Green Innovators of Innovation

Manual

Automatic Meter Reading Systems

Electric Equipment

Automatic Meter Reading System

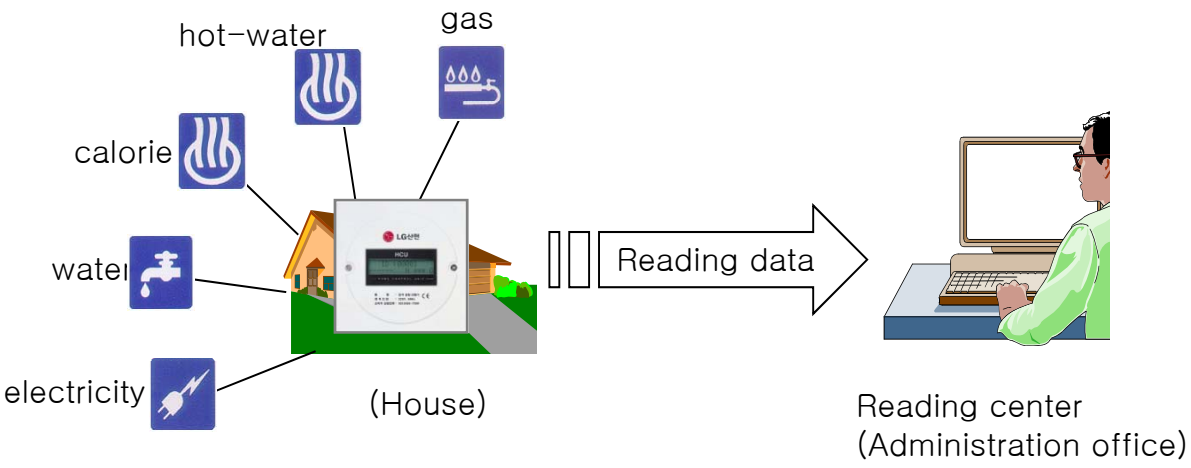
Contents

I. Automatic meter reading system overview

1. Automatic meter reading system overview

1.1 Definition

An advanced system that enables automatic meter reading, convenient searching and printing of data from various meters for electricity, gas, water, hot-water, calorie installed in an apartment house or office from the metering center in the administration office without the meter-reading personnel having to visit each house to take the values.



[Automatic meter reading system overview]

1.2 Communication method

Exclusive line type automatic meter reading system

RS-485 exclusive line is used for communication between HCU or electronic watt-hour meter installed in each house and CCU installed in the reading center.

1.3 Benefit of introduction of the automatic meter reading system

- Creation of new residential culture through introduction of advanced system
- Enhanced housing quality through elegant design of each equipment
- No dispute over wrong reading by reading personnel
- Prevention of crime by fake reading personnel and privacy invention
- Saving of general management expenses through automated reading
- Efficient energy management using automatic meter reading data

2. Use and features

2.1 Use

- Office-tel
- Residential and commercial complex
- Apartment complex
- Stores
- Factory (apartment factory), etc.

2.2 Features

- Connection and reading of 6 different meter types
- Electronic watt-hour meter functions as a HCU
- Extension of communication distance and maintenance of optimal communication status through routing function (No need for a separate router as the product has integrated routing function)
- Provision of various reading information (Daily report, monthly report, usage trend graph, etc.)
- Preservation of data and normal reading operation during blackout
- Elegant and sophisticated design

3. System configuration

● Pulse type meter

- Watt-hour meter, gas meter, water meter, hot-water meter, cooling meter, calorimeter, etc.
- Integrated pulse generator (pulse type instrument)

● HCU

- Receives pulse signal from the meter, saves and displays meter value (sequential display)
- Data transfer (exclusive line) from the CCU

Category	Installation type	Model
Exclusive line type	Exposed type	HCUM-E/HCU-E
	Flush type	HCU-E Te

● Electronic watt-hour meter with integrated automatic meter reading

- Metering of electric power usage (Class 1.0 precision measurement)
- Input and storage of other meter pulse such as gas, water, hot-water, etc.
- Data transfer to the CCU
- Execution of both electronic watt-hour meter and HCU functions

● Central Control Unit (CCU)

· Collects and stores meter reading data from HCU
· Transfers stored data to the meter reading computer (RS-232C)

Category	Installation type	Model
Exclusive line type	Integrated type (Rack installation)	CCU-E2(Rack)
	single unit type	CCU-E2

● Meter reading computer and software

· Meter reading software operation. Management and storage of meter reading data
· Communication with CCU (RS-232)

Ⅱ. Electronic watt-hour meter

1) Electronic watt-hour meter

2) Remote integrated type watt-hour meter

LD1210DR-040/080/120

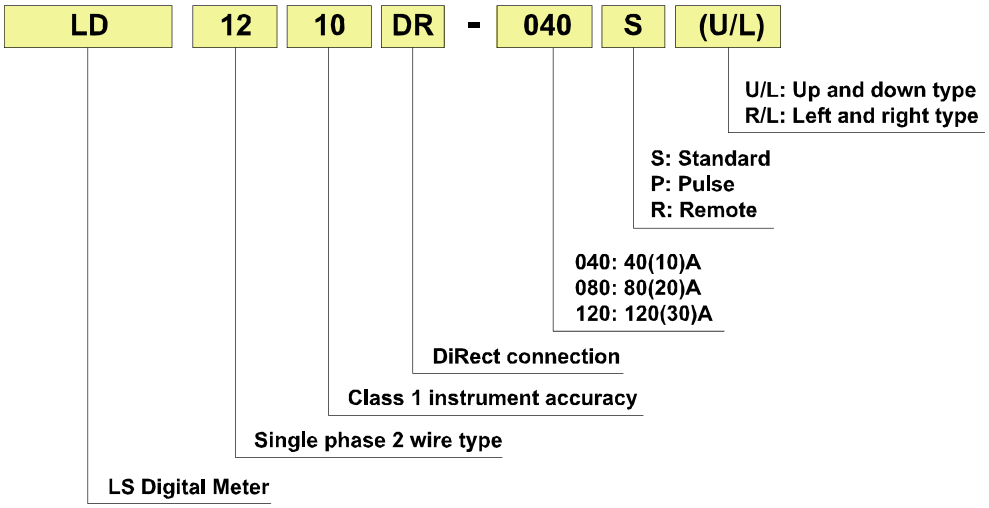
1. Overview

This series of electronic watt-hour meter is able to continuously accumulates effective watt-hour in a very high accuracy and output corresponding proportional pulse. Size has been minimized by type. And, up-and-down and left-and-right types facilitate installation and convenience during use is considered.

2. Rated values and specification

Category	Model		
	LD1210DR-040	LD1210DR-080	LD1210DR-120
Function	Standard (S-TYPE), Pulse (P-TYPE), Remote (R-TYPE)		
Type	Up and down, left and right type (U/L, R/L)		
Phase type	single-phase 2 wire type (single unit)		
Rated voltage	220 V		
Rated current	40(10)A	80(20)A	120(30)A
Instrument class	Class 1.0		
Instrument constant	1000 Pulse/kWh	500 Pulse/kWh	250 Pulse/kWh
Output pulse instrument constant	1000 Pulse/kWh	1000 Pulse/kWh	10 Pulse/kWh
Frequency	60Hz		
Power consumption	Below 2W		
S I Z E	66(W) X 130(H) X 65(D)		
Material	Base unit: Phenol (Black) Cover: Polycarbonate (Opaque)		
Weather resistant structure	Indoor type instrument		
Environment	Operating temperature: -20℃~ 45 ℃, Storage temperature: -20℃~ 70 ℃, Altitude: below 2000 m		

※ **LD1210DR model name**



3. Appearance by type

Figure 1. Up and down type (U/L TYPE)

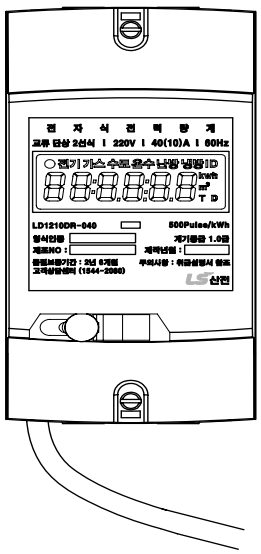
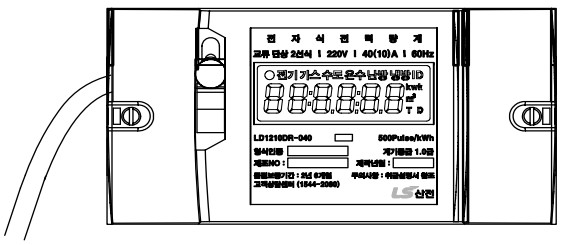
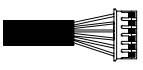


Figure 2. Left and right type (R/L TYPE)

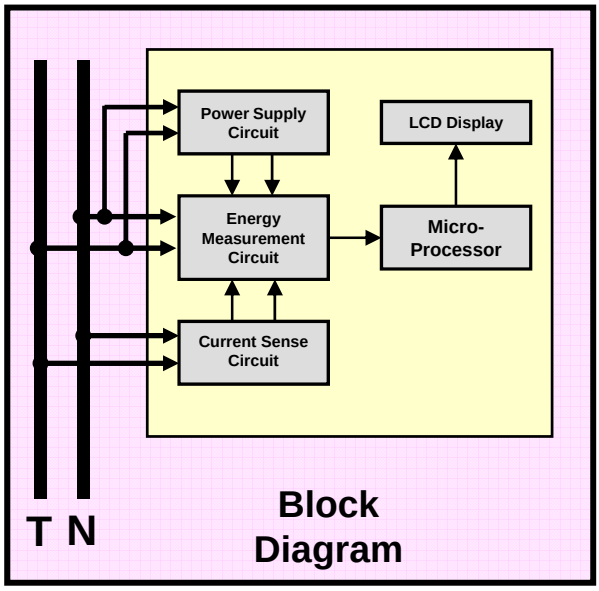


■ Cable type

Standard	Pulse	Remote
N/A		

4. Major function

4.1 Block diagram

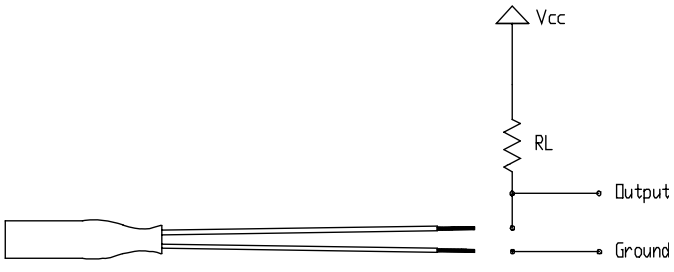


4.2 Circuit configuration

1) Power Supply Circuit
2) Current Sense Circuit
3) Energy Measurement Circuit
4) Micro-Processor
5) LCD Display

4.3 Function description

1) Measurement of effective watt-hour Measured value indicates the effective forward watt-hour, total sum after installation.
2) Display function
   Display of the watt-hour meter consists of LCD and LED.
3) Pulse output function (pulse type)
   Pulse type electronic watt-hour meter has a function to output a pulse that is proportional to the used watt-hour.

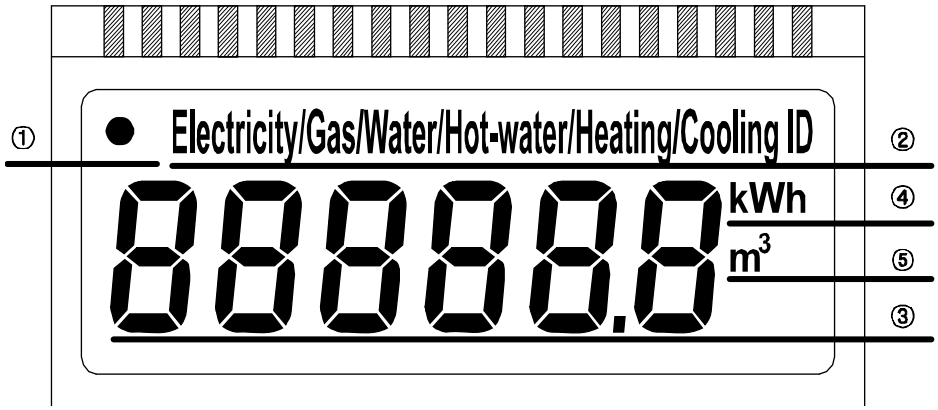


■ Output pulse width: 70 msec
■ Output method : Open Collector
■ Output line specification
White: Wh
Black: Ground
■ Keep Vcc below 30V and Ic below 6mA.

Figure. Pulse output method

5. How to read the display

5.1 LCD display specification



Displays total watt-hour used in 00000.0~99999.9[kWh] range. Accumulated usage displayed on the LCD starts from "0" after reaching the maximum.

