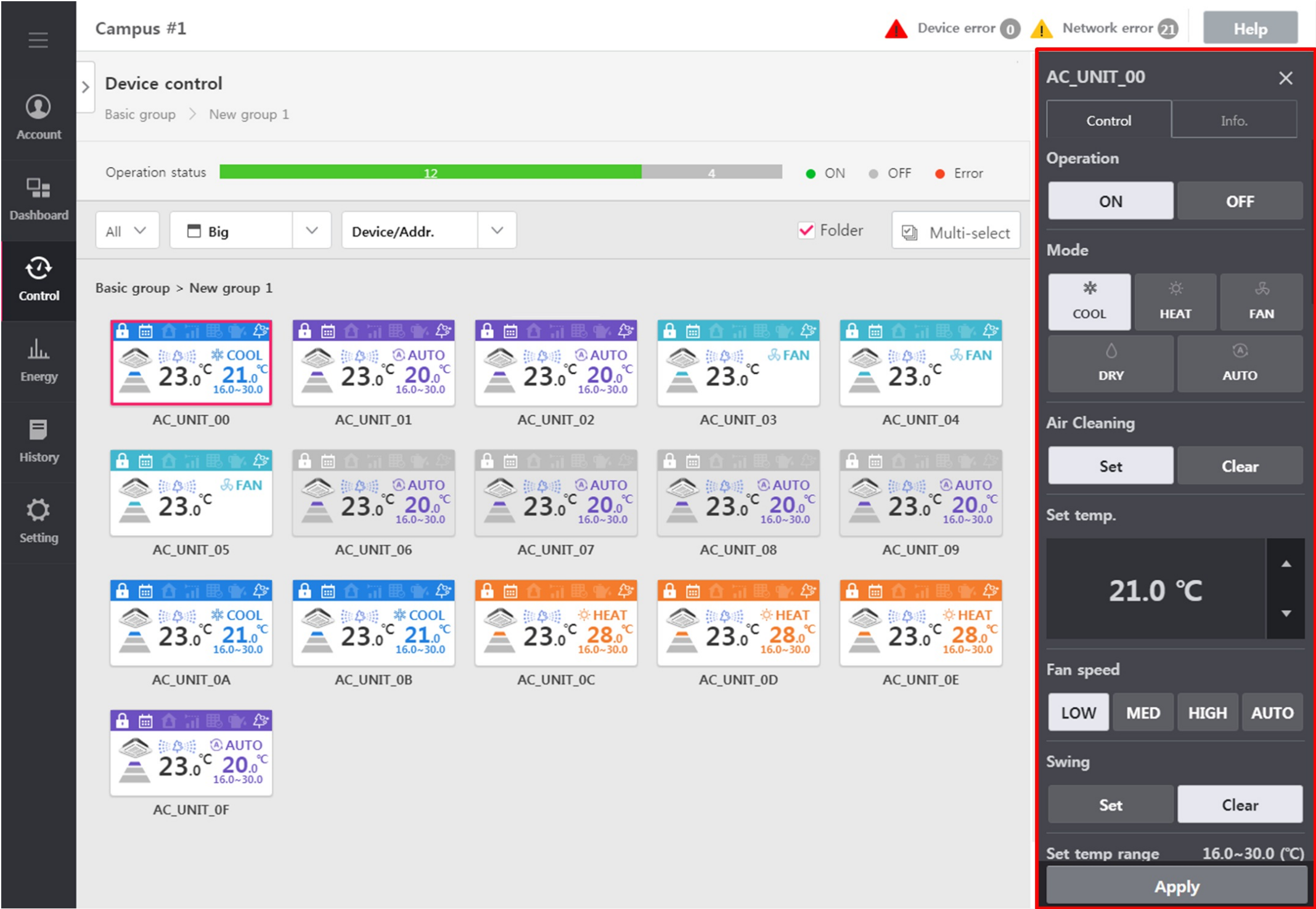
2. Small icon

- Check device icon/operation/mode/device name

3. View list

- indication of attribute of the device in the group (device name, operation status, operation mode, current temperature, set temperature, error code, ACP address, outdoor unit address, device address, etc.).

When a devices selected in the device section, control window is created in the right side as in the following screen. You can control the selected device through the control window.



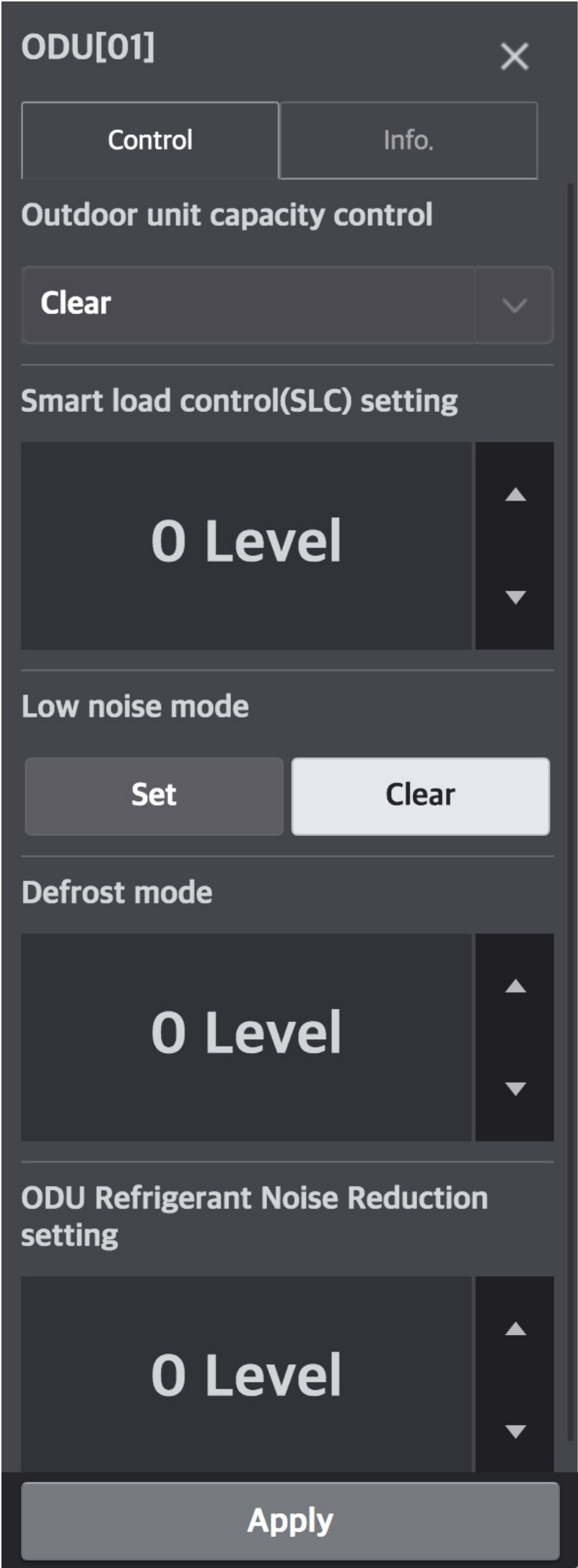
Note

- The detail control boundary for each device may be different from the actual device, so make sure to refer to the corresponding device's manual.
- Chiller interface is an optional function, and you need to separately purchase the option for chiller interface.
- ACS I/O devices may have different control tool name, unit, upper limit, lower limit, etc. according to the setting.

Control of Each Device

- ➔ Outdoor Unit
- ➔ IDU
  - IDU (2Set)
- ➔ ERV
- ➔ ERV DX
- ➔ Heating
- ➔ AHU
- ➔ Scroll chiller
- ➔ Screw chiller
- ➔ Turbo chiller
- ➔ Absorption Chiller
- ➔ DOKIT
- ➔ DO
- ➔ AO
- ➔ Air purifier

Outdoor Unit



Category	Contents
Outdoor unit capacity control	<ul style="list-style-type: none"><li>Press [▼] button to set operation rate (%)</li></ul>
Smart load control function	<ul style="list-style-type: none"><li>Press [▲]/[▼] button to set smart load control stage (0stage, 1stage, 2stage, 3stage, 4stage)</li></ul>
Low noise operation	<ul style="list-style-type: none"><li>[Set/Clear] button: outdoor unit low noise operation Set/Clear</li></ul>
Defrost mode	<ul style="list-style-type: none"><li>Press [▲]/[▼] button to set defrost mode stage (0stage, 1stage, 2stage, 3stage)</li></ul>
ODU Refrigerant Noise Reduction setting	<ul style="list-style-type: none"><li>Press [▲]/[▼] button to set outdoor unit refrigerant noise reduction stage (0stage, 1stage, 2stage)</li></ul>

Note

In the central controller, if 'outdoor unit low noise operation' is used, in the installed indoor unit's remote controller, you need to set [Installer setting] > [Low noise mode] to 'ODU'. (Default value 'ODU')





Category	Contents
Operation	<ul style="list-style-type: none"><li>• <b>[ON]</b> button: starts the device operation</li><li>• <b>[OFF]</b> button: Stops the device operation</li></ul>
Mode	<ul style="list-style-type: none"><li>• <b>[COOL]</b> button: Swtiches to cooling mode</li><li>• <b>[HEAT]</b> button: Switches to heating mode</li><li>• <b>[FAN]</b> button: Air purification operation. When FAN is selected, set temperature is not applied to the device</li><li>• <b>[DRY]</b> button: Removes moisture during rainy season or when humidity is high. When DRY is selected, set temperature is not applied to the device</li><li>• <b>[AUTO]</b> button: Switches to automatic mode</li></ul>
Air cleaning	<p>Air cleaning control only for air cleaning function supporting indoor unit</p> <ul style="list-style-type: none"><li>• Air cleaning single operation<ol style="list-style-type: none"><li>1) In indoor unit stop state, in case of air cleaning <b>[Set]</b>, air cleaning single operation with wind only (automatic wind) (During air cleaning single operation, mode lock and wind amount lock are not checked)</li><li>2) During air cleaning single operation, in case of operation <b>[OFF]</b> or air cleaning <b>[Clear]</b>, air cleaning is cancelled to previous mode and previous wind amount (But, in case of mode or wind amount control together, control is done with controlled mode and wind amount)</li></ol></li><li>• Air cleaning additional operation<ol style="list-style-type: none"><li>1) In indoor unit stop state, in case of operation status <b>[ON]</b> and air cleaning <b>[Set]</b>, in current mode, air cleaning additional operation</li><li>2) In indoor unit operation state, in case of air cleaning <b>[Set]</b>, in current mode, air cleaning additional operation</li><li>3) During air cleaning additional operation, in case of operation <b>[OFF]</b>, operation stops</li><li>4) During air cleaning additional operation, in case of air cleaning <b>[Clear]</b>, air cleaning is cancelled</li></ol></li></ul>
Set temperature	Press <b>[▲]/[▼]</b> button to set the desired temperature
Fan speed	<p>Wind strength setting</p> <ul style="list-style-type: none"><li>• <b>[LOW]</b> button: Set the fan speed to slow</li><li>• <b>[MED]</b> button: Set the fan speed to normal</li><li>• <b>[HIGH]</b> button: Set the fan speed to fast</li><li>• <b>[AUTO]</b> button: <b>[LOW]-[MED]-[HIGH]</b> automatic switching</li></ul>
Swing	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/Clear the Swing function</li></ul>

Set temp range	When user set the desired temperature individually, the desired temperature outside the designated temperature boundary cannot be set
Human detection mode - ON/OFF learned power saving	Only for human detection mode - supporting indoor unit, human detection mode - control <ul style="list-style-type: none"><li>● <b>[Set/Clear]</b> button: human detection mode - ON/OFF learned power saving Set/Clear</li></ul>
Human detection mode - Temperature power saving	Only for human detection mode - supporting indoor unit, human detection mode - control <ul style="list-style-type: none"><li>● <b>[Set/Clear]</b> button: human detection mode - temperature power saving Set/Clear</li></ul>
Human detection mode - Unoccupied time setting(minute)	Only for human detection mode - supporting indoor unit, human detection mode - control Set empty decision time to 5, 10, 15, 30, 60, or 90 min.
Human detection mode - Direct wind	Only for human detection mode - supporting indoor unit, human detection mode - control <ul style="list-style-type: none"><li>● <b>[Set/Clear]</b> button: human detection mode - direct wind Set/Clear</li></ul>
Human detection mode - Indirect wind	Only for human detection mode - supporting indoor unit, human detection mode - control <ul style="list-style-type: none"><li>● <b>[Set/Clear]</b> button: human detection mode - indirect wind Set/Clear</li></ul>
Comfortable Power Saving	<ul style="list-style-type: none"><li>● <b>[Set/Clear]</b> button: Comfortable Power Saving function Set/Clear</li><li>● You can press <b>[▲]/[▼]</b> button to set stage</li></ul> Only when indoor unit is in cooling operation, Comfortable Power Saving control is possible
Filter replacement alarm	<ul style="list-style-type: none"><li>● <b>[Clear]</b> button: in case of filter replacement alarm, it cancels filter replacement alarm</li></ul>
HardLock	<ul style="list-style-type: none"><li>● <b>[Set/Clear]</b> button: Set/clear HardLock so that user cannot control any function with individual remote controller</li></ul>
Mode lock	<ul style="list-style-type: none"><li>● <b>[Set/Clear]</b> button: Set/clear lock so that user cannot control mode setting with individual remote controller</li></ul>
Fan lock	<ul style="list-style-type: none"><li>● <b>[Set/Clear]</b> button: Set/clear lock so that user cannot control Fan speed setting with individual remote controller</li></ul>
TempLock	<ul style="list-style-type: none"><li>● <b>[Set/Clear]</b> button: Set/clear lock so that user cannot control temperature setting with individual remote controller</li></ul>
Auto change over(Occupied)	It is a function to automatically switch to cooling operation if indoor temperature exceeds upper limit temperature, to heating operation if it is less than lower limit temperature, and to wind only operation if it is between upper limit temperature and lower limit temperature (supported only in outdoor unit with both cooling/heating) <ul style="list-style-type: none"><li>● <b>[Set/Clear]</b> button: Set/clear Auto change over(Occupied)</li></ul>
Lower /Upper temp.	Auto change over(Occupied)'s lower limit temperature and upper limit temperature setting
Auto change over(Occupied) Fan speed	Select the Fan speed value to set in the indoor unit during Auto change over(Occupied) operation <ul style="list-style-type: none"><li>● <b>[LOW]</b> button: Set the fan speed to slow</li><li>● <b>[MED]</b> button: Set the fan speed to normal</li><li>● <b>[HIGH]</b> button: Set the fan speed to fast</li><li>● <b>[AUTO]</b> button: <b>[LOW]-[MED]-[HIGH]</b> automatic switching</li></ul>
Setback(UnOccupied)	Function to maintain the temperature of the space where the device is installed in certain boundary (Only supported by cooling/heating simultaneous type outdoor unit) <ul style="list-style-type: none"><li>● <b>[Set/Clear]</b> button: Set/clear the Setback(UnOccupied)</li></ul>
Cool start	Press <b>[▲]/[▼]</b> button to set the cooling operation start temperature(21°C~40°C)
Heat start	Press <b>[▲]/[▼]</b> button to set the heating operation start temperature(1°C~20°C)

IDU (2Set)

When 2Set function supporting outdoor unit/indoor unit/remote controller are used and in **[Setting] > [Installing]**, if ACP's 2Set automatic mode is selected as **IDU**, indoor unit 2Set control window is generated on the right side as in the following screen.



Category	Contents
Operation	<ul style="list-style-type: none"><li>• <b>[ON]</b> button: Starts the device operation</li><li>• <b>[OFF]</b> button: Stops the device operation</li></ul>
Mode	<ul style="list-style-type: none"><li>• <b>[COOL]</b> button: Switches to cooling mode</li><li>• <b>[HEAT]</b> button: Switches to heating mode</li><li>• <b>[FAN]</b> button: Air purification operation. When FAN is selected, set temperature is not applied to the device</li><li>• <b>[DRY]</b> button: Removes moisture during rainy season or when humidity is high. When DRY is selected, set temperature is not applied to the device</li><li>• <b>[AUTO]</b> button: Switches to automatic mode</li></ul>
Air cleaning	Air cleaning control only for air cleaning function supporting indoor unit <ul style="list-style-type: none"><li>• Air cleaning single operation<ol style="list-style-type: none"><li>1) In indoor unit stop state, in case of air cleaning <b>[Set]</b>, air cleaning single operation with wind only (automatic wind) (During air cleaning single operation, mode lock and wind amount lock are not checked)</li><li>2) During air cleaning single operation, in case of operation <b>[OFF]</b> or air cleaning <b>[Clear]</b>, air cleaning is cancelled to previous mode and previous wind amount (But, in case of mode or wind amount control together, control is done with controlled mode and wind amount)</li></ol></li><li>• Air cleaning additional operation<ol style="list-style-type: none"><li>1) In indoor unit stop state, in case of operation status <b>[ON]</b> and air cleaning <b>[Set]</b>, in current mode, air cleaning additional operation</li><li>2) In indoor unit operation state, in case of air cleaning <b>[Set]</b>, in current mode, air cleaning additional operation</li><li>3) During air cleaning additional operation, in case of operation <b>[OFF]</b>, operation stops</li><li>4) During air cleaning additional operation, in case of air cleaning <b>[Clear]</b>, air cleaning is cancelled</li></ol></li></ul>
Occupancy	Function to set the space with the corresponding indoor unit as occupied or empty <ul style="list-style-type: none"><li>• <b>[Occupied]</b> button: occupied setting</li><li>• <b>[Unoccupied]</b> button: empty setting</li></ul>
Cooling set temperature	Press <b>[▲]/[▼]</b> button to set cooling set temperature



Heating setting temperature	Press <b>[▲]/[▼]</b> button to set heating set temperature
Cooling lower limit/upper limit temperature	Cooling lower limit temperature and upper limit temperature setting
Heating lower limit/upper limit temperature	Heating lower limit temperature and upper limit temperature setting
Fan speed	Wind strength setting <ul style="list-style-type: none"><li>• <b>[LOW]</b> button: Set the fan speed to slow</li><li>• <b>[MED]</b> button: Set the fan speed to normal</li><li>• <b>[HIGH]</b> button: Set the fan speed to fast</li><li>• <b>[AUTO]</b> button: <b>[LOW]</b>-<b>[MED]</b>-<b>[HIGH]</b> automatic switching</li></ul>
Swing	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/Clear the Swing function</li></ul>
Human detection mode - ON/OFF learned power saving	Only for human detection mode - supporting indoor unit, human detection mode - control <ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: human detection mode - ON/OFF learned power saving Set/Clear</li></ul>
Human detection mode - Temperature power saving	Only for human detection mode - supporting indoor unit, human detection mode - control <ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: human detection mode - temperature power saving Set/Clear</li></ul>
Human detection mode - Unoccupied time setting(minute)	Only for human detection mode - supporting indoor unit, human detection mode - control Set empty decision time to 5, 10, 15, 30, 60, or 90 min.
Human detection mode - Direct wind	Only for human detection mode - supporting indoor unit, human detection mode - control <ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: human detection mode - direct wind Set/Clear</li></ul>
Human detection mode - Indirect wind	Only for human detection mode - supporting indoor unit, human detection mode - control <ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: human detection mode - indirect wind Set/Clear</li></ul>
Comfortable Power Saving	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Comfortable Power Saving function Set/Clear</li><li>• You can press <b>[▲]/[▼]</b> button to set stage</li></ul> Only when indoor unit is in cooling operation, Comfortable Power Saving control is possible
Filter replacement alarm	<ul style="list-style-type: none"><li>• <b>[Clear]</b> button: In case of filter replacement alarm, it cancels filter replacement alarm</li></ul>
HardLock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/clear HardLock so that user cannot control any function with individual remote controller</li></ul>
Mode lock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/clear lock so that user cannot control mode setting with individual remote controller</li></ul>
Fan lock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/clear lock so that user cannot control Fan speed setting with individual remote controller</li></ul>
TempLock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/clear lock so that user cannot control temperature setting with individual remote controller</li></ul>

Note

2set automatic mode

- Only with 2Set automatic mode supporting indoor/outdoor air, the corresponding function can be used. (For whether each device supports 2Set, please refer to the manual of the corresponding device.)
- Override is a function that can be set from remote controller. For override function related contents, please refer to remote controller manual.
- In 2Set automatic mode, along with Auto icon, product's actual operation mode (cooling, heating) status is displayed.

Occupancy

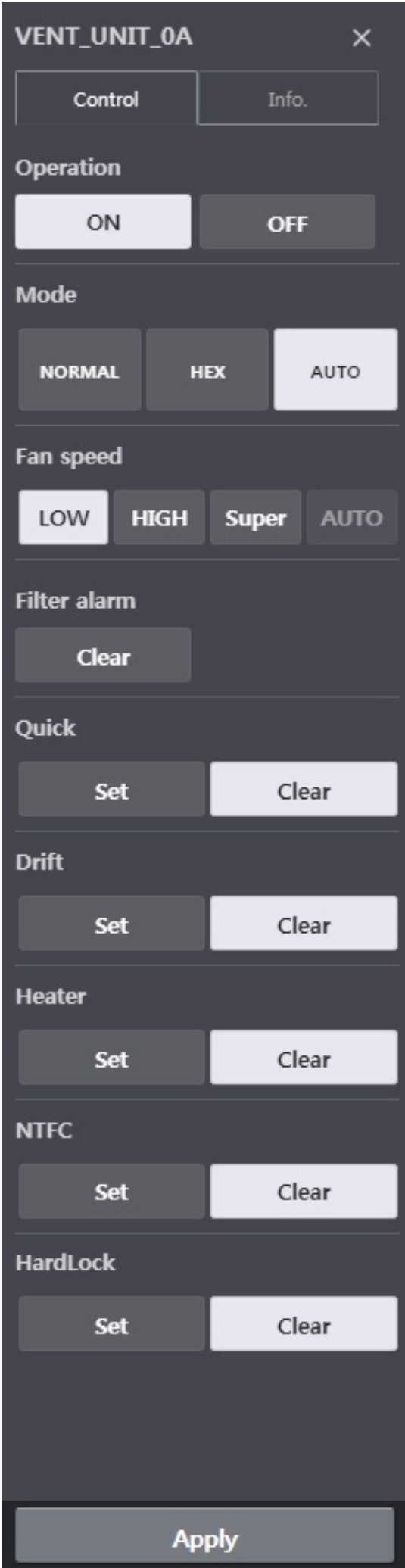
- If occupancy sensor is interlinked to indoor unit, setting from the central control has priority over the corresponding occupancy sensor. For occupancy sensor related contents, please refer to indoor unit or Dry Contact manual.
- When occupied setting is changed, automatically set cooling set temperature and heating set temperature are the most recently run schedule's cooling set temperature and heating set temperature, and if there is no previously run schedule, it is set to default value.

(Example)  
09:00 - 12:00: occupied / cooling set temperature 27°C / heating set temperature 18°C  
12:00 - 13:00: occupied / cooling set temperature 29°C / heating set temperature 16°C  
13:00 - 15:00: occupied / cooling set temperature 26°C / heating set temperature 19°C

If it is empty without schedule after 15:00, cooling set temperature is 29°C and heating set temperature is 16°C, and if it is occupied, cooling set temperature becomes 26°C and heating set temperature becomes 19°C.

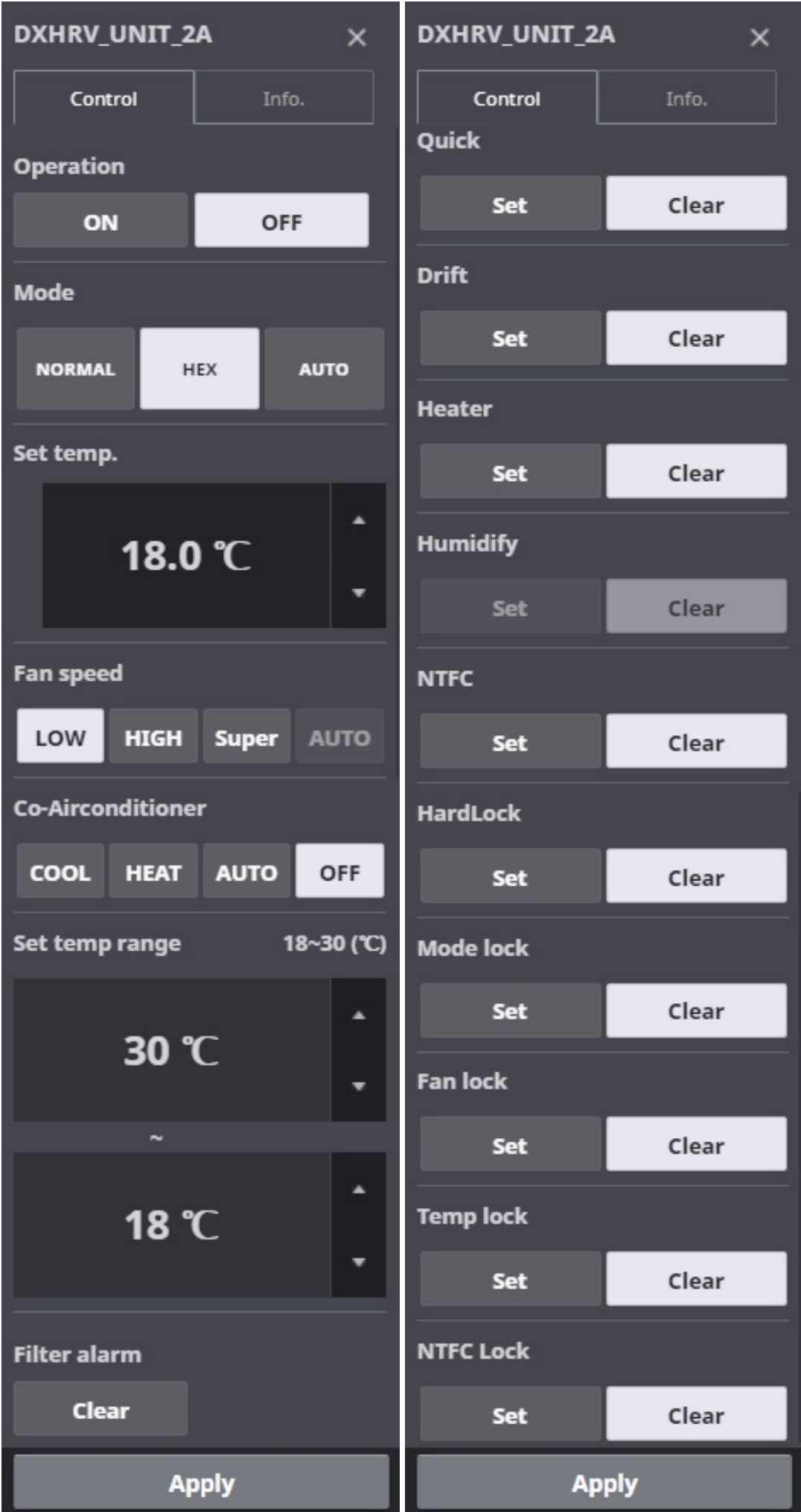


ERV



Category	Contents
Operation	<ul style="list-style-type: none"><li>• <b>[ON]</b> button: starts the device operation</li><li>• <b>[OFF]</b> button: Stops the device operation</li></ul>
Mode	<ul style="list-style-type: none"><li>• <b>[NORMAL]</b> button: Discharged air ventilates without going trough the electric heat exchanger</li><li>• <b>[HEX]</b> button: Both air supply/discharge ventilates through the electric heat exchanger</li><li>• <b>[AUTO]</b> button: Switches to four seasons mode</li></ul>
Fan speed	Wind strength setting <ul style="list-style-type: none"><li>• <b>[LOW]</b> button: Set the fan speed to slow</li><li>• <b>[HIGH]</b> button: Set the fan speed to fast</li><li>• <b>[SUPER]</b> button: Set the fan speed to Max. speed</li><li>• <b>[AUTO]</b> button: <b>[LOW]</b>-<b>[HIGH]</b>-<b>[SUPER]</b> automatic switching<ul style="list-style-type: none"><li>- User setting is impossible</li><li>- When Drift/Quick is set, <b>[AUTO]</b> Fan speed is selected</li><li>- When Drift/Quick is cleared, <b>[HIGH]</b> Fan speed is selected</li><li>- During <b>[AUTO]</b> operation, when <b>[LOW]</b>/<b>[HIGH]</b>/<b>[SUPER]</b> is selected, Drift/Quick function in operation is cleared</li></ul></li></ul>
Filter replacement alarm	<ul style="list-style-type: none"><li>• <b>[Clear]</b> button: in case of filter replacement alarm, it cancels filter replacement alarm</li></ul>
Additional function	<ul style="list-style-type: none"><li>• Quick <b>[Set/Clear]</b> button: Set/clear Quick function (When Quick function is selected, Drift function is cleared)</li><li>• Drift <b>[Set/Clear]</b> button: Set/clear Drift function (When Drift function is selected, Quick function is cleared)</li><li>• Heater <b>[Set/Clear]</b> button: Set/clear heater function</li></ul>
Midnight air cooling(NTFC)	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/Clear Midnight air cooling(NTFC) function that can outdoor unit cooling when outdoor temperature is lower than the base temperature at night time</li></ul>
HardLock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/clear HardLock so that user cannot control any function with individual remote controller</li></ul>

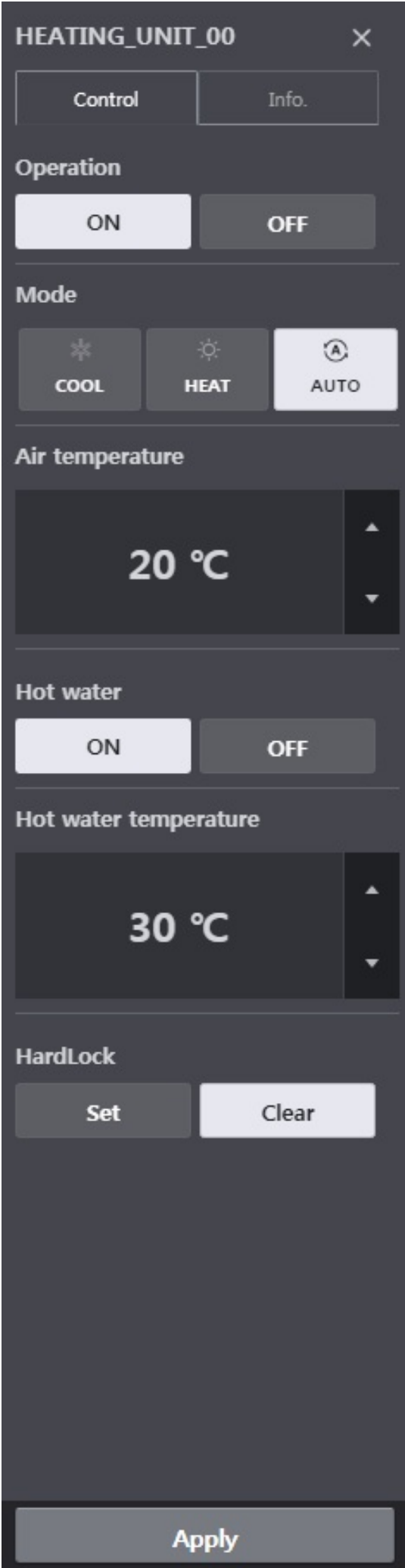
ERV DX



Category	Contents
Operation	<ul style="list-style-type: none"><li>• <b>[ON]</b> button: starts the device operation</li><li>• <b>[OFF]</b> button: Stops the device operation</li></ul>
Mode	<ul style="list-style-type: none"><li>• <b>[NORMAL]</b> button: Discharged air ventilates without going trough the electric heat exchanger</li><li>• <b>[HEX]</b> button: Both air supply/discharge ventilates through the electric heat exchanger</li><li>• <b>[AUTO]</b> button: Switches to four seasons mode</li></ul>
Set temperature	Press <b>[▲]/[▼]</b> button to set the desired temperature
Fan speed	Wind strength setting <ul style="list-style-type: none"><li>• <b>[LOW]</b> button: Set the fan speed to slow</li><li>• <b>[HIGH]</b> button: Set the fan speed to fast</li><li>• <b>[SUPER]</b> button: Set the fan speed to Max. speed</li><li>• <b>[AUTO]</b> button: <b>[LOW]-[HIGH]-[SUPER]</b> automatic switching<ul style="list-style-type: none"><li>- User setting is impossible</li><li>- When Drift/Quick is set, <b>[AUTO]</b> Fan speed is selected</li><li>- When Drift/Quick is cleared, <b>[HIGH]</b> Fan speed is selected</li><li>- During <b>[AUTO]</b> operation, when <b>[LOW]/[HIGH]/[SUPER]</b> is selected, Drift/Quick function in operation is cleared</li></ul></li></ul>
Air conditioner	<ul style="list-style-type: none"><li>• <b>[COOL]</b> button: Operates the ERV DX in cooling mode</li><li>• <b>[AUTO]</b> button: Operates the ERV DX in auto mode</li><li>• <b>[HEAT]</b> button: Operates the ERV DX as heating mode</li><li>• <b>[OFF]</b> button: Stops the air conditioner of the ERV DX</li></ul>
Set temp range	When user set the desired temperature individually, the desired temperature outside the designated temperature boundary cannot be set
Filter replacement alarm	<ul style="list-style-type: none"><li>• <b>[Clear]</b> button: in case of filter replacement alarm, it cancels filter replacement alarm</li></ul>
Additional function	<ul style="list-style-type: none"><li>• Quick <b>[Set/Clear]</b> button: Set/clear Quick function (When Quick function is selected, Drift function is cleared)</li><li>• Drift <b>[Set/Clear]</b> button: Set/clear Drift function (When Drift function is selected, Quick function is cleared)</li><li>• Heater <b>[Set/Clear]</b> button: Set/clear heater function</li><li>• Humidify <b>[Set]</b> button: Set Humidify function (only for air conditioner heating mode)</li></ul>
Midnight air cooling(NTFC)	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/Clear Midnight air cooling(NTFC) function that can outdoor unit cooling when outdoor temperature is lower than the base temperature at night time</li></ul>

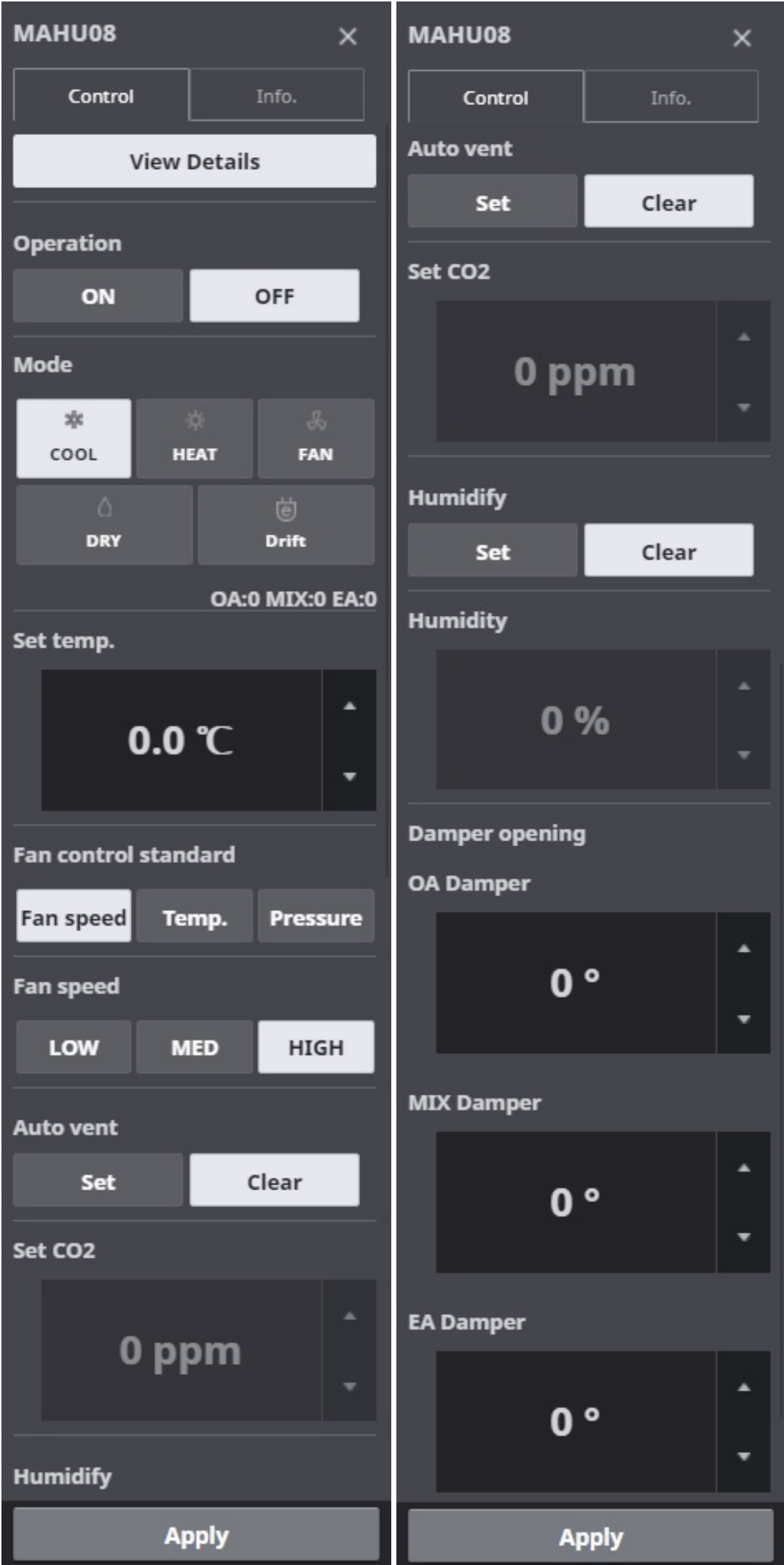
HardLock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/clear HardLock so that user cannot control any function with individual remote controller</li></ul>
Mode lock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/clear lock so that user cannot control mode setting with individual remote controller</li></ul>
Fan lock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/clear lock so that user cannot control Fan speed setting with individual remote controller</li></ul>
TempLock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/clear lock so that user cannot control temperature setting with individual remote controller</li></ul>
Midnight air cooling(NTFC) lock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/Clear Midnight air cooling(NTFC) schedule set in the remote controller</li></ul>

Heating



Category	Contents
Operation	<ul style="list-style-type: none"><li>• <b>[ON]</b> button: starts the device operation</li><li>• <b>[OFF]</b> button: Stops the device operation</li></ul>
Mode	<ul style="list-style-type: none"><li>• <b>[COOL]</b> button: Switches to cooling mode</li><li>• <b>[HEAT]</b> button: Switches to heating mode</li><li>• <b>[AUTO]</b> button: Switches to automatic mode</li></ul>
Air/Water in/out temperature	<p>Press <b>[▲]/[▼]</b> button to set Air/Water in/out temperature</p> <p>It is displayed based on the set temperature selected in <b>[Setting]-[Installing]</b></p> <ul style="list-style-type: none"><li>• When <b>[Water in/out]</b> is selected, it is displayed as water in/out temperature</li><li>• When <b>[indoor]</b> is selected, it is displayed as air temperature</li></ul>
Hot water	<ul style="list-style-type: none"><li>• <b>[ON]</b> button: Starts hot water operation<ul style="list-style-type: none"><li>- If hot water is operated while the device is in automatic/cooling operation, the corresponding mode and hot water are displayed in the icon of the contents display section</li><li>- If hot water is operated while the device is stopped, the icon in the contents display section is enabled, and hot water is displayed</li></ul></li><li>• <b>[OFF]</b> button: Stops hot water operation</li></ul>
Hot water temperature	<p>Press <b>[▲]/[▼]</b> button to set hot water temperature</p>
HardLock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/clear HardLock so that user cannot control any function with individual remote controller</li></ul>

AHU



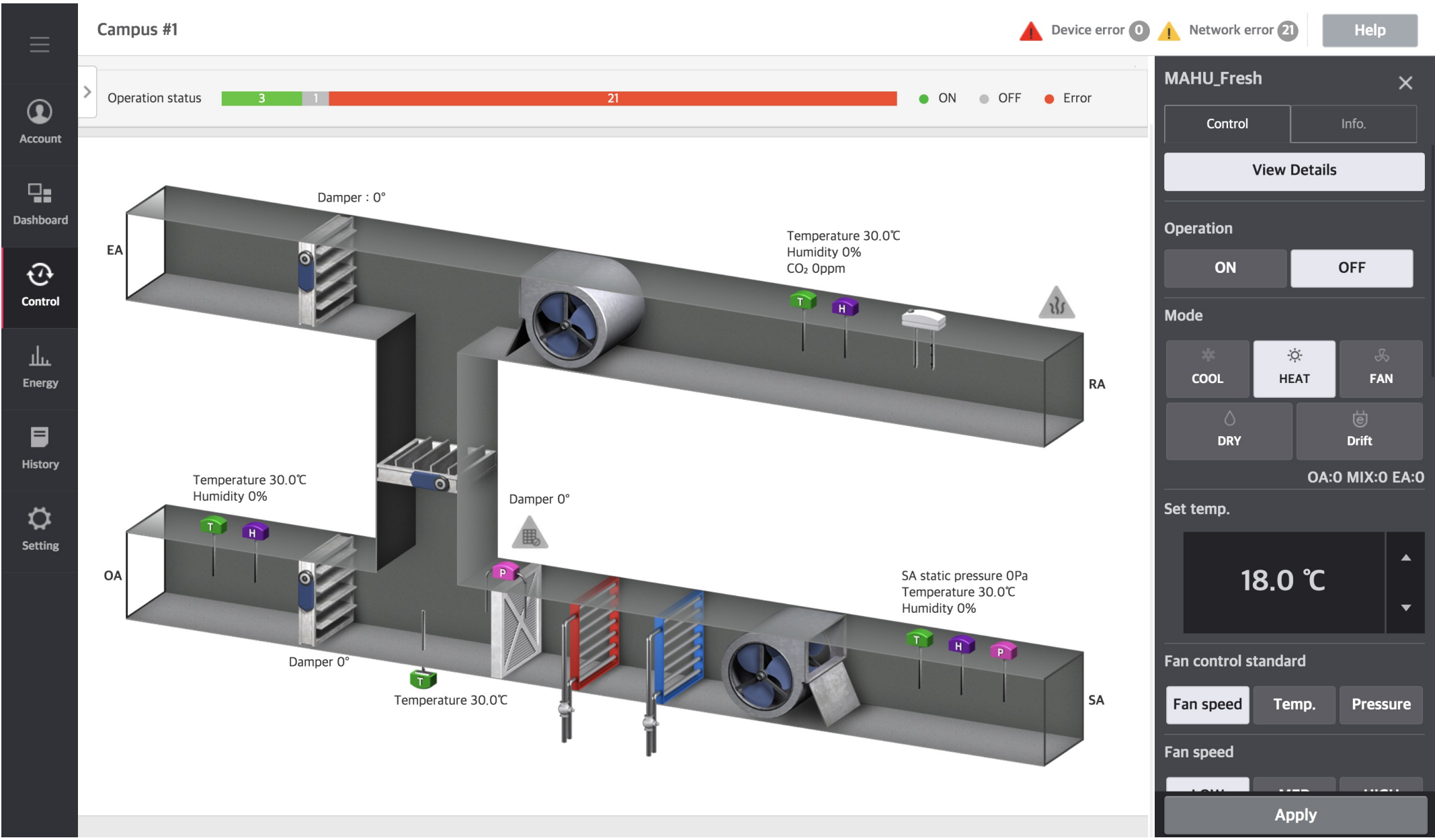
Category	Contents
View Details	Press <b>[View Details]</b> button to check detail information (But, mobile is excluded)
Operation	<ul style="list-style-type: none"><li>• <b>[ON]</b> button: starts the device operation</li><li>• <b>[OFF]</b> button: Stops the device operation</li></ul>
Mode	<ul style="list-style-type: none"><li>• <b>[COOL]</b> button: Swtiches to cooling mode</li><li>• <b>[HEAT]</b> button: Switches to heating mode</li><li>• <b>[FAN]</b> button: Air purification operation. When FAN is selected, you cannot set the desired temperature</li><li>• <b>[DRY]</b> button: Removes moisture in rainy season or when humidity is high. When DRY is selected, you cannot set the desired temperature</li><li>• <b>[Drift]</b> button: Operation to find the operation point with the best ventilation system efficiency to save power consumption. It fluently discharges the contaminated indoor air by having bigger discharger Fan speed than air supply</li></ul>
Set temperature	Press <b>[▲]/[▼]</b> button to set the temperature
Fan control standard	<ul style="list-style-type: none"><li>• <b>[Fan speed]</b> button: Controls the fan based on Fan speed status</li><li>• <b>[Temp]</b> button: Controls the fan based on temperature status</li><li>• <b>[Pressure]</b> button: Controls the fan based on Pressure status</li></ul>
Fan speed	It is displayed only when fan control standard is Fan speed <ul style="list-style-type: none"><li>• <b>[LOW]</b> button: Set the fan speed to slow</li><li>• <b>[MED]</b> button: Set the fan speed to normal</li><li>• <b>[HIGH]</b> button: Set the fan speed to fast</li></ul>
Automatic ventilation	It is displayed only when the additional function's automatic ventilation or automatic ventilation and Humidify are selected during AHU device registration <ul style="list-style-type: none"><li>• Automatic ventilation <b>[Set/Clear]</b> button: Starts/stops automatic ventilation</li></ul>
Set CO <sub>2</sub>	It is enabled only when automatic ventilation function is set Press <b>[▲]/[▼]</b> button to set in the unit of 100ppm within 100 ppm ~ 2 000 ppm range
Humidify	It is displayed only when the addtional function's Humidify or automatic ventilation and Humidify are selected during AHU device registration <ul style="list-style-type: none"><li>• Humidify <b>[Set/Clear]</b> button: Starts/stops Humidify function</li></ul>



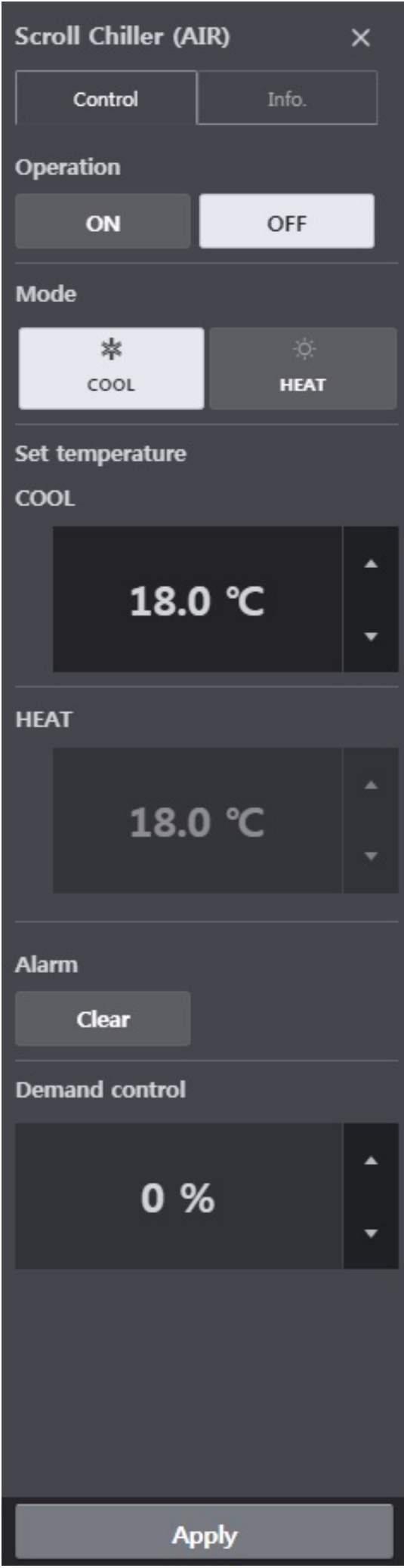
Humidity	It is enabled only when Humidify function is set Press [▲]/[▼] button to set the target humidity
Damper opening	<ul style="list-style-type: none"><li>Press [OA Damper] : [▲]/[▼] button to set the outdoor unit air damper opening value in the unit of 1 ° within 0 ° ~ 90 ° range</li><li>Press [MIX Damper] : [▲]/[▼] button to set the mixer damper opening value in the unit of 1 ° within 0 ° ~ 90 ° range</li><li>Press [EA Damper] : [▲]/[▼] button to set the air discharge damper opening value in the unit of 1 ° within 0 ° ~ 90 ° range</li></ul> <p>When you set [Setting]-[system setting]'s Apply damper opening formula as <b>set</b>, it operates as OA Damper = EA Damper, OA Damper = MIX Damper = 90</p>
HardLock	<ul style="list-style-type: none"><li>[Set/Clear] button: Set/clear HardLock so that user cannot control any function with individual remote controller</li></ul>

View AHU in detail

In AHU's control screen, you can press [View Details] button to check detail information.

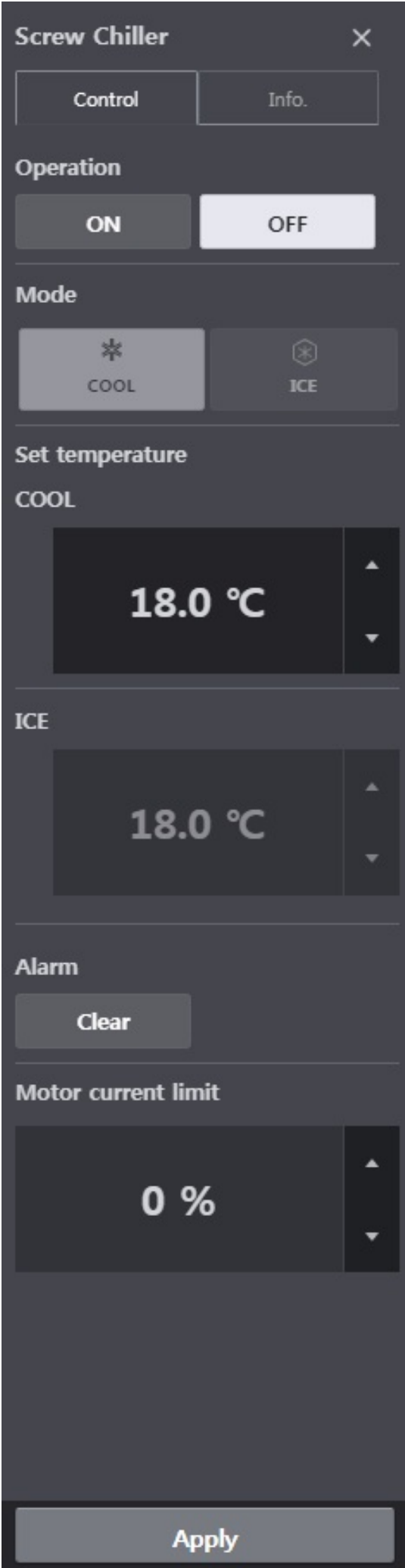


Scroll chiller



Category	Contents
Operation	<ul style="list-style-type: none"><li>• <b>[ON]</b> button: starts the device operation</li><li>• <b>[OFF]</b> button: Stops the device operation</li></ul>
Mode	(It is displayed only when device supports the corresponding mode) <ul style="list-style-type: none"><li>• <b>[COOL]</b> button: Swtiches to cooling mode</li><li>• <b>[HEAT]</b> button: Switches to heating mode</li></ul>
Set temperature	Set the load water out temperature for indoor cooling/heating Press <b>[▲]</b> / <b>[▼]</b> button to set the temperature of cooling mode and heating mode
Alarm	<b>[Clear]</b> button: Clears Chiller alarm in case of Chiller alarm
Demand control	Press <b>[▲]</b> / <b>[▼]</b> button to set demand limit ratio

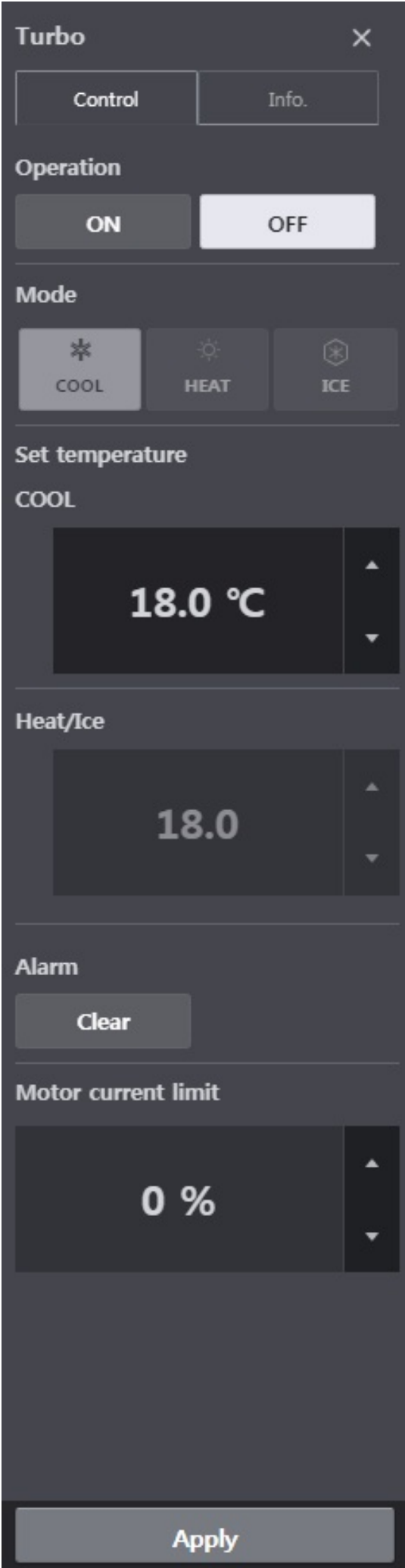
Screw chiller



Category	Contents
Operation	<ul style="list-style-type: none"><li>• <b>[ON]</b> button: starts the device operation</li><li>• <b>[OFF]</b> button: Stops the device operation</li></ul>
Mode	Mode control is impossible. Controls monitored operation mode's set temperature
Set temperature	Set the load water out temperature for indoor cooling/ice making Press <b>[▲]/[▼]</b> button to set the temperature of cooling mode and ice making mode
Alarm	<b>[Clear]</b> button: Clears Chiller alarm in case of Chiller alarm
Motor current limit	Press <b>[▲]/[▼]</b> button to set motor current limit ratio

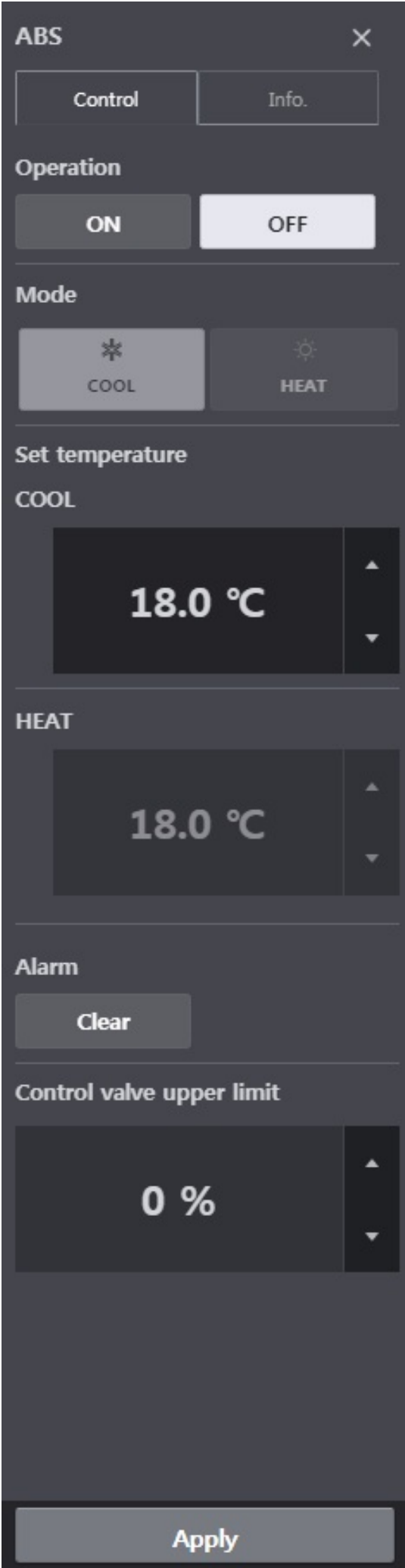


Turbo chiller



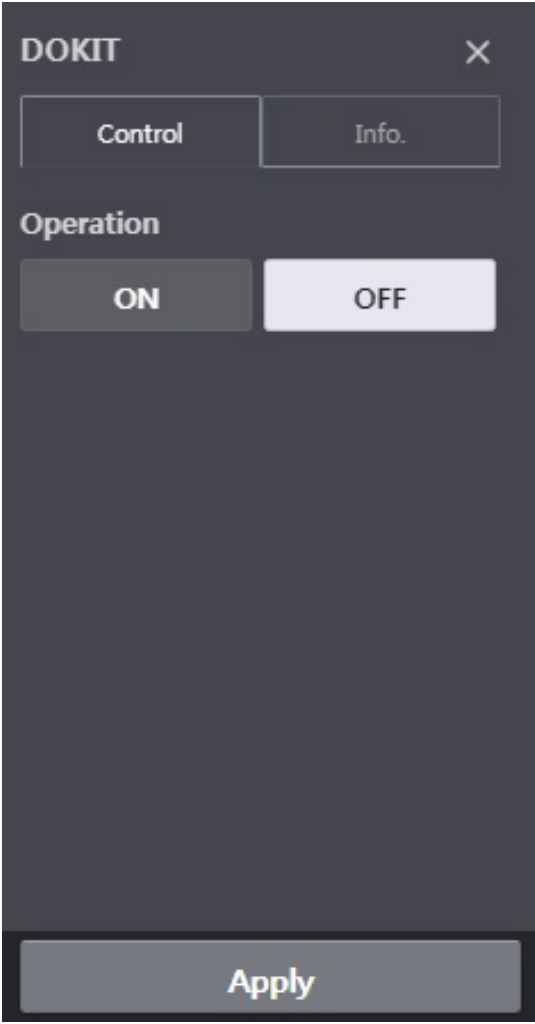
Category	Contents
Operation	<ul style="list-style-type: none"><li>• <b>[ON]</b> button: starts the device operation</li><li>• <b>[OFF]</b> button: Stops the device operation</li></ul>
Mode	Mode control is impossible. Controls monitored operation mode's set temperature
Set temperature	Set the load water out temperature for indoor cooling/heating/ice making Press <b>[▲]/[▼]</b> button to set the temperature of cooling mode and heating/ice making mode
Alarm	<b>[Clear]</b> button: Clears Chiller alarm in case of Chiller alarm
Motor current limit	Press <b>[▲]/[▼]</b> button to set motor current limit ratio

Absorption Chiller



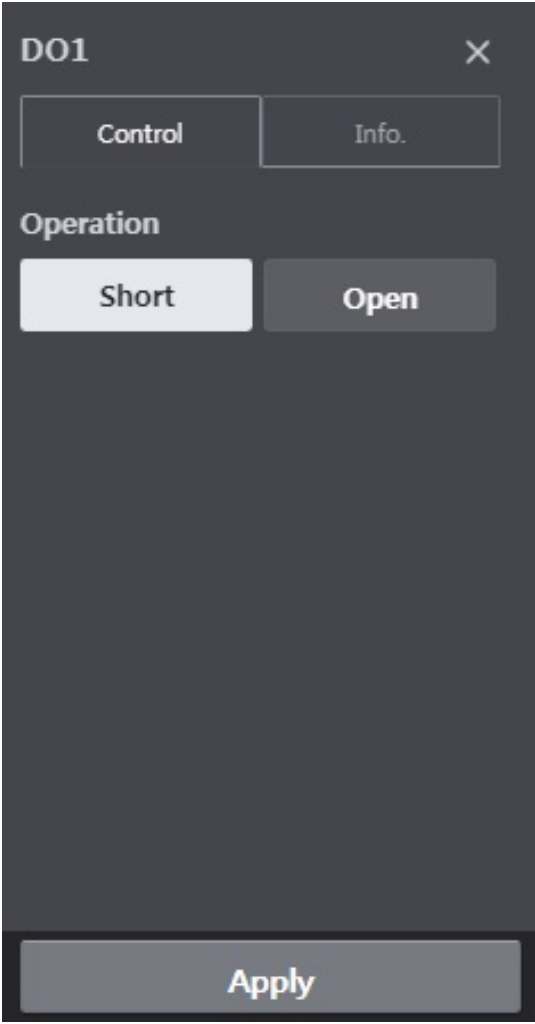
Category	Contents
Operation	<ul style="list-style-type: none"><li>• <b>[ON]</b> button: starts the device operation</li><li>• <b>[OFF]</b> button: Stops the device operation</li></ul>
Mode	Mode control is impossible. Controls monitored operation mode's set temperature
Set temperature	Set the load water out temperature for indoor cooling/heating Press <b>[▲]/[▼]</b> button to set the temperature of cooling mode and heating mode
Alarm	<b>[Clear]</b> button: Clears Chiller alarm in case of Chiller alarm
Control valve upper limit	Press <b>[▲]/[▼]</b> button to set the control valve upper limit ratio

DOKIT



Category	Contents
Operation	<ul style="list-style-type: none"><li>• <b>[ON]</b> button: starts the device operation</li><li>• <b>[OFF]</b> button: Stops the device operation</li></ul>

DO



Category	Contents
Operation	<ul style="list-style-type: none"><li>• <b>[Short]</b> button: Short signal output</li><li>• <b>[Open]</b> button: Open signal output</li></ul>

AO

AO[F7/00]

Control

Info.

