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Edition 3.0 2017-04

INTERNATIONAL STANDARD

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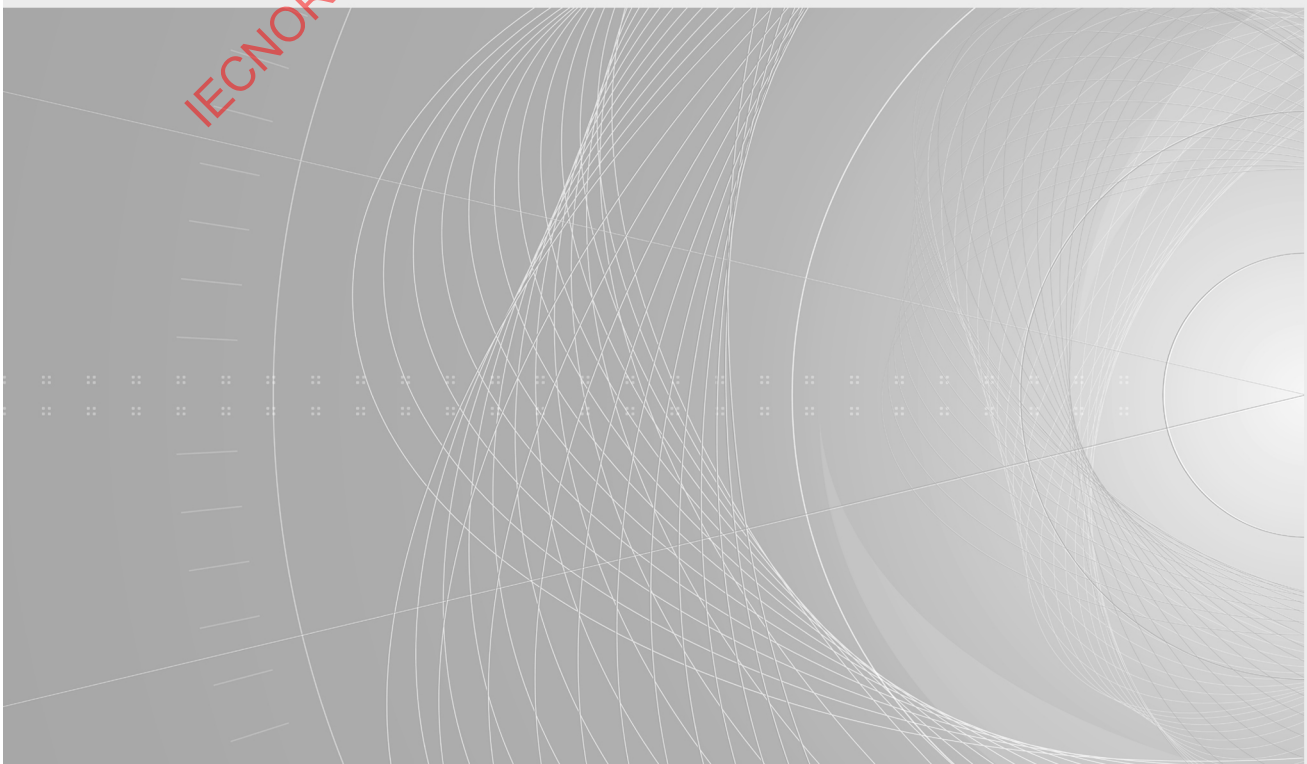
Service diagnostic interface for consumer electronics products and networks – Implementation for echonet



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SERVICE DIAGNOSTIC INTERFACE FOR CONSUMER ELECTRONICS PRODUCTS AND NETWORKS – IMPLEMENTATION FOR ECHONET

FOREWORD

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International Standard IEC 62394 has been prepared by technical area 8: Multimedia home systems and applications for end-user network[1], of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This third edition cancels and replaces the second edition published in 2013. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) updates of the device object super class specifications for the property configurations shared by all device objects;
b) modification and addition of the property configurations defined by each object;
c) addition of new device objects and their property configurations;
d) updates to Bibliography.

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1 The second edition (2013) was developed by technical area 9: Audio, video and multimedia applications for end-user network. However, technical area 9 has now been integrated into technical area 8.

The text of this standard is based on the following documents:

FDIS	Report on voting
100/2851/FDIS	100/2860/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

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INTRODUCTION

Consumer products are often repaired by service workshops, which service a wide range of products developed by different manufacturers.

For highly complex products, fault diagnosis becomes increasingly difficult and time consuming.

To facilitate diagnosis, manufacturers often develop built-in diagnostic software that communicates with an external diagnostic unit through a service diagnostic interface (SDI).

To avoid the need for a service workshop to purchase several different diagnostic units from different manufacturers for different products, a standardized SDI is proposed for use by all manufacturers of any products requiring a diagnostic interface. The result will be that only one SDI is needed in the service workshops.

The SDI should be suitable for diagnosis in a facilities or household appliances network in which different products from different manufacturers are connected together. The interface should also allow for future developments.

The standard SDI should:

- be usable in future products,
- be easily connectable to a product or a network,
- be inexpensive,
- not limit product design.

SERVICE DIAGNOSTIC INTERFACE FOR CONSUMER ELECTRONICS PRODUCTS AND NETWORKS – IMPLEMENTATION FOR ECHONET

1 Scope

This International Standard specifies requirements for service diagnostic software to be implemented in products that incorporate a digital interface. It does not specify requirements for carrying out remote diagnosis or for manufacturer-dependent software.

The Service Diagnostic Interface (SDI) requires an external controller (exclusive or general-purpose/PC) into which service diagnostic software can be loaded. Parts of the controller software should be standardized while other parts should be unique to the manufacturer.

To reach a common approach in servicing all products from all manufacturers, it is necessary to standardize specific items to be tested in products and certain aspects of controllers' diagnostic software.

The SDI is based upon ECHONET specification version 2.11, ECHONET Lite specification version 1.11, and APPENDIX Detailed Requirements for ECHONET Device objects Release G, because this interface will be used in future products. The use of this connection and existing communication protocols enable implementation in products at a low cost, with maximum flexibility and efficiency.

The SDI consists of

- specific hardware and software requirements of the device under test (DUT);
- specific requirements of the controller:
  - the service software;
  - an ECHONET interface;
- the connection between the controller and the DUT.

This standard provides the minimal requirements necessary to carry out computerized diagnosis. It covers the standardized software of the controller as well as the standardized software and provisions in the DUT.

2 Normative references

There are no normative references in this document.

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1.1
ECHONET specifications
specifications designed to enable the use of various kinds of transmission media (for example, power line, low-power radio frequency, ETHERNET, Bluetooth®[2]

3.1.2
remote diagnosis
diagnosis of a product via telephone, Internet, etc.

3.2 Abbreviated terms

CpESV	Compound ECHONET service
DEA	Destination ECHONET address
DEOJ	Destination ECHONET object
DUT	Device under test
EBC	ECHONET byte counter
EDATA	ECHONET DATA
EDT	ECHONET property value data
EHD	ECHONET headers
ELDATA	ECHONET Lite DATA
ELHD	ECHONET Lite headers
ELPDC	ECHONET Lite Property data counter
ELSV	ECHONET Lite service
EOJ	ECHONET objects
EPC	ECHONET property
ESV	ECHONET service
EVPS	Electric Vehicle Power System
LSB	Least Significant Bit
MSB	Most Significant Bit
OEM	Original equipment manufacturer
OHD	Object message header
OPC	Processing target property counter
PC	Personal computer
PDC	Property data counter
PEDATA	Plane EDATA (Plane ECHONET data)
ROM	Read-only memory
SDI	Service diagnostic interface
SEA	Source ECHONET address
SEOJ	Source ECHONET object
SOC	State of Charge
TID	Transaction ID
V2H	Vehicle to Home

2 ETHERNET is the trademark of a product supplied by Xerox Corporation. Bluetooth is the trademark of a product supplied by Bluetooth SIG, Inc. This information is given for the convenience of users of this standard and does not constitute an endorsement by IEC of the product named. Equivalent products may be used if they can be shown to lead to the same results.

4 Different types of service diagnostics

4.1 Stand-alone products

For stand-alone products, a connection is made between the diagnostic controller and the DUT, where the DUT is from any manufacturer and of any type.

4.2 Facilities or household appliances network

In a facilities or household appliances network, a connection is made between the diagnostic controller and a network of facilities or household appliances. Several different facilities or household appliances are interconnected and not all of them are necessarily from the same manufacturer.

In this case, the SDI shall list the products on the network, detect which facilities or appliances are causing problem, and diagnose the product concerned.

4.3 Remote diagnosis

In addition to the configurations described in 4.1 and 4.2, a link can be made (for example, via telephone, the Internet, etc.) between the diagnostic controller in the workshop and a DUT's network at the customer's home. Therefore, if a product has both an ECHONET interface and a remote connection capability, this product should be able to transfer the diagnostic data, as described in this standard, through the remote connection.

5 SDI requirements

5.1 General

The SDI consists of

hardware and software, both in the DUT and in the test equipment ("tester");

the connection between the tester and the DUT.

The total SDI can be divided into the parts described in 5.2 and 5.3.

5.2 Hardware

5.2.1 Tester hardware

The hardware used for testing shall be a controller-exclusive computer or general-purpose controller (for example, a desktop or laptop PC) provided with at least one suitable network interface which enables transfer of the ECHONET frame, as specified in 7.2, and runs the necessary diagnostic software.

NOTE The minimum requirements for the tester hardware depend on the respective tester platform.

5.2.2 Facilities or household appliances network

For the connection between the tester and the DUT, the "facilities or household appliances network" shall be used. For diagnosis of the DUT using the network, the tester shall be connected to the facilities or household appliances network that conforms to the requirements of 7.2 or 8.2.

5.2.3 DUT hardware

5.2.3.1 General

The DUT shall be provided with at least one network interface which enables the transfer of the ECHONET frame as specified in 7.2.

5.2.3.2 Facilities or household appliances network

For diagnosis on a network, the tester shall, where possible, be connected to a “facilities or household appliances network” that conforms to the requirements of 7.1.

5.3 Software

5.3.1 General

The software for the SDI can be divided into two parts (tester and DUT) of which each part again can be divided into mandatory (SDI common) software and non-mandatory (manufacturer-dependent) software.

5.3.2 Tester software

The software platform of the tester shall be able to handle the ECHONET frame as specified in 7.2.

The SDI common software on the tester shall have the following functionalities:

a) initiate a service of “property value read request”, as specified in 7.2.9;

b) read out the service of “property value read response” and “property value notification” of all products, as specified in 7.2.9;

c) display a list of all products connected to the facilities or household appliances network to which the tester is connected. On the display shall be listed the
   - manufacturer code property,
   - place-of-business code property,
   - product code property,
   - serial number property,
   - date-of-manufacture property;

d) display an indication of the fault status property which describes the occurrence of an error in an actual device. The property code used as a property value is 0 × 41 when an error exists or 0 × 42 when no error exists and is found to be “OK” or “Not OK” as specified in 9.3.6;

e) display an indication of the fault content property which describes the content of an error in an actual device as specified in 9.3.6.

5.3.3 DUT software requirements for the SDI

The DUT shall be able to handle the ECHONET frame as specified in 7.2.

In addition, the SDI common software in the DUT shall be able to

a) run a self-test routine,

b) receive a service of “property value read request” as specified in 7.2.9 which is initiated by the tester and response a service of “property value read response” as specified in 7.2.9,

c) initiate a service of “property value notification” as specified in 7.2.9.

6 Tester software requirements

6.1 Reading the property diagnostic unit

The common application shall be able to retrieve and display information from the SDI-compliant devices specified in 6.1 to 6.3.

6.2 General information (product identification)

The manufacturer code property, the place-of-business code property, the product code property and the serial number property shall be read from the DUT and displayed. These property data shall always be available as specified in 9.3. The tester shall display this information for all devices in the system.

NOTE The manufacturer code displayed might not be the same as the name on the physical device.

6.3 Diagnosis information

After start-up of the general information software, the diagnosis information shall be displayed.

7 Control protocol 1st

7.1 General

The ECHONET specifications were designed to enable the use of various kinds of transmission media (for example, power line, low-power radio frequency, ETHERNET, Bluetooth®). Slow transmission speeds discourage large data transfers, and it is desirable to reduce the mounting load on simple devices. In the light of this situation, ECHONET specifies the frame format for the ECHONET communication middleware block to minimize the message size while fulfilling the requirements of the communications layer structure.

7.2 Frame format

7.2.1 General

Figure 1 shows the content of the ECHONET communication middleware frame format. In the ECHONET communication middleware specifications, messages exchanged between ECHONET communications processing blocks are called ECHONET frames. ECHONET frames are roughly divided into two types depending on the specified EHD: the secure message format, of which the EDATA section is enciphered, and the plain message format, of which the EDATA section is not enciphered. The secure message format and the plain message format are subdivided into three formats depending on the specified EHD (see Table 3). Therefore, the following six different message formats are available for ECHONET frames.

a) Plain basic message format

   Insecure communication is performed so that one message is used to view or change the contents of one property.

b) Plain compound message format

   Insecure communication is performed so that one message is used to view or change the contents of two or more properties.

c) Plain arbitrary message format

   Insecure communication is performed so as to exchange information that complies with vendor-unique specifications.

d) Secure basic message format

   Secure communication is performed so that one message is used to view or change the contents of one property.

e) Secure compound message format

   Secure communication is performed so that one message is used to view or change the contents of two or more properties.

f) Secure arbitrary message format

   Secure communication is performed so as to exchange information that complies with vendor-unique specifications.

Figure 1 shows the ECHONET frame structure for the plain message format.

Detailed specifications for each message component will be provided in the following subclauses.

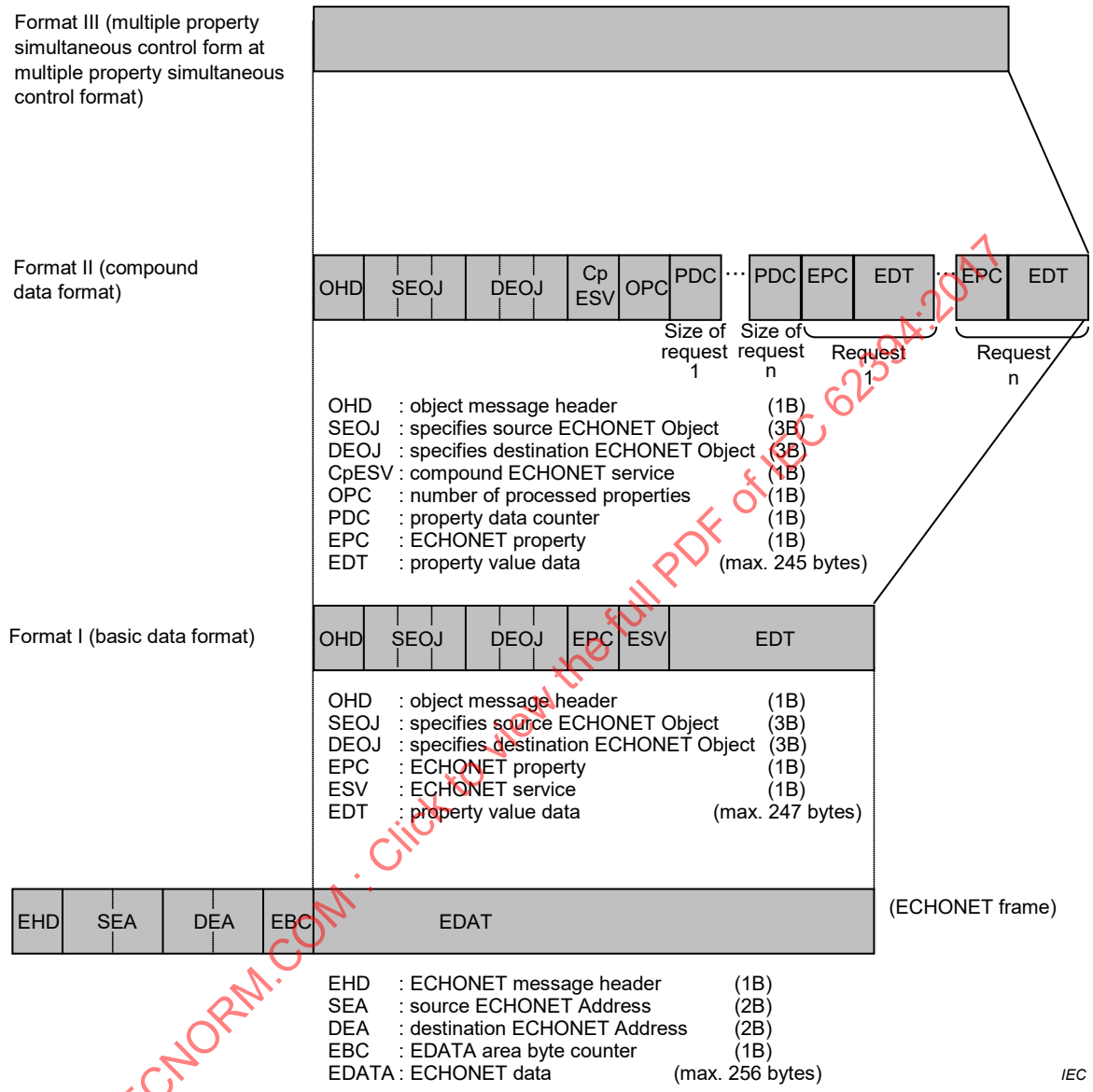
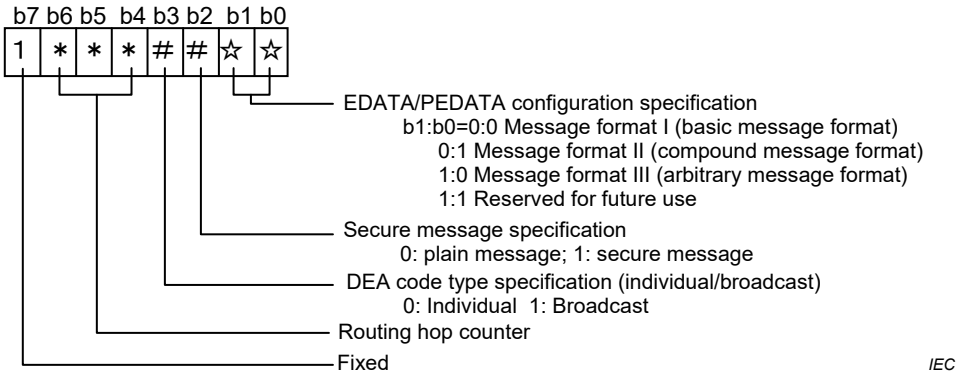


Figure 1 – ECHONET frame for plain data format

7.2.2 ECHONET headers (EHD)]

This subclause provides detailed specifications for the ECHONET header (EHD) shown in Figure 1 and Figure 2.



NOTE When b7=0, b0 to b6 will be specified separately (reserved for future use).

Figure 2 – EHD detailed specifications

The combination of b1 and b0 specifies the message format for EDATA/PEDATA. When b1:b0 = 0:0, it indicates Message Format I (basic message format), which allows one message to operate on one property of one object. When b1:b0 = 0:1, it indicates Message Format II (compound message format), which allows one message to operate on two or more properties of one object. When b1:b0 = 1:0, it indicates Message Format III (arbitrary message format), of which EDATA/PEDATA section is in an arbitrary format.

Bit b2 indicates whether the EDATA section is enciphered or not. When b2 = 1, it means that the EDATA section is enciphered. When b2 = 0, it means that the EDATA section is not enciphered.

Bit b3 specifies whether the DEA (destination ECHONET address) shown in Figure 3 and Figure 4 is a broadcast address or an individual address. When b3 = 1, this indicates that a broadcast address is stipulated by the DEA code. When b3 = 0, this indicates that an individual address is stipulated by the DEA code. Broadcast address codes are discussed in 7.2.3.

Bits b4, b5, and b6 constitute a routing hop counter, which can be manipulated only by ECHONET routers. When a message received at one subnet of an ECHONET router is forwarded to another subnet, the counter is incremented. For every transmission from an ordinary node, a hop count of 0 is used. The relationship between b4, b5, and b6 and the hop count is shown in Table 1. The number of hops can be set to a value between 0 and 7.

Table 1 – Bit pattern for hop count

b6	b5	b4	Hop count (router passes)
0	0	0	0
0	0	1	1
0	1	0	2
0	1	1	3
1	0	0	4
1	0	1	5
1	1	0	6
1	1	1	7

7.2.3 Source/Destination ECHONET address (SEA/DEA)

This subclause provides detailed specifications for the source ECHONET address (SEA) and destination ECHONET address (DEA) shown in Figure 3. Figure 4 shows the configuration of

the source ECHONET address (SEA) and the destination ECHONET address (DEA) prevailing when an individual address is stipulated by setting b3 of EHD to 0.

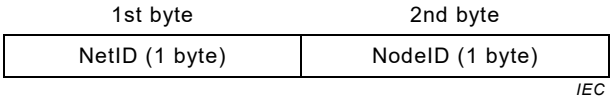
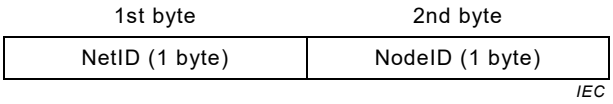


Figure 3 – Configuration of SEA and DEA when an individual address is specified

When b3 of EHD is set to 1 to specify a broadcast, the destination ECHONET address (DEA) becomes a code indicating a broadcast message for a specific ECHONET address group (including a general broadcast). The DEA configuration in this case is shown in Figure 4. The broadcast target stipulation code is shown in Figure 5 and Figure 6.



Broadcast type stipulation code	Broadcast target stipulation code	Remarks
0x00	Specifies the node groups to be targeted for a broadcast within all subnets. For node selection, see Figure 5.	An intra-domain broadcast. In all subnets within a domain, a broadcast is sent to the nodes stipulated by the broadcast target stipulation code.
0x01	Specifies the node groups to be targeted for a broadcast within its own subnet. For node group selection, see Figure 5.	An intra-own-subnet broadcast. In the own subnet, a broadcast is sent to the nodes stipulated by the broadcast target stipulation code.
0x02	All nodes within the subnet having the Net ID code stipulated by the "broadcast target stipulation code" are targeted.	A general broadcast within a specified subnet. A broadcast is sent to all nodes within the subnet stipulated by the broadcast target stipulation code.
0x03~0x7F	Reserved for future use.	
0x80~0xFF	Open to user.	Used when a system manager will manage the system in a collective housing unit or small office building.

Figure 4 – DEA (broadcast-stipulated) address configuration

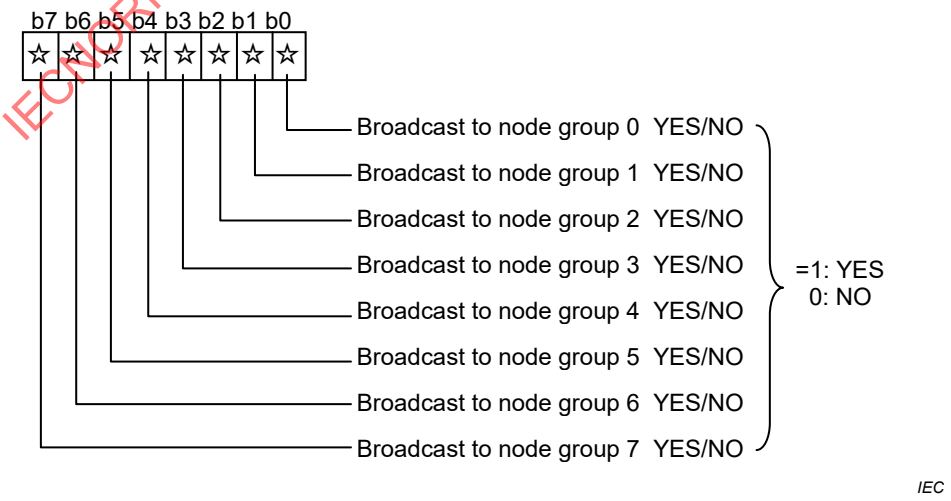


Figure 5 – Broadcast target stipulation code

	0	8	4	C	2	A	6	E	1	9	5	D	3	B	7	F	
0																	Group 0
8																	
4																	Group 1
C																	
2																	Group 2
A																	
6																	Group 3
E																	
1																	Group 4
9																	
5																	Group 5
D																	
3																	Group 6
B																	
7																	Group 7
F																	

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Figure 6 – Node group stipulation bit specifications

7.2.4 ECHONET byte counter (EBC)

EBC indicates the size of the ECHONET data region (EDATA region) shown in Figure 1. The size is variable in 1-byte increments. The acceptable EDATA region size ranges from 6 bytes to 256 bytes (0x06 to 0xFF; 0x00 = 256). The lower limit is 6 bytes, which indicates that a message consists of at least 6 bytes. The reason is that either the SEOJ or the DEOJ needs to be specified with the EPC to ESV options specified for a plain message. A 6-byte message can be a message requesting an ESV with the DEOJ specified or a message carrying a "response of processing impossible" for ESV with the SEOJ specified.

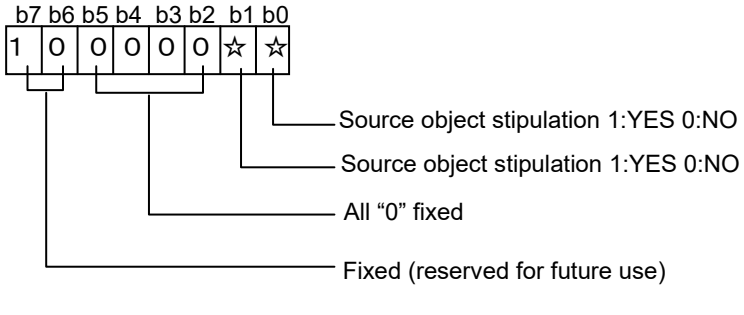
7.2.5 ECHONET data (EDATA)

The DATA region for messages exchanged by the ECHONET communication middleware.

Maximum size: 256 bytes.

7.2.6 Object message header (OHD)

This subclause provides detailed specifications for the object message header (OHD) shown in Figure 1. Detailed specifications are shown in Figure 7. The state in which b1 and b0 are both 0 will never occur.



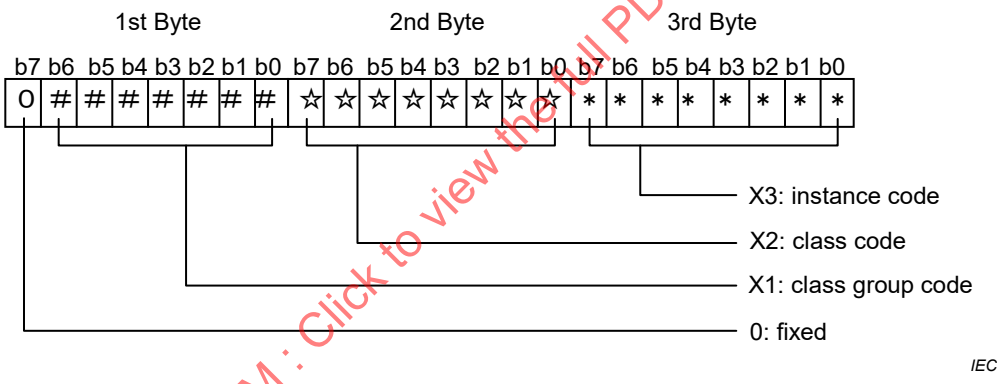
NOTE When b6 and b7 have values other than b6 = 0 and b7 = 1, b0 to b5 will have different meanings.

The meanings of bits b0 to b5 when b6 and b7 have values other than b6 = 0 and b7 =1 will be stipulated in the future (reserved for future use).

Figure 7 – OHD detailed specifications

7.2.7 ECHONET objects (EOJ)

This subclause provides detailed specifications for the source ECHONET object (SEOJ) code and destination ECHONET object (DEOJ) code shown in Figure 1. Detailed specifications are shown in Figure 8.



NOTE The meanings of the bits when b7 of the 1st byte is 1 will be stipulated in the future (reserved for future use).

Figure 8 – EOJ detailed specifications

ECHONET objects are described using the format [X1.X2] and [X3], with these formats to be specified as shown below. (However, “.” is used only for descriptive purposes and does not mean a specific code.) The object class is designated by the combination of X1 and X2, while X3 shows the class instance. A single ECHONET node may contain more than one instance of the same class, in which case X3 is used to identify each one.

The specific items in Table 2 were specified on the basis of JEM 1439 (see Clause 9.45). Detailed specifications for the objects shown here will be developed over time and, during this phase; specifications for the objects themselves (i.e., present/not present) will be further reviewed.

The instance code 0x00 is regarded as a special code (code for specifying all instances). When a DEOJ for which this code is specified is received, it is handled as a code specifying a broadcast to all instances of a specified class.

- X1 : class group code 0x00 -0x7F. For details, refer to Table 2.
- X2 : class code 0x00 -0xFF.
- X3 : instance code 0x00 -0xFF.

The identifier code is used when more than one of the same class specified by [X1.X2] exists within the same node.

However, 0x00 is used as a general broadcast to all instances of class specified with [X1.X2].

Table 2 – List of class group codes

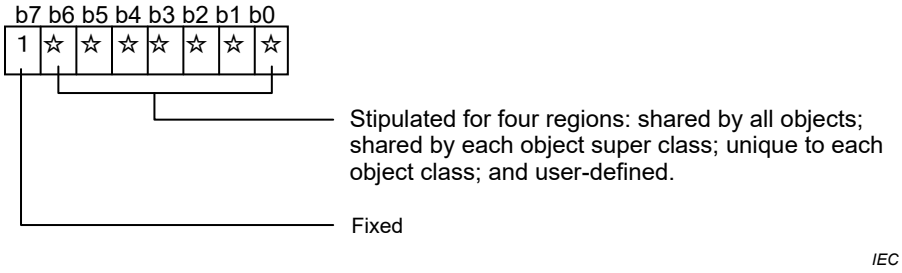
Class group code	Group name	Remarks
0x00	Sensor-related device class group	
0x01	Air conditioner-related device class group	
0x02	Housing/facility-related device class group	Includes lighting
0x03	Cooking/housework-related device class group	
0x04	Health-related device class group	
0x05	Management/control-related device class group	
0x06	AV-related device class group	
0x07~0x0C	Reserved for future use	
0x0D	Service class group	
0x0E	Profile class group	
0x0F	User definition class group	
0x10~0x1F	Communications definition class group for stipulation of status notification method	
0x20~0x2F	Communications definition class group for stipulation of setting control reception method	
0x30~0x3F	Communications definition class group for linked settings (action settings)	
0x40~0x4F	Communications definition class group for linked settings (trigger settings)	
0x50~0x5F	Secure communication access property set-up class	
0x60~0x7F	Reserved for future use	

7.2.8 ECHONET property (EPC)

This subclause provides detailed specifications for the ECHONET property (EPC) code shown in Figure 1. Detailed specifications are shown in Figure 9. The EPC specifies a service target function. Each object stipulated by X1 (class group code) and X2 (class code), described in 7.2.7, is specified here.

When a specified object changes, the target function also changes even when the code remains unchanged. However, the detailed specifications are designed to ensure that, whenever possible, the same functions will have the same code.

Specific code values for each object are stipulated in Figure 46. These codes correspond to the object property identifiers in the object definitions.



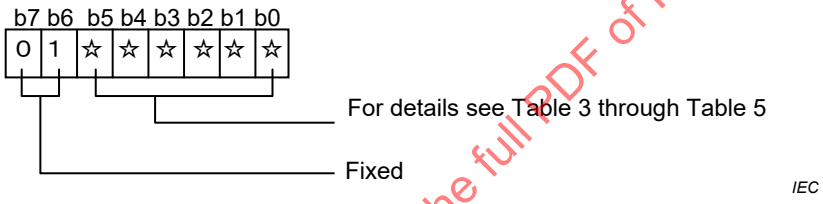
NOTE When b7 = 0, the other bits will be defined differently.

Figure 9 – EPC detailed specifications

7.2.9 ECHONET service (ESV)

7.2.9.1 General

This subclause provides detailed specifications for the ECHONET service (ESV) code shown in Figure 1. Detailed specifications are shown in Figure 10.



NOTE In cases other than when b7:b6 = 0:1, the meaning of values b0 – b5 will be specified separately.

Figure 10 – ESV detailed specifications

This code stipulates manipulation of the properties stipulated by EPC. The three main kinds of operations are shown below. There are also two kinds of responses: the “response”, which is given when the stipulated properties exist; and the “response not possible”, which is given when the requested properties (including array elements) do not exist or when the stipulated service cannot be processed.

“Request”/“Response” (response/response not possible)/“Notification”.

A “response” is considered to be a reply to a “request” that requires a response; when the object stipulated in the DEOJ exists, as a rule it is either “response” or “response not possible” (stipulated processing cannot be accepted, or the stipulated object exists but the property does not). When the request requires no response and the stipulated object does not exist, no response is made.

There are two types of "notification": one for transmitting the own-property information autonomously and the other for sending a response to a notification request. However, these two types have the same code.

Three specific operations are provided: write (response required/no response required), read, and notification (notification/notification with response required). The 12 operations shown below are set in consideration of whether or not the content of the given property is an array.

a) Property value write (response required/no response required)

b) Property value read

c) Property value notification

d) Property value array-element-stipulated write (response required/no response required)

e) Property value array-element-stipulated read

f) Property value array-element-stipulated notification

g) Property value array-element-stipulated addition (response required/no response required)

h) Property value array-element-stipulated deletion (response required/no response required)

i) Property value array-element-stipulated existence confirmation

j) Property value array element addition (response required/no response required)

k) Property value notification (response required)

l) Property value array-element-stipulated notification (response required)

7.2.9.2 Relationship between request and response

The relationship between the message configuration (presence or absence of SEOJ and DEOJ) and EPC and ESV is described below.

- The EPC in an ECHONET message stipulating only SEOJ indicates the properties of the sender object specified in SEOJ. In this case, ESV contains an autonomous “notification” or “notification” or “response” in response to a request for properties specified in SEOJ and EPC. If ESV is a “request” in such a case, the received message is treated as an illegal message.
- The EPC in an ECHONET message stipulating only DEOJ indicates the properties of the destination object specified in DEOJ. In this case, ESV contains a “request” regarding the properties specified in DEOJ and EPC. If ESV is a “response” or a “notification” in such a case, the received message is treated as an illegal message.
- For ECHONET messages stipulating both SEOJ and DEOJ, the ESV value is used to determine whether the EPC is stipulated by the SEOJ or the DEOJ. When the ESV is a “response” or a “notification”, the EPC is considered to be a component of the object specified by SEOJ and is viewed as a “response” or “notification” directed towards the object stipulated in the DEOJ. When the ESV is a “request”, the EPC is considered to be a component of the DEOJ and is viewed as a “request” from the object stipulated in the SEOJ.

Table 3, Table 4 and Table 5 show specific ESV code assignments based on the content described above. Specific descriptions of a) through l) above are provided in (a) through (l) of the remarks column in the relevant table. In the figures given in (a) through (l), the DEOJ for "requests" is shown as an individually stipulated code. However, when the DEOJ indicates a broadcast to all instances of a specified class (when the DEOJ's X3 = 0x00), a response is transmitted with both "process-not-possible" response and "response" configured for each target instance. Note that in the table, the “array elements” described above are presented as “elements”.

Table 3 – List of ESV codes for requests

Service code (ESV)	ECHONET service content	Symbol	Remarks[a]
0x60	Property value write request (no response required)	SetI	(a)
0x61	Property value write request (response required)	SetC	
0x62	Property value read request	Get	(b)
0x63	Property value notify request	INF_REQ	(c)
0x64	Property value element-stipulated write request (no response required)	SetMI	(d)
0x65	Property value element-stipulated write request (response required)	SetMC	
0x66	Property value element-stipulated read request	GetM	(e)
0x67	Property value element-stipulated notify request	INFM_REQ	(f)
0x68	Property value element-stipulated add request (no response required)	AddMI	(g)
0x69	Property value element-stipulated add request (response required)	AddMC	
0x6A	Property value element-stipulated delete request (no response required)	DelMI	(h)
0x6B	Property value element-stipulated delete request (response required)	DelMC	
0x6C	Property value element existence confirm request	CheckM	(i)
0x6D	Property value element add request (no response required)	AddMSI	(j)
0x6E	Property value element add request (response required)	AddMSC	
0x6F	Reserved for future use		

[a] Remarks (a) to (j) are given below Table 5.

Table 4 – List of ESV codes for response/notification

Service code (ESV)	ECHONET service content	Symbol	Remarks [c]
0x71	Property value write response	Set_Res	ESV=0x61 response (a)
0x72	Property value read response	Get_Res	ESV=0x62 response (b)
0x73	Property value notification	INF	(c)[a]
0x74	Property value notification (response required)	INFC	(k)
0x75	Property value element-stipulated write response	SetM_Res	ESV=0x65 response (d)
0x76	Property value element-stipulated read response	GetM_Res	ESV=0x66 response (e)
0x77	Property value element-stipulated notify	INFM	(f)[b]
0x78	Property value element-stipulated notify (response required)	INFMC	(l)
0x79	Property value element-stipulated add response	AddM_Res	ESV=0x69 response (g)
0x7A	Property value notify response	INFC_Res	ESV=0x74 response (k)
0x7B	Property value element-stipulated delete response	DelM_Res	ESV=0x6B response (h)
0x7C	Property value element-stipulated existence confirm response	CheckM_Res	ESV=0x6C response (i)
0x7D	Property value element-stipulated notify response	INFMC_Res	ESV=0x78 response (l)
0x7E	Property value element add response	AddMS_Res	ESV=0x6E response (j)
0x70, 0x7F	Reserved for future use		

[a] Used for autonomous property value notification and for 0x63 response.

[b] Used for autonomous property value notification and for 0x67 response.

[c] Remarks (in brackets) are given below Table 5.

Table 5 – List of ESV codes for “response-not-possible” responses

Service code (ESV)	ECHONET service content	Symbol	Remarks
0x50	Property value write “process-not-possible” response	SetI_SNA	ESV=0x60 response not possible (a)
0x51	Property value write “process-not-possible” response	SetC_SNA	ESV=0x61 response not possible (a)
0x52	Property value read “process-not-possible” response	Get_SNA	ESV=0x62 response not possible (b)
0x53	Property value notify “process-not-possible” response	INF_SNA	ESV=0x63 response not possible (c)
0x54	Property value element-stipulated write request “process-not-possible” response	SetMI_SNA	ESV=0x64 response not possible (d)
0x55	Property value element-stipulated write request “process-not-possible” response	SetMC_SNA	ESV=0x65 response not possible (d)
0x56	Property value element-stipulated read request “process-not-possible” response	GetM_SNA	ESV=0x66 response not possible (e)
0x57	Property value element-stipulated notify request “process-not-possible” response	INFM_SNA	ESV=0x67 response not possible (f)
0x58	Property value element-stipulated add request “process-not-possible” response	AddMI_SNA	ESV=0x68 response not possible (g)
0x59	Property value element-stipulated add request “process-not-possible” response	AddMC_SNA	ESV=0x69 response not possible (g)
0x5A	Property value element-stipulated delete request “process-not-possible” response	DelMI_SNA	ESV=0x6A response not possible (h)
0x5B	Property value element-stipulated delete request “process-not- possible” response	DelMC_SNA	ESV=0x6A response not possible (h)
0x5C	Property value element-stipulated existence confirm request “process-not-possible” response	CheckM_SNA	ESV=0x6C response not possible (i)
0x5D	Property value element add request “process-not-possible” response	AddMSI_SNA	ESV=0x6D response not possible (j)
0x5E	Property value element add request “process-not-possible” response	AddMSC_SNA	ESV=0x6E response not possible (j)
0x5F	Reserved for future use		

[a] Remarks (in brackets) are given below this Table.

Relationships between request and response are described from (a) to (l).

a) Property value write service [0x60, 0x61, 0x71, 0x50, 0x51]

In the case of a “request” (0x60, 0x61), this indicates a request to write the content shown in EDT to the property stipulated in the EPC of the object stipulated in DEOJ. In response to this “request”, when a value indicating a response is stipulated (0x61) and the request shall be (or has already been) received, “response” (0x71) is returned. This “response” is not a processing implementation response. When the request is not to be received, or when the stipulated DEOJ exists but the stipulated EPC does not exist, “response not possible” (0x50, 0x51) is returned. In the response frame format, SEOJ represents the value of the object stipulated by the request, and the relevant property is set in EPC. When the relevant object itself does not exist, neither “response” nor “response not possible” is returned. Also, the “response” message DEA is defined as the requesting entity (i.e., the request message SEA). Relationship between request and response is shown in Figure 11.

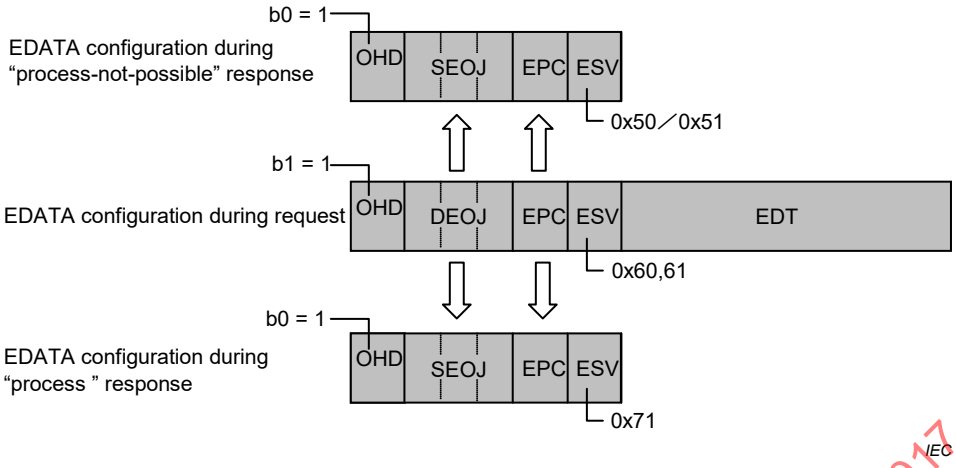


Figure 11 – EDATA configuration in property value write service

When EDATA stipulates SEOJ during a "request", the EOJ stipulated by SEOJ in EDATA during the "request" is allocated as a DEOJ (b1 of OHD is also set to 1), in the case of both "response not possible" and "response".

b) Property value read service [0x62, 0x72, and 0x52]

In the case of a "read" (0x62), this indicates a request to read the content of the property stipulated in the EPC of the object stipulated in the DEOJ. In response to this "read", when the request shall be (or has already been) accepted, "response" (0x72) is returned. When the request is not to be accepted, or when the stipulated DEOJ exists but the stipulated EPC does not exist, "response not possible" (0x52) is returned. In the response frame format, the value of the object stipulated by the request is set in SEOJ, the requested property is set in EPC, and the value of the requested property (i.e., the read content) is set in EDT. When "response not possible" is returned, nothing is written to the EDT. When the relevant object itself does not exist, neither "response" nor "response not possible" is returned. Also, the "response" message DEA is defined as the requesting entity (i.e., the request message SEA). Relationship between request and response is shown in Figure 12.

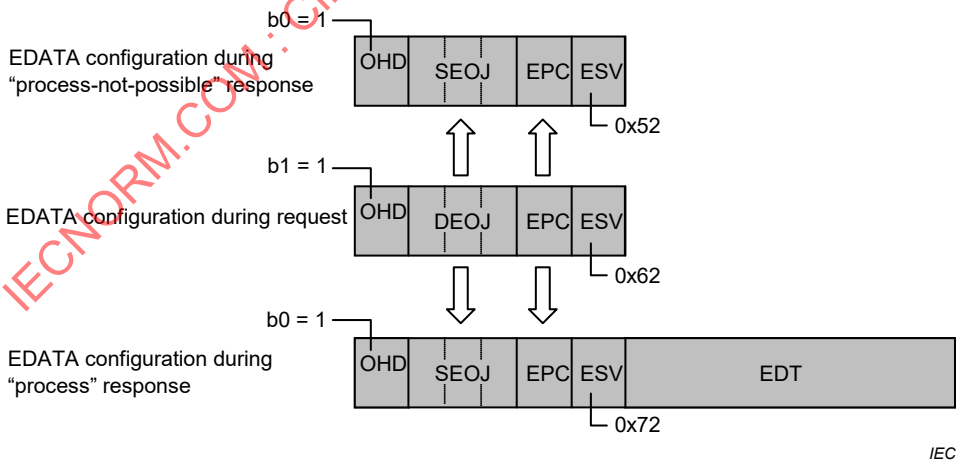


Figure 12 – EDATA configuration in property value read service

When EDATA stipulates SEOJ during a "request", the EOJ stipulated by SEOJ in EDATA during the "request" is allocated as a DEOJ (b1 of OHD is also set to 1), in the case of both "response not possible" and "response".

c) Property value notification service [0x63, 0x73, 0x53]

There are two types of "notification": the notification sent as a response to a "notify request" (0x63) and the autonomous notification which is unrelated to notify requests. The codes for the two types are identical. (Here, notification in response to a "notify request" signifies an

announcement that does not specify the property value [content], while an autonomous notification is a voluntary announcement that was not made in response to a request.) In the case of a “notify request” (0x63), this indicates a request to notify (by general broadcast; hereafter “announce” will signify a general broadcast to the entire domain) the content of the property stipulated in the EPC of the object stipulated in the DEOJ. In response to this “notify request”, when the request was accepted, a “response” (0x73) value is notified; when the request is not to be accepted, a “response not possible” response (0x53) value is returned. In the response frame format, the value of the object stipulated by the request is set in SEOJ, the requested property is set in EPC, and the value of the requested property (i.e., the notification content) is set in EDT. Here, DEA is set to general broadcast, but when “response not possible” is returned, nothing is written to the EDT, and the DEA sets the EA value of the requester.

When the relevant object itself does not exist, neither “response” nor “response not possible” is returned. In the case of an autonomous "notification", the DEA is set to a general broadcast for a required status change notification. In the other cases, however, the DEA can be set as desired regardless of whether "broadcast" or "individual" is selected. Relationship between request and response is shown in Figure 13.

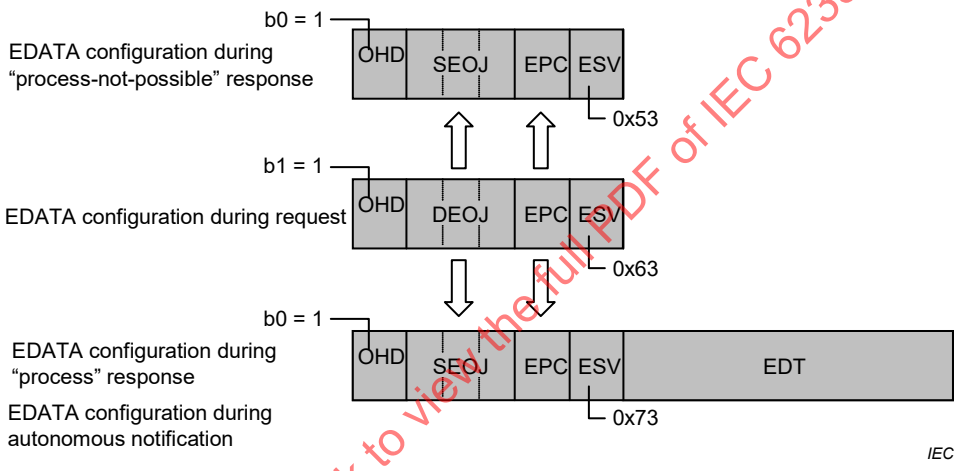


Figure 13 – EDATA configuration in property value notification service

When EDATA stipulates SEOJ during a request, the EOJ stipulated by SEOJ in EDATA during the “request” is allocated as a DEOJ. In the case of both “response not possible” and “process”, the EOJ stipulated in the SEOJ in the EDATA during “request” is allocated as a DEOJ within the EDATA (b1 of OHD is also set to 1). In the case of autonomous notification, the required notification of status change does not add a DEOJ; in all other cases, the addition of a DEOJ is optional.

d) Property value element-stipulated write service [0x64, 0x65, 0x75, 0x54, 0x55]

In the case of a “request” (0x64, 0x65), this indicates a request to write the value stipulated in the EDT (includes array element number and write request value data) of the property stipulated in the EPC of the object stipulated in the DEOJ. In response to this “request”, when a value to process the response is stipulated, and when the request shall be (or has already been) accepted, a “response” (0x75) is returned. However, this “response” is not a processing implementation response. When the request is not to be accepted, or when the stipulated DEOJ exists but the stipulated EPC does not exist, and when the stipulated DEOJ and EPC exist but the array element does not, “response not possible” (0x54, 0x55) is returned.

In the frame format for response, the value of the object stipulated by the request is SEOJ, and the relevant property is set in EPC. When the relevant object itself does not exist, neither “response” nor “response not possible” is returned. Also, the “response” message DEA is defined as the requesting entity (i.e., the request message SEA).

When the request is not to be accepted, or when the stipulated DEOJ and stipulated EPC exist, but the stipulated array element number does not exist, the EDT of “response not possible” is the array element number of a “request. The relationship between request and response is shown in Figure 14.

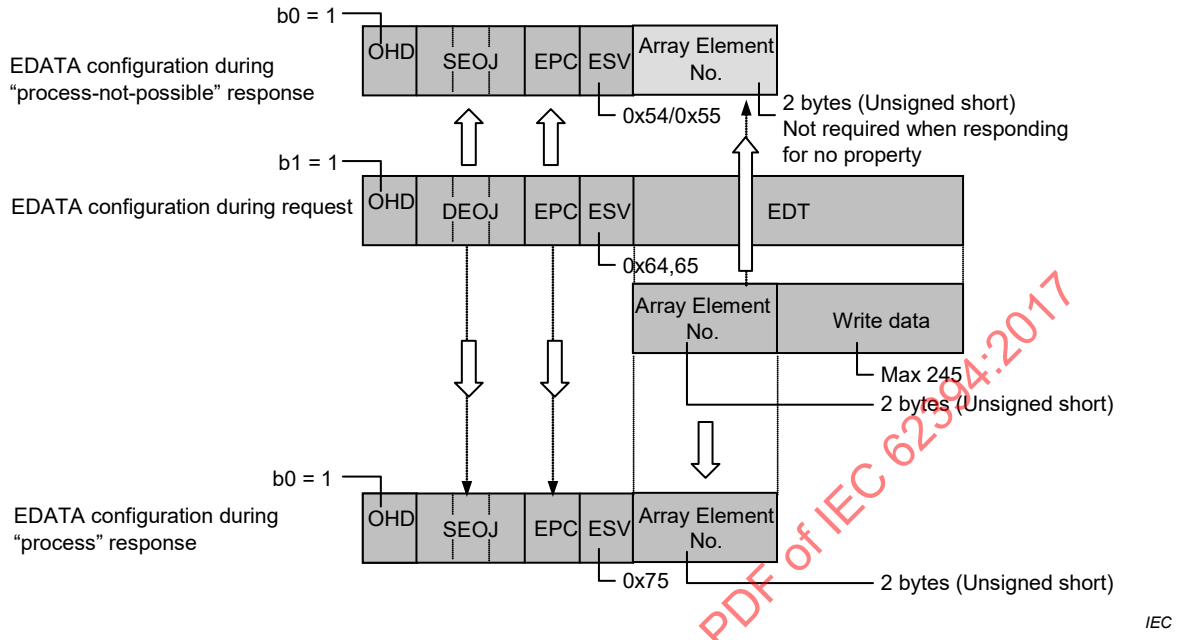


Figure 14 – EDATA configuration in property value element-stipulated write service

The content of each array element number in an array format property is defined separately for each property. When the stipulated (array) element does not exist, “response not possible” is returned. Also, when the EDATA stipulates SEOJ during a “request”, the EOJ stipulated in SEOJ by EDATA during the “request” is allocated as a DEOJ within EDATA (b1 of OHD is also set to 1) in the case of both “response not possible” and “response.”

e) Property value element-stipulated read service [0x66, 0x76, 0x56]

In the case of a “read” (0x66), this indicates a request to read the content stipulated in the array element indicated in the EDT (includes array element number data to be read) of the property stipulated in the EPC of the object stipulated in the DEOJ. In response to this “read”, when the request shall be (or has already been) accepted, “response” (0x76) is returned. When the request is not to be accepted, or when the stipulated DEOJ exists but the stipulated EPC does not, and when the stipulated DEOJ and EPC exist but the array element does not, “response not possible” (0x56) is returned. In the frame format for response, the value of the object stipulated by the request is set in SEOJ, and the relevant property is set in EPC and the value of the relevant property (data to be read) is set in EDT. In the case of “response not possible”, when the request is not to be accepted, or when the stipulated DEOJ exists but the stipulated EPC does not exist, EDT of “response not possible” is the array element number of a “request” and when the stipulated DEOJ exists but the stipulated EPC does not exist, “response not possible” EDT of “response not possible” does not exist. When the relevant object itself does not exist, neither “response” nor “response not possible” is returned. Also, the “response” message DEA is defined as the requesting entity (i.e., the request message SEA). Relationship between request and response is shown in Figure 15.

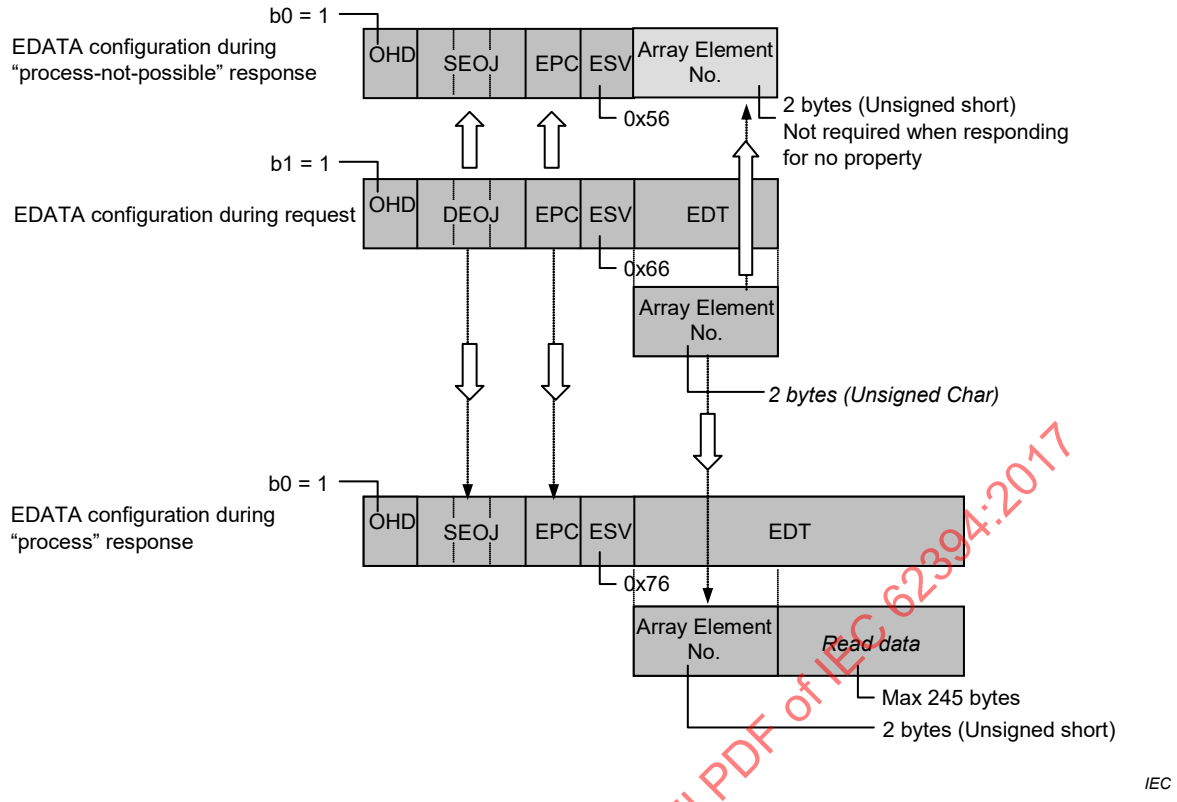


Figure 15 – EDATA configuration in property value element-stipulated read service

The content of each array element number in an array format property is defined separately for each property. When the stipulated array element (element) does not exist, "response not possible" is returned. Also, when EDATA stipulates SEOJ during a "request", the EOJ stipulated in the SEOJ by EDATA during the "request" is allocated as a DEOJ within the EDATA (b1 of OHD is also set to 1) in the case of both "response not possible" and "response".

f) Property value element-stipulated notification service [0x67, 0x77, 0x57]

There are two types of "notification": notification sent in response to a "notify request" (0x67); and autonomous notification, which is unrelated to notify requests. The two types are not distinguished from each other in the codes. (Here, notification in response to a "notify request" signifies an announcement that does not specify the property value [content], while an autonomous notification is a voluntary announcement that was not made in response to a request from someone.) In the case of a "notify request" (0x67), this indicates a request to notify (announce) the content of the array element number stipulated in the EDT of the property stipulated in the EPC of the object stipulated in the DEOJ. In response to this "notify request", when the request was accepted, an array element value (content) is announced as a "response" (0x77). When the request is not to be accepted, or when the stipulated DEOJ exists but the stipulated EPC does not, and when the stipulated DEOJ and EPC exist but the array element does not, "response not possible" (0x57) is returned. In the frame format for response, the value of the object stipulated by the request is set in SEOJ, the requested property is set in EPC, and the value of the requested array element number and its array element value (i.e., the notification content) is set in EDT. Here, DEA is set to general broadcast, but when "response not possible" is returned, and the DEA sets the EA value of the requester. When the relevant object itself does not exist, neither "response" nor "response not possible" is returned.

When the request is not to be accepted, or when the stipulated DEOJ exists but the stipulated EPC does not exist, EDT of "response not possible" is the array element number of a "request" and when the stipulated DEOJ exists but the stipulated EPC does not exist, the EDT of "response not possible" does not exist. The relationship between request and response is shown in Figure 16.

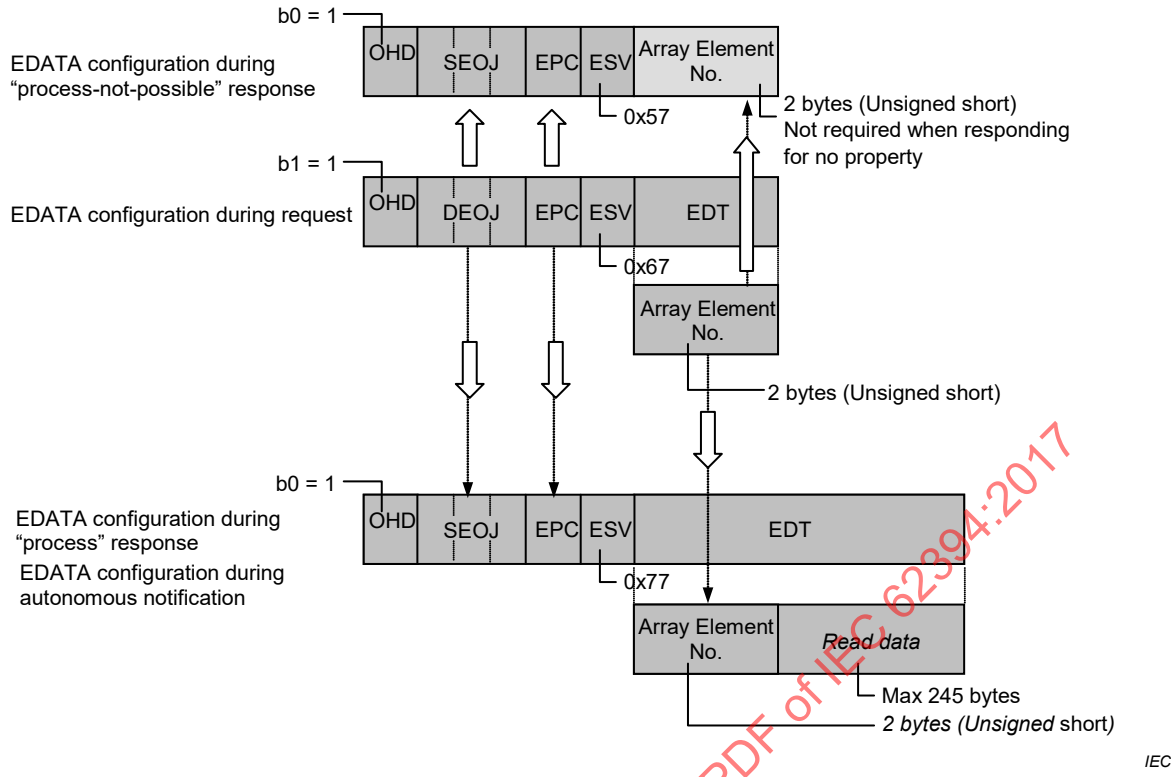


Figure 16 – EDATA configuration in property value element-stipulated notification service

The content of each array element number is defined separately for each property. When the stipulated (array) element does not exist, "response not possible" is returned. Also, when EDATA stipulates SEOJ during a "request", the EOJ stipulated in the SEOJ by EDATA during the "request" is allocated as a DEOJ within the EDATA (b1 of OHD is also set to 1) in the case of both "response not possible" and "response". In the case of autonomous notification, the required notification of status change does not add a DEOJ; in all other cases, the addition of a DEOJ is optional.

g) Property value element-stipulated addition [0x68, 0x69, 0x58, 0x59, 0x79]

In the case of a "request" (0x68, 0x69), this indicates a request to add the array element indicated in the EDT (includes array element number and write request value) of the property stipulated in the EPC of the object stipulated in the DEOJ, and to write the value stipulated therein. In response to this "request", when a value indicating implementation of the response (0x68) is stipulated, and when the request shall be (or has already been) accepted, a "response" (0x78) is returned. However, this "response" is not a processing implementation response. When the request is not to be accepted, or when the stipulated DEOJ exists but the stipulated EPC does not, and when the stipulated DEOJ and EPC exist but the array element does not, "response not possible" (0x58, 0x59) is returned. In the frame format for response, the value of the object stipulated by the request is set in SEOJ, and the requested property is set in EPC. When the relevant object itself does not exist, neither "response" nor "response not possible" is returned. Also, the "response" message DEA is defined as the requesting entity (i.e., the request message SEA).

When the request is not to be accepted, or when the stipulated DEOJ exists but the stipulated EPC does not exist, EDT of "response not possible" is the array element number of a "request" and when the stipulated DEOJ exists but the stipulated EPC does not exist, the EDT of "response not possible" does not exist. Relationship between request and response is shown in Figure 17.

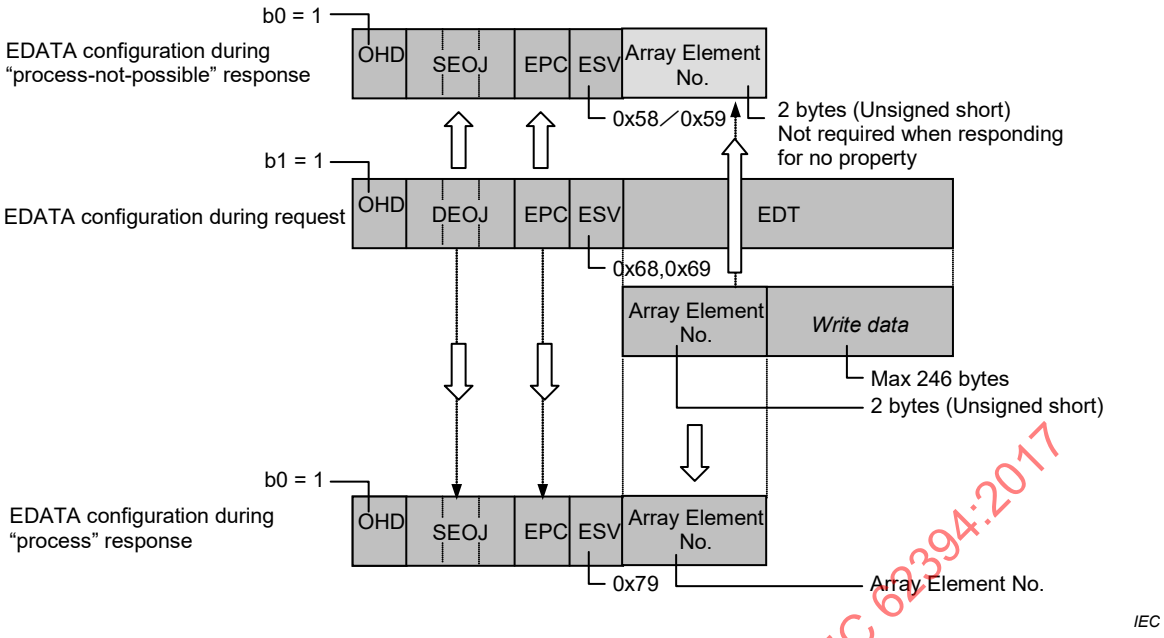


Figure 17 – EDATA configuration in property value element-stipulated addition

The content of each array element number in an array format property is defined separately for each property. When the stipulated array element (element) does not exist, "response not possible" is returned. Also, when EDATA stipulates SEOJ during a "request", the EOJ stipulated in the SEOJ by EDATA during the "request" is allocated as a DEOJ within the EDATA (b1 of OHD is also set to 1) in the case of both "response not possible" and "response".

h) Property value element-stipulated deletion [0x6A, 0x6B, 0x5A, 0x5B, 0x7B]

In the case of a "request" (0x6A, 0x6B), this indicates a request to delete the array element indicated in the EDT (array element number) from the property stipulated in the EPC of the object stipulated in the DEOJ. In response to this "request", when a value indicating implementation of the response (0x6B) is stipulated, and when the request shall be (or has already been) accepted, a "response" (0x7B) is returned. However, this "response" is not a processing implementation response. When the request is not to be accepted (including cases in which the deletion is not to be implemented), or when the stipulated DEOJ exists but the stipulated EPC does not, "response not possible" (0x5A, 0x5B) is returned. In the frame format for response, the value of the object stipulated by the request is set in SEOJ, and the relevant property is set in EPC. When the relevant object itself does not exist, neither "response" nor "response not possible" is returned. Also, the "response" message DEA is defined as the requesting entity (i.e., the request message SEA).

When the request is not to be accepted, or when the stipulated DEOJ exists but the stipulated EPC does not exist, EDT of "response not possible" is the array element number of a "request" and when the stipulated DEOJ exists but the stipulated EPC does not exist, the EDT of "response not possible" does not exist. Relationship between request and response is shown in Figure 18.

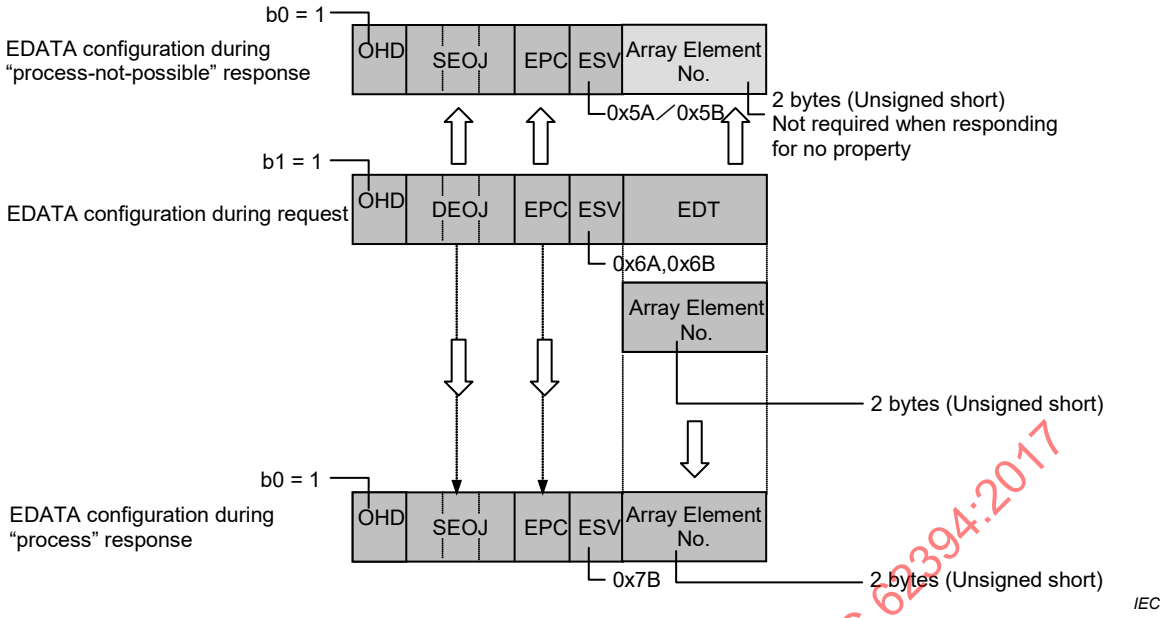


Figure 18 – EDATA configuration in property value element-stipulated deletion

The content of each array element number in an array format property is defined separately for each property. When the stipulated array element (element) does not exist, "response not possible" is returned. Also, when EDATA stipulates SEOJ during a "request", the EOJ stipulated in the SEOJ by EDATA during the "request" is allocated as a DEOJ within the EDATA (b1 of OHD is also set to 1) in the case of both "response not possible" and "response".

i) Property value element-stipulated existence confirmation [0x6C, 0x5C, 0x7C]

In the case of a "request" (0x6C), this indicates a request to confirm the existence of the array element indicated in the EDT (includes array element number value information) in the property stipulated in the EPC of the object stipulated in the DEOJ. When the request shall be (or has already been) accepted, a "response" (0x7C) is returned. When the request shall be rejected (cannot be processed by the ESV) or when the specified DEOJ exists but the specified EPC does not exist, a "process not possible" (0x5C) is returned. In the frame format for response, the value of the object stipulated by the request is set in SEOJ, and the relevant property is set in EPC. When the relevant object itself does not exist, neither "response" nor "response not possible" is returned. Also, the "response" message DEA is defined as the requesting entity (i.e., the request message SEA).

When the request is not to be accepted, or when the stipulated DEOJ exists but the stipulated EPC does not exist, EDT of "response not possible" is the array element number of a "request" and when the stipulated DEOJ exists but the stipulated EPC does not exist, the EDT of "response not possible" does not exist. The relationship between request and response is shown in Figure 19.

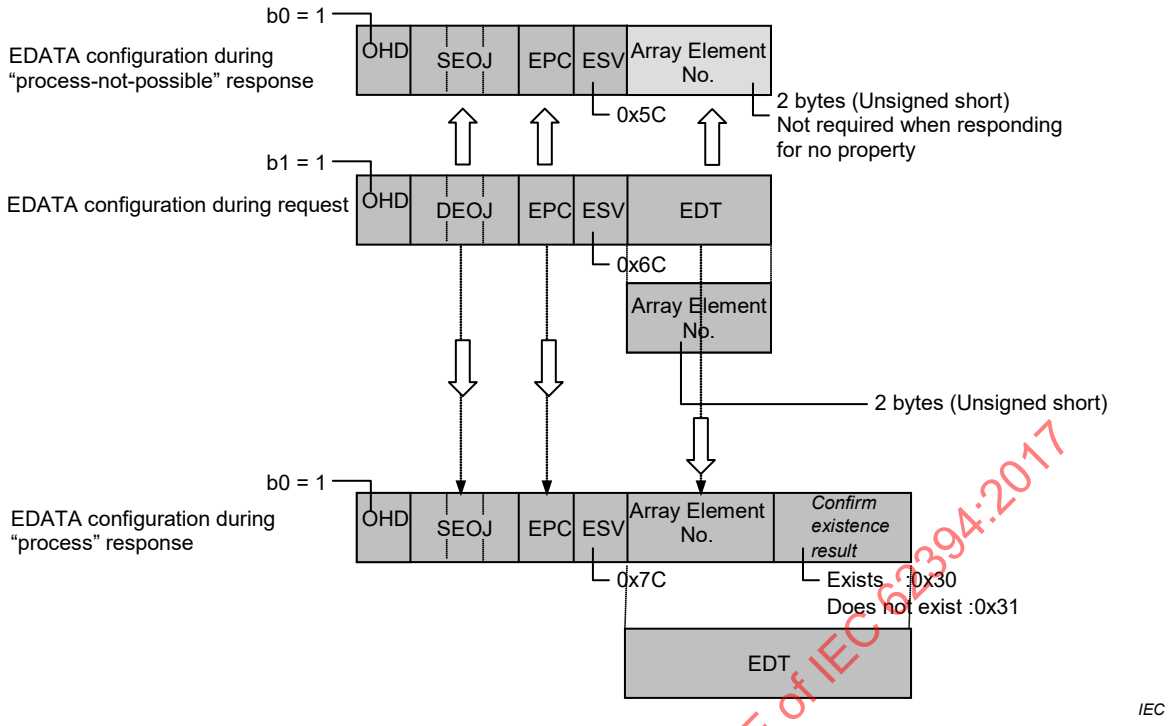


Figure 19 – EDATA configuration in property value element-stipulated existence confirmation

The content of each array element number in an array format property is defined separately for each property. Also, when EDATA stipulates SEOJ during a "request", the EOJ stipulated in the SEOJ by EDATA during the "request" is allocated as a DEOJ within the EDATA (b1 of OHD is also set to 1) in the case of both "response not possible" and "response".

j) Property value element addition [0x6D, 0x6E, 0x5D, 0x5E, 0x7E]

In the case of a "request" (0x6D, 0x6E), this indicates a request to newly add an array element to the property stipulated in the EPC of the object stipulated in the DEOJ, and to write to the newly added array element the value data stipulated in the EDT. In response to this "request", when a value indicating implementation of the response (0x6E) is stipulated, and when the request shall be (or has already been) accepted, a "response" (0x7F) is returned.

However, this "response" is a processing implementation response, and the added array element number is returned as an EDT. When the request is not to be accepted, or when the stipulated DEOJ exists but the stipulated EPC does not, "response not possible" (0x5D, 0x5E) is returned. In the frame format for response, the value of the object stipulated by the request is set in SEOJ, and the relevant property is set in EPC. When the relevant object itself does not exist, neither "response" nor "response not possible" is returned. Also, the "response" message DEA is defined as the requesting entity (i.e., the request message SEA).

For "response not possible", EDT does not exist. The relationship between request and response is shown in Figure 20.