5.2 Description of the display

1) Indicates normal operation of the instrument: Flashing varies depending on the load.
2) Indicates the type of the current value: Sequentially scrolls if automatic meter reading system is implemented.(For automatic meter reading)
3) Displays the accumulated watt-hour up to now.
4) Indicates the unit of the displayed item: electricity
5) Indicates the unit of the displayed item: gas, water, hot-water, heating, cooling. (For automatic meter reading)

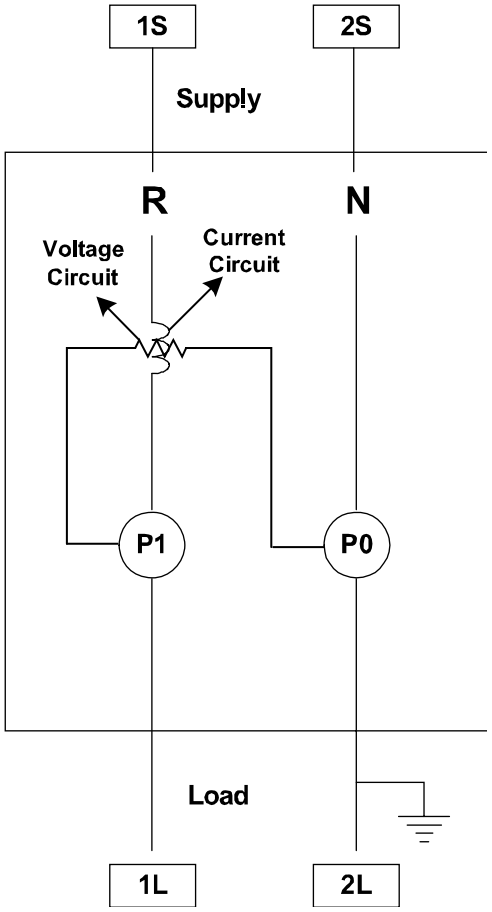
6 Installation guide

6.1 Installation of the product

1) Fix the watt-hour meter in the housing so that the meter cannot move.
2) Strip end of both the power and load cords about 20mm.
3) Loosen terminal screws of the watt-hour meter, put from N phase load side cord into the terminal and then tighten the terminal screws.
4) Repeat the same procedure for the power side cord.
5) Engage the power and check if the display of the watt-hour meter operates normally.
6) Seal off the terminals after installation is finished.

6.2 Wiring of the watt-hour meter

Wiring of the watt-hour meter should be done as shown below.



Warning

1. Wiring should only be performed by personnel with national certification.
2. Carefully check and observe the power system and do the wiring with special attention to the phase type and rated voltage.
   (Wrong wiring may cause damage on the watt-hour meter and human body.)

Caution

Tightening torque of the external wiring bolt is 11~14kgf.㎝ for 40A, 39~49kgf.㎝ for 80A·120A.
(Tightening with excessive may cause wear or damage of the screws.)
Be careful of the bad contact during wiring work.
There is risk of damage and fire due to open power supply and current.

7. Check of contents and storage

7.1 Check of contents

Before installation of the watt-hour meter, check the package according to the list below if there is any discrepancy. For any deviation, contact our headquarter, factory or closest service center.

- ▶ Low voltage electronic watt-hour meter : 1 unit
- ▶ User manual: 1 set
- ▶ Check that the rated value and capacity corresponds to the specification
- ▶ Check if there is any damage on the product during transportation
- ▶ Check if the sealing lead of the watt-hour meter is sealed

7.2 Transportation and storage

Precautions to transportation and storage of the watt-hour meter is as follows.

1) Do not apply large shock during transportation and storage.

(This product is a sensitive electronic product and subject to damage if physical shock is applied to the product. Please, be reminded that we are not responsible for product damage due to vibration or shock during transportation and storage.)

2) Avoid exposure to rain, wind, humidity, harmful gas, chemical substance (volatile substance such as thinner, benzene), excessive vibration, direct sunlight or heater.

3) Handle the product with care in order not to damage or scratch the instrument.

LD3410DR-040/080/120

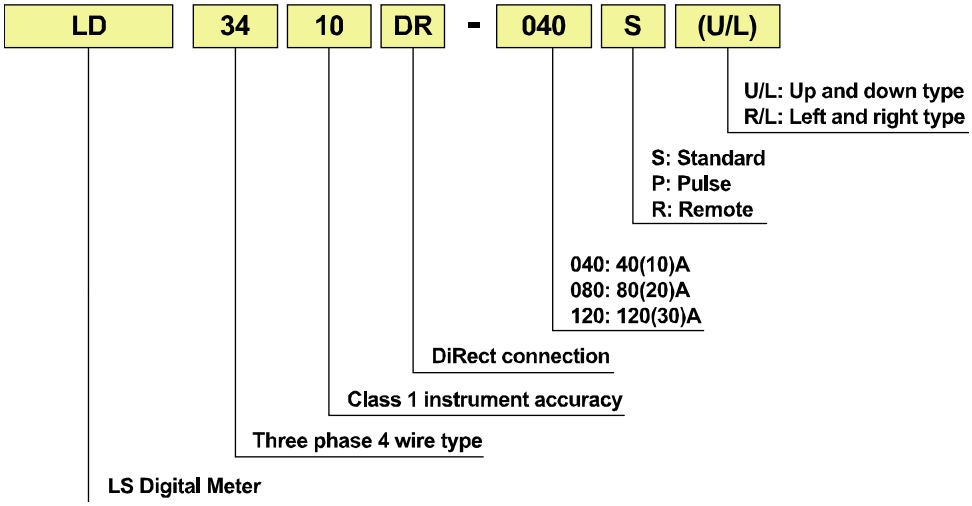
1. Overview

This series of electronic watt-hour meter is able to continuously accumulates effective forward direction watt-hour in a very high accuracy and output corresponding proportional pulse. Size has been minimized by type. And, up-and-down and left-and-right types facilitate installation by environment and convenience during use is considered.

2. Rated values and specification

Category	Model		
	LD3410DR-040	LD3410DR-080	LD3410DR-120
Function	Standard (S-TYPE), Pulse (P-TYPE), Remote (R-TYPE)		
Type	Up and down, left and right type (U/L, R/L)		
Phase type	Three-phase 4 wire type (single unit)		
Rated voltage	220/380 V		
Rated current	40(10)A	80(20)A	120(30)A
Instrument class	Class 1.0		
Instrument constant	500 Pulse/kWh	250 Pulse/kWh	125 Pulse/kWh
Output pulse instrument constant	500 Pulse/kWh	250 Pulse/kWh	125 Pulse/kWh
Frequency	60Hz		
Power consumption	Below 2W		
S I Z E	114(W) X 130(H) X 65(D)		
Material	Base unit: Phenol (black) Cover: Polycarbonate(opaque)		
Weather resistant structure	Indoor type instrument		
Environment	Operating temperature: -20℃~ 45 ℃, Storage temperature: -20℃~ 70 ℃, Altitude: below 2000 m		

※ **LD3410DR model name**



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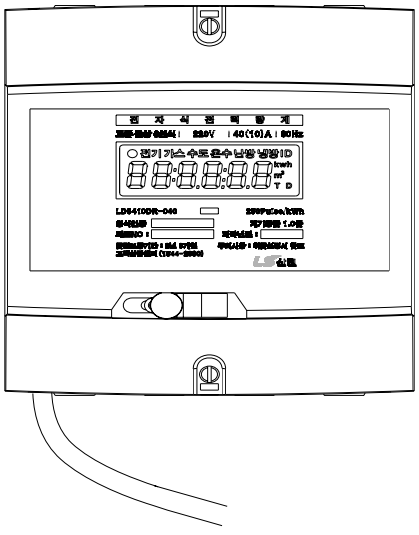
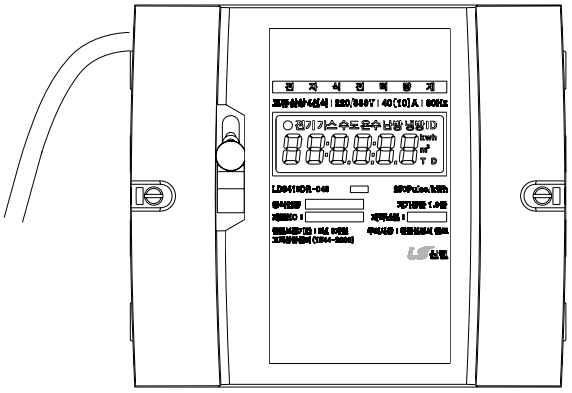
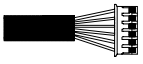


Figure 2. Left and right type (R/L TYPE)

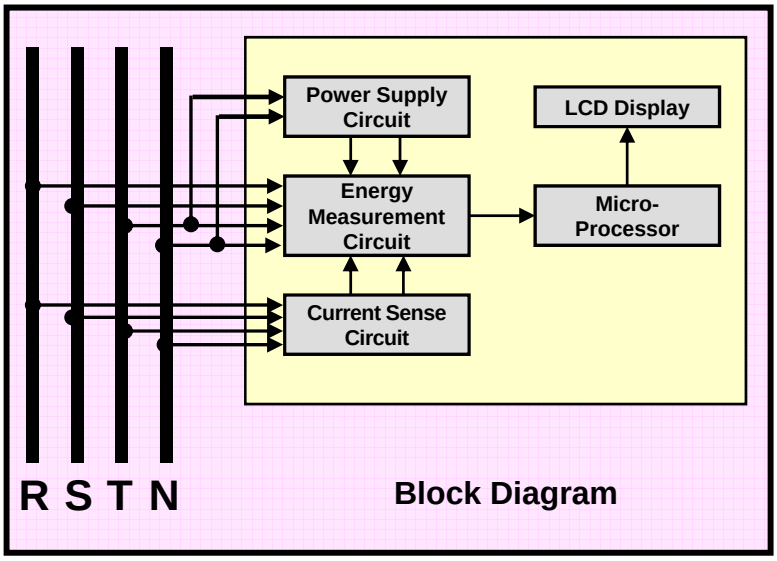


■ Cable type

Standard	Pulse	Remote
N/A		

4. Major function

4.1 Block diagram



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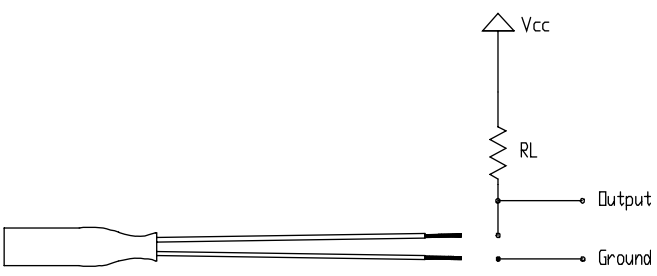

■ Output pulse width: 70 msec
■ Output method : Open Collector
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White: Wh
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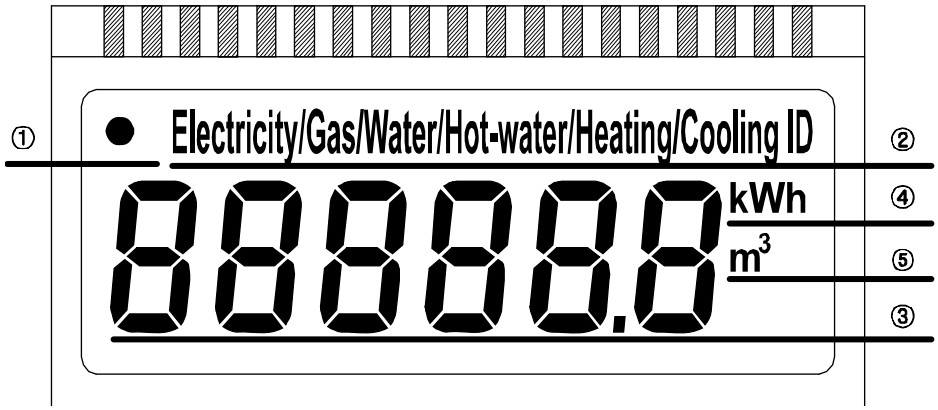
■ Keep Vcc below 30V and Ic below 6mA.

Figure. Pulse output method

5. How to read the display

5.1 LCD display specification



Displays total watt-hour used in 00000.0~99999.9[kWh] range. Accumulated usage displayed on the LCD starts from "0" after reaching the maximum.

5.2 Description of the display

1) Indicates normal operation of the instrument: Flashing varies depending on the load.
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3) Displays the accumulated watt-hour up to now.
4) Indicates the unit of the displayed item: electricity
5) Indicates the unit of the displayed item: gas, water, hot-water, heating, cooling. (For automatic meter reading)

6 Installation guide

6.1 Installation of the product

1) Fix the watt-hour meter in the housing so that the meter cannot move.
2) Strip end of both the power and load cords about 20mm.
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6.2 Wiring of the watt-hour meter

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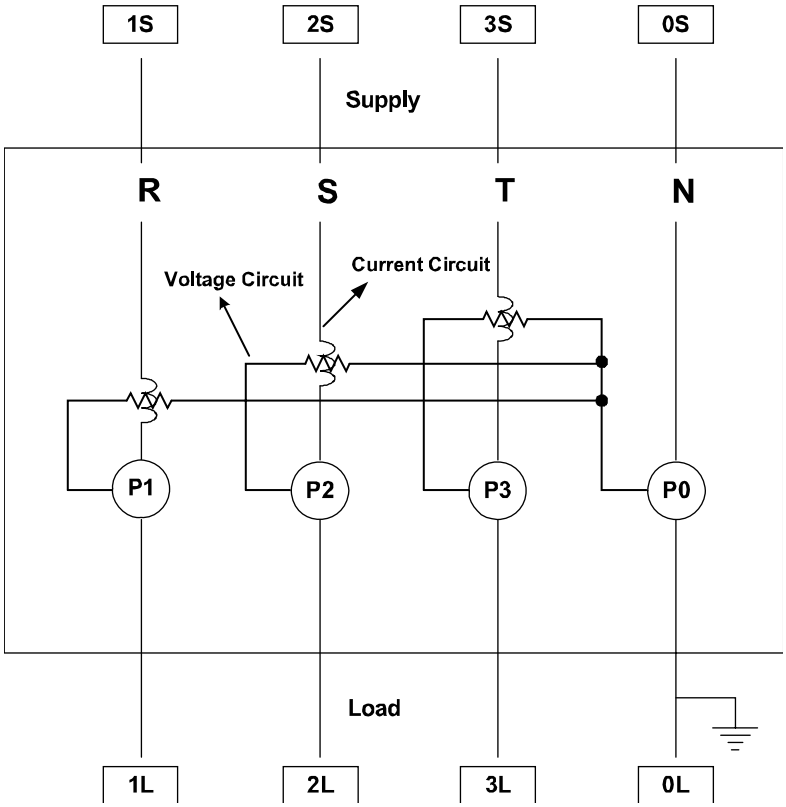


Caution

Tightening torque of the external wiring bolt is 11~14kgf.㎝ for 40A, 39~49kgf.㎝ for 80A·120A.
(Tightening with excessive may cause wear or damage of the screws.)
Be careful of the bad contact during wiring work.
There is risk of damage and fire due to open power supply and current.