Temperature (°C)

20.00

Min 0 ~ Max 100

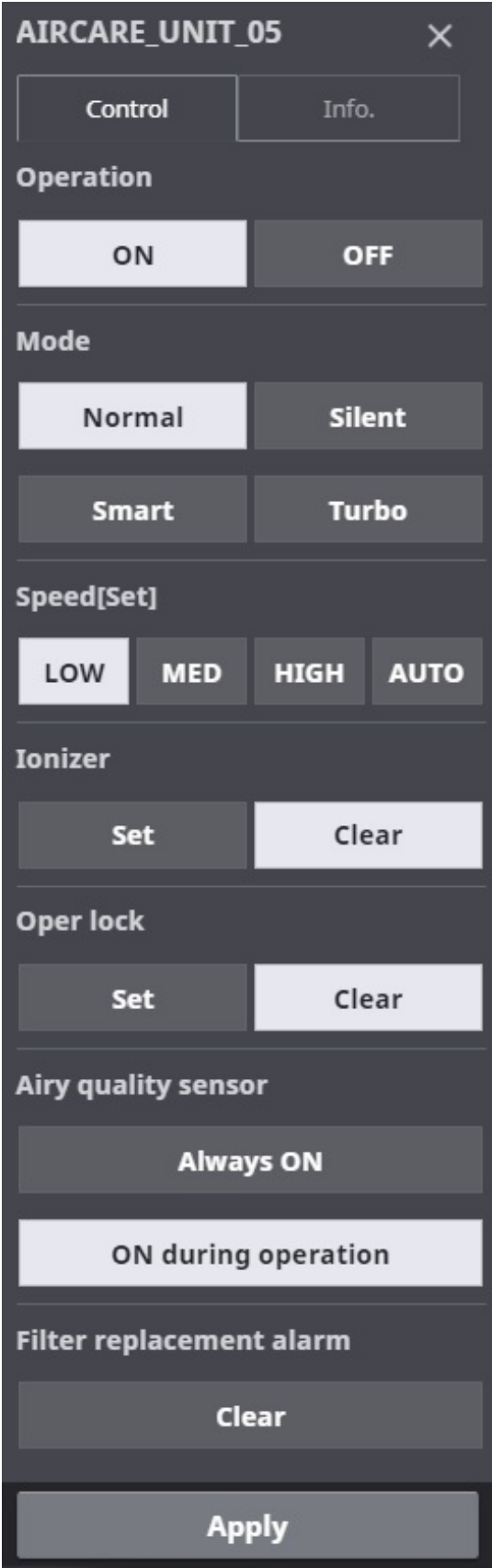
Apply

Category	Contents
Temperature	Set temperature value

Note

Unit symbol may change according to the usage set during device registration.

Air purifier



Category	Contents
Operation	<ul style="list-style-type: none"><li>• <b>[ON]</b> button: starts the device operation</li><li>• <b>[OFF]</b> button: Stops the device operation</li></ul>
Mode	<ul style="list-style-type: none"><li>• <b>[Normal]</b> button: Switches to the General Purification mode.</li><li>• <b>[Silent]</b> button: Minimizes noise during operation.</li><li>• <b>[Smart]</b> button: Switches to the Smart mode. Controls the purification strength automatically according to the Comprehensive Cleanliness level.</li><li>• <b>[Turbo]</b> button: Operates powerfully for 30 minutes to quickly purify the indoor air.</li></ul>
Speed[Set]	Sets the air volume of the air purifier. (It is available only when the operation mode is Normal.) <ul style="list-style-type: none"><li>• <b>[LOW]</b> button: Set the fan speed to slow</li><li>• <b>[MED]</b> button: Set the fan speed to normal</li><li>• <b>[HIGH]</b> button: Set the fan speed to fast</li><li>• <b>[AUTO]</b> button: Controls the fan speed automatically.</li></ul>
Ionizer	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Enables or disables the Air Sterilization function.</li></ul>
Oper lock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Enables or disables the Operation Lock function to prevent or allow operation control on the product (remote control).</li></ul>
Airy quality sensor	<ul style="list-style-type: none"><li>• <b>[Always ON]</b> button: Performs sensor stabilization for the first one time.</li><li>• <b>[ON during operation]</b> button: Performs sensor stabilization whenever starting or stopping the operation.</li></ul>
Filter replacement alarm	<ul style="list-style-type: none"><li>• <b>[Clear]</b> button: in case of filter replacement alarm, it cancels filter replacement alarm</li></ul>



Device Information

When you click device information tab in the device's control screen, you can check the device information.

You can check device's basic information, operation information, schedule information, error information, and today's history.

<div>AC_UNIT_00</div> <div><div>Control</div><div>Info.</div></div> <div>Basic information</div> <div><div>Name</div><div>AC_UNIT_00</div></div> <div><div>Address</div><div>00</div></div> <div><div>Group</div><div>New group 1</div><div>View drawing</div></div> <div><div>ODU</div><div>ODU[00]</div></div> <div><div>Model</div><div>AC</div></div> <div><div>Capacity</div><div>3</div></div> <div><div>ODU model</div><div>MULTIV</div></div> <div><div>ODU capa.</div><div>100</div></div> <div>Operation information</div> <div>Schedule information (5)</div> <div>Error information</div> <div>History</div>	<div>AC_UNIT_00</div> <div><div>Control</div><div>Info.</div></div> <div>Basic information</div> <div><div>Operation information</div></div> <div><div>Operation</div><div>ON</div></div> <div><div>Mode</div><div>AUTO</div></div> <div><div>Air Cleaning</div><div>Set</div></div> <div><div>Current temperature</div><div>23.0 °C</div></div> <div><div>Fine dust(PM10)</div><div>0µg/m³ (Good)</div></div> <div><div>Ultra fine dust(PM2.5)</div><div>0µg/m³ (Good)</div></div> <div><div>Super ultra fine dust(PM1.0)</div><div>0µg/m³ (Good)</div></div> <div><div>Occupancy</div><div>Unoccupied</div></div> <div><div>Cool set temperature</div><div>30.0 °C</div></div> <div><div>Heating set temperature</div><div>18.0 °C</div></div> <div><div>Lowest/Highest Limits for Cooling Temperature</div><div>10.0 °C / 37.5 °C</div></div> <div><div>Lowest/Highest Limits for Heating Temperature</div><div>4.0 °C / 32.0 °C</div></div> <div><div>Fan speed</div></div>	<div>AC_UNIT_00</div> <div><div>Control</div><div>Info.</div></div> <div>Basic information</div> <div><div>Operation information</div></div> <div><div>Schedule information (5)</div></div> <div><div>Time</div><div>Description</div></div> <div><div>10:10</div><div>Schedule</div></div> <div><div>10:10</div><div>Schedule</div></div> <div><div>10:10</div><div>Schedule</div></div> <div><div>10:10</div><div>Schedule</div></div> <div><div>10:10</div><div>Schedule</div></div> <div>Error information</div> <div>History</div>	<div>AC_UNIT_00</div> <div><div>Control</div><div>Info.</div></div> <div>Basic information</div> <div><div>Operation information</div></div> <div><div>Schedule information (5)</div></div> <div><div>Error information</div></div> <div><div>Error</div><div>No error</div></div> <div><div>Error code</div><div>0</div></div> <div><div>Error description</div><div>No error</div></div> <div>History</div>	<div>AC_UNIT_00</div> <div><div>Control</div><div>Info.</div></div> <div>Basic information</div> <div><div>Operation information</div></div> <div><div>Schedule information (5)</div></div> <div><div>Error information</div></div> <div><div>History</div></div> <div><div>Time</div><div>Contents</div></div> <div><div>2018-02-01 10:11</div><div>Control Mode: AUTO by Schedule</div></div>
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Control

You can set the registered device to the desired status and control.

1.
- In the left side menu tab, click **[Control]** > **[Device control]** menu.
2.
- In the device list tab section, click the desired tab.

Category	Description
Group	List of group set for convenience
Installation	Provides actually connected device information

3.
- In the filter section, click the filter button of the device type or status to control.

- All filter buttons can be selected in multiple.
- Only the corresponding information are selected and displayed.

All ^

Big

▼

Name

▼

☐ ODU

☐ IDU

☐ HRV

☐ Air purifier

☐ AWHP

☐ AHU

☐ Chiller

☐ DOKIT

☐ DI

☐ DO

☐ EXP. I/O

☐ ON

☐ OFF

☐ Hot water ON

☐ Hot water OFF

☐ Schedule

☐ Peak/Demand

☐ Error

☐ Filter replacement alarm

☐ Lock

☐ Oil replacement alarm

Initialization

Apply

Filter type	Detail category
Device	Outdoor unit, indoor unit, air purifier, AHU, chiller, ERV, Heating, ON/OFF device, DI, DO, Exp.I/O
Status	ON, OFF, Hot water ON, Hot water OFF, Schedule, Peak control, Error, Filter replacement alarm, Lock, Oil replacement alarm

4.
- In the device section, select the device to control.
- You can select several devices at once to control. To select all devices in certain group, click **[Multi-select]** button, and click **[Select All]** button. According to the multiple selected device types, the category to control is limited.

Campus #1

Device error 0Network error 21Help

Multiple group selection

Group

Installation

Special control group ▼

Basic group ⚠ ▼

New group 1

New group 2

New group 3

New group 4

New group 5

New group 6

Device control

Basic group > New group 2

Select total of 5 devices

Clear allSelect allSelection completed

All ▼Big ▼Device/Addr. ▼

FolderMulti-select

Basic group > New group 2

COOL23.0°C30.0°C10.0~37.5

AC\_UNIT\_10

HEAT23.0°C18.0°C4.0~32.0

AC\_UNIT\_11

COOL23.0°C25.0°C10.0~37.5

AC\_UNIT\_12

COOL23.0°C30.0°C10.0~37.5

AC\_UNIT\_13

COOL23.0°C30.0°C10.0~37.5

AC\_UNIT\_14

COOL23.0°C30.0°C10.0~37.5

AC\_UNIT\_15

COOL23.0°C30.0°C10.0~37.5

AC\_UNIT\_16

COOL23.0°C30.0°C10.0~37.5

AC\_UNIT\_17

COOL23.0°C30.0°C10.0~37.5

AC\_UNIT\_18

COOL23.0°C30.0°C10.0~37.5

AC\_UNIT\_19

5.

In the control window, set the corresponding equipment's control status.

6.

When setting is completed, click **[Apply]** button.

## Monitoring

You can check the registered device's control status.

1.
- In the left side menu tab, click **[Control] > [Device control]** menu.
2.
- In the device list tab section, click the desired tab.

Category	Description
Group	List of group set for convenience
Installation	Provides actually connected device information

3.
- In the filter section, click the filter button of the device type or status to check.
  - All filter buttons can be selected in multiple.
  - Only the corresponding information are selected and displayed.

All ^

Big

▼

Name

▼

☐ ODU

☐ IDU

☐ HRV

☐ Air purifier

☐ AWHP

☐ AHU

☐ Chiller

☐ DOKIT

☐ DI

☐ DO

☐ EXP. I/O

☐ ON

☐ OFF

☐ Hot water ON

☐ Hot water OFF

☐ Schedule

☐ Peak/Demand

☐ Error

☐ Filter replacement alarm

☐ Lock

☐ Oil replacement alarm

Initialization

Apply

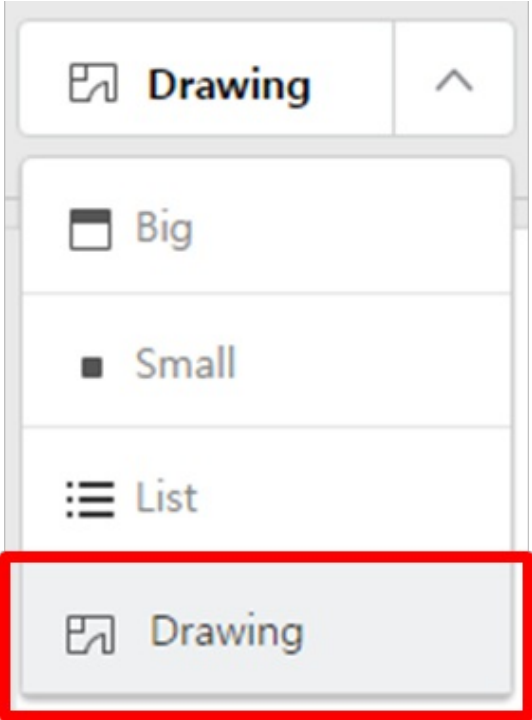
Filter type	Detail category
Device	Outdoor unit, indoor unit, AHU, chiller, ERV, Heating, ON/OFF device, DI, DO, Exp.I/O
Status	ON, OFF, Hot water ON, Hot water OFF, Schedule, Peak control, Error, Filter replacement alarm, Lock, Oil replacement alarm

4.
- In the device section, check the device information.
5.
- To check the device's detail control status, click the corresponding device icon.
  - The corresponding device's control window is displayed.

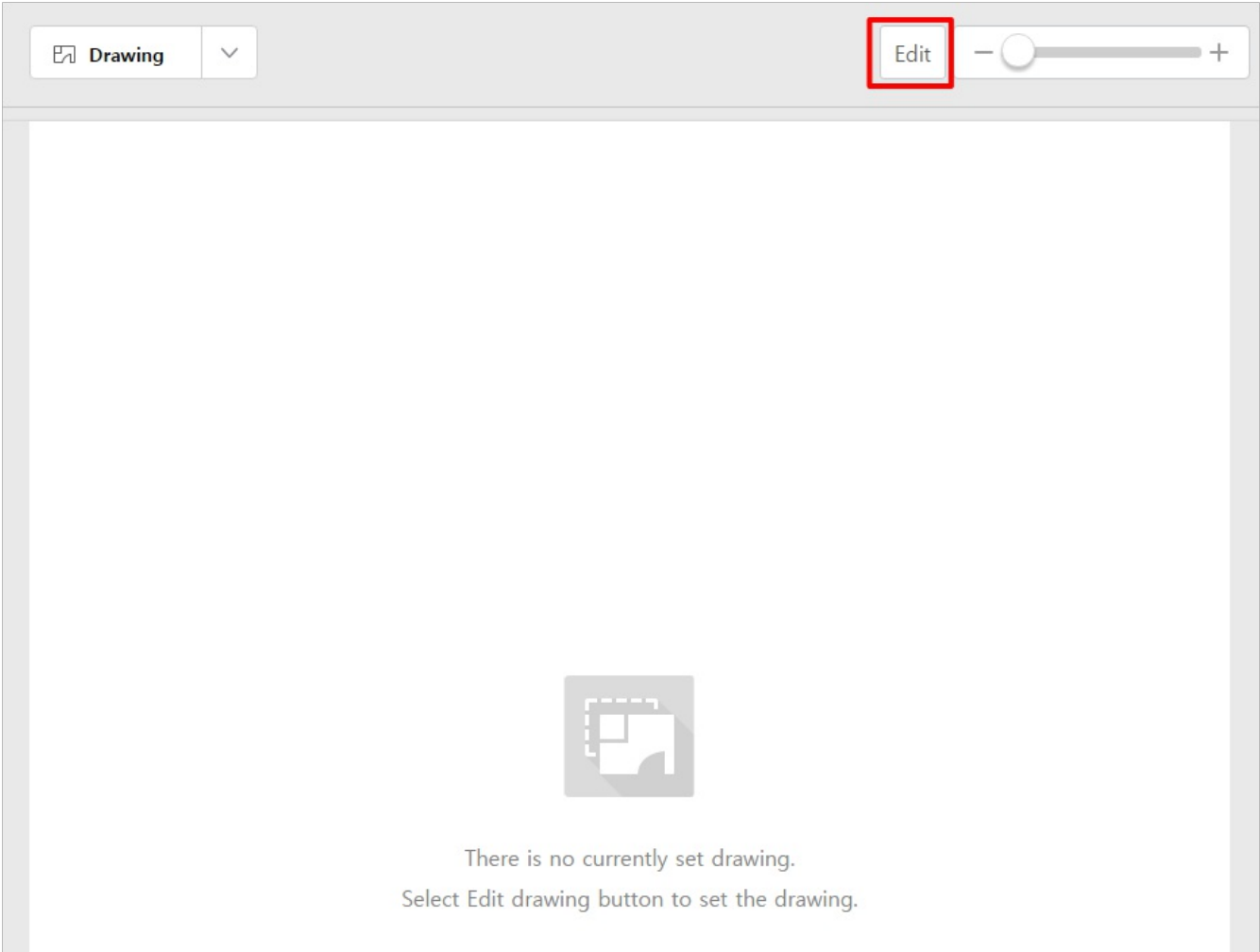
## Edit Drawing

When **[Setting] > [System setting]**'s **Use 'Drawing'** is selected as **Set**, you can edit the drawing.

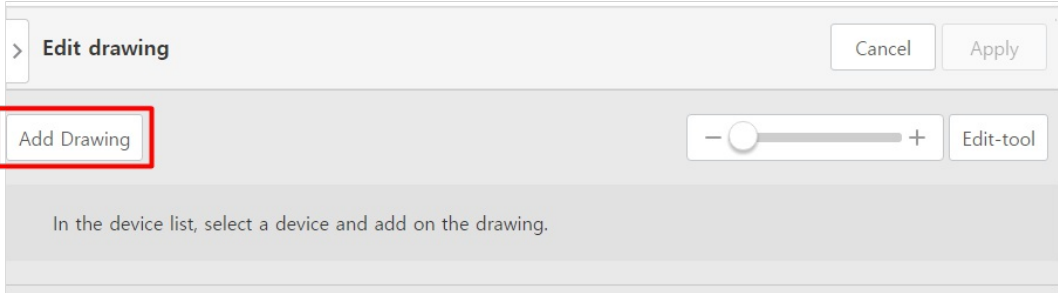
1. In the left side menu tab, click **[Control] > [Device control]** menu.
2. In device group tab area, click **[Group]** tab.
  - When you select **[Installation]** tab, the viewing method's **[Drawing]** is disabled.
3. In the viewing method, click **[View Drawing]**.



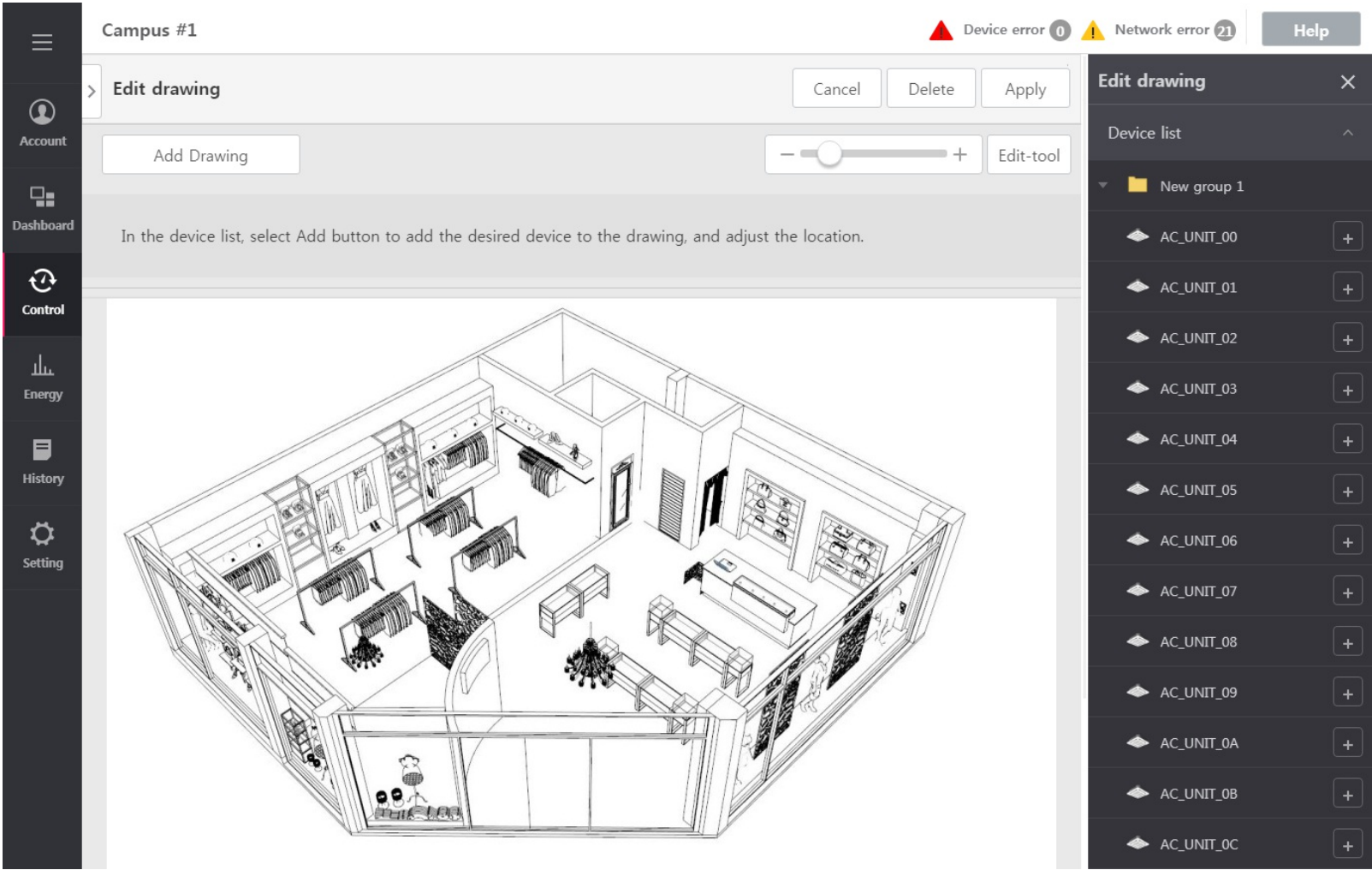
4. Click **[Edit]** button.



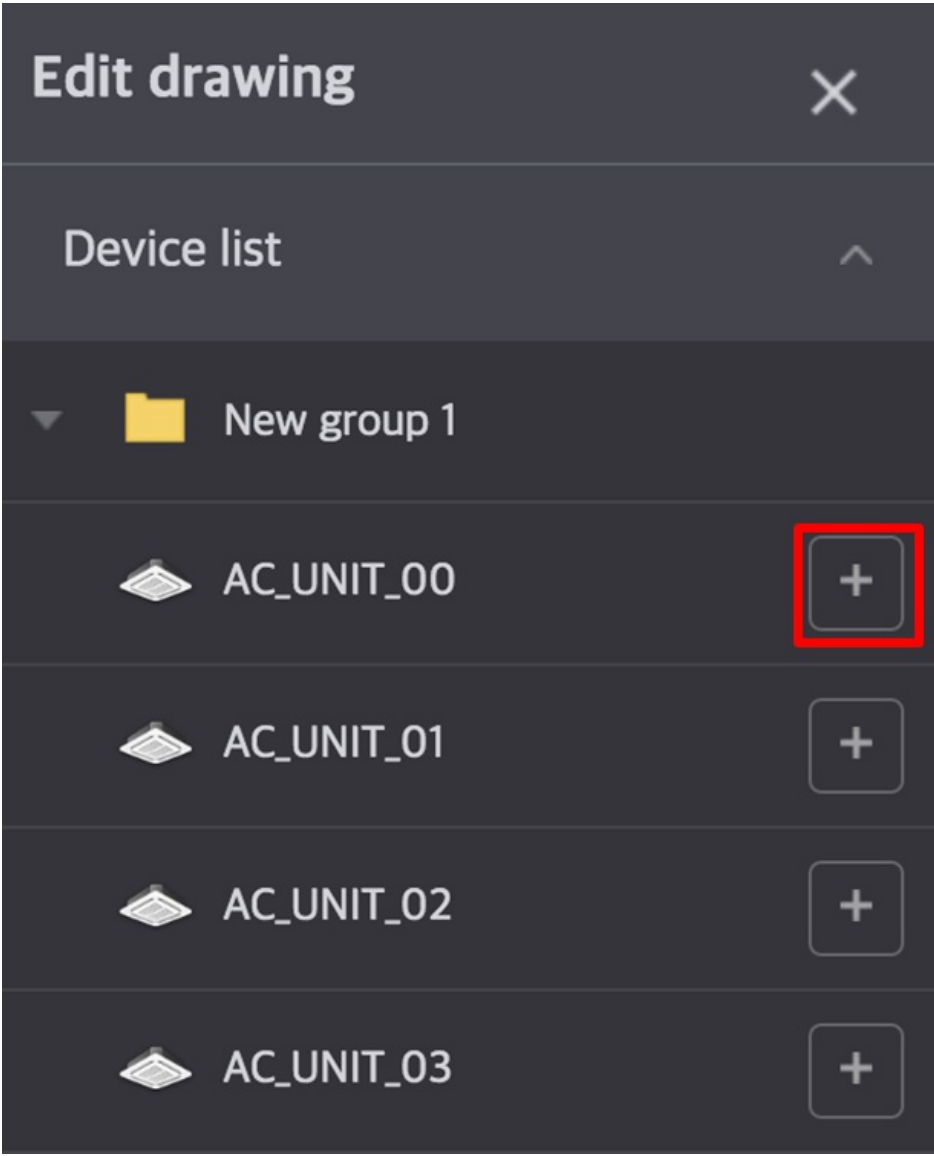
5. When you add or change drawing, click **[Add Drawing]** button.



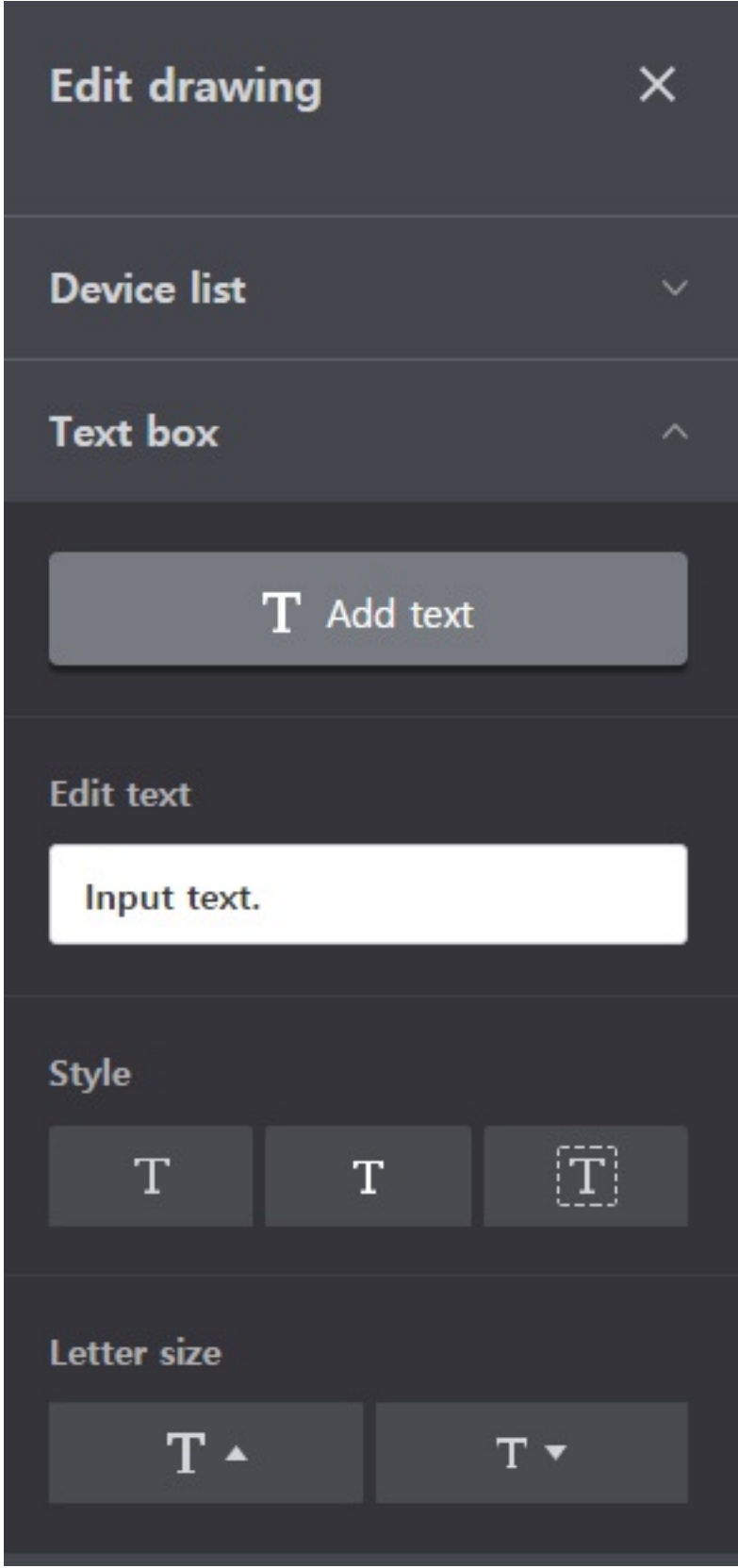
6. When file load window is displayed, select the drawing file to add and click **[Open]** button.
  - The selected drawing is displayed in the Edit drawing screen.



7. To add device in the drawing, select the desired device in the device list in the right side Edit drawing window, and click **[+]** button. The device is added in the drawing section.



8. To add text or change text in the drawing, use text box.

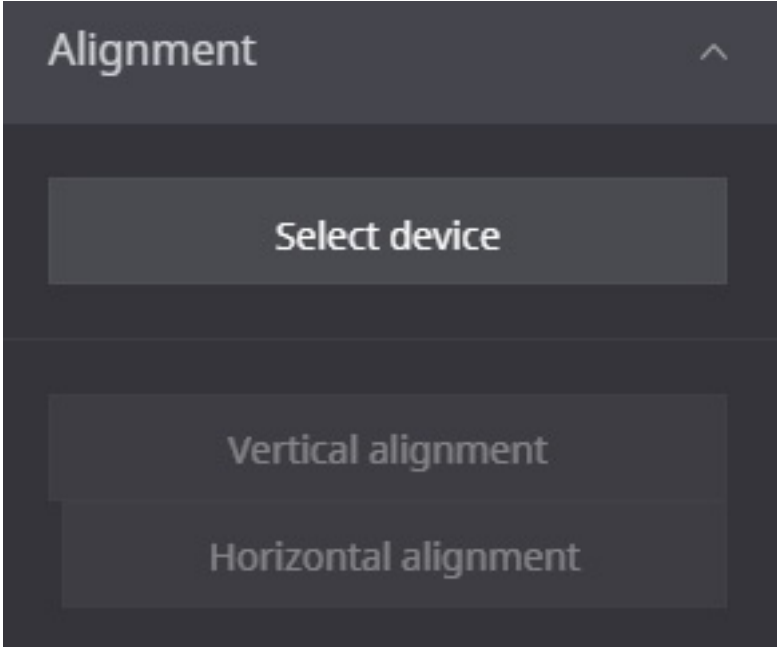


Category	Description



Add text	Add text box in drawing section
Edit text	Edit text in text box
Style	<div><div>T</div> : Normal letter, thick, Italic, underline<ul style="list-style-type: none"><li><div>T</div> : Display in normal letter</li><li><div>T</div> : Display in thick letter</li><li><div>T</div> : Display in Italic letter</li><li><div>T</div> : Display with underlined letter</li></ul><div>T</div> : Change letter color<div>T</div> : Change letter background color</div>
Letter size	<div><div>T</div>▲ : Larger letter</div> <div><div>T</div>▼ : Smaller letter</div>

9. To align the device icons on the drawing, use the Alignment Box.



Category	Description
Select device	Select a device to align on the drawing
Alignment	<div><div>Vertical alignment</div> : Aligns the selected device icons vertically.</div> <div><div>Horizontal alignment</div> : Aligns the selected device icons horizontally.</div>

10. When setting is completed, click **[Apply]** button.

Note

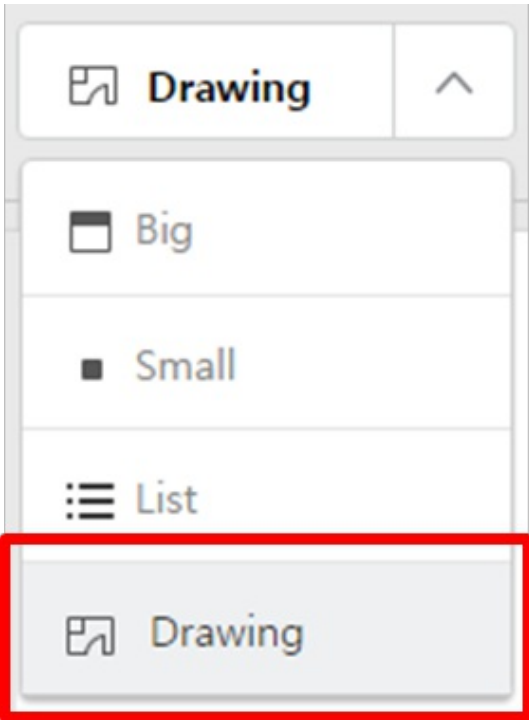
- Part of drawing image with vertical resolution of 1000px or more may not be displayed, and please use image of adequate resolution according to the display resolution.  
In environment with display resolution of 1920x1080, image of 1478x1000 or less is recommended.
- During text add / edit, special symbol (^, "|\) may not be used.



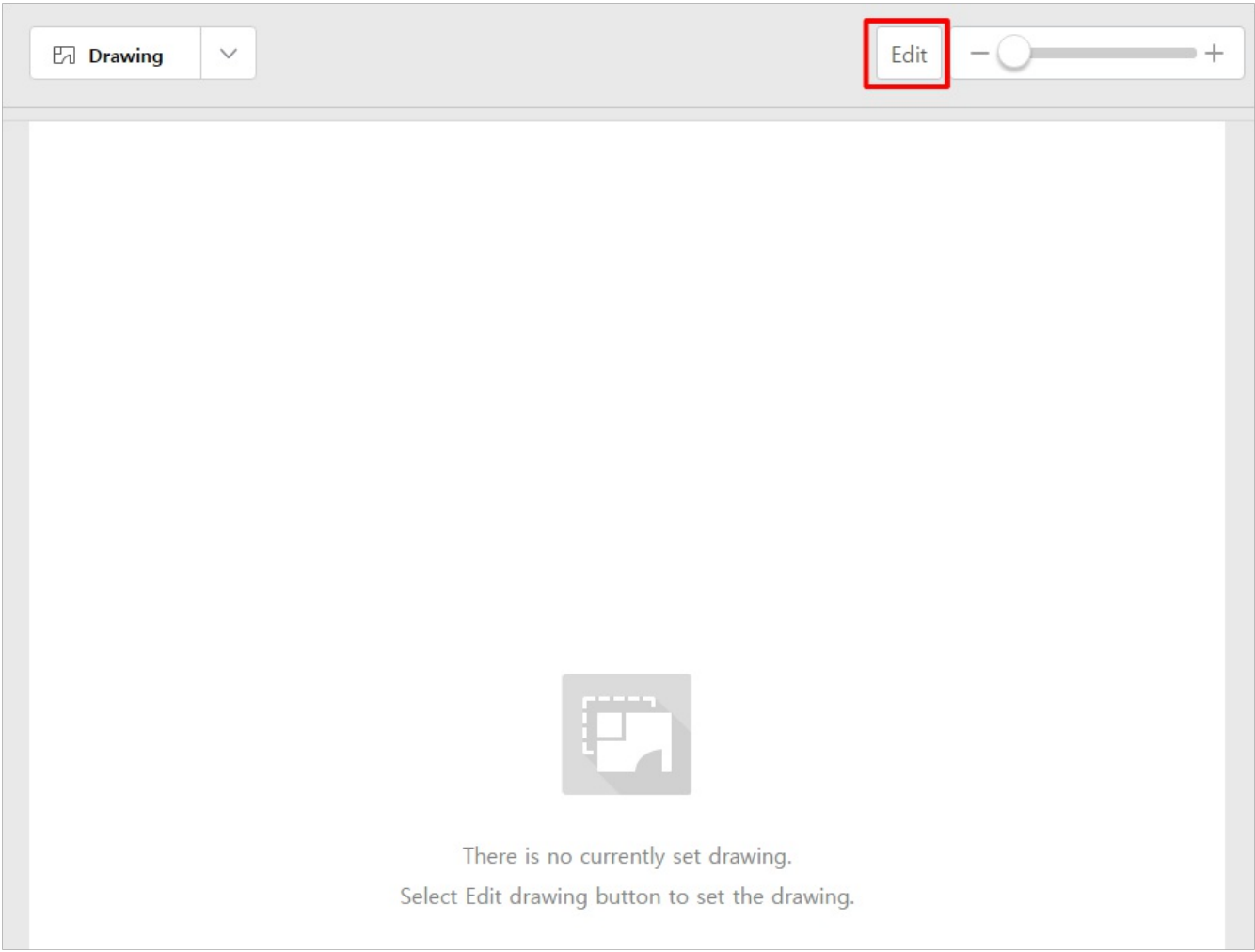
## Delete Drawing

You can delete the added drawing.

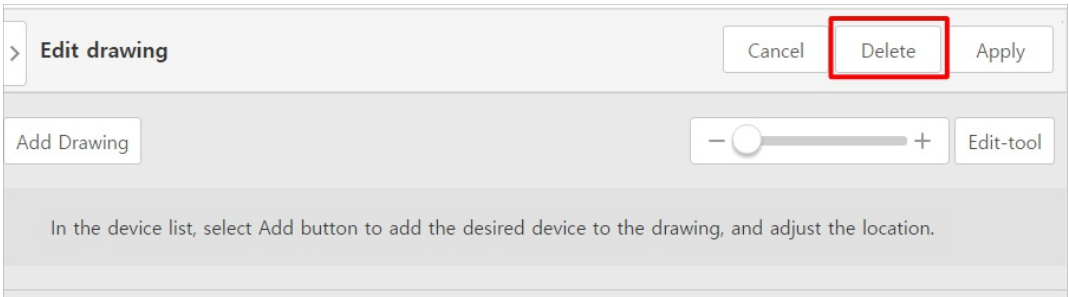
1.
- In the left side menu tab, click **[Control]** > **[Device control]** menu.
2.
- In device group tab area, click **[Group]** tab.
3.
- In the viewing method, click **[View Drawing]**.



4.
- Click **[Edit]** button.
  - The Edit drawing screen is displayed.



5.
- Click **[Delete]** button at the top.
  - The drawing is deleted.



## Schedule Control

Schedule is the function to designate the device operation in advance and let the device perform the operation reserved at certain time. When you use this function, you can efficiently manage the device operation in time unit for excellent energy saving effect.

**[Schedule]**

- ➔ View entire schedule
- ➔ Add Schedule
- ➔ Delete schedule
- ➔ Copy schedule
- ➔ Edit schedule

**[Exception Date]**

- ➔ Load exception date
- ➔ Add exception date
- ➔ Delete exception date

**Note**

**Recommended specification**

- **Schedule: No. of all events included in entire schedule is 50**
- **If it is set to be over the recommended specification, performance degradation may occur.**

View entire schedule

You can see the list of schedule in the set period.

You can check whether the set schedule is applied, name, whether to repeat, start date, end date, and device list, and directly **[Set]** or **[Clear]** the desired schedule.

Account

Dashboard

Control

Energy

History

Setting

Campus #1

Device error0

Network error21

Help

Schedule control

Set all

Clear all

Add schedule

2017-02-01 ~ 2018-02-01 ▼

Operation	Name	Repeat	Start date	End date	Device	Edit
<div>Set</div> <div>Clear</div>	Schedule	Daily	2018-01-29	Not specified	All (69), IDU (16), HRV (16), AWHP (32), DO (2), EXP.DO (3)	<div></div>

## Add Schedule

You can add schedule category.

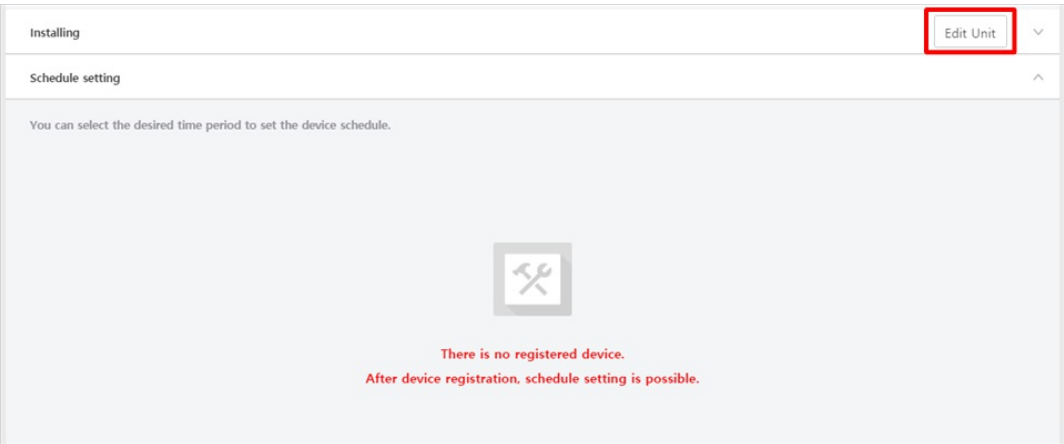
1. In the left menu tab, click **[Control] > [Schedule Control]** menu.
- The schedule control screen is displayed.
2. In the schedule list, click **[Add Schedule]** button.
- The Add schedule screen is displayed.
3. In the schedule name input field, input the desired schedule name.
4. Set whether to repeat the schedule.

Category	Description
Once	Apply the corresponding schedule only to one day designated in <b>[Period]</b>
Day of week selection	Select the desired day of week, and apply the schedule only to the corresponding day of week from the start date to the end date

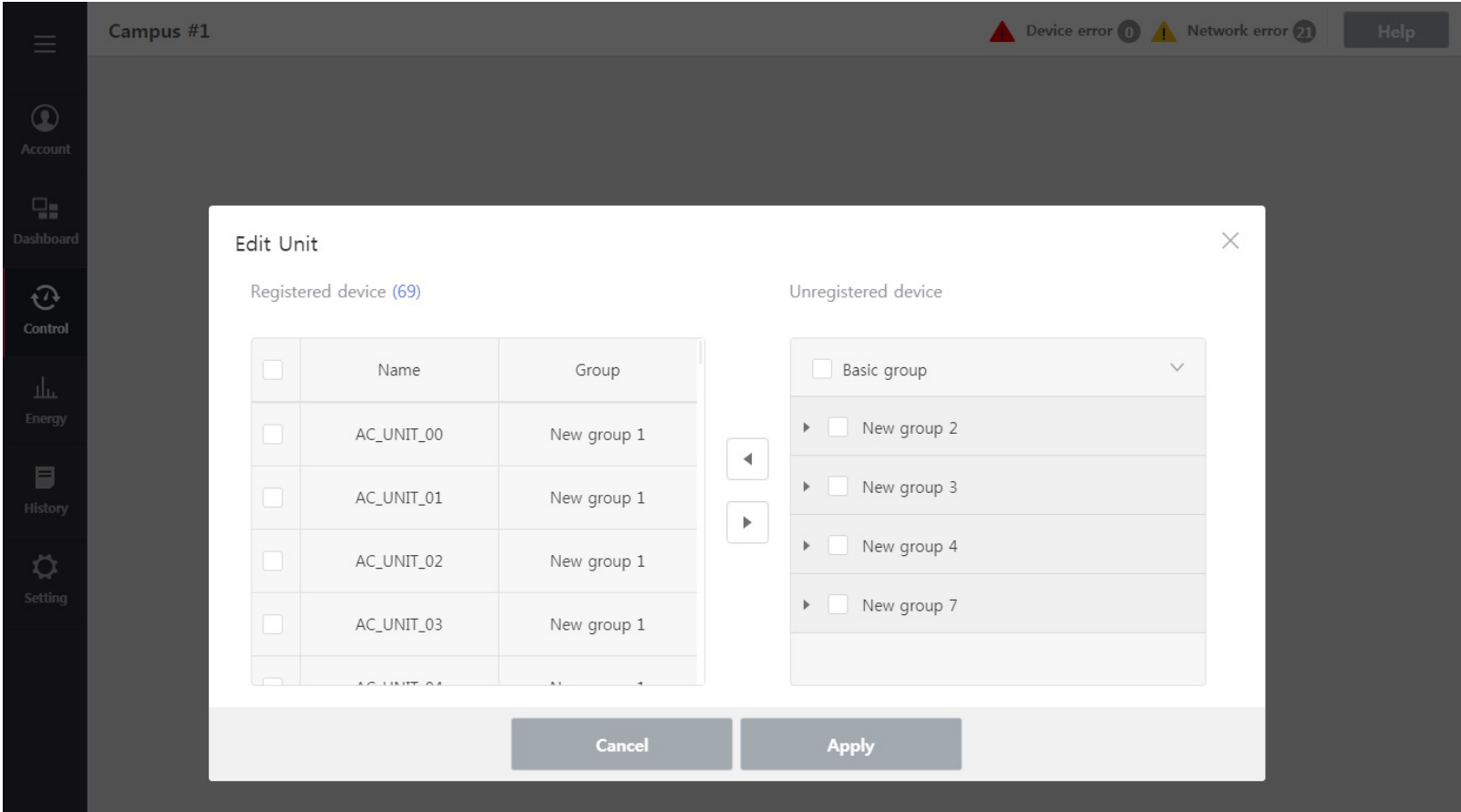
5. Set the desired period.
- When repetition is selected as **[Once]**, select only 1 day
- When repetition is selected as **[select day of week]**, select start and end date

Category	Description
Start Date	<div><div></div><div>Select the desired start date in mini calendar</div></div> <div><div></div><div>Initial start date is selected as today's date</div></div>
End date	<div><div></div><div>Select the desired end date in mini calendar</div></div> <div><div></div><div>You cannot set the end date before the start date</div></div>
End date not specified	<div><div></div><div>Apply the schedule repeatedly without designating the end date</div></div>

6. To apply the set exception date, click **[Load]** button.
- The exception date set in **[Setting]-[system setting]'s schedule exception date setting** is updated and displayed.
7. To apply the new exception date, click **[Add Exception Date]** button to set the exception date name and date to add.
8. In the device setting section, click **[Edit Unit]** button.
- The Edit Unit window is displayed.



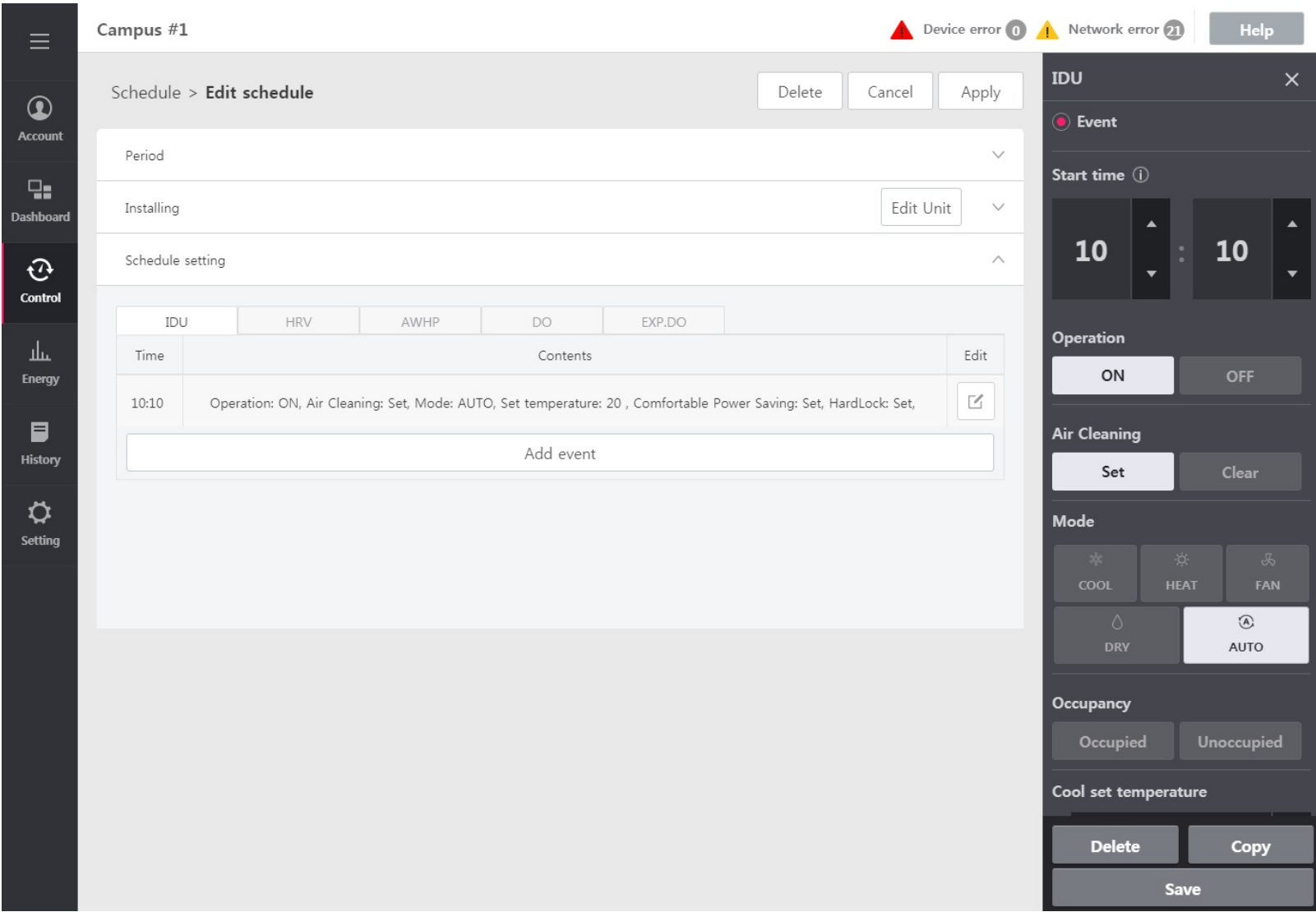
9. In the unregistered device list, click the checkbox of the device to register and click **[◀]** button.
- To register several groups at once, click the checkbox of the group to register and click **[◀]** button.
- The selected devices are added to the registered device list.



10.

When device registration is completed, click **[Apply]** button.
11.

To add schedule event, in **Schedule setting**, select device type tab, and click **[Add event]** button or edit button to set control status of the device in the right side control area.



12.

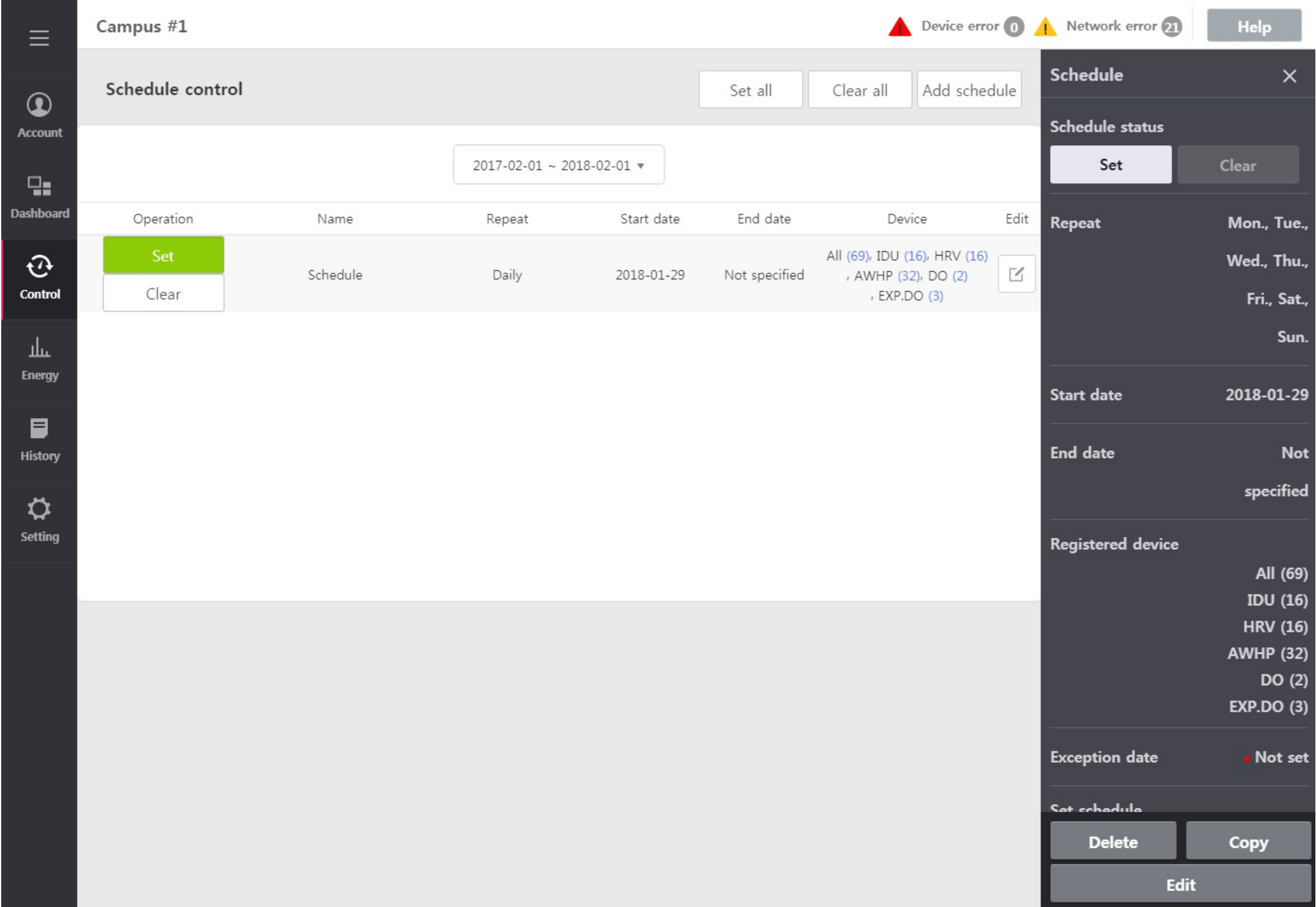
When control setting is completed, click **[Save]** button.
13.

When all settings are completed, click **[Apply]** button.

## Delete schedule

You can delete already registered schedule.

1. In the left menu tab, click **[Control]** > **[Schedule Control]** menu.
  - The schedule control screen is displayed.
2. In the schedule list, click the Edit button of the schedule to delete.



3. In the right side Edit window screen, click **[Delete]** button.
4. When notice popup window is created, click **[Check]** button.



## Copy schedule

You can copy and use registered schedule.

1. In the left menu tab, click **[Control]** > **[Schedule Control]** menu.
  - The schedule control screen is displayed.
2. In schedule list, click edit button of the schedule to copy.

Account

Dashboard

Control

Energy

History

Setting

Campus #1

Device error 0

Network error 21

Help

Schedule control

Set allClear allAdd schedule

2017-02-01 ~ 2018-02-01 ▼

Operation	Name	Repeat	Start date	End date	Device	Edit
<div>Set</div> <div>Clear</div>	Schedule	Daily	2018-01-29	Not specified	All (69), IDU (16), HRV (16), AWHP (32), DO (2), EXP.DO (3)	<div></div>

Schedule

Schedule status

SetClear

Repeat

Mon., Tue., Wed., Thu., Fri., Sat., Sun.