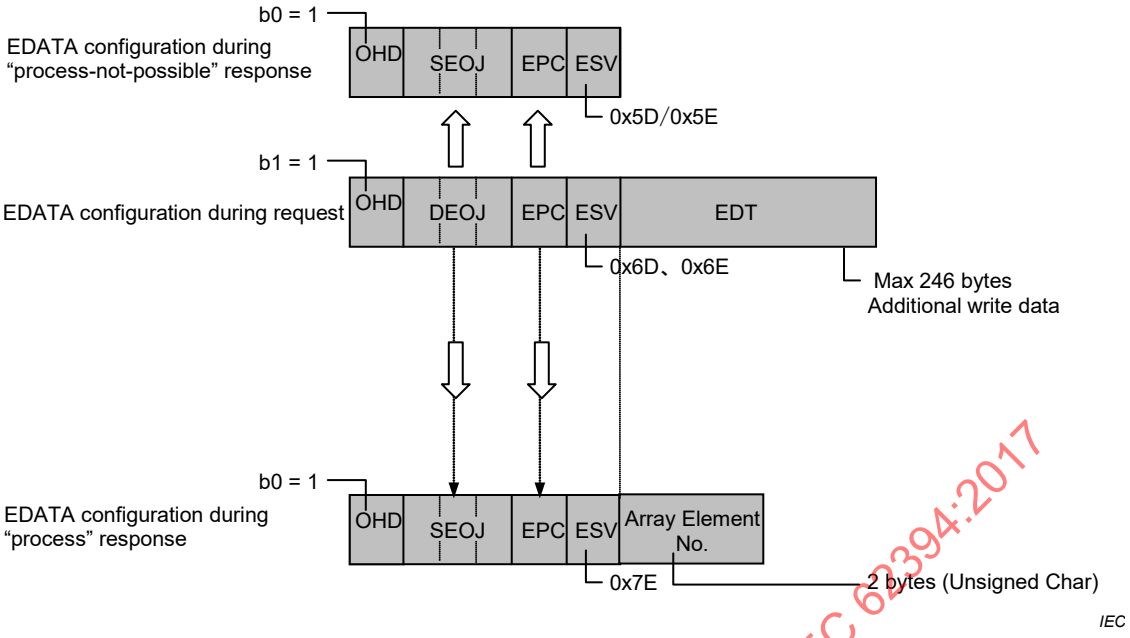


Figure 20 – EDATA configuration in property value element addition

The content of each array element number in an array format property is defined separately for each property. Also, when EDATA stipulates SEOJ during a "request", the EOJ stipulated in the SEOJ by EDATA during the "request" is allocated as a DEOJ within the EDATA (b1 of OHD is also set to 1) in the case of both "response not possible" and "response".

k) Property value notification (response required) [0x74, 0x7A]

The "notification (response required)" (0x74) autonomously notifies a specific node of the property value stipulated by the EPC of the SEOJ-stipulated object and requests a response. The response process for this "notification (response required)" varies depending on whether the DEOJ is specified.

When the DEOJ is not specified, the "response" (0x7A) for autonomous notification reception is returned at all times.

When the DEOJ is specified, on the other hand, the subsequent process varies depending on whether the specified DEOJ exists. If the specified DEOJ exists, the "response" (0x7A) for autonomous notification reception is returned. If the specified DEOJ does not exist, the message is discarded.

If a node receives a "notification (response required)" for which a broadcast is specified, the node discards the message. The relationship between request and response is shown in Figure 21.

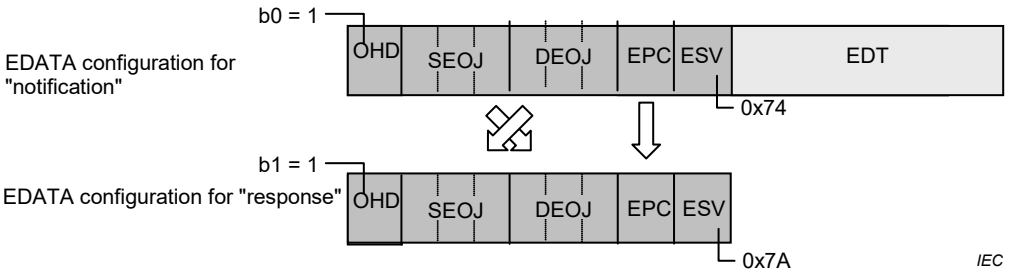


Figure 21 – EDATA configuration in property value notification (response required)

l) Property value element-stipulated notification (response required) [0x78, 0x7D]

The "notification (response required)" (0x78) autonomously notifies a specific node of the array element value stipulated by the EDT (array element number) of the property stipulated by the EPC of the SEOJ-stipulated object, and requests an acknowledgment. The response

message format and response process for this "notification (response required)" varies depending on whether the DEOJ is specified.

When the DEOJ is not specified, the "response" (0x7D) for notification reception is returned at all times.

When the DEOJ is specified, on the other hand, the subsequent process varies depending on whether the specified DEOJ exists. If the specified DEOJ exists, the "response" (0x7D) for notification reception is returned. If the specified DEOJ does not exist, the message is discarded.

If a node receives a "notification (response required)" for which a broadcast is specified, the node discards the message. The relationship between request and response is shown in Figure 22.

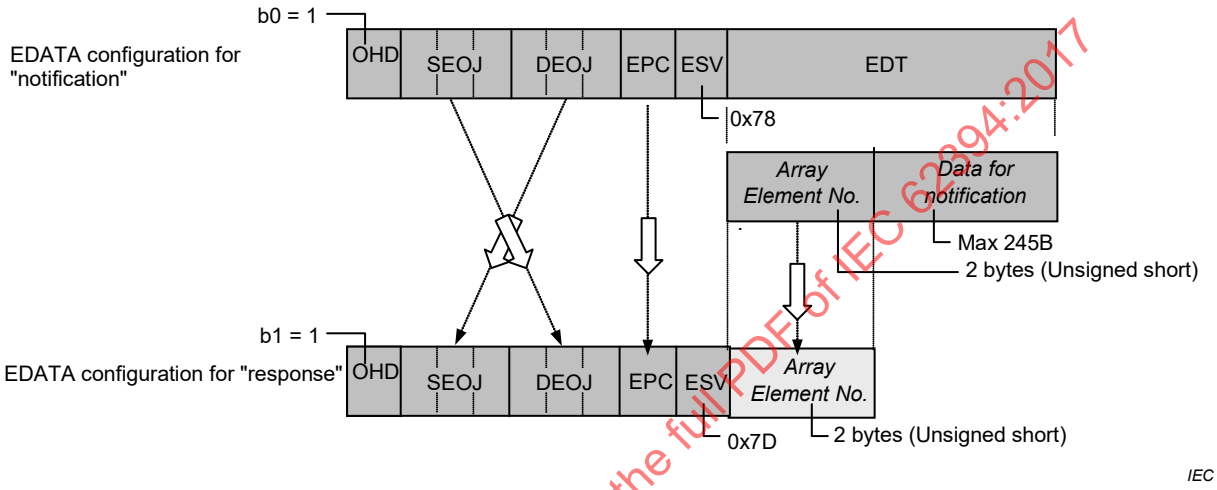


Figure 22 – EDATA configuration in property value element-stipulated notification (response required)

The services shown in Table 3, Table 4 and Table 5 are specified for each property. Regarding those stipulated as services that shall be incorporated in each property, if they have the functions of that property and disclose via communications (read/write notification, etc.), this indicates that they shall be processed. Processing of services for each property is specified in 9.3 and in the access rules column of the object class detailed specification tables. Access rules indicate all services that can be implemented. In this specification, the following nine access rules are specified.

- Set: Processes services related to write requests for non-array property values (performs processing indicated in (a)).
- Get: Processes services related to read requests for non-array property values (performs processing indicated in (b) (c) and (k)).
- SetM: Processes services related to write requests for array property values (performs processing indicated in (d)).
- GetM: Processes services related to read requests for array property values (performs processing indicated in (e) (f) and (l)).
- AddM: Processes services related to element-stipulated add requests for array property values (performs processing indicated in (g)).
- DelM: Processes services related to delete requests for array property values (performs processing indicated in (h)).
- CheckM: Processes services related to existence confirm requests for array property value elements (performs processing indicated in (i)).

- AddMS: Processes services related to non-array-element-stipulated add requests for array property values (performs processing indicated in (j)).
- Anno: Processes non-array property value notification services (performs processing indicated in (c) and (k)).
- AnnoM: Processes array property value notification services (performs processing indicated in (f) and (l)).

The above processing is specified for each property; there is no mixed stipulation of Set and SetM or of Get and GetM.

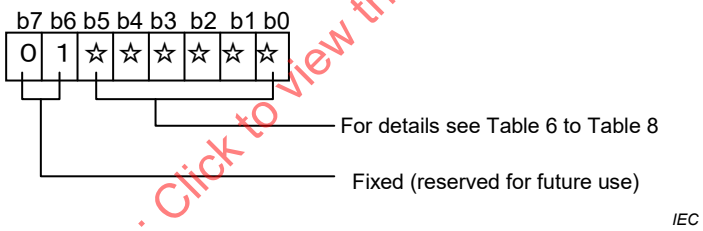
7.2.10 ECHONET property value data (EDT)

This subclause presents detailed specifications for the code for the ECHONET property value data (EDT) range shown in Figure 1. EDT consists of data for the relevant ECHONET property (EPC), such as status notification or specific setting and control by an ECHONET service (ESV). Detailed specifications are provided for the size, code value, etc., of EDT for each EPC (see Clause 9).

7.2.11 Compound ECHONET Service (CpESV)

7.2.11.1 General

This subclause provides detailed specifications for the compound ECHONET service (CpESV) code shown in Figure 1. Detailed specifications are shown in Figure 23.



When bits b7 and b6 are 0 and 1, respectively, the meanings of bits b0 to b5 are stipulated separately.

Figure 23 – CpESV configuration

The service provided by this code is used when the compound message format is used. It specifies a simultaneous action for two or more properties stipulated by the EPC. However, it does not stipulate the order of operations. The order of property operations is an implementation issue.

Three types of operations are provided: request, response, and notification. The response is subdivided into two types: "accepted" response and "process-not-possible" request. The "accepted" response is used when the service request in relation to all the EPC-stipulated properties is accepted. The "process not possible" request is used when one or more specified properties do not exist or when the specified service cannot be processed for one or more properties.

- Request
- Response ("accepted" response/"process not possible" response)
- Notification

The "response" is a response to a "request" that requires a response. It shall be returned when a DEOJ-stipulated object exists. When the service processing request related to all the

EPC-stipulated properties is accepted, the "accepted" response shall be returned. If the processing request related to one or more specified properties cannot be accepted or if the object exists but one or more properties do not exist, "process not possible" shall be returned. When the "request" does not require any response or when the specified object does not exist, no "response" will be returned.

Further, "write" (response-required write/no-response-required write), "read", and "notification" (autonomous notification/response-required notification) are regarded as specific operations. Therefore, the following five types are set. Regarding the CpESV for compound messages, array element properties are not targeted.

a) Property value write request (no response required).

b) Property value write request (response required).

c) Property value read request.

d) Property value notification.

e) Property value notification (response required).

7.2.11.2 Relationship between request and response

The CpESV and message configurations (presence of SEOJ and DEOJ) and their relationship to EPC and ESV are described below.

- The EPC of an ECHONET message in which only the SEOJ is specified indicates the property of the SEOJ-stipulated source object. In this case, the "response", "notification", or autonomous "notification" concerning the "request" related to two or more SEOJ-/EPC-stipulated properties is positioned in the CpESV. When the CpESV is a "request" while this configuration is employed, the associated message shall be handled as an erroneous message.
- The EPC of an ECHONET message in which only the DEOJ is specified indicates the property of the DEOJ-stipulated destination object. In this case, the "request" related to two or more DEOJ-/EPC-stipulated properties are positioned in the CpESV. When the CpESV is a "response" or "notification" while this configuration is employed, the associated message shall be handled as an erroneous message.
- The EPC of an ECHONET message in which the SEOJ and DEOJ are both specified is such that the CpESV value determines whether the target object is stipulated by the SEOJ or DEOJ. When the CpESV is a "response" or "notification", it is concluded that the EPC forms a SEOJ-stipulated object and that the "response" or "notification" is addressed to a DEOJ-stipulated object. When the CpESV is a "request", on the other hand, it is concluded that the EPC forms a DEOJ and that the "request" is issued from a SEOJ-stipulated object.

Table 6, Table 7 and Table 8 show specific CpESV code assignments. The figures in (a) through (e) presume that the DEOJ for a "request" is an individually specified code. However, when the DEOJ indicates an instance general broadcast, a response is transmitted with both "process not possible" response and "response" configured for each target instance. The codes marked "reserved for future use" in the tables are to be stipulated in the future and shall not be used.

Table 6 – List of CpESV codes for request/notification

Service code (CpESV)	ECHONET service content	Symbol	Remarks[a]
0x60	Property value write request (no response required)	CpSetI	(a)
0x61	Property value write request (response required)	CpSetC	(b)
0x62	Property value read request	CpGet	(c)
0x63~0x6F	Reserved for future use		

[a] Remarks (in brackets) are given below Table 8.

Table 7 – List of CpESV codes for "accepted" response

Service code (CpESV)	ECHONET service content	Symbol	Remarks[a]
0x71	Property value write "accepted" response	CpSet_Res	CpESV=61 response (b)
0x72	Property value read "accepted" response	CpGet_Res	CpESV=62 response (c)
0x73	Property value notification	CpINF_Res	(d)
0x74	Property value notification (response required)	CpINFC	(e)
0x7A	Property value notification response	CpINFC_Res	CpESV=74 response (e)
0x75~0x79, 0x7B~0x7F	Reserved for future use		

[a] Remarks (in brackets) are given below Table 8.

Table 8 – List of CpESV codes for "process-not-possible" response

Service code (CpESV)	ECHONET service content	Symbol	Remarks [a]
0x50	Property value write "process not possible" response (1)	CpSetI_SNA	CpESV=60 "process not possible" response (a)
0x51	Property value write "process not possible" response (2)	CpSetC_SNA	CpESV=61 "process not possible" response (b)
0x52	Property value read "process not possible" response	CpGet_SNA	CpESV=62 "process not possible" response (c)
0x5F	Message length excessive	CpOverFlow	Response to be returned when the response message is too long
0x53~0x5E	Reserved for future use		

[a] Remarks (in brackets) are given below this table.

a) Relationships between request and response are described from (a) to (e). Property value writes request (requiring no response) service [0x60, 0x50].

The write request requiring no response (CpESV = 0x60) requests that the EDT-stipulated contents be written into the EPC-stipulated properties of the DEOJ-stipulated object. The order of write operations is not stipulated. The response from a request-processing node is as indicated below.

1) When a processing request for all properties is accepted

   No response will be made.

2) When one or more properties relevant to the request do not exist, a processing request to one or more properties cannot be accepted, or an array property is targeted

   A write "process not possible" response (1) (CpESV = 0x50) will be returned.

3) When the object relevant to the request does not exist, no response will be made.

4) When two or more identical properties exist in the request message, individual processes will be performed on the presumption that differing requests are issued. A response will be made in accordance with the processing results.

NOTE1 The order of processes depends on the implementation. Therefore, the resulting final property status and value also depend on the implementation.

The message structure of a write "process-not-possible" response to a property value write request (requiring no response) is such that the object code of the request destination becomes the SEOJ and that the object code of the request source becomes the DEOJ. The OPC takes the same value as in the request message.

For requests (request 1 to request n) that relate to non-existent properties and process requests that are rejected, both the PDC and EDT use the same values as those used in the write request. For requests related to properties for which processing requests are accepted, the PDC value is 0x01 and the EDT value is omitted. As for the EPC, the EPC in the request message is used as is. When the target object does not exist, neither the "response" nor the "process not possible" response is returned.

An appropriate value for the OHD shall be specified in accordance with the SEOJ/DEOJ configuration in the message. Figure 24 shows the relationship between a write request requiring no response and write addition response for situations where request m cannot be accepted. The EPC sequence in the request message shall be equal to the EPC sequence in the write "process-not-possible" response message.

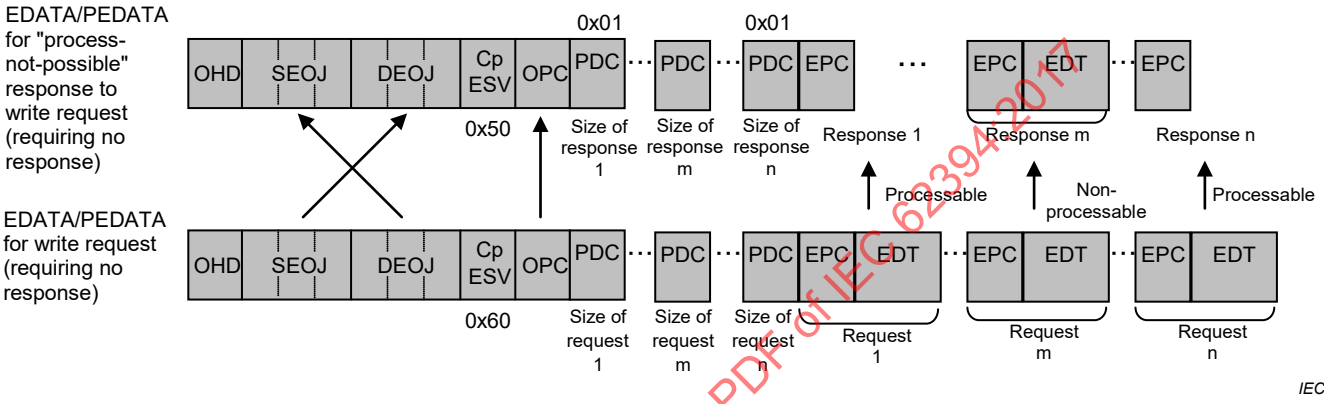


Figure 24 – Relationship between write request (requiring no response) and write "process-not-possible" response

b) Property value write request (requiring a response) service [0x61, 0x71, and 0x51]

The write request requiring a response (CpESV = 0x61) requests that the EDT-stipulated contents be written into the EPC-stipulated properties of the DEOJ-stipulated object. The order of write operations is not stipulated. The response from a request-processing node is as indicated below.

1) When a processing request for all properties are accepted, a write "accepted" response (CpESV = 0x71) will be returned.
2) When one or more properties relevant to the request do not exist, a processing request to one or more properties cannot be accepted, or an array property is targeted, a write "process not possible" response (CpESV = 0x51) will be returned.
3) When the object relevant to the request does not exist, no response will be made.
4) When two or more identical properties exist in the request message individual processes will be performed on the presumption that differing requests are issued. A response will be made in accordance with the processing results.

NOTE 2 The order of processes depends on the implementation. Therefore, the resulting final property status and value also depend on the implementation.

The message structure of a write "process-not-possible" response to a property value write request (requiring a response) is such that the object code of the request destination becomes the SEOJ and that the object code of the request source becomes the DEOJ. The OPC takes the same value as in the request message.

For requests (request 1 to request n) that relate to non-existent properties and process requests that are rejected, both the PDC and EDT use the same values as those used in the write request. For requests related to properties for which processing requests are accepted, the PDC value is 0x01 and the EDT value is omitted. As for the EPC, the EPC in the request message is used as is. If the target object does not exist, neither the "response" nor the "process not possible" response is returned.

The message structure of a write "accepted" response is such that the object code of the request destination becomes the SEOJ and the object code of the request source becomes the DEOJ. The OPC and subsequent values are omitted.

An appropriate value for the OHD shall be specified in accordance with the SEOJ/DEOJ configuration in the message. Figure 25 shows the relationships between a write request requiring a response, a write "accepted" response and a write "process-not-possible" response for situations where request m cannot be accepted. The EPC sequence in the request message shall be equal to the EPC sequence in the write "process-not-possible" response message.

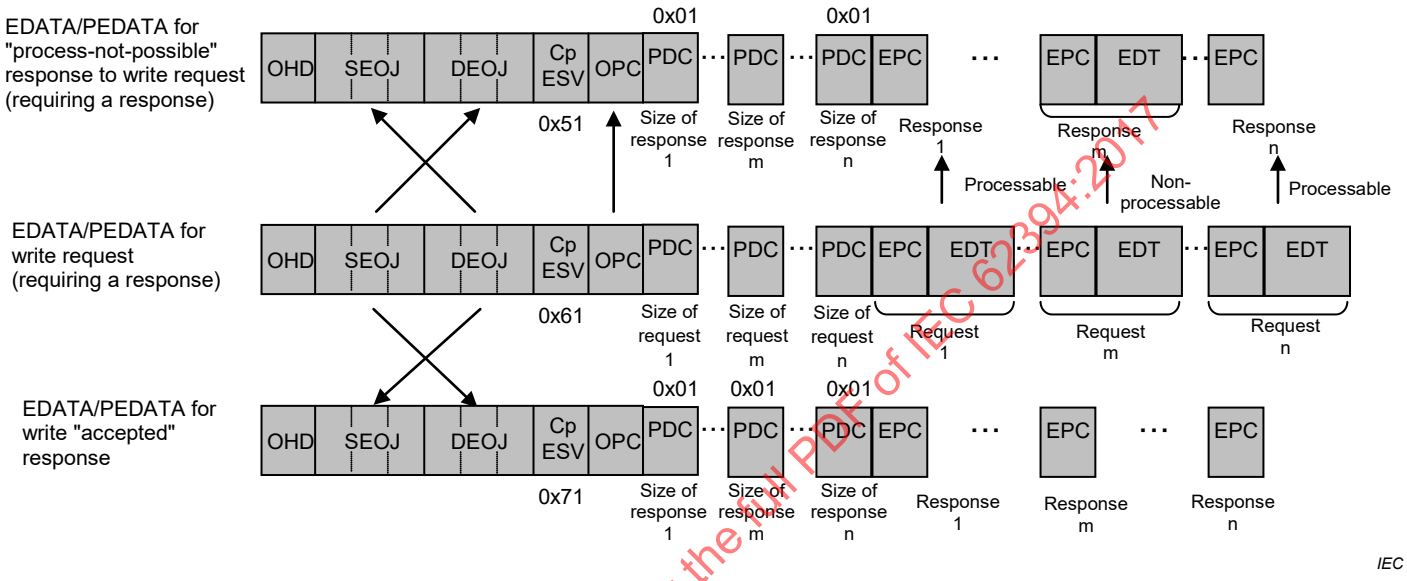


Figure 25 – Relationship between write request (requiring a response), write "accepted" response, and write "process-not-possible" response

c) Property value read request service [0x62, 0x72, 0x52, 0x5F]

The property value read request (CpESV = 0x62) requests that the contents of EPC-stipulated properties of the DEOJ-stipulated object be read. The order of read operations is not stipulated. The response from a request-processing node is as indicated below.

1) When a processing request for all properties is accepted, a read "accepted" response (CpESV = 0x72) will be used to return all the read values.
2) When one or more properties relevant to the request do not exist, a processing request to one or more properties cannot be accepted, or an array property is targeted, a write "process not possible" response (CpESV = 0x52) will be used to return the values of the read properties.
3) When the object relevant to the request does not exist, no response will be made.
4) When two or more identical properties exist in the request message, individual processes will be performed on the presumption that differing requests are issued. A response will be made in accordance with the processing results.

NOTE 3 The order of processes depends on the implementation. Therefore, if two or more property states are read, the resulting final status depends on the implementation.

The message structure of a read "process-not-possible" response is such that the object code of the request destination becomes the SEOJ and the object code of the request source becomes the DEOJ. The OPC takes the same value as in the request message.

For requests (request 1 to request n) that relate to non-existent properties and process requests that are rejected, the PDC value is 0x01 and the EDT value is omitted. For requests related to properties for which processing requests are accepted, the read value is placed in

the EDT and the total number of EPC and EDT bytes is regarded as the PDC. If the target object does not exist, neither the "response" nor the "process-not-possible" response is returned.

The message structure of a read "accepted" response is such that the object code of the request destination becomes the SEOJ and the object code of the request source becomes the DEOJ. The read value is placed in the EDT, and the total number of EPC and EDT bytes is regarded as the PDC.

An appropriate value for the OHD shall be specified in accordance with the SEOJ/DEOJ configuration in the message. Figure 26 shows the relationships between a read request, a read "accepted" response and a read "process-not-possible" response for situations where request m cannot be accepted. The EPC sequence in the request message shall be equal to the EPC sequence in the read "accepted" response and read "process-not-possible" response messages.

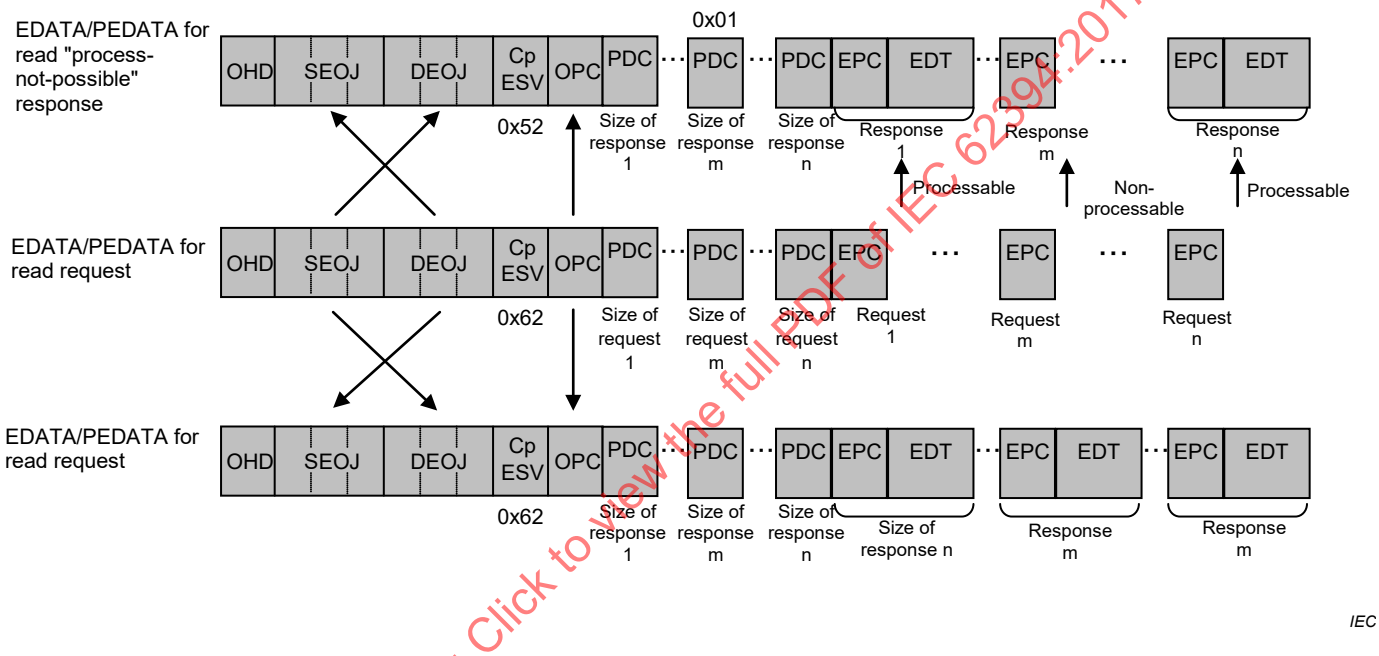


Figure 26 – Relationship between read request (requiring a response), read "accepted" response, and read "process-not-possible" response

As is obvious from Figure 26, the read "accepted" response message is longer than the read response message. Therefore, the maximum permissible message length may be exceeded when an attempt is made to return all the property values that are read in compliance with the request. In such a situation, a response will be made using the message length overflow service code (CpESV = 0x5F). In this case, the responding side can determine the number of property values to be returned. However, the sequence of such properties shall be the same as in the request message.

d) Property value notification service [0x73]

The property value notification (CpESV = 0x73) reads the contents of EPC-stipulated properties and reports them to the DEOJ-stipulated object. When the DEOJ is not contained in the message, it is a notification to nodes. Either "individual" or "broadcast" can be selected for addressing purposes. The order of property value notifications is not stipulated. Nodes receiving this message will not return a response. The notification message format is shown in Figure 27.

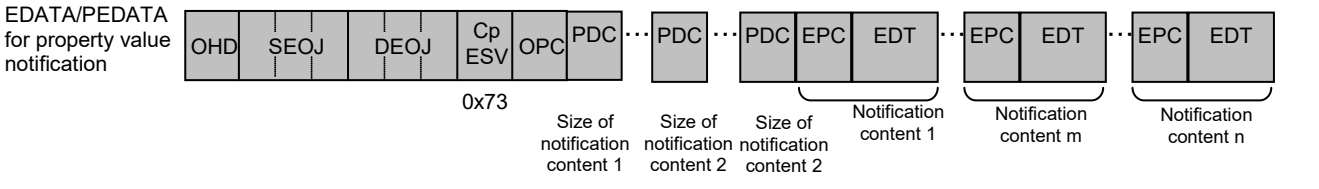


Figure 27 – Notification message format

e) Property value notification (requiring a response) service [0x74, 0x7A]

The property value notification requiring a response (CpESV = 0x74) reads the content of EPC-stipulated properties and reports it to the DEOJ-stipulated object. When the DEOJ is not contained in the message, it is a notification to a node. Only "individual" is available for addressing purposes. The order of property value notifications is not stipulated. The response from a node receiving this message is as indicated below.

1) When a notification is accepted, a property value notification response (CpESV = 0x7A) will be returned.
2) When the DEOJ-stipulated object does not exist, no response will be made.

The message structure of the notification response is such that the object code of the request destination becomes the SEOJ and the object code of the request source becomes the DEOJ. The OPC takes the same value as in the request message.

An appropriate value for the OHD shall be specified in accordance with the SEOJ/DEOJ configuration in the message. Figure 28 shows the relationship between the property value notification (requiring a response) service and property value notification response service.

The EPC sequence in the property value notification request service message shall be equal to the EPC sequence in the property value notification response service message.

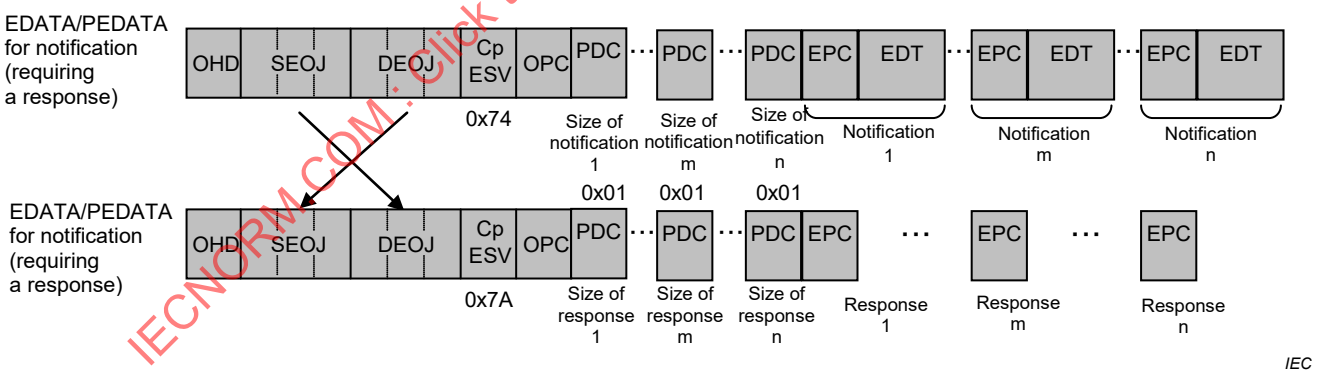


Figure 28 – Relationship between property value notification (requiring a response) and property value notification response

7.2.12 Processing target property counter (OPC)

The processing target property counter is used in the compound message format only. It consists of one byte. In a compound message, the processing target property counter retains the number of properties targeted for a write or read operation. This counter can retain the value 1 or greater. Therefore, a compound message is allowed to exist even when the number of simultaneously operable properties is only one. The maximum number of simultaneously operable properties is limited by the maximum permissible message length.

If, for instance, there are three requests as shown in Figure 29, the processing target property counter is 0x03.

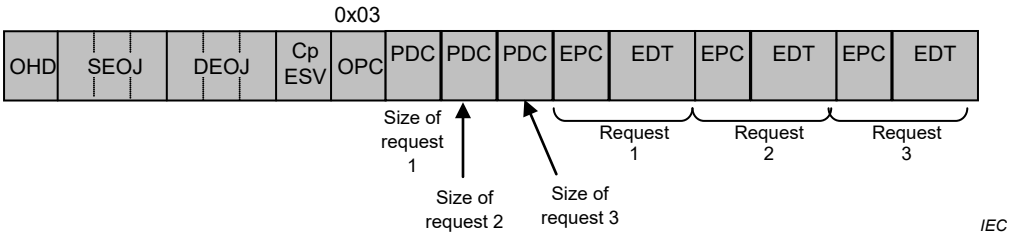


Figure 29 – Processing target property counter for three requests

7.2.13 Property data counter (PDC)

The processing data counter is used in the compound message format only. It retains the number of bytes in the ECHONET property code (EPC) and ECHONET data (EDT), which follow the proper data counter. If, for instance, the ECHONET data sizes for requests 1, 2, and 3 are 2 bytes, 1 byte, and 5 bytes, respectively, the values placed in the first, second, and third property data counters are 0x03, 0x02, and 0x06, respectively, as shown in Figure 30.

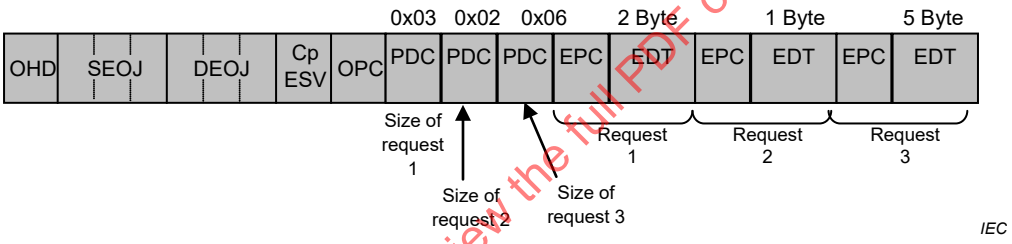


Figure 30 – Property data counter

8 Control protocol 2nd

8.1 General

Considering the situation where it is desirable to reduce the mounting load on simple devices, ECHONET Lite specifies the frame format for the ECHONET Lite Communication Middleware Block to minimize message size while fulfilling the requirements of the communications layer structure.

8.2 Frame format

8.2.1 General

Figure 31 shows the format of ECHONET Lite frames processed by the ECHONET Lite Communication Middleware. Detailed specifications for each message component are provided in 8.2.2 to 8.2.8.

In this International Standard, messages exchanged between ECHONET Lite Communication Processing Blocks are called ECHONET Lite frames. ECHONET Lite frames are roughly divided into two types depending on the specified ELHD (see 8.2.2): message format specified by ECHONET Lite and message format unique to user. The ECHONET Lite frame length depends on the lower-layer communication media.

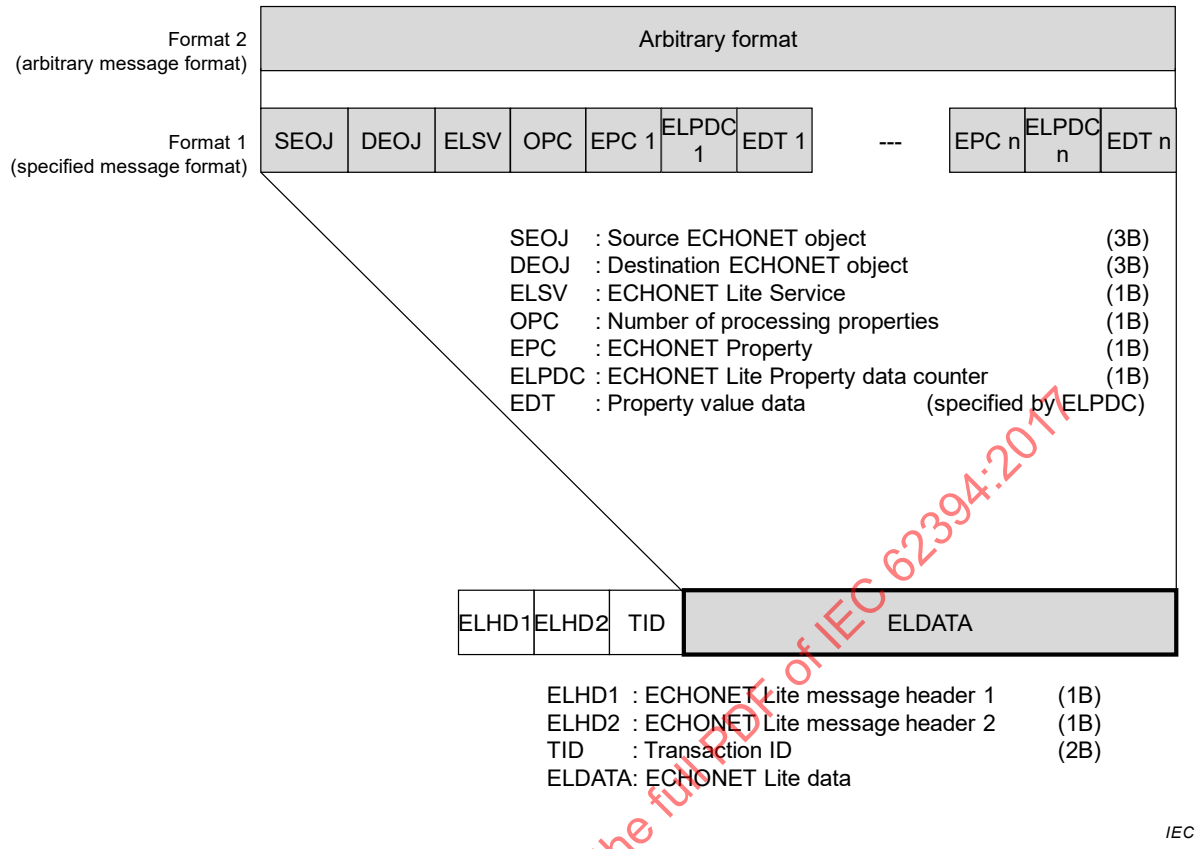


Figure 31 – ECHONET Lite frame format

8.2.2 ECHONET Lite Header (ELHD)

8.2.2.1 General

ELHD consists of ECHONET Lite Header 1 and ECHONET Lite Header 2.

8.2.2.2 ECHONET Lite Header 1 (ELHD1)

Figure 32 shows the detailed specifications of ECHONET Lite Header 1 (ELHD1).

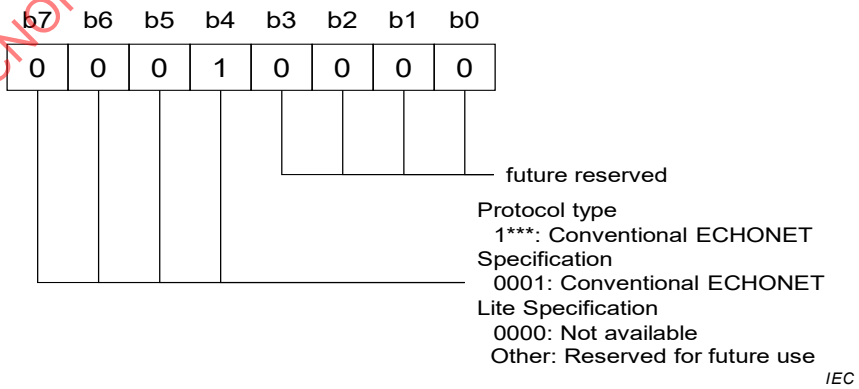


Figure 32 – Detailed specifications of ELHD1

The combination of b7 to b4 specifies an ECHONET protocol type. b7:b6:b5:b4 = 0:0:0:1 indicates the ECHONET Lite Protocol defined in these specifications. b7:b6:b5:b4 = 0:0:0:0 shall not be used because it enables coexistence with the conventional ECHONET Protocol.

8.2.2.3 ECHONET Lite Header 2 (ELHD2)

The detailed specifications of ECHONET Lite Header 2 (ELHD2) is shown in Figure 33.

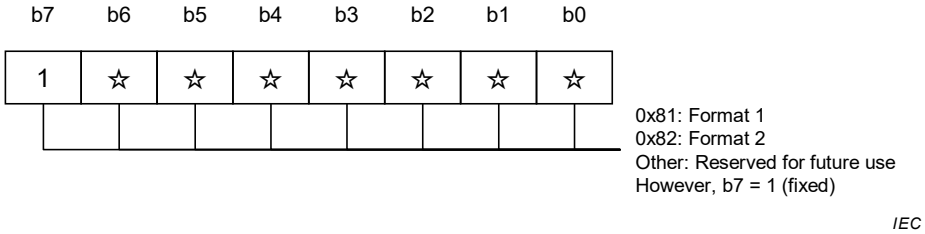


Figure 33 – Detailed specifications of ELHD2

ELHD2 defines the ELDATA frame format. When ELHD2 is 0x81, the ELDATA frame format is Format 1 (specified message format) defined in these specifications. When ELHD2 is 0x82, the ELDATA frame format is Format 2 (arbitrary message format). For coexistence with the conventional ECHONET Protocol, b7 is fixed at 1.

8.2.3 Transaction ID (TID)

TID is a parameter to string a sent request and a received response when a request sender receives a response in ECHONET Lite communications. A response sender shall store the same value as that contained in the request message.

8.2.4 ECHONET Lite Data (ELDATA)

ELDATA refers to the data area of a message exchanged by the ECHONET Lite Communication Middleware.

8.2.5 ECHONET Objects (EOJ)

Figure 34 shows the detailed specifications of ECHONET objects.

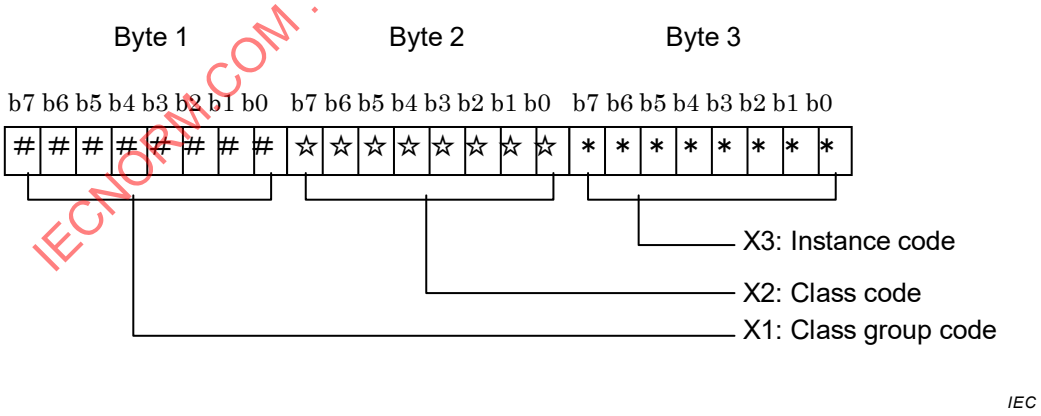


Figure 34 – Detailed specifications of EOJ code

ECHONET objects are described using the formats [X1.X2] and [X3], to be specified as shown below. (However, "." is used only for descriptive purposes and does not mean a specific code.) The object class is designated by the combination of X1 and X2, while X3 shows the class instance. A single ECHONET Lite node may contain more than one instance of the same class, in which case X3 is used to identify each one.

The specific items in Table 9 were specified based on JEM-1439. Detailed specifications for the objects shown here will be developed over time, and during this phase, specifications for the objects themselves (i.e., present/not present) will be further reviewed.

The instance code 0x00 is regarded as a special code (code for specifying all instances). When a DEOJ having this specified code is received, it is handled as a code specifying general broadcast to all instances of a specified class.

X1 : Class group code

0x00–0xFF.

X2 : Class code

0x00–0xFF.

X3 : Instance code

0x00–0x7F. This is an identification code when more than one of the same class as that of the attributes specified by [X1.X2] exists in the same node.

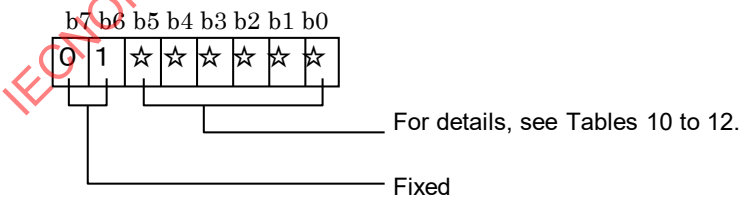
However, 0x00 is used for general broadcast to instances of the same class.

Table 9 – List of class group codes

Group code	Group name
0x00	Sensor-related device class group
0x01	Air conditioner-related device class group
0x02	Housing/facility-related device class group
0x03	Cooking/housework-related device class group
0x04	Health-related device class group
0x05	Management/control-related device class group
0x06	AV-related device class group
0x07 to 0x0D	Reserved for future use
0x0E	Profile class group
0x0F	User definition class group
0x10 to 0xFF	Reserved for future use

8.2.6 ECHONET Lite Service (ELSV)

This subclause provides detailed specifications for the ECHONET Lite service (ELSV) code. Detailed specifications are shown in Figure 35.



Note: Except when b7:b6 = 0:1, b0 to b5 have different meanings.

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Figure 35 – ELSV code detailed specifications

The service provided by this code is used when the compound message format is used. It specifies a simultaneous action for two or more properties stipulated by the EPC. However, it does not stipulate the order of operations. The order of property operations is an implementation issue.

The following three types of operations are provided. The response is subdivided into two types: “accepted” response and “process not possible” request. The “accepted” response is used when the service request in relation to all the EPC-stipulated properties is accepted. The “process not

possible" request is used when one or more specified properties do not exist or when the specified service cannot be processed for one or more properties.

"Request", "response" (response possible/response not possible)", and "notification"

The "response" is a response to a "request" that requires a response. It shall be returned when an EOJ-stipulated object exists. When the service processing request related to all the EPC-stipulated properties is accepted, the "accepted" response shall be returned. When the processing request related to one or more specified properties cannot be accepted, or if the object exists but one or more properties do not exist, "process not possible" shall be returned. When the "request" does not require any response or when the specified object does not exist, no "response" will be returned.

There are two types of "notification": one for transmitting own property information autonomously and the other for sending a response to a notification request. However, these two types have the same code.

Three specific operations are provided: write (response required/no response required), read, read & write, and notification (notification/notification with response required). The six operations shown below are set.

- Property value write (response required).
- Property value write (no response required).
- Property value read.
- Property value write and read.
- Property value notification.
- Property value notification (response required).

The ELSV and message configuration and their relationship to EPC and ELSV are described here. The EPC of an ECHONET Lite message is such that the ELSV value determines whether the target object is stipulated by the SEOJ or DEOJ. When the ELSV is a "response" or "notification", it is concluded that the EPC forms an SEOJ-stipulated object and that the "response" or "notification" is addressed to a DEOJ-stipulated object. On the other hand, when the ELSV is a "request", it is concluded that the EPC forms a DEOJ and that the "request" is issued from an SEOJ-stipulated object.

If there is no EOJ to be set as SEOJ or DEOJ, a node profile class shall be specified.

Table 10 shows specific ELSV code assignments based on the content described above. (The related number is indicated in the Remarks column of the table.)

In the diagrams in (a) to (f), the EOJ values used in relation to "requests" are individually specified codes. However, although a service request is made to two or more nonspecific object instances using a single message when the EOJ value indicates general broadcast to all instances of the specified class (i.e. X3 = 0x00), the processing in such a case shall assume that a request message was sent individually to each instance. That is, when it is necessary to send response messages, they shall be generated in such a manner that the number of instances equals the number of response messages, and messages with content that match the individual instances shall be sent after storing such types of content.

Table 10 – List of service codes for request

Service code (ELSV)	ECHONET Lite service content	Symbol	Remarks
0x60	Property value write request (no response required)	Set	Broadcast possible
0x61	Property value write request (response required)	SetC	
0x62	Property value read request	Get	Broadcast possible
0x63	Property value notification request	INF_REQ	Broadcast possible
0x64 to 0x6D	Reserved for future use		
0x6E	Property value write and read request	SetGet	Broadcast possible
0x6F	Reserved for future use		

Table 11 – List of ELSV codes for response/notification

Service code (ELSV)	ECHONET Lite service content	Symbol	Remarks
0x71	Property value write response	Set_Res	ELSV = 0x61 response; individual response
0x72	Property value read response	Get_Res	ELSV = 0x62 response; individual response
0x73	Property value notification	INF	Both individual notification and broadcast notification [a]
0x74	Property value notification (response required)	INFC	Individual notification
0x75 to 0x79	Reserved for future use		
0x7A	Property value notification response	INFC_Res	ELSV = 0x74 response; individual response
0x7B to 0x7D	Reserved for future use		
0x7E	Property value write and read response	SetGet_Res	ELSV = 0x6E response; individual response
0x7F	Reserved for future use		

[a] Used for autonomous property value notification and for 0x63 response.

Table 12 – List of ELSV codes for “response not possible”

Service code (ELSV)	ECHONET Lite service content	Symbol	Remarks
0x50	Property value write request “response not possible”	SetI_SNA	ELSV = 0x60 response not possible; individual response
0x51	Property value write request “response not possible”	SetC_SNA	ELSV = 0x61 response not possible; individual response
0x52	Property value read “response not possible”	Get_SNA	ELSV = 0x62 response not possible; individual response
0x53	Property value notification “response not possible”	INF_SNA	ELSV = 0x63 response not possible; individual response
0x54 to 0x5D	Reserved for future use		
0x5E	Property value write and read “response not possible”	SetGetI_SNA	ELSV = 0x6E response not possible; individual response
0x5F	Reserved for future use		

Relationships between request and response are described from a) to f).

a) Property value write service (no response required) [0x60, 0x50]

In the case of a “request” (0x60), this indicates a request to write the content shown in the EDT to the property stipulated in the EPC of the DEOJ-stipulated object.

When the request is not accepted, or when the stipulated DEOJ exists but the stipulated EPC does not exist, “response not possible” (0x50) is returned. When the specified DEOJ exists but there are too many target properties of control request to process all, the number of properties processed from the beginning is stored in OPC and “response not possible” (0x50) is returned as a response. Then the destination address of the lower communication layer shall be the source of “request” (the source address of the “request” message in the lower communication layer).

When the relevant object itself does not exist, neither “response” nor “response not possible” is returned. The relationship between request and response is shown in Figure 36.

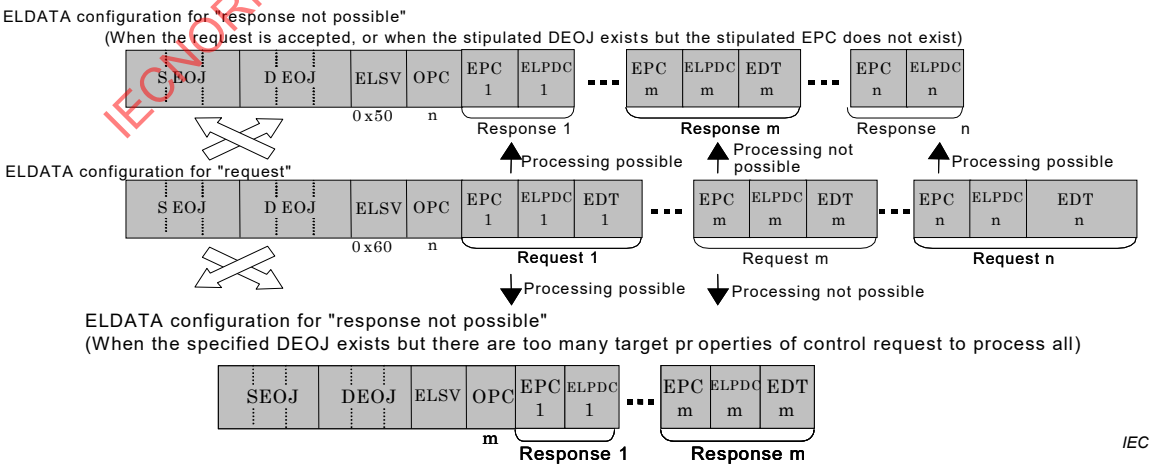


Figure 36 – ELDATA configuration for property value write service (no response required)

b) Property value write service (response required) [0x61, 0x71, 0x51]

In the case of “request” (0x61), this indicates a request to write the content shown in the EDT to the property stipulated in the EPC of the DEOJ-stipulated object.

In response to this “request”, when the request shall be (or has already been) accepted, a “response” (0x71) is returned. However, this “response” is not a processing implementation response. In the frame format for response, the value of the object stipulated by the request is set in the SEOJ and the same value as for the request is set in the OPC. In the EPC, the same property code for the request is set. To indicate that the request was accepted, the ELPDC is set to 0 and no EDT is attached.

When the request is not accepted, or when the stipulated DEOJ exists but the stipulated EPC does not exist, “response not possible” (0x51) is returned. In the same way as for a message of “response”, the request-stipulated object value is set in the SEOJ, the request-source object value is set in the DEOJ, the same value as for the request is set in the OPC, and the same property code for the request in the EPC for a message of “response not possible”. For the EPC that accepted the request, 0 is set in the succeeding ELPDC and no EDT is attached. For the EPC that did not accept the request, the same value as for the request is set in the succeeding ELPDC and the requested EDT is attached to indicate that the request could not be accepted.

When the specified DEOJ exists, but there are too many target properties of control request to process all, the number of properties processed from the beginning is stored in the OPC, the same property code for the request is set in the EPC, and 0 is set in the ELPDC. Then “response not possible” (0x51) is returned as a response. In this case, the responding side can determine the number of property values to be returned. However, the sequence of such properties shall be the same as in the request message.

When the relevant object itself does not exist, neither “response” nor “response not possible” is returned. Whether a response is possible or not, the destination address of the lower communication layer shall be the source of “request” (the source address of the “request” message in the lower communication layer). The relationship between request and response is shown in Figure 37.

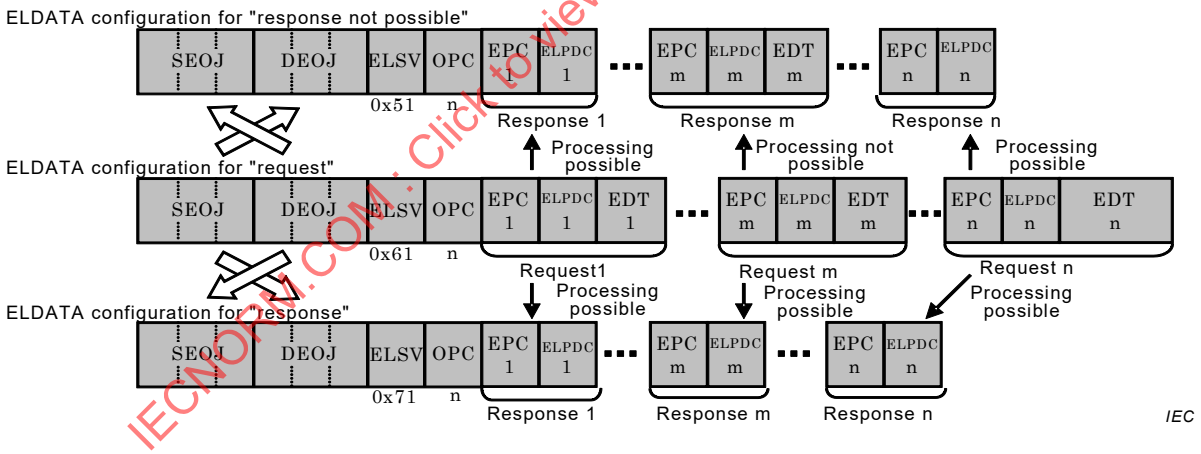


Figure 37 – ELDATA configuration for property value write service (response required)

c) Property value read service [0x62, 0x72, 0x52]

In the case of “read” (0x62), this indicates a request to read EPC-stipulated properties from the DEOJ-stipulated object.

When the request shall be (or has already been) accepted for all properties, a “response” (0x72) is returned. In the frame format for response, the value of the object stipulated by the request is set in the SEOJ, and the value of the request-source object is set in the DEOJ. In the OPC, the same value as for the request is set. To indicate that the request was accepted, the length of the read property is set in the ELPDC and the read property value in the EDT.

When the request is not accepted, or when the stipulated DEOJ exists but the stipulated EPC does not exist, “response not possible” (0x52) is returned. In the same way as for a message of “response”, the request-stipulated object value is set in the SEOJ, the request-source object value is set in the DEOJ, the same value as for the request is set in the OPC, and the same property code for the request is set in the EPC for a message of “response not

possible". For the EPC that accepted the request, the length of the read property is set in the succeeding ELPDC and the read property value in the EDT. For the EPC that did not accept the request, 0 is set in the succeeding ELPDC and no EDT is attached to indicate that the request was not accepted.

When the specified DEOJ exists, but there are too many target properties of control request to process, or all the property values requested for read cannot be returned because the allowable message length is not enough, the number of properties processed from the beginning is stored in the OPC, the same property code for the request is set in the EPC, the length of the read property is set in the ELPDC, and the read property value is set in the EDT. Then, "response not possible" (0x52) is returned as a response. In this case, the responding side can determine the number of property values to be returned. However, the sequence of such properties shall be the same as in the request message.

When the relevant object itself does not exist, neither "response" nor "response not possible" is returned. Whether a response is possible or not, the destination address of the lower communication layer shall be the source of "request" (the source address of the "request" message in the lower communication layer). The relationship between request and response is shown in Figure 38.

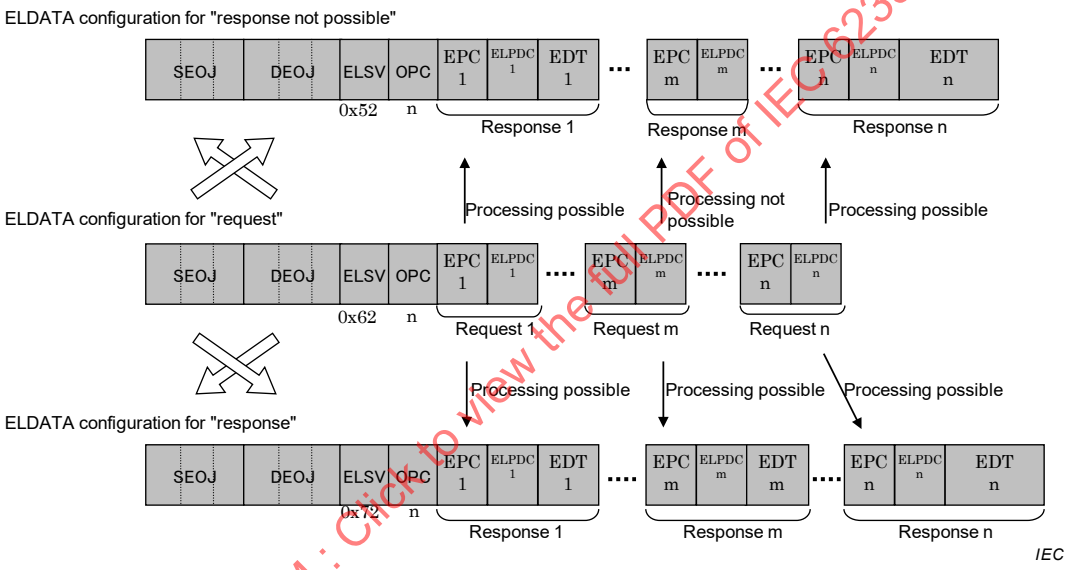


Figure 38 – ELDATA configuration for property value read service

d) Property value write and read service [0x6E, 0x7E, 0x5E]

"Write & read" (0x6E) indicates a service to process two requests by a single message: a request for writing EDT-stipulated contents into EPC-stipulated properties of a DEOJ-stipulated object and a request for the contents of EPC-stipulated properties from a DEOJ-stipulated object. The number of write-requested properties is stored in the OPCSet and that of read-requested properties is set in the OPCGet.

When the request shall be (or has already been) accepted, a "response" (0x71) is returned. In the frame format for response, the value of the object stipulated by the request is set in the SEOJ and the request-source object value in the DEOJ. The same value as for the request is set in the OPCSet, the same property code for the request is set in the EPC, 0 is set in the ELPDC, and no EDT is attached. The same value as for the request is set in the OPCGet, the same property code for the request is set in the EPC, the length of the read property is set in the ELPDC, and the read property value is set in the EDT.

When the request is not accepted, or when the stipulated DEOJ exists but the stipulated EPC does not exist, "response not possible" (0x5E) is returned. When the specified DEOJ exists, but there are too many target properties of control request to process, or all the property values requested for write or read cannot be returned because the allowable message length is not enough, the number of properties processed from the beginning is stored in the OPCSet and OPCGet. Then "response not possible" (0x5E) is returned as a response. In this case, the responding side can determine the number of property values to be returned. However, the sequence of such properties shall be the same as in the request message.

When the relevant object itself does not exist, neither “response” nor “response not possible” is returned. Whether a response is possible or not, the destination address of the lower communication layer shall be the source of “request” (the source address of the “request” message in the lower communication layer). The relationship between request and response is shown in Figure 39.

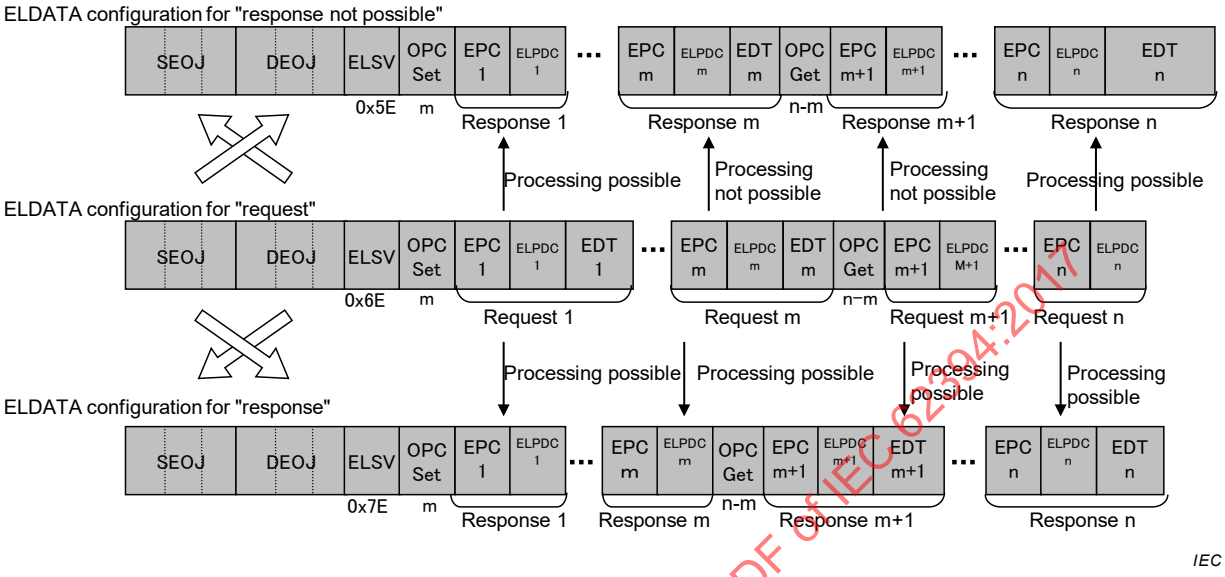


Figure 39 – ELDATA configuration for property value write and read service

This service is an option. If a node not supporting this service receives a request for the service, 0 shall be set in the OPCSet and OPCGet and a “response not possible” (0x52) shall be returned as a response.

e) Property value notification service [0x63, 0x73, 0x53]

There are two types of “notification”: the notification sent as a response to a “notify request” (0x63) and the autonomous notification, which is unrelated to notify requests. The codes for the two types are identical. (Here, notification in response to a “notify request” signifies an announcement that does not specify the property value [content], while an autonomous notification is a voluntary announcement that was not made in response to a request.) In the case of a “notify request” (0x63), this indicates a request to notify (by general broadcast; hereafter “announce” will signify a general broadcast) the content of the property stipulated in the EPC of the DEOJ-stipulated object.

In response to this “notify request”, when the request shall be accepted, a “response” (0x73) value is notified. The request-stipulated object value is set in the SEOJ, the request-source object value is set in the DEOJ, and the same value as for the request is set in the OPC. The same property code as for the request is set in the EPC and the property length of notification is set in the ELPDC. In the EDT, the requested property value (contents of notification) is stored. For broadcast, destination addresses in lower communication layers are set.

When the request is not accepted, or when the stipulated DEOJ exists but the stipulated EPC does not exist, “response not possible” (0x53) is returned. In the same way as for a message of “response”, the request-stipulated object value is set in the SEOJ, the request-source object value is set in the DEOJ, the same value as for the request is set in the OPC, and the same property code for the request in the EPC for a message of “response not possible”. For the EPC that accepted the request, the length of the read property is set in the succeeding ELPDC and the read property value in the EDT. For the EPC that did not accept the request, 0 is set in the succeeding ELPDC and no EDT is attached to indicate that the request was not accepted. When the specified DEOJ exists but there are too many target properties of control request to process, or the property value (contents of notification) requested for read cannot be returned because the allowable message length is not enough, the number of properties processed from the beginning is stored in the OPC, the same property code for the request is set in the EPC, the length of the read property is set in the ELPDC, and the read property value is set in the EDT. Then “response not possible” (0x53) is returned as a response. In this case, the responding side can determine the number of property values to be returned.

Also for a response not possible, the address of the lower communication layer of the request source shall be set as the destination address of the lower communication layer. When the relevant object itself does not exist, neither “response” nor “response not possible” is returned. (See Figure 40 for the sequence.) In the case of an autonomous “notification”, the DEA is set to a general broadcast for a required status change notification. In the other cases, however, the destination of the lower communication layer can be set arbitrarily for broadcast or individual transmission.

For an autonomous “notification”, a node profile class is stored because there is no EOJ to be set in the DEOJ in particular.

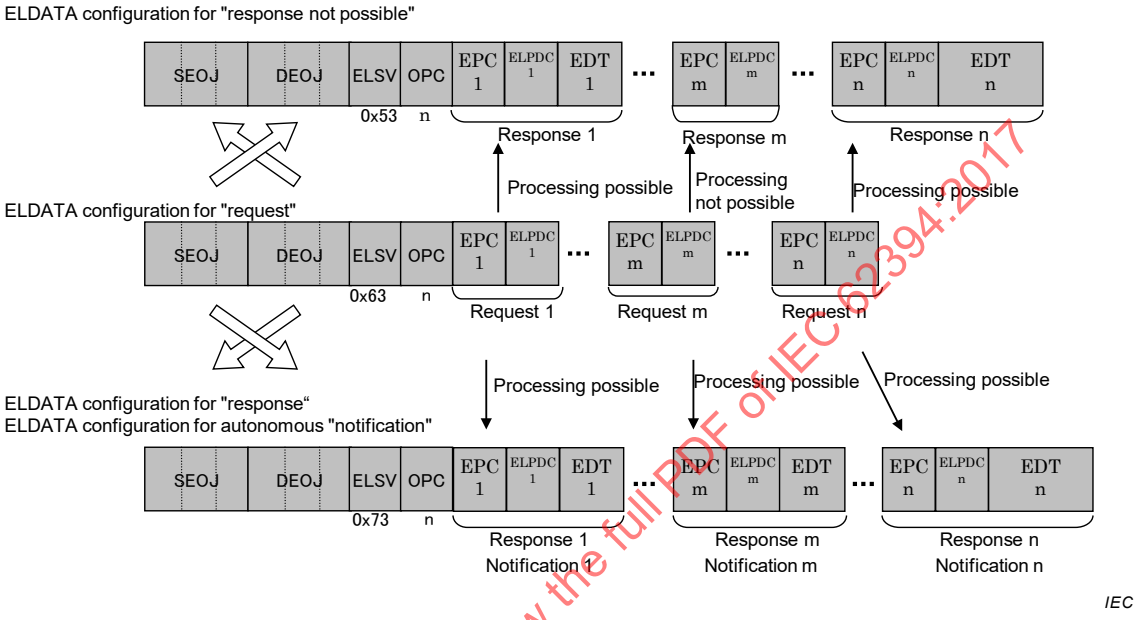


Figure 40 – ELDATA configuration for property value notification service

f) Property value notification (response required) [0x74, 0x7A]

The “notification (response required)” (0x74) autonomously notifies a specific node of the property value stipulated by the EPC of the SEOJ-stipulated object and requests a response. The response process for this “notification (response required)” varies depending on whether or not the DEOJ is specified.

Processing varies depending on whether the specified DEOJ exists. When the specified DEOJ exists, a “response” (0x7A) for autonomous notification reception is returned. (See Figure 41 for the sequence.) In a response message, the requested object value is set in the SEOJ and the request-source object value in the DEOJ. The same value as for notification is set in the OPC and the same property code as for notification is set in the EPC. To indicate that the notification was received, the ELPDC is set to 0 and no EDT is attached.

When the specified DEOJ does not exist, the message shall be discarded. The nodes that received the notification (response required) by broadcast shall discard this message.

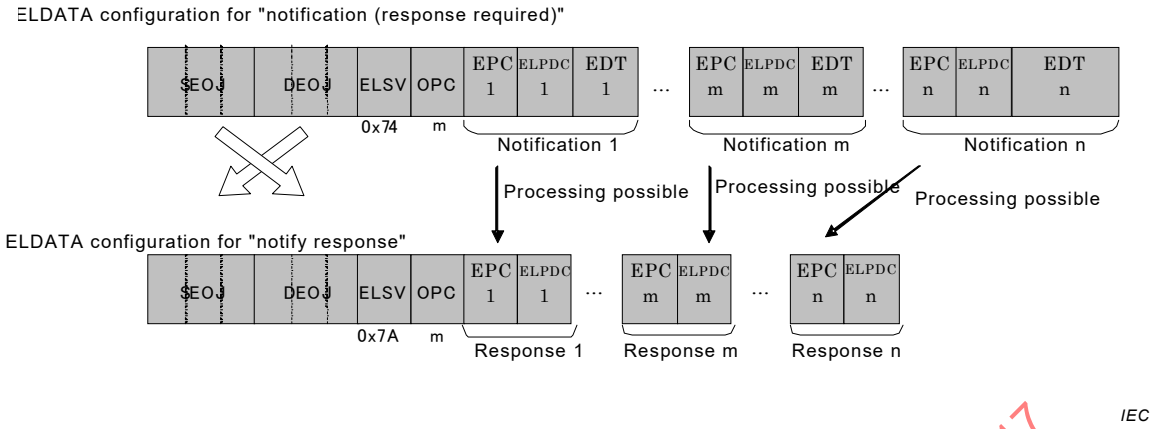


Figure 41 – ELDATA configuration for property value notification (response required) service

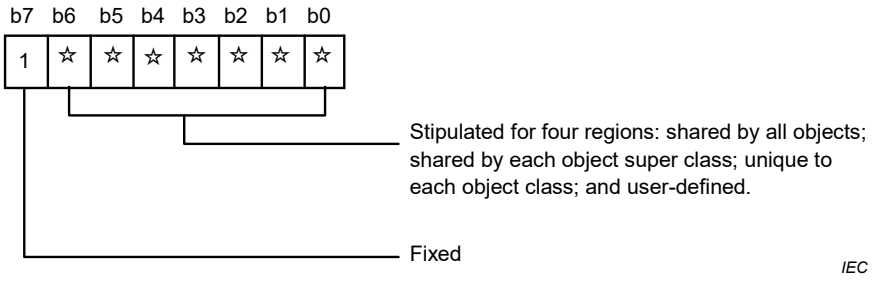
The services shown in Table 10, Table 11 and Table 12 above are specified for each property. Regarding those stipulated as services that shall be incorporated in each property, if they have the functions of that property and disclose via communications (read/write/notification, etc.), this indicates that they shall be processed. Processing of services for each property is specified in the access rules column of the object class detailed in Table 15, Table 18 to Table 27, Table 29 to Table 47, Table 51 to Table 55, Table 61, and Table 67 to Table 71. Access rules indicate all services that can be implemented. In these tables, the following four access rules are specified:

- Set: Processes services related to write requests for property values (performs processing indicated in a) and b)).
- Get: Processes services related to read requests for property values (performs processing indicated in c) and e)).
- SetGet: Processes services related to write and read requests for property values (performs processing indicated in d)).
- Anno: Processes non-array property value notification services (performs processing indicated in e) and f)).

The above processing is specified for each property.

8.2.7 ECHONET property (EPC)

This subclause provides detailed specifications for the ECHONET property (EPC) code shown in Figure 31, Figure 42 and Table 13. The EPC specifies a service target function. Each object stipulated by X1 (class group code) and X2 (class code), described in 8.2.6, is specified here. (When a specified object changes, the target function also changes even when the code remains unchanged. However, the detailed specifications are designed to ensure that, whenever possible, the same functions will have the same code.)



When b7 = 0, the other bits will be defined differently.

Figure 42 – EPC detailed specifications

Table 13 – EPC code allocation table

↓b3–b0 (hex) / b7–b4 →	8	9	A	B	C	D	E	F
0								
1								
2								
3								
4								
5								
6	Region shared by all object classes classes		Region shared by each class group[b]		Region unique to each class[b]			User-defined[a]
7								
8								
9								
A								
B								
C								
D								
E								
F								

[a] Stipulated for each user. In the case of a user-defined object class, 0xA to 0xF in the four high-order bits (b7 to b4) are user-defined.

[b] As a rule these two regions are used, but in practice the boundary line will change for each class group.

8.2.8 ECHONET Lite Property data counter (ELPDC)

The property data counter retains the number of bytes in ECHONET Property Value Data (EDT). If, for instance, the ECHONET property value data sizes for requests 1, 2, and 3 are 2 bytes, 1 byte, and 5 bytes, respectively, the values placed in the first, second, and third property data counters are 0x02, 0x01, and 0x05, respectively, as shown in Figure 43.

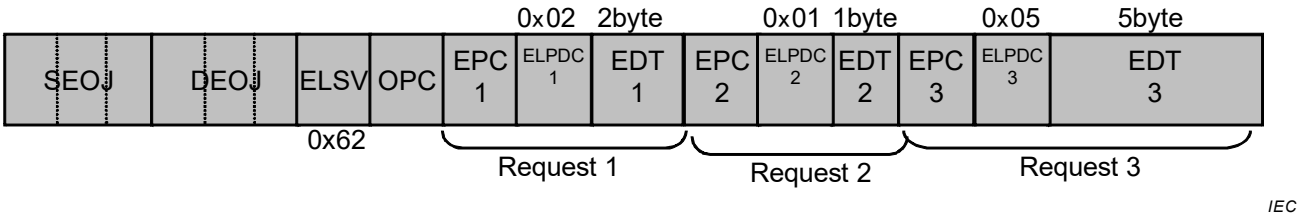


Figure 43 – ECHONET Lite Property data counter

9 ECHONET objects: detailed specifications

9.1 Basic concept

This subclause specifies specific values for the class codes of ECHONET objects processed in the ECHONET communication middleware, whose types and overview are given in Clause 7 and Clause 8, along with property configurations and detailed specifications for property configurations. In the case of class codes, rather than providing entirely new specifications, standards already being studied by the industry were applied whenever possible to capitalize on past work. Regarding object properties, the operands (control content) of JEM-1439 were analyzed and referred to. ECHONET objects described in this subclause are divided into three main classes: device objects, profile objects, and communications definition objects. In terms of the code structure, they will be divided into the class groups shown below. This subclause presents the shared ECHONET property specifications and object super classes that form ECHONET objects.

a) Device objects
   - Sensor-related device class group
   - Air-conditioning-related device class group
   - Housing-related device class group
   - Cooking/housework-related device class group
   - Health-related device class group
   - Management and control-related device class group
   - AV-related device class group

b) Profile objects
   - Profile class group

c) Communications definition objects
   - Sensor-related device communications definition class group
   - Air-conditioning-related device communications definition class group
   - Housing-related device communications definition class group
   - Cooking/housework-related device communications definition class group
   - Health-related device communications definition class group
   - Management and control-related device communications definition class group
   - Profile communications definition class group
   - AV-related device communications definition class group

Each ECHONET node shall implement a device object for at least one representative device.

