





**Mitsubishi Electric**  
**Air Conditioning Network System**  
**LM ADAPTER LMAP02-E/LMAP03**  
**Technical Manual**

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# Safety Precautions





- Before installing this unit, make sure you read all the “Safety Precautions”.
- This manual describes the installation of LM-AP and wiring to the outdoor unit.
- Please look at the installation manual of an air-conditioning unit about the installation method of an air-conditioning unit.
- The “Safety Precautions” provide very important points regarding safety. Make sure you follow them.

## Symbols and Terms

 <b>WARNING</b>	Statements identify condition or practices that could result in personal injury or loss of life.
 <b>CAUTION</b>	Statements identify condition or practices that could result in damage to the unit or other property.

- After reading this installation manual, keep it in a place where the final user can see it anytime he or she wants to it. When someone moves, repairs or uses the LM-AP, make sure that this manual is forwarded to the final user.

## Symbols used in the illustrations

-  : Indicates a part which must be grounded.
-  : Indicates that the main switch must be turned off before servicing. (This symbol is displayed on the main unit label.) <Color: Blue>
-  : Beware of electric shock. (This symbol is displayed on the main unit label.) <Color: Yellow>
-  **ELV** : Please pay attention to electric shock fully because this is not Safety Extra Low-Voltage (SELV) circuit.  
And at servicing, please shut down the power supply for LM-AP.

## **WARNING**

### **Ask your dealer or technical representative to install.**

Any deficiency caused by your own installation may result in an electric shock and fire.

### **Install in a place which is strong enough to withstand the weight of the unit**

Any lack of the strength may cause the unit to fall down, resulting in a personal injury.

Any deficiency caused by installation may result in an electric shock, fire or incorrect operation.

### **Wire and connect using the desired cables securely so that any external force from the cable is imparted to the terminal connections.**

Imperfect connection and fixed may result in heating or fire.

### **Never modify or repair the unit by yourself.**

Any deficiency caused by your modification or repair may result in an electric shock or fire. Consult with your distributor for repair.

### **Make sure that the unit is powered by dedicated line.**

Other appearance connected to the same line could cause an overload.

### **If it is assumed that moisture advances into the unit, such as the time of rainy weather, do not do check or work of an electric circuit.**

It may become the cause of damage of a fire and the unit by an electric shock or corrosion.

### **Ensure that installation work is done correctly following that installation manual.**

Any deficiency caused by installation may result in an electric shock or fire.

### **All electrical work must be performed by a licenced technician, according to local regulations and the instructions given in this manual.**

Any lack of electric circuit or any deficiency caused by installation may result in an electric shock or fire.

### **Securely install the cover (panel) of the LM-AP.**

If the cover (panel) is not installed properly, dust or water may enter the unit and fire or electric shock may result.

### **Do not move and re-install the unit yourself.**

Any deficiency caused by installation may result in an electric shock or fire. Ask your distributor or special vender for moving and installation.

### **Make sure that there is a main power switch.**

A ready accessible breaker for power source line helps reduce the risk of electric shocks. Installation of a breaker is mandatory in same areas.

## CAUTION

**Do not install the unit where combustible gas may leak.**

If the gas leaks and accumulates around the unit, an explosion may result.

**Do not use in any special environment.**

Using in any place exposed to oil(including machine oil), steam and sulfuric gas may deteriorate the performances significantly or given damage to the component parts.

**Do not wash with water.**

Doing so may cause an electric shock or a malfunction.

**Do not install in any steamy place such as bath room or kitchen.**

Avoid any place where moisture is condensed into dew. Doing so may cause an electric shock or a malfunction.

**Do not install in any place at a temperature of more than 43 °C or less than -15°C.**

It may become the cause of modification and failure.

**Safety dispose of the packing materials.**

Tear apart and throw away plastic packaging bags so that children will not play with them. If children play with a plastic bag which was not torn apart, they face the risk of suffocation.

**Be sure to shut off the power source of the unit and all the other unit to connected to the unit before wiring.**

Doing so may cause an electric shock or a malfunction.

**This appliance must be earthed.**

Make sure to install a protective earth(PE) line. Do not connect the protective earth line to gas or water pipes, lightning conductors or telephone grounding lines. Improper grounding may cause an electric shock.

**A power-supply line and a transmission line do not band together, or are not contained in the same metal pipe.**

Doing so may cause a malfunction of unit.

**When installing the unit in a hospital, communication station, or similar place, provide sufficient protection against noise.**

The inverter equipment, private power generator, high-frequency medical equipment, or radio communication equipment may cause the air conditioner to operate erroneously, or fail to operate. On the other hand, the air conditioner may affect such equipment by creating noise that disturbs medical treatment or image broadcasting.

**Do not touch any PCB(Printed Circuit Board) with your hand or tools. Do not have dust collected on the PCB.**

Doing so may cause an electric shock or fire.

**Do not install in any place where acidic or alkaline solution or special spray are other be used.**

Doing so may cause an electric shock or a malfunction.

**Never connect the power source to the transmission line.**

Doing so may caused a malfunction or a failure.

**Use only an earth leakage breaker and fuse of the specified capacity.**

If no earth leakage breaker is installed, it may cause an electric shock.

Using fuse and wire or copper wire with too large capacity may cause a malfunction of unit or fire.

**Use standard wires in compliance with the current capacity.**

A failure to this may result in an electric leakage, heating or fire.

**Wire so that it dose not received any tension.**

Tension may caused wire breakage, heating or fire.

**Do not touch the switches with wet fingers.**

Touching a switch with wet fingers can cause electric shock.

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# 1. Introduction

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## 1.1 Purpose of this manual

This manual provides design information and restrictions required by the system designing in constructing the LONWORKS ® network system using LM ADAPTER. For the items not described here, please refer to the literatures shown below.

LM ADAPTER installation work	: "Installation Manual of LM ADAPTER"
M-NET wiring and designing	: DATA BOOK of air conditioner and the like
Network variable specification	: "Network Variables Specification" of LM ADAPTER

## 1.2 Terminology used in this manual

This manual uses abbreviations for product names and unit classification partially. The main abbreviations are given below. For the terminology relating to the LONWORKS, please see the Appendix of this manual.

LMAP	: LM ADAPTER
BMS	: Building management system
SC	: System controller
IC	: Indoor unit
OC	: Outdoor unit
RC	: Local remote controller
	<MA remote controller (PAR-20MAA, etc.)>
	<ME remote controller (PAR-F27MEA, etc.)>
MA	: Local remote controller <MA remote controller (PAR-20MAA, etc.)>
ME	: Local remote controller <ME remote controller (PAR-F27MEA, etc.)>
TR	: Central controller

## 2. Product Outline

### 2.1 Outline and features

The LM ADAPTER is a communication interface to connect the Mitsubishi Electric made products for M-NET use with the LONWORKS network. Only one LM ADAPTER can control and monitor indoor units up to 50 sets.

Since the LONWORKS network is an open protocol, connection with the Building management system (BMS) and other products usable with LONWORKS can be performed easily thus allowing construction of various systems including "Schedule operation," "Interlocked operation" and "Energy saving control".

<Features>

- Maximum 50 sets indoor units connectable with one LM ADAPTER
- Operation/monitoring with local remote controllers
- Standard Network Variables Type (SNVT) and enriched function (network variables)
- Various Configuration Properties (CP) essential for network construction

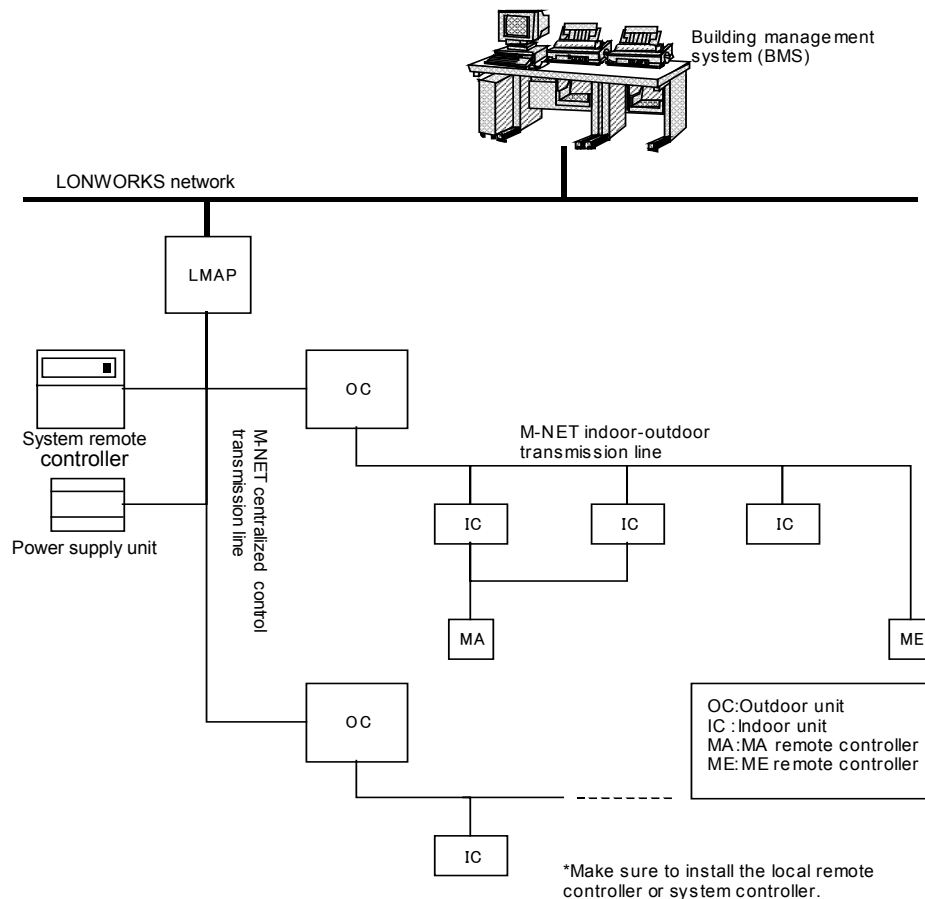


Figure 1-1. System configuration diagram (Example)

## 2.2 List of products

The air conditioners controllable with LM ADAPTER are shown below.

Model name	Objective models for control
LMAP02 - E	CITY MULTI, LOSSNAY, Mr. SLIM
LMAP03	CITY MULTI, LOSSNAY, Mr. SLIM

## 2.3 Function

The basic functions of LM ADAPTER are outlined as below.

Items <sup>1</sup>	Details
Emergency stop	Stopping all air conditioners. Not prohibiting local remote controller operation.
ON/OFF	Operating/monitoring ON/OFF state.
Mode	Operating/monitoring the operation mode set for air conditioners & LOSSNAYS.
SetPoint	Operating/monitoring the temperature set of air conditioners.
Fanspeed	Operating/monitoring the fan airflow rate setting.
Local remote controller prohibit	Operating/monitoring the operation prohibit of local remote controllers. (ON/OFF, operation mode, temperature setting, batch)
Forced thermostat OFF	Operating/monitoring the forced thermostat OFF of air conditioners.
Filter sign/Run time for filter	Resetting/monitoring the integrated data of filter operation time.
Local remote controller setting	Setting the local remote controller. (Time, temperature setting range, simplified locking, actual operation mode display, room temperature display)
Defrosting state	Outputting the defrosting status of all air conditioners.
Failure/alarm	Outputting the failure of air conditioners, control panels and humidifiers.
LM ADAPTER abnormal communication state	Outputting the communication error if existed between LM ADAPTER and air conditioners.
Air conditioner (charging) information (thermostat status)	Outputting each state of the operation/thermostat/auxiliary heater of air conditioners.
Air conditioner (charging) information (capacity code)	Outputting the capacity code of air conditioners.
Space temperature status	Outputting the outlet and inlet temperature of each air conditioner.

<sup>1</sup> The applicable function differs depending on the objective models for control.

## 2.4 Specification

### (1) Product specification

Items <sup>1</sup>		Specification	
Dimension		340mm(Height) x 360mm(Width) x 59.6mm(Depth)	
Weight		3.4 kg	
Power source		~220 - 240V (50/60Hz)	
Power consumption		10 W	
Data holding		Memorizing binding information, address information on air conditioners and set values in nonvolatile memory. Input/output variables are not held.	
Environmental condition	Temperature	Operating	- 15 to 43 °C
		Non operating	- 20 to 60°C
	Humidity		30 to 95 %RH (No condensation allowed)
Installation method		Mountable in horizontal or vertical direction For vertical installation, locate in the direction of the pasted seal.	
External finish		Galvanized steel plate	
Alias		100 pieces	
Explicit message		Not applicable yet	
Neuron ID		Indicated on the seal attached to circuit board (differs by product)	
Program ID		Indicated on the seal attached to circuit board (differs by product)	
Neuron chip		TMPN3150 (10MHz) 1 piece	
Network transceiver		FTT-10A (Free topology 78kbps) 1 piece	

### (2) Performance

Items <sup>2 3</sup>	Specification
Mean communication capacity	2.5 input / second
Peak communication capacity	50 input / second (for 1 second)
Response capacity for poll demand	15 demand / second

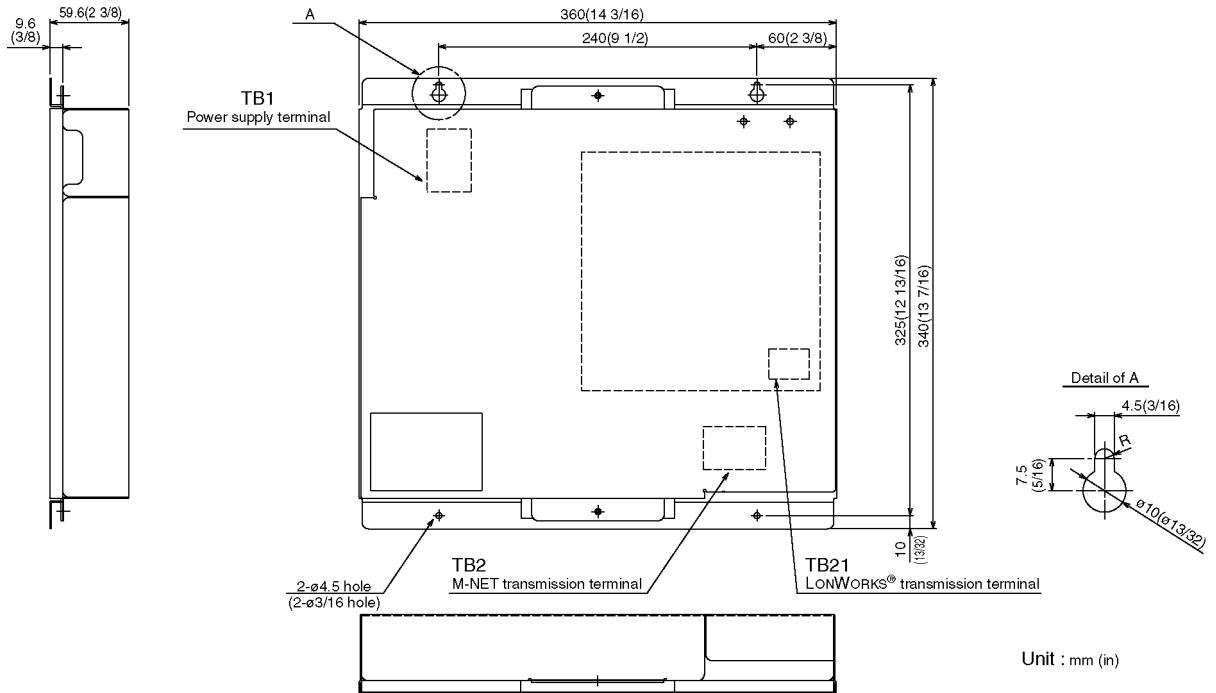
<sup>1</sup> For the detail specification of the LONWORKS network, see the data published by Echelon. "FTT-10A Free Topology Transceiver User's Guide"

<sup>2</sup> Transmitting with an interval time exceeding the capacity hinders normal receiving. Please take a sufficient interval.

<sup>3</sup> The Ack Service is recommended for your network service.



(3) External dimension



### 3. System Design Flow

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The following indicates design flow to construct the system of the LONWORKS network by LM ADAPTER.

**Step 1: Selecting the air conditioners (objective equipment for control, restrictions, etc.).**

**Step 2: Selecting the function.**

**Step 3: Selecting the system control parts**  
**(Quantity of LM ADAPTER, other system controllers, etc.).**

**Step 4: Determining the air conditioner addresses.**

**Step 5: Constructing the LONWORKS system.**

## 4. Designing the LMAP02-E / LMAP03

This section summarizes the air conditioners controllable with LM ADAPTER and various restrictions to be applied. For the details of air conditioning equipment, please refer to the manual of each air conditioner.

### 4.1 Selecting the air conditioners

#### 4.1.1 Controllable quantity

Models	Limitation	Detail
LMAP02-E	50 sets	One LM ADAPTER can control indoor units up to 50 sets. The number of LOSSNAY (including ventilation units) is to be included in this figure.
LMAP03	50 sets	

#### 4.1.2 Range of group control

Models	Limitation	Detail
LMAP02-E	No group control function provided	LM ADAPTER has no group control function.
LMAP03	Master SC <sup>1</sup>	When using other SC in combination, the control can be performed within the group range set by the SC. When not using other SC in combination, group control cannot be performed.

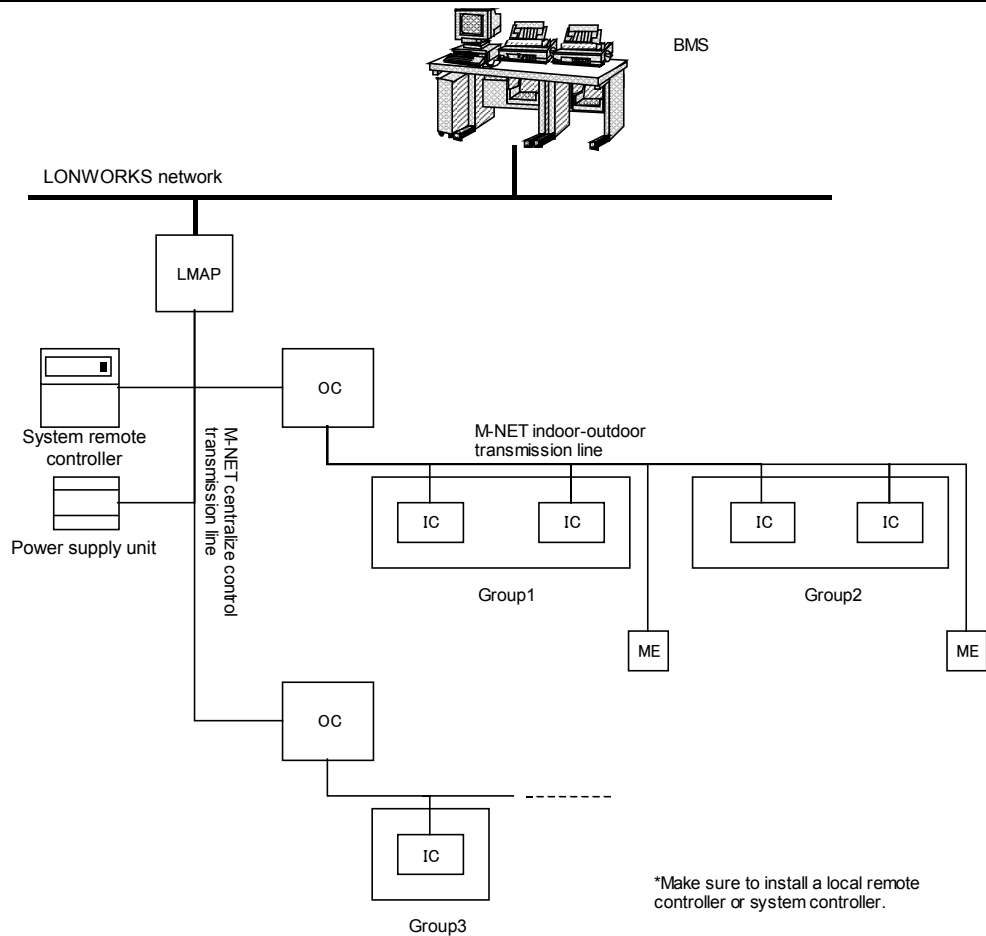


Figure 4-1. System configuration (Example)

<sup>1</sup> Abbreviation of system controller

#### 4.1.3 Objective equipment for control

The following table lists the objective air conditioners for control.

Some indoor units own the plural M-NET addresses. For counting the connected numbers, refer to the table below.

O : Controllable      x : Uncontrollable      Δ : Controllable depending on connected models

Models	Function	LMAP02-E LMAP03	Counting method of connected quantity
CITY MULTI		○	Quantity of indoor unit
Mr. SLIM (1:1, Simultaneous twin/triple/four) <sup>1</sup>		○	Quantity of outdoor unit (not including indoor unit quantity)
Mr. SLIM (Power inverter) <sup>1</sup>		○	Quantity of outdoor unit (not including indoor unit quantity)
Mr. SLIM (Individual twin)		×	—
PAC for general purpose/industrial application		×	
LOSSNAY		○	Quantity of LOSSNAY
OA processing unit		○	Quantity of LOSSNAY
Ventilation unit (LOSSNAY adapter connection)		Δ	Quantity of ventilation unit
K-control unit <sup>2</sup>		×	—

#### 4.1.4 Connecting location

Connect LM ADAPTER to the centralized system transmission line of air conditioners.

#### 4.1.5 Restriction on M-NET transmission wiring

As the M-NET transmission line has restrictions on its wiring length, wire materials, etc. in accordance with the system configuration, the design should be conducted taking the transmission lines of air conditioners and control equipment into your consideration. For detail, please refer to the manuals such as the "DATA BOOK" of each air conditioner.

<sup>1</sup> Require to mount the adapter for M-NET connection (PAC-SF48/49/87MA, PAC-SG40MA)

<sup>2</sup> Unable to control/monitor even by connecting the K-transmission converter.

## 4.2 Selecting the function

The list below shows the operation/monitor function of LM ADAPTER.

### (1) Operation/Setting

⊙: With function ●: Individual –: Without function

	LMAP02-E	LMAP03	Function	CITY MULTI	Mr. SLIM	LOSSNAY (Individual)	LOSSNAY (Interlocked)	OA processing unit (Individual)	OA processing unit (Interlocked)	Ventilation unit (Individual)	Ventilation unit (Interlocked)
Operation/Setting	⊙	⊙	Request All OFF (Emergency stop)	●	●	Differs by models					
	⊙	⊙	Request On/Off	●	●						
	⊙	⊙	Request Mode	●	●						
	⊙	⊙	SetPoint	●	●						
	⊙	⊙	Request LOSSNAY Mode	–	–						
	⊙	⊙	Request Fanspeed	●	●						
	⊙	⊙	Request Local Prohibit On/Off <sup>1</sup>	●	●						
	⊙	⊙	Request Local Prohibit Mode <sup>1</sup>	●	●						
	⊙	⊙	Request Local Prohibit SetPoint <sup>1</sup>	●	●						
	–	⊙	Request Collective Operation Prohibit <sup>1</sup>	●	●						
	–	⊙	Request Forced Thermostat OFF	●	●						
	–	⊙	Filter Sign Reset	●	●						
	–	⊙	Time Stamp <sup>2</sup>	●	–						
	–	⊙	Request Limit Temperature Setting Range <sup>2</sup>	●	–						
	–	⊙	Request Simplified Locking <sup>2</sup>	●	–						

<sup>1</sup> Applicable only at using of MA remote controller (PAR-20MAA) for a local remote controller.

<sup>2</sup> Applicable only at using of ME remote controller (PAR-F27MEA) for a local remote controller.

(2) Monitoring/Measuring

⊙: With function ●: Individual –: Without function

	LMAF02-E	LMAF03	Function	CITY MULTI	Mr. SLIM	LOSSNAY (Individual)	LOSSNAY (Interlocked)	OA processing unit (Individual)	OA processing unit (Interlocked)	Ventilation unit (Individual)	Ventilation unit (Interlocked)
Measuring/Monitoring	–	⊙	Emergency state	●	●						
	⊙	⊙	On/Off run state	●	●						
	–	⊙	Collective On/Off state	●	●						
	⊙	⊙	Mode state	●	●						
	⊙	⊙	SetPoint state	●	●						
	⊙	⊙	LOSSNAY Mode state	–	–						
	⊙	⊙	Fanspeed state	●	●						
	⊙	⊙	Local Prohibit On/Off state <sup>1</sup>	●	●						
	⊙	⊙	Local Prohibit Mode state <sup>1</sup>	●	●						
	⊙	⊙	Local Prohibit SetPoint state <sup>1</sup>	●	●						
	–	⊙	Collective Local Prohibit state <sup>1</sup>	●	●						
	–	⊙	Forced Thermostat OFF state	●	●						
	–	⊙	Filter Run Time	●	●						
	⊙	⊙	Space Temperature	●	●						
	⊙	⊙	Alarm state	●	●						
	–	⊙	Collective Alarm for Indoor Unit	●	●						
	–	⊙	Collective Alarm for LM Adapter	●	●						
	–	⊙	Error Code	●	●						
	–	⊙	Error Unit Address	●	●						
	⊙	⊙	Thermostat On/Off state_1	●	●						
	–	⊙	Thermostat On/Off state_2	●	●						
–	⊙	Model Code	●	●							
–	⊙	Defrost state	●	●							

Differs by models

<sup>1</sup> Applicable only at using of MA remote controller (PAR-20MAA) for a local remote controller.