Start date

2018-01-29

End date

Not specified

Registered device

All (69), IDU (16), HRV (16), AWHP (32), DO (2), EXP.DO (3)

Exception date

Not set

Set schedule

DeleteCopy

Edit

3. In the right side edit window screen, click **[Copy]** button.
4. When notice popup window is created, click **[Check]** button.

## Edit schedule

You can change the set contents of the already registered schedule.

1. In the left menu tab, click **[Control]** > **[Schedule Control]** menu.
  - The schedule control screen is displayed.
2. In the schedule list, click Edit button of the schedule to edit.

Account

Dashboard

Control

Energy

History

Setting

Campus #1

Device error 0

Network error 21

Help

Schedule control

Set all

Clear all

Add schedule

2017-02-01 ~ 2018-02-01 ▼

Operation	Name	Repeat	Start date	End date	Device	Edit
<div>Set</div> <div>Clear</div>	Schedule	Daily	2018-01-29	Not specified	All (69), IDU (16), HRV (16), AWHP (32), DO (2), EXP.DO (3)	<div></div>

Schedule

Schedule status

Set

Clear

Repeat

Mon., Tue., Wed., Thu., Fri., Sat., Sun.

Start date

2018-01-29

End date

Not specified

Registered device

All (69), IDU (16), HRV (16), AWHP (32), DO (2), EXP.DO (3)

Exception date

Not set

Set schedule

Delete

Copy

Edit

3. In the right side edit window screen, click **[Edit]** button.
4. Edit the schedule contents.
  - To check the detail contents, check 'Add Schedule' Category.

## Load exception date

You can load already set exception date.

1.
- In the left menu tab, click **[Control] > [Schedule Control]** menu.
  - The schedule control screen is displayed.
2.
- In the schedule list, click **[Add Schedule]** button.
  - The Add schedule screen is displayed.
3.
- In the exception date tab, click **[Load]** button
  - The exception date set in **[Setting]-[system setting]'s schedule exception date setting** is updated and displayed.

Exception date		Load	Add exception date	Delete all
2017-01-01	New Year's Day			✕
2017-12-25	Christmas Day			✕

## Add exception date

You can add new exception date.

1.
- In the left menu tab, click **[Control] > [Schedule Control]** menu.
  - The schedule control screen is displayed.
2.
- In the schedule list, click **[Add Schedule]** button.
  - The Add schedule screen is displayed.
3.
- In the exception date tab, click **[Add Exception Date]** button
  - The Add exception date screen is dispalyed.

Add exception date

Set exception date

Name

Input exception date name

<<

<

2017 January

>

>>

MON	TUE	WED	THU	FRI	SAT	SUN
26	27	28	29	30	31	01
02	03	04	05	06	07	08
09	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	01	02	03	04	05

Cancel

Apply

4.
- Input the desired exception date name.
5.
- Select the exception date to set.
6.
- When selection is completed, click **[Apply]** button.

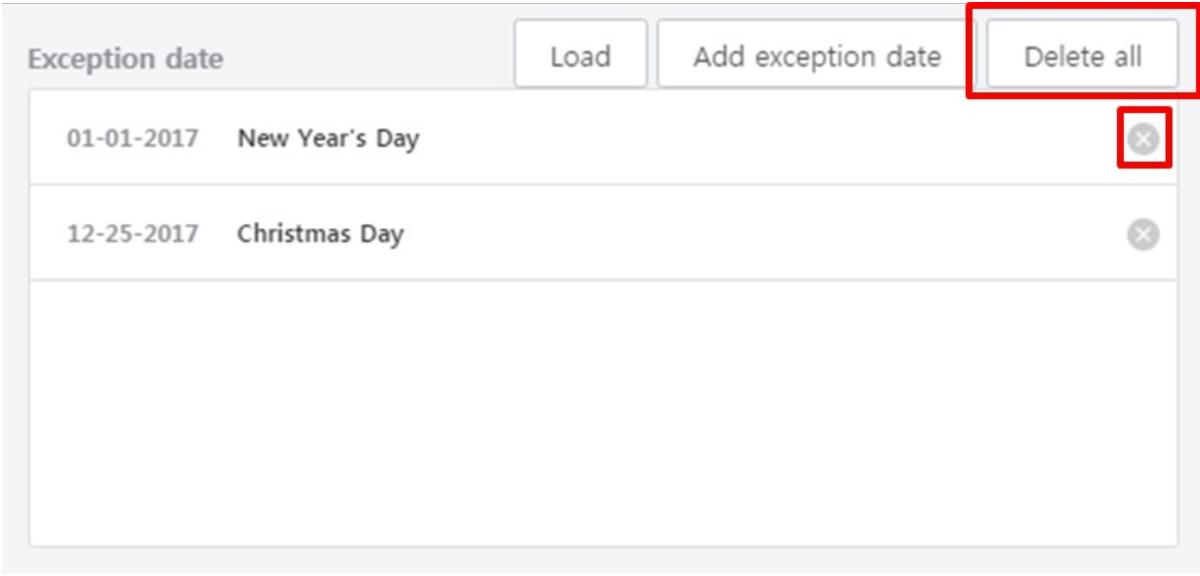
## Delete exception date

You can delete already registered exception date.

1.
- In the left menu tab, click **[Control] > [Schedule Control]** menu.

The schedule control screen is displayed.
2.
- In Edit schedule screen, click **[X]** button to delete exception date.

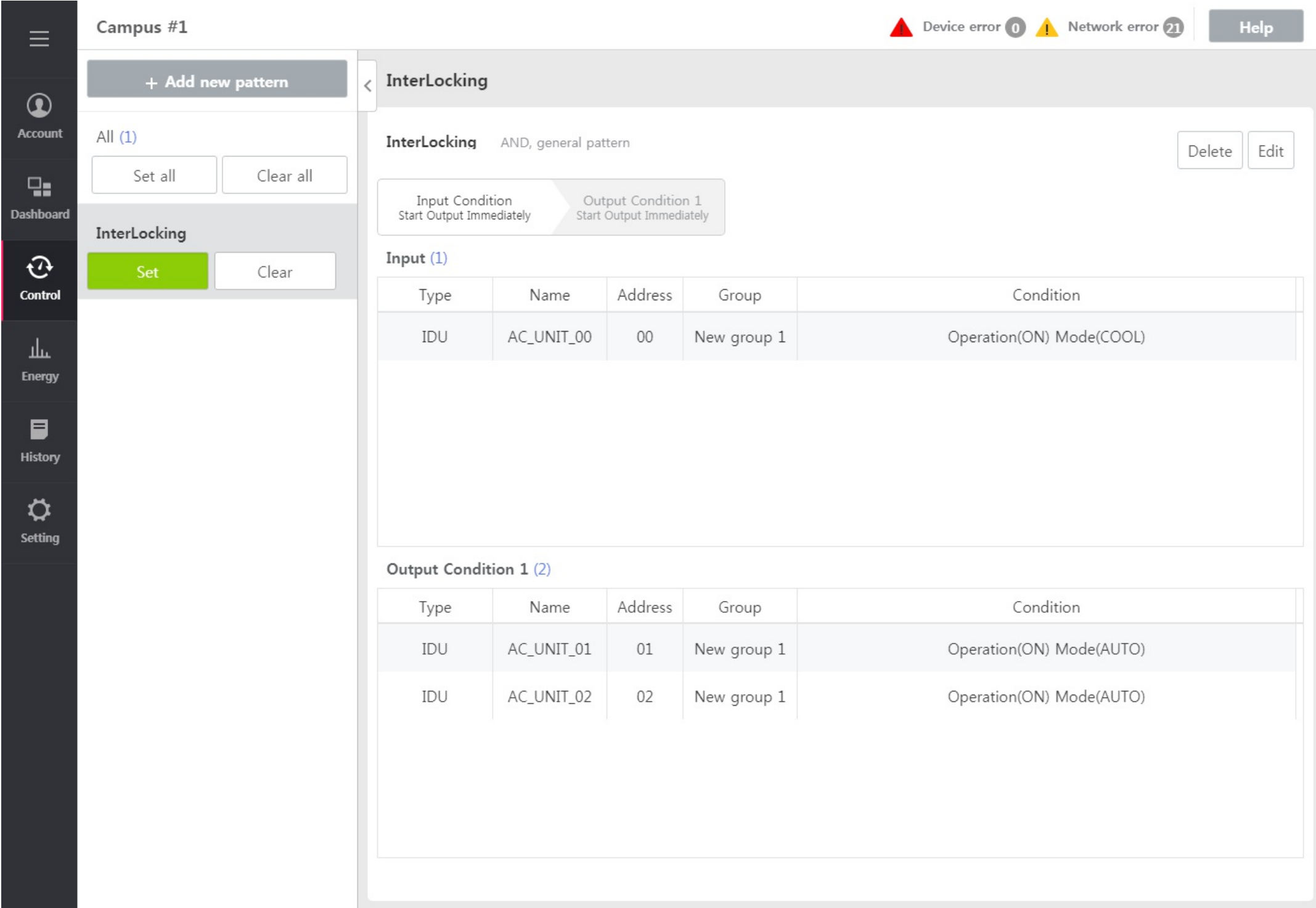
To delete the entire category, click **[Delete All]** button.



## InterLocking

InterLocking is the function to interface with one or more equipment and to control output operation when input condition is satisfied. For InterLocking, you need to group the equipment to mutual interface in one group and apply the control setting. It describes the method to create and manage the group and equipment interface control method.

1.
- In the left menu tab, click **[Control] > [InterLocking]** menu.
- The InterLocking screen is displayed.



2.
- In the group list, select the group to check the setting.
- The the corresponding group's setting status is displayed in the screen.
3.
- In the group list, when you click **[Set]** / **[Clear]** button, you can set the InterLocking operation.
4.
- To start all the registered group, click **[Set All]** button, and to stop all, click **[Clear All]** button.

### Note

#### Recommended specification

- Equipment interface control : No. of patterns is 20, No. of input devices is 500, and No. of output devices is 1000
- If it is set to be over the recommended specification, performance degradation may occur.

## Add/edit InterLocking

You can add and edit new InterLocking.

1.
- In the left menu tab, click **[Control] > [InterLocking]** menu.
- The InterLocking screen is displayed.
2.
- Click **[+ Add new pattern]** button.
- Add InterLocking screen is displayed.



Account

Dashboard

Control

Energy

History

Setting

Campus #1

Device error 0Network error 21Help

InterLocking > Add new pattern

DeleteCancelApply

Name

General pattern

▼

Pattern that output control command is executed when the input condition is met.

Input Condition

Start Output Immediately

Output Condition 1

Start Output Immediately

+

Status

and  OR  NAND  NOR

Maintenance Time

Cancel  Setting

1Min.

▼

 later

Edit Unit

There is no registered device.  
Register the device by selecting Edit device button.

3. In the InterLocking name input field, input the desired InterLocking name.

4. Select pattern type.

Category	Description
General pattern	<ul style="list-style-type: none"><li>The pattern that output control command is executed when the input condition is satisfied</li></ul>
Copy pattern	<ul style="list-style-type: none"><li>The pattern that the output device follows the input device's status (Some control functions may not be copied.)</li><li>You can add only 1 device to input condition, and only the device with the same attribute with the added input device is registered to the output device</li></ul>
Emergency pattern	<ul style="list-style-type: none"><li>The pattern that it recognizes as emergency situation when input condition is satisfied</li><li>When the input condition is satisfied, it tells the alarm with screen and sound</li></ul>
1:1 pattern	<ul style="list-style-type: none"><li>Pattern to conveniently register many devices if input device is the same as output device</li></ul>

5. Select whether to permit user control. (Only general pattern is possible)

- When check box is selected, even if the status is changed by the InterLocking, user may change the status of the equipment.

6. Set equipment interface condition. When you press **[+]** button, you can add up to 3 output conditions.

- It only appears when input condition tab is selected.

Category	Description
Status	<ul style="list-style-type: none"><li>AND : all device conditions match</li><li>OR : one or more device conditions match</li><li>NAND : one or more device conditions do not match</li><li>NOR : no condition matches</li></ul>
Maintaining time	If it is set, while all input conditions are met, output condition control after maintaining time Press <b>[▼]</b> button to select maintaining time

- It only appears when output condition tab is selected.

Category	Description
Send e-mail	When check box is selected, if the corresponding event is executed in ACP, whether event occurred is sent to the e-mail set in Setting > error notice setting > receiving e-mail address <ul style="list-style-type: none"><li>ACP shall be connected to internet network that can send e-mail.</li></ul>
Delay time	If it is set, when input condition is met, output condition is controlled after the registered delay time Press <b>[▼]</b> button to select delay time <ul style="list-style-type: none"><li>If input condition is met, even if it becomes a status that does not meet the input condition during the delay time, output condition is controlled after delay time.</li></ul>

7. To add device, click **[Edit Unit]** button.

- The Edit Unit popup window appears.

8. In the selectable device list, click the checkbox of the device to register and click **[◀]** button.

- To register several groups at once, click the checkbox of the group to register and click [◀] button.
- The selected devices are added to the registered device list.

Edit Unit

Registered device (0)

Select device or group in non registered device.

Unregistered device

ACP

ACP

▶ 

ODU[00]

▶ 

ODU[01]

▶ 

ODU[02]

▶ 

ODU[03]

Cancel

Apply

9. When device registration is completed, click [Apply] button.

10. Click registered device's [Condition] button.

Status

andORNANDNOR

Maintenance Time

CancelSetting

1Min.

▼

later

Edit Unit

IDU (2)

Name	Address	Group	Condition	Batch
AC_UNIT_00	00	New group 1	Operation(ON) Mode(COOL)	Condition
AC_UNIT_00	00	New group 1		Condition

11. In the right side control window section, set the desired control status.

12. Select output condition tab, and run No. 7~11 processes in the order.

13. To save the set contents, click [Apply] button.

Note

Meaning of Odor Conditions by Level

- Reference Value 1 : Weak
- Reference Value 3 : Normal
- Reference Value 5 : Strong
- Reference Value 6 : Very strong

Delete InterLocking

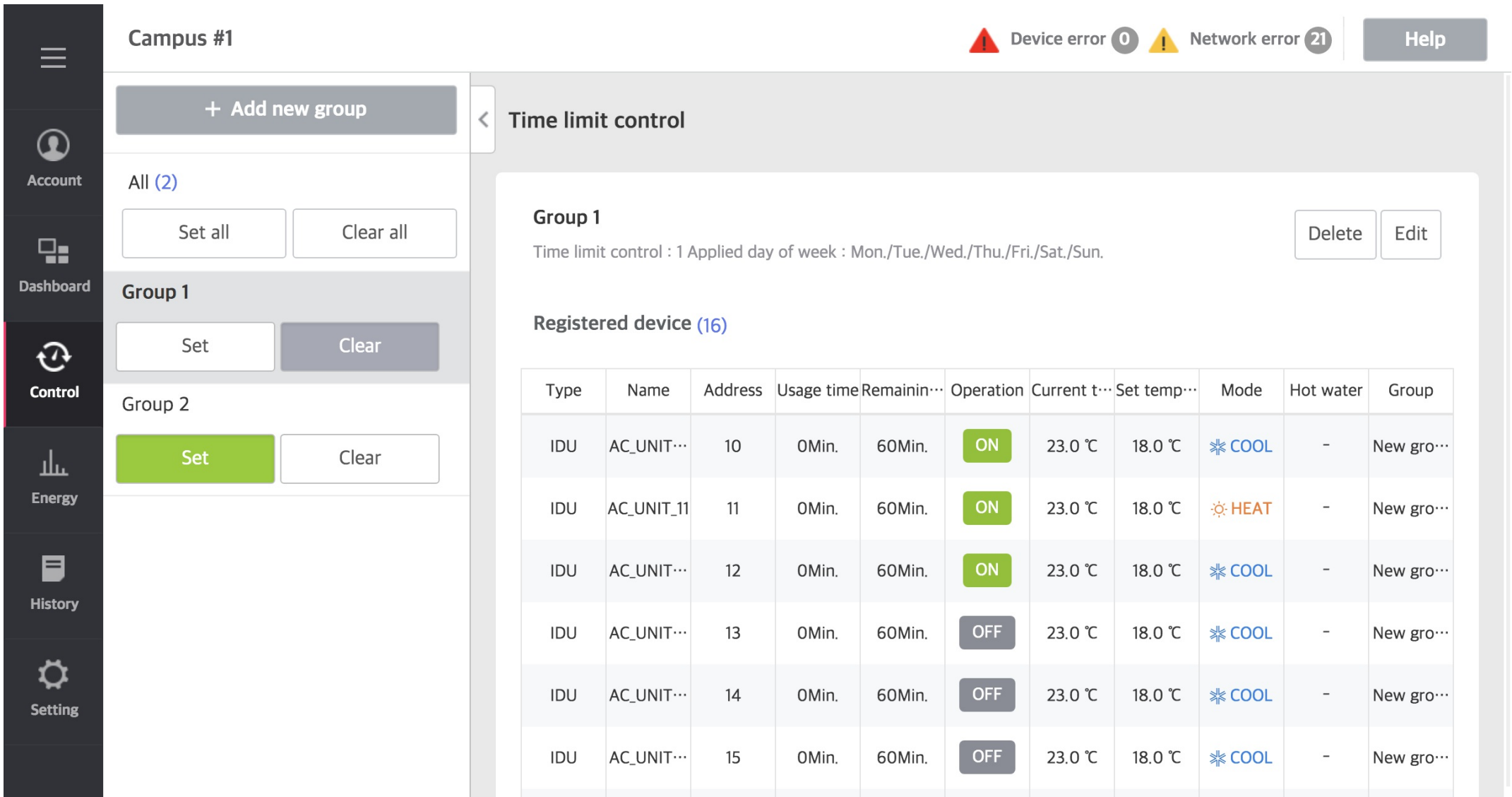
You can delete registerd InterLocking.

1. In the left menu tab, click [Control] > [InterLocking] menu.
  - The InterLocking screen is displayed.
2. In the InterLocking list, select the group to delete, and click [Delete] button.
3. When InterLocking delete popup window appears, click [Yes] button.
  - In the InterLocking list, the selected category is deleted.

## Time limit control

You can control the device to operate for the set time and automatically stop.

1.
- In the left menu tab, click **[Control] > [Time limit control]** menu.
2.
- In the group list, select the group to check the setting.
  - The the corresponding group's setting status is displayed in the screen.
3.
- In the group list, you can click **[Set]** / **[Clear]** button to set the time limit operation.
4.
- To start all the registered group, click **[Set All]** button, and to stop all, click **[Clear All]** button.



### Note

#### Recommended specification

- Time limited operation : No. of groups is 10
- If it is set to be over the recommended specification, performance degradation may occur.

## Add/edit Time limit control group

You can add and edit Time limit control group.

1.
- In the left menu tab, click **[Control] > [Time limit control]** menu.
  - Time limit control screen is displayed.
2.
- Click **[+ Add New Group]** button.
  - Add new group screen is displayed.
  - During the edicting, when you select the group to edit and click **[Edit]** button, the following screen is displayed.

Campus #1

Device error0Network error0Help

Time limit control > Add new group

CancelApply

Group name

Continuous operation time

1 Hour

▼

Applied day of week

☐ Mon. ☐ Tue. ☐ Wed. ☐ Thu. ☐ Fri. ☐ Sat. ☐ Sun.

Registered device

Edit Unit

Type	Name	Address	Group
<div><div></div><div>There is no registered device. Register the device by selecting Edit device button.</div></div>			

3. Input group name.
4. Select continuous operation time and applied day of week.

Category	Description
Continuous operation time	<ul style="list-style-type: none"><li>Press [▼] button, and set the desired continuous operation time (1 hour ~ 4 hours)</li></ul>
Applied day of week	<ul style="list-style-type: none"><li>Select checkbox to select day of week to run the time limit operation</li></ul>

5. To add device, click [Edit Unit] button.
- The Edit Unit popup window appears.

Edit Unit

Registered device (16)

<input type="checkbox"/>	Type	Name	Group
<input type="checkbox"/>	IDU	AC_UNIT_10	New group 2
<input type="checkbox"/>	IDU	AC_UNIT_11	New group 2
<input type="checkbox"/>	IDU	AC_UNIT_12	New group 2
<input type="checkbox"/>	IDU	AC_UNIT_13	New group 2
<input type="checkbox"/>	IDU	AC_UNIT_14	New group 2

Unregistered device

ACPI[0]

▼

☐ AC Smart

▼

☐ ODU[00]

☐ ODU[03]

☐ HRV

☐ AWHP

Cancel

Apply

6. In the selectable device list, click the checkbox of the device to register and click [◀] button.
- For time limited control, you can register all devices except DI, DO, ON/OFF, Chiller, and Exp.I/O device.
  - To register several groups at once, click the checkbox of the group to register and click [◀] button.
  - The selected devices are added to the registered device list.
7. Whenh device registration is completed, click Edit Unit popup window's [Apply] button.
8. Click [Apply] button at the top right side.

## Delete Time limit control

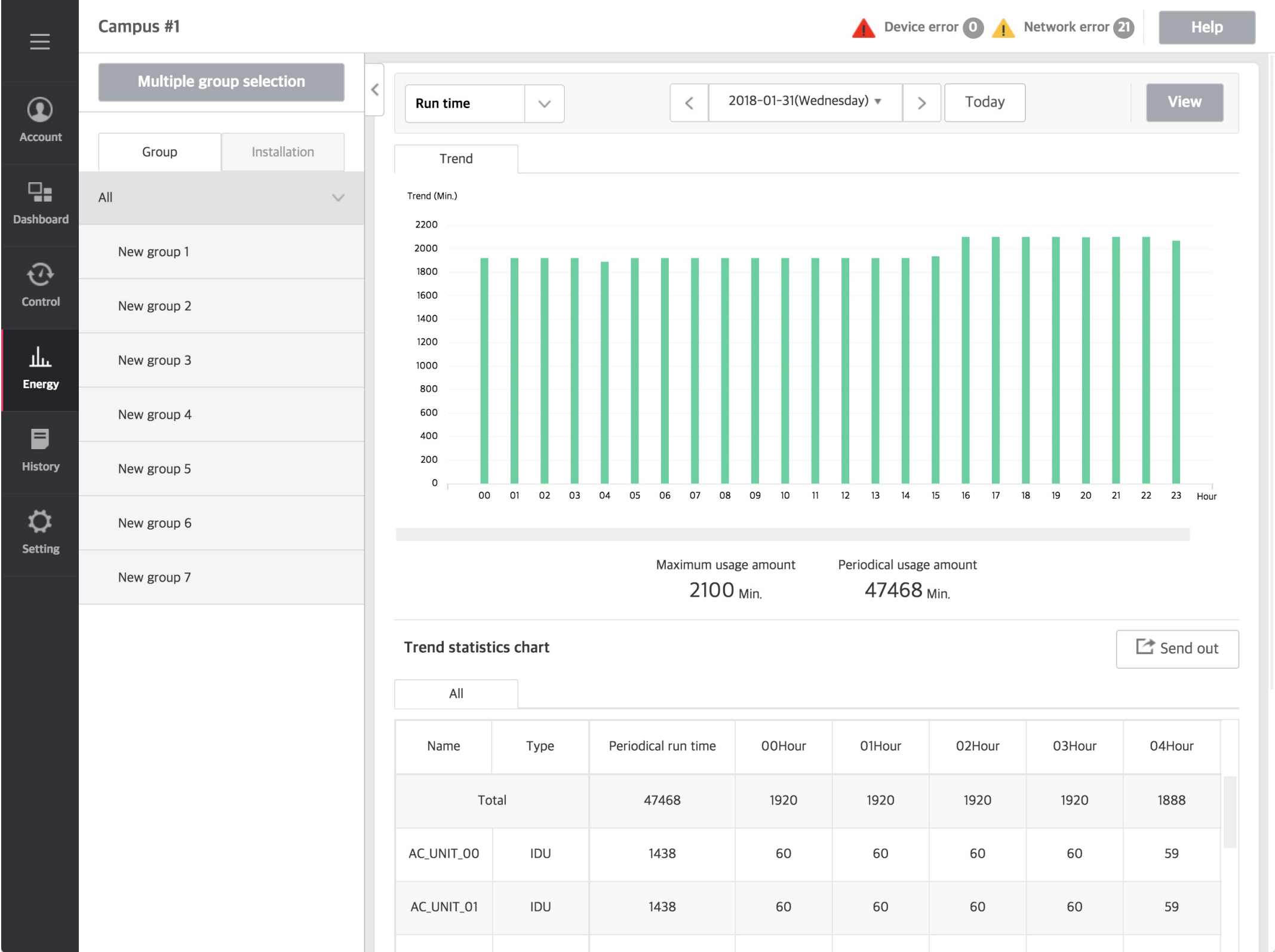
You can delete Time limit control group.

1. In the left menu tab, click [Control] > [Time limit control] menu.
- Time limit control screen is displayed.
2. In the group list, select the group to delete and click [Delete] button.
3. When Delete group popup window appears, click [Yes] button.

Energy Usage

It describes the method to check the device's operation time, electricity usage amount, gas usage amount, TOE, and CO<sub>2</sub> with values and graph.

1. In the left menu tab, click **[Energy]** > **[Energy Usage]** menu.
- Energy usage amount screen is displayed.



2. In the group list, select group to view.
3. In the top left side box, select the category to view.

Run time

Run time

Electricity

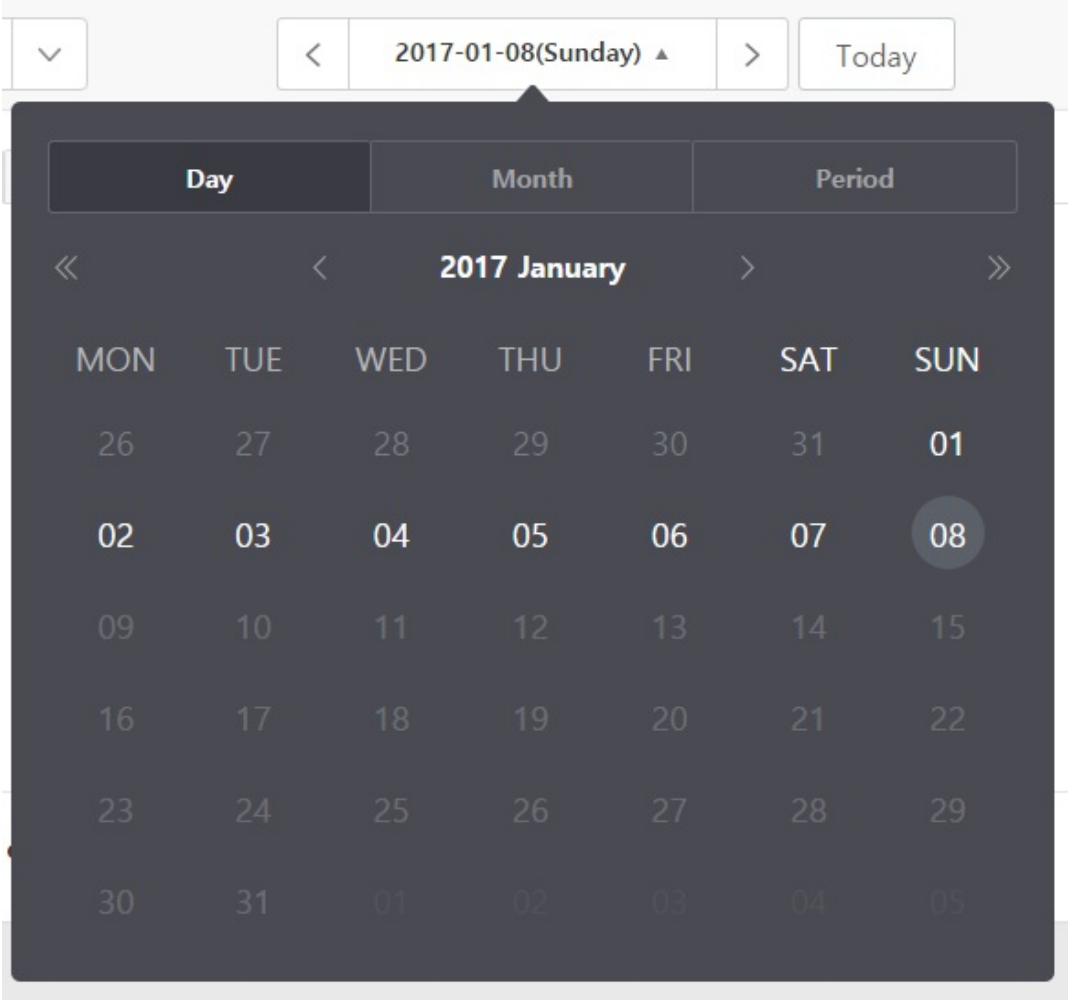
Gas

TOE

CO2

4. Set the viewing period.

Category	Description
Day	Set the desired day in mini calendar
Month	Set the desired month in mini calendar
Period	Set the desired period in mini calendar
Today	Set today's date as the base date



5. To view the set contents, click **[View]** button.
- Energy usage amount of the set period is displayed.
  - To save the viewed contents, click **[Send Out]** button.
- (In AC Smart 5 Device, it is stored in USB.)

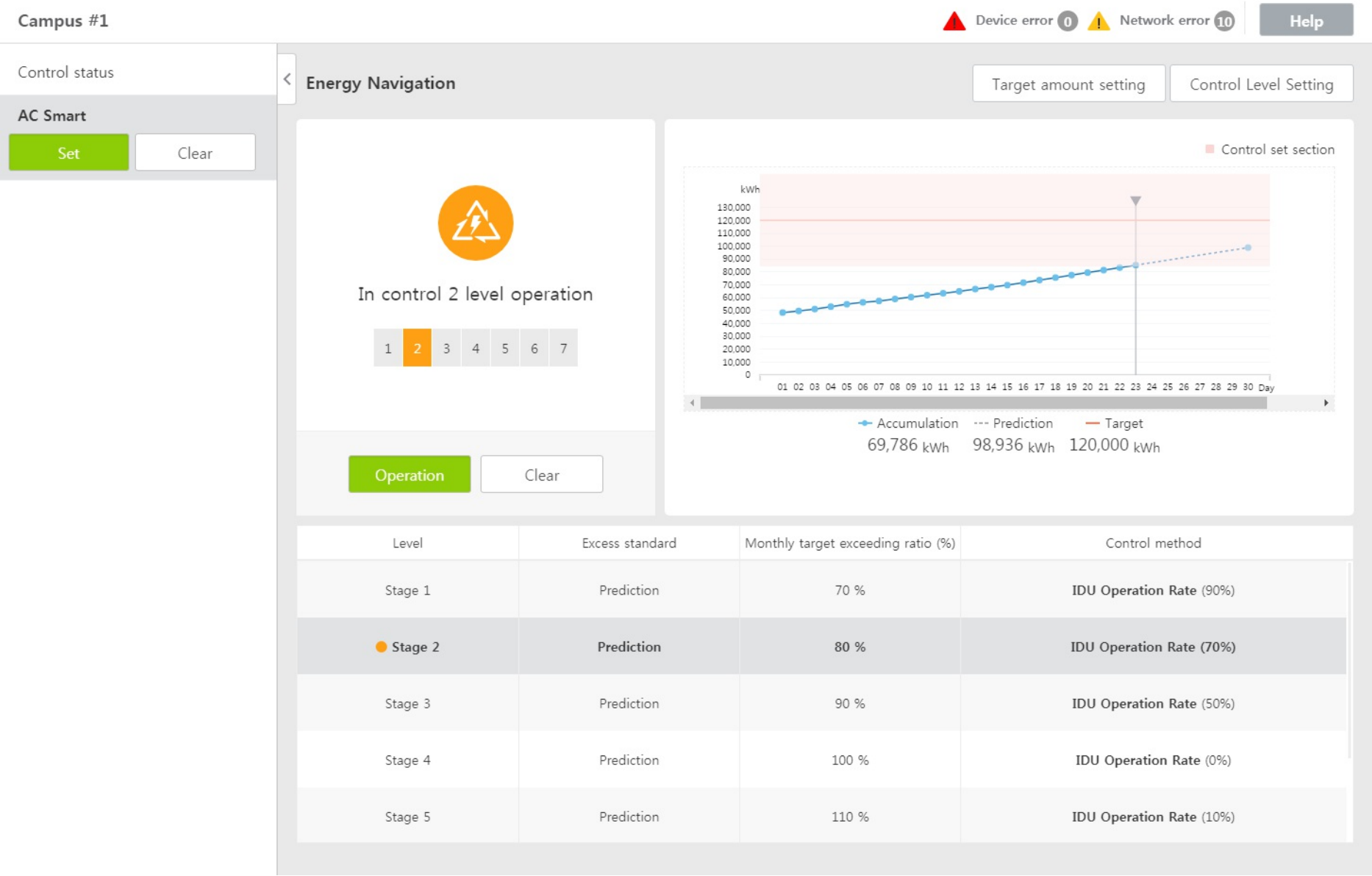
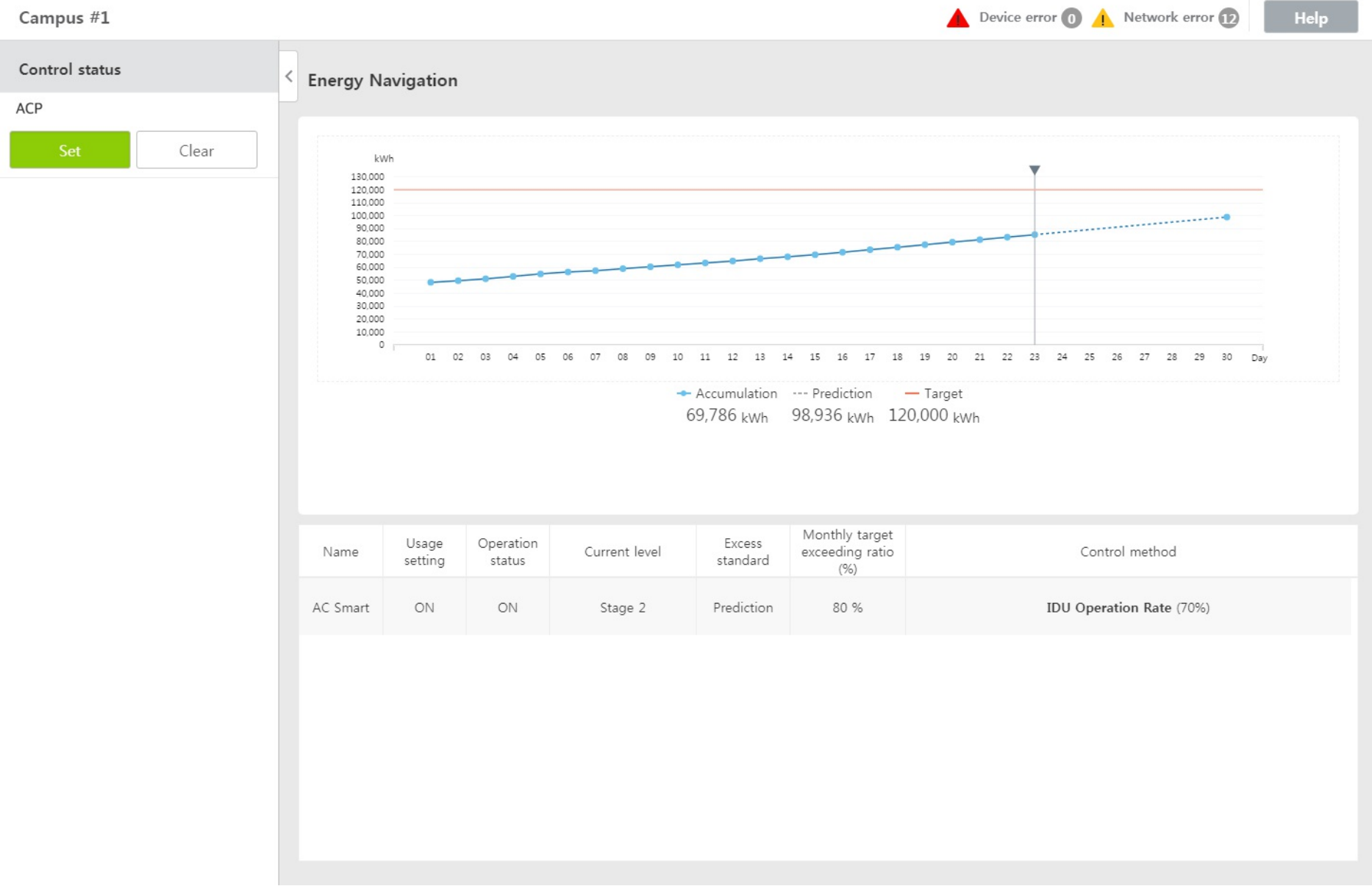
Note

- Viewing power is possible only when PDI is installed.
- If PDI is installed, indoor unit, ERV DX, and Heating address shall be set to avoid overlapping.
- The power consumption amount appeared in the program may be a little different from the power consumption amount marked on actual bill.
- In [Setting]-[Installing], only ACP with [Electricity Usage Amount] set can be monitored.
- Viewing gas is possible only when GDI is installed.
- The gas amount appeared in the program may be a little different from the gas amount marked on actual bill.
- In [Setting]-[Installing], only ACP with [Gas usage amount] set can be monitored.
- Energy monitor maintains only the last 1 year's data.
- Hourly data is provided up to last 3 months.



## Energy Navigation

Energy Navigation is the function that can control **[ODU capacity]/[IDU Operation Rate]/[IDU]** for each level according to the power usage amount forecast and current power usage amount to be able to manage the monthly power usage amount below the target amount.



## Add target amount

You can add Energy Navigation's target amount.

- In the left menu tab, click **[Energy] > [Energy Navigation]** menu.
- In the control status tab, click the group to add target amount.
- Click **[Target amount setting]** button at the top right side.
  - Target amount setting window appears.



<

Energy target management

Cancel

Apply

Input method

Direct input

Decrease ratio compared to the previous year

Monthly target amount

Decrease ratio

Batch input

Apply

Month	Target value	Month	Target value
1Month	60000	7Month	60000
2Month	60000	8Month	60000
3Month	60000	9Month	60000
4Month	60000	10Month	60000
5Month	60000	11Month	60000
6Month	60000	12Month	60000

Total 720000 kWh

100 %

Previous year

4. Input target amount in each month.
- To input in all months at once, input target amount in batch input field and click **[Apply]** button on the side.
5. When target amount input is completed, click **[Apply]** button at the top right side.
6. When Apply notice window appears, click **[Check]** button.

### Control Level Setting

You can set control level of Energy Navigation.

1. In the left menu tab, click **[Energy] > [Energy Navigation]** menu.
2. In the control status tab, click the group to set the control level.
3. Click **[Control Level setting]** button at the top right side.
- Control Level Setting window appears.

Energy Navigation > Control Level Setting

Cancel

Apply

Set control execution method

AUTO

Manual

Help

Control Level Setting

+ Add level

Level	Excess standard	Monthly target exceeding ratio (%)	Control method		Delete
1	<div>Prediction</div> <div></div>	<div>70 %</div> <div><div></div><div></div></div>	<div>ODU capacity</div> <div></div>	<div>90%</div> <div></div>	<div></div>
2	<div>Prediction</div> <div></div>	<div>80 %</div> <div><div></div><div></div></div>	<div>ODU capacity</div> <div></div>	<div>70%</div> <div></div>	<div></div>
3	<div>Prediction</div> <div></div>	<div>90 %</div> <div><div></div><div></div></div>	<div>ODU capacity</div> <div></div>	<div>50%</div> <div></div>	<div></div>
4	<div>Prediction</div> <div></div>	<div>100 %</div> <div><div></div><div></div></div>	<div>ODU capacity</div> <div></div>	<div>0%</div> <div></div>	<div></div>

4. Select control run method setting.

Category	Description

AUTO	At the time of the alarm, control method set for each level is automatically executed.
Manual	At the time of the alarm, you select whether to execute the control method set for each level.

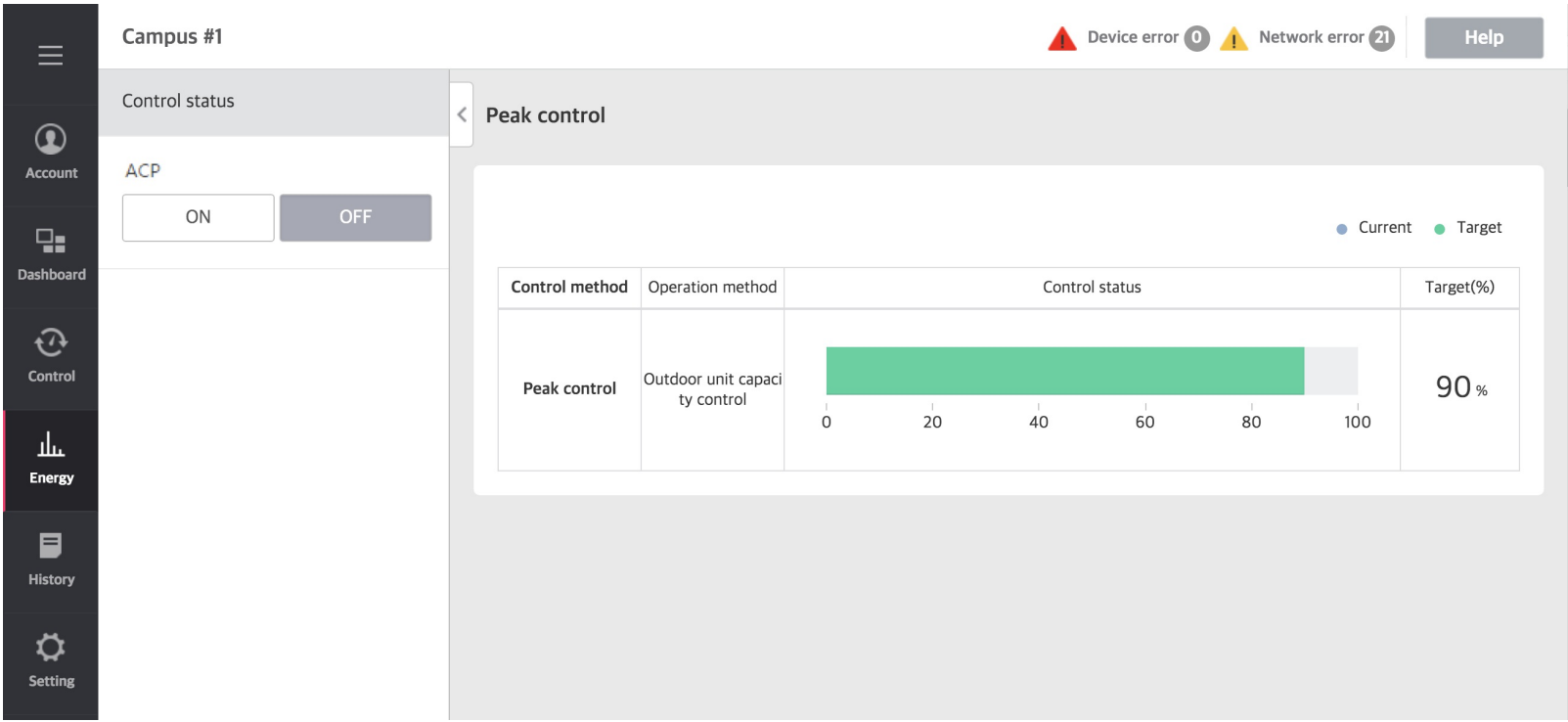
- 5. Click Control Level Setting window's **[+Add Level]** button.
- 6. Set the Control Level Setting categories.

Category	Description
Excess Standard	You can select between usage amount forecast and actual usage amount.
Monthly target excess ratio	You can set in 10% unit within 70~130%
Control method	ODU capacity: You can set in 10% unit within 0~100%. IDU operation ratio: You can set in 10% unit within 0~100%. IDU: IDU control

- 7. When setting is completed, click **[Apply]** button at the top right side.
- 8. When Apply notice window appears, click **[Check]** button.

## Peak demand control

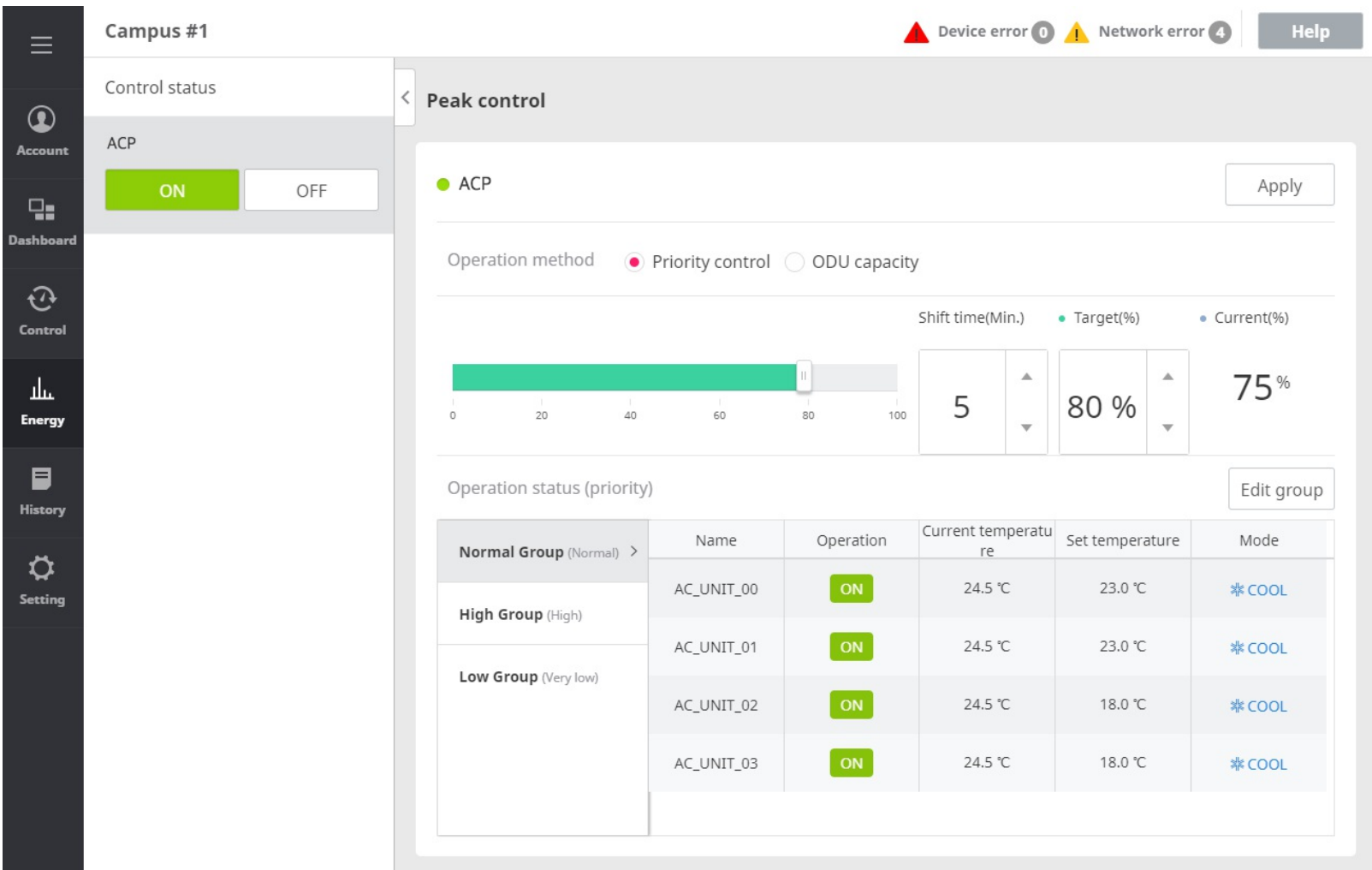
In the control status, you can check ACP name, control method, operation method, control status, and target operation ratio.



## Peak Control

Peak control is a function to set the target operation rate to limit the maximum power usage and to control total power usage not to exceed the target operation rate. To prevent total power usage from exceeding target operation rate, cooling mode is automatically converted to wind only mode according to the priority and heating mode automatically stops, so the power usage amount can be saved.

1. In the left menu tab, click **[Energy] > [Peak demand control]** menu.
- Peak demand control screen is displayed.
2. In ACP list, select ACP to control.
- The corresponding ACP's control setting status is displayed in the screen.



3. In the control information display, set the desired control status.

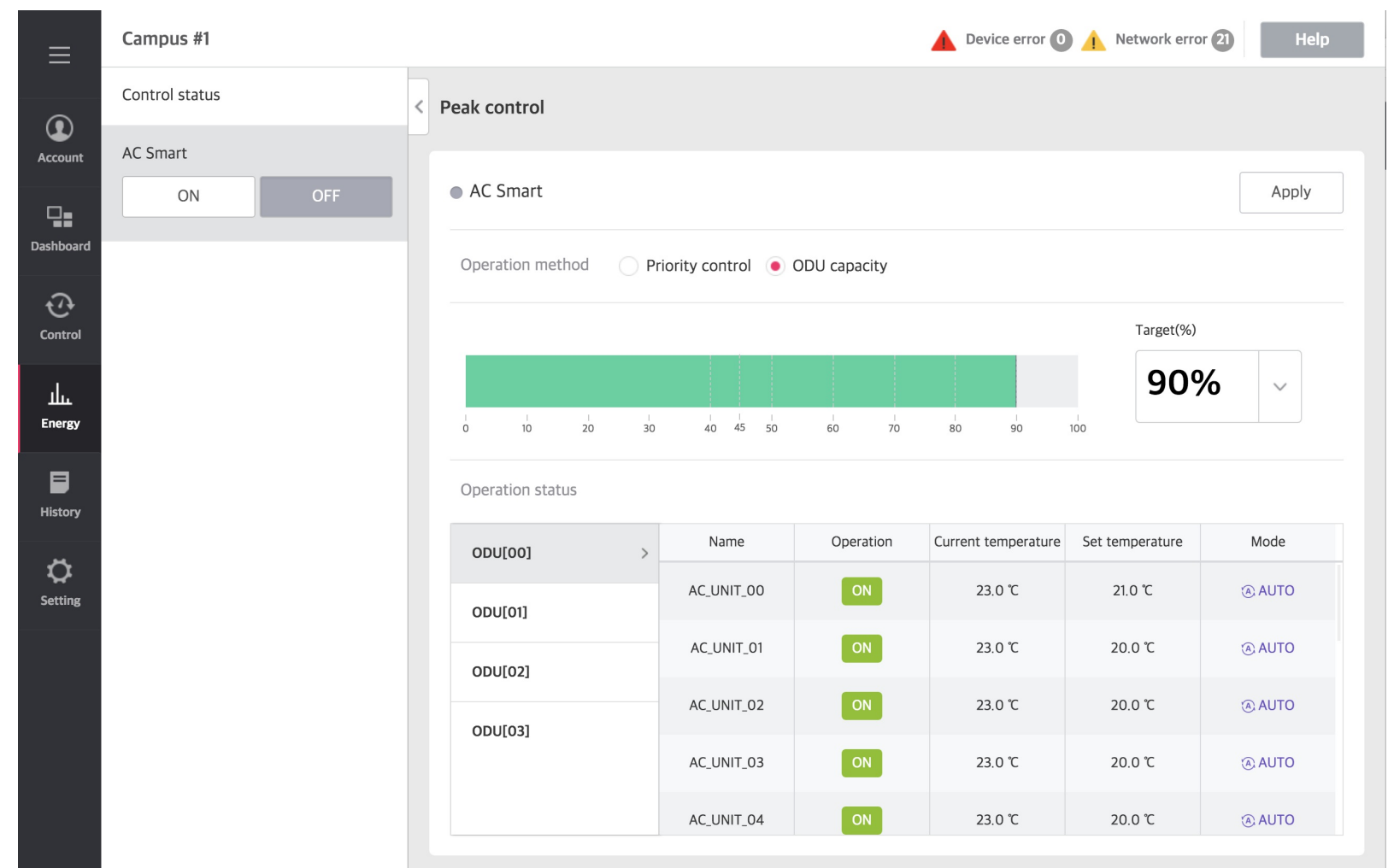
Category	Description
Operation Method	<ul style="list-style-type: none"><li>Outdoor unit capacity control: Target operation ratio is applied in the units of outdoor unit to control outdoor unit capacity operation ratio</li><li>Priority control: Controls according to the priority of ACP lower level gropus</li></ul>
Operation ratio bar	<ul style="list-style-type: none"><li>Indoor unit's target operation ratio is displayed as bar graph</li><li>You can drag the bar of the graph to set the target operation ratio</li></ul>
Current(%)	Among all of the selected ACP indoor units, it marks the % reached by the device currently in operation
Target(%)	Press <b>[▲]/[▼]</b> button to set the target operation ratio
Shift time(min.)	<ul style="list-style-type: none"><li>Press <b>[▲]/[▼]</b> button to set the cycle of forced operation stop in min. unit</li><li>You can set to 5 ~ 15 min. range in the units of 1 min.</li></ul>
Operation status	It displays device name/whether operating/current temperature/set temperature/mode information

4. To apply the control setting, click **[Apply]** button.
- The set control status is saved.
5. To start the corresponding group with the set status, click the group list's **[ON]** button. To stop the corresponding group's operation, click the group list's **[OFF]** button.

Demand control

You can observe the power usage change trend and limit the power usage from exceeding preset contract power usage amount. When it is set to demand control, when it is expected to exceed the contract power usage amount, it stops from the most unnecessary device and the power usage is distributed, so you can save the power usage amount.

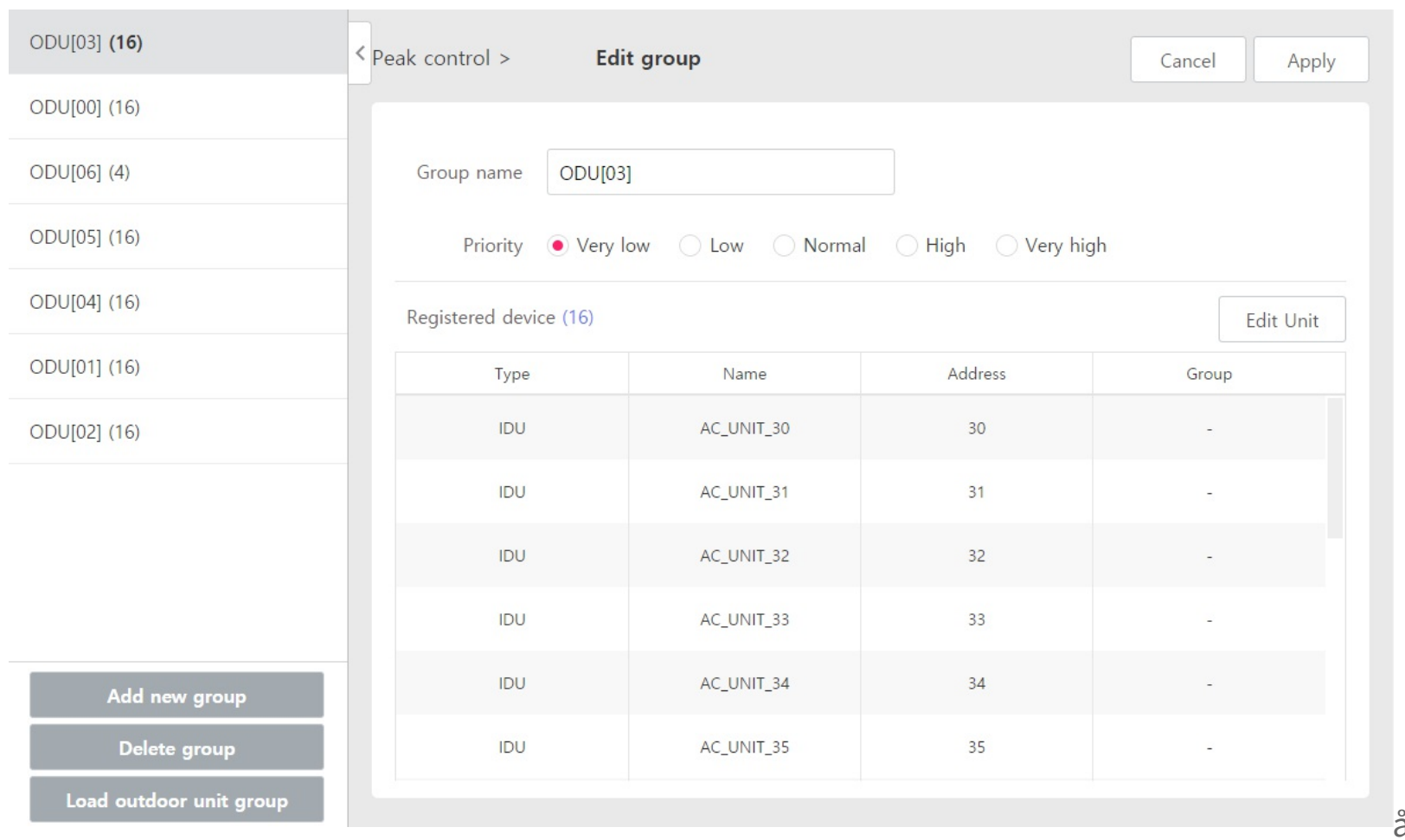
- In demand control menu, you can check demand control status or edit group. But, you cannot set target operation ratio, operation switching time, and operation control.



Add/edit peak group

You can add and edit peak control group.

1. In the left menu tab, click **[Energy] > [Peak demand control]** menu.
  - Peak demand control screen is displayed.
2. Click **[Edit Group]** button.
  - Edit group screen is displayed.



Category	Description
Group name	Input the name of the group to add
Priority	Select the desired priority among very low/low/normal/high/very high
<b>[Edit Unit]</b>	Open device edit window (add or delete device list)
Registered device	It displays the device list registered in the group
<b>[Add New Group]</b>	Add group for peak control
<b>[Delete Group]</b>	Delete the selected peak group
<b>[Load outdoor unit group]</b>	Applied in the units of outdoor unit registerd in ACP

3. Input the name of the corresponding group in the group name input field.
4. Select the desired priority.
5. To register the device, click **[Edit Unit]** button.
  - Edit Unit popup window appears.

6. In the unregistered device list, click the checkbox of the device to register and click [◀] button.
- For peak control, only indoor units can be registered.
  - To register several devices at once, click the check boxes of the devices to register and click [◀] button.
  - The selected devices are added to the registered device list.