9.2 ECHONET properties: basic specifications

9.2.1 General

This subclause presents the specifications shared by all ECHONET object classes, of which details are provided in this subclause and in 9.3.

9.2.2 ECHONET property value data types

The ECHONET property value is expressed as an unsigned integer when the value is a non-negative integer value; it is expressed as a signed integer when the value is an integer value containing negatives.

When the value is a small value, it is handled as a fixed point type. When it is a non-negative small value, it is treated as an unsigned integer, and when it is a small value containing negatives, it is treated as a signed integer. Data types and sizes are specified individually for each property.

Although the property data size is specified individually for each property, property value data of 2 bytes or larger comprises ECHONET communication middleware messages as ECHONET property value data (EDT) beginning from the most significant byte.

9.2.3 Property value range

The treatment of property values when the actual device value operating range differs from them, is specified below.

a) When the actual device property value operating range is smaller than the ECHONET property definition range and the actual device property value assumes the upper and lower limit values, the upper and lower limit values of the operating range are considered to be the property values. Assuming that the ECHONET property definition range is 0x00 to 0xFD (0 °C to 253 °C) and the corresponding actual device operating range is 0x0A to 0x32 (10 °C to 50 °C), when the actual device value is the upper limit value (50 °C) of the operating range, the upper limit value 0x32 (50 °C) of the actual device operating range is considered to be the ECHONET property value, and when the actual device property value is the lower limit value (10 °C), the lower limit value 0x0A (10 °C) is considered to be the ECHONET property value.

b) When the actual device property value operating range as ECHONET property is larger than the ECHONET property definition range and the actual device property value assumes a value outside the ECHONET property definition range, a code showing an underflow or overflow becomes the property value.

c) Assuming that the ECHONET property definition range is 0x00 to 0xFD (0 °C to 253 °C) and the corresponding actual device operating range is –10 °C to 300 °C, when the actual device value assumes a value below the ECHONET property definition range, the underflow code 0xFE becomes the property value. When the actual device property value assumes a value above the ECHONET property definition range, the overflow code 0xFF becomes the property value.

Table 14 shows the underflow and overflow codes for each data type.

Table 14 – Data types, data sizes, and overflow/underflow codes

Data type	Data size	Underflow	Overflow
Signed char	1 byte	0x80	0x7F
Signed short	2 byte	0x8000	0x7FFF
Signed long	4 byte	0x80000000	0x7FFFFFFF
Unsigned char	1 byte	0xFE	0xFF
Unsigned short	2 byte	0xFFFE	0xFFFF
Unsigned long	4 byte	0xFFFFFFFE	0xFFFFFFFF

9.2.4 Required class properties

In the class property specifications described in this subclause, the properties indicated as “mandatory” shall be implemented when implementing the given class.

In addition, actual devices need not implement functions corresponding to all codes listed in the property content value range for a required property. They shall implement only those codes corresponding to the functions they possess.

In the "announcement at status change" column in the property list, the "o" mark denotes mandatory processing when the property is implemented. When a property marked in this manner is implemented and its status changes, an announcement (property value notification service data transmission with an intra-domain general broadcast specified) shall be made.

9.2.5 Array

ECHONET properties can be in the form of an array. Array elements are stipulated by an array element number, which ranges from 0x0000 to 0xFFFF. Array elements may be noncontiguous. The example of array elements is shown in Figure 44. The data type of each array element shall be unique within a property.

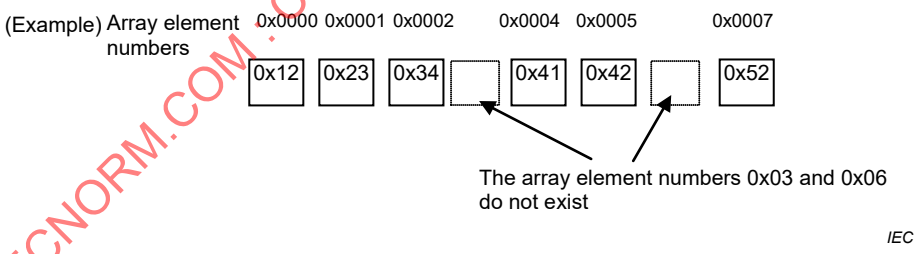


Figure 44 – Example of array elements

For the property value element-stipulated write service (ESV = 0x64, 0x65), property value element-stipulated read service (ESV = 0x66), property value element-stipulated notification service (ESV = 0x67), and property value element-stipulated deletion service (ESV = 0x6A, 0x6B), the "process not possible" response is returned if the associated array element does not exist. For the property value element-stipulated addition service (ESV=0x68, 0x69), the "process-not-possible" response is returned if the associated array element exists.

The property value element-stipulated deletion service deletes a specified array element but does not shift the subsequent elements forward. The example of property value element deletion is shown in Figure 45.

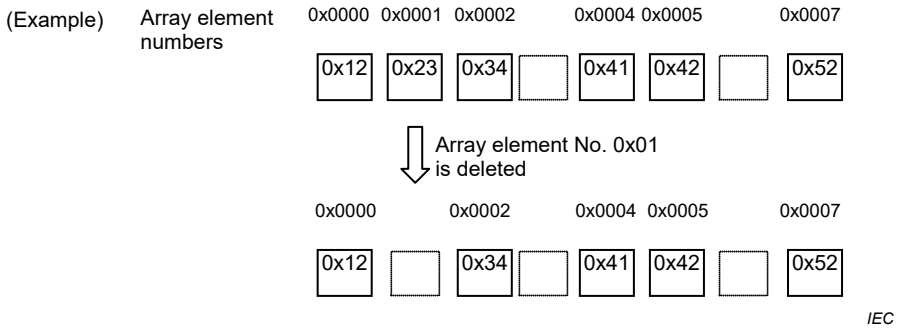


Figure 45 – Example of property value element deletion

The property value element addition service (ESV = 0x6D, 0x6E) does not specify the array element number to which an element addition shall be applied. Such a target array element number depends on the implementation. An example of property value element addition is shown in Figure 46.

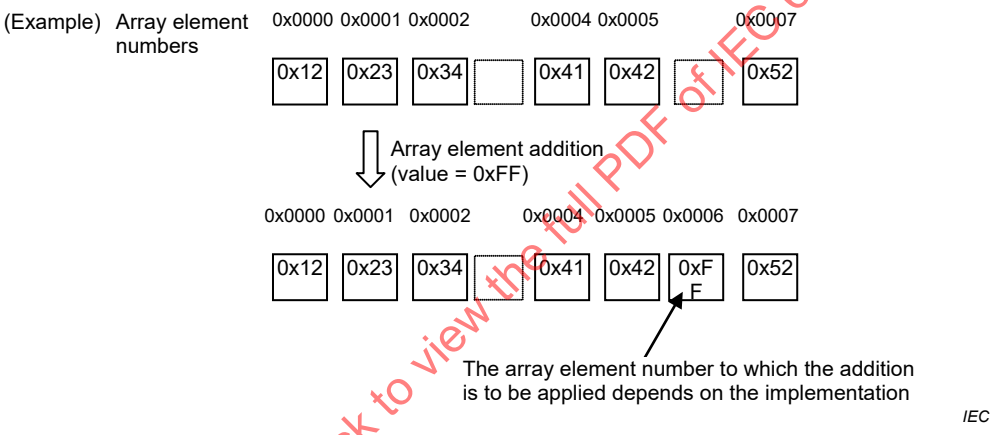


Figure 46 – Example of property value element addition

9.3 Device object super class specifications

9.3.1 General

This subclause will provide detailed specifications for the property configurations shared by all device object classes in the class groups corresponding to device objects (class group codes 0x00 to 0x06). These specifications will be presented as the device object super class.

9.3.2 Overview of device object super class specifications

The device object super class property is implemented by each device object class. Specifications for the device object super class are shown below.

The “operating status” (EPC=0x80) property implements the “get” access rule for all device object classes, signifying that it can be referenced from other nodes. Similarly, the “status change announcement property map” (EPC=0x9D), “fault status” (EPC=0x88), “set properties map” (EPC=0x9E), and “get properties map” (EPC=0x9F) properties also implement the “get” access rule, signifying that they can be referenced. Table 15 shows the list of device object super class configuration properties.

Table 15 – List of device object super class configuration properties

Property name	EPC	Contents of property Value range (decimal notation)	Data size	Data size byte	Access rule	Manda-tory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1	Set Get	 O	O	
Installation location	0x81	Indicates the installation location See 9.3.4.	unsigned char	1	Set/Get	O	O	
Standard version information	0x82	Indicates the version number of the corresponding standard. First byte: Indicates the major version number (integer) in the binary format. Second byte: Indicates the minor version number (decimal places) in the binary format. Third byte: Indicates the release order in the ASCII format. Fourth byte: Fixed at 0x00 (reserved for future use).	unsigned char × 4	4	Get	O		
Identification number	0x83	A number that allows each object to be uniquely identified. First byte: lower-layer communication ID field. 0x01 to 0xFD: This is a communication protocol used in the lower-layer communication and is set arbitrarily according to the protocol class in the case where an unique number is assigned (not used in control protocol 2nd shown in Clause 8). 0xFE: Defined by the manufacturer: (the length of each unique number is 16 bytes). 0xFF: Generated by using a random number table (the length of each unique number is 8 bytes). 0x00: No identification number has been set (the length of each unique number is 8 bytes). Second and succeeding bytes: unique number field.	unsigned char	9 or 17	Get			
		In the case where the first byte is 0xFE, the second and succeeding bytes indicate the manufacturer code (3 bytes) and the identification number defined by the manufacturer (13 bytes).						
Measured instantaneous power consumption	0x84	Indicates the instantaneous power consumption of the device in watts. 0x0000 to 0xFFFF (0 W to 65 535 W)	unsigned short	2	Get			
Measured cumulative power consumption	0x85	Indicates the cumulative power consumption of the device in increments of 0,001 kWh. 0x0 to 0x3B9AC9FF (0 kWh to 999 999,999 kWh)	unsigned long	4	Get			
Manufacturer's	0x86	Indicates the manufacturer-defined	unsigned char	Max	Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data size	Data size byte	Access rule	Manda-tory	Announcement at status change	Remark
fault code		fault code. First byte: Indicates the data size of the fault code field. Second to fourth bytes: Manufacturer code. Fifth and succeeding bytes: Field for manufacturer-defined fault code	× (max) 225	225				
Current limit setting	0x87	Indicates the current limit setting (0 % to 100 %). 0x00-0x64 (= 0 % to 100 %)	unsigned char	1	Set/Get			
Fault status	0x88	Indicates whether a fault (e.g. a sensor trouble) has occurred or not. Fault occurred = 0x41, No fault has occurred = 0x42.	unsigned char	1	Get	○	○	
Fault description	0x89	Describes the fault. See 9.3.12.	unsigned short	2	Get			
Manufacturer code	0x8A	3-byte manufacturer code (Defined by the ECHONET Consortium.)	unsigned char × 3	3	Get	○		
Business facility code	0x8B	3-byte business facility code (Defined by each manufacturer.)	unsigned char × 3	3	Get			
Product code	0x8C	Identifies the product using ASCII code. (Defined by each manufacturer.)	unsigned char × 12	12	Get			
Production number	0x8D	Indicates the production number using ASCII code. (Defined by each manufacturer.)	unsigned char × 12	12	Get			
Production date	0x8E	4-byte production date code Indicates the production date in the YYMD format (1 character = 1 byte). YY: Year (e.g. 1999 = 0x07CF) M: Month (e.g. December = 0x0C) D: Day (e.g. 20th = 0x14)	unsigned char × 4	4	Get			
Power-saving operation setting	0x8F	Indicates whether the device is operating in power-saving mode. Operating in power-saving mode =0x41 Operating in normal operation mode =0x42	unsigned char	1	Set/Get			
Remote control setting	0x93	This property indicates whether remote control is through a public network or not. Not through a public network = 0x41 Through a public network = 0x42	unsigned char	1	Set/Get			
Current time setting	0x97	Current time (HH:MM format) 0x00 to 0x17:0x00 to 0x3B (=0 to 23): (=0 to 59)	unsigned char × 2	2	Set/Get			
Current date setting	0x98	Current date (YYYY:MM:DD format) 1 to 0x270F: 1 to 0x0C:	unsigned char × 4	4	Set/Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data size	Data size byte	Access rule	Manda-tory	Announcement at status change	Remark
		1 to 0x1F (=1 to 9999): (=1 to 12): (=1 to 31)						
Power limit setting	0x99	Indicates the power limit setting in watts. 0x0000 to 0xFFFF (0 W to 65 535 W)	unsigned short	2	Set/Get			
Cumulative operating time	0x9A	Indicates the cumulative number of days, hours, minutes or seconds for which the device has operated, using 1 byte for the unit and 4 bytes for the time. First byte: Indicates the unit. Second: 0x41; Minute: 0x42; Hour: 0x43; Day:0x44. Second to fifth bytes: Indicates the elapsed time in the unit specified by the first byte. 0x00000000-0xFFFFFFFF (0 to 4 294 967 295)	unsigned char + unsigned long	1+4 byte	Get			
SetM property map	0x9B	See 9.45.	unsigned char × (MAX17)	Max. 17	Get	O[a]		
GetM property map	0x9C	See 9.45.	unsigned char × (MAX17)	Max. 17	Get	O[a]		
Status change announcement property map	0x9D	See 9.45.	unsigned char × (MAX17)	Max. 17	Get	O		
Set property map	0x9E	See 9.45.	unsigned char × (MAX17)	Max. 17	Get	O		
Get property map	0x9F	See 9.45.	unsigned char × (MAX17)	Max. 17	Get	O		
The O marks in the “Announcement at status change” column indicate that the processing is mandatory when the property is implemented.								
[a] GetM and SetM property map may not be implemented in control protocol 2nd shown in Clause 8.								

9.3.3 Operation status property

The “operation status” property of the device object super class indicates whether the functions specific to each class are operating in the actual device (ON) or not (OFF). In the case of a node in which a device object class is implemented and the functions specific to that class start operating upon startup of the node, this property may be implemented with the value fixed at 0x30. However, the operation status of the communications function of the node shall be indicated in the “operation status” property of the node profile object.

9.3.4 Installation location property

The “installation location” property indicates the location at which the device has been installed in the form of 1-byte bitmap information. This property is a rewritable mandatory property. When the value is changed, the new value shall be broadcast throughout the domain.

The 8 bits of the “installation location” property are assigned a free definition designation bit, an installation location code and a location number. In the case where all the bits are 0, a special code that indicates that the installation location has not been specified is used. In the case where all the bits are 1, a special code that indicates that the installation location is indefinite is used.

The information contained in each of the bits is as described below. Table 16 shows the relationships between the installation location types, free definition designation bit, installation location code and location number.

- Free definition designation bit (b7)

  This is comprised of a single bit, b7. When b7 is 1, the installation location code and location number can be freely defined.

  When b7 is 0, the installation location code and location number indicate the installation location of the device according to the rules specified in Table 16.

- Installation location code (b3 to b6)

  This code is comprised of the 4 bits from b3 to b6. When b7 is 1, this code can be freely defined.

  When b7 is 0, this code indicates the type of the installation location of the device according to the rules specified in Table 16.

- Location number (b0 to b2)

  This number is comprised of the 3 bits from b0 to b2. When b7 is 1, this number can be freely defined. When b7 is 0, this number is used to distinguish a space of a given type from another space of the same type. For example, when there are 2 lavatories, the lavatory on the first floor can be distinguished from the lavatory on the second floor by assigning 001b as the location number for the former and 010b as the location number for the latter.

  When b7 is 0, the location number field value 000b indicates that the “installation location” property has been initialized on the assumption that the device will be installed at the installation location specified by the installation location code. This situation is herein expressed as the “location number not specified” situation.

In the case where the “installation location” property has been initialized without making an assumption about the type of the installation location for the device, the setting shall be set to 0x00 (the “installation location not specified” code). When it is inappropriate to specify a specific location type as the installation location type for the device, the “installation location” property setting shall be set to 0xFF (the “installation location indefinite” code).

The values 0x01 to 0x07 are reserved for future use.

Table 16 – Installation location (space) types and the bit values assigned to them

	MSB							LSB
Installation location type	**Free definition designation bit**	**Installation location code**				**Location number**		
	b7	b6	b5	b4	b3	b2	b1	b0
Living room	0	0	0	0	1	“000b” to “111b” (“000b” indicates that the location number has not been specified.)		
Dining room	0	0	0	1	0			
Kitchen	0	0	0	1	1			
Bathroom	0	0	1	0	0			
Lavatory	0	0	1	0	1			
Washroom/ changing room	0	0	1	1	0			
Passageway	0	0	1	1	1			
Room	0	1	0	0	0			
Stairway	0	1	0	0	1			
Front door	0	1	0	1	0			
Storeroom	0	1	0	1	1			
Garden/perimeter	0	1	1	0	0			
Garage	0	1	1	0	1			
Veranda/balcony	0	1	1	1	0			
Others	0	1	1	1	1			
Free definition[a]	1	“0000000b” to “1111110b”						
Installation location not specified	0	0	0	0	0	0	0	0
Installation location indefinite	1	1	1	1	1	1	1	1
Reserved for future use	“00000001b” to “00000111b”							

[a] “Free definition” signifies that the installation location code and location number can be freely defined for the use of the device in a store or medium- or small-sized building.

9.3.5 Standard version information property

The “Standard version information” property indicates the release order of the APPENDIX as a one-byte ASCII code.

The first and second bytes are fixed at 0x00 in this version, reserved for future expansion. The third byte indicates the order of release.

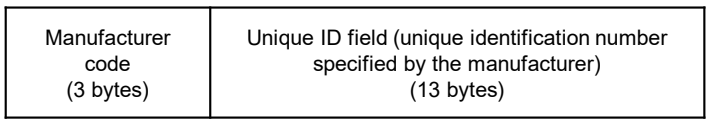
And, in APPENDIX Release B, the first and second bytes shall be 0x00(0), the third byte 0x42(B), and the fourth byte 0x00(0).

9.3.6 Identification number property

The “identification number” property is a number that allows each device object to be uniquely identified. The first byte indicates the format of the unique number.

In the case where the unique number type is 0xFE (“defined by the manufacturer”), the unique number is comprised of a 3-byte manufacturer code field, which contains the unique manufacturer code assigned by the ECHONET Consortium to the manufacture in question, and

a 13-byte unique ID field, which contains the unique identification number defined by the manufacturer. This property's data structure is shown in Figure 47. Each vendor shall ensure that there will be no code value overlap.



IEC

Figure 47 – Data structure of "identification number" property

9.3.7 Measured instantaneous power consumption property

This property indicates the instantaneous power consumption of device in watts. The value range for this property is from 0x0000 to 0xFFFD. When the property value of the actual device is higher than the upper bound of the value range, 0xFFFF (overflow code) shall be used. When the property value of the actual device is lower than the lower bound of the value range, 0xFFFE (underflow code) shall be used.

9.3.8 Measured cumulative power consumption property

This property indicates the cumulative power consumption of device in increments of 0,001 kW. The value range for this property is from 0x00000000 to 0x3B9AC9FF (from 0 kWh to 999 999,999 kWh). When a measured cumulative power consumption overflow occurs, the counting shall restart from 0x00000000.

9.3.9 Manufacturer's fault code property

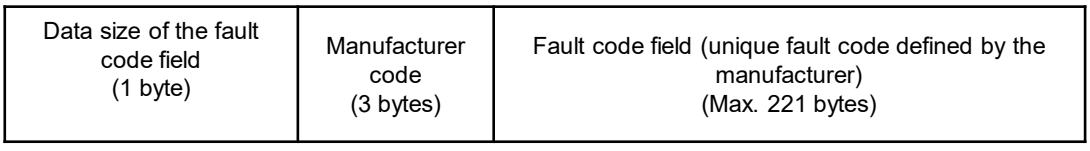
This property identifies the faults that have occurred in the device using unique fault codes defined by the manufacturer.

The first byte indicates the data size of the fault code field.

The second to fourth bytes indicates the 3-byte manufacturer code assigned to the manufacturer in question by the ECHONET Consortium.

The fifth and succeeding bytes (i.e. the fault code field) contain the unique fault code defined by the manufacturer in question.

In the case where this property is implemented, the implementation of the "Fault description" property is mandatory. This property's data structure is shown in Figure 48.



IEC

Figure 48 – Data structure of "manufacturer's fault code" property

9.3.10 Current limit setting property

The "current limit setting" property contains the setting for the maximum consumable current (i.e. current limit setting). The value range for this property is from 0 to 100 (from 0x00 to 0x64), and the unit is %. The maximum consumable current at any given moment for the device associated with the object in question is the maximum current specified for that device times the rate specified by the value contained in this property at that moment. When the value of this property

is 100, no current limit is imposed. In the case where it is not possible to limit the current consumption using the value specified by this property, the current consumption shall be limited using a value that is closest to and lower than the value specified by this property. A read value shall be one set in the equipment.

9.3.11 Fault-status property

The “fault status” property of the device object super class indicates whether a fault has occurred in the actual device. This property shall be set to 0x41 when there is a fault and 0x42 when there is no fault.

9.3.12 Fault description property

The “fault description” property shall be assigned fault description code values as specified in Table 17. A “recoverable fault” as defined in the table is a fault which is currently inhibiting the proper operation of the device or a function of the device but whose cause can be removed by a user action. A “fault that requires repair” as defined in the table is a fault which is currently inhibiting the proper operation of the device or a function of the device, and whose cause cannot be removed without repair work by a specialist.

The lower-order byte of the fault description code shall indicate the general fault classification and the higher-order byte of the fault description code shall indicate the detailed fault classification. The detailed fault classification for recoverable faults will be determined in the future for each class. In the case where recoverable faults or faults that require repair are to be identified only with the general fault classification without using the detailed fault classification, the higher-order byte of the fault description code shall be set to 0x00.

a) Lower-order byte of the fault description code

The lower-order byte of the fault description code provides an overview of the fault in the form of general fault classification.

The value of the lower-order byte of the fault description code shall be 0x00 when no fault has occurred in the device.

The lower-order byte of the fault description code shall be set to a value between 0x01 and 0x09 when a recoverable fault (i.e. a fault that can be repaired by a user action) occurs in the device, according to the value assignment rules described below. The general fault classification for recoverable faults is based on the type of user action required to recover from the fault. 0x01 indicates that a fault has occurred which can be repaired by restarting the device by turning the power off and on again. 0x02 indicates that a fault has occurred which can be repaired by restarting the device and resetting it. 0x03 indicates that a fault has occurred which can be repaired by changing the way the device is mounted or by opening/closing a lid or door. 0x04 indicates that a fault has occurred which can be repaired by supplying fuel, water, air, etc. 0x05 indicates that a fault has occurred which can be repaired by cleaning the device. 0x06 indicates that a fault has occurred which can be repaired by changing the battery or cell. 0x09 can be freely defined by the user. 0x07 and 0x08 are reserved for future revisions to add other types of recoverable faults.

The lower-order byte of the fault description code shall be set to a value between 0x0A and 0x6E, when a fault that requires repair occurs in the device, according to the value assignment rules described below. The general fault classification for faults that require repair is based on the location of the fault. 0x0A to 0x13 indicate that a safety device has tripped. Values between 0x14 to 0x1D indicate that a fault has occurred in the user interface. 0x1E to 0x3B indicate that a fault has occurred in the sensor system. 0x3C to 0x59 indicate that a fault has occurred in an actuator, etc. 0x5A to 0x6E indicate that a fault has occurred in a control circuit board.

b) Higher-order byte of the fault description code

The higher-order byte of the fault description code provides detailed information on the fault in the form of detailed fault classification for each general fault classification category.

When the value of the lower-order byte of the fault description code is 0x00 (no fault), the value of the higher-order byte of the fault description code shall be 0x00. 0x04 to 0xFF are reserved for future use.

When the value of the lower-order byte of the fault description code is a value between 0x01 and 0x06, the higher-order byte of the fault description code can take the value 0x00 or a value between 0x04 and 0xFF. The higher-order byte of the fault description code shall be set to 0x00 in the case where faults are to be identified only with the general fault classification without using the detailed fault classification. 0x04 to 0xFF are reserved for a future class-specific detailed fault classification.

When the value of the lower-order byte of the fault description code is 0x07 or 0x08, the higher-order byte of the fault description code can take the value 0x00 or a value between 0x04 and 0xFF. All of these values are reserved for future use.

When the value of the lower-order byte of the fault description code is 0x09, the higher-order byte of the fault description code can take the value 0x00 or a value between 0x04 and 0xFF. All of these values can be freely defined by the user.

When the value of the lower-order byte of the fault description code is a value between 0x0A and 0x6E, the higher-order byte of the fault description code can take the value 0x00 or a value between 0x04 and 0xFF. The higher-order byte of the fault description code shall be set at 0x00 in the case where faults are to be identified only with the general fault classification without using the detailed fault classification. The values 0x04 to 0xFF can be freely defined by the user.

The values between 0x006F and 0x03E8, which are values for combinations of higher- and lower-order bytes of the fault description code, are values that can be freely defined by the user for faults that require repair.

The value 0x03FF, which is a value for combinations of higher- and lower-order bytes of the fault description code, indicates that a fault has occurred but the recovery method or fault location cannot be determined.

The values between 0x03E9 and 0x03FE, which are values for combinations of higher- and lower-order bytes of the fault description code, are reserved for future use.

Table 17 – Fault-content property value assignments

General fault classification		Fault description code	
		Fault description code Lower-order byte	Fault description code Higher-order byte
No fault		0x00	0x00: No fault. 0x04-0xFF: reserved for future use.
Recoverable faults	Faults that can be repaired by turning off the power switch and turning it on again or withdrawing and re-inserting the power plug.	0x01	0x00: Faults are to be identified only by the general fault classification without using the detailed fault classification. 0x04-0xFF: reserved for future use
	Faults that can be repaired by pressing the reset button.	0x02	
	Faults that can be repaired by changing the way the device is mounted or by opening/closing a lid or door.	0x03	
	Faults that can be repaired by supplying fuel, water, air, etc.	0x04	
	Faults that can be repaired by cleaning the device (filter etc.)	0x05	
	Faults that can be repaired by changing the battery or cell.	0x06	
	Reserved for future use	0x07 to 0x08	0x00, 0x04 to 0xFF
	User-definable domain	0x09	0x00, 0x04 to 0xFF
Faults that require repair	Abnormal event or the tripping of a safety device	0x0a-0x13	0x00: Faults are to be identified only with the general fault classification without using the detailed fault classification. 0x04 to 0xFF: user-definable
	Fault in a switch	0x14-0x1D	
	Fault in the sensor system	0x1E-0x3B	
	Fault in a component such as an actuator	0x3C to 0x59	
	Fault in a control circuit board	0x5A to 0x6E	
	User-definable domain	0x006F to 0x03E8	
A fault has occurred but the recovery method or fault location cannot be determined.		0x03FF	
Reserved for future use.		0x03E9 to 0x03FE, 0x**6F to 0x**FF (**: 04 to FF)	

9.3.13 Manufacturer code property

The “manufacturer code” property identifies the manufacturer using a 3-byte code. Each ECHONET Consortium member is assigned a unique “manufacturer code” property value by the Consortium.

9.3.14 Business facility code property

The “business facility code” property identifies the relevant business facility of the manufacturer using a 3-byte code. “Business facility code” property values are defined by each manufacturer.

9.3.15 Product code property

The “product code” property identifies the relevant product of the manufacturer using a 12-byte ASCII code. “Product code” property values are defined by each manufacturer. When the “product code” property value is less than 12 bytes, the product code shall be left-justified in the data area and the remainder of the data area shall be padded with NULLs or spaces.

9.3.16 Production number property

The “production number” property indicates the production number of the relevant product of the manufacturer using a 12-byte ASCII code. “Production number” property values are defined by each manufacturer. When the “production number” property value is less than 12 bytes, the production number shall be left-justified in the data area and the remainder of the data area shall be padded with NULLs or spaces.

9.3.17 Production date property

The “production date” property indicates the production date of the relevant product of the manufacturer using a 4-byte code. Two of the 4 bytes are used to indicate the year of production. The remaining 2 bytes are used to indicate the month of production and the day of production, with one byte used for each.

9.3.18 Power-saving operation setting property

The “power-saving operation setting” property contains the status as to whether the device associated with the object in question is operating in power-saving mode. When the value contained is 0x41, the device operates in power-saving mode. When the value contained is 0x42, the device operates in normal operation mode (non-power-saving mode).

9.3.19 Remote control setting property

This property indicates by one byte whether remote control is through a public network or not. The value is 0x41 for control not through a public network and 0x42 for control through a public network.

For control through a public network, several properties including this property are stored in one message and the message is sent as a control request. When the message is sent, this property shall always be attached to the first property (EDT=0x42: control through a public network).

A control request message refers to a property value write request (no response required), property value write request (response required), or a property value write & read request.

For example, when an air conditioner is set to cooling mode by operation control through a public network, this property shall be set to the first property and sent by a single control request message in order of the "Remote control setting" property and the "Operation mode setting" property.

When a control request message is sent by using this property, the minimum value of the processing target property counter (OPC) shall be 2.

For control not through a public network, this property is not given but a control request message shall be sent. For example, when an air conditioner is set to cooling mode not through a public network, only the "Operation mode setting" property shall be sent as a control request message without this property.

When the property status is control through a public network (EDT=0x42) but there is control from a dedicated controller, direct control from the main unit, or control not through a public network, change the status to control not through a public network (EDT=0x41).

9.3.20 Current time setting property

This property indicates the current local time using a value between 0x00 and 0x17 (0 and 23) for the hours and a value between 0x00 and 0x3B (0 and 59) for the minutes.

The first byte of the property value indicates hours and the second byte indicates minutes.

9.3.21 Current date setting property

This property indicates the current date using a value between 0x0001 and 0x270F (1 and 9999) for the year, a value between 0x01 and 0x0C (1 and 12) for the month and a value between 0x01 and 0x1F (1 and 31) for the day.

The first and second bytes are treated as one piece of unsigned short data which indicates the year (2 bytes). The third byte indicates the month (1 byte) and the fourth byte indicates the day (1 byte).

9.3.22 Power limit setting property

This property contains the setting for the maximum consumable power (i.e. power limit setting). The value range for this property is from 0 to 65 535 (from 0x0000 to 0xFFFF), and the unit is watt. In the case where it is not possible to limit the power consumption using the value specified by this property, the power consumption shall be limited using a value that is closest to and lower than the value specified by this property. A read value shall be one set in the equipment.

9.3.23 Cumulative operating time property

The “cumulative operating time” property indicates the cumulative operating time.

The first byte indicates the unit for the cumulative operating time. The values that can be used for the first byte are 0x41 (seconds), 0x42 (minutes), 0x43 (hours) and 0x44 (days).

The second to fifth bytes are treated as one piece of unsigned long data which indicates the cumulative operating time in the unit specified by the first byte. The value range for the cumulative operating time (second to fifth bytes) shall be from 0x0000 to 0xFFFFFFFE (from 0 to 4 294 967 294). 0xFFFFFFFF shall be used as the overflow code.

The operating states that are to be counted in when counting up the operating periods and the conditions for starting and stopping the counting shall be device-dependent and no requirement is specified for these.

9.3.24 Property map property

The device object super class defines 3 “property maps”, which provide information on the services that can be provided by the individual properties published by objects.

Of these, “Set property map” and “Get property map” provide information as to what access rules the individual properties published by the implemented objects support in terms of individual product specifications.

“Status change announcement property map” lists the properties that have been so set that a broadcast is performed upon a property value change.

The formats of these maps are as shown in 9.45. When there is no property to list in a map, the number of properties shall be set to “0” and the second and succeeding bytes shall be left blank.

The definitions of the individual property maps are as follows:

a) Set property map

   This is the property map that lists the properties which support the “Set” access rule. For array properties for which batch writing shall be permitted, the EPC values shall be registered on the Set property map.

b) Get property map

This is the property map that lists the properties which support the “Get” access rule. For array properties for which batch reading shall be permitted, the EPC values shall be registered on the Get property map.

c) SetM property map

This is the property map that lists the properties which support the “SetM” access rule. For array properties for which batch writing shall be permitted, the EPC values shall be registered on the SetM property map. Devices which install only “control protocol 2nd” shown in Clause 8 cannot implement the SetM property map because it is not possible to define array properties.

d) GetM property map

This is the property map that lists the properties which support the “GetM” access rule. For array properties for which batch reading shall be permitted, the EPC values shall be registered on the GetM property map. Devices which install only “Control protocol 2nd” shown in Clause 8 cannot implement the SetM property map, because it is not possible to define array properties.

e) Status change announcement property map

This is the property map that lists the properties that have been so set that an intra-domain broadcast is performed upon a property value change. These properties include properties supported in individual product specifications which are specified as properties requiring broadcasting in the “announcement at status change” column of the requirements for properties of individual objects, as well as properties that support “announcement at status change” as part of the product specifications.

A property that is published in a property map as a property capable of supporting the access rule associated with the map shall support that access rule. For properties that are not published in a property map as properties capable of supporting the access rule associated with the map, whether to support that access rule shall be device implementation-dependent.

9.4 Temperature sensor class specifications

9.4.1 General

The control commands of “temperature sensor” are shown in Table 18.

Class group code : 0x00
Class code : 0x11

Table 18 – List of temperature sensor properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 bytes	—	Set Get	 ○	○	
Measured temperature value	0xE0	Indicates the measured temperature value in increments of 0,1 °C. 0xF554 to 0x7FFF (–2 732 to 32 766) (–273,2 °C to 3 276,6 °C)	signed short	2 bytes	0,1 °C	Get	○		

9.4.2 Operation status property

This property indicates whether the function native to this class is operating or not (ON/OFF). In the node mounting this class, if the function of this class is started concurrently with the start of node operation, this property may be implemented at a fixed value of 0x30 (operation status ON).

9.4.3 Measured temperature value property

This property indicates the measured temperature value in units of 0,1°C. The property value range shall be 0xF554 to 0x7FFE (−273,2 °C to 3 276,6 °C). When the property value of the actual device exceeds this property value range, the overflow code 0x7FFF shall be used. When said value falls below the property value range, the underflow code 0x8000 shall be used.

9.5 Humidity sensor class specifications

9.5.1 General

The control commands of “humidity sensor” are shown in Table 19.

Class group code : 0x00
Class code : 0x12

Table 19 – List of humidity sensor properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte	–	Set Get	O	O	
Measured value of relative humidity	0xE0	Indicates measured value of relative humidity in %. 0x00 to 0x64 (0 % to 100 %)	unsigned char	1 byte	%	Get	O		

9.5.2 Operation status property

This property indicates whether the function native to this class is operating or not (ON/OFF). In the node mounting this class, if the function of this class is started concurrently with the start of node operation, this property may be implemented at a fixed value of 0x30 (operation status ON).

9.5.3 Measured value of relative humidity property

This property indicates the measured value of relative humidity in %. The property value range shall be 0x00 to 0x64 (0 % to 100 %). When the property value of the actual device exceeds this property value range, the overflow code 0xFF shall be used. When said value falls below the property value range, the underflow code 0xFE shall be used.

9.6 Illuminance sensor class specifications

9.6.1 General

The control commands of “illuminance sensor” are shown in Table 20.

Class group code : 0x00
Class code : 0x12

Table 20 – List of illuminance sensor properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned short	1 bytes	–	Set Get	 O	O	
Measured illuminance value 1	0xE0	Indicates measured illuminance value in lux. 0x0000 to 0xFFFD (0 lx to 65 533 lx)	unsigned short	2 bytes	lux	Get	O [a]		
Measured illuminance value 2	0xE1	Indicates measured illuminance value in lux. 0x0000 to 0xFFFD (0 lx to 65 533 lx)	unsigned short	2 bytes	lux	Get	O [a]		

[a] Implementation of "measured illuminance value 1 of EPC 0xE0" or "measured illuminance value 2 of EPC 0xE1" shall be mandatory.

9.6.2 Operation status property

This property indicates whether the function native to this class is operating or not (ON/OFF). In the node mounting this class, if the function of this class is started concurrently with the start of node operation, this property may be implemented at a fixed value of 0x30 (operation status ON).

9.6.3 Measured illuminance value 1 property

This property indicates the measured illuminance value in lux. The property value range shall be 0x0000 to FFFD (0 lx to 65 533 lx). When the property value of the actual device exceeds this property value range, the overflow code 0xFFFF shall be used. When said value falls below the property value range, the underflow code 0xFFFE shall be used.

9.6.4 Measured illuminance value 2 property

This property indicates the measured illuminance value in lux. The property value range shall be 0x0000 to FFFD (0 lx to 65 533 lx). When the property value of the actual device exceeds this property value range, the overflow code 0xFFFF shall be used. When said value falls below the property value range, the underflow code 0xFFFE shall be used.

9.7 Human detection sensor class specifications

9.7.1 General

The control commands of “human detection sensor” are shown in Table 21.

Class group code : 0x00
Class code : 0x07

Table 21 – List of human detection sensor properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status ON = 0x30, OFF = 0x31	unsigned char	1 byte	–	Set Get	 ○	○	
Detection threshold level	0xB0	Specifies detection threshold level (8-step). 0x31 to 0x38	unsigned char	1 byte	–	Set/Get			
Human detection status	0xB1	Indicates human detection status. Human detection status found = 0x41 Human detection status not found = 0x42	unsigned char	1 byte	–	Get	○	○	

9.7.2 Operation status property

This property indicates whether the function native to this class is operating or not (ON/OFF). In the node mounting this class, if the function of this class is started concurrently with the start of node operation, this property may be implemented at a fixed value of 0x30 (operation status ON).

9.7.3 Detection threshold level property

Sets the threshold value that causes EPC = 0xB1 "human detection status" to be set to "found" (8-step). The minimum value is 0x31 and the maximum value is 0x38. No concrete value is specified for each level. If the detection threshold of the actual device is higher or lower than the 8-step range, the property of the actual device shall be assigned to the property value of the 8 steps specified in this property.

9.7.4 Human detection status property

This property indicates whether a human detection status is found or not. When EPC = 0xB0 "detection threshold level" is implemented, this property is set to "human detection status found" if the threshold set by the detection threshold level is exceeded, and is set to "human detection status not found" if the detection threshold value is not reached.

9.8 Electric energy sensor class specifications

9.8.1 General

The Control commands of "electric energy sensor" are shown in Table 22.

Class group code : 0x00
Class code : 0x22

Table 22 – List of electric energy sensor properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 bytes	—	Set Get	 ○	○	
Integral electric energy	0xE0	Indicates integral electric energy in 0,001 kWh. 0x0 to 0x3B9AC9FF (0 kWh to 999 999,999 kWh)	unsigned long	4 bytes	0,001 kWh	Get	○		
Small-capacity sensor instantaneous electric energy	0xE2	Indicates instantaneous electric energy in increments of 0,1 W. 0x8001 to 0x7FFE (−3 276,7 to 3 276,6)	signed short	2 bytes	0,1 W	Get			
Large-capacity sensor instantaneous electric energy	0xE3	Indicates instantaneous electric energy in increments of 0,1 kW. 0x8001 to 0x7FFE (−3 276,7 to 3 276,6)	signed short	2 bytes	0,1 kW	Get			
Integral electric energy measurement log	0xE4	Indicates measurement result log of integral electric energy (0,001 kWh) for the past 24 h in 30 min sections. 0 to 0x3B9AC9F (0 to 999 999 999) (0 kWh to 999 999,999 kWh)	unsigned long x 48	192 bytes	0,001 kWh	Get			
Effective voltage value	0xE5	Indicates effective voltage value in V. 0x0000 to 0xFFFD (0 V to 65 533 V)	unsigned short	2 bytes	V	Get			

9.8.2 Operation status property

This property indicates whether the function native to this class is operating or not (ON/OFF). In the node mounting this class, if the function of this class is started concurrently with the start of node operation, this property may be implemented at a fixed value of 0x30 (operation status ON).

9.8.3 Integral electric energy property

This property indicates the integral electric energy in 0,001 kWh. The property value range shall be from 0x00000000 to 0x3B9AC9FF (0 kWh to 999 999,999 kWh). When the integral electric energy overflows, this value shall be incremented from 0x00000000.

9.8.4 Small-capacity sensor instantaneous electric energy property

This property indicates the measured value of small-capacity sensor instantaneous electric energy in units of 0,1 W. The property value range shall be from 0x8001 to 0x7FFD (−3 276,7 W to 3 276,6 W). When the property value of the actual device exceeds this property value range, the overflow code 0x7FFF shall be used. When said value falls below the property value range, the underflow code 0x8000 shall be used.

9.8.5 Large-capacity sensor instantaneous electric energy property

This property indicates the measured value of large-capacity sensor instantaneous electric energy in units of 0,1 kW. The property value range shall be from 0x8001 to 0x7FFD (−3 276,7 kW to 3 276,6 kW). When the property value of the actual device exceeds this property value range, the overflow code 0x7FFF shall be used. When said value falls below the property value range, the underflow code 0x8000 shall be used.

9.8.6 Integral electric energy measurement log property

This property indicates the integral electric energy (0,001 kWh) measurement result log for the past 24 h in 30-min sections. The measured value in 0,001 kWh at each 0 min and 30 min based on the time set in the property name “Current time setting” (EPC = 0x97) shall be indicated in the range from 0x00000000 to 0x3B9AC9FF (0 kWh to 999 999,999 kWh). The property value shall begin with the high-order byte in time series.

9.8.7 Effective voltage value property

This property indicates the measured value of effective voltage of the electric energy sensor in volt. This property may be implemented as a fixed value of the rated voltage of measurement.

9.9 Open/close sensor class specifications

9.9.1 General

The control commands of “open/close sensor” are shown in Table 23.

Class group code : 0x00
Class code : 0x29

Table 23 – List of open/close sensor properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte	—	Set Get	 ○	○	
Degree-of-opening detection status 1	0xE0	Specifies open/close detection status and one of 8 different degrees of opening. Close detected: 0x30; Degree-of-opening level: 0x31 to 0x38; Open detected but degree-of-opening unknown: 0x39	unsigned char	1 byte	–	Get		○ [a]	
Detection threshold level	0xB0	Specifies detection threshold level (8-step). Detection threshold level 0x31 to 0x38	unsigned char	1 byte	–	Set/Get			
Degree-of-opening detection status 2	0xB1	Specifies whether degree-of –opening detected or not Degree-of-opening detection detected = 0x41, not detected = 0x42	unsigned char	1 byte	–	Get	○	○ [a]	

[a] Either the “degree-of-opening detection status 1” (EPC = 0xE0) or “degree-of-opening detection status 2” (EPC = 0xB1) property shall be implemented.

9.9.2 Operation status property

This property indicates whether the function native to this class is operating or not (ON/OFF). In the node mounting this class, if the function of this class is started concurrently with the start of node operation, this property may be implemented at a fixed value of 0x30 (operation status ON).

9.9.3 Degree-of-opening detection status 1 property

This property indicates whether a door or window is open or closed, and uses 8 different steps to indicate the degree of opening.

The property value 0x30 indicates that a door or window is closed. If the property value is between 0x31 and 0x38, it indicates that the detection target is open. The property value 0x31 indicates the minimum degree of opening, whereas the property value 0x38 indicates the maximum degree of opening. Here, the terms “closed”, “open”, and “degree of opening” represent various states detected by an open/close sensor mounted on a door or window. Degrees of opening represented by the values 0x31 to 0x38 should be defined by dividing the difference between the closed state (0x30) and fully open state (0x38) into equal portions.

9.9.4 Detection threshold level property

Sets 8 steps of threshold values at which “open/close detection status 2” (EPC = 0xB1) changes to “open/close detected”. The minimum value is 0x31 and the maximum value is 0x38. No concrete value is specified for each level. If the detection threshold of the actual device is higher or lower than the 8-step range, the property of the actual device shall be assigned to the property value of the 8 steps specified in this property.

9.9.5 Degree-of-opening detection status 2 property

This property specifies detecting of open/close status. In implementing EPC=0xB0 “detection threshold level”, when the detection level becomes higher than or equal to a threshold value set by the detection threshold level, the degree-of opening detection changes into “degree-of-opening detection detected” = 0x41. When the detection level becomes lower than the threshold value set by the detection threshold level, the degree-of opening detection changes into “degree-of-opening detection not detected” = 0x42.

9.10 Current value sensor class specifications

9.10.1 General

The control commands of “current value sensor” are shown in Table 24.

Class group code : 0x00
Class code : 0x23

Table 24 – List of current value sensor properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte	—	Set Get	 O	O	
Measured current value 1	0xE0	Indicates measured current value in mA. 0x00000000 to 0xFFFFFFFD (0 mA to 4 294 967 293 mA)	unsigned long	4 bytes	mA	Get	O [a]		
Rated voltage to be measured	0xE1	Rated voltage value to be measured by current sensor 0x0000 to 0xFFFD (0 V to 65 533 V)	unsigned short	2 bytes	V	Get			
Measured current value 2	0xE2	Indicates measured current value in mA. 0x80000001 to 0x7FFFFFFE (−2 147 483 646 mA to 2 147 483 646 mA)	signed long	4 bytes	mA	Get	O [a]		

[a] Either "Measured current value 1 of EPC 0xE0" or "Measured current value 2 of 0xE2" shall be mandatory.

9.10.2 Operation status property

This property indicates whether the function native to this class is operating or not (ON/OFF). In the node mounting this class, if the function of this class is started concurrently with the start of node operation, this property may be implemented at a fixed value of 0x30 (operation status ON).

9.10.3 Measured current value 1 property

This property indicates the measured current value in milliampere. When an alternating current is measured, its effective value shall be indicated. The property value range shall be from 0x00000000 to 0xFFFFFFFD (0 mA to 4 294 967 293 mA). When the property value of the actual device exceeds this property value range, the overflow code 0xFFFFFFFF shall be used. When said value is below the property value range, the underflow code 0xFFFFFFFE shall be used.

9.10.4 Rated voltage property to be measured

This property indicates the rated voltage value to be measured by the current sensor in volt. This property may be implemented as a fixed value.

9.10.5 Measured current value 2 property

This property indicates the measured current value in milliampere. When an alternating current is measured, its effective value shall be indicated. The property value range shall be from 0x80000001 to 0x7FFFFFE (−2 147 483 647 mA to 2 147 483 646 mA). When the property value of the actual device exceeds this property value range, the overflow code 0x7FFFFFFF shall be used. When said value is below the property value range, the underflow code 0x80000000 shall be used. The current direction shall be the positive direction from power supply to device.

9.11 Air speed sensor class specifications

9.11.1 General

The control commands of “air speed sensor” are shown in Table 25.

Class group code : 0x00
Class code : 0x1F

Table 25 – List of air speed sensor properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte	—	Set Get	 O	O	
Measured value of air speed	0xE0	Indicates the measured value of air speed in increments of 0,01 m/s. 0x0000 to 0xFFFD (0 to 65 533) (0 m/s to 655,33 m/s)	unsigned short	2 bytes	0,01 m/s	Get	O		
Air flow direction	0xE1	Indicates the air flow direction in degrees (angles). 0x0000 to 0x0168 (0°to 360°)	unsigned short	2 bytes	degree	Get			

9.11.2 Operation status property

This property indicates whether the function native to this class is operating or not (ON/OFF). In the node mounting this class, if the function of this class is started concurrently with the start of node operation, this property may be implemented at a fixed value of 0x30 (operation status ON).

9.11.3 Measured value of air speed property

This property indicates the measured value of air speed in units of 0,01 m/s. The property value range shall be from 0x0000 to 0xFFFD (0 m/s to 655,33 m/s). When the property value of the actual device exceeds this property value range, the overflow code 0xFFFF shall be used. When said value falls below the property value range, the underflow code 0xFFFE shall be used.

9.11.4 Air flow direction property

This property indicates the air flow direction in degrees. The property value range shall be from 0x0000 to 0x0168 (0° to 360°). The north direction should be 0° (360°) as a rule.

9.12 Water flow rate sensor class specifications

9.12.1 General

The control commands of “water flow rate sensor” are shown in Table 26. This class is provided for a water tap or the like and is stipulated for the purpose of measuring the amount of water used.

Class group code : 0x00
Class code : 0x25

Table 26 – List of water flow rate sensor properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte	—	Set Get	 O	O	
Integral flow rate	0xE0	Indicates measured integral flow in cubic-centimetres. 0x00000000 to 0x3B9AC9FF (0 to 999 999 999)	unsigned long	4 bytes	cm^3	Get			
Flow rate	0xE2	Indicates measured instantaneous flow rate in cm^3/mm. 0x0000 to 0x3B9AC9FF (0 to 999 999 999)	unsigned long	4 bytes	cm^3/min	Get	O		

9.12.2 Operation status property

This property indicates whether the function native to this class is operating or not (ON/OFF). In the node mounting this class, if the function of this class is started concurrently with the start of node operation, this property may be implemented at a fixed value of 0x30 (operation status ON).

9.12.3 Integral flow rate property

This property indicates the integral value of the flow rate in cubic-centimetres (cm^3). The property value range shall be from 0x00000000 to 0x3B9AC9FF (from 0 cm^3 to 999 999 999 cm^3). If the measured integral flow of the actual device exceeds this property value range, the overflow code 0xFFFFFFFF shall be set.

9.12.4 Flow rate property

This property indicates the flow rate in cubic-centimetres per minute (cm^3/min). The property value range shall be from 0x00000000 to 0x3B9AC9FF (from 0 cm^3/min to 999 999 999 cm^3/min). If the measured value of flow rate of the actual device exceeds this property value range, the overflow code 0xFFFFFFFF shall be set.

9.13 Home air conditioner class specifications

9.13.1 General

The control commands of “home air conditioner” are shown in Table 27.

Class group code : 0x01

Class code : 0x30

Table 27 – List of home air conditioner properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte	—	Set Get	 O	O	
Operation power-saving	0x8F	Used to specify the power-saving operation mode and to acquire the current setting. power saving mode = 0x41 normal mode = 0x42	unsigned char	1 byte	–	Set/Get	O	O	
Operation mode setting	0xB0	Used to specify the operation mode (“automatic”, “cooling”, “heating”, “dehumidification”, “air circulator” or “other”), and to acquire the current setting. The following values shall be used: Automatic: 0x41 Cooling: 0x42 Heating: 0x43 Dehumidification: 0x44 Air circulator: 0x45 Other: 0x40	unsigned char	1 byte	–	Set/Get	O	O	
Automatic temperature control setting	0xB1	Used to specify whether or not to use the automatic temperature control function, and to acquire the current setting. Automatic = 0x41 Non-automatic = 0x42	unsigned char	1 byte	–	Set/Get			
Operation setting normal/high speed/silent	0xB2	Used to specify the type of operation (“normal”, “high-speed” or “silent”), and to acquire the current setting. Normal operation: 0x41 High-speed operation: 0x42 Silent operation: 0x43	unsigned char	1 byte	–	Set/Get			
Set temperature value	0xB3	Used to set the temperature and to acquire the current setting. 0x00 to 0x32 (0 °C to 50 °C)	unsigned char	1 byte	°C	Set/Get	O		
Set value of relative humidity in dehumidifying mode	0xB4	Used to set the relative humidity for the “dehumidification” mode and to acquire the current setting. 0x00 to 0x64 (0 % to 100 %)	unsigned char	1 byte	%	Set/Get			
Set temperature value in cooling mode	0xB5	Used to set the temperature for the “cooling” mode and to acquire the current setting. 0x00 to 0x32 (0 °C to 50 °C)	unsigned char	1 byte	°C	Set/Get			
Set temperature value in	0xB6	Used to set the temperature for the “heating” mode and to acquire the current setting.	unsigned char	1 byte	°C	Set/Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
heating mode		0x00 to 0x32 (0 °C to 50 °C)							
Set temperature value in dehumidifying mode	0xB7	Used to set the temperature for the “dehumidification” mode and to acquire the current setting. 0x00 to 0x32 (0 °C to 50 °C)	unsigned char	1 byte	°C	Set/Get			
Rated power consumption	0xB8	Rated power consumption in each operation mode of cooling/heating/dehumi-difying/blast 0x0000 to 0xFFFD (0 W to 65 533 W) Cooling: heating: dehumidifying: blast	unsigned short x 4	8 bytes	W	Get			
Measured value of current consumption	0xB9	Measured value of current consumption 0x0000 to 0xFFFD (0 A to 6 553,3 A)	unsigned short	2 bytes	0,1 A	Get			
Measured value of room relative humidity	0xBA	Measured value of room relative humidity 0x00 to 0x64 (0 °C to 100 °C)	unsigned char	1 byte	%	Get			
Measured value of room temperature	0xBB	Measured value of room temperature 0x80 to 0x7D (−127 °C to 125 °C)	signed char	1 byte	°C	Get	O		
Set temperature value of user remote control	0xBC	Set temperature value of user remote control 0x00 to 0x32 (0 °C to 50 °C)	unsigned char	1 byte	°C	Get			
Measured cooled air temperature	0xBD	Indicates the measured cooled air temperature at the outlet. 0x81 to 0x7D (−127 °C to 125 °C)	signed char	1 byte	°C	Get			
Measured outdoor air temperature	0xBE	Indicates the measured outdoor air temperature. 0x81 to 0x7D (−127°C to 125 °C)	signed char	1 byte	°C	Get			
Relative temperature setting	0xBF	Used to set the relative temperature relative to the target temperature for an air conditioner operation mode, and to acquire the current setting. 0x81 to 0x7D (−12,7 °C to 12,5 °C)	unsigned char	1 byte	0,1 °C	Set/Get			
Air flow rate setting	0xA0	Used to specify the air flow rate or use the function to automatically control the air flow rate, and to acquire the current setting. The air flow rate shall be selected from the 8 predefined levels. Automatic air flow rate control function used = 0x41 Air flow rate = 0x31 to 0x38	unsigned char	1 byte	–	Set/Get	O	O	

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Automatic control of air flow direction setting	0xA1	Used to specify whether or not to use the automatic air flow direction control function, to specify the plane(s) (vertical and/or horizontal) in which the automatic air flow direction control function shall be used, and to acquire the current setting. Automatic = 0x41, non-automatic = 0x42, automatic (vertical) = 0x43, automatic (horizontal) = 0x44	unsigned char	1 byte	–	Set/Get			
Automatic swing of air flow setting	0xA3	Used to specify whether or not to use the automatic air flow swing function, to specify the plane(s) (vertical and/or horizontal) in which the automatic air flow swing function shall be used, and to acquire the current setting. Automatic air flow swing function not used = 0x31, used (vertical) = 0x41, used (horizontal) = 0x42, used (vertical and horizontal) = 0x43	unsigned char	1 byte	–	Set/Get			
Air flow direction (vertical) setting	0xA4	Used to specify the air flow direction in the vertical plane by selecting a pattern from the 5 predefined patterns, and to acquire the current setting. Uppermost = 0x41, lowermost = 0x42, central = 0x43, midpoint between uppermost and central = 0x44, midpoint between lowermost and central = 0x45	unsigned char	1 byte	–	Set/Get			
Air flow direction (horizontal) setting	0xA5	Used to specify the air flow direction(s) in the horizontal plane by selecting a pattern from the 31 predefined patterns, and to acquire the current setting. Rightward = 0x41, leftward = 0x42, central = 0x43, rightward and leftward = 0x44 (for a full list of the predefined patterns, see the table in the subsection defining the detailed requirements for this property.	unsigned char	1 byte	–	Set/Get			
Special state	0xAA	Indicates if the air conditioner is in a “special” state (i.e. the “defrosting”, “preheating”, or “heat removal” state). “Normal operation” state = 0x40, “defrosting” state = 0x41, “preheating” state = 0x42,	unsigned char	1 byte	–	Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		"heat removal" state = 0x43							
Non-priority state	0xAB	Used to indicate when the air conditioner is in a "non-priority" state. "Normal operation" state = 0x40, "Non-priority" state = 0x41	unsigned char	1 byte	–	Get			
Ventilation function setting	0xC0	Used to specify whether or not to use the ventilation function, to specify the ventilation direction, and to acquire the current setting. Ventilation function ON (outlet direction) = 0x41, ventilation function OFF = 0x42, ventilation function ON (intake direction) = 0x43	unsigned char	1 byte	–	Set/Get			
Humidifier function setting	0xC1	Used to specify whether or not to use the humidifier function, and to acquire the current setting. Humidifier function ON = 0x41, humidifier function OFF = 0x42	unsigned char	1 byte	–	Set/Get			
Ventilation air flow rate setting	0xC2	Used to specify the ventilation air flow rate by selecting a level from the predefined levels, and to acquire the current setting. Automatic control of ventilation air flow rate = 0x41, ventilation air flow rate = 0x31 to 0x38	unsigned char	1 byte	–	Set/Get			
Degree of humidification setting	0xC4	Used to specify the degree of humidification to achieve by selecting a level from the predefined levels, and to acquire the current setting. Automatic control of the degree of humidification = 0x41 degree of humidification = 0x31 to 0x38	unsigned char	1 byte	–	Set/Get			
Air cleaning method	0xC6	A bitmap indicates mounted method of exercising air cleaning function. Bit 0: Information about electrical dust collection method mounting 0 – Not mounted 1 – Mounted Bit 1: Information about cluster ion method mounting 0 – Not mounted 1 – Mounted	unsigned char	1 byte	–	Get			
Air purifier function setting	0xC7	An 8-byte array used to specify, for each type of air purifier function, whether or not to use the air purifier function and the degree of air	unsigned char x 8	1 byte x 8	–	SetM/ GetM			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		purification to achieve with the air purifier function, and to acquire the current settings. Element 0: Indicates whether or not to use the electrical dust collection-based air purifier function. Element 1: Indicates whether or not to use the cluster ion-based air purifier function. Elements 2 to 7: Reserved for future use.				Set/Get			
Air refresh method	0xC8	A bitmap indicates mounted method for exercising refresh function. Bit 0: Information about minus ion method mounting 0 – Not mounted 1 – Mounted Bit 1: Information about cluster ion method mounting 0 – Not mounted 1 – Mounted	unsigned char	1 byte	–	Get			
Air refresher function setting	0xC9	An 8-byte array used to specify, for each type of air refresher function, whether or not to use the air refresher function and the degree of air refreshing to achieve with the air refresher function, and to acquire the current settings. Element 0: Indicates whether or not to use the minus ion-based air refresher function Element 1: Indicates whether or not to use the cluster ion-based air refresher function Elements 2 to 7: Reserved for future use.	unsigned char x 8	1 byte x 8	–	SetM /GetM Set/Get			
Self-cleaning method	0xCA	A bitmap indicates mounted method for exercising self-cleaning function. Bit 0: Information about ozone cleaning method mounting 0 – Not mounted 1 – Mounted Bit 1: Information about drying method mounting 0 – Not mounted 1 – Mounted	unsigned char	1 byte	–	Get			
Self-cleaning function setting	0xCB	An 8-byte array used to specify, for each type of self-cleaning function, whether or not to use the self-cleaning function and the degree of self-cleaning to achieve with the self-cleaning function, and to acquire the current settings.	unsigned char x 8	1 byte x 8	–	SetM /GetM Set/Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Element 0: Indicates whether or not to use the ozone-based self-cleaning function. Element 1: Indicates whether or not to use the drying-based self-cleaning function. Elements 2 to 7: Reserved for future use.							
Special function setting	0xCC	Used to specify the “special function” to use, and to acquire the current setting. No setting: 0x40, clothes dryer function: 0x41, condensation suppressor function: 0x42, mite and mold control function: 0x43, active defrosting function: 0x44 0x45 –: Reserved for future use.	unsigned char	1 byte	–	Set/Get			
Operation status of components	0xCD	Indicates the operation status of components of the air conditioner in a bitmap format. Bit 0: Operation status of the compressor: 0: Not operating 1: In operation Bit 1: Operation status of the thermostat: 0: Thermostat OFF 1: Thermostat ON Bits 2 to 7: Reserved for future use.	unsigned char	1 byte	–	Get			
Thermostat setting override function	0xCE	Used to specify whether or not to allow the air conditioner to operate ignoring its thermostat setting. Normal setting = 0x40, thermostat setting override function ON = 0x41, thermostat setting override function OFF = 0x42	unsigned char	1 byte	–	Set / Get			
Air purification mode setting	0xCF	Used to specify air purification mode setting to set ON/OFF and to acquire the current setting. Air purification ON=0x41, OFF=0x42	unsigned char	1 byte	–	Set/Get			
ON timer-based reservation setting	0x90	Used to specify whether or not to use the ON timer (time-based reservation function, relative time-based reservation function or both), and to acquire the current setting. Both the time- and relative	unsigned char	1 byte	–	Set/Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		time-based reservation functions are ON = 0x41, both reservation functions are OFF = 0x42, time-based reservation function is ON = 0x43, relative time-based reservation function is ON = 0x44							
ON timer setting (time)	0x91	Used to specify the time for the time-based reservation function in the HH:MM format and to acquire the current setting. 0 to 0x17: 0 to 0x3B (= 0 to 23): (= 0 to 59)	unsigned char x 2	2 bytes	–	Set/Get			
ON timer setting (relative time)	0x92	Used to specify the relative time for the relative time-based reservation function in the HH:MM format and to acquire the current setting. 0 to 0xFF: 0 to 0x3B (= 0 to 255): (= 0 to 59)	unsigned char x 2	2 bytes	–	Set/Get			
OFF timer-based reservation setting	0x94	Used to specify whether or not to use the OFF timer (time-based reservation function, relative time-based reservation function or both), and to acquire the current setting. Both the time- and relative time-based reservation functions are ON = 0x41, both reservation functions are OFF = 0x42, time-based reservation function is ON = 0x43, relative time-based reservation function is ON = 0x44	unsigned char	1 byte		Set/Get			
OFF timer setting (time)	0x95	Used to specify the time for the time-based reservation function in the HH:MM format and to acquire the current setting. 0 to 0x17: 0 to 0x3B (= 0 to 23): (= 0 to 59)	unsigned char x 2	2 bytes	–	Set/Get			
OFF timer setting (relative time)	0x96	Used to specify the relative time for the relative time-based reservation function in the HH:MM format and to acquire the current setting. 0 to 0xFF: 0 to 0x3B (= 0 to 255): (= 0 to 59)	unsigned char x 2	2 bytes	–	Set/Get			

9.13.2 Operation status property

This property is used to specify whether to turn on or off the household air conditioner, and to acquire the current operation status. 0x30 and 0x31 shall be used for the ON and OFF states, respectively. When the property value is 0x31 (OFF), values specified or acquired with other properties are not guaranteed.

9.13.3 Power-saving operation setting

This property indicates the operation mode of the household air conditioner (“normal mode” (not saving power) or “power-saving mode”) and to acquire the current status. 0x41 and 0x42 shall be used for power-saving mode and normal mode (not saving power), respectively. For “Life watching service,” “Announcement at status change” is mandatory.

9.13.4 Operation mode setting property

This property is used to specify the operation mode of the household air conditioner (“automatic”, “cooling”, “heating”, “dehumidification”, “air circulator” or “other”) and to acquire the current setting. “Other” represents an operation mode other than the 5 modes. 0x41, 0x42, 0x43, 0x44, 0x45 and 0x40 shall be used for “automatic”, “cooling”, “heating”, “dehumidification”, “air circulator” and “other”, respectively. It is only required to implement the property values that correspond to the modes supported by the actual piece of equipment in which this class is implemented. For example, if the piece of equipment in which this class is implemented does not have an air circulator function, it is not necessary to implement the value for the air circulator mode (0x45).

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.5 Automatic temperature control setting property

This property is used to specify whether or not to use an automatic temperature control function of a household air conditioner that allows the air conditioner to operate based on an automatic temperature setting calculation algorithm, etc. implemented in the main body of the air conditioner and without using as the target any “temperature setting” property (EPC = 0xB3, 0xB5, 0xB6 or 0xB7) to acquire the current setting.

0x41 and 0x42 shall be used for the ON and OFF states, respectively.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.6 Normal/high-speed/silent operation setting property

This property is used to specify the type of operation (“normal”, “high-speed” or “silent”) and to acquire the current setting. 0x41, 0x42 and 0x43 shall be used for “normal”, “high-speed” and “silent”, respectively. This property can be used in combination with the “operation mode setting” property (EPC = 0xB0) to achieve “high-speed (rapid) cooling”, “high-speed (rapid) heating”, “high-speed (strong) dehumidification”, etc. The 3 types of operation (“normal”, “high-speed” and “silent”) are mutually exclusive.

9.13.7 Set temperature value property

This property is used to set the temperature (°C) for the current operation mode of the air conditioner that is specified by the “operation mode setting” property, and to acquire the current setting. The value of this property shall be used as the target temperature when the air conditioner does not have an automatic temperature control function or when it has an automatic temperature control function that is disabled (by the “automatic temperature control setting” property). The value to be used when the specified target temperature is indeterminable as a

result of enabling the automatic temperature control function shall be 0xFD (temperature indeterminable).

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.8 Set value of relative humidity in dehumidifying mode property

This property is used to set the relative humidity (in %) for the “dehumidification” mode (as specified by the “operation mode setting” property (EPC = 0xB0)), and to acquire the current setting. Implementation of this property allows values to be specified and acquired even when a mode other than the “dehumidification” mode is specified by the “operation mode setting” property (EPC = 0xB0).

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.9 Set temperature value in cooling mode property

This property is used to set the temperature (°C) for the “cooling” mode (as specified by the “operation mode setting” property (EPC = 0xB0)), and to acquire the current setting. Implementation of this property allows values to be specified and referenced even when a mode other than the “cooling” mode is specified by the “operation mode setting” property (EPC = 0xB0).

The value of this property shall be used as the target temperature when the air conditioner does not have an automatic temperature control function or when it has an automatic temperature control function that is disabled (by the “automatic temperature control setting” property).

The content of this property shall match the content of the “temperature setting” property (EPC = 0xB3).

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.10 Set temperature value in heating mode property

This property is used to set the temperature (°C) for the “heating” mode (as specified by the “operation mode setting” property (EPC = 0xB0)), and to acquire the current setting. Implementation of this property allows values to be specified and referenced even when a mode other than the “heating” mode is specified by the “operation mode setting” property (EPC = 0xB0).

The value of this property shall be used as the target temperature when the air conditioner does not have an automatic temperature control function, or when it has an automatic temperature control function that is disabled (by the “automatic temperature control setting” property).

The content of this property shall match the content of the “temperature setting” property (EPC = 0xB3).

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.11 Set temperature value in dehumidifying mode property

This property is used to set the temperature (°C) for the “dehumidification” mode (as specified by the “operation mode setting” property (EPC = 0xB0)), and to acquire the current setting. Implementation of this property allows values to be specified and referenced even when a mode

other than the “dehumidification” mode is specified by the “operation mode setting” property (EPC = 0xB0).

The value of this property shall be used as the target temperature when the air conditioner does not have an automatic temperature control function or when it has an automatic temperature control function that is disabled (by the “‘automatic temperature control’ setting” property).

The content of this property shall match the content of the “temperature setting” property (EPC = 0xB3).

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.12 Rated power consumption property

This property indicates, in watts, the rated power consumption values (brochure values) for the “cooling”, “heating”, “dehumidification” and “air circulator” modes. The range of rated power consumption value for each of the 4 modes shall be 0x0000 to 0xFFFD (0 to 65 533 W) and the bytes shall be used in such a manner that the four values are indicated in the order stated in the previous sentence. When the actual piece of equipment does not support one or more of the four modes, the underflow code 0xFFFE shall be used for the unsupported mode(s).

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.13 Measured value of current consumption property

This property indicates the present measured electric current consumption of the air conditioner in 0,1 A increments. When the measured electric current is alternating current, the effective value shall be indicated. The property value range shall be 0x0000 to 0xFFFD (0 A to 6 553,3 A). When the property value of the actual piece of equipment is higher than the upper limit of the property value range, the overflow code 0xFFFF shall be used. When the property value is lower than the lower limit of the property value range, the underflow code 0xFFFE shall be used.

9.13.14 Measured value of room relative humidity property

This property indicates the measured indoor relative humidity in percent (%). The property value range shall be 0x00 to 0x64 (0 % to 100 %). When the property value of the actual piece of equipment is higher than the upper limit of the property value range, the overflow code 0xFF shall be used. When the property value is lower than the lower limit of the property value range, the underflow code 0xFE shall be used. When the measurement value cannot be returned, 0xFD shall be used.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.15 Measured value of room temperature property

This property indicates the measured room temperature (°C). The property value range shall be 0x81 to 0x7D (−127 °C to 125 °C). When the property value of the actual piece of equipment is higher than the upper limit of the property value range, the overflow code 7F shall be used. When the property value is lower than the lower limit of the property value range, the underflow code 0x80 shall be used. When the measurement value cannot be returned, 0x7E shall be used.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.16 Set temperature value of user remote control property

This property indicates the last temperature (°C) set by the user using a remote controller unit for the household air conditioner. This property is mainly used for reference purposes after changing the temperature setting for the household air conditioner by means of a controller, etc.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.17 Measured cooled air temperature property

This property indicates the measured cooled air temperature (°C) at the outlet. The property value range shall be 0x81 to 0x7D (−127 °C to 125 °C). When the property value of the actual piece of equipment is higher than the upper limit of the property value range, the overflow code 0x7F shall be used. When the property value is lower than the lower limit of the property value range, the underflow code 0x80 shall be used. When the measurement value cannot be returned, 0x7E shall be used.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.18 Measured outdoor air temperature property

This property indicates the measured air temperature (°C) (outdoor atmospheric temperature) where the outdoor unit is installed. The property value range shall be 0x81 to 0x7D (−127 °C to 125 °C). When the property value of the actual piece of equipment is higher than the upper limit of the property value range, the overflow code 0x7F shall be used. When the property value is lower than the lower limit of the property value range, the underflow code 0x80 shall be used. When the measurement value cannot be returned, 0x7E shall be used.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.19 Relative temperature setting property

This property is used to specify, in 0,1 °C increments, the relative temperature relative to the target temperature (i.e. the temperature differential above or below the target temperature the user wishes to achieve) for an operation mode of the household air conditioner and to acquire the current setting. It is also possible to use this property to specify a relative temperature for an operation mode that does not use an absolute value of temperature as the target such as the “automatic” mode. The property value range shall be 0x81 to 0x7D (−12,7 °C to 12,5 °C). 0xF6 shall be used for a differential of 1,0 °C below the target temperature and 0x0A shall be used for a differential of 1,0 °C above the target temperature.

When the property value of the actual piece of equipment is higher than the upper limit of the property value range, the overflow code 0x7F shall be used. When the property value is lower than the lower limit of the property value range, the underflow code 0x80 shall be used. When the setting cannot be returned, 0x7E shall be used.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.20 Air flow rate setting property

This property is used to specify the air flow rate or to specify using the function to automatically control the air flow rate, and to acquire the current setting. The air flow rate shall be selected from the 8 levels predefined in the 0x31 to 0x38 range. When the automatic air flow rate control function is used, the property value shall be 0x41. The air flow rate values for the 8 levels may be defined freely, as long as 0x31 and 0x38 are used for the minimum and maximum air flow rates, respectively.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.21 Automatic control of air flow direction setting property

This property is used to specify whether or not to use the automatic air flow direction control function, to specify the plane(s) (vertical and/or horizontal) in which the automatic air flow direction control function shall be used, and to acquire the current setting.

Automatic (vertical and horizontal) = 0x41, non-automatic = 0x42, automatic (vertical) = 0x43, automatic (horizontal) = 0x44.

It is only required to implement the property values that correspond to the functions provided by the actual piece of equipment in which this class is implemented.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.22 Automatic swing of air flow setting property

This property is used to specify whether or not to use the automatic air flow swing function, to specify the plane(s) (vertical and/or horizontal) in which the automatic air flow swing function shall be used, and to acquire the current setting.

Automatic air flow swing function not used = 0x31, used (vertical) = 0x41, used (horizontal) = 0x42, used (vertical and horizontal) = 0x43.

It is only required to implement the property values that correspond to the functions provided by the actual piece of equipment in which this class is implemented.

9.13.23 Air flow direction (vertical) setting property

This property is used to specify the air flow direction in the vertical plane by selecting a pattern from the 5 predefined patterns and to acquire the current setting. The air flow direction (vertical) is shown in Figure 49.

Uppermost = 0x41, lowermost = 0x42, central = 0x43, midpoint between uppermost and central = 0x44, midpoint between lowermost and central = 0x45.

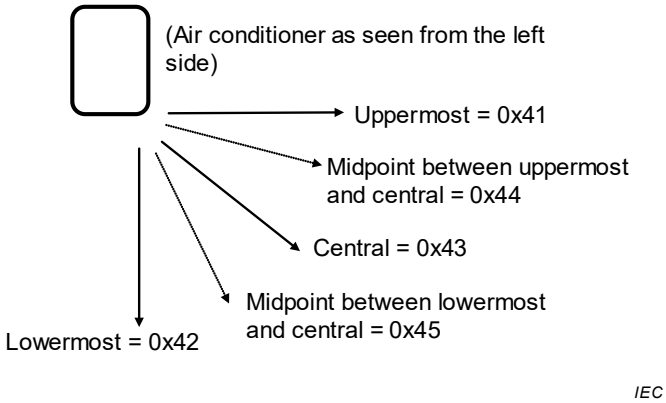


Figure 49 – Air flow direction (vertical) setting

It is only required to implement the property values that correspond to the directions supported by the actual piece of equipment in which this class is implemented. Applicability of this property to the automatic air flow swing function shall be equipment-dependent.

9.13.24 Air flow direction (horizontal) setting property

This property is used to specify the air flow direction(s) in the horizontal plane by selecting a pattern (i.e. “left”, “midpoint between left and central”, “central”, “midpoint between right and central” or “right” or a combination of two or more of the 5 directions, see Table 28, and to acquire the current setting. It is only required to implement the property values that correspond to the directions supported by the actual piece of equipment in which this class is implemented. Applicability of this property to the automatic air flow swing function shall be equipment-dependent. The air flow direction (horizontal) is shown in Figure 50.

