DAIKIN

Air Conditioners

Technical Data

Intelligent Manager

EEDEN10-204

DAM602B51/52

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Intelligent Manager

1 System Overview

1 - 1 Overview

• What is the intelligent Manager?

intelligent Manager is an integrated building management system that uses our independent, high-speed multi-transmission method DIII-NET that is employed on VRV® for buildings.

It has a centralized controller function that can perform high-speed centralized control of our VRV® for buildings.

• Applicable Buildings

This is a VRV® intelligent Manager monitoring system that is perfect for small and medium scale buildings.

Number of Management Items: Standard 256 indoor units. Expansion is possible up to a maximum of 1,024 items.

- For medium and small scale individual air conditioning systems

- For existing buildings planning to update from a central air conditioning system to a decentralized air conditioning system

• Merits

- Allows the configuration of simple systems that do not require an interface.

- Has control data application software that supports drawing up business management plans.

- Handles small to medium scale buildings.

- Can be operated with the ease of an office computer.

- ACNSS (Optional maintenance service) intelligent Manager is equipped with the leading failure warning functions, it prevents A/C faults in advance.

There are restrictions in applicable areas, so consult with us separately for details

1 - 2 Features

• Simple Equipment Configuration

High priced interface equipment is unnecessary between the monitoring system and the air conditioning equipment.

Particularly, if directly connected with VRV® for buildings that employ our DIII-NET, special instrumentation for sensors etc. are unnecessary. DIII-NET makes it possible to directly monitor abundant operating data.

• Low Installation Work, Less Wiring

Wiring to VRV® (with equipment that handles DIII-NET) for your building is extremely easy. You only need to connect to the DIII-NET terminal.

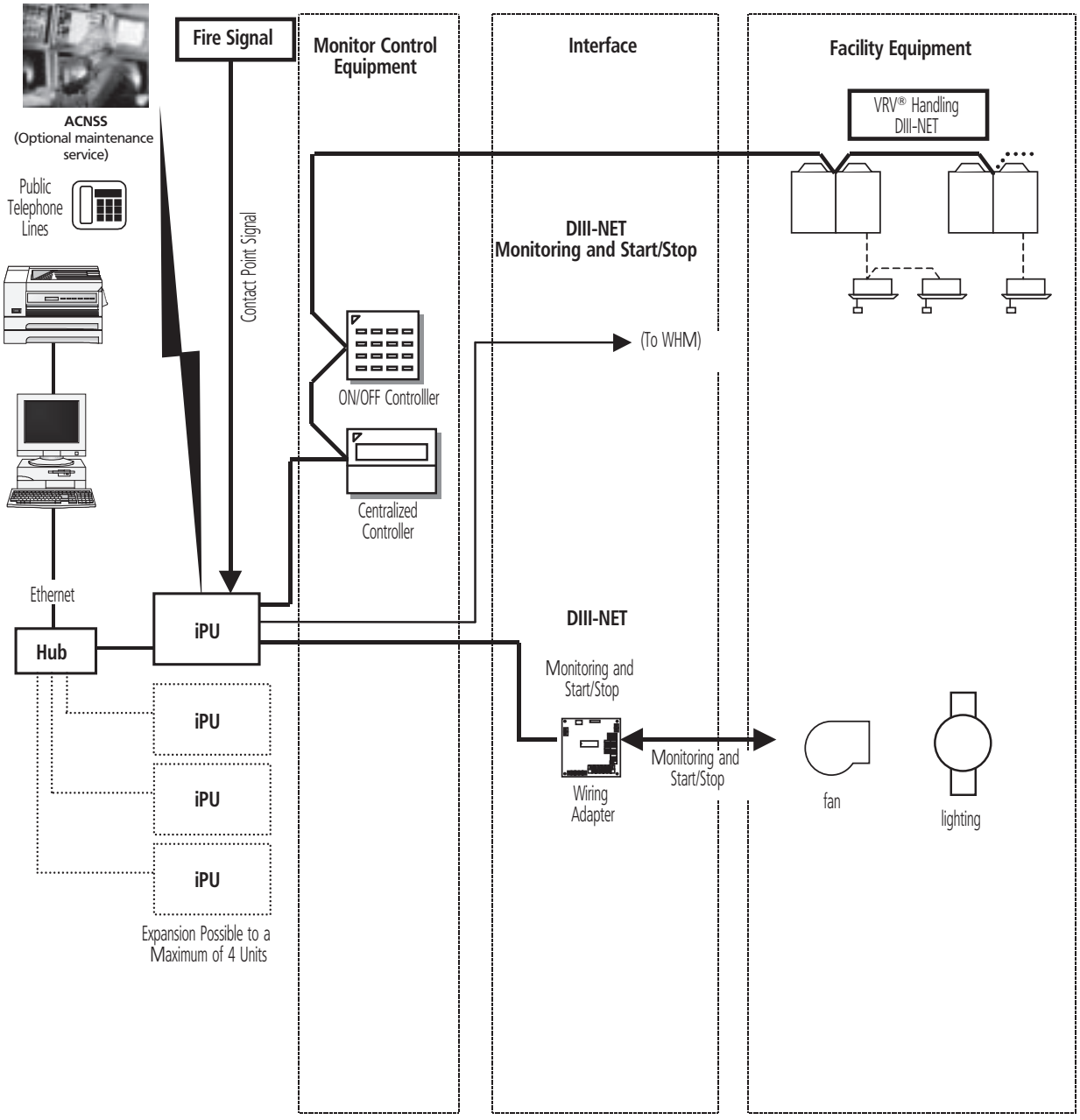
Monitoring and control are possible just by wiring (Daisy-chain method) 1 cable (non-polar, dual core) to each unit even for facility equipment.

• User-friendly System

- Anyone can easily operate using a mouse on an ordinary use computer.

- Using widely sold spread-sheet software, anyone can easily manage and process data. This helps the efficient management of your building.

2 System Image



NOTES

1 iPU: intelligent Processing Unit

2 * intelligent Manager has a scheduling function. There are cases in which it could operate unintentionally, so do not connect the schedule timer.

3 Specifications

Item				Comments
IPU (INTELLIGENT PROCESSING UNIT)	DAM602B51			256 indoor groups per iPU
	DAM602B52			128 indoor groups per iPU
	Back-up for power failure			Data are file into non volatile memory
	Transmission			DIII-NET std: 1 line; Max. 4 lines / 1iPU
	Power supply			AC100-240V, ± 10%, 50/60Hz, Max. 20W
	Ambient temperature			-10 ~ +50°C
	Ambient humidity			0~98% (condensation is not acceptable)
	Dimensions	HxWxD	mm	281 x 260 x 78.5
	Weight		kg	4
PC	Performance	CPU		Pentium 800MHz or above recommended
		Memory		256Mb or above
		HDD		4GB minimum, 8GB or above recommended
	Network			100 Mbit Ethernet
	Operation			Keyboard, mouse, sound & speaker
SOFTWARE				Windows XP (Professional SP2 or later), Windows 2000 (Professional SP4 or later), Internet explorer 7.0
CRT	SVGA			800 x 600, 1,024 x 768, 1,280 x 1,024
PRINTER				A4 page printer
NETWORK EQUIPMENT				Multi Port HUB (1 port per iPU and PC required)
UPS (EG. APC SMART UPS 1,000)	Capacity			200~250W / 20min
	Voltage			As required on the field
	Control signals			Power failure signal (from UPS), UPS shut down signal (to iPU)/Power failure signal from UPS to both iPU and PC
	Relay			I/0 module (AP9610)

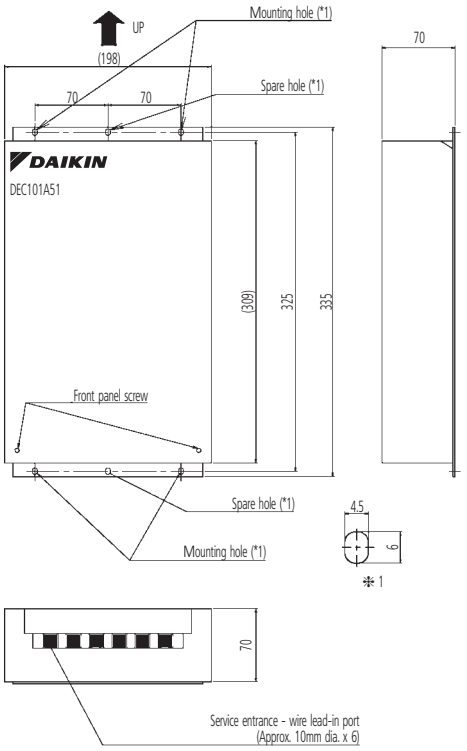
4 Accessories

Item		Comments
INTERFACE ADAPTERS	KRP928B2S	For connection to Split units
	DTA102A52	For connection to R-22/R-407C Sky Air units
	DTA112B51	For connection to R-410A Sky Air units
DIII AI	DAM101A51	Outdoor temperature sensor
DIGITAL INPUT	DEC101A51	Input contacts: 8 points with additional error feedback
DIGITAL INPUT/OUTPUT	DEC102A51	Output contacts: 4 points with additional error and ON/OFF feedback
SOFTWARE	DAM002A51	Power Proportional Distribution
	DAM003A51	ECO Mode
	DAM004A51	Web Access Function

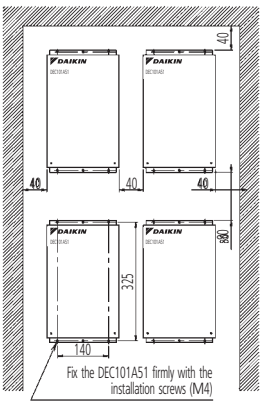
4 - 1 DEC101A51 - Digital input

4 - 1 - 1 Dimensional drawing

DEC101A51



Power supply specifications	1~200-240V 50/60Hz
Rated power consumption	15W
Mass (Weight)	2.5kg
Case material	Plated steel sheet
Case color	Matting chrome



NOTES

1 Installation place
- Install the unit indoors where it is not exposed to water and dust or dirt.
- Install the unit where both temperature and humidity do not become high.
  (Operating (available) temperature: -10~+40°C
  Operating (available) humidity: 10~85%)
- Connect the wiring to be connected in the field from the lower surface side.
  It is, therefore, necessary to make arrangements so as not to attach other equipment within 80mm from the lower surface of this equipment.
- Install this equipment in a place in which only authorized personnel can touch it.

2 Installation Direction
Install this equipment vertically to the floor surface. It should be noted that if it is installed in horizontal direction, a malfunction or failure may result.

3 Installation Method
Ensure that this equipment is installed with 4 screws (screw size M4 min.).

4 Restrictions in continuous installation
In case several devices are set up and installation inside the power board is carried out, each equipment installation space and space between the wall surface and this equipment should be left at least as shown to the left.

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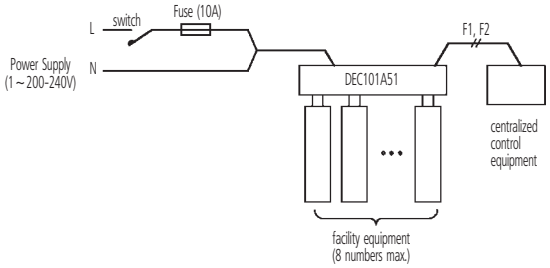
4 Accessories

4 - 1 DEC101A51 - Digital input

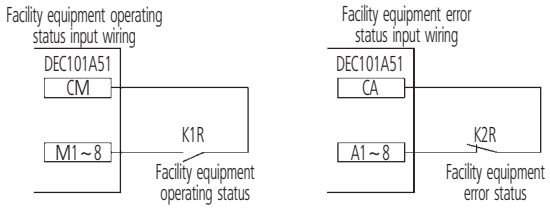
4 - 1 - 2 External connection diagram

DEC101A51

No. ❊	Wiring procedure
①	<F1/F2> wiring between this equipment and centralized control equipment is required.
②	The connection to the facility equipment and setting of various switches are required. See the "Wiring with Facility equipment" paragraph.
③	Connect the power supply and earth. See the "Power Supply & Earth wiring" paragraph.
③	For the wiring connection and clamping method, refer to the "Wiring lead-in" paragraph.



Wiring with Facility Equipment
<Caution> The length of wiring between this equipment and facility equipment is 100m max.
Abormal input When the contact is "Open" or "Closed", "Error" is produced. Input specifications: No-voltage "a" contact (The welding current is approx. 10mA when the applied voltage is 20 to 30 V DC and the contact is "Closed".) For input, use the contact to micro current. (12VDC, 1mA max.)



Power Supply & Earth Wiring
For power supply, 1~200-240V is used. The wiring to the power terminal block (L/N) is required. The electric wire used should be 1.25 to 2.0mm^2. After checking the power supply specifications, make correct connections.
Connect the earth wiring to the " ⏚ " terminal. Use a 2.0 mm^2 wire.

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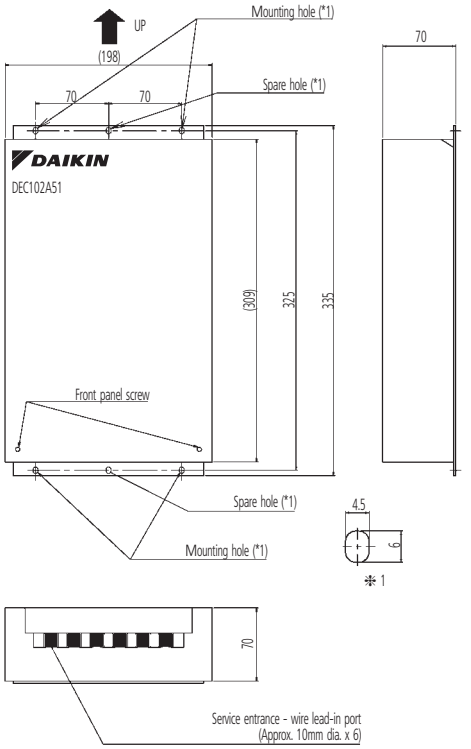
4 Accessories

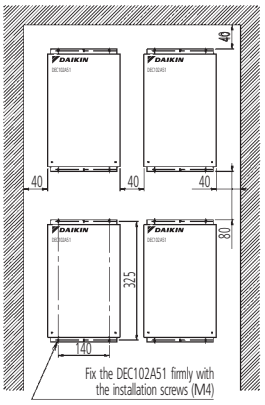
4 - 2 DEC102A51 - Digital input / output

4 - 2 - 1 Dimensional drawing

DEC102A51



Power supply specifications	1~200-240V 50/60Hz
Rated power consumption	15W
Mass (Weight)	2.5kg
Case material	Plated steel sheet
Case color	Matting chrome



NOTES

1 Installation place
- Install the unit indoors where it is not exposed to water and dust or dirt.
- Install the unit where both temperature and humidity do not become high.
  (Operating (available) temperature: -10~+40°C
  Operating (available) humidity: 10~85%)
- Connect the wiring to be connected in the field from the lower surface side.
  It is, therefore, necessary to make arrangements so as not to attach other equipment within 80mm from the lower surface of this equipment.
- Install this equipment in a place in which only authorized personnel can touch it.

2 Installation Direction
Install this equipment vertically to the floor surface. It should be noted that if it is installed in horizontal direction, a malfunction or failure may result.

3 Installation Method
Ensure that this equipment is installed with 4 screws (screw size M4 min.).

4 Restrictions in continuous installation
In case several devices are set up and installation inside the power board is carried out, each equipment installation space and space between the wall surface and this equipment should be left at least as shown to the left.

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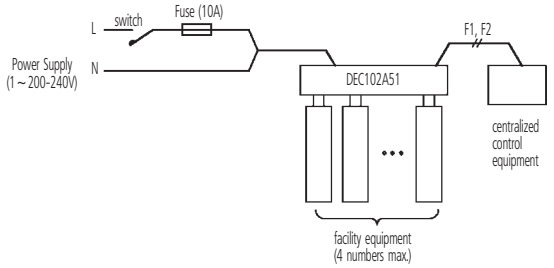
4 Accessories

4 - 2 DEC102A51 - Digital input / output

4 - 2 - 2 External connection diagram

DEC102A51

No. ❊	Wiring procedure
①	<F1/F2> wiring between this equipment and centralized control equipment is required.
②	The connection to the facility equipment and setting of various switches are required. See the "Wiring with Facility equipment" paragraph.
③	Connect the power supply and earth. See the "Power Supply & Earth wiring" paragraph.
③	For the wiring connection and clamping method, refer to the "Wiring lead-in" paragraph.



