BSI Standards Publication

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

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee EPL/100, Audio, video and multimedia systems and equipment.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Interface de diagnostic de service pour produits et réseaux électroniques grand public - Implémentation pour echonet (CEI 62394:2013)

Kundendienst-Diagnoseschnittstelle für Produkte und Netzwerke der Unterhaltungselektronik - Implementierung für Echonet (IEC 62394:2013)

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Foreword

The text of document 100/2182/FDIS, future edition 2 of IEC 62394, prepared by technical area 9: Audio, video and multimedia applications for end-user network, of IEC technical committee 100: Audio, video and multimedia systems and equipment was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62394:2014.

The following dates are fixed:

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The text of the International Standard IEC 62394:2013 was approved by CENELEC as a European Standard without any modification.

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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 development.

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 SDI (Service Diagnostic Interface) requires an external controller (exclusive or general-purpose/PC) into which service diagnostic software can be loaded. Part of the controller software should be standardized while another part of this controller software 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 in controllers' diagnostic software.

The SDI is based upon the ECHONET specification version 2.11, ECHONET Lite specification version 1.01 and APPENDIX Detailed Requirements for ECHONET Device objects Release B because this interface will be used in future products. The use of this connection and existing communication protocols enable implementation in products at 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

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

(void)

3 Terms, definitions and abbreviations

3.1 Terms and definitions

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

3.1.1
ECHONET specifications
specifications designed to enable the use of various kinds of transmission media (for example, power line, low-power radiofrequency, ETHERNET, Bluetooth®[1]

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

3.2 Abbreviations

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

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[1] 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/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, desktop or laptop PC) provided with at least one suitable network interface which enables the transfer of the ECHONET frame, as specified in 7.2, and running 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 the 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 7.1.

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 from the SDI-compliant devices and display the information 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 9.30. 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 radiofrequency, 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.

Format III (multiple property simultaneous control form at multiple property simultaneous control format)

Format II (compound data format)

| OHD | SEOJ | DEOJ | Cp ESV | OPC | PDC | ·· | PDC | EPC | EDT | ·· | EPC | EDT |

Size of request 1 / Size of request n / Request 1 / Request n

OHD   : object message header   (1B)
SEOJ : specifies source ECHONET Object   (3B)
DEOJ : specifies destination ECHONET Object (3B)
CpESV : compound ECHONET service   (1B)
OPC   : number of processed properties   (1B)
PDC   : property data counter   (1B)
EPC   : ECHONET property   (1B)
EDT   : property value data   (max. 245 bytes)

Format I (basic data format)

| OHD | SEOJ | DEOJ | EPC | ESV | EDT |

OHD   : object message header   (1B)
SEOJ : specifies source ECHONET Object   (3B)
DEOJ : specifies destination ECHONET Object (3B)
EPC   : ECHONET property   (1B)
ESV   : ECHONET service   (1B)
EDT   : property value data   (max. 247 bytes)

| EHD | SEA | DEA | EBC | EDAT |

(ECHONET frame)

EHD   : ECHONET message header   (1B)
SEA   : source ECHONET Address   (2B)
DEA   : destination ECHONET Address   (2B)
EBC   : EDATA area byte counter   (1B)
EDATA : ECHONET data   (max. 256 bytes)

IEC   1133/06

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.

IEC 1134/06
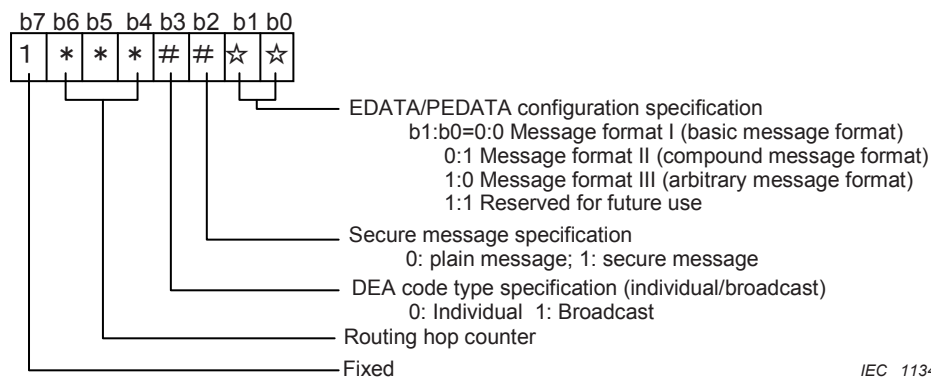
NOTE   When b7=0, b0 to b6 will be specified separately (reserved for future use).

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.

1st byte	2nd byte
NetID (1 byte)	NodeID (1 byte)

IEC   2431/13
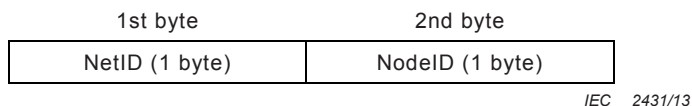
Figure 3 – Configuration of SEA and DEA when an individual address is specified

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.

1st byte	2nd byte
NetID (1 byte)	NodeID (1 byte)

IEC   2432/13
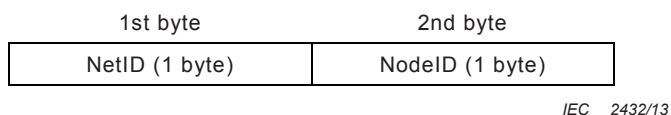
Broadcast type stipulation code	Broadcast target stipulation code	Remarks
0x00	Specifies the node groups to be targeted for a broadcast within all subnets. For node selection, see Figure 5.	An intra-domain broadcast. In all subnets within a domain, a broadcast is sent to the nodes stipulated by the broadcast 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
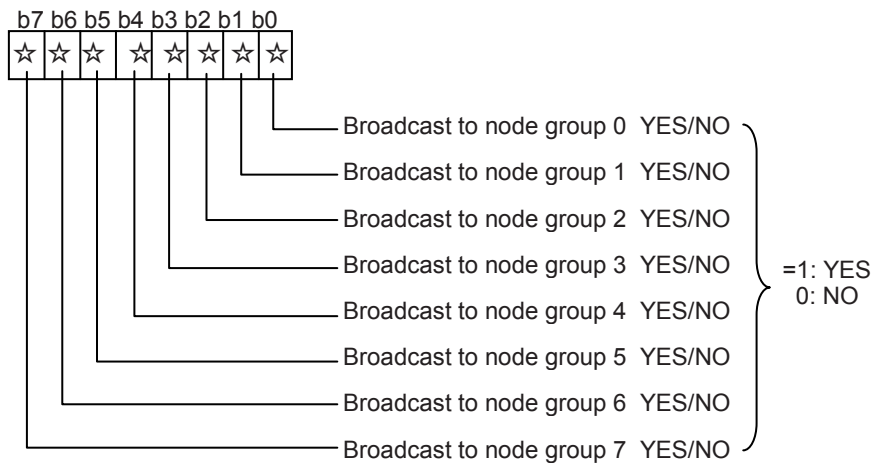
IEC 1137/06

Figure 5 – Broadcast target stipulation code

IEC 1138/06

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 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.
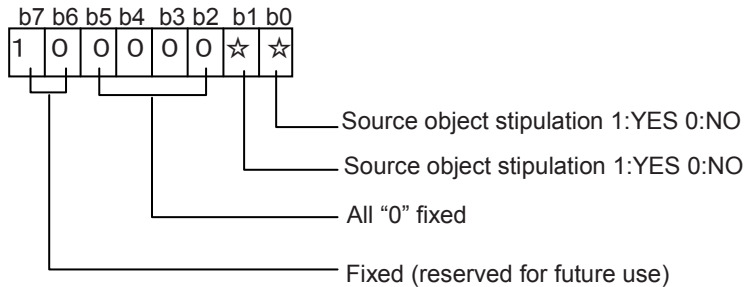
IEC 1139/06

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.
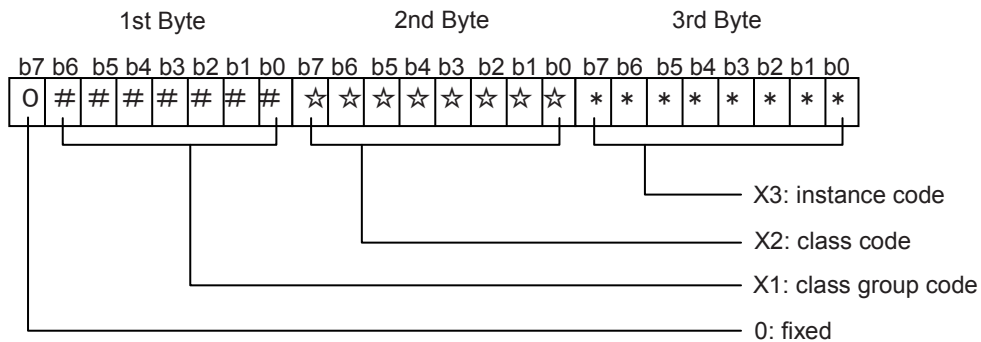
IEC 1140/06

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 10). 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.

Stipulated for four regions: shared by all objects; shared by each object super class; unique to each object class; and user-defined.

Fixed
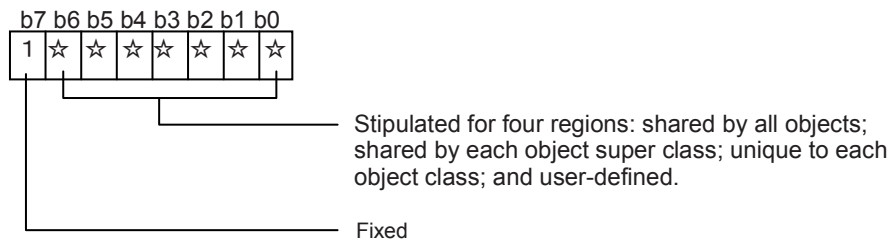
IEC 2433/13

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.

For details see Table 3 through Table 5

Fixed
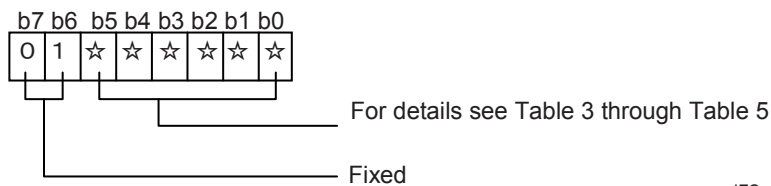
IEC 2434/13

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 through 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	
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			

Table 4 – List of ESV codes for response/notification

Service code (ESV)	ECHONET service content	Symbol	Remarks
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)

Service code (ESV)	ECHONET service content	Symbol	Remarks
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.			

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		

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 is to 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.
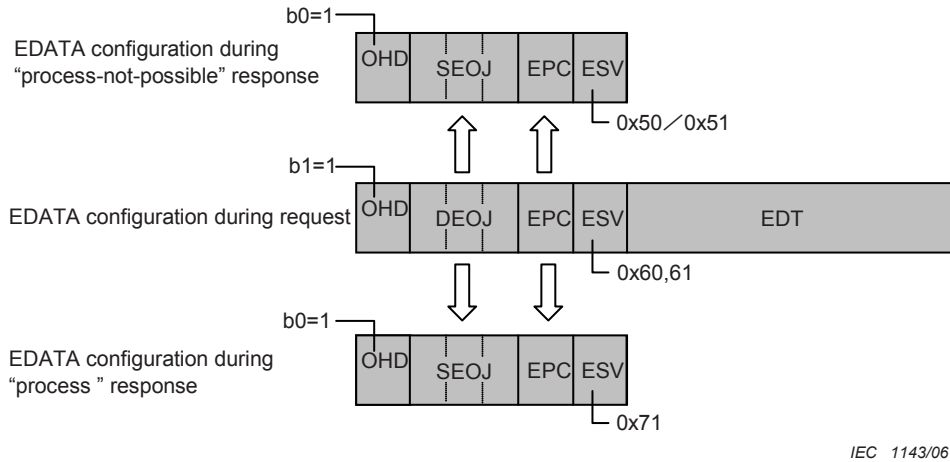
Figure 11 – EDATA configuration in property value write service

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 is to 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.
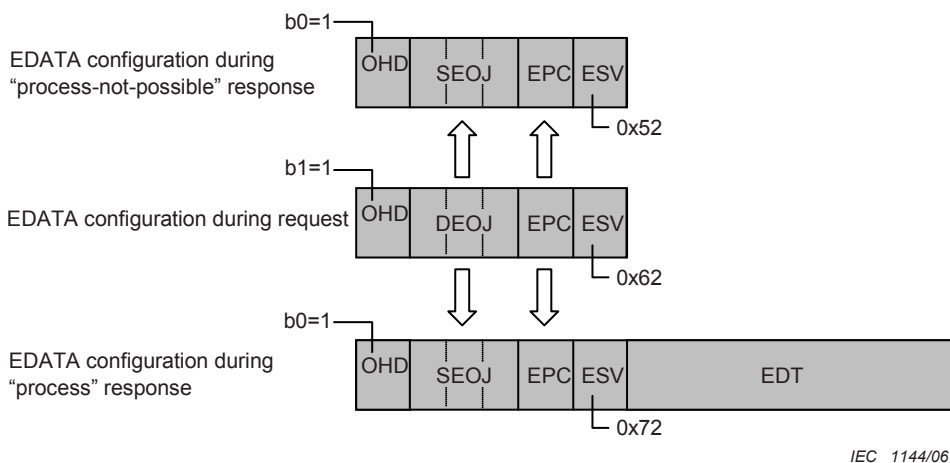
Figure 12 – EDATA configuration in property value read service

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.
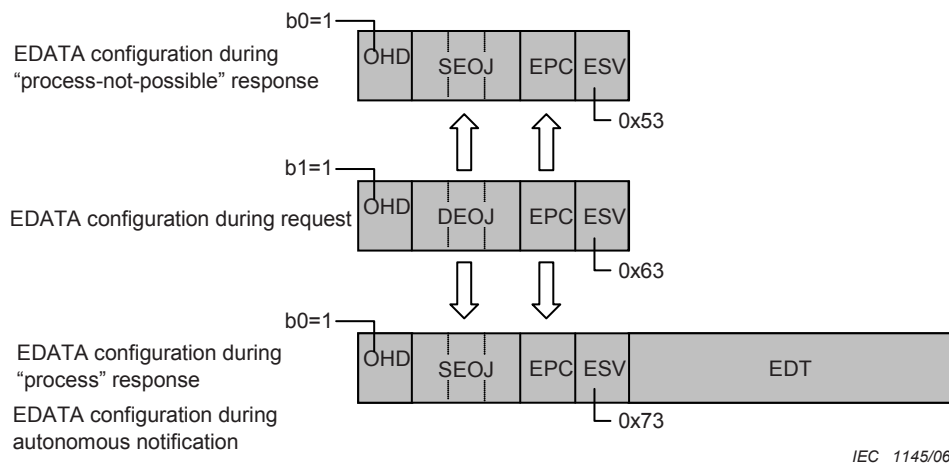
Figure 13 – EDATA configuration in property value notification service

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 is to 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.

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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 is to 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 exit. 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.

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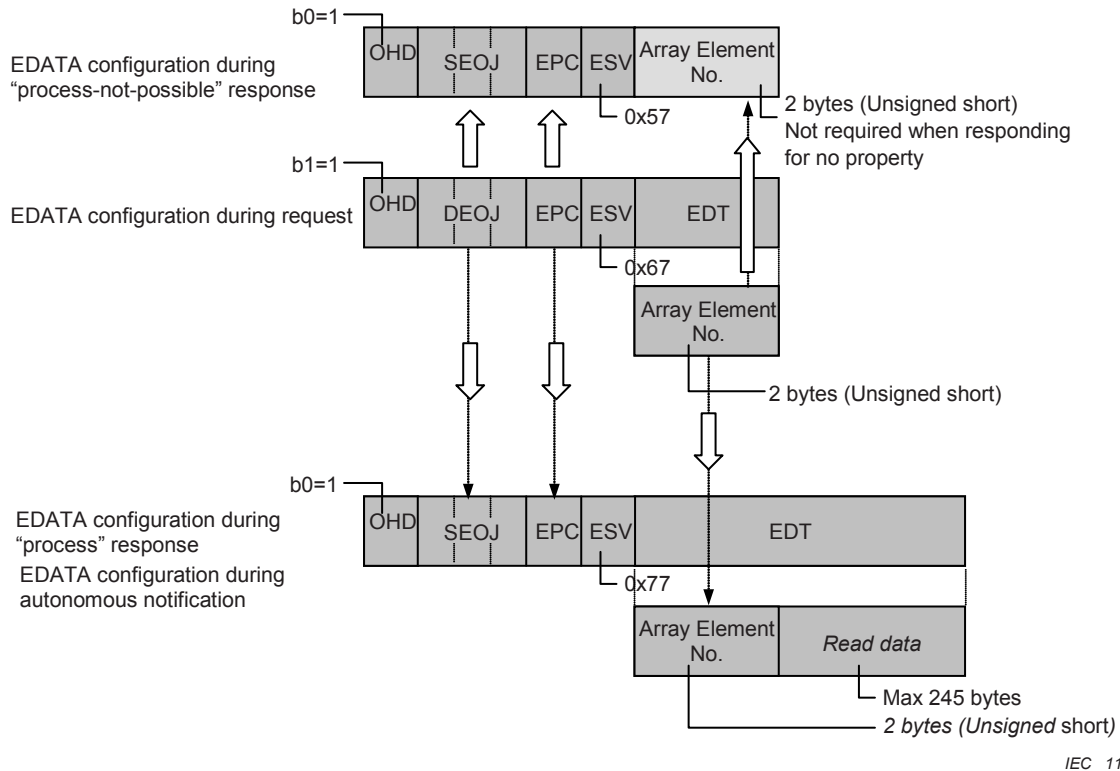
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Figure 16 – EDATA configuration in property value element-stipulated notification service

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 is to 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 exit. Relationship between request and response is shown in Figure 17.
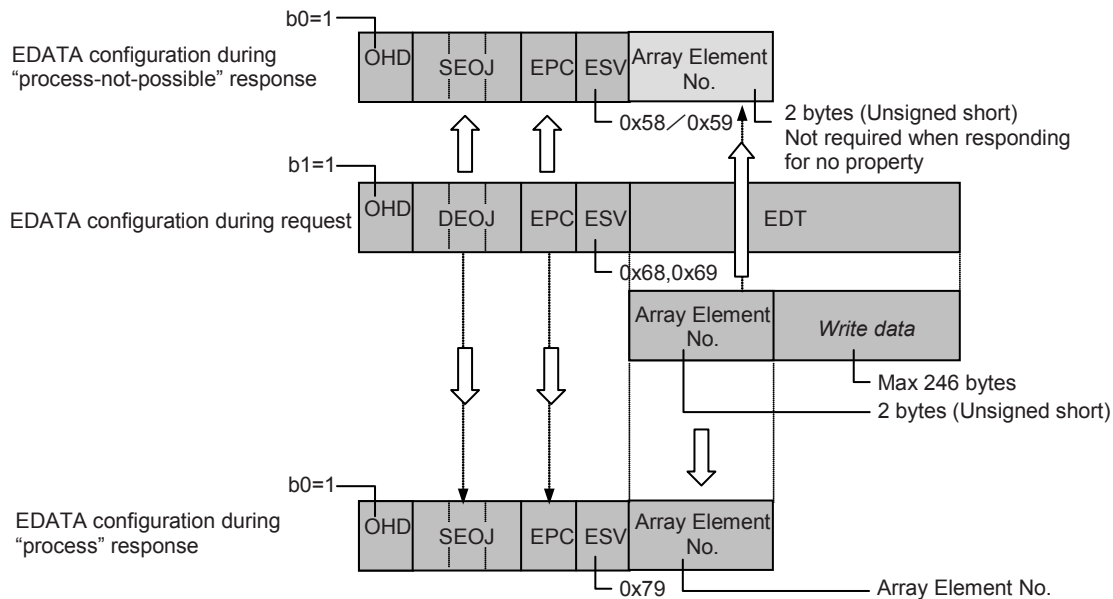
Figure 17 – EDATA configuration in property value element-stipulated addition

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 is to 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 exit. 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 (e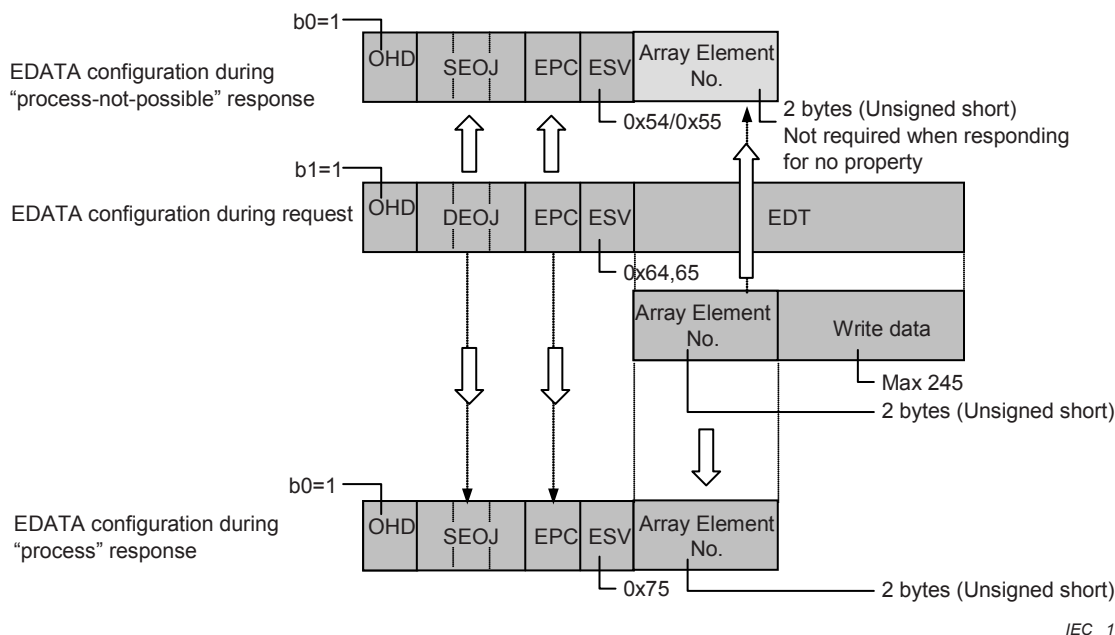lement) does not exist, "response not possible" is returned. Also, when EDATA stipulates SEOJ during a "request", the EOJ stipulated in the SEOJ by EDATA during the "request" is allocated as a DEOJ within the EDATA (b1 of OHD is also set to 1) in the case of both "response not possible" and "response".

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 is to be (or has already been) accepted, a "response" (0x7C) is returned. When the request is to 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.

b0=1

EDATA configuration during
"process-not-possible" response

| OHD | SEOJ | EPC | ESV | Array Element No. |

└ 0x5C

2 bytes (Unsigned short)
Not required when responding
for no property

b1=1

EDATA configuration during request

| OHD | DEOJ | EPC | ESV | EDT |

└ 0x6C

| Array Element No. |

2 bytes (Unsigned short)

b0=1

EDATA configuration during
"process" response

| OHD | SEOJ | EPC | ESV | Array Element No. | *Confirm existence result* |

└ 0x7C

└ Exists   :0x30
Does not exist :0x31
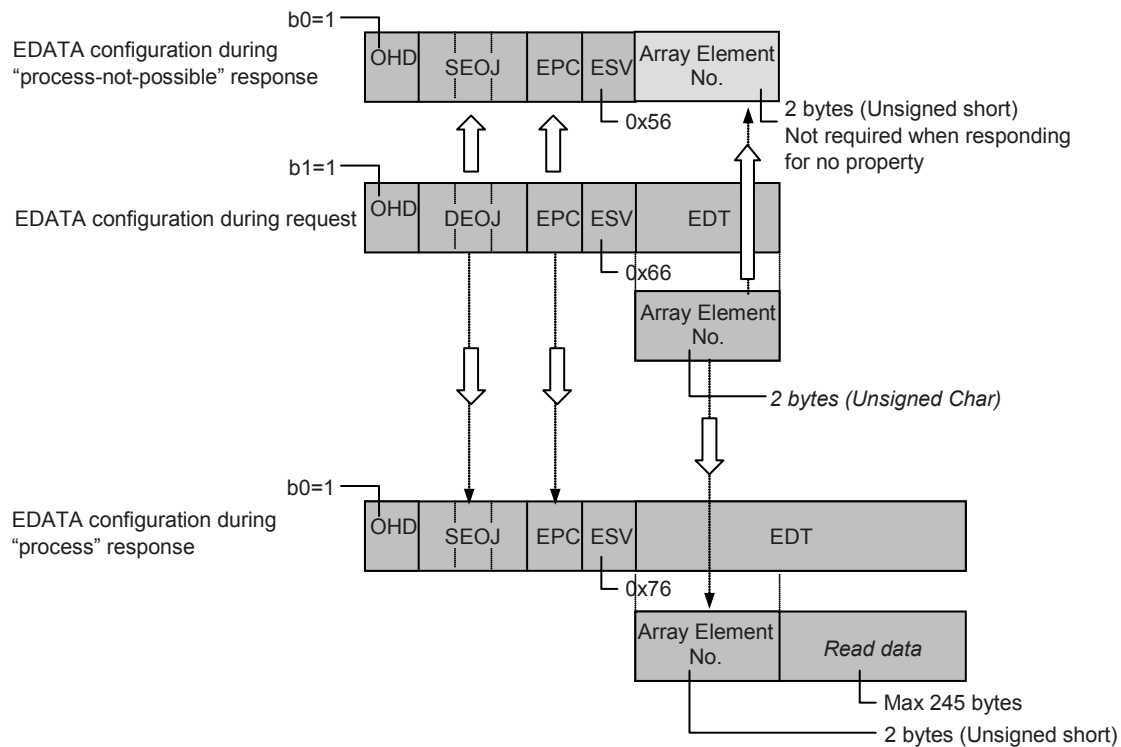
| EDT |

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**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 is to 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 exit. The relationship between request and response is shown in Figure 20.
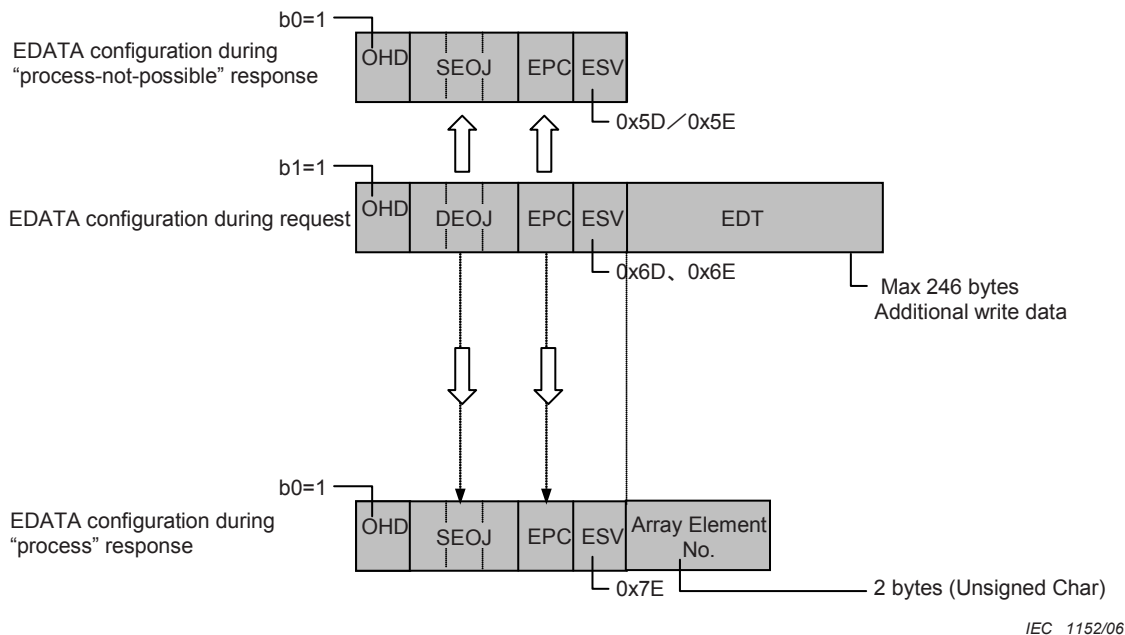
Figure 20 – EDATA configuration in property value element addition

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.

IEC   1153/06

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

The services shown in Table 3 through 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.
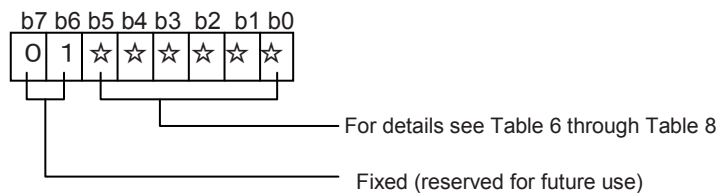
IEC 2436/13

NOTE 1 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 to 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
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		

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

Service code (CpESV)	ECHONET service content	Symbol	Remarks
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		

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

Service code (CpESV)	ECHONET service content	Symbol	Remarks
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) 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.

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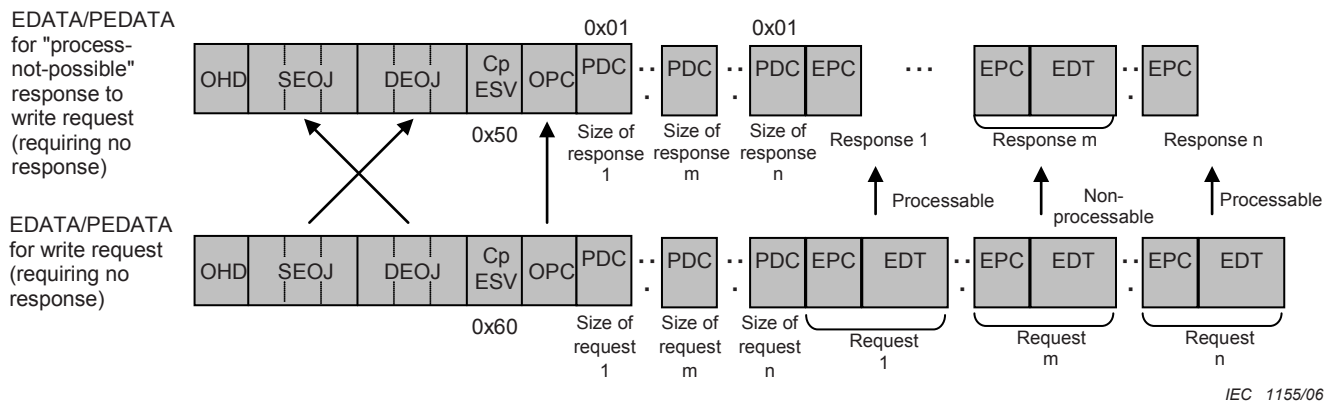
Figure 24 – Relationship between write request (requiring no response) and write "process-not-possible" response

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 3   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.
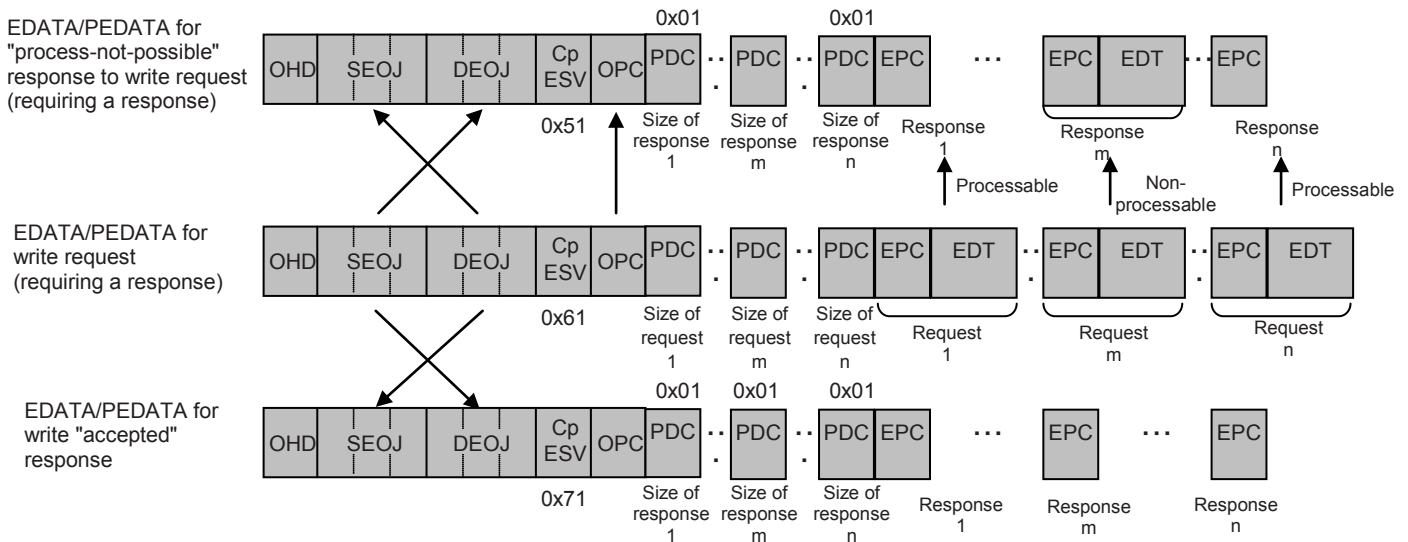
Figure 25 – Relationship between write request (requiring a response), write "accepted" response, and write "process-not-possible" response

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 4   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.
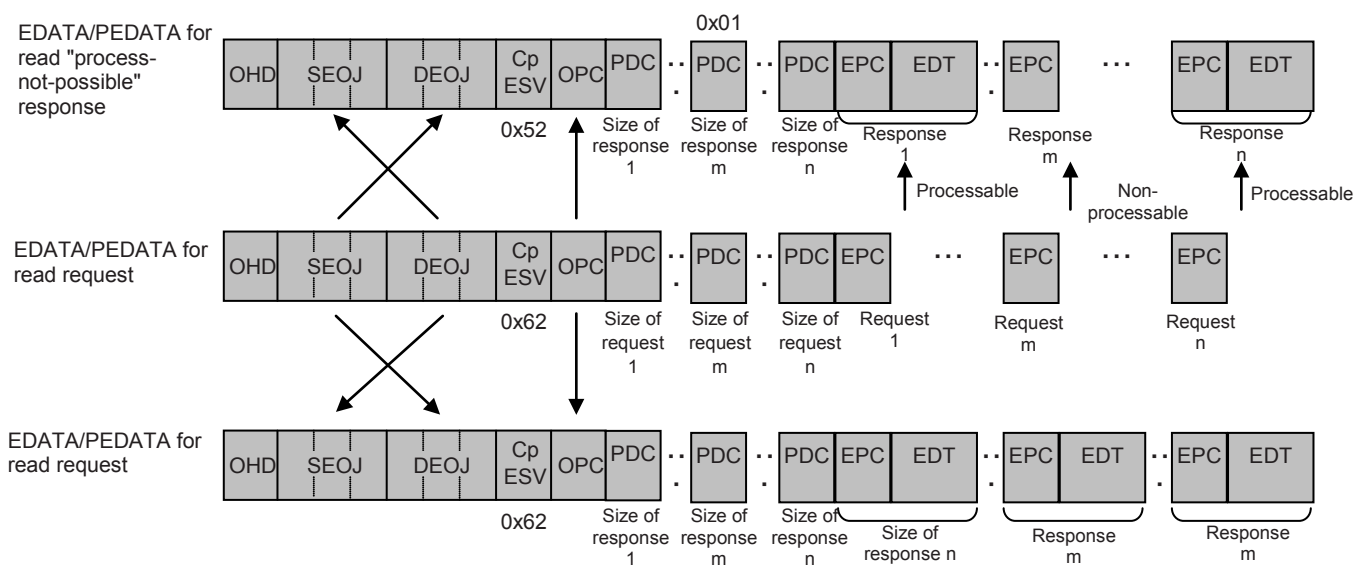
Figure 26 – Relationship between read request (requiring a response),
read "accepted" response, and read "process-not-possible" response

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.
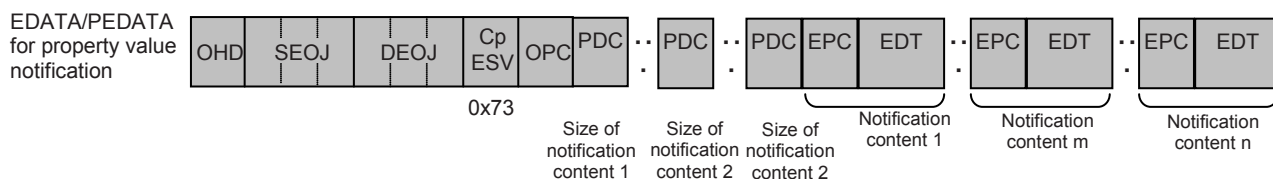
Figure 27 – Notification message format

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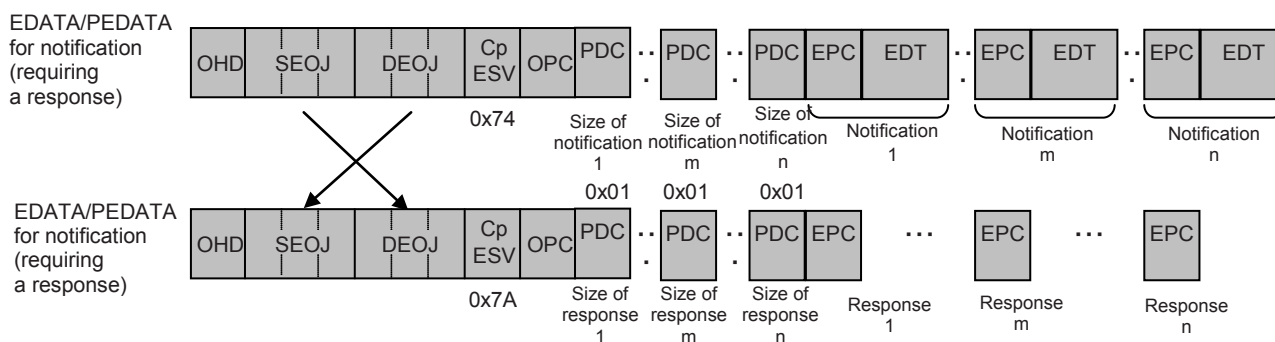
Figure 28 – Relationship between property value notification (requiring a response) and property value notification response

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.
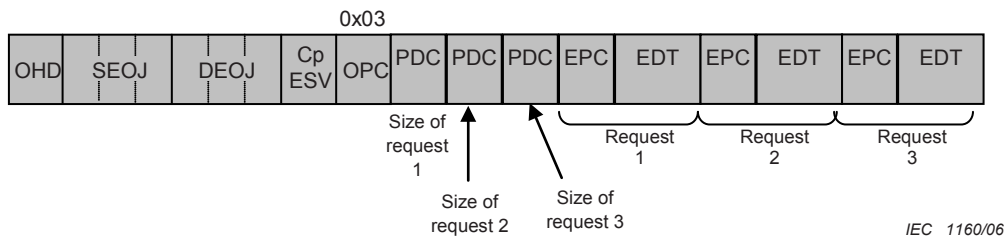
Figure 29 – Processing target property counter for three requests

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.
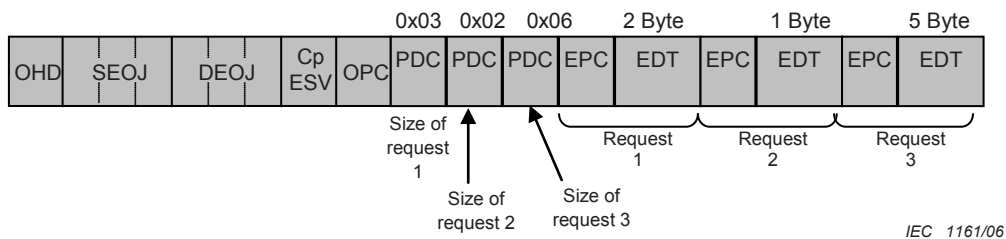
Figure 30 – Property data counter

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.
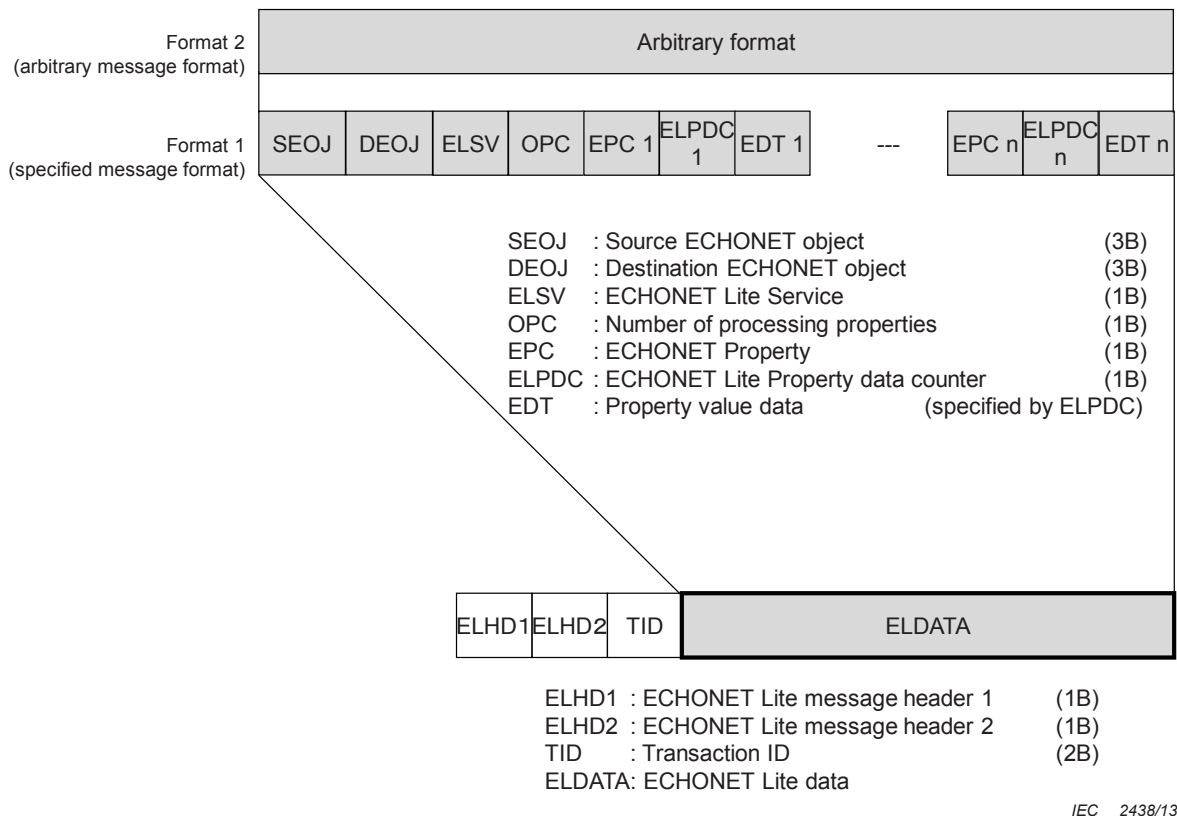
Figure 31 – ECHONET Lite frame format

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).
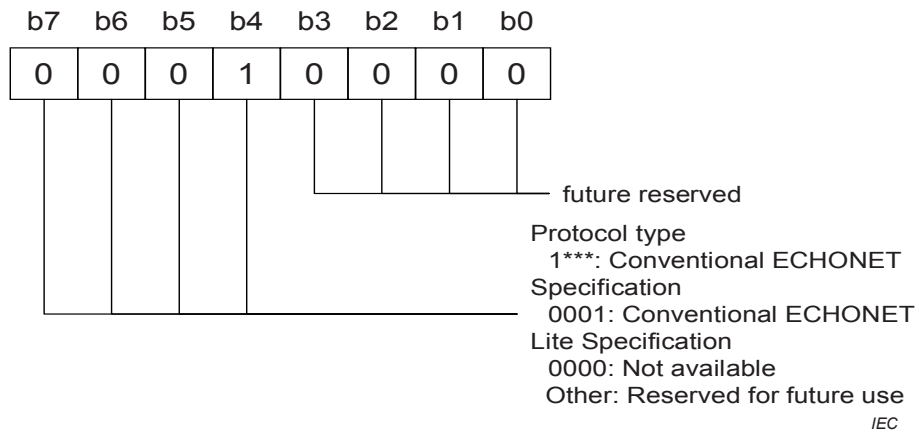
Figure 32 – Detailed specifications of ELHD1

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 figure below shows the detailed specifications of ECHONET Lite Header 2 (ELHD2) shown in Figure 33.