(3) List of LOSSNAY function by models

◎: With function ●: Applicable ▲: Partially applicable -: Not applicable

	LMAF02-E	LMAF03	Function	LOSSNAY		OA processing unit				Ventilation unit	
				LGH -RX3-E		GUF -RD(H)		GUF-RD(H)2		[Adapter] PZ-53ADF-E	
				Individual	Interlocked	Individual	Interlocked	Individual	Interlocked	Individual	Interlocked
Operation/Setting	◎ ◎		Request All OFF (Emergency stop)	●	●	●	●	●	●	●	●
	◎ ◎		Request On/Off	●	● <sup>1</sup>	●	● <sup>1</sup>	●	● <sup>1</sup>	●	● <sup>1</sup>
	◎ ◎		Request Mode	-	-	●	● <sup>2</sup>	●	● <sup>2</sup>	-	-
	◎ ◎		SetPoint	-	-	●	▲ <sup>3</sup>	●	▲ <sup>3</sup>	-	-
	◎ ◎		Request LOSSNAY Mode	●	-	-	-	-	-	●	-
	◎ ◎		Request Fanspeed	●	-	●	-	●	-	▲	-
	◎ ◎		Request Local Prohibit On/Off <sup>4</sup>	●	-	-	-	●	-	-	-
	◎ ◎		Request Local Prohibit Mode <sup>4</sup>	-	-	-	-	●	-	-	-
	◎ ◎		Request Local Prohibit SetPoint <sup>4</sup>	-	-	-	-	●	-	-	-
	- ◎		Request Collective Operation Prohibit <sup>4</sup>	●	-	-	-	●	-	-	-
	- ◎		Request Forced Thermostat OFF	-	-	●	-	●	-	-	-
	- ◎		Filter Sign Reset	●	-	●	-	●	-	●	-
	- ◎		Time Stamp <sup>5</sup>	-	-	-	-	-	-	-	-
	- ◎		Request Limit Temperature Setting Range <sup>5</sup>	-	-	-	-	-	-	-	-
	- ◎		Request Simplified Locking <sup>5</sup>	-	-	-	-	-	-	-	-
Measuring/Monitoring	- ◎		Emergency state	●	●	●	●	●	●	●	●
	◎ ◎		On/Off run state	●	● <sup>1</sup>	●	● <sup>1</sup>	●	● <sup>1</sup>	●	● <sup>1</sup>
	- ◎		Collective On/Off state	●	● <sup>1</sup>	●	● <sup>1</sup>	●	● <sup>1</sup>	●	● <sup>1</sup>
	◎ ◎		Mode state	-	-	●	-	●	-	-	-
	◎ ◎		SetPoint state	-	-	●	-	●	-	-	-
	◎ ◎		LOSSNAY Mode state	●	-	-	-	-	-	●	-
	◎ ◎		Fanspeed state	●	-	●	-	●	-	▲	-
	◎ ◎		Local Prohibit On/Off state <sup>4</sup>	●	-	-	-	●	-	-	-
	◎ ◎		Local Prohibit Mode state <sup>4</sup>	-	-	-	-	●	-	-	-
	◎ ◎		Local Prohibit SetPoint state <sup>4</sup>	-	-	-	-	●	-	-	-
	- ◎		Collective Local Prohibit state <sup>4</sup>	●	-	-	-	●	-	-	-
	- ◎		Forced Thermostat OFF state	-	-	●	-	●	-	-	-
	- ◎		Filter Run Time	●	-	●	-	●	-	●	-
	◎ ◎		Space Temperature	-	-	●	-	●	-	-	-
	◎ ◎		Alarm state	●	●	●	-	●	-	-	-
	◎ ◎		Collective Alarm for Indoor Unit	●	●	●	-	●	-	●	●
	- ◎		Collective Alarm for LM ADAPTER	●	●	●	-	●	-	●	●
	- ◎		Error Code	●	●	●	-	●	-	-	-
	- ◎		Error Unit Address	●	●	●	-	●	-	-	-
	◎ ◎		Thermostat On/Off state_1	-	-	●	-	●	-	-	-
- ◎		Thermostat On/Off state_2	-	-	●	-	●	-	-	-	
- ◎		Model Code	-	-	●	-	●	-	-	-	
- ◎		Defrost state	-	-	-	-	-	-	-	-	

<sup>1</sup> Provides ON/OFF operation interlocked with indoor unit.

<sup>2</sup> Provides same operation mode with that of indoor unit.

<sup>3</sup> Provides same target (set) temperature with that of indoor unit. But effective only under cooling mode for OA processing unit.

<sup>4</sup> Applicable only at using of MA remote controller (PAR-20MAA) for local remote controller.

<sup>5</sup> Applicable only at using of LOSSNAY remote controller (PZ-52SF-E) for the local remote controller.

### 4.3 Selecting the system control parts

Using the system controller (SC) together other than LM ADAPTER allows connecting operation. Some rules to be observed for this purpose are introduced below.

#### 4.3.1 Master controller and slave controller

When LM ADAPTER is used together with other system controller inside a system under own control, it is essential to set a slave SC (requiring a DIP-SW change). In this case, set it so that the control range of LM ADAPTER is included within the control range of the system controller (air conditioner) which is to be the master SC.

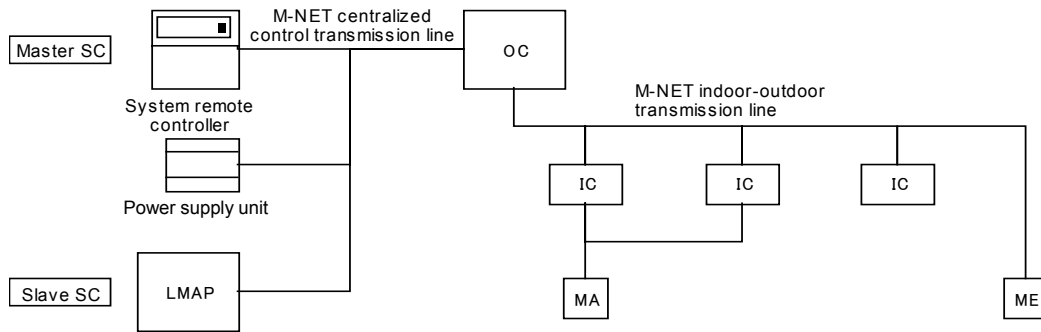
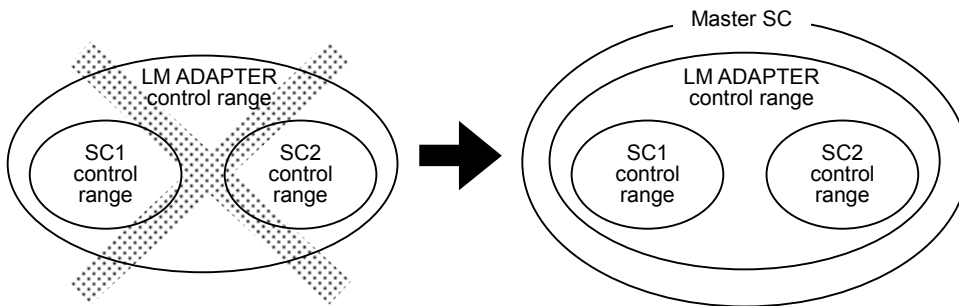
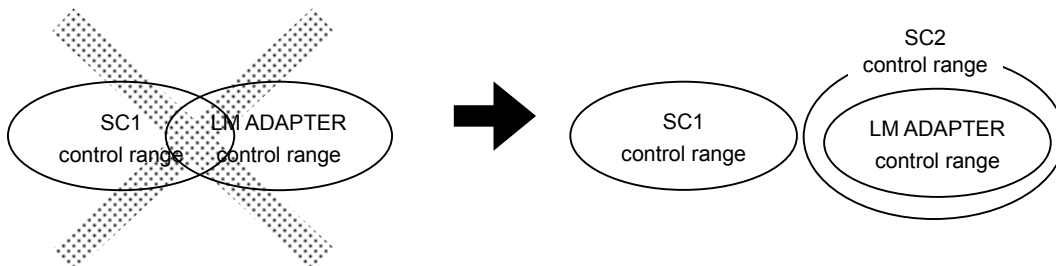


Figure 4-2. System configuration of system controller

(1) In the case when the control range of the LM ADAPTER is covering that of plural system controllers, make sure to install the Master system controller that covers the LM ADAPTER control range.



(2) In the case when the LM ADAPTER control range is covering the control range of the system controller partially, install the system controller so that it covers the entire control range of LM ADAPTER.





### 4.3.2 Local remote controller

The local remote controller includes ME remote controller (PAR-F27MEA, etc.) to be connected to the M-NET indoor-outdoor transmission line of air conditioners and MA remote controller (PAR-20MAA, etc.) to be connected to each indoor unit. Each remote controller provides a different function usable by LM ADAPTER and a different system construction method.

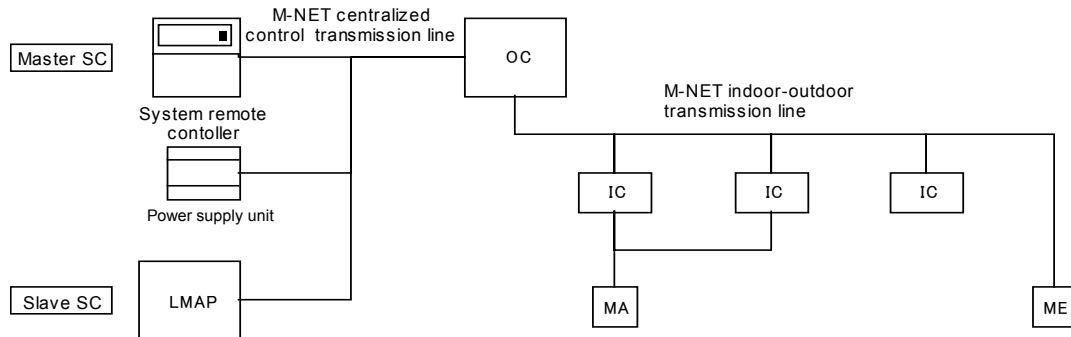


Figure 4-3. System configuration of local remote controller

#### (1) Comparison of function by local remote controllers

The usable function (network variables) by LM ADAPTER differs depending on the model of the local remote controllers (MA remote controller/ME remote controller).

Function (NV names)	MA remote controller	ME remote controller
Request Local Prohibit (ON/OFF , Mode , SetPoint)	○	△ <sup>1</sup>
Local Prohibit State (ON/OFF , Mode , SetPoint)	○	△ <sup>1</sup>
Request Collective Local Prohibit	○	△ <sup>1</sup>
Collective Local Prohibit State	○	△ <sup>1</sup>
Time Stamp	×	△ <sup>2</sup>
Request Limit Temperature Setting Range	×	△ <sup>2</sup>
Request Simplified Locking	×	△ <sup>2</sup>

○ : With function

△ : Possible with limitation

× : Without function

#### (2) Caution on a system without using remote controller

The following problems will be incurred when the operation/monitoring is done only from the BMS (centralized monitoring system) without using the local remote controller. Therefore, please install a local remote controller or system controller without fail.

- ① Test run can not be applied to air conditioners until the BMS has started up.
- ② Air conditioners can not be operated or monitored when trouble is generated on the BMS and LM ADAPTER.
- ③ The detail of the trouble i.e. during the stopping of indoor units can not be clarified.
- ④ The operation/setting of the items other than that controlled by the BMS cannot be performed.
- ⑤ Interlocked setting of LOSSNAY and air conditioners can not be performed.

<sup>1</sup> Applicable to some model of CITY MULTI air conditioners ( manufactured after January 2003 ) even when using ME remote controller.

<sup>2</sup> Applicable when only using ME remote controller for the standard models except the medium temperature models.

### 4.3.3 External contact input/output

The external contact input/output function is not provided to LM ADAPTER.

### 4.3.4 Power supply to M-NET transmission line

The M-NET centralized system controller line should be powered. For the system using other system controller or that with LOSSNAY only, the power supply unit for transmission line is required. In accordance with the system configuration, the setting of LM ADAPTER and outdoor units should partially be changed. Please conduct the setting operation by referring to the "Installation Manual" of LM ADAPTER. For the power supply capacity of the power supply unit and the selection of the unit, please refer to the manuals (like DATA BOOK) of each air conditioner.

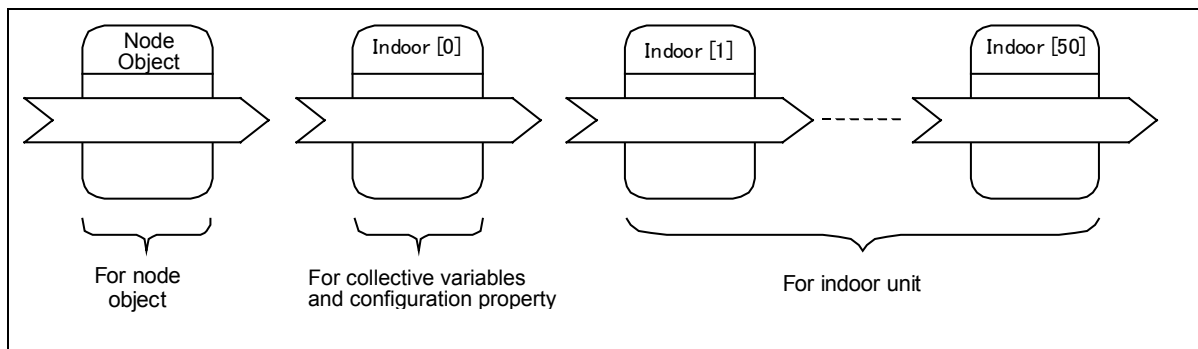
	Installation of power supply unit		Model name <sup>1</sup>
	Individual	With SC	
LMAP02-E LMAP03	Not required	Required	PAC-SC34KUA

## 4.4 Object

### 4.4.1 Network variables and objects

The network variables provided allows the LA ADAPTER to operate/monitor plural equipment (indoor unit, LOSSNAY, etc.) The functional profile (object) represents the network variables collected for each objective equipment to be controlled. Here the objects and network variables are outlined, and the relationship with air conditioners is explained. For the detail of each object and the specification of the network variables, please refer to the "Network Variables Specification" of each product.

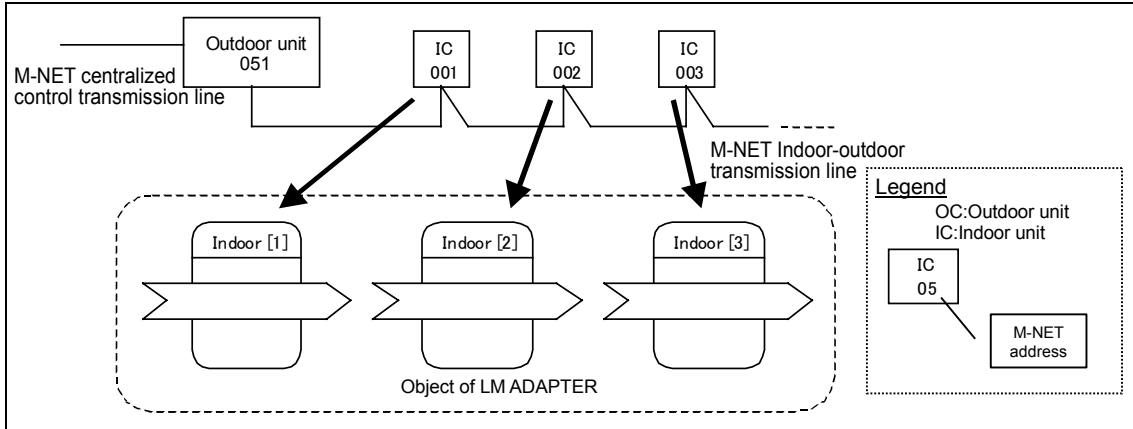
#### (1) Object configuration of LM ADAPTER



<sup>1</sup> Restriction will be applied depending on the quantity of system controllers or local remote controllers. For detail, please refer to the DATA BOOK and the other manual.

(2) Object and equipment address

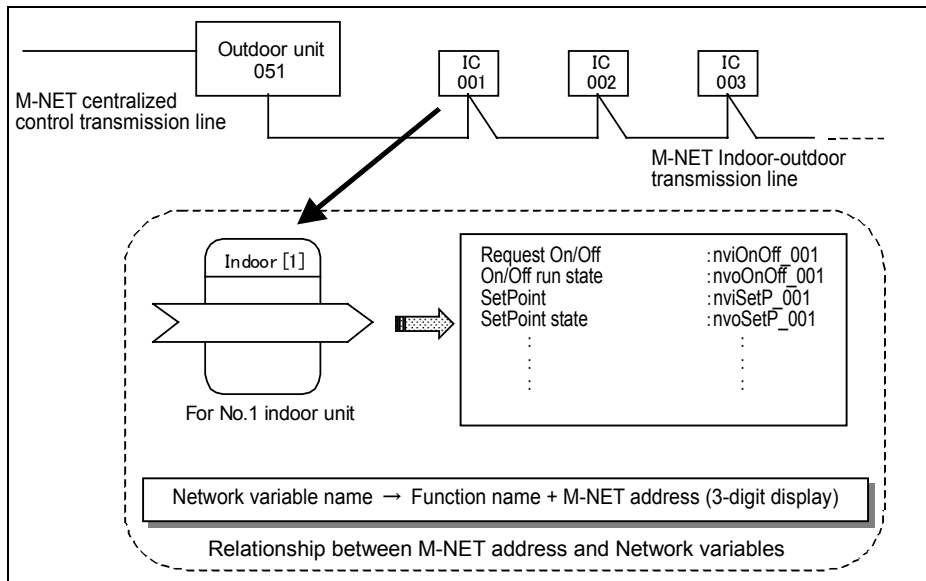
The object for indoor units is individually related with the objective equipment for control. The object (Indoor [1] ~ Indoor [50]) corresponds to the indoor unit (LOSSNAY, ventilation unit, Mr. SLIM) with the M-NET address of 01 ~ 50 being set to each equipment.



4.4.2 Network variables and air conditioner address

LM ADAPTER owns the network variables for each air conditioner. The network variables include set/monitor of an air conditioner individually and to set/monitor of all air conditioners collectively.

Please set so that the M-NET address of the objective air conditioner for control will agree to the name of the variable.



## 4.5 Restrictions on system configuration

The restrictions in constructing the system by LM ADAPTER are outlined here.

### 4.5.1 Restrictions by objective models for control

#### (1) Control of LOSSNAY (including OA processing unit and ventilation unit with LOSSNAY adapter)

- ① LOSSNAY can be operated interlocking with air conditioners on M-NET. As the interlock setting cannot be executed with LM ADAPTER, set it with other system controller or local remote controller (ME remote controller: PAR-F27MEA). In this case, the setting of the function setting SW (DIP- SW1-5) on LM ADAPTER should be changed.
- ② As the controllable function differs, please configure a system so that the individual operation of LOSSNAY and the equipment interlocked (with air conditioner) are not mixed within the control range of LM ADAPTER.
- ③ If the individual operation and interlocked operation of LOSSNAY is desired to switch over depending on the seasons, set LOSSNAY for individual operation, while set it to be operated interlocking with the air conditioner at the BMS side also.

### 4.5.2 Restrictions by system configuration

#### (1) Group control

In the case when the group setting of indoor units are carried out by the local remote controller or system controller, the operation from the BMS is performed as follows.

Group setting	Operation		Monitoring	
	LMAP02-E	LMAP03	LMAP02-E	LMAP03
No setting (individual)	every unit		every unit	
Setting by the local remote controller	every unit Required to issue a same command to all indoor units		every unit	
Setting by the system controller	every unit Required to issue a same command to all indoor units	Principal <sup>1</sup> unit in the same group When using "Forced Thermostat OFF" is required to request into indoor units individual	every unit	

### 4.5.3 Restrictions by control items

#### (1) Operation prohibit

- ① When using together the system controller that can set to prohibit the local remote controller operation, make the controller for setting of operation prohibit one unit, either LM ADAPTER (BMS) or the system controller.
- ② Operation prohibit can not be applied to other system controllers by LM ADAPTER (from BMS)
- ③ Although air conditioners can not be operated by the local remote controller of which operation is being prohibited, they can be operated by LM ADAPTER (BMS) or other system controllers.

<sup>1</sup> At the unit of lowest address in the same group

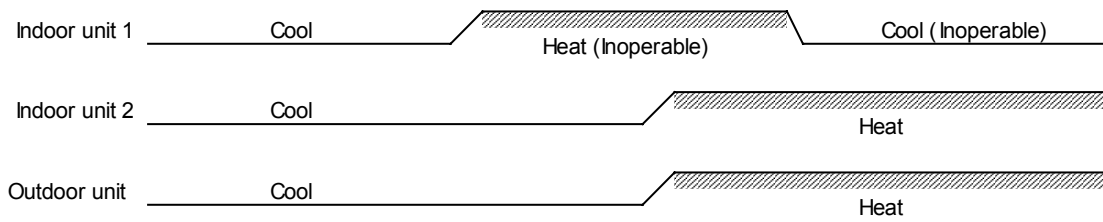
(2) Emergency stop

The emergency stopping of LM ADAPTER stops all air conditioners together, however it does not set the operation prohibit of the local remote controller allowing the operation from other system controller or local remote controller. To prohibit operation from the local remote controller, therefore, set it by entering [Request Collective Local Prohibit] (collective).

\*Operating to run during emergency stopping only results in immediate stopping.

(3) Operation mode

In the case of cooling/heating selectable models of CITY MULTI, the operation mode will be determined by the principle of the "Priority for former pressing." Under the circumstance, a same command should be issued to all indoor units within a same refrigerant system to change the operation mode.



## 5. Design and Operation of LONWORKS System

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This section introduces the mechanism, function and operating method of LM ADAPTER in configuring the system of LONWORKS network by LM ADAPTER. As the operating method shown here represents just one of the examples, you are kindly requested to carry out your designing to meet the system configuration or operation in the actual system.

### 5-1 Constructing the LONWORKS network

The flow of installation procedure for LONWORKS network is shown below.

**Step 1: Addressing (to determine the address of each node)**

**Step 2: Binding (to connect network variables)**

**Step 3: Configuration (for optimum service of each connection, adjustment of re-transmission frequency and interval)**

#### (1) Addressing

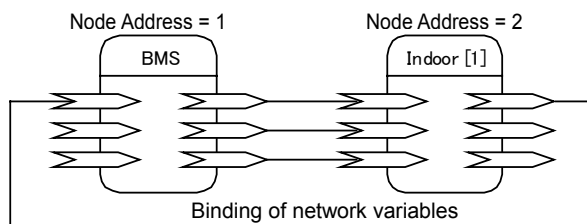
An address is assigned to each node (equipment applicable to LONWORKS) on the LONWORKS network. Set this address by using the install tool. Setting by using LM ADAPTER is not necessary.

#### (2) Binding

The network variables between each node should be related with the exclusive tool like LonMaker for Windows ® or the like.

#### (3) Configuration

For the configuration property of LM ADAPTER, the initial value was set at factory shipment. The set value may be changed depending on the configuration or operation of the network.



## **5.2 Function relating to installing**

### **(1) Service pin (Service switch)**

The service pin is used at the installation of LONWORKS network.

Pressing the service pin sends out the service pin-message (control message including Neuron ID and Program ID) to the network.

### **(2) Service LED**

The service ID indicates the present state of the product.

In the case of LM ADAPTER under the shipment state (Non-configured state), the service LED is blinking.

### **(3) WINK**

Upon receipt of the WINK message from the LONWORKS network, LM ADAPTER blinks the maintenance LED 001 for about 10 seconds.

### **(4) Commission**

After completing the binding, the set detail is reflected on the node. Doing this way allows communication between the nodes on the LONWORKS network.

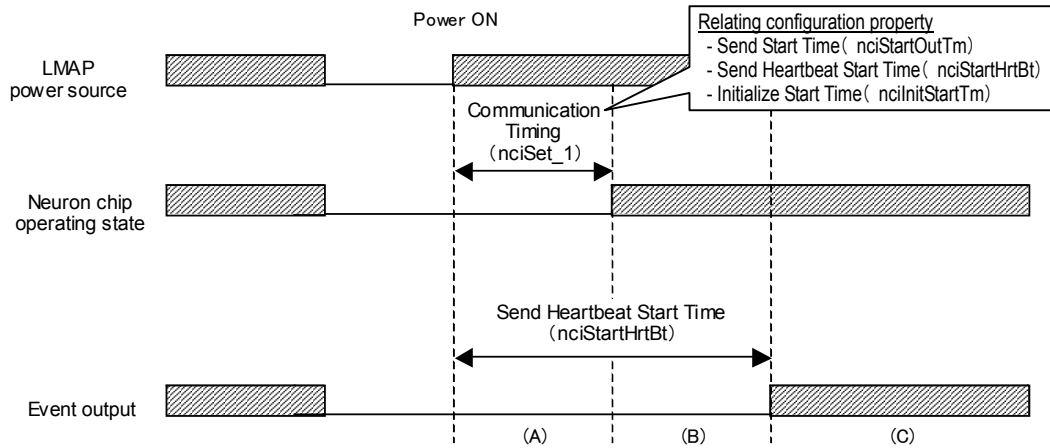
### **(5) XIF**

To design the LONWORKS network, the configuration information of each node, interface (network variables), etc. are required. When the product is already in your hand, such information can be obtained from the LONWORKS network. Without the product, however, you may get it from XIF (eXternal Interface File) locating the interface information of the product.

## 5.3 Operation at power recovery

### 5.3.1 Outline of LM ADAPTER operation

After the power source is applied (the same as the power recovery after instantaneous power stop/power failure), LM ADAPTER requires a time for initialization to collect the connection and operation state of air conditioners up to 50 sets to be controlled. As the operation timing differs depending on the setting of configuration property, you are kindly requested to carry out designing to meet the system operation.