Warning

1. Wiring should only be performed by personnel with national certification.
2. During wiring of the watt-hour meter, be careful of the RSTN phase order.
   (Wrong wiring may cause damage on the watt-hour meter and human body.)

7. Check of contents and storage

7.1 Check of contents

Before installation of the watt-hour meter, check the package according to the list below if there is any discrepancy. For any deviation, contact our headquarter, factory or closest service center.

- ▶ Low voltage electronic watt-hour meter : 1 unit
- ▶ User manual: 1 set
- ▶ Check that the rated value and capacity corresponds to the specification
- ▶ Check if there is any damage on the product during transportation
- ▶ Check if the sealing lead of the watt-hour meter is sealed

7.2 Transportation and storage

Precautions to transportation and storage of the watt-hour meter is as follows.

1) Do not apply large shock during transportation and storage.

(This product is a sensitive electronic product and subject to damage if physical shock is applied to the product. Please, be reminded that we are not responsible for product damage due to vibration or shock during transportation and storage.)

2) Avoid exposure to rain, wind, humidity, harmful gas, chemical substance (volatile substance such as thinner, benzene), excessive vibration, direct sunlight or heater.

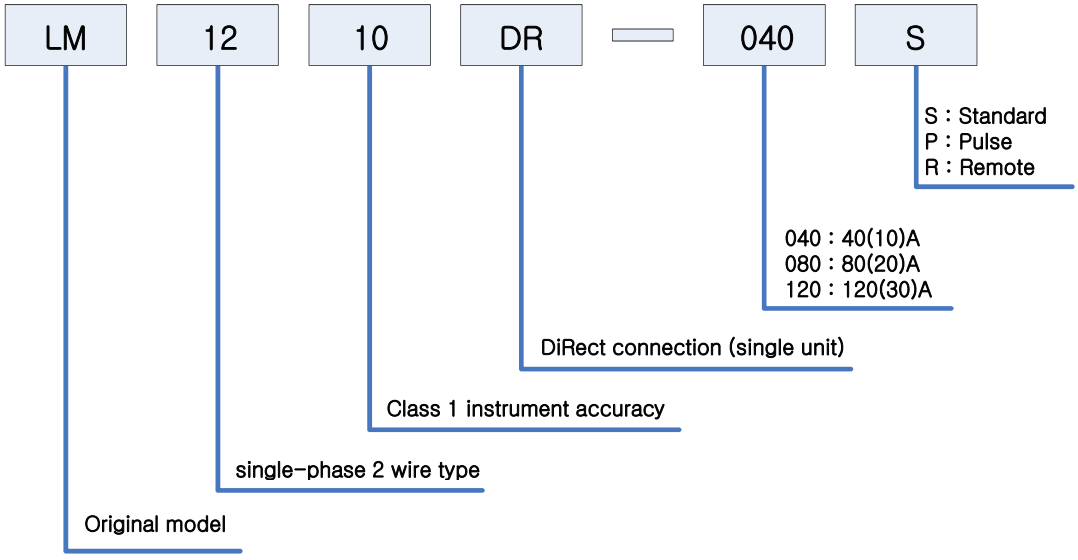
3) Handle the product with care in order not to damage or scratch the instrument.

Watt-hour meter with integrated automatic meter reading (LM1210DR-040/080/120R)

1. Product name

Single-phase electronic watt-hour meter LM1210DR SERIES

1) LM1210DR model name description



2) Types

1) Standard: Meters only the pure electricity watt-hour value (effective).
2) Pulse: Meters and outputs pulse of only the pure electricity watt-hour value (effective).
3) Remote: Meters the pure electricity watt-hour value and 5 different (gas, water, hot-water, cooling, heating) information and transfers the information to CCU through communication line (exclusive line).

2. Items to check before use

Checklist before use

1) Check that the product specification agrees with the one you ordered.
2) Check for any components that came off or damaged by accident during transportation.
3) Check that the watt-hour meter is sealed with sealing lead.

3. Rated values

Category	Model		
	LM1210DR-040	LM1210DR-080	LM1210DR-120
Function	Standard (S-TYPE), Pulse (P-TYPE), Remote (R-TYPE)		
Type	Bottom connection type		
Phase type	Single-phase 2 wire type (single unit)		
Rated voltage	220 V		
Rated current	40A	80A	120A
Instrument class	Class 1.0		
Instrument constant	1000 Pulse/kWh	500 Pulse/kWh	250 Pulse/kWh
Output pulse instrument constant	1000 Pulse/kWh	500 Pulse/kWh	250 Pulse/kWh
Frequency	60Hz		
Power consumption	Below 2W		
S I Z E	108(W) X 140(H) X 60(D)		
Material	Base unit: Polycarbonate (strong grey) Cover: Polycarbonate(white)		
Weather resistant structure	Indoor type instrument		

4. Precaution

Warning

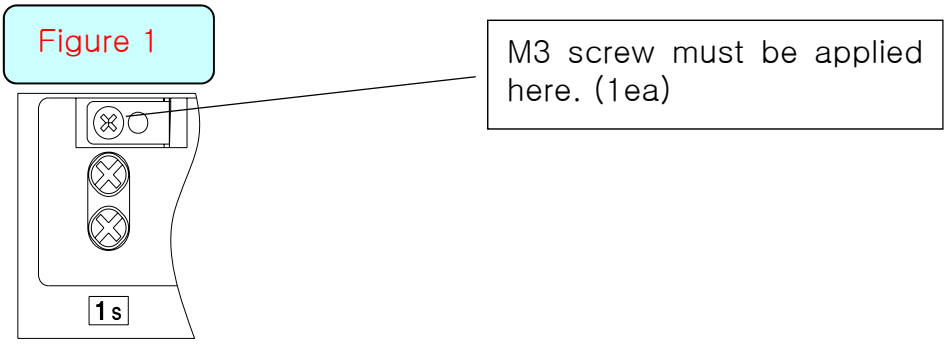
1) Make sure to turn off the power before installation of the meter.
   - Cut off the main switch (single-phase220V or 3 phase power switch).
2) Also, check the power before installation of the meter.
   - Make sure to check the power as the meter is designed for AC 220V and the meter may malfunction or may be damaged in the electronic device.
   - Especially, when engaging three phase power, line voltage(R-S, S-T, T-R) is 380V and it is mandatory to check the power status.
3) Power source side (1S, 2S) needs to be connected first and then load side (2L, 1L) needs to be connected.
4) Location to be installed should be free from rain, wind, humidity, dust, vibration, shock and direct sunlight. The meter should be installed in vertically and horizontally up-right position.

5) Installation height should be about 1.8m from the floor so that values could easily be recognized.
6) Avoid usage at a location that can be flooded as malfunction or electrification may result.
7) Avoid a confined space with direct sunlight.
8) The surface of the watt-hour meter must be kept away from volatile substances such as thinner, benzene, etc.
9) For safety of the installation engineer, never attempt any service when the product is on live wire.

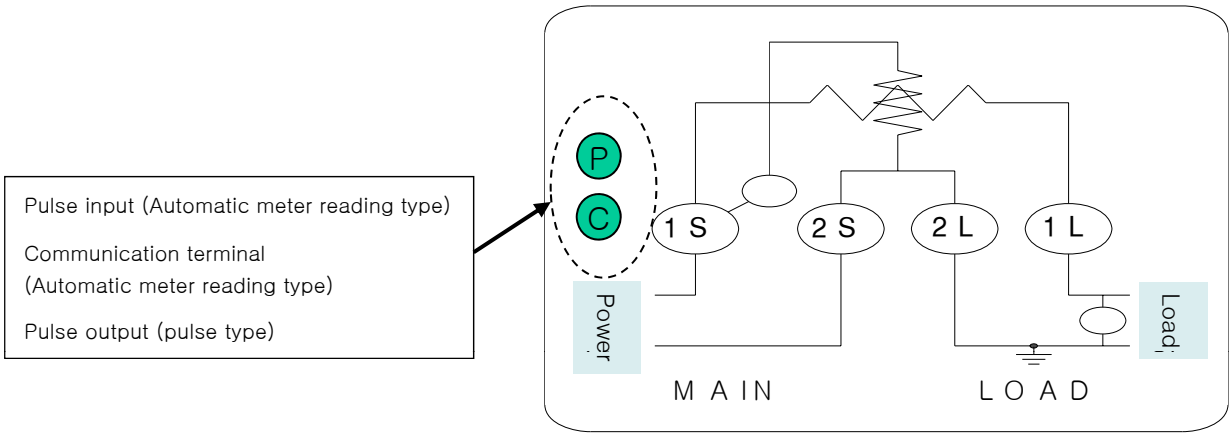
5. Connection procedure

1) Check for the screws inside the terminal block. (Refer to Figure 1)
2) Turn of the power and make the wiring.
3) Perform the wiring from the power source side to the load side according to the connection diagram.
4) Remove the wire coating about 23mm, and seal off the dedicated protection cover (terminal cover) when the connection is over.

Figure 1



6. Connection diagram



1) CABLE wiring method

① Automatic meter reading type (exclusive line)

- Pulse input line (total 6 lines)

WIRE color	meter type
Blue	gas
Black	water
Yellow	hot-water
Green	heating
Red	cooling
White	COMMON

- Communication line (total 4 lines)

WIRE color	wiring type
Green	CCU (+)
Red	CCU (-)
White	ROUTER (+)
Black	ROUTER (-)

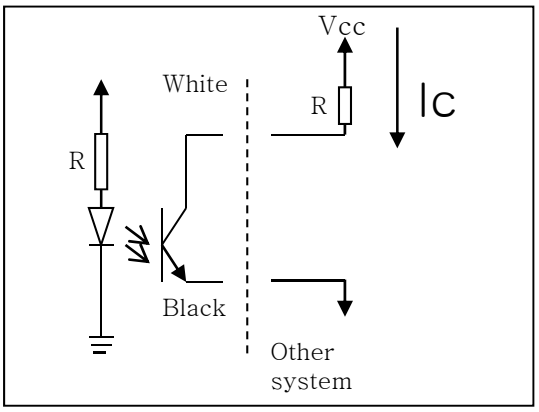
② Pulse type (total 2 lines)

WIRE color	wiring type
White	(+) polarity
Black	(-) polarity

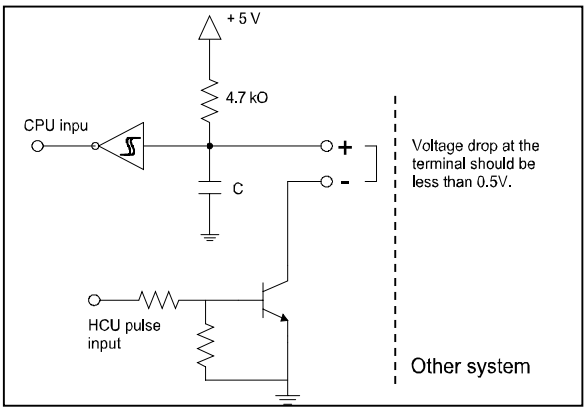
※ Pay attention to the WIRE color and polarity.

2) Connection with other system

▶ Pulse type: pulse output part



▶ Remote integrated type: pulse input part



■ Output pulse width: 70 msec

■ Output method: Open collector

■ Output line specification

White: Watt Hour Signal

Black: GND

■ Conditions to meet: Vcc < 30V, Ic < 6mA

7. Installation procedure

7.1 Installation of the product

1) Fix the watt-hour meter in the housing so that the meter cannot move.

2) Strip end of both the power and load cords about 20mm.

3) Loosen terminal screws of the watt-hour meter, put from N phase load side cord into the terminal and then tighten the terminal screws.

4) Repeat the same procedure for the power side cord.

5) Engage the power and check if the display of the watt-hour meter operates normally.

8. Function and operation

1) Communication function

In case of automatic meter reading type, LM1210DR SERIES electronic watt-hour meter adopts the routing function which enables simultaneous connection to multiple watt-hour meters. Routing function makes it possible to save communication wiring from the CCU, and therefore saves installation cost and facilitates the installation process. Plus, this provides additional benefit of higher chance of successful communication through intensified communication protocol.

2) Instrument setting function

In case of automatic meter reading type, LM1210DR SERIES electronic watt-hour meter provides various instrument setting function to include communication ID setting, routing function setting, communication speed setting, pulse constant and pulse width setting of 5 different meter types, decimal point, etc. This is made possible by Handy Loader, an instrument setting device provided by our company. Using this loader, the system user can change settings depending on various situations.

▶ Example of instrument setting

① Parameter(instrument constant) setting

Setting parameter (other items such as instrument constant, etc.) can be changed using the handy-loader while referring to the example below.(See HANDY-LOADER user manual to learn how to use the loader.)

☞ e.g.) If pulse specification of:

electricity meter is 1000Pulse/1kWh, set the instrument constant to 1000.

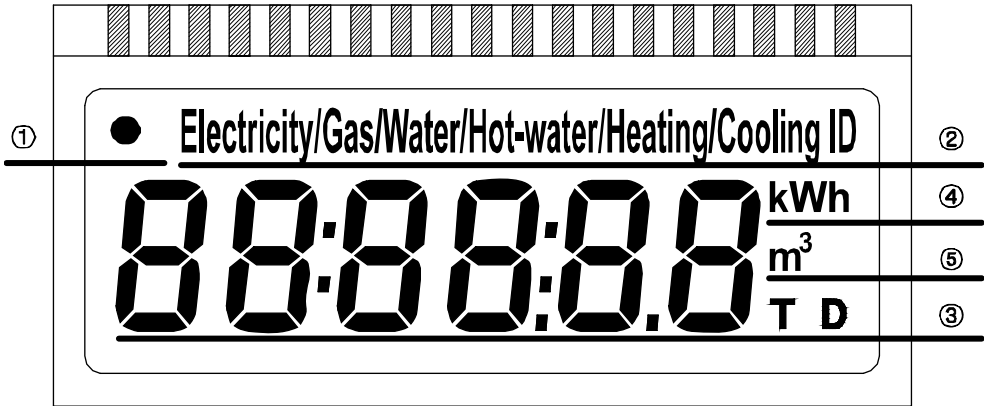
gas meter is 1Pulse/10ℓ, set the instrument constant to 100.

water meter is 1Pulse/100ℓ, set the instrument constant to 10.

calorimeter is 1Pulse/1kWh, set the instrument constant to 1.