0x81: Format 1
0x82: Format 2
Other: Reserved for future use
However, b7 = 1 (fixed)

IEC   2440/13
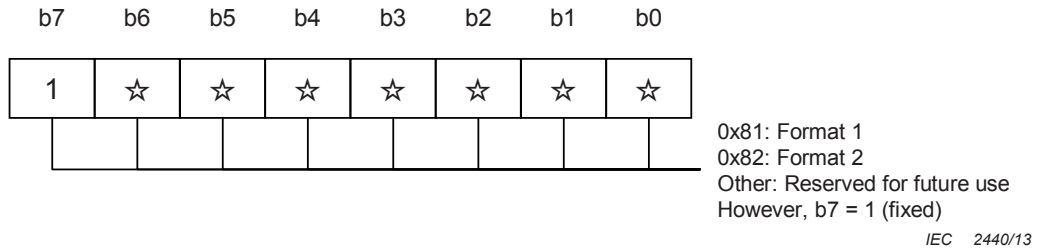
Figure 33 – Detailed specifications of ELHD2

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.

X3: Instance code
X2: Class code
X1: Class group code

IEC   2441/13
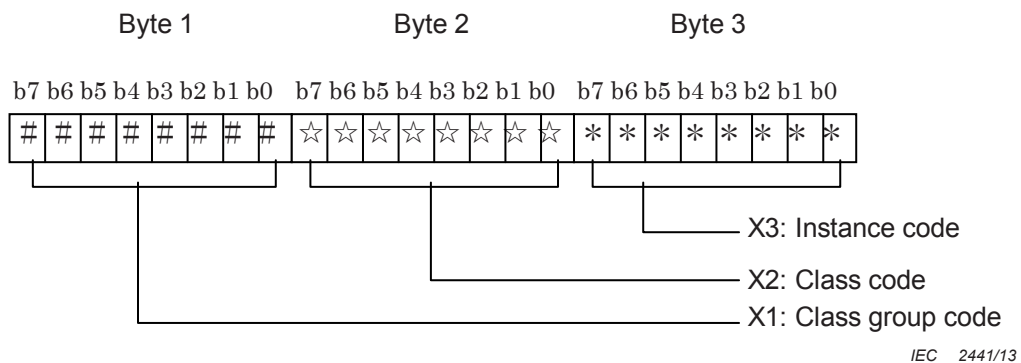
Figure 34 – Detailed specifications of EOJ code

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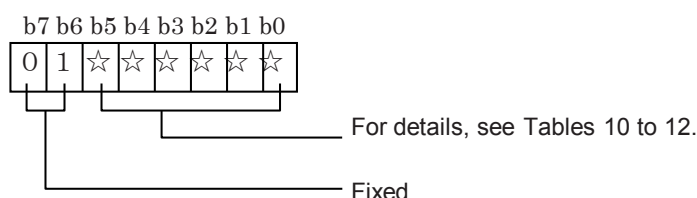
Note: Except when b7:b6=0:1, b0 to b5 have different meanings.

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		

Relationship between request and response

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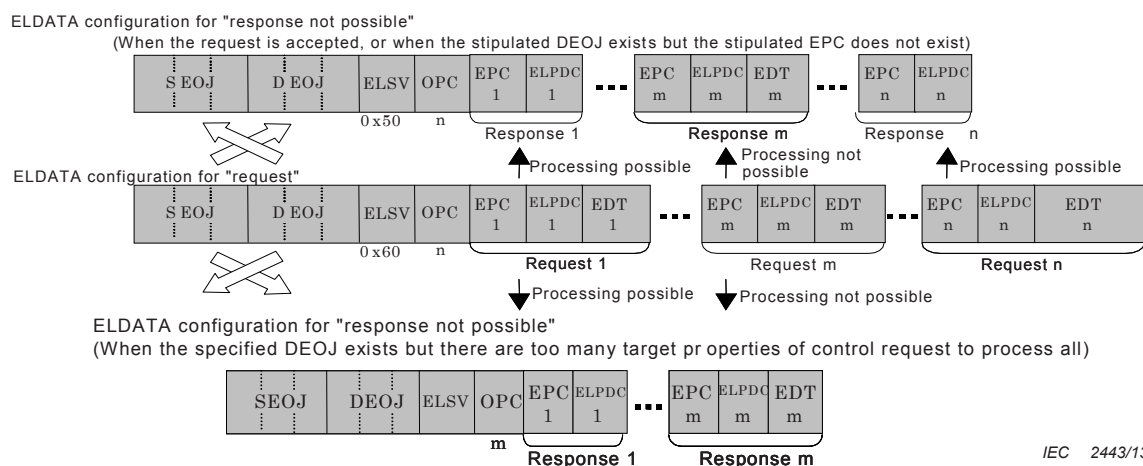
Figure 36 – ELDATA configuration for property value write service (no response required)

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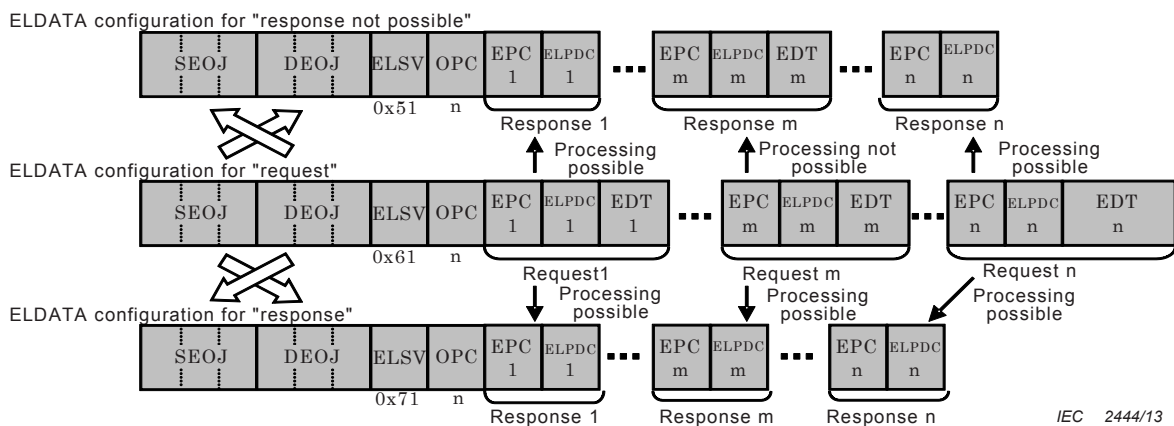
Figure 37 – ELDATA configuration for property value write service (response required)

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 is to 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.
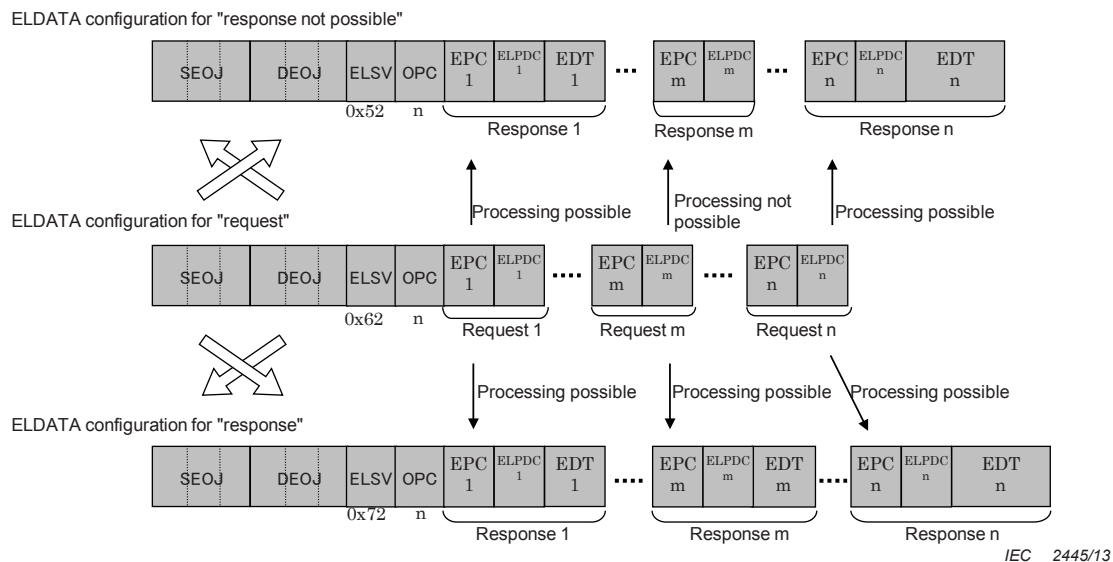
Figure 38 – ELDATA configuration for property value read service

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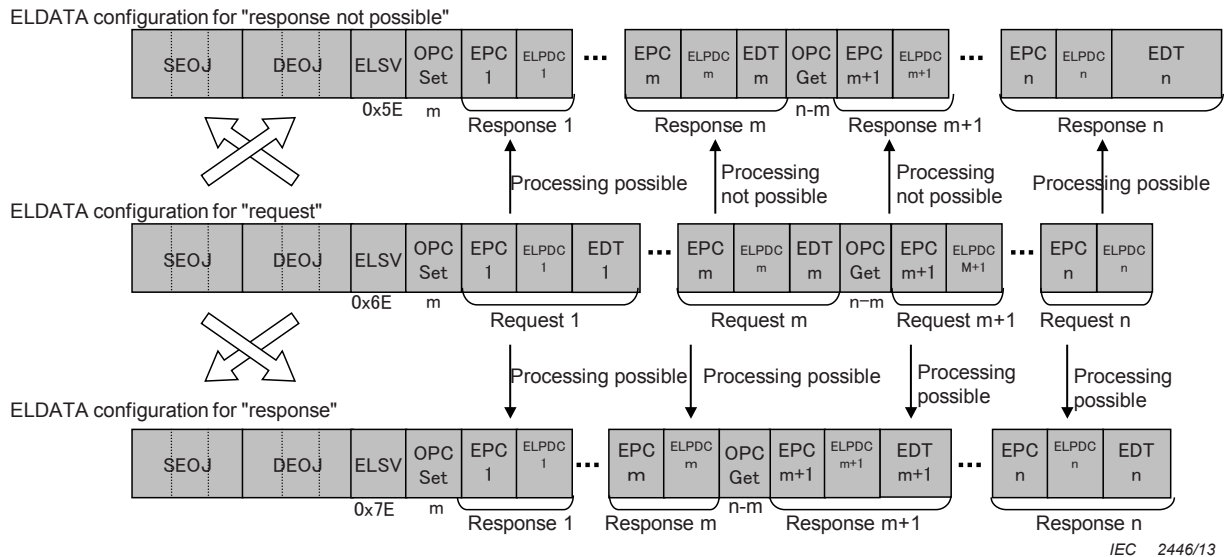
Figure 39 – ELDATA configuration for property value write and read service

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 is to 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.
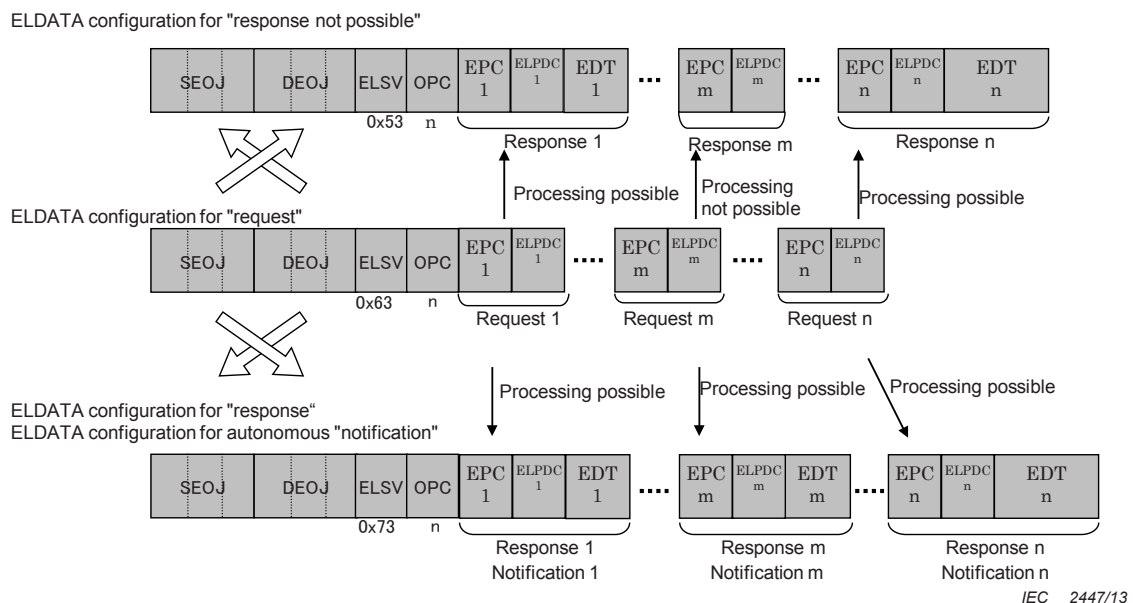
Figure 40 – ELDATA configuration for property value notification service

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.

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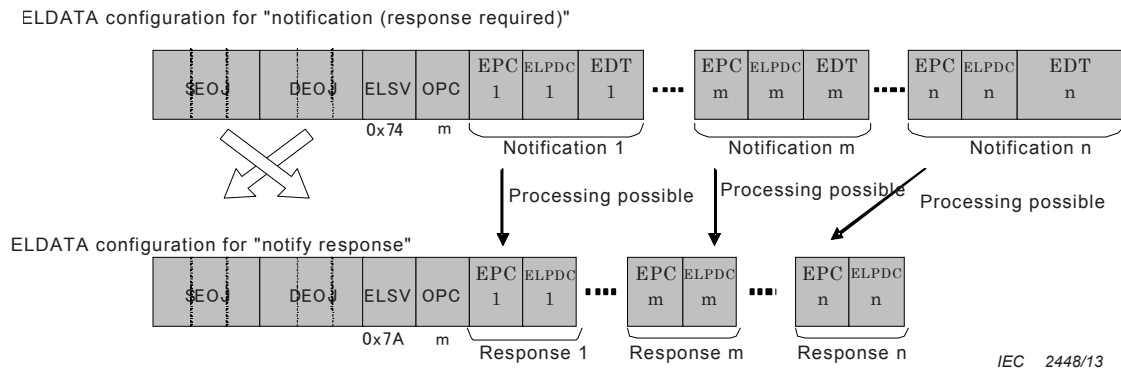
**Figure 41 – ELDATA configuration for property value notification
(response required) service**

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 42, Table 45 to Table 47, Table 53, and Table 59 to Table 61. 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.)
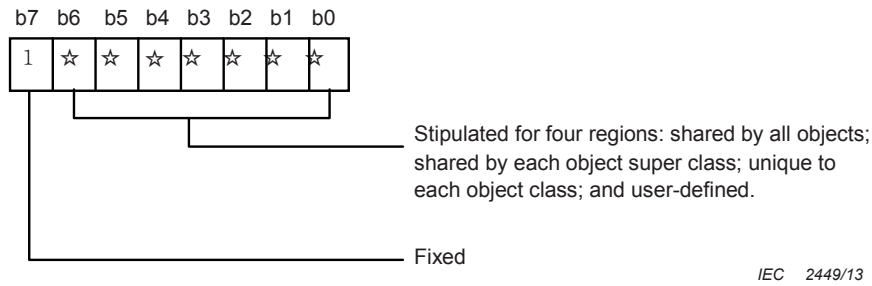
NOTE   When b7 = 0, the other bits will be defined differently.

Figure 42 – EPC detailed specifications

Table 13 – EPC code allocation table

	8	9	A	B	C	D	E	F	← b7–b4 values
0									
1									
2									
3									
4									
5									
6									
7	Region shared by all object classes classes		Region shared by each class group[b]		Region unique to each class[b]			User-defined[a]	
8									
9									
A									
B									
C									
D									
E									
F									

↑
b3–b0   values
(hex)

[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.
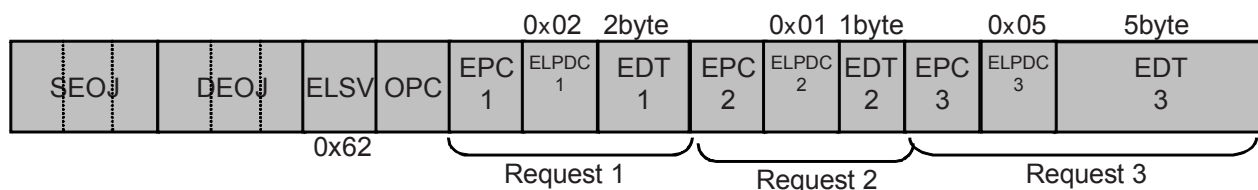
Figure 43 – ECHONET Lite Property data counter

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 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.
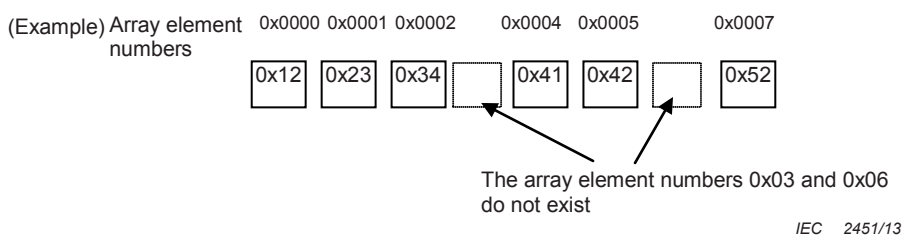
Figure 44 – Example of array elements

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 exist.

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.
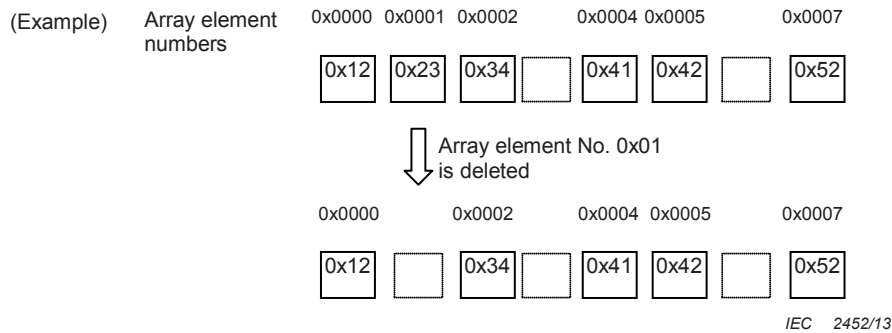
Figure 45 – Example of property value element deletion

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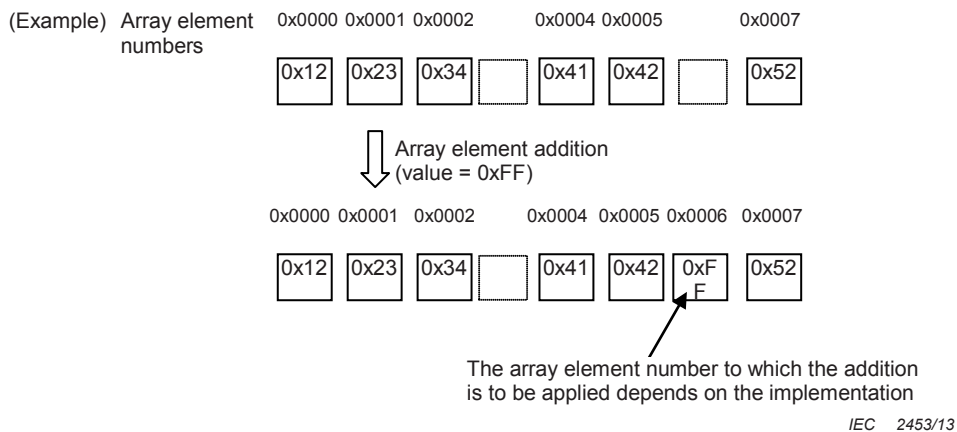
Figure 46 – Example of property value element addition

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		Data size	Data size byte	Access rule	Manda-tory	Announce-ment at status change	Remark
		Value range (decimal notation)							
Operation status	0x80	Indicates the ON/OFF status.		unsigned char	1	Set		○	
		ON = 0x30, OFF = 0x31				Get	○		
Installation location	0x81	Indicates the installation location		unsigned char	1	Set/ Get	○	○	
		See 9.3.4.							
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).							
Identification number	0x83	A number that allows each object to be uniquely identified.		Unsigned char	9 or 17	Get			
		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.							

Property name	EPC	Contents of property		Data size	Data size byte	Access rule	Manda-tory	Announce-ment at status change	Remark
			Value range (decimal notation)						
		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.		unsigned short	2	Get			
		0x0000 to 0xFFFF(0 W to 65 535 W)							
Measured cumulative power consumption	0x85	Indicates the cumulative power consumption of the device in increments of 0,001 kWh.		unsigned long	4	Get			
		0x0 to 0x3B9AC9FF							
		(0 kWh to 999 999,999 kWh)							
Manufacturer's fault code	0x86	Indicates the manufacturer-defined fault code.		unsigned char x (max) 225	Max 225	Get			
		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							
Current limit setting	0x87	Indicates the current limit setting (0 % to 100 %).		unsigned char	1	Set/Get			
		0x00-0x64 (=0 % to 100 %)							
Fault status	0x88	Indicates whether a fault (e.g. a sensor trouble) has occurred or not.		unsigned char	1	Get	○	○	
		Fault occurred＝0x41, No fault has occurred＝0x42							
Fault description	0x89	Describes the fault.		unsigned short	2	Get			
		See 9.3.12.							
Manufacturer code	0x8A	3-byte manufacturer code		unsigned charx3	3	Get	○		
		(Defined by the ECHONET Consortium.)							
Business facility code	0x8B	3-byte business facility code		unsigned charx3	3	Get			
		(Defined by each manufacturer.)							
Product code	0x8C	Identifies the product using ASCII code.		unsigned charx12	12	Get			
		(Defined by each manufacturer.)							
Production number	0x8D	Indicates the production number using ASCII code.		unsigned charx12	12	Get			
		(Defined by each manufacturer.)							

Property name	EPC	Contents of property		Data size	Data size byte	Access rule	Manda-tory	Announce-ment at status change	Remark
		Value range (decimal notation)							
Production date	0x8E	4-byte production date code		unsigned charx4	4	Get			
		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　　＝0x							
Power-saving operation setting	0x8F	Indicates whether the device is operating in power-saving mode.		unsigned char	1	Set/Get			
		Operating in power-saving mode =0x41							
		Operating in normal operation mode =0x42							
Position information	0x93	Indicates the latitude, longitude and altitude of the installation location.		unsigned char x 16	16	Get/Set		○	
Current time setting	0x97	Current time (HH:MM format)		unsigned char x 2	2	Set/Get			
		0x00 to 0x17:0x00 to 0x3B							
		(=0 to 23): (=0 to 59)							
Current date setting	0x98	Current date (YYYY:MM:DD format)		unsigned char x 4	4	Set/Get			
		1 to 0x270F: 1 to 0x0C: 1 to 0x1F							
		(=1 to 9999): (=1 to 12): (=1 to 31)							
Power limit setting	0x99	Indicates the power limit setting in watts.		unsigned short	2	Set/Get			
		0x0000 to 0xFFFF							
		(0 W to 65 535 W)							
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.		unsigned char ＋ unsigned long	1+4 byte	Get			
		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)							

Property name	EPC	Contents of property	Data size	Data size byte	Access rule	Manda-tory	Announce-ment at status change	Remark
		Value range (decimal notation)						
SetM property map	0x9B	See Clause 10.	unsigned char x (MAX17)	Max. 17	Get	○ a		
GetM property map	0x9C	See Clause 10.	unsigned char x (MAX17)	Max. 17	Get	○ a		
Status change announcement property map	0x9D	See Clause 10.	unsigned char x (MAX17)	Max. 17	Get	○		
Set property map	0x9E	See Clause 10.	unsigned char x (MAX17)	Max. 17	Get	○		
Get property map	0x9F	See Clause 10.	unsigned char x (MAX17)	Max. 17	Get	○		
The ○ 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**

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 version number of the main text of the corresponding standard as a two-byte binary value and the release order as a one-byte ASCII code.

The first byte indicates the major version number (integer), the second byte indicates the minor version number (decimal places) and the third byte indicates the order of release. For example, if the version number of the standard is 2.10 and the release order is "a", the first, second and third byte values will be 0x02 (2), 0x0A (10) and 0x61 (a), respectively.

In this version, the fourth byte is fixed at 0x00, that is, reserved for future expansion.

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.

Manufacturer code (3 bytes)	Unique ID field (unique identification number specified by the manufacturer) (13 bytes)
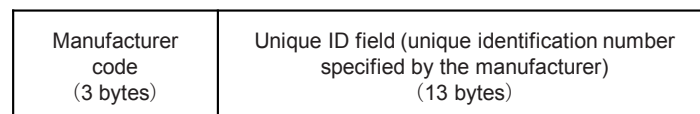
IEC   2454/13

Figure 47 – Data structure of "identification number" property

9.3.7 Measured instantaneous power consumption property

This property indicates the instantaneous power consumption 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 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.

Data size of the fault code field (1 byte)	Manufacturer code (3 bytes)	Fault code field (unique fault code defined by the manufacturer) (Max. 221 bytes)

IEC   2455/13

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.

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. mend

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 Position information property

The "position information" property indicates the latitude, longitude and altitude of the location at which the device has been installed in the form of 16-byte information.

When the 8 higher-order bytes are "0x00, 0x00, 0x1B, 0x00, 0x00, 0x00, 0x00 and 0x03", the position data shall be followed.

The implementation of this property is optional. However, in the case where the "position information" property is implemented, an intra-domain broadcast shall be executed whenever a value change occurs to notify the new value.

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.

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 0xFFFFFFFF (from 0 to 4 294 967 295). 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 Clause 10. 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 is to 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 is to 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 is to 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 is to 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	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Operation status	0x80	Indicates the ON/OFF status.	unsigned char	1 bytes	—	Set		O	
		ON = 0x30, OFF = 0x31				Get	O		
Measured temperature value	0xE0	Indicates the measured temperature value in increments of 0,1 °C.	signed short	2 bytes	0,1 °C	Get	O		
		0xF554 to 0x7FFF (–2 732 to 32 766) (–273,2 °C to 3 276,6 °C)							

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 %. The property value range shall be 0xF554 to 0x7FFD (–273,2 °C to 3 276,6 °C). When the property value of the actual device exceeds this property value range, the overflow code 0x8000 shall be used. When said value falls below the property value range, the underflow code 0x7FFE 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	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Operation status	0x80	Indicates the ON/OFF status.	unsigned char	1 byte	—	Set		O	
		ON = 0x30, OFF = 0x31				Get	O		
Measured value of relative humidity	0xE0	Indicates measured value of relative humidity in %.	unsigned char	1 byte	%	Get	O		
		0x00 to 0x64 (0 % to 100 %)							

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	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Operation status	0x80	Indicates the ON/OFF status.	unsigned short	1 bytes	—	Set		O	
		ON = 0x30, OFF = 0x31				Get	O		
Measured illuminance value 1	0xE0	Indicates measured illuminance value in lux.	unsigned short	2 bytes	lux	Get	O [a]		
		0x0000 to 0xFFFD (0 lx to 65 533 lx)							
Measured illuminance value 2	0xE1	Indicates measured illuminance value in lux.	unsigned short	2 bytes	lux	Get	O [a]		
		0x0000 to 0xFFFD (0 lx to 65 533 lx)							
[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	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Operation status	0x80	Indicates the ON/OFF status	unsigned char	1 byte	–	Set		O	
		ON = 0x30, OFF = 0x31				Get	O		
Detection threshold level	0xB0	Specifies detection threshold level (8-step).	unsigned char	1 byte	–	Set/Get			
		0x31 to 0x38							
Human detection status	0xB1	Indicates human detection status.	unsigned char	1 byte	–	Get	O	O	
		Human detection status found = 0x41 Human detection status not found = 0x42							

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

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

[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	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Operation status	0x80	Indicates the ON/OFF status.	unsigned char	1 byte	—	Set		O	
		ON = 0x30, OFF = 0x31				Get	O		
Measured current value 1	0xE0	Indicates measured current value in mA.	unsigned long	4 bytes	mA	Get	O [a]		
		0x00000000 to 0xFFFFFFFD (0 mA to 4 294 967 293 mA)							
Rated voltage to be measured	0xE1	Rated voltage value to be measured by current sensor	unsigned short	2 bytes	V	Get			
		0x0000 to 0xFFFD (0 V to 65 533 V)							
Measured current value 2	0xE2	Indicates measured current value in mA.	signed long	4 bytes	mA	Get	O [a]		
		0x80000001 to 0x7FFFFFFE (−2 147 483 646 mA to 2 147 483 646 mA)							
[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 0x7FFFFFFE (−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	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Operation status	0x80	Indicates the ON/OFF status.	unsigned char	1 byte	—	Set		O	
		ON = 0x30, OFF = 0x31				Get	O		
Measured value of air speed	0xE0	Indicates the measured value of air speed in increments of 0,01 m/s.	unsigned short	2 bytes	0,01 m/s	Get	O		
		0x0000 to 0xFFFD (0 to 65 533) (0 m/s to 655,33 m/s)							
Air flow direction	0xE1	Indicates the air flow direction in degrees (angles).	unsigned short	2 bytes	degree	Get			
		0x0000 to 0x0168 (0° to 360°)							

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 (Get)	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-cenimetres (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-cenimetres 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 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 dehumidi-fying 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			

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Set temperature value in heating mode	0xB6	Used to set the temperature for the "heating" mode and to acquire the current setting.	unsigned char	1 byte	°C	Set/Get			
		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.	unsigned char	1 byte	°C	Set/Get			
		0x00 to 0x32 (0 °C to 50 °C)							
Rated power consumption	0xB8	Rated power consumption in each operation mode of cooling/heating/dehumidifying/blast	unsigned short x 4	8 bytes	W	Get			
		0x0000 to 0xFFFD (0 W to 65 533 W) Cooling: heating: dehumidifying: blast							
Measured value of current consumption	0xB9	Measured value of current consumption	unsigned short	2 bytes	0,1 A	Get			
		0x0000 to 0xFFFD (0 A to 6 553,3 A)							
Measured value of room relative humidity	0xBA	Measured value of room relative humidity	unsigned char	1 byte	%	Get			
		0x00 to 0x64 (0 °C to 100 °C)							
Measured value of room temperature	0xBB	Measured value of room temperature	signed char	1 byte	°C	Get			
		0x80 to 0x7D (−127 °C to 125 °C)							
Set temperature value of user remote control	0xBC	Set temperature value of user remote control	unsigned char	1 byte	°C	Get			
		0x00 to 0x32 (0 °C to 50 °C)							
Measured cooled air temperature	0xBD	Indicates the measured cooled air temperature at the outlet.	signed char	1 byte	°C	Get			
		0x81 to 0x7D (−127 °C to 125 °C)							
Measured outdoor air temperature	0xBE	Indicates the measured outdoor air temperature.	signed char	1 byte	°C	Get			
		0x81 to 0x7D (−127°C to 125 °C)							
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.	unsigned char	1 byte	0,1 °C	Set/Get			
		0x81 to 0x7D (−12,7 °C to 12,5 °C)							
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.	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
		Automatic air flow rate control function used = 0x41 Air flow rate = 0x31 to 0x38							
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 is to be used, and to acquire the current setting.	unsigned char	1 byte	–	Set/Get			
		Automatic = 0x41, non-automatic = 0x42, automatic (vertical) = 0x43, automatic (horizontal) = 0x44							
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 is to be used, and to acquire the current setting.	unsigned char	1 byte	–	Set/Get			
		Automatic air flow swing function not used = 0x31, used (vertical) = 0x41, used (horizontal) = 0x42, used (vertical and horizontal) = 0x43							
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.	unsigned char	1 byte	–	Set/Get			
		Uppermost = 0x41, lowermost = 0x42, central = 0x43, midpoint between uppermost and central = 0x44, midpoint between lowermost and central = 0x45							
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.	unsigned char	1 byte	–	Set/Get			
		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.							
Special state	0xAA	Indicates if the air conditioner is in a "special" state (i.e. the "defrosting", "preheating", or "heat removal" state).	unsigned char	1 byte	–	Get			
		"Normal operation" state = 0x40, "defrosting" state = 0x41, "preheating" state = 0x42, "heat removal" state = 0x43							

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Non-priority state	0xAB	Used to indicate when the air conditioner is in a "non-priority" state.	unsigned char	1 byte	–	Get			
		"Normal operation" state = 0x40, "Non-priority" state = 0x41							
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.	unsigned char	1 byte	–	Set/Get			
		Ventilation function ON (outlet direction) = 0x41, ventilation function OFF = 0x42, ventilation function ON (intake direction) = 0x43							
Humidifier function setting	0xC1	Used to specify whether or not to use the humidifier function, and to acquire the current setting.	unsigned char	1 byte	–	Set/Get			
		Humidifier function ON = 0x41, humidifier function OFF = 0x42							
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.	unsigned char	1 byte	–	Set/Get			
		Automatic control of ventilation air flow rate = 0x41, ventilation air flow rate = 0x31 to 0x38							
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.	unsigned char	1 byte	–	Set/Get			
		Automatic control of the degree of humidification = 0x41 degree of humidification = 0x31 to 0x38							
Air cleaning method	0xC6	A bitmap indicates mounted method of exercising air cleaning function.	unsigned char	1 byte	–	Get			
		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							
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 purification to achieve with the air purifier 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	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
		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.							
Air refresh method	0xC8	A bitmap indicates mounted method for exercising refresh function.	unsigned char	1 byte	–	Get			
		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							
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.	unsigned char x 8	1 byte x 8	–	SetM /GetM Set/Get			
		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.							
Self-clean-ing method	0xCA	A bitmap indicates mounted method for exercising self-cleaning function.	unsigned char	1 byte	–	Get			
		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							
Self-clean-ing 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.	unsigned char	1 byte	–	Set/Get			
		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.							
Operation status of components	0xCD	Indicates the operation status of components of the air conditioner in a bitmap format.	unsigned char	1 byte	–	Get			
		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.							
Thermostat setting override function	0xCE	Used to specify whether or not to allow the air conditioner to operate ignoring its thermostat setting.	unsigned char	1 byte	–	Set			
		Normal setting = 0x40, thermostat setting override function ON = 0x41, thermostat setting override function OFF = 0x42							
Air purification mode setting	0xCF	Used to specify air purification mode setting to set ON/OFF and to acquire the current setting.	unsigned char	1 byte	–	Set/Get			
		Air purification ON=0x41, OFF=0x42							
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.	unsigned char	1 byte	–	Set/Get			

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
		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							
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.	unsigned char x 2	2 bytes	–	Set/Get			
		0 to 0x17: 0 to 0x3B (= 0 to 23): (= 0 to 59)							
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.	unsigned char x 2	2 bytes	–	Set/Get			
		0 to 0xFF: 0 to 0x3B (= 0 to 255): (= 0 to 59)							
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.	unsigned char	1 byte	–	Set/Get			
		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							
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.	unsigned char x 2	2 bytes	–	Set/Get			
		0 to 0x17: 0 to 0x3B (= 0 to 23): (= 0 to 59)							
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.	unsigned char x 2	2 bytes	–	Set/Get			
		0 to 0xFF: 0 to 0x3B (= 0 to 255): (= 0 to 59)							

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   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).