Table 28 – Air flow direction (horizontal) setting

Code	Left	Left center	Center	Right center	Right	Remarks	Code	Left	Left center	Center	Right center	Right	Remarks
0x41	x	x	x	○	○	Earlier version "right"							
42	○	○	x	x	x	Earlier version "left"							
43	x	○	○	○	x	Earlier version "center"							
44	○	○	x	○	○	Earlier version "left-right"	0x60	○	x	x	x	x	
51	x	x	x	x	○		61	○	x	x	x	○	
52	x	x	x	○	x		62	○	x	x	○	x	
0x53: Not used (because of 0x41 = earlier version "right")							63	○	x	x	○	○	
54	x	x	○	x	x		64	○	x	○	x	x	
55	x	x	○	x	○		65	○	x	○	x	○	
56	x	x	○	○	x		66	○	x	○	○	x	
57	x	x	○	○	○		67	○	x	○	○	○	
58	x	○	x	x	x		0x68: Not used (because of 0x42 = earlier version "left")						
59	x	○	x	x	○		69	○	○	x	x	○	
5A	x	○	x	○	x		6A	○	○	x	○	x	
5B	x	○	x	○	○		0x6B: Not used (because of 0x44 = earlier version "left-right")						
5C	x	○	○	x	x		6C	○	○	○	x	x	
5D	x	○	○	x	○		6D	○	○	○	x	○	
0x5E: Not used (because of 0x43 = earlier version "center")							6E	○	○	○	○	x	
5F	x	○	○	○	○		6F	○	○	○	○	○	

The five directions are as indicated at right.

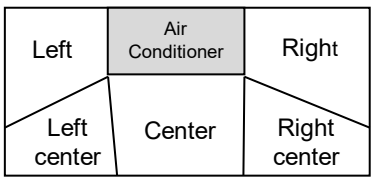


Figure 50 – Air flow direction (horizontal) setting

9.13.25 Special state property

This property indicates when the household air conditioner is in a “special” state, namely, the “defrosting”, “preheating”, or “heat removal” state.

0x41, 0x42 and 0x43 shall be used for the “defrosting”, “preheating”, and “heat removal” states, respectively. When the air conditioner is in a state other than the “defrosting”, “preheating” and “heat removal” states, 0x40 shall be used.

The “preheating” state shall mean a state in which the compressor is being preheated with the indoor unit fan rotating at a low speed or not rotating, after the heating function is activated or after completion of a defrosting cycle, to allow the air conditioner to supply warm air.

The “heat removal” state shall mean a state in which a fan (the indoor unit fan in most cases) is rotating and the refrigerating cycle is operating to release the residual heat from the air conditioner after the air conditioner is turned off (especially after being used in the heating mode).

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.26 Non-priority state property

This property indicates when the household air conditioner is in a “non-priority” state. An example of a household air conditioner (indoor unit) in a “non-priority” state would be one that shares an outdoor unit with another air conditioner (indoor unit) and cannot operate in some of its operating modes because of limitations imposed by the operating mode of the other air conditioner (indoor unit).

0x40 and 0x41 shall be used for the “normal operation” and “non-priority” states, respectively.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.27 Ventilation function setting property

This property is used to specify whether or not to use the ventilation function of the household air conditioner, to specify the ventilation direction, and to acquire the current setting.

Ventilation function ON (outlet direction) = 0x41, ventilation function OFF = 0x42, ventilation function ON (intake direction) = 0x43, ventilation function ON (intake and outlet directions) = 0x44.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.28 Humidifier function setting property

This property is used to specify whether or not to use the humidifier function of the household air conditioner, and to acquire the current setting. Humidifier function ON = 0x41, humidifier function OFF = 0x42.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.29 Ventilation air flow rate setting

This property is used to specify the ventilation air flow rate by selecting a level from the 8 predefined levels (0x31 to 0x38) or to specify using the function to automatically control the ventilation air flow rate (0x41 = automatic ventilation air flow rate control used), and to acquire the current setting.

The ventilation air flow rate values for the 8 levels may be defined freely, as long as 0x31 and 0x38 are used for the minimum and maximum ventilation air flow rates, respectively.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.30 Degree of humidification setting

This property is used to specify the amount of moisture to add for humidification by selecting a level from the 8 predefined levels (0x31 to 0x38) or to specify using the function to automatically control the amount of moisture to add (0x41 = automatic control used), and to acquire the current setting. The moisture values for the 8 levels may be defined freely, as long as 0x31 and 0x38 are used for the minimum and maximum amounts, respectively.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.31 Mounted air cleaning method property

This property indicates, in bitmap format, the air purifier function(s) supported by the air conditioner. A value of “0” for bit 0 or bit 1 shall mean that the air conditioner is not equipped with an electrical dust collection-based or cluster ion-based air purifier function, respectively, and a value of “1” for bit 0 or bit 1 shall mean that the air conditioner is equipped with an electrical dust collection-based or cluster ion-based air purifier function, respectively. The meanings of each bit are shown in Figure 51.

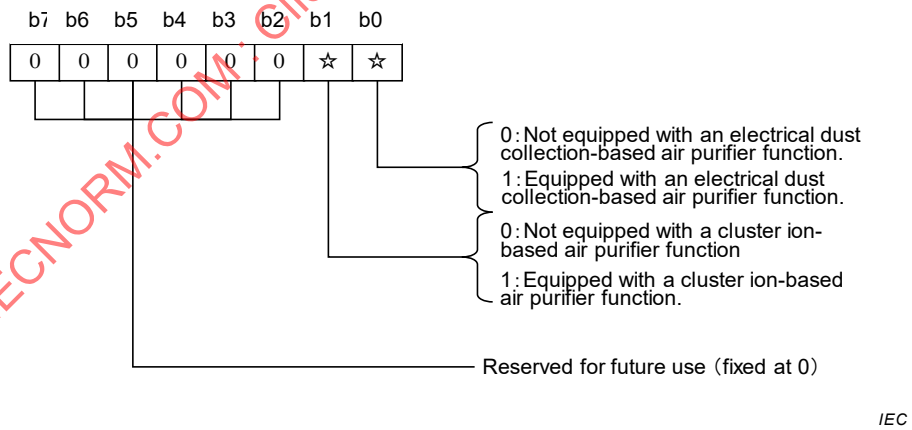


Figure 51 – Mounted air cleaning method

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.32 Air purifier function setting property

An 8-element array is used to specify, for each type of air purifier function, whether or not to use the air purifier function, whether or not to use the function to automatically control the degree of air purification, the degree of air purification to achieve with the air purifier function when the function to automatically control the degree of air purification is not used, and to acquire the current settings.

Each element of the array is used for a different type of air purifier function.

Element 0: Electrical dust collection type
Element 1: Cluster ion type
Elements 2 to 7: Reserved for future use.

The size of each element is 1 byte. Bits 0 to 2 are used to specify the degree of air purification to achieve with the air purifier function, by selecting a level from the 8 predefined levels (000b to 111b). The degree of air purification for the 8 levels may be defined freely, as long as 000b and 111b are used for the lowest and highest levels, respectively. Bit 3 specifies whether or not to use the air purifier function ("OFF" when the value of bit 3 is "0" and "ON" when the value of bit 3 is "1"). Bit 4 specifies whether or not to use the function to automatically control the degree of air purification for the air purifier function ("non-automatic" when the value of bit 4 is "0" and "automatic" when the value of bit 4 is "1"). When the value of bit 4 is "1" (automatic), the degree of air purification specified by bits 0 through 2 becomes ineffective. Figure 52 illustrates the composition of an element.

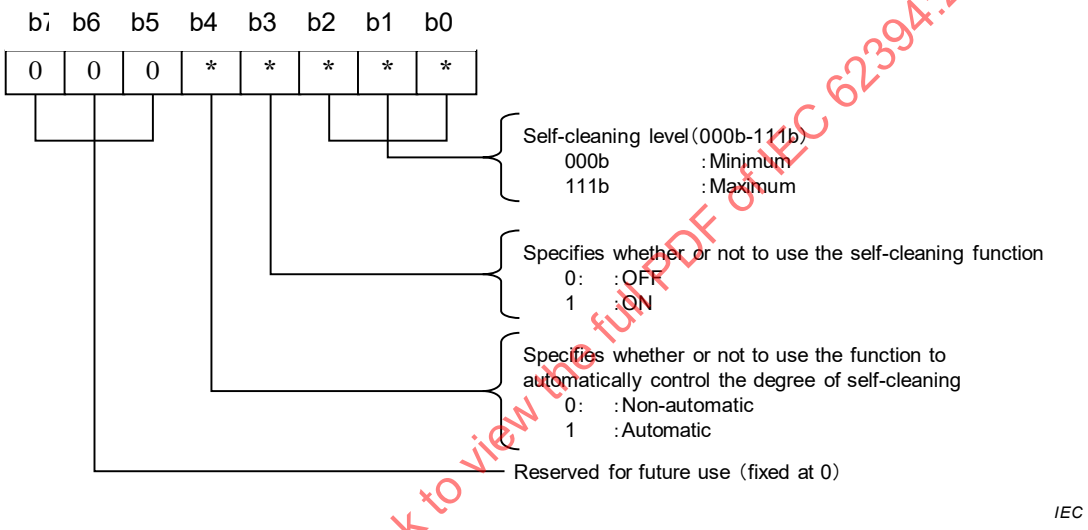


Figure 52 – Air purifier function setting

This property shall be effective even when the value of the "operation status" property (0x80) is OFF (0x31).

9.13.33 Air refresh method

This property indicates, in bitmap format, the air refresher function(s) supported by the air conditioner. A value of "0" for bit 0 or bit 1 shall mean that the air conditioner is not equipped with a minus ion-based or cluster ion-based air refresher function, respectively, and a value of "1" for bit 0 or bit 1 shall mean that the air conditioner is equipped with a minus ion-based or cluster ion-based air refresher function, respectively. The meanings of each bit are shown in Figure 53.

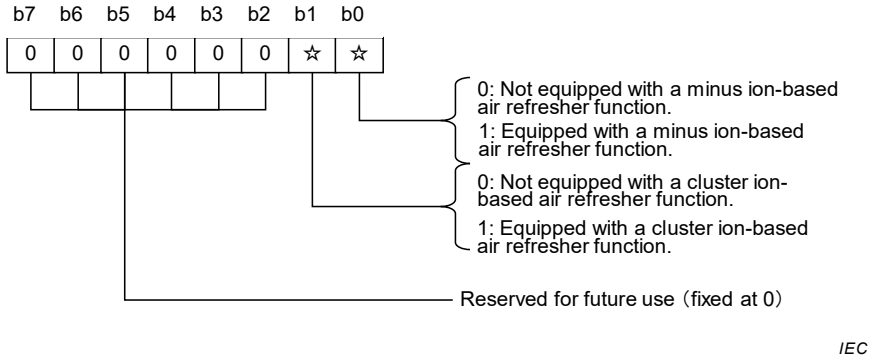


Figure 53 – Air refresh method

9.13.34 Air refresher function setting property

An 8-element array is used to specify, for each type of air refresher function, whether or not to use the air refresher function, whether or not to use the function to automatically control the degree of air refreshing, the degree of air refreshing to achieve with the air refresher function, when the function to automatically control the degree of air refreshing is not used, and to acquire the current settings.

Each element of the array is used for a different type of air refresher function.

Element 0: Negative ion type
Element 1: Cluster ion type
Elements 2 to 7: Reserved for future use.

The size of each element is 1 byte. Bits 0 through 2 are used to specify the degree of air refreshing to achieve with the air refresher function by selecting a level from the 8 predefined levels (000b to 111b). The degree of air refreshing for the 8 levels may be defined freely, as long as 000b and 111b are used for the lowest and highest levels, respectively. Bit 3 specifies whether or not to use the air refresher function ("OFF" when the value of bit 3 is "0" and "ON" when the value of bit 3 is "1"). Bit 4 specifies whether or not to use the function to automatically control the degree of air refreshing for the air refresher function ("non-automatic" when the value of bit 4 is "0" and "automatic" when the value of bit 4 is "1"). When the value of bit 4 is "1" (automatic), the degree of air refreshing specified by bits 0 through 2 becomes ineffective. Figure 54 illustrates the composition of an element.

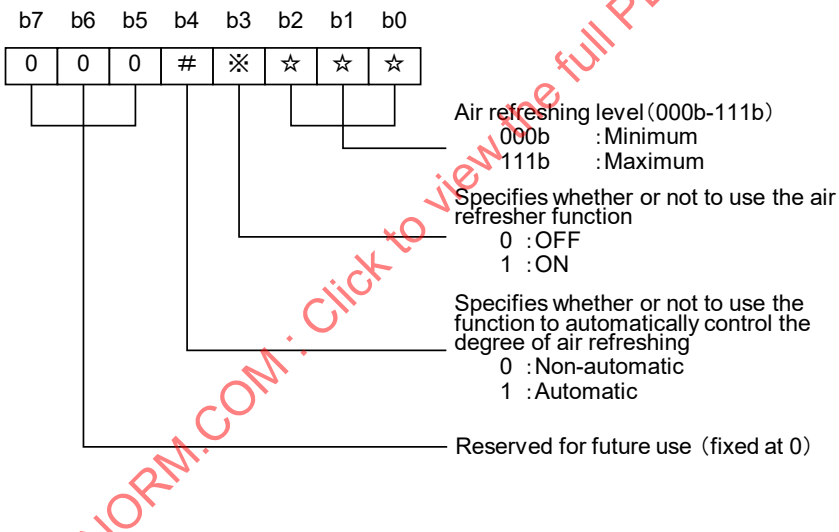


Figure 54 – Air refresher function setting

This property shall be effective even when the value of the "operation status" property (0x80) is OFF (0x31).

9.13.35 Self-cleaning method property

This property indicates, in bitmap format, the self-cleaning function(s) supported by the air conditioner. A value of "0" for bit 0 or bit 1 shall mean that the air conditioner is not equipped with an ozone-based or drying-based self-cleaning function, respectively, and a value of "1" for bit 0 or bit 1 shall mean that the air conditioner is equipped with an ozone-based or drying-based self-cleaning function, respectively. The meanings of each bit are shown in Figure 55.

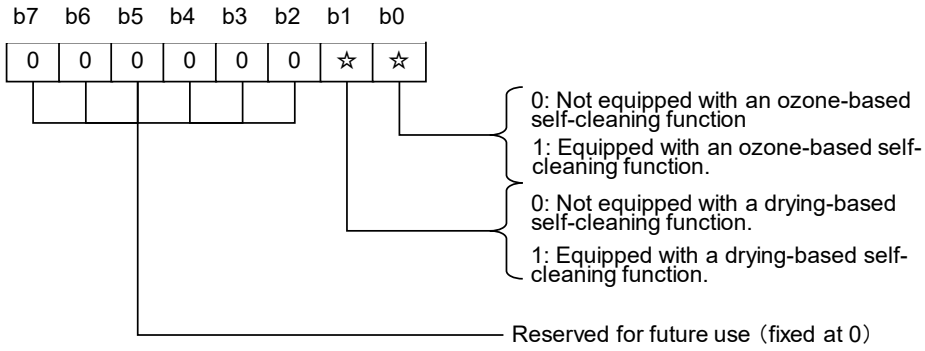


Figure 55 – Self-cleaning method

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.36 Self-cleaning function setting property

An 8-element array is used to specify, for each type of self-cleaning function, whether or not to use the self-cleaning function, whether or not to use the function to automatically control the degree of self-cleaning, the degree of self-cleaning to achieve with the self-cleaning function when the function to automatically control the degree of self-cleaning is not used, and to acquire the current settings.

Each element of the array is used for a different type of self-cleaning function.

Element 0: Ozone-type
Element 1: Drying-type
Elements 2 to 7: Reserved for future use

The size of each element is 1 byte. Bits 0 to 2 are used to specify the degree of self-cleaning to achieve with the self-cleaning function by selecting a level from the 8 predefined levels (000b to 111b). The degree of self-cleaning for the 8 levels may be defined freely, as long as 000b and 111b are used for the lowest and highest levels, respectively. Bit 3 specifies whether or not to use the self-cleaning function (“OFF” when the value of bit 3 is “0” and “ON” when the value of bit 3 is “1”). Bit 4 specifies whether or not to use the function to automatically control the degree of self-cleaning for the self-cleaning function (“non-automatic” when the value of bit 4 is “0” and “automatic” when the value of bit 4 is “1”). When the value of bit 4 is “1” (automatic), the degree of self-cleaning specified by bits 0 through 2 becomes ineffective. Figure 56 illustrates the composition of an element.

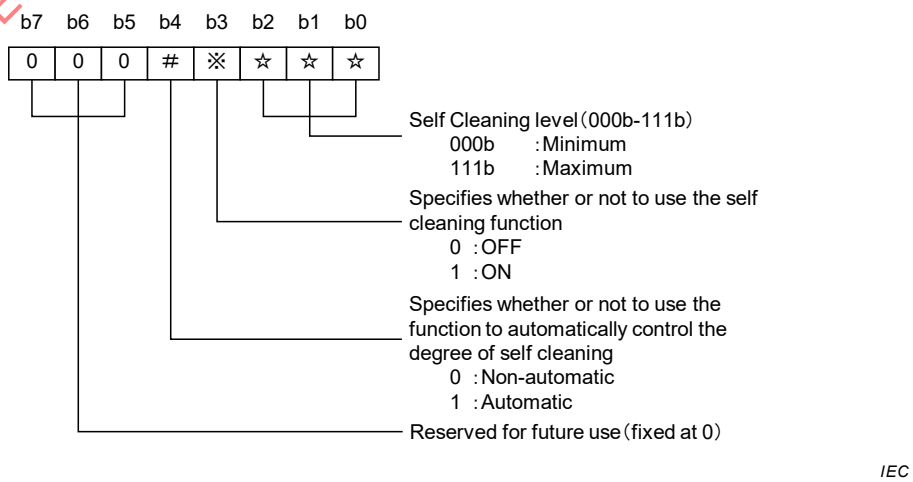


Figure 56 – Self-cleaning function setting

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.37 Special function setting property

This property is used to specify the “special function” to use in the mode specified by the “operation mode setting” property (0xB0), and to acquire the current setting. 0x41, 0x42, 0x43 and 0x44 shall be used for the clothes dryer function, condensation suppressor function, mite and mold control function and active defrosting function, respectively. When none of the 4 special functions are specified, 0x40 shall be used. 0x45 and succeeding values shall be reserved for future use.

In cases where any one of the special functions is designed in such a way that setting the value for that function in the “‘special function’ setting” property necessitates an “operation mode setting” property (0xB0) value change to ensure consistency between the content of the “operation mode setting” property and the content of the “‘special function’ setting” property, a means shall be provided to automatically make any required change to the content of the “operation mode setting” property. For instance, if the clothes dryer function is designed to only operate in the “heating” mode, the “operation mode setting” property value shall be changed to the value for the “heating” mode whenever the clothes dryer function is specified and the “operation mode setting” property value is that for a function other than the “heating” mode. However, the relationship between the two properties shall be implementation-dependent and is not specified in this document.

It is only required to implement the property values that correspond to the functions provided by the actual piece of equipment in which this class is implemented.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.38 Operation status of components property

This property indicates the operation status of the air conditioner components in bitmap format.

Bit 0: Operation status of the compressor:

0: Not operating
1: In operation

Bit 1: Operation status of the thermostat:

0: Thermostat OFF
1: Thermostat ON

Bits 2 to 7: Reserved for future use.

The “thermostat OFF” state shall mean a state in which “the air conditioner is in operation but the target temperature has been achieved (i.e. the difference between the room temperature and the room temperature setting is less than the specified value) and no heat exchange is being made”. The “thermostat ON” state shall mean a state in which “the difference between the room temperature and the room temperature setting is equal to or more than the specified value and heat exchange is being made to achieve the target temperature”.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.39 Thermostat setting override function property

This property is used to specify whether or not the household air conditioner shall operate ignoring its thermostat setting.

Normal setting = 0x40, thermostat setting override function ON = 0x41, thermostat setting override function OFF = 0x42.

The “normal setting” mode is a mode in which the air conditioner is dynamically and automatically switched from the “thermostat ON” state to the “thermostat OFF” state or from the “thermostat OFF” state to the “thermostat ON” state, as appropriate, depending on the room and outdoor temperatures. (The air conditioner remains in operation even after it is switched to the “thermostat OFF” state.) The “thermostat setting override function ON” mode is a mode in which the air conditioner continues performing heat exchange ignoring the temperature setting. The “thermostat setting override function OFF” mode is a mode in which the air conditioner performs no heat exchange regardless of the temperature setting.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.40 Air purification mode setting property

This property is used to turn on (0x41)/ off (0x42) the air purification function mode of the household air conditioner, and to acquire the current setting.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.41 ON timer-based reservation setting property

This property is used to specify whether or not to use the ON timer (time-based reservation function, relative time-based reservation function or both), and to acquire the current setting. This property is used in combination with the “ON timer setting (time)” or “ON timer setting (relative time)” property.

Both the time- and relative time-based reservation functions are ON = 0x41, both reservation functions are OFF = 0x42, time-based reservation function is ON = 0x43, relative time-based reservation function is ON = 0x44.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.42 ON timer setting (time) property

When the “‘ON timer-based reservation’ setting” property value is a value for using the time-based reservation function, this property is used to specify the time when the air conditioner will be turned on in the “hour (0x00 to 0x17 (0 to 23)): minute (0x00 to 0x3B (0 to 59))” format, and to acquire the current setting. The higher- and lower-order bytes shall be used for the “hour” and “minute” values, respectively.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.43 ON timer setting (relative time)

When the “‘ON timer-based reservation’ setting” property value is a value for using the relative time-based reservation function, this property is used to specify the time when the air conditioner will be turned on, in terms of a relative time relative to the current time, and to acquire the current setting. The “hour (0x00 to 0xFF (0 to 255)): minute (0x00 to 0x3B (0 to 59))” format shall be used, with the higher- and lower-order bytes used for the “hour” and “minute” values, respectively.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.44 OFF timer-based reservation setting property

This property is used to specify whether or not to use the OFF timer (time-based reservation function, relative time-based reservation function or both), and to acquire the current setting. This property is used in combination with the “OFF timer setting (time)” or “OFF timer setting (relative time)” property.

Both the time- and relative time-based reservation functions are ON = 0x41, both reservation functions are OFF = 0x42, time-based reservation function is ON = 0x43, relative time-based reservation function is ON = 0x44.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.45 OFF timer setting (time) property

When the “OFF timer-based reservation setting” property value is a value for using the time-based reservation function, this property is used to specify the time when the air conditioner will be turned off in the “hour (0x00 to 0x17 (0 to 23)): minute (0x00 to 0x3B (0 to 59))” format, and to acquire the current setting. The higher- and lower-order bytes shall be used for the “hour” and “minute” values, respectively.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.13.46 OFF timer setting (relative time) property

When the “OFF timer-based reservation setting” property value is a value for using the relative time-based reservation function, this property is used to specify the time when the air conditioner will be turned off, in terms of a relative time relative to the current time, and to acquire the current setting. The “hour (0x00 to 0xFF (0 to 255)): minute (0x00 to 0x3B (0 to 59))” format shall be used, with the higher- and lower-order bytes used for the “hour” and “minute” values, respectively.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.14 Ventilation fan class specifications

9.14.1 General

The control commands of “ventilation fan” are shown in Table 29.

Class group code : 0x01
Class code : 0x34

Table 29 – List of ventilation fan properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON=0x30, OFF=0x31	unsigned char	1 byte	—	Set Get	O O	O	
Ventilation auto setting	0xBF	Auto/Non-auto Auto = 0x41, Non-auto = 0x42	unsigned char	1 byte	–	Set/Get			
Set value of ventilation air flow rate	0xA0	Sets ventilation air flow rate level and ventilation air flow rate auto status. This property specifies ventilation air flow rate level (8-step). Ventilation air flow rate auto status = 0x41 Ventilation air flow rate level = 0x31–0x38	unsigned char	1 byte	–	Set/Get			

9.14.2 Operation status property

This property indicates the operation/stop status of the air conditioner. The property value of 0x30/0x31 shall be associated with both operation and stop.

9.14.3 Ventilation auto setting property

This property indicates either "auto" or "non-auto" for the auto ventilating operation.

Auto = 0x41, Non-auto = 0x42

9.14.4 Set value of ventilation air flow rate property

This property indicates the ventilation air flow rate level and the ventilation air flow rate auto status. The property value of the ventilation air flow rate auto status shall be 0x41. The air flow rate level shall be set (8-step) and take a property value of 0x31 to 0x38. The values for the 8 levels may be defined freely, as long as 0x31 and 0x38 are used for the minimum and maximum air flow rates, respectively.

9.15 Air purifier class specifications

9.15.1 General

The control commands of “air purifier” are shown in Table 30.

Class group code : 0x01
Class code : 0x35

Table 30 – List of air purifier properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 bytes	–	Set Get	O O	O	
Filter change notice	0xE1	Filter change time notice found/not found Found = 0x41, Not found = 0x42	unsigned char	1 byte	–	Get			
Air flow rate setting	0xA0	Sets air flow rate level and air flow rate auto status. The ventilation air flow rate is specified (8-step). Ventilation air flow rate auto status = 0x41 Ventilation air flow rate level = 0x31 to 0x38	unsigned char	1 byte	–	Set/Get			
Smoke (cigarette) detection status	0xC1	Indicates smoke (cigarette) detection status. Smoke (cigarette) detection status found = 0x41 Smoke (cigarette) detection status not found = 0x42	unsigned char	1 byte	–	Get			
Optical catalyst operation setting	0xC2	Optical catalyst ON/OFF status Optical catalyst ON = 0x41 Optical catalyst OFF = 0x42	unsigned char	1 byte	–	Set/Get			
Air pollution detection status	0xC0	Indicates air pollution detection status Air pollution detected = 0x41, Air pollution non-detected = 0x42	unsigned char	1 byte	–	Get			

9.15.2 Operation status property

This property indicates the operation/stop status of the air purifier. The property value of 0x30/0x31 shall be associated with both operation and stop.

9.15.3 Filter change notice property

This property indicates whether notification of filter change shall be made or not. This property shall disclose that the time has come to change the air purifier filter.

The transition from “filter change time notice found” to “filter change time notice not found” shall be achievable using the reset switch on the air purifier body, etc. Found = 0x41, not found = 0x42.

9.15.4 Air flow rate setting property

This property indicates the air flow rate level and air flow rate auto status. The property value of the air flow rate auto status shall be 0x41. The air flow rate level shall be set (8-step) and take a property value of 0x31 to 0x38. The values for the 8 levels may be defined freely, as long as 0x31 and 0x38 are used for the minimum and maximum air flow rates, respectively.

9.15.5 Smoke (cigarette) detection status property

This property indicates whether smoke (cigarette) detection status is found or not. “Smoke (cigarette) detection status found” = 0x41 and “smoke (cigarette) detection status not found” = 0x42 shall be specified.

9.15.6 Optical catalyst operation setting property

This property indicates the operation status of the optical catalyst function as ON/OFF. “Optical catalyst ON” = 0x41 and “optical catalyst OFF” = 0x42 shall be specified.

9.15.7 Air pollution detection status property

This property indicates air pollution detection status. Air pollution detected = 0x41 and air pollution non-detected = 0x42shall be specified.

9.16 Humidifier class specifications

9.16.1 General

The control commands of “humidifier” are shown in Table 31.

Class group code : 0x01
Class code : 0x39

Table 31 – List of humidifier properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte	–	Set Get	O O	O	
Humidifying setting 1	0xC0	Sets value of relative humidity and get setting status 0x00 to 0x64 (0 % to 100 %) Automatic setting = 0x70, Continuous operation = 0x71, intermittent operation = 0x72	unsigned char	1 byte		Set/Get	O [a]		
Humidifying setting 2	0xC1	Sets humidifying level by 3 steps Humidifying levels = 0x31 to 0x33 Automatic setting = 0x70, Continuous operation = 0x71, intermittent operation = 0x72	unsigned char	1 byte		Set/Get	O [a]		
Measured value of relative humidity	0xB4	Indicates measured value of relative humidity 0x00 to 0x64 (0 % to 100 %)	unsigned char	1 byte	–	Get			
Reservation set of OFF timer	0x94	Sets reservation ON/OFF and set setting status Reservation ON = 0x41, OFF = 0x42	unsigned char	1 byte		Set/Get			
Relative time value set of OFF timer	0x96	Sets timer value HH:MM and gets updated time Reservation ON = 0x41, OFF = 0x42	unsigned char x2	2 bytes		Set/Get			
Ion emission setting	0xC2	Sets ON/OFF of ion emission and gets setting status Emission ON= 0x41, OFF = 0x42	unsigned char	1 byte	–	Set/Get			
Implemented ion emission method	0xC3	Sets ion emission method equipped in humidifier by bit map Bit 0: minus ion method, bit 1: cluster ion method	unsigned char	1 byte	–	Get			
Special operation mode setting	0xC4	Sets special operation mode and gets setting status. Specifies by bit map Specifies 1 for effective setting bit 0: throat dry prevention bit 1: quiet operation bit 2-7: reserved for future use	unsigned short	1 byte		Set/Get			
Water amount level	0xC5	Indicates water amount level in water tank by 6 steps. 0x40: empty 0x41 to 0x45: minimum to maximum level	unsigned char	1 byte	–	Get			

[a] Either "humidifying setting 1" or "humidifying setting 2" shall be mandatory.

9.16.2 Operation status property

This property sets the operation of a humidifier ON/OFF and gets operation status. Operation ON/OFF corresponds to 0x30/0x31 respectively. When the property is OFF (0x31), the set and get values of other properties are guaranteed. For humidifiers, access rule “Set” shall be implemented.

9.16.3 Humidifying setting 1 property

This property sets relative humidity and continuous operation status and gets setting status. Relative humidity is set in percent (%) and the humidifier is operated according to the property value as a target. Furthermore, the property value when an automatic humidity detection algorithm of humidifier determines the target is 0x70, the property value of continuous operation is 0x71 and the property value of intermittent operation at a specified interval is 0x72. Detailed intermittent operation interval is not specified. Either the humidifying set 1 or the humidifying set 2 is mandatory to be implemented.

9.16.4 Humidifying setting 2 property

This property sets the humidifying level and continuous operation status, and gets setting status. Humidifying levels are decided by 3 steps and take the property values of 0x31 to 0x33. Not every humidifying level has a specified value. The minimum humidifying is 0x31 and the maximum humidifying is 0x33.

The property value when the target value is automatically decided by a calculation algorithm for an automatic humidity setting value of the humidifier is 0x70. The property value when the humidifier is operated continuously is 0x71. The property value when the humidifier is operated off and on at a specified interval is 0x72. The details of operation interval are not specified when the humidifier is operated off and on.

Either “humidifying setting 1” or “humidifying setting 2” is mandatorily implemented.

9.16.5 Measured value of relative humidity property

This property expresses a measured value of relative humidity in unit of %. The value range of property is 0x00 to 0x64 (100 %). When the property value of actual equipment is over the value range of property, an overflow code 0xFF is used. When the property value is less than the value range of property, an underflow code 0xFE is used. When a measurement value cannot be returned, a code 0xFD is used.

9.16.6 Reservation setting of OFF timer property

This property sets an OFF timer on / off and gets setting status. The property is related to “relative time value setting of OFF timer”. Reservation setting ON = 0x41, reservation setting OFF = 0x42.

9.16.7 Relative time value setting of OFF timer property

This property sets the time when the humidifier turns to OFF and gets updated time when “reservation setting of OFF timer” is ON. The data format is hour: 0x00 to 0x17 (0 to 23) and minute: 0x00 to 0x3B (0 to 59). The property value is taken from the upper bytes in the order of hour and minute.

9.16.8 Ion emission setting property

This property sets the ion emitting function implemented in a humidifier ON / OFF and gets setting status. Ion emitting ON = 0x41, ion emitting OFF = 0x42.

9.16.9 Implemented ion emission method property

This property expresses an implemented method of ion emission functions by a bit map. As realizing methods, the minus ion and cluster ion methods are specified. The details are as follows. Bit 0 means that the realizing method is not implemented, and bit 1 means that the realizing method is implemented. The meanings of each bit are shown in Figure 57.

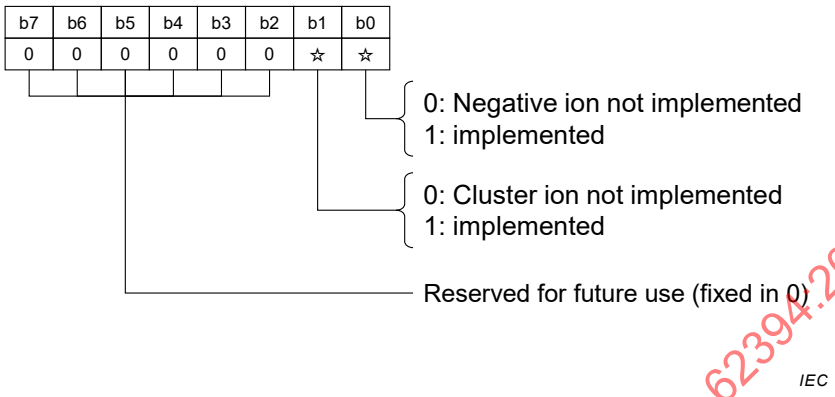


Figure 57 – Implemented ion emission method

9.16.10 Water amount level property

This property expresses the amount of water that remains in the tank in 6 steps. Not every level has a specified value. The empty status is 0x41 and full maximum amount status is 0x45.

9.17 Requirements for package-type commercial air conditioner (indoor unit) class specifications

9.17.1 General

The control commands of “package-type commercial air conditioner (indoor unit)” are shown in Table 32.

Class group code : 0x01
Class code : 0x45

Table 32 – List of package-type commercial air conditioner (indoor unit) properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte	–	Set Get	O O	O	
Operation mode setting	0xB0	Used to specify the operation mode (“automatic,” “cooling,” “heating,” “dehumidification” or “air circulator”) and to acquire the current setting. The following values shall be used: Automatic: 0x41 Cooling: 0x42 Heating: 0x43 Dehumidification: 0x44 Air circulator: 0x45	unsigned char	1 byte		Set/Get	O	O	
Temperature setting 1	0xB3	Used to set the temperature and to acquire the current setting. 0x00–0x32 (0 °C – 50 °C)	signed char	1 byte	1 °C	Set/Get	O	O	a
Relative humidity setting for ‘dehumidification’ mode 1	0xB4	Used to set the relative humidity for the “dehumidification” mode and to acquire the current setting. 0x00–0x64 (0 % – 100 %)	unsigned char	1 byte	1 %	Set/Get		O	
Temperature setting for ‘cooling’ mode 1	0xB5	Used to set the temperature for the “cooling” mode and to acquire the current setting. 0x00–0x32 (0 °C – 50 °C)	signed char	1 byte	1 °C	Set/Get			
Temperature setting for ‘heating’ mode 1	0xB6	Used to set the temperature for the “heating” mode and to acquire the current setting. 0x00–0x32 (0 °C – 50 °C)	signed char	1 byte	1 °C	Set/Get			
Temperature setting for ‘dehumi-dification’ mode 1	0xB7	Used to set the temperature for the “dehumidification” mode and to acquire the current setting. 0x00–0x32 (0 °C – 50 °C)	signed char	1 byte	1 °C	Set/Get			
Rated power consumption of indoor unit	0xB8	This property indicates the rated power consumption for the cooling, heating, dehumidification and air circulator modes. 0x0000–0xFFFD (0 W – 65 533 W) Cooling: heating: dehumidification: air circulator	unsigned short × 4	8 bytes	W	Get			
Measured electric current consumption of indoor unit	0xB9	This property indicates the measured electric current consumption. 0x0000–0xFFFD (0 A – 6 553,3 A)	unsigned short	2 bytes	0,1 A	Get			
Measured indoor	0xBA	Used to acquire the measured indoor relative humidity.	unsigned char	1 byte	1 %	Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
relative humidity 1		0x00–0x64 (0 % – 100 %)							
Measured indoor temperature 1	0xBB	Used to acquire the measured indoor temperature. 0x81–0x7D (−127 °C – 125 °C)	signed char	1 byte	1 °C	Get			
Relative temperature setting	0xBF	Used to set the relative temperature relative to the target temperature for an air conditioner operation mode and to acquire the current setting. 0x81–0x7D (−12,7 °C – 12,5 °C)	signed char	1 byte	0,1 °C	Set/Get			
Air flow rate setting	0xA0	Used to specify the air flow rate or to specify using the function to automatically control the air flow rate, and to acquire the current setting. The air flow rate shall be selected from among the 8 predefined levels. Automatic air flow rate control function used = 0x41 Air flow rate = 0x31–0x38	unsigned char	1 byte		Set/Get			
Air flow direction (vertical) setting	0xA4	Used to specify the air flow direction in the vertical plane by selecting a pattern from among the 9 predefined patterns or to specify using the automatic air flow direction control function or automatic air flow swing function, and to acquire the current setting. Automatic = 0x31, swing = 0x32 Air flow direction: 0x41–0x49 (0x41 and 0x49 shall be used for the uppermost and lowermost directions, respectively.)	unsigned char	1 byte		Set/Get			
Air flow direction (horizontal) setting	0xA5	Used to specify the air flow direction in the horizontal plane by selecting a pattern from among the 6 predefined patterns or to specify using the automatic air flow direction control function or automatic air flow swing function, and to acquire the current setting. Automatic = 0x31, swing = 0x32 Air flow direction: Rightward = 0x41, leftward = 0x42, central = 0x43, rightward and leftward = 0x44	unsigned char	1 byte		Set/Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Special state	0xAA	This property indicates when the air conditioner is in a “special” state. Normal operation state = 0x40, preheating state = 0x42, heat removal state = 0x43	unsigned char	1 byte	—	Get			
Thermostat state	0xAC	This property indicates the state (ON or OFF) of the thermostat. Thermostat ON = 0x41 Thermostat OFF = 0x42	unsigned char	1 byte		Get			
Current function (automatic operation mode)	0xAE	This property indicates, when the air conditioner is operating in the “automatic” operation mode, the function (“cooling,” “heating,” “dehumidification,” “air circulator” or “other”) that is currently being used. The following values shall be used: Cooling: 0x42 Heating: 0x43 Dehumidification: 0x44 Air circulator: 0x45 Other: 0x40	unsigned char	1 byte		Get		○	
Ventilation mode setting	0xC0	Used to specify the ventilation mode and to acquire the current setting. Ordinary ventilation = 0x41, ventilation plus total heat exchanger-based heat exchange = 0x42, automatic control of ventilation (i.e. automatic switching between ordinary ventilation and ventilation plus total heat exchanger-based heat exchange) = 0x43	unsigned char	1 byte	—	Set/Get			
Combined operation of indoor unit and total heat exchanger	0xC1	Used to specify whether or not to use the “combined operation of indoor unit and total heat exchanger” function, and to acquire the current setting. Combined operation of indoor unit and total heat exchanger function used = 0x41 Combined operation of indoor unit and total heat exchanger function not used= 0x42	unsigned char	1 byte	—	Set/Get			
Ventilation air flow rate setting	0xC2	Used to specify the ventilation air flow rate by selecting a level from among the predefined levels and to acquire the current setting. Automatic control of ventilation air flow rate = 0x41 Ventilation air flow	unsigned char	1 byte	—	Set/Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		rate = 0x31 to 0x38							
Disabling of air conditioner setting	0xCD	Used to specify whether or not to disable the air conditioner, and to acquire the current setting. Disabled = 0x41, not disabled = 0x42	unsigned char	1 byte		Set/Get			
Group information	0xCA	Used to specify information to link indoor units with outdoor units. No setting = 0x00 0x01–0xFD	unsigned char	1 byte		Set/Get			
Thermostat setting override function	0xCE	Used to specify whether or not the air conditioner shall operate ignoring its thermostat setting. Normal setting = 0x40, thermostat setting override function ON = 0x41, thermostat setting override function OFF = 0x42	unsigned char	1 byte		Set/Get			
Filter cleaning reminder lamp setting	0xCF	Used to specify whether or not to enable the filter cleaning reminder lamp, and to acquire the current setting. Enabled = 0x41, disabled = 0x42	unsigned char	1 byte		Set/Get		○	
Measured power consumption of indoor unit	0xDB	This property indicates the measured power consumption of the indoor unit. 0x0000–0xFFFD (0 W – 65 533 W)	unsigned short	2 bytes	W	Get			
Aperture of expansion valve	0xDC	This property indicates the aperture of the expansion valve in %. 0–0x64 (0 % – 100 %)	unsigned char	1 byte	%	Get			
Temperature setting 2	0xE3	Used to set the temperature and to acquire the current setting. 0xFE0C–0x3E8 (−50,0 °C – 100,0 °C)	unsigned short	2 bytes	0,1 °C	Set/Get	○	○	[a]
Relative humidity setting for ‘dehumidification’ mode” 2	0xE4	Used to set the relative humidity for the dehumidification mode and to acquire the current setting. 0x0000–0x3E8 (0,0 % – 100,0 %)	unsigned short	2 bytes	0,1 %	Set/Get		○	
Temperature setting for ‘cooling’ mode 2	0xE5	Used to set the temperature for the “cooling” mode and to acquire the current setting. 0xFE0C–0x3E8 (−50,0 °C – 100,0 °C)	unsigned short	2 bytes	0,1 °C	Set/Get			
Temperature setting for ‘heating’ mode 2	0xE6	Used to set the temperature for the heating mode and to acquire the current setting. 0xFE0C–0x3E8 (−50,0 °C – 100,0 °C)	unsigned short	2 bytes	0,1 °C	Set/Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Temperature setting for 'dehumidification' mode 2	0xE7	Used to set the temperature for the dehumidification mode and to acquire the current setting. 0xFE0C–0x3E8 (−50,0 °C – 100,0 °C)	unsigned short	2 bytes	0,1 °C	Set/Get			
Measured indoor relative humidity 2	0xEA	Used to acquire the measured indoor relative humidity. 0x0000–0x3E8 (0,0 % to 100,0 %)	unsigned short	2 bytes	0,1 %	Get			
Measured indoor temperature 2	0xEB	Used to acquire the measured indoor temperature. 0xF554–0x7FFD (−273,2 °C to 3 276,5 °C)	unsigned short	2 bytes	0,1 °C	Get			
ON timer-based reservation setting	0x90	Used to specify whether or not to use the ON timer (time-based reservation function, relative time-based reservation function or both), and to acquire the current setting. Both the time- and relative time-based reservation functions are ON = 0x41, both reservation functions are OFF = 0x42, time-based reservation function is ON = 0x43, relative time-based reservation function is ON = 0x44	unsigned char	1 byte	—	Set/Get			
ON timer setting (time)	0x91	Used to specify the time for the time-based reservation function in the HH:MM format and to acquire the current setting. 0–0x17: 0–0x3B (= 0–23): (= 0–59)	unsigned char × 2	2 bytes	—	Set/Get			
ON timer setting (relative time)	0x92	Used to specify the relative time for the relative time-based reservation function in the HH:MM format and to acquire the current setting. 0–0xFF: 0–0x3B (= 0–255): (= 0–59)	unsigned char × 2	2 bytes	—	Set/Get			
OFF timer-based reservation setting	0x94	Used to specify whether or not to use the OFF timer (time-based reservation function, relative time-based reservation function or both), and to acquire the current setting. Both the time- and relative time-based reservation functions are ON = 0x41, both reservation functions are OFF = 0x42, time-based reservation function is ON = 0x43, relative time-based reservation function is ON = 0x44	unsigned char	1 byte	—	Set/Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
OFF timer setting (time)	0x95	Used to specify the time for the time-based reservation function in the HH:MM format and to acquire the current setting. 0–0x17: 0–0x3B (= 0–23): (= 0–59)	unsigned char × 2	2 bytes	–	Set/Get			
OFF timer setting (relative time)	0x96	Used to specify the relative time for the relative time-based reservation function in the HH:MM format and to acquire the current setting. 0–0xFF: 0–0x3B (= 0–255): (= 0–59)	unsigned char × 2	2 bytes	–	Set/Get			

Either the “temperature setting 1” property (0xB3) or “temperature setting 2” property (0xE3) shall be implemented.

9.17.2 Operation status property

This property is used to specify whether to turn on or off the package-type commercial air conditioner (indoor unit), and to acquire the current operation status. 0x30 and 0x31 shall be used for the ON and OFF states, respectively.

9.17.3 Operation mode setting property

This property is used to specify the operation mode of the package-type commercial air conditioner (indoor unit) (automatic, cooling, heating, dehumidification or air circulator) and to acquire the current setting. 0x41, 0x42, 0x43, 0x44 and 0x45 shall be used for automatic, cooling, heating, dehumidification and air circulator, respectively.

It is only required to implement the property values that correspond to the functions provided by the actual piece of equipment in which this class is implemented. For example, if the piece of equipment in which this class is implemented does not have an air circulator function, it is not necessary to implement the value for the air circulator mode (0x45).

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.17.4 Temperature setting 1 property

This property is used to set the temperature (in 1 °C increments) for the current operation mode of the indoor unit that is specified by the “operation mode setting” property, and to acquire the current setting. The air conditioner shall use the value of this property as the target temperature.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.17.5 Relative humidity setting for dehumidification mode 1 property

This property is used to set the relative humidity (in 1 % increments) for the “dehumidification” mode (as specified by the “operation mode setting” property (EPC = 0xB0)), and to acquire the current setting. Implementation of this property allows values to be specified and referenced even when a mode other than the “dehumidification” mode is specified by the “operation mode

setting" property (EPC = 0xB0). This property shall be effective even when the value of the "operation status" property (0x80) is OFF (0x31).

9.17.6 Temperature setting for cooling mode 1 property

This property is used to set the temperature (in 1 °C increments) for the "cooling" mode (as specified by the "operation mode setting" property (EPC = 0xB0)), and to acquire the current setting. Implementation of this property allows values to be specified and referenced even when a mode other than the "cooling" mode is specified by the "operation mode setting" property (EPC = 0xB0).

The content of this property shall match the content of the "temperature setting" property (EPC = 0xB3).

This property shall be effective even when the value of the "operation status" property (0x80) is OFF (0x31).

9.17.7 Temperature setting for heating mode 1 property

This property is used to set the temperature (in 1 °C increments) for the "heating" mode (as specified by the "operation mode setting" property (EPC = 0xB0)), and to acquire the current setting. Implementation of this property allows values to be specified and referenced even when a mode other than the "heating" mode is specified by the "operation mode setting" property (EPC = 0xB0).

The content of this property shall match the content of the "temperature setting" property (EPC = 0xB3).

This property shall be effective even when the value of the "operation status" property (0x80) is OFF (0x31).

9.17.8 Temperature setting for dehumidification mode 1 property

This property is used to set the temperature (in 1 °C increments) for the "dehumidification" mode (as specified by the "operation mode setting" property (EPC = 0xB0)), and to acquire the current setting. Implementation of this property allows values to be specified and referenced even when a mode other than the "dehumidification" mode is specified by the "operation mode setting" property (EPC = 0xB0).

The content of this property shall match the content of the "temperature setting" property (EPC = 0xB3).

This property shall be effective even when the value of the "operation status" property (0x80) is OFF (0x31).

9.17.9 Rated power consumption of indoor unit property

This property indicates, in watts, the rated power consumption values (brochure values) for the "cooling," "heating," "dehumidification" and "air circulator" modes of the indoor unit. The range of rated power consumption value for each of the 4 modes shall be 0x0000 to 0xFFFD (0 W to 65 533 W) and the bytes shall be used in such a manner that the four values are indicated in the order stated in the previous sentence. When the actual piece of equipment does not support one or more of the four modes, the underflow code 0xFFFE shall be used for the unsupported mode(s).

This property shall be effective even when the value of the "operation status" property (0x80) is OFF (0x31).

9.17.10 Measured electric current consumption of the indoor unit property

This property indicates the present measured electric current consumption of the indoor unit in 0,1 A increments. When the measured electric current is alternating current, the effective value shall be indicated. The property value range shall be 0x0000 to 0xFFFD (0 to 6 553,3 A). When the property value of the actual piece of equipment is higher than the upper limit of the property value range, the overflow code 0xFFFF shall be used. When the property value is lower than the lower limit of the property value range, the underflow code 0xFFFE shall be used.

9.17.11 Measured indoor relative humidity 1 property

This property indicates the measured indoor relative humidity in 1 % increments. The property value range shall be 0x00 to 0x64 (0 to 100 %). When the property value of the actual piece of equipment is higher than the upper limit of the property value range, the overflow code 0xFF shall be used. When the property value is lower than the lower limit of the property value range, the underflow code 0xFE shall be used. When the measurement value cannot be returned, 0xFD shall be used.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.17.12 Measured indoor temperature 1 property

This property indicates the measured room temperature in 1 °C increments. The property value range shall be 0x81 to 0x7D (−127 °C to 125 °C). When the property value of the actual piece of equipment is higher than the upper limit of the property value range, the overflow code 0x7F shall be used. When the property value is lower than the lower limit of the property value range, the underflow code 0x80 shall be used. When the measurement value cannot be returned, 0x7E shall be used.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.17.13 Relative temperature setting property

This property is used to specify, in 0,1 °C increments, the relative temperature relative to the target temperature (i.e. the temperature differential above or below the target temperature the user wishes to achieve) for an air conditioner operation mode of the package-type commercial air conditioner (indoor unit), and to acquire the current setting. It is also possible to use this property to specify a relative temperature for an operation mode that does not use an absolute value of temperature as the target such as the “automatic” mode. The property value range shall be 0x81 to 0x7D (−12,7 °C to 12,5 °C). 0xF6 shall be used for a differential of 1,0 °C below the target temperature and 0x0A shall be used for a differential of 1,0 °C above the target temperature.

When the property value of the actual piece of equipment is higher than the upper limit of the property value range, the overflow code 0x7F shall be used. When the property value is lower than the lower limit of the property value range, the underflow code 0x80 shall be used. When the setting cannot be returned, 0x7E shall be used.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.17.14 Air flow rate setting property

This property is used to specify the air flow rate or to specify using the function to automatically control the air flow rate, and to acquire the current setting. The air flow rate shall be selected from among the 8 levels predefined in the 0x31 to 0x38 range. When the automatic air flow rate control function is used, the property value shall be 0x41. The air flow rate values for the 8 levels

may be defined freely, as long as 0x31 and 0x38 are used for the minimum and maximum air flow rates, respectively.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.17.15 “Air flow direction (vertical)” setting property

This property is used to specify the air flow direction in the vertical plane by selecting a pattern from among the 9 predefined patterns (0x41 to 0x49) or to specify using the function to automatically swing the air flow in the vertical plane (0x32) or the function to automatically control the air flow direction in the vertical plane (0x31), and to acquire the current setting. The 9 predefined patterns are shown in Figure 58.

0x41 and 0x49 shall be used for the uppermost and lowermost directions, respectively. 0x42 to 0x48 shall be used for the highest to lowest directions in between the uppermost and lowermost directions. It is recommended that 0x45 be used for the central direction.

It is only required to implement the property values that correspond to the directions supported by the actual piece of equipment in which this class is implemented. Applicability of this property to the automatic air flow swing function shall be equipment-dependent.

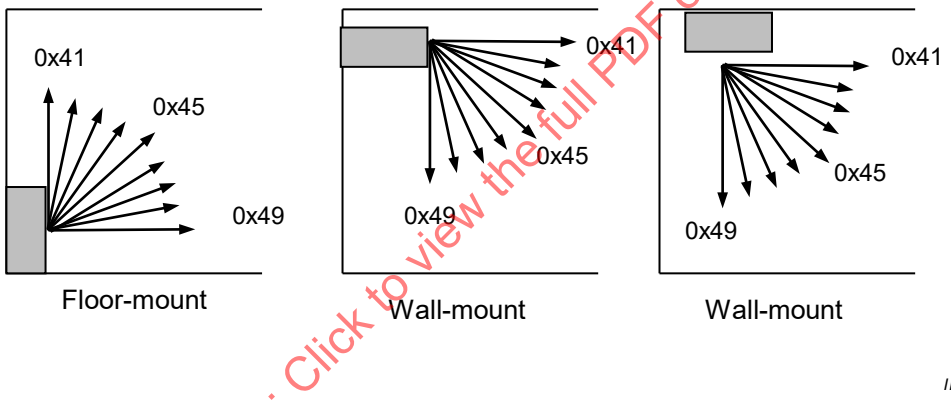


Figure 58 – 9 predefined patterns

9.17.16 “Air flow direction (horizontal)” setting property

This property is used to specify the air flow direction in the horizontal plane by selecting a pattern from among the predefined patterns (rightward = 0x41, leftward = 0x42, central = 0x43, rightward and leftward = 0x44) or to specify using the function to automatically swing the air flow in the horizontal plane (0x32) or the function to automatically control the air flow direction in the horizontal plane (0x31), and to acquire the current setting.

It is only required to implement the property values that correspond to the directions supported by the actual piece of equipment in which this class is implemented. Applicability of this property to the automatic air flow swing function shall be equipment-dependent.

9.17.17 “Special” state property

This property indicates when the package-type commercial air conditioner is in a “special” state, namely, the “defrosting,” “preheating,” or “heat removal” state.

0x41, 0x42 and 0x43 shall be used for the “defrosting,” “preheating,” and “heat removal” states, respectively. When the air conditioner is in a state other than the “defrosting,” “preheating” and “heat removal” states, 0x40 shall be used.

The “preheating” state shall mean a state in which the compressor is being preheated with the indoor unit fan rotating at a low speed or not rotating, after the heating function is activated or after completion of a defrosting cycle, to allow the air conditioner to supply warm air.

The “heat removal” state shall mean a state in which a fan (the indoor unit fan in most cases) is rotating and the refrigerating cycle is operating to release the residual heat from the air conditioner after the air conditioner is turned off (especially after being used in the heating mode).

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.17.18 Thermostat state property

This property indicates the state (ON or OFF) of the thermostat of the package-type commercial air conditioner (indoor unit). 0x41 and 0x42 shall be used for the ON and OFF states, respectively.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.17.19 Current function (“automatic” operation mode) property

When “automatic” is specified by the “operation mode setting” property (EPC = 0xB0) for the package-type commercial air conditioner (indoor unit), this property is used to acquire information as to which function (of the actual piece of equipment) is currently being used (i.e. “cooling,” “heating,” “dehumidification,” “air circulator” or “other”). 0x42, 0x43, 0x44, 0x45 and 0x40 shall be used for “cooling,” “heating,” “dehumidification,” “air circulator” and “other,” respectively. “Other” shall mean that the air conditioner is in operation but is not performing any of the “cooling,” “heating,” “dehumidification” and “air circulator” functions.

It is only required to implement the property values that correspond to the functions provided by the actual piece of equipment in which this class is implemented. For example, if the piece of equipment in which this class is implemented does not have an air circulator function, it is not necessary to implement the value for the air circulator function (0x45).

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.17.20 Ventilation mode setting property

This property is used to specify the ventilation mode (i.e. (a) ordinary ventilation, (b) ventilation plus total heat exchanger-based heat exchange or (c) automatic control of ventilation) of the package-type commercial air conditioner, and to acquire the current setting.

0x41, 0x42 and 0x43 shall be used for (a), (b) and (c), respectively.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31). The “ordinary ventilation” mode shall mean a ventilation mode in which the air conditioner takes in outdoor air without exchanging heat between the exhaust and supply air. The “ventilation plus total heat exchanger-based heat exchange” mode shall mean a ventilation mode in which the air conditioner exchanges heat between the exhaust and supply air before it takes in outdoor air. The “automatic control of ventilation” mode shall mean a ventilation mode in which the air conditioner automatically switches between the “ordinary ventilation” and “ventilation plus total heat exchanger-based heat exchange” modes based on the measured indoor and outdoor air temperatures.

9.17.21 Combined operation of indoor unit and total heat exchanger property

This property is used to specify whether or not to use the “combined operation of indoor unit and total heat exchanger” function, and to acquire the current setting.

“Combined operation of indoor unit and total heat exchanger” function used = 0x41

“Combined operation of indoor unit and total heat exchanger” function not used = 0x42

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

“Combined operation” (0x43) shall mean combined operation of the indoor unit and total heat exchanger that can be started or stopped in response to a control signal from a single remote controller unit designed to control both the indoor unit and the total heat exchanger.

9.17.22 Ventilation air flow rate setting property

This property is used to specify the ventilation air flow rate by selecting a level from among the 8 predefined levels (0x31 to 0x38) or to specify using the function to automatically control the ventilation air flow rate (0x41 = automatic ventilation air flow rate control used), and to acquire the current setting.

The ventilation air flow rate values for the 8 levels may be defined freely, as long as 0x31 and 0x38 are used for the minimum and maximum ventilation air flow rates, respectively.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.17.23 “Disabling of air conditioner” setting property

This property is used to specify whether or not to disable the package-type commercial air conditioner (indoor unit), and to acquire the current setting.

0x41 and 0x42 shall be used for the “disabled” and “not disabled” states, respectively.

When 0x41 (disabled) is selected as the value of this property, the value of the “operation status” property (EPC = 0x80) shall change to 0x31 (OFF) (unless the “operation status” property already contains “0x31”) and the air conditioner shall remain disabled (after being placed out of operation if it was in operation) and shall ignore all signals from the remote controller and all instructions to switch back to the “not disabled” state including “operation status” property (EPC = 0x80) settings.

When the value of this property is changed from 0x41 (disabled) to 0x42 (not disabled), the air conditioner shall be switched from the “disabled” state to be ready to operate as instructed by signals from the remote controller or as specified by the “operation status” property (EPC = 0x80) or by other applicable means. (This will not place back into operation an air conditioner that has stopped operating.)

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.17.24 Group information property

Group information property values provide information to link air conditioners (indoor units) with air conditioners (outdoor units). Air conditioners (indoor units) and air conditioners (outdoor units) with the same property values shall be connected using the same refrigerant piping.

9.17.25 Thermostat setting override function property

This property is used to specify whether or not the package-type commercial air conditioner (indoor unit) shall operate ignoring its thermostat setting, and to acquire the current setting.

Normal setting = 0x40, thermostat setting override function ON = 0x41, thermostat setting override function OFF = 0x42

The “normal setting” mode is a mode in which the air conditioner is dynamically and automatically switched from the “thermostat ON” state to the “thermostat OFF” state or from the “thermostat OFF” state to the “thermostat ON” state as appropriate depending on the room and outdoor temperatures. (The air conditioner remains in operation even after it is switched to the “thermostat OFF” state.) The “thermostat setting override function ON” mode is a mode in which the air conditioner continues performing heat exchange ignoring the temperature setting. The “thermostat setting override function OFF” mode is a mode in which the air conditioner performs no heat exchange regardless of the temperature setting.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.17.26 Filter cleaning reminder lamp setting property

This property is used to specify whether or not to enable the filter cleaning reminder lamp of the package-type commercial air conditioner (indoor unit), and to acquire the current setting.

Filter cleaning reminder lamp enabled = 0x41

Filter cleaning reminder lamp disabled = 0x42

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.17.27 Measured power consumption of indoor unit property

This property indicates the measured power consumption of the indoor unit in 1-W increments. The property value range shall be 0x0000 to 0xFFFD (0 W to 65 533 W). When the property value of the actual piece of equipment is higher than the upper limit of the property value range, 0xFFFF shall be used. When the property value is lower than the lower limit of the property value range, 0xFFFE shall be used.

9.17.28 Aperture of expansion valve property

This property indicates the aperture, in %, of the expansion valve of the indoor unit. The property value range shall be 0x00 to 0x64 (0 % to 100 %). 0 % shall mean that the expansion valve is fully closed and 100 % shall mean that the expansion valve is fully open.

This property is used, for example, to control the flow rate of the refrigerant flowing to the individual indoor units.

9.17.29 Temperature setting 2 property

This property is used to set the temperature, in 0,1 °C increments, for the current operation mode of the package-type commercial air conditioner (indoor unit) that is specified by the “operation mode setting” property, and to acquire the current setting. The air conditioner shall use the value of this property as the target temperature.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.17.30 “Relative humidity setting for ‘dehumidification’ mode” 2 property

This property is used to set the relative humidity for the “dehumidification” mode (as specified by the “operation mode setting” property (EPC = 0xB0)) in 0,1 % increments, and to acquire the current setting. Implementation of this property allows values to be specified and referenced even when a mode other than the “dehumidification” mode is specified by the “operation mode setting” property (EPC = 0xB0).

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.17.31 “Temperature setting for ‘cooling’ mode” 2 property

This property is used to set the temperature for the “cooling” mode (as specified by the “operation mode setting” property (EPC = 0xB0)) in 0,1 °C increments, and to acquire the current setting. Implementation of this property allows values to be specified and referenced even when a mode other than the “cooling” mode is specified by the “operation mode setting” property (EPC = 0xB0).

The content of this property shall match the content of the “temperature setting” property (EPC = 0xB3).

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.17.32 “Temperature setting for ‘heating’ mode” 2 property

This property is used to set the temperature for the “heating” mode (as specified by the “operation mode setting” property (EPC = 0xB0)) in 0,1 °C increments, and to acquire the current setting. Implementation of this property allows values to be specified and referenced even when a mode other than the “heating” mode is specified by the “operation mode setting” property (EPC = 0xB0).

The content of this property shall match the content of the “temperature setting” property (EPC = 0xB3).

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.17.33 “Temperature setting for ‘dehumidification’ mode” 2 property

This property is used to set the temperature for the “dehumidification” mode (as specified by the “operation mode setting” property (EPC = 0xB0)) in 0,1 °C increments, and to acquire the current setting. Implementation of this property allows values to be specified and referenced even when a mode other than the “dehumidification” mode is specified by the “operation mode setting” property (EPC = 0xB0).

The content of this property shall match the content of the “temperature setting” property (EPC = 0xB3).

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.17.34 Measured indoor relative humidity 2 property

This property indicates the measured indoor relative humidity in 0,1 % increments. The property value range shall be 0x0000 to 0x3E8 (0,0 to 100,0 %). When the property value of the actual piece of equipment is higher than the upper limit of the property value range, the overflow code 0xFFFF shall be used. When the property value is lower than the lower limit of the property value

range, the underflow code 0xFFFE shall be used. When the measurement value cannot be returned, 0xFFFD shall be used.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.17.35 Measured indoor temperature 2 property

This property indicates the measured room temperature in 0,1 °C increments. The property value range shall be 0xF554 to 0x7FFD (−273,2 °C to 3 276,5 °C). When the property value of the actual piece of equipment is higher than the upper limit of the property value range, the overflow code 0x7FFF shall be used. When the property value is lower than the lower limit of the property value range, the underflow code 0x8000 shall be used. When the measurement value cannot be returned, 0x7FFE shall be used.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.17.36 “ON timer-based reservation” setting property

This property is used to specify whether or not to use the ON timer (time-based reservation function, relative time-based reservation function or both), and to acquire the current setting. This property is used in combination with the “ON timer setting (time)” or “ON timer setting (relative time)” property.

Both the time- and relative time-based reservation functions are ON = 0x41, both reservation functions are OFF = 0x42, time-based reservation function is ON = 0x43, relative time-based reservation function is ON = 0x44.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.17.37 ON timer setting (time) property

When the “‘ON timer-based reservation’ setting” property value is a value for using the time-based reservation function, this property is used to specify the time when the air conditioner will be turned on in “hour (0x00 to 0x17 (0 to 23)): minute (0x00 to 0x3B (0 to 59))” format, and to acquire the current setting. The higher- and lower-order bytes shall be used for the “hour” and “minute” values, respectively.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.17.38 ON timer setting (relative time) property

When the “‘ON timer-based reservation’ setting” property value is a value for using the relative time-based reservation function, this property is used to specify the time when the air conditioner will be turned on, in terms of a relative time, relative to the current time, and to acquire the current setting. The “hour (0x00 to 0xFF (0 to 255)): minute (0x00 to 0x3B (0 to 59))” format shall be used, with the higher- and lower-order bytes used for the “hour” and “minute” values, respectively.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.17.39 “OFF timer-based reservation” setting property

This property is used to specify whether or not to use the OFF timer (time-based reservation function, relative time-based reservation function or both), and to acquire the current setting.

This property is used in combination with the “OFF timer setting (time)” or “OFF timer setting (relative time)” property.

Both the time- and relative time-based reservation functions are ON = 0x41, both reservation functions are OFF = 0x42, time-based reservation function is ON = 0x43, relative time-based reservation function is ON = 0x44.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.17.40 OFF timer setting (time) property

When the “‘OFF timer-based reservation’ setting” property value is a value for using the time-based reservation function, this property is used to specify the time when the air conditioner will be turned off in the “hour (0x00 to 0x17 (0 to 23)): minute (0x00 to 0x3B (0 to 59))” format, and to acquire the current setting. The higher- and lower-order bytes shall be used for the “hour” and “minute” values, respectively.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.17.41 OFF timer setting (relative time) property

When the “‘OFF timer-based reservation’ setting” property value is a value for using the relative time-based reservation function, this property is used to specify the time when the air conditioner will be turned off, in terms of a relative time relative to the current time, and to acquire the current setting. The “hour (0x00 to 0xFF (0 to 255)): minute (0x00 to 0x3B (0 to 59))” format shall be used, with the higher- and lower-order bytes used for the “hour” and “minute” values, respectively.

9.18 Requirements for package-type commercial air conditioner (outdoor unit) class specifications

9.18.1 General

The control commands of “package-type commercial air conditioner (outdoor unit)” are shown in Table 33.

Class group code : 0x01
Class code : 0x46

Table 33 – List of package-type commercial air conditioner (outdoor unit) properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte	—	Set Get	O O	O	
Operation mode setting	0xB0	Used to acquire the current operation mode setting (i.e. “automatic,” “cooling,” “heating,” “dehumidification” or “air circulator”). The following values shall be used: Automatic: 0x41 Cooling: 0x42 Heating: 0x43 Dehumidification: 0x44 Air circulator: 0x45	unsigned char	1 byte		Set/Get		O	
Rated power consumption of outdoor unit	0xB8	Used to acquire the rated power consumption for the cooling, heating and dehumidification modes. 0x0000–0xFFFD (0 W – 65 533 W) Cooling: heating: dehumidification	unsigned short × 3	6 bytes	W	Get			
Measured electric current consumption of outdoor unit	0xB9	Used to acquire the measured electric current consumption. 0x0000–0xFFFD (0 A – 6 553,3 A)	unsigned short	2 bytes	0,1 A	Get			
Measured outdoor air temperature 1	0xBE	Used to acquire the measured temperature of the outdoor air. 0x81–0x7D (−127 °C – 125 °C)	signed char	1 byte	1 °C	Get			
“Special” state	0xAA	This property indicates when the air conditioner is in the “special” state (i.e. “defrosting” state). “Normal operation” state = 0x40, “defrosting” state = 0x41	unsigned char	1 byte	-	Get			
Group information	0xCA	Used to acquire information to link indoor units with outdoor units No setting = 0x00 0x01–0xFD	unsigned char	1 byte		Set/Get			
Operation status of compressor	0xD0	Used to acquire the operation status (i.e. ON or OFF) of the compressor. Compressor ON: 0x41 Compressor OFF: 0x42	unsigned char	1 byte		Get			
Operation mode	0xD1	Used to acquire the current operation mode (i.e. “cooling,” “heating,” “dehumidification”	unsigned char	1 byte		Get	O		

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
information		or “other”). Cooling: 0x42 Heating: 0x43 Dehumidification: 0x44 Other: 0x40							
Fan rotation speed	0xD2	Used to acquire the rotation speed of the fan of the outdoor unit (expressed in %). 0x00–0x64 (0 % – 100 %)	unsigned char	1 byte	%	Get			
Measured power consumption of outdoor unit	0xDB	Used to acquire the measured power consumption of the outdoor unit. 0x0000–0xFFFD (0 W – 65 533 W)	unsigned short	2 bytes	W	Get			
Measured outdoor air temperature 2	0xEE	Used to acquire the measured temperature of the outdoor air. 0xF554–0x7FFD (−273,2 °C – 3 276,5 °C)	signed short	2 bytes	0,1 °C	Get			

9.18.2 Operation status property

This property indicates whether the package-type commercial air conditioner (outdoor unit) is in the ON state (i.e. can respond to user operation) or OFF state. 0x30 and 0x31 shall be used for the ON and OFF states, respectively. In cases where the package-type commercial air conditioner (outdoor unit) belongs to a node in which the “package-type commercial air conditioner (outdoor unit)” class is implemented and is ready to respond to user operation as soon as the node starts up, 0x30 may be implemented as the fixed value.

9.18.3 Operation mode setting property

This property is used to acquire the current operation mode setting of the package-type commercial air conditioner (outdoor unit) (“automatic,” “cooling,” “heating,” “dehumidification” or “air circulator”). 0x41, 0x42, 0x43, 0x44 and 0x45 shall be used for “automatic,” “cooling,” “heating,” “dehumidification” and “air circulator,” respectively. When the value of this property is 0x42 (“cooling”), the outdoor unit can operate in the cooling mode only. In the case of an air conditioner equipped with both an indoor heating unit and an indoor cooling unit, the value for either the indoor heating or indoor cooling unit shall be acquired.

It is only required to implement the property values that correspond to the modes supported by the actual piece of equipment in which this class is implemented. For example, if the piece of equipment in which this class is implemented does not have a heating function, it is not necessary to implement the value for the heating mode (0x43). The current operation mode can be acquired using the “operation mode information” property (Get).

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.18.4 Rated power consumption of outdoor unit property

This property indicates, in watts, the rated power consumption values (brochure values) for the “cooling,” “heating” and “dehumidification” modes. The range of rated power consumption value for each of the 3 modes shall be 0x0000 to 0xFFFD (0 W to 65 533 W) and the bytes shall be used in such a manner that the three values are indicated in the order stated in the previous

sentence. When the actual piece of equipment does not support one or more of the three modes, the underflow code 0xFFFE shall be used for the unsupported mode(s).

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.18.5 Measured electric current consumption of outdoor unit property

This property indicates the present measured electric current consumption of the outdoor unit in 0,1 A increments. When the measured electric current is alternating current, the effective value shall be indicated. The property value range shall be 0x0000 to 0xFFFD (0 A to 6 553,3 A). When the property value of the actual piece of equipment is higher than the upper limit of the property value range, the overflow code 0xFFFF shall be used. When the property value is lower than the lower limit of the property value range, the underflow code 0xFFFE shall be used.

9.18.6 Measured outdoor air temperature 1 property

This property indicates, in 1 °C increments, the measured air temperature (outdoor atmospheric temperature) where the outdoor unit of the package-type commercial air conditioner is installed. The property value range shall be 0x81 to 0x7D (−127 °C to 125 °C). When the property value of the actual piece of equipment is higher than the upper limit of the property value range, the overflow code 0x7F shall be used. When the property value is lower than the lower limit of the property value range, the underflow code 0x80 shall be used. When the measurement value cannot be returned, 0x7E shall be used.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.18.7 “Special” state property

This property indicates when the package-type commercial air conditioner is in the “special” state, namely, the “defrosting” state.

0x41 shall be used for the “defrosting” state. When the air conditioner is in a state other than the “defrosting” state, 0x40 shall be used.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.18.8 Group information property

Group information property values provide information to link air conditioners (indoor units) with air conditioners (outdoor units). Air conditioners (indoor units) and air conditioners (outdoor units) with the same property values shall be connected using the same refrigerant piping.

9.18.9 Operation status of compressor property

This property indicates the operation status (i.e. ON or OFF) of the compressor of the outdoor unit of the package-type commercial air conditioner. 0x41 and 0x42 shall be used for the “compressor ON” and “compressor OFF” states, respectively. In the case where the outdoor unit has two or more compressors, the “compressor OFF” state shall be defined as a state in which all of the compressors are OFF.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.18.10 Operation mode information property

This property is used to acquire the current operation mode (i.e. “cooling,” “heating,” “dehumidification” or “other”). 0x42, 0x43, 0x44 and 0x40 shall be used for “cooling,” “heating,” “dehumidification” and “other,” respectively. For example, when the value of this property is 0x42 (cooling), it shall mean that the outdoor unit is operating in the “cooling” mode. “Other” shall represent a mode other than the “cooling,” “heating” and “dehumidification” modes, such as an “air circulator” mode. It is only required to implement the property values that correspond to the modes supported by the actual piece of equipment in which this class is implemented.

9.18.11 Fan rotation speed property

This property indicates the rotation speed of the fan of the outdoor unit in %. The property value range shall be 0x00 to 0x64 (0 % to 100 %). When the property value of the actual piece of equipment is higher than the upper limit of the property value range, 0xFF shall be used. When the property value is lower than the lower limit of the property value range, 0xFE shall be used.

9.18.12 Measured power consumption of outdoor unit property

This property indicates the measured power consumption of the outdoor unit in 1-W increments. The property value range shall be 0x0000 to 0xFFFD (0 W to 65 533 W). When the property value of the actual piece of equipment is higher than the upper limit of the property value range, 0xFFFF shall be used. When the property value is lower than the lower limit of the property value range, 0xFFFE shall be used.

9.18.13 Measured outdoor air temperature 2 property

This property indicates, in 0,1 °C increments, the measured air temperature (outdoor atmospheric temperature) where the outdoor unit of the package-type commercial air conditioner is installed.

The property value range shall be 0xF554 to 0x7FFD (−273,2 °C to 3 276,5 °C). When the property value of the actual piece of equipment is higher than the upper limit of the property value range, the overflow code 0x7FFF shall be used. When the property value is lower than the lower limit of the property value range, the underflow code 0x8000 shall be used. When the measurement value cannot be returned, 0x7FFE shall be used.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.19 Requirements for electric storage heater class specifications

9.19.1 General

The control commands of “electric storage heater” are shown in Table 34.