Edit Unit

Registered device (13)

<input type="checkbox"/>	Name	Group
<input type="checkbox"/>	AC_UNIT_03	New group 1
<input type="checkbox"/>	AC_UNIT_04	New group 1
<input type="checkbox"/>	AC_UNIT_05	New group 1
<input type="checkbox"/>	AC_UNIT_06	New group 1
<input type="checkbox"/>	AC_UNIT_07	New group 1

Unregistered device

☐ ACP

☐ ODU[00]

◀

▶

Cancel

Apply

7. To apply in Edit Unit popup window, click [Apply] button.
8. To save the set contents, click Peak demand control screen's [Apply] button.

## Operation History

You can view user/automatic control's operation history and the connected device's status change or error status.

1. In the left menu tab, click **[History]** > **[Operation History]** menu.

- Operation history screen is displayed

Account

Dashboard


Control


Energy

History

Setting

Campus #1

 Device error 0

 Network error 21

Help

Operation history

<

2018-02-01(Thursday) ▾

>

Today

Filter : All history ▾

No.	Occurred time	Name	Address	Device type	Main agent	History type	Detail contents	Group
1	2018-02-01 11:53	Campus #1	-	-	admin	Setting	System setting	-
2	2018-02-01 10:11	AC_UNIT_00	00	IDU	Schedule	Control	Mode: AUTO	New group 1
3	2018-02-01 10:11	AC_UNIT_03	03	IDU	Schedule	Control	Mode: AUTO	New group 1
4	2018-02-01 10:11	AC_UNIT_04	04	IDU	Schedule	Control	Mode: AUTO	New group 1
5	2018-02-01 10:11	AC_UNIT_05	05	IDU	Schedule	Control	Mode: AUTO	New group 1
6	2018-02-01 10:11	AC_UNIT_06	06	IDU	Schedule	Control	Operation: ON	New group 1

2. Set the period to view.

Category	Description
Viewing period	<ul style="list-style-type: none"><li>• Day: Views the history of the selected date</li><li>• Today: Views today's history</li></ul>

3. In filter category, select device or history type.

- You can click the checkbox to select multiple information.
- You can initialize the selected contents through **[Initialization]** button.

4. When device and history type selection is completed, click **[Apply]** button.

- The operation history of the set period is displayed.



## Energy Navigation History

You can view history of Energy Navigation alarm and control operation.

1. In the left menu tab, click **[History] > [Energy Navigation History]** menu.
- Energy navigation screen is displayed.

Energy navigation history

Number of events : 53

2016-12-16 ~ 2017-01-16 ▾

View

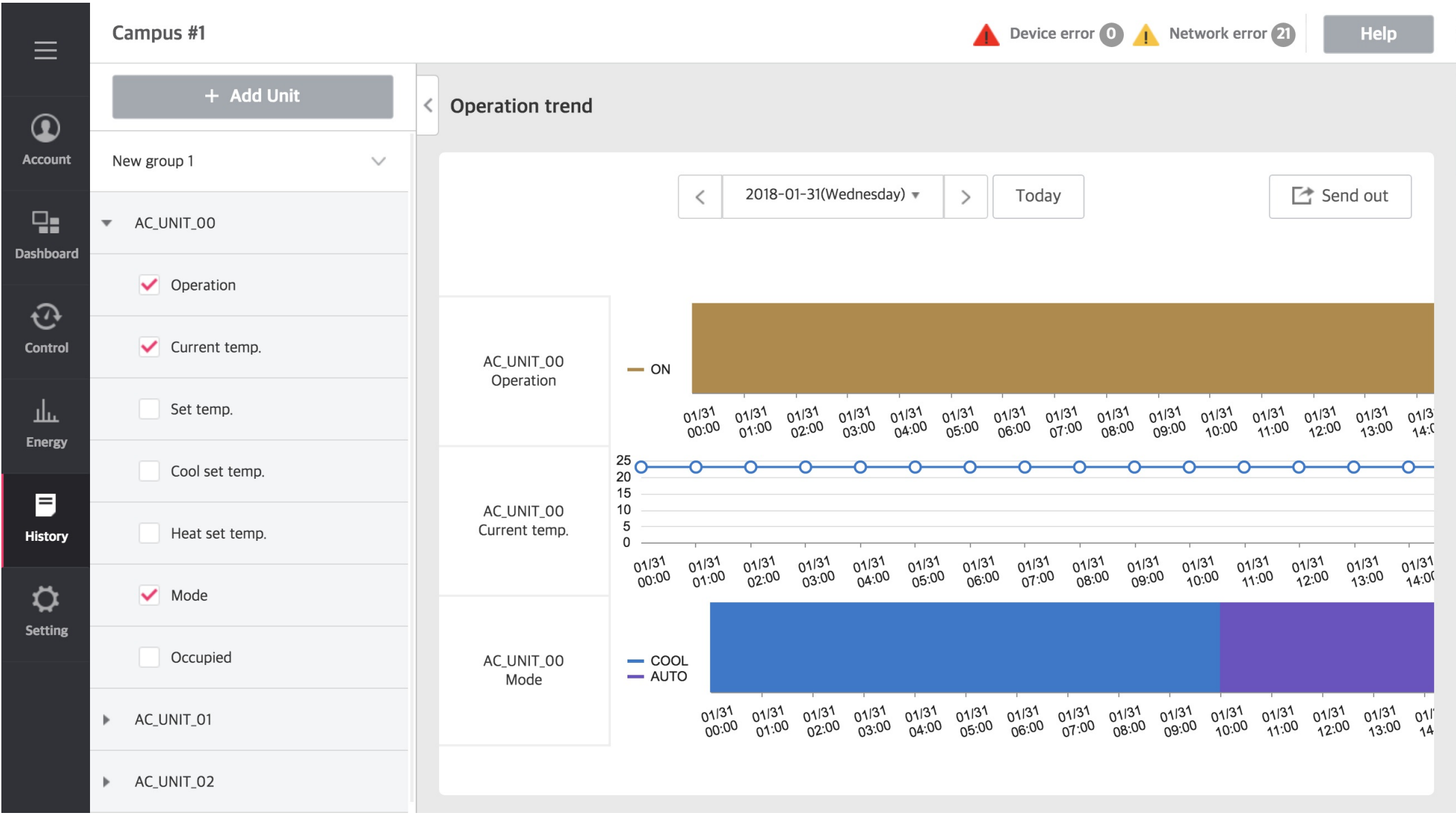
No.	Occurred time	Exceeding standard	Energy warning contents	Execution control option
1	2017-01-16 15:17:26	Prediction	Exceeded monthly target 70% amount	AUTO, ODU capacity, 90%
2	2017-01-16 15:17:21	Prediction	Exceeded monthly target 70% amount	AUTO, ODU capacity, Pause
3	2017-01-16 10:17:46	Prediction	Exceeded monthly target 70% amount	AUTO, ODU capacity, 90%
4	2017-01-16 10:00:39	Prediction	Exceeded monthly target 130% amount	AUTO, ODU capacity, 0%
5	2017-01-12 17:39:27	Prediction	Exceeded monthly target 70% amount	AUTO, ODU capacity, 90%
6	2017-01-11 04:07:15	Prediction	Exceeded monthly target 80% amount	AUTO, ODU capacity, 70%
7	2017-01-11 00:37:15	Prediction	Exceeded monthly target 90% amount	AUTO, ODU capacity, 50%
8	2017-01-10 09:37:13	Prediction	Exceeded monthly target 80% amount	AUTO, ODU capacity, 70%
9	2017-01-10 00:22:12	Prediction	Exceeded monthly target 90% amount	AUTO, ODU capacity, 50%
10	2017-01-09 15:12:11	Prediction	Exceeded monthly target 80% amount	AUTO, ODU capacity, 70%

2. Select device to view the history.
3. Set the start date and end date of the period to view history.
4. To view the set contents, click **[View]** button.
- Energy Navigation history of the set period is displayed.



## Operation Trend

Operation trend function is the function to provide the past status change of the selected device to help establishing reasonable site operation plan.



## Add Device

You can add unit to view operation trend.

- In the left menu tab, click **[History] > [Operation Trend]** menu.
  - Operation trend screen is displayed.
- Click **[+ Add Unit]** button.
  - Add device screen is displayed.
- In the unregistered device list, click the checkbox of the device to register and click **[◀]** button.
  - To register several devices at once, click the check boxes of the devices to register and click **[◀]** button.
  - The selected devices are added to the registered device list.
- To apply in Edit Unit popup window, click **[Apply]** button.

## View Information

You can view the selected device's operation trend information.

- In the left menu tab, click **[History] > [Operation Trend]** menu.
  - Operation trend screen is displayed.
- In the device list tab section, select the category of the device to view.
- Select the period to view operation trend.

<2017-01-01 ~ 2017-01-08▲>

Today

Day

Period

Start day

End day

«<2017 January>»

«<2017 January>»

MONTUEWEDTHUFRI SATSUN

MONTUEWEDTHUFRI SATSUN

26272829303101

26272829303101

02030405060708

02030405060708

09101112131415

09101112131415

16171819202122

16171819202122

23242526272829

23242526272829

30310102030405

30310102030405

Category	Description
Period	<div><div>[Day] button: Select the desired date in mini calendar and set as the base date</div><div>[Period] button: Set the start date and end date of the period to view<ul style="list-style-type: none"><li>The maximum period to view is 1 week.</li></ul></div><div>[Today] button: Set today's date as the base date</div></div>

## Send out information

You can send out the viewed device's operation trend information.

1.

In the left menu tab, click **[History] > [Operation Trend]** menu.

- Operation trend screen is displayed.

2.

In the left side category, select the category to send out and click **[Send Out]** button at the top right side.

(In AC Smart 5 Device, it is stored in USB.)
- ### Note
- Each device stores the following information.
- Indoor unit : operation, current temperature, set temperature, cooling set temperature, heating set temperature, operation mode, occupancy
  - ERV: operation, mode, current temperature (only for ERV DX), set temperature (only for ERV DX)
  - AHU: operation, mode, set temperature, air supply temperature, air supply humidity, ventilation temperature, ventilation humidity
  - Heating: Operation, Water inlet temperature, Water outlet temperature, Hot water temperature, Set temperature, Hot water set temp., Mode, Hot water operation
  - Chiller: Operation, Water inlet temperature, Water outlet temperature, Mode
  - DOKIT: Operation
  - DI: Operation
  - DO: Operation
  - Exp.I/O's Port : value
  - Air purifier : Operation, Odor, PM 10, PM 2.5, PM 1.0

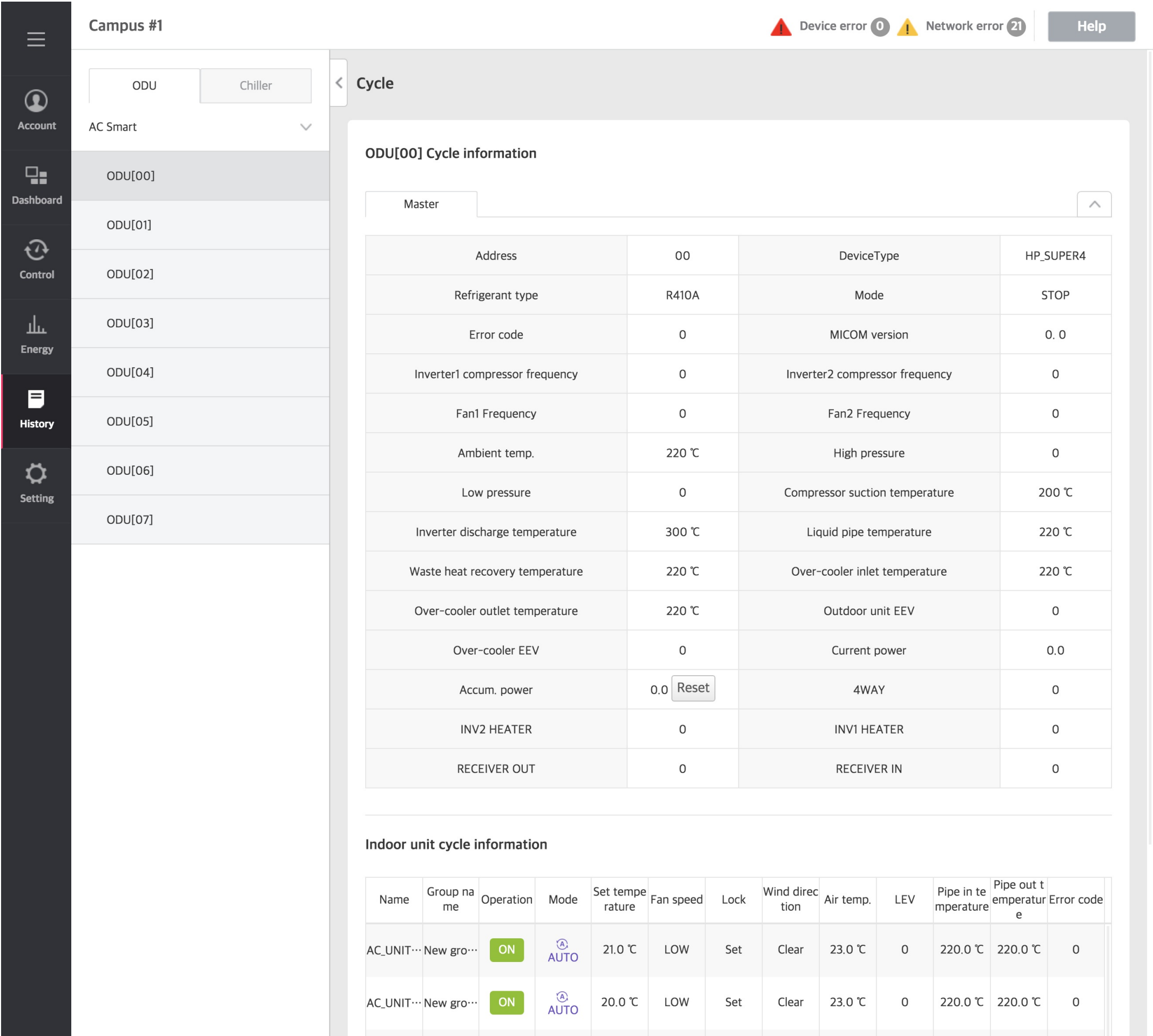
## Cycle

You can view indoor/outdoor unit and chiller's cycle information.

## Outdoor Unit

It provides the selected outdoor unit's cycle information data.

1. In the left menu tab, click **[History]** > **[Cycle]** menu.
- Cycle screen is displayed.



Category	Description
Outdoor unit cycle information	Master/slave outdoor unit information display
Indoor unit cycle information	Displays all indoor unit information connected to the outdoor unit

2. In the outdoor unit list, select the outdoor unit to check cycle information.
- The corresponding outdoor unit's cycle information is displayed.

### Note

You can view only when the outdoor unit providing cycle information is installed.

## Chiller

It provides the selected chiller's cycle information data.

1. In the left menu tab, click **[History]** > **[Cycle]** menu.
- Cycle screen is displayed.
2. In the chiller list, select the chiller to check cycle information.
- The corresponding chiller's cycle information is displayed.

ODU

Chiller

ACP

Scroll Chiller AIR

Scroll Chiller WTR

Turbo Chiller

Screw Chiller AIR

Screw Chiller WTR

ABS Chiller

ACP

Cycle

Screw Chiller AIR Cycle information

View all

Evaporator

Compressor

Condenser

Mode	❄️ COOL	Evaporator water out temperature	0 °C
Operation	ON	Motor current	0 A

Evaporator

Flow amount	OFF	Refrigerant temperature	0 °C
Water in temperature	0 °C	Pressure	0 kgf/cm²
Water out temperature	0 °C	-	-

Compressor

Operation	OFF	Outlet temperature	0 °C
Inlet temperature	0 °C	-	-

Condenser

Flow amount	OFF	Condenser refrigerant saturation t emperature	0 °C
Outdoor air temperature	0 °C	Pressure	0 Kgf/cm²

## Device setting

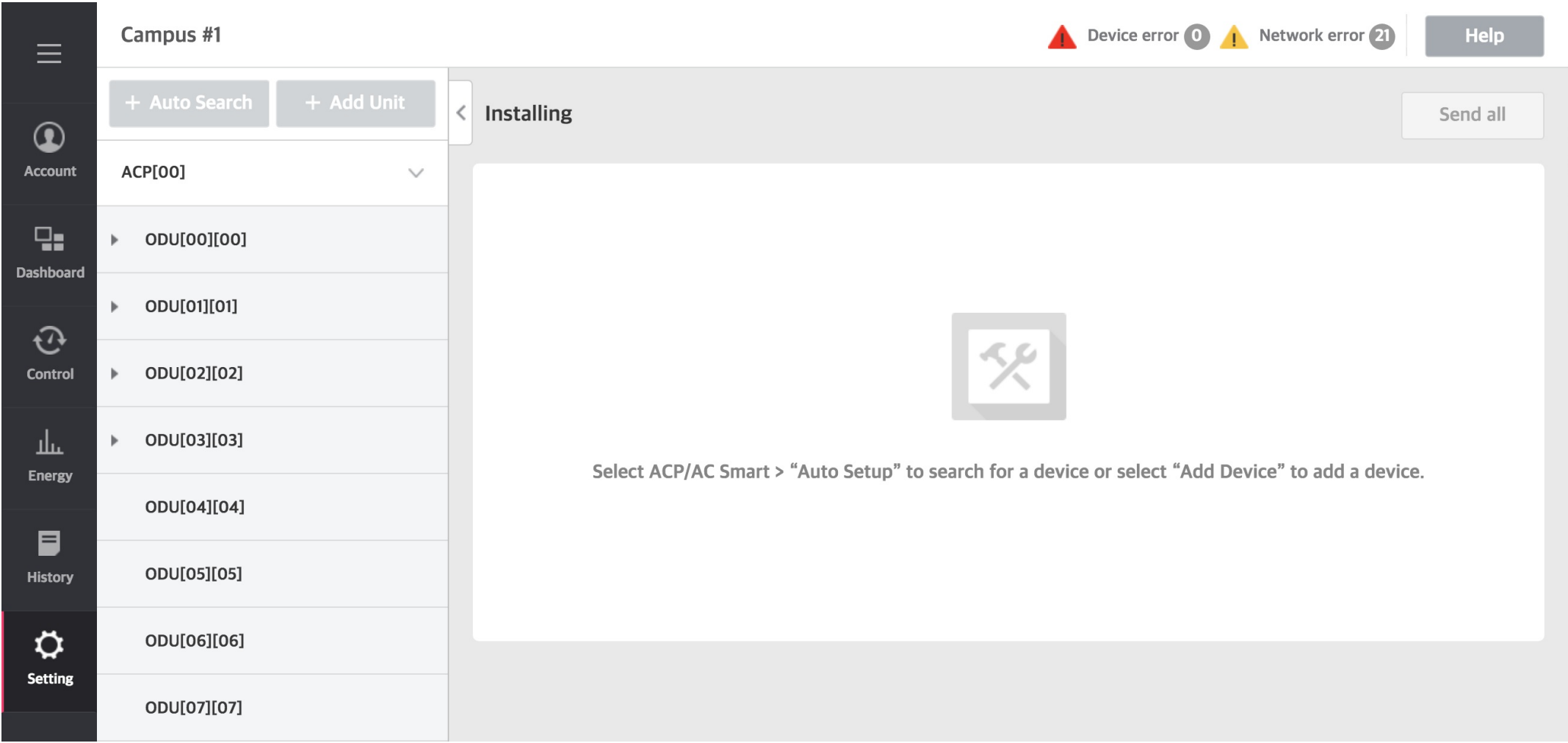
You can change ACP setting, add device, or change registered device's setting.

### Edit ACP

You can change ACP setting.

1.
- In the left menu tab, click **[Setting]** > **[Installing]** menu.

- Device setting screen is displayed.



2.
- In the device list, select ACP.

- ACP edit screen is displayed.
  - In device edit area, you can change ACP setting information.

Registration Status

ODU: 8EA  
IDU: 64EA  
HRV: 16EA  
AHU: 4EA  
AWHP: 32EA  
DI: 2EA  
DO: 2EA  
EXP. IO: 1EA

Energy Management

☒ Peak control

☐ Peak & energy navigation

☐ Demand control

\*Energy navigation will not work if demand contol set.

Operation time

Set

Clear

Electricity usage amount

Set

Clear

Gas usage amount

Set

Clear

Comm. type

LGAPI

LGAPI

LGAP setting

Master

2Set Auto Mode

Central Controller

CH5 Setting

LGAP\_AHU

CH6 Setting

MODBUS\_9600

Address Lock

Cancel

Category	Description
Energy Management	Select among peak control / peak control & energy navigation / demand control When demand control is set, Energy Navigation does not operate.
Operation Time	Operation time collection and view Set/Clear
Electricity usage amount	Electricity usage amount collection and view Set/Clear
Gas usage amount	Gas usage amount collection and view Set/Clear
Communication method	LGAPI / LGAPII setting
LGAP setting	Communication Master / Slave setting function, and it is activated only in AC Smart
2Set automatic mode	Press <b>▼</b> button to select main agent of 2Set automatic mode Central controller / indoor unit
Channel 5 setting	Press <b>▼</b> button to select communication type of the device to connect to CH5 port <ul style="list-style-type: none"><li>LGAP_AHU: for AHU (general, all fresh air, waste heat recovery) connection</li><li>MODBUS_9600, MODBUS_19200: for AHU (modular air conditioner, modular all fresh air, DOAS), Exp.I/O, and chiller connection</li></ul>
Channel 6 setting	Press <b>▼</b> button to select communication type of the device to connect to CH6 port <ul style="list-style-type: none"><li>MODBUS_9600, MODBUS_19200: for AHU (modular air conditioner, modular all fresh air, DOAS), Exp.I/O, and chiller connection</li></ul>
Address lock	When it is set, you cannot change address in indoor unit and ERV remote controller

Note

Some models do not support LGAPII.



- 3. When input is completed, click **[Apply]** button.
- 4. Click **[Send All]** button.

## Automatic setting

You can automatically search device connected to ACP and register.

- 1. In the left menu tab, click **[Setting] > [Installing]** menu.
  - Device setting screen is displayed.
- 2. In device list, select ACP, and click **[Auto Search]** button.
- 3. To overwrite ACP device setting on the existing setting, click **[Check]** button.
  - ACP device setting status is applied.
- 4. When automatic setting is finished, before device edit, click **[Send All]** button.

### Note

- **Automatic setting takes about 10 min.**
- **Some AHU (modular air conditioner, modular all fresh air, DOAS), chiller, and Exp.I/O do not support automatic setting function.**
- **Exp.I/O is activated when you check 'use' in device edit window after device registration.**

## Add Device

You can additionally register new device to the device list.

- 1. In the left menu tab, click **[Setting] > [Installing]** menu.
  - Device setting screen is displayed.
- 2. Click **[+ Add Unit]** button.
  - Add device screen is displayed.

CancelApply

Select device type to add to ACP

☒ ODU

☐ HRV

☐ AWHP

☐ AHU

☐ Chiller

☐ DOKIT

☐ DI

☐ DO

☐ EXP. I/O

☐ Air purifier

ACP name

ACP

Address

Name

Model

ODU

Capacity

3

Activate device control(Icon)

☐ Set☒ Clear

☐ Add all

EA

- 3. In the device list, select upper level group to add device.
  - When you select ACP in device list, you can add outdoor unit, ERV, Heating, Air purifier, AHU, Chiller, ON/OFF device, DI, DO, and Exp.I/O.
  - In the device list, when outdoor unit is selected, you can add only indoor units.
- 4. In Add device section, input the setting information of the device to add.
  - According to the selected device, the setting category according to the corresponding device is displayed differently. For the setting information of each device, refer to the next page.
- 5. To save the set contents, click **[Apply]** button.
- 6. To complete adding device, click **[Send All]** button.



## Device edit

In device list, you can edit registered device.

1. In the left menu tab, click **[Setting] > [Installing]** menu.
  - Device setting screen is displayed.
2. In device list, select device to edit.
3. Device setting screen is displayed.
4. Edit device setting information.
  - According to the selected device, the setting category according to the corresponding device is displayed differently. For the setting information of each device, refer to the next page.
5. To save the set contents, click **[Apply]** button.
6. To complete device edit, click **[Send All]** button.

## Delete Device

In the device list, you can delete registered device.

1. In the left menu tab, click **[Setting] > [Installing]** menu.
  - Device setting screen is displayed.
2. In the group list, select the group to delete and click **[Delete]** button.
3. When Delete group popup window appears, click **[Yes]** button.
  - In the group list, the selected category is deleted.
4. To complete device deleting, click **[Send All]** button.

## Setting information of each device

Setting information of each device is as follows.

- ➔ Outdoor Unit
- ➔ IDU
- ➔ ERV
- ➔ Heating
- ➔ AHU
- ➔ Chiller
- ➔ DOKIT
- ➔ DI/DO
- ➔ Exp.I/O
- ➔ Exp.I/O's lower level setting
- ➔ Air purifier

Outdoor Unit

☒ ODU

☐ AHU

☐ DI

☐ Air purifier

☐ HRV

☐ Chiller

☐ DO

☐ AWHP

☐ DOKIT

☐ EXP. I/O

ACP name

ACP

Address

Name

Model

ODU

Capacity

3

Activate device control(Icon)

☐ Set

☒ Clear

☐ Add all

EA

Category	Description
ACP name	The corresponding device's upper level ACP name
Address	Device address
Name	Device name to be displayed in the system <ul style="list-style-type: none"><li>For batch add, it is displayed as “Name_device address” form</li></ul>
Model	Product model name
Capacity	Product capacity
Activate device control(Icon)	Set whether to activate ODU device icon <ul style="list-style-type: none"><li>ODU device is displayed in Group setting, Device control, Device error and Operation history only when ODU activate device control(Icon) is set.</li></ul>
Add All	When checkboxes are selected, all selected devices are added

IDU

Cancel

Apply

ACP name

ACP

ODU name

ODU[00]

Address

Name

Model

IDU

Type

FCU

Capacity

3

☐ Add all

EA

Category	Description
ACP name	The corresponding device's upper level ACP name
ODU name	Name of the outdoor unit connected to the corresponding device
Address	Device address
Name	Device name to be displayed in the system <ul style="list-style-type: none"><li>For batch add, it is displayed as “Name_device address” form</li></ul>
Model	Product model name
Type	Indoor unit type selection
Capacity	Product capacity
Add All	When checkboxes are selected, all selected devices are added

ERV

☐ ODU

☐ AHU

☐ DI

☐ Air purifier

☒ HRV

☐ Chiller

☐ DO

☐ AWHP

☐ DOKIT

☐ EXP. I/O

ACP name

ACP

Type

 HRV

▼

Address

Name

Model

VENT

Capacity

3

☐ Add all

EA

Category	Description
ACP name	The corresponding device's upper level ACP name
Type	ERV type selection
Address	Device address
Name	Device name to be displayed in the system <ul style="list-style-type: none"><li>For batch add, it is displayed as “Name_device address” form</li></ul>
Model	Product model name
Capacity	Product capacity
Add All	When checkboxes are selected, all selected devices are added

Heating

☐ ODU

☐ AHU

☐ DI

☐ Air purifier

☐ HRV

☐ Chiller

☐ D0

☒ AWHP

☐ DOKIT

☐ EXP. I/O

ACP name

ACP

Address

Name

Model

AWHP

Capacity

3

Control method

☒ Hot water control

☐ Water in/out control

☐ All

Current Temp 1

☒ Water out

☐ Water in

☐ Indoor

☐ Hot water

☐ Do not use

Current Temp 2

☐ Water out

☒ Water in

☐ Indoor

☐ Hot water

☐ Do not use

Current Temp 3

☐ Water out

☐ Water in

☐ Indoor

☐ Hot water

☒ Do not use

Set temperature

☒ Water in/out

☐ Indoor

☐ Add all

EA

Category	Description
ACP name	The corresponding device's upper level ACP name
Address	Device address
Name	Device name to be displayed in the system <ul style="list-style-type: none"><li>For batch add, it is displayed as “Name_device address” form</li></ul>
Model	Product model name
Capacity	Product capacity
Control method	Select control method
Current Temp 1	Type of the current temperature to be displayed first
Current Temp 2	Type of the current temperature to be displayed second
Current Temp 3	Type of the current temperature to be displayed third
Set temperature	Type of the set temperature to control
Add All	When checkboxes are selected, all selected devices are added

AHU

CancelApply

Select device type to add to ACP

☐ ODU

☐ HRV

☐ AWHP

☒ AHU

☐ Chiller

☐ DOKIT

☐ DI

☐ DO

☐ EXP. I/O

☐ Air purifier

ACP name

ACP

Address

Name

Model

AHU

AHU Type

☒ Normal

☐ All outside air device

☐ Multi-fan general

☐ Multi-fan all outside air unit

☐ DOAS(AR-DE)

☐ DOAS(AR-DR)

☐ DOAS(AR-ND)

Additional function

☒ None

☐ Automatic ventilation

☐ Humidify

☐ Automatic ventilation, humidification

Room Temp

☐ Air supply standard

☒ Ventilation standard

☐ Add all

EA

Category	Description
ACP name	The corresponding device's upper level ACP name
Address	Device address
Name	Device name to be displayed in the system <ul style="list-style-type: none"><li>For batch add, it is displayed as “Name_device address” form</li></ul>
Model	Product model name
AHU type	Select AHU type
Additional function	Select function to add
Room Temp	Between air supply or ventilation, selecte the desired indoor temperature setting standard
Add All	When checkboxes are selected, all selected devices are added

Chiller

☐ ODU

☐ AHU

☐ DI

☐ Air purifier

☐ HRV

☒ Chiller

☐ DO

☐ AWHP

☐ DOKIT

☐ EXP. I/O

ACP name

ACP

Address

Name

Type

 Scroll Chiller (Air Cooling)

▼

☐ Add all

EA

Category	Description
ACP name	The corresponding device's upper level ACP name
Address	Device address
Name	Device name to be displayed in the system <ul style="list-style-type: none"><li>For batch add, it is displayed as “Name_device address” form</li></ul>
Type	Select chiller type
Add All	When checkboxes are selected, all selected devices are added



DOKIT

☐ ODU

☐ AHU

☐ DI

☐ Air purifier

☐ HRV

☐ Chiller

☐ DO

☐ AWHP

☒ DOKIT

☐ EXP. I/O

ACP name

ACP

Address

Name

☐ Add all

EA

Category	Description
ACP name	The corresponding device's upper level ACP name
Address	Device address
Name	Device name to be displayed in the system <ul style="list-style-type: none"><li>For batch add, it is displayed as “Name_device address” form</li></ul>
Add All	When checkboxes are selected, all selected devices are added

DI/DO

☐ ODU

☐ AHU

☒ DI

☐ Air purifier

☐ HRV

☐ Chiller

☐ DO

☐ AWHP

☐ DOKIT

☐ EXP. I/O

ACP name

ACP

Address

Name

☐ Add all

EA

Category	Description
ACP name	The corresponding device's upper level ACP name
Address	Device address
Name	Device name to be displayed in the system <ul style="list-style-type: none"><li>For batch add, it is displayed as “Name_device address” form</li></ul>
Add All	When checkboxes are selected, all selected devices are added

Exp.I/O

☐ ODU

☐ AHU

☐ DI

☐ Air purifier

☐ HRV

☐ Chiller

☐ DO

☐ AWHP

☐ DOKIT

☒ EXP. I/O

ACP name

ACP

Type

ACS I/O(14)

▼

Address

※ For detailed address range for each type, refer to [Usage (PC)] > [Device Setting] > [EXP.IO] page in the Help (User Manual).

Name

☐ Add all

EA

Category	Description
ACP name	The corresponding device's upper level ACP name
Type	Select DeviceType
Address	Device address <ul style="list-style-type: none"><li>Address Range of ACS I/O : 01 ~ F7</li><li>Address Range of ACU UIO : 60 ~ 67</li><li>Address Range of ACU UI : 70 ~ 77</li><li>Address Range of ACU UO : 80 ~ 87</li></ul>
Name	Device name to be displayed in the system <ul style="list-style-type: none"><li>For batch add, it is displayed as “Name_device address” form</li></ul>
Add All	When checkboxes are selected, all selected devices are added

Exp.I/O's lower level setting

AO[01/00]

DeleteApply

Whether used

☒ Use

☐ Do not use

ACP name

ACP

Device type

AO


Address

10

Name

AO[01/00]

Icon

 Basic icon

▼

I/O Type

☒ VOL

Signal boundary

0~10V

▼

Usage

☒ Temperature

☐ Humidity

☐ Opening

☐ Water level

☐ Operation ratio

☐ Concentration

☐ Pressure

Unit symbol

☒ ℃

☐ ℉

Display boundary

Min

0

Max

100

Correction value

0

Category	Description
Whether used	Select whether to use the device
ACP name	The corresponding device's upper level ACP name
Device type	Device type
Address	Device address
Name	Device name
Icon	Select icon type
I/O type	Select I/O type <ul style="list-style-type: none"><li>AO: VOL</li><li>UI: BI, VOL, CUR, PT1000, NTC10K, NI1000 (But, when EXP/IO type is ACU UIO, ACU UI, it can be selected from BI or VOL.)</li><li>DO: BI</li><li>DI: BI</li></ul>
Signal boundary	Select signal boundary
Usage	Select usage of the device (Usage selection is different according to I/O type) <ul style="list-style-type: none"><li>Status information: On/Off, short/Open, Warning/Normal, Close/Open, On/Off, Occupied/Unoccupied, 1/0</li><li>Value information: Temperature, Humidity, Opening, Water level, Operation ratio, Concentration, Pressure</li></ul>
Unit Symbol	Select unit symbol Flexibly changed according to the usage selection
Display boundary	Max./Min. value input
Correction value	Correction value input

Air purifier

CancelApply

Select device type to add to ACP

☐ ODU

☐ HRV

☐ AWHP

☐ AHU

☐ Chiller

☐ DOKIT

☐ DI

☐ DO

☐ EXP. I/O

☒ Air purifier

ACP name

ACP

Address

Name

Model

AIRCARE

Coverage

3

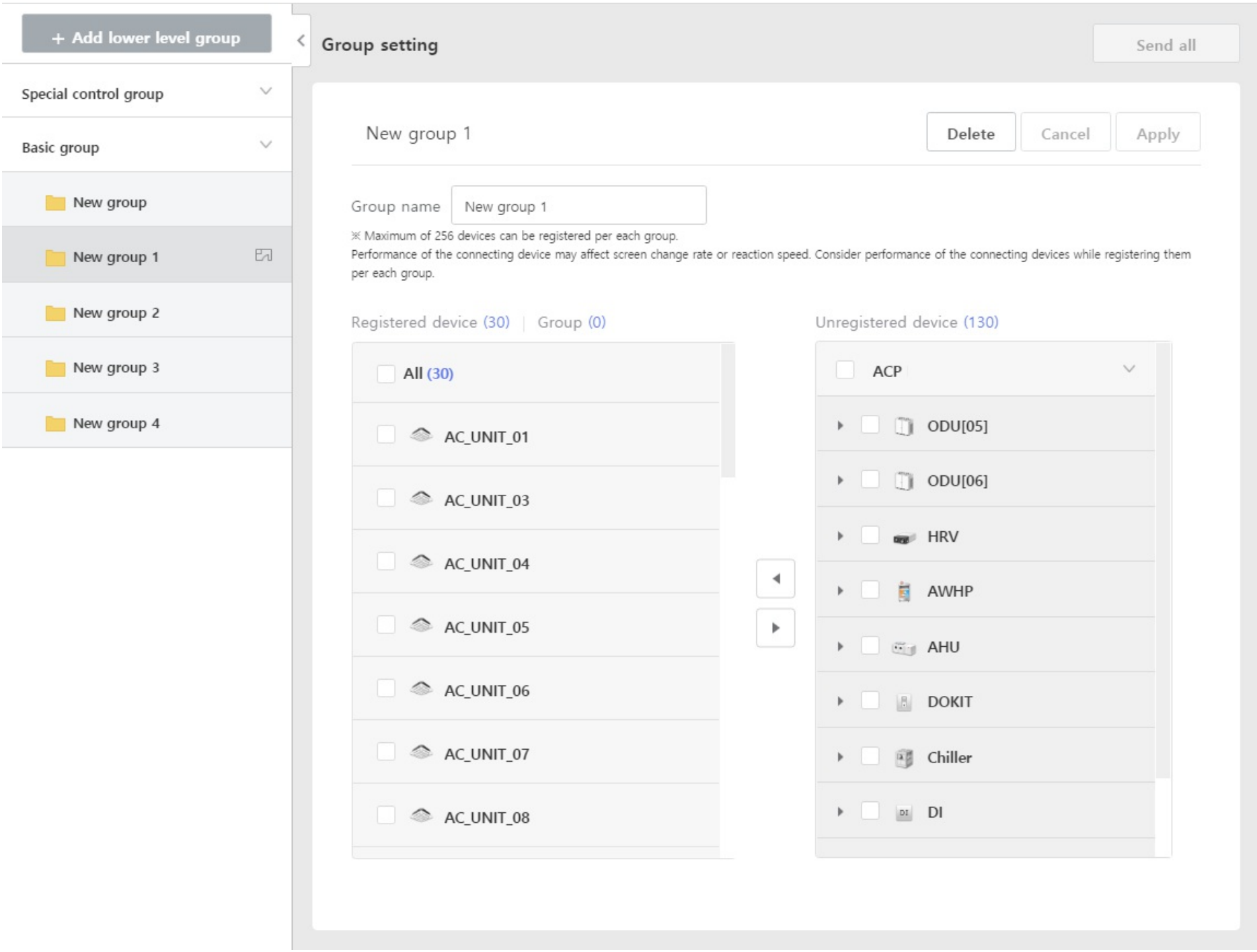
☐ Add all

EA

Category	Description
ACP name	The corresponding device's upper level ACP name
Address	Device address
Name	Device name to be displayed in the system <ul style="list-style-type: none"><li>For batch add, it is displayed as “Name_device address” form</li></ul>
Model	Product model name
Coverage	Purification Area of the Product
Add All	When checkboxes are selected, all selected devices are added

## Group Setting

You can add/delete management group created according to user's usage.



## Add Group

You can add new group.

- In the left menu tab, click **[Setting] > [Group Setting]** menu.
  - Group setting screen is displayed.
- Select group and click **[+ Add lower level group]** button.
  - New group is created.
- Input group name in the group name input field.
- To register new device in the device list, in the unregistered device list, click the checkbox of the device to register and click **[◀]** button.
- To save the set contents, click **[Apply]** button.
- To complete group addition, click **[Send All]** button.

## Group edit

You can edit group.

- In the left menu tab, click **[Setting] > [Group Setting]** menu.
  - Group setting screen is displayed.
- In group list, select group to edit.
- Edit group information.
- To save the set contents, click **[Apply]** button.
- To complete group addition, click **[Send All]** button.

## Delete group

In the group list, you can select and delete the desired group.

- In the left menu tab, click **[Setting] > [Group Setting]** menu.
  - Group setting screen is displayed.
  - In the group list, select the group to delete and click **[Delete]** button.

2.
- When Delete group popup window appears, click **[Yes]** button.
- The selected group is deleted.
3.
- To complete group deletion, click **[Send All]** button.



## System Setting

You can change the system setting.

1. In the left menu tab, click **[Setting] > [System Setting]** menu.
  - System setting screen is displayed.
2. Set the system.

System setting

Cancel

Apply

Title

ACP 5

Language

English

▼

Day format

YYYY-MM-DD

▼

Time format

24 Time

▼

Temperature

Celsius 1°C

▼

Set the lowest temperature for COOL/HEAT

18 °C

▼

Applies only when the mode is COOL/HEAT.

Use energy navigation

☐ Set

☒ Clear

Power usage statistics base date

1Day

▼

Category	Description
Title	Input the desired name in the input field
Language	Press <b>▼</b> button to select the desired language (한국어/ English/ Español/ Português/ Italiano/ Deutsch/ Türkçe/ Polski/ русский/ Français/ 中文/ Čeština)
Day format	You can set the Day format. (YYYY-MM-DD / MM-DD-YYYY / DD-MM-YYYY)
Time format	You can set the Time format. (12 / 24)
Temperature	Press <b>▼</b> button to select the desired control temperature unit (Celsius 0.5°C / Celsius 1°C / Fahrenheit 1°F)
Set the lowest temperature for COOL/HEAT	Press <b>▼</b> button to select the desired cooling/heating lower limit temperature (16°C / 18°C)
Use Energy Navigation	Select wehther to use Energy Navigation
Energy navigation base date	Press <b>▼</b> button to select the desired date <ul style="list-style-type: none"><li>Energy navigation monthly power usage amount base date setting</li><li>Calculate the days to the one day before in the next month from the set date</li></ul>

Use 'Drawing'

Set

Clear

Use CO<sub>2</sub> concentration widget

Set

Clear

Use comfort widget

Set

Clear

Use finedust widget

Set

Clear

Enable Automatic Switching and Temperature Limit

Set

Clear

Apply damper opening formula

Set

Clear

Comfort – Season setting

Summer

Winter

Category	Description
Use 'Drawing'	Select wehther to use 'Drawing'
Use CO <sub>2</sub> concentration widget	When it is set, dash board CO <sub>2</sub> concentration widget is activated
Use pleasantness widget	When it is set, dash board pleasantness widget is activated
Use fine dust widget	When it is set, dash board fine dust widget is activated
Enable Automatic Switching and Temperature Limit	Enables the automatic central control switching and the temperature limit function.
Apply damper opening formula	<ul style="list-style-type: none"><li>Select whether to apply damper opening formula</li><li>When damper opening is set, it operates at OA=EA and OA+MIX=90</li></ul>
Pleasantness season setting	Winter/summer setting for pleasantness calculation When summer is set, pleasantness range is formed in lower temperature

Energy target management

Set

Schedule exception date setting

Set

To register schedule exception device

Set

Back up Setting Data

Backup

Apply backup file

System restart

Restart

Send out installation status

Send out

Category	Description
Energy target amount setting	Target energy amount setting for energy(Dashboard) management
Schedule exception date setting	Set exception date for schedule setting
To register schedule exception device	Set the device to except in schedule setting in advance
Setting data backup	<ul style="list-style-type: none"><li>Backup: backup of data to PC (In AC Smart 5 Device, it is stored in USB.)</li><li>Backup file application: overwrite data with backup file stored in PC</li></ul>
System restart	Restart the entire system
Send out installation status	Save installation status to PC (In AC Smart 5 Device, it is stored in USB.)

System time2018-06-18 11:50

Date setting

2018-06-18 ▾

Time setting

11

▲

▼

50

▲

▼

If you change the system date or time, the system reboots and you need to log on again.

Daylight Saving Time

☐ Set

☒ Clear

Start date

1Month

▼

1st

▼

Mon.Days

▼

1:00

▼

End date

1Month

▼

1st

▼

Mon.Days

▼

1:00

▼

Version

Ver.1.40.0  
Copyright © 2015 - 2018 LG Electronics Inc. All right reserved.

Category	Description
System time	Check system time
Date setting	You can set the date.
Time setting	You can set the time.
Daylight saving time setting	Daylight saving time (summer time) start and end date Set/Clear
Version	You can check the version.

3. When setting is completed, click **[Apply]** button.

- ➔ Setting the exception date
- ➔ Delete exception date
- ➔ Register schedule exception device

**Note**

- **When system time or date is changed, it can be logged out, and you need to log in again.**

## Network Setting

You can set or change network information.

1. In the left menu tab, click **[Setting] > [Network Setting]** menu.
  - Network setting screen is displayed.
2. Set the network information.

Network setting

CancelApply

IPv4 enable

☒ Setting☐ Cancel

IPv4 address setting

☒ AUTO☐ Manual

If device set as DHCP, it is possible to change IP address.

IPv4 information

IP address

10.175.191.199

Subnet mask

255.255.255.0

Basic gateway

10.175.191.254

IPv6 enable

☒ Setting☐ Cancel

IPv6 address setting

☐ Auto Configuration☐ DHCP☒ Manual

If device set as DHCP, it is possible to change IP address.

IPv6 information

IPv6 address

fe80:dc81:e7ff:fe96:cc5a/64

IP address

subnet prefix length

DNS setting

☒ AUTO☐ Manual

Main DNS

165.186.85.11

Sub DNS

165.243.137.34

MAC address

MAC address

de:81:e7:96:cc:5a

Web Port Set

Port number

443

※ Unusable port is a port defined as Public Port, or a port used by AC Smart 5.

Category	Description
IPv4 enable	IPv4 usage address <b>Set/Clear</b>
IPv4 address setting	Check IPv4 address setting <b>AUTO(DHCP)/Manual</b> If you use AUTO(DHCP), the IP address may be changed. So we recommend using the manual IP address configuration.
IPv4 information	Check IPv4 address
IPv6 enable	IPv6 usage address <b>Set/Clear</b>
IPv6 address setting	Check IPv6 address setting <b>Auto Configuration/DHCP/Manual</b> If you use DHCP, the IP address may be changed. So we recommend using the automatic or manual IP address configuration.
IPv6 information	Check IPv6 address
DNS setting	<b>[AUTO]</b> : Automatically sets main DNS and secondary DNS <b>[Manual]</b> : User sets main DNS and secondary DNS
MAC address	Check MAC address
Web Port setting	Port setting (range: 2~65535)

### Note

Network setting can be set in Device, and only some settings may be changed in Web.

3. When setting is completed, click **[Apply]** button.

## Error Notice Setting

You can set or change error notice.

1. In the left menu tab, click **[Setting] > [Error Notice Setting]** menu.
  - Error notice setting screen is displayed.
2. Set the error notice.

Error notice setting

Cancel

Apply

e-mail usage setting

☐ Set

☒ Clear

e-mail title

Receiving e-mail address

Add address

Sending cycle when error occurs

60Min.

▼

Repeat sending when error occurs

☐ Once

☒ Repeat

Automatic daily error-notification mail

☐ Set

☒ Clear

Category	Description
e-mail usage setting	Selection of set/clear of whether to send the error occurred device's address and error No. through e-mail
e-mail title	e-mail title setting
Receiving e-mail address	Input receiving e-mail address
Sending cycle when error occurs	Set transmission cycle in case of error (10/20/30/40/50/60 min.)
Repeat sending when error occurs	Once: Sending once same error alarm when error occur. Repeat: Sending same error alarm repeatedly every cycle.
Automatic daily error-notification mail	Set to send mail at 0:00 every day even if error does not occur

3. To save the set contents, click **[Apply]** button.

### Note

Before e-mail usage setting, check the following categories.

- [Setting] > [Network setting]'s DNS server shall be set.**
- [Setting] > [Administrator setting]'s mail server and sending e-mail shall be set.**



## Administrator Setting

You can set or change the user management environment when the user logs in with manager authority.

1. In the left menu tab, click **[Setting] > [Administrator Setting]** menu.
- Administrator setting screen is displayed. You can change the manager information or set the system usage environment.

Administrator setting

Cancel

Apply

Set password

Current password

New password

Verify new password

Set receiving e-mail

E-mail

※When you add 'new InterLocking', if you select Send e-mail with output condition You can receive InterLocking execution information to the set manager e-mail.

Set mail server

Connection test

SMTP Server

Port

587

Scope 2~65535

※ While editing the email server settings or the incoming/outgoing email settings, you cannot perform [Test Connection]. Click the [Apply] button to save the changes, and then try it again.

※ To perform [Test Connection] in the email server settings or to receive/send emails through the central controller, you first need to set the [Network setting] > [DNS setting].

Set sending e-mail

ID

Password

※ You need to save the mail server (SMTP server) ID and password that connection test succeeded to send e-mail through mail server.

Set menu

☒ Dash board

☒ Control

☒ Device control

☒ Schedule control

☒ InterLocking

☒ Time limit control

☒ Energy

☒ Energy Usage

☒ Energy Navigation

☒ Peak demand control

☒ History

☒ Operation history

☒ Energy navigation history

☒ Operation trend

☒ Cycle

☒ Set

☒ Installing☒ Group setting

☒ System setting

☒ Network setting

☒ Error notice setting

☒ Administrator setting

☒ Additional user setting

☒ Screen Setting

☒ Advance Setting

☒ TMS Setting

☒ BACnet/Modbus Setting

Category	Description
Set password	Set the password to use during login <ul style="list-style-type: none"><li>Current password: Input password used currently for login</li><li>New password: Input new password</li><li>New password verification: Input the same new password one more time</li></ul>
Set receiving e-mail	Input e-mail address
Set Mail server	Manager mail server setting <ul style="list-style-type: none"><li>SMTP server: Input SMTP server address</li><li>Port: Input port No.</li><li>Connection test: Input mail account test (network shall be connected)</li></ul>
Set sending e-mail	<ul style="list-style-type: none"><li>ID: Input user ID</li><li>Password: Input user password</li></ul>
Set Menu	Click checkbox to select the desired manager menu (you can select multiple) <ul style="list-style-type: none"><li>Dashboard</li><li>Control: device control, schedule control, InterLocking, Time limit control</li><li>Energy: Energy usage, Energy Navigation, Peak demand control</li><li>History: operation history, Energy Navigation history, operation trend, cycle</li><li>Setting: Installing, Group setting, System setting, Network setting, Error notice setting, Administrator setting, Additional user setting, Advance Setting, TMS Setting, BACnetModbus Setting</li></ul>

2. To save the set contents, click **[Apply]** button.



## Additional User Setting



You can manage the additional user list when you login with manager authority.

1. In the left menu tab, click **[Setting] > [Additional User Setting]** menu.
- Additional user setting screen is displayed. You can add user or edit or delete registered user information.

Additional user setting

General user list

Add user

ID	E-mail	Group authority	Edit	Delete
Tester	tester@lge.com	Basic group		

## Add User

You can add secondary manager and general user.

1. In the left menu tab, click **[Setting] > [Additional User Setting]** menu.
- Additinal user setting screen is displayed.
2. Click **[Add User]** button.
- Add user screen is displayed.
3. Set each category.

Add user

CancelApply

Info

User authority

☒ Secondary manager

☐ General user

(During the general user setting, only indoor unit easy controls are provided)

Set password

ID

New password

Verify new password

Group authorityMenu authority

☒ Control

☒ Device control

☒ Schedule control

☒ InterLocking

☒ Time limit control

☒ Energy

☒ Energy Usage

☒ History report

☒ Operation history

☒ Set

☒ Additional user setting

Category	Description
Info	<b>[User authority]</b> <ul style="list-style-type: none"><li>Secondary manager: Provides authority assigned menu</li><li>General user: Provides only indoor unit simple controls</li></ul>
Set password	<b>[ID]:</b> input ID to use <b>[password]:</b> input password to use

	<b>[Verify password]</b> : input password to use again
Group Authority	Assign additional user's group authority <ul style="list-style-type: none"><li>When group is selected, only the corresponding group can control</li></ul>
Menu Authority	ASsign menu authority used by additional user <ul style="list-style-type: none"><li>For general user, only <b>[Control]</b>-<b>[Device Control]</b>, <b>[Setting]</b>-<b>[Additional User Setting]</b> menu authorities are assigned</li></ul>

4. When setting is completed, click **[Apply]** button.

## Delete User

You can delete registered user.

- In the left menu tab, click **[Setting] > [Additional User Setting]** menu.
  - Additinal user setting screen is displayed.
- Click **[Delete]** button of the user to delete.
  - Delete user screen is displayed.
- Click **[Yes]** button

## Advance Setting

You can set functions required for device operation.

1.
- In the left side menu tab, click **[Setting]** > **[Advance Setting]** menu.
- Advance Setting screen is displayed.

Advance Setting

Cancel

Apply

Set connected device

Cycle monitor

SetClear

Cycle control

SetClear

Slave controller

SetClear

Slave controller lock

Set

Clear

Configuring DI1 Port Normal Status

OpenShort

Differential

0.5

▼

Outdoor Unit Oil-Return Operation

SetClear

Daily

1

▲

▼

o`clock

Category	Description
Set connected device	<div><ul style="list-style-type: none"><li>Outdoor unit cycle monitoring: set whether to use cycle information monitoring</li><li>Outdoor unit cycle control: set whether to run cycle control</li><li>Slave controller: set whether slave controller control is possible</li><li>Slave controller lock: set whether slave controller control is possible for indoor unit with all lock set (Use: Slave controller control is not possible)</li><li>Configuring DI1 Port Normal Status: Configures the DI1 port normal status.</li></ul></div>
Differential	Press <b>[▼]</b> button to set temperature difference for automatic switching operation
Outdoor Unit Oil-Return Operation	Set whether to run Outdoor Unit Oil-Return Operation Press <b>[▲]/[▼]</b> button to set Outdoor Unit Oil-Return Operation time

2.
- To save the set contents, click **[Apply]** button.

## TMS Setting

You can set remote service that can manage the system remotely.

1. In the left side menu tab, click **[Setting]** > **[TMS Setting]** menu.
- TMS Setting screen is displayed.

TMS Setting

Cancel

Apply

TMS configuration

Set

Clear

Information TMS service

TMS server address

tms2.lge.com

TMS server port

23

Update Cycle (Second)

10Seconds

▼

ODU Cycle monitoring boost

Set

Clear

ODU Cycle monitoring boost should be set after checking with a professional TMS engineer.

Site information

Site address

Site name

Site code

Request a site code

0000000000

Category	Description
TMS configuration	Set whether to use remote service
Information TMS service	<div><ul style="list-style-type: none"><li>Service server address: input remote service server address</li><li>Service server port: input remote service server port number</li><li>Update cycle (sec.):Press <b>[▼]</b> button to select remote service update cycle 10 / 30 / 60 / 90 / 120 seconds</li><li>ODU Cycle monitoring boost: Sets whether to ODU Cycle monitoring boost</li></ul></div>
Site information	<div><ul style="list-style-type: none"><li>Site address: remote site address input</li><li>Site name: input remote site name</li><li>Site code: Press <b>[Request a site code]</b> button to input site code</li></ul></div>

2. To save the set contents, click **[Apply]** button.

BACnet/Modbus Setting

Guide on BTL authentication

You need to set BACnet to Type C to make the devices operate using the functions authenticated by BTL.

BACnet Type A/B exists to maintain compatibility with existing products. If you set BACnet to Type A/B, the devices may use the functions not authenticated by BTL, making them to operate differently from the standard.

Operation method according to BACnet type

- Type A: It creates multiple devices, and the objects are included in the device of each equipment. Multiple devices respond using the same MAC address for their physical addresses.
- Type B: It creates multiple devices, and the objects are included in the device of each equipment. Devices respond with unique physical addresses.
- **Type C: It creates only one device, which includes all objects.**

※ **Caution: If you change the type, the device number may be changed, making it necessary to perform additional engineering with the BMS.**

You can change BACnet/Modbus Setting.

- In the left side menu tab, click **[Setting] > [BACnet/Modbus Setting]** menu.
  - BACnet/Modbus Setting screen is displayed.
- Set BACnet/Modbus information.

BACnet/Modbus Setting

Cancel

Apply

BACnet enable

☐

Set

☒

Clear

Temperature Unit Setting

☒

°C

☐

°F

Device ID Setting

9000

Network Number Setting

0

Register as Foreign Device

☐

Set

☒

Clear

IP

192.168.0.1

Port

47808

TTL

36000

Only Monitoring Setting

☐

Set

☒

Clear

BACnet Port Setting

47808

BACnet Type Setting

☐

A Type

☐

B Type

☒

C Type

Time sync setting

☒

Set

☐

Clear

Modbus TCP enable

☐

Set

☒

Clear

Vnet Number Setting

10

Category	Description
BACnet enable	BACnet enable <b>Set/Clear</b>

Temperature unit setting	Select temperature unit type (°C/°F)
Device ID setting	Device ID setting to designate Device Instance Number <ul style="list-style-type: none"><li>Air conditioner: Device ID</li><li>ERV: Device ID + 1</li><li>AHU: Device ID + 2</li><li>Outdoor unit cycle information: Device ID + 3</li><li>Heating: Device ID + 4</li><li>Normal : Device ID + 5</li></ul>
Network Number Setting	Network Number Setting
Register as Foreign Device	Foreign Device <b>Set/Clear</b>
Only Monitoring setting	Only Monitoring <b>Set/Clear</b>
BACnet Port setting	BACnet Port setting
BACnet Type setting	BACnet Type selection (A/B/C)
Time sync setting	Time sync setting <b>Set/Clear</b>
Modbus TCP enable	Modbus TCP enable <b>Set/Clear</b>
Vnet Number setting	Vnet Number setting to use Modbus TCP function Set Vnet Number value operates as Modbus TCP's Slave ID Address

3. When setting is completed, click **[Apply]** button.



Usage (Mobile, Tablet)

- ➔ LogIn / LogOut
- ➔ Dashboard
- ➔ Device Control
- ➔ Schedule Control



You can access to the product with IP address in internet address window to use various central control functions.

**Note**

- **Chrome browser is recommended for web control.**
- **For access to web, IP address needs to be set.**

**Login**

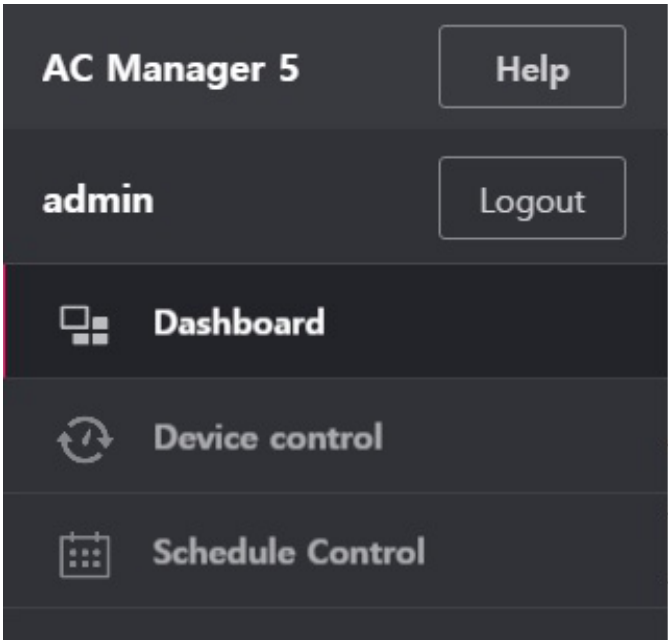
Login method is as follows.

1. Please input IP address of the product in the internet address window.
2. Input ID and password in the login window and click **[Login]** button.

**Logout**

Logout method is as follows.