	(A)	(B)	(C)
Operation/setting from BMS	Not applicable	Applicable	Applicable
Monitoring by Poll (Fetch) from BMS	Not applicable	Applicable	Applicable
Output from LM-AP at changing	Not applicable	Not applicable	Applicable



### 5.3.2 Setting relating to operation after power recovery

#### (1) Setting of Neuron Chip communication start time <sup>1</sup>

The communication start timing of NC can be set through "Communication Timing 【nciSet\_1】".

##### ① "initialize"

Upon completion of the connection between LM ADAPTER and air conditioner, NC starts operation. Up to this time, NC will not reply (even without returning of Ack).

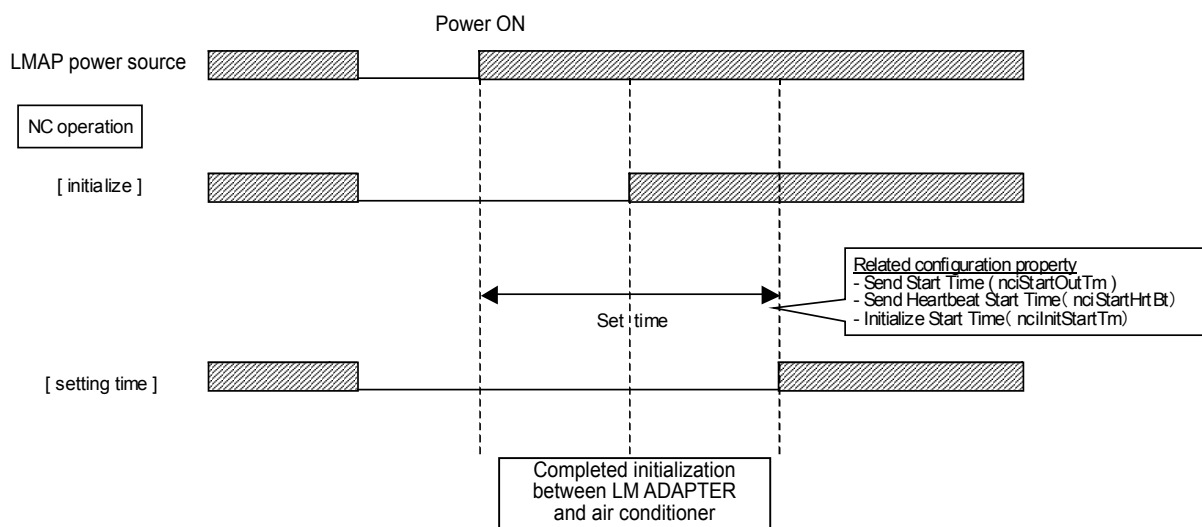
This operation is specifically used to acquire the state of air conditioners by Poll (Fetch) demand.

##### ② "setting time"

Synchronized with the shortest time among the set times of the configuration property below, NC starts operation. Up to this time, NC will not reply (even without returning of Ack).

This operation is specially used to acquire the state of air conditioners by event (at changing) output.

- Send Start Time 【nciStartOutTm】
- Send Heartbeat Start Time 【nciStartHrtBt】
- Initialize Start Time 【nciInitStartTm】



#### (2) Setting of start time relating to event output

The start timing of event output after power recovery can be set by the configuration property shown in the table below.

Items	Set detail and operation
Send Start Time 【nciStartOutTm】	The timing to start output at changing is set. Up to the time passing the set time after power recovery, LM ADAPTER does not output the variables even when the status of the air conditioner changes. During this time, the air conditioner can be operated/set.
Send Heartbeat Start Time 【nciStartHrtBt】	The timing to start the automatic updating (periodical status notice) from LM ADAPTER is set.
Initialize Start Time 【nciInitStartTm】	The timing to start the initial output is set. To match the image of the operation information on air conditioners held by BMS and that of the actual operation status, LM ADAPTER automatically outputs the status of the air conditioners after power recovery.

<sup>1</sup> LMAP02-E could not be set with communication start time. It initializes communication under the timing of "Synchronized with air conditioner initialization."

### (3) Setting to match images

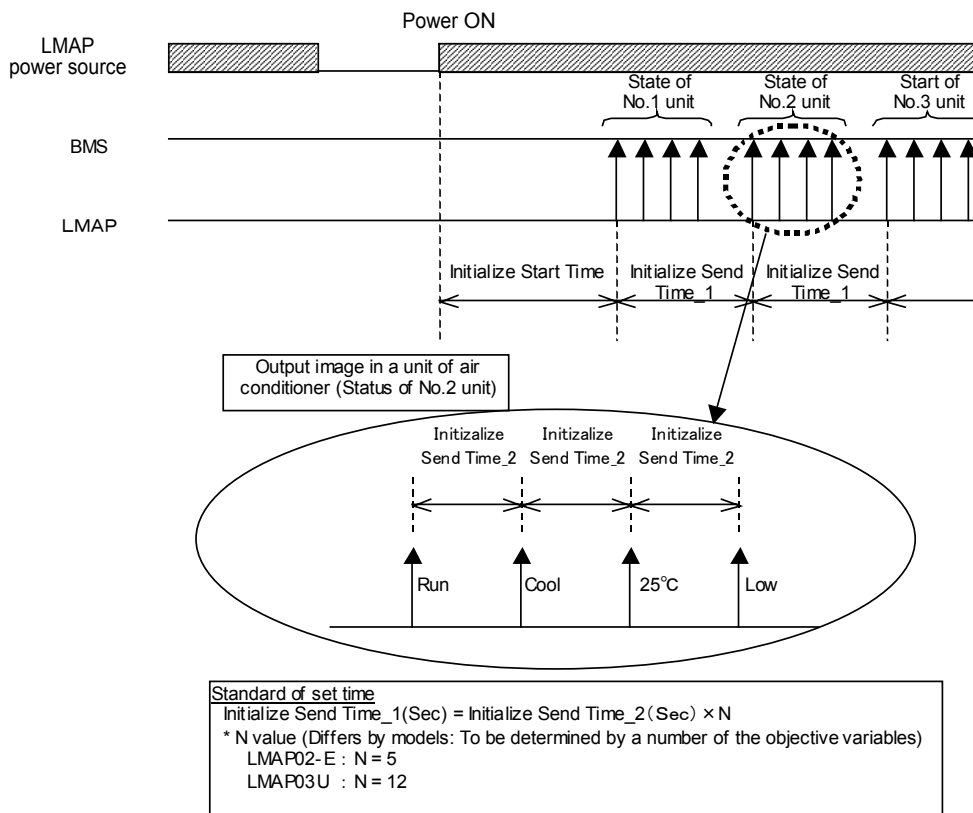
The state of an air conditioner before power failure and after power recovery may differ sometimes <sup>1</sup>. In such case, the operation state of the air conditioner held by the BMS differs from the actual operation state of the air conditioner. In order to match the image after power recovery, LM ADAPTER can be set enabling the initial output to match the image at a time when a certain time has elapsed after power recovery.

#### ▽ Relating configuration property

Items	Set detail and operation
Initialize Start Time 【ncilnitStartTm】	Explained before
Initialize Send Time_1 【ncilnitOutTm_1】	The transmission interval of each air conditioner is set respectively. The variable firstly output by each air conditioner (operation state output) keeps the set interval for output.
Initialize Send Time_2 【ncilnitOutTm_2】	The transmission interval of each variable is set respectively. Each variable of each air conditioner is output keeping this set interval.

#### ① Outline of operation

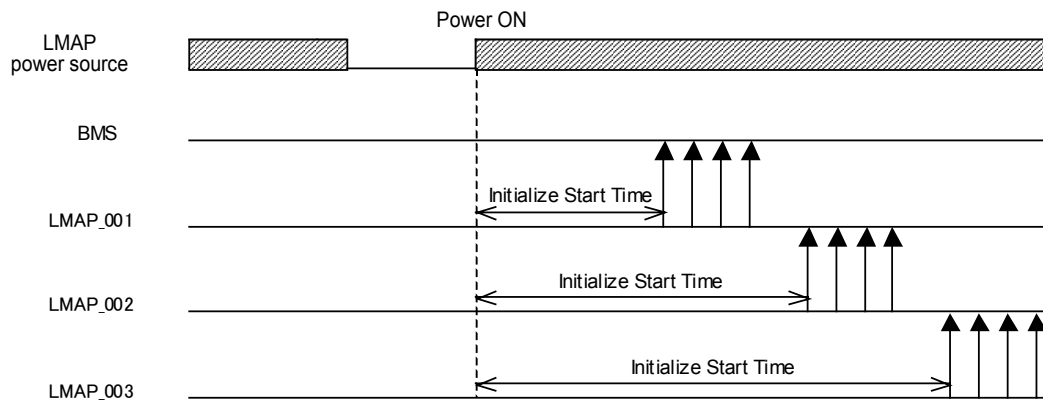
When “Initialize Start Time 【ncilnitStartTm】” has passed, the state variable of air conditioners will be output from No.1 unit in order. The transmission interval of each variable will be that being set by the configuration property. When the initial output time per each unit exceeds “Initialize Send Time\_1【ncilnitOutTm\_1】”, the variable of the next indoor unit will be output after completing the output of the variable of the indoor unit immediately before.



<sup>1</sup> Through the setting of air conditioners, the operation after power recovery ( Power ON/OFF, / Automatic recover / Normal <Stop> ) can be set.

②Setting for plural unit installation

When conducting initial output by installing plural LM ADAPTERs on a same system, stagger the start time of the initial output in setting to avoid the concentration of each output.



<p>Standard of set time (for LMAP_002)</p> <p>Initialize Start Time(LMAP_002) = Initialize Start Time(LMAP_001) + <math>T_i \times m</math></p> <p>Maximum control address value of LMAP_001 : m(1 to 50)</p> <p>Initialize Send Time_2 of LMAP_001 : <math>T_i</math></p>
--

## 5.4 Response restrictions on Poll (Fetch) demand

Upon receipt of Poll (Fetch) demand from the BMS, LM ADAPTER responds with the latest value of the corresponding variable.

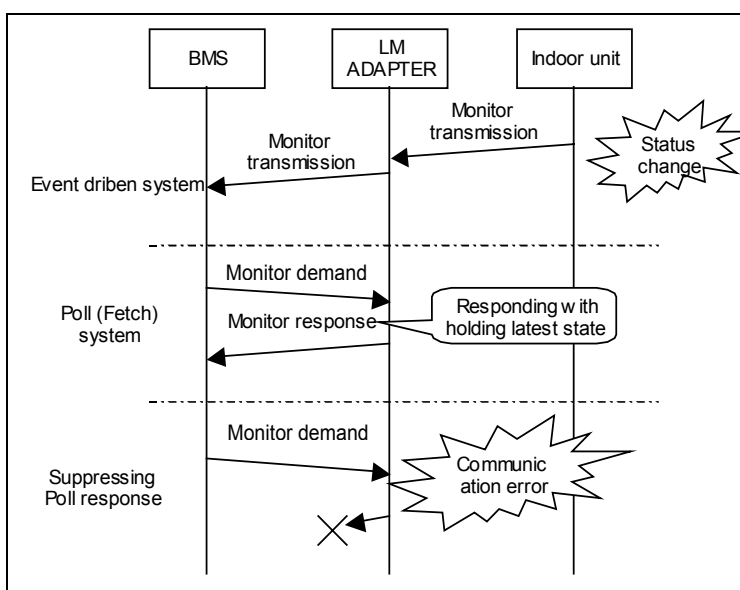
As the operation status being held will be responded at power shutdown due to air conditioner inspection or communication error caused by the disconnection of M-NET transmission line, the error cannot be judged by the BMS.

When the present data being held is uncertain as is in such case, LM ADAPTER can be set so that error generation can be judged easily by suppressing the response against Poll (Fetch) demand.

- ① Suppressing the response of unconnected indoor units.
- ② Suppressing the response of indoor units unable to communicate.

This setting is to follow the configuration property below.

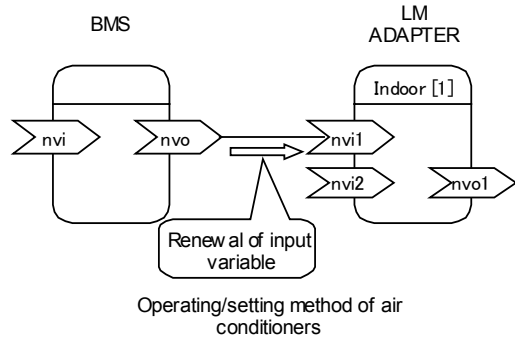
Effective PollFetch【nciPollFetch】



## 5.5 Operation/setting of air conditioner

### 5.5.1 Operation/setting method

For the operation/setting of air conditioners, please renew the value of the input variable of LM ADAPTER.

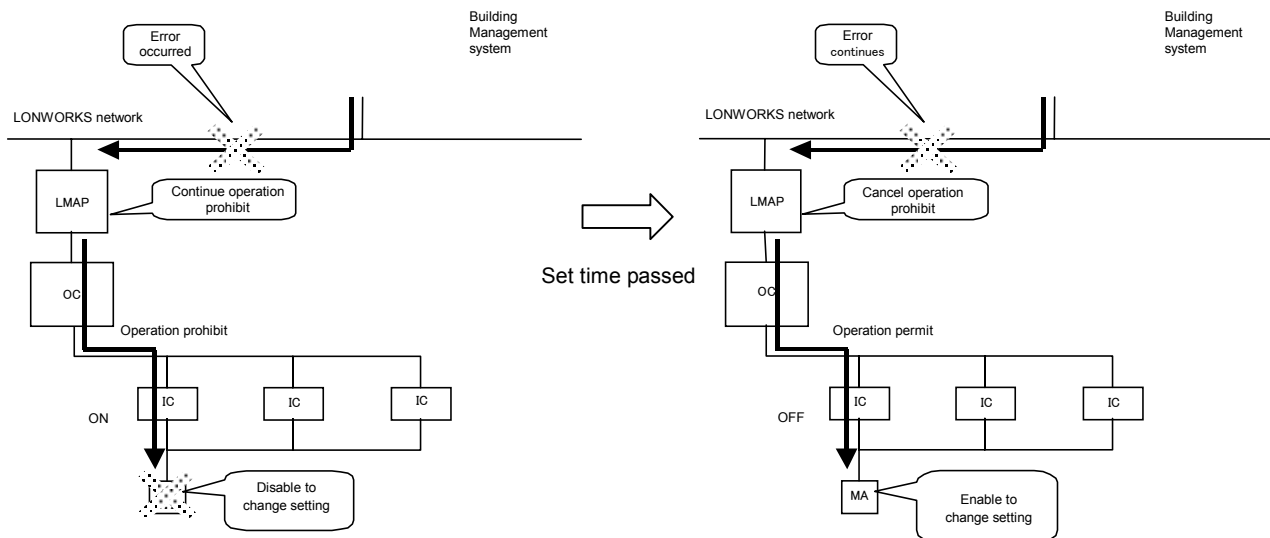


### 5.5.2 Function requiring periodical renewal (Receive Heartbeat, Effective Time)

When setting cannot be cancelled by the local side at the communication error caused by some reason from the BMS side, a function is available to cancel the setting when the communication from the BMS side pauses for a certain time. To continue the setting, it is required to update the input variable again within the set time.

#### ▽ Relating configuration property

Items	Set detail and operation
Receive Heartbeat_1 (Local Prohibit) 【nciRcvHrtBt_1】	The setting is cancelled when the set time is passed after previous receiving.
Receive Heartbeat_2 (Forced Thermostat OFF) 【nciRcvHrtBt_2】	The setting is cancelled when the set time is passed after previous receiving.
Effective Time_1 (Emergency Stop) 【nciEffectTm_1】	Effective request is continued over the set time. The setting cannot be cancelled until the effective time is over.
Effective Time_2 (Collective Local Prohibit) 【nciEffectTm_2】	Effective request is continued over the set time. The setting cannot be cancelled until the effective time is over.

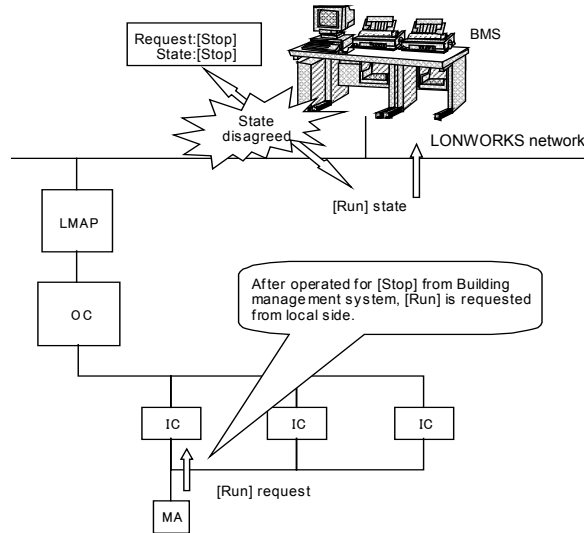


### 5.5.3 Function allowing operating/setting at local side

When using a remote controller together to operate air conditioners locally by user, the same function can be operated/set at both the master system side and the local side. In this case, the "Priority is given to the later pressing" is a principle. Please carry out to configure the LONWORKS system taking the following into consideration.

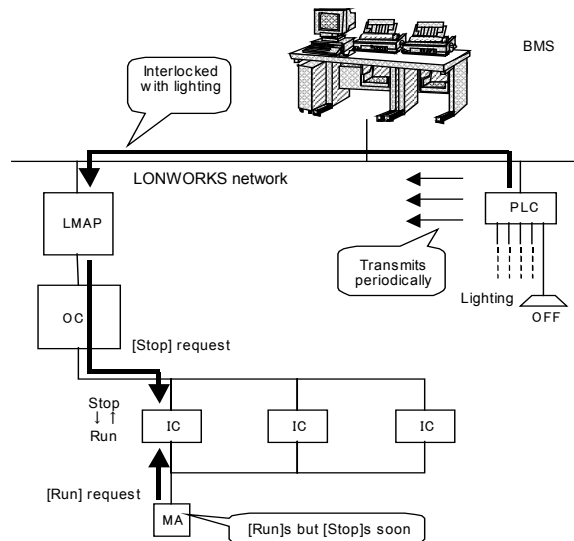
#### (1) Disagreement of state

Problem	Disagreement of state may occasionally be detected when setting is changed by the local side including the local remote controller after operating/setting of the BMS.
Measure taken by BMS side	Avoid detecting for the disagreement of the state.



#### (2) Periodical transmission from master system

Problem	When receiving run request from equipment (like PLC) with the function of periodical transmission (Send Heartbeat), the setting of the local side like remote controllers may not be reflected (or seems to be not reflected) on the air conditioners.
Measure taken by BMS side	Try to transmit (renew) a request only at a time of changing. <Example actions> - Make the periodical transmission (Send Heartbeat) invalid. - Fetch it once by the BMS, and renew the variable of LM ADAPTER.



## 5.6 State monitoring

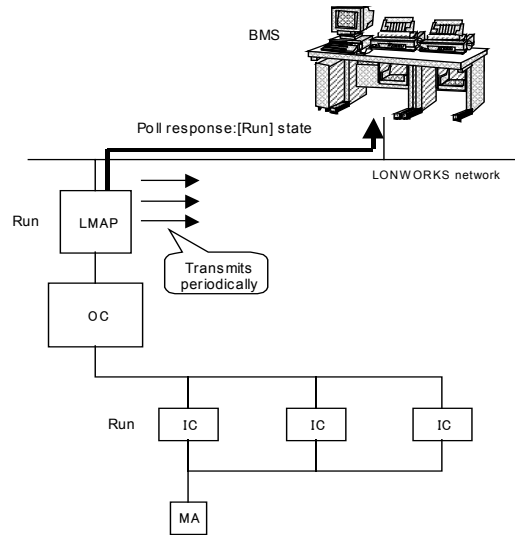
### 5.6.1 State monitoring method

The method to monitor the operation state of air conditioners from the BMS via LM ADAPTER can roughly be classified into two systems, namely (1) Event driven system and (2) Polling system. The configuration property for setting differs depending on the systems.

	Event driven system	Polling system
Operation outline	State is automatically output from LM ADAPTER at the change of air conditioner status (event generation).	Regardless of air conditioner state changes, the variable is directly acquired through polling or fetching from the BMS at any time.
State change output timing	At state change of air conditioner	At Poll (Fetch) demand
Condition	Each variable of both BMS and LM ADAPTER should be bound.	Polling cycle is determined taking the following into consideration. ①Communication traffic of whole LONWORKS network ②Response performance of LM ADAPTER
Communication image	<pre> sequenceDiagram     participant BMS     participant LM-AP     participant Air conditioner     Note over Air conditioner: Stop     Air conditioner-&gt;&gt;LM-AP: State: stop     LM-AP-&gt;&gt;BMS: stop     Note over Air conditioner: Run     Air conditioner-&gt;&gt;LM-AP: State: run     LM-AP-&gt;&gt;BMS: run           </pre>	<pre> sequenceDiagram     participant BMS     participant LM-AP     participant Air conditioner     Note over BMS: Poll cycle     BMS-&gt;&gt;LM-AP: Poll demand     Air conditioner-&gt;&gt;LM-AP: State: stop     LM-AP-&gt;&gt;BMS: stop     Note over BMS: Poll cycle     BMS-&gt;&gt;LM-AP: Poll demand     Air conditioner-&gt;&gt;LM-AP: State: run     LM-AP-&gt;&gt;BMS: run           </pre>
Relating nci	nciStartOutTm【Send Start Time】 nciStartHrtBt【Send Heartbeat Start Time】 nciMinOutTm【Minimum Send Time】 nciSndHrtBt_1【Send Heartbeat_1】 nciSndHrtBt_2【Send Heartbeat_2】 nciInitStartTm【Initialize Start Time】 nciInitOutTm_1【Initialize Send Time_1】 nciInitOutTm_2【Initialize Send Time_2】 nciSet_1【Communication Timing】	nciPollFetch【Effective PollFetch】 nciOffline【Effective Offline Mode】 nciSet_1【Communication Timing】

### 5.6.2 Setting of periodical state notification (Send Heartbeat)

Purpose	In the case of the event driven system, there is no chance to renew the state until facing the next event generation if an unexpected omitting was incurred carelessly. During this time, the air conditioner status being held by the BMS and that of the actual are different.
Countermeasure	Set to conduct the periodical state notification (Transmission heartbeat: Send Heartbeat).
Setting nci	nciSndHrtBt_1【Send Heartbeat_1】 nciStartHrtBt 【Send Heartbeat Start Time】





## 5.7 Measurement (Analog value)

### 5.7.1 Measuring method

The same as the state output of air conditioners, the state will be informed from LM ADAPTER at state change or periodically.

### 5.7.2 Condition setting for state output

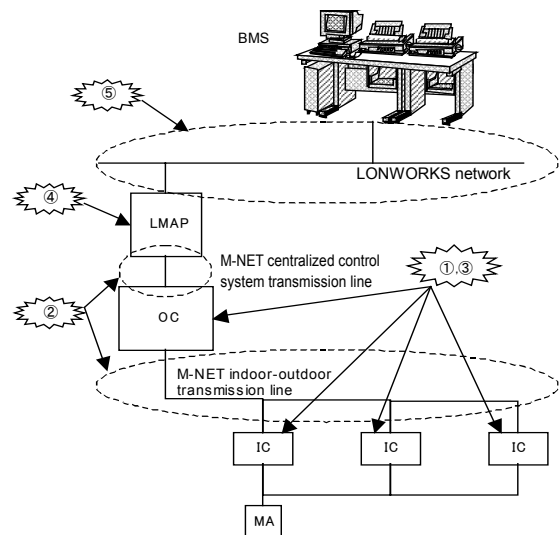
	Condition setting of output at changing	Setting of periodic state notification
Purpose	As the analog value such as the room temperature varies continually, frequent outputs are presented at changing. To suppress this, set to provide the event output only at the occurrence of a certain change.	The variation range of the room temperature decreases as the temperature is stabilized. For this reason, set to provide the state notification periodically as the measurement can not be performed only by the output at changing.
Countermeasure	Set the variation range of analog value. The variation range below the set value will not be applied with the event output.	Set the transmission interval. As the set time elapsed, the present value is automatically output.
Communication image	<p>In case of variation range = 10 °C</p>	<p>In case of variation range = 1.0 °C</p>
Setting nci	nciAnalogWidth 【Spacetemp Width】 nciAnlgMonTm 【Monitoring Time】	nciSndHrtBt_2 【Send Heartbeat_2】 nciStartHrtBt 【Send Heartbeat Start Time】

## 5.8 Trouble/alarm monitoring

The trouble/alarm that can be monitored with LM ADAPTER can mainly be classified as follows.

(Note: It differs depending on the types of LM ADAPTER)

- ① Trouble of equipment such as air conditioners and remote controllers
- ② Network fault of M-NET
- ③ Alarm due to improper air conditioning
- ④ Trouble of LM ADAPTER
- ⑤ Fault of LON network



Section in trouble	Symptom	Monitoring method	Relating nci
①③ Air conditioning equipment	Trouble of relating equipment such as air conditioner/remote controller	1) Network variable (Error)	1) None
② M-NET communication	Unable to communicate between LM ADAPTER and objective equipment for control	1) Network variable (Error) 2) Presence of Poll response	1) None 2) nciPollFetch (Effective PollFetch)
④ LM-AP	Trouble of LM ADAPTER itself	1) Node object 2) Presence of response (including Ack)	1) & 2) nciSet_1 (Communication Timing)
⑤ LON communication	Unable to perform the communication of LONWORKS network	1) Node object 2) Presence of response (including Ack)	1) & 2) nciSet_1 (Communication Timing)

### 5.8.1 Trouble/alarm monitoring by network variables

#### (1) Trouble and alarm of air conditioner - - - ①,③

Air conditioning equipment in trouble will be informed to the BMS by the network variables via LM ADAPTER. In case when the local remote controller or system controller is installed, the detail of the trouble will be displayed.