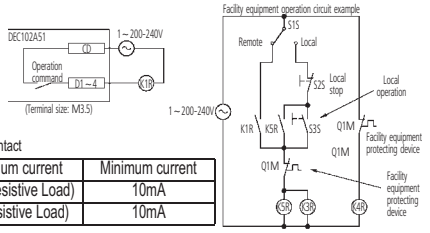
Wiring with Facility Equipment

<Caution> The length of wiring between this equipment and facility equipment is 100m max.

Operation output

It is possible to select continuous 1 output (4 points) or instantaneous 2 output (ON/OFF pair - 2 points).

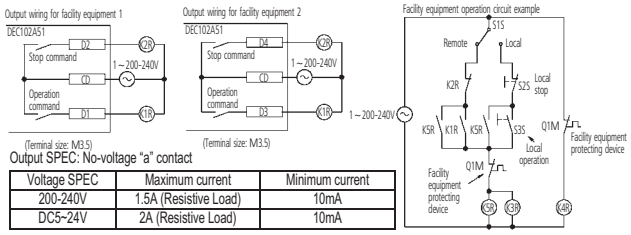
- Wiring at Continuous Output (Up to 4 facility equipments can be connected.)



Output SPEC: No-voltage "a" contact

Voltage SPEC	Maximum current	Minimum current
200-240V	1.5A (Resistive Load)	10mA
DC5~24V	2A (Resistive Load)	10mA

- Wiring at instantaneous Output (Up to 2 facility equipments can be connected.)



Output SPEC: No-voltage "a" contact

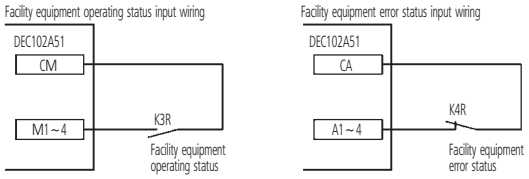
Voltage SPEC	Maximum current	Minimum current
200-240V	1.5A (Resistive Load)	10mA
DC5~24V	2A (Resistive Load)	10mA

Operation input

When the contact is "Closed", "Run" is to be input. Input SPEC: No-voltage "a" contact (When the applied voltage is 20 to 30V DC and the contact is "Closed", the welding current is approx. 10mA.) For input, use a contact for micro current. (12V DC, 1mA max.)

Abnormal input

When the contact is "Open" or "Closed", "Error" is produced. Input specifications: No-voltage "a" contact (The welding current is approx. 10mA when the applied voltage is 20 to 30V DC and the contact is "Closed".) For input, use the contact for micro current. (12V DC, 1mA max.)



When the switch was set to "Ins." (Instantaneous Output), the operation input terminals M3, M4 and abnormal input terminals A3, A4 ar not used.

Terminal used in case where the switch was set to "Continuous Output" (Con.) or "Instantaneous Output" (Ins.)

Facility equipment (Up to 4 units can be connected to single DEC102A51.)	Terminal used in the case of setting to "Continuous Output"					
	Run/Stop output terminal		Operation input terminal		Abnormal input terminal	
1st equipment	CD	D1	CM	M1	CA	A1
2nd equipment	CD	D2	CM	M2	CA	A2
3rd equipment	CD	D3	CM	M3	CA	A3
4th equipment	CD	D4	CM	M4	CA	A4

Facility equipment (Up to 2 units can be connected to single DEC102A51.)	Terminal used in the case or setting to "Instantaneous Output"							
	Operation output terminal		Stop output terminal		Operation input terminal		Stop input terminal	
1st equipment	CD	D1	CD	C2	CM	M1	CA	A1
2nd equipment	CD	D2	CD	C4	CM	M2	CA	A2

When the switch was set to "Ins." (Instantaneous Output), the operation input terminals M3, M4 and abnormal input terminals A3, A4 are not used.

Power Supply & Earth Wiring

For power supply, 1~200-240V is used. The wiring to the power terminal block (L/N) is required. The electric wire used should be 1.25 to 2.0mm^2. After checking tht power supply specifications, make correct connections.

Connect the earth wiring to the " ⏚ " terminal. Use a 2.0 mm^2 wire.

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5 Functions

5 - 1 List of Functions

5 - 1 - 1 Local Functions

	Items	Contents
Local Functions	Monitoring	Monitoring of air conditioner status (256 units, max. 1024 groups on one iManager system with four iPUs)(*1)
		Web access function
		Cumulated value upper limit monitoring (for each item of control)
		Continuous operation time limit monitoring (for each item of control)
		Power failure monitoring
	Control/Operation/Settings	Login settings
		Individual control
		Collective starting/stopping and settings for control group (200 groups)
		Schedule control (200 programs)
		Interlocking control (100 programs)
		Emergency stop control for fire (32 programs)
		Power failure and recovery processing control (selected from 5 power recovery modes)
		Centralized control of air conditioners
		Pre-cooling and pre-heating function
	Display	Display of name of management item or icon display, list display
		Control group list display
		Move screen function
		Operating time, start/stop count integration display, history display
		(abnormalities, warnings, control history)
	Measuring	Operating time integration, start/stop count integration
		Inspection of meter (Pi port of main unit)
	Control	Operating history control
		Creates daily, monthly, annual reports
		VRV® power proportional distribution (option consumption: 256 units)
	Memory/Recording	Print output
		Data memory
	Report	Emergency signal input

NOTES

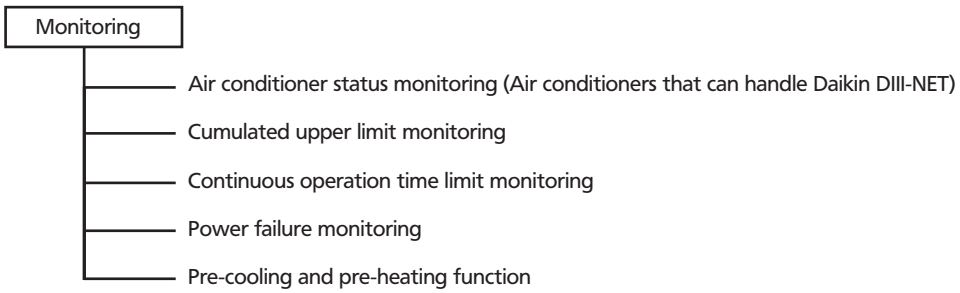
1 iPUs can be expanded to 4 units. Shows “Maximum 1,024 units,” for example, for the values when expanding to the maximum, if the number of management points is increased when expanding the number of units.

2 1,024 indoor units/station when 4 iPUs are connected.

5 Functions

5 - 2 Detailed Explanation of Functions

5 - 2 - 1 Monitoring



(1) Air conditioner status monitoring (Air conditioners that can handle Daikin's DIII-NET)

Allows you to know the detailed operating status such as running/stopped status, temperature setting, operating mode, the occurrence and content of errors and filter sign for each air conditioner targeted for monitoring.

The occurrences and the contents of errors are displayed in the error message area. When an error occurs on an air conditioner targeted for monitoring, or the management item icon flashes. You can set a buzzer notification of the occurrences of errors and have the printer automatically printout of the contents of the errors.

Management points: 1 indoor unit = 1 item

The number of management items of equipment connected to DIII-NET, with the total number of air conditioners is 256 /(per 1 iPU unit)

When expanding to the maximum number: 1,024 items/(when 4 iPUs are connected)

The number of management items can be fewer than those listed above depending on the number of outdoor unit in the air conditioning system.

*Refer to our D-BACS Design Guide for details regarding the method for connecting air conditioners that can handle DIII-NET and the restrictions on the number of units.

(2) Cumulated Value Upper Limit Monitoring

Prints a warning with the daily report of the contents when the cumulated values of the operating time and the start/stop count exceed the set upper limit values.

The Result: General standards for maintenance of the facility's equipment and replacement periods are clarified, therefore allowing for planned maintenance thereby enabling you to expect a reduction of overall maintenance costs.

(3) Continuous Operating Time Limit Monitoring

Displays a fault when a single continuous operating time for the facility equipment exceeds the set upper limit. You can set the buzzer to ring and/or the printer to automatically print when an error occurs.

You can set the time limit up to a range of 8 digits in one second intervals for each item to control.

The Result: Prevents idling or burnout by issuing an abnormality when the operation of facilities exceed prescribed time or normal operation.

(4) Power Failure Monitoring

You can set the error display and/or buzzer ring for power failures.

Power failures are determined by the power failure signal from a UPS (uninterruptible power supply device.)

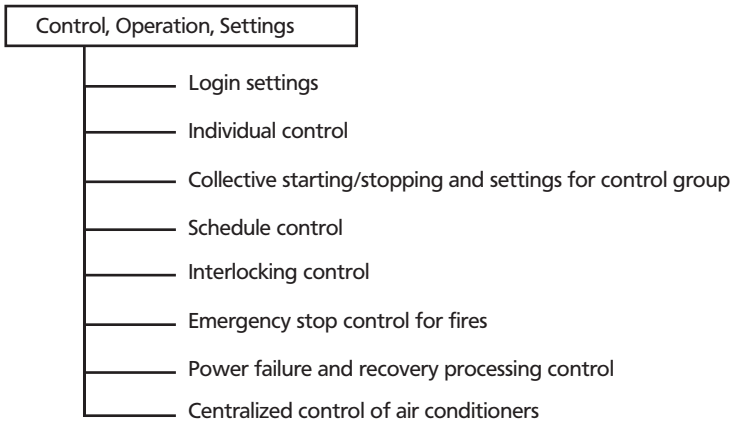
(A UPS is connected to the intelligent Manager monitoring system PC and the iPU.)

Operation data is automatically saved when there is a power failure. The system is automatically shutdown approximately 10 minutes later.

5 Functions

5 - 2 Detailed Explanation of Functions

5 - 2 - 2 Control, Operation, Settings



(1) Login settings

Sets user operation authority to control the range of operation and view, consultation, read, read-only. When logging in, the users can operate the intelligent Manager within their allocated authority.

30 users can be registered and passwords can be set individually.

When unmanned, this is set to a log-off status. Settings can also be set for the log-off status.

It is possible to limit personnel who may operate intelligent Manager to prevent mis-operation or unauthorized handling.

The following shows authorization levels that can be set.

Authorization	When Authorized	When Not Authorized
Running/Stopping/Setting	Can perform run/stop/set operations	Cannot perform run/stop/set
Schedule Registration	Can inspection, register and edit schedules	Can only inspect schedule
Interlock Control Registration	Can inspection, register and edit link control	Can only inspect link operation
Emergency Stop Registration	Can inspection, register and edit emergency stop	Can only inspect emergency stop
Emergency Stop Canceling	Can cancel emergency stop	Cannot operate
Report Inspection	Can inspect reports (daily, monthly annual)	Cannot inspect
Report Registration	Can set reports (daily, monthly annual)	Cannot operate
History Operation	Can inspect and set history	Can only inspect history
System Settings	Can set system	Cannot operate
Subordinate Centralized Control Setting	Can set centralized control	Cannot operate
User Registration	Can register users and set authority	Cannot operate
Maintenance Mode	Can set maintenance mode	Cannot operate

(2) Individual Control

Allows manual, individual operation of starting and stopping of management items. Operations for starting and stopping, switching the operating mode, changing the temperature settings, switching enable/disable of individual remote controllers and for resetting of the filter sign are possible when using DIII-NET compatible air conditioners.

Items pressed later have priority with regard to management items defined by the schedule control and interlocking control.

(3) Collective starting/stopping and settings for control group

Registering a plurality of management items to a control group allows manual starting and stopping for all equipment. Operations for starting and stopping, switching the operating mode, changing the temperature settings, switching enable/disable of individual remote controllers and for resetting of the filter sign are possible when using DIII-NET air conditioners.

Items pressed later have priority with regard to management items defined by the schedule control and interlocking control.

Registers a maximum of 1024 management items in one group and a maximum of 200 groups.

5 Functions

5 - 2 Detailed Explanation of Functions

5 - 2 - 2 Control, Operation, Settings

(4) Schedule control

Automatically performs starting and stopping of any control group and management items according to the set time schedule.

Creating and registering a year calendar and a week schedule will automatically create an execution schedule and the specified management items and control groups are controlled according to that execution schedule. Also, by editing the execution schedule, the schedule for the next coming week can be specially changed.

A maximum of 128 programs can be registered.

The year calendar, week schedule and execution schedule are in parity of 1 to 1, and schedule operations can be executed by combining each one.

Year Calendar:
13 month calendar. Can set for regular days, holidays or special days for each day and allows creation of customized calendars for each tenant.

Week Schedule:
Registers the times for performing control from the intelligent Manager for any control group or management item individually, for each day, holiday or special day of the week. Specify either of the instructions, run, stop, enable remote controller, disable remote controller, fan, cool, heat operation mode or set point.
Registers up to 20 actions per day.

Execution Schedule:
Daily schedule for the coming week. The actual schedule runs according to this. Automatically created based on year calendar and week schedule. With the execution schedule, you can change anytime to correspond to the remaining hours to run and other specially made schedules.

(5) Interlocking control

Automatically starts and stops equipment that has been set according to the change in operating status of specified equipment or the occurrence of abnormality. There are 2 types of input conditions that can be specified: “Start/Stop Status” and “Error”

Using link control allows for starting and stopping links (sequential operation etc) for a plurality of facilities, indoor/outdoor units links, key control links and reporting.

A maximum of 50 input condition management items and a maximum of 50 start/stop output management items can be set with 1 link program. A maximum of 200 link programs can be defined.

The application of a plurality of link programs for input and output with the same management items is possible.

Example of Interlocking Programs: Indoor unit Link: Inputs signal from lighting equipment and turns OFF air conditioning of rooms where all lights have been turned OFF.

Key Control Link: Inputs signal from key control device and turns OFF lights and air conditioning of areas from which keys have been returned.

(6) Emergency stop control for fires

The system performs the necessary determined actions (rings buzzer, prints to printer, display fire sign, stops air conditioning equipment, etc) to notify of fires and to prevent the spread of flames when a fire signal is input. These fire related actions take priority over normal actions.

Though similar to linked operations, a major difference is that the content of the output is limited to the stop instruction. The emergency stop takes priority with regard to control.

Registering the management items to be the target of an emergency stop can be done by specifying the management items to stop or by targeting all management items for a stop and then specifying the management items that are an exceptions.

A maximum of 32 programs can be set.

The fire warning system controls smoke detectors and dampers according to fire prevention laws. Elevators, etc are controlled by a dedicated control system.
Therefore, these facilities are not targeted for control by the emergency stop program.

5 Functions

5 - 2 Detailed Explanation of Functions

5 - 2 - 2 Control, Operation, Settings

(7) Power failure and recovery processing control

- Power Failure

The system enters a power failure execution after the reception of a power failure signal.

Automatically saves all operating data and control data. The system automatically shuts down approximately 10 minutes later. Status monitoring of management items is possible during the power failure processing, but control is not possible.

- Recovery

All facilities and power supplies are restarted when commercial power is recovered.

The following 5 controls can be set for the recovery mode.

1 Restore to status prior to power failure: Returns each management item to its start/stop status prior to the power failure.
2 Execute Scheduled run: Determines start/stop status (the status that should be for operation) of the time of the recovery according to the execution schedule and outputs a start/stop instruction.
3 Force Stop: The start/stop status is “stop”.
4 Force Operation: The start/stop status is “start”.
5 Recover Remote Controller: Returns the remote controller enable/disable to the status prior to power failure. No other instructions are output.

NOTE

1 Regardless of the power recovery mode, a link operation that was applied prior to the power failure will restart after power is restored (after approximately 10 minutes after power is restored).

(8) Centralized control of air conditioners

intelligent Manager allows for centralized operation of DIII-NET air conditioners.

Performs detailed control by allowing operation of start/stop, switching of the operating mode, changing of the temperature setpoint, enable/disable remote controller(1) operations and resetting the filter sign.

NOTE

1 Enable/disable remote controller operations
Limits operations from individual remote controllers on DIII-NET air conditioners and corresponds to various controls and operations.