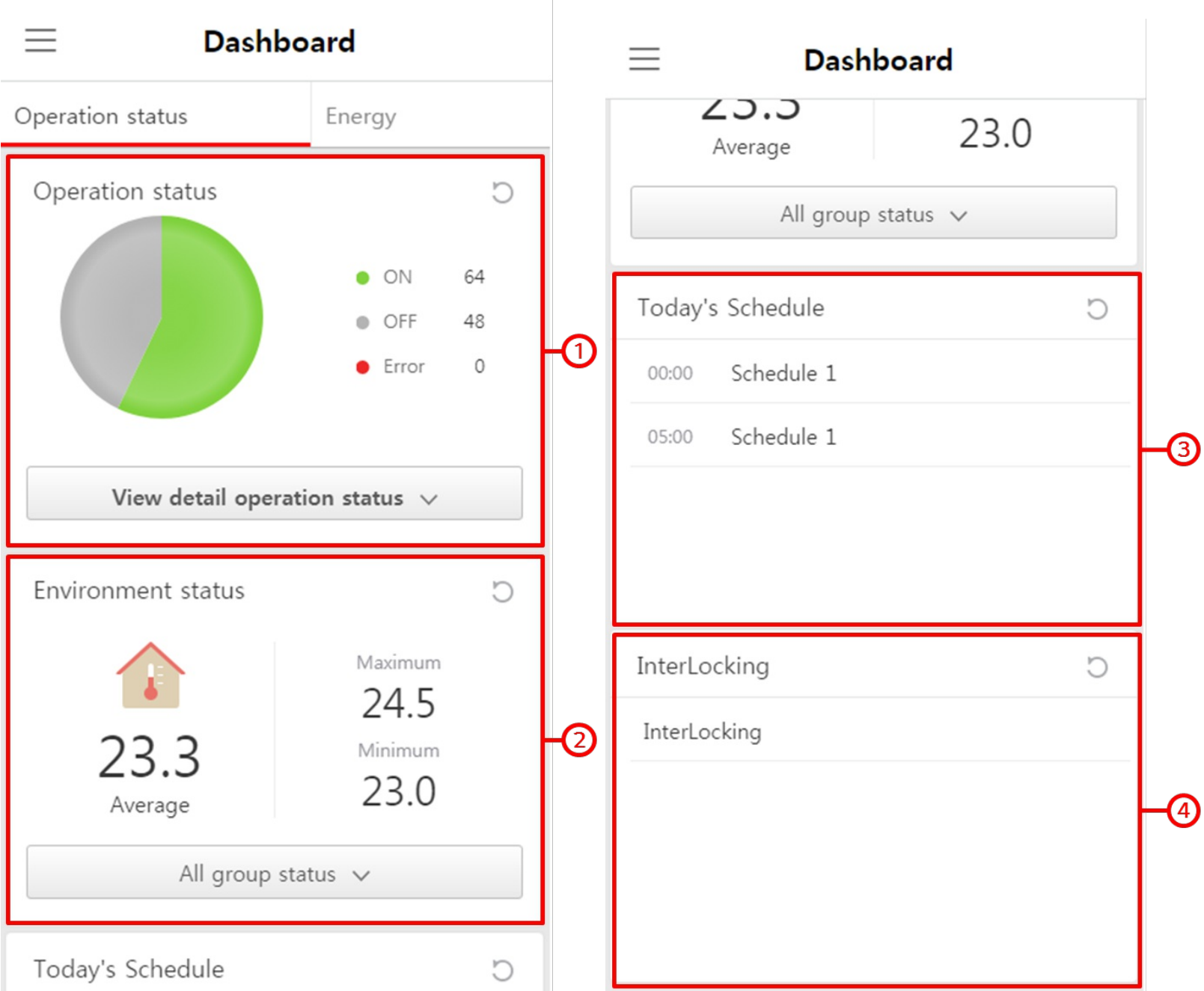
1. In the menu, click **[Logout]** button.



You can check the current operation status and energy usage trend of the equipment installed in the product.

Operation status

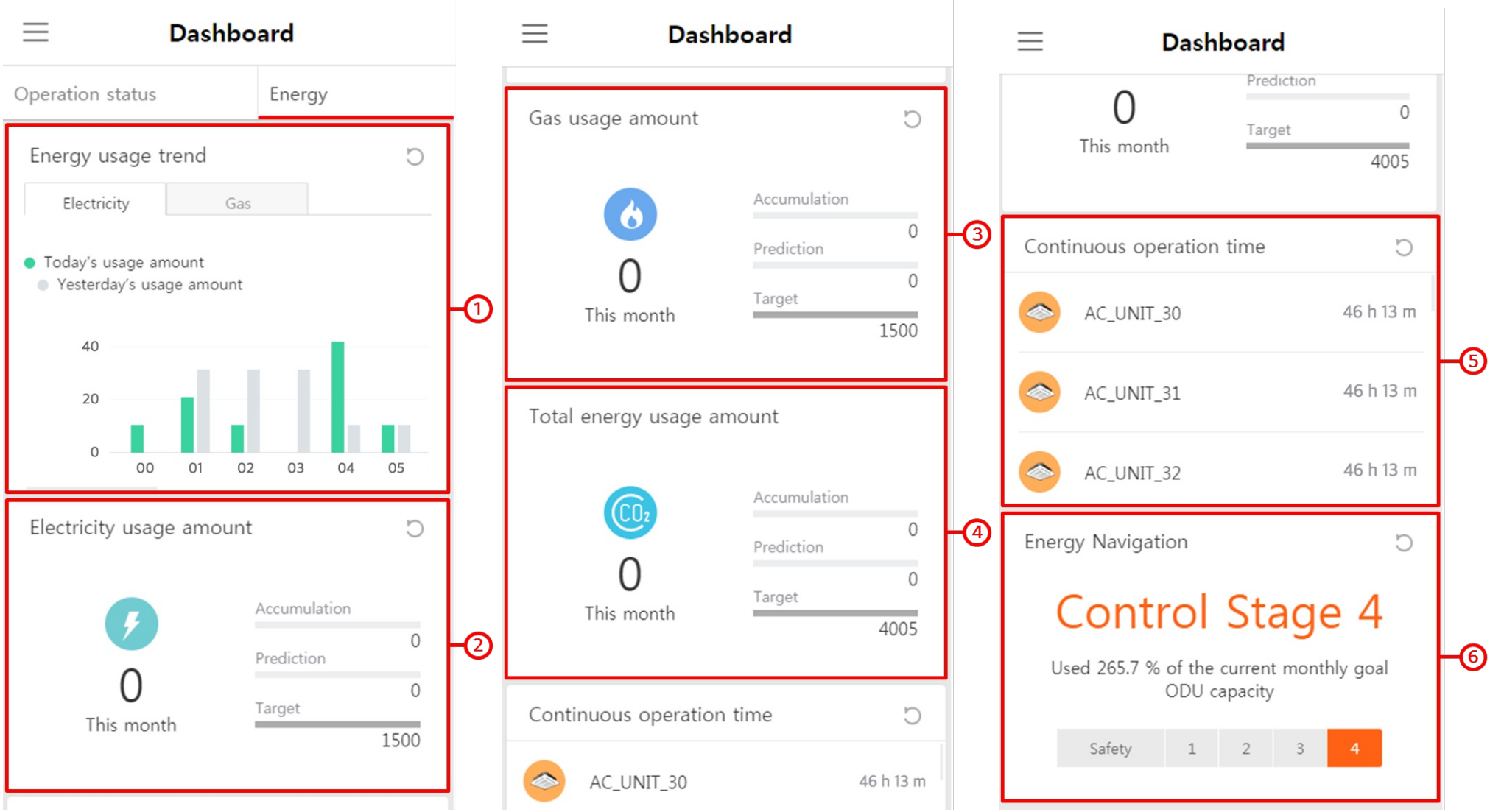
It describes the dash board's current operation status tab composition and functions.



No.	Category	Contents
①	Operation status	Check operation status (start/stop/error) of the equipment installed in the product  [group] <ul style="list-style-type: none"><li>Checking of operation status of each management group designated by user</li></ul> [device] <ul style="list-style-type: none"><li>Checking of operation status of each device</li></ul>
②	Environment status	Checking of average indoor temperature, Max./Min. indoor temperature and group
③	Today's Schedule	Checking today's schedule list
④	InterLocking	Checking of InterLocking list

Energy

It describes the dash board's energy tab composition and functions.

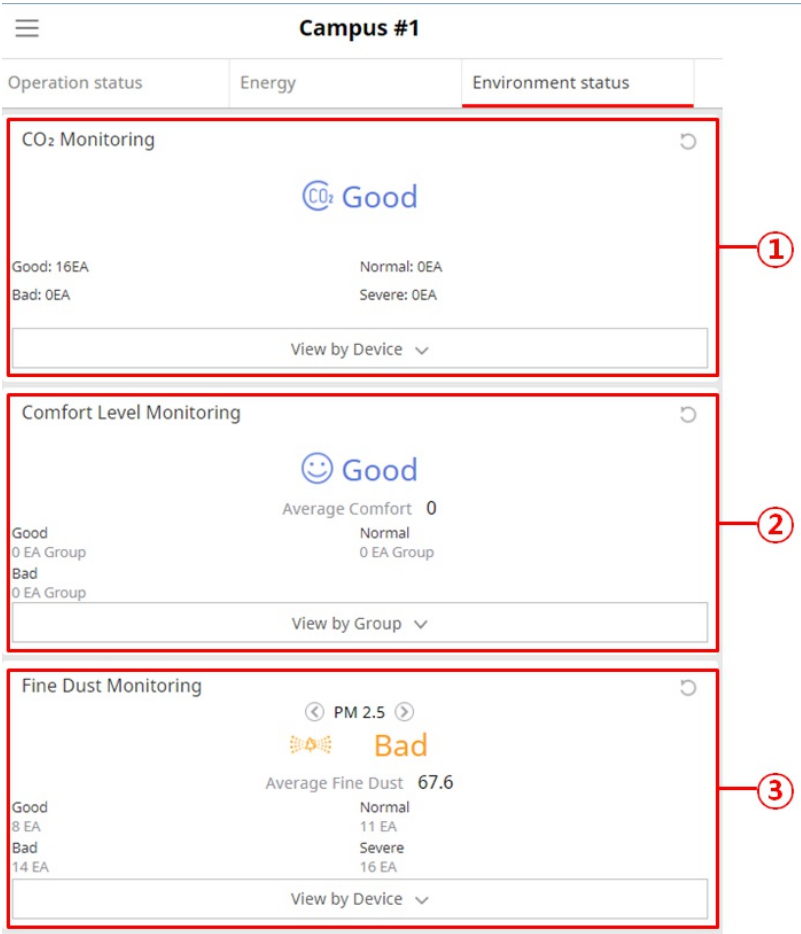


No.	Category	Contents

①	Energy usage trend	Checking of daily, monthly, and yearly trend of electricity/gas usage amount
②	Electricity usage amount	Checking of electricity usage amount accumulation, forecast, and goal
③	Gas usage amount	Checking of gas usage amount accumulation, forecast, and goal
④	Total energy usage amount	Checking of total energy usage amount accumulation, forecast, and goal
⑤	Continuous operation time	Checking of continuous operation time rank of indoor unit
⑥	Energy Navigation	Check energy navigation status

Environment status

It describes the composition and functions of dash board environment status tab



No.	Category	Contents
①	CO <sub>2</sub> monitoring	Check CO <sub>2</sub> status of registered ERV
②	Comfort Level Monitoring	Check registered indoor unit's pleasantness status
③	Fine dust monitoring	Check registered indoor unit, air purifier's fine dust status Fine dust is classified to PM10, PM2.5, and PM1.0, and it indicates each status and concentration

## Device Control

It describes the method to control the device and to monitor the device status.

**[Screen]**

- ➔ Screen Structure and Function

**[Control Window]**

- ➔ Control of Each Device
- ➔ Device Information

Screen Structure and Function

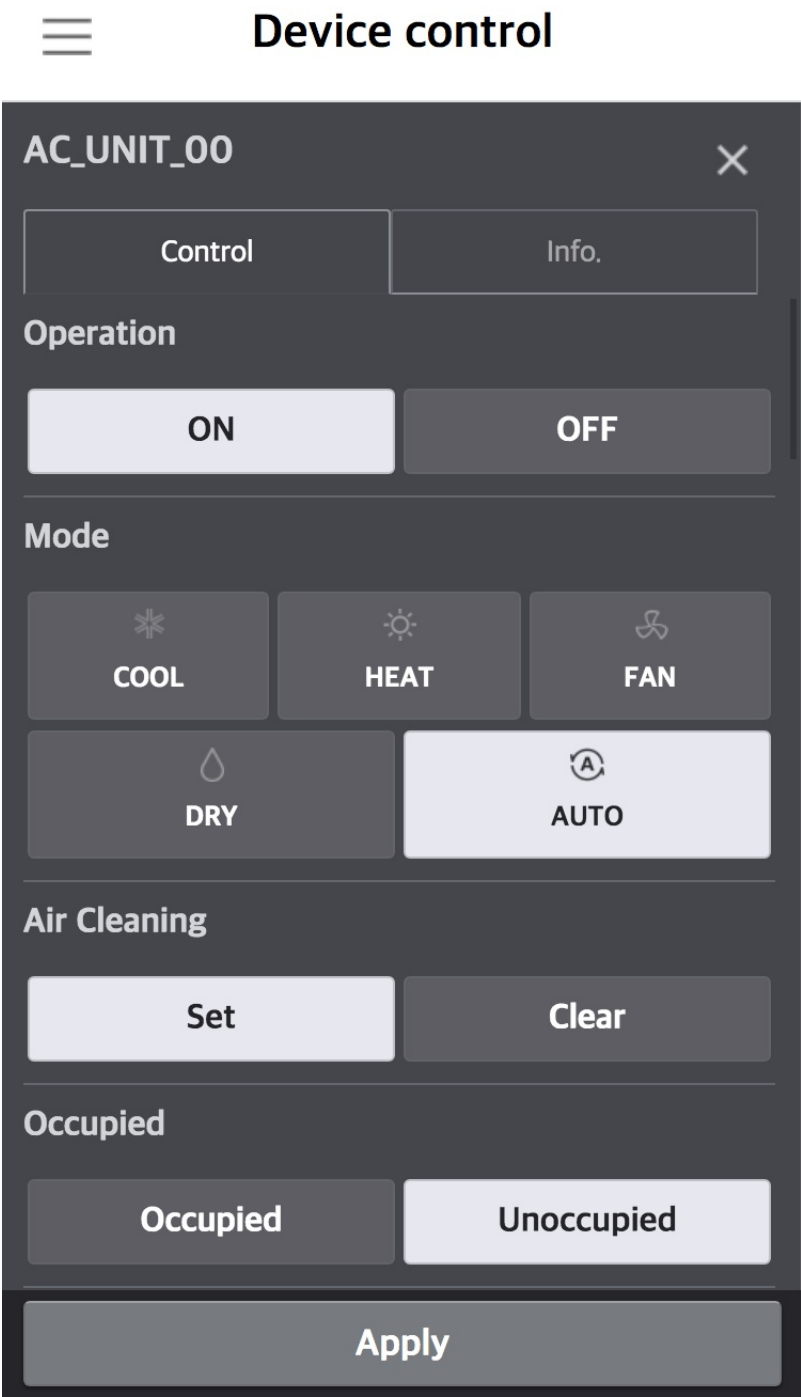
1. In the left menu tab, click **[Control] > [Device Control]** menu.
- The device control screen is displayed.



No.	Category	Contents
①	Group Information	Group name and group location
②	Filtering	Device category filtering
③	Multi-select	Select multiple devices when it is clicked
④	Device section	Check the information of the devices set in the group

## Control of Each Device

When a device is selected in the device section, control window is created as in the following screen. Through the control window, you can control the selected device.



### Note

- The detail control boundary for each device may be different from the actual device, so make sure to refer to the corresponding device's manual.
- Chiller interface is an optional function, and you need to separately purchase the option for chiller interface.
- ACS I/O devices may have different control tool name, unit, upper limit, lower limit, etc. according to the setting.

## Detail controls for each device

- ➔ Outdoor Unit
- ➔ IDU
  - IDU (2Set)
- ➔ ERV
- ➔ ERV DX
- ➔ Heating
- ➔ AHU
- ➔ Scroll chiller
- ➔ Screw chiller
- ➔ Turbo chiller
- ➔ Absorption Chiller
- ➔ DOKIT
- ➔ DO
- ➔ AO
- ➔ Air purifier

Outdoor Unit

ODU[01]

Control

Info.

Outdoor unit capacity control

Clear

▼

Smart load control(SLC) setting

0 Level

▲

▼

Low noise mode

Set

Clear

Defrost mode

0 Level

▲

▼

ODU Refrigerant Noise Reduction setting

0 Level

▲

▼

Apply

Category	Contents
Outdoor unit capacity control	<ul style="list-style-type: none"><li>Press [▼] button to set operation rate (%)</li></ul>
Smart load control function	<ul style="list-style-type: none"><li>Press [▲]/[▼] button to set smart load control stage (0stage, 1stage, 2stage, 3stage, 4stage)</li></ul>
Low noise operation	<ul style="list-style-type: none"><li>[Set/Clear] button: outdoor unit low noise operation Set/Clear</li></ul>
Defrost mode	<ul style="list-style-type: none"><li>Press [▲]/[▼] button to set defrost mode stage (0stage, 1stage, 2stage, 3stage)</li></ul>
ODU Refrigerant Noise Reduction setting	<ul style="list-style-type: none"><li>Press [▲]/[▼] button to set outdoor unit refrigerant noise reduction stage (0stage, 1stage, 2stage)</li></ul>

Note

In the central controller, if 'outdoor unit low noise operation' is used, in the installed indoor unit's remote controller, you need to set [Installer setting] > [Low noise mode] to 'ODU'. (Default value 'ODU')





Category	Contents
Operation	<ul style="list-style-type: none"><li>• <b>[ON]</b> button: starts the device operation</li><li>• <b>[OFF]</b> button: Stops the device operation</li></ul>
Mode	<ul style="list-style-type: none"><li>• <b>[COOL]</b> button: Swtiches to cooling mode</li><li>• <b>[HEAT]</b> button: Switches to heating mode</li><li>• <b>[FAN]</b> button: Air purification operation. When FAN is selected, set temperature is not applied to the device</li><li>• <b>[DRY]</b> button: Removes moisture during rainy season or when humidity is high. When DRY is selected, set temperature is not applied to the device</li><li>• <b>[AUTO]</b> button: Switches to automatic mode</li></ul>
Air cleaning	<p>Air cleaning control only for air cleaning function supporting indoor unit</p> <ul style="list-style-type: none"><li>• Air cleaning single operation<ol style="list-style-type: none"><li>1) In indoor unit stop state, in case of air cleaning <b>[Set]</b>, air cleaning single operation with wind only (automatic wind) (During air cleaning single operation, mode lock and wind amount lock are not checked)</li><li>2) During air cleaning single operation, in case of operation <b>[OFF]</b> or air cleaning <b>[Clear]</b>, air cleaning is cancelled to previous mode and previous wind amount (But, in case of mode or wind amount control together, control is done with controlled mode and wind amount)</li></ol></li><li>• Air cleaning additional operation<ol style="list-style-type: none"><li>1) In indoor unit stop state, in case of operation status <b>[ON]</b> and air cleaning <b>[Set]</b>, in current mode, air cleaning additional operation</li><li>2) In indoor unit operation state, in case of air cleaning <b>[Set]</b>, in current mode, air cleaning additional operation</li><li>3) During air cleaning additional operation, in case of operation <b>[OFF]</b>, operation stops</li><li>4) During air cleaning additional operation, in case of air cleaning <b>[Clear]</b>, air cleaning is cancelled</li></ol></li></ul>
Set temperature	Press <b>[▲]/[▼]</b> button to set the desired temperature
Fan speed	<p>Wind strength setting</p> <ul style="list-style-type: none"><li>• <b>[LOW]</b> button: Set the fan speed to slow</li><li>• <b>[MED]</b> button: Set the fan speed to normal</li><li>• <b>[HIGH]</b> button: Set the fan speed to fast</li><li>• <b>[AUTO]</b> button: <b>[LOW]-[MED]-[HIGH]</b> automatic switching</li></ul>
Swing	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/Clear the Swing function</li></ul>

Set temp range	When user set the desired temperature individually, the desired temperature outside the designated temperature boundary cannot be set
Human detection mode - ON/OFF learned power saving	Only for human detection mode - supporting indoor unit, human detection mode - control <ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: human detection mode - ON/OFF learned power saving Set/Clear</li></ul>
Human detection mode - Temperature power saving	Only for human detection mode - supporting indoor unit, human detection mode - control <ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: human detection mode - temperature power saving Set/Clear</li></ul>
Human detection mode - Unoccupied time setting(minute)	Only for human detection mode - supporting indoor unit, human detection mode - control Set empty decision time to 5, 10, 15, 30, 60, or 90 min.
Human detection mode - Direct wind	Only for human detection mode - supporting indoor unit, human detection mode - control <ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: human detection mode - direct wind Set/Clear</li></ul>
Human detection mode - Indirect wind	Only for human detection mode - supporting indoor unit, human detection mode - control <ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: human detection mode - indirect wind Set/Clear</li></ul>
Comfortable Power Saving	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Comfortable Power Saving function Set/Clear</li><li>• You can press <b>[▲]/[▼]</b> button to set stage</li></ul> Only when indoor unit is in cooling operation, Comfortable Power Saving control is possible
Filter replacement alarm	<ul style="list-style-type: none"><li>• <b>[Clear]</b> button: in case of filter replacement alarm, it cancels filter replacement alarm</li></ul>
HardLock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/clear HardLock so that user cannot control any function with individual remote controller</li></ul>
Mode lock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/clear lock so that user cannot control mode setting with individual remote controller</li></ul>
Fan lock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/clear lock so that user cannot control Fan speed setting with individual remote controller</li></ul>
TempLock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/clear lock so that user cannot control temperature setting with individual remote controller</li></ul>
Auto change over(Occupied)	It is a function to automatically switch to cooling operation if indoor temperature exceeds upper limit temperature, to heating operation if it is less than lower limit temperature, and to wind only operation if it is between upper limit temperature and lower limit temperature (supported only in outdoor unit with both cooling/heating) <ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/clear Auto change over(Occupied)</li></ul>
Lower /Upper temp.	Auto change over(Occupied)'s lower limit temperature and upper limit temperature setting
Auto change over(Occupied) Fan speed	Select the Fan speed value to set in the indoor unit during Auto change over(Occupied) operation <ul style="list-style-type: none"><li>• <b>[LOW]</b> button: Set the fan speed to slow</li><li>• <b>[MED]</b> button: Set the fan speed to normal</li><li>• <b>[HIGH]</b> button: Set the fan speed to fast</li><li>• <b>[AUTO]</b> button: <b>[LOW]-[MED]-[HIGH]</b> automatic switching</li></ul>
Setback(UnOccupied)	Function to maintain the temperature of the space where the device is installed in certain boundary (Only supported by cooling/heating simultaneous type outdoor unit) <ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/clear the Setback(UnOccupied)</li></ul>
Cool start	Press <b>[▲]/[▼]</b> button to set the cooling operation start temperature(21°C~40°C)
Heat start	Press <b>[▲]/[▼]</b> button to set the heating operation start temperature(1°C~20°C)

IDU (2Set)

When 2Set function supporting outdoor unit/indoor unit/remote controller are used and in **[Setting] > [Installing]**, if ACP's 2Set automatic mode is selected as **IDU**, indoor unit 2Set control window is generated on the right side as in the following screen.



Category	Contents
Operation	<ul style="list-style-type: none"><li>• <b>[ON]</b> button: Starts the device operation</li><li>• <b>[OFF]</b> button: Stops the device operation</li></ul>
Mode	<ul style="list-style-type: none"><li>• <b>[COOL]</b> button: Switches to cooling mode</li><li>• <b>[HEAT]</b> button: Switches to heating mode</li><li>• <b>[FAN]</b> button: Air purification operation. When FAN is selected, set temperature is not applied to the device</li><li>• <b>[DRY]</b> button: Removes moisture during rainy season or when humidity is high. When DRY is selected, set temperature is not applied to the device</li><li>• <b>[AUTO]</b> button: Switches to automatic mode</li></ul>
Air cleaning	Air cleaning control only for air cleaning function supporting indoor unit <ul style="list-style-type: none"><li>• Air cleaning single operation<ol style="list-style-type: none"><li>1) In indoor unit stop state, in case of air cleaning <b>[Set]</b>, air cleaning single operation with wind only (automatic wind) (During air cleaning single operation, mode lock and wind amount lock are not checked)</li><li>2) During air cleaning single operation, in case of operation <b>[OFF]</b> or air cleaning <b>[Clear]</b>, air cleaning is cancelled to previous mode and previous wind amount (But, in case of mode or wind amount control together, control is done with controlled mode and wind amount)</li></ol></li><li>• Air cleaning additional operation<ol style="list-style-type: none"><li>1) In indoor unit stop state, in case of operation status <b>[ON]</b> and air cleaning <b>[Set]</b>, in current mode, air cleaning additional operation</li><li>2) In indoor unit operation state, in case of air cleaning <b>[Set]</b>, in current mode, air cleaning additional operation</li><li>3) During air cleaning additional operation, in case of operation <b>[OFF]</b>, operation stops</li><li>4) During air cleaning additional operation, in case of air cleaning <b>[Clear]</b>, air cleaning is cancelled</li></ol></li></ul>
Occupancy	Function to set the space with the corresponding indoor unit as occupied or empty <ul style="list-style-type: none"><li>• <b>[Occupied]</b> button: occupied setting</li><li>• <b>[Unoccupied]</b> button: empty setting</li></ul>
Cooling set temperature	Press <b>[▲]/[▼]</b> button to set cooling set temperature



Heating setting temperature	Press <b>[▲]/[▼]</b> button to set heating set temperature
Cooling lower limit/upper limit temperature	Cooling lower limit temperature and upper limit temperature setting
Heating lower limit/upper limit temperature	Heating lower limit temperature and upper limit temperature setting
Fan speed	Wind strength setting <ul style="list-style-type: none"><li>• <b>[LOW]</b> button: Set the fan speed to slow</li><li>• <b>[MED]</b> button: Set the fan speed to normal</li><li>• <b>[HIGH]</b> button: Set the fan speed to fast</li><li>• <b>[AUTO]</b> button: <b>[LOW]</b>-<b>[MED]</b>-<b>[HIGH]</b> automatic switching</li></ul>
Swing	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/Clear the Swing function</li></ul>
Human detection mode - ON/OFF learned power saving	Only for human detection mode - supporting indoor unit, human detection mode - control <ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: human detection mode - ON/OFF learned power saving Set/Clear</li></ul>
Human detection mode - Temperature power saving	Only for human detection mode - supporting indoor unit, human detection mode - control <ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: human detection mode - temperature power saving Set/Clear</li></ul>
Human detection mode - Unoccupied time setting(minute)	Only for human detection mode - supporting indoor unit, human detection mode - control Set empty decision time to 5, 10, 15, 30, 60, or 90 min.
Human detection mode - Direct wind	Only for human detection mode - supporting indoor unit, human detection mode - control <ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: human detection mode - direct wind Set/Clear</li></ul>
Human detection mode - Indirect wind	Only for human detection mode - supporting indoor unit, human detection mode - control <ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: human detection mode - indirect wind Set/Clear</li></ul>
Comfortable Power Saving	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Comfortable Power Saving function Set/Clear</li><li>• You can press <b>[▲]/[▼]</b> button to set stage</li></ul> Only when indoor unit is in cooling operation, Comfortable Power Saving control is possible
Filter replacement alarm	<ul style="list-style-type: none"><li>• <b>[Clear]</b> button: In case of filter replacement alarm, it cancels filter replacement alarm</li></ul>
HardLock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/clear HardLock so that user cannot control any function with individual remote controller</li></ul>
Mode lock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/clear lock so that user cannot control mode setting with individual remote controller</li></ul>
Fan lock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/clear lock so that user cannot control Fan speed setting with individual remote controller</li></ul>
TempLock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/clear lock so that user cannot control temperature setting with individual remote controller</li></ul>

Note

2set automatic mode

- **Only with 2Set automatic mode supporting indoor/outdoor air, the corresponding function can be used. (For whether each device supports 2Set, please refer to the manual of the corresponding device.)**
- **Override is a function that can be set from remote controller. For override function related contents, please refer to remote controller manual.**
- **In 2Set automatic mode, along with Auto icon, product's actual operation mode (cooling, heating) status is displayed.**

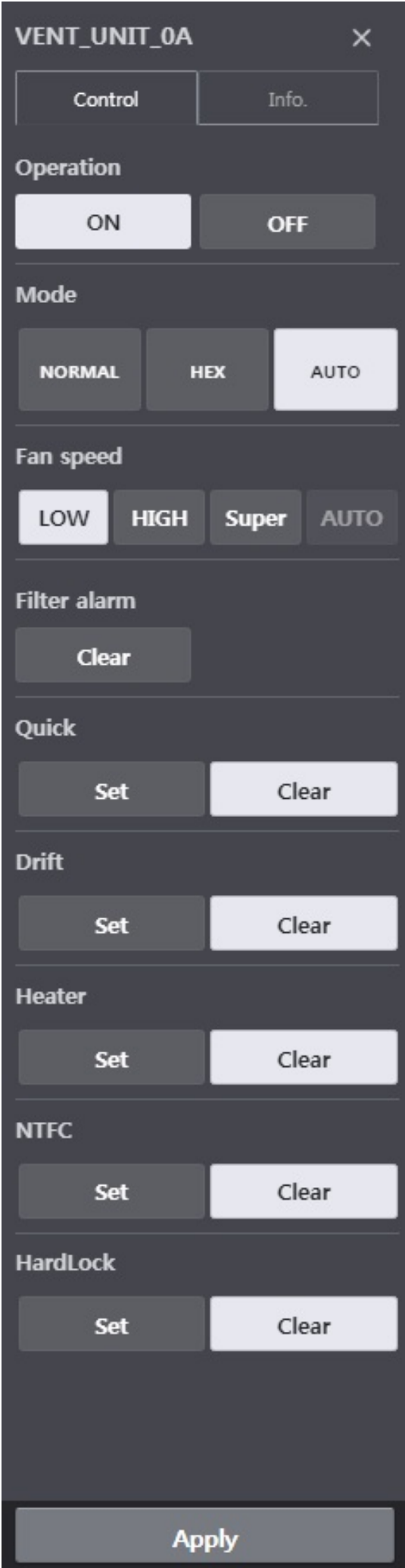
Occupancy

- **If occupancy sensor is interlinked to indoor unit, setting from the central control has priority over the corresponding occupancy sensor. For occupancy sensor related contents, please refer to indoor unit or Dry Contact manual.**
- **When occupied setting is changed, automatically set cooling set temperature and heating set temperature are the most recently run schedule's cooling set temperature and heating set temperature, and if there is no previously run schedule, it is set to default value.**

(Example)  
09:00 - 12:00: occupied / cooling set temperature 27°C / heating set temperature 18°C  
12:00 - 13:00: occupied / cooling set temperature 29°C / heating set temperature 16°C  
13:00 - 15:00: occupied / cooling set temperature 26°C / heating set temperature 19°C

If it is empty without schedule after 15:00, cooling set temperature is 29°C and heating set temperature is 16°C, and if it is occupied, cooling set temperature becomes 26°C and heating set temperature becomes 19°C.

ERV



Category	Contents
Operation	<ul style="list-style-type: none"><li>• <b>[ON]</b> button: starts the device operation</li><li>• <b>[OFF]</b> button: Stops the device operation</li></ul>
Mode	<ul style="list-style-type: none"><li>• <b>[NORMAL]</b> button: Discharged air ventilates without going trough the electric heat exchanger</li><li>• <b>[HEX]</b> button: Both air supply/discharge ventilates through the electric heat exchanger</li><li>• <b>[AUTO]</b> button: Switches to four seasons mode</li></ul>
Fan speed	Wind strength setting <ul style="list-style-type: none"><li>• <b>[LOW]</b> button: Set the fan speed to slow</li><li>• <b>[HIGH]</b> button: Set the fan speed to fast</li><li>• <b>[SUPER]</b> button: Set the fan speed to Max. speed</li><li>• <b>[AUTO]</b> button: <b>[LOW]</b>-<b>[HIGH]</b>-<b>[SUPER]</b> automatic switching<ul style="list-style-type: none"><li>- User setting is impossible</li><li>- When Drift/Quick is set, <b>[AUTO]</b> Fan speed is selected</li><li>- When Drift/Quick is cleared, <b>[HIGH]</b> Fan speed is selected</li><li>- During <b>[AUTO]</b> operation, when <b>[LOW]</b>/<b>[HIGH]</b>/<b>[SUPER]</b> is selected, Drift/Quick function in operation is cleared</li></ul></li></ul>
Filter replacement alarm	<ul style="list-style-type: none"><li>• <b>[Clear]</b> button: in case of filter replacement alarm, it cancels filter replacement alarm</li></ul>
Additional function	<ul style="list-style-type: none"><li>• Quick <b>[Set/Clear]</b> button: Set/clear Quick function (When Quick function is selected, Drift function is cleared)</li><li>• Drift <b>[Set/Clear]</b> button: Set/clear Drift function (When Drift function is selected, Quick function is cleared)</li><li>• Heater <b>[Set/Clear]</b> button: Set/clear heater function</li></ul>
Midnight air cooling(NTFC)	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/Clear Midnight air cooling(NTFC) function that can outdoor unit cooling when outdoor temperature is lower than the base temperature at night time</li></ul>
HardLock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/clear HardLock so that user cannot control any function with individual remote controller</li></ul>

ERV DX

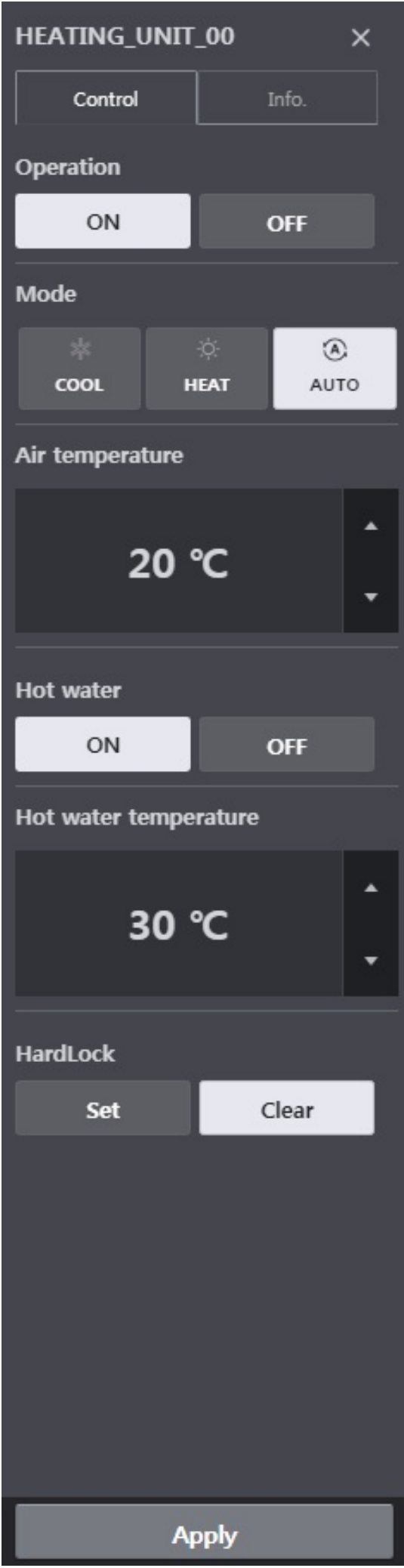


Category	Contents
Operation	<ul style="list-style-type: none"><li>• <b>[ON]</b> button: starts the device operation</li><li>• <b>[OFF]</b> button: Stops the device operation</li></ul>
Mode	<ul style="list-style-type: none"><li>• <b>[NORMAL]</b> button: Discharged air ventilates without going trough the electric heat exchanger</li><li>• <b>[HEX]</b> button: Both air supply/discharge ventilates through the electric heat exchanger</li><li>• <b>[AUTO]</b> button: Switches to four seasons mode</li></ul>
Set temperature	Press <b>[▲]/[▼]</b> button to set the desired temperature
Fan speed	Wind strength setting <ul style="list-style-type: none"><li>• <b>[LOW]</b> button: Set the fan speed to slow</li><li>• <b>[HIGH]</b> button: Set the fan speed to fast</li><li>• <b>[SUPER]</b> button: Set the fan speed to Max. speed</li><li>• <b>[AUTO]</b> button: <b>[LOW]-[HIGH]-[SUPER]</b> automatic switching<ul style="list-style-type: none"><li>- User setting is impossible</li><li>- When Drift/Quick is set, <b>[AUTO]</b> Fan speed is selected</li><li>- When Drift/Quick is cleared, <b>[HIGH]</b> Fan speed is selected</li><li>- During <b>[AUTO]</b> operation, when <b>[LOW]/[HIGH]/[SUPER]</b> is selected, Drift/Quick function in operation is cleared</li></ul></li></ul>
Air conditioner	<ul style="list-style-type: none"><li>• <b>[COOL]</b> button: Operates the ERV DX in cooling mode</li><li>• <b>[AUTO]</b> button: Operates the ERV DX in auto mode</li><li>• <b>[HEAT]</b> button: Operates the ERV DX as heating mode</li><li>• <b>[OFF]</b> button: Stops the air conditioner of the ERV DX</li></ul>
Set temp range	When user set the desired temperature individually, the desired temperature outside the designated temperature boundary cannot be set
Filter replacement alarm	<ul style="list-style-type: none"><li>• <b>[Clear]</b> button: in case of filter replacement alarm, it cancels filter replacement alarm</li></ul>
Additional function	<ul style="list-style-type: none"><li>• Quick <b>[Set/Clear]</b> button: Set/clear Quick function (When Quick function is selected, Drift function is cleared)</li><li>• Drift <b>[Set/Clear]</b> button: Set/clear Drift function (When Drift function is selected, Quick function is cleared)</li><li>• Heater <b>[Set/Clear]</b> button: Set/clear heater function</li><li>• Humidify <b>[Set]</b> button: Set Humidify function (only for air conditioner heating mode)</li></ul>
Midnight air cooling(NTFC)	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/Clear Midnight air cooling(NTFC) function that can outdoor unit cooling when outdoor temperature is lower than the base temperature at night time</li></ul>

HardLock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/clear HardLock so that user cannot control any function with individual remote controller</li></ul>
Mode lock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/clear lock so that user cannot control mode setting with individual remote controller</li></ul>
Fan lock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/clear lock so that user cannot control Fan speed setting with individual remote controller</li></ul>
TempLock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/clear lock so that user cannot control temperature setting with individual remote controller</li></ul>
Midnight air cooling(NTFC) lock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/Clear Midnight air cooling(NTFC) schedule set in the remote controller</li></ul>



Heating



Category	Contents
Operation	<ul style="list-style-type: none"><li>• <b>[ON]</b> button: starts the device operation</li><li>• <b>[OFF]</b> button: Stops the device operation</li></ul>
Mode	<ul style="list-style-type: none"><li>• <b>[COOL]</b> button: Switches to cooling mode</li><li>• <b>[HEAT]</b> button: Switches to heating mode</li><li>• <b>[AUTO]</b> button: Switches to automatic mode</li></ul>
Air/Water in/out temperature	<p>Press <b>[▲]/[▼]</b> button to set Air/Water in/out temperature</p> <p>It is displayed based on the set temperature selected in <b>[Setting]-[Installing]</b></p> <ul style="list-style-type: none"><li>• When <b>[Water in/out]</b> is selected, it is displayed as water in/out temperature</li><li>• When <b>[indoor]</b> is selected, it is displayed as air temperature</li></ul>
Hot water	<ul style="list-style-type: none"><li>• <b>[ON]</b> button: Starts hot water operation<ul style="list-style-type: none"><li>- If hot water is operated while the device is in automatic/cooling operation, the corresponding mode and hot water are displayed in the icon of the contents display section</li><li>- If hot water is operated while the device is stopped, the icon in the contents display section is enabled, and hot water is displayed</li></ul></li><li>• <b>[OFF]</b> button: Stops hot water operation</li></ul>
Hot water temperature	<p>Press <b>[▲]/[▼]</b> button to set hot water temperature</p>
HardLock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Set/clear HardLock so that user cannot control any function with individual remote controller</li></ul>

AHU

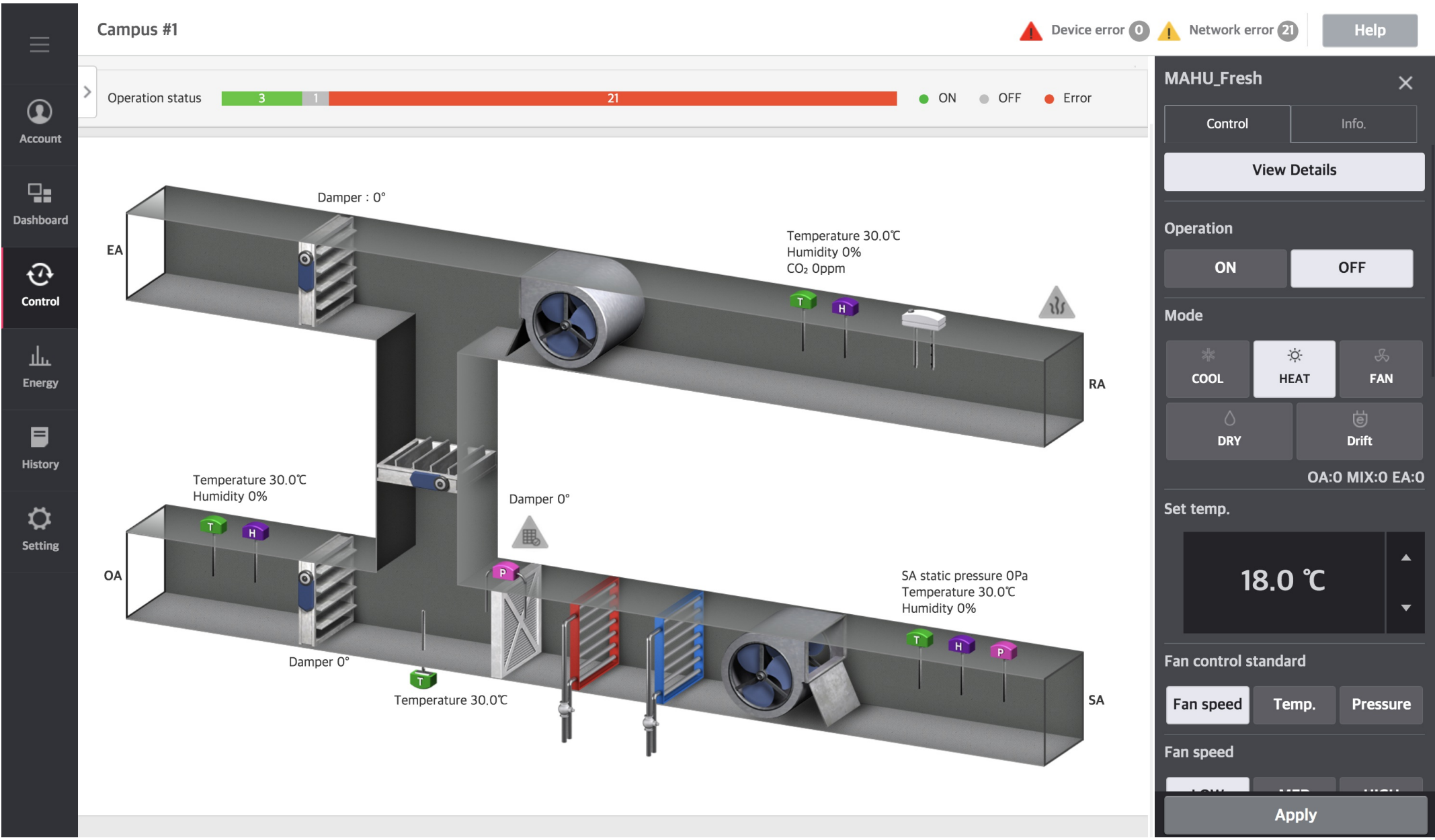


Category	Contents
View Details	Press <b>[View Details]</b> button to check detail information (But, mobile is excluded)
Operation	<ul style="list-style-type: none"><li>• <b>[ON]</b> button: starts the device operation</li><li>• <b>[OFF]</b> button: Stops the device operation</li></ul>
Mode	<ul style="list-style-type: none"><li>• <b>[COOL]</b> button: Swtiches to cooling mode</li><li>• <b>[HEAT]</b> button: Switches to heating mode</li><li>• <b>[FAN]</b> button: Air purification operation. When FAN is selected, you cannot set the desired temperature</li><li>• <b>[DRY]</b> button: Removes moisture in rainy season or when humidity is high. When DRY is selected, you cannot set the desired temperature</li><li>• <b>[Drift]</b> button: Operation to find the operation point with the best ventilation system efficiency to save power consumption. It fluently discharges the contaminated indoor air by having bigger discharger Fan speed than air supply</li></ul>
Set temperature	Press <b>[▲]/[▼]</b> button to set the temperature
Fan control standard	<ul style="list-style-type: none"><li>• <b>[Fan speed]</b> button: Controls the fan based on Fan speed status</li><li>• <b>[Temp]</b> button: Controls the fan based on temperature status</li><li>• <b>[Pressure]</b> button: Controls the fan based on Pressure status</li></ul>
Fan speed	It is displayed only when fan control standard is Fan speed <ul style="list-style-type: none"><li>• <b>[LOW]</b> button: Set the fan speed to slow</li><li>• <b>[MED]</b> button: Set the fan speed to normal</li><li>• <b>[HIGH]</b> button: Set the fan speed to fast</li></ul>
Automatic ventilation	It is displayed only when the additional function's automatic ventilation or automatic ventilation and Humidify are selected during AHU device registration <ul style="list-style-type: none"><li>• Automatic ventilation <b>[Set/Clear]</b> button: Starts/stops automatic ventilation</li></ul>
Set CO <sub>2</sub>	It is enabled only when automatic ventilation function is set Press <b>[▲]/[▼]</b> button to set in the unit of 100ppm within 100 ppm ~ 2 000 ppm range
Humidify	It is displayed only when the addtional function's Humidify or automatic ventilation and Humidify are selected during AHU device registration <ul style="list-style-type: none"><li>• Humidify <b>[Set/Clear]</b> button: Starts/stops Humidify function</li></ul>

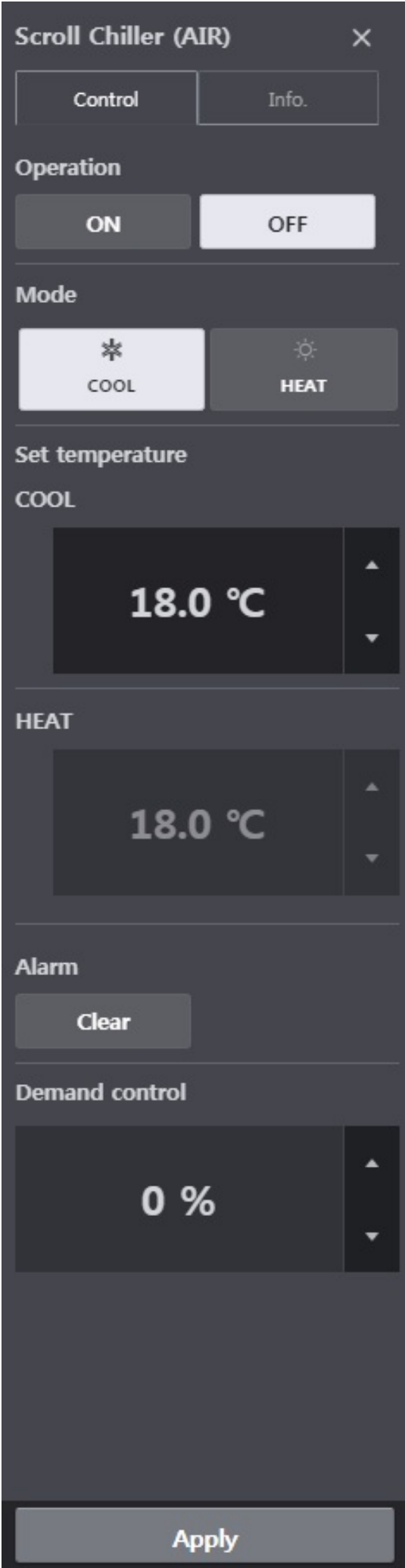
Humidity	It is enabled only when Humidify function is set Press [▲]/[▼] button to set the target humidity
Damper opening	<ul style="list-style-type: none"><li>Press [OA Damper] : [▲]/[▼] button to set the outdoor unit air damper opening value in the unit of 1 ° within 0 ° ~ 90 ° range</li><li>Press [MIX Damper] : [▲]/[▼] button to set the mixer damper opening value in the unit of 1 ° within 0 ° ~ 90 ° range</li><li>Press [EA Damper] : [▲]/[▼] button to set the air discharge damper opening value in the unit of 1 ° within 0 ° ~ 90 ° range</li></ul> <p>When you set [Setting]-[system setting]'s Apply damper opening formula as <b>set</b>, it operates as OA Damper = EA Damper, OA Damper = MIX Damper = 90</p>
HardLock	<ul style="list-style-type: none"><li>[Set/Clear] button: Set/clear HardLock so that user cannot control any function with individual remote controller</li></ul>

View AHU in detail

In AHU's control screen, you can press [View Details] button to check detail information.

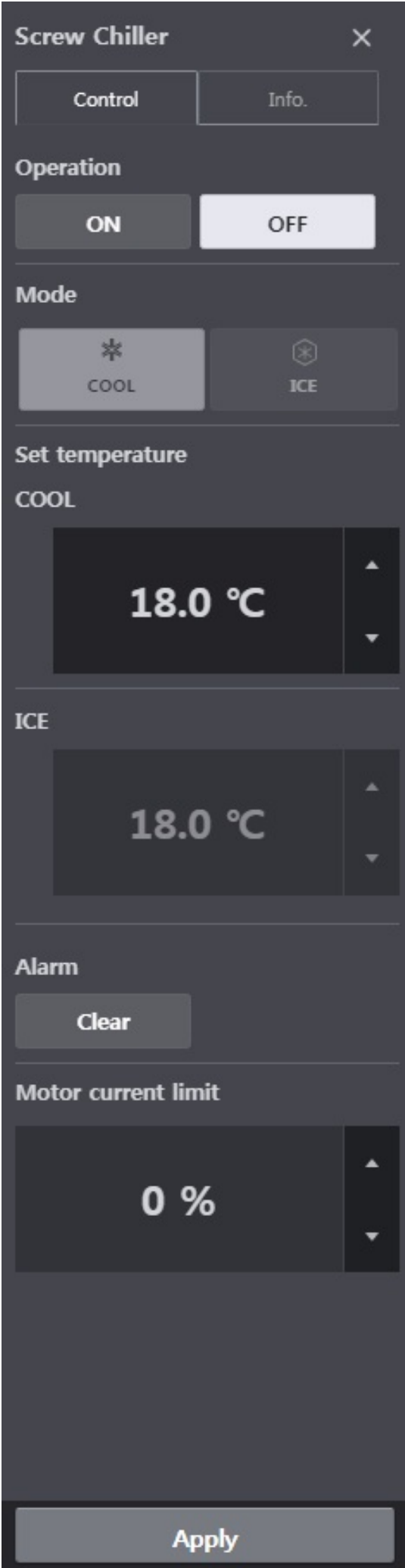


Scroll chiller



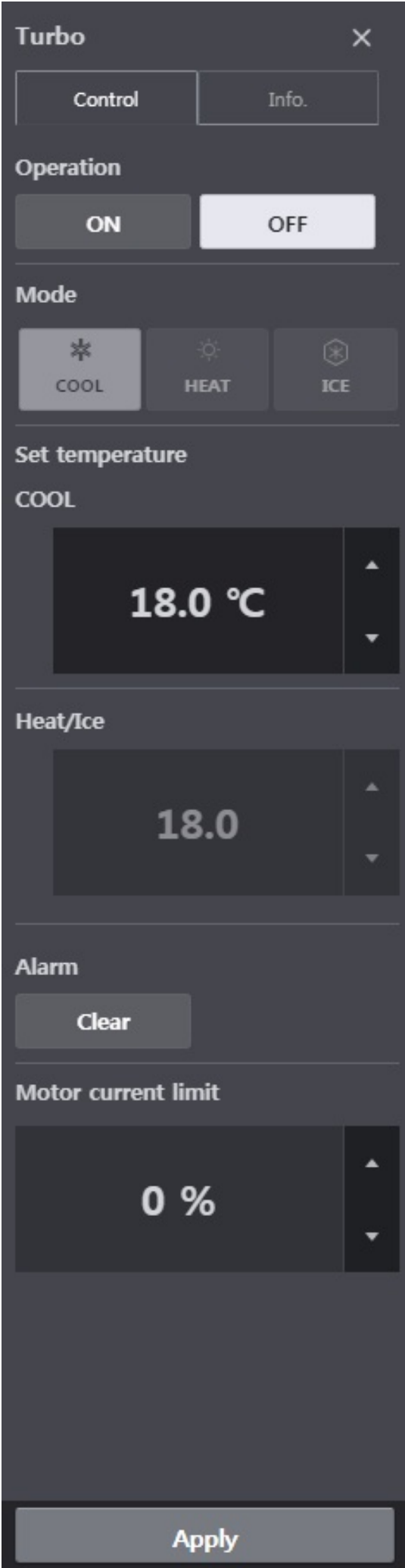
Category	Contents
Operation	<ul style="list-style-type: none"><li>• <b>[ON]</b> button: starts the device operation</li><li>• <b>[OFF]</b> button: Stops the device operation</li></ul>
Mode	(It is displayed only when device supports the corresponding mode) <ul style="list-style-type: none"><li>• <b>[COOL]</b> button: Swtiches to cooling mode</li><li>• <b>[HEAT]</b> button: Switches to heating mode</li></ul>
Set temperature	Set the load water out temperature for indoor cooling/heating Press <b>[▲]</b> / <b>[▼]</b> button to set the temperature of cooling mode and heating mode
Alarm	<b>[Clear]</b> button: Clears Chiller alarm in case of Chiller alarm
Demand control	Press <b>[▲]</b> / <b>[▼]</b> button to set demand limit ratio

Screw chiller



Category	Contents
Operation	<ul style="list-style-type: none"><li>• <b>[ON]</b> button: starts the device operation</li><li>• <b>[OFF]</b> button: Stops the device operation</li></ul>
Mode	Mode control is impossible. Controls monitored operation mode's set temperature
Set temperature	Set the load water out temperature for indoor cooling/ice making Press <b>[▲]/[▼]</b> button to set the temperature of cooling mode and ice making mode
Alarm	<b>[Clear]</b> button: Clears Chiller alarm in case of Chiller alarm
Motor current limit	Press <b>[▲]/[▼]</b> button to set motor current limit ratio

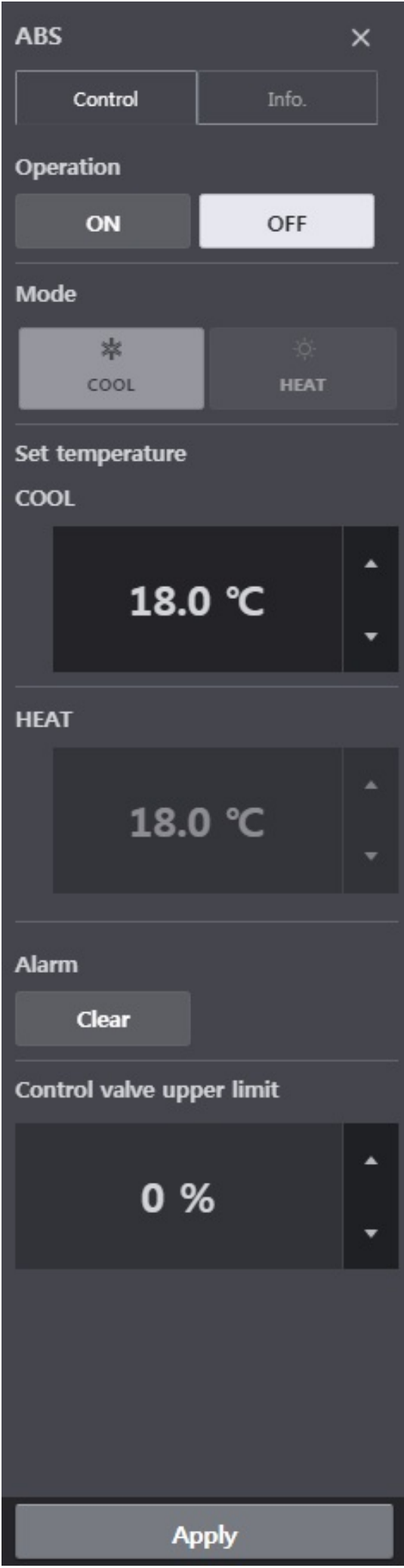
Turbo chiller



Category	Contents
Operation	<ul style="list-style-type: none"><li>• <b>[ON]</b> button: starts the device operation</li><li>• <b>[OFF]</b> button: Stops the device operation</li></ul>
Mode	Mode control is impossible. Controls monitored operation mode's set temperature
Set temperature	Set the load water out temperature for indoor cooling/heating/ice making Press <b>[▲]/[▼]</b> button to set the temperature of cooling mode and heating/ice making mode
Alarm	<b>[Clear]</b> button: Clears Chiller alarm in case of Chiller alarm
Motor current limit	Press <b>[▲]/[▼]</b> button to set motor current limit ratio



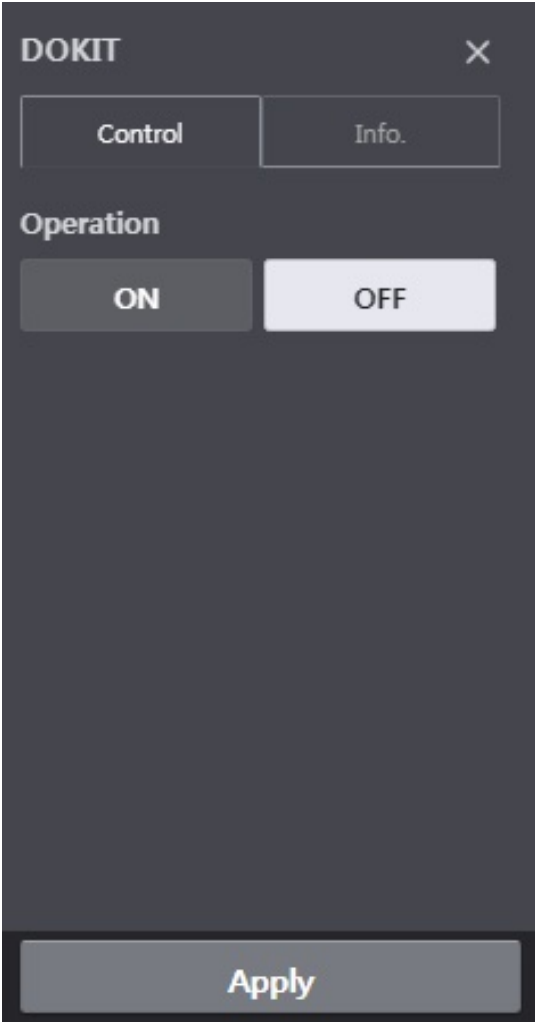
Absorption Chiller



Category	Contents
Operation	<ul style="list-style-type: none"><li>• <b>[ON]</b> button: starts the device operation</li><li>• <b>[OFF]</b> button: Stops the device operation</li></ul>
Mode	Mode control is impossible. Controls monitored operation mode's set temperature
Set temperature	Set the load water out temperature for indoor cooling/heating Press <b>[▲]/[▼]</b> button to set the temperature of cooling mode and heating mode
Alarm	<b>[Clear]</b> button: Clears Chiller alarm in case of Chiller alarm
Control valve upper limit	Press <b>[▲]/[▼]</b> button to set the control valve upper limit ratio

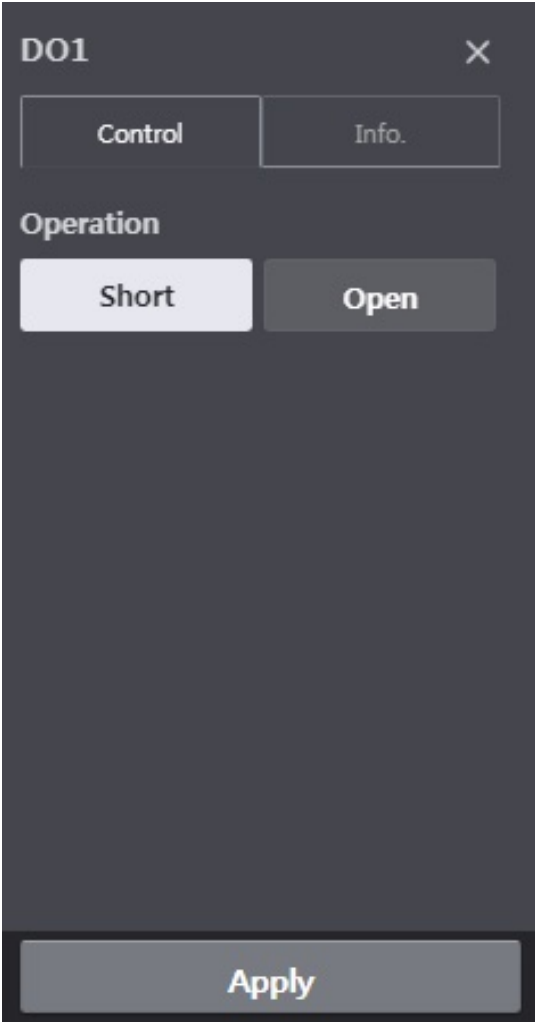


DOKIT



Category	Contents
Operation	<ul style="list-style-type: none"><li>• <b>[ON]</b> button: starts the device operation</li><li>• <b>[OFF]</b> button: Stops the device operation</li></ul>

DO



Category	Contents
Operation	<ul style="list-style-type: none"><li>• <b>[Short]</b> button: Short signal output</li><li>• <b>[Open]</b> button: Open signal output</li></ul>

AO

AO[F7/00]

Control

Info.