##### Detecting method of trouble

- Trouble of indoor unit : Error output from individual indoor unit
- Trouble of outdoor unit : Error output from all indoor units within a same refrigerant system

#### (2) Communication fault of M-NET (including power failure) - - - ②

When the communication (M-NET) between LM ADAPTER and air conditioner is disabled, LM ADAPTER monitors the communication with the air conditioner for a certain time, and informs you about a communication error if abnormality is detected.

##### Detecting method of M-NET communication error

- Network variables (collective for all indoor units) exclusive for communication error
- Response to Polling (by "Effective PollFetch 【nciPollFetch】")

### (3) Resetting of trouble/alarm

The resetting method differs depending on the equipment generating trouble/alarm.

#### Trouble of indoor unit

Switches over the indoor unit in trouble from [Run] to [Stop].

#### Trouble of outdoor unit

Switchovers all indoor units in the refrigerant system from [Run] to [Stop].

### 5.8.2 Health check of LM ADAPTER - - - ④,⑤

Several factors can be considered as the cause to disable the communication of the master system with LM ADAPTER. Depending on the function of the BMS or the system configuration, conduct health check (to judge the life) by combining each detecting method.

#### (1) Detection by Node Object

The Node Object is an exclusive variable to conduct health check (to judge the life) on LM ADAPTER. This is effective when the application of LM ADAPTER is crashed under the condition allowing LON communication, or to detect the recovery timing of power failure.

The node object uses the input variable **【nviRequest】** and output variable **【nvoStatus】** in a pair. The output variable returns the value corresponding to the requested value when only the input variable is renewed. The response can be performed if the application is working regardless of the status of the local side (M-NET).

#### (2) Detection by effectuation of communication

When Ackd is used as the communication service of LON communication, the fault of LON communication can be monitored by the presence of Ack. However for the generating spot of the communication error, it is required to judge comprehensively taking the communication status of other node into consideration.

## 5.9 Emergency stop

In the case when air conditioners are stopped (emergency stop) collectively, it is considered that the communication with the master system may not be performed after stopping. For this reason, the present status will be maintained until “Effective Time\_1【nciEffectTm\_1】” has passed once emergency stop was received. Even after releasing the emergency stop, the air conditioner will continue to stop unless receiving the run request.

## **APPENDIX 1. Outline of Functions – Network Variables**

### **- Models**

**LMAP02-E**

**LMAP03**

### **- Functions**

**「ON/OFF」**

**「Mode」**

**「Thermostat ON/OFF state」**

**「Filter Sign Reset / Run Time for Filter」**

**「LOSSNAY Mode」**

**「Error state」**

**「Collective Alarm」**

**「Collective ON/OFF」**

**「Local Prohibit」**

**「Collective Local Prohibit」**

**「Local Remote Controller Setting」**

**「Space Temperature」**

**「Set Point」**

**「Fan Speed」**

**「Forced Thermostat OFF」**

**「Emergency Stop」**

**「Model Code」**

**「Collective Alarm for LM ADAPTER」**

**「Defrost state」**

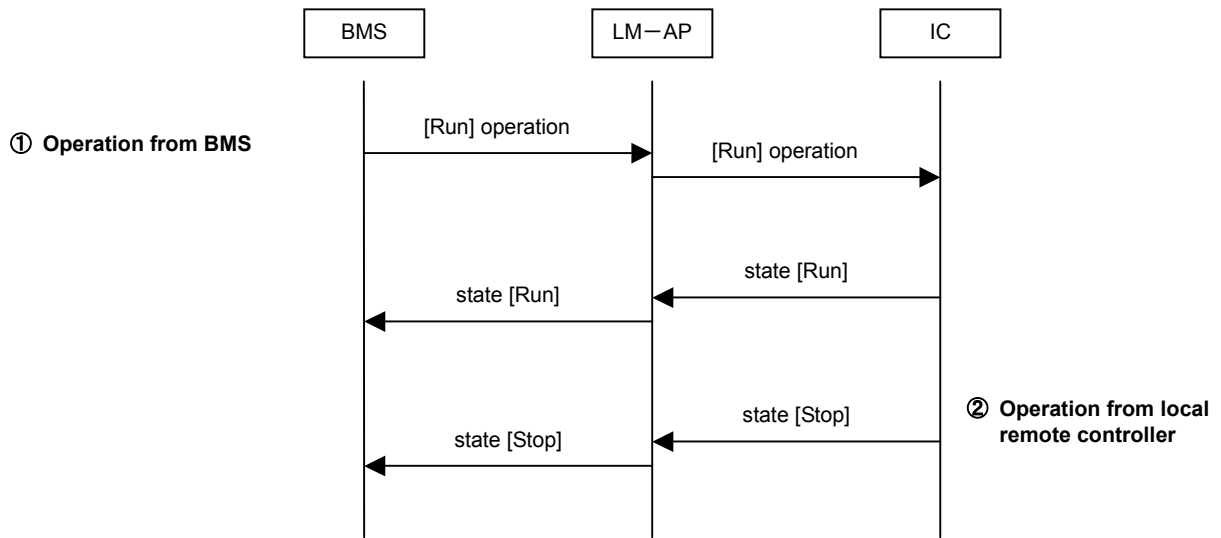
**「Group Number」**

# Function - [ ON/OFF ]

LMAP02-E
LMAP03

Function	[Request On/Off] [On/Off run state]
Description	The run/stop operation and state of indoor units or ventilation units (individual operation without interlocking) are monitored. In the case of the ventilation unit interlocked with the indoor unit, the operation will run/stop interlocking with the indoor unit being registered for interlocking.
Using NV	【nviOnOff_n】【nvoOnOff_n】
Control unit	Indoor unit
Outline of operation	"Indoor unit" will run/stop for each unit individually. "Ventilation unit (individual)" will run/stop for each unit individually. "Ventilation unit (interlocked)" will run/stop interlocking with the unit being registered for interlocking. There is no need to control the operation and to monitor the state.

## Communication Image



### Restrictions

- Operation control during emergency stopping (LMAP03 only)

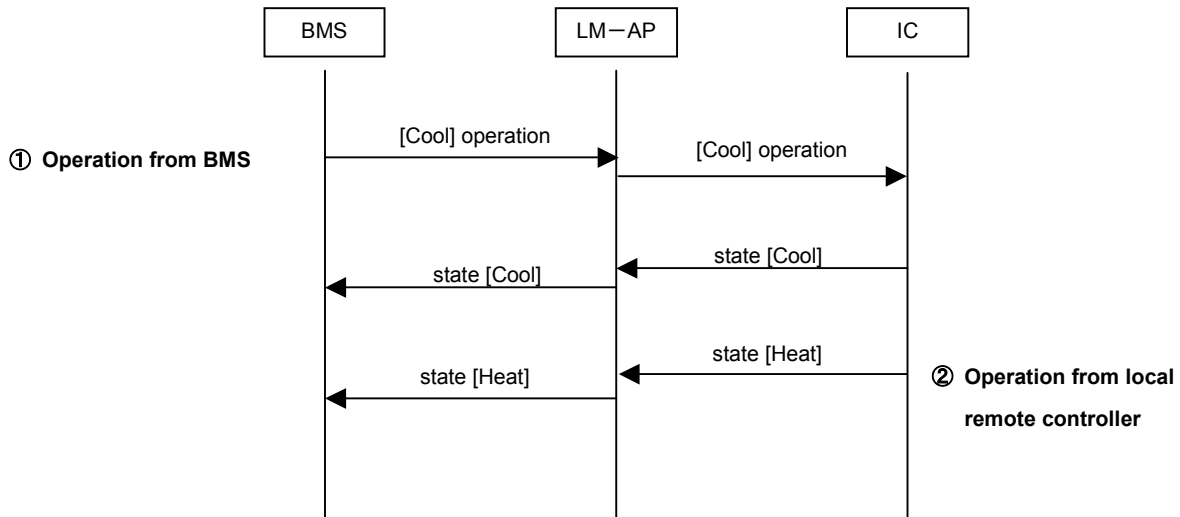
During the emergency stopping in valid, the operation control by the LonWorks network will be invalid.

# Function - [Mode]

LMAP02-E  
LMAP03

Function	[Request Mode] [Mode state]																						
Description	The operation mode control and state of the indoor unit are monitored.																						
Using NV	【nviMode_n】 【nvoMode_n】																						
Control unit	Indoor unit																						
Outline of operation	<p>"Cooling only unit", "Heat Pump (Y unit)" Within a same refrigerant system, the mixed operation of cooling and heating can not be performed. "Priority is given to the former pressing."</p> <p>"Heat Pump (R2 unit)" Within a same refrigerant system, cooling and heating operation can be mixed. "Priority is given to the later pressing."</p>	<p>Within a same refrigerant system, mode operation can be mixed.</p> <table border="1"> <thead> <tr> <th></th> <th>Cooling only unit</th> <th>Y unit</th> <th>R2 unit</th> </tr> </thead> <tbody> <tr> <td>Auto</td> <td>--</td> <td>--</td> <td>All</td> </tr> <tr> <td>Cool/Dry</td> <td>Fan</td> <td>Fan</td> <td>All</td> </tr> <tr> <td>Heat</td> <td>--</td> <td>Fan</td> <td>All</td> </tr> <tr> <td>Fan</td> <td>Cool</td> <td>Cool/Heat</td> <td>All</td> </tr> </tbody> </table>			Cooling only unit	Y unit	R2 unit	Auto	--	--	All	Cool/Dry	Fan	Fan	All	Heat	--	Fan	All	Fan	Cool	Cool/Heat	All
			Cooling only unit	Y unit	R2 unit																		
Auto	--	--	All																				
Cool/Dry	Fan	Fan	All																				
Heat	--	Fan	All																				
Fan	Cool	Cool/Heat	All																				

## Communication Image



### Restrictions

- How to determine the operation mode

In the case of CITY MULTI air conditioners (models exclusive for cooling and that for cooling/heating selectable), priority is given to the operation mode (Cooling-Dry/Heating) formerly adapted to the indoor unit within a same refrigerant system. ("Priority is given to the former pressing.") To change the operation mode, therefore, change the operation mode of all indoor units within a same refrigerant system simultaneously.

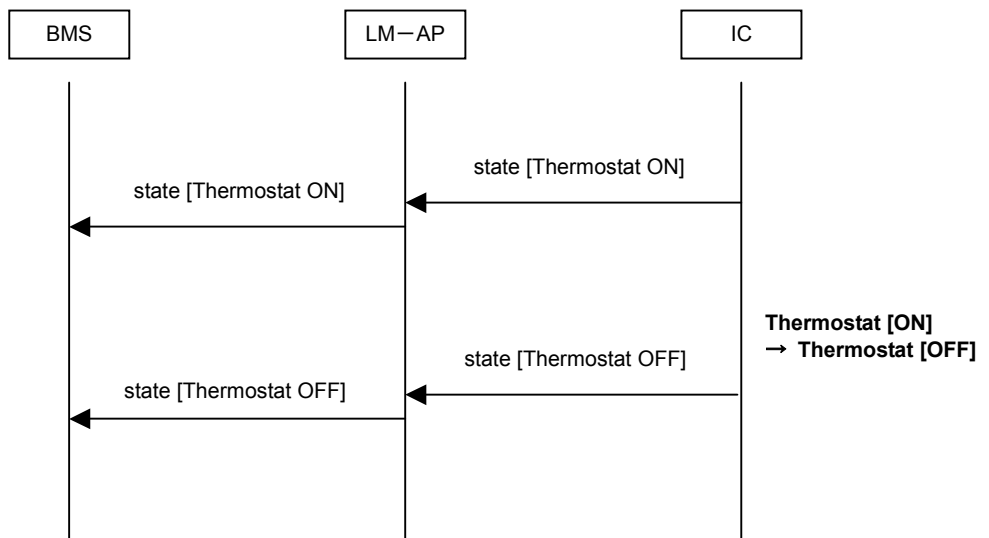
For the models of cooling/heating simultaneous operation, the indoor unit operating for cooling (drying) and that for heating can be mixed in a same refrigerant system. ("Priority is given to the later pressing.")

# Function – [Thermostat ON/OFF state]

LMAP02-E  
LMAP03

Function	[Thermo On/Off state_1] [Thermo On/Off_2]
Description	Monitoring the thermostat state of indoor units, run/stop state, and the state of auxiliary heater for heating.
Using NV	LMAP02-E: [nvoThermo_n] LMAP03: [nvoThermoSt_n][nvoThermo_n]
Control unit	Indoor unit
Outline of operation	The thermostat status of each indoor unit is monitored. In the case of CITY MULTI, the compressor of the outdoor unit turns off if the thermostat of all indoor units within a same refrigerant system turn off. (It depends on the operating condition.) *While the thermostat is turned off forcibly, the thermostat OFF will be output. (LMAP03 only)

## Communication Image



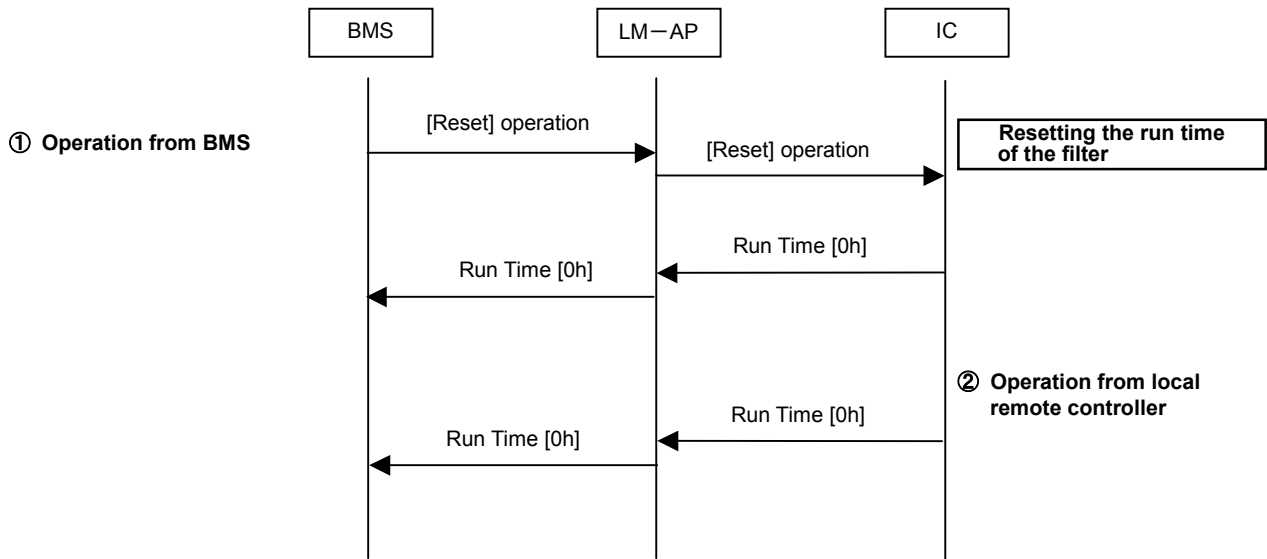
# Function – [Filter Sign Reset / Run Time for Filter]

LMAP02-E

LMAP03

Function	[Filter Sign Reset] [Run Time for Filter]
Description	Monitoring the integrated operation time of the filter. Resetting the filter sign information also.
Using NV	[nviFiltReset_n] [nvoOnTime_n]
Control unit	Indoor unit
Outline of operation	The filter sign resetting clears the filter sign and the filter operating integrated time. The filter sign of the local remote controller or the like will also be reset. The filter sign can be reset with the local remote controller or system controller.

## Communication



### Restrictions

- The Run Time for filter.
  - The filter cleaning period cumulative time and maximum value differ with model (Indoor unit, ventilation, etc...).
  - Continuous reset operation
- When reset operation is continuously carried out by local remote control or BMS, Run Time is reset each time.

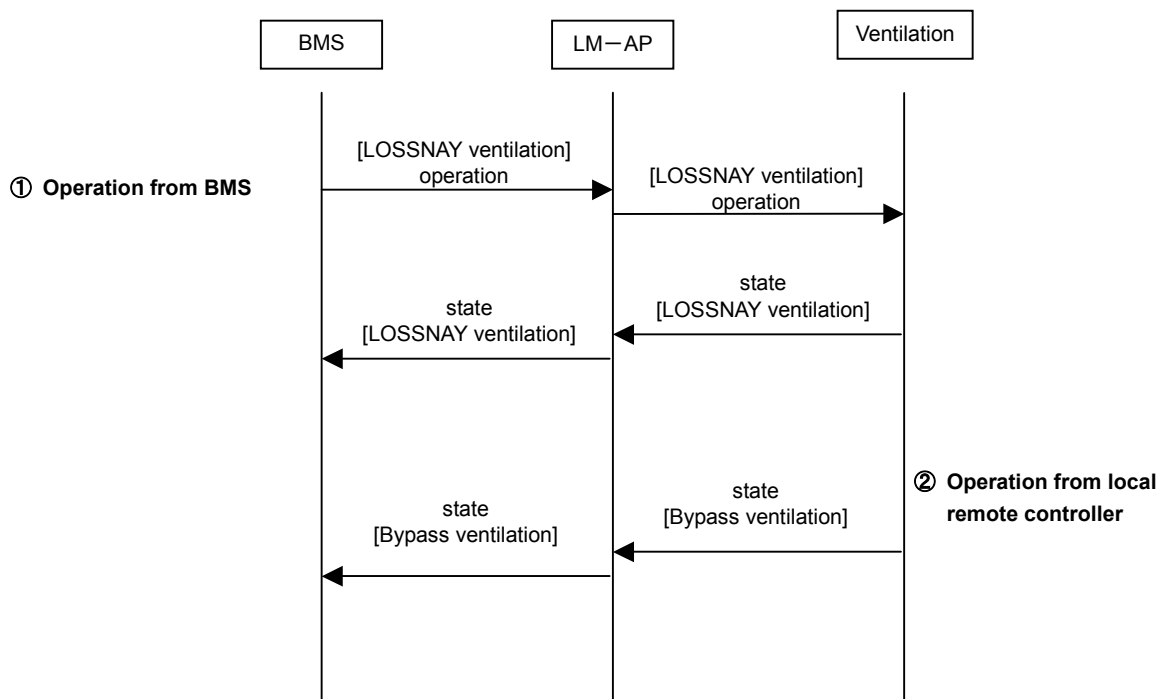


# Function – [LOSSNAY Mode]

LMAP02-E  
LMAP03

Function	[Request LOSSNAY Mode] [LOSSNAY Mode State]
Description	Switching over and monitoring the operation and state of the ventilation unit individually operated (not interlocked with indoor unit).
Using NV	【nviLCMode_n】 【nvoLCMode_n】
Control unit	Indoor unit
Outline of operation	The operation mode (LOSSNAY ventilation/bypass ventilation/automatic) is selected for each ventilation unit. However, the ventilation unit that used the LOSSNAY adapter can not be changed over to the automatic mode. The operation mode of the ventilation unit interlocked with indoor unit is determined by the operating condition of the indoor unit.

## Communication Image



### Restrictions

- The operation mode of the ventilation unit interlocked with indoor unit can not be changed over.
  - Determining measure of operation mode of ventilation unit interlocked with indoor unit
  - Operation from the Building management system, system controller, and remote controller is disabled. It is fixed to the automatic mode.
- However, the ventilation unit that the LOSSNAY adapter, operation mode is fixed to the LOSSNAY ventilation mode.

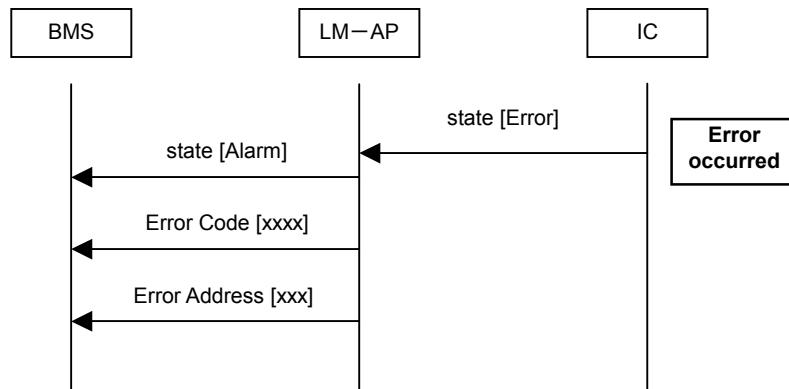
# Function – [Error state]

LMAP02-E  
LMAP03

Function	[Alarm State]
Description	Monitoring the error of the indoor unit or ventilation unit if any.
Using NV	[nvoAlarm_n]
Control unit	Indoor unit
Outline of operation	The error of the indoor unit and ventilation unit if any is output for each unit. The error of the outdoor unit if any is output by all indoor units within a same refrigerant system.

Function	[Error Code] [Error Address]
Description	Outputting the error detail (error code, generating source address) of the indoor unit or ventilation unit.
Using NV	[nvoErrCode_n] [nvoErrAdrs_n]
Control unit	Indoor unit
Outline of operation	For the error of the indoor unit and ventilation unit, the error code and generating source address are output for each unit. For the error of the outdoor unit, the error code and generating source address of the outdoor unit are output from all indoor units within a same refrigerant system. On the local remote controller or system controller controlling the unit generating an error, the error code and generating source address are displayed.

## Communication



### Restrictions

- Error output during stopping (All of the alarm, error code and error generating source)
- Under the stopping of air conditioner, ventilation unit, etc., error output from LM ADAPTER is disabled.
- Output of maintenance error
- The output of maintenance error (including intermittent fault checking) will not be done.
- For some ventilation units, the error (including all alarms, error codes and error generating source addresses) is disabled to output.

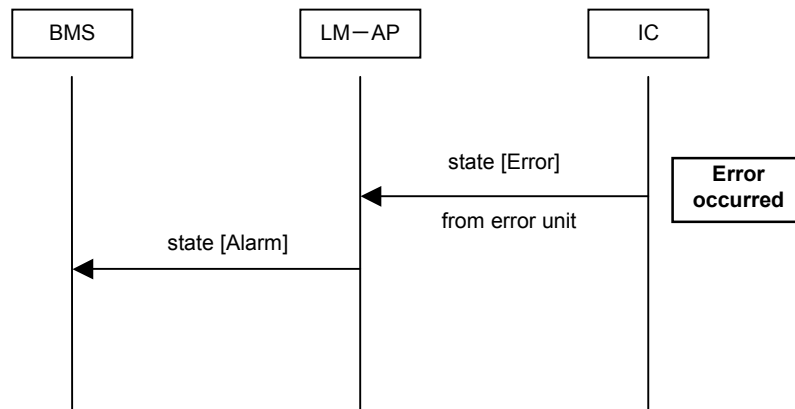
# Function – [Collective Alarm]

LMAP02-E

LMAP03

Function	[Collective Alarm for Indoor Unit]
Description	Monitoring the possible error of all units controlled by LM ADAPTER collectively.
Using NV	[nvoAllAlarm]
Control unit	All of indoor units controlled by LM ADAPTER
Outline of operation	The error will be output even if 1 set of indoor units or ventilation units being controlled by LM ADAPTER generates an error. The error will be output at the error of the outdoor unit. On the local remote controller or system controller controlling the unit with an error generated, the error code and generating source address are displayed.

## Communication



### Restrictions

- Error output during stopping

As the error judgment of air conditioners, LOSSNAY, etc. can not be applied during their stopping; the error output from LM ADAPTER is disabled accordingly.

- Output of maintenance error

The output of maintenance error (including intermittent fault checking) will not be done.

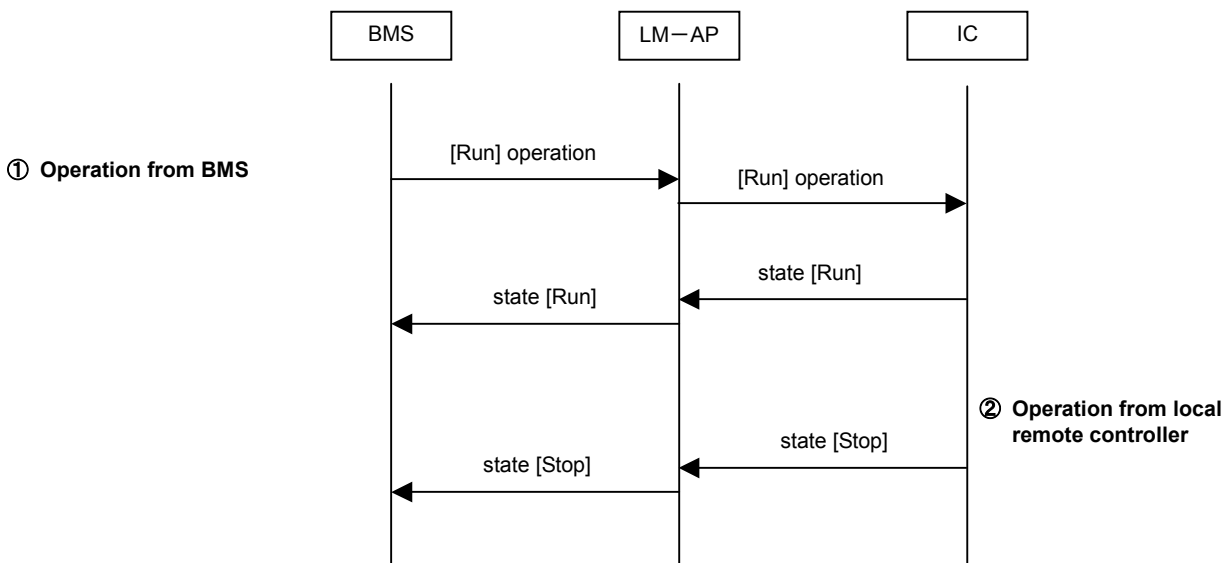
- For some ventilation units, the output of the error (including all alarms, error codes and error generating source addresses) is disabled.