[Start/Stop]:	3 settings possible: Disable remote controller/enable only remote controller stop/enable remote controller
[Operating Mode]:	Select either enable/disable remote controller for this operation
[Temperature Adjustment]:	Select either enable/disable remote controller for this operation

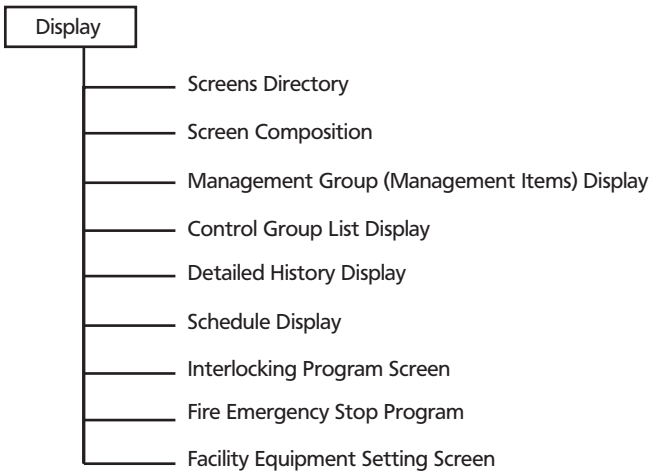
(9) Pre-cooling and pre-heating function

This function varies the starting time of the system depending on actual and predicted heating/cooling loads in the room. This results in a more efficient use of the air conditioning system and improved comfort.

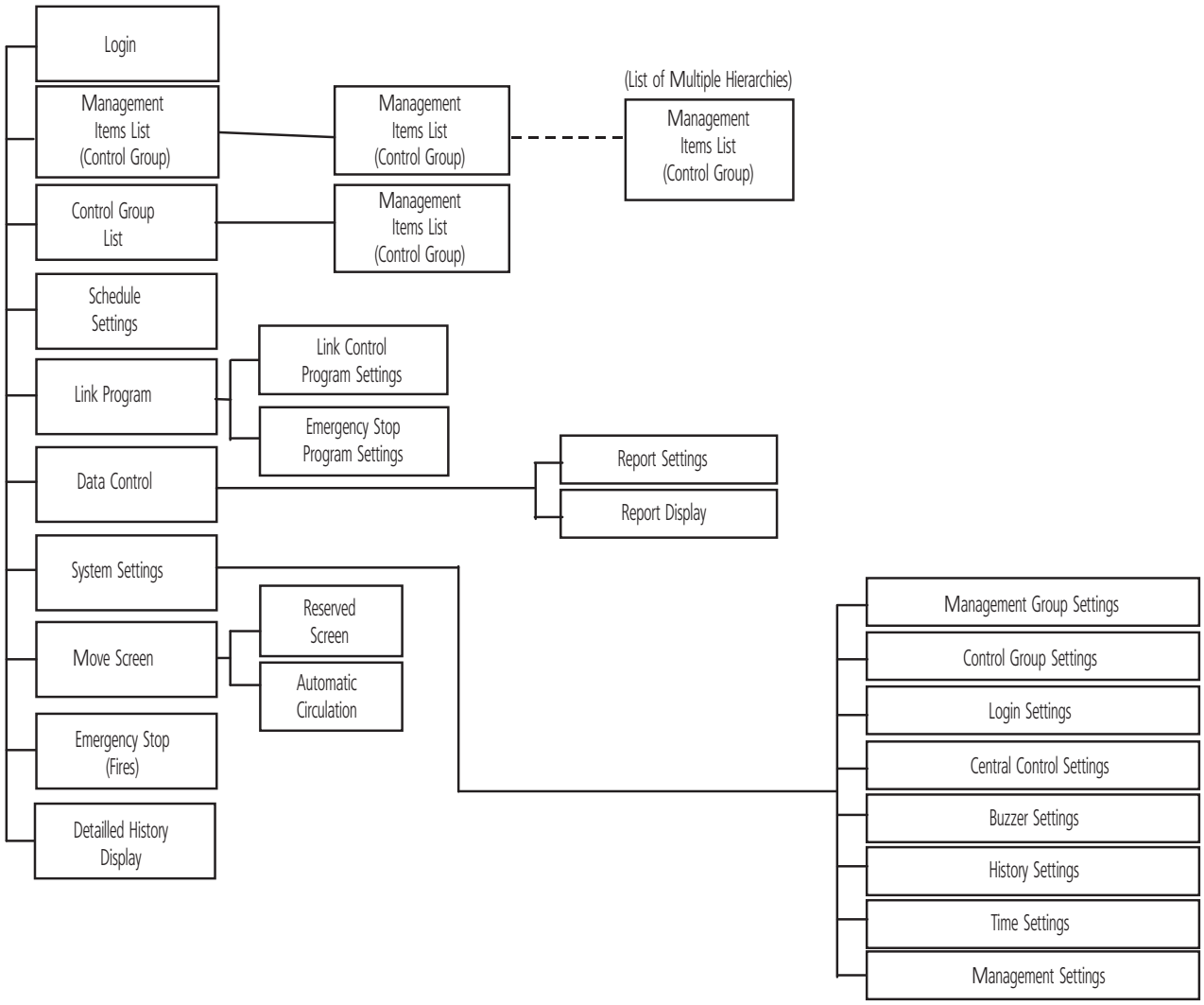
5 Functions

5 - 2 Detailed Explanation of Functions

5 - 2 - 3 Display



(1) Screens Directory



5 Functions

5 - 2 Detailed Explanation of Functions

5 - 2 - 3 Display

(2) Screen Composition

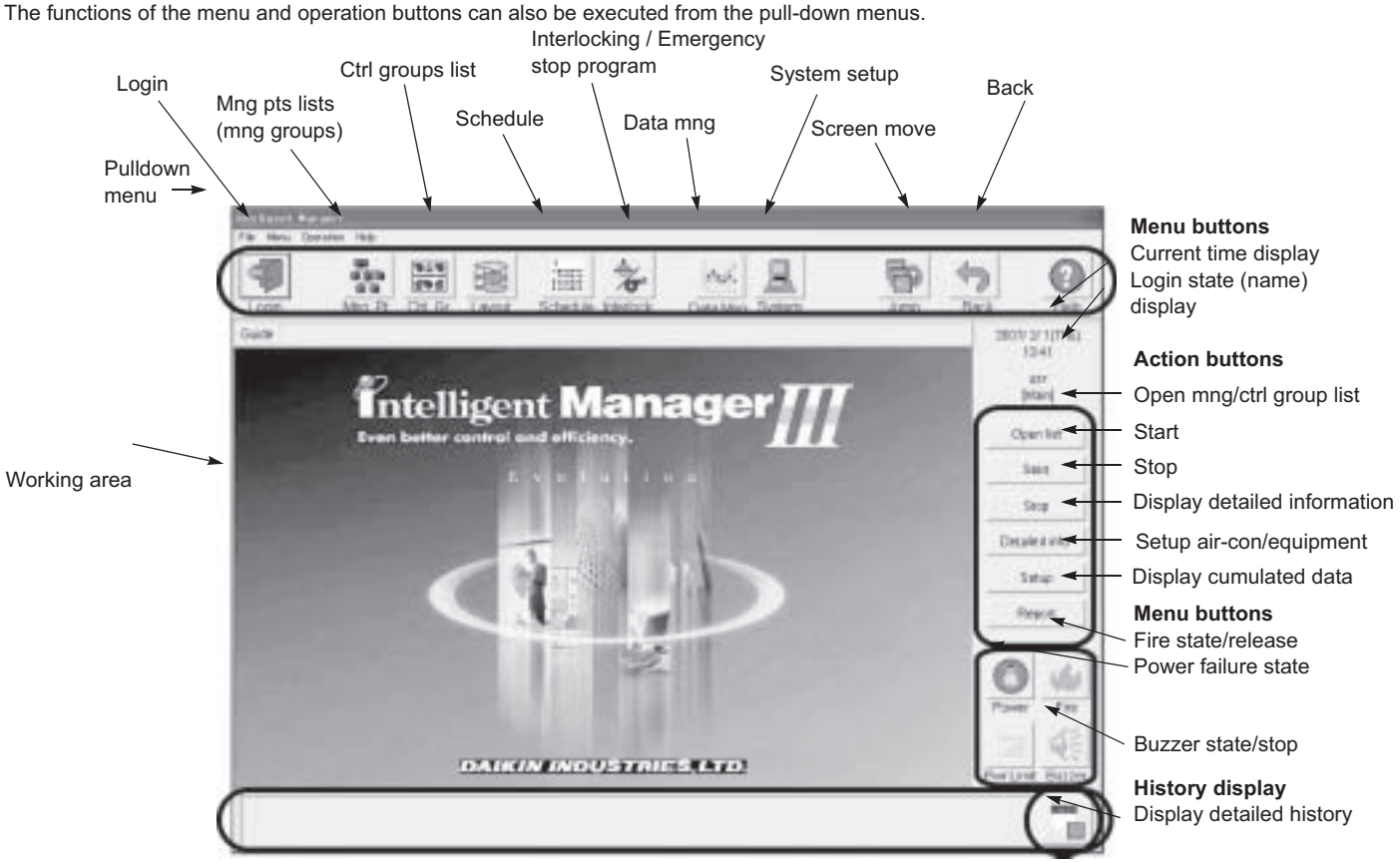
The screen is composed of menu buttons, operation buttons, error history real-time displays and working area.

- Menu buttons: Buttons that call up all functions. These are always operable on any menu screen.
- Operation buttons: Buttons for running and stopping the equipment, etc.
- Error history real-time display:

  Area displaying the error history in real-time
- Working area: Area displaying the functions called up by the menu buttons.

NOTE

1 The functions of the menu and operation buttons can also be executed from the pull-down menus.



5 Functions

5 - 2 Detailed Explanation of Functions

5 - 2 - 3 Display

(3) Management Group (Management Items) Display

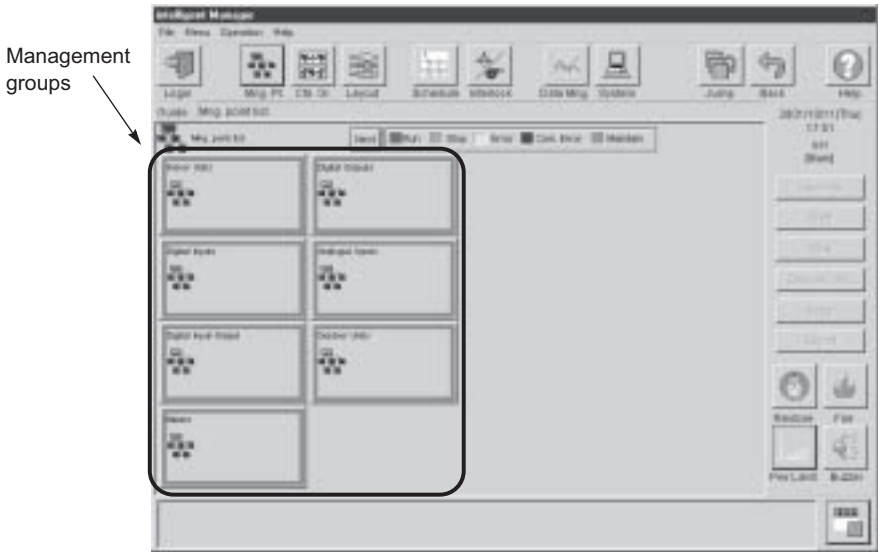
Management Group combines management items to make a group for easy management. (Controls for all of the equipment in a group are performed in control groups.)

Allows division of facilities targeted for monitoring into any group for the monitor screens.

Allows constructing multi-hierarchic configurations to any depth in the order of “Management Group List”

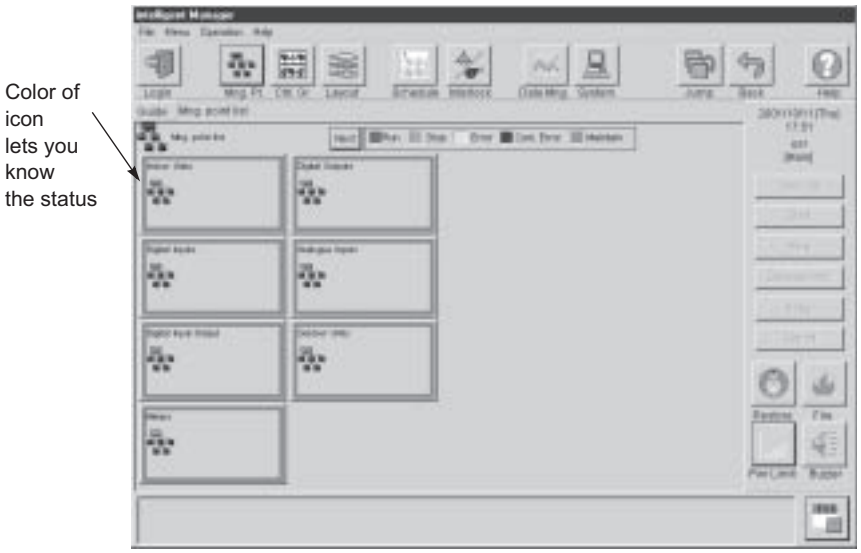
→(“Management Group List”→ ...) → “Management Item List.”

[Management Group List Screen]



Select the group and press “Open List” to shift to lower level management

[Management Item List Screen]



The color of the icon lets you know the status of the management item.

Red: Running, Green: Stopped, Green Flashing: Emergency Stopped, Yellow Flashing: Error, Blue: Communications error, Gray: Under maintenance.

Also, the filter sign, cooling selection authorized, targeted for automatic control (link and schedule target) marks are also displayed.FunctionsDetailed Explanation of Functions

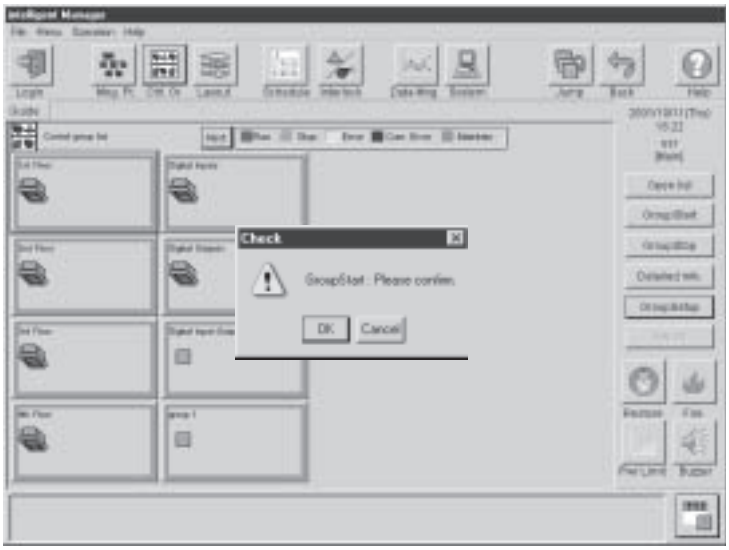
5 - 2 - 3 Display

(4) Control Group List Display

The Control Group binds the management items for batch control.

Select the control group and press the “Run All” or “Stop All” button to control the starting and stopping in control group units. A maximum of 100 management items can be registered in one group and a maximum of 100 groups can be registered.

Also, operations for switching the operating mode, changing temperature settings or enabling/disabling the remote controller are possible when the management items in the control group are DIII-NET compatible air conditioners.

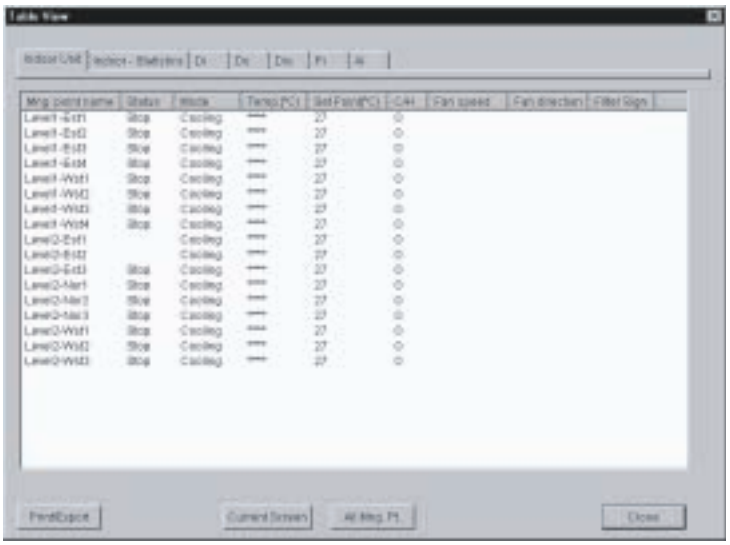


(5) Operating Time and Start/Stop Cumulated Count Display

The following data can be confirmed as the cumulated information display.