9.13.4   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).

9.13.5   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.

9.13.6   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).

9.13.7   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).

9.13.8 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).

9.13.9 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).

9.13.10 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).

9.13.11 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).

9.13.12 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.

9.13.13 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).

9.13.14 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).

9.13.15 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).

9.13.16 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).

9.13.17 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).

9.13.18 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).

9.13.19 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).

9.13.20 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 is to 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).

9.13.21 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 is to 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.

9.13.22 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.

(Air conditioner as seen from the left side)

Uppermost = 0x41

Midpoint between uppermost and central = 0x44

Central = 0x43

Midpoint between lowermost and central = 0x45

Lowermost = 0x42

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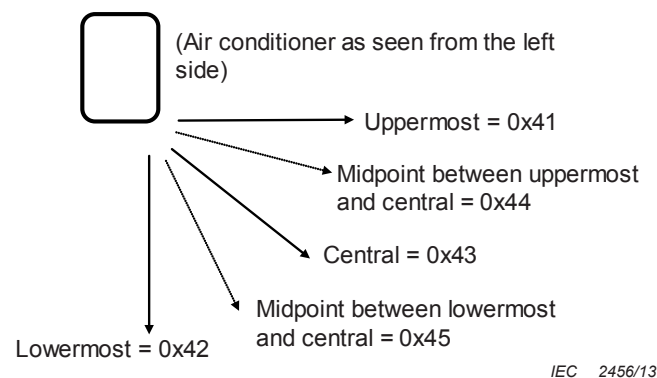
Figure 49 – Air flow direction (vertical) setting

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.

9.13.23 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	○	○	○	○	○	

(Top view)

The five directions are as indicated at right.
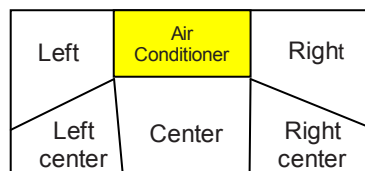
IEC   2457/13

Figure 50 – Air flow direction (horizontal) setting

9.13.24 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).

9.13.25 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).

9.13.26 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).

9.13.27 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).

9.13.28 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).

9.13.29 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).

9.13.30 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.

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Figure 51 – Mounted air cleaning method

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

9.13.31 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 through 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.
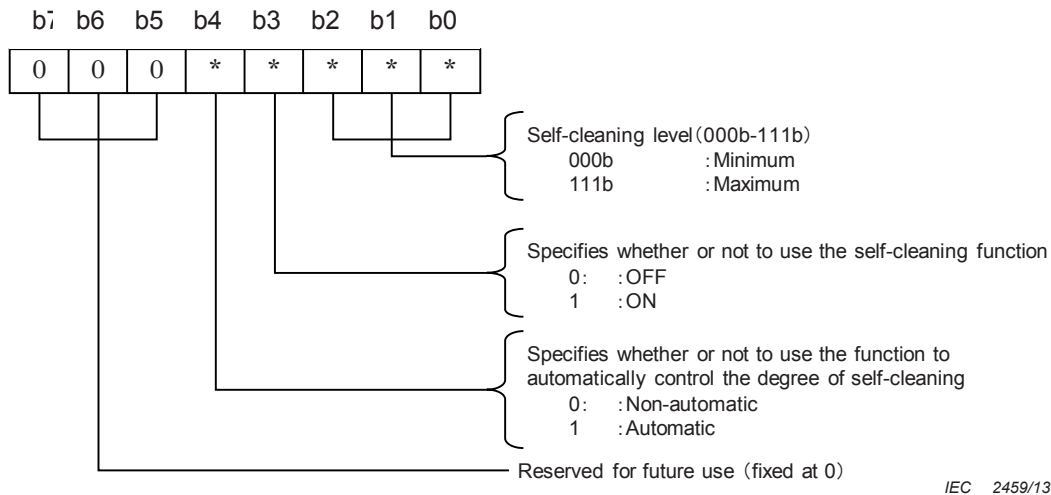
Figure 52 – Air purifier function setting

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

9.13.32 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.
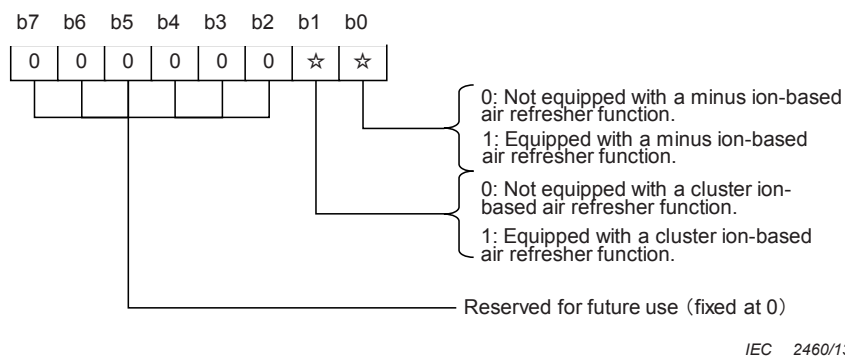
Figure 53 – Air refresh method

9.13.33 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.
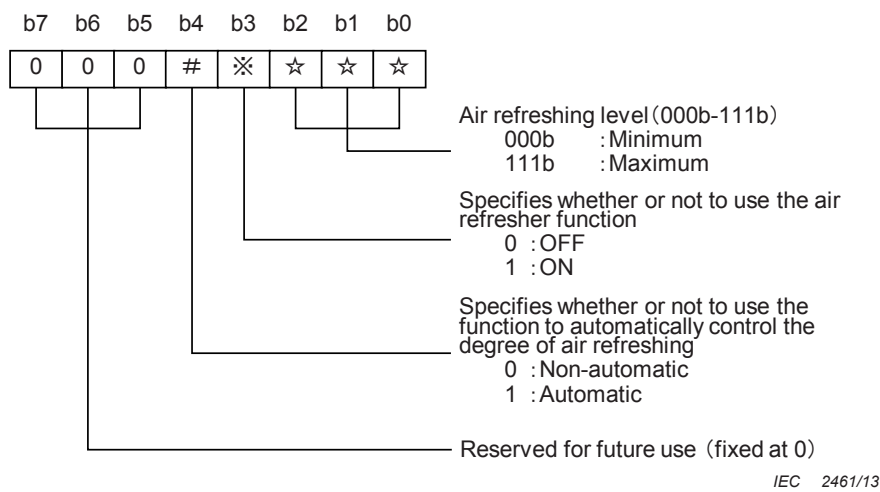
Figure 54 – Air refresher function setting

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

9.13.34 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.
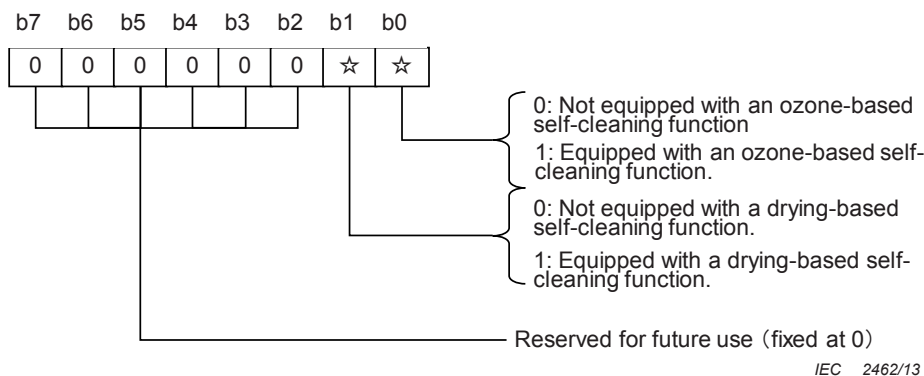
Figure 55 – Self-cleaning method

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

9.13.35 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 through 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.
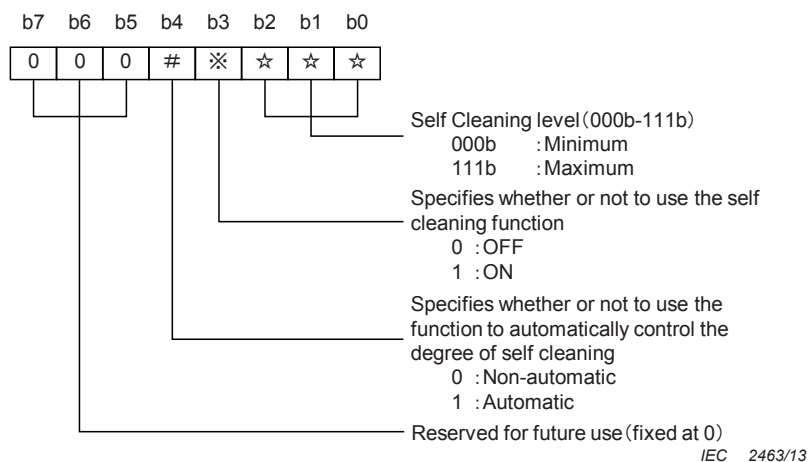
Figure 56 – Self-cleaning function setting

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

9.13.36 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 International Standard.

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).

9.13.37 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).

9.13.38 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).

9.13.39 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).

9.13.40 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).

9.13.41 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).

9.13.42 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.

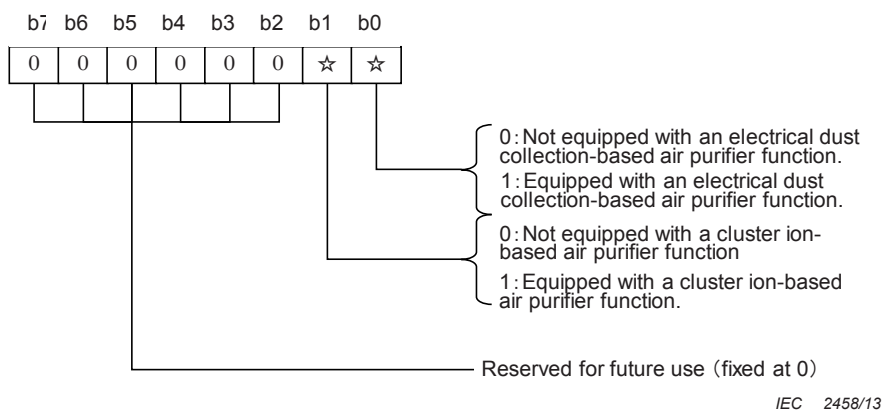This property shall be effective even when the value of the "operation status" property (0x80) is OFF (0x31).

9.13.43 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).

9.13.44 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).

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

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 is to 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 byte		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 0x 33. 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.

IEC   2464/13
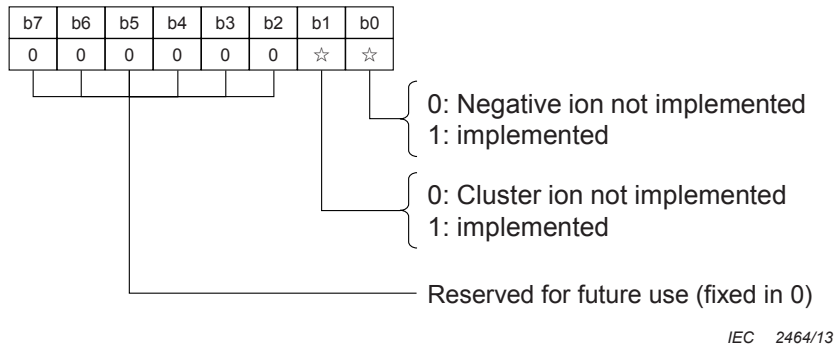
Figure 57 – Implemented ion emission method

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 Electrically operated shade class specifications

9.17.1 General

The control commands of "electrically operated shade" are shown in Table 32.

Class group code   : 0x02
Class code   : 0x60

Table 32 – List of electrically operated shade properties

Property name	EPC	Contents of property		Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)								
Operation status	0x80	Indicates the ON/OFF status.		unsigned char	1 bytes	—	Set		O	
		ON = 0x30, OFF = 0x31					Get	O		
Open/close setting	0xE0	Open/close		unsigned char	1 byte	–	Set/Get	O	O	
		Open = 0x41, close = 0x42								
Degree-of-opening level	0xE1	Used to specify the degree-of-opening level by selecting a level from the 8 predefined levels, and to acquire the current setting.		unsigned char	1 byte	–	Set/Get			
		0x31 to 0x38								
Set value of shade angle	0xE2	Shade angle value		unsigned char	1 byte	degree	Set/Get			
		0x00 to 0xB4 (0° to 180°)								
Shade open/close speed	0xE3	Low/medium/high		unsigned char	1 byte	–	Set/Get			
		Low = 0x41, medium = 0x42, high = 0x43								

9.17.2 Operation status property

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

9.17.3 Open/close status property

This property indicates the open/close status of the electrically operated shade. The open status shall be 0x41, and the close status shall be 0x42.

9.17.4 Degree-of-opening level property

This property indicates one of 8 different degrees of electrically operated shade openings when the value of the open/close status property (0xE0) is 0x41 (open). Specific states of the 8 different levels are not stipulated. However, the value 0x31 shall represent the fully open state and the value 0x38 shall represent the state nearest to the fully closed state (i.e., not fully closed).

9.17.5 Set value of shade angle property

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.

9.17.6 Shade open/close speed property

This property indicates the opening and closing speed of the electric blind at 3 levels: low, medium or high.

9.18 Electric water heater class specifications

9.18.1 General

The control commands of "electric water heater" are shown in Table 33.

Class group code   : 0x02

Class code   : 0x6B

Table 33 – List of electric water heater properties

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Operation status	0x80	Indicates the ON/OFF status.	unsigned char	1 byte	—	Set		O	
		ON = 0x30, OFF = 0x31				Get	O		
Automatic water heating setting	0xB0	Used to specify whether or not to use the automatic water heating function, and to acquire the current setting.	unsigned char	1 byte	–	Set/Get			
		Automatic water heating function used: 0x41							
		Non-automatic water heating function stopped: 0x43							
		Non-automatic water heating function used: 0x42							
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.	unsigned char	1 byte	–	Set/Get			
		Automatic water temperature control function used: 0x41							
		Automatic water temperature control function not used: 0x42							
Water heater status	0xB2	Indicates the current status of the water heater in terms of whether it is heating water or not.	unsigned char	1 byte	–	Get			
		Heating = 0x41							
		Not heating = 0x42							
Water heating temperature setting	0xB3	Used to specify (in °C) the temperature of heated water to achieve, and to acquire the current setting.	unsigned char	1 byte	°C	Set/Get	O		
		0x00 to 0x64 (0 °C to 100 °C)							
Daytime reheating permission setting	0xC0	Used to specify whether or not to permit daytime reheating, and to acquire the current setting.	unsigned char	1 byte	–	Set/Get			
		Daytime reheating permitted: 0x41							
		Daytime reheating not permitted: 0x42							
Measured temperature of water in water heater	0xC1	Indicates the current temperature of the water in the water heater.	unsigned char	1 byte	°C	Get			
		0x00 to 0x64 (0 °C to 100 °C)							

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
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.	unsigned char	1 byte	°C	Set/Get			
		0x00 to 0x64 (0 °C to 100 °C)							
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.	unsigned char	1 byte	°C	Set/Get			
		0x00 to 0x64 (0 °C to 100 °C)							
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.	unsigned char	1 byte	%	Set/Get			
		0x00 to 0x64 (0 % to 100 %)							
Measured amount of water remaining in tank	0xE1	Indicates the measured amount of water left in the tank in litres.	unsigned short	2 bytes	l	Get			
		0x0000 to 0xFFFD (0 l to 65 533 l)							
Tank capacity	0xE2	Indicates the tank capacity in litres.	unsigned short	2 bytes	l	Get			
		0x0000 to 0xFFFD (0 l to 65 533 l)							
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.	unsigned char	1 byte	–	Set/Get			
		"Automatic bath water heating" mode ON = 0x41							
		"Automatic bath water heating" mode OFF = 0x42							
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.	unsigned char	1 byte	–	Set/Get			
		"Addition of hot water" function ON = 0x41							
		"Addition of hot water" function OFF = 0x42							
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.	unsigned char	1 byte	–	Set/Get			
		"Slight bath water temperature lowering" function ON = 0x41							
		"Slight bath water temperature lowering" function OFF = 0x42							
Bath water volume setting 1	0xE7	Used to specify the bath water volume in litres, and to acquire the current setting.	unsigned char	1 byte	l	Set/Get			
		0x00 to 0xFD (0 l to 253 l)							

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
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.	unsigned char	1 byte	–	Set/Get			
		0x31 to 0x38							
Bath water volume setting 3	0xEE	Used to specify the bath water volume in litres, and to acquire the current setting.	unsigned short	2 bytes	l	Set/Get			
		0x0000 to 0xFFFD (0 l to 65 533 l)							
ON timer reservation setting	0x90	0x31 to 0x38	unsigned char	1 byte	l	Set/Get			
		Reservation ON = 0x41							
		Reservation OFF = 0x42							
ON timer setting	0x91	ON timer setting (HH:MM)	unsigned char x 2	2 bytes	–	Set/Get			
		0 to 0x17: 0 to 0x3B							
		(= 0 to 23): (= 0 to 59)							
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.	unsigned short	2 bytes	W	Get			
		0x0000-0xFFFD(0 to 65 533)							
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	unsigned short	2 bytes	W	Get			
		0x0000-0xFFFD (0 to 65 533)							
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	unsigned short	2 bytes	W	Get			
		0x0000 to 0xFFFD (0 to 65 533)							

9.18.2 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.

9.18.3 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.

9.18.4 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.

9.18.5 Water heater status property

This property indicates whether the electric hot water tank is presently heating or not. Presently heating shall be 0x41. Not heating shall be 0x42.

9.18.6 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.

9.18.7 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.

9.18.8 Measured temperature of water in water heater property

This property indicates the degrees Celsius (°C) at the present time inside the hot water tank. The property value range shall be 0x00 to 0x64 (0 °C to 100 °C).

9.18.9 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).

9.18.10 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).

9.18.11 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 %).

9.18.12 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.

9.18.13 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.

9.18.14 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" is to be supported, the implementation of this property is mandatory.

9.18.15 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).

9.18.16 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.

9.18.17 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.

9.18.18 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.

9.18.19 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.

9.18.20 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.

9.18.21 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.

9.18.22 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.

9.18.23 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".

9.18.24 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.

9.19 Household solar power generation class specifications

9.19.1 General

The control commands of "household solar power generation" are shown in Table 34.

Class group code   : 0x02

Class code   : 0x79

Table 34 – List of household solar power generation properties

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Man-datory	Announce-ment at status change	Remark
		Value range (decimal notation)							
Operation status	0x80	Indicates the ON/OFF status.	unsigned char	1 byte	—	Set		O	
		ON = 0x30, OFF = 0x31				Get	O		
System intercon-nection status	0xD0	Indicates system interconnection status	unsigned char	1 byte	–	Get			
		System-linked type (reverse power flow OK) = 0x00							
		Independent type = 0x01							
		System-linked type (reverse power flow NG) = 0x02							
Measured instanta-neous amount of electricity generated	0xE0	Indicates instantaneous generated power in W.	unsigned short	2 bytes	W	Get	O		
		0x0000 to 0xFFFD (0 to 65 533)							
Measured cumulative amount of electricity generated	0xE1	Indicates integral electric energy in 0,001 kWh.	unsigned long	4 bytes	0,001 kWh	Get	O		
		0x0 to 0x3B9AC9FF (0 kWh to 999 999,999 kWh)							
Resetting cumulative amount of electricity generated	0xE2	Resets integral generated electric energy by setting 0x00.	unsigned char	1 byte	–	Set			
		Reset = 0x00							
Measured cumulative amount of electricity sold	0xE3	Indicates integral value of sold power in 0,001 kWh.	unsigned long	4 bytes	0,001 kWh	Get			
		0x0 to 0x3B9AC9FF (0 kWh to 999 999,999 kWh)							

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Man-datory	Announce-ment at status change	Remark
		Value range (decimal notation)							
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			

9.19.2   Operation status property

This property indicates the operation status as a home solar power generation PV inverter. The status where power is supplied to the system side shall be defined as the "operating status".

9.19.3   System interconnection status property

This property indicates system interconnection status. System-linked type (reverse power flow is OK mode) = 0x00, Independent type = 0x01, System-linked type (reverse power flow is NG mode) = 0x02.

9.19.4   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.

9.19.5   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.

9.19.6   Resetting cumulative amount of electricity generated property

Resets the integral generated electric energy to zero by setting 0x00.

9.19.7 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.

9.19.8 Resetting cumulative amount of electricity sold property

Resets the integral generated electric energy to zero by setting 0x00.

9.19.9 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.

9.19.10 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.

9.19.11 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.

9.19.12 Rated power generation output property

This property indicates the rated power generation output (catalog value) in watts. The value range for this property is from 0x0000 to 0xFFFD (from 0 to 65 533).

9.20 Floor heater class specifications

9.20.1 General

The control commands of "floor heater" are shown in Table 35.

Class group code : 0x02
Class code   : 0x7B

Table 35 – 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	
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, timer 1 = 0x41, timer 2 = 0x42	unsigned char	1 byte	—	Set/Get			
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			
ON timer reservation setting	0x90	Reservation ON/OFF ON = 0x41, OFF = 0x42	unsigned char	1 byte	—	Set/Get			

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
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.									

9.20.2   Operation status property

This property indicates ON/OFF of the floor heater. ON/OFF shall correspond to the property value of 0x03/0x31. The access rule "SET" shall be implemented for floor heaters.

9.20.3   Temperature setting 1 property

This property indicates the setting value of temperature in degrees in 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.

9.20.4   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.

9.20.5 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 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).

9.20.6 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 the range. 0x7E shall be used when the measured value cannot be returned.

9.20.7 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).

9.20.8 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.

9.20.9 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).

9.20.10 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 hours are divided by 30 minutes. 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 58.

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

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Figure 58 – Daily timer setting

9.20.11 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).

9.20.12 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).

9.20.13 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).

9.20.14 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).

9.20.15 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).

9.20.16 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).

9.21 Fuel cell class specifications

9.21.1 General

The control commands of "fuel cell" are shown in Table 36.

Class group code   : 0x02
Class code   : 0x7C

Table 36 – List of fuel cell properties

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Operation status	0x80	Indicates the ON/OFF status.	unsigned char	1 byte	—	Set		○	
		ON = 0x30 , OFF = 0x31				Get	○		
Automatic setting of heated water tempera-ture	0xB1	AUTO/Non-AUTO	unsigned char	1 byte	—	Set/Get			
		AUTO = 0x41 , Non-AUTO = 0x42							
Heating status	0xB2	Indicates whether the water is being heated.	unsigned char	1 byte	—	Get			
		Being heated = 0x41 , Not being heated = 0x42							
Heated water tempera-ture setting	0xB3	Indicates the heated water temperature setting in °C.	unsigned char	1 byte	°C	Set/Get			
		0x00 to 0x64 (0 °C to 100 °C)							
Measured tempera-ture of water in water heater	0xC1	Indicates the current temperature of the water in the water heater in °C.	unsigned char	1 byte	—	Get			
		0x00 to 0x64 (0 °C to 100 °C)							
Rated power generation output	0xC2	Indicates the rated power generation output in watts.	unsigned short	2 bytes	W	Get			
		0x0000 to 0xFFFD (0 W to 65 533 W)							
Heating value of hot water storage tank	0xC3	Indicates the heating value of the hot water storage tank in MJ.	unsigned short	2 bytes	MJ	Get			
		0x0000 to 0xFFFD (0 MJ to 65 533 MJ)							
Measured instantane ous power generation output	0xC4	Indicates the instantaneous power generation output in watts.	unsigned short	2 bytes	W	Get	○		
		0x0000 to 0xFFFD (0 W to 65 533 W)							

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Measured cumulative power generation output	0xC5	Indicates the cumulative power generation output in increments of 0,001 kWh.	unsigned long	4 bytes	0,001 kWh	Get	○		
		0x0-0x3B9AC9FF (0 kWh to 999 999,999 kWh)							
Cumulative power generation output reset setting	0xC6	Resets the cumulative power generation output by writing 0x00.	unsigned char	1 byte	—	Set			
		Reset = 0x00							
Measured instanta-neous gas consumption	0xC7	Indicates the instantaneous gas consumption in increments of 0,001 m^3.	unsigned short	2 bytes	0,001 m^3	Get			
		0x0 to 0xFFFD (0 m^3 to 65 533 m^3)							
Measured cumulative gas consumption	0xC8	Indicates the cumulative gas consumption in increments of 0,001 m^3.	unsigned long	4 bytes	0,001 m^3	Get			
		0x0 to 0x3B9AC9FF (0 m^3 to 999 999,999 m^3)							
Cumulative gas consumption reset setting	0xC9	Resets the cumulative gas power generation output by writing 0x00.	unsigned char	1 byte	—	Set			
		Reset = 0x00							
Power generation setting	0xCA	Indicates the ON/OFF status of power generation.	unsigned char	1 byte	—	Set			
		Power generation ON = 0x41, Power generation OFF = 0x42				Get	○		
Bath water reheating	0xE4	Reheating ON/OFF	unsigned char	1 byte	—	Set/ Get			
		Reheating ON = 0x41, Reheating OFF = 0x42							

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
System interconnection status	0xD0	Indicates system interconnection status	unsigned char	1 byte	–	Get			
		System-linked type (reverse power flow OK) = 0x00							
		Independent type = 0x01							
		System-linked type (reverse power flow NG) = 0x02							
"Temperature of supplied water" setting	0xD1	Indicates the temperature setting for the supplied water in °C.	unsigned char	1 byte	°C	Set/ Get			
		0x00 to 0x64 (0 °C to 100 °C)							
Bath water temperature setting	0xD3	Indicates the temperature setting for the bath water in °C.	unsigned char	1 byte	°C	Set/ Get			
		0x00 to 0x64 (0 °C to 100 °C)							
Heated bath water amount setting	0xE0	Indicates the setting for the amount of heated bath water in terms of percentage.	unsigned char	1 byte	%	Set/ Get			
		0x00 to 0x64 (0 % to 100 %)							
Measured remaining hot water amount	0xE1	Indicates the measured amount of the remaining hot water in l.	unsigned short	2 bytes	l	Get			
		0x0000 to 0xFFFD (0 l to 65 533 l)							
Tank capacity	0xE2	Indicates the tank capacity in l.	unsigned short	2 bytes	l	Get			
		0x0000 to 0xFFFD (0 l to 65 533 l)							
Automatic bath water heating mode setting	0xE3	Indicates the ON/OFF status of the automatic bath water heating mode.	unsigned char	1 byte	—	Set/Get			
		Automatic mode ON ＝0x41 , Automatic mode OFF ＝0x42							
Bath water addition function setting	0xE5	Addition function ON/OFF	unsigned char	1 byte	—	Set/Get			
		Addition function ON ＝0x41, Addition function OFF ＝0x42							

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Slight bath water tempera-ture lowering function setting	0xE6	"Slight bath water temperature lowering" function ON/OFF	unsigned char	1 byte	—	Set/Get			
		"Slight bath water temperature lowering" function ON = 0x41, "Slight bath water temperature lowering" function OFF = 0x42							
Bath water amount setting 2	0xE8	Indicates the amount of the bath water using an 8-level scale.	unsigned char	1 byte	—	Set/Get			
		0x31 to 0x38							
Bath water amount setting 3	0xEE	Indicates the amount of the bath water in l.	unsigned short	2 bytes	l	Set/Get			
		0x0000 to 0xFFFD (0 l to 65 533 liters)							
ON timer reservation setting	0x90	Reservation ON/OFF status	unsigned char	1 byte		Set/Get			
		Reservation ON = 0x41, Reservation OFF = 0x42							
ON timer setting	0x91	Time HH:MM	unsigned char x 2	2 bytes	—	Set/Get			
		0 to 0x17: 0 to 0x3B (=0 to 23): (=0 to 59)							

9.21.2 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).

9.21.3 Automatic setting of heated water temperature property

This property indicates the setting as to whether the heated water temperature is set automatically (by means of an automatic setting algorithm etc.). This property shall be set to 0x41 (AUTO) to enable automatic setting and 0x42 (Non-AUTO) to disable automatic setting.

9.21.4 Heating status property

This property indicates the status of the fuel cell with power generation ON: 0x41, and power generation OFF: 0x42.

9.21.5 Heated water temperature setting property

This property indicates the heated water temperature setting in degrees Celsius (°C). The property value range shall be from 0x00 to 0x64 (0 °C to 100 °C). When the target temperature setting specified by this property is indefinite because the "automatic setting of heated water temperature" property is set at AUTO, this property shall take the value 0xFD ("heated water temperature setting indefinite").

9.21.6 Measured temperature of water in water heater property

This property indicates present 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).

9.21.7 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.

9.21.8 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.

9.21.9 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.

9.21.10 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.

9.21.11 Cumulative power generation output reset setting property

This property resets the cumulative power generation output to zero by setting 0x00.

9.21.12 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.

9.21.13 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.

9.21.14 Cumulative gas consumption reset setting property

This property resets the cumulative gas consumption to zero by setting 0x00.

9.21.15 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.

9.21.16 Bath water reheating property

This property indicates whether bath water reheating is ON or OFF. The property value for bath water reheating ON is 0x41, and the property value for bath water reheating OFF is 0x42.

9.21.17 System interconnection status property

This property indicates system interconnection status. System-linked type (reverse power flow is OK mode) = 0x00, Independent type = 0x01, System-linked type (reverse power flow is NG mode) = 0x02.

9.21.18 Measured temperature of water in water heater property

This property indicates the current temperature of the water in the water heater in degrees Celsius (°C). The property value range is from 0x00 to 0x64 (from 0 °C to 100 °C).

9.21.19 "Temperature of supplied water" setting property

This property indicates the temperature setting for the water supplied from the household-use fuel cells to the water heating terminal equipment in degrees Celsius (°C). The property value range is from 0x00 to 0x64 (from 0 °C to 100 °C).

9.21.20 Bath water temperature setting property

This property indicates the temperature setting for the heated bath water in degrees Celsius (°C). The property value range is from 0x00 to 0x64 (from 0 °C to 100 °C).

9.21.21 Measured remaining hot water amount property

This property indicates the amount of the hot water remaining in the tank in litres. The property value range is from 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.

9.21.22 Tank capacity property

This property indicates the tank capacity in litres. The property value range is from 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.

9.21.23 "Automatic bath water heating mode" setting property

This property indicates the ON/OFF setting of the automatic bath water heating mode. The property value for automatic bath water heating mode ON is 0x41, and the property value for

automatic bath water heating mode OFF is 0x42. In the case where the "mobile services" are supported, the implementation of this property is mandatory.

9.21.24 "Bath water addition function" setting property

This property indicates the ON/OFF setting of the bath water addition function. The property value for bath water addition function ON is 0x41, and the property value for bath water addition function OFF is 0x42.

9.21.25 "Slight bath water temperature lowering" function setting property

This property indicates the ON/OFF setting of the slight bath water temperature lowering function. The property value for slight bath water temperature lowering function ON is 0x41, and the property value for slight bath water temperature lowering function OFF is 0x42. When the slight bath water temperature lowering function is ON, the bath water temperature shall be lowered by adding cold water to the bath water or by other means.

9.21.26 Bath water amount setting2 property

This property specifies the amount of the bath water using an 8-level scale. The property value for the lowest level shall be 0x31, and the property value for the highest level shall be 0x38. There is no requirement for the cubic or liter values for the individual levels.

9.21.27 Bath water amount setting3 property

This property indicates the setting for the amount of the bath water in litres. The property value range is from 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.

9.21.28 ON timer reservation setting property

This property indicates whether the automatic bath water heating mode reservation is ON or OFF. The property value for reservation ON is 0x41, and the property value for reservation OFF is 0x42. This property works in combination with the "ON timer setting" property.

9.21.29 ON timer setting property

When the "ON timer reservation setting" property is set at ON, this property indicates the time at which the automatic bath water heating mode setting (EPC = 0xE3) turns ON (0x41). The time is indicated in terms of the hour and minute (hour: 0x00 to 0x17 (0 to 23); minute: 0x00 to 0x3B (0 to 59)). The higher-order byte indicates the hour and the lower-order byte indicates the minute.

9.22 Storage battery class specifications

9.22.1 General

The control commands of "storage battery" are shown in Table 37.

Class group code   : 0x02
Class code   : 0x7D

Table 37 – List of storage battery properties

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Operation status	0x80	This property indicates the ON/OFF status.	unsigned char	1 byte	–	Set		○	
		ON = 0x30, OFF = 0x31				Get	○		
Minimum and maximum charge power	0xC8	This property indicates the minimum and maximum accumulator charge power in units of W.	Unsigned long ×2	8 bytes	W	Get			
		0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W)							
		Minimum charge power: Maximum charge power							
Minimum and maximum discharge power	0xC9	This property indicates the minimum and maximum discharge power from an accumulator in W respectively.	Unsigned long ×2	8 bytes	W	Get			
		0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W)							
		Minimum discharge power: Maximum discharge power							
Minimum and maximum charge currents	0xCA	This property indicates the minimum and maximum charge currents to an accumulator in 0,1 A respectively.	unsigned short ×2	4 bytes	0,1 A	Get			
		0x0000 to 0x7FFE (0 A to 3 276,6 A)							
		Minimum charge current: Maximum charge current							
Minimum and maximum discharge currents	0xCB	This property indicates the minimum and maximum discharge currents from an accumulator 0,1 A respectively.	unsigned short ×2	4 bytes	0,1 A	Get			
		0x0000 to 0x7FFE (0 A to 3 276,6 A)							
		Minimum discharge current: Maximum discharge current							
Rated electric energy	0xD0	This property indicates the rated electric energy of an accumulator in Wh.	unsigned long	4 bytes	Wh	Get			
		0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh)							

Property name	EPC	Contents of property / Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Rated capacity	0xD1	This property indicates the rated charge capacity of an accumulator in 0,1 Ah.	unsigned short	2 bytes	0,1 Ah	Get			
		0x0000 to 0xFFFD(0 Ah to 6 553,3 Ah)							
Rated voltage	0xD2	This property indicates the rated voltage of an accumulator in V.	unsigned short	2 bytes	V	Get			
		0x0000 to 0x7FFE (0 V to 32 766 V)							
Measured instantaneous charge-discharge power	0xD3	This property indicates instantaneous charge-discharge power in the units of ±W.	signed long	4 bytes	W	Get			
		0x00000001 to 0x3B9AC9FF (1 W to 999 999 999 W): At charge (positive value), 0xFFFFFFFF to 0xC4653601 (−1 W to −999 999 999 W): At discharge (negative value).							
Measured instantaneous charge-discharge current	0xD4	This property indicates instantaneous charge-discharge current in units of ±0,1 A.	signed short	2 bytes	0,1 A	Get			
		0x0001 to 0x7FFE (0,1 A to 3 276,6 A): At charge (positive value), 0xFFFF to 0x8001 (−0,1 A to −3 276,7 A): At discharge (negative value).							
Measured instantaneous charge-discharge voltage	0xD5	This property indicates Instantaneous charge-discharge voltage in ±V.	signed short	2 bytes	V	Get			
		0x0001 to 0x7FFE(1 V to 32 766 V): At charge (positive value), 0xFFFF to 0x8001 (−1 V to −32 767 V): At discharge (negative value).							
Measured integral discharge electric energy	0xD6	This property indicates integral discharge electric energy in 0,001 kWh.	unsigned long	4 bytes	0,001 kWh	Get			
		0x00000000 to 0x3B9AC9FF (0 kWh to 999 999,999 kWh)							

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Integral discharge electric energy reset setting	0xD7	Resets the integral discharge electric energy.	unsigned char	1 byte	–	Set			
		Reset = 0x00							
Measured integral charge electric energy	0xD8	This property indicates Integral charge electric energy in 0,001 kWh.	unsigned long	4 bytes	0,001 kWh	Get			
		0x00000000 to 0x3B9AC9FF (0 kWh to 999 999,999 kWh)							
Integral charge electric energy reset setting	0xD9	Resets the integral charge electric energy.	unsigned char	1 byte	-	Set			
		Reset = 0x00							
Operation mode setting	0xDA	Sets the operation mode to quick charge, charge, discharge, standby, test, full charge, full discharge, or other.	unsigned char	1 byte	-	Set/ Get	○	○	
		Quick charge = 0x41, Charge = 0x42, Discharge = 0x43, Standby = 0x44, Test = 0x45, Other = 0x40							
System interconnection status	0xDB	Indicates system interconnection status	unsigned char	1 byte	–	Get			
		System-linked type (reverse power flow OK) = 0x00							
		Independent type = 0x01							
		System-linked type (reverse power flow NG) = 0x02							
Accumulator level 1	0xE2	This property indicates the accumulator level in Wh.	unsigned long	4 bytes	Wh	Get	○ [a]		
		0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh)							
Accumulator level 2	0xE3	This property indicates the accumulator level in 0,1 Ah.	unsigned short	2 bytes	0,1 Ah	Get	○ [a]		
		0x0000 to 0xFFFD (0 Ah to 6 553,3 Ah)							
Accumulator level 3	0xE4	This property indicates the accumulator level in % (0 % to 100 %).	unsigned char	1 byte	%	Get	○ [a]		
Deterioration status	0xE5	This property indicates the accumulator deterioration status oration status (soundness) in % (0 % to 100 %).	unsigned char	1 byte	%	Get			

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Accumula tor type	0xE6	This property indicates the battery type.	unsigned char	1 byte		Get	O		
		Type = 0x00 to 0xFF							
Charge electric energy setting 1	0xE7	Specifies the electric energy at charge in Wh.	unsigned long	4 byte	Wh	Set/Get			b
		0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh)							
Discharge electric energy setting 1	0xE8	Specifies the electric energy at discharge in Wh.	unsigned long	4 bytes	Wh	Set/Get			c
		0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh)							
Charge electric energy setting 2	0xE9	Specifies the charge capacity in 0,1 Ah.	unsigned short	2 bytes	0,1 Ah	Set/Get			b
		0x0000 to 0xFFFD (0 Ah to 6 555,3 Ah)							
Discharge electric energy setting 2	0xEA	Specifies the discharge capacity in 0,1 Ah.	unsigned short	2 bytes	0,1 Ah	Set/Get			c
		0x0000 to 0xFFFD (0 Ah to 6 555,3 Ah)							
Charge electric energy setting	0xEB	Specifies the charge power in W.	unsigned long	4 bytes	W	Set/Get			
		0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W)							
Discharge power setting	0xEC	Specifies the discharge power in W.	unsigned long	4 bytes	W	Set/Get			
		0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W)							
Charge current setting	0xED	Specifies the charge current in 0,1 A.	unsigned short	2 bytes	0,1 A	Set/Get			
		0x0000 to 0xFFFD (0 A to 6 555,3 A)							
Discharge current setting	0xEE	Sets the discharge current in 0,1 A.	unsigned short	2 bytes	0,1 A	Set/Get			
		0x0000 to 0xFFFD (0 A to 6 555,3 A)							

a   Either accumulator level 1, accumulator level 2, or accumulator level 3 shall be implemented.

b   When "charge electric energy setting 1" (or 2) is used, "charge electric energy setting 2" (or 1) shall not be used.

c   When "discharge electric energy setting 1" (or 2) is used, "discharge electric energy setting 2" (or 1) shall not be used.