Class group code : 0x01
Class code : 0x55

Table 34 – List of electric storage heater properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 bytes	–	Set Get	 ○	○	
Temperature setting	0xB3	This property is used to set a temperature and to acquire the setting status. 0x00–0x32 (0 °C – 50 °C)	unsigned char	1 byte	°C	Set/ Get			
Rated power consumption	0xB8	This property indicates the rated power consumption of heat storage, control, weak air flowing, and strong air flowing. 0x0000–0xFFFD (0 W – 65 533 W) Heat storage: Control: Weak air flowing: Strong air flowing	unsigned short × 4	8 bytes	W	Get			
Measured indoor temperature	0xBB	Measured indoor temperature 0x81–0x7D (−127 °C to 125 °C)	signed char	1 byte	°C	Get			
Measured outdoor temperature	0xBE	Measured outdoor temperature 0x81–0x7D (−127 °C to 125 °C)	signed char	1 byte	°C	Get			
Air flow rate setting	0xA0	This property is used to set the air flow level and air flow rate automatic setting and to acquire the setting status. Air flow rate automatic setting = 0x41 OFF = 0x31, Weak = 0x32, Strong = 0x33	unsigned char	1 byte	–	Set/Get			
Fan operation status	0xA1	This property indicates the fan operation status. OFF = 0x31, Weak = 0x32, Strong = 0x33	unsigned char	1 byte		Get		○	
Heat storage operation status	0xC0	This property indicates the heat storage ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte		Get	○	○	
Heat storage temperature setting	0xC1	This property is used to set the heat storage temperature setting and to acquire the setting status. 0x0000–0x3E8 (0 °C – 1 000 °C)	unsigned short	2 bytes	°C	Set/Get	○		
Measured stored heat temperature	0xC2	Measured stored heat temperature 0xFF38–0x3E8 (−200 °C – 1 000 °C)	signed short	2 bytes	°C	Get	○		
Daytime heat storage setting	0xC3	This property indicates the daytime heat storage ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte		Set/Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Daytime heat storage ability	0xC4	This property indicates whether heat can be stored in the daytime. Storage possible = 0x30, Storage not possible = 0x31	unsigned char	1 byte		Get		○	
Midnight power duration setting	0xC5	This property indicates the duration of midnight power. 0x00–0x17 (0-23)	unsigned char	1 byte		Set/Get	○		
Midnight power start time setting	0xC6	This property indicates the midnight power start time. 0x00–0x17 (0-23)	unsigned char	1 byte		Set/Get	○		
Radiation method	0xC7	This property indicates whether the electric storage heater has a fan. With fan = 0x30, Without fan = 0x31	unsigned char	1 byte		Get	○		
Child lock setting	0xC8	This property indicates the child lock status. ON = 0x30, OFF = 0x31	unsigned char	1 byte		Set/Get		○	
Fan timer 1 setting	0xD0	This property is used to specify Reservation ON or OFF of Fan timer 1 and to acquire the setting status. Reservation ON = 0x41, Reservation OFF = 0x42	unsigned char	1 byte		Set/Get			
Fan timer 1 ON time setting	0xD1	This property is used to set a timer value (HH:MM) and to acquire the setting status. 0–0x17:0–0x3B (=0–23):(=0–59)	unsigned char × 2	2 bytes		Set/Get			
Fan timer 1 OFF time setting	0xD2	This property is used to set a timer value (HH:MM) and to acquire the setting status. 0–0x17:0–0x3B (=0–23):(=0–59)	unsigned char × 2	2 bytes		Set/Get			
Fan timer 2 setting	0xD3	This property is used to specify Reservation ON or OFF of Fan timer 2 and to acquire the setting status. Reservation ON = 0x41, Reservation OFF = 0x42	unsigned char	1 byte		Set/Get			
Fan timer 2 ON time setting	0xD4	This property is used to set a timer value (HH:MM) and to acquire the setting status. 0–0x17:0–0x3B (=0–23):(=0–59)	unsigned char × 2	2 bytes		Set/Get			

9.19.2 Operation status property

This property is used to start or stop an electric storage heater and to acquire the operation status. The start status corresponds to 0x30, and the stop status corresponds to 0x31.

9.19.3 Temperature setting property

This property is used to set the temperature under the current fan operation in °C and to acquire the setting status.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

A model with a fan installed requires this property.

9.19.4 Rated power consumption property

This property indicates the rated power consumption of heat storage, control, weak air flowing, and strong air flowing in W. The power consumption is from 0x0000 to 0xFFFD (0 W to 65 533 W). The property value is for heat storage, control, weak air flowing, and strong air flowing from the high-order bytes. When the actual piece of equipment does not support one or more of the functions, the underflow code 0xFFFE shall be used.

If the fan air flow rate cannot be switched, the underflow code 0xFFFE shall be used for weak air flowing.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.19.5 Measured indoor temperature property

This property indicates the measured indoor temperature in °C. The value range for this property is from 0x81 to 0x7D (−127 °C to 125 °C). When the property value of the actual device is higher than the upper limit of the property value range, the overflow code 0x7F shall be used. When the property value is lower than the lower limit of the property value range, the underflow code 0x80 shall be used. When the measurement value cannot be returned, 0x7E shall be used.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

A model with a fan installed requires this property.

9.19.6 Measured outdoor temperature property

This property indicates the measured outdoor temperature in °C. The value range for this property is from 0x81 to 0x7D (−127 °C to 125 °C). When the property value of the actual device is higher than the upper limit of the property value range, the overflow code 0x7F shall be used. When the property value is lower than the lower limit of the property value range, the underflow code 0x80 shall be used. When the measurement value cannot be returned, 0x7E shall be used.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.19.7 Air flow rate setting property

This property is used to set the air flow level and air flow rate automatic setting and to acquire the setting status. The property value for air flow rate automatic setting is 0x41. The air flow rate is set to three levels and the property value is 0x31 to 0x33. The specific value for each air flow level is 0x31 for OFF, weak air flowing for 0x32, and strong air flowing for 0x33.

When the air flow rate cannot be changed, the value is 0x31 for OFF and 0x33 for ON.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.19.8 Fan operation status property

This property is used to acquire the fan operation status. The air flow rate is set to three levels and the property value is 0x31 to 0x33. The specific value for each air flow level is 0x31 for OFF, weak air flowing for 0x32, and strong air flowing for 0x33.

When the air flow rate cannot be changed, the value is 0x31 for OFF and 0x33 for ON.

9.19.9 Heat storage operation status property

This property is used to set the storage heater ON/OFF status. The property value is 0x30 for ON and 0x31 for OFF.

9.19.10 Heat storage temperature setting property

This property is used to set the heat storage temperature and to acquire the setting status. The value range for this property is from 0x0000 to 0x03E8 (0 °C to 1 000 °C).

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.19.11 Measured stored heat temperature property

This property indicates the measured heat storage temperature in °C. The value range for this property is from 0xFF37 to 0x03E8 (−200 °C to 1 000 °C). When the property value of the actual device is higher than the upper limit of the property value range, the overflow code 0x7FFF shall be used. When the property value is lower than the lower limit of the property value range, the underflow code 0x8000 shall be used.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.19.12 Daytime heat storage setting property

This property is used to set daytime heat storage by a storage heater to ON or OFF and to acquire the setting status. The property value is 0x30 for ON and 0x31 for OFF.

9.19.13 Daytime heat storage ability property

This property is used to acquire the status of whether the storage heater can store heat in the daytime. The property value is 0x30 when heat storage is possible and 0x31 when not.

9.19.14 Midnight power duration setting property

This property is used to set the midnight power duration and to acquire the setting status. The property value is 0x00 to 0x17 (0 h to 23 h).

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

Reference information: the current power menu of each power company presents three types of power duration. The duration is 5 h (0x05), 8 h (0x08), or 10 h (0x0A).

9.19.15 Midnight power start time setting property

This property is used to set the midnight power start time and to acquire the setting status. The value range for this property is 0x00 to 0x17 (00:00 to 23:00). This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

Reference information: the current power menu of each power company presents five types of midnight power start time. For the duration of 5 h or 8 h, the start time is 00:00 (0x00), 01:00 (0x01), 21:00 (0x15), 22:00 (0x16), or 23:00 (0x17). For the duration of 10 h, the start time is 22:00 (0x16) only.

9.19.16 Radiation method property

This property is used to acquire the fan installation status of an electric storage heater. The property value is 0x30 when a fan is installed and 0x31 when not.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.19.17 Child lock setting property

This property sets child lock and indicates the setting status. The property value is 0x30 for ON and 0x31 for OFF.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.19.18 Fan timer 1 setting property

This property is used to specify Reservation ON or OFF of Fan timer 1 and to acquire the setting status. The property value is 0x41 for Reservation ON or 0x42 for Reservation OFF.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.19.19 Fan timer 1 ON time setting property

This property is used to set the Fan timer 1 ON time (HH:MM) and to acquire the setting status. The value range for this property is from 0 to 0x17:0 to 0x3B (0 to 23):(0 to 59).

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.19.20 Fan timer 1 OFF time setting property

This property is used to set the Fan timer 1 OFF time (HH:MM) and to acquire the setting status. The value range for this property is from 0 to 0x17:0 to 0x3B (0 to 23):(0 to 59).

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.19.21 Fan timer 2 setting property

This property is used to specify Reservation ON or OFF of Fan timer 2 and to acquire the setting status. The property value is 0x41 for Reservation ON or 0x42 for Reservation OFF.

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.19.22 Fan timer 2 ON time setting property

This property is used to set the Fan timer 2 ON time (HH:MM) and to acquire the setting status. The value range for this property is from 0 to 0x17:0 to 0x3B (0 to 23):(0 to 59).

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.19.23 Fan timer 2 OFF time setting property

This property is used to set the Fan timer 2 OFF time (HH:MM) and to acquire the setting status. The value range for this property is from 0 to 0x17:0 to 0x3B (0 to 23):(0 to 59).

This property shall be effective even when the value of the “operation status” property (0x80) is OFF (0x31).

9.20 Electrically operated shade class specifications

9.20.1 General

The control commands of “electrically operated shade” are shown in Table 35.

Class group code : 0x02
Class code : 0x60

Table 35 – List of electrically operated shade properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announce-ment at status change	Remark
Operation status	0x80	This property indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte	–	Set Get	 O	O	
Fault description (Recover-able faults)	0x89	Fault description Lower order one byte Restarting the device by performing a reset operation = 0x02 Higher-order one byte Obstacle caught = 0x04 Recovery from outage = 0x05 Time out = 0x06 Battery low = 0x07 0x45 to 0xFF: Defined by user	unsigned short	2 bytes	–	Get		O	
Timer operation setting	0x90	Used to specify the timer operation ON or OFF. ON = 0x41, OFF = 0x42	unsigned char	1 byte	–	Set/Get		O	
Wind detection status	0xC2	This property indicates whether wind is detected. Wind = 0x41, No wind = 0x42	unsigned char	1 byte	–	Get		O	
Sunlight detection status	0xC3	This property indicates whether sunlight is detected. Sunlight = 0x41, No sunlight = 0x42	unsigned char	1 byte	–	Get		O	
Opening (extension) speed setting	0xD0	This property specifies the normal opening (extension) speed by levels. Low = 0x41, Medium = 0x42, High = 0x43	unsigned char	1 byte	–	Set/Get			
Closing (retraction) speed setting	0xD1	This property specifies the normal closing (retraction) speed by three levels. Low = 0x41, Medium = 0x42, High = 0x43	unsigned char	1 byte	–	Set/Get			
Operation time	0xD2	This property specifies the operation time in seconds. 0x00–0xFD (0 s – 253 s)	unsigned char	1 byte	second	Set/Get			
Automatic operation setting	0xD4	Automatic operation ON or OFF. ON = 0x41, OFF = 0x42	unsigned char	1 byte	–	Set/Get		O	
Open/close (extension/retraction) setting	0xE0	Open/close/stop Open = 0x41, close = 0x42, stop = 0x43	unsigned char	1 byte	–	Set/Get	O	O	
Degree-of-opening level	0xE1	Used to specify the Degree-of-opening level in %, and to acquire the current setting. 0x00–0x64 (0 % – 100 %)	unsigned char	1 byte	–	Set/Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announce-ment at status change	Remark
Shade angle setting	0xE2	Shade angle value 0x00–0xB4 (0° – 180°)	unsigned char	1 byte	degree	Set/Get			
Open/close (extension/retraction) speed	0xE3	Low/Medium/High Low = 0x41, Medium = 0x42, High = 0x43	unsigned char	1 byte	–	Set/Get			
Electric lock setting	0xE5	Lock or unlock of an electric lock Lock = 0x41, Unlock = 0x42	unsigned char	1 byte	–	Set/Get			
Remote operation setting status	0xE8	This property indicates whether remote operation is permitted or prohibited. ON (permitted) = 0x41, OFF (prohibited) = 0x42	unsigned char	1 byte	–	Get		○	
Selective opening (extension) operation setting	0xE9	Sets a stop at a specified value. Degree-of-setting position: Open = 0x41 Operation time setting value: Open = 0x42 Operation time setting value: Close = 0x43 Local setting position = 0x44 Hereinafter, defined by user (Shortcut to degree-of-opening setting, etc.)	unsigned char	1 byte	–	Set/Get		○	
Open/closed (extended/retracted) status	0xEA	This property indicates the open/closed status. Fully open = 0x41, Fully closed = 0x42, Open = 0x43, Closed = 0x44, Stopped halfway = 0x45	unsigned char	1 byte	–	Get		○	
One-time opening (extension) speed setting	0xEE	Used to specify the speed of single opening operation by three levels. Low = 0x41, Medium = 0x42, High = 0x43, None = 0x44	unsigned char	1 byte	–	Set/Get			
One-time closing (retraction) speed setting	0xEF	Used to specify the speed of single closing operation by three levels. Low = 0x41, Medium = 0x42, High = 0x43, None = 0x44	unsigned char	1 byte	–	Set/Get			

9.20.2 Operation status property

This property indicates whether an electrically operated blind/shade is ready to accept control commands (ON) or not (OFF). The property value is 0x30 for ON and 0x31 for OFF. If an electrically operated blind/shade ready to accept control commands at the start of a node where the electrically operated blind/shade class is installed, the value can be fixed at 0x30 at installation.

9.20.3 Fault description property

The description here is limited to what is not defined in the super class. This property acquires the description of recoverable faults about an electrically operated blind/shade up to the detailed fault classification. The general fault classification shall be fixed at the lower-order byte, and 0x02 indicates a fault that can be recovered from by restarting the device by performing a reset operation in the super class classification. The detailed fault classification shall be fixed at the higher-order byte.

Obstacle caught = 0x04, Recovery from outage = 0x05, Time out = 0x06, Battery low = 0x07, 0x45 to 0xFF are defined by the user.

9.20.4 Timer operation setting property

The property value is 0x41 (ON) to enable timer operation that starts opening or closing at a time preset to the device or 0x42 (OFF) to disable timer operation. Then the contents of the setting are acquired.

9.20.5 Wind detection status property

This property indicates whether the wind speed has reached the level preset in the device. The value is 0x41 (Wind) when the level has been reached and 0x42 (No wind) when not.

9.20.6 Sunlight detection status property

This property indicates whether the illuminance has reached the level preset in the device. The value is 0x41 (Sunlight) when the level has been reached and 0x42 (No sunlight) when not.

9.20.7 Opening (extension) speed setting property

This property specifies the speed in the opening (extension) direction as a repeatedly available value and indicates the speed by three levels (Low/Medium/High).

9.20.8 Closing (retraction) speed setting property

This property specifies the speed in the closing (retraction) direction as a repeatedly available value and indicates the speed by three levels (Low/Medium/High).

9.20.9 Operation time property

When operation is set by the selective opening (extension) operation setting property (0xE9), this property sets the operation time of an electrically operated blind/shade in seconds and acquires the contents of the setting. The operation time is 0 s to 253 s (0x00 to 0xFD).

9.20.10 Automatic operation setting property

The property value is set to 0x41 (ON) to enable the automatic operation of a device supporting automatic operation or 0x42 (OFF) to disable it. Then the contents of the setting are acquired.

9.20.11 Open/close (extension/retraction) operation setting property

This property sets the open/close (extension/retraction) or stops operation of an electrically operated blind/shade and acquires the contents of the setting. The property value is 0x41 for open (extension), 0x42 for close (retraction), and 0x43 for stop. The target of operation setting by this property is the fully open position after open (extension) and the fully closed position after close (retraction). For a stop at any other position, stop operation shall be set (0x43) during operation or the selective opening (extension) operation setting property (0xE9) shall be used.

9.20.12 Degree-of-opening property

This property sets the degree-of-opening of an electrically operated blind/shade within the range from 0 % to 100 % and acquires the operation setting when the value of the selective opening (extension) operation setting property (0xE9) is 0x41 (open). The value 0x00 (degree-of-opening: 0 %) shall represent the state nearest to the fully closed state (i.e., not fully closed) and the value 0x64 (degree-of-opening: 100 %) shall represent the fully open state. During the process of the blind/shade reaching the target position, the target degree-of-opening setting position shall be returned. In the case where an “energy service” or a “home amenity service” shall be supported, the implementation of this property is mandatory.

9.20.13 Shade angle setting property

This property indicates the blind angle of an electrically operated blind from the indoor side in degrees.

In the case of a horizontal electric blind, the blind slats shall be regarded as being in the 90° and 0° positions when blind slats are horizontal and at the highest position inside the room (the light blocking side (convex face outward) is vertical), respectively.

In the case of a vertical electric blind, the blind slats shall be regarded as being in the 0° and 180° positions when the outdoor side surfaces of the blind slats are in the rightmost and leftmost positions as seen from the inside, respectively. The blind slats shall be regarded as being in the 90° position when they are at the midpoint between the 0 ° and 180 ° positions.

9.20.14 Open/close (extension/retraction) speed setting property

This property indicates the open/close (extension/retraction) speed by three levels (Low/Medium/High).

9.20.15 Electric lock setting property

This property locks or unlocks an electrically operated blind/shade and acquires the lock status. The property value is 0x41 for the locked status and 0x42 for the unlocked status.

9.20.16 Remote operation setting status property

This property acquires whether an electrically operated blind/shade permits or prohibits remote operation from outside. The value is 0x41 (ON) when remote operation from outside is permitted and 0x42 (OFF) when it is prohibited. The value can be fixed at 0x41 (ON) at installation to use an electrically operated blind/shade not independently but always by remote operation.

9.20.17 Selective opening (extension) operation setting property

This property indicates the setting to operate or stop an electrically operated blind/shade as specified by another property or device. The property value is 0x41 for operation by “Degree-of-opening level” (0xE1), 0x42 for operation in the opening (extension) direction by “Operation time” (0xD2), 0x43 for operation in the closing (retraction) direction by “Operation time setting value” (0xD2), and 0x44 for stop at a position stored independently by the electrically operated blind/shade. User definition shall be permitted for a stop by opening (extension) level setting using a single signal.

9.20.18 Open/closed (extended/retracted) status property

This property acquires the open/closed (extended/retracted) status of an electrically operated blind/shade. In the fully open (extended) status, the blind/shade is stopped at the upper limit and the property value is 0x41. In the fully closed (retracted) status, the blind/shade is stopped at the lower limit and the property value is 0x42. In the opening (extension) operation status, the blind/shade is being operated in the opening (extension) direction and the property value is 0x43. In the closing (retraction) operation status, the blind/shade is being operated in the closing

(retraction) direction and the property value is 0x44. When the blind/shade is stopped not at the upper or lower limit but halfway, the property value is 0x45.

9.20.19 One-time opening (extension) speed setting property

This property specifies the speed in the opening (extension) direction once only by three levels (Low/Medium/High) and acquires the contents of the setting. The value is 0x41 for low speed, 0x42 for medium speed, 0x43 for high speed, and 0x44 for no setting. After single operation at the speed set by this property, the value changes to 0x44. When the value of this property is 0x44, the operation speed is as set by the opening speed setting property.

9.20.20 One-time closing (retraction) speed setting property

This property specifies the speed in the closing (retraction) direction once only by three levels (Low/Medium/High) and acquires the contents of the setting. The value is 0x41 for low speed, 0x42 for medium speed, 0x43 for high speed, and 0x44 for no setting. After single operation at the speed set by this property, the value changes to 0x44. When the value of this property is 0x44, the operation speed is as set by the closing speed setting property.

9.21 Electric water heater class specifications

9.21.1 General

The control commands of “electric water heater” are shown in Table 36.

Class group code : 0x02
Class code : 0x6B

Table 36 – List of electric water heater properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte	—	Set Get	 ○	○	
Automatic water heating setting	0xB0	Used to specify whether or not to use the automatic water heating function, and to acquire the current setting. Automatic water heating function used: 0x41 Non-automatic water heating function stopped: 0x43 Non-automatic water heating function used: 0x42	unsigned char	1 byte	–	Set/Get	○		
Automatic water temperature control setting	0xB1	Used to specify whether or not to use the automatic water temperature control function, and to acquire the current setting. Automatic water temperature control function used: 0x41 Automatic water temperature control function not used: 0x42	unsigned char	1 byte	–	Set/Get			
Water heater status	0xB2	Indicates the current status of the water heater in terms of whether it is heating water or not. Heating = 0x41 Not heating = 0x42	unsigned char	1 byte	–	Get			
Water heating temperature setting	0xB3	Used to specify (in °C) the temperature of heated water to achieve, and to acquire the current setting. 0x00 to 0x64 (0 °C to 100 °C)	unsigned char	1 byte	°C	Set/Get	○		
Daytime reheating permission setting	0xC0	Used to specify whether or not to permit daytime reheating, and to acquire the current setting. Daytime reheating permitted: 0x41 Daytime reheating not permitted: 0x42	unsigned char	1 byte	–	Set/Get	○		
Measured temperature of water in water heater	0xC1	Indicates the current temperature of the water in the water heater. 0x00 to 0x64 (0 °C to 100 °C)	unsigned char	1 byte	°C	Get			
Alarm status	0xC2	This property indicates the status of an alarm. First byte: Bit 0: Out of hot water 0 Normal 1 Alarm Bit 1: Water leaking	unsigned char × 4	4 bytes	–	Get		○	

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		0 Normal 1 Alarm Bit 2: Water frozen 0 Normal 1 Alarm Bits 3–7: reserved for future use 2–4 bytes: reserved for future use							
Hot water supply status	0xC3	This property indicates the status of supplying hot water. Supplying hot water = 0x41 Not supplying hot water = 0x42	unsigned char	1 byte	–	Get	O	O	
Relative time setting for keeping bath temperature	0xC4	Timer value HH:MM 0x00–0x17:0x00–0x3B (= 0–23 h):(= 0–59 min)	unsigned char × 2	2 bytes	–	Set/Get			
Temperature of supplied water setting	0xD1	Used to specify the temperature of water supplied from the water heater in °C, and to acquire the current setting. 0x00 to 0x64 (0 °C to 100 °C)	unsigned char	1 byte	°C	Set/Get			
Bath water temperature setting	0xD3	Used to specify (in °C) the temperature up to which the water heater will heat bath water, and to acquire the current setting. 0x00 to 0x64 (0 °C to 100 °C)	unsigned char	1 byte	°C	Set/Get			
Bath water volume setting	0xE0	Used to specify (in %) the volume of bath water the bathtub will contain upon completion of heating, and to acquire the current setting. 0x00 to 0x64 (0 % to 100 %)	unsigned char	1 byte	%	Set/Get			
Measured amount of water remaining in tank	0xE1	Indicates the measured amount of water left in the tank in litres. 0x0000 to 0xFFFD (0 l to 65 533 l)	unsigned short	2 bytes	l	Get			
Tank capacity	0xE2	Indicates the tank capacity in litres. 0x0000 to 0xFFFD (0 l to 65 533 l)	unsigned short	2 bytes	l	Get			
Automatic bath water heating mode setting	0xE3	Used to specify whether or not to use the “automatic bath water heating” mode, and to acquire the current setting. “Automatic bath water heating” mode ON = 0x41 “Automatic bath water heating” mode OFF = 0x42	unsigned char	1 byte	–	Set/Get			
Manual	0xE4	Used to specify whether or not	unsigned	1 byte	–	Set/Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
bath reheating operation setting		to use the function to reheat. Bath reheating ON = 0x41 Bath reheating OFF = 0x42	char						
Addition of hot water function setting	0xE5	Used to specify whether or not to use the function to add hot water to the bath water in the bathtub, and to acquire the current setting. “Addition of hot water” function ON = 0x41 “Addition of hot water” function OFF = 0x42	unsigned char	1 byte	–	Set/Get			
Slight bath water temperature lowering function setting	0xE6	Used to specify whether or not to use the “slight bath water temperature lowering” function, and to acquire the current setting. “Slight bath water temperature lowering” function ON = 0x41 “Slight bath water temperature lowering” function OFF = 0x42	unsigned char	1 byte	–	Set/Get			
Bath water volume setting 1	0xE7	Used to specify the bath water volume in litres, and to acquire the current setting. 0x00 to 0xFD (0 l to 253 l)	unsigned char	1 byte	l	Set/Get			
Bath water volume setting 2	0xE8	Used to specify the bath water volume by selecting a level from the 8 predefined levels, and to acquire the current setting. 0x31 to 0x38	unsigned char	1 byte	–	Set/Get			
Bathroom priority setting	0xE9	Used to specify whether or not to use the function of “priority bathroom.” Priority bath ON = 0x41 Priority bath OFF = 0x42	unsigned char	1 byte	–	Get			
Bath operation status monitor	0xEA	This property indicates the status of bath operation. Filling hot water = 0x41 Stopped = 0x42 Keeping temperature = 0x43	unsigned char	1 byte	–	Get		○	
Bath water volume setting 3	0xEE	Used to specify the bath water volume in litres, and to acquire the current setting. 0x0000 to 0xFFFD (0 l to 65 533 l)	unsigned short	2 bytes	l	Set/Get			
Bath water volume setting 4	0xD4	The bath hot water volume is specified by a number of steps. 0x01–0xFF	unsigned char	1 byte	–	Set/Get			
Bath water volume setting 4-	0xD5	The maximum settable level is the top step of Bath water volume setting 4.	unsigned char	1 byte	–	Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Maximum settable level		0x01–0xFF							
ON timer reservation setting	0x90	0x31 to 0x38 Reservation ON = 0x41 Reservation OFF = 0x42	unsigned char	1 byte	I	Set/Get			
ON timer setting	0x91	ON timer setting (HH:MM) 0 to 0x17: 0 to 0x3B (= 0 to 23): (= 0 to 59)	unsigned char x 2	2 bytes	–	Set/Get			
Volume setting	0xD6	Used to set the volume output from the operating units and to acquire the setting status. 0x00-0x64 (0-100)	unsigned char	1 byte	%	Set/Get			
Mute setting	0xD7	Used to set the volume mute status output from the operating units and to acquire the setting status. Mute ON =0x30, Mute OFF = 0x31	unsigned char	1 byte	–	Set/Get			
Remaining hot water volume	0xD8	This property indicates the remaining hot water volume in litres. 0x0000-0xFFFD (0-65 533)	unsigned short	2 byte	litre	Get			
Rated power consumption of H/P unit in wintertime	0xDB	Indicates the rated power consumption in wintertime (Dec, Jan, Feb, Mar) to supply hot water. 0x0000-0xFFFD(0 to 65 533)	unsigned short	2 bytes	W	Get			
Rated power consumption of H/P unit in in-between seasons	0xDC	Indicates the rated power consumption in in-between seasons (Apr, May, Oct, Nov) to supply hot water 0x0000-0xFFFD (0 to 65 533)	unsigned short	2 bytes	W	Get			
Rated power consumption of H/P unit in summertime	0xDD	Indicates the rated power consumption in summertime (Jun, Jul, Aug, Sep) to supply hot water 0x0000 to 0xFFFD (0 to 65 533)	unsigned short	2 bytes	W	Get			

9.21.2 Operation status property

This property indicates the operation status (i.e. operating or not operating) of the electric water heater. 0x30 and 0x31 shall be used for the “operating” and “not operating” states, respectively.

9.21.3 Automatic water heating setting property

This property sets whether the boil-up operation using electric power is performed automatically or not. The automatic water heating function shall be 0x41, the non-automatic water heating function shall be 0x42, and the non-automatic water heating function stopped shall be 0x43.

9.21.4 Automatic water temperature control setting property

This property indicates as automatic or non-automatic the temperature value of the electric hot water tank depending on the algorithm, etc. Automatic shall be 0x41. Non-automatic shall be 0x42.

9.21.5 Water heater status property

This property indicates whether the electric hot water tank is at that moment heating or not. At that time heating shall be 0x41. Not heating shall be 0x42.

9.21.6 Water heating temperature setting property

This property indicates the °C setting value for heating water. The property value range shall be 0x00 to 0x64 (0 °C to 100 °C). 0xFD shall be returned when the “water heating temperature setting” is unknown or unfixed because “automatic water temperature control” setting has been specified.

9.21.7 Daytime reheating permission setting property

This property indicates permission / prohibition for daytime reheating permission setting. Daytime reheating permission shall be 0x41. Daytime reheating prohibition shall be 0x42.

9.21.8 Measured temperature of water in water heater property

This property indicates the degrees Celsius (°C) inside the hot water tank at the time of inspecting. The property value range shall be 0x00 to 0x64 (0 °C to 100 °C).

9.21.9 Alarm status property

Following alarms are defined. The value of each status is shown in Figure 59.

Out of hot water: if boiling prohibition is set or the possibility of a hot water shortage is detected during boiling control, this alarm is output.

Water leaking: if a continuous hot water outflow longer than usual daily use is detected, this alarm is output.

Water frozen: if a possibility of freezing inside equipment or external piping is detected, this alarm is output.

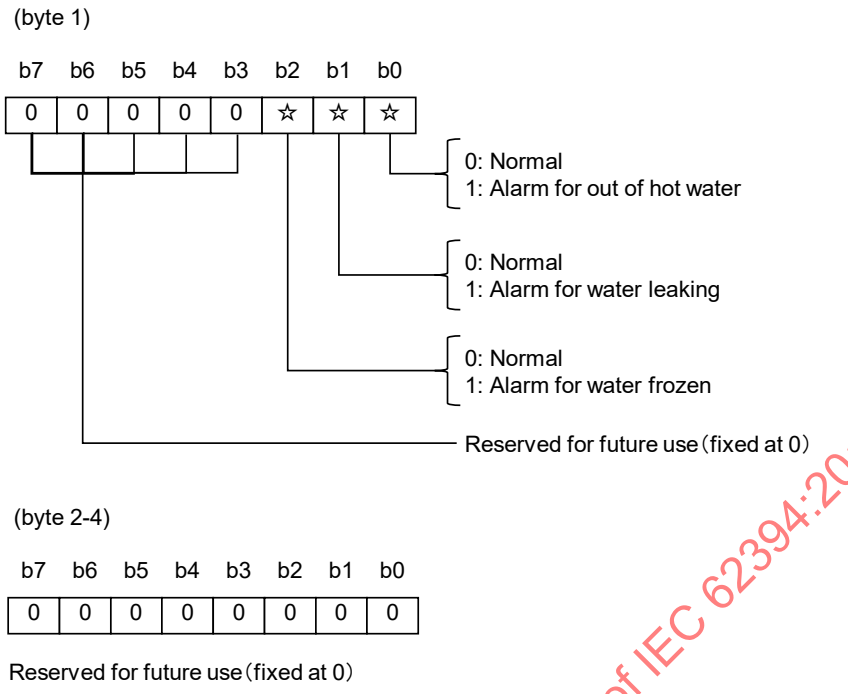


Figure 59 – Value of alarm status

9.21.10 Hot water supply status property

This property indicates whether hot water is supplied from a tap in the kitchen or a shower in the bathroom. The property value is 0x41 for “Supplying hot water” and 0x42 for “Not supplying hot water.” This property does not apply to hot water for a bath.

For “Life watching service,” “Announcement at status change” is mandatory.

9.21.11 Relative time setting for keeping bath temperature property

This property sets the hot water keeping time of “Bath operation status monitor” (EPC = 0xEA) as a relative value. The data format is HH: 0x00 to 0x17 (0 to 23) and MM: 0x00 to 0x3B (0 to 59). The property value is HHMM in order from the highest-order byte.

9.21.12 Temperature of supplied water setting property

This property indicates the temperature setting for the electric water heater supply to a hot water supply terminal. This temperature setting is expressed in degrees Celsius (°C). The property value range shall be 0x00 to 0x64 (0 °C to 100 °C).

9.21.13 Bath water temperature setting property

This property indicates the bath boil-up temperature setting in degrees Celsius (°C). The property value range shall be 0x00 to 0x64 (0 °C to 100 °C).

9.21.14 Bath water volume setting property

This property sets the percentage of the boil-up hot water volume to the tank capacity. The property value range shall be 0x00 to 0x64 (0 % to 100 %).

9.21.15 Measured amount of water remaining in tank property

This property indicates the measured amount of water left in the tank in litres. The property value range shall be 0x0000 to 0xFFFD (0 l to 65 533 l). When the property value of the actual piece

of equipment is higher than the upper limit of the property value range, the overflow code 0xFFFF shall be used. When the property value is lower than the lower limit of the property value range, the underflow code 0xFFFE shall be used.

9.21.16 Tank capacity property

This property indicates the tank capacity in litres. The property value range shall be 0x0000 to 0xFFFD (0 l to 65 533 l). When the property value of the actual piece of equipment is higher than the upper limit of the property value range, the overflow code 0xFFFF shall be used. When the property value is lower than the lower limit of the property value range, the underflow code 0xFFFE shall be used.

9.21.17 Automatic bath water heating mode setting property

This property indicates whether the bath auto mode is ON or OFF. The property value shall be 0x41 (bath auto mode ON) or 0x42 (bath auto mode OFF). In the case where a "mobile service" shall be supported, the implementation of this property is mandatory.

9.21.18 Manual bath reheating operation setting property

This property indicates whether bath reheating is ON or OFF. The property value is 0x41 for "Bath reheating ON" and 0x42 for "Bath reheating OFF."

9.21.19 Addition of hot water function setting property

This property indicates whether the bath hot water adding operation is ON or OFF. The property value shall be 0x41 (bath hot water adding operation ON) or 0x42 (bath hot water adding operation OFF).

9.21.20 Slight bath water temperature lowering function setting property

This property indicates whether the bath hot water temperature lowering operation is ON or OFF. The value 0x41 indicates that the bath hot water temperature lowering operation is ON. The value 0x42 indicates that the bath hot water temperature lowering operation is OFF. When the bath hot water temperature lowering operation is ON, water will be added to the bath to lower the bath hot water temperature.

9.21.21 Bath water volume setting 1 property

This property indicates the bath hot water volume in litres. The property value range shall be 0x00 to 0xFD (0 l to 253 l). When the property value of the actual piece of equipment is higher than the property value range, the overflow code 0xFF shall be used. When the property value is lower than the property value range, the underflow code 0xFE shall be used.

9.21.22 Bath water volume setting 2 property

This property sets the bath hot water volume. Eight different levels are available. The values 0x31 and 0x38 represent the minimum and maximum settings, respectively. Specific volume values for the 8 different levels are not stipulated.

9.21.23 Bathroom priority setting property

This property indicates whether a water heater is controlled or operated with priority to bath. The property value is 0x41 for Priority to bath ON and 0x42 for Priority to bath OFF. For safety, only Get shall be supported. The contents of priority shall depend on the implementation.

Example of device implementation: when Priority to bath is ON, the temperature of hot water can be changed only from the remote controller in the bathroom. It is prohibited to use the water temperature from any other remote controller or HEMS.

9.21.24 Bath operation status monitor property

This property monitors the status of a bath tub in bath auto mode.

When bath auto mode is set (ON: 0x41), the bath tub status is monitored. The property value is 0x41 for “Filling hot water,” 0x43 for “Keeping temperature,” and 0x42 for “Stopped.”

This property indicates the value of “Automatic bath water heating mode setting (EPC = 0xE3)” is Auto ON (0x41).

Filling hot water (0x41): including reheating up to the target temperature after filling.

Keeping temperature (0x43): including water adding and reheating while keeping the temperature.

9.21.25 Bath water volume setting 3 property

This property is used to specify the bath water volume in litres, and to acquire the current setting. The property value range shall be 0x0000 to 0xFFFD (0 l to 65 533 l). When the property value of the actual piece of equipment is higher than the upper limit of the property value range, the overflow code 0xFFFF shall be used. When the property value is lower than the lower limit of the property value range, the underflow code 0xFFFE shall be used.

9.21.26 Bath water volume setting 4 property

This property sets the bath water volume. The minimum value is 0x01 and the maximum value is “Bath water volume setting 4 – Maximum settable level.” No actual value is specified for each level. This property is related to “Bath water volume setting 4 – Maximum settable level.”

9.21.27 Bath water volume setting 4 – Maximum settable level property

This property indicates the maximum settable level of Bath water volume setting 4. The minimum value is 0x01 and the maximum value is 0xFF. No actual value is specified for each level. This property is related to “Bath water volume setting 4.”

9.21.28 Volume setting property

“Set” of this property is used to set the volume of operating sounds, voice guidance, notification melodies, interphone and other outputs from remote controllers and other operating units, etc.

“Get” of this property is used to acquire the value of the current volumesetting.

This property indicates the volume value by percentage. The value is 0 (0x00) for the minimum volume and 100 (0x64) for the maximum volume of each device.

9.21.29 Mute setting property

“Set” of this property is used to set the volume mute output from operating units ON and OFF.

“Get” of this property is used to acquire the value of the current mute status.

Mute ON indicates that voice is not output, mute OFF indicates that voice is output.

Property values 0x30 and 0x31 correspond to mute ON and OFF, respectively.

The correlation between the “mute setting” property and the “volume setting” property shall depend on implementation.

EXAMPLE 1

If the value of the volume setting property is 20 when the mute function is OFF, the value of the volume setting property remains unchanged at 20 even after the mute function is turned ON. On the other hand, when the mute function is ON, the value of the volume setting property may be 0 in some cases.

EXAMPLE 2

If the value of the volume setting property is 20 when the mute function is OFF, the value of the volume setting property remains 20 even after the mute function is turned from OFF to ON and back to OFF. On the other hand, the value of the volume setting property may be 0.

9.21.30 Remaining hot water volume property

This property indicates, in units of litres, the volume of hot water that can be supplied by an electric water heater to a tap in the kitchen, a shower in the bathroom or other hot water outlet. The property value range is 0x0000 to 0xFFFD (0 l to 65 533 l). If the property values of actual devices exceed the property value range, the overflow code 0xFFFF shall be used. If the property values of actual devices are lower than the lower limit of the property value range, the underflow code 0xFFFE shall be used.

9.21.31 Rated power consumption of H/P unit in wintertime property

This property indicates the rated power consumption of the heat pump in wintertime (to supply hot water at 65 °C and water at 9 °C) in watts. The value range for this property is from 0x0000 to 0xFFFD (from 0 to 65 533). When the property value of the actual device is higher than the upper bound of the value range, 0xFFFF (overflow code) shall be used. When the property value of the actual device is lower than the lower bound of the value range, 0xFFFE (underflow code) shall be used.

9.21.32 Rated power consumption of H/P unit in in-between seasons property

This property indicates the rated power consumption of the heat pump in in-between seasons (to supply hot water at 65 °C and water at 17 °C) in watts. The value range for this property is from 0x0000 to 0xFFFD (from 0 to 65 533). When the property value of the actual device is higher than the upper bound of the value range, 0xFFFF (overflow code) shall be used. When the property value of the actual device is lower than the lower bound of the value range, 0xFFFE (underflow code) shall be used.

9.21.33 Rated power consumption of H/P unit in summertime property

This property indicates the rated power consumption of the heat pump in summertime (to supply hot water at 65 °C and water at 24 °C) in watts. The value range for this property is from 0x0000 to 0xFFFD (from 0 to 65 533). When the property value of the actual device is higher than the upper bound of the value range, 0xFFFF (overflow code) shall be used. When the property value of the actual device is lower than the lower bound of the value range, 0xFFFE (underflow code) shall be used.

9.21.34 ON timer reservation setting property

This property indicates whether the bath auto mode reservation is ON or OFF. The property value shall be 0x41 (reservation ON) or 0x42 (reservation OFF). This property has relation to the “set value of ON timer time”.

9.21.35 ON timer setting property

When the “ON timer reservation setting” is ON, this property indicates the time at which the bath auto mode setting (EPC = 0xE3) turns ON (0x41). The time indication is given in hours and minutes (hour: 0x00 to 0x17 (0 to 23); minute: 0x00 to 0x3B (0 to 59)). The property value shall sequentially indicate the hours and minutes, beginning with the high-order byte.

9.22 Instantaneous water heater class specifications

9.22.1 General

The control commands of “instantaneous water heater” are shown in Table 37.

This class is intended for use with instantaneous water heaters that use fossil fuels such as gases and kerosene and heat pump-based instantaneous water heaters.

For water heaters that heat stored water, it is recommended that the “electric water heater” class (class group code = 0x02, class code = 0x6B) be used. For the purposes of this ECHONET Specification, the term “instantaneous water heaters” shall include both “instantaneous water heaters having a heating unit in which water supplied from a water supply unit is heated by means of heat exchanging” and “instantaneous bath water heaters having a bath water heating unit that heats water or hot water filled in the bathtub by means of heat exchanging by continuously circulating the same water or hot water.” The two types of instantaneous water heaters shall be distinguished by using the terms “water heaters” (or water heating) and “bath water heaters (or bath water heating).” The “addition of hot water” function shall belong to instantaneous water heaters of the former type. If both “water heaters” and “bath water heaters” are indicated, the term “instantaneous water heater” shall be used.

Class group code : 0x02
Class code : 0x72

Table 37 – List of household instantaneous water heater properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte	–	Set Get	 ○	○	
Hot water heating status	0xD0	This property indicates the hot water heating status. Hot water heating status found = 0x41 Hot water heating status not found = 0x42	unsigned char	1 byte	–	Get	○		
Set value of hot water temperature	0xD1	This property indicates the set value of the hot water temperature in °C. 0x00–0x64 (0–100)	unsigned char	1 byte	°C	Get/Set			
Hot water warmer setting	0xD2	Hot water warmer setting Hot water warmer operation = 0x41 Hot water warmer operation resetting = 0x42	unsigned char	1 byte	–	Get/Set			
"Duration of automatic operation" setting	0xDA	Timer value (HH:MM) 0–0x17: 0–0x3B (= 0–23): (= 0–59) Limitless: 0xFFFF	unsigned char × 2	2 bytes	–	Get/Set			
Remaining automatic operation time	0xDB	Timer value (HH:MM) 0–0x17: 0–0x3B (= 0–23): (= 0–59) Infinite: 0xFFFF	unsigned char × 2	2 bytes	–	Get			
Set value of bath temperature	0xE1	This property indicates the set value of the bath temperature in °C. 0x00–0x64 (0–100)	unsigned char	1 byte	°C	Get/Set			
Bath water heater status	0xE2	This property indicates whether or not the bath water heater is heating the bath water. Heating = 0x41 Not heating = 0x42	unsigned char	1 byte	–	Get	○		
Bath auto mode setting	0xE3	Bath auto mode ON/OFF Auto ON = 0x41 Auto OFF = 0x42	unsigned char	1 byte	–	Set/Get			
Bath additional boil-up operation setting	0xE4	Additional boil-up ON/OFF Additional boil-up ON = 0x41 Additional boil-up OFF = 0x42	unsigned char	1 byte	–	Set/Get			
Bath hot water adding operation setting	0xE5	Hot water addition ON/OFF Hot water addition ON = 0x41 Hot water addition OFF = 0x42	unsigned char	1 byte	–	Set/Get			
Bath water temperature lowering operation	0xE6	Hot water temperature lowering ON/OFF Hot water temperature lowering ON = 0x41	unsigned char	1 byte	–	Set/Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
setting		Hot water temperature lowering OFF = 0x42							
Bath hot water volume setting 1	0xE7	This property indicates bath hot water volume in litres. 0x00–0xFD (0 l to 253 l)	unsigned char	1 byte	litres	Set/Get			
Bath hot water volume setting 2	0xE8	This property indicates the bath hot water volume (in 8 steps). 0x31–0x38	unsigned char	1 byte	–	Set/Get			
Bath hot water volume setting 3	0xEE	This property indicates the bath hot water volume in litres. 0x0000–0xFFFD (0 to 65 533 litres)	unsigned short	2 bytes	litre	Set/Get			
Bath hot water volume setting 4	0xD4	The bath hot water volume is specified by the number of steps. 0x01-0xFF	unsigned char	1 byte	–	Set/Get			
Bath hot water volume setting 4 – Maximum settable level	0xD5	The maximum settable level is the top step of Bath hot water volume setting 4. 0x01-0xFF	unsigned char	1 byte	–	Get			
Bathroom priority setting	0xE9	Bathroom priority ON/OFF Bathroom priority ON = 0x41, Bathroom priority OFF = 0x42	unsigned char	1 byte	–	Get			
Shower hot water supply status	0xEA	Shower hot water supply ON/OFF Shower hot water supply ON = 0x41 Shower hot water supply OFF = 0x42	unsigned char	1 byte	–	Get			
Kitchen hot water supply status	0xEB	Kitchen hot water supply ON/OFF Kitchen hot water supply ON = 0x41 Kitchen hot water supply OFF = 0x42	unsigned char	1 byte	–	Get			
Hot water warmer ON timer reservation setting	0xEC	Reservation ON/OFF Reservation ON = 0x41 Reservation OFF = 0x42	unsigned char	1 byte	–	Get			
Set value of hot water warmer ON timer time	0xED	Timer value (HH:MM) 0–0x17:0–0x3B (= 0–23):(= 0–59)	unsigned char × 2	2 bytes	–	Set/Get			
Bath operation status monitor	0xEF	This property indicates the status of a bath. Supplying hot water = 0x41, keeping bath temperature = 0x43, stopped = 0x42	unsigned char	1 byte	–	Get		○	
ON timer reservation	0x90	Reservation ON/Reservation OFF	unsigned char	1 byte	–	Set/Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
setting		Reservation ON = 0x41 Reservation OFF = 0x42							
Set value of ON timer time	0x91	Timer value (HH:MM) 0–0x17: 0–0x3B (= 0–23):(= 0–59)	unsigned char × 2	2 bytes	–	Set/Get			
Set value of ON timer relative time	0x92	Timer value (HH:MM) 0–0x17: 0–0x3B (= 0–23):(= 0–59)	unsigned char × 2	2 bytes	–	Set/Get			
Volume setting	0xD6	This property sets the volume output from the operating units and acquires the setting status. 0x00–0x64 (0–100)	unsigned char	1 byte	%	Set/Get			
Mute setting	0xD7	This property sets the volume mute status output from the operating units and acquires the setting status. Mute ON = 0x30, Mute OFF = 0x31	unsigned char	1 byte	–	Set/Get			

9.22.2 Operation status property

This property indicates whether the instantaneous water heater is in the ON state (i.e. the instantaneous water heater responds to user operation) or OFF state. 0x30 and 0x31 shall be used for the ON and OFF states, respectively. In cases where the instantaneous water heater belongs to a node in which the “instantaneous water heater” class is implemented and is ready to respond to user operation as soon as the node starts up, 0x30 may be implemented as the fixed value.

9.22.3 Water heating status property

This property indicates whether or not the water heater is heating water. 0x41 and 0x42 shall be used for the “heating” and “not heating” states, respectively.

In the case of a heat pump-based water heater, the property value shall be 0x41 (“heating” state) and 0x42 (“not heating” state) when the compressor is in operation and when the compressor is not in operation, respectively.

In cases where the water heater has a separate bath water heater, the “bath water heating status” property (EPC = 0xE2) shall be implemented to indicate whether or not the bath water heater is heating bath water.

9.22.4 Set value of hot water temperature property

This property indicates the temperature of water supplied from the water heater to the tap (outlet) unit in °C, and to acquire the current setting. The property value range is 0x00 to 0x64 (0 °C to 100 °C).

9.22.5 Hot water warmer setting property

This property indicates whether or not to use the water temperature maintenance function, and to acquire the current setting. 0x41 and 0x42 shall be used for the ON and OFF states, respectively. The water temperature maintenance function shall be defined as a function to maintain the temperature of water in the water heater and the tap (outlet) unit as well as in the section(s) in between using a sub tank or a water circulation system.

9.22.6 "Duration of automatic operation" setting property

This property indicates, in terms of a relative time, the period of time between a change in the value of the "Automatic bath water heating mode" setting property (EPC = 0xE3) to 0x41 (ON) and a change back to 0x42 (OFF), and to acquire the current setting. The "hour (0x00 to 0x17 (0 to 23)): minute (0x00 to 0x3B (0 to 59))" format shall be used, with the higher- and lower-order bytes used for the "hour" and "minute" values, respectively.

When the value of this property is "0xFFFF," the water heating status shall remain at 0x41 for an indefinite period of time.

The value of this property shall not change over time. The remaining time of automatic operation shall be acquired with the "remaining automatic operation time" property (EPC = 0xDB).

9.22.7 Remaining automatic operation time property

This property acquires the time remaining before the value of the "Automatic bath water heating mode" setting property (EPC = 0xE3) changes to 0x42 (OFF). The "hour (0x00 to 0x17 (0 to 23)):minute (0x00 to 0x3B (0 to 59))" format shall be used, with the higher- and lower-order bytes used for the "hour" and "minute" values, respectively.

When the value of this property is "0xFFFF," the water heating status shall remain at 0x41 for an indefinite period of time.

9.22.8 Set value of bath temperature property

This property indicates (in °C) the temperature up to which the water heater will heat bath water, and to acquire the current setting. The property value range is 0x00 to 0x64 (0 °C to 100 °C). When the water heater has a function to maintain the temperature of bath water by adding hot water, this property may also be used to specify and acquire the bath water temperature to be maintained.

9.22.9 Bath water heater status property

This property indicates whether or not the bath water heater is heating bath water. 0x41 and 0x42 shall be used for the "heating" and "not heating" states, respectively. The "bath water heater status" property value indicates the status of a separate water heater and is independent of the value of the "water heater status" property (EPC = 0xD0).

In the case of a water heater that does not have a bath water heater, the "bath water heater status" property value shall always be 0x42.

In the case of a heat pump-based water heater, the property value shall be 0x41 ("heating" state) and 0x42 ("not heating" state) when the compressor is in operation and when the compressor is not in operation, respectively.

In the case of a water heater with an integrated heat exchanger, this property may be used for the status of the switching valve instead.

9.22.10 Bath auto mode setting property

This property indicates whether or not to use the “automatic bath water heating” mode, and to acquire the current setting. 0x41 and 0x42 shall be used for the ON and OFF states, respectively. Because there are wide differences between water heaters in terms of specifications relating to automatic bath water heating functions, the definition of the “automatic bath water heating” mode shall be implementation-dependent. However, an “automatic bath water heating” mode shall normally be a mode in which a series of processes is executed, such as the processes of “filling the bathtub with the specified volume of water, adding hot water as specified, reheating the water as specified and maintaining the temperature of the water at the specified level” or “unplugging the bathtub (draining the used bath water), cleaning the bathtub, plugging the bathtub, filling the bathtub with the specified volume of water, adding hot water as specified, reheating the water as specified and maintaining the temperature of the water at the specified level.” In the case where a “mobile service” shall be supported, the implementation of this property is mandatory.

9.22.11 Bath additional boil-up operation setting property

This property indicates whether or not to use the bath water reheating function, and to acquire the current setting. 0x41 and 0x42 shall be used for the ON and OFF states, respectively.

9.22.12 Bath hot water adding operation setting property

This property indicates whether or not to use the function to add hot water to the bath water in the bathtub, and to acquire the current setting. 0x41 and 0x42 shall be used for the ON and OFF states, respectively.

9.22.13 Bath water temperature lowering operation setting property

This property indicates whether or not to use the “Bath water temperature lowering operation” function, and to acquire the current setting. 0x41 and 0x42 shall be used for the ON and OFF states, respectively. “Bath water temperature lowering operation” shall mean slightly lowering the temperature of the bath water by adding cold water or by using other appropriate means.

9.22.14 Bath hot water volume setting 1 property

This property indicates the bath water volume in litres, and to acquire the current setting. The property value range is 0x00 to 0xFD (0 l to 253 l). When the property value of the actual piece of equipment is higher than the upper limit of the property value range, the overflow code 0xFF shall be used. When the property value is lower than the lower limit of the property value range, the underflow code 0xFE shall be used.

In cases where implementation of the “Bath hot water volume setting 1” property is accompanied by the implementation of the “Bath hot water volume setting 2” property (EPC = 0xE8) or the “Bath hot water volume setting 3” property (EPC = 0xEE), the values of the properties shall be correlated.

9.22.15 Bath hot water volume setting 2 property

This property indicates the bath water volume by selecting a level from among the eight predefined levels, and to acquire the current setting. The bath water volume values for the eight levels may be defined freely, as long as 0x31 and 0x38 are used for the minimum and maximum volumes, respectively.

In cases where implementation of the “Bath hot water volume setting 2” property is accompanied by the implementation of the “Bath hot water volume setting 1” property (EPC = 0xE7) or the “Bath hot water volume setting 3” property (EPC = 0xEE), the values of the properties shall be correlated.

9.22.16 Bath hot water volume setting 3 property

This property indicates the bath water volume in litres, and to acquire the current setting. The property value range is 0x0000 to 0xFFFD (0 l to 65 533 l). When the property value of the actual piece of equipment is higher than the upper limit of the property value range, the overflow code 0xFFFF shall be used. When the property value is lower than the lower limit of the property value range, the underflow code 0xFFFE shall be used.

In cases where implementation of the “Bath hot water volume setting 3” property is accompanied by the implementation of the “Bath hot water volume setting 1” property (EPC = 0xE7) or the “Bath hot water volume setting 2” property (EPC = 0xE8), the values of the properties shall be correlated.

9.22.17 Bath hot water volume setting 4 property

The bath hot water volume is set by level. The minimum value is 0x01 and the maximum value is "Bath hot water volume setting 4 – Maximum settable level." No actual value is specified for each level. This property is related to "Bath hot water volume setting 4 – Maximum settable level."

9.22.18 Bath hot water volume setting 4 – Maximum settable level property

This property indicates the maximum settable level of “Bath hot water volume setting 4.” The minimum value is 0x01 and the maximum value is 0xFF. No actual value is specified for each level. This property is related to "Bath hot water volume setting 4."

9.22.19 Bathroom priority setting property

This property indicates whether or not to place the water heater in the “Bathroom priority” mode (a mode in which priority is given to bath water heating-related functions, controls and/or user operations), and to acquire the current setting. 0x41 and 0x42 shall be used for the “Bathroom priority” mode and the non-“Bathroom priority” mode, respectively. Determination of the bath water heating-related functions, controls and/or user operations to be given high priority and the manner in which high priority is allocated shall be implementation-dependent.

9.22.20 Shower hot water supply status property

This property indicates whether the shower water heating function is used or not (i.e. the shower is being used or not). 0x41 and 0x42 shall be used for the ON and OFF states, respectively.

9.22.21 Kitchen hot water heating status property

This property indicates whether the kitchen water heating function is used or not. 0x41 and 0x42 shall be used for the ON and OFF states, respectively.

9.22.22 Hot water warmer ON timer reservation setting property

This property indicates whether or not to use the water heating/water temperature maintenance reservation function. This property is used in combination with the “Set value of hot water warmer ON timer time” property.

9.22.23 Bath operation status monitor property

This property is used to monitor the status of a bath in automatic mode. The status of “Bath auto setting mode property” (Auto ON: 0x41) is monitored. This property indicates “supplying hot water: 0x41”, “keeping bath temperature: 0x43”, “stopped: 0x42”.

This property indicates the bath operation status when "Auto ON" is set in (9) “Bath auto mode setting.”

Supplying hot water: including hot water supply and reheating until the target temperature, until the completion of hot water supply is achieved.

Keeping bath temperature: including hot water addition and reheating to keep the bath temperature.

The bath operation status is "stopped" when "Auto OFF" is set in (9) “Bath auto mode setting.”

9.22.24 Set value of hot water warmer ON timer time property

When the value of the “Hot water warmer ON timer reservation setting” property is “ON,” this property indicates, in the “hour (0x00 to 0x17 (0 to 23)):minute (0x00 to 0x3B (0 to 59))” format, the time at which the value of the “Hot water warmer setting” property (EPC = 0xD2) will change to 0x41 (ON). The higher- and lower-order bytes shall be used for the “hour” and “minute” values, respectively.

9.22.25 ON timer reservation setting property

This property indicates whether or not to use the “automatic bath water heating mode” reservation function. This property is used in combination with the “Set value of ON timer time” or “Set value of ON timer relative time” property.

9.22.26 Set value of ON timer time property

When the value of the “ON timer reservation setting” property is 0x41 (ON), this property indicates, in the “hour (0x00 to 0x17 (0 to 23)):minute (0x00 to 0x3B (0 to 59))” format, the time at which the value of the “Bath auto mode setting” property (EPC = 0xE3) will change to 0x41 (ON). The higher- and lower-order bytes shall be used for the “hour” and “minute” values, respectively.

9.22.27 Set value of ON timer relative time property

When the value of the “ON timer reservation setting” property is 0x41 (ON), this property indicates, in terms of a time relative to the current time, the time at which the value of the “Bath auto mode setting” property (EPC = 0xE3) will change to 0x41 (ON). The data format shall be “hour (0x00 to 0x17 (0 to 23)):minute (0x00 to 0x3B (0 to 59)).” The higher- and lower-order bytes shall be used for the “hour” and “minute” values, respectively.

9.22.28 Volume setting property

“Set” of this property is used to set the volume of operating sounds, voice guidance, notification melodies, interphone and others output from remote controllers and other operating units, etc.

“Get” of this property is used to acquire the value of the current volume setting.

This property indicates the volume value by percentage. The value is 0 (0x00) for the minimum volume and 100 (0x64) for the maximum volume of each device.

9.22.29 Mute setting property

“Set” of this property is used to set the volume mute output from operating units ON and OFF.

“Get” of this property is used to acquire the value of the current mute status.

Mute ON indicates that voice is not output, mute OFF indicates that voice is output.

Property values 0x30 and 0x31 correspond to mute ON and OFF, respectively.

The correlation between the “mute setting” property and the “volume setting” property shall depend on implementation.

EXAMPLE 1

If the value of the volume setting property is 20 when the mute function is OFF, the value of the volume setting property remains unchanged at 20 even after the mute function is turned ON. On the other hand, when the mute function is ON, the value of the volume setting property may be 0 in some cases.

EXAMPLE 2

If the value of the volume setting property is 20 when the mute function is OFF, the value of the volume setting property remains 20 even after the mute function is turned from OFF to ON and back to OFF. On the other hand, the value of the volume setting property may be 0.

9.23 Household solar power generation class specifications

9.23.1 General

The control commands of “household solar power generation” are shown in Table 38.

Class group code : 0x02
Class code : 0x79

Table 38 – List of household solar power generation properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte	—	Set Get	 ○	○	
System interconnection status	0xD0	Indicates system interconnection status System-linked type (reverse power flow OK) = 0x00 Independent type = 0x01 System-linked type (reverse power flow NG) = 0x02	unsigned char	1 byte	–	Get			
Measured instantaneous amount of electricity generated	0xE0	Indicates instantaneous generated power in W. 0x0000 to 0xFFFD (0 to 65 533)	unsigned short	2 bytes	W	Get	○		
Measured cumulative amount of electricity generated	0xE1	Indicates integral electric energy in 0,001 kWh. 0x0 to 0x3B9AC9FF (0 kWh to 999 999,999 kWh)	unsigned long	4 bytes	0,001 kWh	Get	○		
Resetting cumulative amount of electricity generated	0xE2	Resets integral generated electric energy by setting 0x00. Reset = 0x00	unsigned char	1 byte	–	Set			
Measured cumulative amount of electricity sold	0xE3	Indicates integral value of sold power in 0,001 kWh. 0x0 to 0x3B9AC9FF (0 kWh to 999 999,999 kWh)	unsigned long	4 bytes	0,001 kWh	Get			
Resetting cumulative amount of electricity sold	0xE4	Resets integral sold electric energy by setting 0x00. Reset = 0x00	unsigned char	1 byte	–	Set			
Power generation output limit setting 1	0xE5	Used to specify the power generation output as a percentage of the rated power generation output and to acquire the current setting 0x00 to 0x64 (0 % to 100 %)	unsigned char	1 byte	%	Get /Set			
Power generation output limit setting 2	0xE6	Used to specify the power generation output in watts and to acquire the current setting 0x0000 to 00xFFFD (0 to 65 533)	unsigned short	2 bytes	W	Get/ Set			
Limit setting for the amount of electricity sold	0xE7	Used to specify the power generation output in watts and to acquire the current setting. 0x0000 to 00xFFFD (0 to 65 533)	unsigned short	2 bytes	W	Get/ Set			
Rated power generation output	0xE8	Indicates the rated power generation output in watts. 0x0000 to 00xFFFD (0 to 65 533)	unsigned short	2 bytes	W	Get/ Set			

9.23.2 Operation status property

This property indicates whether the function native to this class is operating or not (ON/OFF). In the node mounting this class, if the function of this class is started concurrently with the start of node operation, this property may be implemented at a fixed value of 0x30 (Operation status ON).

9.23.3 System interconnection status property

This property indicates the status of interconnection with the current system (system-interconnected type).

System interconnection (reverse power flow acceptable) = 0x00, Independent type = 0x01, System interconnection (reverse power flow not acceptable) = 0x02.

9.23.4 Measured instantaneous amount of electricity generated property

This property indicates the instantaneous output in watts. The property value range shall be 0x0000 to 0xFFFD. When the property value of the actual piece of equipment is higher than the upper limit of the property value range, the overflow code 0xFFFF shall be used. When the property value is lower than the lower limit of the property value range, the underflow code 0xFFFE shall be used.

9.23.5 Measured cumulative amount of electricity generated property

This property indicates the integral generated electric energy in kilowatt hours (kWh). The property value range shall be 0x00000000 to 0x3B9AC9FF (0 kWh to 999 999 999 kWh). When the integral electric energy overflows, the property value shall be incremented again from 0x00000000.

9.23.6 Resetting cumulative amount of electricity generated property

Resets the integral generated electric energy to zero by setting 0x00.

9.23.7 Measured cumulative amount of electricity sold property

This property indicates the integral sold electric energy in kilowatt hours (kWh). The property value range shall be 0x00000000 to 0x3B9AC9FF (0 kWh to 999 999 999 kWh). When the integral electric energy overflows, the property value shall be incremented again from 0x00000000.

9.23.8 Resetting cumulative amount of electricity sold property

Resets the integral generated electric energy to zero by setting 0x00.

9.23.9 Power generation output limit setting 1 property

This property is used to specify the power generation output as a percentage of the rated power generation output and to acquire the current setting. The value range for this property is from 0 to 100 (from 0x00 to 0x64), and the unit is %. When the value of this property is 100, no limit is imposed. In the case where it is not possible to limit the power generation output using the value specified by this property, the power generation output shall be limited using a value that is closest to and lower than the value specified by this property.

9.23.10 Power generation output limit setting 2 property

This property is used to specify the power generation output in watts and to acquire the current setting. The value range for this property is from 0x0000 to 0xFFFD (from 0 to 65 533). In the case where it is not possible to limit the power generation output using the value specified by this

property, the power generation output shall be limited using a value that is closest to and lower than the value specified by this property.

9.23.11 Limit setting for the amount of electricity sold property

This property is used to specify, in watts, the amount of electricity sold and to acquire the current setting. The value range for this property is from 0x0000 to 0xFFFD (from 0 to 65 533). In the case where it is not possible to limit the amounts of electricity sold using the value specified by this property, the amount of electricity sold shall be limited using a value that is closest to and lower than the value specified by this property.

9.23.12 Rated power generation output property

This property indicates the rated power generation output (catalogue value) in watts. The value range for this property is from 0x0000 to 0xFFFD (from 0 to 65 533).

9.24 Floor heater class specifications

9.24.1 General

The control commands of “floor heater” are shown in Table 39.

Class group code : 0x02
Class code : 0x7B

Table 39 – List of floor heater properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte	—	Set Get	O O	O	
Measured instantaneous power consumption	0x84	This property indicates the instantaneous power consumption of the device in watts 0x0000-0xFFFD (0 – 65 533)	unsigned short	2 bytes	W	Get			
Measured cumulative power consumption	0x85	This property indicates the cumulative power consumption of the device in units of 0,001 kWh 0x00000000 – 0x3B9AC9FF (0 – 999 999,999)	unsigned long	4 bytes	kWh	Get			
Temperature setting 1	0xE0	Indicates set temperature 0x00 to 0x32 (0 °C to 50 °C) AUTO = 0x71	unsigned char	1 byte	°C	Set/Get	O[a]		
Temperature setting 2	0xE1	Indicates set temperature level by 15 steps 0x31 to 0x3F 0x31 indicates the minimum level, 0x3F indicates the maximum level AUTO = 0x41	unsigned char	1 byte	—	Set/Get	O[a]		
Measured room temperature	0xE2	Measured room temperature 0x81 to 0x7D (−127 °C to 125 °C)	signed char	1 byte	°C	Get			
Measured floor temperature	0xE3	Measured floor temperature 0x00 to 0x32 (0 °C to 50 °C)	unsigned char	1 byte	°C	Get			
Zone change setting	0xE4	Sets the target zone for control and gets the number of controllable zones b0 to b7 is allocated to 0 to 7 Each bit 1: with control, 0: without control	unsigned char	1 byte		Set/Get			
Special operation setting	0xE5	Sets normal operation/modest operation/high power operation and gets the status Normal operation = 0x41, modest operation = 0x42, high power operation = 0x43	unsigned char	1 byte	—	Set/Get			
Daily timer setting	0xE6	Daily timer ON/OFF Up to 2 kinds of timers can be used. Timer OFF = 0x40,	unsigned char	1 byte	—	Set/Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		timer 1 = 0x41, timer 2 = 0x42							
Daily timer setting 1	0xE7	Time set by daily timer Sets the time in increments of 30 min, dividing 24 h by 30 min and is allocated to 6 bytes. Each bit 1: in operation 0: stopped	unsigned char x 6	6 bytes	—	Set/Get			
Daily timer setting 2	0xE8	Time set by daily timer Sets the time in increments of 30 min, dividing 24 h by 30 min and allocated to 6 bytes. Each bit 1: in operation 0: stopped	unsigned char x 6	6 bytes	—	Set/Get			
Rated power consumption	0xE9	This property indicates the rated power consumption in watts 0x0000 – 0xFFFD (0 – 65 533)	unsigned short	2 bytes	W	Get			
Power consumption measurement method	0xEA	This property indicates the method of measuring instantaneous power consumption, cumulative power consumption and rated power consumption Node unit = 0x41 Class unit = 0x42 Instance unit = 0x43	unsigned char	1 bytes	—	Get			
ON timer reservation setting	0x90	Reservation ON/OFF ON = 0x41, OFF = 0x42	unsigned char	1 byte	—	Set/Get			
ON timer setting	0x91	Timer value HH:MM 0 to 0x17: 0 to 0x3B (= 0 to 23):(= 0 to 59)	unsigned char x 2	2 bytes	—	Set/Get			
Relative ON timer setting	0x92	Timer value HH:MM 0 to 0x17: 0 to 0x3B (= 0 to 23):(= 0 to 59)	unsigned char x 2	2 bytes	—	Set/Get			
OFF timer reservation setting	0x94	Reservation ON/OFF ON = 0x41, OFF = 0x42	unsigned char	1 byte	—	Set/Get			
OFF timer setting	0x95	Timer value HH:MM 0 to 0x17: 0 to 0x3B (= 0 to 23):(= 0 to 59)	unsigned char x2	2 bytes	—	Set/Get			
Relative OFF timer setting	0x96	Timer value HH:MM 0 to 0x17: 0 to 0x3B (= 0 to 23):(= 0 to 59)	unsigned char x2	2 bytes	—	Set/Get			

[a] Either “temperature setting 1 EPC:0xE0” or “temperature setting 2 EPC:0xE1” shall be specified.

9.24.2 Operation status property

This property indicates ON/OFF of the floor heater. ON/OFF shall correspond to the property value of 0x30/0x31. The access rule “SET” shall be implemented for floor heaters.

9.24.3 Measured instantaneous power consumption

This property indicates the instantaneous power consumption of the floor heater in units of watts. The value range for this property shall be 0x0000-0xFFFD. When the property value of the actual device is higher than the property value range, overflow code 0xFFFF shall be used. When the property value of the actual device is lower than the property value range, underflow code 0xFFFE shall be used.

With floor heaters, if there is more than one class or instance inside a single node, the measured instantaneous power consumption for the whole node may be returned as a common value for any class or instance.

This property is related to “Power consumption measurement method” property.

9.24.4 Measured cumulative power consumption

This property indicates the cumulative power consumption of the floor heater in units of 0,001 kWh. The value range for this property shall be 0x00000000-0x3B9AC9FF (0 – 999 999,999 kWh). When the measured cumulative power consumption overflows, the property value shall be incremented again from 0x00000000.

With floor heaters, if there is more than one class or instance inside a single node, the measured cumulative power consumption for the whole node may be returned as a common value for any class or instance.

This property is related to the property of “Power consumption measurement method”.

9.24.5 Temperature setting 1 property

This property indicates the setting value of temperature in degrees Celsius and sets the property values to be 0 °C to 50 °C (0x00 to 0x32).

When this property indicates an automatic operation worked by an algorithm of automatic temperature setting of the floor heater, AUTO=0x41 (automatic temperature) is set.

The temperature means is controlled by the floor heater (room temperature, floor temperature, etc.) and either kind of temperature can be controlled here.

This property shall be effective even when the value of operation status property (0x80) is OFF (0x31).

Either this property or temperature setting 2 (0xE2) shall be implemented.

9.24.6 Water temperature setting 2 property

This property indicates the setting value of temperature by 15 steps and the property value is 0x31 to 0x3F. Each temperature level does not specify the figures in degrees Celsius, and shall indicate 0x31 for the minimum temperature and 0x3F for the maximum temperature.

When this property indicates an automatic operation worked by an algorithm of automatic temperature setting of the floor heater, AUTO = 0x41 (automatic temperature) is set.

This property shall be effective even when the value of operation status property (0x80) is OFF (0x31).

Either this property or temperature setting 1 (0xE1) shall be implemented.

9.24.7 Measured room temperature

This property indicates the measured temperature in degrees Celsius. The range of the property value shall be −127 °C to 125 °C (0x81 to 0x7D). The property value shall use the overflow code 0x7F when the measured property value is over the range, and shall use the underflow code 0x80 when the measured property value is less than the range. 0x7E shall be used when the measured value cannot be returned.

This property shall be effective even when the value of operation status property (0x80) is OFF (0x31).

9.24.8 Measured floor temperature

This property indicates the measured temperature in degrees Celsius. The range of the property value shall be 0 °C to 50 °C (0x00 to 0x32). The property value shall use the overflow code 0x7F when the measured property value is over the range, and shall use the underflow code 0x80 when the measured property value is less than the range. 0x7E shall be used when the measured value cannot be returned.

9.24.9 Zone change setting property

Sets the target zone and gets the controllable zone when the target floor is divided into zones. The maximum number of zones for the floor is 8 and each zone is explained by a bit map. b0 to b7 are allocated to zones 0 to 7. Each bit shall be 1: with control, and 0: without control.

This property shall be effective even when the value of operation status property (0x80) is OFF (0x31).

9.24.10 Special operation setting property

Sets normal/modest/high power operation and gets the status. This property corresponds to the property value of 0x41/0x42/0x43.

The modest operation temporarily sets the temperature value at a lower temperature for night time or for a time of absence. The high power operation temporarily sets the water temperature at a higher value.

9.24.11 Daily timer setting property

This property sets ON/OFF of the daily timer and gets the status.

2 kinds of daily timers can be used (for weekdays or holidays, for example).

Timer OFF: 0x40, timer 1 ON: 0x41, timer 2 ON: 0x42.

This property shall be effective even when the value of operation status property (0x80) is OFF (0x31).

9.24.12 Daily timer setting 1 / Daily timer setting 2

These properties set the setting values of timer 1 and timer 2 for “daily time setting” and get the status respectively.

24 h are divided by 30 min. The timer is set in increments of 30 min and allocated 6 bytes. 1: in operation or 0: stopped is indicated for each bit. The definition of each bit is shown in Figure 60.

This property shall be effective even when the value of operation status property (0x80) is OFF (0x31).

The 1st byte

b0	b1	b2	b3	b4	b5	b6	b7
0:00-0:29	0:30-0:59	1:00-1:29	1:30-1:59	2:00-2:29	2:30-2:59	3:00-3:29	3:30-3:59

The 2nd byte

b0	b1	b2	b3	b4	b5	b6	b7
4:00-4:29	4:30-4:59	5:00-5:29	5:30-5:59	6:00-6:29	6:30-6:59	7:00-7:29	7:30-7:59

The 3rd byte

b0	b1	b2	b3	b4	b5	b6	b7
8:00-8:29	8:30-8:59	9:00-9:29	9:30-9:59	10:00 -10:29	10:30 -10:59	11:00 -11:29	11:30 -11:59

The 4th byte

b0	b1	b2	b3	b4	b5	b6	b7
12:00 -12:29	12:30 -12:59	13:00 -13:29	13:30 -13:59	14:00 -14:29	14:30 -14:59	15:00 -15:29	15:30 -15:59

The 5th byte

b0	b1	b2	b3	b4	b5	b6	b7
16:00 -16:29	16:30 -16:59	17:00 -17:29	17:30 -17:59	18:00 -18:29	18:30 -18:59	19:00 -19:29	19:30 -19:59

The 6th byte

b0	b1	b2	b3	b4	b5	b6	b7
20:00 -20:29	20:30 -20:59	21:00 -21:29	21:30 -21:59	22:00 -22:29	22:30 -22:59	23:00 -23:29	23:30 -23:59

IEC

Figure 60 – Daily timer setting

9.24.13 Rated power consumption

This property indicates the rated power consumption (catalogue value) in watts. The value range for this property shall be 0x0000-0xFFFD (0 – 65 533). When the property value of the actual device is higher than the property value range, overflow code 0xFFFF shall be used. When lower than the property value range, underflow code 0xFFFE shall be used.

This property shall be guaranteed effective even when the operation status property (0x80) is OFF (0x31).

When using more than one class or instance inside a single node (such as when the target floor is divided into zones for control), the rated power consumption for the whole node may be returned as a common value for any class or instance.

This property is related to the property of “Power consumption measurement method”.

9.24.14 Power consumption measurement method

This property indicates the method of measuring “Measured instantaneous power consumption”, “Measured cumulative power consumption” and “Rated power consumption”. If returning common values inside the same node (if returning a common value for more than one class or instance inside the node), the node unit shall be 0x41.

If returning common values inside the same class (if returning a common value for more than one instance inside the class), the class unit shall be 0x42. Note that the acquirable value is the value for the class in question, and that the total of values for each class is not necessarily the value for the whole node.

If returning different values for each instance, the instance unit shall be 0x43. Note that the acquirable value is the value for the instance in question, and that the total of values for each instance is not necessarily the value for the whole node.

This property is related to “Measured instantaneous power consumption”, “Measured cumulative power consumption” and “Rated power consumption”.

When this property is not installed, the method of measuring “Measured instantaneous power consumption”, “Measured cumulative power consumption” and “Rated power consumption” shall be based on the instance unit.

9.24.15 ON timer reservation setting property

This property sets the reservation ON/OFF of the ON timer. This property is related to “ON timer setting” and “relative ON timer setting”.

Reservation ON = 0x41, OFF = 0x42.

This property shall be effective even when the value of operation status property (0x80) is OFF (0x31).

9.24.16 ON timer setting property

This property indicates the ON time of the floor heater by hours: 0x00 to 0x17 (0 to 23) and minutes: 0x00 to 0x3B (0 to 59) when “ON timer reservation setting” is ON. The property value shall sequentially indicate the hour and minute, beginning with the high-order byte.