- Start/stop count
- Start/stop count upper limit value (warning value)
- Operating time cumulated
- Operating time upper limit value (warning value)

[Cumulated Information Display]



5 Functions

5 - 2 Detailed Explanation of Functions

5 - 2 - 3 Display

(6) Detailed History Display

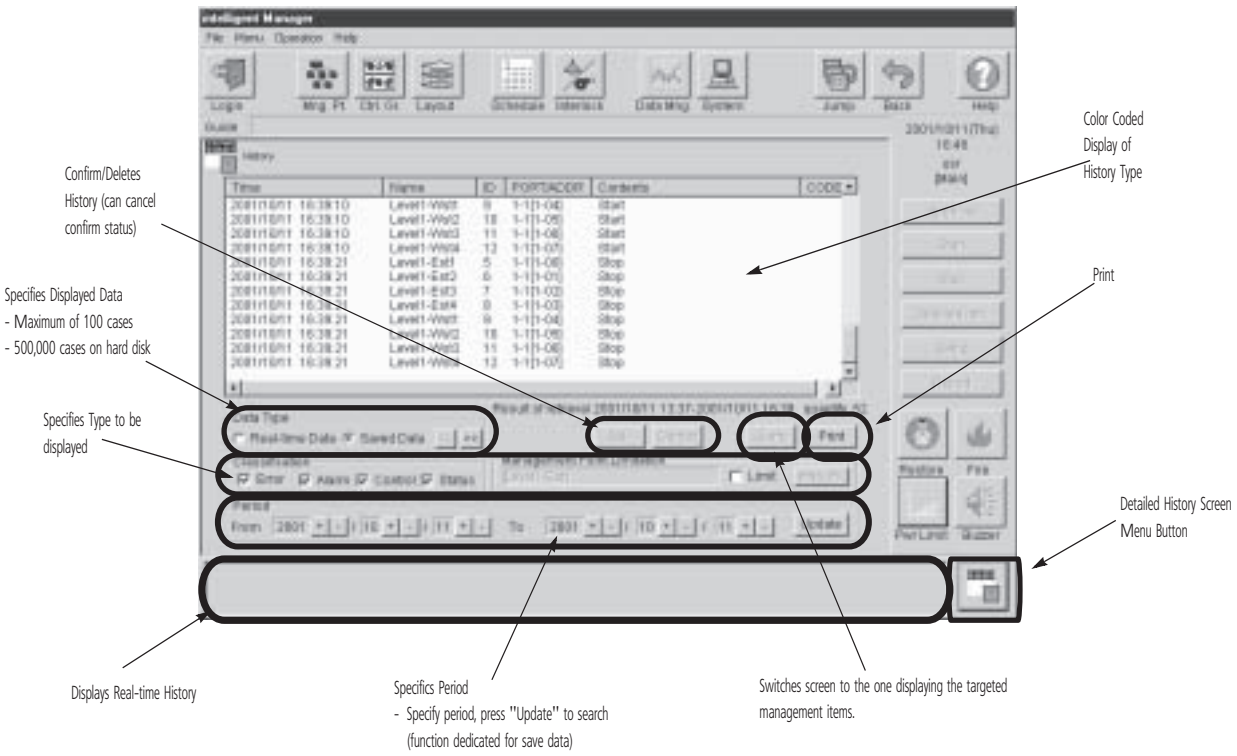
Allows management of history items such as starting the control of management error occurrence/recovery, status changes (run/stop etc) and schedules.

You can select to display the information displayed on the Detailed Screen in real-time or to display data saved to a file on the hard disk.

* Data saved to a file is called saved data.

100 items of information can be displayed on the History Details Screen at a time if using real-time and you can search from 500,000 occurrences of saved data and display.

[History Details Screen]



Message display colors differ according to the type of history:

Error	Red (Purple)
Warning	Blue (Gray)
Cancel	Green
Other	Black

* The colors indicated in the parentheses are the colors of confirmed messages.

5 Functions

5 - 2 Detailed Explanation of Functions

5 - 2 - 3 Display

(7) Schedule Display

Automatically performs facility start/stop control, switching of the operating mode, setting of temperatures and enabling/disabling of the remote controller according to the preset time schedule.

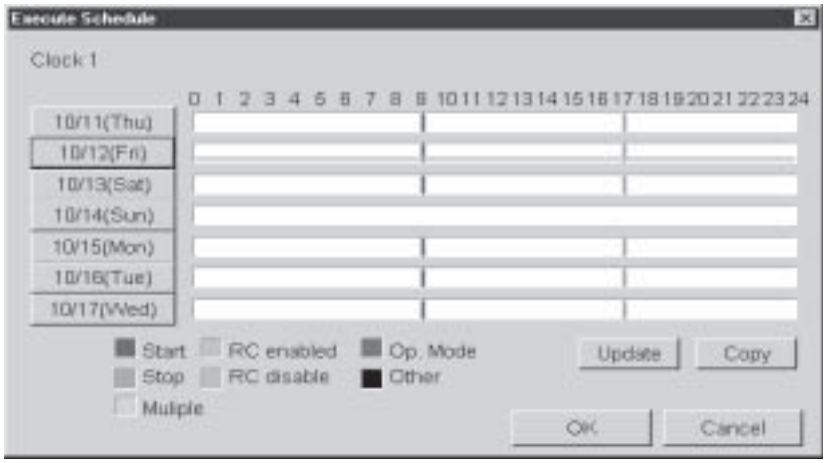
Register 1 week's cycle schedule program and specify what operations to perform on each day. Also, you can specify holidays or special days throughout one year (13 months) and specify the method of operation for holidays or special days in the same way as the daily operating schedule when using the schedule program.

One system can register up to 128 schedule programs.

When the schedule operation is executed, those operations are recorded in the history.

[Schedule Setting Screen]

[Execution Schedule Screen]



You can view this screen if you need to confirm the actual schedule control. Also, special schedule changes within one week change on execution schedule screen.

5 Functions

5 - 2 Detailed Explanation of Functions

5 - 2 - 3 Display

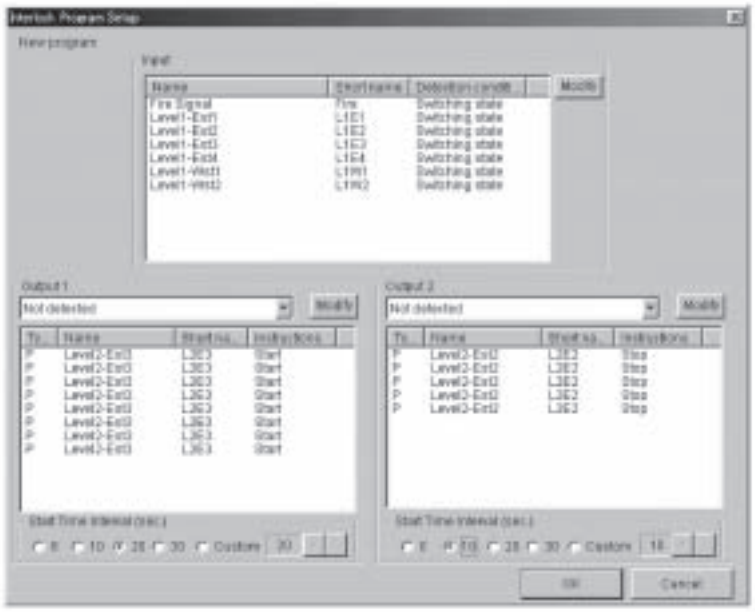
(8) Interlocking Program Screen

Automatically starts and stops equipment that was set, in response to changes in the operating status of the facilities or the occurrence of errors. 8 types of input conditions can be specified.

Using this enables the interlocking of starting and stopping of a plurality of facilities (operation in order etc) indoor/outdoor link, key management link and reporting.

1 link program can set a maximum of 50 input condition management items and a maximum of 50 start/stop output management items. A maximum of 100 link programs can be defined. A plurality of link programs can be applied for input and output of the same management items.

[Interlocking Program Screen]



The figure above is an example of a link program that is running air conditioners in common areas along with the air conditioners that are running for certain tenants.

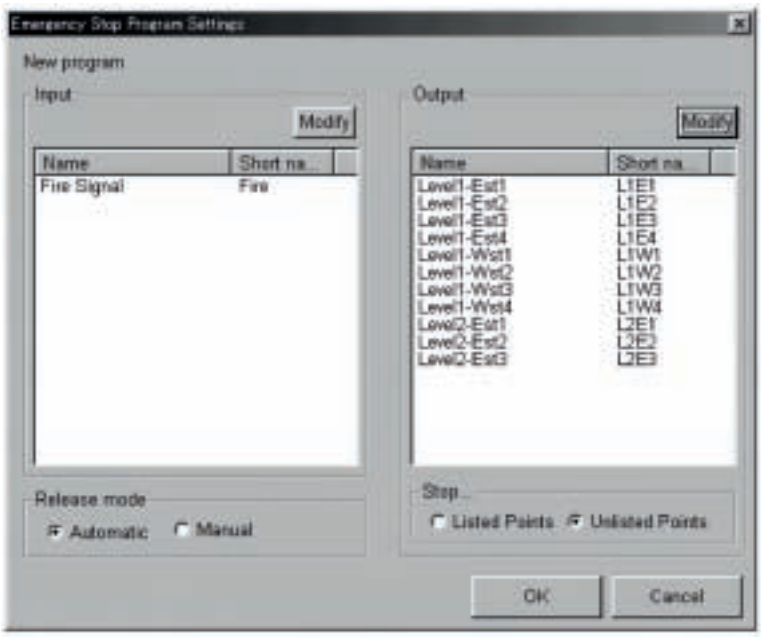
5 Functions

5 - 2 Detailed Explanation of Functions

5 - 2 - 3 Display

(9) Fire Emergency Stop Program

[Emergency Stop Program Screen]



The registration of management items to be targeted for emergency stop can be performed using either method of specifying the management item to stop or of making all management items targets for stopping and then specifying the management item that is out of range.

(Facilities that are conformed to fire safety laws are exceptions.)

This example figure shows the specification of management items (not to stop when there is a fire) that are not targeted for emergency stops.

[Fire Occurrence Screen]

The fire icon on the bottom right-hand side of the screen will change to red when the emergency stop signal is input. (Normally, the report signal is input from the fire system.)

(Intelligent Manager is not a fire prevention certified product.)

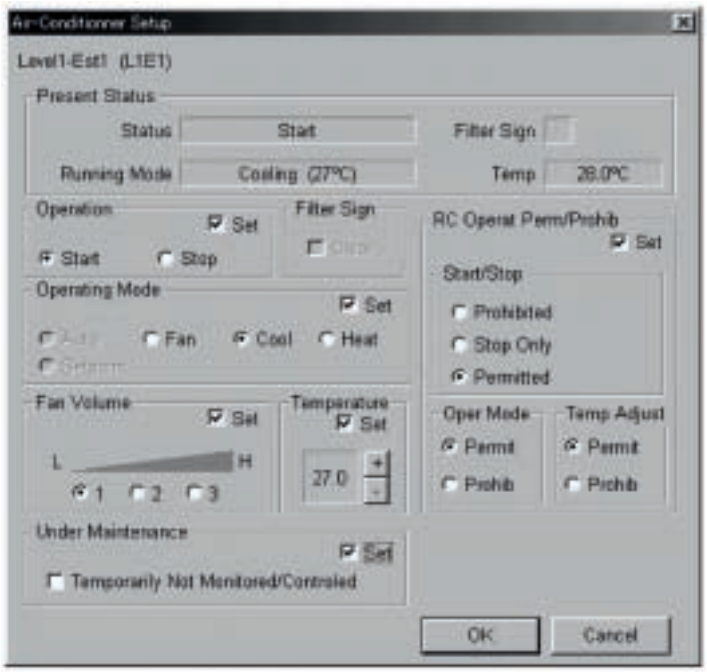
5 Functions

5 - 2 Detailed Explanation of Functions

5 - 2 - 3 Display

(10) Facility Equipment Setting Screen

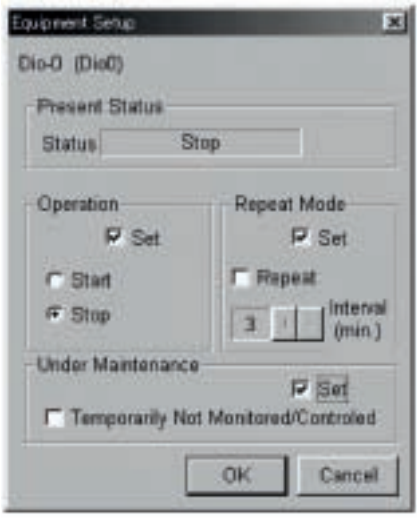
[DIII-NET Air Conditioner Setting Screen]



Each of the operations of start/stop, switching of operating mode, changing of temperature settings, switching of enable/disable of individual remote controllers, resetting of the filter sign, clearing of the failure warning and settings for being under maintenance are possible when using our DIII-NET compatible air conditioners.

Items pressed later have priority with regard to management items defined by the schedule control and link control.

[Setting Screen for Other Facility Equipment that can be Started and Stopped]



In addition to start/stop operation, supported by all facility equipment, our DIII-NET air conditioners, can be started and stopped with the repeat mode. In this case the outputs start and stop instructions in determined time intervals to make the starting and stopping states of the facility obey the intelligent Manager instructions, regardless of the local operation.

5 Functions

5 - 2 Detailed Explanation of Functions

5 - 2 - 4 Measuring

- Measuring
  - Cumulated Running Time and Cumulated Start/Stop Count
  - Automatic Inspection of Meter

(1) Cumulated Running Time and Cumulated Start/Stop Count

Cumulated running time and cumulated start/stop count are possible on all facility equipment that should be monitored. This is a standard for equipment maintenance. Can set as data for calculating electrical costs according to the use of the equipment.

(2) Automatic Inspection of Meter

Automatically cumulates pulses of electrical power meters, water amount totals and gas meter. Data that is inspected is reflected in the tenant's monthly cost calculations (optional). (A measuring instrument with a pulse generator of a minimum of 100 ms pulse width is necessary.)

Number of management items: meter = 1 item.

Meters can be connected to the Pi port on the main unit.

5 - 2 - 5 Management

- Management
  - Running History Management
  - Report Creation (Including the proportion of electric power)

(1) Running History Management

You can print the changes in the status of the equipment (start/stop).

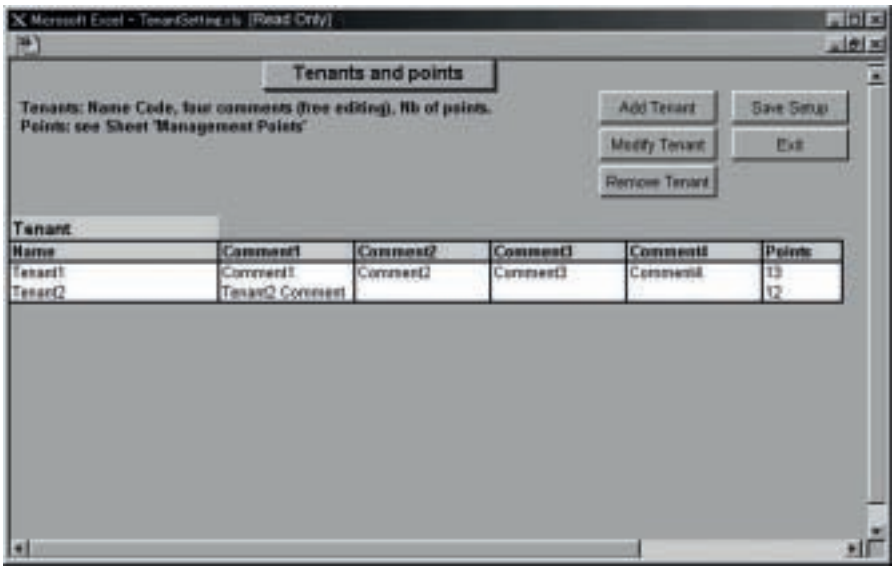
(See the section on Detailed History Display on page 13.)