9.22.2   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 standard.

9.22.3 Minimum and maximum charge power property

This property indicates the maximum and minimum charge power in watts (W). Each value range shall be 0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W) and the property value shall be sequential from high-order byte in order of minimum and maximum. If the property value of actual equipment exceeds this property value range, 0xFFFFFFFF shall be used as the overflow code. The value shall be zero for no charge function.

9.22.4 Minimum and maximum discharge power property

This property indicates the minimum and maximum discharge power in watts (W). Each value range shall be 0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W) and the property value shall be sequential from high-order byte in order of minimum and maximum. If the property value of actual equipment exceeds this property value range, 0xFFFFFFFF shall be used as the overflow code. The value shall be zero for no discharge function.

9.22.5 Minimum and maximum charge currents property

This property indicates the minimum and maximum charge currents in 0,1 A. Each value range shall be 0x0000 to 0x7FFE (0 A to 3 276,6 A) and the property value shall be sequential from high-order byte in order of minimum and maximum If the property value of actual equipment exceeds this property value range, 0xFFFF shall be used as the overflow code. The value shall be zero for no charge function.

9.22.6 Minimum and maximum discharge currents property

This property indicates the minimum and maximum discharge currents in 0,1 A. Each value range shall be 0x0000 to 0x7FFE (0 A to 3 276,6 A), and the property value shall be sequential from high-order byte in order of minimum and maximum. If the property value of actual equipment exceeds this property value range, 0xFFFF shall be used as the overflow code. 0xFFFF shall be used as the overflow code. The value shall be zero for no discharge function.

9.22.7 Rated electric energy property

This property indicates the rated electric energy (catalog value) in watt hours (Wh). The property value range shall be 0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh).

9.22.8 Rated capacity property

This property indicates rated capacity (catalog value) in 0,1 Ah. The property value range shall be 0x0000 to 0xFFFD (0 Ah to 6 553,3 Ah).

9.22.9 Rated voltage property

This property indicates rated voltage (catalog value) in volts (V). The property value range shall be 0x0000 to 0x7FFE (0 V to 32 766 V).

9.22.10 Measured instantaneous charge-discharge power property

This property indicates the instantaneous power at charge or discharge in watts (W). The property value range shall be 0x00000001 to 0x3B9AC9FF (1 W to 999 999 999 W) at charge and 0xFFFFFFFF to 0xC4653601 (−1 W to −999 999 999 W) at discharge If the property value of the actual device exceeds this property value range, 0x7FFFFFFF shall be used as the overflow code. When the said value falls under the value range, 0x80000000 shall be used as the underflow code. The value shall be zero at no charge or discharge.

9.22.11 Measured instantaneous charge-discharge current property

This property indicates the instantaneous charge-discharge current in 0,1 A. The property value range shall be 0x0001 to 0x7FFE (0,1 A to 3 276,6 A) at charge and 0xFFFF to 0x8001(−0,1 A to −3 276,7 A) at discharge. If the property value of the actual device exceeds this property value range, 0x7FFF shall be used as the overflow code. When the said value falls under the value range, 0x8000 shall be used as the underflow code. The value shall be zero at no charge or discharge.

9.22.12 Measured instantaneous charge-discharge voltage

This property indicates the instantaneous charge-discharge voltage in volts (V). The property value range shall be 0x0001 to 0x7FFE (1 V to 32 766 V) at charge and 0xFFFF to 0x8001 (−1 V to −32 767 V) at discharge. If the property value of the actual device exceeds this property value range, 0x7FFF shall be used as the overflow code. When the said value falls under the value range, 0x8000 shall be used as the underflow code. The value shall be zero at no charge or discharge.

9.22.13 Measured integral discharge electric energy property

This property indicates the integral electric energy at discharge in 0,001 kWh. The property value range shall be 0x00000000 to 0x3B9AC9FF (0 kWh to 999 999,999 kWh). If the integral electric energy overflows, the value shall increment again from 0x00000000.

9.22.14 Integral discharge electric energy reset setting property

This property sets 0x00 to reset the measured integral discharge electric energy to zero.

9.22.15 Measured integral charge electric energy property

This property indicates the integral electric energy at charge in 0,001 kWh. The property value range shall be 0x00000000 to 0x3B9AC9FF (0 kWh to 999 999,999 kWh). If the integral electric energy overflows, the value shall increment again from 0x00000000.

9.22.16 Integral charge electric energy reset setting property

This property sets 0x00 to reset the measured integral discharge electric energy to zero.

9.22.17 Operation mode setting property

This property indicates quick charge (0x41), charge (0x42), discharge (0x43), standby (0x44), test (0x45) and other (0x40) as operation mode.

9.22.18 System interconnection status property

This property indicates system interconnection status. System-linked type (reverse power flow is OK mode) = 0x00, independent type = 0x01, system-linked type (reverse power flow is NG mode) = 0x02.

9.22.19 Accumulator level 1 property

This property indicates the remaining power (electric energy) at rated-current discharge in watt hours (Wh). The property value range shall be 0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh).

9.22.20 Accumulator level 2 property

This property indicates the remaining power at rated-current discharge in 0,1 Ah. The property value range shall be 0x0000 to 0xFFFD (0 Ah to 6 553,3 Ah).

9.22.21 Accumulator level 3 property

This property indicates the battery charge rate in %. The property value range shall be 0x00 to 0x64 (0 to 100). (Accumulator level) / (Full charge capacity) × 100.

9.22.22 Deterioration status property

This property indicates the deterioration status (soundness) in %. The property value range shall be 0x00 to 0x64(0 to 100).

Example: (Full charge capacity after deterioration) / (Initial full charge capacity) × 100.

9.22.23 Accumulator type property

This property indicates: unknown (0x00), lead (0x01), nickel-metal hydride (0x02), nickel-cadmium (0x03), lithium (0x04), zinc (0x05), or rechargeable alkali (0x06) as accumulator type. Reserved for future use (0x07 to 0xFF).

9.22.24 Charge electric energy setting 1 property

This property specifies the charge power in watt hours (Wh). The property value range shall be 0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh). The value shall be zero at no charge.

9.22.25 Discharge electric energy setting 1 property

This property specifies the discharge power in watt hours (Wh). The property value range shall be 0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh). The value shall be zero at no discharge.

9.22.26 Charge electric energy setting 2 property

This property specifies the charge capacity in 0,1 Ah. The property value range shall be 0x0000 to 0xFFFD (0 Ah to 6 553,3 Ah). The value shall be zero at no charge.

9.22.27 Discharge electric energy setting 2 property

This property specifies the discharge capacity in 0,1 Ah. The property value range shall be 0x0000 to 0xFFFD (0 Ah to 6 553,3 Ah). The value shall be zero at no discharge.

9.22.28 Charge power setting property

This property specifies the charge power in watts (W). The property value range shall be 0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W). The value shall be zero at no charge.

9.22.29 Discharge power setting property

This property specifies the discharge power in watts (W). The property value range shall be 0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W). The value shall be zero at no discharge.

9.22.30 Charge current setting property

This property specifies the charge current in 0,1 A. The property value range shall be 0x0000 to 0xFFFD (0 A to 6 553,3 A). The value shall be zero at no charge.

9.22.31 Discharge current setting property

This property specifies the charge current in 0,1 A. The property value range shall be 0x0000 to 0xFFFD (0 A to 6 553,3 A). The value shall be zero at no discharge.

9.23 Electric vehicle charge-discharge system class specifications

9.23.1 General

The control commands of "electric vehicle charge-discharge system" are shown in Table 38.

Class group code : 0x02
Class code : 0x7E

Table 38 – 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	This property indicates the ON/OFF status.	unsigned char	1 byte	-	Set		○	
		ON = 0x30 , OFF = 0x31				Get	○		
V2H available capacity 1	0xC0	This property indicates the V2H available capacity of a vehicle-mounted battery in Wh.	unsigned long	4 bytes	Wh	Get	○ [a]		
		0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh)							
V2H available capacity 2	0xC1	This property indicates the V2H available capacity of a vehicle-mounted battery in 0,1 Ah.	unsigned short	2 bytes	0,1 Ah	Get	○ [a]		
		0x0000 to 0xFFFD (0 Ah to 6 553,3 Ah)							
V2H available remaining capacity 1	0xC2	This property indicates the V2H available remaining capacity of a vehicle-mounted battery in Wh.	unsigned long	4 bytes	Wh	Get	○ [b]		
		0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh)							
V2H available remaining capacity 2	0xC3	This property indicates the V2H available remaining capacity of a vehicle-mounted battery in 0,1 Ah.	unsigned short	2 bytes	0,1 Ah	Get	○ [b]		
		0x0000 to 0xFFFD (0 Ah to 6 553,3 Ah)							
V2H available remaining capacity 3	0xC4	This property indicates the V2H available remaining capacity of a vehicle-mounted battery in %.	unsigned char	1 byte	%	Get	○ [b]		
		0x00 to 0x64 (0 % to 100 %)							
Rated charge-ability	0xC5	This property indicates the rated chargeability in W.	unsigned long	4 bytes	W	Get	○		
		0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W)							

Property name	EPC	Contents of property / Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Rated discharge-ability	0xC6	This property indicates the rated dischargeability in W.	unsigned long	4 bytes	W	Get	○		
		0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W)							
Charge-able/ Discharge-able	0xC7	This property indicates whether charge or discharge by the electric vehicle charge-discharge system is possible.	unsigned char	1 byte	–	Get	○	○	
		Not chargeable Not dischargeable = 0x40							
		Chargeable Not dischargeable = 0x41							
		Not chargeable Dischargeable = 0x42							
		Chargeable Dischargeable = 0x43							
Minimum and maximum charge power	0xC8	This property indicates respectively the minimum and maximum charge power of the vehicle charge-discharge system in W.	unsigned long ×2	8 bytes	W	Get			
		0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W)							
		Minimum charge power: Maximum charge power							
Minimum and maximum discharge power	0xC9	This property indicates respectively the minimum and maximum discharge power of the electric vehicle charge-discharge system in W.	unsigned long ×2	8 bytes	W	Get			
		0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W)							
		Minimum discharge power: Maximum discharge power							
Minimum and maximum charge currents	0xCA	This property indicates to the electric vehicle charge-discharge system the minimum and maximum charge currents, respectively, in 0,1 A.	unsigned short ×2	4 bytes	0,1 A	Get			
		0x0000 to 0x7FFE (0 A to 3 276,6 A)							
		Minimum charge current: Maximum charge current							

Property name	EPC	Contents of property / Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Minimum and maximum discharge currents	0xCB	This property indicates respectively the minimum and maximum discharge currents of the electric vehicle charge-discharge system, in 0,1 A.	unsigned short ×2	4 bytes	0,1 A	Get			
		0x0000 to 0x7FFE (0 A to 3 276,6 A) Minimum discharge current: Maximum discharge current							
Used capacity 1	0xD0	This property indicates the capacity of a vehicle-mounted battery in Wh.	unsigned long	4 bytes	Wh	Get	○ [c]		
		0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh)							
Used capacity 2	0xD1	This property indicates the capacity of a vehicle-mounted battery in 0,1 Ah.	unsigned short	2 bytes	0,1 Ah	Get	○ [c]		
		0x0000 to 0xFFFD (0 Ah to 6 553,3 Ah)							
Rated voltage	0xD2	This property indicates the rated voltage of a vehicle-mounted battery in V.	unsigned short	2 bytes	V	Get			
		0x0000 to 0x7FFE (0 V to 32 766 V)							
Measured instant-aneous charge-discharge power	0xD3	This property indicates instantaneous charge-discharge power in ±W.	signed long	4 bytes	W	Get			
		0x00000001 to 0x3B9AC9FF (1 W to 999 999 999 W): At charge (positive value), 0xFFFFFFFF to 0xC4653601 (−1 W to −999 999 999 W): At discharge (negative value).							

Property name	EPC	Contents of property / Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Measured instant-aneous charge-discharge current	0xD4	This property indicates the instantaneous charge-discharge current in 0,1 A.	signed short	2 bytes	0,1 A	Get			
		0x0001 to 0x7FFE (0,1 A to 3 276,6 A): At charge (positive value), 0xFFFF to 0x8001 (−0,1 A to −3 276,7 A): At discharge (negative value).							
Measured instant-aneous charge-discharge voltage	0xD5	This property indicates instantaneous charge-discharge voltage in ±V.	signed short	2 bytes	V	Get			
		0x0001 to 0x7FFE (1 V to 32 766 V): At charge (positive value), 0xFFFF to 0x8001 (−1 V to −32 767 V): At discharge (negative value).							
Measured integral discharge electric energy	0xD6	This property indicates integral discharge electric energy in 0,001 kWh.	unsigned long	4 bytes	0,001 kWh	Get			
		0x00000000 to 0x3B9AC9FF (0 kWh to 999 999,999 kWh							
Integral discharge electric energy reset setting	0xD7	Resets the integral discharge electric energy.	unsigned char	1 byte	-	Set/ Get			
		Reset = 0x00							
Measured integral charge electric energy	0xD8	This property indicates integral charge electric energy in 0,001 kWh.	unsigned long	4 bytes	0,001 kWh	Get			
		0x00000000 to 0x3B9AC9FF (0 kWh to 999 999,999 kWh							
Integral charge electric energy Reset setting	0xD9	Resets the integral charge electric energy.	unsigned char	1 byte	-	Set/ Get			
		Reset = 0x00							
Operation mode setting	0xDA	Specifies operation mode (quick charge, charge, discharge, standby, test, full charge, or full discharge).	unsigned char	1 byte	–	Set /Get	○	○	
		Quick charge = 0x41, Charge = 0x42, Discharge = 0x43, Standby = 0x44, Test = 0x45, Other = 0x40							

| Property name | EPC | Contents of property | Data type | Data size | Unit | Access rule | Mandatory | Announcement at status change | Remark |
		Value range (decimal notation)							
System interconnection status	0xDB	Indicates the system interconnection status.	unsigned char	1 byte	–	Get			
		System-linked type (reverse power flow OK) = 0x00 Independent type = 0x01 System-linked type (reverse power flow NG) = 0x02							
Battery level 1	0xE2	This property indicates the battery level of a vehicle-mounted battery in Wh.	unsigned long	4 bytes	Wh	Get	○ d		
		0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh)							
Battery level 2	0xE3	This property indicates the battery level of a vehicle-mounted battery in 0,1 Ah.	unsigned short	2 bytes	0,1 Ah	Get	○ d		
		0x0000 to 0xFFFD (0 Ah to 6 553,3 Ah)							
Battery level 3	0xE4	This property indicates the battery level of a vehicle-mounted battery in %.	unsigned char	1 byte	%	Get	○ d		
		0x00 to 0x64 (0 % to 100 %)							
Deterioration status	0xE5	This property indicates the deterioration status (soundness) of a vehicle-mounted battery in %.	unsigned char	1 byte	%	Get			
		0x00 to 0x64 (0 % to 100 %)							
Charge electric energy setting 1	0xE7	Specifies the charge electric energy in Wh.	unsigned long	4 bytes	Wh	Set/ Get			e
		0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh)							
Discharge electric energy setting 1	0xE8	Specifies the discharge electric energy in Wh.	unsigned long	4 bytes	Wh	Set/ Get			f
		0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh)							
Charge electric energy setting 2	0xE9	Specifies the charge capacity in 0,1 Ah.	unsigned short	2 bytes	0,1 Ah	Set/ Get			e
		0x0000 to 0xFFFD (0 Ah to 6 553,3 Ah)							
Discharge electric energy setting 2	0xEA	Specifies the discharge capacity in 0,1 Ah.	unsigned short	2 bytes	0,1 Ah	Set/ Get			f
		0x0000 to 0xFFFD (0 Ah to 6 553,3 Ah)							

Property name	EPC	Contents of property / Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Charge electric energy setting	0xEB	Specifies the charge electric energy in W.	unsigned long	4 bytes	W	Set/ Get			
		0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W)							
Discharge power setting	0xEC	Specifies the discharge power in W.	unsigned long	4 bytes	W	Set/ Get			
		0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W)							
Charge current setting	0xED	Specifies the charge current in 0,1 A.	unsigned short	2 bytes	0,1 A	Set/ Get			
		0x0000 to 0xFFFD (0 A to 6 555,3 A)							
Discharge current setting	0xEE	Specifies the discharge current in 0,1 A.	unsigned short	2 bytes	0,1 A	Set/ Get			
		0x0000 to 0xFFFD (0 A to 6 555,3 A)							

[a] V2H available capacity 1 or V2H available capacity 2 shall be implemented.

[b] V2H available remaining capacity 1, V2H available remaining capacity 2, or V2H available remaining capacity 3 shall be implemented.

[c] Used capacity 1 or used capacity 2 shall be implemented.

[d] Battery level 1, battery level 2, or battery level 3 shall be implemented.

[e] When charge electric energy setting 1 (or 2) is used, charge electric energy setting 2 (or 1) shall not be used.

[f] When discharge electric energy setting 1 (or 2) is used, discharge electric energy setting 2 (or 1) shall not be used.

The electric vehicle charge-discharge system consists of EVPS (Electric Vehicle Power System) and electric vehicle. Since the vehicle connected to EVPS can be changed, the property values of the system differ depending on the electric vehicle connected to EVPS. When the operation status changes from OFF to ON, the connected electric vehicle may be different. Therefore, it is preferable to acquire property values again about specifications determined by the electric vehicle and EVPS.

Example: used capacity 1, used capacity 2, V2H available capacity 1, V2H available capacity 2, rated chargeability, rated dischargeability, minimum and maximum charge power, minimum and maximum discharge power, minimum and maximum charge currents, and minimum and maximum discharge currents.

9.23.2 Operation status property

This property indicates the operation status of the electric vehicle charge-discharge system. When an electric vehicle is connected and operation mode setting can be acquired, the status is ON. Otherwise, the status is OFF. When the property value is OFF (0x31), values specified and acquired with other properties are not guaranteed, unless otherwise specified in this standard.

9.23.3 V2H available capacity 1 property

This property indicates the battery level of an electric vehicle available from Vehicle to Home (V2H) in watthours. The property value range shall be 0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh).

9.23.4   V2H available capacity 2 property

This property indicates the battery level of an electric vehicle available from Vehicle to Home (V2H) in 0,1 Ah The property value range shall be 0x0000 to 0xFFFD (0 Ah to 6 553,3 Ah).

9.23.5   V2H available remaining capacity 1 property

This property indicates the battery level of an electric vehicle available from V2H in watthours (Wh). The property value range shall be 0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh).

9.23.6   V2H available remaining capacity 2 property

This property indicates the battery level of an electric vehicle available from V2H in 0,1 Ah. The property value range shall be 0x0000 to 0xFFFD (0 Ah to 6 553,3 Ah).

9.23.7   V2H available remaining capacity 3 property

This property indicates the battery level of an electric vehicle available from V2H in percent (%). The property value range shall be 0x00 to 0x64 (0 % to 100 %).

9.23.8   Rated chargeability property

This property indicates the rated chargeability of Electric Vehicle Power System (EVPS) in watts (W). The property value range shall be 0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W). The value shall be 0 W for no charge function.

9.23.9   Rated dischargeability property

This property indicates the rated dischargeability of Electric Vehicle Power System (EVPS) in watts. The property value range shall be 0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W). The value shall be 0 W for no discharge function.

9.23.10   Chargeable/Dischargeable property

This property indicates whether charging is possible at the electric vehicle charge-discharge system. The parameter value is 0x40 for not chargeable and not dischargeable, 0x41 for chargeable and not dischargeable, 0x42 for not chargeable and dischargeable, and 0x43 for chargeable and dischargeable.

9.23.11   Minimum and maximum charge power property

This property indicates the minimum and maximum charge power (EVPS home side) in watts. Each value range shall be 0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W) and the property value shall be sequential from high-order byte in order of minimum and maximum. If the property value of the actual device exceeds this property value range, 0xFFFFFFFF shall be used as the overflow code. The value shall be 0 for no charge function.

9.23.12   Minimum and maximum discharge power property

This property indicates the minimum and maximum discharge power (EVPS home side) in watts. Each value range shall be 0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W) and the property value shall be sequential from high-order byte in order of minimum and maximum. If the property value of the actual device exceeds this property value range, 0xFFFFFFFF shall be used as the overflow code. The value shall be 0 for no discharge function.

9.23.13   Minimum and maximum charge currents property

This property indicates the minimum and maximum charge currents (EVPS home side) in 0,1 A. Each value range shall be 0x0000 to 0x7FFE (0 A to 3 276,6 A) and the property value shall be sequential from high-order byte in order of minimum and maximum. If the property value of the

actual device exceeds this property value range, 0xFFFF shall be used as the overflow code. The value shall be 0 for no charge function.

9.23.14 Minimum and maximum discharge currents property

This property indicates the minimum and maximum discharge currents (EVPS home side) in 0,1 A. Each value range shall be 0x0000 to 0x7FFE (0 A to 3 276,6 A) and the property value shall be sequential from high-order byte in order of minimum and maximum. If the property value of the actual device exceeds this property value range, 0xFFFF shall be used as the overflow code. The value shall be 0 for no discharge function.

9.23.15 Used capacity 1 property

This property indicates the capacity of a battery mounted on an electric vehicle in watt hours (Wh). The property value range shall be 0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh).

9.23.16 Used capacity 2 property

This property indicates the capacity of a battery mounted on an electric vehicle in 0,1 Ah. The property value range shall be 0x0000 to 0xFFFD (0 Ah to 6 553,3 Ah).

9.23.17 Rated voltage property

This property indicates the rated voltage of a battery mounted on an electric vehicle in volts. The property value range shall be 0x0000 to 0x7FFE (0 V to 32 766 V).

9.23.18 Measured instantaneous charge-discharge power property

This property indicates the instantaneous power at charge or discharge in watts. The property value range shall be 0x00000001 to 0x3B9AC9FF (1 W to 999 999 999 W) at charge and 0xFFFFFFFF to 0xC4653601(-1 W to -999 999 999 W) at discharge. If the property value of the actual device exceeds this property value range, 0x7FFFFFFF shall be used as the overflow code. When the said value falls under the value range, 0x80000000 shall be used as the underflow code. The value shall be zero at no charge or discharge.

9.23.19 Measured instantaneous charge-discharge current property

This property indicates the instantaneous power at charge or discharge in 0,1 A. The property value range shall be 0x0001 to 0x7FFE (0,1 A to 3 276,6 A) at charge and 0xFFFF to 0x8001(-0,1 A to -3 276,7 A) at discharge. If the property value of the actual device exceeds this property value range, 0x7FFF shall be used as the overflow code. When the said value falls under the value range, 0x8000 shall be used as the underflow code The value shall be zero at no charge or discharge.

9.23.20 Measured instantaneous charge-discharge voltage property

This property indicates the instantaneous power at charge or discharge in volts. The property value range shall be 0x0001 to 0x7FFE (1 V to 32 766 V) at charge and 0xFFFF to 0x8001 (-1 V to -32 767 V) at discharge. If the property value of the actual device exceeds this property value range, 0x7FFF shall be used as the overflow code. When the said value falls under the value range, 0x8000 shall be used as the underflow code. The value shall be zero at no charge or discharge.

9.23.21 Measured integral discharge electric energy property

This property indicates the integral electric energy at discharge in 0,001 kWh. The property value range shall be 0x00000000 to 0x3B9AC9FF (0 kWh to 999 999,999 kWh). If the integral electric energy overflows, the value shall increment again from 0x00000000.

9.23.22 Integral discharge electric energy reset setting property

This property sets 0x00 to reset the measured integral discharge electric energy to zero.

9.23.23 Measured integral charge electric energy property

This property indicates the integral electric energy at charge in 0,001 kWh. The property value range shall be 0x00000000 to 0x3B9AC9FF (0 kWh to 999 999,999 kWh). If the integral electric energy overflows, the value shall increment again from 0x00000000.

9.23.24 Integral charge electric energy reset setting property

This property sets 0x00 to reset the measured integral discharge electric energy to zero.

9.23.25 Operation mode setting property

This property indicates quick charge (0x41), charge (0x42), discharge (0x43), standby (0x44), test (0x45) and other (0x40) as operation mode.

9.23.26 System interconnection status property

This property indicates the system interconnection status. System-linked type (reverse power flow is OK mode) = 0x00, independent type = 0x01, system-linked type (reverse power flow is NG mode) = 0x02.

9.23.27 Battery level 1 property

This property indicates the battery level of an electric vehicle in watt hours (Wh). The property value range shall be 0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh).

9.23.28 Battery level 2 property

This property indicates the battery level of an electric vehicle in 0,1Ah. The property value range shall be 0x0000 to 0xFFFD (0 Ah to 6 553,3 Ah).

9.23.29 Battery level 3 property

This property indicates the battery level (SOC, State of Charge) of an electric vehicle in percent. The property value range shall be 0x00 to 0x64 (0 % to 100 %).

9.23.30 Deterioration status property

This property indicates the deterioration status (soundness) of a vehicle-mounted battery in percent. The property value range shall be 0x00 to 0x64 (0 % to 100 %).

Example: (Full charge capacity after deterioration) / (Initial full charge capacity) $\times$ 100.

9.23.31 Charge electric energy setting 1 property

This property specifies the electric energy at charge in watthours (Wh). The property value range shall be 0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh). The value shall be zero at no charge.

9.23.32 Discharge electric energy setting 1 property

This property specifies the electric energy at discharge in watthours (Wh). The property value range shall be 0x00000000 to 0x3B9AC9FF (0 Wh to 999 999 999 Wh). The value shall be zero at no discharge.

9.23.33 Charge electric energy setting 2 property

This property specifies the charge capacity in 0,1 Ah. The property value range shall be 0x0000 to 0xFFFD (0 Ah to 6 553,3 Ah). The value shall be zero at no charge.

9.23.34 Discharge electric energy setting 2 property

This property specifies the discharge capacity in 0,1 Ah. The property value range shall be 0x0000 to 0xFFFD (0 Ah to 6 553,3 Ah). The value shall be zero at no discharge.

9.23.35 Charge electric energy setting property

This property specifies the unit of power at charge in watts (W). The property value range shall be 0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W). The value shall be zero at no charge.

9.23.36 Discharge power setting property

This property specifies the power at discharge in watts (W). The property value range shall be 0x00000000 to 0x3B9AC9FF (0 W to 999 999 999 W). The value shall be zero at no discharge.

9.23.37 Charge current setting property

This property specifies the current at charge in 0,1 A. The property value range shall be 0x0000 to 0xFFFD (0 A to 6 553,3 A). The value shall be zero at no charge.

9.23.38 Discharge current setting property

This property specifies the current at discharge in 0,1 A. The property value range shall be 0x0000 to 0xFFFD (0 A to 6 553,3 A). The value shall be zero at no discharge.

9.24 Water flow meter class specifications

9.24.1 General

The control commands of "water flow meter" are shown in Table 39.

Class group code   : 0x02
Class code   : 0x81

Table 39 – List of water flow meter properties

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announce- ment at status change	Remark
		Value range (decimal notation)							
Operation status	0x80	Indicates the ON/OFF status.	unsigned char	1 byte	—	Set		○	
		ON = 0x30 , OFF = 0x31				Get	○		
Flowing water classifica- tion	0xD0	Indicates the water flow meter type.	unsigned char	1 byte	—	Get Set			
		0x30: running water							
		0x31: recycled water							
		0x32: warm water							
		0x33: other water							

Property name	EPC	Contents of property / Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announce-ment at status change	Remark
Owner classifica-tion	0xD1	Indicates the owner of the meter in the form of owner classification.	unsigned char	1 byte	—	Get Set			
		0x30: not specified							
		0x31: public waterworks company							
		0x32: private sector company							
		0x33: individual							
Measured cumula-tive amount of flowing water	0xE0	Indicates the cumulative amount (consumption) of flowing water using a 9-digit number.	unsigned long	4 bytes	m^3	Get	○		
		0 to 0x3B9AC9FF (0 to 999 999 999)							
Unit for measured cumula-tive 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.	unsigned char	1 byte	—	Get	○		
		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							
Historical data of measured cumula-tive 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.	unsigned long ×48	192 bytes	0,001 m^3	Get			
		0x0 to 0x3B9AC9FF (0 m^3 to 999 999,999 m^3)							
Detection of abnormal value in metering data	0xE3	Indicates whether the meter has detected an abnormal value in the metering data.	unsigned char	1 byte	—	Get		○	
		Abnormal value detected: 0x41							
		No abnormal value detected: 0x42							

Property name	EPC	Contents of property / Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announce-ment at status change	Remark
Security data informa-tion	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.	unsigned long	4 bytes	—	Get			
		0 to 0xFFFFFFFD							
ID number setting	0xE5	Indicates the ID number of the meter.	unsigned char	6 bytes		Get Set			
		The ID number is specified using ASCII code.							
		(Initial value: "000000")							
Verifica-tion expiration informa-tion	0xE6	Indicates the month and year in which the verification of the meter expires.	unsigned char	6 bytes		Get Set			
		The month and year are specified using ASCII code.							
		xxxx xx							
		Year Month							

9.24.2 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).

9.24.3 Water flow meter classification property

This property indicates the type of the flowing water being metered in the form of meter classification.

9.24.4 Owner classification property

This property indicates the owner of the water flow meter in the form of owner classification.

9.24.5 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:

$$123456789 \times 0,000\ 1\ m^3 = 12\ 345,678\ 9\ m^3 \text{(actual measured cumulative amount)}$$

9.24.6 Unit for measured cumulative amounts of flowing water property

This property indicates the unit for measured cumulative amounts of flowing water.

Property value   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	$0,000\ 001\ m^3$

9.24.7 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.

9.24.8 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.

9.24.9 Security data information property

This property 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.

9.24.10 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.

9.24.11 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.

9.25 Power distribution board metering class specifications

9.25.1 General

The control commands of "distribution board metering" are shown in Table 40.

Class group code : 0x02
Class code : 0x87

Table 40 – 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.	unsigned char	1 byte	—	Set		O	
		ON = 0x30 , OFF = 0x31				Get	O		
Measured cumulative amount of electric energy (normal direction)	0xC0	Indicates the measured cumulative amount of electric energy using an 8-digit decimal notation number.	unsigned long	4 bytes	kWh	Get	O		
		0x00000000 to 0x05F5E0FF (0 to 99 999 999)							
Measured cumulative amount of electric energy (reverse direction)	0xC1	Indicates the measured cumulative amount of electric energy using an 8-digit decimal notation number.	unsigned long	4 bytes	kWh	Get	O		
		0x00000000 to 0x05F5E0FF (0 to 99 999 999)							
Unit for cumulative amounts of electric energy	0xC2	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.	unsigned char	1 byte	—	Get	O		

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
		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 0x0C: 1 000 kWh 0x0D: 10 000 kWh							
Historical data of measured cumula-tive amounts of electric energy (normal direction)	0xC3	Indicates the day for which the historical data of measured cumulative amounts of electric energy are to be retrieved and the historical data of measured cumulative amounts of electric energy (8 digits), which consist of 48 pieces of half-hourly data for the preceding 24 h.	unsigned short + unsigned long ×48	194 bytes	kWh	Get			
		0x0000 to 0x0063: 0x00000000 to 0x05F5E0FF (0 to 99): (0 to 99 999 999)							
Historical data of measured cumula-tive amounts of electric energy (reverse direction)	0xC4	Indicates the day for which the historical data of measured cumulative amounts of electric energy are to be retrieved and the historical data of measured cumulative amounts of electric energy (8 digits), which consist of 48 pieces of half-hourly data for the preceding 24 h.	unsigned short + unsigned long ×48	194 bytes	kWh	Get			

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
		0x0000 to 0x0063: 0x00000000 to 0x05F5E0FF (0 to 99): (0 to 99 999 999)							
Day for which the historical data of measured cumula-tive amounts of electric energy are to be retrieved	0xC5	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) are to be retrieved.	unsigned char	1 byte		Set/ Get			
		0x00 to 0x63 (0 to 99) 0: current day 1 to 99: previous day – day that precedes the current day by 99 d							
Measured instanta-neous amount of electric energy	0xC6	Indicates the measured effective instantaneous amount of electric energy in watts.	signed long	4 bytes	W	Get			
		0x80000001 to 0x7FFFFFFD (−2 147 483 647 to 2 147 483 645)							
Measured instanta-neous currents	0xC7	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	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
		0x8001 to 0x7FFD (R phase): 0x8001 to 0x7FFD (T phase) (−3 276,7 to 3 276,5): (−3 276,7 to 3 276,5)							
Measured instanta-neous voltages	0xC8	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.	unsigned short ×2	4 bytes	0,1 V	Get			
		0x0000 to 0xFFFD (between R and S(N)): 0x0000 to 0xFFFD (between S(N) and T) (0 to 6 553,3): (0 to 6 553,3)							

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Measure-ment channel 1	0xD0	Indicates the measurement data for measurement channel 1 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			
		Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7							
Measure-ment channel 2	0xD1	Indicates the measurement data for measurement channel 2 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			
		Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7							
Measure-ment channel 3	0xD2	Indicates the measurement data for measurement channel 3 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
		Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7							
Measure-ment channel 4	0xD3	Indicates the measurement data for measurement channel 4 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			
		Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7							
Measure-ment channel 5	0xD4	Indicates the measurement data for measurement channel 5 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			
		Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7							

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Measure-ment channel 6	0xD5	Indicates the measurement data for measurement channel 6 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			
		Data format for the electric energy: same as 0xC0							
		Unit: same as 0xC2							
		Data format for the currents: same as 0xC7							
Measure-ment channel 7	0xD6	Indicates the measurement data for measurement channel 7 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			
		Data format for the electric energy: same as 0xC0							
		Unit: same as 0xC2							
		Data format for the currents: same as 0xC7							
Measure-ment channel 8	0xD7	Indicates the measurement data for measurement channel 8 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
		Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7							
Measure-ment channel 9	0xD8	Indicates the measurement data for measurement channel 9 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			
		Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7							
Measure-ment channel 10	0xD9	Indicates the measurement data for measurement channel 10 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + unsigned short ×2	8 bytes	kWh + 0,1 A ×2	Get			
		Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7							

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Measure-ment channel 11	0xDA	Indicates the measurement data for measurement channel 11 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			
		Data format for the electric energy: same as 0xC0							
		Unit: same as 0xC2							
		Data format for the currents: same as 0xC7							
Measure-ment channel 12	0xDB	Indicates the measurement data for measurement channel 12 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			
		Data format for the electric energy: same as 0xC0							
		Unit: same as 0xC2							
		Data format for the currents: same as 0xC7							
Measure-ment channel 13	0xDC	Indicates the measurement data for measurement channel 13 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
		Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7							
Measure-ment channel 14	0xDD	Indicates the measurement data for measurement channel 14 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			
		Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7							
Measure-ment channel 15	0xDE	Indicates the measurement data for measurement channel 15 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			
		Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7							

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Measure-ment channel 16	0xDF	Indicates the measurement data for measurement channel 16 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			
		Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7							
Measure-ment channel 17	0xE0	Indicates the measurement data for measurement channel 17 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			
		Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7							
Measure-ment channel 18	0xE1	Indicates the measurement data for measurement channel 18 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
		Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7							
Measurement channel 19	0xE2	Indicates the measurement data for measurement channel 19 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			
		Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7							

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Measurement channel 20	0xE3	Indicates the measurement data for measurement channel 20 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			
		Data format for the electric energy: same as 0xC0							
		Unit: same as 0xC2							
		Data format for the currents: same as 0xC7							
Measure-ment channel 21	0xE4	Indicates the measurement data for measurement channel 21 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			
		Data format for the electric energy: same as 0xC0							
		Unit: same as 0xC2							
		Data format for the currents: same as 0xC7							
Measure-ment channel 22	0xE5	Indicates the measurement data for measurement channel 22 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
		Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7							
Measure-ment channel 23	0xE6	Indicates the measurement data for measurement channel 23 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			
		Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7							
Measure-ment channel 24	0xE7	Indicates the measurement data for measurement channel 24 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			
		Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7							

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Measure-ment channel 25	0xE8	Indicates the measurement data for measurement channel 25 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			
		Data format for the electric energy: same as 0xC0							
		Unit: same as 0xC2							
		Data format for the currents: same as 0xC7							
Measure-ment channel 26	0xE9	Indicates the measurement data for measurement channel 26 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			
		Data format for the electric energy: same as 0xC0							
		Unit: same as 0xC2							
		Data format for the currents: same as 0xC7							
Measure-ment channel 27	0xEA	Indicates the measurement data for measurement channel 27 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
		Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7							
Measure-ment channel 28	0xEB	Indicates the measurement data for measurement channel 28 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			
		Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7							

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	Indicates the measurement data for measurement channel 29 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			
		Data format for the electric energy: same as 0xC0							
		Unit: same as 0xC2							
		Data format for the currents: same as 0xC7							
Measure-ment channel 30	0xED	Indicates the measurement data for measurement channel 30 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			
		Data format for the electric energy: same as 0xC0							
		Unit: same as 0xC2							
		Data format for the currents: same as 0xC7							
Measure-ment channel 31	0xEE	Indicates the measurement data for measurement channel 31 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
		Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7							
Measurement channel 32	0xEF	Indicates the measurement data for measurement channel 32 (cumulative amount of electric energy (kWh) and effective instantaneous R and T phase currents (amperes)).	unsigned long + signed short ×2	8 bytes	kWh + 0,1 A ×2	Get			
		Data format for the electric energy: same as 0xC0 Unit: same as 0xC2 Data format for the currents: same as 0xC7							

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 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 05F5E0FF (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 12345678 and the value of the "unit for measured cumulative amounts of electric energy" property is 0x03, the actual measured cumulative amount would be:

12345678x0,001 kWh = 12 345,678 kWh

Overflow: Counting shall be restarted from 0x00000000.