This property shall be effective even when the value of operation status property (0x80) is OFF (0x31).

9.24.17 Relative ON timer setting property

This property indicates the ON time of the floor heater by relative time from the current time. The data format is hours: 0x00 to 0x17 (0 to 23) and minutes: 0x00 to 0x3B (0 to 59) when “ON timer reservation setting” is ON. The property value shall sequentially indicate the hour and minute, beginning with the high-order byte.

This property shall be effective even when the value of operation status property (0x80) is OFF (0x31).

9.24.18 OFF timer reservation setting property

This property sets reservation ON/OFF of the OFF timer. This property is related to “OFF timer setting” and “relative OFF timer setting”.

Reservation ON = 0x41, OFF = 0x42.

This property shall be effective even when the value of operation status property (0x80) is OFF (0x31).

9.24.19 OFF timer setting property

This property indicates the OFF time of the floor heater by hours: 0x00 to 0x17 (0 to 23) and minutes: 0x00 to 0x3B (0 to 59) when “OFF timer reservation setting” is ON. The property value shall sequentially indicate the hour and minute, beginning with the high-order byte

This property shall be effective even when the value of operation status property (0x80) is OFF (0x31).

9.24.20 Relative OFF timer setting property

This property indicates the OFF time of the floor heater by relative time from the current time when “OFF timer reservation setting” is ON. The data format is hours: 0x00 to 0x17 (0 to 23) and minutes: 0x00 to 0x3B (0 to 59). The property value shall sequentially indicate the hour and minute, beginning with the high-order byte.

This property shall be effective even when the value of operation status property (0x80) is OFF (0x31).

9.25 Fuel cell class specifications

9.25.1 General

The control commands of “fuel cell” are shown in Table 40.

Class group code : 0x02
Class code : 0x7C

Table 40 – List of fuel cell properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	nsigned har	1 byte	—	Set Get	 O	O	
Measured temperature of water in water heater	0xC1	Indicates the current temperature of the water in the water heater in °C. 0x00 to 0x64 (0 °C to 100 °C)	nsigned har	1 byte	—	Get			
Rated power generation output	0xC2	Indicates the rated power generation output in watts. 0x0000 to 0xFFFD (0 W to 65 533 W)	nsigned hort	2 bytes	W	Get			
Heating value of hot water storage tank	0xC3	Indicates the heating value of the hot water storage tank in MJ. 0x0000 to 0xFFFD (0 MJ to 65 533 MJ)	nsigned hort	2 bytes	MJ	Get			
Measured instantaneous power generation output	0xC4	Indicates the instantaneous power generation output in watts. 0x0000 to 0xFFFD (0 W to 65 533 W)	nsigned hort	2 bytes	W	Get	O		
Measured cumulative power generation output	0xC5	Indicates the cumulative power generation output in increments of 0,001 kWh. 0x0-0x3B9AC9FF (0 kWh to 999 999,999 kWh)	nsigned ong	4 bytes	0,001 kWh	Get	O		
Cumulative power generation output reset setting	0xC6	Resets the cumulative power generation output by writing 0x00.	nsigned har	1 byte	—	Set			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Reset = 0x00							
Measured instantaneous gas consumption	0xC7	Indicates the instantaneous gas consumption in increments of 0,001 m^3. 0x0 to 0xFFFD (0 m^3 to 65 533 m^3)	nsigned hort	2 bytes	),001 m	Get			
Measured cumulative gas consumption	0xC8	Indicates the cumulative gas consumption in increments of 0,001 m^3. 0x0 to 0x3B9AC9FF (0 m^3 to 999 999,999 m^3)	nsigned ong	4 bytes	),001 m	Get			
Cumulative gas consumption reset setting	0xC9	Resets the cumulative gas power generation output by writing 0x00. Reset = 0x00	nsigned har	1 byte	–	Set			
Power generation setting	0xCA	Indicates the ON/OFF status of power generation. Power generation ON = 0x41, Power generation OFF = 0x42	nsigned har	1 byte	–	Set/Get			
Power generation status	0xCB	This property indicates the power generation status. Generating = 0x41, stopped = 0x42, starting = 0x43, stopping = 0x44, idling = 0x45	unsigned char	1 byte	–	Get			
Measured in-house instantaneous power consumption	0xCC	This property indicates the measured in-house instantaneous power consumption in watts. 0x0000 –	unsigned short	2 bytes	W	Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		0xFFFD (0 W – 65 533 W)							
Measured in-house cumulative power consumption	0xCD	This property indicates the measured in-house cumulative power consumption in units of 0,001 kWh. 0x00000000 – 0x3B9AC9FF (0 – 999 999,999 kWh)	unsigned long	4 bytes	0,001 kWh	Get			
In-house cumulative power consumption reset	0xCE	This property is set to 0x00 to reset the in-house cumulative power consumption. Reset = 0x00	unsigned char	1 byte		Set			
System interconnection status	0xD0	Indicates system interconnection status System-linked type (reverse power flow OK) = 0x00 Independent type = 0x01 System-linked type (reverse power flow No Good) = 0x02	unsigned char	11 byte	–	Get			
Measured remaining hot water amount	0xE1	Indicates the measured amount of the remaining hot water in litres. 0x0000 to 0xFFFD (0 l to 65 533 l)	nsigned hort	2 bytes	l	Get			
Tank capacity	0xE2	Indicates the tank capacity in litres. 0x0000 to 0xFFFD (0 l to 65 533 l)	nsigned hort	2 bytes	l	Get			

9.25.2 Operation status property

This property indicates whether the functions specific to this class are operating (ON) or not (OFF). In the case of a node in which this class is implemented and the functions specific to this class start operating upon startup of the node, this property may be implemented with the value fixed at 0x30 (operation status ON).

9.25.3 Measured temperature of water in water heater property

This property indicates the actual temperature of the heated bath water in degrees Celsius (°C). The property value range is from 0x00 to 0x64 (from 0 °C to 100 °C).

9.25.4 Rated power generation output property

This property indicates the rated power generation output in watts. The property value range is from 0x0000 to 0xFFFD. When the property value of the actual device is higher than the upper bound of the value range, 0xFFFF (overflow code) shall be used. When the property value of the actual device is lower than the lower bound of the value range, 0xFFFE (underflow code) shall be used.

9.25.5 Heating value of hot water storage tank property

This property indicates the heating value of the hot water storage tank in mega-joule (MJ). The property value range is from 0x0000 to 0xFFFD. When the property value of the actual device is higher than the upper bound of the value range, 0xFFFF (overflow code) shall be used. When the property value of the actual device is lower than the lower bound of the value range, 0xFFFE (underflow code) shall be used.

9.25.6 Measured instantaneous power generation output property

This property indicates the instantaneous power generation output in watts. The property value range is from 0x0000 to 0xFFFD. When the property value of the actual device is higher than the upper bound of the value range, 0xFFFF (overflow code) shall be used. When the property value of the actual device is lower than the lower bound of the value range, 0xFFFE (underflow code) shall be used.

9.25.7 Measured cumulative power generation output property

This property indicates the cumulative power generation output in increments of 0,001 kWh. The property value range is from 0x00000000 to 0x3B9AC9FF (from 0 kWh to 999 999,999 kWh). In the event of a cumulative power generation output overflow, the counting of the cumulative power generation output shall be restarted from 0x00000000.

9.25.8 Cumulative power generation output reset setting property

This property resets the cumulative power generation output to zero by setting 0x00.

9.25.9 Measured instantaneous gas consumption property

This property indicates the instantaneous gas consumption in increments of 0,001 m^3. The property value range is from 0x0000 to 0xFFFD. When the property value of the actual device is higher than the upper bound of the value range, 0xFFFF (overflow code) shall be used. When the property value of the actual device is lower than the lower bound of the value range, 0xFFFE (underflow code) shall be used.

9.25.10 Measured cumulative gas consumption property

This property indicates the cumulative gas consumption in increments of 0,001 m^3. The property value range is from 0x00000000 to 0x3B9AC9FF (from 0 m^3 to 999 999,999 m^3). In the event of a cumulative gas consumption overflow, the counting of the cumulative gas consumption shall be restarted from 0x00000000.

9.25.11 Cumulative gas consumption reset setting property

This property resets the cumulative gas consumption to zero by setting 0x00.

9.25.12 Power generation setting property

This property indicates the status of the household-use fuel cell-based power generation. The property value for power generation ON is 0x41, and the property value for power generation OFF is 0x42.

9.25.13 Power generation status property

This property indicates the power generation status of the fuel cell. The property value for generating is 0x41, the property value for stopped is 0x42, the property value for starting is 0x43, the property value for stopping is 0x44 and the property value for idling is 0x45.

9.25.14 Measured in-house instantaneous power consumption property

This property indicates the in-house instantaneous power consumption in watts. The property value range is 0x0000 to 0xFFFD. When the property value of the actual device is higher than the value range of this property, the overflow code 0xFFFF shall be used. When the property value is lower than the value range of this property, the underflow code 0xFFFE shall be used.

In-house instantaneous power consumption is the sum of power where an anti-reverse power flow CT is installed and the power output.

9.25.15 Measured in-house cumulative power consumption property

This property indicates the in-house cumulative power consumption in units of 0,001 kWh. The property value range is 0x00000000 to 0x3B9AC9FF (0 to 999 999,999 kWh) and increments again from 0x00000000 in case of a cumulative power consumption overflow.

In-house cumulative power consumption is the sum of power where an anti-reverse power flow CT is installed and the power output.

9.25.16 In-house cumulative power consumption reset property

This property is set to 0x00 to reset the in-house cumulative power consumption to zero.

In-house cumulative power consumption is the sum of power where an anti-reverse power flow CT is installed and the power output.

9.25.17 System-interconnected type property

This property indicates the status of interconnection with the current system (system-interconnected type).

System interconnection (reverse power flow acceptable) = 0x00, Independent type = 0x01, System interconnection (reverse power flow not acceptable) = 0x02.

9.25.18 Measured remaining hot water amount property

This property indicates the amount of hot water remaining in the tank in litres. The property value range is 0x0000 to 0xFFFD (0 l to 65 533 l). When the property value of the actual device is higher than the upper bound of the value range, 0xFFFF (overflow code) shall be used. When the property value of the actual device is lower than the lower bound of the value range, 0xFFFE (underflow code) shall be used.

9.25.19 Tank capacity property

This property indicates the tank capacity in litres. The property value range is 0x0000 to 0xFFFD (0 l to 65 533 l). When the property value of the actual device is higher than the upper bound of the value range, 0xFFFF (overflow code) shall be used. When the property value of the actual device is lower than the lower bound of the value range, 0xFFFE (underflow code) shall be used.

9.26 Storage battery class specifications

9.26.1 General

Class group code: 0x02

Class code: 0x7D

In this class, electric current, voltage, and energy values shall be those of AC. An example configuration is shown in Figure 61. The control commands of "storage battery" are shown in Table 41.

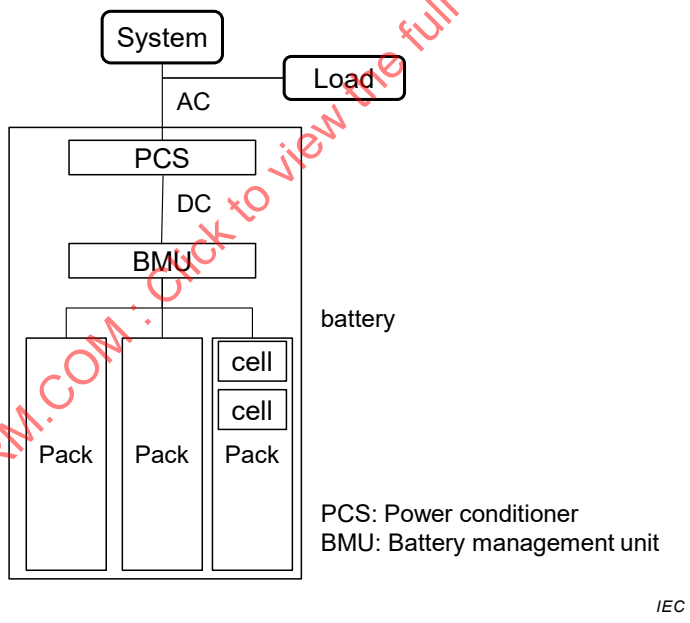


Figure 61 – Example of the battery configuration

Table 41 – List of storage battery properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte	–	Set Get	 ○	○	
Minimum/ maximum charging electric energy	0xC8	This property indicates the minimum/maximum electric energy for charging in watts. 0x00000000–0x3B9AC9FF (0 W to 999 999 999 W) Minimum: maximum	unsigned long × 2	8 bytes	W	Get			
Minimum/ maximum discharging electric energy	0xC9	This property indicates the minimum/maximum electric energy for discharging in watts. 0x00000000–0x3B9AC9FF (0 W to 999 999 999 W) Minimum: maximum	unsigned long × 2	8 bytes	W	Get			
Minimum/ maximum charging current	0xCA	This property indicates the minimum/maximum current for charging in units of 0,1 A. 0x0000–0x7FFE (0 A to 3 276,6 A) Minimum: maximum	unsigned short × 2	4 bytes	0,1 A	Get			
Minimum/ maximum discharging current	0xCB	This property indicates the minimum/maximum current for discharging in units of 0,1 A. 0x0000–0x7FFE (0 A to 3 276,6 A) Minimum: maximum	unsigned short × 2	4 bytes	0,1 A	Get			
Working operation status	0xCF	This property indicates the working operation status. Rapid charging = 0x41, Charging = 0x42, Discharging = 0x43, Standby = 0x44, Test = 0x45, Other = 0x40	unsigned char	1 byte	–	Get	○	○	
Rated electric energy	0xD0	This property indicates the rated electric energy of the battery in Wh. 0x00000000–0x3B9AC9FF (0 Wh to 999 999 999 Wh)	unsigned long	4 bytes	Wh	Get			
Rated capacity	0xD1	This property indicates the rated charging capacity of the battery in units of 0,1 Ah. 0x0000–0x7FFE (0 Ah to 3 276,6 Ah)	unsigned short	2 bytes	0,1Ah	Get			
Rated voltage	0xD2	This property indicates the rated voltage of the battery in volts. 0x0000–0x7FFE (0 V to 32 766 V)	unsigned short	2 bytes	V	Get			
Measured instan-taneous charging/	0xD3	This property indicates the measured instantaneous charging/discharging electric energy in watts	signed long	4 bytes	W	Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
discharging electric energy		(positive/negative). 0x00000001–0x3B9AC9FF (1 W to 999 999 999 W): during charging (positive value), 0xFFFFFFFF–0xC4653601 (−1 W to −999 999 999 W): during discharging (negative value)							
Measured instan-taneous charging/ discharging current	0xD4	This property indicates the measured instantaneous charging/discharging current in units of 0,1 A (positive/negative). 0x0001–0x7FFE (0,1–3 276,6 A): during charging (positive value), 0xFFFF–0x8001 (−0,1 to−3 276,7 A): during discharging (negative value)	signed short	2 bytes	0,1 A	Get			
Measured instan-taneous charging/ discharging voltage	0xD5	This property indicates the measured instantaneous charging/discharging voltage in volts (positive/negative). 0x0001–0x7FFE (1 V to 32 766 V): during charging (positive value), 0xFFFF–0x8001 (−1 V to −32 767 V): during discharging (negative value)	signed short	2 bytes	V	Get			
Measured cumulative discharging electric energy	0xD6	This property indicates the measured cumulative discharging electric energy in units of 0,001 kWh. 0x00000000–0x3B9AC9FF (0 kWh to 999 999,999 kWh)	unsigned long	4 bytes	0,001 kWh	Get			
“Measured cumulative discharging electric energy” reset setting	0xD7	Resets “Measured cumulative discharging electric energy” to zero. Reset = 0x00	unsigned char	1 byte	–	Set			
Measured cumulative charging electric energy	0xD8	This property indicates the measured cumulative charging electric energy in units of 0,001 kWh. 0x00000000–0x3B9AC9FF (0 kWh to 999 999,999 kWh)	unsigned long	4 bytes	0,001 kWh	Get			
“Measured cumulative charging electric energy” reset setting	0xD9	Resets “Measured cumulative charging electric energy” to zero. Reset = 0x00	unsigned char	1 byte	—	Set			
Operation mode setting	0xDA	Sets the battery to one of the following operation modes: “Rapid charging,” “Charging,” “Discharging,” “Standby,” “Test,” “Auto” or “Others.” Rapid charging = 0x41, Charging = 0x42, Discharging = 0x43,	unsigned char	1 byte	–	Set/Get	O	O	

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Standby = 0x44, Test = 0x45, Auto = 0x46, Others = 0x40							
System-interconnected type	0xDB	This property indicates the status of connection with the current system (system interconnection status). System interconnection (reverse power flow acceptable) = 0x00, Independent type = 0x01, System-interconnected type (reverse power flow not acceptable) = 0x02	unsigned char	1 byte	–	Get			
Minimum/maximum charging power (independent)	0xDC	This property indicates the minimum and maximum values of charging power battery in watts in the dependent status. 0x00000000–0x3B9AC9FF (0 W to 999 999 999 W) Minimum charging power: Maximum charging power	unsigned long × 2	8 bytes	W	Get			
Minimum/maximum discharging power (independent)	0xDD	This property indicates the minimum and maximum values of discharging power from the battery in the independent status in watts. 0x00000000–0x3B9AC9FF (0 W to 999 999 999 W) Minimum discharging power: Maximum discharging power	unsigned long × 2	8 bytes	W	Get			
Minimum/maximum charging current (independent)	0xDE	This property indicates the minimum and maximum values of a charging current to the battery in the independent status in units of 0,1 A. 0x0000–0x7FFE (0 A to 3 276,6 A) Minimum charging current: Maximum charging current	unsigned short × 2	4 bytes	0,1 A	Get			
Minimum/maximum discharging current (independent)	0xDF	This property indicates the minimum and maximum values of a discharging current in the independent status in units of 0,1 A. 0x0000–0x7FFE (0 A to 3 276,6 A) Minimum discharging current: Maximum discharging current	unsigned short × 2	4 bytes	0,1 A	Get			
Charging/discharging amount setting 1	0xE0	Used to specify the charging/discharging electric energy in Wh (positive/negative). 0x00000001–0x3B9AC9FF (1 Wh to 999 999 999 Wh): during charging (positive value), 0xFFFFFFFF–0xC4653601 −1 Wh to −999 999 999 Wh): during discharging (negative	signed long	4 bytes	Wh	Set/Get			a

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		value)							
Charging/ discharging amount setting 2	0xE1	Used to specify the charging/discharging capacity in units of 0,1 Ah (positive/negative). 0x0001–0x7FFD (0,1 Ah to 3 276,6 Ah): during charging (positive value), 0xFFFF–0x8001 (−0,1 Ah to −3 276,7 Ah): during discharging (negative value)	signed short	2 bytes	0,1 Ah	Set/Get			a
Remaining stored electricity 1	0xE2	This property indicates the remaining stored electric energy in Wh. 0x00000000–0x3B9AC9FF (0 Wh to 999 999 999 Wh)	unsigned long	4 bytes	Wh	Get	O		b
Remaining stored electricity 2	0xE3	This property indicates the remaining capacity in units of 0,1 Ah. 0x0000–0x7FFE (0 Ah to 3 276,6 Ah)	unsigned short	2 bytes	0,1 Ah	Get	O		b
Remaining stored electricity 3	0xE4	This property indicates the charging rate of the battery in %. 0x00–0x64 (0 % to 100 %)	unsigned char	1 byte	%	Get	O		b
Battery state of health	0xE5	This property indicates the battery state of health in %. 0x00–0x64 (0% to 100 %)	unsigned char	1 byte	%	Get			
Battery type	0xE6	This property indicates the battery type. Type = 0x00–0xFF	unsigned char	1 byte		Get	O		
Charging amount setting 1	0xE7	This property specifies the charging electric energy in Wh. 0x00000000–0x3B9AC9FF (0 Wh to 999 999 999 Wh)	unsigned long	4 bytes	Wh	Set/Get			c
Discharging amount setting 1	0xE8	This property specifies the discharging electric energy in Wh. 0x00000000–0x3B9AC9FF (0 Wh to 999 999 999 Wh)	unsigned long	4 bytes	Wh	Set/Get			d
Charging amount setting 2	0xE9	This property specifies the charging capacity in units of 0,1 Ah. 0x0000–0x7FFE (0 Ah to 3 276,6 Ah)	unsigned short	2 bytes	0,1 Ah	Set/Get			c
Discharging amount setting 2	0xEA	This property specifies the discharging capacity in units of 0,1 Ah. 0x0000–0x7FFE (0 Ah to 3 276,6 Ah)	unsigned short	2 bytes	0,1 Ah	Set/Get			d
Charging electric energy setting	0xEB	This property specifies the charging electric energy in watts. 0x00000000–0x3B9AC9FF (0 Wh to 999 999 999 Wh)	unsigned long	4 bytes	W	Set/Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Discharging electric energy setting	0xEC	This property specifies the discharging electric energy in watts. 0x00000000–0x3B9AC9FF (0 Wh to 999 999 999 Wh)	unsigned long	4 bytes	W	Set/Get			
Charging current setting	0xED	This property specifies the charging current in units of 0,1 A. 0x0000–0xFFFD (0 A to 6 553,3 A)	unsigned short	2 bytes	0,1 A	Set/Get			
Discharging current setting	0xEE	This property specifies the discharging current in units of 0,1 A. 0x0000–0xFFFD (0 A to 6 553,3 A)	unsigned short	2 bytes	0,1 A	Set/Get			
Rated voltage (Indepen-dent)	0xEF	This property indicates the rated voltage of a battery in the independent status in volts. 0x0000–0x7FFE (0 V to 32 766 V)	unsigned short	2 bytes	V	Get			

[a] When Charging/discharging amount setting 1 (or 2) is used, Charging/discharging amount setting 2 (or 1), Charging amount setting 1, Discharging amount setting 1, Charging amount setting 2, and Discharging amount setting 2 shall not be used.

[b] It is mandatory to install Remaining stored electricity 1, Remaining stored electricity 2, or Remaining stored electricity 3.

[c] When Charging amount setting 1 (or 2) is used, Charging amount setting 2 (or 1) and Charging/discharging amount setting 1 and 2 shall not be used.

[d] When Discharging amount setting 1 (or 2) is used, Discharging amount setting 2 (or 1) and Charging/discharging amount setting 1 and 2 shall not be used.

9.26.2 Operation status property

This property indicates whether the functions specific to this class are operating (ON) or not (OFF). In the case of a node in which this class is implemented and the functions specific to this class start operating upon startup of the node, this property may be implemented with the value fixed at 0x30 (operation status ON). When the property value is 0x31 (OFF), values specified and acquired with other properties are not guaranteed, unless otherwise specified in this document.

9.26.3 Minimum/maximum charging electric energy property

This property indicates the minimum/maximum electric energy for charging in watts when the system-interconnected status is system-interconnected (reverse power flow acceptable) or system-interconnected (reverse power flow not acceptable). The property value range is 0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W) and the property value shall be derived from the high-order bytes in order of minimum and maximum. When the property value of the actual device is higher than the upper limit of the value range, 0xFFFFFFFF (overflow code) shall be used. If the charging function is not supported, the value shall be 0. When the “Minimum/maximum charging power (independent)” property (EPC = 0xDC) is not used, the value of this property may also be used as the value in the independent status.

9.26.4 Minimum/maximum discharging electric energy property

This property indicates the minimum/maximum electric energy for discharging in watts when the system-interconnected status is system-interconnected (reverse power flow acceptable) or system-interconnected (reverse power flow not acceptable). The value range of the property

shall be from 0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W) and the property value shall be derived from the high-order bytes in order of minimum and maximum. When the property value of the actual device is higher than the upper limit of the value range, 0xFFFFFFFF (overflow code) shall be used. If the discharging function is not supported, the value shall be 0. When the “Minimum/maximum discharging power (independent)” property (EPC = 0xDD) is not used, the value of this property may also be used as the value in the independent status.

9.26.5 Minimum/maximum charging current property

This property indicates the minimum/maximum current for charging in units of 0,1 A when the system-interconnected status is system-interconnected (reverse power flow acceptable) or system-interconnected (reverse power flow not acceptable). The property value range is 0x0000 to 0x7FFE (0 A to 3 276,6 A) and the property value shall be derived from the high-order bytes in order of minimum and maximum. When the property value of the actual device is higher than the upper limit of the value range, 0xFFFF (overflow code) shall be used. If the charging function is not supported, the value shall be 0. When the “Minimum/maximum charging current (independent)” property (EPC = 0xDE) is not used, the value of this property may also be used as the value in the independent status.

9.26.6 Minimum/maximum discharging current property

This property indicates the minimum/maximum current for discharging in units of 0,1 A when the system-interconnected status is system-interconnected (reverse power flow acceptable) or system-interconnected (reverse power flow not acceptable). The property value range is from 0x0000 to 0x7FFE (0 A to 3 276,6 A) and the property value shall be derived from the high-order bytes in order of minimum and maximum. When the property value of the actual device is higher than the upper limit of the value range, 0xFFFF (overflow code) shall be used. If the discharging function is not supported, the value shall be 0. When the “Minimum/maximum discharging current (independent)” property (EPC = 0xDF) is not used, the value of this property may also be used as the value in the independent status.

9.26.7 Working operation status property

This property indicates the storage battery working operation status as Rapid charging (0x41), Charging (0x42), Discharging (0x43), Standby (0x44), Test (0x45), or Other (0x40). The Charging, Discharging, and Standby operation status are mandatory.

9.26.8 Rated electric energy property

This property indicates the rated electric energy (catalogue value) in Wh. The property value range is 0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh).

9.26.9 Rated capacity property

This property indicates the rated capacity (catalogue value) in increments of 0,1 Ah. The property value range is 0x0000 to 0x7FFE (0 Ah to 3 276,6 Ah). Note that the capacity usable as a system may be smaller than the rated capacity, depending on the life of the battery, the provision of emergency backup and other factors.

9.26.10 Rated voltage property

This property indicates the rated voltage (catalogue value) in volts when the system-interconnected status is system-interconnected (reverse power flow acceptable) or system-interconnected (reverse power flow not acceptable). The property value range is 0x0000 to 0x7FFE (0 V to 32 766 V). When the “Rated voltage (independent)” property (EPC = 0xEF) is not used, the value of this property may also be used as the value in the independent status.

9.26.11 Measured instantaneous charging/discharging electric energy property

This property indicates the measured instantaneous charging/discharging electric energy in watts. The property value range is 0x00000001 to 0x3B9AC9FF (1 W to 999 999 999 W) for charging and 0xFFFFFFFF to 0xC4653601 (−1 W to −999 999 999 W) for discharging. When the property value of the actual device is higher than the upper limit of the value range, 0x7FFFFFFF (overflow code) shall be used. When the property value of the actual device is lower than the lower limit of the value range, 0x80000000 (underflow code) shall be used. When neither charging nor discharging is being performed, the property value shall be 0.

9.26.12 Measured instantaneous charging/discharging current property

This property indicates the measured instantaneous charging/discharging current in units of 0,1 A. The property value range is 0x0001 to 0x7FFE (0,1 to 3 276,6 A) for charging and 0xFFFF to 0x8001 (−0,1 to −3 276,7 A) for discharging. When the property value of the actual device is higher than the upper limit of the value range, 0x7FFF (overflow code) shall be used. When the property value of the actual device is lower than the lower limit of the value range, 0x8000 (underflow code) shall be used. When neither charging nor discharging is being performed, the property value shall be 0.

9.26.13 Measured instantaneous charging/discharging voltage property

This property indicates the measured instantaneous charging/discharging voltage in volts. The property value range is 0x0001 to 0x7FFE (1 V to 32 766 V) for charging and 0xFFFF to 0x8001 (−1 V to −32 767 V) for discharging. When the property value of the actual device is higher than the upper limit of the value range, 0x7FFF (overflow code) shall be used. When the property value of the actual device is lower than the lower limit of the value range, 0x8000 (underflow code) shall be used. When neither charging nor discharging is being performed, the property value shall be 0.

9.26.14 Measured cumulative discharging electric energy property

This property indicates the measured cumulative discharging electric energy in units of 0,001 kWh. The property value range is 0x00000000 to 0x3B9AC9FF (0 kWh to 999 999 999 kWh). In the event of a cumulative discharging electric energy overflow, the counting of the cumulative discharging electric energy shall be restarted from 0x00000000.

9.26.15 “Measured cumulative discharging electric energy” resetting property

This property resets “Measured cumulative discharging electric energy” to zero by setting 0x00.

9.26.16 Measured cumulative charging electric energy property

This property indicates the measured cumulative charging electric energy in units of 0,001 kWh. The property value range is 0x00000000 to 0x3B9AC9FF (0 kWh to 999 999,999 kWh). In the event of a cumulative charging electric energy overflow, the counting of the cumulative charging electric energy shall be restarted from 0x00000000.

9.26.17 “Measured cumulative charging electric energy” resetting property

This property resets “Measured cumulative charging electric energy” to zero by setting 0x00.

9.26.18 Operation mode setting property

This property indicates the operation mode. The property value shall be 0x41 (Rapid charging), 0x42 (Charging), 0x43 (Discharging), 0x44 (Standby), 0x45 (Test), 0x46 (Auto) or 0x40 (Others). “Auto” is the mode where the storage battery is assumed to operate autonomously. The implementation of operation modes such as charging/discharging and standby mode is mandatory. The various operating modes (charging, discharging, and standby) are mandatory. Depending on the system status, it may not always be possible to operate according to the operating mode setting. The actual status of storage battery charging or discharging, etc., is

indicated by the working operation status. Even when operation according to the operating mode setting is not possible, it is recommended that the operating mode setting be kept.

9.26.19 System-interconnected type property

This property indicates the status of interconnection with the current system (system-interconnected type).

System interconnection (reverse power flow acceptable) = 0x00, Independent type = 0x01, System interconnection (reverse power flow not acceptable) = 0x02.

9.26.20 Minimum/maximum charging power (Independent) property

This property indicates the minimum and maximum values of charging power in watts when the system-interconnected type is independent. The range of each value is 0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W). From the higher-order bytes, the property value shall be in order of minimum and maximum values. When the property value of the actual device is higher than the value range of this property, the overflow code 0xFFFFFFFF shall be used. If no charging function is supported, the value shall be 0. When this property is not used, the "Minimum/maximum charging power (independent)" property (EPC = 0xC8) may be used.

9.26.21 Minimum/maximum discharging power (Independent) property

This property indicates the minimum and maximum values of charging power in watts when the system-interconnected type is independent. The range of each value is 0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W). From the higher-order bytes, the property value shall be in order of minimum and maximum values. When the property value of the actual device is higher than the value range of this property, the overflow code 0xFFFFFFFF shall be used. If no discharging function is supported, the value shall be 0. When this property is not used, the "Minimum/maximum discharging power (independent)" property (EPC = 0xC9) may be used.

9.26.22 Minimum/maximum charging current (Independent) property

This property indicates the minimum and maximum values of charging current in units of 0,1 A when the system-interconnected type is independent. The range of each value is 0x0000 to 0x7FFE (0 A to 3 276,6 A). From the higher-order bytes, the property value shall be in order of minimum and maximum values. When the property value of the actual device is higher than the value range of this property, the overflow code 0xFFFF shall be used. If no charging function is supported, the value shall be 0. When this property is not used, the "Minimum/maximum charging current (independent)" property (EPC = 0xCA) may be used.

9.26.23 Minimum/maximum discharging current (Independent) property

This property indicates the minimum and maximum values of discharging current in units of 0,1 A when the system-interconnected type is independent. The range of each value is 0x0000 to 0x7FFE (0 A to 3 276,6 A). From the higher-order bytes, the property value shall be in order of minimum and maximum values. When the property value of the actual device is higher than the value range of this property, the overflow code 0xFFFF shall be used. If no discharging function is supported, the value shall be 0. When this property is not used, the "Minimum/maximum discharging current (independent)" property (EPC = 0xCB) may be used.

9.26.24 Charging/discharging amount setting 1 property

Specifies the charging/discharging electric energy in Wh (positive/negative). Note that this property does not specify the battery level after charging or discharging. The property value range is 0x00000001 to 0x3B9AC9FF (1 Wh to 999 999 999 Wh) for charging and 0xFFFFFFFF to 0xC4653601 (−1 Wh to −999 999 999 Wh) for discharging. The charging/discharging status will not affect the value. When charging/discharging is completed, the operation mode changes to standby. For complete charging, this value shall be set equal to or greater than the rated electric energy. For complete discharging, this value shall be set equal to or greater than the rated electric energy with the negative sign.

9.26.25 Charging/discharging amount setting 2 property

Specifies the charging/discharging capacity in units of 0,1 Ah (positive/negative). Note that this property does not specify the battery level after charging or discharging. The property value range is 0x0001 to 0x7FFE (0,1 Ah to 3 276,6 Ah) for charging and 0xFFFF to 0x8001 (−0,1 Ah to −3 276,7 Ah) for discharging. The charging/discharging status will not affect the value. When charging/discharging is completed, the operation mode changes to standby. For complete charging, this value shall be set equal to or greater than the rated electric energy. For complete discharging, this value shall be set equal to or greater than the rated electric energy with the negative sign.

9.26.26 Remaining stored electricity 1 property

This property indicates the remaining stored electric energy during discharging at the rated discharging current in Wh. The property value range is 0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh). When the remaining stored electricity in Wh is calculated from the values of other remaining stored electricity properties, if the value of this object is provided when indicating the Wh units of remaining stored electricity in terminals, etc., the provided value shall be indicated. This is to avoid situations such as a discrepancy compared to the Wh indicated for the main unit.

9.26.27 Remaining stored electricity 2 property

This property indicates the remaining capacity during discharging at the rated discharging current in units of 0,1 Ah. The property value range is 0x0000 to 0x7FFE (0 Ah to 3 276,6 Ah). When the remaining stored electricity in Ah is calculated from the values of other remaining stored electricity properties, if the value of this object is provided when indicating the Ah units of remaining stored electricity in terminals, etc., the provided value shall be indicated. This is to avoid situations such as a discrepancy compared to the Ah indicated for the main unit.

9.26.28 Remaining stored electricity 3 property

This property indicates the charging rate of the battery in % ((remaining stored electricity) / (full charging capacity) × 100). The property value range is 0x00 to 0x64 (0 to 100). When the remaining stored electricity in % is calculated from the values of other remaining stored electricity properties, if the value of this object is provided when indicating the % units of remaining stored electricity in terminals, etc., the provided value shall be indicated. This is to avoid situations such as a discrepancy compared to the % indicated for the main unit.

9.26.29 Deterioration status property

This property indicates the deterioration (soundness) status of the battery in %. The property value range is 0x00 to 0x64 (0 to 100).

For example: ((full charging capacity after deterioration)/(initial full charging capacity) × 100).

9.26.30 Battery type property

This property indicates the battery type. The property value shall be 0x00 (unknown), 0x01 (lead), 0x02 (nickel-metal hydride), 0x03 (nickel-cadmium), 0x04 (lithium ion), 0x05 (zinc) or 0x06 (rechargeable alkaline). The values from 0x07 to 0xFF are reserved for future use.

9.26.31 Charging amount setting 1 property

This property specifies the charging electric energy in Wh. (Note that this property does not specify the battery level after charging.) The property value range is 0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh). The charging status will not affect the value. When charging is completed, the operation mode changes to standby. For complete charging, this value shall be set equal to or greater than the rated electric energy.

9.26.32 Discharging amount setting 1 property

This property specifies the discharging electric energy in Wh. (Note that this property does not specify the battery level after discharging.) The property value range is 0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh). The discharging status will not affect the value. When discharging is completed, the operation mode changes to standby. For complete discharging, this value shall be set equal to or greater than the rated electric energy.

9.26.33 Charging amount setting 2 property

This property specifies the charging capacity in units of 0,1 Ah. (Note that this property does not specify the battery level after charging.) The property value range is 0x0000 to 0x7FFE (0 Ah to 3 276,6 Ah). The charging status will not affect the value. When charging is completed, the operation mode changes to standby. For complete charging, this value shall be set equal to or greater than the rated capacity.

9.26.34 Discharging amount setting 2 property

This property specifies the discharging capacity in units of 0,1 Ah. (Note that this property does not specify the battery level after discharging.) The property value range is 0x0000 to 0x7FFE (0 Ah to 3 276,6 Ah). The discharging status will not affect the value. When discharging is completed, the operation mode changes to standby. For complete discharging, this value shall be set equal to or greater than the rated capacity.

9.26.35 Charging electric energy setting property

This property specifies the charging electric energy in watts. The property value range is 0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W).

9.26.36 Discharging electric energy setting property

This property specifies the discharging electric energy in watts. The property value range is 0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W).

9.26.37 Charging current setting property

This property specifies the charging current in units of 0,1 A. The property value range is 0x0000 to 0xFFFD (0 A to 6 553,3 A).

9.26.38 Discharging current setting property

This property specifies the discharging current in units of 0,1 A. The property value range is 0x0000 to 0xFFFD (0 A to 6 553,3 A).

9.26.39 Rated voltage (Independent) property

This property indicates the rated voltage (catalogue value) in volts when the system-interconnected type is independent. The property value range is 0x0000 to 0x7FFE (0 V to 32 766 V). When this property is not used, the “Rated voltage (independent)” property (EPC = 0xD2) may be used.

9.27 Electric vehicle charge-discharge system class specifications

9.27.1 General

AC shall be assumed for currents, voltages, and electric energies handled in this class. The control commands of “electric vehicle charge-discharge system” are shown in Table 42.

Class group code: 0x02

Class code: 0x7E

Table 42 – List of electric vehicle charge-discharge system properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte	–	Set Get	 O	O	
Discharge-able capacity of vehicle mounted battery 1	0xC0	This property indicates the dischargeable capacity of an electric vehicle mounted battery connected to an electric vehicle charger/discharger in Wh. 0x00000000–0x3B9AC9FF (0 Wh to 999 999 999 Wh)	unsigned long	4 bytes	Wh	Get	O		a
Discharge-able capacity of vehicle mounted battery 2	0xC1	This property indicates the dischargeable capacity of an electric vehicle mounted battery connected to an electric vehicle charger/discharger in units of 0,1 Ah. 0x0000–0x7FFE (0 Ah to 3 276,6 Ah)	unsigned short	2 bytes	0,1 Ah	Get	O		a
Remaining discharge-able capacity of vehicle mounted battery 1	0xC2	This property indicates the remaining dischargeable capacity of an electric vehicle mounted battery connected to an electric vehicle charger/discharger in Wh. 0x00000000–0x3B9AC9FF (0 Wh to 999 999 999 Wh)	unsigned long	4 bytes	Wh	Get	O		b
Remaining discharge-able capacity of vehicle mounted battery 2	0xC3	This property indicates the remaining dischargeable capacity of an electric vehicle mounted battery connected to an electric vehicle charger/discharger in units of 0,1 Ah. 0x0000–0x7FFE (0 Ah to 3 276,6 Ah)	unsigned short	2 bytes	0,1 Ah	Get	O		b
Remaining discharge-able capacity of vehicle mounted battery 3	0xC4	This property indicates the remaining dischargeable capacity of an electric vehicle mounted battery connected to an electric vehicle charger/discharger in %. 0x00–0x64 (0 % to 100 %)	unsigned char	1 byte	%	Get	O		b
Rated charge capacity	0xC5	This property indicates the rated charge capacity of an electric vehicle charger/discharger in W. 0x00000000–0x3B9AC9FF (0 W to 999 999 999 W)	unsigned long	4 bytes	W	Get	O		
Rated discharge capacity	0xC6	This property indicates the rated discharge capacity of an electric vehicle charger/discharger in W. 0x00000000–0x3B9AC9FF (0 W to 999 999 999 W)	unsigned long	4 bytes	W	Get	O		
Vehicle connection and	0xC7	This property indicates whether an electric vehicle charger/discharger can be	unsigned char	1 byte	—	Get	O	O	

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
chargeable/ discharge-able status		charged or discharged. Undetermined = 0xFF Vehicle not connected = 0x30 Connected to vehicle, Not chargeable, Not dischargeable = 0x40 Connected to vehicle, Chargeable, Not dischargeable = 0x41 Connected to vehicle, Not chargeable, Dischargeable = 0x42 Connected to vehicle, Chargeable, Dischargeable = 0x43							
Minimum/ maximum charging electric energy	0xC8	This property indicates the minimum and maximum values of charging electric energy to an electric vehicle charger/discharger in W. 0x00000000–0x3B9AC9FF (0 W to 999 999 999 W) Minimum charging electric energy: Maximum charging electric energy	unsigned long × 2	8 bytes	W	Get	O		
Minimum/ maximum discharging electric energy	0xC9	This property indicates the minimum and maximum values of discharging electric energy from a vehicle charger/discharger in W. 0x00000000–0x3B9AC9FF (0 W to 999 999 999 W) Minimum discharging electric energy: Maximum discharging electric energy	unsigned long × 2	8 bytes	W	Get	O		
Minimum/ maximum charging current	0xCA	This property indicates the minimum and maximum values of charging electric energy to an electric vehicle charger/discharger in units of 0,1 A. 0x0000–0x7FFE (0 A to 3 276,6 A) Minimum charging current: Maximum charging current	unsigned short × 2	4 bytes	0,1 A	Get	O		
Minimum/ maximum discharging current	0xCB	This property indicates the minimum and maximum values of discharging electric energy from an electric vehicle charger/discharger in units of 0,1 A. 0x0000–0x7FFE (0 A to 3 276,6 A) Minimum discharging current: Maximum discharging current	unsigned short × 2	4 bytes	0,1 A	Get	O		
Charger/ discharger type	0xCC	This property indicates the type of electric vehicle charger/discharger AC_HLC (charging	unsigned char	1 byte	—	Get	O		[f]

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		only) = 0x12 AC_HLC (charging/discharging possible) = 0x13 DC_type AA (charging only)=0x21 DC_type AA (charging/discharging possible)=0x22 DC_type AA (discharging only)=0x23 DC_type BB (charging only)=0x31 DC_type BB(charging/discharging possible)=0x32 DC_type BB (discharging only)=0x33 DC_type EE(charging only)=0x41 DC_type EE (charging/discharging possible)=0x42 DC_type EE (discharging only)=0x43 DC_type FF (charging only)=0x51 DC_type FF (charging/discharging possible)=0x52 DC_type FF (discharging only)=0x53							
Vehicle connection confirmation	0xCD	Confirms the connection status between an electric vehicle charger/discharger and a vehicle Connection confirmation = 0x10	unsigned char	1 byte	—	Set	O		g
Used capacity of vehicle mounted battery 1	0xD0	This property indicates the capacity of an electric vehicle mounted battery connected to an electric vehicle charger/discharger in Wh. 0x00000000–0x3B9AC9FF (0 Wh to 999 999 999 Wh)	unsigned long	4 bytes	Wh	Get	O		c
Used capacity of vehicle mounted battery 2	0xD1	This property indicates the capacity of an electric vehicle mounted battery connected to an electric vehicle charger/discharger in units of 0,1 Ah. 0x0000–0x7FFE (0 Ah to 3 276,6 Ah)	unsigned short	2 bytes	0,1 Ah	Get			
Rated voltage	0xD2	This property indicates the normal rated voltage of an electric vehicle charger/discharger in V. 0x0000–0x7FFE	unsigned short	2 bytes	V	Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		(0 V to 32 766 V)							
Measured instantaneous charging/discharging electric energy	0xD3	This property indicates the measured instantaneous charging/discharging electric energy in ±W. 0x00000001–0x3B9AC9FF (1 W to 999 999 999 W): charging (positive), 0xFFFFFFFF–0xC4653601 (−1 W to −999 999 999 W): discharging (negative)	signed long	4 bytes	W	Get			
Measured instantaneous charging/discharging current	0xD4	This property indicates the instantaneous charging/discharging current in units of ±0,1 A. 0x0001–0x7FFE (0,1 A to 3 276,6 A): charging (positive), 0xFFFF–0x8001 (−0,1 A to −3 276,7 A): discharging (negative)	signed short	2 bytes	0,1 A	Get			
Measured instantaneous charging/discharging voltage	0xD5	This property indicates the instantaneous charging/discharging voltage in ±V. 0x0001–0x7FFE (1 V to 32 766 V): charging (positive), 0xFFFF–0x8001 (−1 V to −32 767 V): discharging (negative)	signed short	2 bytes	V	Get			
Measured cumulative amount of discharging electric energy	0xD6	This property indicates the cumulative amount of discharging electric energy in units of 0,001 kWh. 0x00000000–0x3B9AC9FF (0 kWh to 999 999,999 kWh)	unsigned long	4 bytes	0,001 kWh	Get			
Cumulative amount of discharging electric energy reset setting	0xD7	This property resets the cumulative amount of discharging electric energy. Reset = 0x00	unsigned char	1 byte	—	Set			
Measured cumulative amount of charging electric energy	0xD8	This property indicates the cumulative amount of charging electric energy in units of 0,001 kWh. 0x00000000–0x3B9AC9FF (0 kWh to 999 999,999 kWh)	unsigned long	4 bytes	0,001 kWh	Get			
Cumulative amount of charging electric energy reset setting	0xD9	This property resets the cumulative amount of charging electricity energy. Reset = 0x00	unsigned char	1 byte	—	Set			
Operation mode setting	0xDA	This property sets the operation mode (Charging /Discharging /Standby /Idle /Other). Charging = 0x42, Discharging = 0x43, Standby = 0x44, Idle = 0x47,	unsigned char	1 byte	–	Set /Get	O	O	

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Other = 0x40							
System-interconnected type	0xDB	This property indicates the system interconnection status of an electric vehicle charger/discharger. System interconnection (reverse power flow acceptable) = 0x00 Independent type = 0x01 System interconnection (reverse power flow not acceptable) = 0x02	unsigned char	1 byte	–	Get			
Remaining stored electricity of vehicle mounted battery 1	0xE2	This property indicates the remaining stored capacity of an electric vehicle mounted battery connected to an electric vehicle charger/discharger in Wh. 0x00000000–0x3B9AC9FF (0 Wh to 999 999 999 Wh)	unsigned long	4 bytes	Wh	Get	O		d
Remaining stored electricity of vehicle mounted battery 2	0xE3	This property indicates the remaining stored capacity of an electric vehicle mounted battery connected to an electric vehicle charger/discharger in units of 0,1 Ah. 0x0000–0x7FFE (0 Ah to 3 276,6 Ah)	unsigned short	2 bytes	0,1 Ah	Get	O		d
Remaining stored electricity of vehicle mounted battery 3	0xE4	This property indicates the remaining stored capacity of the electric vehicle mounted battery connected to an electric vehicle charger/discharger in %. 0x00–0x64 (0 % to 100 %)	unsigned char	1 byte	%	Get	O		d
Charging amount setting 1	0xE7	This property specifies the charging electric energy in Wh. 0x00000000–0x3B9AC9FF (0 Wh to 999 999 999 Wh)	unsigned long	4 bytes	Wh	Set/ Get			e
Charging amount setting 2	0xE9	This property specifies the charging capacity in units of 0,1 Ah. 0x0000–0x7FFE (0 Ah to 3 276,6 Ah)	unsigned short	2 bytes	0,1 Ah	Set/ Get			e
Charging electric energy setting	0xEB	This property specifies the charging electric energy in W. 0x00000000–0x3B9AC9FF (0 W to 999 999 999 W)	unsigned long	4 bytes	W	Set/ Get			
Discharging electric energy setting	0xEC	This property specifies the discharging electric energy in W. 0x00000000–0x3B9AC9FF (0 W to 999 999 999 W)	unsigned long	4 bytes	W	Set/ Get			
Charging current setting	0xED	This property specifies the charging current in units of 0,1 A.	unsigned short	2 bytes	0,1 A	Set/ Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		0x0000–0xFFFD (0 A to 6 553,3 A)							
Discharging current setting	0xEE	This property specifies the discharging current in units of 0,1 A. 0x0000–0xFFFD (0 A to6 553,3 A)	unsigned short	2 bytes	0,1 A	Set/ Get			
Rated voltage (Indepen-dent)	0xEF	Indicates the rated voltage of an independent electric vehicle charger/discharger in V. 0x0000–0x7FFE (0 V to 32 766 V)	unsigned short	2 bytes	V	Get			

[a] The installation of “Dischargeable capacity of vehicle mounted battery 1” is mandatory in case of output from an electric vehicle connected to an electric vehicle charger/discharger. Where no response can be returned, “Response impossible” is returned.

[b] The installation of “Remaining dischargeable capacity of vehicle mounted battery 1” or “Remaining dischargeable capacity of vehicle mounted battery 3” is mandatory in case of output from an electric vehicle connected to an electric vehicle charger/discharger. Where no response can be returned, “Response impossible” is returned.

[c] The installation of “Used capacity of vehicle mounted battery 1” is mandatory in case of output from an electric vehicle connected to an electric vehicle charger/discharger. Where no response can be returned, “Response impossible” is returned.

[d] The installation of “Remaining stored electricity of vehicle mounted battery 1” or “Remaining stored electricity of vehicle mounted battery 3” is mandatory in case of output from an electric vehicle connected to an electric vehicle charger/discharger. Where no response can be returned, “Response impossible” is returned.

[e] When “Charging amount setting 1 (or 2)” is used, “Charging amount setting 2 (or 1)” shall not be used.

[f] DC_type AA, DC_type BB, DC_type EE and DC_type FF chargers/dischargers shall be electric vehicle chargers/dischargers with connectors of the shape specified in Configuration AA, Configuration BB, Configuration EE and Configuration FF as defined in IEC 62196-3.

[g] Vehicle connection confirmation is only mandatory when the charger/discharger type is DC_type AA.

Electric vehicle charger/discharger includes Electric Vehicle Power System (EVPS) connected to an electric vehicle. Since an electric vehicle connected to an electric vehicle charger/discharger can be changed, the property values of the electric vehicle charger/discharger vary in accordance with the electric vehicle connected to the electric vehicle charger/discharger. When the status (Connected to vehicle, Chargeable/Dischargeable) changes from “Not connected to vehicle” to “Connected to vehicle,” the connected electric vehicle may be different. Therefore, it is preferable to acquire property values again for specifications that are determined by the electric vehicle and EVPS.

For example: Used capacity of vehicle mounted battery 1, Dischargeable capacity of vehicle mounted battery 1, Remaining dischargeable capacity of vehicle mounted battery 1, and Remaining dischargeable capacity of vehicle mounted battery 3.

9.27.2 Operation status property

This property indicates whether an electric vehicle charger/discharger is ready to acquire status and accept settings (ON) or not (OFF). The property value is 0x30 for ON and 0x31 for OFF.

9.27.3 Dischargeable capacity of vehicle mounted battery 1 property

This property indicates the dischargeable capacity of an electric vehicle mounted battery connected to an electric vehicle charger/discharger in Wh. The property value range is 0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh).

9.27.4 Dischargeable capacity of vehicle mounted battery 2 property

This property indicates the dischargeable capacity of an electric vehicle mounted battery connected to an electric vehicle charger/discharger in units of 0,1 Ah. The property value range is 0x0000 to 0x7FFE (0 Ah to 3 276,6 Ah).

9.27.5 Remaining dischargeable capacity of vehicle mounted battery 1 property

This property indicates the remaining dischargeable capacity of an electric vehicle mounted battery connected to an electric vehicle charger/discharger in Wh. The property value range is 0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh).

9.27.6 Remaining dischargeable capacity of vehicle mounted battery 2 property

This property indicates the remaining dischargeable capacity of an electric vehicle mounted battery connected to an electric vehicle charger/discharger in units of 0,1 Ah. The property value range is 0x0000 to 0x7FFE (0 Ah to 3 276,6 Ah).

9.27.7 Remaining dischargeable capacity of vehicle mounted battery 3 property

This property indicates the remaining dischargeable capacity of an electric vehicle mounted battery connected to an electric vehicle charger/discharger in %. The property value range is 0x00 to 0x64 (0 % to 100 %).

9.27.8 Rated charge capacity property

This property indicates the rated charge capacity of an electric vehicle charger/discharger in W. The property value range is 0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W). When no charging function is supported, the value shall be 0 W.

9.27.9 Rated discharge capacity property

This property indicates the rated discharge capacity of an electric vehicle charger/discharger in W. The property value range is 0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W). When no discharging function is supported, the value shall be 0 W.

9.27.10 Vehicle connection and chargeable/dischargeable status property

This property indicates whether a vehicle is connected to an electric vehicle charger/discharger or not and whether it is chargeable or dischargeable. The property value is 0x30 when no vehicle is connected, 0x40 when a vehicle is connected but not chargeable or dischargeable, 0x41 when the vehicle is chargeable but not dischargeable, 0x42 when the vehicle is not chargeable but dischargeable, and 0x43 when the vehicle is chargeable and dischargeable.

If the vehicle status is unknown until charging or discharging is started, the chargeable/dischargeable status shall be output when a charging or discharging start instruction is given. If the disconnection or connection status of a vehicle cannot be determined, this property indicates 0xFF as the undetermined status.

9.27.11 Minimum/maximum charging electric energy property

This property indicates the minimum and maximum charging electric energies to an electric vehicle charger/discharger in W. Each value range is 0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W). The property value represents minimum and maximum in order from the highest-order byte. When the property value of the actual device is higher than the upper limit of the value range, the overflow code 0xFFFFFFFF shall be used. When no charging function is supported, the value shall be 0.

9.27.12 Minimum/maximum discharging electric energy property

This property indicates the minimum and maximum discharging electric energies to an electric vehicle charger/discharger in W. Each value range is 0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W). The property value represents minimum and maximum in order from the highest-order byte. When the property value of the actual device is higher than the upper limit of the value range, the overflow code 0xFFFFFFFF shall be used. When no discharging function is supported, the value shall be 0.

9.27.13 Minimum/maximum charging current property

This property indicates the minimum and maximum charging currents of an electric vehicle charger/discharger in units of 0,1 A. Each value range is 0x0000 to 0x7FFE (0 A to 3 276,6 A). The property value represents minimum and maximum in order from the highest-order byte. When the property value of the actual device is higher than the upper limit of the value range, the overflow code 0xFFFF shall be used. When no charging function is supported, the value shall be 0.

9.27.14 Minimum/maximum discharging current property

This property indicates the minimum and maximum discharging currents of an electric vehicle charger/discharger in units of 0,1 A. Each value range is 0x0000 to 0x7FFE (0 A to 3 276,6 A). The property value represents minimum and maximum in order from the highest-order byte. When the property value of the actual device is higher than the upper limit of the value range, the overflow code 0xFFFF shall be used. When no discharging function is supported, the value shall be 0.

9.27.15 Charger/discharger type property

This property indicates the type of electric vehicle charger/discharger. As the type of electric vehicle charger/discharger, it indicates one of AC_CPLT (0x11), AC_HLC (charging only) (0x12), AC_HLC (charging/discharging) (0x13), DC_type AA (charging only) (0x21), DC_type AA (charging/discharging) (0x22), DC_type AA (discharging only) (0x23), DC_type BB (charging only) (0x31), DC_type BB (charging/discharging) (0x32), DC_type BB (discharging only) (0x33), DC_type EE (charging only) (0x41), DC_type EE (charging/discharging) (0x42), DC_type EE (discharging only) (0x43), DC_type FF (charging only) (0x51), DC_type FF (charging/discharging) (0x52), and DC_type FF (discharging only) (0x53).

a) Explanation of charger/discharger types

AC_CPLT (0x11): uses alternating current to charge the electric vehicle and CPLT signals to communicate with the electric vehicle.

AC_HLC (charging only) (0x12): uses alternating current to charge the electric vehicle and both CPLT and HLC signals to communicate with the electric vehicle.

AC_HLC (charging/discharging) (0x13): uses alternating current to charge the electric vehicle and to discharge from the electric vehicle to the charger/discharger, and uses both CPLT and HLC signals to communicate with the electric vehicle.

DC_type AA (charging only) (0x21): uses direct current to charge the electric vehicle and type AA signals to communicate with the electric vehicle.

DC_type AA (charging/discharging) (0x22): uses direct current to charge the electric vehicle and to discharge from the electric vehicle to the charger/discharger, and uses type AA signals to communicate with the electric vehicle.

DC_type AA (discharging only) (0x23): uses direct current to discharge from the electric vehicle to the charger/discharger and type AA signals to communicate with the electric vehicle.

DC_type BB (charging only) (0x31): uses direct current to charge the electric vehicle and type BB signals to communicate with the electric vehicle.

DC_type BB (charging/discharging) (0x32): uses direct current to charge the electric vehicle and to discharge from the electric vehicle to the charger/discharger, and uses type BB signals to communicate with the electric vehicle.

DC_type BB (discharging only) (0x33): uses direct current to discharge from the electric vehicle to the charger/discharger and type BB signals to communicate with the electric vehicle.

DC_type EE (charging only) (0x41): uses direct current to charge the electric vehicle and type EE signals to communicate with the electric vehicle.

DC_type EE (charging/discharging) (0x42): uses direct current to charge the electric vehicle and to discharge from the electric vehicle to the charger/discharger, and uses type EE signals to communicate with the electric vehicle.

DC_type EE (discharging only) (0x43): uses direct current to discharge from the electric vehicle to the charger/discharger and type EE signals to communicate with the electric vehicle.

DC_type FF (charging only) (0x51): uses direct current to charge the electric vehicle and type FF signals to communicate with the electric vehicle.

DC_type FF (charging/discharging) (0x52): uses direct current to charge the electric vehicle and to discharge from the electric vehicle to the charger/discharger and type FF signals to communicate with the electric vehicle.

DC_type FF (discharging only) (0x53): uses direct current to discharge from the electric vehicle to the charger/discharger and type FF signals to communicate with the electric vehicle.

b) Explanation of the relationship between charger/discharger type and “Vehicle connection and chargeable/dischargeable status” (0xC7)

AC_CPLT (0x11): always undetermined (0xFF).

AC_HLC (charging only) (0x12) or AC_HLC (charging/discharging) (0x13): undetermined (0xFF) when only CPLT functions are installed in the connected vehicle. When both CPLT and HLC functions are installed in the vehicle, the content is as indicated under vehicle connection and chargeable/dischargeable status (0xC7).

DC_type AA (charging only) (0x21), DC_type AA (charging/discharging) (0x22) or DC_type AA (discharging only) (0x23): undetermined (0xFF) until information is acquired via vehicle connection confirmation (0xCD). After information is acquired, the content is as indicated under vehicle connection and chargeable/dischargeable status.

DC_type BB (charging only) (0x31), DC_type BB (charging/discharging) (0x32), DC_type BB (discharging only) (0x33), DC_type EE (charging only) (0x41), DC_type EE (charging/discharging) (0x42), DC_type EE (discharging only) (0x43), DC_type FF (charging only) (0x51), DC_type FF (charging/discharging) (0x52) or DC_type FF (discharging only) (0x53): content is as indicated under vehicle connection and chargeable/dischargeable status.

9.27.16 Vehicle connection confirmation property

This property confirms the connection status and chargeable/dischargeable status between an electric vehicle charger/discharger and an electric vehicle. This makes it possible to acquire information on the vehicle connection and chargeable/dischargeable status [0xC7].

This property is only mandatory if the electric vehicle charger/discharger type is one of DC_type AA (charging only) (0x21), DC_type AA (charging/discharging) (0x22), and DC_type AA (discharging only) (0x23).

9.27.17 Used capacity of vehicle mounted battery 1 property

This property indicates the capacity of an electric vehicle mounted battery connected to an electric vehicle charger/discharger in Wh. The property value range is 0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh).

9.27.18 Used capacity of vehicle mounted battery 2 property

This property indicates the capacity of an electric vehicle mounted battery connected to an electric vehicle charger/discharger in units of 0,1 Ah. The property value range is 0x0000 to 0x7FFE (0 Ah to 3 276,6 Ah).

9.27.19 Rated voltage property

This property indicates the normal rated voltage of an electric vehicle charger/discharger in V. The property value range is 0x0000 to 0x7FFE (0 V to 32 766 V).

9.27.20 Measured instantaneous charging/discharging electric energy

This property indicates the instantaneous charging or discharging electric energy of an electric vehicle charger/discharger in W. The property value range is 0x00000001 to 0x3B9AC9FF (1 W to 999 999 999 W) for charging and 0xFFFFFFFF to 0xC4653601 (−1 W to −999 999 999 W) for discharging. When the property value of the actual device is higher than the upper limit of the value range, the overflow code 0x7FFFFFFF shall be used. When the property value is lower than the lower limit of the value range, the underflow code 0x80000000 shall be used. The value is 0 for no charging or discharging.

9.27.21 Measured instantaneous charging/discharging current property

This property indicates the instantaneous charging or discharging current of an electric vehicle charger/discharger in units of 0,1 A. The property value range is 0x0001 to 0x7FFE (0,1 A to 3 276,6 A) for charging and 0xFFFF to 0x8001 (−0,1 A to −3 276,7 A) for discharging. When the property value of the actual device is higher than the upper limit of the value range, the overflow code 0x7FFF shall be used. When the property value is lower than the lower limit of the value range, the underflow code 0x8000 shall be used. The value is 0 for no charging or discharging.

9.27.22 Measured instantaneous charging/discharging voltage property

This property indicates the instantaneous charging or discharging voltage of an electric vehicle charger/discharger in V. The property value range is 0x0001 to 0x7FFE (1 V to 32 766 V) for charging and 0xFFFF to 0x8001 (−1 V to −32 767 V) for discharging. When the property value of the actual device is higher than the upper limit of the value range, the overflow code 0x7FFF shall be used. When the property value is lower than the lower limit of the value range, the underflow code 0x8000 shall be used. The value is 0 for no charging or discharging.

9.27.23 Measured cumulative amount of discharging electric energy property

This property indicates the cumulative amount of discharging electric energy of an electric vehicle charger/discharger in units of 0,001 kWh. The property value range is 0x00000000 to 0x3B9AC9FF (0 kWh to 999 999,999 kWh). When the cumulative amount of electric energy overflows, the property value shall be incremented again from 0x00000000.

9.27.24 Cumulative amount of discharging electric energy reset setting

This property is set to 0x00 to reset the measured cumulative amount of discharging electric energy to zero.

9.27.25 Measured cumulative amount of charging electric energy property

This property indicates the cumulative amount of charging electric energy of an electric vehicle charger/discharger in units of 0,001 kWh. The property value range is 0x00000000 to 0x3B9AC9FF (0 kWh to 999 999,999 kWh). When the cumulative amount of electric energy overflows, the property value shall be incremented again from 0x00000000.

9.27.26 Cumulative amount of charging electric energy reset setting property

This property resets the measured cumulative amount of charging electric energy to zero when 0x00 is set.

9.27.27 Operation mode setting property

This property indicates the operation mode of an electric vehicle charger/discharger. The operation mode is Charging (0x42), Discharging (0x43), Standby (0x44), Idle (0x47), or Other (0x40). “Other” indicates that the charger/discharger is not in one of Charging, Discharging, Standby or Idle modes.

9.27.28 System interconnection status property

This property indicates the connection status of the current system and an electric vehicle charger/discharger (system interconnection status).

System-interconnected (reverse power flow acceptable) = 0x00, Independent = 0x01, System-interconnected (reverse power flow not acceptable) = 0x02.

9.27.29 Remaining stored electricity of vehicle mounted battery 1 property

This property indicates the remaining stored capacity of an electric vehicle mounted battery connected to an electric vehicle charger/discharger in Wh. The property value range is 0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh).

9.27.30 Remaining stored electricity of vehicle mounted battery 2 property

This property indicates the remaining stored capacity of an electric vehicle mounted battery connected to an electric vehicle charger/discharger in units of 0,1 Ah. The property value range is 0x0000 to 0x7FFE (0 Ah to 3 276,6 Ah).

9.27.31 Remaining stored electricity of vehicle mounted battery 3 property

This property indicates the remaining stored capacity (SOC: State of Charge) of an electric vehicle mounted battery connected to a charger/discharger in %. The property value range is 0x00 to 0x64 (0 % to 100 %).

9.27.32 Charging amount setting 1 property

This property specifies the charging electric energy in Wh. The property value range is 0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh). The value is 0 for no charging.

9.27.33 Charging amount setting 2 property

This property specifies the charging capacity in units of 0,1 Ah. The property value range is 0x0000 to 0x7FFE (0 Ah to 3 276,6 Ah). The value is 0 for no charging.

9.27.34 Charging electric energy setting property

This property specifies the charging electric energy in W. The property value range is 0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W).

9.27.35 Discharging electric energy setting property

This property specifies the discharging electric energy in the system-interconnected status in W. The property value range is 0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W). The value is 0 for no discharging. In the independent status, “Response impossible” is returned.

9.27.36 Charging current setting property

This property specifies the charging current in units of 0,1 A. The property value range is 0x0000 to 0xFFFD (0 A to 6 553,3 A). The value is 0 for no charging.

9.27.37 Discharging current setting property

This property specifies the discharging current in the system-interconnected status in units of 0,1 A. The property value range is 0x0000 to 0xFFFD (0 A to 6 553,3 A). The value is 0 for no discharging. In the independent status, “Response impossible” is returned.

9.27.38 Rated voltage (Independent) property

This property indicates the rated voltage (catalog value) in V when the system interconnection status is “Independent.” The property value range is 0x0000 to 0x7FFE (0 V to 32 766 V). When this property is not used, the rated voltage (EPC = 0xD2) may be used as the value for the independent status.

9.28 Engine cogeneration class specifications

9.28.1 General

The control commands of “engine cogeneration” are shown in Table 43.

Class group code: 0x02
Class code: 0x7F

Table 43 – List of engine cogeneration properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte	—	Set Get	 O	O	
Measured temperature of water in water heater	0xC1	This property indicates the current temperature of the water in the water heater in °C. 0x00–0x64 (0 °C to 100 °C)	unsigned char	1 byte	°C	Get			
Rated power generation output	0xC2	This property indicates the rated power generation output in watts. 0x0000–0xFFFD (0 W to 65 533 W)	unsigned short	2 bytes	W	Get			
Heating value of hot water storage tank	0xC3	This property indicates the heating value of the hot water storage tank in MJ. 0x0000–0xFFFD (0 MJ to 65 533 MJ)	unsigned short	2 bytes	MJ	Get			
Measured instantaneous power generation output	0xC4	This property indicates the instantaneous power generation output in watts. 0x0000–0xFFFD (0 W to 65 533 W)	unsigned short	2 bytes	W	Get	O		
Measured cumulative power generation output	0xC5	This property indicates the cumulative power generation output in increments of 0,001 kWh. 0x00000000–0x3B9AC9FF (0 kWh to 999 999,999 kWh)	unsigned long	4 bytes	0,001 kWh	Get	O		
Cumulative power generation output reset setting	0xC6	Resets the cumulative power generation output by writing 0x00. Reset=0x00	unsigned char	1byte	—	Set			
Measured instantaneous gas consumption	0xC7	This property indicates the instantaneous gas consumption in increments of 0,001 m^3/h. 0x0000–0xFFFD (0 m^3/h to 65,533 m^3/h)	unsigned short	2 bytes	0,001 m^3/h	Get			
Measured cumulative gas consumption	0xC8	This property indicates the cumulative gas consumption in increments of 0,001 m^3. 0x00000000–0x3B9AC9FF (0 m^3 to 999 999,999 m^3)	unsigned long	4 bytes	0,001 m^3	Get			
Cumulative gas consumption reset setting	0xC9	Resets the cumulative gas consumption by writing 0x00. Reset = 0x00	unsigned char	1 byte	—	Set			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Power generation setting	0xCA	This property indicates the setting of start or stop of power generation. Power generation ON = 0x41, Power generation OFF = 0x42	unsigned char	1 byte	—	Set/Get			
Power generation status	0xCB	This property indicates power generation status. generating = 0x41, stopped = 0x42, idling = 0x45	unsigned char	1 byte	—	Get			
Measured in-house instantaneous power consumption	0xCC	This property indicates the measured in-house instantaneous power consumption in watts. 0x0000-0xFFFD (0 W to 65 533 W)	unsigned short	2 bytes	W	Get			
Measured in-house cumulative power consumption	0xCD	This property indicates the measured in-house cumulative power consumption in 0,001 kWh. 0x00000000-0x3B9AC9FF (0 kWh to 999 999,999 kWh)	unsigned long	4 bytes	0,001 kWh	Get			
In-house cumulative power consumption reset	0xCE	This property is set to 0x00 to reset the in-house cumulative power consumption. Reset=0x00	unsigned char	1 byte		Set			
System interconnected type	0xD0	This property indicates the system interconnected type. System-interconnected type (reverse power flow acceptable) = 0x00, Independent type = 0x01, System-interconnected type (reverse power flow not acceptable) = 0x02	unsigned char	1 byte	—	Get			
Measured remaining hot water amount	0xE1	This property indicates the measured amount of the remaining hot water in litres. 0x0000–0xFFFD (0 l to 65 533 l)	unsigned short	2 bytes	litre	Get			
Tank capacity	0xE2	This property indicates the tank capacity in litres. 0x0000–0xFFFD (0 l to 65 533 l)	unsigned short	2 bytes	litre	Get			

9.28.2 Operation status property

This property indicates whether the functions specific to this class are operating (ON) or not (OFF). In the case of a node in which this class is implemented and the functions specific to this class start operating upon startup of the node, this property may be implemented with the value fixed at 0x30 (operation status ON).

9.28.3 Measured hot water temperature of water heater property

This property indicates the current hot water temperature in the hot water storage tank in °C. The property value range is 0x00 to 0x64 (0 °C to 100 °C).

9.28.4 Rated power generation output property

This property indicates the rated power generation output in watts. The property value range is 0x0000 to 0xFFFD. When the property value of the actual device is higher than the upper bound of the value range, 0xFFFF (overflow code) shall be used. When the property value of the actual device is lower than the lower bound of the value range, 0xFFFE (underflow code) shall be used.

9.28.5 Heating value of hot water storage tank property

This property indicates the heating value of a hot water storage tank in MJ. The property value range is 0x0000 to 0xFFFD. When the property value of the actual device is higher than the upper bound of the value range, 0xFFFF (overflow code) shall be used. When the property value of the actual device is lower than the lower bound of the value range, 0xFFFE (underflow code) shall be used.

9.28.6 Measured instantaneous power generation output property

This property indicates the instantaneous power generation output in watts. The property value range is 0x0000 to 0xFFFD. When the property value of the actual device is higher than the upper bound of the value range, 0xFFFF (overflow code) shall be used. When the property value of the actual device is lower than the lower bound of the value range, 0xFFFE (underflow code) shall be used.

9.28.7 Measured cumulative power generation output property

This property indicates the cumulative power generation output in units of 0,001 kWh. The property value range is 0x00000000 to 0x3B9AC9FF (0 kWh to 999 999,999 kWh). In the event of a cumulative power generation output overflow, the counting of the cumulative power generation output shall be restarted from 0x00000000.

9.28.8 Cumulative power generation output reset setting property

This property resets the cumulative power generation output to zero by setting 0x00.

9.28.9 Measured instantaneous gas consumption property

This property indicates the instantaneous gas consumption in units of 0,001 m^3/h. The property value range is 0x0000 to 0xFFFD (0 m^3/h to 65,533 m^3/h). When the property value of the actual device is higher than the upper bound of the value range, 0xFFFF (overflow code) shall be used. When the property value of the actual device is lower than the lower bound of the value range, 0xFFFE (underflow code) shall be used.

9.28.10 Measured cumulative gas consumption property

This property indicates the cumulative gas consumption in units of 0,001 m^3. The property value range is 0x00000000 to 0x3B9AC9FF (0 m^3 to 999 999,999 m^3). In the event of a cumulative gas consumption overflow, the counting of the cumulative gas consumption shall be restarted from 0x00000000.

9.28.11 Cumulative gas consumption reset setting property

This property resets the cumulative gas consumption to zero by setting 0x00.

9.28.12 Power generation setting property

This property indicates the setting of power generation by the engine cogeneration. The property value for power generation ON is 0x41, and the property value for power generation OFF is 0x42.

9.28.13 Power generation status property

This property indicates the power generation status of the engine cogeneration. The property value for generating is 0x41, the property value for stopped is 0x42 and the property value for idling is 0x45.

9.28.14 Measured in-house instantaneous power consumption property

This property indicates the in-house instantaneous power consumption in watts. The property value range is 0x0000 to 0xFFFD. When the property value of the actual device is higher than the value range of this property, the overflow code 0xFFFF shall be used. When the property value is lower than the value range of this property, the underflow code 0xFFFE shall be used.

In-house instantaneous power consumption is the sum of power where an anti-reverse power flow CT is installed and the power output.

9.28.15 Measured in-house cumulative power consumption property

This property indicates the in-house cumulative power consumption in units of 0,001 kWh. The property value range is 0x00000000 to 0x3B9AC9FF (0 kWh to 999 999,999 kWh) and shall increment again from 0x00000000 in case of a cumulative power consumption overflow.

In-house cumulative power consumption is the sum of power where an anti-reverse power flow CT is installed and power output.

9.28.16 In-house cumulative power consumption reset property

This property is set to 0x00 to reset the in-house cumulative power consumption to zero.

In-house cumulative power consumption is the sum of power where an anti-reverse power flow CT is installed and the power output.

9.28.17 System-interconnected type property

This property indicates the status of interconnection with the current system (system-interconnected type).

System interconnection (reverse power flow acceptable) = 0x00, Independent type = 0x01, System interconnection (reverse power flow not acceptable) = 0x02.

9.28.18 Measured remaining hot water amount property

This property indicates the amount of hot water remaining in the tank in litres. The property value range is 0x0000 to 0xFFFD (from 0 l to 65 533 l). When the property value of the actual device is higher than the upper bound of the value range, 0xFFFF (overflow code) shall be used. When the property value of the actual device is lower than the lower bound of the value range, 0xFFFE (underflow code) shall be used.

9.28.19 Tank capacity property

This property indicates the tank capacity in litres. The property value range is 0x0000 to 0xFFFD (0 l to 65 533 l). When the property value of the actual device is higher than the upper bound of

the value range, 0xFFFF (overflow code) shall be used. When the property value of the actual device is lower than the lower bound of the value range, 0xFFFE (underflow code) shall be used.

9.29 Water flow meter class specifications

9.29.1 General

The control commands of “water flow meter” are shown in Table 44.