② Initial value must be entered after setting of the parameter (instrument constant or decimal places).

3) LCD display specification



Displays total watt-hour used in 00000.0~99999.9[kWh] range.

Accumulated usage displayed on the LCD starts from “0” after reaching the maximum.

▶ Description of the display

1) Indicates normal operation of the instrument: Flashing varies depending on the load.
2) Indicates the type of the current value: Sequentially scrolls if automatic meter reading system is implemented.
(For automatic meter reading)
3) Displays the accumulated watt-hour up to now.
4) Indicates the unit of the displayed item: electricity
5) Indicates the unit of the displayed item: gas, water, hot-water, heating, cooling. (For automatic meter reading)

9. Cable specification

Rated current	Cables used (Number of wires / Diameter of wire)	
	Minimum	Maximum
40A	Dia. 2.0mm	14mm^2
80A	Dia. 8.0mm(7/1.2)	38mm^2 (7/2.6)
120A	Dia. 14.0mm(7/1.6)	60mm^2(19/2.0)

10. Year and month manufactured

Marked on the name plate

11. Warranty period

2.5 years from the manufacturing date

III. Home Control Unit (HCU)

1) Single unit type HCU

2) Module type HCU

Single unit type HCU (HCU-E)

1. Overview

The HCU takes measurements from the pulse meter(electricity, gas, water, calorimeter, etc.) installed at homes and offices and displays on the LCD, transfers measured values to the CCU through the exclusive line according to the command of the exclusive line CCU. When working as a router, the HCU transfers the commands from the exclusive line CCU to the exclusive line HCU through exclusive RS-485 line in RS-485 communication method.

2. Feature and function

1) Receiving and saving of pulse signal from the meter
2) Data transfer to the CCU (exclusive line)
3) DATA display
4) Meter connection : Connection with max. 6 meter units
5) DATA routing: Receives the remote HCU data and transfers the data to the CCU
6) Blackout compensation: Preserves the saved data and normal meter reading is possible in case of blackout (72 hours)

3. Precautions to installation and operation

3-1 Items to check before connection of the power

1) Check that the operating voltage is the rated voltage of AC220V.
2) Commercial frequency is 60Hz.
3) Check wiring status of the meter pulse cables at the pulse input ports.
4) Input of pulse cable and communication line is explained in detail in the user manual. Please, read it carefully and perform the wiring for the pulse and communication lines.
5) Power of the unit must be turned off during installation and check.
   → Failure to do so may cause fatal injury or fatality.
6) Check the connection between the power terminal and the power cable.

3-2 Check list before communication test

1) Check the connection of pulse cable, communication cable and terminals before the test run.

2) Terminal ID, communication speed, pulse spec, meter spec, meter value need to be configured in the HCU which can be done through Handy Loader-2000. Refer to the user manual for the handy loader for details of the configuration.

3) Check the display to see if the corresponding ID, “e.g.) 10001” is displayed.

4) Check that the entered meter data are the same with the data scrolled on the display. → Difference may cause issues during settlement of the charge.

5) Check on the display is scrolling is being performed normally.

6) Only trained personnel should perform the communication test and HCU configuration.

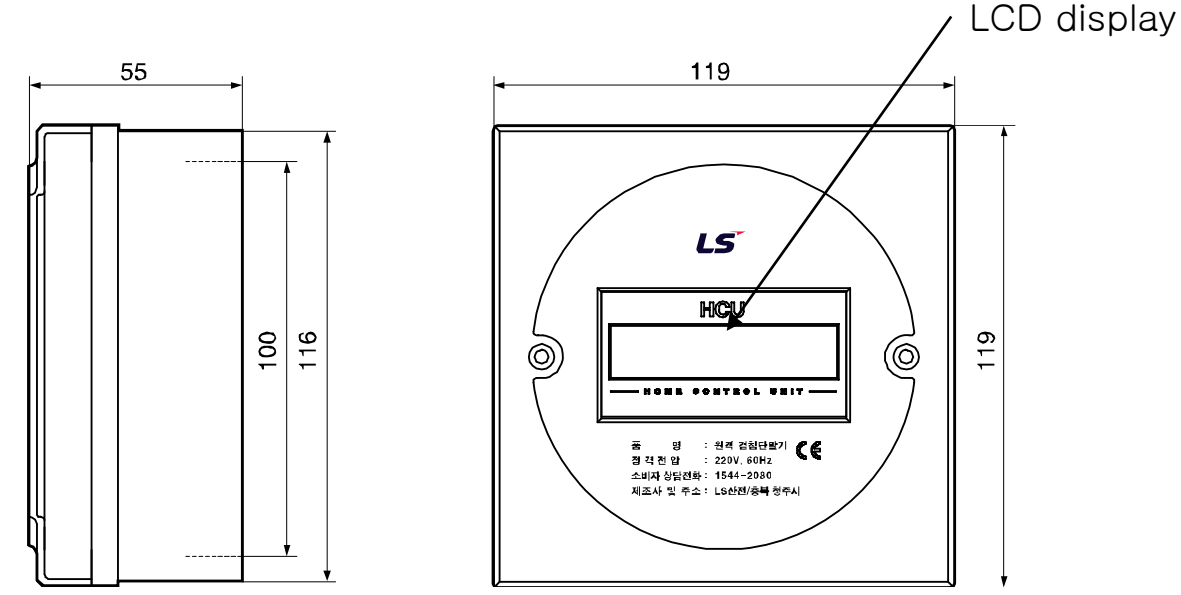
3-3 Precautions to storage and handling

1) Store the product in a dry and dust-free storage.

2) Do not throw or apply too much force during transportation.

4. Appearance and configuration

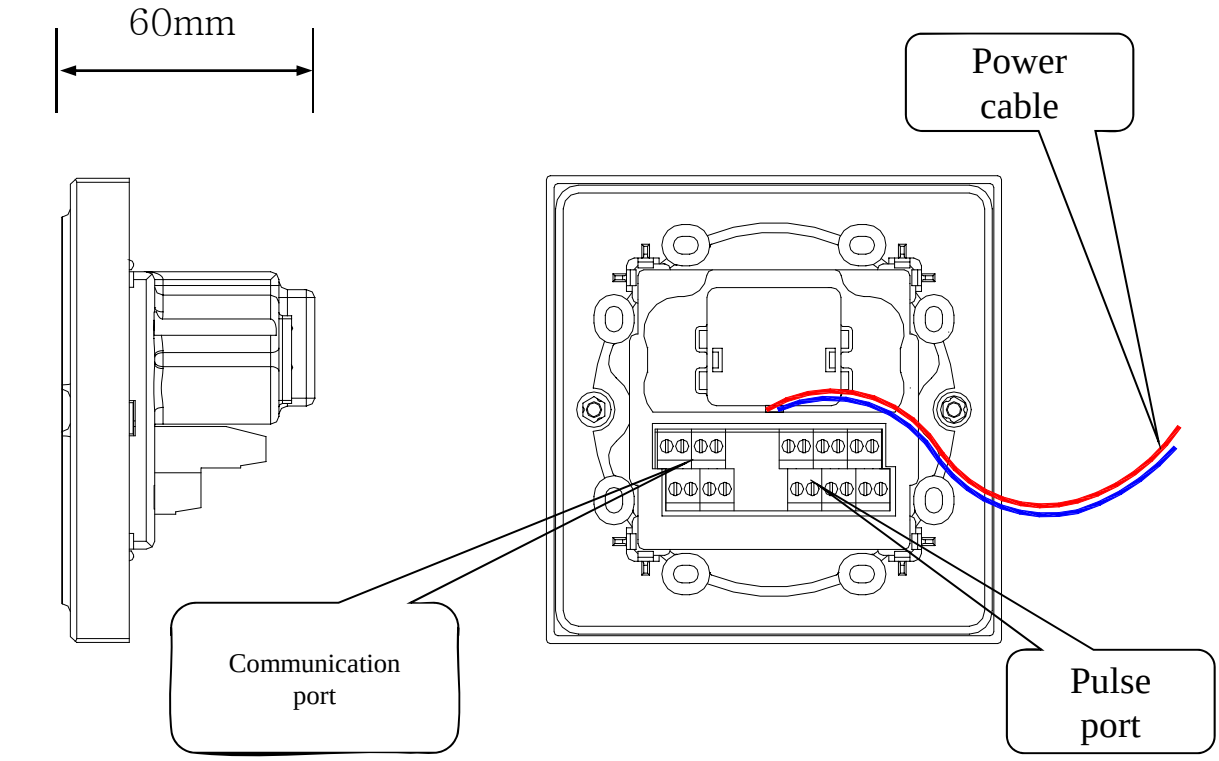
4-1 Appearance and configuration of the HCU-E

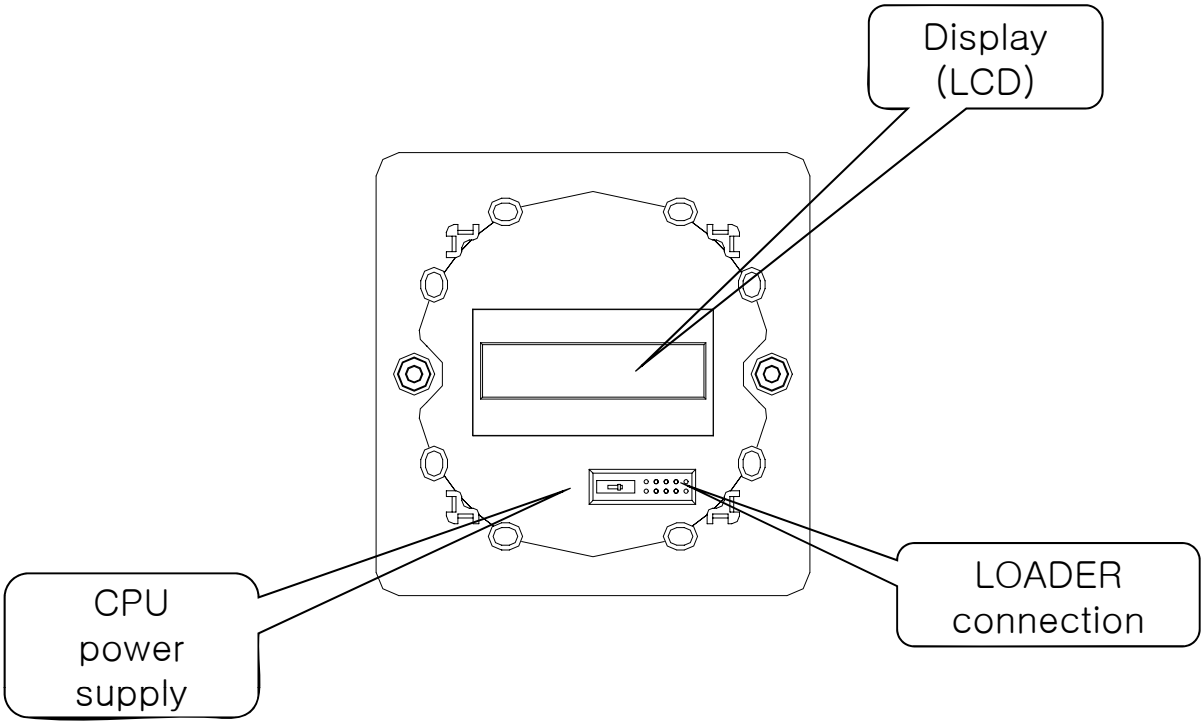


Side view (exposed type)

Front view (Both flush type and exposed type)

4-2 Configuration and appearance of the HCU-ETe





< EXTERNAL COVER REMOVED>

5. Rated value and specification

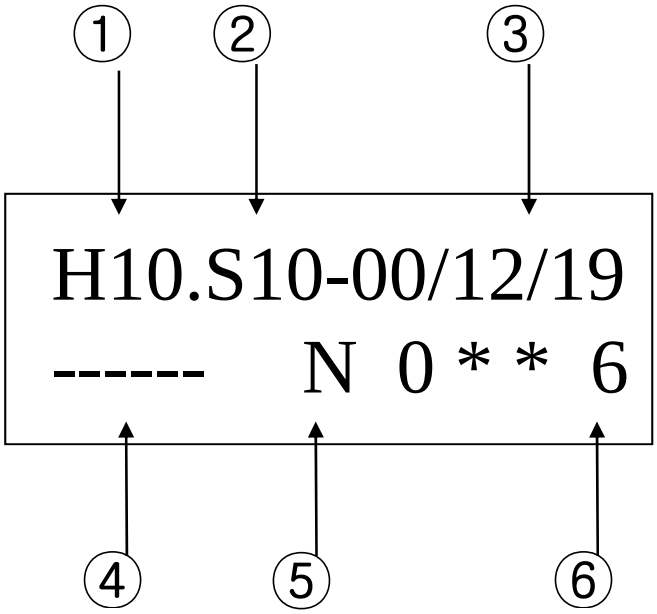
5-1 General specification

Category			Specification	Remark
Communication specification	Serial Communication	Communication speed	38400 bps	Loader Interface
		Communication method	Semi-biasynchronous	
		Transport code	ASCII	
	Exclusive line Communication	Communication speed	1200~38400 bps, variable	
		Communication method	RS-485	
		Communication cable	Shielded 22AWG 1Pair	
Connection	Type of meter		9 types (electricity, gas, water, hot-water, calorie, cooling, heating flow, cooling flow, etc.)	
	No. of connected meters		Maximum 6	
	Meter pulse		Dry contact / Open Collector	
Display (LCD) specification	LCD module spec		16 characters × 2 rows	
	Size		64 × 14 mm	
	Display data		Manufacturing date, HW/SW version, ID, meter type, usage, etc.	
Power source	Input power		AC 220V(±10%)/60Hz	
	Operation power		+ 5 V	
Current consumption			4.2 mA	
Data storage and metering during blackout			72 hours	

5-2 LCD display specification

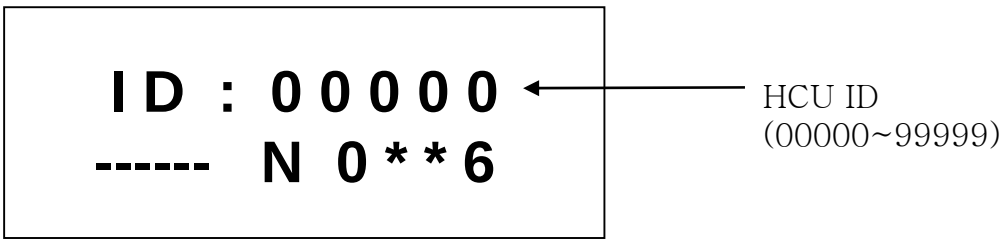
LCD SCROLL interval is 3sec and displayed specification is as follows.