# Function – [Collective ON/OFF]

LMAP02-E
LMAP03

Function	[Collective On/Off State]
Description	Monitoring the operation status of all units controlled by LM ADAPTER collectively.
Using NV	[nvoAllOnOff]
Control unit	All of indoor units controlled by LM ADAPTER
Outline of operation	The "Run" will be output even if 1 set of indoor units or ventilation units being controlled by LM ADAPTER is operating. The "Stop" will be output at the stopping of all units.

## Communication Image



### Restrictions

- State output of ventilation unit interlocked with indoor unit

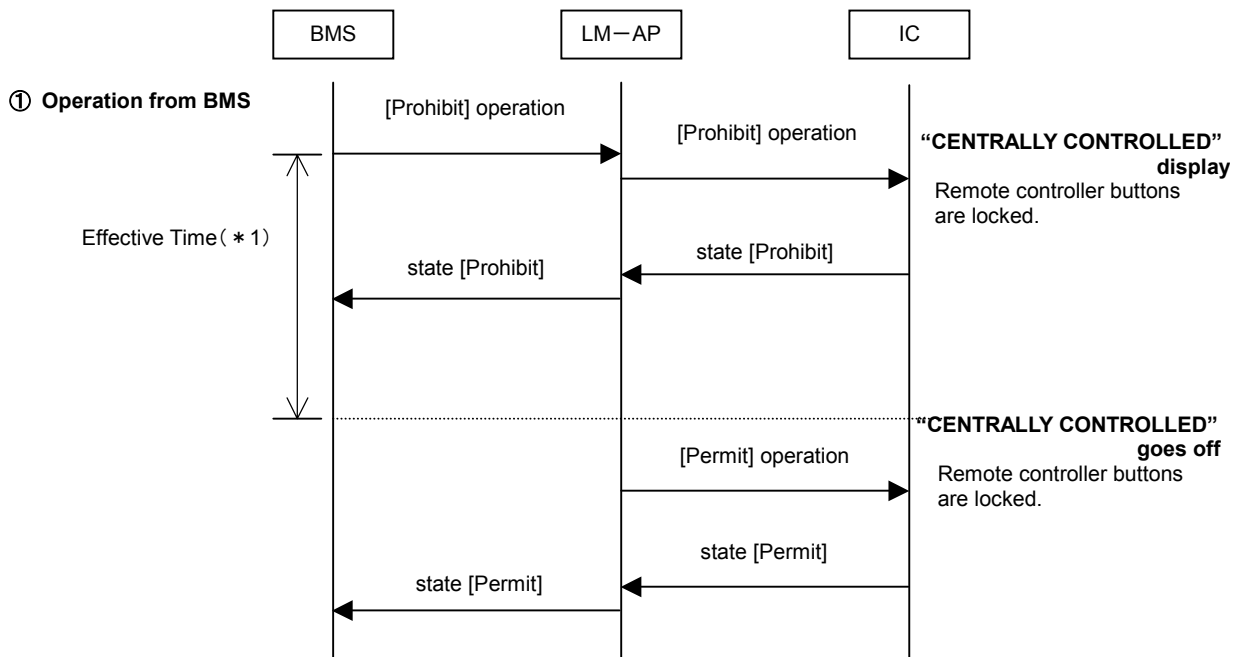
When operating only the ventilation unit interlocked with indoor unit by using the local remote controller, "Collective stopping" will be output to the Building management system unless other indoor unit or individually operating ventilation unit is not being operated.

# Function – [Local Prohibit]

LMAPO2-E
LMAPO3

Function	[Request Local Prohibit] [Local Prohibit State]
Description	Monitoring and setting the prohibit/permit of operation of the remote controller to be connected with indoors unit and ventilation unit.
Using NV	ON/OFF: 【nviProOnOff_n】 【nvoProOnOff_n】 Mode : 【nviProMode_n】 【nvoProMode_n】 SetPoint: 【nviProSetP_n】 【nvoProSetP_n】
Control unit	Indoor unit
Outline of operation	Setting the prohibit/permit of each operation for each unit. When operation is prohibited, the operation can not be done from the local remote controller, however, it can be carried out from LM ADAPTER. If other system controllers are used together, LM ADAPTER can not prohibit their operation.

## Communication



\*1: Setting by Receive Heartbeat\_1 【nciRcvHrtBt\_1】

### Restrictions

- Types of local remote controller

This function is effective to use MA remote controller and ME remote controller for the local remote controller.

- Prohibit/permit of local remote controller for ventilation units

The prohibit/permit setting for the local remote controller of LOSSNAY individually operating is only possible when OA processing unit is controlled with MA remote controller. In this case, turn on the function setting switch (SW1-1) of LMAP.

- Effective time of operation prohibit for local remote controller (LMAPO3 only)

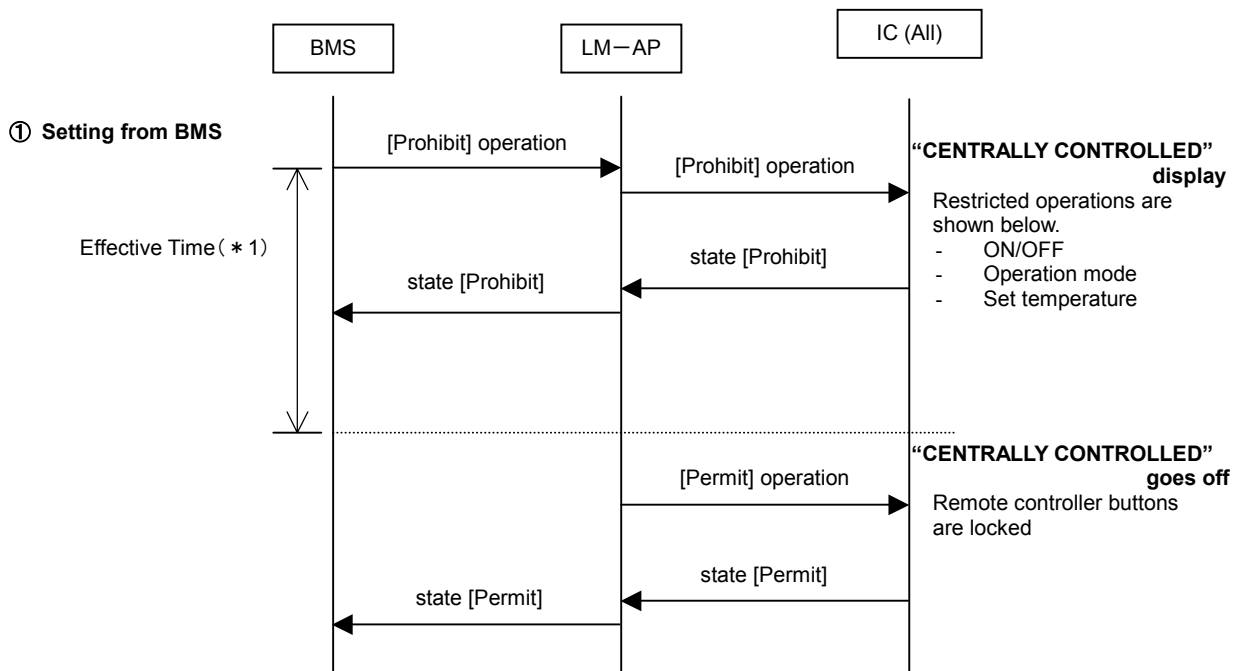
The operation prohibit setting of the local remote controller will automatically be the operation permit of the local remote controller, if the effective time passes without set value renewal or poll/fetch demand within the effective time being set by the "Receive Heartbeat\_1 【nciRevHrtBT\_1】".

# Function – [Collective Local Prohibit]

LMAP02-E  
LMAP03

Function	[Request Collective Local Prohibit] [Collective Local Prohibit state]
Description	Setting and monitoring the operation for prohibit/permit of all local remote controllers to be connected with the indoor units and ventilation units individually operated (without interlocking).
Using NV	【nviAllPro】 【nvoAllPro】
Control unit	All of local remote controllers
Outline of operation	The operation of all local remote controllers to be connected with indoor units and ventilation units is set collectively for the prohibit/permit. When operation is being set to prohibit, the operation by the local remote controller is disabled, however, it can be done by LM ADAPTER. If other system controllers are used together, LM ADAPTER can not prohibit their operation.

## Communication



\*1: Setting by Effective Time\_2【nciEffect\_2】

### Restrictions

#### - Type of local remote controllers

This function is only effective to use MA remote controller (PAR-20MAA) for the local remote controller.

#### - Prohibit/permit of local remote controller for ventilation units

The prohibit/permit setting for the local remote controller of LOSSNAY individually operating is only possible when OA processing unit is controlled with MA remote controller. In this case, turn on the function setting switch (SW1-1) of LMAP.

#### - Effective time of operation prohibit for local remote controller

The operation prohibit setting of the local remote controller will automatically be the operation permit of the local remote controller, if the effective time passes without set value renewal within the effective time being set by the “Effective TIme\_2 【nciEffectTm\_2】”.

# Function – [Local Remote Controller Setting]

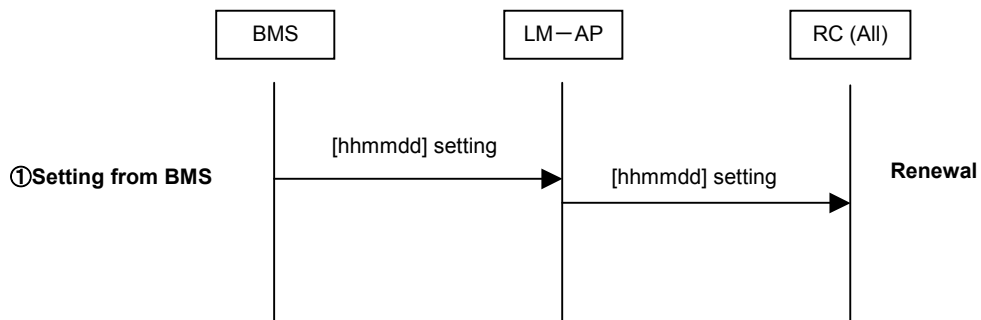
LMAP02-E

LMAP03

Function	[Time Stamp]
Description	Setting the time of the local remote controller.
Using NV	【nviRmTime】
Control unit	All local remote controllers
Outline of operation	Set the local remote controller's time.

Function	[Request Limit Temperature Setting Range] [Request Simplified Locking]
Description	Setting the limit on the temperature range that can be set with the local remote controller and the simplified locking of operation.
Using NV	【nviRmLim】 【nviRmLck】
Control unit	All local remote controllers
Outline of operation	<p>"Set temperature range limit" Limits the temperature range that can be set with the local remote controller.            Limited temperature range: Cooling/drying lower limit temperature, heating upper limit temperature</p> <p>"Simplified locking" Locks simply the operation of local remote controllers.            Operation items to set: All operation or the operation other than ON/OFF</p> <p>At setting of the set temperature range and simplified locking, the display detail of the local remote controller can also be set.            Display to be set: Display of actual operation mode under automatic operation and room temperature            Each set value is to be prepared by the configuration property.</p>

## Communication



### Restrictions

- Types of local remote controllers

This function is only effective to use ME remote controller for the local remote controller.

By using ME remote controller, it is also effective to control OA processing unit among the ventilation units individually operated. (The other models than LOSSNAY can not be controlled with ME remote controller when they are operating individually.)

- Mode selection when temperature set range is limited

When limiting the temperature set range, the automatic mode can not be selected. The operation mode changes to the fan operation when the setting is changed.

Under the circumstance, please change the operation mode after setting the temperature set range.

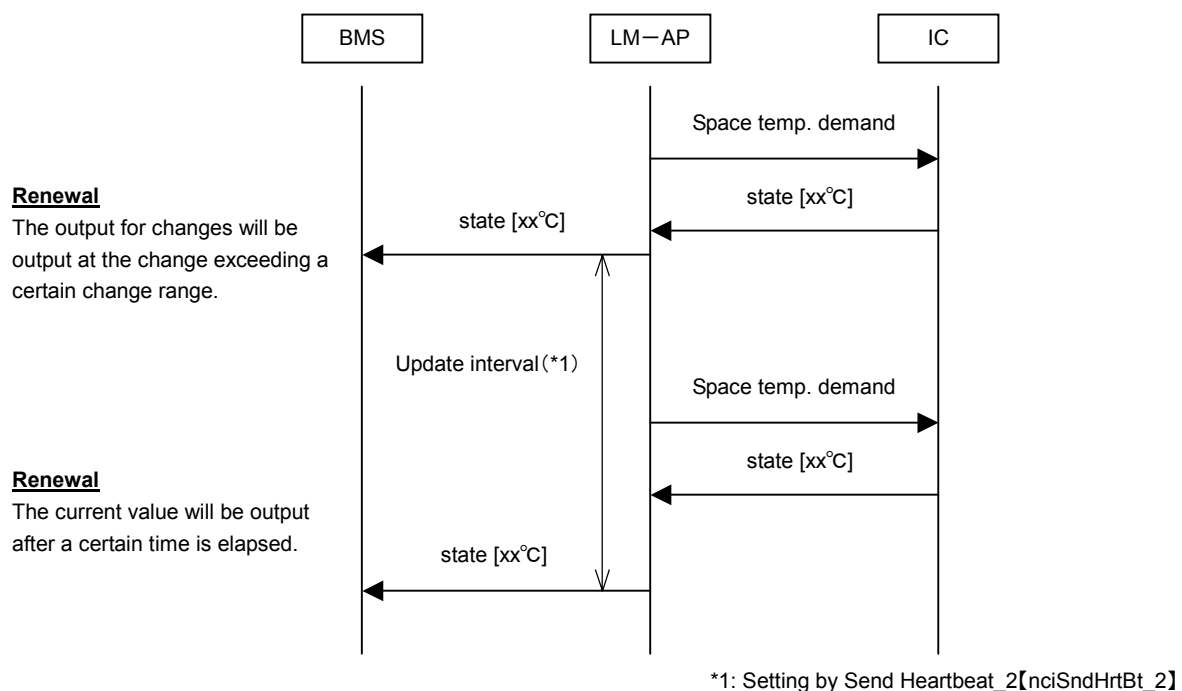
# Function – [Space Temperature]

LMAP02-E

LMAP03

Function	[Space Temperature State]
Description	The room temperature designed to be measured by the indoor unit will be measured.
Using NV	[nvoSpaceTemp_n]
Control unit	Indoor unit
Outline of operation	<p>The room temperature (or inlet temperature) is measured.                      Measuring temperature range: -10°C ~ 50°C, Temperature unit: 1.0°C                      For the measuring sensor, select the indoor unit inlet or remote controller sensor in the setting of indoor units.                      The output for changes will be output at the change exceeding a certain change range.                      Even in the case of no change, the current value will be output after a certain time is elapsed.                      The value of the changing range is set by the configuration property.</p>

## Communication Image



### Restrictions

- A difference of the display value of local remote control and BMS  
 With monitor timing, the display value of local remote control and BMS may change.
- Depending on the connecting number of indoor unit, the monitor interval that can be set is different.  
 To set a periodical monitor interval below 10 minutes, it is required to change SW1-3 on LM ADAPTER to ON. Please make the connecting number 30 sets or less.
- The changing range: 0.5 °C~2.0 °C, Temperature unit: 0.5 °C  
 Operated for 0.49°C or less (except -0.01 °C) --- Set to 0.5 °C  
 Operated for -0.01°C --- Set to 1.0 °C  
 Operated for 2.01°C or more --- Set to 2.0°C

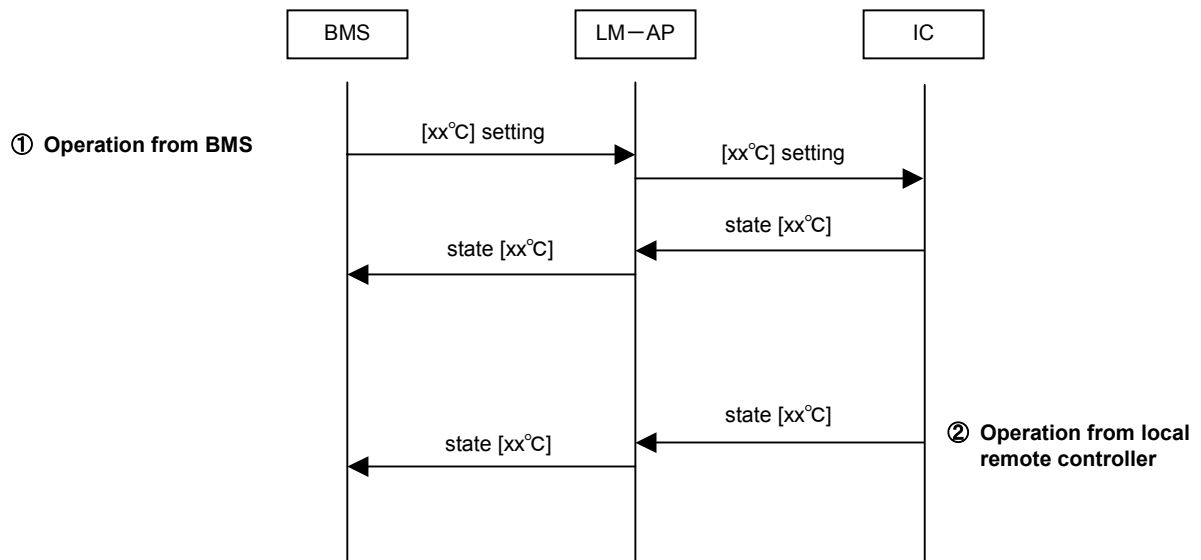


# Function – [Set Point]

LMAP02-E
LMAP03

Function	[Setpoint] [Setpoint State]		
Description	Setting and monitoring the target temperature of indoor units.		
Using NV	LMAP02-E: 【nviSetPoint_n】 【nvoSetPoint_n】 LMAP03 : 【nviSetP_n】 【nvoSetP_n】		
Control unit	Indoor unit		
Outline of operation	The target room temperature for each indoor unit is set and monitored. In accordance with the operation mode of indoor units, the temperature range that can be set is different. Set temperature unit: 1.0°C	Mode	Setting Range
		Auto	19 ~28 °C
		Cool	19 ~30 °C
		Heat	17 ~28 °C
		Dry	19 ~30 °C
		Fan	Not used

## Communication Image



### Restrictions

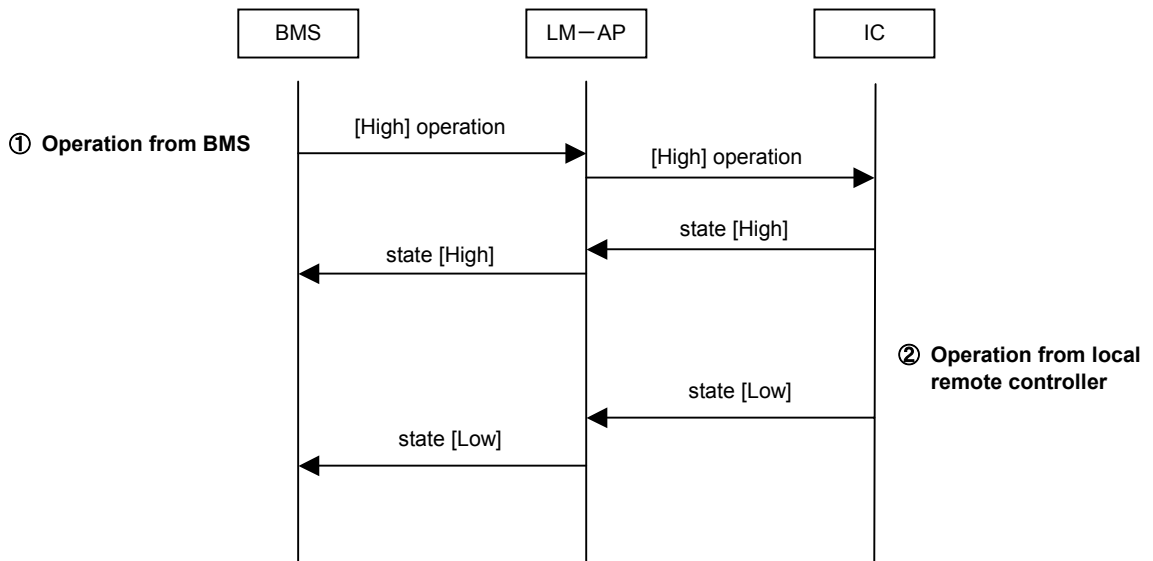
- To set temperature from the Building management system, set so that it stays within the set temperature range above.
- The action by the setting out of the set temperature range differs depending on the operation mode at that time.
  - <At cooling/drying mode> Operated for 19°C or less, or 31°C or more - - - Set to 19°C, 30°C respectively
  - <At heating mode> Operated for 17°C or less, or 29°C or more - - - Set to 17°C, 28°C respectively
  - <At automatic mode> Operated for 19°C or less, or 29°C or more - - - Set to 19°C, 28°C respectively

# Function – [Fan Speed]

LMAP02-E
LMAP03

Function	[Request FanSpeed] [FanSpeed State]
Description	Setting and monitoring the airflow rate of indoor units and individually operating ventilation units (not interlocked with indoor units).
Using NV	【nviFanSpeed_n】 【nvoFanSpeed_n】
Control unit	Indoor unit
Outline of operation	The airflow rate (High/Med.2/Med.1/Low) for each unit is set and monitored.

## Communication Image



### Restrictions

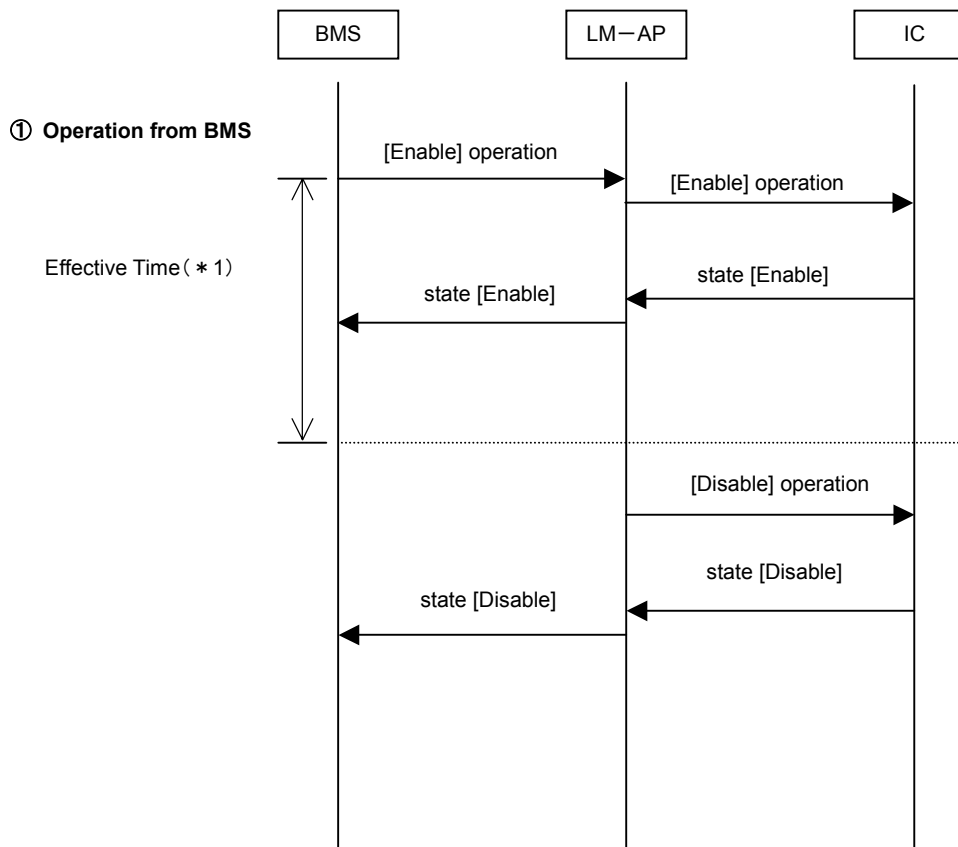
- Airflow setting value and setting operation by unit types
  - 3-speed model: Setting to Med.2 operates in the Med.1 airflow.
  - 2-speed model: Setting to Med 2 or Med 1 operates in the low airflow rate.
  - 1-speed model: Setting to Med 2, Med 1 or Low operates in the high airflow rate.

# Function – [Forced Thermostat OFF]

LMAP02-E  
LMAP03

Function	[Request Forced Thermostat OFF] [Forced Thermostat OFF State]
Description	Setting the Indoor unit forcibly to thermostat OFF.
Using NV	[nviThermoOff_n] [nvoThermoOff_n]
Control unit	Indoor unit
Outline of operation	Indoor unit is forcibly set to thermostat OFF. The indoor unit being set to thermostat OFF will be in the thermostat OFF status regardless of operating conditions (i.e. room temperature, set temperature, etc.).