Temperature (°C)

20.00

Min 0 ~ Max 100

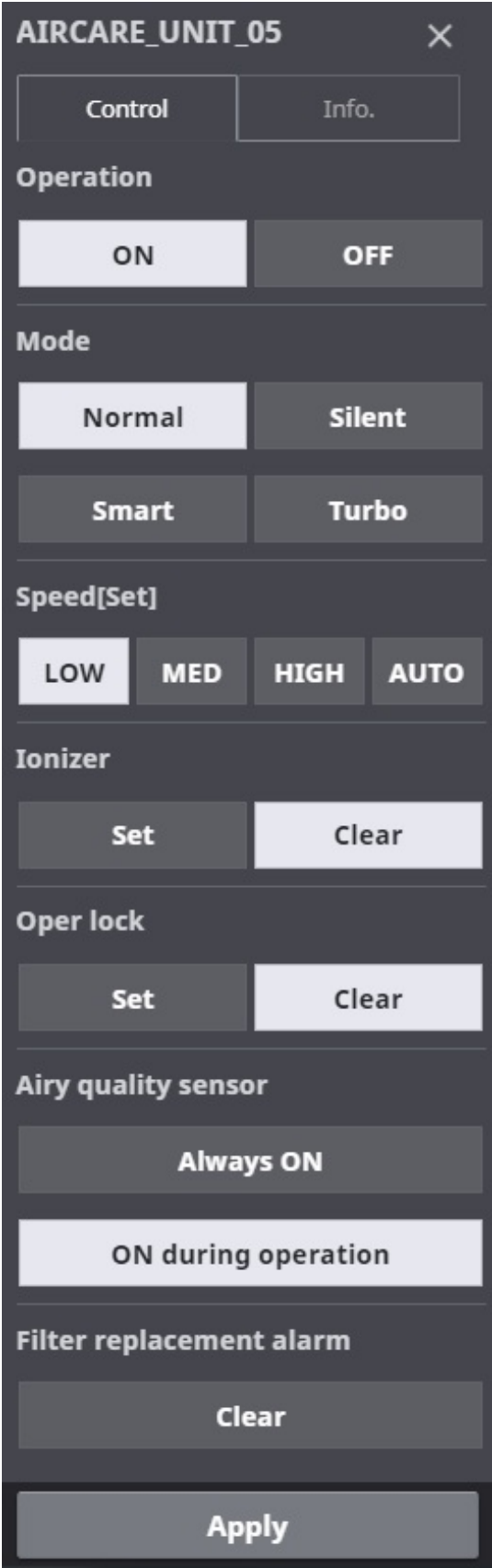
Apply

Category	Contents
Temperature	Set temperature value

Note

Unit symbol may change according to the usage set during device registration.

Air purifier



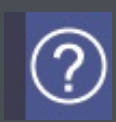
Category	Contents
Operation	<ul style="list-style-type: none"><li>• <b>[ON]</b> button: starts the device operation</li><li>• <b>[OFF]</b> button: Stops the device operation</li></ul>
Mode	<ul style="list-style-type: none"><li>• <b>[Normal]</b> button: Switches to the General Purification mode.</li><li>• <b>[Silent]</b> button: Minimizes noise during operation.</li><li>• <b>[Smart]</b> button: Switches to the Smart mode. Controls the purification strength automatically according to the Comprehensive Cleanliness level.</li><li>• <b>[Turbo]</b> button: Operates powerfully for 30 minutes to quickly purify the indoor air.</li></ul>
Speed[Set]	Sets the air volume of the air purifier. (It is available only when the operation mode is Normal.) <ul style="list-style-type: none"><li>• <b>[LOW]</b> button: Set the fan speed to slow</li><li>• <b>[MED]</b> button: Set the fan speed to normal</li><li>• <b>[HIGH]</b> button: Set the fan speed to fast</li><li>• <b>[AUTO]</b> button: Controls the fan speed automatically.</li></ul>
Ionizer	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Enables or disables the Air Sterilization function.</li></ul>
Oper lock	<ul style="list-style-type: none"><li>• <b>[Set/Clear]</b> button: Enables or disables the Operation Lock function to prevent or allow operation control on the product (remote control).</li></ul>
Airy quality sensor	<ul style="list-style-type: none"><li>• <b>[Always ON]</b> button: Performs sensor stabilization for the first one time.</li><li>• <b>[ON during operation]</b> button: Performs sensor stabilization whenever starting or stopping the operation.</li></ul>
Filter replacement alarm	<ul style="list-style-type: none"><li>• <b>[Clear]</b> button: in case of filter replacement alarm, it cancels filter replacement alarm</li></ul>

## Device Information

When you click device information tab in the device's control screen, you can check the device information.

You can check device's basic information, operation information, schedule information, error information, and today's history.

☰Device control	☰Device control	☰Device control	☰Device control	☰Device control
<div>AC_UNIT_00</div> <div><div>Control</div><div>Info.</div></div> <div>Basic information</div> <div>NameAC_UNIT_00</div> <div>Address00</div> <div>GroupNew group</div> <div>ODUODU[00]</div> <div>ModelAC</div> <div>Capacity3</div> <div>Control Mode</div>	<div>AC_UNIT_00</div> <div><div>Control</div><div>Info.</div></div> <div>Basic information</div> <div>Operation information</div> <div>OperationON</div> <div>ModeAUTO</div> <div>Current temperature23.0 °C</div> <div>Set temperature23.0 °C</div> <div>Fan speedHIGH</div> <div>Swing</div>	<div>AC_UNIT_00</div> <div><div>Control</div><div>Info.</div></div> <div>Basic information</div> <div>Operation information</div> <div>Schedule information (2)</div> <div><div>Time</div><div>Description</div><div>10:00ON Schedule</div><div>19:00OFF Schedule</div></div> <div>Error information</div> <div>History</div>	<div>AC_UNIT_00</div> <div><div>Control</div><div>Info.</div></div> <div>Basic information</div> <div>Operation information</div> <div>Schedule information (2)</div> <div>Error information</div> <div>ErrorNo error</div> <div>Error code0</div> <div>Error descriptionNo error</div> <div>History</div>	<div>AC_UNIT_00</div> <div><div>Control</div><div>Info.</div></div> <div>Basic information</div> <div>Operation information</div> <div>Schedule information (2)</div> <div>Error information</div> <div>History</div> <div><div>Time</div><div>Contents</div><div>07-31-2018 Control Mode: AUTO PM 04:20 ACS</div><div>07-31-2018 Control Set temp range (lower limit): 20°C PM 04:20 by admin</div><div>07-31-2018 Control Set temp range (upper limit): 28°C PM 04:20 by admin</div><div>07-31-2018 Control Mode: AUTO PM 04:20 by admin</div></div>



Schedule Control

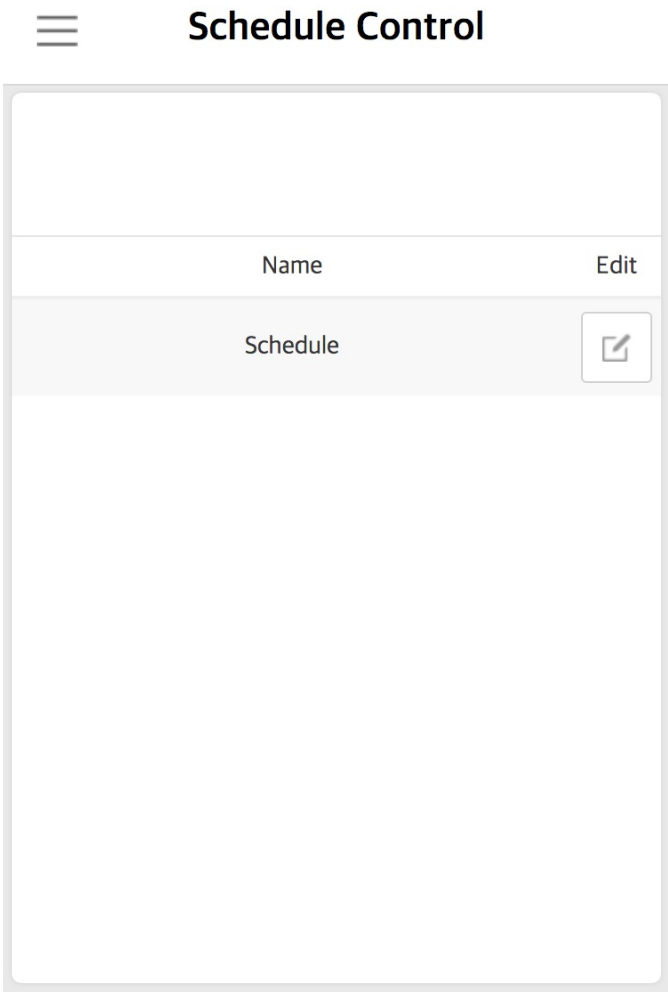
Schedule is a function for device to perform reserved operation at certain time by designating device operation in advance. When this function is used, device operation can be managed in time unit efficiently and energy saving effect is excellent.

[Schedule]

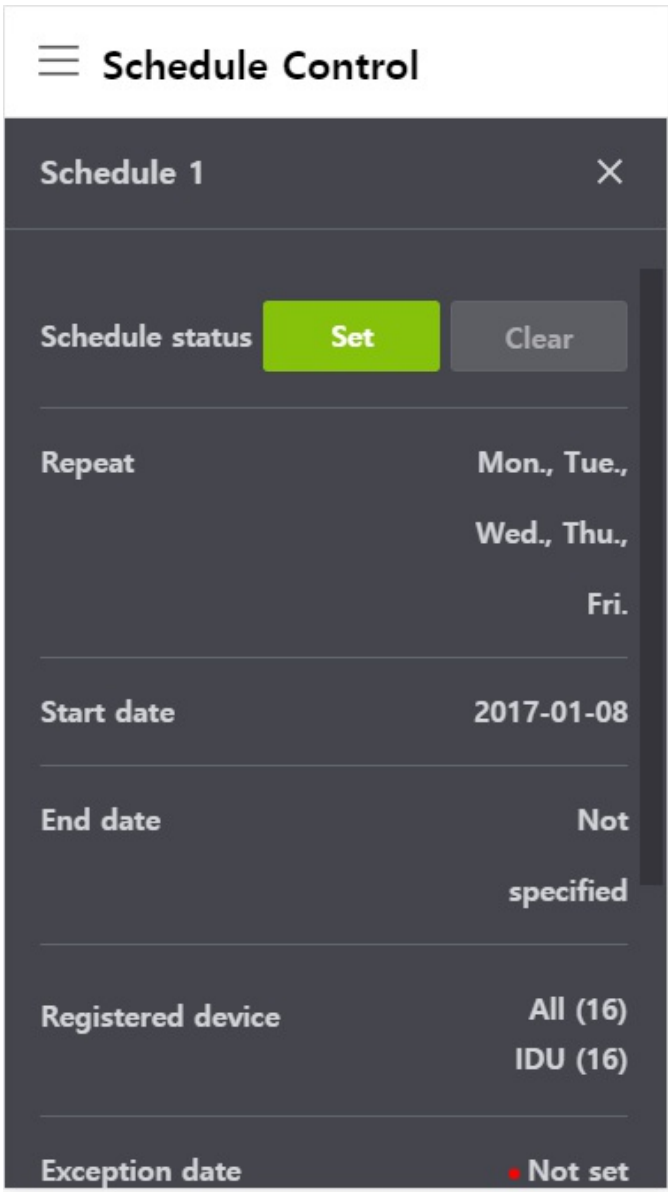
➡ Check schedule

## Check schedule

You can see all set schedules.



When you click Edit icon, you can check detail contents of the chedule.





## BACnet/Modbus Protocol

### Guide on BTL authentication

**You need to set BACnet to Type C to make the devices operate using the functions authenticated by BTL.**

BACnet Type A/B exists to maintain compatibility with existing products. If you set BACnet to Type A/B, the devices may use the functions not authenticated by BTL, making them to operate differently from the standard.

For BACnet Type settings, go to **[Usage (PC)] > [BACnet/Modbus Setting]** menu.

#### Operation method according to BACnet type

- Type A: It creates multiple devices, and the objects are included in the device of each equipment. Multiple devices respond using the same MAC address for their physical addresses.
- Type B: It creates multiple devices, and the objects are included in the device of each equipment. Devices respond with unique physical addresses.
- **Type C: It creates only one device, which includes all objects.**

※ **Caution: If you change the type, the device number may be changed, making it necessary to perform additional engineering with the BMS.**

ACP 5 can be linked with the BMS (Building Management System) that supports the BACnet IP/Modbus TCP protocol.  
The functions that can be controlled or monitored by the BMS vary depending on the protocol.

#### [BACnet]

- ➔ Commission
- ➔ Object List
- ➔ BIBBs
- ➔ PICS

#### [Modbus]

- ➔ Commission
- ➔ Function code
- ➔ Register List



## BACnet Commission

Commissioning is the process of verifying the subsystems to achieve the owner's project requirements as intended by the building owner and as designed by the building architects and engineers.

After ACP 5 installation, you can check the operation status of the device by using the web function before connection with the BMS system.

Creating of the Points. This is NOT to be done by LG since it is directly related to the BMS side. The BMS engineer is to carry out the engineering of the Point, however LG is responsible for providing the method of how the Points are calculated.

## Precautions

- To use BACnet feature, you must select **[Settings] > [BACnet/Modbus Setting] > [BACnet enable]** as **Set**.
- In case of installing 2 or more ACP 5, you must change **[Settings] > [BACnet/Modbus Setting] > [Device ID Setting]** so that the Device IDs are not duplicate among ACP 5. It is recommended that you keep a difference of 10 or more for different Device IDs.
- If Device Discover doesn't work well, change **[Settings] > [BACnet/Modbus Setting] > [BACnet Type Setting]**.
- It is recommended that you request ReadProperty/WriteProperty at an interval of 200 ms or more for each property.
- It is recommended that you request ReadPropertyMultiple/WritePropertyMultiple at an interval of 500 ms or more for each property.
- SubscribeCOV can be registered up to 1024.
- If ACP 5 and BMS are located on different networks, BBMD (BACnet/IP Broadcast Management Device) is needed.
- As ACP 5 does not support the BBMD function, a separate BBMD is required. You can register ACP 5 as a foreign device in BBMD using **[Settings] > [BACnet/Modbus Setting] > [Register as Foreign Device]** function.



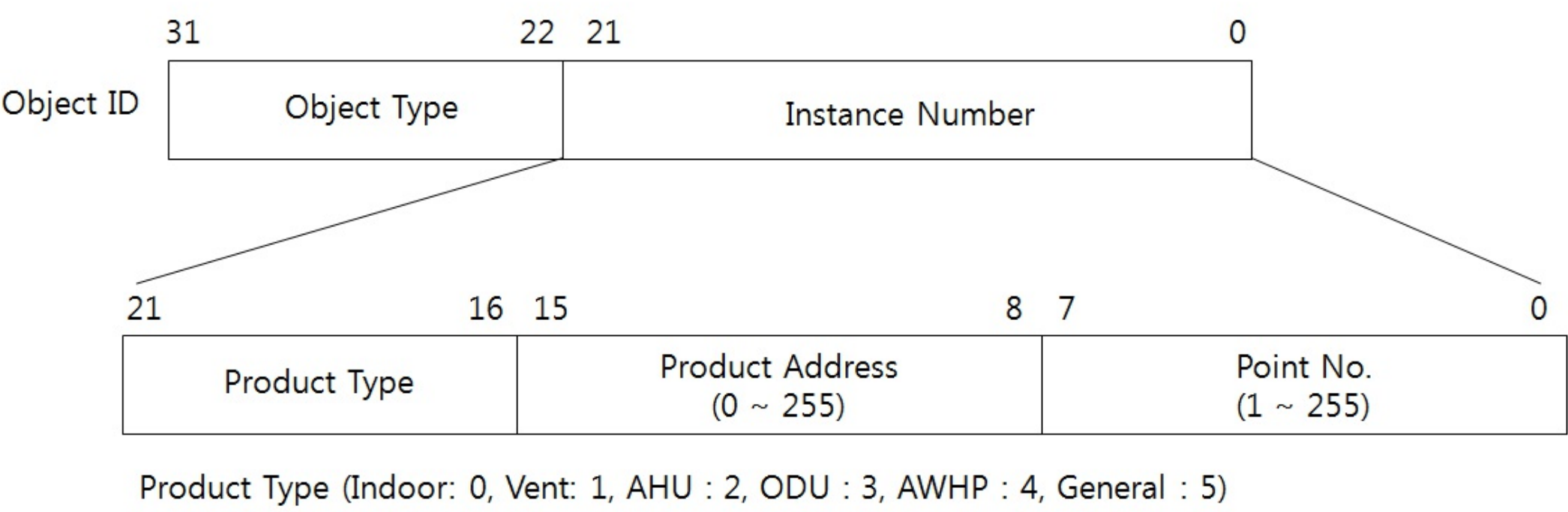
BACnet Object List

It describes the BACnet object list provided by ACP 5.

- ➔ Instance Number
- ➔ Indoor Unit Object List
- ➔ ERV Object List
- ➔ AHU Object List
- ➔ Outdoor Unit Object List
- ➔ Heating Object List
- ➔ General Object List

Definition of Instance Number

The instance number of each device is assigned as follows



Example of Instance Number

Description	Product Type	Product Address	Point	Instance Number
IDU Address 0x00, On/Off (Setting)	0	0	1	1
IDU Address 0x00, Operation Mode (Setting)	0	0	7	7
IDU Address 0x1B, On/Off (Setting)	0	27	1	6913
IDU Address 0x1B, Operation Mode (Setting)	0	27	7	6919
ERV Address 0x00, On/Off (Setting)	1	0	1	65537
ERV Address 0x00, Operation Mode (Setting)	1	0	7	65543
ERV Address 0x1B, On/Off (Setting)	1	27	1	72449
ERV Address 0x1B, Operation Mode (Setting)	1	27	7	72455
AHU Address 0x00, On/Off (Setting)	2	0	1	131073
AHU Address 0x00, Operation Mode (Setting)	2	0	7	131079
AHU Address 0x0F, On/Off (Setting)	2	15	1	134913
AHU Address 0x0F, Operation Mode (Setting)	2	15	7	134919
ODU Address 0x00, Compressor Operation	3	0	1	196609
ODU Address 0x00, Operation Mode	3	0	14	196622
ODU Address 0x0F, Compressor Operation	3	15	1	200449
ODU Address 0x0F, Operation Mode	3	15	14	200462
Heating Address 0x00, On/Off (Setting)	4	0	1	262145
Heating Address 0x00, Operation Mode (Setting)	4	0	5	262149
Heating Address 0x0F, On/Off (Setting)	4	15	1	265985
Heating Address 0x0F, Operation Mode (Setting)	4	15	5	265989
General Object, All Unit Run/Stop (Setting)	5	0	1	327681
General Object, All Unit Set Room Temperature (Setting)	5	0	2	327682

## Indoor Unit Object List

One Indoor unit has the following list of points. Some points may not be supported depending on the product.

[illegible]

36	Occupancy (Status)	OccupancyStatus_XXX	BI	-	Unoccupied (0)	Occupied (1)	-	-	-	-	-
37	2Set Cooling Set Temperature (Setting)	2SetCoolingTempCommand_XXX	AV	°C(°F)	10 °C ~ 37.5 °C (50 °F ~ 99 °F)						
38	2Set Cooling Set Temperature (Status)	2SetCoolingTempStatus_XXX	AI	°C(°F)	10 °C ~ 37.5 °C (50 °F ~ 99 °F)						
39	2Set Heating Set Temperature (Setting)	2SetHeatingTempCommand_XXX	AV	°C(°F)	4 °C ~ 32 °C (40 °F ~ 90 °F)						
40	2Set Heating Set Temperature (Status)	2SetHeatingTempStatus_XXX	AI	°C(°F)	4 °C ~ 32 °C (40 °F ~ 90 °F)						
41	2Set Cooling Upper Temperature (Setting)	2SetCoolingUpperLimitCommand_XXX	AV	°C(°F)	10 °C ~ 37.5 °C (50 °F ~ 99 °F)						
42	2Set Cooling Upper Temperature (Status)	2SetCoolingUpperLimitStatus_XXX	AI	°C(°F)	10 °C ~ 37.5 °C (50 °F ~ 99 °F)						
43	2Set Cooling Lower Temperature (Setting)	2SetHeatingUpperLimitCommand_XXX	AV	°C(°F)	4 °C ~ 32 °C (40 °F ~ 90 °F)						
44	2Set Cooling Lower Temperature (Status)	2SetHeatingUpperLimitStatus_XXX	AI	°C(°F)	4 °C ~ 32 °C (40 °F ~ 90 °F)						
45	2Set Heating Upper Temperature (Setting)	2SetCoolingLowerLimitCommand_XXX	AV	°C(°F)	10 °C ~ 37.5 °C (50 °F ~ 99 °F)						
46	2Set Heating Upper Temperature (Status)	2SetCoolingLowerLimitStatus_XXX	AI	°C(°F)	10 °C ~ 37.5 °C (50 °F ~ 99 °F)						
47	2Set Heating Lower Temperature (Setting)	2SetHeatingLowerLimitCommand_XXX	AV	°C(°F)	4 °C ~ 32 °C (40 °F ~ 90 °F)						
48	2Set Heating Lower Temperature (Status)	2SetHeatingLowerLimitStatus_XXX	AI	°C(°F)	4 °C ~ 32 °C (40 °F ~ 90 °F)						
49	Thermo Status (Status)	ThermoStatus_XXX	BI	-	Stop (0)	Start (1)	-	-	-	-	-
50	Accumulated Gas Distribution (Status)	AccumulatedGas(100 Watt)_XXX	AI	100 Liter	Gas values						
51	Dust Sensor Available (Status)	DustSensorAvail_XXX	BI	-	Disabled (0)	Enabled (1)	-	-	-	-	-
52	Air Cleaning Opereration (Setting)	AirCleaningOperCommand_XXX	BO	-	Stop (0)	Start (1)	-	-	-	-	-
53	Air Cleaning Opereration (Status)	AirCleaningOperStatus_XXX	BI	-	Stop (0)	Start (1)	-	-	-	-	-
54	PM10 (Status)	FineDustStatus_XXX	AI	µg/m³							
55	PM2.5 (Status)	UltraFineDustStatus_XXX	AI	µg/m³							
56	PM1.0 (Status)	SuperUltraFineDustStatus_XXX	AI	µg/m³							
57	Humidity (Status)	HumidityStatus_XXX	AI	%							
58	Comfort Cooling Available (Status)	ComfortCoolingAvail_XXX	BI	-	Disabled (0)	Enabled (1)	-	-	-	-	-
59	Comfort Cooling Opereration (Setting)	ComfortCoolingOperCommand_XXX	BO	-	Stop (0)	Start (1)	-	-	-	-	-
60	Comfort Cooling Opereration (Status)	ComfortCoolingOperStatus_XXX	BI	-	Stop (0)	Start (1)	-	-	-	-	-
61	Comfort Cooling Step (Setting)	ComfortCoolingStepCommand_XXX	AV	-	1 step ~ 3 step						
62	Comfort Cooling Step (Status)	ComfortCoolingStepStatus_XXX	AI	-	1 step ~ 3 step						
63	Human Detection Available (Status)	HumanDetectionAvail_XXX	BI	-	Disabled (0)	Enabled (1)	-	-	-	-	-
64	Human Detection Opereration (Setting)	HumanDetectionOperCommand_XXX	MO	-	-	Stop (1)	OnOffSaving (2)	TempSaving (3)	-	-	-
65	Human Detection Opereration (Status)	HumanDetectionOperStatus_XXX	MI	-	-	Stop (1)	OnOffSaving (2)	TempSaving (3)	-	-	-
66	Human Detection Wind (Setting)	HumanDetectionWindCommand_XXX	MO	-	-	Stop (1)	Direct (2)	Indirect (3)	-	-	-
67	Human Detection Wind (Status)	HumanDetectionWindStatus_XXX	MI	-	-	Stop (1)	Direct (2)	Indirect (3)	-	-	-
68	Human Detection Time (Setting)	HumanDetectionTimeCommand_XXX	MO	-	-	5 min (1)	10 min (2)	15 min (3)	30 min (4)	60 min (5)	90 min (6)
69	Human Detection Time (Status)	HumanDetectionTimeStatus_XXX	MI	-	-	5 min (1)	10 min (2)	15 min (3)	30 min (4)	60 min (5)	90 min (6)



## ERV Object List

One ERV has the following list of points. Some points may not be supported depending on the product.

[illegible]



35	Fan Lock (Status)	FanLockStatus_XXX	BI	-	Permit (0)	Prohibit (1)	-	-	-	-	-
36	NTFC Available (Status)	NtfcAvail_XXX	BI	-	Disabled (0)	Enabled (1)	-	-	-	-	-
37	NTFC Operation (Setting)	NtfcOperCommand_XXX	BO	-	Stop (0)	Start (1)	-	-	-	-	-
38	NTFC Operation (Status)	NtfcOperStatus_XXX	BI	-	Stop (0)	Start (1)	-	-	-	-	-
39	NTFC Lock (Setting)	NtfcLockCommand_XXX	BO	-	Permit (0)	Prohibit (1)	-	-	-	-	-
40	NTFC Lock (Status)	NtfcLockStatus_XXX	BI	-	Permit (0)	Prohibit (1)	-	-	-	-	-

## AHU Object List

One AHU has the following list of points. Some points may not be supported depending on the product.

Point	Description	Object Name(_XXX : Address)	Object Type	Unit	Text-0	Text-1	Text-2	Text-3	Text-4	Text-5	Text-6
1	On/Off (Setting)	StartStopCommand_XXX	BO	-	Stop (0)	Start (1)	-	-	-	-	-
2	On/Off (Status)	StartStopStatus_XXX	BI	-	Stop (0)	Start (1)	-	-	-	-	-
3	Lock (Setting)	LockCommand_XXX	BO	-	Permit (0)	Prohibit (1)	-	-	-	-	-
4	Lock (Status)	LockStatus_XXX	BI	-	Permit (0)	Prohibit (1)	-	-	-	-	-
5	Filter Sign	FilterSign_XXX	BI	-	Off (0)	On (1)	-	-	-	-	-
6	-	-	-	-	-						
7	Operation Mode (Setting)	AirConModeCommand_XXX	MO	-	-	Cool (1)	Dry (2)	Fan (3)	Heat (4)	Energy saving (5)	-
8	Operation Mode (Status)	AirConModeStatus_XXX	MI	-	-	Cool (1)	Dry (2)	Fan (3)	Heat (4)	Energy saving (5)	-
9	-	-	-	-	-						
10	-	-	-	-	-						
11	Fan Speed (Setting)	FanSpeedCommand_XXX	MO	-	-	High (1)	Middle (2)	Low (3)	-	-	-
12	Fan Speed (Status)	FanSpeedStatus_XXX	MI	-	-	High (1)	Middle (2)	Low (3)	-	-	-
13	Set Room Temperature	SetRoomTemp_XXX	AV	°C(°F)	18 °C ~ 30 °C (64 °F ~ 86 °F)						
14	Set Temperature (Status)	RoomTemp_XXX	AI	°C(°F)							
15	Alarm	Alarm_XXX	BI	-	Normal (0)	Abnormal (1)	-	-	-	-	-
16	Error Code	MalfunctionCode_XXX	AI	-	Please refer to LG error code list.						
17	-	-	-	-	-						
18	-	-	-	-	-						
19	Room Temperature	SetTempStatus_XXX	AI	°C(°F)	18 °C ~ 30 °C (64 °F ~ 86 °F)						
20	FireAlarm (Setting)	FireAlarmCommand_XXX	BO	-	Off (0)	On (1)	-	-	-	-	-
21	FireAlarm (Status)	FireAlarmStatus_XXX	BI	-	Off (0)	On (1)	-	-	-	-	-
22	Humidity (Setting)	SetHumidityCommand_XXX	AV	%	40 % ~ 60 %						
23	Humidity (Status)	SetHumidityStatus_XXX	AI	%	40 % ~ 60 %						
24	Humidify ON/OFF (Setting)	HumidifyCommand_XXX	BO	-	Stop (0)	Start (1)	-	-	-	-	-
25	Humidify ON/OFF (Status)	HumidifyStatus_XXX	BI	-	Stop (0)	Start (1)	-	-	-	-	-
26	Auto Ventilation ON/OFF (Setting)	AutoVentilCommand_XXX	BO	-	Stop (0)	Start (1)	-	-	-	-	-
27	Auto Ventilation ON/OFF (Status)	AutoVentilStatus_XXX	BI	-	Stop (0)	Start (1)	-	-	-	-	-
28	Supply Unit Temperature (Status)	SupplyTempStatus_XXX	AI	°C(°F)							
29	Outdoor Unit Temperature (Status)	OutdoorTempStatus_XXX	AI	°C(°F)							
30	Mix Unit Temperature (Status)	MixTempStatus_XXX	AI	°C(°F)							
31	Supply Unit Humidity (Status)	SupplyHumidifyStatus_XXX	AI	%							
32	Outdoor Unit Humidity (Status)	OutdoorHumidifyStatus_XXX	AI	%							
33	Ventilation Unit Humidity (Status)	VentilHumidifyStatus_XXX	AI	%							
34	CO2 Value (Status)	CO2ValueStatus_XXX	AI	-	0~255 (Real Value = Value*10, Example : In case Value is 20, CO2 is 20*10=200ppm)						
35	Humidity Unit ON/OFF (Status)	HumidifyUnitStatus_XXX	BI	-	Stop (0)	Start (1)	-	-	-	-	-
36	Heating Unit ON/OFF (Status)	HeaterUnitStatus_XXX	BI	-	Stop (0)	Start (1)	-	-	-	-	-
37	Ventilator FAN ON/OFF (Status)	VentilFanStatus_XXX	BI	-	Stop (0)	Start (1)	-	-	-	-	-
38	Supply Unit FAN ON/OFF (Status)	SupplyFanStatus_XXX	BI	-	Stop (0)	Start (1)	-	-	-	-	-
39	Current OA Damper (Status)	CurrOADamperStatus_XXX	AI	°	0 ° ~ 90 °						
40	Current EA Damper (Status)	CurrEADamperStatus_XXX	AI	°	0 ° ~ 90 °						
41	Current Mix Damper (Status)	CurrMixDamperStatus_XXX	AI	°	0 ° ~ 90 °						
42	Cooling OA Damper (Setting)	OADamperCoolCommand_XXX	AV	°	0 ° ~ 90 °						
43	Cooling OA Damper (Status))	OADamperCoolStatus_XXX	AI	°	0 ° ~ 90 °						
44	Cooling EA Damper (Setting)	EADamperCoolCommand_XXX	AV	°	0 ° ~ 90 °						

45	Cooling EA Damper (Status))	EADamperCoolStatus_XXX	AI	°	0 ° ~ 90 °
46	Cooling Mix Damper (Setting)	MixDamperCoolCommand_XXX	AV	°	0 ° ~ 90 °
47	Cooling Mix Damper (Status))	MixDamperCoolStatus_XXX	AI	°	0 ° ~ 90 °
48	Heating OA Damper (Setting)	OADamperHeatCommand_XXX	AV	°	0 ° ~ 90 °
49	Heating OA Damper (Status))	OADamperHeatStatus_XXX	AI	°	0 ° ~ 90 °
50	Heating EA Damper (Setting)	EADamperHeatCommand_XXX	AV	°	0 ° ~ 90 °
51	Heating EA Damper (Status))	EADamperHeatStatus_XXX	AI	°	0 ° ~ 90 °
52	Heating Mix Damper (Setting)	MixDamperHeatCommand_XXX	AV	°	0 ° ~ 90 °
53	Heating Mix Damper (Status))	MixDamperHeatStatus_XXX	AI	°	0 ° ~ 90 °
54	FAN OA Damper (Setting)	OADamperFanCommand_XXX	AV	°	0 ° ~ 90 °
55	FAN OA Damper (Status))	OADamperFanStatus_XXX	AI	°	0 ° ~ 90 °
56	FAN EA Damper (Setting)	EADamperFanCommand_XXX	AV	°	0 ° ~ 90 °
57	FAN EA Damper (Status))	EADamperFanStatus_XXX	AI	°	0 ° ~ 90 °
58	FAN Mix Damper (Setting)	MixDamperFanCommand_XXX	AV	°	0 ° ~ 90 °
59	FAN Mix Damper (Status))	MixDamperFanStatus_XXX	AI	°	0 ° ~ 90 °

## Outdoor unit Object List

One outdoor unit has the following list of points. Some points may not be supported depending on the product.

Point	Description	Object Name(_XXX : Address)	Object Type	Unit	Text-0	Text-1	Text-2	Text-3	Text-4	Text-5	Text-6
1	Compressor Operation	CompressorOperation_XXX	BI	-	Stop (0)	Start (1)	-	-	-	-	-
2	Refrigerant Type	RefrigerantType_XXX	MI	-	-	R407C (1)	R22 (2)	R410A (3)	-	-	-
3	Fan1 Frequency	Fan1Frequency_XXX	AI	rpm							
4	High Pressure	HighPressure_XXX	AI	kPa							
5	Low Pressure	LowPressure_XXX	AI	kPa							
6	Compressor Suction Temp	CompressorSunctionTemp_XXX	AI	°C(°F)							
7	Liquid Pipe Temp	LiquidPipeTemp_XXX	AI	°C(°F)							
8	Heat Exchange Temp	HeatExchangeTemp_XXX	AI	°C(°F)							
9	Outdoor Unit EEV	OutdoorUnitEEV_XXX	AI	-							
10	Over-cooler EEV	Over-coolerEEV_XXX	AI	-							
11	Hot Gas Valve	HotGasValue_XXX	BI	-	Off (0)	On (1)	-	-	-	-	-
12	Inverter Discharge Temp	InverterDischargeTemp_XXX	AI	°C(°F)							
13	Air Temp	AirTemp_XXX	AI	°C(°F)							
14	Operation Mode	OperationMode_XXX	MI	-	-	Stop (1)	Cool (2)	Heat (3)	-	-	-
15	Error Code	ErrorCode_XXX	AI	0~255							
16	Inverter1 Compressor Frequency	Inverter1CompressorFrequency_XXX	AI	rpm							
17	Inverter2 Compressor Frequency	Inverter2CompressorFrequency_XXX	AI	rpm							
18	Fan2 Frequency	Fan2Frequency_XXX	AI	rpm							
19	Inverter2 Discharge Temp	Inverter2DischargeTemp_XXX	AI	°C(°F)							
20	Std1 Discharge Temp	Std1DischargeTemp_XXX	AI	°C(°F)							
21	Std2 Discharge Temp	Std2DischargeTemp_XXX	AI	°C(°F)							
22	Upper Hex Temp	UpperHexTemp_XXX	AI	°C(°F)							
23	Lower Hex Temp	LowerHexTemp_XXX	AI	°C(°F)							
24	Sub Cool Pipe In Temp	SubCoolPipeInTemp_XXX	AI	°C(°F)							
25	Sub Cool Pipe Out Temp	SubCoolPipeOutTemp_XXX	AI	°C(°F)							
26	Sub EEV Pulse	SubEevPulse_XXX	AI	-							
27	Oil Equalizing EEV	OilEqualizingEEV_XXX	AI	-							
28	Vapor Injection EEV1	ViEev1_XXX	AI	-							
29	Vapor Injection EEV2	ViEev2_XXX	AI	-							
30	Inverter1 Heater	Inverter1Heater_XXX	BI	-	Off (0)	On (1)	-	-	-	-	-
31	Inverter2 Heater	Inverter2Heater_XXX	BI	-	Off (0)	On (1)	-	-	-	-	-
32	Inverter1 Oil Sensor	Inverter1OilSensor_XXX	BI	-	Not Detect Oil (0)	Detect Oil (1)	-	-	-	-	-
33	Inverter2 Oil Sensor	Inverter2OilSensor_XXX	BI	-	Not Detect Oil (0)	Detect Oil (1)	-	-	-	-	-
34	Inverter1 Backup	Inverter1Backup_XXX	BI	-	Not Used (0)	Used (1)	-	-	-	-	-
35	Inverter2 Backup	Inverter2Backup_XXX	BI	-	Not Used (0)	Used (1)	-	-	-	-	-
36	DDC	DDC_XXX	BI	-	Off (0)	On (1)	-	-	-	-	-
37-64	Additional Point for Master Outdoor Unit										
65	(Slave1) Compressor Operation	CompressorOperation_XXX	BI	-	Stop (0)	Start (1)	-	-	-	-	-
66	(Slave1) Refrigerant Type	RefrigerantType_XXX	MI	-	-	R407C (1)	R22 (2)	R410A (3)	-	-	-
67	(Slave1) Fan1 Frequency	Fan1Frequency_XXX	AI	rpm							
68	(Slave1) High Pressure	HighPressure_XXX	AI	kPa							

69	(Slave1) Low Pressure	LowPressure_XXX	A	kPa							
70	(Slave1) Compressor Suction Temp	CompressorSunctionTemp_XXX	AI	°C(°F)							
71	(Slave1) Liquid Pipe Temp	LiquidPipeTemp_XXX	AI	°C(°F)							
72	(Slave1) Heat Exchange Temp	HeatExchangeTemp_XXX	AI	°C(°F)							
73	(Slave1) Outdoor Unit EEV	OutdoorUnitEEV_XXX	AI	-							
74	(Slave1) Over-cooler EEV	Over-coolerEEV_XXX	AI	-							
75	(Slave1) Hot Gas Valve	HotGasValue_XXX	BI	-	Off (0)	On (1)	-	-	-	-	-
76	(Slave1) Inverter Discharge Temp	InverterDischargeTemp_XXX	AI	°C(°F)							
77	(Slave1) Air Temp	AirTemp_XXX	AI	°C(°F)							
78	(Slave1) Operation Mode	OperationMode_XXX	MI	-	-	Stop (1)	Cool (2)	Heat (3)	-	-	-
79	(Slave1) Error Code	ErrorCode_XXX	AI	0~255							
80	(Slave1) Inverter1 Compressor Frequency	Inverter1CompressorFrequency_XXX	AI	rpm							
81	(Slave1) Inverter2 Compressor Frequency	Inverter2CompressorFrequency_XXX	AI	rpm							
82	(Slave1) Fan2 Frequency	Fan2Frequency_XXX	AI	rpm							
83	(Slave1) Inverter2 Discharge Temp	Inverter2DischargeTemp_XXX	AI	°C(°F)							
84	(Slave1) Std1 Discharge Temp	Std1DischargeTemp_XXX	AI	°C(°F)							
85	(Slave1) Std2 Discharge Temp	Std2DischargeTemp_XXX	AI	°C(°F)							
86	(Slave1) Upper Hex Temp	UpperHexTemp_XXX	AI	°C(°F)							
87	(Slave1) Lower Hex Temp	LowerHexTemp_XXX	AI	°C(°F)							
88	(Slave1) Sub Cool Pipe In Temp	SubCoolPipeInTemp_XXX	AI	°C(°F)							
89	(Slave1) Sub Cool Pipe Out Temp	SubCoolPipeOutTemp_XXX	AI	°C(°F)							
90	(Slave1) Sub EEV Pulse	SubEevPulse_XXX	AI	-							
91	(Slave1) Oil Equalizing EEV	OilEqualizingEEV_XXX	AI	-							
92	(Slave1) Vapor Injection EEV1	ViEev1_XXX	AI	-							
93	(Slave1) Vapor Injection EEV2	ViEev2_XXX	AI	-							
94	(Slave1) Inverter1 Heater	Inverter1Heater_XXX	BI	-	Off (0)	On (1)	-	-	-	-	-
95	(Slave1) Inverter2 Heater	Inverter2Heater_XXX	BI	-	Off (0)	On (1)	-	-	-	-	-
96	(Slave1) Inverter1 Oil Sensor	Inverter1OilSensor_XXX	BI	-	Not Detect Oil (0)	Detect Oil (1)	-	-	-	-	-
97	(Slave1) Inverter2 Oil Sensor	Inverter2OilSensor_XXX	BI	-	Not Detect Oil (0)	Detect Oil (1)	-	-	-	-	-
98	(Slave1) Inverter1 Backup	Inverter1Backup_XXX	BI	-	Not Used (0)	Used (1)	-	-	-	-	-
99	(Slave1) Inverter2 Backup	Inverter2Backup_XXX	BI	-	Not Used (0)	Used (1)	-	-	-	-	-
100	(Slave1) DDC	DDC_XXX	BI	-	Off (0)	On (1)	-	-	-	-	-
101-128	Additional Point for Slave1 Outdoor Unit										
129	(Slave2) Compressor Operation	CompressorOperation_XXX	BI	-	Stop (0)	Start (1)	-	-	-	-	-
130	(Slave2) Refrigerant Type	RefrigerantType_XXX	MI	-	-	R407C (1)	R22 (2)	R410A (3)	-	-	-
131	(Slave2) Fan1 Frequency	Fan1Frequency_XXX	AI	rpm							
132	(Slave2) High Pressure	HighPressure_XXX	AI	kPa							
133	(Slave2) Low Pressure	LowPressure_XXX	AI	kPa							
134	(Slave2) Compressor Suction Temp	CompressorSunctionTemp_XXX	AI	°C(°F)							
135	(Slave2) Liquid Pipe Temp	LiquidPipeTemp_XXX	AI	°C(°F)							
136	(Slave2) Heat Exchange Temp	HeatExchangeTemp_XXX	AI	°C(°F)							
137	(Slave2) Outdoor Unit EEV	OutdoorUnitEEV_XXX	AI	-							
138	(Slave2) Over-cooler EEV	Over-coolerEEV_XXX	AI	-							
139	(Slave2) Hot Gas Valve	HotGasValue_XXX	BI	-	Off (0)	On (1)	-	-	-	-	-
140	(Slave2) Inverter Discharge Temp	InverterDischargeTemp_XXX	AI	°C(°F)							
141	(Slave2) Air Temp	AirTemp_XXX	AI	°C(°F)							

142	(Slave2) Operation Mode	OperationMode_XXX	MI	-	-	Stop (1)	Cool (2)	Heat (3)	-	-	-
143	(Slave2) Error Code	ErrorCode_XXX	AI	0~255							
144	(Slave2) Inverter1 Compressor Frequency	Inverter1CompressorFrequency_XXX	AI	rpm							
145	(Slave2) Inverter2 Compressor Frequency	Inverter2CompressorFrequency_XXX	AI	rpm							
146	(Slave2) Fan2 Frequency	Fan2Frequency_XXX	AI	rpm							
147	(Slave2) Inverter2 Discharge Temp	Inverter2DischargeTemp_XXX	AI	°C(°F)							
148	(Slave2) Std1 Discharge Temp	Std1DischargeTemp_XXX	AI	°C(°F)							
149	(Slave2) Std2 Discharge Temp	Std2DischargeTemp_XXX	AI	°C(°F)							
150	(Slave2) Upper Hex Temp	UpperHexTemp_XXX	AI	°C(°F)							
151	(Slave2) Lower Hex Temp	LowerHexTemp_XXX	AI	°C(°F)							
152	(Slave2) Sub Cool Pipe In Temp	SubCoolPipeInTemp_XXX	AI	°C(°F)							
153	(Slave2) Sub Cool Pipe Out Temp	SubCoolPipeOutTemp_XXX	AI	°C(°F)							
154	(Slave2) Sub EEV Pulse	SubEevPulse_XXX	AI	-							
155	(Slave2) Oil Equalizing EEV	OilEqualizingEEV_XXX	AI	-							
156	(Slave2) Vapor Injection EEV1	ViEev1_XXX	AI	-							
157	(Slave2) Vapor Injection EEV2	ViEev2_XXX	AI	-							
158	(Slave2) Inverter1 Heater	Inverter1Heater_XXX	BI	-	Off (0)	On (1)	-	-	-	-	-
159	(Slave2) Inverter2 Heater	Inverter2Heater_XXX	BI	-	Off (0)	On (1)	-	-	-	-	-
160	(Slave2) Inverter1 Oil Sensor	Inverter1OilSensor_XXX	BI	-	Not Detect Oil (0)	Detect Oil (1)	-	-	-	-	-
161	(Slave2) Inverter2 Oil Sensor	Inverter2OilSensor_XXX	BI	-	Not Detect Oil (0)	Detect Oil (1)	-	-	-	-	-
162	(Slave2) Inverter1 Backup	Inverter1Backup_XXX	BI	-	Not Used (0)	Used (1)	-	-	-	-	-
163	(Slave2) Inverter2 Backup	Inverter2Backup_XXX	BI	-	Not Used (0)	Used (1)	-	-	-	-	-
164	(Slave2) DDC	DDC_XXX	BI	-	Off (0)	On (1)	-	-	-	-	-
165-192	Additional Point for Slave2 Outdoor Unit										
193	(Slave3) Compressor Operation	CompressorOperation_XXX	BI	-	Stop (0)	Start (1)	-	-	-	-	-
194	(Slave3) Refrigerant Type	RefrigerantType_XXX	MI	-	-	R407C (1)	R22 (2)	R410A (3)	-	-	-
195	(Slave3) Fan1 Frequency	Fan1Frequency_XXX	AI	rpm							
196	(Slave3) High Pressure	HighPressure_XXX	AI	kPa							
197	(Slave3) Low Pressure	LowPressure_XXX	AI	kPa							
198	(Slave3) Compressor Suction Temp	CompressorSunctionTemp_XXX	AI	°C(°F)							
199	(Slave3) Liquid Pipe Temp	LiquidPipeTemp_XXX	AI	°C(°F)							
200	(Slave3) Heat Exchange Temp	HeatExchangeTemp_XXX	AI	°C(°F)							
201	(Slave3) Outdoor Unit EEV	OutdoorUnitEEV_XXX	AI	-							
202	(Slave3) Over-cooler EEV	Over-coolerEEV_XXX	AI	-							
203	(Slave3) Hot Gas Valve	HotGasValue_XXX	BI	-	Off (0)	On (1)	-	-	-	-	-
204	(Slave3) Inverter Discharge Temp	InverterDischargeTemp_XXX	AI	°C(°F)							
205	(Slave3) Air Temp	AirTemp_XXX	AI	°C(°F)							
206	(Slave3) Operation Mode	OperationMode_XXX	MI	-	-	Stop (1)	Cool (2)	Heat (3)	-	-	-
207	(Slave3) Error Code	ErrorCode_XXX	AI	0~255							
208	(Slave3) Inverter1 Compressor Frequency	Inverter1CompressorFrequency_XXX	AI	rpm							
209	(Slave3) Inverter2 Compressor Frequency	Inverter2CompressorFrequency_XXX	AI	rpm							
210	(Slave3) Fan2 Frequency	Fan2Frequency_XXX	AI	rpm							
211	(Slave3) Inverter2 Discharge Temp	Inverter2DischargeTemp_XXX	AI	°C(°F)							
212	(Slave3) Std1 Discharge Temp	Std1DischargeTemp_XXX	AI	°C(°F)							

213	(Slave3) Std2 Discharge Temp	Std2DischargeTemp_XXX	AI	°C(°F)							
214	(Slave3) Upper Hex Temp	UpperHexTemp_XXX	AI	°C(°F)							
215	(Slave3) Lower Hex Temp	LowerHexTemp_XXX	AI	°C(°F)							
216	(Slave3) Sub Cool Pipe In Temp	SubCoolPipeInTemp_XXX	AI	°C(°F)							
217	(Slave3) Sub Cool Pipe Out Temp	SubCoolPipeOutTemp_XXX	AI	°C(°F)							
218	(Slave3) Sub EEV Pulse	SubEevPulse_XXX	AI	-							
219	(Slave3) Oil Equalizing EEV	OilEqualizingEEV_XXX	AI	-							
220	(Slave3) Vapor Injection EEV1	ViEev1_XXX	AI	-							
221	(Slave3) Vapor Injection EEV2	ViEev2_XXX	AI	-							
222	(Slave3) Inverter1 Heater	Inverter1Heater_XXX	BI	-	Off (0)	On (1)	-	-	-	-	-
223	(Slave3) Inverter2 Heater	Inverter2Heater_XXX	BI	-	Off (0)	On (1)	-	-	-	-	-
224	(Slave3) Inverter1 Oil Sensor	Inverter1OilSensor_XXX	BI	-	Not Detect Oil (0)	Detect Oil (1)	-	-	-	-	-
225	(Slave3) Inverter2 Oil Sensor	Inverter2OilSensor_XXX	BI	-	Not Detect Oil (0)	Detect Oil (1)	-	-	-	-	-
226	(Slave3) Inverter1 Backup	Inverter1Backup_XXX	BI	-	Not Used (0)	Used (1)	-	-	-	-	-
227	(Slave3) Inverter2 Backup	Inverter2Backup_XXX	BI	-	Not Used (0)	Used (1)	-	-	-	-	-
228	(Slave3) DDC	DDC_XXX	BI	-	Off (0)	On (1)	-	-	-	-	-
229-256	Additional Point for Slave3 Outdoor Unit										



## Heating Object List

One Heating has the following list of points. Some points may not be supported depending on the product.

Point	Description	Object Name(_XXX : Address)	Object Type	Unit	Text-0	Text-1	Text-2	Text-3	Text-4	Text-5	Text-6
1	On/Off (Setting)	StartStopCommand_XXX	BO	-	Stop (0)	Start (1)	-	-	-	-	-
2	On/Off (Status)	StartStopStatus_XXX	BI	-	Stop (0)	Start (1)	-	-	-	-	-
3	Lock (Setting)	LockCommand_XXX	BO	-	Permit (0)	Prohibit (1)	-	-	-	-	-
4	Lock (Status)	LockStatus_XXX	BI	-	Permit (0)	Prohibit (1)	-	-	-	-	-
5	Operation Mode (Setting)	AirConModeCommand_XXX	MO	-	-	Cool (1)	Heat (2)	Auto (3)	-	-	-
6	Operation Mode (Status)	AirConModeStatus_XXX	MI	-	-	Cool (1)	Heat (2)	Auto (3)	-	-	-
7	Set Room Temperature (Setting)	SetRoomTempCommand_XXX	AV	°C(°F)	16 °C ~ 30 °C (60 °F ~ 86 °F)						
8	Set Room Temperature (Status)	SetRoomTempStatus_XXX	AI	°C(°F)	16 °C ~ 30 °C (60 °F ~ 86 °F)						
9	Set Hot Water Temperature (Setting)	SetHotWaterTempCommand_XXX	AV	°C(°F)	30 °C ~ 80 °C (86 °F ~ 176 °F)						
10	Set Hot Water Temperature (Status)	SetHotWaterTempStatus_XXX	AI	°C(°F)	30 °C ~ 80 °C (86 °F ~ 176 °F)						
11	Set PipeOut Water Temperature (Setting)	SetPipeOutWaterTempCommand_XXX	AV	°C(°F)	6 °C ~ 80 °C (42 °F ~ 176 °F)						
12	Set PipeOut Water Temperature (Status)	SetPipeOutWaterTempStatus_XXX	AI	°C(°F)	6 °C ~ 80 °C (42 °F ~ 176 °F)						
13	Setting Temperature Reference (Air/Water)	AirWaterFlag_XXX	BI	-	Air (0)	Water (1)	-	-	-	-	-
14	Hot Water Only Mode	HotWaterOnlyFlag_XXX	BI	-	Normal (0)	Hot Water Only (1)	-	-	-	-	-
15	Set Temperature (Status)	RoomTemp_XXX	AI	°C(°F)							
16	Alarm	Alarm_XXX	BI	-	Normal (0)	Abnormal (1)	-	-	-	-	-
17	Error Code	MalfunctionCode_XXX	AI	-	Please refer to LG error code list.						
18	HotWater On/Off (Setting)	HotWaterCommand_XXX	BO	-	Stop (0)	Start (1)	-	-	-	-	-
19	HotWater On/Off (Status)	HotWaterStatus_XXX	BI	-	Stop (0)	Start (1)	-	-	-	-	-
20	Pipe Inlet Temperature Status	PipeInTempStatus_XXX	AI	°C(°F)							
21	Water Tank Temperature Status	TankTempStatus_XXX	AI	°C(°F)							
22	Solar Temperature Status	SolarTempStatus_XXX	AI	°C(°F)							
23	Pipe Outlet Temperature tatus	PipeOutTempStatus_XXX	AI	°C(°F)							
24	Accumulated Power Distribution (Status)	Accumulated power(100 Watt)_XXX	AI	100 Watt	Wattage values						

### General Object List

This is the list of BACnet objects provided for the general information. Some points may not be supported depending on the product.

Point	Description	Object Name(_XXX : Address)	Object Type	Unit	Text-0	Text-1	Text-2	Text-3	Text-4	Text-5	Text-6
1	All Unit Run/Stop (Setting)	AllStartStopCommand	BO	-	Stop (0)	Start (1)	-	-	-	-	-
2	All Unit Set Room Temperature (Setting)	AllSetRoomTempCommand	AV	°C(°F)	18 °C ~ 30 °C (64 °F ~ 86 °F)						
3	All Unit Temperature Lock (Setting)	AllTempLockCommand	BO	-	Permit (0)	Prohibit (1)	-	-	-	-	-
4	Total Accumulated Power (Status)	TotalAccumulatedPower	AI	100 Watt	Wattage values						
5	Peak Control Operation (Setting)	PeakStartStopCommand	BO	-	Stop (0)	Start (1)	-	-	-	-	-
6	Peak Control Operation (Status)	PeakStartStopStatus	BI	-	Stop (0)	Start (1)	-	-	-	-	-
7	Peak Shift Time(Setting)	PeakShiftTimeCommand	AV	min	5 min ~ 15 min						
8	Peak Shift Time(Status)	PeakShiftTimeStatus	AI	min	5 min ~ 15 min						
9	Peak Target Ratio(Setting)	PeakTargetCommand	AV	%	0 % ~ 100 %						
10	Peak Target Ratio(Status)	PeakTargetStatus	AI	%	0 % ~ 100 %						
11	Peak Current Running Ratio(Status)	PeakCurrentStatus	AI	%	0 % ~ 100 %						
12	Remote Shutdown(Setting)	RemoteShutDownCommand	BO	-	Normal (0)	Shutdown (1)	-	-	-	-	-
13	Temperature Unit Setting (Setting)	TempUnitCommand	BO	-	°C (0)	°F (1)	-	-	-	-	-
14	Temperature Unit Setting (Status)	TempUnitStatus	BI	-	°C (0)	°F (1)	-	-	-	-	-

## BIBBs

BACnet Interoperability Building Blocks

Alarm and Event Management, Scheduling, Trending and Network Security BIBBs are not supported.