No data : FFFFFFFE

9.25.4 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

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

9.25.5 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 is to be retrieved" (EPC = 0xC5; value range = 0x00-0x63 (0 to 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 is to 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 min-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 05F5E0FF (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.

9.25.6 Day for which the historical data of measured cumulative amounts of electric energy is to be retrieved (normal and reverse directions) property

This property specifies the day for which the historical data of measured cumulative amounts of electric energy (EPC = 0xC3, C4) is to 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 proceeds the current day by 99 d

When there is no data for the specified day, the "day for which the historical data of measured cumulative amounts of electric energy is to 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.

9.25.7 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 W to 2 147 483 645 W (unit of measurement: watts)

Underflow   : 0x80000000

Overflow   : 0x7FFFFFFF

No data   : 0x7FFFFFFE

9.25.8 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 A to 3 276,5 A (unit of measurement: 0,1 A)

<Example>

single-phase, three-wire system: 0x03E9 0x03E7   = 100,1,   099,9 (A)

single-phase, two-wire system: 0xFC19 0x7FFE   = −99,9   not measured (A)

Underflow   : 0x8000

Overflow   : 0x7FFF

No data   : 0x7FFE

9.25.9 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   099,9 (V)

Single-phase, two-wire system: 0x03E7 0xFFFE   = 99,9   not measured (V)

[a]Overflow   : 0xFFFF

No data   : 0xFFFE

^a   The voltage values shall be taken from 0xC8.

9.25.10 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 ECP 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).

9.26 Smart electric meter class specifications

9.26.1 General

The control commands of "smart electric meter" are shown in Table 41.

Class group code : 0x02
Class code   : 0x88

Table 41 – List of 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	This property indicates the ON/OFF status.	unsigned char	1 byte	-	Set			○	
		ON = 0x30, OFF = 0x31				Get		○		
Power classification	0xD0	This property indicates the watt-hour meter class.	unsigned char	1 byte	-	Get Set				
		0x30: Power company								
		0x31: Solar light								
		0x32: Thermal battery								
		0x33: Accumulator								
		0x34: EV								
		0x35: Other								
Owner classification	0xD1	This property indicates the owner of a watt-meter by classification.	unsigned char	1 byte	-	Get Set				
		0x30: Not specified								
		0x31: Power company								
		0x32: Private company								
		0x33: Individual								
Phase-wire setting status	0xD2	This property indicates the setting status of a wire meter.	unsigned char	1 byte		Get				
		Single-phase two-wire: 0x30								
		Single-phase three-wire: 0x31								
		Three-phase three-wire: 0x32								
		Three-phase four-wire: 0x33								
Synthesis and transformation ratio	0xD3	This property indicates the synthesis and transformation ratio by six digits in decimal notation	unsigned long	4 bytes		Get				
		0x00000000 to 0x000F423F (000 000 to 999 999)								
Scale factor of synthesis and transformation ratio	0xD4	This property indicates the multiplying factor of synthesis & transformation ratio.	unsigned char	1 byte		Get				
		0x00: ×1								
		0x01: ×0,1								
		0x02: ×0,01								
		0x03: ×0,001								

Property name	EPC	Contents of property	Data type	Data size	Unit	Acc-ess rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Meter certificate number	0xD5	This property indicates the certificate number of an meter using a 10-digit character string	unsigned char × 10	10 bytes		Get			
		(Complying with the certificate number statement method)							
Year and month of inspection expiration	0xD6	This property indicates the year and month of inspection expiration using an ASCII code.	unsigned char × 6	6 bytes		Get Set			
		YYYYMM							
		YYYY (year), MM (month)							
Number of effective digits of integral electric energy	0xD7	This property indicates the number of effective digits for integral electric energy.	unsigned char	1 byte		Get	○		
		0x01 to 0x08							
		(1 to 8)							
Integral electric energy measured value (Forward measure ment)	0xE0	This property indicates the integral electric energy using up to 8 digits in decimal notation.	unsigned long	4 bytes	kWh	Get	○ [a]		
		0x00000000 to 0x05F5E0FF							
		(0 to 99 999 999)							
Unit of integral electric energy (Forward and reverse measure ment)	0xE1	This property indicates a integral electric energy measured value and the unit of log (multiplication factor).	unsigned char	1 byte	–	Get	○		
		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							

Property name	EPC	Contents of property / Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Integral electric energy Measurement log (Forward measurement)	0xE2	This property indicates an integral log collection date and a log of integral electric energy (8 digits maximum) measurement data every 30 min for the last 24 h. 0x0000 to 0x0063: 0x00000000 to 0x05F5E0FF (0 to 99): (0 to 99 999 999)	unsigned short + unsigned long ×48	194 bytes	kWh	Get			
Integral electric energy measured value (Reverse measurement)	0xE3	This property indicates integral electric energy using up to 8 digits in decimal notation. 0x00000000 to 0x05F5E0FF (0 to 99 999 999)	unsigned long	4 bytes	kWh	Get			
Integral electric energy measurement log (Reverse measurement)	0xE4	This property indicates an integral log collection date and a log of integral electric energy (8 digits maximum) measurement data every 30 min for the last 24 h. 0x0000 to 0x0063: 0x00000000 to 0x05F5E0FF (0 to 99): (0 to 99 999 999)	unsigned short + unsigned long ×48	194 bytes	kWh	Get			
Integral log collection day	0xE5	This property indicates a day of collecting measurement log data every 30 min. 0x00 to 0x63 (0 to 99) 0: on the day 1 to 99: preceding days	unsigned char	1 byte		Set Get			
Instantaneous electric energy measured value	0xE7	This property indicates an instantaneous value of RMS electric energy in W. 0x80000001 to 0x7FFFFFFD (−2 147 483 647 to 2 147 483 645)	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
Instantaneous current measured value	0xE8	This property indicates an instantaneous value of RMS current in A (R and T phases together). For a single-phase two-wire meter, 0x7FFE is set to the T phase. 0x8001 to 0x7FFD (R phase): 0x8001 to 0x7FFD (T phase) (−3 276,7 to 3 276,5): (−3 276,7 to 3 276,5)	signed short ×2	4 bytes	0,1 A	Get			
Instantaneous voltage measured value	0xE9	This property indicates an instantaneous value of RMS voltage in V between R-S(N) and S(N)‑T together. For a single-phase two-wire meter, 0xFFFE is set between S(N)-T. 0x0000 to 0xFFFD (R-S(N)): 0x0000 to 0xFFFD (S(N)-T)) (0 to 6 553,3): (0 to 6 553,3)	unsigned short ×2	4 bytes	0,1 V	Get			
Periodic integral electric energy measured value (Forward measurement)	0xEA	This property indicates the integral electric energy (forward measurement) in the latest 30 min measurement period interval (measurement date: 4 bytes, measurement time: 3 bytes, integral electric energy (forward measurement): 4 bytes). ・Measurement date YYYY:MM:DD ・Measurement time hh:mm:ss ・Integral electric energy (80 digits maximum in decimal notation)	unsigned char ×4 + unsigned char ×3 + unsigned long	11 bytes	Date, time, kWh	Get	○ [a]		

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
		Bytes 1 to 4: measurement date							
		YYYY:0x0001 to 0x270F (1 to 9 999)							
		MM:0x01 to 0x0C (1 to 12)							
		DD:0x01 to 0x1F (1 to 31)							
		Bytes 5 to 7: measurement time							
		hh:0x00 to 0x17 (0 to 23)							
		mm:0x00 to 0x3B (0 to 59)							
		ss:0x00 to 0x3B (0 to 59)							
		Bytes 8 to 11:							
		0x00000000 to 0x05F5E0FF (0 to 99 999 999)							
Periodic integral electric energy measured value (Reverse measure-ment)	0xEB	This property indicates the integral electric energy (reverse measurement) in the latest 30 min measurement period interval (measurement date: 4 bytes, measurement time: 3 bytes, integral electric energy (reverse measurement): 4 bytes). ・Measurement date YYYY:MM:DD ・Measurement time hh:mm:ss ・Integral electric energy (80 digits max in decimal notation)	unsigned char×4 + unsigned char ×3 + unsigned long	11 bytes	Date, time, kWh	Get			

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
		Bytes 1 to 4: Measurement date							
		YYYY:0x0001 to 0x270F (1 to 9 999)							
		MM:0x01 to 0x0C (1 to 12)							
		DD:0x01 to 0x1F (1 to 31)							
		Bytes 5 to 7: Measurement time							
		hh:0x00 to 0x17 (0 to 23)							
		mm:0x00 to 0x3B (0 to 59)							
		ss:0x00 to 0x3B (0 to 59)							
		Bytes 8 to 11: 0x00000000 to 0x05F5E0FF (0 to 99 999 999)							

^a 0xE0 (integral electric energy measured value (forward measurement)) or 0xEA (regular integral electric energy measured value (forward measurement)) is mandatory.

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).

9.26.3 Power classification property

This property indicates the type (point) measured by the meter.

9.26.4 Owner classification property

This property indicates the owner of the meter.

9.26.5 Phase-wire setting status property

This property indicates the setting status of the phase-wire meter of a meter (0x30: single-phase two-wire, 0x31: single-phase three-wire, 0x32: three-phase three-wire, 0x33: three-phase four-wire).

9.26.6 Synthesis and transformation ratio property (when using current and voltage transformers)

This property indicates the synthesis and transformation ratio using six digits in decimal notation. The property of multiplying factor of synthesis and transformation ratio indicates the multiplying factor. The synthesis and transformation ratio is multiplied by the multiplying factor to calculate the synthesis and transformation ratio of the meter.

9.26.7 Scale factor of synthesis and transformation ratio property (when using current and voltage transformers)

This property indicates the multiplying factor of synthesis and transformation ratio.

The synthesis and transformation ratio is multiplied by the multiplying factor to calculate the synthesis and transformation ratio of the meter.

Because a meter is not capable of directly connecting a large current and a high voltage, the amount of electric energy, etc. is usually measured using a power transformer (VT) and a current transformer (CT) to transform the high voltage and large current.

In such a case, the value derived from the measurements taken on the secondary sides of the power transformer and current transformer is multiplied by the composite transformation ratio to derive the corresponding measured primary side value.

<Example>

If a 100 V, 200 A/5A, single-phase, three-wire meter, with a 200 A/5A current transformer, but with no power transformer, is used to measure 100 V and 5 A, then

- synthesis and transformation ratio = (100 V/100 V) $\times$ (200 A/5 A) = 40
- scale factor = 1.

Synthesis and transformation ratio of meter = synthesis and transformation ratio $\times$ scale factor = 40 $\times$ 1 = 40.

Secondary-side electric energy = 100 V $\times$ 5 A $\times$ 2 = 1 kW.

The primary-side electric energy is, then, as follows: 1 kW $\times$ 40 = 40 kW.

9.26.8 Meter certificate number property

This property indicates the certificate number of a meter using an alphanumeric character string of 10 digits.

The number shall be 0xFFFFFFFFFFFFFFFFFFFF if the meter is not certified.

9.26.9 Inspection expiration date property

This property indicates the year and month in the form of an ASCII code when the validity of inspection expires if the meter has been inspected.

9.26.10 Number of effective digits of integral electric energy property

This property indicates the effective number of digits from the low-order end of integral electric energy measurement data (4 bytes = 8 digits).

Example   Number of effective digits for integral electric energy: 0x06 (low-order six digits)

Integral electric energy overflows at 0x000F423F (999 999) and increments again from 0x00000000(0).

9.26.11 Integral electric energy measured value property (forward measurement)

This property indicates an integral electric energy measured in the forward (forward tide) direction using up to 8 digits in decimal notation. The unit shall be as specified by the property of

unit of integral electric energy (EPC＝0xE1). The property value range shall be 0x00000000 to 0x05F5E0FF (0 to 99 999 999). If the integral electric energy exceeds the specified effective number of digits for integral electric energy (EPC＝0xD7), the value shall increment again from 0x00000000(0). When the synthesis and transformation ratio (EPC = 0xD3) and the scale of synthesis and transformation ratio (EPC = 0xD4) are specified, the synthesis and transformation ratio shall be multiplied by the multiplying factor of synthesis and transformation ratio to calculate the value on the primary side.

Example Integral electric energy measured value (forward measurement): 0x00BC614E (123 454 678)

Unit of integral electric energy (EPC = 0xE1): 0x03(0,001 kWh)

12 345 678 × 0,001 kW = 12 345,678 kWh (measured value)

Overflow   : Increments again from 0x00000000
No data   : 0xFFFFFFFE

9.26.12 Unit of integral electric energy property (forward and reverse measurement)

This property indicates the unit of integral electric energy measured value (forward and reverse measurement) and the unit of log.

Property value	Unit (multiplying factor) of integral 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

9.26.13 Integral electric energy measurement log property (forward measurement)

This property indicates the 0x00 to 0x63 (0 to 99) set on the day of integral log collection date (EPC = 0xE5) and also integral electric energy data (forward) measured in the forward direction (forward tide) at 30 min intervals for 24 h on the set day of integral log collection. The unit is as specified by the property of unit of integral electric energy (EPC = 0xE1). Based on the time set by property name "current time setting"(EPC = 0x97), a value of up to 8 digits is read from the meter at 00 and 30 min every hour (not value accumulated in a 30 min period) as data of 0x00000000 to 0x05F5E0FF (0 to 99 999 999). The property value shall begin with the high-order byte in time series. If the integral electric energy exceeds the specified effective number of digits for integral electric energy (EPC = 0xD7), the value shall increment again from 0x00000000(0). When the synthesis and transformation ratio (EPC = 0xD3) and the scale of synthesis and transformation ratio (EPC = 0xD4) are specified, the synthesis and transformation ratio shall be multiplied by the multiplying factor of synthesis and transformation ratio to calculate the value on the primary side. For data at a non-measurement time for measurement log, 0xFFFFFFFE shall be used.

9.26.14 Integral electric energy measured value property (reverse measurement)

This property indicates an integral electric energy measured in the reverse (reverse tide) direction using up to 8 digits in decimal notation. The unit shall be as specified by the property of unit of integral electric energy (EPC = 0xE1). The property value range shall be 0x00000000 to

0x05F5E0FF (0 to 99 999 999). If the integral electric energy exceeds the specified effective number of digits for integral electric energy (EPC = 0xD7), the value shall increment again from 0x00000000(0). When the synthesis and transformation ratio (EPC = 0xD3) and the scale of synthesis and transformation ratio (EPC = 0xD4) are specified, the synthesis and transformation ratio shall be multiplied by the multiplying factor of synthesis and transformation ratio to calculate the value on the primary side.

Overflow   : Increments again from 0x00000000

No data   : 0xFFFFFFFE

9.26.15 Integral electric energy measurement log property (reverse measurement)

This property indicates the 0x00 to 0x63 (0 to 99) set on the day of integral log collection date (EPC = 0xE5) and also integral electric energy data (reverse) measured in the reverse direction (reverse tide) at 30 min intervals for 24 h on the set day of integral log collection. The unit is as specified by the property of unit of integral electric energy (EPC = 0xE1). Based on the time set by property name "current time setting"(EPC = 0x97), a value of up to 8 digits is read from the meter at 00 and 30 min every hour (not value accumulated in a 30 min period) as data of 0x00000000 to 0x05F5E0FF (0 to 99 999 999). The property value shall begin with the high-order byte in time series. If the integral electric energy exceeds the specified effective number of digits for integral electric energy (EPC = 0xD7), the value shall increment again from 0x00000000(0). When the synthesis and transformation ratio (EPC = 0xD3) and the scale of synthesis and transformation ratio (EPC = 0xD4) are specified, the synthesis and transformation ratio shall be multiplied by the multiplying factor of synthesis and transformation ratio to calculate the value on the primary side. For data at a non-measurement time for measurement log, 0xFFFFFFFE shall be used.

9.26.16 Integral log collection day property

Specifies a day of calling an integral measurement log (EPC = 0xE2, 0xE4) by setting 0x00 to 0x63 (0 to 99).

0x00(0): Data on the day (until the previous time)

0x63(99): 99 days earlier

If there is no data, 0xFF shall be set to the log collection day in the integral measurement log and 0xFFFFFFFE to all 30 min values.

9.26.17 Instantaneous electric energy measured value property

This property indicates the instantaneous RMS electric energy in watts (W). The property value range shall be 0x80000001 to 0x7FFFFFFD (−2 147 483 647 to 2 147 483 645).

Range: −2 147 483 647 to 2 147 483 645 W (unit of measurement: W)

Underflow   : 0x80000000

Overflow   : 0x7FFFFFFF

No data   : 0x7FFFFFFE

9.26.18 Instantaneous current measured value property

This property indicates an instantaneous value of RMS current in amperes (R and T phases together). The property value range shall be 0x8001 to 0x7FFD (−3 276,7 to 3 276,5). (For a single-phase two-wire meter, data is set in the R phase area and 0x7FFE in the T phase area.)

Range: −3 276,7 A to 3 276,5 A (unit of measurement: 0,1 A)

(Example)   Single-phase three-wire meter 0x03E9 0x03E7 = 100,1, 099,9 (A).

Single-phase two-wire meter 0x FC19 0x7FFE = –99,9 not measured (A)

Underflow   : 0x8000

Overflow   : 0x7FFF

No data   : 0x7FFE

9.26.19 Instantaneous voltage measured value property

This property indicates an instantaneous value of RMS voltage in the volts between R-S(N) and S(N)-T together. The property value range shall be 0x0000 to 0xFFFD (0 to 6 553,3). (For a single-phase two-wire meter, 0xFFFE is set between S(N)-T.)

Range: 0,0 V to 6 553,3 V (unit of measurement: 0,1 V)

Example   Single-phase three-wire meter: 0x0451 0x03E7 = 110,5   099,9 (V)

                   Single-phase two-wire meter: 0x03E7 0xFFFE = 99,9 not measured (V)

Overflow   : 0xFFFF

No data   : 0xFFFE

9.26.20 Periodic integral electric energy measured value property (forward measurement)

This property indicates the integral electric energy (forward) of the latest periodic measurement among the integral electric energy data measured at 00 min and 30 min of each hour (not 30 min integral value but meter reading) and held by the meter in order of measurement date (4 bytes), measurement time (3 bytes), and forward integral electric energy (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. An integral electric energy measured value shall be indicated using up to 8 digits in decimal notation. The unit shall be as specified by the property of unit of integral electric energy (EPC = 0xE1). When the synthesis and transformation ratio (EPC = 0xD3) and the scale of synthesis and transformation ratio (EPC = 0xD4) are specified, the synthesis and transformation ratio shall be multiplied by the multiplying factor of synthesis and transformation ratio to calculate the value on the primary side. The property value range shall be 0x00000000 to 0x05F5E0FF (0 to 99 999 999). If the integral electric energy exceeds the specified effective number of digits for integral electric energy (EPC = 0xD7), the value shall increment again from 0x00000000(0). If there is no integral electric energy (forward) data, 0xFFFFFFFE shall be set.

Overflow: Increments again from 0x00000000

No data: 0xFFFFFFFE

Example   Periodic integral electric energy measured value (forward measurement)

- YYYY = 0x07DC (Year 2012), MM = 0x03 (March 3), DD = 0x0F (Day 15)

- hh = 0x07 (Hour 07), mm = 0x00 (Minute 00), ss = 0x00 (Second 00)

- integral electric energy (forward) = 0x0001E240 (001 234 546)

Number of effective digits for integral electric energy (EPC = 0xD7): 0x06 (low-order 6 digits)

Unit of integral electric energy (EPC = 0xE1): 0x02 (0,01 kWh)

9.26.21 Periodic integral electric energy measured value property (reverse measurement)

This property indicates the integral electric energy (reverse) of the latest periodic measurement among the integral electric energy data measured at 00 min and 30 min of each hour (not 30 min integral value but meter reading) and held by the meter in order of measurement date (4 bytes),

measurement time (3 bytes), and reverse integral electric energy (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. An integral electric energy measured value shall be indicated using up to 8 digits in decimal notation. The unit shall be as specified by the property of unit of integral electric energy (EPC = 0xE1). When the synthesis and transformation ratio (EPC = 0xD3) and the scale of synthesis and transformation ratio (EPC = 0xD4) are specified, the synthesis and transformation ratio shall be multiplied by the multiplying factor of synthesis and transformation ratio to calculate the value on the primary side. The property value range shall be 0x00000000 to 0x05F5E0FF (0 to 99 999 999). If the integral electric energy exceeds the specified effective number of digits for integral electric energy (EPC = 0xD7), the value shall increment again from 0x00000000(0). If there is no integral electric energy (reverse) data, 0xFFFFFFFE shall be set.

Overflow   : Increments again from 0x00000000

No data   : 0xFFFFFFFE

Example   Periodic integral electric energy measured value (reverse measurement)

- YYYY = 0x07DC (Year 2012), MM = 0x03 (March), DD = 0x0F (Day 15)
- hh = 0x07 (Hour 07), mm = 0x00 (Minute 00), ss = 0x00 (Second 0)
- Integral electric energy (reverse) = 0x0001E240 (001 234 546)

Number of effective units for integral electric energy (EPC = 0xD7): 0x06 (6 low-order digits)

Unit of integral electric energy (EPC = 0xE1): 0x02 (0,01 kWh)

9.27   Smart gas meter class specifications

9.27.1   General

The control commands of "smart gas meter" are shown in Table 42.

Class group code   : 0x02
Class code   : 0x89

Table 42 – List of smart gas meter properties

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Man-datory	Announ-cement at status change	Remark
		Value range (decimal notation)							
Operation status	0x80	This property indicates the ON/OFF status.	unsigned char	1 byte	–	Set		○	
		ON = 0x30 , OFF = 0x31				Get	○		
Gas classifica-tion setting	0xE0	This property indicates the gas meter type.	unsigned char	1 byte	–	Get Set			
		0x30: City gas							
		0x31: LP gas							
		0x32: Natural							
		0x33: Other							
Owner classifica-tion setting	0xE1	This property indicates the owner of a meter by classification.	unsigned char	1 byte	–	Get Set			

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Man-datory	Announ-cement at status change	Remark
		Value range (decimal notation)							
		0x30: Not specified							
		0x31: City gas							
		0x32: LP gas							
		0x33: Private company							
		0x34: Individual							
Integral gas consump-tion measured value	0xE2	This property indicates the integral gas consumption.	unsigned long	4 bytes	0,001 m^3	Get	○ [a]		(4)
		0 to 0x3B9AC9FF (0 to 999 999 999)							
Unit of integral gas consump-tion measured value	0xE3	This property indicates the integral gas consumption measured value and the unit of log (multiplying factor).	unsigned char	1 byte	–	Get			(5)
		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							
Integral gas consump-tion log information	0xE4	This property indicates the integral log collection date and gas consumption measurement log at 30 min intervals for 24 d.	unsigned short + unsigned long ×48	194 bytes	0,001 m^3	Get			
		0x0000 to 0x0063: 0x0 to 0x3B9AC9FF (0 to 99): (0 to 999 999 999)							
Integral gas consump-tion log collection day setting	0xE5	This property indicates a day of collecting measurement log data at 30 min intervals.	unsigned char	1 byte		Set Get			
		0x00 to 0x63 (0 to 99) 0: on the day 1 to 99: number of preceding days							
Error detection status of metering data	0xE6	This property indicates an error in metering data detected by the meter.	unsigned char	1 byte	–	Get			
		Error detected: 0x41 Error not detected: 0x42							
Security data information	0xE7	This property indicates security data (meter activated) defined by means of a bit assignment.	unsigned char ×10	10 bytes	–	Get			
		For details, see 9.27.10.							
Center valve shutoff status	0xE8	This property indicates that the shutoff valve of the meter is closed from the center.	unsigned char	1 byte	–	Get			

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Man-datory	Announ-cement at status change	Remark
		Value range (decimal notation)							
		Center valve shutoff: 0x41							
		No center valve shutoff: 0x42							
Center valve shutoff recovery permission setting status	0xE9	This property indicates whether recovery from the gas shutoff status of the meter is permitted.	unsigned char	1 byte	–	Get			
		Recovery permitted: 0x41							
		Recovery not permitted: 0x42							
Emergency valve shutoff status	0xEA	This property indicates the emergency closure of the shutoff valve of the meter.	unsigned char	1 byte	–	Get			
		Emergency shutoff: 0x41							
		No emergency shutoff: 0x42							
Shutoff valve status	0xEB	This property indicates whether the shutoff valve is closed.	unsigned char	1 byte	–	Get			
		Shutoff valve open: 0x41							
		Shutoff valve closed: 0x42							
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.	unsigned char ×3	3 bytes	–	Get			
		Log 3: Log 2: Log 1							
		0xFF: 0xFF: 0xFF							
ID number setting	0xED	This property indicates the ID number of the meter.	unsigned char	6 bytes		Get Set			
		000000 to FFFFFF							
		(Initial value: "000000")							
Inspection expiration setting	0xEE	This property indicates the year and month of expiration of inspection validity.	unsigned char	6 bytes		Get Set			
		YYYYMM							
		YYYY (year), MM (month)							
Integral gas consump-tion measured value information with date	0xD0	This property indicates the integral gas consumption and measurement date and time. ·Measurement date YYYY:MM:DD ·Measurement time HH:MM:SS ·Integral gas consumption : 9 digits	unsigned char ×4 + unsigned char ×3 + unsigned long	11 bytes	Date + time + 0,001 m³	Get	○ [a]		(17)

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
		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)							
Gas consump-tion 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	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			
		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)							

a   Integral gas consumption measured value (EPC = 0xE2) or Integral gas consumption measured value information with date (EPC = 0xD0) is mandatory.

9.27.2   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).

9.27.3   Gas meter classification setting property

This property indicates the type of meter measurement by using gas meter classification.

9.27.4   Owner classification setting property

This property specifies the classification of the owner of a meter.

9.27.5   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.

$$123\ 456\ 789 \times 0,001\ m^3 = 123\ 456,789\ m^3\ \text{(measured value)}$$

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.

9.27.6   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.

9.27.7   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.

9.27.8 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 d 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.

9.27.9 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.

9.27.10 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 43.

Table 43 – 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.							

9.27.11 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.

9.27.12 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.

9.27.13 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.

9.27.14 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.

9.27.15 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.

9.27.16 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.

9.27.17 Inspection expiration date property

This property indicates the expiration month and year of the meter for verification.

9.27.18 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 9.27.5.

Integral gas consumption measured value (EPC = 0xE2) or gas consumption measurement information with date (EPC = 0xD0) is mandatory.

9.27.19 Gas consumption log information property

This property indicates a gas consumption log data per hour in order of log start date (4 bytes), log start time (3 bytes), gas consumption log data (4 bytes x 24), integral gas consumption at log start (4 bytes), and integral time interval (2 bytes). The log start date format is year (2 bytes), month (1 byte), and day (1 byte). The log start 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. The gas consumption log data is shown in Table 44.

For gas consumption log data, the gas consumption (unit: 0,001 m^3) at every interval of integration is indicated using 5 digits in decimal notation. The property value range shall be 0x00000 to 0xF423F (0 m^3 to 99,999 m^3).

For integral gas consumption at a log start, see the definition in 9.27.5.

The value range of integration time interval shall be 0x0001 to 0xFFFF (1 min to 65 535 min).

Example   When sending 24 integral values measured at every 60 min from 00:00:00 on March 1, 2012 (reading: 123 456,789 m^3) (increment of reading every hour) after 00 hours on March 2:

Log start date (YYYY:MM:DD)   =   0x07DC0301(2012:03:01)

Log start time (hh:mm:ss)   =   0x000000(00:00:00)

Gas consumption log data   =   See below (24 logs from Vol.01 to Vol.24)

Integral gas consumption at log start =   0x075BCD15 (123 456,789 m^3)

Integration time interval   =   0x3C (60 min)

Supplement – Transition of integral gas consumption and gas consumption log data.

Table 44 – gas consumption log information property

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)

9.28   General light class specifications

9.28.1   General

The control commands of "general light" are shown in Table 45.

Class group code   : 0x02

Class code   : 0x90

Table 45 – 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	O	O	
						Get	O		
Illuminance level	0xB0	Indicates illuminance level in %. 0x00 to 0x64 (0 % to 100 %)	unsigned char	1 byte	%	Set/Get			
Illumi-nance level step setting	0xB2	Used to specify the illuminance level in terms of steps and acquire the current setting.	unsigned char	1 byte	—	Set/ Get			

Property name	EPC	Contents of property	Data type	data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
		From 0x01 to the maximum specifiable illuminance level value (from dark to bright)							
Light color step setting	0xB3	Used to specify the light color in terms of steps and acquire the current setting.	unsigned char	1 byte	—	Set/Get			
		From 0x01 to the maximum specifiable light color value (from incandescent lamp color to white)							
Maximum specifiable values	0xB4	Used to acquire the maximum specifiable illuminance level value and the maximum specifiable light color value.	unsigned char x2	2 byte	—	Get			
		First byte: illuminance							
		Second byte: light color							
		0x01 to 0xFF (Step 1 to Step 255)							
		0x00 (when the function is not implemented)							
Light color setting	0xB1	Used to specify the light color.	unsigned char	1 byte	—	Set/Get			
		Incandescent lamp color ＝0x41, white ＝0x42, daylight white ＝0x43, daylight color ＝0x44							
ON timer reserva-tion setting	0x90	Reservation ON/OFF	unsigned char	1 byte	—	Set/Get			
		Reservation ON ＝0x41, Reservation OFF ＝0x42							
ON timer setting	0x91	Timer value HH:MM	unsigned char x2	2 bytes	—	Set/Get			
		0 to 0x17: 0-0x3B (= 0 to 23): (= 0 to 59)							
OFF timer reserva-tion setting	0x94	Reservation ON/OFF	unsigned char	1 byte	—	Set/Get			
		Reservation ON ＝0x Reservation OFF ＝0x							
OFF timer setting	0x95	Timer value HH:MM	unsigned char x2	2 bytes	—	Set/Get			
		0 to 0x17: 0-0x3B (= 0 to 23): (= 0 to 59)							

9.28.2　Operation status property

Operation status ON.

When the illuminance level property (0xB0) does not exist: Illuminated.

When the illuminance level property (0xB0) exists: The illuminance level is reflected in the lighting device's illuminance.

9.28.3   Illuminance level property

This property indicates the illuminance level in percent. Even if the illuminance level setting of the actual device is less than or greater than unit in percent, the property of the actual device shall be assigned to the property value in percent specified by this property.

9.28.4   Light color setting property

This property is used to specify the light color (incandescent lamp color/white/ daylight white/daylight color).

9.28.5   Illuminance level step setting property

This property indicates the illuminance level in terms of steps, and is used to specify the illuminance level and acquire the current setting. The maximum specifiable illuminance level value shall be acquired from the "maximum specifiable values" property (EPC = 0xB4). There is no requirement regarding the specific illuminance level to be represented by each step, but the rule that shall be adhered to is that the illuminance level shall become higher as the step number increases. It is only required to implement the property values that correspond to the functions supported by the actual device in which this class is implemented. In the case where both this property and the "illuminance level" property (EPC = 0xB0) are implemented, the property values of this property shall be related to the property values of the "illuminance level" property. When this property is implemented, the implementation of the "maximum specifiable level values" property (0xB4) is mandatory.

9.28.6   Light color step setting property

This property indicates the light color in terms of steps, and is used to specify the light color and acquire the current setting. The maximum specifiable light color value shall be acquired from the "maximum specifiable values" property (EPC = 0xB4). There is no requirement regarding the specific light color to be represented by each step, but the rule that shall be adhered to is that the light color shall become closer to the incandescent lamp color as the step number decreases and shall become whiter as the step number increases. It is only required to implement the property values that correspond to the functions supported by the actual device in which this class is implemented. In the case where both this property and the "light color setting" property (EPC = 0xB1) are implemented, the property values of this property shall be related to the property values of the "light color setting" property. When this property is implemented, the implementation of the "maximum specifiable values" property (0xB4) is mandatory.

9.28.7   Maximum specifiable values property

This property is used to acquire the maximum specifiable illuminance level and light color values. 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 color step value. Each of the 2 bytes indicates the respective maximum specifiable value using a 255-step scale (from 0x01 to 0xFF). The maximum specifiable value for an unimplemented function shall be 0x00.

9.28.8   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).

9.28.9   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).

9.28.10   OFF timer reservation setting 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).

9.28.11   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).

9.29   Refrigerator class specifications

9.29.1   General

The control commands of "refrigerator" are shown in Table 46.

Class group code   : 0x03
Class code   : 0xB7

Table 46 – List of refrigerator properties

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Operation status	0x80	Indicates the ON/OFF status	unsigned char	1 byte	–	Set		O	
		ON = 0x30, OFF = 0x31				Get	O		
Door open/close status	0xB0	Door open/close status	unsigned char	1 byte	–	Get			
		Door open = 0x41, Door close = 0x42							
Door open warning	0xB1	Door open warning status	unsigned char	1 byte	–	Get		O	
		Door open warning found = 0x41 Door open warning not found = 0x42							
Refrigerator compart-ment door	0xB2	Used to acquire the status (i.e. open or closed) of the refrigerator compartment door.	unsigned char	1 byte	–	Get			

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
status		Open = 0x41, closed = 0x42							
Freezer compart-ment door status	0xB3	Used to acquire the status (i.e. open or closed) of the freezer compartment door.	unsigned char	1 byte	–C	Get			
		Open = 0x41, closed = 0x42							
Subzero-fresh com-partment door status	0xB4	Used to acquire the status (i.e. open or closed) of the meat and fish compartment door.	unsigned char	1 byte	–C	Get			
		Open = 0x41, closed = 0x42							
Vegetable compart ment door status	0xB5	Used to acquire the status (i.e. open or closed) of the vegetable compartment door.	unsigned char	1 byte	–C	Get			
		Open = 0x41, closed = 0x42							
Multi-refri gerating mode compart-ment door	0xB6	Used to acquire the status (i.e. open or closed) of the multi-refrigerating mode compartment door.	unsigned char	1 byte	–C	Get			
		Open = 0x41, closed = 0x42							
Maximum allowable temperature setting level	0xE0	Used to acquire the maximum allowable temperature setting levels for the individual compartments of the refrigerator. First byte: Refrigerator compartment Second byte: Freezer compartment Third byte: Subzero-fresh compartment Fourth byte: Vegetable compartment Fifth byte: Multi-refrigerating mode compartment Sixth to eighth bytes: Reserved for future use. 0x01 to 0xFF (level 1 to 255) 0x00 = no compartment	unsigned char × 8	8 bytes	–	Get			
Refrigerator compart-ment temperature setting	0xE2	Used to specify the refrigerator compartment temperature in °C, and to acquire the current setting.	signed char	1 byte	°C	Set/Get			
		0x81 to 0x7E (–127 °C to 126 °C)							
Freezer compart-ment temperature setting	0xE3	Used to specify the freezer compartment temperature in °C, and to acquire the current setting.	signed char	1 byte	°C	Set/Get			
		0x81 to 0x7E (–127 °C to 126 °C)							
Subzero-fresh temperature setting	0xE4	Used to specify the subzero-fresh compartment temperature in °C, and to acquire the current setting.	signed char	1 byte	°C	Set/Get			
		0x81 to 0x7E (–127 °C to 126 °C)							

Property name	EPC	Contents of property / Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Vegetable compartment temperature setting	0xE5	Used to specify the vegetable compartment temperature in °C, and to acquire the current setting.	signed char	1 byte	°C	Set/Get			
		0x81 to 0x7E (–127 °C to 126 °C)							
Multi-refrigerating mode compartment temperature setting	0xE6	Used to specify the multi-refrigerating mode compartment temperature in °C, and to acquire the current setting.	signed char	1 byte	°C	Set/Get			
		0x81 to 0x7E (–127 °C to 126 °C)							
Refrigerator compartment temperature level setting	0xE9	Used to specify the refrigerator compartment temperature by selecting a level from the predefined levels, and to acquire the current setting.	unsigned char	1 byte	–	Set/Get			
		0x01 to maximum allowable temperature setting level (highest to lowest temperature)							
Freezer compartment temperature level setting	0xEA	Used to specify the freezer compartment temperature by selecting a level from the predefined levels, and to acquire the current setting.	unsigned char	1 byte	–	Set/Get			
		0x01 to maximum allowable temperature setting level (highest to lowest temperature)							
Subzero-fresh compartment temperature level setting	0xEB	Used to specify the meat and fish compartment temperature by selecting a level from the predefined levels, and to acquire the current setting.	unsigned char	1 byte	–	Set/Get			
		0x01 to maximum allowable temperature setting level (highest to lowest temperature)							
Vegetable compartment temperature level setting	0xEC	Used to specify the vegetable compartment temperature by selecting a level from the predefined levels, and to acquire the current setting.	unsigned char	1 byte	–	Set/Get			
		0x01 to maximum allowable temperature setting level (highest to lowest temperature)							
Multi-refrigerating mode compartment temperature level setting	0xED	Used to specify the multi-refrigerating mode compartment temperature by selecting a level from the predefined levels, and to acquire the current setting.	unsigned char	1 byte	–	Set/Get			
		0x01 to maximum allowable temperature setting level (highest to lowest temperature)							
Measured refrigerator compart-	0xD1	Used to acquire the measured refrigerator compartment temperature (°C).	signed char	1 byte	°C	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 temperature		0x81 to 0x7E (−127 °C to 126 °C)							
Measured freezer com- partment temperature	0xD2	Used to acquire the measured freezer compartment temperature (°C).	signed char	1 byte	°C	Get			
		0x81 to 0x7E (-127 °C to 126 °C)							
Measured subzero- fresh com- partment temperature	0xD3	Used to acquire the measured meat and fish compartment temperature (°C).	signed char	1 byte	°C	Get			
		0x81 to 0x7E (-127 °C to 126 °C)							
Measured vegetable compart- ment temperature	0xD4	Used to acquire the measured vegetable compartment temperature (°C).	signed char	1 byte	°C	Get			
		0x81 to 0x7E (−127 °C to 126 °C)							
Measured multi- refrigerating mode compart- ment temperature	0xD5	Used to acquire the measured multi-refrigerating mode compartment temperature (°C).	signed char	1 byte	°C	Get			
		0x81 to 0x7E (-127 °C to 126 °C)							
Compressor rotation speed	0xD8	Used to acquire the rotation speed of the compressor. The rotation speed is expressed in terms of a level.	unsigned char	2 bytes	–	Get			
		First byte: Maximum rotation speed L (0x01 to 0xFF (1 to 255))							
		Second byte: Rotation speed of the actual compressor:							
		0x00 to L (zero speed to highest speed)							
Measured electric current consump- tion	0xDA	Used to acquire the measured electric current consumption.	unsigned char	2 bytes	0,1 A	Get			
		0x0000 to 0xFFFD (0 A to 6 553,3 A)							
Rated power consump- tion	0xDC	Used to acquire the rated power consumption.	unsigned char	2 bytes	W	Get			
		0x0000 to 0xFFFD (0 W to 65 533 W)							
Quick freeze function setting	0xA0	Used to specify whether or not to use the "quick freeze" function of the refrigerator, and to acquire the current setting.	unsigned char	1 byte	–	Set/Get			
		"Normal operation" mode: 0x41							
		"Quick freeze" mode: 0x42							
		"Standby for fast freezing" mode: 0x43							
Quick refrigeration function setting	0xA1	Used to specify whether or not to use the "quick refrigeration" function of the refrigerator, and to acquire the current setting.	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
		"Normal operation" mode: 0x41 "Quick refrigeration" mode: 0x42 "Standby for quick refrigeration" mode: 0x43							
Icemaker setting	0xA4	Used to specify whether or not to enable the automatic icemaker of the refrigerator, and to acquire the current setting. "Enable icemaker" option: 0x41 "Disable icemaker" option: 0x42 "Temporarily disable icemaker" option: 0x43	unsigned char	1 byte	–	Set/Get			
Icemaker operation status	0xA5	Used to acquire the status of the automatic icemaker of the refrigerator. "Ice-making in progress" state: 0x41 "Ice-making stopped" state: 0x42	unsigned char	1 byte	–	Get			
Icemaker tank status	0xA6	Used to acquire the status of the tank of the automatic icemaker of the refrigerator in terms of whether it contains water or not. Icemaker tank contains water: 0x41 There is no water left in the icemaker tank or the icemaker tank has not been positioned correctly in the refrigerator: 0x42	unsigned char	1 byte	–	Get			
Refrigerator compart-ment humidifica-tion function setting	0xA8	Used to specify whether or not to use the refrigerator compartment humidification function, and to acquire the current setting. ON = 0x41 OFF = 0x42	unsigned char	1 byte	–	Set/Get			
Vegetable compart-ment humidifica-tion function setting	0xA9	Used to specify whether or not to use the vegetable compartment humidification function, and to acquire the current setting. ON = 0x41 OFF = 0x42	unsigned char	1 byte	–	Set/Get			
Deodoriza-tion function setting	0xAD	Used to specify whether or not to use the deodorization function of the refrigerator, and to acquire the current setting. ON = 0x41 OFF = 0x42	unsigned char	1 byte	–	Set/Get			

9.29.2 Operation status property

This property is used to specify the operation status (i.e. ON or OFF) of the refrigerator and freezer, and to acquire the current setting. 0x30 and 0x31 shall be used for the ON and OFF states, respectively. In cases where the refrigerator and freezer belong to a node in which the "refrigerator and freezer" class is implemented and the refrigerator and freezer start operating as soon as the node starts up, 0x30 may be implemented as the fixed value. When the property value is 0x31 (OFF), values specified and acquired with other properties are not guaranteed, unless otherwise specified in this standard.