## Communication Image



\* 1: Setting by Receive Heartbeat\_2[nCiRcvHrtBt\_2]

### Restrictions

- Effective time of forced thermostat OFF

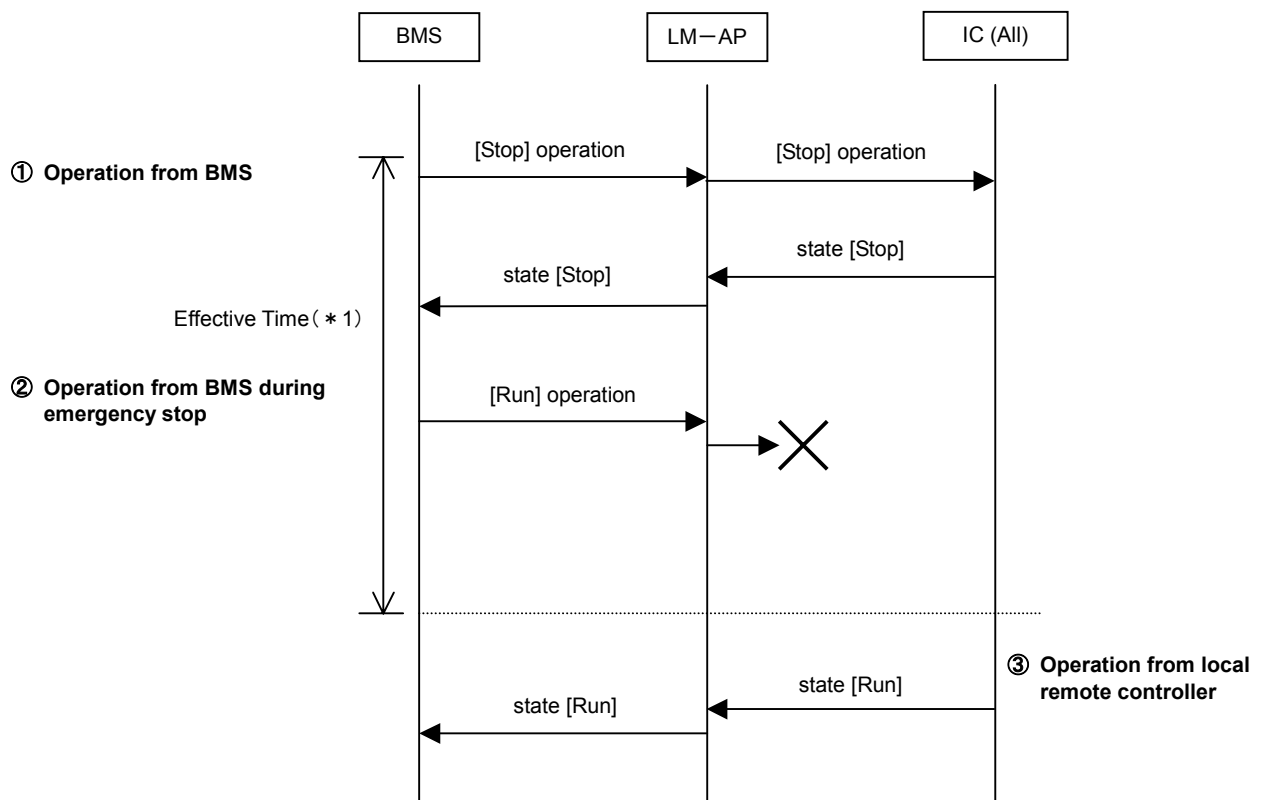
The thermostat OFF will automatically be cancelled if it is not renewed or poll/fetch demand is not presented during the effective time being set by the "Receive Heartbeat 2[nCiRcvHrtBt 2]".

# Function – [Emergency Stop]

LMAP02-E  
LMAP03

Function	[Request All Off] [Emergency State]
Description	Applying emergency stop collectively to all units controlled by LM ADAPTER.
Using NV	【nviAllOff】
Control unit	All of indoor units controlled by LM ADAPTER
Outline of operation	The indoor units and ventilation units being controlled by LM ADAPTER are stopped collectively. During the time when emergency stopping is valid, the operation from LM ADAPTER will be invalid. As the operation from the local remote controller or system controller is valid, the operation may be started, but it stops soon. (LMAP03 only) To prohibit operation from the local remote controller or system controller, use the setting for collective operation prohibit together in combination.

## Communication



\* 1: Setting by Effective Time\_1【nciEffectTm\_1】

### Restrictions

- Effective time of emergency stop (LMAP03 only)

When conducting emergency stop, the operation control from LonWorks network will be invalid for a certain time.

The effective time mentioned here can be set by the “Effective time\_1【nciEffectTm\_1】” of the configuration property.

- Operation of air conditioner during emergency stop

The operation from the local remote controller is valid even under emergency stopping.

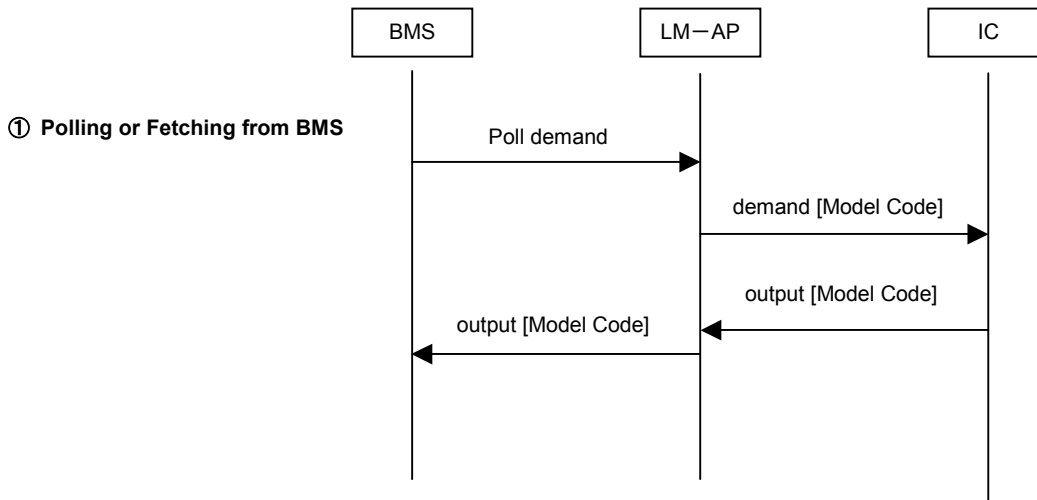
When the operation from the local remote controller is not desired, use together with the variable of “Request Collective Operation prohibit【nviAllPro】”.

# Function – [Model Code]

LMAP02-E  
LMAP03

Function	[Mode Code]
Description	Outputting the capacity code of indoor unit and OA processing unit.
Using NV	[nvolcMdlSize_n]
Control unit	Indoor unit
Outline of operation	The capacity code indicating the capacity of indoor unit and OA processing unit is output. This is used for the apportioning of charge, etc. As this variable is not provided by the event output, acquire the data by Polling or Fetching.

## Communication



### Restrictions

- About the output at changing

This variable is of universal not applicable to the output at changing. Use the Poll or Fetch demand for acquisition as shown above.

- Models for which indoor capacity code can not be output

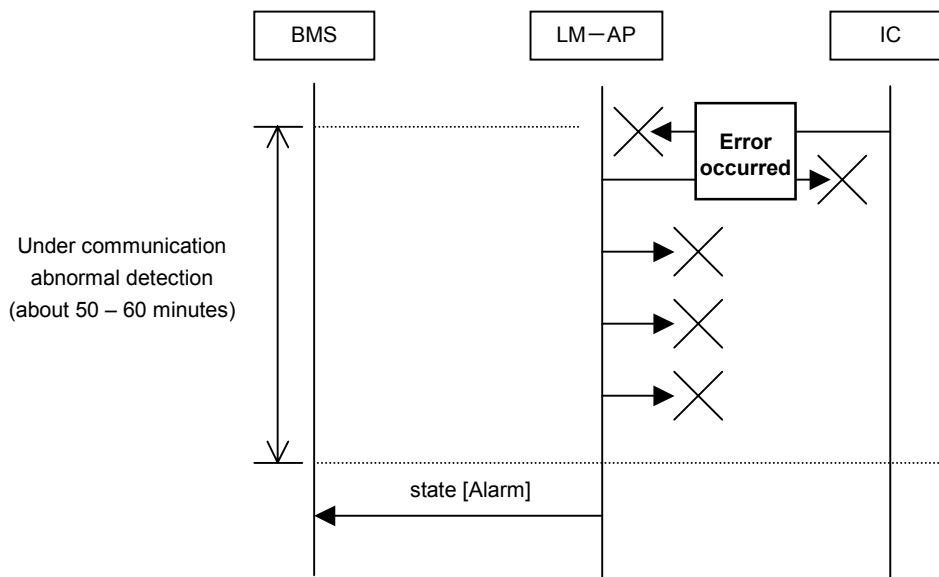
Since the general/industrial application packaged air conditioner units and ventilation units (excluding OA processing units) have no information on the indoor unit capacity code, the code will not be output. (Default value)

# Function – [Collective Alarm for LM ADAPTER]

LMAP02-E  
LMAP03

Function	[Collective Alarm for LM ADAPTER]
Description	Monitoring collectively the communication state of indoor units controlled by LM ADAPTER
Using NV	[nvoAllAlarmLMAP]
Control unit	All of indoor units controlled by LM ADAPTER
Outline of operation	Alarm will be output if communication error occurs between the indoor unit and ventilation unit being controlled with LM ADAPTER even on the one set. Error will be detected when the communication is interrupted for a certain time (about 50 ~ 60 minutes). When all communication errors are restored, the error will be restored as a result.

## Communication



### Cautions

- Even under a communication error occurred, the request input to and the state output from LM ADAPTER are possible.
- Depending on the cause generating communication error, air conditioners may be operated from the local remote controller.

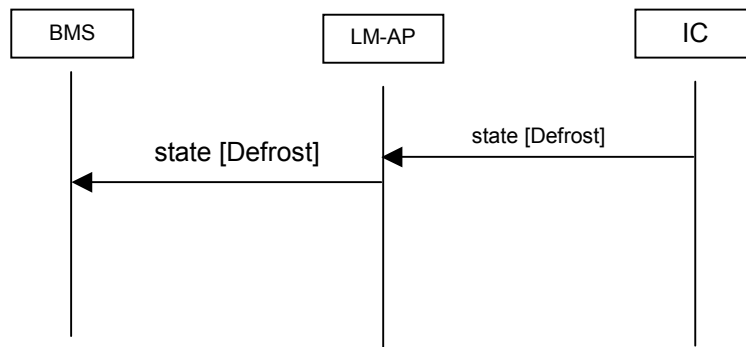
# Function – [Defrost state]

LMAP02-E

LMAP03

Function	[Defrost State]
Description	Monitoring collectively the defrosting state of indoor units controlled by LM ADAPTER.
Using NV	[nvoDefrost]
Control unit	All of indoor units controlled by LM ADAPTER
Outline of operation	Output will be commenced if even one of the indoor units being controlled by LM ADAPTER enters into defrosting state. During the defrosting operation of indoor unit, the run/stop operation will be invalid. It runs if the defrosting operation is cancelled.

## Communication Image



### Caution

- Operation of air conditioner during the defrosting operation

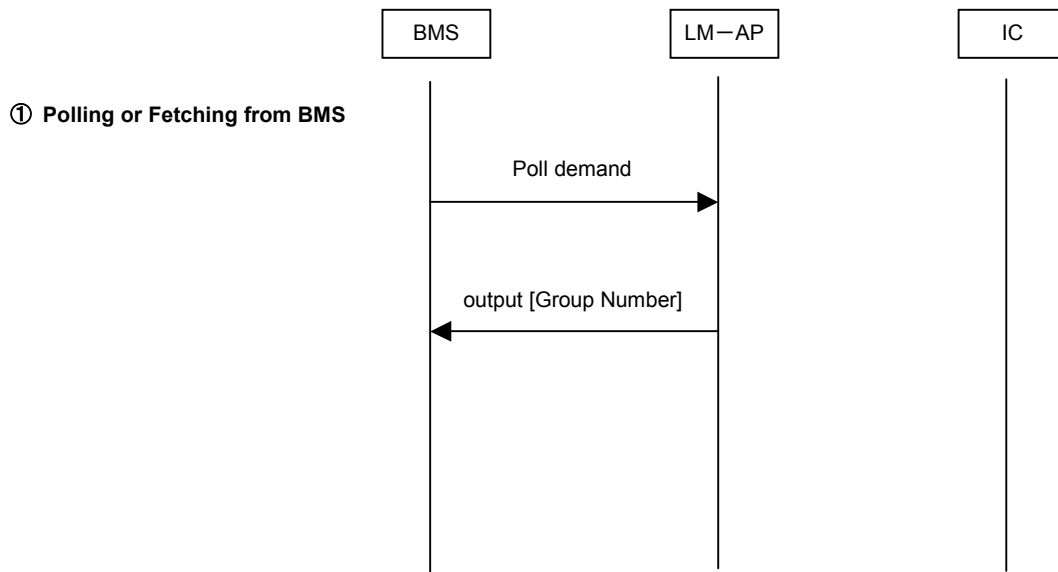
During the defrosting operation of indoor unit, the run/stop operation will be invalid. It runs if the defrosting operation is cancelled.

# Function – [Group Number]

LMAP02-E
LMAP03

Function	[Group Number]
Description	Outputting group information on the indoor unit or ventilation unit.
Using NV	[nvoGroup_n]
Control unit	Indoor unit
Outline of operation	The group information (No.) of indoor unit or individually operating ventilation unit (not locked with indoor unit) will be output. As this variable is not applied with the event output, acquire the data by Poll or Fetch demand. The group information will only be set when grouping is performed with other system controller.

## Communication



### Restrictions

- About output at changing

This variable is of universal and not applicable to the output at changing. Use the Poll or Fetch demand for acquisition as shown above.

- Condition to output indoor unit group information

The group information will be output only when using other system controller like the centralized controller together in combination.



## **APPENDIX 2. Outline of Functions – Configuration Properties**

- **Models**
  - LMAP02-E**
  - LMAP03**
  
- **Functions**
  - 「Minimum Send Time」**
  - 「Send Heartbeat Start Time」**
  - 「Send Start Time」**
  - 「Initial Output」**
  - 「Send Heartbeat\_1」**
  - 「Send Heartbeat\_2」**
  - 「Receive Heartbeat\_1」**
  - 「Receive Heartbeat\_2」**
  - 「Effective Time\_1」**
  - 「Effective Time\_2」**
  - 「Effective PollFetch」**
  - 「Effective Offline Mode」**
  - 「Space Temperature Setting」**
  - 「Limit Temperature Setting Range」**
  - 「Local Operation Lock」**
  - 「Local Display Setting」**
  - 「Communication Timing」**

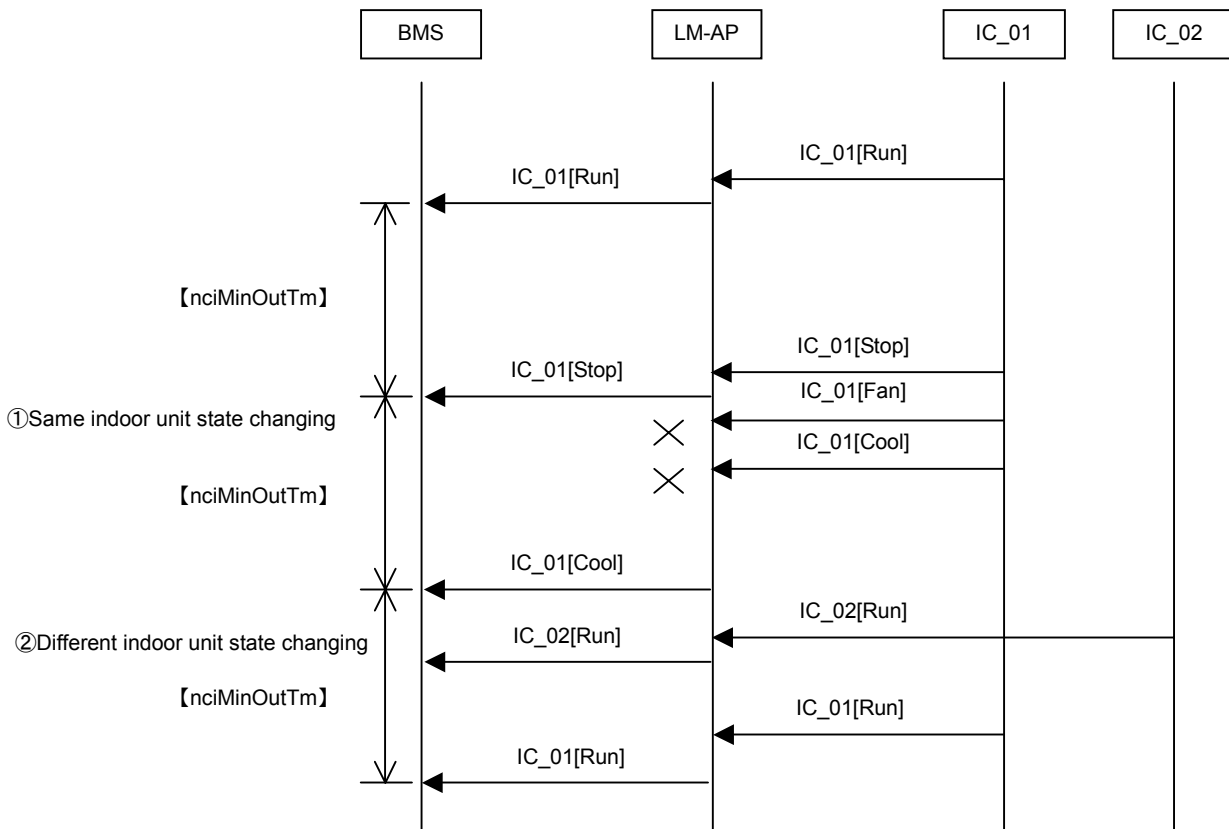
# Function – [ Minimum Send Time]

LMAP02-E

LMAP03

Function	[Minimum Send Time]
Description	Defines the minimum send time between the output network variables.
Using CP	<b>[nciMinOutTm]</b>
Control unit	LM ADAPTER
Relating CP	Nothing
Data holding	Memorizing set values in nonvolatile memory.
Reference NV	Variable output previously (in a unit of same indoor unit)
Purpose	When a state change occurs continually, the variable will be output with a certain interval not to output all state changes.
Outline of operation	When a state change occurs on the same unit that output previously, the output at changing will not be provided within the set time. It will be supplied after elapsing the set time. When the unit other than that output previously changes its state, it will be output even within the set time.

## Communication Image



### Cautions

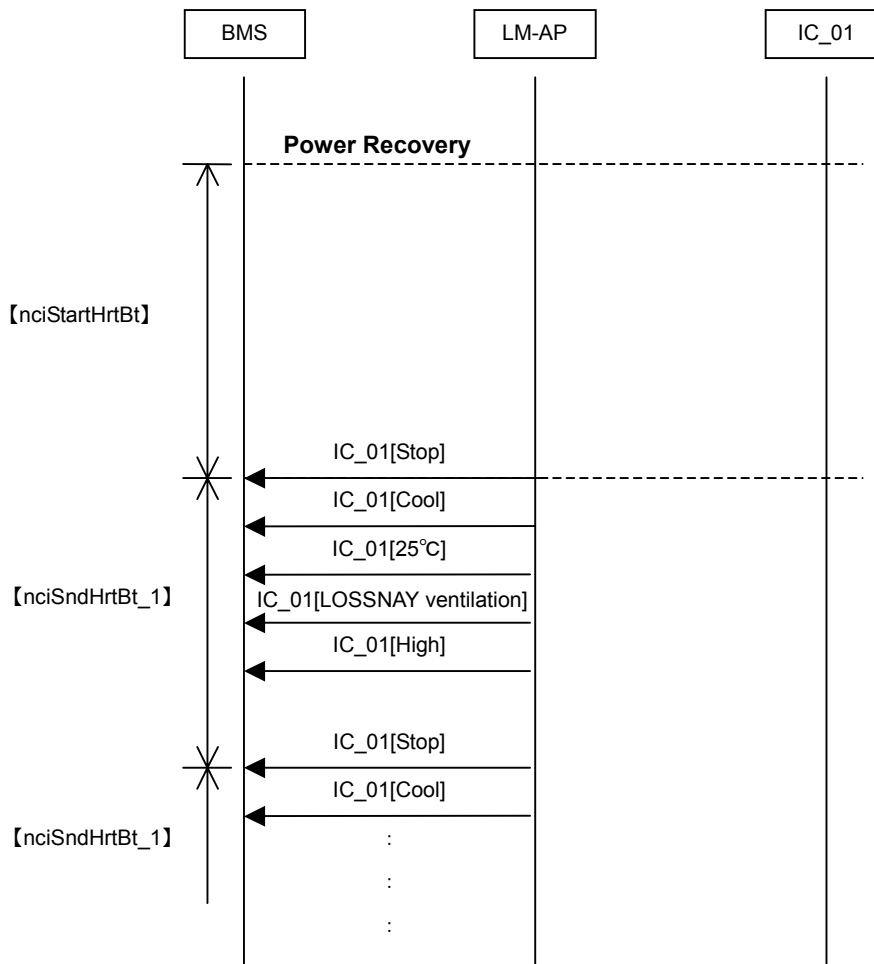
- Effective for the output interval between the output variables on a same indoor unit.
- Unable to keep the output interval between different indoor units.
- Only the bound variables are output.

# Function – [ Send Heartbeat Start Time]

LMAP02-E  
LMAP03

Function	[Send Heartbeat Start Time]
Description	Defines the start time of automatic updating at the powering of the LM ADAPTER.
Using CP	[nciStartHrtBt]
Control unit	LM ADAPTER
Relating CP	[nciSndHrtBt_1] [nciSndHrtBt_2]
Data holding	Memorizing set values in nonvolatile memory.
Reference NV	Nothing
Purpose	This sets the start time of automatic updating at applying power to LM ADAPTER. When plural LM ADAPTERS are installed, the concentration of automatic updating can be prevented. In the case using the initial output to match the image, this can further be applied to delay the automatic updating to avoid excess output during the initial outputting.
Outline of operation	At the passing of the set time after applying power, the timer of "Send Heartbeat_1[nciSndHrtBt_1]" and "Send Heartbeat_2[nciSndHrtBt_2]" is started validating the automatic updating. The output by the automatic updating is invalid within the set time.

## Communication Image



### Cautions

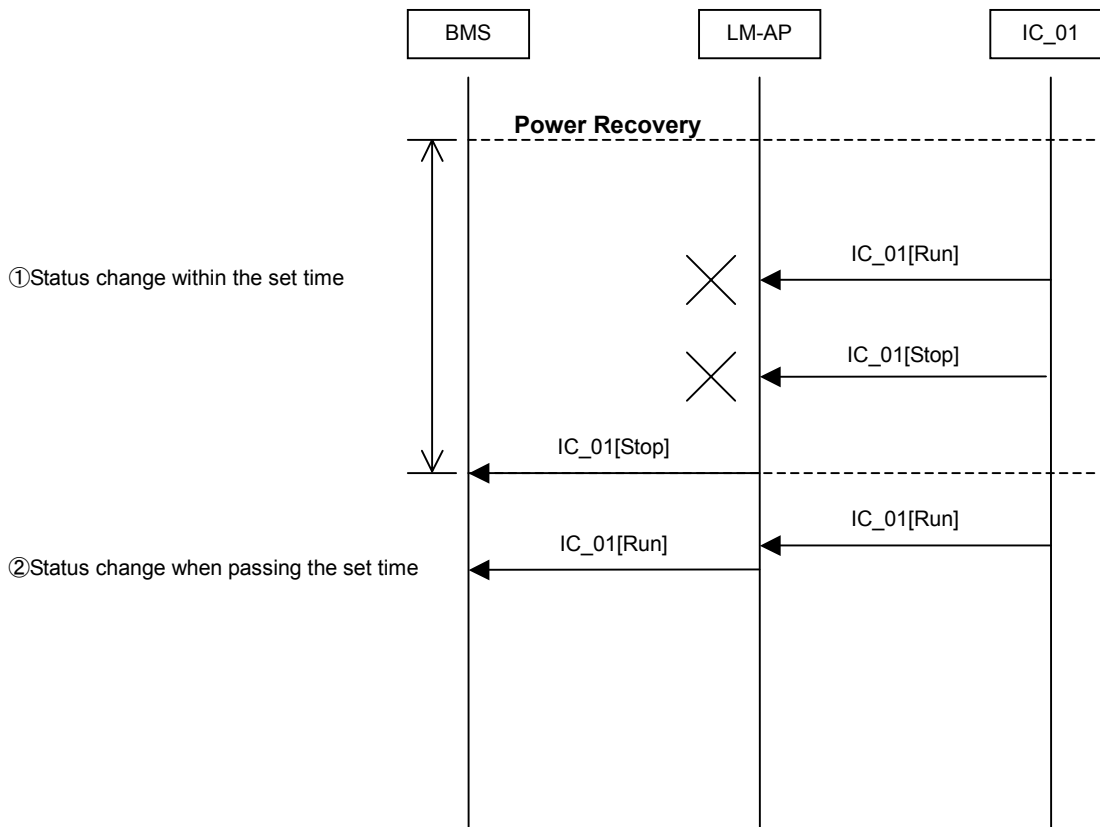
- The bound variables will only be supplied.
- To use the initial output, set the start time for updating to initiate after the initial output.

# Function – [Send Start Time]

LMAP02-E  
LMAP03

Function	[Send Start Time]
Description	Defines the start time of the output network variable change at powering of LM ADAPTER.
Using CP	[nciStartOutTm]
Control unit	LM ADAPTER
Relating CP	Nothing
Data holding	Memorizing set values in nonvolatile memory.
Reference NV	Nothing
Purpose	This is to set the start time of output at changing when LM ADAPTER is powered. When the plural LM ADAPTERS are installed, the concentration of the output at changing can be prevented. In the case using the initial output to match the image, this can further be applied to delay the automatic updating to avoid excess output during the initial outputting.
Outline of operation	The output at changing will be effective when the set time is passed after powering. The status change within the set time will be applied with the output at changing when passing the set time.