Stores up to 500,000 items of error history data of the equipment (occurrence of errors and recovery) in memory. Allows you to display and to print the error history for each specific management item and to display and to print the histories of all management items. Also, you can set the period targeted for display (or printing) for each and set whether to display or print the errors and recoveries.

(2) Report Creation

Accumulates and manages the data for integration (running time of equipment, start/stop count), meters (pulse integration by the Pi on the main unit) and the power consumption amount (in units of indoor equipment) by the proportion of electrical power of the VRV®. It can also be searched and displayed using Excel software.

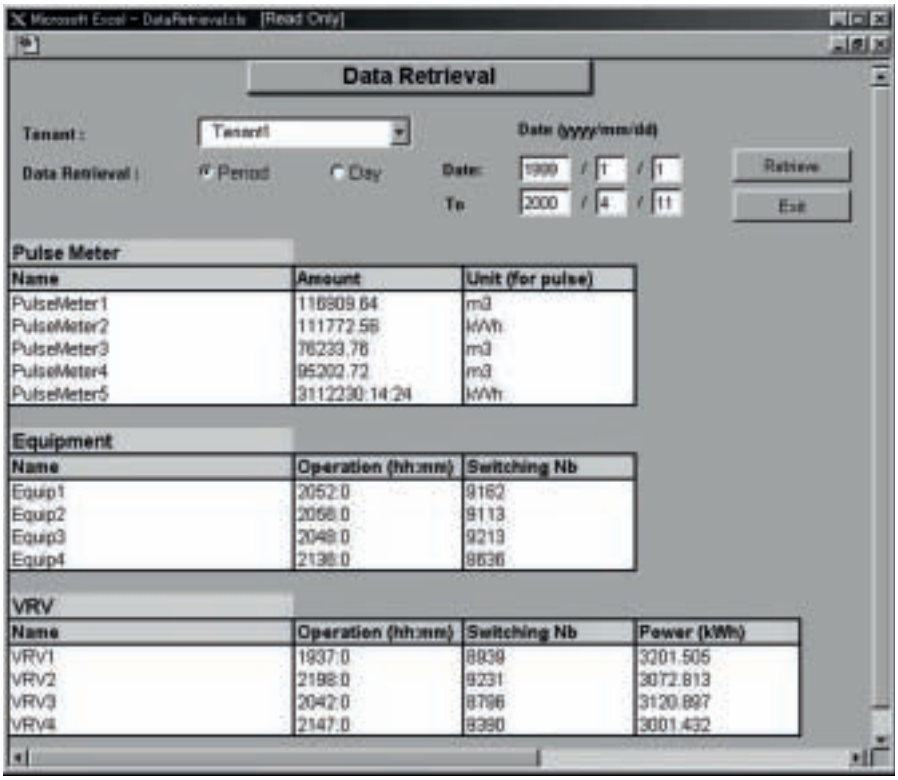
* Customers can freely change their department charges and accounting books (under their own responsibility).



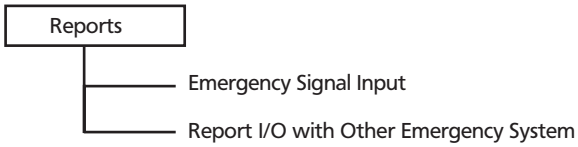
5 Functions

5 - 2 Detailed Explanation of Functions

5 - 2 - 5 Management



5 - 2 - 6 Reports



(1) Emergency Signal Input

Allocates a dedicated input board for fire signal input. (Di on iPU main unit)

The emergency stop program using this as the input signal function has priority over other controls. (See Fire emergency stop control.)

(2) Report I/O with Other Emergency System

The application of link control enables key management control that uses the input of a signal from the key management device and the notification to warning devices in security companies when errors in the facilities are detected, such as filled head water tanks, elevator error signals and fire warning systems. It also controls the input and output of a variety of reports.

(However, the status of the proportion of the output of reports does not change for approximately 10 minutes after recovery from a power failure.)

5 Functions

5 - 2 Detailed Explanation of Functions

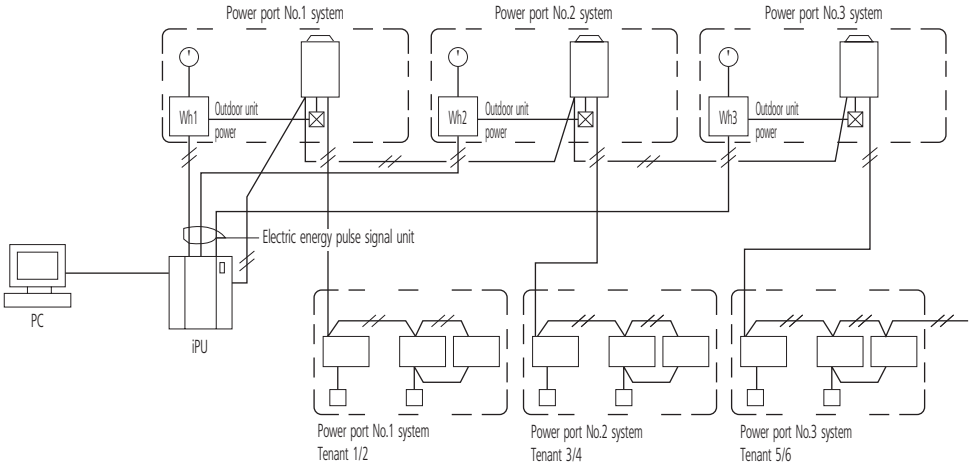
5 - 2 - 7 Power Proportional Distribution

- Power Proportional Distribution
  - System Components
  - Power Proportional Distribution Function
  - Setting of the period with no electric energy distributing
  - Data Back-Up

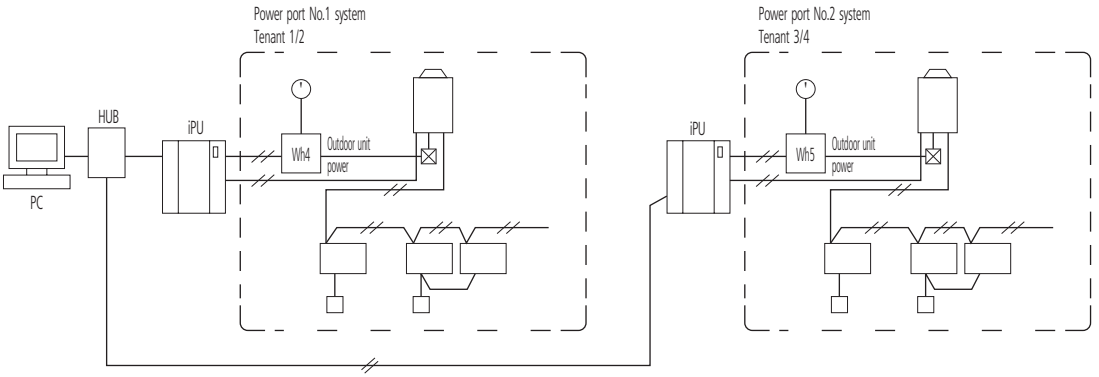
(1) System Components

Option setting for use of many watthour meters (“Grouping of electric power port” to be specified) 18 units (Max.) of watt hour meter for one iPU (the 1st one) and 19 units (Max.) of that for each iPU among several iPUs (the 2nd or more one) can be connected. Therefore, when 4 units of iPU are used, 75 units (Max.) of watthour meter can be connected. (It is not recommended to install many watthour meters.)
In this case, it is also allowed to specify the option of “Grouping of electric power port”.
Normally, it is not necessary to specify it. The system connection example is as shown below. For both Pattern 1 and Pattern 2, the calculation method, if specified, is the same.

- Pattern 1: Three watthour meters to be connected to one iPU:



- Pattern 2: Two watthour meters to be used with two units of iPU:



5 Functions

5 - 2 Detailed Explanation of Functions

5 - 2 - 7 Power Proportional Distribution

Item	Power port not specified (Normal)	Power port specified
Design precautions	Standard design without major conditions	Required to allow each of indoor/outdoor units and watthour meter to correspond.
Test run date	Preparation of address table	Required to prepare the address table and enter the port No.
Relation between the indicated value of watthour meter and the total value of calculation results	The total value of calculation results of electric energy distribution is almost the same as the one of the indicated value of watthour meter. Because the calculation method has a treatment of counting fractions as one, it never becomes smaller than the indicated value of the watthour meter. (1)	
Relation between the distribution calculated value and the watthour meter indicated value	There is a case of no conformance between each watthour meter indicated value and the calculation result of corresponding air-conditioner.	Each watthour meter indicated value almost conforms to the calculation result of corresponding air-conditioner.

NOTE

1 If many watthour meters (more than two) are installed, it is required to make group setting very watthour meter. If the group setting is not made, the error may become large in the total of each calculation result of the indoor unit corresponding with each watthour meter, though the total of the indicated value of watthour meter almost conforms to the total of calculation result.

- Pattern 3: Sky Air distribution of electric energy Refer to Item 7 “Design precautions”.

(2) Power Proportional Distribution Function

Because the JIS calculation is not based on the Weighing Law, it cannot be used for any official business transaction.

- Power proportional distribution function

The power proportional distribution and determination method is as listed below.

1. Power Proportional Distribution as a calculation standard	The power consumption of outdoor unit is counted in 1kWh unit. (To be inputted through integrating watthour meter with pulse oscillator) This value is a standard for determination, therefore, if the watthour meter has a wrong specification, the determined electric energy used is a wrong value.
2. Calculation of operating load state every indoor unit (1 unit) (Load every indoor unit to be supposed)	Every 20 sec., the connected indoor unit operating state is received and collected as a communication data, and the tabulation (summing-up) for an hour shall be a “temporary load".
3. Calculation of distribution ratio	In order to determine the power consumption of some air-conditioner A, it is required to determine the temporary load ratio (distribution ratio) of air-conditioner A to the total temporary load of all the connected air-conditioners. However, the value to be determined here is a ratio and not the power consumption. Distribution ratio of indoor unit A $t = \frac{\text{Temporary load of air-conditioner A}}{\text{Sum total of temporary load of all air- conditioners}}$
4. Electric energy used from distribution calculation of air-conditioner A	If the electric energy pulse [1kWh/pulse] inputted for an hour from the formal time is multiplied by the distribution ratio of every indoor unit, the actual electric energy used can be determined. Electric energy used of air-conditioner A (Distribution calculation) t = Distribution ratio of indoor unit A u = Number of pulses for 1 hour With this formula, the electric energy used for an hour of air-conditioner A can be calculated and determined. Then, if the same calculation is made for all the air-conditioners, the distribution value for an hour of each air-conditioner can be determined.
5. Determination of electric energy distribution value in 1-day unit	For 1-day used power distribution value, the calculation result every hour (1 hour) in r is summed up. For end of one day, 12:00 am (mid-night) is fixed. [Rate calculation] One day to be set in a menu is from 12:00 am to 11:59 pm.

The calculation result of the power proportional distribution function is made using the original method of Daikin and is not under law.
Collected data are saved in s daily report around midnight.

- Basic functions

- The system is that the rate of use of each indoor unit is calculated and determined from the electric energy used of the outdoor unit.
- For calculation, the power consumption of the outdoor unit is counted as a pules signal, and this value is distributed depending on the load situation of the indoor unit. (Mentioned later)

Supplement:

Pattern 1: System of connecting three watthour meters to one iPU

If three watthour meters are connected with one iPU, the electric power port is to be specified individually.

Pattern 2: System of using some/many watthour meters with some/many units of iPU
By specifying of power ports, it is also allowed to collectively specify of some/many units.
Example: Of the four iPU, two units are group-specified with one watthour meter, and the remaining two units are group-specified with each unit individually.

5 Functions

5 - 2 Detailed Explanation of Functions

5 - 2 - 7 Power Proportional Distribution

Pattern 3: Combinations as above
As a combination system, some/many watthour meters can be connected to one iPU for use of some/many units. The precautions and the relation between the calculated value and the indicated value of watthour meter are the same as those in Pattern 1 and Pattern 2.

- Number of integrating watthour meter with pulse oscillator
  As a standard system, one integrating watthour meter with pulse oscillator (abbreviated “Watthour meter” hereafter) is to be provided.
  If more then 19 units are connected, the following treatment (two ways) is effective for it:

  1) The mounting position of watthour meter is to be changed:
     In most cases, if watthour meter mounting position is changed to the main body side (toward near cubicle) of the receiving equipment, the number of watthour meter can be set within 12 units. If the number of units is increased, theequipment cost will be increased by more than hundreds of thousands yen.

  2) The specification of watthour meter is to be changed, together with use of pulse synthesizer:
     In this case, because some/many watthour meters and the to pulse synthesizer are used, the cost goes up. For this reason it is basically not recommended.However, if more than 19 units is connected by all means, the pulse synthesizer should be used and the specification of watthour meter should also be different from the standard one. For more detail, you can consult with our Technical Sales Section.

(3) Setting of the period with no electric energy distributing

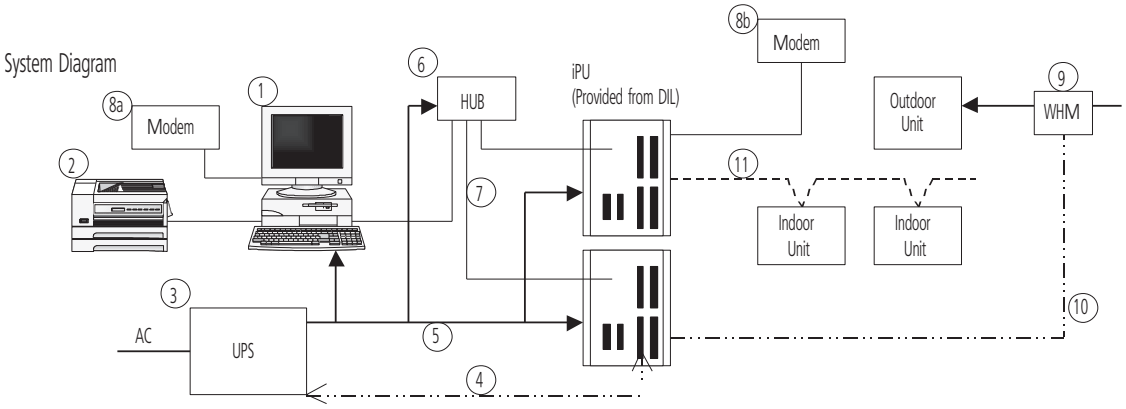
- For period of electric energy distributing, the usual (continuous) calculating system is normally adopted, but it is also allowed to set the time zone and days of the week in which no rate calculation is made. For setting, specifying collectively is done, therefore, it is not possible to set the time zone every each tenant.
- Within the period of no electric energy distributing, the calculation result is 0 kWh. If the electric power is used with the outdoor unit in no-calculation time zone, the calculation result, by this electric energy rate, is less than the meter reading.
- As an example, the above is used in the following case:
  In ordinary regular time, the flat rate (fixed rate) is collected from the tenants, and only in other time, the electric energy distributing is made as an overtime and holiday rate.
- The no-calculation period can be set by combining the following. (Tenants individual not allowed)
- Optional start to end time (1 min. unit)
- Optional day of the week (Unit of day of the week)
- Reversely, if the optional date (month/day) is specified, the rate can forcibly be calculated with 1-day unit.
  Regardless of specifying of no-calculation period, the rate calculation is made. (Tenants individual not allowed)
- Optional date (month/day) with 1-day unit (1 year)

(4) Data Back-Up

- The set data in the dues control unit is not deleted even if the electric power is turned off, because the data is stored in the non-volatile (flash) memory.