9.29.3 Door open/close status property

This property is used to acquire the status (i.e. open or closed) of the door. 0x41 and 0x42 shall be used for the "open" and "closed" states, respectively. In cases where the refrigerator has two or more doors, 0x42 shall be used when any of the doors are open. For the purposes of this subclause, the term "door" shall refer to any door and any drawer.

9.29.4 Door open warning property

This property is used to acquire information as to whether or not the "door open" alarm is activated. 0x41 and 0x42 shall be used for the "alarm activated" and "alarm not activated" states, respectively.

9.29.5 Refrigerator compartment door status

This property is used to acquire the status (i.e. open or closed) of the refrigerator compartment door. 0x41 and 0x42 shall be used for the "open" and "closed" states, respectively. In cases where the refrigerator compartment has two or more doors, 0x42 shall be used when any of the doors are open. For the purposes of this subclause, the term "door" shall refer to any door and any drawer.

9.29.6 Freezer compartment door status property

This property is used to acquire the status (i.e. open or closed) of the freezer compartment door. 0x41 and 0x42 shall be used for the "open" and "closed" states, respectively. In cases where the freezer compartment has two or more doors, 0x42 shall be used when any of the doors are open. For the purposes of this subclause, the term "door" shall refer to any door and any drawer.

9.29.7 Subzero-fresh compartment door status property

This property is used to acquire the status (i.e. open or closed) of the meat and fish compartment door. 0x41 and 0x42 shall be used for the "open" and "closed" states, respectively. In cases where the meat and fish compartment has two or more doors, 0x42 shall be used when any of the doors are open. For the purposes of this subclause, the term "door" shall refer to any door and any drawer.

9.29.8 Vegetable compartment door status property

This property is used to acquire the status (i.e. open or closed) of the vegetable compartment door. 0x41 and 0x42 shall be used for the "open" and "closed" states, respectively. In cases where the vegetable compartment has two or more doors, 0x42 shall be used when any of the doors are open. For the purposes of this subclause, the term "door" shall refer to any door and any drawer.

9.29.9 Multi-refrigerating mode compartment door status property

This property is used to acquire the status (i.e. open or closed) of the multi-refrigerating mode compartment door. 0x41 and 0x42 shall be used for the "open" and "closed" states, respectively. In cases where the multi-refrigerating mode compartment has two or more doors, 0x42 shall be used when any of the doors are open. For the purposes of this subclause, the term "door" shall refer to any door and any drawer.

9.29.10 Maximum allowable temperature setting level property

This property is used to acquire the maximum allowable temperature setting levels for the individual compartments of the refrigerator. The data size shall be 8 bytes, and the maximum allowable temperature setting level for each compartment shall be indicated using one byte (255 levels (0x01 to 0xFF)). The first to fifth bytes shall be used for the refrigerator, freezer, meat and fish, vegetable and multi-refrigerating mode compartments, respectively. The sixth to eighth bytes are reserved for future use. When the refrigerator does not have one or more of the five types of compartments, 0x00 shall be used for the types of compartments the refrigerator is not equipped with.

9.29.11 Refrigerator compartment temperature setting property

This property is used to specify the refrigerator compartment temperature in degrees Celsius, and to acquire the current setting. The property value range shall be 0x81 to 0x7E (−127 °C to 126 °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. It is only required to implement the property values that are supported by the actual piece of equipment in which this class is implemented. In cases where both the "refrigerator compartment temperature setting" property and the "refrigerator compartment temperature level setting" property (EPC = 0xE9) are implemented, the property values shall be correlated.

9.29.12 Freezer compartment temperature setting property

This property is used to specify the freezer compartment temperature in degrees Celsius, and to acquire the current setting. The property value range shall be 0x81 to 0x7E (−127 °C to 126 °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. It is only required to implement the property values that are supported by the actual piece of equipment in which this class is implemented. In cases where both the "freezer compartment temperature setting" property and the "freezer compartment temperature level setting" property (EPC = 0xEA) are implemented, the property values shall be correlated.

9.29.13 Subzero-fresh compartment temperature setting property

This property is used to specify the meat and fish compartment temperature in degrees Celsius, and to acquire the current setting. The property value range shall be 0x81 to 0x7E (−127 °C to 126 °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. It is only required to implement the property values that are supported by the actual piece of equipment in which this class is implemented. In cases where both the "meat and fish compartment temperature setting" property and the "meat and fish compartment temperature level setting" property (EPC = 0xEB) are implemented, the property values shall be correlated.

9.29.14 Vegetable compartment temperature setting property

This property is used to specify the vegetable compartment temperature in degrees Celsius, and to acquire the current setting. The property value range shall be 0x81 to 0x7E (−127 °C to 126 °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. It is only required to implement the property values that are supported by the actual piece of equipment in which this class is implemented. In cases where both the "vegetable compartment temperature setting" property and the "vegetable compartment temperature level setting" property (EPC = 0xEC) are implemented, the property values shall be correlated.

9.29.15 Multi-refrigerating mode compartment temperature setting property

This property is used to specify the multi-refrigerating mode compartment temperature in degrees Celsius, and to acquire the current setting. The property value range shall be 0x81 to 0x7E (−127 °C to 126 °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. It is only required to implement the property values that are supported by the actual piece of equipment in which this class is implemented. In cases where both the "multi-refrigerating mode compartment temperature setting" property and the "multi-refrigerating mode compartment temperature level setting" property (EPC = 0xED) are implemented, the property values shall be correlated.

9.29.16 Refrigerator compartment temperature level setting property

This property is used to specify the refrigerator compartment temperature by selecting a level from the predefined levels, and to acquire the current setting. The maximum allowable temperature setting level shall be acquired with the "maximum allowable temperature setting level" property (EPC = 0xE0). The temperature values for the levels may be defined freely, as long as the smallest to largest temperature level values are used for the highest to lowest temperature values, respectively. It is only required to implement the property values that are supported by the actual piece of equipment in which this class is implemented. In cases where both the "refrigerator compartment temperature level setting" property and the "refrigerator compartment temperature setting" property (EPC = 0xE2) are implemented, the property values shall be correlated. Implementation of this property shall be accompanied by the implementation of the "maximum allowable temperature setting level" property (0xE0).

9.29.17 Freezer compartment temperature level setting property

This property is used to specify the freezer compartment temperature by selecting a level from the predefined levels, and to acquire the current setting. The maximum allowable temperature setting level shall be acquired with the "maximum allowable temperature setting level" property (EPC = 0xE0). The temperature values for the levels may be defined freely, as long as the smallest to largest temperature level values are used for the highest to lowest temperature values, respectively. It is only required to implement the property values that are supported by the actual piece of equipment in which this class is implemented. In cases where both the "freezer compartment temperature level setting" property and the "freezer compartment temperature setting" property (EPC = 0xE3) are implemented, the property values shall be correlated. Implementation of this property shall be accompanied by the implementation of the "maximum allowable temperature setting level" property (0xE0).

9.29.18 Meat and fish compartment temperature level setting property

This property is used to specify the meat and fish compartment temperature by selecting a level from the predefined levels, and to acquire the current setting. The maximum allowable temperature setting level shall be acquired with the "maximum allowable temperature setting level" property (EPC = 0xE0). The temperature values for the levels may be defined freely, as long as the smallest to largest temperature level values are used for the highest to lowest temperature values, respectively. It is only required to implement the property values that are supported by the actual piece of equipment in which this class is implemented. In cases where both the "meat and fish compartment temperature level setting" property and the "meat and fish compartment temperature setting" property (EPC = 0xE4) are implemented, the property values shall be correlated. Implementation of this property shall be accompanied by the implementation of the "maximum allowable temperature setting level" property (0xE0).

9.29.19 Vegetable compartment temperature level setting property

This property is used to specify the vegetable compartment temperature by selecting a level from the predefined levels, and to acquire the current setting. The maximum allowable temperature setting level shall be acquired with the "maximum allowable temperature setting level" property (EPC = 0xE0). The temperature values for the levels may be defined freely, as

long as the smallest to largest temperature level values are used for the highest to lowest temperature values, respectively. It is only required to implement the property values that are supported by the actual piece of equipment in which this class is implemented.

In cases where both the "vegetable compartment temperature level setting" property and the "vegetable compartment temperature setting" property (EPC = 0xE5) are implemented, the property values shall be correlated. Implementation of this property shall be accompanied by the implementation of the "maximum allowable temperature setting level" property (0xE0).

9.29.20 Multi-refrigerating mode compartment temperature level setting property

This property is used to specify the multi-refrigerating mode compartment temperature by selecting a level from the predefined levels, and to acquire the current setting. The maximum allowable temperature setting level shall be acquired with the "maximum allowable temperature setting level" property (EPC = 0xE0). The temperature values for the levels may be defined freely, as long as the smallest to largest temperature level values are used for the highest to lowest temperature values, respectively. It is only required to implement the property values that are supported by the actual piece of equipment in which this class is implemented.

In cases where both the "multi-refrigerating mode compartment temperature level setting" property and the "multi-refrigerating mode compartment temperature setting" property (EPC = 0xE6) are implemented, the property values shall be correlated. Implementation of this property shall be accompanied by the implementation of the "maximum allowable temperature setting level" property (0xE0).

9.29.21 Measured refrigerator compartment temperature property

This property is used to acquire the measured refrigerator compartment temperature in degrees Celsius (°C). The property value range shall be 0x81 to 0x7E (−127 °C to 126 °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.

9.29.22 Measured freezer compartment temperature property

This property is used to acquire the measured freezer compartment temperature in degrees Celsius (°C). The property value range shall be 0x81 to 0x7E (−127 °C to 126 °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.

9.29.23 Measured meat and fish compartment temperature property

This property is used to acquire the measured meat and fish compartment temperature in degrees Celsius (°C). The property value range shall be 0x81 to 0x7E (−127 °C to 126 °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.

9.29.24 Measured vegetable compartment temperature property

This property is used to acquire the measured vegetable compartment temperature in degrees Celsius (°C). The property value range shall be 0x81 to 0x7E (−127 °C to 126 °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.

9.29.25 Measured multi-refrigerating mode compartment temperature property

This property is used to acquire the measured multi-refrigerating mode compartment temperature in degrees Celsius (°C). The property value range shall be 0x81 to 0x7E (−127 °C to 126 °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.

9.29.26 Compressor rotation speed property

This property is used to acquire the rotation speed of the compressor. The rotation speed is expressed in terms of levels. The first and second bytes shall indicate the maximum acquirable rotation speed and the rotation speed of the actual compressor, respectively. The maximum acquirable rotation speed is also expressed in terms of levels. The rotation speed values for the levels may be defined freely, as long as the smallest to largest level values are used for the lowest to highest speed values, respectively, with 0x00 used for zero speed. The property value range shall be as defined by the following equation:

"Value of the first byte" ≥ "Value of the second byte"

9.29.27 Measured electric current consumption property

This property is used to acquire the present measured electric current consumption (expressed in increments of 0,1 A) of the refrigerator and freezer. 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.

9.29.28 Rated power consumption property

This property is used to acquire the rated power consumption (W; brochure value). The property value range shall be 0x0000 to 0xFFFD (0 W to 65 533 W).

9.29.29 Quick freeze function setting property

This property is used to specify whether or not to use the "quick freeze" function of the refrigerator, and to acquire the current setting. 0x41, 0x42 and 0x43 shall be used for the "normal operation", "quick freeze" and "standby for quick freezing" modes, respectively. The "standby for quick freezing" mode (0x43) shall mean a mode in which the refrigerator is standing by to shift to the "quick freeze" mode because a defrosting cycle is being performed or a condition shall be satisfied before the refrigerator can shift to the "quick freeze" mode (0x42) (the refrigerator will shift to the "quick freeze" mode as soon as the defrosting cycle is completed or the condition is satisfied). The property value will change to 0x41 as soon as the quick freeze cycle is completed. The property value may be ignored when it is 0x43. It is only required to implement the property values that are supported by the actual piece of equipment in which this class is implemented.

9.29.30 Quick refrigeration function setting property

This property is used to specify whether or not to use the "quick refrigeration" function of the refrigerator, and to acquire the current setting. 0x41, 0x42 and 0x43 shall be used for the "normal operation", "quick refrigeration" and "standby for quick refrigeration" modes, respectively. The "standby for quick refrigeration" mode (0x43) shall mean a mode in which the refrigerator is standing by to shift to the "quick refrigeration" mode because a defrosting cycle is being performed or a condition shall be satisfied before the refrigerator can shift to the "quick refrigeration" mode (0x42) (the refrigerator will shift to the "quick refrigeration" mode as soon as the defrosting cycle is completed or the condition is satisfied). The property value will change to 0x41 as soon as the quick refrigeration cycle is completed. The property value may be ignored

when it is 0x43. It is only required to implement the property values that are supported by the actual piece of equipment in which this class is implemented.

9.29.31 Icemaker setting property

This property is used to specify whether or not to enable the automatic icemaker of the refrigerator, and to acquire the current setting. 0x41, 0x42 and 0x43 shall be used for the "enable icemaker", "disable icemaker" and "temporarily disable icemaker" options, respectively. The "temporarily disable icemaker" option is used to disable the icemaker temporarily when the user does not want to have the icemaker make ice, such as during the small hours of the night and during a vacation. The condition for a shift back from the "disable icemaker" or "temporarily disable icemaker" option to the "enable icemaker" option shall be equipment-dependent and is not specified in this standard. It is only required to implement the property values that are supported by the actual piece of equipment in which this class is implemented.

9.29.32 Icemaker operation status property

This property is used to acquire the status of the automatic icemaker of the refrigerator. 0x41 and 0x42 shall be used for the "ice-making in progress" and "ice-making stopped" states, respectively.

9.29.33 Icemaker tank status property

This property is used to acquire the status of the tank of the automatic icemaker of the refrigerator in terms of whether it contains water or not. When the icemaker tank contains water, the property value shall be 0x41. When there is no water left in the icemaker tank or when the icemaker tank has not been positioned correctly in the refrigerator, the property value shall be 0x42.

9.29.34 Refrigerator compartment humidification function setting property

This property is used to specify whether or not to use the refrigerator compartment humidification function, and to acquire the current setting. 0x41 and 0x42 shall be used for the "ON" and "OFF" states, respectively.

9.29.35 Vegetable compartment humidification function setting property

This property is used to specify whether or not to use the vegetable compartment humidification function, and to acquire the current setting. 0x41 and 0x42 shall be used for the "ON" and "OFF" states, respectively.

9.29.36 Deodorization function setting property

This property is used to specify whether or not to use the deodorization function of the refrigerator, and to acquire the current setting. 0x41 and 0x42 shall be used for the "ON" and "OFF" states, respectively.

9.30 Microwave oven class specifications

9.30.1 General

The control commands of "microwave oven" are shown in Table 47.

Class group code   : 0x03
Class code   : 0xB8

Table 47 – List of microwave oven 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.	unsigned char	1 bytes	—	Set		O	
		ON = 0x30, OFF = 0x31				Get	O		
Door open/close status	0xB0	Used to acquire the status (i.e. open or closed) of the door of the combination microwave oven.	unsigned char	1 byte	–	Get			
		Door open = 0x41, door closed = 0x42							
Heating status	0xB1	Used to acquire the status of the combination microwave oven.	unsigned char	1 byte	–	Get			
		Initial state = 0x40							
		Heating = 0x41							
		Heating suspended = 0x42							
		Reporting completion of heating cycle = 0x43							
		Setting = 0x44							
		Preheating = 0x45							
		Preheat temperature maintenance = 0x46							
		Heating temporarily stopped for manual cooking action = 0x47							
Heating setting	0xB2	Used to specify whether to start, stop or suspend heating, and to acquire the current setting (i.e. current heating status).	unsigned char	1 byte	–	Set/Get			
		Start/restart heating (heating started/restarted) = 0x41							
		Suspend heating (heating suspended) = 0x42							
		Stop heating (heating stopped) = 0x43							
Heating mode setting	0xE0	Used to specify the heating mode of the combination microwave oven, and to acquire the current setting (i.e. current mode).	unsigned char	1 byte	–	Set/Get			
		Microwave heating = 0x41							
		Defrosting = 0x42							
		Oven = 0x43							
		Grill = 0x44							
		Toaster = 0x45							
		Fermenting = 0x46							
		Stewing = 0x47							
		Steaming = 0x48							
		Two-stage microwave heating = 0x51							
		No mode specified = 0xFF							

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Automatic heating setting	0xE1	Used to specify whether or not to use the combination microwave oven's automatic heating mode, and to acquire the current setting.	unsigned char	1 byte	–	Set/Get			
		Automatic = 0x41 Manual = 0x42 Not specified = 0xFF							
Automatic heating level setting	0xE2	Used to specify, by selecting a level from the five predefined levels, the level of automatic heating for the option specified by the "automatic heating menu setting" property, and to acquire the current setting.	unsigned cha	1 byte	–	Set/Get			
		0x31 to 0x35 (lowest to highest) Not specified = 0xFF							
Automatic heating menu setting	0xD0	Used, when the value of the "automatic heating setting" property is 0x41 (= automatic heating), to select an automatic heating cycle, and to acquire the current setting.	unsigned cha	1 byte	–	Set/Get			
		0 to 0xFE: Automatic heating cycle code (see the automatic heating cycle code table in 9.30.9.) No automatic heating cycle specified = 0xFF							
Oven mode setting	0xD1	Used, when the value of the "heating mode setting" property (EPC = 0xE0) is 0x43 (= oven), to specify the sub-mode to use, and to acquire the current setting.	unsigned cha	1 byte	–	Set/Get			
		Automatic selection mode = 0x40 Convection oven mode = 0x41 Circulation oven mode = 0x42 Hybrid oven mode = 0x43 No sub-mode specified = 0xFF							
Oven preheating setting	0xD5	Used, when the value of the "heating mode setting" property (EPC = 0xE0) is 0x43 (oven), to specify whether or not to preheat the chamber for the selected oven sub-mode, and to acquire the current setting.	unsigned char	1 byte	–	Set/Get			
		With preheating = 0x41 Without preheating = 0x42 Not specified = 0xFF							

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Fermenting mode setting	0xD6	Used, when the value of the "heating mode setting" property (EPC = 0xE0) is 0x46 (= fermenting), to specify the sub-mode to use, and to acquire the current setting.	unsigned char	1 byte	—	Set/Get			
		Automatic selection mode = 0x40							
		Convection fermentation mode = 0x41							
		Circulation fermentation mode = 0x42							
		Hybrid fermentation mode = 0x43							
		Microwave fermentation mode = 0x51							
		No mode specified = 0xFF							
Chamber temperature setting	0xE3	Used, when the value of the "heating mode setting" property (EPC = 0xE0) is 0x43 (= oven) or 0x46 (= fermenting), to specify the temperature in the chamber in 0,1 °C increments, and to acquire the current setting.	signed short	2 bytes	1 °C	Set/Get			
		0xF554 to 0x7FFE (-273,2 °C to 3 276,6 °C)							
		0x8001: Automatic							
		0x8002: Not specified							
Food temperature setting	0xE4	Used to specify the temperature of the heated food in 0,1 °C increments, and to acquire the current setting.	signed short	2 bytes	1 °C	Set/Get			
		0xF554 to 0x7FFE (-273,2 °C to 3 276,6 °C)							
		0x8002: Not specified							
Heating time setting	0xE5	Used to specify the duration of heating in the HH:MM:SS format, and to acquire the current setting.	unsigned char ×3	3 bytes	—	Set/Get			
		0 to 0x17: 0 to 0x3B: 0 to 0x3B							
		(= 0 to 23): (= 0 to 59): (= 0 to 59)							
Remaining heating time setting	0xE6	Used to specify the time remaining to complete the heating cycle in the HH:MM:SS format, and to acquire the current setting.	unsigned char ×3	3 bytes	—	Set/Get			
		0 to 0x17: 0 to 0x3B: 0 to 0x3B							
		(= 0 to 23): (= 0 to 59): (= 0 to 59)							

Property name	EPC	Contents of property / Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Microwave heating power setting	0xE7	Used, when the value of the "heating mode setting" property (EPC = 0xE0) is 0x41 (= microwave heating), 0x42 (= defrosting), 0x47 (= stewing) or 0x48 (= steaming) or when the value of the "heating mode setting" property (EPC = 0xE0) is 0x46 (= fermenting) and the value of the "fermenting mode setting" property (EPC = 0xD6) is 0x51 (= microwave fermentation mode), to specify the microwave heating power in 1 W increments, and to acquire the current setting.	unsigned short	2 bytes	W	Set/Get			
		0x0000 to 0xFFFD (0 W to 65 533 W)							
Prompt message setting	0xE8	Used, when it is necessary to instruct the combination microwave oven to temporarily stop heating at a point during a heating cycle to allow the user to perform manual reversing, mixing, etc. and display a message to instruct the user on the manual action to be performed, to specify the prompt message to be displayed and the timing of the message (in terms of a percentage of the total duration of the heating cycle that is allowed to elapse (from the start of the heating cycle) before the message is displayed), and to acquire the current settings. Up to 4 messages may be specified.	unsigned char ×2 ×4	8 bytes	—	Set/Get			
		First byte: Prompt message code (see 9.30.18.)							
		Second byte: Timing value (0 to 0x64 (0 % to 100 %))							
Accessories to combination microwave oven setting	0xE9	Used to specify, by means of a 2-byte bit map, what accessory or accessories to the combination microwave oven to use, and to acquire the current setting.	unsigned short	2 bytes	-	Set/Get			
		The value contained in a bit in the bit map shall be "1" if the accessory represented by that bit is used and "0" if the accessory represented by that bit is not used (see Table 52).							

Property name	EPC	Contents of property / Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Display character string setting	0xEA	Used to input character strings (up to 20 characters) to use on the display of the combination microwave oven.	unsigned short ×20	40 bytes	-	Set			
		Shift-JIS code characters × 20							
Two-stage microwave heating setting (duration)	0xEB	Used, when the value of the "heating mode setting" property (EPC = 0xE0) is 0x51 (two-stage microwave heating), to specify the duration of the first and second microwave heating cycles in the HH:MM:SS format, and to acquire the current setting. Three bytes shall be used for each heating cycle, with the first and second sets of bytes used for the first and second heating cycles, respectively.	unsigned char ×3 ×2	6 bytes	—	Set/Get			
		Duration of first microwave heating cycle (first through third bytes):							
		0 to 0x17: 0 to 0x3B: 0 to 0x3B							
		(= 0 to 23): (= 0 to 59): (= 0 to 59)							
		Duration of second microwave heating cycle (fourth through sixth bytes):							
		0 to 0x17: 0 to 0x3B: 0 to 0x3B							
		(= 0 to 23): (= 0 to 59): (= 0 to 59)							
Two-stage microwave heating setting (heating power)	0xEC	Used, when the value of the "heating mode setting" property (EPC = 0xE0) is 0x51 (two-stage microwave heating), to specify the heating power for the first and second microwave heating cycles in 1 W increments, and to acquire the current setting. Two bytes shall be used for each heating cycle, with the first and second pairs of bytes used for the first and second heating cycles, respectively.	unsigned short ×2	4 bytes	W	Set/Get			
		Heating power for first microwave heating cycle (first and second bytes):							
		0x0000 to 0xFFFD (0 to 65 533 W)							
		Heating power for second microwave heating cycle (third and fourth bytes):							
		0x0000 to 0xFFFD (0 W to 65 533 W)							

9.30.2 Operation status property

This property is used to specify whether to place the combination microwave oven into the ON state (i.e. a state in which the combination microwave oven is operating in one of its heating

modes or is waiting for a user operation using one of its heating modes) or OFF state, and to acquire the current setting. 0x30 and 0x31 shall be used for the ON and OFF states, respectively. In cases where the combination microwave oven belongs to a node in which the "combination microwave oven" class is implemented and it starts operating in one of its heating modes or is ready to respond to user operation as soon as the node starts up, 0x30 may be implemented as the fixed value. When the property value is 0x31 (OFF), values specified and acquired with other properties are not guaranteed, unless otherwise specified in this standard.

9.30.3 Door open/close status property

This property is used to acquire the status (i.e. open or closed) of the door of the combination microwave oven. 0x41 shall be used for the "open" state and 0x42 shall be used for the "closed" state.

9.30.4 Heating status property

This property is used to acquire the status of the combination microwave oven. The following property values shall be used:

Initial state (a state in which no setting has been made or the combination microwave oven is not heating anything): 0x40.

Heating: 0x41

Heating suspended (a state in which the combination microwave oven is operating but the current heating cycle has been suspended): 0x42.

Reporting completion of heating cycle (a state in which the specified heating cycle has been completed and the combination microwave oven is in the process of shifting to the initial state): 0x43.

Setting (a state in which the heating mode, heating time, heating temperature, etc. are being set): 0x44.

Preheating (a state in which a preheating cycle is being performed for an oven function-based heating cycle): 0x45.

Preheat temperature maintenance (a state in which the preheat temperature achieved for an oven function-based heating cycle is being maintained): 0x46.

Heating temporarily stopped for manual cooking action (a state in which heating has been temporarily stopped during a heating cycle to allow the user to perform manual reversing, mixing, etc. and a message is displayed to instruct the user on the manual action to be performed): 0x47.

This property indicates the current heating status in more detail than the "heating setting" property (Get) (EPC = 0xB2). The relationship between the property values of this property and the property values of the "heating setting" property (Get) are shown in Table 48.

Table 48 – Heating status property

This property	Related property
"Heating status" property (Get) (EPC = 0xB1)	**"Heating setting" property (Get) (EPC = 0xB2)**
Heating: 0x41	Heating started/resumed: 0x41
Preheating: 0x45	
Preheat temperature maintenance: 0x46	
Heating suspended: 0x42	Heating suspended: 0x42
Heating temporarily stopped for manual cooking action: 0x47	
Initial state: 0x40	Heating stopped: 0x43
Reporting completion of heating cycle: 0x43	
Setting: 0x44	

9.30.5 Heating setting property

This property is used to specify whether to start, stop or suspend heating, and to acquire the current setting (i.e. current heating status). 0x41, 0x42 and 0x43 shall be used for the "start/restart heating (heating started/restarted)", "suspend heating (heating suspended)" and "stop heating (heating stopped)" options/states, respectively.

9.30.6 Heating mode setting property

This property is used to specify the heating mode of the combination microwave oven, and to acquire the current setting (i.e. current mode).

The following property values shall be used:

Microwave heating: 0x41

Defrosting (a heating mode that is focused on defrosting frozen foods): 0x42

Oven: 0x43

Grill: 0x44

Toaster: 0x45

Fermenting: 0x46

Stewing (a heating mode that is focused on preparing stew-type dishes): 0x47

Steaming (a heating mode that is focused on preparing steamed dishes): 0x48

Two-stage microwave heating (a mode in which one microwave heating cycle is followed by another microwave heating cycle): 0x51

When no mode is specified, 0xFF shall be used.

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 oven function, it is not necessary to implement the value for the oven mode (0x43).

If a mode is specified by this property when both this property and the "automatic heating setting" property (EPC = 0xE1) have been implemented, the value of the "automatic heating setting" property shall change to 0x42 (manual heating) unless the property already contains 0x42. It is recommended that this property and the "automatic heating menu setting" property (EPC = 0xD0) be implemented in such a way that the value of the "automatic heating menu setting" property will change to 0xFF (= no menu item specified) when a mode is specified by this property.

9.30.7 Automatic heating setting property

This property is used to specify whether or not to use the combination microwave oven's automatic heating mode (i.e. a mode in which the combination microwave oven performs the automatic heating cycle specified by the "automatic heating menu setting" property), and to acquire the current setting. 0x41 and 0x42 shall be used for the "automatic heating" and "manual heating" options/states, respectively. When neither the "automatic heating" nor "manual heating" mode is specified, 0xFF shall be used.

If a mode is specified by the "heating mode setting" property (EPC = 0xE0) when both this property and the "heating mode setting" property have been implemented, the value of this property shall change to 0x42 (manual heating) unless it already contains 0x42.

If an automatic heating cycle is specified by the "automatic heating menu setting" property (EPC = 0xD0) when both this property and the "automatic heating menu setting" property have been implemented, the value of this property shall change to 0x41 (automatic heating), unless it already contains 0x41. The relationship between "heating mode setting" property, "automatic heating menu setting" property and this property is shown in Table 49.

Table 49 – Automatic heating setting property

Property SET	Property value
If a mode is specified (Set) by the "heating mode setting" property (EPC = 0xE0)	The value of the "automatic heating setting" property (EPC = 0xE1) shall be 0x42 (manual heating)
If an automatic heating cycle is specified (Set) by the "automatic heating menu setting" property (EPC = 0xD0)	The value of the "automatic heating setting" property (EPC = 0xE1) shall be 0x41 (automatic heating)

9.30.8 Automatic heating level setting property

This property is used to specify, by selecting a level from the five predefined levels, the level of automatic heating for the option specified by the "automatic heating menu setting" property, and to acquire the current setting.

The heating temperature values for the 5 levels may be defined freely, as long as 0x31, 0x33 and 0x35 are used for the lowest, standard and highest temperatures, respectively. When no heating level is specified, 0xFF shall be used.

9.30.9 Automatic heating menu setting property

When the value of the "automatic heating setting" property is 0x41 (automatic heating), this property is used to select an automatic heating cycle, and to acquire the current setting. The property values specified in Table 50 shall be used. The property value range shall be 0x00 to 0xFF (0 to 255). When no automatic heating cycle is specified, 0xFF shall be used.

Table 50 – Automatic heating cycle codes

Automatic heating cycle code	Name of automatic heating cycle	Description
0x00	Fully automatic	An automatic heating cycle in which the combination microwave oven automatically determines what to do.
0x01	Reheating boiled rice	Reheats boiled rice that has gotten cold in the microwave heating mode.
0x02	Reheating cooked dish	Reheats cooked dishes (other than boiled rice) that have gotten cold in the microwave heating mode.
0x03	Sake	Warms sake in the microwave heating mode.
0x04	Milk	Heats milk in the microwave heating mode.
0x05	Boiling leafy vegetables	Boils leafy vegetables in the microwave heating mode.
0x06	Boiling fruit/flower vegetables	Boils fruit/flower vegetables in the microwave heating mode.
0x07	Boiling root vegetables	Boils root vegetables in the microwave heating mode.
0x08 to 0x1F	Reserved for future use.	
0x20	Defrosting meat	Defrosts frozen meat, etc.
0x21	Defrosting sashimi	Defrosts frozen sashimi, etc.
0x22 to 0x2F	Reserved for future use.	
0x30	Hamburger steaks	Grills hamburger steaks.
0x31	Gratins	Bakes gratins.
0x32	Chawan-mushi	Makes chawan-mushi (steamed savory egg custard with chicken, shrimps and vegetables).
0x33	Cooking rice	Cooks rice.
0x34	Reheating fries	Reheats fries that have gotten cold.
0x35	Fries	Makes fries.
0x36 to 0x5F	Reserved for future use.	
0x60	Sponge cakes	Bakes sponge cakes.
0x61	Chiffon cakes	Bakes chiffon cakes.
0x62	Cookies	Bakes cookies.
0x63	Cream puffs	Bakes cream puffs.
0x64	Rolls	Bakes rolls.
0x65	Toast	Toasts slices of bread.
0x66 to 0x7F	Reserved for future use.	
0x80 to 0xFE	To be defined by the user.	
0xFF	No automatic heating cycle specified.	

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

When the actual piece of equipment is capable of performing any of the automatic heating cycles listed above, the corresponding code shall be implemented in the piece of equipment.

If an automatic heating cycle is specified by this property when both this property and the "automatic heating setting" property (EPC = 0xE1) have been implemented, the value of the "automatic heating setting" property shall change to 0x41 (automatic heating), unless the "automatic heating setting" property already contains 0x41.

It is recommended that this property and the "heating mode setting" property (EPC = 0xE0) be implemented in such a way that the value of the "heating mode setting" property will change to 0xFF (= no mode specified) when an automatic heating cycle is specified by this property.

9.30.10 Oven mode setting property

When the value of the "heating mode setting" property (EPC = 0xE0) is 0x43 (oven), this property is used to specify the sub-mode to use, and to acquire the current setting.

The following property values shall be used:

Convection oven mode (heats the chamber or bakes food by allowing the heated air to convect within the chamber without forcefully circulating it): 0x41.

Circulation oven mode (heats the chamber or bakes food by forcefully circulating the heated air within the chamber using a fan, etc.): 0x42.

Hybrid oven mode (convection and circulation oven functions are used in combination): 0x43.

Automatic selection mode (combination microwave oven automatically determines what to do within the "oven" mode): 0x40.

When no sub-mode is specified, 0xFF shall be used.

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 circulation oven function, it is not necessary to implement the value for the circulation oven mode (0x42).

9.30.11 Oven preheating setting property

When the value of the "heating mode setting" property (EPC = 0xE0) is 0x43 (oven), this property is used to specify whether or not to preheat the chamber for the selected oven sub-mode, and to acquire the current setting. 0x41 and 0x42 shall be used for the "with preheating" and "without preheating" options, respectively. When no option is specified, 0xFF shall be used. When no option is specified, the mode to be used shall be implementation-dependent.

9.30.12 Fermenting mode setting property

When the value of the "heating mode setting" property (EPC = 0xE0) is 0x46 (fermenting), this property is used to specify the sub-mode to use, and to acquire the current setting.

The following property values shall be used:

Convection fermentation mode (heats the chamber and ferments food by allowing the heated air to convect within the chamber without forcefully circulating it): 0x41.

Circulation fermentation mode (heats the chamber and ferments food by forcefully circulating the heated air within the chamber using a fan, etc.): 0x42.

Hybrid fermentation mode (convection and circulation fermentation functions are used in combination to heat the chamber and ferment food): 0x43.

Microwave fermentation mode (ferments food using the microwave heating function): 0x51.

Automatic selection mode (combination microwave oven automatically determines what to do within the "fermenting" mode): 0x40

When no sub-mode is specified, 0xFF shall be used.

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 circulation fermentation function, it is not necessary to implement the value for the circulation fermentation mode (0x42).

9.30.13 Chamber temperature setting property

When the value of the "heating mode setting" property (EPC = 0xE0) is 0x43 (oven) or 0x46 (fermenting), this property is used to specify the temperature in the chamber in 0,1 °C increments, and to acquire the current setting. The property value range shall be 0xF554 to 0x7FFE (–273,2 °C to 3 276,6 °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 actual piece of equipment automatically controls the chamber temperature (for example, in its fermenting mode), the property value shall be 0x8001.

When no temperature is specified, 0x8002 shall be used.

When a value is set in this property and the actual piece of equipment in which this class is implemented is not capable of achieving the temperature that corresponds to the property value (because part or all of the value range of the actual piece of equipment is below the lower limit of the property value range), the value to be used shall be implementation-dependent.

9.30.14 Food temperature setting property

This property is used to specify the heated food temperature in 0,1 °C increments, and to acquire the current setting. The property value range shall be 0xF554 to 0x7FFE (–273,2 °C to 3 276,6 °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 no temperature is specified, 0x8002 shall be used.

When a value is set in this property and the actual piece of equipment in which this class is implemented is not capable of achieving the temperature that corresponds to the property value (because part or all of the value range of the actual piece of equipment is below the lower limit of the property value range), the value to be used shall be implementation-dependent.

In cases where the design is such that setting a value with this property may necessitate a "heating time setting" property (EPC = 0xE5) value change to ensure consistency between property contents, a means shall be provided to automatically make any required change to the content of the "heating time setting" property.

9.30.15 Heating time setting property

This property is used to specify the duration of heating in the "hour (0x00 to 0x17 (0 to 23)): minute (0x00 to 0x3B (0 to 59)): second (0x00 to 0x3B (0 to 59))" format, and to acquire the current setting. Three bytes shall be used, with the highest- and lowest-order bytes used for the "hour" and "second" values, respectively. When the heating time is unknown because an automatic heating cycle has been specified by the "automatic heating menu setting" property or for any other reason, 0xFDFDFD shall be used as the property value. The heating time shall be specified before the heating starts.

When no heating time is specified, 0x000000 shall be used.

When a value is set in this property and the actual piece of equipment in which this class is implemented is not capable of achieving the duration that corresponds to the property value (because part or all of the value range of the actual piece of equipment is below the lower limit of the property value range), the value to be used shall be implementation-dependent.

In cases where the design is such that setting a value with this property may necessitate a "food temperature setting" property (EPC = 0xE4) value change to ensure consistency between property contents, a means shall be provided to automatically make any required change to the content of the "food temperature setting" property.