Class group code: 0x02

Class code: 0x81

Table 44 – List of water flow meter properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announce-ment at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte	–	Set Get	 ○	○	
Flowing water classifi-cation	0xD0	Indicates the water flow meter type. 0x30: running water 0x31: recycled water 0x32: warm water 0x33: other water	unsigned char	1 byte	–	Get Set			
Owner classifi-cation	0xD1	Indicates the owner of the meter in the form of owner classification. 0x30: not specified 0x31: public waterworks company 0x32: private sector company 0x33: individual	unsigned char	1 byte	–	Get Set			
Measured cumulative amount of flowing water	0xE0	Indicates the cumulative amount (consumption) of flowing water using a 9-digit number. 0 to 0x3B9AC9FF (0 to 999 999 999)	unsigned long	4 bytes	m^3	Get	○		
Unit for measured cumulative amounts of flowing water	0xE1	Indicates the unit (multiplying factor) for the measured cumulative amount of flowing water and the historical data of measured cumulative amounts of flowing water. 0x00: 1 m^3 0x01: 0,1 m^3 0x02: 0,01 m^3 0x03: 0,001 m^3 0x04: 0,000 1 m^3 (initial value) 0x05: 0,000 01 m^3 0x06: 0,000 001 m^3	unsigned char	1 byte	–	Get	○		

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announce-ment at status change	Remark
Historical data of measured cumulative amounts of flowing water	0xE2	Indicates the historical data of measured cumulative amounts (consumptions) of running water, which consist of 48 pieces of half-hourly data for the preceding 24 h. 0x0 to 0x3B9AC9FF (0 m^3 to 999 999,999 m^3)	unsigned long ×48	192 bytes	0,001 m^3	Get			
Detection of abnormal value in metering data	0xE3	Indicates whether the meter has detected an abnormal value in the metering data. Abnormal value detected: 0x41 No abnormal value detected: 0x42	unsigned char	1 byte	—	Get		○	
Security data information	0xE4	Provides security information about the abnormal states detected by the meter in form of security data that identifies the abnormal states by means of bit assignments. 0 to 0xFFFFFFFD	unsigned long	4 bytes	—	Get			
ID number setting	0xE5	Indicates the ID number of the meter. The ID number is specified using ASCII code. (Initial value: “000000”)	unsigned char	6 bytes		Get Set			
Verification expiration information	0xE6	Indicates the month and year in which the verification of the meter expires. The month and year are specified using ASCII code. xxxx xx Year Month	unsigned char	6 bytes		Get Set			

9.29.2 Operation status property

This property indicates whether the functions specific to this class are operating (ON) or not (OFF). In the case of a node in which this class is implemented and the functions specific to this class start operating upon startup of the node, this property may be implemented with the value fixed at 0x30 (operation status ON).

9.29.3 Water flow meter classification property

This property indicates the type of the flowing water being metered in the form of meter classification.

9.29.4 Owner classification property

This property indicates the owner of the water flow meter in the form of owner classification.

9.29.5 Measured cumulative amount of flowing water property

This property indicates the measured cumulative amount of running water using a 9-digit decimal notation number. The unit is indicated by the “unit for measured cumulative amount of running water” property (EPC = 0xE1). When the value of the “unit for measured cumulative amounts of running water” property (which indicates the multiplying factor for measured cumulative amounts of running water) is 0x00, 0x01, 0x02, 0x03, 0x04, 0x05 or 0x06, the unit shall be 1 m^3, 0,1 m^3, 0,01 m^3, 0,001 m^3, 0,000 1 m^3, 0,000 01 m^3 or 0,000 001 m^3 respectively. The property value range is from 0x00000000 to 3B9AC9FF (from 0 to 999 999 999). In the event of a measured cumulative running water amount overflow, the counting of the measured cumulative amount of running water shall be restarted from 0x00000000.

Example: if the value of the “measured cumulative amount of flowing water” property indicates that the measured cumulative amount of running water is 1234546789 and the value of the “unit for measured cumulative amount of flowing water” property is 0x04, the actual measured cumulative amount would be:

123456789 × 0,000 1 m^3 = 12 345,678 9 m^3 (actual measured cumulative amount)

9.29.6 Unit for measured cumulative amounts of flowing water property

This property indicates the unit for measured cumulative amounts of flowing water.

Property value and multiplying factor for measured cumulative amounts of flowing water:

0x00 1 m^3
0x01 0,1 m^3
0x02 0,01 m^3
0x03 0,001 m^3
0x04 0,000 1 m^3
0x05 0,000 01 m^3
0x06 0,000 001 m^3

9.29.7 Historical data of measured cumulative amounts of running water property

This property indicates the historical data of measured cumulative amounts of running water (unit = 0,001 m^3), which consists of 48 pieces of half-hourly data for the preceding 24 h. The half-hourly cumulative running water amount measurements shall be measurements that have been taken, in increments of 0,001 m^3, every hour and every half-hour by reference to the time indicated by the “current time setting” property (EPC = 0x97). The measurements shall be stored in the order they have been taken, with the oldest and newest measurements stored in the highest-order and lowest-order bytes, respectively. The property value range is from 0x00000000 to 0x3B9AC9FF (from 0 m^3 to 999 999,999 m^3). For the hours in the historical data at which the amount of electric energy was not measured, 0xFFFFFFFE shall be used.

9.29.8 Detection of abnormal value in metering data property

This property indicates whether the meter has detected an abnormal value in the metering data. The property value shall be 0x41 when an abnormal value has been detected and 0x42 when no abnormal value has been detected.

9.29.9 Security data information property

This property provides security information about the abnormal states detected by the meter in the form of security data that identifies the abnormal states by means of bit assignments.

9.29.10 ID number setting property

This property indicates the ID number of the meter. The ID number shall be a 6-digit code comprised of 6 one-byte alphanumeric characters.

ID numbers are used when there are two or more meters.

9.29.11 Verification expiration information property

When the meter is one that has been verified by a verifying organization, this property indicates the month and year in which the verification of the meter will expire.

9.30 Power distribution board metering class specifications

9.30.1 General

The control commands of “distribution board metering” are shown in Table 45.

Class group code: 0x02

Class code: 0x87

Table 45 – List of power distribution board metering properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte	—	Set Get	 ○	○	
Measured cumulative amount of electric energy (normal direction)	0xC0	This property indicates the measured cumulative amount of electric energy using an 8-digit decimal notation number. 0x00000000–0x05F5E0FF (0 to 99 999 999)	unsigned long	4 bytes	kWh	Get	○		
Measured cumulative amount of electric energy (reverse direction)	0xC1	This property indicates the measured cumulative amount of electric energy using an 8-digit decimal notation number. 0x00000000–0x05F5E0FF (0 to 99 999 999)	unsigned long	4 bytes	kWh	Get	○		
Unit for cumulative amounts of electric energy	0xC2	This property indicates the unit (multiplying factor) used for the measured cumulative amount of electric energy and the historical data of measured cumulative amounts of electric energy. 0x00: 1 kWh 0x01: 0,1 kWh 0x02: 0,01 kWh 0x03: 0,001 kWh (Initial value) 0x04: 0,000 1 kWh 0x0A: 10 kWh 0x0B: 100 kWh	unsigned char	1 byte	—	Get	○		

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		0x0C: 1 000 kWh 0x0D: 10 000 kWh							
Historical data of measured cumulative amounts of electric energy (normal direction)	0xC3	This property indicates the day for which the historical data of measured cumulative amounts of electric energy shall be retrieved and the historical data of measured cumulative amounts of electric energy (8 digits), which consists of 48 pieces of half-hourly data for the preceding 24 h. 0x0000–0x0063: 0x00000000–0x05F5E0FF (0–99): (0–99 999 999)	unsigned short + unsigned long × 48	194 bytes	kWh	Get			
Historical data of measured cumulative amounts of electric energy (reverse direction)	0xC4	This property indicates the day for which the historical data of measured cumulative amounts of electric energy shall be retrieved and the historical data of measured cumulative amounts of electric energy (8 digits), which consists of 48 pieces of half-hourly data for the preceding 24 h. 0x0000–0x0063: 0x00000000–0x05F5E0FF (0–99): (0–99 999 999)	unsigned short + unsigned long × 48	194 bytes	kWh	Get			
Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved	0xC5	This property indicates the day for which the historical data of measured cumulative amounts of electric energy (which consists of 48 pieces of half-hourly data for the preceding 24 h) shall be retrieved. 0x00–0x63 (0–99) 0: current day 1–99: previous day–day that precedes the current day by 99 days	unsigned char	1 byte		Set/Get			
Measured instanta-neous amount of electric energy	0xC6	This property indicates the measured effective instantaneous amount of electric energy in watts. 0x80000001–0x7FFFFFFD (−2 147 483 647 to 2 147 483 645)	signed long	4 bytes	W	Get			
Measured instanta-neous currents	0xC7	This property indicates the measured effective instantaneous R and T phase currents in amperes. In the case of a single-phase, two-wire system, 0x7FFE shall be used for the T phase.	signed short × 2	4 bytes	0,1 A	Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		0x8001-0x7FFD (R phase) : 0x8001-0x7FFD (T phase) (−3 276,7 to 3 276,5): (−3 276,7 to 3 276,5)							
Measured instantaneous voltages	0xC8	This property indicates the measured effective instantaneous R-S(N) and S(N)-T voltages in volts. In the case of a single-phase, two-wire system, 0xFFFE shall be used for the S(N)-T voltage. 0x0000–0xFFFD (between R and S(N)): 0x0000–0xFFFD (between S(N) and T) (0–6 553,3): (0–6 553,3)	unsigned short × 2	4 bytes	0,1 V	Get			
Measurement channel 1	0xD0	This property indicates the measurement data for Measurement channel 1 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			
Measurement channel 2	0xD1	This property indicates the measurement data for Measurement channel 2 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			
Measurement channel 3	0xD2	This property indicates the measurement data for Measurement channel 3 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			
Measurement channel 4	0xD3	This property indicates the measurement data for Measurement channel 4 (cumulative amount of electric energy (kWh) and effective	unsigned long +	8 bytes	kWh + 0,1	Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	signed short × 2		A × 2				
Measure-ment channel 5	0xD4	This property indicates the measurement data for Measurement channel 5 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			
Measure-ment channel 6	0xD5	This property indicates the measurement data for Measurement channel 6 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			
Measure-ment channel 7	0xD6	This property indicates the measurement data for Measurement channel 7 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			
Measure-ment channel 8	0xD7	This property indicates the measurement data for Measurement channel 8 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			
Measure-ment channel 9	0xD8	This property indicates the measurement data for Measurement channel 9 (cumulative amount of electric	unsigned long +	8 bytes	kWh +	Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	signed short × 2		0,1 A × 2				
Measure-ment channel 10	0xD9	This property indicates the measurement data for Measurement channel 10 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			
Measure-ment channel 11	0xDA	This property indicates the measurement data for Measurement channel 11 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			
Measure-ment channel 12	0xDB	This property indicates the measurement data for Measurement channel 12 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			
Measure-ment channel 13	0xDC	This property indicates the measurement data for Measurement channel 13 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			
Measure-ment	0xDD	This property indicates the measurement data for Measurement channel 14	unsigned long	8 bytes	kWh +	Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
channel 14		(cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	+ signed short × 2		0,1 A × 2				
Measure-ment channel 15	0xDE	This property indicates the measurement data for Measurement channel 15 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			
Measure-ment channel 16	0xDF	This property indicates the measurement data for Measurement channel 16 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			
Measure-ment channel 17	0xE0	This property indicates the measurement data for Measurement channel 17 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			
Measure-ment channel 18	0xE1	This property indicates the measurement data for Measurement channel 18 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			
Measure-ment	0xE2	This property indicates the measurement data for	unsigned	8 bytes	kWh	Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
channel 19		Measurement channel 19 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	long + signed short × 2		+ 0,1 A × 2				
Measure-ment channel 20	0xE3	This property indicates the measurement data for Measurement channel 20 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			
Measure-ment channel 21	0xE4	This property indicates the measurement data for Measurement channel 21 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			
Measure-ment channel 22	0xE5	This property indicates the measurement data for Measurement channel 22 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			
Measure-ment channel 23	0xE6	This property indicates the measurement data for Measurement channel 23 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			
Measure-	0xE7	This property indicates the	unsigned	8 bytes	kWh	Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
ment channel 24		measurement data for Measurement channel 24 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	long + signed short × 2		+ 0,1 A × 2				
Measure-ment channel 25	0xE8	This property indicates the measurement data for Measurement channel 25 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			
Measure-ment channel 26	0xE9	This property indicates the measurement data for Measurement channel 26 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			
Measure-ment channel 27	0xEA	This property indicates the measurement data for Measurement channel 27 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			
Measure-ment channel 28	0xEB	This property indicates the measurement data for Measurement channel 28 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Measure-ment channel 29	0xEC	This property indicates the measurement data for Measurement channel 29 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			
Measure-ment channel 30	0xED	This property indicates the measurement data for Measurement channel 30 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			
Measure-ment channel 31	0xEE	This property indicates the measurement data for Measurement channel 31 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			
Measure-ment channel 32	0xEF	This property indicates the measurement data for Measurement channel 32 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)). Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7	unsigned long + signed short × 2	8 bytes	kWh + 0,1 A × 2	Get			
Master rated capacity	0xB0	This property indicates the rated capacity of the master circuit. 0x00–0xFD	unsigned char	1 byte	A	Get			
Number of measure-ment channels (simplex)	0xB1	This property indicates the number of simplex measurement channels. 0x01–0xFC (1–252) 0xFD: Unknown	unsigned char	1 byte	—	Get			
Channel	0xB2	This property is used to	unsigned	2 bytes	—	Set/			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
range specification for cumulative amount of electric power consumption measure-ment (simplex)		specify the range of acquisition by “measured cumulative amount of electric power consumption list (simplex)”. Byte 1: Acquisition start channel 0x01–0xFC (1–252) Byte 2: Range from the acquisition start channel (0x01–0x3C: 1–60)	char × 2			Get			
Measured cumulative amount of electric power consumption list (simplex)	0xB3	This property indicates the measured cumulative amount of electric power consumption of a measurement channel specified by the property of “Channel range specification for cumulative amount of electric power consumption measurement (simplex).” Byte 1: Acquisition start channel 0x01–0xFC (1–252) Byte 2: Range from the acquisition start channel (0x01–0x3C: 1–60) Byte 3 and later: Measured cumulative amount of electric power consumption 0x00000000–0x05F5E0FF (0 to 99 999 999) The unit shall follow EPC = 0xC2.	unsigned char + unsigned char + (unsigned long) (Max) × 60)	(Max) 242 bytes	kWh	Get			
Channel range specification for instanta-neous current measure-ment (simplex)	0xB4	This property is used to specify the range of acquisition by the measured instantaneous current list (simplex). Byte 1: Acquisition start channel 0x01–0xFC (1–252) Byte 2: Range from the acquisition start channel (0x01–0x3C: 1–60)	unsigned char × 2	2 bytes	—	Set/ Get			
Measured instanta-neous current list (simplex)	0xB5	This property indicates the measured instantaneous current of a measurement channel specified by the property of “Channel range specification for instantaneous current measurement (simplex).” Byte 1: Acquisition start channel 0x01–0xFC (1–252) Byte 2: Range from the acquisition start channel (0x01–0x3C: 1–60)	unsigned char + unsigned char + (signed short × 2 (Max) × 60)	(Max) 242 bytes	0,1 A	Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Byte 3 and later: Measured instantaneous current 0x8001–0x7FFD (R phase): 0x8001–0x7FFD (T phase) (−3 276,7 to 3 276,5): (−3 276,7 to 3 276,5)							
Channel range specification for instanta-neous power consumption measure-ment (simplex)	0xB6	This property is used to specify the range of acquisition by the measured instantaneous power consumption list (simplex). Byte 1: Acquisition start channel 0x01–0xFC (1–252) Byte 2: Range from the acquisition start channel (0x01–0x3C: 1–60)	unsigned char × 2	2 bytes	—	Set/Get			
Measured instanta-neous power consumption list (simplex)	0xB7	This property indicates the measured instantaneous power consumption of a measurement channel specified by the property of “Channel range specification for instantaneous power consumption measurement (simplex).” Byte 1: Acquisition start channel 0x01–0xFC (1–252) Byte 2: Range from the acquisition start channel (0x01–0x3C: 1–60) Byte 3 and later: Measured instantaneous power consumption 0x80000001–0x7FFFFFFD (−2 147 483 647 to 2 147 483 645)	unsigned char + unsigned char + (signed long (Max) × 60)	(Max) 242 bytes	W	Get			
Number of measure-ment channels (duplex)	0xB8	This property indicates the number of duplex measurement channels. 0x01–0xFC (1–252) 0xFD: Unknown	unsigned char	1 byte	—	Get			
Channel range specification for cumulative amount of electric power consumption measure-ment (duplex)	0xB9	This property is used to specify the range of acquisition by the measured cumulative amount of electric power consumption list (duplex). Byte 1: Acquisition start channel 0x01–0xFC (1–252) Byte 2: Range from the acquisition start channel (0x01–0x1E: 1–30)	unsigned char × 2	2 bytes	—	Set/Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Measured cumulative amount of electric power consumption list (duplex)	0xBA	This property indicates the measured cumulative amount of electric power consumption of a measurement channel specified by the property of “Channel range specification for cumulative amount of electric power consumption measurement (duplex).” Byte 1: Acquisition start channel 0x01–0xFC (1–252) Byte 2: Range from the acquisition start channel (0x01–0x1E: 1–30) Byte 3 and later: Measured cumulative amount of electric power consumption (forward direction) 0x00000000–0x05F5E0FF (0 to 99 999 999) Measured cumulative amount of electric power consumption (reverse direction) 0x00000000–0x05F5E0FF (0 to 99 999 999) The unit shall follow EPC = 0xC2.	unsigned char + unsigned char + (unsigned long + unsigned long) ×(Max) 30	(Max) 242 bytes	kWh	Get			
Channel range specification for instanta-neous current measure-ment (duplex)	0xBB	This property is used to specify the range of acquisition by the measured instantaneous current list (duplex). Byte 1: Acquisition start channel 0x01–0xFC (1 to 252) Byte 2: Range from the acquisition start channel (0x01–0x3C: 1 to 60)	unsigned char × 2	2 bytes	—	Set/ Get			
Measured instanta-neous current list (duplex)	0xBC	This property indicates the measured instantaneous current of a measurement channel specified by the property of “Channel range specification for instantaneous current measurement (duplex).” Byte 1: Acquisition start channel 0x01–0xFC (1 to 252) Byte 2: Range from the acquisition start channel (0x01–0x3C: 1 to 60) Byte 3 and later: Measured instantaneous current 0x8001–0x7FFD (R phase):	unsigned char + unsigned char + (signed short × 2 (Max) × 60)	(Max) 242 bytes	0,1 A	Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		0x8001–0x7FFD (T phase) (−3 276,7 to 3 276,5): (−3 276,7 to 3 276,5)							
Channel range specification for instanta-neous power consumption measure-ment (duplex)	0xBD	This property is used to specify the range of acquisition by the measured instantaneous power consumption list (duplex). Byte 1: Acquisition start channel 0x01–0xFC (1 to 252) Byte 2: Range from the acquisition start channel (0x01–0x3C: 1 to 60)	unsigned char × 2	2 bytes	—	Set/ Get			
Measured instanta-neous power consumption list (duplex)	0xBE	This property indicates the measured instantaneous power consumption of a measurement channel specified by the property of “Channel range specification for instantaneous power consumption measurement (duplex).” Byte 1: Acquisition start channel 0x01–0xFC (1 to 252) Byte 2: Range from the acquisition start channel (0x01–0x3C: 1 to 60) Byte 3 and later: Measured instantaneous power consumption 0x80000001–0x7FFFFFFD (−2 147 483 647 to 2 147 483 645)	unsigned char + unsigned char + signed long ×(Max)60	(Max) 242 bytes	W	Get			

Forward and reverse directions are defined with reference to Figure 62.

For master metering, forward current is defined as forward direction, and reverse current as reverse direction. Power consumption by air conditioning or lighting is defined as forward direction. Power generation by photovoltaic generator (PV), fuel cell (FC), or similar solar photovoltaic power generation system is defined as reverse direction. For storage battery (SB), electric vehicle (EV/EHV), or similar battery systems, charged energy is defined as forward direction, and discharged energy as reverse direction. The current direction is shown in Figure 62

For the properties defined in this class to indicate measured instantaneous current and measured instantaneous power consumption, forward direction shall be handled as a positive value, and reverse direction as a negative value.

If electric power under measurement is identifiable, such as generated or discharged power, a measured value in the reverse direction may be handled as a positive value. For example, if PV measurement is implemented as an independent instance code of the power distribution board metering class, generated power may be defined as forward direction.

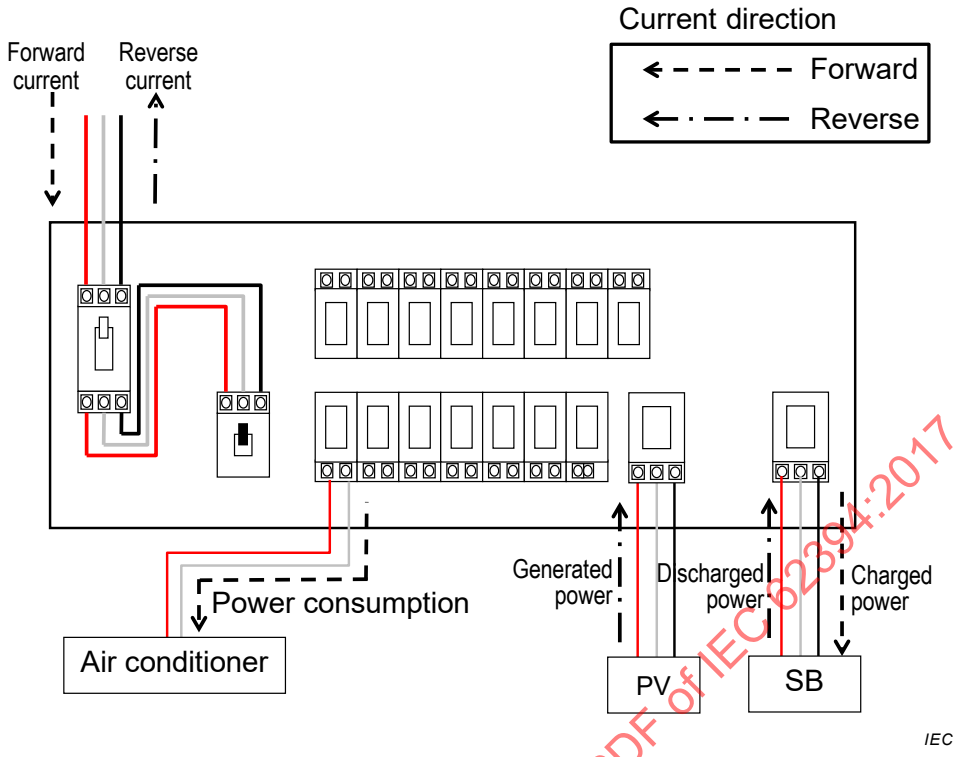


Figure 62 – current direction in power distribution board

With reference to the definition of simplex and duplex, a property defined as duplex can be used for installation where both charged and discharged currents can be detected, for example, in SB. In addition, a property defined as simplex by separating charging and discharging may be used for implementation. The assignment of simplex and duplex properties to circuits shall depend on the implementation because it differs between the measuring points and sensors or systems installed.

9.30.2 Operation status property

This property indicates whether the functions specific to this class are operating (ON) or not (OFF). In the case of a node in which this class is implemented and the functions specific to this class start operating upon startup of the node, this property may be implemented with the value fixed at 0x30 (operation status ON).

9.30.3 Measured cumulative amount of electric energy (normal and reverse directions) property

This property indicates the measured cumulative amount of electric energy using an 8-digit decimal notation number. The property value for the normal direction is the value for the power flow, and the property value for the reverse direction is the value for the reverse power flow. The unit is indicated by the “Unit for measured cumulative amounts of electric energy” property (EPC = 0xC1). When the value of the “Unit for measured cumulative amounts of electric energy” property (which indicates the multiplying factor for measured cumulative amounts of electric energy) is 0x00, 0x01, 0x02, 0x03, 0x04, 0x0A, 0x0B, 0x0C or 0x0D, the unit shall be 1 kWh, 0,1 kWh, 0,01 kWh, 0,001 kWh, 0,000 1 kWh, 10 kWh, 100 kWh, 1 000 kWh or 10 000 kWh, respectively. The property value range is from 0x00000000 to 0x05F5E0FF (from 0 to 99,999,999). In the event of a measured cumulative electric energy amount overflow, the counting of the measured cumulative amount of electric energy shall be restarted from 0x00000000.

Example:

If the value of the “Measured cumulative amount of electric energy” property indicates that the measured cumulative amount of electric energy is 12 345 678 and the value of the “Unit for measured cumulative amounts of electric energy” property is 0x03, the actual measured cumulative amount would be:

12 345 678 × 0,001 kW = 12 345,678 kWh

Overflow: Counting shall be restarted from 0x00000000.

No data: 0xFFFFFFFE

9.30.4 Unit for measured cumulative amounts of electric energy property

This property indicates the unit for measured cumulative amounts of electric energy (EPC = 0xC0, 0xC1).

Property value	Unit (multiplying factor) for measured cumulative amounts of electric energy
0x00	1 kWh
0x01	0,1 kWh
0x02	0,01 kWh
0x03	0,001 kWh
0x04	0,000 1 kWh
0x0A	10 kWh
0x0B	100 kWh
0x0C	1 000 kWh
0x0D	10 000 kWh

9.30.5 Historical data of measured cumulative amounts of electric energy (normal and reverse directions) property

This property indicates the current setting of the “Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved” property (EPC = 0xC5; value range = 0x00–0x63 (0–99)) and the historical data of measured cumulative amounts of electric energy for the day specified by the “Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved” property, which consists of 48 pieces of half-hourly data for the preceding 24 h. The unit is indicated by the “Unit for measured cumulative amounts of electric energy” property. When the value of the “Unit for measured cumulative amounts of electric energy” property is 0x00, 0x01, 0x02, 0x03, 0x04, 0x0A, 0x0B, 0x0C or 0x0D, the unit shall be 1 kWh, 0,1 kWh, 0,01 kWh, 0,001 kWh, 0,000 1 kWh, 10 kWh, 100 kWh, 1 000 kWh or 10 000 kWh, respectively. The half-hourly cumulative electric energy amount measurements shall be measurements that have been taken every hour and every half-hour by reference to the time specified by the “Current time setting” property (EPC = 0x97). The (8-digit) measurements (these are the measurements from the meter, not the cumulated amounts for the 30-minute periods) shall be stored in the order they have been taken, with the oldest and newest measurements stored in the highest-order and lowest-order bytes, respectively. The value range is from 0x00000000 to 0x05F5E0FF (from 0 to 99 999 999). For the hours and half hours at which the amount of electric energy was not measured, 0xFFFFFFFE shall be used as the historical data value.

9.30.6 Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved (normal and reverse directions) property

Specifies the day for which the historical data of measured cumulative amounts of electric energy (EPC = 0xC3, C4) shall be retrieved. The value range is from 0x00 to 0x63 (from 0 to 99).

0x00 (0): historical data for the current day (up to the last hour)

0x63 (99): historical data for the day that precedes the current day by 99 days

When there is no data for the specified day, the “Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved” setting of the “Historical data of measured cumulative amounts of electric energy” property shall be set to 0xFF and all half-hourly value settings shall be set to 0xFFFFFFFE.

9.30.7 Measured instantaneous amount of electric energy property

This property indicates the measured effective instantaneous amount of electric energy in watts. The value range is from 0x80000001 to 0x7FFFFFFD (from −2 147 483 647 to 2 147 483 645).

Value range: from −2 147 483 647 to 2 147 483 645 W (unit of measurement: watts)

Underflow : 0x80000000

Overflow : 0x7FFFFFFF

No data : 0x7FFFFFFE

9.30.8 Measured instantaneous currents property

This property indicates the measured effective instantaneous R and T phase currents in increments of 0,1 A. The value range is from 0x8001 to 0x7FFD (from −3 276,7 to 3 276,5).

(In the case of a single-phase, two-wire system, the data shall be stored in the R phase field and 0x7FFE shall be set in the T phase field.)

Range: from −3 276,7 to 3 276,5 A (unit of measurement: 0,1 A)

Example:

single-phase, three-wire system: 0x03E9 0x03E7 → 100,1 99,9 (A)

single-phase, two-wire system: 0xFC19 0x7FFE → −99,9 not measured (A)

Underflow : 0x8000

Overflow : 0x7FFF

No data : 0x7FFE

9.30.9 Measured instantaneous voltages property

This property indicates the measured effective instantaneous R-S(N) and S(N)-T voltages in volts. The value range is from 0x0000 to 0xFFFD (from 0 to 6 553,3).

(In the case of a single-phase, two-wire system, the data shall be stored in the R-S(N) field and 0xFFFE shall be set in the S(N)-T field.)

Range: from 0,0 V to 6 553,3 V (unit of measurement: 0,1 V)

Example:

single-phase, three-wire system: 0x0451 0x03E7 → 110,5 99,9 (V)

single-phase, two-wire system: 0x03E7 0xFFFE → 99,9 not measured (V)

Overflow : 0xFFFF

No data : 0xFFFE

9.30.10 Measurement channels 1 to 32 property

This property indicates the cumulative amount of electric energy (in kWh) and effective instantaneous currents (in increments of 0,1 A) for the respective measurement channel (each EPC code).

The data format for the cumulative amount of electric energy is the same as that for the "Measured cumulative amount of electric energy" property (0xC0). The format for the effective instantaneous currents is the same as that for the "Measured instantaneous currents" property (0xC7). The unit for the cumulative amount of electric energy is the same as that for the "Unit for cumulative amounts of electric energy" property (0xC2).

The voltage values shall be taken from 0xC8.

9.30.11 Master rated capacity property

This property indicates the rated capacity of the master circuit. The value range for this property is 0x00 to 0xFD (0 to 253) and the unit is A.

9.30.12 Number of measurement channels (simplex) property

This property indicates the number of channels for simplex current and power consumption measurement. The channels are for the measurement of instantaneous current consumption, cumulative amount of electric power consumption, and instantaneous power consumption about load equipment (air conditioner, washing machine, etc.). They are also for the measurement of instantaneous generated current, amount of generated power, and instantaneous power generation about power generation equipment (solar photovoltaic generation, etc.).

The value range for this property is 0x01 to 0xFC (1 to 252). 0xFD means that the number of measurement channels is unknown.

The number of channels defined by this property refers to the number of measurement channels indicated by EPC = 0xB2 to 0xB7..

9.30.13 Channel range specification for cumulative amount of electric power consumption measurement (simplex) property

This property indicates the range of measurement channels to be acquired by the "measured cumulative amount of electric power consumption list (simplex)" property (EPC: 0xB3).

Byte 1 indicates the measurement channel at which to start acquisition. The value range for this property is 0x01 to 0xFC (1 to 252). Byte 2 indicates the range of acquisition from the acquisition start measurement channel. The value range is 0x01 to 0x3C (1 to 60).

The initial value of this property is 0xFD (no setting) for the acquisition start measurement channel and 0xFD (no setting) for the range from the acquisition start measurement channel.

When this property is installed, the "number of measurement channels (simplex)" property (EPC: 0xB1) and the "measured cumulative amount of electric power consumption list (simplex)" property (EPC: 0xB3) are mandatory.

The value of this property is not updated when a property value write request is made by specifying a range beyond the number of measurement channels indicated by the "number of measurement channels (simplex)" property (EPC: 0xB1).

9.30.14 Measured cumulative amount of electric power consumption list (simplex) property

This property indicates the measured cumulative amount of electric power consumption of measurement channels in the range specified by the “channel range specification for cumulative amount of electric power consumption measurement (simplex)” property (EPC: 0xB2).

Byte 1 indicates the measurement channel at which to start acquisition. The value range is 0x01 to 0xFC (1 to 252). Byte 2 indicates the range of acquisition from the acquisition start measurement channel. The value range is 0x01 to 0x3C (1 to 60). Starting from the acquisition start measurement channel, measured cumulative amount of electric power consumption is stored sequentially in Byte 3 and later for the number of channels specified in the acquisition range. The format is the same as for the “measured cumulative amount of electric power consumption (forward direction)” property (EPC: 0xC0) and the “measured cumulative amount of electric power consumption (reverse direction)" property (EPC: 0xC1).

The initial value of this property is 0xFD (no setting) for the acquisition start measurement channel, 0xFD (no setting) for the range from the acquisition start measurement channel, and 0xFFFFFFFE (no data) for the measured cumulative amount of electric power consumption (initial value: 0xFDFDFFFFFFFE).

When this property is installed, the “number of measurement channels (simplex)” property (EPC: 0xB1) and the “channel range specification for cumulative amount of electric power consumption measurement (simplex)” property (EPC: 0xB2) are mandatory.

9.30.15 Channel range specification for instantaneous current measurement (simplex) property

This property indicates the range of measurement channels to be acquired by the “measured instantaneous current list (simplex)” property (EPC: 0xB5).

Byte 1 indicates the measurement channel at which to start acquisition. The value range is 0x01 to 0xFC (1 to 252). Byte 2 indicates the range of acquisition from the acquisition start measurement channel. The value range is 0x01 to 0x3C (1 to 60).

The initial value of this property is 0xFD (no setting) for the acquisition start channel and 0xFD (no setting) for the range from the acquisition start measurement channel.

When this property is installed, the “number of measurement channels (simplex)” property (EPC: 0xB1) and the “measured instantaneous current list (simplex)” property (EPC: 0xB5) are mandatory.

The value of this property is not updated when a property value write request is made by specifying a range beyond the number of measurement channels indicated by the “number of measurement channels (simplex)” property (EPC: 0xB1).

9.30.16 Measured instantaneous current list (simplex) property

This property indicates the measured instantaneous current of measurement channels in the range specified by the “channel range specification for instantaneous current measurement (simplex)” property (EPC: 0xB4).

Byte 1 indicates the measurement channel at which to start acquisition. The value range is 0x01 to 0xFC (1 to 252). Byte 2 indicates the range of acquisition from the acquisition start measurement channel. The value range is 0x01 to 0x3C (1 to 60).

Starting from the acquisition start measurement channel, measured instantaneous current is stored sequentially in Byte 3 and later for the number of channels specified in the acquisition

range. The format is the same as for the “measured instantaneous current” property (EPC: 0xC7).

The initial value of this property is 0xFD (no setting) for the acquisition start measurement channel, 0xFD (no setting) for the range from the acquisition start measurement channel, and 0x7FFE7FFE (no data) for the measured instantaneous current (R and T phases) (initial value: 0xFDFD7FFE7FFE).

When this property is installed, the “number of measurement channels (simplex)” property (EPC: 0xB1) and the “channel range specification for instantaneous current measurement (simplex)” property (EPC: 0xB4) are mandatory.

9.30.17 Channel range specification for instantaneous power consumption measurement (simplex) property

This property indicates the range of measurement channels to be acquired by the “measured instantaneous power consumption list (simplex)” property (EPC: 0xB5).

Byte 1 indicates the measurement channel at which to start acquisition. The value range is 0x01 to 0xFC (1 to 252). Byte 2 indicates the range of acquisition from the acquisition start measurement channel. The value range is 0x01 to 0x3C (1 to 60).

The initial value of this property is 0xFD (no setting) for the acquisition start measurement channel and 0xFD (no setting) for the range from the acquisition start measurement channel.

When this property is installed, the “number of measurement channels (simplex)” property (EPC: 0xB1) and the “measured instantaneous power consumption list (simplex)” property (EPC: 0xB7) are mandatory.

The value of this property is not updated when a property value write request is made by specifying a range beyond the number of measurement channels indicated by the “number of measurement channels (simplex)” property (EPC: 0xB1).

9.30.18 Measured instantaneous power consumption list (simplex) property

This property indicates the measured instantaneous power consumption of measurement channels in the range specified by the “channel range specification for instantaneous power consumption measurement (simplex)” property (EPC: 0xB6).

Byte 1 indicates the measurement channel at which to start acquisition. The value range is 0x01 to 0xFC (1 to 252). Byte 2 indicates the range of acquisition from the acquisition start measurement channel. The value range is 0x01 to 0x3C (1 to 60).

Starting from the acquisition start measurement channel, measured instantaneous power consumption is stored sequentially in Byte 3 and later for the number of channels specified in the acquisition range. The format is the same as for the “measured instantaneous power consumption” property (EPC: 0xC6).

The initial value of this property is 0xFD (no setting) for the acquisition start measurement channel, 0xFD (no setting) for the range from the acquisition start measurement channel, and 0x7FFFFFFE (no data) for the measured instantaneous power consumption (initial value: 0xFDFD7FFFFFFE).

When this property is installed, the “number of measurement channels (simplex)” property (EPC: 0xB1) and the “channel range specification for instantaneous power consumption measurement (simplex)” property (EPC: 0xB6) are mandatory.

9.30.19 Number of measurement channels (duplex) property

This property indicates the number of channels for duplex current and power consumption measurement. The channels are for the measurement of cumulative amount of electric power consumption (forward direction)/(reverse direction), instantaneous current, and instantaneous power consumption for charging and discharging equipment, such as storage battery, EV, and PHV. The value range for this property is 0x01 to 0xFC (1 to 252). 0xFD means that the number of measurement channels is unknown.

The number of channels defined by this property refers to the number of measurement channels indicated by EPC = 0xB9 to 0xBE.

9.30.20 Channel range specification for cumulative amount of electric power consumption measurement (duplex) property

This property indicates the range of measurement channels to be acquired by the “measured cumulative amount of electric power consumption list (duplex)” property (EPC: 0xBA).

Byte 1 indicates the measurement channel at which to start acquisition. The value range is 0x01 to 0xFC (1 to 252). Byte 2 indicates the range of acquisition from the acquisition start measurement channel. The value range is 0x01 to 0x1E (1 to 30).

The initial value of this property is 0xFD (no setting) for the acquisition start measurement channel and 0xFD (no setting) for the range from the acquisition start measurement channel.

When this property is installed, the “number of measurement channels (duplex)” property (EPC: 0xB8) and the “measured cumulative amount of electric power consumption list (duplex)” property (EPC: 0xBA) are mandatory.

The value of this property is not updated when a property value write request is made by specifying a range beyond the number of measurement channels indicated by the “number of measurement channels (duplex)” property (EPC: 0xB8).

9.30.21 Measured cumulative amount of electric power consumption list (duplex) property

This property indicates the measured cumulative amount of electric power consumption of measurement channels in the range specified by the “channel range specification for cumulative amount of electric power consumption measurement (duplex)” property (EPC: 0xB9).

Byte 1 indicates the measurement channel at which to start acquisition. The value range is 0x01 to 0xFC (1 to 252). Byte 2 indicates the range of acquisition from the acquisition start measurement channel. The value range is 0x01 to 0x1E (1 to 30).

Starting from the acquisition start measurement channel, measured cumulative amount of electric power consumption (forward direction) and measured cumulative amount of electric power consumption (reverse direction) are stored sequentially in Byte 3 and later for the number of channels specified in the acquisition range. The format is the same as for the “measured cumulative amount of electric power consumption (forward direction)” property (EPC: 0xC0) and the “measured cumulative amount of electric power consumption (reverse direction)” property (EPC: 0xC1).

The initial value of this property is 0xFD (no setting) for the acquisition start measurement channel, 0xFD (no setting) for the range from the acquisition start measurement channel, and 0xFFFFFFFEFFFFFFFE (no data) for the measured cumulative amount of electric power consumption (initial value: 0xFDFDFFFFFFFEFFFFFFFE).

When this property is installed, the “number of measurement channels (duplex)” property (EPC: 0xB8) and the “channel range specification for cumulative amount of electric power consumption measurement (duplex)” property (EPC: 0xB9) are mandatory.

9.30.22 Channel range specification for instantaneous current measurement (duplex) property

This property indicates the range of measurement channels to be acquired by the “measured instantaneous current list (duplex)” property (EPC: 0xBC).

Byte 1 indicates the measurement channel at which to start acquisition. The value range is 0x01 to 0xFC (1 to 252). Byte 2 indicates the range of acquisition from the acquisition start measurement channel. The value range is 0x01 to 0x3C (1 to 60).

The initial value of this property is 0xFD (no setting) for the acquisition start measurement channel and 0xFD (no setting) for the range from the acquisition start measurement channel.

When this property is installed, the “number of measurement channels (duplex)” property (EPC: 0xB8) and the “measured instantaneous current list (duplex)” property (EPC: 0xBC) are mandatory.

The value of this property is not updated when a property value write request is made by specifying a range beyond the number of measurement channels indicated by the “number of measurement channels (duplex)” property (EPC: 0xB8).

9.30.23 Measured instantaneous current list (duplex) property

This property indicates the measured instantaneous current of measurement channels in the range specified by the “channel range specification for instantaneous current measurement (duplex)” property (EPC: 0xBB).

Byte 1 indicates the measurement channel at which to start acquisition. The value range for this property is 0x01 to 0xFC (1 to 252). Byte 2 indicates the range of acquisition from the acquisition start measurement channel. The value range is 0x01 to 0x3C (1 to 60).

Starting from the acquisition start measurement channel, measured instantaneous current is stored sequentially in Byte 3 and later for the number of channels specified in the acquisition range. The format is the same as for the “measured instantaneous current” property (EPC: 0xC7).

The initial value of this property is 0xFD (no setting) for the acquisition start measurement channel, 0xFD (no setting) for the range from the acquisition start measurement channel, and 0x7FFE7FFE (no data) for the measured instantaneous current (R and T phases) (initial value: 0xFDFD7FFE7FFE).

When this property is installed, the “number of measurement channels (duplex)” property (EPC: 0xB8) and the “channel range specification for instantaneous current measurement (duplex)” property (EPC: 0xBB) are mandatory.

9.30.24 Channel range specification for instantaneous power consumption measurement (duplex) property

This property indicates the range of measurement channels to be acquired by the “measured instantaneous power consumption list (duplex)” property (EPC: 0xBE).

Byte 1 specifies the acquisition start measurement channel and Byte 2 specifies the range from the acquisition start measurement channel. The specification range is from 0x01 to 0x3C (1 to 60).

The initial value of this property is 0xFD (no setting) for the acquisition start measurement channel and 0xFD (no setting) for the range from the acquisition start measurement channel.

When this property is installed, the “number of measurement channels (duplex)” property (EPC: 0xB8) and the “measured instantaneous power consumption list (duplex)” property (EPC: 0xBE) are mandatory.

The value of this property is not updated when a property value write request is made by specifying a range beyond the number of measurement channels indicated by the “number of measurement channels (duplex)” property (EPC: 0xB8).

9.30.25 Measured instantaneous power consumption list (duplex) property

This property indicates the measured instantaneous power consumption of measurement channels in the range specified by the “channel range specification for instantaneous power consumption measurement (duplex)” property (EPC: 0xBD).

Byte 1 indicates the measurement channel at which to start acquisition. The value range for this property is 0x01 to 0xFC (1 to 252). Byte 2 indicates the range of acquisition from the acquisition start measurement channel. The value range for this property is 0x01 to 0x3C (1 to 60).

Starting from the acquisition start measurement channel, measured instantaneous power consumption is stored sequentially in Byte 3 and later for the number of channels specified in the acquisition range. The format is the same as for the “measured instantaneous power consumption” property (EPC: 0xC6).

The initial value of this property is 0xFD (no setting) for the acquisition start measurement channel, 0xFD (no setting) for the range from the acquisition start measurement channel, and 0x7FFFFFFE (no data) for the measured instantaneous power consumption (initial value: 0xFDFD7FFFFFFE).

When this property is installed, the “number of measurement channels (duplex)” property (EPC: 0xB8) and the “channel range specification for instantaneous power consumption measurement (duplex)” property (EPC: 0xBD) are mandatory.

9.31 Low-voltage smart electric meter class specifications

9.31.1 General

The control commands of “low-voltage smart electric meter” are shown in Table 46.

Class group code : 0x02

Class code : 0x88

Table 46 – List of low-voltage smart electric meter properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte	—	Set Get	 ○	○	
Coefficient	0xD3	This property indicates the coefficient for converting measured cumulative amount of electric energy and historical data to actual usage amount using a 6-digit decimal notation. 0x00000000–0x000F423F (000 000 to 999 999)	unsigned long	4 bytes	—	Get			
Number of effective digits for cumulative amounts of electric energy	0xD7	This property indicates the number of effective digits for measured cumulative amounts of electric energy. 0x01–0x08 (1 to 8)	unsigned char	1 byte	digit	Get	○		
Measured cumulative amount of electric energy (normal direction)	0xE0	This property indicates the measured cumulative amount of electric energy using an 8-digit decimal notation number. 0x00000000–0x05F5E0FF (0 to 99 999 999)	unsigned long	4 bytes	kWh	Get	○		
Unit for cumulative amounts of electric energy (normal and reverse directions)	0xE1	This property indicates the unit (multiplying factor) used for the measured cumulative amount of electric energy and the historical data of measured cumulative amounts of electric energy. 0x00: 1kWh 0x01: 0,1 kWh 0x02: 0,01 kWh 0x03: 0,001 kWh 0x04: 0,000 1 kWh 0x0A: 10 kWh 0x0B: 100 kWh 0x0C: 1 000 kWh 0x0D: 10 000 kWh	unsigned char	1 byte	—	Get	○		
Historical data of measured cumulative amounts of electric energy 1 (normal direction)	0xE2	This property indicates the day for which the historical data of measured cumulative amounts of electric energy shall be retrieved 1 and the historical data of measured cumulative amounts of electric energy (normal direction), which consists of 48 items of half-hourly data for the preceding 24 h (00:00 to 23:30) of the day by time series from the highest-order byte. 1-2 bytes: day for which the	unsigned short + unsigned long × 48	194 bytes	kWh	Get	○		

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		historical data of measured cumulative amounts of electric energy shall be retrieved 0x0000–0x0063 (0 to 99) 3 and succeeding bytes: measured cumulative amounts of electric energy 0x00000000–0x05F5E0FF (0 to 99 999 999)							
Measured cumulative amounts of electric energy (reverse direction)	0xE3	This property indicates the measured cumulative amounts of electric energy using an 8-digit decimal notation number. 0x00000000–0x05F5E0FF (0 to 99 999 999)	unsigned long	4 bytes	kWh	Get	O		a
Historical data of measured cumulative amounts of electric energy 1 (reverse direction)	0xE4	This property indicates the day for which the historical data of measured cumulative amounts of electric energy shall be retrieved 1 and the historical data of measured cumulative amounts of electric energy (reverse direction), which consists of 48 items of half-hourly data for the preceding 24 h (00:00 to 23:30) of the day by time series from the highest-order byte. Bytes 1–2: day for which the historical data of measured cumulative amounts of electric energy shall be retrieved 0x0000–0x0063 (0 to 99) 3 and succeeding bytes: measured cumulative amounts of electric energy 0x00000000–0x05F5E0FF (0 to 99 999 999)	unsigned short + unsigned long × 48	194 bytes	kWh	Get	O		a
Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved 1	0xE5	This property indicates the day for which the historical data of measured cumulative amounts of electric energy (which consists of 48 items of half-hourly data for the preceding 24 h) shall be retrieved. 0x00–0x63 (0 to 99) 0: current day 1–99: previous day – day that precedes the current day by 99 days	unsigned char	1 byte		Set/ Get	O		
Measured instanta-neous electric energy	0xE7	This property indicates the measured effective instantaneous electric energy in 1 W unit. 0x80000001–0x7FFFFFFD (−2 147 483 647 to	signed long	4 bytes	W	Get	O		

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		2 147 483 645)							
Measured instanta-neous currents	0xE8	This property indicates the measured effective instantaneous R and T phase currents in 0,1 A unit. In the case of a single-phase, two-wire system, 0x7FFE shall be used for the T phase. 0x8001–0x7FFD (R phase): 0x8001–0x7FFD (T phase) (−3 276,7 to 3 276,5): (−3 276,7 to 3 276,5)	signed short × 2	4 bytes	0,1A	Get	O		
Cumulative amounts of electric energy measured at fixed time (normal direction)	0xEA	This property indicates the most recent cumulative amount of electric energy (normal direction) measured at 30-minute intervals held by the meter in the format of 4 bytes for date of measurement, 3 bytes for time of measurement, and 4 bytes for cumulative electric energy (normal direction). date of measurement YYYY:MM:DD time of measurement hh:mm:ss cumulative electric energy: an 8-digit decimal notation number Bytes 1–4: date of measurement YYYY: 0x0001–0x270F (1–9 999) MM: 0x01–0x0C (1–12) DD: 0x01–0x1F (1–31) Bytes 5–7: time of measurement hh: 0x00–0x17 (0–23) mm: 0x00–0x3B (0–59) ss: 0x00–0x3B (0–59) Bytes 8–11: cumulative amounts of electric energy measured 0x00000000–0x05F5E0FF (0–99 999 999)	unsigned short + unsigned char ×2 + unsigned char × 3 + unsigned long	11 bytes	year + month + day + hour + minute + second + kW h	Get	O		
Cumulative amounts of electric energy measured at fixed time (reverse direction)	0xEB	This property indicates the most recent cumulative amount of electric energy (reverse direction) measured at 30-minute intervals held by the meter in the format of 4 bytes for date of measurement, 3 bytes for time of measurement, and 4 bytes for cumulative electric energy (reverse direction).	unsigned short + unsigned char ×2 + unsigned char × 3	11 bytes	year + month + day + hour	Get	O		Note 1

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		date of measurement YYYY:MM:DD time of measurement hh:mm:ss cumulative electric energy: an 8-digit decimal notation number Bytes 1–4: date of measurement YYYY: 0x0001–0x270F (1 to 9 999) MM: 0x01–0x0C (1–12) DD: 0x01–0x1F (1–31) Bytes 5–7: time of measurement hh: 0x00–0x17 (0–23) mm: 0x00–0x3B (0–59) ss: 0x00–0x3B (0–59) Bytes 8–11: cumulative amounts of electric energy measured 0x00000000–0x05F5E0FF (0 to 99 999 999)	+ unsigned long		+ minute + second + kW h				
Historical data of measured cumulative amounts of electric energy 2 (normal and reverse directions)	0xEC	This property indicates the historical data of measured cumulative amounts of electric energy every 30 min in the normal and reverse directions within the past 6 h in the form of date and time for which the historical data of measured cumulative amounts of electric energy shall be retrieved, the number of collection segments, and cumulative amount of electric energy (8 digits max). ・ date and time for which the historical data shall be retrieved YYYY:MM:DD:hh:mm ・ number of collection segments ・ cumulative amounts of electric energy Decimal notation up to 8 digits (6 h max) Bytes 1–6: date and time for which the historical data shall be retrieved YYYY: 0x0001–0x270F (1–9 999) MM: 0x01–0x0C (1–12) DD: 0x01–0x1F (1–31) hh: 0x00–0x17 (0–23)	unsigned short + unsigned char × 4 + unsigned char + (unsigned long + unsigned long) × (Max) 12	Max. 103 bytes	date, time and kWh	Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		mm: 0x00/0x1E (0/30) Byte 7: number of collection segments 0x01–0x0C (1 to 12) Byte 8 and later: Measured cumulative amount of electric energy (normal direction) 0x00000000–0x05F5E0FF (0 to 99 999 999) Measured cumulative amount of electric energy (reverse direction) 0x00000000–0x05F5E0FF (0 to 99 999 999)							
Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved 2	0xED	This property indicates the date and time of historical data of measurements (every 30 min) and the number of segments where measurement of historical data is collected every 30 min. Bytes 1 to 6: date and time for which the historical data shall be retrieved YYYY: 0x0001–0x270F (1 to 9 999) MM: 0x01–0x0C (1 to 12) DD: 0x01–0x1F (1 to 31) hh: 0x00–0x17 (0 to 23) mm: 0x00/0x1E (0/30) Byte 7: number of collection segments 0x01–0x0C (1 to 12)	unsigned short + unsigned char × 4 + unsigned char	7 bytes		Set/ Get			
[a] It is mandatory if there is a reverse direction measurement function.									

This class is used in the case of smart electric energy meters installed for customers supplied with power of 400 V or less.

In the case of smart electric energy meters installed for customers supplied with power of 6,6 kV, the high-voltage smart electric energy meter class (Class group code: 0x02, Class code: 0x8A) shall be used.

9.31.2 Operation status property

This property indicates whether the functions specific to this class are operating (ON) or not (OFF). In the case of a node in which this class is implemented and the functions specific to this class start operating upon startup of the node, this property may be implemented with the value fixed at 0x30 (operation status ON).

9.31.3 Coefficient property

This property indicates the coefficient for converting measured cumulative amounts of electric energy and historical data of measured cumulative amounts of electric energy to actual usage amounts using a 6-digit decimal notation. If this property is not implemented, the coefficient shall be treated as 1.

9.31.4 Number of effective digits for cumulative amounts of electric energy property

This property indicates the number of effective digits from the low-order side of the measured cumulative amounts of electric energy (data size: 4 bytes, number of digits: 8).

Example:

Number of effective digits for cumulative amounts of electric energy 0x06 (six digits from the low-order side).

The cumulative electric energy value overflows at 0x000F423F (999 999) and increments again from 0x00000000(0).

9.31.5 Measured cumulative amount of electric energy (normal direction) property

This property indicates the measured cumulative amount of electric energy in the normal direction (power flow) using an 8-digit decimal notation number. The unit is indicated by the “Unit for measured cumulative amounts of electric energy” property (EPC = 0xE1). The property value range is from 0x00000000 to 0x05F5E0FF (from 0 to 99 999 999). If the cumulative electric energy value exceeds the value specified by the “Number of effective digits for cumulative electric energy” property (EPC = 0xD7), the value shall increment again from 0x00000000(0). When “Coefficient” (EPC = 0xD3) is specified, the value multiplied by the coefficient is the actual usage amount.

Example:

If the value of the “Measured cumulative amount of electric energy (normal direction)” property is 0x00BC614E (12345678), the value of the “Coefficient (EPC=0xD3)” property is 0x0000000A (10 times) and the value of the “Unit for measured cumulative amounts of electric energy (EPC = 0xE1)” property is 0x03 (0,001 kWh), the actual measured cumulative amount would be:

12345678 × 10× 0,001 kW = 123 456,78 kWh (actual usage amount)

Overflow : Counting shall be restarted from 0x00000000

No measured data : 0xFFFFFFFE

9.31.6 Unit for measured cumulative amounts of electric energy (normal and reverse directions) property

This property indicates the unit for the measured cumulative amount of electric energy (normal and reverse directions) and the historical data of measured cumulative amounts of electric energy.

Property value	Unit (multiplying factor) for measured cumulative amounts of electric energy
0x00	1 kWh
0x01	0,1 kWh
0x02	0,01 kWh
0x03	0,001 kWh
0x04	0,000 1 kWh
0x0A	10 kWh
0x0B	100 kWh
0x0C	1 000 kWh
0x0D	10 000 kWh

9.31.7 Historical data of measured cumulative amounts of electric energy 1 (normal direction) property

This property includes two elements. One is the “day for which the historical data of measured cumulative amounts of electric energy shall be retrieved” 0x0000 to 0x0063 (0 to 99) specified by “Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved 1” (EPC = 0xE5) (day for which the historical data of measured cumulative amounts of electric energy shall be retrieved 1 (EPC = 0xE5) indicated in 2 bytes). The other is the historical data of measured cumulative amounts of electric energy in the normal direction (meter reading and not 30-min cumulative value) every 30 min at 00 and 30 min every hour for 24 h (00:00 to 23:30) on the day, 48 times in total, by time series from the highest-order byte.

This property indicates the cumulative amounts of electric energy using an 8-digit decimal notation number. The unit is indicated by the “Unit for measured cumulative amounts of electric energy” property (EPC = 0xE1). When “Coefficient” (EPC = 0xD3) is specified, the value multiplied by the coefficient is the actual usage amount. The property value range is from 0x00000000 to 0x05F5E0FF (0 to 99 999 999). If the cumulative amounts of electric energy exceeds the number of effective digits specified by “number of effective digits for cumulative amounts of electric energy” (EPC = 0xD7), the value shall be increased again from 0x00000000(0). The property value shall be set to 0xFFFFFFFE (no measured data) in the case of no cumulative amounts of electric energy (normal direction) of the corresponding time. In the case of default values when “Day for which the historical data of measured cumulative amounts of electric energy it to be retrieved 1” (EPC=0xE5) has not been set, the day for which the historical data of measured cumulative amounts of electric energy shall be retrieved shall be set to 0x00FF and all half-hourly measurements of cumulative amount of electric energy shall be set to 0xFFFFFFFE.

9.31.8 Measured cumulative amount of electric energy (reverse direction) property

This property indicates the measured cumulative amount of electric energy in the reverse direction (reverse power flow) using an 8-digit decimal notation number. The unit is indicated by the “Unit for measured cumulative amounts of electric energy” property (EPC = 0xE1). The property value range is from 0x00000000 to 0x05F5E0FF (from 0 to 99 999 999). If the cumulative electric energy value exceeds the value specified by the “Number of effective digits for cumulative electric energy” property (EPC = 0xD7), the value shall increment again from 0x00000000(0). When “Coefficient” (EPC = 0xD3) is specified, the value multiplied by the coefficient is the actual usage amount.

Overflow : Counting shall be restarted from 0x00000000.

No measured data : 0xFFFFFFFE

9.31.9 Historical data of measured cumulative amounts of electric energy 1 (reverse direction) property

This property includes two elements. One is the “day for which the historical data of measured cumulative amounts of electric energy shall be retrieved” 0x0000 to 0x0063 (0 to 99) specified by “Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved 1” (EPC = 0xE5) (day for which the historical data of measured cumulative amounts of electric energy shall be retrieved 1 (EPC = 0xE5) indicated in 2 bytes). The other is the historical data of measured cumulative amounts of electric energy in the reverse direction (meter reading and not 30-min cumulative value) every 30 min at 00 and 30 min every hour for 24 h (00:00 to 23:30) on the day, 48 times in total, by time series from the highest-order byte.

This property indicates the cumulative amounts of electric energy using an 8-digit decimal notation number. The unit is indicated by the “Unit for measured cumulative amounts of electric energy” property (EPC = 0xE1). When “Coefficient” (EPC = 0xD3) is specified, the value multiplied by the coefficient is the actual usage amount. The property value range is from 0x00000000 to 0x05F5E0FF (0 to 99 999 999). If the cumulative amounts of electric energy exceed the number of effective digits specified by “number of effective digits for cumulative amounts of electric energy” (EPC = 0xD7), the value shall be increased again from 0x00000000(0). The property value shall be set to 0xFFFFFFFE (no measured data) in the case

of no cumulative amounts of electric energy (reverse direction) of the corresponding time. In the case of default values when “Day for which the historical data of measured cumulative amounts of electric energy it to be retrieved 1” (EPC=0xE5) has not been set, the day for which the historical data of measured cumulative amounts of electric energy shall be retrieved shall be set to 0x00FF and all half-hourly measurements of cumulative amount of electric energy shall be set to 0xFFFFFFFE.

9.31.10 Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved 1 property

This property specifies the day for which the historical data of measured cumulative amounts of electric energy 1 (EPC = 0xE2, 0xE4) shall be retrieved. The value range is from 0x00 to 0x63 (from 0 to 99).

0x00 (0): measured historical data for the current day (up to the last hour)

0x63 (99): measured historical data for the day that precedes the current day by 99 days

The default values of this property shall be 0xFF.

9.31.11 Measured instantaneous electric energy property

This property indicates the measured effective instantaneous electric energy in watts. The value range is from 0x80000001 to 0x7FFFFFFD (from −2 147 483 647 to 2 147 483 645).

Range: from −2 147 483 647 W to 2 147 483 645 W (unit of measurement: watts)

Underflow : 0x80000000

Overflow : 0x7FFFFFFF

No measured data : 0x7FFFFFFE

9.31.12 Measured instantaneous currents property

This property indicates the measured effective instantaneous R and T phase currents in amperes. The value range is from 0x8001 to 0x7FFD (from −3 276,7 to 3 276,5).

In the case of a single-phase, two-wire system, measured data shall be stored in the R phase field and 0x7FFE (no measured data) shall be set in the T phase field.

Range: from −3 276,7 to 3 276,5 A (unit of measurement: 0,1 A)

Example:

single-phase, three-wire system: 0x03E9 0x03E7 → 100,1 99,9 (A)

single-phase, two-wire system: 0xFC19 0x7FFE → −99,9 not measured (A)

Underflow : 0x8000

Overflow : 0x7FFF

No measured data : 0x7FFE

9.31.13 Cumulative amounts of electric energy measured at fixed time (normal direction) property

This property indicates the cumulative amounts of electric energy (normal direction) measured at 30-min intervals (every half hour) (meter reading and not 30-min cumulative value) held by the meter in the format of 4 bytes for date of measurement, 3 bytes for time of measurement, and 4 bytes for cumulative electric energy (normal direction). The date of measurement shall be indicated in the format of two bytes for year, one byte for month, and one byte for day. The time of measurement shall be indicated in the format of one byte for hour, one byte for minute, and one byte for second. If the meter has no second information, 0x00 shall be set for second. The measured cumulative amounts of electric energy shall be indicated using an 8-digit decimal notation number. The unit shall be indicated by the “Unit of cumulative electric energy” property (EPC = 0xE1). When “Coefficient” (EPC = 0xD3) is specified, the value multiplied by the coefficient is the actual usage amount. The value range of the property shall be from

0x00000000 to 0x05F5E0FF (0 to 99 999 999). If the cumulative electric energy value exceeds the value specified by the “Number of effective digits for cumulative electric energy” property (EPC = 0xD7), the value shall increment again from 0x00000000(0). If the meter does not support cumulative electric energy (normal direction), 0xFFFFFFFE shall be set for no measured data.

Overflow : Counting shall be restarted from 0x00000000

No measured data : 0xFFFFFFFE

Example:

Cumulative amounts of electric energy measured at fixed time (normal direction)

– YYYY = 0x07DC (year: 2012), MM = 0x03 (month: 3), DD = 0x0F (day: 15)
– hh = 0x07 (hour: 7), mm = 0x00 (minute: 0), ss = 0x00 (second: 0)
– Cumulative electric energy (normal direction) = 0x0001E240 (00 123 456)

Number of effective digits for cumulative electric energy (EPC = 0xD7): 0x06 (low-order six digits)

Coefficient (EPC=0xD3): No implementing of property (=1)

Unit of cumulative electric energy (EPC = 0xE1): 0x02 (0,01 kWh)

Date of measurement: March 15, 2012

Time of measurement: 07:00:00

Cumulative electric energy (normal direction)

(123 456 × 0,01) kWh = 1 234,56 kWh (actual usage amount)

9.31.14 Cumulative amounts of electric energy measured at fixed time (reverse direction) property

This property indicates the cumulative amounts of electric energy (reverse direction) measured at 30-min intervals (every half hour) (meter reading and not 30-min cumulative value) held by the meter in the format of 4 bytes for date of measurement, 3 bytes for time of measurement, and 4 bytes for cumulative electric energy (reverse direction). The date of measurement shall be indicated in the format of two bytes for year, one byte for month, and one byte for day. The time of measurement shall be indicated in the format of one byte for hour, one byte for minute, and one byte for second. If the meter has no second information, 0x00 shall be set for second. The measured cumulative amounts of electric energy shall be indicated using an 8-digit decimal notation number. The unit shall be indicated by the “Unit of cumulative electric energy” property (EPC = 0xE1). When “Coefficient” (EPC = 0xD3) is specified, the value multiplied by the coefficient is the actual usage amount. The value range of the property shall be from 0x00000000 to 0x05F5E0FF (0 to 99 999 999). If the cumulative electric energy value exceeds the value specified by the “Number of effective digits for cumulative electric energy” property (EPC = 0xD7), the value shall increment again from 0x00000000(0). If the meter does not support cumulative electric energy (reverse direction), 0xFFFFFFFE shall be set for no data.

Overflow : Counting shall be restarted from 0x00000000

No measured data : 0xFFFFFFFE

Example:

Cumulative amount of electric energy measured at fixed time (reverse direction)

– YYYY = 0x07DC (year: 2012), MM = 0x03 (month: 3), DD = 0x0F (day: 15)
– hh = 0x07 (hour: 7), mm = 0x00 (minute: 0), ss = 0x00 (second: 0)
– Cumulative electric energy (reverse direction) = 0x0001E240 (00123456)

Number of effective digits for cumulative electric energy (EPC = 0xD7): 0x06 (low-order six digits)

Coefficient (EPC=0xD3): No implementing of property (=1)

Unit of cumulative electric energy (EPC = 0xE1): 0x02 (0,01 kWh)

Date of measurement: 2012, March, 15 March 15, 2012

Time of measurement: 07:00:00

Cumulative electric energy (reverse direction)

123 456 × 0,01 kWh = 1 234,56 kWh (actual usage amount)

9.31.15 Historical data of measured cumulative amounts of electric energy 2 (normal and reverse directions) property

This property includes two elements. One is the date and time for which the historical data of measured cumulative amounts of electric energy shall be retrieved in the format of YYYY:MM:DD:hh:mm, and the number of collection segments specified by "Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved 2" (EPC = 0xED) respectively. The other is the historical data of measured cumulative amount of electric energy every 30 min in the normal and reverse directions within the past 6 h on the day.

The date and time indicates date by four bytes and time by two bytes in this order. The property value for minutes every hour is 0x00 (0 min) or 0x1E (30 min).

The number of collection segments indicates the count of collecting data about cumulative amount of electric energy every 30 min by one byte. The valid range is from 0x01 to 0x0C (1 to 12).

Measured cumulative amount of electric energy (meter reading and not 30-min cumulative value) is a decimal notation of up to 8 digits. The property of "Unit for measured cumulative amounts of electric energy" (EPC = 0xE1) indicates the unit. When "Coefficient" (EPC = 0xD3) is specified, the value multiplied by the coefficient is the actual usage amount. The property value range is from 0x00000000 to 0x05F5E0FF (0 to 99 999 999). With the Measured cumulative amount of electric energy (normal and reverse directions) measured at the time set by "date and time for which the historical data shall be retrieved" as the higher-order byte, the property value indicates the number of segments specified by "day for which the historical data of measured cumulative amounts of electric energy shall be retrieved 2" (EPC = 0xED) in reverse time series. If the cumulative amount of electric energy exceeds the number of effective digits specified by "Number of effective digits for cumulative amounts of electric energy" (EPC = 0xD7), the value shall be increased again from 0x00000000(0). When cumulative amount of electric energy is not measured or the data is outside the history retention period, the property value shall be set to 0xFFFFFFFE for no measured data.

When "Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved 2" (EPC = 0xED) is not set, the initial value shall be set to 0xFFFFFFFFFFFF for date and time for which the historical data of measured cumulative amounts of electric energy shall be retrieved, 0x01 for the number of segments, and 0xFFFFFFFE for the 30-min value of each segment in the normal and reverse directions respectively.

9.31.16 Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved 2 property

This property includes two elements. One is the date and time for which the historical data of measured cumulative amounts of electric energy shall be retrieved of a target specified by the "Historical data of measured cumulative amounts of electric energy 2 (normal and reverse directions)" (EPC = 0xEC). The other is the number of collection segments where 30-min measurement historical data is one segment.

The date and time shall be the latest ones of data collection. The format is two bytes for year, one byte for month, one byte for day, one byte for hour, and one byte for minute. Since “Historical data of measured cumulative amounts of electric energy 2 (normal and reverse directions)” is data collected every 30 min, the minutes value shall be 0x00 (0 minute) or 0x1E (30 min).

The number of collection segments indicates the count of collecting data about measured cumulative amount of electric energy every 30 min earlier than the date and time for which the historical data shall be retrieved. The property value range is from 0x01 to 0x0C (1 to 12).

The initial value of this property shall be set to 0xFFFFFFFFFFFF for date and time for which the historical data shall be retrieved and 0x01 for the number of collection segments.

9.32 Smart gas meter class specifications

9.32.1 General

The control commands of “smart gas meter” are shown in Table 47.

Class group code : 0x02

Class code : 0x89

Table 47 – List of smart gas meter properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Man-datory	Announ-cement at status change	Remark
Operation status	0x80	This property indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte	–	Set Get	 ○	○	
Gas classification setting	0xE0	This property indicates the gas meter type. 0x30: City gas 0x31: LP gas 0x32: Natural 0x33: Other	unsigned char	1 byte	–	Set/Get			
Owner classification setting	0xE1	This property indicates the owner of a meter by classification. 0x30: Not specified 0x31: City gas 0x32: LP gas 0x33: Private company 0x34: Individual	unsigned char	1 byte	–	Set/Get			
Integral gas consumption measured value	0xE2	This property indicates the integral gas consumption. 0 to 0x3B9AC9FF (0 to 999 999 999)	unsigned long	4 bytes	0,001 m^3	Get	○ [a]		
Unit of integral gas consumption measured value	0xE3	This property indicates the integral gas consumption measured value and the unit of log (multiplying factor). 0x00: 1 m^3 0x01: 0,1 m^3 0x02: 0,01 m^3 0x03: 0,001 m^3 0x04: 0,000 1 m^3 0x05: 0,000 01 m^3 0x06: 0,000 001 m^3	unsigned char	1 byte	–	Get			
Integral gas consumption log information	0xE4	This property indicates the integral log collection date and gas consumption measurement log at 30 min intervals for 24 days. 0x0000 to 0x0063: 0x0 to 0x3B9AC9FF (0 to 99): (0 to 999 999 999)	unsigned short + unsigned long ×48	194 bytes	0,001 m^3	Get			
Integral gas consumption log collection day setting	0xE5	This property indicates a day of collecting measurement log data at 30 min intervals. 0x00 to 0x63 (0 to 99) 0: on the day 1 to 99: number of preceding	unsigned char	1 byte		Set/Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Man-datory	Announ-cement at status change	Remark
		days							
Error detection status of metering data	0xE6	This property indicates an error in metering data detected by the meter. Error detected: 0x41 Error not detected: 0x42	unsigned char	1 byte	–	Get			
Security data information	0xE7	This property indicates security data (meter activated) defined by means of a bit assignment. For details, see 9.32.10.	unsigned char ×10	10 bytes	–	Get			
Center valve shutoff status	0xE8	This property indicates that the shutoff valve of the meter is closed from the center. Center valve shutoff: 0x41 No center valve shutoff: 0x42	unsigned char	1 byte	–	Get			
Center valve shutoff recovery permission setting status	0xE9	This property indicates whether recovery from the gas shutoff status of the meter is permitted. Recovery permitted: 0x41 Recovery not permitted: 0x42	unsigned char	1 byte	–	Get			
Emergency valve shutoff status	0xEA	This property indicates the emergency closure of the shutoff valve of the meter. Emergency shutoff: 0x41 No emergency shutoff: 0x42	unsigned char	1 byte	–	Get			
Shutoff valve status	0xEB	This property indicates whether the shutoff valve is closed. Shutoff valve open: 0x41 Shutoff valve closed: 0x42	unsigned char	1 byte	–	Get			
Log of reasons for shutoff	0xEC	Defines reasons (one byte each) for the closure of shutoff valve using one byte in the last three cases by means of bit assignment. Log 3: Log 2: Log 1 0xFF: 0xFF: 0xFF	unsigned char ×3	3 bytes	–	Get			
ID number setting	0xED	This property indicates the ID number of the meter. 000000 to FFFFFF (Initial value: “000000”)	unsigned char	6 bytes		Set/Get			
Inspection expiration setting	0xEE	This property indicates the year and month of expiration of inspection validity. YYYYMM YYYY (year), MM (month)	unsigned char	6 bytes		Set/Get			
Integral gas consumption measured value	0xD0	This property indicates the integral gas consumption and measurement date and time.	unsigned char ×4	11 bytes	Date +	Get	○ [a]		

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Man-datory	Announ-cement at status change	Remark
information with date		– Measurement date YYYY:MM:DD – Measurement time HH:MM:SS – Integral gas consumption: 9 digits Bytes 1 to 4: 0 to 0x270f:1 to 0x0C: 1 to 0x1F (= 0 to 9 999):(= 1 to 12): (1 to 31) Bytes 5 to 7: 0 to 0x17: 0 to 0x3B: 0 to 0x3B (= 0 to 23): (= 0 to 59): (= 0 to 59) Bytes 8 to 11: 0x00000000 to 0x3B9AC9FF (0 to 999 999 999)	+ unsigned char ×3 + unsigned long		time + 0,001 m^3				
Gas consumption log information property	0xD1	This property indicates a gas consumption log data per hour. – Measurement date YYYY:MM:DD – Measurement time HH:MM:SS – hourly Integral gas consumption data: 6 digits × 24 data – The integral gas consumption at a log start – Integration time interval Bytes 1 to 4: 0~0x270f:1~0x0C:1~0x1F (=0 to 9 999):(=1 to 12): (1 to 31) Bytes 5 to 7: 0~0x17:0~0x3B:0~0x3B (= 0 to 23):(= 0 to 59): (= 0 to 59) Bytes 8 to 103: 0x00000000~0x0001869F×24 (0 m^3 to 99,999 m^3)×24 Bytes 104 to 107: 0x00000000~0x3B9AC9FF (0 to 999 999 999) Bytes 108 to 109: 0x0001~0xFFFF (1 to 65 535)	unsigned char × 4 + unsigned char × 3 + unsigned long × 24 + unsigned long + unsigned short	109 bytes	Date + time + 0,001 m^3 + 0,001 m^3 + min	Get			

[a] Integral gas consumption measured value (EPC = 0xE2) or Integral gas consumption measured value information with date (EPC = 0xD0) is mandatory.

9.32.2 Operation status property

This property indicates whether the functions specific to this class are operating (ON) or not (OFF). In the case of a node in which this class is implemented and the functions specific to this

class start operating upon startup of the node, this property may be implemented with the value fixed at 0x30 (operation status ON).

9.32.3 Gas meter classification setting property

This property indicates the type of meter measurement by using gas meter classification.

9.32.4 Owner classification setting property

This property specifies the classification of the owner of a meter.

9.32.5 Integral gas consumption measured value property

This property indicates the integral gas consumption using 9 digits in decimal notation. The unit of the integral gas consumption measured value shall be as specified by the property of unit (EPC = 0xE3). When the unit (EPC = 0xE3) is not implemented, 0,001 m^3 shall be assumed.

When the unit (EPC = 0xE3) is implemented, one of the following units shall be used depending on the unit of integral gas consumption measured value (multiplying factor of integral gas consumption measured value): 0x00 for 1 m^3 for, 0x01 for 0,1 m^3, 0x02 for 0,01 m^3, 0x03 for 0,001 m^3, 0x04 for 0,000 1 m^3, 0x05 for 0,000 01 m^3, and 0x06 for 0,000 001 m^3.

The property value range shall be 0x00000000 to 3B9AC9FF (0 m^3 to 999 999,999 m^3). If an integral gas consumption measured value exceeds this property value range, the value shall increment again from 0x00000000.

Example:

Integral gas consumption measured value: 123 456 789, unit of integral gas consumption measured value: 0x03.

123 456 789 × 0,001 m^3 = 123 456,789 m^3 (measured value)

Overflow : increments again from 0x00000000

No data : 0xFFFFFFFE

Either integral gas consumption measured value (EPC = 0xE2) or integral gas consumption measured value information with date (EPC = 0xD0) is mandatory.