## Data Sharing BIBBs

(□:Not supported, ■: Supported)

BIBB Type		Supported	Service	Initiate	Execute
DS-RP-A	Data Sharing-ReadProperty-A	□	ReadProperty	X	
DS-RP-B	Data Sharing-ReadProperty-B	■	ReadProperty		X
DS-RPM-A	Data Sharing-ReadPropertyMultiple-A	□	ReadPropertyMultiple	X	
DS-RPM-B	Data Sharing-ReadPropertyMultiple-B	■	ReadPropertyMultiple		X
DS-RPC-A	Data Sharing-ReadPropertyConditional-A	□	ReadPropertyConditional	X	
DS-RPC-B	Data Sharing-ReadPropertyConditional-B	□	ReadPropertyConditional		X
DS-WP-A	Data Sharing-WriteProperty-A	□	WriteProperty	X	
DS-WP-B	Data Sharing-WriteProperty-B	■	WriteProperty		X
DS-WPM-A	Data Sharing-WritePropertyMultiple-A	□	WritePropertyMultiple	X	
DS-WPM-B	Data Sharing-WritePropertyMultiple-B	■	WritePropertyMultiple		X
DS-COV-A	Data Sharing-Change Of Value-A	□	SubscribeCOV	X	
			ConfirmedCOVNotification		X
			UnconfirmedCOVNotification		X
DS-COV-B	Data Sharing-Change Of Value-B	■	SubscribeCOV		X
			ConfirmedCOVNotification	X	
			UnconfirmedCOVNotification	X	
DS-COVP-A	Data Sharing-Change Of Value Property-A	□	SubscribeCOVProperty	X	
			ConfirmedCOVNotification		X
			UnconfirmedCOVNotification		X
DS-COVP-B	Data Sharing-Change Of Value Property-B	□	SubscribeCOVProperty		X
			ConfirmedCOVNotification	X	
			UnconfirmedCOVNotification	X	
DS-COVU-A	Data Sharing-Change Of Value Unsubscribed-A	□	UnconfirmedCOVNotification		X
DS-COVU-B	Data Sharing-Change Of Value Unsubscribed-B	□	UnconfirmedCOVNotification	X	

## Device and Network Management BIBBs

(□:Not supported, ■: Supported)

BIBB Type		Supported	Service	Initiate	Execute
DM-DDB-A	Device Management-Dynamic Device Binding-A	□	Who-Is	X	
			I-Am		X
DM-DDB-B	Device Management-Dynamic Device Binding-B	■	Who-Is		X
			I-Am	X	
DM-DOB-A	Device Management-Dynamic Object Binding-A	□	Who-Has	X	
			I-Have		X
DM-DOB-B	Device Management-Dynamic Object Binding-B	■	Who-Has		X
			I-Have	X	
DM-DCC-A	Device Management-DeviceCommunicationControl-A	□	DeviceCommunicationControl	X	
DM-DCC-B	Device Management-DeviceCommunicationControl-B	■	DeviceCommunicationControl		X
DM-TS-A	Device Management-TimeSynchronization-A	□	TimeSynchronization	X	

DM-TS-B	Device Management-TimeSynchronization-B	■	TimeSynchronization		X
---------	-----------------------------------------	---	---------------------	--	---

PICS

BACnet Protocol Implementation Conformance Statement

Vendor Name

LG Electronics Inc.

Product Name

ACP 5

Product Description

This gateway converts between BACnet IP and RS-485 LGAP (LG Aircon protocol) allowing third party control and monitoring of the LG A/C system.

It has a built in web server that does not require any additional software.

BACnet Standardized Device Profile (Annex L)

BACnet Application Specific Controller (B-ASC)

Segmentation Capability

Segmented responses supported Window Size - 64

Standard Object Types Supported

Object-Type	Dynamically Creatable	Dynamically Deletable	Optional Properties Supported	Writable Properties
Device	No	No	Location, Description, Max Segments Accepted, APDU Segment Timeout, Active COV Subscriptions, Profile Name	N/A
Analog Input	No	No	Description, Reliability, Min Pres Value, Max Pres Value, Resolution, COV Increment	N/A
Analog Value	No	No	Description, Reliability, Resolution, COV Increment	Present_Value
Binary Input	No	No	Description, Reliability, Inactive Text, Active Text	N/A
Binary Output	No	No	Description, Reliability, Inactive Text, Active Text	Present_Value
Binary Value	No	No	Description, Reliability, Inactive Text, Active Text	Present_Value
Multi-State Input	No	No	Description, Reliability, State Text	N/A
Multi-State Output	No	No	Description, Reliability, State Text	Present_Value

Data Link Layer Options

BACnet IP, (Annex J), Foreign Device - IPv4 only, IPv6 not supported

Device Address Binding

Static device binding is not supported.

Character Sets Supported

ANSI x 3.4



## Modbus Commission

Commissioning is the process of verifying the subsystems to achieve the owner's project requirements as intended by the building owner and as designed by the building architects and engineers.

After ACP 5 installation, you can check the operation status of the device by using the web function before connection with the BMS system.

Creating of the Points. This is NOT to be done by LG since it is directly related to the BMS side. The BMS engineer is to carry out the engineering of the Point, however LG is responsible for providing the method of how the Points are calculated.

## Precautions

- To use the Modbus feature, you must select **[Settings] > [BACnet/Modbus Setting] > [Modbus TCP enable]** as **Set**.
- In case of installing 2 or more ACP 5, you must change **[Settings] > [BACnet/Modbus Setting] > [Vnet Number Setting]** so that the Vnet Numbers are not duplicate among ACP 5.
- The Vnet number is used as a Slave ID of the Modbus protocol and can be set to a value from 1 to 247.
- The Read Single Coils command (Function Code 1) can read up to 2,000 commands at a time. The Read Holding Registers command (Function Code 3) can read up to 125 at a time.



## Supported Function Codes

The Modbus function codes supported by ACP 5 are as follows:

Refer to the Register List page for controlled/monitored items supported by each function code.

- 0x01
- 0x03
- 0x05
- 0x06





## Modbus Register List

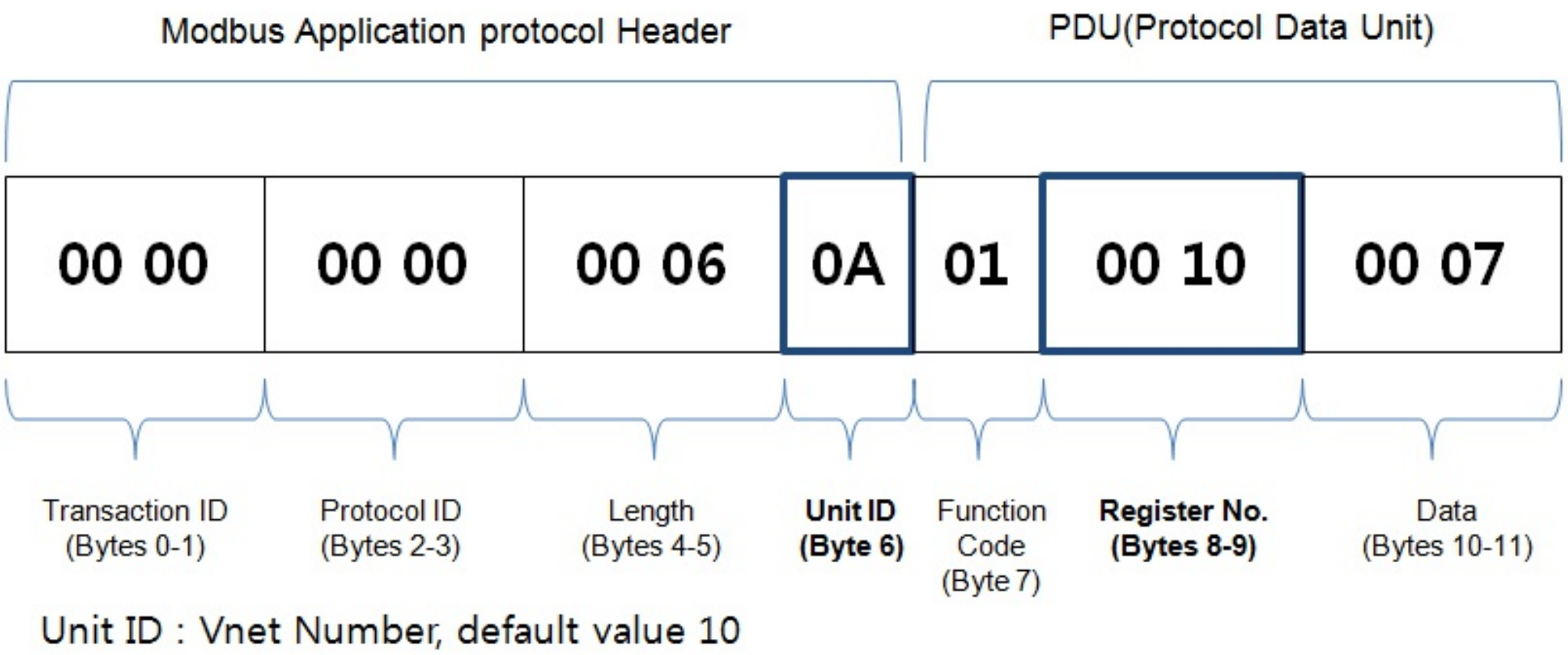
It describes the Modbus Register List provided by ACP 5.

- ➔ Definition of Register Address
- ➔ Indoor Unit Register List
- ➔ ERV Register List
- ➔ AHU Register List
- ➔ Heating Register List

Definition of Register Address

The Register Address of each device is assigned as follows.

- Protocol Configuration



- Register No.



Example of Register Address

Description of Register	Product Type (Hexadecimal)	Product Address (Hexadecimal)	Point (Hexadecimal)	Function Code(Hexadecimal)	Register Address (Hexadecimal)
IDU Address 0x00, On/Off	0x0	0x00	0x1	0x1 / 0x5	0x0000
IDU Address 0x00, Operation Mode	0x0	0x00	0x1	0x3 / 0x6	0x0000
IDU Address 0x1B, On/Off	0x0	0x1B	0x1	0x1 / 0x5	0x01B0
IDU Address 0x1B, Operation Mode	0x0	0x1B	0x1	0x3 / 0x6	0x01B0
ERV Address 0x00, On/Off	0x4	0x00	0x1	0x1 / 0x5	0x4000
ERV Address 0x00, Operation Mode	0x4	0x00	0x1	0x3 / 0x6	0x4000
ERV Address 0x1B, On/Off	0x4	0x1B	0x1	0x1 / 0x5	0x41B0
ERV Address 0x1B, Operation Mode	0x4	0x1B	0x1	0x3 / 0x6	0x41B0
AHU Address 0x00, On/Off	0x8	0x00	0x1	0x1 / 0x5	0x8000
AHU Address 0x00, Operation Mode	0x8	0x00	0x1	0x3 / 0x6	0x8000
AHU Address 0x00, Current OA Damper	0x8	0x01	0x1	0x3	0x8010
AHU Address 0x0F, On/Off	0x8	0x1E	0x1	0x1 / 0x5	0x81E0
AHU Address 0x0F, Operation Mode	0x8	0x1E	0x1	0x3 / 0x6	0x81E0
AHU Address 0x0F, Current OA Damper	0x8	0x1F	0x1	0x3	0x81F0
Heating Address 0x00, On/Off	0xC	0x00	0x1	0x1 / 0x5	0xC000
Heating Address 0x00, Operation Mode	0xC	0x00	0x1	0x3 / 0x6	0xC000
Heating Address 0x0F, On/Off	0xC	0x0F	0x1	0x1 / 0x5	0xC0F0
Heating Address 0x0F, Operation Mode	0xC	0x0F	0x1	0x3 / 0x6	0xC0F0



One Indoor unit has the following list of points. Some points may not be supported depending on the product.

Point	Description	Function Code	Unit	Text-0	Text-1	Text-2	Text-3	Text-4	Text-5	Text-6
1	On/Off	01/05	-	Stop (0)	Start (1)	-	-	-	-	-
2	Lock	01/05	-	Permit (0)	Prohibit (1)	-	-	-	-	-
3	Filter	01/05	-	Off (0)	On (1)	-	-	-	-	-
4	Alarm	01	-	Normal (0)	Abnormal (1)	-	-	-	-	-
5	AC ON/OFF	01/05	-	Stop (0)	Start (1)	-	-	-	-	-
6	AC Humidify	01/05	-	Stop (0)	Start (1)	-	-	-	-	-
1	Operation Mode	03/06	-	-	Heat Exchange (1)	Auto (2)	Normal (3)	-	-	-
2	Fan Speed	03/06	-	-	Low (1)	High (2)	Super High (3)	Auto (4)	-	-
3	User Mode	03/06	-	-	Quick fresh (1)	Energy saving (2)	Clear (3)	-	-	-
4	Error Code	03	-	Please refer to LG error code list.						
5	AC Operation Mode	03/06	-	-	Cool (1)	Auto (2)	Heat (3)	-	-	-
6	Set Room Temperature	03/06	℃	16 ℃ ~ 30 ℃ (60 ℉ ~ 86 ℉)						

## AHU Register List

One AHU has the following list of points. Some points may not be supported depending on the product.

Due to the limited number of points, One AHU device uses two product addresses. Refer to the Definition of Register Address page for the detail information.

Point	Description	Function Code	Unit	Text-0	Text-1	Text-2	Text-3	Text-4	Text-5	Text-6
Product Address X 2										
1	On/Off	01/05	-	Stop (0)	Start (1)	-	-	-	-	-
2	Lock	01/05	-	Permit (0)	Prohibit (1)	-	-	-	-	-
3	Filter	01	-	Off (0)	On (1)	-	-	-	-	-
4	FireAlarm	01/05	-	Off (0)	On (1)	-	-	-	-	-
5	Humidity Oper	01/05	-	Stop (0)	Start (1)	-	-	-	-	-
6	Auto Ventilation ON/OFF	01/05	-	Stop (0)	Start (1)	-	-	-	-	-
7	Humidify ON/OFF Status	01	-	Stop (0)	Start (1)	-	-	-	-	-
8	Heater ON/OFF Status	01	-	Stop (0)	Start (1)	-	-	-	-	-
9	Ventilator FAN ON/OFF	01	-	Stop (0)	Start (1)	-	-	-	-	-
10	Supply Unit FAN ON/OFF	01	-	Stop (0)	Start (1)	-	-	-	-	-
11	Alarm	01	-	Normal (0)	Abnormal (1)	-	-	-	-	-
1	Operation Mode	03/06	-	-	Cool (1)	Dry (2)	Fan (3)	Energy saving (4)	Heat (5)	-
2	Set Room Temperature	03/06	℃	16 ℃ ~ 30 ℃ (60 °F ~ 86 °F)						
3	Supply Unit Temperature	03	℃							
4	Outdoor Unit Temperature	03	℃							
5	Ventilation UnitTemperature	03	℃							
6	Mix Unit Temperature	03	℃							
7	Set Humidity	03/06	%	40 % ~ 60 %						
8	Supply Unit Humidity	03	%							
9	Outdoor Unit Humidity	03	%							
10	Ventilation Unit Humidity	03	%							
11	CO2 Value	03	-	0~255 (Real Value = Value*10, Example : In case Value is 20, CO2 is 20*10=200ppm)						
12	Error Code	03	-	Please refer to LG error code list.						
Product Address X 2 + 1										
1	Current OA Damper	03	°							
2	Current EA Damper	03	°							
3	Current Mix Damper	03	°							
4	Cooling OA Damper	03/06	°	0 ° ~ 90 °						
5	Cooling EA Damper	03/06	°	0 ° ~ 90 °						
6	Cooling Mix Damper	03/06	°	0 ° ~ 90 °						
7	Heating OA Damper	03/06	°	0 ° ~ 90 °						
8	Heating EA Damper	03/06	°	0 ° ~ 90 °						
9	Heating Mix Damper	03/06	°	0 ° ~ 90 °						
10	FAN OA Damper	03/06	°	0 ° ~ 90 °						
11	FAN EA Damper	03/06	°	0 ° ~ 90 °						
12	FAN Mix Damper	03/06	°	0 ° ~ 90 °						





This product from LG Electronics, Inc. ("LGE") contains the open source software detailed below. Please refer to the indicated open source licenses (as are included following this notice) for the terms and conditions of their use.

Open Source	License	Copyright
<a href="#">apmd 3.2.2-14</a>	<a href="#">GPL-2.0</a>	Copyright (c) 1996, Rik E. Faith Copyright (c) 1999, Avery Pennarun
<a href="#">avahi 0.6.31</a>	<a href="#">LGPL-2.1</a>	
<a href="#">bash 3.2.48</a>	<a href="#">GPL-2.0</a>	Copyright (c) 2007, 2009, 2011, 2014 Free Software Foundation, Inc.
<a href="#">BusyBox 1.23.1</a>	<a href="#">GPL-2.0</a>	Copyright (c) 1999-2004 by Erik Andersen. Copyright (c) 2005-2006 Rob Landley
<a href="#">coreutils 6.9</a>	<a href="#">GPL-2.0</a>	
<a href="#">cpufrequtils 008</a>	<a href="#">GPL-2.0</a>	Copyright (c) 2009 Thomas Renninger <trenn@suse.de>, Novell Inc. Copyright (c) 2008 Christian Kornacker <ckornacker@suse.de> Copyright (c) 2002-2003, by Mike Gleason, NcFTP Software.
<a href="#">cryptodev-linux 1.6</a>	<a href="#">GPL-2.0</a>	Copyright (c) 2004 Michal Ludvig <mludvig@logix.net.nz>, SuSE Labs Copyright (c) Nikos Mavrogiannopoulos Copyright (c) Michael Weiser Copyright (c) Phil Sutter Copyright (c) Dmitry Kasatkin
<a href="#">delphionrails trunk-20120505-svn</a>	<a href="#">MPL-1.1</a>	Copyright (c) 2000 Eazel, Inc. Copyright (c) 2005-2006 Red Hat, Inc. Copyright (c) 1991-1992 RSA Data Security, Inc. Copyright (c) 1994-2008 Lua.org, PUC-Rio
<a href="#">dosfstools 2.11</a>	<a href="#">GPL-2.0</a>	(c) 2004-2015 Canonical Ltd
<a href="#">e2fsprogs 1.42.9</a>	<a href="#">GPL-2.0</a>	Copyright 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010 by Theodore Ts'o
<a href="#">ethtool 3.16</a>	<a href="#">GPL-2.0</a>	Copyright (C) 1998 David S. Miller (davem@dm.cobaltmicro.com) Portions Copyright 2001 Sun Microsystems Kernel 2.4 update Copyright 2001 Jeff Garzik Wake-on-LAN,natsemi,misc support by Tim Hockin Portions Copyright 2002 Intel Portions Copyright (C) Sun Microsystems 2008 do_test support by Eli Kupermann ETHTOOL_PHYS_ID support by Chris Leech e1000 support by Scott Feldman e100 support by Wen Tao ixgb support by Nicholas Nunley amd8111e support by Reeja John long arguments by Andi Kleen. SMSC LAN911x support by Steve Glendinning Rx Network Flow Control configuration support Various features by Ben Hutchings ; Copyright 2009, 2010 Solarflare Communications MDI-X set support by Jesse Brandeburg Copyright 2012 Intel Corporation
<a href="#">glibc 2.21</a>	<a href="#">LGPL-2.1</a>	Copyright (C) 1989-2013 Free Software Foundation, Inc.
<a href="#">i2c-tools 3.1.1</a>	<a href="#">GPL-2.0</a>	
<a href="#">lmx-kobs 5.3</a>	<a href="#">GPL-2.0</a>	Copyright (c) 2008-2011 Freescale Semiconductor, Inc. Copyright (c) 2008 by Embedded Alley Solution Inc. Copyright (c) 2003, Dr Brian Gladman <brg@gladman.me.uk>, Worcester, UK.
<a href="#">iproute2 3.17.0</a>	<a href="#">GPL-2.0</a>	Copyright (C)2006 USAGI/WIDE Project Copyright (c) 2008, Intel Corporation. Copyright (C) 2012 Eric Dumazet <edumazet@google.com>
<a href="#">iptables 1.4.21</a>	<a href="#">GPL-2.0</a>	
<a href="#">kexec 2.0.9</a>	<a href="#">GPL-2.0</a>	
<a href="#">kmod 19</a>	<a href="#">LGPL-2.1</a>	Copyright (c) 1994-2013 Free Software Foundation, Inc.
<a href="#">libdaemon 0.14</a>	<a href="#">LGPL-2.1</a>	
<a href="#">libusb 1.0.19</a>	<a href="#">LGPL-2.1</a>	Copyright (c) 2008 Daniel Drake <dsd@gentoo.org> Copyright (c) 2000-2003 Johannes Erdfelt <johannes@erdfelt.com>
<a href="#">libwebsockets 1.3-chrome37-firefox30</a>	<a href="#">LGPL-2.1</a>	



<a href="#">Linux Kernel 3.14.52</a>	<a href="#">GPL-2.0</a>	
<a href="#">memtester 4.1.3</a>	<a href="#">GPL-2.0</a>	Copyright (c) 2004-2010 Charles Cazabon <charlesc-memtester@pyropus.ca>
<a href="#">node-firebird 0.7.2</a>	<a href="#">MPL-2.0</a>	
<a href="#">nss-mdns 0.10</a>	<a href="#">LGPL-2.1</a>	Copyright 2004-2007 Lennart Poettering <mzaffzqaf (at) 0pointer (dot) de>
<a href="#">opkg 0.2.4</a>	<a href="#">GPL-2.0</a>	Florian Boor Copyright (c) 2003 kernel concepts  Carl D. Worth Copyright (c) 2001 University of Southern California
<a href="#">procps 3.3.10</a>	<a href="#">GPL-2.0</a>	
<a href="#">proftpd 1.3.5</a>	<a href="#">GPL-2.0</a>	Copyright (c) 1997, 1998 Public Flood Software Copyright (c) 1999, 2000 MacGyver aka Habeeb J. Dihu <macgyver@tos.net> Copyright (c) 2001-2011 The ProFTPD Project team
<a href="#">sysfsutils 2.1.0</a>	<a href="#">GPL-2.0</a> <a href="#">LGPL-2.1</a>	Copyright (c) Ananth Mavinakayanahalli Copyright (c) Daniel Stekloff Copyright (c) Mohan Kumar Copyright (c) Nitin Vashisth Copyright (c) Ananth Mavinakayanahalli Copyright (c) Daniel Stekloff Copyright (c) Mohan Kumar Copyright (c) Nitin Vashisth
<a href="#">sysstat 11.0.2</a>	<a href="#">GPL-2.0</a>	
<a href="#">sysvinit 2.88dsf</a>	<a href="#">GPL-2.0</a>	Copyright (c) 1991-2004 Miquel van Smoorenburg
<a href="#">udev 182</a>	<a href="#">GPL-2.0</a>	
<a href="#">usbutils 007</a>	<a href="#">GPL-2.0</a>	
<a href="#">Util-Linux 2.25.2</a>	<a href="#">GPL-2.0</a>	

The source code for the above may be obtained free of charge from LGE at <http://opensource.lge.com>. LGE will also provide open source code to you on CD-ROM for a charge covering the cost of performing such distribution (such as the cost of media, shipping, and handling) upon email request to [opensource@lge.com](mailto:opensource@lge.com). This offer is valid for a period of three years after our last shipment of this product. This offer is valid to anyone in receipt of this information.

Please be informed that LG Electronics, Inc. products may contain open source software listed in the tables below.

Open Source	License	Copyright
<a href="#">angular-virtual-keyboard 0.4.3</a>	<a href="#">MIT</a>	Copyright (c) 2015 Daniel Campos
<a href="#">Apache CouchDB</a>	<a href="#">AFL-2.0</a>	Copyright (c) 2009-2016 The Apache Software Foundation
<a href="#">async 2.4.1</a>	<a href="#">MIT</a>	Copyright (c) 2010-2017, Caolan McMahon
<a href="#">body-parser 1.18.3</a>	<a href="#">MIT</a>	Copyright (c) 2014, Jonathan Ong <me@jongleberry.com> Copyright (c) 2014-2015, Douglas Christopher Wilson <doug@somethingdoug.com>
<a href="#">Boost</a>	<a href="#">BSL-1.0</a>	Copyright (c) 1998-2005 Beman Dawes, David Abrahams. Copyright (c) 2004-2007 Rene Rivera.
<a href="#">bower 1.8.4</a>	<a href="#">MIT</a>	Copyright (c) 2013-present, Twitter and other contributors
<a href="#">composable-middleware 0.3.0</a>	<a href="#">MIT</a>	Copyright (c) 2013 Randy McLaughlin
<a href="#">compression 1.7.2</a>	<a href="#">MIT</a>	Copyright (c) 2014, Jonathan Ong <me@jongleberry.com> Copyright (c) 2014-2015, Douglas Christopher Wilson <doug@somethingdoug.com>
<a href="#">connect-livereload 0.5.4</a>	<a href="#">MIT</a>	Copyright (c) 2013 intesso
<a href="#">connect-multiparty 2.1.0</a>	<a href="#">MIT</a>	Copyright (c) 2010, Sencha Inc. Copyright (c) 2011, TJ Holowaychuk Copyright (c) 2013, Andrew Kelley
<a href="#">cookie-parser 1.4.3</a>	<a href="#">MIT</a>	Copyright (c) 2014 TJ Holowaychuk <tj@vision-media.ca>
<a href="#">Crypto-js 3.1.6</a>	<a href="#">MIT</a>	Copyright (c) 2009-2013 Jeff Mott Copyright (c) 2013-2016 Evan Vosberg
<a href="#">curl</a>	<a href="#">curl</a>	Copyright (c) 1996 - 2008, Daniel Stenberg, <daniel@haxx.se>.
<a href="#">dbus 1.8.10</a>	<a href="#">AFL-2.1</a>	Copyright (C) 2003, 2004 Red Hat, Inc.
<a href="#">dropbear 2014.66</a>	<a href="#">MIT</a>	Copyright (c) 2002-2014 Matt Johnston Portions copyright (c) 2004 Mihnea Stoenescu
<a href="#">ejs 2.6.1</a>	<a href="#">Apache-2.0</a>	Copyright 2112 Matthew Eernisse (mde@fleeigix.org)

<a href="#">errorhandler 1.5.0</a>	<a href="#">MIT</a>	Copyright (c) 2014 Jonathan Ong <me@jongleberry.com> Copyright (c) 2014-2015 Douglas Christopher Wilson <doug@somethingdoug.com>
<a href="#">ExcelJS 0.2.46</a>	<a href="#">MIT</a>	Copyright (c) 2014-2017 Guyon Roche
<a href="#">expat 2.1.0</a>	<a href="#">MIT</a>	Copyright (c) 1998, 1999, 2000 Thai Open Source Software Center Ltd and Clark Cooper Copyright (c) 2001, 2002, 2003, 2004, 2005, 2006 Expat maintainers.
<a href="#">express 4.16.3</a>	<a href="#">MIT</a>	Copyright (c) 2009-2014 TJ Holowaychuk <tj@vision-media.ca> Copyright (c) 2013-2014 Roman Shtylman <shtylman+expressjs@gmail.com> Copyright (c) 2014-2015 Douglas Christopher Wilson <doug@somethingdoug.com>
<a href="#">express-session 1.15.6</a>	<a href="#">MIT</a>	Copyright (c) 2010 Sencha Inc. Copyright (c) 2011 TJ Holowaychuk <tj@vision-media.ca> Copyright (c) 2014-2015 Douglas Christopher Wilson <doug@somethingdoug.com>
<a href="#">file 5.22</a>	<a href="#">BSD-like License (file)</a>	Copyright (c) Ian F. Darwin 1986, 1987, 1989, 1990, 1991, 1992, 1994, 1995. Software written by Ian F. Darwin and others; maintained 1994- Christos Zoulas.
<a href="#">file-type 4.3.0</a>	<a href="#">MIT</a>	Copyright (c) Sindre Sorhus <sindresorhus@gmail.com> (sindresorhus.com)
<a href="#">FileSaver.js 1.3.2</a>	<a href="#">MIT</a>	Copyright (c) 2016 Eli Grey.
<a href="#">gulp 3.9.1</a>	<a href="#">MIT</a>	Copyright (c) 2013-2016 Fractal <contact@wearefractal.com>
<a href="#">gulp-clean 0.3.2</a>	<a href="#">MIT</a>	Copyright (c) Peter Vilja
<a href="#">gulp-clean-css 2.4.0</a>	<a href="#">MIT</a>	Copyright (c) 2016 scniro <scniro@outlook.com>
<a href="#">gulp-concat 2.6.1</a>	<a href="#">MIT</a>	Copyright (c) 2016 Contra
<a href="#">gulp-concat-css 2.3.0</a>	<a href="#">MIT</a>	Copyright (c) 2014 Mario Casciaro
<a href="#">gulp-inject 1.5.0</a>	<a href="#">MIT</a>	
<a href="#">gulp-inject-string 0.0.2</a>	<a href="#">MIT</a>	Copyright (c) 2014 Mike
<a href="#">gulp-live-server 0.0.28</a>	<a href="#">MIT</a>	
<a href="#">gulp-ng-config 1.4.0</a>	<a href="#">MIT</a>	Copyright (c) 2015 Atticus White
<a href="#">gulp-ng-constant 0.2.0</a>	<a href="#">MIT</a>	Copyright (c) 2014 Arturo Guzman
<a href="#">gulp-rename 1.2.2</a>	<a href="#">MIT</a>	Copyright 2013 Hector Guillermo Parra Alvarez
<a href="#">gulp-replace 0.5.4</a>	<a href="#">MIT</a>	Copyright (c) 2013 Larry Davis
<a href="#">gulp-sass 2.3.2</a>	<a href="#">MIT</a>	Copyright (c) 2013 David Manning
<a href="#">gulp-strip-debug 1.1.0</a>	<a href="#">MIT</a>	Copyright (c) Sindre Sorhus <sindresorhus@gmail.com> (sindresorhus.com)
<a href="#">gulp-uglify 1.5.4</a>	<a href="#">MIT</a>	Copyright (c) 2013-2014 Terin Stock <terinjokes@gmail.com>
<a href="#">gulp-util 2.2.20</a>	<a href="#">MIT</a>	Copyright (c) 2014 Fractal <contact@wearefractal.com>
<a href="#">icu 54.1</a>	<a href="#">ICU</a>	Copyright (c) 1995-2010 International Business Machines Corporation and others
<a href="#">Jansson 2.7</a>	<a href="#">MIT</a>	Copyright (c) 2009-2014 Petri Lehtinen <petri@digip.org>
<a href="#">JSZIP 2.6.0</a>	<a href="#">MIT</a>	Copyright (c) 2009-2014 Stuart Knightley, David Duponchel, Franz Buchinger, António Afonso
<a href="#">libcap 2.24</a>	<a href="#">BSD-3-Clause</a>	Copyright (c) The Regents of the University of California
<a href="#">libedit 20130712-3.1</a>	<a href="#">BSD-3-Clause</a>	Copyright (c) 1992, 1993 The Regents of the University of California
<a href="#">libpcre 8.36</a>	<a href="#">BSD-3-Clause</a>	Copyright (c) 2007-2012, Google Inc. Copyright (c) 2009-2014 Zoltan Herczeg Copyright (c) 1997-2014 University of Cambridge
<a href="#">libtirpc 0.2.5</a>	<a href="#">BSD-3-Clause</a>	Copyright (c) Copyright (c) Bull S.A. 2005
<a href="#">libxml2 2.9.2</a>	<a href="#">MIT</a>	Copyright (c) 1998-2012 Daniel Veillard.
<a href="#">libxml2</a>	<a href="#">MIT</a>	Copyright (C) 1998-2003 Daniel Veillard
<a href="#">list-to-tree 0.0.6</a>	<a href="#">BSD-3-Clause</a>	Copyright (c) 2013 Denis Ivanov
<a href="#">lodash 4.17.10</a>	<a href="#">MIT</a>	Copyright (c) JS Foundation and other contributors
<a href="#">main-bower-files 2.13.1</a>	<a href="#">MIT</a>	Copyright (c) 2013 Christopher Knötschke
<a href="#">method-override 2.3.10</a>	<a href="#">MIT</a>	Copyright (c) 2014, Jonathan Ong <me@jongleberry.com> Copyright (c) 2014, Douglas Christopher Wilson <doug@somethingdoug.com>
<a href="#">minini 1.2</a>	<a href="#">Apache-2.0</a>	

<a href="#">minini</a>	<a href="#">Apache-2.0</a>	
<a href="#">moment 2.22.1</a>	<a href="#">MIT</a>	Copyright (c) JS Foundation and other contributors
<a href="#">morgan 1.9.0</a>	<a href="#">MIT</a>	Copyright (c) 2014 Jonathan Ong <me@jongleberry.com> Copyright (c) 2014-2015 Douglas Christopher Wilson <doug@somethingdoug.com>
<a href="#">my-bubble</a>	<a href="#">Apache-2.0</a>	Copyright (c) 2007, Uppsala University
<a href="#">ncurses 5.9</a>	<a href="#">MIT-like License (ncurses)</a>	Copyright (c) 1998-2004,2006 Free Software Foundation, Inc.
<a href="#">nginx 1.10.3</a>	<a href="#">BSD-2-Clause</a>	Copyright (C) 2002-2016 Igor Sysoev Copyright (C) 2011-2016 Nginx, Inc.
<a href="#">node-xmldom 0.1.27</a>	<a href="#">MIT</a>	
<a href="#">node-mailer 2.7.2</a>	<a href="#">MIT</a>	Copyright (c) 2011-2016 Andris Reinman
<a href="#">node-mime 1.6.0</a>	<a href="#">MIT</a>	Copyright (c) 2010, Benjamin Thomas, Robert Kieffer
<a href="#">node-mime 1.3.4</a>	<a href="#">MIT</a>	Copyright (c) 2010 Benjamin Thomas, Robert Kieffer
<a href="#">node-q 1.5.1</a>	<a href="#">MIT</a>	Copyright (c) 2009–2017, Kristopher Michael Kowal
<a href="#">node-sqlite3 3.1.8</a>	<a href="#">BSD-3-Clause</a>	Copyright (c) MapBox
<a href="#">node-unzip-2 0.2.5</a>	<a href="#">MIT</a>	Copyright (c) 2012 - 2013 Near Infinity Corporation
<a href="#">node-xml2js 0.4.19</a>	<a href="#">MIT</a>	Copyright 2010, 2011, 2012, 2013.
<a href="#">nodemailer-smtp-transport 2.7.4</a>	<a href="#">MIT</a>	Copyright (c) 2014-2016 Andris Reinman
<a href="#">npm 2.14.12</a>	<a href="#">Artistic-2.0</a>	Copyright (c) npm, Inc. and Contributors Copyright (c) 2000-2006, The Perl Foundation.
<a href="#">ntpdate 4.2.8</a>	<a href="#">NTP</a>	
<a href="#">openssl 1.0.2d</a>	<a href="#">OpenSSL</a>	
<a href="#">openssl</a>	<a href="#">OpenSSL</a>	Copyright (c) 1998-2017 The OpenSSL Project. Copyright (C) 1995-1998 Eric Young (eay@cryptsoft.com)
<a href="#">passport 0.3.2</a>	<a href="#">MIT</a>	Copyright (c) 2011-2015 Jared Hanson
<a href="#">passport-local 1.0.0</a>	<a href="#">MIT</a>	Copyright (c) 2011-2015 Jared Hanson
<a href="#">path 0.12.7</a>	<a href="#">MIT</a>	Copyright Joyent, Inc. and other Node contributors
<a href="#">perl 5.20.0</a>	<a href="#">Artistic-1.0-Perl</a>	Copyright (C) 1993-2014 by Larry Wall and others.
<a href="#">read-chunk 2.0.0</a>	<a href="#">MIT</a>	Copyright (c) Sindre Sorhus <sindresorhus@gmail.com> (sindresorhus.com)
<a href="#">rpcbind 0.2.2</a>	<a href="#">BSD-3-Clause</a>	Copyright (c) Bull S.A. 2005
<a href="#">serve-favicon 2.5.0</a>	<a href="#">MIT</a>	Copyright (c) 2010, Sencha Inc. Copyright (c) 2011, LearnBoost Copyright (c) 2011, TJ Holowaychuk Copyright (c) 2014-2017, Douglas Christopher Wilson
<a href="#">serve-favicon 2.3.1</a>	<a href="#">MIT</a>	Copyright (c) 2010 Sencha Inc. Copyright (c) 2011 LearnBoost Copyright (c) 2011 TJ Holowaychuk Copyright (c) 2014 Douglas Christopher Wilson
<a href="#">shadow 4.2.1</a>	<a href="#">BSD-3-Clause</a>	Copyright (c) 2007 - 2009, Nicolas François Copyright (c) 1989 - 1994, Julianne Frances Haugh Copyright (c) 1991 - 1993, Chip Rosenthal Copyright (c) 1996 - 2000, Marek Michalkiewicz Copyright (c) 2003 - 2005, Tomasz Kloczko
<a href="#">shelljs 0.6.1</a>	<a href="#">BSD-3-Clause</a>	Copyright (c) 2012, Artur Adib <aadib@mozilla.com>
<a href="#">shelljs 0.4.0</a>	<a href="#">BSD-3-Clause</a>	Copyright (c) 2012, Artur Adib <aadib@mozilla.com>
<a href="#">sudo 1.8.11p2</a>	<a href="#">MIT-like License (sudo)</a>	
<a href="#">zlib 1.2.8</a>	<a href="#">Zlib</a>	Copyright (c) 1995-2013 Jean-loup Gailly and Mark Adler

This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (<http://www.openssl.org/>)

AFL-2.0

This Academic Free License (the "License") applies to any original work of authorship (the "Original Work") whose owner (the "Licensor") has placed the following notice immediately following the copyright notice for the Original Work:

Licensed under the Academic Free License version 2.0

1) Grant of Copyright License. Licensor hereby grants You a world-wide, royalty-free, non-exclusive, perpetual, sublicenseable license to do the following:

- a) to reproduce the Original Work in copies;
- b) to prepare derivative works ("Derivative Works") based upon the Original Work;
- c) to distribute copies of the Original Work and Derivative Works to the public;
- d) to perform the Original Work publicly; and
- e) to display the Original Work publicly.

2) Grant of Patent License. Licensor hereby grants You a world-wide, royalty-free, non-exclusive, perpetual, sublicenseable license, under patent claims owned or controlled by the Licensor that are embodied in the Original Work as furnished by the Licensor, to make, use, sell and offer for sale the Original Work and Derivative Works.

3) Grant of Source Code License. The term "Source Code" means the preferred form of the Original Work for making modifications to it and all available documentation describing how to modify the Original Work. Licensor hereby agrees to provide a machine-readable copy of the Source Code of the Original Work along with each copy of the Original Work that Licensor distributes. Licensor reserves the right to satisfy this obligation by placing a machine-readable copy of the Source Code in an information repository reasonably calculated to permit inexpensive and convenient access by You for as long as Licensor continues to distribute the Original Work, and by publishing the address of that information repository in a notice immediately following the copyright notice that applies to the Original Work.

4) Exclusions From License Grant. Neither the names of Licensor, nor the names of any contributors to the Original Work, nor any of their trademarks or service marks, may be used to endorse or promote products derived from this Original Work without express prior written permission of the Licensor. Nothing in this License shall be deemed to grant any rights to trademarks, copyrights, patents, trade secrets or any other intellectual property of Licensor except as expressly stated herein. No patent license is granted to make, use, sell or offer to sell embodiments of any patent claims other than the licensed claims defined in Section 2. No right is granted to the trademarks of Licensor even if such marks are included in the Original Work. Nothing in this License shall be interpreted to prohibit Licensor from licensing under different terms from this License any Original Work that Licensor otherwise would have a right to license.

5) This section intentionally omitted.

6) Attribution Rights. You must retain, in the Source Code of any Derivative Works that You create, all copyright, patent or trademark notices from the Source Code of the Original Work, as well as any notices of licensing and any descriptive text identified therein as an "Attribution Notice." You must cause the Source Code for any Derivative Works that You create to carry a prominent Attribution Notice reasonably calculated to inform recipients that You have modified the Original Work.

7) Warranty of Provenance and Disclaimer of Warranty. Licensor warrants that the copyright in and to the Original Work and the patent rights granted herein by Licensor are owned by the Licensor or are sublicensed to You under the terms of this License with the permission of the contributor(s) of those copyrights and patent rights. Except as expressly stated in the immediately proceeding sentence, the Original Work is provided under this License on an "AS IS" BASIS and WITHOUT WARRANTY, either express or implied, including, without limitation, the warranties of NON-INFRINGEMENT, MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY OF THE ORIGINAL WORK IS WITH YOU. This DISCLAIMER OF WARRANTY constitutes an essential part of this License. No license to Original Work is granted hereunder except under this disclaimer.

8) Limitation of Liability. Under no circumstances and under no legal theory, whether in tort (including negligence), contract, or otherwise, shall the Licensor be liable to any person for any direct, indirect, special, incidental, or consequential damages of any character arising as a result of this License or the use of the Original Work including, without limitation, damages for loss of goodwill, work stoppage, computer failure or malfunction, or any and all other commercial damages or losses. This limitation of liability shall not apply to liability for death or personal injury resulting from Licensor's negligence to the extent applicable law prohibits such limitation. Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so this exclusion and limitation may not apply to You.

9) Acceptance and Termination. If You distribute copies of the Original Work or a Derivative Work, You must make a reasonable effort under the circumstances to obtain the express assent of recipients to the terms of this License. Nothing else but this License (or another written agreement between Licensor and You) grants You permission to create Derivative Works based upon the Original Work or to exercise any of the rights granted in Section 1 herein, and any attempt to do so except under the terms of this License (or another written agreement between Licensor and You) is expressly prohibited by U.S. copyright law, the equivalent laws of other countries, and by international treaty. Therefore, by exercising any of the rights granted to You in Section 1 herein, You indicate Your acceptance of this License and all of its terms and conditions.

10) Termination for Patent Action. This License shall terminate automatically and You may no longer exercise any of the rights granted to You by this License as of the date You commence an action, including a cross-claim or counterclaim, for patent infringement (i) against Licensor with respect to a patent applicable to software or (ii) against any entity with respect to a patent applicable to the Original Work (but excluding combinations of the Original Work with other software or hardware).

11) Jurisdiction, Venue and Governing Law. Any action or suit relating to this License may be brought only in the courts of a jurisdiction wherein the Licensor resides or in which Licensor conducts its primary business, and under the laws of that jurisdiction excluding its conflict-of-law provisions. The application of the United Nations Convention on Contracts for the International Sale of Goods is expressly excluded. Any use of the Original Work outside the scope of this License or after its termination shall be subject to the requirements and penalties of the U.S. Copyright Act, 17 U.S.C.   101 et seq., the equivalent laws of other countries, and international treaty. This section shall survive the termination of this License.

12) Attorneys Fees. In any action to enforce the terms of this License or seeking damages relating thereto, the prevailing party shall be entitled to recover its costs and expenses, including, without limitation, reasonable attorneys' fees and costs incurred in connection with such action, including any appeal of such action. This section shall survive the termination of this License.

13) Miscellaneous. This License represents the complete agreement concerning the subject matter hereof. If any provision of this License is held to be unenforceable, such provision shall be reformed only to the extent necessary to make it enforceable.

14) Definition of "You" in This License. "You" throughout this License, whether in upper or lower case, means an individual or a legal entity exercising rights under, and complying with all of the terms of, this License. For legal entities, "You" includes any entity that controls, is controlled by, or is under common control with you. For purposes of this definition, "control" means (i) the power, direct or indirect, to cause the direction or management of such entity, whether by contract or otherwise, or (ii) ownership of fifty percent (50%) or more of the outstanding shares, or (iii) beneficial ownership of such entity.

15) Right to Use. You may use the Original Work in all ways not otherwise restricted or conditioned by this License or by law, and Licensor promises not to interfere with or be responsible for such uses by You.

This license is Copyright (C) 2003 Lawrence E. Rosen. All rights reserved.  
Permission is hereby granted to copy and distribute this license without modification. This license may not be modified without the express written permission of its copyright owner.

AFL-2.1



1) Grant of Copyright License. Licensor hereby grants You a world-wide, royalty-free, non-exclusive, perpetual, sublicenseable license to do the following:

- a) to reproduce the Original Work in copies;
- b) to prepare derivative works ("Derivative Works") based upon the Original Work;
- c) to distribute copies of the Original Work and Derivative Works to the public;
- d) to perform the Original Work publicly; and
- e) to display the Original Work publicly.

2) Grant of Patent License. Licensor hereby grants You a world-wide, royalty-free, non-exclusive, perpetual, sublicenseable license, under patent claims owned or controlled by the Licensor that are embodied in the Original Work as furnished by the Licensor, to make, use, sell and offer for sale the Original Work and Derivative Works.

3) Grant of Source Code License. The term "Source Code" means the preferred form of the Original Work for making modifications to it and all available documentation describing how to modify the Original Work. Licensor hereby agrees to provide a machine-readable copy of the Source Code of the Original Work along with each copy of the Original Work that Licensor distributes. Licensor reserves the right to satisfy this obligation by placing a machine-readable copy of the Source Code in an information repository reasonably calculated to permit inexpensive and convenient access by You for as long as Licensor continues to distribute the Original Work, and by publishing the address of that information repository in a notice immediately following the copyright notice that applies to the Original Work.

4) Exclusions From License Grant. Neither the names of Licensor, nor the names of any contributors to the Original Work, nor any of their trademarks or service marks, may be used to endorse or promote products derived from this Original Work without express prior written permission of the Licensor. Nothing in this License shall be deemed to grant any rights to trademarks, copyrights, patents, trade secrets or any other intellectual property of Licensor except as expressly stated herein. No patent license is granted to make, use, sell or offer to sell embodiments of any patent claims other than the licensed claims defined in Section 2. No right is granted to the trademarks of Licensor even if such marks are included in the Original Work. Nothing in this License shall be interpreted to prohibit Licensor from licensing under different terms from this License any Original Work that Licensor otherwise would have a right to license.

5) This section intentionally omitted.

6) Attribution Rights. You must retain, in the Source Code of any Derivative Works that You create, all copyright, patent or trademark notices from the Source Code of the Original Work, as well as any notices of licensing and any descriptive text identified therein as an "Attribution Notice." You must cause the Source Code for any Derivative Works that You create to carry a prominent Attribution Notice reasonably calculated to inform recipients that You have modified the Original Work.

7) Warranty of Provenance and Disclaimer of Warranty. Licensor warrants that the copyright in and to the Original Work and the patent rights granted herein by Licensor are owned by the Licensor or are sublicensed to You under the terms of this License with the permission of the contributor(s) of those copyrights and patent rights. Except as expressly stated in the immediately proceeding sentence, the Original Work is provided under this License on an "AS IS" BASIS and WITHOUT WARRANTY, either express or implied, including, without limitation, the warranties of NON-INFRINGEMENT, MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY OF THE ORIGINAL WORK IS WITH YOU. This DISCLAIMER OF WARRANTY constitutes an essential part of this License. No license to Original Work is granted hereunder except under this disclaimer.

8) Limitation of Liability. Under no circumstances and under no legal theory, whether in tort (including negligence), contract, or otherwise, shall the Licensor be liable to any person for any direct, indirect, special, incidental, or consequential damages of any character arising as a result of this License or the use of the Original Work including, without limitation, damages for loss of goodwill, work stoppage, computer failure or malfunction, or any and all other commercial damages or losses. This limitation of liability shall not apply to liability for death or personal injury resulting from Licensor's negligence to the extent applicable law prohibits such limitation. Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so this exclusion and limitation may not apply to You.

9) Acceptance and Termination. If You distribute copies of the Original Work or a Derivative Work, You must make a reasonable effort under the circumstances to obtain the express assent of recipients to the terms of this License. Nothing else but this License (or another written agreement between Licensor and You) grants You permission to create Derivative Works based upon the Original Work or to exercise any of the rights granted in Section 1 herein, and any attempt to do so except under the terms of this License (or another written agreement between Licensor and You) is expressly prohibited by U.S. copyright law, the equivalent laws of other countries, and by international treaty. Therefore, by exercising any of the rights granted to You in Section 1 herein, You indicate Your acceptance of this License and all of its terms and conditions.

10) Termination for Patent Action. This License shall terminate automatically and You may no longer exercise any of the rights granted to You by this License as of the date You commence an action, including a cross-claim or counterclaim, against Licensor or any licensee alleging that the Original Work infringes a patent. This termination provision shall not apply for an action alleging patent infringement by combinations of the Original Work with other software or hardware.

11) Jurisdiction, Venue and Governing Law. Any action or suit relating to this License may be brought only in the courts of a jurisdiction wherein the Licensor resides or in which Licensor conducts its primary business, and under the laws of that jurisdiction excluding its conflict-of-law provisions. The application of the United Nations Convention on Contracts for the International Sale of Goods is expressly excluded. Any use of the Original Work outside the scope of this License or after its termination shall be subject to the requirements and penalties of the U.S. Copyright Act, 17 U.S.C. § 101 et seq., the equivalent laws of other countries, and international treaty. This section shall survive the termination of this License.

12) Attorneys Fees. In any action to enforce the terms of this License or seeking damages relating thereto, the prevailing party shall be entitled to recover its costs and expenses, including, without limitation, reasonable attorneys' fees and costs incurred in connection with such action, including any appeal of such action. This section shall survive the termination of this License.

13) Miscellaneous. This License represents the complete agreement concerning the subject matter hereof. If any provision of this License is held to be unenforceable, such provision shall be reformed only to the extent necessary to make it enforceable.

14) Definition of "You" in This License. "You" throughout this License, whether in upper or lower case, means an individual or a legal entity exercising rights under, and complying with all of the terms of, this License. For legal entities, "You" includes any entity that controls, is controlled by, or is under common control with you. For purposes of this definition, "control" means (i) the power, direct or indirect, to cause the direction or management of such entity, whether by contract or otherwise, or (ii) ownership of fifty percent (50%) or more of the outstanding shares, or (iii) beneficial ownership of such entity.

15) Right to Use. You may use the Original Work in all ways not otherwise restricted or conditioned by this License or by law, and Licensor promises not to interfere with or be responsible for such uses by You.

This license is Copyright (C) 2003-2004 Lawrence E. Rosen. All rights reserved.  
Permission is hereby granted to copy and distribute this license without modification. This license may not be modified without the express written permission of its copyright owner.

---

## Apache-2.0

Apache License  
Version 2.0, January 2004  
<http://www.apache.org/licenses/>

### TERMS AND CONDITIONS FOR USE, REPRODUCTION, AND DISTRIBUTION

#### 1. Definitions.

"License" shall mean the terms and conditions for use, reproduction, and distribution as defined by Sections 1 through 9 of this document.

-----

"Licensor" shall mean the copyright owner or entity authorized by the copyright owner that is granting the License.

"Legal Entity" shall mean the union of the acting entity and all other entities that control, are controlled by, or are under common control with that entity. For the purposes of this definition, "control" means (i) the power, direct or indirect, to cause the direction or management of such entity, whether by contract or otherwise, or (ii) ownership of fifty percent (50%) or more of the outstanding shares, or (iii) beneficial ownership of such entity.

"You" (or "Your") shall mean an individual or Legal Entity exercising permissions granted by this License.

"Source" form shall mean the preferred form for making modifications, including but not limited to software source code, documentation source, and configuration files.

"Object" form shall mean any form resulting from mechanical transformation or translation of a Source form, including but not limited to compiled object code, generated documentation, and conversions to other media types.

"Work" shall mean the work of authorship, whether in Source or Object form, made available under the License, as indicated by a copyright notice that is included in or attached to the work (an example is provided in the Appendix below).

"Derivative Works" shall mean any work, whether in Source or Object form, that is based on (or derived from) the Work and for which the editorial revisions, annotations, elaborations, or other modifications represent, as a whole, an original work of authorship. For the purposes of this License, Derivative Works shall not include works that remain separable from, or merely link (or bind by name) to the interfaces of, the Work and Derivative Works thereof.

"Contribution" shall mean any work of authorship, including the original version of the Work and any modifications or additions to that Work or Derivative Works thereof, that is intentionally submitted to Licensor for inclusion in the Work by the copyright owner or by an individual or Legal Entity authorized to submit on behalf of the copyright owner. For the purposes of this definition, "submitted" means any form of electronic, verbal, or written communication sent to the Licensor or its representatives, including but not limited to communication on electronic mailing lists, source code control systems, and issue tracking systems that are managed by, or on behalf of, the Licensor for the purpose of discussing and improving the Work, but excluding communication that is conspicuously marked or otherwise designated in writing by the copyright owner as "Not a Contribution."

"Contributor" shall mean Licensor and any individual or Legal Entity on behalf of whom a Contribution has been received by Licensor and subsequently incorporated within the Work.

2. Grant of Copyright License. Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable copyright license to reproduce, prepare Derivative Works of, publicly display, publicly perform, sublicense, and distribute the Work and such Derivative Works in Source or Object form.

3. Grant of Patent License. Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable (except as stated in this section) patent license to make, have made, use, offer to sell, sell, import, and otherwise transfer the Work, where such license applies only to those patent claims licensable by such Contributor that are necessarily infringed by their Contribution(s) alone or by combination of their Contribution(s) with the Work to which such Contribution(s) was submitted. If You institute patent litigation against any entity (including a cross-claim or counterclaim in a lawsuit) alleging that the Work or a Contribution incorporated within the Work constitutes direct or contributory patent infringement, then any patent licenses granted to You under this License for that Work shall terminate as of the date such litigation is filed.

4. Redistribution. You may reproduce and distribute copies of the Work or Derivative Works thereof in any medium, with or without modifications, and in Source or Object form, provided that You meet the following conditions:

(a) You must give any other recipients of the Work or Derivative Works a copy of this License; and

(b) You must cause any modified files to carry prominent notices stating that You changed the files; and

(c) You must retain, in the Source form of any Derivative Works that You distribute, all copyright, patent, trademark, and attribution notices from the Source form of the Work, excluding those notices that do not pertain to any part of the Derivative Works; and

(d) If the Work includes a "NOTICE" text file as part of its distribution, then any Derivative Works that You distribute must include a readable copy of the attribution notices contained within such NOTICE file, excluding those notices that do not pertain to any part of the Derivative Works, in at least one of the following places: within a NOTICE text file distributed as part of the Derivative Works; within the Source form or documentation, if provided along with the Derivative Works; or, within a display generated by the Derivative Works, if and wherever such third-party notices normally appear. The contents of the NOTICE file are for informational purposes only and do not modify the License. You may add Your own attribution notices within Derivative Works that You distribute, alongside or as an addendum to the NOTICE text from the Work, provided that such additional attribution notices cannot be construed as modifying the License.

You may add Your own copyright statement to Your modifications and may provide additional or different license terms and conditions for use, reproduction, or distribution of Your modifications, or for any such Derivative Works as a whole, provided Your use, reproduction, and distribution of the Work otherwise complies with the conditions stated in this License.

5. Submission of Contributions. Unless You explicitly state otherwise, any Contribution intentionally submitted for inclusion in the Work by You to the Licensor shall be under the terms and conditions of this License, without any additional terms or conditions. Notwithstanding the above, nothing herein shall supersede or modify the terms of any separate license agreement you may have executed with Licensor regarding such Contributions.

6. Trademarks. This License does not grant permission to use the trade names, trademarks, service marks, or product names of the Licensor, except as required for reasonable and customary use in describing the origin of the Work and reproducing the content of the NOTICE file.

7. Disclaimer of Warranty. Unless required by applicable law or agreed to in writing, Licensor provides the Work (and each Contributor provides its Contributions) on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied, including, without limitation, any warranties or conditions of TITLE, NON-INFRINGEMENT, MERCHANTABILITY, or FITNESS FOR A PARTICULAR PURPOSE. You are solely responsible for determining the appropriateness of using or redistributing the Work and assume any risks associated with Your exercise of permissions under this License.

8. Limitation of Liability. In no event and under no legal theory, whether in tort (including negligence), contract, or otherwise, unless required by applicable law (such as deliberate and grossly negligent acts) or agreed to in writing, shall any Contributor be liable to You for damages, including any direct, indirect, special, incidental, or consequential damages of any character arising as a result of this License or out of the use or inability to use the Work (including but not limited to damages for loss of goodwill, work stoppage, computer failure or malfunction, or any and all other commercial damages or losses), even if such Contributor has been advised of the possibility of such damages.

9. Accepting Warranty or Additional Liability. While redistributing the Work or Derivative Works thereof, You may choose to offer, and charge a fee for, acceptance of support, warranty, indemnity, or other liability obligations and/or rights consistent with this License. However, in accepting such obligations, You may act only on Your own behalf and on Your sole responsibility, not on behalf of any other Contributor, and only if You agree to indemnify, defend, and hold each Contributor harmless for any liability incurred by, or claims asserted against, such Contributor by reason of your accepting any such warranty or additional liability.

END OF TERMS AND CONDITIONS

APPENDIX: How to apply the Apache License to your work.

To apply the Apache License to your work, attach the following boilerplate notice, with the fields enclosed by brackets "[]" replaced with your own identifying information. (Don't include the brackets!) The text should be enclosed in the appropriate comment syntax for the file format. We also recommend that a file or class name and description of purpose be included on the same "printed page" as the copyright notice for easier identification within third-party archives.

Copyright [yyyy] [name of copyright owner]

Licensed under the Apache License, Version 2.0 (the "License");

you may not use this file except in compliance with the License.  
You may obtain a copy of the License at

<http://www.apache.org/licenses/LICENSE-2.0>

Unless required by applicable law or agreed to in writing, software distributed under the License is distributed on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License.

---

## Artistic-1.0-Perl

The "Artistic License"

Preamble

The intent of this document is to state the conditions under which a Package may be copied, such that the Copyright Holder maintains some semblance of artistic control over the development of the package, while giving the users of the package the right to use and distribute the Package in a more-or-less customary fashion, plus the right to make reasonable modifications.

Definitions:

"Package" refers to the collection of files distributed by the Copyright Holder, and derivatives of that collection of files created through textual modification.

"Standard Version" refers to such a Package if it has not been modified, or has been modified in accordance with the wishes of the Copyright Holder as specified below.

"Copyright Holder" is whoever is named in the copyright or copyrights for the package.

"You" is you, if you're thinking about copying or distributing this Package.

"Reasonable copying fee" is whatever you can justify on the basis of media cost, duplication charges, time of people involved, and so on. (You will not be required to justify it to the Copyright Holder, but only to the computing community at large as a market that must bear the fee.)

"Freely Available" means that no fee is charged for the item itself, though there may be fees involved in handling the item. It also means that recipients of the item may redistribute it under the same conditions they received it.

1. You may make and give away verbatim copies of the source form of the Standard Version of this Package without restriction, provided that you duplicate all of the original copyright notices and associated disclaimers.

2. You may apply bug fixes, portability fixes and other modifications derived from the Public Domain or from the Copyright Holder. A Package modified in such a way shall still be considered the Standard Version.