## Communication Image



### Cautions

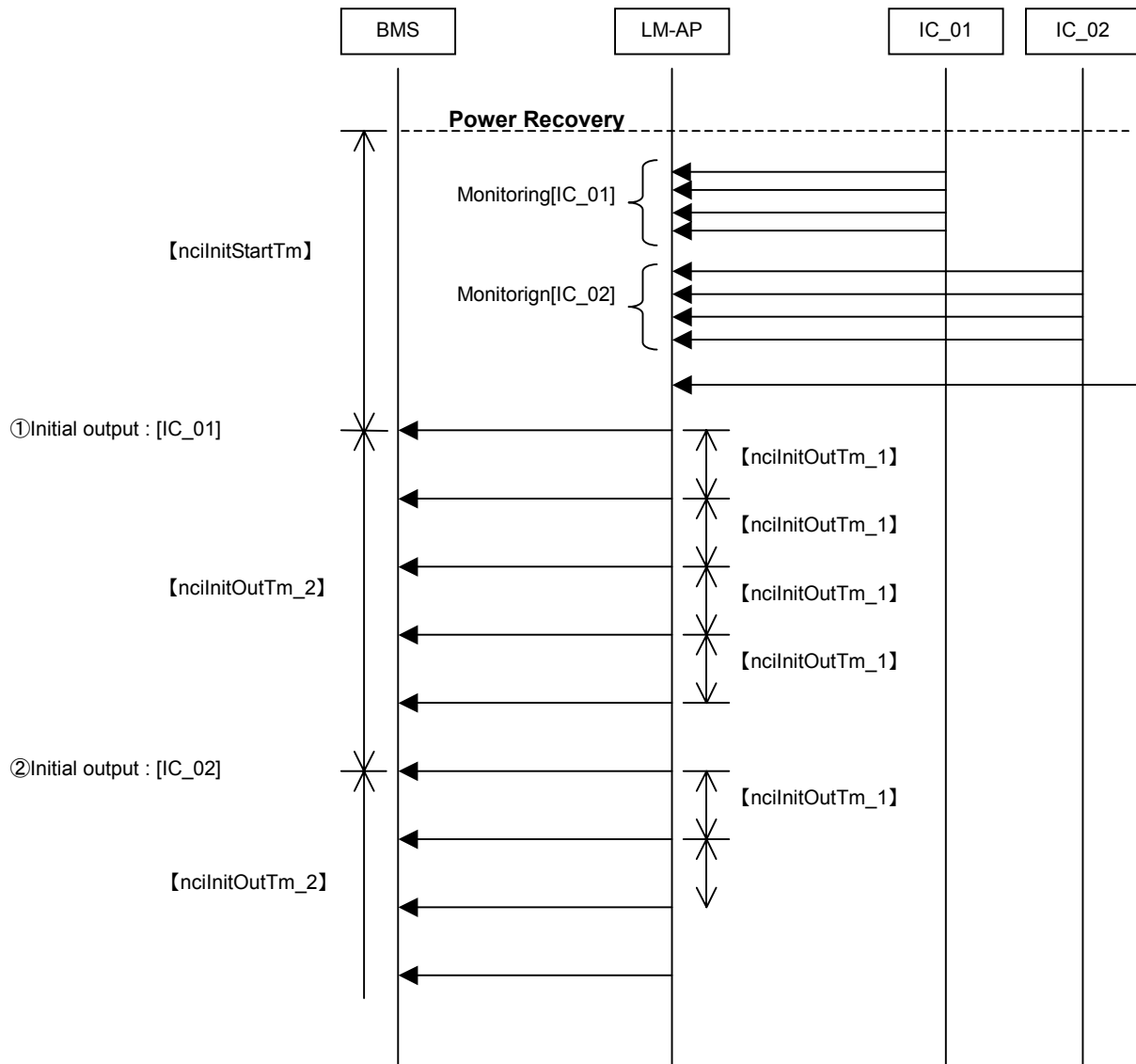
- After initializing LM ADAPTER, the request before the starting of the output at changing will be valid, but the state change will not be provided.
- Only the bound variables are output.

# Function – [Initial Output]

LMAP02-E  
LMAP03

Function	[Initialize Start Time] [Initialize Send Time_1] [Initialize Send Time_2]
Description	Defines the time to start the output when the output network variables change at LM ADAPTER power on, and the minimum send time between the output network variables at initial output.
Using CP	【ncilnitStartTm】 【ncilnitOutTm_1】 【ncilnitOutTm_2】
Control unit	LM ADAPTER
Relating CP	Nothing
Data holding	Memorizing set values in nonvolatile memory.
Reference NV	Nothing
Purpose	At the powering of LM ADAPTER, initial output will be provided to match the image of the indoor unit held by the Building management system and that of the current state.
Outline of operation	After passing the set time, the output variable will be supplied starting from No.1 unit in order. The transmission interval between each unit【ncilnitOutTm_2】 and that between the variables【ncilnitOutTm_1】 are set by each configuration property respectively.

## Communication Image



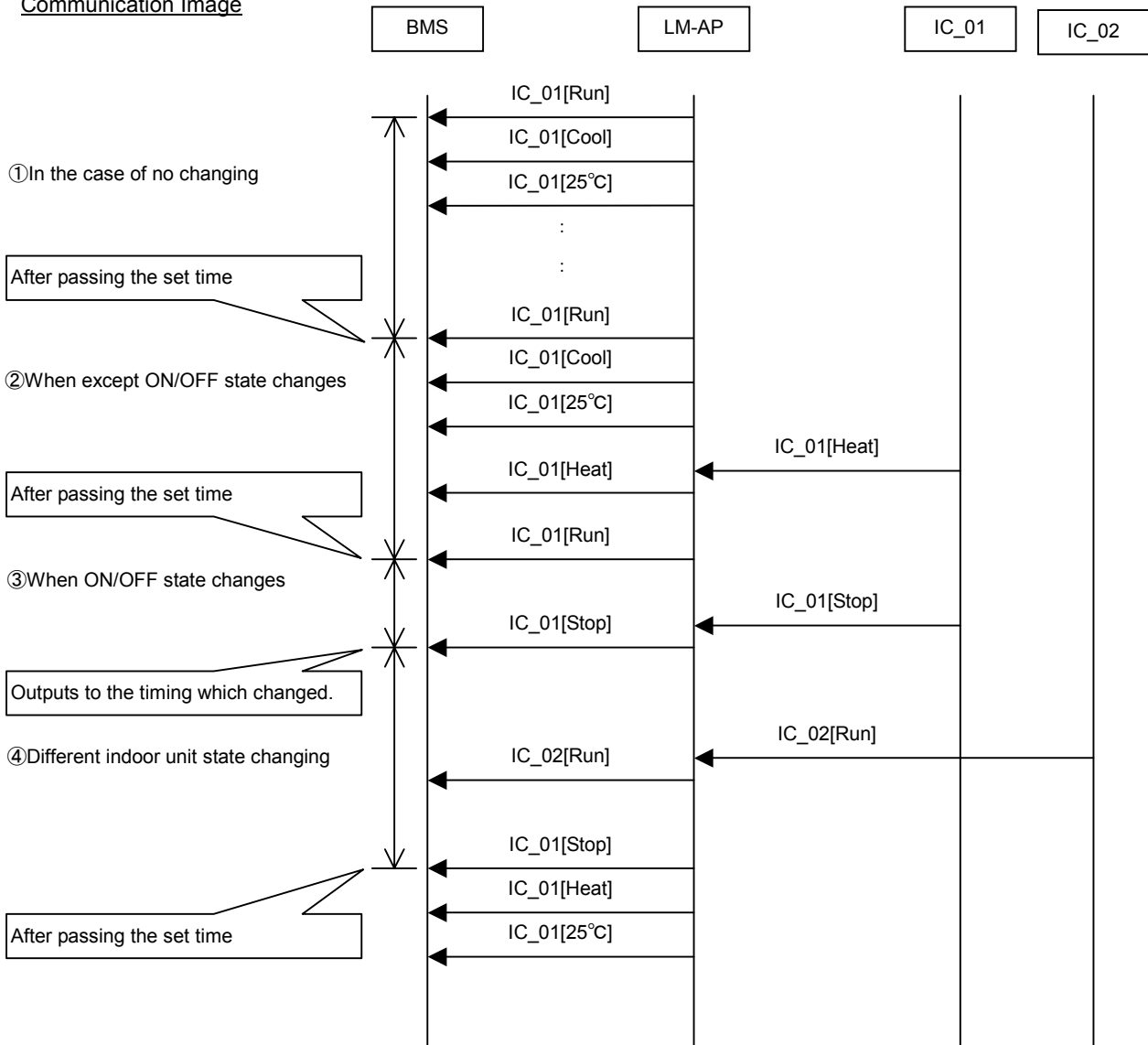
**Caution**  
- Only the bound variables are output.

# Function – [Send Heartbeat\_1]

LMAP02-E  
LMAP03

Function	[Send Heartbeat_1]
Description	Defines the time between the previous and next updating.
Using CP	[nciSndHrtBt_1]
Control unit	LM ADAPTER (in a unit of same indoor unit)
Relating CP	[nciStartHrtBt]
Data holding	Memorizing set values in nonvolatile memory.
Reference NV	Output of the previous nvoOnOff_n
Purpose	This is to use for preventing the non-agreement of the image when the output of LM ADAPTER is failed to receive normally by the recipient.
Outline of operation	When the set time is passed after the automatic updating or outputting at changing of the previous [nvoOnOff_n] (On/Off run state), the objective variable will be updated (output). In this case, the latest value held by LM ADAPTER will be supplied even when the data has no change.

## Communication Image



### Cautions

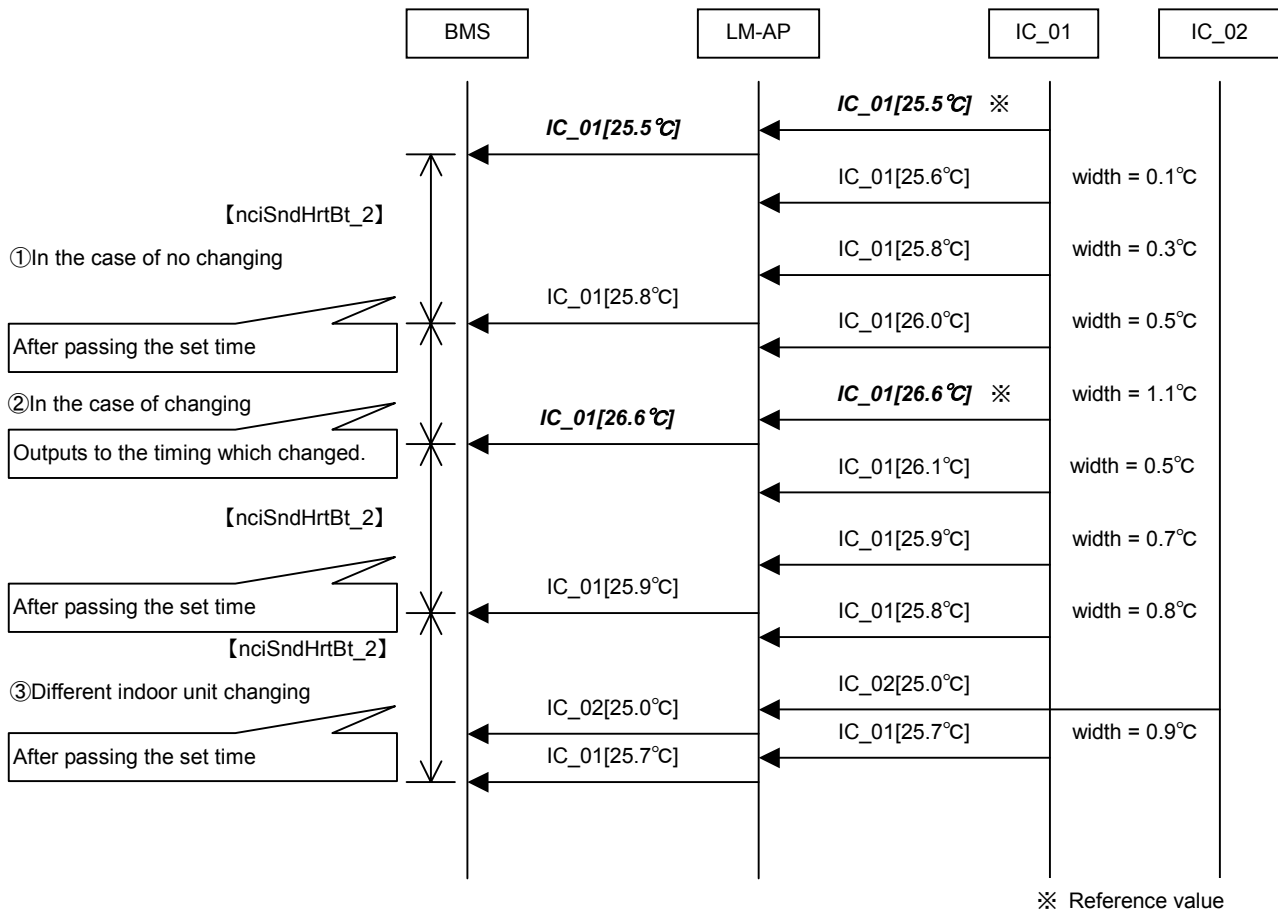
- The transmission timing between indoor units may be duplicated occasionally.
- Make sure to set the start time of automatic updating.
- Only the bound variables will be output.

# Function – [Send Heartbeat\_2]

LMAP02-E  
LMAP03

Function	[Send Heartbeat_2]
Description	Defines the time between the previous and next updating.
Using CP	[nciSndHrtBt_2]
Control unit	LM ADAPTER (in a unit of same indoor unit)
Relating CP	[nciInitStartTm] [nciAnlgMonTm] [nciAnalogWidth]
Data holding	Memorizing set values in nonvolatile memory.
Reference NV	Output of the previous nvoSpaceTemp
Purpose	This is to use for preventing the non-agreement of the image when the output of LM ADAPTER is failed in normal receiving by the recipient.
Outline of operation	When the set time is passed after the automatic updating or outputting at changing of the previous nvoSpaceTemp_n (room temperature state output), the objective variable will be updated (output). In this case, the latest value held by LM ADAPTER will be supplied even when the data has no change.

## Communication Image (In the case of spacetemp width )



### Cautions

- The transmission timing between indoor units may be duplicated occasionally.
- Make sure to set the start time of automatic updating.
- Only the bound variables will be output.

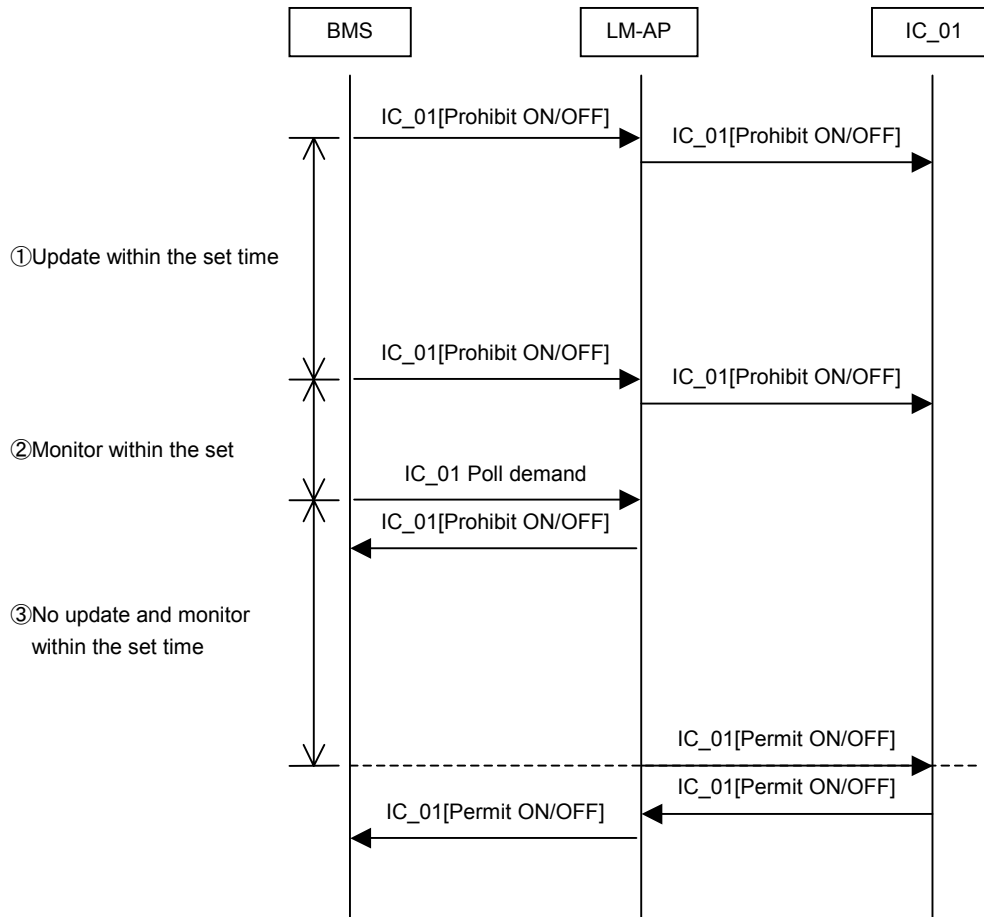
# Function – [Recevier Heartbeat]

LMAP02-E

LMAP03

Function	[Receive Heartbeat_1] [Receive Heartbeat_2]
Description	Defines the maximum elapse time from the last update of the network variables.
Using CP	【nciRcvHrtBt_1】 【nciRcbHrtBt_2】
Control unit	LM ADAPTER
Relating CP	Nothing
Data holding	Memorizing set values in nonvolatile memory.
Reference NV	Objective variable lastly updated
Purpose	This is to be used to determine the operation when the periodical updating to LM ADAPTER is eliminated such as in the case when the master system is downed or communication error is occurred.
Outline of operation	When the set time is passed after updating the network variable lastly (by renewing the set value for the input network variable, and the poll/fetch demanding for the output network variable), the setting will automatically be cancelled. To continue the set state, update one of the variables of the objective unit (address) periodically.

## Communication Image (In the case of local prohibit)





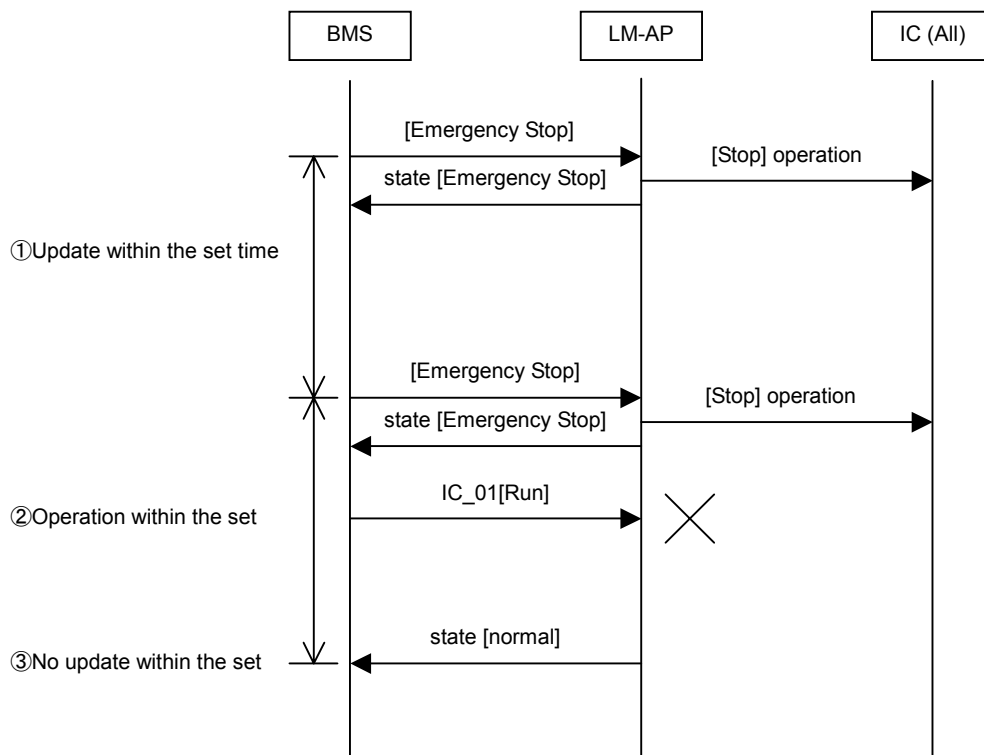
# Function – [Effective Time\_1]

LMAP02-E

LMAP03

Function	[Effective Time_1]
Description	Defines the valid time of nviAllOff (Request All Off)
Using CP	[nciEffectTm_1]
Control unit	LM ADAPTER
Relating CP	Nothing
Data holding	Memorizing set values in nonvolatile memory.
Reference NV	nviAllOff
Purpose	The continuing time of emergency stopping is set. During the emergency stopping, individual operation will be invalid.
Outline of operation	"Emergency stop" If emergency stop is requested by [nviAllOff](Request All Off), all units controlled by LM ADAPTER will be stopped. The emergency stop effective status is valid during the set time. During this time, the ON/OFF operation by [nviOnOff_n](Request ON/OFF) is invalid. As the set time is passed, the emergency stopping status will be cancelled making the ON/OFF operation by [nviOnOff_n]valid.

## Communication Image



### Restrictions

- During a period when the emergency stopping is valid, individual ON/OFF operation will be invalid.

### Cautions

-The operation with local remote controllers or system controllers is possible.

- When emergency stop is effectuated by using the set input of the system controller or the like, LM ADAPTER will not be under emergency stopping.

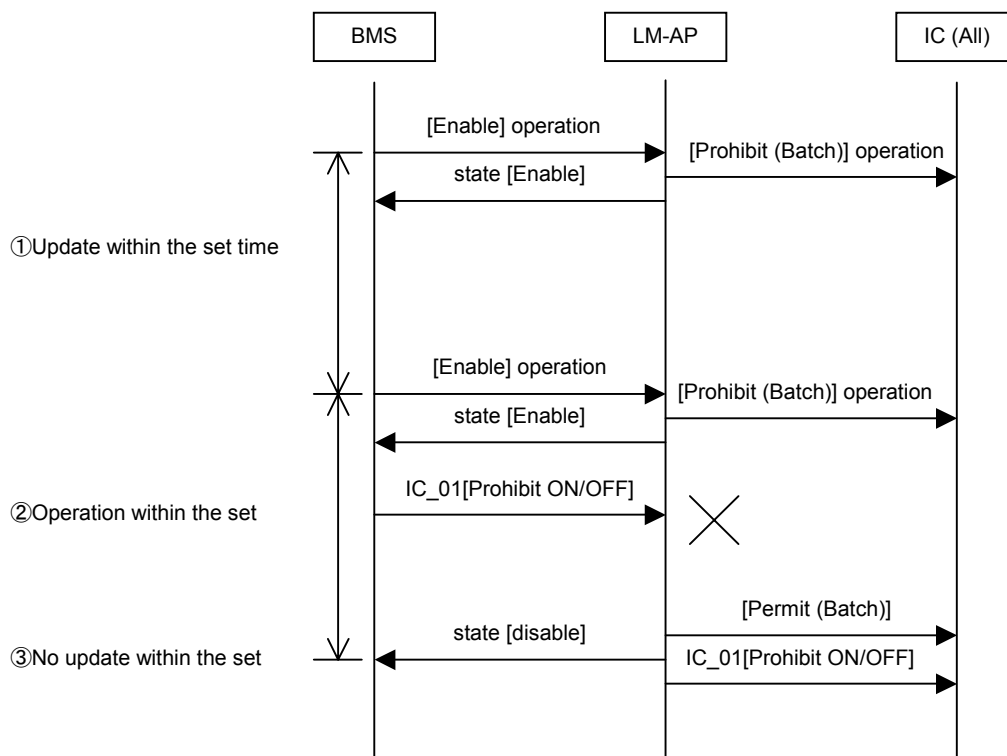
# Function – [Effective Time\_2]

LMAP02-E

LMAP03

Function	[Effective Time_2]
Description	Defines the valid time of nviAllPro (Request Collective Operation Prohibit)
Using CP	[nciEffectTm_2]
Control unit	LM ADAPTER
Relating CP	Nothing
Data holding	Memorizing set values in nonvolatile memory.
Reference NV	nviAllPro
Purpose	This is to set the time to continue collective operation prohibit. During the time when the operation prohibit is valid, the individual operation prohibit setting will not be reflected.
Outline of operation	"Collective Local Prohibit " Upon receipt of collective operation prohibiting request by [nviAllPro](Request Collective Operation Prohibit), the operation (ON-OFF mode/Temperature setting) of the local remote controller connected to all units controlled with LM ADAPTER will be prohibited. The operation prohibit is valid within the set time, and during this time, the setting by the operation prohibit of the individual local remote controller ([nviProOnOff_n][nviProMode_n][nviProSetP_n]) will be reserved. As the set time is passed, the collective operation prohibiting state is cancelled, and the operation prohibiting request such as [nviProOnOff], etc. received during the effective time will be reflected.

## Communication Image



### Restrictions

- Operation prohibit state can not be cancelled by nviAllPro.
- The time minimization of this configuration property should be applied.

### Cautions

- The operation by the system controller is possible.
- The command from the LonWorks network under operation prohibit is valid.