1) Initial screen upon POWER ON (Reset)



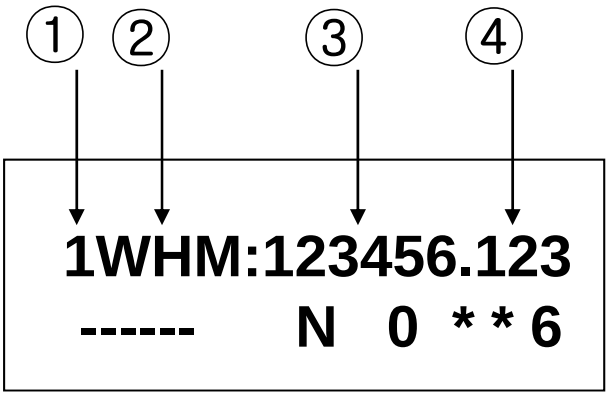
Catego	Display		Description	Remark
①	HW Version	H10	HW Version 1.0	
②	SW Version	S10	SW Version 1.0	
③	Manufactured date	2000-12-19	Manufactured on 19 Dec 2000	
④	Pulse recognition status	1 _ _ _ _ _	Pulse recognized at port 1	
		1 2 _ _ _ _ _	Pulse recognized at port 1 and 2	
		1 2 3 4 _ _ _	Pulse recognized at port 1, 2, 3 and 4	
		1 2 3 4 5 6	Pulse recognized at port 1, 2, 3, 4, 5 and 6	
⑤	HCU status	N	Normal	
		H	Loader connected	
		R	Router operation	
⑥	Communication speed	*	N/A	
		1	1200 bps	
		2	2400 bps	
		3	4800 bps	
		4	9600 bps	
		5	19200 bps	
		6	38400 bps	

2) ID display screen



- ID may be in 00000~99999 range.

3) Display of meter and usage



Category	Display		Description	Remark
①	PORT	1~6	PORT Number	Scrolls only the port in
②	Meter	WHM	Watt-hour meter	Unit: KWh
		GAS	Gas meter	Unit: m3
		WTR	Water meter	Unit: m3
		HOT	Hot-water meter	Unit: m3
		HEAT	Calorie meter	Unit: MWh
		COOL	Cooling meter	Unit: MWh
		HEAT	Heating flow meter	Unit: m3
		COOL	Cooling flow meter	Unit: m3
		ETC	Other	Unit: N/A
③	Integer part of the		Display up to 4~6 digits	
④	Fraction part of the reading and Unit *		Display up to 3 digits below decimal point. Returns to unit after certain time.	

* Fraction part of the reading. When inputting with loader, unit of the pulse specification becomes the fraction part.

e.g.) You can input as follows:

Pulse specification of the electricity meter:

1Pulse/1kWh → Fraction part: 0

Pulse specification of the gas meter: 1pulse/10 ℓ → Fraction part : 2

Pulse specification of the water meter: 1Pulse/100ℓ → Fraction part : 1

Pulse specification of the calorimeter: 1Pulse/1kWh → Fraction part : 0

5-3 Pulse recognition specification

NO.	Category	Performance
1	Pulse recognition time	- Higher than 10 msec
2	Distance between the terminal and the meter	- Less than 50 m
3	Connectable meter type	- Electricity, gas, water, hot-water, calorie, cooling, heating flow rate, cooling flow rate (total 9 types)
4	Maximum number of meters that can be connected	- 6 units
5	Pulse cable specification	- Shelded 22AWG less than 1 Ohm/m (In case of DC)

* Recommended pulse cable specification

- LIREV-AMESB 22AWG 1P

Note) Among pulse ports, ground terminal of port 1, 2 & 3 and ground of terminal 4, 5 & 6, maximum three can be used when using facility meters with common ground. Do the wiring for 1, 2 & 3 or 4, 5 & 6.

(When both 1, 2 & 3 and 4, 5 & 6 are used together pulse recognition will fail.)

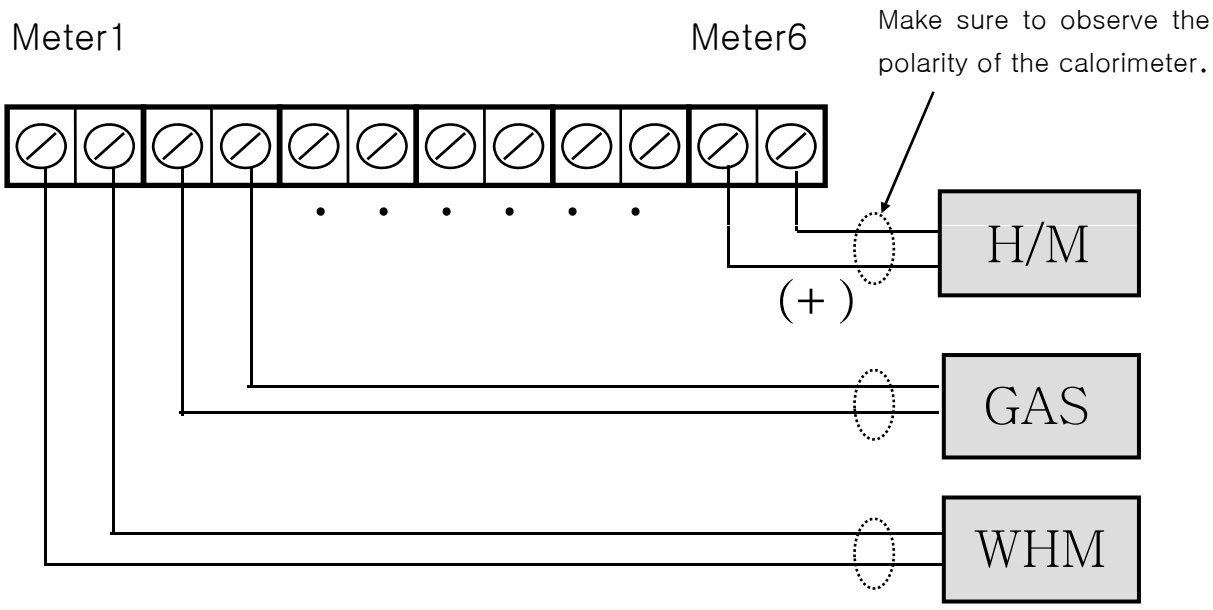
6. Pulse cable wiring method

6-1. wiring method

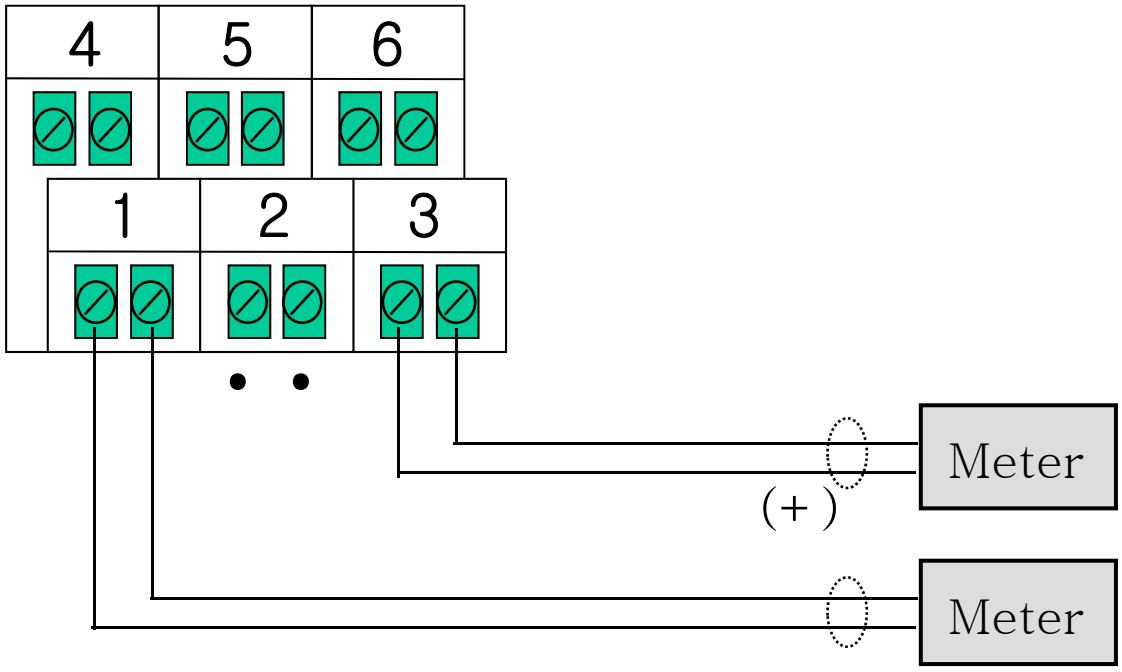
1) When connecting the pulse cable to the port, make sure to check the pulse cable of the used meter and connect to the corresponding port.

2) Among meters, calorimeter is polarity sensitive. Therefore, pay attention and do the wiring as seen in the figure below.
3) Communication cable and pulse cable must be contained in different piping.
4) Check connection status between pulse cable and port.

6-2. HCU-E wiring diagram



6-3. HCU-ETe wiring diagram



7. Communication specification

7-1 Communication method : RS-485

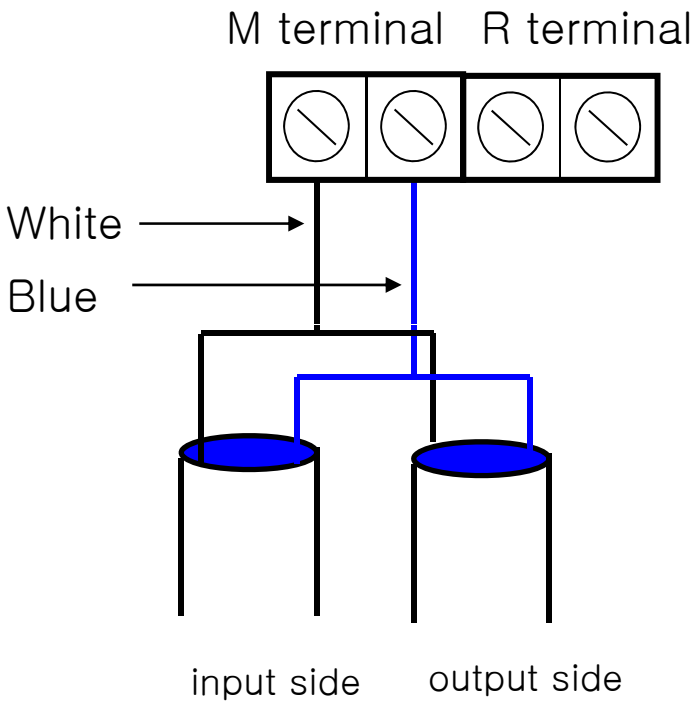
1) Communication speed : 1200bps ~ 38400bps, variable
2) Communication distance : 1.2km (Maximum extension of 13.2km when using router)
3) Connection method : 2 Wire Multi – drop

7-2 Wiring method

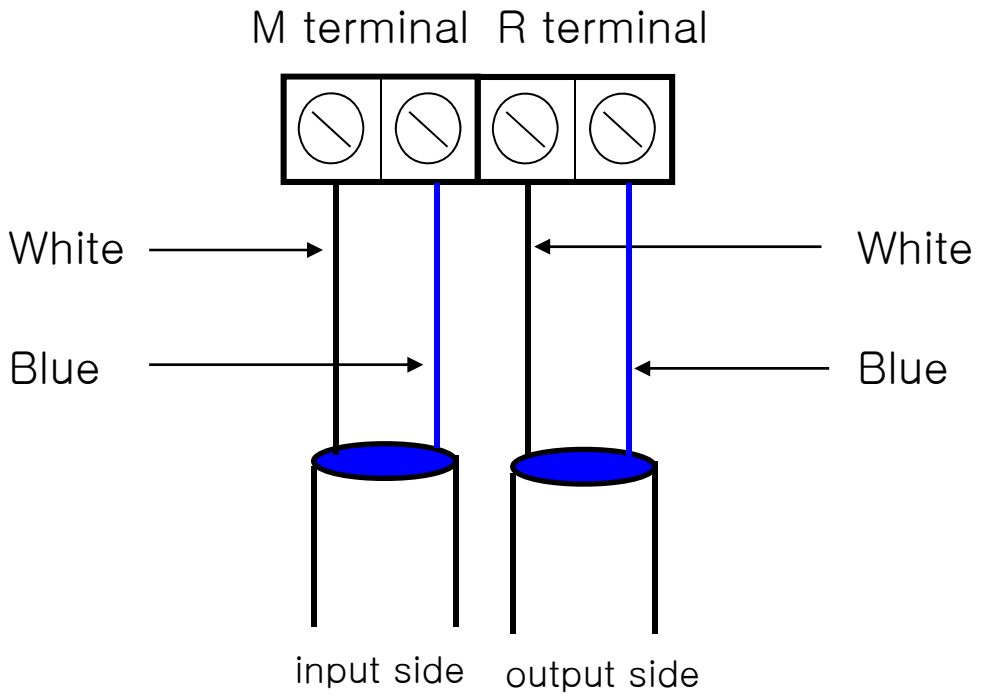
1) Shielded Twisted Pair Cable must be used. Mutual capacitance of the signal cable should be less than 50 PF/m. Line impedance should be less than 120 ohms.
2) Recommended cable: LIREV-AMESB 22 AWG 1P