3. You may otherwise modify your copy of this Package in any way, provided that you insert a prominent notice in each changed file stating how and when you changed that file, and provided that you do at least ONE of the following:

- a) place your modifications in the Public Domain or otherwise make them Freely Available, such as by posting said modifications to Usenet or an equivalent medium, or placing the modifications on a major archive site such as uunet.uu.net, or by allowing the Copyright Holder to include your modifications in the Standard Version of the Package.
- b) use the modified Package only within your corporation or organization.
- c) rename any non-standard executables so the names do not conflict with standard executables, which must also be provided, and provide a separate manual page for each non-standard executable that clearly documents how it differs from the Standard Version.
- d) make other distribution arrangements with the Copyright Holder.

4. You may distribute the programs of this Package in object code or executable form, provided that you do at least ONE of the following:

- a) distribute a Standard Version of the executables and library files, together with instructions (in the manual page or equivalent) on where to get the Standard Version.
- b) accompany the distribution with the machine-readable source of the Package with your modifications.
- c) give non-standard executables non-standard names, and clearly document the differences in manual pages (or equivalent), together with instructions on where to get the Standard Version.
- d) make other distribution arrangements with the Copyright Holder.

5. You may charge a reasonable copying fee for any distribution of this Package. You may charge any fee you choose for support of this Package. You may not charge a fee for this Package itself. However, you may distribute this Package in aggregate with other (possibly commercial) programs as part of a larger (possibly commercial) software distribution provided that you do not advertise this Package as a product of your own. You may embed this Package's interpreter within an executable of yours (by linking); this shall be construed as a mere form of aggregation, provided that the complete Standard Version of the interpreter is so embedded.

6. The scripts and library files supplied as input to or produced as output from the programs of this Package do not automatically fall under the copyright of this Package, but belong to whoever generated them, and may be sold commercially, and may be aggregated with this Package. If such scripts or library files are aggregated with this Package via the so-called "undump" or "unexec" methods of producing a binary executable image, then distribution of such an image shall neither be construed as a distribution of this Package nor shall it fall under the restrictions of Paragraphs 3 and 4, provided that you do not represent such an executable image as a Standard Version of this Package.

7. C subroutines (or comparably compiled subroutines in other languages) supplied by you and linked into this Package in order to emulate subroutines and variables of the language defined by this Package shall not be considered part of this Package, but are the equivalent of input as in Paragraph 6, provided these subroutines do not change the language in any way that would cause it to fail the regression tests for the language.

8. Aggregation of this Package with a commercial distribution is always permitted provided that the use of this Package is embedded; that is, when no overt attempt is made to make this Package's interfaces visible to the end user of the commercial distribution. Such use shall not be construed as a distribution of this Package.

9. The name of the Copyright Holder may not be used to endorse or promote products derived from this software without specific prior written permission.

10. THIS PACKAGE IS PROVIDED "AS IS" AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

The End

---



Artistic-2.0

The Artistic License 2.0

Copyright (c) 2000-2006, The Perl Foundation.

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

Preamble

This license establishes the terms under which a given free software Package may be copied, modified, distributed, and/or redistributed. The intent is that the Copyright Holder maintains some artistic control over the development of that Package while still keeping the Package available as open source and free software.

You are always permitted to make arrangements wholly outside of this license directly with the Copyright Holder of a given Package. If the terms of this license do not permit the full use that you propose to make of the Package, you should contact the Copyright Holder and seek a different licensing arrangement.

Definitions

"Copyright Holder" means the individual(s) or organization(s) named in the copyright notice for the entire Package.

"Contributor" means any party that has contributed code or other material to the Package, in accordance with the Copyright Holder's procedures.

"You" and "your" means any person who would like to copy, distribute, or modify the Package.

"Package" means the collection of files distributed by the Copyright Holder, and derivatives of that collection and/or of those files. A given Package may consist of either the Standard Version, or a Modified Version.

"Distribute" means providing a copy of the Package or making it accessible to anyone else, or in the case of a company or organization, to others outside of your company or organization.

"Distributor Fee" means any fee that you charge for Distributing this Package or providing support for this Package to another party. It does not mean licensing fees.

"Standard Version" refers to the Package if it has not been modified, or has been modified only in ways explicitly requested by the Copyright Holder.

"Modified Version" means the Package, if it has been changed, and such changes were not explicitly requested by the Copyright Holder.

"Original License" means this Artistic License as Distributed with the Standard Version of the Package, in its current version or as it may be modified by The Perl Foundation in the future.

"Source" form means the source code, documentation source, and configuration files for the Package.

"Compiled" form means the compiled bytecode, object code, binary, or any other form resulting from mechanical transformation or translation of the Source form.

Permission for Use and Modification Without Distribution

(1) You are permitted to use the Standard Version and create and use Modified Versions for any purpose without restriction, provided that you do not Distribute the Modified Version.

Permissions for Redistribution of the Standard Version

(2) You may Distribute verbatim copies of the Source form of the Standard Version of this Package in any medium without restriction, either gratis or for a Distributor Fee, provided that you duplicate all of the original copyright notices and associated disclaimers. At your discretion, such verbatim copies may or may not include a Compiled form of the Package.

(3) You may apply any bug fixes, portability changes, and other modifications made available from the Copyright Holder. The resulting Package will still be considered the Standard Version, and as such will be subject to the Original License.

Distribution of Modified Versions of the Package as Source

(4) You may Distribute your Modified Version as Source (either gratis or for a Distributor Fee, and with or without a Compiled form of the Modified Version) provided that you clearly document how it differs from the Standard Version, including, but not limited to, documenting any non-standard features, executables, or modules, and provided that you do at least ONE of the following:

- (a) make the Modified Version available to the Copyright Holder of the Standard Version, under the Original License, so that the Copyright Holder may include your modifications in the Standard Version.
- (b) ensure that installation of your Modified Version does not prevent the user installing or running the Standard Version. In addition, the Modified Version must bear a name that is different from the name of the Standard Version.
- (c) allow anyone who receives a copy of the Modified Version to make the Source form of the Modified Version available to others under
  - (i) the Original License or
  - (ii) a license that permits the licensee to freely copy, modify and redistribute the Modified Version using the same licensing terms that apply to the copy that the licensee received, and requires that the Source form of the Modified Version, and of any works derived from it, be made freely available in that license fees are prohibited but Distributor Fees are allowed.

Distribution of Compiled Forms of the Standard Version or Modified Versions without the Source

(5) You may Distribute Compiled forms of the Standard Version without the Source, provided that you include complete instructions on how to get the Source of the Standard Version. Such instructions must be valid at the time of your distribution. If these instructions, at any time while you are carrying out such distribution, become invalid, you must provide new instructions on demand or cease further distribution. If you provide valid instructions or cease distribution within thirty days after you become aware that the instructions are invalid, then you do not forfeit any of your rights under this license.

(6) You may Distribute a Modified Version in Compiled form without the Source, provided that you comply with Section 4 with respect to the Source of the Modified Version.

Aggregating or Linking the Package

(7) You may aggregate the Package (either the Standard Version or Modified Version) with other packages and Distribute the resulting aggregation provided that you do not charge a licensing fee for the Package. Distributor Fees are permitted, and licensing fees for other components in the aggregation are permitted. The terms of this license apply to the use and Distribution of the Standard or Modified Versions as included in the aggregation.

(8) You are permitted to link Modified and Standard Versions with other works, to embed the Package in a larger work of your own, or to build stand-alone binary or bytecode versions of applications that include the Package, and Distribute the result without restriction, provided the result does not expose a direct interface to the Package.

Items That are Not Considered Part of a Modified Version

(9) Works (including, but not limited to, modules and scripts) that merely extend or make use of the Package, do not, by themselves, cause the Package to be a Modified Version. In addition, such works are not considered parts of the Package itself and are not subiect to the terms of this license

works are not considered parts of the Package itself, and are not subject to the terms of this license.

General Provisions

(10) Any use, modification, and distribution of the Standard or Modified Versions is governed by this Artistic License. By using, modifying or distributing the Package, you accept this license. Do not use, modify, or distribute the Package, if you do not accept this license.

(11) If your Modified Version has been derived from a Modified Version made by someone other than you, you are nevertheless required to ensure that your Modified Version complies with the requirements of this license.

(12) This license does not grant you the right to use any trademark, service mark, tradename, or logo of the Copyright Holder.

(13) This license includes the non-exclusive, worldwide, free-of-charge patent license to make, have made, use, offer to sell, sell, import and otherwise transfer the Package with respect to any patent claims licensable by the Copyright Holder that are necessarily infringed by the Package. If you institute patent litigation (including a cross-claim or counterclaim) against any party alleging that the Package constitutes direct or contributory patent infringement, then this Artistic License to you shall terminate on the date that such litigation is filed.

(14) Disclaimer of Warranty:  
THE PACKAGE IS PROVIDED BY THE COPYRIGHT HOLDER AND CONTRIBUTORS "AS IS" AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES. THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT ARE DISCLAIMED TO THE EXTENT PERMITTED BY YOUR LOCAL LAW. UNLESS REQUIRED BY LAW, NO COPYRIGHT HOLDER OR CONTRIBUTOR WILL BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING IN ANY WAY OUT OF THE USE OF THE PACKAGE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

---

BSD-2-Clause

Copyright (c) <year> <owner> All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT HOLDER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

---

BSD-3-Clause

Copyright (c) <year> <owner>. All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. Neither the name of the copyright holder nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT HOLDER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

---

BSD-like License (file)

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice immediately at the beginning of the file, without modification, this list of conditions, and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.

THIS SOFTWARE IS PROVIDED BY THE AUTHOR AND CONTRIBUTORS ``AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE AUTHOR OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY

LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

---

## BSL-1.0

Boost Software License - Version 1.0 - August 17th, 2003

Permission is hereby granted, free of charge, to any person or organization obtaining a copy of the software and accompanying documentation covered by this license (the "Software") to use, reproduce, display, distribute, execute, and transmit the Software, and to prepare derivative works of the Software, and to permit third-parties to whom the Software is furnished to do so, all subject to the following:

The copyright notices in the Software and this entire statement, including the above license grant, this restriction and the following disclaimer, must be included in all copies of the Software, in whole or in part, and all derivative works of the Software, unless such copies or derivative works are solely in the form of machine-executable object code generated by a source language processor.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, TITLE AND NON-INFRINGEMENT. IN NO EVENT SHALL THE COPYRIGHT HOLDERS OR ANYONE DISTRIBUTING THE SOFTWARE BE LIABLE FOR ANY DAMAGES OR OTHER LIABILITY, WHETHER IN CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

---

## GPL-2.0

GNU GENERAL PUBLIC LICENSE  
Version 2, June 1991

Copyright (C) 1989, 1991 Free Software Foundation, Inc.  
51 Franklin Street, Fifth Floor, Boston, MA 02110-1301, USA

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public License is intended to guarantee your freedom to share and change free software--to make sure the software is free for all its users. This General Public License applies to most of the Free Software Foundation's software and to any other program whose authors commit to using it. (Some other Free Software Foundation software is covered by the GNU Lesser General Public License instead.) You can apply it to your programs, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs; and that you know you can do these things.

To protect your rights, we need to make restrictions that forbid anyone to deny you these rights or to ask you to surrender the rights. These restrictions translate to certain responsibilities for you if you distribute copies of the software, or if you modify it.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must give the recipients all the rights that you have. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

We protect your rights with two steps: (1) copyright the software, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the software.

Also, for each author's protection and ours, we want to make certain that everyone understands that there is no warranty for this free software. If the software is modified by someone else and passed on, we want its recipients to know that what they have is not the original, so that any problems introduced by others will not reflect on the original authors' reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that redistributors of a free program will individually obtain patent licenses, in effect making the program proprietary. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

The precise terms and conditions for copying, distribution and modification follow.

TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

0. This License applies to any program or other work which contains a notice placed by the copyright holder saying it may be distributed under the terms of this General Public License. The "Program", below, refers to any such program or work, and a "work based on the Program" means either the Program or any derivative work under copyright law: that is to say, a work containing the Program or a portion of it, either verbatim or with modifications and/or translated into another language. (Hereinafter, translation is included without limitation in the term "modification".) Each licensee is addressed as "you".

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running the Program is not restricted, and the output from the Program is covered only if its contents constitute a work based on the Program (independent of having been made by running the Program). Whether that is true depends on what the Program does.

1. You may copy and distribute verbatim copies of the Program's source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and give any other recipients of the Program a copy of this License along with the Program.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Program or any portion of it, thus forming a work based on the Program, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

- a) You must cause the modified files to carry prominent notices stating that you changed the files and the date of any change.
- b) You must cause any work that you distribute or publish, that in whole or in part contains or is derived from the Program or any part thereof, to be licensed as a whole at no charge to all third parties under the terms of this License.
- c) If the modified program normally reads commands interactively when run, you must cause it, when started running for such interactive use in the most ordinary way, to print or display an announcement including an appropriate copyright notice and a notice that there is no warranty (or else, saying that you provide a warranty) and that users may redistribute the program under these conditions, and telling the user how to view a copy of this License. (Exception: if the Program itself is interactive but does not normally print such an announcement, your work based on the

these conditions, and telling the user how to view a copy of this License. (Exception: if the Program itself is interactive but does not normally print such an announcement, your work based on the Program is not required to print an announcement.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Program, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Program, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Program.

In addition, mere aggregation of another work not based on the Program with the Program (or with a work based on the Program) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may copy and distribute the Program (or a work based on it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you also do one of the following:

a) Accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,

b) Accompany it with a written offer, valid for at least three years, to give any third party, for a charge no more than your cost of physically performing source distribution, a complete machine-readable copy of the corresponding source code, to be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,

c) Accompany it with the information you received as to the offer to distribute corresponding source code. (This alternative is allowed only for noncommercial distribution and only if you received the program in object code or executable form with such an offer, in accord with Subsection b above.)

The source code for a work means the preferred form of the work for making modifications to it. For an executable work, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the executable. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

If distribution of executable or object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place counts as distribution of the source code, even though third parties are not compelled to copy the source along with the object code.

4. You may not copy, modify, sublicense, or distribute the Program except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense or distribute the Program is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

5. You are not required to accept this License, since you have not signed it. However, nothing else grants you permission to modify or distribute the Program or its derivative works. These actions are prohibited by law if you do not accept this License. Therefore, by modifying or distributing the Program (or any work based on the Program), you indicate your acceptance of this License to do so, and all its terms and conditions for copying, distributing or modifying the Program or works based on it.

6. Each time you redistribute the Program (or any work based on the Program), the recipient automatically receives a license from the original licensor to copy, distribute or modify the Program subject to these terms and conditions. You may not impose any further restrictions on the recipients' exercise of the rights granted herein. You are not responsible for enforcing compliance by third parties to this License.

7. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute the Program at all. For example, if a patent license would not permit royalty-free redistribution of the Program by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Program.

If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply and the section as a whole is intended to apply in other circumstances.

It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system, which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

8. If the distribution and/or use of the Program is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Program under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.

9. The Free Software Foundation may publish revised and/or new versions of the General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Program specifies a version number of this License which applies to it and "any later version", you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation. If the Program does not specify a version number of this License, you may choose any version ever published by the Free Software Foundation.

10. If you wish to incorporate parts of the Program into other free programs whose distribution conditions are different, write to the author to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.

#### NO WARRANTY

11. BECAUSE THE PROGRAM IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE PROGRAM, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE PROGRAM "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE PROGRAM IS WITH YOU. SHOULD THE PROGRAM PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

12. IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MAY MODIFY AND/OR REDISTRIBUTE THE PROGRAM AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PROGRAM (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE PROGRAM TO OPERATE WITH ANY OTHER PROGRAMS), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

#### END OF TERMS AND CONDITIONS

How to Apply These Terms to Your New Programs

If you develop a new program, and you want it to be of the greatest possible use to the public, the best way to achieve this is to make it free software which everyone can redistribute and change under these terms.

To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

one line to give the program's name and an idea of what it does. Copyright (C) yyyy name of author

This program is free software; you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation; either version 2 of the License, or (at your option) any later version.

This program is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details.

You should have received a copy of the GNU General Public License along with this program; if not, write to the Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301, USA. Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

Gnomovision version 69, Copyright (C) year name of author Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'. This is free software, and you are welcome to redistribute it under certain conditions; type `show c' for details.

The hypothetical commands `show w' and `show c' should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than `show w' and `show c'; they could even be mouse-clicks or menu items--whatever suits your program.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the program, if necessary. Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the program `Gnomovision' (which makes passes at compilers) written by James Hacker.

signature of Ty Coon, 1 April 1989 Ty Coon, President of Vice

ICU

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, provided that the above copyright notice(s) and this permission notice appear in all copies of the Software and that both the above copyright notice(s) and this permission notice appear in supporting documentation.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT OF THIRD PARTY RIGHTS. IN NO EVENT SHALL THE COPYRIGHT HOLDER OR HOLDERS INCLUDED IN THIS NOTICE BE LIABLE FOR ANY CLAIM, OR ANY SPECIAL INDIRECT OR CONSEQUENTIAL DAMAGES, OR ANY DAMAGES WHATSOEVER RESULTING FROM LOSS OF USE, DATA OR PROFITS, WHETHER IN AN ACTION OF CONTRACT, NEGLIGENCE OR OTHER TORTIOUS ACTION, ARISING OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THIS SOFTWARE.

Except as contained in this notice, the name of a copyright holder shall not be used in advertising or otherwise to promote the sale, use or other dealings in this Software without prior written authorization of the copyright holder.

LGPL-2.1

GNU LESSER GENERAL PUBLIC LICENSE

Version 2.1, February 1999

Copyright (C) 1991, 1999 Free Software Foundation, Inc.  
51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

[This is the first released version of the Lesser GPL. It also counts as the successor of the GNU Library Public License, version 2, hence the version number 2.1.]

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public Licenses are intended to guarantee your freedom to share and change free software--to make sure the software is free for all its users.

This license, the Lesser General Public License, applies to some specially designated software packages--typically libraries--of the Free Software Foundation and other authors who decide to use it. You can use it too, but we suggest you first think carefully about whether this license or the ordinary General Public License is the better strategy to use in any particular case, based on the explanations below.

When we speak of free software, we are referring to freedom of use, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish); that you receive source code or can get it if you want it; that you can change the software and use pieces of it in new free programs; and that you are informed that you can do these things.

To protect your rights, we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights. These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it.

For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link other code with the library, you must provide complete object files to the recipients, so that they can relink them with the library after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

We protect your rights with a two-step method: (1) we copyright the library, and (2) we offer you this license, which gives you legal permission to copy, distribute and/or modify the library.

To protect each distributor, we want to make it very clear that there is no warranty for the free library. Also, if the library is modified by someone else and passed on, the recipients should know that what they have is not the original version, so that the original author's reputation will not be affected by problems that might be introduced by others.

Finally, software patents pose a constant threat to the existence of any free program. We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder. Therefore, we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License. This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License. We use this license for certain libraries in order to permit linking those libraries into non-free programs.

When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the "Lesser" General Public License because it does Less to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

#### TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

0. This License Agreement applies to any software library or other program which contains a notice placed by the copyright holder or other authorized party saying it may be distributed under the terms of this Lesser General Public License (also called "this License"). Each licensee is addressed as "you".

A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

a) The modified work must itself be a software library.

b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.



4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

a) Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities. This must be distributed under the terms of the Sections above.

b) Give prominent notice with the combined library of the fact that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.

8. You may not copy, modify, sublicense, link with, or distribute the Library except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense, link with, or distribute the Library is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

9. You are not required to accept this License, since you have not signed it. However, nothing else grants you permission to modify or distribute the Library or its derivative works. These actions are prohibited by law if you do not accept this License. Therefore, by modifying or distributing the Library (or any work based on the Library), you indicate your acceptance of this License to do so, and all its terms and conditions for copying, distributing or modifying the Library or works based on it.

10. Each time you redistribute the Library (or any work based on the Library), the recipient automatically receives a license from the original licensor to copy, distribute, link with or modify the Library subject to these terms and conditions. You may not impose any further restrictions on the recipients' exercise of the rights granted herein. You are not responsible for enforcing compliance by third parties with this License.

11. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute the Library at all. For example, if a patent license would not permit royalty-free redistribution of the Library by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Library.

If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply, and the section as a whole is intended to apply in other circumstances.

It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

12. If the distribution and/or use of the Library is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Library under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.



13. The Free Software Foundation may publish revised and/or new versions of the Lesser General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Library specifies a version number of this License which applies to it and "any later version", you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation. If the Library does not specify a license version number, you may choose any version ever published by the Free Software Foundation.

14. If you wish to incorporate parts of the Library into other free programs whose distribution conditions are incompatible with these, write to the author to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.

NO WARRANTY

15. BECAUSE THE LIBRARY IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE LIBRARY, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE LIBRARY "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU. SHOULD THE LIBRARY PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

16. IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MAY MODIFY AND/OR REDISTRIBUTE THE LIBRARY AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE LIBRARY (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIR D PARTIES OR A FAILURE OF THE LIBRARY TO OPERATE WITH ANY OTHER SOFTWARE), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

END OF TERMS AND CONDITIONS

How to Apply These Terms to Your New Libraries

If you develop a new library, and you want it to be of the greatest possible use to the public, we recommend making it free software that everyone can redistribute and change. You can do so by permitting redistribution under these terms (or, alternatively, under the terms of the ordinary General Public License).

To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

one line to give the library's name and an idea of what it does.  
Copyright (C) year name of author

This library is free software; you can redistribute it and/or modify it under the terms of the GNU Lesser General Public License as published by the Free Software Foundation; either version 2.1 of the License, or (at your option) any later version.

This library is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU Lesser General Public License for more details.

You should have received a copy of the GNU Lesser General Public License along with this library; if not, write to the Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA Also add information on how to contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the library, if necessary. Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in  
the library `Frob' (a library for tweaking knobs) written  
by James Random Hacker.

signature of Ty Coon, 1 April 1990  
Ty Coon, President of Vice  
That's all there is to it!

MIT

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

MIT-like License (ncurses)

Copyright (c) 1999-2004,2005 Free Software Foundation, Inc.

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, distribute with modifications, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE ABOVE COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

Except as contained in this notice, the name(s) of the above copyright holders shall not be used in advertising or otherwise to promote the sale, use or other dealings in this Software without prior written authorization.

---

## MIT-like License (sudo)

Sudo is distributed under the following license:

Copyright (c) 1994-1996, 1998-2013  
Todd C. Miller <Todd.Miller@courtesan.com>

Permission to use, copy, modify, and distribute this software for any purpose with or without fee is hereby granted, provided that the above copyright notice and this permission notice appear in all copies.

THE SOFTWARE IS PROVIDED "AS IS" AND THE AUTHOR DISCLAIMS ALL WARRANTIES WITH REGARD TO THIS SOFTWARE INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS. IN NO EVENT SHALL THE AUTHOR BE LIABLE FOR ANY SPECIAL, DIRECT, INDIRECT, OR CONSEQUENTIAL DAMAGES OR ANY DAMAGES WHATSOEVER RESULTING FROM LOSS OF USE, DATA OR PROFITS, WHETHER IN AN ACTION OF CONTRACT, NEGLIGENCE OR OTHER TORTIOUS ACTION, ARISING OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THIS SOFTWARE.

Sponsored in part by the Defense Advanced Research Projects Agency (DARPA) and Air Force Research Laboratory, Air Force Materiel Command, USAF, under agreement number F39502-99-1-0512.

The file redblack.c bears the following license:

Copyright (c) 2001 Emin Martinian

Redistribution and use in source and binary forms, with or without modification, are permitted provided that neither the name of Emin Martinian nor the names of any contributors are be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT OWNER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

The files getcwd.c, glob.c, glob.h and snprintf.c bear the following license:

Copyright (c) 1989, 1990, 1991, 1993  
The Regents of the University of California. All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. Neither the name of the University nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE REGENTS AND CONTRIBUTORS ``AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE REGENTS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

The file fnmatch.c bears the following license:

Copyright (c) 2011, VMware, Inc.  
All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

- \* Redistributions of source code must retain the above copyright

notice, this list of conditions and the following disclaimer.

- \* Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
- \* Neither the name of the VMware, Inc. nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL VMWARE, INC. OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

The embedded copy of zlib bears the following license:

Copyright (C) 1995-2012 Jean-loup Gailly and Mark Adler

This software is provided 'as-is', without any express or implied warranty. In no event will the authors be held liable for any damages arising from the use of this software.

Permission is granted to anyone to use this software for any purpose, including commercial applications, and to alter it and redistribute it freely, subject to the following restrictions:

1. The origin of this software must not be misrepresented; you must not claim that you wrote the original software. If you use this software in a product, an acknowledgment in the product documentation would be appreciated but is not required.
2. Altered source versions must be plainly marked as such, and must not be misrepresented as being the original software.
3. This notice may not be removed or altered from any source distribution.

Jean-loup Gailly Mark Adler  
jloup@gzip.org madler@alumni.caltech.edu

---

## MPL-1.1

Mozilla Public License Version 1.1

1. Definitions.
  - 1.0.1. "Commercial Use" means distribution or otherwise making the Covered Code available to a third party.
  - 1.1. "Contributor" means each entity that creates or contributes to the creation of Modifications.
  - 1.2. "Contributor Version" means the combination of the Original Code, prior Modifications used by a Contributor, and the Modifications made by that particular Contributor.
  - 1.3. "Covered Code" means the Original Code or Modifications or the combination of the Original Code and Modifications, in each case including portions thereof.
  - 1.4. "Electronic Distribution Mechanism" means a mechanism generally accepted in the software development community for the electronic transfer of data.
  - 1.5. "Executable" means Covered Code in any form other than Source Code.
  - 1.6. "Initial Developer" means the individual or entity identified as the Initial Developer in the Source Code notice required by Exhibit A.
  - 1.7. "Larger Work" means a work which combines Covered Code or portions thereof with code not governed by the terms of this License.
  - 1.8. "License" means this document.
    - 1.8.1. "Licensable" means having the right to grant, to the maximum extent possible, whether at the time of the initial grant or subsequently acquired, any and all of the rights conveyed herein.
  - 1.9. "Modifications" means any addition to or deletion from the substance or structure of either the Original Code or any previous Modifications. When Covered Code is released as a series of files, a Modification is:  
Any addition to or deletion from the contents of a file containing Original Code or previous Modifications.  
Any new file that contains any part of the Original Code or previous Modifications.
  - 1.10. "Original Code" means Source Code of computer software code which is described in the Source Code notice required by Exhibit A as Original Code, and which, at the time of its release under this License is not already Covered Code governed by this License.
    - 1.10.1. "Patent Claims" means any patent claim(s), now owned or hereafter acquired, including without limitation, method, process, and apparatus claims, in any patent Licensable by grantor.
    - 1.11. "Source Code" means the preferred form of the Covered Code for making modifications to it, including all modules it contains, plus any associated interface definition files, scripts used to control compilation and installation of an Executable, or source code differential comparisons against either the Original Code or another well known, available Covered Code of the Contributor's choice. The Source Code can be in a compressed or archival form, provided the appropriate decompression or de-archiving software is widely available for no charge.
    - 1.12. "You" (or "Your") means an individual or a legal entity exercising rights under, and complying with all of the terms of, this License or a future version of this License issued under Section 6.1. For legal entities, "You" includes any entity which controls, is controlled by, or is under common control with You. For purposes of this definition, "control" means (a) the power, direct or indirect, to cause the direction or management of such entity, whether by contract or otherwise, or (b) ownership of more than fifty percent (50%) of the outstanding shares or beneficial ownership of such entity.

2. Source Code License.

2.1. The Initial Developer Grant. The Initial Developer hereby grants You a world-wide, royalty-free, non-exclusive license, subject to third party intellectual property claims:

- a. under intellectual property rights (other than patent or trademark) Licensable by Initial Developer to use, reproduce, modify, display, perform, sublicense and distribute the Original Code (or portions thereof) with or without Modifications, and/or as part of a Larger Work; and
- b. under Patents Claims infringed by the making, using or selling of Original Code, to make, have made, use, practice, sell, and offer for sale, and/or otherwise dispose of the Original Code (or portions thereof).
- c. the licenses granted in this Section 2.1 (a) and (b) are effective on the date Initial Developer first distributes Original Code under the terms of this License.
- d. Notwithstanding Section 2.1 (b) above, no patent license is granted: 1) for code that You delete from the Original Code; 2) separate from the Original Code; or 3) for infringements caused by: i) the modification of the Original Code or ii) the combination of the Original Code with other software or devices.

2.2. Contributor Grant. Subject to third party intellectual property claims, each Contributor hereby grants You a world-wide, royalty-free, non-exclusive license

- a. under intellectual property rights (other than patent or trademark) Licensable by Contributor, to use, reproduce, modify, display, perform, sublicense and distribute the Modifications created by such Contributor (or portions thereof) either on an unmodified basis, with other Modifications, as Covered Code and/or as part of a Larger Work; and
- b. under Patent Claims infringed by the making, using, or selling of Modifications made by that Contributor either alone and/or in combination with its Contributor Version (or portions of such combination), to make, use, sell, offer for sale, have made, and/or otherwise dispose of: 1) Modifications made by that Contributor (or portions thereof); and 2) the combination of Modifications made by that Contributor with its Contributor Version (or portions of such combination).
- c. the licenses granted in Sections 2.2 (a) and 2.2 (b) are effective on the date Contributor first makes Commercial Use of the Covered Code.
- d. Notwithstanding Section 2.2 (b) above, no patent license is granted: 1) for any code that Contributor has deleted from the Contributor Version; 2) separate from the Contributor Version; 3) for infringements caused by: i) third party modifications of Contributor Version or ii) the combination of Modifications made by that Contributor with other software (except as part of the Contributor Version) or other devices; or 4) under Patent Claims infringed by Covered Code in the absence of Modifications made by that Contributor.

3. Distribution Obligations.

3.1. Application of License. The Modifications which You create or to which You contribute are governed by the terms of this License, including without limitation Section 2.2. The Source Code version of Covered Code may be distributed only under the terms of this License or a future version of this License released under Section 6.1, and You must include a copy of this License with every copy of the Source Code You distribute. You may not offer or impose any terms on any Source Code version that alters or restricts the applicable version of this License or the recipients' rights hereunder. However, You may include an additional document offering the additional rights described in Section 3.5.

3.2. Availability of Source Code. Any Modification which You create or to which You contribute must be made available in Source Code form under the terms of this License either on the same media as an Executable version or via an accepted Electronic Distribution Mechanism to anyone to whom you made an Executable version available; and if made available via Electronic Distribution Mechanism, must remain available for at least twelve (12) months after the date it initially became available, or at least six (6) months after a subsequent version of that particular Modification has been made available to such recipients. You are responsible for ensuring that the Source Code version remains available even if the Electronic Distribution Mechanism is maintained by a third party.

3.3. Description of Modifications. You must cause all Covered Code to which You contribute to contain a file documenting the changes You made to create that Covered Code and the date of any change. You must include a prominent statement that the Modification is derived, directly or indirectly, from Original Code provided by the Initial Developer and including the name of the Initial Developer in (a) the Source Code, and (b) in any notice in an Executable version or related documentation in which You describe the origin or ownership of the Covered Code.

3.4. Intellectual Property Matters

(a) Third Party Claims

If Contributor has knowledge that a license under a third party's intellectual property rights is required to exercise the rights granted by such Contributor under Sections 2.1 or 2.2, Contributor must include a text file with the Source Code distribution titled "LEGAL" which describes the claim and the party making the claim in sufficient detail that a recipient will know whom to contact. If Contributor obtains such knowledge after the Modification is made available as described in Section 3.2, Contributor shall promptly modify the LEGAL file in all copies Contributor makes available thereafter and shall take other steps (such as notifying appropriate mailing lists or newsgroups) reasonably calculated to inform those who received the Covered Code that new knowledge has been obtained.

(b) Contributor APIs

If Contributor's Modifications include an application programming interface and Contributor has knowledge of patent licenses which are reasonably necessary to implement that API, Contributor must also include this information in the LEGAL file.

(c) Representations.

Contributor represents that, except as disclosed pursuant to Section 3.4 (a) above, Contributor believes that Contributor's Modifications are Contributor's original creation(s) and/or Contributor has sufficient rights to grant the rights conveyed by this License.

3.5. Required Notices. You must duplicate the notice in Exhibit A in each file of the Source Code. If it is not possible to put such notice in a particular Source Code file due to its structure, then You must include such notice in a location (such as a relevant directory) where a user would be likely to look for such a notice. If You created one or more Modification(s) You may add your name as a Contributor to the notice described in Exhibit A. You must also duplicate this License in any documentation for the Source Code where You describe recipients' rights or ownership rights relating to Covered Code. You may choose to offer, and to charge a fee for, warranty, support, indemnity or liability obligations to one or more recipients of Covered Code. However, You may do so only on Your own behalf, and not on behalf of the Initial Developer or any Contributor. You must make it absolutely clear than any such warranty, support, indemnity or liability obligation is offered by You alone, and You hereby agree to indemnify the Initial Developer and every Contributor for any liability incurred by the Initial Developer or such Contributor as a result of warranty, support, indemnity or liability terms You offer.

3.6. Distribution of Executable Versions. You may distribute Covered Code in Executable form only if the requirements of Sections 3.1, 3.2, 3.3, 3.4 and 3.5 have been met for that Covered Code, and if You include a notice stating that the Source Code version of the Covered Code is available under the terms of this License, including a description of how and where You have fulfilled the obligations of Section 3.2. The notice must be conspicuously included in any notice in an Executable version, related documentation or collateral in which You describe recipients' rights relating to the Covered Code. You may distribute the Executable version of Covered Code or ownership rights under a license of Your choice, which may contain terms different from this License, provided that You are in compliance with the terms of this License and that the license for the Executable version does not attempt to limit or alter the recipient's rights in the Source Code version from the rights set forth in this License. If You distribute the Executable version under a different license You must make it absolutely clear that any terms which differ from this License are offered by You alone, not by the Initial Developer or any Contributor. You hereby agree to indemnify the Initial Developer and every Contributor for any liability incurred by the Initial Developer or such Contributor as a result of any such terms You offer.

3.7. Larger Works. You may create a Larger Work by combining Covered Code with other code not governed by the terms of this License and distribute the Larger Work as a single product. In such a case, You must make sure the requirements of this License are fulfilled for the Covered Code.

4. Inability to Comply Due to Statute or Regulation.

If it is impossible for You to comply with any of the terms of this License with respect to some or all of the Covered Code due to statute, judicial order, or regulation then You must: (a) comply with the terms of this License to the maximum extent possible; and (b) describe the limitations and the code they affect. Such description must be included in the LEGAL file described in Section 3.4 and must be included with all distributions of the Source Code. Except to the extent prohibited by statute or regulation, such description must be sufficiently detailed for a recipient of ordinary skill to be able to understand it.

5. Application of this License.

This License applies to code to which the Initial Developer has attached the notice in Exhibit A and to related Covered Code.

6. Versions of the License.

6.1. NEW VERSIONS

Netscape Communications Corporation ("Netscape") may publish revised and/or new versions of the License from time to time. Each version will be given a distinguishing version number.

6.2. Effect of New Versions

Once Covered Code has been published under a particular version of the License, You may always continue to use it under the terms of that version. You may also choose to use such Covered Code under the terms of any subsequent version of the License published by Netscape. No one other than Netscape has the right to modify the terms applicable to Covered Code created under this License.

6.3. Derivative Works

If You create or use a modified version of this License (which you may only do in order to apply it to code which is not already Covered Code governed by this License), You must (a) rename Your license so that the phrases "Mozilla", "MOZILLAPL", "MOZPL", "Netscape", "MPL", "NPL" or any confusingly similar phrase do not appear in your license (except to note that your license differs from this License) and (b) otherwise make it clear that Your version of the license contains terms which differ from the Mozilla Public License and Netscape Public License. (Filling in the name of the Initial Developer, Original Code or Contributor in the notice described in Exhibit A shall not of themselves be deemed to be modifications of this License.)

7. DISCLAIMER OF WARRANTY

COVERED CODE IS PROVIDED UNDER THIS LICENSE ON AN "AS IS" BASIS, WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, WARRANTIES THAT THE COVERED CODE IS FREE OF DEFECTS, MERCHANTABLE, FIT FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE COVERED CODE IS WITH YOU. SHOULD ANY COVERED CODE PROVE DEFECTIVE IN ANY RESPECT, YOU (NOT THE INITIAL DEVELOPER OR ANY OTHER CONTRIBUTOR) ASSUME THE COST OF ANY NECESSARY SERVICING, REPAIR OR CORRECTION. THIS DISCLAIMER OF WARRANTY CONSTITUTES AN ESSENTIAL PART OF THIS LICENSE. NO USE OF ANY COVERED CODE IS AUTHORIZED HEREUNDER EXCEPT UNDER THIS DISCLAIMER.

8. Termination

8.1. This License and the rights granted hereunder will terminate automatically if You fail to comply with terms herein and fail to cure such breach within 30 days of becoming aware of the breach. All sublicenses to the Covered Code which are properly granted shall survive any termination of this License. Provisions which, by their nature, must remain in effect beyond the termination of this License shall survive.

8.2. If You initiate litigation by asserting a patent infringement claim (excluding declaratory judgment actions) against Initial Developer or a Contributor (the Initial Developer or Contributor against whom You file such action is referred to as "Participant") alleging that:

- a. such Participant's Contributor Version directly or indirectly infringes any patent, then any and all rights granted by such Participant to You under Sections 2.1 and/or 2.2 of this License shall, upon 60 days notice from Participant terminate prospectively, unless if within 60 days after receipt of notice You either: (i) agree in writing to pay Participant a mutually agreeable reasonable royalty for Your past and future use of Modifications made by such Participant, or (ii) withdraw Your litigation claim with respect to the Contributor Version against such Participant. If within 60 days of notice, a reasonable royalty and payment arrangement are not mutually agreed upon in writing by the parties or the litigation claim is not withdrawn, the rights granted by Participant to You under Sections 2.1 and/or 2.2 automatically terminate at the expiration of the 60 day notice period specified above.
- b. any software, hardware, or device, other than such Participant's Contributor Version, directly or indirectly infringes any patent, then any rights granted to You by such Participant under Sections 2.1(b) and 2.2(b) are revoked effective as of the date You first made, used, sold, distributed, or had made, Modifications made by that Participant.

8.3. If You assert a patent infringement claim against Participant alleging that such Participant's Contributor Version directly or indirectly infringes any patent where such claim is resolved (such as by license or settlement) prior to the initiation of patent infringement litigation, then the reasonable value of the licenses granted by such Participant under Sections 2.1 or 2.2 shall be taken into account in determining the amount or value of any payment or license.

8.4. In the event of termination under Sections 8.1 or 8.2 above, all end user license agreements (excluding distributors and resellers) which have been validly granted by You or any distributor hereunder prior to termination shall survive termination.

9. LIMITATION OF LIABILITY

UNDER NO CIRCUMSTANCES AND UNDER NO LEGAL THEORY, WHETHER TORT (INCLUDING NEGLIGENCE), CONTRACT, OR OTHERWISE, SHALL YOU, THE INITIAL DEVELOPER, ANY OTHER CONTRIBUTOR, OR ANY DISTRIBUTOR OF COVERED CODE, OR ANY SUPPLIER OF ANY OF SUCH PARTIES, BE LIABLE TO ANY PERSON FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OF ANY CHARACTER INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF GOODWILL, WORK STOPPAGE, COMPUTER FAILURE OR MALFUNCTION, OR ANY AND ALL OTHER COMMERCIAL DAMAGES OR LOSSES, EVEN IF SUCH PARTY SHALL HAVE BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. THIS LIMITATION OF LIABILITY SHALL NOT APPLY TO LIABILITY FOR DEATH OR PERSONAL INJURY RESULTING FROM SUCH PARTY'S NEGLIGENCE TO THE EXTENT APPLICABLE LAW PROHIBITS SUCH LIMITATION. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THIS EXCLUSION AND LIMITATION MAY NOT APPLY TO YOU.

10. U.S. government end users

The Covered Code is a "commercial item," as that term is defined in 48 C.F.R. 2.101 (Oct. 1995), consisting of "commercial computer software" and "commercial computer software documentation," as such terms are used in 48 C.F.R. 12.212 (Sept. 1995). Consistent with 48 C.F.R. 12.212 and 48 C.F.R. 227.7202-1 through 227.7202-4 (June 1995), all U.S. Government End Users acquire Covered Code with only those rights set forth herein.

11. Miscellaneous

This License represents the complete agreement concerning subject matter hereof. If any provision of this License is held to be unenforceable, such provision shall be reformed only to the extent necessary to make it enforceable. This License shall be governed by California law provisions (except to the extent applicable law, if any, provides otherwise), excluding its conflict-of-law provisions. With respect to disputes in which at least one party is a citizen of, or an entity chartered or registered to do business in the United States of America, any litigation relating to this License shall be subject to the jurisdiction of the Federal Courts of the Northern District of California, with venue lying in Santa Clara County, California, with the losing party responsible for costs, including without limitation, court costs and reasonable attorneys' fees and expenses. The application of the United Nations Convention on Contracts for the International Sale of Goods is expressly excluded. Any law or regulation which provides that the language of a contract shall be construed against the drafter shall not apply to this License.

12. Responsibility for claims

As between Initial Developer and the Contributors, each party is responsible for claims and damages arising, directly or indirectly, out of its utilization of rights under this License and You agree to work with Initial Developer and Contributors to distribute such responsibility on an equitable basis. Nothing herein is intended or shall be deemed to constitute any admission of liability.

13. Multiple-licensed code

Initial Developer may designate portions of the Covered Code as "Multiple-Licensed". "Multiple-Licensed" means that the Initial Developer permits you to utilize portions of the Covered Code under Your choice of the MPL or the alternative licenses, if any, specified by the Initial Developer in the file described in Exhibit A.

Exhibit A - Mozilla Public License.

"The contents of this file are subject to the Mozilla Public License Version 1.1 (the "License"); you may not use this file except in compliance with the License. You may obtain a copy of the License at <http://www.mozilla.org/MPL/>

Software distributed under the License is distributed on an "AS IS" basis, WITHOUT WARRANTY OF ANY KIND, either express or implied. See the License for the specific language governing rights and limitations under the License.

The Original Code is \_\_\_\_\_.

The Initial Developer of the Original Code is \_\_\_\_\_.

Portions created by \_\_\_\_\_ are Copyright (C) \_\_\_\_\_  
\_\_\_\_\_. All Rights Reserved.

Contributor(s): \_\_\_\_\_.

Alternatively, the contents of this file may be used under the terms of the \_\_\_\_\_ license (the "[\_\_\_\_\_] License"), in which case the provisions of [\_\_\_\_\_] License are applicable instead of those above.

If you wish to allow use of your version of this file only under the terms of the [\_\_\_\_\_] License and not to allow others to use your version of this file under the MPL, indicate your decision by deleting the provisions above and replace them with the notice and other provisions required by the [\_\_\_\_\_] License. If you do not delete the provisions above, a recipient may use your version of this file under either the MPL or the [\_\_\_\_\_] License."

NOTE: The text of this Exhibit A may differ slightly from the text of the notices in the Source Code files of the Original Code. You should use the text of this Exhibit A rather than the text found in the Original Code Source Code for Your Modifications.

MPL-2.0

Mozilla Public License Version 2.0

1. Definitions

- 1.1. "Contributor" means each individual or legal entity that creates, contributes to the creation of, or owns Covered Software.
- 1.2. "Contributor Version" means the combination of the Contributions of others (if any) used by a Contributor and that particular Contributor's Contribution.
- 1.3. "Contribution" means Covered Software of a particular Contributor.
- 1.4. "Covered Software" means Source Code Form to which the initial Contributor has attached the notice in Exhibit A, the Executable Form of such Source Code Form, and Modifications of such Source Code Form, in each case including portions thereof.
- 1.5. "Incompatible With Secondary Licenses" means
  - (a) that the initial Contributor has attached the notice described in Exhibit B to the Covered Software; or
  - (b) that the Covered Software was made available under the terms of version 1.1 or earlier of the License, but not also under the terms of a Secondary License.
- 1.6. "Executable Form" means any form of the work other than Source Code Form.
- 1.7. "Larger Work" means a work that combines Covered Software with other material, in a separate file or files, that is not Covered Software.
- 1.8. "License" means this document.
- 1.9. "Licensable" means having the right to grant, to the maximum extent possible, whether at the time of the initial grant or subsequently, any and all of the rights conveyed by this License.
- 1.10. "Modifications" means any of the following:
  - (a) any file in Source Code Form that results from an addition to, deletion from, or modification of the contents of Covered Software; or
  - (b) any new file in Source Code Form that contains any Covered Software.
- 1.11. "Patent Claims" of a Contributor means any patent claim(s), including without limitation, method, process, and apparatus claims, in any patent Licensable by such Contributor that would be infringed, but for the grant of the License, by the making, using, selling, offering for sale, having made, import, or transfer of either its Contributions or its Contributor Version.
- 1.12. "Secondary License" means either the GNU General Public License, Version 2.0, the GNU Lesser General Public License, Version 2.1, the GNU Affero General Public License, Version 3.0, or any later versions of those licenses.
- 1.13. "Source Code Form" means the form of the work preferred for making modifications.
- 1.14. "You" (or "Your") means an individual or a legal entity exercising rights under this License. For legal entities, "You" includes any entity that controls, is controlled by, or is under common control with You. For purposes of this definition, "control" means (a) the power, direct or indirect, to cause the direction or management of such entity, whether by contract or otherwise, or (b) ownership of more than fifty percent (50%) of the outstanding shares or beneficial ownership of such entity.

2. License Grants and Conditions

- 2.1. Grants

Each Contributor hereby grants You a world-wide, royalty-free, non-exclusive license:

  - (a) under intellectual property rights (other than patent or trademark) Licensable by such Contributor to use, reproduce, make available, modify, display, perform, distribute, and otherwise exploit its Contributions, either on an unmodified basis, with Modifications, or as part of a Larger Work; and
  - (b) under Patent Claims of such Contributor to make, use, sell, offer for sale, have made, import, and otherwise transfer either its Contributions or its Contributor Version.
- 2.2. Effective Date

The licenses granted in Section 2.1 with respect to any Contribution become effective for each Contribution on the date the Contributor first distributes such Contribution.
- 2.3. Limitations on Grant Scope

The licenses granted in this Section 2 are the only rights granted under this License. No additional rights or licenses will be implied from the distribution or licensing of Covered Software under this License. Notwithstanding Section 2.1(b) above, no patent license is granted by a Contributor:

  - (a) for any code that a Contributor has removed from Covered Software; or
  - (b) for infringements caused by: (i) Your and any other third party's modifications of Covered Software, or (ii) the combination of its Contributions with other software (except as part of its Contributor Version); or
  - (c) under Patent Claims infringed by Covered Software in the absence of its Contributions.

This License does not grant any rights in the trademarks, service marks, or logos of any Contributor (except as may be necessary to comply with the notice requirements in Section 3.4).

- 2.4. Subsequent Licenses

No Contributor makes additional grants as a result of Your choice to distribute the Covered Software under a subsequent version of this License (see Section 10.2) or under the terms of a Secondary License (if permitted under the terms of Section 3.3).
- 2.5. Representation

Each Contributor represents that the Contributor believes its Contributions are its original creation(s) or it has sufficient rights to grant the rights to its Contributions conveyed by this License.



## 2.6. Fair Use

This License is not intended to limit any rights You have under applicable copyright doctrines of fair use, fair dealing, or other equivalents.

## 2.7. Conditions

Sections 3.1, 3.2, 3.3, and 3.4 are conditions of the licenses granted in Section 2.1.

## 3. Responsibilities

### 3.1. Distribution of Source Form

All distribution of Covered Software in Source Code Form, including any Modifications that You create or to which You contribute, must be under the terms of this License. You must inform recipients that the Source Code Form of the Covered Software is governed by the terms of this License, and how they can obtain a copy of this License. You may not attempt to alter or restrict the recipients' rights in the Source Code Form.

### 3.2. Distribution of Executable Form

If You distribute Covered Software in Executable Form then:

(a) such Covered Software must also be made available in Source Code Form, as described in Section 3.1, and You must inform recipients of the Executable Form how they can obtain a copy of such Source Code Form by reasonable means in a timely manner, at a charge no more than the cost of distribution to the recipient; and

(b) You may distribute such Executable Form under the terms of this License, or sublicense it under different terms, provided that the license for the Executable Form does not attempt to limit or alter the recipients' rights in the Source Code Form under this License.

### 3.3. Distribution of a Larger Work

You may create and distribute a Larger Work under terms of Your choice, provided that You also comply with the requirements of this License for the Covered Software. If the Larger Work is a combination of Covered Software with a work governed by one or more Secondary Licenses, and the Covered Software is not Incompatible With Secondary Licenses, this License permits You to additionally distribute such Covered Software under the terms of such Secondary License(s), so that the recipient of the Larger Work may, at their option, further distribute the Covered Software under the terms of either this License or such Secondary License(s).

### 3.4. Notices

You may not remove or alter the substance of any license notices (including copyright notices, patent notices, disclaimers of warranty, or limitations of liability) contained within the Source Code Form of the Covered Software, except that You may alter any license notices to the extent required to remedy known factual inaccuracies.

### 3.5. Application of Additional Terms

You may choose to offer, and to charge a fee for, warranty, support, indemnity or liability obligations to one or more recipients of Covered Software. However, You may do so only on Your own behalf, and not on behalf of any Contributor. You must make it absolutely clear that any such warranty, support, indemnity, or liability obligation is offered by You alone, and You hereby agree to indemnify every Contributor for any liability incurred by such Contributor as a result of warranty, support, indemnity or liability terms You offer. You may include additional disclaimers of warranty and limitations of liability specific to any jurisdiction.

## 4. Inability to Comply Due to Statute or Regulation

If it is impossible for You to comply with any of the terms of this License with respect to some or all of the Covered Software due to statute, judicial order, or regulation then You must: (a) comply with the terms of this License to the maximum extent possible; and (b) describe the limitations and the code they affect. Such description must be placed in a text file included with all distributions of the Covered Software under this License. Except to the extent prohibited by statute or regulation, such description must be sufficiently detailed for a recipient of ordinary skill to be able to understand it.

## 5. Termination

5.1. The rights granted under this License will terminate automatically if You fail to comply with any of its terms. However, if You become compliant, then the rights granted under this License from a particular Contributor are reinstated (a) provisionally, unless and until such Contributor explicitly and finally terminates Your grants, and (b) on an ongoing basis, if such Contributor fails to notify You of the non-compliance by some reasonable means prior to 60 days after You have come back into compliance. Moreover, Your grants from a particular Contributor are reinstated on an ongoing basis if such Contributor notifies You of the non-compliance by some reasonable means, this is the first time You have received notice of non-compliance with this License from such Contributor, and You become compliant prior to 30 days after Your receipt of the notice.

5.2. If You initiate litigation against any entity by asserting a patent infringement claim (excluding declaratory judgment actions, counter-claims, and cross-claims) alleging that a Contributor Version directly or indirectly infringes any patent, then the rights granted to You by any and all Contributors for the Covered Software under Section 2.1 of this License shall terminate.

5.3. In the event of termination under Sections 5.1 or 5.2 above, all end user license agreements (excluding distributors and resellers) which have been validly granted by You or Your distributors under this License prior to termination shall survive termination.

## 6. Disclaimer of Warranty

Covered Software is provided under this License on an "as is" basis, without warranty of any kind, either expressed, implied, or statutory, including, without limitation, warranties that the Covered Software is free of defects, merchantable, fit for a particular purpose or non-infringing. The entire risk as to the quality and performance of the Covered Software is with You. Should any Covered Software prove defective in any respect, You (not any Contributor) assume the cost of any necessary servicing, repair, or correction. This disclaimer of warranty constitutes an essential part of this License. No use of any Covered Software is authorized under this License except under this disclaimer.

## 7. Limitation of Liability

Under no circumstances and under no legal theory, whether tort (including negligence), contract, or otherwise, shall any Contributor, or anyone who distributes Covered Software as permitted above, be liable to You for any direct, indirect, special, incidental, or consequential damages of any character including, without limitation, damages for lost profits, loss of goodwill, work stoppage, computer failure or malfunction, or any and all other commercial damages or losses, even if such party shall have been informed of the possibility of such damages. This limitation of liability shall not apply to liability for death or personal injury resulting from such party's negligence to the extent applicable law prohibits such limitation. Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so this exclusion and limitation may not apply to You.

## 8. Litigation

Any litigation relating to this License may be brought only in the courts of a jurisdiction where the defendant maintains its principal place of business and such litigation shall be governed by laws of that jurisdiction, without reference to its conflict-of-law provisions. Nothing in this Section shall prevent a party's ability to bring cross-claims or counter-claims.

## 9. Miscellaneous

This License represents the complete agreement concerning the subject matter hereof. If any provision of this License is held to be unenforceable, such provision shall be reformed only to the extent necessary to make it enforceable. Any law or regulation which provides that the language of a contract shall be construed against the drafter shall not be used to construe this License against a Contributor.

## 10. Versions of the License

### 10.1. New Versions

Mozilla Foundation is the license steward. Except as provided in Section 10.3, no one other than the license steward has the right to modify or publish new versions of this License. Each version will be given a distinguishing version number.

### 10.2. Effect of New Versions

You may distribute the Covered Software under the terms of the version of the License under which You originally received the Covered Software, or under the terms of any subsequent version published by the license steward.



10.3. Modified Versions

If you create software not governed by this License, and you want to create a new license for such software, you may create and use a modified version of this License if you rename the license and remove any references to the name of the license steward (except to note that such modified license differs from this License).

10.4. Distributing Source Code Form that is Incompatible With Secondary Licenses

If You choose to distribute Source Code Form that is Incompatible With Secondary Licenses under the terms of this version of the License, the notice described in Exhibit B of this License must be attached.

Exhibit A - Source Code Form License Notice

This Source Code Form is subject to the terms of the Mozilla Public License, v. 2.0. If a copy of the MPL was not distributed with this file, You can obtain one at <http://mozilla.org/MPL/2.0/>.

If it is not possible or desirable to put the notice in a particular file, then You may include the notice in a location (such as a LICENSE file in a relevant directory) where a recipient would be likely to look for such a notice.

You may add additional accurate notices of copyright ownership.

Exhibit B - "Incompatible With Secondary Licenses" Notice

This Source Code Form is "Incompatible With Secondary Licenses", as defined by the Mozilla Public License, v. 2.0.

NTP

NTP License (NTP)

Copyright (c) (CopyrightHoldersName) (From 4-digit-year)-(To 4-digit-year)

Permission to use, copy, modify, and distribute this software and its documentation for any purpose with or without fee is hereby granted, provided that the above copyright notice appears in all copies and that both the copyright notice and this permission notice appear in supporting documentation, and that the name (TrademarkedName) not be used in advertising or publicity pertaining to distribution of the software without specific, written prior permission. (TrademarkedName) makes no representations about the suitability this software for any purpose. It is provided "as is" without express or implied warranty.

OpenSSL

OpenSSL License

Copyright (c) 1998-2008 The OpenSSL Project. All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. All advertising materials mentioning features or use of this software must display the following acknowledgment: "This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit. (<http://www.openssl.org/>)"
4. The names "OpenSSL Toolkit" and "OpenSSL Project" must not be used to endorse or promote products derived from this software without prior written permission. For written permission, please contact [openssl-core@openssl.org](mailto:openssl-core@openssl.org).
5. Products derived from this software may not be called "OpenSSL" nor may "OpenSSL" appear in their names without prior written permission of the OpenSSL Project.
6. Redistributions of any form whatsoever must retain the following acknowledgment: "This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (<http://www.openssl.org/>)"

THIS SOFTWARE IS PROVIDED BY THE OpenSSL PROJECT ``AS IS'' AND ANY EXPRESSED OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE OpenSSL PROJECT OR ITS CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

This product includes cryptographic software written by Eric Young ([eay@cryptsoft.com](mailto:eay@cryptsoft.com)). This product includes software written by Tim Hudson ([tjh@cryptsoft.com](mailto:tjh@cryptsoft.com)).

Original SSLeay License

Copyright (C) 1995-1998 Eric Young ([eay@cryptsoft.com](mailto:eay@cryptsoft.com)) All rights reserved.

This package is an SSL implementation written by Eric Young ([eay@cryptsoft.com](mailto:eay@cryptsoft.com)). The implementation was written so as to conform with Netscapes SSL.

This library is free for commercial and non-commercial use as long as the following conditions are aheared to. The following conditions apply to all code found in this distribution, be it the RC4, RSA, lhash, DES, etc., code; not just the SSL code. The SSL documentation included with this distribution is covered by the same copyright terms except that the holder is Tim Hudson ([tjh@cryptsoft.com](mailto:tjh@cryptsoft.com)).

Copyright remains Eric Young's, and as such any Copyright notices in the code are not to be removed. If this package is used in a product, Eric Young should be given attribution as the author of the parts of the library used. This can be in the form of a textual message at program startup or in documentation (online or textual) provided with the package.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the copyright notice, this list of conditions and the following disclaimer.

2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. All advertising materials mentioning features or use of this software must display the following acknowledgement:  
"This product includes cryptographic software written by Eric Young (eay@cryptsoft.com)"  
The word 'cryptographic' can be left out if the rouines from the library being used are not cryptographic related :-).
4. If you include any Windows specific code (or a derivative thereof) from the apps directory (application code) you must include an acknowledgement: "This product includes software written by Tim Hudson (tjh@cryptsoft.com)"

THIS SOFTWARE IS PROVIDED BY ERIC YOUNG ``AS IS'' AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE AUTHOR OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

The licence and distribution terms for any publically available version or derivative of this code cannot be changed. i.e. this code cannot simply be copied and put under another distribution licence [including the GNU Public Licence.]

---

## zlib

zlib License

This software is provided 'as-is', without any express or implied warranty. In no event will the authors be held liable for any damages arising from the use of this software.

Permission is granted to anyone to use this software for any purpose, including commercial applications, and to alter it and redistribute it freely, subject to the following restrictions:

1. The origin of this software must not be misrepresented; you must not claim that you wrote the original software. If you use this software in a product, an acknowledgment in the product documentation would be appreciated but is not required.
2. Altered source versions must be plainly marked as such, and must not be misrepresented as being the original software.
3. This notice may not be removed or altered from any source distribution.

---

## curl

Copyright (c) 1996 - 2015, Daniel Stenberg, <daniel@haxx.se>.  
All rights reserved.

Permission to use, copy, modify, and distribute this software for any purpose with or without fee is hereby granted, provided that the above copyright notice and this permission notice appear in all copies.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT OF THIRD PARTY RIGHTS. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

Except as contained in this notice, the name of a copyright holder shall not be used in advertising or otherwise to promote the sale, use or other dealings in this Software without prior written authorization of the copyright holder.