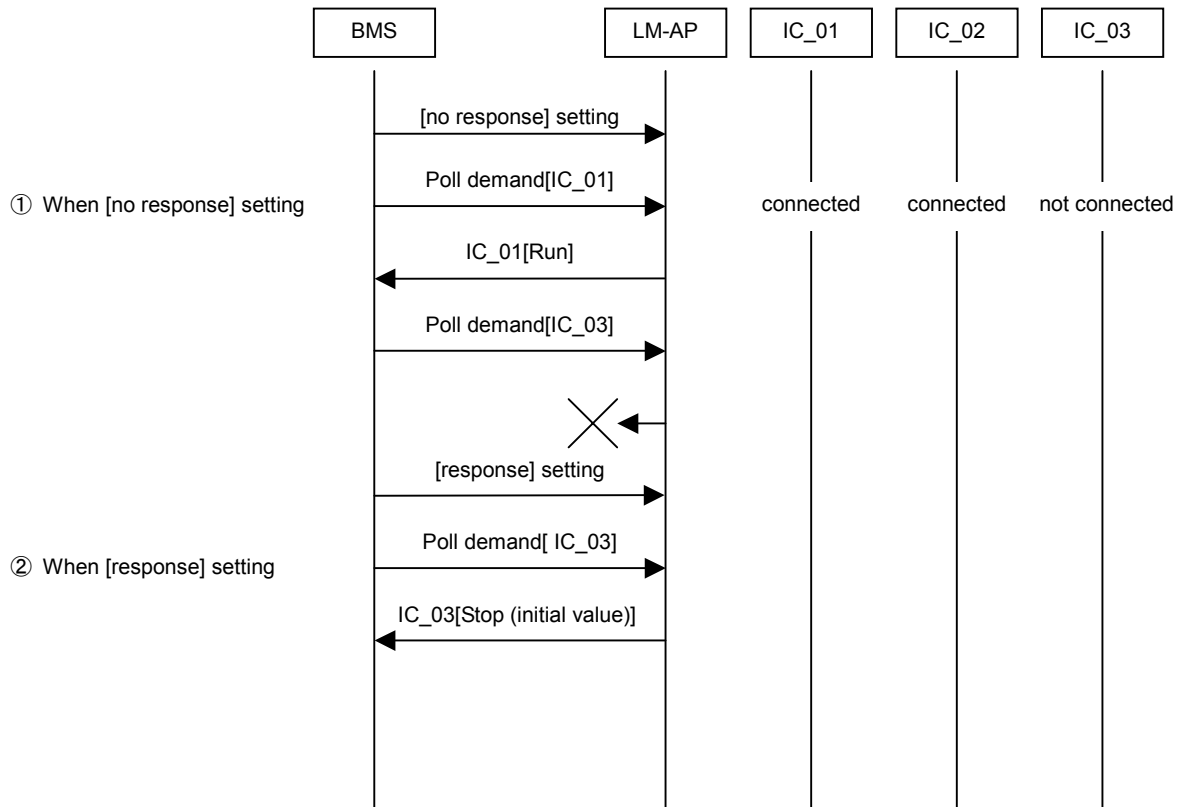
# Function – [Effective PollFetch]

LMAP02-E

LMAP03

Function	[Effective PollFetch]
Description	Defines the presence of response to the output network variables Poll (Fetch) request.
Using CP	[nciPollFetch]
Control unit	LM ADAPTER
Relating CP	Nothing
Data holding	Memorizing set values in nonvolatile memory.
Reference NV	Nothing
Purpose	This is to use when not desiring to get a response under unstable state.
Outline of operation	Under the conditions below, the response to Poll (Fetch) demand against the output variable will not be returned. - Unit not being connected - Unit with outdoor unit being not powered - Communication with LM ADAPTER interrupted for a certain time - Registration of LM ADAPTER to Master controller is not completed yet

## Communication Image



### Caution

- When the Ack service is employed, Ack will be responded.

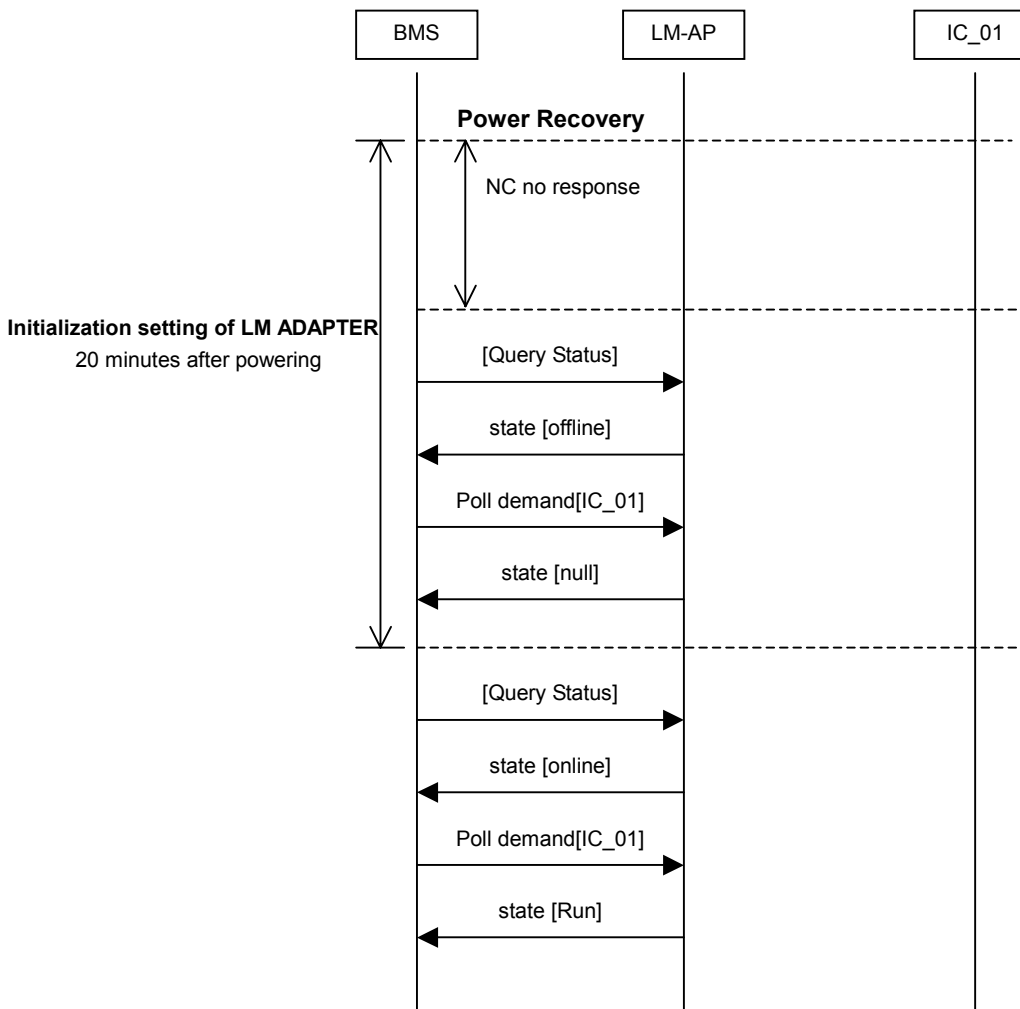
# Function – [Effective Offline Mode]

LMAP02-E

LMAP03

Function	[Effective Offline Mode]
Description	Defines the offline mode setting when the LM ADAPTER power is turned ON.
Using CP	[nciOffline]
Control unit	LM ADAPTER
Relating CP	Nothing
Data holding	Memorizing set values in nonvolatile memory.
Reference NV	Nothing
Purpose	The mode will be fixed to judge whether the initialization is commenced at the powering of LM ADAPTER.
Outline of operation	In the case when the OFF line mode is set in valid, the OFF line mode will forcibly be commenced for about 20 minutes after powering LM ADAPTER. If Poll (Fetch) demand is presented to the input variable and outdoor variable during this time, the null will be responded. After 20 minutes elapsed, ON line mode will be set.

## Communication Image



### Cautions

- To conduct binding, be sure to make the OFF line mode invalid.
- The mode change under OFF line mode will be invalid.
- This function is only effective during the initialization (20 minutes after powering) of LM ADAPTER.

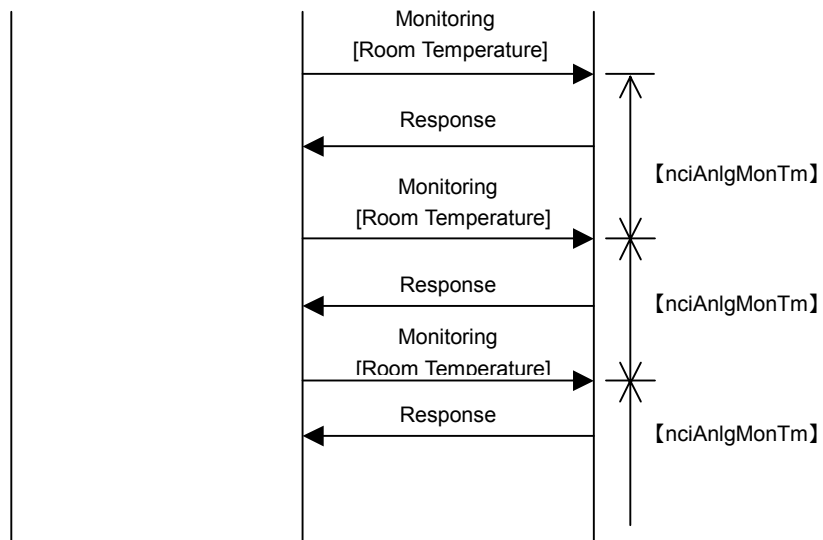
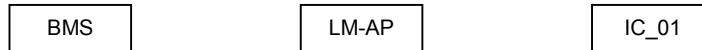
# Function – [Space Temperature Setting]

LMAP02-E  
LMAP03

Function	[Monitoring Time]
Description	Defines the indoor temperature monitor interval from the LM ADAPTER to the indoor unit.
Using CP	<b>[nciAnlgMonTm]</b>
Control unit	LM ADAPTER
Relating CP	<b>[nciSndHrtBt_2]</b>
Data holding	Memorizing set values in nonvolatile memory.
Reference NV	Nothing
Purpose	To be used to modify the monitoring interval of room temperature
Outline of operation	With the set interval, room temperature is monitored for indoor units from LM ADAPTER. Depending on the connecting number of indoor units, the monitor interval that can be set is different.

Function	[Spacetemp Width]
Description	Defines the minimum variation width of the output when <b>[nvoSpaceTemp_n]</b> (Space Temperature) changes.
Using CP	<b>[nciAnalogWidth]</b>
Control unit	LM ADAPTER
Relating CP	<b>[nciSndHrtBt_2]</b>
Data holding	Memorizing set values in nonvolatile memory.
Reference NV	Nothing
Purpose	To be used for suppressing frequent outputs at the changes of room temperature
Outline of operation	The output at changes will be provided if the status change of room temperature becomes more than the set temperature range. The output at changes will not be provided if the status change of room temperature becomes less than the set temperature range. Changing range: 0.5 °C~2.0 °C, Temperature unit: 0.5 °C

## Communication Image



### Restriction

- The set range differs depending on the connecting number of indoor units.

### Caution

- To set a periodical monitor interval below 10 minutes, it is required to change SW1-3 on LM ADAPTER to ON. Please make the connecting numbers 30 sets or less.

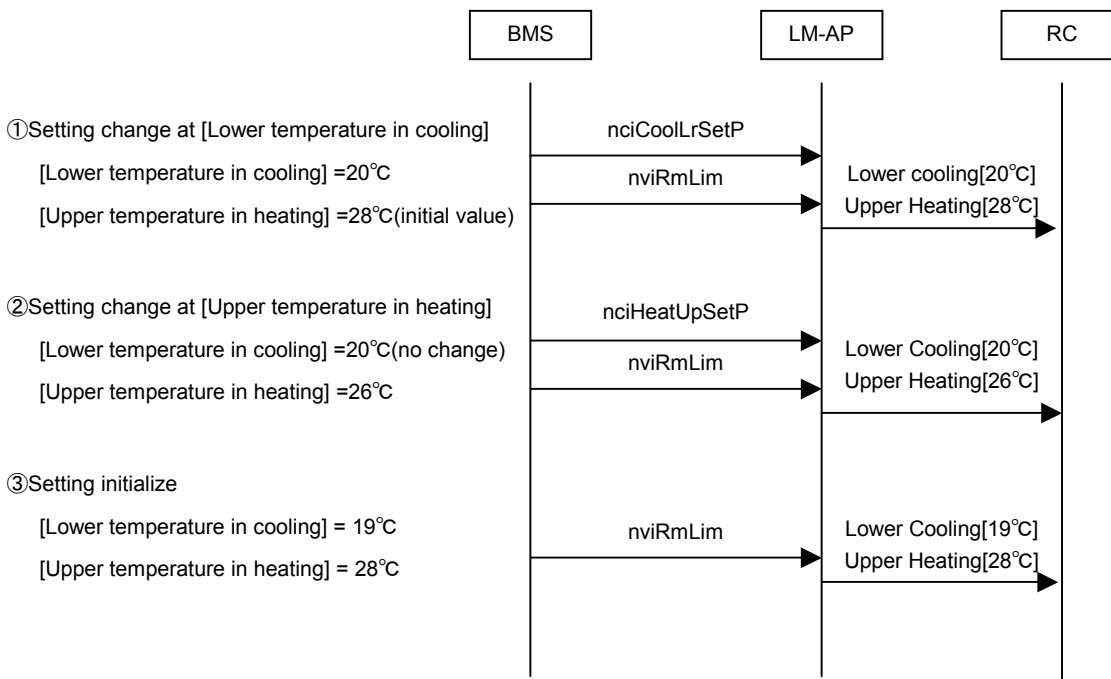
# Function – [Limit Temperature Setting]

LMAP02-E

LMAP03

Function	[Lower Setpoint Cooling] [Upper Setpoint Heating]
Description	Defines the limit temperature setting value for local remote controller.
Using CP	【nciCoolLrSetP】 【nciHeatUpSetP】
Control unit	LM ADAPTER
Relating CP	【nciRmDsp_1】 【nciRmDsp_2】
Using NV	【nviRmLim】
Data holding	Memorizing set values in nonvolatile memory.
Reference NV	Nothing
Purpose	To be used for energy saving purpose by preventing cooling, drying and heating operation at excessive temperature
Outline of operation	With this configuration property, the lowest set temperature in cooling and drying and the highest set temperature in heating are set to the local remote controller. The set detail will be reflected on the local remote controller when "Valid" is requested by 【nviRmLim】.

## Communication Image



### Restriction

- This is effective only for the standard local remote controllers with function to limit the set temperature range.

### Cautions

- As the setting is applied to the local remote controller collectively, the setting can not be changed for the remote controller individually.

- Changing the setting moves to the fan mode.

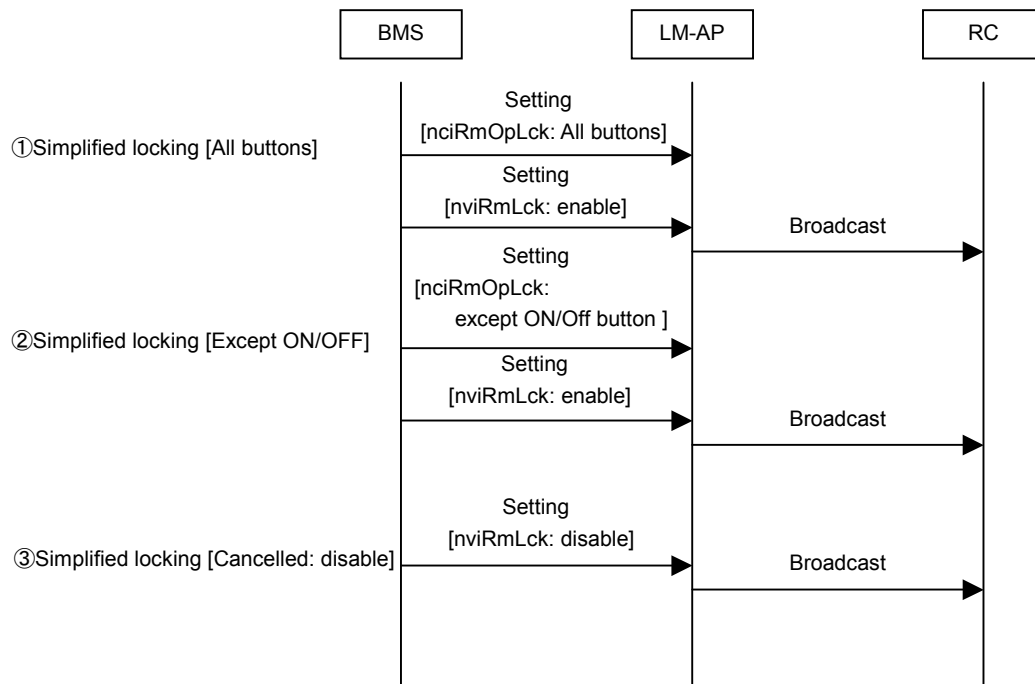
# Function – [Local Operation Lock]

LMAP02-E

LMAP03

Function	[Local Operation Lock]
Description	Defines the local remote controller simple lock setting value.
Using CP	[nciRmOpLck]
Control unit	LM ADAPTER
Relating CP	[nciRmDsp_1] [nciRmDsp_2]
Using NV	[nviRmLck]
Data holding	Memorizing set values in nonvolatile memory.
Reference NV	Nothing
Purpose	To be used for limiting the switch operation of local remote controller collectively
Outline of operation	With this configuration property, the limiting range of simplified locking function is set for the local remote controller. The set detail will be reflected on the local remote controller when "Valid" is requested by [nviRmLim].

## Communication Image



### Restrictions

- Effective only for the local remote controller with function to limit switch operation
- Effective only for the local remote controller set to the standard model.

### Caution

- Setting to local remote controllers collectively

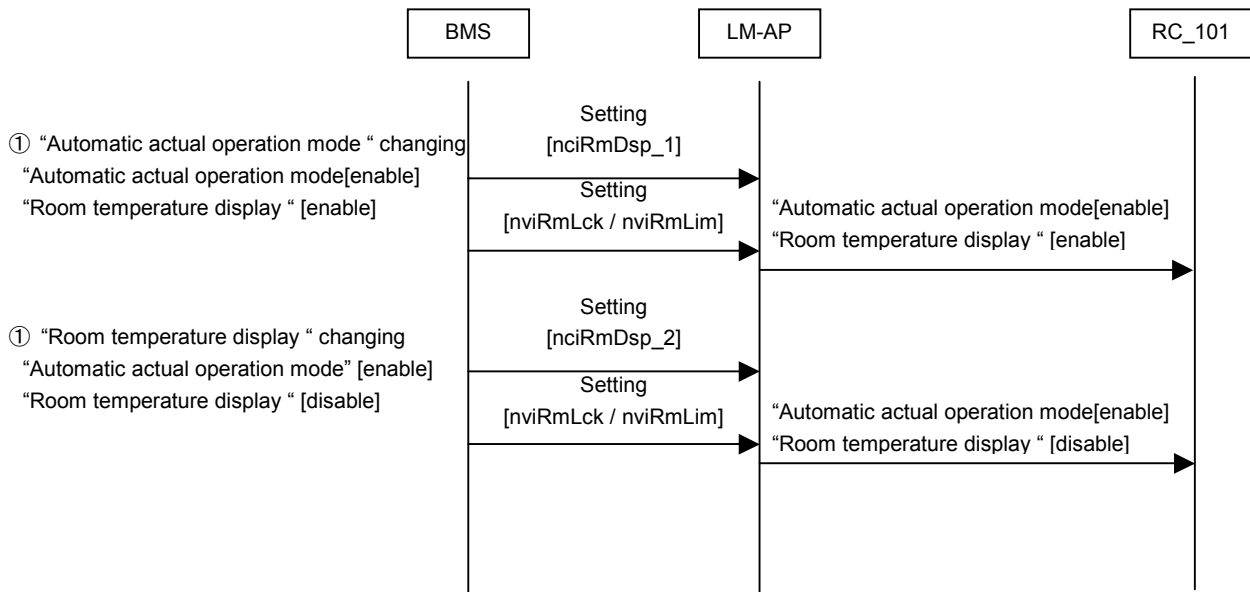
# Function – [Local Display Setting]

LMAP02-E

LMAP03

Function	[Local Display_1] [Local Display_2]
Description	Defines the presence of the automatic actual operation mode display on the local remote controller.
Using CP	【nciRmDsp_1】 【nciRmDsp_2】
Control unit	LM ADAPTER
Relating CP	Nothing
Using NV	【nviRmLck】 【nviRmLim】
Data holding	Memorizing set values in nonvolatile memory.
Reference NV	Nothing
Purpose	Used for switching over the display of operation mode and room temperature alternately on the local remote controller
Outline of operation	<p>"Automatic actual operation mode"</p> <p>Selecting the presence of display for the operation mode (automatic cooling, automatic heating) actually working on the models operable automatically.</p> <p>"Room temperature display"</p> <p>Selecting the presence of display for room temperature.</p> <p>With this configuration property, the presence of display for the actual operation mode of local remote controller is set. The set detail is reflected on the local remote controller at the renewal of 【nviRmLim】 and 【nviRmLck】.</p>

## Communication Image



### Restrictions

- Effective only for the local remote controller with function to change over the presence of display
- Effective only for the local remote controller set to the standard model.

### Caution

- Setting to local remote controllers collectively

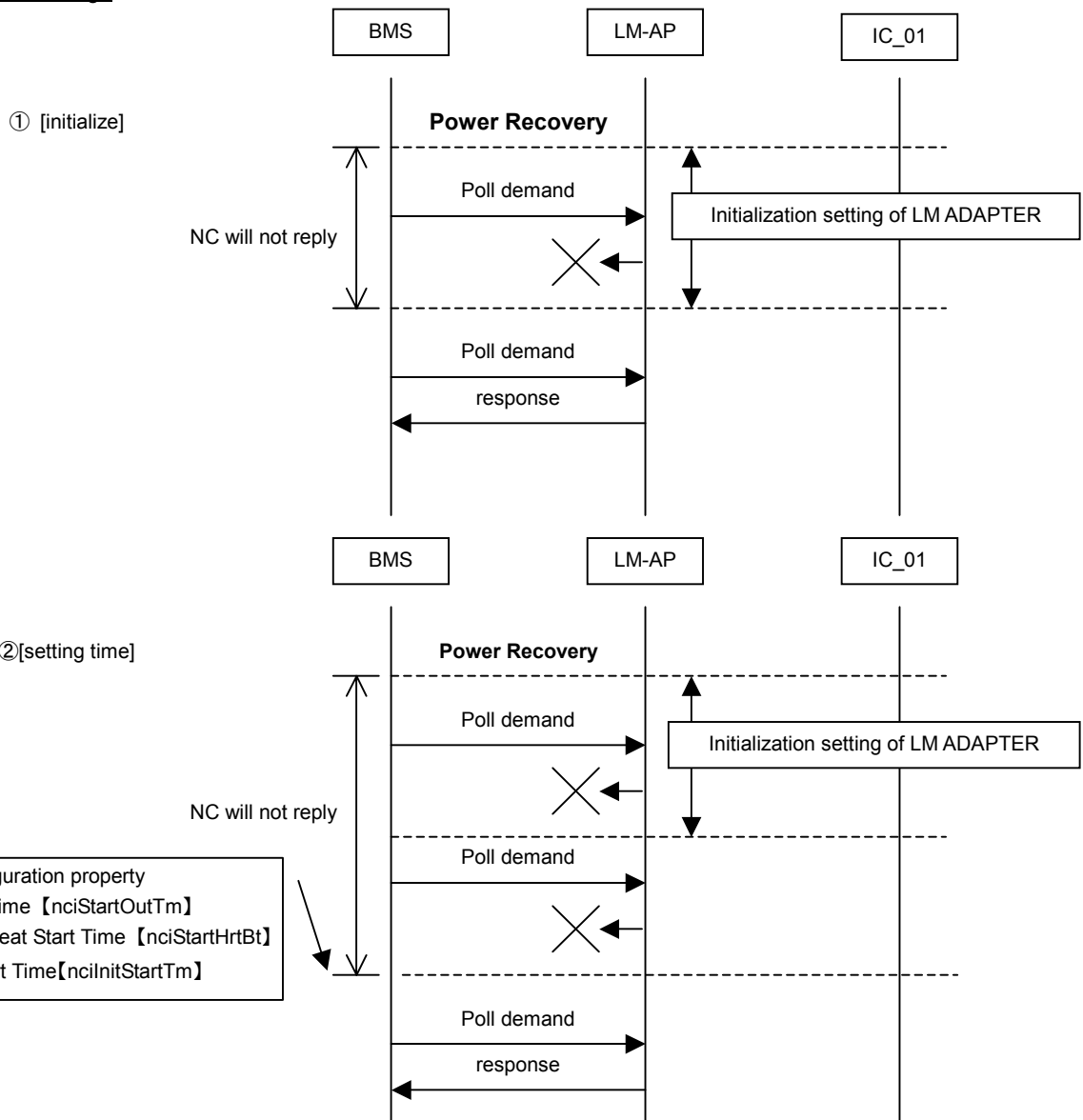


# Function – [Communication Timing]

LMAP02-E  
LMAP03

Function	[Communication Timing]
Description	Defines the network communication start timing at the powering of the LM ADAPTER.
Using CP	【nciSet_1】
Control unit	LM ADAPTER
Relating CP	【nciStartHrtBt】 【nciStartOutTm】 【nciInitStartTm】
Data holding	Memorizing set values in nonvolatile memory.
Reference NV	Nothing
Purpose	To be used for setting of the timing to start the operation of Neuron Chip after completing the initialization. While the Neuron Chip is stopped during the initialization setting of LM ADAPTER with air conditioners.
Outline of operation	At the set time after powering, the operation of Neuron Chip will start enabling the LonWorks communication of LM ADAPTER.

## Communication Image



### Caution

- This does not represent the start timing of the output at changing (event output). Setting is required by the configuration property (Send Start Time 【nciStartOutTm】) additionally.



**Mitsubishi Electric**  
**Air Conditioning Network System**  
**LM ADAPTER LMAP02-E/LMAP03**  
**Technical Manual**