9.30.16 Remaining heating time property

This property is used to specify the time remaining to complete the heating cycle in the "hour (0x00 to 0x17 (0 to 23)): minute (0x00 to 0x3B (0 to 59)): second (0x00 to 0x3B (0 to 59))" format, and to acquire the current setting. Three bytes shall be used, with the highest- and lowest-order bytes used for the "hour" and "second" values, respectively.

When the remaining heating time is unknown because an automatic heating cycle has been specified by the "automatic heating menu setting" property or for any other reason, 0xFDFDFD shall be used as the property value.

When no remaining heating time is specified, 0x000000 shall be used.

The remaining heating time shall be specified after the heating starts, because the setting of a value in this property means altering the remaining heating time.

9.30.17 Microwave heating power setting property

When the value of the "heating mode setting" property (EPC = 0xE0) is 0x41 (microwave heating), 0x42 (defrosting), 0x47 (stewing) or 0x48 (steaming), or when the value of the "heating mode setting" property (EPC = 0xE0) is 0x46 (fermenting) and the value of the "fermenting mode setting" property (EPC = 0xD6) is 0x51 (microwave fermentation mode), this property is used to specify the microwave heating power in 1 W increments, and to acquire the current setting.

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, 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 a value is set in this property and the actual piece of equipment is not capable of achieving the microwave heating power that corresponds to the property value, the value to be used shall be implementation-dependent.

When the microwave heating power is not specified, 0x0000 shall be used.

9.30.18 Prompt message setting property

When it is necessary to instruct the combination microwave oven to temporarily stop heating at a point during a heating cycle to allow the user to perform manual reversing, mixing, etc. and display a message to instruct the user on the manual action to be performed, this property is used to specify the prompt message to be displayed and the timing of the message (in terms of a percentage of the total duration of the heating cycle that is allowed to elapse (from the start of the heating cycle) before the message is displayed), and to acquire the current settings.

This property shall use four pairs of bytes, with the first and second bytes of each pair used for the prompt message code (0x00 to 0xFF (0 to 255)) and the timing value (0x00 to 0x64 (0 % to 100 %)), respectively. The pairs of values shall be arranged in the order that the messages will be displayed. The prompt message codes are defined in Table 51.

Table 51 – Prompt message codes

Prompt message code	Instruction
0x00	No instruction.
0x01	Stir the mixture.
0x02	Stir the mixture using an eggbeater.
0x03	Stir the mixture gently but thoroughly.
0x04	Mix the ingredients thoroughly.
0x05	Reverse foods.
0x06	Skim the scum.
0x07 to 0x1F	Reserved for future use.
0x20	Cover with aluminum foil and continue heating.
0x21	Cover with clear plastic wrap and continue heating.
0x22	Put the lid on the pot and continue heating.
0x23 to 0x2F	Reserved for future use.
0x30	Remove the aluminum foil and continue heating.
0x31	Remove the clear plastic wrap and continue heating.
0x32	Take the lid off the pot and continue heating.
0x33 to 0x3F	Reserved for future use.
0x40	Add the appropriate ingredients.
0x41	Sprinkle salt and pepper.
0x42 to 0x4F	Reserved for future use.
0x50	Preheating completed.
0x51 to 0x7F	Reserved for future use.
0x80 to 0xFF	To be defined by the user.

When none of the accessories is to be used, bits 0 through bit 14 shall contain "0" and bit 15 shall contain "1" (property value = 0x8000).

When no accessory is specified or the accessories selected are unknown, bits 0 through bit 14 and bit 15 shall contain "0" (property value = 0x0000).

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

<Example>

When the total duration of the heating cycle is 10 min and the combination microwave oven is to be instructed to display the prompt message "please stir food" (0x05) 2 min (0x14 = 20 % of the total duration of the heating cycle) after the heating cycle starts, the content of the property shall be 0x05 14 00 00 00 00 00 00.

9.30.19 "Accessories to combination microwave oven" setting property

This property is used to specify, by means of a 2-byte bitmap, what accessory or accessories to use for the combination microwave oven, and to acquire the current setting. The value contained in a bit in the bitmap shall be "1" if the accessory represented by that bit is used (in the specified position in cases where the position is specified) and "0" if the accessory represented by that bit is not used.

When bit 15 contains "1", it shall mean that the accessories represented by all the other bits (bit 0 through bit 14) are used. When bit 15 contains "0", it shall mean that one or more accessories selected from those represented by bit 0 through bit 14 are used.

The composition of the 2-byte bitmap shall be shown in Table 52.

Table 52 – 2 bytes bitmap definition for each accessory

Bit number	Accessory	Explanation
Bit 0	Ceramic turntable	A circular ceramic turntable that is attachable to a rotating lattice, etc.
Bit 1	Glass turntable	A circular glass turntable that is attachable to a rotating lattice, etc.
Bit 2	Metallic turntable	A circular metallic turntable that is attachable to a rotating lattice, etc.
Bit 3	Rotating lattice	A rotating lattice or plate.
Bit 4	Rotating latticed metallic grill	A latticed metallic grill that is attachable to a turntable.
Bit 5	Rectangular ceramic tray (third shelf level (as counted from the lowest shelf level))	A rectangular ceramic tray for use at the third shelf level of the chamber of a combination microwave oven having 3 shelf levels.
Bit 6	Rectangular metallic tray (third shelf level (as counted from the lowest shelf level))	A rectangular metallic tray for use at the third shelf level of the chamber of a combination microwave oven having 3 shelf levels.
Bit 7	Latticed metallic grill (third shelf level (as counted from the lowest shelf level))	A latticed metallic grill that is mountable on a rectangular tray for use at the third shelf level of the chamber of a combination microwave oven having 3 shelf levels.
Bit 8	Rectangular ceramic tray (second shelf level (as counted from the lowest shelf level))	A rectangular ceramic tray for use at the second shelf level of the chamber of a combination microwave oven having 2 or more shelf levels.
Bit 9	Rectangular metallic tray (second shelf level (as counted from the lowest shelf level))	A rectangular metallic tray for use at the second shelf level of the chamber of a combination microwave oven having 2 or more shelf levels.
Bit 10	Latticed metallic grill (second shelf level (as counted from the lowest shelf level))	A latticed metallic grill that is mountable on a rectangular tray for use at the second shelf level of the chamber of a combination microwave oven having 2 or more shelf levels.
Bit 11	Rectangular ceramic tray (first shelf level (lowest shelf level))	A rectangular ceramic tray for use at the lowest shelf level of the chamber of a combination microwave oven.
Bit 12	Rectangular metallic tray (first shelf level (lowest shelf level))	A rectangular metallic tray for use at the lowest shelf level of the chamber of a combination microwave oven.
Bit 13	Latticed metallic grill (first shelf level (lowest shelf level))	A latticed metallic grill that is mountable on a rectangular tray for use at the lowest shelf level of the chamber of a combination microwave oven.
Bit 14	To be defined by the user.	
Bit 15	Accessory selection bit	When bit 15 contains "1", it shall mean that the accessories represented by all the other bits (bit 0 through bit 14) are used. When bit 15 contains "0", it shall mean that one or more accessories selected from the accessories represented by bit 0 through bit 14 are used.

When none of the accessories is to be used, bits 0 through bit 14 shall contain "0" and bit 15 shall contain "1" (property value = 0x8000).

When no accessory is specified or the accessories selected are unknown, bits 0 through bit 14 and bit 15 shall contain "0" (property value = 0x0000).

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

9.30.20 Display character string setting property

This property is used to input character strings to use on the display of the combination microwave oven. The shift-JIS code system (1 character = 2 bytes) shall be used. The maximum number of characters shall be 20.

The first and succeeding pairs of bytes shall be used for the first and succeeding characters, respectively. When the number of characters to input is less than 20, each pair of bytes after the pair of bytes that contains the last character shall contain the shift-JIS space code (0x8140). For example, when the number of characters is 15, each of the 16th through 20th pairs of bytes shall contain the shift-JIS space code (0x8140).

9.30.21 Two-stage microwave heating setting (duration) property

When the value of the "heating mode setting" property (EPC = 0xE0) is 0x51 (two-stage microwave heating), this property is used to specify the duration of the first and second microwave heating cycles in the "hour (0x00 to 0x17 (0 to 23)): minute (0x00 to 0x3B (0 to 59)): second (0x00 to 0x3B (0 to 59))" format, and to acquire the current setting. Three bytes shall be used for each heating cycle, with the first set of bytes (first through third bytes) and second set of bytes (fourth through sixth bytes) used for the first and second heating cycles, respectively, and the highest- and lowest-order bytes of each set of bytes used for the "hour" and "second" values, respectively.

When the duration of the heating cycles for two-stage microwave heating is not specified, the value 0x000000 000000 shall be used.

The durations shall be specified before the two-stage microwave heating starts.

This property is independent of the "heating time setting" property (EPC = 0xE5) and there is no need to correlate the properties.

When a value is set in this property and the actual piece of equipment in which this class is implemented is not capable of achieving the duration that corresponds to the property value (because part or all of the value range of the actual piece of equipment is below the lower limit of the property value range), the value to be used shall be implementation-dependent.

9.30.22 Two-stage microwave heating setting (heating power) property

When the value of the "heating mode setting" property (EPC = 0xE0) is 0x51 (two-stage microwave heating), this property is used to specify the heating power for the first and second microwave heating cycles in 1 W increments, and to acquire the current setting. Two bytes shall be used for each heating cycle, with the first pair of bytes (first and second bytes) and second pair of bytes (third and fourth bytes) used for the first and second heating cycles, respectively.

The property value range for each microwave heating cycle 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, 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 a value is set in this property and the actual piece of equipment is not capable of achieving the microwave heating power that corresponds to the property value, the value to be used shall be implementation-dependent.

When the heating power for the heating cycles for two-stage microwave heating is not specified, the value 0x0000 0000 shall be used.

This property is independent of the "microwave heating power setting" property (EPC = 0xE7) and there is no need to correlate the properties.

9.31 Washer and dryer class specifications

9.31.1 General

The control commands of "washer and dryer class" are shown in Table 53.

Class group code   : 0x03

Class code   : 0xD3

Table 53 – List of washer and dryer 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.	unsigned char	1 byte	–	Set		O	
		ON = 0x30, OFF = 0x31				Get	O		
Door/cover open/close status	0xB0	Used to acquire the status of the door/cover (i.e. open or closed).	unsigned char	1 byte	–	Get			
		Door/cover open = 0x41							
		Door/cover closed = 0x42							
Washer and dryer setting	0xB2	Used to specify whether to start or stop the washing, drying or washing and drying cycle, and to acquire the current status.	unsigned char	1 byte	–	Set/Get			
		Start/restart(ed) or in progress = 0x41							
		Suspend(ed) = 0x42							
		Stop(ped) = 0x43							
Washer and dryer cycle setting 1 (see [a])	0xD0	Used to specify the washer and dryer cycle option(s) to use in the "washing and drying", "washing" or "drying" mode and to acquire the current setting(s). The value ranges shall be as follows:	unsigned char	1 byte	–	Set/Get			(see [a]) (see [b])
		Washing and drying course: 0x21 to 0x3F							
		Washing and drying course manufacturer original code: 0x40 to 0x4F							
		Washing course: 0x61 to 0x7F							
		Washing course manufacturer original code: 0x80 to 0x8F							
		Drying course: 0xA1 to 0xBF							
		Drying course manufacturer original code: 0xC0 to 0xDF							
		\<Washing and drying course\>							
		Standard = 0x21, silent = 0x22, heavily soiled clothes = 0x23, hard-to-remove stains = 0x24, presoaking = 0x25, blankets = 0x26,							

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
		soft = 0x27, dry = 0x28, clean rinsing = 0x29, ironing/business shirts = 0x2A, hang drying = 0x2B, thick clothes = 0x2C, disinfection = 0x2D, oil stains = 0x2E, memory = 0x2F, detergent saving = 0x30, lightly soiled clothes = 0x31, quick wash of small amount of laundry = 0x32							
		Washing course / manufacturer original course = 0x40 to 0x4F							
		\<Washing course\>							
		Standard = 0x61, silent = 0x62, heavily soiled clothes = 0x63, hard-to-remove stains = 0x64, presoaking = 0x65, blankets = 0x66, soft = 0x67, dry = 0x68, clean rinsing = 0x69, disinfection = 0x6A, oil stains = 0x6B, memory = 0x6C, detergent saving = 0x6D, lightly soiled clothes = 0x6E, quick wash of small amount of laundry = 0x6F, tank cleaning = 0x7F							
		Washing course / manufacturer original course = 0x80 to 0x8F							
		\<Drying course\>							
		Standard = 0xA1, blankets = 0xA2, soft = 0xA3, dry = 0xA4, ironing/business shirts = 0xA5, hang drying = 0xA6, thick clothes = 0xA7, disinfection = 0xA8, shrinkage minimization = 0xA9, finishing = 0xAA, stationary drying = 0xAB, user definition of drying time = 0xAC, garment warming = 0xAD, tank drying = 0xBF							
		Drying course / manufacturer original course = 0xC0 to 0xCF							

Property name	EPC	Contents of property / Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Washer and dryer cycle setting 2	0xD1	Used to specify the washer and dryer cycle option(s) to use in the "washing and drying" mode, and to acquire the current setting(s). The drying option(s) to use shall be specified with the "drying cycle setting" property (EPC = 0xD2). Manufacturer original code = 0xE0 to 0xEF	unsigned char	1 byte	–	Set/ Get			(see [a]) (see [b])
		No washing = 0x20, standard = 0x21, silent = 0x22, heavily soiled clothes = 0x23, hard-to-remove stains = 0x24, presoaking = 0x25, blankets = 0x26, soft = 0x27, dry = 0x28, clean rinsing = 0x29, disinfection = 0x2D, oil stains = 0x2E, memory = 0x2F, detergent saving = 0x30, lightly soiled clothes = 0x31, quick wash of small amount of laundry = 0x32, tank cleaning = 0x3F Manufacturer original course = 0xE0 to 0xEF							
Drying cycle setting (see [a])	0xD2	Used to specify the drying cycle option(s) to use, and to acquire the current setting. For the "washing and drying" mode, the "washer and dryer cycle setting 2" property (EPC = 0xD1) shall be used. Manufacturer original code = 0xE0 to 0xEF	unsigned char	1 byte	–	Set/ Get			(see [a]) (see [b])
		No drying = 0xA0, standard = 0xA1, blankets = 0xA2, soft = 0xA3, dry = 0xA4, ironing/business shirts = 0xA5, hang drying = 0xA6, thick clothes = 0xA7, disinfection = 0xA8, shrinkage minimization = 0xA9, finishing = 0xAA, stationary drying = 0xAB, user definition of drying time = 0xAC, garment warming = 0xAD, heater current limit = 0xAE, tank drying = 0xBF Manufacturer original course = 0xE0 to 0xEF							

Property name	EPC	Contents of property / Value range (decimal notation)	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
Washer and dryer cycle option list 1	0xD3	Used to acquire a bitmap list of the washer and dryer cycle options that can be specified with the "washer and dryer cycle setting 1" property.	unsigned char ×12	12 bytes	–	Get			
		When the value contained in the bit for the desired washer and dryer cycle option is "1", the option can be specified. When the value contained in the bit for the desired washer and dryer cycle option is "0", the option cannot be specified. For the requirement as to which bit shall be used for which option, refer to the detailed explanation.							
Washer and dryer cycle option list 2	0xD4	Used to acquire a bitmap list of the washer and dryer cycle options that can be specified with the "washer and dryer cycle setting 2" property.	unsigned char ×4	4 bytes	–	Get			
		When the value contained in the bit for the desired washer and dryer cycle option is "1", the option can be specified. When the value contained in the bit for the desired washer and dryer cycle option is "0", the option cannot be specified. For the requirement as to which bit shall be used for which option, refer to the detailed explanation.							
Washer and dryer cycle option list 3	0xD5	Used to acquire a bitmap list of the drying cycle options that can be specified with the "drying cycle setting" property.	unsigned char ×4	4 bytes	–	Get			
		When the value contained in the bit for the desired drying cycle option is "1", the option can be specified. When the value contained in the bit for the desired drying cycle option is "0", the option cannot be specified. For the requirement as to which bit shall be used for which option, refer to the detailed explanation.							
Water flow rate setting	0xD6	Used to specify the water flow rate by selecting a level from the predefined levels and to acquire the current setting. <Absolute setting> 0x31 to 0x40 (16 levels) 0x31 and 0x40 shall be used for the lowest and highest flow rates, respectively.	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
		<Relative setting relative to the automatic setting>							
		- Automatic setting 0xFF							
		- Relative setting in the positive direction 0xA0 to 0xA7: levels 1 to 8							
		- Relative setting in the negative direction 0xC0 to 0xC7: levels 1 to 8							
Rotation speed for spin drying setting	0xD7	Used to specify the rotation speed for spin drying in r/min and to acquire the current setting.	unsigned short	2 bytes	–	Set/ Get			
		<Absolute setting>							
		- 0x0000 to 0x0FFF (0 r/min to 4 095 r/min.)							
		<Relative setting relative to the automatic setting>							
		- Automatic setting 0xFFFF							
		- Relative setting in the positive direction							
		0xA000 to 0xA7FF (1 r/min to 2 048 r/min.)							
		- Relative setting in the negative direction							
		0xC000 to 0xC7FF (1 r/min to 2 048 r/min.)							
Degree of drying setting	0xD8	Used to specify the degree of drying to achieve by selecting a level from the 16 predefined levels and to acquire the current setting.	unsigned char	1 byte	–	Set/ Get			
		<Absolute setting>							
		- 0x31 to 0x40 (16 levels)							
		0x31 and 0x40 shall be used for the lowest and highest levels, respectively.							
		<Relative setting relative to the automatic setting>							
		- Automatic setting							
		0xFF							
		- Relative setting in the positive direction							
		0xA0 to 0xA7: levels 1 to 8							
		- Relative setting in the negative direction							
		0xC0 to 0xC7: levels 1 to 8							

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Remain-ing washing time	0xDB	Acquires the remaining washing time in the "HH:MM" format.	unsigned char ×2	2 bytes	–	Get			
		0 to 0xFE: 0 to 0x3B							
		(=0 to 254) h: (=0 to 59) min							
		Remaining time unknown = 0xFF: 0xFF							
Remain-ing drying time	0xDC	Acquires the remaining drying time in the "HH:MM" format.	unsigned char ×2	2 bytes	–	Get			
		0 to 0xFE: 0 to 0x3B							
		(= 0 to 254) h: (= 0 to 59) min							
		Remaining time unknown = 0xFF: 0xFF							
Elapsed time on the ON timer	0xDF	Used to acquire the time elapsed on the ON timer after the ON timer was activated.	unsigned char ×2	2 bytes	h m	Get			
		0 to 0xFF: 0 to 0x3B							
		(= 0 to 255): (= 0 to 59)							
Pre-soaking time setting	0xE1	Used to specify the duration of the presoaking process and to acquire the current setting.	unsigned char ×2	2 bytes	hh: min	Set/ Get			
		<Absolute setting>							
		- 0x00 to 0x17: 0x00 to 0x3B							
		(= 0 h to 23 h): (= 0 min to 59 min)							
		<Relative setting relative to the automatic setting>							
		- Automatic setting							
		0xFF: 0xFF							
		- Relative setting in the positive direction							
		0xA000 to 0xA03B: 1 min to 60 min							
		- Relative setting in the negative direction							
		0xC000 to 0xC03B: 1 min to 60 min							

a   The washer and dryer cycle shall be specified either by the "washer and dryer cycle setting 1" property (EPC = 0xD0) or by the "washer and dryer cycle setting 2" property (EPC = 0xD1) combined with the "drying cycle setting" property (EPC = 0xD2). Either the "washer and dryer cycle setting 1" property or the "washer and dryer cycle setting 2" and "drying cycle setting" properties shall be implemented in the actual piece of equipment (the alternative shall not be implemented).

The following properties may be used to make changes or additions to the washer and dryer cycle options specified with the "washer and dryer cycle setting 1" property or with the "washer and dryer cycle setting 2" and "drying cycle setting" properties.

b   Manufacturer original code shall be used for the property which is not defined as the property of the ECHONET object specification.

The code in the manufacturer original code shall be set by the individual manufacturer and add / delete / modify of the code shall be done by the individual manufacturer.

The contents set as the manufacturer original code can be open or not to the public by the individual manufacturer.

9.31.2 Operation status property

This property indicates whether the washer and dryer are in the ON state (i.e. the washer and dryer response to user operation) or OFF state. 0x30 and 0x31 shall be used for the ON and OFF states, respectively. In cases where the washer and dryer belong to a node in which the "washer and dryer" class is implemented and the washer and dryer are ready to respond to user operation as soon as the node starts up, 0x30 may be implemented as the fixed value. When the property value is 0x31 (OFF), values acquired with other properties are not guaranteed, unless otherwise specified in this standard.

9.31.3 Door/cover open/close status property

This property is used to acquire the status (i.e. open or closed) of the door/cover. 0x41 shall be used for the "open" state and 0x42 shall be used for the "closed" state.

9.31.4 Washer and dryer setting property

This property is used to specify whether to start, stop or suspend the washer and dryer cycle, and to acquire the current operation status. 0x41 shall be used for the "start/restart(ed)" option/state and 0x42 and 0x43 shall be used for "suspend(ed)" and "stop(ped)" options/states, respectively. The relationship between the values of this property (Get) and the values of the "current stage of washer and dryer cycle" property (Get) (EPC = 0xE2) are as shown in Table 54.

Table 54 – washer and dryer setting property

"Washer and dryer setting" property	"Current stage of washer and dryer cycle" property (EPC = 0xE2)
0x41: Washer and dryer cycle in progress	Other than below
0x42: Washer and dryer cycle suspended	0x44: Suspended
0x43: Washer and dryer cycle stopped	0x45: Washing completed 0x51: Washing completed / drying (without wrinkling minimization) completed 0x54: Drying (with wrinkling minimization) completed 0x61: Standing by to start

9.31.5 Washer and dryer cycle setting 1 property

Used to specify the washer and dryer cycle option(s) to use in the "washing and drying" (washing followed by drying), "washing" (washing only) or "drying" (drying only) mode, and to acquire the current setting(s).

The value ranges shall be as follows:

Washing and drying course: 0x21 to 0x3F

Washing and drying course manufacturer original code: 0x40 to 0x4F

Washing course: 0x61 to 0x7F

Washing course manufacturer original code: 0x80 to 0x8F

Drying course: 0xA1 to 0xBF

Drying course manufacturer original code: 0xC0 to 0xDF

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.

The possible washer and dryer cycle options are explained below for each of the 3 modes.

<Washing and drying>

a) Standard (0x21)

This status is the most basic washing and drying cycle of the piece of equipment.

b) Silent (0x22)

A washing and drying cycle focused on washing and drying clothes at an operation noise level that is lower than that of the "standard" option.

Heavily soiled clothes (0x23)

A washing and drying cycle focused on removing stains from heavily soiled clothes. In cases where two different cycles of this type are available for different levels of soiling, this cycle shall be defined as the one for lightly soiled clothes.

c) Hard-to-remove stains (0x24)

A washing and drying cycle focused on removing stains from heavily soiled clothes. In cases where two different cycles of this type are available for different levels of soiling, this cycle shall be defined as the one for heavily soiled clothes. In cases where only one cycle is available for heavily soiled clothes, it shall not be defined as the "hard-to-remove stains" (0x24) option.

d) Presoaking (0x25)

A washing and drying cycle that includes a presoaking process performed before the washing process.

e) Blankets (0x26)

A washing and drying cycle focused on washing blankets.

f) Soft (0x27)

A washing and drying cycle focused on washing delicate clothes (e.g. those that easily lose shape).

g) Dry (0x28)

A washing and drying cycle focused on washing clothes with a dry-cleaning symbol or delicate clothes (e.g. those that easily lose shape).

h) Clean rinsing (0x29)

A washing and drying cycle focused on thorough rinsing.

i) Ironing/business shirts (0x2A)

A washing and drying cycle that leaves the laundry slightly damp to facilitate ironing.

j) Hang drying (0x2B)

A washing and drying cycle that leaves the laundry slightly damp to allow for hang drying.

k) Thick clothes (0x2C)

A washing and drying cycle focused on drying clothes that do not dry easily.

l) Disinfection (0x2D)

A washing and drying cycle focused on removing bacteria.

m) Oil stains (0x2E)

A washing and drying cycle focused on removing oil stains.

n) Memory (0x2F)

This status is a washing and drying cycle option to perform a washing and drying cycle that has been input into the memory by the user.

o) Detergent saving (0x30)

A washing and drying cycle focused on saving detergent.

p) Lightly soiled clothes (0x31)

A washing and drying cycle focused on quickly washing lightly soiled clothes.

q) Quick wash of a small amount of laundry (0x32)

A washing and drying cycle focused on washing a small amount of laundry quickly.

r) Washing and drying setting / manufacturer original course (0x40 to 0x4F)

A washing and drying process defined by the manufacturer.

<Washing>

1) Standard (0x61)

This status is the most basic washing cycle of the piece of equipment.

2) Silent (0x62)

A washing cycle focused on washing clothes at an operation noise level that is lower than that of the "standard" cycle.

3) Heavily soiled clothes (0x63)

A washing cycle focused on removing stains from heavily soiled clothes. In cases where two different cycles of this type are available for different levels of soiling, this cycle shall be defined as the one for lightly soiled clothes.

4) Hard-to-remove stains (0x64)

A washing cycle focused on removing stains from heavily soiled clothes. In cases where two different cycles of this type are available for different levels of soiling, this cycle shall be defined as the one for heavily soiled clothes. In cases where only one cycle is available for heavily soiled clothes, it shall not be defined as the "hard-to-remove stains" (0x64) option.

5) Presoaking (0x65)

A washing cycle that includes a presoaking process performed before the washing process.

6) Blankets (0x66)

A washing cycle focused on washing blankets.

7) Soft (0x67)

A washing cycle focused on washing delicate clothes (e.g. those that easily lose shape).

8) Dry (0x68)

A washing cycle focused on washing clothes with a dry-cleaning symbol or delicate clothes (e.g. those that easily lose shape).

9) Clean rinsing (0x69)

A washing cycle focused on thorough rinsing.

10) Disinfection (0x6A)

A washing cycle focused on removing bacteria.

11) Oil stains (0x6B)

A washing cycle focused on removing oil stains.

12) Memory (0x6C)

A washing cycle option to perform a washing cycle that has been input into the memory by the user.

13) Detergent saving (0x6D)

A washing cycle focused on saving detergent.

14) Lightly soiled clothes (0x6E)

A washing cycle focused on quickly washing lightly soiled clothes.

15) Quick wash of a small amount of laundry (0x6F)

A washing cycle focused on washing a small amount of laundry quickly.

16) Tank cleaning (0x7F)

A cycle used to clean the tank.

17) Washing setting / manufacturer original course (0x80 to 0x8F)

A washing process defined by the manufacturer.

<Drying>

i) Standard (0xA1)

This status is the most basic drying cycle of the piece of equipment.

ii) Blankets (0xA2)

A drying cycle focused on drying blankets.

iii) Soft (0xA3)

A drying cycle focused on drying delicate clothes (e.g. those that easily lose shape).

iv) Dry (0xA4)

A drying cycle focused on drying clothes with a dry-cleaning symbol or delicate clothes (e.g. those that easily lose shape).

v) Ironing/business shirts (0xA5)

A drying cycle that leaves the laundry slightly damp to facilitate ironing.

vi) Hang drying (0xA6)

A drying cycle that leaves the laundry slightly damp to allow for hang drying.

vii) Thick clothes (0xA7)

A drying cycle focused on drying clothes that do not dry easily.

viii) Disinfection (0xA8)

A drying cycle focused on removing bacteria.

ix) Shrinkage minimization (0xA9)

A drying cycle focused on minimizing shrinkage of clothes.

x) Finishing (0xAA)

A drying cycle focused on drying partly dried laundry.

xi) Stationary drying (0xAB)

A drying cycle that dries the laundry without rotating the drum or tank.

xii) User definition of drying time (0xAC)

A drying cycle option that allows the user to specify the duration of the drying cycle.

xiii) Garment warming (0xAD)

A drying cycle used to warm garments.

xiv) Tank drying (0xBF)

A cycle used to dry the tank.

xv) Drying setting / manufacturer original course (0xC0 to 0xCF)

A drying process defined by the manufacturer.

9.31.6 Washer and dryer cycle setting 2 property

Used to specify the washer and dryer cycle option(s) to use in the "washing and drying" (washing followed by drying) mode, and to acquire the current setting(s). This property is used in combination with the "drying cycle setting" property (EPC = 0xD2), which is used to specify the drying cycle option(s) to use in combination with the washer and dryer cycle options specified with this property. 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.

a) No washing (0x20)

A cycle with no washing process.

b) Standard (0x21)

The most basic washing and drying cycle of the piece of equipment.

c) Silent (0x22)

A washing and drying cycle focused on washing and drying clothes at an operation noise level that is lower than that of the "standard" cycle.

d) Heavily soiled clothes (0x23)

A washing and drying cycle focused on removing stains from heavily soiled clothes. In cases where two different cycles of this type are available for different levels of soiling, this cycle shall be defined as the one for lightly soiled clothes.

e) Hard-to-remove stains (0x24)

A washing and drying cycle focused on removing stains from heavily soiled clothes. In cases where two different cycles of this type are available for different levels of soiling, this cycle shall be defined as the one for heavily soiled clothes. In cases where there is only one cycle for heavily soiled clothes, it shall not be defined as the "hard-to-remove stains" (0x24) option.

f) Presoaking (0x25)

A washing and drying cycle that includes a presoaking process performed before the washing process.

g) Blankets (0x26)

A washing and drying cycle focused on washing blankets.

h) Soft (0x27)

A washing and drying cycle focused on washing delicate clothes (e.g. those that easily lose shape).

i) Dry (0x28)

A washing and drying cycle focused on washing clothes with a dry-cleaning symbol as well as delicate clothes (e.g. those that easily lose shape).

j) Clean rinsing (0x29)

A washing and drying cycle focused on thorough rinsing.

k) Disinfection (0x2D)

A washing and drying cycle focused on removing bacteria.

l) Oil stains (0x2E)

A washing and drying cycle focused on removing oil stains.

m) Memory (0x2F)

A washing and drying cycle option to perform a washing cycle that has been input into the memory by the user.

n) Detergent saving (0x30)

A washing and drying cycle focused on saving detergent.

o) Lightly soiled clothes (0x31)

A washing and drying cycle focused on washing lightly soiled clothes quickly.

p) Quick wash of a small amount of laundry (0x32)

A washing and drying cycle focused on washing a small amount of laundry quickly.

q) Tank cleaning (0x3F)

A cycle used to clean the tank.

r) Manufacturer original course (0xE0 to 0xEF)

A washing and drying process defined by the manufacturer.

9.31.7 Drying cycle setting property

This property is used to specify the drying cycle option(s) to use, and to acquire the current setting. This property is used in combination with the "washer and dryer cycle setting 2" property (EPC = 0xD1), which is used to specify the washer and dryer cycle (washing) option(s) to use in combination with the drying cycle option(s) specified with this property.

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.

a) No drying (0xA0)

A cycle with no drying process.

b) Standard (0xA1)

The most basic drying cycle of the piece of equipment.

c) Blankets (0xA2)

A drying cycle focused on drying blankets.

d) Soft (0xA3)

A drying cycle focused on drying delicate clothes (e.g. those that easily lose shape).

e) Dry (0xA4)

A drying cycle focused on drying clothes with a dry-cleaning symbol as well as delicate clothes (e.g. those that easily lose shape).

f) Ironing/business shirts (0xA5)

A drying cycle that leaves the laundry slightly damp to facilitate ironing.

g) Hang drying (0xA6)

A drying cycle that leaves the laundry slightly damp to allow for hang drying.

h) Thick clothes (0xA7)

A drying cycle focused on drying clothes that do not dry easily.

i) Disinfection (0xA8)

A drying cycle focused on removing bacteria.

j) Shrinkage minimization (0xA9)

A drying cycle focused on minimizing shrinkage of clothes.

k) Finishing (0xAA)

A drying cycle focused on drying partly dried laundry.

l) Stationary drying (0xAB)

A drying cycle that dries the laundry without rotating the drum or tank.

m) User definition of drying time (0xAC)

A drying cycle option that allows the user to specify the duration of the drying cycle.

n) Garment warming (0xAD)

A cycle used to warm garments.

o) Heater current limit (0xAE)

A drying cycle in which a limit is imposed on the amount of electric current supplied to the heater.

p) Tank drying (0xBF)

A cycle used to dry the tank.

q) Manufacturer original course (0xE0 to 0xEF)

A drying process defined by the manufacturer.

9.31.8 Washer and dryer cycle option list 1 property

Used to acquire a bitmap list of the washer and dryer cycle options that can be specified with the "washer and dryer cycle setting 1" property (0xD0) for the actual piece of equipment. If the value contained in a bit shown in Table 55 is "1", it means that the option represented by that bit is available. If the value is "0", it means that the option represented by that bit is not available.

Table 55 – washer and dryer cycle option list 1 property

	b7	b6	b5	b4	b3	b2	b1	b0
First byte	0x27	0x26	0x25	0x24	0x23	0x22	0x21	0x20
Second byte	0x2F	0x2E	0x2D	0x2C	0x2B	0x2A	0x29	0x28
Third byte	0x37	036	0x35	0x34	0x33	0x32	0x31	0x30
Fourth byte	0x3F	0x3E	0x3D	0x3C	0x3B	0x3A	0x39	0x38
Fifth byte	0x67	0x66	0x65	0x64	0x63	0x62	0x61	0x60
Sixth byte	0x6F	0x6E	0x6D	0x6C	0x6B	0x6A	0x69	0x68
Seventh byte	0x77	0x76	0x75	0x74	0x73	0x72	0x71	0x70
Eighth byte	0x7F	0x7E	0x7D	0x7C	0x7B	0x7A	0x79	0x78
Ninth byte	0xA7	0xA6	0xA5	0xA4	0xA3	0xA2	0xA1	0xA0
Tenth byte	0xAF	0xAE	0xAD	0xAC	0xAB	0xAA	0xA9	0xA8
Eleventh byte	0xB7	0xB6	0xB5	0xB4	0xB3	0xB2	0xB1	0xB0
Twelfth byte	0xBF	0xBE	0xBD	0xBC	0xBB	0xAB	0xB9	0xB8

9.31.9 Washer and dryer cycle option list 2 property

Used to acquire a bitmap list of the washer and dryer cycle options that can be specified with the "washer and dryer cycle setting 2" property (0xD1) for the actual piece of equipment. If the value contained in a bit shown in Table 56 is "1", it means that the option represented by that bit is available. If the value "0", it means that the option represented by that bit is not available.

Table 56 – Washer and dryer cycle option list 2 property

	b7	b6	b5	b4	b3	b2	b1	b0
First byte	0x27	0x26	0x25	0x24	0x23	0x22	0x21	0x20
Second byte	0x2F	0x2E	0x2D	0x2C	0x2B	0x2A	0x29	0x28
Third byte	0x37	036	0x35	0x34	0x33	0x32	0x31	0x30
Fourth byte	0x3F	0x3E	0x3D	0x3C	0x3B	0x3A	0x39	0x38

9.31.10 Washer and dryer cycle option list 3 property

Used to acquire a bitmap list of the washer and dryer cycle options that can be specified with the "drying cycle setting" property (0xD2) for the actual piece of equipment. If the value contained in a bit shown in Table 57 is "1", it means that the option represented by that bit is available. If the value is "0", it means that the option represented by that bit is not available.

Table 57 – Washer and dryer cycle option list 3 property

	b7	b6	b5	b4	b3	b2	b1	b0
First byte	0xA7	0xA6	0xA5	0xA4	0xA3	0xA2	0xA1	0xA0
Second byte	0xAF	0xAE	0xAD	0xAC	0xAB	0xAA	0xA9	0xA8
Third byte	0xB7	0xB6	0xB5	0xB4	0xB3	0xB2	0xB1	0xB0
Fourth byte	0xBF	0xBE	0xBD	0xBC	0xBB	0xAB	0xB9	0xB8

9.31.11 Water flow rate setting property

Used to specify or change, by selecting a level from the predefined levels, the water flow rate for the washer and dryer cycle option(s) specified with the "washer and dryer cycle setting 1" property (EPC = 0xD0) or with the "washer and dryer cycle setting 2" property (EPC = 0xD1) and the "drying cycle setting" property (EPC = 0xD2), and to acquire the current setting. Three water flow rate setting modes shall be available: "absolute setting", "automatic setting" and "relative setting" (relative to the automatic setting). When the actual piece of equipment cannot operate at the level specified with this property, the water flow rate to be used shall be implementation-dependent.

<Absolute setting>

It shall be possible to specify the water flow rate by selecting a level from the 16 levels in the 0x31 to 0x40 (lowest to highest) range and acquire the setting.

<Automatic setting; relative setting relative to the automatic setting>

0xFF shall be used for the "automatic setting" mode.

In relative setting in the positive direction, it shall be possible to specify the water flow rate by selecting a level from 8 levels (level 1 to level 8) in the 0xA0 to 0xA7 range. In relative setting in the negative direction, it shall be possible to specify the water flow rate by selecting a level from 8 levels (level 1 to level 8) in the 0xC0 to 0xC7 range.

9.31.12 "Rotation speed for spin drying" setting property

This property is used to specify or change the rotation speed for spin drying (in r/min.) for the washer and dryer cycle option(s) specified with the "washer and dryer cycle setting 1" property (EPC = 0xD0) or with the "washer and dryer cycle setting 2" property (EPC = 0xD1) and the "drying cycle setting" property (EPC = 0xD2), and to acquire the current setting. Three rotation speed setting modes shall be available: "absolute setting", "automatic setting" and "relative setting" (relative to the automatic setting). When the actual piece of equipment cannot operate at the speed specified with this property, the rotation speed to be used shall be implementation-dependent.

<Absolute setting>

It shall be possible to specify the rotation speed in the 0x0000 to 0x0FFF (0 r/min to 4 095 r/min.) range and acquire the setting.

<Automatic setting; relative setting relative to the automatic setting>

0xFFFF shall be used for the "automatic setting" mode.

In relative setting in the positive direction, it shall be possible to specify the rotation speed in the 0xA000 to 0xA7FF (1 r/min to 2 048 r/min.) range. In relative setting in the negative direction, it shall be possible to specify the rotation speed in the 0xC000 to 0xC7FF (1 r/min to 2 048 r/min.) range.

9.31.13 "Degree of drying" setting property

This property is used to specify or change, by selecting a level from the predefined levels, the degree of drying for the washer and dryer cycle option(s) specified with the "washer and dryer cycle setting 1" property (EPC = 0xD0) or with the "washer and dryer cycle setting 2" property (EPC = 0xD1) and the "drying cycle setting" property (EPC = 0xD2), and to acquire the current setting. Three drying level setting modes shall be available: "absolute setting", "automatic setting" and "relative setting" (relative to the automatic setting). When the actual piece of equipment cannot achieve the level specified with this property, the drying level to be used shall be implementation-dependent.

<Absolute setting>

It shall be possible to specify the degree of drying by selecting a level from the 16 levels in the 0x31 to 0x40 (lowest to highest) range and acquire the setting.