9.32.6 Unit of integral gas consumption measured value property

This property indicates a unit of integral gas consumption.

Property value	Integral gas consumption (multiplying factor)
0x00	1 m^3
0x01	0,1 m^3
0x02	0,01 m^3
0x03	0,001 m^3
0x04	0,000 1 m^3
0x05	0,000 01 m^3
0x06	0,000 001 m^3

When this property is not implemented, the unit of integral gas consumption measured value shall be 0,001 m^3.

9.32.7 Integral gas consumption log information property

This property indicates the data 0x00 to 0x63 (0 to 99) set on the day of integral gas consumption log collection date (EPC = 0xE5) and also integral gas consumption (0,001 m^3) measured at 30 min intervals for 24 h on the set day of integral gas consumption log collection. Based on the time set by property name "current time setting" (EPC = 0x97), a value (in units of 0,001 m^3) of up to 8 digits is read from the meter at 00 and 30 min every hour as data of 0x00000000 to 0x3B9AC9FF (0 m^3 to 999 999,999 m^3). The property value shall begin with the high-order byte in time series.

9.32.8 Integral gas consumption log collection day setting property

Specifies a day of calling an integral gas consumption log by setting 0x00 to 0x63 (0 to 99).

0x00(0): on the day (until the previous day)

0x63(99): 99 days earlier

If there is no data, 0xFF shall be set to the log collection day in the integral gas consumption log information (EPC = 0xE4) and 0xFFFFFFFE to all 30 min values.

9.32.9 Error detection status of metering data property

This property indicates an error detected in metering data. The property value shall be 0x41 if an error is detected or 0x42 if no error is detected.

9.32.10 Security data information property

This property indicates security information about the abnormal states detected by the meter in the form of security data that identifies the abnormal states by means of bit assignments as shown in Table 48.

Table 48 – Security data information property

	Char1	Char2	Char3	Char4	Char5		Char10
Bit1	Arr01	Arr09	Arr17	Arr25	Arr33		Arr73
Bit2	Arr02	Arr10	Arr18	Arr26	Arr34		Arr74
Bit3	Arr03	Arr11	Arr19	Arr27	Arr35		Arr75
Bit4	Arr04	Arr12	Arr20	Arr28	Arr36	···	Arr76
Bit5	Arr05	Arr13	Arr21	Arr29	Arr37		Arr78
Bit6	Arr06	Arr14	Arr22	Arr30	Arr38		Arr77
Bit7	Arr07	Arr15	Arr23	Arr31	Arr39		Arr79
Bit8	Arr08	Arr16	Arr24	Arr32	Arr40		Arr80
Arr: Alarm information.							

9.32.11 Center valve shutoff status property

This property indicates whether the gas shutoff valve of a meter is closed from the center. When the shutoff valve is closed, a shutoff valve open request cannot be accepted until the center valve shutoff recover permission (0x41) is received.

9.32.12 Center valve shutoff recovery permission setting status property

This property indicates whether recovery from the gas shutoff status of the meter recovery is permitted when the value is 0x41 but not when the value is 0x42.

9.32.13 Emergency closure of shutoff valve property

This property indicates the gas shutoff valve of a meter is closed for emergency. The property value shall be 0x41 for emergency shutoff and 0x42 for no emergency shutoff.

9.32.14 Shutoff valve status property

This property indicates whether the shutoff valve is closed. The property value shall be 0x41 when the valve is open and 0x42 when it is closed.

9.32.15 Log data of reasons for shutoff property

This property indicates a log of reasons for the last three occasions of shutting gas supply by closing the shutoff valve by means of a bit assignment with one byte used for each of the three shutoff reasons. The higher-order, intermediate-order and lower-order bytes shall contain log 3 (the reason for the shutoff before the last but one shutoff before the last shutoff), log 2 (the reason for the shutoff before the last shutoff) and log 1 (the reason for the last shutoff), respectively.

9.32.16 ID number setting property

This property indicates the ID number of the meter. The ID number shall be a 6-digit code comprised of 6 one-byte alphanumeric characters.

ID numbers are used when there are two or more meters.

9.32.17 Inspection expiration date property

This property indicates the expiration month and year of the meter for verification.

9.32.18 Integral gas consumption measured value information with date property

This property indicates integral gas consumption and measurement date in order of measurement date (4 bytes), measurement time (3 bytes), and integral gas consumption (4 bytes).

The measurement date format is year (2 bytes), month (1 byte), and data (1 byte). The measurement time format is hour (1 byte), minute (1 byte), and second (1 byte). If the meter does not have second information for measurement time, the second shall be set to 0x00.

For the definition of integral gas consumption, see 9.32.5.

Integral gas consumption measured value (EPC = 0xE2) or gas consumption measurement information with date (EPC = 0xD0) is mandatory.

9.32.19 Gas consumption log information property

This property indicates the historical information of gas consumption measured at every hour in the format of 4 bytes for the date of history start, 3 bytes for the time of history start, 4 bytes × 24 for historical data of measured cumulative gas consumption, 4 bytes for cumulative gas consumption at history start, and 2 bytes for cumulative time interval.

The date of history start shall be indicated in the format of two bytes for year, one byte for month, and one byte for day. The time of history start shall be indicated in the format of one byte for hour, one byte for minute, and one byte for second. If the meter has no second information, 0x00 shall be set for second.

Historical data of measured cumulative gas consumption indicates the gas consumption (unit: 0,001 m^3) at every cumulative interval using a 5-digit decimal notation number. The value range of the property shall be from 0x00000 to 0xF423F (0 to 99,999 m^3).

Cumulative gas consumption at history start shall follow the definition in "Integral gas consumption measured value property."

The value range of cumulative time interval shall be 0x0001 to 0xFFFF (1 min to 65 535 min).

Example:

Sending 24 cumulative values (reading increment at every hour) from 00:00:00 on March 1, 2012 (reading: 123,456.789m^3) after 00:00:00 on March 2

Date of history start (YYYY:MM:DD) = 0x07DC0301(2012:03:01)

Time of history start (hh:mm:ss) = 0x000000(00:00:00)

Historical data of measured cumulative gas consumption = See Table 49 (24 from Vol.01 to Vol.24)

Cumulative gas consumption at history start = 0x075BCD15 (123,456.789 m^3)

Cumulative time interval = 0x3C (60 min)

Table 49 – Historical data of measured cumulative gas consumption (example) corresponding to the transition of cumulative gas consumption

No.	Date	Time	Reading	Gas consumption log Vol.01 to 24
	20120301	000000	123456789	
01	20120301	010000	123456799	00010 (= 123456799 to 123456789)
02	20120301	020000	123456819	00020 (= 123456819 to 123456799)
03	20120301	030000	123456849	00030 (= 123456849 to 123456819)
04	20120301	040000	123456889	00040 (= 123456889 to 123456849)
. . .	. . .	. . .	. . .	. . .
21	20120301	210000	123461234	01000 (= 123461234 to 123460234)
22	20120301	220000	123461756	00522 (= 123461756 to 123461234)
23	20120301	230000	123461756	00000 (= 123461756 to 123461756)
24	20120302	000000	123461756	00000 (= 123461756 to 123461756)

9.33 High-voltage smart electric energy meter class specifications

9.33.1 General

The control commands of “high-voltage smart electric emergy meter” are shown in Table 50.

Class group code : 0x02
Class code : 0x8A

Table 50 – List of high-voltage smart electric emergy meter properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte	–	Set Get	 ○	○	
Coefficient	0xD3	This property indicates the coefficient for converting measured cumulative amount of electric energy and historical data to actual usage amount using a 6-digit decimal notation. 0x00000000–0x000F423F (000 000 to 999 999)	unsigned long	4 bytes	–	Get			
Multiplying factor for coefficient	0xD4	This property indicates the multiplying factor for coefficient. 0x00: × 1 0x01: × 0,1 0x02: × 0,01 0x03: × 0,001	unsigned char	1 byte		Get	○		
Fixed date	0xE0	This property indicates the fixed date for monthly usage, etc. 0x01-0x1F (1-31)	unsigned char	1 byte		Get	○		
Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved	0xE1	This property indicates the day for which the historical data of measured cumulative amounts of electric energy shall be retrieved (consisting of 48 items of half-hourly data for the preceding 24 h) shall be retrieved. 0x00-0x63 (0 to 99) 0: current day 1 to 99: days ago	unsigned char	1 byte		Set/ Get	○		
Measured cumulative amount of active electric energy	0xE2	This property indicates the unit used for the measured cumulative amount of active electric energy at the most recent measurement time using a maximum of 8 digits in decimal notation. Indicates the measurement date in 4 bytes, measurement time in 3 bytes, and cumulative amount of active electric energy in 4 bytes. – Measurement date YYYY:MM:DD – Measurement time hh:mm:ss – Cumulative amount of active electric energy Max. 8 digits in decimal notation 1st to 4th bytes: measurement date	unsigned short + unsigned char × 2 + unsigned char × 3 + unsigned long	11 bytes	year + month + day + hour + minute + second + kWh	Get	○		

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		YYYY: 0x0001-0x270F (1-9 999) MM: 0x01-0x0C (1-12) DD: 0x01-0x1F (1-31) 5th to 7th bytes: measurement time hh: 0x00-0x17 (0-23) mm: 0x00-0x3B (0-59) ss: 0x00-0x3B (0-59) 8th to 11th bytes: Cumulative amount of active electric energy 0x00000000-0x05F5E0FF (0 to 99 999 999)							
Cumulative amounts of active electric energy at fixed time	0xE3	This property indicates the most recent cumulative amount of active electric energy measured at 30-min intervals held by the meter with the measurement date in 4 bytes, measurement time in 3 bytes, and cumulative amount of active electric energy in 4 bytes. Measurement date YYYY:MM:DD Measurement time hh:mm:ss cumulative electric energy: an 8-digit decimal notation number 1st to 4th bytes: measurement date YYYY: 0x0001-0x270F (1-9 999) MM: 0x01-0x0C (1-12) DD: 0x01-0x1F (1-31) 5th to 7th bytes: measurement time hh: 0x00-0x17 (0-23) mm: 0x00-0x3B (0-59) ss: 0x00-0x3B (0-59) 8th to 11th bytes: Cumulative amount of active electric energy 0x00000000-0x05F5E0FF (0 to 99 999 999)	unsigned short + unsigned char × 2 + unsigned char × 3 + unsigned long	11 bytes	year + month + day + hour + minute + second + kWh	Get	O		
Measure-ment data of cumulative amount of active electric energy for	0xE4	This property indicates the measurement data of cumulative amount of active electric energy for power factor measurement at the most recent measurement time, with the measurement date in 4 bytes, measurement	unsigned short + unsigned char × 2	11 bytes	year + month + day	Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
power factor measure-ment		time in 3 bytes, and cumulative amount of active electric energy in 4 bytes. – Measurement date YYYY: MM: DD – Measurement time hh: mm: ss – Cumulative amount of active electric energy Max. 8 digits in decimal notation 1st to 4th bytes: measurement date YYYY: 0x0001-0x270F (1-9 999) MM: 0x01-0x0C (1-12) DD: 0x01-0x1F (1-31) 5th to 7th bytes: measurement time hh: 0x00-0x17 (0-23) mm: 0x00-0x3B (0-59) ss: 0x00-0x3B (0-59) 8th to 11th bytes: Cumulative amount of active electric energy 0x00000000-0x05F5E0FF (0-99 999 999)	+ unsigned char × 3 + unsigned long		+ hour + minute + second + kWh				
Number of effective digits for cumulative amount of active electric energy	0xE5	This property indicates the number of effective digits for cumulative amounts of active electric energy. 0x01-0x08 (1 to 8)	unsigned char	1 byte	digit	Get	O		
Unit for cumulative amounts of active electric energy	0xE6	This property indicates the unit for measured cumulative active electric energy and historical data (multiplying factors). 0x00: 1 kWh 0x01: 0,1 kWh 0x02: 0,01 kWh 0x03: 0,001 kWh 0x04: 0,0001 kWh 0x0A: 10 kWh 0x0B: 100 kWh 0x0C: 1 000 kWh 0x0D: 10 000 kWh	unsigned char	1 byte		Get	O		
Historical data of measured cumulative amount of active	0xE7	This property indicates the historical data of measured cumulative amount of active electric energy on the retrieval day specified under “day for which the historical data of	unsigned short + unsigned	194 bytes	kWh	Get	O		

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
electric energy		measured cumulative amounts of electric energy shall be retrieved", equaling 48 pieces of half-hourly data for 24 h (00:00-23:30) of the day by time series from the highest-order byte. 1st to 2nd bytes: Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved 0x0000-0x0063 (0 to 99): 3rd and succeeding bytes: Measured cumulative amount of active electric energy 0x00000000-0x05F5E0FF (0 to 99 999 999)	long × 48						
Monthly maximum electric power demand	0xC1	This property indicates the maximum value of meter readings for electric power demand recorded between the date of the last fixed reading and the most recent measurement time. 0x00000000-0x05F5E0FF (0 to 99 999 999)	unsigned long	4 bytes	kWh	Get	O		
Cumulative maximum electric power demand	0xC2	This property indicates the cumulative value of meter readings for maximum electric power demand contractually fixed by the electric power company. 0x00000000-0x05F5E0FF (0 to 99 999 999)	unsigned long	4 bytes	kW	Get			
Electric power demand at fixed time (30-min average electric power)	0xC3	This property indicates the meter reading for electric power demand (30-min average electric power) in the most recent half-hourly measurement time, with the measurement date in 4 bytes, measurement time in 3 bytes, and electric power demand (30-min average electric power) in 4 bytes. – Measurement date YYYY: MM: DD – Measurement time hh: mm: ss – Electric power demand Max. 8 digits in decimal notation 1st to 4th bytes: Measurement date YYYY: 0x0001-0x270F (1-9 999) MM: 0x01-0x0C (1-12) DD: 0x01-0x1F (1-31) 5th to 7th bytes: Measurement	unsigned short + unsigned char × 2 + unsigned char × 3 + unsigned long	11 bytes	year + month + day + hour + minute + second + kWh	Get	O		

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		time hh: 0x00-0x17 (0-23) mm: 0x00-0x3B (0-59) ss: 0x00-0x3B (0-59) 8th to 11th bytes: Electric power demand 0x00000000-0x05F5E0FF (0 to 99 999 999)							
Number of effective digits of electric power demand	0xC4	This property indicates the number of effective digits of electric power demand. 0x01-0x08 (1 to 8)	unsigned char	1 byte	digit	Get	O		
Unit of electric power demand	0xC5	This property indicates the unit for the monthly maximum electric power demand, and the electric power demand at fixed time (30-min average electric power). 0x00: 1 kW 0x01: 0,1 kW 0x02: 0,01 kW 0x03: 0,001 kW 0x04: 0,000 1 kW 0x0A: 10 kW 0x0B: 100 kW 0x0C: 1 000 kW 0x0D: 10 000 kW	unsigned char	1 byte		Get	O		
Historical data of measured electric power demand	0xC6	This property indicates historical data of meter readings for electric power demand at fixed time (30-min average electric power) on the day specified under “Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved”, equaling 48 pieces of half-hourly data for 24 h (00:00-23:30) of the day by time series from the highest-order byte. 1st-2nd bytes: day for which the historical data of measured cumulative amounts of electric energy shall be retrieved 0x0000-0x0063 (0-99) 3rd and succeeding bytes: electric power demand 0x00000000-0x05F5E0FF (0 to 99 999 999)	unsigned short + unsigned long × 48	194 bytes	kW	Get	O		
Unit of cumulative maximum	0xC7	This property indicates the unit of cumulative maximum electric power demand.	unsigned char	1 byte		Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
electric power demand		0x00 : 1 kW 0x01 : 0,1 kW 0x02 : 0,01 kW 0x03 : 0,001 kW 0x04 : 0,000 1 kW 0x0A : 10 kW 0x0B : 100 kW 0x0C : 1 000 kW 0x0D : 10 000 kW							
Measurement data of reactive electric power consumption (lag) for power factor measurement	0xCA	This property indicates the measurement data of reactive electric power consumption (lag) for power factor measurement at the most recent measurement time, with the measurement date in 4 bytes, measurement time in 3 bytes, and cumulative amount of reactive electric power consumption in 4 bytes. – Measurement date YYYY: MM: DD – Measurement time hh: mm: ss – Cumulative amount of reactive electric power consumption (lag) Max. 8 digits in decimal notation 1st to 4th bytes: Measurement date YYYY: 0x0001-0x270F (1 to 9 999) MM: 0x01-0x0C (1-12) DD: 0x01-0x1F (1-31) 5th to 7th bytes: Measurement time hh: 0x00-0x17 (0-23) mm: 0x00-0x3B (0-59) ss: 0x00-0x3B (0-59) 8th to 11th bytes: Cumulative amount of reactive electric power consumption (lag) 0x00000000-0x05F5E0FF (0 to 99 999 999)	unsigned short + unsigned char × 2 + unsigned char × 3 + unsigned long	11 bytes	year + month + day + hour + minute + second + kWh	Get			
Measurement data of cumulative amount of reactive electric power consumption (lag) at	0xCB	This property indicates the measurement data of cumulative amount of reactive electric power for power factor measurement at the most recent half-hourly measurement time, with the measurement date in 4 bytes, measurement time in 3 bytes, and cumulative amount of	unsigned short + unsigned char × 2 + unsigned	11 bytes	year + month + day +	Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
fixed time for power factor measure-ment		reactive electric power consumption in 4 bytes. – Measurement date YYYY: MM: DD – Measurement time hh: mm: ss – Cumulative amount of reactive electric power consumption (lag) Max.8 digits in decimal notation 1st to 4th bytes: Measurement date YYYY: 0x0001-0x270F (1 to 9 999) MM: 0x01-0x0C (1-12) DD: 0x01-0x1F (1-31) 5th to 7th bytes: Measurement time hh: 0x00-0x17 (0-23) mm: 0x00-0x3B (0-59) ss: 0x00-0x3B (0-59) 8th to 11th bytes: Cumulative amount of reactive electric power consumption (lag) 0x00000000-0x05F5E0FF (0 to 99 999 999)	char × 3 + unsigned long		hour + minute + second + kWh				
Number of effective digits for measure-ment data of cumulative amount of reactive electric power consumption (lag) for power factor measure-ment	0xCC	This property indicates the number of effective digits of measured data of cumulative amount of reactive electric power consumption (lag) for power factor measurement. 0x01-0x08 (1 to 8)	unsigned char	1 byte	digit	Get			
Unit of measure-ment data of cumulative amount of reactive electric power consumption (lag)	0xCD	This property indicates the unit (multiplying factor) for measurement data of cumulative amount of reactive electric power consumption (lag) and historical data. 0x00: 1 kVarh 0x01: 0,1 kVarh 0x02: 0,01 kVarh 0x03: 0,001 kVarh 0x04: 0,000 1 kVarh 0x0A: 10 kVarh	unsigned char	1 byte		Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		0x0B: 100 kVarh 0x0C: 1 000 kVarh 0x0D: 10 000 kVarh							
Historical data of measure-ment data of cumulative amount of reactive electric power consumption (lag) for power factor measure-ment	0xCE	This property indicates historical data for cumulative amount of reactive electric power consumption (lag) measurements at fixed time on the day specified under "Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved", equaling 48 pieces of half-hourly data for 24 h (00:00-23:30) of the day by time series from the highest-order byte. 1st to 2nd bytes: Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved 0x0000-0x0063 (0 to 99) 3rd and succeeding bytes: measurement data of cumulative amount of reactive electric power consumption (lag) 0x00000000 to 0x05F5E0FF (0 to 99 999 999)	unsigned short + unsigned long × 48	194 bytes	kVarh	Get			

This class is used in the case of smart electric energy meters installed for users supplied with power of 6,6 kV.

In the case of smart electric energy meters installed for users supplied with 400 V or less, the low-voltage smart electric energy meter class (Class group code: 0x02, Class code: 0x88) shall be used.

9.33.2 Operation status property

This property indicates whether the functions specific to this class are operating (ON) or not (OFF). In the case of a node in which this class is implemented and the functions specific to this class start operating upon startup of the node, this property may be implemented with the value fixed at 0x30 (operation status ON).

9.33.3 Coefficient property

This property indicates the coefficient in 6-digit decimal notation. The multiple is indicated by the properties of the multiplying factor for the coefficient. The coefficient multiplied by the multiplying factor for the coefficient shall be used as the coefficient for converting meter readings to actually used kWh, kVarh or kW.

9.33.4 Multiplying factor for coefficient property

This property indicates the multiplying factor for the coefficient. Meter readings can be converted to actually used kWh, kVarh or kW by multiplying by the coefficient and the multiplying factor for the coefficient.

With a 6,6 kV supply, meters cannot be connected directly to power supply circuits. In such cases, electric energy and others are measured by means of a voltage transformer (VT) and current transformer (CT). Meter readings taken using a voltage transformer and current transformer are converted to primary side measured values representing actual usage, etc., by multiplying by the coefficient and the multiplying factor for the coefficient.

Example:

Coefficient = 0x00000001 (1)

Multiplying factor for coefficient = 0x01 (1)

Measured cumulative amount of active electric energy (EPC=0xE2): 0x00BC614E (12 345 678)

Unit for cumulative amounts of active electric energy (EPC=0xE6): 0x01 (0,1 kWh)

In this case, the primary side measured value (actual usage) will be:

Measured cumulative amount of active electric energy × coefficient × multiplying factor for coefficient × Unit for cumulative amounts of active electric energy
= 12 345 678 × 1 × 1 × 0,1 kWh = 1 234 567,8 kWh

9.33.5 Fixed date property

This property indicates the fixed date of monthly usage, etc., as 0x01-0x1F (1 to 31). If the fixed date is the 10th, the value will be 0x0A (10).

9.33.6 Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved property

This property specifies the Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved (EPC = 0xE7, 0xC6, 0xCE). The value range is from 0x00 to 0x63 (from 0 to 99).

0x00 (0): measured historical data for the current day (up to the last hour)

0x63 (99): measured historical data for the day that precedes the current day by 99 days

The default values of this property shall be 0xFF.

9.33.7 Measured cumulative amount of active electric energy property

This property indicates the measured cumulative amount of active electric energy in the order of measurement date in 4 bytes, measurement time in 3 bytes, and cumulative amount of active electric energy in 4 bytes. The measurement date is indicated using 2 bytes for the year, 1 byte for the month, and 1 byte for the day. The measurement time is indicated using 1 byte for hours, 1 byte for minutes, and 1 byte for seconds. If the meter does not have information on seconds as a unit of measured time, 0x00 is set for seconds. The cumulative amount of active electric energy is indicated using a maximum of 8 digits in decimal notation, with units indicated by property values of the unit for cumulative amounts of active electric energy (EPC = 0xE6). Measurements are multiplied by the coefficient (EPC = 0xD3) and multiplying factor for coefficient (EPC = 0xD4) to produce the actual usage.

The property value range is 0x00000000-0x05F5E0FF (0 to 99 999 999). If the cumulative amount of active electric energy exceeds the number of effective digits specified under “Number of effective digits for cumulative amount of active electric energy” (EPC = 0xE5), the number shall be incremented again from 0x00000000 (0). The value shall be set to 0xFFFFFFFE (no measured data) in the case of no cumulative amount of active electric energy.

Example:

Measured cumulative amount of active electric energy = 0x00BC614E (12 345 678)

Coefficient (EPC=0xD3): 0x00000001 (1)

Multiplying factor for Coefficient (EPC=0xD4): 0x01 (1)

Unit for cumulative amounts of active electric energy (EPC=0xE6): 0x01 (0,1 kWh)

In this case, the primary side measured value (actual usage) will be:

Measured cumulative amount of active electric energy × coefficient × multiplying factor for multiple × unit for cumulative amounts of active electric energy
= 12 345 678 × 1 × 1 × 0,1 kWh = 1 234 567,8 kWh

9.33.8 Cumulative amounts of active electric energy at fixed time property

This property indicates cumulative amounts of active electric energy measured at 30-min intervals (every hour on the hour and on the half hour). This property indicates the cumulative amount of active electric energy at the most recent scheduled measurement time retained by the meter, in the order of measurement date in 4 bytes, measurement time in 3 bytes, and cumulative amount of active electric energy in 4 bytes. The measurement date is indicated using 2 bytes for the year, 1 byte for the month, and 1 byte for the day. The measurement time is indicated using 1 byte for hours, 1 byte for minutes, and 1 byte for seconds. If the meter does not have information on seconds as a unit of measured time, 0x00 is set for seconds. The cumulative amount of active electric energy is indicated using a maximum of 8 digits in decimal notation, with units indicated by property values of the unit for cumulative amounts of active electric energy (EPC=0xE6). Measurements are multiplied by the coefficient (EPC=0xD3) and multiplying factor for coefficient (EPC=0xD4) to produce the actual usage.

The property value range is 0x00000000 to 0x05F5E0FF (0 to 99 999 999). If the cumulative amount of active electric energy exceeds the number of effective digits specified under “Number of effective digits for cumulative amount of active electric energy” (EPC=0xE5), the number shall be incremented again from 0x00000000 (0). The value shall be set to 0xFFFFFFFE (no measured data) in the case of no cumulative amount of active electric energy.

Example:

Cumulative amounts of active electric energy at fixed time

- YYYY = 0x07DE (2014), MM = 0x04 (April), DD = 0x01 (1st)
- hh = 0x0A (hour:10), mm = 0x1E (minute:30), ss = 0x00 (second:00)
- Cumulative amount of active electric energy = 0x00BC614E (12 345 678)

Coefficient (EPC=0xD3): 0x00000001 (1)

Multiplying factor for coefficient (EPC=0xD4): 0x01 (1)

Unit for cumulative amounts of active electric energy (EPC=0xE6): 0x01 (0,1 kWh)

In this case,

Measurement date: April 1, 2014

Measurement time: 10:30:00

Cumulative amount of active electric energy (primary side measured value (actual usage)):0

Cumulative amounts of active electric energy at fixed time × coefficient × multiplying factor for coefficient × unit for cumulative amounts of active electric energy
= 12 345 678 × 1 × 1 × 0,1 kWh = 1 234 567,8 kWh.

9.33.9 Measurement data of cumulative amount of active electric energy for power factor measurement

This property indicates the measurement data of cumulative amounts of active electric energy for power factor measurement, in the order of measurement date in 4 bytes, measurement time in 3 bytes, and cumulative amount of active electric energy in 4 bytes. The measurement date is indicated using 2 bytes for the year, 1 byte for the month, and 1 byte for the day. The measurement time is indicated using 1 byte for hours, 1 byte for minutes, and 1 byte for seconds.

If the meter does not have information on seconds as a unit of measured time, 0x00 is set for seconds. The cumulative amount of active electric energy is indicated using a maximum of 8 digits in decimal notation, with units indicated by property values of the unit for cumulative amounts of active electric energy (EPC = 0xE6). Measurements are multiplied by the coefficient (EPC = 0xD3) and multiplying factor for coefficient (EPC = 0xD4) to produce the actual usage.

The property value range is 0x00000000 to 0x05F5E0FF (0 to 99 999 999). If the cumulative amount of active electric energy exceeds the number of effective digits specified under "Number of effective digits for cumulative amount of active electric energy" (EPC = 0xE5), the number shall be incremented again from 0x00000000 (0). The value shall be set to 0xFFFFFFFE (no measured data) in the case of no cumulative amount of active electric energy.

Example:

Measurement data of cumulative amount of active electric energy for power factor measurement= 0x00BC614E (12 345 678)

Coefficient (EPC = 0xD3): 0x00000001 (1)

Multiplying factor for coefficient (EPC = 0xD4): 0x01 (1)

Unit for cumulative amounts of active electric energy (EPC = 0xE6): 0x01 (0,1 kWh)

In this case, the primary side measured value (actual usage) will be:

Measurement data of cumulative amount of active electric energy for power factor measurement × coefficient × multiplying factor for coefficient × unit for cumulative amounts of active electric energy = 12 345 678 × 1 × 1 × 0,1 kWh = 1 234 567,8 kWh.

9.33.10 Number of effective digits for cumulative amount of active electric energy property

This property indicates the number of effective digits (effective digit count) for the data size of measured cumulative amounts of active electric energy (4 bytes: as a digit count, 8 digits), from the lower order side within these.

Example:

Number of effective digits for cumulative amount of active electric energy is 0x06 (6 digits from the lower order side).

Cumulative amount of active electric energy overflows at 0x000F423F (999 999), and increments again from 0x00000000 (0).

9.33.11 Unit for cumulative amounts of active electric energy property

This property indicates units of measured cumulative amounts of active electric energy and historical data.

Property values	Unit for cumulative amounts of active electric energy (multiplying factor)
0x00	1 kWh
0x01	0,1 kWh
0x02	0,01 kWh
0x03	0,001 kWh
0x04	0,000 1 kWh
0x0A	10 kWh
0x0B	100 kWh
0x0C	1 000 kWh
0x0D	10 000 kWh

9.33.12 Historical data of measured cumulative amount of active electric energy property

This property indicates the historical data of measured cumulative amounts of active electric energy on the retrieval day specified under “Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved” (Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved 1 (EPC = 0xE1) indicated in 2 bytes), equaling 48 pieces of half-hourly data for 24 h (00:00-23:30) of the day by time series from the highest-order byte. The cumulative amount of active electric energy is indicated in a maximum of 8 digits in decimal notation, with units indicated by property values of the unit for cumulative amounts of active electric energy (EPC=0xE6). Measurements are multiplied by the coefficient (EPC=0xD3) and multiplying factor for coefficient (EPC=0xD4) to produce the actual usage.

The property value range is 0x00000000 to 0x05F5E0FF (0 to 99 999 999). If the cumulative amount of active electric energy exceeds the number of effective digits specified under “Number of effective digits for cumulative amount of active electric energy” (EPC=0xE5), the number shall be incremented again from 0x00000000 (0). The value shall be set to 0xFFFFFFFE (no measured data) in the case of no cumulative amount of active electric energy at the time in question.

In the case of default values with no “Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved” (EPC=0xE1) set, the day for which the historical data of measured cumulative amounts of electric energy shall be retrieved shall be set to 0x00FF and all half-hourly measurements of cumulative amounts of active electric energy shall be set to 0xFFFFFFFE.

9.33.13 Monthly maximum electric power demand property

This property indicates the maximum value of meter readings for electric power demand recorded every hour on the hour and on the half hour between the date of the last fixed reading and the most recent measurement time.

Monthly maximum electric power demand is indicated using a maximum of 8 digits in decimal notation, with units indicated by property values of the unit of electric power demand (EPC = 0xC5). Measurements are multiplied by the coefficient (EPC = 0xD3) and multiplying factor for coefficient (EPC = 0xD4) to produce the actual usage. The property value range is 0x00000000 to 0x05F5E0FF (0 to 99 999 999). The value shall be set to 0xFFFFFFFE (no measured data) in the case of no monthly maximum electric power demand.

Example:

Monthly maximum electric power demand = 0x00BC614E (12 345 678)

Coefficient (EPC=0xD3): 0x00000001 (1)

Multiplying factor for coefficient(EPC=0xD4): 0x01 (1)

Unit of electric power demand (EPC=0xC5): 0x01 (0,1 kW)

In this case, the primary side measured value (actual usage) will be:

Monthly maximum electric power demand × coefficient × multiplying factor for coefficient × unit of electric power demand = 12 345 678 × 1 × 1 × 0,1 kW = 1 234 567,8 kW

9.33.14 Cumulative maximum electric power demand property

This property indicates the cumulative value of meter readings for maximum electric power demand contractually fixed by the electric power company.

Cumulative maximum electric power demand is indicated using a maximum of 8 digits in decimal notation, with units indicated by property values of the unit of electric power demand (EPC = 0xC5). Measurements are multiplied by the coefficient (EPC = 0xD3) and multiplying factor for coefficient (EPC = 0xD4) to produce the actual usage. The property value range is 0x00000000 to 0x05F5E0FF (0 to 99 999 999). If the cumulative maximum electric power demand exceeds

the number of effective digits specified under “Number of effective digits of electric power demand” (EPC = 0xC4), the number shall be incremented again from 0x00000000 (0). The value shall be set to 0xFFFFFFFE (no measured data) in the case of no cumulative maximum electric power demand.

Example:

Cumulative maximum electric power demand = 0x00BC614E (12 345 678)

Coefficient (EPC = 0xD3): 0x00000001 (1)

Multiplying factor for coefficient (EPC = 0xD4): 0x01 (1)

Unit of electric power demand (EPC = 0xC5): 0x01 (0,1 kW)

In this case, measurements of the primary side (actual usage) will be:

Cumulative maximum electric power demand × coefficient × multiplying factor for coefficient multiple × unit of electric power demand = 12 345 678 × 1 × 1 × 0,1 kW = 1 234 567,8 kW.

9.33.15 Electric power demand at fixed time (30-min average electric power) property

Of meter readings for electric power demand (30-min average electric power) every 30 min at 00 min and 30 min, this property indicates electric power demand at the most recent scheduled measurement time retained by the meter, in the order of measurement date in 4 bytes, measurement time in 3 bytes, and electric power demand 4 bytes. The measurement date is indicated using 2 bytes for the year, 1 byte for the month, and 1 byte for the day. The measurement time is indicated using 1 byte for hours, 1 byte for minutes, and 1 byte for seconds. If the meter does not have information on seconds as a unit of measured time, 0x00 is set for seconds. Electric power demand is indicated using a maximum of 8 digits in decimal notation, with units indicated by property values of the unit of electric power demand (EPC = 0xC5). Measurements are multiplied by the coefficient (EPC = 0xD3) and multiplying factor for coefficient (EPC = 0xD4) to produce the actual usage. The property value range is 0x00000000 to 0x05F5E0FF (0 to 99 999 999). The value shall be set to 0xFFFFFFFE (no measured data) in the case of no electric power demand.

Example:

Electric power demand at fixed time (30-min average electric power)

– YYYY = 0x07DE (2014), MM = 0x04 (April), DD = 0x01 (1st)
– hh = 0x0A (hour:10), mm = 0x1E (minute:30), ss = 0x00 (second:00)
– Electric power demand = 0x00BC614E (12 345 678)

Coefficient (EPC=0xD3): 0x00000001 (1)

Multiplying factor for coefficient (EPC=0xD4): 0x01 (1)

Unit of electric power demand (EPC=0xC5): 0x01 (0,1 kW)

In this case,

Measurement date April 1, 2014

Measurement time 10:30:00

Electric power demand (30-min average electric power) (primary side measured value (actual usage)):

Electric power demand at fixed time (30-min average electric power) × coefficient × multiplying factor for coefficient × unit of electric power demand = 12 345 678 × 1 × 1 × 0,1 kW = 1 234 567,8 kW

9.33.16 Number of effective digits of electric power demand property

This property indicates the number of effective digits (effective digit count) for the data size of monthly maximum electric power demand, cumulative maximum electric power demand, and

electric power demand (30-min average electric power) (4 bytes: as a digit count, 8 digits), from the lower order side within these.

Example:

Number of effective digits for electric power demand 0x06 (6 digits from the lower order side)

Cumulative maximum electric power demand overflows at 0x000F423F (999 999), and increments again from 0x00000000 (0).

9.33.17 Unit of electric power demand property

This property indicates units of monthly maximum electric power demand, cumulative maximum electric power demand, and electric power demand at fixed time (30-min average electric power).

Property values	Unit of measured electric power demand (multiple)
0x00	1 kW
0x01	0,1 kW
0x02	0,01 kW
0x03	0,001 kW
0x04	0,000 1 kW
0x0A	10 kW
0x0B	100 kW
0x0C	1 000 kW
0x0D	10 000 kW

9.33.18 Historical data of measured electric power demand property

This property indicates the day of historical data retrieval 0x0000 to 0x0063 (0 to 99) specified under “Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved ” (EPC = 0xE1) (Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved 1 (EPC = 0xE1) indicated in 2 bytes), and meter readings for scheduled electric power demand (30 min average electric power) every 30 min at 00 and 30 min every hour for 24 h (00:00 to 23:30) of the day, equaling 48 pieces of historical data, representing property values by time series from the highest-order byte.

Electric power demand is indicated using a maximum 8-digit decimal notation number, with units indicated by property values of the unit of electric power demand (EPC = 0xC5). Measurements are multiplied by the coefficient (EPC = 0xD3) and multiplying factor for coefficient (EPC = 0xD4) to produce the actual usage.

The property value range is 0x00000000 to 0x05F5E0FF (0 to 99 999 999). The value shall be set to 0xFFFFFFFE (no measured data) in the case of no electric power demand at the time in question.

In the case of default values with no “Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved” (EPC = 0xE1) set, the day for which the historical data of measured cumulative amounts of electric energy shall be retrieved shall be set to 0x00FF and electric power demand every 30 min at fixed time (30-min average electric power) shall be set to 0xFFFFFFFE.

9.33.19 Unit of cumulative maximum electric power demand property

This property indicates units of cumulative maximum electric power demand.

Property value	Unit of measured electric power demand (multiple)
0x00	1 kW
0x01	0,1 kW
0x02	0,01 kW
0x03	0,001 kW
0x04	0,000 1 kW
0x0A	10 kW
0x0B	100 kW
0x0C	1 000 kW
0x0D	10 000 kW

9.33.20 Measurement data of reactive electric power consumption (lag) for power factor measurement property

This property indicates measurement data of reactive electric power consumption (lag) for power factor measurement, in the order of measurement date in 4 bytes, measurement time in 3 bytes, and cumulative amount of reactive electric power consumption in 4 bytes. The measurement date is indicated using 2 bytes for the year, 1 byte for the month, and 1 byte for the day. The measurement time is indicated using 1 byte for hours, 1 byte for minutes, and 1 byte for seconds. If the meter does not have information on seconds as a unit of measured time, 0x00 is set for seconds. Reactive electric power consumption is indicated using a maximum 8-digit decimal notation number, with units indicated by the property values of unit of measurement data for cumulative amount of reactive electric power consumption (lag) (EPC = 0xCD). Measurements are multiplied by the coefficient (EPC = 0xD3) and multiplying factor for coefficient (EPC = 0xD4) to produce the actual usage.

The property value range is 0x00000000 to 0x05F5E0FF (0 to 99 999 999). If the cumulative amount of reactive electric power consumption exceeds the number of effective digits specified under “Number of effective digits for measurement data of cumulative amount of reactive electric power consumption (lag) for power factor measurement” (EPC = 0xCC), the number shall be incremented again from 0x00000000 (0). The value shall be set to 0xFFFFFFFE (no measured data) in the case of no measurement data of cumulative amount of reactive electric power consumption (lag) for power factor measurement.

Example:

Measurement data of cumulative amount of reactive electric power consumption (lag) for power factor measurement = 0x00BC614E (12 345 678)

Coefficient (EPC = 0xD3): 0x00000001 (1)

Multiplying factor for coefficient (EPC = 0xD4): 0x01 (1)

Unit of measurement data for cumulative amount of reactive electric power consumption (lag) (EPC = 0xCD): 0x01 (0,1 kVarh)

In this case, the primary side measured value (actual usage) will be:

measurement data of cumulative amount of reactive electric power consumption (lag) for power factor measurement × coefficient × multiplying factor for coefficient × unit of measurement data for cumulative amount of reactive electric power consumption (lag) = 12 345 678 × 1 × 1 × 0,1 kVarh = 1 234 567,8 kVarh

9.33.21 Measurement data of cumulative amount of reactive electric power consumption (lag) at fixed time for power factor measurement property

Measurement data of cumulative amount of reactive electric power consumption (lag) at fixed time for power factor measurement every 30 min at 00 and 30 min, this property indicates measurement data of cumulative amount of reactive electric power consumption (lag) for power factor measurement at the most recent scheduled measurement time retained by the meter, in the order of measurement date in 4 bytes, measurement time in 3 bytes, and cumulative amount

of reactive electric power consumption in 4 bytes. The measurement date is indicated using 2 bytes for the year, 1 byte for the month, and 1 byte for the day. The measurement time is indicated using 1 byte for hours, 1 byte for minutes, and 1 byte for seconds. If the meter does not have information on seconds as a unit of measured time, 0x00 is set for seconds. The cumulative amount of reactive electric power consumption is indicated using a maximum 8-digit number in decimal notation, with units indicated by the property values of unit of measurement data of cumulative amount of reactive electric power consumption (lag) for power factor measurement (EPC = 0xCD). Measurements are multiplied by the coefficient (EPC = 0xD3) and multiplying factor for coefficient (EPC = 0xD4) to produce the actual usage.

The property value range is 0x00000000 to 0x05F5E0FF (0 to 99 999 999). If the cumulative amount of reactive electric power consumption exceeds the number of effective digits specified under “Number of effective digits for measurement data of cumulative amount of reactive electric power consumption (lag) for power factor measurement” (EPC = 0xCC), the number shall be incremented again from 0x00000000 (0). The value shall be set to 0xFFFFFFFE (no measured data) in the case of no cumulative amount of reactive electric power consumption (lag) for power factor measurement.

Example:

Measurement data of reactive electric power consumption (lag) at fixed time

– YYYY = 0x07DE (2014), MM = 0x04 (April), DD = 0x01 (1st)
– hh = 0x0A (hour:10), mm = 0x1E (minute:30), ss = 0x00 (second:00)
– Cumulative amount of reactive electric power consumption (lag) = 0x00BC614E (12 345 678)

Coefficient (EPC=0xD3): 0x00000001 (1)

Multiplying factor for coefficient (EPC=0xD4): 0x01 (1)

Unit of measurement data of cumulative amount of reactive electric power consumption (lag) for power factor measurement (EPC=0xCD): 0x01 (0,1 kWh)

In this case

Measurement date April 1, 2014

Measurement time 10:30:00

Cumulative amount of reactive electric power consumption (lag) (primary side measured value (actual usage):

Measurement data of reactive electric power consumption (lag) at fixed time × coefficient × multiplying factor for coefficient × unit of measurement data of cumulative amount of reactive electric power consumption (lag) for power factor measurement = 12 345 678 × 1 × 1 × 0,1 kVarh = 1 234 567,8 kVarh

9.33.22 Number of effective digits for measurement data of cumulative amount of reactive electric power consumption (lag) for power factor measurement property

This property indicates the number of effective digits (effective digit count) for the data size of measurement data of cumulative amount of reactive electric power consumption (lag) (4 bytes: as a digit count, 8 digits), from the lower order side within these.

Example:

Number of effective digits for cumulative amount of reactive electric power consumption (lag) for power factor measurement 0x06 (6 digits from the lower order side).

Cumulative amount of reactive electric power consumption (lag) for power factor measurement overflows at 0x000F423F (999 999), and increments again from 0x00000000 (0).

9.33.23 Unit of measurement data of cumulative amount of reactive electric power consumption (lag) property

This property indicates units of measurement data of cumulative amount of reactive electric power consumption (lag).

Property values	Unit of measurement data of cumulative amount of reactive electric power consumption (lag) for power factor measurement (multiple)
0x01	0,1 kVarh
0x02	0,01 kVarh
0x03	0,001 kVarh
0x04	0,000 1 kVarh
0x0A	10 kVarh
0x0B	100 kVarh
0x0C	1 000 kVarh
0x0D	10 000 kVarh

9.33.24 Historical data of measurement data of cumulative amount of reactive electric power consumption (lag) for power factor measurement property

This property indicates the day for which the historical data of measured 0x0000 to 0x0063 (0 to 99) specified under “Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved” (EPC = 0xE1) (Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved 1 (EPC = 0xE1) indicated in 2 bytes) and measured data for cumulative amount of reactive electric power consumption (lag) every 30 min at 00 and 30 min past every hour, for 24 h (00:00 to 23:30) of the day, equaling 48 pieces of historical data, representing property values by time series from the highest-order byte.

The cumulative amount of reactive electric power consumption (lag) is indicated using a maximum 8-digit number in decimal notation. Units are indicated by the property values of the unit of measurement data of cumulative amount of reactive electric power consumption (lag) (EPC = 0xCD). Measurements are multiplied by the coefficient (EPC = 0xD3) and multiplying factor for coefficient (EPC = 0xD4) to produce the actual usage.

The property value range is 0x00000000 to 0x05F5E0FF (0 to 99 999 999). If the cumulative amount of reactive electric power consumption exceeds the number of effective digits specified under “Number of effective digits for measurement data of cumulative amount of reactive electric power consumption (lag) for power factor measurement” (EPC = 0xCC), the number shall be incremented again from 0x00000000 (0). The value shall be set to 0xFFFFFFFE (no measured data) in the case of no cumulative amount of reactive electric power consumption (lag) at the time in question.

In the case of default values with no “Day for which the historical data of measured cumulative amounts of electric energy shall be retrieved” (EPC = 0xE1) set, the day for which the historical data of measured cumulative amounts of electric energy shall be retrieved shall be set to 0x00FF and cumulative amount of reactive electric power consumption (lag) every 30 min shall be set to 0xFFFFFFFE.

9.34 General light class specifications

9.34.1 General

The control commands of “general light” are shown in Table 51.

Class group code : 0x02
Class code : 0x90

Table 51 – List of general light properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte	—	Set Get	O O	O	
Illuminance level setting	0xB0	This property indicates illuminance level in %. 0x00–0x64 (0 % – 100 %)	unsigned char	1 byte	%	Set/Get			
Light colour setting	0xB1	This property indicates the colour setting. Incandescent lamp colour = 0x41, white = 0x42, daylight white = 0x43, daylight colour = 0x44, other = 0x40	unsigned char	1 byte	–	Set/Get			
Illuminance level step setting	0xB2	Used to specify the illuminance level in terms of steps and acquire the current setting. From 0x01 to the maximum specifiable illuminance level value (dark to bright)	unsigned char	1 byte	–	Set/Get			
Light colour step setting	0xB3	Used to specify the light colour in terms of steps and acquire the current setting. From 0x01 to the maximum specifiable light colour value (incandescent lamp colour to white)	unsigned char	1 byte	–	Set/Get			
Maximum specifiable values	0xB4	Used to acquire the maximum specifiable illuminance level value and the maximum specifiable light colour value of main lighting. Byte 1: illuminance Byte 2: light colour 0x01 to 0xFF (Step 1 to Step 255) 0x00 (when the function is not implemented)	unsigned char × 2	2 bytes	–	Get			
Maximum value of settable level for night lighting	0xB5	Used to acquire the maximum values of illuminance and light colour settable levels for night lighting. First byte: illuminance Second byte: light colour 0x01 to 0xFF (Step 1 to Step 255) 0x00 (when the function is not implemented)	unsigned char × 2	2 bytes	–	Get			
Lighting mode setting	0xB6	Auto/main lighting/night lighting/colour lighting Auto = 0x41, main lighting = 0x42, night lighting = 0x43, colour lighting = 0x45	unsigned char	1 byte	–	Set/Get	O		
Illuminance	0xB7	Indicates the illuminance level	unsigned	1 byte	%	Set/Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
level setting for main lighting		of main lighting in %. 0x00 to 0x64 (0% to 100 %)	char						
Illuminance level step setting for main lighting	0xB8	Used to set the illuminance level by the number of steps for main lighting and to acquire the current setting. 0x01 to the maximum value of settable illuminance level (dark to bright)	unsigned char	1 byte	–	Set/Get			
Illuminance level setting for night lighting	0xB9	Indicates the illuminance level of night lighting in %. 0x00 to 0x64 (0 % to 100 %)	unsigned char	1 byte	%	Set/Get			
Illuminance level step setting for night lighting	0xBA	Used to set the illuminance level by the number of steps for night lighting and to acquire the current setting status. 0x01 to the maximum value of settable illuminance level (dark to bright)	unsigned char	1 byte	–	Set/Get			
Light colour setting for main lighting	0xBB	Used to set the light colour for main lighting. Incandescent lamp colour = 0x41, white = 0x42, daylight white = 0x43, daylight colour = 0x44, other = 0x40	unsigned char	1 byte	–	Set/Get			
Light colour level step setting for main lighting	0xBC	Used to set the light colour level by the number of steps for main lighting and to acquire the current setting. 0x01 to the maximum value of settable light colour level (incandescent lamp colour to white)	unsigned char	1 byte	–	Set/Get			
Light colour setting for night lighting	0xBD	Used to set the light colour for night lighting. incandescent lamp colour = 0x41, white = 0x42, daylight white = 0x43, daylight colour = 0x44	unsigned char	1 byte	–	Set/Get			
Light colour level step setting for night lighting	0xBE	Used to set the light colour level by the number of steps for night lighting and to acquire the current setting. 0x01 to the maximum value of settable light colour level (incandescent lamp colour to white)	unsigned char	1 byte	–	Set/Get			
Lighting mode Status in auto mode	0xBF	Used to acquire the current lighting mode in auto mode. main lighting = 0x42, night lighting = 0x43, off = 0x44, colour lighting = 0x45	unsigned char	1 byte	–	Get			

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
RGB setting for colour lighting	0xC0	Used to set the RGB value for colour lighting and to acquire the current setting. Byte 1: R Byte 2: G Byte 3: B 0x00–0xFF (0 to 255) Minimum brightness = 0x00, maximum brightness = 0xFF	unsigned char × 3	3 bytes	–	Set/Get			
ON timer reservation setting	0x90	Reservation ON/OFF Reservation ON = 0x41, Reservation OFF = 0x42	unsigned char	1 byte	–	Set/Get			
ON timer setting	0x91	Timer value HH:MM 0–0x17: 0–0x3B (= 0 to 23):(= 0 to 59)	unsigned char × 2	2 bytes	–	Set/Get			
OFF timer reservation setting	0x94	Reservation ON/OFF Reservation ON = 0x41, Reservation OFF = 0x42	unsigned char	1 byte	–	Set/Get			
OFF timer setting	0x95	Timer value HH:MM 0–0x17: 0–0x3B (= 0 to 23):(= 0 to 59)	unsigned char × 2	2 bytes	–	Set/Get			

9.34.2 Operation status property

Operation status ON:

When the illuminance level property (0xB0, 0xB2) does not exist: illuminated.

When the illuminance level property (0xB0, 0xB2) exists: the illuminance level is reflected in the lighting device's illuminance.

When the "Lighting mode" property (0xB6) has Auto mode (0x41), the lighting may be off in Auto mode.

Operation status OFF:

Extinguished.

9.34.3 Illuminance level setting property

This property indicates the illuminance level of lighting in % in the current lighting mode setting. This property is used to set the illuminance level and to acquire the current setting. If the illuminance level setting of the actual device is smaller or greater than the property value in %, the value of the actual device shall be assigned to this property.

When this property and the "Illuminance level step setting" property (0xB2) are implemented, their values shall be associated with each other.

The Illuminance level setting indicated by this property is that of the actual device when the "Lighting mode setting" property (0xB6) does not have the Auto function (0x41) or when the function is implemented but the lighting mode setting is Main lighting (0x42) or Night lighting (0x43). When the lighting mode setting is Auto (0x41), the illuminance level setting at the time of acquisition is recommended. Since the illuminance level setting indicated by this property is unknown in the Auto status, the property value shall be 0xFD (setting unknown).

Even when the "Operation status" property (0x80) is OFF (0x31), the effectiveness of this property shall be guaranteed.

9.34.4 Light colour setting property

This property is used to set a light colour (incandescent lamp colour/white/daylight white/daylight colour/other) of lighting in the current "Lighting mode setting" and to acquire the current setting. "Other" means a light colour not belonging to any specified colour. Only property values for functions supported by a device of this class may be implemented. For a device of this class not supporting the daylight white function, there is no need to implement 0x43 for daylight white. When this property and the "Light color level step setting" property (EPC = 0xB3) are implemented, their values shall be associated with each other.

The light colour setting indicated by this property is that of the actual device when the "Lighting mode setting" property (0xB6) does not have the Auto function (0x41) or when the function is implemented but the lighting mode setting is Main lighting (0x42) or Night lighting (0x43). When the lighting mode setting is Auto (0x41), the lighting mode setting at the time of acquisition is recommended. Since the light colour setting indicated by this property is unknown in the Auto status, the property value shall be 0xFD (setting unknown).

Even when the "Operation status" property (0x80) is OFF (0x31), the effectiveness of this property shall be guaranteed.

9.34.5 Illuminance level step setting property

This property indicates the illuminance level of lighting in the current "Lighting mode setting" by the number of steps. This property is also used to set the illuminance level and to acquire the current setting. The maximum value of settable illuminance level is acquired by the "Maximum value of settable level" property (EPC = 0xB4) and the "Maximum value of night lighting settable level" property (EPC = 0xB5). No actual value is specified for illuminance level. However, the illuminance decreases as the level setting becomes smaller and increases as it becomes greater. Only property values for functions supported by a device of this class may be implemented. When this property and the "Illuminance level setting" property (EPC = 0xB0) are implemented, their values shall be associated with each other. With this property, the "Maximum settable level" property (0xB4) shall be implemented. When the "Night lighting" function (0x43) of the "Lighting mode setting" property (0xB6) is implemented, the "Maximum value of night lighting settable level" property (0xB5) shall also be implemented.

The illuminance level step setting indicated by this property is that of the actual device when the "Lighting mode setting" property (0xB6) does not have the Auto function (0x41) or when the function is implemented but the lighting mode setting is Main lighting (0x42) or Night lighting (0x43). When the lighting mode setting is Auto (0x41), the illuminance level step setting at the time of acquisition is recommended. Since the illuminance level step setting indicated by this property is unknown in the Auto status, the property value shall be 0x00 (setting unknown).

Even when the "Operation status" property (0x80) is OFF (0x31), the effectiveness of this property shall be guaranteed.

9.34.6 Light colour step setting property

This property indicates the light colour level of lighting in the current "Lighting mode setting" by the number of steps. This property is also used to set the light colour and to acquire the current setting. The maximum value of settable light colour level is acquired by the "Maximum value of

settable level" property (EPC = 0xB4) and the "Maximum value of night lighting settable level" property (EPC = 0xB5). No actual value is specified for light colour level. However, the light colour becomes closer to incandescent lamp colour as the level setting becomes smaller and closer to white as it becomes greater. Only property values for functions supported by a device of this class may be implemented. When this property and the "Light color setting" property (EPC = 0xB1) are implemented, their values shall be associated with each other. With this property, the "Maximum settable level" property (0xB4) shall be implemented. When the "Night lighting" function (0x43) of the "Lighting mode setting" property (0xB6) is implemented, the "Maximum value of night lighting settable level" property (0xB5) shall also be implemented.

The light colour step setting indicated by this property is that of the actual device when the "Lighting mode setting" property (0xB6) does not have the Auto function (0x41) or when the function is implemented but the lighting mode setting is Main lighting (0x42) or Night lighting (0x43). When the lighting mode setting is Auto (0x41), the light colour level step setting at the time of acquisition is recommended. Since the light colour level step setting indicated by this property is unknown in the Auto status, the property value shall be 0x00 (setting unknown).

Even when the "Operation status" property (0x80) is OFF (0x31), the effectiveness of this property shall be guaranteed.

9.34.7 Maximum specifiable values property

This property is used to acquire the maximum specifiable illuminance level and light colour values for main lighting. This is a 2-byte property. The first byte represents the maximum specifiable illuminance level step value, and the second byte represents the maximum specifiable light colour step value. Each of the 2 bytes indicates the respective maximum specifiable value using a 255-step scale (0x01 to 0xFF). The maximum specifiable value for an unimplemented function shall be 0x00.

9.34.8 Maximum value of settable level for night lighting property

This property is used to acquire the maximum specifiable illuminance level and light colour values for night lighting. This is a 2-byte property. The first byte represents the maximum specifiable illuminance level step value, and the second byte represents the maximum specifiable light colour step value. Each of the 2 bytes indicates the respective maximum specifiable value using a 255-step scale (0x01 to 0xFF). The maximum specifiable value for an unimplemented function shall be 0x00.

9.34.9 Lighting mode setting property

This property is used to set auto, main lighting, night lighting, or colour lighting and to acquire the current setting.

Auto (0x41): The lighting instrument automatically selects main lighting or night lighting and controls illuminance level setting, illuminance level step setting, light colour setting, or light colour level step setting by using illuminance sensors and auto dimming algorithms.

Main lighting (0x42): The main light is lit.

Night lighting (0x43): Not the main light but a night light (such as a midget lamp) is lit.

Color lighting (0x45): Colour lights are lit.

Only property values for functions supported by a device of this class may be implemented. For a device of this class not supporting the auto function, there is no need to implement 0x41 for auto.

9.34.10 Illuminance level setting for main lighting property

This property indicates the illuminance level in % when the "Lighting mode setting" property (EPC = 0xB6) is set to main lighting. This property is also used to set the illuminance level and to acquire the current setting. If the illuminance level setting of the actual device is smaller or greater than the property value in %, the value of the actual device shall be assigned to this property.

This property allows setting and acquisition even when the "Lighting mode setting" property (0xB6) is set to other than main lighting mode. When this property and the "Illuminance level step setting in main lighting mode" property (0xB8) are implemented, their values shall be associated with each other.

Even when the "Operation status" property (0x80) is OFF (0x31), the effectiveness of this property shall be guaranteed.

9.34.11 Illuminance level step setting for main lighting property

This property indicates the illuminance level by the number of steps when the "Lighting mode setting" property (EPC = 0xB6) is set to main lighting. This property is also used to set the illuminance level and to acquire the current setting. The maximum value of settable illuminance level is acquired by the "Maximum value of settable level" property (EPC = 0xB4). No actual value is specified for illuminance level. However, the illuminance decreases as the level setting becomes smaller and increases as it becomes greater. Only property values for functions supported by a device of this class may be implemented. When this property and the "Illuminance level setting in main lighting mode" property (EPC = 0xB7) are implemented, their values shall be associated with each other. With this property, the "Maximum settable level" property (0xB4) shall be implemented.

This property allows setting and acquisition even when the "Lighting mode setting" property (0xB6) is set to other than main lighting mode.

Even when the "Operation status" property (0x80) is OFF (0x31), the effectiveness of this property shall be guaranteed.

9.34.12 Illuminance level setting for night lighting property

This property indicates the illuminance level in % when the "Lighting mode setting" property (EPC = 0xB6) is set to night lighting mode. This property is also used to set the illuminance level and to acquire the current setting. If the illuminance level setting of the actual device is smaller or greater than the property value in %, the value of the actual device shall be assigned to this property.

This property allows setting and acquisition even when the "Lighting mode setting" property (0xB6) is set to other than night lighting mode. When this property and the "Illuminance level step setting in night lighting mode" property (0xBA) are implemented, their values shall be associated with each other.

Even when the "Operation status" property (0x80) is OFF (0x31), the effectiveness of this property shall be guaranteed.

9.34.13 Illuminance level step setting for night lighting property

This property indicates the illuminance level by the number of steps when the "Lighting mode setting" property (EPC = 0xB6) is set to night lighting. This property is also used to set the illuminance level and to acquire the current setting. The maximum value of settable illuminance level is acquired by the "Maximum value of night lighting settable level" property (EPC = 0xB5). No actual value is specified for illuminance level. However, the illuminance decreases as the level setting becomes smaller and increases as it becomes greater. Only property values for

functions supported by a device of this class may be implemented. When this property and the "Illuminance level step setting in night lighting mode" property (EPC = 0xB9) are implemented, their values shall be associated with each other. With this property, the "Maximum value of night lighting settable level" property (0xB5) shall also be implemented.

This property allows setting and acquisition even when the "Lighting mode setting" property (0xB6) is set to other than night lighting mode.

Even when the "Operation status" property (0x80) is OFF (0x31), the effectiveness of this property shall be guaranteed.

9.34.14 Light colour setting for main lighting property

This property is used to set a light colour (incandescent lamp colour 0x41/white 0x42/daylight white 0x43/daylight colour 0x44/other 0x40) when the "Lighting mode setting" property (EPC = 0xB6) is set to main lighting and to acquire the current setting. "Other" means a light colour not belonging to any specified colour. Only property values for functions supported by a device of this class may be implemented. For a device of this class not supporting the daylight white function, there is no need to implement 0x43 for daylight white.

This property allows setting and acquisition even when the "Lighting mode setting" property (0xB6) is set to other than main lighting mode. When this property and the "Light color level step setting in main lighting mode" property (0xBC) are implemented, their values shall be associated with each other.

Even when the "Operation status" property (0x80) is OFF (0x31), the effectiveness of this property shall be guaranteed.

9.34.15 Light colour level step setting for main lighting property

This property indicates the light colour level by the number of steps when the "Lighting mode setting" property (EPC = 0xB6) is set to main lighting. This property is also used to set the light colour level and to acquire the current setting. The maximum value of settable light colour level is acquired by the "Maximum value of settable level" property (EPC = 0xB4). No actual value is specified for light colour level. However, the light colour becomes closer to incandescent lamp colour as the level setting becomes smaller and closer to white as it becomes greater. Only property values for functions supported by a device of this class may be implemented. Whenever this property is implemented, the "Maximum value of settable level" property (EPC = 0xB4) shall also be implemented.

This property allows setting and acquisition even when the "Lighting mode setting" property (0xB6) is set to other than main lighting mode. When this property and the "Light color setting in main lighting mode" property (0xBB) are implemented, their values shall be associated with each other.

Even when the "Operation status" property (0x80) is OFF (0x31), the effectiveness of this property shall be guaranteed.

9.34.16 Light colour setting for night lighting property

This property is used to set a light colour (incandescent lamp colour 0x41/white 0x42/daylight white 0x43/daylight colour 0x44/other 0x40) when the "Lighting mode setting" property (EPC = 0xB6) is set to night lighting and to acquire the current setting. "Other" means a light colour not belonging to any specified colour. Only property values for functions supported by a device of this class may be implemented. For a device of this class not supporting the daylight white function, there is no need to implement 0x43 for daylight white.

This property allows setting and acquisition even when the "Lighting mode setting" property (0xB6) is set to other than night lighting mode. When this property and the "Light color level step

setting in night lighting mode" property (0xBE) are implemented, their values shall be associated with each other.

Even when the "Operation status" property (0x80) is OFF (0x31), the effectiveness of this property shall be guaranteed.

9.34.17 Light colour level step setting for night lighting property

This property indicates the light colour level by the number of steps when the "Lighting mode setting" property (EPC = 0xB6) is set to night lighting. This property is also used to set the light colour level and to acquire the current setting. The maximum value of settable light colour level is acquired by the "Maximum value of night lighting settable level" property (EPC = 0xB5). No actual value is specified for light colour level. However, the light colour becomes closer to incandescent lamp colour as the level setting becomes smaller and closer to white as it becomes greater. Only property values for functions supported by a device of this class may be implemented. Whenever this property is implemented, the "Maximum value of night lighting settable level" property (0xB5) shall also be implemented.

This property allows setting and acquisition even when the "Lighting mode setting" property (0xB6) is set to other than night lighting mode. When this property and the "Light color setting in night lighting mode" property (0xBD) are implemented, their values shall be associated with each other.

Even when the "Operation status" property (0x80) is OFF (0x31), the effectiveness of this property shall be guaranteed.

9.34.18 Lighting mode status in auto mode property

This property is used to acquire the lighting status of an actual device when the "Lighting mode setting" property (EPC = 0xB6) is set to auto (0x41), main lighting (0x42), night lighting (0x43), off (0x44), or colour lighting (0x45).

Only property values for functions supported by a device of this class may be implemented. For a device of this class not supporting the night lighting function, there is no need to implement 0x43 for night lighting.

9.34.19 RGB setting in colour lighting mode property

This property is used to set the RGB value when the "Lighting mode setting" property (EPC = 0xB6) is set to colour lighting (0x45) and to acquire the current setting. No actual value is specified for RGB. Only property values for functions supported by a device of this class may be implemented. If the RGB setting by this property is not acceptable, the closest acceptable value is set. This property allows setting and acquisition even when the "Lighting mode setting" property (0xB6) is set to other than colour lighting mode (0x45).

9.34.20 ON timer reservation setting property

This property specifies whether the ON timer reservation is ON or OFF. This property shall be related to the “ON timer setting” property.

Reservation ON=0x41; reservation OFF=0x42

This property shall be effective even when the value of the “Operation status” property (0x80) is OFF (0x31).

9.34.21 ON timer setting property

This property indicates when the setting of the “ON timer reservation setting” property is “ON,” the time at which the device will be turned on. The “hour (0x00 to 0x17 (0 to 23)): minute (0x00

to 0x3B (0 to 59))" format shall be used, with the higher- and lower-order bytes used for the "hour" and "minute" values, respectively.

This property shall be effective even when the value of the "Operation status" property (0x80) is OFF (0x31).

9.34.22 OFF timer reservation setting property

This property specifies whether the OFF timer reservation is ON or OFF. This property shall be related to the "OFF timer setting" property.

Reservation ON=0x41; reservation OFF=0x42

This property shall be effective even when the value of the "Operation status" property (0x80) is OFF (0x31).

9.34.23 OFF timer setting property

This property indicates when the setting of the "OFF timer reservation setting" property is "ON," the time at which the device will be turned off. The "hour (0x00 to 0x17 (0 to 23)): minute (0x00 to 0x3B (0 to 59))" format shall be used, with the higher- and lower-order bytes used for the "hour" and "minute" values, respectively.

This property shall be effective even when the value of the "Operation status" property (0x80) is OFF (0x31).

9.35 Mono functional light class specifications

9.35.1 General

The control commands of "mono functional light" are shown in Table 52.

Class group code : 0x02

Class code : 0x91

Table 52 – List of mono functional light properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte	—	Set Get	O O	O	
Illuminance level setting	0xB0	This property indicates illuminance level in %. 0x00–0x64 (0 % to 100 %)	unsigned char	1 byte	%	Set/Get			

This class is used for lighting not supported by general lighting class requirements.

Operation status settings of ON (when switched on) / OFF (when extinguished) are possible, irrespective of the lighting mode.

9.35.2 Operation status property

This property indicates whether the status of lighting devices is ON (switched on) or OFF (extinguished).

9.35.3 Illuminance level setting property

This property indicates the current illuminance level of lighting in %. This property is used to set the illuminance level and to acquire the current setting. If the illuminance level setting of the actual device is smaller or greater than the property value in %, the value of the actual device shall be assigned to the property value in % required for this property.

Even when the operation status property (0x80) is OFF (0x31), the effectiveness of this property shall be guaranteed.

9.36 Electric vehicle charger class specifications

9.36.1 General

The control commands of “electric vehicle charger” are shown in Table 53.

Class group code : 0x02

Class code : 0xA1

Table 53 – List of electric vehicle charger properties

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Operation status	0x80	Indicates the ON/OFF status. ON = 0x30, OFF = 0x31	unsigned char	1 byte	—	Set Get	 ○	○	
Rated charge capacity	0xC5	This property indicates the rated charge capacity of an electric vehicle charger in W 0x00000000-0x3B9AC9FF (0 W to 999 999 999 W)	unsigned long	4 bytes	W	Get	○		
Vehicle connection and chargeable status	0xC7	This property indicates whether an electric vehicle charger can be charged Undetermined = 0xFF Vehicle not connected = 0x30 Connected to vehicle, Not chargeable = 0x40 Connected to vehicle, Chargeable = 0x41	unsigned char	1 byte	—	Get	○	○	
Minimum/ maximum charging electric energy	0xC8	This property indicates the minimum and maximum values of charging electric energy to an electric vehicle charger, respectively, in W 0x00000000-0x3B9AC9FF (0 W to 999 999 999 W) Minimum charging electric energy: Maximum charging electric energy	unsigned long × 2	8 bytes	W	Get			
Minimum/ maximum charging current	0xCA	This property indicates the minimum and maximum values of charging current to an electric vehicle charger, respectively, in units of 0,1 A 0x0000-0x7FFE (0 A to 3 276,6 A) Minimum charging current: Maximum charging current	unsigned short ×2	4 bytes	0,1 A	Get			
Charger	0xCC	This property indicates the type of electric vehicle	unsigned	1 byte	—	Get	○		[d]

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
type		charger AC_CPLT = 0x11 AC_HLC (charging only) = 0x12 DC_type AA (charging only) = 0x21 DC_type BB (charging only) = 0x31 DC_type EE (charging only) = 0x41 DC_type FF (charging only) = 0x51	char						
Vehicle connection confirmation	0xCD	This property confirms the connection status between an electric vehicle charger and a vehicle Connection confirmation = 0x10	unsigned char	1 byte	–	Set	O		a
Used capacity of vehicle-mounted battery 1	0xD0	This property indicates the capacity of a vehicle-mounted battery of an electric vehicle connected to an electric vehicle charger in Wh 0x00000000-0x3B9AC9FF (0 Wh to 999 999 999 Wh)	unsigned long	4 bytes	Wh	Get	O		b
Rated voltage	0xD2	This property indicates the normal rated voltage of an electric vehicle charger in V 0x0000-0x7FFE (0 V to 32 766 V)	unsigned short	2 bytes	V	Get			
Measured instantaneous charging electric energy	0xD3	This property indicates the instantaneous charging electric energy in W 0x00000000-0x3B9AC9FF (0 W to 999 999 999 W)	signed long	4 bytes	W	Get			
Measured cumulative amount of charging electric energy	0xD8	This property indicates the cumulative amount of charging electric energy in units of 0,001 kWh 0x00000000-0x3B9AC9FF (0 kWh to 999 999,999 kWh)	unsigned long	4 bytes	0,001 kWh	Get			
Cumulative amount of charging electric energy reset setting	0xD9	This property resets the cumulative amount of charging electric energy Reset = 0x00	unsigned char	1 byte	–	Set			
Operating mode setting	0xDA	This property sets the operating mode (Charging / Standby / Idle / Other) Charging = 0x42, Standby = 0x44, Idle = 0x47, Other = 0x40	unsigned char	1 byte	–	Set/Get	O	O	
Remaining stored electricity	0xE2	This property indicates the remaining stored electricity of a vehicle-mounted battery of	unsigned long	4 bytes	Wh	Get	O		c

Property name	EPC	Contents of property Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
of vehicle-mounted battery 1		an electric vehicle connected to an electric vehicle charger in Wh 0x00000000-0x3B9AC9FF (0 Wh to 999 999 999 Wh)							
Remaining stored electricity of vehicle-mounted battery 3	0xE4	This property indicates the remaining stored electricity of a vehicle-mounted battery of an electric vehicle connected to an electric vehicle charger in % 0x00-0x64 (0 % to 100 %)	unsigned char	1 byte	%	Get	O		[c]
Charging electric energy setting	0xEB	This property designates the charging electric energy in W 0x00000000-0x3B9AC9FF (0 W to 999 999 999 W)	unsigned long	4 bytes	W	Set/Get			
Charging current setting	0xED	This property designates the charging current in units of 0,1 A 0x0000-0xFFFD (0 A to 6 553,3 A)	unsigned short	2 bytes	0,1 A	Set/Get			

[a] "Vehicle connection confirmation" is only mandatory when the charger type is DC_type AA.

[b] "Used capacity of vehicle-mounted battery 1" is mandatory in cases of output from an electric vehicle connected to an electric vehicle charger. If no response can be returned, "Response impossible" is returned.

[c] Installation of either "Remaining stored electricity of vehicle-mounted battery 1" or "Remaining stored electricity of vehicle-mounted battery 3" is mandatory in cases of output from an electric vehicle connected to an electric vehicle charger. If no response can be returned, "Response impossible" is returned.

[d] DC_type AA, DC_type BB, DC_type EE and DC_type FF charger shall be electric vehicle chargers with connectors of the shape specified in Configuration AA, Configuration BB, Configuration EE and Configuration FF as defined in IEC 62196-3.

Electric vehicle chargers are chargers that include Electric Vehicle Power Systems (EVPS) connected to electric vehicles. Since an electric vehicle connected to an electric vehicle charger can be changed, the property values of the electric vehicle charger will also vary in accordance with the electric vehicle connected to the electric vehicle charger. Therefore, when the "Vehicle connection and chargeable status" changes from "Not connected to vehicle" to "Connected to vehicle", the connected electric vehicle may be different. For this reason, it is preferable to re-acquire property values for specifications determined by the electric vehicle and EVPS.

For example: used capacity of vehicle-mounted battery 1.

Note that AC is assumed for currents, voltages and electric energies handled in this class.

9.36.2 Operation status property

This property indicates whether an electric vehicle charger is ready to acquire status and accept settings (ON) or not (OFF). The property value is 0x30 for ON and 0x31 for OFF.

9.36.3 Rated charge capacity property

This property indicates the rated charge capacity of an electric vehicle charger in units of watts. The value range for this property shall be 0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W).

9.36.4 Vehicle connection and chargeable status property

This property indicates whether an electric vehicle charger can be charged. The property value is 0x30 when no vehicle is connected, 0x40 when a vehicle is connected but not chargeable, and 0x41 when the vehicle is chargeable.

If the vehicle status is unknown until charging is started, the chargeable status shall be output when a charging start instruction is given. If the disconnection or connection status of a vehicle cannot be determined, this property indicates 0xFF as the undetermined status.

9.36.5 Minimum/maximum charging electric energy property

This property indicates the minimum and maximum charging electric energies to an electric vehicle charger in units of watts. The value range of each is 0x00000000-0x3B9AC9FF (0 W to 999 999 999 W). The property value represents minimum and maximum in sequence from the highest-order byte. When the property value of the actual device is higher than the property value range, overflow code 0xFFFFFFFF shall be used.

9.36.6 Minimum/maximum charging current property

This property indicates the minimum and maximum charging currents of an electric vehicle charger in units of 0,1 A. The value range of each is 0x0000-0x7FFE (0 A to 3 276,6 A). The property value represents minimum and maximum in sequence from the highest-order byte. When the property value of the actual device is higher than the property value range, overflow code 0xFFFF shall be used.

9.36.7 Charger type property

This property indicates the type of electric vehicle charger. As the type of electric vehicle charger, it indicates one of AC_CPLT (0x11), AC_HLC (charging only) (0x12), DC_type AA (charging only) (0x21), DC_type BB (charging only) (0x31), DC_type EE (charging only) (0x41), and DC_type FF (charging only) (0x51).

Explanation of charger types

AC_CPLT (0x11): Uses alternating current to charge the electric vehicle and CPLT signals to communicate with the electric vehicle.

AC_HLC (charging only) (0x12): Uses alternating current to charge the electric vehicle and both CPLT and HLC signals to communicate with the electric vehicle.

DC_type AA (charging only) (0x21): Uses direct current to charge the electric vehicle and type AA signals to communicate with the electric vehicle.

DC_type BB (charging only) (0x31): Uses direct current to charge the electric vehicle and type BB signals to communicate with the electric vehicle.

DC_type EE (charging only) (0x41): Uses direct current to charge the electric vehicle and type EE signals to communicate with the electric vehicle.

DC_type FF (charging only) (0x51): Uses direct current to charge the electric vehicle and type FF signals to communicate with the electric vehicle.

Explanation of the relationship between charger type and “Vehicle connection and chargeable status” (0xC7).

AC_CPLT (0x11): Always undetermined (0xFF).