7-3 Exclusive line communication cable wiring diagram (exposed type)

1) Typical wiring diagram of exclusive line exposed type HCU communication cable

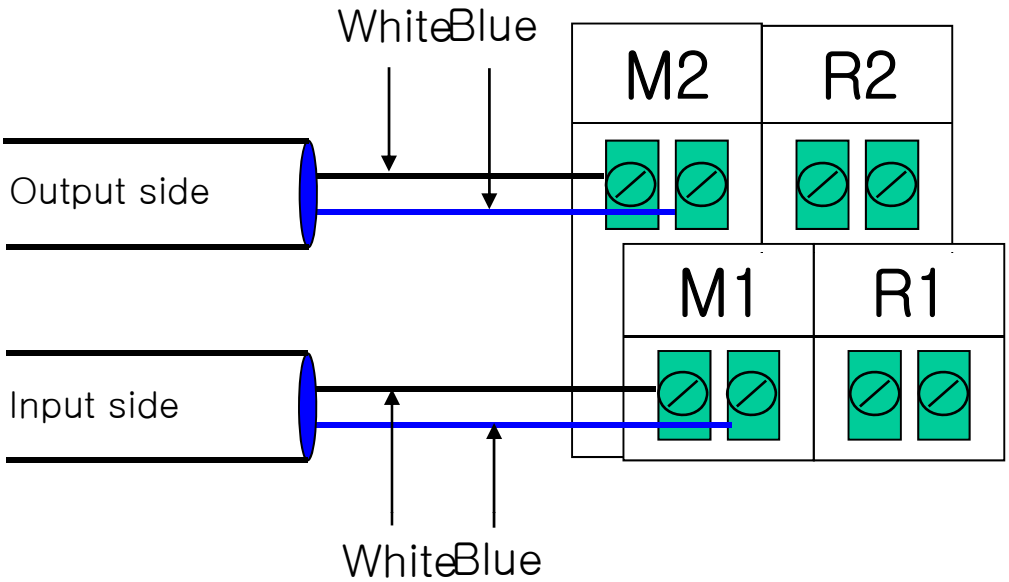


2) Wiring diagram of exclusive line exposed type HCU communication cable for router

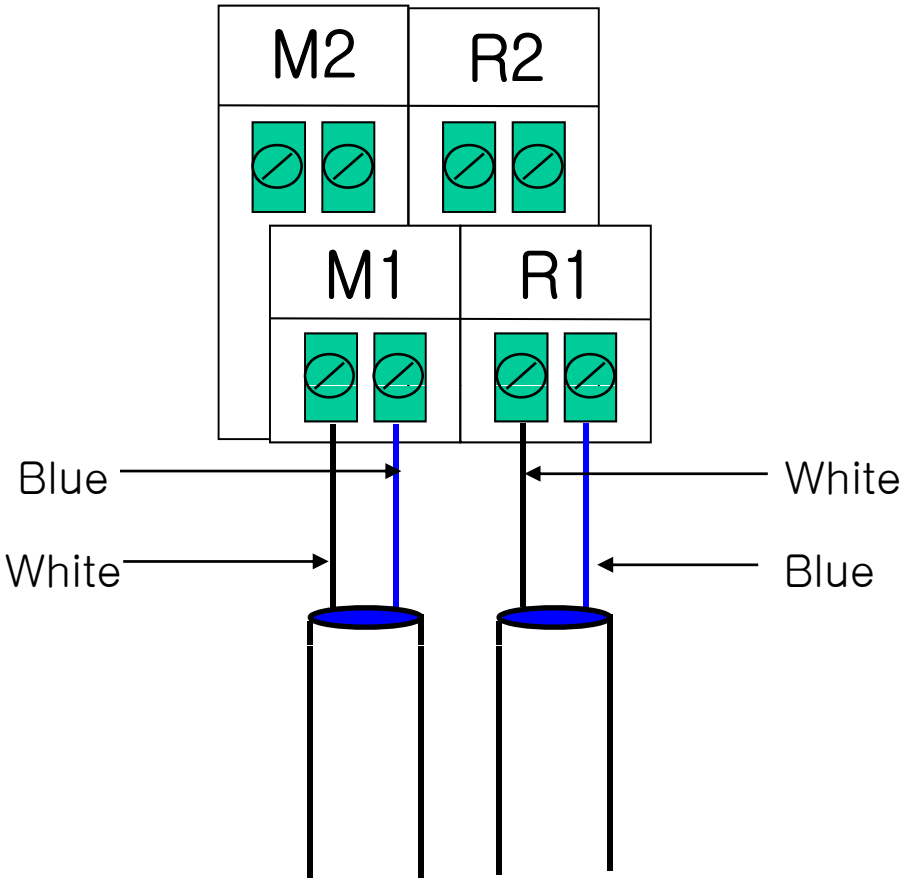


7-4 Exclusive line communication cable wiring diagram (flush type)

1) Typical wiring diagram of exclusive line flushed type HCU communication cable



2) Wiring diagram of exclusive line flushed type HCU communication cable for router



Module type HCU (HCUM-E)

1. Overview

The HCU takes measurements from the pulse meter(electricity, gas, water, hot-water, calorimeter, etc.) installed at homes and offices, saves the values and displays on the LCD of the watt-hour meter, transfers measured values to the CCU through RS-485 communication method.

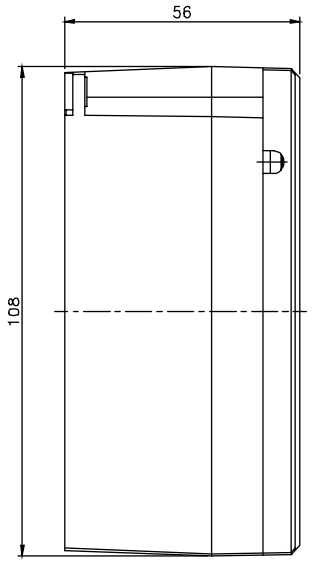
2. Rated value and specification

Category	specification	
Model name	HCUM-E(NEW)	Standard type
	HCUM-E(ROUTER)	Routing function included
Communication method	RS-485 method	
Communication speed	1200bps~38400bps	
Rated voltage	AC220V	
Source power frequency	60Hz	
Power consumption	3W	

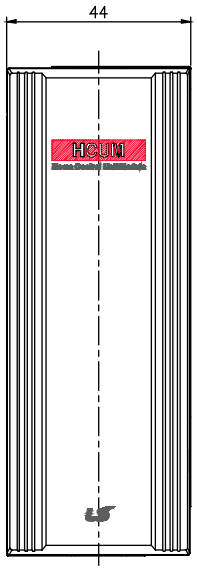
3. Feature and function

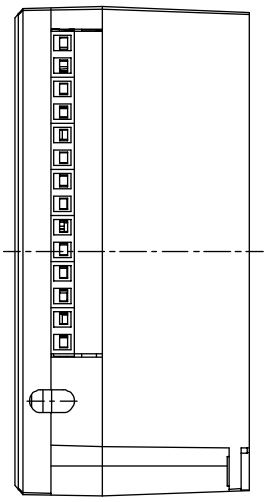
1) Receiving and saving of pulse signal from the facility meter
2) Data transfer to the CCU (exclusive line communication method)
3) Meter connection : Connection with max. 5 meter units
4) Blackout compensation: Preserves the saved data in case of blackout
   Compensation hours: 72 hours
   [Use condition: 1PULSE/min after full battery charge]
5) communication specification: communication method (RS-485 method)
   communication distance (Maximum extension 1.2 km)
6) DATA routing function[HCUM-E(ROUTER) only] : Receives the remote HCUM data and transfers the data to the CCU