6 System Architecture

6 - 1 Requirement spec and the recommendation of other equipment

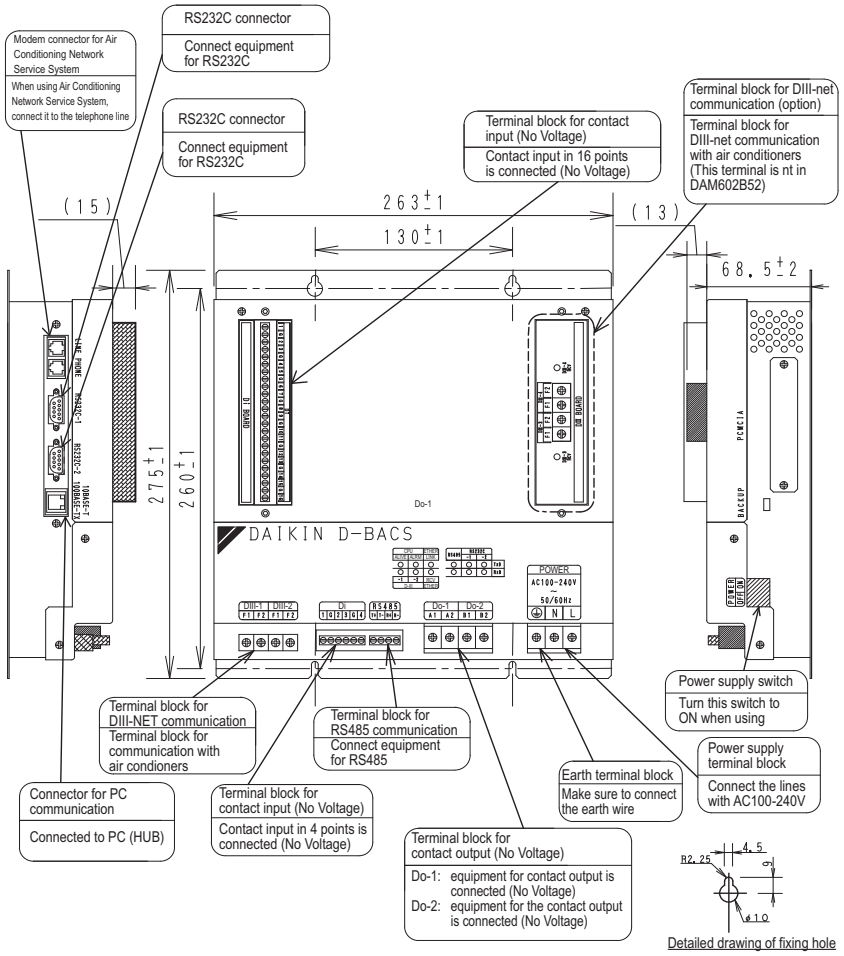


		Requirement Specifications	Recommendations	Remarks
PC	1	[Hardware] CPU : Pentium 500MHz or above recommended Memory: 256MB or above HDD: 4GB minimum, 8GB or above Keybord/Mouse Network: 100Base/T Ethernet SVGA (800 x 600, 1,024 x 768, 1,280 x 1,024) Monitor (15',17') Sound & Speaker	We recommend makers such as IBM, Compaq or Dell, etc.	In the case of an alternative maker, correct operation should be checked before shipment.
		[Software] Windows XP (Professional SP2 or later), Windows 2000 (Professional SP4 or later) Microsoft Excel 2000	The intelligent Manager is executing on the English version.	The Windows NT 2 bytes encoded characters (Chinese, etc.) are not supported.
		[Other equip.]		
	2	LBP (not indispensable.) - It must be supported by Windows NT. - Require A4 size paper	We recommend makers such as HP, Canon, etc.	
UPS	3	Capacity: 200-250 W / 20 min Voltage: as required on the field	APC SU 700, SU 1000 Series	
	4	Control Signals - Power failure signal (from UPS) - UPS shutdown signal (to UPS)	+ Relay I/O module (AP9610)	
	5	AC power lines		
NETWORK EQUIP.	6	Multi-port HUB (4 or more ports) 10 Base/T cables (category 5)	We recommend makers such as 3 com, etc.	Hub should be used even when one iPU is connected to PC.
	7	A required distance and a number	The cable for networks is required.	
MODEM	8a	33.6 kbps communication speed and reception function are required.	We recommend makers such as 3 com, etc.	Required for remote monitoring. However, we recommend it to be included as a standard.
	8b	Air Conditioning Network Service System		
WHM	9	1pulse / 1kWh output is required.	As specified in the D-BACS system design guide.	Required for powerproportional-division.
	10	WHM - iPU connection cable		
OTHER	11	D3 network cables	As specified in the D-BACS system design guide.	

6 System Architecture

6 - 1 Requirement spec and the recommendation of other equipment

<iPU External View>



Detailed view of Attachment Hole

(1) Electrical rating

1) Rated voltage: Single phase AC 200 to 240 V 50/60 Hz

2) Power consumption: Max. 20 W

(2) Conditions of Use

1) Power voltage variation: ±10% of rated value
2) Ambient temperature of use: -10 to 50°C
3) Ambient humidity of use: 0 to 98% (However, there must be no humidity.)
4) Storage temperature: -20 to 60°C

(3) Performance : Insulation resistance: Min. 50 MΩ at DC 500 V M

(4) Mass : 4 kg

(5) Painting color : light ivory

Item		Requirement Specification
UPS (e.g.APC SU700, 1000 series)	Capacity	200-250 W/20min
	Voltage	As required on the field
	Control signals	Power failure signal (from UPS) UPS shut down signal (to UPS)
	Relay	I/0 module (AP9610)

6 System Architecture

6 - 2 Confirmation of Watthour Meter

For distribution of electric energy, the integrating watthour meter with pulse transmitter is required.

It is important to confirm that the specifications coincide with each other, and also to confirm with the division in charge (normally, electrical work division, not air-conditioning div.).

6 - 2 - 1 Specifications of watthour meter to be connected to intelligent Manager

1) To be an integrating watthour meter with pulse transmitter.

2) The output pulse unit (pulse weight) is to be 1 pulse to 1kWh (1Wh/pulse).

3) The pulse width is to be within 40 to 400 msec.

4) The mercury relay is to be used for pulse output, and it to be no-voltage output.

5) If even any of the mechanical or electrical type conforms to the above “1)” to “4)”, it can be used.

If the specifications are not coincident, there is a possibility that the following imperfections are caused:

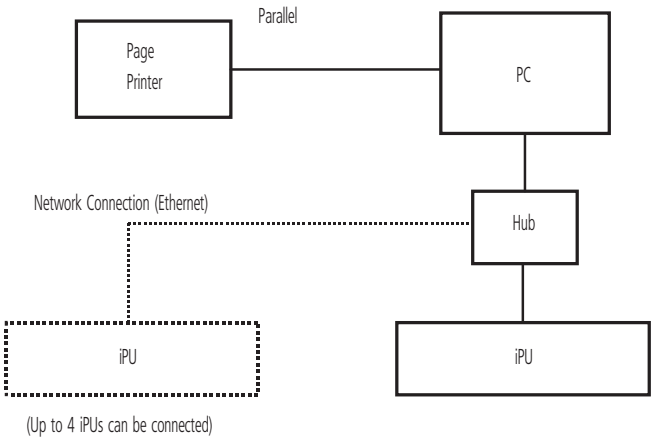
- If the output pulse unit is not 1kWh/pulse.
  It results a large difference between the reading (value) of watthour meter and the total value of distribution of electric energy.
  For the charge calculation, the number of pulse input is counted and the power consumption of the outdoor unit is monitored, therefore, for example, if the large value, 10 kWh/pulse, is inputted, the electric energy calculated is the value of one tenth (1/10) times.
- If the pulse width is not within 40 to 400 msec. If it is less than 40 msec., the pulse input cannot be detected, and the result of calculation is smaller than the real value. In addition, if more than 400 msec., more than 2 pulses is detected for 1-pulse input, and the result of calculation is larger than the real value.
- If use of contact other than mercury relay.
  If it is a general relay, the pulse may not accurately be detected due to relay chattering.

Confirm the following items for the construction process.

- Construction of pulse signal line is kept away from power cables. For this pulse signal line, the voltage DC24V should be applied from the intelligent Manager side. It should be constructed separating from the power cables.
- Max. distance to be 200 m. Confirm that the distance with the watthour meter~intelligent Manager is within 200 m.

7 Wiring Image

7 - 1 System Connection



7 - 1 - 1 Use of Printers

(1.) Standard Setting: With only the page printer: Parallel port connection

- Printing of daily, monthly, annual reports and cost calculations: Automatically prints at the set time.
- Display of errors and changes of states etc: Printer at error or at determined build up of data, or freely.

(2.) 2Units of Page Printer and Line Printer (Optional)

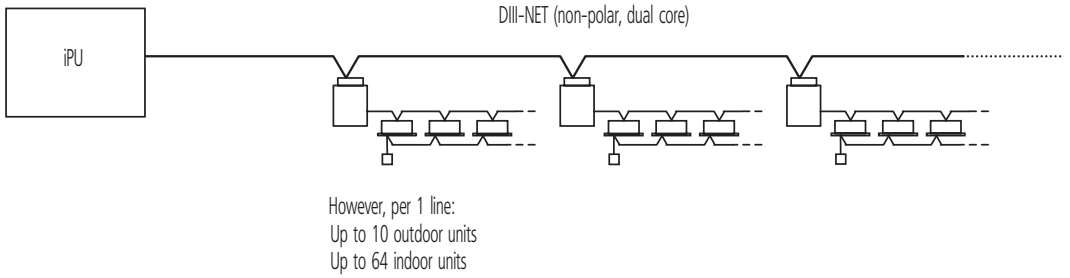
* Page printer: Network connection

- Daily, monthly, annual reports: Automatically prints at the set time
- Cost calculation

7 - 1 - 2 Connecting to iPU

Wiring varies according to the equipment to be connected, as shown below.