<Automatic setting; relative setting relative to the automatic setting>

0xFF shall be used for the "automatic setting" mode.

In relative setting in the positive direction, it shall be possible to specify the degree of drying by selecting a level from the 8 levels (level 1 to level 8) in the 0xA0 to 0xA7 range. In relative setting in the negative direction, it shall be possible to specify the degree of drying by selecting a level from the 8 levels (level 1 to level 8) in the 0xC0 to 0xC7 range.

9.31.14 Remaining washing time property

This property acquires the remaining washing time in the "hour (0x00 to 0xFE (0 to 254)): minute (0x00 to 0x3B (0 to 59))" format. The higher- and lower-order bytes shall be used for the "hour" and "minute" values, respectively. When the remaining time cannot be displayed because it is unknown, this property shall be set to "0xFF: 0xFF".

9.31.15 Remaining drying time

Acquires the remaining drying time in the "hour (0x00 to 0xFE (0 to 254)): minute (0x00 to 0x3B (0 to 59))" format. The higher- and lower-order bytes shall be used for the "hour" and "minute" values, respectively. When the remaining time cannot be displayed because it is unknown, this property shall be set to "0xFF: 0xFF".

9.31.16 Elapsed time on the ON timer property

When the "ON timer reservation setting" property contains the value for "reservation ON", this property is used to acquire the time elapsed on the ON timer after the ON timer is activated. The data format shall be "hour (0x00 to 0xFF (0 to 255)): minute (0x00 to 0x3B (0 to 59))".

9.31.17 Presoaking time setting property

This property is used to specify or change the duration of the presoaking process for the washer and dryer cycle option(s) specified with the "washer and dryer cycle setting 1" property (EPC = 0xD0) or by the "washer and dryer cycle setting 2" property (EPC = 0xD1) and the

"drying cycle setting" property (EPC = 0xD2), and to acquire the current setting. Three presoaking time setting modes shall be available: "absolute setting", "automatic setting" and "relative setting" (relative to the automatic setting). It is only required to implement the property values that are supported by the actual piece of equipment in which this class is implemented.

<Absolute setting>

The higher- and lower-order bytes shall be used for the "hour" and "minute" values, respectively.

It shall be possible to specify the presoaking time in the "0x00: 0x00 to 0x17: 0x3B (0 min to 23 h and 59 min)" range and acquire the setting. When the specified time is 0 min, the presoaking process will not be performed.

<Automatic setting; relative setting relative to the automatic setting>

"0xFF: 0xFF" shall be used for the "automatic setting" mode.

In relative setting in the positive direction, it shall be possible to specify the presoaking time in the 0xA000 to 0xA03B (1 min to 60 min) range. In relative setting in the negative direction, it shall be possible to specify the presoaking time in the 0xC000 to 0xC03B (1 min to 60 min) range.

9.31.18 Current stage of washer and dryer cycle property

This property is used to acquire the current stage of the washer and dryer cycle. It shall be possible to identify the following stages using the values shown:

Washing: 0x41

Rinsing: 0x42

Spin drying: 0x43

Suspended: 0x44

Washing completed: 0x45

Washing/drying (without wrinkling minimization) completed: 0x51

Drying:0x52

Wrinkling minimization: 0x53

Drying (with wrinkling minimization) completed: 0x54

Standing by to start: 0x61

1st rinsing: 0x71

2nd rinsing: 0x72

3rd rinsing: 0x73

4th rinsing: 0x74

5th rinsing: 0x75

6th rinsing: 0x76

7th rinsing: 0x77

8th rinsing: 0x78

1st spin drying: 0x81

2nd spin drying: 0x82

3rd spin drying: 0x83

4th spin drying: 0x84

5th spin drying: 0x85

6th spin drying: 0x86

7th spin drying: 0x87

8th spin drying: 0x88

Preheat spin drying: 0x91

In cases where it is possible to specify the number of times to repeat the rinsing process (i.e. 1st rinsing, 2nd rinsing, …), values between 0x71 and 0x78 shall be used. Otherwise, 0x42 shall be used. In cases where it is possible to specify the number of times to repeat the spin drying process (i.e. 1st spin drying, 2nd spin drying, …), values between 0x81 and 0x88 shall be used. Otherwise, 0x43 shall be used. In cases where a spin drying process is available in which warm air blows on the laundry while it is being dried, 0x91 shall be used for that spin drying process. The "standing by to start" stage shall include the "ON timer reservation ON" state.

The relationship between the property values of this property (Get) and the property values of the "washer and dryer setting" property (Get) (EPC = 0xB2) are as shown in Table 58.

Table 58 – Current stage of washer and dryer cycle property

"Current stage of washer and dryer cycle" property	"Washer and dryer setting" property (EPC = 0xB2)
Other than below	0x41: Washer and dryer cycle in progress
0x44: Suspended	0x42: Washer and dryer cycle suspended
0x45: Washing completed 0x51: Washing completed / drying (without wrinkling minimization) completed 0x54: Drying (with wrinkling minimization) completed 0x61: Standing by to start	0x43: Washer and dryer cycle stopped
0xE0 to 0xEF: Manufacturer original code	Current washing and drying operation status at the washing and drying transition state defined by the individual manufacturer

9.31.19 Water volume setting 1 property

Used to specify or change the water volume (in litres) for the washer and dryer cycle option(s) specified with the "washer and dryer cycle setting 1" property (EPC = 0xD0) or by the "washer and dryer cycle setting 2" property (EPC = 0xD1) and the "drying cycle setting" property (EPC = 0xD2), and to acquire the current setting. Three water volume setting modes shall be available: "absolute setting", "automatic setting" and "relative setting" (relative to the automatic setting). When the actual piece of equipment cannot handle the water volume specified with this property, the water volume to be used shall be implementation-dependent.

<Absolute setting>

It shall be possible to specify the water volume in the 0x00 to 0x7F (0 l to 127 l) range and acquire the setting.

<Automatic setting; relative setting relative to the automatic setting>

"0xFF" shall be used for the "automatic setting" mode.

In relative setting in the positive direction, it shall be possible to specify the water volume in the 0xA0 to 0xBF (1 l to 32 l) range. In relative setting in the negative direction, it shall be possible to specify the water volume in the 0xC0 to 0xDF (1 l to 32 l) range.

In cases where both the "water volume setting 1" and "water volume setting 2" properties are implemented, the property values shall be correlated.

9.31.20 Water volume setting 2 property

Used to specify or change the water volume for the washer and dryer cycle option(s) specified with the "washer and dryer cycle setting 1" property (EPC = 0xD0) or by the "washer and dryer cycle setting 2" property (EPC = 0xD1) and the "drying cycle setting" property (EPC = 0xD2), and to acquire the current setting. Three water volume setting modes shall be available: "absolute setting", "automatic setting" and "relative setting" (relative to the automatic setting). When the actual piece of equipment cannot handle the water volume specified with this property, the level to be used shall be implementation-dependent. It is only required to implement the property values that are supported by the actual piece of equipment in which this class is implemented.

<Absolute setting>

It shall be possible to specify the water volume by selecting a level from the 16 levels in the 0x31 to 0x40 (lowest to highest) range and acquire the setting.

<Automatic setting; relative setting relative to the automatic setting>

0xFF shall be used for the "automatic setting" mode.

In relative setting in the positive direction, it shall be possible to specify the water volume by selecting a level from the 8 levels (level 1 to level 8) in the 0xA0 to 0xA7 range. In relative setting in the negative direction, it shall be possible to specify the water volume by selecting a level from the 8 levels (level 1 to level 8) in the 0xC0 to 0xC7 range.

In cases where both the "water volume setting 1" and "water volume setting 2" properties are implemented, the property values for the "water volume setting 2" property shall be correlated with the property values for the "water volume setting 1" property.

9.31.21 Washing time setting property

This property is used to specify or change the duration of the washing process for the washer and dryer cycle option(s) specified with the "washer and dryer cycle setting 1" property (EPC = 0xD0) or by the "washer and dryer cycle setting 2" property (EPC = 0xD1) and the "drying cycle setting" property (EPC = 0xD2), and to acquire the current setting. Three washing time setting modes shall be available: "absolute setting", "automatic setting" and "relative setting" (relative to the automatic setting). It is only required to implement the property values that are supported by the actual piece of equipment in which this class is implemented.

<Absolute setting>

The higher- and lower-order bytes shall be used for the "hour" and "minute" values, respectively.

It shall be possible to specify the washing time in the "0x00: 0x00 to 0x17: 0x3B (0 min to 23 h and 59 min)" range and acquire the setting. When the specified time is 0 min, the washing process will not be performed.

<Automatic setting; relative setting relative to the automatic setting>

"0xFF: 0xFF" shall be used for the "automatic setting" mode.

In relative setting in the positive direction, it shall be possible to specify the washing time in the 0xA000 to 0xA03B (1 min to 60 min) range. In relative setting in the negative direction, it shall be possible to specify the washing time in the 0xC000 to 0xC03B (1 min to 60 min) range.

9.31.22 Number of times of rinsing property

This property is used to specify or change the number of times of rinsing for the washer and dryer cycle option(s) specified with the "washer and dryer cycle setting 1" property (EPC = 0xD0) or by the "washer and dryer cycle setting 2" property (EPC = 0xD1) and the "drying cycle setting" property (EPC = 0xD2), and to acquire the current setting. The number of times of rinsing shall be a number between 0 and 8. When 0 is selected, no rinsing will be performed. In cases where the number of times of rinsing is automatically determined by the actual piece of equipment, 0xFF shall be used as the property value. It is only required to implement the property values that are supported by the actual piece of equipment in which this class is implemented.

9.31.23 Rinsing process setting property

This property is used to specify or change the rinsing process(es) to use for the washer and dryer cycle option(s) specified with the "washer and dryer cycle setting 1" property (EPC = 0xD0) or by the "washer and dryer cycle setting 2" property (EPC = 0xD1) and the "drying cycle setting" property (EPC = 0xD2), and to acquire the current setting. Four bits shall be used for each rinsing process as specified below. It is only required to implement the property values that correspond to the rinsing processes supported by the actual piece of equipment in which this class is implemented.

Bits 0 through bit 3: 1st rinsing

Bits 4 through bit 7: 2nd rinsing

Bits 8 through bit 11: 3rd rinsing

Bits 12 through bit 15: 4th rinsing

Bits 16 through bit 19: 5th rinsing

Bits 20 through bit 23: 6th rinsing

Bits 24 through bit 27: 7th rinsing

Bits 28 through bit 31: 8th rinsing

Each set of bits shall contain one of the following values:

0000: No mode specified

0001: Rinsing without additional supply of water from the tap

0010: Rinsing with additional supply of water from the tap

0011: Shower rinsing

The MSB of the first byte shall be bit 31 and the LSB of the fourth byte shall be bit 0.

9.31.24 Spin drying time setting property

This property is used to specify or change the duration of the spin drying process for the washer and dryer cycle option(s) specified with the "washer and dryer cycle setting 1" property (EPC = 0xD0) or by the "washer and dryer cycle setting 2" property (EPC = 0xD1) and the "drying cycle setting" property (EPC = 0xD2), and to acquire the current setting. Three spin drying time setting modes shall be available: "absolute setting", "automatic setting" and "relative setting" (relative to the automatic setting). It is only required to implement the property values that are supported by the actual piece of equipment in which this class is implemented.

<Absolute setting>

It shall be possible to specify the spin drying time in the 0x00 to 0x3B (0 min to 59 min) range and acquire the setting.

<Automatic setting; relative setting relative to the automatic setting>

"0xFF" shall be used for the "automatic setting" mode.

In relative setting in the positive direction, it shall be possible to specify the spin drying time in the 0xA0 to 0xBF (1 min to 32 min) range. In relative setting in the negative direction, it shall be possible to specify the spin drying time in the 0xC0 to 0xDF (1 min to 32 min) range.

9.31.25 Drying time setting property

This property is used to specify or change the duration of the drying process for the washer and dryer cycle option(s) specified with the "washer and dryer cycle setting 1" property (EPC = 0xD0) or by the "washer and dryer cycle setting 2" property (EPC = 0xD1) and the "drying cycle setting" property (EPC = 0xD2), and to acquire the current setting. Three drying time setting modes shall be available: "absolute setting", "automatic setting" and "relative setting" (relative to the automatic setting). It is only required to implement the property values that are supported by the actual piece of equipment in which this class is implemented.

<Absolute setting>

The higher- and lower-order bytes shall be used for the "hour" and "minute" values, respectively.

It shall be possible to specify the drying time in the "0x00: 0x00 to 0x17: 0x3B (0 min to 23 h and 59 min)" range and acquire the setting. When the specified drying time is 0 min, the drying process will not be performed.

<Automatic setting; relative setting relative to the automatic setting>

"0xFF: 0xFF" shall be used for the "automatic setting" mode.

In relative setting in the positive direction, it shall be possible to specify the drying time in the 0xA000 to 0xA03B (1 min to 60 min) range. In relative setting in the negative direction, it shall be possible to specify the drying time in the 0xC000 to 0xC03B (1 min to 60 min) range.

9.31.26 Warm water setting property

This property is used to specify whether to use warm water in the washing process for the washer and dryer cycle option(s) specified with the "washer and dryer cycle setting 1" property (EPC = 0xD0) or by the "washer and dryer cycle setting 2" property (EPC = 0xD1) and the "drying cycle setting" property (EPC = 0xD2) or specify/change the temperature of the warm water (in degrees Celsius) in cases where it is specified to use warm water, and to acquire the current setting. The warm water temperature shall be between 0 °C and 100 °C. When the value is 0xFE, it shall mean that warm water is not used. When the value is 0xFF, it shall mean that the warm water temperature is automatically set. When the actual piece of equipment cannot achieve the temperature specified with this property, the warm water temperature to be used shall be implementation-dependent.

9.31.27 Bathtub water recycle setting property

This property is used to specify whether to use used bathtub water for the washer and dryer cycle option(s) specified with the "washer and dryer cycle setting 1" property (EPC = 0xD0) or by the "washer and dryer cycle setting 2" property (EPC = 0xD1) and the "drying cycle setting" property (EPC = 0xD2) or select/reselect the process(es) in which used bathtub water is to be used in cases where it is specified to use bathtub water, and to acquire the current setting.

The property values shall be as follows:

Bathtub water not used = 0x40

Use bathtub water for washing only = 0x41

Use bathtub water for rinsing only (excluding the final rinsing process) = 0x42

Use bathtub water for all rinsing processes = 0x43

Use bathtub water for washing and rinsing (excluding the final rinsing process) = 0x44

Use bathtub water for washing and all rinsing processes = 0x45

9.31.28 Wrinkling minimization setting property

This property is used to specify whether or not to use the wrinkling minimization function after completion of the drying process for the washer and dryer cycle option(s) specified with the "washer and dryer cycle setting 1" property (EPC = 0xD0) or by the "washer and dryer cycle setting 2" property (EPC = 0xD1) and the "drying cycle setting" property (EPC = 0xD2), and to change or acquire the current setting. 0x41 shall be used when the wrinkling minimization function is to be used and 0x42 shall be used when the wrinkling minimization function is not to be used.

9.31.29 Time remaining to complete washer and dryer cycle property

This property is used to acquire the time remaining to complete the current washer and dryer cycle in the "hour (0x00 to 0xFE (0 to 254)): minute (0x00 to 0x3B (0 to 59))" format. The higher- and lower-order bytes shall be used for the "hour" and "minute" values, respectively. When the time remaining to complete the washer and dryer cycle is unknown and cannot be displayed, "0xFF: 0xFF" shall be used.

9.31.30 Door/cover lock setting property

This property is used to specify the state of the door/cover during operation (i.e. locked or unlocked) and to acquire the current setting. 0x41 and 0x42 shall be used for the "locked" and "unlocked" states, respectively.

9.31.31 Washer and dryer cycle property

This property is used to acquire the current washer and dryer cycle setting that has been specified with the "washer and dryer cycle setting 1" property (EPC = 0xD0) or by the "washer and dryer cycle setting 2" property (EPC = 0xD1) and the "drying cycle setting" property (EPC = 0xD2) and to which the settings specified with the following properties have been applied.

Presoaking time setting (EPC = 0xE1)

Water volume setting 1 (EPC = 0xE3)

Water volume setting 2 (EPC = 0xE4)

Washing time setting (EPC = 0xE5)

Number of times of rinsing setting (EPC = 0xE6)

Rinsing process setting (EPC = 0xE7)

Spin drying time setting (EPC = 0xE8)

Drying time setting (EPC = 0xE9)

Warm water setting (EPC = 0xEA)

Bathtub water recycle setting (EPC = 0xEB)

Wrinkling minimization setting (EPC = 0xEC)

Water flow rate setting (EPC = 0xD6)

Rotation speed for spin drying setting (EPC = 0xD7)

Degree of drying setting (EPC = 0xD8)

The first and second bytes comprise a bitmap list of the properties whose values may be obtained when applicable. When the value contained in a bit is "1", it shall mean that the setting specified with the property represented by that bit is effective and can be obtained with this property.

Bit 0: Presoaking

Bit 1: Washing time setting

Bit 2: Number of times of rinsing setting

Bit 3: Rinsing process setting

Bit 4: Spin drying time setting

Bit 5: Drying time setting

Bit 6: Warm water setting

Bit 7: Water volume setting 1

Bit 8: Water volume setting 2

Bit 9: Bathtub water recycle setting

Bit 10: Water flow rate setting

Bit 11: Rotation speed for spin drying setting

Bit 12: Degree of drying setting

Bit 13: Presoaking time setting

Bit 14: Wrinkling minimization setting

Bit 15: Reserved for future use.

The third byte indicates whether or not to use the presoaking process. 0x41 shall mean that the presoaking process is used and 0x42 shall mean that the presoaking process is not used. When the value contained in the third byte is 0x41 and bit 13 of the set of the first and second bytes contains "1" (= effective), the 22nd and 23rd bytes shall contain an appropriate value.

The fourth and fifth bytes indicate the washing time specified. This value shall be identical to the value of the "washing time setting" property.

The sixth byte indicates the number of times of rinsing specified. This value shall be identical to the value of the "number of times of rinsing setting" property.

The seventh through tenth bytes indicate the rinsing process(es) specified. This value shall be identical to the value of the "rinsing process setting" property.

The eleventh byte indicates the spin drying time specified. This value shall be identical to the value of the "spin drying time setting" property.

The twelfth and thirteenth bytes indicate the drying time specified. This value shall be identical to the value of the "drying time setting" property.

The fourteenth byte indicates the warm water setting specified. This value shall be identical to the value of the "warm water setting" property.

The fifteenth byte indicates the water volume specified with the "water volume setting 1" property. This value shall be identical to the value of the "water volume setting 1" property.

The sixteenth byte indicates the water volume specified with the "water volume setting 2" property. This value shall be identical to the value of the "water volume setting 2" property.

The seventeenth byte indicates the bathtub water recycle setting specified. This value shall be identical to the value of the "bathtub water recycle setting" property.

The eighteenth byte indicates the water flow rate specified. This value shall be identical to the value of the "water flow rate setting" property.

The nineteenth and twentieth bytes indicate the rotation speed specified for spin drying. This value shall be identical to the value of the "'rotation speed for spin drying' setting" property.

The twenty-first byte indicates the degree of drying specified. This value shall be identical to the value of the "degree of drying setting" property.

The twenty-second and twenty-third bytes indicate the presoaking time specified. This value shall be identical to the value of the "presoaking time setting" property. When the presoaking time setting is effective and bit 0 of the set of the first and second bytes contains "1" (effective), the third byte shall contain the appropriate value.

The twenty-fourth byte indicates the wrinkling minimization setting specified. This value shall be identical to the value of the "wrinkling minimization setting" property.

9.31.32 ON timer reservation setting property

This property is used to specify whether or not to use the ON timer-based reservation function (i.e. reservation ON or reservation OFF), and to acquire the current setting. The property value shall be 0x41(reservation ON) or 0x42 (reservation OFF). This property is used in combination with the "ON timer setting" or "relative time-based ON timer setting" property.

9.31.33 ON timer setting property

When the value of the "ON timer reservation setting" property is "reservation ON", this property is used to specify the time when the value of the "washer and dryer setting" property (EPC = 0xB2) will change to "start" (0x41) or the time when the value of the "current stage of washer and dryer cycle" property (EPC = 0xE2) will change to "washing completed" (0x45), "washing/drying (without wrinkling minimization) completed" (0x51) or "drying (with wrinkling minimization) completed" (0x54), 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.

9.31.34 Relative time-based ON timer setting

When the value of the "'ON timer reservation' setting" property is "reservation ON", this property is used to specify the time when the value of the "washer and dryer setting" property (EPC = 0xB2) will change to "start" (0x41) or the time when the value of the "current stage of washer and dryer cycle" property (EPC = 0xE2) will change to "washing completed" (0x45), "washing/drying (without wrinkling minimization) completed" (0x51) or "drying (with wrinkling minimization) completed" (0x54), in terms of a 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.

9.32 Clothes dryer class specifications

9.32.1 General

The control commands of "clothes dryer" are shown in Table 59.

Class group code   : 0x03

Class code   : 0xC6

Table 59 – List of clothes dryer 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.	unsigned char	1 byte	—	Set		○	
		ON = 0x30 ,=OFF31				Get	○		
Door/ cover open/ close status	0xB0	Indicates the status of the door or cover as to whether it is open or closed.	unsigned char	1 byte	—	Get			
		Door/cover open = 0x41							
		Door/cover closed = 0x42							
Drying setting	0xB2	Drying setting	unsigned char	1 byte	—	Set/ Get			
		Start/restart drying = 0x41,							
		Suspend drying = 0x42,							
		Stop drying = 0x43							
Drying status	0xE1	Drying status	unsigned char	1 byte	—	Get			
		Drying in progress = 0x41							
		Drying suspended = 0x42							
		Drying completed/stopped = 0x43							
Remaining drying time	0xE6	Indicates the remaining drying time in the "HH:MM:SS" format.	unsigned char ×3	3 bytes	—	Get			
		0 to 0x17: 0 to 0x3B: 0 to 0x3B							
		(= 0 to 23): (= 0 to 59): (= 0 to 59)							
ON timer reservation setting	0x90	Reservation ON/OFF	unsigned char	1 byte	—	Set/ Get			
		Reservation ON = 0x41							
		Reservation OFF = 0x42							
ON timer setting	0x91	Timer value HH:MM	unsigned char ×2	2 bytes	—	Set/ Get			
		0 to 0x17: 0 to 0x3B							
		(= 0 to 23): (= 0 to 59)							
Relative time-based ON timer setting	0x92	Timer value HH:MM	unsigned char ×2	2 bytes	—	Set/ Get			
		0 to 0x17: 0 to 0x3B							
		(= 0 to 23): (= 0 to 59)							

9.32.2 Operation status property

This property indicates the ON/OFF status of the clothes dryer (i.e. the status as to whether the clothes dryer is waiting for the user operation to instruct it to start drying operation or performing drying operation (ON) or not (OFF)).

9.32.3 Door/cover open/close status property

This property indicates whether the door or cover of the clothes dryer is open or closed.

0x41 shall be used for the "open" state and 0x42 shall be used for the "closed" state.

9.32.4 Drying setting property

This property specifies what the clothes dryer is instructed to do (start/restart drying = 0x41, suspend drying = 0x42, stop drying = 0x43).

9.32.5 Drying status property

This property indicates the status of the clothes dryer's drying operation (drying in progress = 0x41, drying suspended = 0x42, drying completed/stopped = 0x43).

9.32.6 Remaining drying time property

This property indicates the remaining drying time in the "hour (0x00 to 0x17 (0 to 23)): minute (0x00 to 0x3B (0 to 59)): second (0x00 to 0x3B (0 to 59))" format, with the higher-order, intermediate-order and lower-order bytes used for the "hour", "minute" and "second" values, respectively.

9.32.7 ON timer reservation setting property

This property specifies whether the reservation function for drying operation is ON or OFF. This property shall be related to the "ON timer setting" or "relative time-based ON timer setting" property. The property value for "reservation function ON" shall be 0x41 and the property value for "reservation function OFF" shall be 0x42.

9.32.8 ON timer setting property

This property indicates, when the setting of the "ON timer reservation setting" property is "ON", the time at which the setting of the "drying setting" property becomes "start drying" or the setting of the "drying status" property becomes "drying completed". 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.

9.32.9 Relative time-based ON timer setting property

When the setting of the "ON timer reservation setting" property is "ON", this property indicates, in terms of a relative time ("hour (0x00 to 0x17 (0 to 23)): minute (0x00 to 0x3B (0 to 59))" format) relative to the current time, the time at which the setting of the "drying setting" property becomes "start drying" or the setting of the "drying status" property becomes "drying completed. The higher- and lower-order bytes shall be used for the "hour" and "minute" values, respectively.

9.33 Cooking heater class specifications

9.33.1 General

The control commands of "cooking heater" are shown in Table 60.

Class group code   : 0x03
Class code   : 0xB9

Table 60 – List of cooking 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.	unsigned char	1 byte	–	Set			
		ON = 0x30, OFF = 0x31				Get	O		
Heating status	0xB1	Heating status of the left stove: heating status of the right stove: heating status of the far-side stove: heating status of the roaster.	unsigned char × 4	1 byte × 4	–	Get	O		
		Standing by: 0x40 Operating: 0x41 Temporarily stopped: 0x42 Heating prohibited: 0x50 Unknown: 0xFF							
Heating setting	0xB2	Left stove setting: right stove setting: far-side stove setting: roaster setting	unsigned char	1 byte	–	Set/Get			
		Stop heating: 0x40							
		Start/resume heating: 0x41							
		Temporarily stop heating: 0x42							
		No setting: 0xFF							
All stop setting	0xB3	Used to stop the heating on all stoves which are the left stove, right stove, far-side stove and roaster.	unsigned char	1 byte	–	Set			
		Stop the heating on all of the left stove, right stove, far-side stove and roaster: 0x40							
Heating power setting	0xE7	Heating power of the left stove: heating power of the right stove: heating power of the far-side stove: heating power of the roaster	unsigned char × 4	2 bytes × 4	W Or Level Or –	Set/Get			
		When the heating powers are specified in terms of output wattage (0 W to 10 000 W): 0x0000 to 0x2710.							
		When the heating powers are specified in terms of level (17 levels): 0x3000 to 0x3010							
		When the heating powers are specified in terms of the state of flame: Very low flame: 0x4002 Low flame: 0x4004 Medium flame: 0x4006 High flame: 0x4008 High power: 0x400a No setting: 0xFFFF							

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Heating temperature setting	0xE3	Left stove temperature setting: right stove temperature setting: far-side stove temperature setting	unsigned char × 3	1 byte × 3	°C	Set/Get			
		Temperature setting: 0x32 to 0xFA (50 °C to 250 °C)							
		No setting: 0xFF							
Heating modes of stoves setting	0xE0	Heating mode of the left stove: heating mode of the right stove: heating mode of the far-side stove	unsigned char × 3	1 byte × 3	–	Set/Get			
		Heating power control mode: 0x41							
		Deep-frying mode (tempura, etc.): 0x42							
		Water heating mode: 0x43							
		Rice boiling mode: 0x44							
		Stir-frying mode: 0x45							
		No setting: 0xFF							
Relative time settings of OFF timers	0x96	Relative time setting of the left stove OFF timer: relative time setting of the right stove OFF timer: relative time setting of the far-side stove OFF timer: relative time setting of the roaster OFF timer	unsigned char × 3 × 4	1 byte × 3 × 4	–	Set/Get			
		Used to set the relative time settings of the OFF timers (in the HH:MM:SS format), activate the relevant timers and acquire the updated current relative time settings of the OFF timers.							
		(0 to 0x17: 0 to 0x3B: 0 to 0x3B) × 4							
		(= 0 to 23): (= 0 to 59): (= 0 to 59)							
		No setting: 0XFFFFFF							
Child lock setting	0xA1	Child lock ON/OFF setting	unsigned char	1 byte	–	Set/Get			
		Child lock OFF: 0x40							
		Child lock ON: 0x41							
Radiant heater lock setting	0xA2	Radiant heater lock ON/OFF	unsigned char	1 byte	–	Set/Get			
		Radiant heater lock OFF: 0x40							
		Radiant heater lock ON: 0x41							

9.33.2 Operation status property

This property indicates whether this object is ready to accept control commands (ON state) or not (OFF state).

The values "0x30" and "0x31" shall be assigned to the ON and OFF states, respectively.

In the case of a node implemented with this class in which this class becomes ready to accept control commands as soon as the node starts operating, this property may be implemented with the property value fixed at "0x30". When the property value is "0x31" (OFF), values acquired with other properties are not guaranteed, unless specified otherwise in this standard.

9.33.3   Heating status property

This property indicates the heating statuses of the cooking heater's left stove, right stove, far-side stove and roaster.

Each of the states described below shall be assigned with the indicated value:

"Standing by" state (i.e. a state whereby the cooking heater is not operating): 0x40

"Operating" state: 0x41

"Temporarily stopped" state (i.e. a state whereby the cooking heater is operating but the heating is temporarily stopped): 0x42

"Heating prohibited" state (i.e. a state whereby the cooking heater is prohibited from starting to operate): 0x50

"Unknown" (i.e. It is not clear what state the cooking heater is in.): 0xFF

The heating statuses of the left stove, right stove, far-side stove (the "left stove", "right stove" and "far-side stove" are the stoves located on the left, right and far sides, respectively, as seen from the front) and roaster shall be indicated in the stated order using 4 bytes. For example, if the status of the left stove is "Operating" and the statuses of the right stove, far-side stove and roaster are "Standing by", the property value is "0x41404040". The example of stove structure is shown in Figure 59.
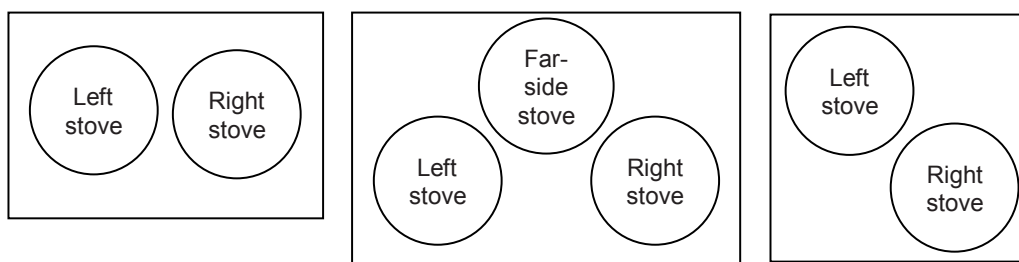
IEC   2466/13

Figure 59 – Stove

9.33.4   Heating setting property

This property sets the heating operation settings of the cooking heater's left stove, right stove, far-side stove and roaster.

The property values "0x40", "0x41", "0x42" and "0xFF" shall be assigned to "Stop heating", "Start/resume heating", "Temporarily stop heating" and "No setting", respectively.

This property acquires the current settings.

The heating settings of the left stove, right stove, far-side stove (the "left stove", "right stove" and "far-side stove" are the stoves located on the left, right and far sides, respectively, as seen from the front) and roaster shall be indicated in the stated order using 4 bytes. For example, in the case of a SET to set only the left stove to "Start /resume heating", the property value is "0x41FFFFFF". If a stove or the roaster is set to a value other than "0xFF" and then to "0xFF", the setting of the stove or roaster acquired by a GET on this property will be the value before the stove or roaster was set to "0xFF". For example, if the property is first set to "0x41FFFFFF" and then to "0xFF41FFFF", the GET value will be "0x4141FFFF".

9.33.5 "All stop" setting Property

This property stops the heating on all of the cooking heater's left stove, right stove, far-side stove and roaster.

The property value for stopping the heating on all of the cooking heaters' left stove, right stove, far-side stove and roaster shall be "0x40".

In the case where a "mobile service" is to be supported, the implementation of this property is mandatory.

9.33.6 Heating power setting property

This property sets the heating power settings of the cooking heater's stoves and roaster.

In the case where the heating powers are specified in terms of output wattage (in watts), values in the "0x0000 to 0x2710" (0 W to 10 000 W) range shall be used.

In the case where the heating powers are specified in terms of power level, 17 power levels shall be provided and values between 0x3000 and 0x3010 shall be used. The states that correspond to the 17 levels may be defined freely, as long as the values "0x3000" and "0x3010" are assigned to the states in which the heating power is lowest and highest, respectively. The state that corresponds to "0x3000" shall be the state in which the heating power is lowest, and shall not be a state in which the heating power is 0.

In the case where the heating powers are specified in terms of the state of flame, each of the states described below shall be assigned with the indicated value.

Very low flame: 0x4002, low flame: 0x4004, medium flame: 0x4006, high flame: 0x4008, high power: 0x400A, no setting: 0xFFFF.

The heating power settings of the left stove, right stove, far-side stove (the "left stove", "right stove" and "far-side stove" are the stoves located on the left, right and far sides, respectively, as seen from the front) and roaster shall be indicated in the stated order using 8 bytes. For example, the property value in the case where the left stove is set to "high flame", the right stove is set to "very low flame" and the heating powers of the far-side stove and roaster are not specified is "0x4008 4002 FFFF FFFF".

This property acquires the current heating power settings of the cooking heater. The heating power settings of the cooking heater in the case where the device cannot achieve the values set in this property shall be implementation-dependent.

9.33.7 Heating temperature setting property

This property sets the heating temperature settings of the stoves of the cooking heater (in degrees Celsius). A GET on this property acquires the current heating temperature settings of the stoves. The value range shall be 0x32 to 0xFA (50 °C to 250 °C). The value "0xFF" indicates that the setting is not set.

The heating temperature settings of the left stove, right stove and far-side stove (the "left stove", "right stove" and "far-side stove" are the stoves located on the left, right and far sides, respectively, as seen from the front) shall be indicated in the stated order using 3 bytes. For example, the property value, in the case where the heating temperature setting of the left stove is 180 °C and the heating temperature settings of the right and far-side stoves are not set, is "0xB4FFFF".

9.33.8 "Heating modes of stoves" setting property

This property sets the heating modes of the left stove, right stove (the "left" and "right" stoves are the stoves located in the left and right, respectively, as seen from the front) and far-side stove.

This property acquires the current heating mode settings of the stoves.

Each of the modes described below shall be assigned with the indicated value:

Heating power control mode (i.e. a mode in which the operation is controlled using heating power values that can be set through EPC = 0xE7): 0x41.

Deep-frying mode (tempura, etc.) (i.e. a mode for cooking deep fries (tempura, etc.) using heating temperature values that can be set through EPC = 0xE3): 0x42.

Water heating mode: 0x43, rice boiling mode: 0x44, stir-frying mode (i.e. a heating mode suitable for cooking stir fries): 0x45.

No setting: 0xFF

The heating mode settings of the left stove, right stove and far-side stove (the "left stove", "right stove" and "far-side stove" are the stoves located on the left, right and far sides, respectively, as seen from the front) shall be indicated in the stated order using 3 bytes. For example, the property value in the case where the heating mode settings of the left and right stoves are "heating power control mode" and the heating mode setting of the far-side stove is not set, is "0x4141FF".

9.33.9 Relative time settings of OFF timers' property

This property sets the relative time settings of the left stove OFF timer, right stove OFF timer, far-side stove OFF timer and roaster OFF timer of the cooking heater.

This property acquires the updated relative time settings of the stove OFF timers and roaster OFF timer.

The format for the settings shall be "hour (0x00 to 0x17 (0 to 23)): minute (0x00 to 0x3B (0 to 59)): second (0x00 to 0x3B (0 to 59))".

The relative time settings of the left stove, right stove and far-side stove (the "left stove", "right stove" and "far-side stove" are the stoves located on the left, right and far sides, respectively, as seen from the front) OFF timers and the roaster OFF timer shall be indicated in the stated order using 12 bytes. For example, the property value in the case where the relative time setting of the left stove OFF timer is 1 h and 10 min is "0x01 0A 00 FF FF FF FF FF FF FF FF FF".

The operation of the actual device in the case where a property value of the actual device implemented does not support this class (e.g. a property value that is above the upper limit of the OFF timer setting range for the actual device implemented with this class) is implementation-dependent.

9.33.10 Child lock setting property

This property sets the child lock setting of the cooking heater.

This property acquires the current child lock setting of the cooking heater.

The property values "0x40" and "0x41" shall be assigned to the child lock OFF (deactivated) and ON states, respectively.

9.33.11 Radiant heater lock setting property

This property sets the radiant heater lock setting of the cooking heater.

This property acquires the current radiant heater lock setting of the cooking heater.

The property values "0x40" and "0x41" shall be assigned to the radiant heater lock OFF and ON states, respectively.

9.34 Switch class specifications

9.34.1 General

The control commands of "switch class" are shown in Table 61.

Class group code   : 0x05
Class code   : 0xFD

Table 61 – List of switch properties

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Operation status	0x80	Indicates the ON/OFF status.	unsigned char	1 byte	—	Set	○	○	
		ON = 0x30 OFF = 0x31				Get	○		
Connected device	0xE0	Name of the device to connect to.	unsigned char	12 bytes	—	Set			
		Stores the name of the type of the device.				Get			

9.34.2 Operation status property

This property indicates whether the functions specific to this class are operating (ON) or not (OFF). In the case of Get, the status of the M signal of the HA terminal shall be reflected. In the case of Set, the set value shall be compared with the value of the M signal of the HA terminal, and if they are different, the prescribed pulse shall be output (C signal of the HA terminal).

9.34.3 Connected device property

This property stores the name of the type of the device to connect to in the form of an ASCII code. This value shall be stored in a non-volatile memory.

(Refer to the explanation about the "product code" property.)

10 Property map description format

When there are fewer than 16 properties, description format 1 below is followed, when there are 16 properties or more, description format 2 is followed.

Description format 1

Byte 1: Number of properties. Displayed in binary.

Byte 2 and higher: List of property codes (1-byte code).

Description format 2

Byte 1: Number of properties. Displayed in binary.

Bytes 2–17: In the 16-byte format shown in Table 62, the bit location showing existing property codes is set to 1, and properties are listed in order starting with byte 2.

Table 62 – Property map description format

	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
Byte 2	80	90	A0	B0	C0	D0	E0	F0
Byte 3	81	91	A1	B1	C1	D1	E1	F1
Byte 4	82	92	A2	B2	C2	D2	E2	F2
Byte 5	83	93	A3	B3	C3	D3	E3	F3
Byte 6	84	94	A4	B4	C4	D4	E4	F4
Byte 7	85	95	A5	B5	C5	D5	E5	F5
Byte 8	86	96	A6	B6	C6	D6	E6	F6
Byte 9	87	97	A7	B7	C7	D7	E7	F7
Byte 10	88	98	A8	B8	C8	D8	E8	F8
Byte 11	89	99	A9	B9	C9	D9	E9	F9
Byte 12	8A	9A	AA	BA	CA	DA	EA	FA
Byte 13	8B	9B	AB	BB	CB	DB	EB	FB
Byte 14	8C	9C	AC	BC	CC	DC	EC	FC
Byte 15	8D	9D	AD	BD	CD	DD	ED	FD
Byte 16	8E	9E	AE	BE	CE	DE	EE	FE
Byte 17	8F	9F	AF	BF	CF	DF	EF	FF

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