4. Appearance and configuration

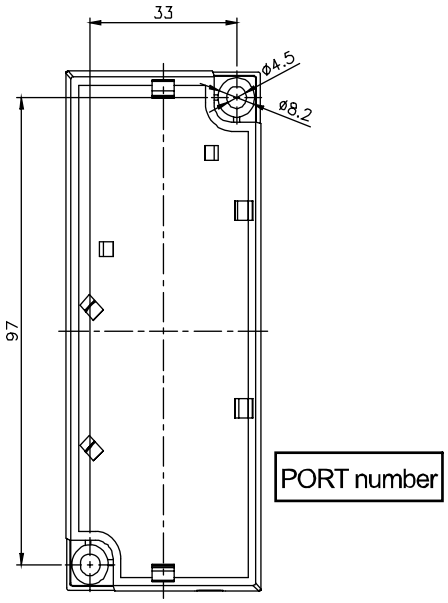


<Left side>

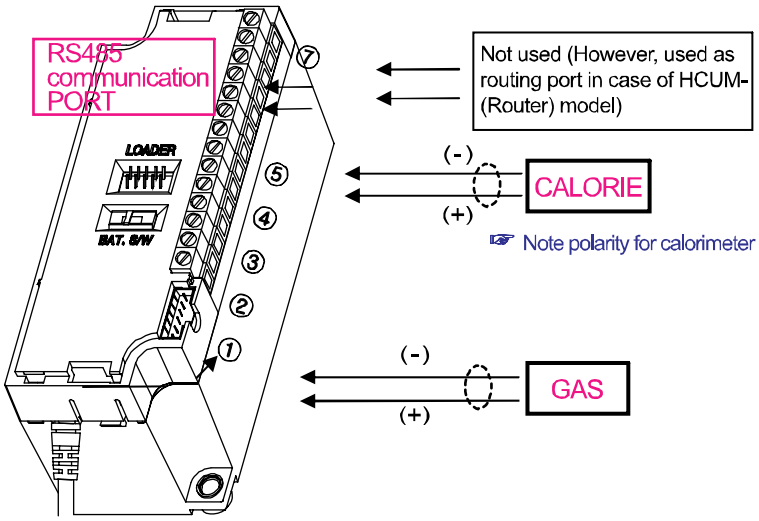




<Right side>

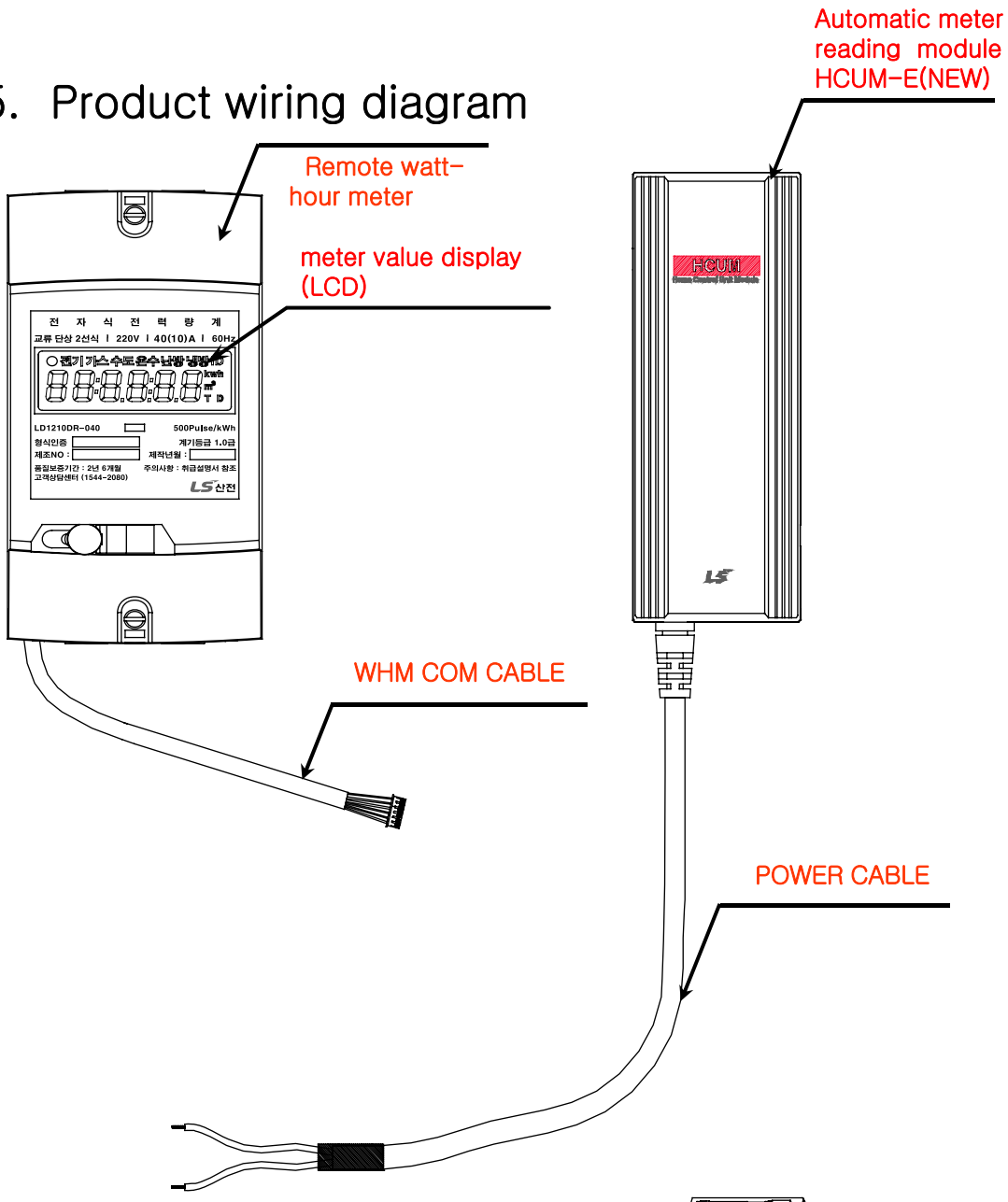


<Mounting drawing>

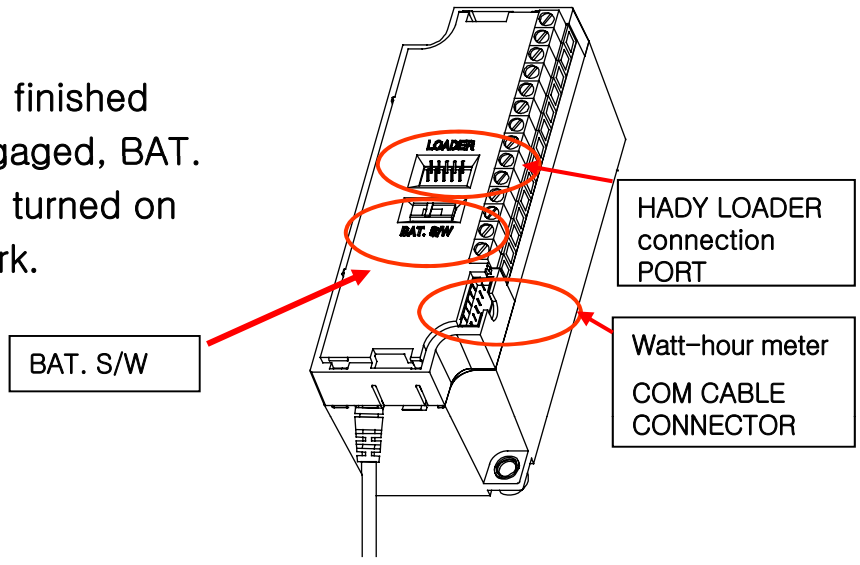


<PULSE and communication PORT wiring diagram>

5. Product wiring diagram



♣ After wiring is finished and power is engaged, BAT. S/W needs to be turned on to show " · " mark.



6. Pulse recognition specification

NO	Category	Performance
1	Pulse recognition time	Longer than 10 msec (ON Time basis)
2	Distance between terminal and meter	Defined to be less than 50M (May cause pulse recognition failure if exceeded)
3	Connectable meter type	Electricity, gas, water, hot-water, calorie, cooling, heating, flow rate, other (Total 9 types)
4	Maximum number of meters	Total 5 units
5	Pulse and communication CABLE specification	Shielded CABLE

♣ Recommended pulse cable specification

- LIREV-AMESB 22AWG 1P (LS cable)

Note) Among pulse ports, ground terminal of port 1, 2 & 3 and ground of terminal 4 & 5, maximum three can be used when using facility meters with common ground. Do the wiring for 1, 2 & 3 or 4 & 5.

(Using common GND may cause pulse recognition failure.)

Note) Communication cables need to be shielded.

(Noise source may affect communication of the automatic meter reading.)

♣ Parameter (instrument constant) setting

Setting parameter (other items such as instrument constant, etc.) can be changed using the handy-loader while referring to the example below.(See HANDY-LOADER user manual to learn how to use the loader.)

☞ e.g.) If pulse specification of:

electricity meter is 1000Pulse/1kWh, set the instrument constant to 1000.

gas meter is 1Pulse/10ℓ, set the instrument constant to 100.

water meter is 1Pulse/100ℓ, set the instrument constant to 10.

calorimeter is 1Pulse/1kWh, set the instrument constant to 1.

♣ Initial value must be entered after setting of the parameter (instrument constant or decimal places).

7. Check of contents and storage

7.1 Check of contents

Before installation of the HCU, check the package according to the list below if there is any discrepancy. For any deviation, contact our headquarter, factory or closest service center.

- ▶ HCUM-E(NEW) or HCUM-E(ROUTER) [exclusive line HCU] : 1 unit
- ▶ User manual: 1 set / Mounting screws
- ▶ Check the rated value and the specification
- ▶ Check if there is any damage on the product during transportation
- ▶ Check the detail drawing and power cable of the product

7.2 Transportation and storage

Precautions to transportation and storage of the product is as follows.

1) Do not apply strong vibration or shock during transportation and storage.

2) Avoid exposure to rain, wind, humidity, harmful gas, chemical substance (volatile substance such as thinner, benzene), excessive vibration, direct sunlight or heater.

3) Handle the product with care in order not to damage or scratch the instrument.

7.3 Warranty period

Free warranty	2 years and 6 months
Charged warranty	7 years

IV. Central Control Unit (CCU)

Central Control Unit with Exclusive Line

1. Overview

Central Control Unit With Exclusive Line performs data routing function between the meter reading computer and the Home Control Unit With Exclusive Line and executes meter reading and communication tests according to the order of the meter reading computer. This does not require that the meter reading personnel directly perform the meter reading. Rather, this enables the remote meter reading for enhanced user convenience and reliability.

2. Precautions to installation and operation

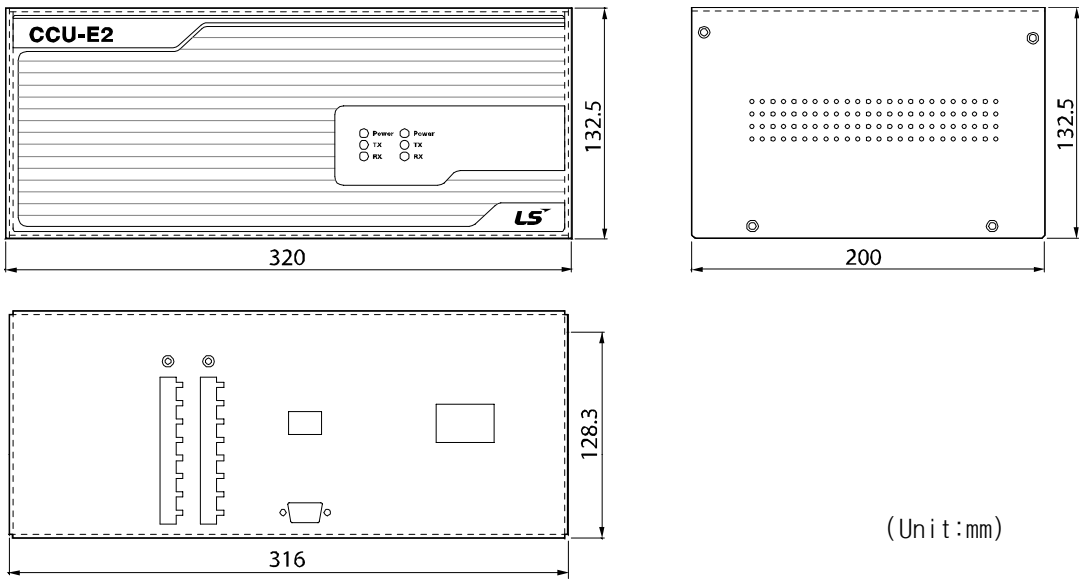
Caution

2.1 Items to check before connection of the power

1) Check that the operating power source is the rated voltage(AC220V).
2) Commercial frequency is 60Hz.
3) Use the power cord and communication cable provided with the product.
4) Power cord must be connected to a power outlet with ground terminal.

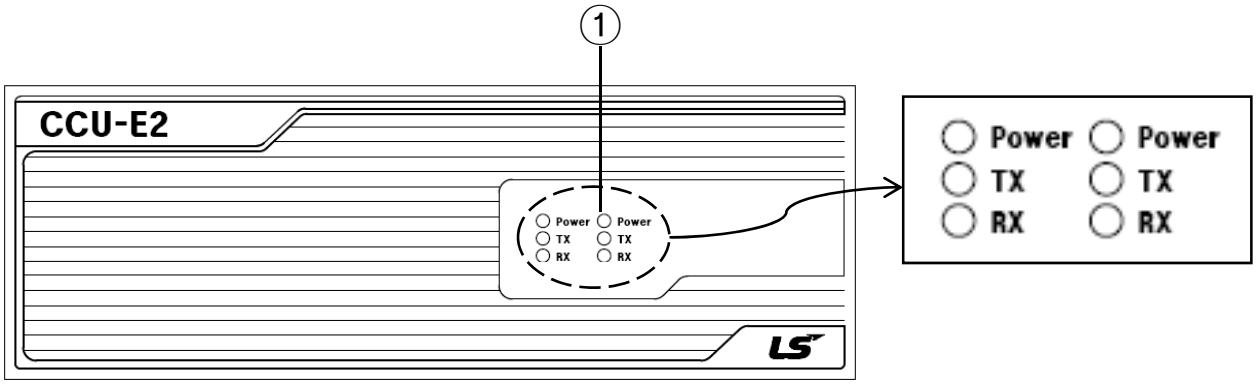
3. Appearance and configuration of the product

3.1 Product dimensions



< Product dimensions>

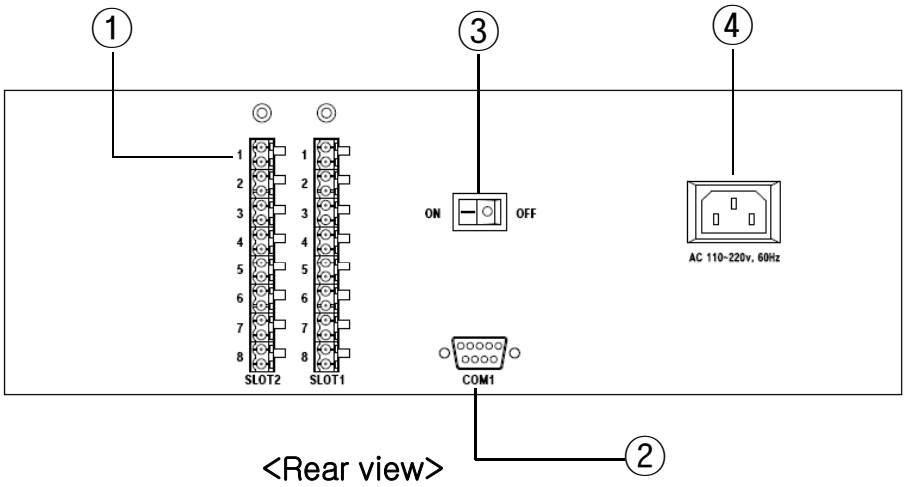
3.2 Front view of the central control unit (CCU-E2)



<Front view>

① LED : Displays the communication status
- PWR: Turns on in red when power is supplied
- TX: Blinks in green when transferring data to the PC port
- RX: Blinks in green when receiving data from the PC port

3.3 Rear view of the central control unit (CCU-E2)



<Rear view>

① Communication port
- Exclusive line communication port(16 ports)

② PC port
- Communication between the meter reading PC and the CCU.(RS-232 cable)

③ Power terminal
- AC 220V,60Hz.

④ Power switch: Power on/off switch for the product

4. Rated value and specification

4.1 General specification

Category			Specification
Communication specification	Serial Communication	Communication speed	38400 bps
		Communication method	Semi-biasynchronous
		Transport code	ASCII
	Exclusive line Communication	Communication speed	1200~38400 bps, variable
		Communication method	RS-485
		Communication cable	Shielded 22AWG 1Pair
		I/O card	2 Cards
		Router setup	Maximum 10 stages
		HCU connection	31 units
Power source	Input power		Single phase AC 220V(±10%)/60Hz
	Operation power		DC 5 V
Current consumption			2A

5. Communication specification

5.1 Communication specification between the meter reading PC and the CCU

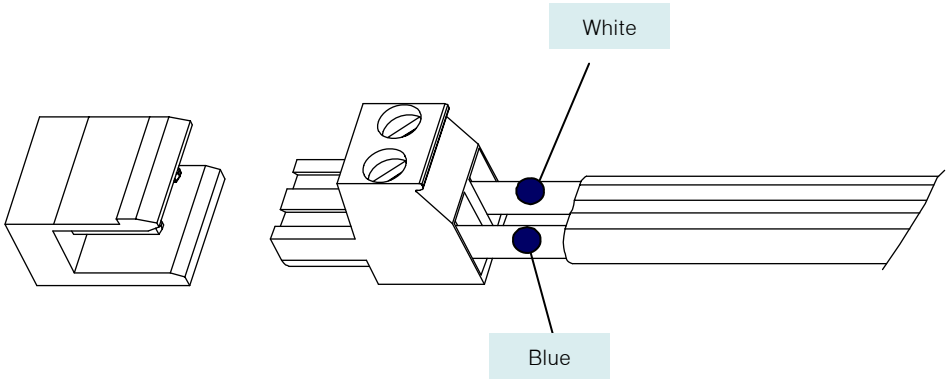
- Communication method: RS-232
- Communication speed: 38400 bps
- Communication distance: Below 10m

5.2 Communication specification between CCU and HCU

- Communication method: RS-485
- Communication speed: 1200bps ~ 38400bps, variable
- Communication distance :1.2Km (Maximum extension of 13.2Km if router is used)
- Connection method: 2 Wire Multi – drop.

6. Wiring method and precautions

- Use shielded Twisted Pair Cable.
- Recommended Cable: LIREV AMESB 22AWG made by LS Cable
- Pay attention to color when performing the communication cable wiring.