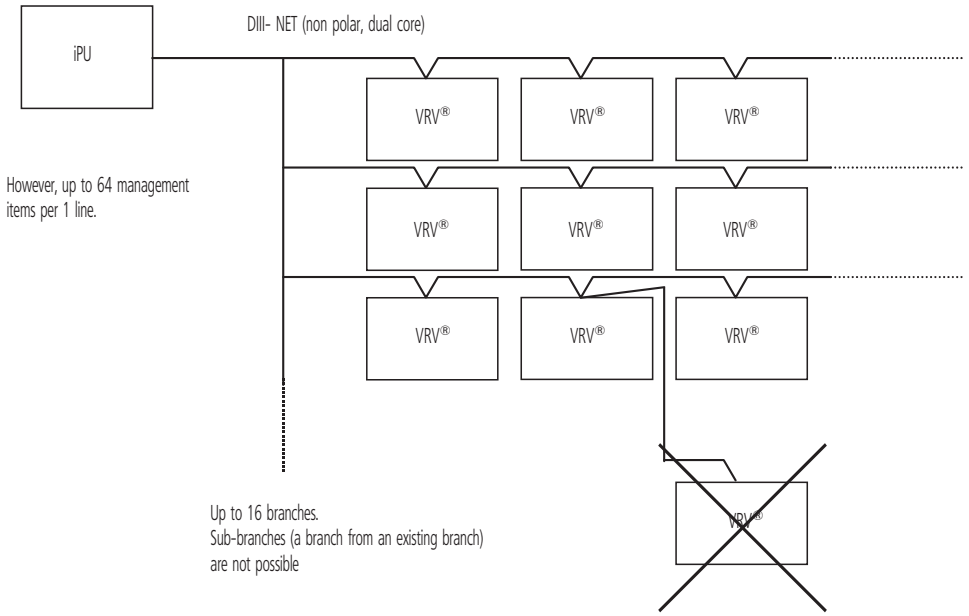
* DIII-NET Compatible Air Conditioners



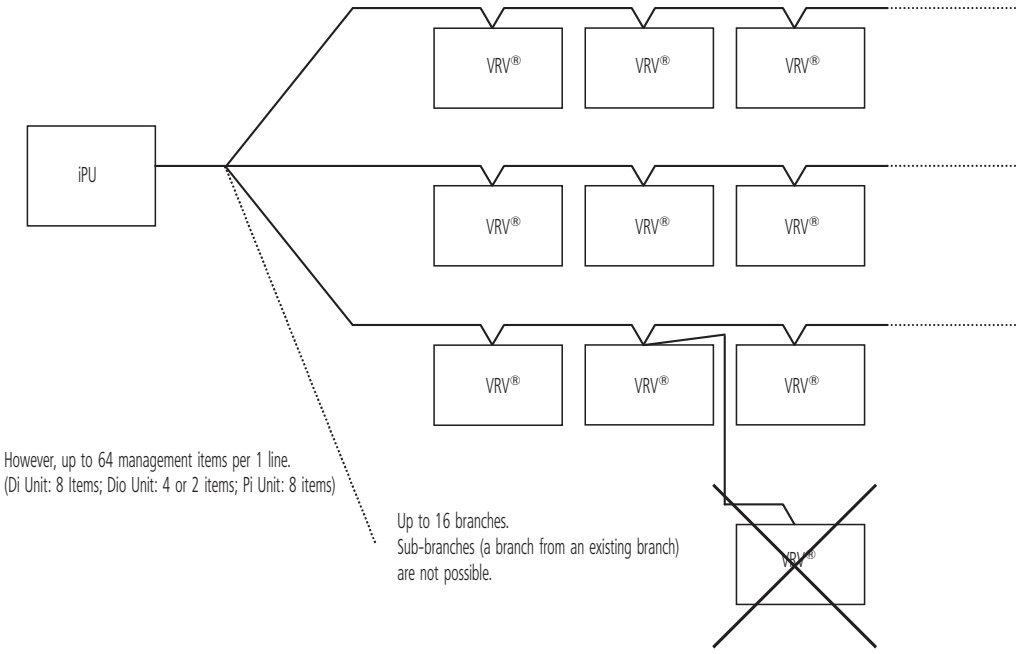
7 Wiring Image

7 - 1 System Connection

(1) Bus Method



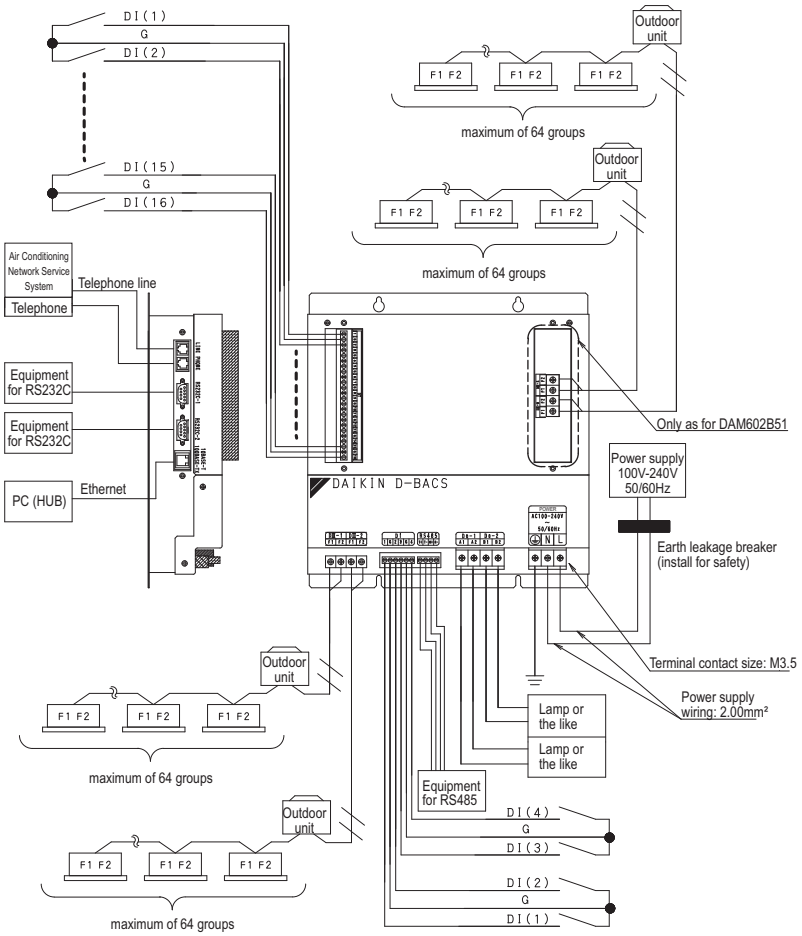
(2) Star Method



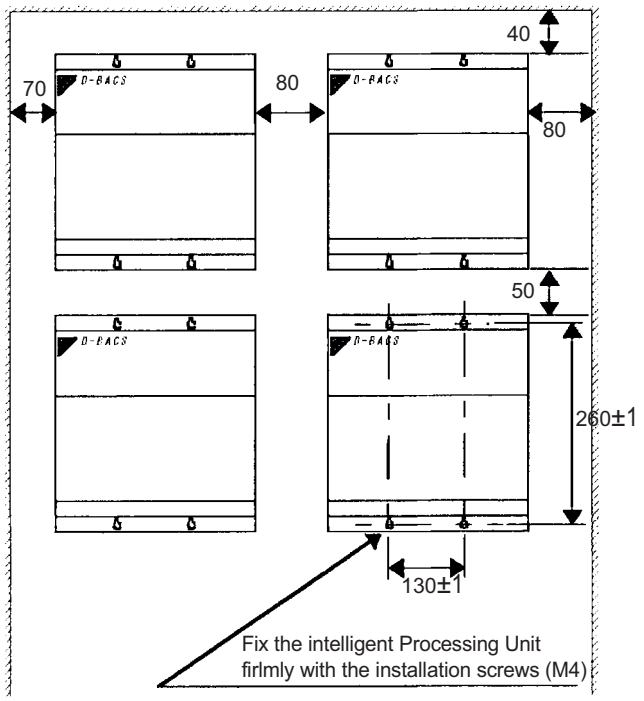
7 Wiring Image

7 - 2 Wiring Diagram

7 - 2 - 1 Intelligent Manager Electric Wiring Diagram



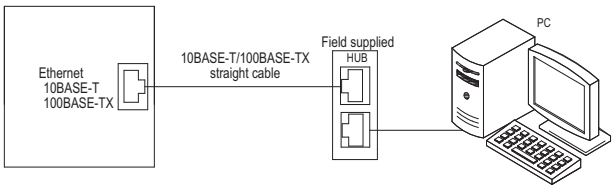
7 - 2 - 2 Required Installation Space

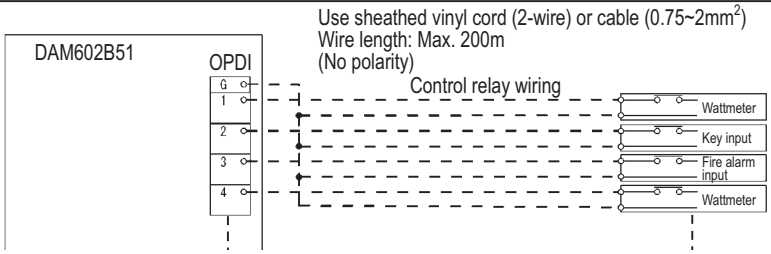


7 Wiring Image

7 - 3 Wiring Specifications

● Ethernet communication wiring





NOTES

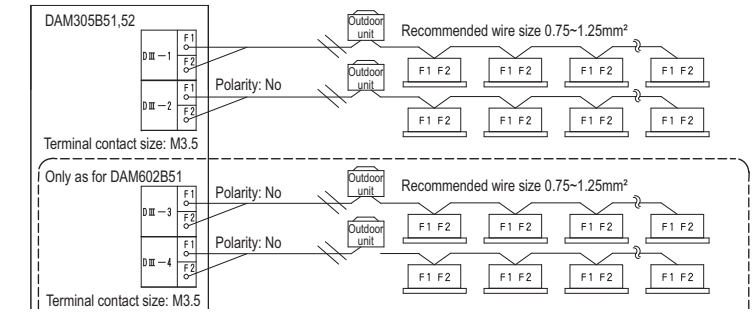
1 Up to four input devices can be connected to each G terminal. Do not connect three or more wires togheter to one terminal.

2 Use micro-current contacts for no-voltage input contacts. (Voltage and current to be at DC 16 V and below 10 mA with the contact closed)

3 The order of connections may flexibility be modified depending on the test-run settngs.

With a combination of OPDI, Di-2 and Di-3, total of 18 input devices can be connected.

● DIII-NET wiring



CAUTIONS FOR WIRING

1 Do not use multicore cables with three or more cores

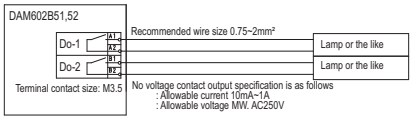
2 Use wires of sizes between 0.75mm² and 1.25mm²

3 Do not bind the wire for DIII-NET

4 Wirings for DIII-NET must be isolated from the power lines

5 Wire length: Max 1000m

● Do-1 and Do-2 Settings



CAUTIONS FOR WIRING

1 Do not use multicore cables with three or more cores

2 Use wires of sizes between 0.75mm² and 1.25mm²

3 Do not bind the wire for control

4 Wirings for control must be isolated from the power lines

5 Wire length: Max 150m

8 Setting Up

8 - 1 Precautions for Setup

The intelligent Manager Monitor System PC and printer are used in the same way as general OA equipment.

iPUs are set up within the system.

However, avoid setting up in the following locations.

- Locations that are exposed to direct sunlight, or that are subject to radiation from heat generating equipment such as a boiler.
- Locations with high humidity or where there could be contact with water.
- Locations that are corrosive or where inflammable gas is generated.

Ambient temperature and humidity conditions of location of setup

10 - 35°C 20 - 80% RH (intelligent Manager Monitor System PC, Printer, Display, UPS)

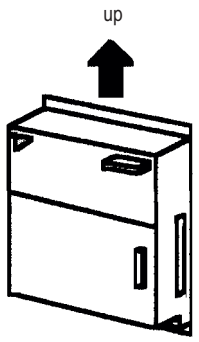
0 - 50°C - 95%RH (iPU)

Separate our air conditioning power (electrical) lines and the communications lines for control a minimum of 50 mm. In other cases, separate from the power lines to meet the following conditions.

Power Line Electrical Capacity		Distance of Separation of Power Lines and Communication Lines for Control	
		Daikin Air Conditioners	Other Equipment
Max. 220 V	Max. 10A	Min. 50 mm	Min. 300 mm
	Max. 50A		Min. 500 mm
	Max. 109A		Min. 1000 mm
	Exceeding 100A		Min. 1500 mm

8 - 2 Summary of Attachment

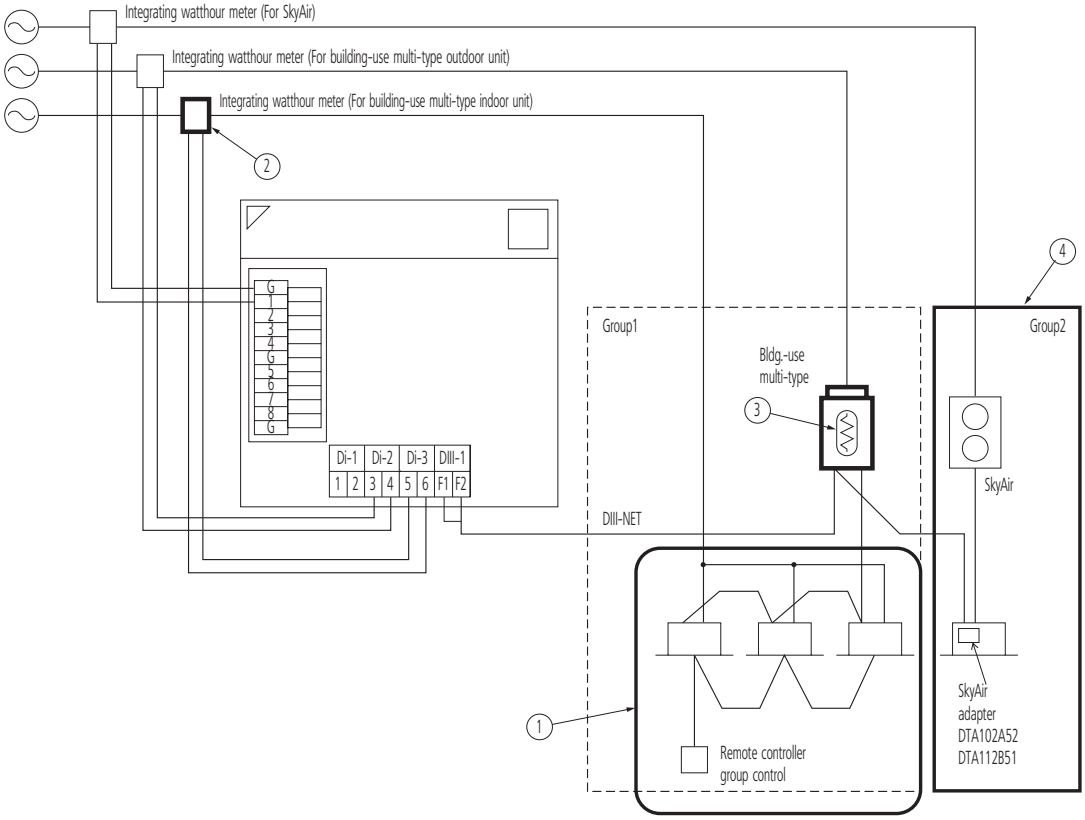
- Always attach inside a locked electrical equipment box (or somewhere that cannot be opened without the use of a special tool) so that indoor equipment cannot be easily tampered. The location should not allow the equipment to be subjected to the influence of electromagnetic waves or to be exposed to dust.
  Minimum depth dimension necessary for setup is 100 mm.
- The figure at right shows the minimum spacing between equipment when setting up consecutively and the wall.
- Attach as shown in the following figure.



Always attach in the vertical direction. Attaching horizontally will cause failures so do not attach in that direction.

9 Design Precautions

9 - 1 Rate calculation



9 - 1 - 1 Remote controller group control

Also in the indoor unit (sub-unit) with remote controller group control, set the centralized address for correct electric energy distributing.

(The centralized address for sub-unit can be set in the site set mode “30” of the remote controller.

However, after setting with “30”, if set with “00”, the sub-unit address will be deleted.)

→ An imperfection in case collective distribution is done with main-unit running state without setting of centralized address at sub-unit .

Even if the remote controller group control is done, each indoor unit has different thermostat state depending on its installation place.

Therefore, the distribution result will differ depending on the decision which indoor unit is to be as main unit.

9 - 1 - 2 In case power consumption of indoor unit to be distributed

In distributing the power consumption of the indoor unit, it is necessary to connect the integrating watthour meter to the power system of the indoor unit and input its pulse output to intelligent Manager.

If such a wiring is connected, in making equipment setting in test run, set at “To make distribution calculation for indoor fan” with intelligent Manager calculation conditions.

9 - 1 - 3 Calculation of electric power (Crankcase heater/PC Board power consumption) at stopping

1. In the case of calculation for crank case heater and PC Board when not in operation.
   The electric power consumed by crank case heater of the outdoor unit is divided by the capacity of each indoor unit.
   N.B. The calculation also includes the indoor units which are not in operation. (eg.vacant)
2. In the case of not calculating for crank case heater and PC Board when not in operation.
   It is possible to exclude the power consumed by crank case heater and PC Board.
   Therefore the power won’t be added to each indoor unit.

9 Design Precautions

9 - 1 Rate calculation

9 - 1 - 4 Electric energy distributing of SkyAir

The SkyAir electric energy distributing cannot be included with the case of building-use multi-type.

Therefore, it is necessary to separate the group for rate calculation by group setting.

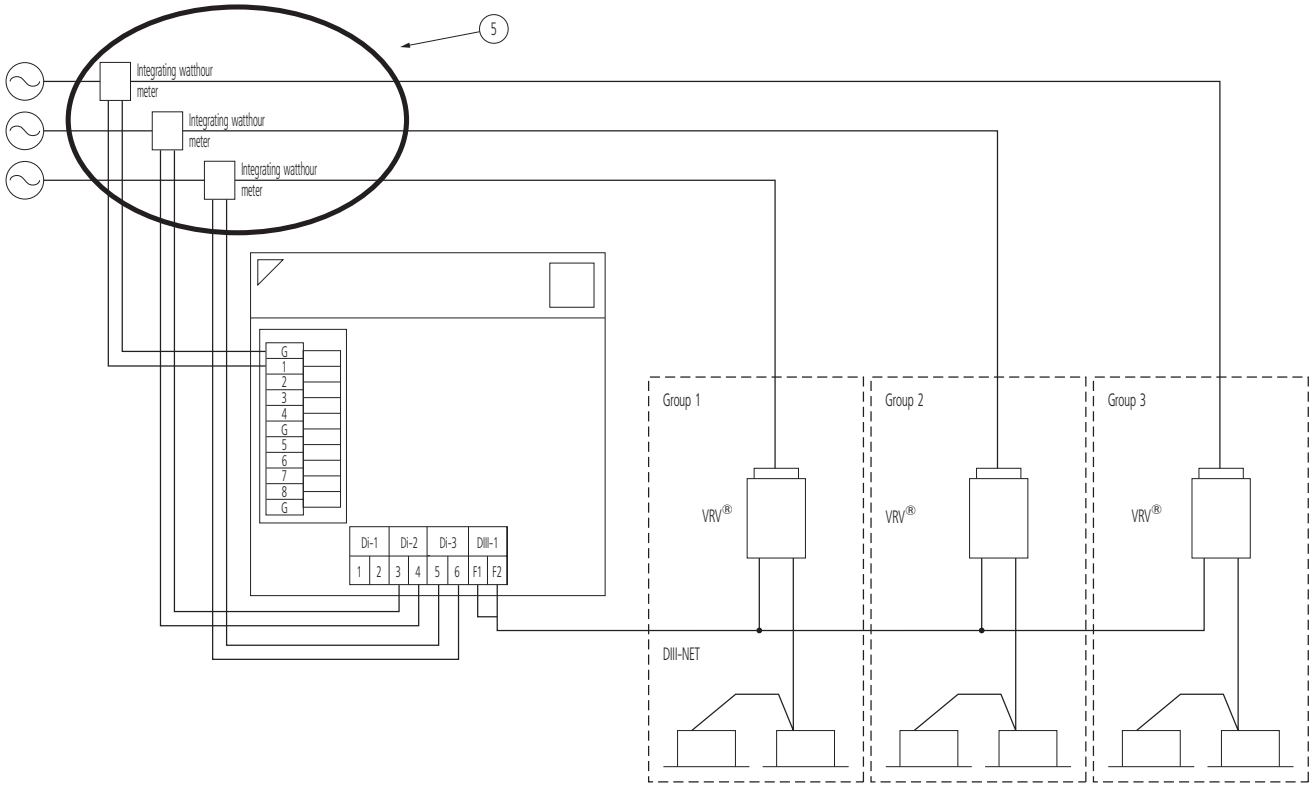
Further, the applicable model is also limited.

9 - 1 - 5 Setting of electric power group

For iPU, the electric energy can be distributed with one unit of integrating watthour meter, but if some/many integrating watthour meters are connected as shown below, after setting of electric power group, if the electric energy is distributed every electric power group, the electric energy distributing accuracy can be improved.

9 - 2 Setting of each electric power group

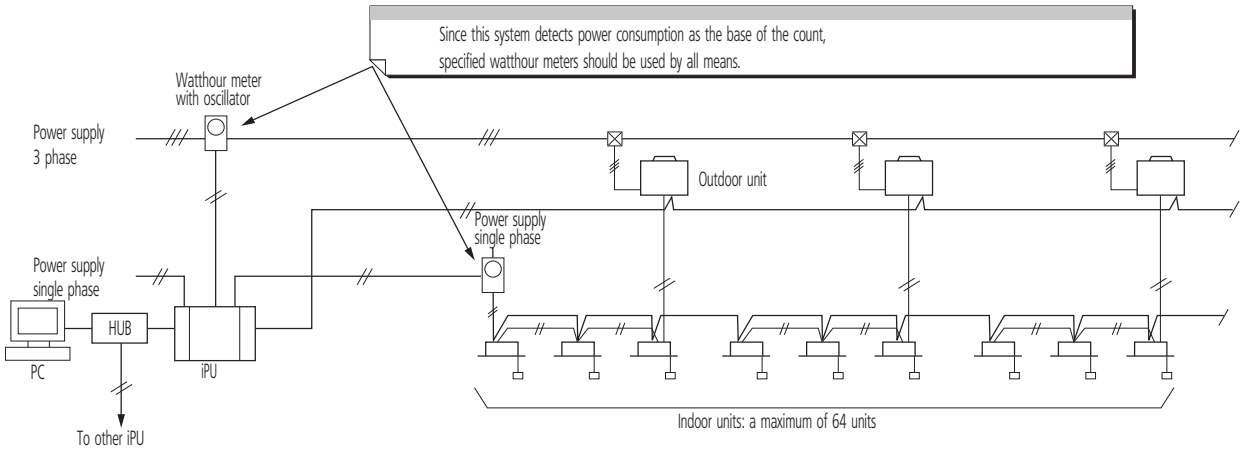
Although the iPU unit allows electric energy distributing with one integrating watthour meter, if some/many integrating watthour meters are connected as shown below, the electric energy distributing accuracy can be improved.