V. HCU LOADER

1. LOADER overview

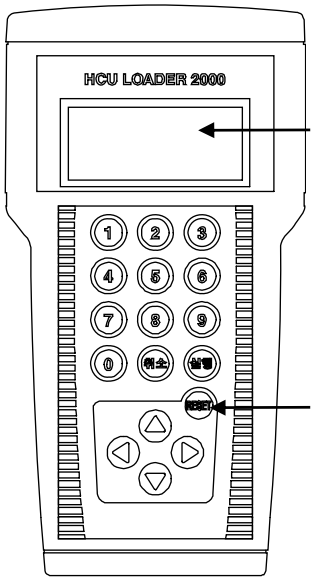
1.1 Overview

HCU Loader is a portable device that is used in conjunction with the HCU (Home Control Unit). After installation of the HCU, the device is used to input various data of HCU.

1.2 Purpose

- Input of HCU ID
- Input of HCU Version and Data and Date
- Input of HCU communication baud rate
- Input of meter type and meter pulse specification connected to the HCU
- Input of each port meter usage connected to the HCU
- Display setting of meter usage such as decimal places and units

1.3 HCU Loader appearance



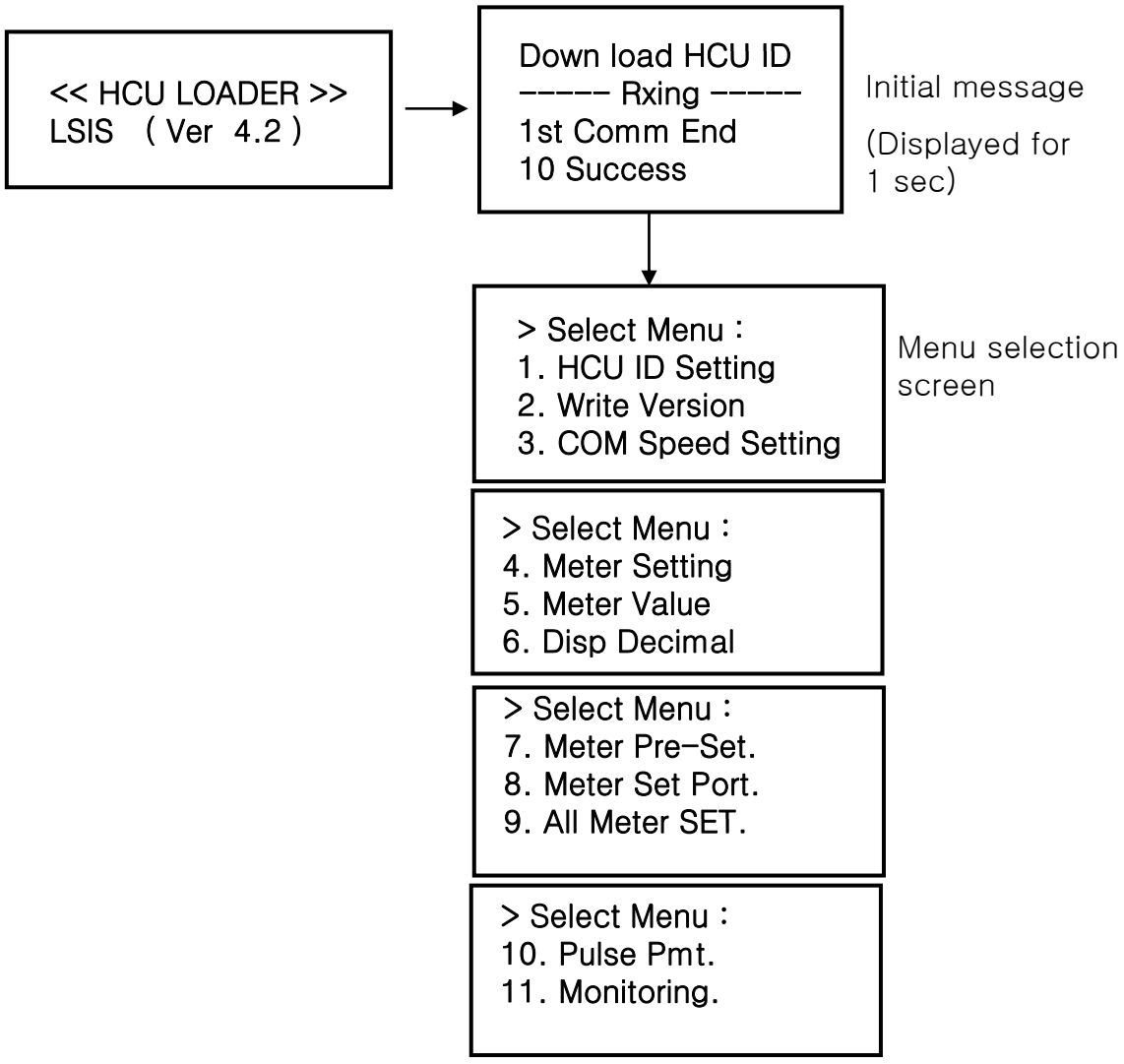
■ KEY description

KEY	Description
0~9	Data input
Cancel	Return to previous screen
Run	Run a command
↔	Page left, right
↑↓	Page up, down
Reset	Initialize program

2. LOADER user guide

2.1 Initial screen of the loader

■ If cover of the HCU is removed and the HCU loader is connected to the loader communication connector, the load will display as follows.



■ Input menu description

'1' : Input of HCU ID

'2' : Input of HCU Version

'3' : Input of HCU communication baud rate

'4' : Input of Meter Setting, parameter and pulse time

'5' : Input of current meter usage in the HCU

'6' : Display setting of HCU such as decimal places and units.

'7' : Input and storage of batch setting data (Pre-set function).

'8' : Batch input with the setting data saved in '7'.

'9' : Same function as '8' (However, if you press 'Run', it will move to the input screen for the next port).

'10': Input of instrument constant(Pulse Parameter) of each port.

'11': Not used.

2.2 HCU ID input

■ Inputs ID in the HCU. HCU ID installed in the same CCU location should not be overlapped.

NO	KEY operation	LCD status	Remark
1	Key No. 1 +'Run'	> Select Menu : 1.HCU ID Setting	Menu selection screen appears.
2	Input of ID	HCU ID Setting ID :	Press 'Cancel' KEY to return to the previous screen
3	'10001' + 'Run'	HCU ID Setting ID : 10001	In case the HCU ID is 10001 Press '←' (Back Space) key for correction
4		> Select Menu : 1.HCU ID Setting	Return to the main menu selection screen.

2.3 Input of HCU Version and date

■ HCU Version is entered as the product is shipped. The Version and date is used for later version upgrade. For accurate version management, the user should never modify the version and date.

NO	KEY operation	LCD status	Remark
1	Key No. 2 +'Run'	> Select Menu : 2.Write Version	Menu selection screen appears.
2	Enter S/W, H/W and modified date +'Run'	HCU Version S/W Ver :	Press 'Cancel' KEY to return to the previous screen
3		H/W Ver : Date :	Press '←' (Back Space) key for correction
4		> Select Menu : 2.Write Version	Return to the main menu selection screen.

2.4 Input of the HCU communication baud rate

■ The system is designed in a way that the HCU communicates the meter reading PC through the routing function of the CCU. At this time, the communication speed needs to match in order for the communication to work. Therefore, this is used to input the accurate communication speed into the HCU.

NO	KEY operation	LCD status	Remark
1	Key No. 3 +'Run'	> Select Menu : 3.COM Speed Setting	Menu selection screen appears.
2	Input of COM Speed	> COM Speed : 1. 1200 bps	Press 'Cancel' KEY to return to the previous screen
3	+ 'Run'	~ 6. 38400 bps	Press '←' (Back Space) key for correction
4		> Select Menu : 3.COM Speed Setting	Return to the main menu selection screen.

2.5 Input of the Meter Setting

■ Configures meter type that are connected to the HCU, pulse time of the metering pulse, data display type of the meter reading data stored in the HCU.

Caution : '4' Meter Setting Input process needs to be performed after '10' Pulse Pmt. setting Input is finished. If '4' Meter Setting Input is performed first and then '10'Pulse Pmt. setting Input is performed, meter reading data that are stored in the HCU are internally calculated again using the Pulse Parameter(instrument constant).

NO	KEY operation	LCD status	Remark
1	Key No. 4 +'Run'	> Select Menu : 4.Meter Setting	Menu selection screen appears.
2	Port setting of HCU (No. 1) + 'Run'	> Select Port : 1 1. Port ~ 6.Port	Enter the port number of the HCU to input (1~6).
3	1'+'6/0'+'0005'+'Run'	1P WHM Set : 1 Parmeter : 6/3 Pulse Time : 0005	In case the type of the meter is electricity, the Pulse Parmeter (instrument constant) is1000 and the Pulse Time is 5ms.
4	'Run' or 'Cancel'	> Select Port : 1. Port ~ 6.Port	Return to the main menu selection screen.
5	Repeat 2~4 until port 6.		

■ Type of meter and how to setup parameter (example)

Category of meter		Parameter setup	Pulse Parmeter(instrument constant) specification
1	Electricity	6/0	1 (1 pulse/1kWh)
2	Gas	6/1	10 (10 pulse/1㎥)
3	Water	6/2	100 (100 pulse/1㎥)
4	Hot-water	6/3	1000 (1000 pulse/1㎥)
5	Calorie	6/3	500 (500 pulse/1MWh)

2.6 Input of meter usage

■ Used to enter usage of each port meter connected to HCU into the HCU.

NO	KEY operation	LCD status	Remark
1	Key No. 5 +'Run'	> Select Menu : 5.Meter Value	Menu selection screen appears.
2	HCU Port (No. 1) +'Run'	> Value Port : 1. Port ~ 6.Port	Enter meter usage by port (1~6).
3	'001111'+'Run'	> Input Value Value : 001111	In case the meter usage is '001111'
4	Run' or 'Cancel'	> Value Port : 1. Port ~ 6.Port	Return to the main menu selection screen.
5	Repeat 2~4 until port 6.		

■ Example of meter usage input

- If the meter type is electricity meter and current total usage is '123'KWh

  : '000123.000' (Parameter is entered 6/0 so that digits below the decimal point will not be displayed.)

- If the meter type is gas, water, hot-water meter and pulse specification is 1000pulse/1㎥ and current total usage is '123.456' ㎥

  : '000123.456' (Parameter is entered 6/3 so that three digits below the decimal point will be displayed.)

2.8 Batch storage of setting DATA (Pre-set function).

■ The following four setting data can be stored in this menu: Meter type of each port, Parameter (display specification), Pulse Time (time interval of the metering pulse), Pulse Parameter(instrument constant).

NO	KEY operation	LCD status	Remark
1	Key No. 7 +'Run'	> Select Menu : 7.Meter Pre-Set	Menu selection screen appears.
2	'1' + 'Run'	NEW HCU (Y/N?) YES ==> 1 NO ==> 0 Press [Y/N]	Asks if the HCU is the new type.
3	'Run' or 'Cancel'	> Select Port :1 1.Port -> 6.Port	Displays that the port No. 1 is selected.
4	'Run' or 'Cancel'	1P WMH Set : x Parameter : x/x Pulse Time : xxxx	Enter corresponding values.
5	'Run' or 'Cancel'	> Input Pulse Pmt. xxxxx	Enter the desired Pulse Parameter value
6	'Run' or 'Cancel'	> Select Port :2 1.Port -> 6.Port	Enter Port1 through Port6 in the same procedure as No. 3.

2.9 Batch input of setting DATA (All Meter SET function).

■ In this menu, setting data stored in 2.8 can be called back to setup the four setting data i.e. the meter type of each port, Parameter (display specification), Pulse Time (time interval of the metering pulse), Pulse Parameter(instrument constant) in one stroke by port.

NO	KEY operation	LCD status	Remark
1	Key No. 9 +'Run'	> Select Menu : 9.All Meter SET	Menu selection screen appears.
2	'Run' or 'Cancel'	Meter Pre-Set Value Port 1->6	
3	'Run' or 'Cancel'	>Input Pulse Pmt. Pulse Parameter Port #1 xxxxx	Enter the corresponding Pulse Parameter value
4	'Run' or 'Cancel'	1P WMH Set : x Prameter:x/x Pulse Time:xxxx	Enter corresponding values.
5	'Run' or 'Cancel'	>Input Value Value:xxxxxx .xxx	Enter metered values.
6	'Run' or 'Cancel'	>Input Pulse Pmt. Pulse Parameter Port #2 xxxxx	Enter Port2 through Port6 in the same procedure as No. 3.

2.10 Pulse Parameter (instrument constant) input

■ Input of PULSE/Unit usage for each port meter connected to the HCU..

NO	KEY operation	LCD status	Remark
1	KEY No. 10 + 'Run'	> Select Menu : 10.Pulse Pmt.	Show menu selection screen.
2	'Cancel'or PORT No. + 'Run'	>Select Port : 1.Port -> 6.Port	Port selection.
3	Run' or 'Cancel'	> Input Pulse Pmt Pulse Parameter xxxxx	Corresponding Pulse Parameter input.

2.11 Setup data input procedure

■ Input Pulse Parameter (instrument constant)
-> Input Meter Value (meter usage) -> Input Meter Setting

3. Precautions during use of HCU Loader

■ Do not drop the loader on the ground during operation or moving.

■ Do not apply too much force when operating the keys.

■ Check the date on the LCD during input in order to prevent input errors.

■ Use caution to avoid electric damage when connecting signal cables to the HCU.

Green Innovators of Innovation

Safety Instructions

- For your safety, please read user's manual thoroughly before operating.
- Contact the nearest authorized service facility for examination, repair, or adjustment.
- Please contact qualified service technician when you need maintenance.
  Do not disassemble or repair by yourself!
- Any maintenance and inspection shall be performed by the personnel having expertise concerned.

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Specifications in this catalog are subject to change without notice due to continuous product development and improvement.

Global Network

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