10 Explanations of Power Proportional Distribution

10 - 1 What is the Power Proportional Distribution.

(System Ex.: Normal VRV®)



- Previously the general way for requesting the electricity charge at rental buildings was that a management staff read a watthour meter and billed the tenants by manual-account based on the operation time which were counted through time-counters.
  However, this method takes a lot of time for the management staff. In addition, as airconditioning consumes much different electricity for either the operation of airconditioning (thermostat-on) or the operation of fan only (thermostat-off), it might cause to give unfair sense to the tenants inhabited in the spaces with different heat load, though “operation-time” itself is the same.
  For instance, even if a certain higher preset temperature is applied in summer for energy saving, fee for airconditioning may equal to the fee without preset temperature so far as it is counted based on the operation time.
- Electric energy distributing function of intelligent Manager carries out the proportional division computation in consideration of those thermostat-on and thermostat-off operations and saves time for building management staffs to read watthour meters, and also supplies tenants printed data useful for making the bills.
  Namely, iPU is the products created by the concept to help the assignment of bill-issuing and offers users the reasonable price of the products.
- Yet, since iPU is persistently the system assuming each indoor unit’s power consumption based on the data which is transferred from indoor units, depending on the power consumption of the airconditioner in the standard installation conditions, it should be noticed that iPU is not the products which complies with the Weight and Measure Act as shown in the catalogue.
  The details of the cause to count error is described at chapter 2.

10 - 1 - 1Count method (for a conventional VRV® system)

1) The following proportional division computation is carried out every one hour and assigns the power consumption of airconditioning system to each indoor unit.

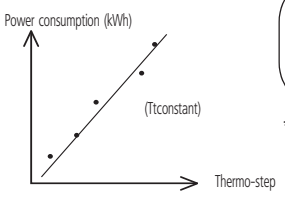
Heat load depending on the operation conditions of airconditioner = power consumption of indoor unit’s fan
+ power consumption of optional heater
+ the rated power consumption in cooling (*1) ×a
+ the rated power consumption in heating (*1) ×b

*1:The value which is registered at the test run, adapting the indoor unit’s capacity

$$a = (a1 + a2¥T) \frac{\text{Thermo-step (*2)}}{10}$$

$$b = (b1 - b2¥T) ¥ \frac{\text{Thermo-step (*2)}}{10}$$

a1, a2:correction factor for cooling
b1, b2:correction factor for heating
T:indoor unit’s suction air temperature



As shown in the left, heat load is calcuated from an equation of the first degree which approximates the correlation, among thermo-step, indoor unit’s suction air temperature and power consumption, into the linear line under the standard conditions of the unit.

*2:“Thermo-step” signifies that an airconditioning capacity is expressed in a range of the values 0-5 mainly based on the opening grade of an electronic expansion valve in an indoor unit.

$$\text{Indoor units N's power consumption (kWh)} = \text{total pulse input from wattmeters} \times ¥ \frac{\text{Heat load by one hour calculated through the operating of airconditioner N}}{\text{Total heat load by one hour caiculated through the operating conditions of all the airconditioners}}$$

10 Explanations of Power Proportional Distribution

10 - 1 What is the Power Proportional Distribution.

2) Calculation of the proportional division value for a daily power consumption.

The proportional division value for a dairy power consumption is stored with factors of each indoor unit's number and a calendar date as a table shown below after adding the count result of hourly power consumption from 00:00 through 23:59. (with a graduation of 10 W)

Indoor unit No. / Date	001	002	003	004
April 1st	000150	000211	000741	004402
April 2nd	002004	005202	009205	005902
April 3rd	000313	001103	000086	008173

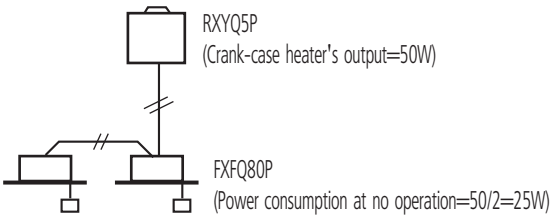
The set data in the dues control unit is not deleted even if the electric power is turned off, because the data is stored in the non-volatile (flash) memory.

3) Counting the electricity at the ceased condition of the unit

Even if an airconditioner is stopped or in the condition of thermostat -off (the condition that the compressors are stopped as the temperature in the space where all the indoor units are installed falls down to the preset temperature), the airconditioner consumes energy due to the energy consumption mainly by the crank-case heater in the outdoor unit.

When the iPU is used, the rated power consumption of the crank-case heater is divided by the number of indoor units in usual connection (for instance two indoor units of 2.5 HP are connected to an outdoor unit of 5 HP etc.) and the value is registered at the test run ,adapting each indoor unit's capacity.

(Example)



The iPU counts the indoor unit's operating conditions every 20 seconds.

Since the indoor units send ON/OFF data of the crank-case heater the to iPU, it adds one(+1) to the power counter inside iPU at no operation of the airconditioner when the crank-case heater is ON.

When this counter reaches 180, it judges that the crank-case heater was on for one hour, and in case of the above mentioned indoor unit, the counter goes back to zero after 25 Wh is added to the counting result .

This calculation process is conducted separately from the proportional division computation and this input is got rid of from the pulse input of the watthour meter. Because of this procedure, the power consumption in the space where the airconditioner is not used at all is counted constantly every month.

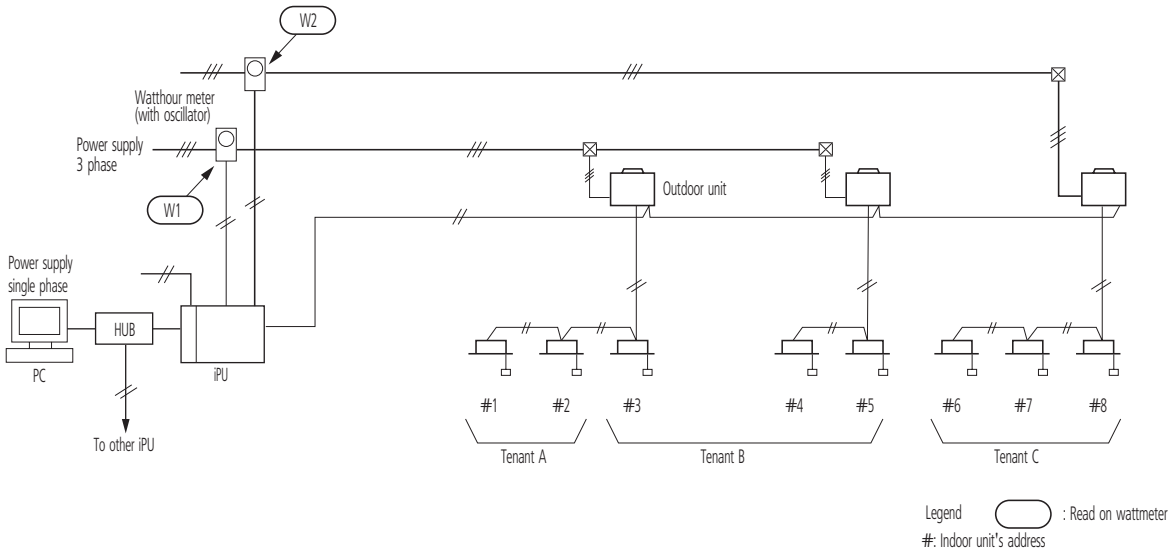
(However, as this airconditioning system is a multi-system, in case that one outdoor unit is shared to another tenant, the count output can be seen in lower value rather than the crank-case heater's power consumption registered, because the crank-case heater doesn't actuate when another tenant operates the airconditioner.)

10 Explanations of Power Proportional Distribution

10 - 2 Count Accuracy

10 - 2 - 1 Cause of error

System example



<Case of arising error>

1 W1 + W2 ≠ Count conclusive total for indoor unit #1~#8 → Refer to the next page

2 W1 ≠ Count conclusive total for indoor unit #1~#5

W2 ≠ Count conclusive total for indoor unit #6~#8 → Refer to the next page

1 W1 ≠ W2 ≠ Count conclusive total for indoor unit #1~#8*: The reason to get and the error size.

- REASON 1

iPU counts every one hour's power consumption.

Though fraction in case of computation occurs at this time, it is computed after leaving off a 1-W figure to avoid the risk for the owners. As a result, the error by the leaving-off occurs by 0.5W/ hour in average value of all indoor units.

Calculation example

(1) Count for errors in 8-day

Tenant A + B: 0.5 (Wh) × 24 hours × 8 days × 5 units = + 0.480 kWh

Tenant C : 0.5 (Wh) × 24 hours × 8 days × 3 units = + 0.288 kWh

total = + 0.768 kWh

(2) Assuming that the reads on watthour meters are as follows:

W1: read on watthour meter = 490 kWh

W2: read on watthour meter = 200 kWh

total = 690 kWh

(3) Finally it is concluded as total error = 0.768/690 × 100 = 0.11%

10 Explanations of Power Proportional Distribution

10 - 2 Count Accuracy

10 - 2 - 1 Cause of error

- REASON 2

When airconditioners of all the tenants cease operation, the power consumption which were preliminarily registered to all the airconditioners are being added as described on the section 10.1.1).

(Example)

In case of 2 HP indoor unit (FXCQ50M8), it brings the watts for one month during the ceased operation = 20 Wh × 24 hours × 30 days = 14.4 kWh. But for the different case that 10 HP outdoor unit (RXYQ10P) is connected to three indoor units with 100 % combination rate, it will show as follows;

Outdoor unit RXYQ10P one unit	Crankcase heater's power consumption : 66 W	Monthly actual power consumption of outdoor unit 47.52 kWh (66×24×30 = 47520 Wh)
Indoor unit FXCQ50M8	The watts at the ceased operation (registered data) 20 W	Monthly count value 43.2 kWh (14.4×3 = 43.2 kWh)

2 (W1) ≠ Count conclusive total for indoor unit #1~#5 :

(W2) ≠ Count conclusive total for indoor unit #6~#8 :

iPU counts the power consumption as the following conditions (1)~(6) for the standards. So, the gap to be raised from these conditions may cause the error. Since these errors vary depending on the surrounded situations, the worst error value can't be drawn out from the computing.

(1) Combination rate of indoor units connected to an outdoor unit (100%)
(2) Outdoor temperature (35°C)
(3) Indoor unit's suction air temperature (19°C)
(4) Piping length (5 m)
(5) Level difference (0 m)
(6) Pipe diameter (ø22.2)

10 Explanations of Power Proportional Distribution

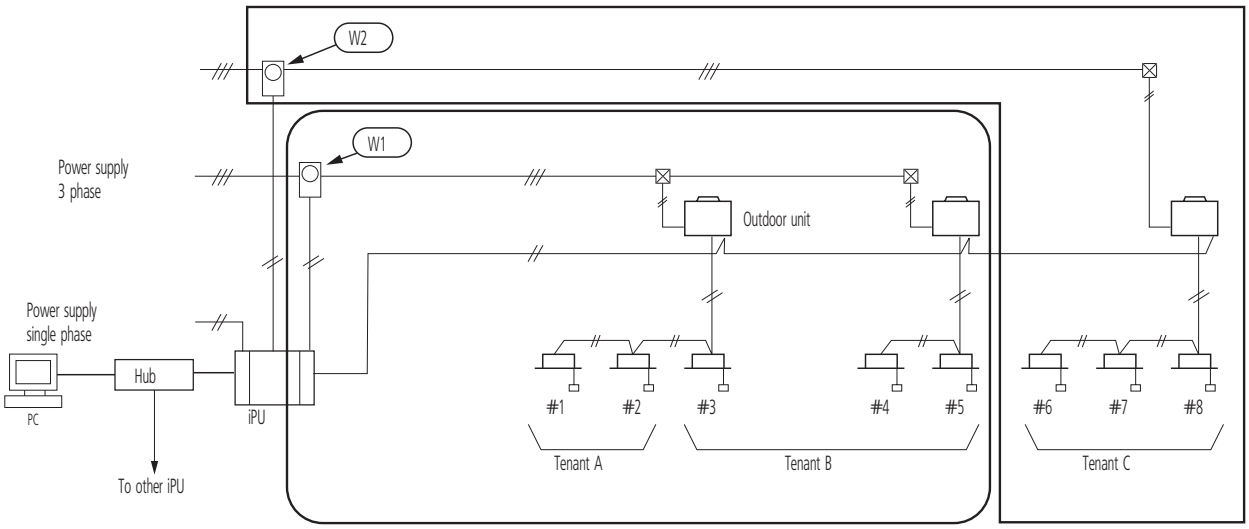
10 - 2 Count Accuracy

10 - 2 - 2 The way to reduce errors

The error 1 can't be reduced, yet this error is small and appears to be positive always, so it can generally get rid of troubles if excusing the reason caused to tenants.

The way to reduce the error 2 will be described as follows.

As shown in the drawing below, when the relation between a wattmeter and indoor units are clear, "the setting to make grouping for power ports" should be carried out at the test run of intelligent Manager. (The actual site job will be conducted by persons of service dept networks responsible for the test run.)



The power input to iPU can be counted with the proportional division system based on the every input of wattmeter. On the above example, watts at W1 and watts at W2 are shared by indoor units #1~#5 and indoor units #6~#8, respectively. (Before the test run goes on, it is necessary to enter the exact power port No. on the address table.)

The above setting results in the followings:

(W1) = Count conclusive total for indoor unit #1~#5

(W2) = Count conclusive total for indoor unit #6~#8

(Except for the error at 1). Furthermore, since iPU watt input has just 18 ports, additional divisional counting is no longer possible.

10 Explanations of Power Proportional Distribution

10 - 2 Count Accuracy

10 - 2 - 2The way to reduce errors

CAUTION

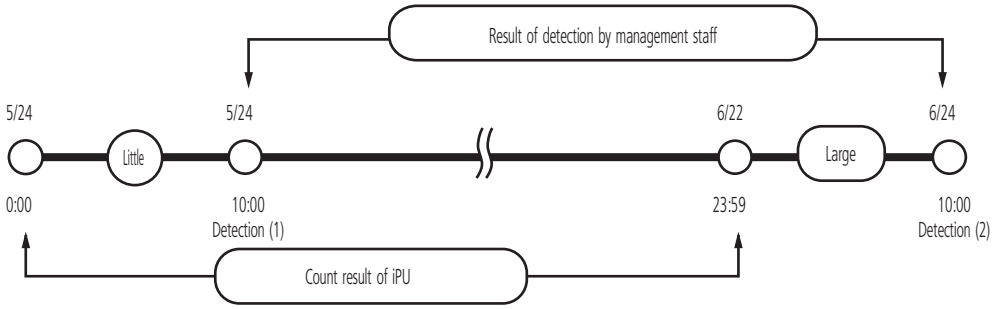
When management staff checks the watts in the procedure mentioned below, they would find the calculation to be incorrect due to an incomplete cycle.

Example:

(1) May/24th, read wattmeter and records the watts at 10:00 am

(2) June/24th, read wattmeter and records the watts at 10:00 am

(3) When the count in a period of may/24th to June/23rd is printed out, the total value doesn't meet the value detected mentioned above on (2) - (1).



iPU stores the information collected in a period of 0:00 am through 23:59 pm as one day information as shown above.

It results in the fact that there are ten hours gaps between on the first day of the counting and on the last day of the count in the above mentioned column of "Result of detection by management staff" and "Count result".

As shown in the figure above, this error increases in the season from the intermediate forwarding to the season in which airconditioning is highly required.

For more accuracy, it is nessary to compare with the value detected at 0:00 am.

Daikin's unique position as a manufacturer of air conditioning equipment, compressors and refrigerants has led to its close involvement in environmental issues. For several years Daikin has had the intention to become a leader in the provision of products that have limited impact on the environment. This challenge demands the eco design and development of a wide range of products and an energy management system, resulting in energy conservation and a reduction of waste.

VRV® products are not within the scope of the Eurovent certification programme.

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